



**WOOD BUFFALO  
ENVIRONMENTAL ASSOCIATION**

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**Wood Buffalo Environmental Association**

**NOVEMBER 2023  
MONTHLY REPORT**

CONTINUOUS MONITORING

December 22, 2023

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





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December 22, 2023

Director, Environmental Monitoring and Evaluation Branch  
Alberta Environment and Protected Areas  
11<sup>th</sup> Floor, Oxbridge Place  
9820 106 Street  
Edmonton, Alberta T5K 2J6

**RE: Monthly Ambient Air Quality Monitoring Report November 2023  
Wood Buffalo Environmental Association**

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Enclosed is the November 2023 Ambient Air Quality Monitoring Report for the continuous ambient air quality monitoring stations of the Wood Buffalo Environmental Association (WBEA) regional air quality monitoring network.

The continuous ambient air quality monitoring network stations are:

AMS01 - Bertha Ganter - Fort McKay	AMS19 - Firebag
AMS02 - Mildred Lake	AMS20 - MacKay River
AMS03 - Lower Camp (Meteorology)	AMS21 - Conklin
AMS04 - Buffalo Viewpoint	AMS22 - Janvier
AMS05 - Mannix	AMS23 - Fort Hills
AMS06 - Patricia McInnes	AMS25 - Waskōw ohci Pimâtisiwin
AMS07 - Athabasca Valley	AMS26 - Christina Lake
AMS08 - Fort Chipewyan	AMS27 - Jackfish 2/3
AMS09 - Barge Landing	AMS29 - Surmont 2
AMS11 - Lower Camp (Air Quality)	AMS30 - Ells River
AMS13 - Fort McKay South	AMS501 - Liesmer
AMS14 - Anzac	AMS505 - Sawbones Bay
AMS17 - Wapasu	AMS507 - Kirby South
AMS18 - Stony Mountain	AMS511 - Blackgold

The WBEA submits this report on behalf of its members and for some members to satisfy the requirements contained in their EPEA Approvals (as amended):



**Industry Operators**

Athabasca Oil Corporation  
Canadian Natural

**EPEA Approval No.**

289664-00-00; 241311-00-00  
149968-01-00; 153125-01-00;  
20809-02-00; 224816-01-00; 228044-00-00;  
237382-00-00

Cenovus Energy Inc.

48522-01-00

ChemTrade Logistics

404827-00-00

CNOOC International

137467-01-00; 236394-00-00

Connacher Oil and Gas Ltd.

240008-00-00

ConocoPhillips

48263-01-00

Fort Hills Energy Corporation

151469-01-00

Hammerstone Corporation

189942-00-00

Harvest Operations Corp.

246984-01-00

H.J. Baker Sulphur Canada ULC

426549-00-00

Husky Oil Operations Ltd.

206355-01-00

Imperial Oil Ltd.

00046586-00-00

Inter Pipeline Ltd.

73203-02-00

Keyera Energy Ltd.

187-03-00

MEG Energy Corp.

00216466-01-00

Parsons Creek Aggregates

231302-00

PetroChina Canada Ltd.

254465-00-00

Suncor Energy Inc.

094-02-00; 80105-01-00

Sunshine Oilsands Ltd.

305529-00-00

Surmont Energy

318401-00-00

Syncrude Canada Ltd.

026-02-00

Titan Tire Reclamation Corporation

364232-00-00

**Government and Non-Government Organizations**

Alberta Energy Regulator

Health Canada

Alberta Environment and Protected Areas

Keyano College

Alberta Health

Parks Canada

Alberta Health Services

Regional Municipality of Wood Buffalo

Environment and Climate Change Canada

**Indigenous Communities**

Athabasca Chipewyan First Nation

Fort McKay First Nation

Chard Métis Nation

Fort McMurray 468 First Nation

Chipewyan Prairie Dene First Nation

Fort McKay Métis

Christina River Dene Nation Council

Lakeland Métis

Conklin Resource Development Advisory  
Council

McMurray Métis

Mikisew Cree First Nation

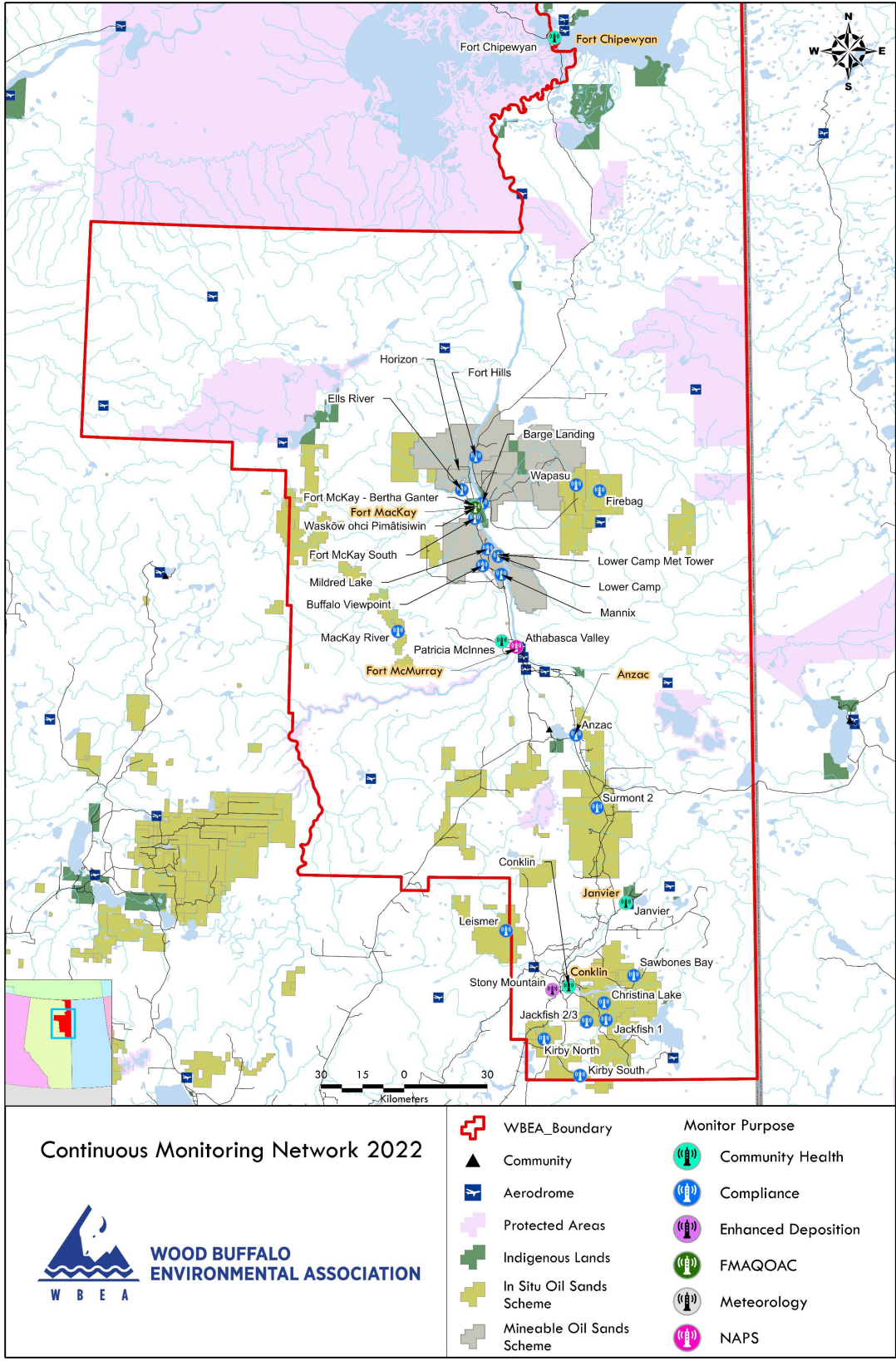


Figure 1: Map of WBEA Continuous Monitoring Network

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

## 1.0 Concentrations in Excess of Alberta Ambient Air Quality Guidelines and Objectives

There were no ambient concentrations in excess of the Alberta Ambient Air Quality Objectives or Guidelines (AAAQO/AAAQG) as indicated in the Air Monitoring Directive Section RC 15-F for CO, Dustfall NH<sub>3</sub>, NO<sub>2</sub>, O<sub>3</sub>, PM<sub>2.5</sub>, SO<sub>2</sub>, TRS, and TSP.

There were nine ground-level concentrations in excess of the 1-hour H<sub>2</sub>S objective reported to AEPA; following data validation and processing, seven exceedances were confirmed.

There was one ground-level concentration in excess of the 24-hour H<sub>2</sub>S objective reported to AEPA; following data validation and processing, this exceedance was confirmed.

Site	Parameter	Date / Time	Reference	Period	Reported	Final	Status*
Lower Camp	H2S	7Nov23, 19:00	421724	1-hr	10	9.3	nae
Lower Camp	H2S	7Nov23, 20:00	421725	1-hr	23	22.8	exc
Lower Camp	H2S	7Nov23, 24:00	421727	24-hr	3	3.3	exc
Lower Camp	H2S	9Nov23, 07:00	421782	1-hr	10	9.5	nae
Lower Camp	H2S	14Nov23, 08:00	421919	1-hr	17	16.3	exc
Lower Camp	H2S	14Nov23, 19:00	421919	1-hr	13	12.7	exc
Lower Camp	H2S	15Nov23, 17:00	422000	1-hr	30	29.8	exc
Mildred Lake	H2S	19Nov23, 05:00	422156	1-hr	12	12.3	exc
Mildred Lake	H2S	19Nov23, 06:00	422158	1-hr	10	9.6	nae
Buffalo Viewpoint	H2S	26Nov23, 07:00	422396	1-hr	12	11.8	exc

\*status legend:

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

## 2.0 Data Processing and Validation

Concentrations reported in near real-time are raw values. The final values are determined after processing data for reporting. For all parameters, except PM<sub>2.5</sub>, the final 5-minute data values are determined by subtracting the daily zero responses, interpolated to the time of each raw 5-minute value, from the raw 5-minute data values. The PM<sub>2.5</sub> analyzers do not have the capability of performing zero's, therefore, the raw 5-minute values are validated through a comparison with associated parameters at the same, or a nearby, AMS. The final 5-minute data values are then rounded to one decimal place greater than the reporting precision indicated in the Air Monitoring Directive (AMD). The final 1-hour data values are calculated from

final 5-minute data values and then rounded to reporting precision. The final 24-hour data values are calculated from final 1-hour values.

After data processing and validation, NO<sub>2</sub> concentrations are re-calculated from baseline-corrected NO<sub>x</sub> and NO concentrations. Specifically, the NO concentration is subtracted from the NO<sub>x</sub> concentration to determine the NO<sub>2</sub> concentration.

## 2.1 Revisions to ETS Electronic Transfer System – Data and Monthly Reports

There were no revisions to historical data stored at the Electronic Transfer System with this monthly report.

## 3.0 Operational Status

### 3.1 Continuous Monitoring

In November 2023, there were three instances that resulted in monitoring instruments operating less than 90% of the time.

1. The relative humidity (RH) sensor at the Sawbones Bay air monitoring station (AMS) operated less than 90% of November 2023, which is a contravention of the Air Monitoring Directive (AMD) (2016, as amended), Chapter 6, Clause DQ 4-C. This letter is a follow-up to the verbal report to Alberta Environment and Protected Areas (AB EPA) on November 17, 2023 (reference number 422062).

During routine daily system checks, the WBEA identified that the relative humidity sensor was over-ranging periodically, with values greater than 100% during high humidity events. The data was invalidated during the periods when measurements were over-ranging, and the sensor will be replaced. During the data validation process, 122 hours of data were invalidated.

2. The THC/NMHC/CH<sub>4</sub> analyzer at Ells River AMS operated for less than 90% of November 2023, which is a contravention of the Air Monitoring Directive (AMD) (2016, as amended), Chapter 6, Clause DQ 4-C. This letter is a follow-up to the verbal report to Alberta Environment and Protected Areas (AB EPA) on December 11, 2023 (reference number 422934).

During routine daily system checks, the WBEA identified that the daily zero/span for the THC/NMHC/CH<sub>4</sub> analyzer on November 5 did not meet AMD criteria. The WBEA investigated and found that the analyzer was operating with a depleted support gas cylinder. On November 8, the support gas cylinder was replaced, and the instrument was calibrated to verify its performance. During the data validation process, 103 hours of data were invalidated due to this incident, resulting in an analyzer operational time of 85% for November.

3. The wind speed and wind direction (WS/WD) sensor at Stony Mountain AMS operated less than 90% of November 2023, which is a contravention of the Air Monitoring Directive (AMD) (2016, as amended), Chapter 6, Clause DQ 4-C. This letter is a follow-up to the verbal report to Alberta Environment and Protected Areas (AB EPA) on November 24, 2023 (reference number 422365).

Throughout November, the WS/WD sensor froze due to weather conditions, resulting in inaccurate data. The sensor returned to normal operation when weather conditions changed, and the sensor

thawed. Data from the freezing events were invalidated for a total of 79 hours, resulting in a sensor operational time of 89% for November.

### 3.2 Intermittent Monitoring

The results for time-integrated sampling of precipitation, PAH, VOC, ECOC, PM<sub>2.5</sub>, and PM<sub>10</sub> will be submitted in the 2023 Annual Report.

### 3.3 General Network Notes

The Ammonia (NH<sub>3</sub>) analyzer currently operates on a 0 to 2500 ppb operating range with a detection level of 5 ppb in the WBEA network. In data processing, values less than five ppb have been considered below detection levels and are reported as zero.

Total hydrocarbon (THC), non-methane hydrocarbon (NMHC), and methane (CH<sub>4</sub>) measurements are collected at some air monitoring stations in the WBEA network using the Thermo Environmental model 55i direct CH<sub>4</sub>/NMHC analyzer. This analyzer uses a Gas Chromatography (GC) based system, which resets the baseline value at the start of every run. This may cause the ambient background to indicate a response below the expected 1.8 ppm background level. When all measurable criteria indicate valid data during the QAQC and validation process, the data is reported without any additional flags. However, a response below the expected 1.8 ppm triggers an investigation of the analyzer to determine if there is an issue.

Monitoring notes, including changes to monitoring locations, methods, or equipment, and any reporting or monitoring irregularities, for the continuous monitoring stations, are provided on a station-by-station basis. Notes of each interrupted event are provided in chronological order, and meteorological parameters are mentioned last.

On November 6 and 7, there were instances where zero/span triggers were not activated at various WBEA stations. An investigation revealed that the dataloggers were into intensive processing, leading to a temporary halt in data collection. Regarding the missed zero/span on November 7, it was discovered that an incorrect variable had been selected when troubleshooting this incident on November 6, causing the interruption of trigger sequences. The issue was addressed by resetting the variable, and all sites underwent manual zero/span triggering to verify the daily QA checks.

#### ***Station 1, Bertha Ganter – Fort McKay***

The NH<sub>3</sub> analyzer required additional time to stabilize to levels below ambient concentrations following the automated daily spans and routine monthly multipoint calibrations. Additional time is required for stabilization after exposure to high concentrations of NH<sub>3</sub> gas, and this is an inherent behavior in the NH<sub>3</sub> analyzer operations due to the properties of the NH<sub>3</sub> gas. Data for 1 hour following the daily spans have been reported as invalid for a total of 26 hours this month.

Maintenance to replace the support gas cylinder on November 10 interrupted the normal operations of the THC/NMHC/CH<sub>4</sub> analyzer for 4 hours.



The NH<sub>3</sub> analyzer underwent routine calibration on November 14 and 15. Due to time constraints on November 14, we needed to extend the calibration over two days, resulting in 18 hours of downtime.

Maintenance to replace the faulty external valve of the NH<sub>3</sub> analyzer on November 18 resulted in 5 hours of downtime.

The surface leaf wetness sensor operated out of range on November 8 and 10 resulting in 3 hours of invalid data.

Intermittent flatlines in the output signal of the wind sensor throughout the month resulted in 4 hours of invalid data.

The daily span checks of the NH<sub>3</sub> analyzer were outside the 10% AMD criteria on November 13 through 17 due to a faulty external zero/span valve.

### ***Station 2, Mildred Lake***

Maintenance to replace a faulty pump of the SO<sub>2</sub> analyzer on November 22 and 23 resulted in 26 hours of downtime.

Maintenance to reset the logger and the modem on November 23 interrupted the normal operation of the H<sub>2</sub>S and THC/NMHC/CH<sub>4</sub> analyzers for 1 hour.

Maintenance to verify the daily QA check on November 24 interrupted the normal operations of the THC/NMHC/CH<sub>4</sub> analyzer for 1 hour.

Intermittent flatlines in the output signal of the wind sensor throughout the month resulted in 2 hours of invalid data.

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

Failure to record data for all wind sensors on November 2 to 3 resulted in 15 hours of invalid data.

Intermittent flatlines in the output signal of the wind speed, wind direction and vertical wind speed at 100-meter on November 7 and 8 resulted in 3 hours of invalid data.

Intermittent flatlines in the output signal of the wind speed, wind direction and vertical wind speed at 163-meter all throughout the month resulted in 23 hours of invalid data.

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

Cleaning of the manifold on November 28 interrupted the normal operations of all gaseous analyzers for 1 hour.

Maintenance to install the new firmware on November 30 interrupted the normal operation of PM<sub>2.5</sub> analyzer for 1 hour.

A flatline in the output signal of the wind sensor on November 8 and 10 resulted in 53 hours of invalid data.



Automated daily zero-response checks of the NO<sub>2</sub> analyzer did not meet WBEA's QC acceptance criteria for the month of November. Therefore, the calibrator zeros from the October, November and December multi-point calibrations were used to validate the analyzer baseline response.

### ***Station 5, Mannix***

An internal audit on November 16 interrupted the normal operations of all air quality analyzers for 2 to 3 hours.

Maintenance to replace the support gas cylinder for THC/NMHC/CH<sub>4</sub> on November 22 resulted in 3 hours of downtime.

The relative humidity sensor at the 75-meters elevation operated out of range throughout the month resulting in 23 hours of invalid data.

Intermittent flatlines in the output signal of the wind speed, wind direction and vertical wind speed at 20-meter on November 8 and 9 resulted in 31 hours of invalid data.

Intermittent flatlines in the output signal of the wind speed, wind direction and vertical wind speed at 45-meter on November 8 to 10 resulted in 44 hours of invalid data.

Intermittent flatlines in the output signal of the wind speed, wind direction and vertical wind speed at 75-meter on November 8 to 14 resulted in 58 hours of invalid data.

Intermittent flatlines in the output signal of the wind speed, wind direction and vertical wind speed at 90-meter on November 8 to 14 resulted in 43 hours of invalid data.

### ***Station 6, Patricia McInnes***

The NH<sub>3</sub> analyzer required additional time to stabilize to levels below ambient concentrations following the automated daily spans and routine monthly multipoint calibrations. NH<sub>3</sub> analyzers require additional time for stabilization after being exposed to high concentrations, this is due to the physical properties of the NH<sub>3</sub> gas. Data for 1 to 2 hours following each daily span has been reported as invalid for a total of 31 hours this month.

Stabilization period following the replacement of the NH<sub>3</sub> analyzer on November 1 and 2 resulted in 16 hours of downtime.

Maintenance to install the new firmware on November 30 interrupted the normal operation of PM<sub>2.5</sub> analyzer for 1 hour.

Unstable operations due to flatline in the output signal of PM<sub>2.5</sub> analyzer on November 30 resulted in 15 hours of invalid data.

### ***Station 7, Athabasca Valley***

Cleaning of the sample manifold on November 1 interrupted the normal operations of all gaseous analyzers, except NO<sub>2</sub> analyzer, for 1 hour.

An internal audit on November 2 and 3 interrupted the normal operations of all air quality analyzers for 1 to 4 hours.

A flatline in the output signal of the THC/NMHC/CH<sub>4</sub> analyzer and a reset of the instrument on November 24 resulted in 22 hours of invalid data.

Maintenance to install the new firmware on November 30 interrupted the normal operation of PM<sub>2.5</sub> analyzer for 1 hour.

Intermittent unstable operation in the output signal of the wind sensors on November 8 and 10 resulted in 39 hours of invalid data.

Automated daily zero-response checks of the O<sub>3</sub> analyzer did not meet WBEA's QC acceptance criteria for the month of November. Therefore, the calibrator zeros from the October and November multi-point calibrations were used to validate the analyzer baseline response.

### ***Station 8, Fort Chipewyan***

Station power failure on November 15 interrupted the normal operations of SO<sub>2</sub>, TRS, NO<sub>2</sub>, PM<sub>2.5</sub>, CO, and CO<sub>2</sub> analyzers for a total of 1 hour.

Failure to record data for the O<sub>3</sub> analyzer on November 6 resulted in 1 hour of invalid data.

Station power failure on November 6 interrupted the normal operation of NO<sub>2</sub> and CO analyzers for a total of 1 hour. Additional time is required for stabilization after power failure for CO analyzer which resulted in an additional 4 hours of downtime.

Unstable operations due to flatline in the output signal of PM<sub>2.5</sub> analyzer on November 5 and 6 resulted in 24 hours of invalid data.

Maintenance to install the new firmware on November 30 interrupted the normal operation of PM<sub>2.5</sub> analyzer for 2 hours.

Failure to record data for the precipitation collector on November 15 resulted in 1 hour of invalid data.

### ***Station 9, Barge Landing***

Station operator activities interrupted the normal operations of SO<sub>2</sub> analyzer on November 15 for 1 hour.

Unstable operation due to inconsistent response of the THC/NMHC/CH<sub>4</sub> analyzer on November 14 and 15 resulted in 11 hours of invalid data. Subsequent maintenance to recalibrate the THC/NMHC/CH<sub>4</sub> analyzer on November 15 resulted in 4 hours of downtime.

Unstable operation due to inconsistent response of the THC/NMHC/CH<sub>4</sub> analyzer on November 16 and 17 resulted in 32 hours of invalid data. Subsequent maintenance to replace the THC/NMHC/CH<sub>4</sub> analyzer on November 17 resulted in an additional 5 hours of downtime.

### ***Station 11, Lower Camp***

Station operator activities interrupted the normal operations of H<sub>2</sub>S analyzer on November 22 for 1 hour.

Maintenance to replace the support gas cylinder of THC/NMHC/CH<sub>4</sub> analyzer on November 30 resulted in 2 hours of downtime.

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

Unstable operations of the THC/NMHC/CH<sub>4</sub> analyzer due to excessive baseline noise on November 17 resulted in 1 hour of invalid data.

Analyzer failure due to inconsistent response of the THC/NMHC/CH<sub>4</sub> analyzer on November 19 through 21 resulted in 58 hours of invalid data. Subsequent maintenance to replace the THC/NMHC/CH<sub>4</sub> analyzer on November 21 resulted in additional 3 hours of downtime.

Unstable operations of the O<sub>3</sub> analyzer due to inconsistent response on November 7 resulted in 2 hours of invalid data.

Maintenance to install the new firmware on November 30 interrupted the normal operation of PM<sub>2.5</sub> analyzer for 1 hour.

Intermittent flatlines in the output signal of the wind sensor throughout the month resulted in 3 hours of invalid data.

### ***Station 14, Anzac***

Maintenance to replace the O<sub>3</sub> analyzer on November 21 to improve the performance of the analyzer resulted in 3 hours of downtime.

Maintenance to replace the support gas cylinder for THC/NMHC/CH<sub>4</sub> analyzer on November 23 resulted in 2 hours of downtime.

Maintenance to replace the relative humidity and temperature sensor as part of preventative maintenance on November 7 and 8 resulted in 2 hours of downtime.

A flatline in the output signal of the relative humidity and temperature sensor on November 7 and 8 resulted in 22 hours of invalid data.

The relative humidity sensor operated out of range on November 6 resulting in 3 hours of invalid data.

The surface leaf wetness sensor operated out of range on November 8 resulting in 1 hour of invalid data.

Automated daily zero-response checks of the O<sub>3</sub> analyzer did not meet WBEA's QC acceptance criteria from November 1 through 21. Therefore, the calibrator zeros from the October and November multi-point calibrations were used to validate the analyzer baseline response. The O<sub>3</sub> analyzer was replaced on November 21 which improved the daily zero response.

The daily span checks of all gaseous analyzer were outside the 10% AMD criteria on November 20 due to an interruption in the station calibrator configuration.

#### ***Station 17, Wapasu***

Cleaning of the sample manifold on November 21 interrupted the normal operations of H<sub>2</sub>S, O<sub>3</sub>, SO<sub>2</sub>, and THC analyzers for 1 hour.

Maintenance to install the new firmware on November 30 interrupted the normal operation of PM<sub>2.5</sub> analyzer for 1 hours.

A flatline in the output signal of the wind sensor on November 2 resulted in 2 hours of invalid data.

#### ***Station 18, Stony Mountain***

Maintenance to install the new firmware on November 30 interrupted the normal operation of PM<sub>2.5</sub> analyzer for 1 hour.

The relative humidity sensor operated out of range on November 6 and 7 resulting in 22 hours of invalid data.

Failure to record data for the precipitation collector on November 3 resulted in 8 hours of invalid data.

A flatline in the output signal of the wind sensor throughout the month resulted in 79 hours of invalid data.

#### ***Station 19, Firebag***

No operational issues to report.

#### ***Station 20, MacKay River***

Maintenance to replace sample pump and subsequent stabilization of the NO<sub>2</sub> analyzer on November 30 resulted in 16 hours of downtime.

A flatline in the output signal of the wind sensor throughout the month resulted in 34 hours of invalid data.

Maintenance to empty the precipitation collector bucket on November 17 resulted in a 1 hour of downtime.

#### ***Station 21, Conklin***

Maintenance to verify the daily QA check on November 7 interrupted the normal operations of all gaseous analyzers for 1 to 2 hours.

Cleaning of the sample manifold on November 30 interrupted the normal operations NO<sub>2</sub>, O<sub>3</sub>, and TRS analyzers for 1 hour.

Automated daily zero-response checks of the O<sub>3</sub> analyzer did not meet WBEA's QC acceptance criteria for November. Therefore, the calibrator zeros from the October, November, and December multi-point calibrations were used to validate the analyzer baseline response.

#### ***Station 22, Janvier***

Maintenance to verify the daily QA check on November 7 interrupted the normal operations of all gaseous analyzers for 1 to 2 hours.

Unstable operations of the THC/NMHC/CH<sub>4</sub> analyzer due to failure of the zero-air generator on November 20 and 21 resulted in 18 hours of invalid data. Subsequent maintenance to replace the zero-air generator and verify QA check on November 21 resulted in additional 3 hours of downtime.

Maintenance to install the new firmware on November 30 interrupted the normal operation of PM<sub>2.5</sub> analyzer for 2 hours.

#### ***Station 23, Fort Hills***

Maintenance to verify the daily QA check on November 8 interrupted the normal operations of all gaseous analyzers for 1 to 2 hours.

Maintenance to replace the support gas cylinder for THC/NMHC/CH<sub>4</sub> analyzer on November 29 resulted in 2 hours of downtime.

Maintenance to install the new firmware on November 30 interrupted the normal operation of PM<sub>2.5</sub> analyzer for 1 hour.

A flatline in the output signal of the wind sensor on November 8 and 10 resulted in 47 hours of invalid data.

#### ***Station 25, Waskōw ohci Pimâtisiwin***

Maintenance to verify the daily QA check on November 7 interrupted the normal operations of all gaseous analyzers for 1 to 2 hours.

A flatline in the output signal of the SO<sub>2</sub> analyzer on November 14 and 15 resulted in 14 hours of invalid data. Subsequent maintenance to reboot the SO<sub>2</sub> analyzer on November 15 resulted in a further 1 hour of downtime.

A flatline in the output signal of the wind sensor on November 9 and 22 resulted in 2 hours of invalid data.

#### ***Station 26, Christina Lake***

Maintenance to verify the daily QA check on November 7 interrupted the normal operations of all gaseous analyzers for 1 to 2 hours.

Maintenance to replace the relative humidity and temperature sensor as part of preventative maintenance on November 29 resulted in 1 hour of downtime.

### ***Station 27, Jackfish 2/3***

Maintenance to verify the daily QA check on November 7 interrupted the normal operations of all gaseous analyzers for 1 to 2 hours.

Analyzer failure due to sample pump failure of the NO<sub>2</sub> analyzer on November 19 and 20 resulted in 34 hours of invalid data. Subsequent maintenance to replace the NO<sub>2</sub> sample pump and conduct a multi-point verification on November 20 resulted in additional 5 hours of downtime.

Maintenance to replace the relative humidity and temperature sensor as part of preventative maintenance on November 9 resulted in 1 hour of downtime.

A flatline in the output signal of the wind sensor on November 7 through 9 resulted in 53 hours of invalid data. Subsequent maintenance to lower the tower and de-ice the wind sensor resulted in additional 1 hour of downtime.

### ***Station 29, Surmont 2***

Maintenance to verify the daily QA check on November 11 interrupted the normal operations of H<sub>2</sub>S, SO<sub>2</sub>, and THC analyzers for 1 hour.

A flatline in the output signal of the wind sensors on November 19 and 27 resulted in 3 hours of invalid data.

### ***Station 30, Ells River***

Maintenance to verify the daily QA check on November 7 interrupted the normal operations of all gaseous analyzers for 1 hour.

Unstable operations due to depleted support gas cylinder of the THC/NMHC/CH<sub>4</sub> analyzer on November 4 to November 8 resulted in 103 hours of invalid data.

Cleaning of the sample manifold on November 30 interrupted the normal operations of the NO<sub>2</sub>, SO<sub>2</sub>, and THC/NMHC/CH<sub>4</sub> analyzers for 2 hours.

Intermittent flatlines in the output signal of the wind sensor throughout the month resulted in 12 hours of invalid data.

### ***Station 501, Leismer***

Maintenance to verify the daily QA check on November 7 interrupted the normal operations of all gaseous analyzers for 1 to 2 hours.

Cleaning of the sample manifold on November 29 interrupted the normal operations of the NO<sub>2</sub> and SO<sub>2</sub> analyzers for 1 hour.

A flatline in the output signal of the wind sensor on November 7, 8 and 29 resulted in 27 hours of invalid data.

#### ***Station 505, Sawbones Bay***

Maintenance to verify the daily QA check on November 7 interrupted the normal operations of all gaseous analyzers for 1 to 2 hours.

Cleaning of the sample manifold on November 9 interrupted the normal operations of the NO<sub>2</sub> and SO<sub>2</sub> analyzers for 2 hours.

The relative humidity sensor operated out of range on throughout the month resulting in 139 hours of invalid data.

Automated daily zero-response checks of the NO<sub>2</sub> analyzer did not meet WBEA's QC acceptance criteria for November. Therefore, the calibrator zeros from the October, November, and December multi-point calibrations were used to validate the analyzer baseline response.

#### ***Station 507, Kirby South***

A flatline in the output signal of the wind sensor on November 5 through 7 resulted in 42 hours of invalid data. Subsequent maintenance to lower the tower and de-ice the wind sensor on November 6 resulted in additional 2 hours of downtime.

#### ***Station 511, Blackgold***

The relative humidity sensor operated out of range on November 4 and 6 resulting in 7 hours of invalid data.

If additional information is required, please contact the Wood Buffalo Environmental Association at (780) 799-4420.

Yours sincerely,

#### **Wood Buffalo Environmental Association**

The representative of the Person Responsible for this monitoring program is Emilie Briggs, Operations Manager, WBEA.

Level one (L1) data review was completed by the Field Technicians responsible for each respective air monitoring station. Level two (L2) data validation, report preparation, and submission were completed by Asad Hidayat and Karina Fenwick of WBEA. The WBEA has retained the services of Whiteley Enterprises to conduct Level three (L3) review on its behalf. Contact information for WBEA staff is included below.

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I certify that I have reviewed and verified this report and that the information is complete, accurate and representative of the monitoring results, reporting timeframe, and the specified analysis, summarization, and reporting requirements.



Dianne McIsaac  
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WOOD BUFFALO ENVIRONMENTAL ASSOCIATION  
MONTHLY AIR MONITORING SUMMARY

November 2023

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APPROVAL NUMBERS	REPORT DATE						
	MONTH	YEAR					
289664-00-00	11	2023					
241311-00-00	CONTINUOUS AMBIENT MONITORING						
20809-02-00							
149968-01-00							
237382-00-00							
48522-01-00							
240008-00-00	PARAMETER	STN. NO.	% TIME OPERATIONAL	ONE-HOUR AVERAGE MAXIMUM CONCENTRATION	NO. READINGS > REGULATION	24-HOUR AVERAGE MAXIMUM CONCENTRATION	NO. READINGS > REGULATION
48263-01-00	SO2(ppb)	1	100	8	0	3.2	0
224816-00-00	SO2(ppb)	2	96	92.9	0	19.8	0
151469-01-00	SO2(ppb)	4	100	23.5	0	2.1	0
189942-00-00	SO2(ppb)	5	100	18.9	0	4.6	0
206355-00-00	SO2(ppb)	6	100	5.0	0	0.9	0
46586-00-00	SO2(ppb)	7	100	10.3	0	1.2	0
73203-02-00	SO2(ppb)	8	100	4.5	0	2.1	0
216466-01-00	SO2(ppb)	9	100	4.9	0	1.4	0
137467-01-00	SO2(ppb)	11	100	143.0	0	13.2	0
236394-00-00	SO2(ppb)	13	100	9.9	0	2.5	0
254465-00-00	SO2(ppb)	14	100	9.5	0	2.2	0
094-03-00	SO2(ppb)	17	100	29.2	0	9.5	0
80105-01-00	SO2(ppb)	18	100	1.9	0	0.6	0
305529-00-00	SO2(ppb)	19	100	56.1	0	8.3	0
318401-00-00	SO2(ppb)	20	100	24.6	0	4.4	0
026-03-00	SO2(ppb)	21	100	1.1	0	0.3	0
364232-00-00	SO2(ppb)	22	100	2.8	0	0.6	0
228044-00-00	SO2(ppb)	23	100	10.5	0	2.4	0
247548-00-00	SO2(ppb)	25	98	5.2	0	2.0	0
231302-00-00	SO2(ppb)	26	100	30.5	0	7.8	0
153125-01-00	SO2(ppb)	27	100	28.3	0	7.6	0
	SO2(ppb)	29	100	3.8	0	1.0	0
	SO2(ppb)	30	100	17.6	0	3.5	0
	SO2(ppb)	501	100	25.2	0	8.2	0
	SO2(ppb)	505	100	15.9	0	6.1	0
	SO2(ppb)	507	100	8.5	0	2.0	0
	SO2(ppb)	511	100	19.0	0	6.0	0
	H2S(ppb)	1	100	2.3	0	1.0	0
	H2S(ppb)	2	100	12.3	1	2.3	0
	H2S(ppb)	4	100	11.8	1	0.9	0
	H2S(ppb)	5	100	4.0	0	1.0	0
	H2S(ppb)	11	100	29.8	4	3.3	1
	H2S(ppb)	17	100	0.7	0	0.3	0
	H2S(ppb)	19	100	2.1	0	0.5	0
	H2S(ppb)	20	100	1.3	0	0.3	0
	H2S(ppb)	25	100	1.8	0	0.9	0
	H2S(ppb)	26	100	0.9	0	0.5	0
	H2S(ppb)	27	100	3.8	0	0.8	0
	H2S(ppb)	29	100	0.3	0	0.1	0
	H2S(ppb)	501	100	2.7	0	0.7	0
	H2S(ppb)	505	100	2.0	0	0.8	0
	H2S(ppb)	507	100	1.5	0	0.3	0
	H2S(ppb)	511	100	1.8	0	0.5	0
	TRS(ppb)	1	100	2.6	0	1.3	0
	TRS(ppb)	6	100	1.1	0	0.5	0
	TRS(ppb)	7	100	1.1	0	0.3	0
	TRS(ppb)	8	100	0.6	0	0.3	0
	TRS(ppb)	9	100	3.3	0	1.4	0
	TRS(ppb)	13	100	3.5	0	1.1	0
	TRS(ppb)	14	100	1.3	0	0.4	0
	TRS(ppb)	18	100	0.4	0	0.3	0
	TRS(ppb)	21	100	0.5	0	0.5	0
	TRS(ppb)	22	100	0.3	0	0.2	0
	TRS(ppb)	23	100	1.7	0	0.9	0
	TRS(ppb)	30	100	1.8	0	1.0	0
	THC(ppm)	1	100	5.4	-	2.9	-
	THC(ppm)	2	99	4.1	-	2.7	-
	THC(ppm)	4	100	4.0	-	2.1	-
	THC(ppm)	5	99	3.6	-	2.3	-
	THC(ppm)	6	100	2.6	-	2.2	-
	THC(ppm)	7	97	2.6	-	2.3	-
	THC(ppm)	9	93	4.5	-	2.8	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION  
MONTHLY AIR MONITORING SUMMARY

November 2023

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REPORT DATE							
MONTH	YEAR						
11	2023	CONTINUOUS AMBIENT MONITORING					
APPROVAL NUMBERS	PARAMETER	STN. NO.	% TIME OPERATIONAL	ONE-HOUR AVERAGE		24-HOUR AVERAGE	
				MAXIMUM CONCENTRATION	NO. READINGS > REGULATION	MAXIMUM CONCENTRATION	NO. READINGS > REGULATION
289664-00-00	THC(ppm)	11	100	3.9	-	2.6	-
241311-00-00	THC(ppm)	13	91	4.8	-	2.7	-
20809-02-00	THC(ppm)	14	100	3.0	-	2.1	-
149968-01-00	THC(ppm)	17	100	3.0	-	2.5	-
237382-00-00	THC(ppm)	18	100	2.3	-	2.1	-
48522-01-00	THC(ppm)	19	100	2.7	-	2.3	-
240008-00-00	THC(ppm)	20	100	3.0	-	2.4	-
48263-01-00	THC(ppm)	21	100	2.4	-	2.3	-
224816-00-00	THC(ppm)	22	97	2.2	-	2.1	-
151469-01-00	THC(ppm)	23	100	5.3	-	3.8	-
189942-00-00	THC(ppm)	29	100	2.6	-	2.4	-
206355-00-00	THC(ppm)	30	85	5.0	-	2.6	-
46586-00-00	THC(ppm)	507	100	2.9	-	2.5	-
73203-02-00	THC(ppm)	511	100	2.8	-	2.6	-
216466-01-00	O3(ppb)	1	100	35.9	0	30.4	-
137467-01-00	O3(ppb)	4	100	41.4	0	37.7	-
236394-00-00	O3(ppb)	6	100	39.1	0	36.0	-
254465-00-00	O3(ppb)	7	100	45.9	0	35.6	-
094-03-00	O3(ppb)	8	100	37.8	0	34.9	-
80105-01-00	O3(ppb)	13	100	37.4	0	33.1	-
305529-00-00	O3(ppb)	14	100	36.7	0	33.5	-
318401-00-00	O3(ppb)	17	100	39.7	0	34.1	-
026-03-00	O3(ppb)	18	100	38.0	0	34.2	-
364232-00-00	O3(ppb)	21	100	39.5	0	35.3	-
228044-00-00	O3(ppb)	22	100	41.1	0	38.7	-
247548-00-00	NO2(ppb)	1	100	28.3	0	16.9	-
231302-00-00	NO2(ppb)	4	100	30.5	0	11.8	-
153125-01-00	NO2(ppb)	6	100	31.9	0	12.5	-
	NO2(ppb)	7	99	30.5	0	14.9	-
	NO2(ppb)	8	100	20.0	0	7.4	-
	NO2(ppb)	9	100	32.8	0	17.8	-
	NO2(ppb)	13	100	26.1	0	13.2	-
	NO2(ppb)	14	100	16.4	0	5.3	-
	NO2(ppb)	17	100	31.0	0	10.6	-
	NO2(ppb)	18	100	7.4	0	3.1	-
	NO2(ppb)	19	100	22.2	0	8.9	-
	NO2(ppb)	20	98	23.7	0	7.9	-
	NO2(ppb)	21	100	15.9	0	4.0	-
	NO2(ppb)	22	100	7.0	0	3.6	-
	NO2(ppb)	23	100	43.5	0	25.3	-
	NO2(ppb)	26	100	19.7	0	7.8	-
	NO2(ppb)	27	94	6.6	0	3.1	-
	NO2(ppb)	29	100	8.6	0	2.7	-
	NO2(ppb)	30	100	30.1	0	16.6	-
	NO2(ppb)	501	100	13.1	0	4.2	-
	NO2(ppb)	505	100	16.4	0	8.6	-
	NO2(ppb)	507	100	8.7	0	3.5	-
	NO2(ppb)	511	100	17.1	0	4.1	-
	CO(ppm)	1	100	0.5	0	0.3	-
	CO(ppm)	7	100	0.8	0	0.3	-
	CO(ppm)	8	99	0.2	0	0.1	-
	CO(ppm)	18	100	0.2	0	0.2	-
	CO2(ppm)	1	100	480.7	-	459.0	-
	CO2(ppm)	8	100	449.4	-	443.9	-
	CO2(ppm)	18	100	444.1	-	438.5	-
	NH3(ppb)	1	93	0.0	0	0.0	-
	NH3(ppb)	6	93	0.0	0	0.0	-
	PM2.5(ug/m3)	1	100	30.8	0	16.3	0
	PM2.5(ug/m3)	4	100	78.8	0	18.8	0
	PM2.5(ug/m3)	6	98	31.7	0	13.5	0
	PM2.5(ug/m3)	7	100	68.1	0	17.3	0
	PM2.5(ug/m3)	8	96	46.4	0	23.6	0
	PM2.5(ug/m3)	9	100	37.7	0	18.3	0
	PM2.5(ug/m3)	13	100	35.8	0	14.8	0

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION  
MONTHLY AIR MONITORING SUMMARY



November 2023

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REPORT DATE	
MONTH	YEAR
11	2023

CONTINUOUS AMBIENT MONITORING

APPROVAL NUMBERS	PARAMETER	STN. NO.	% TIME OPERATIONAL	ONE-HOUR AVERAGE		24-HOUR AVERAGE	
				MAXIMUM CONCENTRATION	NO. READINGS > REGULATION	MAXIMUM CONCENTRATION	NO. READINGS > REGULATION
289664-00-00	PM2.5(ug/m3)	14	100	47.8	0	15.1	0
241311-00-00	PM2.5(ug/m3)	17	100	20.7	0	13.4	0
20809-02-00	PM2.5(ug/m3)	18	100	21	0	16.8	0
149968-01-00	PM2.5(ug/m3)	21	100	42	0	17.6	0
237382-00-00	PM2.5(ug/m3)	22	100	26	0	14.9	0
48522-01-00	PM2.5(ug/m3)	23	100	37.2	0	17.2	0
240008-00-00	PM2.5(ug/m3)	29	100	19.1	0	11.6	0
48263-01-00	PM2.5(ug/m3)	30	100	23	0	13.6	0
224816-00-00	WS(km/h)	1	99	-	-	-	-
151469-01-00	WS(km/h)	2	100	-	-	-	-
189942-00-00	WS(km/h)	4	93	-	-	-	-
206355-00-00	WS(km/h)	5	96	-	-	-	-
46586-00-00	WS(km/h)	6	100	-	-	-	-
73203-02-00	WS(km/h)	7	95	-	-	-	-
216466-01-00	WS(km/h)	8	100	-	-	-	-
137467-01-00	WS(km/h)	9	100	-	-	-	-
236394-00-00	WS(km/h)	11	100	-	-	-	-
254465-00-00	WS(km/h)	13	100	-	-	-	-
094-03-00	WS(km/h)	14	100	-	-	-	-
80105-01-00	WS(km/h)	17	100	-	-	-	-
318401-00-00	WS(km/h)	18	89	-	-	-	-
026-03-00	WS(km/h)	19	100	-	-	-	-
364232-00-00	WS(km/h)	20	95	-	-	-	-
228044-00-00	WS(km/h)	21	100	-	-	-	-
247548-00-00	WS(km/h)	22	100	-	-	-	-
231302-00-00	WS(km/h)	23	93	-	-	-	-
153125-01-00	WS(km/h)	25	100	-	-	-	-
	WS(km/h)	26	100	-	-	-	-
	WS(km/h)	27	93	-	-	-	-
	WS(km/h)	29	100	-	-	-	-
	WS(km/h)	30	98	-	-	-	-
	WS(km/h)	501	96	-	-	-	-
	WS(km/h)	505	100	-	-	-	-
	WS(km/h)	507	94	-	-	-	-
	WS(km/h)	511	100	-	-	-	-
							
SIGNATURE OF ASSOCIATION REPRESENTATIVE				FOR ALBERTA ENVIRONMENT USE ONLY			



## **WOOD BUFFALO ENVIRONMENTAL ASSOCIATION**

CONTINUOUS AMBIENT AIR QUALITY  
MONITORING PROGRAM  
MONTHLY REPORT

### **AMS01 BERTHA GANTER - FORT MCKAY NOVEMBER 2023**

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

December 22, 2023

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FORT MCKAY - BERTHA GANTER (AMS01)  
NOVEMBER 2023

MONTHLY SUMMARY

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	8.2	0	3.2	0
H2S(ppb) Average	682	38	38	100	2.3	0	1	0
TRS(ppb) Average	682	38	38	100	2.6	0	1.3	0
THC(ppm) Average	683	35	37	99.72	5.4	-	2.9	-
NMHC(ppm) Average	683	35	37	99.72	0.416	-	0.206	-
CH4(ppm) Average	683	35	37	99.72	5	-	2.8	-
O3 (ppb) Average	687	33	33	100	35.9	0	30.4	-
NO2 (ppb) Average	686	34	34	100	28.3	0	16.9	-
NO (ppb) Average	686	34	34	100	102.5	-	46.8	-
NOX (ppb) Average	686	34	34	100	125.4	-	60.9	-
NH3 (ppb) Average	630	41	90	93.19	0	0	0	-
PM2.5 (ug/m3) Average	718	2	2	100	30.8	0	16.3	0
CO(ppm) Average	687	33	33	100	0.5	0	0.3	0
CO2(ppm) Average	687	33	33	100	480.7	0	459	0
Temperature 2 m (C) Average	720	0	0	100	5	-	1.4	-
Temperature 10 m (C) Average	720	0	0	100	5.3	-	1.7	-
Relative Humidity (%) Average	720	0	0	100	97.3	-	95.5	-
Wind Speed 10 m (km/h) Average	716	0	4	99.44	26	-	11	-
Wind Direction 10 m (deg) Average	716	0	4	99.44	-	-	-	-
Precipitation (mm) Total	720	0	0	100	1.4	-	9.9	-
Leaf Wetness (% of range) Average	717	0	3	99.58	79.3	-	19.4	-
Global Solar Radiation (W/m2) Average	720	0	0	100	363.8	-	71.9	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - BERTHA GANTER FORT McKAY (AMS01)  
 NOVEMBER 2023

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	0.53	1.1	-	0	0	0	0.1	0.5	1.5	8.2
H2S (ppb) Average	682	0.29	0.4	-	0	0	0.1	0.1	0.3	0.9	2.3
TRS (ppb) Average	682	0.58	0.4	-	0.3	0.3	0.4	0.4	0.6	1.1	2.6
THC (ppm) Average	683	2.17	0.4	-	1.9	1.9	2	2	2.2	2.6	5.4
NMHC(ppm) Average	683	0.037	0.073	-	0	0	0	0	0	0.2	0.416
CH4(ppm) Average	683	2.13	0.3	-	1.9	1.9	2	2	2.2	2.4	
O3 (ppb) Average	687	14.04	9.7	-	0	1	5.2	13.8	21.9	28.3	35.9
NO2 (ppb) Average	686	8.16	6.5	-	0	0.4	1.9	7.5	12.3	17.3	28.3
NO (ppb) Average	686	6.31	15.9	-	0	0	0	0.2	3.4	19.1	102.5
NOX (ppb) Average	686	14.47	19.6	-	0	0.4	2.1	8.7	17.1	33	125.4
NH3 (ppb) Average	630	0	0	-	0	0	0	0	0	0	0
PM2.5 (ug/m3) Average	718	6.94	4.5	-	0.5	2.5	3.6	5.9	9.1	12.7	30.8
CO(ppm) Average	687	0.25	0	-	0.2	0.2	0.2	0.2	0.3	0.3	0.5
CO2(ppm) Average	687	432.68	10.6	-	417.8	422.4	424.7	430.3	437.8	446.6	480.7
Temperature 2 m (C) Average	720	-4.2	4.4	-	-17.4	-10.4	-6.3	-3.9	-1	1.2	5
Temperature 10 m (C) Average	720	-4.1	4.3	-	-16.9	-10.6	-6.2	-3.9	-0.8	1.1	5.3
Relative Humidity (%) Average	720	82.91	9.9	-	47.6	68.8	76.8	84.7	90.5	94	97.3
Wind Speed 10 m (km/h) Average	716	6	4	-	0	2	3	5	8	11	26
Wind Direction 10 m (deg) Average	716	-	-	-	-	-	-	-	-	-	-
Precipitation (mm) Total	720	-	-	20.44	-	-	-	-	-	-	-
Leaf Wetness (% of range) Average	717	5.87	7.4	-	1.9	2.4	2.6	3.1	6.4	12.1	79.3
Global Solar Radiation (W/m2) Average	720	27.77	61.1	-	0	0	0	0	22.8	90.2	363.8

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - BERTHA GANTER FORT MCKAY (AMS01)  
NOVEMBER 2023

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
THC/NMHC/CH4	10 Nov 2023 13:00	10 Nov 2023 14:00	2	Maintenance - replaced support gas cylinder
NH3	01 Nov 2023 05:00	30 Nov 2023 03:00	26	Stabilization after daily QA check
NH3	14 Nov 2023 18:00	15 Nov 2023 11:00	18	Maintenance - calibration
NH3	17 Nov 2023 10:00	17 Nov 2023 14:00	5	Maintenance - external valve replaced
Wind Speed, Wind Direction	07 Nov 2023 18:00	07 Nov 2023 18:00	1	Flat line in sensor output signal - Sensor frozen
Wind Speed, Wind Direction	09 Nov 2023 02:00	09 Nov 2023 02:00	1	Flat line in sensor output signal - Sensor frozen
Wind Speed, Wind Direction	27 Nov 2023 10:00	27 Nov 2023 10:00	1	Flat line in sensor output signal - Sensor frozen
Wind Speed, Wind Direction	30 Nov 2023 07:00	30 Nov 2023 07:00	1	Flat line in sensor output signal - Sensor frozen
Surface Leaf Wetness	08 Nov 2023 03:00	08 Nov 2023 04:00	2	Sensor operated out of range
Surface Leaf Wetness	10 Nov 2023 13:00	10 Nov 2023 13:00	1	Sensor operated out of range



Number of Exceedences (AAAQO):		1-hr: 0	24-hr: 0	Hours in Service: 720																	Daily Average		Daily Maximum				
Maximum Value: 8.2 ppb on Nov 10 04:00		Maximum Daily Average: 3.2 ppb on Nov 10																	Hours of Data: 685		Hours of Missing Data: 35						
Minimum Value: 0.0 ppb on Nov 2 09:00		Minimum Daily Average: 0.0 ppb on Nov 20																	Hours of Calibration: 35		Percent Operational Time: 100.0						
Maximum Diurnal Average: 1.0 ppb at hour 16		Minimum Diurnal Average: 0.3 ppb at hour 6																									
Monthly Average: 0.53 ppb		Percentiles: P <sub>1</sub> = 0.0 P <sub>10</sub> = 0.0 Q <sub>1</sub> = 0.0 Median = 0.1 Q <sub>3</sub> = 0.5 P <sub>90</sub> = 1.5 P <sub>99</sub> = 5.3																									
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Nov	Z	0.2	0.2	0.2	0.2	0.3	0.4	0.3	0.6	C	C	C	C	C	C	5.2	1.1	1.3	0.8	0.5	0.2	0.2	0.4	1.1	--	5.2	
2-Nov	1.2	Z	0.3	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.1	1.2	
3-Nov	0.6	2.1	Z	0.9	0.3	0.3	0.4	0.3	0.3	0.6	1.3	1.7	3.3	3.9	4.6	5.5	3.3	1.4	1.4	1.3	1.1	0.9	0.7	0.7	1.6	5.5	
4-Nov	0.5	0.4	0.3	Z	0.2	0.2	0.2	0.1	0.1	0.2	0.1	0.1	0.1	0.0	0.0	0.1	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.5	
5-Nov	0.0	0.1	0.1	0.0	Z	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.2	
6-Nov	0.0	0.0	0.0	0.0	0.6	1.3	2.2	2.8	2.7	0.6	2.2	5.3	3.2	3.3	2.4	0.7	1.1	2.0	3.4	0.7	0.6	0.5	1.0	1.6	1.6	5.3	
7-Nov	0.5	0.4	0.3	0.2	0.1	Z	0.1	0.0	0.1	0.1	0.2	0.1	0.1	0.2	0.1	0.1	0.0	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.2	0.5	
8-Nov	Z	0.1	0.1	0.2	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.1	0.1	0.1	0.0	0.1	0.0	0.1	0.0	0.1	0.2	
9-Nov	0.1	Z	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.3	1.4	2.7	1.6	2.3	2.2	1.3	1.4	0.8	0.3	0.7	0.5	0.3	0.1	0.7	2.7	
10-Nov	0.1	5.5	Z	8.2	4.2	0.5	7.0	2.3	3.4	4.3	0.8	3.4	2.7	1.2	2.4	2.9	2.8	2.9	2.7	5.2	2.3	2.2	2.5	2.8	3.2	8.2	
11-Nov	4.3	1.9	2.1	Z	0.4	0.2	0.3	0.2	0.3	0.3	0.3	0.5	0.7	0.8	1.0	0.9	0.5	1.1	0.5	0.2	0.1	0.0	0.0	0.1	0.7	4.3	
12-Nov	0.1	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	
13-Nov	0.0	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.1	0.2	0.1	0.2	
14-Nov	Z	0.2	0.2	0.2	0.2	0.1	0.2	0.2	0.2	0.3	0.3	0.2	0.2	0.3	0.2	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.0	0.0	0.2	0.3	
15-Nov	0.1	Z	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	
16-Nov	0.1	0.0	Z	0.0	0.1	0.2	0.5	1.5	1.6	2.0	2.1	7.0	6.2	4.4	2.0	1.0	0.4	0.3	0.2	0.2	0.2	0.3	0.2	0.1	1.3	7.0	
17-Nov	0.3	0.2	0.1	Z	0.1	0.2	0.2	0.2	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.1	0.3	
18-Nov	0.2	0.3	0.3	0.4	Z	0.7	0.4	0.6	0.6	1.0	0.8	0.5	0.5	0.7	0.9	0.6	0.7	0.6	0.7	0.6	0.7	0.7	0.4	0.5	0.6	1.0	
19-Nov	0.7	0.8	1.0	0.8	0.8	Z	0.8	0.9	0.8	0.7	1.3	1.7	1.1	2.6	1.6	1.0	0.6	1.3	1.4	0.9	0.6	1.2	0.9	0.4	1.0	2.6	
20-Nov	Z	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	
21-Nov	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	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	
22-Nov	0.1	0.0	Z	0.1	0.0	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.2	0.1	0.0	0.3	
23-Nov	0.2	0.4	1.1	Z	2.9	1.7	0.8	1.1	0.6	0.4	1.3	2.2	0.4	0.3	0.9	0.3	0.2	0.4	0.4	0.4	2.2	2.3	0.9	1.1	1.0	2.9	
24-Nov	0.5	0.2	0.2	0.2	Z	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	0.0	0.1	0.1	0.2	0.2	0.1	0.5	
25-Nov	0.1	0.1	0.1	0.1	0.1	Z	0.2	0.2	0.4	0.3	0.3	0.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.4	
26-Nov	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.5	0.7	1.3	4.5	5.9	5.2	3.2	1.4	1.4	1.5	1.1	0.6	0.6	1.2	5.9	
27-Nov	0.6	Z	0.6	0.6	0.6	0.5	0.6	0.7	1.2	0.6	0.6	0.9	1.0	2.2	2.4	2.0	0.6	0.6	0.3	0.2	0.2	0.2	0.1	0.1	0.8	2.4	
28-Nov	0.1	0.0	Z	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	0.1	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.1	
29-Nov	0.0	0.0	0.0	Z	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.1	
30-Nov	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.1	0.0	0.0	0.1	0.1	0.1	0.0	0.1	0.0	0.1	
																								Diurnal Average		Diurnal Maximum	
																								0.4		4.3	
																								0.5		5.5	
																								0.3		2.1	
																								0.5		8.2	
																								0.5		4.2	
																								0.3		1.7	
																								0.5		7.0	
																								0.4		2.8	
																								0.5		3.4	
																								0.4		4.3	
																								0.4		2.2	
																								0.9		7.0	
																								0.8		6.2	
																								0.8		4.4	
																								0.9		4.6	
																								1.0		5.9	
																								0.6		5.2	
																								0.6		3.2	
																								0.5		3.4	
																								0.4		5.2	
																								0.4		2.3	
																								0.4		2.3	
																								0.3		2.5	
																								0.3		2.8	

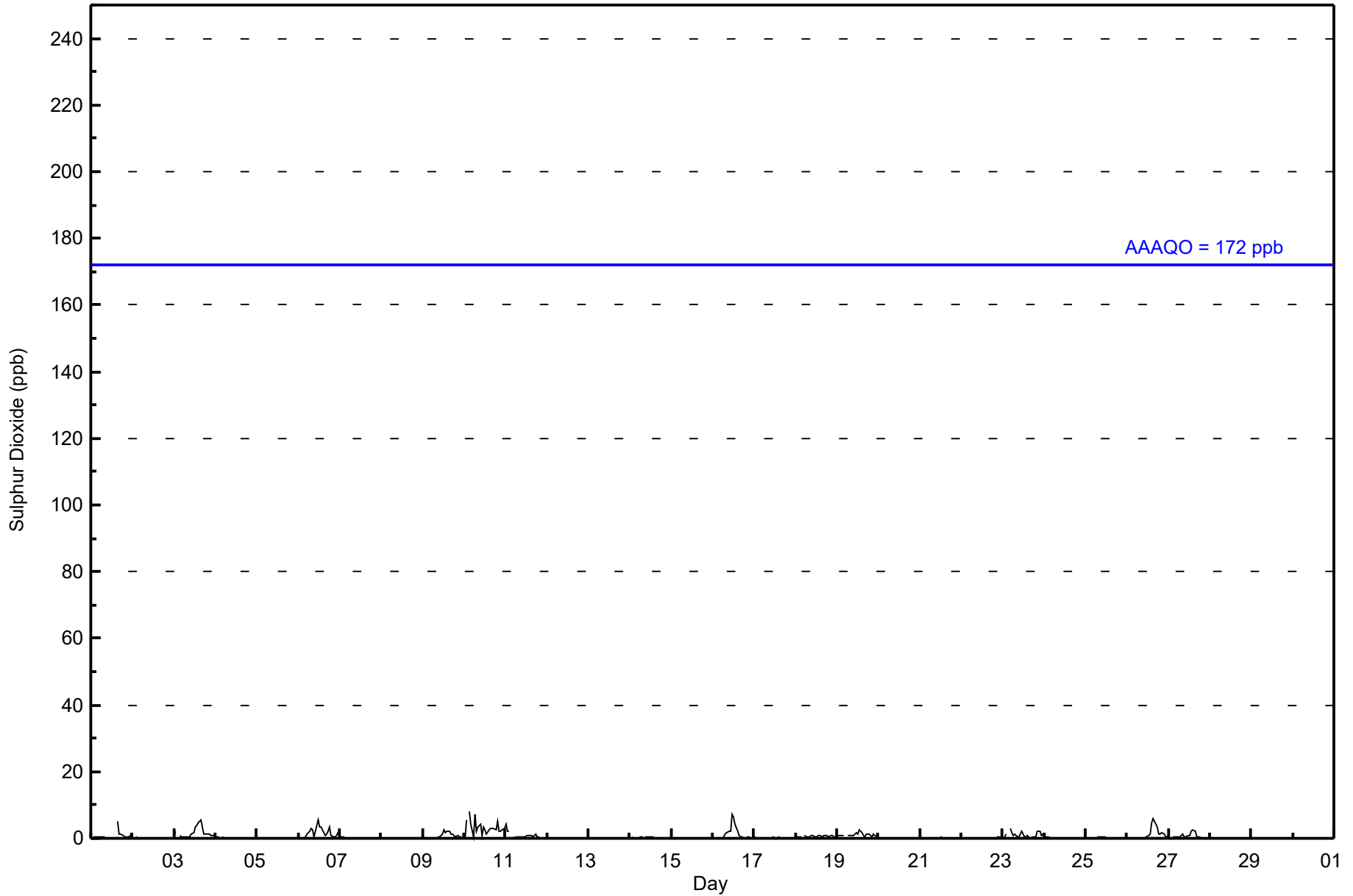
Z - zerospan C - Calibration  
 Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 172 ppb 24-hr 48 ppb





Wood Buffalo Environmental Association  
Hourly Averages

Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Fort McKay - Bertha Ganter - November 2023





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

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Fort McKay - Bertha Ganter - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 10	685	100.00	100.00
11 - 20	0	0.00	100.00
21 - 60	0	0.00	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



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

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Fort McKay - Bertha Ganter - November 2023**

<b>Concentration</b> <b>Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 10	41	53	21	17	13	13	17	40	162	73	33	30	50	66	31	22	682
11 - 20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	41	53	21	17	13	13	17	40	162	73	33	30	50	66	31	22	682

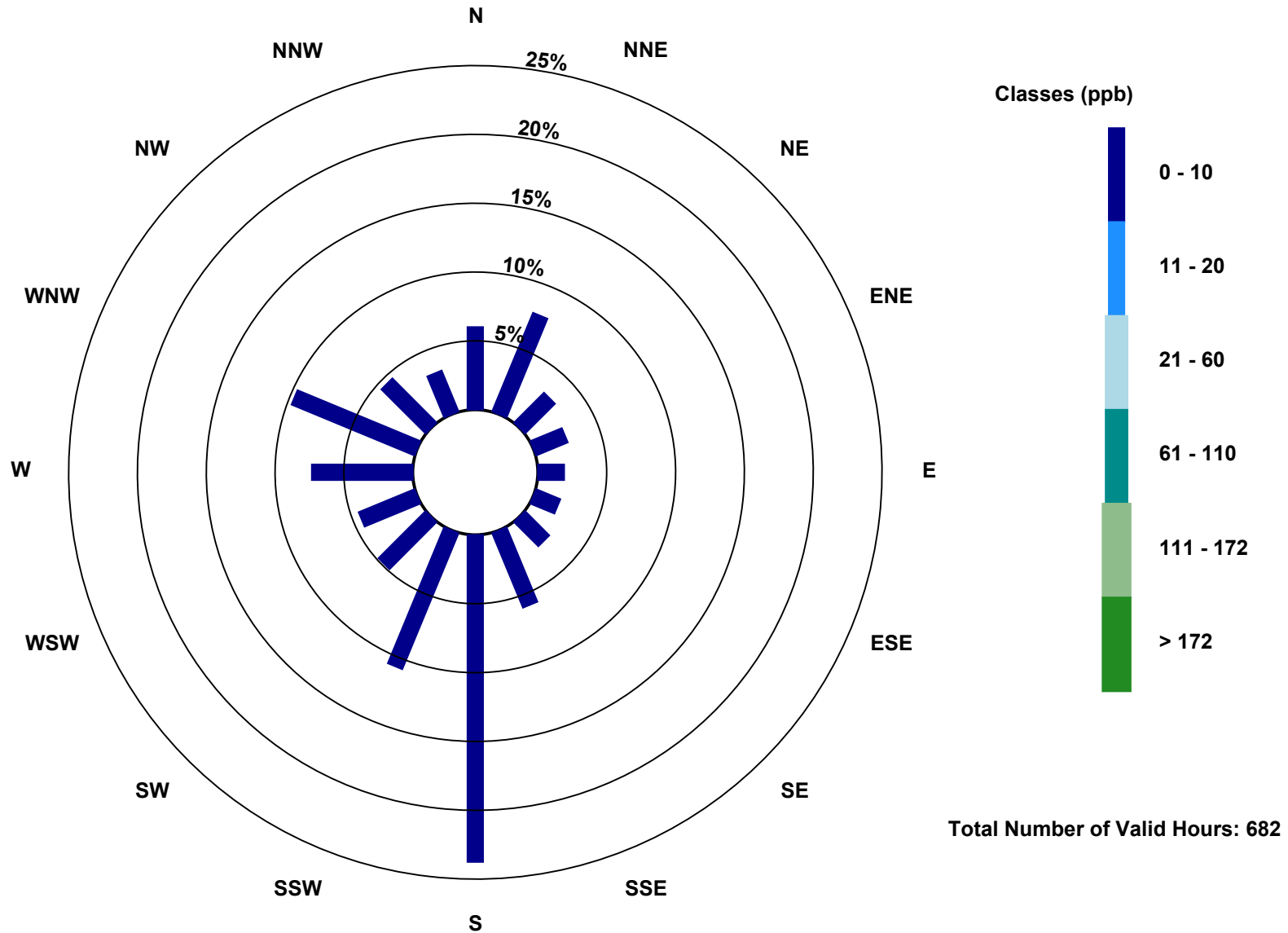
Total Number of Valid Hours: 682

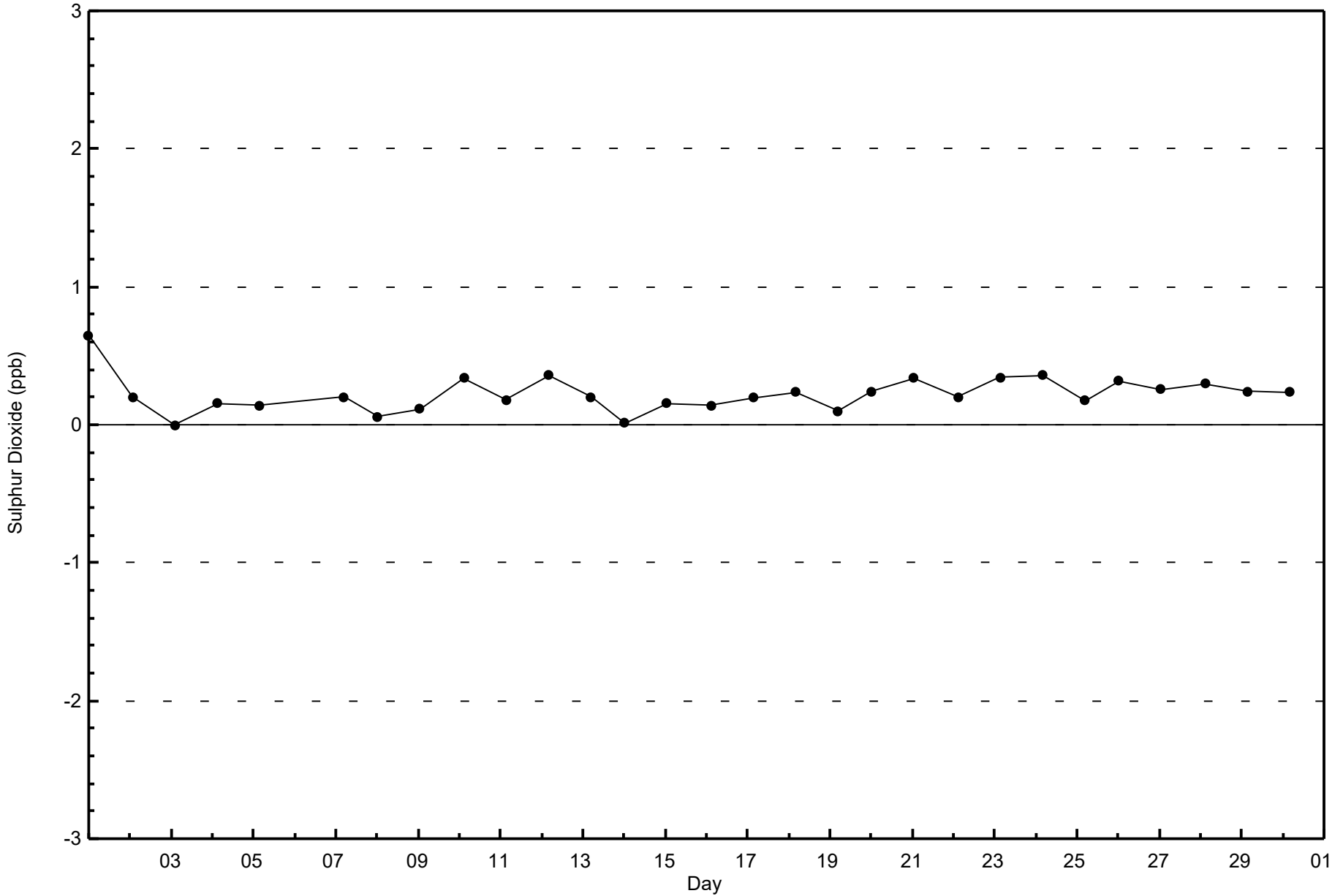
Total Number of Hours: 720

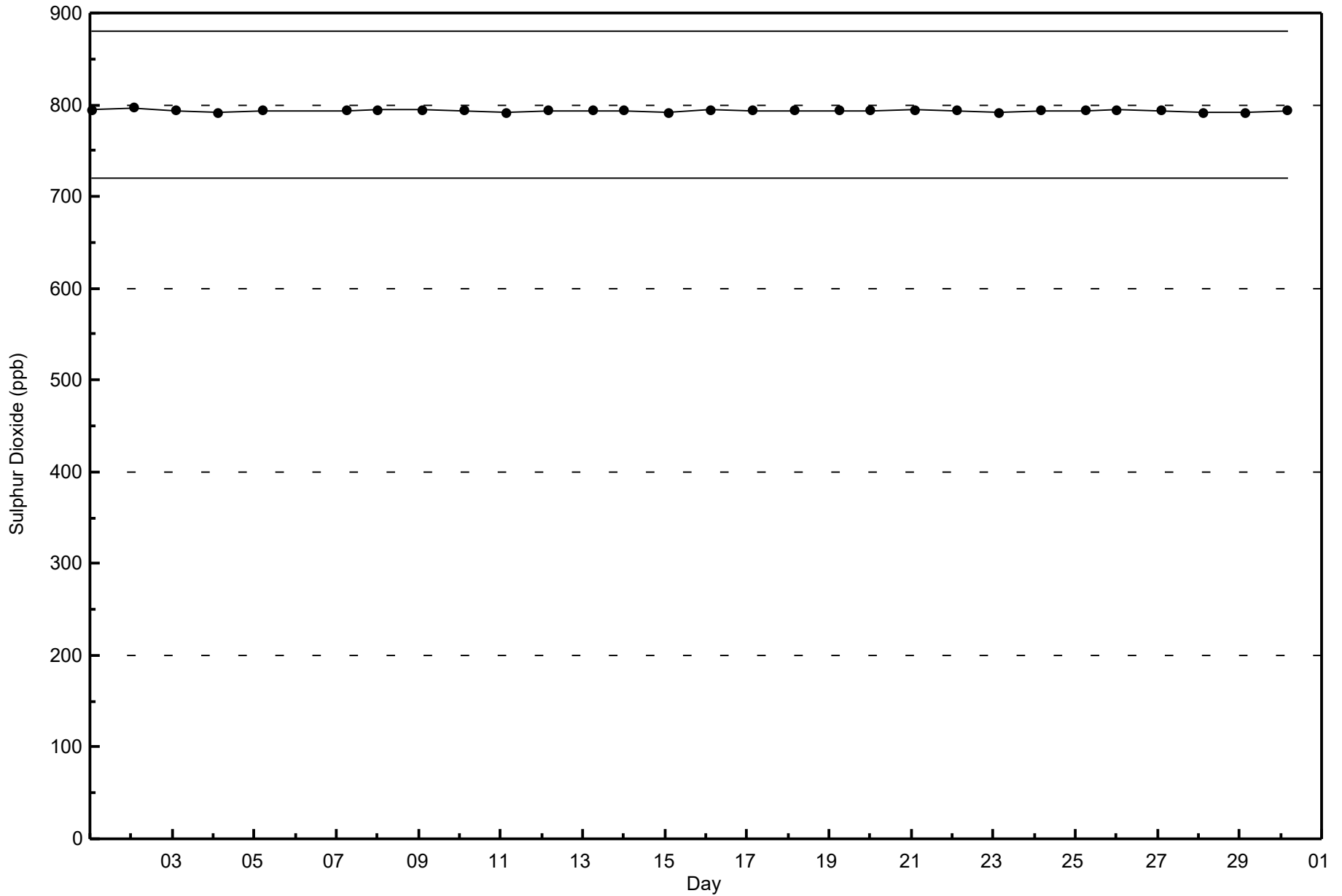


Wood Buffalo Environmental Association  
Wind Rose Nov 2023

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

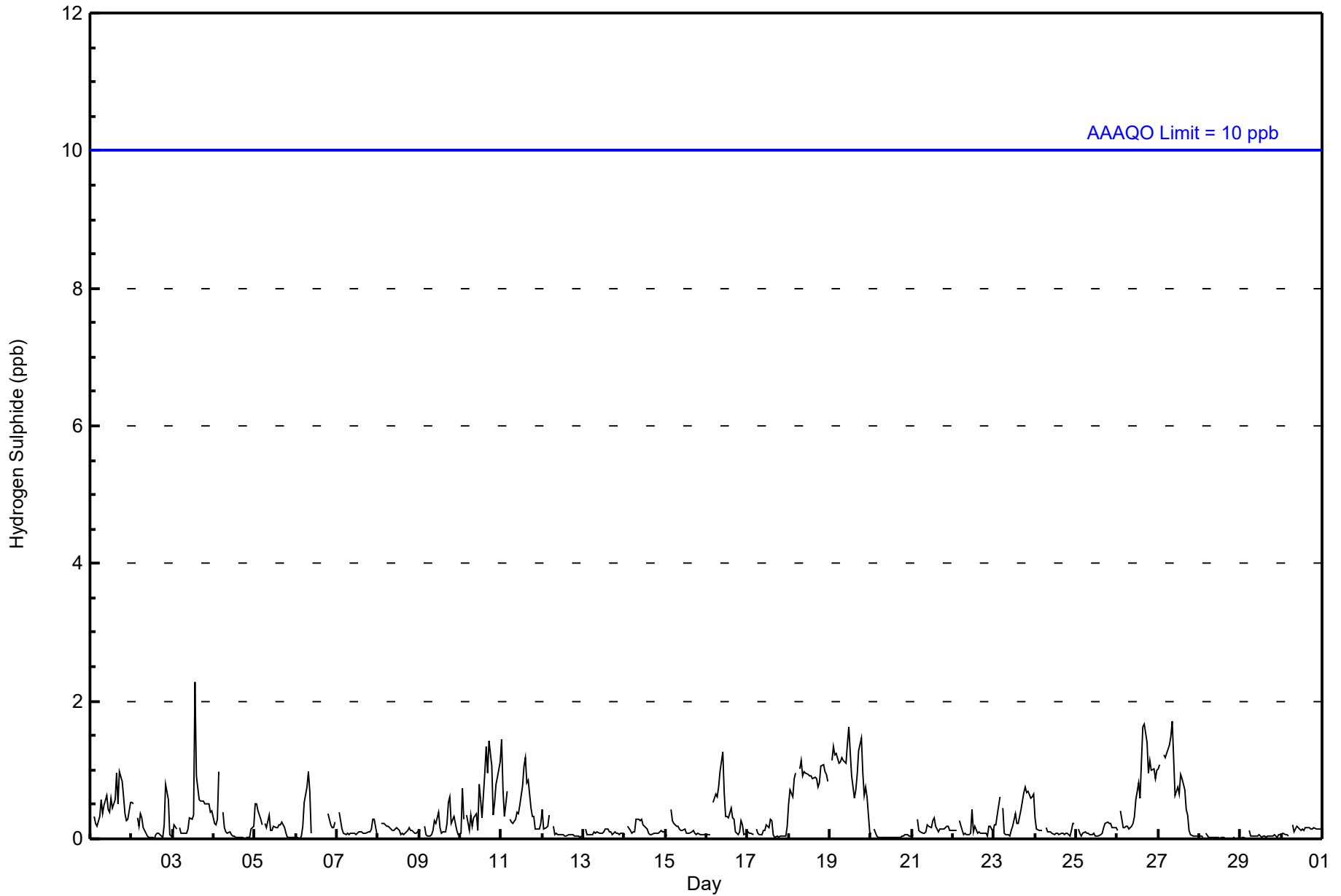








Number of Exceedences (AAAQO):		1-hr: 0	24-hr: 0																		Hours in Service:	720				
Maximum Value: 2.3 ppb on Nov 3 14:00		Maximum Daily Average: 1.0 ppb on Nov 19																	Hours of Data:	682						
Minimum Value: 0.0 ppb on Nov 28 19:00		Minimum Daily Average: 0.0 ppb on Nov 28																	Hours of Missing Data:	38						
Maximum Diurnal Average: 0.3 ppb at hour 18		Minimum Diurnal Average: 0.2 ppb at hour 23																	Hours of Calibration:	38						
Monthly Average: 0.29 ppb		Percentiles: P <sub>1</sub> = 0.0 P <sub>10</sub> = 0.0 Q <sub>1</sub> = 0.1 Median = 0.1 Q <sub>3</sub> = 0.3 P <sub>90</sub> = 0.9 P <sub>99</sub> = 1.5																	Percent Operational Time:	100.0						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	0.4	Z	0.3	0.2	0.2	0.3	0.6	0.4	0.5	0.6	0.4	0.4	0.6	0.5	0.6	0.9	0.5	1.0	0.8	0.6	0.4	0.3	0.3	0.5	0.5	1.0
2-Nov	0.5	0.5	Z	0.3	0.2	0.4	0.3	0.2	0.1	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.0	0.2	0.8	0.6	0.1	0.0	0.2	0.8	0.8
3-Nov	0.0	0.2	0.1	Z	0.2	0.1	0.1	0.1	0.1	0.1	0.3	0.3	0.3	2.3	0.9	0.6	0.5	0.6	0.5	0.5	0.5	0.4	0.4	0.4	0.4	2.3
4-Nov	0.2	0.2	0.3	1.0	Z	0.4	0.2	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.1	1.0	
5-Nov	0.5	0.5	0.4	0.3	0.2	Z	0.2	0.2	0.3	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.5	0.5
6-Nov	0.0	0.0	0.0	0.0	0.2	0.5	0.8	1.0	0.7	0.1	C	C	C	C	C	C	C	C	C	0.4	0.2	0.2	0.2	0.2	--	1.0
7-Nov	Z	0.4	0.3	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.3	0.3	0.1	0.1	0.4
8-Nov	0.1	Z	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.2	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	0.2
9-Nov	0.1	0.1	Z	0.2	0.1	0.0	0.0	0.1	0.1	0.3	0.2	0.4	0.2	0.1	0.1	0.1	0.2	0.5	0.6	0.2	0.3	0.2	0.1	0.1	0.2	0.6
10-Nov	0.1	0.7	0.3	Z	0.4	0.1	0.3	0.2	0.3	0.4	0.1	0.8	0.6	0.3	1.0	1.3	1.0	1.4	1.1	0.3	0.5	0.8	0.9	1.1	0.6	1.4
11-Nov	1.5	0.7	0.3	0.7	Z	0.3	0.2	0.2	0.3	0.4	0.4	0.5	0.8	1.1	1.2	0.8	0.8	0.4	0.3	0.3	0.1	0.1	0.1	0.2	0.5	1.5
12-Nov	0.4	0.1	0.2	0.2	0.3	Z	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.4
13-Nov	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
14-Nov	0.1	Z	0.2	0.1	0.1	0.1	0.1	0.3	0.3	0.3	0.3	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.3
15-Nov	0.1	0.0	Z	0.4	0.3	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	0.4
16-Nov	0.1	0.1	0.1	Z	0.5	0.7	0.6	0.8	1.0	1.3	0.7	0.3	0.3	0.3	0.5	0.3	0.3	0.1	0.1	0.1	0.3	0.2	0.1	0.1	0.4	1.3
17-Nov	0.1	0.1	0.1	0.1	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.3	0.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.1	0.3
18-Nov	0.5	0.7	0.6	0.9	0.9	Z	1.0	1.1	0.9	1.0	1.0	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.7	0.8	1.1	1.1	1.0	0.9	0.9	1.1
19-Nov	Z	1.1	1.4	1.2	1.2	1.1	1.1	1.2	1.1	1.1	1.4	1.6	1.3	0.9	0.6	0.7	0.9	1.3	1.5	1.0	0.6	0.8	0.6	0.1	1.0	1.6
20-Nov	0.1	Z	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.1
21-Nov	0.0	0.1	Z	0.3	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.3	0.3	0.2	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.1	0.1	0.2	0.3
22-Nov	0.1	0.1	0.1	Z	0.3	0.1	0.1	0.1	0.1	0.1	0.1	0.4	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.2	0.2	0.1	0.1	0.4
23-Nov	0.2	0.2	0.3	0.6	Z	0.5	0.1	0.1	0.1	0.0	0.1	0.2	0.4	0.2	0.2	0.3	0.4	0.7	0.8	0.7	0.7	0.6	0.6	0.7	0.4	0.8
24-Nov	0.3	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	0.0	0.1	0.2	0.2	0.1	0.3
25-Nov	Z	0.2	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.0	0.1	0.1	0.2	0.2	0.3	0.2	0.2	0.2	0.2	0.2	0.1	0.3
26-Nov	0.1	Z	0.4	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.6	0.8	0.6	1.1	1.6	1.7	1.4	1.0	1.1	1.0	1.0	0.9	1.0	0.7	1.7
27-Nov	1.0	1.1	Z	1.2	1.2	1.2	1.4	1.5	1.7	1.2	0.6	0.7	0.6	0.9	0.9	0.7	0.4	0.3	0.1	0.1	0.0	0.1	0.0	0.0	0.7	1.7
28-Nov	0.0	0.0	0.0	Z	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
29-Nov	0.0	0.0	0.0	0.0	Z	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	0.1	0.0	0.1	0.1	0.0	0.1
30-Nov	0.1	0.1	0.1	0.1	0.0	Z	0.2	0.1	0.1	0.2	0.2	0.1	0.1	0.1	0.2	0.2	0.2	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.2
																								Diurnal Average		
																								Diurnal Maximum		
																								0.3 0.3 0.2 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.2 0.2		
																								1.5 1.1 1.4 1.2 1.2 1.2 1.4 1.5 1.7 1.3 1.4 1.6 1.3 2.3 1.2 1.6 1.7 1.4 1.5 1.1 1.1 1.0 0.9 1.1		
Z - zerospan C - Calibration																										
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 10 ppb 24-hr 3 ppb																										







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

**Hydrogen Sulphide (H<sub>2</sub>S) - ppb**  
**Fort McKay - Bertha Ganter - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
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 (H<sub>2</sub>S) - ppb  
Fort McKay - Bertha Ganter - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 2	45	52	21	16	13	13	16	44	155	71	34	30	51	64	31	22	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
<b>Totals</b>	45	52	21	16	13	13	16	44	155	71	34	30	51	64	31	22	678

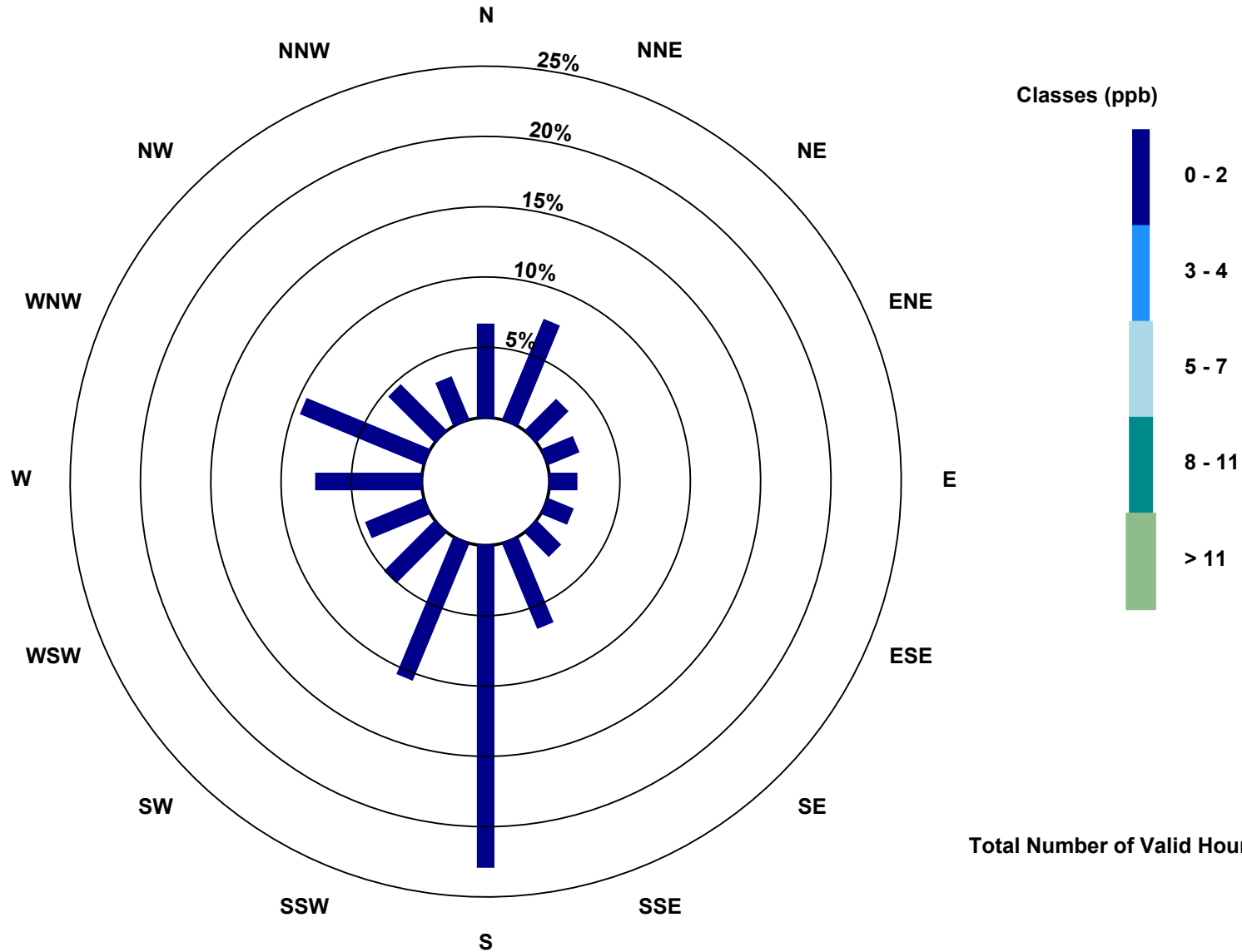
Total Number of Valid Hours: 678

Total Number of Hours: 720

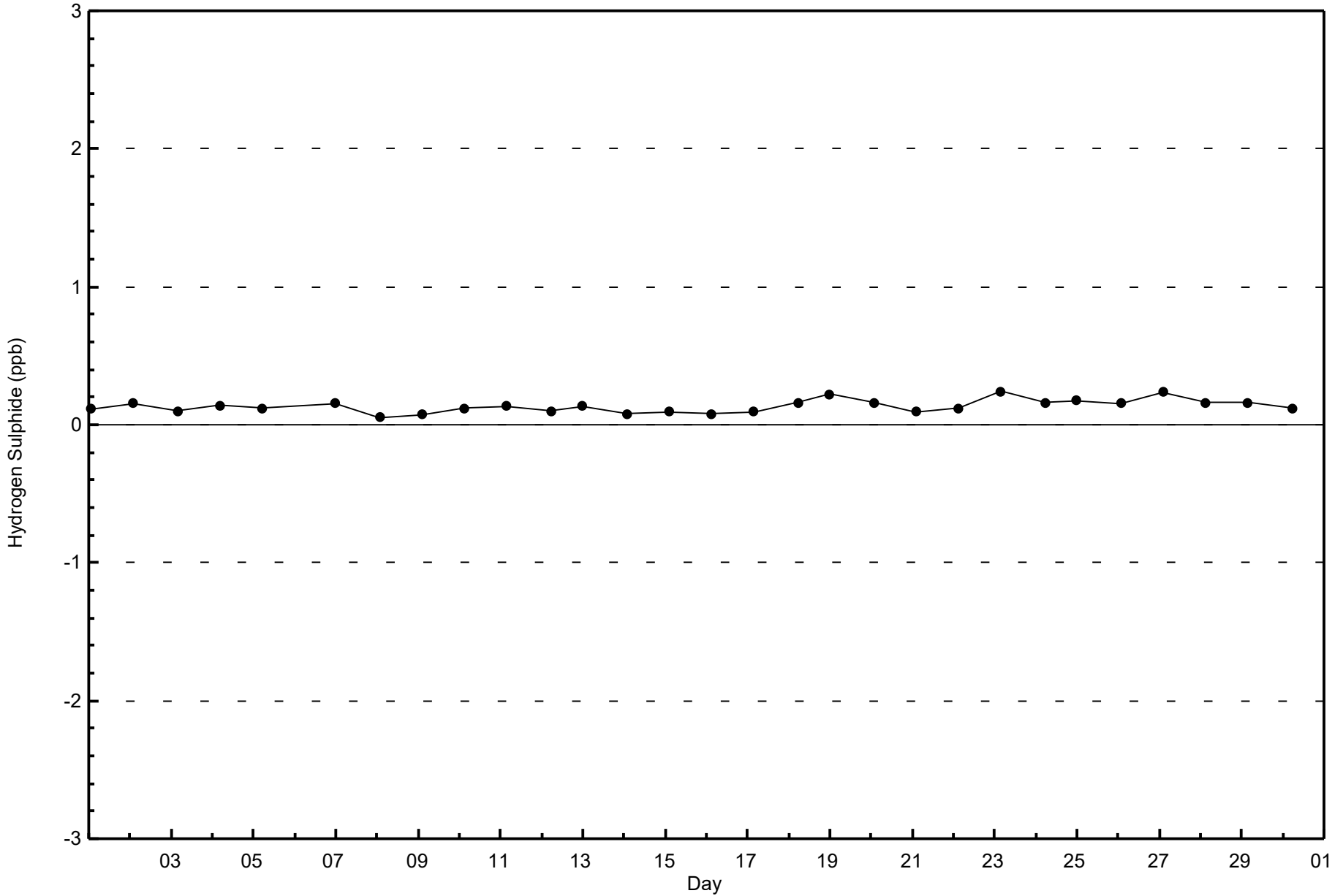


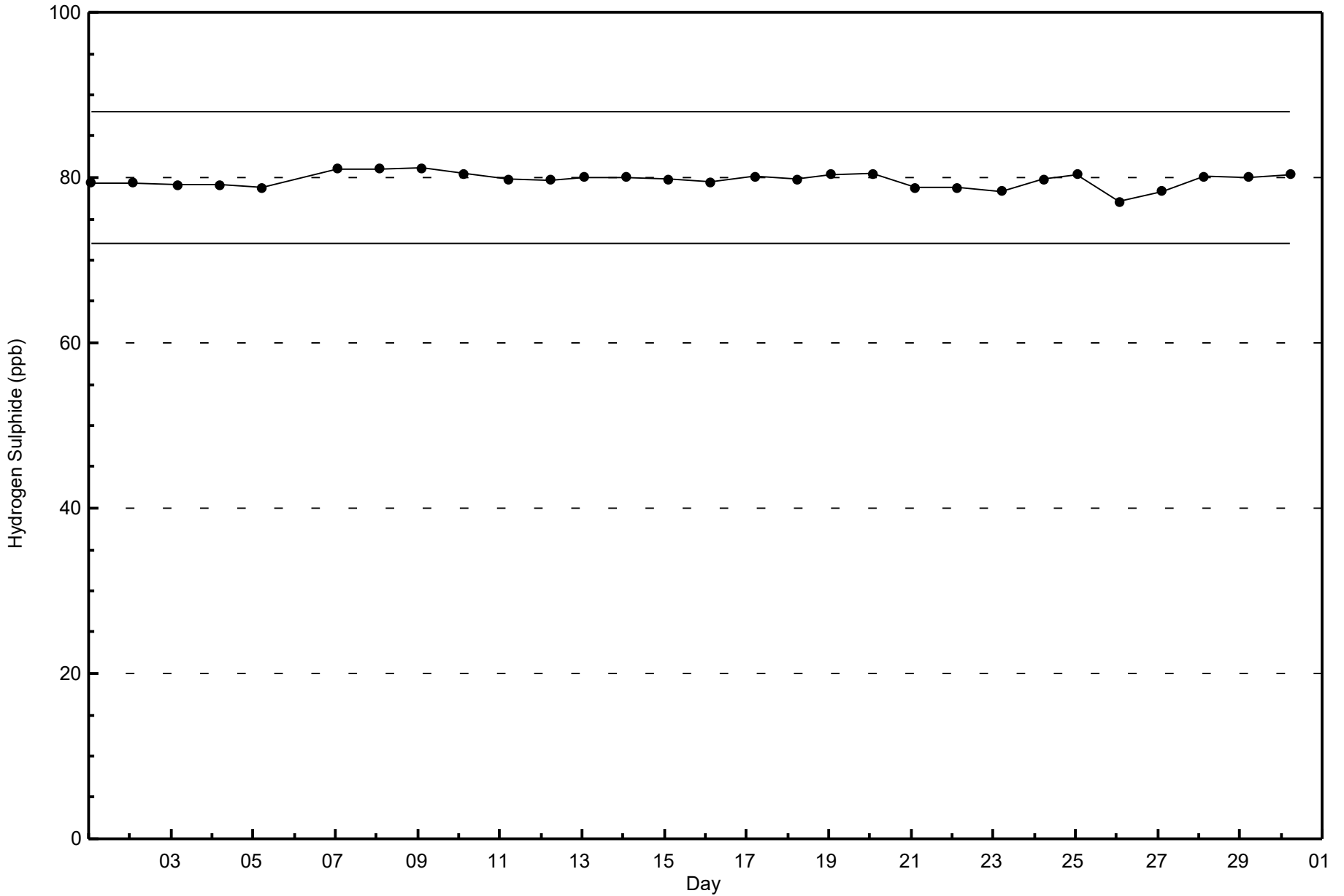
Wood Buffalo Environmental Association  
Wind Rose Nov 2023

Hydrogen Sulphide (H<sub>2</sub>S) - ppb  
Fort McKay - Bertha Ganter



Total Number of Valid Hours: 678







Wood Buffalo Environmental Association

Summary of Hour Averages

Total Reduced Sulphur (TRS) - ppb

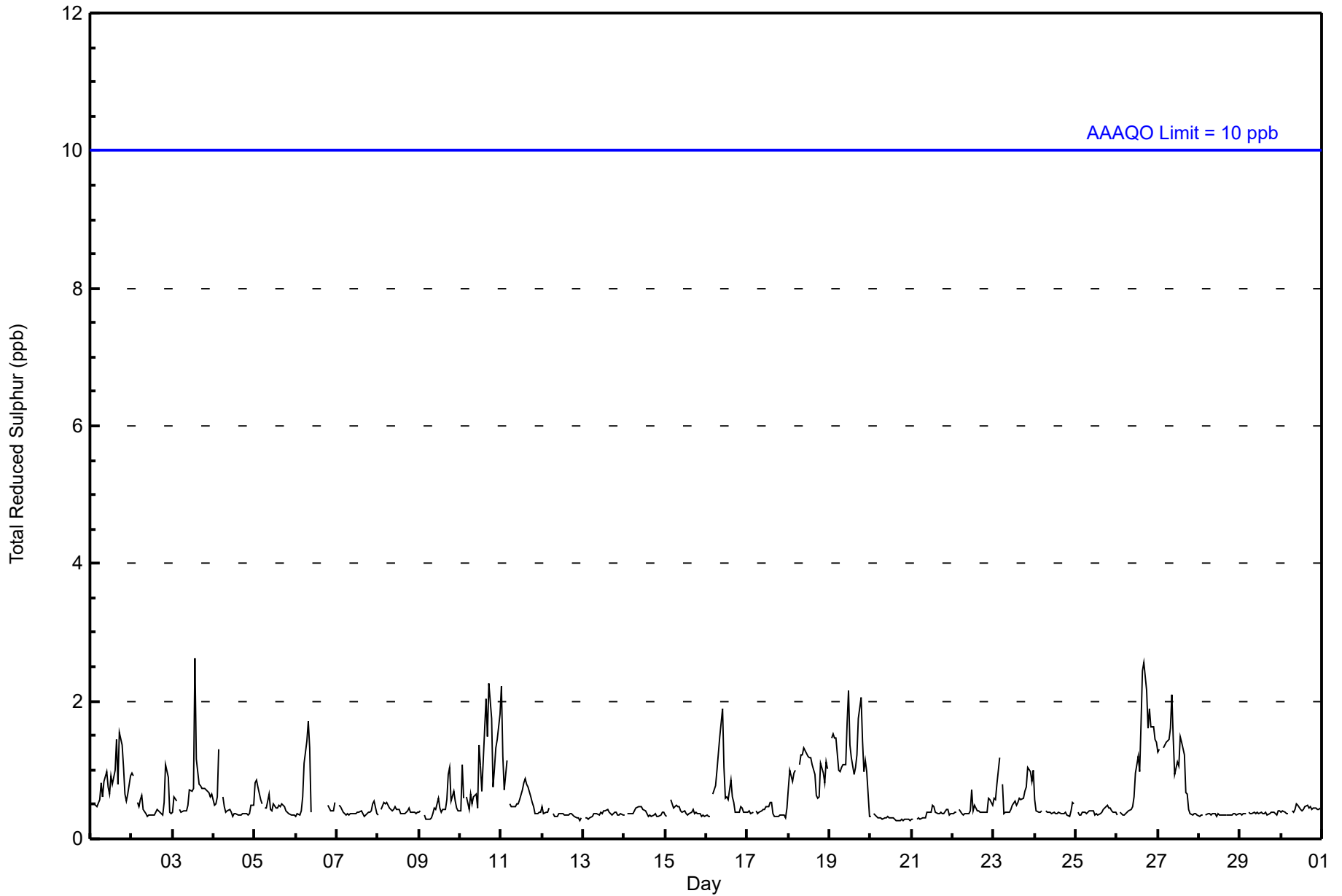
Fort McKay - Bertha Ganter - November 2023

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 2.6 ppb on Nov 3 14:00	Maximum Daily Average: 1.3 ppb on Nov 19		Hours of Data:	682
Minimum Value: 0.3 ppb on Nov 21 00:00	Minimum Daily Average: 0.3 ppb on Nov 20		Hours of Missing Data:	38
Maximum Diurnal Average: 0.7 ppb at hour 16	Minimum Diurnal Average: 0.5 ppb at hour 3		Hours of Calibration:	38
Monthly Average: 0.58 ppb	Percentiles: P <sub>1</sub> = 0.3 P <sub>10</sub> = 0.3 Q <sub>1</sub> = 0.4 Median = 0.4 Q <sub>3</sub> = 0.6 P <sub>90</sub> = 1.1 P <sub>99</sub> = 2.1		Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	0.6	Z	0.5	0.5	0.5	0.6	0.8	0.6	0.8	1.0	0.7	0.7	0.9	0.8	1.0	1.4	0.8	1.5	1.4	1.0	0.6	0.6	0.6	0.9	0.8	1.5
2-Nov	1.0	0.9	Z	0.5	0.5	0.6	0.6	0.4	0.4	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.3	0.5	1.1	0.9	0.4	0.4	0.5	1.1
3-Nov	0.4	0.6	0.6	Z	0.4	0.4	0.4	0.4	0.4	0.5	0.7	0.7	0.7	2.6	1.2	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.6	0.7	0.7	2.6
4-Nov	0.5	0.5	0.6	1.3	Z	0.6	0.5	0.4	0.4	0.4	0.4	0.3	0.4	0.4	0.3	0.4	0.3	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.5	1.3
5-Nov	0.8	0.9	0.8	0.6	0.5	Z	0.4	0.5	0.6	0.4	0.4	0.5	0.5	0.4	0.5	0.5	0.5	0.5	0.4	0.4	0.4	0.3	0.4	0.3	0.5	0.9
6-Nov	0.3	0.4	0.3	0.4	0.6	1.1	1.4	1.7	1.3	0.4	C	C	C	C	C	C	C	C	C	0.5	0.4	0.4	0.4	0.5	--	1.7
7-Nov	Z	0.5	0.5	0.4	0.4	0.3	0.4	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.4	0.4	0.4	0.4	0.5	0.5	0.4	0.4	0.5
8-Nov	0.4	Z	0.4	0.5	0.5	0.5	0.5	0.4	0.4	0.4	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5
9-Nov	0.4	0.4	Z	0.4	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.6	0.4	0.4	0.4	0.4	0.6	0.9	1.0	0.6	0.7	0.6	0.4	0.4	1.0
10-Nov	0.4	1.1	0.6	Z	0.6	0.4	0.6	0.5	0.6	0.6	0.4	1.4	1.1	0.7	1.6	2.0	1.5	2.3	1.7	0.7	1.0	1.3	1.5	1.8	1.1	2.3
11-Nov	2.2	1.2	0.7	1.1	Z	0.5	0.5	0.5	0.5	0.5	0.5	0.6	0.7	0.8	0.9	0.8	0.8	0.6	0.5	0.5	0.4	0.4	0.4	0.4	0.7	2.2
12-Nov	0.5	0.4	0.4	0.4	0.5	Z	0.4	0.3	0.3	0.3	0.4	0.4	0.4	0.3	0.4	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.5
13-Nov	Z	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
14-Nov	0.4	Z	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.4	0.4	0.4	0.3	0.3	0.4	0.4	0.4	0.3	0.3	0.3	0.4	0.4	0.4	0.5
15-Nov	0.4	0.3	Z	0.6	0.5	0.5	0.5	0.5	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.3	0.4	0.6
16-Nov	0.3	0.3	0.3	Z	0.6	0.8	1.0	1.2	1.5	1.9	1.0	0.6	0.6	0.6	0.9	0.6	0.5	0.4	0.4	0.4	0.5	0.4	0.4	0.4	0.7	1.9
17-Nov	0.4	0.4	0.4	0.4	Z	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.5
18-Nov	0.7	1.0	0.8	0.9	1.0	Z	1.1	1.2	1.2	1.3	1.3	1.2	1.2	1.2	1.1	0.9	0.6	0.6	0.6	1.1	1.0	0.8	1.1	1.0	1.0	1.3
19-Nov	Z	1.5	1.5	1.5	1.5	1.0	1.0	1.0	1.1	1.1	1.7	2.2	1.4	1.2	0.9	1.0	1.2	1.7	2.1	1.4	1.0	1.1	1.0	0.3	2.2	
20-Nov	0.3	Z	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4
21-Nov	0.3	0.3	Z	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.5	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5
22-Nov	0.4	0.4	0.4	Z	0.4	0.4	0.3	0.4	0.4	0.4	0.4	0.7	0.4	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.6	0.6	0.5	0.4	0.7
23-Nov	0.6	0.6	0.8	1.2	Z	0.8	0.4	0.4	0.4	0.4	0.4	0.5	0.6	0.5	0.5	0.6	0.6	0.6	0.7	0.7	1.0	1.0	0.8	1.0	0.7	1.2
24-Nov	0.6	0.4	0.4	0.4	0.4	Z	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.4	0.5	0.5	0.4	0.6
25-Nov	Z	0.4	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.4	0.4	0.4	0.4	0.5
26-Nov	0.3	Z	0.4	0.3	0.3	0.4	0.4	0.4	0.4	0.5	0.6	1.0	1.2	1.0	1.7	2.4	2.6	2.2	1.6	1.9	1.6	1.6	1.4	1.4	1.1	2.6
27-Nov	1.3	1.3	Z	1.3	1.4	1.4	1.4	1.6	2.1	1.5	0.9	1.1	1.1	1.5	1.4	1.2	0.7	0.6	0.4	0.4	0.4	0.4	0.4	0.3	1.0	2.1
28-Nov	0.3	0.3	0.4	Z	0.3	0.4	0.4	0.3	0.4	0.4	0.3	0.4	0.3	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.3	0.4	0.3	0.4
29-Nov	0.4	0.3	0.4	0.4	Z	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
30-Nov	0.4	0.4	0.4	0.4	0.4	Z	0.4	0.4	0.4	0.5	0.5	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5

0.6	0.6	0.5	0.6	0.5	0.5	0.5	0.6	0.6	0.6	0.5	0.6	0.6	0.6	0.6	0.7	0.6	0.7	0.6	0.6	0.6	0.6	0.6	0.5	0.5	Diurnal Average	
2.2	1.5	1.5	1.5	1.5	1.4	1.4	1.7	2.1	1.9	1.7	2.2	1.4	2.6	1.7	2.4	2.6	2.3	2.1	1.9	1.6	1.6	1.5	1.8	Diurnal Maximum		

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





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

**Total Reduced Sulphur (TRS) - ppb**  
**Fort McKay - Bertha Ganter - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2	680	99.71	99.71
3 - 4	2	0.29	100.00
5 - 7	0	0.00	100.00
8 - 11	0	0.00	100.00
> 11	0	0.00	100.00

Total Number of Valid Hours: 682

Total Number of Hours: 720





**Wood Buffalo Environmental Association  
Frequency Distribution**

**Total Reduced Sulphur (TRS) - ppb  
Fort McKay - Bertha Ganter - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	44	52	21	16	13	13	16	44	154	71	34	30	51	64	31	22	676
3 - 4	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	2
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	45	52	21	16	13	13	16	44	155	71	34	30	51	64	31	22	678

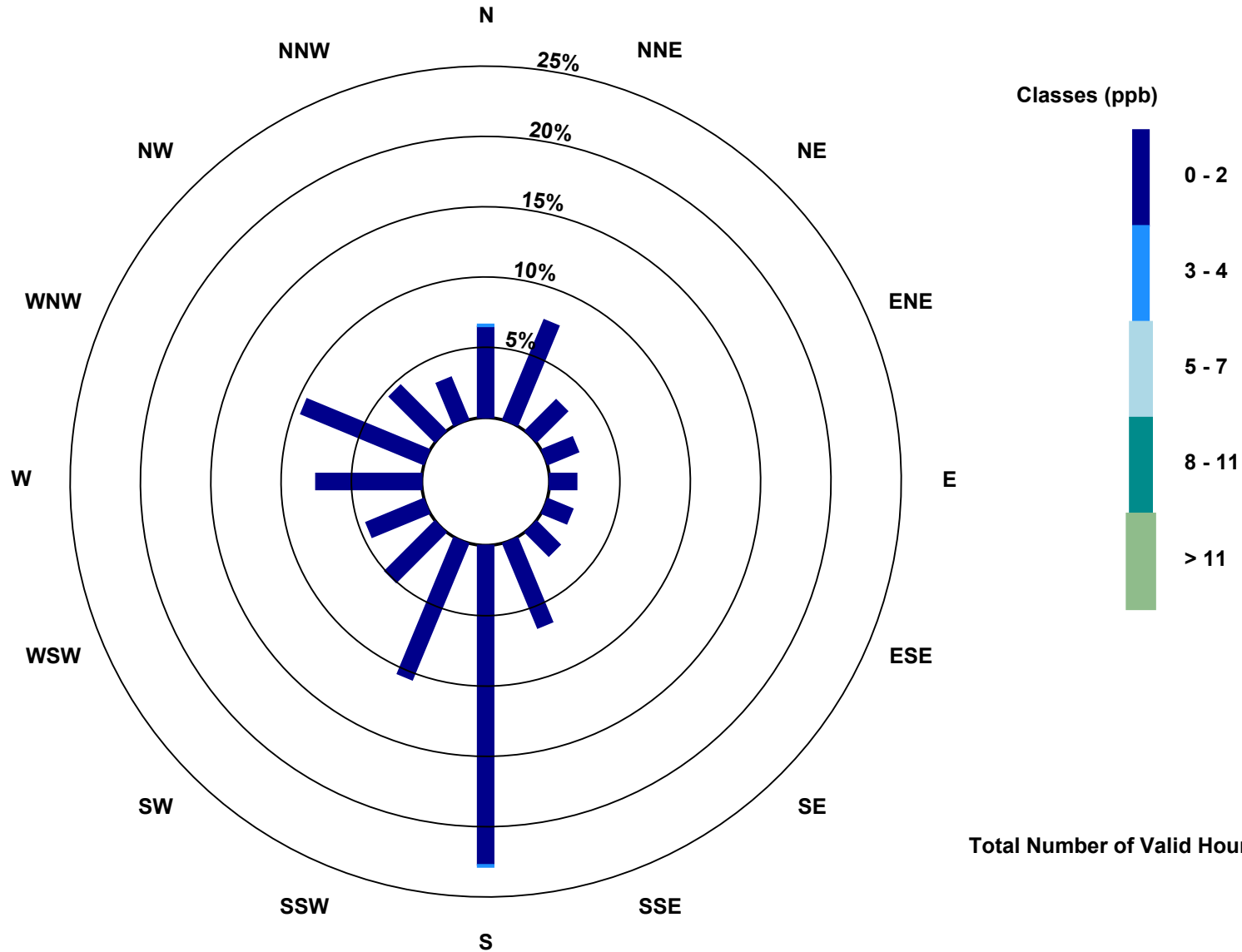
Total Number of Valid Hours: 678

Total Number of Hours: 720

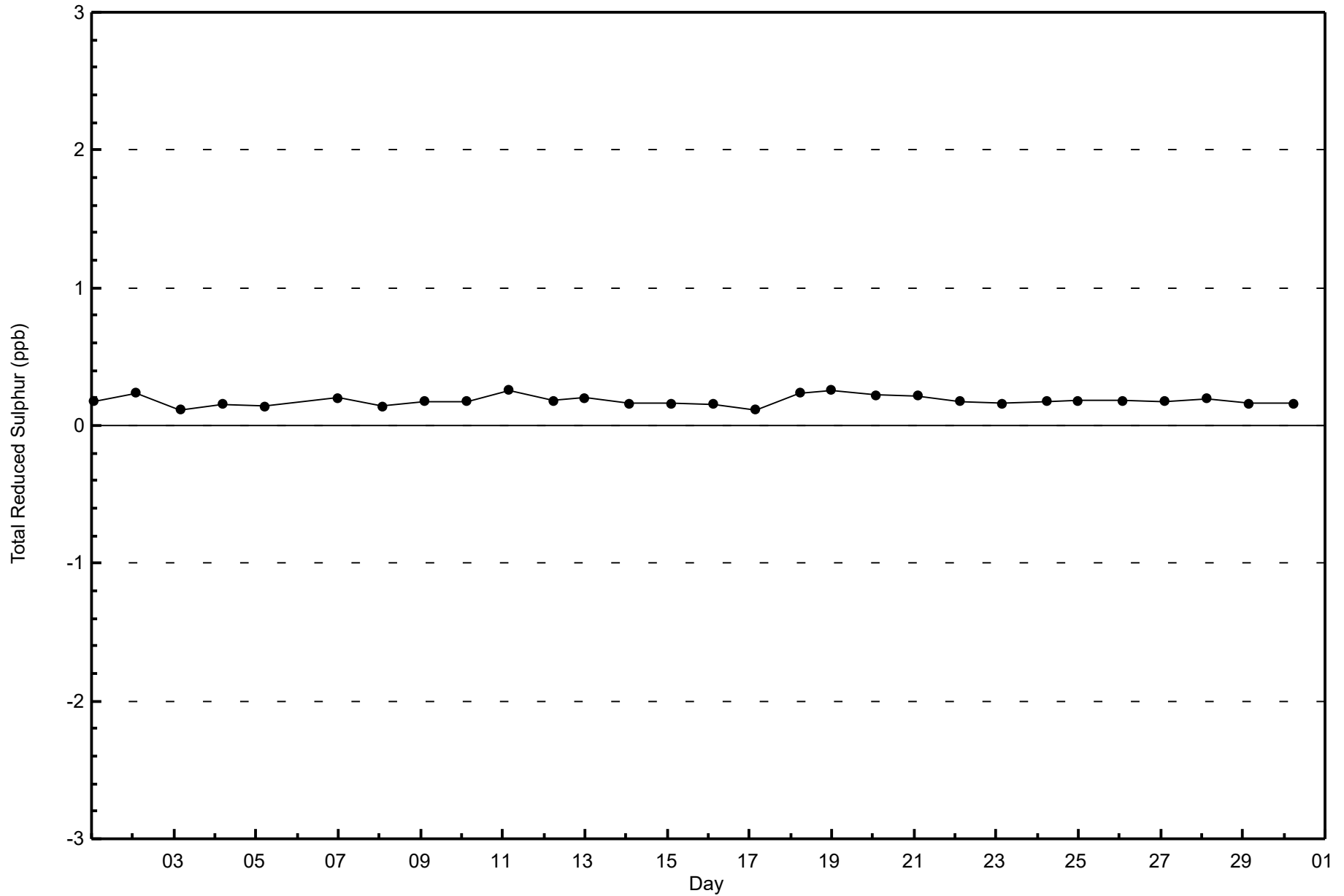


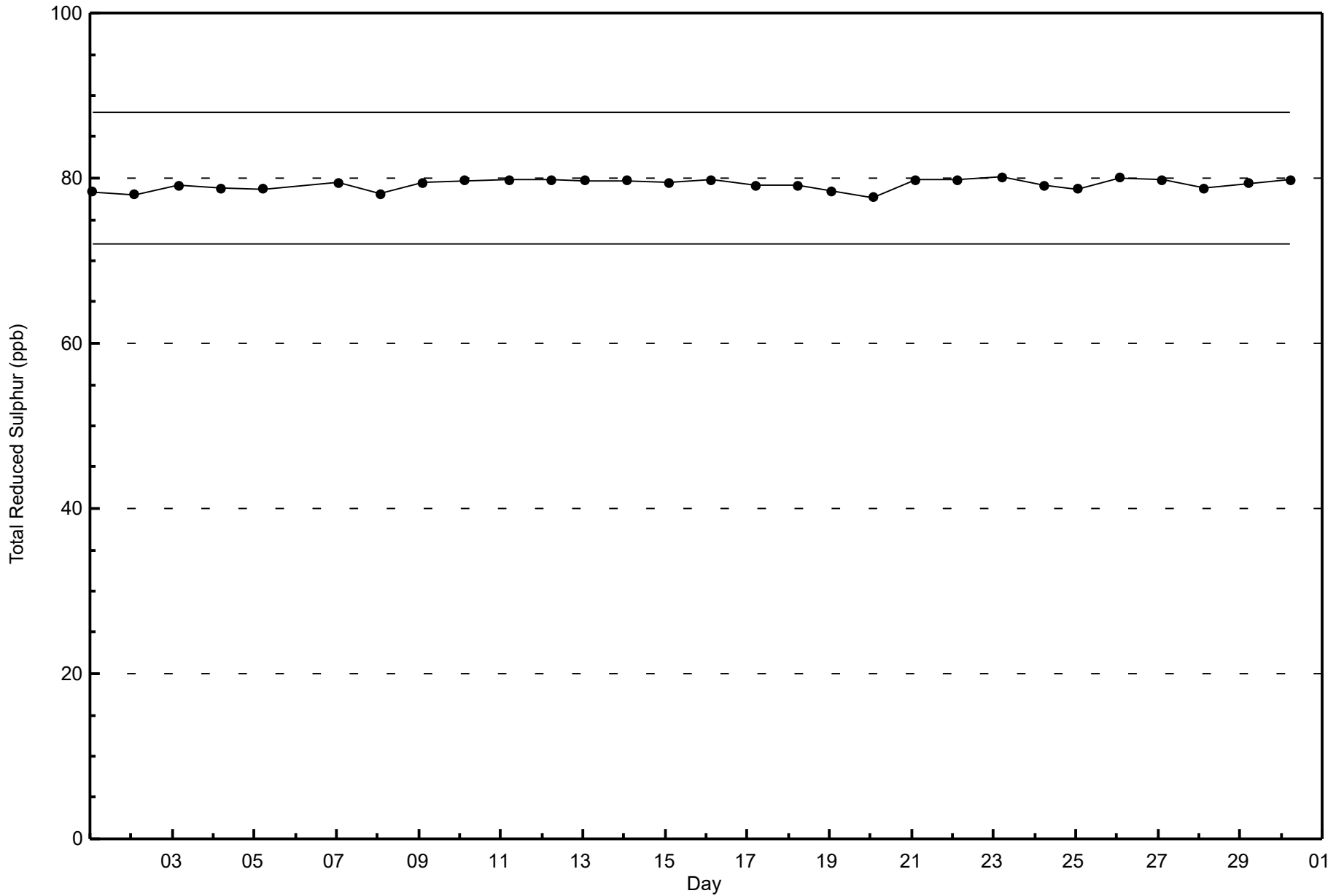
Wood Buffalo Environmental Association  
Wind Rose Nov 2023

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



Total Number of Valid Hours: 678



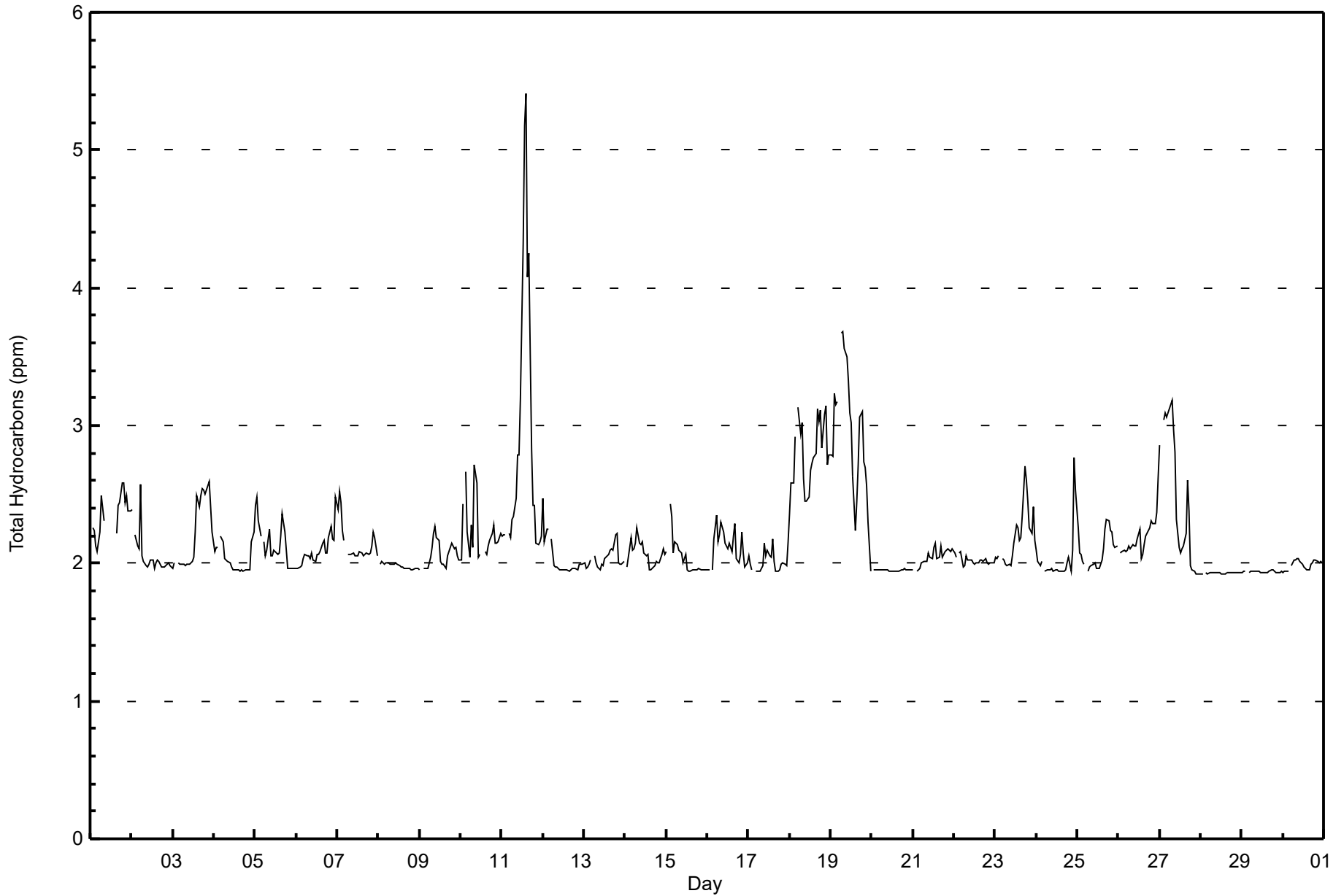




**Wood Buffalo Environmental Association**  
**Summary of Hour Averages**

**Total Hydrocarbons (THC) - ppm**  
**Fort McKay - Bertha Ganter - November 2023**

Maximum Value: 5.4 ppm on Nov 11 15:00		Maximum Daily Average: 2.9 ppm on Nov 19		Hours in Service: 720																						
Minimum Value: 1.9 ppm on Nov 27 23:00		Minimum Daily Average: 1.9 ppm on Nov 28		Hours of Data: 683																						
Maximum Diurnal Average: 2.2 ppm at hour 17		Minimum Diurnal Average: 2.1 ppm at hour 11		Hours of Missing Data: 37																						
Monthly Average: 2.17 ppm		Percentiles: P <sub>1</sub> = 1.9 P <sub>10</sub> = 1.9 Q <sub>1</sub> = 2.0 Median = 2.0 Q <sub>3</sub> = 2.2 P <sub>90</sub> = 2.6 P <sub>99</sub> = 3.6		Hours of Calibration: 35																						
				Percent Operational Time: 99.7																						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	Z	2.3	2.2	2.1	2.1	2.2	2.5	2.4	2.3	C	C	C	C	C	C	2.2	2.4	2.4	2.6	2.6	2.4	2.5	2.4	2.4	--	2.6
2-Nov	2.4	Z	2.2	2.1	2.1	2.6	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.6
3-Nov	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.2	2.5	2.4	2.5	2.5	2.5	2.5	2.6	2.6	2.4	2.2	2.2	2.6	
4-Nov	2.1	2.1	2.1	Z	2.2	2.2	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	2.2	2.2	2.0	2.2
5-Nov	2.4	2.5	2.3	2.2	Z	2.2	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.4	2.2	2.1	2.0	2.0	2.0	2.0	2.1	2.5	
6-Nov	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.0	2.1	2.0	2.0	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.2	2.3	2.2	2.2	2.5	2.1	2.5
7-Nov	2.4	2.5	2.4	2.2	2.2	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.1	2.1	2.5	
8-Nov	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
9-Nov	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.1	2.2	2.3	2.2	2.2	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.2	2.1	2.1	2.1	2.0	2.1	2.3
10-Nov	2.0	2.4	Z	2.7	2.2	2.0	2.3	2.1	2.7	2.6	2.0	2.1	M	M	2.1	2.1	2.1	2.2	2.2	2.3	2.1	2.1	2.2	2.2	2.2	2.7
11-Nov	2.2	2.2	2.2	Z	2.2	2.2	2.3	2.3	2.5	2.8	2.8	3.2	4.3	5.2	5.4	4.1	4.3	2.8	2.4	2.4	2.1	2.1	2.2	2.2	2.9	5.4
12-Nov	2.5	2.2	2.2	2.2	Z	2.2	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	2.0	2.0	2.0	2.5	
13-Nov	2.0	2.0	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.0	2.0	2.0	2.0	2.2	
14-Nov	Z	2.0	2.0	2.2	2.1	2.1	2.1	2.3	2.1	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	2.3	
15-Nov	2.1	Z	2.4	2.3	2.1	2.2	2.1	2.1	2.1	2.1	2.0	2.1	2.0	1.9	1.9	2.0	2.0	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.4	
16-Nov	2.0	2.0	Z	2.0	2.2	2.3	2.2	2.2	2.3	2.2	2.1	2.1	2.1	2.1	2.1	2.2	2.3	2.0	2.0	2.1	2.2	2.1	2.0	2.0	2.1	2.3
17-Nov	2.1	2.0	2.0	Z	1.9	1.9	1.9	1.9	2.0	2.1	2.1	2.1	2.1	2.0	2.2	2.0	1.9	1.9	2.0	2.0	2.0	2.0	2.2	2.0	2.2	
18-Nov	2.4	2.6	2.6	2.9	Z	3.1	2.9	3.0	2.6	2.5	2.4	2.5	2.7	2.7	2.8	2.8	3.1	3.0	3.1	2.8	3.1	3.1	2.7	2.8	2.8	3.1
19-Nov	2.8	2.8	3.2	3.1	3.2	Z	3.7	3.7	3.6	3.5	3.3	3.1	3.0	2.6	2.2	2.4	2.7	3.1	3.1	2.7	2.7	2.6	2.3	1.9	2.9	3.7
20-Nov	Z	1.9	2.0	2.0	1.9	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	1.9	1.9	1.9	1.9	2.0
21-Nov	2.0	Z	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.0	2.1	2.1	2.0	2.0	2.1	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.1
22-Nov	2.1	2.0	Z	2.1	2.1	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1
23-Nov	2.0	2.0	2.1	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.2	2.3	2.3	2.2	2.2	2.3	2.7	2.6	2.5	2.3	2.2	2.4	2.2	2.2	2.7
24-Nov	2.1	2.0	2.0	2.0	Z	1.9	1.9	2.0	2.0	2.0	1.9	2.0	2.0	1.9	1.9	1.9	1.9	2.0	2.0	1.9	2.1	2.8	2.5	2.0	2.0	2.8
25-Nov	2.3	2.1	2.1	2.0	2.0	Z	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.2	2.3	2.3	2.2	2.2	2.1	2.1	2.1	2.1	2.3
26-Nov	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.0	2.1	2.1	2.2	2.2	2.3	2.3	2.3	2.3	2.4	2.6	2.2	2.6
27-Nov	2.9	Z	3.0	3.1	3.1	3.1	3.2	3.2	3.0	2.8	2.3	2.1	2.1	2.1	2.1	2.2	2.6	2.4	2.0	1.9	1.9	1.9	1.9	1.9	2.5	3.2
28-Nov	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
29-Nov	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	1.9	1.9	1.9	1.9	1.9	1.9	2.0
30-Nov	1.9	1.9	1.9	1.9	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
																								Diurnal Average		
																								Diurnal Maximum		
Z - zerospan      C - Calibration      M - Maintenance																										





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

**Total Hydrocarbons (THC) - ppm**  
**Fort McKay - Bertha Ganter - November 2023**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2.0	346	50.66	50.66
2.1 - 3.0	310	45.39	96.05
3.1 - 10.0	27	3.95	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 683

Total Number of Hours: 720



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

**Total Hydrocarbons (THC) - ppm**  
**Fort McKay - Bertha Ganter - November 2023**

<b>Concentration</b> <b>Ranges (ppm)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	15	20	11	13	11	12	16	19	33	24	12	20	43	55	28	13	345
2.1 - 3.0	24	33	9	4	1	1	1	15	121	44	18	10	7	10	2	8	308
3.1 - 10.0	2	0	1	0	1	0	0	6	6	5	3	0	0	1	1	1	27
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	41	53	21	17	13	13	17	40	160	73	33	30	50	66	31	22	680

Total Number of Valid Hours: 680

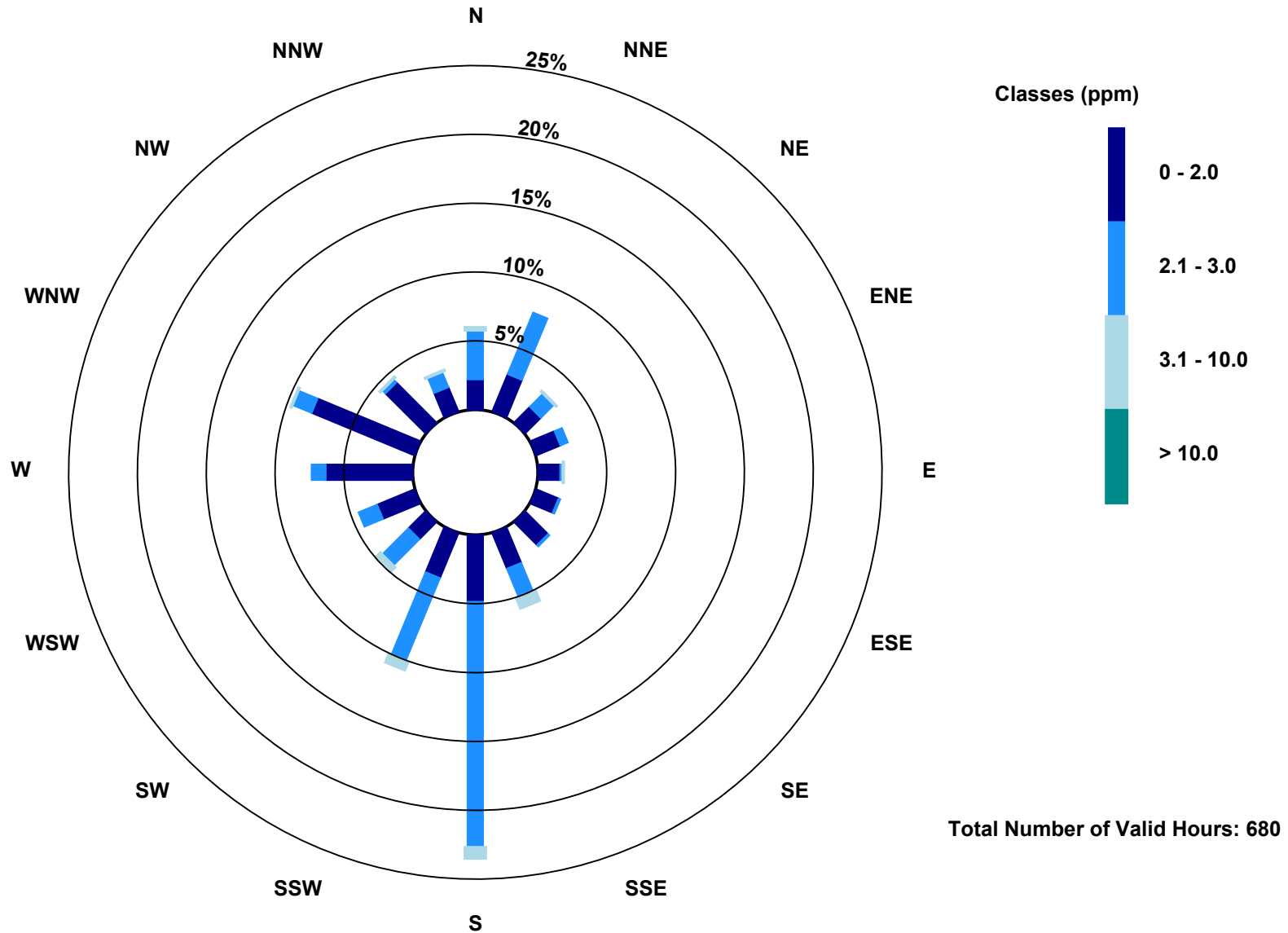
Total Number of Hours: 720

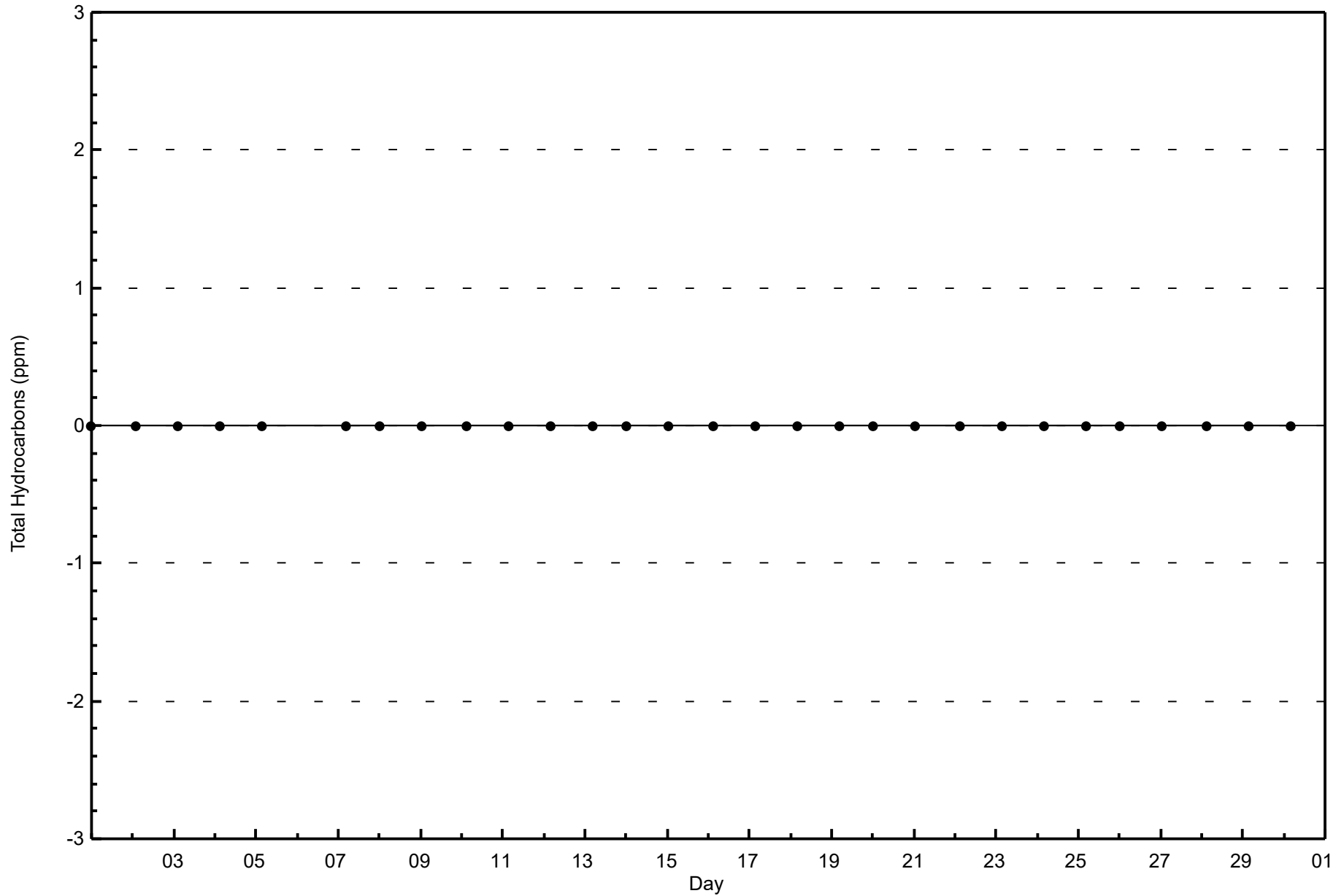


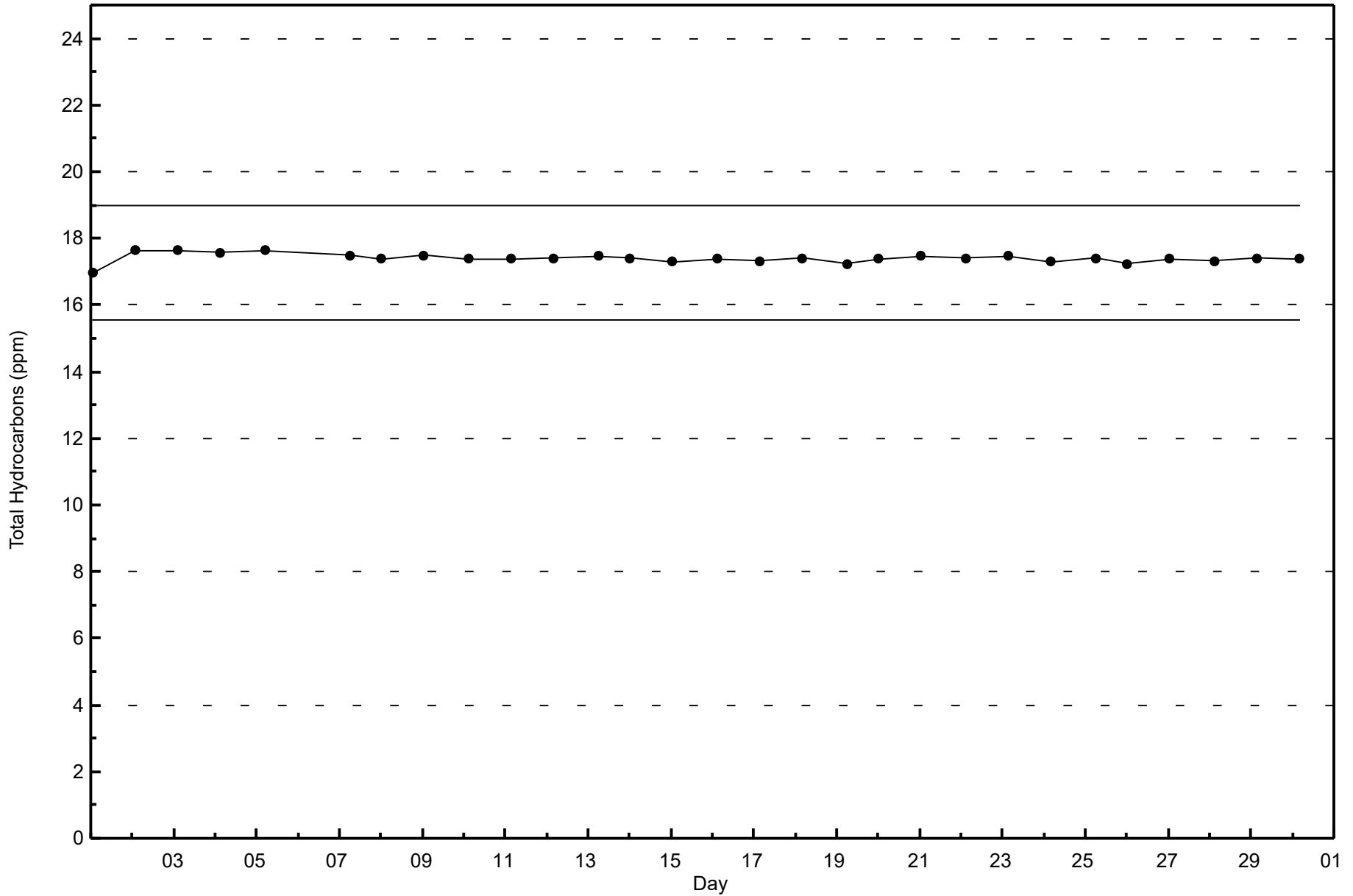


Wood Buffalo Environmental Association  
Wind Rose Nov 2023

Total Hydrocarbons (THC) - ppm  
Fort McKay - Bertha Garter







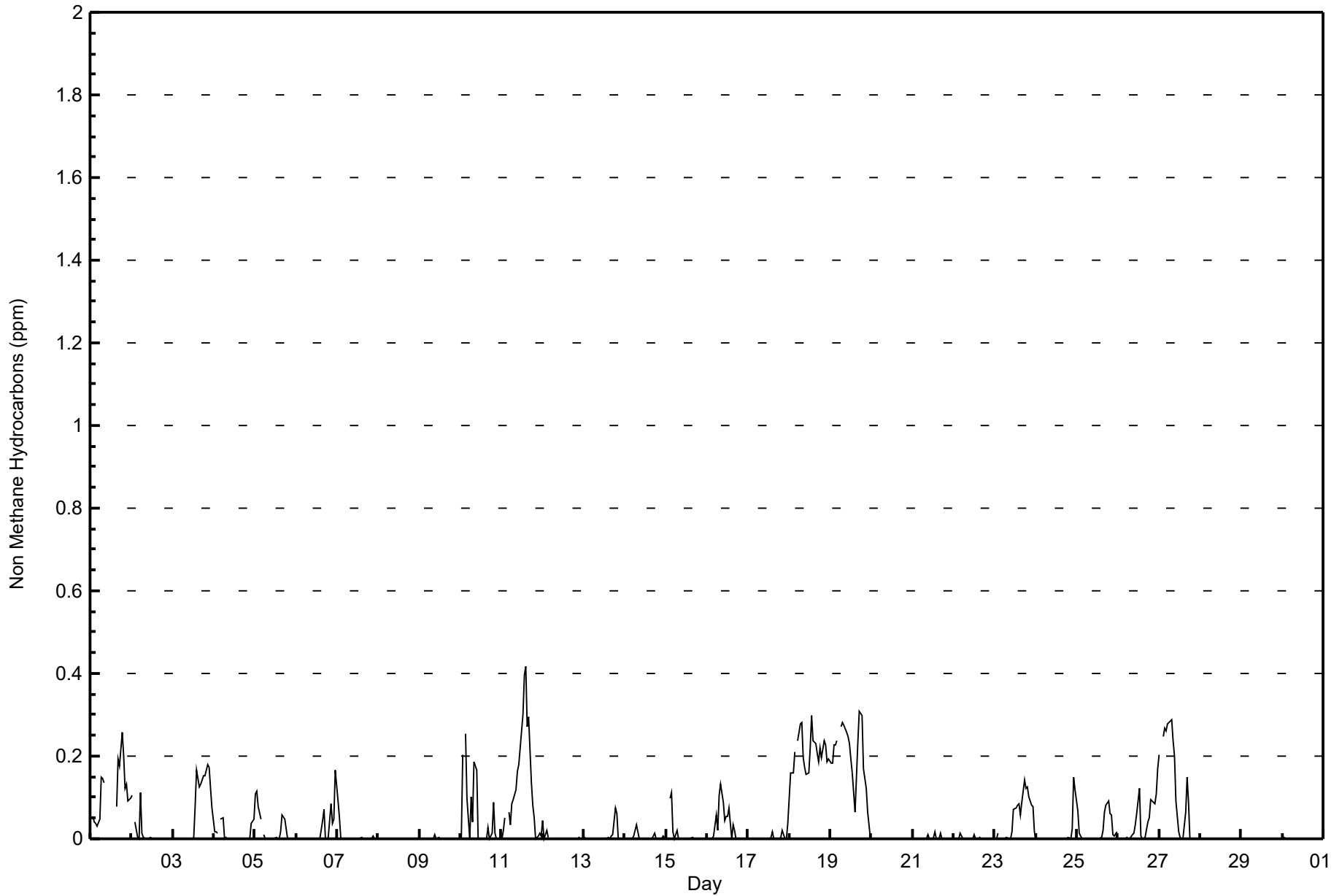


Maximum Value: 0.416 ppm on Nov 11 15:00																				Maximum Daily Average: 0.206 ppm on Nov 18					Hours in Service:	720										
Minimum Value: 0.000 ppm on Nov 2 09:00																				Minimum Daily Average: 0.000 ppm on Nov 8					Hours of Data:	683										
Maximum Diurnal Average: 0.052 ppm at hour 17																				Minimum Diurnal Average: 0.027 ppm at hour 11					Hours of Missing Data:	37										
Monthly Average: 0.037 ppm																				Percentiles: P <sub>1</sub> = 0.0 P <sub>10</sub> = 0.0 Q <sub>1</sub> = 0.0 Median = 0.0 Q <sub>3</sub> = 0.0 P <sub>90</sub> = 0.2 P <sub>99</sub> = 0.3					Hours of Calibration:	35										
																									Percent Operational Time:	99.7										
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum										
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24												
1-Nov	Z	0.055	0.040	0.037	0.029	0.046	0.150	0.144	0.134	C	C	C	C	C	C	0.077	0.193	0.175	0.256	0.201	0.121	0.132	0.092	0.098	--	0.256										
2-Nov	0.104	Z	0.041	0.003	0.001	0.112	0.013	0.003	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	0.012	0.112										
3-Nov	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.078	0.166	0.125	0.134	0.143	0.152	0.152	0.179	0.174	0.121	0.073	0.065	0.179										
4-Nov	0.016	0.017	0.012	Z	0.049	0.050	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	0.038	0.047	0.010	0.050											
5-Nov	0.107	0.114	0.077	0.046	Z	0.012	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.001	0.000	0.016	0.058	0.047	0.023	0.000	0.000	0.000	0.000	0.000	0.022	0.114										
6-Nov	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.043	0.072	0.000	0.000	0.002	0.084	0.038	0.049	0.167	0.019	0.167										
7-Nov	0.091	0.049	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	0.007	0.091										
8-Nov	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000										
9-Nov	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.009	0.000	0.003	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.001	0.009										
10-Nov	0.002	0.202	Z	0.255	0.097	0.000	0.103	0.039	0.186	0.165	0.000	0.000	M	M	0.000	0.001	0.027	0.000	0.013	0.087	0.015	0.000	0.000	0.000	0.057	0.255										
11-Nov	0.000	0.020	0.050	Z	0.065	0.036	0.084	0.094	0.120	0.163	0.180	0.219	0.303	0.396	0.416	0.271	0.294	0.135	0.082	0.051	0.000	0.008	0.013	0.006	0.131	0.416										
12-Nov	0.045	0.000	0.019	0.002	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.003	0.045										
13-Nov	0.002	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	0.004	0.000	0.008	0.010	0.073	0.060	0.000	0.000	0.000	0.000	0.007	0.073										
14-Nov	Z	0.000	0.000	0.000	0.000	0.006	0.022	0.032	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.014	0.001	0.000	0.000	0.002	0.007	0.002	0.004	0.032										
15-Nov	0.000	Z	0.098	0.112	0.017	0.000	0.021	0.000	0.001	0.001	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	0.011	0.112										
16-Nov	0.000	0.000	Z	0.000	0.007	0.058	0.022	0.106	0.132	0.087	0.043	0.054	0.053	0.075	0.000	0.035	0.021	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.030	0.132										
17-Nov	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.005	0.016	0.000	0.000	0.000	0.000	0.003	0.019	0.000	0.000	0.037	0.003	0.037										
18-Nov	0.097	0.158	0.159	0.211	Z	0.237	0.278	0.281	0.195	0.173	0.157	0.160	0.222	0.298	0.238	0.231	0.207	0.186	0.219	0.196	0.237	0.229	0.186	0.193	0.206	0.298										
19-Nov	0.183	0.183	0.226	0.227	0.236	Z	0.272	0.282	0.275	0.256	0.246	0.232	0.192	0.158	0.063	0.149	0.233	0.308	0.298	0.171	0.146	0.122	0.064	0.000	0.197	0.308										
20-Nov	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000										
21-Nov	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.009	0.000	0.000	0.003	0.016	0.000	0.001	0.013	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.002	0.016										
22-Nov	0.000	0.000	Z	0.000	0.013	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.012	0.000	0.000	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.013										
23-Nov	0.000	0.000	0.014	Z	0.001	0.000	0.000	0.005	0.000	0.000	0.018	0.072	0.074	0.081	0.086	0.058	0.088	0.143	0.123	0.124	0.100	0.080	0.079	0.016	0.050	0.143										
24-Nov	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.000	0.023	0.150	0.118	0.013	0.150										
25-Nov	0.068	0.014	0.007	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.020	0.064	0.081	0.092	0.061	0.058	0.010	0.007	0.018	0.022	0.092										
26-Nov	Z	0.000	0.000	0.000	0.000	0.002	0.000	0.009	0.014	0.035	0.062	0.121	0.006	0.000	0.000	0.004	0.040	0.051	0.096	0.092	0.085	0.109	0.169	0.039	0.169											
27-Nov	0.203	Z	0.246	0.269	0.261	0.280	0.286	0.288	0.239	0.201	0.091	0.016	0.004	0.000	0.000	0.063	0.150	0.089	0.000	0.000	0.000	0.000	0.000	0.000	0.117	0.288										
28-Nov	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000										
29-Nov	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.000	0.000	0.000	0.000	0.001										
30-Nov	0.000	0.005	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	0.005										
																				0.037 0.033 0.040 0.047 0.031 0.032 0.042 0.043 0.043 0.037 0.027 0.028 0.035 0.040 0.034 0.037 0.052 0.046 0.046 0.040 0.035 0.030 0.030 0.031					Diurnal Average											
																				0.203 0.202 0.246 0.269 0.261 0.280 0.286 0.288 0.275 0.256 0.246 0.232 0.303 0.396 0.416 0.271 0.294 0.308 0.298 0.201 0.237 0.229 0.186 0.193					Diurnal Maximum											
Z - zerospan																				C - Calibration					M - Maintenance											



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

**Non Methane Hydrocarbons (NMHC) - ppm**  
**Fort McKay - Bertha Ganter - November 2023**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Non Methane Hydrocarbons (NMHC) - ppm  
Fort McKay - Bertha Ganter - November 2023**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 0.005	456	66.76	66.76
0.006 - 0.05	79	11.57	78.33
0.06 - 0.1	77	11.27	89.60
> 0.1	71	10.40	100.00

Total Number of Valid Hours: 683

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Non Methane Hydrocarbons (NMHC) - ppm  
Fort McKay - Bertha Ganter - November 2023**

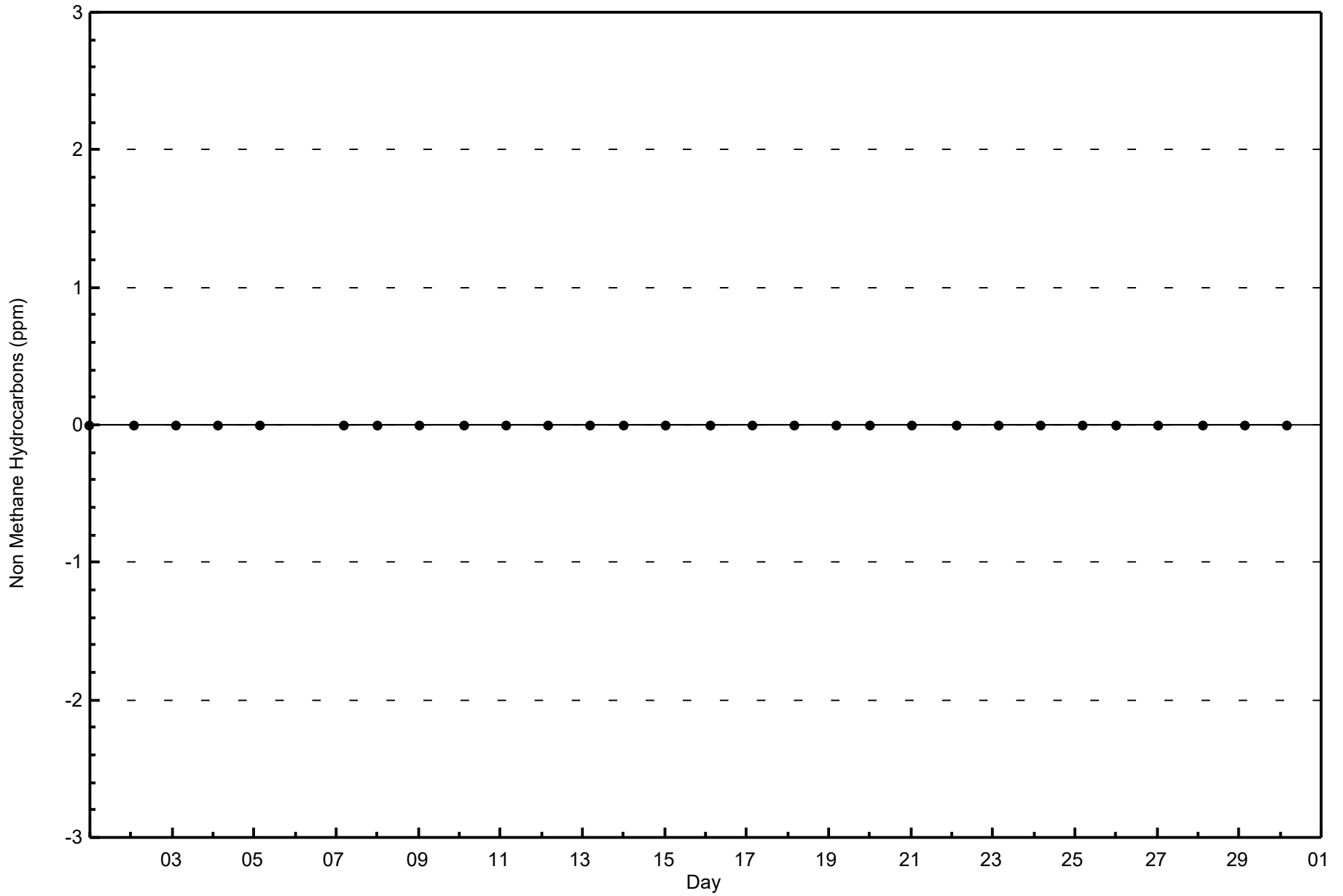
<b>Concentration Ranges (ppm)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 0.005	23	35	17	13	10	12	16	27	74	36	19	25	47	57	29	14	454
0.006 - 0.05	5	12	3	2	2	1	0	2	31	11	3	2	1	3	0	1	79
0.06 - 0.1	8	5	0	2	0	0	1	2	31	10	6	3	2	2	1	4	77
> 0.1	5	1	1	0	1	0	0	9	24	16	5	0	0	4	1	3	70
<b>Totals</b>	41	53	21	17	13	13	17	40	160	73	33	30	50	66	31	22	680

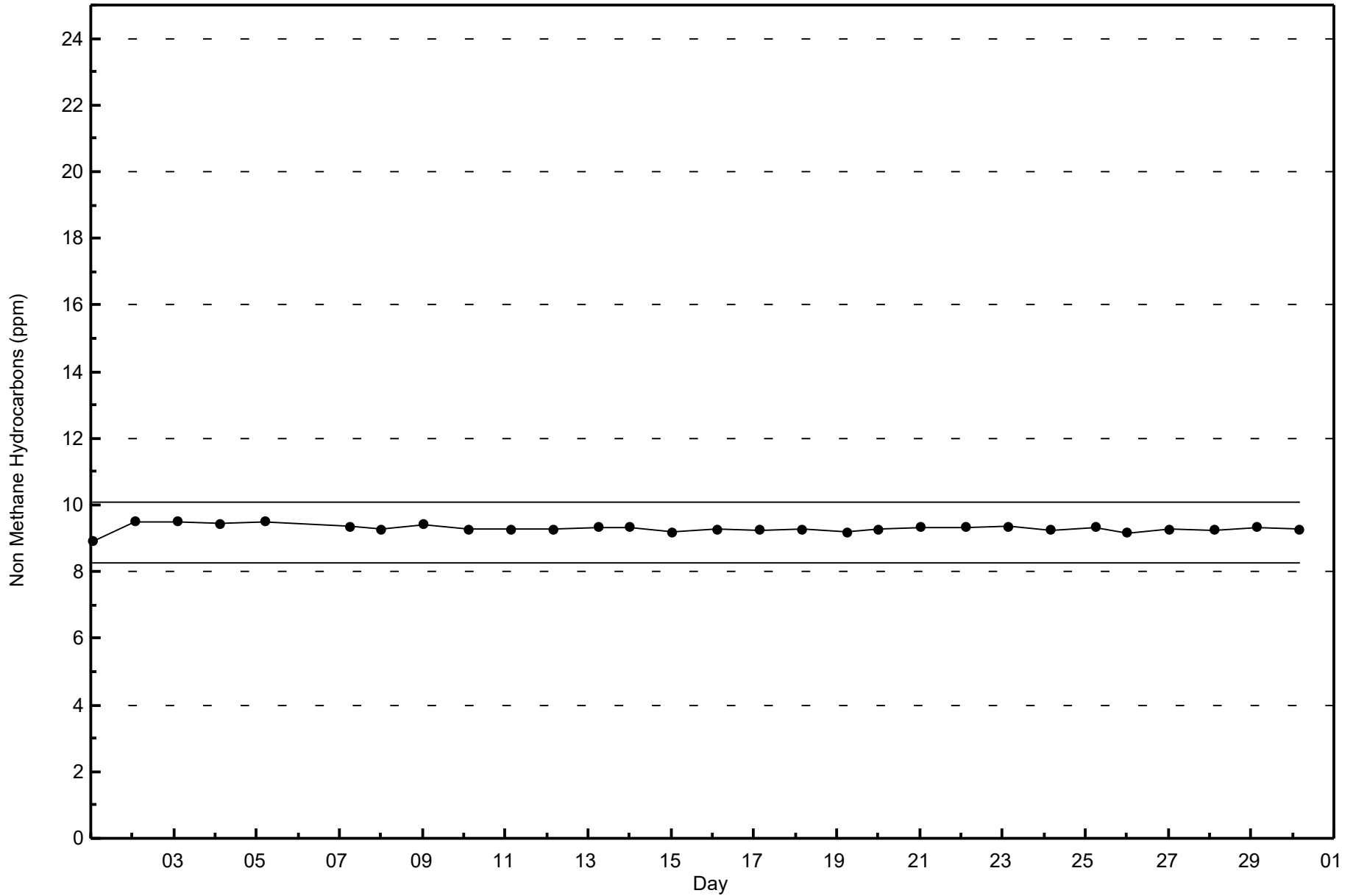
Total Number of Valid Hours: 680

Total Number of Hours: 720

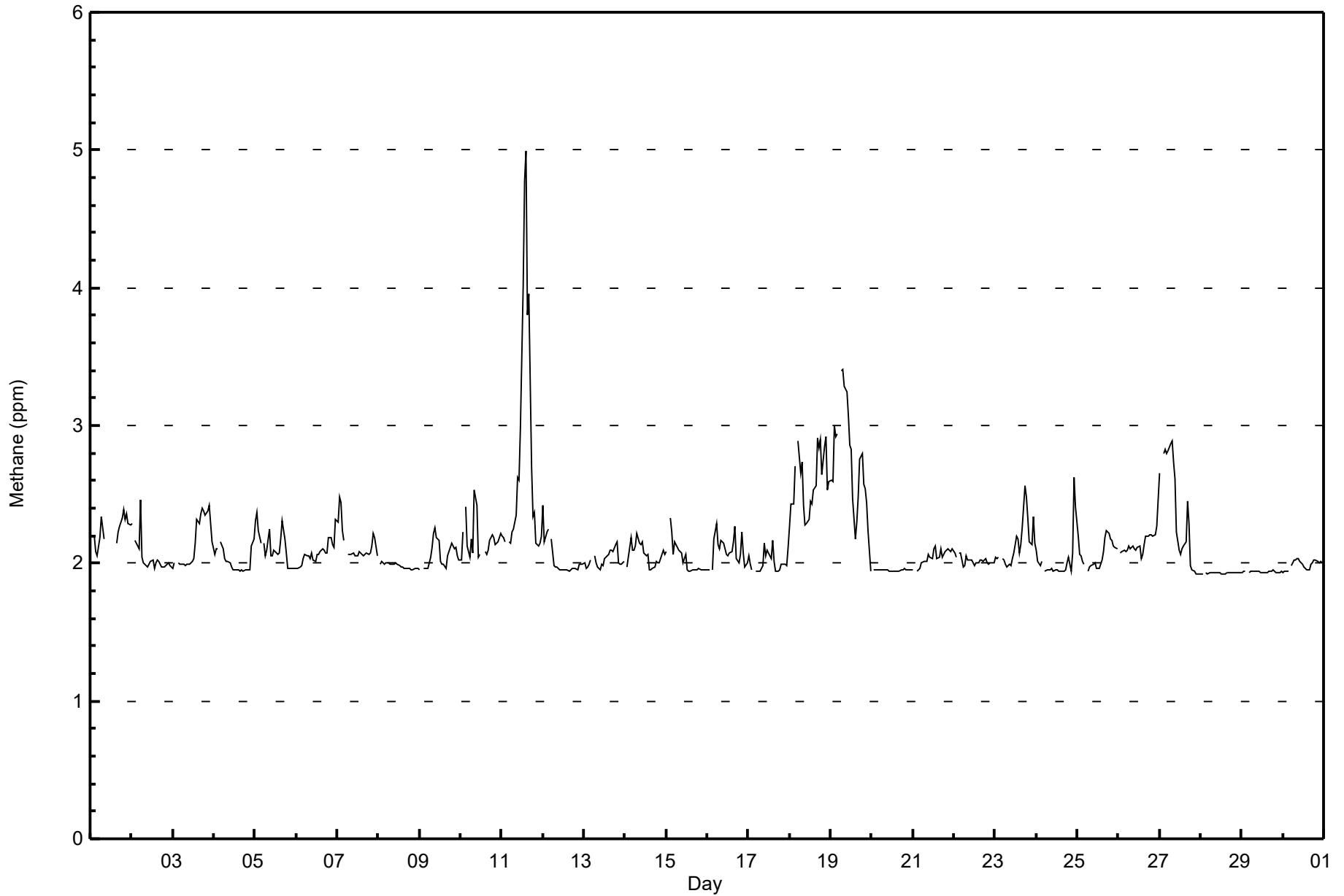














**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Methane (CH<sub>4</sub>) - ppm**  
**Fort McKay - Bertha Ganter - November 2023**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2.0	349	51.10	51.10
2.1 - 3.0	324	47.44	98.54
3.1 - 10.0	10	1.46	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 683

Total Number of Hours: 720



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

**Methane (CH<sub>4</sub>) - ppm**  
**Fort McKay - Bertha Ganter - November 2023**

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	21	11	13	11	12	16	19	35	24	12	20	43	55	28	13	348
2.1 - 3.0	25	32	9	4	1	1	1	19	124	49	19	10	7	11	2	8	322
3.1 - 10.0	1	0	1	0	1	0	0	2	1	0	2	0	0	0	1	1	10
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	41	53	21	17	13	13	17	40	160	73	33	30	50	66	31	22	680

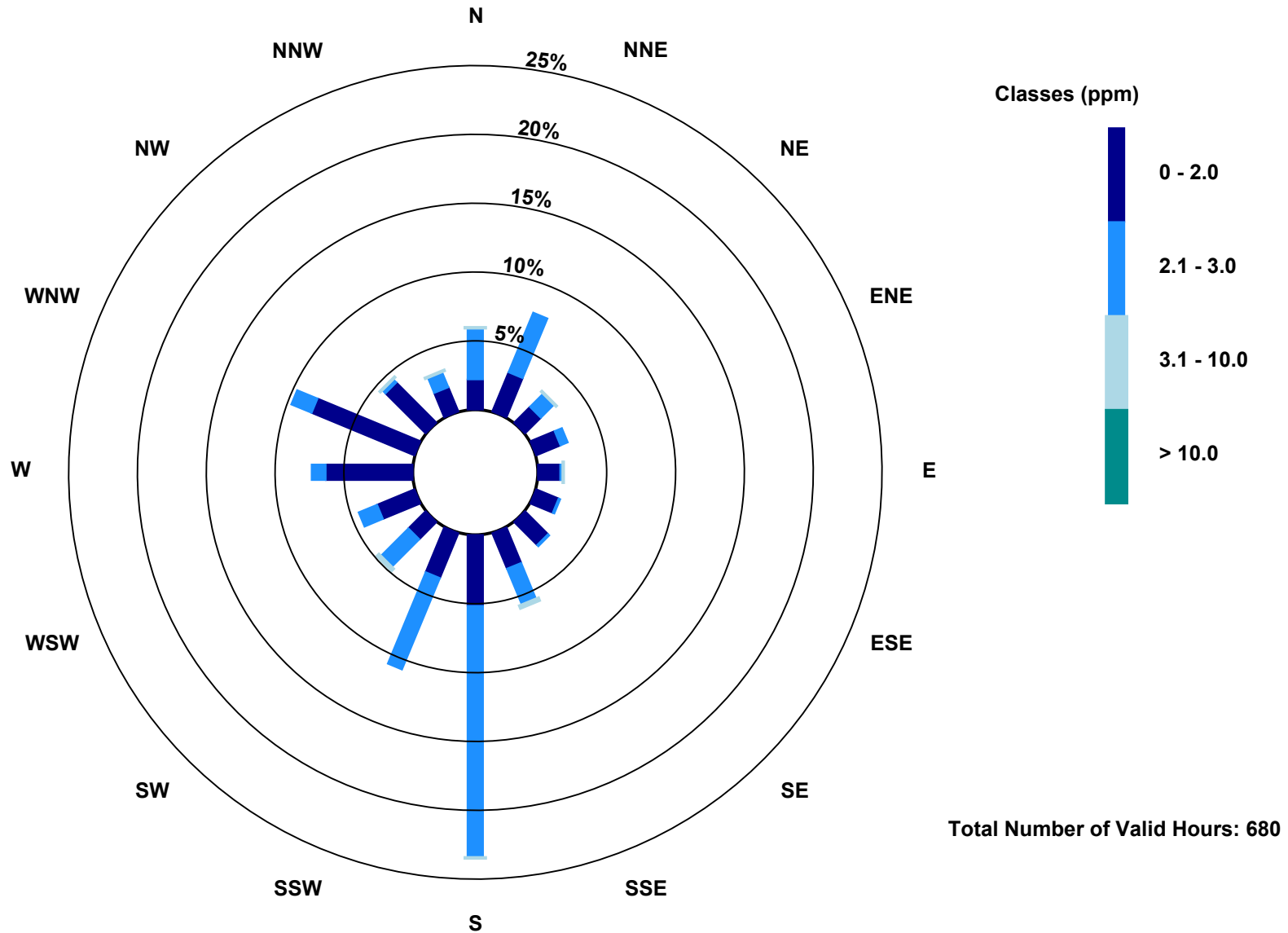
Total Number of Valid Hours: 680

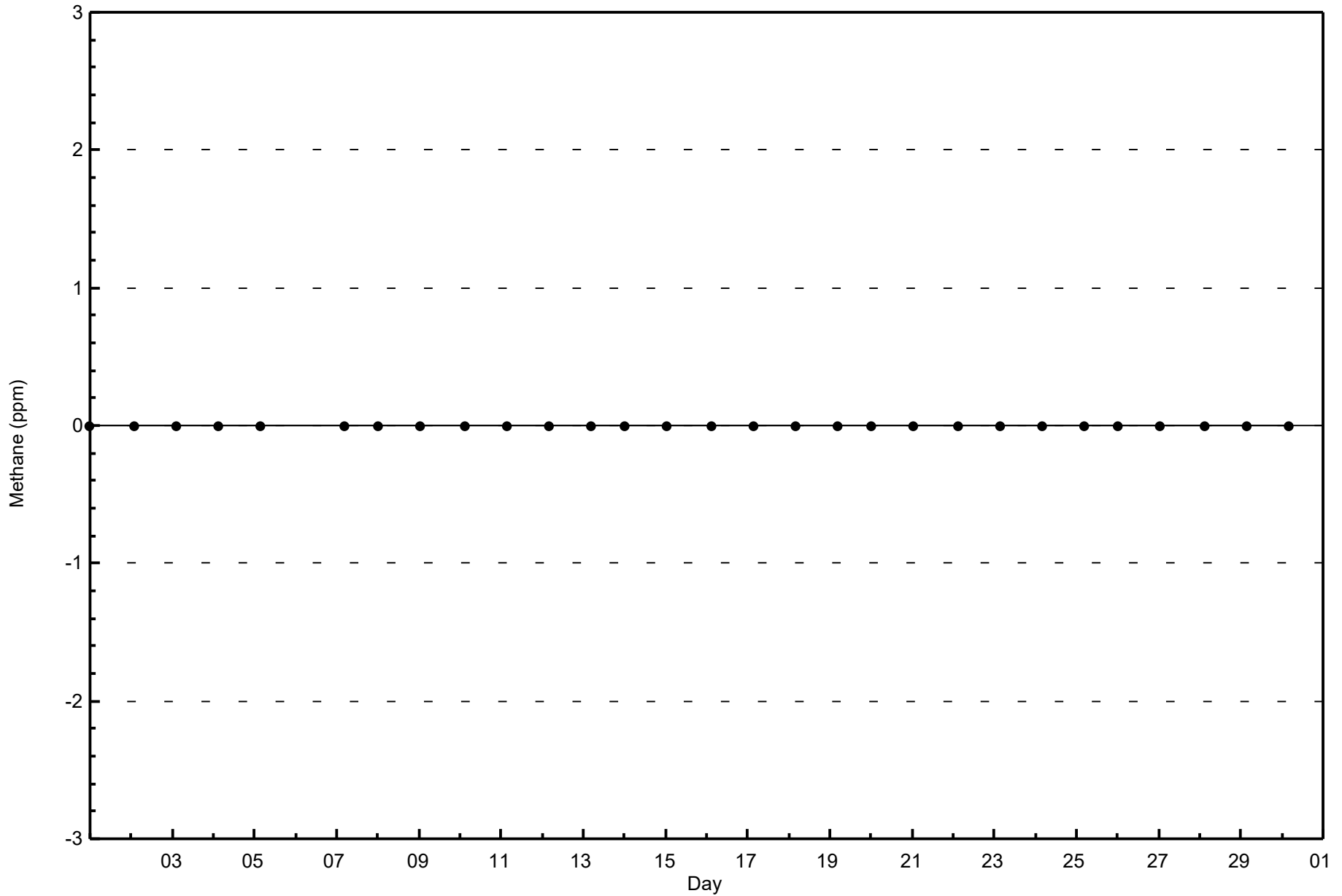
Total Number of Hours: 720



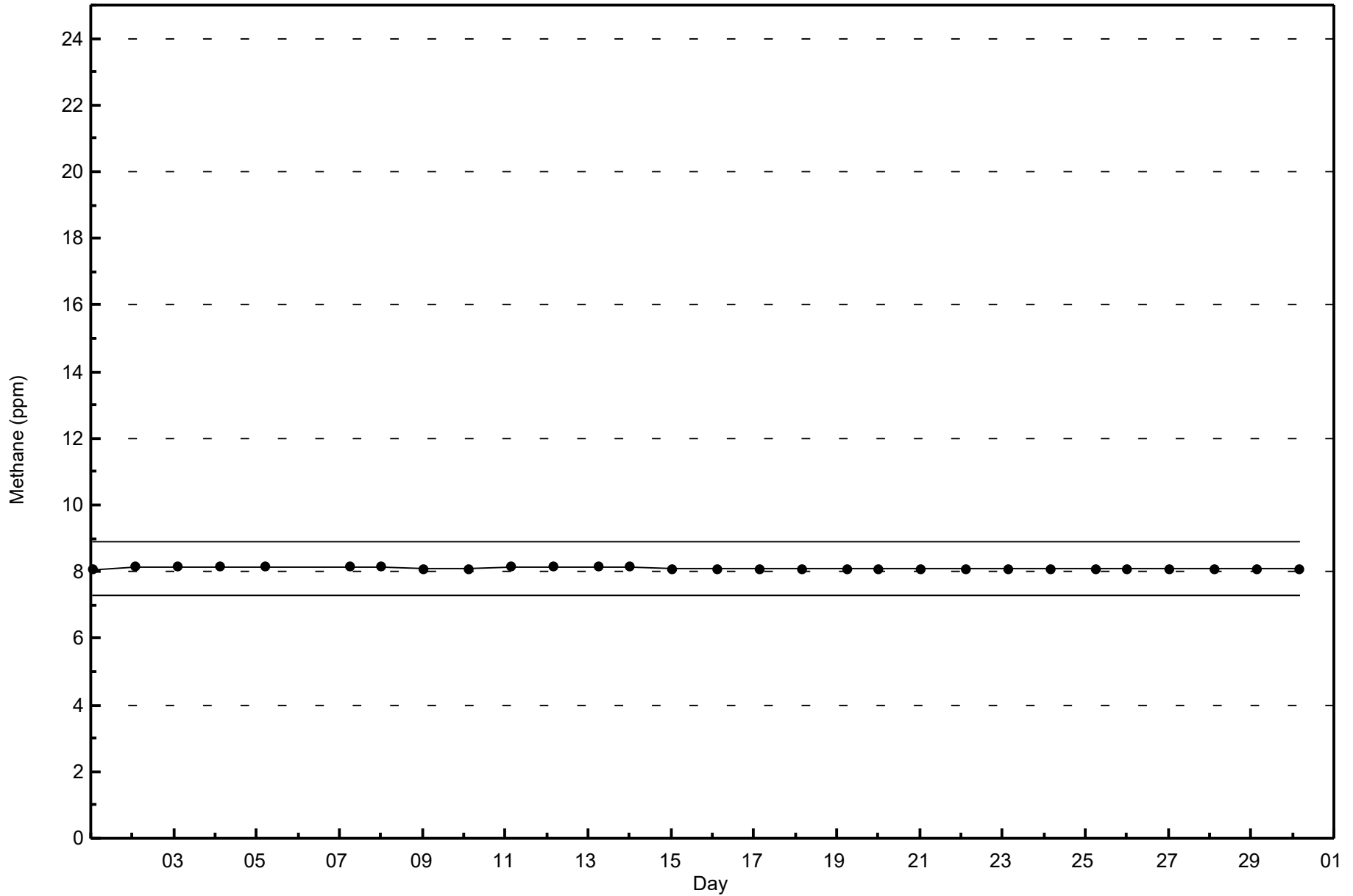
Wood Buffalo Environmental Association  
Wind Rose Nov 2023

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



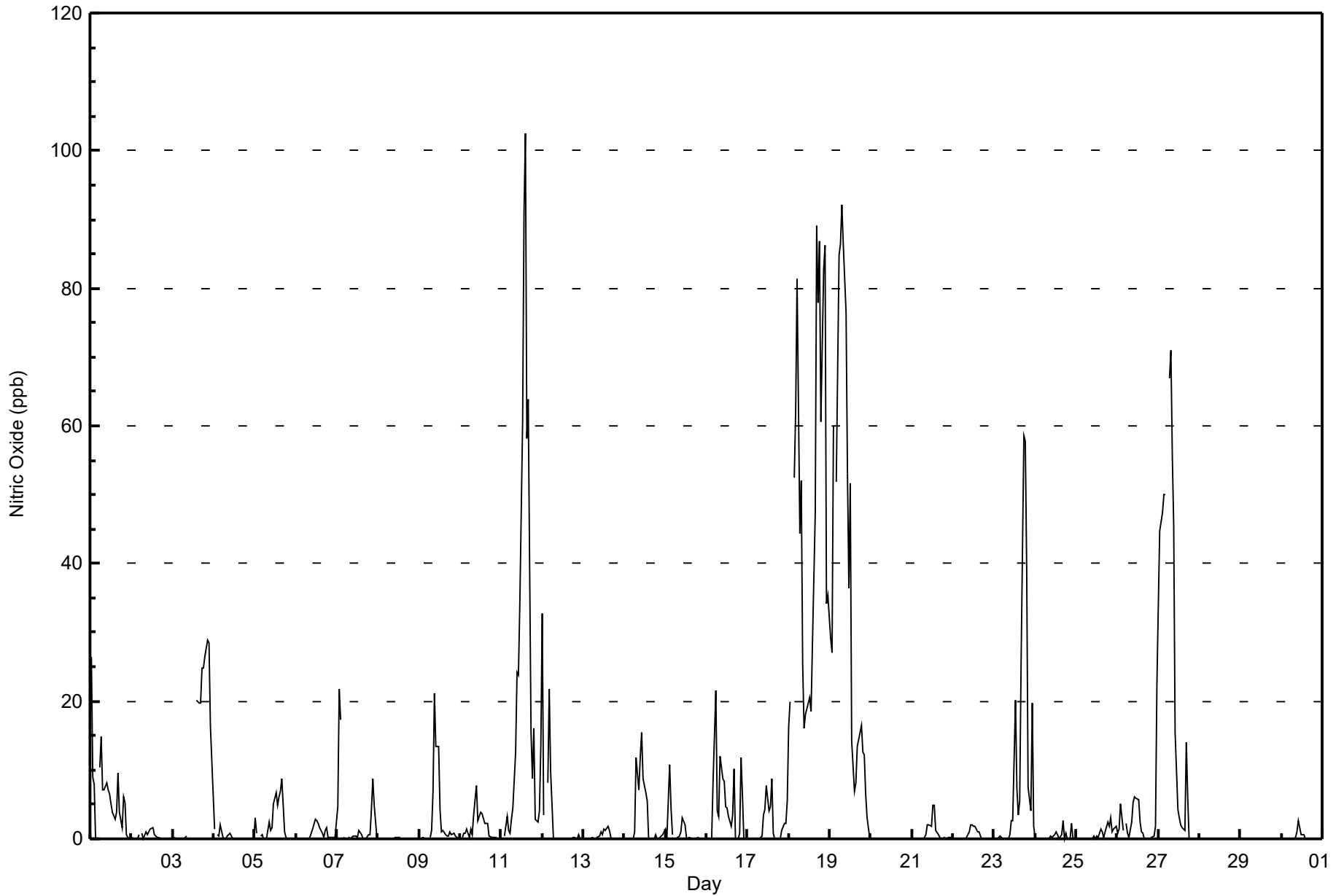








Maximum Value: 102.5 ppb on Nov 11 15:00																						Maximum Daily Average: 46.8 ppb on Nov 18																						Hours in Service: 720	
Minimum Value: 0.0 ppb on Nov 2 04:00																						Minimum Daily Average: 0.0 ppb on Nov 20																						Hours of Data: 686	
Maximum Diurnal Average: 8.7 ppb at hour 17																						Minimum Diurnal Average: 3.0 ppb at hour 23																						Hours of Missing Data: 34	
Monthly Average: 6.31 ppb																						Percentiles: P <sub>1</sub> = 0.0 P <sub>10</sub> = 0.0 Q <sub>1</sub> = 0.0 Median = 0.2 Q <sub>3</sub> = 3.4 P <sub>90</sub> = 19.1 P <sub>99</sub> = 86.2																						Hours of Calibration: 34	
																																												Percent Operational Time: 100.0	
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																					
1-Nov	26.4	8.9	7.8	0.1	Z	10.3	14.9	7.0	7.1	8.2	7.0	6.5	5.1	3.9	2.8	3.9	9.6	3.9	1.6	6.0	5.3	0.5	0.2	0.1	6.4	26.4																			
2-Nov	0.1	0.1	0.0	0.0	0.7	Z	0.8	0.1	1.0	0.6	1.1	1.5	1.5	0.5	0.5	0.3	0.1	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.4	1.5																			
3-Nov	Z	0.1	0.1	0.1	0.0	0.0	0.0	0.3	0.4	C	C	C	C	C	20.1	19.7	19.8	24.8	24.7	26.4	29.0	28.6	16.5	11.4	12.3	29.0																			
4-Nov	1.4	Z	0.7	0.4	2.1	0.2	0.0	0.0	0.3	0.9	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	0.3	2.1																			
5-Nov	3.0	0.9	Z	0.4	0.6	0.1	0.0	0.1	2.4	1.1	1.7	5.0	6.6	4.8	6.1	6.9	8.8	1.1	0.1	0.0	0.0	0.0	0.0	0.0	2.2	8.8																			
6-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.7	1.4	2.9	2.5	2.2	1.5	0.9	0.3	1.1	1.7	0.2	0.2	0.2	0.2	0.2	0.7	2.9																			
7-Nov	4.6	21.8	17.2	Z	0.2	0.1	0.0	0.1	0.1	0.5	0.5	0.3	0.2	1.1	0.5	0.1	0.0	0.0	0.5	0.6	4.3	8.8	4.9	0.1	2.9	21.8																			
8-Nov	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2																			
9-Nov	0.0	0.0	0.2	0.1	0.0	Z	0.3	1.2	6.9	21.1	13.5	13.4	4.3	1.1	1.1	0.7	0.3	0.3	0.9	0.6	0.8	0.5	0.1	0.1	2.9	21.1																			
10-Nov	Z	0.3	0.8	0.8	1.4	0.2	1.5	0.6	3.4	7.8	2.7	3.3	3.9	3.6	2.3	2.3	2.2	0.4	0.2	0.1	0.1	0.1	0.1	0.1	1.7	7.8																			
11-Nov	0.1	Z	0.3	3.2	1.3	0.9	2.8	4.5	12.6	24.2	23.8	34.1	60.5	91.2	102.5	58.2	63.9	15.5	8.8	16.1	2.9	2.4	4.0	13.5	23.8	102.5																			
12-Nov	32.7	3.5	Z	8.2	21.8	9.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.0	0.6	0.0	0.1	3.3	32.7																			
13-Nov	0.1	0.0	0.0	Z	0.0	0.3	0.1	0.0	0.1	0.3	1.0	0.7	1.4	1.3	1.7	1.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	1.7																			
14-Nov	0.0	0.0	0.0	0.0	Z	0.0	1.0	11.8	7.1	11.7	15.5	8.6	6.8	5.6	0.1	0.0	0.0	0.0	0.6	0.0	0.0	0.4	0.7	1.0	3.1	15.5																			
15-Nov	1.5	0.0	10.9	4.4	0.5	Z	0.2	0.2	0.4	1.1	3.0	2.1	0.1	0.0	0.1	0.1	0.0	0.0	0.0	0.1	0.1	0.0	0.1	0.1	1.1	10.9																			
16-Nov	Z	0.0	0.0	0.1	8.3	21.6	4.1	3.3	11.9	8.8	8.4	4.8	4.4	3.4	1.7	3.4	10.2	0.0	0.0	0.8	11.8	6.3	0.0	0.0	4.9	21.6																			
17-Nov	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.3	3.4	4.3	7.7	4.0	4.6	8.7	0.9	0.0	0.0	0.0	0.1	1.2	2.3	2.3	5.5	2.0	8.7																			
18-Nov	16.2	19.8	Z	52.6	62.1	81.4	44.3	52.1	25.4	16.1	18.2	19.7	20.6	18.5	28.5	47.4	89.0	77.9	86.9	60.6	82.9	86.2	34.1	35.4	46.8	89.0																			
19-Nov	29.1	27.0	60.0	Z	51.8	84.8	86.4	92.1	86.4	76.5	53.1	36.5	51.6	14.2	6.9	8.1	13.4	14.4	16.4	12.6	12.2	6.5	3.1	0.0	36.7	92.1																			
20-Nov	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0																			
21-Nov	0.0	0.0	0.0	0.0	0.0	Z	0.0	0.2	0.7	2.0	2.0	1.9	4.9	4.8	1.2	0.5	0.2	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.2	0.8	4.9																		
22-Nov	Z	0.1	0.1	0.0	0.1	0.0	0.0	0.0	0.2	1.1	2.0	2.0	1.8	1.9	1.0	1.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	2.0																			
23-Nov	0.1	Z	0.1	0.3	0.1	0.0	0.0	0.1	0.1	0.5	2.7	2.7	20.2	7.3	3.5	5.5	25.4	58.6	57.8	39.3	7.5	4.1	19.7	1.7	11.2	58.6																			
24-Nov	0.2	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.2	0.6	1.0	0.6	0.1	0.6	2.6	0.0	0.7	0.0	0.0	2.3	0.1	0.1	0.4	2.6																			
25-Nov	0.1	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.3	0.3	1.1	1.1	0.3	1.1	2.4	1.9	3.0	1.0	1.3	1.9	0.7	3.0																			
26-Nov	0.8	1.5	5.0	1.1	Z	2.2	0.9	0.2	2.5	5.3	6.1	5.9	5.6	2.4	1.1	0.8	0.0	0.0	0.0	0.1	0.2	0.5	1.9	22.3	2.9	22.3																			
27-Nov	33.7	44.7	47.4	50.0	50.0	Z	66.9	71.0	55.8	45.6	15.4	4.4	3.0	2.1	1.5	1.2	14.1	6.0	0.0	0.0	0.0	0.0	0.0	0.1	22.3	71.0																			
28-Nov	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	0.0	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																		
29-Nov	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0																		
30-Nov	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.2	1.0	2.7	0.5	0.7	0.6	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	2.7																		
																								Diurnal Average																					
																								Diurnal Maximum																					
6.0 5.1 6.0 4.7 8.0 8.5 7.5 8.2 7.5 8.2 6.4 5.7 7.3 6.1 6.5 5.5 8.7 6.8 6.8 5.5 5.4 5.0 3.0 3.1																																													
33.7 44.7 60.0 52.6 62.1 84.8 86.4 92.1 86.4 76.5 53.1 36.5 60.5 91.2 102.5 58.2 89.0 77.9 86.9 60.6 82.9 86.2 34.1 35.4																																													
Z - zerospan C - Calibration																																													





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Nitric Oxide (NO) - ppb  
Fort McKay - Bertha Ganter - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	624	90.96	90.96
21 - 40	26	3.79	94.75
41 - 80	25	3.64	98.40
81 - 159	10	1.46	99.85
> 159	0	0.00	99.85

Total Number of Valid Hours: 686

Total Number of Hours: 720



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

**Nitric Oxide (NO) - ppb**  
**Fort McKay - Bertha Ganter - November 2023**

<b>Concentration</b> <b>Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	38	49	18	16	13	12	18	37	150	54	25	31	50	60	30	20	621
21 - 40	3	1	0	0	0	0	0	2	9	4	1	0	0	3	0	3	26
41 - 80	1	0	0	0	0	0	0	5	4	10	2	0	0	1	0	1	24
81 - 159	1	0	1	0	1	0	0	0	2	1	3	0	0	0	1	0	10
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	43	50	19	16	14	12	18	44	165	69	31	31	50	64	31	24	681

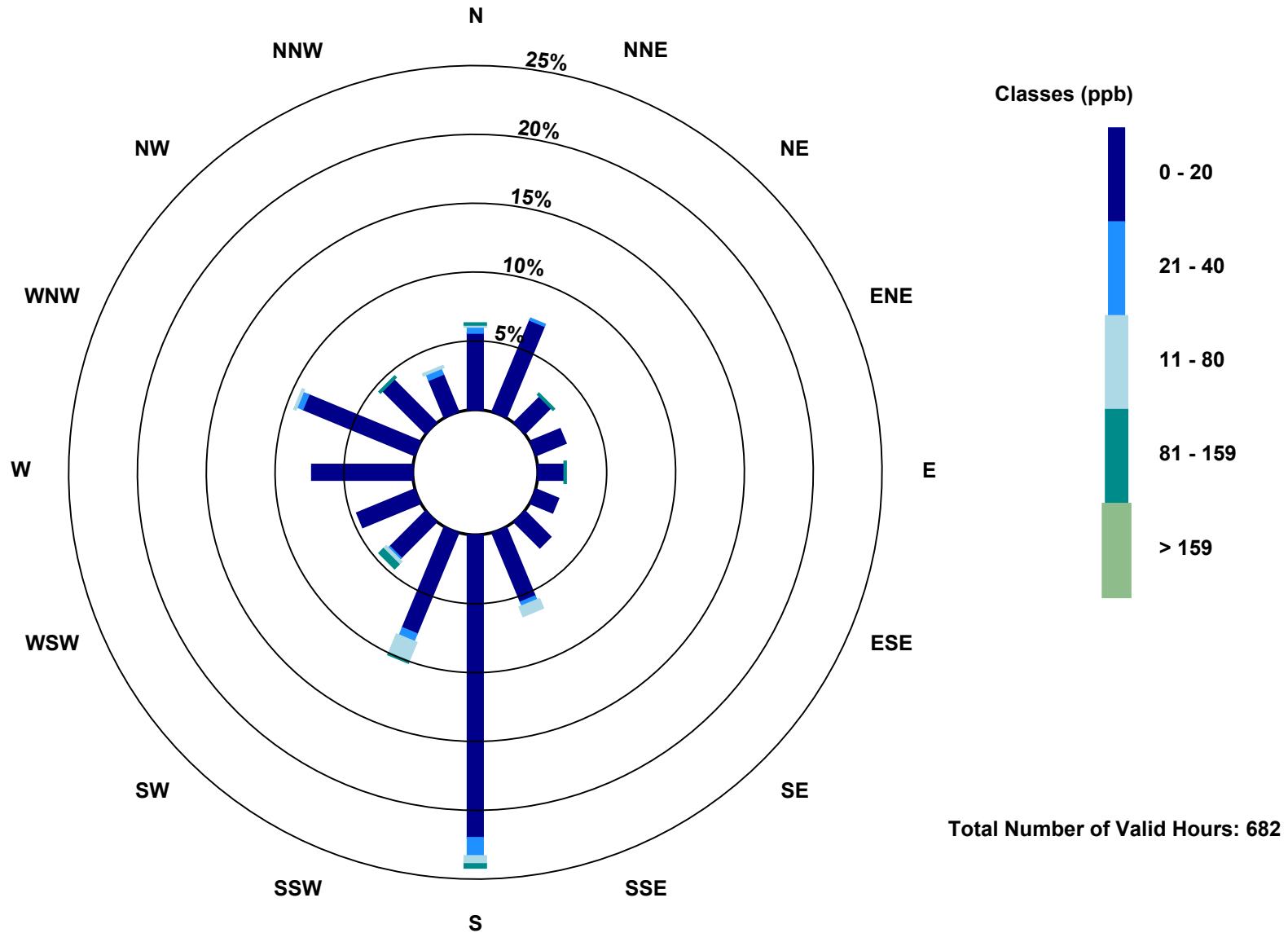
Total Number of Valid Hours: 682

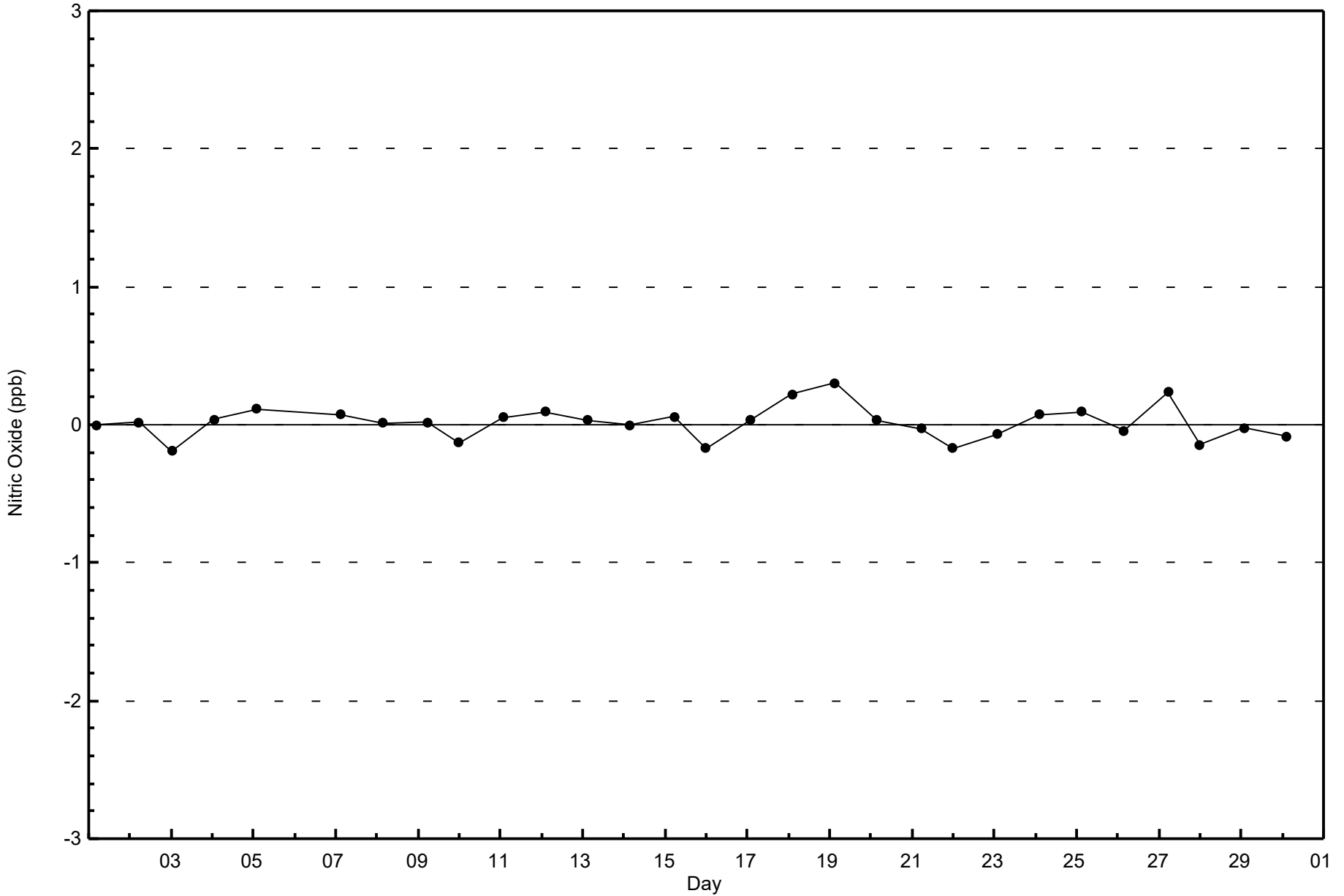
Total Number of Hours: 720

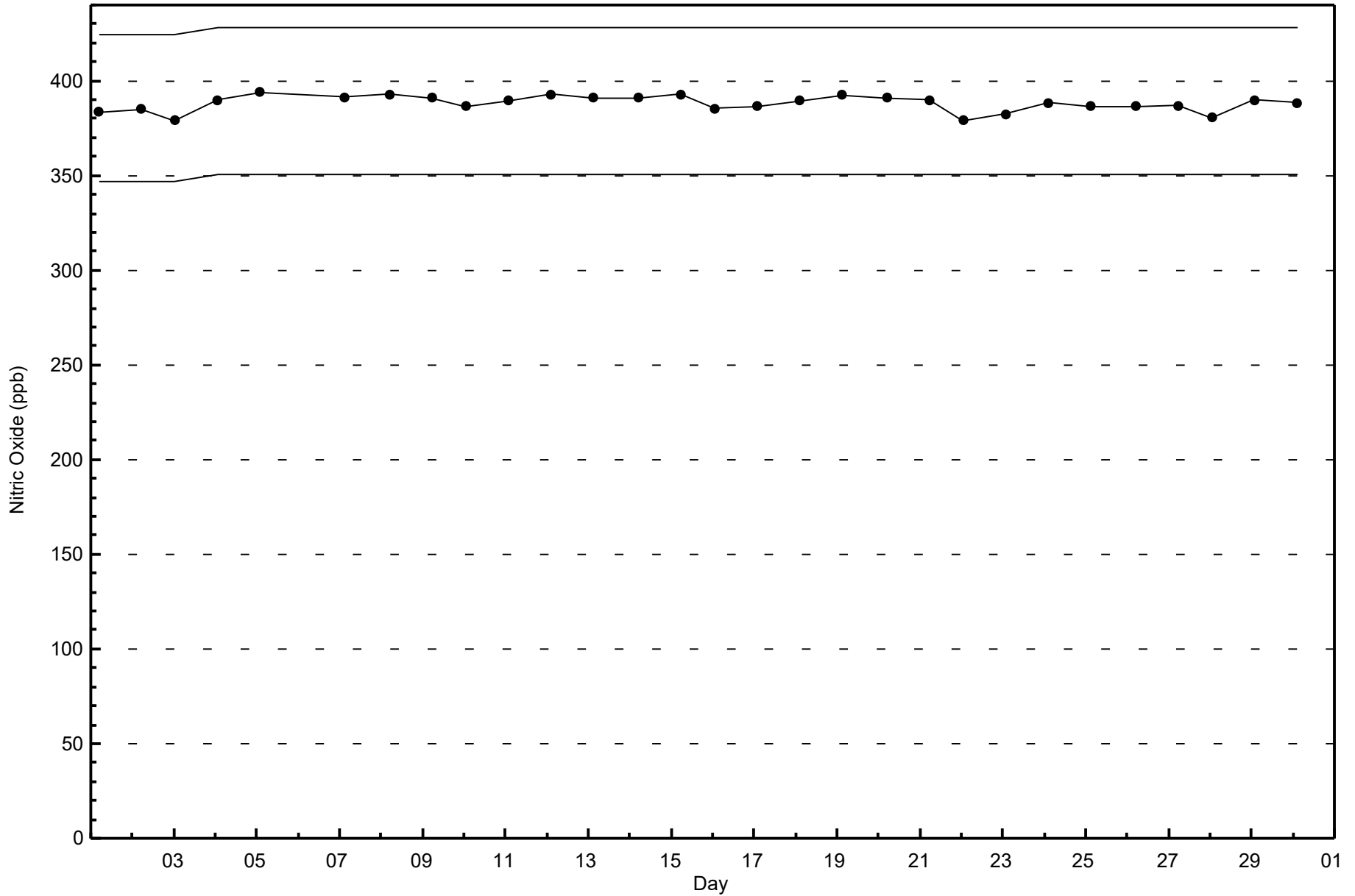


Wood Buffalo Environmental Association  
Wind Rose Nov 2023

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











Wood Buffalo Environmental Association

Summary of Hour Averages

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

Fort McKay - Bertha Ganter - November 2023

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 28.3 ppb on Nov 25 18:00	Maximum Daily Average: 16.9 ppb on Nov 3		Hours of Data:	686
Minimum Value: 0.0 ppb on Nov 8 19:00	Minimum Daily Average: 0.2 ppb on Nov 20		Hours of Missing Data:	34
Maximum Diurnal Average: 10.5 ppb at hour 17	Minimum Diurnal Average: 6.3 ppb at hour 12		Hours of Calibration:	34
Monthly Average: 8.16 ppb	Percentiles: P <sub>1</sub> = 0.0 P <sub>10</sub> = 0.4 Q <sub>1</sub> = 1.9 Median = 7.5 Q <sub>3</sub> = 12.3 P <sub>90</sub> = 17.3 P <sub>99</sub> = 24.3		Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	20.1	18.8	17.4	9.7	Z	11.8	17.0	16.5	12.2	9.3	7.6	7.2	6.9	6.9	8.2	14.8	21.1	21.1	19.3	19.7	19.5	13.5	10.0	8.5	13.8	21.1
2-Nov	9.9	9.0	5.1	3.7	4.0	Z	7.0	4.1	4.9	4.6	5.2	7.5	6.9	4.7	6.0	6.0	6.5	4.9	2.3	3.2	4.6	3.9	5.7	3.5	5.4	9.9
3-Nov	Z	9.6	4.9	11.4	7.5	7.7	9.0	9.8	11.0	C	C	C	C	C	22.7	24.0	25.9	25.0	23.9	23.9	23.4	22.2	21.2	21.8	16.9	25.9
4-Nov	14.0	Z	17.2	17.1	20.5	15.7	10.0	7.4	8.9	9.9	4.0	1.3	0.6	0.4	0.6	0.2	0.8	0.2	0.5	0.5	0.6	0.4	13.9	16.0	7.0	20.5
5-Nov	27.5	22.4	Z	22.2	23.3	19.2	9.5	11.0	15.7	8.1	7.5	11.4	14.6	14.6	18.6	21.6	25.1	21.7	10.7	2.5	3.2	0.9	0.3	0.2	13.6	27.5
6-Nov	1.3	0.5	1.2	2.2	6.1	11.5	10.0	10.4	6.6	4.3	4.5	5.9	5.2	5.4	5.3	5.3	6.0	9.3	9.5	6.1	6.0	6.4	6.9	6.1	5.9	11.5
7-Nov	7.7	10.5	11.1	Z	8.3	5.4	2.9	3.4	2.8	3.1	2.8	2.2	1.9	5.1	3.4	2.0	2.1	1.9	3.7	5.0	8.4	10.4	9.0	2.2	5.0	11.1
8-Nov	1.4	1.2	1.2	1.5	Z	1.2	1.1	0.8	0.6	0.5	0.5	0.6	0.8	0.5	0.2	0.2	0.1	0.2	0.0	0.1	0.0	2.8	1.7	0.3	0.8	2.8
9-Nov	0.4	1.9	4.3	2.1	1.0	Z	3.4	7.2	10.4	14.2	12.0	11.9	5.6	3.2	4.7	4.3	7.4	10.6	13.8	12.6	12.3	7.2	5.0	3.6	6.9	14.2
10-Nov	Z	10.4	13.5	15.0	11.4	4.0	16.6	9.7	12.8	12.3	4.9	5.1	5.9	6.5	6.2	10.7	18.9	14.6	12.6	11.2	10.5	10.3	9.4	8.7	10.5	18.9
11-Nov	8.9	Z	8.3	15.0	14.3	9.9	11.6	11.2	11.1	10.8	9.1	11.9	17.2	20.8	22.9	18.1	17.7	15.1	14.7	14.4	10.4	8.6	9.1	10.8	13.1	22.9
12-Nov	10.2	8.6	Z	9.4	17.7	9.8	0.6	0.7	0.8	0.4	0.3	0.3	0.5	0.5	0.5	0.3	1.0	5.7	4.5	3.8	1.1	3.8	3.5	5.4	3.9	17.7
13-Nov	5.3	2.2	3.2	Z	4.0	5.2	7.8	4.2	5.5	4.4	6.0	4.7	9.2	9.8	13.5	15.5	12.1	6.6	7.8	11.5	8.1	7.6	11.1	10.6	7.6	15.5
14-Nov	6.1	6.9	4.2	5.3	Z	10.2	13.8	20.1	14.4	13.1	12.4	8.1	7.8	6.9	0.7	1.4	3.3	6.6	13.5	8.3	8.7	14.4	14.4	11.4	9.2	20.1
15-Nov	10.8	3.2	16.5	18.4	15.0	Z	11.5	6.1	5.1	6.9	9.5	5.9	0.7	0.1	0.9	1.2	3.6	0.6	0.3	4.6	1.3	1.1	1.8	0.7	5.5	18.4
16-Nov	Z	0.6	0.5	1.6	22.7	23.2	14.7	19.3	22.1	17.1	12.3	7.7	7.7	7.7	8.4	11.5	20.0	5.4	3.1	7.2	16.5	7.4	0.5	5.0	10.5	23.2
17-Nov	11.6	Z	0.5	0.4	0.4	0.4	0.5	3.4	13.6	10.1	11.4	11.7	12.5	20.1	6.2	0.9	0.8	2.1	8.7	9.0	8.4	6.8	9.6	6.5	6.5	20.1
18-Nov	11.4	16.7	Z	17.8	16.6	14.6	15.1	13.6	13.2	12.4	11.7	11.2	11.3	13.2	15.0	19.2	21.9	17.3	15.8	15.0	12.4	9.3	11.4	9.4	14.2	21.9
19-Nov	9.7	9.7	12.0	Z	9.5	6.9	7.3	8.3	9.1	8.3	10.8	10.9	14.0	9.9	9.0	11.3	13.1	12.4	11.6	10.4	10.2	10.4	7.0	1.0	9.7	14.0
20-Nov	0.9	0.3	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.3	1.0	0.4	0.4	0.0	0.2	2.3
21-Nov	0.3	1.0	1.4	1.4	5.8	Z	7.1	7.3	6.9	14.8	12.3	9.5	13.2	12.6	7.9	10.0	15.0	10.9	12.8	16.0	11.9	17.5	13.6	16.1	9.8	17.5
22-Nov	Z	8.8	9.4	10.4	12.5	7.5	6.5	10.2	8.3	7.7	5.8	5.0	4.6	5.7	6.6	12.0	11.8	12.3	13.5	10.3	8.8	9.5	11.5	8.3	9.0	13.5
23-Nov	14.4	Z	13.5	18.5	17.3	3.2	4.3	5.9	5.5	6.1	9.6	8.1	17.0	12.1	10.3	14.0	18.8	19.1	18.6	17.4	16.5	15.4	18.7	13.2	12.9	19.1
24-Nov	11.5	8.2	Z	11.1	10.2	0.7	0.6	0.7	1.9	4.0	1.3	1.9	2.7	2.2	1.5	4.2	7.0	2.9	8.7	8.2	1.5	11.9	12.2	8.8	5.4	12.2
25-Nov	7.0	4.2	3.9	Z	8.6	7.5	0.9	1.2	1.8	2.1	2.6	0.9	1.8	1.8	8.0	15.1	22.9	28.3	27.4	24.9	24.2	19.6	17.4	16.1	10.8	28.3
26-Nov	13.0	13.3	14.7	12.0	Z	17.2	17.3	14.7	15.8	14.4	14.9	15.9	16.9	11.0	9.1	11.7	12.0	14.3	14.1	14.3	15.7	15.0	17.2	19.8	14.5	19.8
27-Nov	22.3	22.3	19.9	19.6	19.5	Z	19.3	20.3	19.8	17.3	14.2	9.7	9.6	9.1	8.4	9.8	13.4	12.7	2.7	1.5	0.9	0.7	0.8	0.6	11.9	22.3
28-Nov	Z	0.6	1.9	3.5	0.5	0.7	0.5	0.8	0.5	0.7	0.4	0.5	0.2	0.3	0.3	0.4	0.7	0.3	0.2	0.2	0.2	0.1	0.3	0.9	0.6	3.5
29-Nov	1.1	Z	0.3	0.3	0.1	0.1	0.0	0.1	0.3	0.1	0.3	0.6	0.1	0.0	0.0	0.0	0.0	0.1	1.8	0.3	0.0	0.0	0.0	0.0	0.2	1.8
30-Nov	0.1	2.2	Z	0.5	0.1	3.5	6.6	7.2	10.4	12.5	9.4	5.1	5.8	5.4	3.1	3.6	6.1	5.8	7.3	7.2	6.5	5.2	6.2	5.9	5.5	12.5

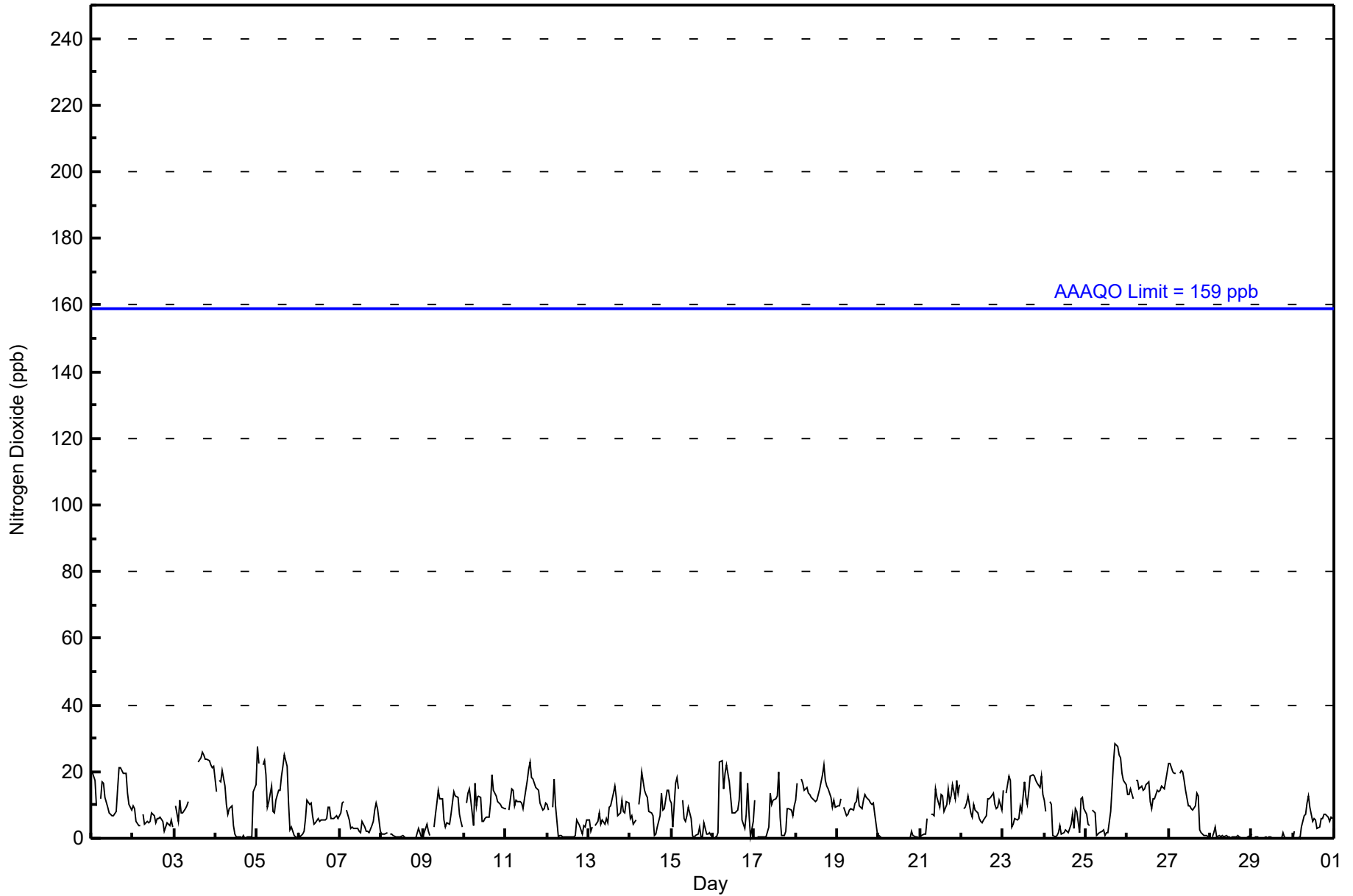
9.1	7.7	7.4	8.9	10.3	7.9	7.7	7.8	8.1	8.0	7.0	6.3	6.9	6.5	7.4	8.5	10.5	9.6	9.2	9.0	8.4	8.1	8.2	7.5	Diurnal Average	
27.5	22.4	19.9	22.2	23.3	23.2	19.3	20.3	22.1	17.3	14.9	15.9	17.2	20.8	22.9	24.0	25.9	28.3	27.4	24.9	24.2	22.2	21.2	21.8	Diurnal Maximum	

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



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

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb**  
**Fort McKay - Bertha Ganter - November 2023**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Fort McKay - Bertha Ganter - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	653	95.19	95.19
21 - 40	33	4.81	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 686

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Fort McKay - Bertha Ganter - November 2023**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	36	43	18	14	14	12	18	44	160	70	27	30	50	61	30	22	649
21 - 40	7	7	1	2	0	0	0	0	5	0	4	1	0	3	1	2	33
41 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	43	50	19	16	14	12	18	44	165	70	31	31	50	64	31	24	682

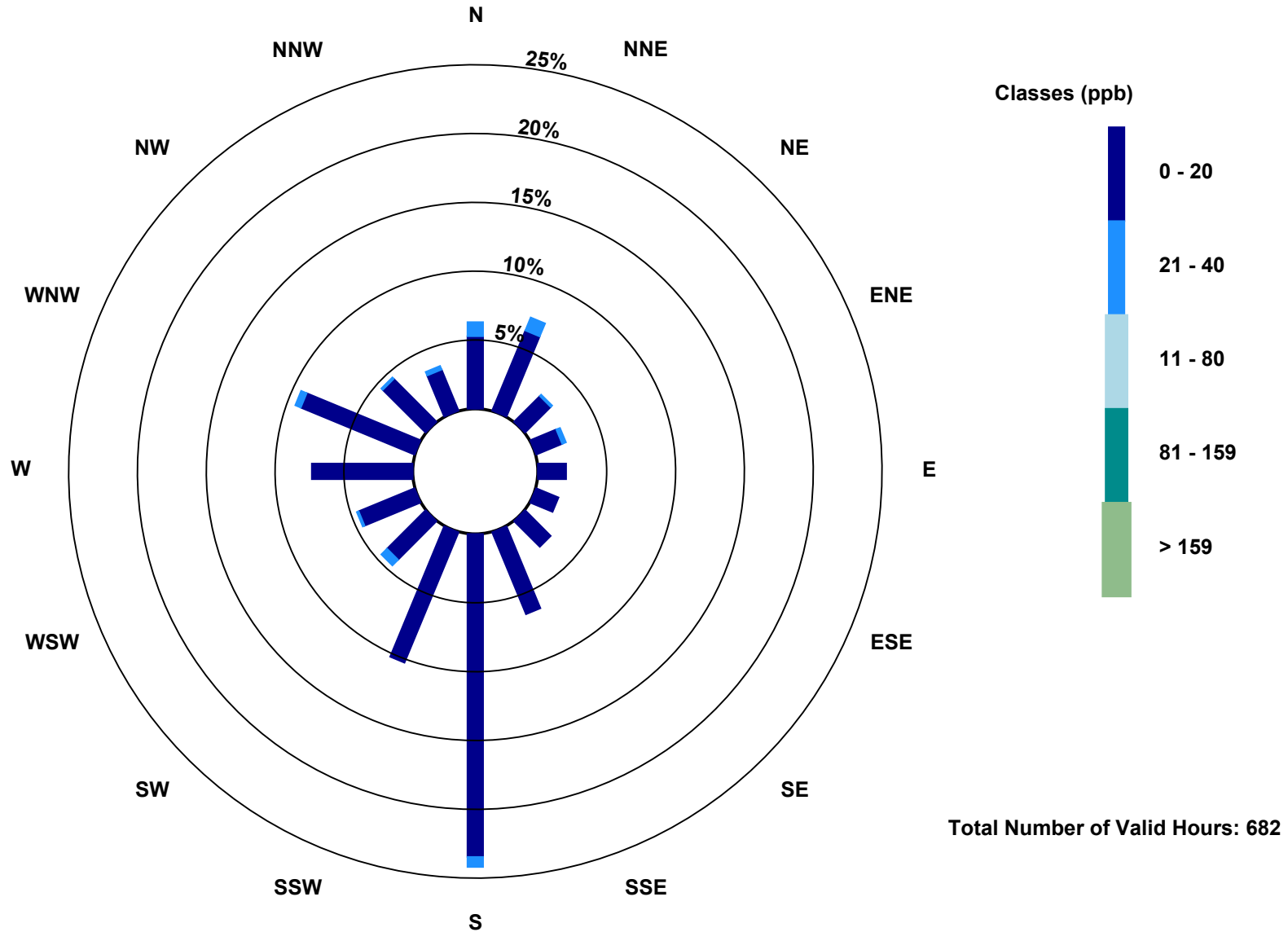
Total Number of Valid Hours: 682

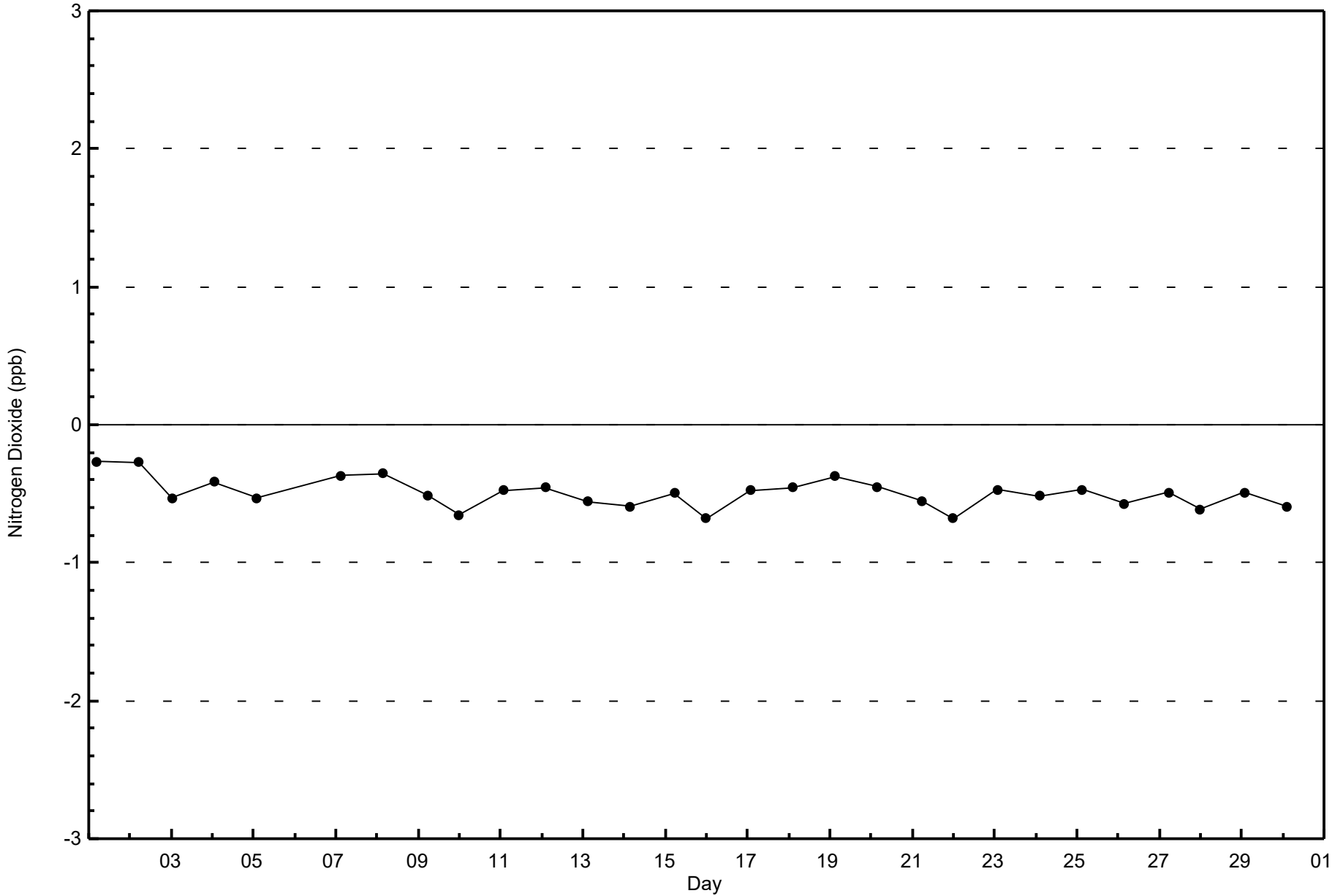
Total Number of Hours: 720

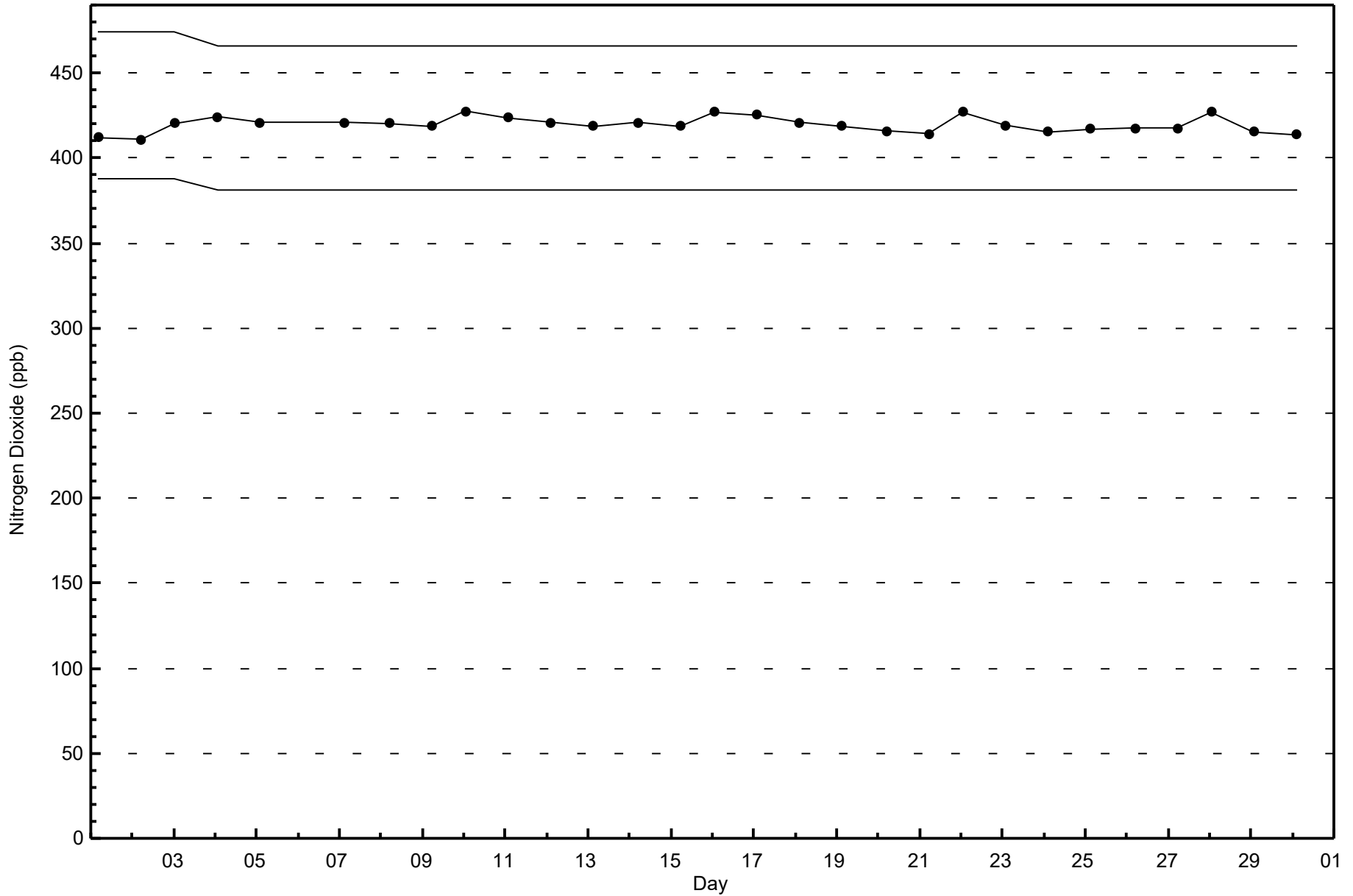


Wood Buffalo Environmental Association  
Wind Rose Nov 2023

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









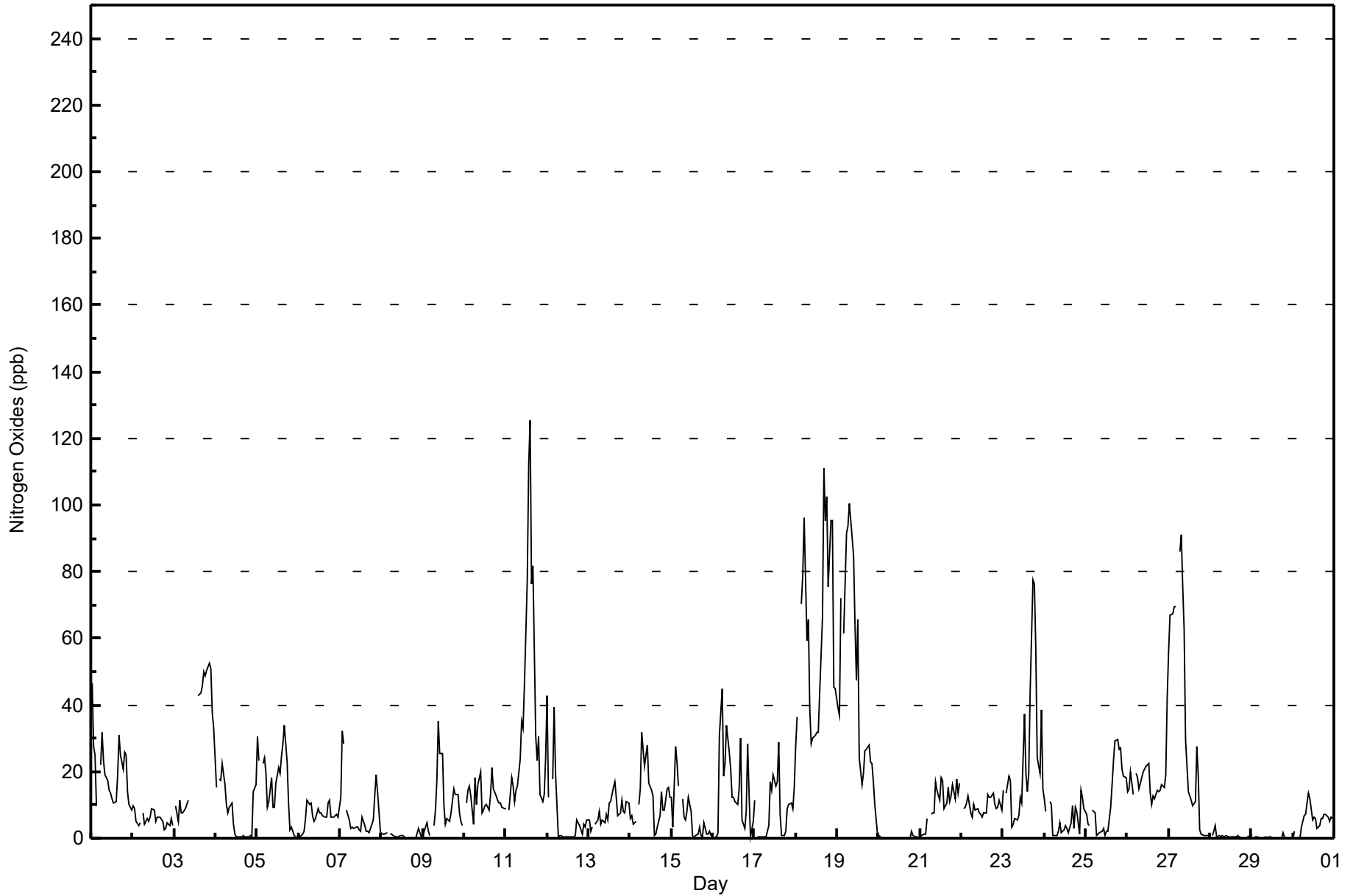
Maximum Value: 125.4 ppb on Nov 11 15:00      Maximum Daily Average: 60.9 ppb on Nov 18																						Hours in Service: 720 Hours of Data: 686																											
Minimum Value: 0.0 ppb on Nov 8 21:00      Minimum Daily Average: 0.2 ppb on Nov 20 Maximum Diurnal Average: 19.2 ppb at hour 17      Minimum Diurnal Average: 10.6 ppb at hour 24 Monthly Average: 14.47 ppb      Percentiles: P <sub>1</sub> = 0.0 P <sub>10</sub> = 0.4 Q <sub>1</sub> = 2.1 Median = 8.7 Q <sub>3</sub> = 17.1 P <sub>90</sub> = 33.0 P <sub>99</sub> = 95.5																						Hours of Missing Data: 34 Hours of Calibration: 34 Percent Operational Time: 100.0																											
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Nov	46.5	27.7	25.2	9.8	Z	22.1	31.9	23.5	19.3	17.5	14.6	13.7	12.0	10.8	11.0	18.7	30.7	25.0	20.9	25.7	24.8	14.0	10.2	8.6	20.2	46.5																							
2-Nov	10.0	9.1	5.1	3.7	4.7	Z	7.8	4.2	5.9	5.2	6.3	9.0	8.4	5.2	6.5	6.3	6.6	4.9	2.3	3.2	4.6	4.0	5.8	3.6	5.7	10.0																							
3-Nov	Z	9.7	5.0	11.5	7.5	7.7	9.0	10.1	11.4	C	C	C	C	C	42.8	43.7	45.7	49.8	48.6	50.3	52.4	50.8	37.7	33.2	29.3	52.4																							
4-Nov	15.4	Z	17.9	17.5	22.6	15.9	10.0	7.4	9.2	10.8	4.4	1.3	0.6	0.4	0.6	0.2	0.8	0.2	0.5	0.5	0.6	0.4	13.9	16.0	7.3	22.6																							
5-Nov	30.5	23.3	Z	22.6	23.9	19.3	9.5	11.1	18.1	9.2	9.2	16.4	21.2	19.4	24.7	28.5	33.9	22.8	10.8	2.5	3.2	0.9	0.3	0.2	15.7	33.9																							
6-Nov	1.3	0.5	1.2	2.2	6.1	11.5	10.0	10.4	6.9	5.0	5.9	8.8	7.7	7.6	6.8	6.2	6.3	10.4	11.2	6.3	6.2	6.6	7.1	6.3	6.6	11.5																							
7-Nov	12.3	32.3	28.3	Z	8.5	5.5	2.9	3.5	2.9	3.6	3.3	2.5	2.1	6.2	3.9	2.1	2.1	1.9	4.2	5.6	12.7	19.2	13.9	2.3	7.9	32.3																							
8-Nov	1.4	1.2	1.2	1.5	Z	1.2	1.1	0.8	0.6	0.5	0.6	0.7	1.0	0.6	0.2	0.2	0.1	0.2	0.0	0.1	0.0	2.8	1.7	0.3	0.8	2.8																							
9-Nov	0.4	1.9	4.5	2.2	1.0	Z	3.7	8.4	17.3	35.3	25.5	25.3	9.9	4.3	5.8	5.0	7.7	10.9	14.7	13.2	13.1	7.7	5.1	3.7	9.9	35.3																							
10-Nov	Z	10.7	14.3	15.8	12.8	4.2	18.1	10.3	16.2	20.1	7.6	8.4	9.8	10.1	8.5	13.0	21.1	15.0	12.8	11.3	10.6	10.4	9.5	8.8	12.2	21.1																							
11-Nov	9.0	Z	8.6	18.2	15.6	10.8	14.4	15.7	23.7	35.0	32.9	46.0	77.7	112.0	125.4	76.3	81.6	30.6	23.5	30.5	13.3	11.0	13.1	24.3	36.9	125.4																							
12-Nov	42.9	12.1	Z	17.6	39.5	19.6	0.6	0.7	0.8	0.4	0.3	0.3	0.5	0.5	0.5	0.3	1.0	5.7	4.7	4.0	1.1	4.4	3.5	5.5	7.2	42.9																							
13-Nov	5.4	2.2	3.2	Z	4.0	5.5	7.9	4.2	5.6	4.7	7.0	5.4	10.6	11.1	15.2	16.7	12.2	6.6	7.8	11.5	8.1	7.6	11.1	10.6	8.0	16.7																							
14-Nov	6.1	6.9	4.2	5.3	Z	10.2	14.8	31.9	21.5	24.8	27.9	16.7	14.6	12.5	0.8	1.4	3.3	6.6	14.1	8.3	8.7	14.8	15.1	12.4	12.3	31.9																							
15-Nov	12.3	3.2	27.4	22.8	15.5	Z	11.7	6.3	5.5	8.0	12.5	8.0	0.8	0.1	1.0	1.3	3.6	0.6	0.3	4.7	1.4	1.1	1.9	0.8	6.6	27.4																							
16-Nov	Z	0.6	0.5	1.7	31.0	44.8	18.8	22.6	34.0	25.9	20.7	12.5	12.1	11.1	10.1	14.9	30.2	5.4	3.1	8.0	28.3	13.7	0.5	5.0	15.5	44.8																							
17-Nov	11.6	Z	0.5	0.4	0.4	0.4	0.4	0.5	3.7	17.0	14.4	19.1	15.7	17.1	28.8	7.1	0.9	0.8	2.1	8.8	10.2	10.7	9.1	15.1	8.5	28.8																							
18-Nov	27.6	36.5	Z	70.4	78.7	96.0	59.4	65.7	38.6	28.5	29.9	30.9	31.9	31.7	43.5	66.6	110.9	95.2	102.7	75.6	95.3	95.5	45.5	44.8	60.9	110.9																							
19-Nov	38.8	36.7	72.0	Z	61.3	91.7	93.7	100.4	95.5	84.8	63.9	47.4	65.6	24.1	15.9	19.4	26.5	26.8	28.0	23.0	22.4	16.9	10.1	1.0	46.3	100.4																							
20-Nov	0.9	0.3	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.3	1.0	0.4	0.4	0.0	0.2	2.3																							
21-Nov	0.3	1.0	1.4	1.4	5.8	Z	7.1	7.5	7.6	16.8	14.3	11.4	18.1	17.4	9.1	10.5	15.2	11.0	12.9	16.1	12.0	17.7	13.7	16.3	10.6	18.1																							
22-Nov	Z	8.9	9.5	10.4	12.6	7.5	6.5	10.2	8.5	8.8	7.8	7.0	6.4	7.6	7.6	13.0	12.1	12.3	13.5	10.3	8.8	9.5	11.5	8.3	9.5	13.5																							
23-Nov	14.5	Z	13.6	18.8	17.4	3.2	4.3	6.0	5.6	6.6	12.3	10.8	37.2	19.4	13.8	19.5	44.2	77.7	76.4	56.7	24.0	19.5	38.4	14.9	24.1	77.7																							
24-Nov	11.7	8.2	Z	11.1	10.2	0.7	0.6	0.7	1.9	4.5	1.5	2.5	3.7	2.8	1.6	4.8	9.6	2.9	9.4	8.2	1.5	14.2	12.3	8.9	5.8	14.2																							
25-Nov	7.1	4.2	3.9	Z	8.6	7.5	0.9	1.2	1.8	2.1	2.9	0.9	2.1	2.1	9.4	16.2	23.2	29.4	29.8	26.8	27.2	20.6	18.7	18.0	11.5	29.8																							
26-Nov	13.8	14.8	19.7	13.1	Z	19.4	18.2	14.9	18.3	19.7	21.0	21.8	22.5	13.4	10.2	12.5	12.0	14.3	14.1	14.4	15.9	15.5	19.1	42.1	17.4	42.1																							
27-Nov	56.0	67.0	67.3	69.6	69.5	Z	86.2	91.3	75.6	62.9	29.6	14.1	12.6	11.2	9.9	11.0	27.5	18.7	2.7	1.5	0.9	0.7	0.8	0.7	34.2	91.3																							
28-Nov	Z	0.7	2.0	3.6	0.5	0.7	0.5	0.8	0.5	0.7	0.4	0.5	0.2	0.3	0.3	0.4	0.7	0.3	0.2	0.2	0.2	0.1	0.3	0.9	0.7	3.6																							
29-Nov	1.1	Z	0.3	0.3	0.1	0.1	0.0	0.1	0.3	0.1	0.3	0.6	0.1	0.0	0.0	0.0	0.0	0.1	1.8	0.3	0.0	0.0	0.0	0.0	0.2	1.8																							
30-Nov	0.1	2.2	Z	0.5	0.1	3.5	6.6	7.2	10.6	13.5	12.1	5.6	6.5	6.0	3.2	3.6	6.1	5.8	7.3	7.2	6.5	5.2	6.2	5.9	5.7	13.5																							
																								15.1	12.9	13.5	13.5	18.3	16.4	15.2	15.9	15.6	16.3	13.4	12.0	14.2	12.6	13.9	14.0	19.2	16.4	16.0	14.6	13.8	13.2	11.2	10.6	Diurnal Average	
																								56.0	67.0	72.0	70.4	78.7	96.0	93.7	100.4	95.5	84.8	63.9	47.4	77.7	112.0	125.4	76.3	110.9	95.2	102.7	75.6	95.3	95.5	45.5	44.8	Diurnal Maximum	
Z - zerospan      C - Calibration																																																	





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

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Fort McKay - Bertha Ganter - November 2023**





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

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Fort McKay - Bertha Ganter - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	550	80.17	80.17
21 - 40	80	11.66	91.84
41 - 80	40	5.83	97.67
81 - 159	16	2.33	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 686

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Fort McKay - Bertha Ganter - November 2023**

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	42	17	14	13	12	18	33	122	42	19	29	49	59	29	18	547
21 - 40	6	7	1	2	0	0	0	5	31	15	6	2	1	1	1	2	80
41 - 80	5	1	0	0	0	0	0	4	9	10	2	0	0	4	0	4	39
81 - 159	1	0	1	0	1	0	0	2	3	3	4	0	0	0	1	0	16
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	43	50	19	16	14	12	18	44	165	70	31	31	50	64	31	24	682

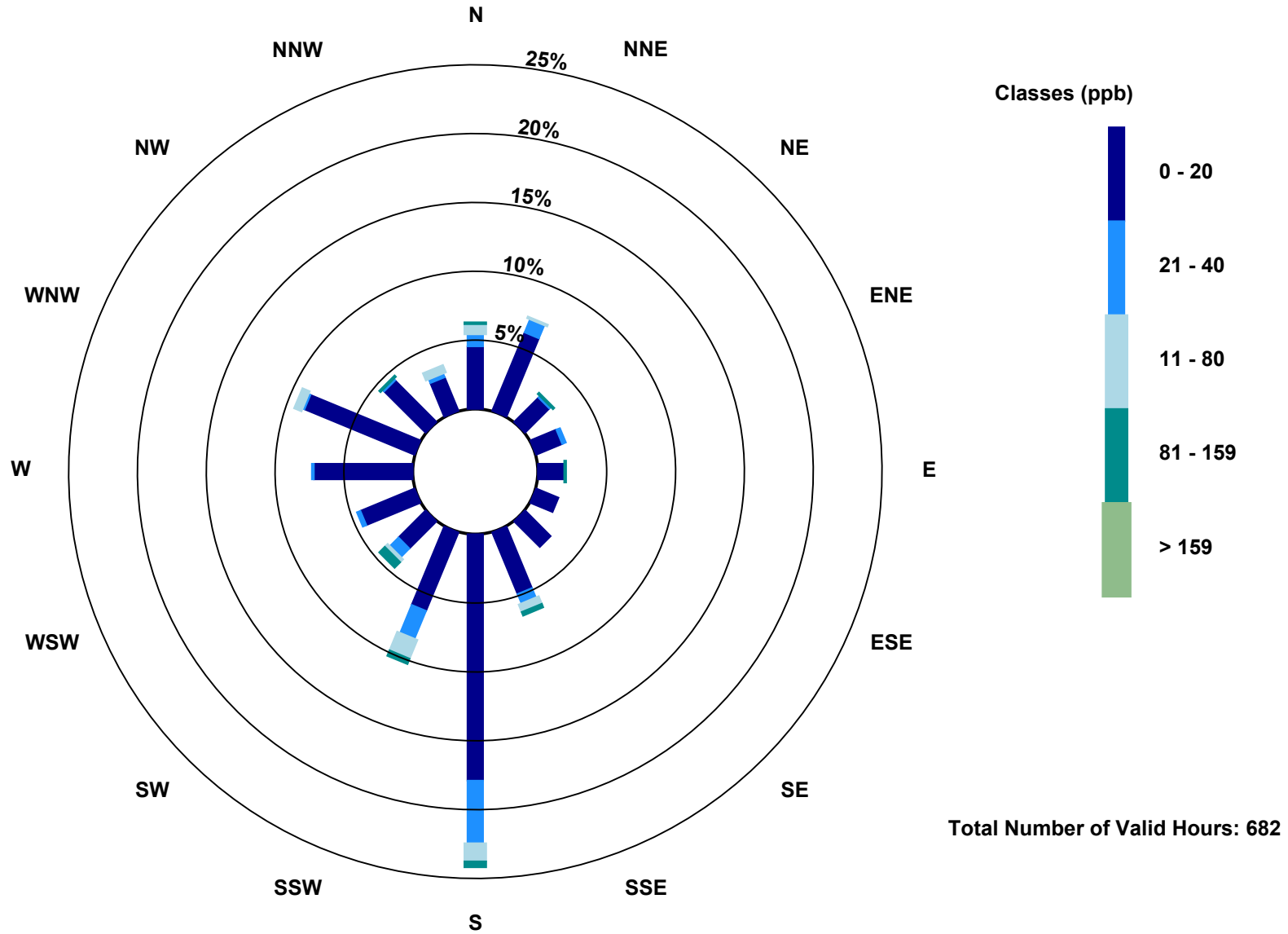
Total Number of Valid Hours: 682

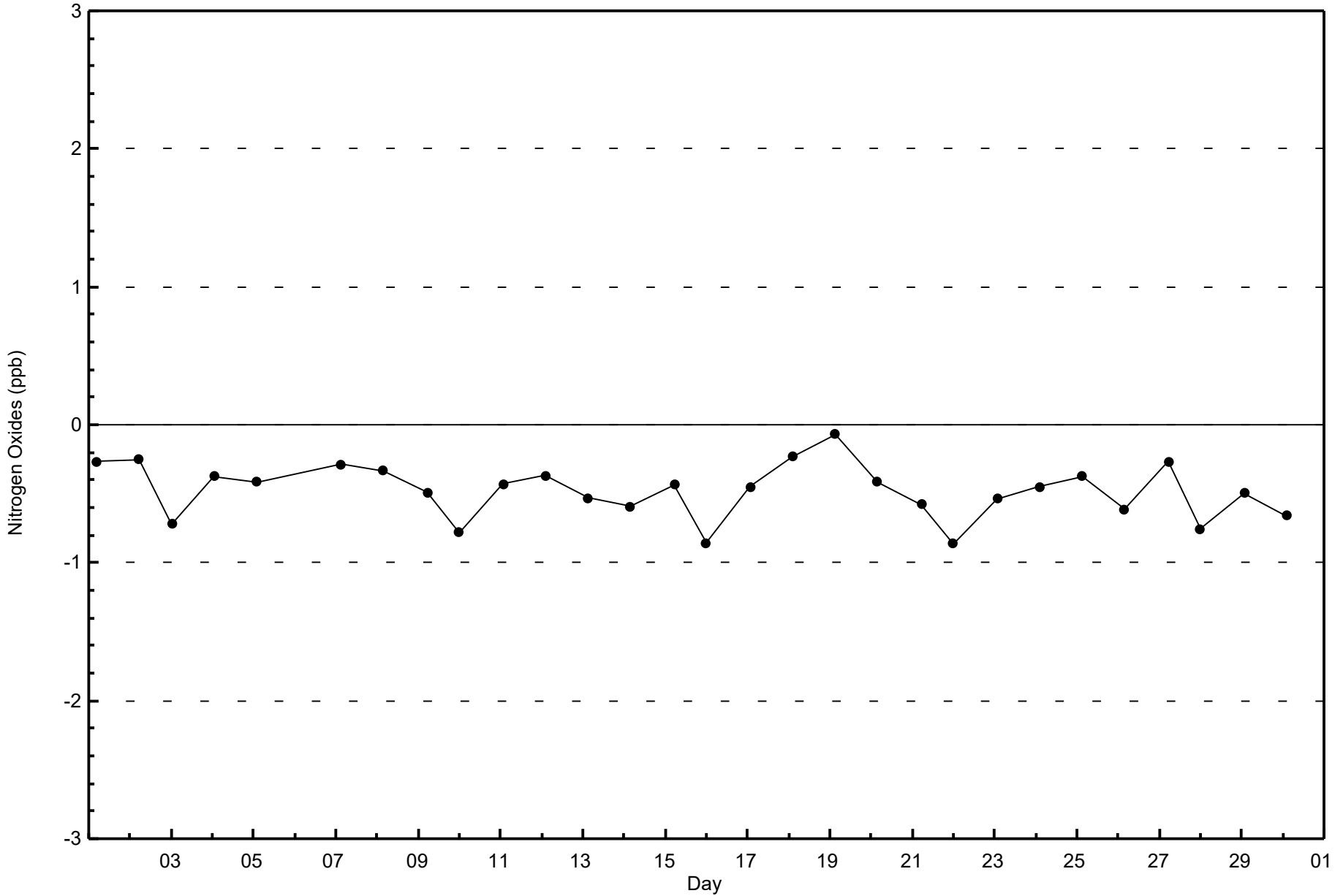
Total Number of Hours: 720

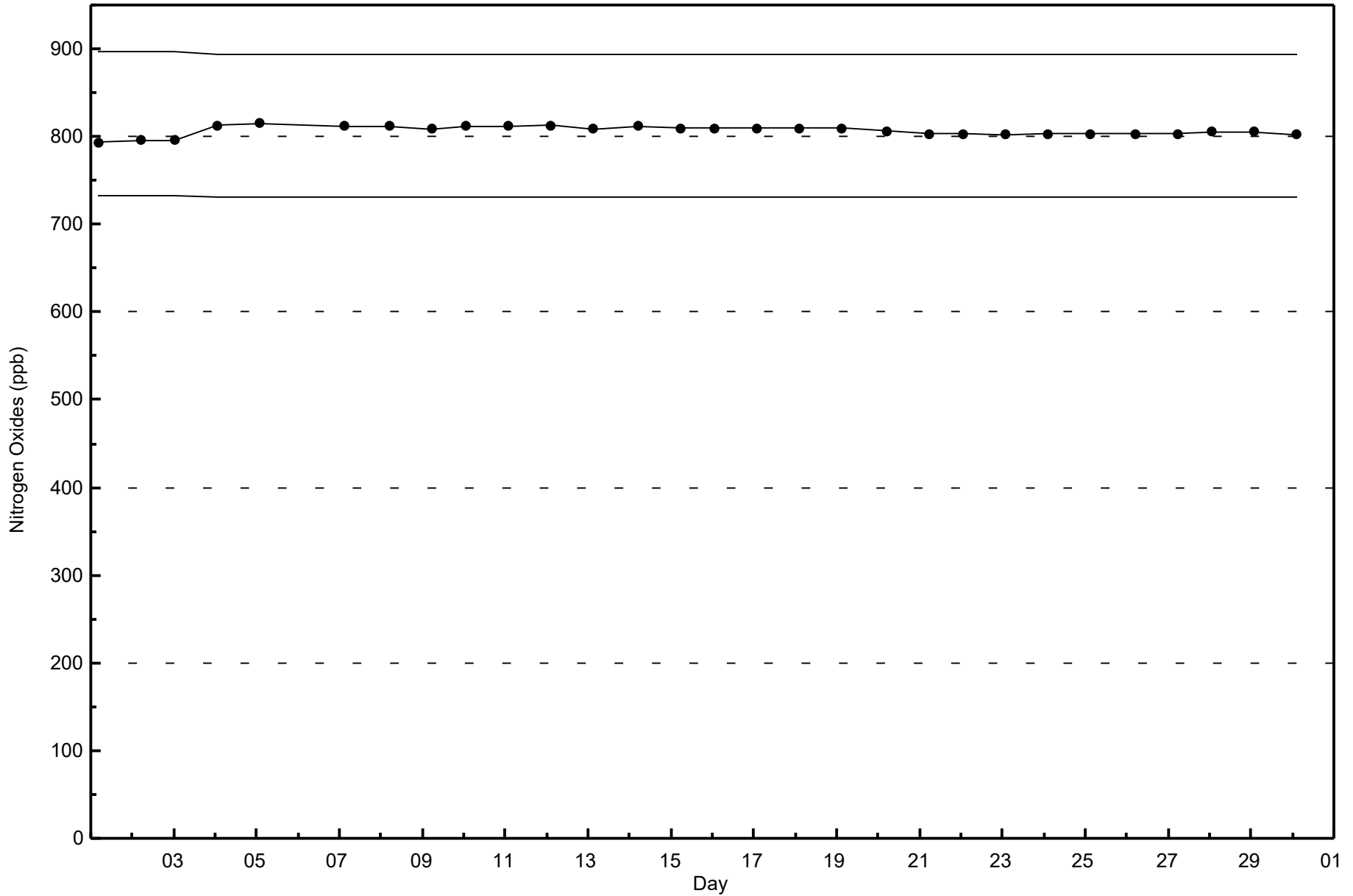


Wood Buffalo Environmental Association  
Wind Rose Nov 2023

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









Summary of Hour Averages

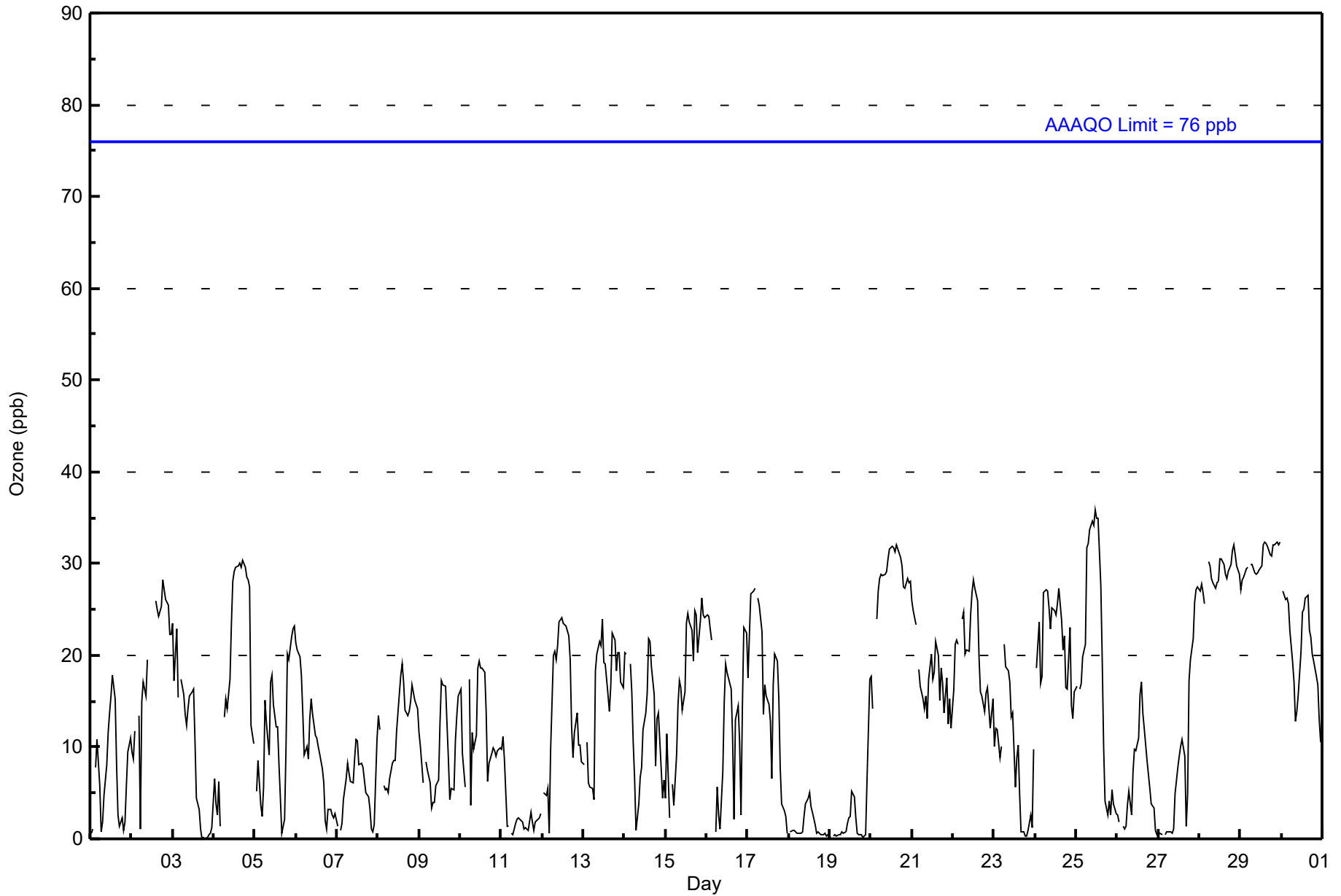
Fort McKay - Bertha Ganter - November 2023

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 35.9 ppb on Nov 25 12:00	Maximum Daily Average: 30.4 ppb on Nov 29		Hours of Data:	687
Minimum Value: 0.0 ppb on Nov 3 18:00	Minimum Daily Average: 1.5 ppb on Nov 18		Hours of Missing Data:	33
Maximum Diurnal Average: 18.1 ppb at hour 14	Minimum Diurnal Average: 10.7 ppb at hour 5		Hours of Calibration:	33
Monthly Average: 14.04 ppb	Percentiles: P <sub>1</sub> = 0.3 P <sub>10</sub> = 1.0 Q <sub>1</sub> = 5.2 Median = 13.8 Q <sub>3</sub> = 21.9 P <sub>90</sub> = 28.3 P <sub>99</sub> = 32.3		Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	0.7	1.1	Z	7.8	10.8	5.8	0.8	1.9	4.8	8.1	11.6	13.8	15.6	17.9	15.3	8.1	2.6	1.3	2.2	0.9	1.9	5.8	9.4	11.0	6.9	17.9
2-Nov	9.5	8.6	11.7	Z	13.4	1.0	15.0	17.1	15.5	19.5	C	C	C	C	25.9	25.0	24.3	25.4	28.3	27.1	26.1	25.5	22.3	22.2	19.1	28.3
3-Nov	23.6	17.3	22.9	15.4	Z	17.3	15.8	13.6	12.3	14.1	15.5	16.0	16.3	10.7	4.4	3.1	1.1	0.0	0.2	0.1	0.2	0.4	0.5	1.2	9.6	23.6
4-Nov	6.5	3.8	2.7	6.2	1.4	Z	13.3	15.2	14.2	17.5	23.4	28.1	29.2	29.7	29.7	30.1	29.6	30.4	29.6	28.5	28.3	27.4	12.4	10.3	19.5	30.4
5-Nov	Z	5.1	8.5	3.7	2.5	5.6	15.0	12.7	9.1	17.1	17.8	14.7	12.2	12.1	8.0	4.4	0.7	2.2	9.7	20.2	19.5	22.0	22.9	23.2	11.7	23.2
6-Nov	21.4	20.6	19.8	17.9	13.7	9.1	10.1	8.7	13.2	15.3	13.6	11.3	11.0	10.1	9.3	7.6	6.1	2.0	1.1	3.3	3.2	2.6	2.2	2.8	9.8	21.4
7-Nov	1.4	Z	1.0	1.6	4.2	6.5	8.2	7.2	6.3	6.2	8.7	10.8	10.7	8.0	8.3	7.7	6.5	5.0	4.6	3.2	1.0	0.8	1.5	10.8	5.7	10.8
8-Nov	13.4	12.0	Z	5.7	5.4	5.5	5.1	6.6	8.3	8.6	8.5	11.7	15.9	17.9	19.1	17.0	14.1	13.4	13.9	15.0	16.8	15.0	14.7	14.2	12.1	19.1
9-Nov	11.6	10.1	6.1	Z	8.3	7.5	6.0	3.4	3.9	4.0	5.7	6.4	12.6	17.3	16.8	16.6	12.5	8.7	4.3	5.5	5.3	10.6	13.4	15.6	9.2	17.3
10-Nov	16.3	9.3	7.5	5.6	Z	17.4	3.6	11.6	9.7	11.2	18.6	19.3	18.6	18.6	18.1	13.7	6.2	8.2	9.3	9.9	9.5	9.0	9.6	10.0	11.8	19.3
11-Nov	9.7	11.2	8.6	1.4	1.3	Z	0.6	0.4	1.6	2.1	2.3	2.2	1.9	1.1	1.2	1.0	0.9	2.8	1.9	0.9	1.8	2.1	2.3	2.7	2.7	11.2
12-Nov	Z	5.0	4.8	5.5	0.6	9.7	20.0	20.4	19.5	21.1	23.7	24.0	23.5	23.4	23.2	22.2	19.5	12.2	8.9	11.7	13.8	10.2	10.2	8.3	14.8	24.0
13-Nov	8.1	Z	10.5	6.1	5.6	5.5	4.3	18.3	20.2	21.5	21.1	24.0	19.3	19.1	15.7	13.9	16.7	22.4	21.7	18.3	20.3	20.4	17.0	16.5	15.9	24.0
14-Nov	20.3	20.2	Z	19.1	16.0	10.5	6.6	0.9	3.9	6.7	7.9	11.9	13.7	15.9	21.9	21.6	18.7	15.7	7.9	13.0	13.7	7.7	4.5	6.4	12.4	21.9
15-Nov	4.5	11.5	2.3	Z	5.9	3.6	9.1	14.7	17.2	16.4	14.0	16.1	23.5	24.5	23.7	22.8	19.4	24.8	24.5	20.2	23.8	26.2	24.4	24.1	17.3	26.2
16-Nov	24.5	24.3	22.9	21.7	Z	0.7	5.6	2.6	1.0	7.3	14.8	19.1	18.2	17.5	16.4	11.1	2.2	13.0	14.5	10.5	2.6	14.5	23.0	22.5	13.5	24.5
17-Nov	17.6	22.3	26.7	27.0	27.3	Z	26.2	25.5	22.6	13.5	16.8	15.5	14.7	12.7	6.5	16.8	20.1	19.3	15.4	7.7	3.8	3.1	2.5	0.7	15.8	27.3
18-Nov	Z	0.7	1.0	1.0	0.8	0.6	0.7	0.6	0.8	2.5	3.7	4.4	5.1	3.5	2.9	1.5	0.6	0.7	0.6	0.5	0.5	0.6	0.3	0.5	1.5	5.1
19-Nov	0.2	Z	0.2	0.4	0.3	0.4	0.4	0.7	0.6	0.8	1.6	2.2	2.4	5.2	4.6	2.3	0.7	0.5	0.4	0.2	0.4	0.5	6.4	17.4	2.1	17.4
20-Nov	17.7	14.2	Z	24.0	27.0	28.4	28.8	28.8	28.8	29.1	30.5	31.6	31.9	31.7	31.2	32.1	31.5	30.6	29.8	27.5	27.3	28.4	27.8	28.0	28.1	32.1
21-Nov	26.0	24.9	23.3	Z	18.5	16.7	15.2	14.2	15.6	13.1	17.4	20.2	17.4	18.1	21.5	19.9	15.0	18.5	16.9	13.8	17.6	12.5	15.3	12.1	17.5	26.0
22-Nov	16.3	21.2	21.7	21.2	Z	23.9	24.8	20.1	20.6	20.5	24.4	26.8	28.2	27.3	25.9	19.9	16.0	15.5	13.9	15.8	16.4	14.4	12.1	15.3	20.1	28.2
23-Nov	10.1	12.1	11.9	8.9	10.1	Z	21.2	18.8	18.4	17.0	13.2	13.7	5.7	8.8	10.3	4.9	0.7	0.7	0.4	0.4	1.0	2.6	1.3	9.7	8.8	21.2
24-Nov	Z	18.6	23.6	16.9	17.7	26.9	27.1	26.9	25.2	22.9	25.1	24.9	24.4	25.6	27.3	23.8	20.7	22.0	16.5	16.3	23.0	14.5	13.1	16.0	21.7	27.3
25-Nov	16.7	Z	16.3	17.0	19.9	21.2	31.7	32.1	33.7	34.6	34.2	35.9	34.9	35.0	27.6	19.5	10.0	4.1	2.6	4.2	2.6	5.3	3.8	2.7	19.4	35.9
26-Nov	2.6	1.9	Z	1.4	1.1	1.4	3.6	5.2	2.6	7.3	9.7	9.6	11.0	15.7	17.0	13.8	12.1	8.6	7.1	5.5	3.9	3.3	1.0	0.5	6.4	17.0
27-Nov	0.4	0.6	0.5	Z	0.4	0.8	0.8	0.7	0.7	1.0	4.8	7.8	9.0	10.1	10.8	9.0	1.4	4.8	17.3	19.5	21.9	25.7	27.1	27.4	8.8	27.4
28-Nov	27.0	27.8	26.8	25.6	Z	30.2	29.7	28.4	27.9	27.3	27.9	28.1	30.5	30.6	29.8	28.8	28.4	29.1	29.9	31.4	32.0	31.0	29.7	28.9	29.0	32.0
29-Nov	27.2	28.3	28.5	29.4	29.6	Z	29.9	29.9	29.0	28.8	29.0	29.3	29.8	32.0	32.3	32.2	31.8	31.0	30.9	32.1	32.1	32.4	32.1	32.3	30.4	32.4
30-Nov	Z	26.9	26.1	26.2	25.7	22.7	19.1	17.0	12.8	13.9	15.8	20.4	24.7	25.0	26.3	26.5	22.7	22.0	20.1	19.3	17.7	16.8	12.9	10.5	20.5	26.9

13.3	13.8	13.4	12.7	10.7	11.2	13.3	13.5	13.3	14.3	15.9	17.2	17.7	18.1	17.7	15.9	13.1	13.2	12.8	12.7	12.9	13.1	12.5	13.5	Diurnal Average	
27.2	28.3	28.5	29.4	29.6	30.2	31.7	32.1	33.7	34.6	34.2	35.9	34.9	35.0	32.3	32.2	31.8	31.0	30.9	32.1	32.1	32.4	32.1	32.3	Diurnal Maximum	

Z - zerospan C - Calibration  
 Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 76 ppb







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

**Ozone (O<sub>3</sub>) - ppb**  
**Fort McKay - Bertha Ganter - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	498	72.49	72.49
21 - 50	189	27.51	100.00
51 - 82	0	0.00	100.00
> 83	0	0.00	100.00

Total Number of Valid Hours: 687

Total Number of Hours: 720



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

**Ozone (O<sub>3</sub>) - ppb**  
**Fort McKay - Bertha Ganter - November 2023**

<b>Concentration</b> <b>Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	36	40	16	10	5	3	13	38	152	60	28	14	15	30	18	16	494
21 - 50	9	6	5	7	9	10	5	8	6	11	7	17	38	33	11	7	189
51 - 82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 83	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	45	46	21	17	14	13	18	46	158	71	35	31	53	63	29	23	683

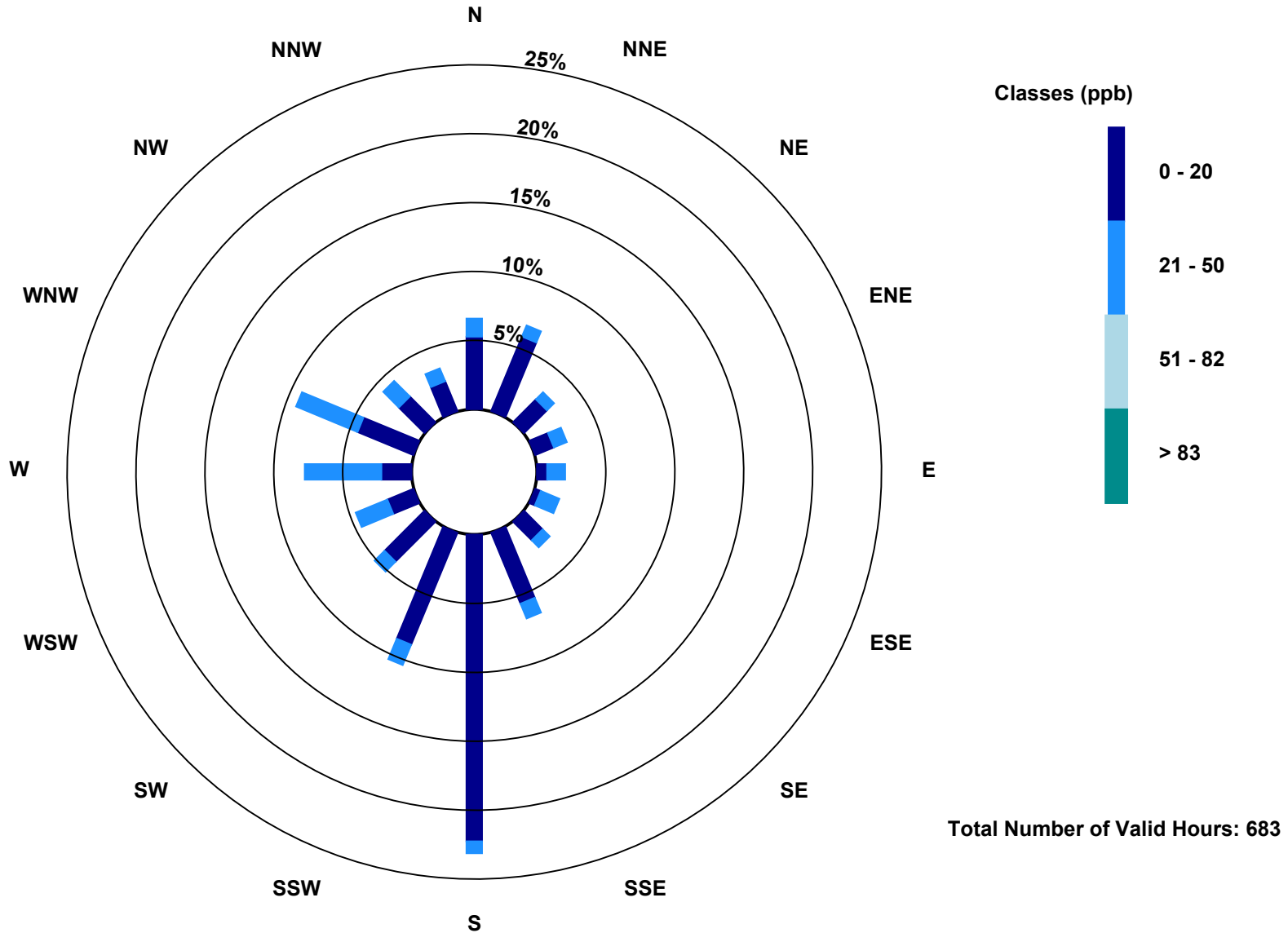
Total Number of Valid Hours: 683

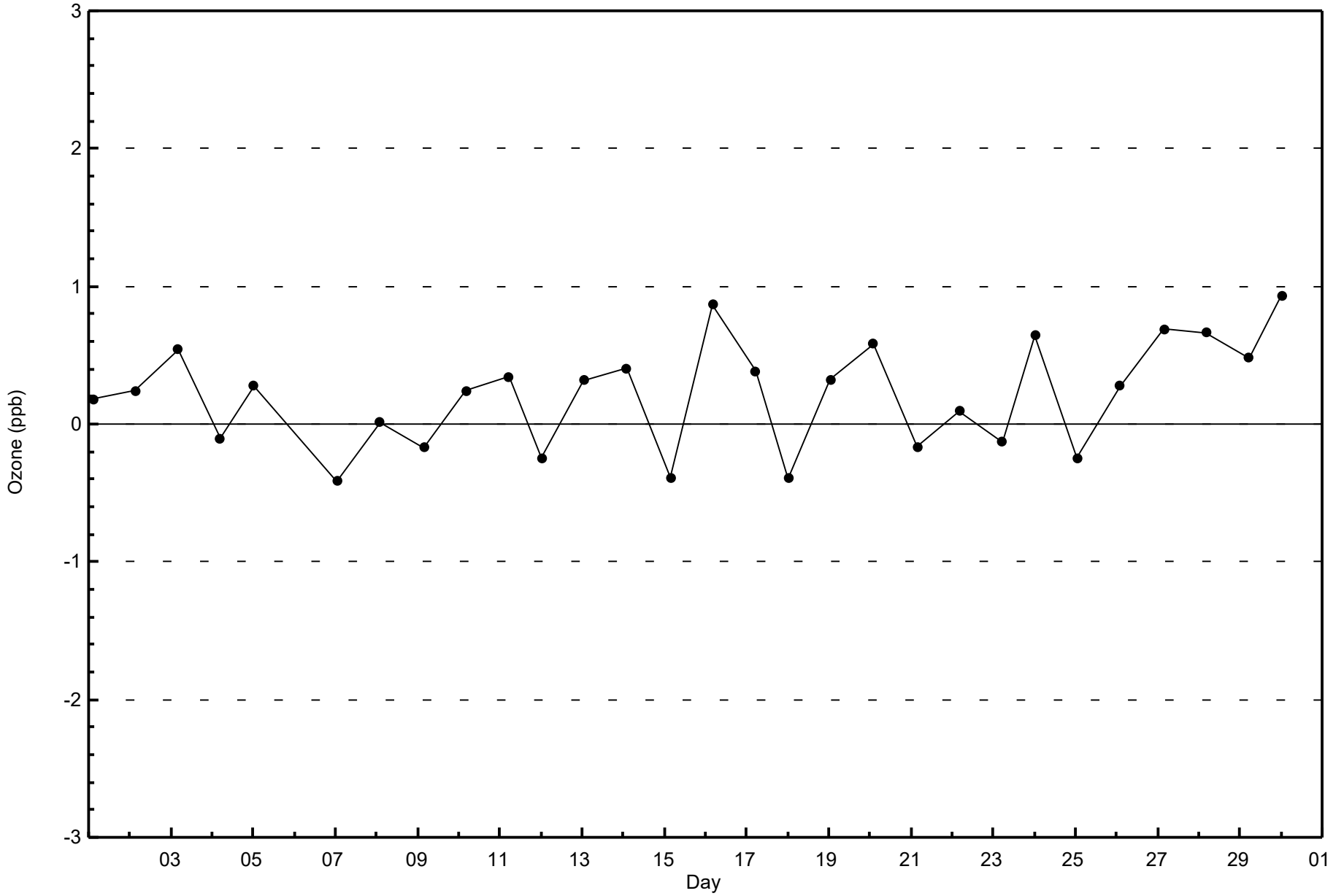
Total Number of Hours: 720

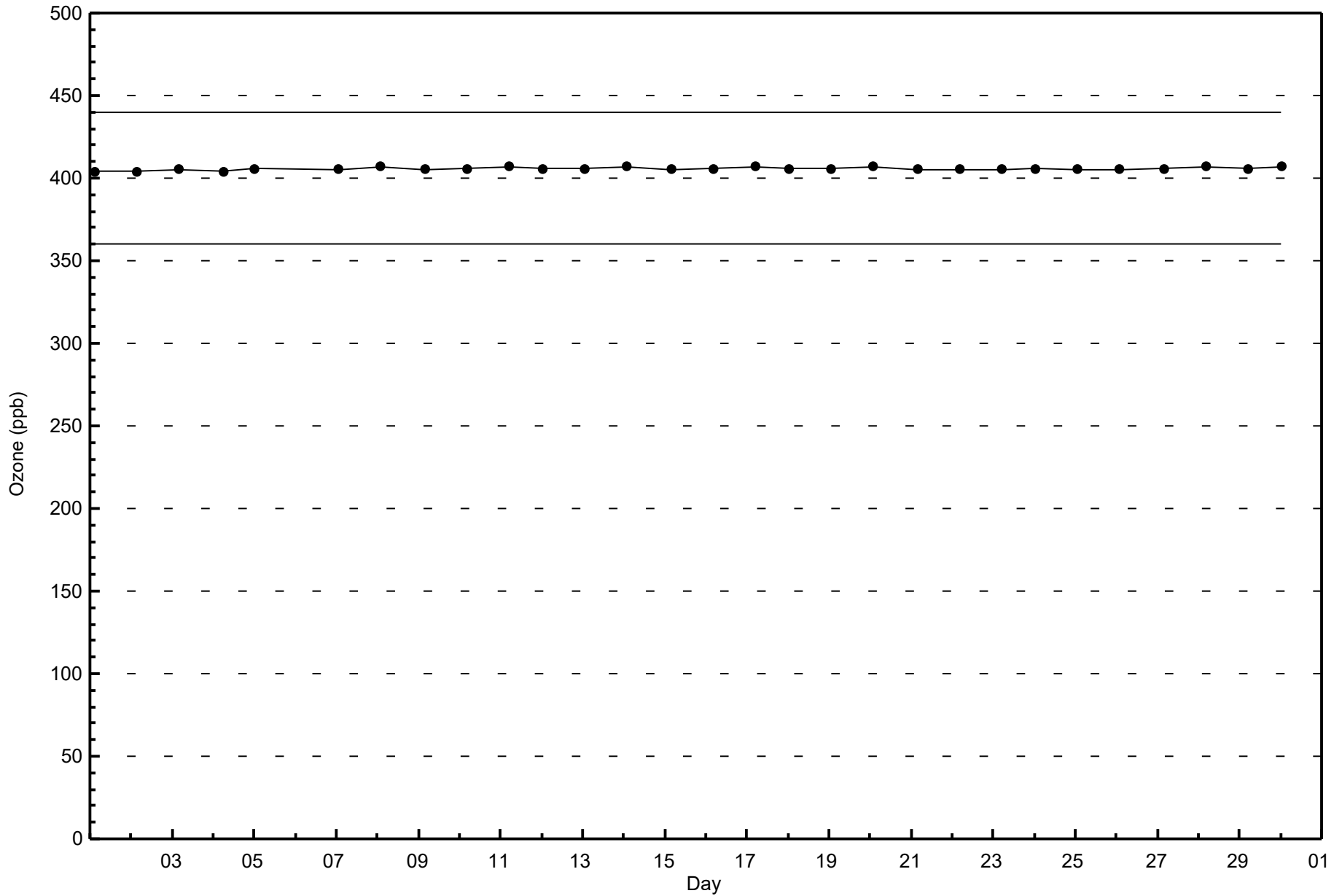


Wood Buffalo Environmental Association  
Wind Rose Nov 2023

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









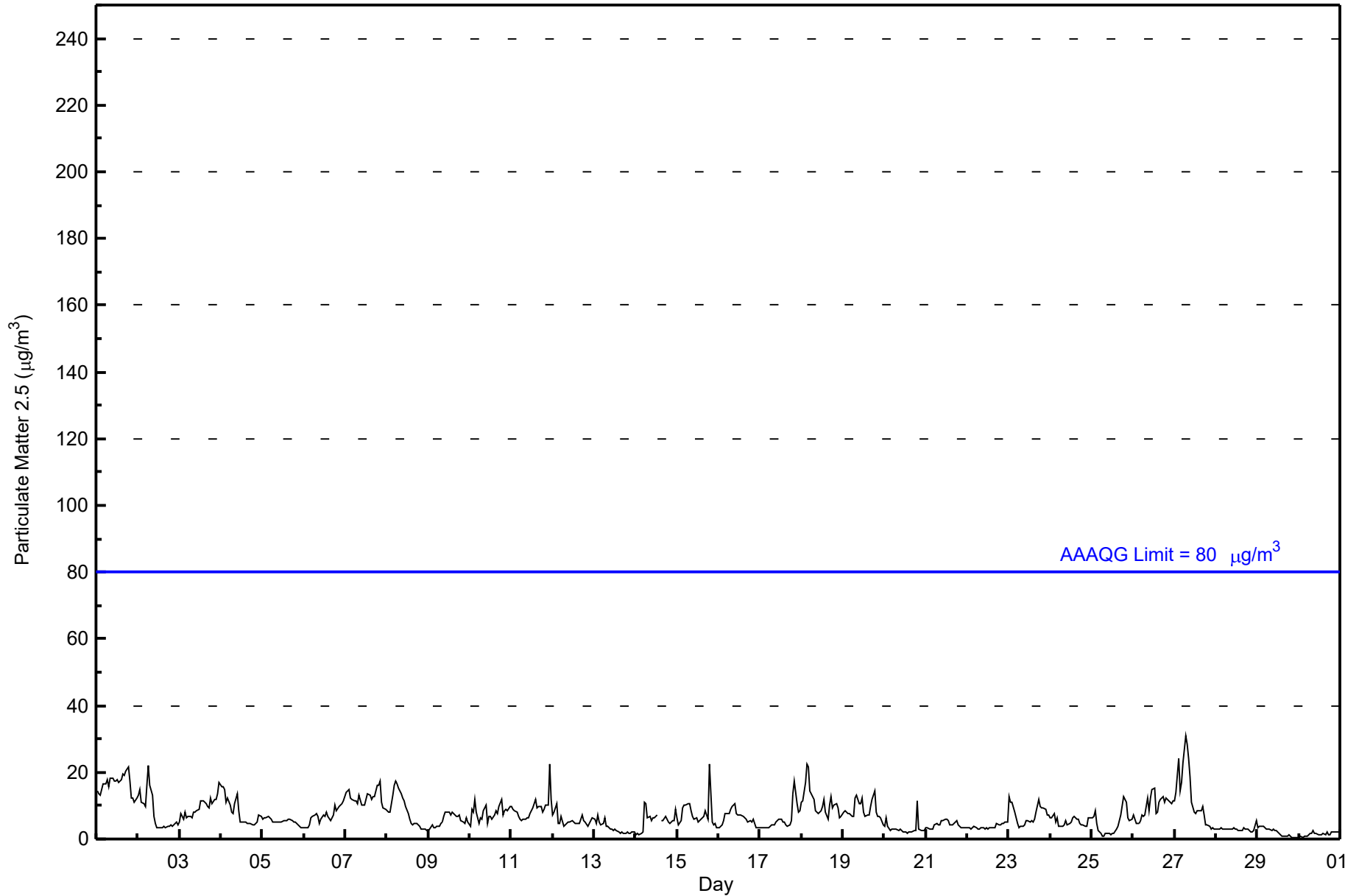
Wood Buffalo Environmental Association

Summary of Hour Averages

Particulate Matter 2.5 (PM<sub>2.5</sub>) - µg/m<sup>3</sup>

Fort McKay - Bertha Ganter - November 2023

Number of Exceedences (AAAQO):		1-hr: 0		24-hr: 0		Hours in Service:		720																																								
Maximum Value: 30.8 µg/m <sup>3</sup> on Nov 27 07:00		Maximum Daily Average: 16.3 µg/m <sup>3</sup> on Nov 1				Hours of Data:		718																																								
Minimum Value: 0.5 µg/m <sup>3</sup> on Nov 30 01:00		Minimum Daily Average: 1.5 µg/m <sup>3</sup> on Nov 30				Hours of Missing Data:		2																																								
Maximum Diurnal Average: 7.9 µg/m <sup>3</sup> at hour 7		Minimum Diurnal Average: 6.1 µg/m <sup>3</sup> at hour 22				Hours of Calibration:		2																																								
Monthly Average: 6.94 µg/m <sup>3</sup>		Percentiles: P <sub>1</sub> = 0.7 P <sub>10</sub> = 2.5 Q <sub>1</sub> = 3.6 Median = 5.9 Q <sub>3</sub> = 9.1 P <sub>90</sub> = 12.7 P <sub>99</sub> = 22.4				Percent Operational Time:		100.0																																								
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Nov	14.4	13.5	13.2	14.9	16.4	16.7	17.9	15.9	18.1	18.3	17.2	17.4	17.8	17.0	17.6	19.6	18.9	20.4	21.4	17.5	12.5	12.5	11.0	12.2	16.3	21.4																						
2-Nov	13.3	14.7	11.2	10.5	9.7	16.0	22.1	16.2	13.0	6.8	4.5	3.4	3.5	3.3	3.6	3.5	3.7	3.8	4.2	4.0	4.7	5.2	4.1	7.8	22.1	22.1																						
3-Nov	5.3	7.5	5.7	7.9	6.2	6.8	6.7	6.4	7.9	7.9	8.6	8.8	11.4	11.5	11.6	10.5	9.9	9.2	12.1	10.4	11.8	11.9	13.6	17.1	9.4	17.1																						
4-Nov	15.6	15.6	15.0	11.0	12.1	10.3	8.2	7.7	10.4	13.4	8.7	4.9	5.0	5.2	5.3	4.8	4.9	4.6	4.3	4.4	4.8	5.1	7.1	6.7	8.1	15.6																						
5-Nov	5.8	6.4	6.5	6.8	6.3	6.1	5.2	5.0	5.1	4.9	5.1	5.3	5.5	5.5	5.5	5.9	5.9	5.5	5.2	5.2	4.7	3.7	3.4	3.3	5.3	6.8																						
6-Nov	3.6	3.3	3.5	4.1	6.2	6.9	7.4	7.6	6.7	4.5	6.1	7.1	7.0	7.9	7.0	5.7	6.3	7.3	10.3	8.6	9.5	10.0	10.6	11.4	7.0	11.4																						
7-Nov	13.9	14.4	15.0	12.4	11.7	11.6	11.5	10.8	13.1	10.3	10.2	10.1	11.8	13.5	13.0	12.0	12.7	12.5	15.9	16.0	17.3	10.9	9.2	9.1	12.5	17.3																						
8-Nov	8.4	8.0	8.1	13.2	16.2	17.5	16.4	15.1	13.6	12.2	11.5	9.7	7.6	6.0	4.6	4.2	4.8	4.6	4.3	3.7	3.1	3.1	3.1	2.7	8.4	17.5																						
9-Nov	2.3	3.2	4.2	3.5	3.4	3.8	3.6	4.8	5.1	6.8	8.2	8.0	8.2	7.4	8.0	7.1	6.7	6.8	7.1	5.5	5.2	4.9	6.2	5.1	5.6	8.2																						
10-Nov	4.0	8.8	8.0	12.0	8.3	4.5	6.5	6.1	8.6	10.4	4.6	7.0	6.9	6.0	7.3	8.5	7.4	9.6	11.7	7.3	8.3	9.1	8.7	9.8	7.9	12.0																						
11-Nov	9.8	9.1	8.3	7.9	6.9	6.1	5.7	5.7	6.1	6.3	6.2	7.5	9.2	10.6	11.7	9.3	9.9	9.9	8.3	8.8	10.3	10.3	22.4	11.8	9.1	22.4																						
12-Nov	7.3	7.9	10.4	4.8	4.8	6.7	4.0	4.4	4.6	5.2	5.2	5.4	5.2	4.8	4.5	4.6	6.1	7.3	5.4	5.2	3.6	4.6	5.6	6.2	5.6	10.4																						
13-Nov	6.1	4.7	7.1	5.2	4.3	4.6	6.3	3.7	3.8	3.1	3.0	2.4	2.8	2.6	2.1	1.9	1.9	1.9	1.9	2.0	1.8	1.6	2.0	2.0	3.3	7.1																						
14-Nov	1.4	1.6	1.4	1.6	1.9	11.1	10.4	6.4	6.9	5.6	6.3	6.5	7.4	C	C	5.6	5.5	6.9	5.8	5.1	4.5	5.5	5.6	9.0	5.6	11.1																						
15-Nov	6.2	4.2	5.6	9.2	10.1	10.0	10.5	10.8	8.7	6.8	6.0	6.5	5.1	5.5	6.1	6.8	8.5	7.2	5.8	22.5	5.0	4.4	4.5	3.5	7.5	22.5																						
16-Nov	3.5	3.9	4.3	5.5	7.6	7.5	7.6	9.1	9.7	10.4	7.6	7.2	7.2	7.1	6.9	6.2	5.8	5.0	5.7	5.2	5.9	4.6	3.4	3.3	6.3	10.4																						
17-Nov	3.2	3.4	3.2	3.4	3.5	3.5	4.0	4.2	4.3	4.9	5.3	6.1	5.9	5.1	5.1	4.3	3.9	4.1	5.3	13.5	17.5	10.4	8.0	8.3	5.9	17.5																						
18-Nov	10.9	11.4	16.8	22.6	21.5	14.2	12.9	11.7	8.5	7.9	7.8	8.3	9.7	11.9	7.9	5.9	10.4	12.8	9.3	10.2	10.7	9.2	6.2	6.8	11.1	22.6																						
19-Nov	8.0	8.6	8.0	7.7	7.7	6.6	6.7	12.4	13.0	10.7	10.8	12.3	7.9	6.9	7.1	7.2	9.6	11.7	14.5	8.0	6.6	6.7	6.4	4.2	8.7	14.5																						
20-Nov	3.9	6.3	4.0	2.5	2.8	3.0	2.9	2.8	2.6	2.8	2.4	2.0	2.0	1.9	2.1	1.9	1.9	2.5	2.7	11.3	2.8	2.7	2.7	2.7	3.1	11.3																						
21-Nov	3.5	3.3	3.1	3.0	3.1	4.3	4.6	4.3	4.3	5.6	5.4	5.8	6.0	5.4	4.3	4.2	4.8	5.0	5.4	4.3	3.5	3.2	3.2	3.3	4.3	6.0																						
22-Nov	3.3	3.2	3.1	3.3	3.6	3.5	3.0	3.1	3.4	3.2	3.1	3.2	3.1	3.2	3.2	3.3	3.3	4.8	4.3	4.1	4.6	4.9	5.2	5.0	3.7	5.2																						
23-Nov	12.8	11.1	11.0	8.0	6.5	4.7	3.2	3.9	3.6	4.1	5.6	5.5	5.2	5.7	5.2	5.9	7.9	12.1	9.6	9.1	9.1	8.7	7.4	7.4	7.2	12.8																						
24-Nov	6.3	6.3	7.5	5.0	6.4	3.8	3.8	3.9	4.2	5.4	4.2	4.5	5.2	6.3	6.8	5.8	5.8	4.6	4.2	4.2	3.6	3.9	6.3	6.2	5.2	7.5																						
25-Nov	6.2	6.6	8.5	4.8	2.6	1.6	0.9	0.9	1.6	1.5	1.7	1.5	1.7	1.8	3.0	3.9	5.4	7.0	12.8	12.0	11.1	6.4	5.5	6.0	4.8	12.8																						
26-Nov	7.3	6.0	4.8	4.9	5.5	7.4	7.0	7.2	12.1	8.3	12.4	15.0	15.3	7.6	7.9	11.2	11.8	12.7	11.0	12.4	11.8	10.9	10.5	11.5	9.7	15.3																						
27-Nov	11.6	13.8	24.0	14.5	17.1	22.8	30.8	28.4	24.0	18.4	11.1	8.0	7.8	8.7	8.6	8.4	9.9	7.2	4.3	4.4	3.6	3.2	3.5	3.1	12.4	30.8																						
28-Nov	3.0	3.1	3.2	3.2	2.9	2.8	2.9	2.9	3.0	3.0	3.2	3.1	2.9	2.6	2.5	2.7	3.5	3.1	2.8	2.7	2.2	2.3	2.7	5.5	3.0	5.5																						
29-Nov	3.6	3.8	3.8	3.7	3.4	3.1	2.9	2.8	2.8	2.8	2.7	2.6	1.6	1.1	0.9	0.8	0.6	0.6	1.3	0.8	0.6	0.5	0.5	0.5	2.0	3.8																						
30-Nov	0.5	0.7	0.6	1.0	0.7	0.9	1.5	1.8	2.6	1.7	1.6	1.1	1.3	1.3	1.6	1.4	2.1	1.2	1.2	2.0	2.2	2.1	2.1	2.0	1.5	2.6																						
																								6.8	7.1	7.6	7.3	7.3	7.6	7.9	7.5	7.7	7.1	6.5	6.5	6.6	6.3	6.2	6.1	6.7	7.1	7.3	7.7	6.7	6.1	6.4	6.3	Diurnal Average
																								15.6	15.6	24.0	22.6	21.5	22.8	30.8	28.4	24.0	18.4	17.2	17.4	17.8	17.0	17.6	19.6	18.9	20.4	21.4	22.5	17.5	12.5	22.4	17.1	Diurnal Maximum
C - Calibration																																																
Alberta Ambient Air Quality Guideline/Objectives: 1-hr 80 µg/m <sup>3</sup> 24-hr 29 µg/m <sup>3</sup>																																																





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

**Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$**   
**Fort McKay - Bertha Ganter - November 2023**

<b>Concentration Ranges (<math>\mu\text{g}/\text{m}^3</math>)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	332	46.24	46.24
6 - 15	345	48.05	94.29
16 - 25	39	5.43	99.72
26 - 80	2	0.28	100.00
> 81.0	0	0.00	100.00

Total Number of Valid Hours: 718

Total Number of Hours: 720





**Wood Buffalo Environmental Association  
Frequency Distribution**

**Particulate Matter 2.5 (PM<sub>2.5</sub>) - μg/m<sup>3</sup>  
Fort McKay - Bertha Ganter - November 2023**

Concentration Ranges (μg/m <sup>3</sup> )	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	24	28	15	9	10	11	12	16	28	20	11	21	44	45	23	13	330
6 - 15	21	24	5	6	4	2	6	25	122	48	23	12	9	19	7	11	344
16 - 25	1	2	1	2	0	0	0	5	18	5	0	0	0	3	1	0	38
26 - 80	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	2
> 81.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	46	54	21	17	14	13	18	47	168	74	34	33	53	67	31	24	714

Total Number of Valid Hours: 714

Total Number of Hours: 720

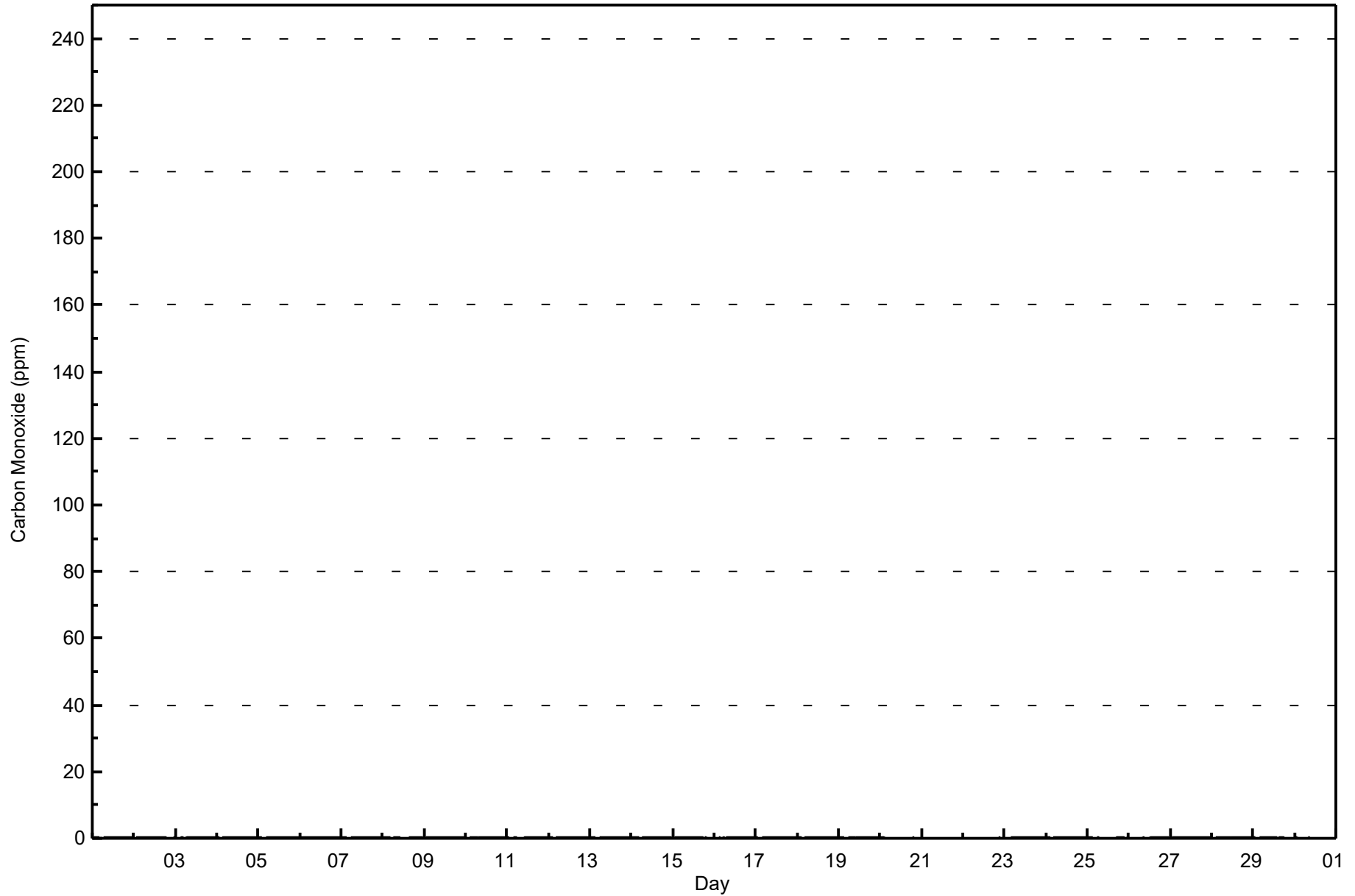






**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Carbon Monoxide (CO) - ppm**  
**Fort McKay - Bertha Ganter - November 2023**





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

**Carbon Monoxide (CO) - ppm**  
**Fort McKay - Bertha Ganter - November 2023**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 0.3	664	96.65	96.65
0.4 - 0.5	23	3.35	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: 687

Total Number of Hours: 720



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

**Carbon Monoxide (CO) - ppm**  
**Fort McKay - Bertha Ganter - November 2023**

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	44	51	21	17	14	13	18	46	155	62	32	32	49	57	25	24	660
0.4 - 0.5	0	0	0	0	0	0	0	0	5	9	2	0	0	6	1	0	23
0.6 - 0.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.8 - 1.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1.5 - 10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	44	51	21	17	14	13	18	46	160	71	34	32	49	63	26	24	683

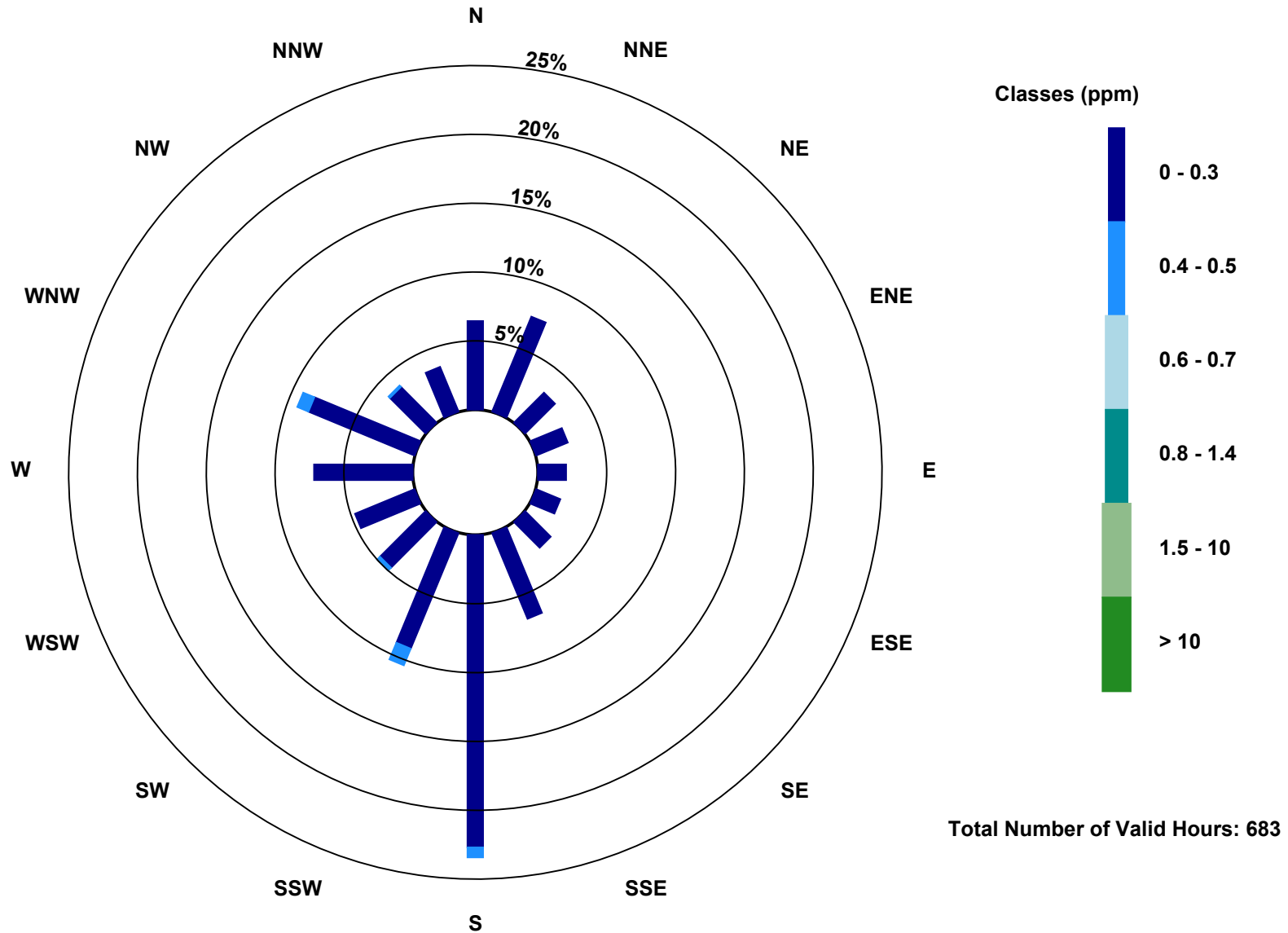
Total Number of Valid Hours: 683

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 2023

Carbon Monoxide (CO) - ppm  
Fort McKay - Bertha Ganter





Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 480.7 ppm on Nov 19 08:00	Maximum Daily Average: 459.0 ppm on Nov 19		Hours of Data:	687
Minimum Value: 417.8 ppm on Nov 20 17:00	Minimum Daily Average: 421.1 ppm on Nov 20		Hours of Missing Data:	33
Maximum Diurnal Average: 435.5 ppm at hour 3	Minimum Diurnal Average: 429.6 ppm at hour 15		Hours of Calibration:	33
Monthly Average: 432.68 ppm	Percentiles: P <sub>1</sub> = 418.5 P <sub>10</sub> = 422.4 Q <sub>1</sub> = 424.7 Median = 430.3 Q <sub>3</sub> = 437.8 P <sub>90</sub> = 446.6 P <sub>99</sub> = 466.2		Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	438.7	437.8	437.6	433.3	432.9	Z	442.4	440.3	445.8	443.3	439.2	439.3	439.4	435.9	439.7	441.9	441.5	443.0	445.2	448.0	440.8	441.3	440.3	439.5	440.3	448.0
2-Nov	Z	445.0	442.9	443.7	439.1	437.7	432.9	430.9	429.9	424.7	422.6	422.4	423.1	421.4	421.8	422.5	421.8	421.9	421.2	421.3	421.3	421.8	422.8	423.9	427.7	445.0
3-Nov	424.6	Z	424.8	426.2	425.2	425.9	427.2	427.8	427.6	427.5	427.5	428.1	432.0	435.4	437.5	437.8	439.6	441.4	446.2	444.1	444.5	446.3	443.2	438.1	433.8	446.3
4-Nov	436.3	436.3	Z	432.9	436.1	436.0	431.1	431.0	430.5	427.3	426.0	423.9	423.6	423.5	423.5	423.8	423.5	423.5	423.9	423.8	424.3	424.3	428.4	429.0	427.9	436.3
5-Nov	429.8	430.5	430.3	Z	431.4	431.4	432.1	430.4	430.2	431.5	427.4	427.4	429.0	430.6	431.1	431.0	431.5	432.4	432.2	431.5	427.5	427.4	426.7	426.6	429.8	432.4
6-Nov	427.0	427.0	427.6	428.3	430.6	432.3	432.5	434.0	432.4	432.1	434.3	437.2	436.2	436.5	437.4	438.4	439.4	442.3	444.4	442.8	443.1	443.8	445.6	446.6	436.3	446.6
7-Nov	447.1	449.0	447.3	443.4	Z	442.0	441.9	443.4	445.0	443.6	440.1	C	C	C	C	435.2	436.4	441.9	440.6	442.9	442.6	438.5	438.4	437.6	441.9	449.0
8-Nov	434.1	434.4	437.6	437.3	436.3	Z	435.7	434.2	432.2	431.2	431.1	429.3	425.8	423.9	422.7	422.6	423.6	424.0	423.6	422.6	421.7	421.8	423.2	424.3	428.4	437.6
9-Nov	Z	427.9	434.7	432.4	433.4	433.9	434.6	433.7	432.3	431.1	429.9	429.4	428.7	425.2	425.1	426.2	429.5	431.7	435.4	435.3	434.7	433.4	432.7	430.1	431.4	435.4
10-Nov	430.3	Z	454.9	448.9	445.8	431.4	439.1	436.9	444.9	453.7	431.2	431.5	431.4	430.5	430.0	433.3	435.1	434.0	434.6	438.3	438.2	437.4	436.1	435.3	437.5	454.9
11-Nov	437.2	436.7	Z	441.3	441.0	441.5	448.5	449.8	454.3	454.9	458.0	457.5	454.9	457.4	456.6	451.4	454.9	444.3	443.2	444.0	440.1	444.9	448.5	441.4	447.9	458.0
12-Nov	450.9	442.0	442.5	Z	442.9	437.0	429.3	428.4	428.6	427.1	425.6	425.0	424.7	424.4	424.1	424.0	425.1	431.6	430.7	431.6	429.2	434.8	431.9	437.1	431.7	450.9
13-Nov	435.8	432.8	434.8	439.8	Z	436.9	439.5	428.8	426.8	424.6	424.4	425.6	424.1	425.1	426.8	424.5	424.6	425.6	426.5	427.8	426.0	425.9	426.7	427.1	428.7	439.8
14-Nov	425.3	425.3	425.5	426.5	429.4	Z	435.5	439.2	436.5	435.9	433.7	431.2	430.6	429.4	427.5	428.4	430.6	433.5	435.6	433.3	433.2	435.8	441.2	440.9	432.3	441.2
15-Nov	Z	435.5	436.5	436.0	431.8	430.2	430.9	429.8	431.5	428.7	427.9	425.0	424.5	425.4	426.9	430.4	425.6	425.0	432.7	427.4	424.7	426.1	425.5	428.9	436.5	436.5
16-Nov	425.0	Z	426.1	426.6	431.7	436.9	435.2	435.8	438.8	437.1	433.7	439.1	441.0	441.2	434.9	436.1	435.5	433.0	434.2	436.5	437.4	433.2	428.4	426.9	434.1	441.2
17-Nov	427.9	427.2	Z	425.2	424.7	424.8	424.8	424.9	425.3	427.0	427.0	428.0	427.9	427.5	428.5	426.1	425.0	424.8	427.1	436.2	439.8	437.3	438.1	442.1	429.0	442.1
18-Nov	443.9	442.0	449.4	Z	450.2	458.4	454.2	458.0	454.5	451.6	450.1	450.1	450.8	453.9	448.8	444.2	451.3	454.2	460.4	455.8	466.5	466.2	455.4	465.5	453.7	466.5
19-Nov	461.8	461.5	462.3	462.8	Z	470.2	474.7	480.7	474.9	476.6	466.4	463.3	452.1	444.9	444.9	448.0	451.8	453.2	458.3	458.0	458.1	456.0	446.8	430.5	459.0	480.7
20-Nov	429.3	430.1	427.1	424.1	422.3	Z	420.9	420.6	420.8	420.1	418.9	418.5	418.2	418.2	418.1	417.9	417.8	418.6	418.7	423.0	421.2	420.0	420.2	419.6	421.1	430.1
21-Nov	Z	422.2	423.0	422.7	424.1	425.0	426.0	426.7	426.6	426.0	428.1	426.8	433.6	428.6	423.1	422.5	423.1	421.5	421.3	421.6	421.8	422.6	422.7	422.9	424.5	433.6
22-Nov	422.3	Z	420.3	423.5	421.0	419.0	419.2	420.0	423.4	421.4	420.9	420.2	419.9	423.0	420.1	422.2	424.0	425.0	425.0	424.9	425.4	425.8	426.6	424.5	422.5	426.6
23-Nov	424.3	422.8	Z	425.6	425.9	423.8	424.2	426.0	425.4	425.8	434.3	432.9	429.8	428.4	432.6	431.5	434.6	442.5	444.6	444.5	439.5	437.8	438.5	431.7	431.6	444.6
24-Nov	429.2	425.2	423.4	Z	424.7	422.0	422.0	422.2	423.7	425.9	423.1	423.2	424.3	423.4	422.3	424.1	424.5	423.6	425.6	426.9	425.5	426.0	427.4	428.3	424.6	429.2
25-Nov	429.7	429.3	429.0	426.5	Z	421.4	419.3	419.9	420.0	419.0	418.8	418.7	418.4	418.3	419.7	421.8	422.9	425.4	433.0	431.0	434.9	431.8	434.4	438.2	425.3	438.2
26-Nov	438.6	441.8	446.9	441.8	442.3	Z	435.3	434.8	441.5	435.8	431.2	430.2	430.7	430.6	431.1	431.6	431.7	433.2	433.9	435.7	435.7	435.5	437.8	440.1	436.0	446.9
27-Nov	Z	446.4	454.5	454.2	452.0	455.0	457.6	457.4	455.1	454.0	442.8	437.9	437.8	436.7	435.9	437.1	442.5	438.4	429.3	427.6	426.0	423.9	423.7	423.5	441.3	457.6
28-Nov	423.6	Z	424.0	424.6	423.6	423.6	423.7	424.4	424.0	424.3	423.6	424.6	423.0	423.1	423.3	423.8	424.7	424.0	423.5	423.4	423.3	423.5	424.4	425.1	423.9	425.1
29-Nov	426.3	425.7	Z	425.0	425.2	425.4	424.8	425.0	425.6	424.8	424.9	424.5	423.7	422.4	422.0	421.9	421.9	422.0	421.7	421.9	421.6	421.5	421.9	421.8	423.5	426.3
30-Nov	422.4	425.5	425.3	Z	424.2	424.9	427.8	430.7	432.8	428.9	429.2	426.3	424.1	423.8	423.6	423.8	424.9	424.9	426.0	429.5	431.3	431.2	433.1	433.0	427.3	433.1

432.9	434.4	435.5	434.1	432.6	433.9	434.0	434.2	434.7	433.7	431.7	431.1	430.5	429.9	429.6	430.0	431.5	432.0	433.0	433.8	433.4	433.1	433.0	432.6	Diurnal Average
461.8	461.5	462.3	462.8	452.0	470.2	474.7	480.7	474.9	476.6	466.4	463.3	454.9	457.4	456.6	451.4	454.9	454.2	460.4	458.0	466.5	466.2	455.4	465.5	Diurnal Maximum

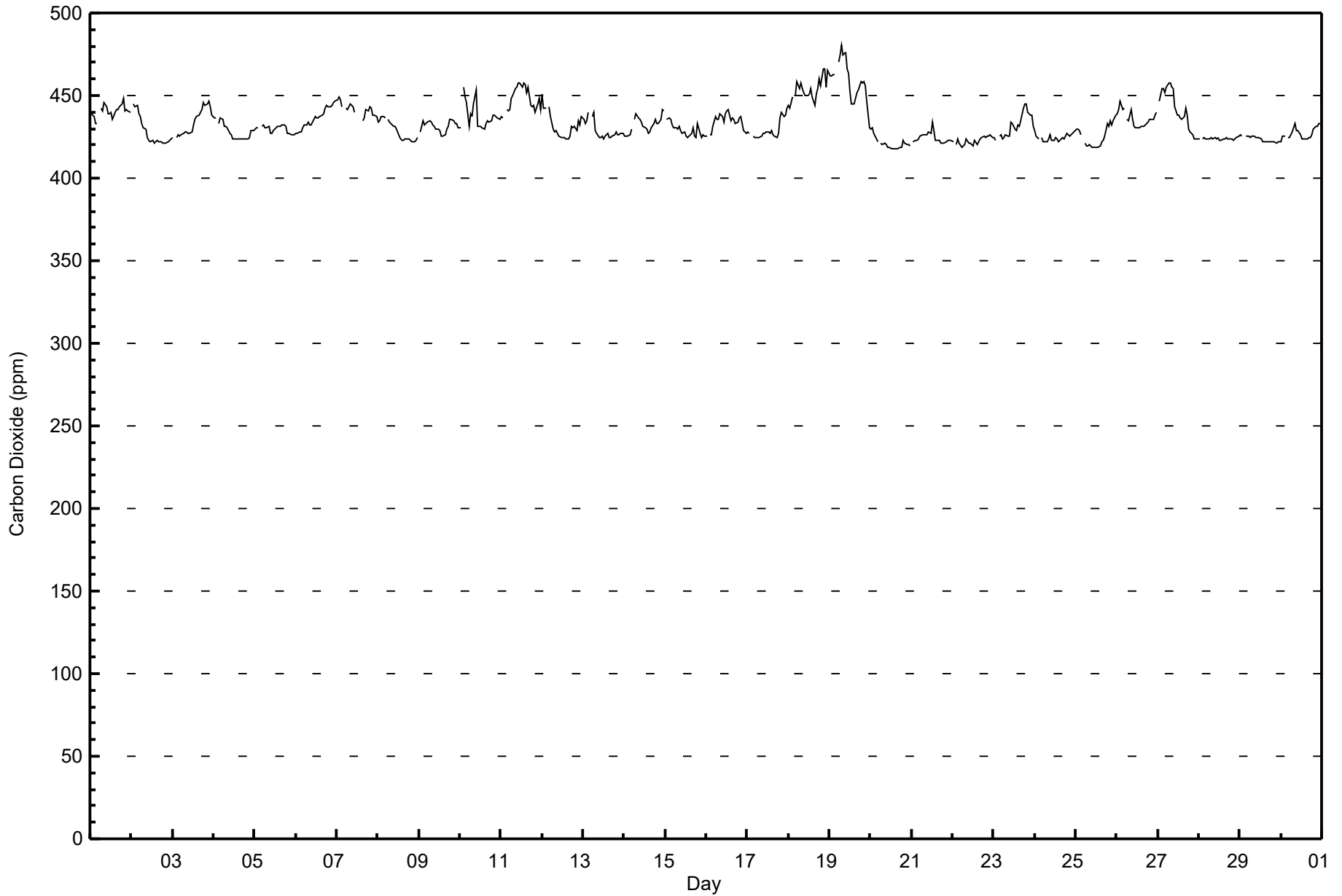
Z - zerospan      C - Calibration





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

**Carbon Dioxide (CO<sub>2</sub>) - ppm**  
**Fort McKay - Bertha Ganter - November 2023**





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

**Carbon Dioxide (CO<sub>2</sub>) - ppm**  
**Fort McKay - Bertha Ganter - November 2023**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
400 - 420	29	4.22	4.22
420 - 440	521	75.84	80.06
440 - 460	123	17.90	97.96
460 - 480	13	1.89	99.85
480 - 500	1	0.15	100.00
> 500	0	0.00	100.00

Total Number of Valid Hours: 687

Total Number of Hours: 720



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

**Carbon Dioxide (CO<sub>2</sub>) - ppm**  
**Fort McKay - Bertha Ganter - November 2023**

Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
400 - 420	5	1	1	0	2	0	0	0	0	0	0	0	2	10	2	6	29
420 - 440	34	46	19	17	10	13	16	36	106	40	23	27	44	49	26	13	519
440 - 460	4	4	1	0	1	0	2	6	51	28	9	3	2	3	2	5	121
460 - 480	1	0	0	0	1	0	0	4	3	3	1	0	0	0	0	0	13
480 - 500	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
> 500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	44	51	21	17	14	13	18	46	160	71	34	30	48	62	30	24	683

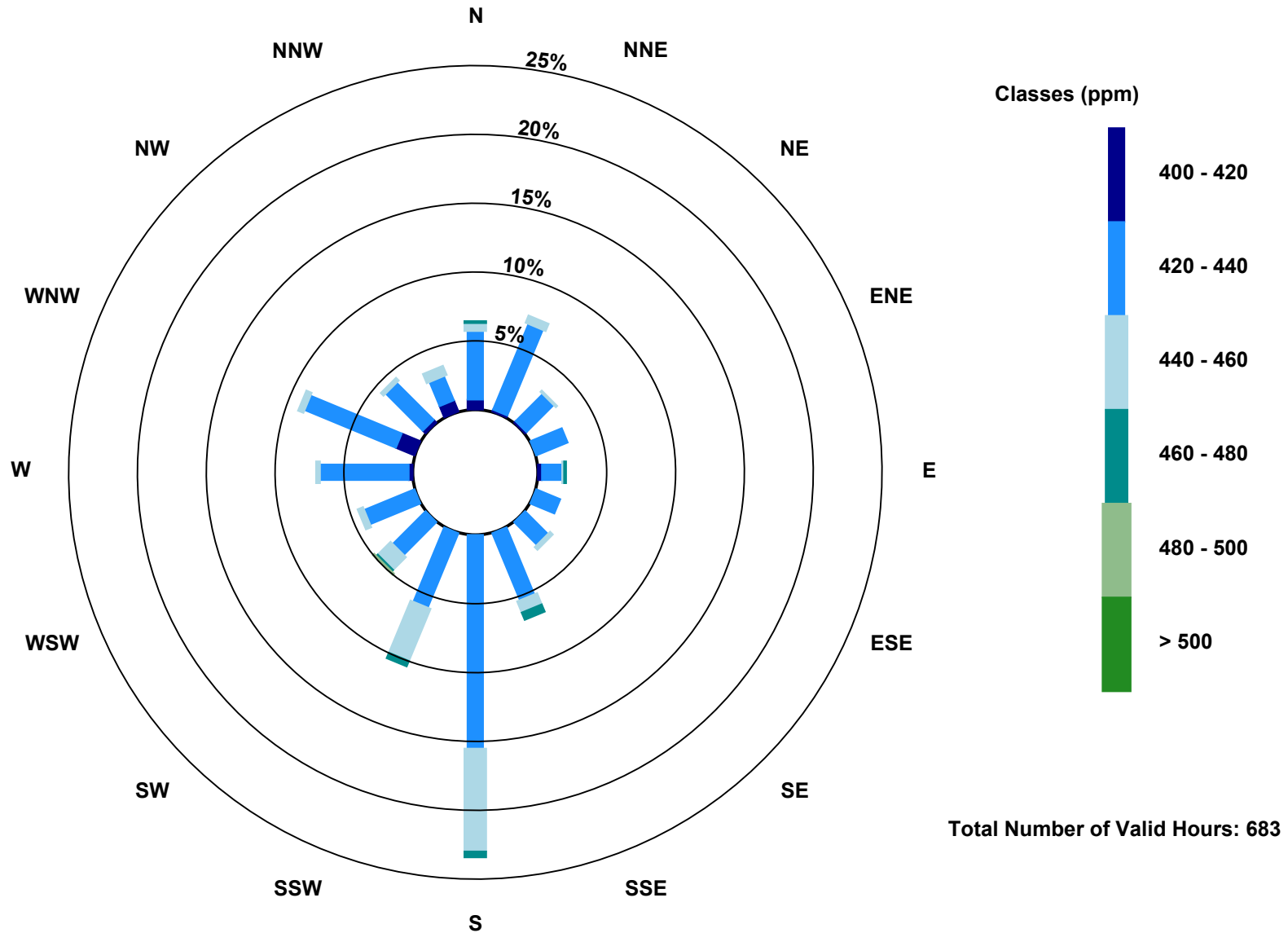
Total Number of Valid Hours: 683

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 2023

Carbon Dioxide (CO<sub>2</sub>) - ppm  
Fort McKay - Bertha Ganter





Number of Exceedences (AAAQO): 1-hr: 0		Hours in Service: 720	
Maximum Value: 0.0 ppb on Nov 1 01:00		Maximum Daily Average: 0.0 ppb on Nov 1	
Minimum Value: 0.0 ppb on Nov 1 01:00		Hours of Data: 630	
Maximum Diurnal Average: 0.0 ppb at hour 1		Hours of Missing Data: 90	
Monthly Average: 0.00 ppb		Hours of Calibration: 41	
Minimum Daily Average: 0.0 ppb on Nov 1		Percent Operational Time: 93.2	
Minimum Diurnal Average: 0.0 ppb at hour 1		Percentiles: P <sub>1</sub> = 0.0 P <sub>10</sub> = 0.0 Q <sub>1</sub> = 0.0 Median = 0.0 Q <sub>3</sub> = 0.0 P <sub>90</sub> = 0.0 P <sub>99</sub> = 0.0	

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24				
1-Nov	0.0	0.0	0.0	Z	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
2-Nov	0.0	0.0	0.0	0.0	Z	RE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3-Nov	0.0	0.0	0.0	0.0	0.0	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
4-Nov	Z	RE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5-Nov	0.0	Z	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
6-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7-Nov	0.0	0.0	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
8-Nov	0.0	0.0	0.0	Z	RE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9-Nov	0.0	0.0	0.0	0.0	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
10-Nov	0.0	0.0	0.0	0.0	0.0	Z	RE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11-Nov	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
12-Nov	0.0	Z	RE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13-Nov	0.0	0.0	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
14-Nov	0.0	0.0	0.0	Z	RE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15-Nov	M	M	M	M	M	M	M	M	M	M	M	C	C	C	C	C	C	C	M	M	M	M	M	M	M	M	M	M
16-Nov	0.0	0.0	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17-Nov	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	M	M	M	M	M	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18-Nov	0.0	Z	RE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19-Nov	0.0	0.0	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
20-Nov	0.0	0.0	0.0	Z	RE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
21-Nov	0.0	0.0	0.0	0.0	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
22-Nov	0.0	0.0	0.0	0.0	0.0	Z	RE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23-Nov	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
24-Nov	0.0	Z	RE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25-Nov	0.0	0.0	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
26-Nov	0.0	0.0	0.0	Z	RE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
27-Nov	0.0	0.0	0.0	0.0	Z	RE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
28-Nov	0.0	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
29-Nov	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
30-Nov	0.0	Z	RE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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				

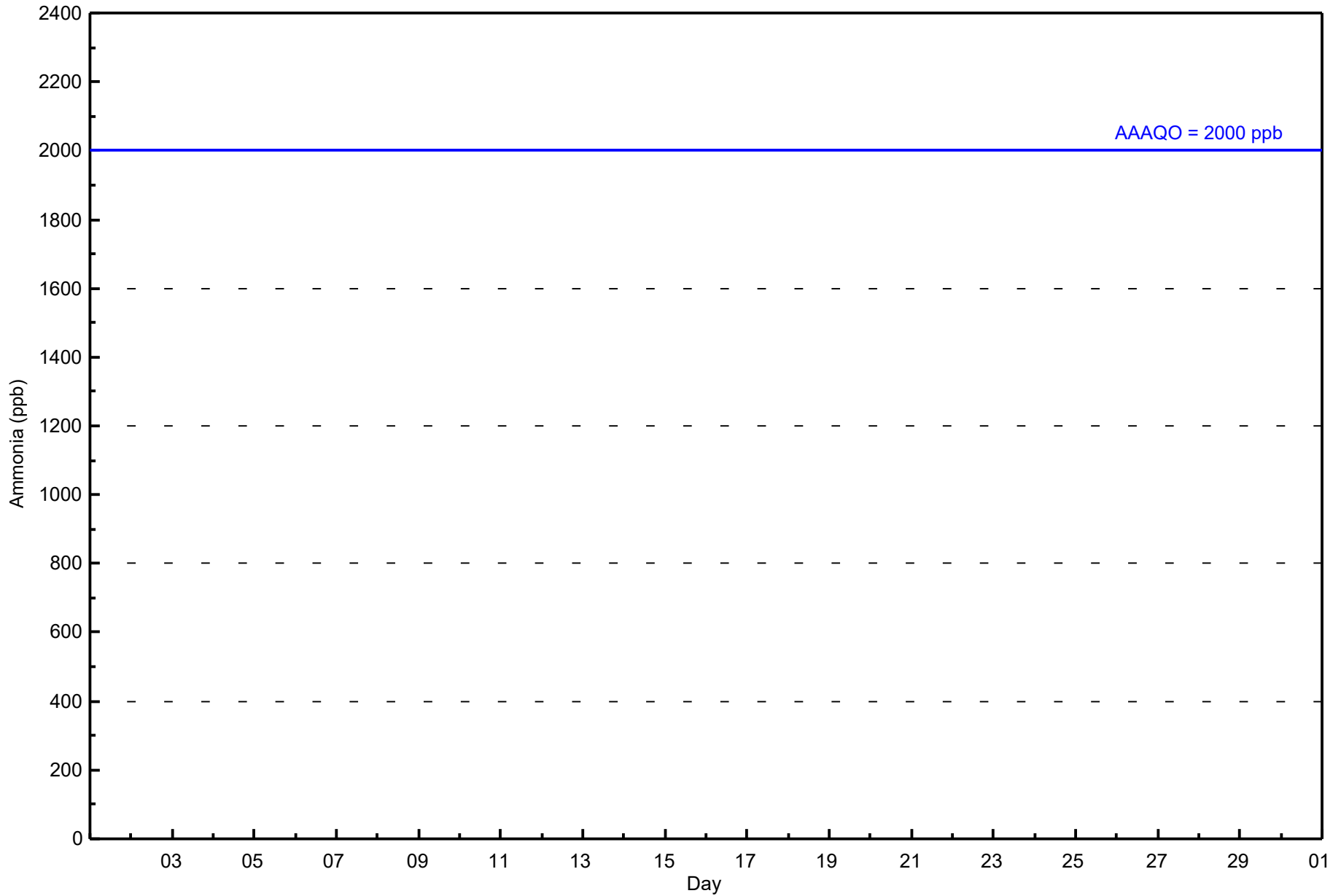
  

Z - zerspan	C - Calibration	M - Maintenance	RE - Recovery
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 2000 ppb			



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

**Ammonia (NH<sub>3</sub>) - ppb**  
**Fort McKay - Bertha Ganter - November 2023**





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

**Ammonia (NH<sub>3</sub>) - ppb**  
**Fort McKay - Bertha Ganter - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	630	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: 630

Total Number of Hours: 720



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

**Ammonia (NH<sub>3</sub>) - ppb**  
**Fort McKay - Bertha Ganter - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 5	37	45	20	16	14	13	15	41	148	60	26	32	48	58	30	23	626
6 - 10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 - 15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16 - 20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21 - 25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	<b>37</b>	<b>45</b>	<b>20</b>	<b>16</b>	<b>14</b>	<b>13</b>	<b>15</b>	<b>41</b>	<b>148</b>	<b>60</b>	<b>26</b>	<b>32</b>	<b>48</b>	<b>58</b>	<b>30</b>	<b>23</b>	<b>626</b>

Total Number of Valid Hours: 626

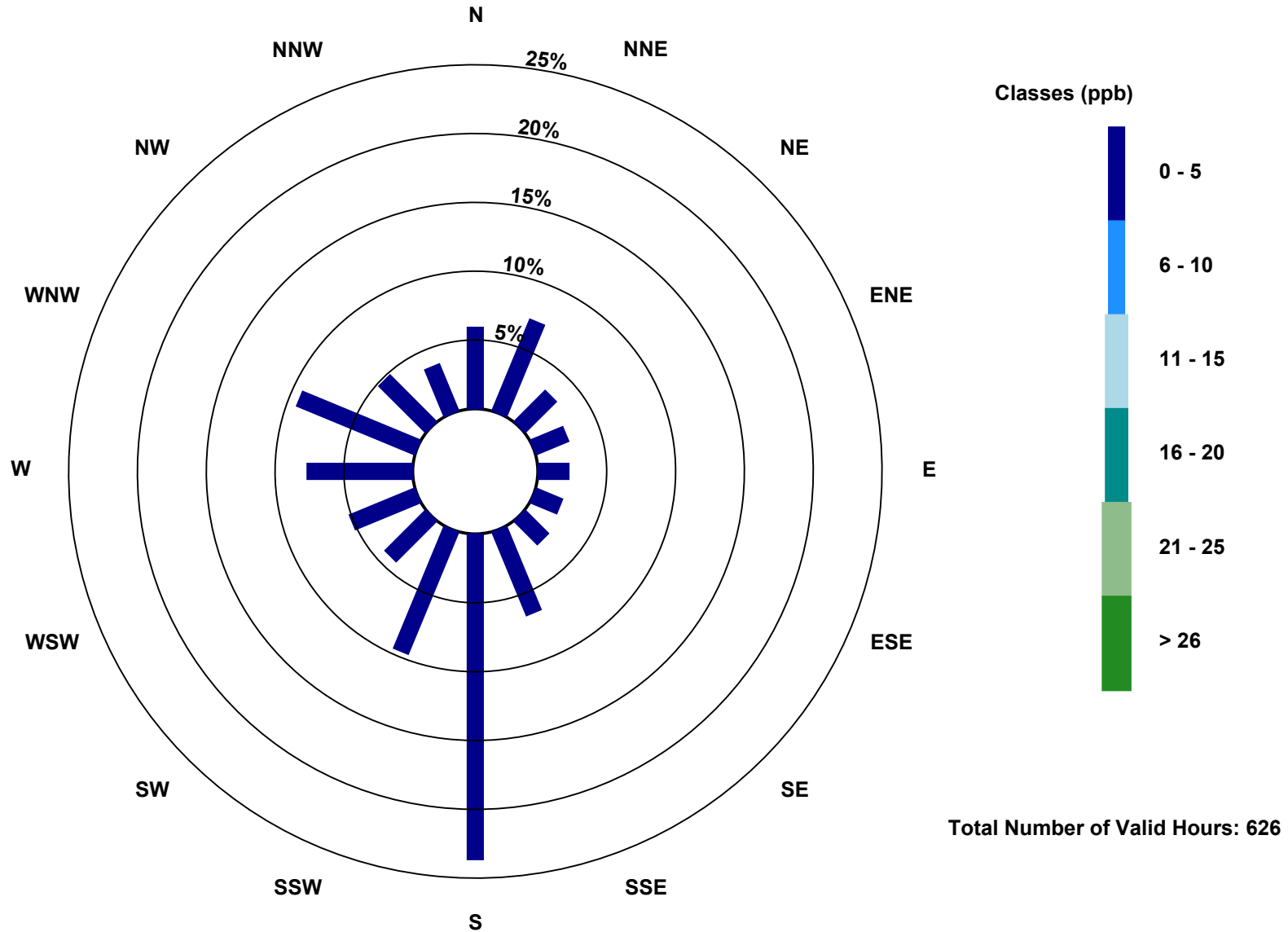
Total Number of Hours: 720

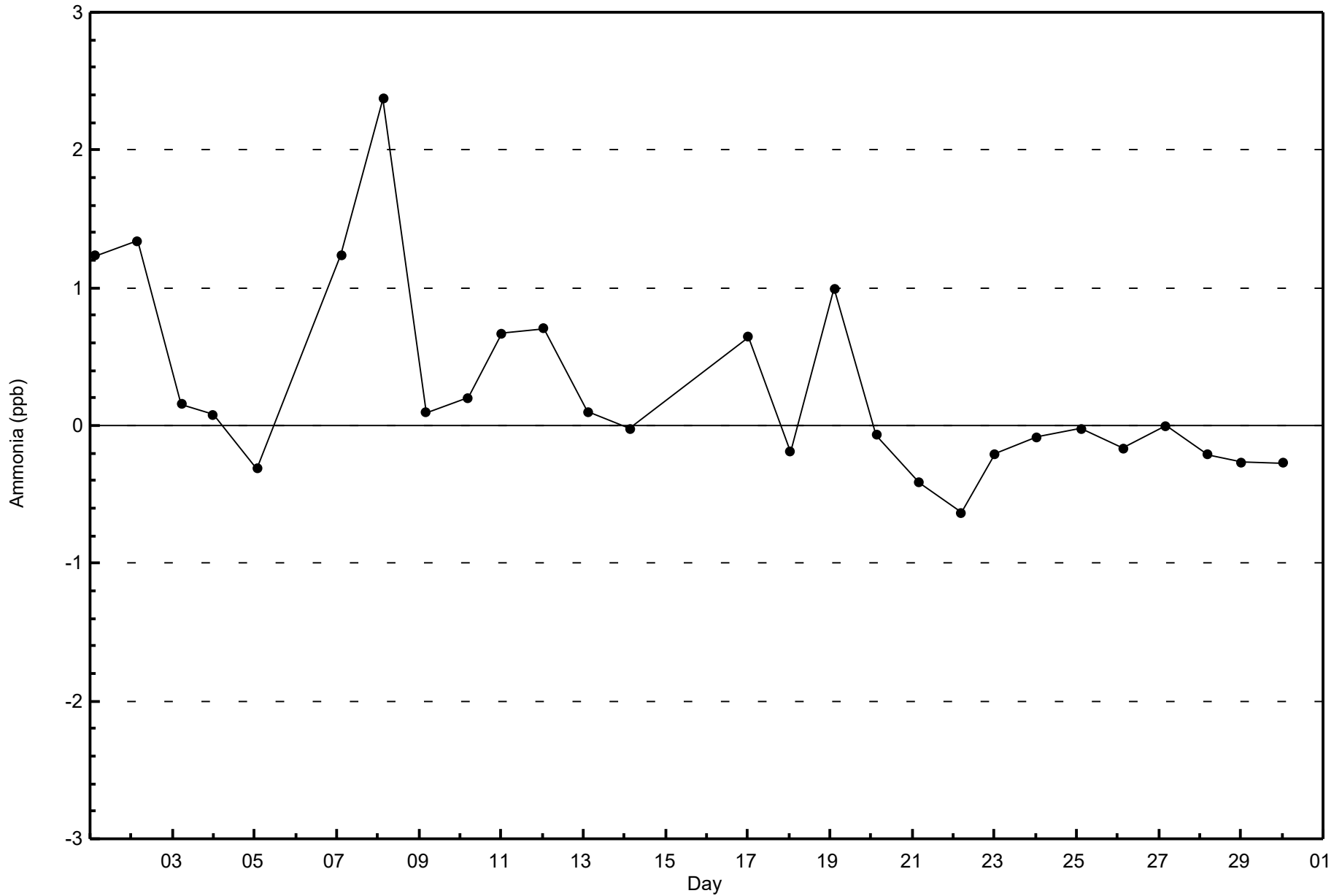


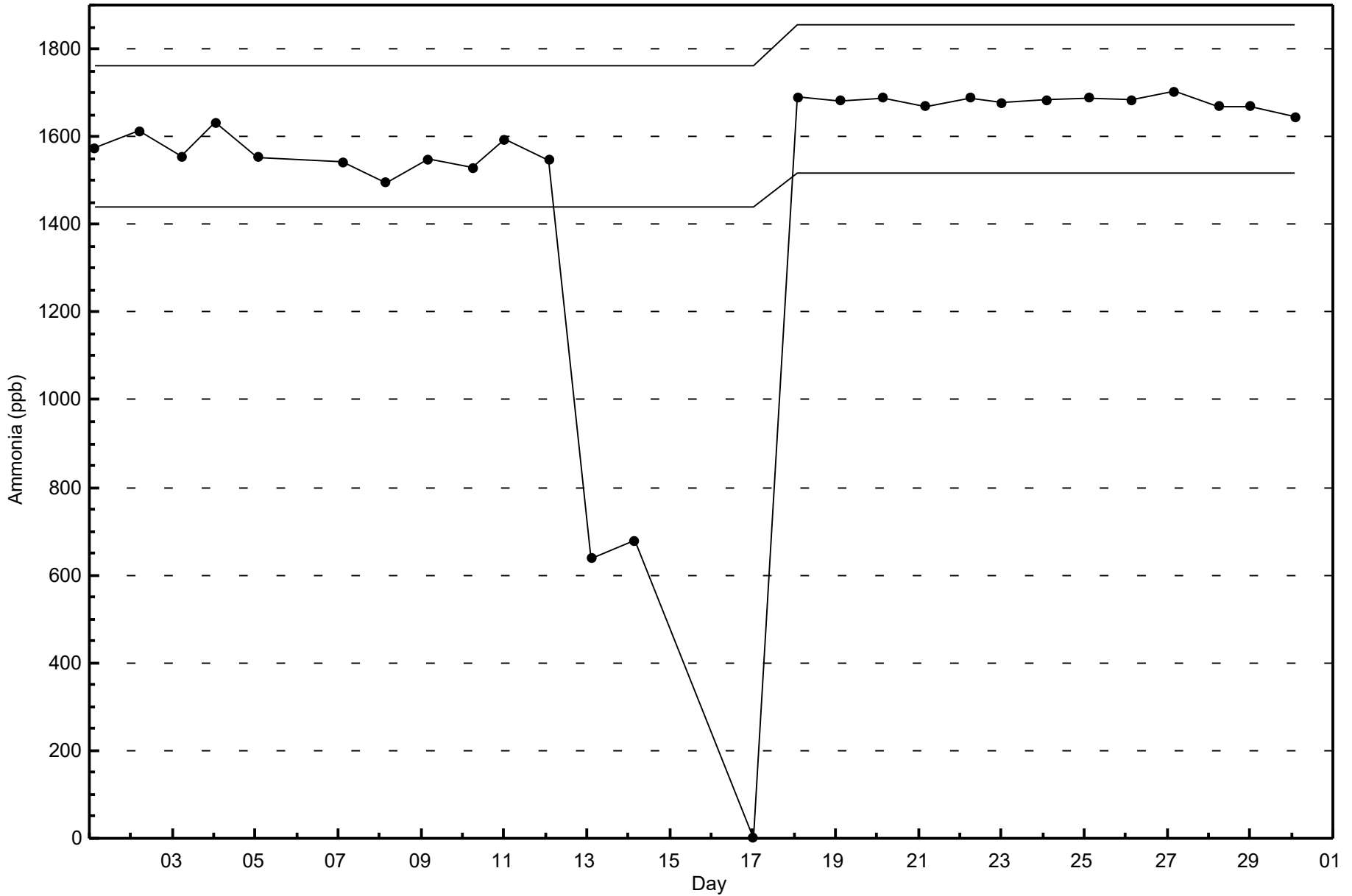


Wood Buffalo Environmental Association  
Wind Rose Nov 2023

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







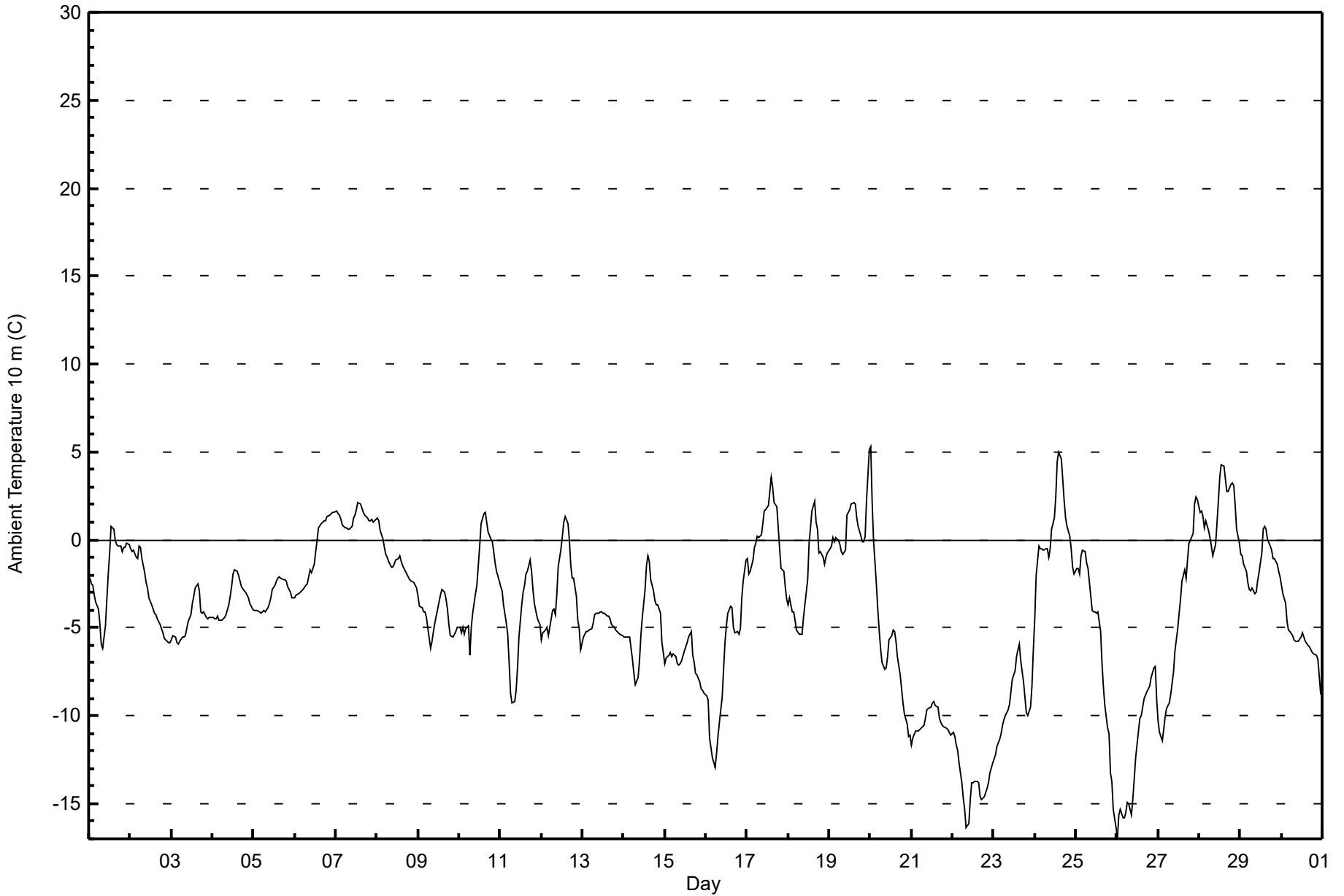


Maximum Value: 5.3 C on Nov 20 01:00																				Maximum Daily Average: 1.7 C on Nov 28					Hours in Service:	720
Minimum Value: -16.9 C on Nov 26 01:00																				Minimum Daily Average: -13.8 C on Nov 22					Hours of Data:	720
Maximum Diurnal Average: -2.2 C at hour 15																				Minimum Diurnal Average: -5.5 C at hour 9					Hours of Missing Data:	0
Monthly Average: -4.10 C																				Percentiles: P <sub>1</sub> = -15.6 P <sub>10</sub> = -10.6 Q <sub>1</sub> = -6.2 Median = -3.9 Q <sub>3</sub> = -0.8 P <sub>90</sub> = 1.1 P <sub>99</sub> = 3.6					Hours of Calibration:	0
																									Percent Operational Time:	100.0
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	-2.2	-2.5	-2.6	-3.2	-3.5	-4.0	-4.7	-5.9	-6.2	-4.9	-3.4	-1.9	-0.8	0.8	0.6	0.0	-0.2	-0.4	-0.3	-0.7	-0.4	-0.4	-0.2	-0.3	-2.0	0.8
2-Nov	-0.5	-0.6	-0.6	-1.0	-1.1	-0.4	-0.4	-1.1	-1.8	-2.4	-2.8	-3.3	-3.7	-4.0	-4.2	-4.3	-4.5	-4.8	-5.0	-5.3	-5.6	-5.8	-5.8	-5.8	-3.1	-0.4
3-Nov	-5.7	-5.5	-5.6	-5.9	-5.9	-5.8	-5.6	-5.5	-5.4	-5.1	-4.7	-4.2	-3.6	-3.2	-2.7	-2.5	-2.9	-4.1	-4.2	-4.1	-4.4	-4.5	-4.4	-4.4	-4.6	-2.5
4-Nov	-4.4	-4.5	-4.5	-4.4	-4.6	-4.6	-4.5	-4.4	-4.3	-3.7	-3.2	-2.7	-1.9	-1.7	-1.8	-2.0	-2.3	-2.7	-2.9	-3.0	-3.1	-3.3	-3.6	-3.9	-3.4	-1.7
5-Nov	-4.0	-4.0	-4.0	-4.1	-4.2	-4.1	-4.0	-4.1	-3.9	-3.6	-3.3	-2.9	-2.5	-2.3	-2.2	-2.1	-2.2	-2.2	-2.3	-2.4	-2.6	-3.0	-3.3	-3.3	-3.2	-2.1
6-Nov	-3.3	-3.1	-3.1	-3.0	-2.9	-2.8	-2.6	-2.5	-2.1	-1.7	-1.9	-1.4	-0.6	0.0	0.7	0.9	1.0	1.1	1.1	1.3	1.4	1.5	1.6	1.6	-0.8	1.6
7-Nov	1.6	1.5	1.4	1.2	0.9	0.7	0.6	0.6	0.6	0.8	1.2	1.4	1.8	2.1	2.1	1.8	1.6	1.4	1.3	1.1	1.1	1.1	1.0	1.1	1.2	2.1
8-Nov	1.3	1.1	0.5	0.0	-0.4	-0.9	-1.0	-1.2	-1.5	-1.6	-1.4	-1.1	-1.0	-0.9	-1.2	-1.5	-1.6	-1.9	-2.1	-2.2	-2.3	-2.4	-2.6	-2.8	-1.2	1.3
9-Nov	-3.2	-3.8	-3.9	-4.1	-4.1	-4.4	-5.6	-6.2	-5.8	-5.2	-4.7	-3.9	-3.5	-3.2	-2.9	-3.0	-3.4	-3.9	-4.8	-5.4	-5.5	-5.4	-5.2	-5.0	-4.4	-2.9
10-Nov	-5.0	-5.3	-5.0	-5.3	-5.0	-4.9	-6.6	-5.0	-4.2	-3.0	-2.6	-1.5	-0.3	0.9	1.5	1.5	1.0	0.4	0.0	-0.1	-0.7	-1.3	-1.8	-2.4	-2.3	1.5
11-Nov	-2.6	-2.9	-3.7	-4.8	-5.4	-6.9	-8.7	-9.3	-9.2	-8.6	-7.2	-5.5	-3.7	-3.0	-2.6	-2.0	-1.8	-1.2	-1.8	-2.8	-3.6	-4.4	-4.7	-4.8	-4.6	-1.2
12-Nov	-5.7	-5.3	-5.1	-5.0	-5.5	-5.0	-4.0	-3.9	-4.2	-3.1	-1.5	-0.5	0.2	1.0	1.3	0.9	0.0	-1.4	-2.2	-2.2	-3.2	-4.6	-5.1	-6.2	-2.9	1.3
13-Nov	-5.5	-5.3	-5.2	-5.2	-5.2	-5.1	-4.8	-4.2	-4.1	-4.2	-4.1	-4.1	-4.2	-4.2	-4.3	-4.3	-4.5	-4.8	-4.9	-5.1	-5.2	-5.3	-5.4	-5.5	-4.8	-4.1
14-Nov	-5.5	-5.5	-5.5	-5.5	-6.1	-6.8	-7.6	-8.2	-7.9	-6.9	-5.4	-4.4	-2.8	-1.5	-0.9	-1.2	-2.3	-2.9	-3.4	-3.7	-3.7	-4.2	-5.8	-6.4	-4.8	-0.9
15-Nov	-7.0	-6.8	-6.6	-6.4	-6.6	-6.5	-6.7	-7.1	-7.1	-7.1	-6.9	-6.3	-6.1	-5.8	-5.5	-5.2	-6.6	-7.0	-7.6	-7.7	-8.1	-8.4	-8.6	-8.8	-6.9	-5.2
16-Nov	-8.9	-9.1	-11.3	-11.8	-12.4	-13.0	-12.2	-11.2	-10.4	-8.9	-7.4	-5.8	-4.9	-4.1	-3.8	-3.9	-5.0	-5.3	-5.2	-5.3	-5.1	-3.3	-2.4	-1.2	-7.2	-1.2
17-Nov	-1.1	-1.9	-1.8	-1.1	-0.4	-0.2	0.2	0.2	0.3	0.9	1.6	1.7	2.0	2.8	3.6	3.0	2.1	1.9	0.7	-0.5	-1.6	-1.8	-2.6	-3.3	0.2	3.6
18-Nov	-3.7	-3.3	-4.1	-4.1	-4.6	-5.1	-5.4	-5.4	-5.4	-4.4	-3.7	-2.3	-0.2	0.7	1.6	2.2	1.0	0.6	-0.7	-0.6	-1.0	-1.4	-1.0	-0.8	-2.1	2.2
19-Nov	-0.5	-0.4	0.1	-0.1	0.1	0.0	-0.3	-0.7	-0.8	-0.6	1.4	1.6	1.7	2.0	2.1	2.1	1.3	0.7	0.2	-0.1	-0.1	0.2	2.3	5.2	0.7	5.2
20-Nov	5.3	2.1	-0.1	-2.5	-3.9	-5.1	-6.1	-7.0	-7.4	-7.3	-6.6	-5.7	-5.5	-5.2	-5.2	-5.8	-6.7	-7.7	-8.5	-9.2	-9.9	-10.4	-11.2	-11.1	-5.9	5.3
21-Nov	-11.7	-11.2	-10.8	-10.8	-10.9	-10.8	-10.6	-10.6	-10.2	-9.7	-9.6	-9.5	-9.2	-9.2	-9.4	-9.6	-10.1	-10.4	-10.6	-10.6	-10.7	-10.8	-10.9	-11.1	-10.4	-9.2
22-Nov	-10.9	-11.2	-11.6	-12.0	-12.7	-13.8	-14.7	-15.3	-16.4	-16.1	-14.8	-13.8	-13.8	-13.7	-13.7	-13.8	-14.6	-14.8	-14.6	-14.4	-14.1	-13.8	-13.3	-12.7	-13.8	-10.9
23-Nov	-12.5	-12.2	-11.8	-11.4	-11.0	-10.5	-10.2	-10.0	-9.7	-9.4	-8.7	-7.9	-7.5	-6.6	-6.2	-5.9	-6.9	-8.1	-8.9	-9.8	-10.0	-9.5	-8.3	-6.2	-9.1	-5.9
24-Nov	-4.5	-2.0	-0.4	-0.5	-0.5	-0.6	-0.5	-0.5	-1.0	-0.5	0.6	1.2	2.5	4.5	5.0	4.6	3.4	2.2	1.3	0.7	0.2	-0.5	-1.5	-1.9	0.5	5.0
25-Nov	-1.6	-1.6	-1.9	-0.9	-0.6	-0.7	-1.3	-1.7	-2.4	-4.0	-4.1	-4.1	-4.1	-4.1	-5.2	-7.1	-8.4	-9.5	-10.7	-11.0	-13.3	-13.7	-15.4	-16.4	-6.0	-0.6
26-Nov	-16.9	-15.6	-15.3	-15.8	-15.8	-15.5	-14.9	-15.0	-15.7	-14.7	-13.6	-12.4	-10.9	-10.1	-10.0	-9.5	-9.0	-8.7	-8.4	-8.4	-7.9	-7.3	-7.2	-9.1	-12.0	-7.2
27-Nov	-10.3	-11.0	-11.4	-10.8	-10.1	-9.6	-9.3	-8.8	-8.2	-7.5	-6.3	-5.0	-4.2	-3.4	-2.4	-1.7	-2.2	-1.1	-0.2	0.0	0.4	2.0	2.4	2.3	-4.8	2.4
28-Nov	1.6	1.6	1.3	0.7	1.0	0.5	0.1	-0.4	-0.9	-0.2	0.9	2.2	3.5	4.3	4.2	3.5	2.8	2.8	3.1	3.2	3.0	2.0	0.6	-0.2	1.7	4.3
29-Nov	-0.9	-0.9	-1.4	-1.8	-2.5	-2.8	-2.9	-2.7	-3.1	-3.0	-2.4	-1.9	-0.7	0.6	0.7	0.6	0.0	-0.3	-0.6	-1.1	-1.1	-1.4	-1.8	-2.1	-1.4	0.7
30-Nov	-2.5	-3.1	-3.6	-4.7	-5.1	-5.2	-5.5	-5.7	-5.8	-5.8	-5.8	-5.5	-5.3	-5.6	-5.7	-6.0	-6.0	-6.3	-6.4	-6.5	-6.6	-6.8	-7.8	-8.8	-5.7	-2.5
																								Diurnal Average		
																								Diurnal Maximum		



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

**Ambient Temperature 10 m (AT 10m) - C**  
**Fort McKay - Bertha Ganter - November 2023**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Ambient Temperature 10 m (AT 10m) - C  
Fort McKay - Bertha Ganter - November 2023**

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	0	0.00	0.00
-20 - 0	596	82.78	82.78
0 - 10	124	17.22	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720

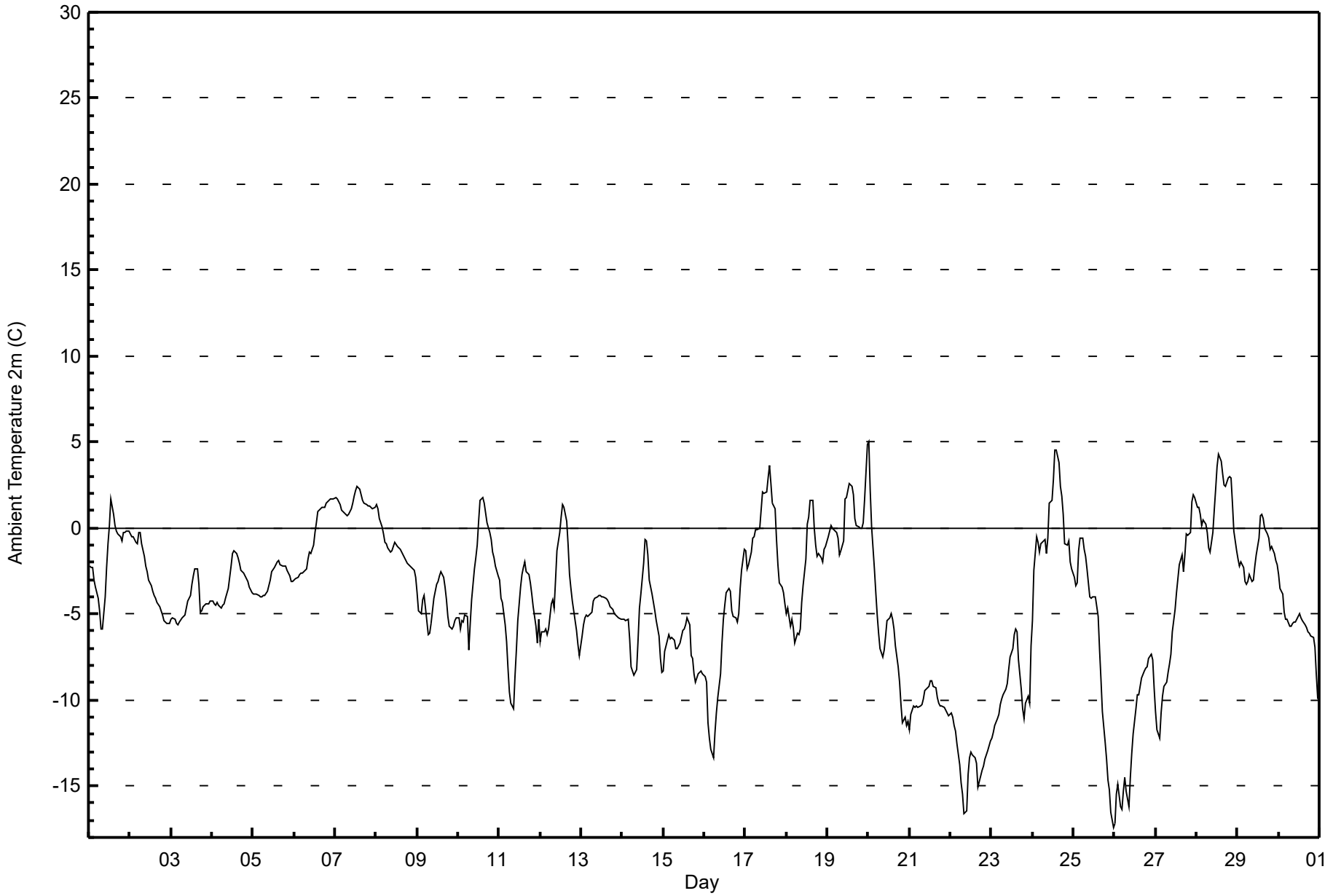


Maximum Value: 5.0 C on Nov 20 01:00																				Maximum Daily Average: 1.4 C on Nov 7					Hours in Service: 720				
Minimum Value: -17.4 C on Nov 26 00:00																				Minimum Daily Average: -13.6 C on Nov 22					Hours of Data: 720				
Maximum Diurnal Average: -2.1 C at hour 15																				Minimum Diurnal Average: -5.5 C at hour 8					Hours of Missing Data: 0				
Monthly Average: -4.20 C																				Percentiles: P <sub>1</sub> = -16.1 P <sub>10</sub> = -10.4 Q <sub>1</sub> = -6.3 Median = -3.9 Q <sub>3</sub> = -1.0 P <sub>90</sub> = 1.2 P <sub>99</sub> = 3.6					Hours of Calibration: 0				
																				Percent Operational Time: 100.0									
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24					
1-Nov	-2.2	-2.3	-2.3	-3.1	-3.5	-4.1	-4.8	-5.9	-5.9	-4.0	-2.3	-0.9	0.1	1.7	0.8	0.2	-0.1	-0.3	-0.5	-0.7	-0.3	-0.3	-0.1	-0.2	-1.7	1.7			
2-Nov	-0.3	-0.5	-0.5	-0.8	-1.0	-0.3	-0.3	-0.9	-1.7	-2.2	-2.5	-3.0	-3.4	-3.7	-3.9	-4.1	-4.3	-4.6	-4.8	-5.1	-5.4	-5.6	-5.6	-5.5	-2.9	-0.3			
3-Nov	-5.3	-5.3	-5.3	-5.6	-5.6	-5.5	-5.2	-5.1	-5.1	-4.7	-4.3	-3.9	-3.3	-2.8	-2.4	-2.4	-3.3	-4.9	-4.8	-4.6	-4.4	-4.4	-4.4	-4.3	-4.4	-2.4			
4-Nov	-4.3	-4.5	-4.5	-4.3	-4.5	-4.6	-4.5	-4.4	-4.1	-3.5	-2.9	-2.2	-1.5	-1.3	-1.5	-1.7	-2.1	-2.5	-2.7	-2.8	-3.0	-3.1	-3.4	-3.7	-3.2	-1.3			
5-Nov	-3.9	-3.8	-3.8	-3.9	-4.0	-4.0	-3.9	-3.9	-3.7	-3.4	-3.1	-2.6	-2.3	-2.1	-2.0	-1.9	-2.1	-2.2	-2.2	-2.2	-2.4	-2.8	-3.1	-3.1	-3.0	-1.9			
6-Nov	-3.0	-2.9	-2.8	-2.7	-2.7	-2.6	-2.4	-2.3	-1.8	-1.4	-1.5	-1.0	-0.2	0.3	1.0	1.1	1.2	1.2	1.2	1.5	1.6	1.7	1.7	1.7	-0.6	1.7			
7-Nov	1.8	1.7	1.5	1.4	1.1	0.9	0.8	0.7	0.8	1.1	1.5	1.8	2.2	2.4	2.2	1.9	1.6	1.4	1.4	1.3	1.3	1.2	1.1	1.2	1.4	2.4			
8-Nov	1.3	1.2	0.5	0.1	-0.3	-0.8	-0.9	-1.2	-1.4	-1.3	-1.1	-0.9	-1.1	-1.2	-1.3	-1.4	-1.6	-1.9	-2.0	-2.1	-2.2	-2.3	-2.5	-2.8	-1.1	1.3			
9-Nov	-3.8	-4.8	-5.0	-4.2	-4.0	-4.6	-6.2	-6.1	-5.5	-4.8	-4.1	-3.2	-3.1	-2.8	-2.5	-2.8	-3.4	-4.1	-5.1	-5.7	-5.9	-5.7	-5.4	-5.2	-4.5	-2.5			
10-Nov	-5.2	-5.9	-5.4	-5.5	-5.1	-5.1	-7.1	-5.5	-4.2	-2.3	-1.7	-1.0	0.4	1.6	1.7	1.5	0.9	0.3	-0.3	-0.6	-1.4	-1.8	-2.2	-2.8	-2.4	1.7			
11-Nov	-3.1	-4.1	-4.4	-5.7	-6.6	-8.2	-9.5	-10.2	-10.5	-8.6	-7.1	-5.3	-3.5	-2.7	-2.3	-2.0	-2.5	-2.7	-3.2	-3.8	-4.6	-5.7	-6.7	-5.3	-5.3	-2.0			
12-Nov	-6.6	-6.0	-6.1	-5.9	-6.2	-5.9	-4.4	-4.2	-4.6	-3.0	-1.3	-0.3	0.6	1.4	1.2	0.4	-1.0	-2.7	-3.6	-4.2	-5.4	-6.0	-6.8	-7.4	-3.7	1.4			
13-Nov	-6.3	-5.7	-5.2	-5.0	-5.1	-5.0	-4.9	-4.3	-4.1	-4.0	-3.9	-3.9	-4.0	-4.0	-4.1	-4.2	-4.3	-4.6	-4.8	-5.0	-5.0	-5.1	-5.2	-5.3	-4.7	-3.9			
14-Nov	-5.3	-5.3	-5.4	-5.3	-6.5	-8.1	-8.3	-8.6	-8.2	-6.5	-4.7	-3.9	-2.0	-0.6	-0.8	-1.6	-3.0	-3.9	-4.4	-4.8	-5.4	-6.3	-7.6	-8.4	-5.2	-0.6			
15-Nov	-8.3	-7.2	-6.5	-6.2	-6.4	-6.3	-6.5	-7.0	-7.0	-6.9	-6.7	-6.0	-5.9	-5.6	-5.2	-5.7	-7.4	-7.6	-8.5	-8.9	-8.5	-8.4	-8.3	-8.5	-7.1	-5.2			
16-Nov	-8.7	-8.9	-11.3	-12.2	-12.9	-13.3	-11.9	-10.8	-9.9	-8.5	-6.7	-5.3	-4.5	-3.8	-3.6	-3.7	-4.8	-5.1	-5.2	-5.5	-5.0	-3.5	-2.5	-1.3	-7.0	-1.3			
17-Nov	-1.3	-2.4	-2.1	-1.4	-0.6	-0.5	-0.1	-0.1	0.0	1.1	2.1	2.0	2.1	2.9	3.6	2.6	1.4	1.1	-0.6	-2.1	-3.2	-3.4	-3.8	-4.4	-0.3	3.6			
18-Nov	-5.0	-4.7	-5.7	-5.3	-5.8	-6.7	-6.1	-6.2	-5.8	-4.3	-3.3	-1.8	0.2	0.6	1.6	1.6	0.0	-1.0	-1.7	-1.5	-1.7	-1.9	-1.3	-1.1	-2.8	1.6			
19-Nov	-0.5	-0.2	0.1	0.0	-0.1	-0.3	-0.6	-1.5	-1.3	-0.8	1.7	1.8	2.2	2.6	2.5	1.9	0.6	0.1	0.0	0.0	0.0	0.3	1.7	4.9	0.6	4.9			
20-Nov	5.0	2.1	0.1	-2.4	-3.8	-5.0	-6.2	-7.1	-7.5	-7.1	-6.3	-5.4	-5.2	-5.0	-5.3	-5.9	-6.9	-8.0	-9.0	-10.3	-11.3	-11.0	-11.5	-11.3	-6.0	5.0			
21-Nov	-11.7	-10.8	-10.3	-10.4	-10.4	-10.4	-10.3	-10.3	-9.9	-9.4	-9.3	-9.2	-8.9	-8.9	-9.2	-9.3	-9.9	-10.2	-10.4	-10.4	-10.5	-10.6	-10.7	-10.9	-10.1	-8.9			
22-Nov	-10.8	-11.0	-11.5	-11.8	-12.6	-13.8	-14.8	-15.5	-16.6	-16.4	-14.3	-13.4	-13.0	-13.2	-13.4	-13.7	-15.1	-14.8	-14.1	-13.8	-13.5	-13.2	-12.9	-12.4	-13.6	-10.8			
23-Nov	-12.3	-11.9	-11.5	-11.1	-10.8	-10.3	-10.0	-9.7	-9.4	-9.0	-8.2	-7.5	-7.0	-6.2	-5.9	-6.1	-7.7	-9.4	-10.5	-11.1	-10.2	-9.8	-10.2	-6.8	-9.3	-5.9			
24-Nov	-5.4	-2.5	-0.5	-0.8	-1.4	-0.9	-0.8	-0.7	-1.5	-0.6	1.4	1.6	2.8	4.5	4.5	3.8	2.4	1.8	0.8	-0.9	-1.0	-0.8	-1.9	-2.4	0.1	4.5			
25-Nov	-2.9	-3.3	-3.2	-1.3	-0.6	-0.6	-1.2	-1.6	-2.3	-4.0	-4.1	-4.0	-4.0	-4.0	-5.2	-7.1	-8.8	-10.7	-12.5	-13.4	-14.7	-15.2	-16.5	-17.4	-6.6	-0.6			
26-Nov	-17.2	-15.5	-14.9	-16.2	-16.4	-15.3	-14.5	-15.4	-16.2	-14.5	-13.1	-12.0	-10.5	-9.7	-9.7	-9.2	-8.8	-8.3	-8.2	-8.1	-7.6	-7.3	-7.6	-9.3	-11.9	-7.3			
27-Nov	-10.7	-11.7	-12.3	-10.7	-9.7	-9.2	-9.0	-8.4	-7.9	-7.4	-6.0	-4.7	-3.8	-3.0	-2.1	-1.6	-2.5	-1.6	-0.3	-0.4	-0.3	1.5	1.9	1.8	-4.9	1.9			
28-Nov	1.2	1.2	0.8	0.1	0.5	0.2	-0.3	-1.2	-1.4	-0.2	1.0	2.3	3.6	4.3	3.9	3.2	2.5	2.4	2.9	3.0	2.9	1.4	-0.2	-1.4	1.4	4.3			
29-Nov	-1.8	-2.2	-2.0	-2.3	-3.1	-3.3	-3.1	-2.7	-3.1	-3.0	-2.3	-1.6	-0.6	0.7	0.8	0.6	0.0	-0.3	-0.6	-1.3	-1.1	-1.5	-1.9	-2.1	-1.6	0.8			
30-Nov	-2.7	-3.5	-3.8	-4.9	-5.3	-5.3	-5.7	-5.7	-5.5	-5.5	-5.5	-5.1	-5.0	-5.2	-5.4	-5.7	-5.8	-6.0	-6.1	-6.2	-6.3	-6.9	-8.5	-9.9	-5.7	-2.7			
																								Diurnal Average					
																								Diurnal Maximum					



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

**Ambient Temperature 2m (AT 2m) - C**  
**Fort McKay - Bertha Ganter - November 2023**







**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Ambient Temperature 2m (AT 2m) - C  
Fort McKay - Bertha Ganter - November 2023**

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	0	0.00	0.00
-20 - 0	605	84.03	84.03
0 - 10	115	15.97	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



**Wood Buffalo Environmental Association**

**Summary of Hour Averages**

**Relative Humidity (RH) - %**

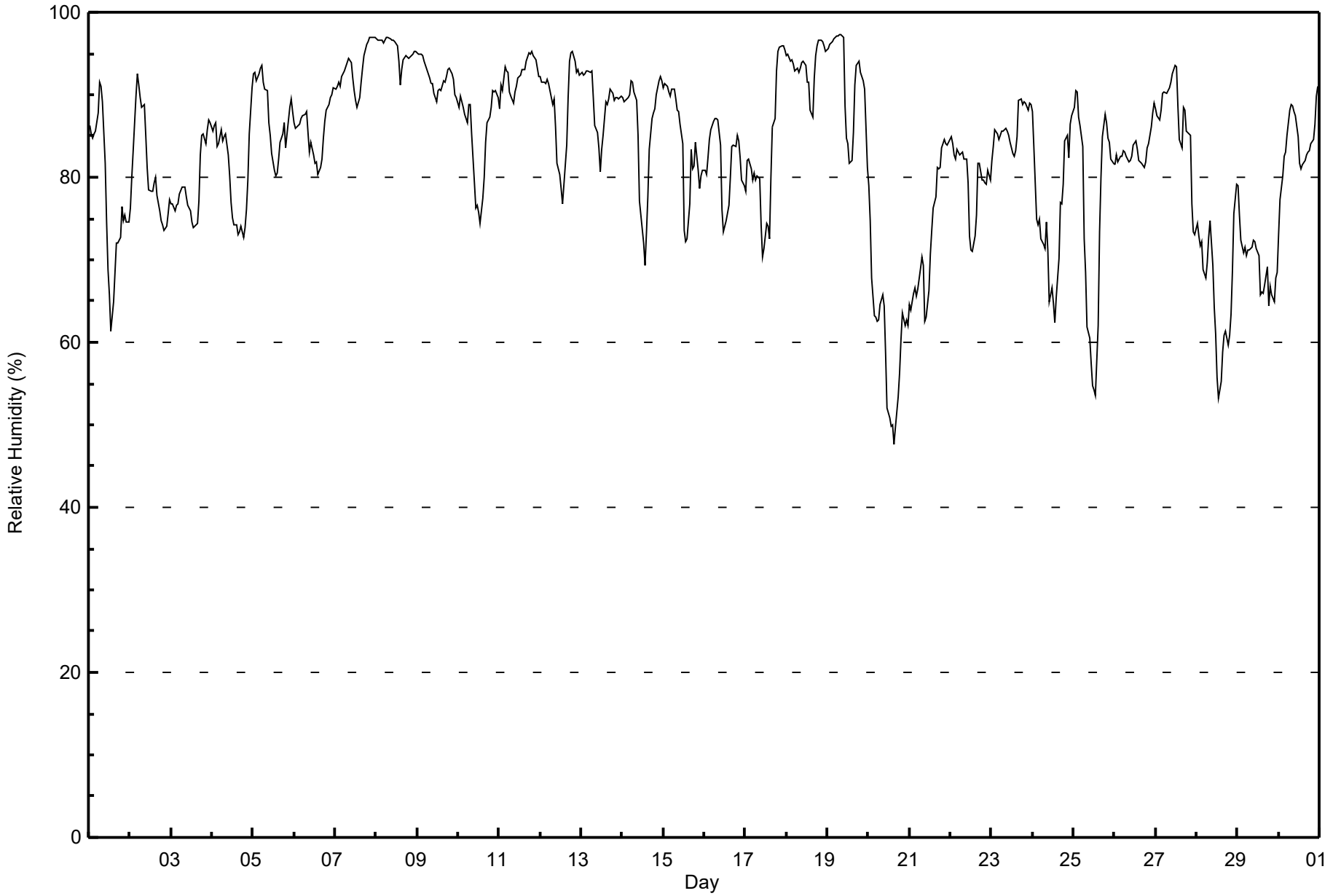
**Fort McKay - Bertha Ganter - November 2023**

Maximum Value: 97.3 % on Nov 19 09:00      Maximum Daily Average: 95.5 % on Nov 8																						Hours in Service: 720 Hours of Data: 720																											
Minimum Value: 47.6 % on Nov 20 16:00      Minimum Daily Average: 60.3 % on Nov 20 Maximum Diurnal Average: 85.5 % at hour 2      Minimum Diurnal Average: 76.0 % at hour 14 Monthly Average: 82.91 %      Percentiles: P <sub>1</sub> = 53.4 P <sub>10</sub> = 68.8 Q <sub>1</sub> = 76.8 Median = 84.7 Q <sub>3</sub> = 90.5 P <sub>90</sub> = 94.0 P <sub>99</sub> = 97.0																						Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0																											
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Nov	86.3	85.3	84.8	85.3	85.7	87.8	91.6	91.1	89.2	81.7	74.6	68.8	65.7	61.3	64.9	68.5	72.0	72.0	72.8	76.5	74.7	75.4	74.6	74.5	77.7	91.6																							
2-Nov	76.2	80.0	83.3	89.9	92.6	91.3	89.7	88.5	88.7	85.1	81.2	78.5	78.4	78.4	79.3	80.0	77.7	75.9	74.7	74.3	73.5	74.0	75.6	77.3	81.0	92.6																							
3-Nov	76.8	76.8	75.9	76.7	76.9	77.9	78.8	78.9	78.9	77.7	76.6	76.0	74.5	74.0	74.1	74.4	77.2	82.8	85.0	85.2	84.1	85.8	86.9	86.5	79.1	86.9																							
4-Nov	85.6	86.2	86.6	83.7	84.1	85.7	84.5	84.8	85.2	82.8	80.1	76.9	75.1	74.3	74.3	73.1	73.4	74.2	72.8	73.9	76.1	79.6	85.3	90.9	80.4	90.9																							
5-Nov	92.5	92.7	91.8	92.5	93.2	93.5	91.5	90.7	90.6	86.7	85.2	82.8	80.9	80.1	80.4	82.3	84.3	85.3	86.7	83.6	85.3	88.4	89.5	88.0	87.4	93.5																							
6-Nov	86.6	85.9	86.2	86.4	87.1	87.5	87.6	88.0	85.4	83.1	84.2	82.8	81.7	81.8	80.3	81.2	82.3	84.7	86.8	88.1	88.9	89.6	90.0	90.8	85.7	90.8																							
7-Nov	90.8	91.1	91.6	91.1	92.1	92.8	93.4	93.9	94.4	94.0	92.1	90.6	89.3	88.5	89.7	91.5	93.2	94.7	96.0	96.5	97.0	97.0	97.0	96.9	93.1	97.0																							
8-Nov	96.7	96.6	96.6	96.7	96.3	96.6	97.0	97.0	96.8	96.7	96.6	96.4	95.9	94.0	91.3	93.1	94.2	94.8	94.6	94.5	94.6	94.9	95.2	95.3	95.5	97.0																							
9-Nov	95.0	95.0	94.8	94.8	94.0	93.6	92.6	92.0	91.4	91.4	90.2	89.2	90.4	90.8	90.6	91.6	91.6	92.3	93.0	93.3	92.6	91.9	89.9	89.6	92.1	95.0																							
10-Nov	88.5	89.9	89.2	88.5	87.6	86.6	88.9	88.8	85.3	79.4	76.3	76.7	75.7	74.3	77.4	80.1	84.2	86.7	87.3	88.4	90.6	90.4	90.4	89.6	85.0	90.6																							
11-Nov	88.3	91.1	90.5	93.5	92.9	92.7	90.3	89.8	89.0	90.4	91.1	92.1	92.4	93.1	93.1	93.0	94.1	95.0	95.0	95.2	94.8	94.2	93.2	92.2	92.4	95.2																							
12-Nov	92.3	91.6	91.5	91.3	91.9	91.4	89.7	88.9	89.5	86.0	81.7	80.3	78.6	76.8	79.1	83.9	89.6	94.1	95.2	95.3	94.0	92.7	93.0	92.4	88.8	95.3																							
13-Nov	92.8	92.3	92.5	92.8	92.8	92.6	92.8	89.6	86.3	85.4	83.6	80.7	83.4	85.1	89.2	88.9	89.4	90.7	90.2	89.3	89.7	89.6	89.6	89.8	89.1	92.8																							
14-Nov	89.6	89.2	89.3	89.7	89.9	91.7	91.5	90.4	89.3	85.1	77.1	75.3	72.1	69.3	73.2	77.6	83.4	87.2	87.8	88.3	89.9	91.8	92.1	91.7	85.5	92.1																							
15-Nov	90.8	91.4	91.0	90.3	89.8	90.7	90.7	89.5	88.1	88.0	86.5	84.0	73.6	72.2	72.6	76.8	83.3	81.0	81.4	84.2	80.9	78.6	80.2	80.8	84.0	91.4																							
16-Nov	80.8	80.4	82.4	84.6	85.8	86.7	87.1	87.1	86.9	84.0	76.1	73.4	74.0	74.7	76.6	80.0	83.7	83.9	83.7	85.1	84.5	82.4	79.6	79.0	81.8	87.1																							
17-Nov	78.2	82.0	82.2	81.1	79.7	80.5	79.7	80.2	79.8	74.3	70.3	71.4	74.4	74.1	72.6	80.0	86.2	87.1	92.9	95.2	95.8	96.0	95.9	95.4	82.7	96.0																							
18-Nov	94.8	95.0	94.1	94.3	93.8	92.8	93.3	92.8	93.2	93.9	94.1	93.5	91.5	91.6	88.2	87.3	92.1	94.8	95.9	96.6	96.6	96.4	95.9	95.2	93.7	96.6																							
19-Nov	95.5	96.0	96.2	96.5	96.8	97.1	97.2	97.2	97.3	97.0	88.7	84.7	84.1	81.7	82.1	85.5	91.2	93.6	94.0	92.8	92.2	91.8	90.6	81.2	91.7	97.3																							
20-Nov	79.0	74.7	67.8	63.3	63.1	62.5	62.7	64.5	65.8	64.4	58.6	52.0	50.8	49.9	50.0	47.6	49.7	53.3	56.3	60.4	63.5	62.0	62.8	62.0	60.3	79.0																							
21-Nov	64.6	63.8	65.9	66.6	65.6	66.5	68.9	70.3	69.4	62.5	63.1	66.3	70.7	73.5	76.2	77.5	81.3	81.0	81.3	83.6	84.6	84.1	83.9	84.3	73.1	84.6																							
22-Nov	85.0	84.0	82.7	82.2	83.5	82.7	82.9	83.0	82.2	82.2	79.4	72.9	71.3	71.0	72.9	75.4	81.6	81.7	79.7	79.6	79.3	79.2	80.8	79.7	79.8	85.0																							
23-Nov	82.0	83.8	85.8	85.3	84.5	85.0	85.6	85.6	85.9	85.6	85.1	84.2	82.9	82.6	83.2	84.9	89.3	89.6	88.8	89.1	89.0	88.1	89.0	88.8	86.0	89.6																							
24-Nov	88.0	83.7	74.9	74.3	74.9	72.6	71.8	71.4	74.6	71.2	65.0	66.6	64.8	62.4	65.5	70.2	77.0	76.9	79.2	84.5	85.1	82.3	86.4	87.5	75.4	88.0																							
25-Nov	88.4	90.5	90.4	87.2	86.3	83.7	72.6	68.5	61.8	60.4	57.5	54.7	53.6	53.6	62.1	73.4	80.0	84.9	87.6	86.6	84.8	84.2	82.2	81.7	75.7	90.5																							
26-Nov	81.5	82.8	81.8	82.6	82.5	83.2	83.0	82.5	81.9	82.1	82.5	83.9	84.3	83.4	82.0	81.8	81.8	81.2	81.9	83.6	84.1	86.1	87.7	89.0	83.2	89.0																							
27-Nov	88.3	87.4	86.9	88.2	90.2	90.3	90.2	90.5	90.9	91.5	92.6	93.6	93.4	88.7	84.6	83.5	88.5	88.1	85.6	85.4	85.2	76.7	73.5	73.0	86.9	93.6																							
28-Nov	74.3	72.8	71.7	72.2	68.8	67.8	69.6	72.8	74.7	69.3	64.2	61.1	55.8	53.3	55.3	58.8	60.9	61.4	59.6	60.9	63.4	68.6	75.6	79.2	66.3	79.2																							
29-Nov	79.0	75.4	72.4	70.9	71.5	70.5	71.3	71.3	71.5	72.4	72.2	71.3	70.5	65.7	66.1	66.0	66.9	69.2	64.4	66.7	65.8	64.9	67.7	68.5	69.7	79.0																							
30-Nov	73.0	77.3	80.1	82.5	83.1	85.1	88.1	88.9	88.6	88.0	87.4	85.0	81.8	81.0	81.6	82.0	82.7	83.1	83.3	84.0	84.6	86.5	89.8	91.0	84.1	91.0																							
																								85.4	85.5	85.0	85.2	85.2	85.3	85.1	84.9	84.4	82.4	79.8	78.2	77.1	76.0	76.9	79.0	82.1	83.4	83.8	84.7	84.8	84.8	85.5	85.4	Diurnal Average	
																								96.7	96.6	96.6	96.7	96.8	97.1	97.2	97.2	97.3	97.0	96.6	96.4	95.9	94.0	93.1	93.1	94.2	95.0	96.0	96.6	97.0	97.0	97.0	96.9	96.9	Diurnal Maximum



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

**Relative Humidity (RH) - %**  
**Fort McKay - Bertha Ganter - November 2023**



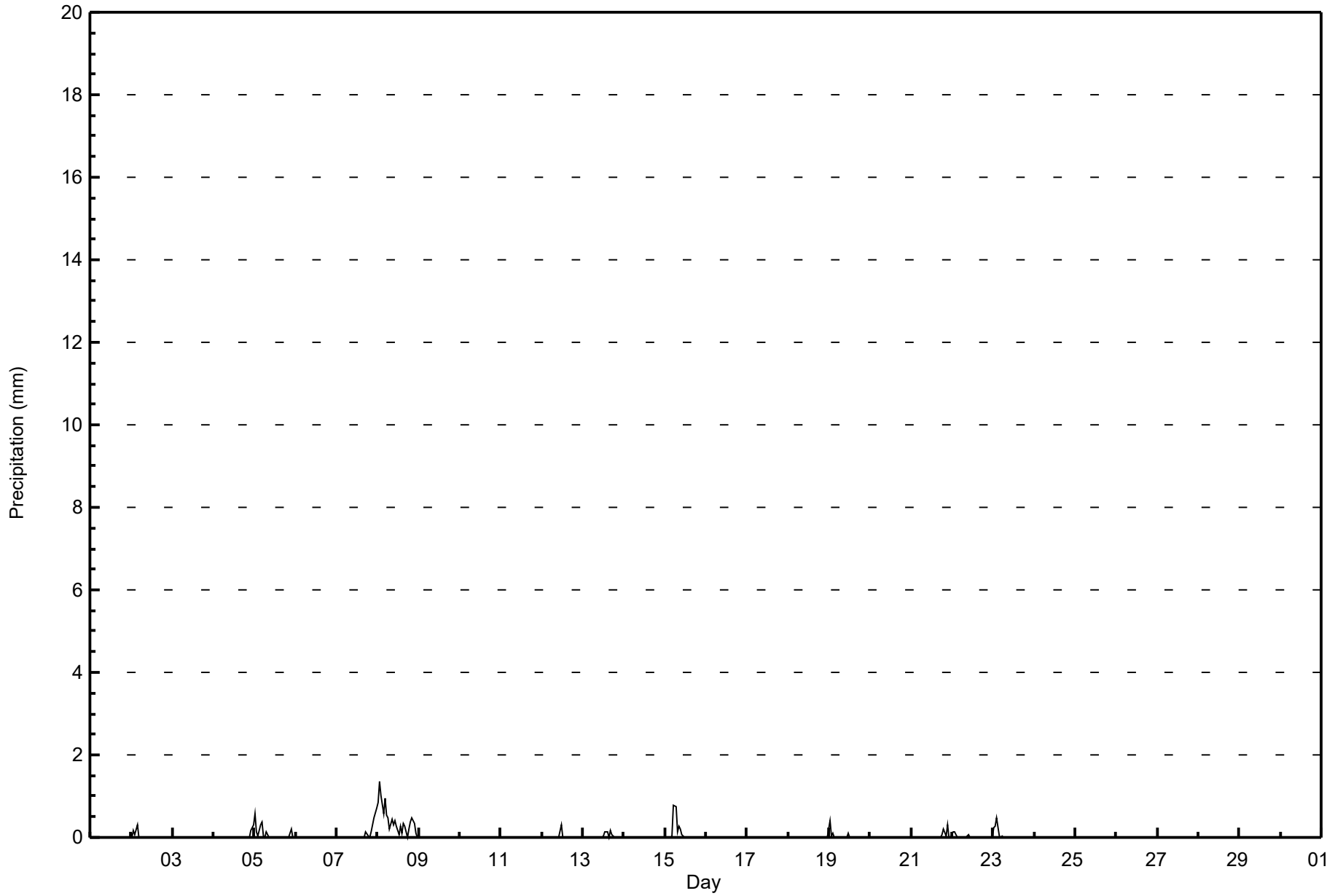


Maximum Value: 1.4 mm on Nov 8 02:00		Maximum Daily Total: 9.9 mm on Nov 8		Hours in Service: 720																													
Minimum Value: 0.0 mm on Nov 1 01:00		Minimum Daily Total: 0.0 mm on Nov 1		Hours of Data: 720																													
Maximum Diurnal Total: 2.2 mm at hour 1		Minimum Diurnal Total: 0.1 mm at hour 13		Hours of Missing Data: 0																													
Monthly Total: 20.44 mm		Percentiles: P <sub>1</sub> = 0.0 P <sub>10</sub> = 0.0 Q <sub>1</sub> = 0.0 Median = 0.0 Q <sub>3</sub> = 0.0 P <sub>90</sub> = 0.0 P <sub>99</sub> = 0.6		Hours of Calibration: 0																													
				Percent Operational Time: 100.0																													
Day	Hourly Period Ending At (MST)																								Daily Total	Daily Maximum							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24									
1-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
2-Nov	0.0	0.2	0.1	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.3
3-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5-Nov	0.6	0.1	0.1	0.3	0.4	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	1.8	0.6	
6-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.2	0.3	0.5	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8	0.7
8-Nov	0.9	1.4	1.0	0.6	0.9	0.5	0.5	0.2	0.5	0.3	0.4	0.3	0.1	0.3	0.1	0.3	0.3	0.0	0.2	0.4	0.5	0.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.9	1.4
9-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	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	0.3	0.3
13-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.0	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.2
14-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15-Nov	0.0	0.0	0.0	0.0	0.1	0.8	0.7	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.3	0.8
16-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19-Nov	0.4	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	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.4
20-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
21-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.1	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.3
22-Nov	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.2
23-Nov	0.3	0.3	0.5	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	0.5
24-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
26-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
27-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
28-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
29-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		2.2	2.1	1.8	1.2	1.4	1.4	1.2	0.5	0.7	0.6	0.5	0.7	0.1	0.4	0.2	0.3	0.4	0.2	0.3	0.6	0.7	1.2	0.7	1.0			Diurnal Average					
		0.9	1.4	1.0	0.6	0.9	0.8	0.7	0.2	0.5	0.3	0.4	0.3	0.1	0.3	0.2	0.3	0.3	0.1	0.2	0.4	0.5	0.3	0.5	0.7			Diurnal Maximum					



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

**Precipitation (PC) - mm**  
**Fort McKay - Bertha Ganter - November 2023**





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

**Precipitation (PC) - mm**  
**Fort McKay - Bertha Ganter - November 2023**

<b>Concentration Ranges (mm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 0.3	701	97.36	97.36
0.4 - 0.5	10	1.39	98.75
0.6 - 0.7	4	0.56	99.31
0.8 - 1.4	5	0.69	100.00
1.5 - 10	0	0.00	100.00
> 10	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720

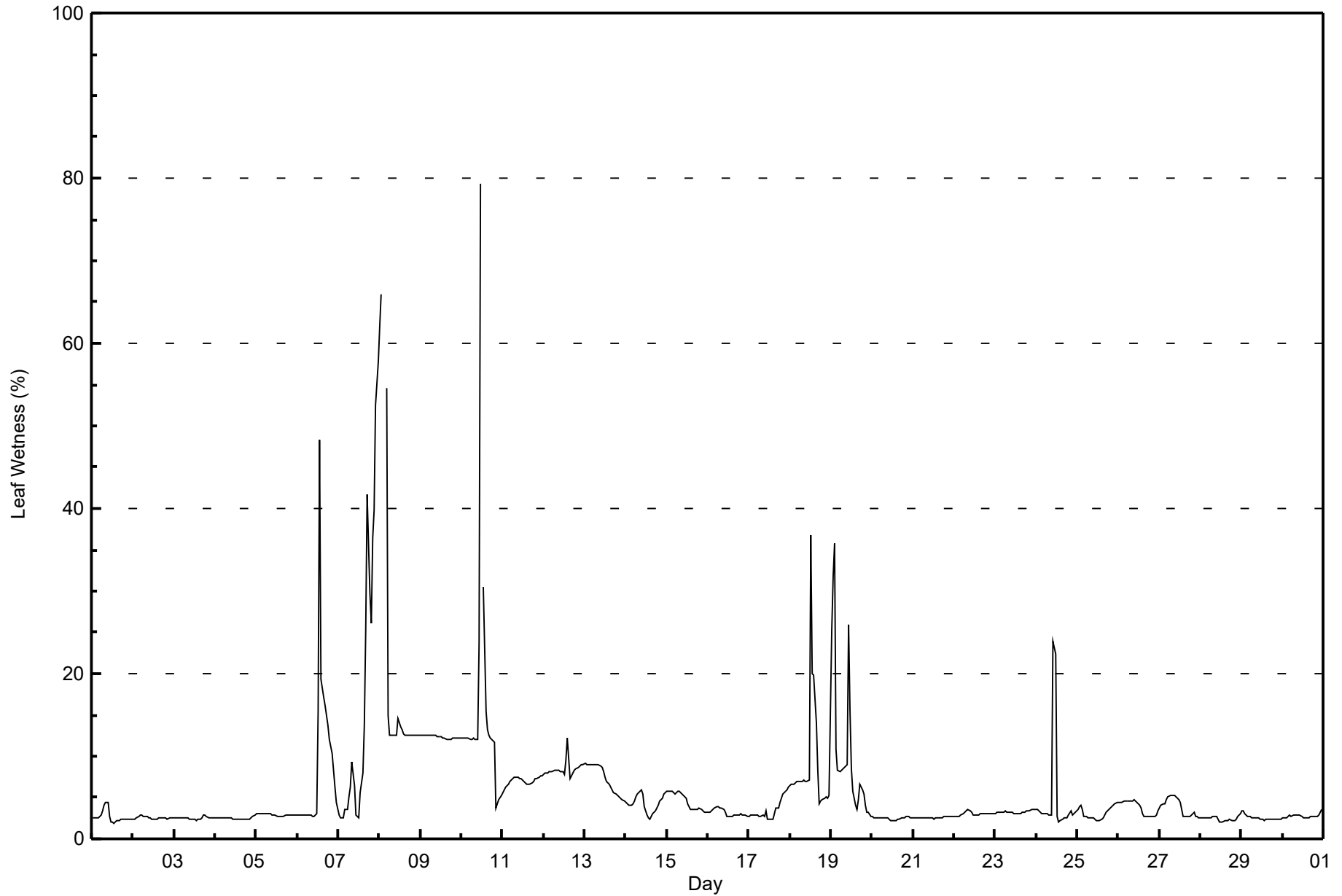


Maximum Value: 79.3 % on Nov 10 12:00		Maximum Daily Average: 19.4 % on Nov 8		Hours in Service: 720																							
Minimum Value: 1.9 % on Nov 1 14:00		Minimum Daily Average: 2.4 % on Nov 28		Hours of Data: 717																							
Maximum Diurnal Average: 7.9 % at hour 12		Minimum Diurnal Average: 4.7 % at hour 4		Hours of Missing Data: 3																							
Monthly Average: 5.87 %		Percentiles: P <sub>1</sub> = 2.1 P <sub>10</sub> = 2.4 Q <sub>1</sub> = 2.6 Median = 3.1 Q <sub>3</sub> = 6.4 P <sub>90</sub> = 12.1 P <sub>99</sub> = 41.4		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-Nov	2.6	2.5	2.5	2.6	2.6	2.8	3.4	4.0	4.4	4.3	2.7	2.1	2.0	1.9	2.1	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.6	4.4	
2-Nov	2.3	2.4	2.5	2.8	2.8	2.8	2.8	2.7	2.7	2.6	2.5	2.4	2.4	2.4	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.8	
3-Nov	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.4	2.4	2.4	2.3	2.3	2.3	2.3	2.6	2.9	2.9	2.7	2.6	2.6	2.6	2.6	2.9		
4-Nov	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.5	2.4	2.3	2.3	2.3	2.3	2.4	2.4	2.4	2.4	2.4	2.4	2.5	2.7	2.9	2.9		
5-Nov	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	2.9	2.9	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.9	2.9	2.9	3.0		
6-Nov	2.9	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.9	2.7	2.6	3.0	15.4	48.4	19.4	17.2	16.1	15.0	13.7	12.1	10.3	8.3	6.2	4.4	9.2	48.4	
7-Nov	2.8	2.6	2.6	2.6	3.6	3.5	5.0	6.2	9.4	6.5	2.9	2.8	2.5	5.5	7.9	13.8	25.2	41.7	29.7	26.2	36.5	39.8	52.5	57.9	16.2	57.9	
8-Nov	62.1	66.0	OR	OR	54.6	14.9	12.6	12.6	12.6	12.6	12.5	14.6	13.5	13.2	12.7	12.6	12.6	12.6	12.6	12.6	12.6	12.6	12.6	12.6	19.4	66.0	
9-Nov	12.6	12.5	12.6	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.4	12.4	12.3	12.2	12.2	12.1	12.1	12.1	12.1	12.1	12.1	12.2	12.1	12.1	12.3	12.6	
10-Nov	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.0	23.7	79.3	OR	30.4	15.4	13.3	12.6	12.1	11.9	11.7	3.8	4.3	4.8	5.2	15.2	79.3	
11-Nov	5.6	5.9	6.3	6.6	6.9	7.1	7.3	7.5	7.5	7.5	7.4	7.2	7.0	6.8	6.6	6.5	6.6	6.8	7.0	7.2	7.4	7.5	7.6	7.7	7.0	7.7	
12-Nov	7.8	7.9	8.0	8.1	8.1	8.2	8.3	8.3	8.3	8.3	8.2	8.2	7.8	9.5	12.3	7.2	7.6	8.0	8.3	8.5	8.7	8.9	9.0	9.1	8.4	12.3	
13-Nov	9.1	9.0	9.0	9.0	9.0	9.0	9.0	9.0	8.9	8.8	8.6	8.1	7.5	7.0	6.5	6.2	5.9	5.7	5.5	5.3	5.1	4.9	4.7	4.5	7.3	9.1	
14-Nov	4.4	4.2	4.1	4.0	4.2	4.6	5.0	5.4	5.8	6.0	5.5	3.8	2.9	2.5	2.4	2.7	3.0	3.5	3.7	4.1	4.5	5.0	5.4	5.6	4.3	6.0	
15-Nov	5.7	5.7	5.8	5.7	5.5	5.4	5.7	5.7	5.6	5.5	5.2	4.8	4.3	3.8	3.6	3.5	3.6	3.6	3.6	3.7	3.6	3.4	3.3	3.2	4.6	5.8	
16-Nov	3.2	3.2	3.3	3.5	3.7	3.9	3.8	3.8	3.7	3.6	3.2	2.8	2.8	2.8	2.8	2.8	2.9	2.9	2.9	3.0	2.9	2.9	2.8	2.8	3.2	3.9	
17-Nov	2.8	2.9	2.9	2.9	2.8	2.8	2.8	2.8	2.8	2.7	3.4	2.4	2.4	2.3	2.3	3.1	3.8	3.7	4.3	4.9	5.4	5.7	6.0	6.2	3.5	6.2	
18-Nov	6.4	6.6	6.7	6.8	6.9	6.9	7.0	7.0	7.0	7.0	6.9	7.2	36.7	20.0	19.8	14.1	8.3	4.2	4.6	4.8	4.9	5.0	5.0	5.3	9.0	36.7	
19-Nov	25.5	31.8	35.7	10.9	8.2	8.2	8.2	8.5	8.7	8.9	25.9	15.6	8.5	5.7	4.0	3.6	4.7	6.7	5.9	5.4	4.1	3.3	3.3	2.8	10.6	35.7	
20-Nov	2.7	2.6	2.5	2.5	2.5	2.5	2.5	2.6	2.6	2.6	2.4	2.2	2.2	2.2	2.2	2.3	2.4	2.5	2.5	2.6	2.6	2.6	2.6	2.6	2.5	2.7	
21-Nov	2.6	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.4	2.5	2.5	2.6	2.6	2.6	2.6	2.7	2.7	2.7	2.7	2.7	2.6	2.7	
22-Nov	2.7	2.7	2.7	2.7	2.8	3.1	3.3	3.4	3.5	3.5	3.2	2.9	2.9	2.9	3.0	3.0	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.0	3.5	
23-Nov	3.1	3.1	3.2	3.2	3.2	3.2	3.3	3.3	3.3	3.2	3.1	3.1	3.1	3.0	3.0	3.1	3.2	3.3	3.3	3.4	3.4	3.5	3.6	3.6	3.2	3.6	
24-Nov	3.6	3.6	3.2	3.1	3.1	3.0	3.0	2.9	2.9	2.9	23.9	22.4	2.8	2.1	2.1	2.3	2.5	2.5	2.6	2.9	3.3	2.9	3.0	3.3	4.6	23.9	
25-Nov	3.6	4.0	4.1	3.6	2.8	2.7	2.6	2.5	2.5	2.5	2.4	2.3	2.3	2.3	2.3	2.5	2.8	3.2	3.5	3.7	4.0	4.1	4.2	4.4	3.1	4.4	
26-Nov	4.4	4.4	4.4	4.5	4.6	4.6	4.5	4.6	4.7	4.7	4.6	4.3	4.1	3.7	3.1	2.8	2.7	2.7	2.7	2.7	2.7	2.7	2.9	3.3	3.8	4.7	
27-Nov	3.7	4.0	4.2	4.2	4.7	5.1	5.2	5.3	5.3	5.2	5.1	4.8	4.5	3.6	2.8	2.6	2.8	2.7	2.7	2.9	3.2	2.8	2.6	2.6	3.9	5.3	
28-Nov	2.6	2.6	2.6	2.6	2.6	2.5	2.6	2.7	2.7	2.6	2.4	2.1	2.1	2.0	2.1	2.3	2.3	2.3	2.3	2.2	2.3	2.4	2.7	3.1	2.4	3.1	
29-Nov	3.4	3.4	3.1	2.8	2.7	2.7	2.6	2.5	2.5	2.5	2.5	2.4	2.4	2.3	2.3	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.5	2.4	2.6	3.4	
30-Nov	2.5	2.6	2.6	2.7	2.8	2.8	2.9	2.9	2.9	2.8	2.8	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.7	2.7	2.7	2.8	3.2	3.6	2.8	3.6	
		7.0	7.4	5.5	4.7	6.3	5.0	5.1	5.1	5.3	5.1	6.5	7.9	5.7	7.0	5.6	5.3	5.6	6.0	5.6	5.5	5.6	5.6	6.0	6.2	Diurnal Average	
		62.1	66.0	35.7	12.5	54.6	14.9	12.6	12.6	12.6	12.6	25.9	79.3	36.7	48.4	19.8	17.2	25.2	41.7	29.7	26.2	36.5	39.8	52.5	57.9	Diurnal Maximum	
OR - Out of Range																											



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

**Leaf Wetness (LW) - %**  
**Fort McKay - Bertha Ganter - November 2023**







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

**Leaf Wetness (LW) - %**  
**Fort McKay - Bertha Ganter - November 2023**

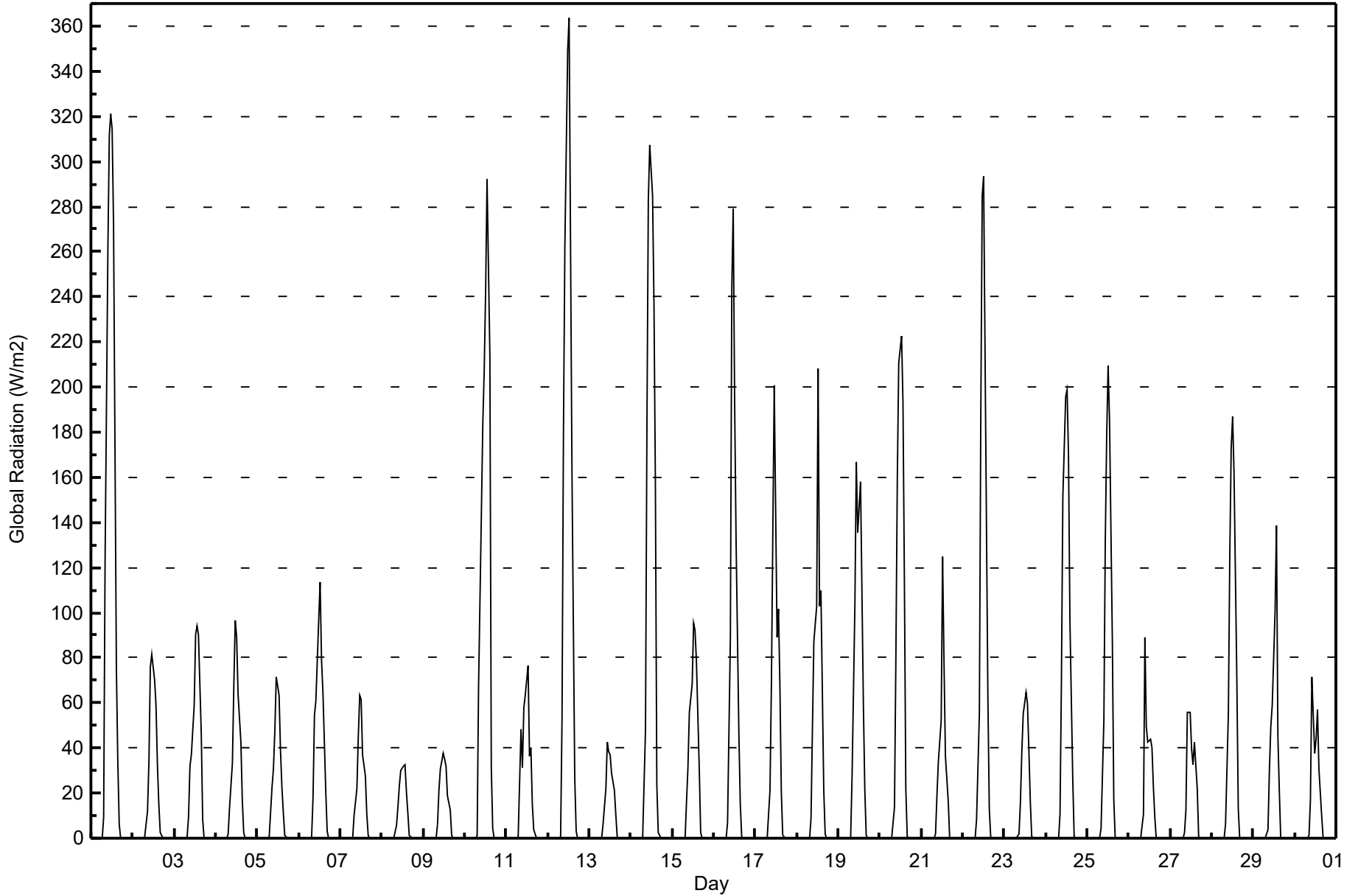
<b>Concentration Ranges (%)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 0.3	0	0.00	0.00
0.4 - 0.5	0	0.00	0.00
0.6 - 0.7	0	0.00	0.00
0.8 - 1.4	0	0.00	0.00
1.5 - 10	621	86.61	86.61
> 10	96	13.39	100.00

Total Number of Valid Hours: 717

Total Number of Hours: 720



Maximum Value: 363.8 W/m2 on Nov 12 13:00																						Maximum Daily Average: 71.9 W/m2 on Nov 1																						Hours in Service: 720	
Minimum Value: 0.0 W/m2 on Nov 1 01:00																						Minimum Daily Average: 7.1 W/m2 on Nov 8																						Hours of Data: 720	
Maximum Diurnal Average: 137.8 W/m2 at hour 13																						Minimum Diurnal Average: 0.0 W/m2 at hour 18																						Hours of Missing Data: 0	
Monthly Average: 27.77 W/m2																						Percentiles: P <sub>1</sub> = 0.0 P <sub>10</sub> = 0.0 Q <sub>1</sub> = 0.0 Median = 0.0 Q <sub>3</sub> = 22.8 P <sub>90</sub> = 90.2 P <sub>99</sub> = 290.6																						Hours of Calibration: 0	
																																												Percent Operational Time: 100.0	
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																					
1-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.3	122.4	261.5	311.9	320.8	314.1	271.4	75.5	33.6	6.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	71.9	320.8																		
2-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	12.2	33.7	75.6	81.7	70.5	58.7	32.4	15.2	2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	16.0	81.7																		
3-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	9.7	31.8	36.8	58.7	90.3	94.3	90.2	46.3	8.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	19.5	94.3																		
4-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0	13.7	33.4	67.3	96.5	89.4	63.7	42.8	16.8	2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	17.8	96.5																		
5-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	22.7	30.9	47.8	71.5	63.5	39.0	22.7	11.5	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	13.0	71.5																		
6-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	18.2	54.8	60.7	96.4	113.7	79.0	64.7	20.7	3.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	21.3	113.7																		
7-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	10.3	22.2	45.0	63.5	61.4	37.2	27.3	10.8	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11.6	63.5																		
8-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.7	13.8	23.2	30.4	31.9	32.7	20.8	11.1	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.1	32.7																		
9-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	6.1	21.3	31.0	37.6	35.0	31.8	18.5	12.4	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.1	37.6																		
10-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.4	67.1	144.5	183.5	207.9	242.5	292.0	213.9	31.5	4.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	57.9	292.0																		
11-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	48.2	31.3	57.5	63.6	76.5	36.5	40.0	15.0	3.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15.5	76.5																		
12-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	53.0	178.9	262.0	349.2	363.8	264.5	164.4	26.2	3.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	69.4	363.8																		
13-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.3	22.1	42.4	38.4	37.1	29.0	21.6	10.6	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.7	42.4																		
14-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	48.5	181.0	282.8	307.2	284.6	236.6	156.1	23.9	2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	63.5	307.2																		
15-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	16.0	31.1	56.1	68.5	95.1	92.4	78.3	30.6	2.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	19.6	95.1																		
16-Nov	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	6.6	88.9	243.9	278.9	193.7	133.1	46.5	15.4	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	42.0	278.9																		
17-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	21.1	68.6	135.4	201.0	88.8	101.7	67.9	20.6	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	29.4	201.0																		
18-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	9.0	49.1	87.0	103.0	208.1	103.0	109.7	21.6	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	28.8	208.1																		
19-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	27.0	102.9	166.9	135.2	146.6	158.1	59.9	22.2	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	34.2	166.9																		
20-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	13.6	81.6	159.7	211.0	222.8	193.4	113.9	21.8	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	42.4	222.8																		
21-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.1	18.9	34.1	52.2	124.8	78.0	36.5	16.4	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15.1	124.8																		
22-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.4	55.5	187.0	284.4	293.7	215.5	63.6	13.2	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	46.7	293.7																		
23-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.1	15.4	38.2	55.3	64.6	59.7	38.6	16.4	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12.1	64.6																		
24-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.9	70.3	151.3	195.8	198.6	169.4	96.5	26.3	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	38.3	198.6																		
25-Nov	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.7	52.0	131.9	178.5	209.2	185.1	87.2	17.8	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	36.1	209.2																		
26-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.5	88.9	49.3	42.9	43.6	40.1	22.4	9.3	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12.8	88.9																		
27-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.5	12.8	55.6	55.8	39.7	32.8	42.6	21.6	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11.0	55.8																		
28-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.0	55.3	125.5	173.0	186.7	161.9	69.9	13.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	33.0	186.7																		
29-Nov	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.5	30.0	49.3	59.2	100.5	138.9	45.1	21.2	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	18.7	138.9																		
30-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	17.1	71.6	37.9	44.2	57.1	30.6	9.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11.2	71.6																		
																								Diurnal Average																					
																								Diurnal Maximum																					





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

**Global Radiation (GR) - W/m2**  
**Fort McKay - Bertha Ganter - November 2023**

<b>Concentration Ranges (W/m2)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	524	72.78	72.78
21 - 100	131	18.19	90.97
101 - 300	59	8.19	99.17
301 - 600	6	0.83	100.00
601 - 900	0	0.00	100.00
> 900	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720

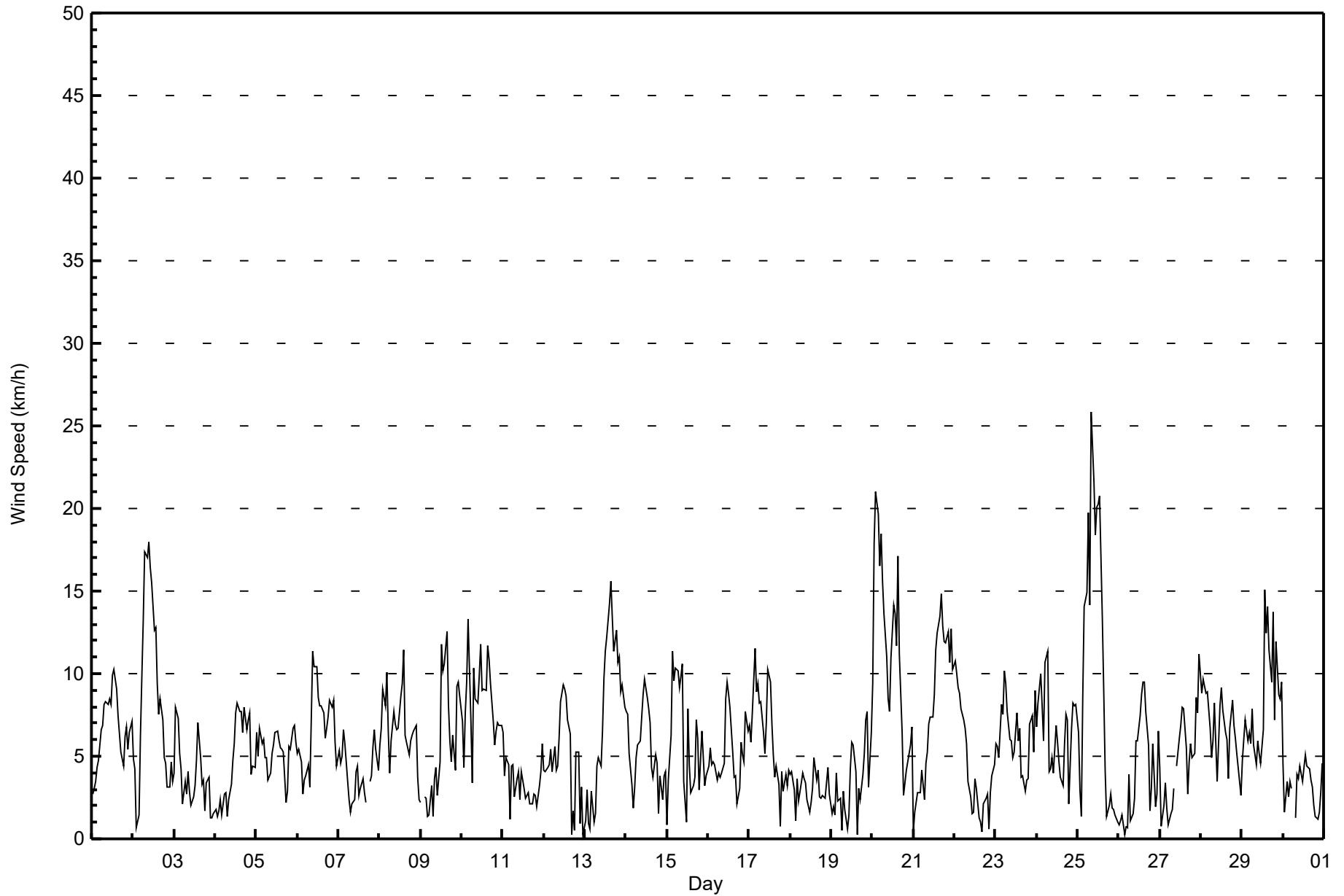


Maximum Speed: 26 km/h on Nov 25 09:00	Maximum Daily Speed Average: 11.2 km/h on Nov 20	Hours in Service: 720
Minimum Speed Value: 0 km/h on Nov 13 00:00	Minimum Daily Speed Average: 0.5 km/h on Nov 30	Hours of Data: 716
Maximum Diurnal Speed Average: 2.3 km/h at hour 2	Minimum Diurnal Speed Average: 0.6 km/h at hour 11	Hours of Missing Data: 4
Monthly Average Velocity: 1.2 km/h 244.7 deg	Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 2 Q <sub>1</sub> = 3 Median = 5 Q <sub>3</sub> = 8 P <sub>90</sub> = 11 P <sub>99</sub> = 20	Percent Operational Time: 99.4

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	S3	S3	SSW4	SSW4	S5	S7	S7	S8	S8	S8	SSE8	SSE8	SSE10	SSE10	S9	S7	S6	S5	S4	S6	S7	S5	S6	S7	S6.5	SSE10
2-Nov	S5	S4	E1	NNE1	N6	NNE10	NNE13	N17	N17	N18	NNE16	NNE16	NNE13	NNE13	NNE9	NE8	NNE8	NNE7	E5	ENE5	ENE3	ENE3	ESE5	SE3	NNE7.1	N18
3-Nov	SSW4	S8	SSE7	SE5	S4	SE2	SE3	SE3	ESE4	ESE3	ENE2	NNE3	NE3	N5	N7	N5	NNW3	NNW4	WNW2	WNW3	N4	NNE1	NNE1	ENE2	E0.8	S8
4-Nov	ENE2	NE1	NNE2	E2	ENE1	NNE3	ENE3	NNE1	NNE2	ENE3	E5	ESE6	ESE8	SE8	ESE8	ESE8	E6	ESE8	ESE7	ESE7	ESE8	E4	NNE4	NNE4	E3.9	SE8
5-Nov	NNE6	NNE5	NNE7	NNE6	NNE6	NNE5	NE5	NE4	NE4	NE5	NE6	NNE6	NE7	NE6	NNE5	N5	N5	NNE2	ESE3	SE6	SE5	SSE7	SSE7	SE6	NE3.5	SSE7
6-Nov	SE5	SSE5	SE5	SSE3	SSE4	SSE4	SSE4	SSE3	S7	S11	SSE10	S10	S9	SSE8	S8	S8	S6	S7	S7	S8	S8	S8	S6	S4	S6.5	S11
7-Nov	SSW5	SSW5	SSW5	S7	SSW6	SW3	WSW2	W2	SSW2	SSW2	W4	W4	W3	WSW3	WNW4	NW3	N2	UO	S3	S4	S6	S7	S5	SSW4	SW3.0	S7
8-Nov	W6	WNW7	WNW9	WNW8	WNW10	NW6	WNW4	WNW6	WNW8	WNW7	NW7	NW7	NW9	NW9	NW11	NW6	NW6	WNW5	WNW6	WNW6	NW7	NW7	NW4	WNW2	NW6.6	NW11
9-Nov	WNW2	UO	S3	SSW2	S1	W1	WSW3	S1	SSW4	SSW4	SW3	SSW5	S12	S10	S11	SSE13	S8	S6	S5	S6	SSE4	S9	S9	SSW9	S5.3	SSE13
10-Nov	SSW7	SW4	S8	S10	S13	S7	W3	S10	S8	S8	S10	S12	S9	S9	S9	S12	S11	S9	S7	S6	S7	S7	S7	S7	S8.1	S13
11-Nov	S6	SW4	S5	SE5	SE1	NNW4	WNW5	NNW3	NW4	NNW4	N2	N4	N3	NE2	NW3	NNW3	S2	SW2	SSW3	SW3	SW2	SW3	SSW4	SSW6	WSW1.0	S6
12-Nov	S4	SSW4	SSW4	SSW4	S5	WSW4	W6	SW4	W4	W6	W8	W9	W9	W9	W7	WNW6	ENE0	SSW2	NNW0	WNW5	NW5	NNW1	NNW3	N0	W3.6	W9
13-Nov	W1	WNW3	WSW1	SW1	N3	N1	NNW2	ENE4	E5	ENE4	NE6	NE10	NNE11	NNE12	NNE14	NNE16	N13	N11	N13	N11	N11	NNW9	N9	NNW8	NNE6.6	NNE16
14-Nov	NNW8	NNW8	NW5	WNW3	W2	SSW3	S5	S6	SSW6	S7	S9	S10	S9	SSW8	SW7	SW4	S4	S5	S5	SSW1	S4	SW2	S4	SSW4	SSW3.5	S10
15-Nov	S1	N4	NNW6	N11	NNE10	NNE10	N10	NNE9	N10	N11	N3	NNE1	NW8	WNW5	S3	SSW3	SW4	WNW7	NNW6	WNW3	WNW7	WNW5	SSW3	SW4	NNW4.0	N11
16-Nov	WSW4	W6	WSW4	SSW5	S5	S4	S4	SSE4	S4	S5	SSE8	S9	S9	S8	S5	WNW4	WNW4	WNW2	SSW3	S6	S5	SW5	W8	WSW6	SSW4.0	S9
17-Nov	S7	SW6	W8	W12	W9	WSW9	W8	WSW8	WSW6	SW5	SSW7	SSE10	S9	S7	SSW5	W4	W4	NW3	NE1	S4	SSW3	SSW4	SSW3	S4	SW4.7	W12
18-Nov	S4	SSW4	SSW3	S1	SSW4	SSW2	S3	SSW4	S4	S3	SSW2	S2	SSE2	SSW3	S5	SSW4	SW4	SW3	S2	SSW3	SSW2	S3	SSW4	S3	SSW3.0	S5
19-Nov	SSW1	S2	SSW1	SSE4	WNW2	N2	E0	SW3	SW2	SSE1	SSE1	SSE4	SSE6	SSE6	SSW4	W0	S3	SSW2	S4	S5	S7	S8	WSW3	W6	S2.6	S8
20-Nov	WNW9	WNW18	WNW21	WNW20	WNW16	WNW19	WNW16	WNW14	W11	W9	WNW8	WNW11	WNW14	WNW14	WNW12	NW17	WNW11	WNW6	WNW3	W3	W4	W5	WNW6	WNW7	WNW11.2	WNW21
21-Nov	SSW0	SSE2	SSE3	SSE3	SE3	SSE4	NE2	NNE5	NNE5	NE7	NE7	NE7	NNE9	NE11	NE12	NNE13	N15	NNE13	NNE12	NNE12	N13	N11	N13	NNE10	NNE6.8	N15
22-Nov	N11	NNE10	N9	N9	NNE8	NNE7	N7	NNW6	WNW3	NW3	ENE2	E2	E4	ENE3	NE1	NNE1	E0	SE2	SSE2	SSE3	SSW1	SSW3	S4	SE4	NNE2.4	N11
23-Nov	SSE6	SSE6	S5	SSE8	S8	S10	S9	S8	S6	S6	S5	S5	SSW8	SSW6	S7	SSW4	SW4	SSW3	SSW4	S4	S7	SSW7	SW5	S9	S6.0	S10
24-Nov	S7	S8	SSW10	S8	SSW6	WSW11	WSW11	WSW4	SSW4	S5	SSW4	SSE7	SSE6	S5	SW4	S3	SSW6	S8	S7	SW2	WSW7	S8	S8	S8	SSW5.7	WSW11
25-Nov	S6	SSW3	WNW1	N9	N14	N15	N20	NNW14	NNW26	NNW22	N18	NNW20	NNW20	NNW21	N13	NNE9	N4	N1	SW2	WSW3	SW2	W2	WSW1	WSW1	NNW8.7	NNW26
26-Nov	WSW1	SW1	S1	NNE0	SW1	SSE1	SSE4	WSW1	SSE2	S2	S6	S6	SSE7	S9	S9	S9	S8	S6	NNE2	SW3	S6	ENE2	WNW3	NNW7	S2.9	S9
27-Nov	WNW4	SW1	S2	S3	SSE2	S1	SSE2	SSW2	SSW3	UO	S4	S6	S7	S8	S8	SSW6	WSW3	S5	SSW6	SW5	W5	W9	WSW8	WSW11	SW3.7	WSW11
28-Nov	WSW9	WSW10	WSW9	WSW9	WSW9	SSW7	SW5	W6	W8	W3	W6	W8	WNW9	W8	W6	W6	SW4	W7	W8	WSW7	W6	WNW5	W4	W3	W6.4	WSW10
29-Nov	SSW5	W6	W7	W6	WNW6	WNW6	WNW8	WNW6	W5	WNW6	WNW5	WSW5	WNW7	WNW15	WNW12	WNW14	NW11	NW9	NW14	NW7	NW12	NW9	NW9	NW9	WNW7.8	WNW15
30-Nov	NW5	W2	WNW3	W3	NNW3	NNE3	UO	WSW1	SSE4	SSE4	SSE4	SE3	ENE4	E5	E4	ESE4	SE4	E3	ENE2	NE1	N1	NW2	WNW3	WNW5	E0.5	E5

SW1.9	WSW2.3	WSW2.3	WSW1.6	W1.4	NNW1.5	NNW1.8	NNW1.5	W1.4	W0.7	SW0.6	S1.0	SSW0.9	SSW0.9	WSW1.0	NNW1.0	W1.0	WSW0.8	SW0.8	SW1.5	SW1.5	SW2.0	SW1.9	SW2.2	Diurnal Average																							
N11																							WNW18	WNW21	WNW20	WNW16	WNW19	N20	N17	NNW26	NNW22	N18	NNW20	NW20	NNW21	NNE14	NW17	N15	NNE13	NW14	NNE12	N13	N11	NNE13	WSW11	Diurnal Maximum	

UO - Unstable Operation  
 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 - November 2023**

<b>Wind Speed Ranges (km/h)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	373	52.09	52.10
6 - 11	289	40.36	92.46
12 - 19	46	6.42	98.88
20 - 28	8	1.12	100.00
29 - 38	0	0.00	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 716

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Wind Speed (WS) - km/h  
Fort McKay - Bertha Ganter - November 2023**

<b>Wind Speed Ranges (km/h)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	18	21	11	17	13	5	15	27	66	58	33	18	22	28	10	11	373
6 - 11	16	20	9	0	1	8	3	19	98	17	2	15	30	26	17	8	289
12 - 19	11	13	1	0	0	0	0	1	4	0	0	0	1	11	3	1	46
20 - 28	1	0	0	0	0	0	0	0	0	0	0	0	0	2	1	4	8
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	46	54	21	17	14	13	18	47	168	75	35	33	53	67	31	24	716

Total Number of Valid Hours: 716

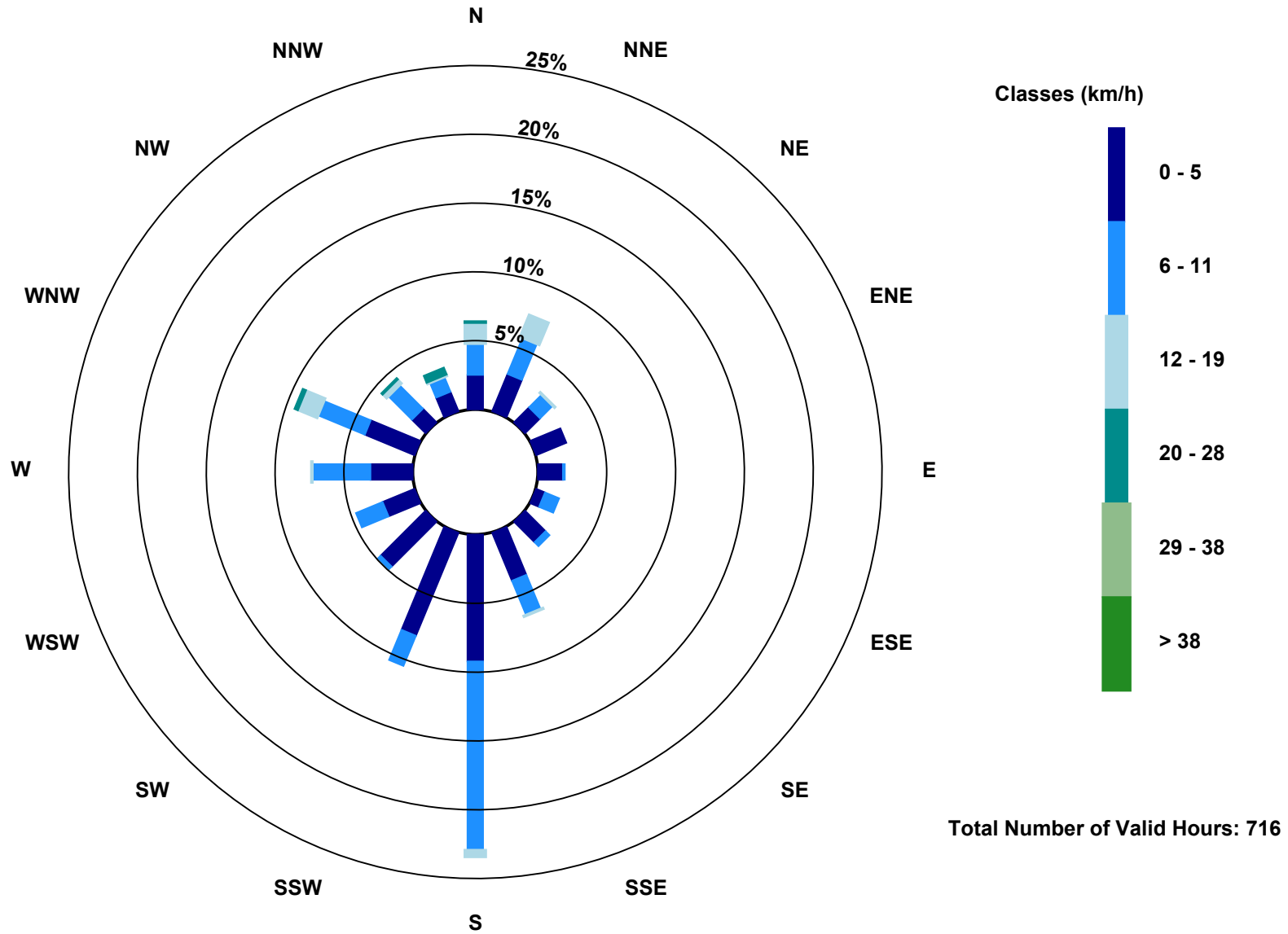
Total Number of Hours: 720





Wood Buffalo Environmental Association  
Wind Rose Nov 2023

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





Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

Wind Speed (WS) - km/h

Fort McKay - Bertha Ganter - November 2023

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 9 km/h on Nov 20 03:00	Hours of Data: 716
Minimum Value: 1 km/h on Nov 3 17:00	Hours of Missing Data: 4
Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 1 Q <sub>1</sub> = 1 Median = 2 Q <sub>3</sub> = 2 P <sub>90</sub> = 3 P <sub>99</sub> = 6	Hours of Calibration: 0
	Percent Operational Time: 99.4

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

Diurnal Maximum

UO - Unstable Operation



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

**Wind Direction (WD) - deg**  
**Fort McKay - Bertha Ganter - November 2023**

Direction of Maximum Speed: 345 deg on Nov 25 09:00	Hours in Service: 720
Direction of Maximum Daily Speed Average: 291.7 deg on Nov 20	Hours of Data: 716
Direction of Minimum Speed: 6 deg on Nov 13 00:00	Direction of Minimum Daily Speed Average: 0.5 deg on Nov 30
Direction of Minimum Speed: 6 deg on Nov 13 00:00	Hours of Missing Data: 4
Monthly Average Direction: 244.7 deg	Percent Operational Time: 99.4

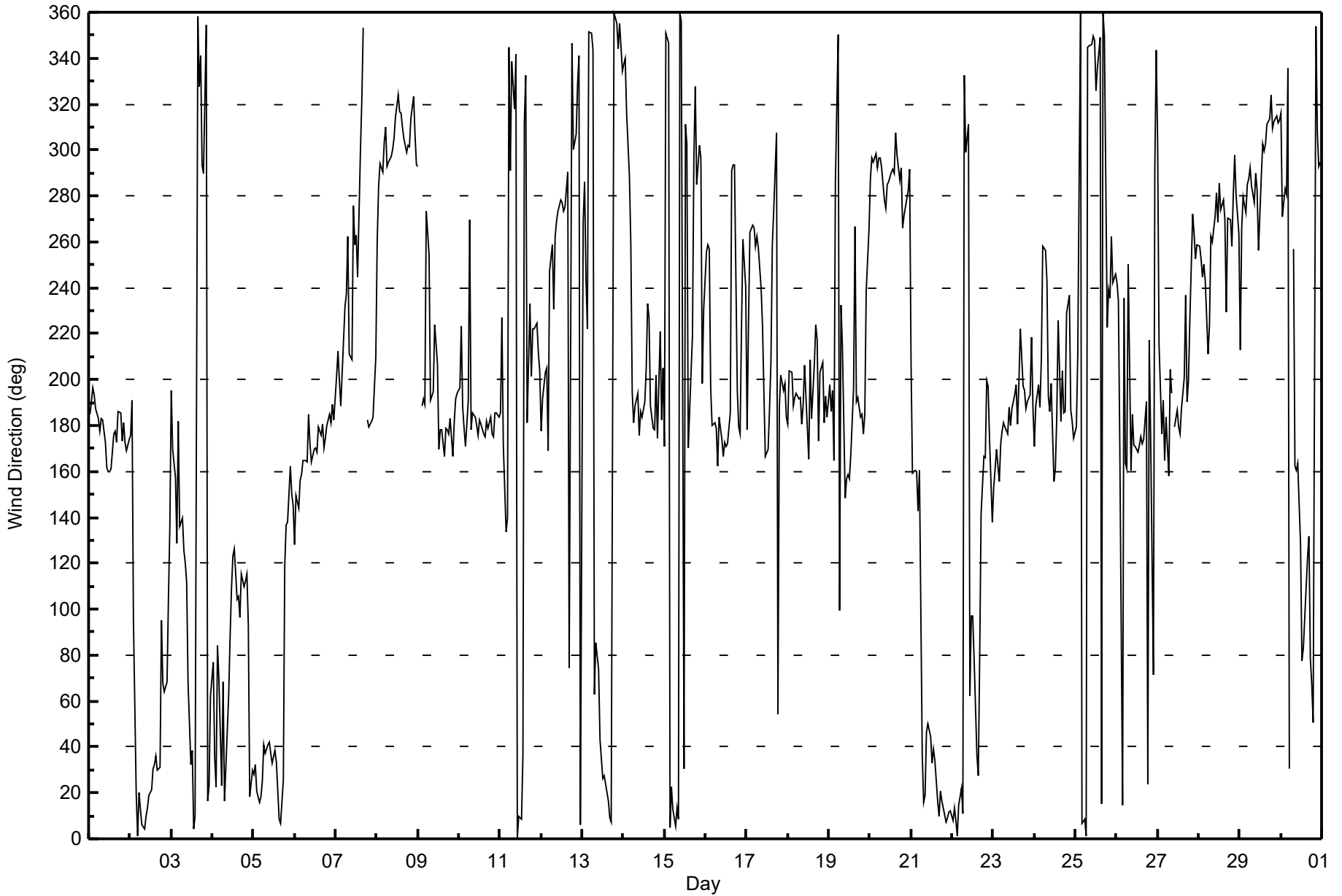
Day	Hourly Period Ending At (MST)																								Daily Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Nov	185	190	197	193	187	183	178	183	182	173	162	160	160	161	176	178	173	186	186	173	181	173	169	174	175.2
2-Nov	176	191	95	19	1	20	13	6	4	10	14	19	21	30	32	36	30	31	95	67	64	68	105	136	25.2
3-Nov	196	169	158	129	182	136	140	126	120	111	68	33	39	4	10	358	327	341	294	290	355	17	23	62	84.0
4-Nov	77	35	23	84	70	23	68	17	32	63	88	109	123	126	104	106	97	115	110	112	115	94	18	30	94.4
5-Nov	28	33	21	16	19	25	41	37	41	42	37	33	38	34	22	9	7	26	119	137	138	162	150	145	48.1
6-Nov	128	150	144	156	159	165	165	164	185	172	164	170	170	168	179	176	181	170	174	180	185	181	189	182	171.1
7-Nov	201	212	199	189	203	232	238	262	211	209	276	259	263	244	299	322	353	UO	182	180	181	182	183	210	214.6
8-Nov	260	284	294	291	303	310	293	295	297	300	305	314	324	317	316	310	305	299	302	302	314	323	306	293	303.9
9-Nov	293	UO	188	192	189	274	255	191	193	194	224	207	169	178	178	167	179	178	176	183	166	182	191	194	185.1
10-Nov	197	224	188	179	171	191	270	178	186	183	180	175	182	181	177	175	182	179	184	176	175	185	186	184	182.6
11-Nov	185	227	171	133	140	344	291	339	318	342	1	10	9	37	312	333	181	233	201	222	222	224	212	204	249.8
12-Nov	177	192	203	205	169	247	259	231	262	269	274	278	277	273	275	291	75	207	347	301	307	329	341	6	261.8
13-Nov	269	286	244	222	351	351	344	63	85	74	43	35	26	28	20	16	9	7	360	358	355	344	355	335	11.8
14-Nov	337	340	316	289	260	195	181	188	194	176	186	184	190	205	233	227	189	179	178	202	174	221	182	205	205.0
15-Nov	171	351	347	5	23	13	5	14	9	359	356	30	311	303	170	203	219	296	328	285	302	297	198	231	342.0
16-Nov	255	259	257	196	180	181	179	163	184	174	166	173	171	172	185	291	293	293	195	179	176	223	261	240	201.1
17-Nov	178	224	264	267	266	258	262	258	240	224	194	166	170	187	207	259	274	307	54	188	202	195	198	184	226.1
18-Nov	181	204	203	188	192	194	191	192	181	189	206	179	165	208	183	207	224	217	173	203	208	181	193	184	194.1
19-Nov	197	186	195	165	286	350	100	233	215	149	157	159	157	167	196	267	190	192	184	185	176	185	239	266	191.1
20-Nov	288	297	295	298	292	297	296	292	278	275	285	286	291	292	290	307	298	287	292	266	272	279	282	291	291.7
21-Nov	208	159	160	160	143	160	37	16	19	47	50	45	33	39	34	16	10	21	17	13	7	9	11	12	25.2
22-Nov	8	13	8	1	14	22	11	333	299	311	62	97	97	78	36	27	79	141	166	166	200	197	175	138	20.2
23-Nov	153	161	170	156	172	177	181	179	176	188	180	187	193	198	181	199	222	197	195	187	190	194	218	188	183.3
24-Nov	171	189	197	188	209	258	256	243	193	186	199	156	161	183	226	182	204	186	186	229	237	187	182	175	199.2
25-Nov	180	211	289	360	7	9	1	345	345	346	349	348	326	336	349	15	360	350	223	239	236	262	242	246	345.8
26-Nov	242	235	171	15	235	164	161	250	161	185	172	171	168	172	175	172	174	190	24	218	176	71	293	344	178.4
27-Nov	303	215	176	191	165	184	158	205	194	UO	179	187	180	176	187	200	237	190	199	227	272	263	253	258	214.4
28-Nov	258	253	245	250	243	211	224	262	260	271	281	268	286	274	278	269	229	270	270	258	280	298	280	264	261.7
29-Nov	213	266	279	273	285	287	292	285	277	290	283	256	289	303	300	302	311	314	324	310	312	315	312	313	298.0
30-Nov	316	271	283	281	336	30	UO	257	163	161	164	128	77	83	97	123	132	79	67	51	354	308	293	295	88.0

219.1 243.0 246.6 245.7 262.3 289.9 291.6 283.4 273.1 273.6 214.0 186.8 211.5 237.9 250.9 288.4 267.9 242.1 218.0 215.2 231.1 221.8 228.9 228.7

Diurnal Average

UO - Unstable Operation

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





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

**Wind Direction (WD) - deg**  
**Fort McKay - Bertha Ganter - November 2023**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 98 deg on Nov 2 03:00	Hours of Data: 716
Minimum Value: 10 deg on Nov 1 23:00	Hours of Missing Data: 4
Percentiles: P <sub>1</sub> = 11 P <sub>10</sub> = 14 Q <sub>1</sub> = 16 Median = 23 Q <sub>3</sub> = 39 P <sub>90</sub> = 56 P <sub>99</sub> = 91	Hours of Calibration: 0
	Percent Operational Time: 99.4

Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Nov	18	28	20	18	18	12	17	14	16	16	15	16	13	13	13	13	12	13	18	12	13	23	10	14	28
2-Nov	20	20	98	60	13	13	16	16	16	15	16	16	18	17	20	23	17	26	29	26	25	40	22	40	98
3-Nov	25	15	20	32	38	46	26	38	19	25	39	38	34	20	16	18	15	17	33	12	28	74	52	45	74
4-Nov	54	40	29	25	50	18	47	45	18	22	28	23	22	20	22	19	22	19	23	21	19	29	14	14	54
5-Nov	14	17	14	13	13	16	16	14	19	17	15	21	17	16	16	12	15	14	26	13	13	17	14	17	26
6-Nov	15	17	24	41	47	20	16	53	21	15	14	14	16	17	16	16	15	14	13	15	15	14	16	14	53
7-Nov	20	26	19	15	21	36	44	56	37	47	41	44	59	47	23	30	18	UO	10	12	12	13	16	38	59
8-Nov	45	29	20	25	22	18	27	25	20	17	15	14	15	14	12	16	14	17	15	15	14	11	15	27	45
9-Nov	25	UO	19	19	45	65	42	78	26	37	58	40	17	18	15	12	19	14	15	12	22	19	16	19	78
10-Nov	30	29	21	16	13	35	41	16	15	17	17	14	15	15	14	12	13	11	15	10	13	12	16	16	41
11-Nov	28	52	29	27	84	30	50	64	45	31	65	34	62	34	63	49	51	50	48	39	51	26	25	22	84
12-Nov	27	21	29	38	16	51	44	55	42	43	40	32	34	33	38	23	93	79	86	22	25	97	31	95	97
13-Nov	76	44	65	69	32	82	74	33	23	24	23	16	15	16	15	14	15	15	16	18	18	24	15	12	82
14-Nov	12	16	17	28	28	22	17	12	15	12	16	18	19	30	39	33	33	13	22	98	26	65	27	41	98
15-Nov	87	41	21	16	23	17	14	15	15	15	40	79	22	33	44	31	33	16	19	19	18	36	40	40	87
16-Nov	43	42	51	17	14	55	50	28	21	16	17	16	14	12	17	34	32	65	57	15	22	52	47	46	65
17-Nov	27	38	41	38	47	40	49	41	40	36	30	11	10	17	23	39	41	54	84	34	47	29	27	21	84
18-Nov	26	22	30	66	20	51	18	23	20	25	38	57	40	31	19	33	18	44	34	20	49	18	23	54	66
19-Nov	79	77	90	47	44	27	74	52	55	91	77	23	18	14	28	87	56	47	24	21	23	15	70	54	91
20-Nov	40	22	22	21	22	19	19	19	29	40	37	33	28	23	23	17	20	26	92	33	20	36	30	22	92
21-Nov	91	66	31	43	33	33	39	20	17	21	25	26	20	16	16	16	14	15	14	16	13	14	14	13	91
22-Nov	14	14	15	14	15	14	18	12	15	12	49	47	27	33	45	20	52	21	30	21	67	22	19	17	67
23-Nov	15	19	17	15	17	14	16	14	16	18	19	19	17	21	12	15	19	19	17	36	14	17	32	13	36
24-Nov	18	17	19	15	32	39	37	89	56	27	46	18	15	48	54	56	19	23	14	91	24	26	10	14	91
25-Nov	17	69	85	28	14	15	19	15	16	15	15	18	15	16	31	12	14	90	56	55	69	71	68	53	90
26-Nov	76	65	60	71	69	76	58	87	64	75	22	18	14	15	13	14	14	16	54	67	29	77	61	15	87
27-Nov	15	73	34	22	32	91	68	25	18	UO	19	16	14	14	16	24	49	31	28	37	44	42	42	33	91
28-Nov	39	34	33	29	31	32	45	25	30	55	41	32	30	35	42	40	54	41	35	43	42	24	25	34	55
29-Nov	32	36	24	38	21	17	19	32	36	19	29	42	47	17	18	15	14	12	15	16	12	10	10	11	47
30-Nov	33	51	27	71	41	28	UO	49	24	24	22	36	30	24	33	20	33	27	37	83	66	36	27	18	83
	91	77	98	71	84	91	74	89	64	91	77	79	62	48	63	87	93	90	92	98	69	97	70	95	

Diurnal Maximum

UO - Unstable Operation



## WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY  
MONITORING PROGRAM  
MONTHLY REPORT

### **AMS02 MILDRED LAKE NOVEMBER 2023**

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

December 22, 2023

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - MILDRED LAKE (AMS02)  
November 2023

MONTHLY SUMMARY

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	662	31	58	96.25	92.9	0	19.8	0
H2S (ppb) Average	684	33	36	99.58	12.3	1	2.3	0
THC (ppm) Average	682	34	38	99.44	4.1	-	2.7	-
NMHC(ppm) Average	682	34	38	99.44	0.474	-	0.092	-
CH4(ppm) Average	682	34	38	99.44	3.8	-	2.6	-
Temperature (C) Average	720	0	0	100	6.7	-	2.7	-
Relative Humidity (%) Average	720	0	0	100	99.3	-	94.5	-
Wind Speed 10 m (km/h) Average	718	0	2	99.72	28	-	19	-
Wind Direction 10 m (deg) Average	718	0	2	99.72	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - MILDRED LAKE (AMS02)  
 NOVEMBER 2023

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile						
					Min	P10	Q1	Median	Q3	P90	Max
SO2 (ppb) Average	662	2.78	8.8	-	0	0	0.1	0.3	1.1	4.8	92.9
H2S (ppb) Average	684	0.46	1	-	0	0.1	0.1	0.2	0.3	1	12.3
THC (ppm) Average	682	2.16	0.3	-	1.9	2	2	2.1	2.2	2.5	4.1
NMHC(ppm) Average	682	0.03	0.054	-	0	0	0	0	0	0.1	0.474
CH4(ppm) Average	682	2.13	0.2	-	1.9	2	2	2.1	2.2	2.4	3.8
Temperature 2 m (C) Average	720	-3.6	4.3	-	-15.3	-9.7	-5.9	-3.4	-0.4	1.4	6.7
Relative Humidity (%) Average	720	83.06	10.6	-	48.4	67.2	77	85.3	91.2	94.6	99.3
Wind Speed 10 m (km/h) Average	718	8.8	5	-	0	4	5	8	11	15	28
Wind Direction 10 m (deg) Average	718	-	-	-	-	-	-	-	-	-	-



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - MILDRED LAKE (AMS02)  
NOVEMBER 2023

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
SO2, H2S, THC/NMHC/CH4	07 Nov 2023 12:00	07 Nov 2023 12:00	1	Maintenance - reinitiated daily QA check
SO2	22 Nov 2023 13:00	23 Nov 2023 14:00	26	Maintenance - station operator activities
H2S, THC/NMHC/CH4	23 Nov 2023 13:00	23 Nov 2023 14:00	2	Maintenance - station logger/modem reset
THC/NMHC/CH4	24 Nov 2023 12:00	24 Nov 2023 12:00	1	Maintenance - station operator activities
WS/WD	18 Nov 2023 20:00	18 Nov 2023 20:00	1	Flat line in sensor output signal
WS/WD	25 Nov 2023 22:00	25 Nov 2023 22:00	1	Flat line in sensor output signal



Wood Buffalo Environmental Association

Summary of Hour Averages

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

Mildred Lake - November 2023

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 92.9 ppb on Nov 17 07:00	Maximum Daily Average: 19.8 ppb on Nov 28		Hours of Data:	662
Minimum Value: 0.0 ppb on Nov 2 05:00	Minimum Daily Average: 0.0 ppb on Nov 2		Hours of Missing Data:	58
Maximum Diurnal Average: 7.8 ppb at hour 5	Minimum Diurnal Average: 0.7 ppb at hour 12		Hours of Calibration:	31
Monthly Average: 2.78 ppb	Percentiles: P <sub>1</sub> = 0.0 P <sub>10</sub> = 0.0 Q <sub>1</sub> = 0.1 Median = 0.3 Q <sub>3</sub> = 1.1 P <sub>90</sub> = 4.8 P <sub>99</sub> = 46.8		Percent Operational Time:	96.3

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Nov	0.4	0.4	Z	0.4	0.3	0.3	0.3	0.3	0.3	0.2	0.2	2.0	0.9	2.6	12.2	9.9	0.8	0.5	0.3	0.3	0.2	0.2	0.2	0.1	1.5	12.2	
2-Nov	0.0	0.3	0.3	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.1	0.0	0.3	
3-Nov	1.7	0.5	3.4	2.9	Z	0.3	0.3	0.3	0.5	0.5	0.5	0.2	1.6	6.7	4.8	2.9	2.1	2.0	2.2	2.4	2.2	1.3	0.8	0.5	1.8	6.7	
4-Nov	0.4	0.3	0.3	0.2	0.2	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.9	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.9	
5-Nov	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.8	0.0	0.0	1.0	0.4	0.1	1.0	
6-Nov	2.5	0.7	1.2	0.4	0.1	0.1	0.1	0.3	0.3	0.2	0.7	0.3	0.3	0.2	0.3	0.2	0.3	0.2	0.2	0.1	0.1	0.1	0.1	0.0	0.4	2.5	
7-Nov	0.0	0.0	0.1	0.0	0.0	0.1	0.1	0.1	0.1	0.2	0.3	0.2	M	0.1	0.1	0.2	0.2	0.2	0.1	0.0	0.1	0.1	0.4	0.1	0.1	0.4	
8-Nov	1.6	2.1	Z	0.2	0.1	0.1	0.1	0.0	0.1	0.0	0.1	0.0	0.1	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.1	0.0	0.1	0.2	2.1	
9-Nov	0.1	0.0	0.1	Z	0.1	0.3	2.7	0.5	3.5	2.1	0.3	0.2	0.2	0.2	0.4	1.0	1.1	0.8	0.4	0.4	0.6	0.4	0.2	0.2	0.7	3.5	
10-Nov	0.3	0.2	0.2	0.3	Z	0.3	0.3	0.8	0.2	0.1	0.1	0.2	1.0	1.0	10.9	12.5	23.3	8.7	1.2	0.5	0.2	0.5	3.4	3.1	3.0	23.3	
11-Nov	4.4	2.6	3.3	12.7	8.6	Z	9.3	4.3	11.9	17.2	2.8	4.9	1.3	0.5	0.7	0.3	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.0	3.7	17.2	
12-Nov	Z	0.0	0.0	0.0	0.0	2.8	1.4	1.2	0.7	8.0	13.4	0.6	14.0	11.2	1.1	0.5	1.3	1.7	1.4	0.6	0.2	0.3	0.1	0.1	2.6	14.0	
13-Nov	0.1	Z	0.2	0.2	0.1	0.2	0.2	0.2	0.2	0.1	0.2	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.2	
14-Nov	0.0	0.0	Z	0.0	0.1	0.3	0.0	0.1	0.2	0.1	0.3	0.2	0.2	0.2	0.2	0.9	4.8	8.0	5.1	0.9	0.4	1.1	0.3	0.4	1.0	8.0	
15-Nov	0.9	1.1	0.4	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.1	0.9	4.3	0.5	1.7	0.3	0.2	0.3	0.2	0.2	1.4	0.6	4.3	
16-Nov	0.9	0.6	0.3	0.1	Z	3.0	8.6	1.6	2.4	0.5	0.6	0.6	0.4	0.4	0.3	0.2	0.3	0.4	0.3	0.2	0.5	18.0	17.6	3.4	2.7	18.0	
17-Nov	1.7	2.2	67.9	36.4	71.9	Z	92.9	47.2	7.7	1.6	1.0	0.9	0.6	0.8	0.6	0.5	0.4	0.7	0.7	0.6	0.5	0.4	1.3	0.5	14.7	92.9	
18-Nov	Z	0.8	0.9	0.6	2.0	2.4	3.4	2.8	1.8	1.7	1.3	1.5	2.5	1.5	0.6	0.4	0.9	0.5	0.7	1.2	1.1	1.6	12.2	4.3	2.0	12.2	
19-Nov	1.2	Z	1.4	0.5	35.1	13.2	2.1	1.5	2.8	3.6	7.1	0.8	1.4	4.7	4.2	2.5	1.4	0.9	0.7	0.6	0.7	1.2	22.0	13.7	5.4	35.1	
20-Nov	29.7	1.7	Z	0.1	0.1	0.1	0.0	0.0	0.4	0.5	0.1	0.4	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.0	0.1	0.1	0.1	0.1	1.5	29.7	
21-Nov	0.1	0.1	0.2	Z	0.2	5.0	3.6	0.4	0.3	0.2	0.2	0.1	0.1	0.1	0.2	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	5.0	
22-Nov	0.0	0.1	0.0	0.0	Z	0.0	0.1	0.1	0.1	0.1	C	C	M	M	M	M	M	M	M	M	M	M	M	M	--	0.1	
23-Nov	M	M	M	M	M	M	M	M	M	M	M	M	M	M	C	C	1.1	0.9	0.6	0.4	0.4	0.4	1.1	0.7	--	1.1	
24-Nov	0.5	Z	0.4	0.3	0.1	0.1	2.4	31.7	29.3	7.2	1.2	1.0	0.5	1.1	3.7	3.9	1.2	1.5	0.3	0.7	4.5	0.3	0.3	0.3	4.0	31.7	
25-Nov	0.6	1.0	Z	0.4	0.3	0.2	0.2	0.1	0.2	0.2	0.3	0.3	0.2	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.1	0.2	0.5	0.2	1.0	
26-Nov	16.0	2.2	9.2	Z	2.9	0.7	0.4	1.4	1.9	2.7	3.9	0.6	0.5	4.2	0.4	0.4	0.2	0.2	0.2	0.2	0.2	0.1	1.2	4.2	1.9	2.4	16.0
27-Nov	0.9	0.5	0.6	0.7	Z	17.6	10.9	0.9	0.5	0.4	0.4	0.4	0.3	0.3	0.2	0.2	0.2	0.2	0.2	36.8	18.0	53.2	42.4	10.1	40.9	10.3	53.2
28-Nov	46.6	31.3	43.2	43.2	64.2	Z	6.0	8.5	22.0	27.7	22.1	3.4	1.9	0.6	4.4	24.7	14.9	9.6	4.9	7.4	47.2	19.3	1.2	0.6	19.8	64.2	
29-Nov	Z	0.3	0.3	0.3	0.1	0.2	0.2	0.2	0.5	0.2	0.1	0.2	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	0.5	
30-Nov	0.0	Z	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.2	0.3	0.4	0.3	0.6	0.6	0.4	0.2	0.2	0.2	0.6	0.6

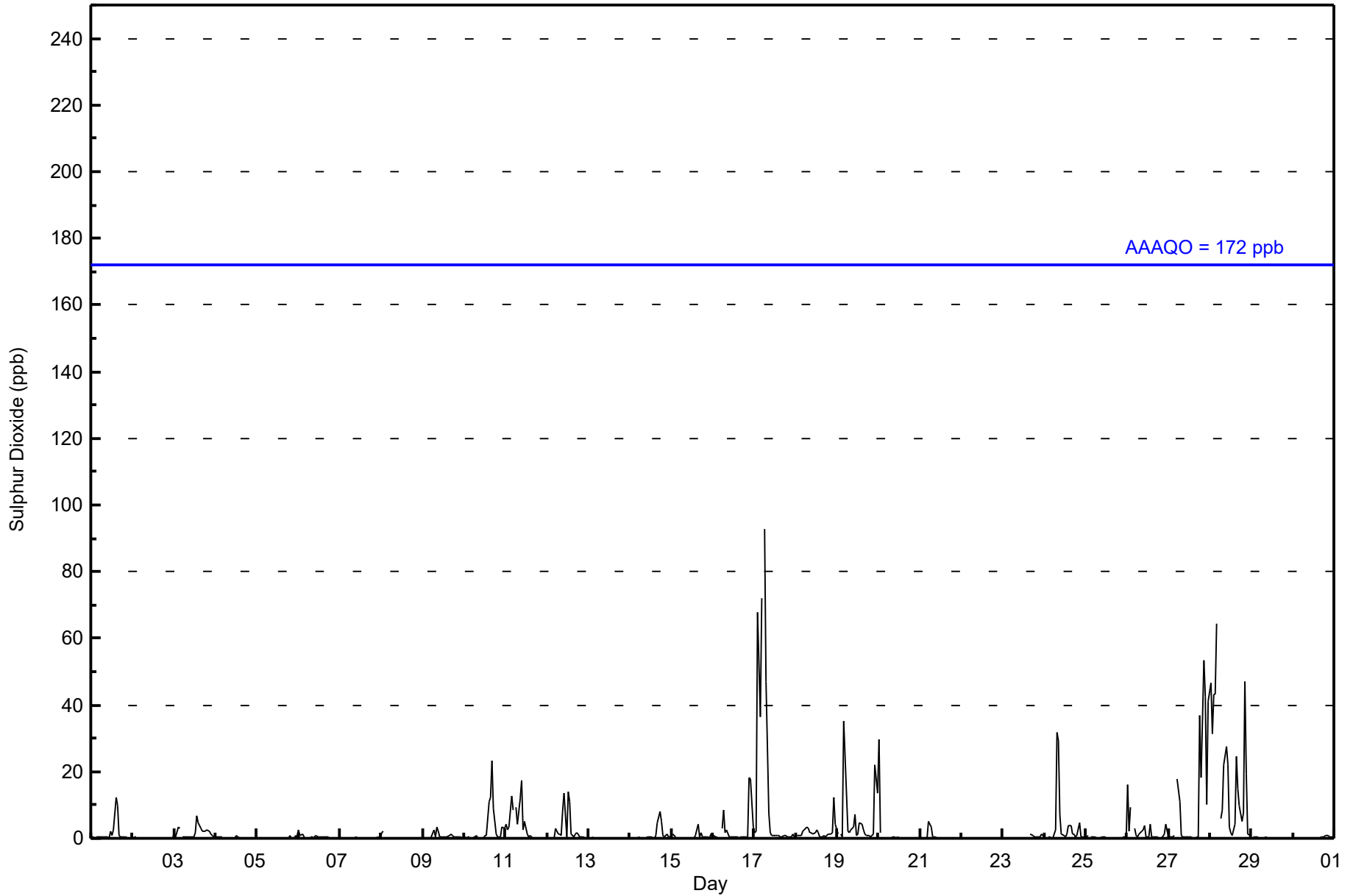
4.4	2.0	5.6	4.2	7.8	1.9	5.0	3.6	3.0	2.6	2.0	0.7	1.1	1.3	1.7	2.4	1.9	1.4	2.0	1.3	3.9	3.1	2.7	2.5	Diurnal Average	
46.6	31.3	67.9	43.2	71.9	17.6	92.9	47.2	29.3	27.7	22.1	4.9	14.0	11.2	12.2	24.7	23.3	9.6	36.8	18.0	53.2	42.4	22.0	40.9	Diurnal Maximum	

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



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

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Mildred Lake - November 2023**





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

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Mildred Lake - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 10	617	93.20	93.20
11 - 20	20	3.02	96.22
21 - 60	21	3.17	99.40
61 - 110	4	0.60	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 662

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Mildred Lake - November 2023**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	62	32	16	32	27	22	37	118	42	38	42	18	17	56	31	25	615
11 - 20	0	0	0	0	0	2	6	2	0	0	0	3	4	3	0	0	20
21 - 60	0	0	0	0	0	0	2	0	0	0	0	7	11	1	0	0	21
61 - 110	0	0	0	0	0	0	0	0	0	0	0	1	3	0	0	0	4
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	62	32	16	32	27	24	45	120	42	38	42	29	35	60	31	25	660

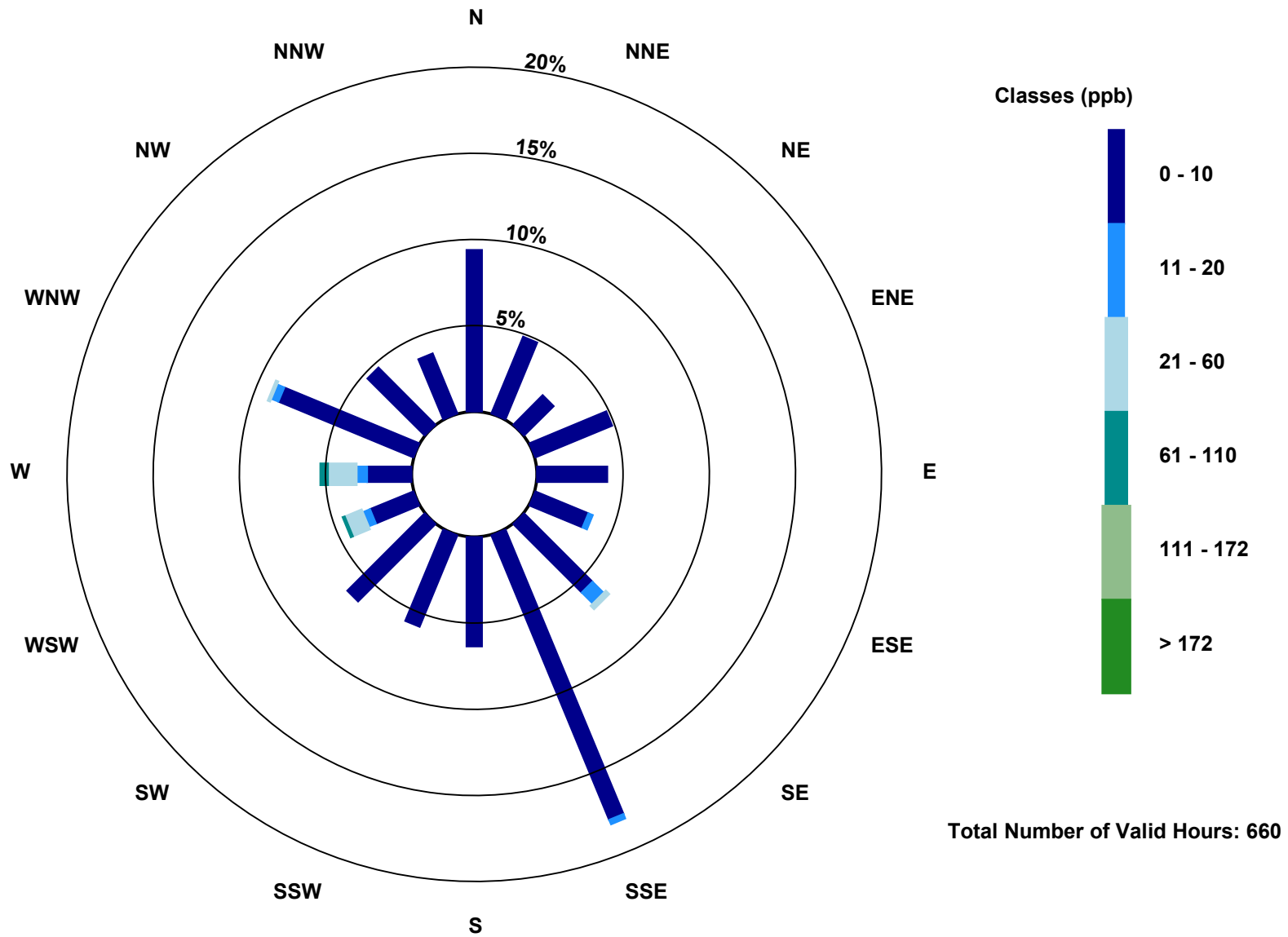
Total Number of Valid Hours: 660

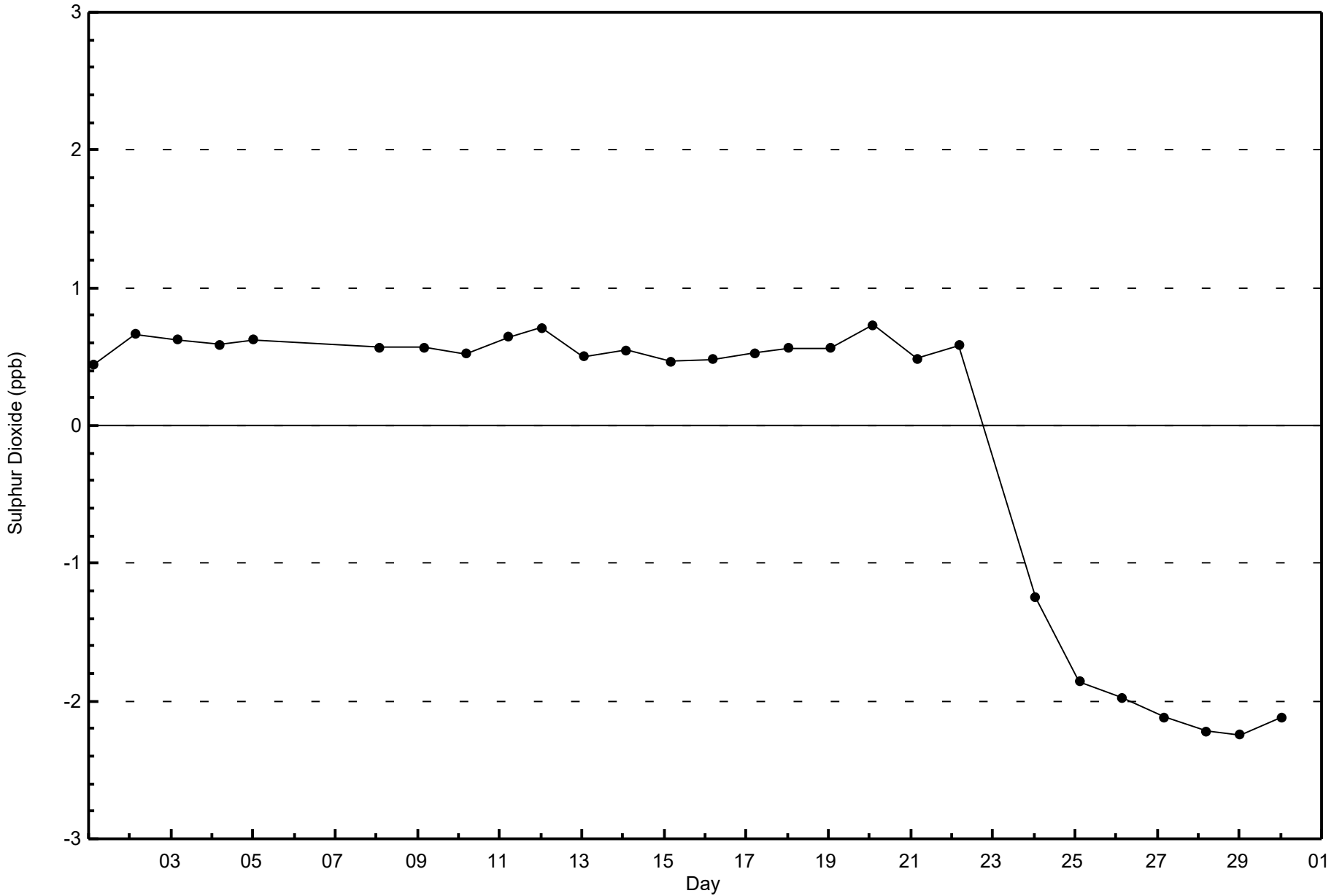
Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 2023

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

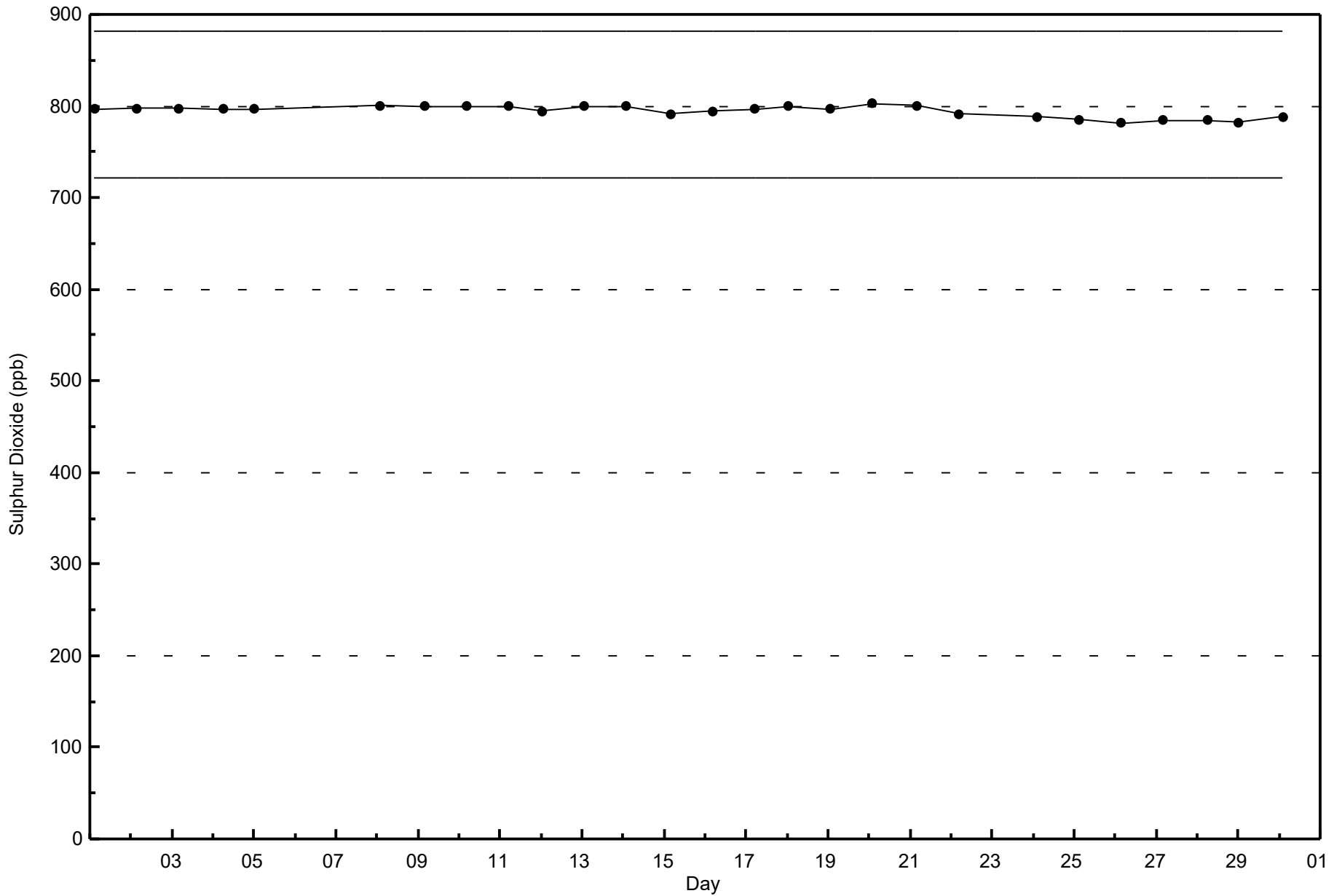






Wood Buffalo Environmental Association  
Span Responses

Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Mildred Lake - November 2023







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

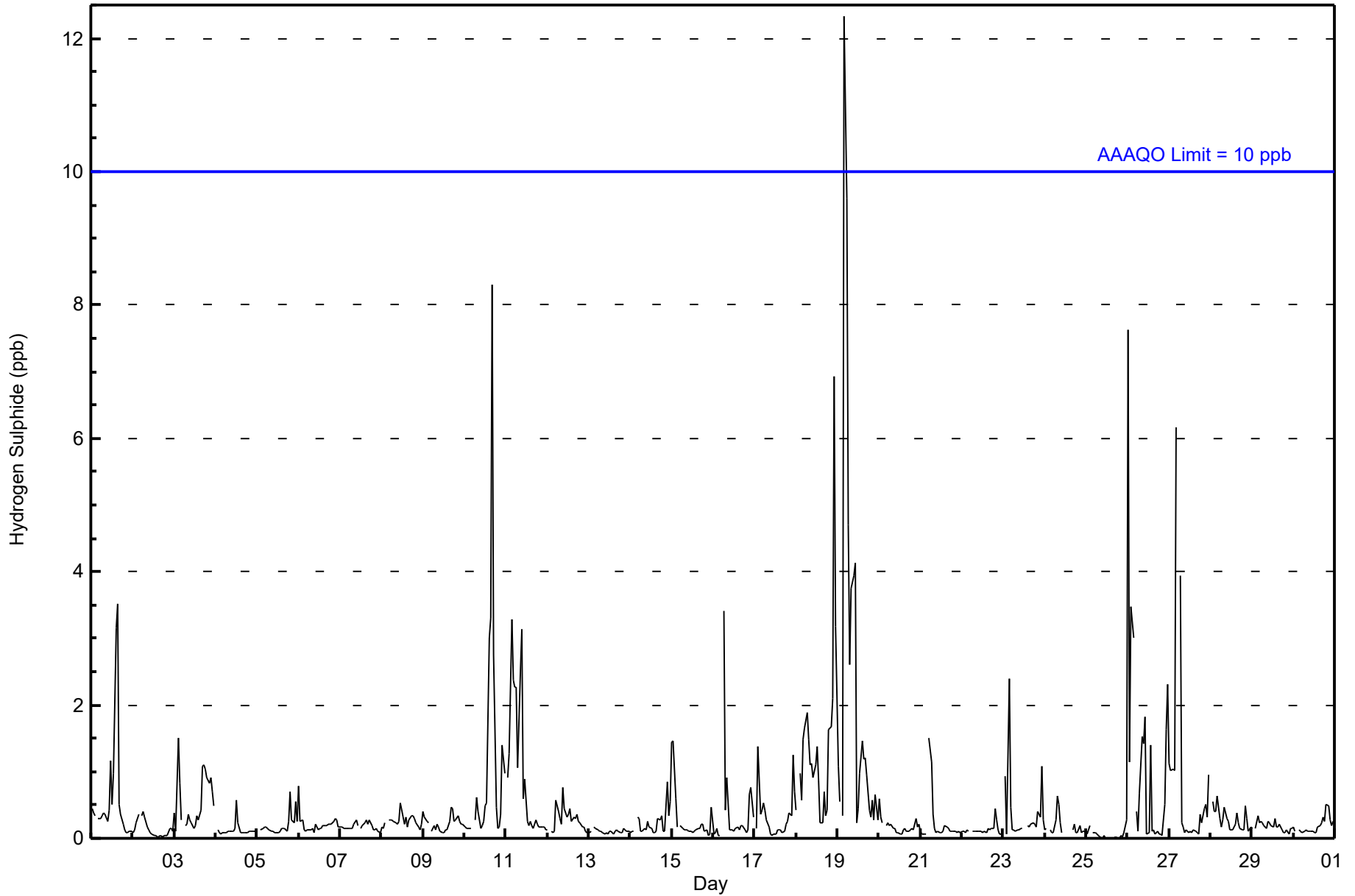
**Hydrogen Sulphide (H<sub>2</sub>S) - ppb**  
**Mildred Lake - November 2023**

Number of Exceedences (AAAQO): 1-hr: 1    24-hr: 0	Hours in Service: 720
Maximum Value: 12.3 ppb on Nov 19 05:00	Maximum Daily Average: 2.3 ppb on Nov 19
Minimum Value: 0.0 ppb on Nov 25 13:00	Hours of Data: 684
Maximum Diurnal Average: 1.1 ppb at hour 5	Hours of Missing Data: 36
Monthly Average: 0.46 ppb	Hours of Calibration: 33
Minimum Daily Average: 0.1 ppb on Nov 25	Percent Operational Time: 99.6
Minimum Diurnal Average: 0.2 ppb at hour 13	
Percentiles: P <sub>1</sub> = 0.0 P <sub>10</sub> = 0.1 Q <sub>1</sub> = 0.1 Median = 0.2 Q <sub>3</sub> = 0.3 P <sub>90</sub> = 1.0 P <sub>99</sub> = 4.2	

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	0.4	0.4	0.3	Z	0.3	0.3	0.3	0.4	0.4	0.3	0.4	1.2	0.5	1.0	3.2	3.5	0.5	0.4	0.2	0.1	0.1	0.1	0.1	0.1	0.6	3.5
2-Nov	0.1	0.1	0.2	0.4	Z	0.3	0.4	0.3	0.2	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.1	0.1	0.1	0.4
3-Nov	0.4	0.1	1.5	0.8	0.3	Z	0.2	0.2	0.4	0.3	0.2	0.1	0.2	0.3	0.3	0.4	1.1	1.1	1.0	0.9	0.8	0.9	0.7	0.5	0.6	1.5
4-Nov	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	0.6	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.6
5-Nov	0.1	Z	0.1	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.1	0.3	0.7	0.3	0.2	0.5	0.2	0.7
6-Nov	0.8	0.3	0.3	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.2	0.2	0.8
7-Nov	0.2	0.2	0.2	0.1	0.2	0.2	0.2	0.2	0.2	0.3	0.2	M	0.2	0.2	0.2	0.3	0.2	0.3	0.2	0.1	0.1	0.1	0.1	0.1	0.2	0.3
8-Nov	0.2	0.2	0.2	Z	0.3	0.3	0.3	0.2	0.2	0.2	0.3	0.5	0.3	0.2	0.3	0.2	0.3	0.3	0.3	0.3	0.2	0.2	0.1	0.2	0.3	0.5
9-Nov	0.4	0.3	0.3	0.2	Z	0.1	0.2	0.1	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.2	0.5	0.4	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.5
10-Nov	0.2	0.2	0.2	0.2	0.1	Z	0.3	0.6	0.4	0.2	0.2	0.3	0.5	0.5	3.0	3.3	8.3	2.8	0.5	0.1	0.2	0.4	1.4	1.0	1.1	8.3
11-Nov	Z	0.9	1.3	3.3	2.4	2.3	2.3	1.1	2.5	3.1	0.6	0.9	0.3	0.2	0.3	0.2	0.1	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.1	3.3
12-Nov	0.1	Z	0.1	0.1	0.1	0.6	0.4	0.3	0.2	0.8	0.4	0.3	0.4	0.5	0.3	0.3	0.3	0.4	0.3	0.2	0.2	0.2	0.2	0.1	0.1	0.8
13-Nov	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	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2
14-Nov	0.1	0.1	0.1	Z	0.3	0.3	0.1	0.1	0.2	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.3	0.3	0.3	0.1	0.1	0.9	0.3	0.5	0.2	0.9
15-Nov	1.4	1.5	0.6	0.2	Z	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.2	0.2	0.1	0.1	0.1	0.1	0.5	0.3	1.5
16-Nov	0.1	0.1	0.2	0.0	0.0	Z	3.4	0.4	0.9	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.2	0.2	0.1	0.1	0.1	0.7	0.8	0.3	0.4	3.4
17-Nov	Z	0.2	1.4	0.4	0.4	0.5	0.4	0.3	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.3	0.4	0.3	1.2	0.7	0.3	1.4
18-Nov	0.4	Z	1.0	0.6	1.5	1.7	1.9	1.5	1.1	1.1	0.9	1.1	1.4	0.9	0.2	0.2	0.7	0.3	0.4	1.6	1.7	2.1	6.9	3.2	1.4	6.9
19-Nov	1.1	0.5	Z	0.3	12.3	9.6	4.7	2.6	3.8	3.9	4.1	0.2	0.5	1.0	1.5	1.2	1.2	1.0	0.4	0.3	0.6	0.3	0.7	0.3	2.3	12.3
20-Nov	0.6	0.3	0.2	Z	0.2	0.2	0.2	0.2	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.3	0.2	0.2	0.2	0.6
21-Nov	0.1	0.1	0.1	0.1	Z	1.5	1.1	0.4	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	1.5
22-Nov	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	0.4	0.3	0.1	0.1	0.1	0.1	0.4
23-Nov	Z	0.9	0.1	2.4	0.5	0.1	0.1	0.1	0.1	0.1	0.1	0.2	DF	DF	0.2	0.2	0.2	0.2	0.2	0.4	0.3	1.1	0.3	0.4	2.4	
24-Nov	0.1	0.1	Z	0.1	0.1	0.1	0.3	0.6	0.5	0.2	0.1	C	C	C	C	C	0.1	0.2	0.1	0.1	0.2	0.1	0.1	0.1	0.2	0.6
25-Nov	0.1	0.1	0.2	Z	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.3	0.1	0.3
26-Nov	7.6	1.1	3.5	3.0	Z	0.4	0.1	0.7	1.5	1.4	1.8	0.1	0.1	1.4	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.5	1.6	2.3	1.2	7.6
27-Nov	1.1	1.0	1.0	1.0	6.2	Z	3.9	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.4	0.2	0.5	0.5	0.3	1.0	0.8	6.2
28-Nov	Z	0.5	0.4	0.4	0.6	0.3	0.2	0.3	0.5	0.3	0.3	0.1	0.1	0.1	0.2	0.4	0.2	0.1	0.1	0.1	0.5	0.3	0.1	0.2	0.3	0.6
29-Nov	0.2	Z	0.2	0.3	0.2	0.3	0.2	0.2	0.1	0.3	0.2	0.2	0.2	0.3	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.3
30-Nov	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	0.2	0.2	0.2	0.3	0.3	0.5	0.5	0.3	0.2	0.3	0.2	0.5

0.6	0.4	0.5	0.6	1.1	0.8	0.7	0.4	0.5	0.5	0.4	0.2	0.2	0.3	0.4	0.4	0.5	0.3	0.2	0.3	0.3	0.3	0.6	0.4	Diurnal Average	
7.6	1.5	3.5	3.3	12.3	9.6	4.7	2.6	3.8	3.9	4.1	1.2	1.4	1.4	3.2	3.5	8.3	2.8	1.0	1.6	1.7	2.1	6.9	3.2	Diurnal Maximum	

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





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

**Hydrogen Sulphide (H<sub>2</sub>S) - ppb**  
**Mildred Lake - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2	661	96.64	96.64
3 - 4	16	2.34	98.98
5 - 7	3	0.44	99.42
8 - 11	3	0.44	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**

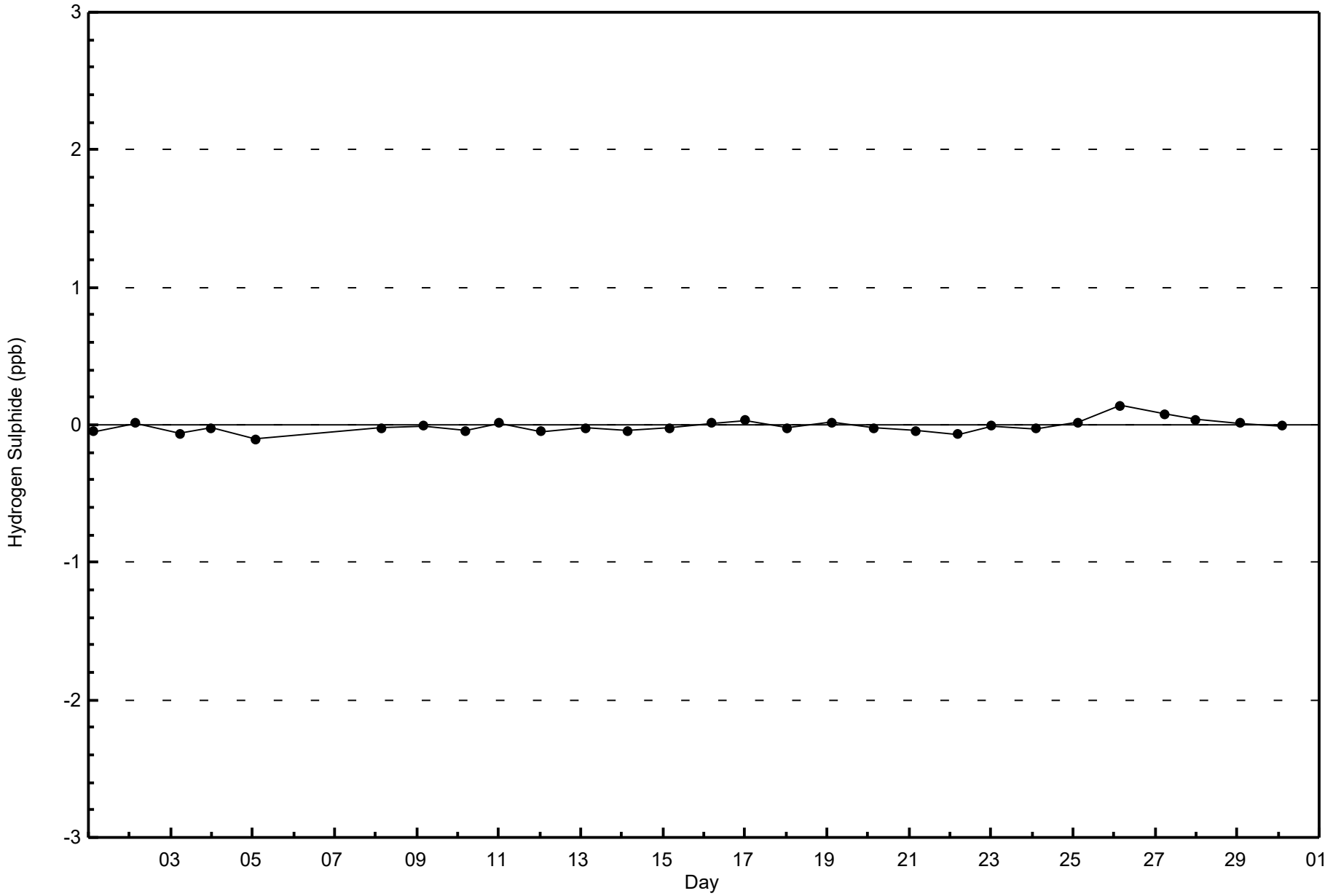
**Hydrogen Sulphide (H<sub>2</sub>S) - ppb  
Mildred Lake - November 2023**

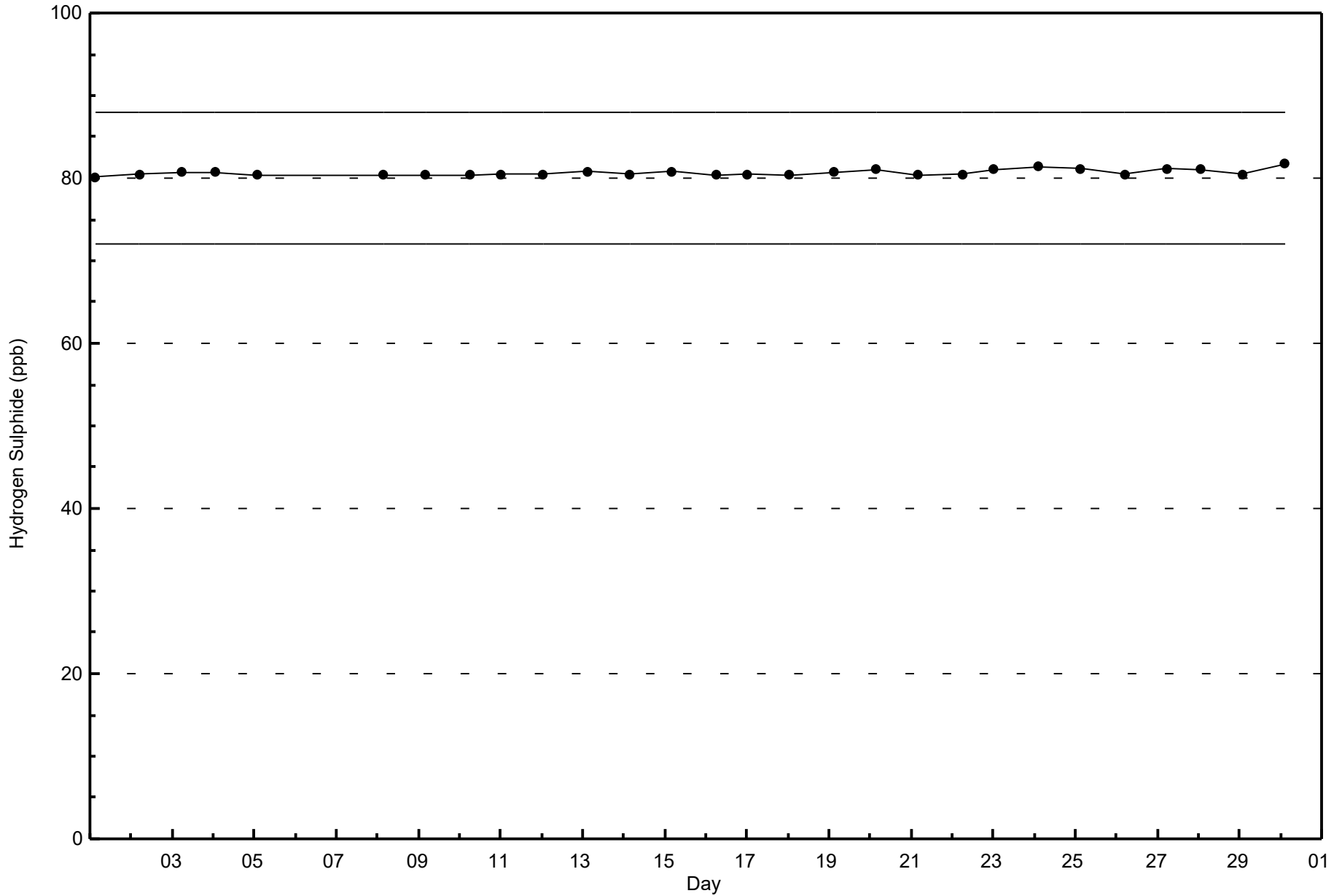
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	63	34	15	33	27	22	35	128	49	35	39	28	31	63	30	27	659
3 - 4	0	0	0	0	1	1	8	3	1	2	0	0	0	0	0	0	16
5 - 7	0	0	0	0	1	1	0	1	0	0	0	0	0	0	0	0	3
8 - 11	0	0	0	0	0	1	1	0	0	0	0	1	0	0	0	0	3
> 11	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
<b>Totals</b>	63	34	15	33	29	25	45	132	50	37	39	29	31	63	30	27	682

Total Number of Valid Hours: 682

Total Number of Hours: 720

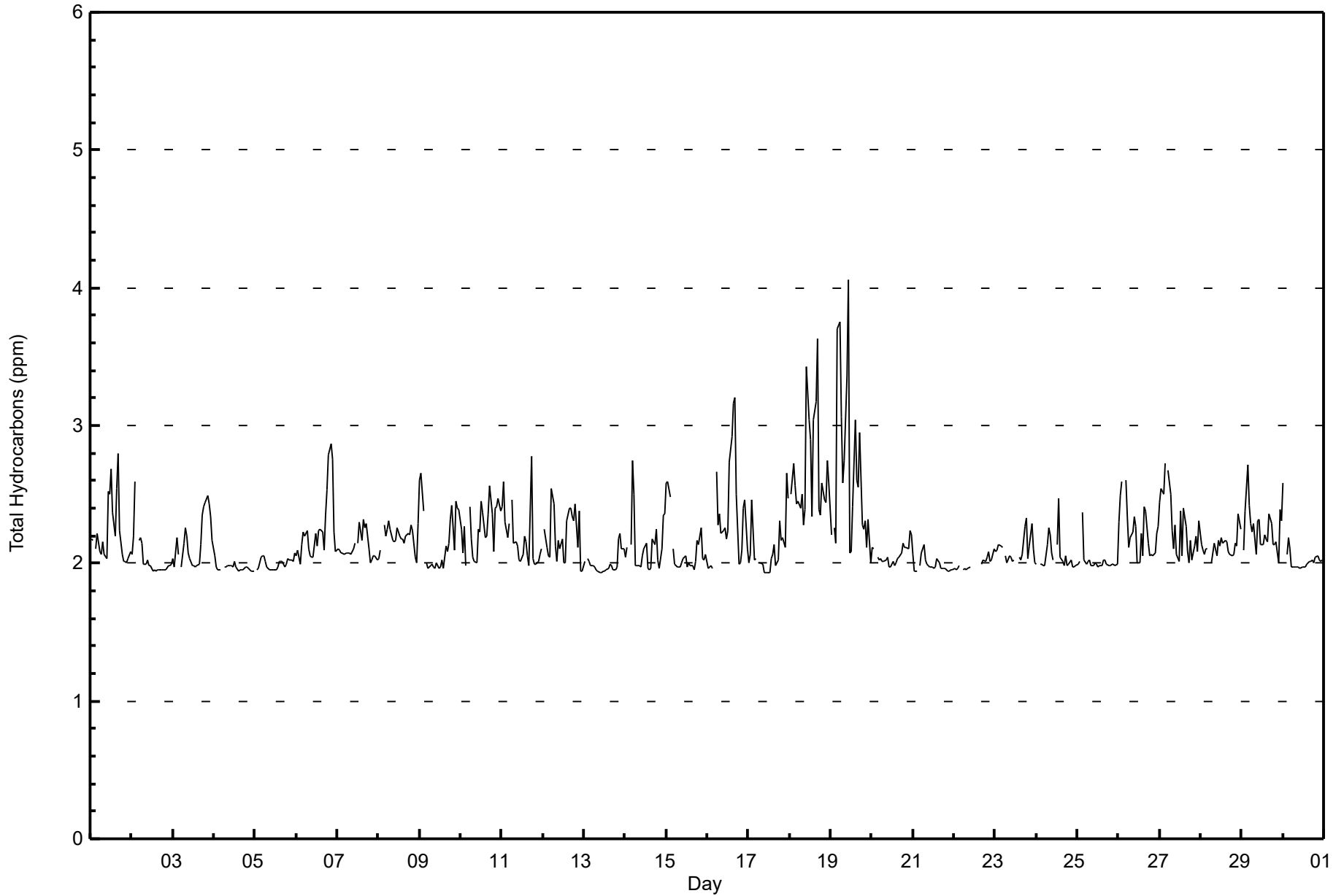














**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Total Hydrocarbons (THC) - ppm**  
**Mildred Lake - November 2023**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2.0	293	42.96	42.96
2.1 - 3.0	379	55.57	98.53
3.1 - 10.0	10	1.47	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  
Mildred Lake - November 2023**

<b>Concentration Ranges (ppm)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	46	26	11	29	21	10	5	27	20	15	26	9	9	15	10	13	292
2.1 - 3.0	17	6	5	4	6	14	42	99	25	22	16	19	25	45	21	12	378
3.1 - 10.0	0	0	0	0	1	0	2	4	1	1	0	1	0	0	0	0	10
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	63	32	16	33	28	24	49	130	46	38	42	29	34	60	31	25	680

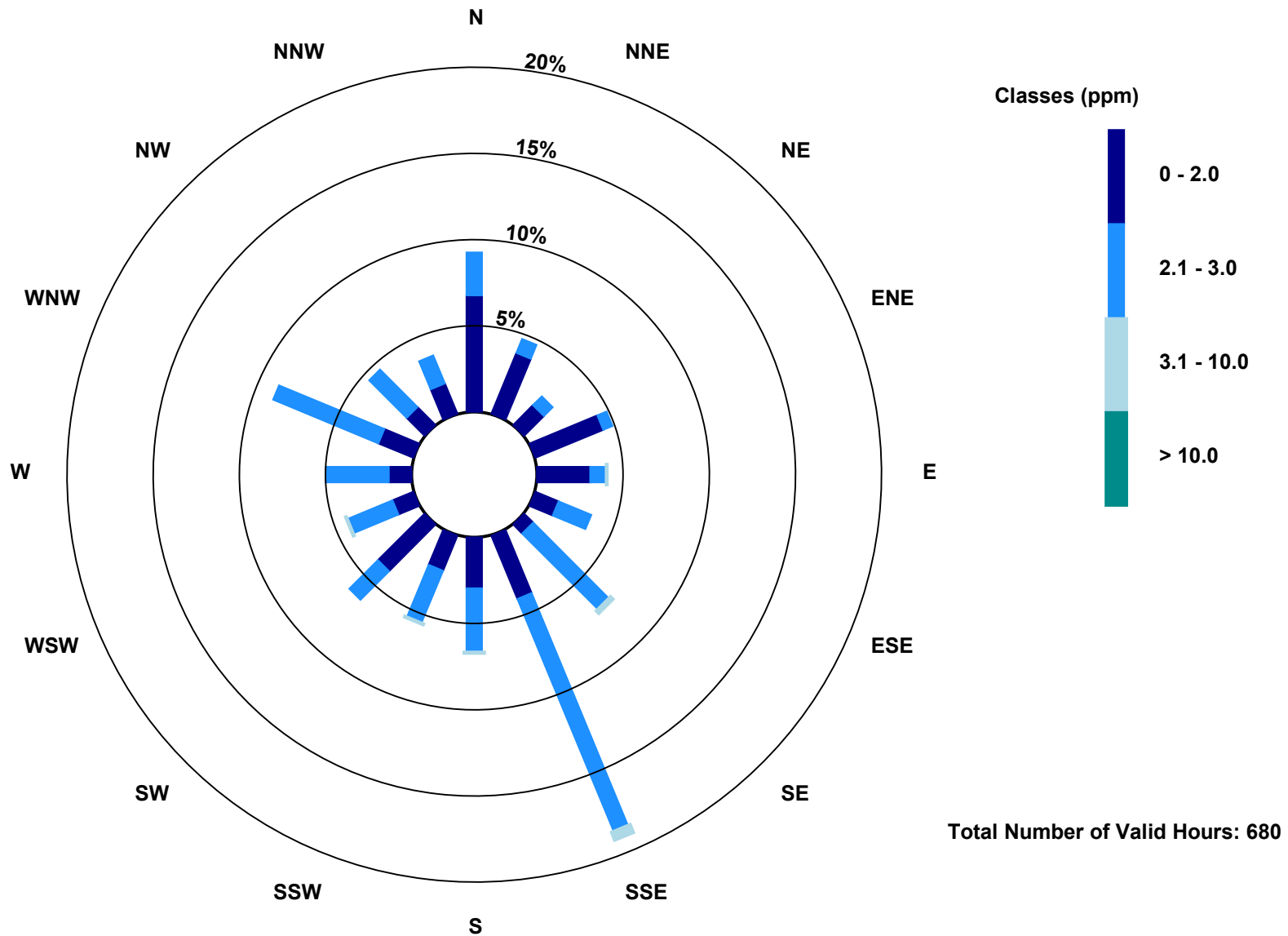
Total Number of Valid Hours: 680

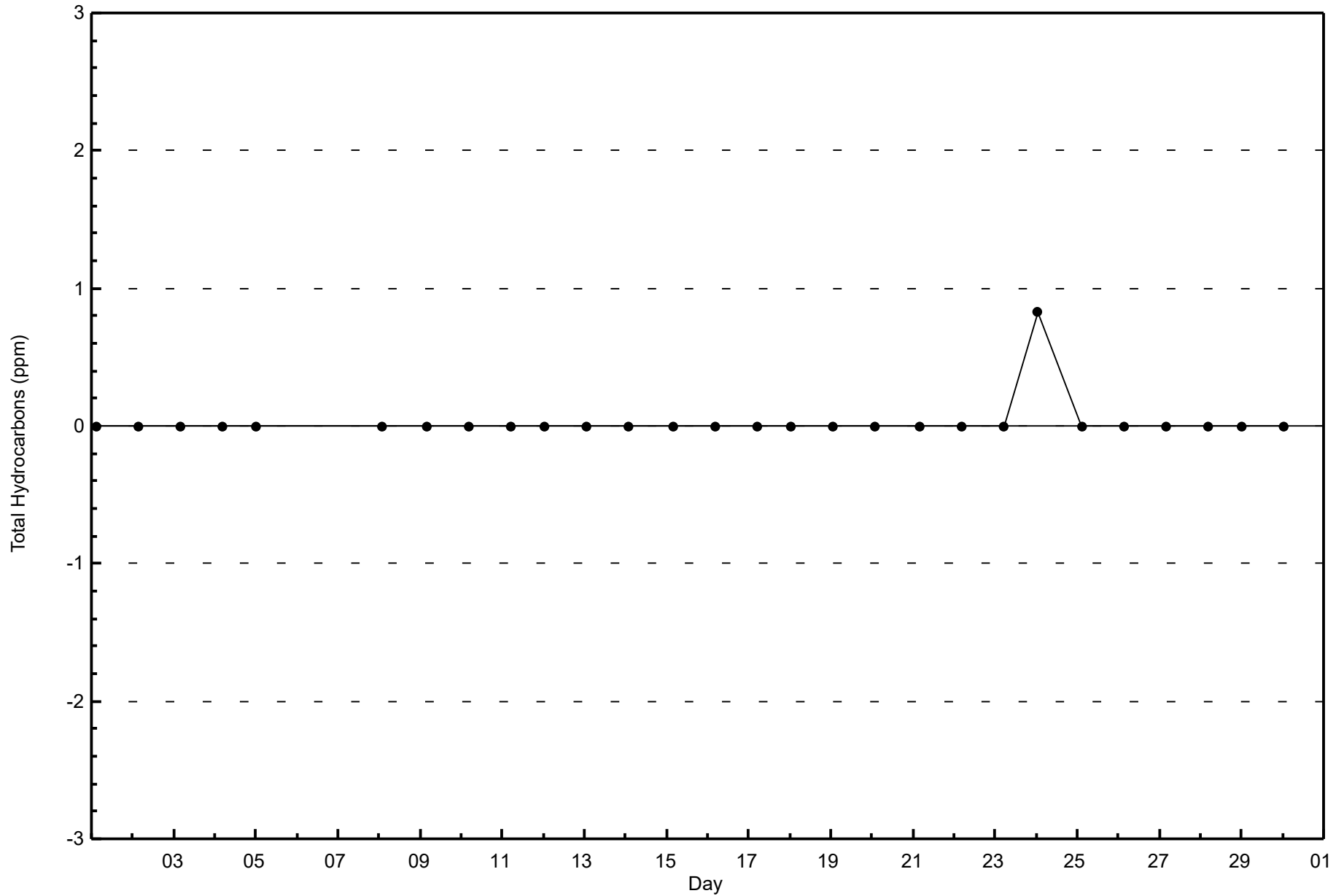
Total Number of Hours: 720

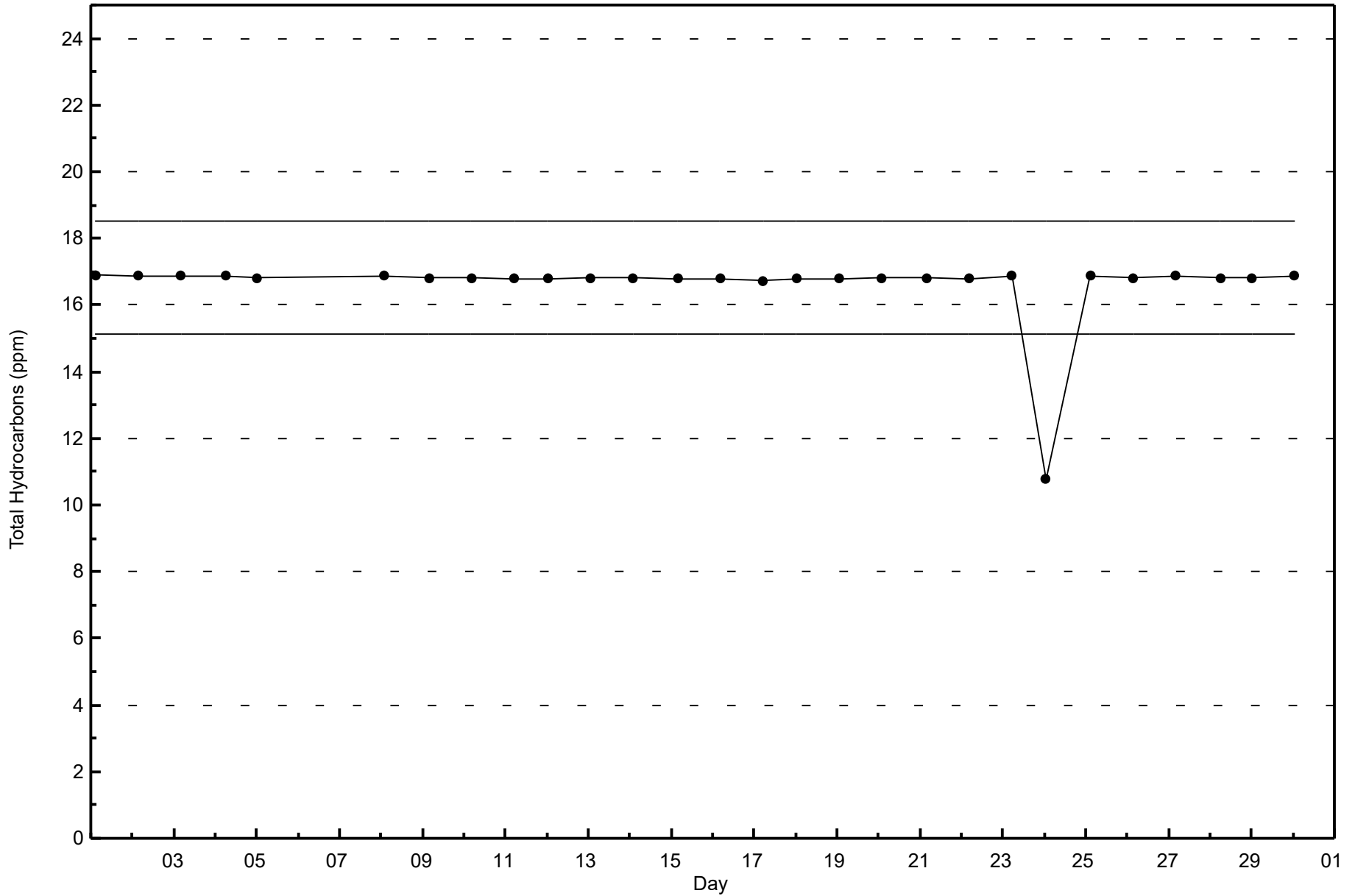


Wood Buffalo Environmental Association  
Wind Rose Nov 2023

Total Hydrocarbons (THC) - ppm  
Mildred Lake









Summary of Hour Averages

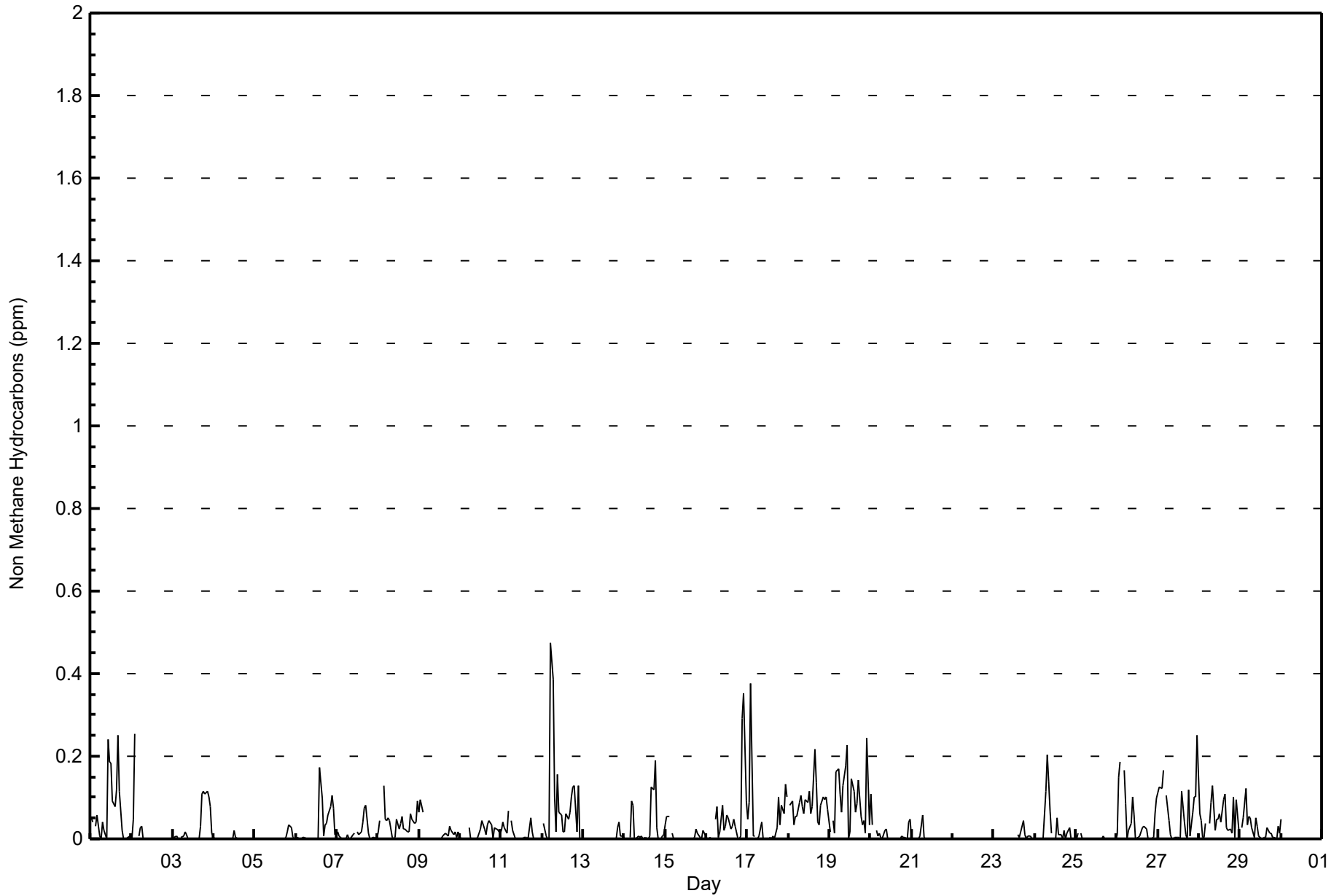
Mildred Lake - November 2023

Maximum Value: 0.474 ppm on Nov 12 06:00		Maximum Daily Average: 0.092 ppm on Nov 19		Hours in Service:	720																																											
Minimum Value: 0.000 ppm on Nov 1 07:00		Minimum Daily Average: 0.001 ppm on Nov 4		Hours of Data:	682																																											
Maximum Diurnal Average: 0.052 ppm at hour 3		Minimum Diurnal Average: 0.018 ppm at hour 12		Hours of Missing Data:	38																																											
Monthly Average: 0.030 ppm		Percentiles: P <sub>1</sub> = 0.0 P <sub>10</sub> = 0.0 Q <sub>1</sub> = 0.0 Median = 0.0 Q <sub>3</sub> = 0.0 P <sub>90</sub> = 0.1 P <sub>99</sub> = 0.3		Hours of Calibration:	34																																											
				Percent Operational Time:	99.4																																											
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Nov	0.051	0.041	Z	0.029	0.056	0.006	0.000	0.039	0.019	0.000	0.241	0.186	0.182	0.092	0.078	0.118	0.251	0.117	0.022	0.000	0.000	0.000	0.002	0.007	0.067	0.251																						
2-Nov	0.000	0.047	0.253	Z	0.008	0.029	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	0.016	0.253																						
3-Nov	0.000	0.005	0.007	0.000	Z	0.002	0.007	0.018	0.012	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.030	0.108	0.114	0.107	0.115	0.103	0.079	0.015	0.031	0.115																						
4-Nov	0.001	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.021	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.021																						
5-Nov	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.018	0.036	0.027	0.003	0.000	0.004	0.036																						
6-Nov	0.000	0.002	0.000	0.001	0.002	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.172	0.097	0.006	0.036	0.038	0.058	0.076	0.106	0.076	0.009	0.029	0.172																						
7-Nov	0.017	0.008	0.004	0.001	0.001	0.000	0.009	0.002	0.001	0.010	0.012	M	0.017	0.012	0.017	0.040	0.075	0.081	0.013	0.000	0.000	0.002	0.004	0.000	0.014	0.081																						
8-Nov	0.018	0.044	Z	0.129	0.048	0.043	0.052	0.044	0.004	0.001	0.004	0.049	0.025	0.036	0.056	0.025	0.025	0.018	0.018	0.062	0.048	0.036	0.042	0.091	0.040	0.129																						
9-Nov	0.066	0.096	0.066	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.008	0.014	0.009	0.008	0.031	0.021	0.011	0.016	0.004	0.016	0.016	0.096																						
10-Nov	0.001	0.001	0.000	0.000	Z	0.027	0.001	0.001	0.000	0.000	0.003	0.013	0.023	0.043	0.022	0.009	0.035	0.043	0.033	0.000	0.027	0.024	0.022	0.015	0.015	0.043																						
11-Nov	0.020	0.041	0.028	0.015	0.067	Z	0.046	0.022	0.001	0.000	0.000	0.000	0.000	0.003	0.003	0.003	0.000	0.052	0.018	0.000	0.000	0.000	0.000	0.000	0.014	0.067																						
12-Nov	Z	0.037	0.006	0.000	0.000	0.474	0.386	0.101	0.018	0.158	0.064	0.059	0.016	0.016	0.062	0.049	0.064	0.101	0.124	0.128	0.016	0.130	0.000	0.000	0.087	0.474																						
13-Nov	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.026	0.040	0.005	0.005	0.003	0.040																						
14-Nov	0.000	0.000	Z	0.002	0.091	0.080	0.000	0.000	0.008	0.005	0.008	0.000	0.003	0.000	0.001	0.007	0.126	0.120	0.190	0.026	0.000	0.000	0.007	0.010	0.030	0.190																						
15-Nov	0.034	0.056	0.053	Z	0.013	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.025	0.012	0.002	0.000	0.019	0.013	0.010	0.056																						
16-Nov	0.000	0.000	0.003	0.000	Z	0.047	0.077	0.003	0.018	0.080	0.020	0.032	0.057	0.050	0.022	0.031	0.046	0.029	0.000	0.000	0.006	0.290	0.353	0.090	0.055	0.353																						
17-Nov	0.048	0.089	0.375	0.008	0.005	Z	0.000	0.006	0.041	0.000	0.000	0.000	0.000	0.002	0.001	0.005	0.000	0.027	0.101	0.032	0.081	0.061	0.131	0.101	0.048	0.375																						
18-Nov	Z	0.082	0.090	0.036	0.055	0.053	0.089	0.107	0.076	0.061	0.096	0.087	0.116	0.060	0.078	0.218	0.134	0.041	0.033	0.083	0.100	0.096	0.100	0.070	0.085	0.218																						
19-Nov	0.018	Z	0.044	0.013	0.163	0.169	0.109	0.063	0.129	0.175	0.227	0.000	0.017	0.146	0.115	0.064	0.083	0.142	0.055	0.035	0.046	0.015	0.246	0.034	0.092	0.246																						
20-Nov	0.108	0.034	Z	0.019	0.008	0.014	0.005	0.000	0.020	0.023	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.007	0.004	0.002	0.001	0.042	0.048	0.015	0.108																						
21-Nov	0.000	0.000	0.000	Z	0.000	0.007	0.059	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	0.003	0.059																						
22-Nov	0.000	0.000	0.000	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	0.001	0.000	0.000	0.000	--	0.001																						
23-Nov	0.000	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	DF	DF	0.011	0.002	0.016	0.045	0.010	0.000	0.006	0.008	0.000	0.000	0.005	0.045																						
24-Nov	0.000	Z	0.000	0.000	0.000	0.000	0.115	0.205	0.141	0.067	0.015	M	0.000	0.049	0.011	0.009	0.001	0.019	0.000	0.013	0.029	0.000	0.000	0.001	0.031	0.205																						
25-Nov	0.001	0.014	Z	0.014	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.008	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.014																						
26-Nov	0.012	0.150	0.187	Z	0.164	0.086	0.000	0.019	0.038	0.102	0.057	0.000	0.003	0.008	0.017	0.027	0.030	0.023	0.000	0.000	0.000	0.002	0.061	0.097	0.047	0.187																						
27-Nov	0.113	0.125	0.122	0.168	Z	0.107	0.044	0.011	0.001	0.000	0.003	0.003	0.004	0.000	0.116	0.042	0.009	0.000	0.118	0.005	0.066	0.100	0.102	0.250	0.066	0.250																						
28-Nov	0.061	0.046	0.002	0.005	0.038	Z	0.037	0.087	0.129	0.021	0.046	0.046	0.062	0.039	0.095	0.109	0.026	0.019	0.025	0.013	0.103	0.005	0.094	0.016	0.049	0.129																						
29-Nov	Z	0.028	0.053	0.121	0.035	0.054	0.050	0.029	0.003	0.052	0.029	0.006	0.001	0.001	0.005	0.002	0.028	0.014	0.013	0.002	0.003	0.000	0.030	0.014	0.025	0.121																						
30-Nov	0.047	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	0.002	0.047																						
																								0.024	0.036	0.052	0.022	0.030	0.048	0.037	0.025	0.022	0.025	0.028	0.018	0.019	0.020	0.031	0.030	0.033	0.035	0.033	0.021	0.027	0.035	0.047	0.030	Diurnal Average
																								0.113	0.150	0.375	0.168	0.164	0.474	0.386	0.205	0.141	0.175	0.241	0.186	0.182	0.146	0.172	0.218	0.251	0.142	0.190	0.128	0.115	0.290	0.353	0.250	Diurnal Maximum
Z - zerspan																								C - Calibration				M - Maintenance				DF - DAS Failure																



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

**Non Methane Hydrocarbons (NMHC) - ppm**  
**Mildred Lake - November 2023**







**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Non Methane Hydrocarbons (NMHC) - ppm  
Mildred Lake - November 2023**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 0.005	356	52.20	52.20
0.006 - 0.05	197	28.89	81.09
0.06 - 0.1	105	15.40	96.48
> 0.1	24	3.52	100.00

Total Number of Valid Hours: 682

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Non Methane Hydrocarbons (NMHC) - ppm  
Mildred Lake - November 2023**

<b>Concentration Ranges (ppm)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 0.005	47	29	13	29	22	8	15	57	24	24	24	3	9	22	11	18	355
0.006 - 0.05	10	1	1	1	2	8	26	43	14	7	12	9	17	29	14	3	197
0.06 - 0.1	6	2	1	2	4	8	6	23	8	6	4	10	5	9	6	4	104
> 0.1	0	0	1	1	0	0	2	7	0	1	2	7	3	0	0	0	24
<b>Totals</b>	63	32	16	33	28	24	49	130	46	38	42	29	34	60	31	25	680

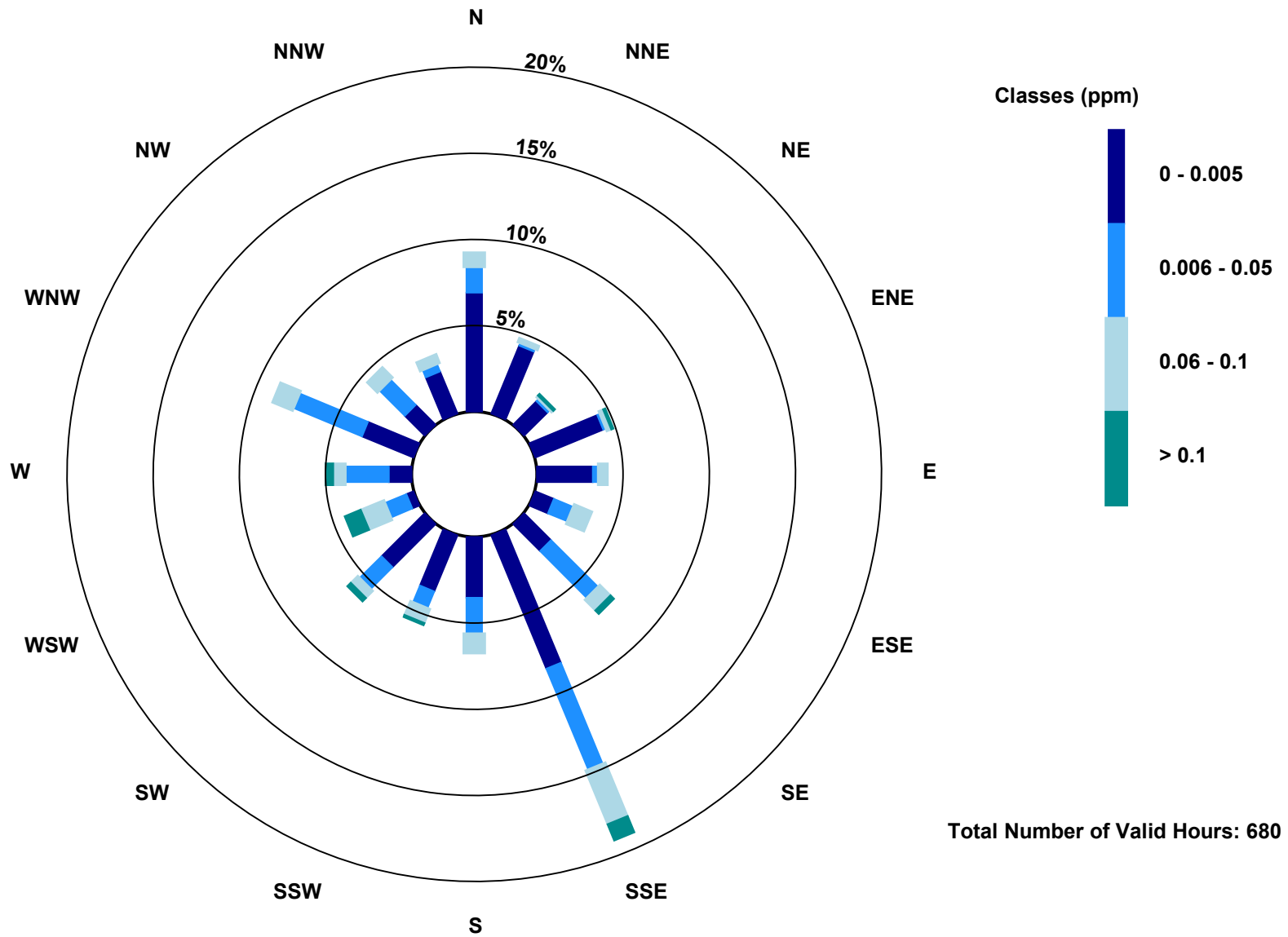
Total Number of Valid Hours: 680

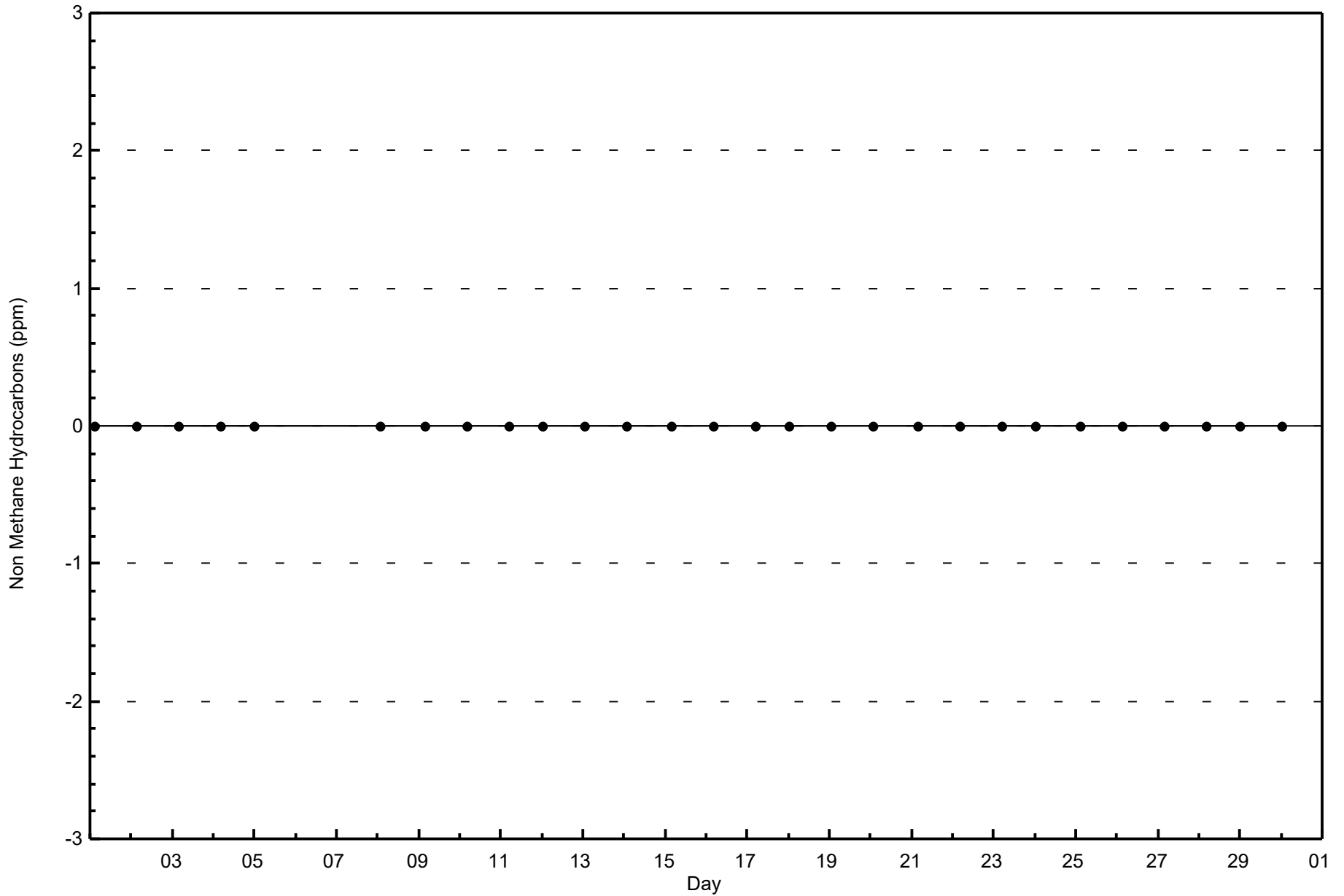
Total Number of Hours: 720

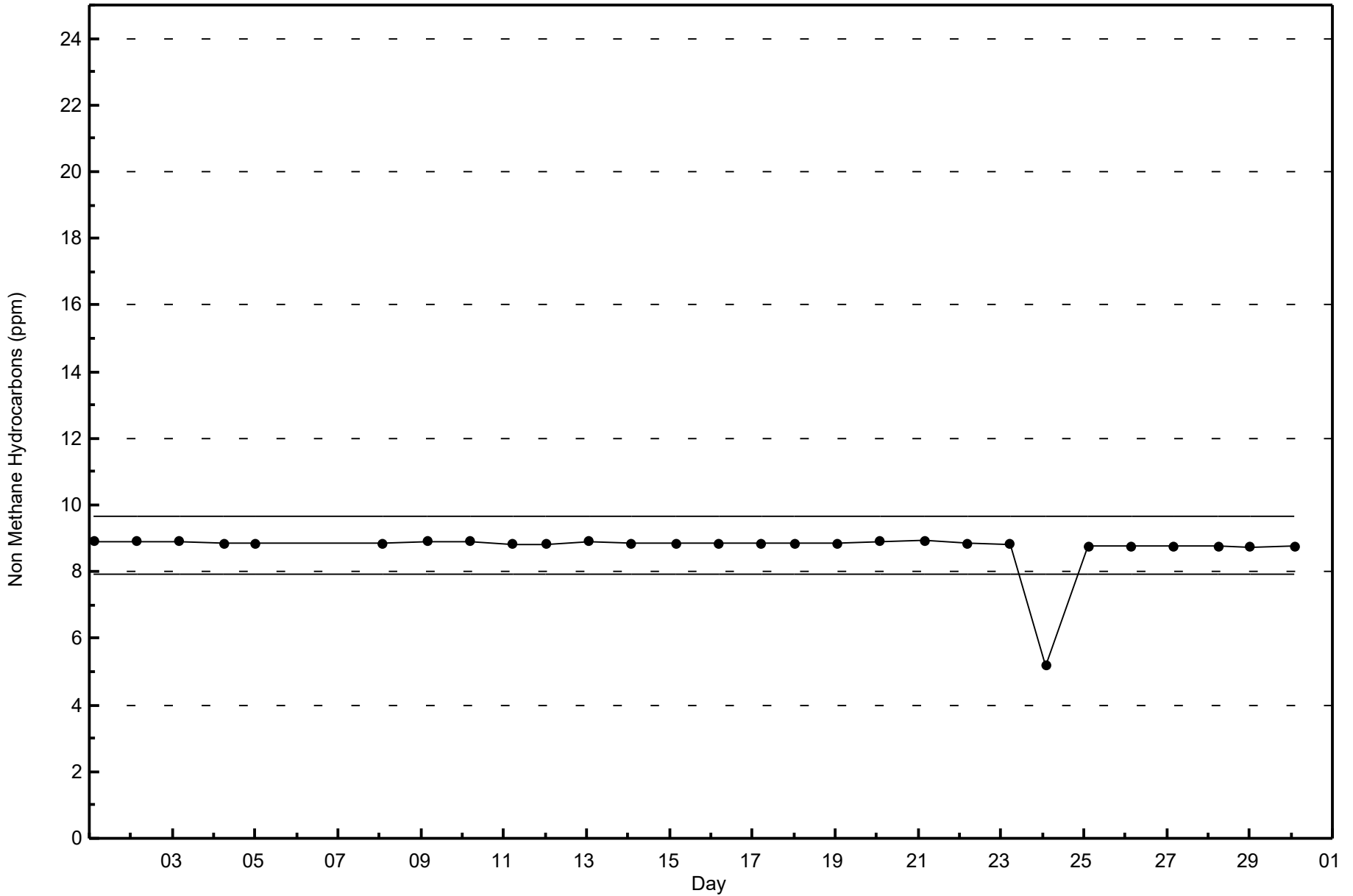


Wood Buffalo Environmental Association  
Wind Rose Nov 2023

Non Methane Hydrocarbons (NMHC) - ppm  
Mildred Lake





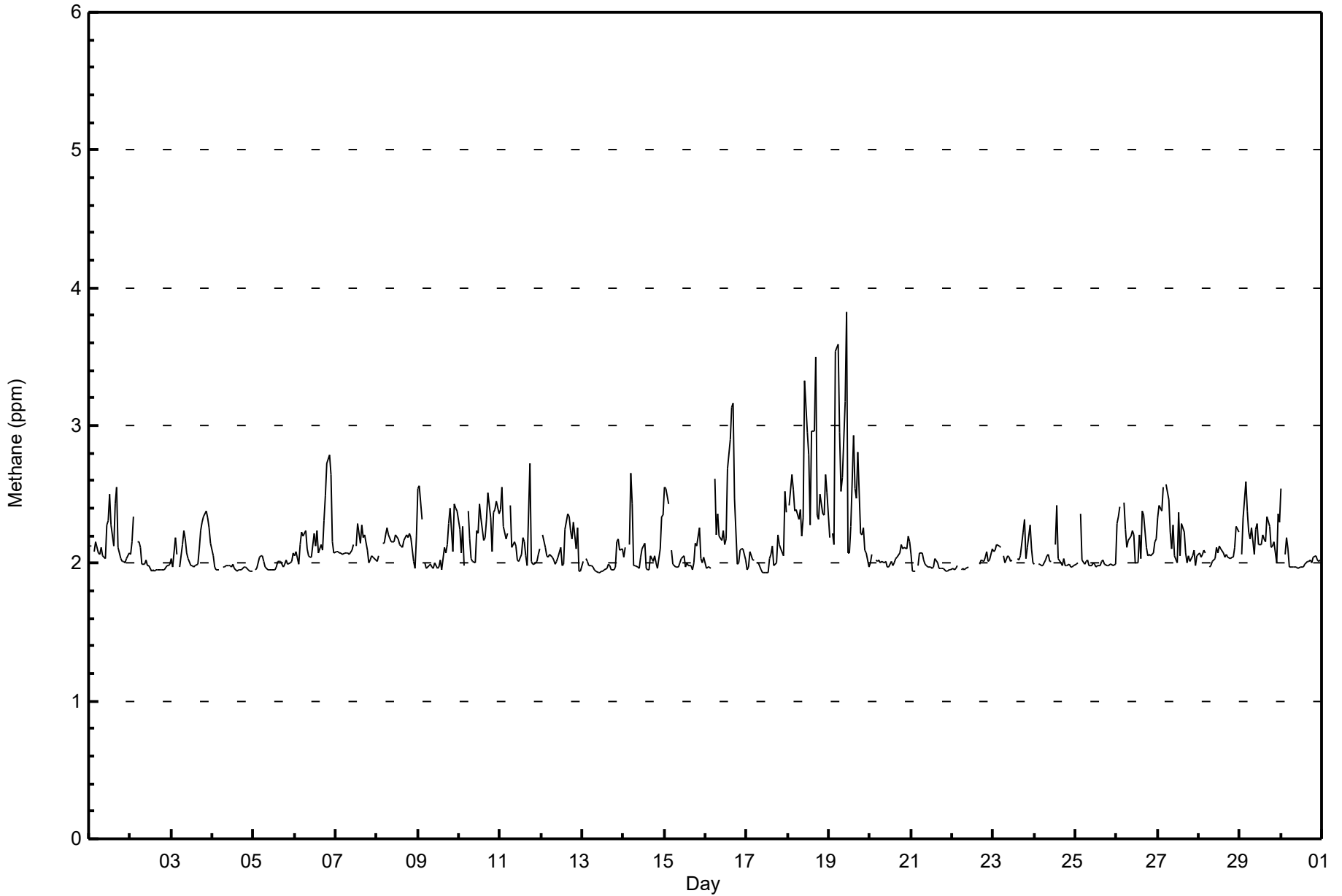






**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Methane (CH<sub>4</sub>) - ppm**  
**Mildred Lake - November 2023**





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

**Methane (CH<sub>4</sub>) - ppm**  
**Mildred Lake - November 2023**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2.0	319	46.77	46.77
2.1 - 3.0	355	52.05	98.83
3.1 - 10.0	8	1.17	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 682

Total Number of Hours: 720





**Wood Buffalo Environmental Association  
Frequency Distribution**

**Methane (CH<sub>4</sub>) - ppm  
Mildred Lake - November 2023**

<b>Concentration Ranges (ppm)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	46	26	11	29	21	10	5	28	21	15	33	18	16	16	10	13	318
2.1 - 3.0	17	6	5	4	7	14	42	99	24	22	9	10	18	44	21	12	354
3.1 - 10.0	0	0	0	0	0	0	2	3	1	1	0	1	0	0	0	0	8
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	63	32	16	33	28	24	49	130	46	38	42	29	34	60	31	25	680

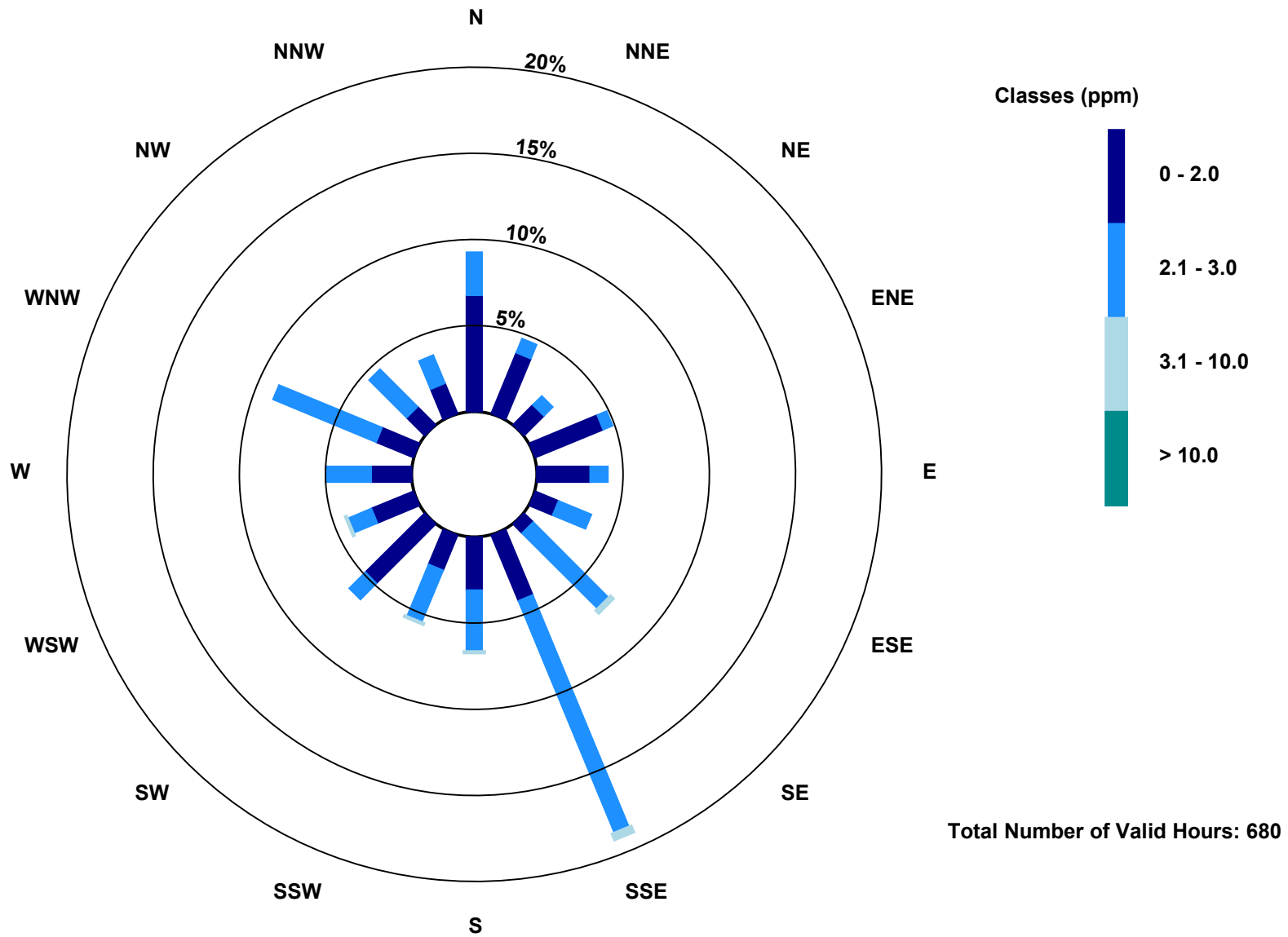
Total Number of Valid Hours: 680

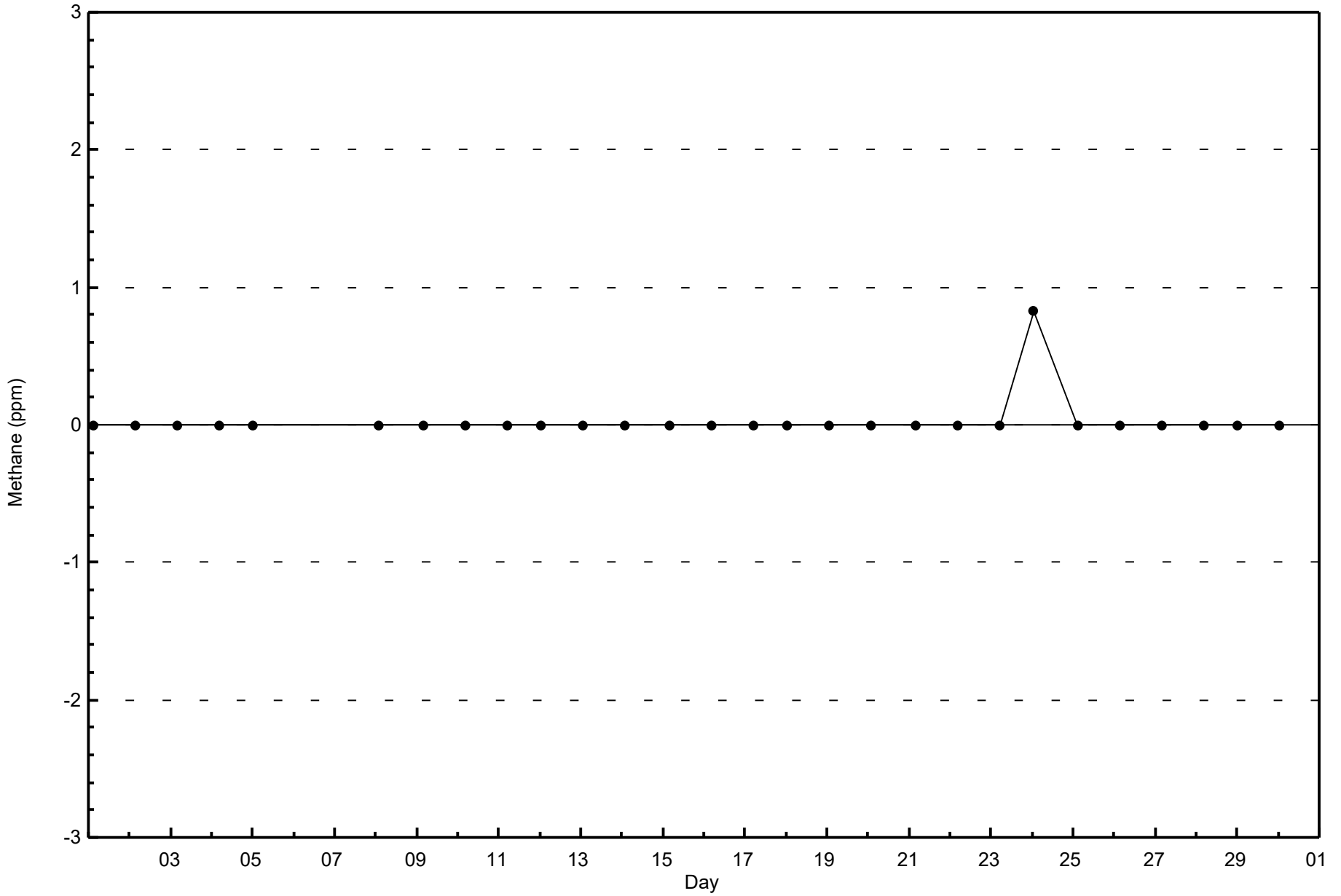
Total Number of Hours: 720

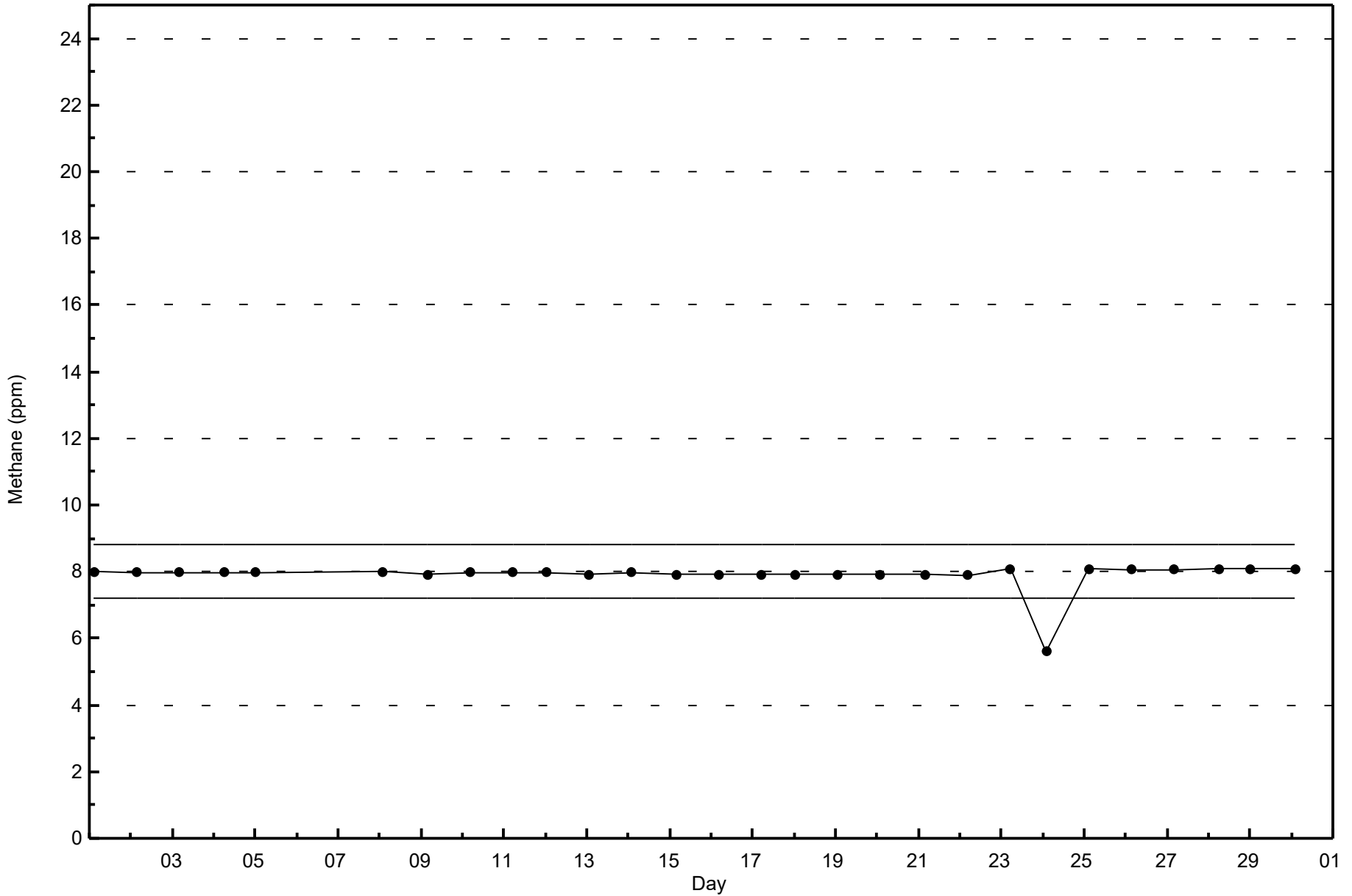


Wood Buffalo Environmental Association  
Wind Rose Nov 2023

Methane (CH<sub>4</sub>) - ppm  
Mildred Lake









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

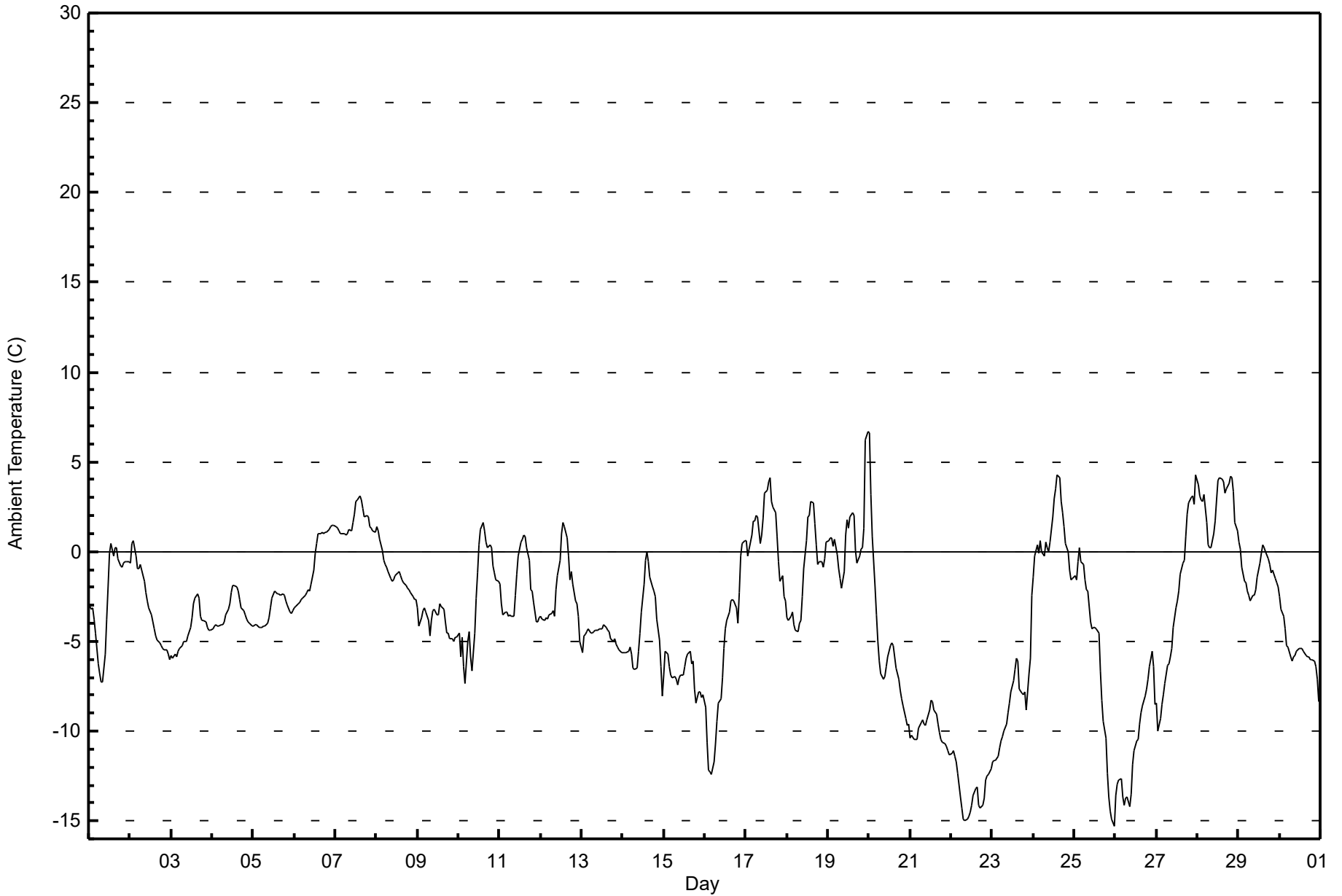
**Ambient Temperature (AT) - C**  
**Mildred Lake - November 2023**

Maximum Value: 6.7 C on Nov 20 00:00																				Maximum Daily Average: 2.7 C on Nov 28					Hours in Service: 720	
Minimum Value: -15.3 C on Nov 26 00:00																				Minimum Daily Average: -13.3 C on Nov 22					Hours of Data: 720	
Maximum Diurnal Average: -1.9 C at hour 15																				Minimum Diurnal Average: -4.8 C at hour 9					Hours of Missing Data: 0	
Monthly Average: -3.60 C																				Percentiles: P <sub>1</sub> = -14.4 P <sub>10</sub> = -9.7 Q <sub>1</sub> = -5.9 Median = -3.4 Q <sub>3</sub> = -0.4 P <sub>90</sub> = 1.4 P <sub>99</sub> = 4.1					Hours of Calibration: 0	
																									Percent Operational Time: 100.0	
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	-3.0	-3.2	-3.1	-3.7	-4.5	-6.3	-6.8	-7.2	-7.3	-5.7	-3.8	-2.0	-0.1	0.4	-0.2	0.2	0.2	-0.4	-0.8	-0.9	-0.7	-0.6	-0.6	-0.6	-2.5	0.4
2-Nov	-0.6	0.5	0.6	-0.3	-0.9	-1.0	-0.7	-1.0	-1.7	-2.3	-2.7	-3.1	-3.5	-3.9	-4.3	-4.7	-4.9	-5.1	-5.2	-5.4	-5.5	-5.5	-5.7	-6.0	-3.0	0.6
3-Nov	-5.8	-5.9	-5.7	-5.9	-5.5	-5.4	-5.2	-5.0	-5.0	-5.0	-4.7	-4.3	-3.7	-2.9	-2.6	-2.4	-2.6	-3.6	-3.8	-3.9	-3.9	-4.2	-4.4	-4.4	-4.4	-2.4
4-Nov	-4.3	-4.2	-4.1	-4.2	-4.2	-4.1	-4.1	-3.9	-3.6	-3.2	-2.9	-2.3	-1.9	-1.9	-1.9	-2.2	-2.7	-3.1	-3.3	-3.5	-3.8	-3.9	-4.0	-4.1	-3.4	-1.9
5-Nov	-4.2	-4.1	-4.0	-4.2	-4.2	-4.2	-4.1	-4.2	-4.0	-3.6	-3.2	-2.6	-2.2	-2.3	-2.4	-2.4	-2.5	-2.4	-2.4	-2.7	-3.0	-3.3	-3.4	-3.3	-3.3	-2.2
6-Nov	-3.2	-3.0	-2.9	-2.8	-2.6	-2.6	-2.4	-2.3	-2.1	-2.2	-1.8	-1.0	-0.1	0.5	1.0	1.0	1.1	1.0	1.1	1.1	1.2	1.4	1.4	1.4	-0.7	1.4
7-Nov	1.4	1.3	1.2	1.0	1.0	1.0	0.9	1.0	1.2	1.2	1.6	2.1	2.8	2.9	3.1	2.9	2.4	1.9	2.0	1.9	1.4	1.3	1.1	1.1	1.6	3.1
8-Nov	1.4	1.2	0.7	0.0	-0.5	-0.7	-0.9	-1.1	-1.5	-1.6	-1.6	-1.3	-1.2	-1.1	-1.3	-1.6	-1.8	-1.9	-2.0	-2.2	-2.3	-2.5	-2.7	-2.7	-1.2	1.4
9-Nov	-3.1	-4.1	-3.7	-3.3	-3.2	-3.4	-3.9	-4.7	-3.9	-3.3	-3.2	-3.5	-3.5	-2.9	-3.0	-3.2	-3.9	-4.5	-4.6	-4.9	-4.8	-5.0	-4.8	-4.7	-3.9	-2.9
10-Nov	-4.5	-5.9	-4.8	-6.4	-7.4	-5.0	-4.5	-5.9	-6.7	-4.5	-2.6	-1.2	0.4	1.2	1.6	1.2	0.5	0.2	0.3	0.2	-0.8	-1.2	-1.6	-1.6	-2.4	1.6
11-Nov	-1.8	-2.9	-3.5	-3.3	-3.4	-3.6	-3.5	-3.6	-3.6	-2.4	-1.3	-0.2	0.6	0.7	0.9	0.8	0.2	-0.5	-2.1	-2.2	-2.8	-3.9	-3.9	-3.7	-2.0	0.9
12-Nov	-3.6	-3.8	-3.8	-3.7	-3.8	-3.5	-3.4	-3.3	-3.6	-2.1	-1.3	-0.5	1.0	1.6	1.3	0.8	-0.2	-1.6	-1.1	-1.8	-2.7	-2.9	-3.6	-5.0	-2.1	1.6
13-Nov	-5.7	-4.7	-4.6	-4.4	-4.3	-4.5	-4.5	-4.4	-4.4	-4.4	-4.3	-4.3	-4.3	-4.1	-4.2	-4.4	-4.5	-4.9	-5.0	-4.8	-5.1	-5.3	-5.5	-5.6	-4.7	-4.1
14-Nov	-5.6	-5.6	-5.6	-5.5	-5.3	-5.7	-6.5	-6.6	-6.5	-5.6	-4.6	-3.3	-1.8	-0.5	0.0	-0.5	-1.4	-2.0	-2.2	-2.5	-3.8	-4.9	-6.4	-8.0	-4.2	0.0
15-Nov	-6.9	-5.6	-5.7	-6.4	-6.9	-7.1	-7.0	-7.1	-7.4	-7.0	-6.9	-6.9	-6.4	-6.0	-5.7	-5.5	-6.3	-6.1	-7.7	-8.4	-7.8	-7.8	-8.1	-8.0	-6.9	-5.5
16-Nov	-8.7	-10.6	-12.2	-12.2	-12.4	-11.7	-10.7	-9.5	-8.4	-8.2	-7.1	-5.4	-4.3	-3.8	-3.4	-2.8	-2.7	-2.7	-3.1	-4.0	-2.3	-0.2	0.4	0.6	-6.1	0.6
17-Nov	0.6	-0.2	0.2	0.9	1.7	1.7	2.0	1.9	0.4	0.9	1.9	3.2	3.4	3.9	4.1	2.8	2.5	2.2	0.8	-0.6	-1.7	-1.4	-2.5	-2.7	1.1	4.1
18-Nov	-3.7	-3.8	-3.6	-3.4	-4.0	-4.4	-4.5	-4.0	-3.8	-2.5	-0.9	0.6	2.0	2.0	2.8	2.7	1.5	0.4	-0.7	-0.5	-0.5	-0.8	-0.4	0.5	-1.2	2.8
19-Nov	0.6	0.8	0.7	0.3	0.7	-0.2	-0.9	-1.5	-2.0	-1.1	0.9	1.7	1.3	1.9	2.2	2.0	0.1	-0.7	-0.2	0.1	0.2	1.3	6.2	6.7	0.9	6.7
20-Nov	6.6	3.2	0.8	-1.9	-3.5	-5.0	-6.1	-6.8	-7.1	-7.0	-6.4	-5.8	-5.2	-5.1	-5.3	-5.9	-6.5	-7.1	-7.8	-8.2	-8.6	-9.3	-9.7	-9.6	-5.3	6.6
21-Nov	-10.4	-10.3	-10.5	-10.5	-10.5	-9.9	-9.5	-9.4	-9.6	-9.7	-9.3	-8.8	-8.3	-8.4	-8.8	-9.1	-9.6	-10.1	-10.5	-10.6	-10.7	-10.8	-11.1	-11.3	-9.9	-8.3
22-Nov	-11.3	-11.1	-11.4	-11.7	-12.3	-13.7	-14.3	-14.9	-15.0	-14.9	-14.7	-14.5	-14.1	-13.6	-13.2	-13.1	-14.1	-14.3	-14.1	-13.7	-12.7	-12.5	-12.4	-12.1	-13.3	-11.1
23-Nov	-11.7	-11.6	-11.7	-11.4	-10.9	-10.6	-10.3	-10.0	-9.6	-9.0	-8.5	-7.8	-7.2	-6.6	-5.9	-6.1	-7.7	-7.9	-8.0	-7.8	-8.8	-6.8	-6.0	-2.4	-8.5	-2.4
24-Nov	-1.4	-0.2	0.4	-0.1	0.6	0.0	-0.2	0.5	0.2	0.0	0.5	1.9	2.9	3.5	4.3	4.1	2.8	2.1	1.4	0.5	0.0	-1.0	-1.6	-1.5	0.8	4.3
25-Nov	-1.4	-1.6	-0.5	0.2	-0.5	-0.7	-1.6	-2.1	-2.2	-3.9	-4.3	-4.2	-4.3	-4.3	-4.5	-6.6	-8.3	-9.4	-10.4	-12.3	-13.7	-14.5	-14.9	-15.3	-5.9	0.2
26-Nov	-13.6	-12.9	-12.8	-12.6	-13.7	-14.1	-13.7	-13.6	-14.2	-13.5	-11.9	-11.0	-10.6	-10.5	-9.6	-9.0	-8.6	-8.1	-7.6	-7.1	-6.4	-5.6	-6.4	-8.5	-10.7	-5.6
27-Nov	-8.5	-10.0	-9.3	-8.5	-8.0	-7.3	-6.3	-6.3	-5.8	-5.4	-4.2	-3.1	-2.8	-2.2	-1.3	-0.6	-0.4	0.8	2.1	2.7	3.0	3.1	2.7	4.2	-3.0	4.2
28-Nov	3.8	3.1	2.9	2.8	3.2	1.6	0.4	0.2	0.3	1.0	1.7	2.9	4.0	4.1	4.0	3.9	3.3	3.5	3.8	4.2	4.1	3.3	1.6	1.1	2.7	4.2
29-Nov	0.5	0.1	-0.9	-1.7	-1.7	-2.2	-2.4	-2.7	-2.5	-2.4	-2.1	-1.5	-0.7	-0.1	0.4	0.2	0.0	-0.4	-0.7	-1.2	-1.0	-1.5	-1.7	-2.0	-1.2	0.5
30-Nov	-2.5	-3.2	-3.6	-4.3	-5.2	-5.3	-5.9	-6.1	-5.8	-5.8	-5.5	-5.4	-5.4	-5.4	-5.6	-5.8	-5.8	-5.8	-6.0	-6.0	-6.1	-6.4	-7.1	-8.4	-5.5	-2.5
																								Diurnal Average		
																								Diurnal Maximum		



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

**Ambient Temperature (AT) - C**  
**Mildred Lake - November 2023**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C  
Mildred Lake - November 2023**

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	0	0.00	0.00
-20 - 0	559	77.64	77.64
0 - 10	161	22.36	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



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

**Relative Humidity (RH) - %**  
**Mildred Lake - November 2023**

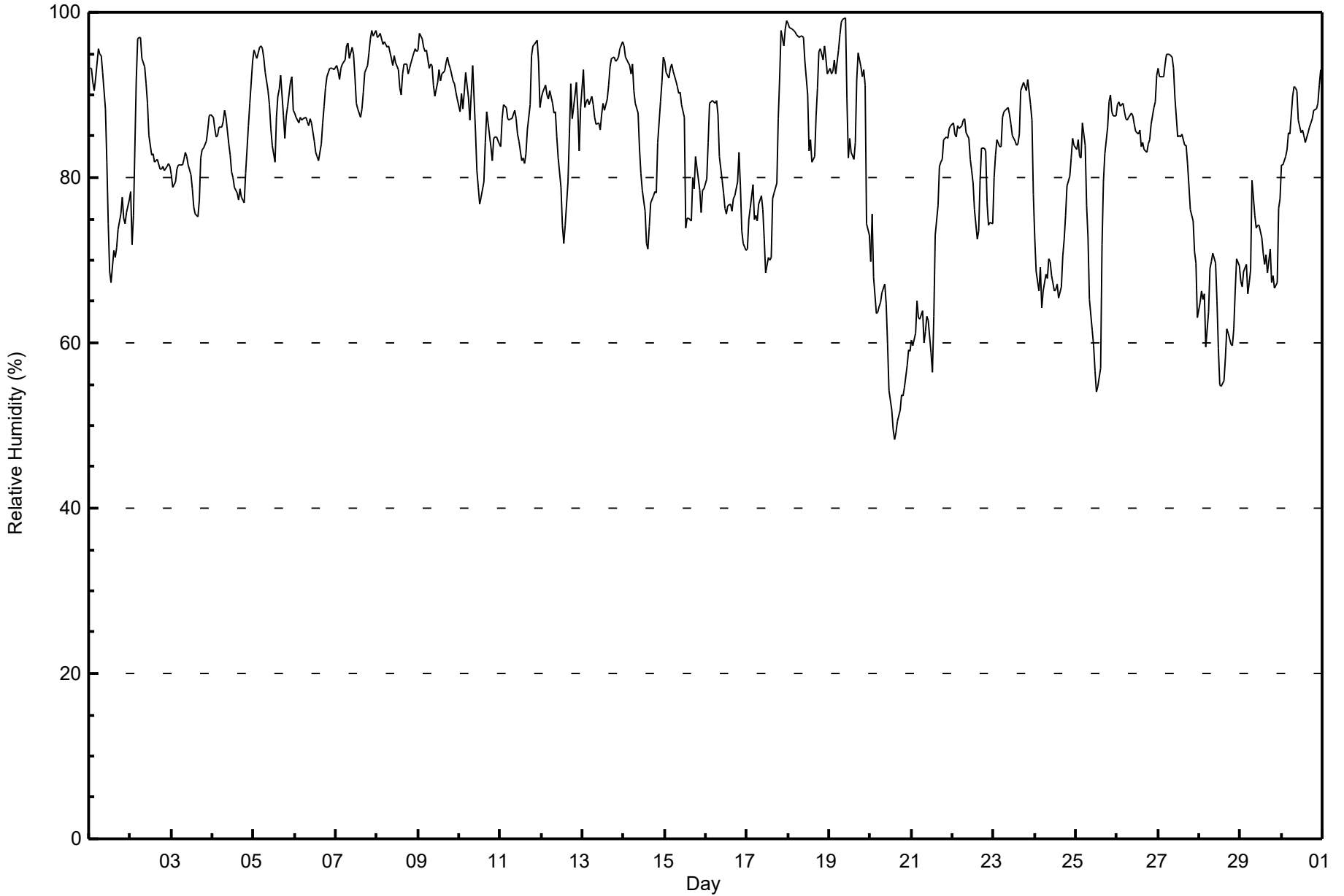
Maximum Value: 99.3 % on Nov 19 10:00		Maximum Daily Average: 94.5 % on Nov 8		Hours in Service: 720																							
Minimum Value: 48.4 % on Nov 20 15:00		Minimum Daily Average: 59.2 % on Nov 20		Hours of Data: 720																							
Maximum Diurnal Average: 86.1 % at hour 8		Minimum Diurnal Average: 76.8 % at hour 14		Hours of Missing Data: 0																							
Monthly Average: 83.06 %		Percentiles: P <sub>1</sub> = 53.7 P <sub>10</sub> = 67.2 Q <sub>1</sub> = 77.0 Median = 85.3 Q <sub>3</sub> = 91.2 P <sub>90</sub> = 94.6 P <sub>99</sub> = 98.0		Hours of Calibration: 0																							
				Percent Operational Time: 100.0																							
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Nov	93.3	93.2	91.5	90.6	92.1	95.6	94.9	94.7	92.7	88.3	81.9	74.3	68.7	67.3	71.2	70.3	71.6	73.7	75.7	77.7	75.1	74.4	75.7	77.3	81.7	95.6	
2-Nov	78.3	71.9	75.4	91.8	96.8	97.0	97.0	94.4	93.5	91.4	89.0	85.2	82.7	82.8	81.8	82.0	82.2	81.1	80.9	81.4	80.8	81.4	81.7	81.4	85.1	97.0	
3-Nov	80.3	78.9	79.6	81.1	81.6	81.5	81.5	82.2	83.1	82.6	81.6	80.3	78.7	76.4	75.6	75.3	77.2	82.3	83.4	83.6	84.3	85.8	87.5	87.6	81.3	87.6	
4-Nov	87.3	85.9	84.9	85.0	86.1	86.1	86.8	88.2	87.3	84.0	82.7	80.6	80.1	78.9	78.1	77.3	78.6	77.6	77.0	80.5	83.3	86.3	89.0	94.1	83.6	94.1	
5-Nov	95.4	94.8	94.4	95.7	96.0	95.6	94.4	92.7	90.5	88.9	86.0	84.0	81.9	87.3	89.8	90.6	92.3	87.4	84.8	87.5	88.6	91.5	92.3	88.2	90.4	96.0	
6-Nov	87.8	87.2	86.6	87.3	87.0	87.2	87.2	86.8	86.3	87.1	86.6	84.5	83.1	82.6	82.0	84.0	86.6	88.7	90.8	92.3	93.1	93.3	93.1	93.1	87.7	93.3	
7-Nov	93.6	92.8	91.9	93.3	93.8	94.3	95.9	96.2	94.4	95.7	95.0	92.2	88.9	88.3	87.4	88.3	90.4	92.7	93.6	95.1	96.8	97.8	97.1	97.8	93.5	97.8	
8-Nov	97.0	97.1	97.4	96.1	96.4	96.2	95.7	96.0	94.4	93.6	94.8	94.0	93.1	90.8	90.1	92.6	93.7	93.8	92.6	93.3	93.9	95.0	95.6	95.2	94.5	97.4	
9-Nov	95.4	97.5	96.8	95.8	95.3	95.4	93.2	93.8	93.5	91.1	89.9	91.4	93.1	91.6	92.6	92.9	93.9	94.5	93.8	93.2	91.7	91.4	90.4	89.5	93.2	97.5	
10-Nov	88.0	90.2	88.3	90.3	92.7	89.7	86.9	90.2	93.5	85.6	80.8	78.9	76.7	77.6	79.5	84.3	88.0	86.6	83.7	82.1	84.8	84.9	84.9	84.1	85.5	93.5	
11-Nov	83.7	87.2	88.7	88.5	87.2	86.9	87.1	87.1	88.1	87.2	85.3	84.3	82.0	82.5	81.7	82.8	85.7	88.8	94.7	96.0	96.2	96.7	94.0	88.5	88.0	96.7	
12-Nov	89.7	90.3	91.2	90.0	89.4	90.5	88.9	87.8	88.0	84.8	82.4	78.8	74.2	72.1	74.2	79.4	85.3	91.3	87.2	88.6	91.5	88.1	83.2	88.5	85.6	91.5	
13-Nov	93.0	88.4	89.1	89.5	88.8	89.9	88.8	87.3	86.4	86.6	85.8	87.6	89.0	88.2	89.5	91.3	93.3	94.4	94.5	94.1	94.3	94.6	95.7	96.4	90.7	96.4	
14-Nov	96.0	94.6	94.2	93.5	92.6	93.8	90.6	89.0	87.7	83.5	80.5	78.4	76.0	72.0	71.4	74.0	77.0	77.8	78.3	78.1	84.3	89.2	91.5	94.6	84.9	96.0	
15-Nov	94.1	92.8	92.1	93.2	93.8	92.9	91.7	91.0	90.2	90.4	88.8	87.3	73.8	75.0	75.1	74.8	80.0	78.6	82.5	81.1	78.4	75.7	78.5	78.6	84.6	94.1	
16-Nov	79.9	84.2	88.9	89.1	89.3	89.0	89.3	87.7	82.6	79.7	78.1	76.3	75.6	76.6	76.9	75.9	77.4	77.9	79.5	83.1	78.9	73.5	72.1	71.2	80.5	89.3	
17-Nov	71.4	74.8	76.2	79.1	74.8	75.4	74.8	76.8	77.8	76.1	72.5	68.4	70.3	70.0	70.3	77.5	78.2	79.4	87.1	92.0	97.8	95.9	98.0	98.9	79.7	98.9	
18-Nov	98.7	98.2	98.0	97.9	97.6	97.2	97.0	97.2	97.1	97.0	94.0	90.0	83.2	84.5	81.8	82.5	87.4	90.8	95.3	95.5	94.2	95.9	94.4	92.6	93.3	98.7	
19-Nov	93.2	92.5	92.8	94.3	92.5	95.5	97.3	98.7	99.2	99.3	89.4	82.3	84.8	83.0	82.3	84.3	91.8	95.1	93.3	92.2	93.0	91.2	74.4	73.1	90.2	99.3	
20-Nov	69.8	75.6	67.9	63.5	63.7	64.5	65.0	66.1	67.2	64.7	59.8	54.3	51.9	49.5	48.4	49.2	50.5	51.9	53.7	53.6	54.5	57.2	59.1	59.0	59.2	75.6	
21-Nov	60.3	59.6	61.2	65.0	63.1	62.8	63.9	60.0	61.4	63.2	62.7	58.8	56.4	63.3	73.0	76.7	81.3	81.8	82.2	84.7	84.9	84.8	86.0	86.2	70.1	86.2	
22-Nov	86.7	85.2	84.9	86.3	86.0	86.3	86.9	87.1	85.4	84.7	82.2	80.9	79.3	76.1	72.5	73.5	79.7	83.5	83.5	83.3	76.9	74.3	74.5	74.5	81.4	87.1	
23-Nov	80.1	82.7	84.5	83.7	83.8	87.3	87.9	88.1	88.5	87.7	86.4	85.1	84.3	83.9	84.1	85.3	90.5	91.6	91.1	90.5	91.8	88.9	87.0	77.9	86.4	91.8	
24-Nov	72.8	68.6	66.4	69.1	64.3	66.3	68.3	67.8	70.2	69.9	68.2	66.2	66.5	67.2	65.4	66.8	70.5	72.5	75.4	78.9	80.1	82.4	84.7	83.9	71.3	84.7	
25-Nov	83.4	84.6	82.5	82.4	86.7	83.9	76.5	72.7	65.2	61.6	59.7	56.6	54.1	54.7	56.9	71.8	79.5	82.9	86.1	89.1	90.1	87.9	87.5	87.5	76.0	90.1	
26-Nov	88.8	89.1	88.6	88.9	87.9	87.2	87.0	87.2	87.8	87.4	86.5	85.5	85.2	85.7	83.8	84.2	83.4	83.1	84.1	84.5	86.4	88.4	89.1	92.4	86.8	92.4	
27-Nov	93.3	92.2	92.2	92.2	93.7	94.9	95.0	94.7	94.5	93.2	89.7	84.9	85.0	85.0	85.3	83.8	83.8	81.7	79.0	76.2	74.7	71.0	69.6	63.1	85.4	95.0	
28-Nov	64.8	66.3	65.2	66.0	59.6	63.8	69.0	69.8	70.9	69.6	65.0	59.3	54.9	54.7	55.4	58.2	61.7	61.2	59.9	59.7	61.7	66.2	70.2	69.3	63.4	70.9	
29-Nov	67.4	66.8	68.6	69.5	65.9	67.2	68.9	79.7	75.3	73.8	74.2	74.3	72.7	70.8	69.6	70.7	68.5	71.4	67.3	68.1	66.7	67.3	76.2	77.4	70.8	79.7	
30-Nov	81.6	81.6	82.5	83.4	85.5	85.3	89.9	91.0	90.8	90.5	87.0	85.4	85.8	85.0	84.2	85.4	86.1	86.6	87.1	88.2	88.3	89.1	91.2	93.1	86.9	93.1	
		84.8	84.8	84.8	85.7	85.5	86.0	85.9	86.1	85.5	84.0	81.6	79.0	77.1	76.8	77.0	78.9	81.5	82.7	83.3	84.1	84.6	84.7	84.8	84.5	Diurnal Average	
		98.7	98.2	98.0	97.9	97.6	97.2	97.3	98.7	99.2	99.3	95.0	94.0	93.1	91.6	92.6	92.9	93.9	95.1	95.3	96.0	97.8	97.8	98.0	98.9	Diurnal Maximum	





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

**Relative Humidity (RH) - %**  
**Mildred Lake - November 2023**





Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed (WS) - km/h

Mildred Lake - November 2023

Maximum Speed: 28 km/h on Nov 20 04:00	Maximum Daily Speed Average: 18.4 km/h on Nov 20	Hours in Service: 720
Minimum Speed Value: 0 km/h on Dec 1 00:00	Minimum Daily Speed Average: 1.9 km/h on Nov 3	Hours of Data: 718
Maximum Diurnal Speed Average: 3.6 km/h at hour 1	Minimum Diurnal Speed Average: 0.6 km/h at hour 14	Hours of Missing Data: 2
Monthly Average Velocity: 1.5 km/h 237.6 deg	Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 4 Q <sub>1</sub> = 5 Median = 8 Q <sub>3</sub> = 11 P <sub>90</sub> = 15 P <sub>99</sub> = 24	Percent Operational Time: 99.7

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Nov	SSW4	S3	S4	SSW4	SSW4	S4	SSE7	SSE6	S8	SSE10	SSE8	SSE7	SSE9	SE8	ESE7	SE8	SSE6	SSE2	SW3	S5	S8	S3	SE4	SSE5	SSE5.3	SSE10	
2-Nov	SSW3	WSW4	W5	NNW6	N6	N8	N11	N13	N14	N15	N14	N12	N11	NNE11	NNE10	NNE8	NE7	NE4	ENE5	ENE7	E3	SSE4	E7	ESE6	NNE5.9	N15	
3-Nov	S9	SSE9	SE8	E5	S6	SSE4	SSE7	SSE5	ESE4	NE4	NE5	NNE6	NE5	NE5	N7	N6	N7	N6	N5	N5	N7	N5	N4	N4	NE1.9	SSE9	
4-Nov	NE4	ENE7	ENE7	E5	E6	E6	ENE5	ENE4	ENE5	E8	E8	E7	ESE9	E10	E11	E11	E12	E10	E10	E12	E10	ENE8	NE7	NNE6	E7.4	E12	
5-Nov	NNE8	NNE8	NNE7	NNE7	NNE6	NNE6	NNE5	NE5	NE5	ENE6	ENE7	ENE6	ENE4	N6	NNW6	N6	N4	E5	ESE5	ESE6	ESE6	ESE6	ESE6	SE10	NE4.3	SE10	
6-Nov	SE7	SE9	SE12	SSE8	SSE11	SSE11	SSE11	SSE12	SSE14	SSE12	SSE10	SSE8	SSE9	SSE9	SSE10	SSE9	SE12	SSE10	SSE11	SSE9	SSE9	SSE10	SSE9	SSE7	SSE9.9	SSE14	
7-Nov	SSE8	S9	SSW8	SW7	SW6	SSW4	S4	SW3	SSW4	S3	SSW2	SSW2	SSW3	S4	SW4	S4	ESE1	NNE1	S5	S8	S7	SSW8	SW9	SW10	SSW4.7	SW10	
8-Nov	WSW11	WNW12	WNW17	NW17	WNW15	WNW11	WNW11	WNW12	WNW14	WNW13	WNW11	NW11	WNW12	NW14	WNW13	NW14	WNW10	WNW11	WNW10	NW11	NW10	NW10	NW8	NW6	WNW11.5	NW17	
9-Nov	NW5	NNW3	NNE3	S2	S3	SSE3	S6	SSW5	S6	SSE9	SSE11	SSE12	SSE13	SSE15	S13	SSE13	SE11	SSE9	SSE10	SSE11	SSE12	SSE10	SSE14	SSE16	SSE7.8	SSE16	
10-Nov	SSE15	S6	SSE13	S7	S7	SSE13	SSE13	S4	SSW4	SSE9	SE15	SE13	SE14	SSE14	SE12	SE11	SE11	SE11	SSE10	SSE10	SE11	SE13	SE13	SE14	SSE10.6	SSE15	
11-Nov	SSE12	SSE9	SE15	SE15	SE13	SSE14	SSE12	SE16	SE14	SE14	SE21	SE20	SSE15	SSE8	SE15	SSE9	SSE9	SSE7	S4	S7	S7	S5	SSW4	SW5	SSE10.9	SE21	
12-Nov	SSW7	SW6	SW6	SW7	SW7	W5	SW8	SW7	SW6	WSW10	WNW12	WNW8	WNW14	WNW15	NW11	NNW5	WNW2	SSW3	WNW4	NNW5	NW8	NW10	NNW10	NNW6	W5.6	WNW15	
13-Nov	NW5	NNW6	NNE4	ENE4	ENE5	ENE5	ENE6	NE6	ENE8	NE8	NNE8	NNE9	NNE9	NNE10	N17	NNE15	N9	N9	N11	N10	N13	N9	N10	NNW9	NNE7.7	N17	
14-Nov	NW10	NW7	NW7	NW6	WNW1	SSW3	SSW8	SSW11	SSW11	SSW10	SSE8	SSE8	S8	SSW10	SW10	WSW7	WSW6	WSW6	WSW7	SW7	SSE5	SSE6	E1	E2	SW4.1	SSW11	
15-Nov	NE2	E2	NNE4	N8	N12	N12	N16	N12	N11	N9	NNW10	NNW6	NW12	NW9	WNW7	WSW6	W5	W8	NNW6	NW10	WNW10	NW11	NW3	WSW4	NNW6.9	N16	
16-Nov	SW6	SW5	SSW7	SW6	S6	SE6	SE6	SSE10	SSE13	SSE12	SE12	SSE9	SE9	SE8	SE9	SE8	SSE5	SSE5	SSW7	S3	SSW9	WSW12	WSW15	WSW17	S6.4	WSW17	
17-Nov	SW16	SW14	WSW12	W17	W20	W24	W23	W19	WSW14	SW14	SW13	SW11	SW7	SSW6	SSW9	SSW7	SW8	SW4	N6	ESE2	SSW4	S4	S5	S6	WSW9.4	W24	
18-Nov	S4	SE4	SSE4	SSE5	SE3	SSE4	S4	SSE5	SSE5	SSE5	SSE6	SSE6	SSE6	S6	SSE9	SSE8	S7	SSW3	ENE1	UO	SSE1	S4	SSE2	S3	SSE4.4	SSE9	
19-Nov	W1	SSE4	SSW3	SE4	SE5	WSW3	E3	E2	SSW2	SSE4	SSW3	S7	ESE5	ESE7	SSE4	ESE4	ESE4	SSE5	SSW4	SSE4	SSE5	S6	WSW15	W19	S2.9	W19	
20-Nov	W19	WNW23	WNW27	WNW28	WNW26	WNW26	WNW24	WNW21	W22	W20	WNW16	WNW17	WNW21	WNW24	WNW21	WNW18	WNW17	WNW15	WNW13	WNW12	WNW11	NW5	NW8	WNW18.4	WNW28		
21-Nov	NNW6	N5	ENE3	E5	E4	SE4	ENE3	ENE5	NE6	ENE8	ENE7	ENE9	NNE8	NNE11	NNE11	N12	N14	N13	N12	N13	N13	N12	N12	N10	NNE7.5	N14	
22-Nov	N9	N10	N9	NNW8	N10	N9	NNE7	N4	N6	N5	NNE5	NNW7	NNE5	NNE6	ENE2	N1	N4	ENE3	E4	SE3	S7	S10	SSE11	SSE14	NNE3.0	SSE14	
23-Nov	SE11	SE11	SSE12	SE11	SSE14	SSE12	SSE9	S9	SSE8	SSE10	S10	SSE9	SSE10	SSE9	SSE8	S7	SSE6	SSE7	SSE7	SSE9	SSE6	SSE9	SSE8	SW14	SSE9.0	SW14	
24-Nov	SW14	SW15	SW17	SSW11	SW15	SW12	SW10	WSW12	WSW12	SW7	SW7	W7	W8	W7	SW7	WSW8	WSW6	WSW7	SW10	SW6	SW7	SSW10	SSW7	SSW8	SW9.0	SW17	
25-Nov	SW7	WSW6	WNW9	NNW12	N15	N20	N22	NNW13	NNW24	NNW25	NNW20	NNW18	NW21	NNW18	NNW18	N10	N7	NNE7	NNE6	NNE2	E3	UO	SSE2	SSE3	NNW10.6	NNW25	
26-Nov	ESE2	ESE3	SE3	SSE4	ENE3	ENE4	ESE3	N2	SE5	ESE7	SSE7	S10	SSE8	SE8	SSE7	SSE8	SSE8	S7	SSW6	S7	S6	ESE5	SSE4	E2	SSE4.3	SSE10	
27-Nov	NNW6	ESE2	NE3	NE2	ESE3	SE4	SSE7	SSE8	SSE10	SSE12	SSE8	SSE10	SSE11	SSE9	SSE8	SSE7	S8	SW6	WSW9	W12	W14	WSW17	WSW17	W23	SSW4.8	W23	
28-Nov	W24	W20	W21	W17	W22	WSW14	WSW13	WSW12	WSW11	W16	WNW10	WNW12	WNW11	WNW12	W11	W13	W9	W15	W19	W17	W17	W17	W17	WNW13	WNW11	W14.4	W24
29-Nov	WNW14	W17	WNW11	NW8	WNW11	WNW10	WNW11	W12	W14	WNW11	WNW11	W9	WNW13	WNW15	WNW16	WNW15	WNW14	NW13	NW18	NW13	NW14	NW11	WNW10	NW12	WNW12.3	NW18	
30-Nov	WNW9	NNW7	NNW7	NNW6	N5	NNE6	NNE4	ENE2	E2	ESE4	ESE5	E6	ENE7	NE7	ENE7	ENE4	ESE3	ENE3	NNE4	ENE1	NNE4	N3	N2	NNW0	NNE2.8	WNW9	

WSW3.0	WSW2.8	WSW2.5	W2.2	W2.1	WSW1.5	WSW1.5	WSW1.8	SW2.0	SSW1.5	S1.4	S1.2	SSW0.8	NNW0.6	W0.7	SSW0.6	SSW0.6	WSW0.9	W1.2	WSW1.2	SW1.7	SW2.2	SW1.9	SW3.0	Diurnal Average
W24	WNW23	WNW27	WNW28	WNW26	WNW26	WNW24	WNW21	NNW24	NNW25	SE21	SE20	WNW21	WNW24	WNW21	WNW18	WNW17	WNW15	W19	W17	WSW17	WSW17	WSW17	W23	Diurnal Maximum

UO - Unstable Operation  
 All monthly, daily, and diurnal averages have been calculated using vector methods



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

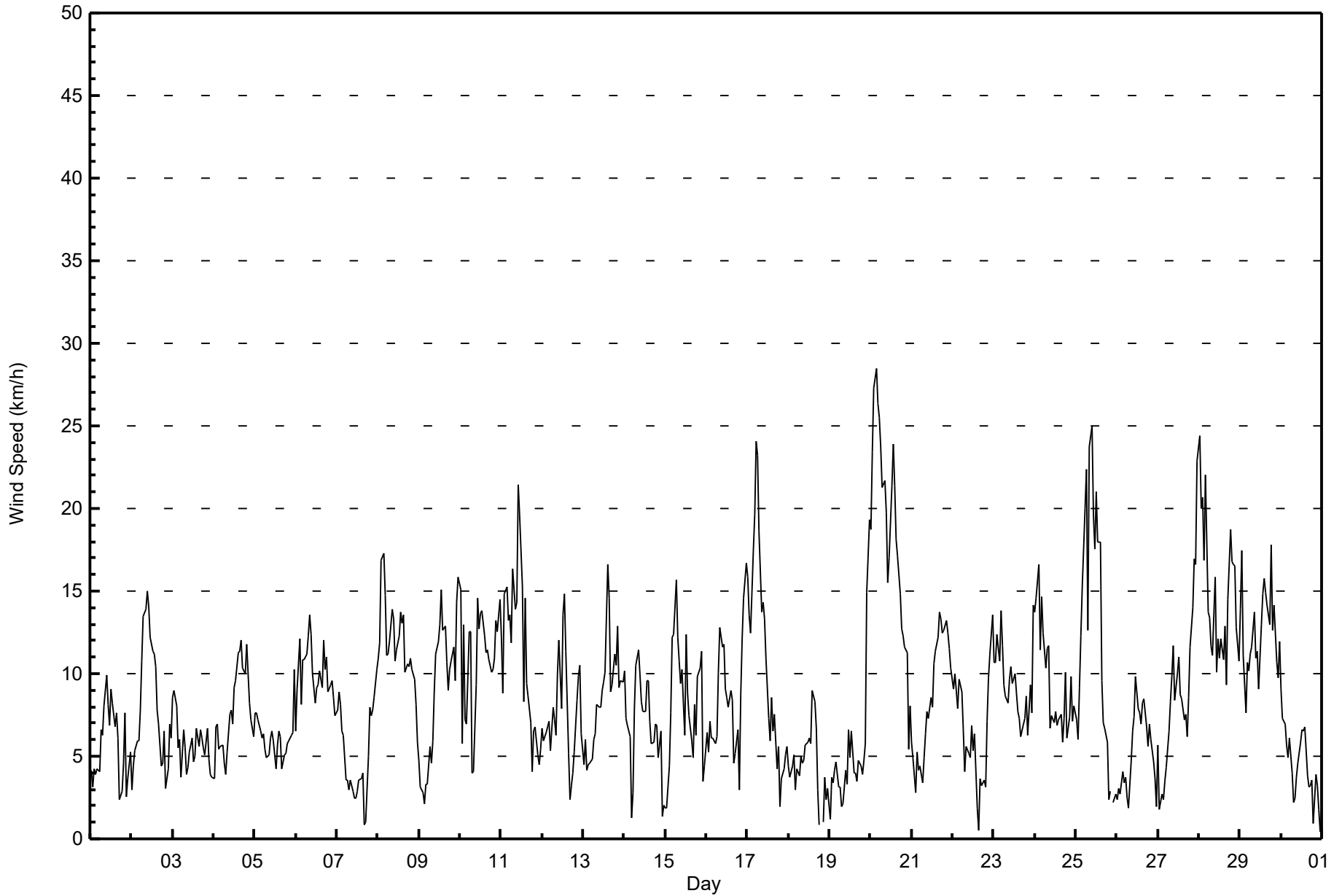
**Wind Speed (WS) - km/h**  
**Mildred Lake - November 2023**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 8 km/h on Nov 25 09:00														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 Nov 22 19:00																									
Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 1 Q <sub>1</sub> = 2 Median = 2 Q <sub>3</sub> = 3 P <sub>90</sub> = 4 P <sub>99</sub> = 7																									
Day	Hourly Period Ending At (MST)																							Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23		24
1-Nov	1	1	1	1	1	2	2	1	2	2	2	2	1	2	2	2	2	2	1	1	2	2	1	1	2
2-Nov	1	1	2	1	2	2	3	3	4	3	4	3	3	3	3	2	2	2	2	2	1	2	2	2	4
3-Nov	2	2	2	3	2	2	2	1	1	1	1	2	1	1	2	2	1	1	1	1	2	1	1	1	3
4-Nov	1	2	1	1	1	1	2	1	1	2	2	1	3	2	3	2	3	2	2	3	2	2	2	1	3
5-Nov	2	2	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	2	2	3	3
6-Nov	2	3	4	2	3	2	3	3	3	3	2	2	2	2	2	2	2	2	2	2	2	2	2	1	4
7-Nov	1	1	2	2	2	1	1	1	1	1	1	1	2	1	1	1	2	1	2	1	2	3	3	3	3
8-Nov	4	3	6	5	4	4	3	4	4	4	3	2	3	3	3	3	2	3	3	2	2	2	1	1	6
9-Nov	1	1	1	1	1	1	2	2	2	3	2	2	3	3	3	2	2	2	3	2	3	3	5	3	5
10-Nov	3	2	3	2	1	3	3	3	2	2	4	3	3	2	2	2	2	3	2	2	2	2	2	2	4
11-Nov	3	3	3	3	3	2	2	3	3	4	5	5	3	2	4	3	2	2	1	1	2	1	3	2	5
12-Nov	2	1	2	2	2	2	3	3	2	4	6	4	5	4	2	3	2	2	3	2	2	2	2	2	6
13-Nov	1	2	1	1	1	1	1	2	2	2	2	2	3	3	4	5	4	2	2	2	2	2	2	2	5
14-Nov	2	1	1	1	2	2	3	3	3	3	2	1	2	3	3	3	2	2	2	2	1	1	2	1	3
15-Nov	1	1	3	3	3	3	3	3	2	2	2	3	3	2	3	3	2	3	1	3	3	3	2	2	3
16-Nov	2	2	2	1	2	2	2	3	2	2	2	2	2	2	2	2	2	1	2	2	2	6	4	5	6
17-Nov	5	4	5	5	6	7	7	6	4	4	4	4	2	2	2	2	3	3	2	2	1	1	1	1	7
18-Nov	1	1	2	2	1	2	1	1	1	2	3	1	2	1	2	1	2	1	1	UO	1	2	2	2	3
19-Nov	2	2	2	2	2	1	1	1	2	2	2	1	2	2	2	1	2	1	1	1	1	3	5	6	6
20-Nov	6	7	8	7	7	7	7	7	7	6	5	5	6	7	6	6	5	4	3	3	4	3	3	2	8
21-Nov	2	3	1	1	1	1	1	2	2	2	2	2	2	3	3	3	3	3	3	3	3	3	3	2	3
22-Nov	2	3	3	2	3	3	2	1	1	1	2	2	2	2	2	1	1	1	1	1	2	2	3	3	3
23-Nov	3	3	3	3	4	3	2	2	2	2	2	2	2	2	2	1	2	1	2	1	2	2	5	5	
24-Nov	4	5	5	3	4	3	3	6	6	3	2	3	3	3	3	2	2	2	3	3	3	2	2	2	6
25-Nov	2	2	2	4	4	5	6	4	8	7	5	5	5	4	4	2	2	1	1	2	2	UO	1	1	8
26-Nov	2	1	1	1	1	1	3	3	1	1	2	2	2	2	2	2	1	2	3	1	2	2	2	2	3
27-Nov	2	1	1	1	1	1	3	2	3	3	2	2	2	2	2	2	2	2	5	4	4	6	5	7	7
28-Nov	7	6	6	5	6	5	4	5	5	5	4	3	3	4	4	6	3	5	5	5	5	5	3	3	7
29-Nov	4	5	4	3	3	3	3	3	4	3	3	3	4	4	5	4	4	3	5	3	4	2	2	3	5
30-Nov	3	2	1	1	1	2	1	1	2	1	1	1	1	1	2	2	1	1	1	1	2	1	1	1	3
Diurnal Maximum																									
7 7 8 7 7 7 7 7 8 7 6 5 6 7 6 6 5 5 5 5 5 6 5 7																									
UO - Unstable Operation																									



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

**Wind Speed (WS) - km/h**  
**Mildred Lake - November 2023**





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

**Wind Speed (WS) - km/h**  
**Mildred Lake - November 2023**

<b>Wind Speed Ranges (km/h)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	191	26.60	26.60
6 - 11	350	48.75	75.35
12 - 19	149	20.75	96.10
20 - 28	28	3.90	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  
Mildred Lake - November 2023**

Wind Speed Ranges (km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	15	12	10	20	15	16	10	28	21	20	6	4	3	3	4	4	191
6 - 11	29	23	6	14	13	9	21	82	29	20	27	12	7	23	18	17	350
12 - 19	20	1	0	0	2	0	16	27	1	0	10	14	16	28	9	5	149
20 - 28	2	0	0	0	0	0	2	0	0	0	0	0	10	10	1	3	28
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	66	36	16	34	30	25	49	137	51	40	43	30	36	64	32	29	718

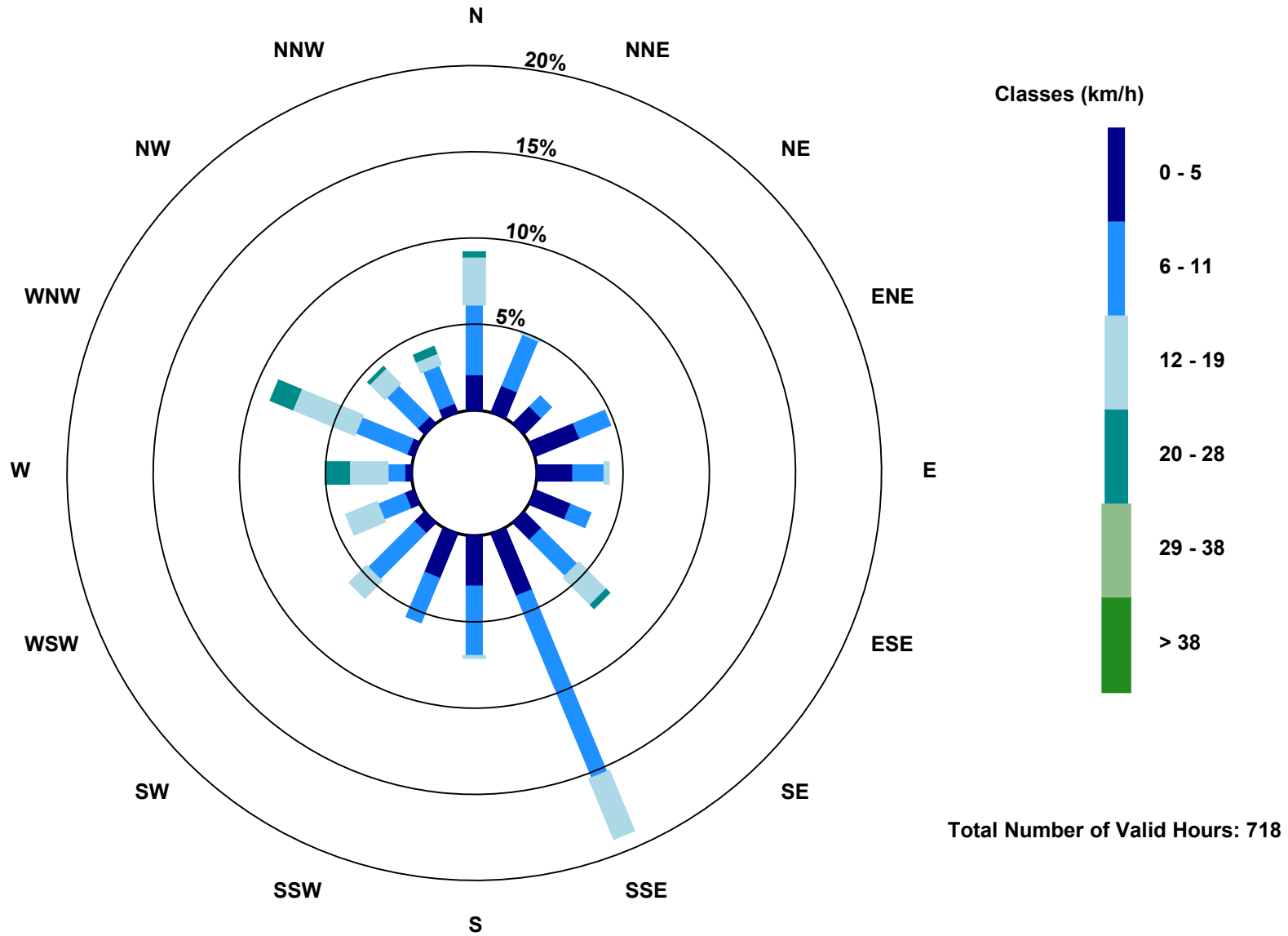
Total Number of Valid Hours: 718

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 2023

Wind Speed (WS) - km/h  
Mildred Lake





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

**Wind Direction (WD) - deg**  
**Mildred Lake - November 2023**

Direction of Maximum Speed: 302 deg on Nov 20 04:00	Hours in Service: 720
Direction of Maximum Daily Speed Average: 291.5 deg on Nov 20	Hours of Data: 718
Direction of Minimum Speed: 348 deg on Dec 1 00:00	Hours of Missing Data: 2
Direction of Minimum Daily Speed Average: 1.9 deg on Nov 3	Percent Operational Time: 99.7
Monthly Average Direction: 237.6 deg	

Day	Hourly Period Ending At (MST)																								Daily Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Nov	206	186	180	193	194	173	159	165	180	167	153	151	151	127	119	144	153	153	216	180	183	170	137	154	162.5
2-Nov	198	240	275	337	1	357	356	357	358	355	358	10	11	20	20	33	39	49	72	65	99	151	89	112	14.3
3-Nov	175	160	136	99	179	161	154	151	105	42	38	13	34	54	353	351	353	349	358	353	356	7	6	8	50.7
4-Nov	37	67	77	83	85	91	58	62	75	91	80	89	117	91	88	93	91	93	94	99	83	65	51	33	83.0
5-Nov	28	31	13	12	19	14	28	42	47	59	65	62	67	354	347	351	6	91	103	111	109	118	119	138	51.5
6-Nov	129	138	139	148	148	151	148	151	148	155	149	154	150	149	166	150	145	148	149	157	151	155	159	163	150.0
7-Nov	166	178	195	215	221	205	185	227	211	175	212	201	197	188	217	185	123	24	188	181	188	197	228	220	198.3
8-Nov	250	283	295	305	295	294	289	289	296	296	300	304	302	309	303	311	300	298	301	307	312	319	317	305	299.0
9-Nov	310	334	25	187	176	162	183	210	186	161	162	161	155	151	169	150	142	149	156	152	149	156	150	151	157.8
10-Nov	153	189	162	190	175	150	154	188	193	165	143	144	144	148	141	133	134	135	155	155	145	144	141	143	150.6
11-Nov	149	151	138	141	146	150	154	141	140	140	141	140	147	152	145	165	154	157	171	171	173	185	207	223	150.1
12-Nov	213	227	231	226	221	259	234	219	214	239	282	300	282	282	317	338	296	205	298	339	321	321	330	345	276.0
13-Nov	312	348	22	58	74	57	64	51	58	50	32	22	15	16	11	18	7	356	359	360	352	352	349	343	14.2
14-Nov	326	326	323	326	283	201	212	209	202	209	157	162	171	211	215	241	257	245	227	218	148	157	98	92	217.0
15-Nov	36	84	19	349	360	357	359	2	1	349	327	328	307	319	303	256	259	271	338	316	300	310	312	258	330.0
16-Nov	234	221	211	221	181	146	131	148	150	151	144	152	145	139	140	140	151	155	192	182	201	241	246	237	178.8
17-Nov	229	227	249	268	264	264	265	266	240	235	228	223	216	199	201	197	225	229	10	106	198	187	188	180	240.4
18-Nov	169	143	149	160	131	153	176	154	152	159	150	161	156	182	158	156	189	195	61	UO	152	169	161	190	161.6
19-Nov	261	163	194	132	145	241	86	92	211	150	199	190	113	119	161	117	117	162	193	153	154	191	255	269	185.2
20-Nov	264	296	292	302	301	299	293	292	278	278	284	283	294	292	296	293	291	293	295	289	290	288	308	314	291.5
21-Nov	328	358	57	81	98	130	75	67	41	61	57	64	31	16	14	2	2	8	10	2	1	8	6	4	20.7
22-Nov	8	3	4	348	9	9	16	357	0	358	25	342	19	23	72	357	4	60	95	132	175	171	153	148	28.7
23-Nov	145	143	149	140	149	154	157	169	157	168	169	165	161	154	161	169	156	158	160	166	165	164	163	220	160.8
24-Nov	214	217	223	206	224	216	225	249	251	230	226	263	272	275	236	246	255	244	229	219	221	204	201	207	229.0
25-Nov	214	243	300	328	353	350	359	347	329	340	336	342	325	335	333	8	5	15	26	18	87	UO	167	168	340.1
26-Nov	116	104	125	149	63	63	108	351	140	104	158	169	154	137	153	159	162	184	200	187	179	123	151	84	149.0
27-Nov	340	104	51	52	120	130	152	153	167	150	158	165	149	154	153	163	176	217	258	280	268	256	248	263	203.4
28-Nov	265	264	265	270	263	245	242	246	247	271	285	286	288	289	279	267	268	276	275	274	259	277	285	291	269.1
29-Nov	283	280	292	304	291	286	286	280	272	284	285	278	290	294	289	293	300	304	316	312	305	314	299	309	293.6
30-Nov	299	331	334	338	352	15	24	71	99	116	103	86	68	47	59	74	115	64	28	74	24	7	3	348	30.7

237.5 247.6 247.8 274.5 259.2 257.7 247.4 238.7 230.2 209.5 179.2 182.8 210.9 284.7 261.5 205.1 211.1 240.3 270.3 239.9 230.4 229.0 228.1 230.0

Diurnal Average

UO - Unstable Operation

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





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

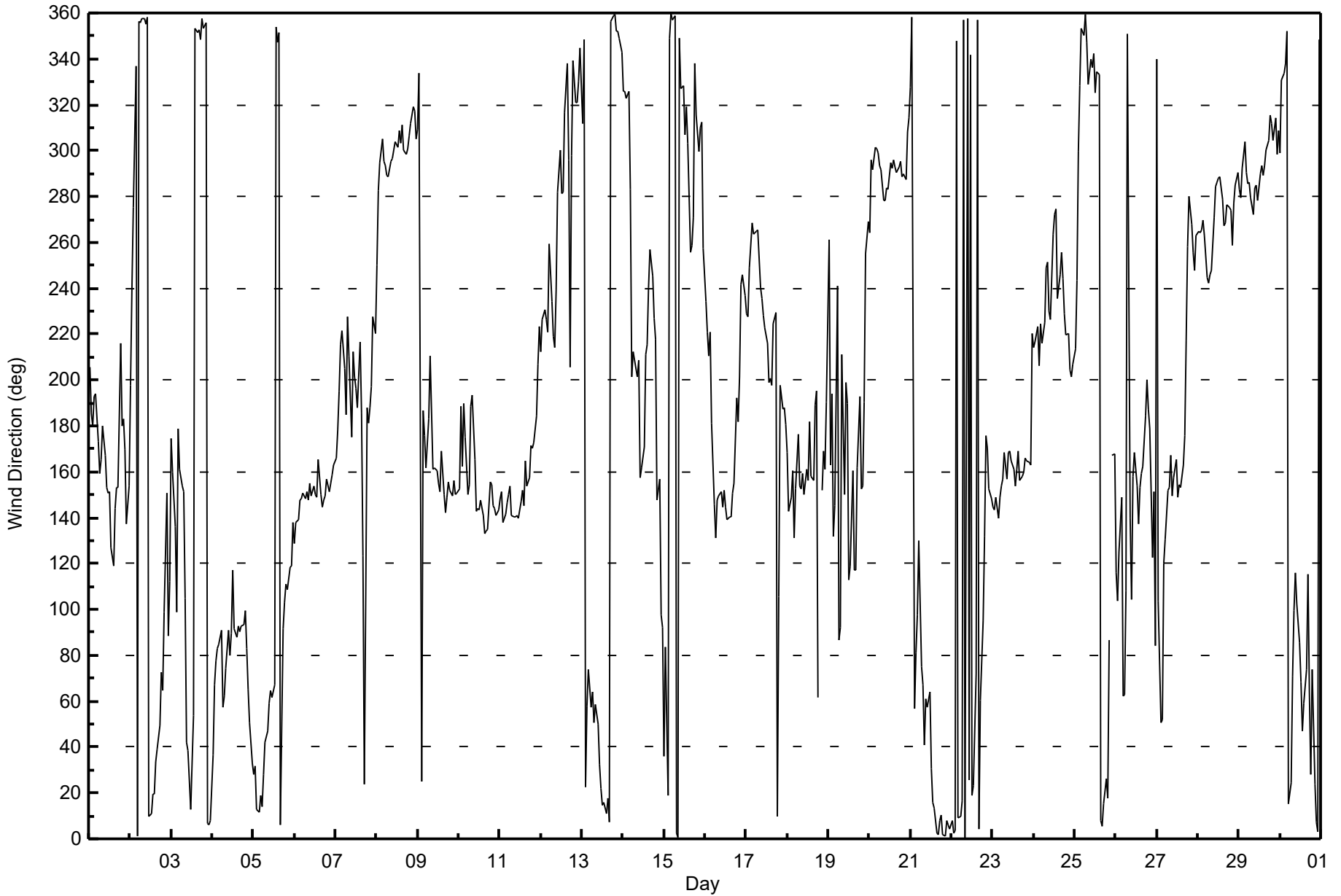
**Wind Direction (WD) - deg**  
**Mildred Lake - November 2023**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 91 deg on Nov 22 16:00	Hours of Data: 718
Minimum Value: 9 deg on Nov 23 17:00	Hours of Missing Data: 2
Percentiles: P <sub>1</sub> = 10 P <sub>10</sub> = 13 Q <sub>1</sub> = 15 Median = 19 Q <sub>3</sub> = 26 P <sub>90</sub> = 37 P <sub>99</sub> = 79	Hours of Calibration: 0
	Percent Operational Time: 99.7

Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Nov	17	37	19	20	19	39	14	19	14	15	20	19	12	19	17	12	15	86	42	21	15	69	37	13	86
2-Nov	39	21	31	12	15	14	15	16	16	16	18	22	20	20	23	22	23	26	28	16	34	26	25	31	39
3-Nov	17	17	19	31	29	26	19	20	39	22	26	22	28	26	15	13	11	9	11	18	17	15	21	21	39
4-Nov	18	13	12	14	15	11	30	18	17	13	14	18	20	17	14	13	13	14	16	15	13	18	17	19	30
5-Nov	17	20	19	17	18	16	17	24	20	18	16	21	23	37	11	12	19	18	19	16	15	18	19	17	37
6-Nov	19	18	18	17	14	14	14	13	13	16	15	17	16	15	14	13	12	11	12	13	13	15	13	13	19
7-Nov	12	15	17	21	21	28	23	34	27	19	29	34	40	28	23	27	55	61	25	12	21	24	27	25	61
8-Nov	23	21	18	16	17	17	16	17	16	17	17	15	15	14	16	13	15	14	16	14	13	9	10	12	23
9-Nov	10	37	29	66	24	25	35	27	17	19	14	16	17	15	15	13	12	11	13	14	16	16	17	11	66
10-Nov	12	29	15	17	20	10	12	35	27	21	12	13	12	11	13	15	13	15	18	12	11	10	11	12	35
11-Nov	14	20	13	12	16	12	13	13	14	15	15	16	14	17	13	15	16	30	21	20	15	28	43	24	43
12-Nov	27	23	18	23	22	25	24	28	35	29	31	30	22	20	15	59	75	52	78	45	15	15	16	17	78
13-Nov	25	12	20	14	16	16	17	18	17	19	20	18	20	18	17	19	22	13	14	17	14	14	13	13	25
14-Nov	10	11	12	15	87	66	26	18	18	24	19	16	24	23	23	33	25	32	27	34	28	12	74	62	87
15-Nov	65	62	48	21	16	16	15	16	15	15	10	20	17	20	34	35	39	28	17	16	16	14	21	37	65
16-Nov	22	30	16	20	37	19	21	14	11	12	12	12	14	14	15	17	30	24	16	58	27	29	22	22	58
17-Nov	22	27	26	20	20	19	20	21	23	23	22	25	23	15	17	45	28	81	27	66	30	17	12	15	81
18-Nov	35	29	27	25	36	33	21	24	29	25	20	18	22	18	15	11	27	28	85	UO	61	15	86	45	86
19-Nov	80	54	24	31	19	23	44	70	76	40	46	20	28	21	32	20	32	15	21	27	29	44	25	22	80
20-Nov	23	18	19	15	17	16	17	18	19	19	20	21	17	17	17	17	18	17	17	18	18	19	62	34	62
21-Nov	30	44	47	12	18	21	43	19	29	17	19	19	29	20	19	17	16	18	18	17	16	17	18	17	47
22-Nov	19	18	15	15	22	18	20	21	16	22	37	27	36	32	56	91	20	29	14	31	14	14	15	11	91
23-Nov	14	17	12	16	14	16	16	16	17	14	16	14	15	13	15	14	9	13	12	14	15	12	17	23	23
24-Nov	20	22	21	20	21	20	24	31	29	25	23	31	21	25	26	18	35	24	22	46	46	18	21	22	46
25-Nov	26	35	22	18	15	17	18	15	13	15	13	15	12	13	17	17	16	15	18	70	26	UO	39	51	70
26-Nov	52	25	31	32	39	36	56	74	33	23	22	13	23	19	18	18	15	21	28	13	19	53	50	60	74
27-Nov	34	56	21	44	17	27	14	15	17	13	16	16	12	15	15	16	18	30	47	25	21	22	22	20	56
28-Nov	20	22	20	20	20	23	21	29	30	24	29	21	22	22	27	32	25	20	18	18	22	19	16	16	32
29-Nov	16	17	18	36	21	17	17	18	17	19	17	21	19	16	18	17	15	15	16	13	14	11	16	14	36
30-Nov	16	15	12	20	27	22	23	41	40	27	27	23	14	24	21	35	31	33	30	79	59	32	34	74	79

80	62	48	66	87	66	56	74	76	40	46	34	40	37	56	91	75	86	85	79	61	69	86	74	
Diurnal Maximum																								

UO - Unstable Operation





## WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY  
MONITORING PROGRAM  
MONTHLY REPORT

### **AMS03 LOWER CAMP METEOROLOGY NOVEMBER 2023**

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

December 22, 2023

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - LOWER CAMP MET TOWER (AMS03)  
NOVEMBER 2023

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	705	0	15	97.92	6.6	-	2.6	-
Temperature 45 m (C) Average	705	0	15	97.92	6.6	-	2.6	-
Temperature 100 m (C) Average	705	0	15	97.92	6.6	-	2.6	-
Temperature 163 m (C) Average	705	0	15	97.92	6.5	-	3.0	-
Relative Humidity 20 m (%) Average	705	0	15	97.92	97.4	-	94.1	-
Relative Humidity 45 m (%) Average	705	0	15	97.92	96.8	-	93.3	-
Relative Humidity 100 m (%) Average	705	0	15	97.92	93.5	-	89.9	-
Relative Humidity 163 m (%) Average	705	0	15	97.92	96.3	-	92.6	-
Wind Speed 20 m (km/h) Average	705	0	15	97.92	28	-	17.0	-
Wind Speed 45 m (km/h) Average	705	0	15	97.92	37	-	24.0	-
Wind Speed 100 m (km/h) Average	702	0	18	97.5	46	-	31.0	-
Wind Speed 163 m (km/h) Average	682	0	38	94.72	57	-	37.0	-
Wind Direction 20 m (deg) Average	705	0	15	97.92	-	-	-	-
Wind Direction 45 m (deg) Average	705	0	15	97.92	-	-	-	-
Wind Direction 100 m (deg) Average	702	0	18	97.5	-	-	-	-
Wind Direction 163 m (deg) Average	682	0	38	94.72	-	-	-	-
Vertical Wind Speed 20 m (km/h) Average	705	0	15	97.92	0.4	-	0.0	-
Vertical Wind Speed 45 m (km/h) Average	705	0	15	97.92	1.5	-	0.7	-
Vertical Wind Speed 100 m (km/h) Average	702	0	18	97.5	2.9	-	1.1	-
Vertical Wind Speed 163 m (km/h) Average	682	0	38	94.72	4.5	-	1.3	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - LOWER CAMP MET TOWER (AMS03)  
 NOVEMBER 2023

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	705	-3.14	4.3	-	-15.3	-9.4	-5.4	-2.7	0.1	2	6.6
Temperature 45 m (C) Average	705	-3.05	4.3	-	-14.6	-9.5	-5.4	-2.6	0.4	2	6.6
Temperature 100 m (C) Average	705	-3.01	4.4	-	-15	-9.8	-5.5	-2.6	0.6	2.3	6.6
Temperature 163 m (C) Average	705	-3.04	4.5	-	-15.5	-10.1	-5.6	-2.9	0.6	2.6	6.5
Relative Humidity 20 m (%) Average	705	80.41	10.8	-	44.7	64.9	74	82.6	88.5	92.5	97.4
Relative Humidity 45 m (%) Average	705	80.72	10.8	-	45.4	65.5	74.1	83.6	88.5	92.8	96.8
Relative Humidity 100 m (%) Average	705	77.19	10.4	-	44.1	61.5	70.6	80.2	84.5	89	93.5
Relative Humidity 163 m (%) Average	705	78.84	11	-	44.9	62.8	72.4	81.2	86.7	91.6	96.3
Wind Speed 20 m (km/h) Average	705	8.4	5	-	0	2	4	7	12	16	28
Wind Speed 45 m (km/h) Average	705	12.3	7	-	0	3	7	11	17	22	37
Wind Speed 100 m (km/h) Average	702	16.3	9	-	1	5	9	15	23	29	46
Wind Speed 163 m (km/h) Average	682	20.1	11	-	1	7	12	19	26	34	57
Wind Direction 20 m (deg) Average	705	-	-	-	-	-	-	-	-	-	-
Wind Direction 45 m (deg) Average	705	-	-	-	-	-	-	-	-	-	-
Wind Direction 100 m (deg) Average	702	-	-	-	-	-	-	-	-	-	-
Wind Direction 163 m (deg) Average	682	-	-	-	-	-	-	-	-	-	-
Vertical Wind Speed 20 m (km/h) Average	705	-0.26	0.3	-	-1.3	-0.7	-0.4	-0.2	0	0	0.4
Vertical Wind Speed 45 m (km/h) Average	705	0.03	0.4	-	-1.6	-0.6	-0.1	0.1	0.3	0.5	1.5
Vertical Wind Speed 100 m (km/h) Average	702	0.06	0.7	-	-3.2	-0.8	-0.2	0.1	0.4	0.9	2.9
Vertical Wind Speed 163 m (km/h) Average	682	0.52	0.8	-	-3.1	-0.1	0.1	0.3	0.8	1.5	4.5

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - LOWER CAMP MET TOWER (AMS03)  
 NOVEMBER 2023

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
ALL PARAMETERS	02 Nov 2023 21:00	03 Nov 2023 11:00	15	DAS Failure - data not recorded
Wind Speed, Wind Direction, Vertical Wind Speed 100m	07 Nov 2023 21:00	07 Nov 2023 22:00	2	Flat line in sensor output signal
Wind Speed, Wind Direction, Vertical Wind Speed 100m	08 Nov 2023 00:00	08 Nov 2023 00:00	1	Flat line in sensor output signal
Wind Speed, Wind Direction, Vertical Wind Speed 163m	07 Nov 2023 21:00	07 Nov 2023 21:00	1	Flat line in sensor output signal
Wind Speed, Wind Direction, Vertical Wind Speed 163m	08 Nov 2023 03:00	08 Nov 2023 11:00	9	Flat line in sensor output signal
Wind Speed, Wind Direction, Vertical Wind Speed 163m	14 Nov 2023 00:00	14 Nov 2023 07:00	8	Flat line in sensor output signal
Wind Speed, Wind Direction, Vertical Wind Speed 163m	27 Nov 2023 05:00	27 Nov 2023 09:00	5	Flat line in sensor output signal



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

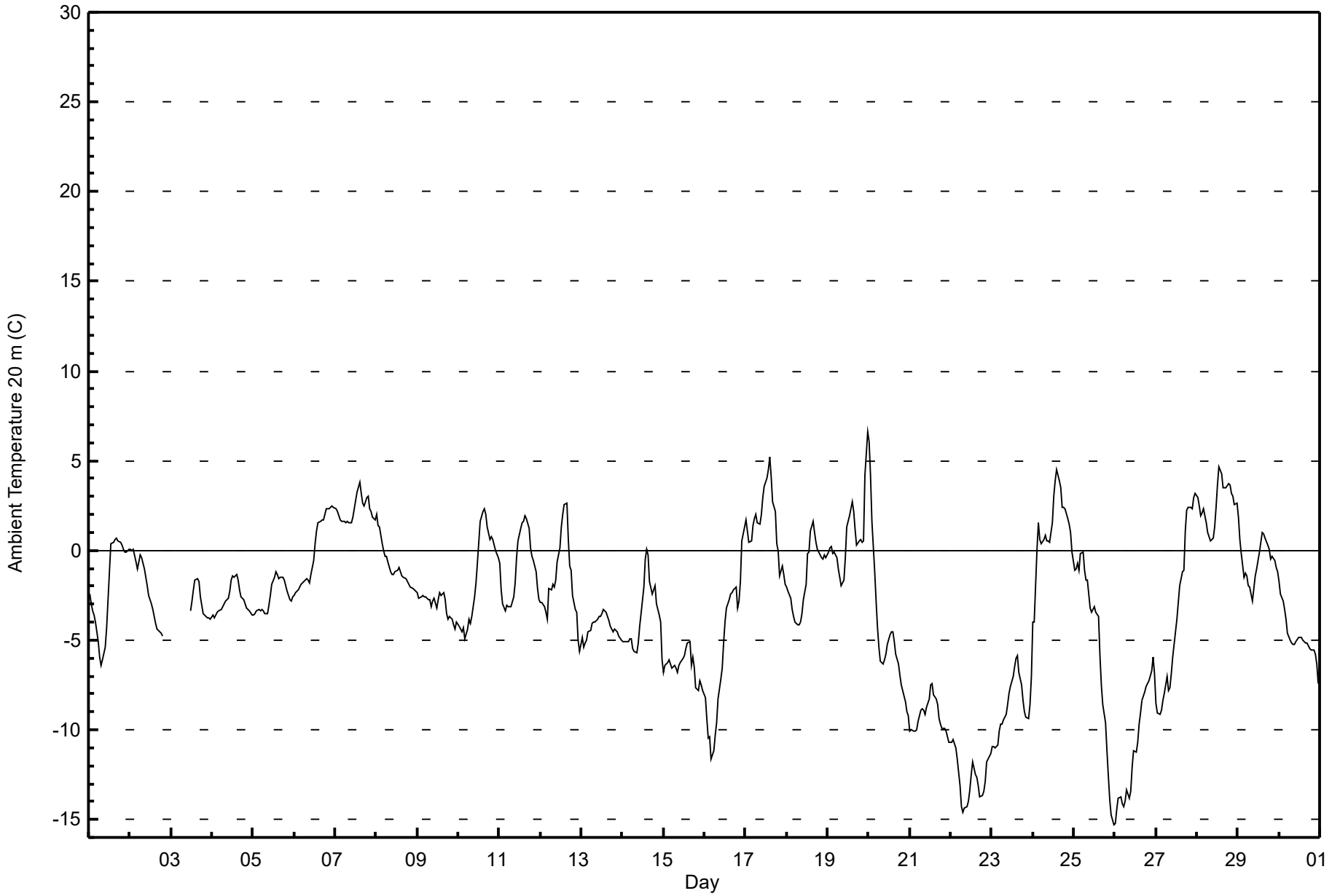
**Ambient Temperature 20 m (AT20m) - C**  
**Lower Camp Met Tower - November 2023**

Maximum Value: 6.6 C on Nov 20 00:00		Maximum Daily Average: 2.6 C on Nov 28		Hours in Service: 720																						
Minimum Value: -15.3 C on Nov 26 00:00		Minimum Daily Average: -12.6 C on Nov 22		Hours of Data: 705																						
Maximum Diurnal Average: -1.5 C at hour 15		Minimum Diurnal Average: -4.3 C at hour 9		Hours of Missing Data: 15																						
Monthly Average: -3.14 C		Percentiles: P <sub>1</sub> = -14.3 P <sub>10</sub> = -9.4 Q <sub>1</sub> = -5.4 Median = -2.7 Q <sub>3</sub> = 0.1 P <sub>90</sub> = 2.0 P <sub>99</sub> = 4.2		Hours of Calibration: 0																						
				Percent Operational Time: 97.9																						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	-2.5	-3.0	-3.4	-3.6	-4.0	-5.1	-5.9	-6.4	-6.1	-5.4	-4.3	-2.7	-1.2	0.4	0.5	0.6	0.7	0.5	0.4	0.3	0.1	-0.1	-0.1	0.1	-2.1	0.7
2-Nov	0.1	0.0	0.1	-0.7	-1.1	-0.7	-0.2	-0.4	-1.0	-1.5	-2.0	-2.5	-2.9	-3.3	-3.7	-4.1	-4.4	-4.6	-4.6	-4.8	DF	DF	DF	DF	-2.1	0.1
3-Nov	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	-3.4	-2.8	-2.2	-1.6	-1.6	-1.7	-2.6	-3.0	-3.6	-3.7	-3.8	-3.8	--	-1.6
4-Nov	-3.6	-3.7	-3.6	-3.5	-3.3	-3.3	-3.2	-3.0	-2.8	-2.7	-2.3	-1.7	-1.4	-1.5	-1.4	-1.7	-2.2	-2.6	-2.7	-3.0	-3.2	-3.3	-3.3	-3.6	-2.8	-1.4
5-Nov	-3.6	-3.6	-3.3	-3.3	-3.4	-3.3	-3.4	-3.5	-3.5	-3.0	-2.5	-1.9	-1.5	-1.2	-1.4	-1.6	-1.5	-1.5	-1.7	-2.0	-2.3	-2.7	-2.8	-2.6	-2.5	-1.2
6-Nov	-2.5	-2.3	-2.2	-2.1	-1.9	-1.8	-1.7	-1.6	-1.6	-1.8	-1.3	-0.6	0.4	1.1	1.5	1.6	1.7	1.7	2.0	2.4	2.3	2.4	2.5	2.4	0.0	2.5
7-Nov	2.3	2.2	2.0	1.7	1.6	1.6	1.6	1.6	1.6	1.5	1.9	2.3	2.8	3.3	3.8	3.2	2.7	2.5	2.9	3.0	2.3	2.2	1.9	1.7	2.3	3.8
8-Nov	2.0	1.4	1.3	0.4	0.0	-0.3	-0.4	-0.6	-1.2	-1.3	-1.3	-1.2	-1.1	-1.0	-1.2	-1.4	-1.5	-1.6	-1.8	-1.9	-2.1	-2.1	-2.2	-2.3	-0.9	2.0
9-Nov	-2.4	-2.6	-2.6	-2.5	-2.6	-2.6	-2.7	-2.7	-3.2	-2.8	-2.7	-3.2	-2.8	-2.4	-2.5	-2.4	-2.8	-3.5	-3.9	-3.7	-3.9	-4.2	-4.4	-4.0	-3.0	-2.4
10-Nov	-4.2	-4.4	-4.6	-4.3	-5.0	-4.4	-3.8	-4.0	-3.7	-2.6	-1.8	-0.7	0.4	1.6	2.1	2.4	2.0	1.3	0.6	0.8	0.6	0.3	0.0	-0.4	-1.3	2.4
11-Nov	-0.7	-2.2	-2.9	-3.4	-3.1	-3.2	-3.1	-3.1	-2.6	-1.8	-0.4	0.6	1.3	1.5	1.6	2.0	1.8	1.3	0.2	-0.3	-0.6	-1.1	-2.1	-2.7	-1.0	2.0
12-Nov	-2.9	-2.9	-3.2	-3.5	-3.8	-2.2	-2.2	-1.9	-2.1	-1.6	-0.6	0.1	1.3	2.0	2.6	2.6	0.6	-0.9	-1.1	-2.5	-3.3	-3.4	-5.0	-5.7	-1.6	2.6
13-Nov	-4.8	-5.4	-5.2	-5.0	-4.6	-4.4	-4.1	-4.0	-4.0	-3.9	-3.7	-3.7	-3.5	-3.3	-3.4	-3.7	-3.9	-4.2	-4.5	-4.4	-4.4	-4.5	-4.8	-5.0	-4.3	-3.3
14-Nov	-5.1	-5.1	-5.1	-5.1	-4.9	-4.9	-5.5	-5.6	-5.7	-5.2	-4.2	-3.6	-2.1	-0.5	0.0	-0.2	-1.8	-2.4	-2.2	-1.9	-3.0	-3.6	-4.0	-6.1	-3.7	0.0
15-Nov	-6.8	-6.4	-6.3	-6.1	-6.3	-6.6	-6.4	-6.6	-6.8	-6.4	-6.3	-6.0	-5.8	-5.5	-5.1	-5.1	-6.4	-6.0	-6.5	-7.7	-7.8	-7.3	-7.5	-7.8	-6.5	-5.1
16-Nov	-8.2	-9.4	-10.4	-10.4	-11.6	-11.1	-10.3	-9.6	-8.3	-7.2	-6.6	-5.1	-4.0	-3.2	-2.7	-2.4	-2.3	-2.2	-2.0	-3.2	-2.9	-1.8	0.5	1.3	-5.5	1.3
17-Nov	1.7	1.1	0.5	0.6	1.4	1.8	2.0	1.5	1.4	2.0	2.9	3.6	4.0	4.5	5.2	4.1	2.7	2.2	0.4	0.0	-1.4	-0.9	-1.3	-1.9	1.6	5.2
18-Nov	-2.1	-2.3	-2.7	-3.3	-3.7	-4.0	-4.2	-4.2	-4.0	-3.5	-2.8	-1.9	-0.2	-0.1	1.1	1.7	1.0	0.4	0.1	-0.1	-0.4	-0.4	-0.3	-0.4	-1.5	1.7
19-Nov	-0.1	0.1	0.2	-0.2	-0.1	-0.4	-1.0	-1.5	-2.0	-1.6	-0.4	1.3	1.6	1.9	2.7	2.2	1.1	0.3	0.5	0.6	0.4	0.5	4.2	6.6	0.7	6.6
20-Nov	6.0	4.2	1.7	-1.2	-2.8	-4.3	-5.4	-6.1	-6.3	-6.1	-5.8	-5.2	-4.7	-4.5	-4.6	-5.1	-5.8	-6.3	-7.0	-7.5	-7.8	-8.4	-9.0	-9.2	-4.6	6.0
21-Nov	-10.1	-10.0	-10.0	-10.1	-10.0	-9.6	-8.9	-8.8	-8.9	-9.1	-8.7	-8.3	-7.5	-7.4	-8.1	-8.3	-8.6	-9.3	-9.7	-9.9	-9.9	-10.1	-10.4	-10.7	-9.3	-7.4
22-Nov	-10.7	-10.5	-10.7	-11.0	-11.6	-13.1	-14.3	-14.6	-14.4	-14.3	-14.0	-13.3	-12.5	-11.8	-12.5	-12.7	-13.1	-13.7	-13.7	-13.5	-12.9	-11.8	-11.6	-11.3	-12.6	-10.5
23-Nov	-10.9	-10.9	-11.0	-10.8	-10.1	-9.7	-9.7	-9.4	-9.1	-8.6	-8.0	-7.6	-7.0	-6.4	-6.0	-5.9	-6.8	-7.5	-8.3	-9.0	-9.3	-9.3	-8.6	-7.1	-8.6	-5.9
24-Nov	-4.0	-4.0	0.1	1.5	0.6	0.4	0.6	0.8	0.5	0.5	0.5	1.6	3.0	3.9	4.5	3.9	3.5	2.4	2.4	2.3	1.8	1.4	1.0	-0.1	1.2	4.5
25-Nov	-1.1	-1.0	-0.7	-1.1	-0.2	-0.1	-1.1	-1.6	-1.7	-3.2	-3.4	-3.3	-3.1	-3.4	-3.7	-5.8	-7.5	-8.6	-9.6	-11.2	-12.5	-13.9	-14.8	-15.3	-5.3	-0.1
26-Nov	-15.2	-14.4	-13.8	-13.7	-14.1	-14.3	-14.0	-13.4	-13.8	-13.4	-12.1	-11.2	-11.2	-10.7	-9.7	-9.0	-8.4	-7.9	-7.6	-7.4	-7.2	-6.7	-5.9	-6.9	-10.9	-5.9
27-Nov	-8.5	-9.1	-9.1	-8.9	-8.3	-7.9	-7.0	-7.8	-7.7	-6.8	-5.9	-4.5	-3.8	-2.9	-1.9	-1.2	-1.1	1.1	2.2	2.4	2.4	2.3	3.0	3.2	-3.6	3.2
28-Nov	3.0	2.5	2.0	2.1	2.3	1.6	1.0	0.8	0.5	0.7	1.3	2.4	3.6	4.7	4.3	3.5	3.5	3.5	3.7	3.7	3.2	3.1	2.6	2.6	2.6	4.7
29-Nov	1.8	0.6	-0.2	-1.5	-1.3	-1.4	-2.0	-2.0	-2.9	-2.1	-1.4	-1.1	-0.1	0.5	1.0	0.9	0.7	0.3	0.1	-0.5	-0.4	-0.6	-1.0	-1.2	-0.6	1.8
30-Nov	-1.7	-2.4	-2.8	-3.3	-3.9	-4.6	-5.0	-5.1	-5.3	-5.3	-5.1	-4.9	-4.9	-4.8	-5.0	-5.1	-5.2	-5.3	-5.4	-5.5	-5.6	-5.8	-6.3	-7.4	-4.8	-1.7
																								Diurnal Average		
																								Diurnal Maximum		
-3.3 -3.6 -3.7 -3.9 -4.0 -4.1 -4.1 -4.2 -4.3 -4.0 -3.5 -2.9 -2.2 -1.7 -1.5 -1.6 -2.1 -2.4 -2.7 -2.9 -3.1 -3.2 -3.2 -3.4																										
6.0 4.2 2.0 2.1 2.3 1.8 2.0 1.6 1.6 2.0 2.9 3.6 4.0 4.7 5.2 4.1 3.5 3.5 3.7 3.7 3.2 3.1 4.2 6.6																										
DF - DAS Failure																										



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

**Ambient Temperature 20 m (AT20m) - C**  
**Lower Camp Met Tower - November 2023**







**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Ambient Temperature 20 m (AT20m) - C  
Lower Camp Met Tower - November 2023**

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	0	0.00	0.00
-20 - 0	525	74.47	74.47
0 - 10	180	25.53	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 705

Total Number of Hours: 720



Wood Buffalo Environmental Association

Summary of Hour Averages

Ambient Temperature 45 m (AT45m) - C

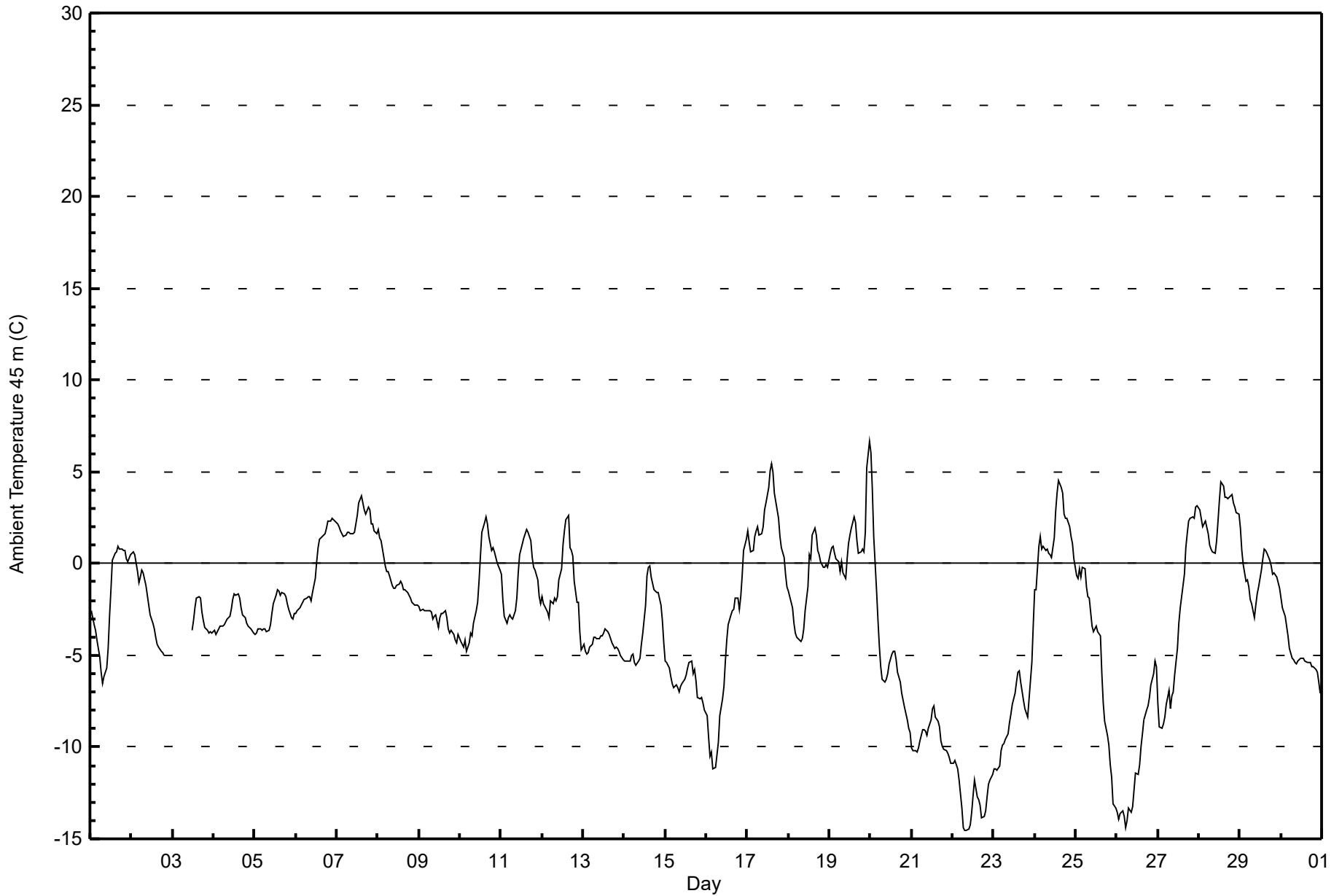
Lower Camp Met Tower - November 2023

Maximum Value: 6.6 C on Nov 20 00:00																				Maximum Daily Average: 2.6 C on Nov 28					Hours in Service: 720		
Minimum Value: -14.6 C on Nov 22 08:00																				Minimum Daily Average: -12.8 C on Nov 22					Hours of Data: 705		
Maximum Diurnal Average: -1.6 C at hour 15																				Minimum Diurnal Average: -4.3 C at hour 9					Hours of Missing Data: 15		
Monthly Average: -3.05 C																				Percentiles: P <sub>1</sub> = -13.9 P <sub>10</sub> = -9.5 Q <sub>1</sub> = -5.4 Median = -2.6 Q <sub>3</sub> = 0.4 P <sub>90</sub> = 2.0 P <sub>99</sub> = 4.4					Hours of Calibration: 0		
																									Percent Operational Time: 97.9		
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Nov	-2.5	-2.9	-3.4	-3.6	-4.2	-5.1	-5.9	-6.5	-6.2	-5.7	-4.7	-2.9	-1.4	0.2	0.5	0.7	0.9	0.8	0.8	0.7	0.7	0.3	0.1	0.5	-2.0	0.9	
2-Nov	0.6	0.6	0.5	-0.4	-1.0	-0.7	-0.3	-0.5	-1.2	-1.7	-2.2	-2.8	-3.3	-3.6	-4.0	-4.4	-4.6	-4.8	-4.8	-5.0	DF	DF	DF	DF	-2.2	0.6	
3-Nov	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	-3.6	-3.1	-2.4	-1.9	-1.8	-1.9	-2.7	-3.1	-3.5	-3.7	-3.8	-3.7	-3.8	--	-1.8
4-Nov	-3.7	-3.9	-3.7	-3.6	-3.4	-3.4	-3.3	-3.2	-3.0	-2.9	-2.5	-2.0	-1.7	-1.7	-1.6	-1.9	-2.4	-2.8	-2.9	-3.2	-3.4	-3.4	-3.5	-3.8	-3.0	-1.6	
5-Nov	-3.9	-3.8	-3.6	-3.6	-3.6	-3.6	-3.6	-3.7	-3.7	-3.3	-2.7	-2.2	-1.8	-1.4	-1.5	-1.8	-1.6	-1.7	-1.8	-2.2	-2.5	-2.9	-3.0	-2.7	-2.8	-1.4	
6-Nov	-2.7	-2.5	-2.4	-2.3	-2.1	-2.0	-1.9	-1.8	-1.8	-2.0	-1.5	-0.8	0.1	0.9	1.4	1.5	1.6	1.6	2.0	2.3	2.3	2.4	2.4	2.3	-0.1	2.4	
7-Nov	2.2	2.0	1.8	1.6	1.5	1.6	1.7	1.7	1.6	1.6	1.7	2.2	2.6	3.3	3.7	3.3	2.9	2.7	3.0	2.9	2.2	2.1	1.8	1.6	2.2	3.7	
8-Nov	1.9	1.4	1.2	0.3	-0.1	-0.4	-0.4	-0.7	-1.2	-1.3	-1.4	-1.2	-1.1	-1.0	-1.2	-1.4	-1.4	-1.6	-1.7	-1.9	-2.1	-2.2	-2.3	-2.3	-0.9	1.9	
9-Nov	-2.3	-2.6	-2.5	-2.6	-2.6	-2.6	-2.6	-2.6	-3.0	-2.9	-2.8	-3.5	-3.0	-2.7	-2.7	-2.5	-2.9	-3.6	-3.8	-3.6	-3.8	-4.2	-4.3	-3.9	-3.1	-2.3	
10-Nov	-4.2	-4.4	-4.6	-4.2	-4.8	-4.3	-3.8	-3.9	-3.2	-2.6	-2.1	-0.9	0.4	1.7	2.2	2.5	2.2	1.5	0.7	0.9	0.6	0.3	0.1	-0.3	-1.3	2.5	
11-Nov	-0.5	-1.9	-2.8	-3.3	-2.9	-2.8	-2.9	-3.0	-2.6	-1.9	-0.5	0.4	1.1	1.4	1.6	1.9	1.7	1.3	0.3	-0.2	-0.4	-0.9	-1.8	-2.2	-0.9	1.9	
12-Nov	-1.8	-2.2	-2.5	-2.7	-3.0	-2.0	-2.2	-1.9	-2.1	-1.8	-0.9	-0.3	1.0	1.7	2.4	2.6	0.9	0.7	0.4	-1.0	-2.1	-2.1	-3.7	-4.7	-1.1	2.6	
13-Nov	-4.4	-4.8	-5.0	-4.9	-4.5	-4.4	-4.0	-4.0	-4.1	-4.1	-4.0	-3.9	-3.8	-3.6	-3.7	-3.9	-4.1	-4.3	-4.6	-4.6	-4.7	-5.0	-5.2	-4.3	-4.3	-3.6	
14-Nov	-5.3	-5.3	-5.3	-5.3	-5.0	-4.9	-5.4	-5.5	-5.3	-5.1	-4.4	-3.8	-2.2	-0.6	-0.2	-0.1	-0.8	-1.4	-1.5	-1.6	-1.6	-2.3	-3.1	-4.3	-3.4	-0.1	
15-Nov	-5.3	-5.4	-5.7	-6.1	-6.5	-6.8	-6.6	-6.7	-7.0	-6.7	-6.5	-6.3	-6.1	-5.7	-5.4	-5.3	-6.0	-5.8	-6.3	-7.3	-7.4	-7.3	-7.6	-8.0	-6.4	-5.3	
16-Nov	-8.3	-9.4	-10.5	-10.3	-11.2	-11.1	-10.5	-9.8	-8.3	-7.4	-6.7	-5.3	-4.2	-3.3	-2.8	-2.5	-2.5	-1.9	-1.9	-2.5	-1.8	-0.7	0.7	1.3	-5.4	1.3	
17-Nov	1.8	1.1	0.6	0.7	1.5	1.8	2.0	1.6	1.6	2.0	2.9	3.3	4.1	5.1	5.5	5.0	3.9	2.9	2.5	1.5	0.8	0.3	-0.6	-1.3	2.1	5.5	
18-Nov	-1.5	-1.8	-2.4	-3.3	-3.8	-4.0	-4.2	-4.2	-4.1	-3.5	-2.6	-1.3	0.5	0.2	1.6	1.9	1.5	0.7	0.5	0.1	-0.2	-0.2	0.0	-0.2	-1.3	1.9	
19-Nov	0.6	0.9	1.0	0.6	0.2	0.1	-0.4	0.1	-0.5	-0.8	0.2	1.1	1.5	1.9	2.6	2.2	1.2	0.6	0.6	0.8	0.6	1.7	5.2	6.6	1.2	6.6	
20-Nov	6.1	4.0	1.5	-1.4	-3.1	-4.5	-5.6	-6.3	-6.5	-6.3	-6.0	-5.5	-5.0	-4.8	-4.8	-5.3	-5.9	-6.4	-7.0	-7.5	-7.8	-8.5	-9.0	-9.2	-4.8	6.1	
21-Nov	-10.1	-10.2	-10.2	-10.3	-10.0	-9.6	-9.1	-9.0	-9.2	-9.3	-9.0	-8.5	-7.9	-7.8	-8.4	-8.6	-8.9	-9.6	-10.0	-10.1	-10.2	-10.4	-10.6	-10.9	-9.5	-7.8	
22-Nov	-10.9	-10.7	-11.0	-11.2	-11.8	-13.3	-14.4	-14.6	-14.5	-14.5	-14.2	-13.5	-12.7	-11.8	-12.7	-12.9	-13.2	-13.8	-13.8	-13.5	-12.7	-12.0	-11.8	-11.5	-12.8	-10.7	
23-Nov	-11.2	-11.1	-11.2	-11.0	-10.2	-9.9	-9.8	-9.6	-9.3	-8.7	-8.2	-7.7	-7.1	-6.4	-6.0	-5.8	-6.4	-7.4	-7.9	-8.1	-8.4	-6.4	-5.4	-3.4	-8.2	-3.4	
24-Nov	-1.4	-1.4	0.9	1.5	0.8	0.9	0.7	0.8	0.5	0.5	0.4	1.4	2.9	3.8	4.5	4.1	3.8	2.7	2.4	2.5	2.0	1.5	1.1	0.3	1.6	4.5	
25-Nov	-0.6	-0.8	-0.3	-0.7	-0.2	-0.3	-1.2	-1.8	-1.8	-3.4	-3.7	-3.5	-3.4	-3.7	-3.9	-6.0	-7.6	-8.6	-9.4	-9.9	-11.0	-11.7	-13.1	-13.3	-5.0	-0.2	
26-Nov	-13.5	-13.9	-13.6	-13.5	-13.8	-14.4	-14.0	-13.3	-13.6	-13.2	-12.3	-11.4	-11.5	-10.9	-9.9	-9.2	-8.5	-8.0	-7.7	-7.3	-6.6	-6.0	-5.3	-5.6	-10.7	-5.3	
27-Nov	-7.6	-8.9	-8.9	-8.8	-8.4	-7.7	-6.9	-7.9	-7.2	-7.0	-6.0	-4.6	-3.3	-2.4	-1.8	-0.6	0.8	1.6	2.3	2.4	2.5	2.4	3.1	3.2	-3.3	3.2	
28-Nov	2.9	2.5	2.0	2.2	2.3	1.6	1.0	0.8	0.6	0.6	1.3	2.3	3.4	4.4	4.2	3.6	3.6	3.5	3.7	3.8	3.3	3.0	2.7	2.7	2.6	4.4	
29-Nov	1.9	0.7	0.0	-1.0	-0.9	-1.3	-1.9	-2.2	-3.0	-2.2	-1.6	-1.3	-0.3	0.2	0.8	0.7	0.5	0.2	-0.1	-0.6	-0.5	-0.7	-1.0	-1.3	-0.6	1.9	
30-Nov	-1.9	-2.4	-2.9	-3.4	-3.9	-4.6	-5.2	-5.3	-5.4	-5.5	-5.3	-5.1	-5.1	-5.2	-5.3	-5.4	-5.4	-5.4	-5.6	-5.6	-5.7	-6.0	-6.4	-7.1	-5.0	-1.9	
																								Diurnal Average			
																								Diurnal Maximum			
-3.0 -3.4 -3.6 -3.8 -4.0 -4.1 -4.2 -4.2 -4.3 -4.1 -3.6 -3.0 -2.3 -1.8 -1.6 -1.6 -2.0 -2.3 -2.5 -2.7 -2.8 -2.8 -2.9 -3.0																											
6.1 4.0 2.0 2.2 2.3 1.8 2.0 1.7 1.6 2.0 2.9 3.3 4.1 5.1 5.5 5.0 3.9 3.5 3.7 3.8 3.3 3.0 5.2 6.6																											
DF - DAS Failure																											



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

**Ambient Temperature 45 m (AT45m) - C**  
**Lower Camp Met Tower - November 2023**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Ambient Temperature 45 m (AT45m) - C  
Lower Camp Met Tower - November 2023**

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	0	0.00	0.00
-20 - 0	508	72.06	72.06
0 - 10	197	27.94	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 705

Total Number of Hours: 720



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

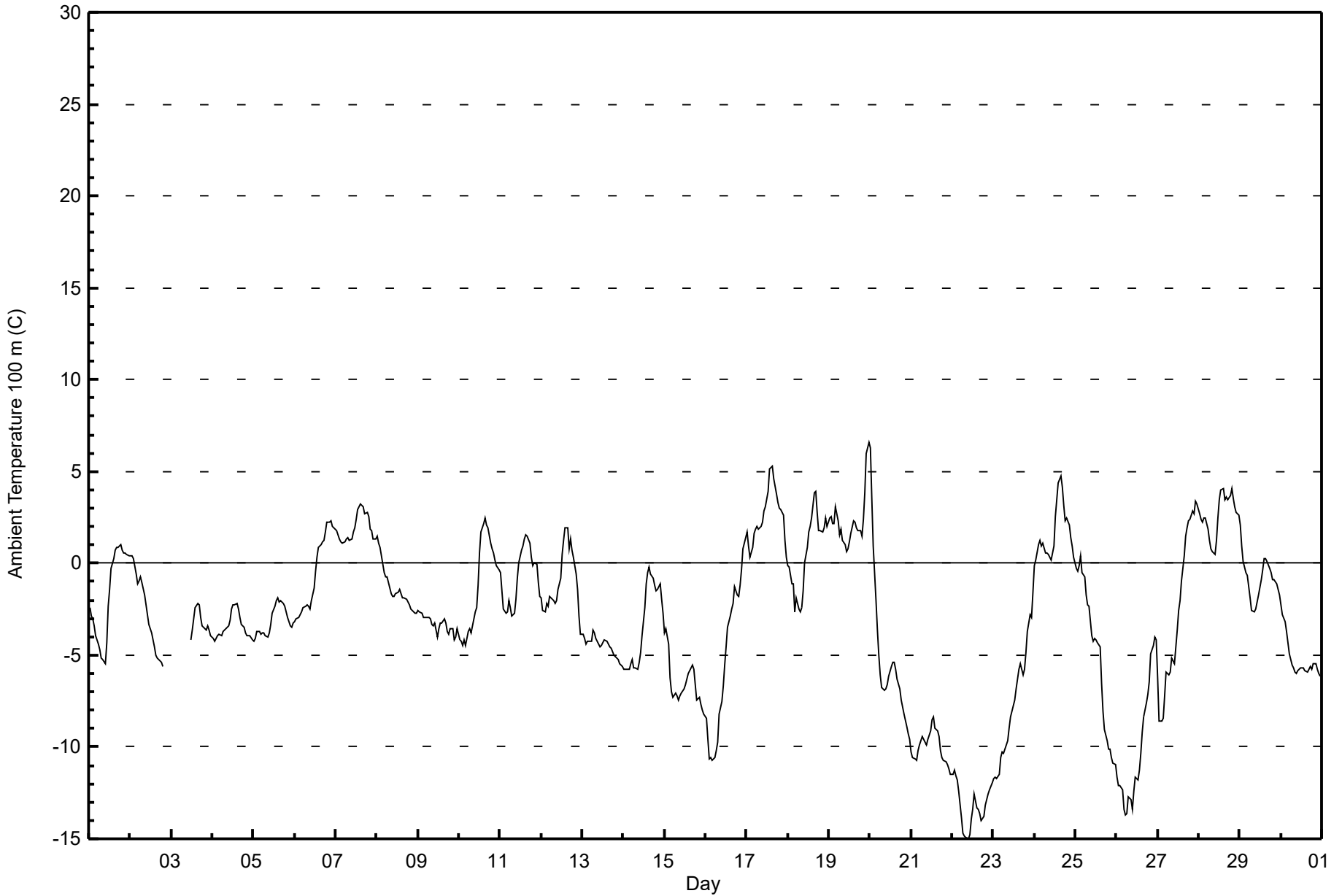
**Ambient Temperature 100 m (AT100m) - C**  
**Lower Camp Met Tower - November 2023**

Maximum Value: 6.6 C on Nov 20 00:00		Maximum Daily Average: 2.6 C on Nov 28		Hours in Service: 720																							
Minimum Value: -15.0 C on Nov 22 10:00		Minimum Daily Average: -13.2 C on Nov 22		Hours of Data: 705																							
Maximum Diurnal Average: -1.8 C at hour 16		Minimum Diurnal Average: -4.2 C at hour 9		Hours of Missing Data: 15																							
Monthly Average: -3.01 C		Percentiles: P <sub>1</sub> = -13.8 P <sub>10</sub> = -9.8 Q <sub>1</sub> = -5.5 Median = -2.6 Q <sub>3</sub> = 0.6 P <sub>90</sub> = 2.3 P <sub>99</sub> = 4.6		Hours of Calibration: 0																							
				Percent Operational Time: 97.9																							
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Nov	-2.4	-2.9	-3.0	-3.4	-3.9	-4.4	-4.7	-5.2	-5.2	-5.5	-4.3	-2.4	-1.4	-0.3	0.2	0.7	0.8	0.8	1.0	0.7	0.6	0.6	0.5	0.4	-1.8	1.0	
2-Nov	0.4	0.4	0.3	-0.6	-1.1	-0.9	-0.7	-1.1	-1.8	-2.3	-2.8	-3.4	-3.8	-4.2	-4.6	-5.0	-5.2	-5.4	-5.4	-5.6	DF	DF	DF	DF	-2.6	0.4	
3-Nov	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	-4.2	-3.7	-3.1	-2.5	-2.2	-2.2	-2.9	-3.4	-3.5	-3.6	-3.4	-3.7	-4.0	--	-2.2	
4-Nov	-4.1	-4.2	-4.1	-3.9	-3.9	-3.9	-3.7	-3.7	-3.5	-3.4	-3.1	-2.5	-2.3	-2.3	-2.2	-2.5	-3.0	-3.3	-3.5	-3.8	-4.0	-3.9	-3.9	-4.2	-3.4	-2.2	
5-Nov	-4.3	-4.1	-3.7	-3.7	-3.9	-3.8	-3.8	-4.0	-4.0	-3.8	-3.3	-2.8	-2.3	-2.1	-1.9	-2.1	-2.1	-2.2	-2.3	-2.7	-3.0	-3.4	-3.5	-3.2	-3.2	-1.9	
6-Nov	-3.2	-3.0	-2.9	-2.8	-2.7	-2.5	-2.4	-2.3	-2.4	-2.5	-2.0	-1.4	-0.4	0.3	0.8	1.0	1.2	1.3	1.7	2.3	2.3	2.3	2.0	1.9	-0.6	2.3	
7-Nov	1.8	1.6	1.3	1.2	1.1	1.2	1.3	1.4	1.2	1.3	1.7	1.9	2.4	2.9	3.2	3.1	3.0	2.7	2.8	2.5	1.8	1.8	1.3	1.3	1.9	3.2	
8-Nov	1.5	1.1	0.9	0.0	-0.5	-0.7	-0.8	-1.0	-1.6	-1.8	-1.8	-1.7	-1.6	-1.4	-1.6	-1.9	-1.9	-2.0	-2.1	-2.3	-2.5	-2.6	-2.7	-2.7	-1.3	1.5	
9-Nov	-2.6	-2.6	-2.7	-2.9	-2.9	-2.9	-3.0	-3.0	-3.4	-3.4	-3.3	-4.0	-3.6	-3.3	-3.3	-3.1	-3.2	-3.7	-3.8	-3.5	-3.5	-4.2	-4.0	-3.6	-3.3	-2.6	
10-Nov	-4.2	-4.3	-4.5	-4.1	-4.5	-3.7	-3.6	-3.8	-3.4	-2.6	-2.4	-1.2	0.6	1.7	2.2	2.5	2.1	2.0	1.1	0.8	0.5	0.2	-0.1	-0.4	-1.2	2.5	
11-Nov	-0.5	-1.5	-2.5	-2.7	-2.6	-2.1	-2.4	-2.9	-2.7	-2.0	-0.8	0.0	0.7	1.0	1.3	1.6	1.5	1.1	0.3	-0.1	0.0	-0.1	-1.1	-1.8	-0.8	1.6	
12-Nov	-1.9	-2.5	-2.7	-2.2	-2.3	-1.8	-2.0	-2.0	-2.2	-2.0	-1.4	-0.8	0.5	1.3	2.0	1.9	0.8	1.3	0.7	0.3	-0.6	-1.5	-2.9	-3.9	-1.0	2.0	
13-Nov	-3.9	-4.1	-4.4	-4.2	-4.2	-4.2	-3.6	-3.8	-4.1	-4.4	-4.5	-4.5	-4.3	-4.1	-4.2	-4.4	-4.6	-4.7	-5.0	-5.1	-5.1	-5.3	-5.4	-5.6	-4.5	-3.6	
14-Nov	-5.8	-5.8	-5.8	-5.8	-5.4	-5.3	-5.7	-5.7	-5.7	-5.4	-4.8	-4.0	-2.5	-1.1	-0.5	-0.2	-0.6	-0.8	-1.2	-1.5	-1.5	-1.1	-2.0	-2.7	-3.4	-0.2	
15-Nov	-3.8	-3.6	-4.4	-6.2	-7.0	-7.3	-7.1	-7.2	-7.4	-7.2	-7.1	-6.9	-6.6	-6.3	-6.0	-5.7	-5.6	-5.8	-6.6	-7.5	-7.3	-7.7	-7.9	-8.2	-6.5	-3.6	
16-Nov	-8.5	-9.6	-10.6	-10.6	-10.7	-10.6	-10.2	-9.8	-8.2	-7.5	-6.7	-5.5	-4.6	-3.5	-2.9	-2.5	-2.2	-1.3	-1.7	-1.8	-1.2	-0.4	0.8	1.4	-5.3	1.4	
17-Nov	1.7	0.9	0.4	0.8	1.6	1.9	2.0	1.8	2.0	2.2	2.8	3.1	3.9	5.1	5.2	5.3	4.6	3.8	3.3	3.0	3.0	2.6	1.3	0.4	2.6	5.3	
18-Nov	-0.2	-0.2	-1.1	-1.1	-2.6	-1.9	-2.5	-2.6	-2.4	-1.5	0.0	0.9	1.7	2.0	2.5	3.8	3.9	2.7	1.8	1.8	1.7	1.9	2.4	2.0	0.5	3.9	
19-Nov	2.5	2.5	2.1	2.2	3.1	2.3	1.6	1.8	1.3	1.0	0.6	0.8	1.1	1.6	2.3	2.3	1.9	1.8	1.8	1.5	2.4	3.8	6.0	6.6	2.3	6.6	
20-Nov	6.3	3.6	1.0	-2.0	-3.6	-5.0	-6.1	-6.8	-6.9	-6.9	-6.6	-6.1	-5.6	-5.4	-5.4	-5.7	-6.3	-6.8	-7.4	-7.8	-8.2	-8.9	-9.2	-9.6	-5.2	6.3	
21-Nov	-10.3	-10.6	-10.7	-10.7	-10.2	-9.9	-9.4	-9.6	-9.7	-9.9	-9.6	-9.1	-8.5	-8.3	-9.0	-9.1	-9.5	-10.2	-10.6	-10.7	-10.8	-10.9	-11.2	-11.5	-10.0	-8.3	
22-Nov	-11.5	-11.3	-11.6	-11.8	-12.4	-13.8	-14.7	-14.8	-14.9	-15.0	-14.8	-14.0	-13.4	-12.6	-13.3	-13.4	-13.7	-14.0	-13.8	-13.2	-12.8	-12.5	-12.4	-12.0	-13.2	-11.3	
23-Nov	-11.7	-11.6	-11.7	-11.5	-10.6	-10.3	-10.4	-10.1	-9.7	-9.0	-8.4	-8.1	-7.4	-6.8	-6.3	-5.8	-5.5	-6.1	-5.7	-4.8	-3.7	-2.8	-2.9	-1.6	-7.6	-1.6	
24-Nov	-0.1	0.2	1.0	1.3	0.9	1.1	0.6	0.6	0.5	0.3	0.2	1.0	2.5	3.4	4.4	4.8	4.1	3.1	2.3	2.5	2.1	1.4	0.9	0.3	1.6	4.8	
25-Nov	-0.3	-0.4	-0.1	0.4	-0.5	-0.8	-1.8	-2.3	-2.3	-4.0	-4.3	-4.1	-4.2	-4.3	-4.5	-6.5	-8.1	-9.0	-9.6	-10.1	-10.2	-10.6	-10.9	-11.0	-5.0	0.4	
26-Nov	-11.7	-12.1	-12.1	-12.3	-13.4	-13.7	-13.6	-12.7	-12.9	-13.4	-12.4	-11.7	-11.8	-11.2	-10.4	-9.2	-8.3	-7.6	-7.2	-6.5	-4.9	-4.5	-4.0	-4.2	-10.1	-4.0	
27-Nov	-6.3	-8.6	-8.6	-8.5	-7.2	-6.0	-6.1	-5.9	-5.2	-5.4	-5.5	-3.6	-2.6	-2.0	-0.9	0.4	1.4	2.0	2.3	2.4	2.8	2.7	3.4	3.2	-2.6	3.4	
28-Nov	2.7	2.4	2.2	2.4	2.5	1.9	1.2	0.8	0.6	0.5	1.2	2.5	3.5	4.0	4.1	3.4	3.6	3.5	3.7	4.0	3.5	3.0	2.8	2.6	2.6	4.1	
29-Nov	2.1	0.9	0.1	-0.5	-0.7	-1.2	-1.9	-2.6	-2.7	-2.5	-2.1	-1.7	-0.9	-0.3	0.3	0.3	0.1	-0.3	-0.5	-0.9	-0.9	-1.2	-1.4	-1.8	-0.8	2.1	
30-Nov	-2.3	-2.8	-3.2	-3.7	-4.3	-4.9	-5.5	-5.7	-5.9	-6.0	-5.9	-5.7	-5.7	-5.7	-5.9	-5.9	-5.8	-5.6	-5.7	-5.5	-5.5	-5.8	-6.0	-6.2	-5.2	-2.3	
		-2.8	-3.2	-3.5	-3.7	-3.9	-3.9	-4.1	-4.2	-4.2	-4.2	-3.8	-3.3	-2.7	-2.2	-1.9	-1.8	-1.9	-2.2	-2.4	-2.5	-2.4	-2.4	-2.5	-2.7	Diurnal Average	
		6.3	3.6	2.2	2.4	3.1	2.3	2.0	1.8	2.0	2.2	2.8	3.1	3.9	5.1	5.2	5.3	4.6	3.8	3.7	4.0	3.5	3.8	6.0	6.6	Diurnal Maximum	
DF - DAS Failure																											



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

**Ambient Temperature 100 m (AT100m) - C**  
**Lower Camp Met Tower - November 2023**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Ambient Temperature 100 m (AT100m) - C  
Lower Camp Met Tower - November 2023**

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	0	0.00	0.00
-20 - 0	497	70.50	70.50
0 - 10	208	29.50	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 705

Total Number of Hours: 720



Wood Buffalo Environmental Association

Summary of Hour Averages

Ambient Temperature 163 m (AT163m) - C

Lower Camp Met Tower - November 2023

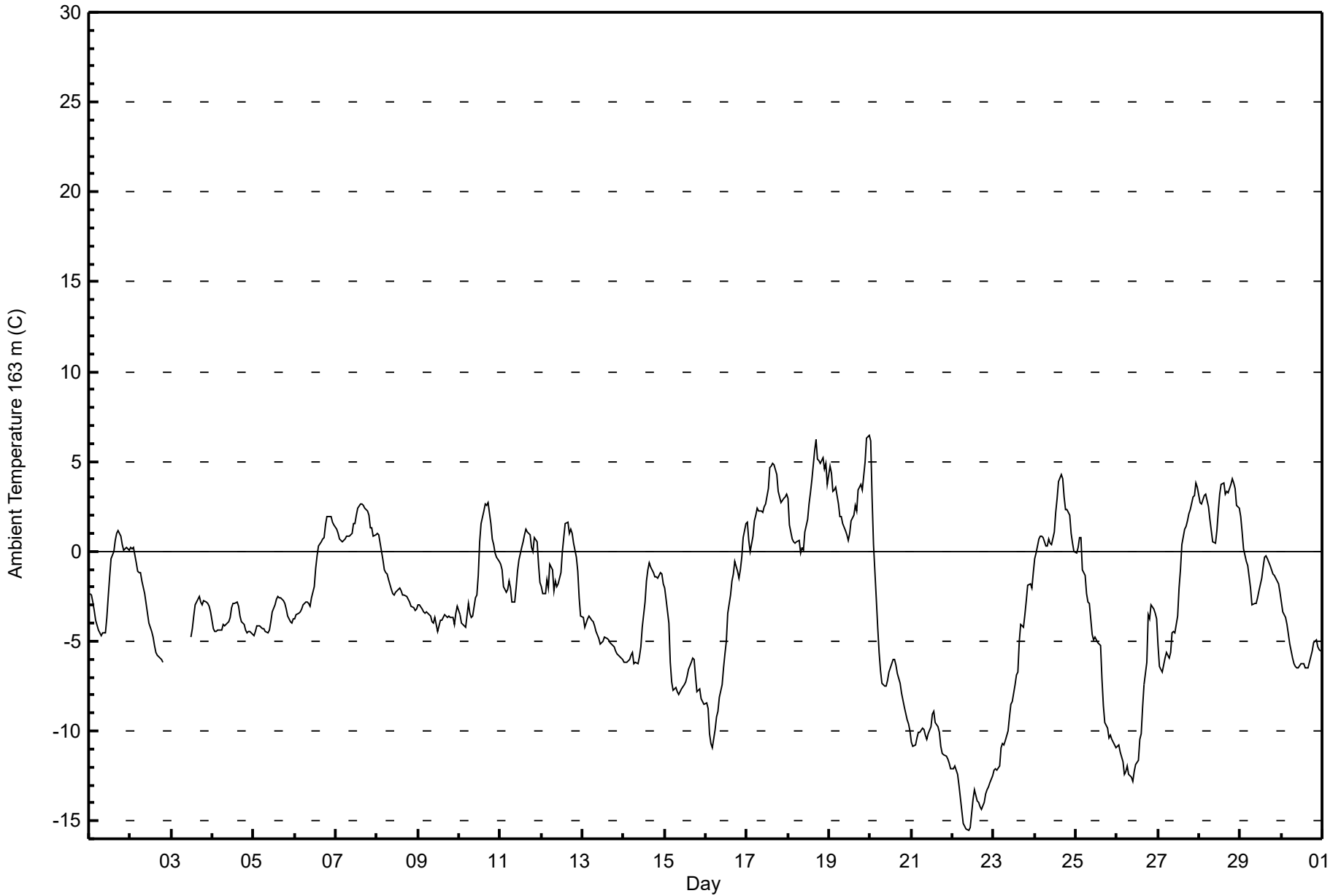
Maximum Value: 6.5 C on Nov 20 00:00																				Maximum Daily Average: 3.0 C on Nov 19					Hours in Service:	720
Minimum Value: -15.5 C on Nov 22 10:00																				Minimum Daily Average: -13.8 C on Nov 22					Hours of Data:	705
Maximum Diurnal Average: -2.0 C at hour 16																				Minimum Diurnal Average: -4.4 C at hour 10					Hours of Missing Data:	15
Monthly Average: -3.04 C																				Percentiles: P <sub>1</sub> = -14.4 P <sub>10</sub> = -10.1 Q <sub>1</sub> = -5.6 Median = -2.9 Q <sub>3</sub> = 0.6 P <sub>90</sub> = 2.6 P <sub>99</sub> = 5.1					Hours of Calibration:	0
																									Percent Operational Time:	97.9
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	-2.4	-2.5	-2.8	-3.3	-3.8	-4.4	-4.6	-4.7	-4.6	-4.6	-3.7	-2.5	-1.4	-0.4	0.0	0.6	1.0	1.2	0.9	0.3	0.1	0.1	0.2	0.1	-1.7	1.2
2-Nov	0.2	0.2	0.2	-0.6	-1.1	-1.2	-1.2	-1.6	-2.4	-2.9	-3.4	-4.0	-4.5	-4.8	-5.2	-5.6	-5.8	-6.0	-6.0	-6.2	DF	DF	DF	DF	-3.1	0.2
3-Nov	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	-4.8	-4.3	-3.6	-3.0	-2.6	-2.5	-2.8	-3.0	-2.8	-2.9	-3.1	-3.4	--	-2.5
4-Nov	-4.3	-4.5	-4.5	-4.4	-4.4	-4.4	-4.1	-4.1	-4.0	-3.9	-3.7	-3.1	-2.9	-2.9	-2.8	-3.1	-3.6	-3.9	-4.1	-4.4	-4.5	-4.5	-4.4	-4.6	-4.0	-2.8
5-Nov	-4.7	-4.4	-4.1	-4.1	-4.3	-4.3	-4.3	-4.5	-4.5	-4.4	-3.9	-3.4	-3.0	-2.7	-2.5	-2.6	-2.6	-2.7	-2.9	-3.2	-3.6	-3.9	-4.0	-3.8	-3.7	-2.5
6-Nov	-3.8	-3.6	-3.5	-3.4	-3.2	-3.0	-2.8	-2.8	-2.9	-3.0	-2.6	-1.9	-1.0	-0.2	0.3	0.5	0.7	0.8	1.5	2.0	1.9	1.9	1.6	1.5	-1.0	2.0
7-Nov	1.3	1.0	0.7	0.6	0.5	0.7	0.8	0.9	0.8	1.0	1.5	1.6	2.0	2.4	2.6	2.6	2.4	2.3	2.0	1.3	1.3	0.9	0.9	1.4	2.6	
8-Nov	1.0	0.9	0.5	-0.5	-1.0	-1.2	-1.3	-1.6	-2.1	-2.3	-2.4	-2.2	-2.1	-2.0	-2.2	-2.4	-2.4	-2.5	-2.7	-2.8	-3.0	-3.2	-3.3	-3.2	-1.8	1.0
9-Nov	-3.0	-3.0	-3.2	-3.4	-3.5	-3.4	-3.5	-3.6	-3.9	-4.0	-3.7	-4.5	-4.1	-3.8	-3.8	-3.5	-3.6	-3.7	-3.6	-3.7	-3.6	-4.1	-3.4	-3.1	-3.6	-3.0
10-Nov	-3.5	-4.0	-4.0	-4.1	-4.2	-2.9	-3.4	-3.6	-3.6	-2.6	-2.5	-1.3	0.6	1.6	2.2	2.7	2.5	2.7	1.5	0.7	0.4	-0.1	-0.3	-0.6	-1.1	2.7
11-Nov	-0.7	-1.1	-1.9	-2.3	-2.1	-1.6	-2.0	-2.8	-2.9	-2.0	-1.1	-0.4	0.2	0.5	0.9	1.2	1.1	0.9	0.3	0.0	0.8	0.5	-0.7	-1.7	-0.7	1.2
12-Nov	-1.9	-2.3	-2.3	-1.5	-2.1	-0.7	-1.0	-2.2	-1.7	-2.0	-1.8	-1.2	0.0	0.8	1.5	1.6	1.0	1.2	1.0	0.5	-0.3	-1.1	-2.6	-3.6	-0.9	1.6
13-Nov	-3.7	-4.2	-4.0	-3.8	-3.6	-3.8	-3.9	-4.2	-4.5	-4.9	-5.1	-5.1	-5.0	-4.8	-4.8	-5.0	-5.1	-5.2	-5.4	-5.5	-5.7	-5.8	-5.9	-6.0	-4.8	-3.6
14-Nov	-6.2	-6.2	-6.1	-6.0	-5.8	-5.6	-6.2	-6.2	-6.2	-5.9	-5.3	-4.2	-2.8	-1.7	-1.1	-0.7	-0.9	-1.2	-1.4	-1.4	-1.5	-1.1	-1.3	-1.8	-3.6	-0.7
15-Nov	-2.1	-2.7	-4.0	-6.2	-7.3	-7.7	-7.6	-7.8	-8.0	-7.8	-7.7	-7.5	-7.2	-7.0	-6.6	-6.2	-5.9	-6.0	-7.0	-7.8	-7.6	-8.2	-8.3	-8.5	-6.8	-2.1
16-Nov	-8.4	-8.7	-10.1	-10.7	-10.9	-9.9	-9.2	-8.9	-8.2	-7.4	-6.5	-5.7	-5.0	-3.4	-2.4	-1.7	-1.3	-0.6	-1.1	-1.5	-1.1	-0.3	0.7	1.5	-5.0	1.5
17-Nov	1.6	0.6	0.0	0.8	1.7	2.0	2.4	2.2	2.3	2.2	2.5	2.7	3.5	4.7	4.7	4.9	4.8	4.3	3.3	3.0	2.7	2.9	3.0	3.2	2.8	4.9
18-Nov	3.0	1.5	0.6	0.6	0.4	0.6	0.6	-0.1	0.2	0.1	1.1	1.8	2.6	3.3	3.9	5.6	6.2	5.1	5.1	4.9	5.2	4.6	4.9	3.7	2.7	6.2
19-Nov	4.7	4.3	3.3	3.4	3.6	2.6	1.9	1.9	1.5	1.2	0.9	0.6	1.0	1.7	2.0	2.6	2.3	3.4	3.7	3.4	4.2	5.0	6.3	6.5	3.0	6.5
20-Nov	6.2	3.0	0.3	-2.6	-4.3	-5.6	-6.7	-7.3	-7.5	-7.5	-7.2	-6.8	-6.2	-6.0	-6.0	-6.3	-6.8	-7.3	-7.9	-8.3	-8.7	-9.4	-9.6	-10.0	-5.8	6.2
21-Nov	-10.6	-10.9	-10.8	-10.4	-10.0	-10.1	-9.8	-9.9	-10.2	-10.5	-10.2	-9.7	-9.1	-8.9	-9.6	-9.8	-10.1	-10.9	-11.2	-11.3	-11.4	-11.6	-11.8	-12.1	-10.4	-8.9
22-Nov	-12.1	-11.9	-12.2	-12.4	-13.0	-14.4	-15.2	-15.3	-15.4	-15.5	-15.4	-14.6	-13.9	-13.3	-13.9	-14.0	-14.2	-14.4	-14.0	-13.5	-13.3	-13.1	-12.9	-12.5	-13.8	-11.9
23-Nov	-12.2	-12.1	-12.2	-11.9	-11.0	-10.7	-10.8	-10.5	-10.0	-9.2	-8.5	-8.4	-7.5	-6.9	-6.7	-5.0	-4.1	-4.2	-3.5	-2.8	-1.9	-1.8	-2.0	-1.2	-7.3	-1.2
24-Nov	-0.4	-0.1	0.7	0.9	0.8	0.8	0.3	0.3	0.7	0.5	0.3	1.1	2.1	3.0	3.9	4.3	4.0	3.0	2.3	2.3	2.0	1.0	0.5	0.0	1.4	4.3
25-Nov	-0.1	0.2	0.8	0.8	-1.0	-1.3	-2.4	-2.8	-2.9	-4.6	-4.9	-4.8	-4.9	-5.1	-5.2	-7.1	-8.6	-9.5	-9.9	-10.4	-10.2	-10.4	-10.6	-10.9	-5.2	0.8
26-Nov	-10.9	-10.8	-11.2	-11.7	-12.4	-12.3	-11.9	-12.5	-12.6	-12.8	-12.3	-11.9	-11.6	-10.5	-10.2	-8.7	-7.4	-6.2	-3.5	-3.8	-3.0	-3.2	-3.5	-3.8	-9.1	-3.0
27-Nov	-5.2	-6.4	-6.7	-6.4	-5.9	-5.6	-6.0	-5.6	-4.5	-4.4	-4.5	-3.6	-2.0	-1.0	0.4	1.2	1.4	1.7	2.1	2.3	3.0	3.1	3.8	3.6	-1.9	3.8
28-Nov	2.7	2.6	2.8	3.1	3.2	2.5	1.8	1.1	0.5	0.4	1.1	2.2	3.2	3.7	3.8	3.2	3.3	3.2	3.8	4.0	3.8	3.5	2.6	2.4	2.7	4.0
29-Nov	2.0	1.1	0.1	-0.5	-0.8	-1.4	-2.0	-3.0	-2.9	-2.9	-2.6	-2.2	-1.5	-0.9	-0.3	-0.3	-0.4	-0.8	-1.1	-1.3	-1.4	-1.7	-1.8	-2.3	-1.2	2.0
30-Nov	-2.8	-3.3	-3.6	-4.0	-4.6	-5.1	-5.9	-6.2	-6.4	-6.5	-6.5	-6.3	-6.3	-6.3	-6.5	-6.5	-6.2	-5.8	-5.5	-5.1	-4.9	-5.3	-5.5	-5.6	-5.5	-2.8
																				-2.6 -3.0 -3.3 -3.6 -3.8 -3.8 -4.1 -4.3 -4.3 -4.4 -4.1 -3.7 -3.0 -2.5 -2.2 -2.0 -2.0 -2.1 -2.2 -2.3 -2.2 -2.3 -2.4 -2.6					Diurnal Average	
																				6.2 4.3 3.3 3.4 3.6 2.6 2.4 2.2 2.3 2.2 2.5 2.7 3.5 4.7 4.7 5.6 6.2 5.1 5.1 4.9 5.2 5.0 6.3 6.5					Diurnal Maximum	
DF - DAS Failure																										





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

**Ambient Temperature 163 m (AT163m) - C**  
**Lower Camp Met Tower - November 2023**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Ambient Temperature 163 m (AT163m) - C  
Lower Camp Met Tower - November 2023**

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	0	0.00	0.00
-20 - 0	493	69.93	69.93
0 - 10	212	30.07	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 705

Total Number of Hours: 720



Maximum Value: 97.4 % on Nov 19 09:00	Maximum Daily Average: 94.1 % on Nov 8	Hours in Service: 720
Minimum Value: 44.7 % on Nov 20 15:00	Minimum Daily Average: 55.5 % on Nov 20	Hours of Data: 705
Maximum Diurnal Average: 83.7 % at hour 5	Minimum Diurnal Average: 73.5 % at hour 14	Hours of Missing Data: 15
Monthly Average: 80.41 %	Percentiles: P <sub>1</sub> = 49.5 P <sub>10</sub> = 64.9 Q <sub>1</sub> = 74.0 Median = 82.6 Q <sub>3</sub> = 88.5 P <sub>90</sub> = 92.5 P <sub>99</sub> = 95.8	Hours of Calibration: 0
		Percent Operational Time: 97.9

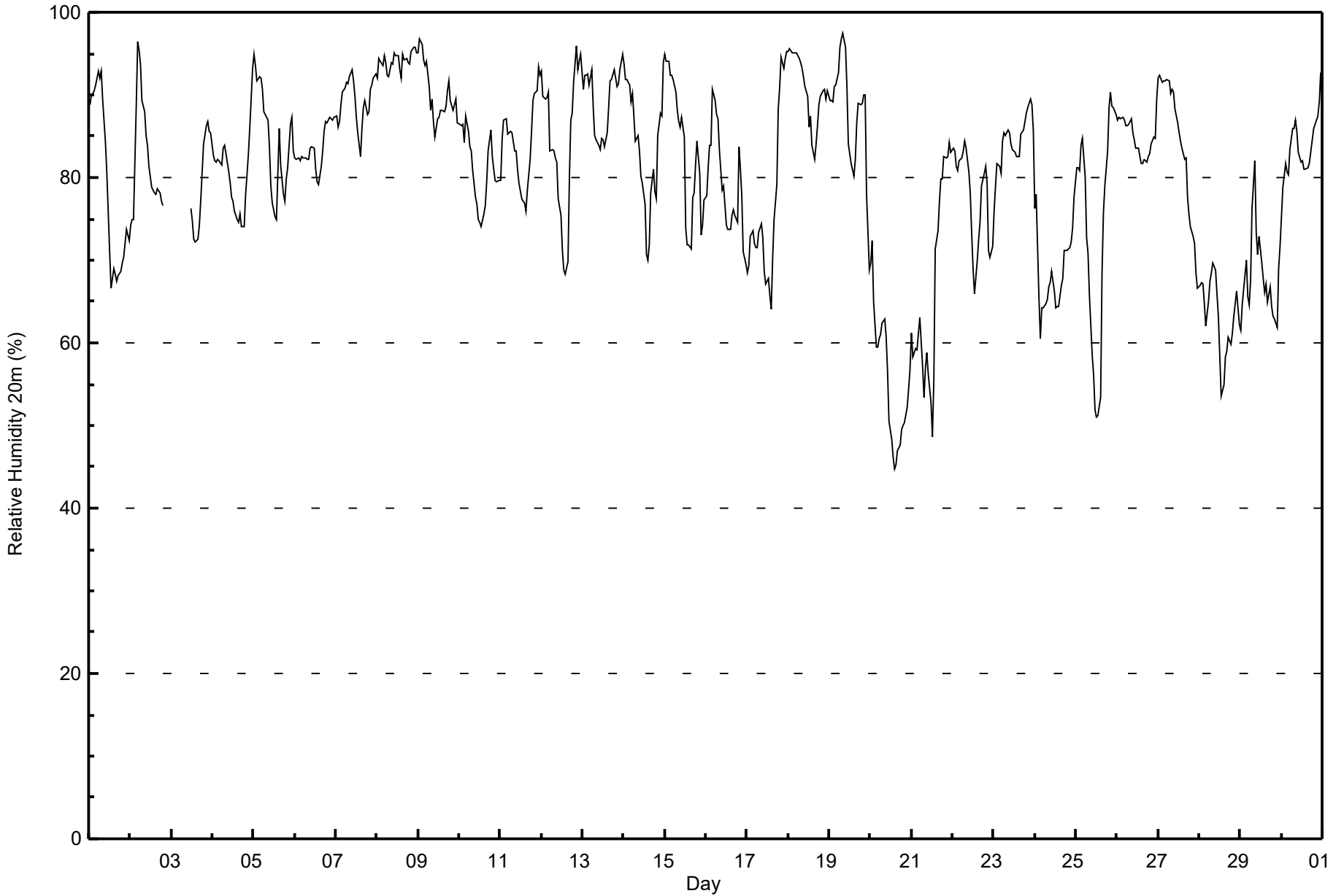
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	88.8	90.1	90.1	90.5	91.2	92.9	92.1	92.9	89.5	84.2	80.5	75.8	71.0	66.5	69.0	68.2	67.5	68.2	68.6	69.6	70.4	72.0	73.7	72.3	79.0	92.9
2-Nov	74.2	74.9	74.9	88.8	96.4	95.4	93.7	89.4	88.1	85.2	83.9	81.3	78.7	78.4	78.2	77.9	78.6	78.1	77.1	76.6	DF	DF	DF	DF	82.5	96.4
3-Nov	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	76.3	74.8	72.5	72.2	72.6	74.3	77.4	80.7	84.0	86.3	86.8	85.6	85.4	--	86.8
4-Nov	82.7	82.0	81.8	82.3	82.0	81.5	83.6	83.9	82.8	80.7	79.4	77.6	77.2	76.0	75.0	74.6	75.6	74.1	74.1	78.0	80.4	82.9	86.2	93.3	80.3	93.3
5-Nov	94.9	93.6	91.7	92.2	92.0	90.7	88.0	87.7	86.9	83.7	79.1	77.0	75.3	74.9	80.5	85.9	81.6	77.9	77.1	79.9	81.2	86.5	87.3	83.2	84.5	94.9
6-Nov	82.4	82.2	82.4	82.1	82.6	82.4	82.4	82.2	82.3	83.6	83.8	83.5	81.1	79.5	79.1	81.4	83.2	85.5	86.9	86.6	87.3	87.1	86.9	87.3	83.5	87.3
7-Nov	87.5	86.1	86.8	88.7	90.3	90.9	91.5	91.4	92.2	93.0	91.7	89.9	87.3	85.4	82.5	85.9	88.6	89.3	87.6	88.0	90.7	91.2	92.0	92.5	89.2	93.0
8-Nov	92.1	94.4	94.1	93.5	94.8	93.9	92.3	92.2	94.0	93.8	95.1	94.7	94.7	93.0	92.1	94.9	94.2	94.4	93.9	93.7	95.2	95.8	95.8	95.0	94.1	95.8
9-Nov	95.1	96.7	96.2	94.2	93.5	94.1	91.0	88.1	89.6	86.7	84.9	87.2	87.2	88.1	88.2	88.0	88.6	90.6	91.7	89.3	88.1	88.8	89.5	86.6	90.1	96.7
10-Nov	86.5	86.2	86.5	84.3	87.4	85.6	83.7	83.2	80.9	77.6	76.8	74.9	74.5	74.0	75.5	76.5	79.5	83.3	85.8	82.6	81.0	79.6	79.4	79.7	81.0	87.4
11-Nov	79.7	84.5	86.9	87.1	85.3	85.4	85.6	85.4	83.2	83.2	81.1	79.3	77.5	77.1	76.9	75.9	78.4	82.2	85.6	89.3	90.1	90.5	93.5	92.4	84.0	93.5
12-Nov	92.8	89.9	89.5	89.7	90.4	83.3	83.4	83.1	82.4	81.9	77.5	75.5	71.2	68.9	68.3	69.9	80.0	87.0	87.8	91.5	95.9	93.0	94.1	94.9	84.2	95.9
13-Nov	90.7	92.4	92.4	92.5	91.2	93.1	88.5	85.2	84.6	83.9	83.3	84.7	84.6	83.8	85.5	88.5	91.7	91.9	93.0	92.0	90.9	91.3	93.1	94.8	89.3	94.8
14-Nov	93.8	91.9	91.9	91.2	89.1	90.1	87.5	84.5	85.1	83.2	80.2	79.3	76.7	70.6	70.1	71.8	78.2	81.1	78.3	77.5	85.2	87.8	87.5	93.9	83.6	93.9
15-Nov	94.9	94.2	94.1	92.4	92.4	91.8	90.4	88.1	86.8	86.2	87.3	84.9	73.9	71.8	71.8	71.4	77.7	78.1	81.5	84.4	80.6	73.1	74.3	77.3	83.3	94.9
16-Nov	77.9	81.2	83.8	83.9	90.6	89.3	87.7	87.2	83.4	78.5	79.0	76.7	74.2	73.7	73.7	75.4	76.1	75.4	74.7	83.8	80.9	77.7	71.0	69.5	79.4	90.6
17-Nov	68.5	69.3	72.9	73.6	72.1	71.5	71.5	73.5	74.4	72.7	68.7	67.1	67.7	65.8	64.0	70.2	74.9	79.1	88.3	90.9	94.6	93.3	94.5	95.2	76.4	95.2
18-Nov	95.3	95.5	95.2	95.2	95.1	95.0	94.4	93.9	93.2	92.2	91.1	89.9	86.1	87.5	83.9	82.2	84.0	86.3	88.8	89.8	90.4	90.6	89.6	90.5	90.7	95.5
19-Nov	89.3	89.3	89.1	91.0	91.2	92.7	95.7	96.7	97.4	95.7	91.0	84.0	82.8	81.7	80.2	82.3	86.6	89.0	88.8	89.0	89.9	89.9	78.0	68.8	87.9	97.4
20-Nov	69.7	72.3	65.0	59.5	59.5	60.5	61.0	62.3	62.9	60.6	56.4	50.6	48.3	46.1	44.7	45.3	46.9	47.6	49.5	50.0	50.4	52.2	54.4	56.8	55.5	72.3
21-Nov	61.2	58.3	59.3	59.1	61.1	63.0	57.1	53.3	57.0	58.8	56.2	52.7	48.7	55.4	71.3	73.6	77.1	79.8	79.9	82.6	82.4	82.5	84.2	83.0	66.6	84.2
22-Nov	83.5	83.2	81.3	80.8	82.1	82.4	83.2	84.4	83.6	80.7	78.1	73.1	69.0	65.9	70.0	72.5	74.8	79.0	80.4	81.4	79.2	71.2	70.3	71.7	77.6	84.4
23-Nov	76.0	79.0	81.6	81.3	80.5	84.3	85.4	85.1	85.8	85.4	84.1	83.3	83.1	82.5	82.5	82.6	85.2	85.7	86.9	87.8	88.4	89.4	88.9	85.6	84.2	89.4
24-Nov	76.2	77.9	65.5	60.5	64.2	64.2	64.8	65.3	66.7	67.3	68.6	66.3	64.3	64.4	64.3	67.0	67.9	71.2	71.2	71.1	71.6	72.2	73.9	77.6	68.5	77.9
25-Nov	81.2	81.3	80.9	83.9	84.7	80.0	72.8	70.8	65.8	58.6	56.1	51.8	51.0	51.1	53.4	68.5	75.7	79.0	83.2	88.5	90.4	88.6	88.4	87.7	73.9	90.4
26-Nov	86.9	87.2	87.2	87.2	86.9	86.3	86.3	86.4	87.1	85.4	84.5	83.5	83.6	82.5	81.7	81.8	82.1	81.9	82.5	82.9	84.1	85.0	84.7	89.5	84.9	89.5
27-Nov	92.1	92.4	91.5	91.7	91.6	91.8	91.7	90.3	90.7	90.4	88.4	86.7	85.4	84.4	83.6	82.2	82.3	77.6	75.6	74.0	72.8	72.0	68.4	66.7	83.9	92.4
28-Nov	67.0	67.3	67.1	64.7	62.0	65.1	67.4	68.5	69.7	68.7	66.0	63.2	58.5	53.5	54.9	58.4	58.9	60.8	59.9	61.2	63.3	64.8	66.3	62.3	63.3	69.7
29-Nov	61.5	64.5	66.5	70.0	65.6	64.6	67.6	76.3	82.1	73.4	70.7	72.8	69.7	67.9	66.1	67.2	64.8	66.9	64.4	63.1	62.8	61.9	69.0	71.7	68.0	82.1
30-Nov	75.3	78.8	81.7	80.7	80.4	83.4	85.9	85.9	86.9	85.6	83.1	81.8	82.0	81.1	81.0	81.2	81.9	83.2	84.6	86.0	87.0	87.4	89.2	92.8	83.6	92.8
	82.7	83.3	83.0	83.2	83.7	83.6	83.0	82.7	82.6	80.7	78.8	76.8	74.7	73.5	74.0	75.8	77.9	79.4	80.3	81.5	82.5	82.2	82.4	82.7		Diurnal Average
	95.3	96.7	96.2	95.2	96.4	95.4	95.7	96.7	97.4	95.7	95.1	94.7	94.7	93.0	92.1	94.9	94.2	94.4	93.9	93.7	95.9	95.8	95.8	95.2		Diurnal Maximum

DF - DAS Failure



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

**Relative Humidity 20m (RH20m) - %**  
**Lower Camp Met Tower - November 2023**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Relative Humidity 20m (RH20m) - %  
Lower Camp Met Tower - November 2023**

<b>Concentration Ranges (%)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	0	0.00	0.00
20 - 40	0	0.00	0.00
40 - 60	39	5.53	5.53
60 - 80	236	33.48	39.01
80 - 100	430	60.99	100.00

Total Number of Valid Hours: 705

Total Number of Hours: 720



Maximum Value: 96.8 % on Nov 14 00:00	Maximum Daily Average: 93.3 % on Nov 8	Hours in Service: 720
Minimum Value: 45.4 % on Nov 20 15:00	Minimum Daily Average: 56.0 % on Nov 20	Hours of Data: 705
Maximum Diurnal Average: 84.1 % at hour 6	Minimum Diurnal Average: 74.5 % at hour 14	Hours of Missing Data: 15
Monthly Average: 80.72 %	Percentiles: P <sub>1</sub> = 49.5 P <sub>10</sub> = 65.5 Q <sub>1</sub> = 74.1 Median = 83.6 Q <sub>3</sub> = 88.5 P <sub>90</sub> = 92.8 P <sub>99</sub> = 96.0	Hours of Calibration: 0
		Percent Operational Time: 97.9

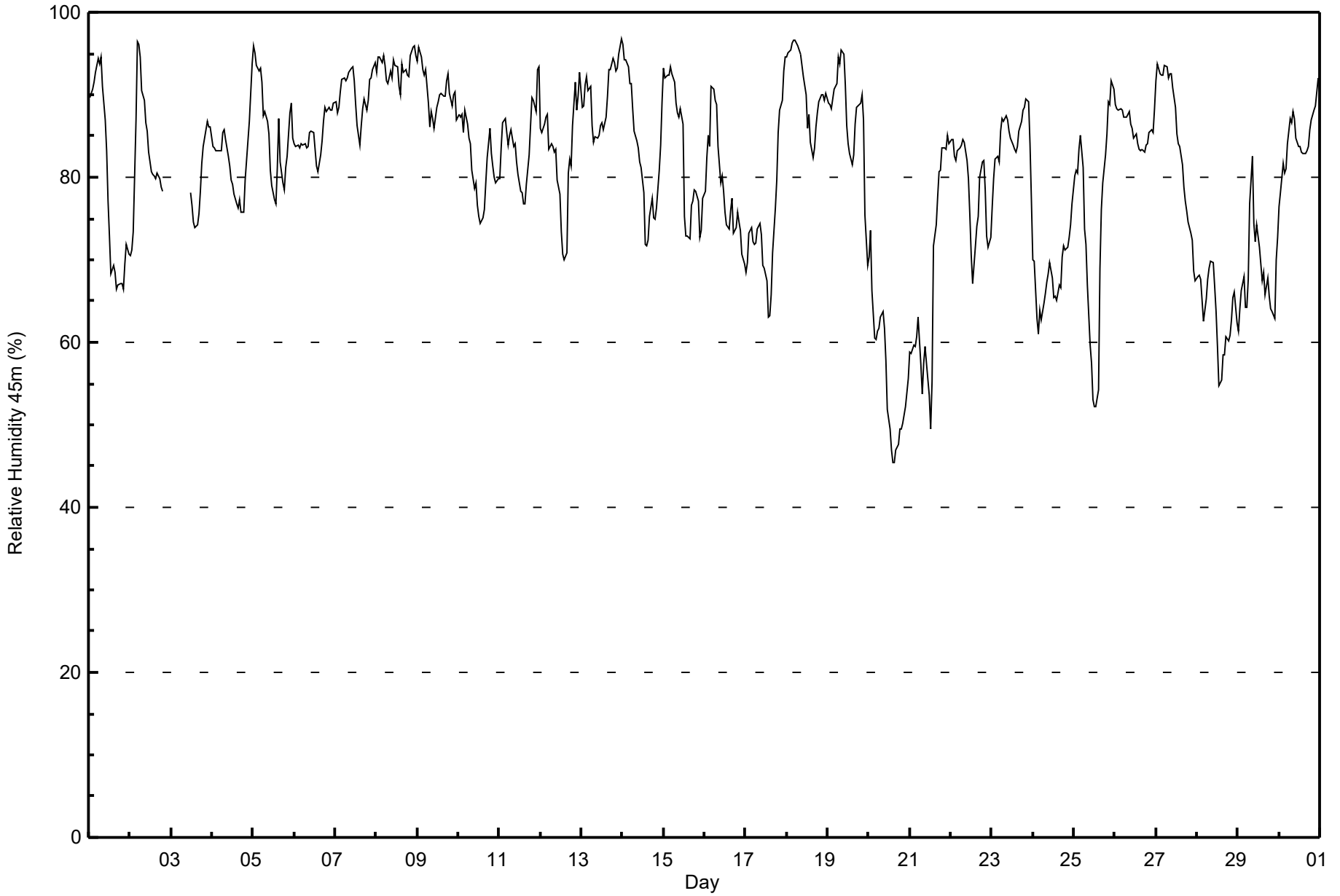
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	89.7	90.2	90.7	91.6	92.7	94.4	93.8	94.7	91.1	87.0	83.3	77.1	72.9	68.3	69.2	68.5	66.4	66.9	67.1	67.1	66.5	69.4	71.9	70.8	79.2	94.7
2-Nov	70.5	71.2	73.4	86.9	96.4	96.1	94.6	90.6	89.4	86.6	85.6	83.1	80.8	80.3	80.1	79.8	80.5	79.9	78.8	78.2	DF	DF	DF	DF	83.1	96.4
3-Nov	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	78.1	76.6	74.6	73.9	74.2	75.6	78.3	81.7	83.8	85.8	86.8	86.1	86.2	--	86.8
4-Nov	83.8	83.6	83.3	83.3	83.2	83.3	85.5	85.8	84.5	82.6	81.4	79.6	79.1	77.9	76.8	76.2	77.3	75.7	75.7	79.7	82.0	84.4	86.8	93.7	81.9	93.7
5-Nov	95.9	95.1	93.6	92.8	93.2	91.5	87.4	88.0	86.7	85.3	80.9	79.0	77.3	76.8	81.2	87.1	81.8	79.3	78.5	81.2	82.6	87.8	88.9	84.7	85.7	95.9
6-Nov	84.1	83.7	83.8	83.6	84.1	83.9	84.0	83.6	83.8	85.4	85.7	85.4	83.3	81.3	80.6	82.7	84.4	86.8	88.4	88.0	88.5	88.1	88.2	89.1	85.0	89.1
7-Nov	89.1	87.7	88.5	90.3	91.9	92.1	91.7	92.0	92.8	93.3	93.5	91.7	88.8	86.2	83.8	86.2	88.3	89.5	88.1	89.3	91.8	92.1	93.0	93.9	90.2	93.9
8-Nov	92.7	94.6	94.6	93.8	94.7	93.5	91.8	91.4	92.9	92.1	94.2	93.6	93.3	91.0	90.0	93.7	92.7	93.1	92.4	92.2	94.7	95.7	96.0	94.7	93.3	96.0
9-Nov	94.0	95.7	94.5	93.0	92.4	93.1	89.0	86.2	87.9	87.1	86.0	88.5	89.1	90.0	90.2	89.8	89.8	91.7	92.6	90.1	88.6	90.0	90.4	87.0	90.3	95.7
10-Nov	87.7	87.3	87.6	85.4	88.2	86.5	84.8	84.1	80.9	78.6	79.4	76.5	75.2	74.5	75.1	76.1	79.3	82.4	86.0	82.9	81.3	80.0	79.3	79.8	81.6	88.2
11-Nov	79.8	83.6	86.7	87.1	85.5	84.0	85.2	85.8	83.8	84.1	81.9	80.3	78.3	78.2	76.8	76.7	79.1	82.7	86.2	89.7	89.3	88.1	93.0	93.3	84.1	93.3
12-Nov	85.9	85.4	86.4	87.3	87.6	83.4	84.0	83.7	83.1	83.4	79.7	78.0	73.4	70.6	70.0	70.8	80.6	82.1	81.4	86.2	91.6	88.1	89.9	92.7	82.7	92.7
13-Nov	88.5	88.7	91.3	92.3	90.5	91.1	86.3	84.2	84.9	84.7	85.1	86.3	86.6	85.7	87.3	89.9	93.1	93.1	94.4	93.9	92.9	93.3	94.9	96.8	89.8	96.8
14-Nov	96.2	94.2	94.2	93.3	91.3	91.4	88.4	85.6	84.4	83.5	81.9	81.2	78.2	71.9	71.6	72.4	75.3	77.5	75.0	75.0	76.3	80.9	84.0	89.2	83.0	96.2
15-Nov	93.2	92.1	92.4	92.3	93.4	92.6	91.5	89.0	87.8	87.2	88.4	86.4	75.3	72.9	72.8	72.5	76.7	77.2	78.4	78.3	77.2	72.7	73.6	77.5	83.0	93.4
16-Nov	78.3	82.3	85.0	83.7	91.1	90.7	89.3	88.8	83.7	79.3	80.2	78.2	75.7	74.2	73.8	76.0	77.5	73.2	73.9	75.8	74.6	73.6	70.7	69.5	79.1	91.1
17-Nov	68.4	69.6	73.2	73.9	72.2	71.9	72.1	73.7	74.3	73.1	69.4	69.0	67.5	63.0	63.3	65.8	70.9	76.3	79.6	85.4	88.1	89.3	92.9	94.6	74.9	94.6
18-Nov	94.6	95.0	95.4	96.3	96.6	96.7	95.9	95.4	94.8	93.6	92.1	89.9	86.0	87.6	84.3	82.5	83.6	86.2	87.8	89.1	89.9	89.9	89.3	90.3	91.0	96.7
19-Nov	89.0	88.7	88.4	89.5	90.7	91.4	94.6	93.8	95.4	94.9	91.3	86.2	84.1	82.9	81.5	82.6	86.4	88.4	88.8	89.0	90.1	86.9	75.4	69.3	87.5	95.4
20-Nov	70.4	73.5	66.3	60.5	60.3	61.3	61.7	63.0	63.7	61.8	57.8	51.8	49.4	47.0	45.4	45.4	46.9	47.7	49.5	49.6	50.2	52.1	53.9	55.6	56.0	73.5
21-Nov	58.9	58.6	59.6	59.4	60.7	63.1	57.3	53.7	57.4	59.5	57.4	53.5	49.5	55.2	71.7	74.2	77.6	80.7	80.9	83.5	83.5	83.3	85.1	84.0	67.0	85.1
22-Nov	84.7	84.5	82.6	82.0	83.3	83.5	84.0	84.6	84.2	82.0	79.9	75.5	70.4	67.1	71.6	74.1	75.3	79.9	81.8	82.0	78.4	72.9	71.5	72.6	78.7	84.7
23-Nov	76.4	79.8	82.3	82.6	81.8	85.6	87.0	86.7	87.5	87.0	85.6	84.7	83.9	83.4	83.1	83.8	85.5	86.8	88.2	88.4	89.5	89.1	84.1	77.3	84.6	89.5
24-Nov	69.9	69.8	63.0	61.0	63.9	62.8	64.7	65.9	67.3	68.3	69.6	67.7	65.5	65.7	65.1	66.9	66.7	70.4	71.1	71.5	72.7	74.2	76.8	68.0	76.8	
25-Nov	80.1	80.9	80.4	83.4	85.1	81.2	73.7	71.9	67.0	59.7	57.5	53.1	52.3	52.2	54.2	68.9	76.1	79.4	82.7	85.2	89.2	88.8	91.6	90.6	74.4	91.6
26-Nov	88.9	88.4	88.1	88.3	88.1	87.3	87.3	87.2	88.0	86.4	85.9	84.7	85.3	84.1	83.4	83.3	83.4	83.1	83.9	84.1	85.4	85.8	85.4	88.2	86.0	88.9
27-Nov	91.7	93.8	92.6	92.3	92.4	93.6	93.4	92.1	92.6	92.6	90.9	88.5	85.3	84.0	83.7	81.5	78.8	77.2	76.0	74.6	73.2	72.4	68.6	67.4	84.5	93.8
28-Nov	67.9	68.1	67.6	65.0	62.5	65.3	67.7	69.0	69.9	69.7	66.7	63.7	59.5	54.8	55.4	58.5	58.4	60.7	60.2	60.9	62.7	65.4	66.2	62.3	63.7	69.9
29-Nov	61.4	64.1	66.2	67.9	64.2	64.2	67.6	76.8	82.6	74.5	72.2	74.2	71.6	69.6	67.5	68.4	65.8	67.9	65.6	64.0	63.8	62.9	70.0	72.7	68.6	82.6
30-Nov	76.4	78.2	81.7	80.6	80.9	84.0	87.1	86.6	88.0	87.1	84.8	83.7	83.8	83.1	82.8	82.9	83.2	83.7	85.7	86.9	88.1	88.7	90.3	92.1	84.6	92.1
	82.3	83.0	83.2	83.4	84.1	84.1	83.5	83.2	83.1	81.7	80.3	78.3	75.9	74.5	74.9	76.4	77.9	79.3	80.0	80.8	81.6	81.8	82.2	82.5		Diurnal Average
	96.2	95.7	95.4	96.3	96.6	96.7	95.9	95.4	95.4	94.9	94.2	93.6	93.3	91.0	90.2	93.7	93.1	93.1	94.4	93.9	94.7	95.7	96.0	96.8		Diurnal Maximum

DF - DAS Failure



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

**Relative Humidity 45m (RH45m) - %**  
**Lower Camp Met Tower - November 2023**





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

**Relative Humidity 45m (RH45m) - %**  
**Lower Camp Met Tower - November 2023**

<b>Concentration Ranges (%)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	0	0.00	0.00
20 - 40	0	0.00	0.00
40 - 60	37	5.25	5.25
60 - 80	233	33.05	38.30
80 - 100	435	61.70	100.00

Total Number of Valid Hours: 705

Total Number of Hours: 720





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

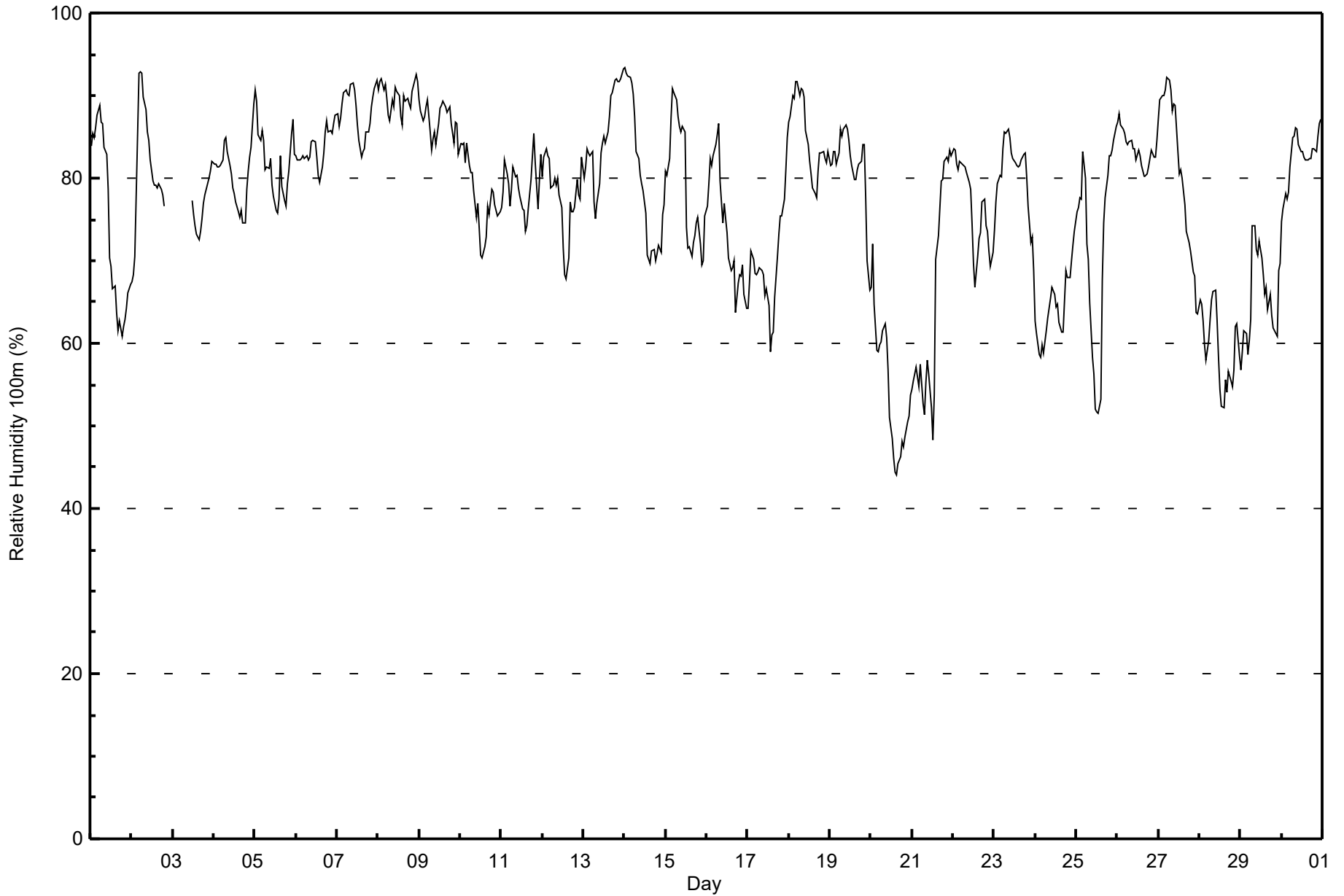
**Relative Humidity 100m (RH100m) - %**  
**Lower Camp Met Tower - November 2023**

Maximum Value: 93.5 % on Nov 14 01:00		Maximum Daily Average: 89.9 % on Nov 8		Hours in Service: 720																																												
Minimum Value: 44.1 % on Nov 20 16:00		Minimum Daily Average: 54.5 % on Nov 20		Hours of Data: 705																																												
Maximum Diurnal Average: 80.3 % at hour 6		Minimum Diurnal Average: 72.6 % at hour 14		Hours of Missing Data: 15																																												
Monthly Average: 77.19 %		Percentiles: P <sub>1</sub> = 48.3 P <sub>10</sub> = 61.5 Q <sub>1</sub> = 70.6 Median = 80.2 Q <sub>3</sub> = 84.5 P <sub>90</sub> = 89.0 P <sub>99</sub> = 92.4		Hours of Calibration: 0																																												
				Percent Operational Time: 97.9																																												
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Nov	83.9	85.5	84.9	86.1	87.6	88.8	86.8	86.6	83.8	82.8	78.6	70.3	69.4	66.6	66.9	63.7	61.6	62.8	60.9	62.0	62.9	64.2	66.1	67.2	74.2	88.8																						
2-Nov	67.5	68.2	70.5	85.2	92.7	92.8	92.7	89.9	88.3	85.6	84.7	82.2	79.7	79.1	79.1	78.8	79.3	78.7	77.9	76.7	DF	DF	DF	DF	81.5	92.8																						
3-Nov	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	77.3	75.7	74.2	73.1	72.6	73.6	75.1	77.0	78.0	79.4	79.9	80.8	82.0	--	82.0																						
4-Nov	81.7	81.7	81.4	81.4	81.6	82.2	84.5	84.8	83.3	81.5	80.5	78.8	78.2	77.1	75.9	75.2	76.2	74.6	74.5	78.6	80.8	82.6	83.7	88.9	80.4	88.9																						
5-Nov	90.6	89.4	85.2	84.5	85.8	84.6	81.1	81.4	81.2	82.4	79.2	77.7	76.1	75.8	77.5	82.7	79.0	77.4	76.6	79.3	80.9	85.4	87.1	82.8	81.8	90.6																						
6-Nov	82.6	82.3	82.2	82.3	82.8	82.4	82.7	82.1	82.5	84.4	84.6	84.4	82.5	80.4	79.5	81.3	83.0	85.6	86.9	85.7	85.7	85.4	86.6	87.7	83.6	87.7																						
7-Nov	87.7	86.3	87.3	89.1	90.4	90.6	90.1	90.1	91.4	91.5	90.7	88.7	86.5	84.5	82.6	83.2	83.5	85.6	85.6	86.7	88.7	89.8	90.8	91.8	88.0	91.8																						
8-Nov	90.7	91.7	92.1	90.6	91.4	89.6	87.6	87.0	89.4	88.7	91.1	90.5	90.0	87.5	86.5	90.0	89.4	89.6	89.1	88.5	90.6	91.8	92.6	91.6	89.9	92.6																						
9-Nov	89.6	88.2	87.0	87.4	88.7	89.5	85.5	83.4	84.8	85.6	84.0	86.7	88.4	88.8	89.3	88.6	88.0	88.3	88.7	86.7	84.2	86.8	86.6	83.0	87.0	89.6																						
10-Nov	84.2	84.1	84.3	81.9	84.2	81.6	80.8	80.7	78.6	75.2	76.9	73.9	70.7	70.3	71.8	72.8	76.6	75.6	78.6	78.2	76.8	76.1	75.4	75.9	77.7	84.3																						
11-Nov	76.4	78.2	82.2	80.5	79.3	76.7	78.7	81.3	80.2	80.4	78.9	77.9	76.3	76.0	73.5	74.2	76.3	79.9	82.8	85.5	81.8	76.2	79.8	82.9	79.0	85.5																						
12-Nov	80.3	82.5	83.5	82.7	82.4	78.8	79.2	80.0	79.2	80.1	77.9	76.5	71.5	68.2	67.7	70.4	77.1	76.0	75.9	76.5	79.8	78.0	77.4	82.6	77.7	83.5																						
13-Nov	80.1	81.3	83.6	83.1	82.8	83.3	77.0	75.1	77.0	79.3	83.0	84.3	85.1	84.3	85.6	87.5	90.1	90.3	91.8	92.1	91.6	91.7	92.1	93.2	85.2	93.2																						
14-Nov	93.5	92.7	92.4	92.2	91.5	90.2	87.4	83.3	82.3	80.4	79.3	78.5	75.8	70.7	70.1	69.7	71.2	71.4	70.1	70.9	71.9	71.0	75.6	76.7	79.5	93.5																						
15-Nov	80.9	80.3	82.4	87.2	90.8	90.3	89.6	87.5	86.3	85.7	86.3	85.6	74.1	71.5	71.6	70.6	72.1	73.1	74.5	75.3	72.0	69.5	70.1	75.5	79.3	90.8																						
16-Nov	76.7	79.3	82.4	81.5	82.7	84.1	85.3	86.6	79.7	74.6	77.0	75.1	73.4	70.4	68.9	69.1	69.9	63.8	67.3	68.3	68.1	69.4	65.9	64.3	74.3	86.6																						
17-Nov	64.2	67.2	71.2	70.1	68.4	68.2	68.7	69.2	68.8	68.3	65.8	66.7	64.5	58.9	61.0	61.4	65.6	70.5	73.3	75.5	75.4	77.4	80.9	85.0	69.4	85.0																						
18-Nov	86.8	87.4	89.9	89.6	91.7	91.6	90.1	90.9	90.6	89.8	85.7	84.1	82.0	80.5	78.9	78.2	77.6	80.9	83.1	83.0	83.3	82.4	81.9	83.2	85.1	91.7																						
19-Nov	81.5	81.7	83.3	83.3	81.7	83.1	85.9	85.2	85.9	86.4	86.0	84.5	82.8	81.6	79.8	79.9	81.0	81.7	82.1	84.1	84.0	77.9	69.9	66.5	81.7	86.4																						
20-Nov	66.7	72.1	64.8	59.1	59.1	59.9	60.2	61.5	62.4	60.6	56.8	51.0	48.4	46.1	44.4	44.1	45.4	46.3	48.1	47.5	48.6	50.5	51.2	53.8	54.5	72.1																						
21-Nov	54.4	55.5	57.1	56.0	54.7	57.4	52.7	51.4	55.3	58.0	56.2	52.3	48.3	53.6	70.2	73.0	76.4	79.7	79.8	82.1	82.5	82.0	83.4	82.7	64.8	83.4																						
22-Nov	83.5	83.5	81.7	81.0	82.0	81.7	81.6	81.4	80.7	79.6	78.6	74.4	69.6	66.8	70.4	72.7	73.4	77.1	77.4	74.2	73.6	71.1	69.4	71.0	76.5	83.5																						
23-Nov	73.7	77.1	79.3	80.3	80.2	83.5	85.5	85.3	85.9	84.9	83.0	82.4	81.9	81.6	81.4	81.5	82.2	82.9	83.0	80.2	76.6	72.3	72.9	68.8	80.3	85.9																						
24-Nov	62.8	61.2	58.7	58.4	59.9	58.8	61.5	63.0	64.2	65.4	66.8	65.9	64.4	64.8	62.5	61.3	61.4	65.0	68.8	67.9	68.0	69.9	71.9	73.6	64.4	73.6																						
25-Nov	75.9	76.4	77.7	77.4	83.2	80.0	72.1	70.2	65.0	58.3	56.3	52.1	51.8	51.5	53.3	67.5	74.6	77.6	80.3	82.7	82.8	83.5	84.6	86.3	71.7	86.3																						
26-Nov	86.7	87.7	86.4	85.9	85.4	84.4	84.1	84.5	84.6	83.6	83.5	82.2	83.4	82.8	81.5	80.9	80.2	80.6	81.3	82.4	83.4	82.5	82.5	84.7	83.5	87.7																						
27-Nov	87.2	89.5	90.0	90.0	90.8	92.1	91.8	90.6	88.2	89.0	88.7	83.3	80.5	81.1	80.0	76.8	73.5	73.0	72.3	71.2	68.6	68.1	63.7	63.5	81.0	92.1																						
28-Nov	65.3	64.7	62.7	59.9	58.0	60.4	62.8	65.3	66.3	66.5	62.6	58.3	54.5	52.4	52.3	55.6	54.0	56.5	55.4	54.8	56.7	62.1	62.4	58.4	59.5	66.5																						
29-Nov	56.7	59.1	61.6	61.2	58.7	60.3	62.9	74.3	74.2	71.3	70.6	72.4	70.4	68.3	65.9	66.9	64.0	66.0	63.3	61.8	61.5	60.8	68.9	69.7	65.5	74.3																						
30-Nov	74.8	76.2	78.2	77.5	78.2	81.4	84.9	85.1	86.1	86.0	84.0	83.3	83.2	82.5	82.2	82.3	82.4	82.3	83.6	83.6	83.2	85.0	86.6	87.1	82.5	87.1																						
																								78.2	79.0	79.4	79.5	80.2	80.3	79.8	79.9	79.5	78.8	77.8	76.0	74.0	72.6	72.8	73.8	74.6	75.6	76.3	76.7	76.7	76.7	77.3	77.9	Diurnal Average
																								93.5	92.7	92.4	92.2	92.7	92.8	92.7	90.9	91.4	91.5	91.1	90.5	90.0	88.8	89.3	90.0	90.1	90.3	91.8	92.1	91.6	91.8	92.6	93.2	Diurnal Maximum
DF - DAS Failure																																																



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

**Relative Humidity 100m (RH100m) - %**  
**Lower Camp Met Tower - November 2023**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Relative Humidity 100m (RH100m) - %  
Lower Camp Met Tower - November 2023**

<b>Concentration Ranges (%)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	0	0.00	0.00
20 - 40	0	0.00	0.00
40 - 60	58	8.23	8.23
60 - 80	290	41.13	49.36
80 - 100	357	50.64	100.00

Total Number of Valid Hours: 705

Total Number of Hours: 720

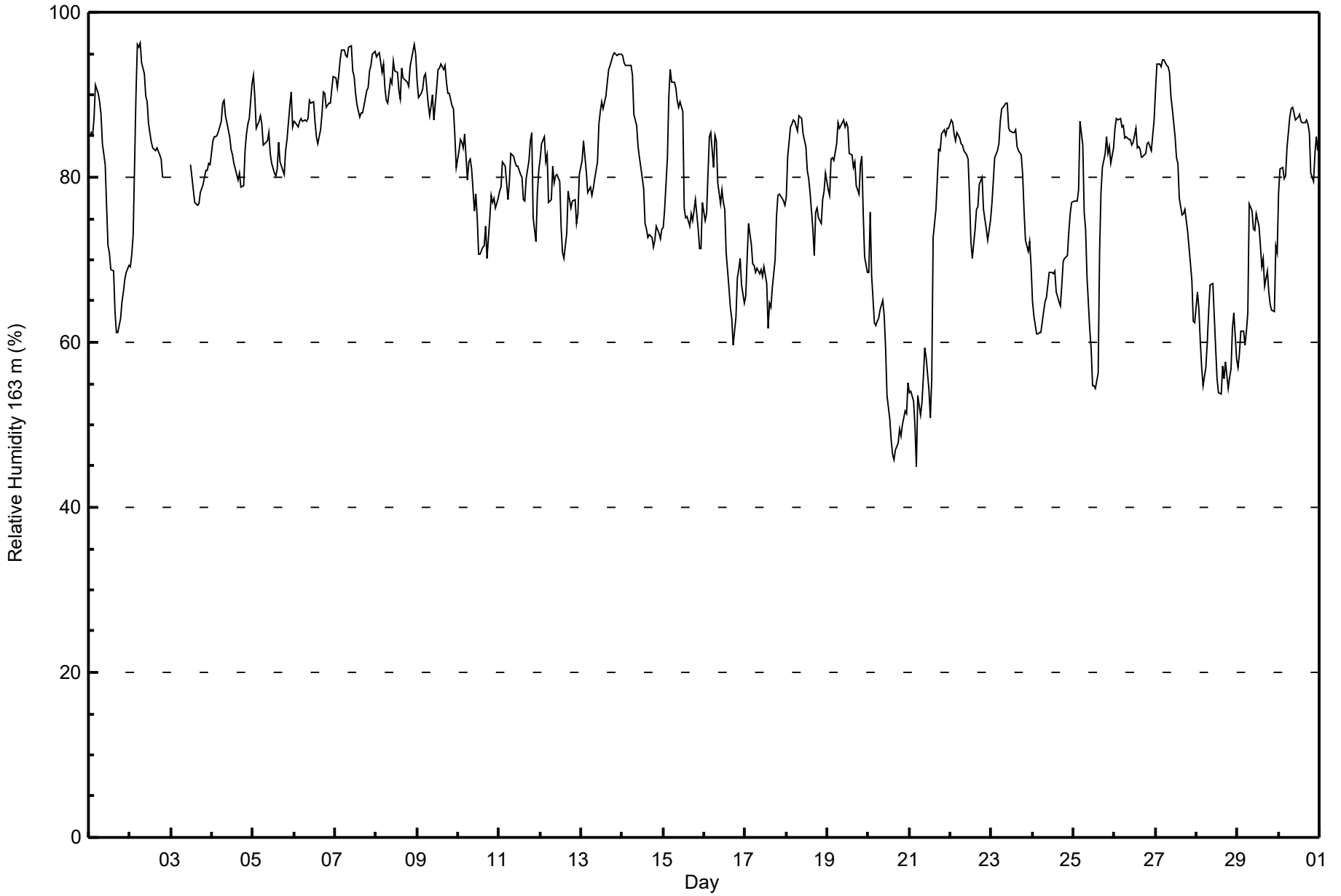


Maximum Value: 96.3 % on Nov 2 07:00      Maximum Daily Average: 92.6 % on Nov 8																						Hours in Service: 720 Hours of Data: 705																										
Minimum Value: 44.9 % on Nov 21 05:00      Minimum Daily Average: 56.6 % on Nov 20 Maximum Diurnal Average: 82.0 % at hour 8      Minimum Diurnal Average: 75.5 % at hour 14 Monthly Average: 78.84 %      Percentiles: P <sub>1</sub> = 49.5 P <sub>10</sub> = 62.8 Q <sub>1</sub> = 72.4 Median = 81.2 Q <sub>3</sub> = 86.7 P <sub>90</sub> = 91.6 P <sub>99</sub> = 95.4																						Hours of Missing Data: 15 Hours of Calibration: 0 Percent Operational Time: 97.9																										
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Nov	84.9	85.5	85.2	87.1	91.2	90.1	89.1	87.7	84.0	81.5	76.5	71.6	70.9	68.7	68.6	63.7	61.3	61.1	62.8	64.9	66.0	67.6	68.4	69.3	75.3	91.2																						
2-Nov	69.2	70.6	73.1	90.1	96.0	95.8	96.3	94.0	92.5	89.8	89.2	86.5	84.2	83.6	83.4	83.2	83.5	82.7	82.2	80.0	DF	DF	DF	DF	85.3	96.3																						
3-Nov	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	81.6	80.0	78.5	77.0	76.6	76.8	78.2	78.6	79.2	80.9	80.8	81.7	81.6	--	81.7																						
4-Nov	84.5	84.9	85.0	85.1	85.7	86.8	89.0	89.3	87.5	85.8	85.0	83.3	82.7	81.7	80.3	79.7	80.6	78.9	79.1	83.2	85.3	86.5	87.1	91.3	84.5	91.3																						
5-Nov	92.4	89.7	85.9	86.8	87.4	86.4	83.9	84.1	84.4	85.4	82.8	81.8	80.5	80.1	81.0	84.3	81.9	80.8	80.3	83.2	84.7	88.7	90.4	86.1	84.7	92.4																						
6-Nov	86.8	86.5	86.2	86.7	87.1	86.9	87.0	86.7	87.2	89.3	89.1	89.1	86.8	85.0	84.1	85.8	87.7	90.3	90.2	88.4	88.9	88.9	90.7	92.2	87.8	92.2																						
7-Nov	92.1	90.9	92.4	94.2	95.4	95.4	94.7	94.5	95.8	95.9	92.9	92.2	90.1	88.8	87.3	87.7	87.8	88.7	90.6	90.8	92.8	93.6	94.9	95.2	92.3	95.9																						
8-Nov	94.6	95.0	95.2	92.8	93.8	90.8	89.3	88.9	91.8	91.4	94.1	93.0	92.7	90.5	89.5	93.2	92.1	91.7	91.5	91.1	93.3	95.2	96.1	94.9	92.6	96.1																						
9-Nov	91.7	89.6	90.1	90.7	92.2	92.6	88.8	87.4	88.6	89.9	87.0	90.8	93.1	93.3	93.8	93.0	93.5	91.5	90.2	90.1	88.7	88.3	85.0	81.2	90.0	93.8																						
10-Nov	83.3	84.7	84.2	83.5	85.2	79.7	81.8	82.3	81.0	76.0	77.9	75.0	70.7	70.6	71.5	71.7	74.0	70.2	75.1	77.8	77.0	77.5	76.4	77.5	77.7	85.2																						
11-Nov	78.3	78.8	81.9	81.4	79.4	77.3	79.4	83.0	82.6	81.9	81.4	81.3	80.3	80.0	77.3	77.1	79.9	82.0	84.4	85.5	75.1	72.2	78.0	80.9	80.0	85.5																						
12-Nov	82.2	84.1	85.0	81.8	82.7	76.9	77.3	81.4	79.3	80.1	80.4	79.6	73.9	70.8	70.2	73.2	78.2	77.3	76.2	77.1	77.3	74.3	75.7	80.3	78.1	85.0																						
13-Nov	82.1	84.3	82.5	80.7	78.2	78.8	77.8	78.6	79.8	81.8	86.4	88.0	89.1	88.3	89.8	91.6	93.1	93.5	94.8	95.0	94.8	94.8	94.9	95.0	87.2	95.0																						
14-Nov	94.7	93.8	93.6	93.5	93.5	92.4	87.6	86.3	83.8	82.4	81.2	78.6	74.4	73.7	72.7	73.0	72.8	71.6	72.4	74.1	73.2	72.6	73.8	81.6	94.7																							
15-Nov	73.9	76.1	82.4	89.8	93.1	91.6	91.6	90.8	89.3	88.4	89.1	88.0	76.2	75.1	75.2	74.1	75.6	74.8	75.9	77.2	73.7	71.4	71.3	77.0	80.9	93.1																						
16-Nov	74.8	75.5	80.3	84.9	85.5	81.2	85.0	84.5	79.3	76.7	78.5	77.0	76.1	70.8	66.6	64.2	62.8	59.6	63.1	67.8	68.8	70.2	66.9	64.8	73.5	85.5																						
17-Nov	65.5	70.2	74.4	71.8	69.5	69.3	68.5	68.9	68.4	68.9	68.0	69.2	67.1	61.8	64.7	64.2	66.7	70.0	75.2	77.7	78.0	77.5	77.1	76.6	70.4	78.0																						
18-Nov	77.6	82.6	86.1	86.5	87.0	86.7	85.5	87.5	87.3	87.1	85.3	83.8	80.9	79.8	78.2	73.7	70.4	75.8	76.2	75.1	74.5	77.3	78.3	80.5	81.0	87.5																						
19-Nov	78.5	77.8	82.2	82.3	82.0	84.1	86.7	86.0	86.2	87.0	86.2	86.6	86.1	82.9	82.7	81.2	81.9	79.0	78.0	81.6	82.5	75.6	70.3	68.4	81.5	87.0																						
20-Nov	68.5	75.7	68.1	62.3	62.0	62.5	62.8	64.0	65.1	63.2	59.3	53.5	50.7	48.2	46.4	45.7	46.9	47.8	49.5	48.7	50.0	51.7	51.4	55.0	56.6	75.7																						
21-Nov	53.8	54.1	52.9	49.9	44.9	53.6	51.3	52.7	55.7	59.3	58.1	54.3	50.9	55.7	72.6	76.1	79.8	83.3	83.3	85.3	85.7	85.0	86.0	86.0	65.4	86.0																						
22-Nov	87.0	86.7	85.2	84.5	85.5	84.7	84.1	84.0	83.2	82.7	82.2	77.7	72.2	70.1	73.8	76.1	76.5	79.2	80.0	76.0	74.9	73.7	72.4	74.8	79.5	87.0																						
23-Nov	76.8	79.5	82.4	83.3	84.1	86.8	88.3	88.4	89.0	89.0	85.9	85.6	85.5	85.8	83.8	83.1	82.7	80.3	76.0	72.4	71.0	72.1	69.3	81.9	89.0																							
24-Nov	65.2	63.3	60.9	61.0	61.2	61.1	63.8	65.0	65.5	67.0	68.4	68.6	68.3	68.7	66.1	64.9	64.3	66.9	69.8	70.1	70.4	73.4	75.6	77.0	66.9	77.0																						
25-Nov	77.1	77.1	77.2	78.5	86.7	84.0	75.8	73.7	68.0	61.5	59.1	54.8	54.8	54.4	56.3	70.8	78.2	81.1	82.9	85.0	82.9	83.7	81.7	83.6	73.7	86.7																						
26-Nov	85.9	87.1	86.9	87.1	86.2	86.3	84.8	85.0	84.5	84.5	83.9	84.3	86.0	83.5	83.7	83.3	82.4	82.8	82.9	84.1	84.2	83.3	85.2	86.9	84.8	87.1																						
27-Nov	90.6	93.7	93.8	93.4	94.3	94.2	93.6	93.4	92.7	89.8	88.3	84.9	82.5	81.7	77.5	75.4	75.6	76.1	74.8	73.5	69.5	67.4	62.6	62.4	82.6	94.3																						
28-Nov	66.2	64.0	60.1	57.0	54.7	57.0	59.9	63.7	67.0	67.1	63.3	59.3	55.6	53.8	53.8	57.1	55.6	57.6	54.4	55.7	56.8	61.7	63.5	58.0	59.3	67.1																						
29-Nov	56.9	58.6	61.4	61.3	59.6	61.3	63.5	76.7	75.9	73.8	73.6	75.7	74.1	71.8	69.2	70.1	66.8	68.7	66.0	64.7	63.8	63.8	71.7	70.8	67.5	76.7																						
30-Nov	78.1	80.9	81.1	79.9	80.2	83.5	87.3	88.3	88.5	87.8	86.9	87.3	87.6	86.7	86.6	86.7	87.0	86.5	85.5	80.6	79.4	82.9	84.9	83.3	84.5	88.5																						
																								79.1	80.0	80.5	81.0	81.5	81.3	81.4	82.0	81.6	80.9	80.0	78.8	76.9	75.5	75.6	76.0	76.6	77.1	77.5	77.9	77.5	77.6	78.0	78.4	Diurnal Average
																								94.7	95.0	95.2	94.2	96.0	95.8	96.3	94.5	95.8	95.9	94.1	93.0	93.1	93.3	93.8	93.2	93.5	93.5	94.8	95.0	94.8	95.2	96.1	95.2	Diurnal Maximum
DF - DAS Failure																																																



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

**Relative Humidity 163 m (RH163m) - %**  
**Lower Camp Met Tower - November 2023**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Relative Humidity 163 m (RH163m) - %  
Lower Camp Met Tower - November 2023**

<b>Concentration Ranges (%)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	0	0.00	0.00
20 - 40	0	0.00	0.00
40 - 60	52	7.38	7.38
60 - 80	268	38.01	45.39
80 - 100	385	54.61	100.00

Total Number of Valid Hours: 705

Total Number of Hours: 720



Maximum Speed: 28 km/h on Nov 20 04:00	Maximum Daily Speed Average: 17.0 km/h on Nov 20	Hours in Service: 720
Minimum Speed Value: 0 km/h on Nov 27 06:00	Minimum Daily Speed Average: 1.9 km/h on Nov 30	Hours of Data: 705
Maximum Diurnal Speed Average: 2.8 km/h at hour 7	Minimum Diurnal Speed Average: 0.6 km/h at hour 19	Hours of Missing Data: 15
Monthly Average Velocity: 1.1 km/h 210.6 deg	Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 2 Q <sub>1</sub> = 4 Median = 7 Q <sub>3</sub> = 12 P <sub>90</sub> = 16 P <sub>99</sub> = 23	Percent Operational Time: 97.9

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	SSE3	SE8	SE7	SE7	SE7	SE8	SE10	SE11	SE11	SE9	SE9	SE10	SE11	SE9	SE6	SE2	ESE4	SE4	SE5	SE6	SE9	SE7	SE8	ESE6	SE7.3	SE11
2-Nov	ESE3	ESE5	SE3	NNW1	NNW3	NNW5	N10	N14	N13	N14	N12	N13	N12	N11	NNE7	NNE5	NE4	SE2	NE3	DF	DF	DF	DF	N6.4	N14	
3-Nov	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	NNW4	N4	NNE1	NNW5	NNW4	N6	NNW5	NNW4	NW4	NNW5	NNW3	NNW4	NW3	----	N6
4-Nov	ENE2	NE3	ENE2	NNE2	ESE4	ESE7	E6	E4	E5	ENE4	E6	E7	ESE10	E7	E9	E9	E10	E9	ESE9	ESE11	E6	ENE5	ENE5	NNE6	E5.7	ESE11
5-Nov	NNE6	NNE6	N7	NNE7	NNE7	NNE8	NE6	NE2	NE5	ENE4	ENE4	ENE3	E4	E2	NW2	NNW4	NNE3	ESE4	ESE7	SE5	SE4	SE6	ESE4	SE8	ENE3.2	SE8
6-Nov	ESE6	SE9	SE12	SE12	SE9	SSE12	SSE16	SE14	SE16	SSE15	SE13	SE13	SE14	SSE12	SSE14	SSE15	SE13	SE13	SSE18	SSE21	SSE16	SSE16	SSE14	SSE13	SSE13.4	SSE21
7-Nov	SSE11	S11	SSW9	SW6	SW6	SW2	SSE2	WNN1	NNE1	NW0	NW2	WSW1	WSW2	SSW3	SSW6	NNW3	NW3	NW3	SSW7	SSW9	S8	SSW5	WSW14	SW8	SSW3.9	WSW14
8-Nov	WSW15	W15	NNW18	NW18	NNW15	NNW12	NNW14	NNW15	NNW14	NNW12	NNW11	NW12	NW12	NW11	NW14	NW11	NW9	NW10	NW8	NW10	NW7	NW6	NW6	NW4	NNW11.1	NW18
9-Nov	NNW4	N2	NNW1	SSW2	S3	SE2	S7	S7	SSW7	SSE14	SSE18	SSE19	SSE16	SSE16	S16	SSE12	SE14	ESE2	SE3	SE9	SE10	SE5	SE4	SE14	SSE7.5	SSE19
10-Nov	SE9	ESE7	SE7	S6	SE7	ESE8	E1	S3	SSW7	SSE7	SE4	SE9	SE12	SE17	SE17	SE16	SE15	SE13	E3	ESE7	SE13	SE15	SE17	SE15	SE9.3	SE17
11-Nov	SSE15	SSE11	SE11	SE7	SSE5	SE8	SSW1	SE6	SE14	ESE15	SE16	SE19	SE18	SSE15	SE16	SSE20	SSE18	SSE15	SSW2	SE3	SE9	SE5	SSW1	SSE3	SE10.2	SSE20
12-Nov	SE8	SE9	SE9	SE8	SSE8	W16	W18	W15	WSW18	W15	W14	W11	W13	W13	WNN8	NW2	SSW2	SW1	WSW2	NNW4	SE1	NNW4	NW3	NW3	WSW5.5	WSW18
13-Nov	W2	NW2	NW2	NNW2	NNW2	N4	NE4	NE8	ENE8	NE7	NNE5	NNE8	N7	N9	N16	N9	NNW7	NNW4	NNW6	NNW6	NNW10	NNW6	NW6	NW7	N5.3	N16
14-Nov	NW8	NW6	NW5	NW4	N2	E1	SW7	S5	SSE5	SSE7	SSE11	SE13	SE11	SW8	SW6	SW4	SW2	SE1	S2	SE7	SE8	SE10	SE2	NNW3	S2.8	SE13
15-Nov	NNW2	NNW2	NNW4	NW6	NNW8	NNW8	NNW11	NNW13	NNW8	NNW8	NNW8	NNW7	NW10	NNW7	NW3	WSW4	SSW5	NNW6	NNW6	NNW3	NW5	NNW2	NNW4	SW8	NW5.5	NNW13
16-Nov	SW13	SW17	SSW3	SSE5	SE5	ESE6	SE8	ESE5	SE8	SE12	SE17	SE11	SE11	SE9	SE8	ESE5	E3	SE7	E3	NNW3	SE7	SE5	WSW13	WSW20	SSE5.3	WSW20
17-Nov	WSW18	WSW10	SSW3	WSW14	W18	W22	W23	W23	WSW22	WSW18	WSW14	WSW8	WSW8	SW6	SW9	WSW4	W3	NNW2	WNN2	SW1	S1	SSE6	SSE3	SE5	WSW9.0	W23
18-Nov	SE5	SE7	SE9	SE6	SE5	SE5	SE7	SE7	SE9	SE7	SE8	SE8	SE7	SE6	SE9	SE8	SE12	SE6	WSW1	SSE1	SSE2	SE5	SE5	SE4	SE6.0	SE12
19-Nov	SW1	SE7	SE6	SE3	SE7	NNE2	WNN1	SE4	NNE2	SSE7	SSE5	WSW4	ESE4	SE8	SSE5	SE8	SE6	SE6	SE7	SE9	SE11	SE16	SW7	W12	SSE4.6	SE16
20-Nov	WSW8	NW23	WNN27	NW28	NW27	WNN25	WNN25	WNN20	WNN18	WNN16	WNN18	WNN18	WNN21	WNN23	NW19	WNN18	WNN16	NW15	NW11	WNN11	WNN11	NW10	NW6	N2	WNN17.0	NW28
21-Nov	NNW4	NW2	E2	E2	N1	WSW1	E3	E3	NNE4	ENE5	ENE5	ENE7	ENE5	NNE9	N12	N14	N13	N14	N12	N12	N11	N12	N9	N10	NNE6.1	N14
22-Nov	NNW8	N8	N11	NNW7	N11	N9	N6	N4	N5	N6	NNW6	NNW5	N5	N4	W3	W3	NNW2	E2	N1	NNW2	NNW2	SSE7	SSE9	SE11	N3.2	SE11
23-Nov	SE14	SE12	SE15	SE10	SE13	SE10	SE4	SSE7	SSE5	SSE8	SSE9	SE7	SE10	SSE9	SE9	ESE6	SE9	ESE7	SE11	SE14	SE16	SE18	SE20	SE22	SE10.9	SE22
24-Nov	SE16	SE18	SSW11	SSW15	S10	SSW10	WSW17	WSW12	W16	WSW13	SW11	SW7	SW6	WSW5	WSW7	W5	SW7	S6	SSE5	SW6	SW12	SW11	S8	SSE9	SSW7.6	SE18
25-Nov	SSE9	ESE1	NW4	NNW5	NNW12	N19	N22	NNW13	NNW15	NNW21	NNW18	NNW19	NNW14	NNW16	NNW15	N10	N8	N6	NNW4	NNW2	W1	NNW3	WNNW0	SSW1	NNW8.8	N22
26-Nov	N2	NNE1	N2	NNE1	N3	N2	WNN0	N3	ESE1	ESE3	SE6	SE9	SE8	SE9	SE8	SE10	SE8	SE9	SE8	SE9	SE12	ESE10	SE4	NW1	SE4.4	SE12
27-Nov	N3	SE2	NNW2	NNW2	NNE1	SE0	SE5	SE10	SE13	ESE6	E6	ESE7	SE14	SE12	SE13	SE11	SE14	SSE6	WSW9	SW14	WSW13	WSW13	WSW19	W18	S3.8	WSW19
28-Nov	W15	W15	W17	W16	W18	W14	W17	W16	W14	W11	WSW16	WSW14	WSW11	WSW7	SW7	WSW7	WSW14	W10	W16	WSW13	WSW17	W15	W11	WNN14	W13.3	W18
29-Nov	W15	W13	W7	WSW11	W11	W11	W10	W14	WSW14	W9	WNN15	W10	WNN13	WNN13	WNN17	NW14	NW14	NW13	NW14	NW10	NW14	NW12	NW12	NW12	WNN11.7	WNN17
30-Nov	NW7	NNW4	NNW4	NNW5	WNN3	N2	NNW2	NW1	ENE1	ESE2	ESE2	ENE3	ENE4	NE4	NE5	NE2	E1	NNE2	NNW2	NW0	NNW4	NW3	NW2	NW3	N1.9	NW7

SSW2.5	SSW2.0	SW1.2	W2.0	W1.5	WNN2.1	W2.8	W2.2	WSW1.9	SSW1.2	SSW1.4	SSE1.3	SSE1.6	S1.0	SSW0.8	SE0.8	SE1.5	SE0.9	SSW0.6	S1.4	SSE1.9	SSE1.9	SSW2.1	SSW2.0	Diurnal Average	
WSW18	NW23	WNN27	NW28	WNN27	WNN25	WNN25	W23	WSW22	NNW21	WNN18	NNW19	WNN21	WNN23	NW19	SSE20	SSE18	SSE15	SSE18	SSE21	WSW17	SE18	SE20	SE22	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**  
**Lower Camp Met Tower - November 2023**

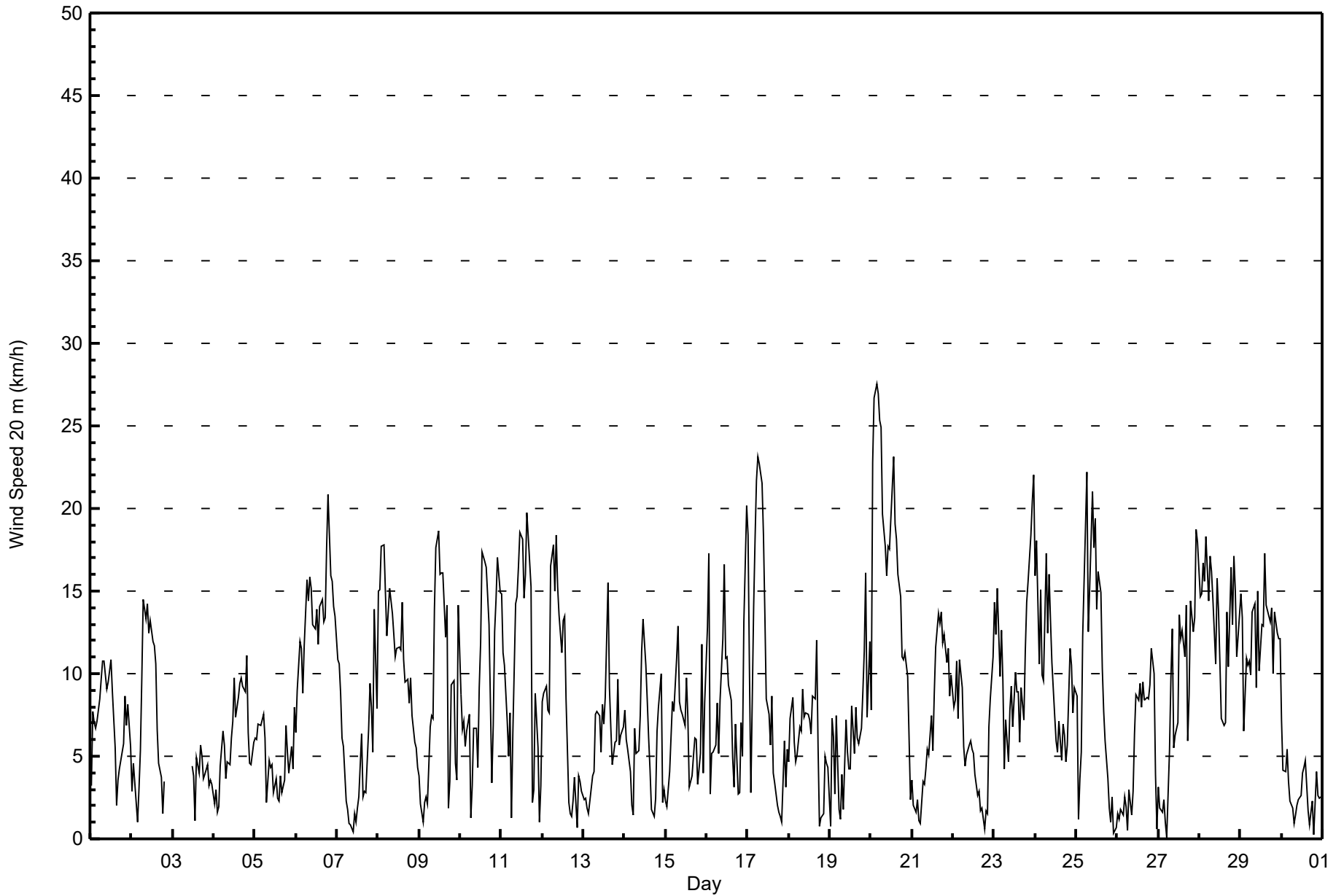
Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 9 km/h on Nov 20 05:00	Hours of Data: 705
Minimum Value: 1 km/h on Nov 30 08:00	Hours of Missing Data: 15
Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 1 Q <sub>1</sub> = 2 Median = 3 Q <sub>3</sub> = 4 P <sub>90</sub> = 5 P <sub>99</sub> = 8	Hours of Calibration: 0
	Percent Operational Time: 97.9

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

Diurnal Maximum

DF - DAS Failure







**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Wind Speed 20 m (WS20m) - km/h  
Lower Camp Met Tower - November 2023**

<b>Wind Speed Ranges (km/h)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	243	34.47	34.47
6 - 11	264	37.45	71.91
12 - 19	178	25.25	97.16
20 - 28	20	2.84	100.00
29 - 38	0	0.00	100.00
> 38	0	0.00	100.00

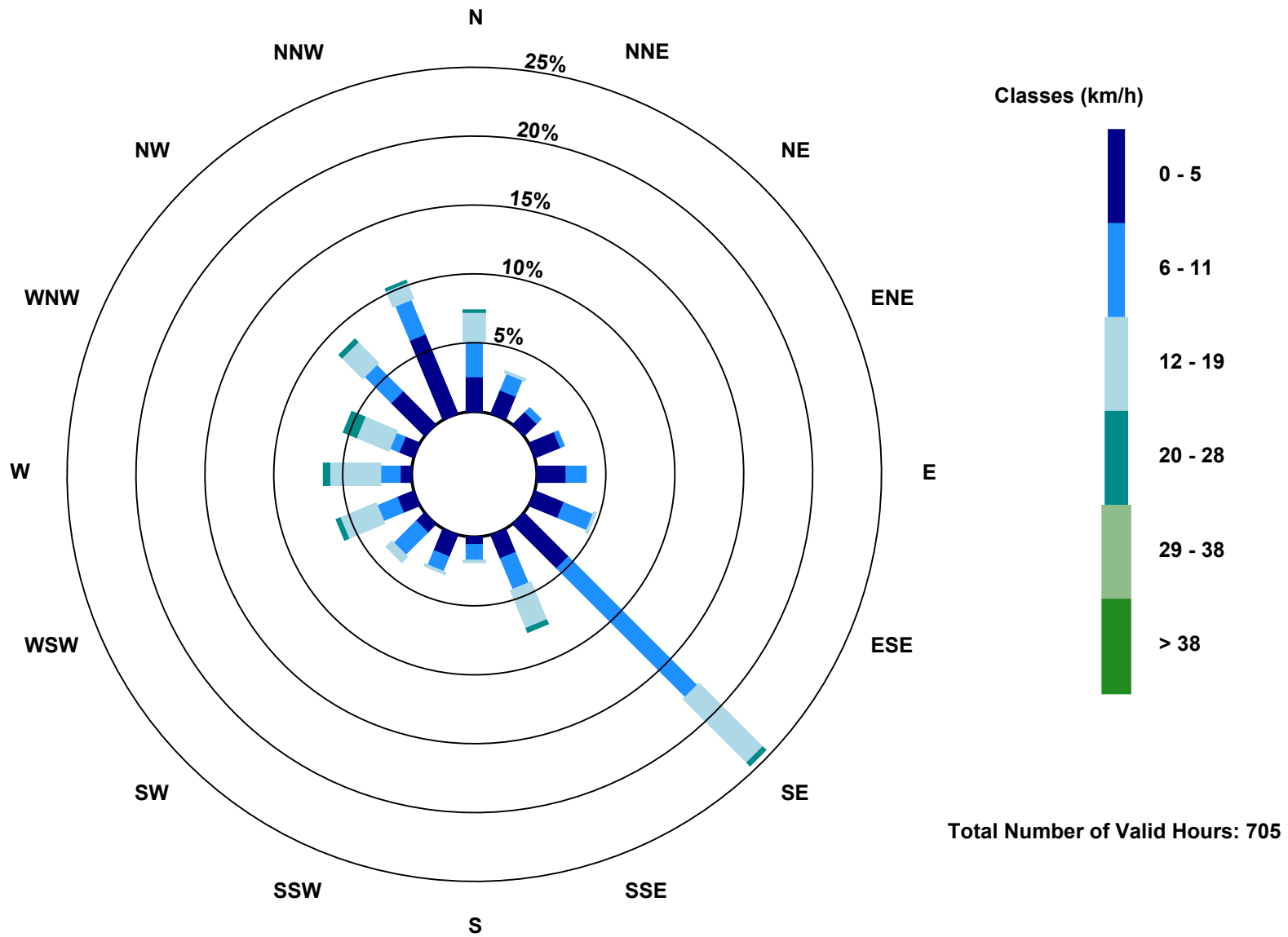
Total Number of Valid Hours: 705

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 2023

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





Maximum Speed: 37 km/h on Nov 20 03:00	Maximum Daily Speed Average: 23.9 km/h on Nov 20	Hours in Service: 720
Minimum Speed Value: 0 km/h on Nov 17 20:00	Minimum Daily Speed Average: 3.0 km/h on Nov 30	Hours of Data: 705
Maximum Diurnal Speed Average: 3.6 km/h at hour 1	Minimum Diurnal Speed Average: 0.7 km/h at hour 15	Hours of Missing Data: 15
Monthly Average Velocity: 1.6 km/h 214.6 deg	Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 3 Q <sub>1</sub> = 7 Median = 11 Q <sub>3</sub> = 17 P <sub>90</sub> = 22 P <sub>99</sub> = 33	Percent Operational Time: 97.9

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	SSE4	SE8	SE8	SE7	SE9	SE11	SE14	SE15	SE14	SE13	SE12	SE11	SE13	SE11	SE9	SE5	SE8	SE7	SSE7	SSE7	SSE9	SE9	SE10	SE7	SE9.4	SE15
2-Nov	SE4	SE5	SSE3	NNW1	NNW6	NNW10	N15	N22	N21	N22	N19	N20	N18	N16	N16	NNE10	NE7	ENE6	SE2	NE5	DF	DF	DF	DF	N9.7	N22
3-Nov	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	N6	N5	NE2	NNW6	NNW5	N8	NNW9	N6	NNW7	NNW8	N4	N5	N4	----	NNW9
4-Nov	E4	ENE5	E3	ENE3	ESE7	ESE9	E8	E6	E8	E7	E10	ESE12	ESE15	E12	E13	E15	E15	E14	ESE13	ESE16	E9	ENE7	ENE7	NNE8	E8.9	ESE16
5-Nov	NNE8	NNE8	NNE10	NE10	NE10	ENE10	ENE10	ENE6	ENE9	ENE7	E6	E5	E6	E4	NNW3	NNW5	ENE4	ESE6	ESE11	ESE8	SE5	ESE8	ESE7	SE13	ENE5.6	SE13
6-Nov	ESE10	SE13	SE18	SE16	SE13	SE16	SE20	SE21	SE22	SSE18	SE17	SE18	SE18	SE15	SE18	SE19	SE19	SE18	SSE21	SSE24	SSE18	SSE19	SSE17	SSE16	SE17.5	SSE24
7-Nov	S13	S13	SSW11	SW8	SW7	SSW4	S4	SW3	NNE1	NNE1	W2	WSW2	WSW3	SSW5	SSW8	W2	WNN2	WNN4	SSW10	SSW12	S10	SSW8	WSW18	SW11	SSW5.8	WSW18
8-Nov	WSW21	W22	WNN25	NW25	WNN21	WNN18	WNN20	WNN22	WNN20	WNN19	WNN16	NW16	NW17	NW16	NW20	NW15	NW14	WNN14	WNN13	NW15	NW11	NW9	NW8	NW7	WNN16.1	WNN25
9-Nov	NW6	N4	N3	S2	S3	SSE3	S8	S9	SSW9	SSE16	SSE20	SSE21	SSE19	SE21	S17	SSE16	SE24	SE6	SE8	SE18	SE18	SE10	SE11	SE24	SSE10.6	SE24
10-Nov	SE14	SE10	SE13	SSE7	SE10	ESE13	E5	SSE6	S8	SSE10	SE8	SE12	SE16	SE22	SE23	SE23	SE23	SE21	ESE11	ESE11	SE16	SE18	SE21	SE20	SE14.0	SE23
11-Nov	SE20	SSE15	SE17	SE16	SE13	SE18	SE7	SE13	SE24	ESE24	SE27	SE29	SE28	SE19	SE27	SSE24	SSE23	SE20	SSE5	SE8	SE15	SE9	SE3	SE5	SE16.8	SE29
12-Nov	SSE8	SSE8	SSE10	S7	S8	W26	W28	WSW23	WSW25	WSW23	W19	W16	W18	W20	WNN12	NNW4	ENE2	W4	W9	WNN7	NNW4	NNW9	NNW10	NNW8	W9.6	W28
13-Nov	WNN6	NNW5	N3	ENE1	N2	NNE4	ENE8	ENE14	ENE13	NE12	NNE7	NNE11	N10	N13	N23	N13	NNW10	NNW8	NNW11	NNW10	NNW15	NNW9	NNW10	NNW10	N8.2	N23
14-Nov	NW11	NW8	NW8	NW6	NNW2	SSE1	SW11	SSW8	SSE9	SSE8	SSE13	SE16	SSE13	SW11	SW10	SW8	SW4	SW5	SW8	SSE6	SE10	SE15	SE7	SSE1	S4.2	SE16
15-Nov	NNW3	NNW2	NNW7	NNW11	NNW14	NNW12	NNW18	NNW19	NNW13	NNW13	NNW11	NNW10	NW13	NW11	NW5	WSW6	SSW9	W10	NNW8	NNW6	WNN11	NW18	NW7	SE10	NW8.6	NNW19
16-Nov	SW16	SW21	SSW6	S7	SE9	SE9	SE12	ESE9	SE15	SE17	SE20	SE16	SE16	SE15	SE13	SE9	ESE7	SE10	ESE5	WNN2	SSE5	SSW4	WSW21	WSW30	SSE8.1	WSW30
17-Nov	WSW27	WSW16	SW6	WSW20	WSW27	W33	W32	W34	WSW32	WSW28	WSW21	WSW14	WSW12	SW10	SW13	SW8	SW8	W4	NNW4	N0	SSW2	SE10	SE8	SE11	WSW13.6	W34
18-Nov	SE10	SE11	SE11	SE9	SE7	SE7	SE9	SE9	SE12	SE10	SE10	SE9	SE8	SE7	SE10	SE9	SE15	SE7	SE4	SE4	SE6	SE9	SE7	SE8	SE8.7	SE15
19-Nov	ESE1	SE7	SE5	SE5	SE10	ESE3	N2	SE7	SSW2	SE9	SSE9	SW6	ESE6	SE10	SSE7	SE10	SE8	SE10	SE10	SE11	SE15	SE16	SW14	W19	SSE6.0	W19
20-Nov	WSW13	NW31	WNN37	NW37	WNN36	WNN35	WNN35	WNN28	WNN25	WNN23	WNN24	WNN24	WNN28	WNN31	NW25	WNN25	WNN22	WNN20	NW16	WNN17	WNN17	WNN15	WNN10	NNW4	WNN23.9	WNN37
21-Nov	NNW7	NW4	ENE2	E4	ENE1	SSE1	E6	E5	NNE6	E7	ENE7	E10	ENE8	NNE13	N17	N20	N20	N20	N18	N18	N16	N17	N14	N15	NNE8.9	N20
22-Nov	N11	N12	N16	N11	N16	N14	NNE9	N8	N8	N9	N8	NNW7	N7	N5	W3	W3	NNW3	E3	NE1	N1	SE2	SSE8	SSE11	SE17	N4.8	SE17
23-Nov	SE20	SE17	SE20	SE17	SE20	SE14	SE7	SSE8	SE6	SSE9	SSE12	SE9	SSE12	SSE11	SE11	SE9	SE13	SE11	SE14	SE21	SE22	SE25	SE21	SSE16	SE14.3	SE25
24-Nov	SSW14	SSE16	SW15	SSW19	S12	SW15	WSW24	WSW19	W24	WSW19	SW15	SW11	SW8	WSW7	WSW12	WSW12	SW12	SW9	SSW7	SW11	SW17	SW15	SSW10	SSW10	SW12.6	WSW24
25-Nov	SSW9	WSW3	NW7	NNW10	N20	N29	N36	NNW19	NNW24	NNW33	NNW27	NNW28	NNW21	NNW23	NNW22	N16	N11	N9	N7	WNN3	S0	WNN1	SE1	SE5	NNW13.6	N36
26-Nov	ESE4	SE4	E1	E3	ENE2	NNE2	NNE1	NNE4	ESE3	ESE6	SE9	SE12	SE11	SE13	SE11	SE12	SE11	SE9	SE10	SE11	SE13	SE11	SE7	SE3	SE6.7	SE13
27-Nov	N6	ENE2	NNW2	N3	NNE1	SE4	SE10	SE16	SE18	SE12	ESE8	ESE11	SE19	SE18	SE19	SE18	SSE14	SW8	WSW14	WSW19	WSW19	WSW20	WSW29	W26	S6.0	WSW29
28-Nov	W22	W22	W25	W24	W27	WSW22	WSW26	W24	WSW23	W16	WSW22	WSW19	WSW16	WSW11	WSW11	WSW11	WSW21	W16	W25	WSW20	WSW25	W21	W17	WNN21	W20.0	W27
29-Nov	W23	W20	WNN12	WSW16	W18	W18	W17	W20	WSW21	W15	WNN21	W15	WNN17	WNN18	WNN25	WNN20	WNN20	NW19	NW20	NW15	NW20	NW18	NW18	NW18	WNN17.6	WNN25
30-Nov	NW11	NNW6	NNW7	NNW8	NW5	N4	N3	NNE1	E2	ESE3	ESE3	ENE4	ENE5	NE6	NE7	ENE3	ESE1	NE2	N3	E1	N6	NNW4	NNW4	NNW4	N3.0	NW11

SW3.6	SW2.9	WSW1.9	W2.4	W2.0	W2.5	W3.3	W2.6	SW2.5	SW1.5	SSW1.9	SSE1.6	SSE2.1	SSE1.1	S0.7	SE1.3	SSE2.3	SSE1.0	SW1.0	S1.8	S2.4	S2.3	SW2.8	SSW3.0	Diurnal Average
WSW27	NW31	WNN37	NW37	WNN36	WNN35	N36	W34	WSW32	NNW33	SE27	SE29	WNN28	WNN31	SE27	WNN25	SE24	SE21	W25	SSE24	WSW25	SE25	WSW29	WSW30	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**

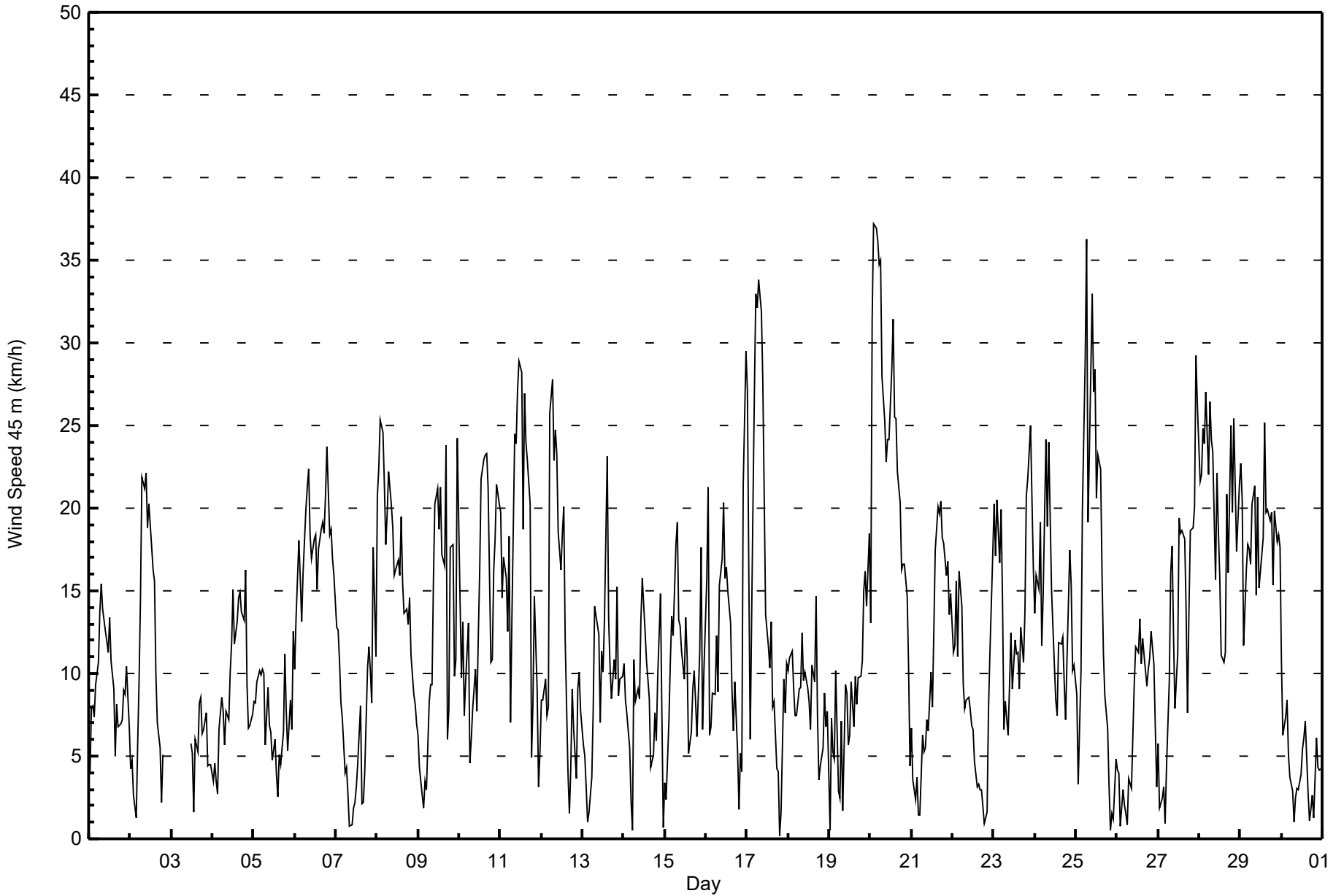
**Wind Speed 45 m (WS45m) - km/h**  
**Lower Camp Met Tower - November 2023**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 11 km/h on Nov 25 09:00	Hours of Data: 705
Minimum Value: 0 km/h on Nov 7 09:00	Hours of Missing Data: 15
Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 1 Q <sub>1</sub> = 2 Median = 3 Q <sub>3</sub> = 4 P <sub>90</sub> = 5 P <sub>99</sub> = 9	Hours of Calibration: 0
	Percent Operational Time: 97.9

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

7	8	9	9	9	9	9	9	7	11	9	8	7	8	8	7	8	6	6	6	6	5	6	6	7	6		
Diurnal Maximum																											

DF - DAS Failure





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

**Wind Speed 45 m (WS45m) - km/h**  
**Lower Camp Met Tower - November 2023**

<b>Wind Speed Ranges (km/h)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	131	18.58	18.58
6 - 11	255	36.17	54.75
12 - 19	191	27.09	81.84
20 - 28	111	15.74	97.59
29 - 38	17	2.41	100.00
> 38	0	0.00	100.00

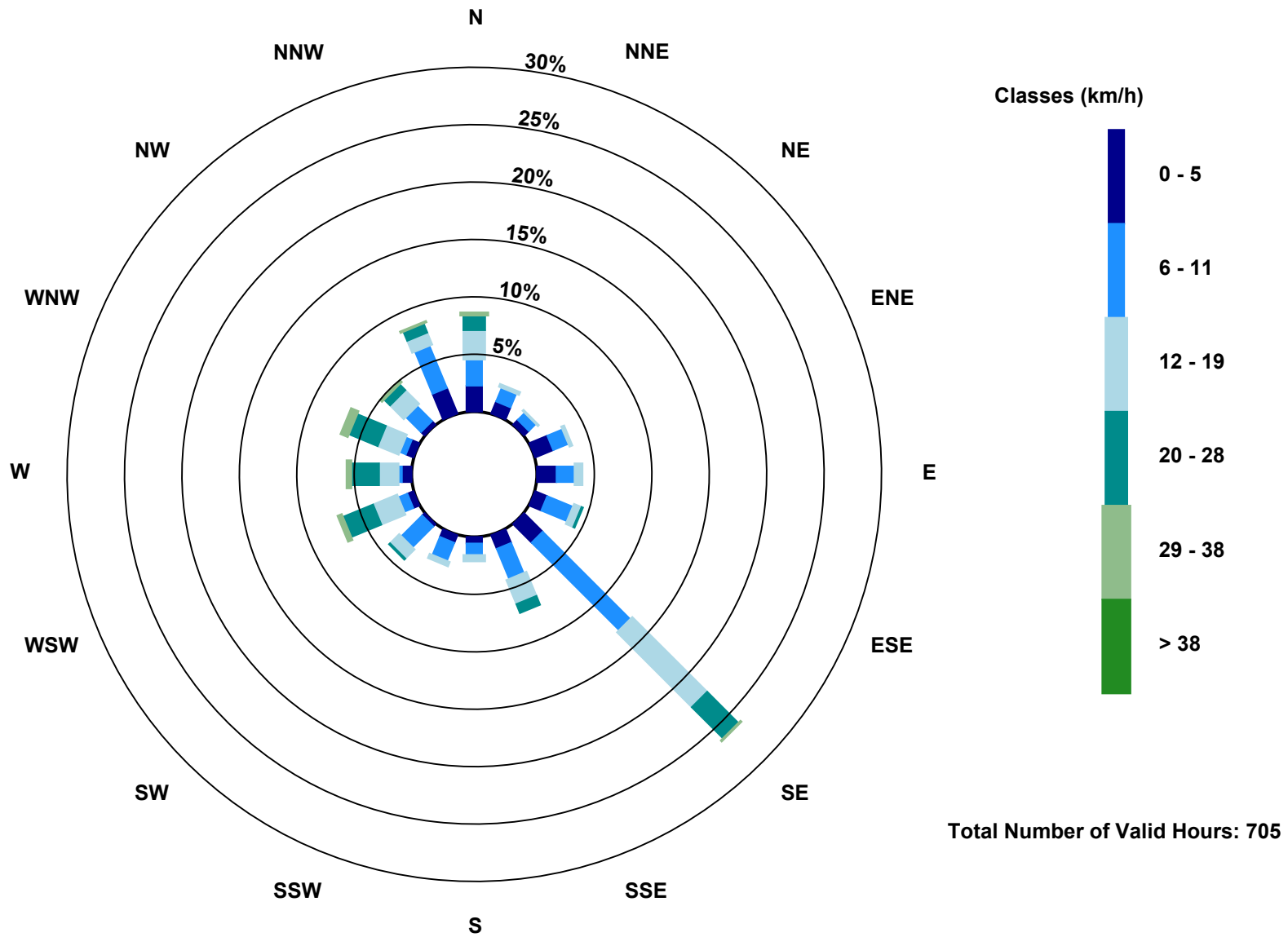
Total Number of Valid Hours: 705

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 2023

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







Maximum Speed: 46 km/h on Nov 20 03:00	Maximum Daily Speed Average: 30.8 km/h on Nov 20	Hours in Service: 720
Minimum Speed Value: 1 km/h on Nov 26 08:00	Minimum Daily Speed Average: 2.9 km/h on Nov 30	Hours of Data: 702
Maximum Diurnal Speed Average: 6.8 km/h at hour 1	Minimum Diurnal Speed Average: 1.9 km/h at hour 14	Hours of Missing Data: 18
Monthly Average Velocity: 3.8 km/h 228.1 deg	Percentiles: P <sub>1</sub> = 2 P <sub>10</sub> = 5 Q <sub>1</sub> = 9 Median = 15 Q <sub>3</sub> = 23 P <sub>90</sub> = 29 P <sub>99</sub> = 43	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-Nov	SSW5	SSW5	SSW5	SSW4	S4	SSW8	S10	S13	S11	SSE11	SSE10	SSE7	SSE10	SE11	SE12	SSE10	SSE11	S8	SSW12	SSW11	SSW11	S9	S9	SSW8	S8.2	S13	
2-Nov	SSW5	SSW5	WSW6	NNW6	N12	N14	N21	N26	N24	N26	N22	N23	N20	NNE19	NNE18	NNE13	NE10	ENE7	SE2	ENE6	DF	DF	DF	DF	N12.1	N26	
3-Nov	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	N6	NNE6	NE3	N6	N6	N9	N11	N8	NNE8	N7	ENE5	E5	ENE5	----	N11	
4-Nov	E7	E7	ESE8	ESE6	ESE10	ESE11	ESE12	ESE9	ESE12	E11	ESE13	ESE14	ESE17	E14	E15	E18	E17	ESE16	ESE17	ESE19	E12	E9	E10	ENE8	ESE12.0	ESE19	
5-Nov	NE8	ENE9	NE7	ENE9	ENE11	ENE10	E11	E9	E11	E8	E8	E7	E7	E5	NE2	NNE5	E7	ESE10	ESE17	ESE12	ESE8	ESE13	SE12	SE18	E8.2	SE18	
6-Nov	ESE14	SE17	SE23	SE19	SE17	SE21	SE24	SE26	SE27	SSE20	SE20	SE20	SE20	SE17	SE20	SE23	SE23	SE21	SSE25	SSE26	SSE21	SSE24	SSE22	S20	SE21.0	SE27	
7-Nov	S16	SSW16	SSW14	SW11	SW10	SSW7	SSW7	WSW7	W3	WSW2	SSW7	SW6	SW6	SSW8	SSW11	SSW5	SSW7	SW10	SSW16	SSW17	UO	UO	WSW24	UO	SSW9.5	WSW24	
8-Nov	WSW28	W33	NNW36	NW29	NNW28	NNW24	NNW26	NNW29	NNW26	NNW24	NNW19	NW21	NW21	NW21	NNW24	NW20	NNW19	NNW19	NNW18	NW21	NW17	NW13	NW12	NW11	NNW21.7	NNW36	
9-Nov	NW11	NNW8	N6	ENE2	SSE3	SSE5	S10	S12	S12	SSE17	SSE24	SSE24	SSE21	SE25	S19	SSE20	SE31	SE15	SE18	SE26	SE26	SE18	SE20	SE28	SSE14.1	SE31	
10-Nov	SE19	SSE13	SE19	SSE14	SE14	SE18	SE9	SSE12	SSE13	SSE19	SE14	SSE17	SSE22	SSE24	SE26	SE27	SE26	SSE28	SE21	SE18	SSE24	SSE25	SSE26	SSE25	SSE19.5	SSE28	
11-Nov	SE23	SSE18	SE22	SE27	SE25	SE29	SE21	SE21	SE34	SE34	SE38	SE37	SE35	SE23	SE33	SSE29	SSE29	SSE24	SSE14	SSE16	SSE22	S16	SSW5	SSW3	SE23.3	SE38	
12-Nov	SW10	SSW9	SSW10	SSW16	SSW18	W33	WSW36	WSW31	WSW29	WSW32	W25	W21	W25	W27	W17	W17	N2	W12	W18	NNW17	NW16	NW18	NNW18	N15	W16.7	WSW36	
13-Nov	NNW10	N9	NE7	ENE7	ESE6	E7	E14	ENE17	ENE17	ENE17	NNE9	NNE13	NNE13	NNE14	N25	N16	N14	N13	N16	N13	NNW20	N12	NNW14	NNW14	NNE10.5	N25	
14-Nov	NW14	NW11	NW9	NW7	W5	WSW5	SW15	SW15	S12	SSW11	SSE14	SSE14	SSE12	S12	SW14	WSW15	WSW14	WSW11	WSW13	WSW16	SW9	S7	SSE14	SSE10	SSE7	SW7.4	WSW16
15-Nov	SE4	S1	N8	NNW14	N16	NNW17	N24	N24	N18	NNW17	NNW15	NNW12	NW17	NW15	NNW7	WSW10	SW17	W15	NNW12	NNW9	NNW20	NW23	NNW10	WSW11	NW11.0	N24	
16-Nov	WSW18	WSW22	SW13	SSW9	SSE10	SSE11	SE17	SE13	SE23	SE22	SSE25	SSE21	SSE19	SSE20	SSE15	SE14	SSE17	S8	SSW4	SW11	WSW13	WSW33	WSW41	S12.4	WSW41		
17-Nov	WSW36	WSW24	SW12	WSW30	WSW37	W45	W44	W45	WSW42	WSW37	WSW27	WSW21	WSW17	SW16	SW17	SW14	SW19	WSW16	NNW7	NE2	S2	S5	S7	SSE16	WSW20.7	W45	
18-Nov	SSE12	SSE15	SSE16	SSE14	SE13	SSE13	SSE10	SSE14	SSE15	SSE15	SSE15	SE12	SE10	SSE5	SSE10	SSE14	SSE11	SSE8	SE9	SE7	SSE5	SSE7	SE12	SSE7	SSE11.1	SSE16	
19-Nov	SSE1	SE9	SSW6	SSE4	SE14	S5	SW2	ESE8	SE6	SE12	SE10	SSW8	ESE8	ESE10	S8	SE9	SSE6	S8	S9	SSE9	S9	SSW14	WSW27	W29	S6.3	W29	
20-Nov	WSW25	NNW39	NNW46	NW45	NNW45	NNW43	NNW43	NNW34	NNW32	NNW28	NNW29	NNW30	NNW35	NNW38	NNW33	NNW32	NNW30	NNW27	NNW22	NNW24	NNW23	NNW21	NNW16	NW7	NNW30.8	NNW46	
21-Nov	NNW10	NNW7	NE3	E5	ESE6	SE6	ESE11	ESE8	ENE7	E9	E7	E10	ENE8	NNE13	N19	N22	N21	N23	N20	N20	N19	N19	N16	N18	NNE9.9	N23	
22-Nov	N13	N14	N18	N14	N19	N18	NNE15	N13	N12	NNE10	N9	NNW8	N7	N5	W3	NNW3	N4	E6	E4	SSE5	SSE6	SSE9	SSE15	SE21	NNE5.8	SE21	
23-Nov	SE24	SE21	SE24	SE23	SE25	SE21	SE10	SSE10	SE9	SSE12	SSE17	SSE13	SSE14	SSE13	SSE13	SSE11	SSE16	SSE18	SSE22	S21	S18	S24	S17	SSW20	SSE16.4	SE25	
24-Nov	SW24	SSW21	SW23	SW26	SW18	SW21	WSW32	WSW27	WSW34	WSW29	WSW21	WSW16	WSW10	W10	WSW17	WSW19	WSW21	WSW17	SW17	SW21	WSW25	SW24	SW16	SW19	WSW20.5	WSW34	
25-Nov	WSW19	WSW16	NNW14	NNW19	N28	N35	N43	NNW26	NNW32	NNW42	NNW35	NNW35	NNW26	NNW31	NNW29	N18	N14	N12	NNE10	N5	NE5	N3	WSW1	SSE5	NNW18.1	N43	
26-Nov	SE5	SE12	SE7	SSE6	SE5	ESE5	SE5	SE1	SE4	SE11	SSE11	SSE12	SE11	SE13	SE11	SSE10	SSE7	S6	SSW7	SSW12	S7	SSE7	SW4	SSE7.2	SE13		
27-Nov	NNW1	NNE2	ESE3	SE6	SSE6	SE9	SSE14	SSE23	SSE25	SSE21	SE16	SSE21	SSE24	SSE22	SSE24	SSE23	SSW16	WSW18	WSW21	WSW22	W28	WSW31	WSW42	WSW38	SSW12.4	WSW42	
28-Nov	W32	WSW33	WSW37	W36	W38	WSW35	WSW39	WSW35	WSW33	WSW25	WSW27	W20	W22	W18	WSW17	WSW19	WSW27	W24	W35	W28	WSW35	W31	NNW23	NNW30	W28.6	WSW39	
29-Nov	W31	W29	NNW20	W19	NNW25	NNW24	NNW24	NNW26	W27	W20	NNW26	W19	NNW22	NNW23	NNW32	NNW25	NNW26	NW26	NW28	NW24	NW28	NW24	NW24	NW24	NNW24.1	NNW32	
30-Nov	NW16	NNW8	NW11	NW12	NW8	NNE8	NE6	ENE3	ENE4	E4	E3	ENE4	ENE5	NE6	ENE7	E3	SSE2	ESE2	ENE2	SSE3	NNE3	NE3	ESE2	SW2	NNE2.9	NW16	

SW6.8 SW5.7WSW4.4WSW4.2WSW3.3WSW3.9WSW4.7WSW4.5 SW4.5SSW3.6SSW3.8SSW2.8 S2.7 SW1.9 SW2.2SSW2.7SSW3.6 SW3.5 SW3.6 SW3.6WSW5.0 SW4.9 SW5.9 SW6.0	Diurnal Average
WSW36WSW39WSW46WSW45WSW45 W45 W44 W45WSW42NNW42 SE38 SE37WSW35WSW38 SE33WSW32 SE31 SSE28 W35 W28WSW35WSW31WSW42WSW41	Diurnal Maximum

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



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

**Wind Speed 100 m (WS100m) - km/h**  
**Lower Camp Met Tower - November 2023**

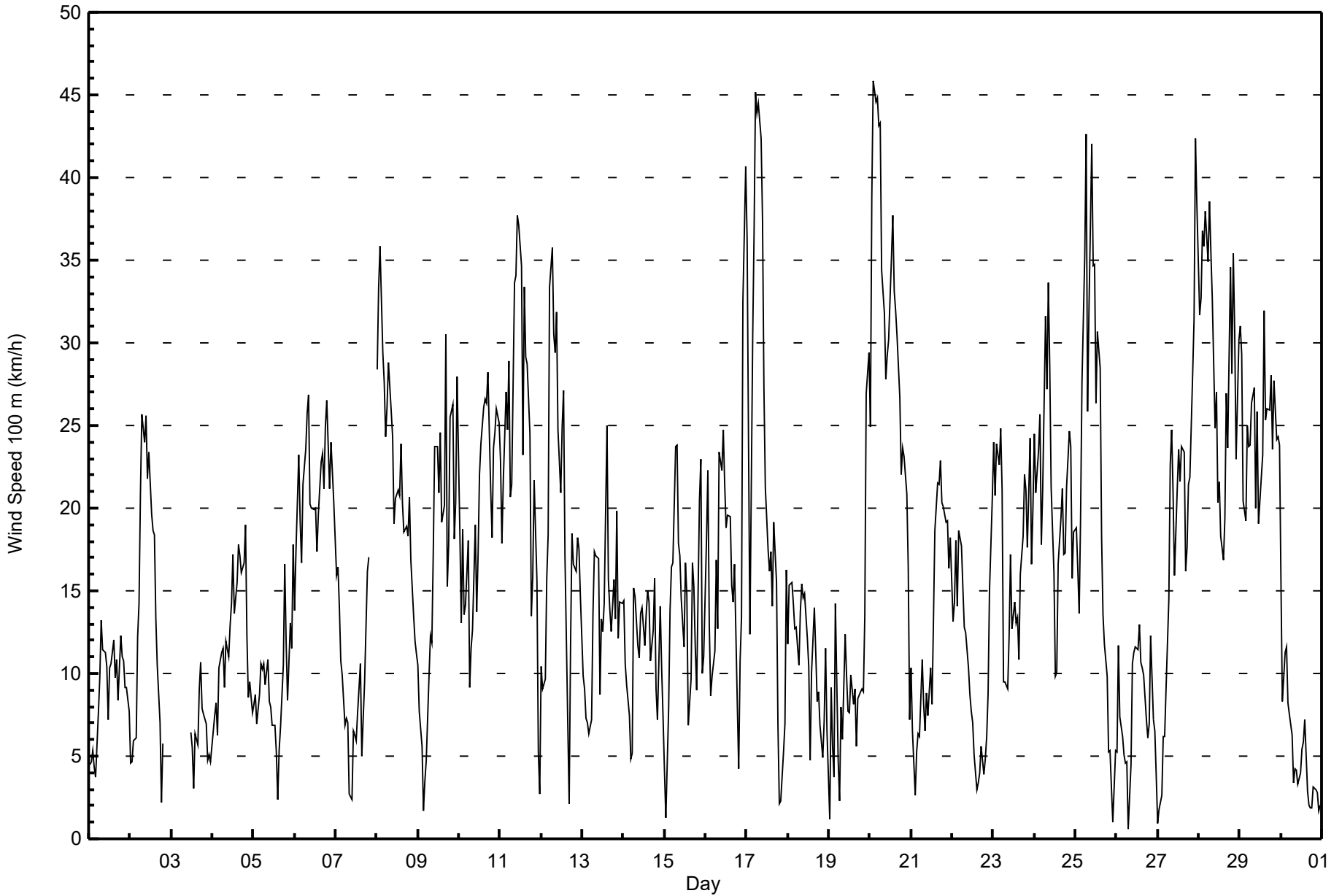
Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 12 km/h on Nov 25 09:00	Hours in Service: 720 Hours of Data: 702 Hours of Missing Data: 18 Hours of Calibration: 0 Percent Operational Time: 97.5
Minimum Value: 1 km/h on Nov 7 09:00	
Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 1 Q <sub>1</sub> = 2 Median = 3 Q <sub>3</sub> = 4 P <sub>90</sub> = 5 P <sub>99</sub> = 8	

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

Diurnal Maximum

DF - DAS Failure

UO - Unstable Operation





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Wind Speed 100 m (WS100m) - km/h  
Lower Camp Met Tower - November 2023**

<b>Wind Speed Ranges (km/h)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	76	10.83	10.83
6 - 11	181	25.78	36.61
12 - 19	206	29.34	65.95
20 - 28	164	23.36	89.32
29 - 38	60	8.55	97.86
> 38	15	2.14	100.00

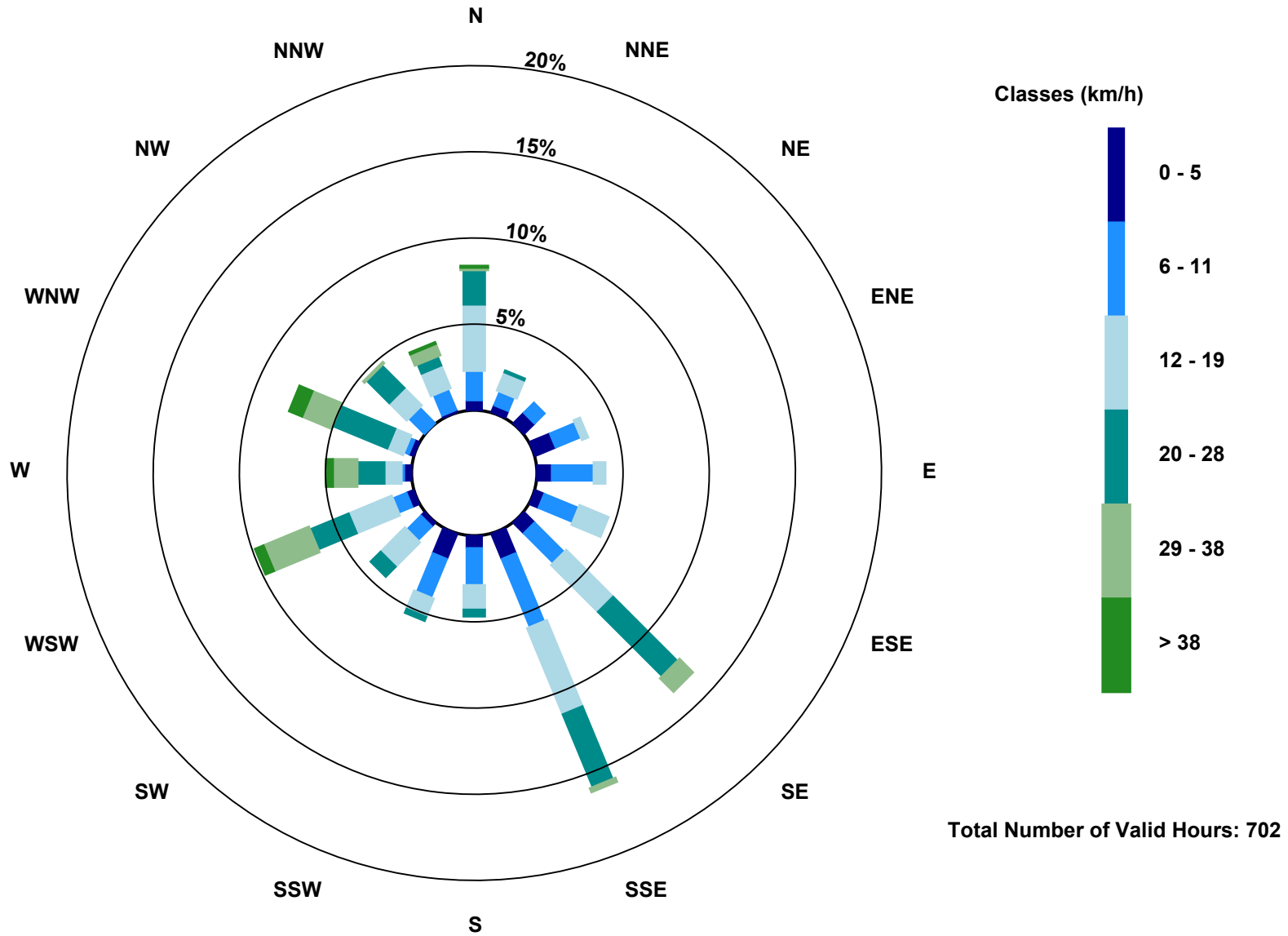
Total Number of Valid Hours: 702

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 2023

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





Maximum Speed: 57 km/h on Nov 17 07:00	Maximum Daily Speed Average: 36.5 km/h on Nov 28	Hours in Service: 720
Minimum Speed Value: 1 km/h on Nov 30 22:00	Minimum Daily Speed Average: 3.0 km/h on Nov 30	Hours of Data: 682
Maximum Diurnal Speed Average: 9.9 km/h at hour 1	Minimum Diurnal Speed Average: 3.4 km/h at hour 14	Hours of Missing Data: 38
Monthly Average Velocity: 5.9 km/h 234.8 deg	Percentiles: P <sub>1</sub> = 3 P <sub>10</sub> = 7 Q <sub>1</sub> = 12 Median = 19 Q <sub>3</sub> = 26 P <sub>90</sub> = 34 P <sub>99</sub> = 50	Percent Operational Time: 94.7

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	SSW9	SW9	SW10	SW6	WSW7	SW10	SW10	SSW11	SSW12	SSW12	SSW10	SSW8	S9	SE9	SE14	SSE15	S15	SW12	SW12	SW12	SW13	SW10	SW10	SW12	SSW9.5	SSE15
2-Nov	WSW10	WSW9	W11	NW14	NNW16	NNE21	N24	N28	N27	N28	N23	N24	NNE20	NNE20	NNE20	NE17	NE14	ENE10	SE2	ENE6	DF	DF	DF	DF	N14.1	N28
3-Nov	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	NNE6	NE6	ENE5	NNE6	NE5	NE7	NE8	NE11	ENE9	E5	E8	E8	E8	---	NE11
4-Nov	ESE13	ESE13	ESE12	ESE12	ESE15	SE16	SE15	ESE14	ESE17	ESE16	ESE16	ESE17	ESE19	ESE15	ESE17	ESE19	ESE18	ESE19	ESE20	ESE22	ESE15	ESE11	E13	E9	ESE15.3	ESE22
5-Nov	E8	E11	E9	E7	E7	E8	ESE13	E12	ESE15	E10	E8	E7	E6	E5	E4	ENE5	E9	ESE15	ESE20	ESE15	ESE14	SE17	SE16	SE21	ESE10.5	SE21
6-Nov	SE16	SE19	SE26	SE21	SE19	SE23	SSE25	SE25	SE27	SSE20	SE21	SE18	SE19	SSE17	SSE19	SSE23	SE25	SSE22	SSE26	SSE27	SSE26	S26	S26	S21	SSE21.8	SSE27
7-Nov	SSW19	SSW18	SSW15	SW12	SW12	SSW10	SW11	WSW11	WSW6	SSW6	SSW12	SW11	SSW9	SSW10	SSW12	SSW7	SSW10	SW14	SW18	SW18	UO	SW17	WSW26	WSW24	SW12.6	WSW26
8-Nov	WSW31	W33	UO	UO	UO	UO	UO	UO	UO	UO	UO	NW24	NW26	NW24	NW28	NW24	NW24	NW25	NW24	NW26	NW22	NW17	NW15	NW14	---	W33
9-Nov	NW13	NNW10	N7	NE3	SSE4	SSE6	S10	S14	S14	S17	SSE25	SSE23	SSE21	SE24	S20	SSE20	SE30	SE22	SE25	SE25	SE25	SSE24	SSE32	SSE39	SSE15.8	SSE39
10-Nov	SSE29	SSE24	SSE26	SSE22	SSE23	SSE32	SSE19	SSE20	SSE19	SSE30	SSE20	SSE26	SSE30	SSE29	SSE27	SSE30	SSE33	SSE41	SSE29	SSE22	SSE29	SSE30	SSE31	SSE29	SSE27.0	SSE41
11-Nov	SSE27	SSE21	SE25	SE32	SE30	SE34	SE30	SE27	SE39	SE41	SE42	SE41	SE37	SSE25	SE35	SSE31	SSE30	SSE29	SSE22	SSE24	S24	SSW17	SW10	WSW14	SSE26.9	SE42
12-Nov	WSW19	WSW21	WSW21	WSW27	WSW28	W39	W41	W37	W33	W39	W31	W23	W30	W32	W23	W12	W8	W20	W26	WNW23	NW23	NW25	NNW24	N21	W23.8	W41
13-Nov	N14	NNE12	ENE13	ENE10	E10	ESE14	E14	E14	E13	ENE17	NE11	NNE15	NNE14	NNE17	NNE27	NNE19	NNE16	N15	N20	N16	N21	N13	N15	UO	NNE12.5	NNE27
14-Nov	UO	UO	UO	UO	UO	UO	UO	SW18	SSW14	SW15	S15	SSW15	SSW14	SW14	WSW18	WSW18	W17	W19	WSW23	WSW18	SW12	SSW15	SSW12	SSW7	---	WSW23
15-Nov	SW4	WNW6	N7	N11	N17	N18	N26	N27	N22	N20	NNW16	NNW13	NW19	NW17	WNW9	WSW12	WSW18	W20	NW17	NW15	NW25	NW27	NNW13	W12	NW13.0	NW27
16-Nov	W18	W23	WSW16	WSW13	SSW8	S10	SSE17	SSE20	SE27	SE24	SSE32	SSE25	SSE21	S21	S23	S21	S23	S20	SSW19	SW13	WSW22	WSW26	WSW42	WSW49	SSW16.0	WSW49
17-Nov	WSW44	WSW31	WSW20	W40	W46	W57	W57	W53	W48	WSW45	WSW33	WSW28	WSW23	SW20	WSW21	WSW19	WSW29	WSW28	WNW11	NW5	W5	SSW7	S13	S17	WSW27.5	W57
18-Nov	S16	SSE19	SSE23	SSE23	SSE24	SSE25	SSE25	SSE26	SSE26	SSE22	SSE21	SSE16	SSE16	SSE12	SSE16	SSE19	SSE21	SSE16	SSE15	SSE13	SSE14	SSE12	SE13	SSE10	SSE18.4	SSE26
19-Nov	SE7	SE15	SSE10	SE12	SE19	SE8	SSE4	ESE13	ESE13	SE16	SE14	S10	SE6	ESE8	S6	SSE6	S8	SSW14	SSW13	SW13	WSW16	WSW24	W37	W41	S7.9	W41
20-Nov	W34	WNW45	WNW52	NW49	WNW51	WNW50	WNW49	WNW41	WNW37	WNW34	WNW32	WNW33	WNW40	WNW43	WNW37	WNW38	WNW37	WNW34	WNW29	WNW29	WNW29	WNW26	WNW22	NW11	WNW36.3	WNW52
21-Nov	NW15	NNW13	N8	ENE8	E9	SE12	SE15	SE10	E8	E9	E8	E10	ENE8	NNE13	NNE19	N22	NNE22	NNE24	NNE22	N21	N20	N21	NNE19	N21	NNE10.9	NNE24
22-Nov	N15	N17	N19	N15	N20	NNE21	NNE19	NNE15	NNE14	NNE10	N9	N7	NNE7	NNE6	WNW2	WNW3	N3	ESE3	SE4	SSE8	SSE9	SSE10	SSE18	SE20	NNE6.2	NNE21
23-Nov	SE25	SE23	SE24	SE25	SSE27	SSE23	SSE12	SSE12	SSE11	SSE18	SSE21	S15	S13	SSE14	SSE15	SSW16	S18	S28	S30	SSW27	SW30	SSW30	SW24	SW28	S18.6	S30
24-Nov	SW31	SW25	SW30	SW30	SW25	WSW28	WSW39	WSW36	W40	W32	W22	W15	W10	W12	WSW19	W20	W24	WSW24	WSW30	WSW29	WSW27	WSW27	SW21	WSW22	WSW24.9	W40
25-Nov	WSW27	W25	NNW23	NNW29	N34	N39	N46	N30	NNW37	NNW47	NNW40	NNW38	NNW30	NNW33	NNW31	N20	N16	NNE16	NE18	NNE10	NE14	NE9	NE6	SE4	NNW21.8	NNW47
26-Nov	SSE5	SSE8	SSE12	S12	SSE8	ESE6	SSE4	SSW6	S12	SE13	S12	S12	S9	SSE11	S9	S9	S11	SSW12	SW14	SW18	WSW24	SW13	SW7	W7	S8.8	WSW24
27-Nov	SW6	S9	S8	S7	UO	UO	UO	UO	UO	SSE28	SSE25	SSE25	S22	S23	SSW26	SSW24	SW18	WSW25	W24	W26	W37	W44	WSW52	W51	SW19.1	WSW52
28-Nov	W43	W44	W47	W45	W49	W44	W47	W45	WSW40	W34	W28	W28	W26	W25	W23	WSW28	W30	W32	W43	W35	W41	WNW41	WNW31	WNW39	W36.5	W49
29-Nov	WNW36	WNW36	WNW29	WNW24	WNW31	WNW31	WNW30	WNW29	WNW25	WNW23	WNW29	WNW22	WNW25	WNW29	WNW38	WNW31	NW32	NW32	NW33	NW30	NW34	NW29	NW30	NW29	WNW29.3	WNW38
30-Nov	NW20	NNW10	NW15	NW16	NW13	N12	NE13	ENE7	ENE7	ENE6	ENE5	ENE4	ENE5	NE6	ENE7	E3	S6	S6	SSE4	SW8	WSW3	SE1	S2	W7	N3.0	NW20

WSW9.9	WSW8.0	WSW6.3	WSW5.4	WSW4.8	WSW4.5	WSW5.1	WSW5.7	WSW5.2	WSW5.5	SSW3.9	SW3.8	WSW3.4	SW4.1	SW4.6	SW5.6	SW6.5	WSW6.1	WSW6.4	WSW8.7	WSW8.4	WSW8.6	WSW9.8	Diurnal Average		
WSW44	WNW45	WNW52	WNW49	WNW51	W57	W57	W53	W48	NNW47	SE42	SE41	WNW40	WNW43	WNW38	WNW38	WNW37	SSE41	W43	W35	W41	W44	WSW52	W51	Diurnal Maximum	

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



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

**Wind Speed 163 m (WS163m) - km/h**  
**Lower Camp Met Tower - November 2023**

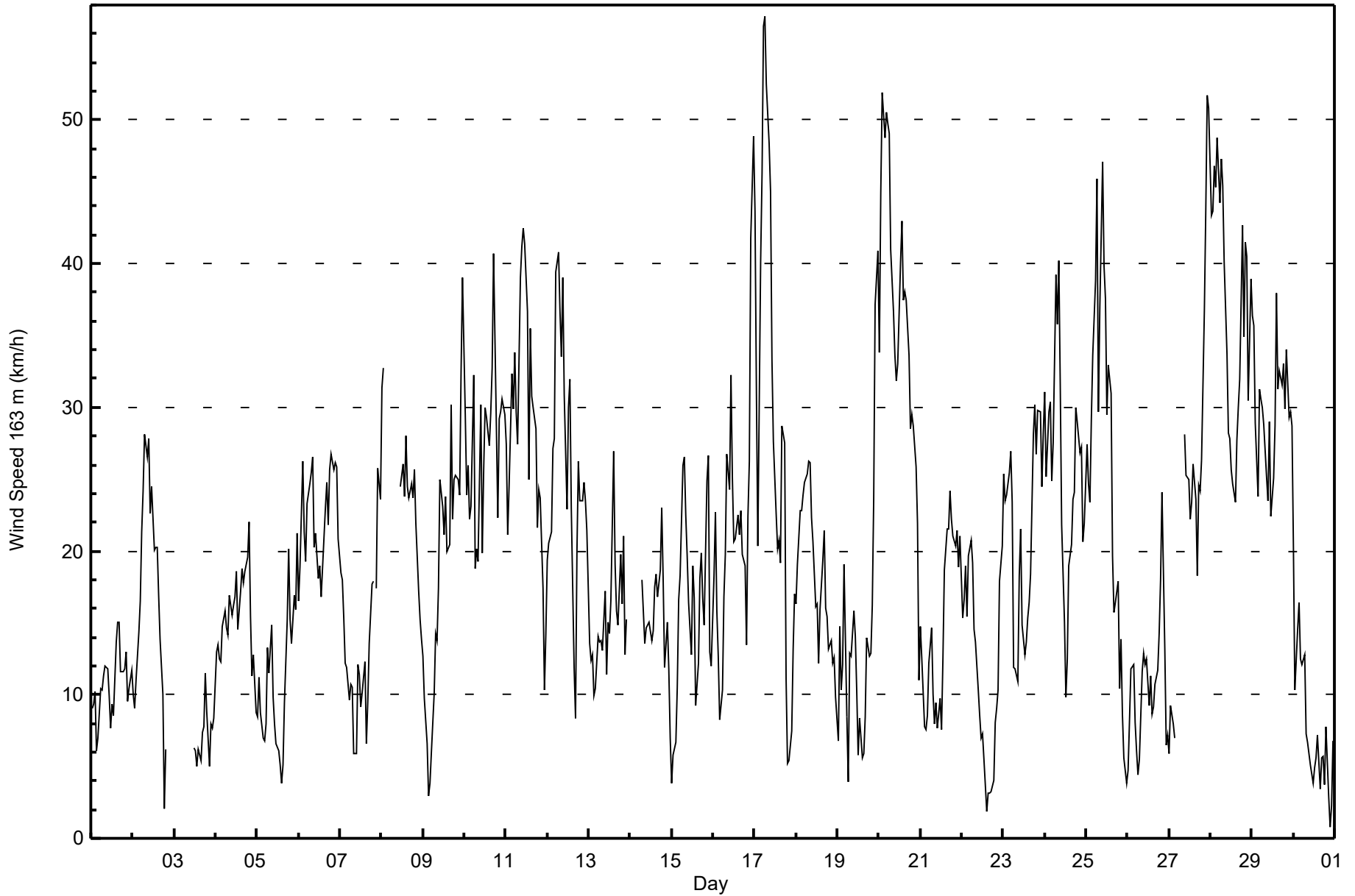
Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 12 km/h on Nov 25 09:00	Hours in Service: 720 Hours of Data: 682 Hours of Missing Data: 38 Hours of Calibration: 0 Percent Operational Time: 94.7
Minimum Value: 1 km/h on Nov 1 05:00	
Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 2 Q <sub>1</sub> = 2 Median = 3 Q <sub>3</sub> = 4 P <sub>90</sub> = 5 P <sub>99</sub> = 8	

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

Diurnal Maximum

DF - DAS Failure

UO - Unstable Operation







**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Wind Speed 163 m (WS163m) - km/h  
Lower Camp Met Tower - November 2023**

<b>Wind Speed Ranges (km/h)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	29	4.25	4.25
6 - 11	128	18.77	23.02
12 - 19	197	28.89	51.91
20 - 28	187	27.42	79.33
29 - 38	90	13.20	92.52
> 38	51	7.48	100.00

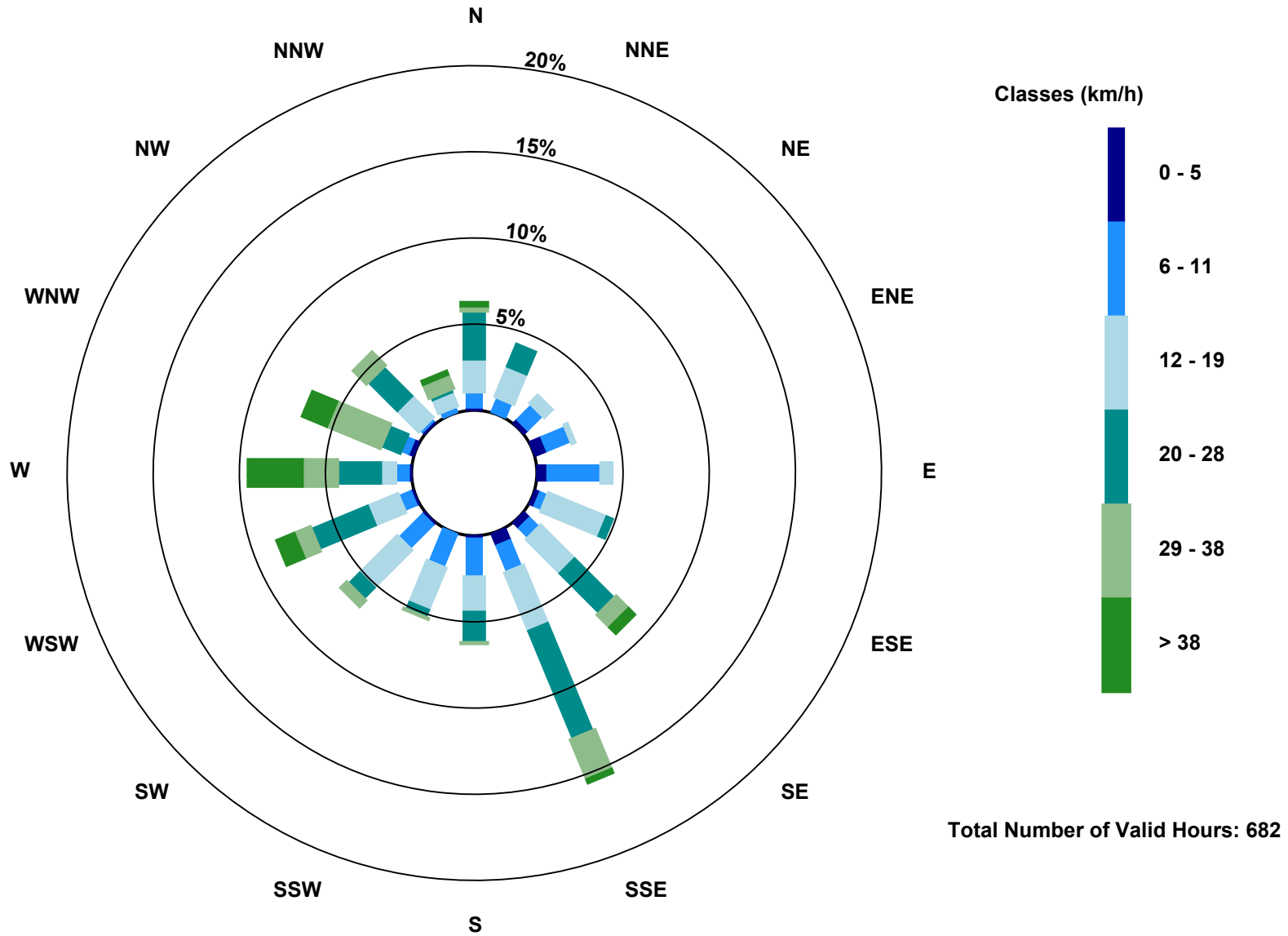
Total Number of Valid Hours: 682

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 2023

Wind Speed 163 m (WS163m) - km/h  
Lower Camp Met Tower





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

**Wind Direction 20 m (WD20m) - deg**  
**Lower Camp Met Tower - November 2023**

Direction of Maximum Speed: 309 deg on Nov 20 04:00																				Hours in Service: 720					
Direction of Maximum Daily Speed Average: 299.5 deg on Nov 20																				Hours of Data: 705					
Direction of Minimum Speed: 140 deg on Nov 27 06:00										Direction of Minimum Daily Speed Average: 1.9 deg on Nov 30										Hours of Missing Data: 15					
Monthly Average Direction: 210.6 deg																				Percent Operational Time: 97.9					
Day	Hourly Period Ending At (MST)																								Daily Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Nov	157	134	127	133	133	138	131	134	134	135	135	140	138	139	134	127	123	125	145	138	131	131	124	121	133.9
2-Nov	123	113	126	330	334	328	349	352	3	359	4	5	7	11	5	19	29	52	142	44	DF	DF	DF	DF	8.4
3-Nov	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	348	350	14	342	328	352	339	347	323	347	329	329	323	--
4-Nov	57	43	60	29	104	109	97	89	82	73	88	98	116	92	91	91	94	95	102	104	88	62	59	24	89.0
5-Nov	15	17	5	27	29	30	50	40	52	68	77	72	91	91	307	333	31	109	119	133	138	133	121	129	63.3
6-Nov	115	132	136	143	141	147	148	138	140	154	142	142	142	150	153	147	141	141	153	159	155	153	156	157	146.7
7-Nov	165	182	204	236	219	223	167	292	14	320	319	252	249	205	204	334	313	325	194	193	187	204	239	223	210.7
8-Nov	251	261	295	311	300	303	297	294	297	298	302	306	307	315	306	316	306	305	307	310	317	318	311	313	299.9
9-Nov	336	352	335	197	191	146	182	188	211	163	167	165	159	148	173	155	138	106	141	140	139	133	127	134	157.5
10-Nov	135	123	138	171	138	123	87	171	204	149	129	141	138	140	139	138	133	135	97	104	130	134	141	143	137.8
11-Nov	154	151	138	139	154	141	196	131	126	119	125	130	137	154	131	157	156	147	210	126	134	127	198	160	141.0
12-Nov	139	141	140	146	147	260	263	263	252	259	274	265	269	268	292	325	195	222	257	344	136	346	316	311	254.0
13-Nov	274	318	310	298	332	352	44	50	58	45	15	14	4	2	354	356	338	338	340	332	342	333	326	324	356.4
14-Nov	318	318	312	304	1	88	219	184	165	155	148	141	144	223	235	229	219	134	180	137	136	141	137	336	173.3
15-Nov	335	335	329	325	335	339	338	345	343	333	329	342	309	329	315	243	194	286	342	336	321	308	327	219	322.4
16-Nov	226	229	199	159	125	122	129	110	137	144	145	139	136	131	126	116	92	140	93	338	128	141	249	254	161.3
17-Nov	250	246	208	250	259	264	269	263	256	256	255	253	243	225	230	251	277	334	296	236	169	147	159	141	251.8
18-Nov	133	141	139	128	136	135	135	129	129	136	128	141	137	134	145	139	136	139	238	167	147	139	140	140	136.7
19-Nov	223	144	127	145	141	14	293	124	18	149	161	239	121	144	167	133	131	131	135	134	130	129	219	266	146.7
20-Nov	249	307	299	309	304	300	293	295	290	286	295	289	298	299	307	301	303	307	308	303	301	306	310	360	299.5
21-Nov	346	306	86	81	3	251	85	89	26	73	70	76	61	13	4	0	358	4	2	352	349	359	352	355	11.4
22-Nov	348	356	356	348	10	9	11	355	356	7	348	341	3	358	261	259	327	80	349	336	339	167	153	134	3.3
23-Nov	138	139	140	126	136	141	136	161	151	152	148	139	145	150	137	115	124	121	136	135	132	136	129	127	136.2
24-Nov	142	130	192	210	169	212	247	256	267	255	234	231	232	246	238	263	233	191	168	217	227	218	176	160	213.6
25-Nov	161	122	307	343	346	353	357	344	331	336	333	340	332	329	337	354	352	351	348	329	268	336	296	200	341.0
26-Nov	1	12	5	18	3	357	294	4	112	112	131	135	126	132	133	136	137	137	137	135	126	122	142	312	125.9
27-Nov	352	130	332	327	16	140	131	130	130	113	91	121	135	132	127	130	131	158	239	235	246	256	258	265	175.1
28-Nov	267	265	266	264	266	266	264	271	260	263	250	245	251	251	236	246	252	262	263	256	255	275	274	299	262.3
29-Nov	275	266	277	253	271	267	274	279	256	278	285	277	299	301	294	305	304	307	316	315	306	312	307	310	289.8
30-Nov	319	336	340	340	300	358	332	310	77	115	114	73	68	44	55	56	87	29	343	308	343	325	325	313	0.5
210.6	205.2	228.6	261.3	271.6	283.8	277.7	273.5	247.3	212.8	193.5	167.2	156.8	171.3	198.0	140.0	140.7	124.0	204.1	173.5	168.0	164.6	207.6	203.7		
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**

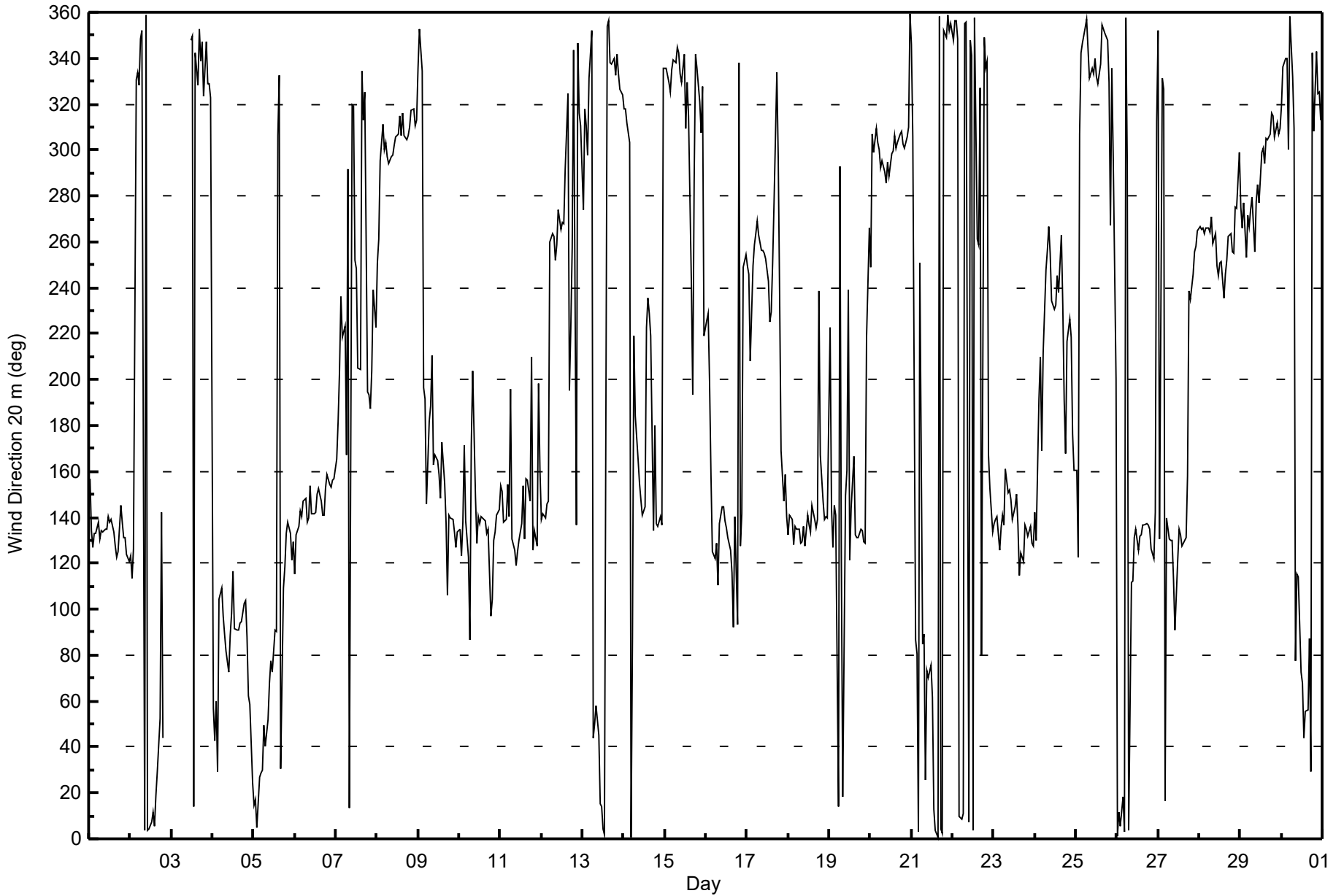
**Wind Direction 20 m (WD20m) - deg**  
**Lower Camp Met Tower - November 2023**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 104 deg on Nov 27 06:00	Hours of Data: 705
Minimum Value: 6 deg on Nov 6 20:00	Hours of Missing Data: 15
Percentiles: P <sub>1</sub> = 8 P <sub>10</sub> = 12 Q <sub>1</sub> = 15 Median = 19 Q <sub>3</sub> = 31 P <sub>90</sub> = 55 P <sub>99</sub> = 92	Hours of Calibration: 0
	Percent Operational Time: 97.9

Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Nov	30	9	14	12	14	10	12	13	12	15	14	12	11	15	21	36	23	36	21	18	9	13	12	28	36
2-Nov	49	17	25	66	21	18	13	16	17	16	20	19	20	22	37	42	68	78	39	DF	DF	DF	DF	78	
3-Nov	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	23	23	89	18	19	16	17	25	30	24	28	20	20	89
4-Nov	46	45	62	60	49	16	21	41	30	28	29	28	20	24	20	17	20	17	20	18	22	26	19	13	62
5-Nov	15	20	17	13	13	12	16	60	24	29	25	60	32	39	63	20	40	43	29	29	33	22	27	19	63
6-Nov	17	18	19	15	16	18	14	15	14	16	12	16	13	17	14	11	14	12	11	6	11	9	8	6	19
7-Nov	9	7	20	12	15	21	20	58	51	91	42	66	37	31	15	45	25	23	52	9	22	41	11	20	91
8-Nov	14	15	18	16	19	18	17	17	18	18	17	14	16	16	14	16	16	14	17	17	16	15	13	13	19
9-Nov	14	33	63	57	41	56	25	26	15	11	8	11	11	18	13	20	17	88	40	19	22	62	82	15	88
10-Nov	21	31	29	22	21	50	92	54	30	55	33	15	14	9	9	9	13	14	74	27	13	13	10	13	92
11-Nov	10	19	18	33	53	34	83	53	16	17	19	18	19	15	14	13	12	12	58	55	35	38	92	35	92
12-Nov	10	15	13	22	25	15	16	14	9	15	19	17	17	17	20	48	53	69	51	25	84	25	38	36	84
13-Nov	47	53	42	20	24	22	24	18	17	19	21	17	23	15	13	19	26	26	18	23	18	24	17	17	53
14-Nov	16	14	14	23	32	65	32	21	19	15	10	9	19	21	15	29	70	71	35	15	12	8	82	42	82
15-Nov	49	61	46	15	21	18	17	14	16	18	18	18	22	18	50	35	57	41	29	32	24	15	27	38	61
16-Nov	8	9	78	21	23	24	21	25	50	11	8	17	17	15	18	45	55	27	50	52	32	57	21	13	78
17-Nov	15	41	79	12	13	15	15	14	12	13	13	19	21	16	9	39	39	60	52	46	90	17	18	17	90
18-Nov	22	14	8	18	19	23	16	22	13	18	15	16	20	19	12	8	8	14	87	71	51	21	24	55	87
19-Nov	86	31	12	19	12	94	66	33	85	13	54	31	26	12	37	12	16	14	9	8	11	12	50	23	94
20-Nov	25	20	19	16	17	16	17	18	23	23	18	22	19	19	18	17	17	18	17	16	18	23	49	72	72
21-Nov	44	64	68	38	75	84	30	54	41	26	27	22	31	30	17	15	16	17	15	15	17	17	19	18	84
22-Nov	17	19	18	19	18	17	19	16	18	24	23	32	34	37	62	34	35	43	69	35	79	20	25	18	79
23-Nov	14	14	14	22	20	36	52	15	21	11	18	20	10	12	16	27	18	17	7	9	8	9	6	9	52
24-Nov	14	11	30	17	11	27	12	20	18	17	12	18	18	26	14	31	14	21	33	44	31	17	14	24	44
25-Nov	19	102	48	22	19	16	15	17	17	16	17	16	18	17	20	16	16	19	26	51	72	30	77	84	102
26-Nov	54	59	24	54	58	72	77	61	93	71	20	16	15	14	17	12	13	10	12	10	9	14	50	104	104
27-Nov	36	41	59	20	46	104	35	20	11	53	19	27	14	13	12	18	8	28	18	13	24	18	15	18	104
28-Nov	24	19	16	16	18	17	17	17	15	23	14	11	18	25	35	29	11	22	18	18	16	19	21	16	35
29-Nov	17	17	49	13	20	19	24	21	16	26	15	22	19	19	17	17	15	16	17	15	15	15	14	16	49
30-Nov	23	27	21	25	28	51	42	57	46	47	41	42	24	27	26	61	63	73	34	93	19	24	24	24	93

86	102	79	66	75	104	92	61	93	91	54	66	37	89	63	61	70	88	87	93	90	62	92	104	
Diurnal Maximum																								

DF - DAS Failure





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

**Wind Direction 45 m (WD45m) - deg**  
**Lower Camp Met Tower - November 2023**

Direction of Maximum Speed: 297 deg on Nov 20 03:00	Hours in Service: 720
Direction of Maximum Daily Speed Average: 297.0 deg on Nov 20	Hours of Data: 705
Direction of Minimum Speed: 349 deg on Nov 17 20:00	Hours of Missing Data: 15
Direction of Minimum Daily Speed Average: 3.0 deg on Nov 30	Percent Operational Time: 97.9
Monthly Average Direction: 214.6 deg	

Day	Hourly Period Ending At (MST)																								Daily Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Nov	148	138	134	135	134	139	136	136	137	134	130	130	134	132	127	126	133	134	166	159	151	136	130	141	136.5
2-Nov	142	143	164	336	343	337	352	356	4	360	4	6	11	11	10	30	34	57	139	52	DF	DF	DF	DF	8.8
3-Nov	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	353	357	37	344	331	352	344	351	340	348	350	359	352	--
4-Nov	84	66	90	67	111	111	100	93	89	84	96	102	118	96	94	97	100	106	106	93	74	69	31	95.0	
5-Nov	21	26	12	37	36	39	63	61	65	74	82	83	95	94	329	340	61	106	116	123	127	123	120	127	71.8
6-Nov	117	131	132	137	135	139	142	134	135	149	137	136	137	143	146	141	136	137	152	156	151	153	158	159	142.0
7-Nov	170	185	206	232	222	211	182	236	13	19	274	250	240	207	204	281	290	297	201	198	190	209	238	225	212.1
8-Nov	248	261	293	309	300	300	294	292	296	295	301	304	305	314	304	313	304	302	301	306	312	318	314	310	297.7
9-Nov	325	354	10	180	185	155	181	184	196	163	165	163	157	141	171	148	132	127	137	132	132	124	129	133	149.2
10-Nov	129	125	130	154	132	119	96	165	177	151	132	136	137	140	136	134	130	133	122	120	134	138	141	140	135.3
11-Nov	144	147	136	125	130	128	126	128	127	123	128	129	134	145	131	154	153	144	166	136	143	146	133	135	136.2
12-Nov	159	161	154	182	187	259	260	258	250	255	269	265	268	267	290	334	62	263	261	294	330	333	343	337	261.2
13-Nov	303	342	351	64	1	20	71	57	63	51	19	12	6	4	356	359	346	345	348	340	345	339	332	328	4.1
14-Nov	319	319	314	306	332	166	219	197	164	167	148	140	147	224	236	235	234	218	229	154	136	134	134	154	187.5
15-Nov	342	346	346	331	340	341	341	347	346	337	332	340	309	326	315	242	208	274	343	344	303	306	323	224	323.2
16-Nov	231	229	211	171	136	129	130	119	134	137	141	139	136	138	133	126	116	142	120	300	157	193	248	250	164.4
17-Nov	246	241	220	251	258	262	266	261	253	252	251	249	240	217	229	225	232	277	343	349	209	141	138	132	246.9
18-Nov	130	132	129	128	126	129	127	125	128	127	124	127	129	127	131	129	131	128	135	138	137	132	134	131	129.4
19-Nov	120	142	137	131	132	123	357	131	208	137	152	234	115	134	168	127	128	131	130	132	130	138	236	263	148.1
20-Nov	250	305	297	307	303	298	293	295	286	285	293	287	297	299	304	299	300	302	304	298	296	300	303	330	297.0
21-Nov	345	320	69	88	68	148	97	96	33	80	76	80	64	15	4	1	359	4	4	354	352	360	357	357	13.8
22-Nov	352	358	358	351	8	7	14	360	360	10	351	338	6	1	269	265	341	83	39	357	146	162	147	133	9.1
23-Nov	136	136	137	128	134	137	134	155	146	151	148	143	148	149	139	127	133	126	133	132	130	134	130	147	136.7
24-Nov	193	157	217	213	190	221	245	255	262	256	234	229	236	250	238	248	236	218	208	228	232	222	201	195	227.5
25-Nov	197	251	308	346	351	355	359	345	333	335	333	343	332	329	339	358	354	354	354	298	174	288	145	140	341.6
26-Nov	113	127	87	101	60	22	19	15	105	121	132	135	126	132	132	135	134	138	135	136	134	124	143	143	128.2
27-Nov	353	63	340	351	19	138	129	131	135	125	102	123	136	134	128	133	157	216	242	238	252	255	253	261	180.6
28-Nov	263	261	262	261	264	258	258	262	254	261	250	246	249	258	246	246	251	261	263	255	253	273	279	295	260.1
29-Nov	276	268	284	257	276	271	274	279	254	275	285	277	295	301	293	302	303	306	316	315	306	313	305	309	289.3
30-Nov	316	345	330	335	311	10	1	19	79	109	106	72	66	42	55	73	109	45	0	86	351	341	345	330	6.7

223.1 221.7 243.4 261.3 272.6 274.5 277.3 266.3 233.2 214.9 192.2 160.5 153.2 165.3 189.9 141.9 147.7 155.6 218.9 179.3 185.8 176.6 214.3 209.4

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**

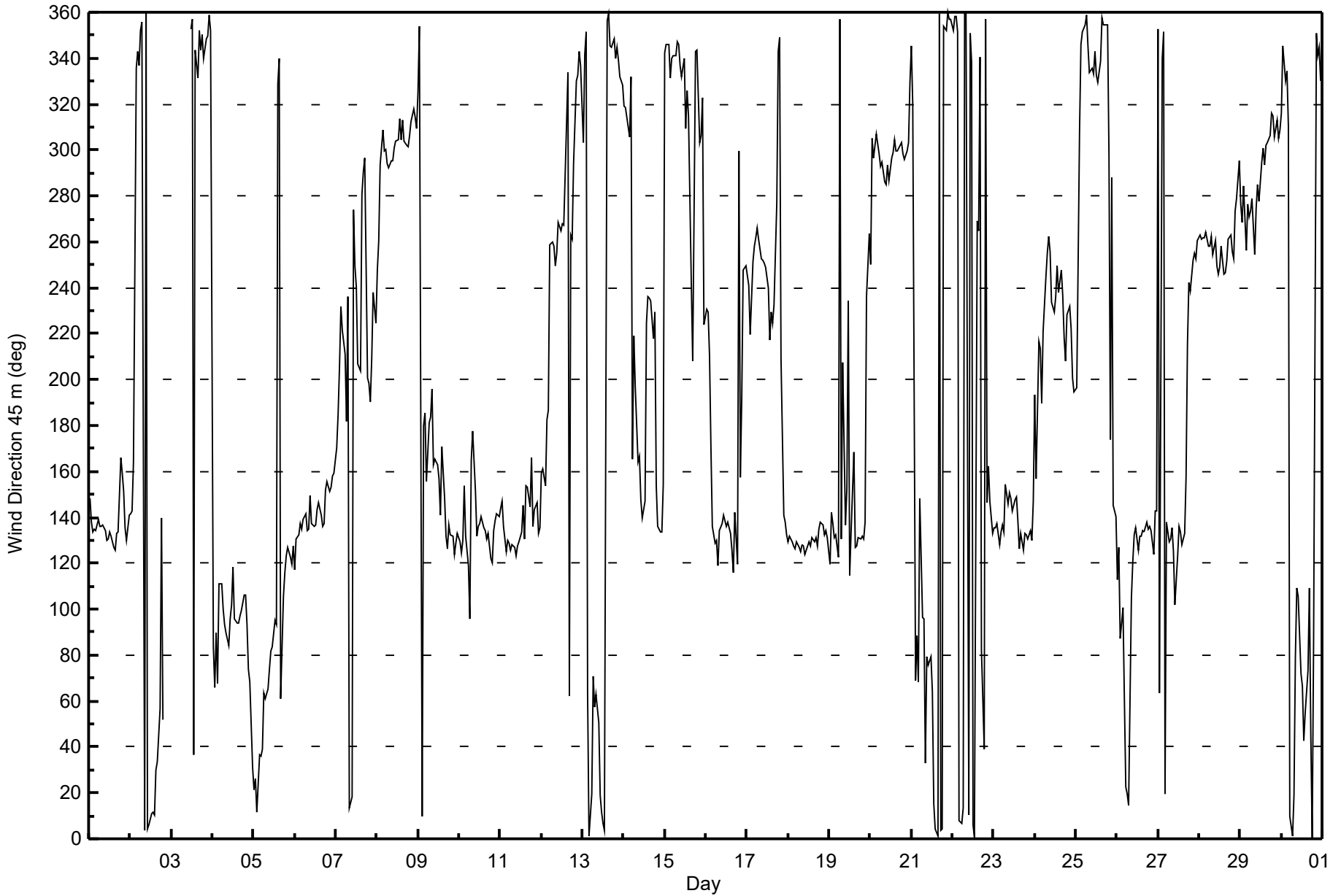
**Wind Direction 45 m (WD45m) - deg**  
**Lower Camp Met Tower - November 2023**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 108 deg on Nov 19 01:00	Hours of Data: 705
Minimum Value: 3 deg on Nov 23 21:00	Hours of Missing Data: 15
Percentiles: P <sub>1</sub> = 5 P <sub>10</sub> = 8 Q <sub>1</sub> = 10 Median = 13 Q <sub>3</sub> = 20 P <sub>90</sub> = 38 P <sub>99</sub> = 79	Hours of Calibration: 0
	Percent Operational Time: 97.9

Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Nov	25	9	13	8	6	6	6	5	7	9	9	6	6	8	8	14	10	12	22	17	10	10	10	21	25
2-Nov	21	23	35	66	19	10	8	10	11	9	12	11	12	13	15	25	25	55	73	30	DF	DF	DF	DF	73
3-Nov	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	13	16	76	14	15	9	11	7	13	12	23	18	25	76
4-Nov	38	19	34	31	30	11	16	31	15	15	15	12	14	11	9	10	11	13	11	12	16	13	12	38	
5-Nov	13	22	14	10	11	10	8	20	9	19	17	34	15	22	96	14	27	21	17	21	28	17	17	12	96
6-Nov	11	11	12	10	11	15	12	8	9	15	8	9	7	15	13	9	8	9	10	5	9	8	7	6	15
7-Nov	9	7	18	9	13	9	15	39	46	64	50	32	26	20	12	47	35	33	10	7	16	29	7	14	64
8-Nov	10	9	13	12	15	13	12	10	11	11	11	10	12	12	10	10	11	9	11	12	12	11	9	9	15
9-Nov	11	17	28	61	28	42	23	17	11	10	7	9	12	15	11	18	8	58	17	9	10	23	33	7	61
10-Nov	11	15	15	15	11	14	52	37	24	32	16	12	10	7	4	5	5	7	29	18	12	12	8	9	52
11-Nov	8	10	8	12	20	12	74	41	7	9	10	10	12	15	5	12	11	10	54	22	13	24	24	13	74
12-Nov	14	16	17	37	36	8	8	8	4	8	13	11	10	11	18	33	56	46	15	35	37	18	11	12	56
13-Nov	25	22	15	48	64	26	12	9	9	14	19	11	16	9	8	13	21	12	11	15	12	17	11	11	64
14-Nov	11	10	9	17	37	90	24	18	13	19	9	6	20	18	10	12	33	20	15	33	12	5	18	92	92
15-Nov	26	48	59	8	13	11	10	8	10	12	12	12	19	13	35	29	41	27	29	25	12	9	14	33	59
16-Nov	5	6	42	20	12	12	12	15	24	8	6	11	10	10	11	39	26	22	26	59	33	65	10	8	65
17-Nov	9	25	68	9	7	9	10	8	6	6	8	12	16	10	7	13	23	35	28	106	68	8	9	5	106
18-Nov	8	8	6	10	10	14	11	13	7	11	12	12	16	14	6	9	6	11	26	15	11	9	12	12	26
19-Nov	108	39	25	9	13	70	64	9	67	10	46	32	17	10	30	9	10	7	6	10	7	31	26	16	108
20-Nov	16	15	14	12	12	11	11	12	15	16	13	16	13	14	14	13	13	13	13	10	13	16	23	48	48
21-Nov	29	56	50	25	66	61	16	27	35	17	19	15	24	26	10	8	9	11	9	8	12	11	10	11	66
22-Nov	11	13	11	12	13	10	10	11	14	17	17	25	28	27	53	34	27	28	69	69	79	18	19	9	79
23-Nov	7	8	9	11	12	19	27	14	18	11	15	16	9	10	12	16	10	12	7	3	3	5	8	19	27
24-Nov	18	20	14	13	12	17	8	12	12	11	9	13	17	16	10	9	7	17	27	20	11	12	14	22	27
25-Nov	25	80	30	11	14	10	9	11	12	11	11	12	13	12	16	9	11	14	16	53	87	50	69	14	87
26-Nov	14	28	71	49	46	76	74	58	79	16	11	11	8	8	9	7	7	12	8	8	13	21	20	58	79
27-Nov	29	57	66	20	66	19	12	6	8	20	15	18	7	6	6	6	12	22	10	8	17	12	9	12	66
28-Nov	17	14	10	10	11	12	11	11	8	16	9	5	11	17	23	18	6	15	12	13	10	14	15	10	23
29-Nov	12	11	34	10	14	13	18	17	8	17	9	16	15	14	11	13	10	11	12	11	10	11	9	11	34
30-Nov	17	17	14	20	18	36	38	72	29	30	30	31	17	17	20	49	54	42	40	62	14	14	9	14	72

108	80	71	66	66	90	74	72	79	64	50	34	28	76	96	49	56	58	73	106	87	65	69	92	
Diurnal Maximum																								

DF - DAS Failure







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

**Wind Direction 100 m (WD100m) - deg**  
**Lower Camp Met Tower - November 2023**

Direction of Maximum Speed: 296 deg on Nov 20 03:00	Hours in Service: 720
Direction of Maximum Daily Speed Average: 294.7 deg on Nov 20	Hours of Data: 702
Direction of Minimum Speed: 139 deg on Nov 26 08:00	Direction of Minimum Daily Speed Average: 2.9 deg on Nov 30
Direction of Minimum Speed: 139 deg on Nov 26 08:00	Hours of Missing Data: 18
Monthly Average Direction: 228.1 deg	Percent Operational Time: 97.5

Day	Hourly Period Ending At (MST)																								Daily Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Nov	196	194	198	200	183	194	183	172	175	156	147	157	150	129	128	149	159	181	204	203	199	181	182	194	172.9
2-Nov	203	207	239	333	351	356	355	357	4	360	4	7	11	13	17	31	36	57	138	57	DF	DF	DF	DF	6.3
3-Nov	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	3	16	48	354	353	360	360	3	17	6	74	79	61	--
4-Nov	93	96	106	111	116	116	114	108	103	101	104	109	118	99	98	100	100	104	110	108	101	90	88	67	103.7
5-Nov	55	57	54	65	59	65	88	82	89	88	86	88	94	97	36	16	88	108	118	119	120	120	127	131	92.9
6-Nov	123	134	131	137	135	140	143	137	137	150	139	138	139	143	145	142	139	142	152	152	153	158	164	170	144.0
7-Nov	181	193	208	228	224	210	205	239	260	242	202	221	223	202	202	208	201	221	210	205	UO	UO	244	UO	213.0
8-Nov	249	267	292	309	299	295	292	291	297	297	302	305	304	314	303	311	303	302	302	306	310	320	317	312	297.5
9-Nov	314	339	10	71	167	151	181	185	189	166	163	163	158	141	170	149	136	135	136	137	134	136	143	145	149.9
10-Nov	139	148	139	155	143	140	138	164	167	158	144	149	151	152	143	142	138	149	142	141	148	149	150	147	146.9
11-Nov	145	148	137	130	129	130	126	130	132	132	134	133	136	145	134	151	153	149	155	150	163	176	203	211	140.6
12-Nov	214	207	205	241	245	259	257	255	255	254	265	268	266	267	281	303	359	262	262	291	316	315	331	352	267.1
13-Nov	339	359	46	78	105	100	93	72	76	61	30	17	14	12	3	7	357	355	355	350	348	349	344	338	18.4
14-Nov	324	324	322	309	278	253	226	214	186	197	164	158	173	223	237	244	254	249	247	219	179	167	153	161	221.0
15-Nov	136	170	351	339	349	348	349	354	353	344	335	340	309	322	303	250	225	266	328	330	300	312	325	243	323.0
16-Nov	245	238	227	208	164	151	144	144	139	139	151	152	148	151	149	149	141	164	179	198	230	246	248	246	181.7
17-Nov	244	240	235	257	257	259	262	259	251	249	247	243	237	223	235	229	234	246	331	45	187	172	177	159	246.0
18-Nov	158	149	148	154	134	148	153	148	148	149	154	139	134	158	150	148	155	151	135	145	164	162	131	156	148.0
19-Nov	167	133	201	153	133	188	214	111	131	130	139	203	123	117	179	140	167	174	172	160	182	204	250	262	177.2
20-Nov	255	303	296	304	300	298	294	295	283	283	292	287	297	298	302	298	297	298	297	295	292	292	294	308	294.7
21-Nov	332	332	38	95	104	128	114	106	63	84	82	83	68	19	8	3	3	6	8	358	356	1	2	0	19.9
22-Nov	359	358	358	354	7	11	21	8	9	13	357	339	11	7	277	284	349	89	100	147	152	155	147	137	19.6
23-Nov	137	136	139	132	139	140	141	154	146	163	156	158	160	158	152	164	168	159	163	170	191	180	178	204	157.2
24-Nov	219	206	226	220	216	230	243	252	258	256	241	237	248	263	247	253	246	242	230	234	239	228	219	223	236.8
25-Nov	237	246	303	333	355	357	358	348	336	338	335	344	333	331	338	359	0	5	15	349	37	3	245	154	340.4
26-Nov	129	134	145	149	126	115	134	139	152	125	154	158	139	142	140	152	152	168	180	193	208	176	168	216	153.4
27-Nov	287	26	119	134	155	145	152	159	160	149	144	147	153	155	153	163	194	240	250	251	261	254	249	256	197.2
28-Nov	260	256	257	261	260	249	253	254	250	258	255	261	260	263	257	249	256	265	265	264	256	273	289	290	260.4
29-Nov	281	274	290	279	288	282	284	284	268	280	288	281	296	301	294	299	303	309	317	316	308	316	305	313	294.1
30-Nov	314	341	321	322	313	20	36	59	69	100	90	71	62	43	57	82	161	114	67	168	18	49	115	232	12.8

235.1 235.7 244.6 255.4 255.5 249.3 255.8 246.3 224.9 213.5 200.0 191.6 189.3 215.4 219.0 194.3 196.2 217.1 226.4 217.0 238.5 227.4 230.5 227.1

Diurnal Average

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



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

**Wind Direction 100 m (WD100m) - deg**  
**Lower Camp Met Tower - November 2023**

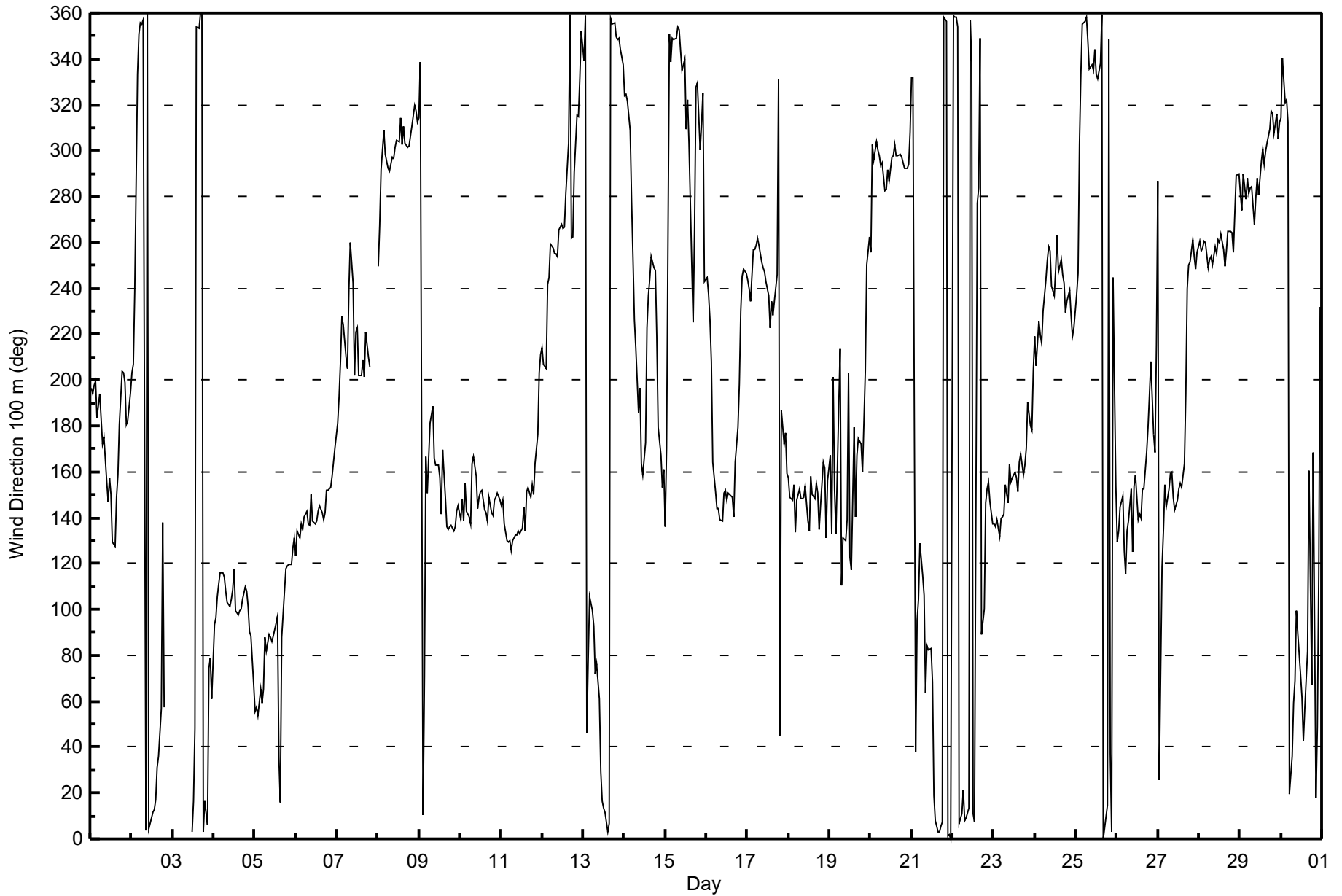
Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 91 deg on Nov 12 00:00	Hours of Data: 702
Minimum Value: 2 deg on Nov 17 09:00	Hours of Missing Data: 18
Percentiles: P <sub>1</sub> = 3 P <sub>10</sub> = 5 Q <sub>1</sub> = 7 Median = 10 Q <sub>3</sub> = 15 P <sub>90</sub> = 24 P <sub>99</sub> = 67	Hours of Calibration: 0
	Percent Operational Time: 97.5

Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Nov	20	14	14	9	15	7	15	8	11	12	14	17	10	5	5	11	14	14	8	7	9	10	13	18	20
2-Nov	26	25	22	19	5	7	5	7	8	7	10	8	9	11	11	18	17	59	72	23	DF	DF	DF	DF	72
3-Nov	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	13	15	38	24	17	14	6	9	12	18	19	12	23	38
4-Nov	15	10	12	17	8	10	11	16	10	10	11	11	8	11	8	7	9	8	9	9	9	12	8	11	17
5-Nov	14	26	20	7	8	8	6	9	6	12	12	19	13	12	60	32	16	13	9	11	15	10	11	8	60
6-Nov	7	8	7	7	7	11	10	5	5	12	6	6	6	14	11	8	7	8	6	3	5	4	6	4	14
7-Nov	7	5	13	7	9	8	6	19	14	23	18	11	7	13	9	10	10	14	5	4	UO	UO	4	UO	23
8-Nov	6	11	11	9	12	8	8	6	8	8	7	7	9	9	7	7	7	7	8	7	7	6	5	5	12
9-Nov	5	21	15	71	17	19	19	10	7	9	5	6	11	11	9	13	4	9	5	4	4	8	11	6	71
10-Nov	9	17	8	13	10	12	26	21	17	12	9	13	9	7	6	6	6	9	9	11	9	9	8	9	26
11-Nov	7	8	9	3	4	3	34	14	4	4	4	6	8	11	3	9	7	7	16	12	11	7	29	91	91
12-Nov	13	21	24	14	9	5	4	3	4	4	10	6	6	6	13	23	47	17	9	24	10	10	8	9	47
13-Nov	18	17	11	8	16	14	8	4	4	10	19	8	12	9	7	12	9	7	5	11	7	10	6	7	19
14-Nov	6	6	4	18	30	28	10	12	14	18	10	11	22	11	6	8	6	10	6	23	22	8	9	14	30
15-Nov	19	78	53	5	10	7	7	5	7	8	8	11	14	9	25	16	5	21	21	18	4	8	6	25	78
16-Nov	4	7	22	18	23	11	12	9	7	4	8	9	8	6	8	16	14	14	29	37	20	33	5	3	37
17-Nov	5	10	45	5	4	5	6	4	2	2	5	6	9	5	6	4	4	11	30	46	37	20	11	5	46
18-Nov	12	9	9	11	8	11	12	9	9	9	6	12	9	22	7	8	8	16	9	13	17	15	9	24	24
19-Nov	79	23	16	24	4	56	35	11	25	6	42	22	16	8	21	19	19	16	9	23	15	24	7	10	79
20-Nov	8	14	11	9	9	9	8	10	12	13	10	13	11	10	11	10	9	10	10	7	9	10	13	37	37
21-Nov	17	60	38	26	16	19	13	16	25	12	15	13	24	23	8	7	8	8	7	6	7	8	7	8	60
22-Nov	8	8	7	8	11	7	6	9	9	12	11	19	25	23	47	30	21	18	9	24	15	16	13	5	47
23-Nov	4	5	5	5	8	9	17	14	14	13	9	12	7	9	10	14	6	5	4	10	7	8	16	10	17
24-Nov	8	9	9	10	11	11	6	7	7	5	6	7	18	15	8	4	4	7	10	7	5	6	8	6	18
25-Nov	6	26	18	15	8	7	6	7	9	7	8	9	10	8	13	7	9	13	13	34	17	15	67	34	67
26-Nov	33	7	10	19	51	34	31	81	62	9	15	12	8	8	7	12	12	22	22	12	13	56	40	18	81
27-Nov	76	53	56	11	18	17	9	5	5	8	14	9	5	6	7	6	13	9	6	7	6	5	5	7	76
28-Nov	11	9	4	5	7	5	4	6	3	14	9	5	6	10	16	12	4	8	7	9	5	12	11	7	16
29-Nov	8	9	22	8	7	8	11	13	5	12	6	11	12	10	9	10	8	8	10	5	6	7	8	7	22
30-Nov	8	12	10	16	18	25	18	25	16	23	26	29	15	17	22	40	37	46	49	47	19	30	38	47	49
	79	78	56	71	51	56	35	81	62	23	42	29	25	38	60	40	47	59	72	47	37	56	67	91	

Diurnal Maximum

DF - DAS Failure

UO - Unstable Operation





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

**Wind Direction 163 m (WD163m) - deg**  
**Lower Camp Met Tower - November 2023**

Direction of Maximum Speed: 264 deg on Nov 17 07:00	Hours in Service: 720
Direction of Maximum Daily Speed Average: 268.7 deg on Nov 28	Hours of Data: 682
Direction of Minimum Speed: 138 deg on Nov 30 22:00	Hours of Missing Data: 38
Direction of Minimum Daily Speed Average: 3.0 deg on Nov 30	Percent Operational Time: 94.7
Monthly Average Direction: 234.8 deg	

Day	Hourly Period Ending At (MST)																								Daily Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Nov	208	223	221	236	249	229	221	213	209	198	192	194	184	138	143	165	184	217	229	231	225	216	219	225	206.3
2-Nov	244	246	273	318	342	13	2	3	8	4	8	11	17	20	25	36	41	60	124	64	DF	DF	DF	DF	7.0
3-Nov	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	24	38	67	21	34	37	42	46	60	83	96	91	85	--
4-Nov	105	108	113	119	122	127	128	120	116	114	113	116	120	105	103	107	106	112	114	113	110	103	99	93	112.4
5-Nov	84	92	98	88	85	90	102	100	102	97	92	88	94	99	91	66	100	112	112	122	123	121	127	131	107.7
6-Nov	130	139	133	140	138	143	148	143	143	156	144	143	146	147	152	148	144	150	153	156	161	171	178	184	150.0
7-Nov	192	199	211	224	224	213	216	243	246	210	192	219	211	202	203	203	206	222	218	214	UO	236	254	242	219.1
8-Nov	255	275	UO	UO	UO	UO	UO	UO	UO	UO	UO	310	308	316	305	312	307	308	306	313	315	325	326	325	--
9-Nov	326	344	5	36	151	152	187	188	190	169	159	161	159	146	169	150	145	138	137	142	140	148	153	153	153.0
10-Nov	154	157	152	160	155	154	156	164	167	158	156	159	160	160	158	158	156	166	164	162	166	165	167	160	159.9
11-Nov	153	151	141	134	135	135	134	133	137	135	138	136	140	149	140	152	153	154	161	160	181	192	229	245	146.9
12-Nov	240	245	245	251	250	271	270	263	274	263	270	280	271	270	279	277	262	267	275	296	311	321	332	349	274.5
13-Nov	359	28	63	78	96	102	99	81	88	73	48	31	28	23	14	21	12	9	10	3	356	1	357	UO	33.3
14-Nov	UO	UO	UO	UO	UO	UO	UO	236	213	220	185	192	197	224	241	253	265	259	255	240	224	201	194	193	--
15-Nov	216	282	349	359	5	359	2	5	3	354	340	337	311	319	295	254	242	276	322	316	306	319	329	264	326.0
16-Nov	267	267	250	238	193	170	152	156	142	143	165	163	160	177	180	177	173	191	202	232	247	253	253	253	202.3
17-Nov	251	247	247	263	260	261	264	268	263	256	251	246	240	234	242	237	246	254	303	307	261	208	172	177	252.9
18-Nov	186	168	166	159	160	158	163	167	163	159	153	154	153	156	152	156	162	149	153	153	157	151	144	149	159.1
19-Nov	133	131	148	134	134	146	148	117	121	129	141	188	141	112	185	162	172	194	199	215	239	242	262	267	186.2
20-Nov	261	302	295	304	301	299	296	297	284	284	292	288	299	298	301	298	298	297	297	296	293	294	293	305	295.1
21-Nov	326	338	10	65	96	132	124	126	90	90	88	87	72	32	18	10	12	14	18	9	5	10	12	9	28.4
22-Nov	9	5	4	359	11	19	27	20	19	22	7	350	21	22	293	302	355	107	140	157	162	159	150	143	29.6
23-Nov	140	138	143	136	147	148	152	163	154	165	164	169	171	163	166	195	188	180	186	212	222	213	214	222	175.4
24-Nov	229	220	234	230	233	239	248	254	263	266	263	273	277	276	257	263	261	252	243	247	254	239	234	237	247.9
25-Nov	251	265	306	343	1	1	1	353	340	341	340	348	335	334	340	3	11	20	34	28	41	36	45	143	346.6
26-Nov	159	152	166	170	151	118	150	198	177	144	174	177	176	167	172	174	174	197	233	223	240	229	214	259	188.7
27-Nov	230	183	181	175	UO	UO	UO	UO	UO	160	165	163	176	191	193	199	224	251	262	266	270	259	257	262	226.7
28-Nov	264	264	267	271	268	260	262	259	256	263	267	270	270	272	266	256	264	270	275	275	268	283	293	293	268.7
29-Nov	289	287	293	294	295	292	296	297	282	289	299	288	298	303	297	300	306	315	321	320	312	320	309	319	301.3
30-Nov	317	337	320	319	318	11	44	61	63	76	75	75	61	47	63	98	184	185	162	222	242	138	173	265	357.1

239.6 243.0 236.7 244.9 244.4 239.5 254.9 243.8 226.8 206.4 197.2 209.6 219.1 237.6 235.9 218.8 215.5 226.9 236.6 240.1 251.4 244.9 242.1 239.7

Diurnal Average

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



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

**Wind Direction 163 m (WD163m) - deg**  
**Lower Camp Met Tower - November 2023**

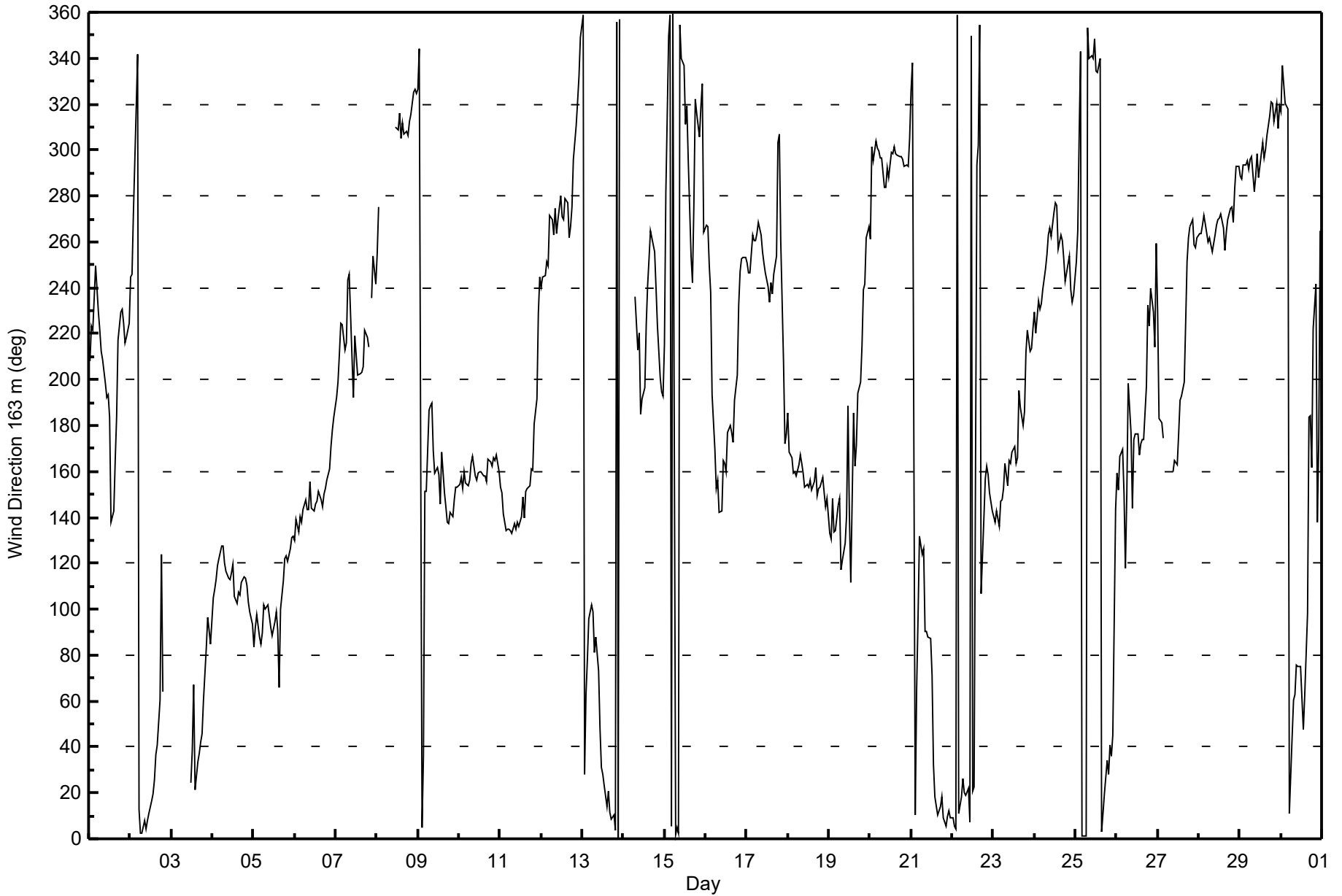
Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 82 deg on Nov 2 19:00	Hours of Data: 682
Minimum Value: 2 deg on Nov 17 07:00	Hours of Missing Data: 38
Percentiles: P <sub>1</sub> = 3 P <sub>10</sub> = 4 Q <sub>1</sub> = 6 Median = 8 Q <sub>3</sub> = 11 P <sub>90</sub> = 16 P <sub>99</sub> = 47	Hours of Calibration: 0
	Percent Operational Time: 94.7

Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Nov	10	5	7	8	4	6	7	9	8	12	10	11	12	18	7	6	16	10	7	6	8	11	9	14	18
2-Nov	9	14	15	8	15	6	6	6	7	6	9	7	8	9	9	13	13	20	82	18	DF	DF	DF	DF	82
3-Nov	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	13	14	14	22	22	15	13	4	8	12	7	7	9	22
4-Nov	6	5	5	7	6	8	6	9	8	8	9	8	7	7	9	7	9	6	6	7	9	6	8	9	9
5-Nov	9	18	12	8	5	7	5	5	3	10	11	15	13	12	28	28	9	8	6	6	8	9	7	6	28
6-Nov	5	7	6	7	7	8	8	7	6	11	8	8	10	13	10	9	7	7	5	4	5	4	5	3	13
7-Nov	4	5	11	7	9	7	5	14	11	13	16	9	7	11	7	9	12	6	4	3	UO	14	5	6	16
8-Nov	7	8	UO	UO	UO	UO	UO	UO	UO	UO	UO	5	6	8	6	6	5	5	5	4	4	5	4	5	8
9-Nov	5	16	10	66	25	14	15	8	6	10	4	8	11	9	8	9	4	5	4	4	6	9	7	6	66
10-Nov	8	10	9	9	10	9	19	11	12	7	8	8	5	5	7	6	6	7	6	7	6	6	7	9	19
11-Nov	7	6	6	3	6	4	6	5	4	3	3	5	7	9	4	6	6	5	5	4	10	9	10	9	10
12-Nov	5	5	8	6	3	5	5	3	7	4	7	6	4	3	9	11	16	5	9	16	5	7	4	10	16
13-Nov	7	15	6	5	14	6	7	5	3	7	13	7	12	9	7	11	9	6	4	9	6	10	7	UO	15
14-Nov	UO	UO	UO	UO	UO	UO	UO	17	10	14	9	9	16	9	7	7	6	10	4	7	14	11	8	12	17
15-Nov	30	22	19	9	9	7	7	5	6	8	9	13	12	10	18	12	4	16	12	13	5	10	10	17	30
16-Nov	8	10	13	8	26	11	8	6	4	8	7	6	8	6	7	12	10	12	12	13	8	10	4	3	26
17-Nov	4	7	29	4	4	3	2	2	2	3	4	5	6	6	6	5	2	7	26	33	10	26	7	8	33
18-Nov	6	5	8	7	4	4	6	6	8	6	3	7	6	7	8	4	5	5	6	6	4	10	4	12	12
19-Nov	12	10	13	11	5	31	33	5	6	3	37	14	30	8	31	20	14	5	10	12	11	14	4	5	37
20-Nov	5	11	9	8	8	6	6	7	9	10	8	11	9	8	9	7	6	8	7	6	5	7	9	22	22
21-Nov	10	13	17	19	11	9	8	11	14	10	13	11	22	19	7	6	8	8	7	7	7	8	7	7	22
22-Nov	9	8	7	8	9	5	4	6	8	13	13	21	24	25	76	24	27	29	15	12	14	14	9	6	76
23-Nov	4	5	6	6	7	8	14	13	12	7	6	7	6	6	12	7	5	8	8	4	5	6	6	6	14
24-Nov	8	8	7	8	9	8	5	5	4	4	7	10	15	14	6	4	3	5	4	7	6	6	6	6	15
25-Nov	5	10	13	12	6	6	6	5	8	5	7	8	9	6	11	8	8	12	7	12	7	10	10	45	45
26-Nov	23	16	6	12	25	18	30	49	21	12	14	7	11	9	10	10	8	19	6	6	5	62	46	19	62
27-Nov	24	10	8	22	UO	UO	UO	UO	UO	13	5	5	9	6	5	6	12	5	5	5	4	3	5	3	24
28-Nov	6	7	2	3	5	4	4	4	3	11	7	5	5	7	12	8	3	6	4	6	3	9	8	4	12
29-Nov	6	7	14	6	5	4	5	10	5	7	6	8	11	8	6	8	5	7	9	4	5	5	7	5	14
30-Nov	6	8	10	9	14	28	5	12	7	13	17	23	18	18	20	23	12	19	28	27	58	78	42	19	78
	30	22	29	66	26	31	33	49	21	14	37	23	30	25	76	28	27	29	82	33	58	78	46	45	

Diurnal Maximum

DF - DAS Failure

UO - Unstable Operation





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

**Vertical Wind Speed 20 m (VW20m) - km/h**  
**Lower Camp Met Tower - November 2023**

Maximum Value: 0.4 km/h on Nov 12 05:00      Maximum Daily Average: 0.0 km/h on Nov 2																				Hours in Service:	720							
Minimum Value: -1.3 km/h on Nov 17 07:00      Minimum Daily Average: -0.7 km/h on Nov 28																				Hours of Data:	705							
Maximum Diurnal Average: -0.1 km/h at hour 19      Minimum Diurnal Average: -0.4 km/h at hour 11																				Hours of Missing Data:	15							
Monthly Average: -0.26 km/h      Percentiles: $P_1 = -1.0$ $P_{10} = -0.7$ $Q_1 = -0.4$ Median = -0.2 $Q_3 = 0.0$ $P_{90} = 0.0$ $P_{99} = 0.2$																				Hours of Calibration:	0							
																				Percent Operational Time:	97.9							
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24				
1-Nov	0.0	-0.2	-0.1	-0.1	-0.1	-0.2	-0.2	-0.3	-0.4	-0.3	-0.2	-0.3	-0.7	-0.4	-0.3	0.0	0.0	0.1	-0.2	-0.1	0.1	-0.1	-0.1	0.1	-0.2	0.1	-0.2	0.1
2-Nov	0.1	0.2	0.0	0.0	0.1	0.0	-0.2	-0.2	0.2	-0.1	0.1	0.1	-0.2	-0.1	0.1	0.2	0.0	-0.1	-0.1	0.2	DF	DF	DF	DF	0.0	0.0	0.2	0.2
3-Nov	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	-0.2	0.1	-0.2	-0.1	-0.1	0.0	0.0	0.0	-0.2	0.0	-0.1	-0.2	-0.2	--	0.0	0.1	0.1
4-Nov	0.1	0.1	0.0	0.0	-0.2	-0.2	-0.1	-0.2	0.0	0.1	-0.2	-0.2	0.0	0.0	-0.2	-0.2	-0.2	-0.2	-0.2	-0.3	-0.3	-0.1	0.0	0.1	-0.1	0.0	0.1	0.1
5-Nov	0.2	0.1	0.0	0.1	0.0	0.1	0.0	0.2	0.1	-0.1	-0.1	0.1	0.0	0.2	0.0	-0.1	0.1	0.0	-0.2	0.0	-0.2	-0.2	-0.2	-0.2	0.0	0.0	0.2	0.2
6-Nov	-0.1	-0.3	-0.5	-0.5	-0.4	-0.2	-0.8	-0.5	-0.6	-0.7	-0.8	-0.6	-0.7	-0.5	-0.8	-0.8	-0.7	-0.8	-0.5	-0.7	-0.7	-0.6	-0.5	-0.7	-0.6	-0.5	-0.7	-0.1
7-Nov	-0.6	-0.7	-0.6	-0.2	-0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.1	-0.1	-0.1	-0.2	0.0	-0.1	0.0	-0.1	-0.5	-0.4	-0.1	-0.5	-0.2	-0.2	-0.1	-0.2	0.1
8-Nov	-0.7	-0.8	-0.8	-0.7	-0.5	-0.4	-0.5	-0.6	-0.3	-0.2	-0.5	-0.4	-0.4	-0.3	-0.5	-0.3	-0.2	-0.3	-0.1	-0.2	-0.1	-0.2	-0.2	-0.1	-0.4	-0.1	-0.1	-0.1
9-Nov	-0.1	0.0	0.0	-0.1	0.0	-0.1	-0.3	-0.4	-0.3	-0.7	-1.0	-1.0	-0.9	-0.7	-0.8	-0.6	-0.4	-0.1	0.0	-0.3	-0.4	-0.1	-0.2	-0.6	-0.4	0.0	0.0	0.0
10-Nov	-0.4	-0.5	-0.4	-0.2	-0.3	-0.4	-0.1	-0.2	-0.2	0.0	0.0	-0.5	-0.6	-1.0	-0.8	-0.7	-0.6	-0.5	-0.1	-0.4	-0.7	-0.8	-0.7	-0.6	-0.5	0.0	0.0	0.0
11-Nov	-0.6	-0.2	-0.3	-0.1	0.1	-0.3	-0.1	-0.2	-0.6	-0.6	-0.6	-0.8	-0.6	-0.7	-0.5	-1.0	-0.8	-0.6	0.0	-0.1	-0.4	0.0	0.0	0.0	-0.4	0.0	0.1	0.1
12-Nov	-0.1	0.1	0.0	0.0	0.4	-0.7	-0.8	-0.7	-1.2	-0.6	-0.7	-0.4	-0.7	-0.5	-0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.1	-0.1	-0.1	-0.3	0.0	0.1	0.1
13-Nov	-0.1	-0.1	-0.1	0.0	0.0	0.0	0.1	0.1	0.1	0.0	-0.2	0.1	0.1	0.1	-0.2	-0.1	-0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14-Nov	-0.2	-0.2	-0.3	-0.2	0.0	0.0	-0.2	0.0	0.0	-0.2	-0.6	-0.8	-0.6	-0.6	-0.4	-0.2	-0.1	0.0	0.0	0.1	0.1	0.0	0.0	0.0	-0.2	0.0	0.0	0.0
15-Nov	0.0	0.0	-0.1	0.0	-0.1	0.0	0.0	-0.3	-0.1	0.2	0.0	-0.1	-0.3	-0.1	0.0	-0.1	-0.1	-0.3	-0.1	0.0	-0.1	-0.4	0.0	-0.2	-0.1	0.0	0.0	0.2
16-Nov	-0.3	-0.5	0.0	0.0	-0.1	-0.2	-0.3	-0.3	-0.3	-0.6	-0.8	-0.5	-0.4	-0.3	-0.3	-0.1	-0.1	-0.3	0.0	0.0	0.0	0.2	-0.5	-1.0	-0.3	0.0	0.0	0.2
17-Nov	-0.8	-0.5	-0.3	-0.7	-1.0	-0.9	-1.3	-1.2	-1.2	-1.0	-0.8	-0.4	-0.3	-0.1	-0.2	-0.1	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	-0.5	0.0	0.1	0.1
18-Nov	0.0	0.0	-0.1	-0.1	-0.2	-0.1	-0.2	-0.1	-0.4	-0.2	-0.3	-0.3	-0.4	-0.1	-0.3	-0.3	-0.4	-0.1	0.0	0.0	0.0	0.0	-0.1	-0.2	-0.2	0.0	0.0	0.0
19-Nov	0.0	-0.3	0.1	0.0	-0.3	0.0	0.0	0.1	0.0	-0.1	-0.3	0.0	-0.2	-0.4	-0.3	-0.3	-0.1	-0.1	-0.1	-0.2	-0.3	-0.4	-0.2	-0.6	-0.2	0.0	0.0	0.1
20-Nov	-0.3	-0.8	-0.8	-0.8	-0.8	-1.0	-0.8	-0.7	-0.6	-0.5	-0.8	-0.7	-1.0	-0.8	-0.7	-0.7	-0.5	-0.6	-0.4	-0.4	-0.3	-0.3	0.0	0.0	-0.6	0.0	0.0	0.0
21-Nov	-0.1	0.0	-0.1	0.0	0.0	0.0	-0.1	-0.1	0.0	-0.1	0.0	-0.3	0.1	-0.2	0.2	0.0	-0.1	0.0	0.2	-0.3	-0.1	-0.1	0.1	-0.1	-0.1	0.0	0.0	0.2
22-Nov	-0.1	0.0	0.0	-0.1	0.2	0.1	0.1	0.0	0.1	0.1	0.0	0.0	0.0	-0.1	0.0	-0.1	0.0	-0.1	0.0	0.0	-0.1	-0.3	-0.1	-0.3	0.0	0.0	0.0	0.2
23-Nov	-0.6	-0.6	-0.8	-0.4	-0.3	-0.4	-0.2	-0.3	-0.2	-0.3	-0.3	-0.3	-0.6	-0.6	-0.6	-0.4	-0.4	-0.5	-0.4	0.1	-0.1	-0.2	-0.6	-0.7	-0.4	0.0	0.0	0.1
24-Nov	-0.6	-0.5	0.0	-0.7	-0.6	-0.3	-0.9	-0.7	-0.8	-0.8	-0.5	-0.5	-0.5	-0.2	-0.4	-0.1	-0.1	-0.3	-0.1	0.0	-0.2	-0.2	-0.3	0.0	-0.4	0.0	0.0	0.0
25-Nov	-0.1	0.0	-0.2	0.0	0.0	-0.2	-0.1	-0.1	-0.1	-0.1	0.2	-0.5	0.0	0.1	0.0	-0.1	-0.1	-0.1	-0.1	0.0	0.0	0.0	0.0	0.0	-0.1	0.0	0.0	0.2
26-Nov	0.0	0.0	0.1	0.0	0.1	0.0	-0.1	-0.1	0.0	-0.1	-0.2	-0.5	-0.4	-0.4	-0.3	-0.4	-0.4	-0.3	-0.3	-0.2	-0.1	0.0	-0.1	0.0	-0.2	0.0	0.0	0.1
27-Nov	0.0	0.1	0.0	0.0	0.0	0.0	-0.3	-0.4	-0.5	-0.2	-0.5	-0.5	-0.6	-0.6	-0.5	-0.4	-0.3	-0.2	-0.3	-0.6	-0.7	-0.7	-1.0	-0.9	-0.4	0.0	0.0	0.1
28-Nov	-0.8	-0.8	-0.9	-0.7	-1.0	-0.8	-0.8	-0.8	-0.8	-0.6	-0.9	-0.7	-0.4	-0.2	-0.4	-0.2	-0.8	-0.6	-0.6	-0.6	-0.8	-0.6	-0.4	-0.5	-0.7	-0.4	0.0	0.1
29-Nov	-0.6	-0.5	-0.2	-0.6	-0.4	-0.3	-0.2	-0.6	-0.6	-0.1	-0.8	-0.3	-0.5	-0.3	-0.4	-0.5	-0.6	-0.4	-0.4	-0.3	-0.4	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.1
30-Nov	-0.2	-0.1	0.1	-0.1	-0.1	0.0	-0.1	0.0	0.0	0.0	-0.1	0.0	-0.1	-0.2	0.0	-0.1	0.0	0.0	-0.1	-0.1	0.0	-0.1	-0.1	0.0	0.0	0.0	0.0	0.1
																								Diurnal Average				
																								Diurnal Maximum				
DF - DAS Failure																												



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

**Vertical Wind Speed 20 m (VW20m) - km/h**  
**Lower Camp Met Tower - November 2023**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0																				Hours in Service: 720					
Maximum Value: 4.8 km/h on Nov 20 03:00																				Hours of Data: 705					
Minimum Value: 0.1 km/h on Nov 7 09:00																				Hours of Missing Data: 15					
Percentiles: P <sub>1</sub> = 0.2 P <sub>10</sub> = 0.4 Q <sub>1</sub> = 0.7 Median = 1.2 Q <sub>3</sub> = 1.9 P <sub>90</sub> = 2.6 P <sub>99</sub> = 4.1																				Hours of Calibration: 0					
																				Percent Operational Time: 97.9					
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Nov	0.3	0.8	0.9	0.8	1.0	0.9	1.2	1.6	1.4	1.6	1.9	1.5	1.7	1.4	0.7	0.4	0.6	0.5	0.5	0.6	0.7	0.6	0.6	0.7	1.9
2-Nov	0.4	0.5	0.3	0.2	0.5	0.9	1.6	2.4	2.5	2.5	2.4	2.6	2.2	2.2	2.3	1.9	1.3	1.2	0.9	0.9	DF	DF	DF	DF	2.6
3-Nov	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	0.9	0.9	0.7	0.9	0.7	0.7	0.7	0.5	0.5	0.6	0.4	0.5	0.5	0.9
4-Nov	0.8	0.7	0.6	0.4	0.8	1.1	1.1	0.9	1.1	1.2	1.5	1.7	2.1	1.7	1.8	1.9	2.1	1.7	1.8	2.2	1.4	1.0	0.9	0.9	2.2
5-Nov	1.0	0.9	1.0	1.0	0.9	0.9	1.0	0.8	1.1	1.1	1.1	1.0	1.0	0.8	0.6	0.7	0.8	1.0	1.7	1.3	1.0	1.4	1.0	1.7	1.7
6-Nov	1.3	1.8	2.3	1.9	1.8	2.1	2.3	2.5	2.6	1.8	1.9	2.2	2.1	1.7	1.8	1.8	2.0	1.9	1.6	1.4	1.2	1.2	1.2	1.1	2.6
7-Nov	0.8	0.8	1.1	0.6	0.4	0.2	0.2	0.2	0.1	0.2	0.4	0.4	0.4	0.4	0.8	0.3	0.3	0.4	0.9	0.9	0.9	1.0	1.5	1.3	1.5
8-Nov	2.2	2.5	3.2	3.0	2.8	2.2	2.5	2.7	2.6	2.5	1.9	2.0	2.2	2.0	2.4	2.0	1.6	1.6	1.6	1.9	1.4	1.0	0.8	0.6	3.2
9-Nov	0.5	0.3	0.3	0.4	0.4	0.4	0.7	0.8	0.6	1.3	1.6	1.9	2.0	2.6	1.4	1.9	2.8	1.2	0.9	1.9	2.0	1.5	1.7	2.6	2.8
10-Nov	1.8	1.3	1.7	0.8	1.0	1.5	1.0	0.9	1.1	1.4	1.0	1.4	1.6	1.8	1.7	1.9	2.4	1.9	1.5	1.4	1.6	1.7	1.8	1.9	2.4
11-Nov	1.6	0.9	1.8	1.9	1.5	1.9	1.2	1.7	2.7	2.8	3.4	3.6	3.3	2.0	2.9	2.0	1.7	1.7	0.8	1.1	1.4	1.1	0.3	0.3	3.6
12-Nov	0.8	1.0	1.2	1.4	1.3	2.9	3.1	2.3	2.1	2.6	2.6	2.3	2.5	2.7	1.7	0.6	0.3	0.4	0.4	0.5	0.3	0.5	0.4	0.4	3.1
13-Nov	0.3	0.4	0.2	0.1	0.2	0.4	0.9	1.5	1.6	1.5	1.1	1.4	1.4	1.4	2.5	1.9	1.3	0.9	1.2	1.3	1.9	1.2	1.2	1.3	2.5
14-Nov	1.3	1.0	0.9	0.6	0.3	0.3	0.8	0.8	0.6	0.7	1.3	1.6	1.3	1.0	0.9	0.6	0.3	0.4	0.6	0.6	0.5	0.6	0.4	0.2	1.6
15-Nov	0.2	0.2	0.5	1.1	1.7	1.5	2.1	2.3	1.5	1.7	1.6	1.2	2.0	1.6	1.0	1.0	0.6	1.1	0.7	0.5	0.9	2.0	0.6	0.9	2.3
16-Nov	1.0	1.4	1.2	1.0	0.6	1.0	1.5	1.2	2.1	1.7	1.7	2.0	2.1	1.7	1.5	1.3	1.0	0.7	0.8	0.3	0.8	1.3	2.4	3.0	3.0
17-Nov	2.8	1.9	1.2	2.0	2.9	3.9	3.9	3.7	3.0	2.7	2.1	1.8	1.0	0.6	0.8	0.4	0.6	0.4	0.3	0.2	0.2	0.2	0.3	0.5	3.9
18-Nov	0.6	0.6	0.8	1.0	0.7	0.7	0.8	0.9	1.3	1.1	1.2	0.9	0.8	0.8	0.9	0.6	1.0	0.6	0.3	0.3	0.3	0.4	0.4	0.7	1.3
19-Nov	0.2	0.6	0.6	0.1	0.4	0.5	0.2	0.4	0.4	0.6	0.7	0.9	0.6	1.0	0.5	0.7	0.4	0.5	0.5	0.7	1.0	1.6	1.4	2.7	2.7
20-Nov	1.6	4.1	4.8	4.8	4.7	4.3	4.3	3.4	3.7	3.5	3.2	3.5	3.9	4.2	3.5	3.3	2.9	2.8	2.1	1.9	2.1	2.0	1.4	0.8	4.8
21-Nov	0.7	0.8	0.5	0.7	0.4	0.4	1.0	1.0	0.9	1.3	1.3	1.6	1.4	1.7	2.2	2.2	2.3	2.4	2.3	1.9	2.0	2.1	1.8	1.9	2.4
22-Nov	1.5	1.6	2.0	1.5	1.9	1.7	0.9	0.7	0.9	1.1	1.2	1.3	1.4	1.1	0.9	0.6	0.3	0.5	0.2	0.3	0.4	1.0	1.6	2.2	2.2
23-Nov	2.3	2.0	2.4	2.4	2.5	2.1	1.2	1.0	0.9	0.8	1.6	1.1	1.2	1.0	1.2	1.1	0.8	1.1	0.9	1.5	1.7	2.2	1.3	1.8	2.5
24-Nov	1.9	1.3	1.8	1.8	0.9	0.8	2.2	2.3	2.9	2.4	1.3	1.2	0.7	0.8	0.9	1.1	0.6	0.7	1.1	1.1	1.4	1.4	0.9	1.2	2.9
25-Nov	1.3	1.1	0.8	0.8	2.5	3.4	3.9	2.2	3.2	4.1	3.6	3.5	2.8	3.3	2.9	1.8	1.2	1.0	0.6	0.3	0.3	0.2	0.1	0.1	4.1
26-Nov	0.2	0.3	0.2	0.2	0.3	0.4	0.5	0.8	0.3	0.7	1.1	1.5	1.5	1.7	1.5	1.4	1.1	1.0	1.0	1.0	1.2	0.9	0.5	0.2	1.7
27-Nov	0.3	0.3	0.2	0.3	0.2	0.2	1.0	1.9	1.8	1.6	1.2	1.8	1.9	1.8	1.7	1.7	1.1	0.9	1.3	1.4	1.9	2.1	3.1	3.5	3.5
28-Nov	3.3	3.1	2.9	2.9	3.3	2.8	3.1	2.9	2.4	2.2	2.3	1.6	1.8	1.6	1.5	1.2	1.8	1.8	3.1	2.1	2.6	2.9	2.0	2.4	3.3
29-Nov	2.5	2.4	1.4	1.3	1.7	2.0	2.0	2.5	2.3	2.0	2.6	2.0	2.5	2.5	3.2	2.5	2.3	2.2	2.4	1.7	2.4	2.1	1.8	2.0	3.2
30-Nov	1.3	0.5	0.7	0.7	0.5	0.5	0.4	0.3	0.5	0.5	0.7	0.9	0.9	0.9	1.1	0.6	0.2	0.3	0.4	0.3	0.7	0.4	0.3	0.2	1.3
	3.3	4.1	4.8	4.8	4.7	4.3	4.3	3.7	3.7	4.1	3.6	3.6	3.9	4.2	3.5	3.3	2.9	2.8	3.1	2.2	2.6	2.9	3.1	3.5	
Diurnal Maximum																									
DF - DAS Failure																									





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

**Vertical Wind Speed 45 m (VW45m) - km/h**  
**Lower Camp Met Tower - November 2023**

Maximum Value: 1.5 km/h on Nov 23 22:00																				Maximum Daily Average: 0.7 km/h on Nov 11					Hours in Service: 720	
Minimum Value: -1.6 km/h on Nov 20 04:00																				Minimum Daily Average: -0.9 km/h on Nov 20					Hours of Data: 705	
Maximum Diurnal Average: 0.1 km/h at hour 20																				Minimum Diurnal Average: -0.1 km/h at hour 8					Hours of Missing Data: 15	
Monthly Average: 0.03 km/h																				Percentiles: $P_1 = -1.2$ $P_{10} = -0.6$ $Q_1 = -0.1$ Median = 0.1 $Q_3 = 0.3$ $P_{90} = 0.5$ $P_{99} = 0.9$					Hours of Calibration: 0	
																									Percent Operational Time: 97.9	
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	0.2	0.3	0.2	0.2	0.3	0.5	0.6	0.7	0.5	0.2	0.3	0.1	0.0	0.3	0.0	0.1	0.3	0.4	0.0	0.1	0.4	0.4	0.3	0.3	0.3	0.7
2-Nov	0.1	0.4	0.0	0.0	0.1	0.1	-0.1	0.0	0.3	0.0	0.2	0.1	-0.2	-0.1	-0.2	0.1	0.2	0.1	0.1	0.2	DF	DF	DF	DF	0.1	0.4
3-Nov	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	-0.1	0.0	-0.1	-0.1	-0.2	-0.1	0.0	-0.1	-0.2	-0.1	0.0	-0.1	-0.2	--	0.0
4-Nov	0.1	0.2	-0.2	-0.1	0.0	-0.2	-0.2	0.0	0.2	0.3	0.3	0.4	0.5	0.3	0.3	0.3	0.2	0.1	0.3	0.1	-0.1	0.0	-0.1	0.0	0.1	0.5
5-Nov	0.1	0.0	-0.1	0.0	-0.1	-0.2	-0.1	0.5	0.3	0.1	0.0	0.2	0.2	0.2	-0.1	0.0	0.1	0.2	0.4	0.4	0.0	0.2	0.2	0.4	0.1	0.5
6-Nov	0.2	0.4	0.7	0.5	0.3	0.8	0.9	0.7	0.8	0.2	0.4	0.6	0.6	0.5	0.9	0.8	0.8	0.6	0.9	0.6	0.4	0.3	0.1	-0.2	0.5	0.9
7-Nov	-0.2	0.0	0.0	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	-0.1	0.1	0.1	0.1	0.0	-0.1	0.5	0.2	0.0	0.2	0.2	0.2	0.1	0.5
8-Nov	0.0	-0.6	-1.0	-1.2	-0.7	-0.8	-0.9	-0.9	-0.6	-0.5	-0.8	-0.6	-0.7	-0.6	-0.8	-0.7	-0.5	-0.6	-0.4	-0.4	-0.4	-0.3	-0.4	-0.3	-0.6	0.0
9-Nov	-0.2	0.0	0.0	0.0	0.3	0.1	0.3	0.1	0.1	0.0	-0.3	-0.1	0.0	0.9	0.0	0.4	0.8	0.3	0.5	0.7	0.8	0.3	0.2	0.7	0.2	0.9
10-Nov	0.2	-0.3	0.2	0.3	0.1	-0.1	-0.2	-0.1	0.0	0.5	0.2	0.2	0.4	0.5	0.6	0.5	0.6	0.7	0.3	-0.3	-0.4	-0.2	0.3	0.5	0.2	0.7
11-Nov	0.6	0.9	1.0	0.8	0.9	1.1	0.6	0.5	0.6	0.5	0.7	0.5	1.0	0.9	0.8	0.8	0.7	0.8	0.5	0.3	0.5	0.6	0.1	0.3	0.7	1.1
12-Nov	0.2	0.2	0.7	0.8	0.9	-0.3	-0.4	-0.5	-0.6	-0.3	-0.7	-0.1	-0.7	-0.7	-0.5	0.0	0.1	0.0	0.1	0.1	-0.1	-0.2	0.0	-0.1	-0.1	0.9
13-Nov	-0.1	-0.1	-0.1	0.1	0.0	0.0	0.2	0.1	0.2	0.0	-0.1	0.1	0.3	0.1	-0.2	0.0	0.0	0.1	0.1	-0.1	0.0	0.0	-0.1	-0.2	0.0	0.3
14-Nov	-0.4	-0.4	-0.3	-0.2	-0.2	0.1	0.2	0.3	0.4	0.2	0.3	0.3	0.3	0.0	0.0	0.1	0.0	0.1	0.1	0.3	0.6	1.0	0.3	0.1	0.1	1.0
15-Nov	0.1	0.1	-0.1	-0.3	-0.2	-0.1	-0.2	-0.3	-0.2	-0.1	-0.1	-0.2	-0.7	-0.4	0.0	0.2	0.3	-0.3	-0.1	-0.1	-0.3	-0.8	-0.2	0.3	-0.2	0.3
16-Nov	0.4	0.6	0.4	0.0	0.5	0.3	0.3	0.0	0.8	0.7	0.8	0.5	0.5	0.6	0.5	0.4	0.2	0.0	0.1	0.0	0.2	0.2	0.3	-0.2	0.3	0.8
17-Nov	0.1	0.1	-0.2	-0.2	-0.6	-0.8	-1.4	-1.0	-0.7	-0.5	-0.4	-0.3	-0.1	0.3	0.2	0.2	0.1	0.0	0.1	0.1	0.1	0.6	0.4	0.7	-0.1	0.7
18-Nov	0.3	0.6	0.3	0.4	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.3	0.1	0.5	0.4	0.2	0.1	0.3	0.2	0.2	0.3	0.5	0.3	0.3	0.3	0.6
19-Nov	0.1	0.1	0.4	0.3	-0.1	0.2	0.1	0.4	0.1	0.4	0.3	0.2	0.1	0.1	0.1	0.1	0.1	0.3	0.3	0.3	0.4	0.3	0.3	-0.3	0.2	0.4
20-Nov	0.1	-1.2	-1.3	-1.6	-1.5	-1.2	-1.5	-1.1	-0.7	-0.6	-1.2	-0.7	-1.1	-1.1	-0.9	-1.1	-0.8	-0.9	-0.8	-0.7	-0.5	-0.3	-0.1	0.0	-0.9	0.1
21-Nov	-0.2	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.1	0.0	-0.1	0.0	-0.2	0.2	0.0	0.0	0.0	0.1	-0.1	-0.1	0.0	0.3	0.0	0.0	0.3
22-Nov	-0.2	0.2	-0.1	0.0	0.0	0.2	0.1	0.0	0.2	0.1	0.0	-0.1	-0.1	-0.4	0.1	0.1	0.0	-0.1	0.1	0.0	0.0	0.3	0.9	0.5	0.1	0.9
23-Nov	0.7	0.5	0.8	0.4	0.7	0.7	0.2	0.2	-0.1	0.3	0.5	0.3	0.2	0.2	-0.1	0.0	0.0	-0.8	0.1	1.4	0.9	1.5	0.2	0.1	0.4	1.5
24-Nov	0.0	0.2	0.8	0.3	0.0	0.2	-0.2	-0.4	-0.7	-0.3	0.1	0.0	0.0	0.1	0.0	0.4	0.3	0.1	0.2	0.5	0.7	0.6	0.3	0.6	0.2	0.8
25-Nov	0.7	0.4	-0.2	-0.1	0.0	-0.1	0.2	-0.2	-0.7	-0.7	-0.7	-0.6	-0.5	-0.6	-0.4	-0.1	0.0	-0.3	0.0	0.1	0.1	0.1	0.1	0.2	-0.1	0.7
26-Nov	0.2	0.1	0.1	0.1	0.0	0.0	0.0	-0.2	0.2	0.2	0.0	0.1	0.2	0.2	0.1	0.2	0.1	0.1	0.4	0.3	0.5	0.3	0.3	0.2	0.2	0.5
27-Nov	0.1	0.2	0.1	0.1	0.0	0.2	0.1	0.1	0.3	0.1	-0.6	-0.1	0.4	0.2	0.3	0.6	0.3	0.1	0.2	0.0	-0.2	-0.6	-0.5	-0.7	0.0	0.6
28-Nov	-0.9	-0.7	-0.9	-0.8	-1.0	-0.6	-0.8	-1.0	-0.5	-0.6	-0.4	0.0	0.3	0.3	0.1	0.0	-0.3	-0.3	-0.3	-0.1	-0.4	-0.8	-0.4	-0.9	-0.5	0.3
29-Nov	-0.4	-0.4	0.0	-0.3	-0.3	0.2	0.3	-0.5	0.1	0.1	-0.9	-0.4	-0.6	-0.5	-0.8	-1.0	-0.9	-0.8	-0.9	-0.5	-0.7	-0.7	-0.8	-0.7	-0.5	0.3
30-Nov	-0.4	-0.1	-0.1	-0.3	-0.3	0.1	0.0	0.1	0.0	0.1	0.2	0.0	-0.1	0.0	0.2	0.0	0.0	0.0	-0.1	0.1	-0.1	0.0	0.0	0.0	0.0	0.2
																								Diurnal Average		
																								Diurnal Maximum		
DF - DAS Failure																										



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

**Vertical Wind Speed 45 m (VW45m) - km/h**  
**Lower Camp Met Tower - November 2023**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 5.0 km/h on Nov 20 03:00 Minimum Value: 0.1 km/h on Nov 7 09:00 Percentiles: $P_1 = 0.2$ $P_{10} = 0.4$ $Q_1 = 0.7$ Median = 1.2 $Q_3 = 1.8$ $P_{90} = 2.4$ $P_{99} = 4.2$																				Hours in Service: 720 Hours of Data: 705 Hours of Missing Data: 15 Hours of Calibration: 0 Percent Operational Time: 97.9					
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Nov	0.4	0.6	0.8	0.7	0.8	0.8	0.8	1.0	0.9	1.2	1.4	0.8	1.0	1.0	0.5	0.5	0.7	0.9	0.8	0.9	0.9	0.5	0.7	0.9	1.4
2-Nov	0.5	0.7	0.4	0.3	0.5	0.9	1.4	2.0	2.1	2.1	2.3	2.3	2.1	2.2	2.4	2.1	1.5	1.2	1.0	0.9	DF	DF	DF	DF	2.4
3-Nov	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	0.9	0.9	0.7	0.9	0.7	0.4	0.5	0.3	0.4	0.5	0.5	0.5	0.5	0.9
4-Nov	1.1	0.8	0.8	0.6	0.8	1.2	1.3	1.0	1.1	1.2	1.4	1.5	1.8	1.5	1.8	1.8	1.5	1.8	1.9	1.2	1.0	0.9	0.8	1.9	
5-Nov	0.9	0.8	0.8	0.6	0.7	0.7	0.8	1.0	0.9	1.1	1.3	1.2	1.0	0.8	0.7	0.8	0.9	1.1	1.7	1.5	1.3	1.5	1.2	1.6	1.7
6-Nov	1.2	1.5	2.0	1.6	1.6	2.1	2.1	1.9	2.1	1.7	1.5	1.5	1.6	1.6	1.9	1.6	1.6	1.6	1.8	1.5	1.0	1.3	1.5	1.1	2.1
7-Nov	0.9	0.9	1.3	0.6	0.5	0.3	0.3	0.3	0.1	0.2	0.4	0.4	0.3	0.5	0.9	0.4	0.5	0.6	1.1	1.2	1.0	1.2	1.3	1.5	1.5
8-Nov	2.0	2.1	3.1	3.2	2.8	2.3	2.5	2.7	2.6	2.4	1.7	1.9	2.1	2.0	2.3	2.0	1.7	1.5	1.7	1.9	1.6	1.2	0.8	0.7	3.2
9-Nov	0.5	0.4	0.4	0.5	0.5	0.5	0.8	1.0	0.7	1.5	1.6	2.0	2.1	2.2	1.8	1.8	2.2	1.4	1.2	1.8	1.8	1.9	1.8	1.9	2.2
10-Nov	1.7	1.3	1.8	1.2	1.1	1.6	1.4	1.3	1.6	1.9	1.1	1.4	1.4	1.4	1.1	1.5	1.6	1.5	1.9	1.8	2.2	2.2	2.0	1.9	2.2
11-Nov	1.5	0.9	1.1	1.9	1.8	1.9	1.6	1.5	2.0	2.3	2.9	2.8	2.6	2.1	1.8	2.0	1.9	1.5	1.2	1.4	1.4	1.2	0.5	0.7	2.9
12-Nov	1.0	1.2	1.5	1.8	1.6	2.3	2.6	1.9	1.4	2.2	2.7	2.1	2.6	2.7	1.7	0.8	0.4	0.6	0.7	0.6	0.7	0.7	0.4	0.3	2.7
13-Nov	0.4	0.5	0.3	0.3	0.3	0.5	0.9	1.3	1.4	1.5	1.2	1.3	1.4	1.2	2.0	1.8	1.2	0.9	1.1	1.3	1.8	1.1	1.3	1.4	2.0
14-Nov	1.3	1.0	0.7	0.6	0.4	0.6	0.9	1.2	0.9	0.9	1.2	1.2	1.2	1.0	0.9	0.7	0.5	0.8	0.7	0.9	0.7	0.6	0.5	0.3	1.3
15-Nov	0.3	0.3	0.3	1.1	1.5	1.5	2.1	1.8	1.4	1.8	1.6	1.1	2.0	1.6	1.1	1.1	0.8	1.2	0.7	0.7	1.0	1.8	0.6	0.8	2.1
16-Nov	0.8	1.1	1.8	1.3	0.7	1.0	1.2	1.1	2.1	1.5	1.3	1.8	1.6	1.5	1.5	1.3	1.3	0.9	1.0	0.5	1.1	1.6	2.3	2.7	2.7
17-Nov	2.4	2.0	1.5	1.9	2.3	3.5	4.2	3.4	2.3	2.1	1.7	1.7	1.0	0.8	0.8	0.4	0.8	0.6	0.5	0.2	0.3	0.4	0.5	0.6	4.2
18-Nov	0.8	0.6	0.8	0.8	0.6	0.7	0.7	0.8	1.2	1.1	0.8	0.7	0.7	0.6	0.6	0.6	0.7	0.5	0.5	0.4	0.4	0.4	0.4	0.4	1.2
19-Nov	0.2	0.6	0.6	0.3	0.5	0.5	0.1	0.4	0.3	0.5	0.6	0.9	0.4	0.6	0.6	0.5	0.4	0.5	0.5	0.6	0.7	1.4	1.7	3.1	3.1
20-Nov	1.9	4.4	5.0	4.8	5.0	4.4	4.1	3.8	3.9	3.7	3.3	3.7	4.3	4.7	3.9	3.4	3.2	3.0	2.3	2.0	2.3	2.5	1.7	1.0	5.0
21-Nov	0.7	1.0	0.5	0.6	0.5	0.5	1.1	1.0	1.0	1.4	1.4	1.5	1.6	1.5	1.8	1.8	1.8	2.3	2.0	1.5	1.8	1.8	1.5	1.6	2.3
22-Nov	1.3	1.5	1.7	1.4	1.6	1.5	0.9	0.8	0.9	1.1	1.2	1.4	1.3	1.2	1.0	0.7	0.3	0.6	0.3	0.4	0.5	1.3	1.9	1.7	1.9
23-Nov	1.6	1.4	1.7	2.0	2.1	2.2	1.5	1.4	1.0	1.0	1.3	1.1	1.1	1.0	1.0	1.0	0.8	1.2	1.0	0.9	0.9	1.3	1.2	2.0	2.2
24-Nov	2.0	1.9	2.1	2.2	1.2	1.0	2.0	2.2	3.0	2.5	1.3	1.2	0.7	0.8	0.7	1.0	0.7	0.8	1.5	1.5	1.4	1.7	1.2	1.5	3.0
25-Nov	1.7	1.5	1.3	0.7	2.3	2.9	3.3	2.2	3.5	4.2	3.8	3.4	2.9	3.4	3.0	1.4	1.2	1.1	0.8	0.4	0.5	0.2	0.2	0.3	4.2
26-Nov	0.2	0.4	0.3	0.3	0.3	0.3	0.4	0.6	0.5	0.7	1.0	1.1	1.2	1.2	1.1	0.9	0.8	0.9	0.8	0.9	1.3	0.8	0.5	0.3	1.3
27-Nov	0.4	0.4	0.3	0.3	0.2	0.4	0.9	1.3	1.1	1.5	1.2	1.7	1.3	1.0	1.1	1.3	0.8	1.1	1.4	1.1	1.6	2.3	2.8	3.5	3.5
28-Nov	3.8	3.4	2.9	3.0	3.4	2.9	3.0	3.0	2.1	2.5	2.0	1.2	1.5	1.9	1.6	1.4	1.4	2.0	3.1	2.1	2.4	3.2	2.2	2.3	3.8
29-Nov	2.5	2.5	1.6	1.1	1.6	1.9	2.0	2.3	1.8	2.1	2.1	1.9	2.7	2.7	3.3	2.6	2.3	2.3	2.7	1.9	2.4	2.1	1.6	1.8	3.3
30-Nov	1.5	0.5	0.8	0.7	0.7	0.7	0.6	0.4	0.6	0.6	0.7	0.8	0.9	0.9	1.1	0.7	0.2	0.2	0.3	0.3	0.5	0.4	0.2	0.4	1.5
3.8 4.4 5.0 4.8 5.0 4.4 4.2 3.8 3.9 4.2 3.8 3.7 4.3 4.7 3.9 3.4 3.2 3.0 3.1 2.1 2.4 3.2 2.8 3.5																									
Diurnal Maximum																									
DF - DAS Failure																									



Maximum Value: 2.9 km/h on Nov 11 07:00																				Maximum Daily Average: 1.1 km/h on Nov 11					Hours in Service:	720
Minimum Value: -3.2 km/h on Nov 8 04:00																				Minimum Daily Average: -1.0 km/h on Nov 20					Hours of Data:	702
Maximum Diurnal Average: 0.3 km/h at hour 16																				Minimum Diurnal Average: -0.1 km/h at hour 21					Hours of Missing Data:	18
Monthly Average: 0.06 km/h																				Percentiles: P <sub>1</sub> = -1.7 P <sub>10</sub> = -0.8 Q <sub>1</sub> = -0.2 Median = 0.1 Q <sub>3</sub> = 0.4 P <sub>90</sub> = 0.9 P <sub>99</sub> = 2.0					Hours of Calibration:	0
																									Percent Operational Time:	97.5
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	0.0	-0.2	-0.1	-0.1	-0.1	-0.2	-0.4	0.0	-0.2	0.0	-0.1	0.0	0.0	-0.1	-0.2	-0.3	-0.2	-0.3	-0.1	-0.4	-0.1	-0.1	-0.2	-0.2	-0.1	0.0
2-Nov	-0.1	0.0	-0.2	-0.1	0.0	0.1	0.0	0.3	1.0	0.5	0.9	0.4	0.2	0.4	0.7	0.9	1.0	0.5	0.5	0.5	DF	DF	DF	DF	0.4	1.0
3-Nov	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	0.1	0.2	0.0	0.2	0.0	0.0	0.2	0.0	0.2	0.2	0.1	0.1	0.0	--	0.2
4-Nov	-0.1	0.4	-0.2	0.1	0.0	-0.6	-0.4	0.2	0.7	1.0	1.0	0.7	1.1	0.8	0.5	0.6	0.4	0.3	0.5	0.2	0.0	0.1	0.1	0.2	0.3	1.1
5-Nov	0.3	0.2	0.1	0.1	0.0	0.1	0.2	1.4	0.7	0.3	0.1	0.6	0.4	0.3	0.3	0.6	0.5	0.8	1.2	1.0	0.1	0.8	0.5	0.8	0.5	1.4
6-Nov	0.3	0.5	1.0	0.9	1.1	2.4	2.8	1.3	1.4	0.2	0.3	0.6	0.5	1.1	2.6	2.0	1.8	1.7	1.7	0.7	0.3	0.0	-0.6	-0.9	1.0	2.8
7-Nov	-0.6	-0.4	-0.4	0.0	-0.1	-0.2	-0.1	-0.1	-0.1	0.0	-0.1	-0.1	-0.2	-0.2	-0.2	0.1	0.0	0.2	0.3	-0.2	UO	UO	-2.1	UO	-0.2	0.3
8-Nov	-0.6	1.5	0.3	-3.2	-1.0	-1.2	-1.3	-1.3	-0.8	-0.5	-0.6	-0.7	-0.8	-0.6	-0.9	-0.4	-0.5	-0.7	-0.4	-0.4	-0.4	-0.3	-0.4	-0.3	-0.7	1.5
9-Nov	-0.2	-0.1	0.2	0.0	0.4	0.1	0.1	0.2	-0.2	-0.3	-0.4	-0.3	0.6	2.2	-0.3	1.0	1.7	1.4	1.2	1.6	1.3	1.5	1.9	0.9	0.6	2.2
10-Nov	0.6	0.1	0.7	0.4	0.2	0.3	0.1	0.3	-0.3	1.1	0.6	0.5	0.3	0.4	0.4	0.3	0.5	1.3	1.6	-0.7	-1.7	-1.2	-0.1	0.3	0.2	1.6
11-Nov	0.4	1.0	1.0	2.0	2.0	2.0	2.9	0.8	0.5	0.9	0.7	0.5	1.1	2.6	0.3	1.6	1.4	1.7	1.4	1.3	0.5	0.5	-0.1	0.0	1.1	2.9
12-Nov	0.0	0.1	0.4	1.4	1.2	-0.4	-0.5	-0.8	-0.9	-0.5	-0.6	-0.3	-1.2	-1.1	-0.4	0.2	0.2	-0.1	-0.2	0.1	-0.4	-0.5	0.0	0.1	-0.2	1.4
13-Nov	0.1	0.0	0.2	0.2	0.3	0.2	0.7	0.5	0.3	0.4	0.4	0.2	0.5	0.5	0.4	0.4	0.2	0.5	0.6	0.4	0.3	0.2	0.0	0.0	0.3	0.7
14-Nov	-0.4	-0.3	-0.3	-0.2	-0.2	0.3	0.1	0.0	0.1	-0.1	0.1	0.0	0.1	-0.2	0.0	0.0	0.0	-0.1	-0.3	-0.1	0.0	-0.2	0.2	0.1	-0.1	0.3
15-Nov	0.1	0.1	0.1	-0.2	-0.1	0.1	0.0	0.2	0.1	-0.1	-0.2	-0.2	-0.9	-0.5	0.0	0.4	0.6	0.0	-0.2	-0.1	-0.4	-0.9	-0.2	0.1	-0.1	0.6
16-Nov	-0.2	0.1	0.3	-0.6	0.0	0.2	0.4	0.3	2.1	1.3	0.7	0.9	0.9	0.6	0.9	1.3	1.2	-0.7	-0.2	0.0	-0.2	-0.2	0.1	-0.9	0.3	2.1
17-Nov	-0.3	-0.3	-0.7	-0.5	-1.0	-1.2	-1.9	-1.2	-1.4	-1.3	-1.0	-0.8	-0.5	0.1	-0.2	0.1	-0.2	-0.2	0.0	0.1	0.1	0.1	-0.1	0.3	-0.5	0.3
18-Nov	0.1	0.4	0.2	0.3	0.1	-0.1	-0.1	0.2	-0.1	-0.2	0.1	0.4	0.1	0.2	0.2	-0.1	0.1	0.2	0.3	0.1	0.0	0.0	0.5	0.1	0.1	0.5
19-Nov	0.1	0.2	-0.1	0.1	0.7	0.2	0.0	0.4	0.2	0.3	0.1	0.1	0.2	0.3	0.1	-0.1	0.1	-0.2	-0.2	-0.1	-0.2	-0.6	-0.3	-0.7	0.0	0.7
20-Nov	-0.3	-1.7	-1.4	-1.8	-1.7	-1.6	-1.7	-1.2	-0.4	-0.6	-1.4	-1.2	-1.0	-1.6	-1.2	-1.3	-1.1	-1.1	-0.9	-1.0	-0.7	-0.4	0.1	0.2	-1.0	0.2
21-Nov	-0.2	0.0	0.2	0.1	0.1	0.2	0.9	0.3	0.2	0.2	0.2	0.2	0.2	0.1	0.8	0.3	0.6	0.9	0.6	0.4	0.4	0.4	0.8	0.4	0.3	0.9
22-Nov	0.3	0.4	0.4	0.5	0.4	0.5	0.8	0.3	0.6	0.5	0.5	-0.2	0.2	-0.4	0.2	0.4	0.3	0.1	0.4	0.0	-0.1	1.1	2.0	0.6	0.4	2.0
23-Nov	0.8	0.6	1.1	1.0	1.2	2.0	0.5	0.6	0.0	0.4	1.0	0.5	0.4	0.0	-0.5	0.4	-0.7	-1.7	-0.9	0.4	-0.1	-0.8	-0.8	-0.6	0.2	2.0
24-Nov	-0.2	-0.3	0.6	-0.2	-0.3	-0.2	-0.8	-0.6	-1.0	-0.1	-0.3	-0.2	-0.2	0.0	-0.2	0.4	-0.1	-0.1	0.5	0.7	0.5	0.7	0.1	1.0	0.0	1.0
25-Nov	1.9	1.5	-0.7	-0.2	0.6	0.6	0.9	0.1	-0.8	-0.7	-0.5	-0.4	-0.4	-0.8	-0.5	0.1	0.2	-0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	1.9
26-Nov	0.3	0.4	0.2	0.1	0.3	0.2	0.2	0.0	0.1	0.1	0.0	-0.1	-0.2	0.0	0.0	0.0	-0.1	-0.2	0.0	-0.2	-0.4	-0.2	0.0	-0.1	0.0	0.4
27-Nov	0.2	0.1	0.1	0.2	0.1	0.2	0.0	0.6	0.3	1.3	-1.5	0.9	0.8	0.3	0.6	0.3	-0.4	-0.1	0.0	-0.6	-0.6	-1.0	-1.2	-0.7	0.0	1.3
28-Nov	-1.0	-1.4	-1.4	-1.6	-1.3	-1.0	-0.9	-1.5	-0.9	-1.3	-0.8	-0.3	0.2	0.6	0.2	-0.5	-0.7	-0.4	-0.4	-0.3	-0.7	-0.9	-0.4	-1.2	-0.8	0.6
29-Nov	-0.7	-0.3	0.1	-0.3	-0.3	0.5	0.7	-0.5	0.2	0.7	-0.9	-0.4	-0.5	-0.6	-1.3	-1.0	-1.1	-0.9	-0.9	-0.6	-1.1	-0.8	-1.0	-0.7	-0.5	0.7
30-Nov	-0.2	0.0	0.0	-0.5	-0.6	0.3	0.2	0.1	0.0	0.1	0.2	0.2	0.0	0.2	0.4	0.1	0.0	0.1	0.1	0.0	0.1	0.1	0.1	0.0	0.1	0.4
																				0.0 0.1 0.1 -0.1 0.1 0.1 0.1 0.0 0.0 0.1 -0.1 0.0 0.1 0.2 0.1 0.3 0.2 0.1 0.2 0.1 -0.1 -0.1 0.0 0.0					Diurnal Average	
																				1.9 1.5 1.1 2.0 2.0 2.4 2.9 1.4 2.1 1.3 1.0 0.9 1.1 2.6 2.6 2.0 1.8 1.7 1.7 1.6 1.3 1.5 2.0 1.0					Diurnal Maximum	
DF - DAS Failure																				UO - Unstable Operation						



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

**Vertical Wind Speed 100 m (VW100m) - km/h**  
**Lower Camp Met Tower - November 2023**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0																				Hours in Service: 720						
Maximum Value: 5.2 km/h on Nov 20 05:00																				Hours of Data: 702						
Minimum Value: 0.2 km/h on Nov 7 09:00																				Hours of Missing Data: 18						
Percentiles: P <sub>1</sub> = 0.3 P <sub>10</sub> = 0.5 Q <sub>1</sub> = 0.8 Median = 1.3 Q <sub>3</sub> = 1.8 P <sub>90</sub> = 2.4 P <sub>99</sub> = 4.1																				Hours of Calibration: 0						
																				Percent Operational Time: 97.5						
Day	Hourly Period Ending At (MST)																								Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	0.4	0.5	0.7	0.4	0.5	0.5	0.7	0.9	0.8	0.9	1.0	0.9	0.8	0.7	0.6	0.8	1.2	1.0	0.8	0.8	0.8	0.7	0.8	1.0	1.2	
2-Nov	0.8	0.9	0.5	0.3	0.3	1.0	1.4	2.0	2.2	2.2	2.4	2.4	2.2	2.4	2.7	2.5	1.9	1.4	1.2	1.1	DF	DF	DF	DF	2.7	
3-Nov	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	0.7	0.8	0.8	0.9	0.6	0.4	0.4	0.3	0.5	0.4	0.5	0.7	0.8	0.9	
4-Nov	1.2	0.9	0.9	1.0	1.0	1.5	1.3	1.3	1.5	1.4	1.6	1.7	2.1	1.7	1.8	1.7	1.9	1.7	1.8	2.1	1.6	1.1	0.9	0.7	2.1	
5-Nov	0.7	0.8	0.9	0.5	0.4	0.6	0.6	0.9	0.6	1.2	1.3	1.5	1.2	0.9	0.9	1.1	1.0	1.4	1.6	1.5	1.7	1.5	1.3	1.6	1.7	
6-Nov	1.2	1.5	1.7	1.8	1.7	2.2	2.4	2.0	2.0	2.4	1.8	1.7	2.0	2.3	2.7	2.0	1.8	1.9	2.0	1.3	1.4	1.4	1.3	0.6	2.7	
7-Nov	0.8	0.7	1.2	0.7	0.5	0.5	0.3	0.4	0.2	0.3	0.7	0.5	0.4	0.7	1.0	0.5	0.5	0.8	0.7	0.6	UO	UO	0.8	UO	1.2	
8-Nov	1.8	2.1	3.5	3.3	3.0	2.3	2.2	2.2	2.4	2.2	1.8	1.7	1.9	1.8	2.2	1.8	1.5	1.6	1.6	1.6	1.3	1.0	0.7	0.7	3.5	
9-Nov	0.5	0.9	0.6	0.5	0.6	0.6	1.0	1.2	0.8	1.6	1.6	2.0	2.4	2.4	2.1	1.9	1.7	1.4	1.3	1.6	1.7	1.9	2.4	2.4	2.4	
10-Nov	2.0	2.2	2.2	1.9	2.0	2.7	2.4	1.8	2.3	2.5	1.5	2.3	2.3	2.0	1.9	1.8	1.7	2.1	2.0	2.2	2.7	3.1	2.6	2.3	3.1	
11-Nov	1.9	1.2	1.1	1.0	1.2	1.6	1.7	1.6	1.5	2.1	2.4	2.6	3.0	2.1	1.4	2.2	2.1	1.9	1.7	1.7	1.4	1.6	0.6	1.0	3.0	
12-Nov	1.2	1.5	1.6	2.0	1.5	1.1	1.1	1.0	0.7	1.3	2.5	1.6	1.9	2.0	1.7	0.9	0.7	0.9	0.9	0.8	0.9	0.8	0.5	0.4	2.5	
13-Nov	0.4	0.7	0.5	0.4	0.6	0.6	0.5	0.6	0.5	0.9	1.5	1.4	1.5	1.4	2.1	2.2	1.2	0.8	0.8	1.2	1.4	1.1	0.9	0.8	2.2	
14-Nov	0.9	0.7	0.4	0.5	0.5	0.8	0.9	1.1	1.1	1.2	1.3	1.3	1.2	1.0	0.7	0.7	0.5	0.8	1.0	1.1	1.0	0.8	0.7	0.4	1.3	
15-Nov	0.4	0.4	0.4	0.3	0.9	1.2	1.6	1.6	1.6	1.6	1.3	1.0	1.9	1.6	1.2	1.1	0.9	1.7	0.9	1.2	0.9	1.5	0.5	0.7	1.9	
16-Nov	0.6	0.9	2.6	1.8	0.9	0.9	1.2	1.1	2.0	1.7	1.9	2.1	1.8	1.4	1.5	1.6	1.6	1.0	1.6	0.8	1.4	2.2	1.6	1.4	2.6	
17-Nov	1.9	2.2	2.1	1.5	1.5	2.6	3.4	2.1	0.9	1.1	1.4	1.5	1.0	0.9	1.0	0.5	0.9	0.7	0.8	0.4	0.4	0.4	0.5	0.8	3.4	
18-Nov	0.8	0.8	0.9	0.9	0.8	0.8	0.8	1.1	1.0	1.1	0.9	1.0	0.9	0.6	0.7	0.9	0.8	0.8	0.5	0.4	0.4	0.4	0.4	0.6	1.1	
19-Nov	0.4	0.5	0.4	0.3	0.6	0.6	0.2	0.5	0.5	0.6	0.5	0.8	0.5	0.4	0.6	0.4	0.5	0.6	0.5	0.6	0.6	1.7	1.6	3.5	3.5	
20-Nov	1.9	4.5	4.8	4.8	5.2	4.6	4.0	3.7	3.9	4.1	3.2	3.4	4.4	4.2	3.9	3.5	3.4	3.0	2.4	1.9	2.4	2.2	1.9	1.4	5.2	
21-Nov	0.7	1.0	0.6	0.6	0.7	0.9	1.2	1.1	1.2	1.4	1.6	1.7	2.2	1.8	1.7	1.7	2.0	2.4	2.1	1.6	1.7	2.1	1.5	1.7	2.4	
22-Nov	1.4	1.7	1.6	1.5	1.5	1.7	0.8	0.7	1.1	1.3	1.4	1.3	1.4	1.0	1.2	0.8	0.5	0.8	0.4	0.8	0.9	1.6	2.0	1.4	2.0	
23-Nov	1.4	1.4	1.6	1.6	1.9	2.1	1.7	1.6	1.2	1.5	1.7	1.5	1.3	1.3	1.2	1.1	0.9	1.0	0.9	1.2	1.1	1.4	1.5	1.9	2.1	
24-Nov	2.2	1.8	2.4	2.3	1.5	1.7	2.0	2.0	2.5	1.7	0.8	1.0	0.8	0.9	0.7	0.5	0.7	0.4	1.8	1.4	1.2	1.2	1.0	1.2	2.5	
25-Nov	1.3	2.0	1.9	1.2	2.5	3.0	3.4	1.9	3.2	3.8	3.5	3.4	2.8	2.8	2.8	1.5	1.4	1.6	1.3	0.8	0.8	0.3	0.2	0.3	3.8	
26-Nov	0.4	0.4	0.4	0.5	0.4	0.4	0.3	0.6	0.6	0.8	0.8	1.0	0.7	1.0	0.7	0.7	0.7	0.6	0.6	0.6	1.6	1.3	0.7	0.4	1.6	
27-Nov	0.4	0.3	0.4	0.4	0.4	0.6	0.9	1.3	1.3	1.5	1.9	1.7	1.3	1.3	1.2	1.2	1.0	1.1	1.0	1.1	1.1	1.6	1.8	2.8	2.8	
28-Nov	4.0	3.2	1.8	2.1	2.9	2.1	1.7	2.1	1.1	2.4	1.6	1.4	1.3	1.8	1.7	1.5	0.8	2.0	2.7	1.7	1.5	3.2	2.9	2.3	4.0	
29-Nov	2.3	2.5	1.9	1.4	1.4	1.8	1.7	1.6	1.3	1.9	1.6	1.8	2.7	2.8	3.0	2.9	2.3	2.1	2.3	1.3	2.0	1.7	1.5	1.5	3.0	
30-Nov	1.3	0.6	0.8	0.9	1.0	1.0	1.0	0.7	0.7	0.8	0.8	0.9	1.0	1.0	1.5	0.8	0.4	0.5	0.4	0.7	0.3	0.5	0.3	0.8	1.5	
	4.0	4.5	4.8	4.8	5.2	4.6	4.0	3.7	3.9	4.1	3.5	3.4	4.4	4.2	3.9	3.5	3.4	3.0	2.7	2.2	2.7	3.2	2.9	3.5		
Diurnal Maximum																										
DF - DAS Failure													UO - Unstable Operation													



Maximum Value: 4.5 km/h on Nov 25 02:00																				Maximum Daily Average: 1.3 km/h on Nov 11					Hours in Service: 720	
Minimum Value: -3.1 km/h on Nov 10 21:00																				Minimum Daily Average: 0.0 km/h on Nov 4					Hours of Data: 682	
Maximum Diurnal Average: 0.7 km/h at hour 19																				Minimum Diurnal Average: 0.3 km/h at hour 21					Hours of Missing Data: 38	
Monthly Average: 0.52 km/h																				Percentiles: P <sub>1</sub> = -0.9 P <sub>10</sub> = -0.1 Q <sub>1</sub> = 0.1 Median = 0.3 Q <sub>3</sub> = 0.8 P <sub>90</sub> = 1.5 P <sub>99</sub> = 3.1					Hours of Calibration: 0	
																									Percent Operational Time: 94.7	
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	0.2	0.1	0.2	0.1	0.2	0.0	-0.1	0.2	0.1	-0.1	-0.3	0.1	0.2	0.0	0.1	-0.5	-0.5	0.0	0.4	0.1	0.3	0.2	0.1	0.3	0.0	0.4
2-Nov	0.4	0.2	0.2	0.0	0.2	0.4	0.3	0.2	1.0	0.6	1.5	0.4	0.3	0.7	1.3	1.1	1.3	0.3	0.5	0.2	DF	DF	DF	DF	0.5	1.5
3-Nov	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	0.2	0.2	0.1	0.4	-0.1	0.1	0.2	-0.2	0.0	0.1	0.0	0.1	0.0	--	0.4
4-Nov	-0.3	0.6	0.1	0.0	-0.5	-1.2	-0.8	0.1	0.4	0.8	0.7	0.8	0.7	0.3	0.0	0.2	0.0	-0.3	-0.2	-0.5	-0.3	-0.2	-0.1	0.1	0.0	0.8
5-Nov	0.2	0.0	0.1	0.0	0.0	0.0	-0.1	1.1	0.2	0.0	0.0	0.4	0.3	0.2	0.6	0.3	0.3	0.8	1.2	1.2	0.0	0.8	0.6	1.1	0.4	1.2
6-Nov	0.3	0.5	1.0	1.2	1.5	3.1	3.8	1.6	1.8	0.1	0.2	0.4	0.3	1.4	3.2	3.1	2.5	2.8	1.9	0.2	-0.2	-0.7	-0.9	-0.9	1.2	3.8
7-Nov	-0.5	-0.2	-0.1	0.3	0.4	0.0	0.2	0.2	0.0	0.0	0.1	0.0	-0.1	0.0	0.1	0.4	0.2	0.8	0.9	0.4	UO	0.7	0.9	1.7	0.3	1.7
8-Nov	1.4	0.5	UO	UO	UO	UO	UO	UO	UO	UO	UO	0.3	-0.1	0.1	-0.1	0.4	0.1	0.0	0.3	0.5	0.2	0.1	0.0	0.0	--	1.4
9-Nov	0.2	0.3	0.4	0.1	0.4	-0.1	0.4	0.2	-0.3	0.0	0.1	0.2	1.0	3.0	-0.1	1.6	1.7	2.1	1.5	1.3	0.7	1.8	3.1	1.2	0.9	3.1
10-Nov	1.2	0.5	1.1	0.7	0.2	1.0	0.6	0.8	-0.1	1.6	0.9	0.4	0.1	0.2	0.8	0.5	1.2	2.1	2.5	-1.0	-3.1	-2.4	-0.7	0.3	0.4	2.5
11-Nov	0.2	0.8	0.8	2.1	1.9	1.6	3.0	0.8	0.6	1.0	0.7	0.4	0.9	3.4	0.2	2.0	1.5	2.0	2.5	2.4	0.7	0.7	0.5	0.5	1.3	3.4
12-Nov	1.0	1.4	1.8	3.8	3.5	2.0	1.7	0.5	0.3	1.5	0.8	0.8	0.0	0.2	0.7	0.9	0.5	0.8	0.9	1.0	0.2	0.2	0.7	0.7	1.1	3.8
13-Nov	0.5	0.2	-0.2	0.0	0.1	-0.1	0.2	0.3	0.3	-0.1	0.0	0.3	0.5	0.4	0.7	0.4	0.3	0.7	1.2	0.8	0.9	0.4	0.9	UO	0.4	1.2
14-Nov	UO	UO	UO	UO	UO	UO	UO	0.6	0.9	0.6	0.1	0.2	0.2	0.3	0.8	1.0	0.7	0.7	0.8	0.7	0.3	0.1	0.0	0.1	--	1.0
15-Nov	0.2	0.1	0.2	0.0	0.2	0.4	0.3	0.2	0.2	0.4	0.1	0.0	-0.1	0.0	0.2	1.1	1.2	1.2	0.1	0.2	0.4	-0.2	0.1	0.7	0.3	1.2
16-Nov	0.6	1.0	0.6	-0.5	0.0	0.2	0.3	0.3	2.0	0.9	1.1	1.2	0.9	0.1	0.6	1.4	0.9	-0.9	-0.4	0.2	0.5	1.0	2.7	1.8	0.7	2.7
17-Nov	2.0	1.2	0.2	1.3	0.7	1.1	0.1	0.8	0.6	1.0	0.4	0.1	0.3	0.7	0.5	0.8	0.8	1.1	0.4	0.1	0.2	0.1	-0.1	0.1	0.6	2.0
18-Nov	0.2	-0.1	0.0	0.3	0.2	-0.1	-0.2	0.1	-0.4	-0.3	0.3	0.3	0.2	0.4	0.4	-0.3	0.2	0.6	0.5	0.3	0.0	0.2	0.4	0.1	0.1	0.6
19-Nov	0.1	0.3	0.2	0.1	0.8	0.1	0.1	0.2	0.1	0.1	0.4	0.1	0.0	0.1	0.3	0.0	0.1	-0.1	-0.2	0.1	0.3	0.3	1.6	1.4	0.3	1.6
20-Nov	1.6	-0.3	0.5	0.1	0.0	-0.2	-0.1	0.2	2.2	1.2	-0.1	0.6	0.7	-0.2	0.2	-0.1	-0.3	-0.3	-0.2	0.1	0.3	0.7	1.2	0.6	0.3	2.2
21-Nov	0.2	0.2	0.2	0.2	0.0	0.2	0.7	0.5	0.1	0.1	0.1	0.2	0.4	0.0	1.0	0.2	0.6	1.2	0.7	0.4	0.5	0.1	0.9	0.4	0.4	1.2
22-Nov	0.4	0.4	0.4	0.6	0.2	0.8	0.9	0.7	0.7	0.3	0.6	0.0	0.1	-0.5	0.6	0.5	0.3	0.1	0.1	-0.2	-0.2	1.5	2.9	0.9	0.5	2.9
23-Nov	1.0	0.7	1.4	1.6	1.7	2.5	0.6	0.8	0.1	0.6	1.1	0.7	0.7	0.3	-0.4	1.3	-0.6	-2.6	-1.3	0.8	0.8	-0.2	-0.5	0.8	0.5	2.5
24-Nov	1.0	0.6	2.0	0.9	0.7	0.7	0.9	1.1	0.9	1.7	1.1	0.7	0.2	0.6	0.8	1.3	1.6	1.3	2.8	2.5	1.9	2.2	1.1	2.2	1.3	2.8
25-Nov	4.4	4.5	-0.1	0.6	1.1	0.9	1.0	0.9	0.5	0.6	0.2	0.4	0.3	0.3	0.4	0.3	0.1	0.0	0.2	0.3	0.1	0.1	0.0	0.0	0.7	4.5
26-Nov	0.1	0.2	0.1	0.0	0.1	0.1	0.0	0.1	0.0	0.0	0.0	-0.1	-0.2	-0.3	-0.2	0.0	-0.1	-0.1	0.3	0.2	0.5	0.3	0.1	0.2	0.1	0.5
27-Nov	0.3	-0.1	-0.1	0.1	UO	UO	UO	UO	UO	2.1	-2.1	1.5	0.1	-0.4	-0.1	0.1	0.2	1.0	1.5	0.7	1.2	1.1	1.3	1.6	0.5	2.1
28-Nov	0.9	0.5	0.4	0.6	0.8	1.4	1.6	1.1	1.4	0.2	0.6	0.7	1.5	2.2	1.6	1.0	0.5	1.2	1.7	1.1	1.4	0.9	0.7	-0.2	1.0	2.2
29-Nov	0.7	1.4	1.3	0.8	0.8	1.8	2.2	0.5	1.0	1.7	0.2	0.5	0.9	0.6	0.0	-0.1	-0.3	-0.1	0.1	0.2	-0.1	-0.2	-0.1	0.1	0.6	2.2
30-Nov	0.6	0.3	0.5	-0.3	-0.1	0.3	0.2	-0.1	-0.3	-0.1	0.1	0.1	0.0	0.0	0.1	0.2	-0.1	0.1	0.2	0.3	0.1	0.2	0.1	0.1	0.1	0.6
																								Diurnal Average		
																								Diurnal Maximum		
0.7 0.6 0.5 0.5 0.6 0.7 0.7 0.5 0.5 0.6 0.3 0.4 0.4 0.5 0.5 0.6 0.5 0.5 0.7 0.5 0.3 0.3 0.6 0.6																										
4.4 4.5 2.0 3.8 3.5 3.1 3.8 1.6 2.2 2.1 1.5 1.5 1.5 3.4 3.2 3.1 2.5 2.8 2.8 2.5 1.9 2.2 3.1 2.2																										
DF - DAS Failure												UO - Unstable Operation														



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

**Vertical Wind Speed 163 m (VW163m) - km/h**  
**Lower Camp Met Tower - November 2023**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 5.3 km/h on Nov 20 05:00	Hours of Data: 682
Minimum Value: 0.2 km/h on Nov 25 23:00	Hours of Missing Data: 38
Percentiles: P <sub>1</sub> = 0.3 P <sub>10</sub> = 0.5 Q <sub>1</sub> = 0.8 Median = 1.3 Q <sub>3</sub> = 1.8 P <sub>90</sub> = 2.5 P <sub>99</sub> = 4.1	Hours of Calibration: 0
	Percent Operational Time: 94.7

Day	Hourly Period Ending At (MST)																								Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	0.7	0.4	0.7	0.2	0.3	0.5	0.6	0.9	0.8	0.8	0.8	0.8	0.7	0.6	0.9	1.0	0.8	0.8	0.5	0.6	0.9	0.9	0.7	0.7	1.0	
2-Nov	0.7	0.8	0.6	0.3	0.5	1.4	1.3	2.0	2.5	2.2	2.7	2.4	2.3	2.4	2.5	2.5	1.9	1.3	1.6	1.0	DF	DF	DF	DF	2.7	
3-Nov	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	DF	0.8
4-Nov	1.0	0.9	0.8	0.8	0.9	1.4	1.3	1.5	1.6	1.5	1.8	1.6	2.1	1.6	1.5	1.6	1.6	1.6	1.9	1.4	1.0	0.7	0.7	0.7	2.1	
5-Nov	0.7	0.7	0.8	0.6	0.5	0.6	0.7	0.8	0.5	1.3	1.2	1.4	1.2	0.9	1.1	1.3	0.8	1.2	1.2	1.2	1.5	1.3	1.4	1.6	1.6	
6-Nov	1.2	2.0	1.9	2.0	1.7	2.7	2.7	2.5	2.2	2.5	2.2	2.2	2.4	2.7	2.8	2.3	2.3	2.1	1.9	1.2	1.5	1.0	0.7	0.5	2.8	
7-Nov	0.5	0.6	1.1	0.8	0.6	0.7	0.4	0.5	0.4	0.6	1.0	0.9	0.7	0.9	0.9	0.6	0.5	0.7	0.6	0.5	UO	1.3	1.2	1.3	1.3	
8-Nov	1.6	1.4	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	2.0	
9-Nov	0.5	1.2	0.9	0.6	0.6	0.9	1.1	1.1	0.9	1.7	1.6	2.0	2.6	2.5	2.2	2.0	2.0	1.6	1.7	2.0	2.5	2.9	3.1	2.9	3.1	
10-Nov	3.0	2.9	3.4	2.6	3.2	3.9	4.1	2.9	2.4	2.5	2.2	2.3	2.2	2.0	2.6	2.4	2.2	1.5	2.0	1.9	1.8	2.3	2.2	2.5	4.1	
11-Nov	2.5	1.8	1.5	1.1	1.1	1.3	1.7	1.6	1.5	1.5	2.0	2.6	3.7	2.4	1.9	2.3	2.4	2.0	1.3	1.3	1.0	1.4	0.9	1.3	3.7	
12-Nov	1.2	1.1	1.1	1.7	1.1	0.8	0.7	1.0	0.6	1.2	2.1	1.5	1.4	1.2	1.5	1.3	1.1	1.1	1.0	1.0	0.5	0.5	0.6	0.4	2.1	
13-Nov	0.6	1.1	0.5	0.4	0.7	0.5	0.6	0.5	0.6	1.5	1.2	1.7	1.5	2.3	2.4	1.3	0.9	1.0	1.3	1.2	1.3	1.5	UO	2.4		
14-Nov	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	1.2	
15-Nov	0.5	0.5	0.5	0.4	0.9	1.3	1.5	1.8	1.7	1.7	0.9	1.2	2.0	1.5	1.6	1.1	0.8	2.0	0.9	1.7	0.7	1.4	0.7	1.0	2.0	
16-Nov	0.9	0.9	2.8	1.4	0.9	0.9	1.2	1.3	2.1	1.9	1.8	1.8	1.6	1.0	0.8	1.3	1.6	1.5	1.9	1.2	1.7	2.4	1.6	1.2	2.8	
17-Nov	2.0	2.5	2.6	1.5	1.4	1.6	1.6	1.0	0.8	1.2	1.6	1.7	1.0	1.3	1.3	0.7	0.8	0.8	1.1	0.5	0.6	0.4	0.6	0.5	2.6	
18-Nov	0.9	0.7	0.7	1.2	1.0	1.1	1.1	1.3	1.3	1.3	0.9	0.9	1.2	0.8	0.6	0.9	1.2	0.8	0.7	0.5	0.7	0.6	0.4	0.6	1.3	
19-Nov	0.4	0.6	0.5	0.4	0.7	0.6	0.4	0.5	0.4	0.7	0.6	0.6	0.3	0.2	0.5	0.3	0.5	0.6	0.7	0.5	0.4	1.6	1.8	2.8	2.8	
20-Nov	1.8	4.2	4.9	5.2	5.3	3.9	3.2	3.4	3.7	3.9	3.1	3.4	4.6	4.1	4.2	3.0	3.0	2.9	2.3	1.8	2.0	1.9	1.9	1.7	5.3	
21-Nov	0.9	1.2	0.5	0.7	0.4	0.7	1.0	1.0	0.8	1.3	1.5	1.6	2.2	2.1	1.7	1.5	1.9	2.5	2.1	1.6	1.8	2.3	1.9	1.8	2.5	
22-Nov	1.6	1.9	1.6	1.5	1.3	1.4	0.7	0.9	1.3	1.6	1.4	1.4	1.4	1.1	1.2	0.9	0.5	0.6	0.4	1.2	1.4	1.8	2.0	1.5	2.0	
23-Nov	1.7	1.5	2.1	1.5	2.1	2.3	1.9	2.0	1.4	1.7	1.3	1.7	1.1	1.3	1.1	1.1	0.5	0.9	1.3	1.4	1.2	1.4	1.5	2.1	2.3	
24-Nov	2.9	2.2	2.6	2.6	1.8	2.3	2.4	1.9	1.8	0.9	0.9	1.2	1.1	1.1	1.1	0.9	0.9	0.6	1.2	1.3	1.3	1.2	1.1	1.0	2.9	
25-Nov	1.4	1.8	1.9	1.3	2.8	3.1	3.6	1.8	2.9	3.1	3.2	3.3	2.4	2.7	2.4	1.5	1.6	1.9	1.4	1.0	0.9	0.3	0.2	0.3	3.6	
26-Nov	0.3	0.4	0.4	0.7	0.6	0.4	0.3	0.8	0.7	0.7	0.8	1.0	0.6	1.0	0.7	0.7	0.6	0.5	0.4	0.6	1.1	0.8	0.7	0.5	1.1	
27-Nov	0.4	0.4	0.4	0.5	UO	UO	UO	UO	UO	UO	1.7	1.7	1.7	1.3	1.0	1.0	1.2	1.2	1.3	1.4	1.5	1.3	1.1	1.6	2.0	2.0
28-Nov	3.3	2.2	1.1	1.2	2.2	1.9	1.4	1.9	1.3	2.2	2.0	1.8	1.6	1.9	1.7	1.5	1.1	1.7	1.8	1.7	0.8	2.3	3.2	1.9	3.3	
29-Nov	2.6	2.4	2.1	1.8	1.6	1.6	1.5	1.2	1.5	1.8	1.2	1.9	2.9	3.0	2.6	2.5	1.8	1.6	2.0	1.1	2.0	1.5	1.3	1.4	3.0	
30-Nov	1.5	0.8	0.9	0.9	1.0	1.0	0.9	0.8	0.7	0.8	1.0	0.8	0.9	0.9	1.3	0.6	0.5	0.9	0.7	1.1	0.4	0.5	0.4	1.0	1.5	

3.3	4.2	4.9	5.2	5.3	3.9	4.1	3.4	3.7	3.9	3.2	3.4	4.6	4.1	4.2	3.0	3.0	2.9	2.3	2.0	2.5	2.9	3.2	2.9	
Diurnal Maximum																								

DF - DAS Failure      UO - Unstable Operation



## **WOOD BUFFALO ENVIRONMENTAL ASSOCIATION**

CONTINUOUS AMBIENT AIR QUALITY  
MONITORING PROGRAM  
MONTHLY REPORT

### **AMS04 BUFFALO VIEWPOINT NOVEMBER 2023**

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

December 22, 2023

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - BUFFALO VIEWPOINT (AMS04)  
 NOVEMBER 2023

MONTHLY SUMMARY

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2 (ppb) Average	686	33	34	99.86	23.5	0	2.1	0
H2S (ppb) Average	684	35	36	99.86	11.8	1	0.9	0
THC (ppm) Average	686	33	34	99.86	4	-	2.1	-
NMHC(ppm) Average	686	33	34	99.86	0.542	-	0.086	-
CH4(ppm) Average	686	33	34	99.86	3.5	-	2.1	-
O3(ppb) Average	684	35	36	99.86	41.4	0	37.7	-
NO2(ppb) Average	684	35	36	99.86	30.5	0	11.8	-
NO(ppb) Average	684	35	36	99.86	91.8	-	5.7	-
NOX(ppb) Average	684	35	36	99.86	115.9	-	15.1	-
PM2.5(ug/m3) Average	717	2	3	99.86	78.8	0	18.8	0
Temperature (C) Average	720	0	0	100	6.2	-	2.5	-
Relative Humidity (%) Average	720	0	0	100	97.3	-	95.3	-
Wind Speed 10 m (km/h) Average	667	0	53	92.64	32	-	20	-
Wind Direction 10 m (deg) Average	667	0	53	92.64	-	-	-	-

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



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - BUFFALO VIEWPOINT (AMS04)  
 NOVEMBER 2023

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile						
					Min	P10	Q1	Median	Q3	P90	Max
SO2 (ppb) Average	686	0.51	1.6	-	0	0	0	0.1	0.2	1.1	23.5
H2S (ppb) Average	684	0.22	0.6	-	0	0.1	0.1	0.1	0.2	0.3	11.8
THC (ppm) Average	686	2.05	0.1	-	1.9	2	2	2	2	2.2	4
NMHC(ppm) Average	686	0.015	0.052	-	0	0	0	0	0	0	0.542
CH4(ppm) Average	686	2.03	0.1	-	1.9	2	2	2	2	2.1	3.5
O3(ppb) Average	684	21.5	9.2	-	2	8.6	14.9	20.6	28.6	34.8	41.4
NO2(ppb) Average	684	4.95	5.4	-	0.1	0.5	1	3.1	6.8	12.1	30.5
NO(ppb) Average	684	0.82	4.4	-	0	0	0	0.1	0.4	1.2	91.8
NOX(ppb) Average	684	5.76	8.4	-	0.1	0.5	1	3.3	7.3	13	115.9
PM2.5(ug/m3) Average	717	7.83	5.3	-	0.7	3.5	4.8	6.5	9.3	13.4	78.8
Temperature 2 m (C) Average	720	-3.6	4.4	-	-15.8	-9.7	-6	-3.4	-0.1	1.6	6.2
Relative Humidity (%) Average	720	82.02	10.8	-	47.9	65	76	84.7	90.5	93.7	97.3
Wind Speed 10 m (km/h) Average	667	9	6	-	0	3	5	7	11	17	32
Wind Direction 10 m (deg) Average	667	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - BUFFALO VIEWPOINT (AMS04)  
NOVEMBER 2023

OPERATIONAL NOTES

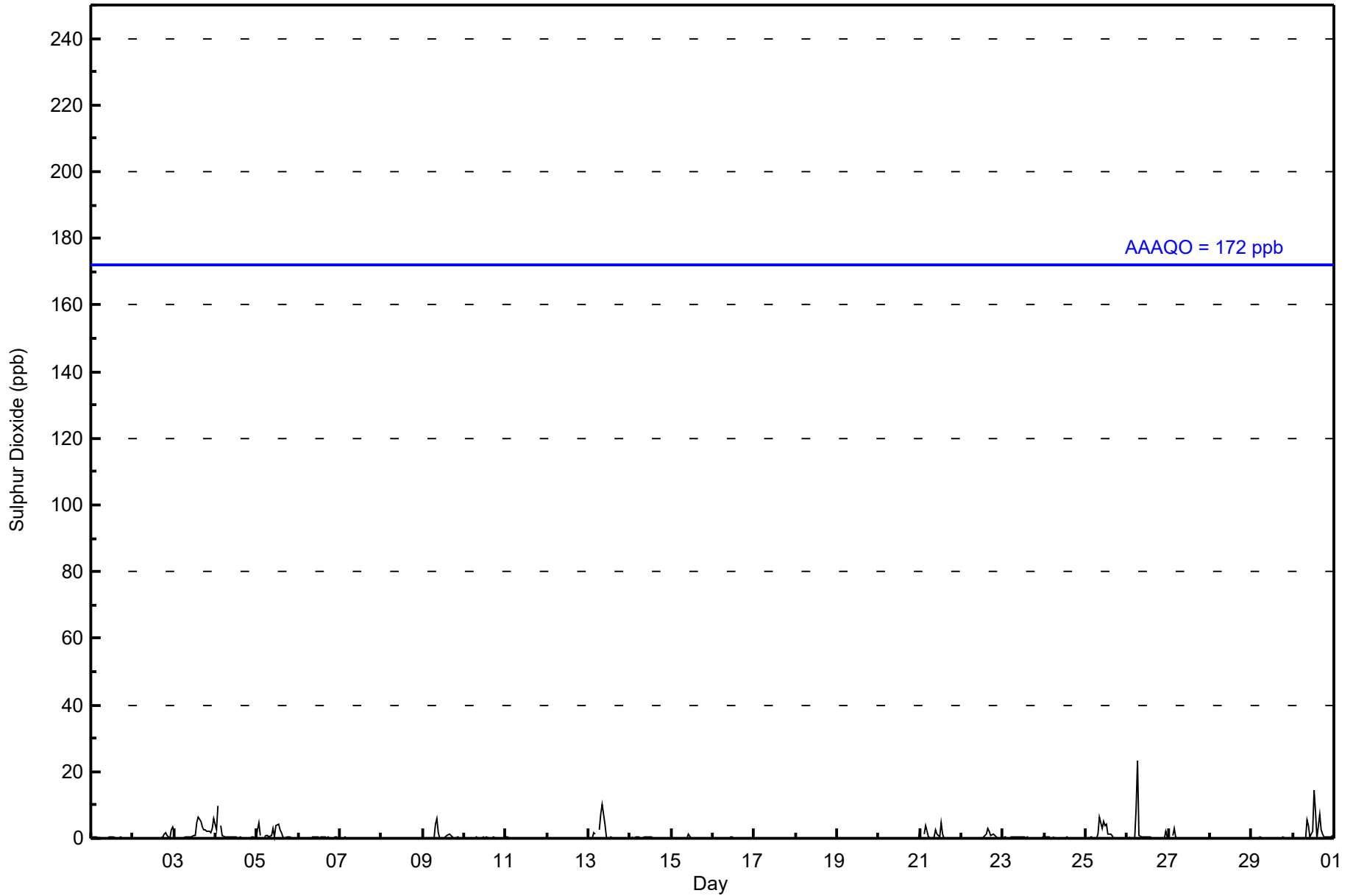
Parameter	Period Start	Period End	Duration (Hours)	Notes
ALL GASEOUS ANALYZERS	28 Nov 2023 09:00	28 Nov 2023 09:00	1	Maintenance - sample manifold cleaned
PM2.5	30 Nov 2023 10:00	30 Nov 2023 10:00	1	Maintenance - firmware update
Wind Speed, Wind Direction	08 Nov 2023 06:00	10 Nov 2023 10:00	53	Flat line in sensor output signal - Sensor frozen





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

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Buffalo Viewpoint - November 2023**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Buffalo Viewpoint - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 10	684	99.71	99.71
11 - 20	1	0.15	99.85
21 - 60	1	0.15	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 686

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Buffalo Viewpoint - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	37	36	25	20	14	29	55	160	31	23	28	52	54	26	32	11	633
11 - 20	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
21 - 60	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	37	36	25	21	14	29	56	160	31	23	28	52	54	26	32	11	635

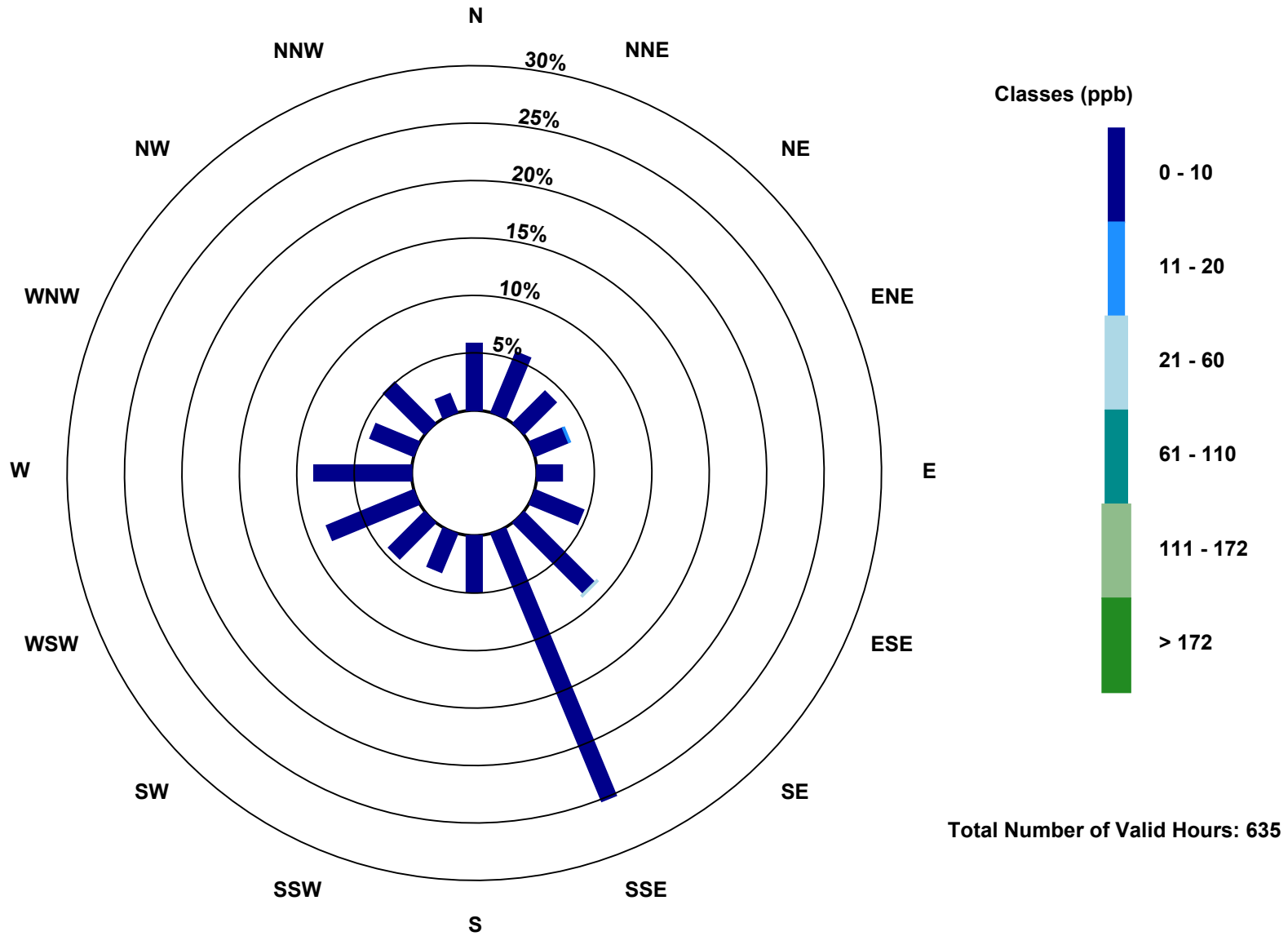
Total Number of Valid Hours: 635

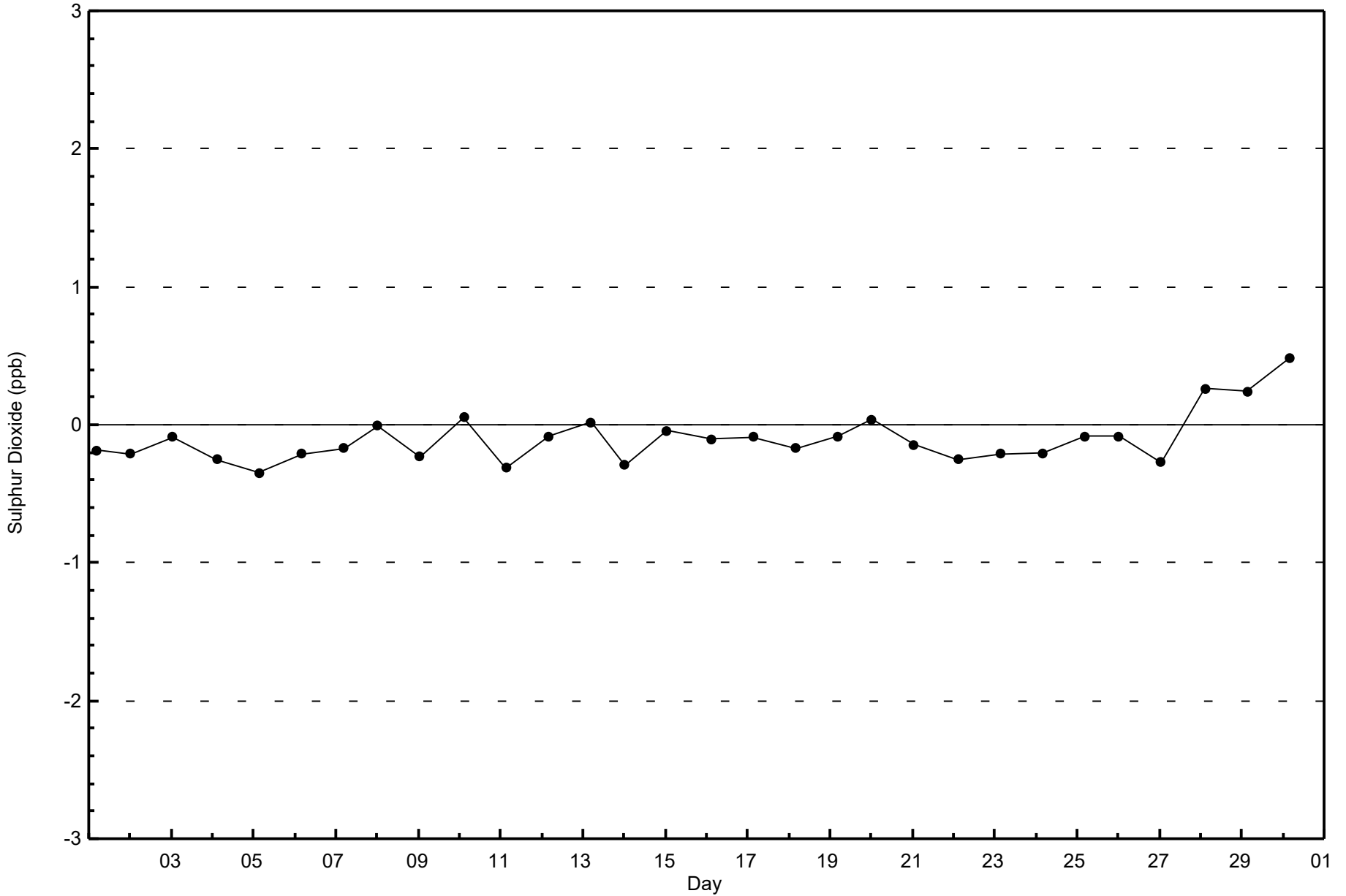
Total Number of Hours: 720



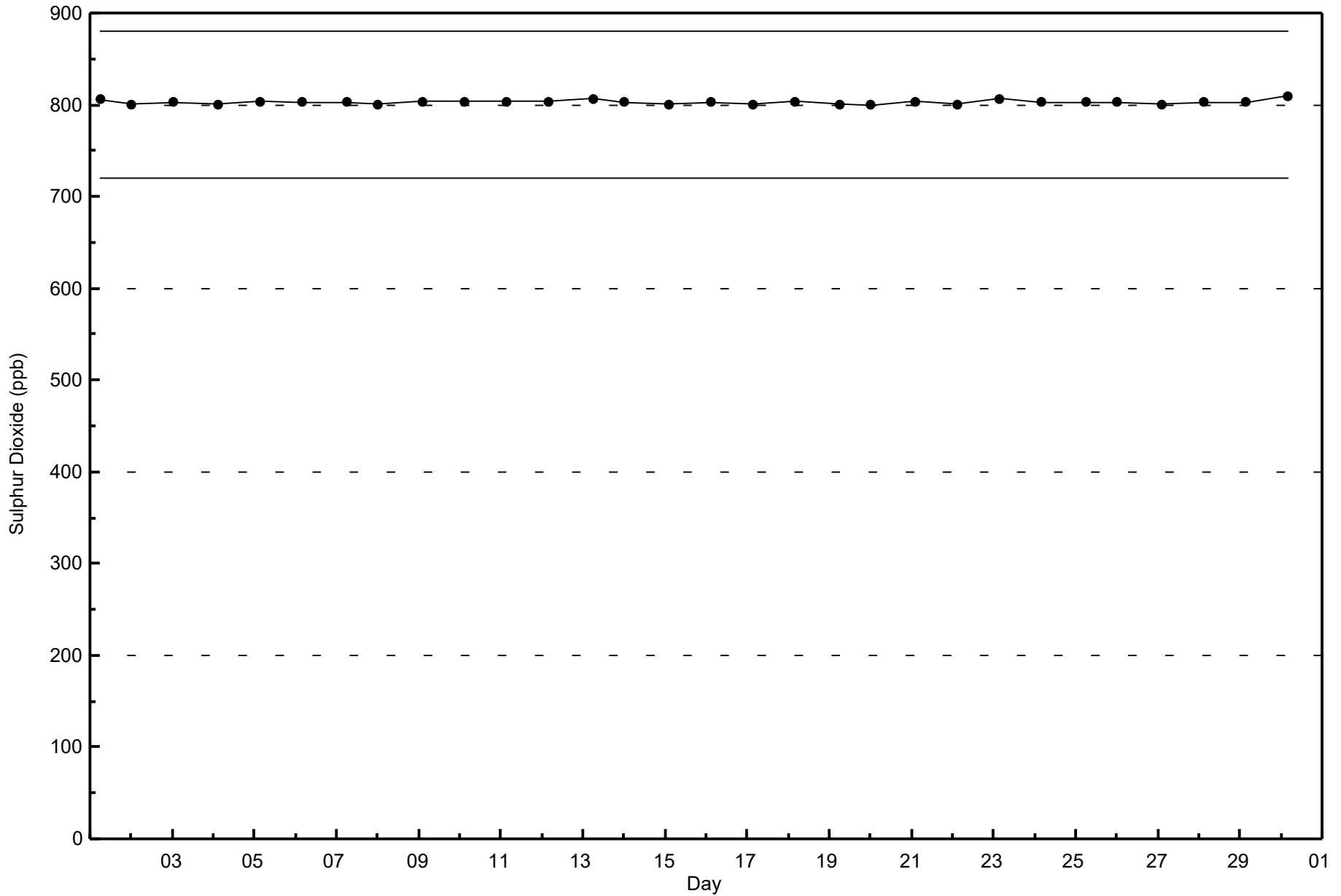
Wood Buffalo Environmental Association  
Wind Rose Nov 2023

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

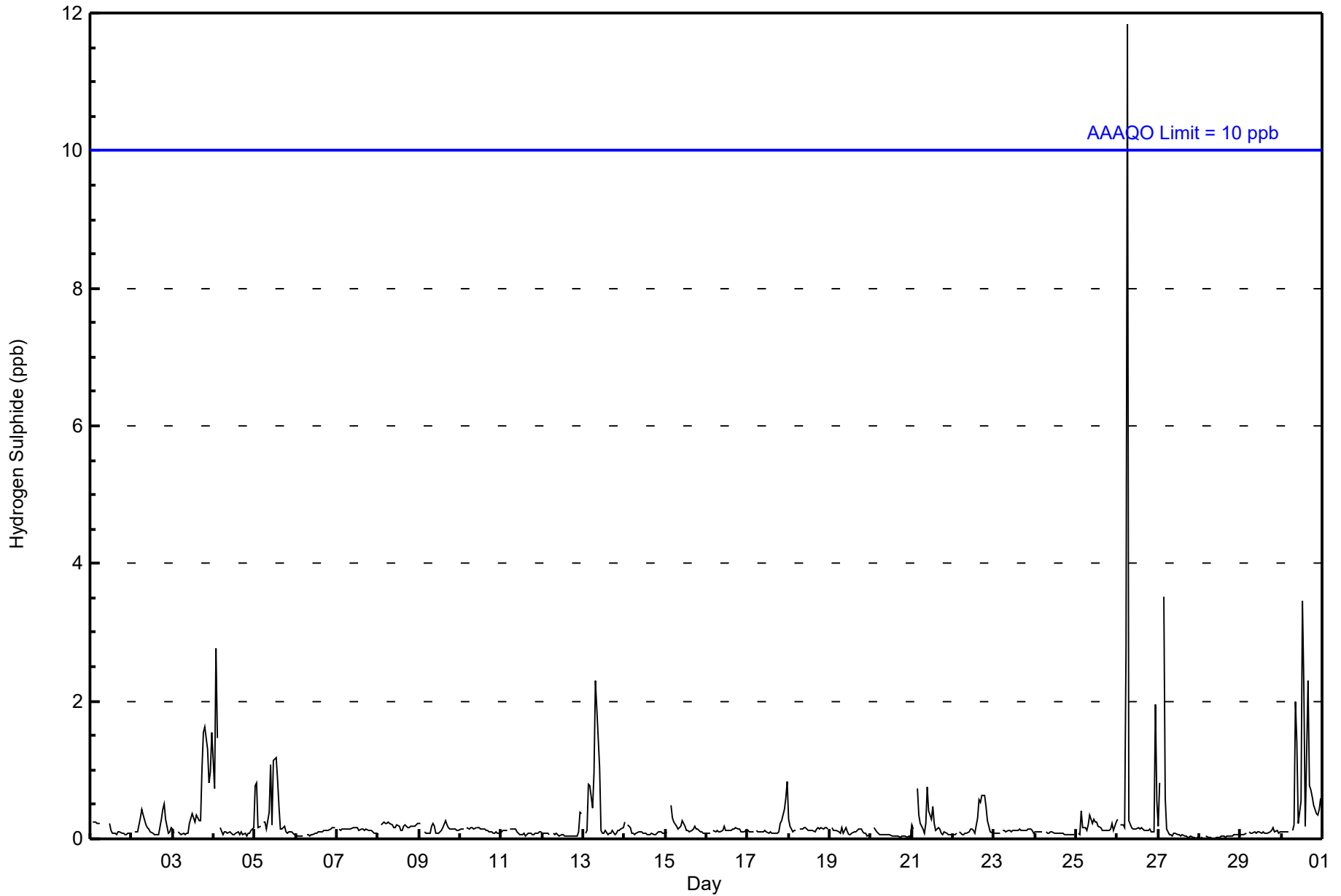














**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Hydrogen Sulphide (H<sub>2</sub>S) - ppb  
Buffalo Viewpoint - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2	679	99.27	99.27
3 - 4	4	0.58	99.85
5 - 7	0	0.00	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 (H<sub>2</sub>S) - ppb  
Buffalo Viewpoint - November 2023**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	38	34	24	19	13	29	56	157	26	24	29	57	53	25	32	12	628
3 - 4	0	0	1	2	1	0	0	0	0	0	0	0	0	0	0	0	4
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
<b>Totals</b>	38	34	25	21	14	29	57	157	26	24	29	57	53	25	32	12	633

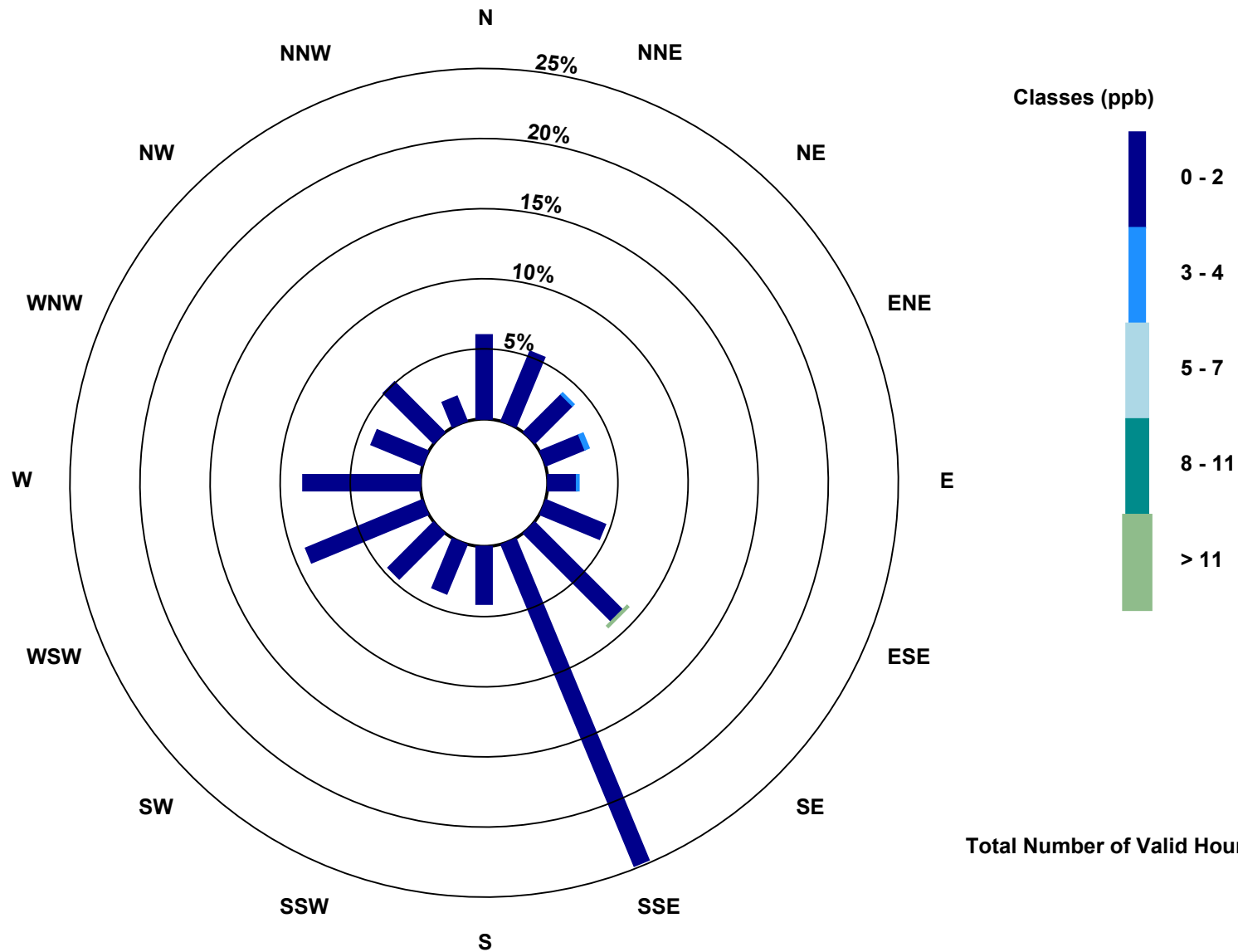
Total Number of Valid Hours: 633

Total Number of Hours: 720

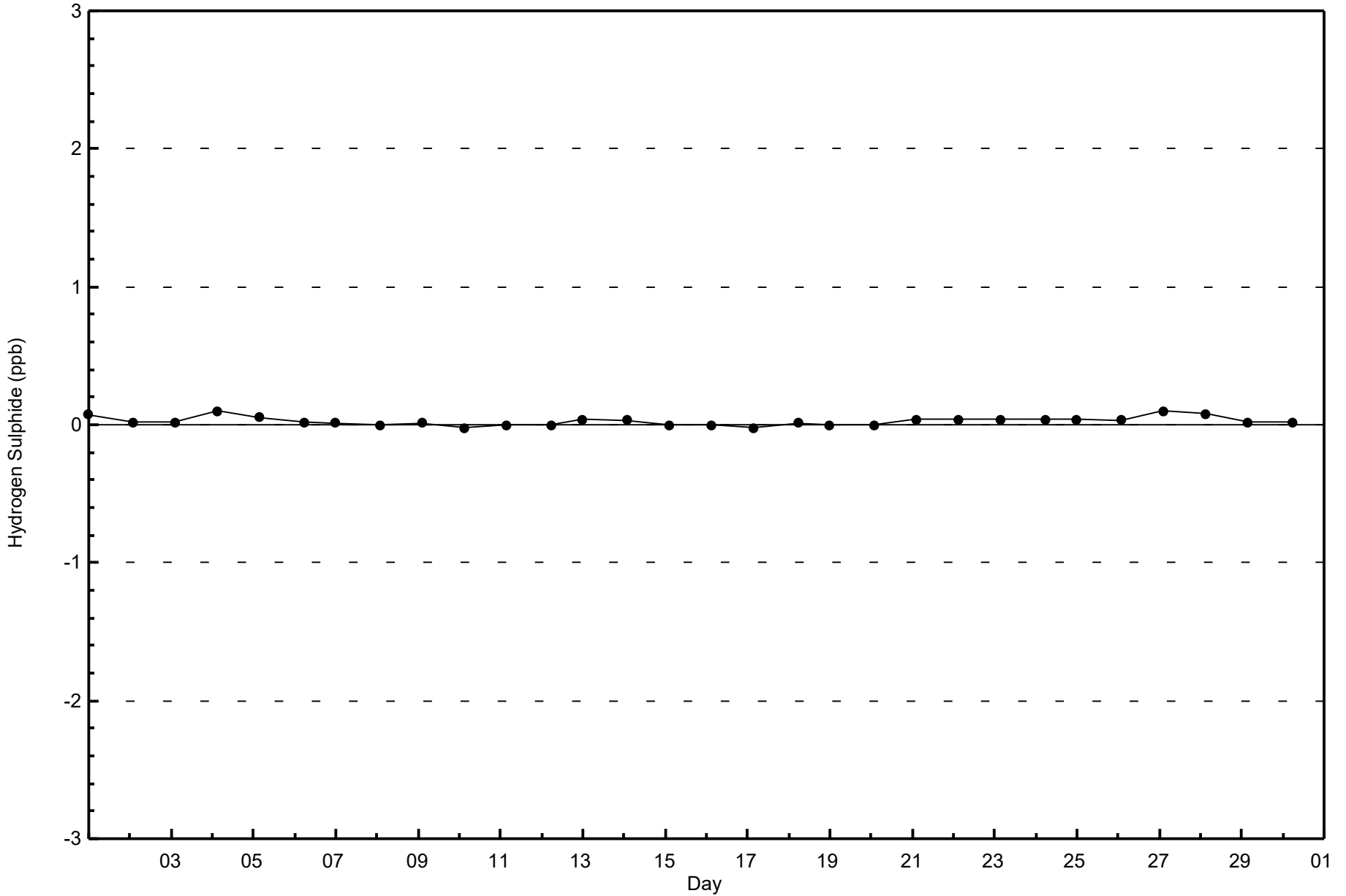


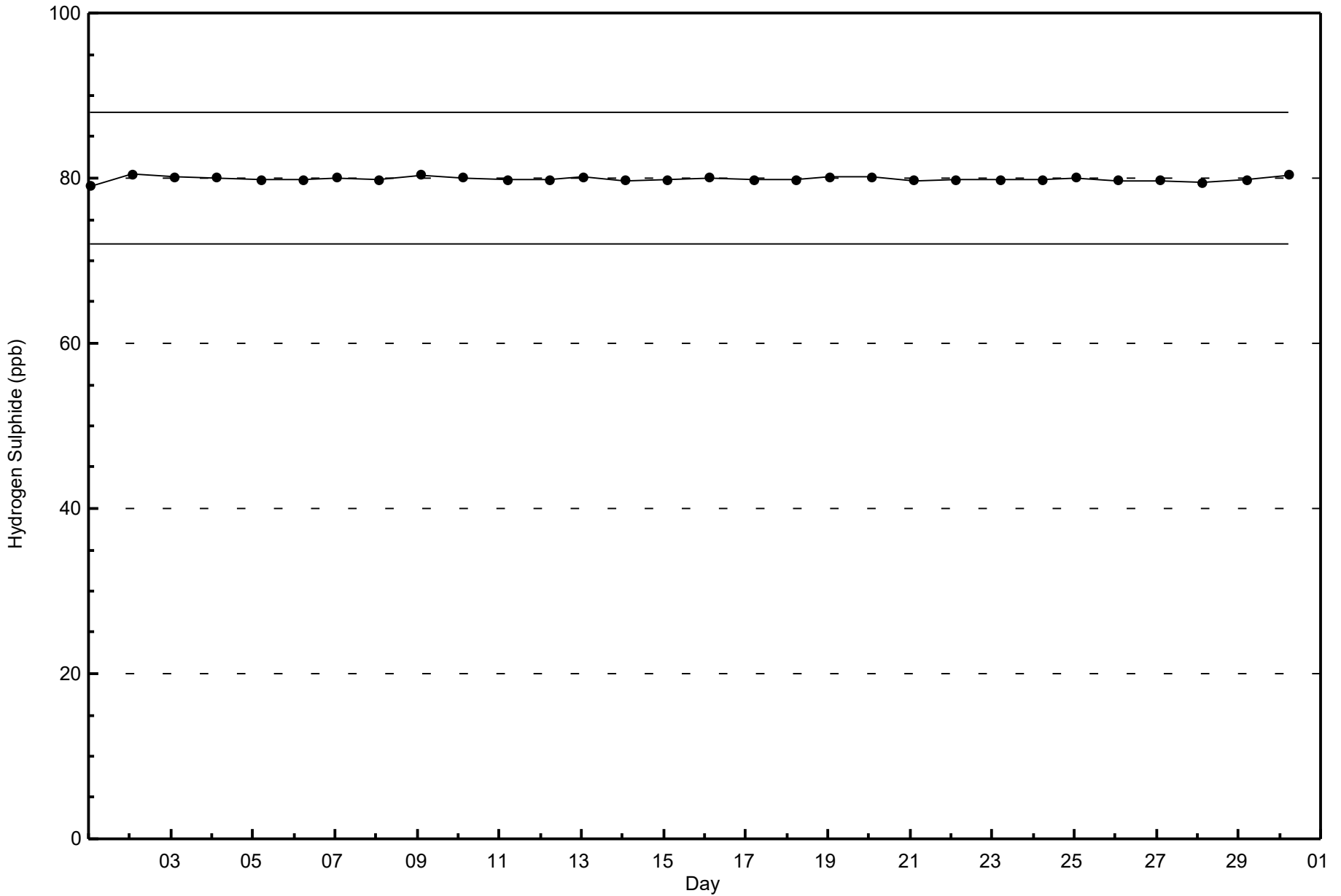
Wood Buffalo Environmental Association  
Wind Rose Nov 2023

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



Total Number of Valid Hours: 633









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

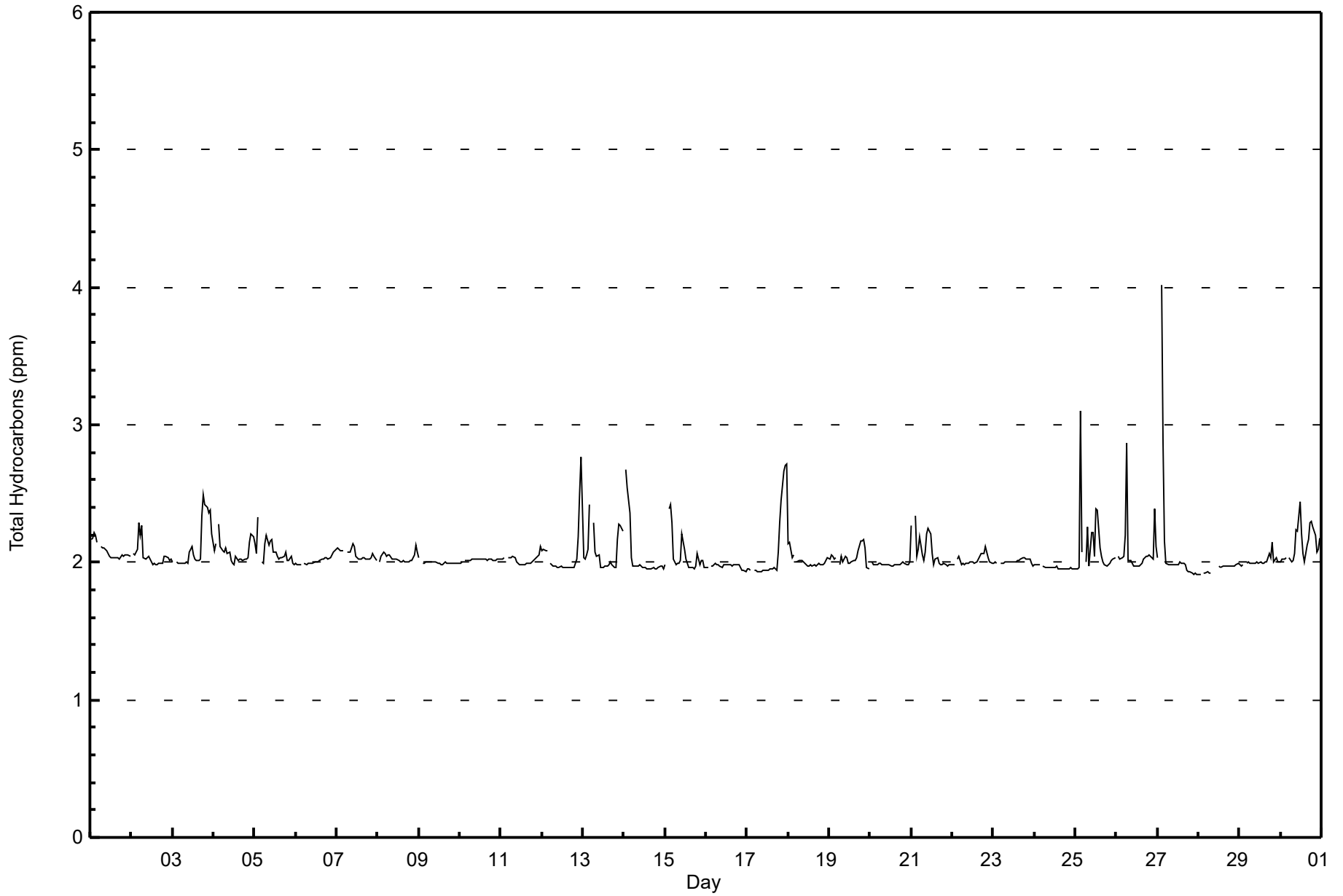
**Total Hydrocarbons (THC) - ppm**  
**Buffalo Viewpoint - November 2023**

Maximum Value: 4.0 ppm on Nov 27 03:00		Maximum Daily Average: 2.1 ppm on Nov 30		Hours in Service: 720																											
Minimum Value: 1.9 ppm on Nov 28 00:00		Minimum Daily Average: 2.0 ppm on Nov 28		Hours of Data: 686																											
Maximum Diurnal Average: 2.2 ppm at hour 3		Minimum Diurnal Average: 2.0 ppm at hour 15		Hours of Missing Data: 34																											
Monthly Average: 2.05 ppm		Percentiles: P <sub>1</sub> = 1.9 P <sub>10</sub> = 2.0 Q <sub>1</sub> = 2.0 Median = 2.0 Q <sub>3</sub> = 2.0 P <sub>90</sub> = 2.2 P <sub>99</sub> = 2.7		Hours of Calibration: 33																											
				Percent Operational Time: 99.9																											
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum					
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24							
1-Nov	2.2	2.2	2.2	2.2	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.1	2.1	2.1	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.2
2-Nov	Z	2.1	2.1	2.1	2.3	2.2	2.3	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.3
3-Nov	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.3	2.5	2.4	2.4	2.4	2.4	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.5
4-Nov	2.1	2.1	Z	2.3	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	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.3
5-Nov	2.1	2.1	2.3	Z	2.0	2.0	2.1	2.2	2.1	2.2	2.2	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.3
6-Nov	2.0	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.0	2.0	2.0	2.0	2.1	2.1	2.1
7-Nov	2.1	2.1	2.1	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1
8-Nov	Z	2.0	2.0	2.1	2.1	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.1
9-Nov	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
10-Nov	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
11-Nov	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.1	2.1
12-Nov	2.1	2.1	2.1	2.1	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.2	2.5	2.8	2.1	2.1	2.1	2.1	2.1	2.1	2.8
13-Nov	2.0	2.0	2.1	2.1	2.4	Z	2.3	2.1	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.2	2.3	2.3	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.4
14-Nov	Z	2.7	2.5	2.4	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.7
15-Nov	2.0	Z	2.4	2.4	2.3	2.0	2.0	2.0	2.0	2.0	2.2	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.1	2.4
16-Nov	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0
17-Nov	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.1	2.3	2.4	2.7	2.7	2.7	2.1	2.1	2.1	2.1	2.7
18-Nov	2.1	2.1	2.0	2.1	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1
19-Nov	2.0	2.1	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.2	2.2	2.2	2.1	2.0	1.9	2.0	2.0	2.0	2.0	2.0	2.2
20-Nov	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
21-Nov	2.3	Z	2.3	2.0	2.1	2.2	2.1	2.0	2.1	2.2	2.2	2.2	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.3
22-Nov	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1
23-Nov	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
24-Nov	2.0	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
25-Nov	2.0	2.0	2.0	3.1	2.1	Z	2.0	2.3	2.0	2.2	2.2	2.0	2.4	2.4	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	3.1
26-Nov	Z	2.0	2.0	2.0	2.0	2.2	2.9	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	2.4	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.9
27-Nov	2.0	Z	4.0	2.9	2.2	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	4.0
28-Nov	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	M	C	C	C	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
29-Nov	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1
30-Nov	2.0	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.1	2.2	2.2	2.4	2.2	2.1	2.0	2.1	2.2	2.3	2.3	2.3	2.2	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.4
																								Diurnal Average							
																								Diurnal Maximum							
Z - zerospan      C - Calibration      M - Maintenance																															



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

**Total Hydrocarbons (THC) - ppm**  
**Buffalo Viewpoint - November 2023**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Total Hydrocarbons (THC) - ppm  
Buffalo Viewpoint - November 2023**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2.0	525	76.53	76.53
2.1 - 3.0	159	23.18	99.71
3.1 - 10.0	2	0.29	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 686

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Total Hydrocarbons (THC) - ppm  
Buffalo Viewpoint - November 2023**

<b>Concentration Ranges (ppm)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	28	29	13	2	5	19	43	130	25	18	21	49	53	25	16	2	478
2.1 - 3.0	8	7	12	19	9	10	13	30	6	5	7	3	1	1	15	9	155
3.1 - 10.0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	37	36	25	21	14	29	56	160	31	23	28	52	54	26	32	11	635

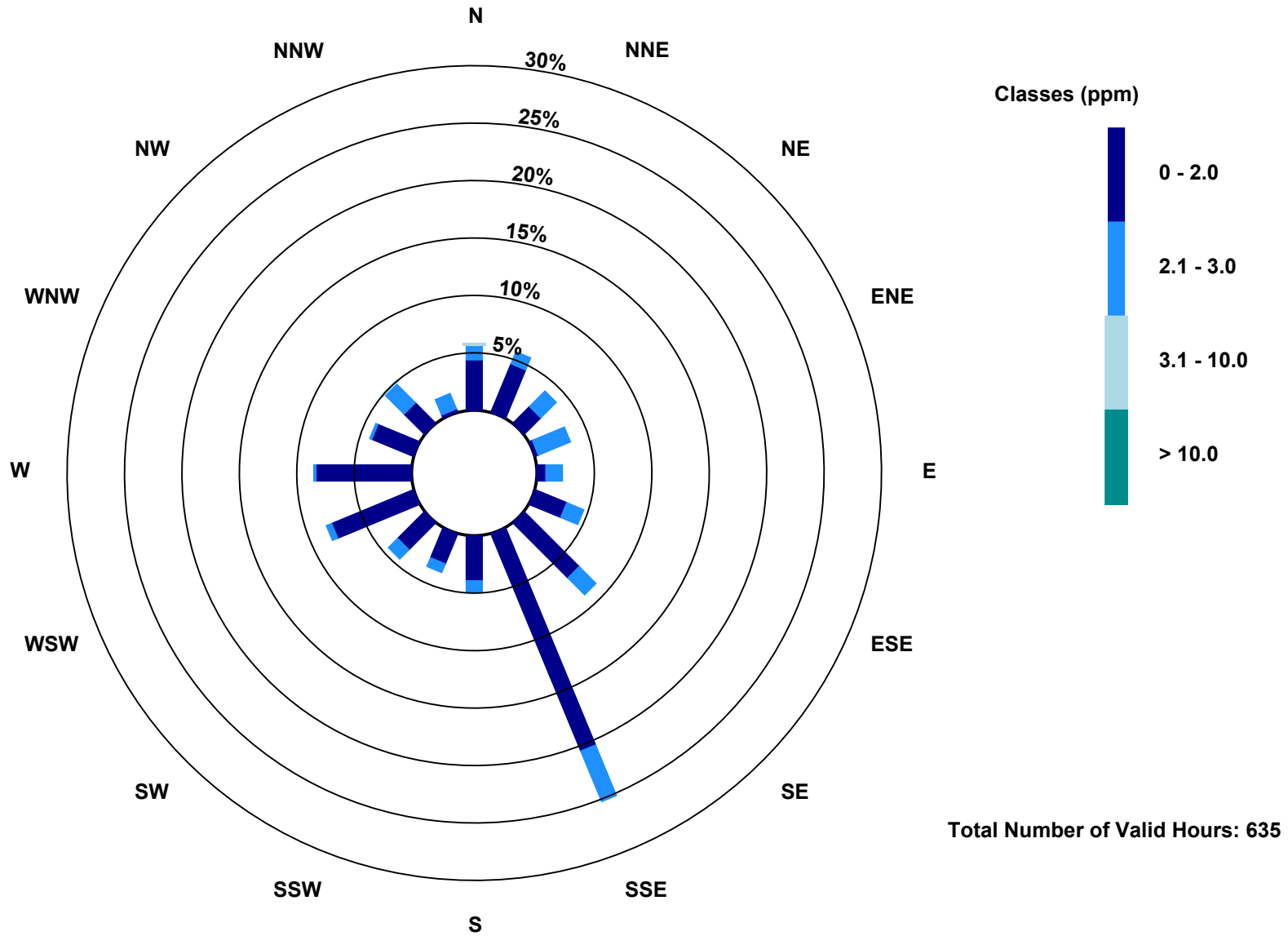
Total Number of Valid Hours: 635

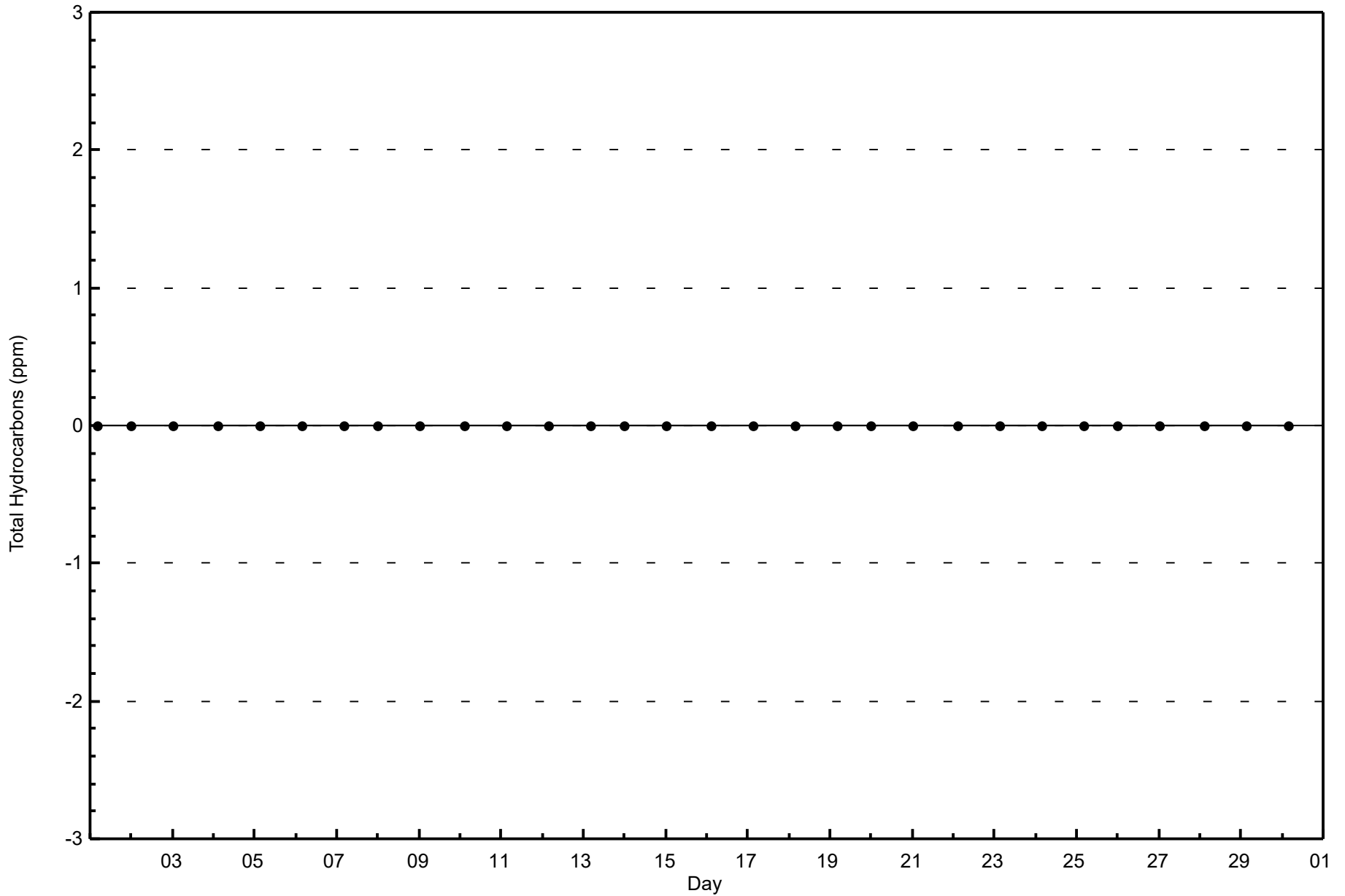
Total Number of Hours: 720

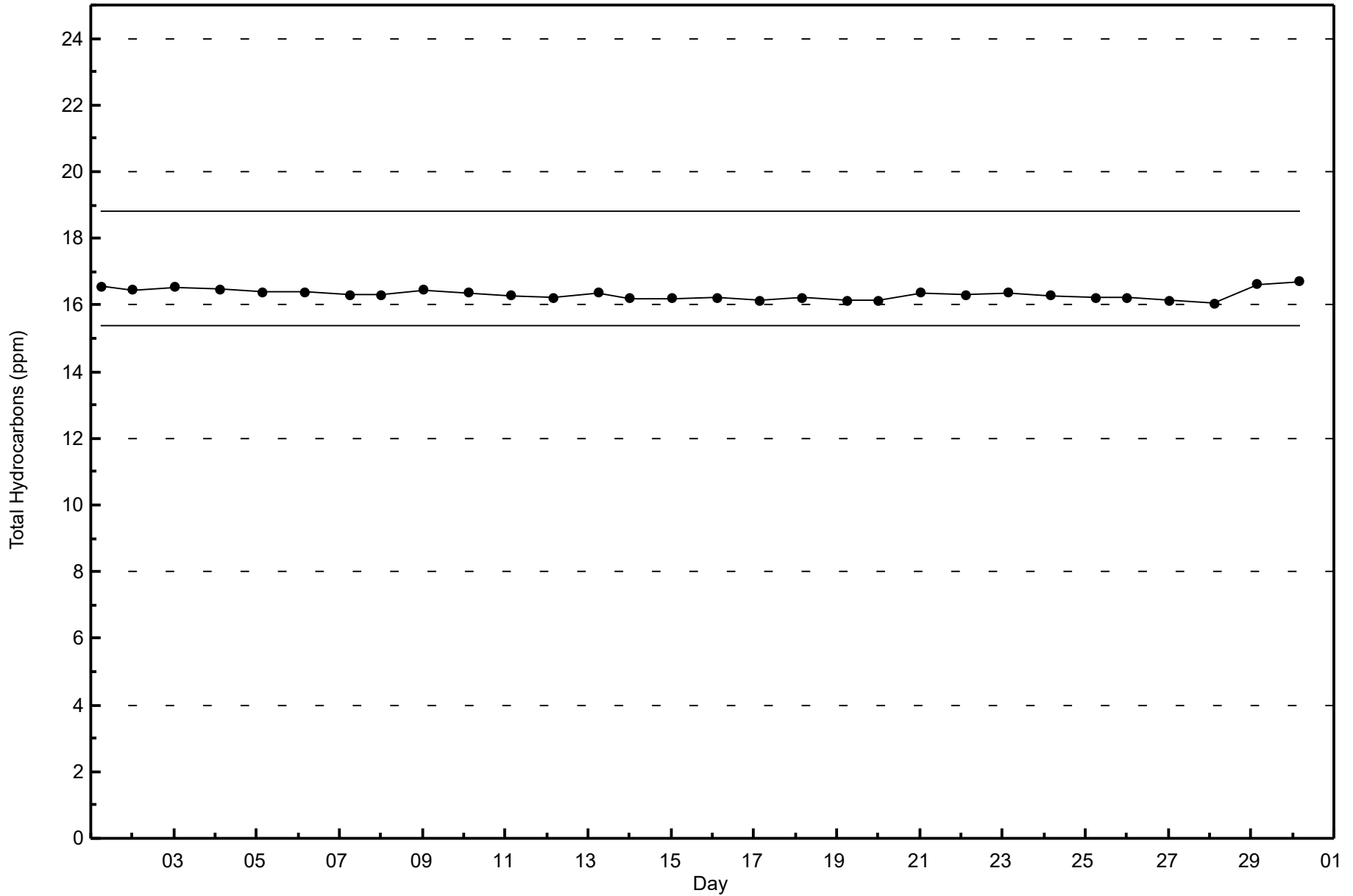


Wood Buffalo Environmental Association  
Wind Rose Nov 2023

Total Hydrocarbons (THC) - ppm  
Buffalo Viewpoint



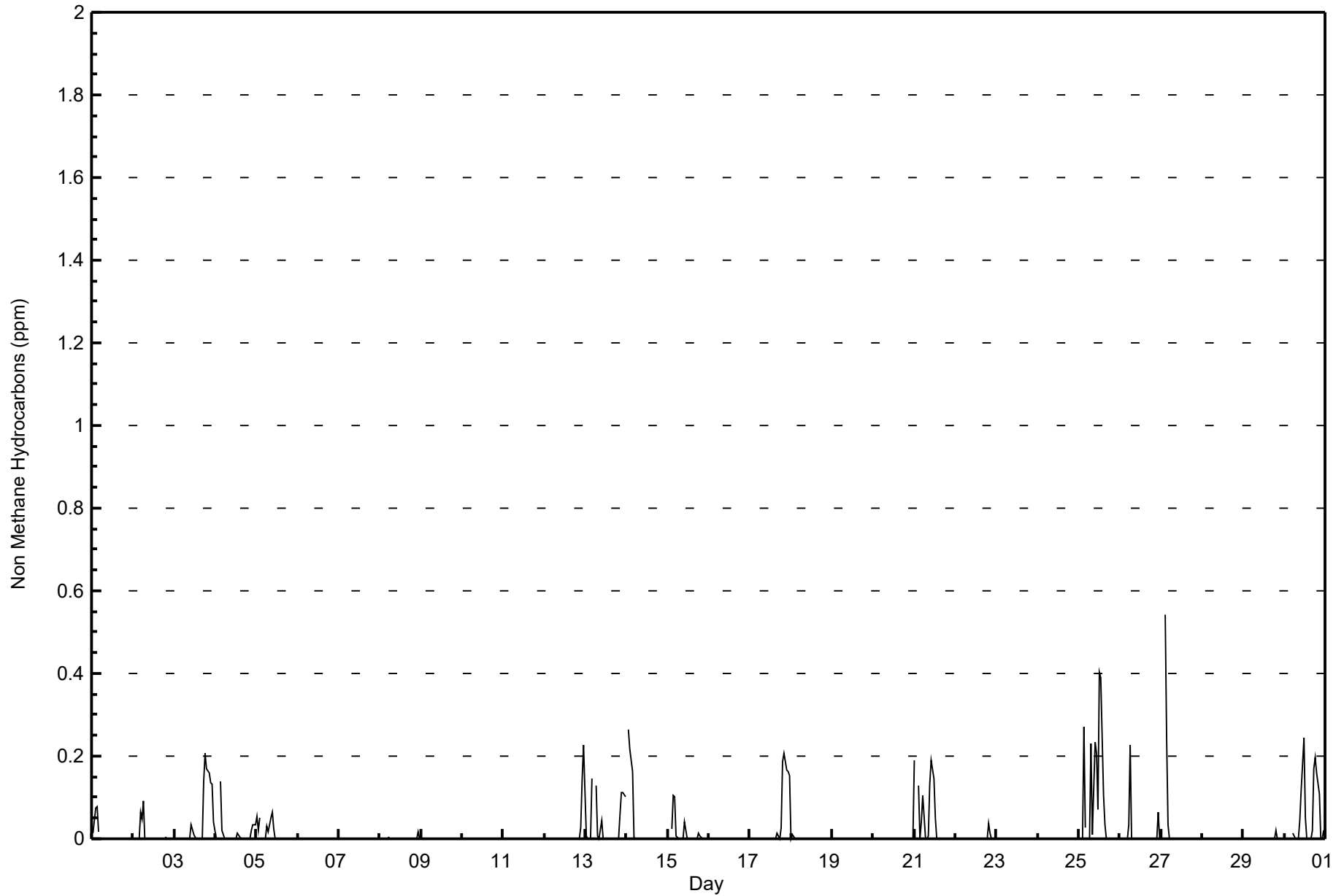






Maximum Value: 0.542 ppm on Nov 27 03:00																				Maximum Daily Average: 0.086 ppm on Nov 25					Hours in Service:	720
Minimum Value: 0.000 ppm on Nov 1 07:00																				Minimum Daily Average: 0.000 ppm on Nov 6					Hours of Data:	686
Maximum Diurnal Average: 0.041 ppm at hour 3																				Minimum Diurnal Average: 0.001 ppm at hour 16					Hours of Missing Data:	34
Monthly Average: 0.015 ppm																				Percentiles: P <sub>1</sub> = 0.0 P <sub>10</sub> = 0.0 Q <sub>1</sub> = 0.0 Median = 0.0 Q <sub>3</sub> = 0.0 P <sub>90</sub> = 0.0 P <sub>99</sub> = 0.2					Hours of Calibration:	33
																									Percent Operational Time:	99.9
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	0.012	0.043	0.073	0.078	0.016	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	0.010	0.078
2-Nov	Z	0.000	0.000	0.000	0.066	0.047	0.093	0.000	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	0.009	0.093
3-Nov	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.035	0.010	0.003	0.000	0.000	0.000	0.000	0.139	0.207	0.170	0.158	0.134	0.134	0.041	0.045	0.207
4-Nov	0.000	0.000	Z	0.138	0.019	0.000	0.000	0.000	0.000	0.000	0.000	0.012	0.003	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.022	0.033	0.033	0.011	0.138
5-Nov	0.054	0.021	0.051	Z	0.000	0.000	0.030	0.015	0.051	0.064	0.025	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.014	0.064	
6-Nov	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
7-Nov	0.000	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
8-Nov	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	0.000	0.018	0.000	0.001	0.018
9-Nov	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
10-Nov	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
11-Nov	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
12-Nov	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.027	0.142	0.227	0.017	0.227
13-Nov	0.006	0.000	0.000	0.000	0.147	Z	0.128	0.006	0.001	0.045	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.059	0.112	0.111	0.102	0.031	0.147
14-Nov	Z	0.266	0.216	0.164	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	0.028	0.266
15-Nov	0.000	Z	0.023	0.105	0.100	0.007	0.000	0.000	0.000	0.000	0.041	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.015	0.008	0.000	0.000	0.000	0.013	0.105	
16-Nov	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
17-Nov	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.014	0.000	0.026	0.186	0.206	0.166	0.163	0.153	0.040	0.206
18-Nov	0.001	0.009	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	0.009
19-Nov	0.000	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
20-Nov	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
21-Nov	0.189	Z	0.128	0.001	0.041	0.104	0.000	0.000	0.007	0.133	0.189	0.147	0.052	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.043	0.189
22-Nov	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.038	0.015	0.000	0.000	0.000	0.002	0.038
23-Nov	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
24-Nov	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
25-Nov	0.000	0.000	0.000	0.272	0.028	Z	0.000	0.231	0.010	0.232	0.208	0.070	0.404	0.391	0.105	0.034	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.086	0.404
26-Nov	Z	0.000	0.000	0.000	0.000	0.034	0.227	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.065	0.000	0.014	0.227
27-Nov	0.000	Z	0.542	0.242	0.034	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.036	0.542
28-Nov	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	M	C	C	C	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
29-Nov	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.020	0.000	0.000	0.000	0.000	0.001	0.020
30-Nov	0.000	0.000	0.000	0.000	Z	0.013	0.000	0.000	0.000	0.043	0.117	0.245	0.052	0.000	0.000	0.000	0.022	0.169	0.197	0.160	0.109	0.000	0.000	0.019	0.050	0.245
																								Diurnal Average		
																								Diurnal Maximum		
Z - zerospan      C - Calibration      M - Maintenance																										







**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Non Methane Hydrocarbons (NMHC) - ppm  
Buffalo Viewpoint - November 2023**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 0.005	584	85.13	85.13
0.006 - 0.05	48	7.00	92.13
0.06 - 0.1	27	3.94	96.06
> 0.1	27	3.94	100.00

Total Number of Valid Hours: 686

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

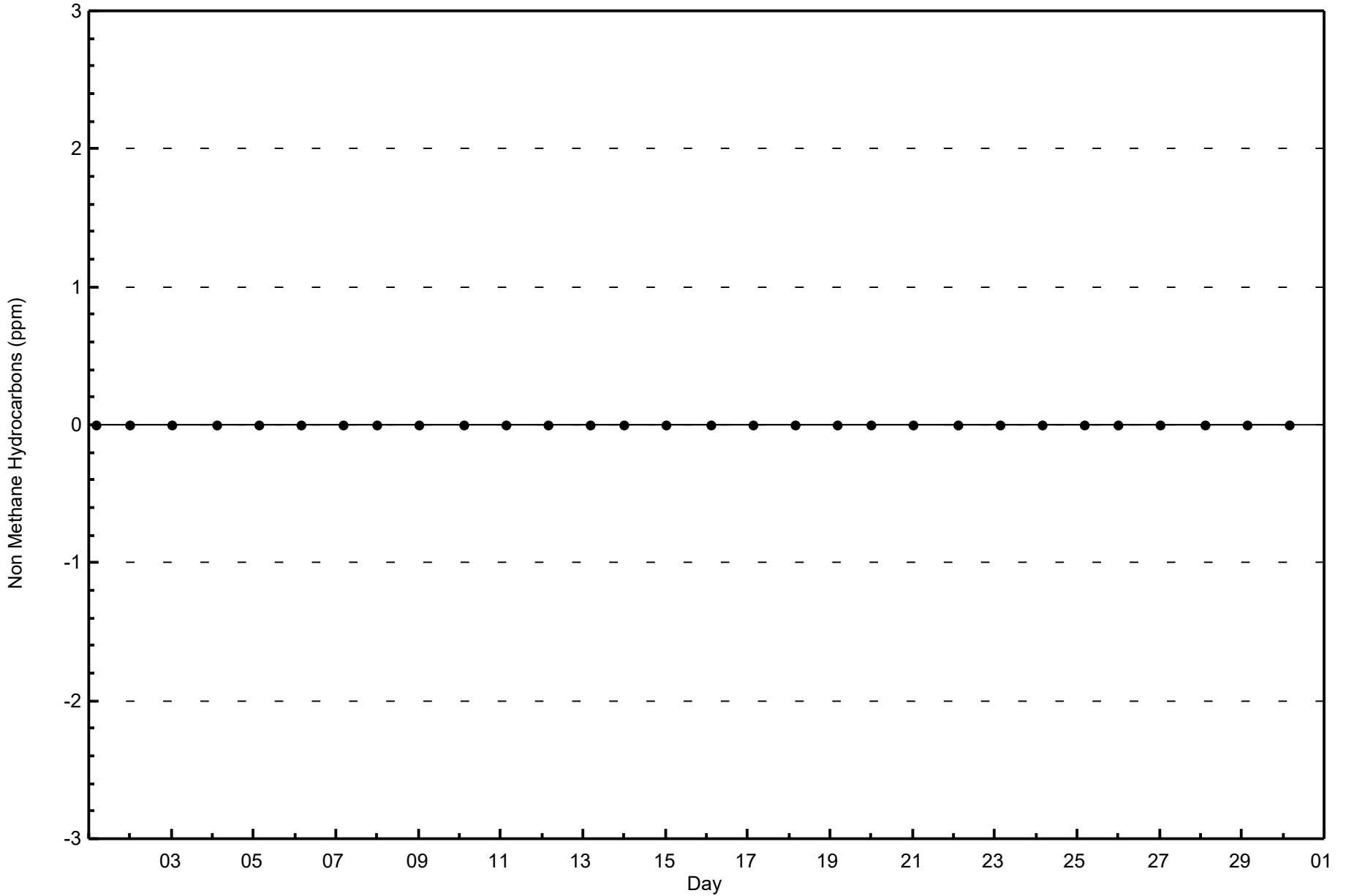
**Non Methane Hydrocarbons (NMHC) - ppm  
Buffalo Viewpoint - November 2023**

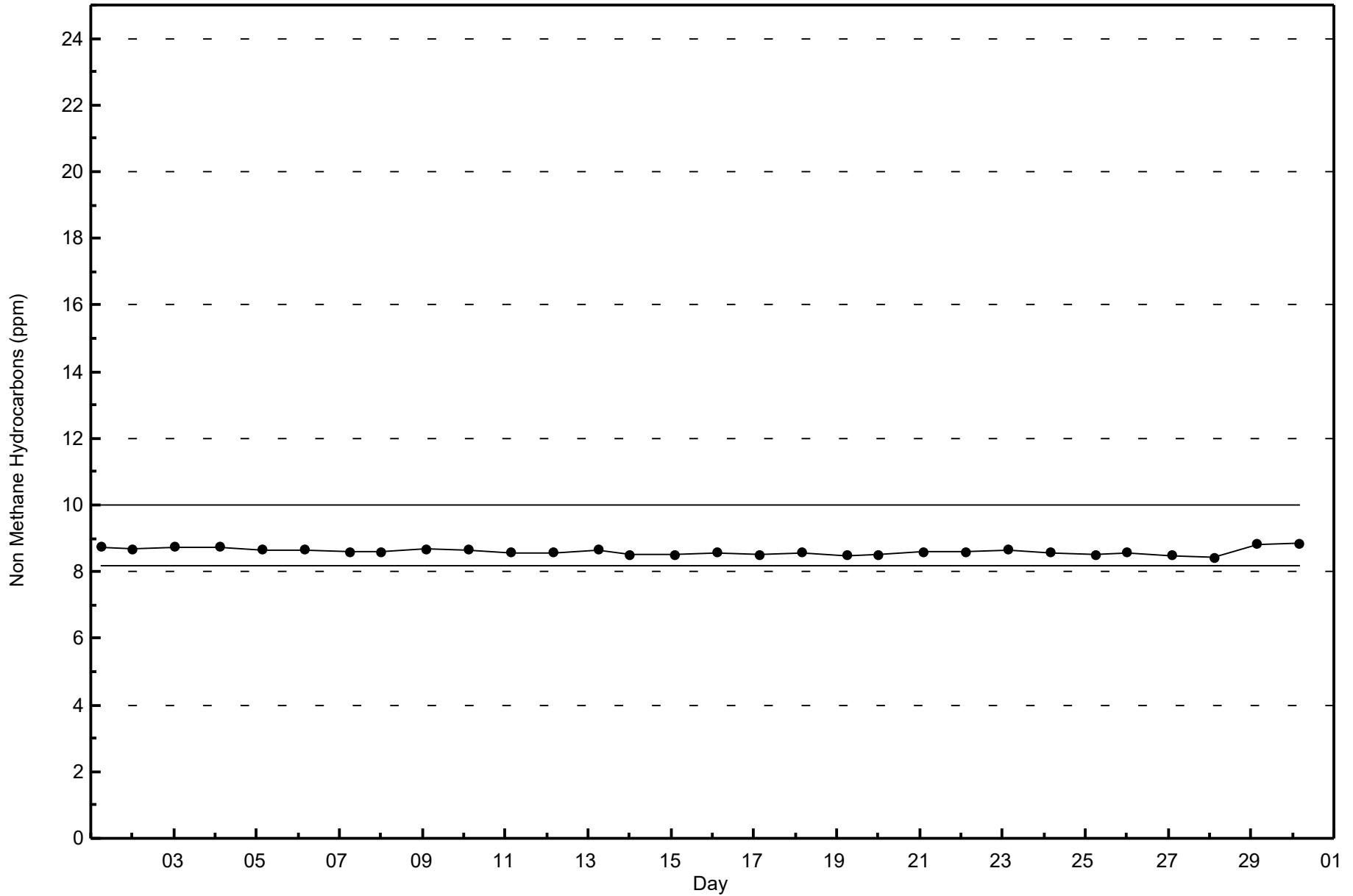
<b>Concentration Ranges (ppm)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 0.005	26	29	20	3	7	23	51	145	30	23	27	52	52	25	21	0	534
0.006 - 0.05	4	3	2	12	4	2	2	7	1	0	1	0	2	1	5	1	47
0.06 - 0.1	6	1	2	4	2	3	1	3	0	0	0	0	0	0	2	3	27
> 0.1	1	3	1	2	1	1	2	5	0	0	0	0	0	0	4	7	27
<b>Totals</b>	37	36	25	21	14	29	56	160	31	23	28	52	54	26	32	11	635

Total Number of Valid Hours: 635

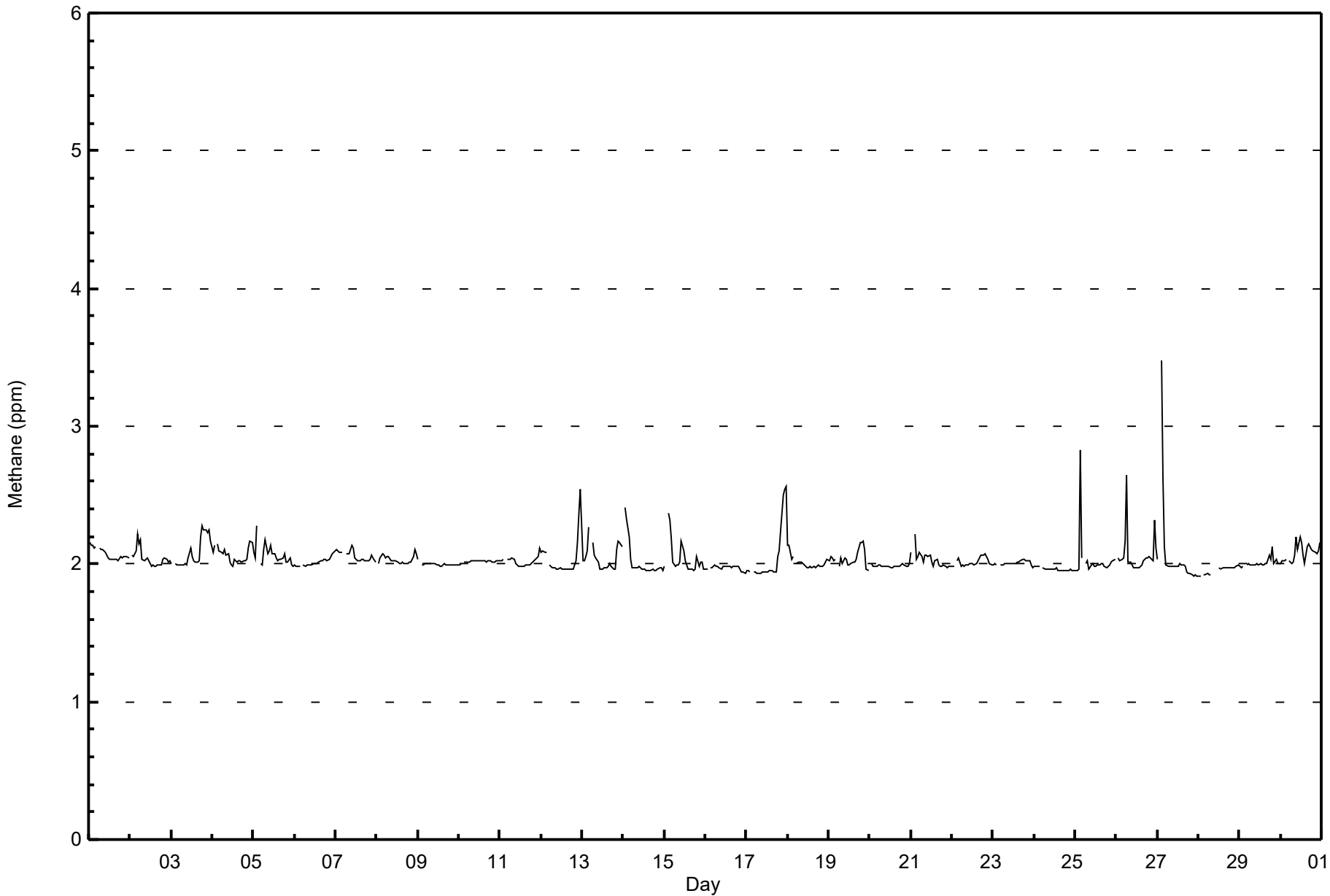
Total Number of Hours: 720















**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Methane (CH<sub>4</sub>) - ppm  
Buffalo Viewpoint - November 2023**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2.0	536	78.13	78.13
2.1 - 3.0	149	21.72	99.85
3.1 - 10.0	1	0.15	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 686

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Methane (CH<sub>4</sub>) - ppm  
Buffalo Viewpoint - November 2023**

<b>Concentration Ranges (ppm)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	29	29	13	6	5	19	43	130	25	18	21	49	53	25	17	7	489
2.1 - 3.0	7	7	12	15	9	10	13	30	6	5	7	3	1	1	15	4	145
3.1 - 10.0	1	0	0	0	0	0	0	0	0	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
<b>Totals</b>	37	36	25	21	14	29	56	160	31	23	28	52	54	26	32	11	635

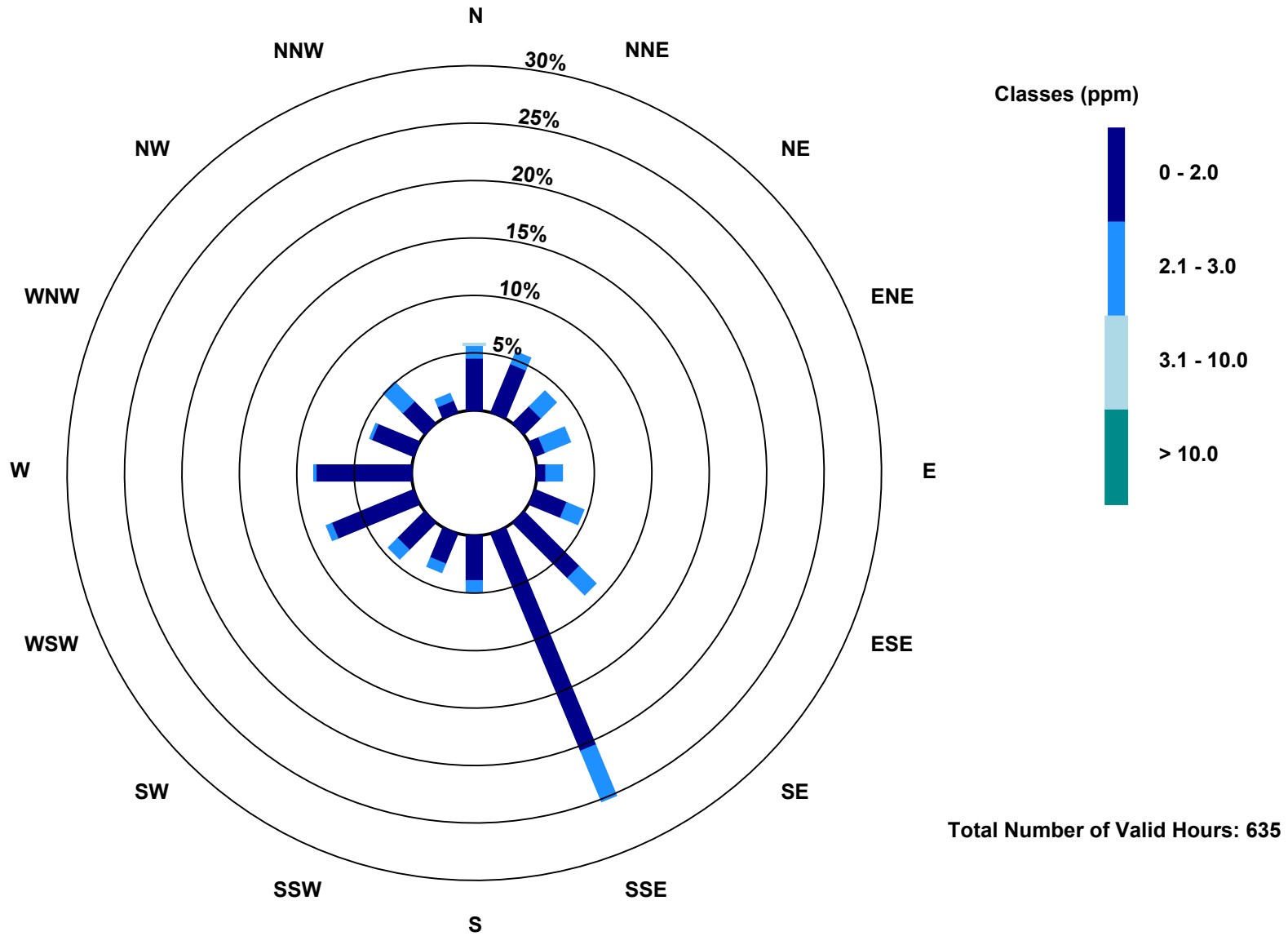
Total Number of Valid Hours: 635

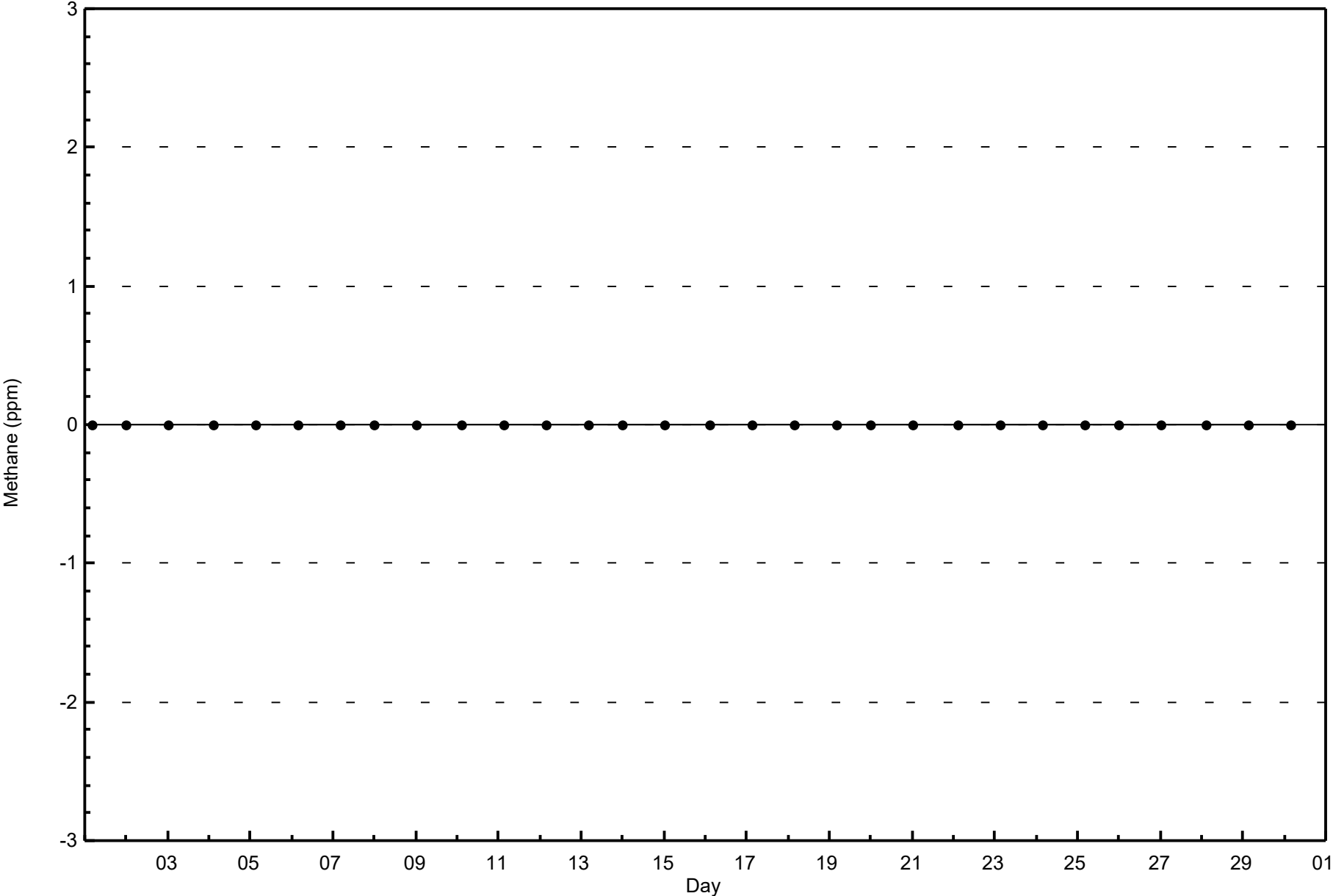
Total Number of Hours: 720

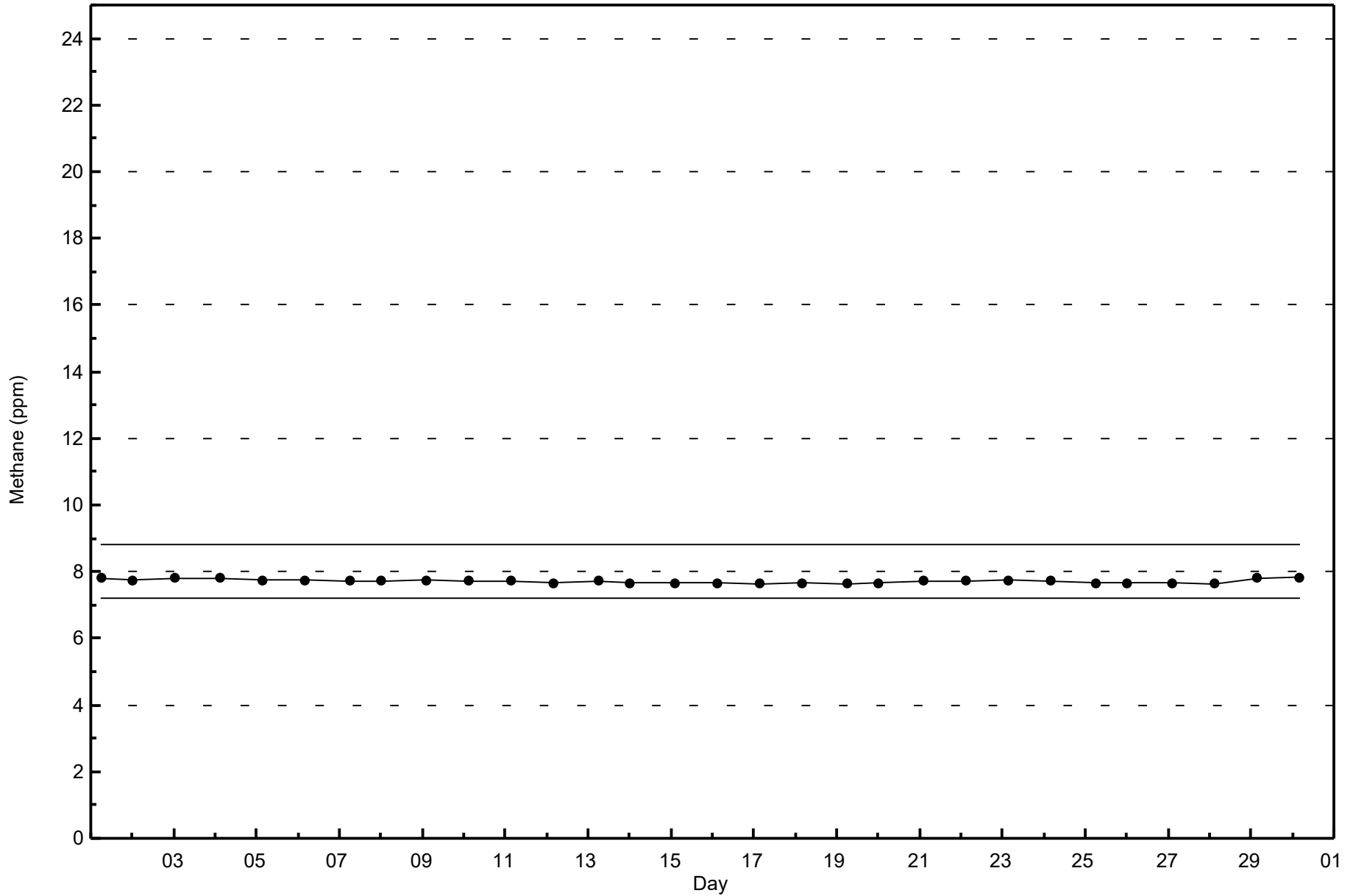


Wood Buffalo Environmental Association  
Wind Rose Nov 2023

Methane (CH<sub>4</sub>) - ppm  
Buffalo Viewpoint

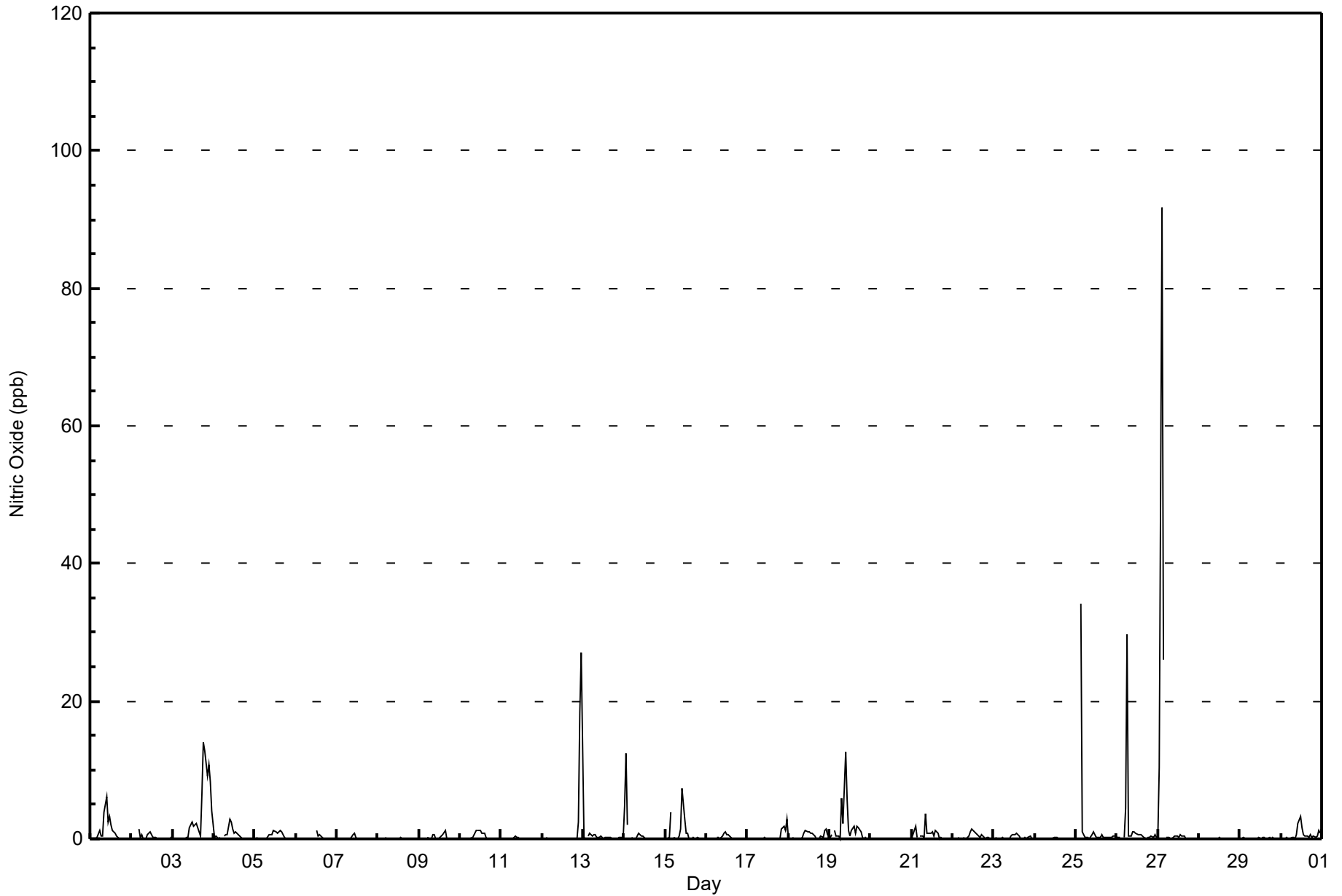








Maximum Value: 91.8 ppb on Nov 27 03:00																				Maximum Daily Average: 5.7 ppb on Nov 27					Hours in Service: 720		
Minimum Value: 0.0 ppb on Nov 1 01:00																				Minimum Daily Average: 0.0 ppb on Nov 20					Hours of Data: 684		
Maximum Diurnal Average: 3.9 ppb at hour 3																				Minimum Diurnal Average: 0.2 ppb at hour 17					Hours of Missing Data: 36		
Monthly Average: 0.82 ppb																				Percentiles: P <sub>1</sub> = 0.0 P <sub>10</sub> = 0.0 Q <sub>1</sub> = 0.0 Median = 0.1 Q <sub>3</sub> = 0.4 P <sub>90</sub> = 1.2 P <sub>99</sub> = 13.0					Hours of Calibration: 35		
																									Percent Operational Time: 99.9		
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Nov	0.0	0.0	Z	0.0	0.2	1.3	0.4	0.5	3.9	6.0	2.4	3.2	2.0	1.3	0.8	0.3	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	1.0	6.0	
2-Nov	0.0	0.0	0.0	Z	1.5	0.2	0.6	0.0	0.0	0.7	0.9	1.0	0.3	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.2	1.5	
3-Nov	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.2	0.2	1.7	2.4	1.9	2.0	2.3	1.0	0.4	6.5	14.0	12.8	9.1	10.8	8.4	4.2	3.4	14.0	
4-Nov	0.3	0.3	0.1	0.0	0.2	Z	0.5	0.7	0.6	2.9	2.4	1.3	0.8	1.0	0.5	0.4	0.2	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.5	2.9	
5-Nov	Z	0.2	0.0	0.0	0.0	0.0	0.0	0.1	0.6	0.7	0.5	1.2	1.1	0.7	1.0	1.2	1.0	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.4	1.2	
6-Nov	0.0	Z	0.0	0.0	0.0	0.0	0.0	C	C	C	C	C	1.2	0.4	0.6	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	1.2	
7-Nov	0.0	0.0	Z	0.1	0.0	0.0	0.0	0.0	0.0	0.7	0.8	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.8	
8-Nov	0.0	0.0	0.0	Z	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	
9-Nov	0.0	0.0	0.0	0.0	Z	0.1	0.0	0.0	0.6	0.7	0.0	0.0	0.2	0.4	0.6	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	1.2	
10-Nov	0.0	0.0	0.0	0.0	0.0	Z	0.2	0.0	0.3	1.2	1.2	1.2	1.1	0.9	0.8	0.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	1.2	
11-Nov	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	
12-Nov	0.0	Z	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.4	18.3	27.1	2.1	27.1
13-Nov	0.2	0.0	Z	0.4	0.8	0.4	0.7	0.7	0.2	0.2	0.4	0.2	0.0	0.1	0.2	0.2	0.1	0.0	0.0	0.0	0.0	0.2	0.3	0.3	0.2	0.8	
14-Nov	4.7	12.4	2.0	Z	0.2	0.0	0.0	0.0	0.7	0.5	0.5	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	0.9	12.4	
15-Nov	0.0	0.0	0.1	3.8	Z	0.2	0.1	0.1	0.3	1.4	7.2	2.8	0.8	0.8	0.0	0.0	0.3	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.8	7.2	
16-Nov	0.0	0.0	0.0	0.0	0.0	Z	0.2	0.1	0.0	0.3	0.8	0.9	0.7	0.7	0.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.9	
17-Nov	Z	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	0.0	1.5	1.8	1.2	2.9	0.3	2.9
18-Nov	0.1	Z	0.1	0.0	0.0	0.1	0.0	0.0	0.3	0.8	1.3	0.9	1.1	0.7	0.8	0.5	0.0	0.0	0.0	0.5	0.3	1.2	1.5	0.6	0.5	1.5	
19-Nov	0.3	0.6	Z	1.3	0.4	0.3	0.0	5.8	2.3	12.5	5.6	1.2	0.4	1.2	1.8	0.9	1.8	1.7	1.1	0.2	0.1	0.2	0.0	0.0	1.7	12.5	
20-Nov	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	
21-Nov	0.1	0.6	1.9	0.1	Z	0.5	0.4	0.2	3.7	0.9	0.7	0.7	1.1	0.3	1.3	0.8	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.6	3.7	
22-Nov	0.0	0.0	0.0	0.1	0.2	Z	0.2	0.0	0.0	0.5	1.0	1.5	1.2	0.9	0.6	0.5	0.1	0.6	0.3	0.1	0.3	0.2	0.0	0.0	0.4	1.5	
23-Nov	Z	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.4	0.6	0.6	0.7	0.7	0.5	0.0	0.1	0.2	0.0	0.1	0.5	0.0	0.0	0.2	0.7	
24-Nov	0.0	Z	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	
25-Nov	0.0	0.0	Z	34.2	0.9	0.2	0.2	0.1	0.0	0.5	1.0	0.6	0.2	0.1	0.2	0.5	0.3	0.3	0.1	0.1	0.3	0.1	0.3	0.3	1.8	34.2	
26-Nov	0.2	0.1	0.1	Z	0.2	4.5	29.7	0.4	0.5	1.0	1.0	0.8	0.6	0.6	0.5	0.4	0.2	0.1	0.1	0.2	0.3	0.2	0.6	0.1	1.8	29.7	
27-Nov	0.1	10.4	91.8	26.1	Z	0.2	0.2	0.0	0.1	0.3	0.3	0.4	0.3	0.5	0.5	0.3	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	5.7	91.8	
28-Nov	0.0	0.0	0.0	0.0	0.0	Z	0.1	0.1	M	0.0	0.0	0.0	0.2	0.1	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	
29-Nov	Z	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.0	0.2	0.1	0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.2	
30-Nov	0.0	Z	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.5	2.2	3.3	1.7	0.5	0.3	0.5	0.3	0.6	0.2	0.3	0.3	0.3	1.2	0.9	0.6	3.3	
																								Diurnal Average			
																								Diurnal Maximum			
Z - zerospan      C - Calibration      M - Maintenance																											





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Nitric Oxide (NO) - ppb  
Buffalo Viewpoint - November 2023**

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

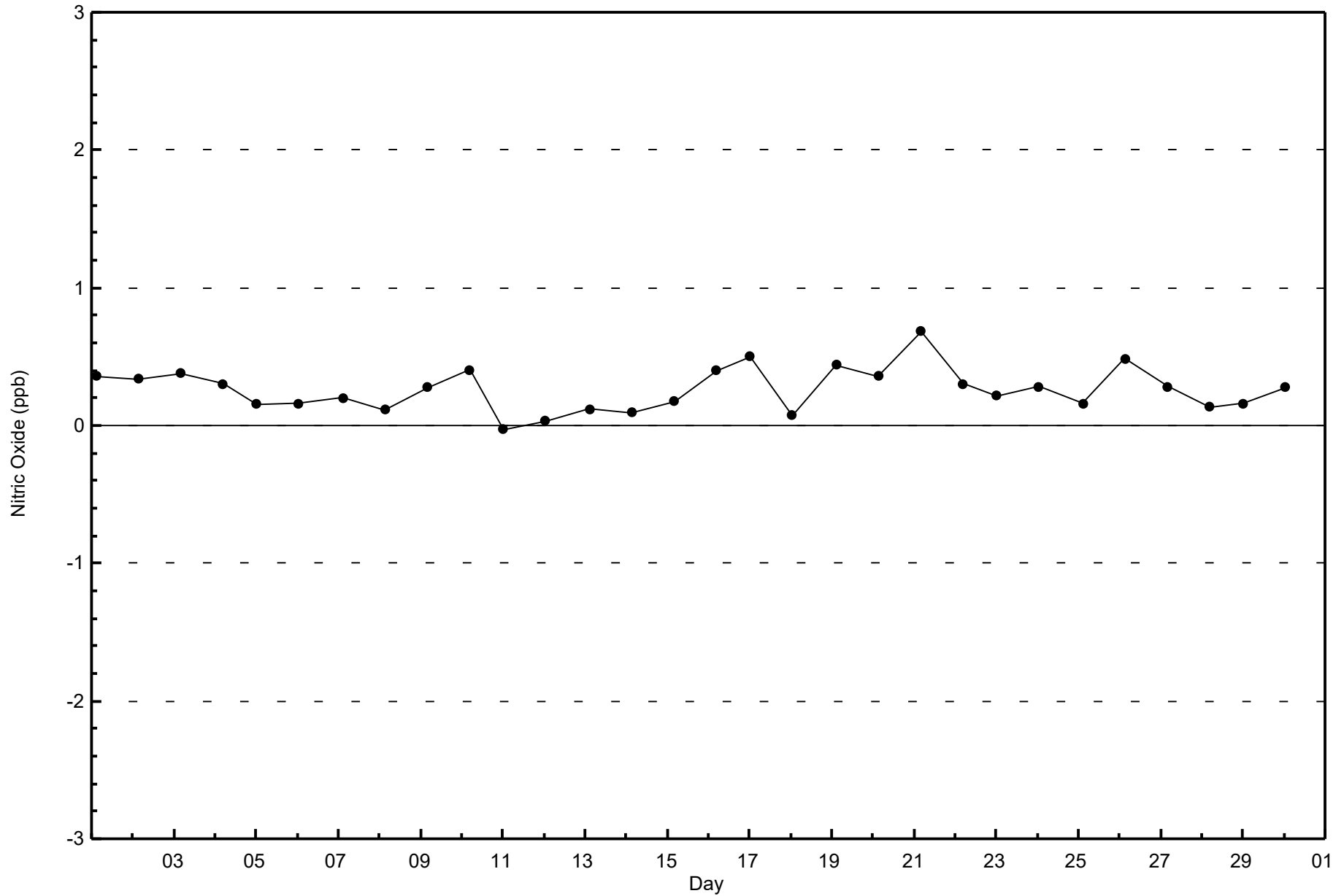
**Nitric Oxide (NO) - ppb**  
**Buffalo Viewpoint - November 2023**

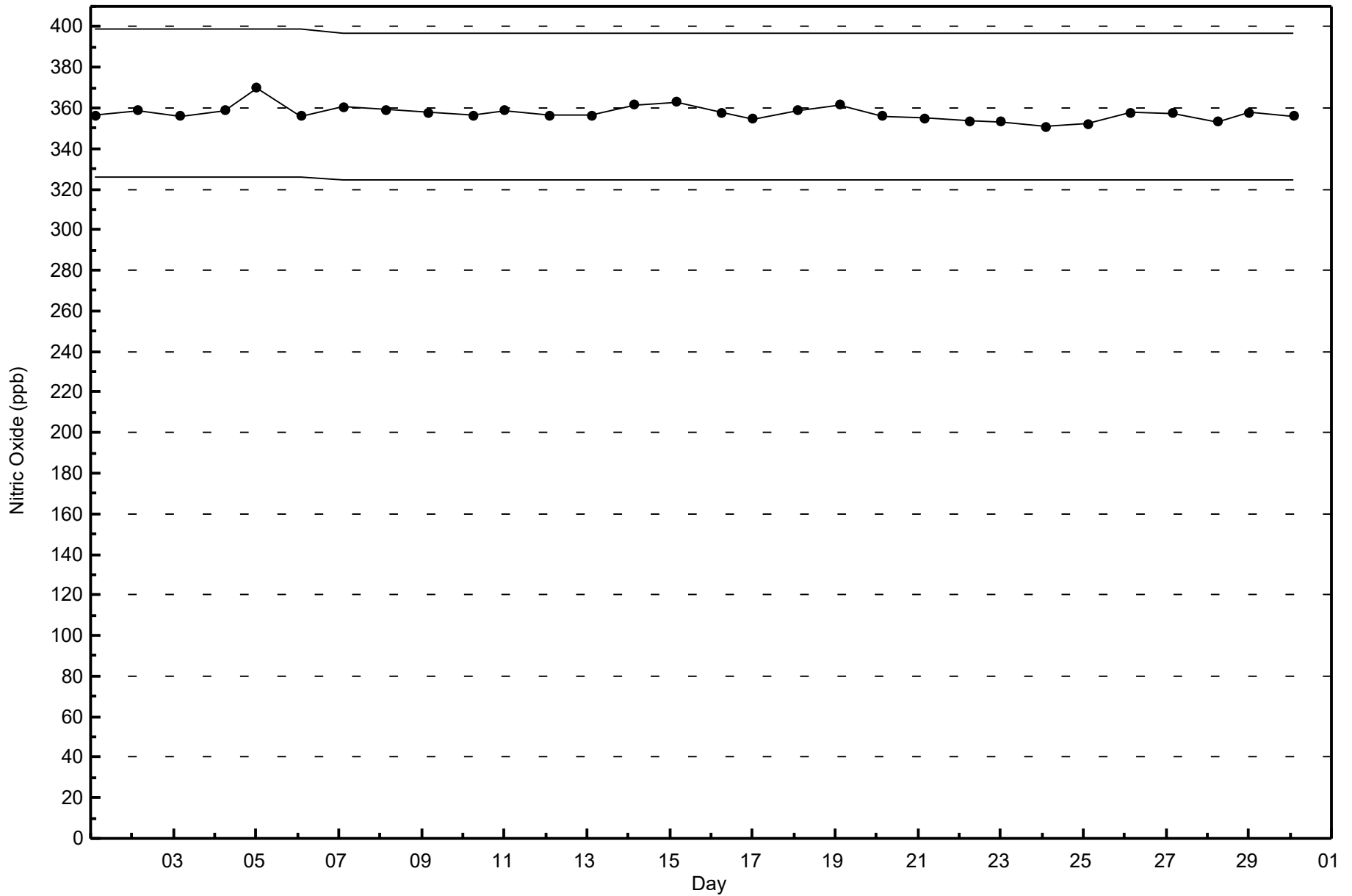
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	38	35	26	19	14	30	54	153	31	24	26	59	55	24	29	11	628
21 - 40	0	0	0	1	0	0	1	0	0	0	0	0	0	0	1	1	4
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	39	35	26	20	14	30	55	153	31	24	26	59	55	24	30	12	633

Total Number of Valid Hours: 633

Total Number of Hours: 720









Wood Buffalo Environmental Association

Summary of Hour Averages

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

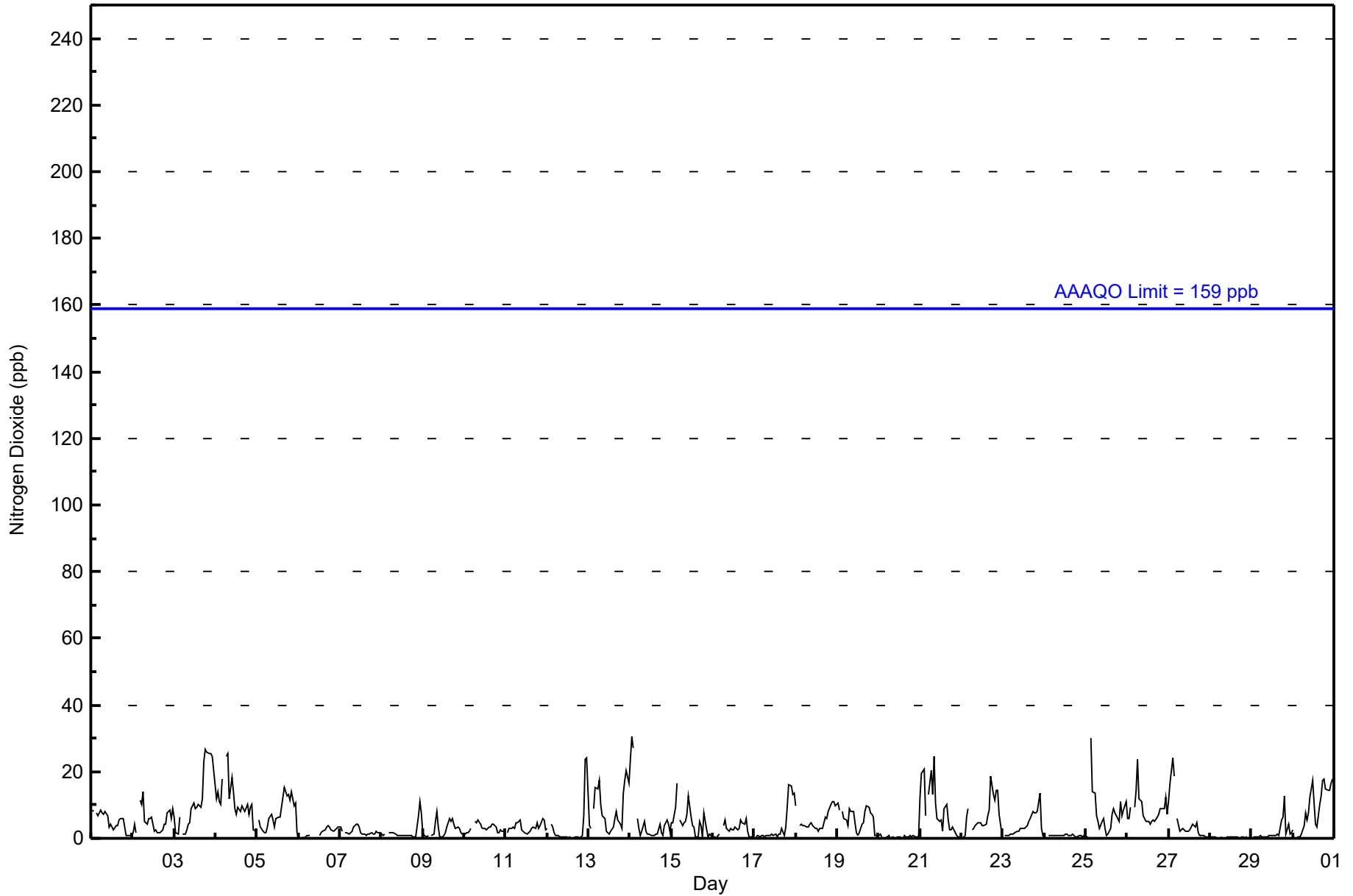
Buffalo Viewpoint - November 2023

Number of Exceedences (AAQO):		1-hr: 0	24-hr: 0																		Hours in Service:	720					
Maximum Value: 30.5 ppb on Nov 14 02:00		Maximum Daily Average: 11.8 ppb on Nov 3																			Hours of Data:	684					
Minimum Value: 0.1 ppb on Nov 6 01:00		Minimum Daily Average: 0.4 ppb on Nov 28																			Hours of Missing Data:	36					
Maximum Diurnal Average: 6.9 ppb at hour 22		Minimum Diurnal Average: 2.6 ppb at hour 14																			Hours of Calibration:	35					
Monthly Average: 4.95 ppb		Percentiles: P <sub>1</sub> = 0.2 P <sub>10</sub> = 0.5 Q <sub>1</sub> = 1.0 Median = 3.1 Q <sub>3</sub> = 6.8 P <sub>90</sub> = 12.1 P <sub>99</sub> = 25.4																			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-Nov	8.3	8.2	Z	7.5	6.7	8.3	7.8	7.0	8.0	6.8	3.6	4.3	3.5	2.6	4.0	4.0	5.6	6.1	6.0	3.3	0.8	0.8	1.0	0.8	5.0	8.3	
2-Nov	1.7	4.1	1.7	Z	11.6	10.2	14.0	5.2	4.1	6.1	6.0	6.4	2.0	2.4	1.8	1.6	1.9	2.5	4.4	4.4	7.7	8.6	6.1	8.8	5.4	14.0	
3-Nov	6.4	1.8	1.4	6.4	Z	1.2	1.2	2.4	4.1	4.5	8.9	10.7	8.7	9.5	10.1	9.4	12.0	22.9	26.9	26.0	25.6	25.6	24.6	20.3	11.8	26.9	
4-Nov	11.8	14.0	10.9	10.3	17.9	Z	24.6	25.4	11.8	18.2	13.8	9.1	7.2	9.5	8.2	9.9	8.8	8.1	10.3	7.0	9.5	10.0	2.4	2.3	11.3	25.4	
5-Nov	Z	5.3	3.4	2.3	1.8	1.9	3.2	6.1	7.2	5.3	3.3	6.0	6.4	6.4	9.4	12.3	15.3	12.7	13.1	11.5	14.1	9.6	10.7	1.6	7.3	15.3	
6-Nov	0.1	Z	0.4	0.2	0.5	0.7	0.7	C	C	C	C	C	0.8	1.5	2.0	2.4	3.5	3.8	3.5	2.7	2.3	2.7	3.1	3.3	1.9	3.8	
7-Nov	3.3	2.0	Z	1.6	1.7	1.3	1.5	2.2	3.3	4.2	4.1	3.6	1.9	1.2	1.1	1.0	1.2	1.1	1.9	1.4	1.4	2.0	1.8	1.5	2.0	4.2	
8-Nov	1.1	0.8	1.3	Z	1.9	1.8	1.7	1.6	1.1	0.7	0.9	0.8	0.8	0.9	0.7	0.8	0.9	0.8	0.6	0.4	0.3	6.8	11.1	7.7	2.0	11.1	
9-Nov	1.7	1.0	0.3	0.8	Z	0.9	1.1	4.9	8.0	3.3	0.4	0.3	1.0	1.8	3.2	5.8	4.9	5.8	4.2	3.1	3.2	3.0	1.7	1.3	2.7	8.0	
10-Nov	1.1	1.8	1.8	2.3	2.8	Z	4.9	4.6	5.4	4.4	2.9	2.8	2.8	2.4	3.2	3.2	4.1	4.1	3.3	1.8	1.6	2.4	2.3	2.1	3.0	5.4	
11-Nov	Z	1.8	3.0	2.8	3.3	2.8	4.6	4.8	5.3	2.6	2.2	1.9	1.4	1.8	2.0	3.0	3.3	2.9	4.7	2.9	3.9	5.8	5.4	2.6	3.3	5.8	
12-Nov	3.0	Z	4.1	3.4	1.5	0.9	0.7	0.6	0.6	0.6	0.6	0.3	0.2	0.3	0.2	0.2	0.5	0.6	0.4	0.2	1.0	6.9	23.6	24.2	3.2	24.2	
13-Nov	3.7	2.9	Z	8.7	15.4	14.8	17.2	10.3	6.9	6.0	2.1	1.6	1.3	2.2	3.3	5.8	8.2	5.6	4.3	2.8	13.7	17.5	20.2	16.6	8.3	20.2	
14-Nov	23.7	30.5	27.1	Z	6.0	3.1	0.9	2.3	5.0	2.3	1.4	1.3	0.8	0.9	0.9	1.3	1.1	4.4	1.5	0.7	3.7	5.6	4.1	2.0	5.7	30.5	
15-Nov	4.6	4.7	9.3	16.4	Z	5.5	3.7	4.7	5.1	7.4	12.9	6.5	3.7	3.5	3.3	0.5	5.2	3.8	0.5	7.6	2.7	0.6	1.4	1.0	4.9	16.4	
16-Nov	0.3	0.4	0.2	0.7	1.2	Z	3.9	5.5	2.9	2.3	2.8	2.5	2.4	3.2	2.7	3.0	5.3	4.8	4.4	6.0	2.2	0.6	0.4	0.6	2.5	6.0	
17-Nov	Z	0.6	0.7	0.6	0.7	0.8	0.6	0.7	0.7	0.9	1.3	0.9	1.1	0.5	1.3	1.4	2.9	0.9	3.4	9.3	16.3	15.6	13.0	13.7	3.8	16.3	
18-Nov	9.7	Z	3.7	4.1	3.9	3.7	3.3	3.6	4.1	4.8	4.0	2.8	2.8	2.2	2.8	2.9	4.8	6.3	6.0	7.9	10.0	11.0	10.9	9.7	5.4	11.0	
19-Nov	10.5	8.3	Z	8.0	5.9	5.7	3.8	9.0	8.0	8.1	4.7	1.5	1.0	1.9	4.1	4.7	8.2	9.9	9.3	7.7	7.2	6.4	0.9	1.0	5.9	10.5	
20-Nov	0.9	1.1	0.3	Z	0.3	0.4	0.9	0.2	0.5	0.1	0.2	0.3	0.5	0.2	0.1	1.0	0.5	0.5	0.7	0.5	0.7	0.3	0.3	0.6	0.5	1.1	
21-Nov	12.2	19.5	20.7	6.7	Z	13.2	20.5	13.2	24.6	10.7	5.9	4.9	5.4	2.0	9.0	10.2	5.6	2.7	2.6	3.4	1.5	0.7	0.4	0.4	8.5	24.6	
22-Nov	0.2	0.4	1.0	6.2	9.1	Z	2.5	3.0	3.7	4.8	4.5	4.6	3.7	3.7	4.2	6.8	8.6	18.6	13.1	11.3	14.5	14.4	7.2	1.4	6.4	18.6	
23-Nov	Z	1.0	0.7	1.0	1.2	1.3	1.3	1.9	2.3	2.1	2.8	3.0	2.9	3.2	3.9	4.9	5.8	7.9	7.5	7.5	8.1	13.4	3.1	0.9	3.8	13.4	
24-Nov	1.1	Z	0.8	0.7	0.8	0.8	1.0	0.7	0.7	0.8	0.7	0.9	1.2	1.2	1.0	1.1	0.8	0.6	0.6	0.8	0.7	0.5	0.7	0.8	0.8	1.2	
25-Nov	0.5	0.5	Z	30.2	14.0	13.7	6.7	5.1	2.9	5.1	6.1	2.9	0.9	1.1	3.0	7.2	8.7	7.6	5.9	5.1	11.1	6.8	8.3	11.0	7.1	30.2	
26-Nov	6.1	5.9	9.4	Z	9.5	14.5	23.9	11.8	10.9	6.9	5.8	5.2	5.0	4.1	5.2	5.4	5.2	6.3	7.0	9.0	8.9	9.0	12.4	7.2	8.5	23.9	
27-Nov	11.6	16.6	24.1	18.8	Z	6.1	2.2	2.5	3.0	2.5	2.1	2.1	2.7	3.4	4.1	3.6	4.6	1.9	0.9	0.7	0.7	0.3	0.5	0.3	5.0	24.1	
28-Nov	0.3	0.3	0.3	0.4	0.1	Z	0.3	0.2	M	0.6	0.4	0.5	0.4	0.4	0.5	0.5	0.5	0.5	0.2	0.4	0.4	0.2	0.4	0.2	0.6	0.4	0.6
29-Nov	Z	0.6	0.5	0.5	0.6	0.7	0.3	0.3	0.5	0.5	0.8	0.8	0.7	0.7	0.7	1.1	1.0	5.6	6.2	12.6	1.4	4.3	1.2	1.6	1.9	12.6	
30-Nov	2.5	Z	0.4	0.6	0.5	1.3	3.9	7.6	5.3	7.6	12.2	17.4	10.6	4.3	3.4	10.3	12.7	17.2	17.7	15.0	14.6	14.2	16.4	17.7	9.3	17.7	
		5.1	5.4	5.1	5.6	4.8	4.6	5.4	5.1	5.2	4.5	4.0	3.7	2.8	2.6	3.2	4.2	5.1	5.9	5.7	5.8	6.3	6.9	6.5	5.5	Diurnal Average	
		23.7	30.5	27.1	30.2	17.9	14.8	24.6	25.4	24.6	18.2	13.8	17.4	10.6	9.5	10.1	12.3	15.3	22.9	26.9	26.0	25.6	25.6	24.6	24.2	Diurnal Maximum	
Z - zerospan		C - Calibration		M - Maintenance																							
Alberta Ambient Air Quality Objectives (AAQO):		1-hr		159 ppb																							



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

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb**  
**Buffalo Viewpoint - November 2023**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Buffalo Viewpoint - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	665	97.22	97.22
21 - 40	19	2.78	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 684

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Buffalo Viewpoint - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 20	38	32	23	19	14	27	53	153	31	24	26	59	55	24	25	11	614
21 - 40	1	3	3	1	0	3	2	0	0	0	0	0	0	0	5	1	19
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	<b>39</b>	<b>35</b>	<b>26</b>	<b>20</b>	<b>14</b>	<b>30</b>	<b>55</b>	<b>153</b>	<b>31</b>	<b>24</b>	<b>26</b>	<b>59</b>	<b>55</b>	<b>24</b>	<b>30</b>	<b>12</b>	<b>633</b>

Total Number of Valid Hours: 633

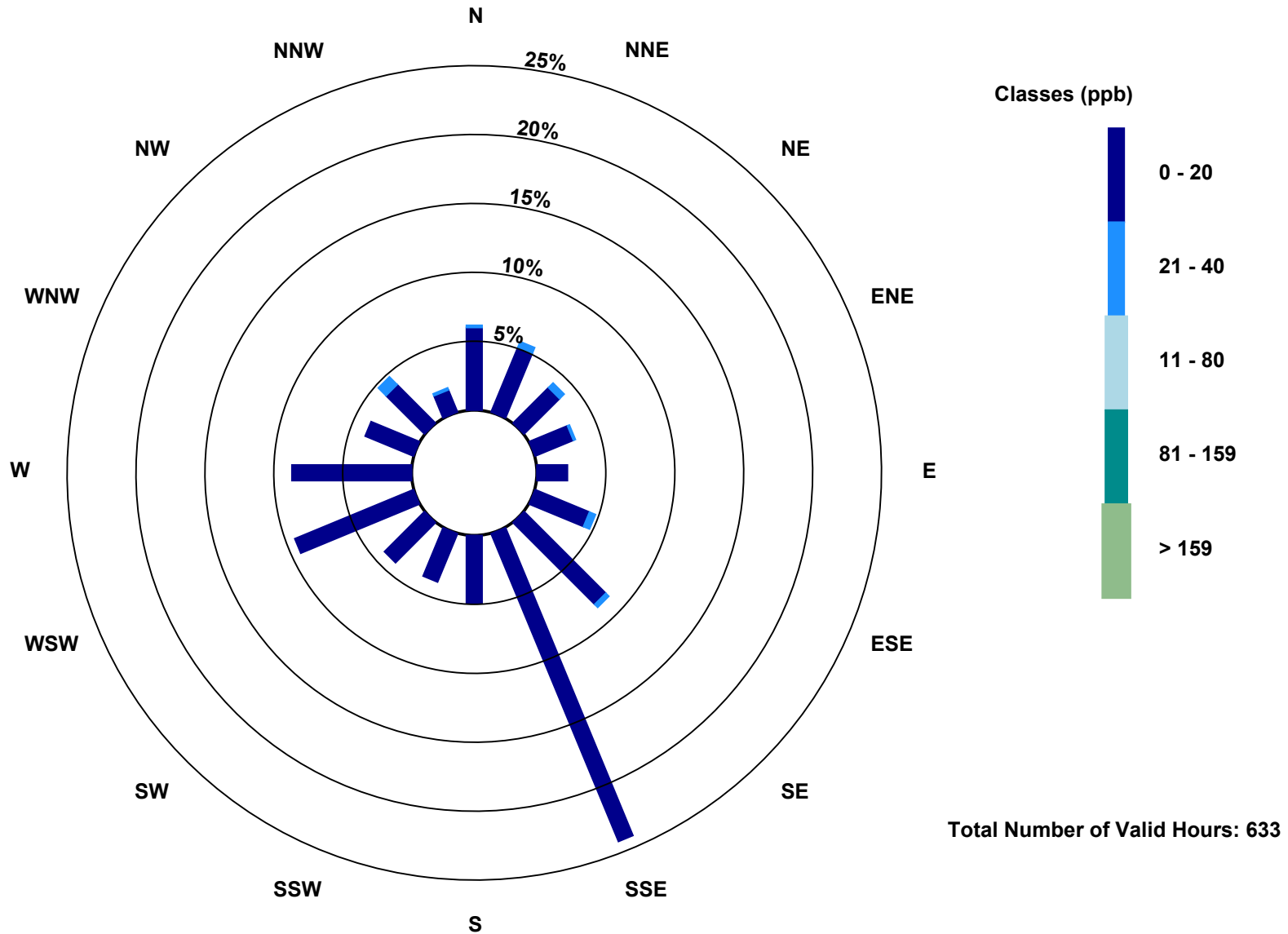
Total Number of Hours: 720

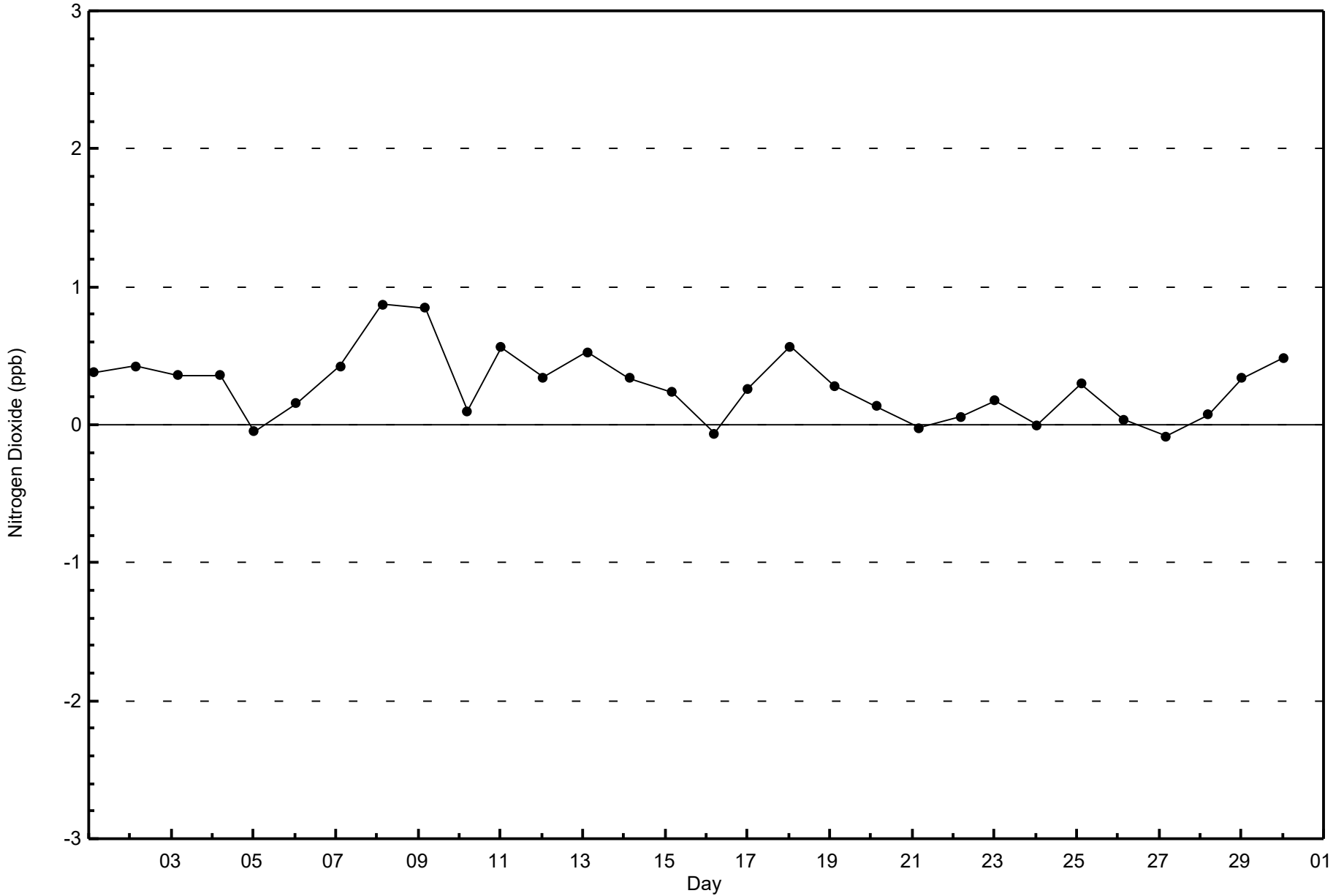


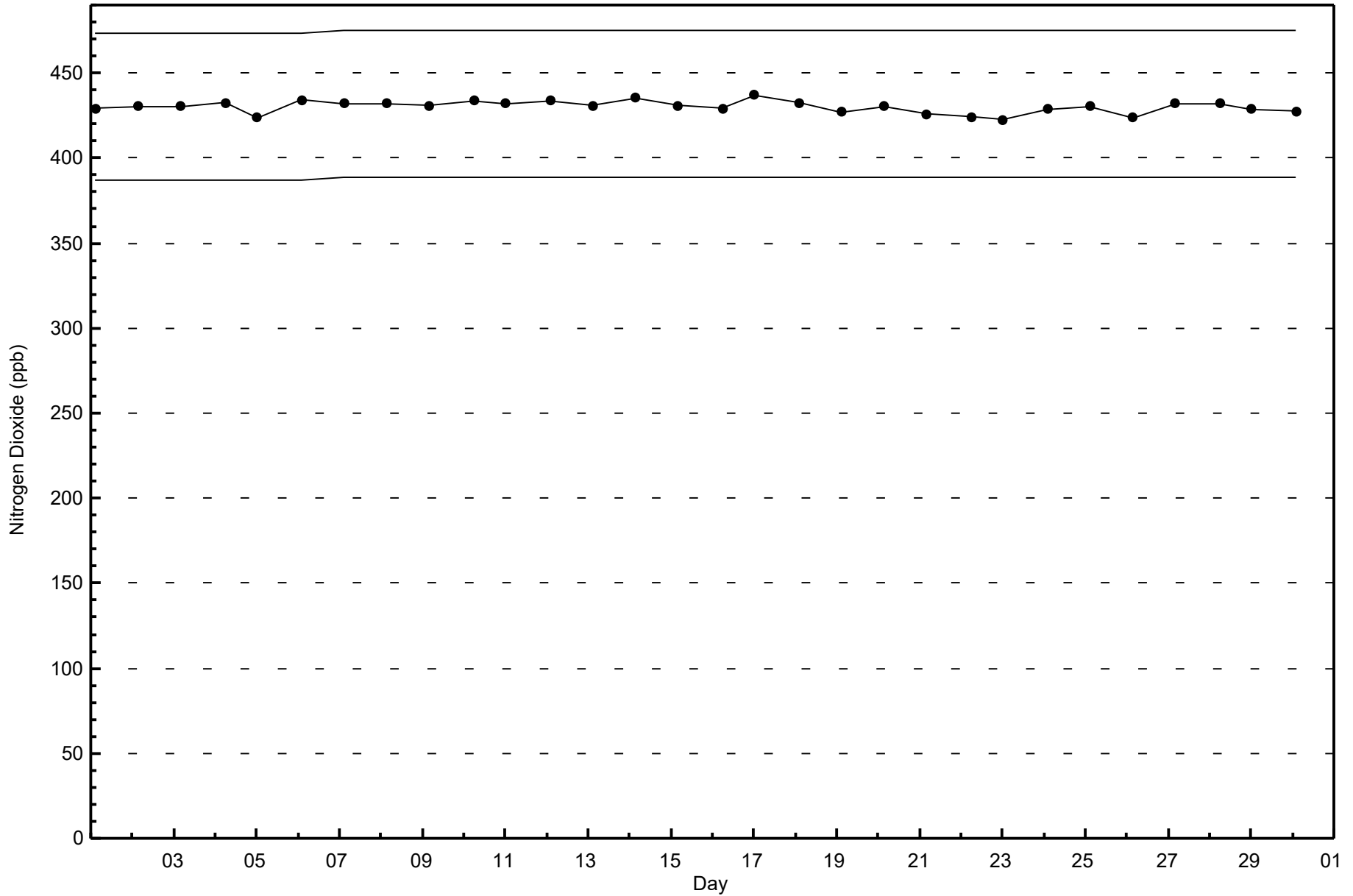


Wood Buffalo Environmental Association  
Wind Rose Nov 2023

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









Wood Buffalo Environmental Association

Summary of Hour Averages

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

Buffalo Viewpoint - November 2023

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 115.9 ppb on Nov 27 03:00	Maximum Daily Average: 15.1 ppb on Nov 3		Hours of Data:	684
Minimum Value: 0.1 ppb on Nov 6 01:00	Minimum Daily Average: 0.4 ppb on Nov 28		Hours of Missing Data:	36
Maximum Diurnal Average: 9.0 ppb at hour 3	Minimum Diurnal Average: 3.1 ppb at hour 14		Hours of Calibration:	35
Monthly Average: 5.76 ppb	Percentiles: P <sub>1</sub> = 0.2 P <sub>10</sub> = 0.5 Q <sub>1</sub> = 1.0 Median = 3.3 Q <sub>3</sub> = 7.3 P <sub>90</sub> = 13.0 P <sub>99</sub> = 41.1		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-Nov	8.3	8.2	Z	7.5	6.9	9.6	8.2	7.5	11.9	12.8	6.0	7.5	5.5	3.9	4.8	4.3	5.7	6.1	6.1	3.3	0.8	0.8	1.0	0.8	6.0	12.8	
2-Nov	1.7	4.1	1.7	Z	13.1	10.4	14.6	5.2	4.1	6.8	6.9	7.4	2.3	2.6	1.9	1.6	1.9	2.5	4.4	4.4	7.7	8.6	6.2	9.0	5.6	14.6	
3-Nov	6.4	1.8	1.4	6.4	Z	1.2	1.2	2.4	4.3	4.7	10.6	13.1	10.6	11.5	12.4	10.4	12.4	29.4	40.9	38.8	34.7	36.4	33.0	24.5	15.1	40.9	
4-Nov	12.1	14.3	11.0	10.3	18.1	Z	25.1	26.1	12.4	21.1	16.2	10.4	8.0	10.5	8.7	10.3	9.0	8.2	10.3	7.0	9.5	10.1	2.4	2.3	11.9	26.1	
5-Nov	Z	5.5	3.4	2.3	1.8	1.9	3.2	6.2	7.8	6.0	3.8	7.2	7.5	7.1	10.4	13.5	16.3	12.8	13.2	11.6	14.2	9.7	10.7	1.6	7.7	16.3	
6-Nov	0.1	Z	0.4	0.2	0.5	0.7	0.7	C	C	C	C	C	2.0	1.9	2.6	2.6	3.5	3.8	3.5	2.7	2.3	2.7	3.1	3.3	2.0	3.8	
7-Nov	3.3	2.0	Z	1.7	1.7	1.3	1.5	2.2	3.3	4.9	4.9	3.9	1.9	1.2	1.1	1.0	1.2	1.1	1.9	1.4	1.4	2.0	1.8	1.5	2.1	4.9	
8-Nov	1.1	0.8	1.3	Z	2.0	1.8	1.7	1.6	1.2	0.7	0.9	0.8	0.8	1.0	0.7	0.8	0.9	0.8	0.6	0.4	0.3	6.8	11.1	7.7	2.0	11.1	
9-Nov	1.7	1.0	0.3	0.8	Z	1.0	1.1	4.9	8.6	4.0	0.4	0.3	1.2	2.2	3.8	7.0	4.9	5.8	4.2	3.1	3.2	3.0	1.7	1.3	2.8	8.6	
10-Nov	1.1	1.8	1.8	2.3	2.8	Z	5.1	4.6	5.7	5.6	4.1	4.0	3.9	3.3	4.0	3.5	4.2	4.1	3.3	1.8	1.6	2.4	2.3	2.1	3.3	5.7	
11-Nov	Z	1.8	3.0	2.8	3.3	2.8	4.6	4.8	5.7	2.8	2.4	2.0	1.5	1.9	2.1	3.1	3.3	2.9	4.7	2.9	3.9	5.8	5.4	2.6	3.3	5.8	
12-Nov	3.0	Z	4.3	3.4	1.5	0.9	0.7	0.6	0.6	0.6	0.6	0.6	0.3	0.2	0.3	0.2	0.2	0.5	0.6	0.4	0.2	1.0	9.3	41.9	51.3	5.3	51.3
13-Nov	3.9	2.9	Z	9.1	16.2	15.2	17.9	11.0	7.1	6.2	2.5	1.8	1.3	2.3	3.5	6.0	8.3	5.6	4.3	2.8	13.7	17.7	20.5	16.9	8.6	20.5	
14-Nov	28.4	42.9	29.1	Z	6.2	3.1	0.9	2.3	5.7	2.8	1.9	1.8	0.9	1.0	0.9	1.3	1.1	4.4	1.5	0.7	3.7	5.6	4.1	2.0	6.6	42.9	
15-Nov	4.6	4.7	9.4	20.2	Z	5.7	3.8	4.8	5.4	8.8	20.1	9.3	4.5	4.3	0.3	0.5	5.5	3.8	0.5	7.9	2.7	0.6	1.4	1.0	5.6	20.2	
16-Nov	0.3	0.4	0.2	0.7	1.2	Z	4.1	5.6	2.9	2.6	3.6	3.4	3.1	3.9	3.0	3.1	5.3	4.8	4.4	6.0	2.2	0.6	0.4	0.6	2.7	6.0	
17-Nov	Z	0.6	0.7	0.6	0.7	0.8	0.6	0.7	0.7	0.9	1.4	1.0	1.1	0.5	1.3	1.4	2.9	0.9	3.4	9.3	17.8	17.4	14.2	16.6	4.1	17.8	
18-Nov	9.8	Z	3.8	4.1	3.9	3.8	3.3	3.6	4.4	5.6	5.3	3.7	3.9	2.9	3.6	3.4	4.8	6.3	6.0	8.4	10.3	12.2	12.4	10.3	5.9	12.4	
19-Nov	10.8	8.9	Z	9.3	6.3	6.0	3.8	14.8	10.3	20.6	10.3	2.7	1.4	3.1	5.9	5.6	10.0	11.6	10.4	7.9	7.3	6.6	0.9	1.0	7.6	20.6	
20-Nov	0.9	1.1	0.3	Z	0.3	0.4	0.9	0.2	0.5	0.2	0.2	0.3	0.5	0.2	0.1	1.0	0.5	0.5	0.7	0.5	0.7	0.3	0.3	0.6	0.5	1.1	
21-Nov	12.3	20.1	22.6	6.8	Z	13.7	20.9	13.4	28.3	11.6	6.6	5.6	6.5	2.3	10.3	11.0	5.7	2.8	2.7	3.5	1.5	0.7	0.4	0.4	9.1	28.3	
22-Nov	0.2	0.4	1.0	6.3	9.3	Z	2.7	3.0	3.7	5.3	5.5	6.1	4.9	4.6	4.8	7.3	8.7	19.2	13.4	11.4	14.8	14.6	7.2	1.4	6.8	19.2	
23-Nov	Z	1.1	0.7	1.0	1.2	1.4	1.3	1.9	2.3	2.2	3.2	3.6	3.5	3.9	4.6	5.4	5.8	8.0	7.7	7.5	8.2	13.9	3.1	0.9	4.0	13.9	
24-Nov	1.1	Z	0.9	0.7	0.8	0.8	1.0	0.7	0.7	0.9	0.7	1.0	1.4	1.0	1.0	1.1	0.8	0.6	0.6	0.8	0.7	0.5	0.7	0.9	0.9	1.4	
25-Nov	0.5	0.5	Z	64.4	14.9	13.9	6.9	5.2	2.9	5.6	7.1	3.5	1.1	1.2	3.2	7.7	9.0	7.9	6.0	5.2	11.4	6.9	8.6	11.3	8.9	64.4	
26-Nov	6.3	6.0	9.5	Z	9.7	19.0	53.6	12.2	11.4	7.9	6.8	6.0	5.6	4.7	5.7	5.8	5.4	6.4	7.1	9.2	9.2	9.2	13.0	7.3	10.3	53.6	
27-Nov	11.7	27.0	115.9	44.9	Z	6.3	2.4	2.5	3.1	2.8	2.4	2.5	3.0	3.9	4.6	3.9	4.7	1.9	0.9	0.7	0.7	0.3	0.6	0.3	10.7	115.9	
28-Nov	0.3	0.3	0.3	0.4	0.1	Z	0.4	0.3	M	0.6	0.4	0.5	0.6	0.5	0.6	0.5	0.5	0.3	0.4	0.4	0.2	0.4	0.2	0.6	0.4	0.6	
29-Nov	Z	0.7	0.6	0.5	0.6	0.7	0.3	0.3	0.5	0.5	0.9	1.0	0.7	0.9	0.8	1.1	1.0	5.7	6.2	12.7	1.4	4.3	1.2	1.6	1.9	12.7	
30-Nov	2.5	Z	0.5	0.7	0.6	1.4	4.0	7.8	5.4	8.1	14.4	20.7	12.3	4.8	3.7	10.8	13.0	17.8	17.9	15.3	14.9	14.5	17.6	18.6	9.9	20.7	

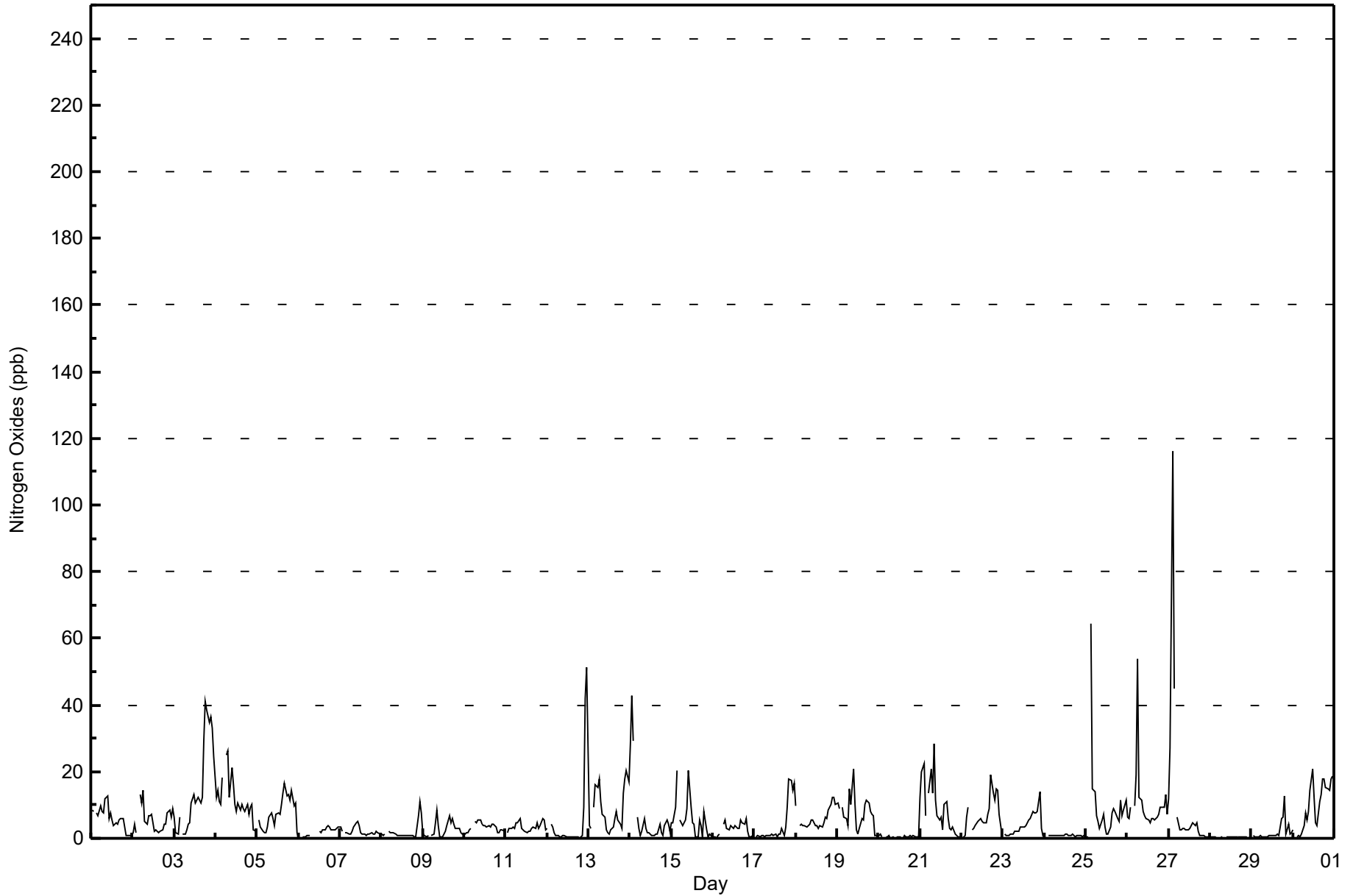
5.3	6.4	9.0	8.3	4.9	5.0	6.5	5.4	5.7	5.6	5.2	4.5	3.4	3.1	3.7	4.5	5.2	6.2	6.3	6.2	6.7	7.5	7.6	6.7	Diurnal Average	
28.4	42.9	115.9	64.4	18.1	19.0	53.6	26.1	28.3	21.1	20.1	20.7	12.3	11.5	12.4	13.5	16.3	29.4	40.9	38.8	34.7	36.4	41.9	51.3	Diurnal Maximum	

Z - zerospan      C - Calibration      M - Maintenance



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

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Buffalo Viewpoint - November 2023**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Buffalo Viewpoint - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	659	96.35	96.35
21 - 40	17	2.49	98.83
41 - 80	7	1.02	99.85
81 - 159	1	0.15	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 684

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Buffalo Viewpoint - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 20	38	32	22	18	14	26	51	153	31	24	26	59	55	24	25	10	608
21 - 40	0	2	4	1	0	4	3	0	0	0	0	0	0	0	2	1	17
11 - 80	0	1	0	1	0	0	1	0	0	0	0	0	0	0	3	1	7
81 - 159	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	<b>39</b>	<b>35</b>	<b>26</b>	<b>20</b>	<b>14</b>	<b>30</b>	<b>55</b>	<b>153</b>	<b>31</b>	<b>24</b>	<b>26</b>	<b>59</b>	<b>55</b>	<b>24</b>	<b>30</b>	<b>12</b>	<b>633</b>

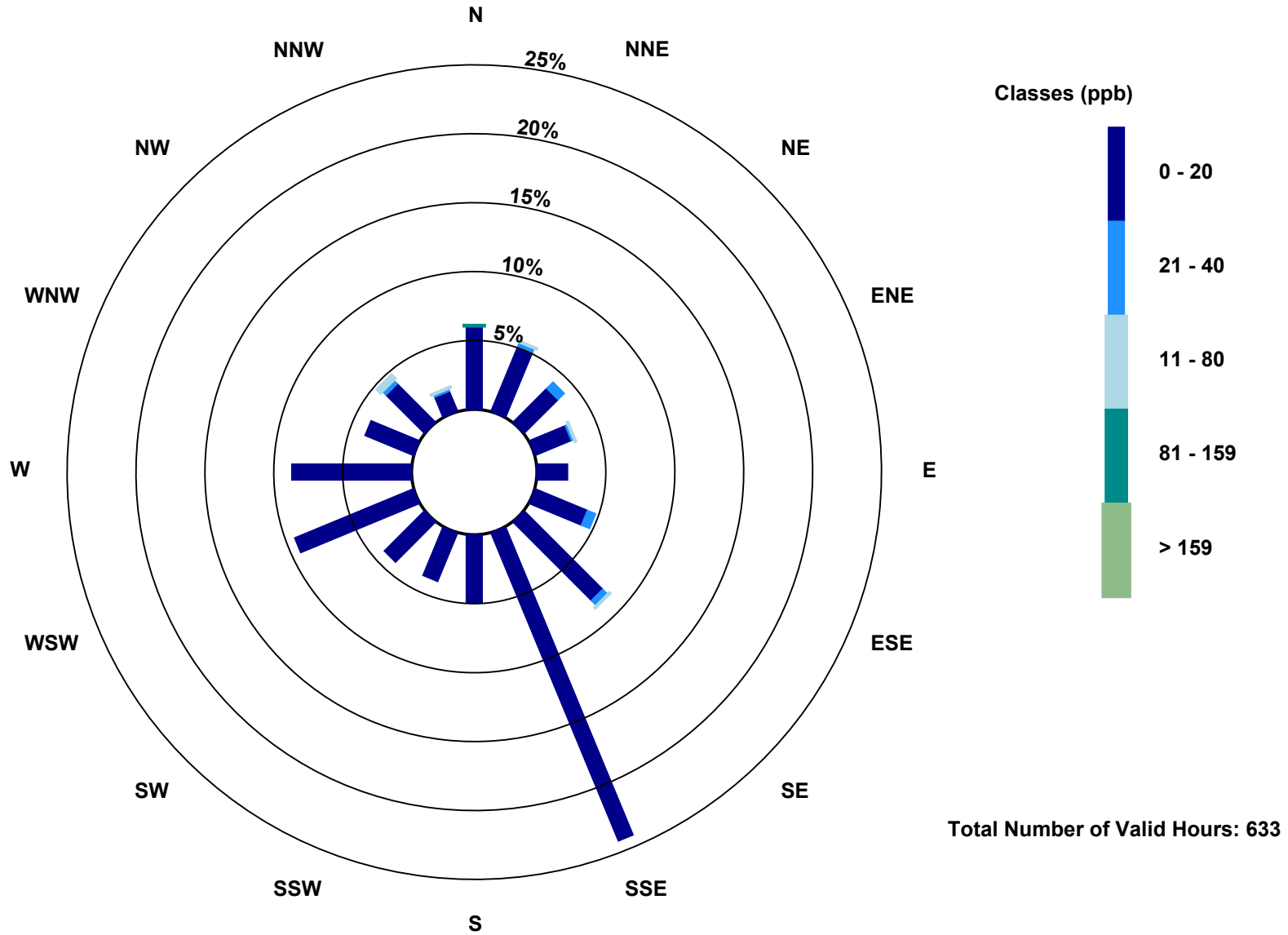
Total Number of Valid Hours: 633

Total Number of Hours: 720

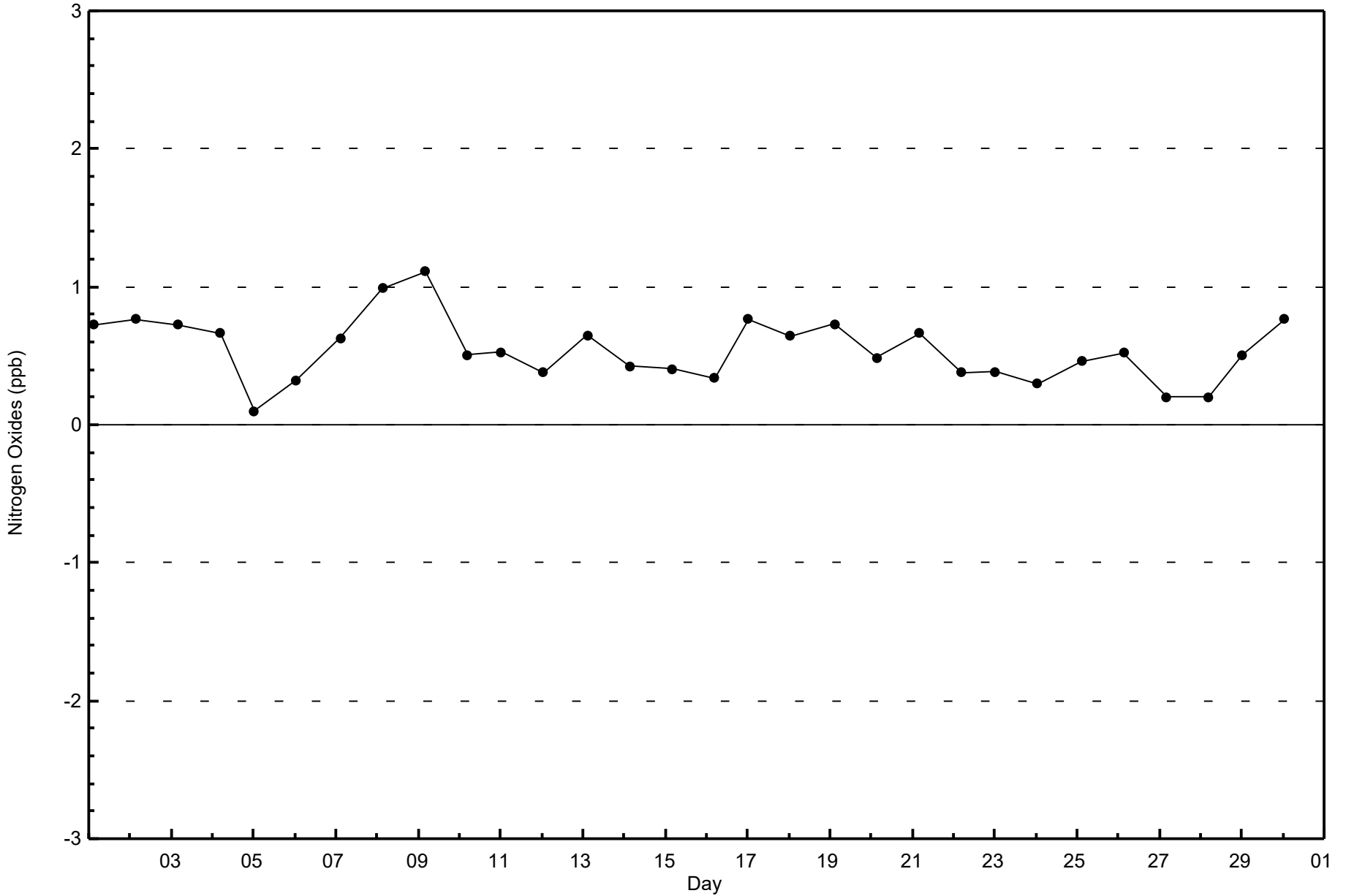


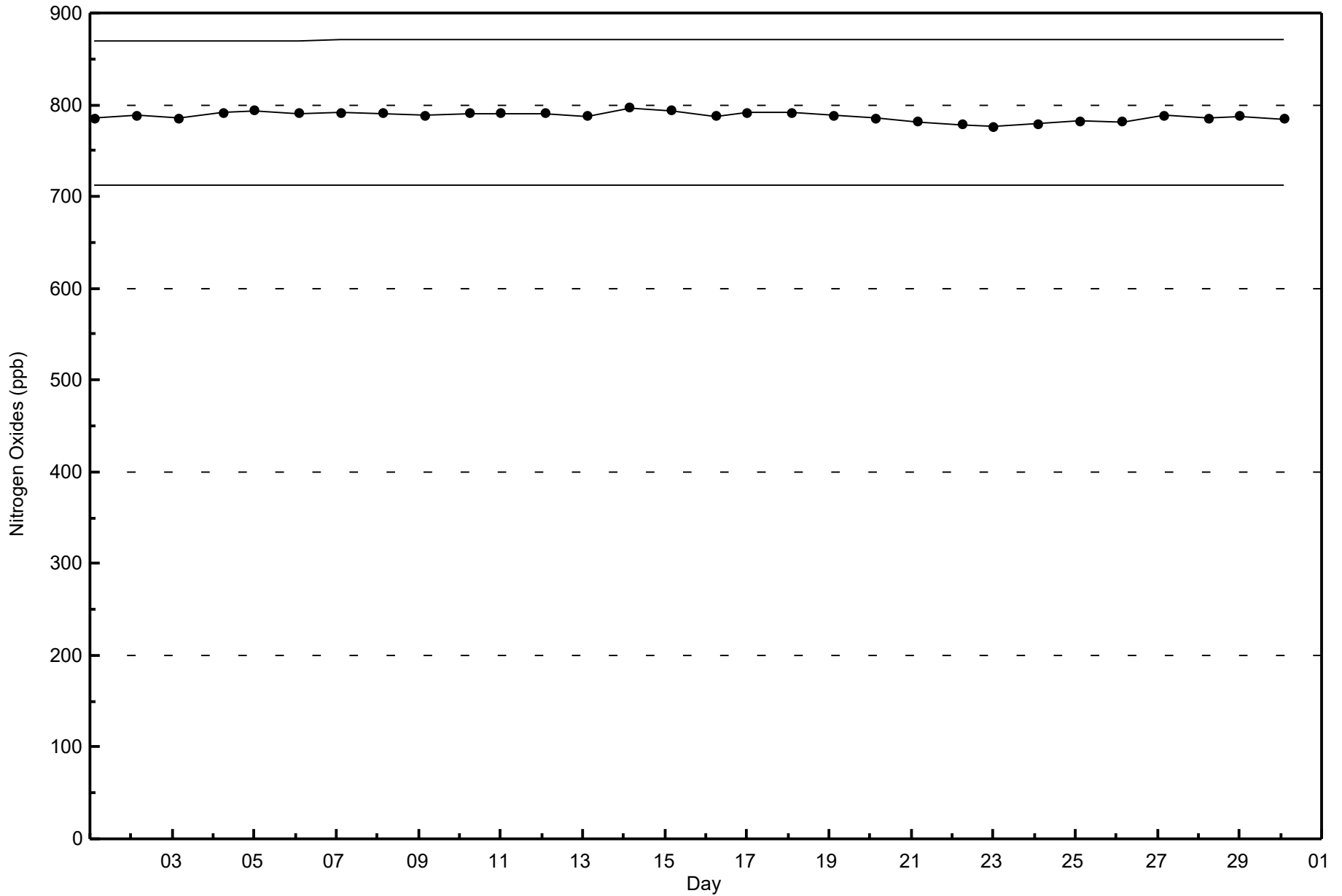
Wood Buffalo Environmental Association  
Wind Rose Nov 2023

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











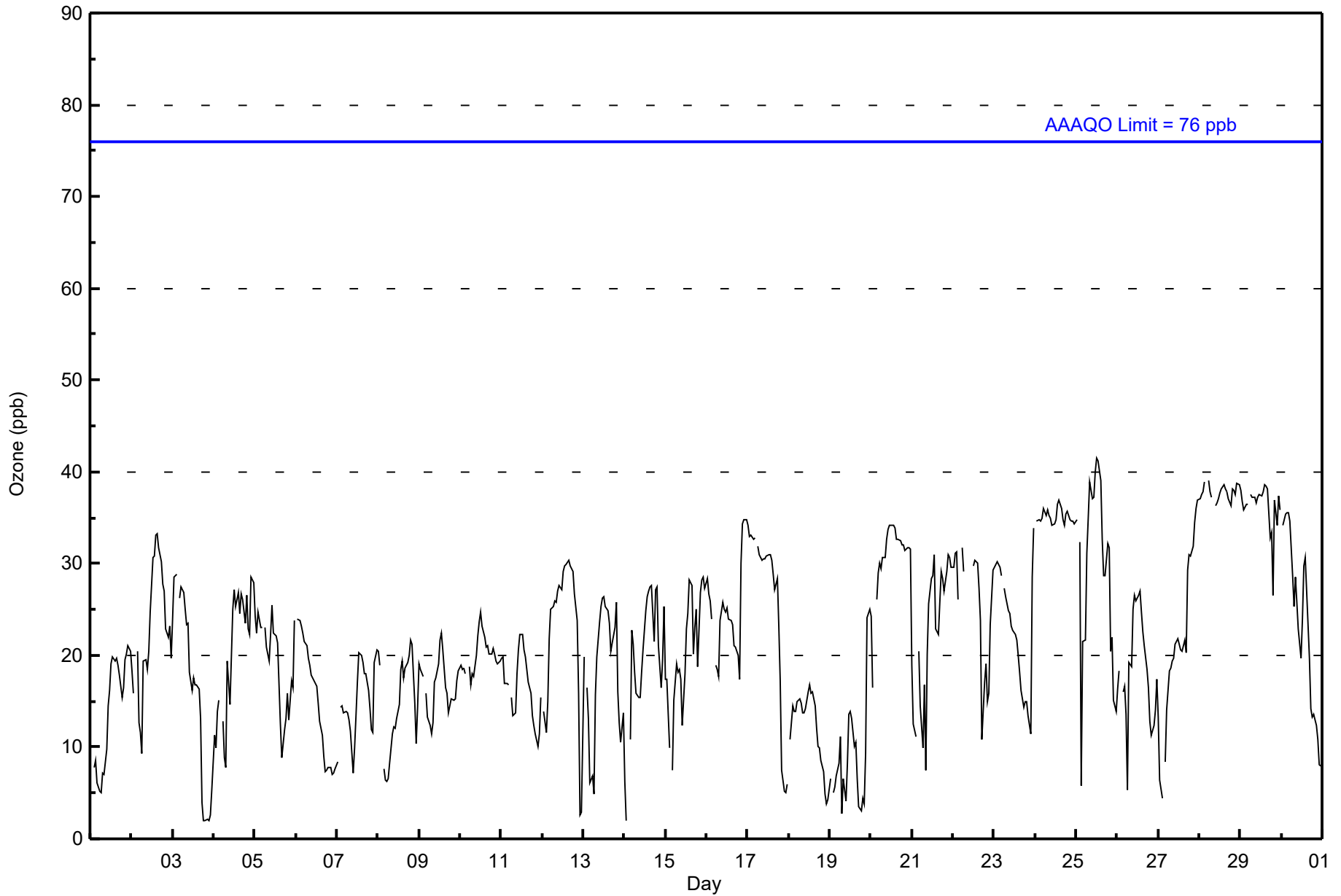
# Wood Buffalo Environmental Association

## Summary of Hour Averages

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

## Buffalo Viewpoint - November 2023

Number of Exceedences (AAAQO):		1-hr: 0	24-hr: 0																		Hours in Service:	720					
Maximum Value: 41.4 ppb on Nov 25 13:00		Maximum Daily Average: 37.7 ppb on Nov 28																	Hours of Data:	684							
Minimum Value: 2.0 ppb on Nov 14 02:00		Minimum Daily Average: 9.0 ppb on Nov 19																	Hours of Missing Data:	36							
Maximum Diurnal Average: 25.7 ppb at hour 14		Minimum Diurnal Average: 18.8 ppb at hour 22																	Hours of Calibration:	35							
Monthly Average: 21.50 ppb		Percentiles: P <sub>1</sub> = 2.7 P <sub>10</sub> = 8.6 Q <sub>1</sub> = 14.9 Median = 20.6 Q <sub>3</sub> = 28.6 P <sub>90</sub> = 34.8 P <sub>99</sub> = 38.7																	Percent Operational Time:	99.9							
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Nov	6.6	Z	7.7	8.5	6.1	5.1	5.1	7.1	7.0	9.8	14.4	16.2	19.1	19.8	19.3	19.8	18.9	17.8	15.4	16.4	19.6	20.1	21.1	20.4	14.0	21.1	
2-Nov	18.3	15.8	Z	20.4	12.7	11.7	9.4	19.4	19.5	18.5	20.4	24.7	30.7	30.8	33.0	33.2	31.8	30.2	27.7	27.0	22.8	22.0	23.2	19.6	22.7	33.2	
3-Nov	24.0	28.5	28.9	Z	26.3	27.5	26.8	25.1	23.4	23.4	18.2	16.2	17.6	16.8	16.7	16.3	13.2	4.0	2.1	2.0	2.1	2.0	2.5	5.3	16.0	28.9	
4-Nov	11.2	9.9	13.9	15.1	Z	12.8	8.8	7.7	19.4	14.6	19.9	25.0	27.2	25.2	26.8	24.5	26.7	26.1	23.5	26.6	22.8	22.2	28.6	28.0	20.3	28.6	
5-Nov	24.2	22.4	24.8	23.1	Z	23.1	Z	23.0	20.9	19.4	22.3	25.4	22.5	22.1	21.3	16.9	12.5	8.9	11.9	13.0	15.9	12.9	17.2	16.5	23.8	19.3	25.4
6-Nov	Z	23.9	23.7	23.2	22.5	21.5	21.0	19.6	18.9	17.8	17.5	16.9	16.7	14.7	12.8	11.3	9.0	7.3	7.5	7.7	7.7	7.1	7.2	7.6	14.9	23.9	
7-Nov	8.5	Z	14.3	14.5	13.8	13.9	13.7	12.9	11.7	7.1	9.9	13.5	17.2	20.2	19.9	19.2	18.1	18.0	16.2	14.2	11.8	11.6	19.2	20.6	14.8	20.6	
8-Nov	20.5	19.0	Z	7.6	6.4	6.2	6.6	8.3	11.4	12.1	12.0	13.2	14.6	18.4	19.4	17.5	18.6	19.2	20.0	21.6	21.2	14.9	10.3	14.3	14.5	21.6	
9-Nov	19.1	18.5	17.7	Z	15.9	13.3	12.4	11.4	12.7	17.1	17.5	19.1	21.7	22.4	20.6	16.4	15.9	13.7	14.4	15.3	15.1	15.2	17.2	18.4	16.6	22.4	
10-Nov	19.0	18.5	18.6	18.0	Z	18.8	16.8	18.1	17.7	20.0	22.1	23.6	24.7	23.2	22.0	21.0	21.0	20.2	20.1	20.7	20.2	19.4	19.1	19.3	20.1	24.7	
11-Nov	19.7	19.9	16.9	16.9	16.8	Z	15.4	13.5	13.7	18.1	20.5	22.2	22.2	20.7	19.8	18.5	17.1	15.9	13.4	12.4	11.5	10.0	11.4	15.3	16.6	22.2	
12-Nov	Z	13.9	11.7	14.9	21.8	25.0	25.3	25.9	25.8	27.0	27.6	27.2	29.2	29.8	29.9	30.4	29.8	29.4	29.2	26.7	23.8	15.9	2.6	2.8	22.9	30.4	
13-Nov	19.8	Z	16.5	13.2	6.0	6.9	4.9	15.7	19.9	23.7	25.3	26.2	26.3	25.3	24.9	23.5	20.5	21.4	23.0	25.7	16.0	12.7	10.5	13.8	18.3	26.3	
14-Nov	6.2	2.0	Z	10.8	22.7	21.2	18.2	15.8	15.5	15.5	18.2	20.6	24.8	26.4	27.1	27.5	27.6	21.4	27.2	27.4	21.1	16.5	19.6	25.3	19.9	27.6	
15-Nov	17.4	17.4	9.9	Z	7.5	15.2	19.1	18.2	18.5	17.4	12.3	18.1	22.8	24.6	28.2	27.6	20.1	23.1	25.1	18.7	26.9	28.3	28.6	27.4	20.5	28.6	
16-Nov	28.4	26.7	25.9	23.9	Z	18.9	18.4	17.7	23.8	25.8	25.0	24.7	25.2	24.0	23.8	23.3	21.1	20.9	20.0	17.3	30.0	34.4	34.8	34.8	24.7	34.8	
17-Nov	34.1	32.9	33.2	32.7	32.8	Z	31.9	30.9	30.3	30.5	30.5	30.7	30.9	30.9	30.3	28.9	27.1	28.4	23.2	17.3	7.5	5.2	5.0	5.9	25.7	34.1	
18-Nov	Z	10.8	14.4	13.8	13.9	14.9	15.2	14.9	13.7	13.7	14.2	16.0	16.7	15.8	16.0	14.5	12.0	10.1	9.9	8.6	7.3	4.9	3.8	4.3	12.1	16.7	
19-Nov	6.5	Z	5.0	5.6	6.8	8.3	11.1	2.7	6.6	4.2	8.3	13.6	13.8	13.1	10.1	10.5	6.5	3.6	3.1	4.5	3.8	9.3	24.1	25.1	9.0	25.1	
20-Nov	24.2	16.5	Z	26.1	29.0	30.0	29.5	30.7	30.6	32.6	33.7	34.1	34.2	34.2	33.9	32.6	32.6	32.5	32.1	32.0	31.4	31.7	31.7	31.6	30.8	34.2	
21-Nov	18.9	12.5	11.2	Z	20.4	14.4	10.0	16.8	7.4	20.1	25.6	28.3	28.6	31.0	22.9	22.3	25.8	29.2	28.3	26.9	29.1	31.0	30.7	29.6	22.7	31.0	
22-Nov	29.6	31.1	31.3	26.1	Z	31.8	29.2	C	C	C	C	C	29.8	30.4	30.0	27.3	23.8	10.8	17.1	19.1	14.9	15.8	23.3	29.2	25.0	31.8	
23-Nov	29.6	30.0	30.2	29.6	28.7	Z	27.4	26.4	24.9	24.6	23.2	22.7	22.3	21.7	20.0	18.2	16.1	14.3	15.0	14.9	13.4	11.5	28.5	33.8	22.9	33.8	
24-Nov	Z	34.6	34.8	34.6	34.9	36.0	35.3	35.8	35.2	35.0	34.2	34.3	34.8	36.4	36.9	36.0	34.8	34.1	35.5	35.7	34.8	34.6	34.6	34.3	35.1	36.9	
25-Nov	34.8	Z	32.3	5.8	21.6	21.7	31.1	35.0	38.8	37.1	37.3	40.0	41.4	41.1	39.0	32.7	28.6	28.7	32.2	31.8	20.5	22.0	15.0	13.9	29.7	41.4	
26-Nov	16.3	18.2	Z	16.0	16.6	13.6	5.3	19.2	18.8	25.1	26.5	26.0	26.5	27.0	24.7	22.6	21.1	18.4	16.5	12.9	11.2	12.3	14.1	17.4	18.5	27.0	
27-Nov	13.3	6.5	4.4	Z	8.4	14.0	18.2	18.7	19.4	19.7	21.1	21.9	21.2	20.5	20.4	21.6	20.3	29.3	31.0	30.9	31.9	34.4	36.0	36.8	21.7	36.8	
28-Nov	37.1	37.5	37.9	38.9	Z	39.0	37.8	37.2	M	36.3	36.7	37.1	37.6	38.1	38.6	38.1	37.9	37.0	36.3	38.2	38.0	37.6	38.7	38.7	37.7	39.0	
29-Nov	38.1	36.7	35.8	36.5	36.5	Z	37.5	37.2	37.3	36.6	37.2	37.6	37.3	37.8	38.5	38.4	38.1	32.8	33.4	26.5	36.8	34.2	37.4	35.8	36.3	38.5	
30-Nov	Z	34.2	35.4	35.5	35.6	34.6	28.7	25.3	28.6	25.7	22.8	19.6	24.0	29.7	30.6	23.4	19.7	14.2	13.3	13.6	12.4	10.8	8.1	7.9	23.2	35.6	
																								Diurnal Average			
																								Diurnal Maximum			
																								Z - zerospan      C - Calibration      M - Maintenance			
																								Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 76 ppb			





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

**Ozone (O<sub>3</sub>) - ppb**  
**Buffalo Viewpoint - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	337	49.27	49.27
21 - 50	347	50.73	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 (O<sub>3</sub>) - ppb**  
**Buffalo Viewpoint - November 2023**

<b>Concentration</b> <b>Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	18	12	12	9	4	14	42	109	21	15	11	2	2	2	13	5	291
21 - 50	19	19	13	12	9	15	13	50	12	8	17	56	51	22	19	7	342
51 - 82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 83	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	37	31	25	21	13	29	55	159	33	23	28	58	53	24	32	12	633

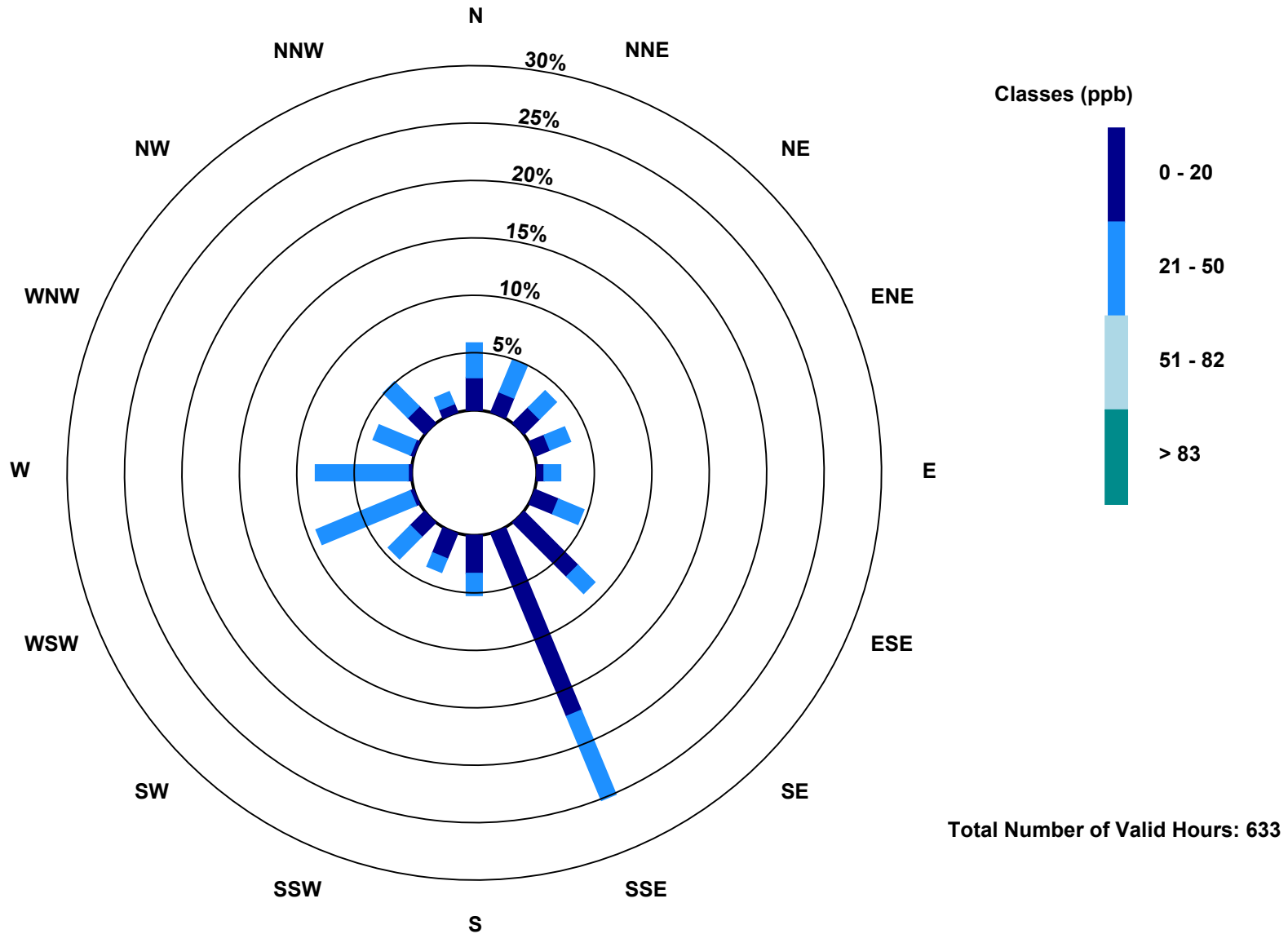
Total Number of Valid Hours: 633

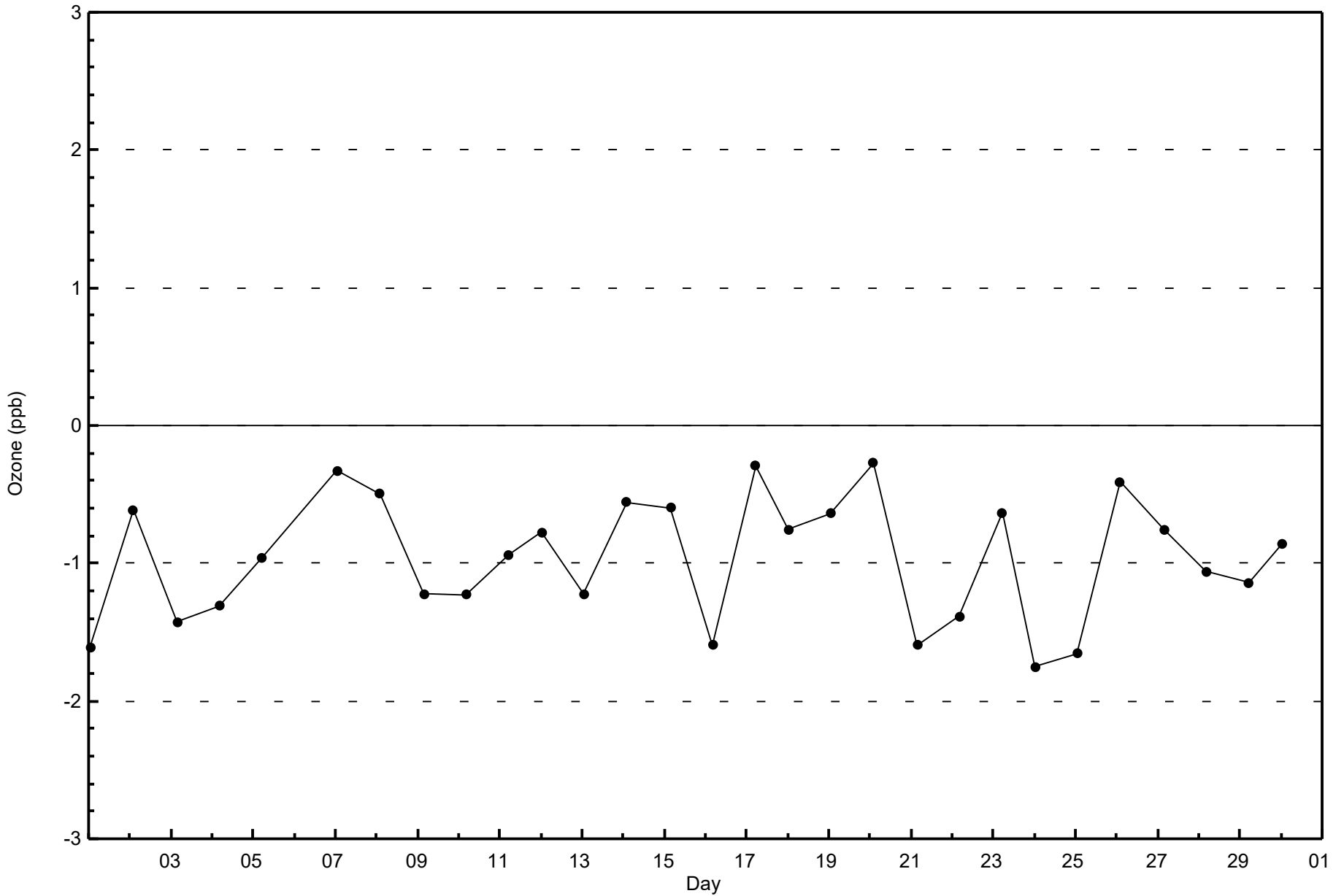
Total Number of Hours: 720



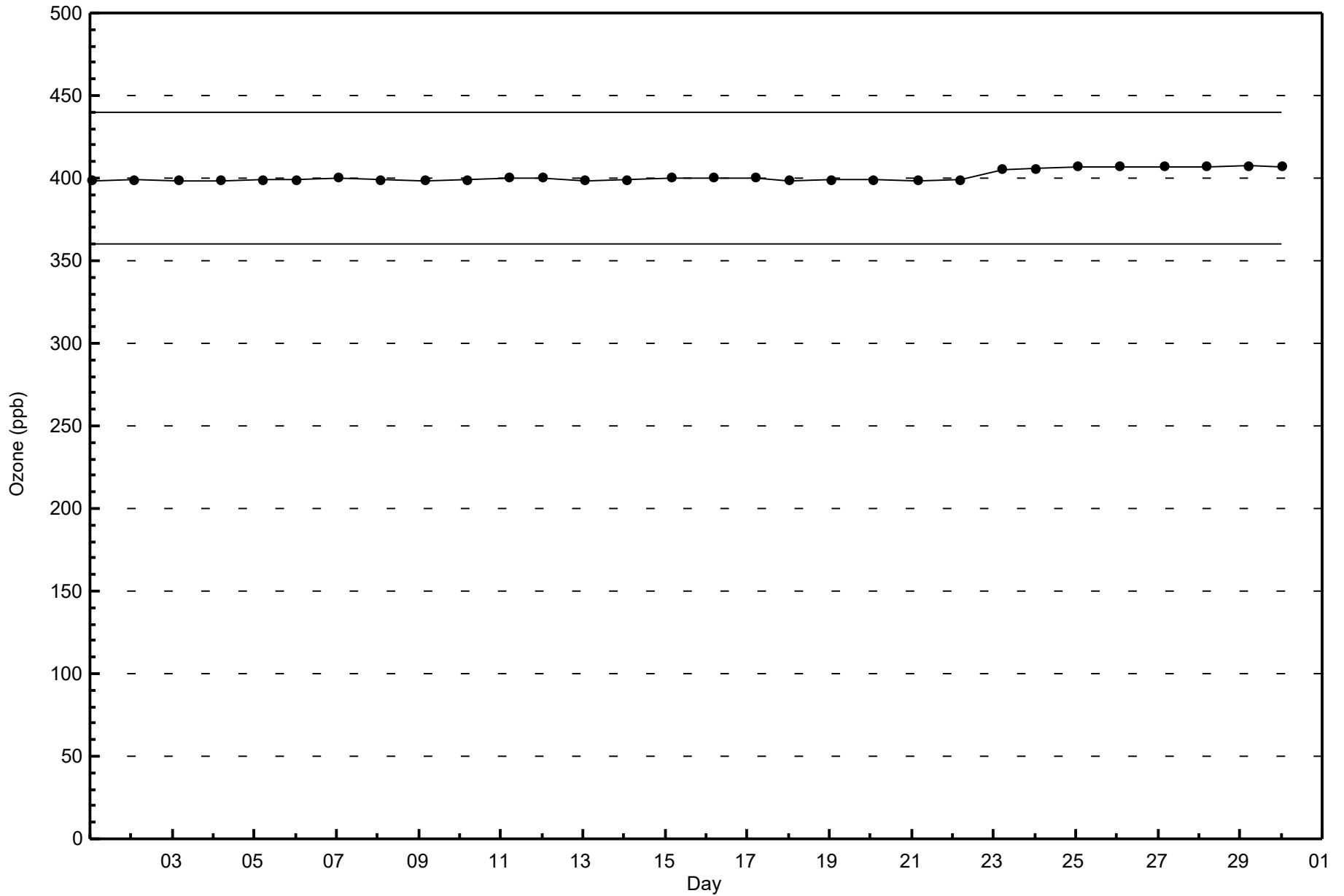
Wood Buffalo Environmental Association  
Wind Rose Nov 2023

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











Wood Buffalo Environmental Association

Summary of Hour Averages

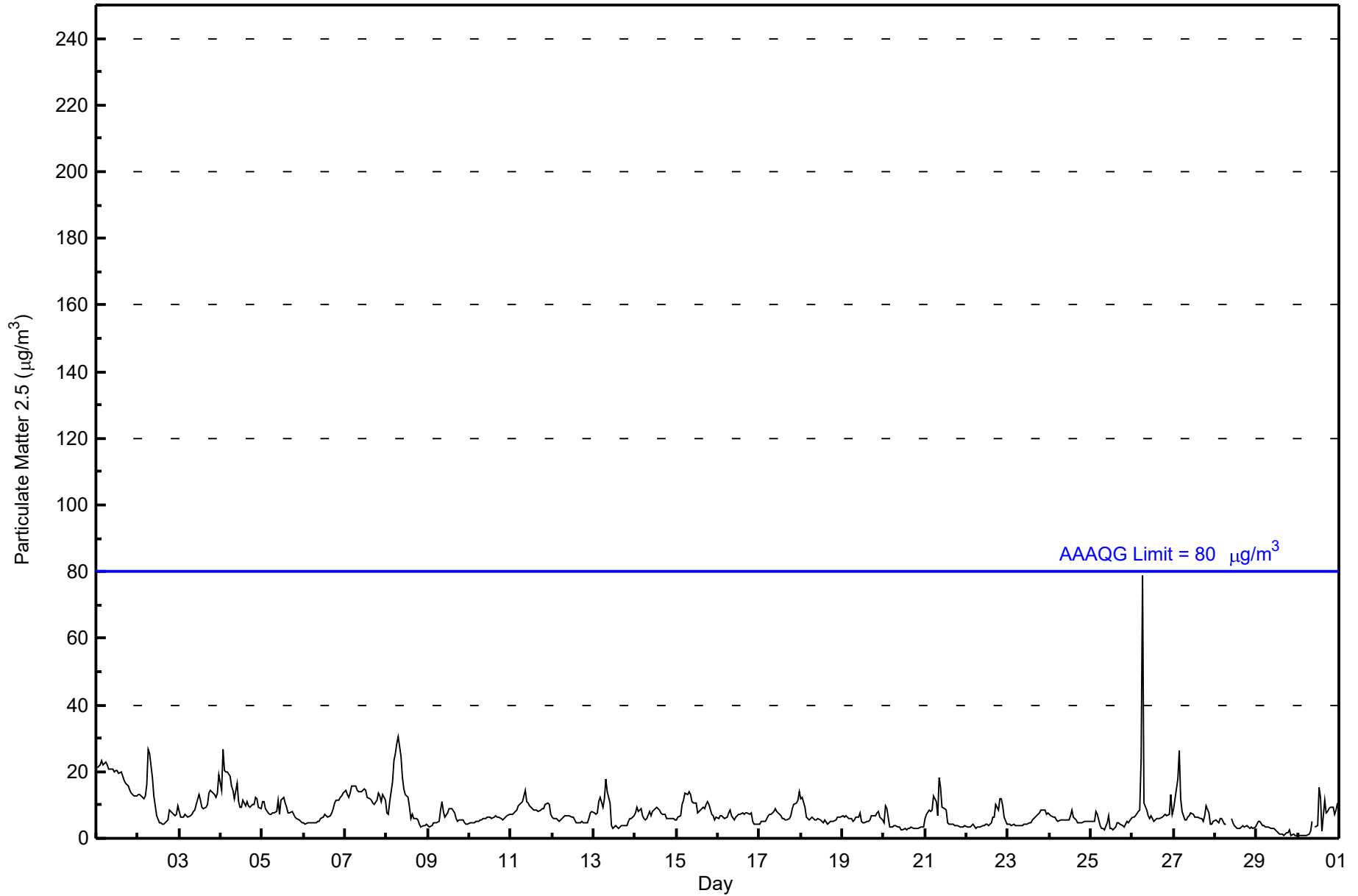
Particulate Matter 2.5 (PM<sub>2.5</sub>) - µg/m<sup>3</sup>

Buffalo Viewpoint - November 2023

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 78.8 µg/m <sup>3</sup> on Nov 26 07:00	Maximum Daily Average: 18.8 µg/m <sup>3</sup> on Nov 1		Hours of Data:	717
Minimum Value: 0.7 µg/m <sup>3</sup> on Nov 30 05:00	Minimum Daily Average: 2.5 µg/m <sup>3</sup> on Nov 29		Hours of Missing Data:	3
Maximum Diurnal Average: 11.1 µg/m <sup>3</sup> at hour 7	Minimum Diurnal Average: 6.5 µg/m <sup>3</sup> at hour 15		Hours of Calibration:	2
Monthly Average: 7.83 µg/m <sup>3</sup>	Percentiles: P <sub>1</sub> = 0.9 P <sub>10</sub> = 3.5 Q <sub>1</sub> = 4.8 Median = 6.5 Q <sub>3</sub> = 9.3 P <sub>90</sub> = 13.4 P <sub>99</sub> = 25.2		Percent Operational Time:	99.9

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Nov	21.2	21.8	22.0	23.4	21.9	23.1	21.9	20.6	20.9	20.8	19.8	20.4	20.3	19.4	20.0	18.5	17.4	16.4	15.5	14.2	13.6	13.3	12.9	12.9	18.8	23.4																						
2-Nov	13.1	13.3	12.7	11.9	12.6	16.3	26.7	25.4	18.1	12.9	9.9	6.7	4.6	4.8	4.3	4.2	4.5	5.6	8.5	7.9	7.6	6.6	7.2	9.8	10.6	26.7																						
3-Nov	8.0	6.2	6.2	7.2	6.9	6.3	6.6	7.1	8.0	8.5	10.0	12.9	11.4	9.2	8.8	9.3	10.3	13.4	14.4	13.8	13.1	12.1	13.7	19.0	10.1	19.0																						
4-Nov	14.4	26.5	20.5	20.1	19.9	18.6	15.6	14.5	12.0	16.3	10.9	9.4	9.4	11.4	9.8	10.9	9.7	9.5	10.1	10.3	12.4	11.8	9.4	9.0	13.4	26.5																						
5-Nov	10.9	11.2	8.7	7.7	7.4	7.3	7.6	7.4	8.3	11.3	7.1	11.6	12.2	10.6	9.2	7.6	7.7	7.9	7.2	6.3	6.0	5.5	5.2	4.6	8.2	12.2																						
6-Nov	4.5	4.4	4.7	4.8	4.6	4.6	4.6	4.7	4.9	5.3	5.7	6.3	7.3	6.9	6.5	6.7	7.7	8.9	10.4	11.3	11.6	12.1	12.7	13.5	7.3	13.5																						
7-Nov	14.4	13.1	12.3	13.5	15.9	15.8	15.7	14.6	14.1	13.9	14.6	14.8	14.4	12.4	11.8	11.3	10.4	10.3	11.4	13.7	12.8	11.2	13.1	11.5	13.2	15.9																						
8-Nov	7.7	7.2	11.0	17.0	23.2	25.3	28.4	30.7	24.6	18.2	14.9	13.2	12.1	9.4	5.9	7.0	6.1	6.1	5.7	4.2	3.6	3.7	3.9	4.0	12.2	30.7																						
9-Nov	4.0	3.6	3.6	4.6	4.7	4.8	4.9	8.4	10.9	8.0	6.6	7.5	8.8	8.8	8.7	7.7	5.8	5.2	5.5	5.5	5.3	4.6	4.3	4.3	6.1	10.9																						
10-Nov	4.5	4.6	4.5	4.6	4.9	5.2	5.4	5.7	5.8	5.9	6.4	6.3	6.3	6.0	6.3	6.9	6.5	6.3	6.1	5.7	5.9	6.3	6.7	7.1	5.8	7.1																						
11-Nov	7.4	7.2	7.7	8.7	9.7	10.3	10.5	11.0	14.2	10.9	10.5	9.8	8.9	8.3	8.3	8.5	8.2	8.3	8.8	8.9	10.2	10.7	10.2	7.4	9.4	14.2																						
12-Nov	6.5	6.0	6.1	5.6	5.2	5.7	6.3	6.9	6.9	6.6	6.6	6.4	6.3	5.6	4.8	4.8	4.7	5.0	4.8	4.7	4.8	5.8	7.5	8.2	5.9	8.2																						
13-Nov	7.8	7.2	7.6	11.1	12.2	9.5	12.1	17.7	14.0	10.7	3.7	3.1	3.2	3.7	3.2	3.5	3.7	3.8	3.7	3.8	5.1	5.7	6.0	6.7	7.0	17.7																						
14-Nov	7.5	9.3	8.2	8.9	7.0	5.9	5.5	5.8	8.1	6.7	8.0	8.4	9.1	9.0	8.5	7.7	7.0	7.1	6.0	5.8	5.8	6.0	5.9	5.7	7.2	9.3																						
15-Nov	5.6	6.5	6.7	10.2	11.5	13.7	13.0	13.8	13.3	10.9	10.5	10.4	7.5	7.9	8.6	9.1	8.9	10.0	11.0	10.0	7.1	6.7	5.7	6.2	9.4	13.8																						
16-Nov	5.8	6.7	6.9	6.5	6.0	6.3	7.8	8.3	6.7	5.6	6.5	6.9	7.2	7.4	7.4	7.0	7.6	7.5	7.4	7.6	5.0	4.2	4.1	4.1	6.5	8.3																						
17-Nov	4.3	5.0	5.0	5.2	5.9	6.6	7.1	7.4	8.3	8.8	8.1	7.5	6.8	6.0	5.9	5.6	5.7	6.1	6.8	9.0	10.3	10.6	11.5	13.9	7.4	13.9																						
18-Nov	11.7	12.2	9.1	6.5	5.7	5.4	6.3	6.0	5.7	5.7	6.0	5.7	5.3	4.7	5.4	4.3	4.8	5.0	5.1	5.1	5.6	6.2	6.3	6.5	6.3	12.2																						
19-Nov	6.9	6.4	6.6	6.4	6.1	6.0	5.2	5.6	6.2	6.3	7.6	4.9	4.8	4.7	4.9	4.9	5.4	6.6	6.8	6.9	7.6	7.9	6.5	5.4	6.1	7.9																						
20-Nov	4.6	9.6	9.0	3.4	3.5	3.6	3.7	3.7	3.5	3.3	2.6	2.7	3.0	2.6	2.9	3.1	3.2	3.1	3.2	3.0	3.1	3.2	3.2	3.3	3.8	9.6																						
21-Nov	5.7	7.2	8.4	7.9	8.5	12.9	10.9	6.8	18.1	15.4	9.3	9.0	8.6	4.7	4.4	4.4	4.1	3.6	3.7	3.9	3.5	3.4	3.4	3.6	7.1	18.1																						
22-Nov	3.6	3.4	3.4	3.9	4.3	3.1	3.3	3.4	3.6	3.7	4.0	4.1	4.0	3.9	4.6	6.5	6.6	10.1	8.4	11.9	12.0	9.8	6.2	4.1	5.5	12.0																						
23-Nov	4.3	4.1	4.0	4.0	3.8	3.6	3.7	3.8	4.0	4.0	4.1	4.3	4.5	4.9	5.4	6.0	6.5	7.3	7.6	8.5	8.6	8.6	7.4	7.7	5.4	8.6																						
24-Nov	7.3	6.7	6.5	6.2	5.6	5.2	5.3	5.4	5.7	5.4	5.5	5.5	6.8	8.4	6.3	5.6	4.8	4.8	4.6	4.8	4.9	5.1	5.3	5.2	5.7	8.4																						
25-Nov	5.1	5.0	5.1	8.1	7.2	3.6	3.0	2.8	2.4	4.7	6.8	3.1	2.8	2.7	3.5	4.7	4.8	4.0	3.7	3.5	4.3	5.0	4.8	6.1	4.5	8.1																						
26-Nov	6.3	6.5	6.7	8.0	8.5	23.8	78.8	10.4	8.3	6.7	5.9	6.8	5.2	5.6	6.0	6.1	6.1	6.5	6.9	7.1	6.9	7.2	13.0	7.2	10.9	78.8																						
27-Nov	8.7	12.0	17.7	26.1	11.7	8.1	5.4	5.7	6.2	7.0	7.7	7.2	6.6	6.5	6.3	6.0	6.0	5.2	6.8	9.8	7.8	4.3	4.3	4.9	8.2	26.1																						
28-Nov	5.5	5.2	4.7	5.8	6.1	4.3	4.2	C	C	5.9	4.8	3.8	3.3	3.1	3.0	3.6	3.6	3.5	3.7	3.4	3.1	3.4	3.2	3.3	4.1	6.1																						
29-Nov	4.1	5.1	5.2	4.0	3.7	3.5	3.3	3.3	3.2	3.0	2.9	2.6	1.5	1.4	1.3	1.3	0.9	1.7	1.5	2.4	0.9	1.1	1.0	0.9	2.5	5.2																						
30-Nov	1.0	0.9	0.7	0.8	0.7	0.8	1.1	1.9	5.0	M	3.3	3.8	15.3	12.4	2.2	11.4	7.8	7.9	8.9	9.4	9.1	7.4	8.6	10.7	5.7	15.3																						
																								7.4	8.1	8.1	8.7	8.5	9.0	11.1	9.3	9.3	8.7	7.7	7.5	7.6	7.1	6.5	6.8	6.6	6.9	7.1	7.4	7.3	7.0	7.1	7.2	Diurnal Average
																								21.2	26.5	22.0	26.1	23.2	25.3	78.8	30.7	24.6	20.8	19.8	20.4	20.3	19.4	20.0	18.5	17.4	16.4	15.5	14.2	13.6	13.3	13.7	19.0	Diurnal Maximum

C - Calibration M - Maintenance  
 Alberta Ambient Air Quality Guideline/Objectives: 1-hr 80 µg/m<sup>3</sup> 24-hr 29 µg/m<sup>3</sup>





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$   
Buffalo Viewpoint - November 2023**

<b>Concentration Ranges (<math>\mu\text{g}/\text{m}^3</math>)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	244	34.03	34.03
6 - 15	426	59.41	93.44
16 - 25	41	5.72	99.16
26 - 80	6	0.84	100.00
> 81.0	0	0.00	100.00

Total Number of Valid Hours: 717

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$   
Buffalo Viewpoint - November 2023**

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	
0 - 5	20	22	8	0	1	3	12	31	4	4	5	31	36	19	18	6	220
6 - 15	15	14	15	18	12	23	38	124	26	18	24	28	20	7	14	6	402
16 - 25	4	0	2	3	1	4	6	10	3	2	1	0	0	0	2	0	38
26 - 80	1	0	1	1	0	0	1	0	0	0	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
<b>Totals</b>	40	36	26	22	14	30	57	165	33	24	30	59	56	26	34	12	664

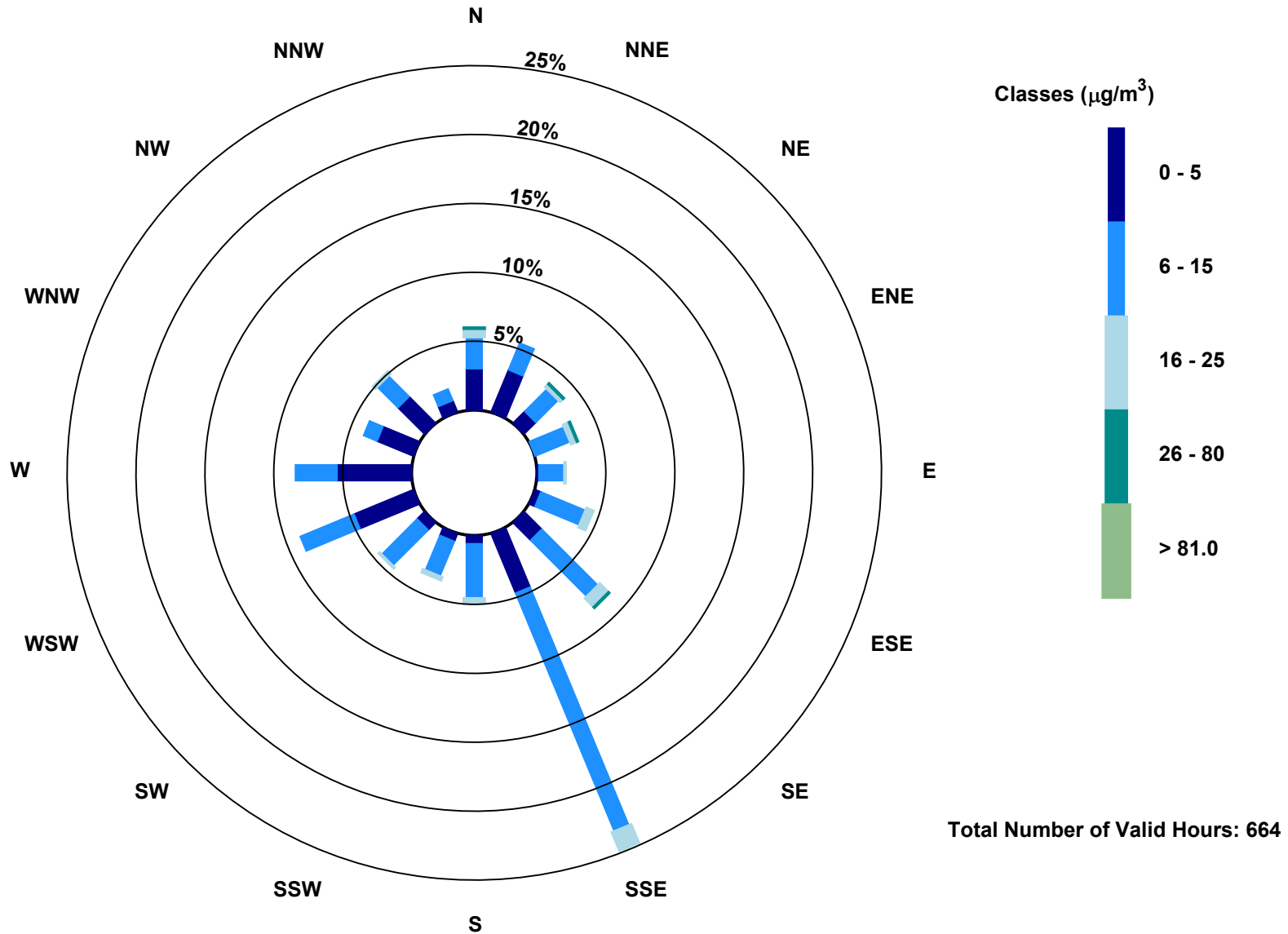
Total Number of Valid Hours: 664

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 2023

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

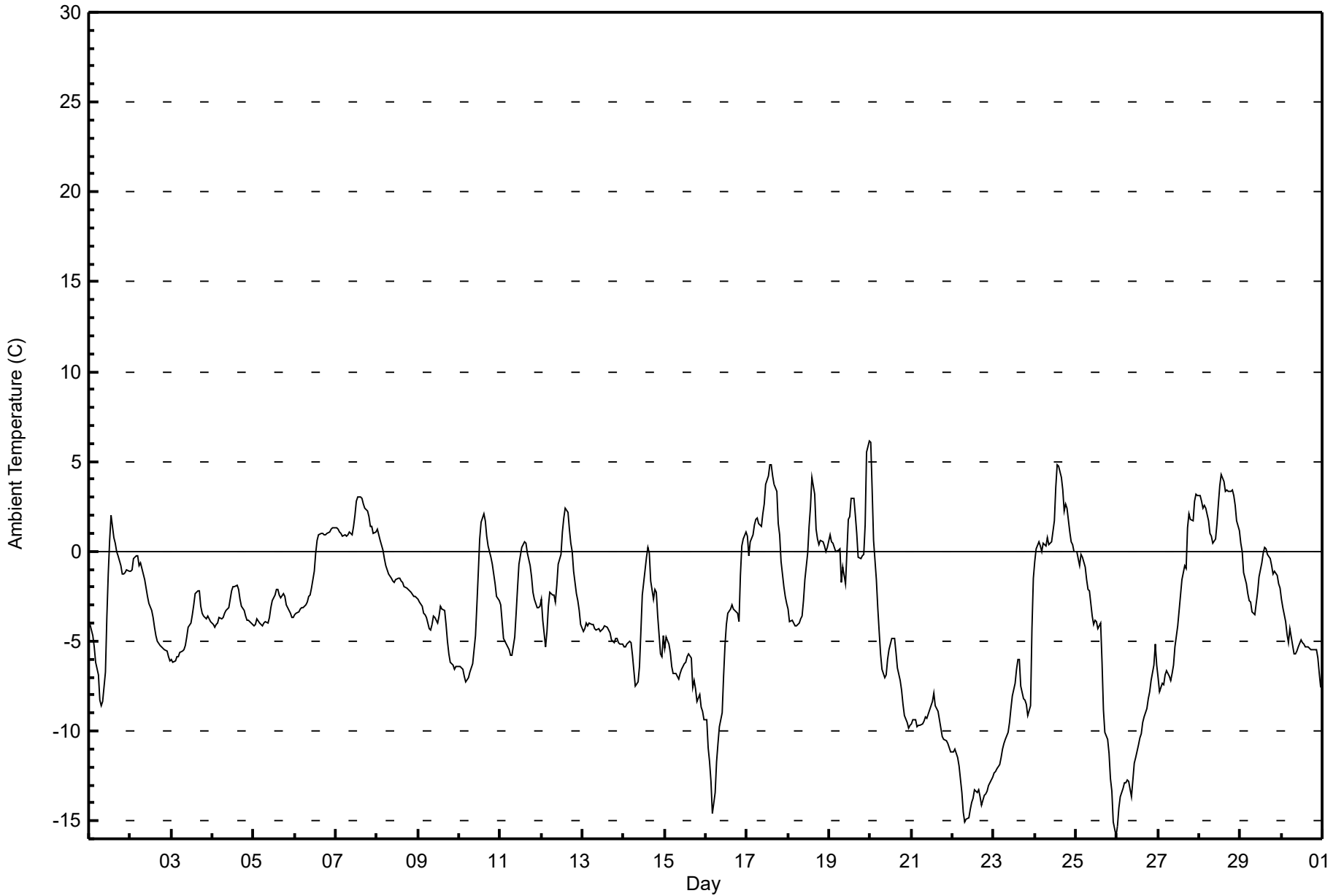




**Wood Buffalo Environmental Association**  
**Summary of Hour Averages**

**Ambient Temperature (AT) - C**  
**Buffalo Viewpoint - November 2023**

Maximum Value: 6.2 C on Nov 20 00:00      Maximum Daily Average: 2.5 C on Nov 28																				Hours in Service: 720 Hours of Data: 720						
Minimum Value: -15.8 C on Nov 26 00:00      Minimum Daily Average: -13.3 C on Nov 22 Maximum Diurnal Average: -1.7 C at hour 15      Minimum Diurnal Average: -5.0 C at hour 8 Monthly Average: -3.60 C      Percentiles: P <sub>1</sub> = -14.5 P <sub>10</sub> = -9.7 Q <sub>1</sub> = -6.0 Median = -3.4 Q <sub>3</sub> = -0.1 P <sub>90</sub> = 1.6 P <sub>99</sub> = 4.3																				Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	-4.1	-4.3	-4.7	-5.3	-6.2	-6.9	-8.3	-8.6	-8.3	-6.7	-3.7	-1.3	0.6	2.0	0.8	0.4	0.0	-0.3	-0.8	-1.2	-1.3	-1.2	-1.0	-1.1	-3.0	2.0
2-Nov	-1.1	-1.1	-0.4	-0.3	-0.2	-0.8	-0.7	-0.9	-1.5	-2.0	-2.5	-2.9	-3.3	-3.7	-4.2	-4.7	-5.0	-5.2	-5.3	-5.4	-5.4	-5.5	-5.9	-6.1	-3.1	-0.2
3-Nov	-6.1	-6.2	-6.1	-5.9	-5.9	-5.6	-5.5	-5.4	-5.2	-4.8	-4.2	-4.0	-3.5	-3.0	-2.3	-2.2	-2.2	-3.1	-3.4	-3.6	-3.7	-3.6	-3.8	-3.9	-4.3	-2.2
4-Nov	-4.1	-4.2	-4.1	-4.0	-3.7	-3.7	-3.7	-3.5	-3.3	-3.1	-2.7	-2.2	-1.9	-1.9	-1.9	-2.1	-2.6	-3.1	-3.3	-3.6	-3.8	-3.9	-3.9	-4.0	-3.3	-1.9
5-Nov	-4.1	-4.1	-3.8	-4.0	-4.1	-4.1	-4.0	-3.9	-4.0	-3.7	-3.1	-2.7	-2.4	-2.2	-2.2	-2.4	-2.6	-2.3	-2.5	-3.0	-3.1	-3.5	-3.7	-3.7	-3.3	-2.2
6-Nov	-3.5	-3.5	-3.4	-3.3	-3.1	-3.1	-3.0	-2.8	-2.5	-2.5	-2.1	-1.1	-0.1	0.6	0.9	1.0	1.0	0.9	0.9	1.0	1.1	1.2	1.3	1.3	-0.9	1.3
7-Nov	1.3	1.2	1.0	1.0	0.9	0.9	0.8	0.9	1.1	0.9	1.3	2.0	2.8	3.0	3.1	2.9	2.6	2.4	2.2	2.0	1.4	1.4	1.0	1.1	1.6	3.1
8-Nov	1.2	0.9	0.6	0.0	-0.4	-0.8	-1.0	-1.2	-1.5	-1.6	-1.7	-1.6	-1.5	-1.5	-1.6	-1.8	-1.9	-2.1	-2.1	-2.2	-2.3	-2.5	-2.5	-2.6	-1.3	1.2
9-Nov	-2.7	-2.8	-3.1	-3.5	-3.5	-3.7	-4.3	-4.4	-4.1	-3.6	-3.7	-4.0	-3.6	-3.1	-3.2	-3.3	-4.1	-5.0	-5.7	-6.2	-6.3	-6.6	-6.4	-6.4	-4.3	-2.7
10-Nov	-6.4	-6.5	-6.6	-6.9	-7.3	-7.0	-6.7	-6.5	-6.3	-4.7	-3.0	-1.2	0.7	1.7	2.1	1.7	0.9	0.3	-0.3	-0.8	-1.3	-1.8	-2.5	-2.8	-3.0	2.1
11-Nov	-3.0	-3.9	-4.9	-5.2	-5.4	-5.4	-5.8	-5.8	-4.8	-3.5	-2.0	-0.7	0.2	0.4	0.5	0.5	-0.1	-0.8	-1.4	-2.3	-2.7	-3.2	-3.1	-3.1	-2.7	0.5
12-Nov	-2.7	-3.8	-5.3	-4.4	-3.1	-2.2	-2.5	-2.4	-2.8	-1.9	-0.7	-0.2	1.1	1.9	2.4	2.2	1.2	0.5	-0.1	-1.1	-2.4	-2.8	-3.3	-4.1	-1.5	2.4
13-Nov	-4.5	-4.3	-4.0	-4.2	-4.0	-4.1	-4.1	-4.3	-4.4	-4.3	-4.4	-4.4	-4.3	-4.1	-4.2	-4.4	-4.6	-5.0	-5.1	-4.9	-4.9	-5.1	-5.2	-5.2	-4.5	-4.0
14-Nov	-5.3	-5.3	-5.2	-5.0	-5.1	-5.8	-6.6	-7.5	-7.3	-6.4	-4.5	-2.4	-1.0	-0.3	0.2	-0.1	-1.7	-2.7	-2.1	-2.3	-3.6	-5.7	-5.9	-4.7	-4.0	0.2
15-Nov	-5.4	-4.8	-5.2	-5.7	-6.4	-6.8	-6.8	-6.9	-7.1	-6.8	-6.6	-6.3	-6.2	-5.9	-5.7	-6.0	-7.6	-7.2	-7.7	-8.3	-7.9	-8.6	-8.9	-9.4	-6.8	-4.8
16-Nov	-9.4	-10.9	-11.7	-12.8	-14.6	-13.5	-11.7	-10.7	-9.8	-9.0	-7.0	-5.2	-4.0	-3.5	-3.2	-3.0	-3.2	-3.3	-3.5	-3.9	-1.4	0.3	0.7	1.1	-6.4	1.1
17-Nov	0.8	-0.2	0.5	0.9	1.5	1.7	1.9	1.5	1.4	2.1	2.6	3.7	4.2	4.8	4.8	4.2	3.7	3.4	1.6	0.9	-0.5	-1.9	-2.5	-2.9	1.6	4.8
18-Nov	-3.2	-3.9	-3.8	-4.0	-4.2	-4.1	-4.0	-3.8	-3.6	-2.8	-1.6	-0.1	1.4	2.4	4.1	3.2	1.3	0.7	0.4	0.6	0.6	0.3	0.0	0.2	-1.0	4.1
19-Nov	0.9	0.6	0.5	0.2	0.0	0.1	0.2	-1.7	-0.8	-1.8	0.0	1.8	1.9	3.0	3.0	2.0	1.0	-0.3	-0.4	-0.2	-0.1	1.4	5.5	6.2	0.9	6.2
20-Nov	6.1	3.4	0.6	-1.6	-3.1	-4.5	-5.7	-6.5	-7.0	-6.9	-6.0	-5.4	-4.8	-4.8	-4.9	-5.6	-6.5	-7.2	-7.7	-8.5	-9.2	-9.5	-9.9	-9.7	-5.2	6.1
21-Nov	-9.6	-9.3	-9.4	-9.8	-9.7	-9.7	-9.6	-9.4	-9.2	-9.3	-9.0	-8.6	-8.3	-7.9	-8.6	-8.9	-9.4	-9.9	-10.3	-10.4	-10.5	-10.7	-10.9	-11.2	-9.6	-7.9
22-Nov	-11.2	-11.0	-11.2	-11.5	-12.0	-13.4	-14.5	-15.0	-14.9	-14.8	-14.4	-13.9	-13.8	-13.3	-13.4	-13.3	-13.7	-14.1	-13.6	-13.5	-13.3	-13.1	-12.9	-12.5	-13.3	-11.0
23-Nov	-12.4	-12.2	-12.1	-11.9	-11.5	-11.0	-10.7	-10.5	-10.1	-9.5	-8.8	-8.0	-7.3	-6.6	-6.0	-6.0	-7.5	-8.2	-8.3	-8.5	-9.2	-8.6	-4.3	-1.5	-8.8	-1.5
24-Nov	-0.5	0.1	0.5	0.3	0.0	0.4	0.3	0.8	0.4	0.5	0.5	1.7	3.6	4.8	4.8	4.1	3.4	2.2	2.6	2.4	1.1	0.5	0.4	0.0	1.5	4.8
25-Nov	0.0	-0.4	-0.8	-0.2	-0.4	-0.9	-1.6	-2.1	-2.2	-3.6	-4.1	-3.8	-3.9	-4.3	-4.0	-6.2	-8.8	-10.1	-10.5	-11.2	-12.6	-13.4	-15.1	-15.8	-5.7	0.0
26-Nov	-15.3	-14.3	-13.7	-13.2	-12.9	-12.9	-12.7	-12.8	-13.7	-12.7	-11.8	-11.5	-10.8	-10.4	-10.1	-9.6	-9.2	-8.7	-8.2	-7.8	-7.2	-6.3	-5.2	-6.3	-10.7	-5.2
27-Nov	-7.0	-7.8	-7.4	-7.4	-6.9	-6.7	-6.9	-7.2	-6.8	-6.4	-5.3	-4.1	-3.3	-2.4	-1.6	-0.8	-0.9	1.3	2.1	1.7	1.7	2.8	3.2	3.1	-3.0	3.2
28-Nov	3.1	2.8	2.4	2.6	2.4	1.7	1.0	0.8	0.5	0.7	1.5	2.7	3.6	4.3	3.9	3.3	3.4	3.3	3.3	3.5	3.1	2.5	1.7	1.2	2.5	4.3
29-Nov	0.5	0.0	-1.2	-1.8	-2.3	-2.7	-2.8	-3.4	-3.5	-2.9	-2.3	-1.4	-0.7	-0.1	0.2	0.2	-0.1	-0.4	-0.8	-1.2	-1.1	-1.4	-1.8	-2.1	-1.4	0.5
30-Nov	-2.7	-3.1	-3.9	-4.6	-5.1	-4.3	-5.2	-5.7	-5.5	-5.3	-4.9	-5.1	-5.2	-5.3	-5.3	-5.4	-5.5	-5.4	-5.5	-5.5	-6.0	-6.8	-7.6	-5.2	-2.7	
																								Diurnal Average		
																								Diurnal Maximum		







**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C  
Buffalo Viewpoint - November 2023**

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	0	0.00	0.00
-20 - 0	551	76.53	76.53
0 - 10	169	23.47	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



**Wood Buffalo Environmental Association**

**Summary of Hour Averages**

**Relative Humidity (RH) - %**

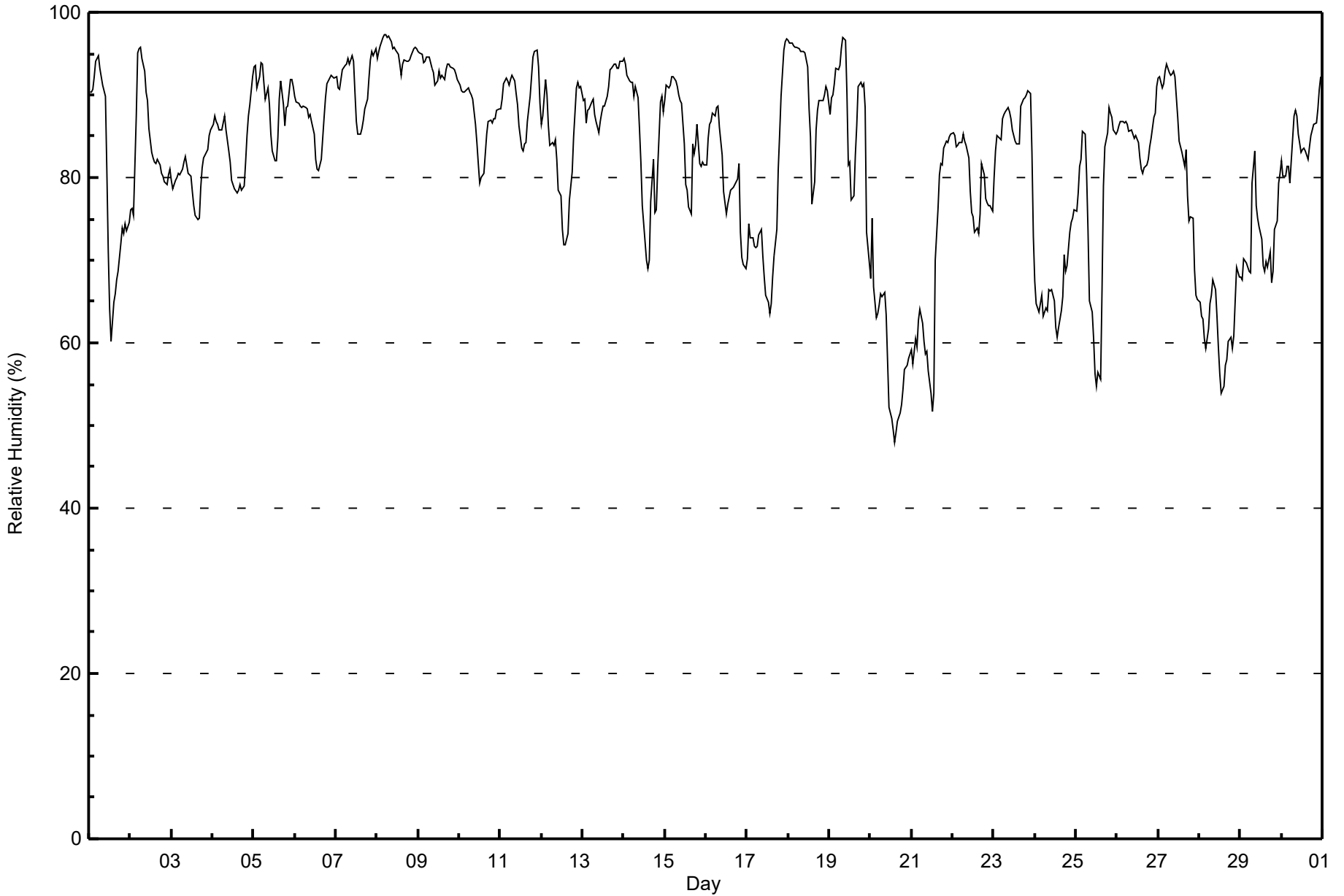
**Buffalo Viewpoint - November 2023**

<b>Maximum Value: 97.3 % on Nov 8 05:00</b>		<b>Maximum Daily Average: 95.3 % on Nov 8</b>																				<b>Hours in Service: 720</b>				
<b>Minimum Value: 47.9 % on Nov 20 15:00</b>		<b>Minimum Daily Average: 58.7 % on Nov 20</b>																				<b>Hours of Data: 720</b>				
<b>Maximum Diurnal Average: 85.1 % at hour 8</b>		<b>Minimum Diurnal Average: 75.2 % at hour 14</b>																				<b>Hours of Missing Data: 0</b>				
<b>Monthly Average: 82.02 %</b>		<b>Percentiles: P<sub>1</sub> = 52.3 P<sub>10</sub> = 65.0 Q<sub>1</sub> = 76.0 Median = 84.7 Q<sub>3</sub> = 90.5 P<sub>90</sub> = 93.7 P<sub>99</sub> = 96.6</b>																				<b>Hours of Calibration: 0</b>				
																						<b>Percent Operational Time: 100.0</b>				
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	90.3	90.4	90.6	92.2	94.1	94.7	93.2	92.2	91.3	89.9	80.9	71.2	64.1	60.1	64.9	66.0	67.6	68.7	72.1	73.8	73.3	74.4	73.5	74.6	79.3	94.7
2-Nov	76.1	76.2	75.4	87.4	95.0	95.6	95.8	94.4	92.9	90.4	89.4	85.9	83.1	82.4	81.9	81.8	82.2	81.6	80.5	80.1	79.5	79.1	80.4	81.0	84.5	95.8
3-Nov	79.6	78.6	79.6	80.0	80.5	80.4	81.1	81.9	82.6	81.6	80.5	80.1	78.3	76.6	75.4	74.9	75.1	78.8	81.1	82.5	83.0	83.5	85.0	85.8	80.3	85.8
4-Nov	86.5	87.4	86.8	86.4	85.7	85.8	86.6	87.4	85.8	83.2	81.9	79.7	79.2	78.7	78.2	78.4	79.2	78.4	79.1	81.9	85.1	87.5	88.7	92.2	83.7	92.2
5-Nov	93.4	93.5	90.8	92.1	93.9	93.8	91.5	89.5	90.8	88.8	85.3	83.2	82.1	82.0	84.7	89.5	91.7	88.8	86.3	88.4	88.7	91.9	91.9	91.1	89.3	93.9
6-Nov	89.8	89.2	88.9	88.7	88.5	88.7	88.5	88.2	87.3	87.6	86.8	85.2	82.2	81.0	80.8	82.3	84.8	87.3	89.7	91.3	92.1	92.4	92.2	92.1	87.7	92.4
7-Nov	92.2	90.9	90.7	91.8	93.0	93.6	93.8	94.4	93.7	94.7	94.0	90.3	86.7	85.2	85.2	85.9	87.0	88.3	89.5	92.1	94.2	95.2	94.8	95.6	91.4	95.6
8-Nov	94.5	95.3	96.0	96.9	97.3	97.3	97.0	97.1	96.5	95.6	95.7	95.4	94.9	93.7	92.4	93.8	94.2	94.1	94.0	94.2	94.7	95.6	95.8	95.6	95.3	97.3
9-Nov	95.3	95.1	95.0	94.0	94.0	94.6	94.7	93.9	93.3	92.7	91.2	91.8	92.8	92.0	92.3	91.8	93.0	93.8	93.7	93.3	93.3	93.0	92.6	91.9	93.3	95.3
10-Nov	91.2	90.6	90.4	90.3	90.5	90.8	90.3	90.0	89.5	86.4	84.3	81.7	79.3	79.9	80.5	82.9	85.2	86.8	87.0	86.6	87.1	87.1	88.1	88.3	86.9	91.2
11-Nov	88.3	89.5	91.4	92.0	91.8	91.3	91.8	92.5	91.8	90.1	88.9	86.3	83.5	83.2	84.1	84.3	86.8	89.8	92.2	94.5	95.2	95.5	93.4	89.1	89.9	95.5
12-Nov	86.5	87.5	91.9	89.9	86.2	83.9	84.2	83.8	84.5	82.2	78.6	77.9	73.7	71.9	71.8	73.2	77.4	79.1	80.7	84.9	90.9	91.6	90.8	91.1	83.1	91.9
13-Nov	89.3	89.6	86.6	88.1	88.3	89.2	89.4	87.6	86.9	85.5	86.8	87.8	88.7	88.7	89.8	91.0	93.0	93.2	93.8	93.7	93.2	93.3	94.1	94.1	90.1	94.1
14-Nov	94.4	93.8	92.4	91.8	91.5	91.5	89.9	91.0	89.7	85.9	81.8	76.6	72.2	69.9	69.0	70.1	77.2	82.2	75.8	76.2	81.3	89.1	89.8	88.0	83.8	94.4
15-Nov	89.3	91.2	90.8	91.1	92.2	92.1	91.8	91.1	90.0	89.3	88.9	84.1	79.1	78.5	76.5	75.7	84.1	83.0	83.8	86.5	81.7	81.3	81.9	81.5	85.6	92.2
16-Nov	81.5	84.7	86.4	86.9	87.7	87.4	88.4	88.7	86.2	82.8	78.3	77.0	75.7	76.7	78.4	78.7	78.8	79.1	79.8	81.7	73.4	70.3	69.5	69.0	80.3	88.7
17-Nov	70.2	74.4	72.7	72.7	71.7	71.5	71.6	73.0	73.7	70.5	68.0	65.8	65.0	63.5	64.7	67.9	70.6	73.7	81.0	85.3	89.8	95.3	96.5	96.7	75.2	96.7
18-Nov	96.6	96.3	96.3	96.0	95.8	95.7	95.5	95.2	95.2	95.3	95.1	93.5	88.4	85.0	76.8	79.5	85.8	88.1	89.3	89.3	89.3	90.0	91.0	90.5	91.2	96.6
19-Nov	87.6	89.7	89.9	91.4	93.2	93.1	93.5	95.5	96.9	96.7	90.2	81.6	81.9	77.3	77.9	82.6	86.3	91.1	91.5	91.1	91.4	88.4	73.4	69.7	87.6	96.9
20-Nov	67.8	75.1	66.8	63.1	63.5	64.6	65.9	65.5	66.1	63.4	57.8	52.2	50.9	49.5	47.9	49.2	50.6	51.5	52.6	54.4	56.7	57.3	58.1	58.6	58.7	75.1
21-Nov	59.1	57.5	60.6	59.5	62.7	64.0	62.3	60.2	58.7	59.0	56.7	53.8	51.7	53.8	70.0	76.3	80.4	81.7	81.6	83.5	84.5	84.3	84.9	85.2	68.0	85.2
22-Nov	85.5	85.0	83.7	83.9	84.3	84.2	85.2	84.5	83.9	82.4	78.3	75.8	75.3	73.4	73.9	73.2	75.5	81.6	80.3	77.4	77.0	76.7	76.7	76.0	79.7	85.5
23-Nov	79.9	83.2	85.0	84.7	84.6	87.1	87.6	88.0	88.4	87.9	87.1	85.8	84.5	84.1	84.1	84.0	88.6	89.5	89.7	89.9	90.6	90.1	83.0	72.8	85.8	90.6
24-Nov	67.5	64.7	63.6	64.8	65.8	63.3	64.2	63.8	66.4	66.3	66.4	65.0	61.9	60.7	61.9	63.9	65.7	70.6	68.7	69.3	73.4	74.6	75.0	76.0	66.8	76.0
25-Nov	76.0	78.1	81.4	82.3	85.6	85.2	80.4	73.5	65.0	63.8	60.5	56.3	54.8	56.4	55.5	66.4	79.1	83.8	85.5	88.5	87.8	87.2	85.8	85.2	75.2	88.5
26-Nov	85.7	86.3	86.7	86.7	86.6	86.8	86.4	85.7	85.8	85.3	84.7	85.2	84.3	82.4	81.0	80.4	81.2	81.5	82.2	83.7	84.7	87.3	87.7	91.1	85.0	91.1
27-Nov	92.1	92.3	90.9	91.3	92.8	93.7	92.7	92.4	92.6	92.8	92.2	87.3	84.3	83.7	83.0	81.4	83.4	77.9	74.8	75.3	75.0	68.8	65.7	65.3	84.2	93.7
28-Nov	64.9	63.2	63.0	60.6	59.3	61.7	64.8	65.8	67.6	66.4	63.3	59.4	56.2	53.9	54.8	57.3	58.0	60.2	60.7	59.3	60.8	65.2	69.2	68.0	61.8	69.2
29-Nov	68.0	67.7	70.2	69.6	69.2	68.7	68.4	79.4	83.3	76.6	75.1	74.1	72.5	69.4	68.7	69.8	69.1	71.0	67.2	68.7	73.7	74.7	79.3	80.4	72.3	83.3
30-Nov	82.0	80.1	80.2	81.3	81.4	79.4	84.7	87.5	88.1	87.4	85.3	83.0	83.4	83.5	83.2	82.3	83.7	85.2	85.8	86.4	86.5	88.3	90.6	92.3	84.6	92.3
																								Diurnal Average		
																								Diurnal Maximum		



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

**Relative Humidity (RH) - %**  
**Buffalo Viewpoint - November 2023**





Maximum Speed: 32 km/h on Nov 20 04:00	Maximum Daily Speed Average: 19.4 km/h on Nov 20	Hours in Service: 720
Minimum Speed Value: 0 km/h on Nov 22 16:00	Minimum Daily Speed Average: 0.7 km/h on Nov 30	Hours of Data: 667
Maximum Diurnal Speed Average: 4.2 km/h at hour 1	Minimum Diurnal Speed Average: 1.1 km/h at hour 13	Hours of Missing Data: 53
Monthly Average Velocity: 2.2 km/h 245.6 deg	Percentiles: P <sub>1</sub> = 2 P <sub>10</sub> = 3 Q <sub>1</sub> = 5 Median = 7 Q <sub>3</sub> = 11 P <sub>90</sub> = 17 P <sub>99</sub> = 26	Percent Operational Time: 92.6

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	SSE4	SSE4	SE6	SSE5	S5	SSE6	SSE7	SSE6	S7	S6	SSE5	SSE5	SSE6	SE6	ESE8	SE4	SE6	SE6	SSE5	SSE5	SSE5	SSE4	SSE5	SSE6	SSE5.4	ESE8
2-Nov	S6	S6	WSW5	NW6	NNW5	N9	N12	N17	N17	N18	N17	NNE16	NNE14	NNE14	NNE15	NE12	NE11	ENE7	E5	E5	SSE2	SSE4	ESE5	SSE4	NNE6.5	N18
3-Nov	S7	SSE6	SE6	SE6	S5	SE2	SE3	SE4	ESE4	ESE3	ENE4	NNE6	NNE6	NE4	NNE6	N4	NNE2	NNE5	NNE7	NNE6	NE6	NE5	NE5	ENE2.6	S7	
4-Nov	NE6	NE5	ENE5	ENE4	ESE5	SE5	ESE4	ESE6	ESE7	ESE8	ESE10	ESE9	ESE12	ESE10	ESE10	ESE12	ESE11	ESE10	ESE10	ESE11	ESE8	E7	E7	ENE6	ESE7.4	ESE12
5-Nov	ENE7	ENE7	E6	NE6	NE7	NE7	ENE5	ENE5	ENE5	ENE6	ENE6	NE6	NE5	NNE4	NNE4	NNE5	NE4	ESE3	SE4	SE6	ESE6	SE7	SE7	SE5	ENE4.5	ENE7
6-Nov	SE5	SSE5	SSE7	SSE6	SSE6	SSE7	SSE7	SSE6	SSE9	SSE8	SSE7	SSE8	SE8	SSE9	SSE7	SSE6	SSE6	SSE7	SSE7	SSE6	SSE7	SSE7	SSE5	SSE6.8	SSE9	
7-Nov	S5	SSW7	SW6	SW5	SW4	SSW2	S3	WSW3	WSW2	SE1	SSW2	SW3	SW4	SSW6	SW5	SSW4	SSW5	SSW5	SSW6	S6	S5	SW8	SW10	SW10	SSW4.6	SW10
8-Nov	WSW13	W15WNW16	NW13	NW3	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	---	WNW16
9-Nov	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	---	---
10-Nov	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	---	SSE11
11-Nov	SSE10	SSE7	SE10	SE9	SSE9	SSE11	SSE8	SE6	SE12	SE13	SSE14	SSE13	SSE9	SSE7	SSE9	S7	SSE7	S6	SSE6	SSE5	SSE6	S5	SW3	NW3	SSE7.6	SSE14
12-Nov	SW7	SW5	SSE6	SSW8	WSW9	WSW20	WSW20	WSW16	WSW15	WSW16	W16	W17	W16	W13	W11	W12	WSW11	WSW13	W15	WNW10	NW6	NW7	NW6	NNW7	W10.6	WSW20
13-Nov	N5	N3	ENE2	E2	ESE3	ESE4	ENE3	NE8	ENE8	ENE10	NE9	NNE10	NNE11	NNE12	N20	NNE13	N9	N8	N11	NNE10	N11	N8	N10	NNW8	NNE7.4	N20
14-Nov	NW9	NW9	NW7	NW6	W5	SW6	SSW7	SSE5	SSW5	SSE5	SSE5	S5	SW8	SW9	WSW9	WSW7	WSW3	SSW5	WSW7	SSW8	SSE6	SE7	SSE4	SE5	SW3.6	WSW9
15-Nov	NE1	N3	NNE2	N6	N11	N11	N16	N14	N9	N11	NW9	NW12	NW13	WNW9	W10	SW5	SSE6	WSW8	W6	WNW9	WNW10	W8	W5	SSW4	NW5.9	N16
16-Nov	WSW4	W4	SW4	S5	SSE6	SE5	SSE6	SSE7	SSE9	SSE9	SSE9	SSE9	SSE8	SE6	SE6	SSE5	SSE6	S6	S8	SSE6	WSW11	W11	WSW14	WSW16	S5.4	WSW16
17-Nov	SW9	SSW5	WSW17	WSW24	WSW23	WSW27	WSW28	WSW25	WSW17	WSW15	SW15	WSW14	WSW8	SSW6	SW6	SW8	SW10	WSW9	NW6	NNE6	E2	SSE5	SSE6	SSE7	WSW10.6	WSW28
18-Nov	SE8	SSE7	SSE7	SSE7	SSE7	SSE7	SSE8	SSE8	SSE6	SSE6	SSE4	SSE6	SSE6	SSE4	SSE6	SE7	SE9	SSE9	SSE7	SE5	SSW3	SSE6	SSE5	S3	SSE6.2	SE9
19-Nov	S3	SSE6	S5	SE6	SSE6	SW3	ESE3	SSE4	SSW3	SE5	S6	S5	SE5	SE5	SE3	SE6	SE6	SSE8	SSE8	SE9	SSE8	SSW6	W18	W21	S4.3	W21
20-Nov	W21	WNW23	WNW31	NW32	NW29	NW25	NW24	WNW24	W21	W23	WNW18	WNW18	WNW24	WNW24	NW23	NW20	WNW17	WNW16	WNW12	W9	W10	W13	W14	WNW9	WNW19.4	NW32
21-Nov	NNW6	NW6	ESE2	E3	SSE2	SSE3	SE4	SE2	ENE5	ENE8	ENE9	E10	ENE10	NE9	NNE12	N14	N15	NNE16	NNE15	N14	N14	N14	N13	N12	NNE7.1	NNE16
22-Nov	N12	N12	N12	N12	N12	NNE13	NNE9	NNE7	NNE7	NNE6	NNE6	NNE6	NE4	NNE4	NNE1	E0	SE1	SE3	SE2	SSE3	SSE4	SSE5	SSE6	SSE7	NNE4.1	NNE13
23-Nov	SSE9	SSE8	SSE8	SSE9	SSE10	SSE9	S8	S8	SSE6	S6	SSE5	SSE6	SSE6	SSE6	SSE7	SSE5	SSE6	SSE9	SSE9	SSE11	SE12	SE12	S8	SW15	SSE7.7	SW15
24-Nov	SW17	SW13	SSW6	SSW8	S7	SW10	WSW19	WSW23	WSW18	W17	W13	W13	W7	WNW6	WSW12	WSW9	W8	W8	WSW14	WSW10	WSW7	SW9	SW9	WSW10	WSW10.8	WSW23
25-Nov	WSW14	W7	WNW9	NW14	N19	N21	N26	NNW17	NNW26	NNW23	NNW20	NNW22	NNW19	NNW19	NW18	N13	NNE9	NNE8	E2	SW2	SSE3	SSW3	S4	SSE5	NNW10.6	NNW26
26-Nov	SE4	S3	SSE3	SSE4	SSE3	E2	SE1	S2	SE5	SE5	S5	S7	SSE6	SSE6	SSE6	SSE6	SSE7	SSE8	SSE8	SSE8	S8	ESE7	SSE2	S5	SSE4.9	SSE8
27-Nov	SSE4	NNW2	N2	ENE2	SE4	SSE3	SSE5	SSE6	SSE7	SSE9	SSE9	SSE9	SSE8	SSE8	SSE7	SSE6	SSE7	WSW8	W16	W13	W9	WSW25	WSW23	WSW27	SW5.9	WSW27
28-Nov	WSW30	WSW24	WSW25	W26	W24	WSW18	WSW21	WSW21	WSW16	WSW18	WSW18	WSW17	W17	W15	WSW14	WSW19	WSW12	W19	W23	W16	WSW15	W23	W16	WNW13	WSW18.9	WSW30
29-Nov	W18	W24	W14	WSW12	W9	W15	W17	W14	W17	W16	WNW11	W10	WNW14	WNW18	WNW19	WNW18	NW16	NW14	NW17	NW12	NW11	NW12	NW12	NW12	WNW13.6	W24
30-Nov	NW9	WNW7	WNW8	W8	W8	NW7	NE4	NE4	ESE3	SE3	SE3	SE3	ENE6	NE5	NE6	E2	SSE3	ESE3	SSE4	SSE5	E2	NE3	NE4	W2	N0.7	NW9

WSW4.2	WSW3.8	WSW3.2	W3.4	W2.6	W2.9	W2.9	W2.9	WSW2.5	WSW1.9	SW1.6	WSW1.8	W1.1	WNW1.4	WNW1.7	WSW1.2	SSW1.1	SW1.8	SW2.3	SSW1.7	SSW1.8	SW2.7	WSW3.2	WSW3.6	Diurnal Average	
WSW30	WSW24	WNW31	NW32	NW29	WSW27	WSW28	WSW25	NNW26	NNW23	NNW20	NNW22	WNW24	WNW24	NW23	NW20	WNW17	W19	W23	W16	WSW15	WSW25	WSW23	WSW27	Diurnal Maximum	

UO - Unstable Operation  
 All monthly, daily, and diurnal averages have been calculated using vector methods



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

**Wind Speed (WS) - km/h**  
**Buffalo Viewpoint - November 2023**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 9 km/h on Nov 20 04:00	Hours of Data: 667
Minimum Value: 1 km/h on Nov 1 05:00	Hours of Missing Data: 53
Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 1 Q <sub>1</sub> = 2 Median = 2 Q <sub>3</sub> = 3 P <sub>90</sub> = 5 P <sub>99</sub> = 7	Hours of Calibration: 0
	Percent Operational Time: 92.6

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

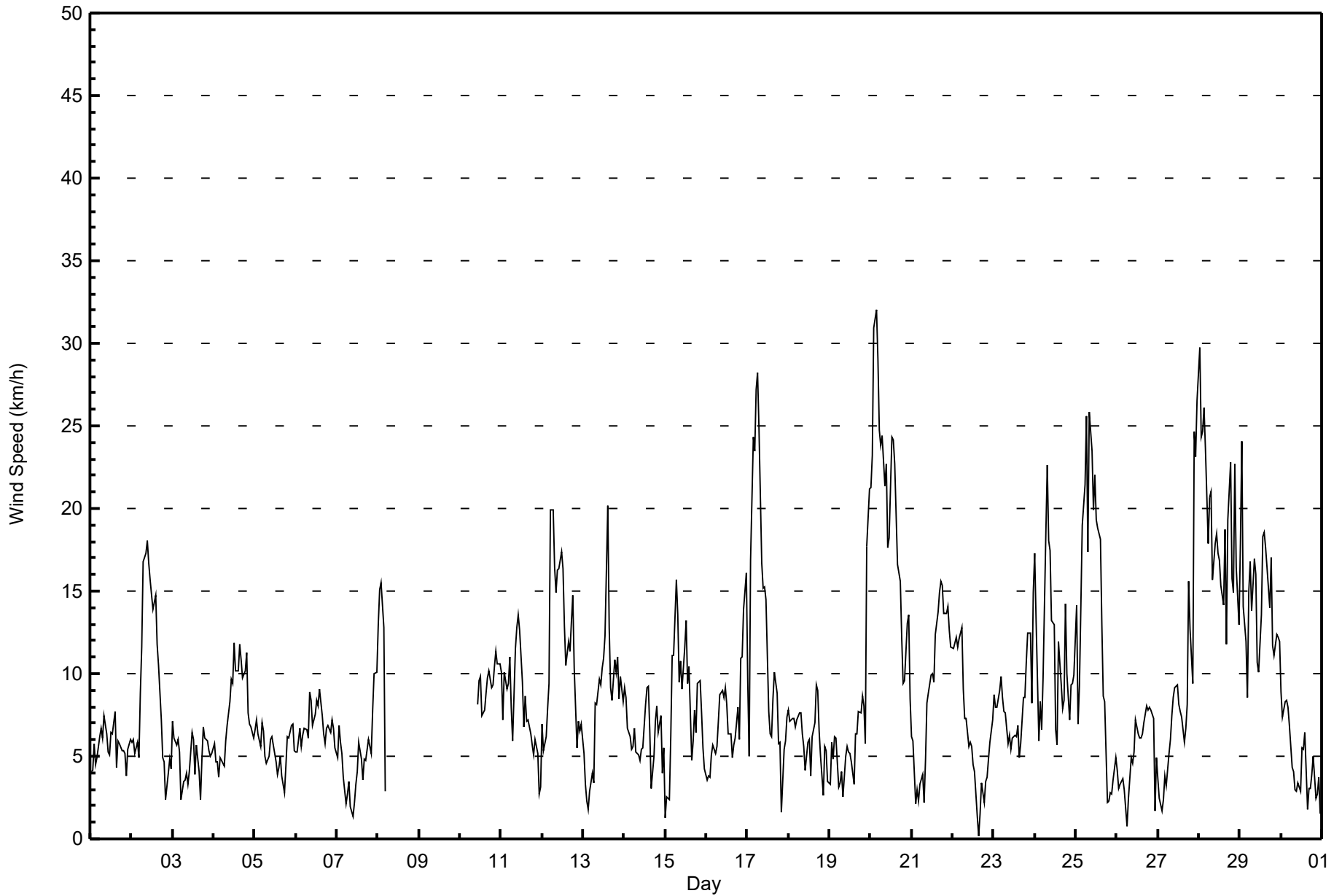
Diurnal Maximum

UO - Unstable Operation



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

**Wind Speed (WS) - km/h**  
**Buffalo Viewpoint - November 2023**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h  
Buffalo Viewpoint - November 2023**

<b>Wind Speed Ranges (km/h)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	186	27.89	27.89
6 - 11	315	47.23	75.11
12 - 19	123	18.44	93.55
20 - 28	39	5.85	99.40
29 - 38	4	0.60	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 667

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Wind Speed (WS) - km/h  
Buffalo Viewpoint - November 2023**

<b>Wind Speed Ranges (km/h)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 5	4	9	14	10	10	13	27	46	15	14	11	5	4	0	2	2	186
6 - 11	12	17	11	12	4	15	27	117	18	10	15	14	16	10	14	3	315
12 - 19	21	10	1	0	0	2	4	2	0	0	4	26	27	11	12	3	123
20 - 28	3	0	0	0	0	0	0	0	0	0	0	15	9	4	4	4	39
29 - 38	0	0	0	0	0	0	0	0	0	0	0	1	0	1	2	0	4
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	<b>40</b>	<b>36</b>	<b>26</b>	<b>22</b>	<b>14</b>	<b>30</b>	<b>58</b>	<b>165</b>	<b>33</b>	<b>24</b>	<b>30</b>	<b>61</b>	<b>56</b>	<b>26</b>	<b>34</b>	<b>12</b>	<b>667</b>

Total Number of Valid Hours: 667

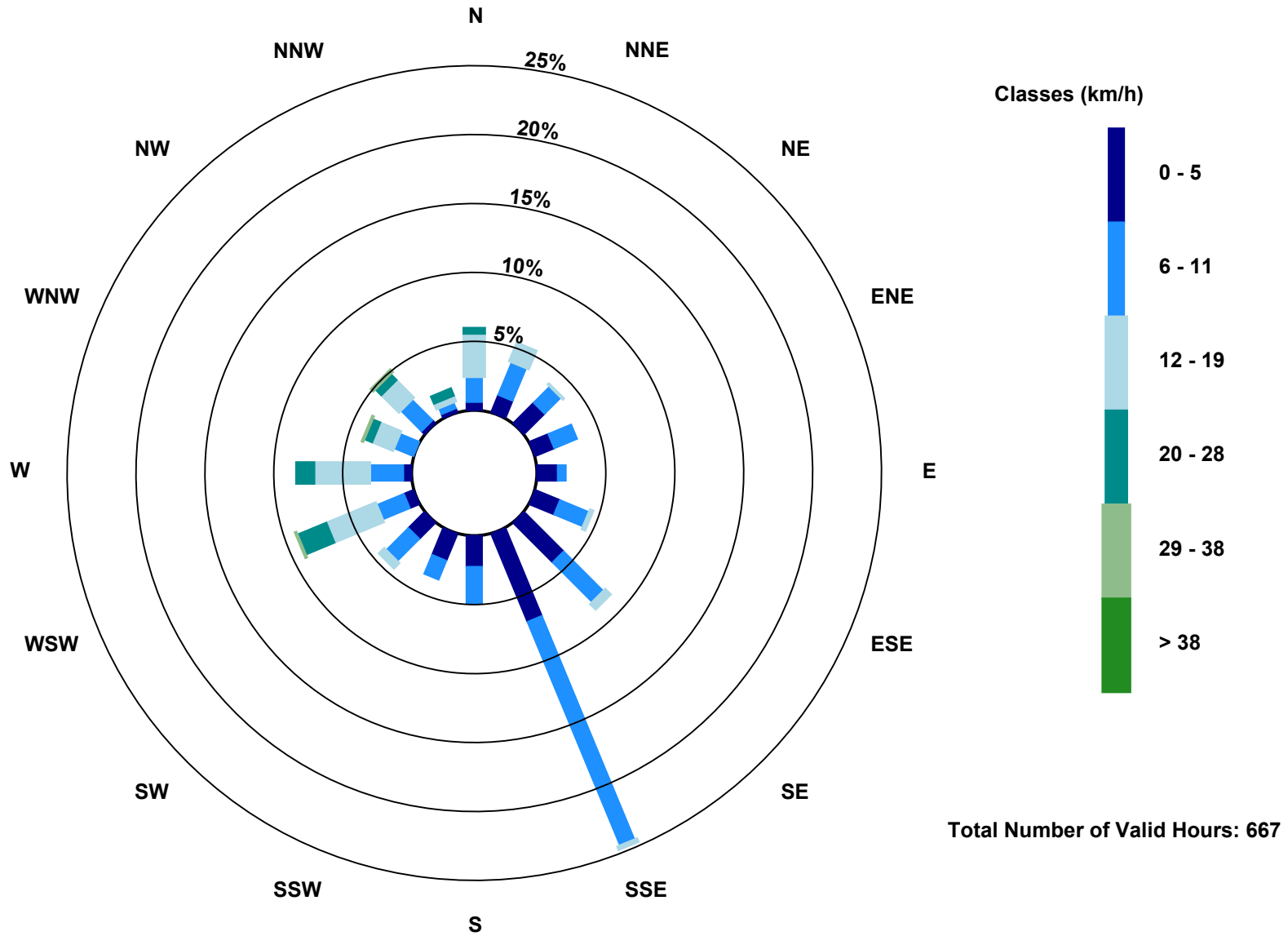
Total Number of Hours: 720





Wood Buffalo Environmental Association  
Wind Rose Nov 2023

Wind Speed (WS) - km/h  
Buffalo Viewpoint





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

**Wind Direction (WD) - deg**  
**Buffalo Viewpoint - November 2023**

Direction of Maximum Speed: 308 deg on Nov 20 04:00	Hours in Service: 720
Direction of Maximum Daily Speed Average: 294.4 deg on Nov 20	Hours of Data: 667
Direction of Minimum Speed: 80 deg on Nov 22 16:00	Direction of Minimum Daily Speed Average: 0.7 deg on Nov 30
Direction of Minimum Speed: 80 deg on Nov 22 16:00	Hours of Missing Data: 53
Monthly Average Direction: 245.6 deg	Percent Operational Time: 92.6

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-Nov	160	160	145	153	189	162	155	163	174	176	148	154	158	141	122	142	135	145	164	147	150	160	156	156	154.5	
2-Nov	185	181	257	307	344	1	1	357	354	356	360	12	20	19	24	35	44	59	81	81	149	168	118	150	15.4	
3-Nov	181	156	134	142	183	142	138	138	116	116	72	23	19	45	17	358	13	26	27	32	39	50	52	44	70.5	
4-Nov	45	44	59	77	120	124	104	117	112	115	111	113	114	109	103	112	107	108	111	110	105	93	79	77	102.9	
5-Nov	62	65	80	47	51	49	75	77	65	68	76	54	47	23	21	21	40	102	130	124	122	126	127	135	75.3	
6-Nov	137	154	150	154	154	155	155	152	154	155	157	153	155	145	157	156	155	149	156	158	157	157	161	160	154.1	
7-Nov	175	198	220	225	220	203	191	253	250	127	212	224	218	210	219	209	203	209	195	191	188	218	232	222	211.6	
8-Nov	245	261	295	305	312	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	--	
9-Nov	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	--	
10-Nov	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	135	150	156	145	146	147	153	155	155	152	150	151	143	141	--
11-Nov	153	157	128	145	152	161	158	144	140	145	148	148	157	159	150	170	167	178	166	164	166	187	233	318	155.2	
12-Nov	229	220	162	211	239	256	254	252	252	252	264	267	266	271	276	266	258	256	262	283	314	325	319	339	261.3	
13-Nov	11	354	59	96	113	114	60	54	62	62	46	28	20	12	10	18	4	360	9	19	354	356	353	342	20.3	
14-Nov	321	309	320	307	271	233	201	156	197	149	157	176	225	229	251	246	247	200	243	211	158	146	151	128	221.8	
15-Nov	56	350	13	10	1	355	351	354	354	351	319	317	323	300	278	222	159	248	269	298	295	273	259	213	319.3	
16-Nov	249	265	220	171	149	146	153	153	162	167	164	160	152	156	140	156	162	172	172	168	238	262	257	249	188.0	
17-Nov	223	192	244	254	253	258	257	258	248	238	232	238	238	203	221	221	229	250	321	29	84	157	154	152	242.3	
18-Nov	144	160	155	150	159	151	157	154	164	163	159	154	156	158	155	136	138	147	148	142	192	148	154	171	152.8	
19-Nov	190	150	178	136	147	231	120	148	199	146	186	191	132	131	129	142	142	147	152	146	155	198	262	264	176.4	
20-Nov	261	295	291	308	306	309	312	302	281	279	286	289	302	301	305	307	302	291	294	275	275	269	271	292	294.4	
21-Nov	344	320	102	98	156	153	142	143	69	72	76	80	71	35	16	5	8	15	17	8	357	4	8	7	25.0	
22-Nov	11	10	9	352	2	14	20	17	16	16	31	26	39	32	25	80	136	126	134	161	155	165	156	154	25.4	
23-Nov	151	159	159	157	158	163	172	171	157	169	166	162	163	167	168	161	159	168	158	138	132	189	223	163.7	163.7	
24-Nov	226	217	197	205	190	227	238	252	259	259	265	282	253	253	260	261	247	242	255	222	236	243	243	243	243.1	
25-Nov	243	259	295	320	358	359	1	347	331	343	336	330	339	339	326	359	17	21	83	217	161	204	172	155	338.1	
26-Nov	138	174	163	147	147	93	129	173	146	140	173	175	161	163	149	155	155	157	157	157	174	123	168	173	156.2	
27-Nov	167	341	0	69	134	159	152	164	166	159	161	167	163	165	161	166	163	241	262	267	267	251	250	254	217.0	
28-Nov	256	252	256	260	263	249	252	246	239	248	250	255	261	266	258	256	253	264	263	260	253	262	272	284	257.1	
29-Nov	267	263	274	256	271	259	269	271	263	272	292	275	291	303	297	295	306	316	325	319	308	314	305	310	287.6	
30-Nov	310	297	289	269	274	310	45	55	106	136	124	132	68	53	47	91	163	116	167	148	91	35	50	273	5.6	

237.3	247.5	253.4	262.1	259.3	263.4	265.2	261.7	246.6	240.9	227.3	239.7	266.1	294.4	298.0	258.0	195.3	219.2	232.5	199.7	207.7	220.7	240.1	239.9	
Diurnal Average																								

UO - Unstable Operation  
 All monthly, daily, and diurnal averages have been calculated using vector methods



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

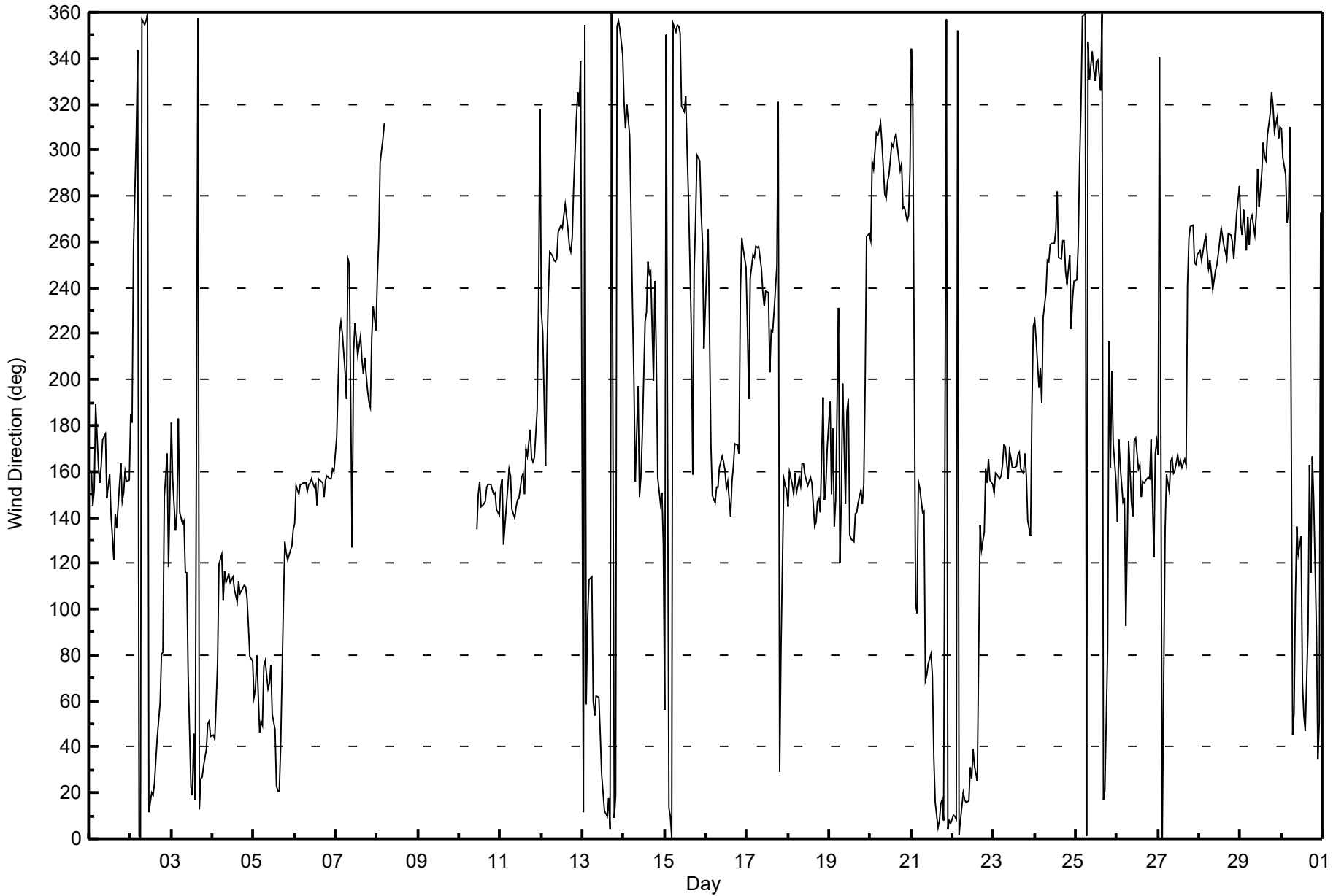
**Wind Direction (WD) - deg**  
**Buffalo Viewpoint - November 2023**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 88 deg on Nov 26 23:00	Hours of Data: 667
Minimum Value: 8 deg on Nov 22 18:00	Hours of Missing Data: 53
Percentiles: P <sub>1</sub> = 10 P <sub>10</sub> = 14 Q <sub>1</sub> = 18 Median = 21 Q <sub>3</sub> = 27 P <sub>90</sub> = 35 P <sub>99</sub> = 69	Hours of Calibration: 0
	Percent Operational Time: 92.6

Day	Hourly Period Ending At (MST)																								Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	19	31	15	12	16	15	14	22	14	22	27	34	33	30	18	30	16	18	24	13	15	46	17	11	46	
2-Nov	20	15	20	22	36	19	19	20	20	22	20	20	20	20	21	20	19	20	17	21	55	36	25	34	55	
3-Nov	26	27	27	37	27	31	25	30	20	33	41	20	20	36	22	21	21	29	14	12	16	14	22	21	41	
4-Nov	11	20	18	31	26	27	22	21	21	21	20	20	20	20	20	19	19	20	21	21	21	21	14	14	31	
5-Nov	18	18	18	20	16	15	17	16	16	18	16	21	20	16	19	20	17	31	27	23	26	22	26	26	31	
6-Nov	28	29	32	27	27	26	26	29	29	31	32	29	30	29	28	27	27	26	27	30	28	24	29	26	32	
7-Nov	24	18	18	14	24	21	32	20	41	88	67	27	20	17	16	21	16	13	17	18	20	24	22	23	88	
8-Nov	18	15	21	21	13	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	21	
9-Nov	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	--	
10-Nov	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	28	25	27	26	24	23	27	24	25	21	20	21	18	21	28
11-Nov	26	28	20	29	31	31	31	33	25	28	28	30	31	29	29	24	24	25	20	24	19	36	68	47	68	
12-Nov	26	44	19	23	20	11	12	13	13	14	15	14	15	16	17	11	8	10	10	24	20	17	17	27	44	
13-Nov	17	24	52	24	19	21	65	13	14	17	19	20	20	18	20	19	21	15	15	17	18	17	17	20	65	
14-Nov	20	20	20	25	22	20	19	23	26	29	26	24	21	19	18	14	41	27	20	18	38	17	35	22	41	
15-Nov	80	64	72	18	19	19	20	18	18	18	21	20	18	26	19	33	19	18	16	19	17	14	22	25	80	
16-Nov	45	59	50	19	23	19	24	27	29	25	26	24	27	25	21	31	21	17	13	24	22	19	20	16	59	
17-Nov	31	63	20	13	14	12	11	12	16	17	18	19	18	20	16	14	14	21	53	19	67	14	18	20	67	
18-Nov	14	13	11	16	17	18	16	18	16	23	27	24	20	32	23	16	13	17	19	21	21	22	18	41	41	
19-Nov	43	41	26	17	22	30	66	57	51	35	28	31	22	24	35	13	23	19	14	14	20	55	13	13	66	
20-Nov	11	24	21	21	21	21	21	20	19	20	22	23	21	21	21	20	21	22	22	20	17	15	15	27	27	
21-Nov	30	22	67	22	33	35	38	46	30	16	16	16	19	24	20	21	19	19	19	20	19	19	19	19	67	
22-Nov	20	19	20	19	22	17	19	16	18	22	25	25	22	26	56	77	63	8	23	26	26	27	30	27	77	
23-Nov	27	28	29	27	28	28	28	25	28	27	27	23	26	24	22	20	17	18	19	15	10	10	39	18	39	
24-Nov	19	23	65	26	26	26	18	15	16	19	15	14	27	30	16	26	22	19	16	48	46	19	22	20	65	
25-Nov	21	42	24	16	21	20	22	21	17	19	20	18	18	17	19	25	16	17	47	39	35	23	28	12	47	
26-Nov	17	22	28	23	33	65	66	70	25	24	28	23	23	27	26	23	18	13	11	12	14	36	88	52	88	
27-Nov	50	35	14	30	24	21	18	26	25	23	23	23	25	27	28	28	18	28	15	18	51	15	16	13	51	
28-Nov	12	15	12	11	14	15	14	15	19	19	17	14	12	14	17	13	19	13	11	16	14	10	15	18	19	
29-Nov	14	10	23	12	37	14	14	17	11	14	20	18	22	20	21	21	20	19	18	18	20	18	19	19	37	
30-Nov	17	20	20	19	13	45	24	23	33	36	36	46	22	25	20	37	38	42	43	17	63	20	10	73	73	
	80	64	72	37	37	65	66	70	51	88	67	46	33	36	56	77	63	42	53	48	67	55	88	73		

Diurnal Maximum

UO - Unstable Operation





## WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY  
MONITORING PROGRAM  
MONTHLY REPORT

**AMS05  
MANNIX  
NOVEMBER 2023**

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

December 22, 2023

## WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - MANNIX (AMS05)

NOVEMBER 2023

## MONTHLY SUMMARY

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2 (ppb) Average	684	33	36	99.58	18.9	0	4.6	0
H2S (ppb) Average	683	34	37	99.58	4	0	1	0
THC (ppm) Average	682	33	38	99.31	3.6	-	2.3	-
NMHC(ppm) Average	682	33	38	99.31	0.752	-	0.147	-
CH4(ppm) Average	682	33	38	99.31	2.9	-	2.2	-
Temperature 2 m (C) Average	720	0	0	100	5.6	-	2.1	-
Temperature 20 m (C) Average	720	0	0	100	6.5	-	2.7	-
Temperature 45 m (C) Average	720	0	0	100	6.5	-	2.6	-
Temperature 75 m (C) Average	720	0	0	100	6.4	-	2.7	-
Temperature 90 m (C) Average	720	0	0	100	6.6	-	3.4	-
Relative Humidity 2 m (%) Average	720	0	0	100	97	-	95	-
Relative Humidity 20 m (%) Average	720	0	0	100	98	-	97	-
Relative Humidity 45 m (%) Average	720	0	0	100	98	-	95	-
Relative Humidity 75 m (%) Average	697	0	23	96.81	100	-	97	-
Relative Humidity 90 m (%) Average	720	0	0	100	100	-	97	-
Wind Speed 20 m (km/h) Average	689	0	31	95.69	40	-	24	-
Wind Speed 45 m (km/h) Average	676	0	44	93.89	52	-	30	-
Wind Speed 75 m (km/h) Average	662	0	58	91.94	57	-	33	-
Wind Speed 90 m (km/h) Average	677	0	43	94.03	58	-	35	-
Wind Direction 20 m (deg) Average	689	0	31	95.69	-	-	-	-
Wind Direction 45 m (deg) Average	676	0	44	93.89	-	-	-	-
Wind Direction 75 m (deg) Average	662	0	58	91.94	-	-	-	-
Wind Direction 90 m (deg) Average	677	0	43	94.03	-	-	-	-
Vertical Wind Speed 20 m (km/h) Average	689	0	31	95.69	4.5	-	0.9	-
Vertical Wind Speed 45 m (km/h) Average	676	0	44	93.89	2.8	-	1	-
Vertical Wind Speed 75 m (km/h) Average	662	0	58	91.94	2.9	-	0.9	-
Vertical Wind Speed 90 m (km/h) Average	677	0	43	94.03	3.4	-	1.1	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - MANNIX (AMS05)  
NOVEMBER 2023

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile						
					Min	P10	Q1	Median	Q3	P90	Max
SO2 (ppb) Average	684	0.85	2.4	-	0	0	0.1	0.2	0.3	1.6	18.9
H2S (ppb) Average	683	0.28	0.4	-	0	0.1	0.1	0.2	0.3	0.6	4
THC (ppm) Average	682	2.13	0.2	-	2	2	2.1	2.1	2.1	2.3	3.6
NMHC(ppm) Average	682	0.03	0.082	-	0	0	0	0	0	0.1	0.752
CH4(ppm) Average	682	2.1	0.1	-	2	2	2	2.1	2.1	2.2	2.9
Temperature 2 m (C) Average	720	-3.8	4.2	-	-14.8	-9.8	-5.8	-3.4	-0.7	1.1	5.6
Temperature 20 m (C) Average	720	-3.35	4.3	-	-14.9	-9.8	-5.6	-3.1	0	1.7	6.5
Temperature 45 m (C) Average	720	-3.3	4.4	-	-15.2	-10	-5.8	-3.1	0.2	2.1	6.5
Temperature 75 m (C) Average	720	-3.22	4.5	-	-15.5	-10.1	-5.8	-3.2	0.4	2.3	6.4
Temperature 90 m (C) Average	720	-3.1	4.6	-	-15.5	-10	-5.7	-3	0.5	2.4	6.6
Relative Humidity 2 m (%) Average	720	82.5	10	-	51	68	77	84	90	93	97
Relative Humidity 20 m (%) Average	720	80.5	11	-	46	64	74	83	87	93	98
Relative Humidity 45 m (%) Average	720	79.8	11	-	46	64	74	82	87	93	98
Relative Humidity 75 m (%) Average	697	80.9	12	-	47	63	73	83	90	96	100
Relative Humidity 90 m (%) Average	720	79.6	11	-	46	63	72	82	87	95	100
Wind Speed 20 m (km/h) Average	689	11.4	6	-	0	5	7	11	14	19	40
Wind Speed 45 m (km/h) Average	676	15.6	7	-	2	7	10	14	20	25	52
Wind Speed 75 m (km/h) Average	662	18	9	-	1	7	11	16	24	30	57
Wind Speed 90 m (km/h) Average	677	19.1	9	-	1	8	12	17	26	32	58
Wind Direction 20 m (deg) Average	689	-	-	-	-	-	-	-	-	-	-
Wind Direction 45 m (deg) Average	676	-	-	-	-	-	-	-	-	-	-
Wind Direction 75 m (deg) Average	662	-	-	-	-	-	-	-	-	-	-
Wind Direction 90 m (deg) Average	677	-	-	-	-	-	-	-	-	-	-
Vertical Wind Speed 20 m (km/h) Average	689	0.18	0.5	-	-1.7	-0.4	-0.1	0.1	0.5	0.8	4.5
Vertical Wind Speed 45 m (km/h) Average	676	0	0.5	-	-1.5	-0.6	-0.4	0	0.4	0.6	2.8
Vertical Wind Speed 75 m (km/h) Average	662	0.19	0.4	-	-1.1	-0.2	0	0.2	0.4	0.6	2.9
Vertical Wind Speed 90 m (km/h) Average	677	0.03	0.6	-	-1.3	-0.6	-0.3	0	0.3	0.6	3.4

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - MANNIX (AMS05)  
NOVEMBER 2023

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
SO2	16 Nov 2023 14:00	16 Nov 2023 16:00	3	Maintenance - WBEA internal audit
H2S	16 Nov 2023 12:00	16 Nov 2023 14:00	3	Maintenance - WBEA internal audit
THC/NMHC/CH4	16 Nov 2023 15:00	16 Nov 2023 16:00	2	Maintenance - WBEA internal audit
THC/NMHC/CH4	22 Nov 2023 11:00	22 Nov 2023 13:00	3	Maintenance - replaced support gas cylinder
Relative Humidity 75m	02 Nov 2023 05:00	27 Nov 2023 03:00	23	Sensor operated out of range
Wind Speed, Wind Direction, Vertical Wind Speed 20m	08 Nov 2023 03:00	08 Nov 2023 13:00	11	Flat line in sensor output signal
Wind Speed, Wind Direction, Vertical Wind Speed 20m	08 Nov 2023 17:00	09 Nov 2023 12:00	20	Flat line in sensor output signal
Wind Speed, Wind Direction, Vertical Wind Speed 45m	08 Nov 2023 02:00	09 Nov 2023 13:00	36	Flat line in sensor output signal
Wind Speed, Wind Direction, Vertical Wind Speed 45m	09 Nov 2023 16:00	09 Nov 2023 18:00	3	Flat line in sensor output signal
Wind Speed, Wind Direction, Vertical Wind Speed 45m	09 Nov 2023 22:00	09 Nov 2023 22:00	1	Flat line in sensor output signal
Wind Speed, Wind Direction, Vertical Wind Speed 45m	10 Nov 2023 06:00	10 Nov 2023 09:00	4	Flat line in sensor output signal
Wind Speed, Wind Direction, Vertical Wind Speed 75m	08 Nov 2023 02:00	10 Nov 2023 00:00	47	Flat line in sensor output signal
Wind Speed, Wind Direction, Vertical Wind Speed 75m	14 Nov 2023 00:00	14 Nov 2023 10:00	11	Flat line in sensor output signal
Wind Speed, Wind Direction, Vertical Wind Speed 90m	08 Nov 2023 00:00	08 Nov 2023 00:00	1	Flat line in sensor output signal
Wind Speed, Wind Direction, Vertical Wind Speed 90m	08 Nov 2023 02:00	09 Nov 2023 11:00	34	Flat line in sensor output signal
Wind Speed, Wind Direction, Vertical Wind Speed 90m	14 Nov 2023 01:00	14 Nov 2023 08:00	8	Flat line in sensor output signal





Wood Buffalo Environmental Association

Summary of Hour Averages

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

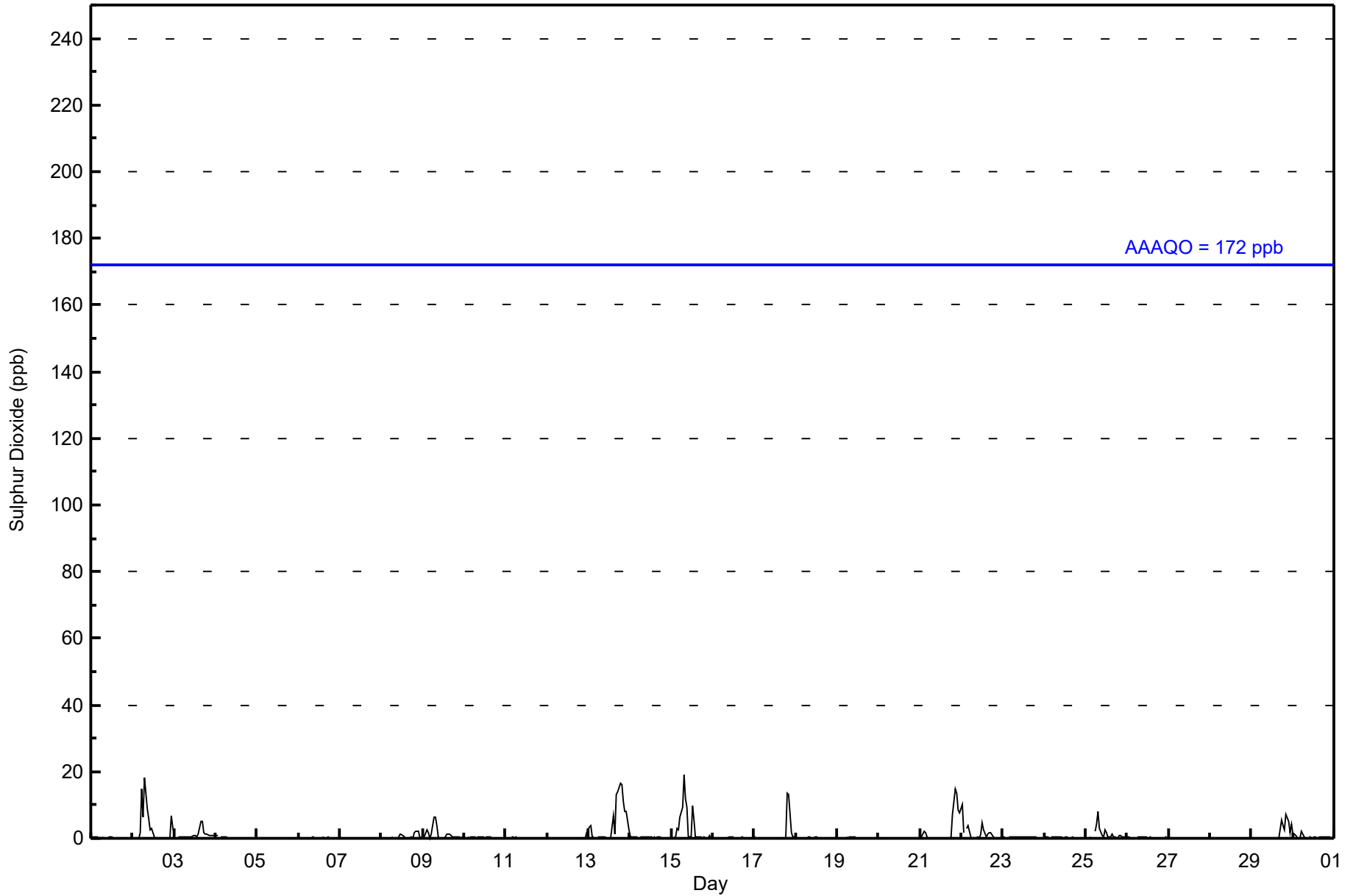
Mannix - November 2023

Number of Exceedences (AAAQO):		1-hr: 0	24-hr: 0	Hours in Service: 720																	Daily Average		Daily Maximum																									
Maximum Value: 18.9 ppb on Nov 15 08:00		Maximum Daily Average: 4.6 ppb on Nov 13																	Hours of Data: 684		Hours of Missing Data: 36																											
Minimum Value: 0.0 ppb on Nov 4 23:00		Minimum Daily Average: 0.0 ppb on Nov 5																	Hours of Calibration: 33		Percent Operational Time: 99.6																											
Maximum Diurnal Average: 1.9 ppb at hour 8		Minimum Diurnal Average: 0.3 ppb at hour 11																																														
Monthly Average: 0.85 ppb		Percentiles: P <sub>1</sub> = 0.0 P <sub>10</sub> = 0.0 Q <sub>1</sub> = 0.1 Median = 0.2 Q <sub>3</sub> = 0.3 P <sub>90</sub> = 1.6 P <sub>99</sub> = 13.7																																														
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Nov	0.2	0.2	0.3	0.3	0.3	Z	0.4	0.2	0.1	0.2	0.2	0.3	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.2	0.4																						
2-Nov	Z	0.2	0.2	0.1	1.8	14.8	6.2	18.1	8.9	6.1	2.7	2.8	0.2	0.1	0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.1	6.7	3.5	3.2	18.1																						
3-Nov	1.2	Z	0.2	0.3	0.3	0.4	0.4	0.4	0.3	0.3	0.3	0.7	0.9	0.5	1.1	5.3	4.9	1.6	1.3	1.1	0.9	0.8	0.9	0.9	1.1	5.3																						
4-Nov	0.9	0.7	Z	0.6	0.4	0.3	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.2	0.9																						
5-Nov	0.0	0.0	0.0	Z	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1																						
6-Nov	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.2	0.3	0.3	C	C	C	C	0.2	0.1	0.2	0.2	0.2	0.0	0.0	0.1	0.0	0.0	0.1	0.3																						
7-Nov	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.2	0.1	0.1	0.0	0.0	0.1	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2																						
8-Nov	0.0	0.1	0.0	0.2	0.1	Z	0.2	0.1	0.1	0.2	0.2	1.1	0.8	0.5	0.1	0.1	0.1	0.1	0.3	0.1	1.5	2.3	2.1	0.1	0.5	2.3																						
9-Nov	Z	0.5	2.4	1.9	0.1	1.2	6.3	6.2	3.8	0.6	0.2	0.1	0.2	0.5	1.4	1.1	0.7	0.5	0.4	0.3	0.3	0.4	0.2	0.3	1.3	6.3																						
10-Nov	0.2	Z	0.3	0.1	0.2	0.2	0.2	0.2	0.3	0.2	0.2	0.2	0.2	0.2	0.3	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.3																						
11-Nov	0.1	0.1	Z	0.3	0.2	0.2	0.3	0.2	0.1	0.1	0.1	0.0	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	0.3																					
12-Nov	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.2	1.6	0.1	1.6																						
13-Nov	3.5	3.6	0.3	0.2	Z	0.3	0.4	0.4	0.5	0.3	0.1	0.1	0.1	0.1	6.7	1.3	13.2	13.9	16.4	16.0	11.2	8.1	7.9	2.3	4.6	16.4																						
14-Nov	0.4	0.3	0.3	0.4	0.3	Z	0.2	0.3	0.3	0.4	0.2	0.3	0.2	0.2	0.3	0.2	0.3	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.3	0.4																						
15-Nov	Z	0.1	0.3	3.1	2.7	6.5	9.5	18.9	11.9	9.2	0.6	0.6	9.7	5.7	0.4	0.3	0.3	0.2	0.2	0.5	0.1	0.2	0.8	0.2	3.6	18.9																						
16-Nov	0.1	Z	0.1	0.2	0.2	0.1	0.1	0.1	0.1	0.2	0.3	0.3	0.3	M	M	M	0.2	0.2	0.2	0.1	0.2	0.2	0.2	0.2	0.2	0.3																						
17-Nov	0.2	0.2	Z	0.2	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.1	0.2	0.1	0.2	0.4	13.7	13.3	1.7	0.4	0.2	1.4	13.7																						
18-Nov	0.1	0.1	0.1	Z	0.2	0.2	0.2	0.2	0.3	0.2	0.2	0.3	0.2	0.2	0.2	0.2	0.1	0.2	0.2	0.1	0.1	0.1	0.1	0.2	0.2	0.3																						
19-Nov	0.2	0.2	0.1	0.2	Z	0.2	0.2	0.3	0.4	0.3	0.3	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.1	0.0	0.1	0.1	0.2	0.4																						
20-Nov	0.0	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.0	0.0	0.1	0.0	0.1																						
21-Nov	Z	0.4	2.2	1.9	0.2	0.1	0.1	0.2	0.2	0.2	0.1	0.1	0.2	0.1	0.1	0.0	0.0	0.2	0.4	7.1	14.7	13.7	8.5	7.6	2.5	14.7																						
22-Nov	10.3	1.7	Z	3.0	3.9	0.2	0.1	0.1	0.1	0.2	0.2	1.4	4.6	2.7	0.5	1.2	1.8	1.5	0.4	0.2	0.1	0.1	0.0	0.1	1.5	10.3																						
23-Nov	0.3	0.3	Z	0.3	0.3	0.3	0.2	0.2	0.3	0.2	0.3	0.3	0.3	0.3	0.3	0.2	0.3	0.2	0.3	0.3	0.2	0.1	0.2	0.1	0.3	0.3																						
24-Nov	0.2	0.2	0.3	Z	0.3	0.2	0.3	0.2	0.2	0.3	0.3	0.2	0.2	0.3	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.0	0.1	0.1	0.2	0.3																						
25-Nov	0.0	0.0	0.0	0.3	Z	2.0	4.4	8.2	2.8	0.7	0.5	2.5	1.7	0.2	0.4	1.5	0.3	0.6	0.1	0.7	0.9	0.5	0.5	0.5	1.3	8.2																						
26-Nov	0.6	0.3	0.2	0.2	0.2	Z	0.3	0.3	0.3	0.4	0.3	0.3	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.3	0.2	0.6																						
27-Nov	Z	0.1	0.0	0.1	0.0	0.1	0.0	0.1	0.1	0.1	0.2	0.1	0.1	0.2	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.1	0.2																						
28-Nov	0.1	Z	0.1	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.2																						
29-Nov	0.2	0.2	Z	0.1	0.1	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	5.5	4.0	2.6	7.0	5.1	1.6	4.1	1.4	7.0																						
30-Nov	1.3	1.1	0.3	Z	0.1	2.1	0.4	0.1	0.1	0.2	0.2	0.2	0.2	0.6	0.2	0.4	0.3	0.5	0.5	0.2	0.2	0.3	0.2	0.3	0.4	2.1																						
																								0.8	0.4	0.3	0.5	0.5	1.2	1.0	1.9	1.1	0.7	0.3	0.4	0.7	0.5	0.5	0.5	0.8	0.9	0.9	1.5	1.8	1.2	1.0	0.8	Diurnal Average
																								10.3	3.6	2.4	3.1	3.9	14.8	9.5	18.9	11.9	9.2	2.7	2.8	9.7	5.7	6.7	5.3	13.2	13.9	16.4	16.0	14.7	13.7	8.5	7.6	Diurnal Maximum
Z - zerospan      C - Calibration      M - Maintenance																																																
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 172 ppb      24-hr 48 ppb																																																



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

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Mannix - November 2023**





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

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Mannix - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 10	671	98.10	98.10
11 - 20	13	1.90	100.00
21 - 60	0	0.00	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 684

Total Number of Hours: 720



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

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Mannix - November 2023**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	19	31	12	16	27	20	67	170	36	31	24	46	62	37	19	25	642
11 - 20	11	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	13
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	30	31	12	16	28	20	67	170	36	31	24	46	62	37	19	26	655

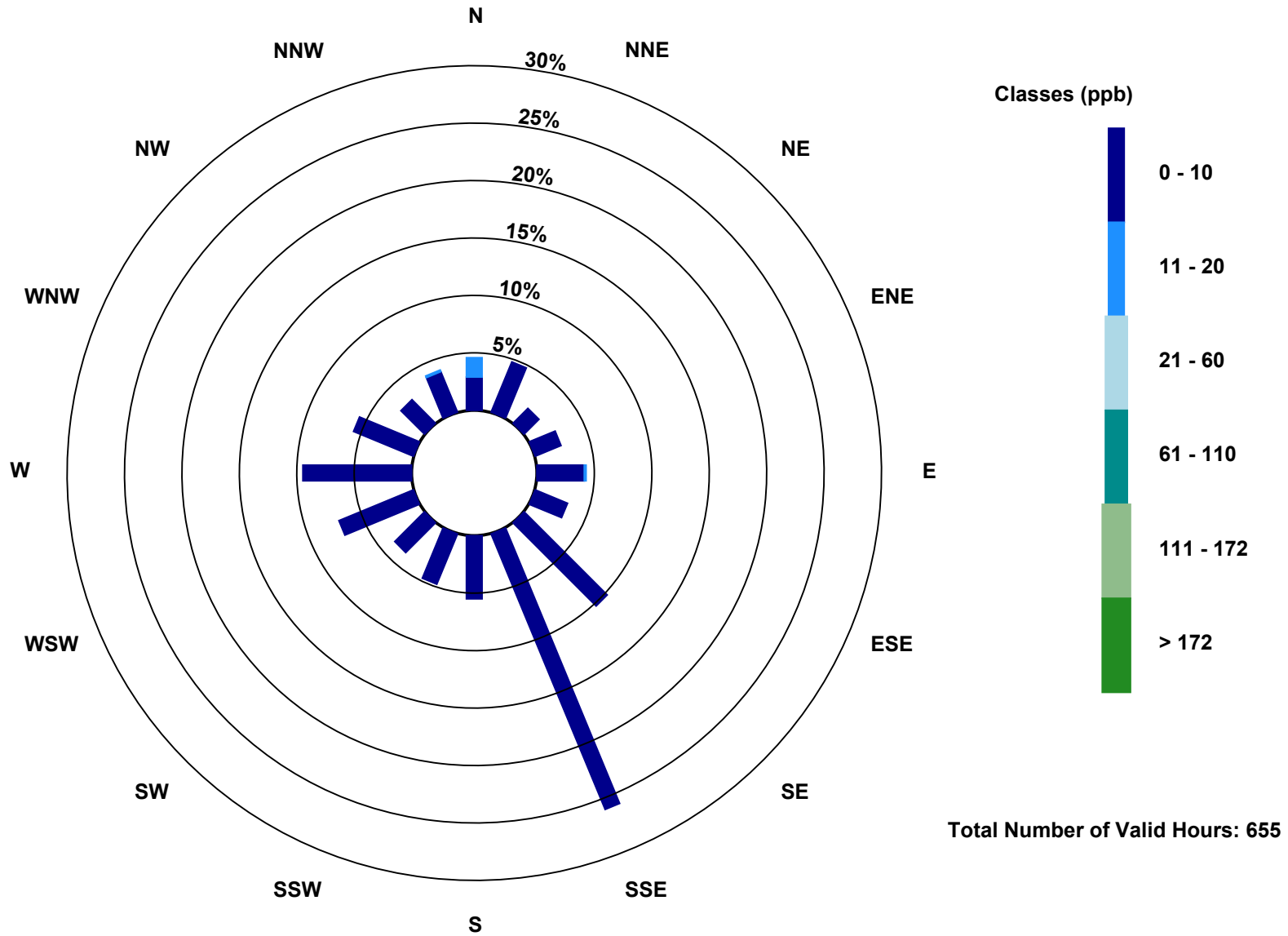
Total Number of Valid Hours: 655

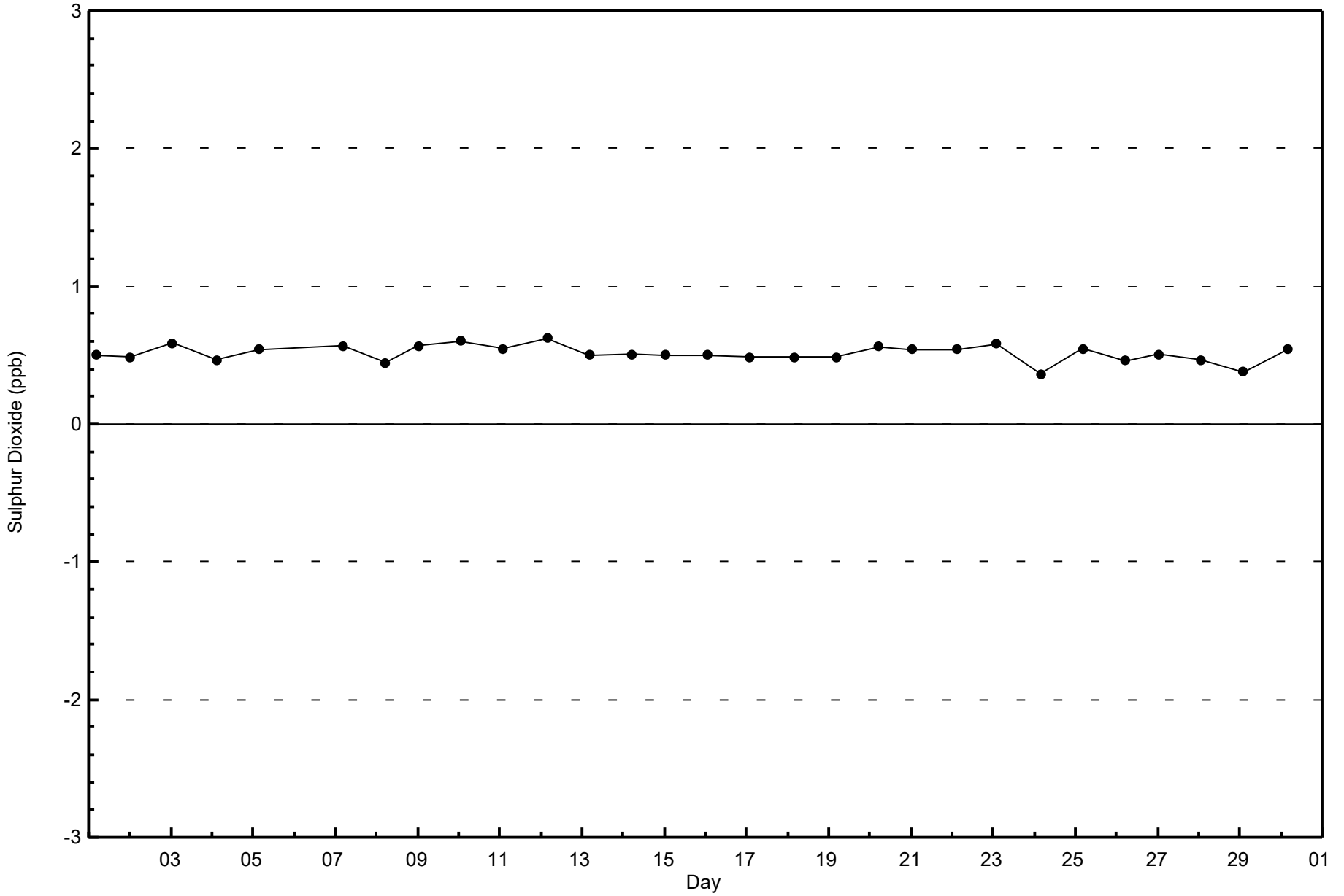
Total Number of Hours: 720

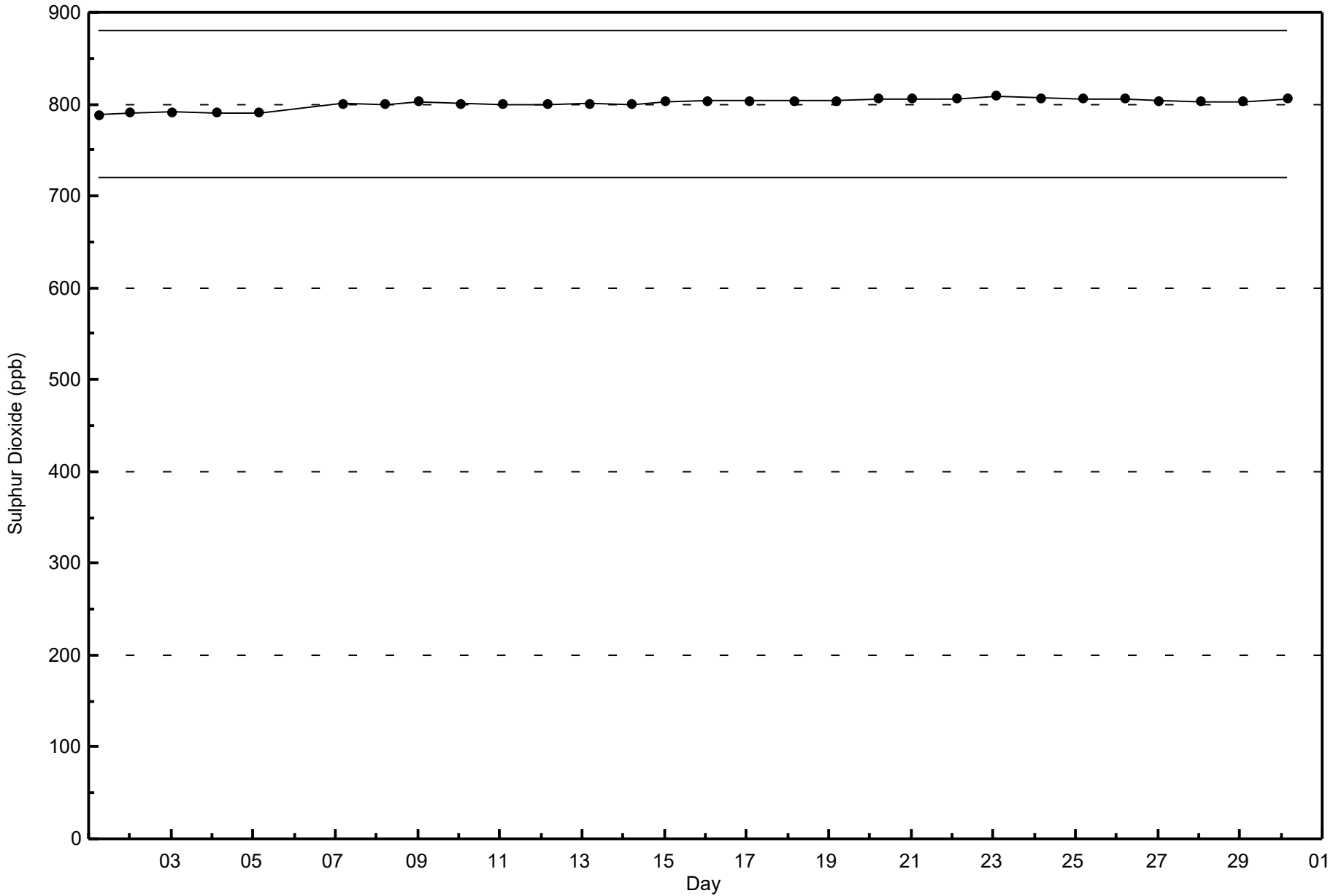


Wood Buffalo Environmental Association  
Wind Rose Nov 2023

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









# Wood Buffalo Environmental Association

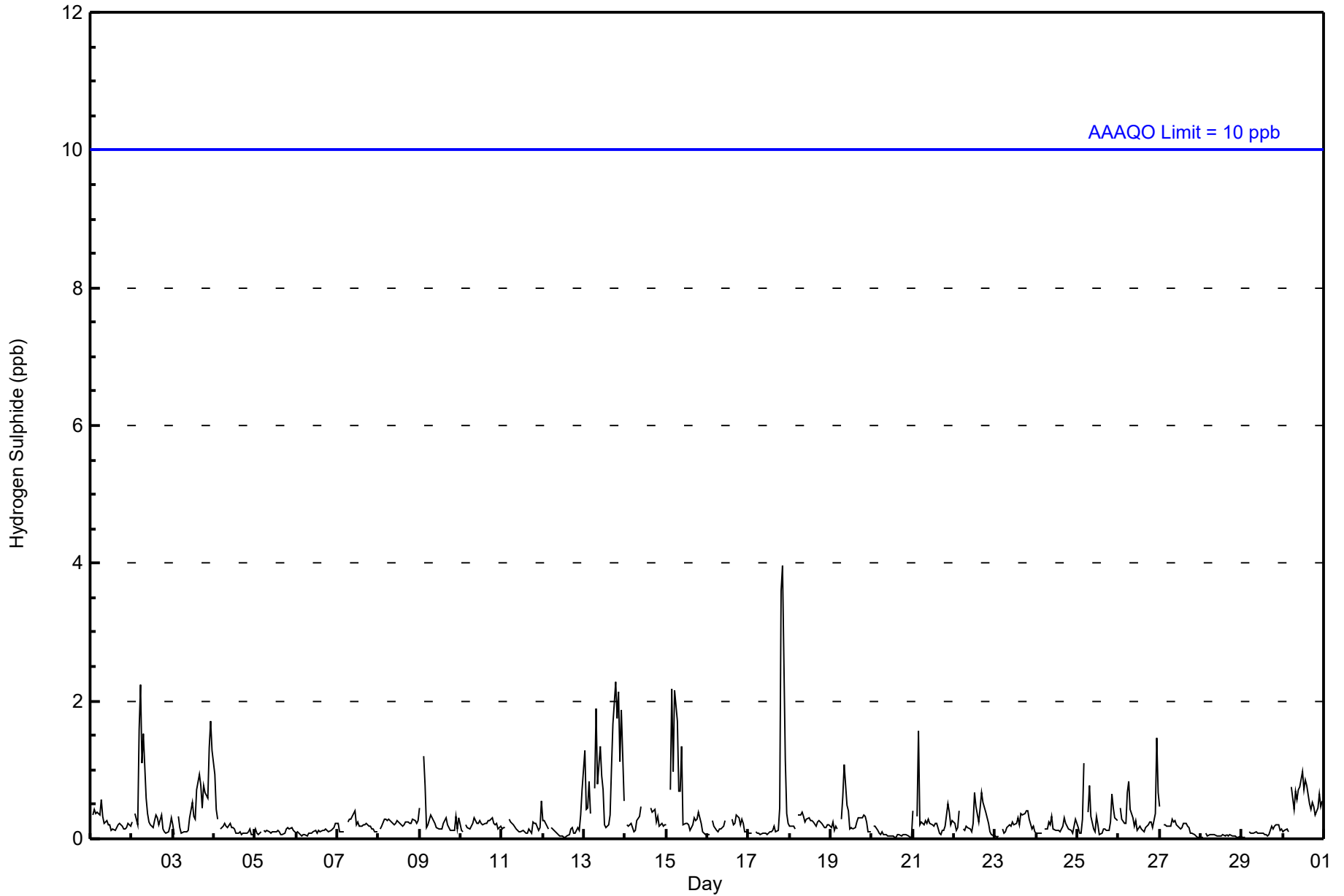
## Summary of Hour Averages

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

## Mannix - November 2023

Number of Exceedences (AAAQO):		1-hr: 0	24-hr: 0	Hours in Service:		720																																											
Maximum Value: 4.0 ppb on Nov 17 21:00		Maximum Daily Average: 1.0 ppb on Nov 13		Hours of Data:		683																																											
Minimum Value: 0.0 ppb on Nov 28 23:00		Minimum Daily Average: 0.0 ppb on Nov 28		Hours of Missing Data:		37																																											
Maximum Diurnal Average: 0.4 ppb at hour 21		Minimum Diurnal Average: 0.2 ppb at hour 2		Hours of Calibration:		34																																											
Monthly Average: 0.28 ppb		Percentiles: P <sub>1</sub> = 0.0 P <sub>10</sub> = 0.1 Q <sub>1</sub> = 0.1 Median = 0.2 Q <sub>3</sub> = 0.3 P <sub>90</sub> = 0.6 P <sub>99</sub> = 1.9		Percent Operational Time:		99.6																																											
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Nov	Z	0.3	0.4	0.4	0.4	0.3	0.6	0.3	0.2	0.3	0.2	0.2	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.1	0.2	0.2	0.2	0.2	0.2	0.5	2.2																					
2-Nov	0.2	Z	0.4	0.2	1.6	2.2	1.1	1.5	0.6	0.4	0.3	0.2	0.2	0.3	0.4	0.3	0.2	0.3	0.2	0.1	0.1	0.1	0.2	0.3	0.1	0.1	0.1	0.2	0.3	0.5	2.2																		
3-Nov	0.2	0.1	Z	0.3	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.3	0.5	0.3	0.3	0.7	0.9	0.8	0.4	0.8	0.7	0.6	1.3	1.7	1.3	0.5	1.7	0.5	1.7																				
4-Nov	0.9	0.4	0.3	Z	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	0.2	0.9																			
5-Nov	0.1	0.1	0.1	0.1	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2																			
6-Nov	0.1	0.1	0.1	0.0	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	0.1	0.1	0.1	0.1	0.1	0.2	0.2																		
7-Nov	0.2	0.1	0.1	0.1	0.1	Z	0.2	0.3	0.3	0.4	0.4	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.4																		
8-Nov	Z	0.1	0.2	0.3	0.3	0.3	0.3	0.3	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	0.3	0.3	0.2	0.3	0.2	0.3	0.2	0.3	0.2	0.3																	
9-Nov	0.4	Z	1.2	0.8	0.2	0.2	0.3	0.3	0.3	0.2	0.2	0.1	0.1	0.1	0.1	0.2	0.3	0.2	0.2	0.1	0.1	0.1	0.3	0.1	0.3	0.3	0.3	0.3	0.3	1.2	1.2																		
10-Nov	0.1	0.1	Z	0.2	0.2	0.1	0.2	0.2	0.3	0.2	0.2	0.3	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.1	0.2	0.2	0.2	0.2	0.2	0.3	0.3																		
11-Nov	0.2	0.2	0.2	Z	0.3	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	0.3	0.2	0.2	0.1	0.2	0.5	0.2	0.5	0.2	0.5	0.2	0.5																		
12-Nov	0.3	0.3	0.2	0.1	Z	0.2	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.1	0.1	0.2	0.1	0.3	0.7	0.2	0.7	0.2	0.7	0.2	0.7	0.2	0.7																	
13-Nov	1.3	0.4	0.4	0.8	0.4	Z	0.7	1.9	0.8	1.3	0.9	0.7	0.2	0.2	0.2	0.3	1.0	1.7	2.3	1.8	2.1	1.1	1.9	0.6	1.0	2.3	1.0	2.3	1.0	2.3																			
14-Nov	Z	0.2	0.2	0.2	0.2	0.1	0.1	0.3	0.3	0.3	0.5	C	C	C	C	C	0.4	0.4	0.4	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																	
15-Nov	0.2	Z	0.7	2.2	1.0	2.2	1.7	0.7	0.7	1.3	0.2	0.2	0.2	0.2	0.1	0.2	0.3	0.3	0.3	0.4	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.6	2.2																	
16-Nov	0.1	0.1	Z	0.3	0.2	0.1	0.1	0.1	0.1	0.1	0.2	0.3	M	M	M	0.3	0.2	0.2	0.4	0.3	0.2	0.3	0.2	0.1	0.1	0.2	0.4	0.3	0.2	0.3	0.2	0.4																	
17-Nov	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	0.1	0.1	0.4	3.6	4.0	1.1	0.4	0.2	0.5	4.0	0.5	4.0	0.5	4.0																		
18-Nov	0.2	0.2	0.2	0.1	Z	0.4	0.3	0.4	0.3	0.2	0.3	0.3	0.3	0.3	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	0.2	0.2	0.4																	
19-Nov	0.2	0.2	0.1	0.2	0.1	Z	0.3	0.6	1.1	0.5	0.4	0.1	0.2	0.1	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.1	0.1	0.3	1.1	0.3	1.1	0.3	1.1																		
20-Nov	Z	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.1	0.2	0.1	0.2	0.1	0.2	0.2																	
21-Nov	0.4	Z	0.3	1.6	0.2	0.2	0.2	0.3	0.2	0.3	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.2	0.5	0.4	0.2	0.3	0.3	1.6	0.3	1.6	0.3	1.6																			
22-Nov	0.2	0.1	0.2	0.4	Z	0.1	0.1	0.2	0.2	0.1	0.1	0.2	0.7	0.5	0.2	0.5	0.7	0.5	0.4	0.3	0.2	0.1	0.1	0.0	0.3	0.7	0.2	0.7	0.2	0.7	0.2	0.7																	
23-Nov	0.0	0.0	0.0	Z	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.2	0.4	0.3	0.4	0.4	0.4	0.3	0.2	0.2	0.1	0.2	0.4	0.2	0.4	0.2	0.4	0.2	0.4																	
24-Nov	0.1	0.1	0.1	0.1	Z	0.1	0.1	0.2	0.2	0.3	0.1	0.1	0.1	0.1	0.1	0.2	0.3	0.2	0.2	0.1	0.1	0.1	0.1	0.2	0.3	0.2	0.3	0.2	0.3	0.2	0.3	0.2	0.3																
25-Nov	0.2	0.1	0.1	0.3	1.1	Z	0.4	0.8	0.3	0.1	0.1	0.3	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.7	0.4	0.3	0.3	0.3	0.3	0.3	0.3	1.1	1.1																	
26-Nov	Z	0.4	0.3	0.2	0.2	0.7	0.8	0.4	0.3	0.2	0.3	0.1	0.2	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.3	0.2	0.4	1.5	0.7	0.3	1.5	0.3	1.5	0.3	1.5																		
27-Nov	0.5	Z	0.2	0.2	0.2	0.2	0.2	0.3	0.2	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.0	0.0	0.0	0.2	0.5	0.2	0.5	0.2	0.5																		
28-Nov	0.0	0.0	Z	0.1	0.0	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.1	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	0.1	0.1																
29-Nov	0.0	0.0	0.0	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	0.0	0.1	0.2	0.1	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2																
30-Nov	0.1	0.1	0.1	0.1	Z	0.8	0.4	0.7	0.6	0.7	0.7	1.0	0.7	0.8	0.8	0.5	0.4	0.5	0.5	0.3	0.4	0.6	0.5	0.6	0.5	0.6	0.5	0.6	0.5	0.6	0.5	0.6	1.0																
																								0.3	0.2	0.2	0.4	0.3	0.4	0.3	0.4	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.4	0.4	0.3	0.3	0.3	Diurnal Average	
																								1.3	0.4	1.2	2.2	1.6	2.2	1.7	1.9	1.1	1.3	0.9	1.0	0.7	0.8	0.8	0.9	1.0	1.7	2.3	3.6	4.0	1.3	1.9	1.3	Diurnal Maximum	
Z - zerospan      C - Calibration      M - Maintenance																																																	
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 10 ppb    24-hr 3 ppb																																																	







**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Hydrogen Sulphide (H<sub>2</sub>S) - ppb  
Mannix - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2	681	99.71	99.71
3 - 4	2	0.29	100.00
5 - 7	0	0.00	100.00
8 - 11	0	0.00	100.00
> 11	0	0.00	100.00

Total Number of Valid Hours: 683

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Hydrogen Sulphide (H<sub>2</sub>S) - ppb  
Mannix - November 2023**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	29	31	12	17	28	19	66	171	38	31	21	44	62	37	18	27	651
3 - 4	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	2
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	30	31	12	17	29	19	66	171	38	31	21	44	62	37	18	27	653

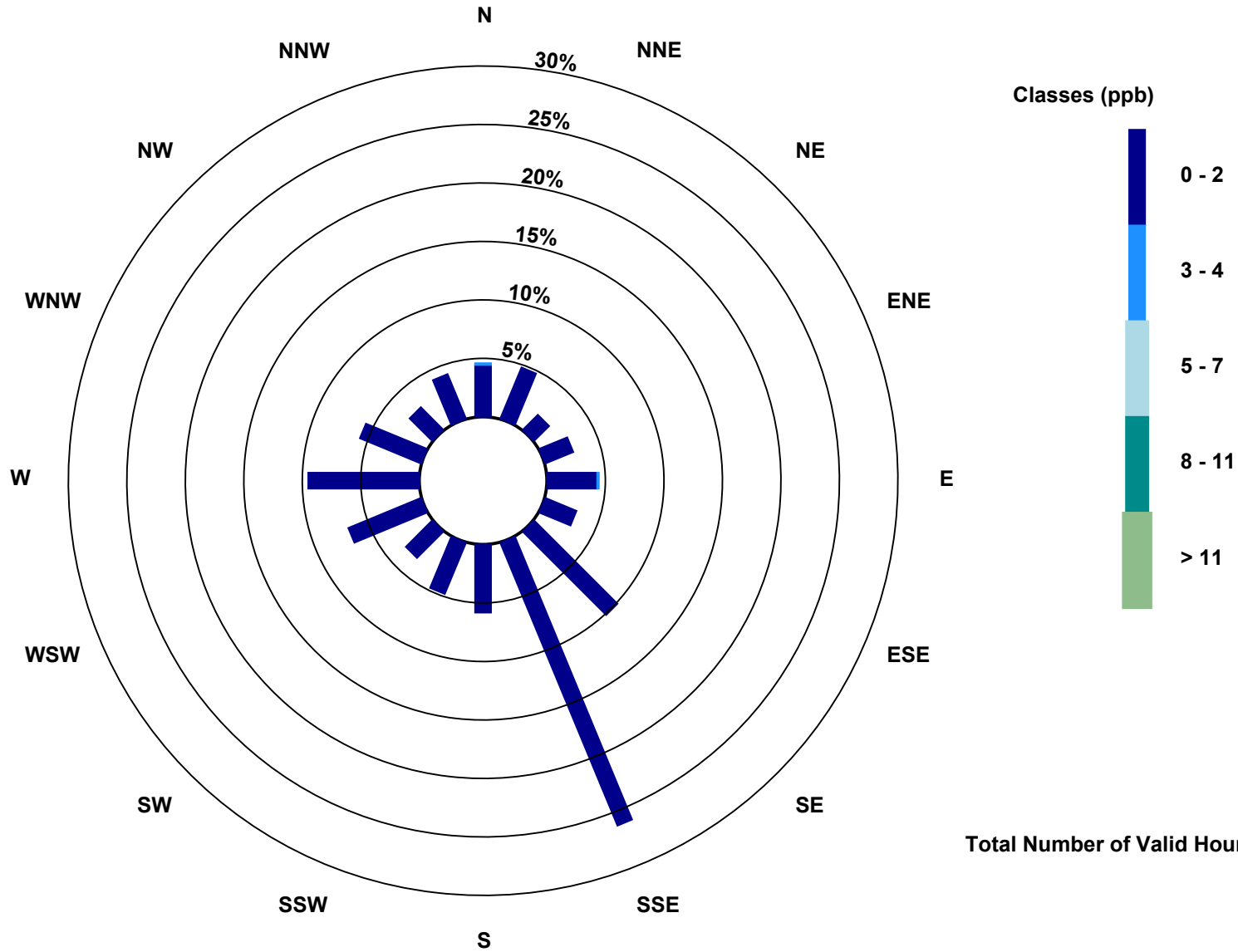
Total Number of Valid Hours: 653

Total Number of Hours: 720

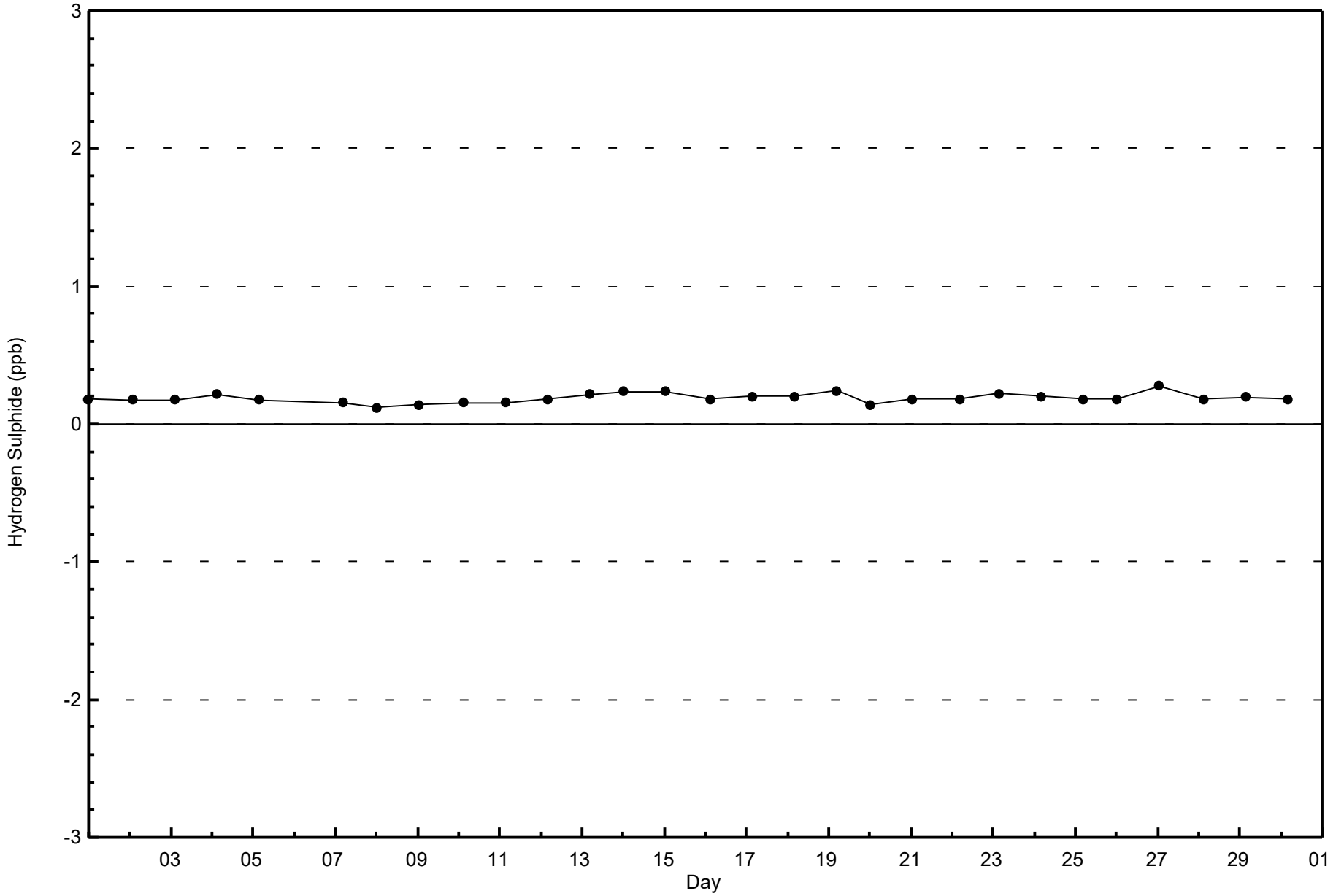


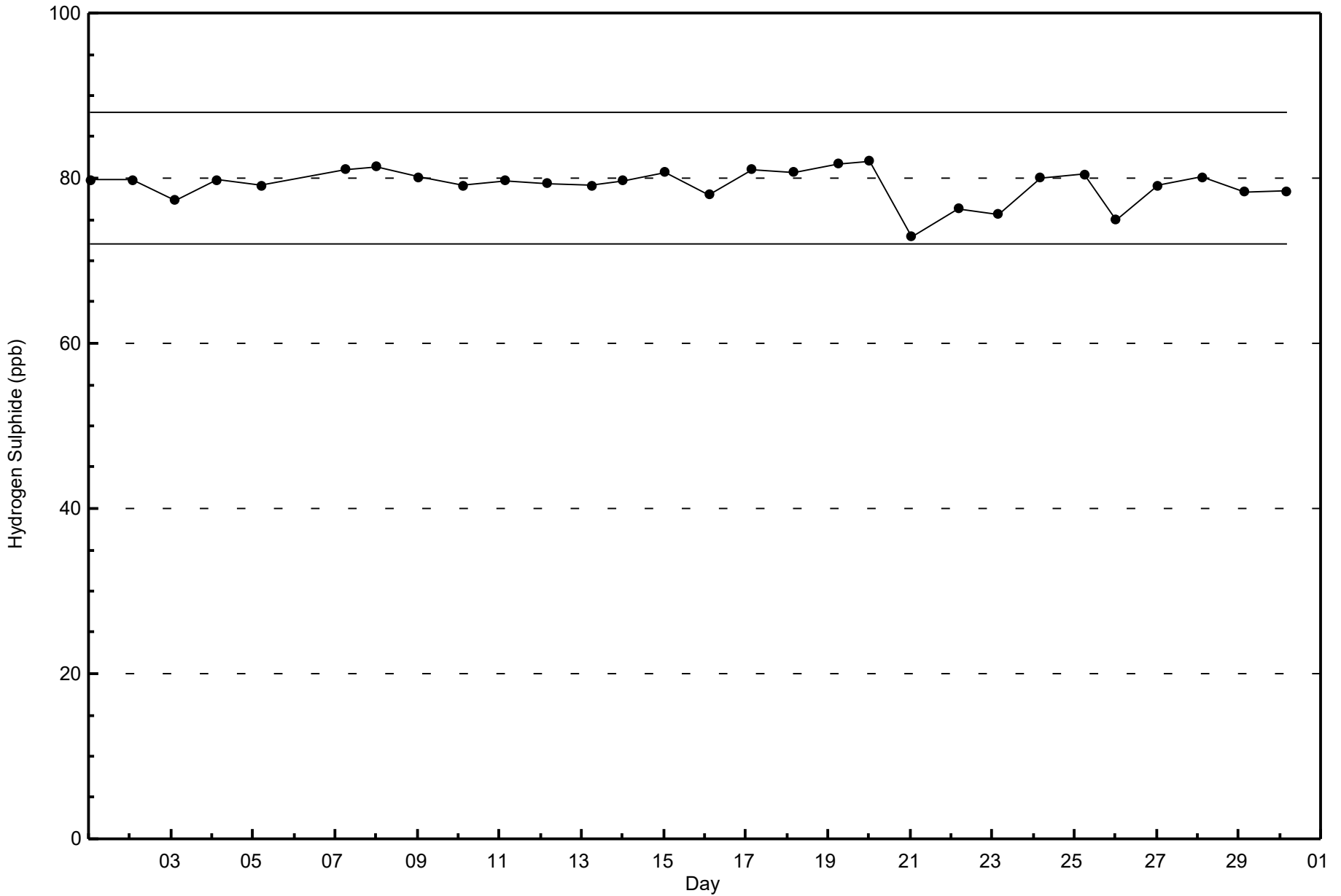
Wood Buffalo Environmental Association  
Wind Rose Nov 2023

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



Total Number of Valid Hours: 653



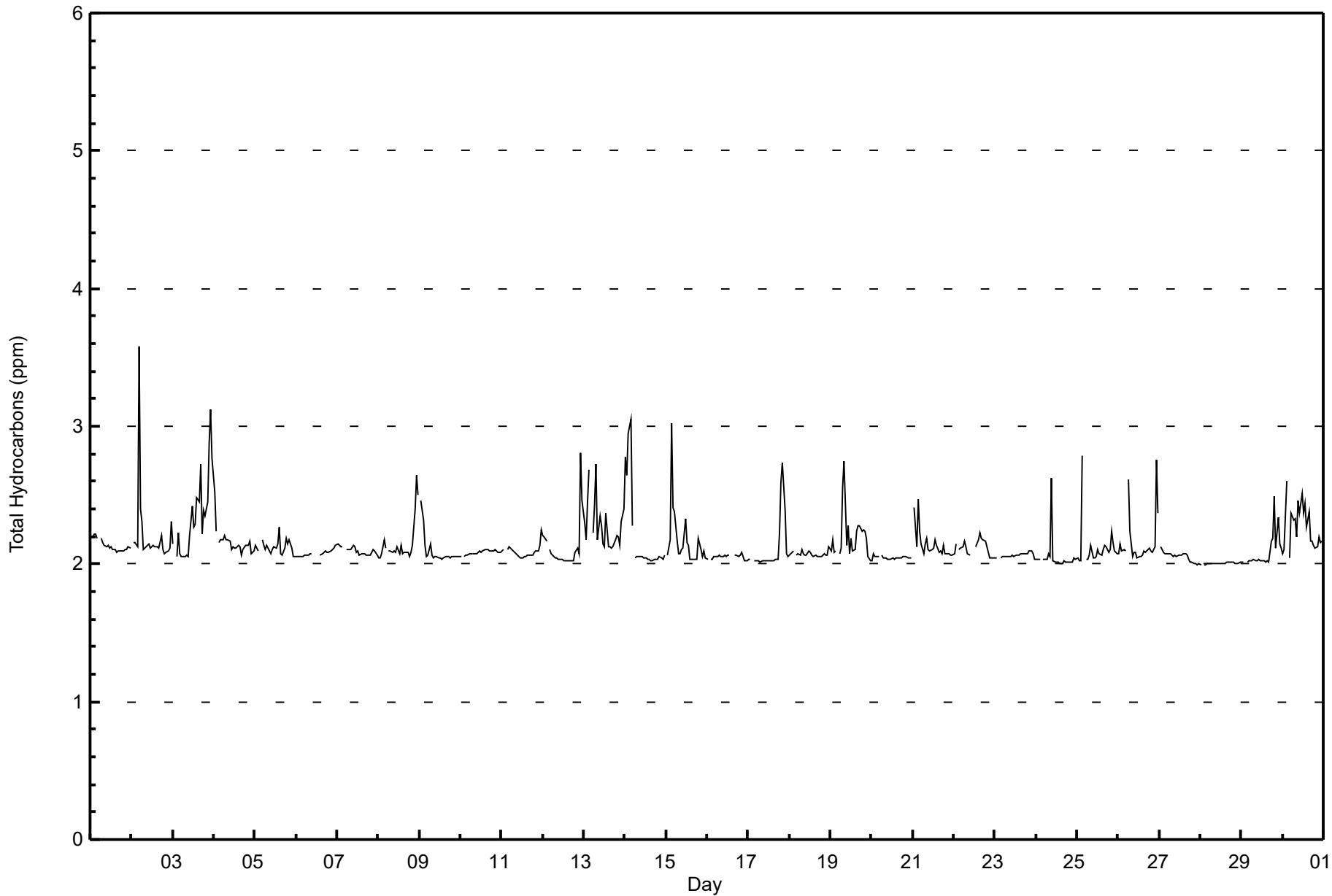






**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Total Hydrocarbons (THC) - ppm**  
**Mannix - November 2023**







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

**Total Hydrocarbons (THC) - ppm**  
**Mannix - November 2023**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2.0	165	24.19	24.19
2.1 - 3.0	515	75.51	99.71
3.1 - 10.0	2	0.29	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  
Mannix - November 2023**

<b>Concentration Ranges (ppm)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	1	0	0	0	0	0	6	18	4	10	15	38	50	18	0	3	163
2.1 - 3.0	27	30	12	15	28	20	61	153	32	21	9	8	12	19	19	22	488
3.1 - 10.0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	2
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	28	30	12	16	28	20	67	171	36	31	24	46	62	37	19	26	653

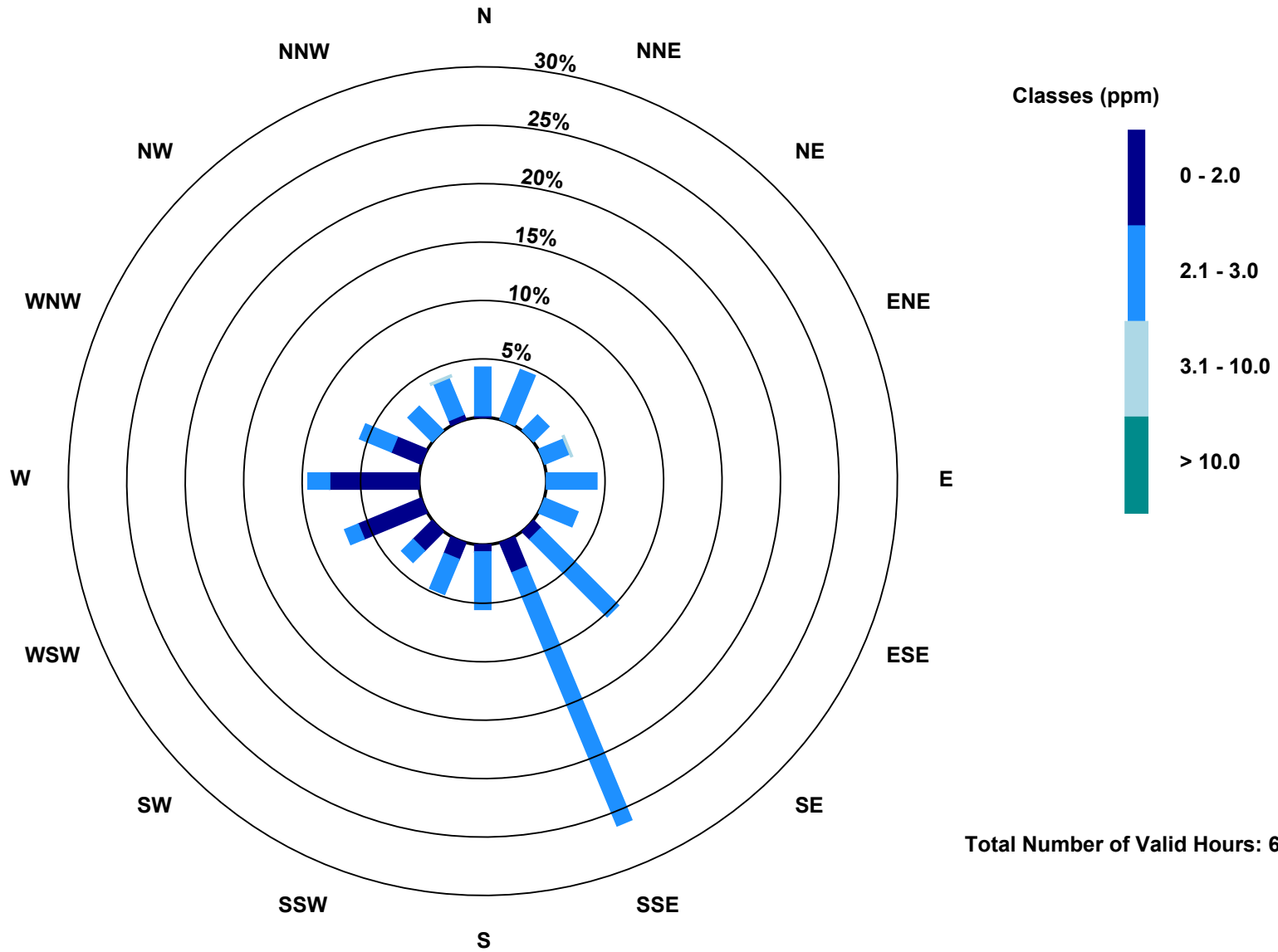
Total Number of Valid Hours: 653

Total Number of Hours: 720

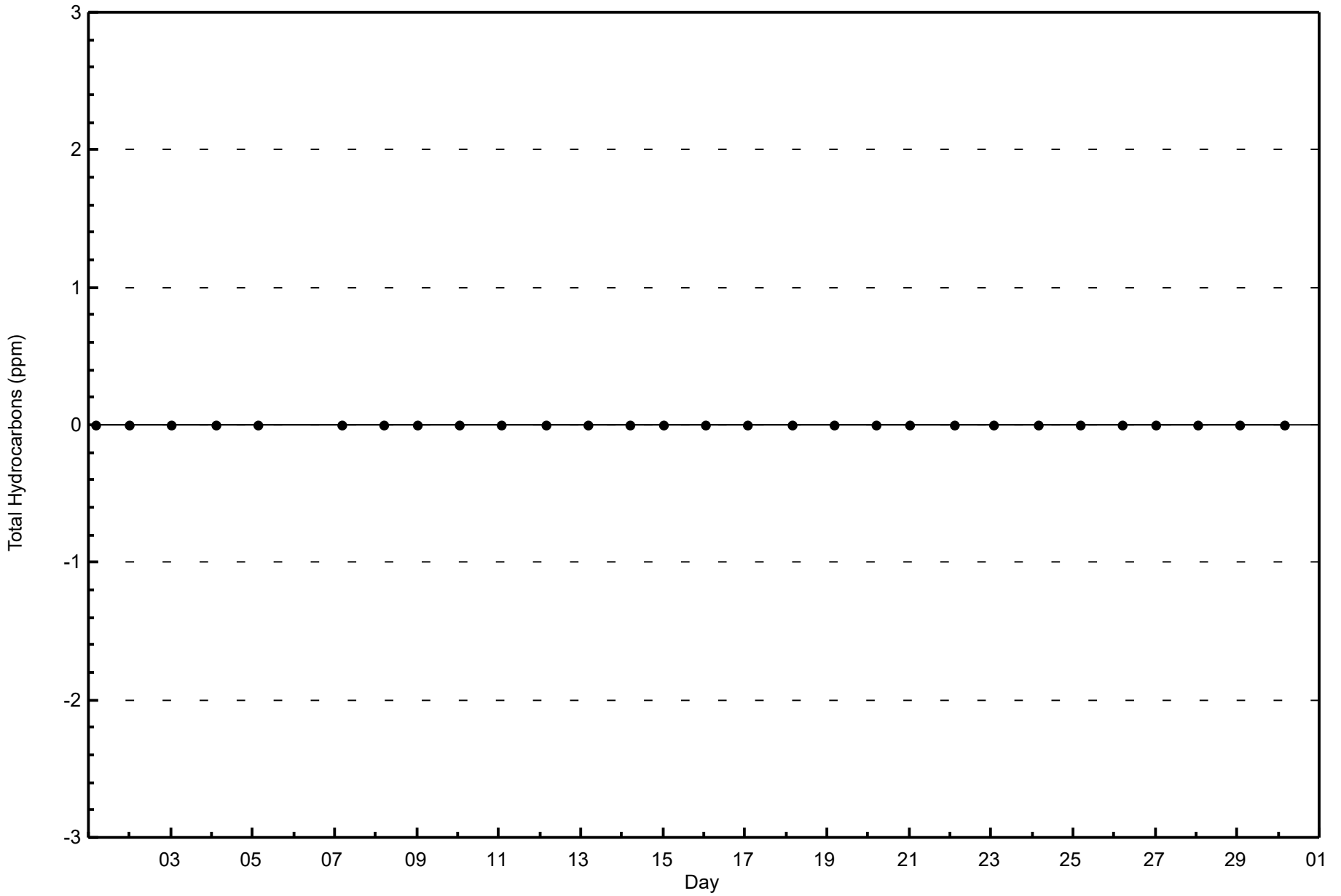


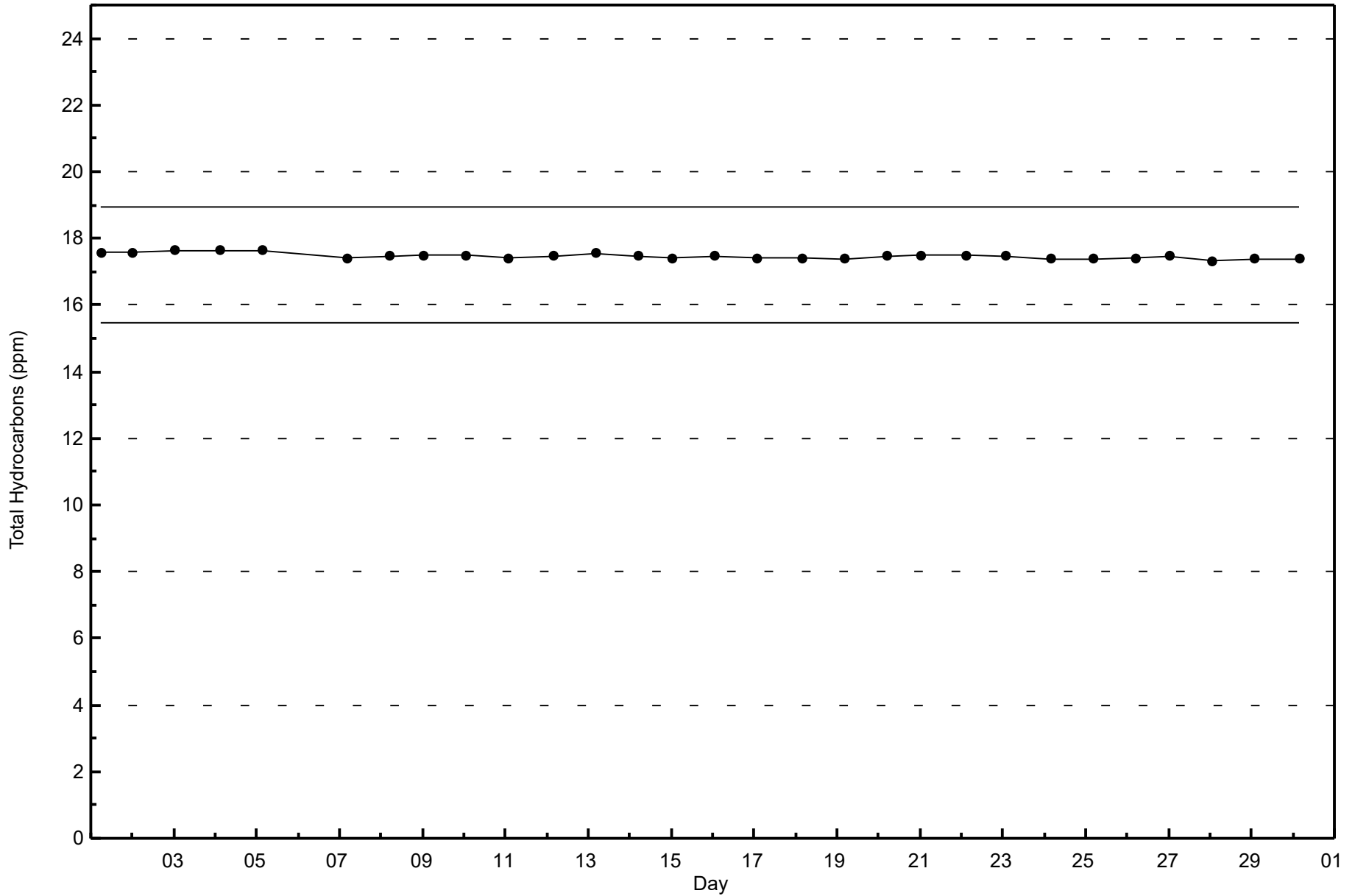
Wood Buffalo Environmental Association  
Wind Rose Nov 2023

Total Hydrocarbons (THC) - ppm  
Mannix



Total Number of Valid Hours: 653



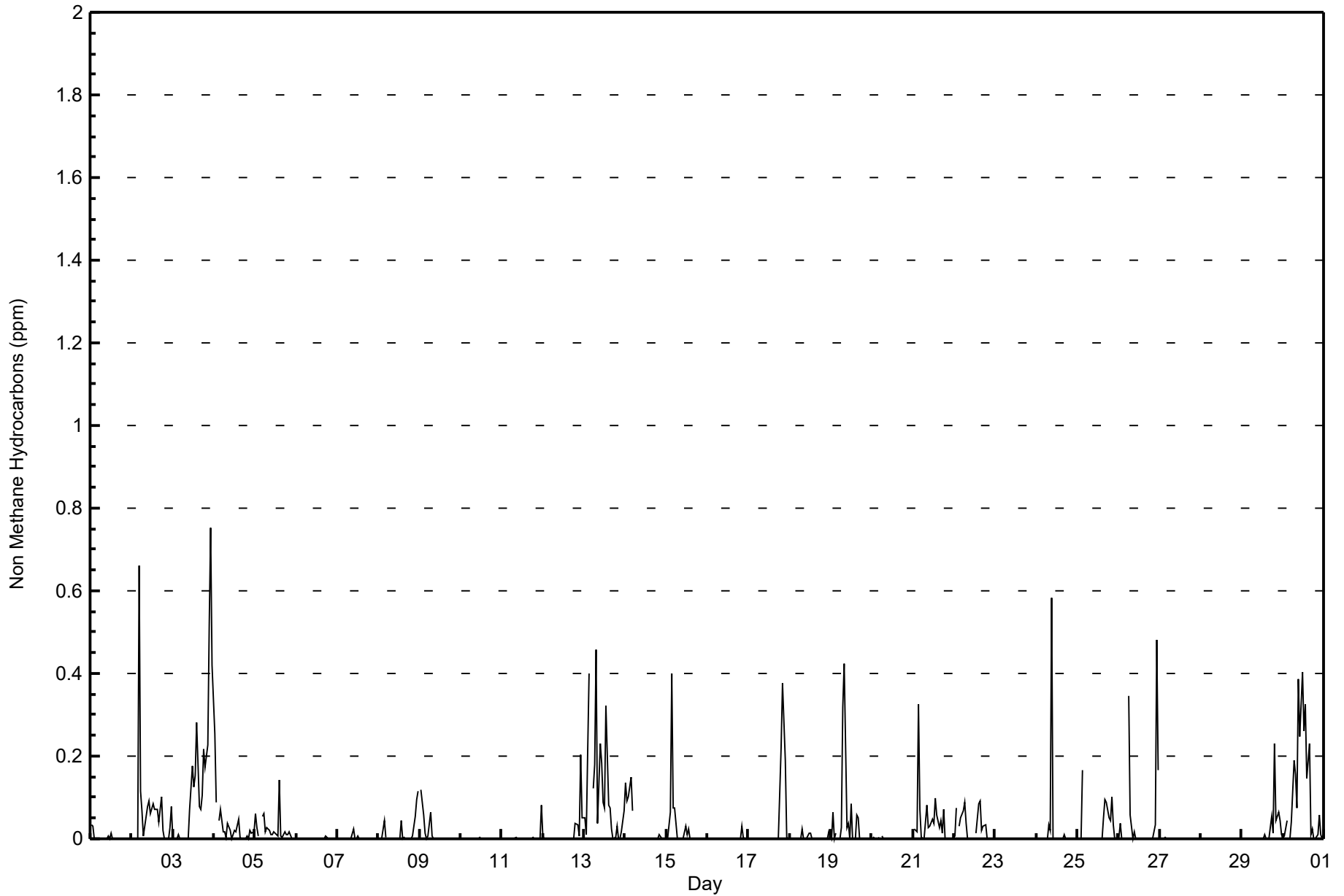




Summary of Hour Averages

Mannix - November 2023

Maximum Value: 0.752 ppm on Nov 3 23:00		Maximum Daily Average: 0.147 ppm on Nov 3		Hours in Service: 720																							
Minimum Value: 0.000 ppm on Nov 1 03:00		Minimum Daily Average: 0.000 ppm on Nov 23		Hours of Data: 682																							
Maximum Diurnal Average: 0.064 ppm at hour 4		Minimum Diurnal Average: 0.012 ppm at hour 17		Hours of Missing Data: 38																							
Monthly Average: 0.030 ppm		Percentiles: P <sub>1</sub> = 0.0 P <sub>10</sub> = 0.0 Q <sub>1</sub> = 0.0 Median = 0.0 Q <sub>3</sub> = 0.0 P <sub>90</sub> = 0.1 P <sub>99</sub> = 0.4		Hours of Calibration: 33																							
				Percent Operational Time: 99.3																							
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Nov	0.032	0.030	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.006	0.000	0.015	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.032	
2-Nov	Z	0.000	0.000	0.000	0.660	0.114	0.069	0.007	0.053	0.076	0.090	0.063	0.085	0.072	0.071	0.072	0.041	0.103	0.020	0.001	0.000	0.000	0.027	0.078	0.074	0.660	
3-Nov	0.000	Z	0.000	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.073	0.175	0.126	0.154	0.281	0.076	0.071	0.106	0.216	0.174	0.228	0.514	0.752	0.419	0.147	0.752	
4-Nov	0.253	0.089	Z	0.044	0.070	0.016	0.016	0.004	0.039	0.019	0.000	0.009	0.020	0.015	0.049	0.002	0.000	0.000	0.002	0.008	0.002	0.022	0.013	0.017	0.031	0.253	
5-Nov	0.060	0.027	0.006	Z	0.056	0.059	0.018	0.029	0.020	0.012	0.010	0.017	0.010	0.007	0.144	0.006	0.004	0.016	0.011	0.011	0.016	0.000	0.000	0.000	0.023	0.144	
6-Nov	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	C	C	C	C	0.000	0.000	0.000	0.005	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.005	
7-Nov	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.024	0.000	0.000	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.024	
8-Nov	0.000	0.000	0.000	0.044	0.004	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.043	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.005	0.053	0.095	0.117	0.016	0.117	
9-Nov	Z	0.120	0.057	0.014	0.000	0.007	0.065	0.008	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.012	0.120	
10-Nov	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	
11-Nov	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.002	0.000	0.000	0.000	0.080	0.004	0.080	
12-Nov	0.007	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	0.036	0.035	0.008	0.204	0.052	0.015	0.204	
13-Nov	0.049	0.010	0.210	0.401	Z	0.120	0.179	0.458	0.037	0.229	0.182	0.087	0.074	0.321	0.081	0.074	0.022	0.000	0.003	0.030	0.000	0.000	0.019	0.067	0.115	0.458	
14-Nov	0.134	0.091	0.103	0.148	0.069	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	0.009	0.000	0.000	0.000	0.024	0.148	
15-Nov	Z	0.000	0.064	0.401	0.075	0.074	0.000	0.000	0.000	0.000	0.000	0.031	0.009	0.024	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.030	0.401	
16-Nov	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	M	M	0.000	0.000	0.000	0.000	0.030	0.002	0.000	0.000	0.002	0.030	
17-Nov	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.107	0.221	0.377	0.188	0.004	0.000	0.039	0.377	
18-Nov	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.025	0.000	0.000	0.000	0.013	0.014	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.017	0.003	0.025	
19-Nov	0.000	0.066	0.000	0.014	Z	0.000	0.026	0.319	0.424	0.028	0.038	0.000	0.084	0.000	0.000	0.056	0.052	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.048	0.424	
20-Nov	0.000	0.004	0.000	0.001	0.005	Z	0.008	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.008	
21-Nov	Z	0.022	0.016	0.324	0.070	0.004	0.000	0.041	0.082	0.029	0.029	0.046	0.037	0.097	0.059	0.027	0.043	0.014	0.071	0.000	0.000	0.000	0.000	0.000	0.044	0.324	
22-Nov	0.008	0.073	Z	0.032	0.050	0.066	0.088	0.036	0.000	0.000	M	M	M	0.015	0.086	0.093	0.021	0.032	0.034	0.000	0.000	0.000	0.000	0.000	0.032	0.093	
23-Nov	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
24-Nov	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.032	0.019	0.583	0.000	0.000	0.000	0.000	0.000	0.010	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.028	0.583	
25-Nov	0.000	0.000	0.000	0.166	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.049	0.095	0.089	0.051	0.044	0.101	0.033	0.000	0.003	0.027	0.166	
26-Nov	0.005	0.037	0.000	0.000	0.000	Z	0.344	0.057	0.000	0.018	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.033	0.481	0.165	0.050	0.481	
27-Nov	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	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	
28-Nov	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
29-Nov	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.009	0.000	0.000	0.000	0.055	0.013	0.230	0.043	0.065	0.044	0.012	0.020	0.230	
30-Nov	0.003	0.008	0.045	Z	0.000	0.042	0.189	0.155	0.076	0.386	0.248	0.402	0.262	0.326	0.147	0.230	0.011	0.022	0.000	0.000	0.011	0.058	0.011	0.000	0.114	0.402	
		0.022	0.022	0.021	0.064	0.041	0.020	0.033	0.039	0.025	0.047	0.024	0.030	0.026	0.037	0.032	0.024	0.012	0.015	0.018	0.025	0.029	0.033	0.055	0.034	Diurnal Average	
		0.253	0.120	0.210	0.401	0.660	0.120	0.344	0.458	0.424	0.583	0.248	0.402	0.262	0.326	0.281	0.230	0.095	0.106	0.216	0.230	0.377	0.514	0.752	0.419	Diurnal Maximum	
Z - zerospan		C - Calibration				M - Maintenance																					





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Non Methane Hydrocarbons (NMHC) - ppm  
Mannix - November 2023**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 0.005	466	68.33	68.33
0.006 - 0.05	111	16.28	84.60
0.06 - 0.1	65	9.53	94.13
> 0.1	40	5.87	100.00

Total Number of Valid Hours: 682

Total Number of Hours: 720





**Wood Buffalo Environmental Association  
Frequency Distribution**

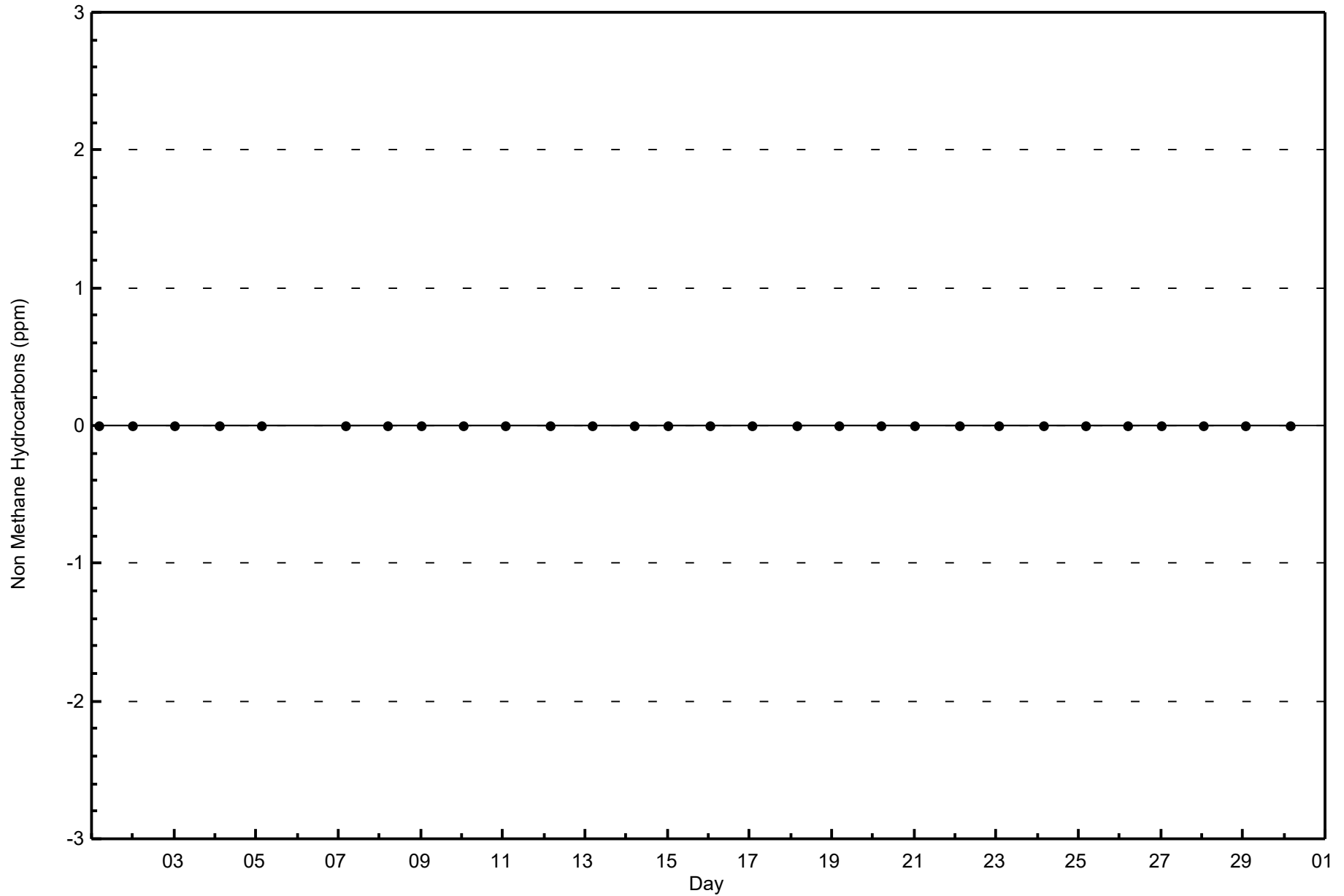
**Non Methane Hydrocarbons (NMHC) - ppm  
Mannix - November 2023**

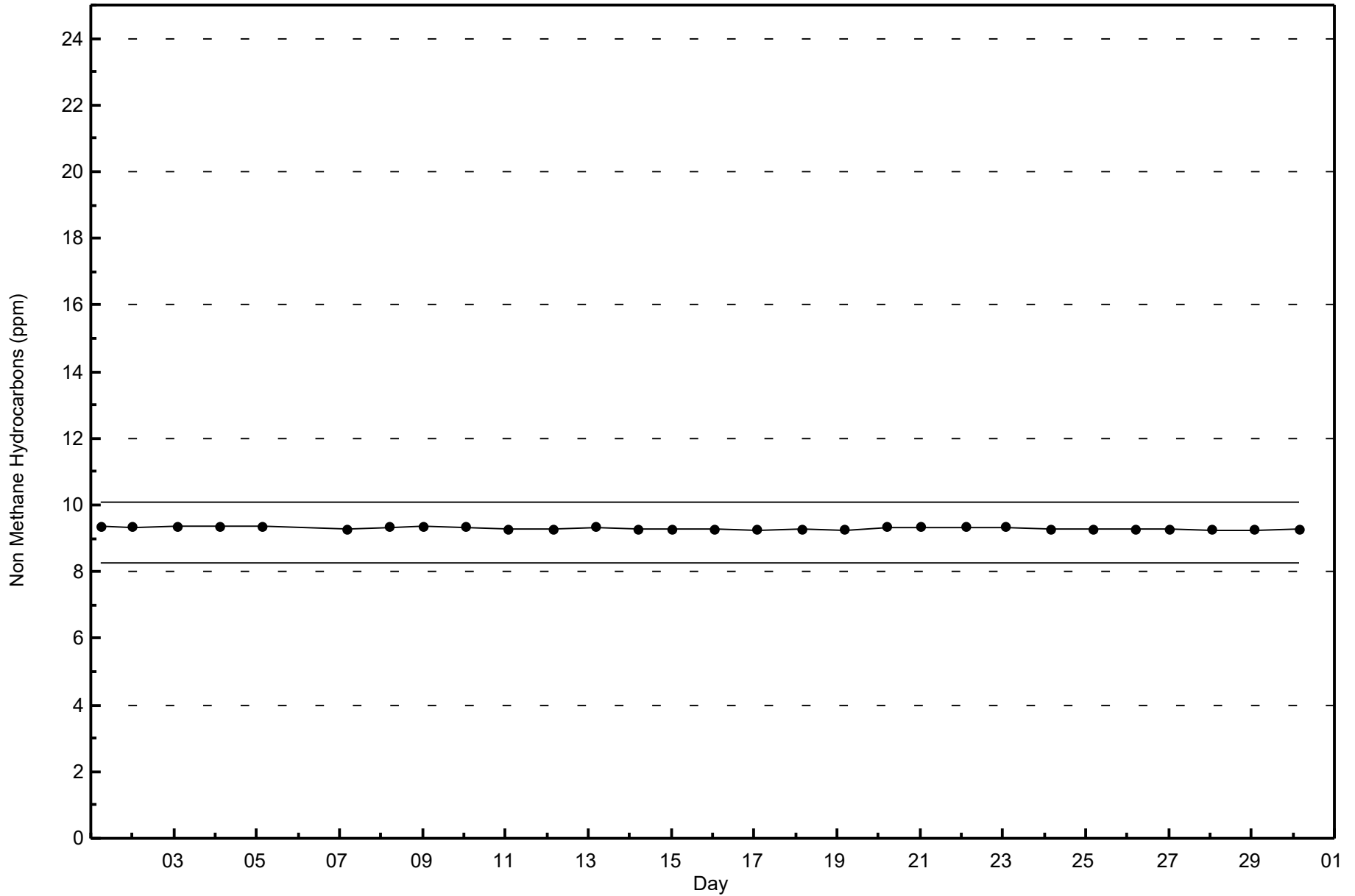
<b>Concentration Ranges (ppm)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 0.005	10	2	0	0	2	6	51	153	33	27	20	43	59	24	5	12	447
0.006 - 0.05	11	5	0	4	17	10	13	14	2	2	2	2	1	9	8	6	106
0.06 - 0.1	5	18	5	3	6	1	3	2	1	1	1	0	2	3	4	5	60
> 0.1	2	5	7	9	3	3	0	2	0	1	1	1	0	1	2	3	40
<b>Totals</b>	<b>28</b>	<b>30</b>	<b>12</b>	<b>16</b>	<b>28</b>	<b>20</b>	<b>67</b>	<b>171</b>	<b>36</b>	<b>31</b>	<b>24</b>	<b>46</b>	<b>62</b>	<b>37</b>	<b>19</b>	<b>26</b>	<b>653</b>

Total Number of Valid Hours: 653

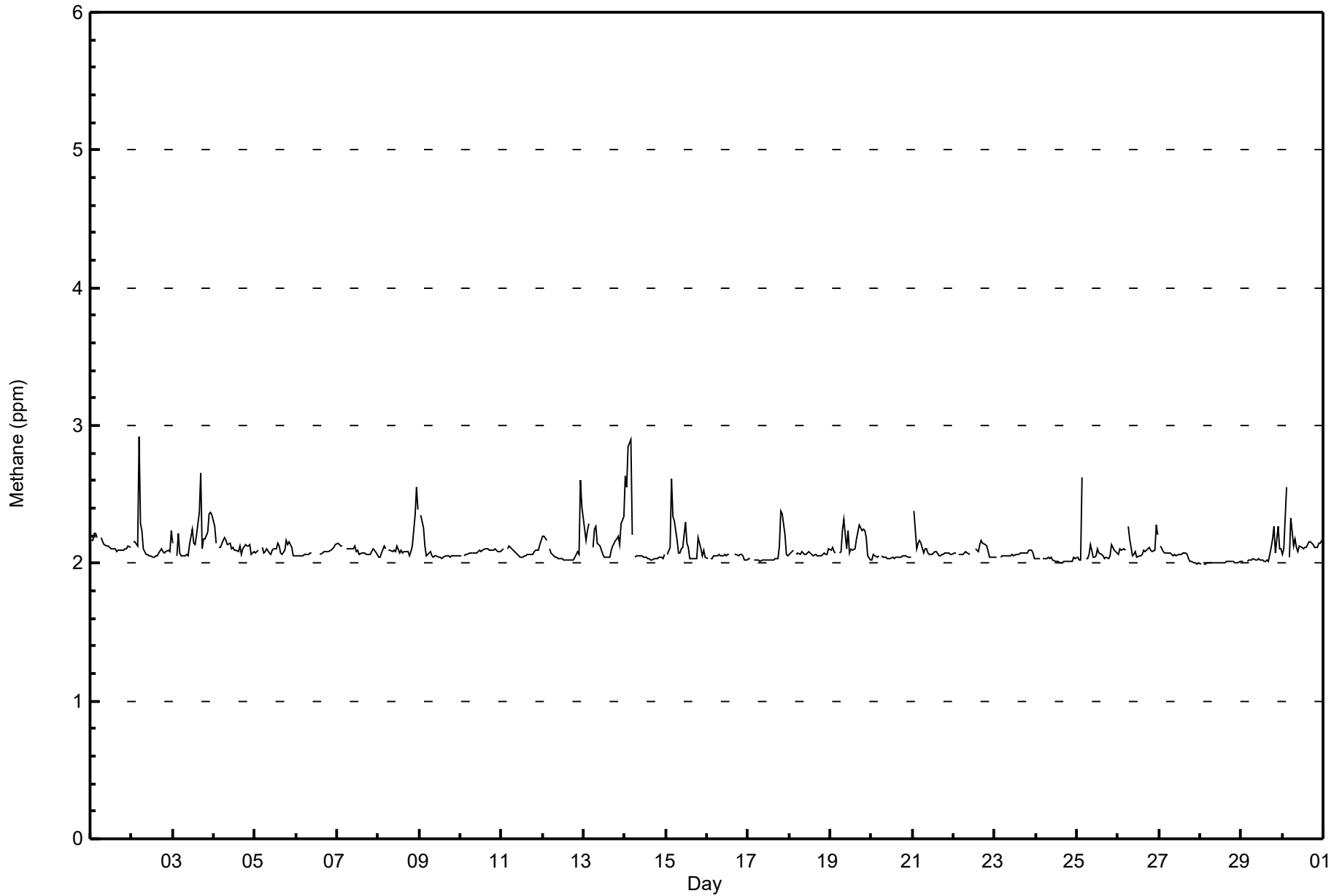
Total Number of Hours: 720













**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Methane (CH<sub>4</sub>) - ppm  
Mannix - November 2023**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2.0	182	26.69	26.69
2.1 - 3.0	500	73.31	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 682

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Methane (CH<sub>4</sub>) - ppm  
Mannix - November 2023**

<b>Concentration Ranges (ppm)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 2.0	2	9	0	0	0	0	6	20	4	10	16	39	50	21	0	3	180
2.1 - 3.0	26	21	12	16	28	20	61	151	32	21	8	7	12	16	19	23	473
3.1 - 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	<b>28</b>	<b>30</b>	<b>12</b>	<b>16</b>	<b>28</b>	<b>20</b>	<b>67</b>	<b>171</b>	<b>36</b>	<b>31</b>	<b>24</b>	<b>46</b>	<b>62</b>	<b>37</b>	<b>19</b>	<b>26</b>	<b>653</b>

Total Number of Valid Hours: 653

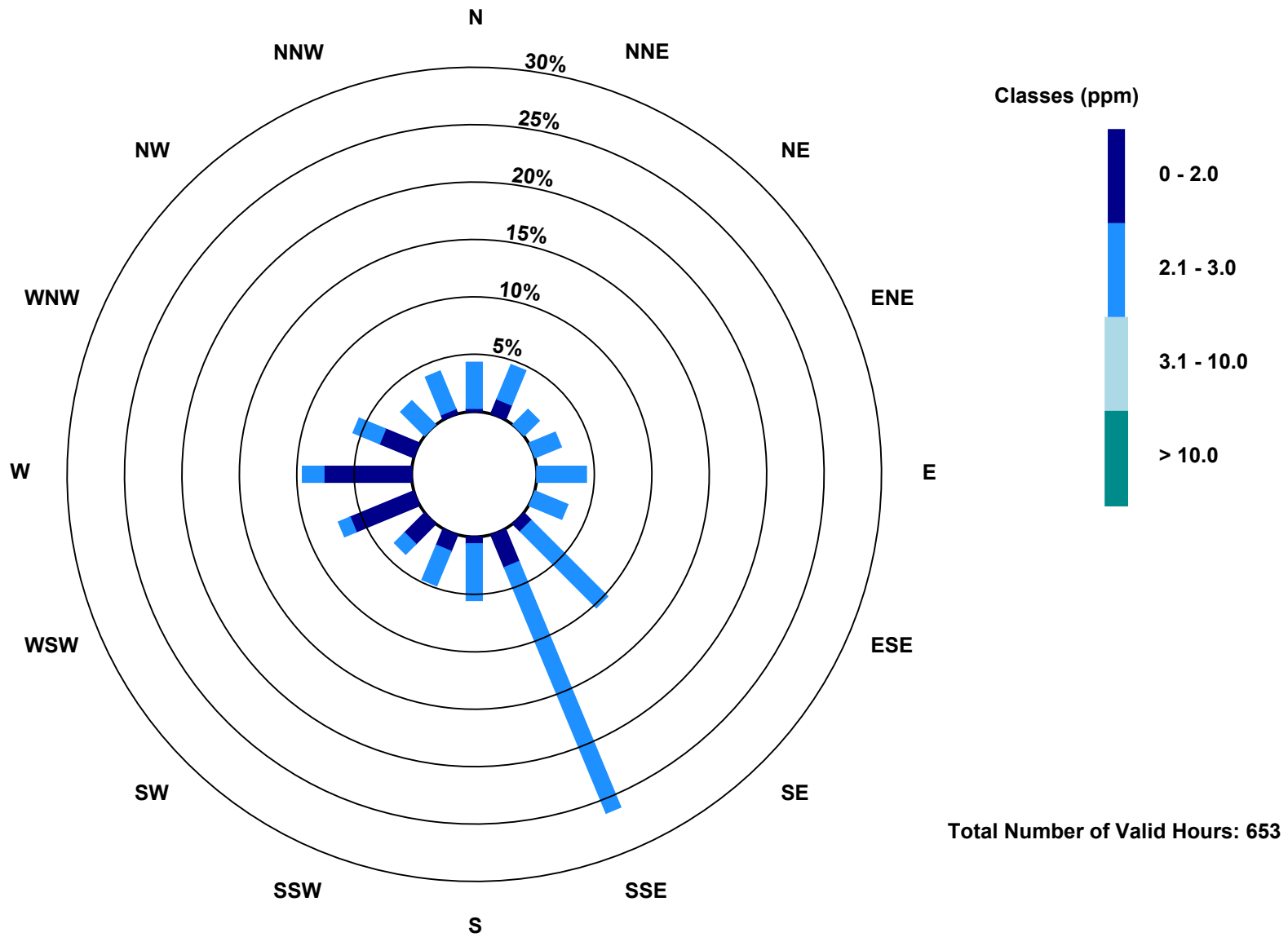
Total Number of Hours: 720

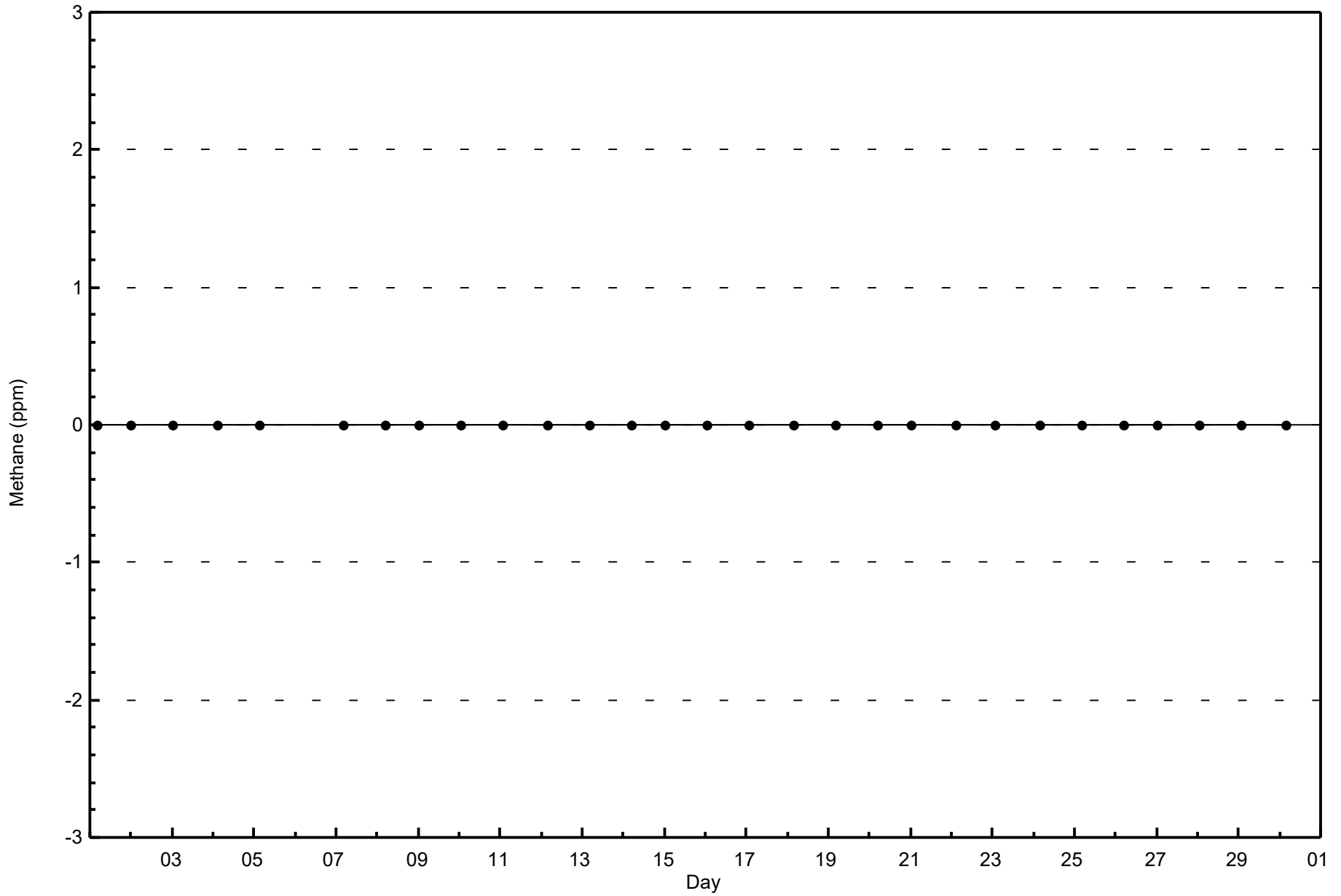


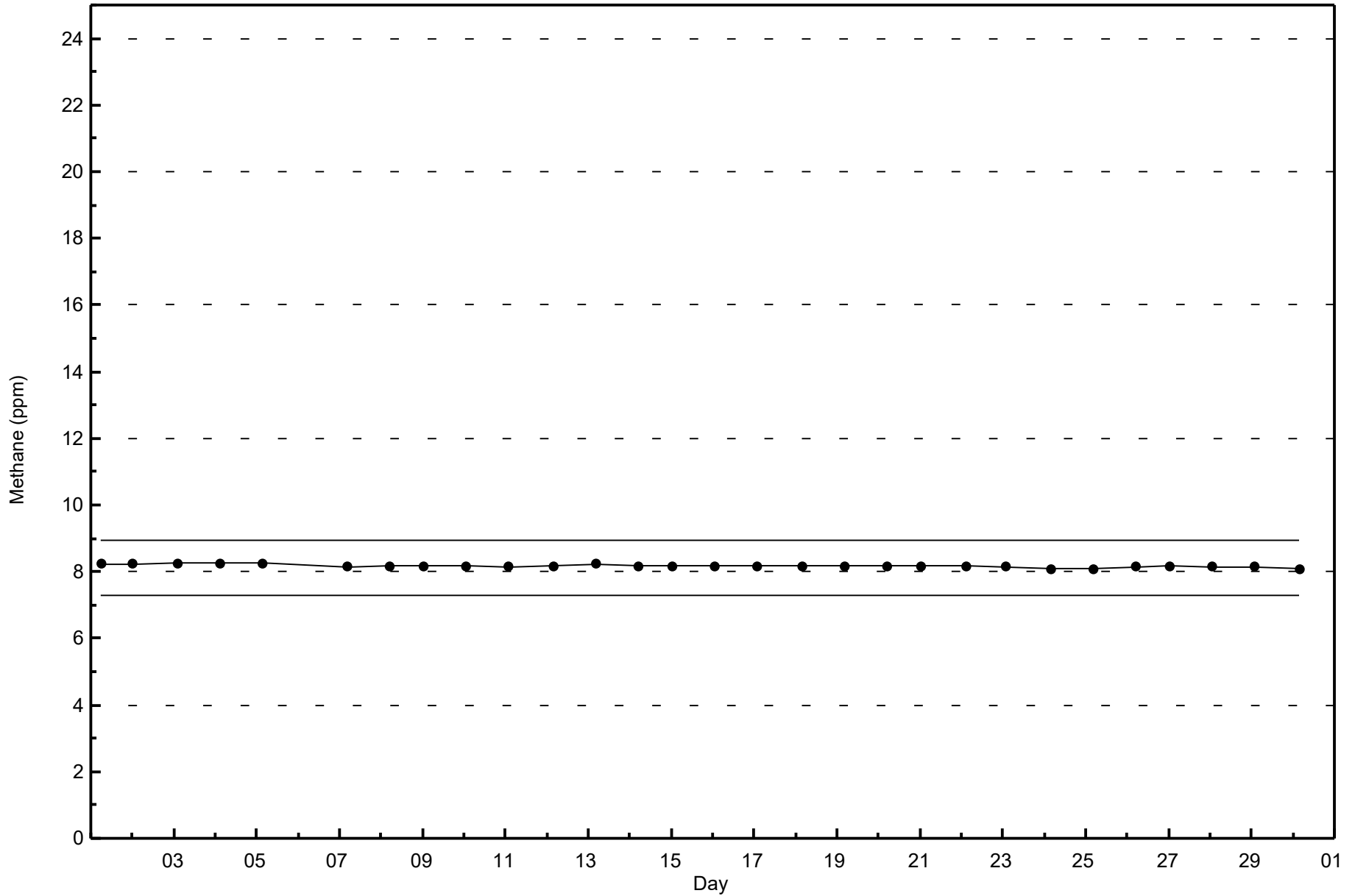


Wood Buffalo Environmental Association  
Wind Rose Nov 2023

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







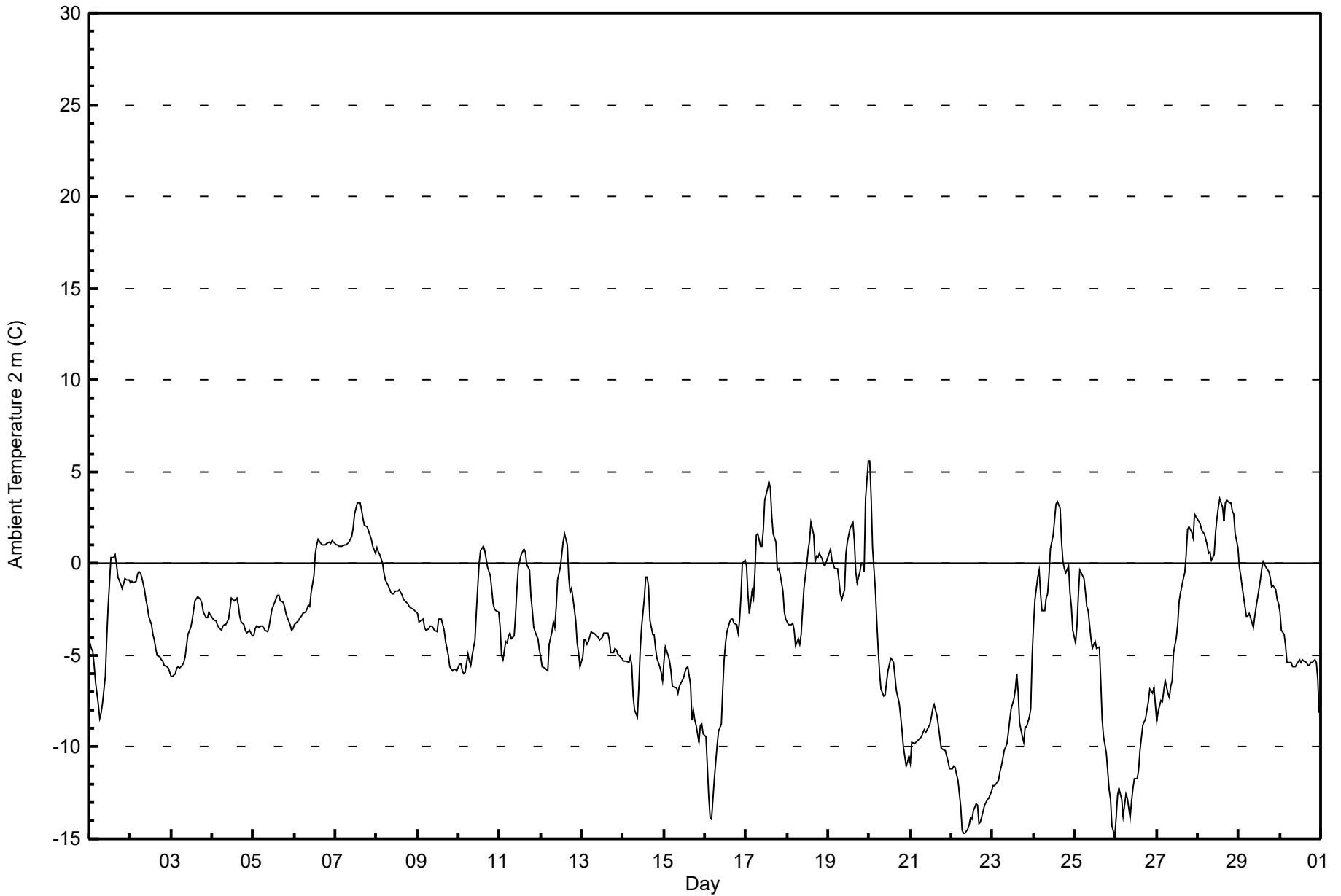


Maximum Value: 5.6 C on Nov 20 00:00      Maximum Daily Average: 2.1 C on Nov 28																				Hours in Service: 720 Hours of Data: 720						
Minimum Value: -14.8 C on Nov 26 00:00      Minimum Daily Average: -13.2 C on Nov 22 Maximum Diurnal Average: -1.9 C at hour 15      Minimum Diurnal Average: -4.9 C at hour 9 Monthly Average: -3.80 C      Percentiles: P <sub>1</sub> = -14.1 P <sub>10</sub> = -9.8 Q <sub>1</sub> = -5.8 Median = -3.4 Q <sub>3</sub> = -0.7 P <sub>90</sub> = 1.1 P <sub>99</sub> = 3.5																				Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	-4.3	-4.6	-4.8	-5.5	-6.5	-7.7	-8.5	-8.2	-7.6	-6.2	-4.1	-2.4	-1.0	0.3	0.4	0.5	-0.1	-0.7	-1.1	-1.4	-1.1	-0.8	-0.9	-0.9	-3.2	0.5
2-Nov	-1.0	-1.0	-1.0	-0.9	-0.6	-0.5	-0.5	-0.8	-1.4	-2.0	-2.3	-2.8	-3.3	-3.8	-4.2	-4.6	-5.0	-5.1	-5.2	-5.3	-5.5	-5.6	-5.7	-5.9	-3.1	-0.5
3-Nov	-6.1	-6.2	-6.0	-5.7	-5.6	-5.7	-5.5	-5.4	-5.1	-4.5	-3.9	-3.5	-3.1	-2.6	-2.1	-1.8	-1.9	-1.9	-2.2	-2.7	-3.0	-2.9	-2.7	-2.8	-3.9	-1.8
4-Nov	-3.0	-3.1	-3.1	-3.3	-3.5	-3.6	-3.4	-3.3	-3.3	-3.0	-2.5	-1.9	-2.0	-2.0	-1.9	-2.2	-2.9	-3.2	-3.3	-3.6	-3.8	-3.7	-3.7	-4.0	-3.1	-1.9
5-Nov	-4.0	-3.6	-3.4	-3.5	-3.4	-3.4	-3.5	-3.6	-3.7	-3.4	-2.9	-2.5	-2.1	-1.9	-1.7	-1.8	-2.0	-2.1	-2.3	-2.7	-2.9	-3.3	-3.6	-3.5	-3.0	-1.7
6-Nov	-3.4	-3.2	-3.1	-2.9	-2.9	-2.8	-2.7	-2.5	-2.3	-2.3	-1.6	-0.6	0.5	1.0	1.3	1.1	1.0	1.0	1.0	1.1	1.1	1.1	1.3	1.2	-0.7	1.3
7-Nov	1.0	1.0	0.9	1.0	0.9	1.0	1.0	1.1	1.2	1.4	2.0	2.7	3.0	3.3	3.3	2.9	2.4	2.1	2.0	1.8	1.5	1.3	0.9	0.5	1.7	3.3
8-Nov	0.9	0.6	0.5	0.0	-0.5	-0.9	-1.0	-1.2	-1.5	-1.6	-1.7	-1.5	-1.4	-1.6	-1.7	-2.0	-2.1	-2.2	-2.3	-2.4	-2.5	-2.6	-2.7	-1.4	0.9	
9-Nov	-2.7	-3.1	-3.1	-3.0	-3.5	-3.6	-3.5	-3.4	-3.4	-3.4	-3.6	-3.7	-3.0	-3.0	-3.1	-3.7	-4.3	-4.6	-5.0	-5.6	-5.8	-5.8	-5.8	-5.8	-4.0	-2.7
10-Nov	-5.5	-5.4	-5.8	-6.0	-5.9	-4.9	-5.3	-5.5	-5.0	-4.2	-2.7	-1.2	0.1	0.7	0.9	0.7	0.2	-0.2	-0.7	-1.4	-2.2	-2.5	-2.6	-2.6	-2.8	0.9
11-Nov	-3.5	-5.0	-5.2	-4.3	-4.3	-3.9	-3.8	-4.1	-3.9	-2.8	-1.3	-0.2	0.5	0.7	0.8	0.7	-0.1	-0.4	-1.8	-2.6	-3.5	-3.9	-4.1	-4.7	-2.5	0.8
12-Nov	-5.1	-5.6	-5.7	-5.7	-5.8	-4.4	-3.7	-3.2	-3.5	-2.4	-0.9	-0.2	0.5	1.2	1.6	1.0	-0.7	-1.6	-1.3	-1.9	-3.1	-4.3	-4.9	-5.6	-2.7	1.6
13-Nov	-5.1	-4.2	-4.2	-4.4	-4.3	-3.7	-3.8	-3.8	-3.9	-4.0	-4.2	-4.1	-4.0	-3.8	-3.8	-3.8	-4.2	-4.8	-4.8	-4.6	-4.7	-4.9	-5.0	-5.2	-4.3	-3.7
14-Nov	-5.3	-5.4	-5.4	-5.4	-5.1	-5.5	-7.2	-8.0	-8.4	-6.8	-4.8	-3.5	-1.9	-0.7	-0.7	-1.2	-3.1	-3.8	-3.9	-4.6	-5.2	-5.6	-6.0	-6.3	-4.7	-0.7
15-Nov	-5.3	-4.6	-5.0	-5.3	-5.9	-6.7	-6.8	-6.7	-7.1	-6.7	-6.5	-6.2	-5.9	-5.7	-5.6	-6.6	-8.5	-8.0	-8.5	-8.8	-9.7	-8.9	-8.8	-9.3	-7.0	-4.6
16-Nov	-9.4	-11.0	-12.7	-13.8	-13.9	-11.7	-10.8	-9.9	-9.1	-8.7	-6.9	-5.3	-4.3	-3.7	-3.2	-3.0	-3.1	-3.3	-3.4	-3.8	-3.1	-1.8	0.0	0.2	-6.5	0.2
17-Nov	-0.1	-1.7	-2.7	-1.5	-1.9	-0.4	1.6	1.7	0.9	0.9	1.9	3.5	4.1	4.4	4.2	2.6	1.7	1.2	-0.4	-0.3	-0.6	-1.5	-2.7	-3.0	0.5	4.4
18-Nov	-3.2	-3.4	-3.3	-3.3	-3.7	-4.5	-4.1	-4.4	-3.9	-2.5	-1.3	0.0	0.7	1.3	2.2	1.6	0.1	0.4	0.3	0.6	0.3	-0.1	-0.1	0.1	-1.3	2.2
19-Nov	0.6	0.8	0.2	0.0	-0.3	-0.3	-0.9	-1.7	-1.9	-1.4	0.5	1.2	1.5	1.9	2.3	1.3	-0.4	-1.1	-0.4	0.0	0.0	-0.4	3.5	5.6	0.4	5.6
20-Nov	5.6	3.6	0.9	-1.4	-3.1	-4.6	-6.0	-6.8	-7.2	-7.1	-6.5	-5.9	-5.2	-5.2	-5.4	-6.1	-6.9	-7.6	-8.3	-9.0	-10.0	-11.0	-10.8	-10.5	-5.6	5.6
21-Nov	-10.9	-9.8	-9.8	-9.7	-9.6	-9.6	-9.4	-9.2	-9.1	-9.2	-9.0	-8.7	-8.4	-7.9	-7.6	-8.3	-8.8	-9.4	-10.1	-10.1	-10.2	-10.5	-10.8	-11.2	-9.5	-7.6
22-Nov	-11.2	-11.1	-11.1	-11.5	-11.8	-13.3	-14.5	-14.7	-14.7	-14.5	-14.2	-13.9	-13.9	-13.5	-13.1	-13.2	-14.1	-14.1	-13.5	-13.2	-13.0	-12.9	-12.8	-12.4	-13.2	-11.1
23-Nov	-12.1	-12.1	-12.1	-11.8	-11.3	-11.0	-10.6	-10.2	-9.8	-9.2	-8.5	-7.9	-7.4	-6.8	-6.0	-7.0	-8.6	-9.4	-9.7	-8.9	-8.9	-8.4	-7.9	-5.0	-9.2	-5.0
24-Nov	-3.3	-1.9	-0.7	-0.4	-1.7	-2.6	-2.6	-1.9	-1.6	-0.6	0.8	1.6	2.4	3.2	3.4	3.0	1.2	0.1	-0.3	-0.5	-0.1	-1.6	-2.4	-3.7	-0.4	3.4
25-Nov	-4.3	-3.4	-1.7	-0.4	-0.5	-0.8	-1.5	-2.4	-2.5	-4.1	-4.6	-4.4	-4.2	-4.6	-4.6	-6.4	-8.5	-9.5	-10.3	-11.4	-12.3	-12.8	-14.3	-14.8	-6.0	-0.4
26-Nov	-13.9	-12.6	-12.3	-12.9	-13.8	-13.1	-12.6	-12.8	-13.8	-12.9	-12.3	-11.8	-11.7	-11.3	-10.2	-9.5	-8.8	-8.4	-8.0	-7.5	-6.8	-7.1	-6.8	-7.7	-10.8	-6.8
27-Nov	-8.6	-8.0	-7.4	-7.5	-6.9	-6.4	-7.1	-7.3	-6.7	-6.3	-4.8	-4.0	-3.3	-2.0	-1.6	-0.8	-0.5	0.5	1.9	2.0	1.7	1.4	2.7	2.5	-3.2	2.7
28-Nov	2.3	2.1	1.9	1.7	1.6	1.0	0.6	0.6	0.2	0.5	1.7	2.4	3.1	3.6	3.1	2.3	3.3	3.4	3.3	3.3	2.9	2.7	1.6	0.9	2.1	3.6
29-Nov	-0.2	-0.6	-1.3	-2.3	-2.9	-2.9	-2.7	-3.0	-3.5	-2.9	-2.4	-1.9	-0.9	-0.3	0.1	0.0	-0.2	-0.5	-0.7	-1.3	-1.2	-1.4	-1.9	-2.2	-1.5	0.1
30-Nov	-2.6	-3.6	-3.8	-4.5	-5.4	-5.4	-5.4	-5.6	-5.6	-5.6	-5.5	-5.2	-5.4	-5.2	-5.3	-5.4	-5.5	-5.5	-5.4	-5.4	-5.3	-5.4	-6.3	-8.1	-5.3	-2.6
																								Diurnal Average		
																								Diurnal Maximum		



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

**Ambient Temperature 2 m (AT2m) - C**  
**Mannix - November 2023**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Ambient Temperature 2 m (AT2m) - C  
Mannix - November 2023**

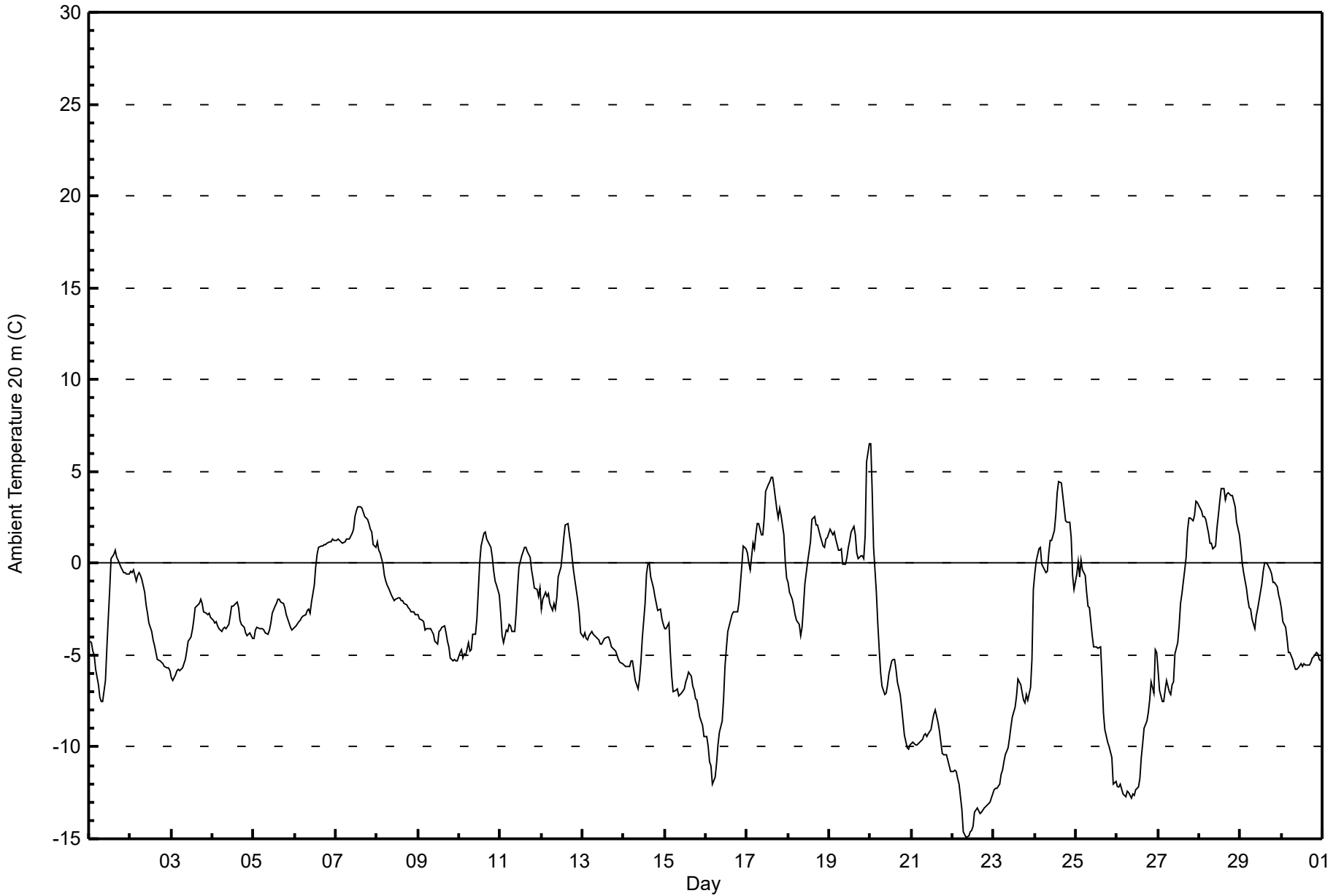
<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	0	0.00	0.00
-20 - 0	585	81.25	81.25
0 - 10	135	18.75	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



Maximum Value: 6.5 C on Nov 20 00:00																				Maximum Daily Average: 2.7 C on Nov 28					Hours in Service: 720				
Minimum Value: -14.9 C on Nov 22 09:00																				Minimum Daily Average: -13.3 C on Nov 22					Hours of Data: 720				
Maximum Diurnal Average: -1.9 C at hour 15																				Minimum Diurnal Average: -4.6 C at hour 9					Hours of Missing Data: 0				
Monthly Average: -3.35 C																				Percentiles: P <sub>1</sub> = -13.6 P <sub>10</sub> = -9.8 Q <sub>1</sub> = -5.6 Median = -3.1 Q <sub>3</sub> = 0.0 P <sub>90</sub> = 1.7 P <sub>99</sub> = 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-Nov	-4.2	-4.4	-4.8	-5.0	-5.8	-6.6	-7.3	-7.5	-7.5	-6.4	-4.6	-3.0	-1.5	0.3	0.5	0.7	0.3	0.2	-0.2	-0.4	-0.5	-0.5	-0.6	-0.6	-2.9	0.7			
2-Nov	-0.5	-0.5	-0.4	-1.0	-0.6	-0.5	-0.7	-0.9	-1.6	-2.2	-2.7	-3.3	-3.7	-4.2	-4.5	-4.9	-5.2	-5.3	-5.4	-5.5	-5.6	-5.7	-5.7	-5.9	-3.2	-0.4			
3-Nov	-6.3	-6.4	-6.1	-5.8	-5.8	-5.8	-5.7	-5.5	-5.2	-4.8	-4.2	-4.0	-3.6	-3.1	-2.4	-2.3	-2.2	-2.0	-2.2	-2.6	-2.7	-2.8	-2.7	-2.9	-4.0	-2.0			
4-Nov	-3.1	-3.2	-3.2	-3.4	-3.6	-3.7	-3.6	-3.5	-3.3	-2.9	-2.4	-2.4	-2.3	-2.1	-2.4	-3.1	-3.3	-3.5	-3.8	-3.9	-3.9	-3.8	-4.1	-3.2	-2.1				
5-Nov	-4.1	-3.7	-3.5	-3.6	-3.5	-3.6	-3.6	-3.8	-3.9	-3.7	-3.2	-2.8	-2.4	-2.1	-1.9	-1.9	-2.1	-2.2	-2.4	-2.8	-3.0	-3.5	-3.7	-3.6	-3.1	-1.9			
6-Nov	-3.5	-3.4	-3.2	-3.1	-2.9	-2.8	-2.8	-2.6	-2.5	-2.7	-2.1	-1.2	-0.2	0.5	0.9	0.9	0.9	1.0	1.0	1.1	1.2	1.2	1.3	1.3	-0.9	1.3			
7-Nov	1.2	1.3	1.2	1.2	1.1	1.2	1.3	1.3	1.4	1.6	1.9	2.5	2.8	3.1	3.1	3.0	2.8	2.6	2.4	2.2	1.8	1.7	1.0	0.8	1.9	3.1			
8-Nov	1.1	0.7	0.5	0.0	-0.7	-1.0	-1.2	-1.4	-1.7	-1.9	-2.0	-1.9	-1.9	-2.0	-2.1	-2.2	-2.3	-2.4	-2.5	-2.6	-2.7	-2.8	-2.8	-1.6	1.1				
9-Nov	-2.8	-3.0	-3.1	-3.2	-3.6	-3.5	-3.5	-3.6	-3.7	-3.9	-4.2	-4.4	-3.7	-3.7	-3.5	-3.4	-3.8	-4.2	-4.5	-5.2	-5.3	-5.3	-5.3	-5.3	-4.0	-2.8			
10-Nov	-4.8	-4.7	-5.2	-4.9	-5.0	-4.3	-4.8	-4.7	-3.9	-3.9	-3.1	-1.5	0.1	1.0	1.6	1.7	1.3	1.1	0.9	0.3	-0.4	-1.0	-1.2	-1.7	-2.0	1.7			
11-Nov	-2.8	-3.9	-4.3	-3.6	-3.7	-3.3	-3.4	-3.7	-3.7	-2.7	-1.3	-0.2	0.4	0.6	0.8	0.9	0.6	0.3	-0.4	-0.8	-1.4	-1.4	-1.8	-1.4	-1.7	0.9			
12-Nov	-2.5	-2.0	-1.5	-1.8	-1.6	-2.2	-2.6	-2.2	-2.5	-1.9	-0.8	-0.2	0.6	1.4	2.1	2.2	1.6	1.0	0.3	-0.4	-1.5	-2.0	-2.8	-3.8	-1.0	2.2			
13-Nov	-4.0	-3.8	-4.1	-4.2	-3.9	-3.7	-3.9	-3.9	-4.0	-4.2	-4.4	-4.4	-4.3	-4.1	-4.0	-4.0	-4.3	-4.6	-4.7	-4.8	-5.0	-5.2	-5.4	-5.5	-4.3	-3.7			
14-Nov	-5.6	-5.6	-5.6	-5.6	-5.3	-5.3	-5.9	-6.4	-6.9	-6.3	-5.4	-4.1	-2.2	-0.6	-0.1	0.0	-0.7	-1.4	-1.8	-2.2	-2.6	-2.5	-3.0	-3.3	-3.7	0.0			
15-Nov	-3.5	-3.6	-3.3	-4.9	-6.1	-7.0	-7.0	-6.9	-7.2	-7.2	-7.1	-6.9	-6.5	-6.3	-5.9	-6.1	-6.7	-6.9	-7.4	-7.5	-8.4	-8.6	-8.8	-9.4	-6.6	-3.3			
16-Nov	-9.4	-10.0	-10.8	-11.1	-12.0	-11.6	-10.9	-9.9	-9.2	-8.6	-7.3	-5.6	-4.6	-3.7	-3.1	-2.8	-2.6	-2.6	-2.6	-2.1	-1.1	-0.1	1.0	0.8	-5.8	1.0			
17-Nov	0.6	0.0	-0.3	1.1	0.8	1.5	2.1	2.2	1.6	1.6	2.4	3.9	4.3	4.5	4.6	4.7	4.1	2.9	2.5	3.0	2.6	1.6	0.1	-0.8	2.1	4.7			
18-Nov	-1.1	-1.6	-1.9	-2.3	-2.8	-3.1	-3.4	-4.0	-3.5	-2.4	-1.1	0.1	0.7	1.2	2.4	2.5	2.1	2.1	1.8	1.5	0.9	0.8	1.3	1.4	-0.3	2.5			
19-Nov	1.9	1.7	1.6	1.7	1.3	0.7	0.7	0.8	-0.1	-0.1	0.3	0.9	1.2	1.7	2.0	1.6	0.6	0.3	0.4	0.4	0.3	1.4	5.6	6.5	1.4	6.5			
20-Nov	6.5	4.0	0.9	-1.5	-3.3	-4.6	-5.9	-6.7	-7.1	-7.1	-6.6	-6.0	-5.3	-5.2	-5.2	-5.7	-6.5	-7.2	-7.8	-8.6	-9.4	-10.0	-10.1	-9.9	-5.4	6.5			
21-Nov	-9.9	-9.7	-9.9	-9.9	-9.8	-9.7	-9.6	-9.4	-9.3	-9.4	-9.3	-9.0	-8.6	-8.2	-8.0	-8.7	-9.1	-9.7	-10.3	-10.4	-10.4	-10.7	-11.0	-11.4	-9.6	-8.0			
22-Nov	-11.3	-11.3	-11.4	-11.7	-12.1	-13.4	-14.6	-14.8	-14.9	-14.8	-14.6	-14.5	-14.3	-13.5	-13.3	-13.5	-13.6	-13.5	-13.3	-13.3	-13.2	-13.1	-13.0	-12.6	-13.3	-11.3			
23-Nov	-12.3	-12.3	-12.2	-12.0	-11.5	-11.3	-10.8	-10.4	-10.0	-9.5	-8.9	-8.4	-7.8	-7.2	-6.3	-6.5	-6.6	-7.4	-7.6	-7.2	-7.5	-6.8	-5.2	-1.5	-8.6	-1.5			
24-Nov	-0.6	0.1	0.8	0.9	-0.1	-0.2	-0.5	-0.4	0.6	1.3	1.3	1.8	2.6	3.9	4.5	4.3	3.7	3.0	2.3	2.2	2.2	1.4	-0.7	-1.4	1.4	4.5			
25-Nov	-0.6	0.1	-0.7	0.1	-0.4	-0.7	-1.5	-2.3	-2.4	-4.0	-4.6	-4.5	-4.6	-4.5	-4.5	-6.2	-8.2	-9.0	-9.7	-10.0	-10.3	-10.6	-12.0	-11.9	-5.1	0.1			
26-Nov	-12.2	-12.2	-12.0	-12.5	-12.7	-12.7	-12.4	-12.5	-12.8	-12.5	-12.7	-12.3	-12.2	-11.7	-10.6	-9.8	-9.0	-8.6	-8.1	-7.4	-6.5	-7.1	-4.7	-4.9	-10.4	-4.7			
27-Nov	-5.8	-6.9	-7.5	-7.6	-6.9	-6.4	-7.0	-7.1	-6.6	-6.5	-4.9	-4.3	-3.4	-2.2	-1.7	-0.4	0.3	1.8	2.4	2.5	2.3	2.7	3.3	3.3	-2.8	3.3			
28-Nov	3.0	2.8	2.5	2.5	2.4	1.6	1.1	1.1	0.8	1.0	2.0	2.6	3.4	4.0	4.1	3.5	3.8	3.8	3.7	3.7	3.4	3.1	2.2	1.5	2.7	4.1			
29-Nov	0.8	0.0	-0.5	-1.4	-2.0	-2.4	-2.5	-3.0	-3.5	-2.9	-2.5	-2.0	-1.2	-0.4	0.0	0.1	-0.1	-0.4	-0.6	-1.0	-1.1	-1.3	-1.8	-2.0	-1.3	0.8			
30-Nov	-2.5	-3.1	-3.5	-4.1	-4.8	-4.9	-5.2	-5.5	-5.7	-5.8	-5.7	-5.5	-5.6	-5.5	-5.5	-5.5	-5.6	-5.4	-5.1	-5.1	-4.8	-4.9	-5.3	-5.3	-5.0	-2.5			
																								Diurnal Average					
																								Diurnal Maximum					







**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Ambient Temperature 20 m (AT20m) - C  
Mannix - November 2023**

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	0	0.00	0.00
-20 - 0	539	74.86	74.86
0 - 10	181	25.14	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



Summary of Hour Averages

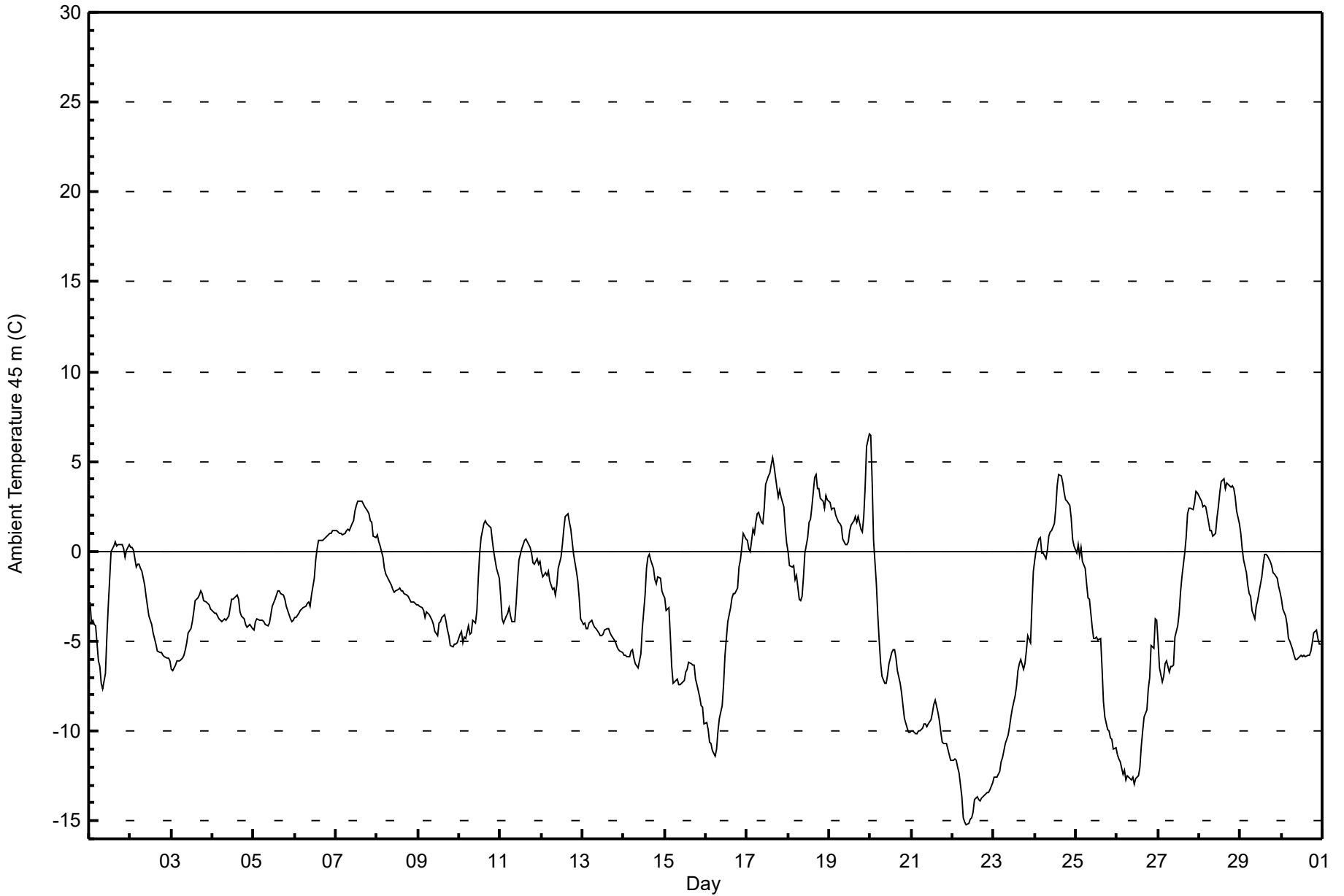
Mannix - November 2023

Maximum Value: 6.5 C on Nov 20 00:00																				Maximum Daily Average: 2.6 C on Nov 28					Hours in Service: 720	
Minimum Value: -15.2 C on Nov 22 09:00																				Minimum Daily Average: -13.6 C on Nov 22					Hours of Data: 720	
Maximum Diurnal Average: -2.1 C at hour 16																				Minimum Diurnal Average: -4.7 C at hour 9					Hours of Missing Data: 0	
Monthly Average: -3.30 C																				Percentiles: P <sub>1</sub> = -13.9 P <sub>10</sub> = -10.0 Q <sub>1</sub> = -5.8 Median = -3.1 Q <sub>3</sub> = 0.2 P <sub>90</sub> = 2.1 P <sub>99</sub> = 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-Nov	-2.8	-3.9	-3.9	-4.1	-4.1	-6.1	-6.4	-7.3	-7.7	-6.8	-4.8	-3.0	-1.6	0.0	0.3	0.6	0.3	0.4	0.4	0.3	0.1	-0.4	0.1	0.4	-2.5	0.6
2-Nov	0.2	0.2	0.0	-0.9	-0.8	-0.7	-0.9	-1.1	-1.9	-2.5	-3.0	-3.6	-4.1	-4.5	-4.8	-5.2	-5.5	-5.6	-5.7	-5.8	-5.9	-6.0	-5.9	-6.1	-3.3	0.2
3-Nov	-6.5	-6.6	-6.4	-6.1	-6.1	-6.1	-5.9	-5.8	-5.5	-5.1	-4.5	-4.3	-3.9	-3.4	-2.7	-2.6	-2.4	-2.2	-2.4	-2.7	-2.8	-2.9	-3.0	-3.2	-4.3	-2.2
4-Nov	-3.4	-3.5	-3.5	-3.6	-3.8	-4.0	-3.8	-3.8	-3.8	-3.6	-3.2	-2.6	-2.6	-2.6	-2.4	-2.7	-3.4	-3.6	-3.8	-4.1	-4.2	-4.1	-4.1	-4.3	-3.5	-2.4
5-Nov	-4.4	-3.9	-3.7	-3.8	-3.8	-3.8	-3.9	-4.0	-4.2	-4.0	-3.5	-3.1	-2.7	-2.4	-2.2	-2.2	-2.4	-2.4	-2.7	-3.0	-3.3	-3.7	-3.9	-3.8	-3.4	-2.2
6-Nov	-3.7	-3.7	-3.5	-3.3	-3.2	-3.1	-3.1	-2.9	-2.8	-3.0	-2.4	-1.5	-0.5	0.1	0.6	0.6	0.6	0.7	0.8	0.9	1.0	1.0	1.2	1.2	-1.2	1.2
7-Nov	1.2	1.1	1.0	1.0	0.9	1.0	1.2	1.2	1.2	1.5	1.7	2.2	2.6	2.8	2.8	2.8	2.6	2.4	2.3	2.0	1.7	1.6	0.8	0.8	1.7	2.8
8-Nov	1.0	0.6	0.3	-0.3	-1.0	-1.2	-1.4	-1.6	-1.9	-2.1	-2.2	-2.2	-2.1	-2.1	-2.2	-2.2	-2.4	-2.4	-2.5	-2.7	-2.8	-2.8	-2.9	-3.0	-1.8	1.0
9-Nov	-3.0	-3.0	-3.1	-3.3	-3.7	-3.4	-3.5	-3.7	-3.8	-4.1	-4.4	-4.7	-4.0	-3.9	-3.7	-3.6	-3.9	-4.4	-4.7	-5.2	-5.3	-5.2	-5.1	-5.1	-4.1	-3.0
10-Nov	-4.6	-4.5	-5.1	-4.8	-4.8	-4.1	-4.6	-4.5	-3.8	-4.0	-3.3	-1.5	-0.1	0.8	1.5	1.7	1.5	1.5	1.3	0.6	0.0	-0.5	-1.0	-1.5	-1.8	1.7
11-Nov	-2.5	-3.7	-4.0	-3.6	-3.4	-3.1	-3.6	-3.9	-3.9	-2.9	-1.6	-0.5	0.1	0.4	0.6	0.7	0.5	0.2	-0.1	-0.6	-0.7	-0.4	-0.7	-0.5	-1.5	0.7
12-Nov	-1.1	-1.4	-1.2	-1.3	-1.1	-1.7	-2.1	-2.0	-2.4	-1.9	-0.9	-0.3	0.4	1.2	1.9	2.1	1.6	1.2	0.5	-0.1	-1.1	-1.7	-2.6	-3.7	-0.7	2.1
13-Nov	-4.0	-4.0	-4.3	-4.3	-4.0	-3.9	-4.0	-4.3	-4.3	-4.5	-4.7	-4.7	-4.6	-4.4	-4.3	-4.3	-4.5	-4.7	-4.9	-5.1	-5.3	-5.5	-5.6	-5.7	-4.6	-3.9
14-Nov	-5.8	-5.8	-5.8	-5.8	-5.6	-5.5	-5.9	-6.2	-6.5	-6.1	-5.7	-4.3	-2.5	-1.0	-0.4	-0.2	-0.5	-1.0	-1.6	-1.8	-1.4	-1.5	-2.2	-2.4	-3.6	-0.2
15-Nov	-2.6	-3.3	-3.1	-4.7	-6.4	-7.3	-7.2	-7.1	-7.4	-7.4	-7.4	-7.2	-6.7	-6.6	-6.2	-6.3	-6.3	-6.4	-7.1	-7.4	-8.1	-8.6	-8.7	-9.6	-6.6	-2.6
16-Nov	-9.5	-9.9	-10.7	-10.7	-11.1	-11.4	-11.0	-10.0	-9.3	-8.6	-7.4	-5.8	-4.8	-3.9	-3.1	-2.6	-2.3	-2.3	-2.0	-0.9	-0.5	0.2	1.0	0.7	-5.7	1.0
17-Nov	0.6	0.1	-0.1	1.2	1.0	1.6	2.1	2.2	1.6	1.5	2.4	3.8	4.2	4.4	4.8	5.2	4.8	3.5	3.0	3.4	3.0	2.5	1.3	0.5	2.4	5.2
18-Nov	0.0	-0.8	-0.9	-0.8	-1.5	-1.3	-2.6	-2.8	-2.5	-1.4	-0.1	0.8	1.6	1.8	2.5	4.1	4.3	3.5	3.5	2.9	2.8	2.4	3.1	2.9	0.9	4.3
19-Nov	2.7	2.3	2.4	2.4	2.0	1.6	1.5	1.4	0.7	0.4	0.4	0.5	1.2	1.5	1.7	1.9	1.6	1.9	1.2	1.1	1.9	3.5	5.9	6.5	2.0	6.5
20-Nov	6.5	3.9	0.6	-1.8	-3.5	-4.9	-6.1	-6.9	-7.4	-7.3	-6.9	-6.3	-5.6	-5.5	-5.9	-6.6	-7.3	-7.9	-8.6	-9.3	-9.8	-10.1	-10.1	-5.5	6.5	
21-Nov	-10.0	-10.0	-10.1	-10.2	-10.0	-10.0	-9.9	-9.6	-9.6	-9.7	-9.6	-9.4	-9.0	-8.5	-8.3	-9.0	-9.4	-10.1	-10.7	-10.7	-10.7	-11.0	-11.3	-11.6	-9.9	-8.3
22-Nov	-11.6	-11.6	-11.7	-12.0	-12.3	-13.7	-14.8	-15.1	-15.2	-15.1	-14.9	-14.8	-14.5	-13.9	-13.7	-13.8	-13.9	-13.8	-13.5	-13.5	-13.4	-13.4	-13.3	-12.9	-13.6	-11.6
23-Nov	-12.6	-12.6	-12.5	-12.3	-11.7	-11.5	-11.1	-10.7	-10.3	-9.7	-9.2	-8.7	-8.1	-7.5	-6.6	-6.2	-6.1	-6.6	-6.3	-5.6	-4.7	-5.1	-3.0	-1.1	-8.3	-1.1
24-Nov	-0.5	0.0	0.7	0.8	-0.1	-0.1	-0.4	0.0	0.9	1.1	1.1	1.6	2.4	3.6	4.3	4.2	3.8	3.3	2.8	2.8	2.6	1.9	0.7	0.3	1.6	4.3
25-Nov	-0.1	0.4	-0.2	0.2	-0.6	-0.9	-1.8	-2.6	-2.7	-4.2	-4.8	-4.8	-4.8	-4.9	-4.8	-6.5	-8.4	-9.2	-9.9	-10.0	-10.4	-10.5	-11.0	-11.0	-5.1	0.4
26-Nov	-11.3	-11.6	-11.7	-12.4	-12.2	-12.7	-12.5	-12.6	-12.8	-12.6	-12.9	-12.7	-12.5	-12.0	-10.8	-10.0	-9.2	-8.8	-7.7	-7.0	-5.2	-5.4	-3.8	-3.8	-10.2	-3.8
27-Nov	-5.1	-6.5	-7.3	-7.0	-6.3	-6.1	-6.7	-6.4	-6.4	-6.3	-4.8	-4.1	-3.5	-2.3	-1.4	-0.1	0.7	2.1	2.4	2.4	2.3	2.7	3.4	3.2	-2.5	3.4
28-Nov	3.0	2.8	2.5	2.6	2.4	1.6	1.1	1.1	0.8	1.0	1.9	2.5	3.2	3.9	4.1	3.5	3.8	3.8	3.6	3.6	3.5	3.0	2.2	1.6	2.6	4.1
29-Nov	1.0	0.1	-0.4	-1.2	-1.9	-2.4	-2.5	-3.3	-3.7	-3.1	-2.8	-2.3	-1.4	-0.7	-0.2	-0.2	-0.3	-0.6	-0.8	-1.2	-1.3	-1.5	-1.9	-2.2	-1.4	1.0
30-Nov	-2.7	-3.2	-3.6	-4.1	-4.8	-5.0	-5.4	-5.8	-6.0	-6.0	-5.9	-5.8	-5.9	-5.8	-5.9	-5.8	-5.8	-5.6	-5.1	-4.5	-4.4	-4.8	-5.2	-5.1	-5.1	-2.7
																								Diurnal Average		
																								Diurnal Maximum		



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

**Ambient Temperature 45 m (AT45m) - C**  
**Mannix - November 2023**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Ambient Temperature 45 m (AT45m) - C  
Mannix - November 2023**

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	0	0.00	0.00
-20 - 0	528	73.33	73.33
0 - 10	192	26.67	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



Summary of Hour Averages

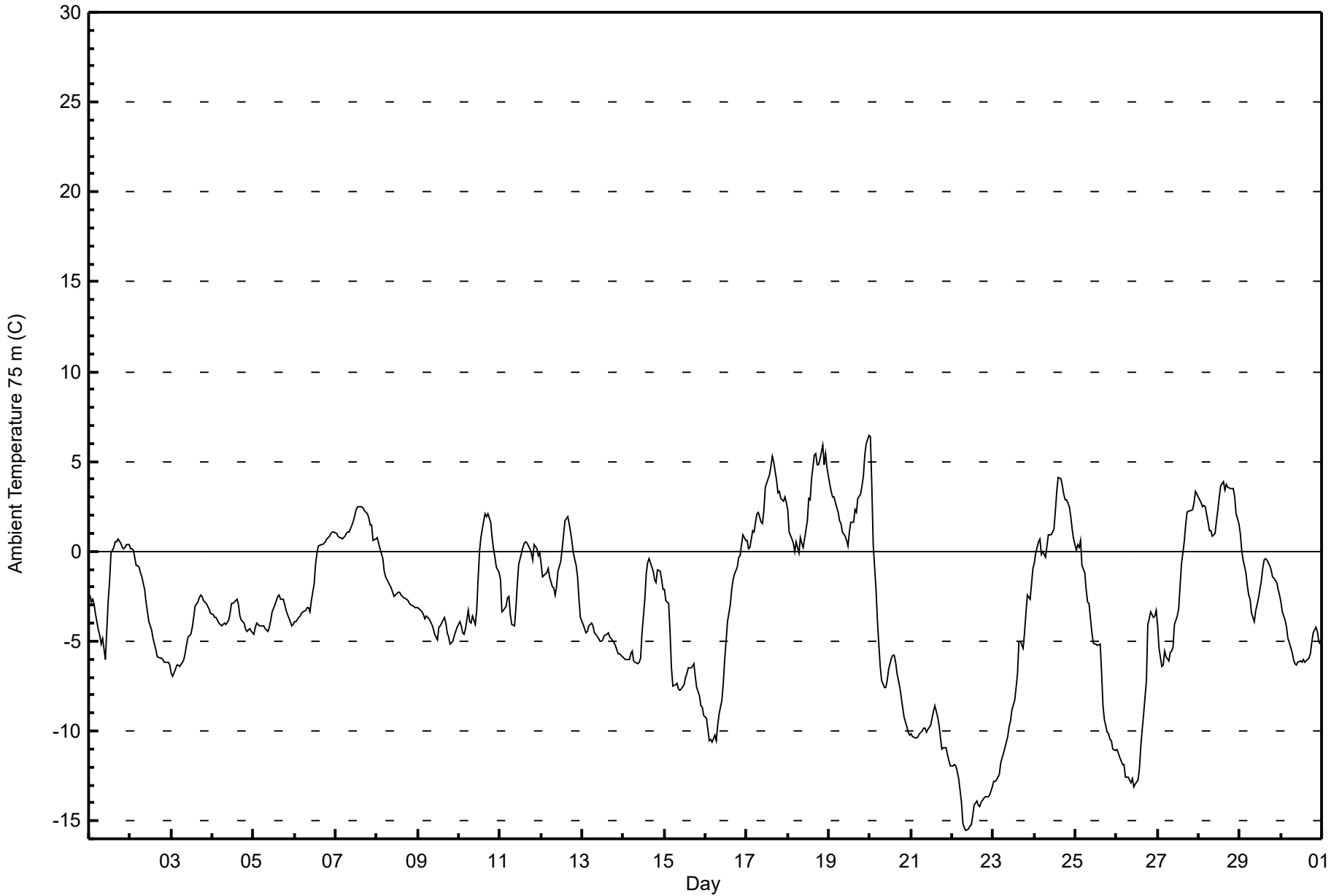
Mannix - November 2023

Maximum Value: 6.4 C on Nov 20 00:00																				Maximum Daily Average: 2.7 C on Nov 18					Hours in Service:	720																						
Minimum Value: -15.5 C on Nov 22 09:00																				Minimum Daily Average: -13.9 C on Nov 22					Hours of Data:	720																						
Maximum Diurnal Average: -2.1 C at hour 16																				Minimum Diurnal Average: -4.6 C at hour 10					Hours of Missing Data:	0																						
Monthly Average: -3.22 C																				Percentiles: P <sub>1</sub> = -14.2 P <sub>10</sub> = -10.1 Q <sub>1</sub> = -5.8 Median = -3.2 Q <sub>3</sub> = 0.4 P <sub>90</sub> = 2.3 P <sub>99</sub> = 5.3					Hours of Calibration:	0																						
																									Percent Operational Time:	100.0																						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Nov	-2.4	-2.8	-2.7	-3.0	-3.5	-4.4	-4.7	-5.1	-4.9	-6.0	-4.4	-2.7	-1.7	-0.1	0.3	0.6	0.5	0.7	0.5	0.2	0.1	0.2	0.4	0.4	-1.9	0.7																						
2-Nov	0.1	0.1	0.0	-0.8	-0.8	-0.9	-1.2	-1.4	-2.2	-2.8	-3.3	-3.9	-4.4	-4.9	-5.1	-5.5	-5.8	-5.9	-6.0	-6.1	-6.2	-6.2	-6.1	-6.4	-3.6	0.1																						
3-Nov	-6.8	-6.9	-6.6	-6.3	-6.4	-6.4	-6.2	-6.0	-5.6	-5.2	-4.8	-4.6	-4.2	-3.7	-3.0	-2.8	-2.6	-2.4	-2.5	-2.7	-2.9	-3.1	-3.2	-3.4	-4.5	-2.4																						
4-Nov	-3.5	-3.7	-3.7	-3.8	-4.0	-4.1	-4.1	-4.0	-4.1	-3.8	-3.4	-2.9	-2.9	-2.9	-2.7	-2.9	-3.6	-3.9	-4.0	-4.3	-4.5	-4.4	-4.3	-4.6	-3.8	-2.7																						
5-Nov	-4.6	-4.2	-4.0	-4.1	-4.1	-4.1	-4.2	-4.3	-4.5	-4.2	-3.8	-3.4	-3.0	-2.7	-2.5	-2.5	-2.6	-2.7	-3.0	-3.3	-3.5	-3.9	-4.1	-4.1	-3.6	-2.5																						
6-Nov	-3.9	-3.9	-3.7	-3.6	-3.5	-3.4	-3.3	-3.1	-3.1	-3.3	-2.7	-1.8	-0.8	-0.1	0.3	0.4	0.4	0.5	0.6	0.7	0.8	1.0	1.1	1.1	-1.4	1.1																						
7-Nov	1.0	0.9	0.8	0.7	0.7	0.8	1.0	1.1	1.0	1.4	1.7	2.0	2.3	2.5	2.5	2.5	2.4	2.3	2.1	1.9	1.5	1.4	0.6	0.7	1.5	2.5																						
8-Nov	0.8	0.4	0.2	-0.4	-1.1	-1.4	-1.6	-1.8	-2.1	-2.3	-2.5	-2.4	-2.3	-2.4	-2.5	-2.6	-2.7	-2.8	-2.9	-3.0	-3.0	-3.2	-3.2	-2.0	0.8																							
9-Nov	-3.1	-3.2	-3.4	-3.6	-3.8	-3.6	-3.8	-3.9	-4.1	-4.3	-4.6	-4.9	-4.2	-4.1	-4.0	-3.7	-4.0	-4.5	-4.8	-5.2	-5.0	-4.7	-4.5	-4.2	-4.1	-3.1																						
10-Nov	-3.9	-4.1	-4.6	-4.6	-4.3	-3.3	-3.9	-4.0	-3.6	-4.1	-3.3	-1.6	0.0	0.8	1.7	2.1	1.9	2.1	1.7	0.7	0.1	-0.3	-0.8	-1.2	-1.5	2.1																						
11-Nov	-1.6	-3.4	-3.3	-3.1	-2.6	-2.5	-3.6	-4.1	-4.1	-3.1	-1.8	-0.7	-0.1	0.2	0.4	0.5	0.4	0.1	-0.1	-0.5	0.3	0.1	-0.3	-0.1	-1.4	0.5																						
12-Nov	-0.7	-1.4	-1.2	-1.2	-1.0	-1.4	-1.9	-2.0	-2.4	-2.0	-1.1	-0.6	0.1	0.9	1.7	1.9	1.6	1.1	0.5	-0.1	-0.8	-1.5	-2.7	-3.7	-0.7	1.9																						
13-Nov	-4.1	-4.3	-4.5	-4.5	-4.1	-4.0	-4.2	-4.5	-4.6	-4.8	-5.0	-5.0	-4.9	-4.7	-4.6	-4.6	-4.8	-4.9	-5.1	-5.3	-5.5	-5.7	-5.7	-5.8	-4.8	-4.0																						
14-Nov	-6.0	-6.0	-6.0	-6.0	-5.7	-5.6	-6.1	-6.2	-6.2	-6.2	-6.0	-4.5	-2.7	-1.3	-0.6	-0.4	-0.6	-1.1	-1.6	-1.7	-1.0	-1.1	-1.5	-2.1	-3.6	-0.4																						
15-Nov	-2.1	-2.7	-2.9	-4.4	-6.5	-7.5	-7.4	-7.4	-7.7	-7.7	-7.7	-7.4	-7.0	-6.8	-6.5	-6.5	-6.4	-6.3	-7.0	-7.6	-8.0	-8.6	-8.7	-9.1	-6.7	-2.1																						
16-Nov	-9.3	-9.9	-10.5	-10.5	-10.6	-10.2	-10.6	-9.7	-9.1	-8.3	-7.4	-6.0	-5.0	-3.9	-3.0	-2.1	-1.5	-1.2	-0.9	-0.3	-0.3	0.4	0.9	0.6	-5.3	0.9																						
17-Nov	0.6	0.1	0.2	1.1	1.0	1.7	2.1	2.1	1.6	1.5	2.3	3.5	4.0	4.3	4.7	5.3	5.0	4.0	3.3	3.3	3.0	2.8	3.0	2.7	2.6	5.3																						
18-Nov	2.3	1.1	0.7	0.5	0.0	0.6	-0.1	0.8	0.5	0.2	0.7	1.7	3.0	2.8	4.0	5.4	5.4	4.8	4.8	5.1	5.9	4.8	5.4	4.6	2.7	5.9																						
19-Nov	3.7	3.3	3.0	3.0	2.7	2.2	1.7	1.6	1.1	0.8	0.6	0.3	1.1	1.6	1.6	2.3	2.1	2.9	3.2	3.7	4.2	5.3	6.0	6.4	2.7	6.4																						
20-Nov	6.4	3.7	0.3	-2.1	-3.8	-5.2	-6.4	-7.2	-7.6	-7.6	-7.2	-6.6	-5.9	-5.8	-5.8	-6.2	-6.8	-7.5	-8.1	-8.6	-9.2	-9.8	-10.1	-10.2	-5.7	6.4																						
21-Nov	-10.2	-10.3	-10.4	-10.4	-10.3	-10.1	-10.0	-9.9	-9.9	-10.1	-9.9	-9.7	-9.3	-8.9	-8.6	-9.2	-9.7	-10.4	-11.0	-11.0	-11.0	-11.3	-11.6	-11.9	-10.2	-8.6																						
22-Nov	-11.9	-11.8	-12.0	-12.3	-12.6	-14.0	-15.1	-15.4	-15.5	-15.5	-15.3	-15.2	-14.8	-14.1	-13.9	-14.1	-14.2	-14.0	-13.8	-13.7	-13.7	-13.7	-13.6	-13.1	-13.9	-11.8																						
23-Nov	-12.8	-12.8	-12.8	-12.4	-11.8	-11.5	-11.3	-10.9	-10.3	-9.8	-9.4	-8.9	-8.3	-7.6	-6.8	-5.0	-5.0	-5.4	-4.6	-3.4	-2.5	-2.6	-1.8	-1.0	-7.9	-1.0																						
24-Nov	-0.6	-0.1	0.5	0.7	-0.1	0.0	-0.3	0.3	0.9	0.9	0.9	1.3	2.2	3.4	4.1	4.1	3.6	3.2	2.9	2.9	2.5	1.9	1.2	0.7	1.5	4.1																						
25-Nov	0.0	0.4	0.2	0.6	-0.8	-1.2	-2.1	-2.8	-2.9	-4.5	-5.1	-5.1	-5.1	-5.2	-5.1	-6.7	-8.6	-9.4	-10.0	-10.1	-10.5	-10.5	-11.0	-11.1	-5.3	0.6																						
26-Nov	-11.0	-11.3	-11.5	-11.9	-11.9	-12.5	-12.5	-12.6	-12.9	-12.7	-13.1	-12.9	-12.7	-12.1	-10.9	-9.9	-9.1	-7.2	-4.0	-3.7	-3.4	-3.7	-3.6	-3.3	-9.6	-3.3																						
27-Nov	-4.1	-5.4	-6.4	-6.3	-5.6	-5.8	-6.1	-5.6	-5.6	-5.3	-4.1	-3.6	-3.2	-2.0	-0.7	0.5	1.4	2.2	2.3	2.3	2.3	2.7	3.4	3.2	-2.1	3.4																						
28-Nov	2.9	2.7	2.5	2.6	2.4	1.6	1.2	1.2	0.8	1.0	1.7	2.3	3.0	3.7	3.9	3.4	3.7	3.6	3.5	3.5	3.5	3.0	2.1	1.5	2.5	3.9																						
29-Nov	1.0	0.1	-0.5	-1.2	-1.9	-2.4	-2.6	-3.5	-3.9	-3.3	-3.0	-2.6	-1.7	-1.0	-0.4	-0.4	-0.5	-0.8	-1.0	-1.4	-1.5	-1.7	-2.1	-2.4	-1.6	1.0																						
30-Nov	-2.9	-3.4	-3.8	-4.2	-4.9	-5.1	-5.7	-6.0	-6.2	-6.3	-6.2	-6.1	-6.2	-6.0	-6.1	-6.0	-6.0	-5.7	-5.1	-4.5	-4.2	-4.5	-5.0	-5.2	-5.2	-2.9																						
																								-2.9	-3.3	-3.5	-3.7	-4.0	-4.1	-4.4	-4.5	-4.6	-4.6	-4.2	-3.7	-3.2	-2.7	-2.3	-2.1	-2.2	-2.3	-2.3	-2.4	-2.4	-2.6	-2.7	-2.8	Diurnal Average
																								6.4	3.7	3.0	3.0	2.7	2.2	2.1	2.1	1.6	1.5	2.3	3.5	4.0	4.3	4.7	5.4	5.4	4.8	4.8	5.1	5.9	5.3	6.0	6.4	Diurnal Maximum



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

**Ambient Temperature 75 m (AT75m) - C**  
**Mannix - November 2023**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Ambient Temperature 75 m (AT75m) - C  
Mannix - November 2023**

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	0	0.00	0.00
-20 - 0	514	71.39	71.39
0 - 10	206	28.61	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720

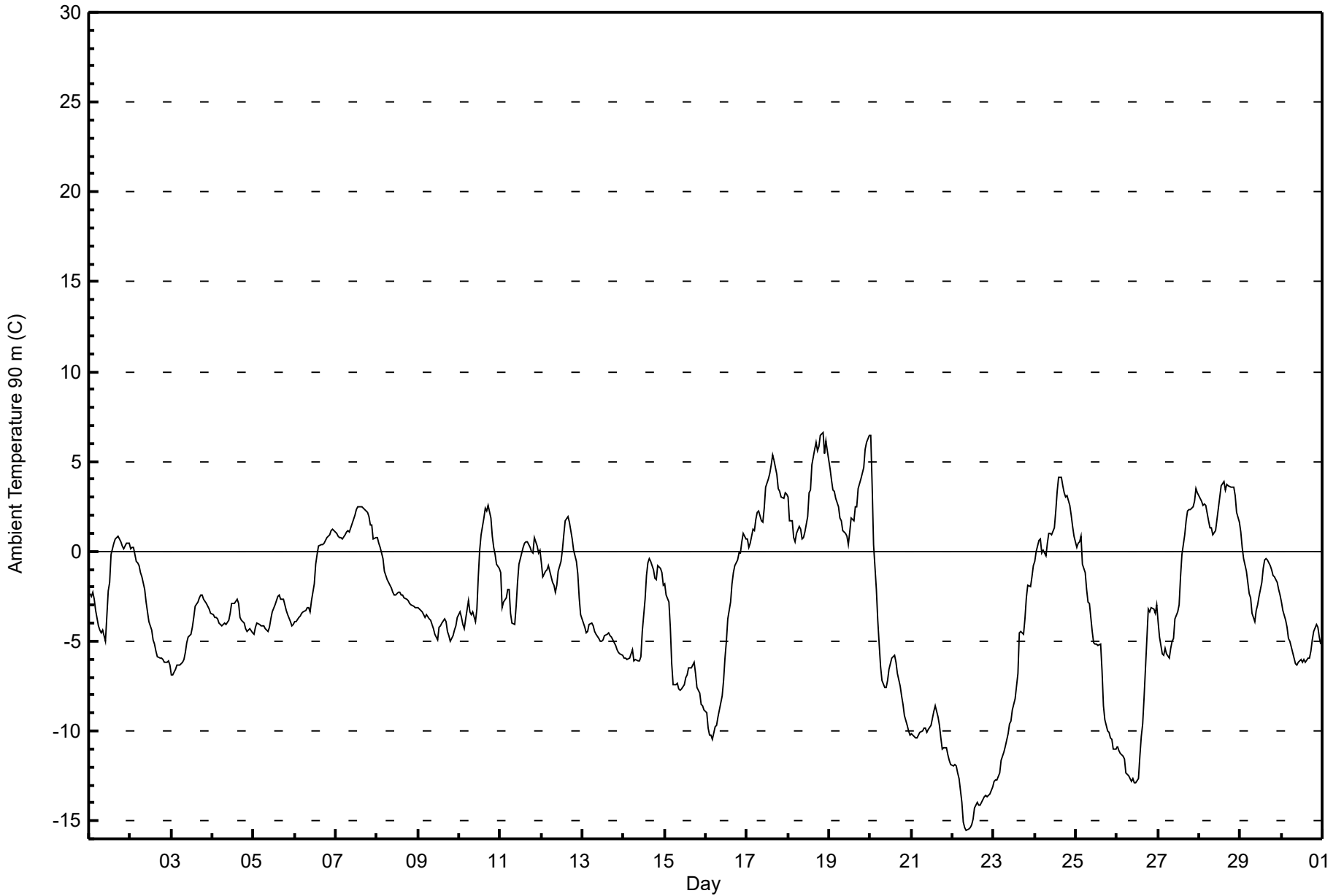


Summary of Hour Averages

Mannix - November 2023

Maximum Value: 6.6 C on Nov 18 21:00		Maximum Daily Average: 3.4 C on Nov 18		Hours in Service: 720																																												
Minimum Value: -15.5 C on Nov 22 09:00		Minimum Daily Average: -13.9 C on Nov 22		Hours of Data: 720																																												
Maximum Diurnal Average: -2.0 C at hour 16		Minimum Diurnal Average: -4.5 C at hour 9		Hours of Missing Data: 0																																												
Monthly Average: -3.10 C		Percentiles: P <sub>1</sub> = -14.3 P <sub>10</sub> = -10.0 Q <sub>1</sub> = -5.7 Median = -3.0 Q <sub>3</sub> = 0.5 P <sub>90</sub> = 2.4 P <sub>99</sub> = 5.8		Hours of Calibration: 0																																												
				Percent Operational Time: 100.0																																												
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Nov	-2.4	-2.5	-2.3	-2.7	-3.3	-4.1	-4.4	-4.6	-4.4	-5.0	-3.6	-2.2	-1.7	-0.1	0.4	0.7	0.8	0.8	0.5	0.3	0.2	0.3	0.5	0.4	-1.6	0.8																						
2-Nov	0.2	0.2	0.2	-0.6	-0.6	-0.8	-1.2	-1.4	-2.2	-2.8	-3.4	-3.9	-4.4	-4.9	-5.2	-5.5	-5.9	-5.9	-6.0	-6.1	-6.2	-6.2	-6.1	-6.3	-3.5	0.2																						
3-Nov	-6.8	-6.9	-6.6	-6.3	-6.4	-6.4	-6.2	-6.0	-5.6	-5.1	-4.8	-4.6	-4.2	-3.7	-3.1	-2.8	-2.6	-2.4	-2.5	-2.6	-2.9	-3.0	-3.2	-3.4	-4.5	-2.4																						
4-Nov	-3.5	-3.7	-3.7	-3.8	-4.0	-4.1	-4.1	-4.0	-4.0	-3.8	-3.4	-2.9	-2.9	-2.9	-2.7	-2.9	-3.6	-3.9	-4.0	-4.3	-4.4	-4.4	-4.3	-4.6	-3.7	-2.7																						
5-Nov	-4.6	-4.2	-4.0	-4.1	-4.1	-4.1	-4.2	-4.3	-4.4	-4.2	-3.8	-3.4	-3.0	-2.7	-2.5	-2.5	-2.6	-2.7	-2.9	-3.3	-3.5	-3.9	-4.1	-4.1	-3.6	-2.5																						
6-Nov	-3.9	-3.9	-3.7	-3.6	-3.5	-3.4	-3.3	-3.1	-3.1	-3.3	-2.7	-1.8	-0.7	-0.2	0.3	0.4	0.4	0.5	0.6	0.8	0.9	1.2	1.2	1.1	-1.4	1.2																						
7-Nov	1.0	0.9	0.8	0.7	0.7	0.9	1.1	1.1	1.1	1.5	1.8	2.0	2.3	2.5	2.5	2.5	2.4	2.3	2.1	1.9	1.5	1.4	0.7	0.8	1.5	2.5																						
8-Nov	0.8	0.5	0.2	-0.4	-1.1	-1.4	-1.6	-1.7	-2.1	-2.3	-2.5	-2.4	-2.3	-2.3	-2.4	-2.5	-2.6	-2.7	-2.7	-2.9	-3.0	-3.0	-3.1	-3.1	-1.9	0.8																						
9-Nov	-3.1	-3.2	-3.3	-3.5	-3.7	-3.5	-3.8	-3.9	-4.1	-4.3	-4.6	-5.0	-4.2	-4.2	-4.0	-3.7	-3.9	-4.4	-4.7	-5.0	-4.7	-4.4	-4.1	-3.7	-4.0	-3.1																						
10-Nov	-3.4	-3.7	-4.1	-4.3	-3.8	-2.7	-3.4	-3.5	-3.3	-3.9	-3.2	-1.4	0.1	0.9	1.9	2.4	2.2	2.5	1.9	0.9	0.2	-0.2	-0.7	-1.0	-1.2	2.5																						
11-Nov	-1.2	-3.1	-2.9	-2.6	-2.1	-2.2	-3.4	-4.0	-4.1	-3.1	-1.7	-0.7	-0.1	0.2	0.5	0.5	0.5	0.2	0.0	-0.1	0.8	0.3	-0.1	0.1	-1.2	0.8																						
12-Nov	-0.6	-1.4	-1.1	-1.0	-0.8	-1.1	-1.7	-1.9	-2.3	-1.9	-1.1	-0.6	0.1	0.9	1.7	1.9	1.6	1.2	0.7	0.1	-0.6	-1.3	-2.6	-3.5	-0.6	1.9																						
13-Nov	-4.0	-4.3	-4.5	-4.4	-4.1	-4.0	-4.1	-4.5	-4.6	-4.8	-5.0	-5.0	-4.9	-4.7	-4.6	-4.6	-4.7	-4.8	-5.1	-5.2	-5.4	-5.6	-5.7	-5.8	-4.8	-4.0																						
14-Nov	-5.9	-5.9	-6.0	-6.0	-5.7	-5.5	-6.1	-6.0	-6.1	-6.1	-5.9	-4.5	-2.7	-1.3	-0.6	-0.4	-0.6	-1.0	-1.5	-1.6	-0.8	-1.0	-1.2	-1.9	-3.5	-0.4																						
15-Nov	-1.8	-2.4	-2.8	-4.2	-6.2	-7.4	-7.4	-7.4	-7.7	-7.7	-7.7	-7.4	-7.0	-6.9	-6.5	-6.5	-6.3	-6.2	-6.8	-7.5	-7.9	-8.5	-8.6	-8.9	-6.6	-1.8																						
16-Nov	-9.0	-9.8	-10.2	-10.2	-10.4	-9.8	-9.7	-9.2	-8.9	-8.1	-7.2	-6.0	-5.0	-3.8	-2.8	-1.8	-1.2	-0.8	-0.5	-0.1	-0.1	0.6	1.0	0.7	-5.1	1.0																						
17-Nov	0.7	0.3	0.4	1.2	1.1	1.8	2.2	2.2	1.7	1.6	2.4	3.6	4.1	4.3	4.8	5.3	5.0	4.3	3.5	3.4	3.0	2.9	3.3	3.2	2.8	5.3																						
18-Nov	3.0	1.7	1.7	0.8	0.5	1.0	1.4	1.2	0.7	0.7	1.1	1.9	3.3	3.4	4.9	5.7	6.1	5.6	5.9	6.4	6.6	5.5	6.1	5.6	3.4	6.6																						
19-Nov	4.6	3.9	3.4	3.3	2.9	2.5	1.9	1.7	1.2	1.0	0.8	0.3	1.1	1.8	1.7	2.5	2.4	3.5	4.0	4.3	4.6	5.7	6.0	6.5	3.0	6.5																						
20-Nov	6.4	3.7	0.3	-2.1	-3.8	-5.2	-6.4	-7.2	-7.6	-7.6	-7.2	-6.6	-5.9	-5.8	-5.8	-6.2	-6.8	-7.5	-8.1	-8.5	-9.1	-9.7	-10.0	-10.2	-5.7	6.4																						
21-Nov	-10.1	-10.3	-10.4	-10.4	-10.2	-10.1	-10.0	-9.8	-9.9	-10.1	-10.0	-9.7	-9.3	-8.9	-8.6	-9.2	-9.7	-10.4	-11.0	-10.9	-10.9	-11.3	-11.6	-11.9	-10.2	-8.6																						
22-Nov	-11.9	-11.9	-12.0	-12.3	-12.7	-14.0	-15.1	-15.4	-15.5	-15.5	-15.4	-15.2	-14.9	-14.3	-14.0	-14.1	-14.1	-14.0	-13.7	-13.6	-13.7	-13.6	-13.5	-13.1	-13.9	-11.9																						
23-Nov	-12.8	-12.7	-12.7	-12.3	-11.6	-11.4	-11.2	-10.9	-10.1	-9.6	-9.4	-8.8	-8.2	-7.5	-6.8	-4.5	-4.5	-4.6	-3.8	-2.6	-1.9	-1.9	-1.4	-0.8	-7.6	-0.8																						
24-Nov	-0.5	0.0	0.6	0.7	-0.1	0.1	-0.2	0.4	1.0	1.0	0.9	1.3	2.2	3.4	4.1	4.1	3.7	3.2	3.0	3.1	2.6	2.0	1.4	0.9	1.6	4.1																						
25-Nov	0.2	0.5	0.6	0.9	-0.7	-1.2	-2.1	-2.8	-2.9	-4.5	-5.1	-5.2	-5.2	-5.2	-5.2	-6.7	-8.6	-9.4	-10.0	-10.1	-10.4	-10.5	-11.0	-11.0	-5.2	0.9																						
26-Nov	-10.9	-11.1	-11.2	-11.4	-11.5	-12.3	-12.4	-12.5	-12.8	-12.6	-12.9	-12.9	-12.6	-11.4	-10.3	-9.6	-8.1	-4.8	-3.2	-3.4	-3.2	-3.2	-3.5	-3.0	-9.2	-3.0																						
27-Nov	-4.0	-4.7	-5.7	-5.8	-5.4	-5.7	-6.0	-5.4	-5.0	-4.9	-3.7	-3.4	-3.0	-1.4	-0.2	0.9	1.7	2.2	2.3	2.3	2.4	2.8	3.5	3.3	-1.8	3.5																						
28-Nov	2.9	2.8	2.6	2.7	2.5	1.7	1.3	1.3	0.9	1.1	1.8	2.4	3.0	3.7	3.9	3.4	3.8	3.7	3.5	3.6	3.6	3.1	2.2	1.6	2.6	3.9																						
29-Nov	1.1	0.2	-0.4	-1.1	-1.8	-2.3	-2.6	-3.4	-3.9	-3.3	-3.0	-2.5	-1.7	-0.9	-0.4	-0.4	-0.5	-0.8	-1.0	-1.3	-1.4	-1.7	-2.1	-2.4	-1.6	1.1																						
30-Nov	-2.8	-3.3	-3.8	-4.2	-4.8	-5.0	-5.6	-6.0	-6.2	-6.3	-6.2	-6.0	-6.1	-6.0	-6.1	-6.0	-5.9	-5.6	-5.0	-4.5	-4.1	-4.2	-4.8	-5.1	-5.2	-2.8																						
																								-2.7	-3.1	-3.4	-3.6	-3.8	-4.0	-4.3	-4.4	-4.5	-4.5	-4.2	-3.7	-3.1	-2.6	-2.2	-2.0	-2.1	-2.1	-2.1	-2.2	-2.3	-2.4	-2.5	-2.7	Diurnal Average
																								6.4	3.9	3.4	3.3	2.9	2.5	2.2	2.2	1.7	1.6	2.4	3.6	4.1	4.3	4.9	5.7	6.1	5.6	5.9	6.4	6.6	5.7	6.1	6.5	Diurnal Maximum







**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Ambient Temperature 90 m (AT90m) - C  
Mannix - November 2023**

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	0	0.00	0.00
-20 - 0	508	70.56	70.56
0 - 10	212	29.44	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



**Wood Buffalo Environmental Association**

**Summary of Hour Averages**

**Relative Humidity (RH) - %**

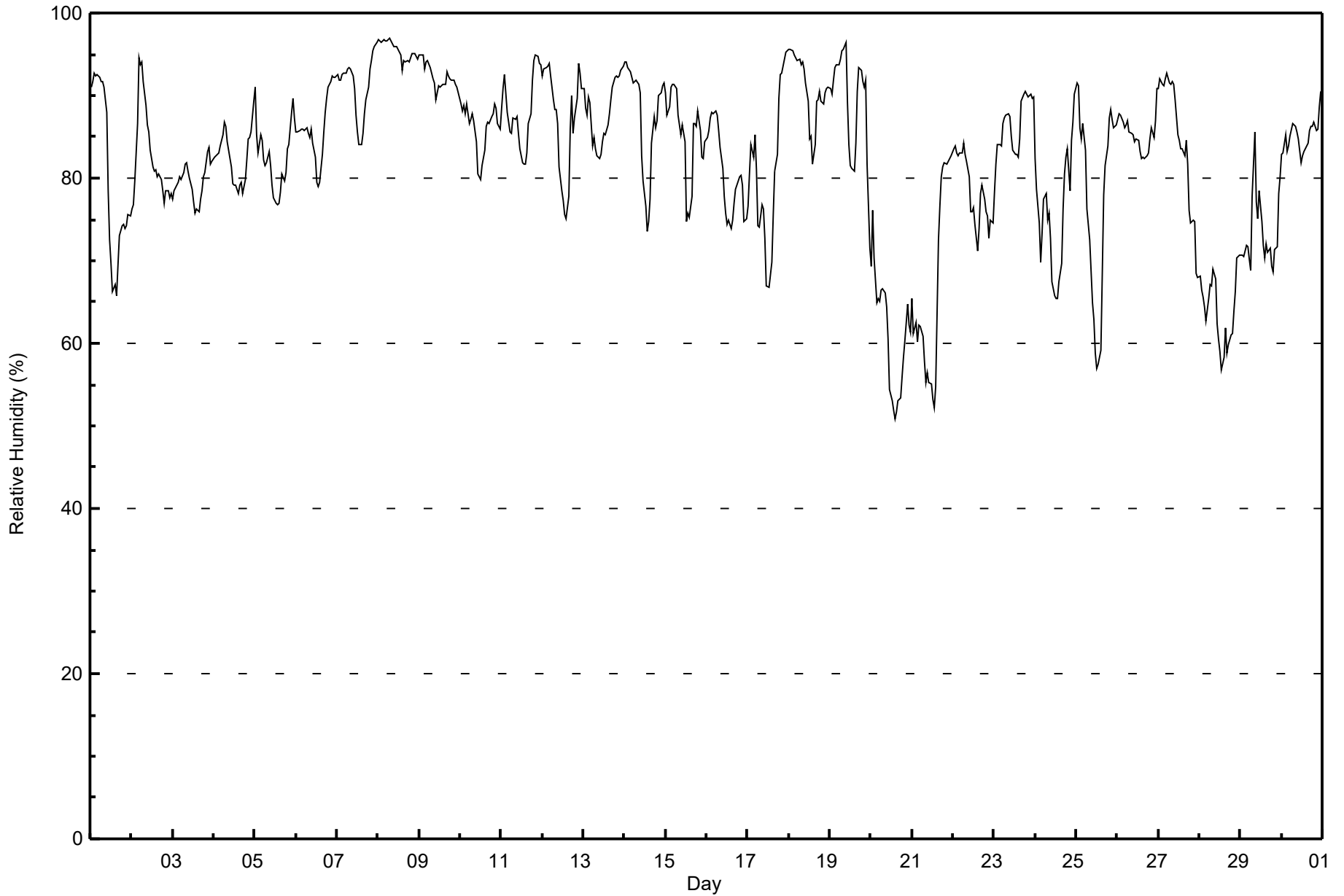
**Mannix - November 2023**

Maximum Value: 97 % on Nov 8 08:00      Maximum Daily Average: 95.5 % on Nov 8																		Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0								
Minimum Value: 51 % on Nov 20 15:00      Minimum Daily Average: 61.1 % on Nov 20 Maximum Diurnal Average: 85.3 % at hour 5      Minimum Diurnal Average: 75.8 % at hour 14 Monthly Average: 82.5 %      Percentiles: P <sub>1</sub> = 54 P <sub>10</sub> = 68 Q <sub>1</sub> = 77 Median = 84 Q <sub>3</sub> = 90 P <sub>90</sub> = 93 P <sub>99</sub> = 96																										
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	91	92	93	92	93	92	92	92	91	88	78	73	70	66	67	66	69	73	74	74	74	74	76	75	80.2	93
2-Nov	76	77	80	87	95	94	94	92	89	87	86	83	81	81	81	80	80	80	78	77	78	79	78	78	82.9	95
3-Nov	77	78	79	80	80	80	81	82	82	81	80	79	77	76	76	76	77	78	80	81	83	84	82	82	79.6	84
4-Nov	83	83	83	83	84	85	87	86	84	82	81	79	79	79	78	79	80	78	80	82	85	85	86	89	82.5	89
5-Nov	91	85	83	85	84	82	82	82	83	82	79	78	77	77	77	78	81	80	81	84	84	88	90	87	82.4	91
6-Nov	86	86	86	86	86	86	86	85	85	86	84	83	79	79	80	83	86	88	90	91	92	92	92	92	86.1	92
7-Nov	93	92	92	92	93	93	93	93	93	92	91	88	86	84	84	85	88	89	91	93	94	95	96	97	91.2	97
8-Nov	97	97	96	97	97	97	97	97	96	96	96	96	95	95	93	94	94	94	94	95	95	95	95	94	95.5	97
9-Nov	95	95	95	93	94	94	93	93	92	92	90	91	91	91	91	91	93	92	92	92	92	91	91	90	92.3	95
10-Nov	89	88	89	88	89	87	87	88	87	84	80	80	80	82	83	86	87	87	87	88	89	88	87	86	86.1	89
11-Nov	88	91	93	88	87	86	85	87	87	87	85	83	82	82	82	83	87	88	92	94	95	95	94	94	88.1	95
12-Nov	92	93	93	94	94	92	90	88	88	87	81	79	77	76	75	78	86	90	85	87	90	94	93	91	87.2	94
13-Nov	91	88	88	90	89	84	85	84	83	82	83	84	85	85	86	88	89	91	92	92	92	92	93	94	88.0	94
14-Nov	94	94	93	93	92	92	92	92	91	90	83	80	77	74	75	77	84	88	86	87	90	90	91	91	87.3	94
15-Nov	90	88	89	91	91	91	91	88	86	85	87	84	75	76	75	78	87	87	86	88	86	82	82	84	85.3	91
16-Nov	85	86	87	88	88	88	88	86	84	81	78	76	74	75	74	75	77	79	80	80	80	79	75	75	80.7	88
17-Nov	77	80	84	83	85	81	74	74	77	76	73	67	67	68	70	76	81	83	90	93	93	94	95	95	80.6	95
18-Nov	96	96	95	95	95	94	94	94	94	93	92	89	85	85	82	84	89	90	91	89	89	90	91	91	90.9	96
19-Nov	91	90	92	93	94	94	94	95	96	96	89	84	82	81	81	84	90	93	93	92	91	92	82	71	89.2	96
20-Nov	69	76	70	65	65	65	66	67	66	64	61	54	53	52	51	52	53	53	56	58	60	65	62	61	61.1	76
21-Nov	65	61	63	60	62	62	61	58	55	56	55	55	53	52	55	72	77	80	81	82	82	82	82	83	66.5	83
22-Nov	84	84	83	83	83	83	84	83	82	80	76	76	77	74	71	74	78	79	77	76	75	73	75	75	78.5	84
23-Nov	78	82	84	84	84	87	87	88	88	87	85	83	83	83	83	85	89	90	91	90	90	90	90	90	86.2	91
24-Nov	82	79	75	70	73	77	78	75	76	73	67	66	65	65	67	70	76	80	83	84	78	85	87	90	75.9	90
25-Nov	92	91	86	85	87	83	76	74	73	65	63	59	57	57	59	68	78	81	84	87	88	87	86	86	77.2	92
26-Nov	87	88	88	87	86	86	87	86	85	85	84	85	85	83	82	83	82	83	83	85	86	85	87	91	85.3	91
27-Nov	91	92	91	91	92	93	92	91	92	91	89	85	85	83	84	83	85	82	76	75	75	75	69	68	84.5	93
28-Nov	68	66	66	64	63	65	67	67	69	68	62	61	59	57	58	62	59	60	61	61	64	66	70	71	63.9	71
29-Nov	71	71	70	72	72	70	69	78	86	77	75	79	75	72	70	72	71	72	69	69	71	72	78	80	73.3	86
30-Nov	83	83	85	83	84	85	87	86	86	86	85	82	83	83	83	84	86	86	86	87	86	86	89	91	85.2	91
85.0 85.0 85.0 84.7 85.3 85.0 84.6 84.3 84.2 82.7 80.0 78.0 76.4 75.8 75.8 78.2 81.3 82.5 83.0 83.7 84.3 84.9 84.7 84.8																								Diurnal Average		
97 97 96 97 97 97 97 97 97 96 96 96 95 95 93 94 94 94 94 95 95 95 95 96 97																								Diurnal Maximum		



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

**Relative Humidity (RH) - %**  
**Mannix - November 2023**





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

**Relative Humidity (RH) - %**  
**Mannix - November 2023**

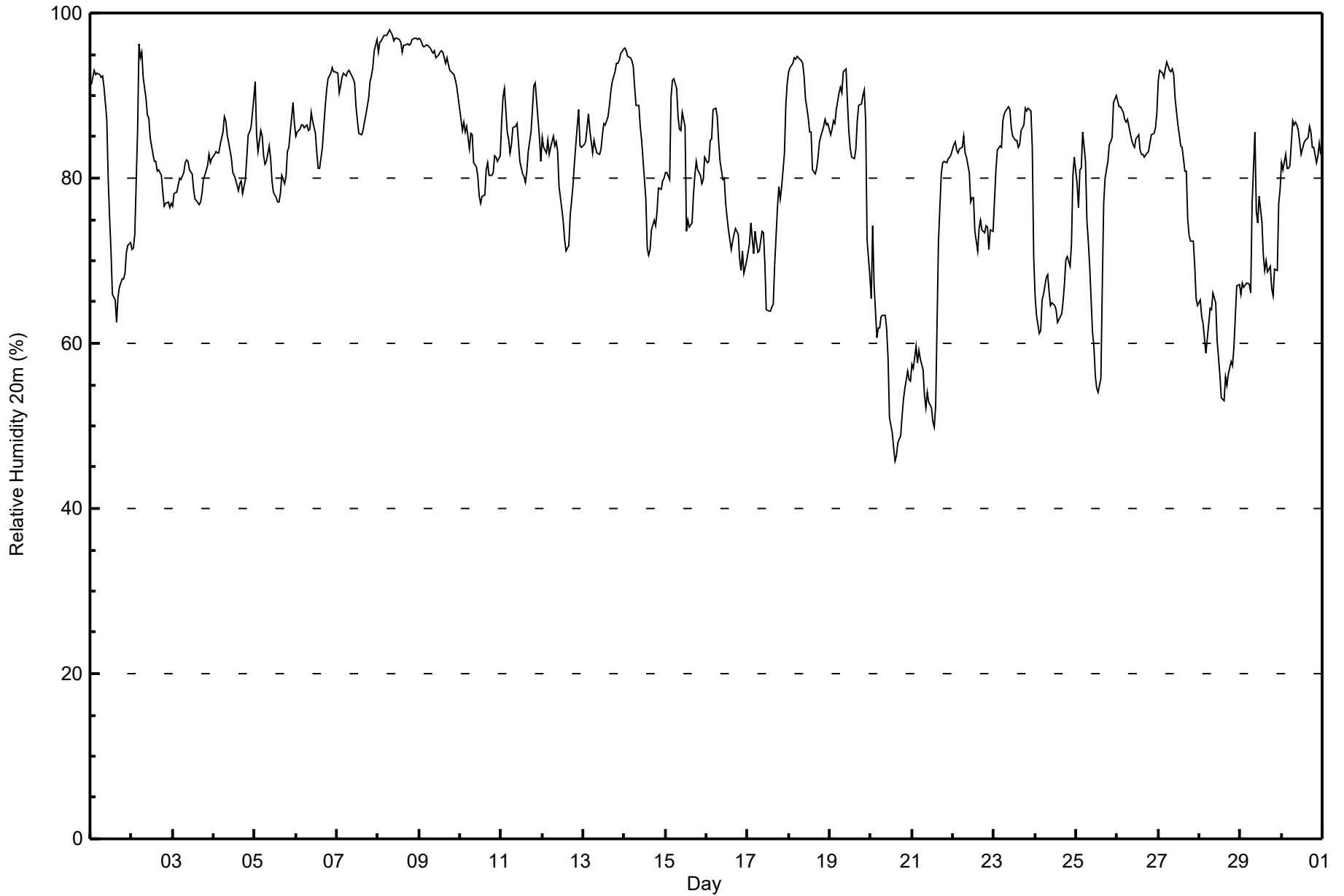
<b>Concentration Ranges (%)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	0	0.00	0.00
20 - 40	0	0.00	0.00
40 - 60	26	3.61	3.61
60 - 80	204	28.33	31.94
80 - 100	490	68.06	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



Maximum Value: 98 % on Nov 8 08:00      Maximum Daily Average: 96.7 % on Nov 8																		Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0								
Minimum Value: 46 % on Nov 20 15:00      Minimum Daily Average: 56.8 % on Nov 20 Maximum Diurnal Average: 83.6 % at hour 7      Minimum Diurnal Average: 74.7 % at hour 15 Monthly Average: 80.5 %      Percentiles: P <sub>1</sub> = 51 P <sub>10</sub> = 64 Q <sub>1</sub> = 74 Median = 83 Q <sub>3</sub> = 87 P <sub>90</sub> = 93 P <sub>99</sub> = 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-Nov	91	92	93	93	93	93	92	92	91	87	80	75	71	66	65	63	66	67	68	68	68	71	72	72	78.7	93
2-Nov	71	71	73	86	96	95	95	92	90	88	87	85	83	82	82	81	81	80	78	77	77	77	76	77	82.5	96
3-Nov	77	78	78	79	80	80	81	82	82	82	81	80	79	77	77	77	77	78	80	80	82	83	82	82	79.8	83
4-Nov	83	83	83	83	84	86	88	87	85	83	82	81	80	80	78	79	80	78	80	83	85	86	86	90	83.0	90
5-Nov	92	85	83	86	85	83	82	82	84	82	80	78	78	77	77	78	80	79	80	83	84	87	89	87	82.5	92
6-Nov	85	86	86	86	86	86	86	86	86	88	87	85	83	81	81	84	86	89	91	92	93	93	93	93	87.2	93
7-Nov	93	90	91	92	93	92	93	93	93	92	91	89	87	85	85	86	87	88	90	92	92	93	96	97	90.8	97
8-Nov	95	96	97	97	97	97	98	98	97	97	97	97	97	96	95	96	96	96	96	96	97	97	97	97	96.7	98
9-Nov	97	97	96	96	96	96	96	95	95	95	95	95	95	95	95	94	95	94	93	93	92	92	91	90	94.5	97
10-Nov	87	86	87	86	86	84	85	85	82	81	80	78	77	78	78	81	82	80	80	81	83	82	82	83	82.2	87
11-Nov	87	90	91	86	85	83	84	86	86	87	84	82	81	80	79	81	83	86	88	91	92	87	85	82	85.2	92
12-Nov	85	84	83	85	83	84	85	84	84	83	79	76	75	73	71	72	76	77	79	82	86	88	84	84	80.9	88
13-Nov	84	84	86	88	86	83	85	84	83	83	84	85	87	86	87	89	91	92	93	94	94	94	95	96	88.0	96
14-Nov	96	95	95	95	94	93	91	89	89	86	85	82	77	72	71	71	74	75	74	76	79	79	80	80	83.2	96
15-Nov	81	81	80	90	92	92	91	88	86	86	88	86	74	75	74	74	78	80	82	81	80	79	80	83	82.5	92
16-Nov	82	82	85	85	88	88	87	84	82	80	80	77	75	74	71	72	73	74	73	70	69	71	68	70	77.6	88
17-Nov	71	72	75	71	74	72	71	71	74	73	70	64	64	64	64	65	70	76	79	77	79	83	89	91	73.3	91
18-Nov	93	93	94	95	94	95	94	94	94	92	90	87	86	86	81	81	81	82	84	85	86	87	87	87	88.7	95
19-Nov	85	86	87	87	88	90	91	90	93	93	89	86	84	82	82	84	87	89	89	90	91	87	72	68	86.3	93
20-Nov	65	74	67	61	62	62	63	63	63	62	58	51	49	47	46	46	48	49	51	53	55	57	56	55	56.8	74
21-Nov	57	57	60	58	59	58	57	54	52	54	53	52	51	50	53	72	76	81	82	82	82	82	82	83	64.4	83
22-Nov	84	84	83	83	84	84	85	83	83	81	77	78	78	73	71	74	75	74	73	74	74	71	74	74	78.1	85
23-Nov	77	81	83	84	84	87	88	88	89	88	86	85	85	85	84	84	86	86	88	88	89	88	84	70	84.9	89
24-Nov	66	63	61	62	65	66	68	68	66	65	65	65	64	63	64	65	67	70	71	69	72	80	82	82	67.1	82
25-Nov	79	76	81	81	86	82	75	72	69	61	60	56	55	54	56	67	77	80	82	84	84	85	89	90	74.3	90
26-Nov	89	89	89	88	87	87	87	86	85	84	84	85	85	83	83	83	83	83	83	84	85	85	86	88	85.5	89
27-Nov	92	93	93	92	93	94	93	93	93	93	90	86	85	84	84	81	81	75	73	72	72	69	65	65	83.8	94
28-Nov	65	63	62	60	59	62	64	64	66	65	60	58	56	53	53	56	55	56	58	57	59	63	67	67	60.5	67
29-Nov	66	67	67	67	67	67	66	77	86	76	75	78	75	71	69	70	69	69	67	66	69	69	77	79	71.1	86
30-Nov	82	81	83	81	81	82	87	86	87	86	86	83	84	84	85	85	86	86	84	84	82	83	84	83	83.9	87
81.9 82.1 82.4 82.7 83.6 83.4 83.6 83.3 83.1 81.8 80.1 78.2 76.5 75.3 74.7 76.3 78.1 78.9 79.7 80.2 81.0 81.4 81.6 81.4																								Diurnal Average		
97 97 97 97 97 97 98 98 97 97 97 97 97 96 95 96 96 96 96 96 97 97 97 97 97																								Diurnal Maximum		





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

**Relative Humidity 20m (RH20m) - %**  
**Mannix - November 2023**

<b>Concentration Ranges (%)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	0	0.00	0.00
20 - 40	0	0.00	0.00
40 - 60	45	6.25	6.25
60 - 80	220	30.56	36.81
80 - 100	455	63.19	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



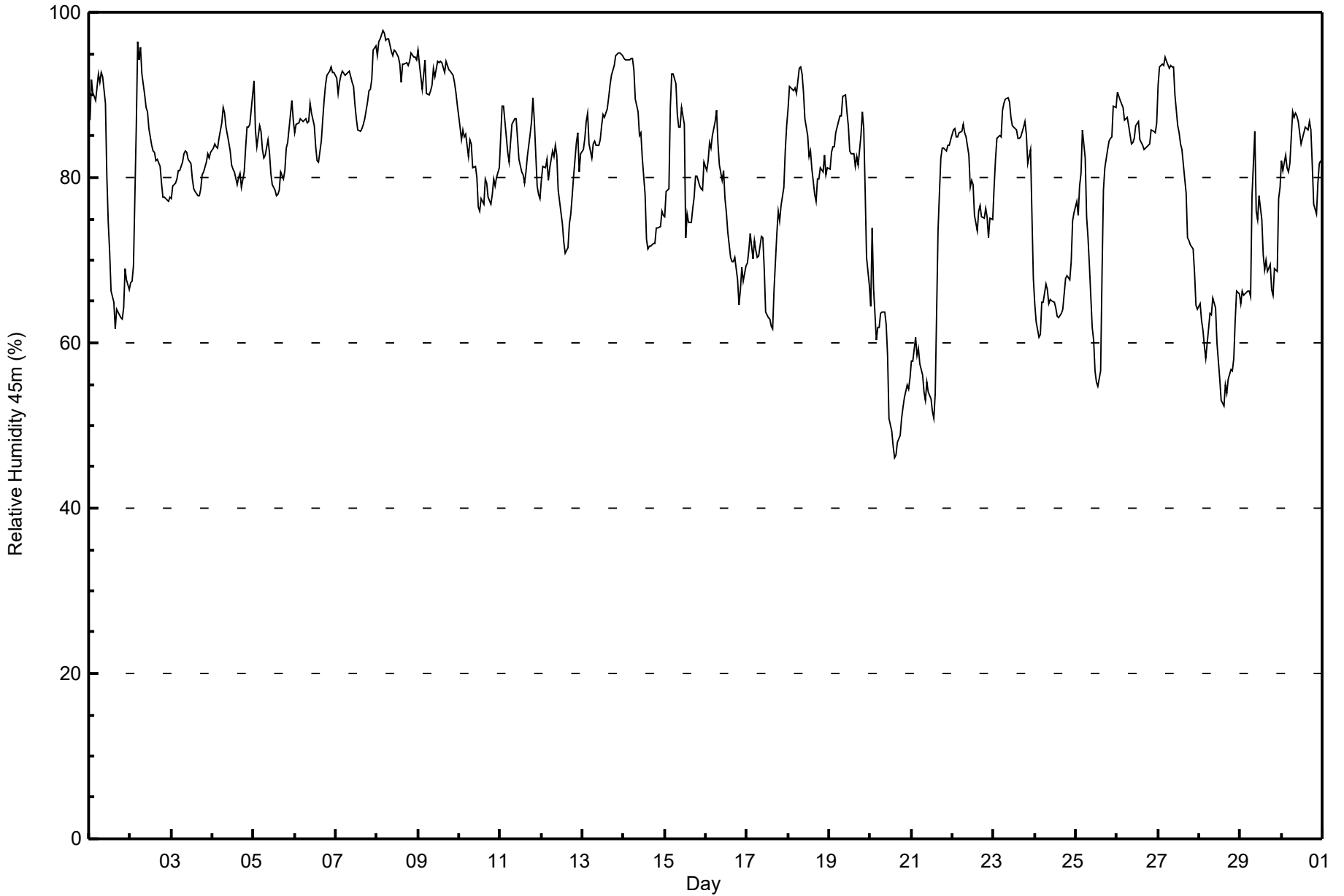


Maximum Value: 98 % on Nov 8 04:00																		Maximum Daily Average: 95.1 % on Nov 8																		Hours in Service: 720	
Minimum Value: 46 % on Nov 20 15:00																		Minimum Daily Average: 56.6 % on Nov 20																		Hours of Data: 720	
Maximum Diurnal Average: 83.4 % at hour 7																		Minimum Diurnal Average: 74.9 % at hour 15																		Hours of Missing Data: 0	
Monthly Average: 79.8 %																		Percentiles: P <sub>1</sub> = 51 P <sub>10</sub> = 64 Q <sub>1</sub> = 74 Median = 82 Q <sub>3</sub> = 87 P <sub>90</sub> = 93 P <sub>99</sub> = 96																		Hours of Calibration: 0	
																																				Percent Operational Time: 100.0	
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum											
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24													
1-Nov	87	92	90	90	89	93	92	93	92	89	80	75	71	66	65	62	64	64	63	63	64	69	68	66	76.9	93											
2-Nov	67	68	69	86	97	94	96	92	90	88	88	86	84	83	83	82	82	81	79	78	78	77	77	78	82.7	97											
3-Nov	77	79	79	80	81	81	82	83	83	83	82	82	80	79	78	78	79	80	81	82	83	82	83	83	80.6	83											
4-Nov	83	84	84	84	85	87	88	88	86	84	83	81	81	81	79	80	80	79	81	84	86	86	87	90	83.8	90											
5-Nov	92	86	84	86	86	83	82	83	85	83	81	79	78	78	78	79	81	80	81	84	84	88	89	87	83.1	92											
6-Nov	85	86	87	87	87	87	87	87	87	89	88	86	84	82	82	84	87	89	91	92	93	93	93	93	87.8	93											
7-Nov	92	90	92	92	93	92	93	93	93	92	91	89	87	86	86	86	86	87	89	91	91	92	95	96	90.5	96											
8-Nov	95	96	97	98	98	97	97	97	95	95	95	95	95	94	92	94	94	94	94	94	95	95	95	94	95.1	98											
9-Nov	95	94	91	92	94	90	90	91	91	93	92	94	94	94	94	93	94	94	93	93	92	92	90	89	92.5	95											
10-Nov	86	85	86	85	85	83	85	84	81	81	80	76	76	77	77	80	79	78	77	78	80	79	80	81	80.8	86											
11-Nov	85	89	89	85	83	82	84	87	87	87	85	82	81	80	79	81	83	85	87	90	87	79	78	78	83.8	90											
12-Nov	80	81	81	82	80	81	83	83	84	83	78	76	74	72	71	72	74	76	78	80	84	85	81	83	79.2	85											
13-Nov	83	85	87	88	84	82	84	84	84	84	85	86	88	87	88	90	91	92	94	95	95	95	95	95	88.4	95											
14-Nov	94	94	94	94	94	94	93	89	88	85	85	82	78	73	71	72	72	72	72	74	74	74	76	75	82.1	94											
15-Nov	75	78	79	88	93	93	91	88	86	86	89	86	73	76	75	75	76	78	80	80	79	79	78	82	81.7	93											
16-Nov	81	82	84	83	85	87	88	84	82	80	81	77	76	73	70	70	70	70	68	65	66	69	67	69	76.2	88											
17-Nov	70	71	73	70	72	71	70	70	73	73	69	64	63	63	62	62	66	73	76	75	77	79	83	86	71.3	86											
18-Nov	88	91	91	91	91	90	93	93	92	90	87	85	83	83	81	78	77	80	80	81	81	83	80	81	85.4	93											
19-Nov	81	83	84	84	85	87	87	87	90	90	88	86	83	83	83	81	83	82	85	88	86	78	70	67	83.4	90											
20-Nov	64	74	67	60	62	62	64	64	64	62	58	51	49	48	46	46	48	49	51	52	53	55	54	56	56.6	74											
21-Nov	58	58	61	59	59	57	56	54	53	55	54	53	52	51	54	74	78	82	84	84	83	84	84	84	65.4	84											
22-Nov	86	86	85	85	85	86	87	85	85	83	79	80	79	75	74	76	77	75	75	76	75	73	75	75	79.8	87											
23-Nov	79	82	85	85	85	88	89	89	90	89	87	86	86	86	85	85	85	86	87	85	82	83	75	68	84.5	90											
24-Nov	65	63	61	61	65	65	67	66	65	65	65	64	63	64	64	66	68	68	68	68	70	75	76	76	65.9	76											
25-Nov	77	75	79	80	86	82	75	73	69	62	60	57	55	55	57	68	78	81	83	84	85	85	89	88	74.4	89											
26-Nov	90	90	89	89	87	87	87	86	84	84	85	86	87	85	84	84	83	84	84	84	86	86	85	87	86.0	90											
27-Nov	91	93	94	93	95	94	93	94	93	93	90	86	85	84	83	80	78	73	72	72	71	68	65	64	83.6	95											
28-Nov	65	63	62	60	58	62	64	63	65	64	60	58	56	53	52	55	54	56	57	57	58	63	66	66	59.8	66											
29-Nov	65	66	66	66	66	66	66	78	86	76	75	78	75	71	69	70	69	69	67	66	69	69	77	79	70.9	86											
30-Nov	82	81	83	81	81	82	88	87	88	87	87	84	85	85	86	86	87	86	82	77	76	79	82	82	83.4	88											
	80.7	81.5	81.6	82.2	83.0	82.8	83.4	83.2	83.0	81.9	80.3	78.4	76.7	75.5	74.9	76.1	77.3	78.0	78.5	78.9	79.3	79.6	79.8	79.9	Diurnal Average												
	95	96	97	98	98	97	97	97	95	95	95	95	95	94	94	94	94	94	94	94	95	95	95	96	Diurnal Maximum												



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

**Relative Humidity 45m (RH45m) - %**  
**Mannix - November 2023**





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

**Relative Humidity 45m (RH45m) - %**  
**Mannix - November 2023**

<b>Concentration Ranges (%)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	0	0.00	0.00
20 - 40	0	0.00	0.00
40 - 60	44	6.11	6.11
60 - 80	246	34.17	40.28
80 - 100	430	59.72	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity 75m (RH75m) - %

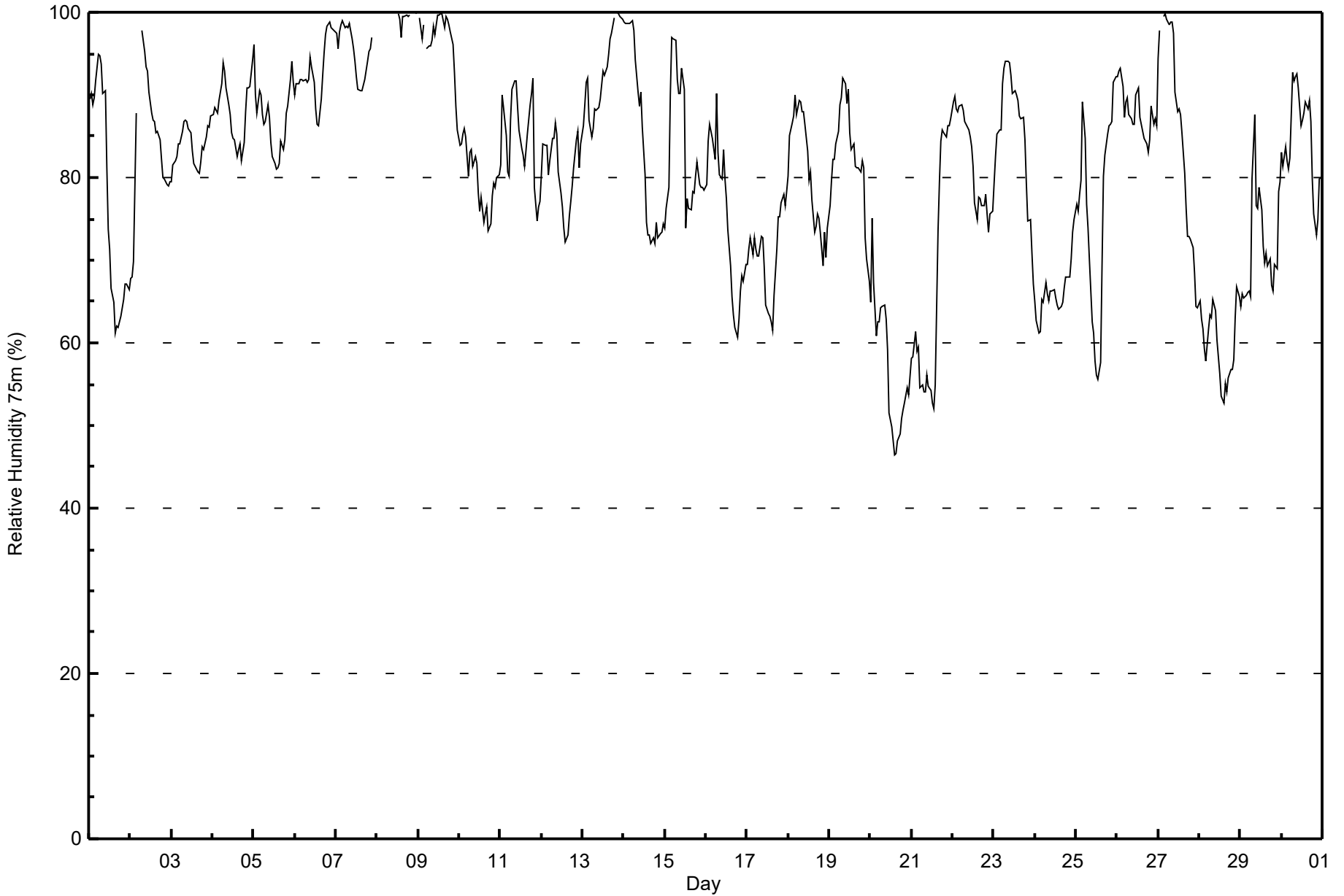
Mannix - November 2023

Maximum Value: 100 % on Nov 8 23:00																			Maximum Daily Average: 96.8 % on Nov 9						Hours in Service: 720	
Minimum Value: 47 % on Nov 20 15:00																			Minimum Daily Average: 57.0 % on Nov 20						Hours of Data: 697	
Maximum Diurnal Average: 85.2 % at hour 8																			Minimum Diurnal Average: 76.8 % at hour 15						Hours of Missing Data: 23	
Monthly Average: 80.9 %																			Percentiles: P <sub>1</sub> = 51 P <sub>10</sub> = 63 Q <sub>1</sub> = 73 Median = 83 Q <sub>3</sub> = 90 P <sub>90</sub> = 96 P <sub>99</sub> = 100						Hours of Calibration: 0	
																									Percent Operational Time: 96.8	
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	89	90	89	90	92	95	95	94	90	91	81	74	71	67	65	61	62	62	63	64	65	67	67	66	77.1	95
2-Nov	68	68	70	88	OR	OR	OR	98	95	93	93	90	88	87	87	85	86	85	82	80	80	79	79	80	83.8	98
3-Nov	80	82	82	83	84	84	86	87	87	87	86	85	83	82	81	81	81	82	84	83	85	86	86	87	83.9	87
4-Nov	88	89	88	88	89	91	94	93	91	89	88	85	85	85	83	83	84	82	84	88	91	91	91	94	88.0	94
5-Nov	96	90	88	90	90	88	86	87	89	87	84	83	82	81	81	82	84	83	85	88	89	92	94	92	87.1	96
6-Nov	90	91	91	92	92	92	92	92	92	95	93	92	88	86	86	89	92	95	97	98	99	98	98	98	92.9	99
7-Nov	97	96	98	99	99	98	98	98	99	97	96	94	92	91	90	91	91	92	94	95	96	97	OR	OR	95.3	99
8-Nov	OR	OR	OR	OR	OR	OR	OR	OR	OR	OR	OR	OR	100	99	97	99	99	100	99	100	OR	OR	100	100	--	100
9-Nov	OR	99	97	99	OR	96	96	96	97	98	97	100	100	100	100	98	99	99	98	98	96	93	89	86	96.8	100
10-Nov	84	84	85	86	85	80	83	83	81	83	82	78	76	78	75	76	76	74	74	78	79	79	80	80	79.9	86
11-Nov	81	90	88	85	81	80	87	91	92	92	89	86	84	83	81	83	85	89	90	92	79	75	77	77	84.8	92
12-Nov	80	84	84	84	80	82	85	85	87	85	81	78	76	74	72	73	75	77	79	81	85	86	81	84	80.8	87
13-Nov	86	89	91	92	87	85	86	88	88	88	89	91	93	92	93	95	97	98	99	OR	100	100	99	99	92.5	100
14-Nov	99	99	99	99	99	99	98	94	90	89	90	86	80	75	73	73	72	73	72	75	73	73	73	74	84.4	99
15-Nov	74	76	79	90	97	97	97	92	90	90	93	91	74	77	76	76	78	78	80	82	79	79	79	78	83.5	97
16-Nov	79	84	86	86	85	82	90	83	80	80	83	80	77	74	69	66	63	62	61	63	66	68	68	69	75.2	90
17-Nov	70	71	73	71	73	71	71	71	73	73	69	65	64	63	63	62	66	71	75	75	77	78	77	78	70.7	78
18-Nov	80	85	87	87	90	88	89	89	88	88	86	83	80	81	77	73	74	76	75	73	69	73	70	74	80.7	90
19-Nov	77	80	82	82	84	86	89	90	92	91	89	91	85	83	84	81	81	81	81	82	81	73	70	67	82.6	92
20-Nov	65	75	67	61	62	63	64	64	65	63	59	51	50	48	47	47	48	49	51	52	53	55	54	56	57.0	75
21-Nov	58	58	61	59	59	55	55	54	54	56	55	54	53	52	55	74	80	84	86	85	85	86	86	87	66.3	87
22-Nov	89	90	88	88	89	89	88	87	86	86	85	84	81	77	75	78	77	77	77	78	76	73	76	76	82.0	90
23-Nov	79	83	85	86	86	91	93	94	94	94	92	90	91	90	89	87	87	85	79	75	75	71	67	85.5	94	
24-Nov	65	63	61	61	65	65	67	66	65	66	66	67	65	65	64	64	65	67	68	68	68	70	73	75	66.2	75
25-Nov	77	76	78	80	89	85	77	74	70	63	61	58	56	56	58	69	80	83	85	86	87	87	92	92	75.7	92
26-Nov	92	93	93	91	87	89	90	88	87	86	86	90	91	87	86	86	85	84	83	85	89	86	87	86	87.8	93
27-Nov	94	98	OR	100	100	99	99	99	99	98	90	88	88	88	85	81	76	73	73	73	71	69	64	64	85.6	100
28-Nov	65	63	62	59	58	62	63	63	65	64	60	58	56	54	53	55	54	56	57	57	58	63	67	66	59.9	67
29-Nov	64	66	65	66	66	66	66	80	88	77	76	79	76	72	70	71	69	70	67	66	69	69	78	79	71.5	88
30-Nov	83	81	84	82	81	82	93	92	92	93	91	86	87	88	89	88	89	87	80	76	73	75	80	80	84.6	93
																								Diurnal Average		
																								Diurnal Maximum		
80.4 82.5 82.2 83.5 83.3 83.5 84.8 85.2 85.0 84.1 82.5 80.6 79.1 77.7 76.8 77.6 78.6 79.1 79.5 79.3 79.0 79.1 79.5 79.8																										
99 99 99 100 100 99 99 99 99 99 98 97 100 100 100 100 99 99 100 99 100 100 100 100																										
OR - Out of Range																										



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

**Relative Humidity 75m (RH75m) - %**  
**Mannix - November 2023**





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

**Relative Humidity 75m (RH75m) - %**  
**Mannix - November 2023**

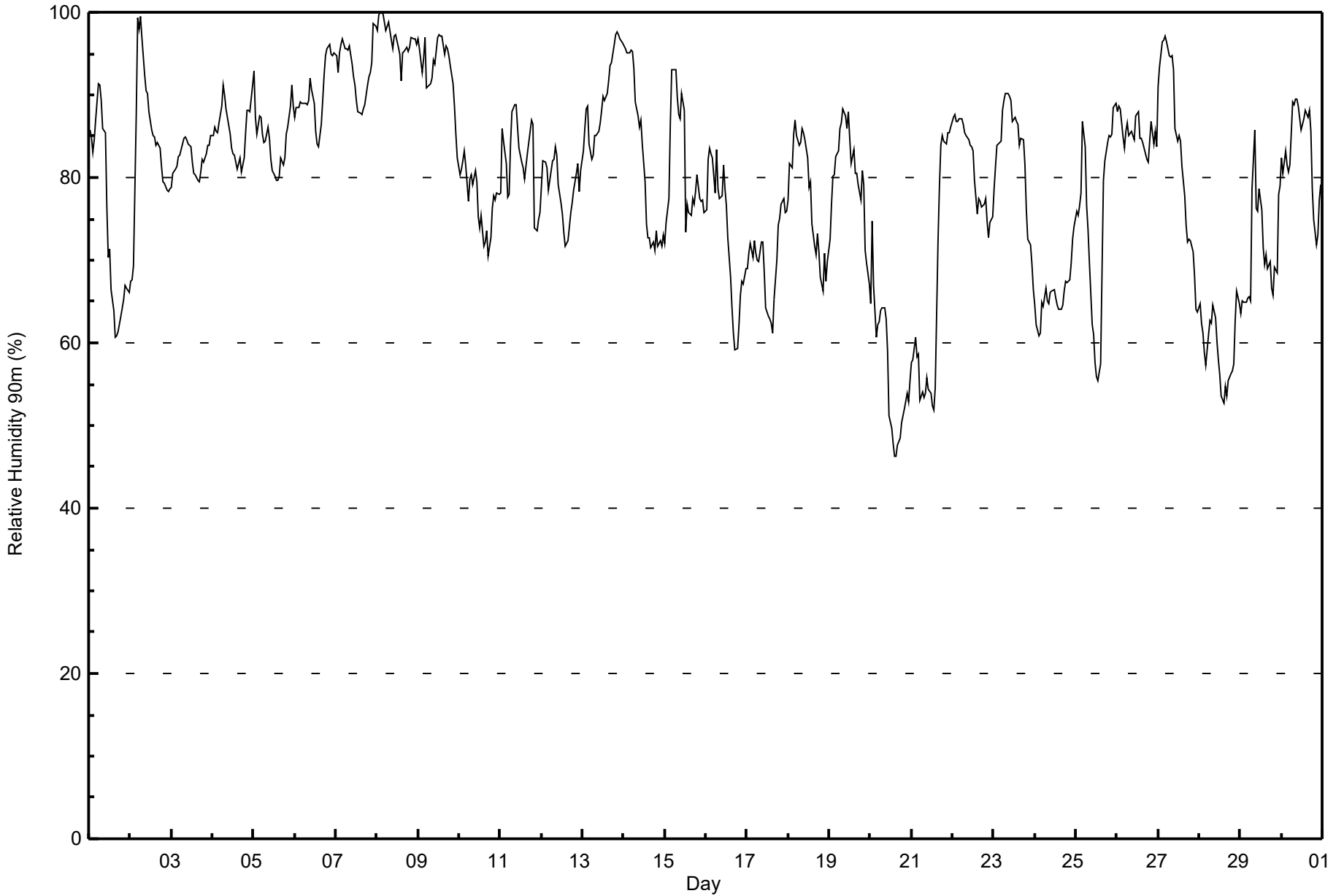
<b>Concentration Ranges (%)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	0	0.00	0.00
20 - 40	0	0.00	0.00
40 - 60	44	6.31	6.31
60 - 80	236	33.86	40.17
80 - 100	415	59.54	99.71

Total Number of Valid Hours: 697

Total Number of Hours: 720



Maximum Value: 100 % on Nov 8 03:00																		Maximum Daily Average: 96.8 % on Nov 8																		Hours in Service: 720			
Minimum Value: 46 % on Nov 20 16:00																		Minimum Daily Average: 56.7 % on Nov 20																		Hours of Data: 720			
Maximum Diurnal Average: 83.3 % at hour 7																		Minimum Diurnal Average: 75.4 % at hour 15																		Hours of Missing Data: 0			
Monthly Average: 79.6 %																		Percentiles: P <sub>1</sub> = 51 P <sub>10</sub> = 63 Q <sub>1</sub> = 72 Median = 82 Q <sub>3</sub> = 87 P <sub>90</sub> = 95 P <sub>99</sub> = 99																		Hours of Calibration: 0			
																																				Percent Operational Time: 100.0			
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24															
1-Nov	86	85	83	85	87	91	91	89	86	85	77	70	71	66	64	61	61	61	63	64	65	67	67	66	74.7	91													
2-Nov	67	68	69	88	99	98	99	97	92	90	90	88	86	85	85	84	84	84	81	80	79	79	78	79	84.6	99													
3-Nov	79	80	81	81	83	83	84	85	85	85	84	84	82	81	80	80	79	81	82	82	83	84	84	85	82.3	85													
4-Nov	85	86	86	85	87	89	91	90	88	86	85	83	83	83	81	82	82	81	82	85	88	88	88	91	85.7	91													
5-Nov	93	87	85	87	87	85	84	84	86	85	82	81	80	80	80	80	82	82	82	85	86	89	91	89	84.8	93													
6-Nov	87	89	89	89	89	89	89	89	89	92	91	89	86	84	84	86	89	92	95	96	96	95	95	95	90.1	96													
7-Nov	95	93	95	96	97	96	96	95	96	94	92	91	89	88	88	88	88	89	91	92	93	94	99	98	93.0	99													
8-Nov	98	100	100	100	99	98	98	99	97	96	97	97	96	95	92	95	95	96	95	96	97	97	97	96	96.8	100													
9-Nov	97	96	93	94	97	91	91	91	92	94	94	97	97	97	97	95	96	96	95	94	91	89	85	82	93.4	97													
10-Nov	80	81	82	83	81	77	80	80	79	81	80	75	74	75	72	72	74	71	73	76	78	77	78	78	77.4	83													
11-Nov	78	86	84	82	78	78	84	88	89	89	86	84	82	81	80	81	83	86	87	86	74	74	75	76	82.1	89													
12-Nov	79	82	82	81	78	80	82	82	84	83	79	77	76	73	72	72	74	76	77	79	81	82	78	81	78.7	84													
13-Nov	83	86	88	89	84	82	83	85	85	86	87	88	90	89	90	92	94	94	96	97	98	97	97	96	89.8	98													
14-Nov	96	96	95	95	95	95	93	89	87	86	87	84	79	74	73	73	71	72	71	74	72	72	72	73	82.3	96													
15-Nov	72	75	77	87	93	93	93	90	88	87	90	88	73	77	76	75	77	77	78	80	77	77	77	76	81.4	93													
16-Nov	76	82	84	83	82	78	83	79	77	78	81	79	77	73	68	64	61	59	59	62	66	67	67	69	73.1	84													
17-Nov	69	71	72	70	72	71	70	70	72	72	69	64	63	63	62	61	65	70	74	75	77	78	76	76	70.1	78													
18-Nov	77	82	81	85	87	85	84	84	86	85	85	82	79	79	74	72	71	73	71	68	66	71	67	70	77.7	87													
19-Nov	73	77	80	80	83	83	86	87	88	87	86	88	85	82	83	80	80	79	77	81	79	71	70	67	80.6	88													
20-Nov	65	75	67	61	62	62	64	64	64	63	59	51	50	48	46	46	48	49	50	51	52	54	53	55	56.7	75													
21-Nov	58	58	61	58	59	53	54	53	54	56	54	54	52	52	55	72	79	84	85	84	84	85	85	86	65.7	86													
22-Nov	87	88	87	87	87	87	86	85	85	85	84	84	83	80	76	77	77	76	77	77	75	73	75	75	81.4	88													
23-Nov	79	81	84	84	84	88	89	90	90	90	89	87	87	86	84	85	85	82	76	73	72	69	66	82.8	90														
24-Nov	65	62	61	61	65	64	67	65	65	66	66	66	65	65	64	64	65	66	67	67	68	70	73	74	65.9	74													
25-Nov	76	75	77	78	87	84	77	74	70	62	61	58	56	55	57	69	80	82	84	85	85	85	88	89	74.7	89													
26-Nov	88	89	88	85	84	86	87	85	86	85	85	87	88	85	85	84	83	82	82	84	87	84	86	84	85.3	89													
27-Nov	91	93	97	97	97	96	95	94	95	93	86	84	85	84	81	78	74	72	73	72	71	68	64	64	83.6	97													
28-Nov	65	62	61	59	57	61	63	62	65	63	60	58	56	54	53	55	54	55	56	57	58	63	66	65	59.4	66													
29-Nov	64	65	65	65	65	66	65	79	86	76	76	79	76	72	70	71	69	70	67	66	69	69	78	79	71.0	86													
30-Nov	82	81	83	82	81	82	89	89	90	90	89	86	86	87	88	87	88	86	79	75	72	73	77	79	83.3	90													
	79.6	81.0	81.2	81.9	82.9	82.4	83.3	83.2	83.2	82.3	81.0	79.5	77.8	76.4	75.4	76.0	77.0	77.5	77.8	78.3	77.9	78.1	78.5	78.7	Diurnal Average														
	98	100	100	100	99	98	99	99	97	96	97	97	97	97	97	95	96	96	96	97	98	97	99	98	Diurnal Maximum														







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

**Relative Humidity 90m (RH90m) - %**  
**Mannix - November 2023**

<b>Concentration Ranges (%)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	0	0.00	0.00
20 - 40	0	0.00	0.00
40 - 60	46	6.39	6.39
60 - 80	268	37.22	43.61
80 - 100	406	56.39	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



Maximum Speed: 40 km/h on Nov 20 04:00	Maximum Daily Speed Average: 23.1 km/h on Nov 20	Hours in Service: 720
Minimum Speed Value: 0 km/h on Nov 30 23:00	Minimum Daily Speed Average: 1.7 km/h on Nov 30	Hours of Data: 689
Maximum Diurnal Speed Average: 4.3 km/h at hour 1	Minimum Diurnal Speed Average: 1.4 km/h at hour 14	Hours of Missing Data: 31
Monthly Average Velocity: 2.8 km/h 199.6 deg	Percentiles: P <sub>1</sub> = 2 P <sub>10</sub> = 5 Q <sub>1</sub> = 7 Median = 11 Q <sub>3</sub> = 14 P <sub>90</sub> = 19 P <sub>99</sub> = 29	Percent Operational Time: 95.7

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	WSW4	SSE4	SSE6	SSE6	SSE9	S9	SSE10	SSE8	SSE11	SSE9	SE6	SSE7	SE8	SE8	SE8	SSE10	SSE10	S7	S8	S7	SSE9	SSE8	SSE8	SSE8	SSE7.5	SSE11
2-Nov	S7	SSE6	SW4	W5	NNW8	N14	N12	N15	N18	NNE18	NNE16	N15	NNE15	NNE16	NNE15	NNE13	NNE9	ENE10	E6	E6	S6	S6	ESE6	SE9	NNE6.6	N18
3-Nov	SSE11	SSE8	SE9	ESE11	SSE11	SSE7	SE7	SSE7	SSE6	S3	NNE3	N6	NNE6	NNE6	NE5	NNW3	NNW5	NNE6	NNE7	NE6	NNW1	NE5	ENE7	NE8	E3.1	SSE11
4-Nov	ENE6	ENE9	E6	ESE10	SE9	SE10	ESE8	ESE9	ESE11	SE9	SE12	SE13	SE15	ESE14	ESE14	ESE14	ESE15	ESE14	ESE13	ESE14	E15	E13	E13	E12	ESE11.0	SE15
5-Nov	E11	E12	E11	E11	E11	E12	E11	E10	E11	E10	E10	E9	E6	E8	E9	E9	E9	E11	ESE10	SE9	SE9	SE10	SE14	SE14	ESE9.8	SE14
6-Nov	SE16	SE12	SE14	SSE9	SE11	SE11	SE10	SE13	SE14	SSE13	SE11	SSE9	SE10	SSE12	SSE12	SE14	SE13	SE12	SSE11	SSE10	SSE9	SSE9	SSE12	SSE10	SSE11.5	SE16
7-Nov	S8	SSW9	SSW8	SW6	SW8	SW5	SSW5	SW2	WSW1	SSE4	S5	SSW6	S6	S7	S6	S5	S6	SSW7	SSW7	SSW7	SSW6	SW9	WSW12	SSW10	SSW6.0	WSW12
8-Nov	WSW12	W17	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	NW14	NW14	NW13	UO	UO	UO	UO	UO	UO	UO	---	W17
9-Nov	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	SE18	SE20	SSE17	SSE13	SE15	SE15	SE14	SE15	SE16	SE17	---	SE20
10-Nov	SE18	SSE17	SE19	SSE14	SE16	SE22	SE20	SSE16	SSE15	SSE14	SSE12	SSE13	SSE15	SE13	SE11	SE11	SSE14	SSE18	SSE16	SSE14	SSE15	SSE18	SSE16	SSE15	SSE15.5	SE22
11-Nov	SSE14	SSE11	SE14	SE20	SE18	SE22	SE22	SE23	SE25	SE23	SE25	SE24	SE19	SSE12	SE19	SSE13	SSE11	SE11	SSE7	SSE10	SSE13	S11	S7	SSW3	SE15.5	SE25
12-Nov	SSE8	S7	SW8	SSW9	SW12	W13	W17	W17	W15	W18	W23	W21	W24	W19	W13	W10	W8	WSW10	W12	WNNW13	WNNW7	W5	WNNW8	WNNW9	W11.3	W24
13-Nov	N7	N7	NNE3	ESE2	E5	E8	ENE6	ENE10	ENE13	ENE13	NE12	NE11	NNE10	NNE14	NNE19	NNE11	N9	N10	N11	N7	NNW11	NNW9	NNW9	NNW9	NNE7.9	NNE19
14-Nov	NW12	NW10	NW7	WNNW9	W8	WSW9	SW9	S8	S9	SSE10	SSE10	SSE11	S9	SW8	WSW10	WSW5	W3	SW5	SW7	S6	SSE5	SSE11	SSE11	SSE10	SSW5.0	WNNW12
15-Nov	SE6	SE4	N3	NNW4	NNW9	NNW10	NNW14	N16	N15	NNW13	NW11	NW10	NW16	NW11	W11	W6	S7	WSW11	W7	NW5	W10	WNNW11	W8	SW9	NW6.4	NW16
16-Nov	WSW10	WSW11	SW6	S8	SSE10	SSE10	SSE12	SSE12	SSE13	SSE14	SSE12	SSE13	SSE12	SSE12	SSE12	SSE11	SSE11	SSE7	S10	SSW8	SSW6	WSW9	WSW16	WSW16	S8.5	WSW16
17-Nov	WSW17	SW11	SSW7	SW12	SW7	WSW15	W28	W27	WSW18	WSW14	WSW12	WSW14	WSW7	SSW6	SSW8	SW11	WSW16	WSW13	N4	N5	E3	SSE8	S10	SSE12	WSW9.5	W28
18-Nov	SSE10	SSE10	SSE11	SSE12	SSE11	SSE12	SSE10	SSE9	SSE10	SSE11	SE12	SE8	SSE7	SSE9	SSE11	SSE12	SSE12	SSE12	SSE10	SSE11	SSE11	SSE6	S5	SSE6	SSE9.9	SSE12
19-Nov	W3	SSE3	SSW6	SSE3	S4	SW3	SSW2	ESE4	WSW3	SE4	SSE7	SSW6	SE5	SSE7	SSE6	SSE6	SSE7	SSE7	SSE7	SSE6	SSE9	S8	W17	W24	S4.5	W24
20-Nov	WSW20	WNNW29	WNNW38	WNNW40	WNNW35	WNNW36	WNNW31	WNNW29	W29	W24	WNNW23	W26	WNNW27	WNNW28	WNNW25	WNNW22	WNNW21	WNNW17	WNNW14	W14	W12	WSW11	WNNW10	WNNW6	WNNW23.1	WNNW40
21-Nov	NNW4	NW3	ENE3	ENE5	ESE4	SSE10	SSE9	SE6	E10	ENE12	E13	E16	ENE10	NE12	NE10	N13	N14	N19	NNE19	N18	N16	N17	N16	N17	NE7.9	N19
22-Nov	N16	NNE14	N12	N10	N13	NNE16	NNE15	NNE10	NNE9	NNE7	NNE6	N5	N5	NNE3	SW2	W3	WNNW4	S3	SSE6	SSE10	SSE9	SSE11	SSE10	SSE13	NE3.8	NNE16
23-Nov	SSE13	SSE13	SSE13	SSE14	SSE15	SSE13	SSE13	SSE10	SSE9	S8	SSE10	SSE10	SSE10	SSE10	SSE10	SSE10	SSE11	SSE10	SSE12	SSE14	SSE12	SSE13	S13	SSW13	SSE11.4	SSE15
24-Nov	SSW13	SSW14	SW18	SW18	SSW11	SSW11	SSW12	SSE3	WSW10	SW4	WSW9	WSW8	W7	W5	WSW9	SW5	SW5	SSW7	SSW9	SW11	WSW12	SW11	SSE8	SSE10	SW8.6	SW18
25-Nov	SSE6	W11	WNNW14	NW14	NNW21	NNW26	N32	NNW18	NNW21	NNW29	NNW23	NNW21	NNW19	NNW19	NNW19	N15	NNE11	NNE13	NNE8	NNW4	ENE2	N2	WSW6	SSW5	NNW12.6	N32
26-Nov	SE3	SSE5	S7	SSE7	SSE6	ENE3	SSE2	S4	SSE6	SE7	SSE10	SSE9	SSE10	SSE9	SSE10	SSE8	SSE7	S5	SSW5	S6	ESE5	ESE2	SSW7	SSE5.8	SSE10	
27-Nov	S4	SSE5	SSE5	SSE5	SSE5	SSE9	SSE11	SSE13	SSE12	SSE13	SSE13	SSE14	SSE14	SSE13	SSE15	SSE16	S9	WSW10	WSW13	W19	W19	WSW15	WSW23	WSW20	SSW8.7	WSW23
28-Nov	WSW18	W20	W21	W17	WSW18	W21	W21	WSW22	WSW22	WSW23	W21	W24	W24	W16	WSW13	WSW12	W22	W22	W25	W20	WSW18	W25	W17	WNNW15	W19.7	W25
29-Nov	W17	W19	W17	W17	W16	W18	W18	W17	W16	W18	W17	W17	W19	WNNW20	WNNW23	WNNW20	WNNW18	NW17	NW21	NW17	WNNW15	NW16	WNNW14	WNNW16	WNNW17.1	WNNW23
30-Nov	WNNW12	WNNW10	NW8	WNNW10	WNNW8	NNW6	NNE6	NE7	NE6	E5	ENE4	ENE4	ENE8	NE5	NE8	E3	SW3	S2	S5	SSW5	S2	WNNW1	NW0	WSW4	NNW1.7	WNNW12

SSW4.3 SW4.0SSW3.7SSW3.4SSW2.9SSW2.5 SW2.2SSW2.0 S2.5 S2.2 S2.4SSW2.5 S2.0SSW1.4 S1.7 S2.1 S2.7 S2.7SSW2.6SSW3.1SSW3.9SSW4.1SSW4.1SSW4.1	Diurnal Average
WSW20WNNW29WNNW38WNNW40WNNW35WNNW36 N32WNNW29 W29NNNW29 SE25 W26WNNW27WNNW28WNNW25WNNW22 W22 W22 W25 W20 W19 W25WSW23 W24	Diurnal Maximum

UO - Unstable Operation  
 All monthly, daily, and diurnal averages have been calculated using vector methods



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

**Wind Speed 20 m (WS20m) - km/h**  
**Mannix - November 2023**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 10 km/h on Nov 20 04:00	Hours of Data: 689
Minimum Value: 1 km/h on Nov 30 22:00	Hours of Missing Data: 31
Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 2 Q <sub>1</sub> = 2 Median = 3 Q <sub>3</sub> = 4 P <sub>90</sub> = 5 P <sub>99</sub> = 8	Hours of Calibration: 0
	Percent Operational Time: 95.7

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

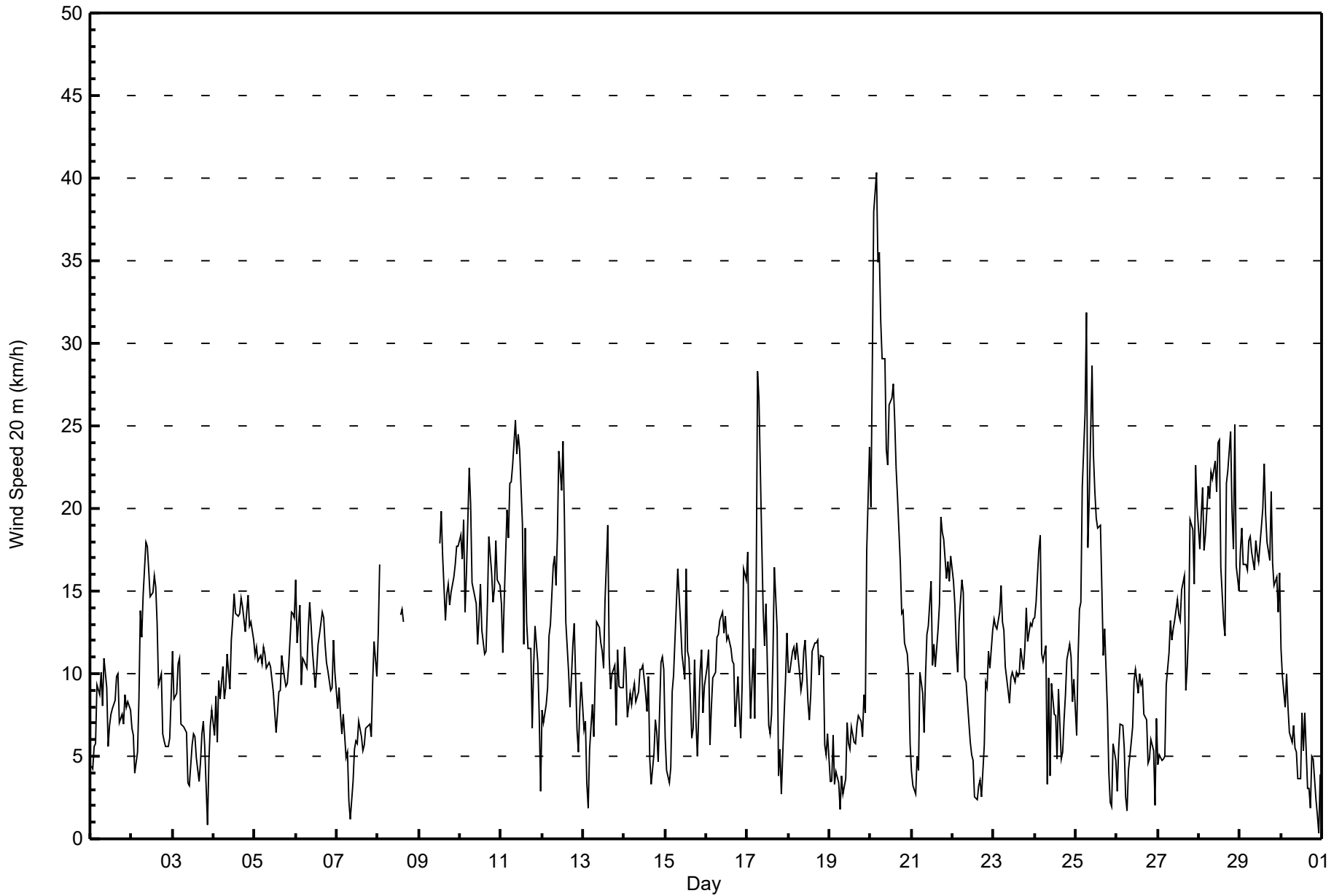
Diurnal Maximum

UO - Unstable Operation



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

**Wind Speed 20 m (WS20m) - km/h**  
**Mannix - November 2023**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Wind Speed 20 m (WS20m) - km/h  
Mannix - November 2023**

<b>Wind Speed Ranges (km/h)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	93	13.50	13.50
6 - 11	304	44.12	57.62
12 - 19	230	33.38	91.00
20 - 28	52	7.55	98.55
29 - 38	9	1.31	99.85
> 38	1	0.15	100.00

Total Number of Valid Hours: 689

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Wind Speed 20 m (WS20m) - km/h  
Mannix - November 2023**

<b>Wind Speed Ranges (km/h)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 5	5	3	3	6	4	5	4	13	11	7	9	6	5	2	3	7	93
6 - 11	7	14	7	8	20	7	25	104	27	22	13	15	10	9	6	10	304
12 - 19	18	14	2	3	7	8	31	63	1	4	4	20	29	12	8	6	230
20 - 28	0	0	0	0	0	0	11	0	0	0	0	7	19	9	2	4	52
29 - 38	1	0	0	0	0	0	0	0	0	0	0	0	1	6	0	1	9
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
<b>Totals</b>	<b>31</b>	<b>31</b>	<b>12</b>	<b>17</b>	<b>31</b>	<b>20</b>	<b>71</b>	<b>180</b>	<b>39</b>	<b>33</b>	<b>26</b>	<b>48</b>	<b>64</b>	<b>39</b>	<b>19</b>	<b>28</b>	<b>689</b>

Total Number of Valid Hours: 689

Total Number of Hours: 720









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

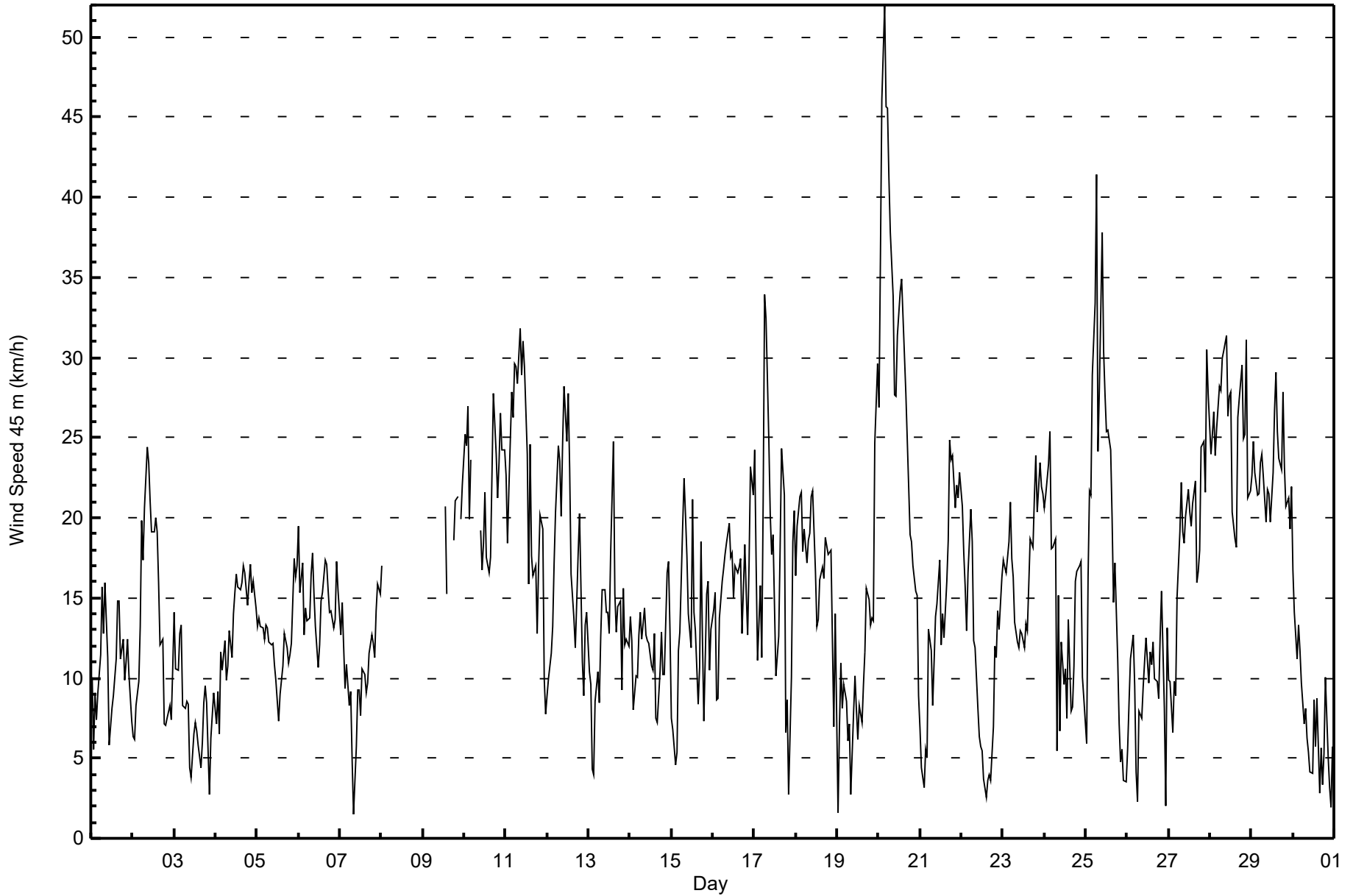
**Wind Speed 45 m (WS45m) - km/h**  
**Mannix - November 2023**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 11 km/h on Nov 25 09:00	Hours of Data: 676
Minimum Value: 1 km/h on Nov 14 08:00	Hours of Missing Data: 44
Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 2 Q <sub>1</sub> = 2 Median = 3 Q <sub>3</sub> = 4 P <sub>90</sub> = 5 P <sub>99</sub> = 7	Hours of Calibration: 0
	Percent Operational Time: 93.9

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

Diurnal Maximum

UO - Unstable Operation





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

**Wind Speed 45 m (WS45m) - km/h**  
**Mannix - November 2023**

<b>Wind Speed Ranges (km/h)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	38	5.62	5.62
6 - 11	178	26.33	31.95
12 - 19	280	41.42	73.37
20 - 28	146	21.60	94.97
29 - 38	28	4.14	99.11
> 38	6	0.89	100.00

Total Number of Valid Hours: 676

Total Number of Hours: 720



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

**Wind Speed 45 m (WS45m) - km/h**  
**Mannix - November 2023**

<b>Wind Speed</b> <b>Ranges (km/h)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 5	2	3	4	4	3	1	1	5	1	4	4	2	1	0	1	2	38
6 - 11	6	9	9	5	12	7	30	24	20	17	14	7	5	5	4	4	178
12 - 19	10	14	6	4	20	9	55	72	6	14	16	19	12	9	4	10	280
20 - 28	18	1	0	0	0	0	21	24	1	3	3	27	27	10	7	4	146
29 - 38	0	0	0	0	0	0	6	0	0	0	0	5	7	6	0	4	28
> 38	1	0	0	0	0	0	0	0	0	0	0	0	1	4	0	0	6
<b>Totals</b>	<b>37</b>	<b>27</b>	<b>19</b>	<b>13</b>	<b>35</b>	<b>17</b>	<b>113</b>	<b>125</b>	<b>28</b>	<b>38</b>	<b>37</b>	<b>60</b>	<b>53</b>	<b>34</b>	<b>16</b>	<b>24</b>	<b>676</b>

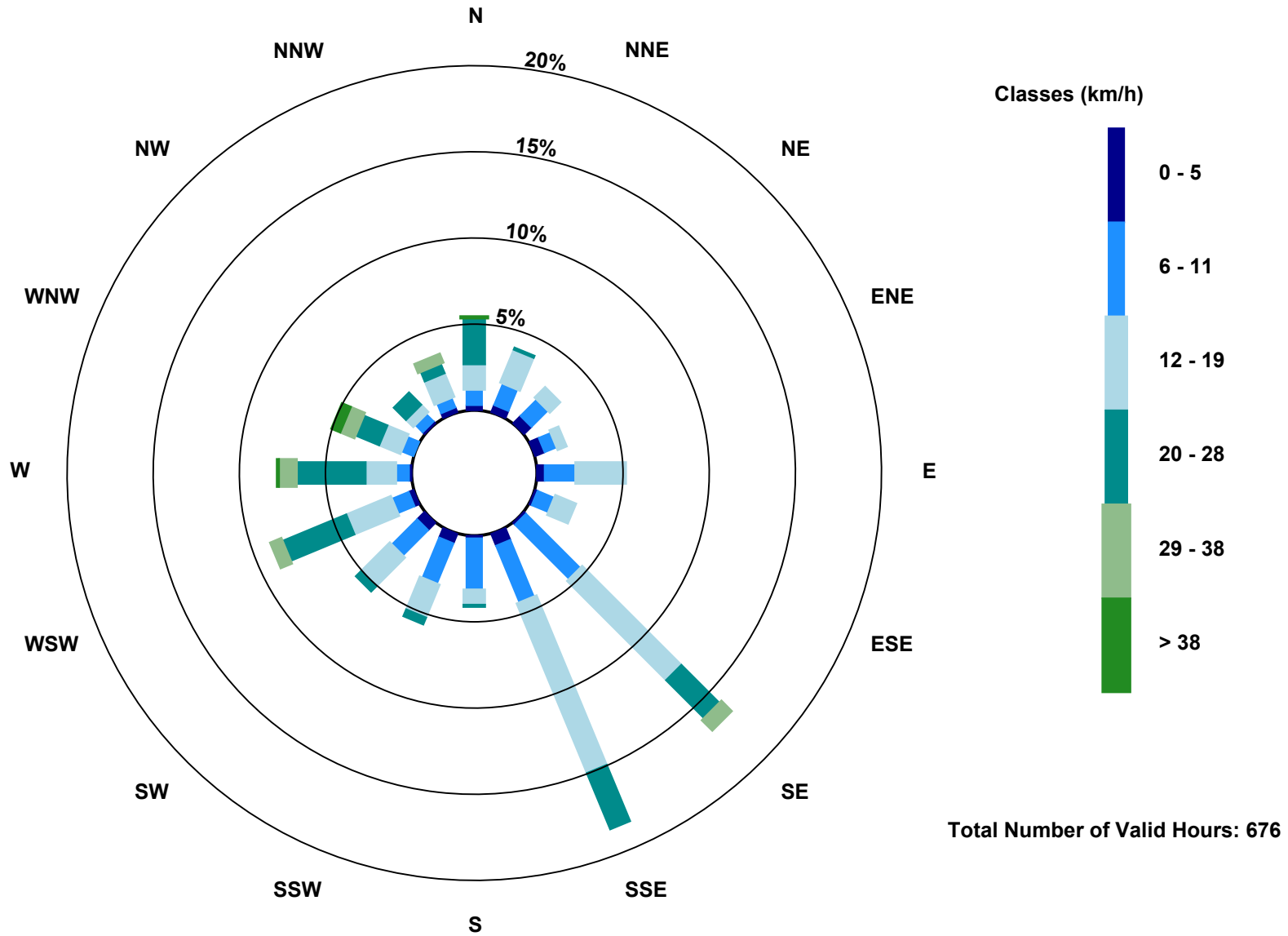
Total Number of Valid Hours: 676

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 2023

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





Maximum Speed: 57 km/h on Nov 20 04:00	Maximum Daily Speed Average: 33.0 km/h on Nov 20	Hours in Service: 720
Minimum Speed Value: 1 km/h on Nov 25 23:00	Minimum Daily Speed Average: 3.0 km/h on Nov 30	Hours of Data: 662
Maximum Diurnal Speed Average: 8.1 km/h at hour 1	Minimum Diurnal Speed Average: 3.1 km/h at hour 14	Hours of Missing Data: 58
Monthly Average Velocity: 5.3 km/h 209.8 deg	Percentiles: P <sub>1</sub> = 3 P <sub>10</sub> = 7 Q <sub>1</sub> = 11 Median = 16 Q <sub>3</sub> = 24 P <sub>90</sub> = 30 P <sub>99</sub> = 43	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-Nov	SSW12	SW11	SSW11	SW7	SW5	SSW8	S10	SSE11	SSE12	SSE14	SSE7	SSE7	SSE9	SSE9	SE14	SSE18	S18	SSW13	SW12	SSW9	S9	S10	S6	SW6	S9.2	S18
2-Nov	WSW8	WSW9	W12WNW14	NNW16	N24	N20	N24	N28	NNE27	NNE24	N21	NNE21	NNE22	NNE21	NNE17	NNE13	NE14	ENE7	E7	SSE8	S10	ESE7	SE10	NNE10.6	N28	
3-Nov	SSE16	SE13	SE9	ESE11	SSE15	SSE9	SE9	SSE11	SE11	SE6	NNE4	N7	NNE7	NE7	NE6	N4	NNE6	NE10	NE10	ENE10	ENE5	ENE8	ENE9	ENE9	E5.5	SSE16
4-Nov	ENE7	ENE8	E6	ESE10	ESE9	SE10	ESE9	ESE9	ESE11	SE10	SE11	SE12	ESE12	ESE13	ESE13	E13	ESE13	ESE12	ESE13	ESE13	E13	E14	E13	ESE10.8	E14	
5-Nov	E14	E13	E12	E14	E13	E13	E11	E11	E12	E12	E10	E10	E7	E8	E9	E10	E11	ESE10	SE10	ESE10	SE10	SE16	SE14	SE17	E11.0	SE17
6-Nov	SE16	SE16	SE15	SSE16	SE17	SE16	SE17	SE19	SE20	SSE16	SE14	SE11	SE13	SSE16	SE16	SE19	SE20	SE18	SE17	SSE18	SSE17	SSE18	SSE21	S19	SE16.7	SSE21
7-Nov	S15	SSW18	SSW15	SW11	SW13	SW11	SSW12	SW7	SSW2	SSE9	S14	SSW12	S9	S12	S12	S11	SSW12	SW13	SSW16	SSW15	SSW13	SW17	WSW19	SW20	SSW12.2	SW20
8-Nov	WSW20	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	---	WSW20
9-Nov	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	---	---
10-Nov	SSE34	SSE34	SE36	SSE27	SE33	SE43	SE41	SSE33	SSE29	SSE25	SSE22	SSE23	SSE27	SE23	SSE24	SSE25	SSE30	SSE36	S30	S27	SSE27	S31	SSE30	SSE31	SSE29.8	SE43
11-Nov	SSE30	SSE21	SE26	SE31	SE26	SE30	SE33	SE28	SE32	SE28	SE33	SE31	SE27	SE19	SE27	SSE21	SSE21	SE22	SSE17	SSE23	S24	S21	SW12	WSW13	SE23.3	SE33
12-Nov	SW11	SW13	SW14	WSW17	WSW22	W27	W31	WSW29	W26	WSW30	W31	W27	W30	W25	W18	W16	W16	WSW18	W23	WNW25	NW15	NW14	NW17	NNW18	W19.7	W31
13-Nov	NNW13	N11	NE5	ENE6	E9	E11	ENE11	ENE15	ENE17	ENE17	NE16	NNE16	NNE15	NNE20	NNE29	NNE17	N15	N16	N16	N10	N17	N14	NNW15	UO	NNE12.4	NNE29
14-Nov	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	---	S10
15-Nov	SE4	SE4	N7	NNW6	N14	NNW15	N23	N26	N23	NNW20	NW15	NW13	NW23	WNW15	W14	W10	SW13	WSW22	W17	NW9	WNW20	WNW20	WNW11	WSW16	NW11.2	N26
16-Nov	WSW17	WSW18	WSW13	SW10	SSE10	SE13	SSE21	SSE24	SE24	SE26	SSE23	SSE20	SSE17	SSE21	SSE21	SSE21	SSE22	SSE20	SSW24	SW20	WSW18	WSW24	WSW28	WSW26	S14.7	WSW28
17-Nov	WSW29	SW23	SW16	SW19	WSW15	WSW27	W39	W38	WSW31	WSW26	WSW23	WSW22	SW13	SW14	SW14	SW22	WSW29	WSW28	WNW10	NNW8	N3	SE7	SSE15	S16	WSW17.9	W39
18-Nov	S17	S24	SSE25	SSE27	SSE24	SSE25	SSE25	SSE29	SSE29	SSE29	SE27	SE24	SE20	SE16	SE20	SE20	SE19	SE20	SE20	SE20	SSE21	SE14	SE10	SE17	SSE21.4	SSE29
19-Nov	ESE3	SE6	SE13	SE7	SE11	SSE9	SE7	ESE6	ESE3	SE7	SE8	S9	SSE5	SE9	S8	SSE9	S13	S15	S16	SSW11	SSW11	WSW20	W30	W34	S7.3	W34
20-Nov	WSW32	WNW39	W50	WNW57	WNW49	WNW49	WNW45	WNW41	W37	W30	W30	W33	WNW37	WNW37	WNW35	WNW33	WNW31	WNW25	WNW22	W22	W21	W19	WNW19	WNW12	WNW33.0	WNW57
21-Nov	NNW9	NW5	NNE3	ENE6	ESE5	SE15	SE11	SE8	E10	ENE15	E15	E18	ENE13	NE15	NE13	N17	NNE20	N26	NNE26	N25	N23	N24	N23	N25	NNE11.3	N26
22-Nov	N22	NNE20	N17	N14	N18	NNE22	NNE21	NNE14	NNE13	NNE9	NNE6	N6	N5	NNE4	SSW2	WSW4	W3	SSE4	SSE9	SSE13	SSE13	SSE17	SE16	SE20	NE5.5	NNE22
23-Nov	SE21	SE21	SE20	SE24	SE26	SE22	SSE19	SSE16	SSE16	SSE16	SSE16	SSE16	SSE15	SSE17	SSE16	S19	SSE24	SSE27	SSE31	SSW26	SSW22	S26	SSW29	SW27	SSE19.7	SSE31
24-Nov	SSW25	SSW26	SW26	SW29	SSW23	SSW23	SW22	SW10	WSW20	WSW10	WSW15	WSW12	W13	W9	WSW16	WSW12	WSW10	SW13	SW19	WSW21	WSW20	WSW21	SW11	SW10	SW16.6	SW29
25-Nov	WSW9	W20	WNW27	NW27	N34	NNW38	N46	N28	NNW33	NNW44	NNW35	NNW31	NNW29	NNW29	NNW27	N23	NNE18	NNE20	NNE15	N10	NE8	NNE9	WNW1	SSE4	NNW20.5	N46
26-Nov	SSE7	SE10	SSE14	SSE19	SE14	ESE5	SE3	SSE11	SSE9	E11	SSE13	S14	SSE10	SSE14	SSE13	SSE14	SSE14	S14	SSW14	SSW19	SW19	SW11	W1	SW13	S10.3	SW19
27-Nov	SSW11	S11	S10	S9	SSW8	SSE18	SSE24	SSE29	SSE27	SSE27	SSE27	SSE28	SSE27	S26	S26	S24	SSW19	WSW22	WSW22	W28	W29	WSW27	WSW38	WSW34	SSW17.1	WSW38
28-Nov	WSW30	WSW30	W32	WSW30	WSW32	WSW34	WSW34	WSW36	WSW37	WSW38	WSW30	W30	W30	W22	WSW21	WSW22	W30	W31	W33	W28	WSW31	W36	W25	W26	WSW30.2	WSW38
29-Nov	W27	W29	W27	W26	W26	W27	W28	W26	W23	W24	W24	W22	W24	WNW29	WNW32	WNW28	WNW26	WNW26	NW32	NW27	WNW24	NW24	WNW23	WNW25	WNW25.4	WNW32
30-Nov	WNW20	WNW17	NW12	WNW15	WNW14	NNW11	NNE8	NE8	NE7	ENE5	ENE4	ENE4	NE9	NE6	NE9	ESE3	S8	S5	SW5	SW10	SW7	SSW8	SW5	W8	NW3.0	WNW20

SSW8.1	SSW7.6	SW7.1	SW5.8	SSW4.3	SSW4.0	SSW3.7	SSW4.0	S4.4	S3.9	S4.4	SSW4.3	SSW3.2	SSW3.1	SSW3.6	SSW4.4	SSW5.6	SSW6.0	SW6.5	SW6.5	SW7.3	SW7.6	SW7.2	SW7.8	Diurnal Average	
SSE34	WNW39	W50	WNW57	WNW49	WNW49	N46	WNW41	WSW37	NNW44	NNW35	W33	WNW37	WNW37	WNW35	WNW33	WNW31	SSE36	W33	W28	WSW31	W36	WSW38	WSW34	Diurnal Maximum	

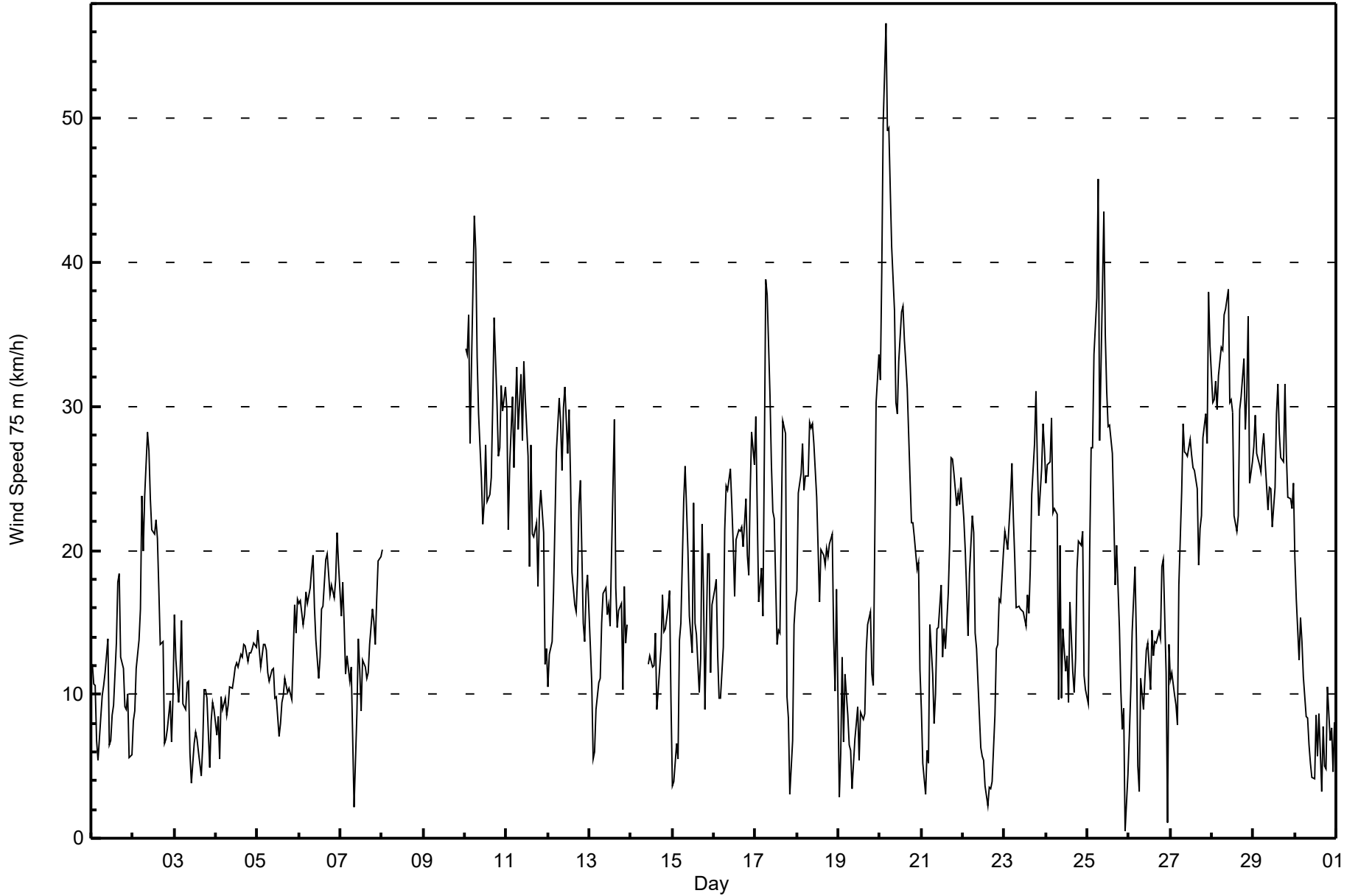
UO - Unstable Operation  
 All monthly, daily, and diurnal averages have been calculated using vector methods



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

**Wind Speed 75 m (WS75m) - km/h**  
**Mannix - November 2023**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0											Hours in Service: 720														
Maximum Value: 12 km/h on Nov 25 09:00											Hours of Data: 662														
Minimum Value: 1 km/h on Nov 1 01:00											Hours of Missing Data: 58														
Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 2 Q <sub>1</sub> = 2 Median = 3 Q <sub>3</sub> = 4 P <sub>90</sub> = 5 P <sub>99</sub> = 8											Hours of Calibration: 0														
											Percent Operational Time: 91.9														
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Nov	1	1	1	1	1	2	3	2	2	2	2	2	2	2	2	2	1	2	1	2	1	2	1	3	3
2-Nov	2	2	1	1	3	4	3	6	6	5	6	4	4	4	4	4	3	3	4	2	2	2	3	4	6
3-Nov	2	3	3	4	2	3	2	1	2	3	2	2	1	2	2	2	2	1	2	1	3	2	2	4	
4-Nov	2	2	2	3	3	4	3	3	4	4	4	5	5	3	4	4	4	4	4	4	4	4	4	3	5
5-Nov	3	3	4	2	2	2	3	2	2	2	3	2	2	2	2	2	2	3	3	4	4	4	5	4	5
6-Nov	5	4	5	2	3	3	3	4	4	4	4	2	3	2	3	4	3	3	3	2	2	2	2	2	5
7-Nov	1	3	2	1	2	2	2	2	1	4	2	4	2	2	2	2	2	2	2	1	2	2	3	2	4
8-Nov	3	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	3
9-Nov	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	--
10-Nov	4	4	3	5	5	3	4	8	3	5	3	4	4	3	3	2	3	2	3	3	4	2	3	2	8
11-Nov	3	1	4	4	7	7	6	9	8	8	8	8	5	4	5	3	2	3	1	2	1	4	2	3	9
12-Nov	2	2	2	3	2	3	2	4	3	5	4	4	4	4	3	2	2	3	3	3	4	3	2	4	5
13-Nov	3	4	2	2	3	2	3	2	2	3	2	3	4	5	5	4	3	2	2	2	4	4	2	UO	5
14-Nov	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	1	2	2	2	2	2	2	2	3	2	5	3	2	2	5
15-Nov	2	3	3	4	2	3	6	6	5	5	3	3	4	3	3	4	3	2	3	3	4	4	3	2	6
16-Nov	1	2	3	2	3	6	2	3	2	2	3	2	2	3	2	1	2	2	1	2	4	5	4	4	6
17-Nov	3	5	6	5	4	5	5	5	4	3	4	4	4	3	2	3	2	2	6	3	1	5	1	3	6
18-Nov	2	3	4	2	2	1	2	2	1	2	2	1	2	3	3	2	2	2	2	1	1	4	4	5	5
19-Nov	2	3	4	3	3	3	2	2	2	3	4	3	2	2	1	2	2	1	3	2	2	5	4	6	6
20-Nov	5	6	7	9	8	7	6	6	6	5	5	5	7	7	7	5	5	5	3	3	2	2	2	3	9
21-Nov	2	3	2	2	2	2	4	4	3	3	3	4	3	2	2	3	2	3	3	3	5	4	3	3	5
22-Nov	4	3	4	4	4	3	4	4	3	2	2	2	2	2	2	1	1	2	2	1	3	2	2	3	4
23-Nov	3	3	2	4	3	2	2	3	3	2	2	3	3	2	2	2	3	2	1	3	2	2	3	5	5
24-Nov	5	5	6	5	3	3	3	8	5	5	3	2	2	2	3	4	3	2	2	4	3	2	2	2	8
25-Nov	3	5	2	3	6	6	9	8	12	8	7	6	6	5	5	6	3	3	3	2	3	2	1	2	12
26-Nov	1	3	1	2	4	3	3	6	2	3	3	2	2	3	4	3	2	1	2	1	1	5	4	2	6
27-Nov	1	2	3	1	2	3	2	1	2	2	2	2	3	2	2	2	2	3	4	4	3	7	5	5	7
28-Nov	6	5	4	4	5	4	4	4	4	4	4	4	4	3	3	6	3	4	4	5	5	6	3	3	6
29-Nov	3	3	4	2	4	3	3	4	3	3	3	3	5	4	4	4	4	5	6	4	5	4	4	4	6
30-Nov	3	3	2	3	2	3	2	1	2	2	2	2	2	2	2	2	1	2	4	1	2	2	1	2	4
Diurnal Maximum																									
6 6 7 9 8 7 9 9 12 8 8 8 7 7 7 6 5 5 6 5 5 7 5 6																									
UO - Unstable Operation																									







**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Wind Speed 75 m (WS75m) - km/h  
Mannix - November 2023**

<b>Wind Speed Ranges (km/h)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	33	4.98	4.98
6 - 11	150	22.66	27.64
12 - 19	208	31.42	59.06
20 - 28	179	27.04	86.10
29 - 38	80	12.08	98.19
> 38	12	1.81	100.00

Total Number of Valid Hours: 662

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Wind Speed 75 m (WS75m) - km/h  
Mannix - November 2023**

<b>Wind Speed Ranges (km/h)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 5	3	3	1	4	0	5	2	4	1	2	3	1	2	1	1	0	33
6 - 11	6	7	9	10	14	10	24	17	14	9	13	7	3	2	1	4	150
12 - 19	9	9	4	5	14	8	26	39	17	13	20	17	8	7	5	7	208
20 - 28	16	12	0	0	0	0	27	36	8	7	7	22	24	13	4	3	179
29 - 38	1	1	0	0	0	0	8	14	2	1	1	20	18	7	1	6	80
> 38	1	0	0	0	0	0	2	0	0	0	0	0	2	6	0	1	12
<b>Totals</b>	<b>36</b>	<b>32</b>	<b>14</b>	<b>19</b>	<b>28</b>	<b>23</b>	<b>89</b>	<b>110</b>	<b>42</b>	<b>32</b>	<b>44</b>	<b>67</b>	<b>57</b>	<b>36</b>	<b>12</b>	<b>21</b>	<b>662</b>

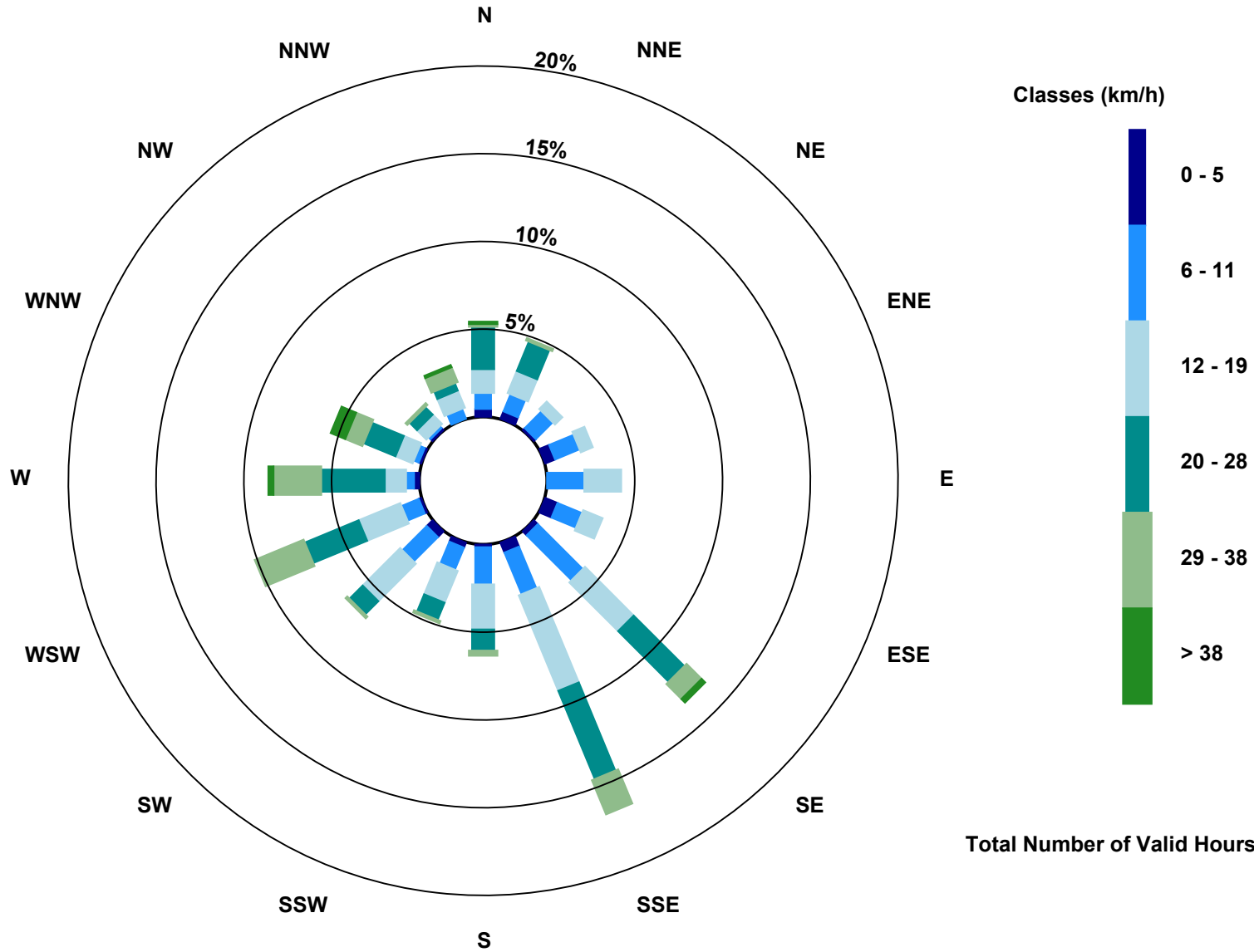
Total Number of Valid Hours: 662

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 2023

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





Maximum Speed: 58 km/h on Nov 20 04:00	Maximum Daily Speed Average: 34.4 km/h on Nov 20	Hours in Service: 720
Minimum Speed Value: 1 km/h on Nov 15 02:00	Minimum Daily Speed Average: 3.6 km/h on Nov 30	Hours of Data: 677
Maximum Diurnal Speed Average: 8.4 km/h at hour 1	Minimum Diurnal Speed Average: 3.6 km/h at hour 14	Hours of Missing Data: 43
Monthly Average Velocity: 5.6 km/h 211.1 deg	Percentiles: P <sub>1</sub> = 3 P <sub>10</sub> = 8 Q <sub>1</sub> = 12 Median = 17 Q <sub>3</sub> = 26 P <sub>90</sub> = 32 P <sub>99</sub> = 45	Percent Operational Time: 94.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Nov	SSW12	SW11	SSW13	SW9	SW8	SSW6	S6	S8	S8	S12	S7	SSE6	SSE9	SSE9	SE14	SSE18	S18	SW13	SW12	SW9	SSW8	S8	SSW5	SW6	SSW8.7	S18	
2-Nov	WSW9	WSW10	W14	WNW15	NNW17	N25	N21	N25	N29	N28	N24	N22	NNE21	NNE23	NNE21	NNE18	NNE14	NE14	ENE7	E7	SSE7	S9	ESE7	ESE11	N11.2	N29	
3-Nov	SSE16	SSE13	SE11	ESE13	SSE15	SSE10	SE9	SSE11	SE11	SE7	NE4	N7	NNE7	NNE7	NE6	N4	NNE7	NE11	NE10	ENE10	ENE6	ENE9	ENE10	ENE9	E5.9	SSE16	
4-Nov	ENE7	ENE8	E6	ESE12	ESE11	ESE11	ESE10	ESE11	ESE12	SE11	ESE12	ESE13	ESE15	ESE17	ESE16	ESE18	ESE18	ESE16	ESE17	ESE18	E17	E17	E17	E17	ESE13.3	ESE18	
5-Nov	E16	E16	E15	E15	E14	E14	E14	E14	E13	E13	E13	E12	E11	E8	E8	E10	E11	E13	ESE12	SE11	ESE11	ESE11	SE17	SE15	SE18	E12.4	SE18
6-Nov	SE17	SE17	SE16	SE16	SE18	SE17	SE18	SE19	SE20	SSE16	SE14	SE11	SE13	SSE16	SE16	SE20	SE20	SE19	SE17	SSE19	SSE18	SSE19	SSE22	S19	SE17.1	SSE22	
7-Nov	S16	SSW18	SSW15	SW12	SW13	SW12	SW13	SW8	SSW2	SSE10	S15	SSW12	S9	S12	S12	S11	SSW12	SW14	SSW16	SSW16	SSW14	SW17	WSW20	UO	SSW12.4	WSW20	
8-Nov	WSW22	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	---	WSW22	
9-Nov	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	SSE18	SSE18	SE21	SSE20	SSE21	SE25	SE26	SE26	SE27	SE31	SE32	SE34	SSE40	---	SSE40
10-Nov	SSE40	SSE37	SE39	SSE30	SE36	SE44	SE43	SSE36	SSE32	SSE27	SSE24	SSE25	SSE29	SSE25	SSE26	SSE28	SSE32	SSE38	S32	S28	S27	S32	SSE30	SSE32	SSE31.8	SE44	
11-Nov	SSE32	SE21	SE27	SE34	SE26	SE29	SE33	SE31	SE34	SE30	SE35	SE32	SE27	SE20	SE29	SSE22	SSE22	SE23	SSE19	SSE24	S23	S19	SW13	WSW15	SE23.8	SE35	
12-Nov	WSW12	WSW14	WSW15	WSW19	WSW24	W30	W33	WSW31	W28	WSW32	W33	W28	W30	W26	W19	W17	W17	WSW20	W25	WNW27	NW17	NW16	NW19	NNW20	W21.4	W33	
13-Nov	NNW15	N12	NE6	ENE7	E11	E12	ENE12	ENE16	ENE17	ENE18	NE16	NNE17	NNE16	NNE20	N31	NNE18	N15	N16	N17	N11	N18	N14	NNW16	NNW15	NNE12.8	NNE31	
14-Nov	UO	UO	UO	UO	UO	UO	UO	UO	UO	SW13	SSW11	SSE13	SSE13	S12	SW12	WSW15	WSW10	WSW12	WSW14	WSW18	SW16	SW16	S15	S15	SSW8	---	WSW18
15-Nov	SW2	SSE1	NNW8	NNW5	NNW4	NNW16	N25	N27	N24	NNW21	NW16	NW14	NW24	WNW16	W14	W11	SW13	W22	W18	NW10	WNW22	WNW21	WNW12	W16	NW12.4	N27	
16-Nov	W18	WSW19	WSW15	SW11	S9	SSE10	SSE20	SSE26	SE25	SE27	SSE25	SSE21	SSE17	SSE21	SSE22	SSE21	SSE22	S21	SSW24	SW22	WSW21	WSW26	WSW30	WSW28	SSW15.1	WSW30	
17-Nov	WSW31	SW25	WSW19	WSW20	WSW17	WSW29	W41	W40	WSW33	WSW28	WSW24	WSW23	SW15	SW16	SW15	SW23	WSW30	WSW31	WNW12	NW9	NNW3	SE6	SSE13	S15	WSW19.4	W41	
18-Nov	S16	S22	S23	SSE26	SSE26	SSE26	SSE28	SSE29	SSE27	SSE27	SSE27	SSE24	SE21	SE18	SE21	SSE21	SSE20	SE20	SSE21	SSE23	SSE22	SE18	SE15	SE19	SSE22.0	SSE29	
19-Nov	ESE5	ESE8	SE13	ESE9	SE11	SE8	SE6	ESE8	ESE5	ESE8	SE9	S9	SSE5	SE8	S8	SSE8	SSE11	S13	SSW12	SW12	SW12	WSW23	W32	W35	S6.5	W35	
20-Nov	WSW33	WNW41	W51	WNW58	WNW51	WNW51	WNW47	WNW43	W38	W31	W30	W34	WNW38	WNW38	WNW35	WNW34	WNW33	WNW27	WNW24	W23	W23	W20	WNW21	WNW13	WNW34.4	WNW58	
21-Nov	NW10	NW6	NNE3	ENE7	ESE6	SE14	SE11	SE9	E11	ENE15	E16	E18	ENE13	NE14	NE13	N17	N21	N27	N27	N25	N24	N25	N23	N25	NNE11.6	N27	
22-Nov	N23	N21	N18	N15	N19	N23	NNE22	NNE15	NNE14	NNE8	NNE6	N6	N5	NNE4	SSW2	WSW3	W3	SE4	SE9	SE13	SSE14	SSE17	SSE18	SE21	NE5.7	N23	
23-Nov	SE22	SE22	SE21	SE25	SE27	SE23	SSE21	SSE17	SE17	SSE18	SSE17	SSE17	SSE16	SSE18	S16	SSW17	S23	S27	S31	SSW26	SSW25	SSW27	SW31	SW29	S19.8	SSW31	
24-Nov	SW26	SW27	SW27	SW30	SW24	SW24	WSW12	WSW22	WSW11	WSW15	WSW12	W13	W10	WSW17	WSW13	WSW11	SW13	WSW20	WSW22	WSW21	WSW23	SW12	WSW12	SW12	SW17.8	SW30	
25-Nov	WSW12	W22	WNW29	NW30	N36	NNW40	N47	NNW29	NW35	NNW46	NNW37	NNW33	NW30	NNW30	NNW28	N24	NNE19	NNE21	NNE16	N12	NNE9	NNE10	NE1	SSE5	NNW22.0	N47	
26-Nov	SSE8	SE11	SSE15	SSE21	SE16	ESE6	SE4	SSE12	SSE10	SE11	SSE14	S14	SSE11	SSE15	SSE12	SSE13	S13	SSW14	SW13	SW18	SW21	SW13	WNW3	WSW13	S10.2	SW21	
27-Nov	SSW10	SSW11	SSW11	SSW9	SSW7	SSE16	SSE23	SSE29	SSE30	SSE29	S27	SSE28	SSE27	S26	S24	S24	SW19	WSW23	WSW24	W29	W31	WSW29	WSW40	WSW36	SSW17.8	WSW40	
28-Nov	WSW32	WSW32	W34	W32	WSW34	WSW36	WSW36	WSW39	WSW38	WSW40	W32	W31	W30	W23	WSW22	WSW24	W31	W32	W35	W30	WSW32	W38	W26	W28	W31.8	WSW40	
29-Nov	W29	W31	W28	W28	W27	W29	W30	WNW28	W24	W26	W25	W23	W25	WNW31	WNW33	WNW30	WNW28	WNW28	NW33	NW28	WNW25	NW25	WNW25	WNW26	WNW26.9	NW33	
30-Nov	WNW21	WNW18	NW13	WNW16	WNW15	NW12	NNE9	NE8	NE7	ENE5	ENE4	ENE4	NE8	NE5	NE9	ESE3	S8	S5	SW5	WSW10	SW7	SSW9	SW6	W9	NW3.6	WNW21	

SW8.4 SW7.8 SW7.5 SW6.1 SSW4.5 SSW3.8 SSW3.8 SSW4.2 SSW4.6 S4.3 SSW4.7 SSW4.8 SSW3.8 SSW3.6 SSW4.1 SSW5.0 SSW6.2 SSW6.4 SW6.8 SW7.0 SW7.7 SW8.0 SW7.5 SW7.2	Diurnal Average
SSE40 WNW41 W51 WNW58 WNW51 WNW51 N47 WNW43 WSW38 NNW46 NNW37 W34 WNW38 WNW38 WNW35 WNW34 WNW33 SSE38 W35 W30 WSW32 W38 WSW40 SSE40	Diurnal Maximum

UO - Unstable Operation  
All monthly, daily, and diurnal averages have been calculated using vector methods



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

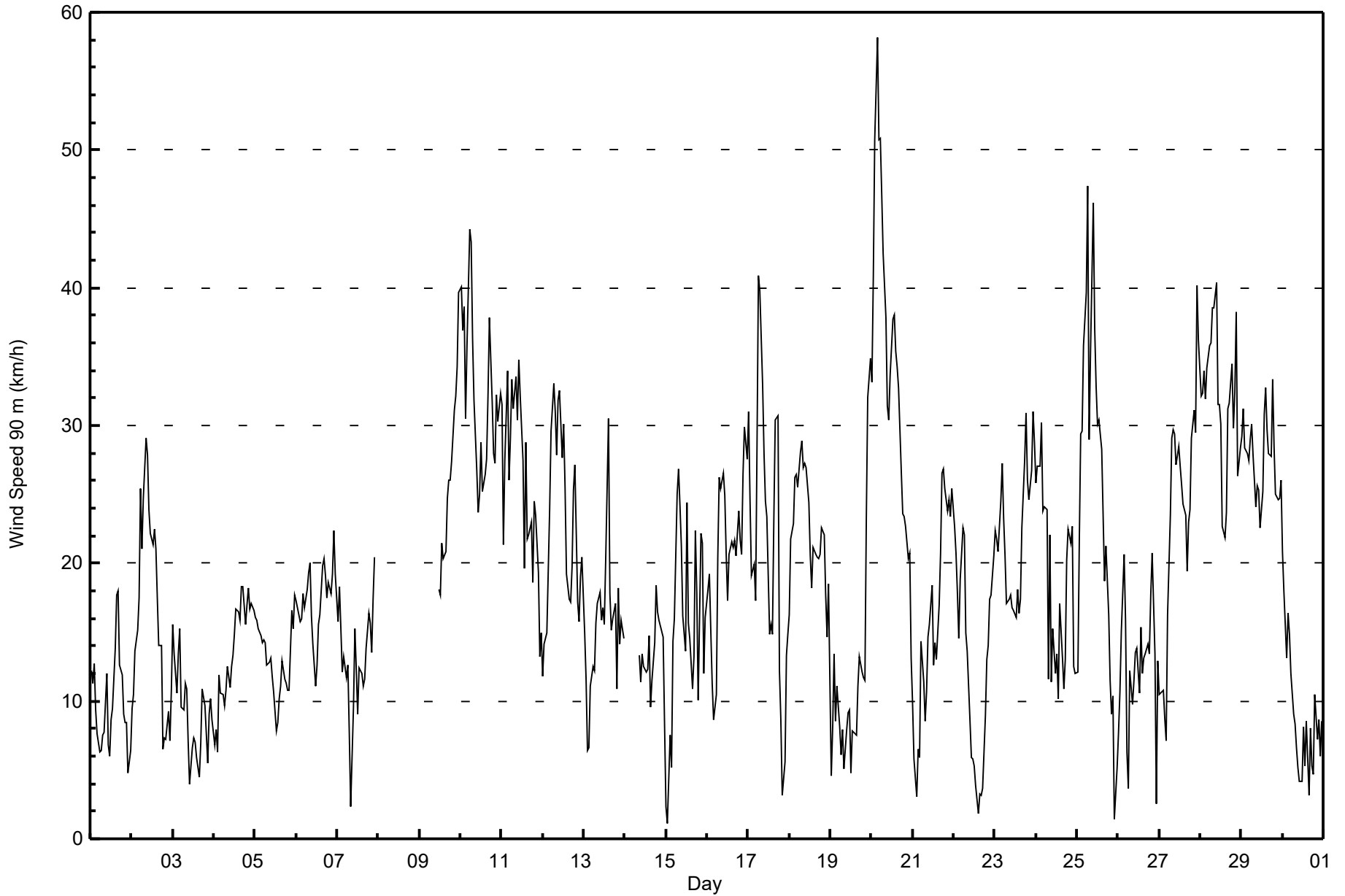
**Wind Speed 90 m (WS90m) - km/h**  
**Mannix - November 2023**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 12 km/h on Nov 25 09:00	Hours of Data: 677
Minimum Value: 1 km/h on Nov 17 23:00	Hours of Missing Data: 43
Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 1 Q <sub>1</sub> = 2 Median = 3 Q <sub>3</sub> = 4 P <sub>90</sub> = 5 P <sub>99</sub> = 8	Hours of Calibration: 0
	Percent Operational Time: 94.0

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

Diurnal Maximum

UO - Unstable Operation





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

**Wind Speed 90 m (WS90m) - km/h**  
**Mannix - November 2023**

<b>Wind Speed Ranges (km/h)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	29	4.28	4.28
6 - 11	128	18.91	23.19
12 - 19	226	33.38	56.57
20 - 28	177	26.14	82.72
29 - 38	97	14.33	97.05
> 38	20	2.95	100.00

Total Number of Valid Hours: 677

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Wind Speed 90 m (WS90m) - km/h  
Mannix - November 2023**

<b>Wind Speed Ranges (km/h)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 5	2	2	3	3	0	3	2	3	1	3	1	2	1	1	0	2	29
6 - 11	3	8	8	10	9	14	17	14	12	10	9	6	3	0	4	1	128
12 - 19	11	9	4	6	18	15	26	32	16	13	25	22	8	8	7	6	226
20 - 28	20	7	0	0	0	0	25	39	12	4	10	21	19	14	3	3	177
29 - 38	2	1	0	0	0	0	12	15	3	1	2	18	26	9	2	6	97
> 38	1	0	0	0	0	0	3	2	0	0	0	3	3	6	0	2	20
<b>Totals</b>	<b>39</b>	<b>27</b>	<b>15</b>	<b>19</b>	<b>27</b>	<b>32</b>	<b>85</b>	<b>105</b>	<b>44</b>	<b>31</b>	<b>47</b>	<b>72</b>	<b>60</b>	<b>38</b>	<b>16</b>	<b>20</b>	<b>677</b>

Total Number of Valid Hours: 677

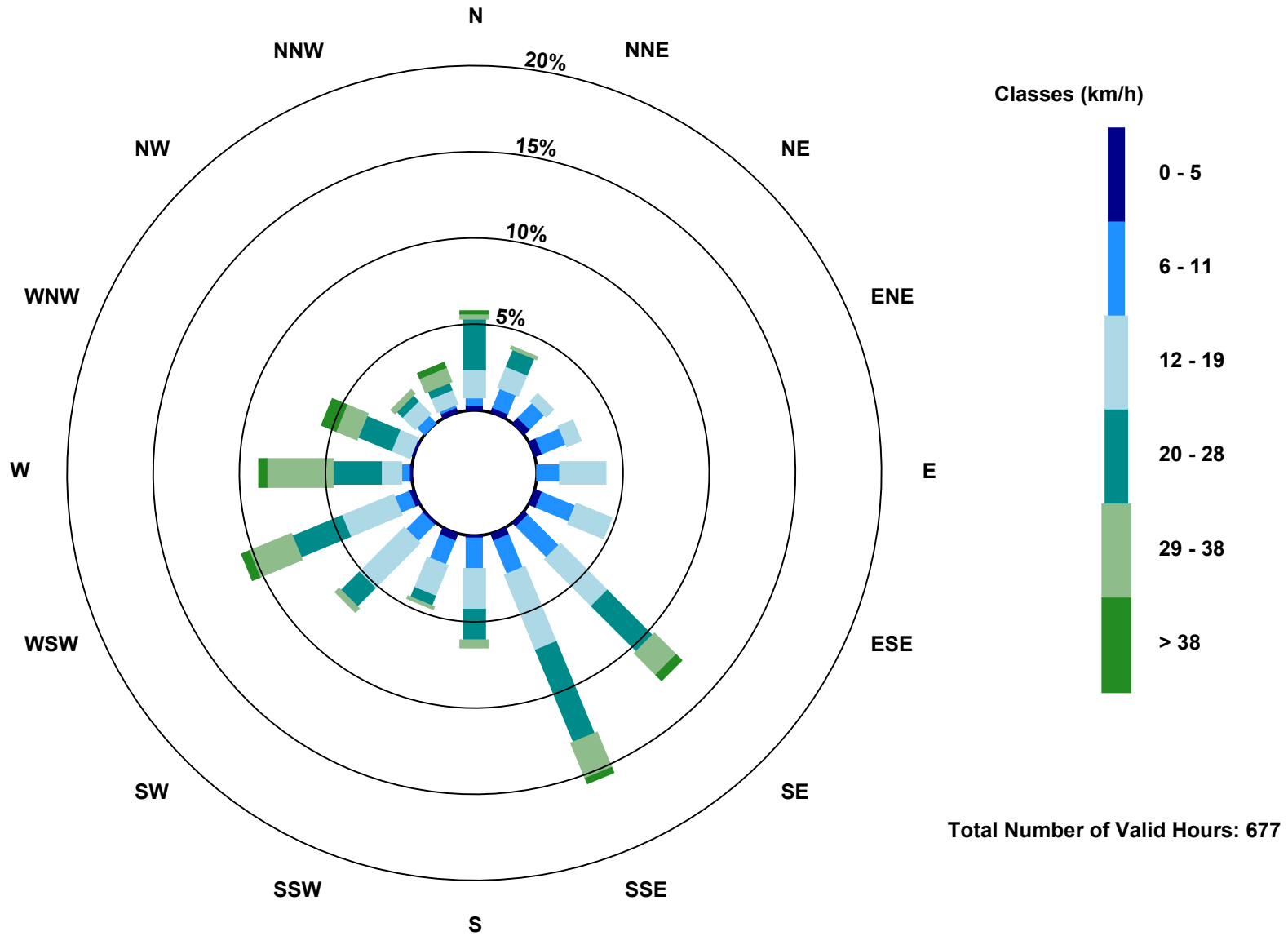
Total Number of Hours: 720





Wood Buffalo Environmental Association  
Wind Rose Nov 2023

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





Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Direction 20 m (WD20m) - deg

Mannix - November 2023

Direction of Maximum Speed: 293 deg on Nov 20 04:00	Hours in Service: 720
Direction of Maximum Daily Speed Average: 286.2 deg on Nov 20	Hours of Data: 689
Direction of Minimum Speed: 308 deg on Nov 30 23:00	Direction of Minimum Daily Speed Average: 1.7 deg on Nov 30
Direction of Minimum Speed: 308 deg on Nov 30 23:00	Hours of Missing Data: 31
Monthly Average Direction: 199.6 deg	Percent Operational Time: 95.7

Day	Hourly Period Ending At (MST)																								Daily Average	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	243	168	166	157	166	169	166	152	158	165	139	153	145	145	141	157	162	173	186	181	165	159	157	165	162.0	
2-Nov	169	168	214	281	333	1	359	359	11	14	15	10	19	28	30	30	25	60	91	95	174	177	123	132	25.7	
3-Nov	167	149	137	123	159	152	141	151	152	176	24	8	26	28	54	338	348	29	29	37	336	45	62	53	96.5	
4-Nov	62	74	91	112	124	139	121	115	114	134	132	134	127	106	105	117	105	110	110	105	101	98	93	94	110.4	
5-Nov	84	90	99	85	81	87	98	92	90	87	95	87	93	94	90	94	92	110	134	133	133	140	137	138	103.4	
6-Nov	137	141	138	151	145	145	146	143	141	152	143	147	146	156	147	138	140	142	148	153	154	156	160	162	146.5	
7-Nov	173	196	209	234	232	214	197	226	238	148	175	200	169	189	190	182	185	211	206	205	199	220	240	213	203.7	
8-Nov	241	263	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	315	312	317	UO	UO	UO	UO	UO	UO	UO	UO	--	
9-Nov	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	135	136	150	152	138	137	139	146	143	146	144	143	--
10-Nov	144	148	142	151	146	142	146	155	159	158	155	160	152	144	139	142	147	160	162	160	158	163	156	152	151.6	
11-Nov	149	150	140	137	146	145	140	135	137	135	137	137	142	147	137	153	150	145	166	153	163	172	169	205	144.4	
12-Nov	158	187	214	212	232	261	261	261	265	261	265	276	264	263	275	269	266	247	270	294	289	281	303	342	262.8	
13-Nov	349	6	33	120	95	94	73	61	70	62	48	36	25	18	15	17	353	1	3	351	348	348	345	329	23.1	
14-Nov	304	308	311	292	269	256	218	187	171	161	155	153	171	221	239	243	276	223	230	191	165	160	162	155	209.2	
15-Nov	144	145	4	333	339	335	346	1	354	336	323	319	310	306	270	262	189	243	276	309	276	282	264	232	307.6	
16-Nov	237	246	224	170	155	152	147	149	147	156	160	157	150	158	156	151	149	160	176	192	204	246	249	250	177.6	
17-Nov	244	224	193	222	220	254	265	265	257	253	244	240	244	205	203	226	238	252	4	10	99	153	170	162	237.7	
18-Nov	157	155	151	148	151	157	159	155	148	147	142	143	154	165	157	156	159	156	156	156	159	164	176	157	154.7	
19-Nov	262	167	195	156	169	232	196	113	251	133	159	208	139	152	166	155	163	161	168	163	156	183	260	262	191.2	
20-Nov	252	287	282	293	297	293	297	290	273	277	283	279	292	295	298	298	295	288	286	271	259	253	282	289	286.2	
21-Nov	336	323	59	78	122	156	151	141	101	77	88	89	77	55	43	9	11	10	13	7	1	7	7	8	38.2	
22-Nov	10	16	3	2	9	13	18	24	30	33	31	6	7	21	218	261	285	173	162	158	162	159	150	147	34.1	
23-Nov	147	150	152	147	153	150	154	161	156	171	157	161	153	151	164	164	162	156	160	162	154	154	176	206	158.8	
24-Nov	209	210	219	221	208	204	208	167	246	222	248	248	264	259	253	231	220	202	212	228	251	230	150	158	220.1	
25-Nov	165	260	287	316	347	346	353	346	326	337	335	338	330	330	333	0	19	17	20	339	58	349	238	205	337.4	
26-Nov	142	157	171	168	156	78	152	185	164	133	162	167	149	155	162	156	155	160	172	194	184	115	103	211	160.6	
27-Nov	188	165	156	159	155	161	151	158	165	158	160	155	160	167	162	165	171	238	257	263	260	248	251	251	195.8	
28-Nov	255	261	265	259	257	259	259	256	253	256	262	268	265	261	249	250	265	263	267	261	252	264	276	285	261.4	
29-Nov	270	263	275	274	274	271	280	281	267	273	277	272	281	293	285	287	290	306	309	312	295	309	292	302	284.7	
30-Nov	298	291	307	296	282	338	30	43	53	84	66	71	57	49	47	94	216	169	187	209	173	290	308	251	343.7	

205.0 216.9 211.5 213.6 207.2 211.0 215.1 197.8 186.6 179.1 183.5 199.1 189.2 196.5 190.0 184.0 183.2 188.2 202.8 200.7 193.4 195.9 202.9 203.2

Diurnal Average

UO - Unstable Operation

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



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

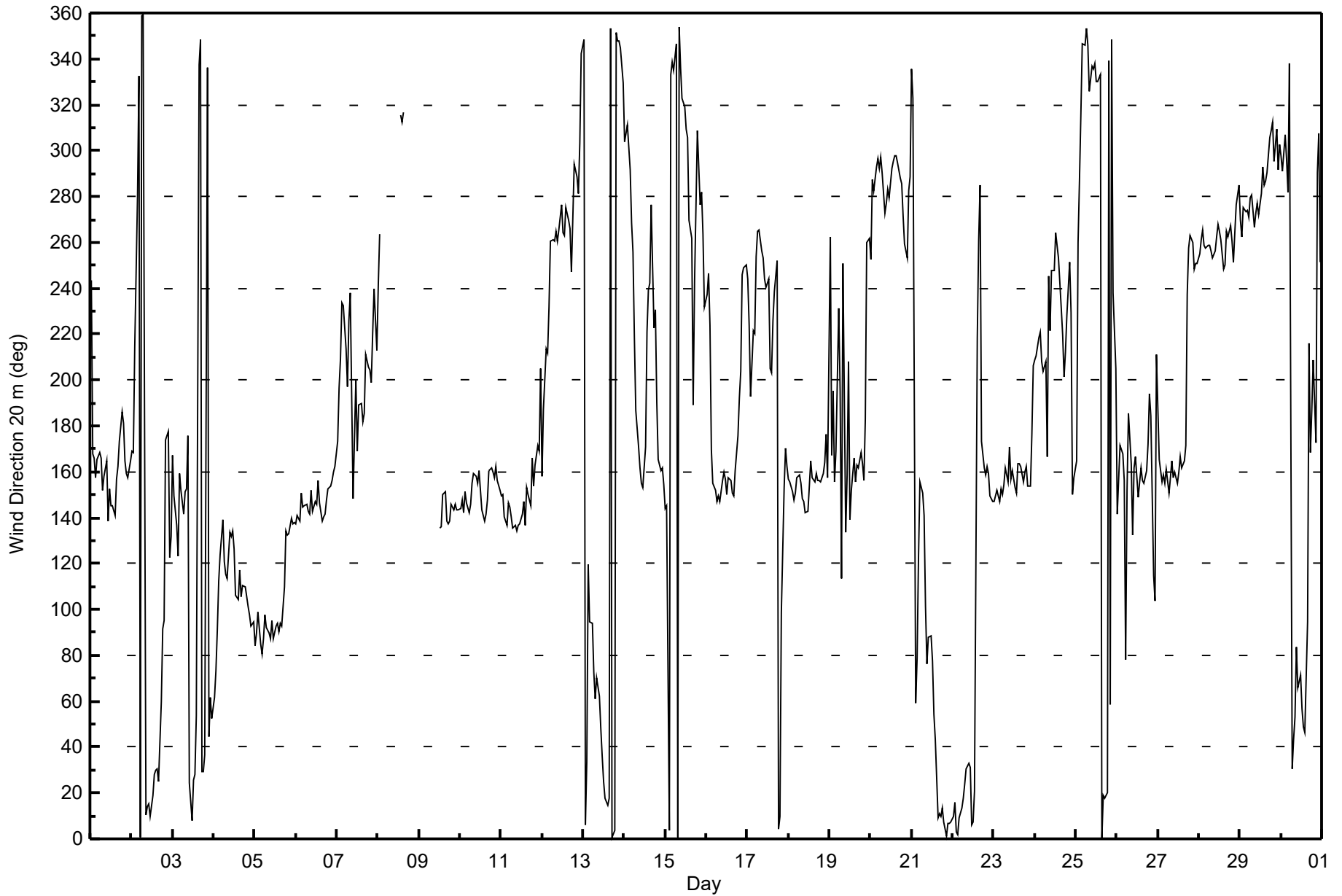
**Wind Direction 20 m (WD20m) - deg**  
**Mannix - November 2023**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 89 deg on Nov 30 23:00	Hours of Data: 689
Minimum Value: 5 deg on Nov 23 17:00	Hours of Missing Data: 31
Percentiles: P <sub>1</sub> = 6 P <sub>10</sub> = 8 Q <sub>1</sub> = 9 Median = 12 Q <sub>3</sub> = 17 P <sub>90</sub> = 29 P <sub>99</sub> = 64	Hours of Calibration: 0
	Percent Operational Time: 95.7

Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Nov	11	20	10	10	5	11	5	16	8	14	17	11	13	13	10	13	11	9	12	12	10	11	8	13	20
2-Nov	8	7	33	26	25	14	13	15	13	14	15	16	13	13	12	13	18	19	23	22	20	15	38	18	38
3-Nov	11	13	9	26	10	11	11	9	12	45	47	21	16	22	28	34	25	13	14	52	87	38	17	15	87
4-Nov	17	9	20	16	15	11	19	16	22	17	15	11	16	10	13	16	11	15	15	12	10	11	10	12	22
5-Nov	11	16	13	11	12	10	12	12	9	10	12	13	16	11	10	9	7	22	19	16	11	9	8	9	22
6-Nov	8	10	12	10	10	10	10	11	10	14	12	12	13	14	12	8	8	9	10	7	9	9	8	8	14
7-Nov	12	14	13	11	12	13	15	40	63	36	22	23	21	18	17	15	17	11	12	12	14	19	12	16	63
8-Nov	12	11	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	20	18	23	UO	UO	UO	UO	UO	UO	UO	UO	23
9-Nov	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	11	10	13	13	8	9	10	9	10	9	8	9	13
10-Nov	9	9	8	10	9	8	9	13	10	13	11	8	9	9	10	8	9	7	5	6	7	6	7	9	13
11-Nov	9	8	8	8	9	10	9	9	8	8	8	9	10	12	8	9	11	9	11	9	7	6	13	53	53
12-Nov	11	21	12	13	7	9	7	8	6	9	9	8	9	8	10	13	7	9	11	9	15	31	23	16	31
13-Nov	21	17	35	48	20	12	33	13	10	13	12	12	13	13	12	17	19	12	12	22	16	14	14	16	48
14-Nov	10	12	11	13	17	19	9	17	9	6	9	7	26	19	11	19	23	58	17	13	39	12	6	11	58
15-Nov	19	23	41	59	14	14	15	13	14	18	15	13	14	14	13	37	9	18	23	26	10	10	20	9	59
16-Nov	8	7	38	13	14	10	13	9	9	7	10	8	8	9	8	7	8	16	12	12	35	39	11	9	39
17-Nov	9	23	35	20	21	13	8	8	10	10	12	14	24	17	10	10	5	9	57	17	57	12	7	6	57
18-Nov	12	9	8	7	9	6	13	16	10	10	9	12	14	14	8	7	7	6	7	8	6	15	29	33	33
19-Nov	44	56	25	33	34	77	60	24	75	41	29	25	23	13	20	27	21	13	14	20	16	43	11	10	77
20-Nov	11	16	11	10	10	10	11	10	11	11	11	10	11	11	11	10	11	11	11	9	9	9	8	28	28
21-Nov	40	48	44	22	33	9	13	21	16	12	12	11	20	16	23	12	11	10	10	9	13	12	11	11	48
22-Nov	11	12	15	17	16	11	11	13	17	21	23	34	32	55	55	31	13	61	10	7	11	9	10	9	61
23-Nov	10	10	9	9	9	9	10	10	10	13	15	10	9	9	10	7	5	6	6	6	8	7	22	13	22
24-Nov	15	14	11	11	13	13	14	61	19	58	16	14	18	20	14	45	31	15	11	20	15	20	7	7	61
25-Nov	22	14	10	20	13	12	13	14	14	12	14	14	15	13	13	18	11	10	17	60	51	58	23	20	60
26-Nov	44	19	9	16	22	59	84	75	28	23	14	13	12	10	12	12	12	15	25	20	15	38	82	31	84
27-Nov	28	15	17	22	17	10	10	8	9	8	7	8	9	10	7	8	11	21	11	9	9	15	11	11	28
28-Nov	13	10	9	11	12	9	9	9	9	10	9	7	8	10	11	14	7	8	8	11	10	9	8	9	14
29-Nov	9	7	13	6	12	6	8	12	8	8	9	8	10	11	10	10	9	11	15	10	13	11	12	10	15
30-Nov	11	12	11	16	14	25	19	12	23	21	29	41	18	22	11	61	29	38	25	18	58	62	89	27	89

44	56	44	59	34	77	84	75	75	58	47	41	32	55	55	61	31	61	57	60	87	62	89	53	
Diurnal Maximum																								

UO - Unstable Operation





Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Direction 45 m (WD45m) - deg

Mannix - November 2023

Direction of Maximum Speed: 288 deg on Nov 20 04:00	Hours in Service: 720
Direction of Maximum Daily Speed Average: 281.8 deg on Nov 20	Hours of Data: 676
Direction of Minimum Speed: 227 deg on Nov 7 09:00	Direction of Minimum Daily Speed Average: 2.5 deg on Nov 30
Direction of Minimum Speed: 227 deg on Nov 7 09:00	Hours of Missing Data: 44
Monthly Average Direction: 199.5 deg	Percent Operational Time: 93.9

Day	Hourly Period Ending At (MST)																								Daily Average	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	216	185	174	167	171	169	158	149	153	159	135	143	143	141	138	153	162	182	196	194	169	157	160	175	164.0	
2-Nov	210	215	244	287	332	359	356	357	6	9	9	7	14	22	23	24	25	52	81	87	166	172	116	123	14.1	
3-Nov	161	142	129	117	153	144	136	146	142	160	21	1	22	24	46	340	354	33	33	41	42	53	58	51	91.3	
4-Nov	59	69	86	103	113	130	114	106	107	126	123	126	119	101	100	111	99	104	103	99	97	93	89	90	104.0	
5-Nov	79	85	94	80	77	82	93	88	85	82	91	83	86	86	83	88	87	103	126	124	124	131	129	131	98.0	
6-Nov	129	135	131	145	139	140	139	137	137	146	138	141	140	151	139	134	135	136	141	148	150	152	158	160	141.3	
7-Nov	174	192	204	227	227	213	206	229	227	150	180	196	171	184	184	179	186	210	204	204	196	219	237	215	201.6	
8-Nov	240	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	-	
9-Nov	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	126	149	UO	UO	UO	142	142	135	UO	136	135	-
10-Nov	142	145	140	147	143	UO	UO	UO	UO	152	149	159	148	140	139	141	145	155	161	161	156	162	154	148	149.6	
11-Nov	144	149	138	130	135	134	134	129	130	128	131	131	136	141	131	147	144	142	161	151	157	171	190	233	140.2	
12-Nov	192	222	224	226	241	258	258	256	259	254	260	270	259	258	269	265	260	247	262	285	296	303	308	339	261.2	
13-Nov	343	1	33	76	87	85	67	56	65	56	42	29	21	15	10	14	350	357	359	350	345	344	342	329	17.9	
14-Nov	303	306	307	291	267	255	221	195	179	168	151	150	172	216	236	239	253	233	236	213	202	164	162	157	212.0	
15-Nov	143	141	355	332	338	335	345	358	351	334	321	316	304	299	265	262	200	245	269	315	284	282	281	235	304.4	
16-Nov	239	247	232	192	152	147	141	145	140	148	155	156	149	155	152	145	147	153	176	210	225	247	248	247	177.4	
17-Nov	239	226	214	224	232	252	259	260	251	247	238	236	233	205	209	225	234	245	318	345	41	143	161	159	234.0	
18-Nov	158	154	152	141	139	139	156	160	148	142	134	135	134	148	146	130	134	139	137	146	143	142	129	136	143.1	
19-Nov	151	144	163	142	145	174	160	120	165	135	142	193	139	142	165	149	168	166	164	167	163	208	257	257	176.3	
20-Nov	250	282	277	288	291	287	292	286	269	272	278	273	287	288	292	292	289	282	282	271	265	263	278	289	281.8	
21-Nov	328	324	34	69	114	145	139	131	93	71	81	81	71	48	36	5	8	6	8	3	359	3	3	4	30.7	
22-Nov	6	12	2	358	6	9	14	21	25	27	28	357	1	13	208	255	278	165	159	152	156	152	143	142	31.1	
23-Nov	140	142	145	141	146	144	150	157	148	163	153	156	151	152	162	164	158	152	157	167	165	161	191	208	158.1	
24-Nov	208	208	216	218	208	206	212	206	247	239	245	245	259	258	250	243	231	211	221	235	250	233	179	192	224.1	
25-Nov	208	261	285	314	344	343	350	344	322	332	331	333	325	326	328	355	14	12	18	359	39	25	235	174	334.6	
26-Nov	164	138	153	156	132	81	130	173	152	131	158	164	146	151	156	147	145	155	179	186	194	166	94	218	159.4	
27-Nov	181	164	162	163	164	154	151	151	158	150	159	153	158	164	162	164	180	239	254	259	257	246	246	247	190.3	
28-Nov	251	255	259	255	254	252	252	251	248	252	257	263	260	257	247	249	259	259	262	257	249	259	271	279	256.4	
29-Nov	266	259	270	269	271	268	276	278	263	269	274	269	278	288	281	283	286	300	305	308	291	306	288	298	281.1	
30-Nov	294	290	304	297	279	330	28	40	48	73	58	66	51	44	41	94	201	168	194	215	206	226	254	275	316.4	

206.3	207.5	207.5	209.1	201.0	218.4	221.6	201.2	186.4	175.4	178.2	190.5	202.2	184.1	185.3	179.9	188.2	197.1	201.8	202.5	197.1	201.1	206.3	206.0
Diurnal Average																							

UO - Unstable Operation  
 All monthly, daily, and diurnal averages have been calculated using vector methods

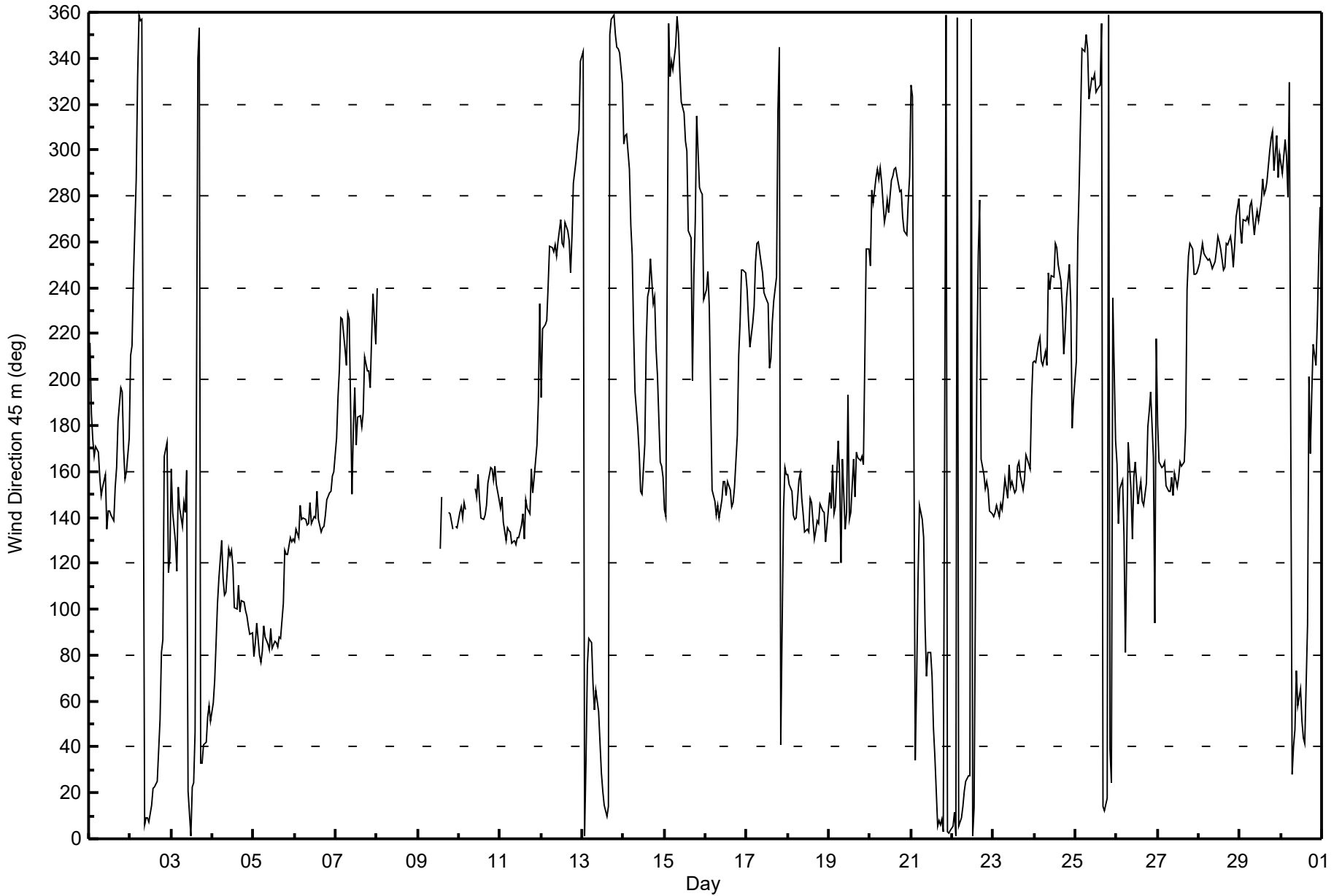


Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 82 deg on Nov 26 23:00	Hours of Data: 676
Minimum Value: 2 deg on Nov 17 17:00	Hours of Missing Data: 44
Percentiles: P <sub>1</sub> = 4 P <sub>10</sub> = 6 Q <sub>1</sub> = 7 Median = 9 Q <sub>3</sub> = 13 P <sub>90</sub> = 21 P <sub>99</sub> = 55	Hours of Calibration: 0
	Percent Operational Time: 93.9

Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Nov	5	21	9	6	5	9	4	13	5	9	14	11	9	11	8	9	9	7	9	9	11	8	8	24	24
2-Nov	15	11	12	15	19	10	9	11	10	11	12	12	10	9	8	9	14	13	19	16	16	8	36	16	36
3-Nov	9	11	9	22	8	9	9	7	10	41	44	14	13	24	26	29	21	11	11	17	44	20	12	12	44
4-Nov	13	9	17	14	14	9	18	13	19	16	13	10	14	9	11	14	8	13	13	10	8	10	8	10	19
5-Nov	10	13	11	9	10	8	10	9	8	8	11	10	13	8	8	7	5	19	17	15	11	6	6	6	19
6-Nov	6	8	10	7	8	8	7	8	8	14	11	10	10	11	10	7	7	7	7	5	6	7	6	5	14
7-Nov	8	8	8	9	9	8	8	29	52	23	14	17	17	13	12	8	15	5	9	7	9	16	11	12	52
8-Nov	9	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	9
9-Nov	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	7	15	UO	UO	UO	7	5	6	UO	5	6	15
10-Nov	5	6	5	6	5	UO	UO	UO	UO	11	9	7	6	7	7	5	6	4	5	5	4	3	5	7	11
11-Nov	5	3	8	5	7	7	6	8	6	6	7	8	9	9	5	7	8	7	6	5	6	6	20	22	22
12-Nov	22	16	9	9	5	4	4	6	5	6	8	7	8	7	9	10	6	6	7	9	11	19	12	14	22
13-Nov	15	12	31	23	10	10	25	10	8	10	10	8	9	8	9	13	14	8	7	19	12	10	9	13	31
14-Nov	7	8	9	10	13	13	5	16	9	12	7	6	21	14	8	12	10	8	6	10	34	6	4	7	34
15-Nov	17	17	40	69	11	12	13	10	11	15	11	12	12	10	28	10	13	13	25	8	10	19	5	5	69
16-Nov	5	6	23	14	13	6	10	6	7	5	6	6	7	5	6	4	4	8	11	10	12	11	8	6	23
17-Nov	6	13	30	16	16	10	6	6	7	7	9	11	20	11	6	5	2	8	50	9	58	11	3	4	58
18-Nov	9	5	5	6	11	7	9	9	5	7	4	6	10	12	7	5	6	6	5	7	5	10	22	11	22
19-Nov	67	32	18	16	12	28	24	15	47	18	27	15	21	10	17	15	13	7	8	12	13	38	7	8	67
20-Nov	9	14	9	8	7	8	8	7	10	9	8	8	9	9	8	7	9	9	9	8	6	6	5	21	21
21-Nov	31	40	39	19	34	8	9	17	18	10	10	9	17	12	21	8	7	6	7	6	10	8	6	7	40
22-Nov	7	9	10	14	14	7	8	10	12	17	21	31	27	44	53	22	11	36	9	5	8	6	8	7	53
23-Nov	8	8	7	7	6	7	7	7	8	8	12	7	8	6	7	4	5	3	4	4	8	5	16	9	16
24-Nov	11	10	9	8	8	7	9	66	12	29	11	10	13	15	8	31	15	7	5	16	12	10	13	17	66
25-Nov	29	9	9	17	10	9	9	11	12	9	11	11	12	10	9	16	8	7	12	29	23	14	54	22	54
26-Nov	24	15	6	11	15	38	56	43	19	16	13	9	13	9	10	10	11	16	17	7	6	49	82	17	82
27-Nov	13	6	18	18	13	5	4	5	6	6	5	4	7	6	5	6	13	13	8	7	7	10	8	9	18
28-Nov	9	8	7	8	8	6	6	6	6	7	7	6	6	8	8	10	6	6	6	9	7	7	6	6	10
29-Nov	7	5	10	4	7	4	6	10	6	6	7	7	9	8	7	8	7	8	14	7	9	8	10	6	14
30-Nov	7	9	8	11	6	27	12	9	18	20	26	38	14	19	10	59	11	24	20	8	55	30	40	15	59

67	40	40	69	34	38	56	66	52	41	44	38	27	44	53	59	21	36	50	29	58	49	82	24	
Diurnal Maximum																								

UO - Unstable Operation





**Wood Buffalo Environmental Association**

**Summary of Hour Averages**

**Wind Direction 75 m (WD75m) - deg**

**Mannix - November 2023**

Direction of Maximum Speed: 290 deg on Nov 20 04:00	Hours in Service: 720
Direction of Maximum Daily Speed Average: 284.5 deg on Nov 20	Hours of Data: 662
Direction of Minimum Speed: 299 deg on Nov 25 23:00	Hours of Missing Data: 58
Direction of Minimum Daily Speed Average: 3.0 deg on Nov 30	Percent Operational Time: 91.9
Monthly Average Direction: 209.8 deg	

Day	Hourly Period Ending At (MST)																								Daily Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Nov	205	217	206	227	216	193	175	166	167	165	148	147	147	147	142	157	175	207	216	208	189	174	186	214	181.0
2-Nov	240	243	263	296	336	4	0	2	8	12	12	11	17	23	24	26	30	53	78	84	165	173	120	124	12.4
3-Nov	160	146	134	122	156	147	142	148	140	142	32	6	30	34	48	355	13	44	51	62	62	65	67	63	98.8
4-Nov	73	76	95	102	112	129	116	111	111	127	124	126	119	104	103	113	101	106	106	103	102	96	94	93	106.4
5-Nov	85	90	97	85	81	86	96	92	88	87	94	88	91	89	88	91	90	105	130	123	124	132	131	133	100.6
6-Nov	131	137	133	147	142	142	141	139	140	148	141	144	142	152	142	137	138	139	143	150	153	152	164	169	144.7
7-Nov	181	195	206	225	224	214	211	227	205	162	186	199	178	186	186	183	193	214	208	209	200	226	240	222	205.0
8-Nov	240	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	--
9-Nov	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	--
10-Nov	148	150	144	150	146	141	143	150	156	154	151	163	150	145	148	151	151	161	170	170	166	169	162	153	153.4
11-Nov	148	148	141	134	133	133	135	133	133	132	135	135	140	143	135	149	147	146	161	155	170	182	219	243	144.9
12-Nov	229	234	236	241	249	259	259	257	260	256	261	270	261	259	268	266	260	251	263	283	306	310	316	342	264.8
13-Nov	347	6	45	72	90	86	72	64	71	60	47	33	26	20	13	20	358	2	3	358	350	352	348	UO	25.2
14-Nov	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	--
15-Nov	167	146	351	340	349	343	351	1	355	341	326	318	308	300	267	265	214	255	274	320	292	291	298	252	310.2
16-Nov	252	252	242	223	165	146	147	147	138	145	158	161	158	162	158	155	159	166	194	229	238	250	250	247	186.1
17-Nov	241	231	233	233	243	254	260	261	252	247	239	238	232	214	220	229	238	247	290	327	4	137	160	172	240.3
18-Nov	181	170	164	154	151	150	155	163	159	155	146	142	141	141	139	144	140	136	137	145	147	134	131	134	149.6
19-Nov	111	125	145	126	135	149	145	111	121	130	139	186	148	143	177	147	170	179	186	210	210	239	260	260	187.3
20-Nov	252	284	280	290	294	290	295	289	271	274	280	274	289	291	293	295	292	284	286	279	275	275	282	294	284.5
21-Nov	327	325	23	68	108	140	135	131	91	76	82	82	72	50	40	10	12	10	12	8	4	7	6	7	32.2
22-Nov	9	14	6	0	9	12	17	23	28	29	31	360	4	25	200	253	270	157	153	147	155	152	146	143	39.2
23-Nov	140	143	146	141	145	144	152	158	147	158	158	157	157	159	168	183	168	162	168	193	200	189	208	215	166.6
24-Nov	213	212	220	221	213	213	221	236	251	250	248	247	261	260	253	252	243	224	233	246	253	238	216	228	232.2
25-Nov	245	265	290	323	350	348	354	349	328	335	335	337	328	330	331	357	16	15	22	10	36	30	299	167	339.3
26-Nov	164	141	153	153	141	105	126	163	164	139	157	171	157	156	160	147	154	177	208	208	225	217	275	235	170.6
27-Nov	197	183	183	190	195	158	158	156	154	150	166	160	163	172	174	179	205	245	256	261	259	249	248	249	197.5
28-Nov	253	257	260	258	256	253	254	252	249	254	258	264	262	259	251	251	261	261	265	261	253	261	273	280	258.3
29-Nov	269	262	272	271	274	273	279	281	266	273	278	273	281	290	284	285	290	303	310	312	296	310	291	302	284.3
30-Nov	298	295	307	303	282	328	29	49	54	68	63	71	55	50	47	102	185	183	221	232	224	207	232	277	307.2

212.5 212.0 214.1 216.3 206.4 199.8 202.6 192.9 187.1 183.0 187.7 194.7 204.9 201.5 196.6 193.6 198.3 207.2 221.2 226.5 226.0 219.9 229.2 225.0

Diurnal Average

UO - Unstable Operation

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





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

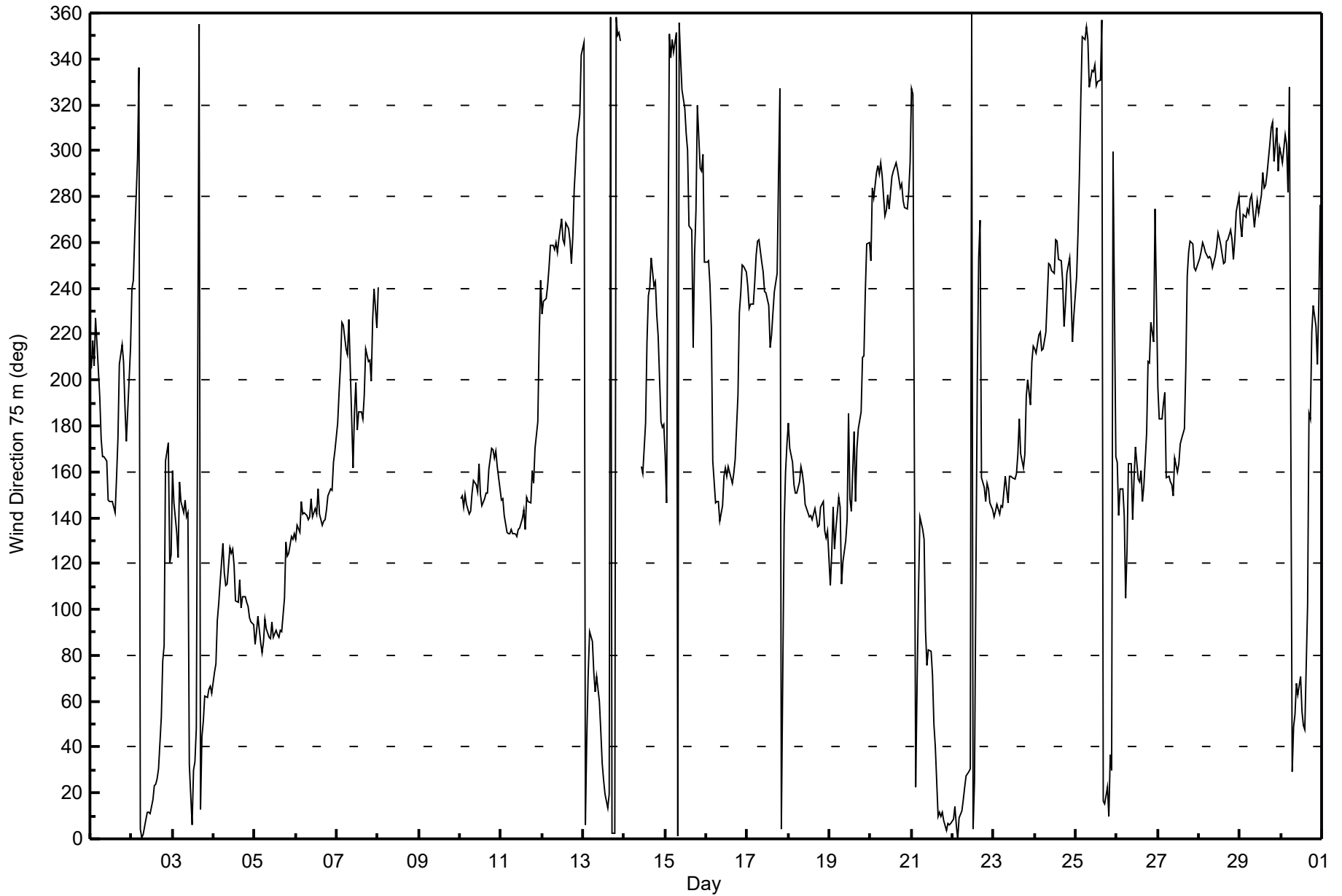
**Wind Direction 75 m (WD75m) - deg**  
**Mannix - November 2023**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 88 deg on Nov 26 23:00	Hours of Data: 662
Minimum Value: 2 deg on Nov 17 17:00	Hours of Missing Data: 58
Percentiles: P <sub>1</sub> = 3 P <sub>10</sub> = 5 Q <sub>1</sub> = 6 Median = 8 Q <sub>3</sub> = 12 P <sub>90</sub> = 19 P <sub>99</sub> = 51	Hours of Calibration: 0
	Percent Operational Time: 91.9

Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Nov	9	8	10	6	11	11	5	16	5	6	13	12	10	10	4	5	9	8	6	10	12	11	21	31	31
2-Nov	12	8	11	14	16	7	8	10	9	9	11	10	8	7	7	8	12	11	21	15	16	7	39	17	39
3-Nov	9	8	12	22	7	9	9	6	6	20	39	17	11	19	21	22	14	9	9	10	17	12	9	11	39
4-Nov	13	9	17	15	14	11	18	13	17	15	14	12	15	11	13	15	12	14	14	12	10	11	10	11	18
5-Nov	9	12	12	8	8	8	11	10	9	9	11	10	13	10	9	9	7	19	16	16	13	7	10	7	19
6-Nov	8	7	11	6	6	7	5	7	7	13	10	9	9	9	8	5	5	6	6	4	4	5	6	3	13
7-Nov	7	7	6	9	9	6	6	21	53	18	9	13	14	11	10	6	15	5	7	6	7	13	11	10	53
8-Nov	7	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	7
9-Nov	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	--
10-Nov	5	4	4	5	4	3	4	8	5	7	6	6	4	4	5	3	4	4	4	4	4	3	5	6	8
11-Nov	3	4	8	3	6	5	4	8	5	7	5	7	7	7	4	6	7	5	4	3	7	10	18	11	18
12-Nov	19	14	9	6	4	4	4	5	5	5	7	7	7	6	9	9	5	5	6	9	8	15	7	13	19
13-Nov	11	11	24	11	9	9	17	8	7	9	9	8	7	6	7	11	11	6	5	17	10	7	7	UO	24
14-Nov	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	29	8	18	12	7	11	8	7	6	7	27	9	7	11	29
15-Nov	40	51	27	45	9	11	11	8	10	13	10	12	11	12	9	23	10	9	11	27	7	11	17	7	51
16-Nov	8	5	15	13	21	10	8	5	3	5	5	4	6	4	4	3	4	6	13	6	7	7	6	5	21
17-Nov	5	9	17	14	13	8	6	6	6	6	7	9	16	7	6	5	2	8	42	12	31	27	8	6	42
18-Nov	9	4	9	4	5	4	5	6	3	6	4	4	6	10	6	6	5	4	4	4	5	6	9	6	10
19-Nov	51	40	13	17	7	26	19	19	40	13	24	13	19	7	17	12	10	6	6	13	13	23	7	7	51
20-Nov	7	13	9	7	7	8	7	6	9	9	8	8	8	9	8	7	8	8	8	8	5	6	4	18	18
21-Nov	26	43	38	15	29	6	8	16	19	9	10	8	13	11	20	8	5	5	6	4	7	6	5	5	43
22-Nov	6	8	9	14	12	6	7	7	10	15	18	28	28	47	52	24	16	27	7	6	7	4	6	5	52
23-Nov	5	6	5	4	5	5	6	6	7	7	9	5	7	5	6	4	7	3	5	13	9	6	9	9	13
24-Nov	10	8	8	7	6	6	9	64	9	20	10	9	11	12	6	19	12	7	5	13	10	7	10	14	64
25-Nov	18	7	10	17	8	8	8	10	11	8	10	10	9	9	8	15	7	6	9	11	16	7	83	20	83
26-Nov	18	9	5	9	8	35	38	16	12	8	12	7	14	7	8	9	7	19	9	9	3	51	88	17	88
27-Nov	14	10	9	20	23	5	3	6	4	5	4	3	4	5	5	10	12	9	7	6	6	8	6	7	23
28-Nov	8	8	6	7	7	5	5	5	4	6	6	6	6	7	7	8	5	6	6	9	6	6	6	5	9
29-Nov	6	5	9	4	5	4	5	9	6	6	7	7	9	7	7	7	6	7	13	7	9	7	8	6	13
30-Nov	6	7	8	8	8	32	8	12	15	21	23	34	12	19	11	51	7	23	43	13	30	8	30	12	51
	51	51	38	45	29	35	38	64	53	21	39	34	28	47	52	51	16	27	43	27	31	51	88	31	

Diurnal Maximum

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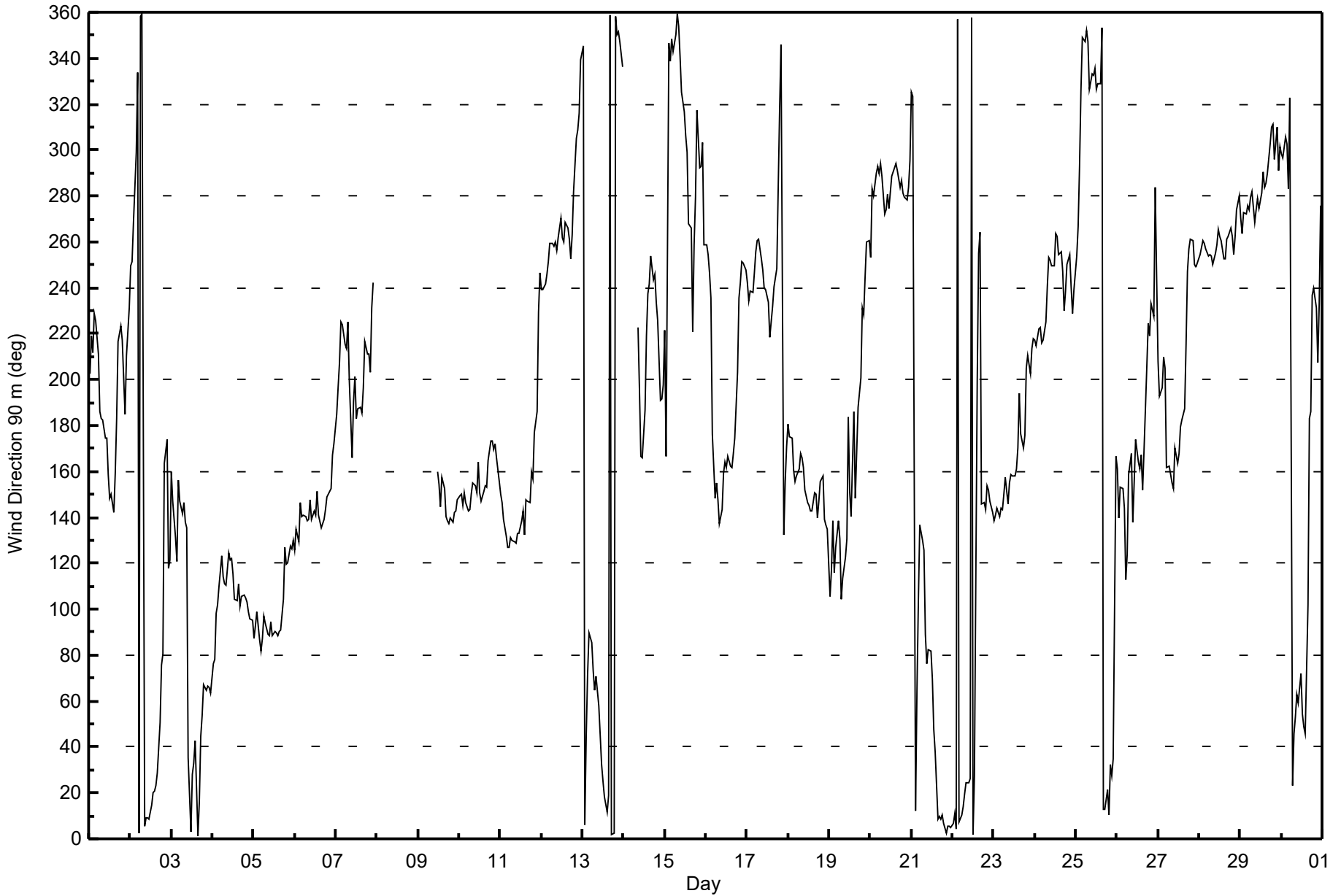
**Wood Buffalo Environmental Association**  
**Summary of Hour Standard Deviations**

**Wind Direction 90 m (WD90m) - deg**  
**Mannix - November 2023**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 94 deg on Nov 25 23:00	Hours of Data: 677
Minimum Value: 2 deg on Nov 9 23:00	Hours of Missing Data: 43
Percentiles: P <sub>1</sub> = 3 P <sub>10</sub> = 4 Q <sub>1</sub> = 6 Median = 8 Q <sub>3</sub> = 11 P <sub>90</sub> = 17 P <sub>99</sub> = 52	Hours of Calibration: 0
	Percent Operational Time: 94.0

Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Nov	8	6	9	2	6	11	8	19	9	7	16	18	10	11	4	5	10	8	5	9	13	14	25	24	25
2-Nov	10	6	9	13	15	6	8	9	8	9	10	10	7	6	7	8	12	10	23	13	18	8	42	15	42
3-Nov	9	7	12	19	7	8	10	5	6	13	34	17	10	17	19	20	12	9	9	11	15	10	9	11	34
4-Nov	14	9	14	12	12	11	15	11	14	14	12	10	11	8	10	11	9	11	11	10	7	10	7	9	15
5-Nov	9	11	10	8	8	7	8	8	8	8	9	8	13	9	7	6	5	17	15	14	11	6	8	7	17
6-Nov	8	7	12	5	5	7	5	6	7	13	10	10	9	9	8	4	5	5	5	3	4	5	6	4	13
7-Nov	8	7	6	8	8	6	5	18	51	19	8	11	14	12	9	5	14	5	7	5	7	12	10	UO	51
8-Nov	7	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	7
9-Nov	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	9	10	7	8	8	3	4	4	3	3	2	2	3	10
10-Nov	3	3	3	4	3	2	3	7	4	6	6	6	4	4	4	3	3	5	4	4	3	3	4	7	7
11-Nov	3	3	7	2	6	5	4	7	5	5	5	7	7	6	3	6	6	5	4	4	4	13	16	10	16
12-Nov	15	12	8	5	4	4	3	5	4	4	6	6	7	6	9	9	5	5	6	8	7	14	5	12	15
13-Nov	10	9	22	11	6	8	15	8	7	9	8	7	7	6	6	10	9	6	5	16	10	7	7	11	22
14-Nov	UO	UO	UO	UO	UO	UO	UO	UO	28	21	10	11	17	11	6	10	8	7	5	5	24	10	9	13	28
15-Nov	67	94	22	47	9	10	10	7	9	13	10	11	10	11	9	22	10	9	13	26	6	10	14	6	94
16-Nov	8	5	11	8	25	11	9	5	3	5	5	4	6	4	4	5	3	8	14	5	6	6	6	5	25
17-Nov	5	8	13	14	11	8	6	6	5	5	6	9	15	6	5	4	2	7	35	10	27	33	8	10	35
18-Nov	8	6	14	4	5	4	4	4	3	6	6	4	5	6	8	6	4	3	5	4	5	8	6	5	14
19-Nov	42	15	11	10	6	25	16	12	32	10	22	13	23	8	17	15	12	6	8	9	11	18	6	7	42
20-Nov	7	12	8	7	6	7	7	6	9	9	8	8	7	8	7	6	7	7	7	7	5	5	3	16	16
21-Nov	24	39	33	14	28	6	8	15	19	9	10	8	14	11	20	7	5	5	5	4	6	5	4	4	39
22-Nov	6	7	9	14	12	5	7	6	8	13	17	28	21	38	57	25	26	24	6	6	7	4	6	5	57
23-Nov	4	5	4	3	4	4	6	5	7	7	8	5	6	4	7	5	5	3	4	12	6	5	7	8	12
24-Nov	10	8	8	7	6	5	8	62	8	16	9	8	10	11	6	15	10	7	5	11	9	6	10	11	62
25-Nov	13	7	10	15	7	7	7	9	10	7	9	9	9	8	7	13	6	6	7	9	13	6	94	19	94
26-Nov	18	8	4	7	9	31	31	13	10	9	11	8	14	8	8	11	11	18	5	9	2	52	82	17	82
27-Nov	12	9	13	16	24	8	3	5	3	5	4	4	4	5	6	10	11	8	7	6	6	8	6	6	24
28-Nov	7	7	6	7	6	4	5	5	4	5	6	6	6	7	7	8	5	6	6	8	6	6	6	5	8
29-Nov	6	4	8	4	5	4	4	8	5	6	6	6	8	6	6	7	6	7	13	6	8	7	7	5	13
30-Nov	6	6	7	7	8	32	8	14	15	21	20	33	13	21	12	51	6	27	36	13	20	8	26	10	51
Diurnal Maximum																									
67 94 33 47 28 32 31 62 51 21 34 33 23 38 57 51 26 27 36 26 27 52 94 24																									

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Maximum Value: 4.5 km/h on Nov 9 13:00 Minimum Value: -1.7 km/h on Nov 25 07:00 Maximum Diurnal Average: 0.3 km/h at hour 15 Monthly Average: 0.18 km/h		Maximum Daily Average: 0.9 km/h on Nov 10 Minimum Daily Average: -0.6 km/h on Nov 25 Minimum Diurnal Average: 0.1 km/h at hour 6 Percentiles: $P_1 = -0.9$ $P_{10} = -0.4$ $Q_1 = -0.1$ Median = 0.1 $Q_3 = 0.5$ $P_{90} = 0.8$ $P_{99} = 1.4$		Hours in Service: 720 Hours of Data: 689 Hours of Missing Data: 31 Hours of Calibration: 0 Percent Operational Time: 95.7																							
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Nov	0.1	0.2	0.2	0.2	0.1	0.2	0.4	0.4	0.5	0.4	0.4	0.4	0.4	0.4	0.5	0.6	0.5	0.2	0.0	0.1	0.3	0.3	0.3	0.2	0.3	0.6	
2-Nov	0.1	0.1	0.0	-0.1	-0.3	-0.5	-0.4	-0.5	-0.5	-0.5	-0.4	-0.3	-0.4	-0.2	-0.2	-0.2	0.1	0.1	0.3	0.2	0.2	0.1	0.3	0.8	-0.1	0.8	
3-Nov	0.3	0.4	0.5	0.5	0.4	0.1	0.2	0.2	0.2	0.2	0.1	-0.1	0.0	-0.1	0.4	-0.1	-0.1	0.0	-0.1	0.0	-0.1	0.2	0.3	0.2	0.1	0.5	
4-Nov	0.4	0.2	0.2	0.9	1.1	0.7	0.9	1.0	0.9	0.9	0.9	0.8	1.0	0.4	0.8	1.2	0.7	0.8	1.2	1.0	0.8	0.5	0.4	0.4	0.8	1.2	
5-Nov	0.3	0.4	0.6	0.2	0.1	0.3	0.6	0.5	0.3	0.2	0.5	0.4	0.4	0.4	0.5	0.3	0.8	0.6	0.8	0.7	0.5	0.5	0.4	0.4	0.4	0.8	
6-Nov	0.6	0.5	0.5	0.6	0.5	0.5	0.5	0.6	0.7	0.6	0.5	0.6	0.6	0.6	0.7	0.7	0.5	0.5	0.5	0.5	0.6	0.5	0.6	0.5	0.6	0.7	
7-Nov	0.3	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.2	0.3	0.1	0.2	0.1	0.2	0.2	0.2	0.0	0.1	0.0	0.1	0.0	-0.2	-0.4	0.1	0.3	
8-Nov	-0.1	0.2	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	3.3	3.2	3.1	UO	UO	UO	UO	UO	UO	UO	UO	UO	3.3
9-Nov	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	4.5	3.2	2.2	1.2	0.9	1.0	0.9	1.1	1.4	1.2	1.2	1.4	UO	4.5
10-Nov	1.5	1.2	1.1	1.0	0.8	1.1	1.0	0.8	0.8	0.7	0.5	0.6	0.9	0.8	0.8	0.8	0.8	1.0	0.8	0.9	0.8	1.1	0.9	0.8	0.9	1.5	
11-Nov	0.8	0.6	0.5	0.8	0.8	0.8	1.0	0.9	1.0	0.8	1.0	0.7	0.9	0.7	0.8	0.7	0.5	0.6	0.3	0.6	0.7	0.4	0.1	0.1	0.7	1.0	
12-Nov	0.2	0.0	-0.1	0.0	-0.2	-0.2	-0.2	-0.2	-0.1	-0.2	-0.2	-0.2	-0.2	-0.2	0.0	-0.1	0.0	-0.2	-0.1	-0.3	-0.1	-0.2	-0.2	-0.5	-0.2	0.2	
13-Nov	-0.3	-0.3	0.0	0.2	0.4	0.2	0.4	0.3	0.3	0.2	-0.1	0.0	-0.1	-0.4	-0.7	-0.1	-0.3	-0.3	-0.4	-0.3	-0.3	-0.3	-0.4	-0.5	-0.1	0.4	
14-Nov	-0.5	-0.3	-0.4	-0.3	-0.1	-0.3	-0.2	0.0	0.2	0.3	0.5	0.5	0.3	0.1	0.1	0.0	0.0	0.0	-0.1	0.0	0.2	0.5	0.5	0.5	0.1	0.5	
15-Nov	0.3	0.2	-0.1	-0.1	-0.4	-0.5	-0.7	-0.7	-0.7	-0.4	-0.4	-0.4	-0.5	-0.3	0.0	-0.1	0.0	-0.1	0.0	-0.1	0.0	-0.2	0.0	0.0	-0.2	0.3	
16-Nov	-0.1	-0.1	0.0	0.2	0.5	0.7	0.7	0.6	0.6	0.7	0.6	0.8	0.7	0.6	0.6	0.5	0.5	0.4	0.2	0.0	0.0	0.1	-0.1	-0.2	0.4	0.8	
17-Nov	-0.2	-0.1	0.1	-0.2	-0.1	-0.3	-0.4	-0.3	-0.3	-0.2	-0.1	-0.1	0.0	0.0	0.1	-0.1	-0.2	-0.1	-0.1	-0.2	0.1	0.4	0.4	0.7	0.0	0.7	
18-Nov	0.4	0.5	0.6	0.6	0.5	0.4	0.5	0.5	0.5	0.7	0.7	0.5	0.4	0.2	0.5	0.6	0.7	0.6	0.4	0.4	0.5	0.2	0.2	0.4	0.5	0.7	
19-Nov	0.0	0.3	0.0	0.2	0.2	0.1	0.0	0.2	0.0	0.2	0.5	0.3	0.4	0.5	0.2	0.3	0.3	0.3	0.2	0.2	0.3	0.1	-0.2	-0.2	0.2	0.5	
20-Nov	-0.1	-0.6	-0.5	-1.1	-0.8	-0.9	-0.8	-0.4	-0.3	-0.2	-0.5	-0.3	-0.4	-0.7	-0.6	-0.5	-0.5	-0.3	-0.2	0.0	-0.1	-0.2	-0.1	-0.1	-0.4	0.0	
21-Nov	-0.1	0.0	0.1	0.4	0.3	0.5	0.7	0.6	0.6	0.4	0.3	0.4	0.4	0.1	0.0	-0.4	-0.6	-1.0	-0.7	-0.8	-0.5	-0.7	-0.7	-0.7	0.0	0.7	
22-Nov	-0.5	-0.4	-0.3	-0.3	-0.6	-0.4	-0.5	-0.1	0.0	0.1	0.0	0.0	0.1	0.2	0.1	0.0	0.0	0.1	0.3	0.4	0.4	0.5	0.6	0.7	0.0	0.7	
23-Nov	0.6	0.7	0.8	0.8	0.8	0.6	0.5	0.6	0.4	0.2	0.5	0.6	0.4	0.3	0.5	0.4	0.6	0.6	0.7	0.8	0.5	0.7	0.3	0.0	0.5	0.8	
24-Nov	0.1	0.2	-0.1	-0.1	0.0	-0.1	-0.1	0.3	0.0	0.1	0.0	0.0	0.0	-0.1	0.0	0.0	0.0	-0.1	0.0	-0.1	-0.1	-0.1	0.3	0.3	0.0	0.3	
25-Nov	0.2	-0.1	-0.3	-0.5	-0.8	-1.4	-1.7	-0.7	-0.8	-1.3	-1.0	-1.0	-0.7	-0.6	-0.9	-0.6	-0.3	-0.4	-0.3	-0.2	0.0	0.0	-0.1	0.0	-0.6	0.2	
26-Nov	0.2	0.3	0.2	0.2	0.3	0.2	0.0	0.1	0.2	0.6	0.5	0.5	0.4	0.6	0.3	0.5	0.4	0.2	0.1	0.1	0.1	0.2	-0.1	0.0	0.2	0.6	
27-Nov	0.0	0.2	0.2	0.2	0.2	0.4	0.6	0.6	0.5	0.5	0.7	0.7	0.8	0.6	0.8	0.7	0.3	-0.1	0.0	0.1	-0.2	0.0	-0.2	-0.2	0.3	0.8	
28-Nov	-0.1	0.0	-0.1	-0.1	0.0	-0.3	-0.2	-0.3	-0.3	-0.3	-0.3	-0.3	-0.2	-0.2	-0.1	-0.1	0.1	-0.1	-0.2	-0.2	-0.2	-0.2	-0.3	-0.2	-0.2	-0.2	0.1
29-Nov	-0.1	-0.1	-0.2	-0.1	-0.1	0.0	-0.3	-0.1	-0.1	-0.1	0.0	-0.1	-0.3	-0.3	-0.2	-0.4	-0.4	-0.4	-0.8	-0.5	-0.3	-0.6	-0.2	-0.4	-0.3	0.0	
30-Nov	-0.3	-0.1	-0.2	-0.2	-0.1	-0.2	-0.1	-0.1	0.3	0.3	0.2	0.3	0.2	0.2	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.0	0.0	-0.1	0.0	0.3	
																								Diurnal Average			
																								Diurnal Maximum			
UO - Unstable Operation																											



Summary of Hour Standard Deviations

Mannix - November 2023

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0																				Hours in Service: 720					
Maximum Value: 4.5 km/h on Nov 25 07:00																				Hours of Data: 689					
Minimum Value: 0.2 km/h on Nov 25 23:00																				Hours of Missing Data: 31					
Percentiles: P <sub>1</sub> = 0.3 P <sub>10</sub> = 0.5 Q <sub>1</sub> = 0.8 Median = 1.1 Q <sub>3</sub> = 1.6 P <sub>90</sub> = 2.2 P <sub>99</sub> = 3.4																				Hours of Calibration: 0					
																				Percent Operational Time: 95.7					
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Nov	0.4	0.4	0.5	0.4	0.5	0.5	0.6	0.8	0.9	1.2	1.0	1.2	1.2	1.2	0.9	1.1	0.8	0.6	0.8	0.6	0.5	0.6	0.6	0.7	1.2
2-Nov	0.5	0.3	0.3	0.5	1.2	2.2	1.9	2.5	2.7	2.4	2.3	2.2	2.0	2.1	2.1	1.8	1.6	1.5	1.0	0.9	0.7	0.7	1.0	1.2	2.7
3-Nov	1.2	1.1	1.1	1.4	1.1	0.8	0.9	0.8	0.8	0.7	0.8	1.0	1.1	1.0	1.1	0.6	0.5	0.8	0.8	0.7	0.4	0.8	1.0	0.9	1.4
4-Nov	1.0	0.9	0.8	1.2	1.4	1.3	1.3	1.4	1.6	1.5	1.8	1.8	2.0	1.8	1.9	2.0	1.8	1.9	1.8	1.9	1.8	1.6	1.5	1.5	2.0
5-Nov	1.4	1.5	1.6	1.2	1.3	1.2	1.4	1.3	1.1	1.2	1.3	1.2	1.1	1.0	1.0	1.0	1.0	1.5	1.4	1.3	1.4	1.6	1.5	1.6	1.6
6-Nov	1.7	1.5	1.5	1.1	1.3	1.3	1.3	1.6	1.6	1.5	1.4	1.1	1.3	1.4	1.5	1.6	1.5	1.5	1.2	0.9	0.9	0.9	1.1	0.9	1.7
7-Nov	0.8	1.4	1.0	0.7	0.9	0.7	0.7	0.4	0.3	0.5	0.8	1.1	0.8	1.1	1.0	0.8	0.7	0.8	1.0	0.9	0.8	1.2	1.4	1.5	1.5
8-Nov	1.5	2.0	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	2.8	2.7	2.8	UO	UO	UO	UO	UO	UO	UO	UO	2.8
9-Nov	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	2.1	2.2	2.0	1.6	1.8	1.9	1.7	1.6	2.0	1.8	1.9	2.1	2.2
10-Nov	2.1	1.9	2.2	1.6	1.9	2.5	2.4	1.8	1.5	1.6	1.3	1.3	1.5	1.5	1.4	1.3	1.4	1.4	1.1	1.0	1.2	1.3	1.4	1.6	2.5
11-Nov	1.5	1.1	1.5	2.2	1.8	2.3	2.4	2.7	2.8	2.5	2.7	2.7	2.2	1.5	2.0	1.3	1.1	1.2	0.6	0.7	0.7	0.7	0.5	0.7	2.8
12-Nov	0.6	0.5	0.5	0.5	0.5	0.9	1.2	1.3	1.0	1.9	1.9	1.8	2.0	1.6	1.2	0.8	0.5	0.8	0.9	1.0	0.5	0.5	0.6	1.0	2.0
13-Nov	0.8	0.9	0.6	0.5	0.8	0.9	1.0	1.4	1.6	1.7	1.5	1.6	1.4	1.8	2.6	1.7	1.3	1.2	1.4	1.1	1.7	1.3	1.4	1.4	2.6
14-Nov	1.2	1.0	0.8	0.8	0.8	0.8	0.9	0.6	0.6	0.7	1.0	1.0	1.2	1.2	1.2	0.5	0.4	0.6	0.7	0.5	0.6	0.6	0.5	0.5	1.2
15-Nov	0.5	0.5	0.4	0.6	1.2	1.4	2.2	2.6	2.4	2.1	1.5	1.2	1.9	1.2	1.1	0.6	0.5	0.9	0.4	0.6	0.8	0.9	0.7	0.9	2.6
16-Nov	0.7	0.8	0.3	0.4	0.7	1.0	1.3	1.4	1.4	1.1	1.2	1.3	1.3	1.0	1.0	0.9	0.9	0.8	1.0	0.8	0.8	1.6	2.1	1.7	2.1
17-Nov	1.7	1.3	1.2	1.6	1.0	2.0	2.4	2.2	1.8	1.7	1.6	2.1	1.2	0.9	0.8	0.8	0.8	1.0	0.4	0.4	0.4	0.5	0.6	0.6	2.4
18-Nov	0.6	0.8	0.9	1.1	0.9	0.6	0.8	0.9	1.0	1.2	1.3	1.1	0.8	0.8	0.9	0.7	0.6	0.7	0.6	0.8	0.7	0.6	0.5	0.7	1.3
19-Nov	0.3	0.5	0.5	0.6	0.7	0.5	0.4	0.5	0.3	0.6	0.9	1.1	0.7	0.9	0.6	0.6	0.5	0.6	0.7	0.7	0.8	1.0	2.1	2.5	2.5
20-Nov	2.6	2.8	3.5	4.1	3.7	3.5	3.4	2.9	2.3	2.2	2.5	2.3	2.9	2.9	2.7	2.6	2.3	1.9	1.5	1.0	1.0	0.9	0.7	0.8	4.1
21-Nov	0.8	0.6	0.7	0.8	0.7	1.0	1.1	1.0	1.3	1.6	1.7	1.7	1.5	1.6	1.5	1.6	1.8	2.3	2.3	2.2	2.1	2.2	2.1	2.1	2.3
22-Nov	2.0	1.9	1.7	1.4	1.7	1.9	1.8	1.5	1.5	1.2	1.2	1.2	1.1	1.0	0.8	0.6	0.4	0.5	0.6	0.8	1.0	1.0	1.2	1.6	2.0
23-Nov	1.6	1.4	1.4	1.6	1.6	1.4	1.3	1.2	1.0	1.1	1.3	1.1	1.0	1.1	1.1	0.7	0.6	0.5	0.7	0.8	0.9	1.0	1.2	1.9	1.9
24-Nov	2.0	2.1	2.0	2.2	1.6	1.5	1.5	1.2	1.4	1.0	1.2	1.1	1.0	0.7	1.2	0.8	0.5	0.6	1.0	0.9	0.8	0.7	0.5	0.4	2.2
25-Nov	0.7	1.0	1.0	1.7	2.9	3.5	4.5	2.6	2.8	3.8	3.2	3.0	2.7	2.6	2.4	2.0	1.3	1.5	1.1	0.6	0.6	0.4	0.2	0.3	4.5
26-Nov	0.3	0.6	0.5	0.7	0.5	0.6	0.4	1.0	0.6	0.8	1.0	1.2	1.0	1.1	1.0	0.9	1.0	0.9	0.6	0.8	0.8	0.6	0.9	0.6	1.2
27-Nov	0.4	0.4	0.6	0.6	0.5	0.8	1.2	1.1	1.1	1.1	1.2	1.3	1.4	1.3	1.1	1.1	0.9	1.3	1.6	1.7	1.8	2.3	2.9	2.7	2.9
28-Nov	2.6	2.3	2.0	2.0	2.4	2.1	2.3	2.5	2.5	2.6	2.1	1.7	1.7	1.5	1.5	1.6	1.6	1.9	1.8	1.8	1.9	2.1	1.4	1.5	2.6
29-Nov	1.1	1.5	1.4	0.8	1.1	1.2	1.5	2.0	1.3	1.4	1.6	1.3	1.8	2.4	2.3	2.1	1.9	1.9	2.5	1.9	1.7	1.7	1.6	1.8	2.5
30-Nov	1.4	0.8	0.8	0.9	0.5	0.8	0.8	0.9	0.9	0.9	0.8	0.9	1.0	0.8	1.1	0.7	0.6	0.3	0.5	0.6	0.5	0.4	0.2	0.2	1.4
2.6 2.8 3.5 4.1 3.7 3.5 4.5 2.9 2.8 3.8 3.2 3.0 2.9 2.9 2.7 2.8 2.3 2.3 2.5 2.2 2.1 2.3 2.9 2.7																									
Diurnal Maximum																									
UO - Unstable Operation																									



Maximum Value: 2.8 km/h on Nov 9 19:00		Maximum Daily Average: 1.0 km/h on Nov 4		Hours in Service: 720																						
Minimum Value: -1.5 km/h on Nov 25 07:00		Minimum Daily Average: -0.7 km/h on Nov 20		Hours of Data: 676																						
Maximum Diurnal Average: 0.1 km/h at hour 13		Minimum Diurnal Average: -0.1 km/h at hour 1		Hours of Missing Data: 44																						
Monthly Average: 0.00 km/h		Percentiles: P <sub>1</sub> = -1.0 P <sub>10</sub> = -0.6 Q <sub>1</sub> = -0.4 Median = 0.0 Q <sub>3</sub> = 0.4 P <sub>90</sub> = 0.6 P <sub>99</sub> = 1.5		Hours of Calibration: 0																						
				Percent Operational Time: 93.9																						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	-0.1	-0.1	-0.2	0.0	-0.1	-0.1	0.2	0.3	0.4	0.3	0.2	0.1	0.3	0.4	0.3	0.5	0.3	-0.1	-0.3	-0.2	0.0	0.2	0.1	-0.1	0.1	0.5
2-Nov	-0.4	-0.3	-0.4	-0.4	-0.4	-0.3	-0.4	0.2	0.2	-0.1	0.1	0.2	-0.1	0.1	0.4	0.0	0.2	0.6	0.2	0.2	0.2	0.3	0.5	1.4	0.1	1.4
3-Nov	0.3	0.3	0.3	0.5	0.3	-0.1	-0.1	0.0	0.0	0.1	0.1	-0.1	0.1	0.0	0.4	-0.3	-0.2	0.0	0.0	0.3	0.3	0.4	0.5	0.5	0.2	0.5
4-Nov	0.3	0.2	0.3	1.4	2.1	0.9	1.6	1.9	1.4	1.4	1.5	0.8	1.0	0.3	1.2	1.6	0.5	0.6	1.9	1.5	0.6	0.4	0.2	0.3	1.0	2.1
5-Nov	0.3	0.4	0.5	0.0	0.1	0.1	0.5	0.4	0.2	0.2	0.5	0.5	0.7	0.5	0.4	0.5	0.1	1.1	0.9	1.2	0.9	-0.2	0.0	0.1	0.4	1.2
6-Nov	0.0	0.1	0.2	0.4	0.5	0.3	0.5	0.4	0.6	0.5	0.2	0.3	0.4	0.4	0.5	0.5	0.4	0.4	0.2	0.3	0.5	0.4	0.6	0.4	0.4	0.6
7-Nov	0.2	-0.2	-0.3	-0.2	-0.3	-0.3	-0.3	-0.2	-0.2	0.0	0.0	-0.2	0.1	0.0	0.1	0.0	-0.1	-0.4	-0.3	-0.4	-0.3	-0.4	-0.6	-0.5	-0.2	0.2
8-Nov	-0.6	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	-0.6
9-Nov	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	0.1	0.6	UO	UO	UO	UO	2.8	0.9	0.3	UO	-0.3	0.4	2.8
10-Nov	0.3	0.8	0.4	0.6	0.1	UO	UO	UO	UO	0.2	0.4	0.3	0.8	0.6	0.6	0.7	0.8	0.9	0.5	0.7	0.8	1.0	1.0	0.9	0.6	1.0
11-Nov	1.0	0.7	0.5	0.9	0.6	0.9	0.6	0.4	0.7	0.6	0.6	0.4	0.6	0.4	0.5	0.5	0.4	0.5	0.3	0.5	0.5	0.2	-0.2	-0.2	0.5	1.0
12-Nov	-0.2	-0.4	-0.4	-0.5	-0.6	-0.6	-0.8	-0.9	-0.6	-0.8	-0.8	-0.5	-0.8	-0.7	-0.3	-0.4	-0.4	-0.5	-0.5	-0.7	-0.4	-0.5	-0.6	-0.6	-0.6	-0.2
13-Nov	-0.3	-0.4	0.0	0.2	0.6	0.2	0.5	0.4	0.3	0.5	-0.1	0.2	0.1	0.0	-0.1	-0.1	-0.3	-0.3	-0.4	-0.2	-0.4	-0.4	-0.3	-0.2	0.0	0.6
14-Nov	-0.3	-0.4	-0.2	-0.3	-0.1	-0.4	-0.6	-0.3	-0.1	0.2	0.4	0.2	0.0	-0.4	-0.3	-0.2	-0.2	-0.3	-0.5	-0.4	-0.1	0.3	0.2	0.2	-0.1	0.4
15-Nov	0.3	0.1	-0.2	-0.1	-0.4	-0.4	-0.6	-0.3	-0.4	-0.3	-0.5	-0.4	-0.5	-0.4	-0.2	-0.2	-0.3	-0.5	-0.4	-0.3	-0.4	-0.5	-0.3	-0.4	-0.3	0.3
16-Nov	-0.6	-0.7	-0.3	-0.2	0.3	0.6	0.6	0.6	0.5	0.5	0.7	0.6	0.6	0.5	0.5	0.6	0.6	0.4	-0.1	-0.5	-0.4	-0.2	-0.8	-0.8	0.1	0.7
17-Nov	-1.0	-0.8	-0.2	-0.7	-0.6	-0.6	-0.9	-0.8	-0.8	-0.8	-0.6	-0.6	-0.4	-0.3	-0.5	-0.5	-0.8	-0.7	-0.2	-0.3	0.0	0.4	0.4	0.6	-0.4	0.6
18-Nov	0.2	0.6	0.7	0.7	0.5	0.5	0.4	0.6	0.7	0.9	0.8	0.6	0.6	0.3	0.4	0.8	0.9	0.7	0.3	0.3	0.6	0.6	0.2	0.6	0.6	0.9
19-Nov	0.0	0.2	0.2	0.2	0.4	0.3	0.0	0.1	-0.1	0.4	0.7	0.2	0.4	0.4	0.1	0.2	0.1	0.2	0.1	-0.1	-0.1	-0.4	-0.7	-0.8	0.1	0.7
20-Nov	-0.9	-0.6	-0.7	-1.0	-0.8	-1.1	-0.9	-1.1	-0.9	-0.4	-0.8	-0.8	-0.6	-0.5	-0.8	-0.7	-0.6	-0.5	-0.4	-0.4	-0.5	-0.6	-0.5	-0.3	-0.7	-0.3
21-Nov	-0.2	0.1	0.0	0.5	0.3	0.2	1.1	1.0	0.9	0.6	0.3	0.6	0.6	0.4	0.1	-0.3	-0.2	-0.6	-0.3	-0.6	0.0	-0.5	-0.6	-0.4	0.1	1.1
22-Nov	-0.3	-0.2	-0.2	-0.2	-0.4	-0.3	0.0	0.4	0.0	0.3	0.0	0.0	0.1	0.0	0.0	-0.1	-0.2	-0.1	0.1	0.1	0.1	0.4	0.4	0.7	0.0	0.7
23-Nov	0.5	0.5	0.5	0.6	0.6	0.5	0.4	0.6	0.3	0.1	0.3	0.5	0.3	0.3	0.5	0.3	0.5	0.5	0.7	0.3	0.2	0.6	-0.2	-0.4	0.4	0.7
24-Nov	-0.6	-0.4	-0.7	-0.5	-0.6	-0.6	-0.6	0.1	-0.5	-0.3	-0.4	-0.2	-0.3	-0.4	-0.4	-0.2	-0.3	-0.4	-0.5	-0.6	-0.4	-0.6	-0.1	-0.2	-0.4	0.1
25-Nov	-0.2	-0.5	-0.6	-0.7	-0.9	-1.4	-1.5	-0.7	-0.7	-1.3	-0.8	-1.1	-0.7	-0.9	-1.0	-0.5	-0.1	-0.3	-0.3	-0.2	-0.1	0.1	-0.2	0.0	-0.6	0.1
26-Nov	0.1	0.5	0.2	0.2	0.3	0.2	0.0	0.0	0.1	0.5	0.3	0.3	0.2	0.5	0.2	0.3	0.2	0.1	-0.1	-0.1	-0.3	0.0	-0.1	-0.3	0.1	0.5
27-Nov	0.0	0.1	0.0	0.1	0.1	0.3	0.7	0.6	0.3	0.4	0.6	0.6	0.6	0.6	0.5	0.4	-0.1	-0.6	-0.5	-0.6	-0.6	-0.7	-0.8	-0.6	0.1	0.7
28-Nov	-0.6	-0.4	-0.4	-0.5	-0.6	-0.8	-0.8	-0.8	-1.1	-0.8	-0.7	-0.6	-0.7	-0.4	-0.5	-0.3	-0.6	-0.7	-0.7	-0.8	-0.8	-0.7	-0.5	-0.6	-0.6	-0.3
29-Nov	-0.6	-0.5	-0.6	-0.4	-0.4	-0.4	-0.7	-0.6	-0.6	-0.5	-0.6	-0.4	-0.6	-0.7	-0.7	-0.7	-0.7	-0.7	-0.4	-0.9	-0.7	-0.5	-0.6	-0.5	-0.6	-0.4
30-Nov	-0.5	-0.2	-0.3	-0.4	-0.3	-0.3	-0.1	-0.2	0.3	0.2	0.3	0.5	0.2	0.2	-0.1	-0.2	-0.1	-0.1	-0.2	-0.1	-0.1	-0.1	-0.1	-0.2	-0.1	0.5
																								Diurnal Average		
																								Diurnal Maximum		
UO - Unstable Operation																										



Summary of Hour Standard Deviations

Mannix - November 2023

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 4.4 km/h on Nov 20 04:00 Minimum Value: 0.2 km/h on Nov 1 01:00 Percentiles: P <sub>1</sub> = 0.2 P <sub>10</sub> = 0.5 Q <sub>1</sub> = 0.7 Median = 1.2 Q <sub>3</sub> = 1.8 P <sub>90</sub> = 2.4 P <sub>99</sub> = 3.6																					Hours in Service: 720 Hours of Data: 676 Hours of Missing Data: 44 Hours of Calibration: 0 Percent Operational Time: 93.9					
Day	Hourly Period Ending At (MST)																								Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	0.2	0.3	0.3	0.3	0.2	0.2	0.3	0.8	0.7	1.0	0.8	1.1	1.3	1.3	1.0	0.9	0.6	0.3	0.3	0.2	0.4	0.5	0.5	0.8	1.3	
2-Nov	0.7	0.3	0.4	0.4	1.0	2.3	2.1	2.7	2.7	2.5	2.3	2.5	1.9	2.1	2.2	1.9	1.9	1.5	1.0	0.9	0.7	0.7	1.2	1.6	2.7	
3-Nov	1.2	1.3	1.4	1.5	1.3	0.9	1.1	0.8	0.7	0.7	0.9	1.1	1.2	1.2	1.3	0.7	0.6	0.8	0.7	0.8	0.7	1.0	1.2	1.1	1.5	
4-Nov	1.1	0.9	0.9	1.5	1.5	1.8	1.7	1.7	2.1	1.8	2.3	2.2	2.4	2.0	2.2	2.5	2.0	2.2	2.3	2.3	2.0	1.8	1.5	1.6	2.5	
5-Nov	1.5	1.8	1.8	1.3	1.6	1.3	1.6	1.3	1.2	1.3	1.5	1.4	1.4	1.1	1.3	1.1	0.8	1.7	1.8	1.7	1.6	1.5	1.7	1.6	1.8	
6-Nov	1.9	1.6	1.8	1.2	1.5	1.4	1.6	1.9	2.0	1.8	1.8	1.5	1.7	1.5	1.8	1.7	1.8	1.7	1.3	1.0	0.9	0.7	1.0	0.8	2.0	
7-Nov	0.6	1.3	1.0	0.6	0.8	0.6	0.4	0.3	0.3	0.7	0.8	1.2	1.0	1.1	1.0	0.7	0.5	0.5	0.7	0.6	0.7	1.3	1.5	1.2	1.5	
8-Nov	1.7	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	1.7	
9-Nov	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	2.4	1.9	UO	UO	UO	UO	2.4	1.3	1.9	UO	1.8	2.1	2.4
10-Nov	2.2	2.1	2.0	1.6	1.8	UO	UO	UO	UO	1.7	1.6	1.4	1.7	1.6	1.6	1.2	1.2	1.3	1.1	1.1	0.9	1.0	1.3	1.5	2.2	
11-Nov	1.1	0.7	1.3	1.9	1.7	2.2	2.5	2.8	2.9	2.6	3.0	3.1	2.5	1.8	2.0	1.5	1.1	1.2	0.5	0.7	0.6	0.5	0.8	1.1	3.1	
12-Nov	0.9	0.6	0.7	0.6	0.7	0.8	1.1	1.5	1.2	1.9	2.1	2.1	2.3	1.8	1.5	0.9	0.6	1.0	1.3	0.9	0.4	0.5	0.8	1.1	2.3	
13-Nov	1.0	0.9	0.7	0.7	0.7	0.9	1.0	1.3	1.6	1.8	1.5	1.6	1.7	1.6	2.5	1.7	1.3	1.0	1.0	1.1	1.6	1.2	1.5	1.6	2.5	
14-Nov	1.1	0.8	0.7	0.7	0.6	0.6	0.5	0.5	0.6	1.0	0.9	1.3	1.4	1.2	0.5	0.6	0.7	0.8	0.6	0.7	0.7	0.5	0.4	1.4	1.4	
15-Nov	0.7	0.6	0.4	0.4	1.2	1.6	2.4	2.6	2.5	2.5	1.7	1.3	2.1	1.5	1.1	0.6	0.2	0.5	0.4	0.9	1.1	1.1	0.7	0.7	2.6	
16-Nov	0.5	0.7	0.3	0.5	0.7	1.1	1.3	1.3	1.5	0.9	1.3	1.3	1.3	1.0	0.9	0.7	0.6	1.0	0.7	0.5	1.0	1.8	2.3	1.9	2.3	
17-Nov	1.8	1.6	1.7	2.1	1.5	2.4	2.9	2.7	1.9	1.9	1.9	2.4	1.4	0.8	0.6	0.5	0.5	0.6	0.6	0.4	0.3	0.4	0.3	0.5	2.9	
18-Nov	0.5	0.6	0.6	0.7	0.8	0.4	0.5	0.7	0.8	1.0	1.1	1.0	1.0	0.8	0.8	0.7	0.6	0.5	0.5	0.5	0.6	0.7	0.5	0.8	1.1	
19-Nov	0.3	0.5	0.5	0.6	0.8	0.8	0.4	0.6	0.5	1.0	1.2	1.0	0.7	0.9	0.4	0.6	0.4	0.3	0.5	0.5	0.5	1.3	2.3	2.8	2.8	
20-Nov	2.9	3.2	3.9	4.4	3.8	3.6	3.2	3.0	2.7	2.8	2.6	2.4	3.5	3.3	2.9	2.7	2.5	2.1	1.6	1.1	0.9	0.8	0.7	1.0	4.4	
21-Nov	0.9	0.8	0.8	1.1	0.9	1.0	1.3	1.3	1.9	1.7	1.9	2.0	1.7	1.7	1.5	1.3	1.6	1.8	2.1	1.8	2.3	2.0	1.8	1.8	2.3	
22-Nov	1.8	2.0	1.7	1.5	1.7	1.7	1.8	1.7	1.7	1.5	1.5	1.4	1.4	1.4	0.9	0.9	0.4	0.6	0.8	0.7	1.2	1.2	1.5	1.8	2.0	
23-Nov	1.8	1.6	1.5	1.7	1.6	1.5	1.3	1.2	1.0	0.9	1.4	1.1	1.1	1.0	1.1	0.5	0.5	0.6	0.8	0.8	0.7	1.0	1.3	2.2	2.2	
24-Nov	2.4	2.3	2.1	2.2	1.6	1.4	1.6	1.5	1.8	1.4	1.5	1.3	1.0	0.7	1.4	1.0	0.8	0.7	0.8	0.9	1.1	1.0	0.7	0.7	2.4	
25-Nov	1.2	1.0	0.7	1.8	3.3	3.9	4.3	2.8	3.2	4.4	3.6	3.4	3.0	2.9	2.7	2.0	1.5	1.5	1.3	0.9	0.8	0.6	0.3	0.2	4.4	
26-Nov	0.3	0.7	0.3	0.6	0.6	0.7	0.4	0.9	0.5	0.9	1.2	1.2	1.2	1.3	1.0	0.8	1.0	0.8	0.5	0.6	0.6	0.7	1.1	0.5	1.3	
27-Nov	0.4	0.4	0.5	0.6	0.5	0.6	0.8	0.7	0.8	0.9	0.9	1.1	1.4	1.1	0.8	0.7	0.8	1.6	2.0	2.1	1.9	2.4	3.2	3.0	3.2	
28-Nov	3.1	2.7	2.4	2.4	2.7	2.3	2.3	2.5	2.3	2.6	2.4	2.1	1.8	1.7	1.5	1.9	1.8	2.0	2.2	1.8	1.9	2.4	1.7	1.5	3.1	
29-Nov	1.4	1.5	1.5	1.1	1.1	1.2	1.5	1.8	1.4	1.6	1.7	1.5	1.9	2.4	2.5	2.1	2.0	2.0	2.7	2.0	1.8	1.8	1.7	1.8	2.7	
30-Nov	1.4	0.9	0.8	0.8	0.5	0.8	0.9	0.9	1.0	1.2	0.9	1.0	1.2	1.0	1.1	0.7	0.4	0.4	0.3	0.5	0.5	0.4	0.2	0.2	1.4	
Diurnal Maximum																								3.0		
UO - Unstable Operation																										





Summary of Hour Averages

Mannix - November 2023

Maximum Value: 2.9 km/h on Nov 4 05:00		Maximum Daily Average: 0.9 km/h on Nov 4		Hours in Service: 720																						
Minimum Value: -1.1 km/h on Nov 5 22:00		Minimum Daily Average: -0.1 km/h on Nov 25		Hours of Data: 662																						
Maximum Diurnal Average: 0.3 km/h at hour 8		Minimum Diurnal Average: 0.0 km/h at hour 6		Hours of Missing Data: 58																						
Monthly Average: 0.19 km/h		Percentiles: P <sub>1</sub> = -0.7 P <sub>10</sub> = -0.2 Q <sub>1</sub> = 0.0 Median = 0.2 Q <sub>3</sub> = 0.4 P <sub>90</sub> = 0.6 P <sub>99</sub> = 1.6		Hours of Calibration: 0																						
				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-Nov	0.1	0.1	-0.1	0.1	0.1	0.0	0.1	0.3	0.3	0.3	0.1	0.1	0.2	0.2	-0.1	0.5	0.4	-0.1	-0.1	-0.1	0.1	0.2	0.1	0.1	0.1	0.5
2-Nov	0.0	0.0	0.0	0.1	0.0	0.2	0.0	1.4	0.9	0.7	0.7	0.7	0.2	0.2	0.6	-0.1	0.5	0.7	0.2	0.2	0.3	0.5	0.6	1.8	0.4	1.8
3-Nov	0.3	0.2	0.0	0.1	0.3	-0.2	-0.1	-0.1	-0.2	0.1	0.3	0.1	0.3	0.2	0.6	0.0	0.1	0.1	0.2	0.5	1.0	0.6	0.4	0.7	0.2	1.0
4-Nov	0.3	0.1	0.5	1.6	2.9	0.6	2.0	2.6	1.4	1.7	1.6	0.4	0.9	-0.4	1.0	1.6	-0.2	0.0	2.0	1.4	0.0	-0.3	-0.4	-0.2	0.9	2.9
5-Nov	-0.2	0.0	0.0	-0.5	-0.4	-0.4	-0.2	0.0	-0.3	-0.2	0.2	0.4	0.7	0.6	0.3	0.2	-0.3	1.2	1.0	1.4	1.1	-1.1	-0.8	-0.6	0.1	1.4
6-Nov	-0.8	-0.5	-0.5	0.2	-0.1	-0.2	-0.1	-0.2	0.1	0.2	-0.2	-0.1	-0.1	0.3	0.2	-0.3	-0.3	-0.3	-0.2	0.2	0.5	0.4	0.6	0.3	0.0	0.6
7-Nov	0.3	0.0	-0.1	0.1	0.1	-0.1	-0.1	0.1	0.0	0.1	0.0	-0.1	0.2	0.1	0.4	0.2	0.0	-0.2	-0.1	-0.2	-0.1	0.0	-0.1	-0.1	0.0	0.4
8-Nov	-0.2	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	-0.2
9-Nov	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	-
10-Nov	-0.1	0.0	-0.7	0.1	-0.3	-0.7	-0.4	0.2	0.8	0.5	0.1	0.3	0.4	0.2	0.4	0.5	0.4	0.9	0.3	0.5	0.6	0.7	0.8	0.7	0.3	0.9
11-Nov	0.4	0.4	0.0	-0.2	-0.3	-0.1	-0.5	-0.7	-0.6	-0.4	-0.8	-0.6	-0.3	-0.2	-0.6	0.2	0.1	0.0	0.7	0.5	0.5	0.4	0.0	0.3	-0.1	0.7
12-Nov	0.1	-0.1	-0.2	-0.1	-0.1	0.0	0.1	-0.4	-0.1	0.1	0.0	0.4	0.2	0.0	0.3	0.1	0.0	-0.1	0.0	0.0	0.3	0.0	-0.2	-0.3	0.0	0.4
13-Nov	0.1	-0.1	0.0	0.3	0.5	0.0	0.6	0.4	0.4	0.5	0.0	0.2	0.3	0.3	0.3	0.1	0.0	0.0	-0.1	0.0	0.0	0.0	0.1	UO	0.2	0.6
14-Nov	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	0.7	0.4	0.3	0.2	0.0	0.1	0.1	0.0	-0.1	-0.1	0.1	0.4	0.2	0.1	-	0.7
15-Nov	0.2	0.1	0.1	0.3	0.0	0.0	-0.2	0.1	0.3	0.3	-0.1	0.1	0.1	0.4	0.4	0.1	-0.1	0.2	0.1	0.1	0.4	0.1	0.1	0.2	0.1	0.4
16-Nov	-0.2	-0.3	0.0	0.0	0.2	0.3	0.3	0.3	-0.2	0.0	0.7	0.8	0.6	0.6	0.6	0.7	0.6	0.4	-0.1	-0.2	0.1	0.6	0.0	-0.3	0.2	0.8
17-Nov	-0.4	-0.5	0.2	-0.6	-0.2	0.1	0.2	0.4	0.0	-0.1	0.2	0.5	-0.1	-0.1	-0.3	-0.1	-0.4	-0.1	0.2	0.0	0.2	0.2	0.5	0.4	0.0	0.5
18-Nov	0.2	0.4	0.7	0.7	0.3	0.3	0.5	0.7	0.9	0.8	0.2	0.2	0.2	0.0	0.1	0.2	0.2	0.0	-0.3	0.0	0.3	-0.1	0.0	0.1	0.3	0.9
19-Nov	0.2	0.0	0.3	0.3	0.2	0.4	0.1	0.0	0.3	0.2	0.4	0.4	0.4	0.2	0.2	0.1	0.3	0.3	0.2	0.0	-0.1	0.0	0.0	0.2	0.2	0.4
20-Nov	-0.1	1.0	1.0	1.0	1.1	0.7	0.6	0.4	0.2	0.5	0.3	0.1	0.9	1.0	0.6	0.8	0.6	0.4	0.4	0.4	0.1	-0.1	0.1	0.0	0.5	1.1
21-Nov	0.1	0.4	0.2	0.4	0.6	-0.1	1.0	1.1	0.9	0.2	0.2	0.1	0.4	0.4	0.2	0.0	0.1	-0.3	-0.1	-0.3	0.6	-0.2	-0.3	-0.2	0.2	1.1
22-Nov	0.0	-0.1	0.5	0.1	-0.1	0.0	0.1	0.5	0.1	0.4	0.0	0.3	0.3	0.4	0.3	0.0	0.0	0.1	0.2	0.0	0.1	0.3	0.2	0.0	0.2	0.5
23-Nov	-0.1	0.0	0.1	-0.1	0.0	0.0	0.3	0.7	0.1	0.3	0.4	0.6	0.2	0.4	0.4	0.2	0.5	0.6	0.6	0.0	-0.2	0.2	-0.1	-0.2	0.2	0.7
24-Nov	-0.3	-0.2	-0.3	-0.1	-0.3	-0.4	-0.3	0.2	0.1	0.3	0.1	0.1	0.3	0.1	0.1	0.2	0.0	-0.1	0.0	-0.1	0.1	-0.1	0.0	0.1	0.0	0.3
25-Nov	0.1	0.1	0.4	0.0	-0.4	-0.7	-0.8	-0.2	-0.2	-0.5	-0.1	-0.3	-0.2	-0.2	-0.3	-0.1	0.0	-0.2	-0.2	0.0	0.1	0.1	0.1	0.1	-0.1	0.4
26-Nov	0.2	0.4	0.3	0.2	0.0	0.3	0.2	0.2	0.2	0.2	0.3	0.3	0.2	0.3	0.4	0.1	0.3	0.2	-0.2	0.0	0.0	0.1	0.0	0.1	0.2	0.4
27-Nov	0.2	0.2	0.2	0.2	0.2	0.5	0.9	0.6	0.4	0.1	0.5	0.5	0.6	0.5	0.4	0.1	-0.1	-0.2	0.2	0.0	0.0	0.2	0.2	0.4	0.3	0.9
28-Nov	0.6	0.5	0.7	0.5	0.4	0.1	0.2	0.2	-0.4	0.2	0.3	0.2	0.2	0.4	0.2	0.3	0.3	0.2	0.1	-0.1	0.1	0.2	0.2	0.3	0.2	0.7
29-Nov	0.1	0.3	0.2	0.2	0.3	0.3	0.3	0.1	0.1	0.3	0.2	0.3	0.3	0.4	0.3	0.4	0.3	0.8	0.2	0.2	0.6	0.3	0.4	0.4	0.3	0.8
30-Nov	0.5	0.6	0.2	0.3	0.2	0.2	0.0	-0.1	0.5	0.4	0.4	0.6	0.1	0.2	-0.1	-0.1	0.2	0.0	0.1	0.2	0.2	0.1	0.1	0.1	0.2	0.6
																								Diurnal Average		
																								Diurnal Maximum		
UO - Unstable Operation																										



Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0																				Hours in Service: 720						
Maximum Value: 4.5 km/h on Nov 20 04:00																				Hours of Data: 662						
Minimum Value: 0.1 km/h on Nov 1 04:00																				Hours of Missing Data: 58						
Percentiles: P <sub>1</sub> = 0.2 P <sub>10</sub> = 0.5 Q <sub>1</sub> = 0.7 Median = 1.2 Q <sub>3</sub> = 1.8 P <sub>90</sub> = 2.5 P <sub>99</sub> = 3.6																				Hours of Calibration: 0						
																				Percent Operational Time: 91.9						
Day	Hourly Period Ending At (MST)																								Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	0.2	0.3	0.2	0.1	0.2	0.2	0.4	0.7	0.5	0.7	0.6	0.6	1.2	1.1	0.5	0.6	0.4	0.2	0.2	0.4	0.5	0.4	0.8	0.9	1.2	
2-Nov	0.9	0.5	0.4	0.4	0.8	2.4	2.0	2.8	2.7	2.4	2.3	2.4	1.7	1.8	2.1	1.8	1.8	1.5	1.1	1.2	0.8	0.8	1.6	2.1	2.8	
3-Nov	1.1	1.2	1.5	1.8	1.2	0.8	1.0	0.5	0.6	0.8	0.9	1.0	1.2	1.2	1.4	0.8	0.6	0.7	0.6	0.8	0.9	1.0	1.2	1.2	1.8	
4-Nov	1.0	0.7	1.3	2.4	2.0	2.2	2.1	2.1	2.8	2.4	2.8	2.7	3.0	3.0	3.2	3.4	3.1	3.3	3.1	3.3	3.0	2.7	2.1	2.3	3.4	
5-Nov	1.8	2.4	2.6	1.5	1.7	1.4	2.4	1.9	1.5	1.8	2.2	1.7	1.7	1.4	1.6	1.6	1.4	2.3	2.3	2.4	2.2	1.5	1.9	1.7	2.6	
6-Nov	2.1	1.5	2.0	1.1	1.2	1.2	1.3	1.7	1.8	1.9	1.8	1.4	1.7	1.3	1.7	1.5	1.5	1.4	1.1	0.8	0.8	0.6	0.9	0.6	2.1	
7-Nov	0.5	1.1	0.9	0.7	0.9	0.6	0.5	0.4	0.3	0.8	0.9	1.3	1.2	1.0	1.0	0.5	0.4	0.4	0.5	0.5	0.7	1.3	1.3	1.2	1.3	
8-Nov	1.7	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	1.7	
9-Nov	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	-	
10-Nov	1.5	1.8	1.5	1.7	1.3	1.3	1.7	1.6	1.1	1.5	1.3	1.3	1.3	1.2	1.2	0.8	0.8	0.9	1.1	1.2	0.9	1.1	1.1	1.0	1.8	
11-Nov	0.6	0.4	0.9	1.3	1.5	1.8	1.9	2.4	2.4	2.4	2.7	2.7	2.4	1.6	1.6	1.4	1.0	0.9	0.5	0.5	0.5	0.7	0.9	1.4	2.7	
12-Nov	1.2	0.8	1.0	0.8	0.9	0.9	1.1	1.5	1.4	1.8	2.2	2.2	2.4	1.9	1.6	1.1	0.8	1.2	1.3	1.0	0.6	0.5	0.9	1.1	2.4	
13-Nov	1.2	0.9	0.8	0.8	1.1	1.2	1.2	1.3	1.6	1.7	1.4	1.3	1.6	1.4	2.4	1.6	1.1	0.8	0.9	0.9	1.6	1.0	1.4	UO	2.4	
14-Nov	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	0.9	0.8	1.3	1.3	1.2	0.7	0.9	0.9	0.8	0.7	0.9	0.6	0.5	0.5	1.3	1.3
15-Nov	0.9	0.7	0.5	0.4	1.0	1.4	2.3	2.6	2.5	2.8	1.6	1.4	2.1	1.7	1.2	0.5	0.3	0.5	0.4	1.3	1.3	1.3	0.8	0.6	2.8	
16-Nov	0.4	0.7	0.5	0.6	0.7	0.7	0.8	1.0	1.0	0.7	1.3	1.1	1.1	0.7	0.7	0.5	0.5	0.9	0.6	0.6	1.2	1.8	2.1	1.8	2.1	
17-Nov	1.7	1.9	2.2	2.7	2.1	2.5	3.2	2.9	2.1	1.7	1.9	2.6	1.5	0.8	0.8	0.5	0.5	0.5	0.7	0.5	0.3	0.4	0.3	0.4	3.2	
18-Nov	0.4	0.4	0.6	0.6	0.7	0.5	0.5	0.5	0.5	0.6	0.6	0.6	0.7	0.8	0.8	0.6	0.6	0.7	0.6	0.3	0.5	0.8	0.9	1.0	1.0	
19-Nov	0.6	0.9	0.5	1.1	0.8	0.9	0.6	1.0	0.7	1.0	1.2	1.0	0.7	0.7	0.4	0.4	0.3	0.2	0.4	0.4	0.5	1.6	2.5	3.2	3.2	
20-Nov	3.1	3.3	4.1	4.5	4.0	3.5	3.1	3.2	2.9	3.1	2.9	2.7	3.6	3.6	3.0	2.7	2.4	2.3	1.8	1.2	1.1	1.0	0.6	1.1	4.5	
21-Nov	1.0	0.9	0.8	1.1	1.2	0.9	1.4	1.4	2.4	1.8	2.1	2.4	1.9	1.8	1.5	1.0	1.3	1.4	1.9	1.5	2.1	2.0	1.5	1.7	2.4	
22-Nov	1.7	1.9	1.7	1.5	1.5	1.3	1.6	1.5	1.6	1.6	1.5	1.5	1.5	1.4	1.1	0.7	0.3	0.7	0.8	0.5	1.2	0.8	1.1	1.4	1.9	
23-Nov	1.4	1.3	1.2	1.3	1.1	1.1	1.0	1.2	0.8	0.8	1.2	0.9	1.1	0.9	1.0	0.5	0.4	0.5	0.7	0.8	0.8	1.1	1.5	2.6	2.6	
24-Nov	2.6	2.5	2.3	2.4	1.4	1.3	1.9	2.0	2.2	1.9	1.5	1.3	1.1	0.8	1.2	1.1	1.0	0.8	1.1	1.1	1.4	1.1	0.9	0.9	2.6	
25-Nov	1.4	1.2	0.7	1.8	3.2	3.7	4.4	2.9	3.0	3.8	3.7	3.4	2.8	2.6	2.4	1.6	1.3	1.4	1.3	1.2	1.0	0.5	0.3	0.3	4.4	
26-Nov	0.3	0.6	0.3	0.4	0.7	0.8	0.6	0.8	0.4	0.9	1.0	0.9	0.8	0.9	0.7	0.7	0.8	0.6	0.4	0.4	0.6	0.8	1.4	0.7	1.4	
27-Nov	0.5	0.4	0.5	0.5	0.6	0.4	0.4	0.6	0.5	0.7	0.8	0.9	1.1	0.8	0.6	0.7	0.8	1.8	2.1	2.3	2.1	2.8	3.1	2.9	3.1	
28-Nov	3.1	2.9	2.6	2.5	2.5	2.1	2.2	2.3	2.1	2.2	2.4	2.3	2.0	1.8	1.5	2.0	2.0	2.3	2.3	2.0	1.7	2.4	1.8	1.5	3.1	
29-Nov	1.5	1.7	1.6	1.2	1.3	1.2	1.5	1.7	1.5	1.7	1.6	1.5	2.1	2.4	2.5	2.2	2.1	2.0	2.6	1.7	2.0	1.7	1.7	1.8	2.6	
30-Nov	1.5	1.0	1.0	0.8	0.7	0.6	0.8	1.1	1.2	1.2	0.9	1.1	1.3	1.0	1.2	0.7	0.3	0.4	0.4	0.5	0.5	0.5	0.4	0.3	1.5	
	3.1	3.3	4.1	4.5	4.0	3.7	4.4	3.2	3.0	3.8	3.7	3.4	3.6	3.6	3.2	3.4	3.1	3.3	3.1	3.3	3.0	2.8	3.1	3.2		
Diurnal Maximum																										
UO - Unstable Operation																										



Maximum Value: 3.4 km/h on Nov 4 05:00 Minimum Value: -1.3 km/h on Nov 28 09:00 Maximum Diurnal Average: 0.3 km/h at hour 8 Monthly Average: 0.03 km/h		Maximum Daily Average: 1.1 km/h on Nov 4 Minimum Daily Average: -0.5 km/h on Nov 17 Minimum Diurnal Average: -0.2 km/h at hour 1 Percentiles: $P_1 = -1.1$ $P_{10} = -0.6$ $Q_1 = -0.3$ Median = 0.0 $Q_3 = 0.3$ $P_{90} = 0.6$ $P_{99} = 2.0$		Hours in Service: 720 Hours of Data: 677 Hours of Missing Data: 43 Hours of Calibration: 0 Percent Operational Time: 94.0																									
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24					
1-Nov	-0.2	-0.3	-0.5	-0.2	-0.2	-0.2	-0.2	0.0	-0.1	-0.2	-0.2	0.0	0.0	0.1	0.1	0.1	-0.3	-0.5	-0.5	-0.4	-0.3	-0.2	-0.2	-0.2	-0.2	-0.2	0.1		
2-Nov	-0.2	-0.2	-0.2	-0.1	0.1	0.8	0.6	2.4	1.9	1.7	1.5	1.4	0.9	0.7	1.2	0.4	0.9	1.1	0.3	0.3	0.0	0.1	0.6	2.2	0.8	2.4	0.8	2.4	
3-Nov	-0.1	0.1	0.0	0.2	0.1	-0.3	-0.2	-0.1	0.0	0.1	0.4	0.1	0.3	0.3	0.8	-0.1	0.2	0.4	0.4	0.7	1.2	0.8	0.5	0.8	0.3	1.2	0.3	1.2	
4-Nov	0.3	0.1	0.5	2.1	3.4	0.4	2.2	2.9	1.5	2.0	1.9	0.3	0.9	0.1	1.4	1.9	0.4	0.5	2.1	1.5	0.3	0.1	0.1	0.1	1.1	3.4	1.1	3.4	
5-Nov	0.2	0.3	0.3	-0.3	-0.2	-0.2	0.0	0.2	-0.1	0.0	0.3	0.5	0.8	0.8	0.4	0.3	0.0	1.5	1.1	1.6	1.3	-1.3	-0.9	-0.5	0.3	1.6	0.3	1.6	
6-Nov	-1.1	-0.4	-0.7	0.3	0.2	-0.1	0.1	0.0	0.3	0.0	-0.2	-0.3	-0.2	0.1	0.4	0.1	0.1	-0.1	-0.1	0.1	0.3	0.2	-0.1	-0.2	0.0	0.4	0.0	0.4	
7-Nov	-0.2	-0.6	-0.6	-0.3	-0.4	-0.5	-0.6	-0.2	-0.1	-0.2	-0.5	-0.5	-0.1	-0.3	0.1	-0.2	-0.4	-0.6	-0.6	-0.6	-0.5	-0.5	-0.7	UO	-0.4	0.1	-0.4	0.1	
8-Nov	-0.7	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	-0.7	-0.7
9-Nov	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	1.7	0.4	0.2	-0.2	0.2	0.5	0.5	0.2	0.5	0.3	0.8	0.0	-0.1	--	1.7	--	1.7
10-Nov	-0.1	0.0	-0.2	0.0	0.3	0.5	0.5	0.4	0.4	0.1	0.0	-0.2	0.2	0.3	0.3	0.3	0.2	0.1	-0.5	-0.2	-0.2	0.0	0.1	0.5	0.1	0.5	0.1	0.5	
11-Nov	0.6	0.5	0.4	0.3	-0.9	-0.7	-0.1	-0.6	-0.6	-0.4	-0.3	-0.2	0.1	0.0	-0.1	0.2	0.1	0.1	0.2	0.0	-0.1	-0.2	-0.4	-0.2	-0.1	0.6	-0.1	0.6	
12-Nov	-0.3	-0.6	-0.6	-0.6	-0.7	-0.7	-0.6	-1.1	-0.9	-0.6	-0.7	-0.3	-0.6	-0.7	-0.2	-0.4	-0.3	-0.5	-0.5	-0.5	0.2	-0.1	-0.3	-0.1	-0.5	0.2	-0.5	0.2	
13-Nov	0.4	0.0	0.1	0.3	0.7	0.3	0.8	0.7	0.9	1.0	0.4	0.7	0.7	0.8	1.3	0.6	0.2	0.3	0.3	0.2	0.4	0.3	0.3	0.3	0.5	1.3	0.5	1.3	
14-Nov	UO	UO	UO	UO	UO	UO	UO	UO	-0.4	-0.2	0.1	0.1	-0.1	-0.2	-0.5	-0.3	-0.2	-0.4	-0.5	-0.6	-0.4	-0.2	-0.3	-0.3	--	0.1	--	0.1	
15-Nov	0.0	0.0	0.1	0.2	0.2	0.3	0.3	1.0	1.0	0.7	-0.1	0.0	-0.1	0.3	0.1	-0.2	-0.5	-0.3	-0.2	0.0	0.0	-0.3	-0.1	-0.1	0.1	1.0	0.1	1.0	
16-Nov	-0.6	-0.8	-0.4	-0.3	-0.1	0.2	0.3	0.6	0.7	0.4	0.2	0.2	0.1	-0.1	0.0	0.1	-0.1	-0.2	-0.8	-0.8	-0.4	0.0	-0.8	-1.0	-0.1	0.7	-0.1	0.7	
17-Nov	-1.2	-1.2	-0.3	-1.3	-0.8	-0.4	-0.6	-0.6	-0.8	-0.9	-0.5	0.0	-0.5	-0.6	-0.8	-0.8	-1.3	-0.9	0.0	0.0	0.1	0.2	0.1	0.0	-0.5	0.2	-0.5	0.2	
18-Nov	-0.2	-0.1	-0.1	0.2	0.2	0.1	0.1	0.0	0.1	0.2	0.3	0.6	0.6	0.3	0.5	0.4	0.5	0.7	0.2	0.1	0.3	0.3	0.4	0.6	0.3	0.7	0.3	0.7	
19-Nov	0.1	-0.1	0.3	0.2	0.1	0.1	0.1	0.1	0.3	0.1	0.3	0.0	0.1	0.2	-0.2	0.0	-0.1	-0.2	-0.3	-0.3	-0.4	-0.6	-0.6	-0.6	-0.1	0.3	-0.1	0.3	
20-Nov	-0.9	0.2	0.0	-0.1	0.4	-0.1	-0.1	-0.3	-0.6	-0.2	-0.4	-0.6	0.3	0.4	0.1	0.3	0.2	-0.1	-0.1	-0.1	-0.3	-0.6	-0.3	-0.2	-0.1	0.4	-0.1	0.4	
21-Nov	0.0	0.2	0.1	0.4	0.7	0.2	1.5	1.4	1.2	0.5	0.5	0.6	0.6	0.8	0.5	0.5	0.7	0.5	0.7	0.3	1.3	0.5	0.4	0.4	0.6	1.5	0.6	1.5	
22-Nov	0.5	0.4	1.1	0.3	0.4	0.6	0.6	0.8	0.4	0.6	0.0	0.5	0.3	0.4	0.2	-0.2	-0.1	0.0	0.1	0.0	-0.2	0.1	0.2	0.3	0.3	1.1	0.3	1.1	
23-Nov	0.4	0.4	0.3	0.6	0.4	0.4	0.1	0.3	0.2	0.0	0.0	0.3	-0.2	-0.1	0.0	-0.4	-0.2	-0.3	-0.2	-0.7	-0.8	-0.7	-0.9	-1.1	-0.1	0.6	-0.1	0.6	
24-Nov	-0.9	-1.0	-1.1	-0.9	-1.0	-1.1	-0.9	-0.1	-0.4	0.0	-0.3	-0.2	0.0	-0.2	-0.3	-0.1	-0.3	-0.5	-0.5	-0.7	-0.5	-0.8	-0.3	-0.3	-0.5	0.0	-0.5	0.0	
25-Nov	-0.4	-0.3	0.0	0.0	0.2	-0.1	0.2	0.3	-0.1	0.0	0.4	0.2	0.0	0.0	-0.1	0.5	0.5	0.3	0.2	0.2	0.3	0.4	0.1	-0.1	0.1	0.5	0.1	0.5	
26-Nov	0.0	0.5	0.0	0.1	0.1	0.3	0.1	0.0	-0.1	0.3	0.1	-0.1	-0.1	-0.1	0.0	0.0	-0.2	-0.4	-0.5	-0.4	-0.5	-0.2	-0.1	-0.2	-0.1	0.5	-0.1	0.5	
27-Nov	-0.2	-0.2	-0.2	-0.2	-0.1	0.0	0.3	0.1	0.1	0.0	-0.3	-0.2	-0.1	-0.1	-0.4	-0.5	-0.6	-0.8	-0.3	-0.5	-0.7	-0.5	-0.6	-0.7	-0.3	0.3	-0.3	0.3	
28-Nov	-0.1	-0.1	-0.2	-0.1	-0.4	-0.6	-0.6	-0.8	-1.3	-0.8	-0.3	-0.5	-0.5	-0.2	-0.3	-0.3	-0.4	-0.5	-0.7	-0.7	-0.7	-0.6	-0.4	-0.2	-0.5	-0.1	-0.5	-0.1	
29-Nov	-0.4	-0.4	-0.4	-0.3	-0.2	-0.2	-0.3	-0.4	-0.4	-0.3	-0.3	-0.2	-0.2	-0.1	-0.3	-0.3	-0.2	0.5	0.0	0.3	0.2	0.3	-0.1	0.1	-0.2	0.5	-0.2	0.5	
30-Nov	0.2	0.3	0.0	0.1	-0.1	0.1	0.1	0.1	0.5	0.5	0.3	0.5	0.2	0.3	0.0	-0.1	0.0	-0.2	-0.1	-0.2	-0.1	-0.2	-0.2	-0.1	0.1	0.5	0.1	0.5	
																								Diurnal Average					
																								Diurnal Maximum					
-0.2 -0.1 -0.1 0.0 0.1 0.0 0.1 0.3 0.1 0.2 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.0 0.0 0.0 0.0 0.0 -0.1 -0.1 0.0 0.6 0.5 1.1 2.1 3.4 0.8 2.2 2.9 1.9 2.0 1.9 1.7 0.9 0.8 1.4 1.9 0.9 1.5 2.1 1.6 1.3 0.8 0.6 2.2																													
UO - Unstable Operation																													



Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0																				Hours in Service: 720					
Maximum Value: 4.5 km/h on Nov 20 04:00																				Hours of Data: 677					
Minimum Value: 0.2 km/h on Nov 1 01:00																				Hours of Missing Data: 43					
Percentiles: P <sub>1</sub> = 0.2 P <sub>10</sub> = 0.5 Q <sub>1</sub> = 0.7 Median = 1.2 Q <sub>3</sub> = 1.8 P <sub>90</sub> = 2.5 P <sub>99</sub> = 3.7																				Hours of Calibration: 0					
Percent Operational Time: 94.0																									
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Nov	0.2	0.2	0.2	0.2	0.2	0.2	0.4	0.5	0.5	0.5	0.6	0.4	0.9	1.1	0.5	0.5	0.3	0.3	0.3	0.5	0.7	0.5	0.8	1.1	1.1
2-Nov	1.0	0.5	0.4	0.4	0.9	2.4	2.3	3.0	2.8	2.5	2.3	2.5	1.8	1.7	2.1	1.9	1.9	1.6	1.1	1.1	0.8	0.9	1.7	2.3	3.0
3-Nov	1.0	1.1	1.4	1.6	1.1	0.8	0.9	0.4	0.5	0.7	1.0	1.0	1.2	1.2	1.5	0.8	0.7	0.6	0.7	0.8	1.0	1.0	1.1	1.2	1.6
4-Nov	0.9	0.6	1.2	2.2	1.9	2.6	2.2	2.2	2.8	2.5	3.1	2.9	3.1	2.3	2.7	3.1	2.2	2.8	2.8	2.8	2.2	2.1	1.6	1.8	3.1
5-Nov	1.6	1.9	2.2	1.2	1.5	1.3	1.9	1.6	1.3	1.5	1.9	1.7	1.7	1.4	1.5	1.4	1.1	2.3	2.5	2.7	2.4	1.4	1.9	1.7	2.7
6-Nov	2.2	1.4	2.1	1.1	1.2	1.1	1.2	1.7	1.9	1.9	1.9	1.4	1.8	1.3	1.7	1.4	1.4	1.4	1.1	0.7	0.6	0.5	0.8	0.6	2.2
7-Nov	0.6	1.0	1.0	0.7	0.9	0.6	0.5	0.4	0.4	0.9	0.9	1.3	1.3	1.0	1.1	0.5	0.4	0.5	0.5	0.5	0.8	1.5	1.4	UO	1.5
8-Nov	1.7	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	1.7
9-Nov	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	1.9	1.8	2.0	1.6	1.0	1.2	1.4	1.4	1.0	1.4	0.8	0.7	0.8	2.0
10-Nov	1.4	1.7	1.4	1.7	1.1	1.4	1.5	1.4	1.0	1.5	1.3	1.3	1.2	1.1	1.1	0.7	0.7	0.9	1.2	1.2	0.9	1.1	1.0	0.9	1.7
11-Nov	0.5	0.4	0.7	0.8	1.4	1.5	1.6	2.3	2.3	2.2	2.6	2.7	2.3	1.7	1.3	1.3	0.9	0.9	0.4	0.4	0.4	0.8	1.0	1.6	2.7
12-Nov	1.3	0.9	1.1	0.8	0.9	0.9	1.0	1.4	1.4	1.7	2.1	2.2	2.5	1.9	1.6	1.1	0.7	1.2	1.3	0.9	0.7	0.6	0.9	1.0	2.5
13-Nov	1.3	0.9	0.8	0.8	0.7	0.9	0.9	1.2	1.5	1.7	1.4	1.2	1.5	1.3	2.3	1.7	1.2	0.8	1.0	1.0	1.7	1.0	1.3	1.4	2.3
14-Nov	UO	UO	UO	UO	UO	UO	UO	UO	0.9	0.8	0.8	0.8	1.3	1.4	1.3	0.7	0.9	1.0	1.0	0.8	0.8	1.0	0.7	0.5	1.4
15-Nov	0.9	0.8	0.6	0.5	0.9	1.3	2.3	2.7	2.6	2.8	1.7	1.4	2.1	1.8	1.2	0.5	0.3	0.5	0.5	1.4	1.3	1.3	0.8	0.6	2.8
16-Nov	0.4	0.7	0.5	0.6	0.7	0.5	0.6	0.9	0.9	0.7	1.2	1.0	1.1	0.5	0.6	0.6	0.5	1.0	0.6	0.6	1.4	1.7	2.2	1.8	2.2
17-Nov	1.8	2.0	2.4	2.9	2.3	2.6	3.3	2.9	2.0	1.8	1.9	2.7	1.6	0.8	0.8	0.6	0.5	0.6	0.8	0.6	0.2	0.4	0.3	0.4	3.3
18-Nov	0.3	0.3	0.6	0.5	0.7	0.5	0.5	0.4	0.5	0.6	0.7	0.6	0.6	0.6	0.6	0.6	0.5	0.6	0.5	0.3	0.5	0.5	0.7	0.7	0.7
19-Nov	0.6	0.7	0.5	0.9	0.8	1.0	0.5	0.8	0.6	0.9	1.2	0.9	0.7	0.6	0.4	0.3	0.2	0.2	0.3	0.5	0.5	1.6	2.7	3.3	3.3
20-Nov	3.2	3.4	4.1	4.5	4.1	3.3	3.0	3.2	2.8	3.3	2.8	2.7	3.7	3.5	3.1	2.7	2.5	2.4	1.8	1.3	1.1	1.0	0.6	1.0	4.5
21-Nov	1.0	1.1	0.8	1.1	1.3	1.1	1.6	1.6	2.5	1.8	2.0	2.3	2.0	2.0	1.6	1.1	1.2	1.4	1.9	1.5	2.3	2.0	1.5	1.8	2.5
22-Nov	1.7	2.0	1.7	1.6	1.4	1.2	1.5	1.5	1.6	1.6	1.5	1.6	1.5	1.6	1.1	0.7	0.3	0.7	0.7	0.4	1.1	0.7	1.0	1.2	2.0
23-Nov	1.2	1.1	1.0	1.2	0.9	1.0	0.9	1.1	0.7	0.6	1.1	0.9	1.1	0.9	0.9	0.5	0.3	0.3	0.6	0.7	0.7	1.1	1.7	2.9	2.9
24-Nov	2.9	2.7	2.6	2.5	1.5	1.4	2.1	2.2	2.2	2.2	1.6	1.3	1.1	0.8	1.2	1.2	1.1	1.0	1.2	1.2	1.4	1.2	1.0	1.1	2.9
25-Nov	1.6	1.3	0.6	1.7	3.5	3.7	4.4	3.1	2.8	3.7	3.7	3.4	2.6	2.7	2.4	1.7	1.2	1.4	1.3	1.3	1.1	0.5	0.4	0.3	4.4
26-Nov	0.3	0.6	0.2	0.3	0.6	0.9	0.6	0.9	0.4	0.8	0.8	0.8	0.7	0.7	0.7	0.5	0.6	0.4	0.3	0.3	0.6	0.8	1.4	0.9	1.4
27-Nov	0.4	0.4	0.5	0.4	0.6	0.5	0.5	0.5	0.5	0.7	0.7	0.9	0.9	0.6	0.6	0.8	0.9	1.8	2.2	2.3	2.0	2.8	3.1	2.9	3.1
28-Nov	3.1	2.9	2.5	2.4	2.4	2.0	2.2	2.2	2.0	2.0	2.3	2.2	2.0	1.8	1.5	2.1	1.9	2.3	2.3	1.9	1.7	2.4	1.7	1.5	3.1
29-Nov	1.5	1.6	1.7	1.2	1.3	1.2	1.4	1.5	1.4	1.6	1.6	1.5	2.0	2.5	2.4	2.3	2.0	2.0	2.5	1.7	2.2	1.8	1.6	1.8	2.5
30-Nov	1.5	1.0	1.0	0.8	0.7	0.7	0.8	1.1	1.3	1.2	0.8	1.1	1.3	1.0	1.2	0.6	0.3	0.5	0.5	0.6	0.4	0.6	0.5	0.3	1.5
	3.2	3.4	4.1	4.5	4.1	3.7	4.4	3.2	2.8	3.7	3.7	3.4	3.7	3.5	3.1	3.1	2.5	2.8	2.8	2.8	2.4	2.8	3.1	3.3	
Diurnal Maximum																									
UO - Unstable Operation																									



## WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY  
MONITORING PROGRAM  
MONTHLY REPORT

**AMS06**  
**PATRICIA MCINNES**  
**NOVEMBER 2023**

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

December 22, 2023

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - PATRICIA McINNES (AMS06)  
NOVEMBER 2023

MONTHLY SUMMARY

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2 (ppb) Average	686	34	34	100	5	0	0.9	0
TRS (ppb) Average	685	35	35	100	1.1	0	0.5	0
THC (ppm) Average	686	34	34	100	2.6	-	2.2	-
NMHC(ppm) Average	686	34	34	100	0.455	-	0.056	-
CH4(ppm) Average	686	34	34	100	2.6	-	2.1	-
O3 (ppb) Average	687	33	33	100	39.1	0	36	-
NO2 (ppb) Average	684	36	36	100	31.9	0	12.5	-
NO (ppb) Average	684	36	36	100	55.8	-	10	-
NOX (ppb) Average	684	36	36	100	80.8	-	21.3	-
NH3 (ppb) Average	628	45	92	93.47	0	0	0	-
PM2.5 (ug/m3) Average	703	1	17	97.78	31.7	0	13.5	0
Temperature 2 m (C) Average	720	0	0	100	7	-	2.4	-
Relative Humidity (%) Average	720	0	0	100	96.8	-	91.1	-
Wind Speed 10 m (km/h) Average	720	0	0	100	36	-	20	-
Wind Direction 10 m (deg) Average	720	0	0	100	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - PATRICIA McINNES (AMS06)  
NOVEMBER 2023

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile						
					Min	P10	Q1	Median	Q3	P90	Max
SO2 (ppb) Average	686	0.29	0.6	-	0	0	0	0.1	0.3	0.5	5
TRS (ppb) Average	685	0.37	0.1	-	0.2	0.3	0.3	0.4	0.4	0.5	1.1
THC (ppm) Average	686	2.09	0.1	-	2	2	2	2.1	2.1	2.2	2.6
NMHC(ppm) Average	686	0.029	0.023	-	0	0	0	0	0	0	0.455
CH4(ppm) Average	686	2.06	0.1	-	2	2	2	2	2.1	2.1	2.6
O3 (ppb) Average	687	21.24	9.2	-	1.3	7.7	14.6	21.6	28.1	33.5	39.1
NO2 (ppb) Average	684	5.23	5.5	-	0	0.2	1.2	3.5	7	12.8	31.9
NO (ppb) Average	684	2.26	5.2	-	0	0.1	0.2	0.8	2.1	4.5	55.8
NOX (ppb) Average	684	7.49	9.7	-	0	0.3	1.6	4.5	9.1	17	80.8
NH3 (ppb) Average	628	0	0	-	0	0	0	0	0	0	0
PM2.5 (ug/m3) Average	703	5.92	3.7	-	0.6	2.6	3.6	5	7.3	10.6	31.7
Temperature 2 m (C) Average	720	-3.58	4.4	-	-17.7	-9.9	-5.8	-3.2	-0.5	1.6	7
Relative Humidity (%) Average	720	80.73	10.8	-	45.9	63.7	74.6	83.4	88.7	92.5	96.8
Wind Speed 10 m (km/h) Average	720	10.4	6	-	0	4	6	9	13	19	36
Wind Direction 10 m (deg) Average	720	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - PATRICIA McINNES (AMS06)  
NOVEMBER 2023

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
NH3	01 Nov 2023 04:00	30 Nov 2023 03:00	31	Stabilization after daily span
NH3	01 Nov 2023 18:00	02 Nov 2023 09:00	16	Maintenance - stablization after analyzer replacement
PM2.5	30 Nov 2023 09:00	30 Nov 2023 09:00	1	Maintenance - firmware update
PM2.5	30 Nov 2023 10:00	01 Dec 2023 00:00	15	Unstable Operation - flatline in analyzer output signal

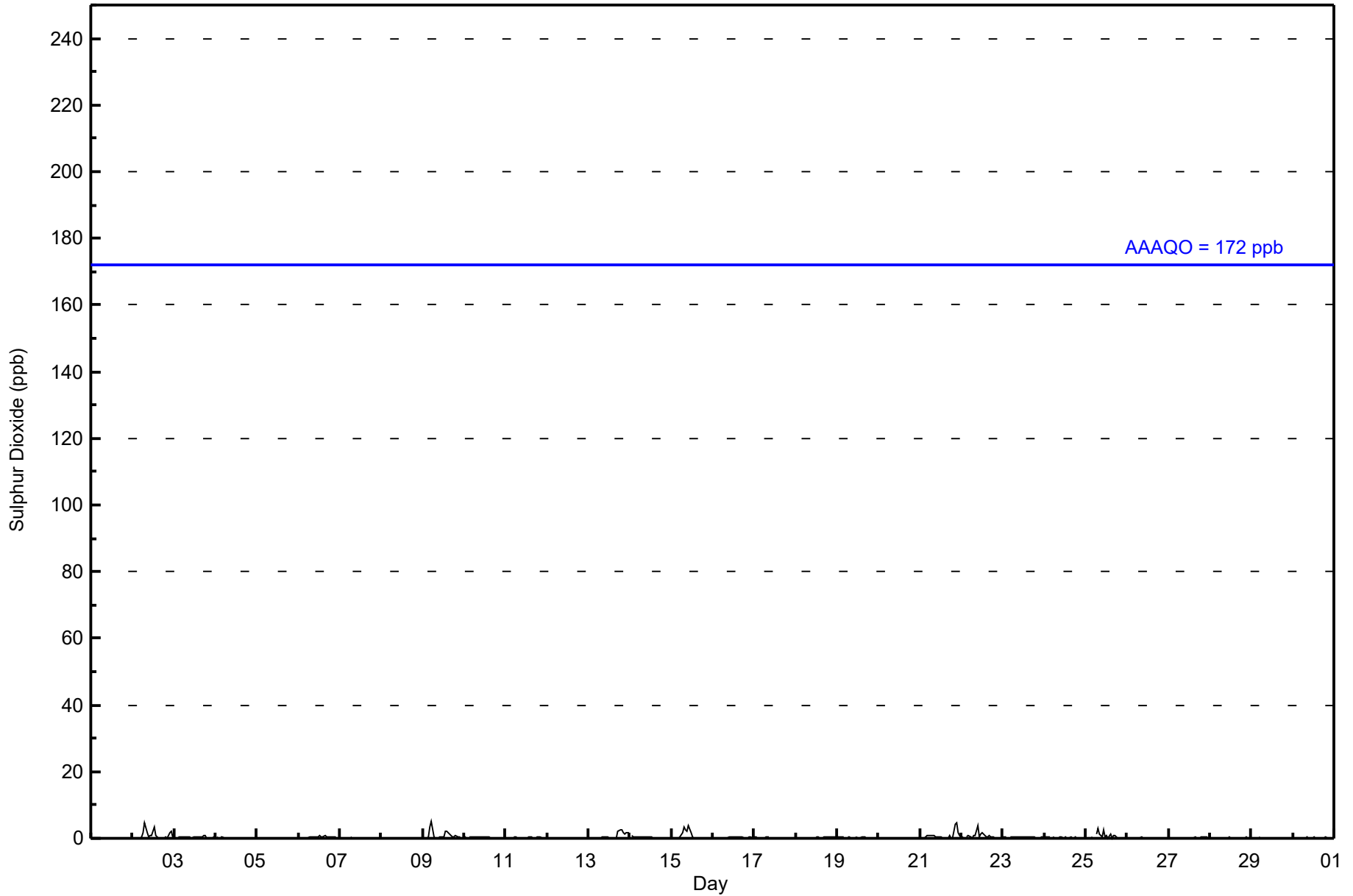






**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Patricia McInnes - November 2023**





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

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Patricia McInnes - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 10	686	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: 686

Total Number of Hours: 720



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

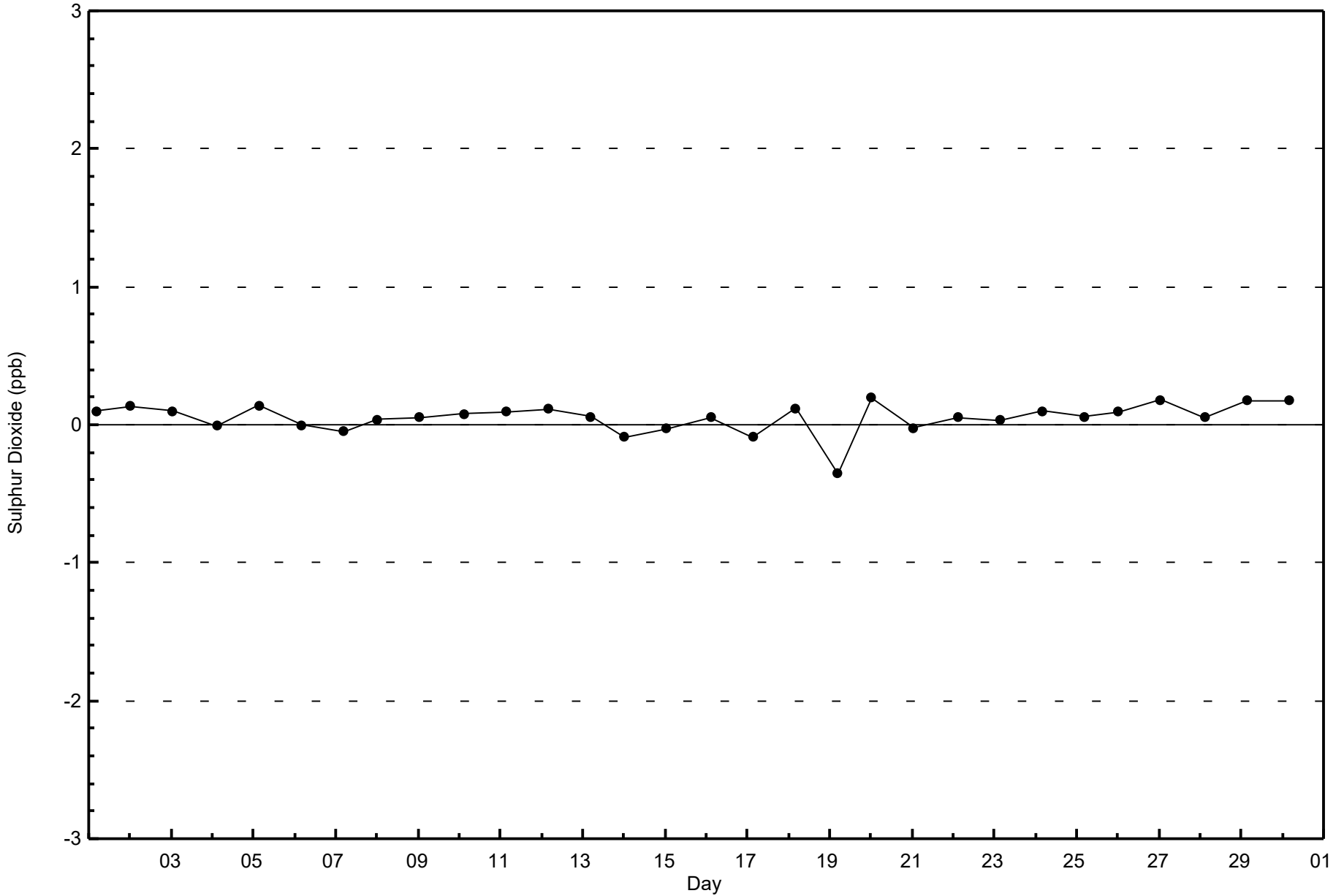
**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Patricia McInnes - November 2023**

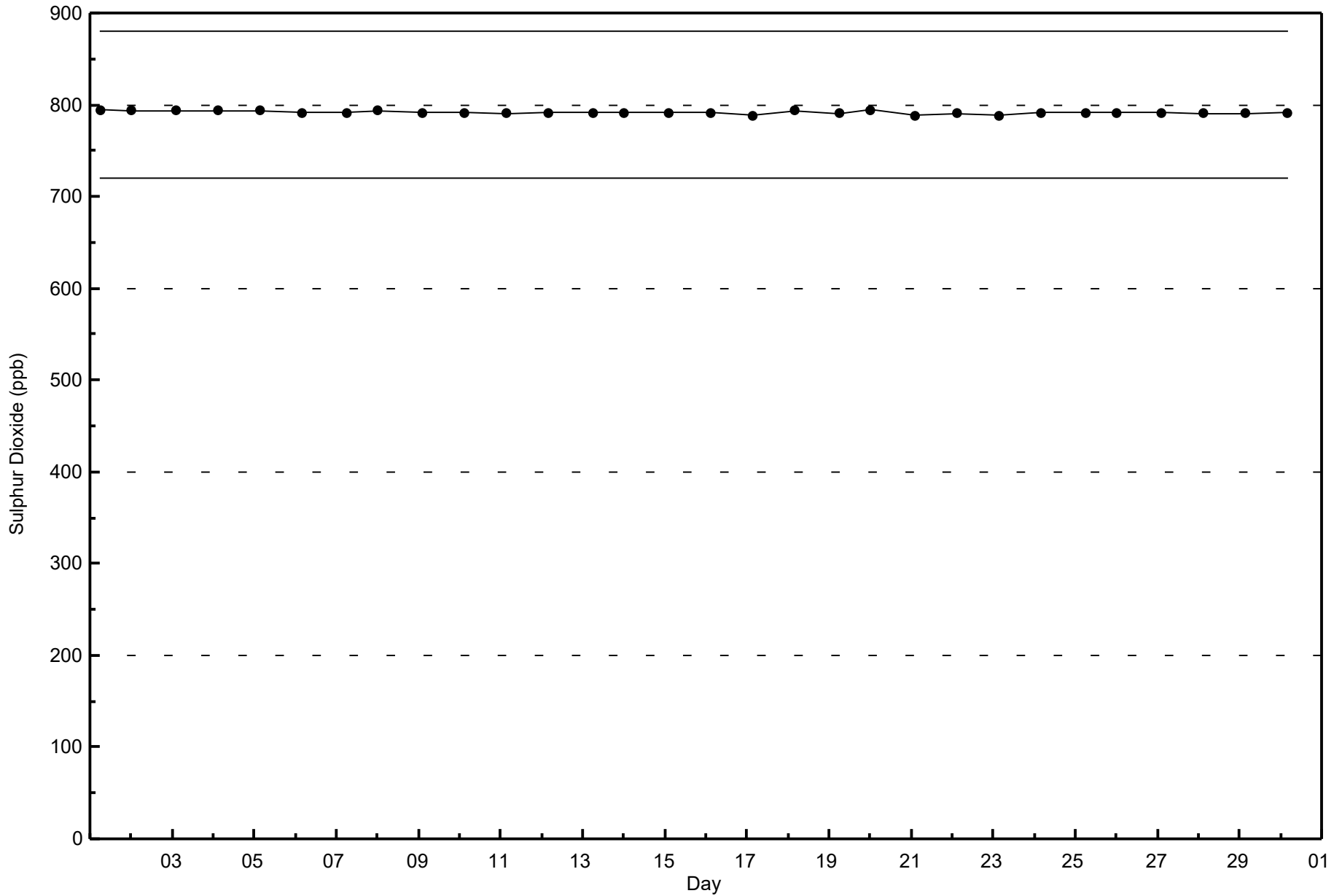
<b>Concentration</b> <b>Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 10	35	16	21	19	32	48	96	38	57	43	60	57	46	59	31	28	686
11 - 20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	35	16	21	19	32	48	96	38	57	43	60	57	46	59	31	28	686

Total Number of Valid Hours: 686

Total Number of Hours: 720







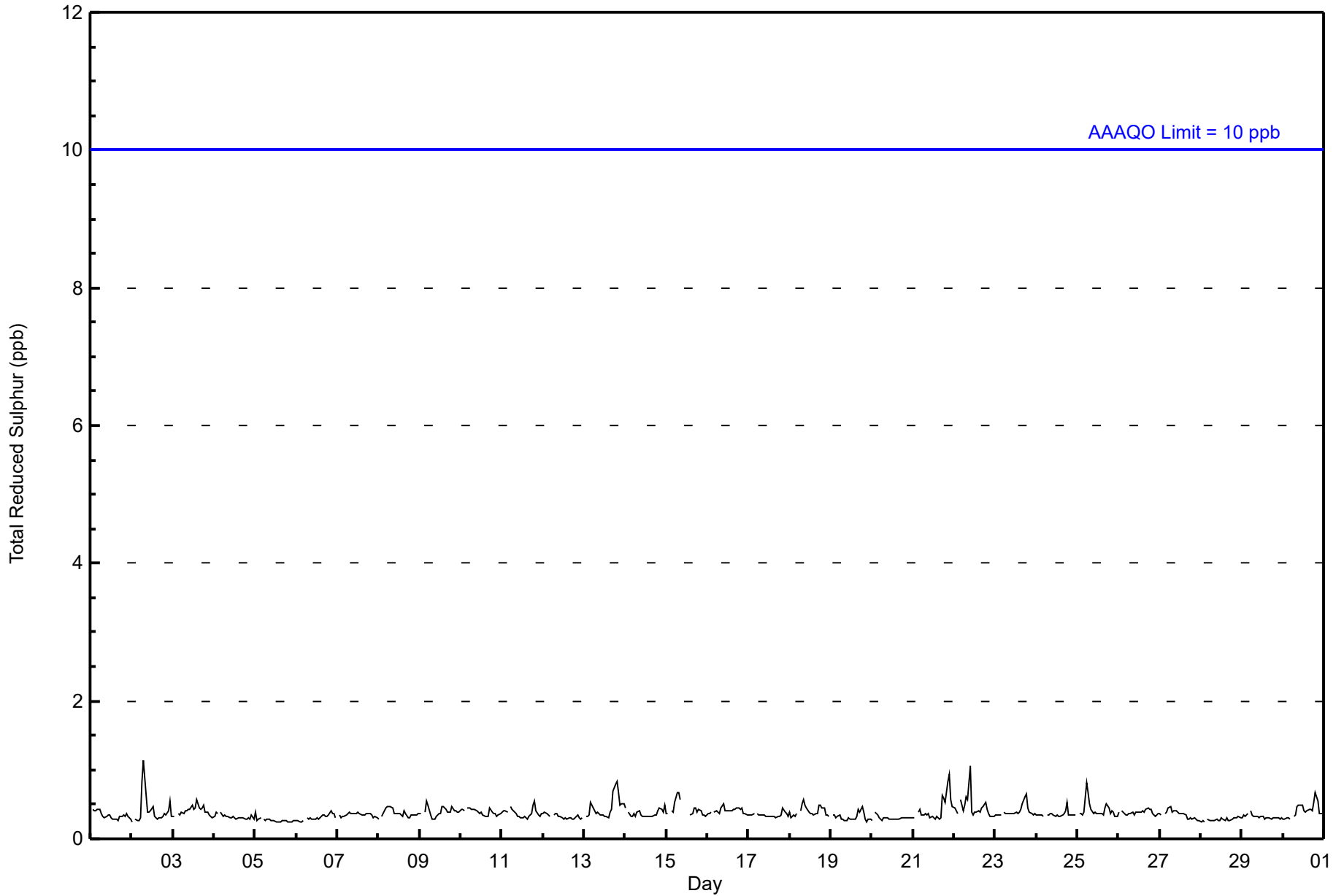






**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Total Reduced Sulphur (TRS) - ppb**  
**Patricia McInnes - November 2023**





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

**Total Reduced Sulphur (TRS) - ppb**  
**Patricia McInnes - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2	685	100.00	100.00
3 - 4	0	0.00	100.00
5 - 7	0	0.00	100.00
8 - 11	0	0.00	100.00
> 11	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Total Reduced Sulphur (TRS) - ppb  
Patricia McInnes - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	36	16	21	18	33	47	98	39	56	41	62	61	44	60	29	24	685
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	36	16	21	18	33	47	98	39	56	41	62	61	44	60	29	24	685

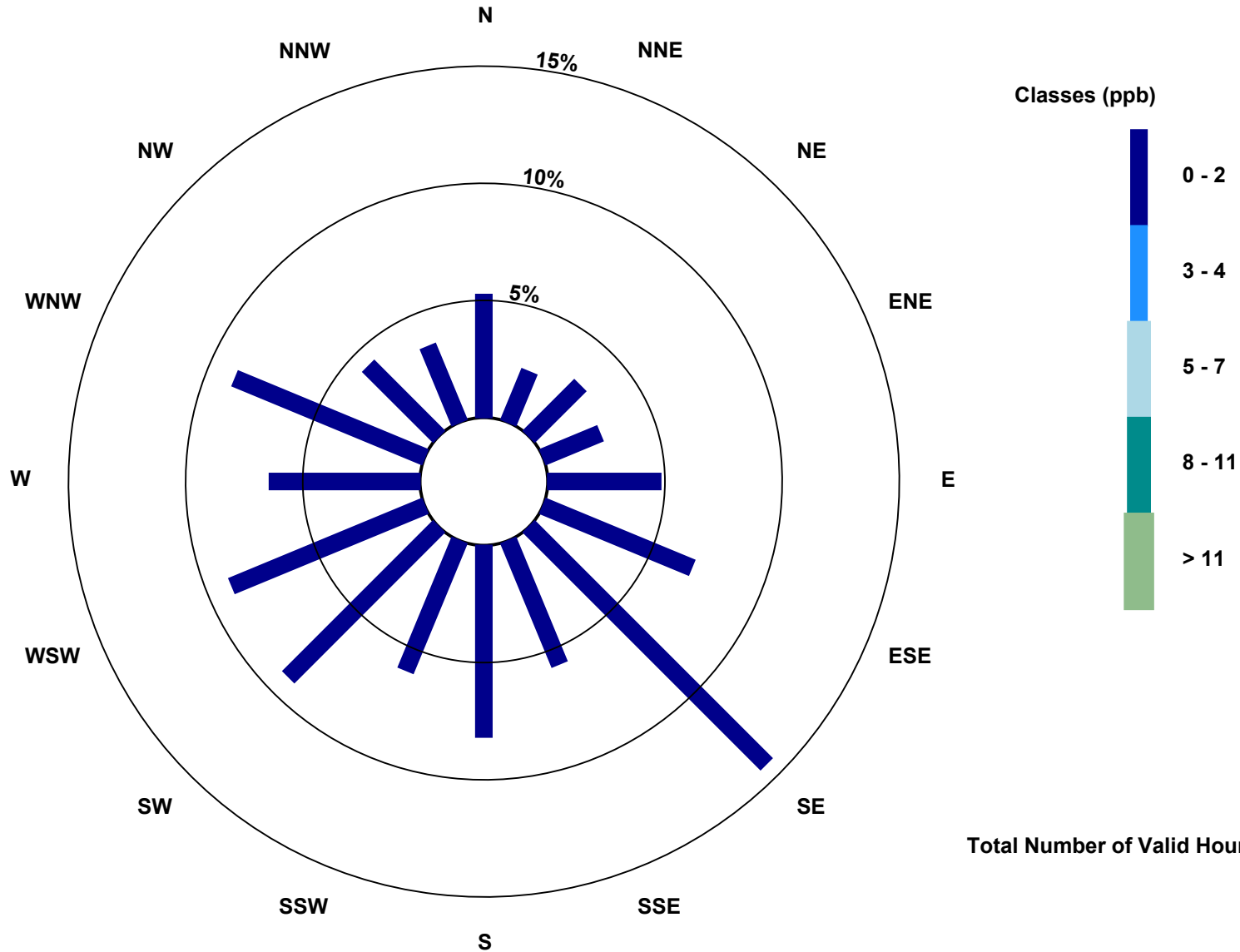
Total Number of Valid Hours: 685

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 2023

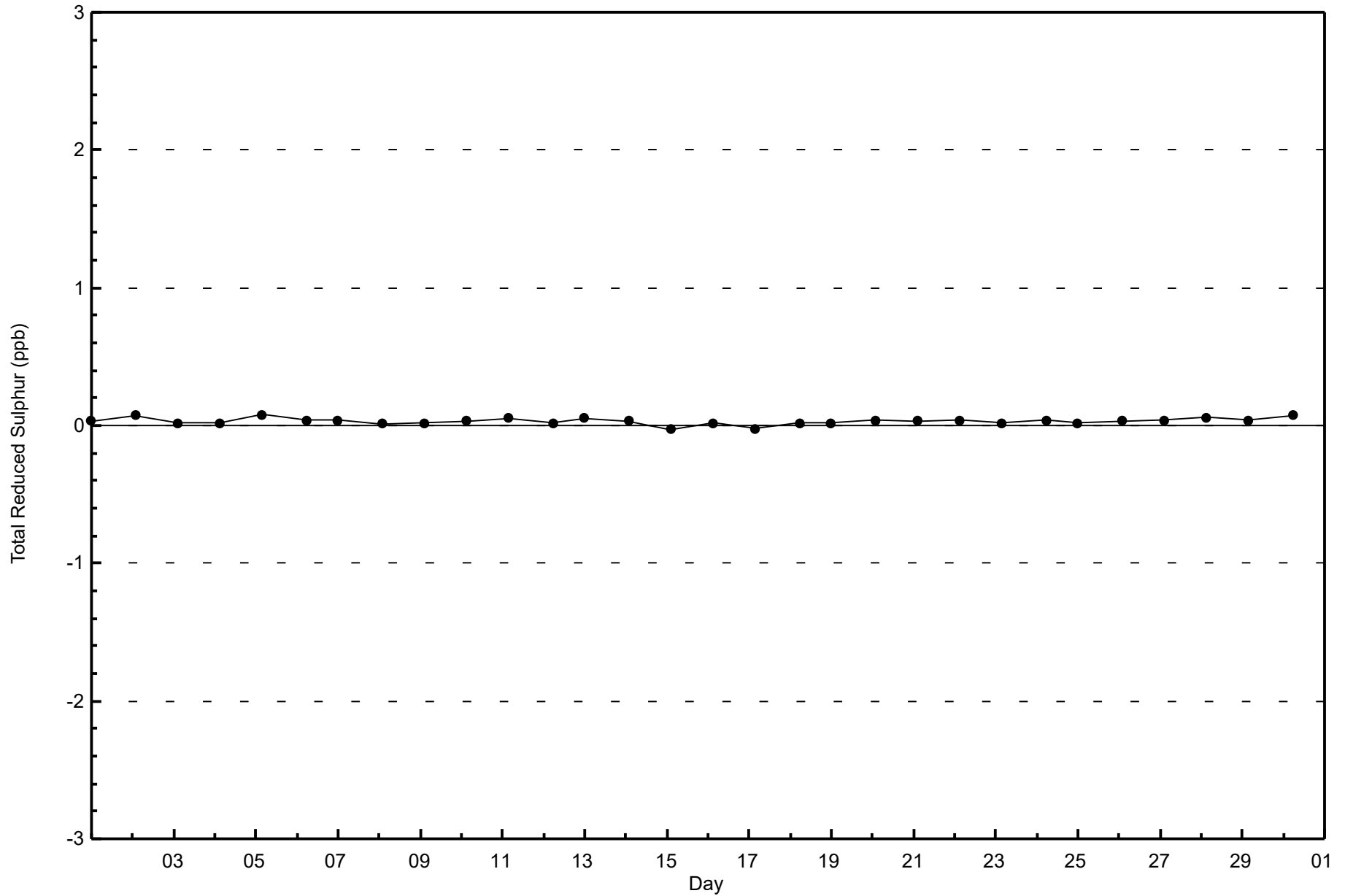
Total Reduced Sulphur (TRS) - ppb  
Patricia McInnes

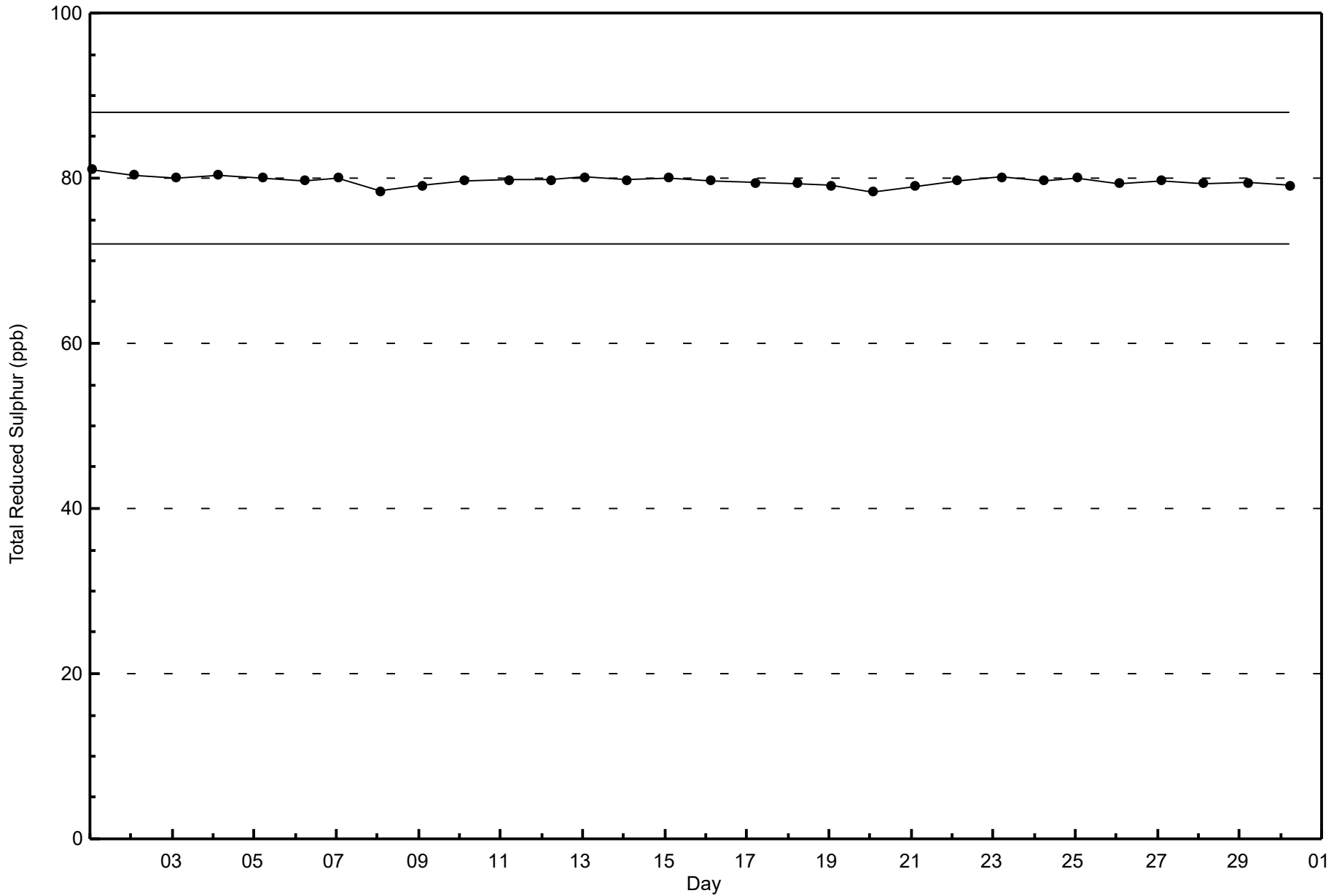




Wood Buffalo Environmental Association  
Zero Responses

Total Reduced Sulphur (TRS) - ppb  
Patricia McInnes - November 2023







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

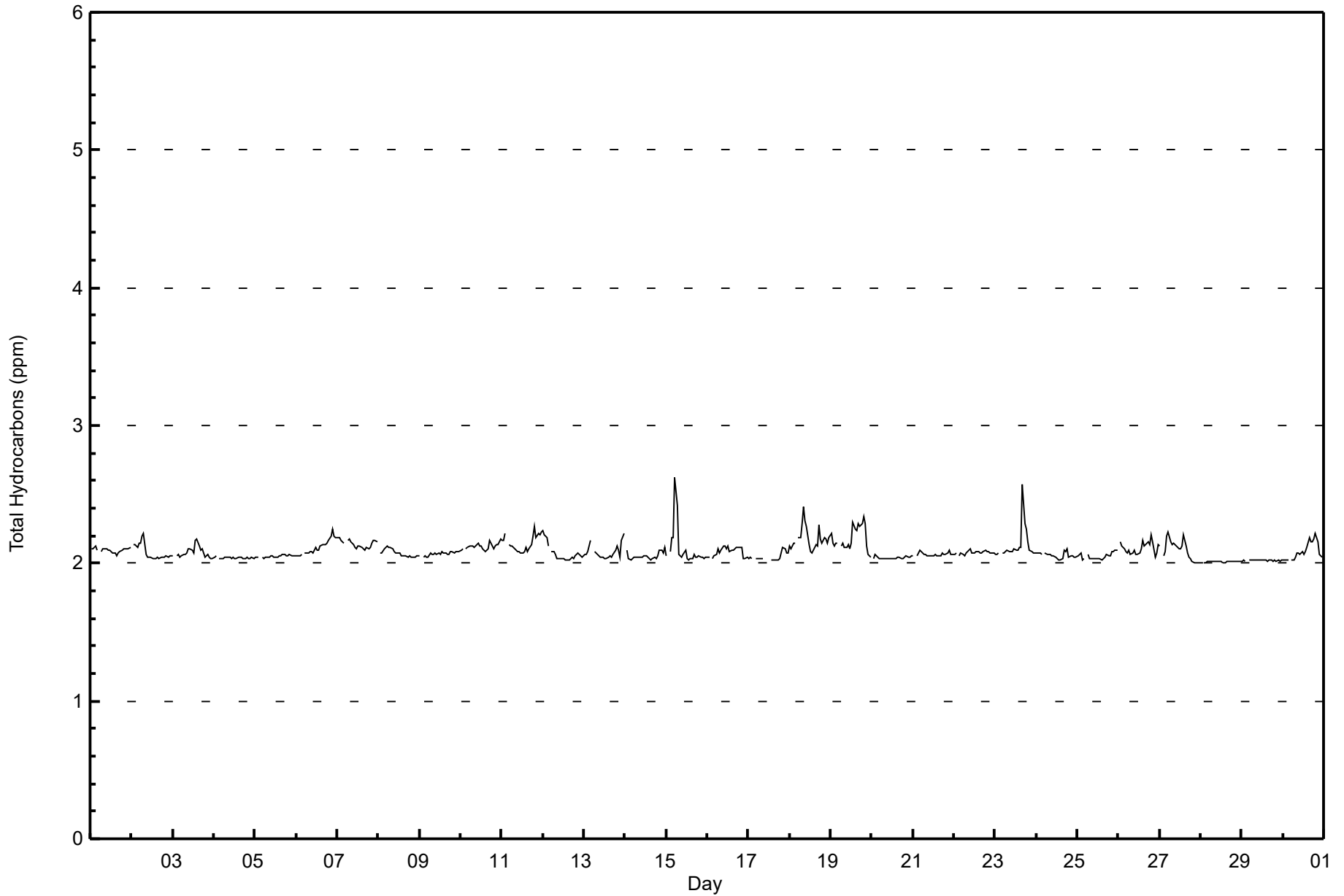
**Total Hydrocarbons (THC) - ppm**  
**Patricia McInnes - November 2023**

Maximum Value: 2.6 ppm on Nov 15 06:00		Maximum Daily Average: 2.2 ppm on Nov 19		Hours in Service: 720																							
Minimum Value: 2.0 ppm on Nov 28 00:00		Minimum Daily Average: 2.0 ppm on Nov 28		Hours of Data: 686																							
Maximum Diurnal Average: 2.1 ppm at hour 6		Minimum Diurnal Average: 2.1 ppm at hour 13		Hours of Missing Data: 34																							
Monthly Average: 2.09 ppm		Percentiles: P <sub>1</sub> = 2.0 P <sub>10</sub> = 2.0 Q <sub>1</sub> = 2.0 Median = 2.1 Q <sub>3</sub> = 2.1 P <sub>90</sub> = 2.2 P <sub>99</sub> = 2.3		Hours of Calibration: 34																							
				Percent Operational Time: 100.0																							
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Nov	2.1	2.1	2.1	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
2-Nov	Z	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.1	2.1	2.1	2.1	2.1
3-Nov	2.1	Z	2.1	2.1	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.1
4-Nov	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
5-Nov	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0
6-Nov	2.1	2.1	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.3	2.2	2.2	2.2	2.1	2.3
7-Nov	2.2	2.2	2.2	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	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.1	2.2
8-Nov	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1
9-Nov	2.1	Z	2.0	2.1	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
10-Nov	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.2
11-Nov	2.2	2.2	2.2	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.3	2.2	2.2	2.2	2.2	2.1	2.3	
12-Nov	2.2	2.2	2.2	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	2.1	2.1	2.1	2.1	2.0	2.1	2.2	
13-Nov	2.1	2.1	2.1	2.1	2.2	Z	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.1	2.1	2.1	2.1	2.0	2.2	2.2	2.1	2.1	2.2
14-Nov	Z	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.0	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
15-Nov	2.1	Z	2.1	2.2	2.2	2.6	2.4	2.1	2.1	2.0	2.1	2.1	2.0	2.0	2.0	2.0	2.1	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.1	2.1	2.6
16-Nov	2.0	2.0	Z	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.1	2.1	2.1
17-Nov	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	C	C	C	C	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.0	2.1	
18-Nov	2.1	2.1	2.1	2.1	Z	2.2	2.2	2.3	2.4	2.3	2.3	2.1	2.1	2.1	2.1	2.1	2.1	2.3	2.2	2.1	2.2	2.2	2.1	2.2	2.2	2.4	
19-Nov	2.2	2.1	2.1	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.3	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.1	2.1	2.0	2.2	2.3	
20-Nov	Z	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.0	2.1	2.0	2.1	2.0	
21-Nov	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
22-Nov	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
23-Nov	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	2.6	2.3	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.6
24-Nov	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	2.0	2.0	2.0	2.1	2.1	2.1	2.0	2.1	2.1	2.0	2.0	2.1	2.1	2.1
25-Nov	2.1	2.1	2.1	2.0	2.0	Z	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
26-Nov	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	2.2	2.1	2.1	2.2	2.1	2.2	2.2	2.0	2.1	2.1	2.1	2.1	2.2
27-Nov	2.1	Z	2.1	2.1	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.2
28-Nov	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
29-Nov	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
30-Nov	2.0	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.0	2.1	2.1	2.2
																								Diurnal Average			
																								Diurnal Maximum			
Z - zerospan      C - Calibration																											



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

**Total Hydrocarbons (THC) - ppm**  
**Patricia McInnes - November 2023**







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

**Total Hydrocarbons (THC) - ppm**  
**Patricia McInnes - November 2023**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2.0	232	33.82	33.82
2.1 - 3.0	454	66.18	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 686

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Total Hydrocarbons (THC) - ppm  
Patricia McInnes - November 2023**

<b>Concentration Ranges (ppm)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	6	7	11	10	18	10	1	1	0	3	13	44	36	45	15	12	232
2.1 - 3.0	29	9	10	9	14	38	95	37	57	40	47	13	10	14	16	16	454
3.1 - 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	35	16	21	19	32	48	96	38	57	43	60	57	46	59	31	28	686

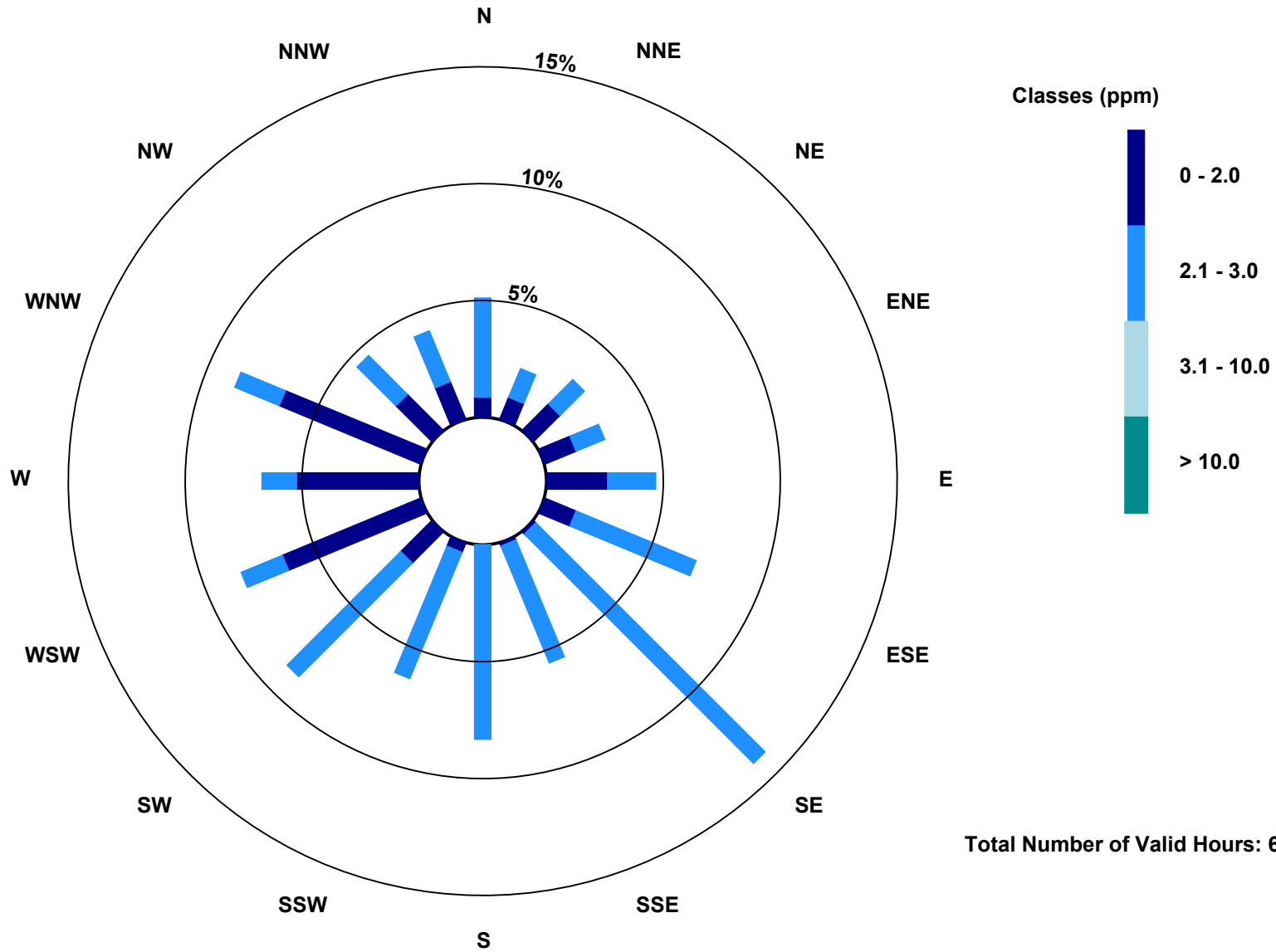
Total Number of Valid Hours: 686

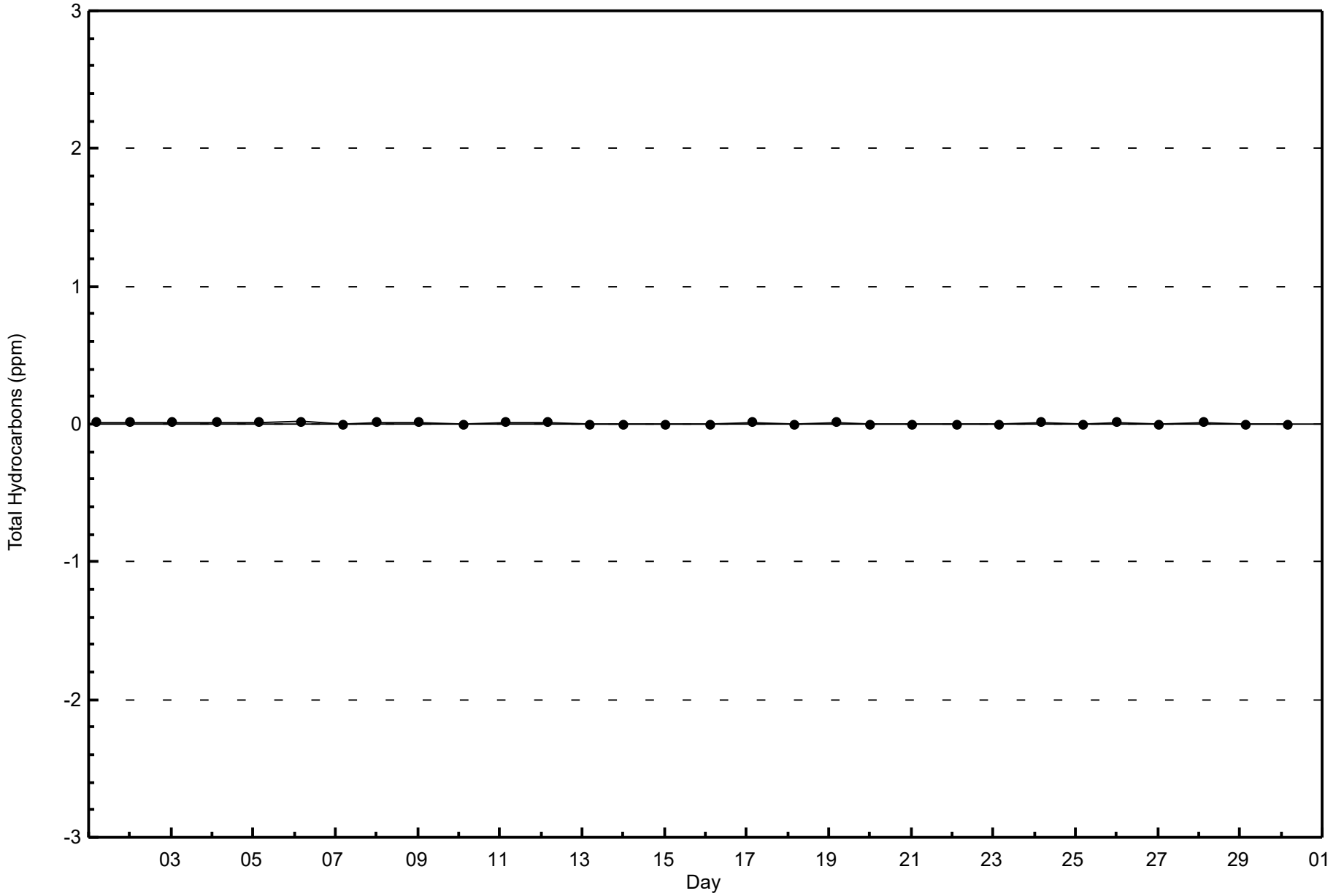
Total Number of Hours: 720

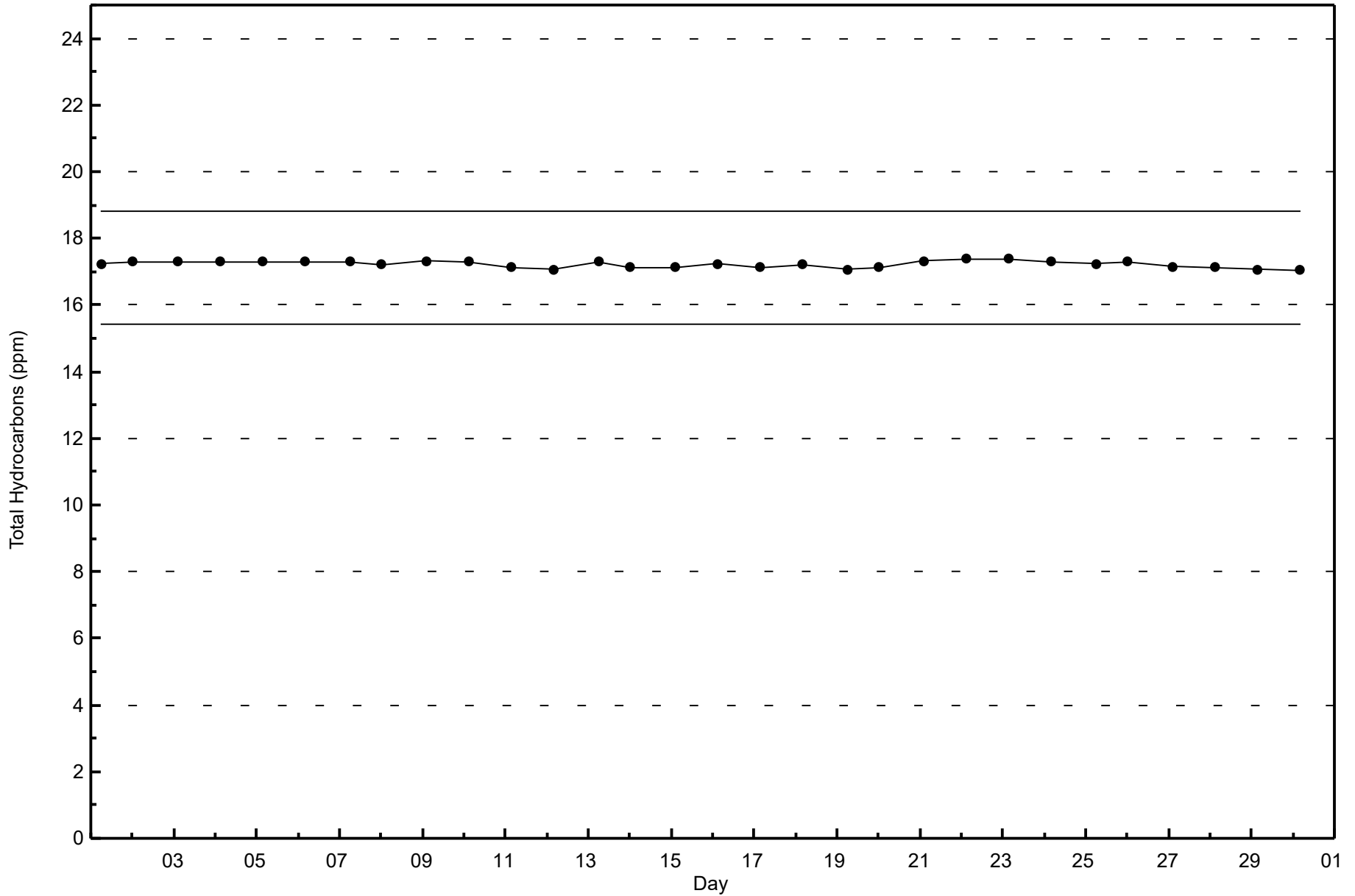


Wood Buffalo Environmental Association  
Wind Rose Nov 2023

Total Hydrocarbons (THC) - ppm  
Patricia McInnes

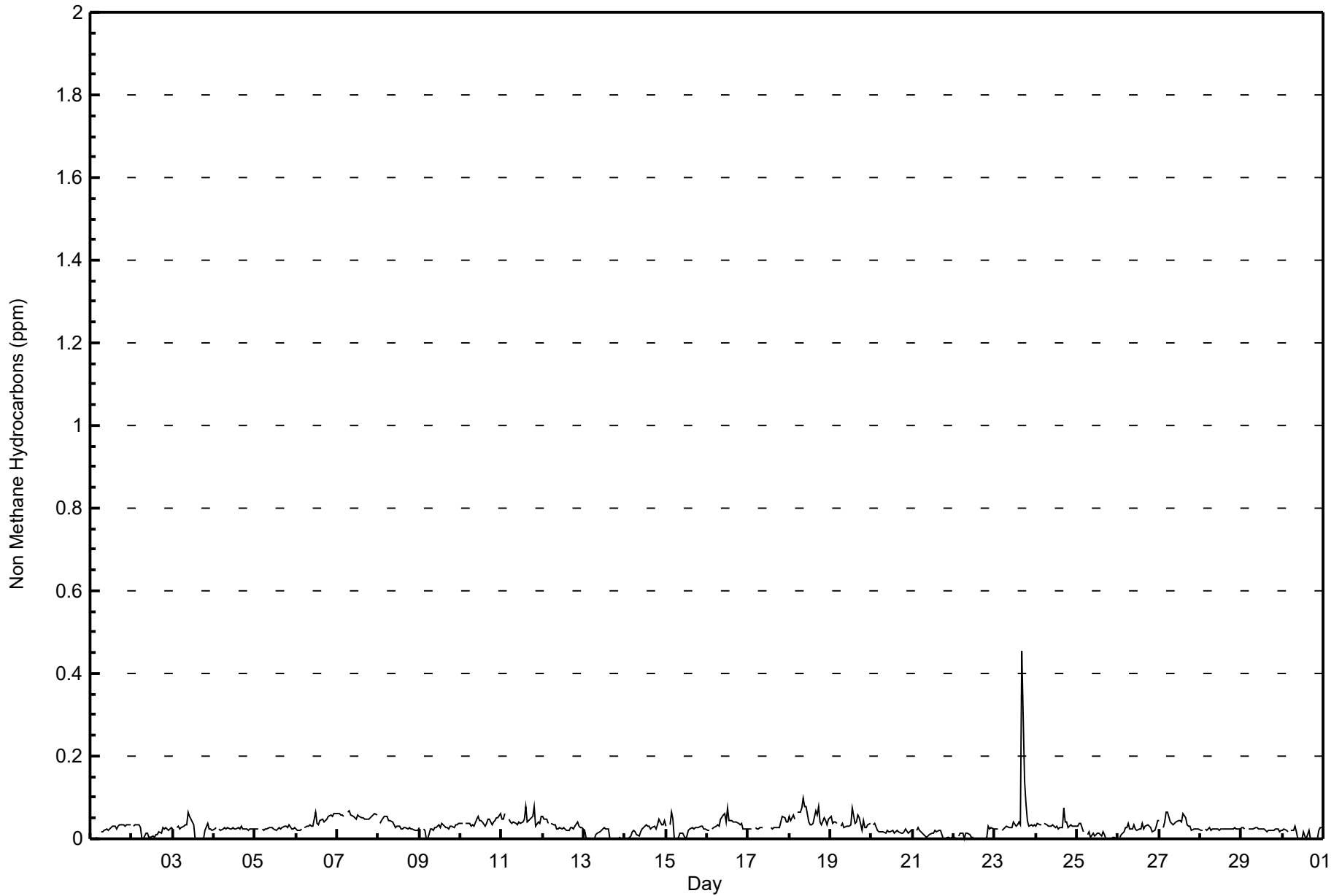








Maximum Value: 0.455 ppm on Nov 23 17:00		Maximum Daily Average: 0.056 ppm on Nov 23		Hours in Service:	720																																												
Minimum Value: 0.000 ppm on Nov 1 01:00		Minimum Daily Average: 0.008 ppm on Nov 13		Hours of Data:	686																																												
Maximum Diurnal Average: 0.043 ppm at hour 17		Minimum Diurnal Average: 0.026 ppm at hour 7		Hours of Missing Data:	34																																												
Monthly Average: 0.029 ppm		Percentiles: P <sub>1</sub> = 0.0 P <sub>10</sub> = 0.0 Q <sub>1</sub> = 0.0 Median = 0.0 Q <sub>3</sub> = 0.0 P <sub>90</sub> = 0.0 P <sub>99</sub> = 0.1		Hours of Calibration:	34																																												
				Percent Operational Time:	100.0																																												
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Nov	0.000	0.000	0.000	0.000	0.004	Z	0.016	0.017	0.019	0.022	0.022	0.025	0.028	0.030	0.032	0.025	0.032	0.035	0.035	0.033	0.030	0.034	0.033	0.034	0.022	0.035																							
2-Nov	Z	0.032	0.035	0.033	0.034	0.028	0.000	0.000	0.013	0.013	0.004	0.002	0.008	0.005	0.012	0.011	0.017	0.015	0.026	0.025	0.026	0.022	0.023	0.027	0.018	0.035																							
3-Nov	0.024	Z	0.026	0.031	0.023	0.027	0.032	0.032	0.036	0.065	0.054	0.041	0.033	0.000	0.000	0.000	0.000	0.000	0.021	0.039	0.022	0.023	0.021	0.024	0.065	0.065																							
4-Nov	0.025	0.028	Z	0.022	0.022	0.023	0.028	0.025	0.026	0.025	0.023	0.027	0.022	0.023	0.026	0.025	0.030	0.022	0.024	0.024	0.022	0.023	0.023	0.023	0.024	0.030	0.030																						
5-Nov	0.024	0.023	0.023	Z	0.024	0.021	0.024	0.022	0.026	0.027	0.026	0.022	0.021	0.025	0.026	0.025	0.029	0.030	0.029	0.028	0.032	0.023	0.023	0.026	0.025	0.032	0.032																						
6-Nov	0.025	0.021	0.021	0.025	Z	0.029	0.030	0.031	0.032	0.031	0.030	0.064	0.037	0.034	0.043	0.046	0.042	0.044	0.049	0.056	0.058	0.053	0.061	0.063	0.040	0.064																							
7-Nov	0.061	0.060	0.056	0.056	0.056	Z	0.064	0.067	0.058	0.056	0.050	0.048	0.056	0.056	0.051	0.050	0.047	0.048	0.049	0.050	0.054	0.059	0.060	0.059	0.055	0.067																							
8-Nov	Z	0.038	0.044	0.054	0.056	0.055	0.045	0.043	0.041	0.032	0.027	0.030	0.030	0.025	0.025	0.027	0.026	0.022	0.026	0.022	0.024	0.020	0.022	0.020	0.033	0.056																							
9-Nov	0.028	Z	0.022	0.020	0.001	0.001	0.025	0.023	0.022	0.026	0.027	0.034	0.028	0.037	0.034	0.027	0.026	0.025	0.032	0.032	0.027	0.033	0.034	0.037	0.026	0.037																							
10-Nov	0.036	0.037	Z	0.038	0.038	0.038	0.032	0.034	0.032	0.048	0.055	0.044	0.046	0.042	0.031	0.036	0.046	0.048	0.035	0.041	0.045	0.051	0.049	0.062	0.042	0.062																							
11-Nov	0.048	0.047	0.063	Z	0.048	0.042	0.039	0.040	0.036	0.033	0.040	0.036	0.041	0.048	0.078	0.041	0.045	0.050	0.053	0.076	0.031	0.040	0.039	0.053	0.046	0.078																							
12-Nov	0.054	0.047	0.047	0.039	Z	0.036	0.036	0.035	0.024	0.025	0.026	0.024	0.027	0.024	0.022	0.022	0.026	0.028	0.025	0.031	0.042	0.030	0.027	0.026	0.031	0.054																							
13-Nov	0.021	0.004	0.000	0.000	0.000	Z	0.002	0.010	0.012	0.018	0.021	0.025	0.027	0.024	0.022	0.000	0.000	0.000	0.001	0.000	0.000	0.002	0.000	0.000	0.008	0.027																							
14-Nov	Z	0.000	0.000	0.007	0.017	0.021	0.016	0.010	0.006	0.017	0.024	0.028	0.032	0.030	0.029	0.023	0.026	0.029	0.025	0.033	0.048	0.034	0.033	0.044	0.023	0.048																							
15-Nov	0.029	Z	0.035	0.064	0.047	0.000	0.000	0.002	0.013	0.015	0.012	0.000	0.006	0.022	0.023	0.028	0.024	0.027	0.028	0.028	0.048	0.029	0.023	0.024	0.022	0.064																							
16-Nov	0.021	0.022	Z	0.023	0.027	0.029	0.033	0.032	0.047	0.059	0.060	0.041	0.076	0.043	0.044	0.041	0.039	0.040	0.037	0.033	0.037	0.025	0.022	0.022	0.037	0.076																							
17-Nov	0.023	0.023	0.025	Z	0.027	0.023	0.024	0.026	0.026	Z	C	C	C	C	0.026	0.025	0.028	0.026	0.027	0.027	0.040	0.055	0.051	0.039	0.040	0.031	0.055																						
18-Nov	0.056	0.045	0.059	0.046	Z	0.065	0.066	0.074	0.098	0.079	0.079	0.039	0.035	0.034	0.036	0.068	0.057	0.079	0.042	0.034	0.050	0.044	0.034	0.047	0.055	0.098																							
19-Nov	0.054	0.039	0.039	0.042	0.038	Z	0.031	0.038	0.027	0.029	0.030	0.031	0.032	0.076	0.038	0.040	0.059	0.052	0.020	0.045	0.027	0.027	0.035	0.039	0.039	0.076																							
20-Nov	Z	0.033	0.036	0.021	0.016	0.019	0.018	0.018	0.015	0.019	0.016	0.018	0.019	0.015	0.017	0.021	0.018	0.014	0.015	0.016	0.025	0.014	0.016	0.019	0.019	0.036																							
21-Nov	0.021	Z	0.019	0.027	0.019	0.016	0.009	0.006	0.004	0.008	0.012	0.014	0.015	0.019	0.017	0.020	0.021	0.010	0.001	0.000	0.004	0.003	0.001	0.002	0.012	0.027																							
22-Nov	0.003	0.001	Z	0.008	0.013	0.014	0.001	0.012	0.015	0.010	0.003	0.004	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.031	0.025	0.026	0.024	0.008	0.031																							
23-Nov	0.022	0.023	0.025	Z	0.022	0.025	0.027	0.032	0.027	0.028	0.027	0.041	0.031	0.033	0.040	0.033	0.455	0.139	0.086	0.045	0.030	0.032	0.029	0.036	0.056	0.455																							
24-Nov	0.032	0.037	0.035	0.032	Z	0.036	0.035	0.031	0.031	0.030	0.033	0.028	0.029	0.023	0.027	0.027	0.075	0.042	0.042	0.028	0.032	0.030	0.030	0.030	0.034	0.075																							
25-Nov	0.030	0.037	0.039	0.026	0.017	Z	0.011	0.017	0.004	0.012	0.006	0.011	0.012	0.012	0.008	0.016	0.009	0.000	0.000	0.000	0.000	0.003	0.003	0.000	0.012	0.039																							
26-Nov	Z	0.004	0.012	0.019	0.027	0.028	0.036	0.023	0.024	0.034	0.025	0.021	0.025	0.024	0.038	0.025	0.030	0.034	0.031	0.027	0.017	0.020	0.031	0.043	0.026	0.043																							
27-Nov	0.043	Z	0.027	0.040	0.066	0.065	0.040	0.037	0.035	0.037	0.042	0.043	0.043	0.042	0.060	0.049	0.035	0.032	0.032	0.021	0.023	0.023	0.023	0.023	0.038	0.066																							
28-Nov	0.021	0.020	Z	0.022	0.021	0.026	0.021	0.022	0.023	0.024	0.024	0.022	0.024	0.022	0.022	0.024	0.023	0.024	0.024	0.023	0.026	0.022	0.022	0.024	0.023	0.026	0.026																						
29-Nov	0.026	0.028	0.023	Z	0.025	0.024	0.023	0.024	0.028	0.026	0.023	0.024	0.023	0.024	0.021	0.018	0.022	0.020	0.021	0.021	0.022	0.024	0.018	0.021	0.023	0.028	0.028																						
30-Nov	0.020	0.024	0.022	0.018	Z	0.020	0.022	0.030	0.017	0.000	0.001	0.001	0.017	0.007	0.000	0.021	0.000	0.000	0.002	0.000	0.000	0.019	0.028	0.027	0.013	0.030																							
																								0.030	0.027	0.029	0.029	0.028	0.028	0.026	0.027	0.027	0.029	0.028	0.027	0.028	0.027	0.028	0.027	0.043	0.031	0.027	0.028	0.030	0.028	0.028	0.031	Diurnal Average	
																								0.061	0.060	0.063	0.064	0.066	0.065	0.066	0.074	0.098	0.079	0.079	0.064	0.076	0.076	0.078	0.068	0.455	0.139	0.086	0.076	0.058	0.059	0.061	0.063	Diurnal Maximum	
Z - zerospan																								C - Calibration																									





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

**Non Methane Hydrocarbons (NMHC) - ppm**  
**Patricia McInnes - November 2023**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 0.005	76	11.08	11.08
0.006 - 0.05	561	81.78	92.86
0.06 - 0.1	48	7.00	99.85
> 0.1	1	0.15	100.00

Total Number of Valid Hours: 686

Total Number of Hours: 720





**Wood Buffalo Environmental Association  
Frequency Distribution**

**Non Methane Hydrocarbons (NMHC) - ppm  
Patricia McInnes - November 2023**

<b>Concentration Ranges (ppm)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 0.005	20	8	3	3	2	1	4	3	0	4	2	1	5	3	4	13	76
0.006 - 0.05	15	8	18	15	30	44	80	26	45	32	54	56	41	56	26	15	561
0.06 - 0.1	0	0	0	1	0	3	12	8	12	7	4	0	0	0	1	0	48
> 0.1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1
<b>Totals</b>	35	16	21	19	32	48	96	38	57	43	60	57	46	59	31	28	686

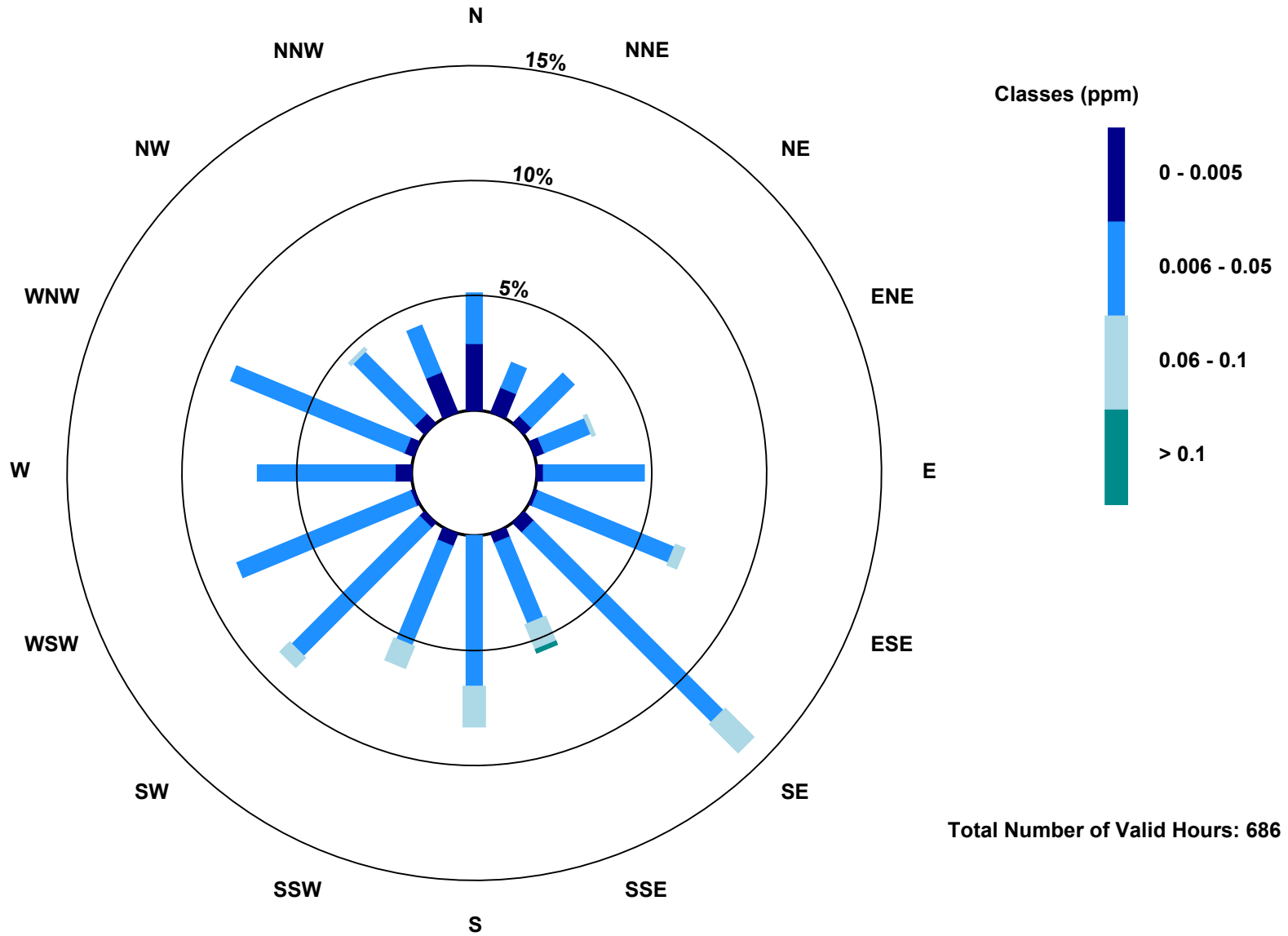
Total Number of Valid Hours: 686

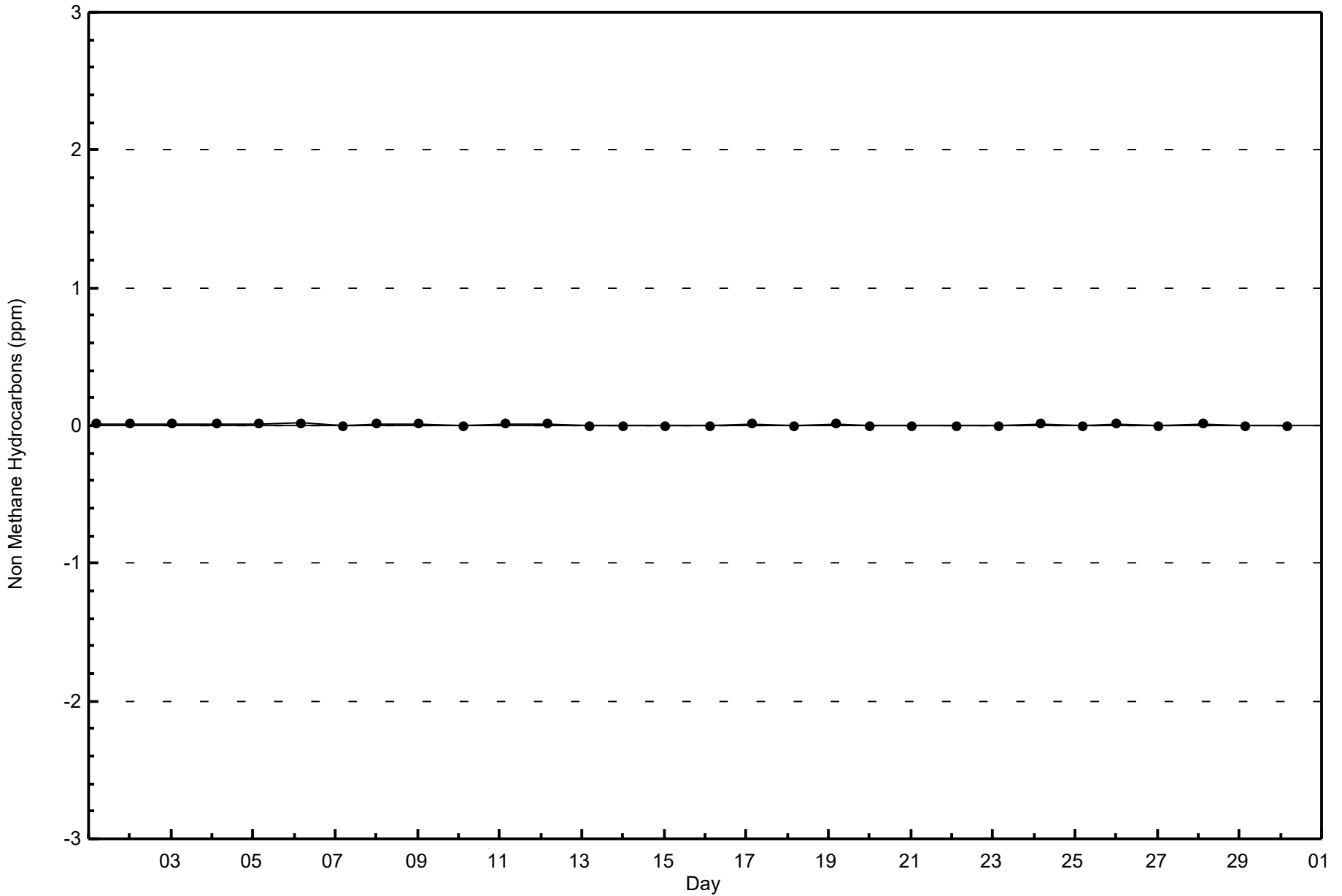
Total Number of Hours: 720

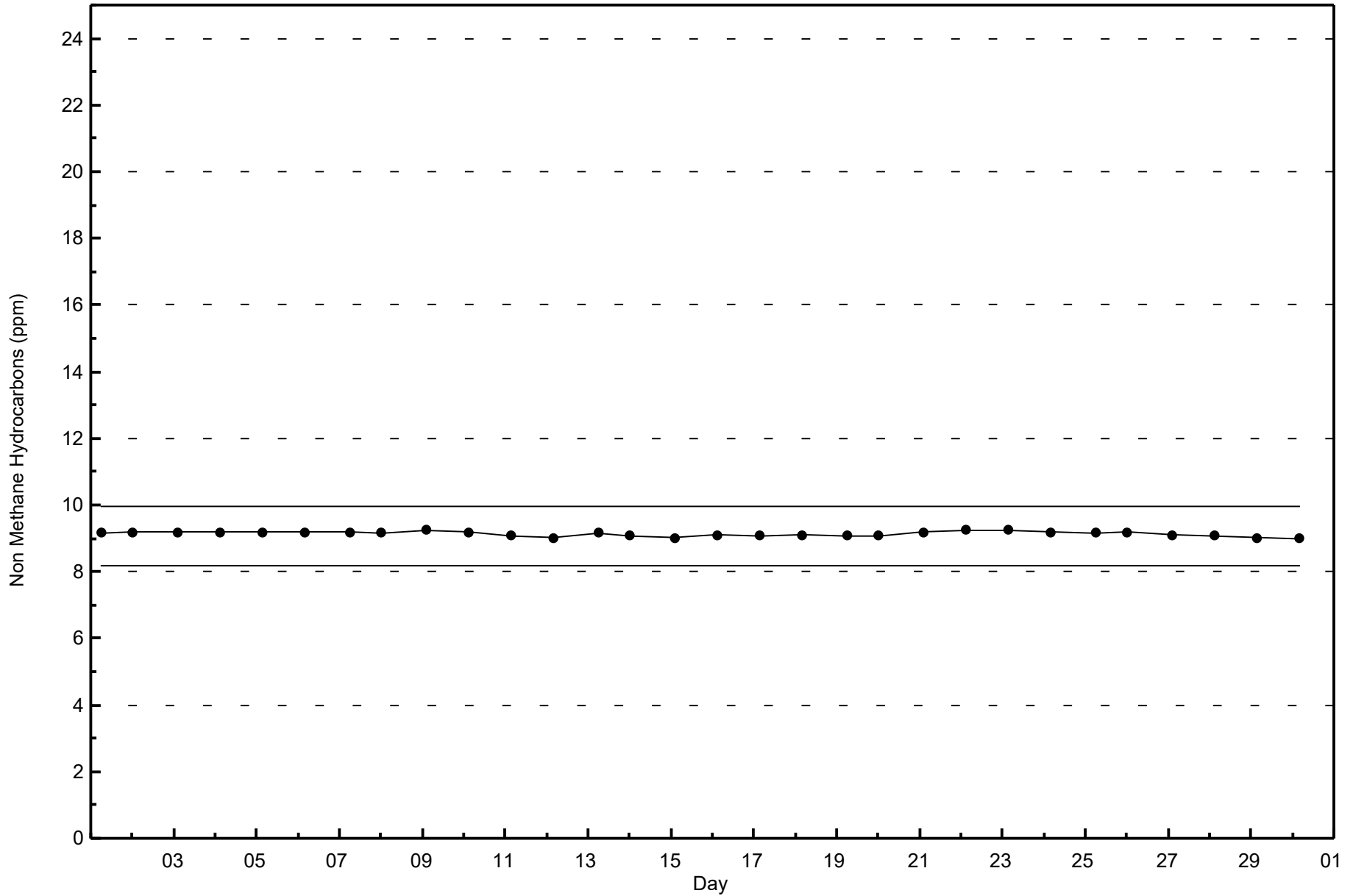


Wood Buffalo Environmental Association  
Wind Rose Nov 2023

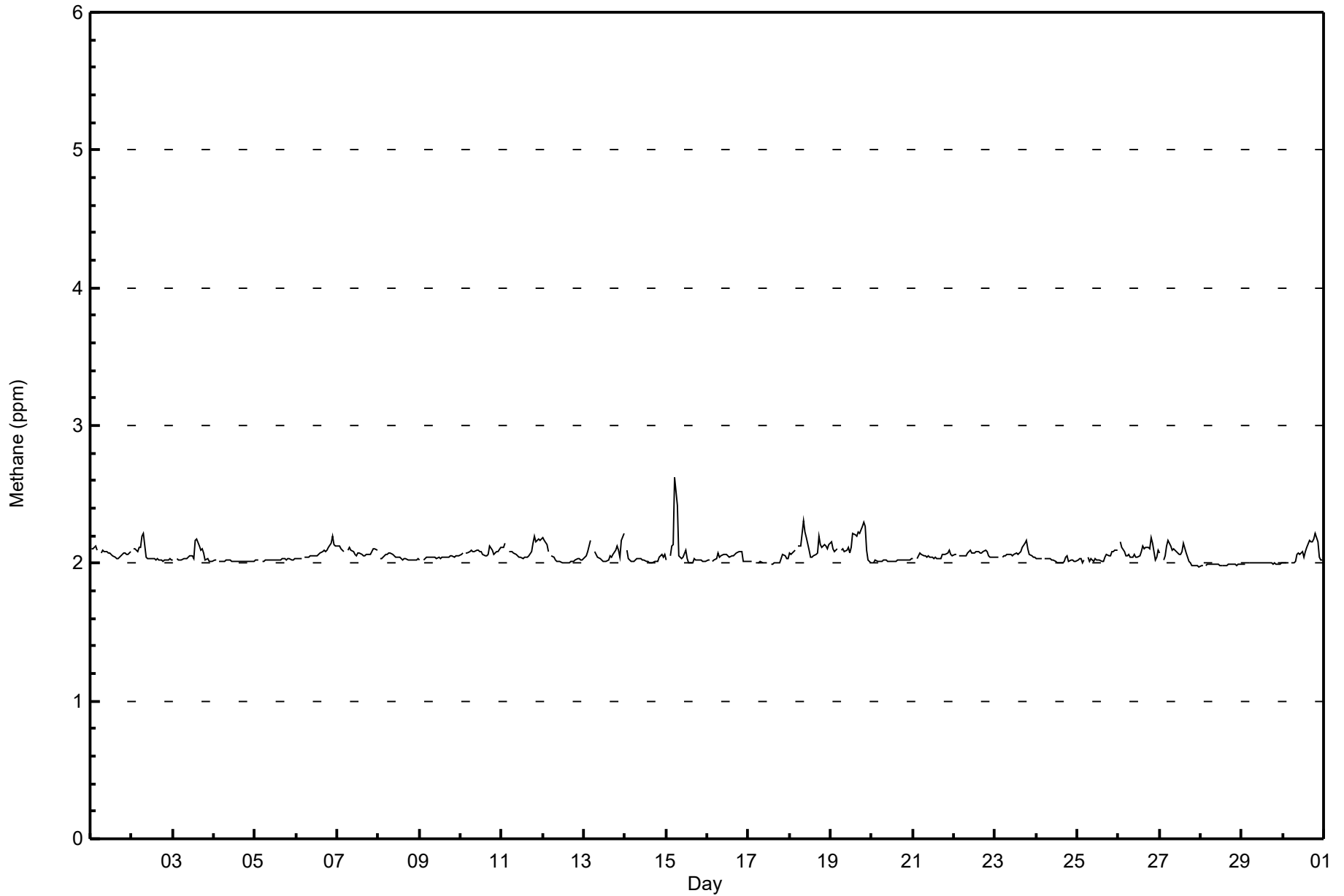
Non Methane Hydrocarbons (NMHC) - ppm  
Patricia McInnes













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

**Methane (CH<sub>4</sub>) - ppm**  
**Patricia McInnes - November 2023**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2.0	383	55.83	55.83
2.1 - 3.0	303	44.17	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 686

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Methane (CH<sub>4</sub>) - ppm  
Patricia McInnes - November 2023**

<b>Concentration Ranges (ppm)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	10	7	15	13	27	26	36	4	14	8	40	52	38	54	23	16	383
2.1 - 3.0	25	9	6	6	5	22	60	34	43	35	20	5	8	5	8	12	303
3.1 - 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	35	16	21	19	32	48	96	38	57	43	60	57	46	59	31	28	686

Total Number of Valid Hours: 686

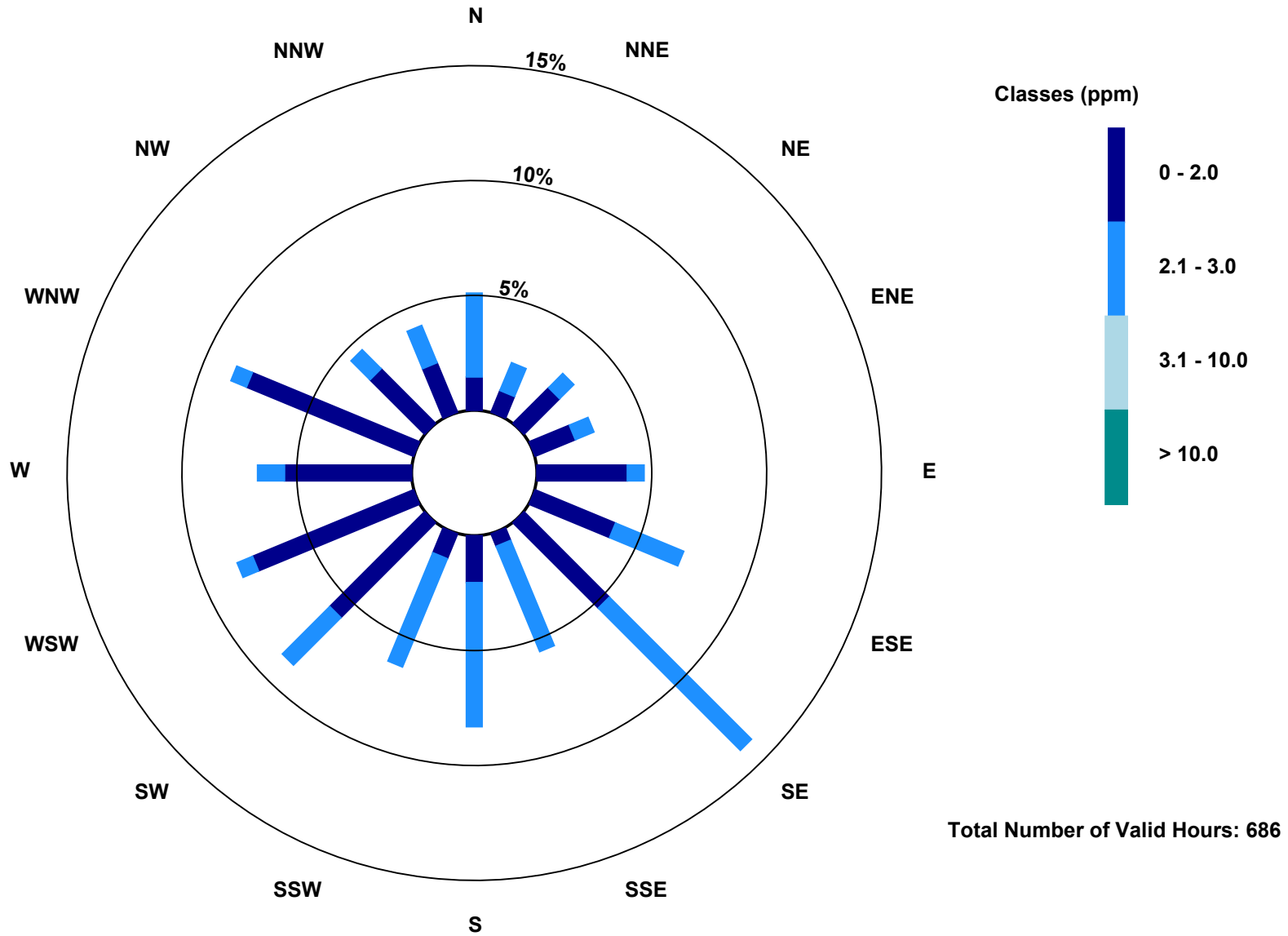
Total Number of Hours: 720

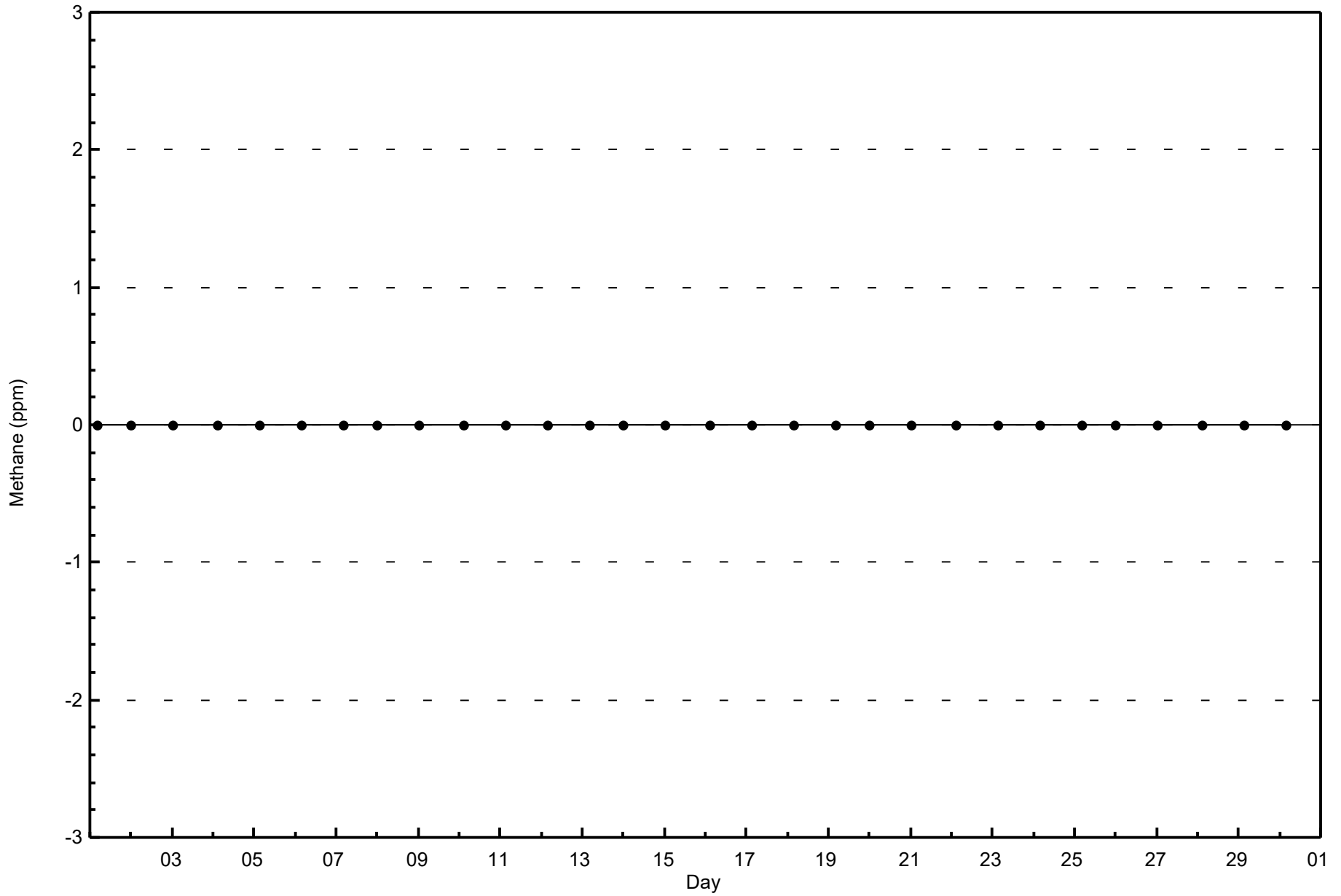


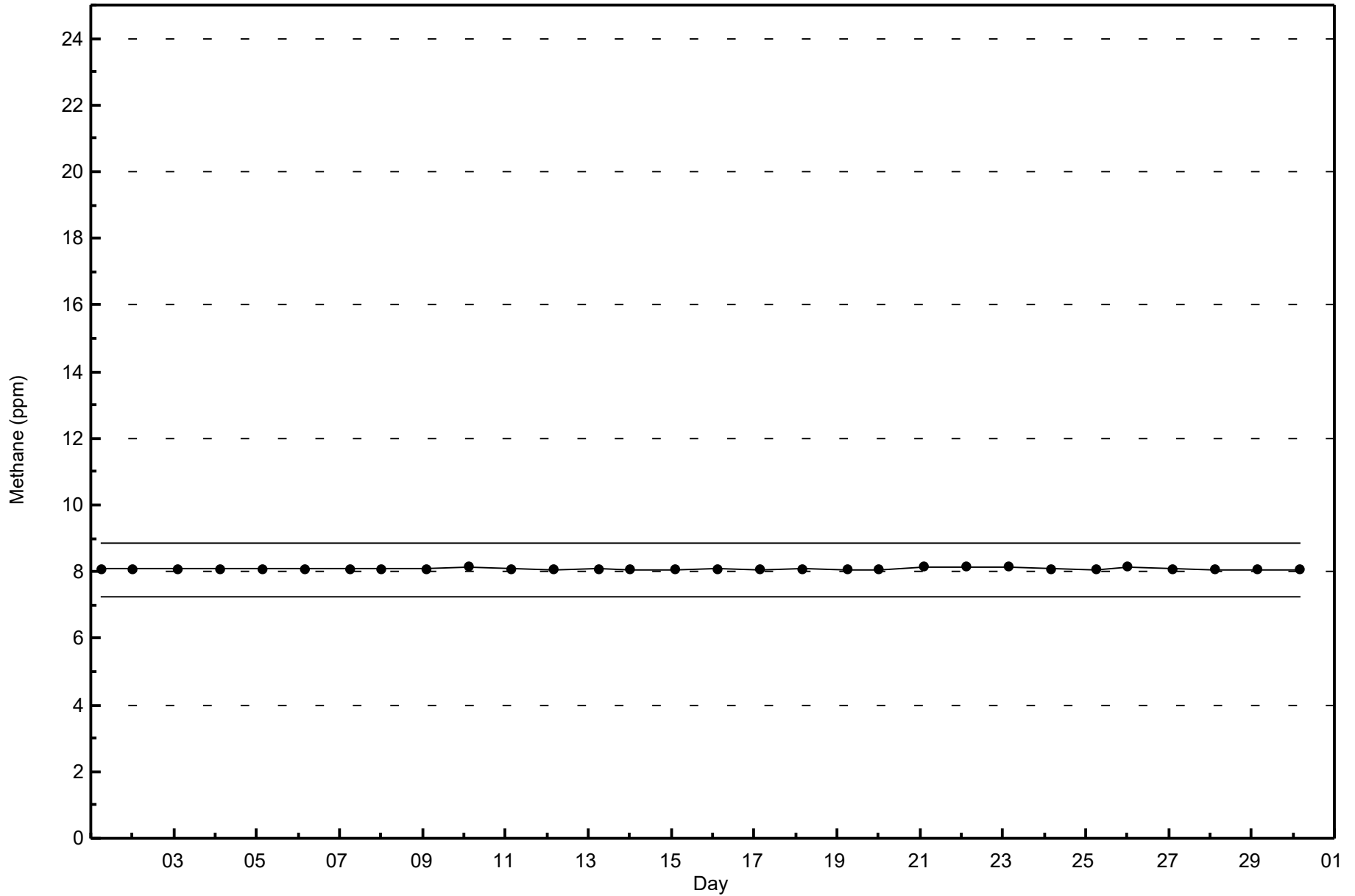


Wood Buffalo Environmental Association  
Wind Rose Nov 2023

Methane (CH<sub>4</sub>) - ppm  
Patricia McInnes

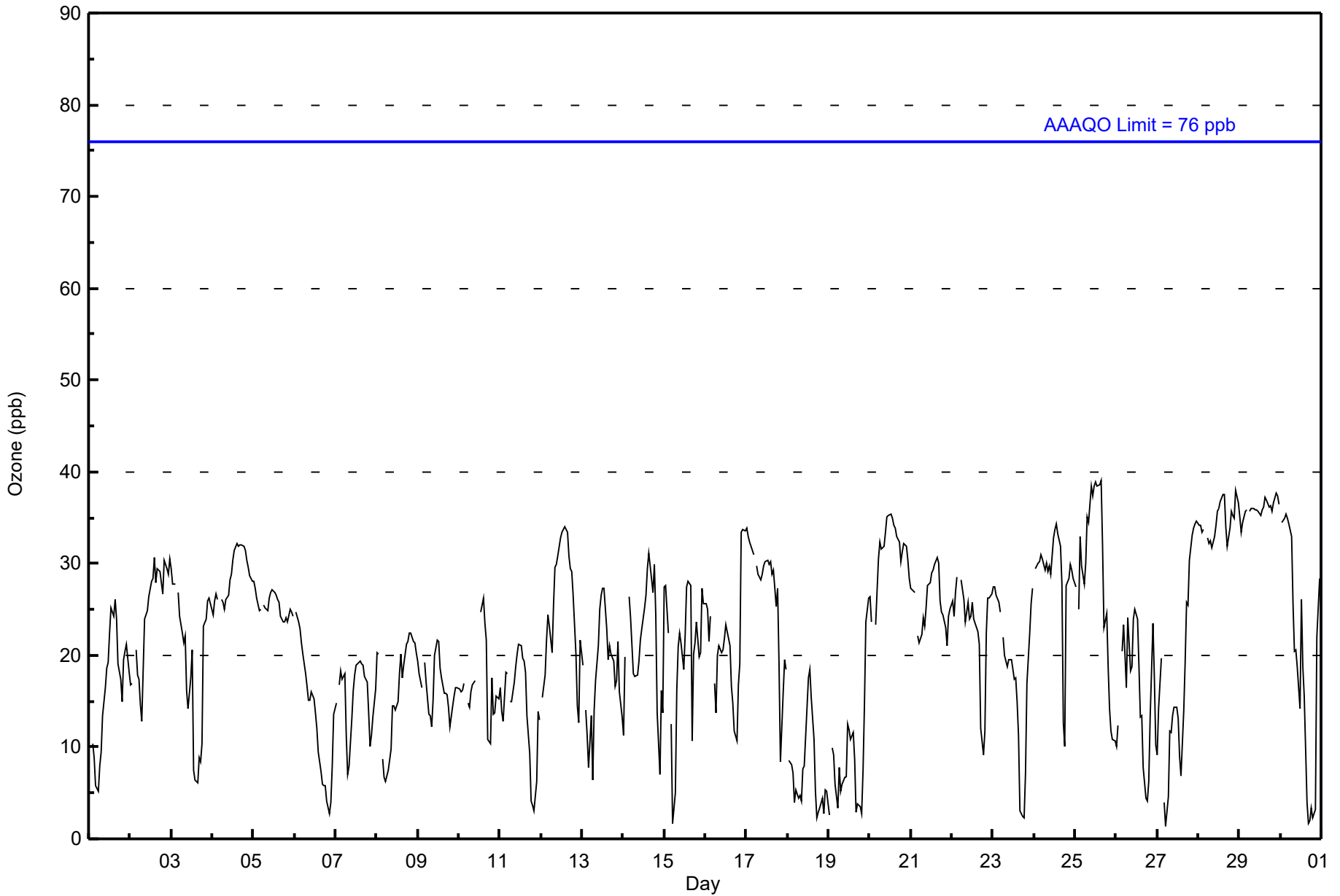








Number of Exceedences (AAAQO):		1-hr: 0	24-hr: 0																		Hours in Service:	720					
Maximum Value: 39.1 ppb on Nov 25 16:00		Maximum Daily Average: 36.0 ppb on Nov 29																	Hours of Data:	687							
Minimum Value: 1.3 ppb on Nov 27 06:00		Minimum Daily Average: 7.4 ppb on Nov 18																	Hours of Missing Data:	33							
Maximum Diurnal Average: 25.0 ppb at hour 13		Minimum Diurnal Average: 17.8 ppb at hour 19																	Hours of Calibration:	33							
Monthly Average: 21.24 ppb		Percentiles: P <sub>1</sub> = 2.5 P <sub>10</sub> = 7.7 Q <sub>1</sub> = 14.6 Median = 21.6 Q <sub>3</sub> = 28.1 P <sub>90</sub> = 33.5 P <sub>99</sub> = 37.7																	Percent Operational Time:	100.0							
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Nov	11.4	Z	10.4	8.8	5.8	5.1	7.9	9.4	13.4	16.5	18.6	19.1	22.4	25.1	24.3	26.1	23.9	19.1	17.3	15.0	19.6	20.4	21.1	18.1	16.5	26.1	
2-Nov	16.8	16.9	Z	20.6	17.9	17.4	14.7	12.8	24.0	24.3	24.9	26.4	28.1	28.4	30.7	27.9	29.4	29.1	27.9	26.8	30.3	29.5	28.8	30.5	24.5	30.7	
3-Nov	29.4	27.8	27.8	Z	26.8	24.3	22.4	21.4	22.2	16.2	14.2	17.6	20.6	7.4	6.3	6.2	8.8	8.3	10.4	23.2	24.0	26.0	26.3	25.6	19.3	29.4	
4-Nov	24.4	25.9	26.6	26.1	Z	26.2	25.8	25.0	26.1	26.5	28.2	28.9	30.3	31.5	32.3	31.9	32.0	32.0	31.8	31.4	30.4	29.5	28.7	28.1	28.7	32.3	
5-Nov	28.1	27.3	26.3	24.8	25.0	Z	25.5	25.2	24.8	26.2	26.8	27.1	26.8	26.5	26.1	25.8	24.3	23.6	23.7	24.1	23.7	25.1	24.7	24.2	25.5	28.1	
6-Nov	Z	24.6	23.6	22.9	21.3	20.1	18.0	16.7	15.1	15.0	16.0	15.3	13.8	12.0	9.4	7.4	6.0	5.8	5.7	4.1	2.7	4.0	7.9	13.6	13.1	24.6	
7-Nov	14.8	Z	16.7	18.3	17.4	18.0	11.3	7.0	8.0	13.1	16.2	17.9	18.9	19.1	19.4	19.0	18.9	17.7	17.0	13.7	10.1	11.3	13.3	16.4	15.4	19.4	
8-Nov	20.3	20.2	Z	8.8	6.7	6.2	6.8	7.5	9.8	14.5	14.4	14.0	14.9	18.1	20.1	17.6	19.0	21.2	21.5	22.3	22.4	21.5	21.4	20.4	16.1	22.4	
9-Nov	19.4	18.0	16.5	Z	19.2	17.1	13.6	13.4	12.2	15.2	19.9	21.7	21.6	18.6	17.6	15.9	15.8	15.8	14.3	12.2	14.5	15.5	16.5	16.5	16.6	21.7	
10-Nov	16.3	16.0	16.2	16.9	Z	14.8	14.4	16.0	16.7	17.2	C	C	C	24.7	26.3	23.4	21.6	10.8	10.3	17.6	13.6	13.8	15.5	15.2	16.9	26.3	
11-Nov	16.4	13.9	12.8	18.1	18.1	Z	15.0	14.9	17.1	18.8	20.2	21.2	21.1	19.6	19.3	18.2	13.5	9.3	4.2	3.6	3.1	6.3	13.9	13.0	14.4	21.2	
12-Nov	Z	15.3	17.9	21.6	24.4	23.1	20.3	25.5	29.6	29.9	30.9	32.7	33.4	33.7	34.0	33.5	30.8	29.5	29.1	26.5	20.1	14.4	12.7	21.7	25.7	34.0	
13-Nov	18.9	Z	14.0	11.3	7.7	13.4	6.4	14.1	17.3	21.0	25.0	26.5	27.3	27.4	22.8	19.6	21.0	20.1	19.4	16.6	17.2	21.6	16.0	13.3	18.2	27.4	
14-Nov	11.2	19.8	Z	26.3	24.1	21.0	18.1	17.7	17.8	19.3	21.7	22.8	25.2	26.6	29.4	31.1	29.7	26.8	29.8	24.5	13.7	7.1	16.2	13.8	21.5	31.1	
15-Nov	27.4	27.6	22.4	Z	12.6	1.6	5.1	16.2	20.8	22.4	21.4	18.5	22.3	27.5	28.1	27.7	10.7	20.2	21.4	23.6	19.8	20.3	27.3	25.6	20.5	28.1	
16-Nov	25.7	25.0	21.6	24.2	Z	16.9	13.7	20.0	21.0	20.3	20.6	21.8	23.3	22.5	21.0	16.6	14.7	11.7	10.7	16.8	19.1	33.5	33.7	33.6	21.2	33.7	
17-Nov	33.8	33.0	32.4	31.4	31.0	Z	29.8	28.8	28.2	28.8	29.7	30.3	30.4	29.8	30.2	28.8	29.3	25.3	27.3	19.1	8.4	16.0	19.5	18.5	26.9	33.8	
18-Nov	Z	8.6	8.0	7.2	3.9	5.4	4.4	4.7	4.1	7.7	7.9	14.3	17.6	18.4	15.4	10.8	5.3	2.3	3.0	3.4	4.4	2.8	5.4	5.2	7.4	18.4	
19-Nov	2.7	Z	9.9	9.1	5.9	3.4	7.8	5.1	5.9	6.7	6.7	12.6	12.0	10.8	11.6	8.7	2.9	3.7	3.5	2.8	7.4	14.6	23.6	26.2	8.8	26.2	
20-Nov	26.4	23.7	Z	23.3	27.0	30.5	32.4	31.6	31.8	33.4	35.1	35.2	35.3	34.9	34.1	33.9	33.0	32.3	30.2	31.3	32.2	31.9	30.4	28.4	31.2	35.3	
21-Nov	27.3	27.2	26.8	Z	22.1	21.3	22.2	24.1	23.2	25.1	27.7	27.9	29.0	29.3	29.9	30.7	30.0	25.9	24.8	24.5	23.0	21.0	24.2	25.0	25.8	30.7	
22-Nov	26.0	24.3	26.9	28.5	Z	28.2	27.1	26.0	23.6	25.7	24.0	24.2	25.7	24.0	23.1	22.5	21.1	12.0	9.2	11.8	22.4	26.2	26.2	26.7	23.3	28.5	
23-Nov	27.4	27.5	26.6	25.8	24.7	Z	21.9	20.0	18.7	19.5	19.6	19.5	17.4	17.5	15.0	11.3	3.0	2.5	2.3	7.2	16.9	22.4	25.6	27.3	18.2	27.5	
24-Nov	Z	29.5	30.0	30.3	31.0	30.5	29.3	30.1	29.2	29.8	28.8	32.8	33.8	34.4	33.3	31.8	27.8	12.6	10.1	27.6	28.3	29.8	29.3	28.3	28.6	34.4	
25-Nov	27.4	Z	25.0	33.0	29.8	27.7	30.0	35.1	34.5	38.4	37.4	38.4	38.8	38.5	38.6	39.1	32.1	23.1	24.6	18.7	14.2	11.7	10.8	10.7	28.6	39.1	
26-Nov	10.1	12.3	Z	20.4	23.3	20.1	16.5	24.0	18.3	18.7	23.9	25.0	24.0	18.8	13.2	13.5	7.8	4.5	4.1	6.3	13.2	23.5	17.6	10.2	16.1	25.0	
27-Nov	9.2	14.2	19.6	Z	4.0	1.3	4.6	11.7	11.6	13.5	14.4	14.3	13.2	9.0	6.8	14.1	19.4	25.8	25.5	30.4	33.1	33.8	34.3	34.6	17.3	34.6	
28-Nov	34.1	34.2	33.4	33.7	Z	32.9	32.2	32.4	31.7	33.0	34.2	35.7	36.0	36.8	37.5	37.5	34.0	31.8	33.9	35.7	35.3	34.9	38.0	36.6	34.6	38.0	
29-Nov	35.0	33.4	34.5	35.7	35.9	Z	35.7	36.0	35.9	35.8	35.9	35.7	35.2	35.8	36.2	37.2	36.9	36.2	36.3	35.7	36.7	37.7	37.4	36.4	36.0	37.7	
30-Nov	Z	34.5	35.0	35.4	34.9	34.3	33.0	25.6	20.5	20.6	18.7	14.2	26.0	18.8	15.5	4.0	1.6	2.0	3.3	2.3	3.2	22.0	25.2	28.4	20.0	35.4	
		21.6	23.2	22.4	22.5	20.0	18.4	18.9	19.9	20.4	21.8	22.9	23.9	25.0	24.2	23.6	22.4	20.1	18.0	17.8	18.6	18.8	20.9	22.4	22.4	Diurnal Average	
		35.0	34.5	35.0	35.7	35.9	34.3	35.7	36.0	35.9	38.4	37.4	38.4	38.8	38.5	38.6	39.1	36.9	36.2	36.3	35.7	36.7	37.7	38.0	36.6	Diurnal Maximum	
Z - zerospan		C - Calibration																									
Alberta Ambient Air Quality Objectives (AAAQO):		1-hr 76 ppb																									





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

**Ozone (O<sub>3</sub>) - ppb**  
**Patricia McInnes - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	316	46.00	46.00
21 - 50	371	54.00	100.00
51 - 82	0	0.00	100.00
> 83	0	0.00	100.00

Total Number of Valid Hours: 687

Total Number of Hours: 720



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

**Ozone (O<sub>3</sub>) - ppb**  
**Patricia McInnes - November 2023**

<b>Concentration</b> <b>Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 20	14	6	5	4	2	20	69	38	46	34	32	5	10	11	13	7	316
21 - 50	22	10	16	15	28	29	24	1	11	4	32	57	39	44	18	21	371
51 - 82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 83	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	<b>36</b>	<b>16</b>	<b>21</b>	<b>19</b>	<b>30</b>	<b>49</b>	<b>93</b>	<b>39</b>	<b>57</b>	<b>38</b>	<b>64</b>	<b>62</b>	<b>49</b>	<b>55</b>	<b>31</b>	<b>28</b>	<b>687</b>

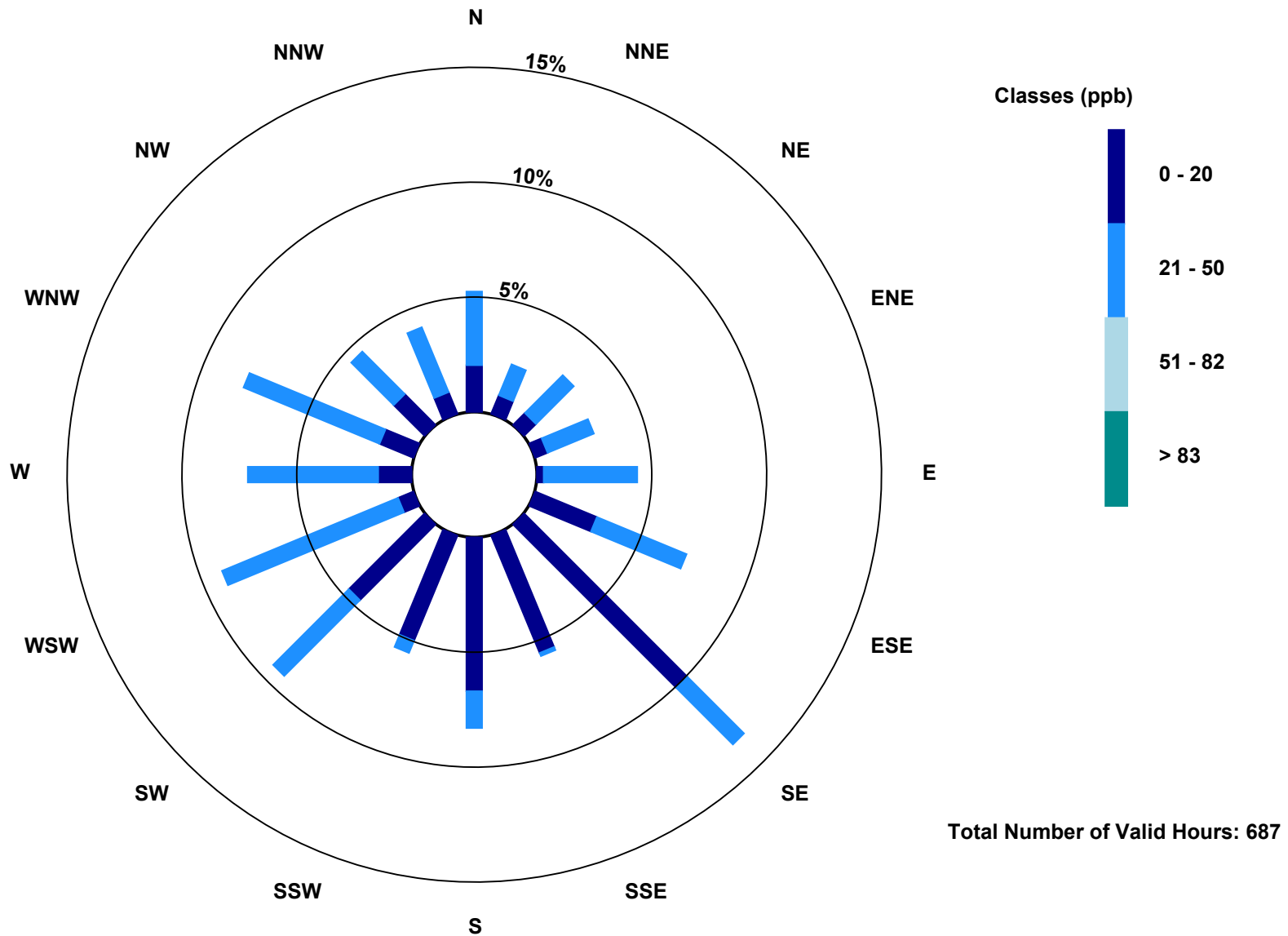
Total Number of Valid Hours: 687

Total Number of Hours: 720

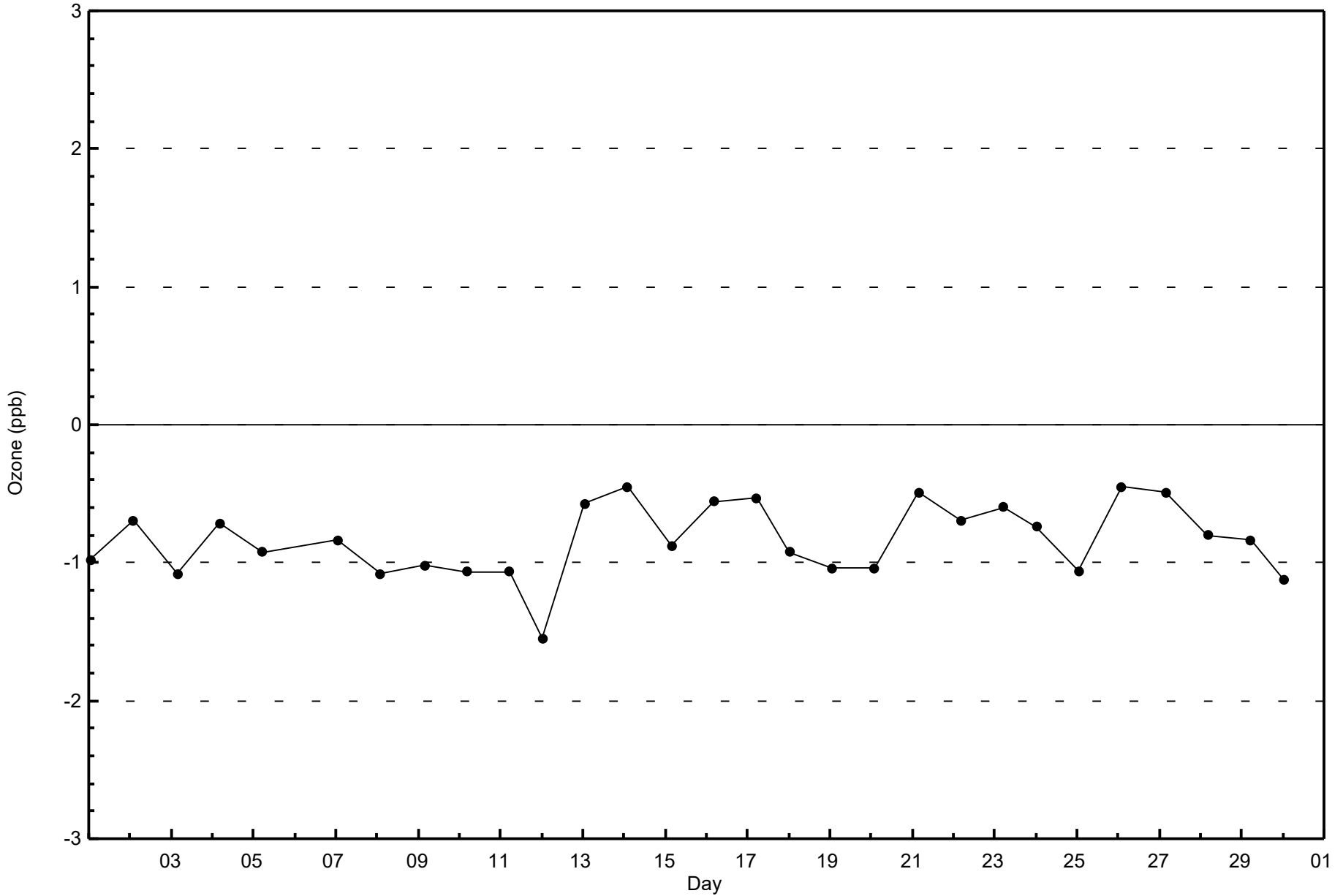


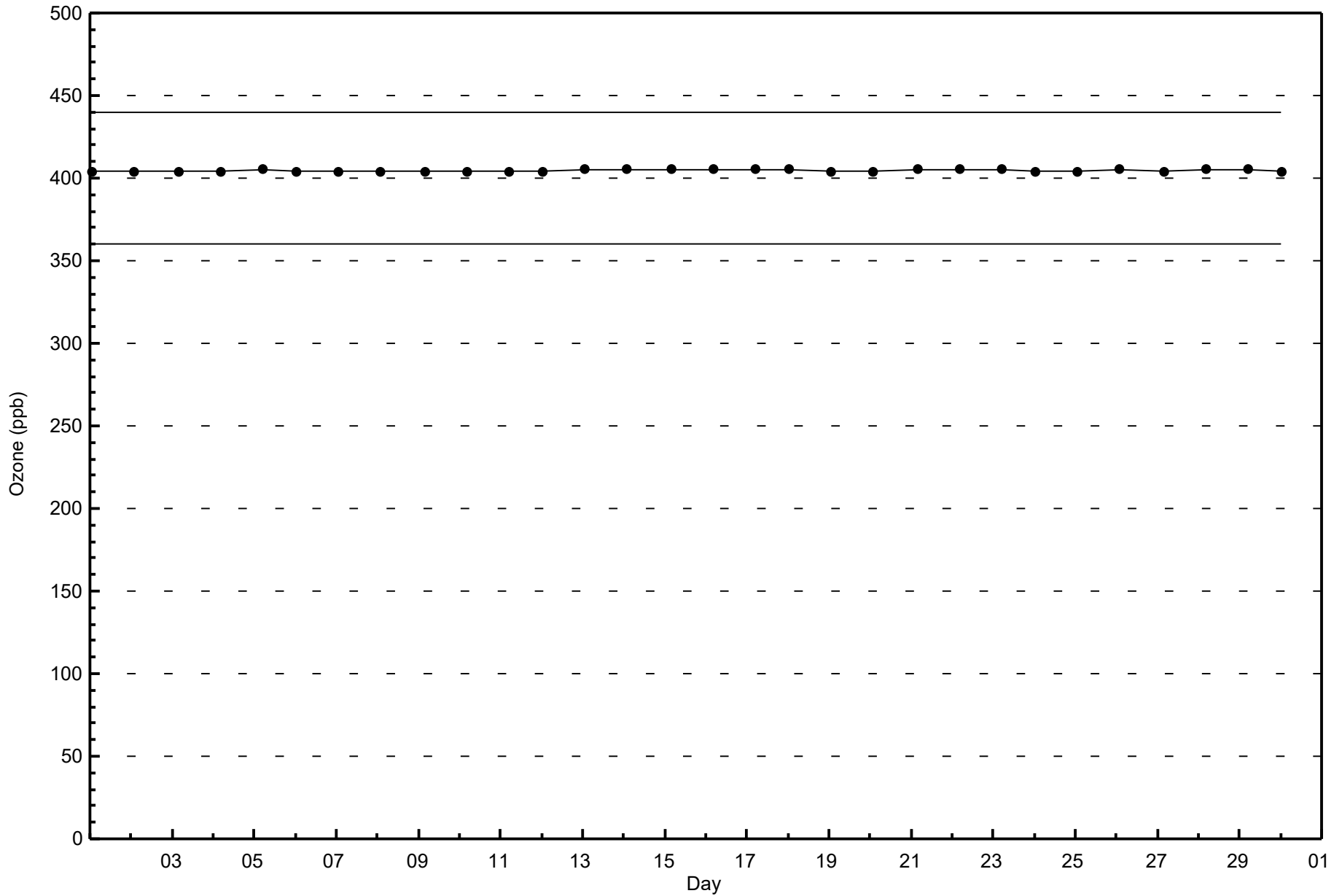
Wood Buffalo Environmental Association  
Wind Rose Nov 2023

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











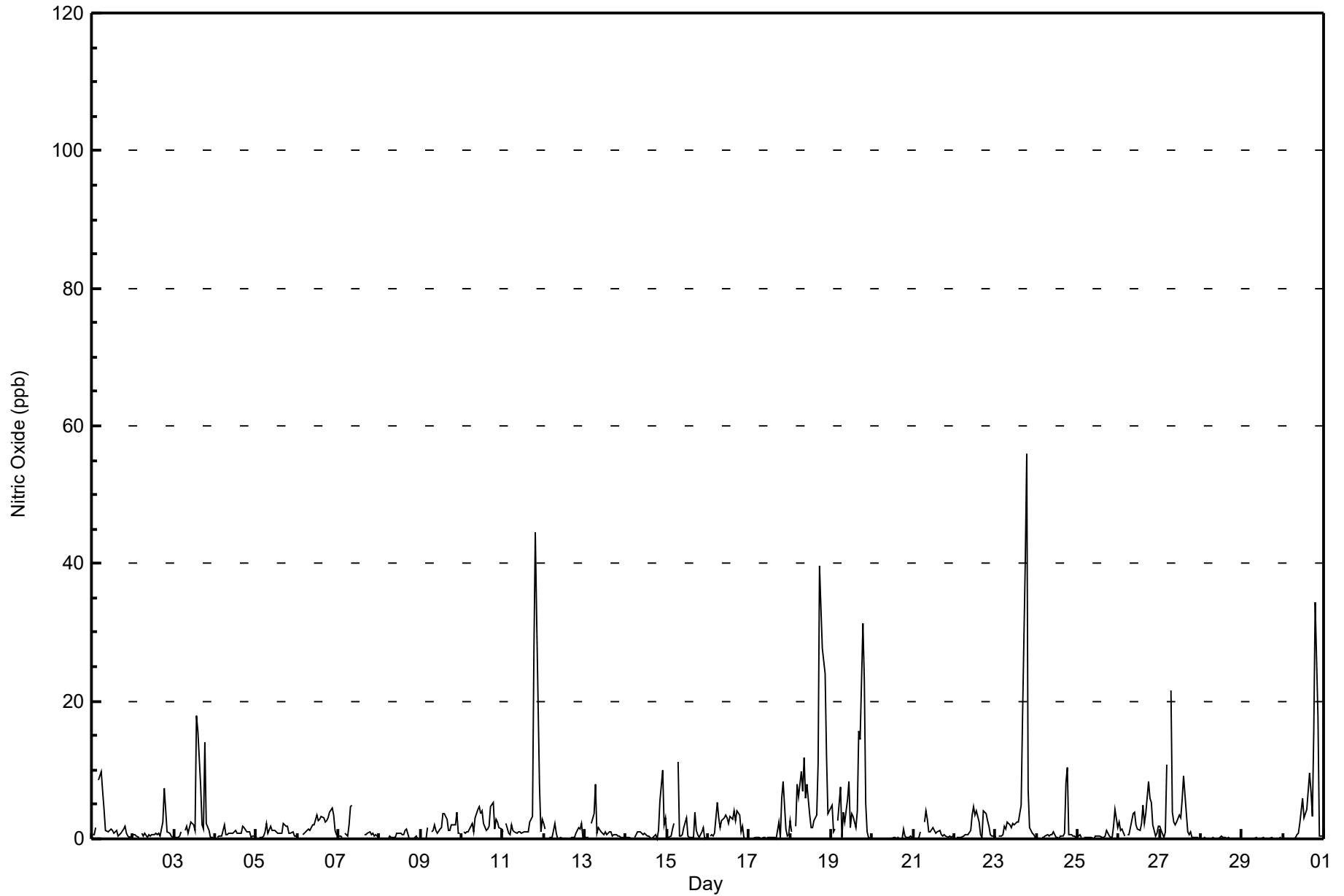
Wood Buffalo Environmental Association

Summary of Hour Averages

Nitric Oxide (NO) - ppb

Patricia McInnes - November 2023

Maximum Value: 55.8 ppb on Nov 23 19:00																				Maximum Daily Average: 10.0 ppb on Nov 18					Hours in Service: 720	
Minimum Value: 0.0 ppb on Nov 8 02:00																				Minimum Daily Average: 0.0 ppb on Nov 29					Hours of Data: 684	
Maximum Diurnal Average: 7.6 ppb at hour 19																				Minimum Diurnal Average: 0.4 ppb at hour 4					Hours of Missing Data: 36	
Monthly Average: 2.26 ppb																				Percentiles: P <sub>1</sub> = 0.0 P <sub>10</sub> = 0.1 Q <sub>1</sub> = 0.2 Median = 0.8 Q <sub>3</sub> = 2.1 P <sub>90</sub> = 4.5 P <sub>99</sub> = 31.4					Hours of Calibration: 36	
																									Percent Operational Time: 100.0	
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	0.6	0.6	1.7	Z	8.6	9.8	7.0	4.3	1.1	1.1	1.2	1.3	1.2	0.8	1.2	0.4	0.6	0.8	1.3	1.8	0.8	0.5	0.3	0.4	2.1	9.8
2-Nov	0.7	0.6	0.5	0.3	Z	0.8	0.4	0.8	0.3	0.6	0.4	0.6	0.6	0.7	0.6	0.7	0.5	2.5	7.3	4.2	1.0	0.9	0.4	0.2	1.1	7.3
3-Nov	0.2	0.3	0.3	0.5	1.1	Z	1.2	1.8	0.8	1.7	2.5	2.1	1.3	17.9	15.7	7.8	2.0	1.4	14.0	2.2	1.3	0.2	0.2	0.3	3.3	17.9
4-Nov	Z	0.1	0.3	0.4	0.5	2.0	0.6	0.7	0.8	0.7	0.7	1.1	1.1	0.8	0.7	0.7	1.7	1.7	1.0	1.1	1.0	0.2	0.3	0.4	0.8	2.0
5-Nov	0.2	Z	0.2	0.1	0.5	1.1	2.2	0.9	1.9	1.3	1.2	1.1	0.8	0.9	0.9	0.9	2.3	1.9	1.8	0.9	0.8	1.0	0.4	0.3	1.0	2.3
6-Nov	0.1	0.2	Z	0.5	0.9	0.9	1.4	1.2	1.6	2.0	2.0	3.4	2.7	2.9	3.3	3.1	2.4	2.6	3.0	3.8	4.5	3.5	1.1	0.6	2.1	4.5
7-Nov	0.4	0.4	0.3	Z	0.8	0.3	2.1	4.6	4.8	C	C	C	C	C	C	0.7	0.6	0.8	0.9	0.6	0.8	0.4	0.7	0.3	--	4.8
8-Nov	0.0	0.0	0.0	0.0	Z	0.1	0.4	0.1	0.3	0.2	0.7	0.8	0.7	0.6	0.6	1.3	1.3	0.0	0.0	0.1	0.0	0.5	0.0	0.0	0.3	1.3
9-Nov	0.0	0.0	0.0	0.1	1.6	Z	0.9	1.1	2.0	1.2	0.9	1.4	1.6	3.6	3.6	2.8	1.3	1.3	2.0	1.9	2.1	3.9	0.8	0.9	1.5	3.9
10-Nov	Z	1.0	0.9	0.9	1.0	1.8	2.2	1.1	3.0	4.2	4.6	3.7	4.1	2.2	1.2	1.5	1.8	4.7	5.2	1.5	2.8	2.5	1.6	1.5	2.4	5.2
11-Nov	0.9	Z	2.2	0.7	0.6	2.1	1.3	1.0	0.8	1.0	1.1	0.8	0.9	1.1	1.0	1.0	2.4	3.4	26.8	44.5	31.7	7.7	1.1	2.9	6.0	44.5
12-Nov	2.3	1.4	Z	0.3	0.1	0.3	2.1	0.8	0.1	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.2	0.3	0.2	0.8	1.5	1.4	2.2	0.2	0.6	2.3
13-Nov	0.2	0.2	0.2	Z	2.3	3.7	7.9	0.8	1.6	1.1	0.9	0.7	0.9	0.6	1.1	1.1	0.5	0.6	0.6	0.5	0.4	0.1	0.2	0.2	1.1	7.9
14-Nov	0.2	0.1	0.1	0.1	Z	0.2	0.7	1.0	0.9	0.8	0.6	0.7	0.5	0.4	0.2	0.1	0.2	0.5	0.1	1.2	5.6	9.9	2.1	3.1	1.3	9.9
15-Nov	0.2	0.2	0.4	1.3	2.2	Z	11.3	0.4	0.4	0.7	1.6	3.1	0.4	0.3	0.1	0.2	3.9	1.2	0.6	0.3	1.0	1.7	0.1	0.2	1.4	11.3
16-Nov	Z	0.3	0.7	0.5	0.8	5.4	3.1	1.6	2.6	3.0	3.4	3.0	2.3	3.3	2.8	4.1	2.6	4.1	3.5	1.1	1.9	0.1	0.1	0.1	2.2	5.4
17-Nov	0.1	Z	0.1	0.2	0.1	0.1	0.2	0.1	0.1	0.2	0.1	0.2	0.2	0.2	0.2	0.3	0.0	2.5	0.2	5.9	8.3	1.5	0.5	0.6	0.9	8.3
18-Nov	2.7	1.1	Z	1.9	8.0	6.0	9.8	6.8	11.7	5.9	7.9	3.4	1.6	1.6	2.6	3.5	11.0	39.6	33.5	27.7	24.0	12.1	3.6	4.1	10.0	39.6
19-Nov	4.8	1.0	1.3	Z	2.5	7.6	0.2	3.8	2.5	5.7	8.3	1.6	3.7	3.3	1.7	4.1	15.7	14.5	31.3	23.0	5.1	1.1	0.3	0.0	6.2	31.3
20-Nov	0.0	0.0	0.0	0.0	Z	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.2	0.1	0.1	0.1	0.1	0.1	1.3	0.4	0.1	0.1	0.4	0.3	0.2	1.3
21-Nov	0.1	0.1	0.0	0.3	1.1	Z	2.5	4.1	2.8	1.1	1.0	1.6	1.2	0.8	1.0	1.2	0.7	0.5	0.6	0.3	0.3	0.4	0.2	0.4	1.0	4.1
22-Nov	Z	0.2	0.2	0.1	0.2	0.4	0.5	0.5	0.7	1.2	3.5	4.7	3.5	4.1	2.4	0.7	0.2	4.1	3.7	2.6	1.9	0.6	0.5	0.4	1.6	4.7
23-Nov	0.3	Z	0.4	0.3	0.5	1.8	1.4	2.4	2.1	1.6	2.3	2.1	2.5	2.5	3.6	4.9	17.6	40.8	55.8	7.1	1.7	0.8	0.6	0.2	6.7	55.8
24-Nov	0.2	0.2	Z	0.1	0.2	0.3	0.5	0.5	0.6	0.7	0.9	0.2	0.2	0.1	0.3	0.3	0.8	8.0	10.4	0.7	0.6	0.4	0.3	0.3	1.2	10.4
25-Nov	0.4	0.6	0.3	Z	0.1	0.2	0.1	0.2	0.1	0.1	0.5	0.5	0.4	0.3	0.2	0.2	0.3	1.2	0.3	0.2	0.1	1.9	4.3	1.7	0.6	4.3
26-Nov	2.5	1.2	1.5	0.4	Z	0.5	0.6	1.5	3.7	3.8	2.0	1.4	1.1	2.2	4.8	2.2	3.7	8.4	6.0	5.3	2.1	0.4	0.9	1.8	2.5	8.4
27-Nov	1.8	1.2	0.2	1.1	10.7	Z	21.5	3.9	2.4	2.0	2.4	3.4	3.0	5.6	9.1	3.7	1.0	0.6	0.9	0.2	0.1	0.2	0.1	0.1	3.3	21.5
28-Nov	Z	0.1	0.1	0.1	0.1	0.0	0.1	0.1	0.0	0.0	0.1	0.3	0.4	0.2	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.4
29-Nov	0.0	Z	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.1	0.2	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.2
30-Nov	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.3	0.6	0.8	2.2	5.8	3.0	3.8	4.2	9.5	6.9	3.3	15.7	34.4	17.7	0.5	0.4	0.3	4.8	34.4
																								Diurnal Average		
																								Diurnal Maximum		
Z - zerospan C - Calibration																										





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

**Nitric Oxide (NO) - ppb**  
**Patricia McInnes - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	671	98.10	98.10
21 - 40	10	1.46	99.56
41 - 80	3	0.44	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 684

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitric Oxide (NO) - ppb  
Patricia McInnes - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	34	16	21	19	32	46	94	31	51	40	62	62	48	58	30	27	671
21 - 40	0	0	0	0	0	1	2	3	4	0	0	0	0	0	0	0	10
41 - 80	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	3
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	34	16	21	19	32	47	97	35	56	40	62	62	48	58	30	27	684

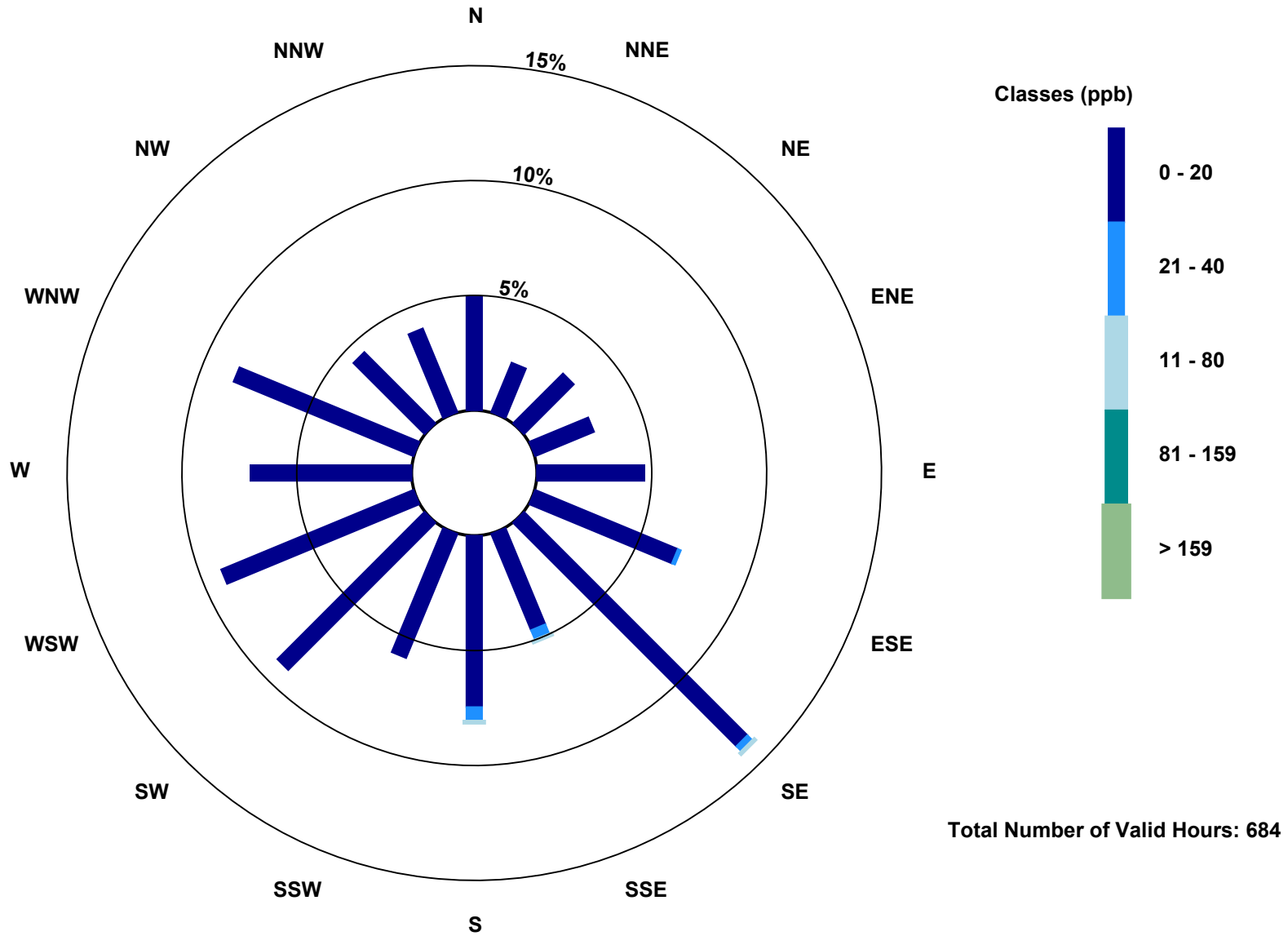
Total Number of Valid Hours: 684

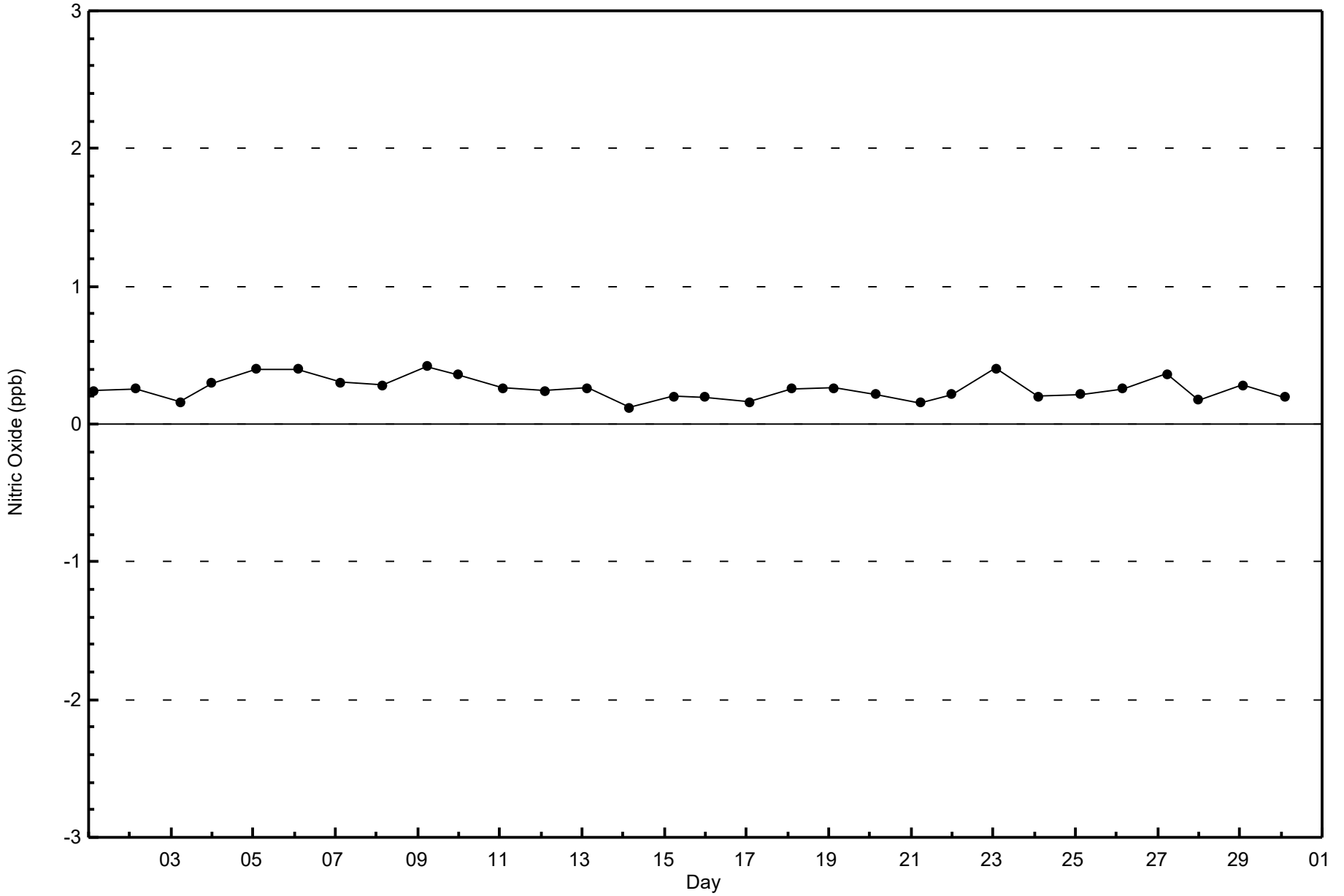
Total Number of Hours: 720



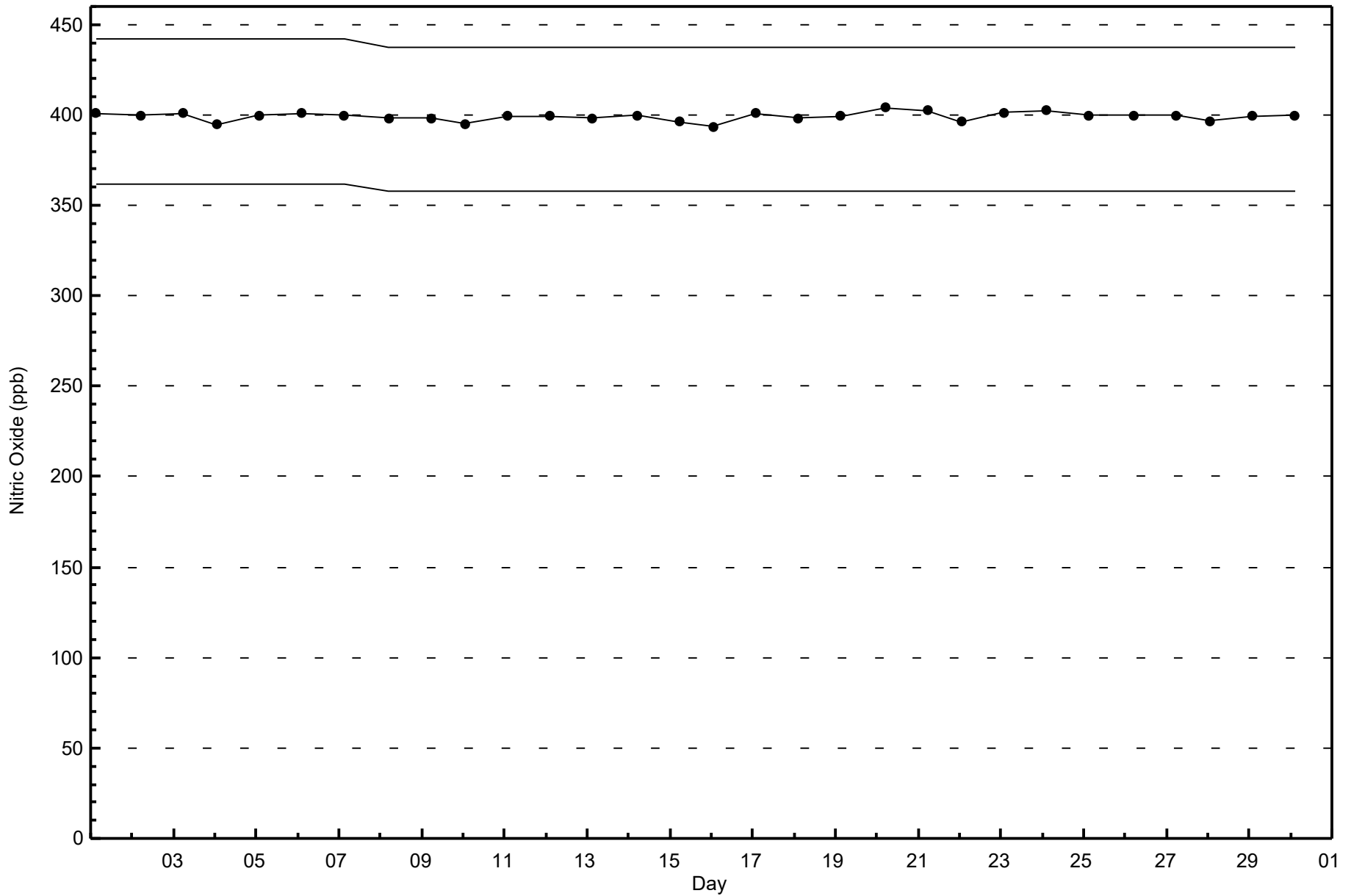
Wood Buffalo Environmental Association  
Wind Rose Nov 2023

Nitric Oxide (NO) - ppb  
Patricia McInnes











Wood Buffalo Environmental Association

Summary of Hour Averages

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

Patricia McInnes - November 2023

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 31.9 ppb on Nov 30 20:00	Maximum Daily Average: 12.5 ppb on Nov 30		Hours of Data:	684
Minimum Value: 0.0 ppb on Nov 8 18:00	Minimum Daily Average: 0.2 ppb on Nov 29		Hours of Missing Data:	36
Maximum Diurnal Average: 9.8 ppb at hour 19	Minimum Diurnal Average: 2.6 ppb at hour 13		Hours of Calibration:	36
Monthly Average: 5.23 ppb	Percentiles: P <sub>1</sub> = 0.0 P <sub>10</sub> = 0.2 Q <sub>1</sub> = 1.2 Median = 3.5 Q <sub>3</sub> = 7.0 P <sub>90</sub> = 12.8 P <sub>99</sub> = 23.4		Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Nov	5.7	5.8	6.9	Z	11.0	10.7	8.6	6.4	1.4	0.7	0.7	0.8	0.4	0.7	2.2	1.0	2.8	7.1	8.8	9.5	3.5	3.2	2.7	3.9	4.5	11.0	
2-Nov	4.0	3.8	2.7	2.0	Z	5.4	10.1	11.1	2.4	1.9	2.5	2.5	2.9	4.0	3.4	6.6	5.2	6.3	6.0	7.8	3.7	4.5	4.6	2.9	4.6	11.1	
3-Nov	2.8	3.2	3.3	3.9	3.9	Z	6.6	7.7	5.7	10.6	12.0	8.4	4.3	19.8	21.4	20.8	17.5	17.1	17.4	6.3	6.2	3.4	3.4	3.4	9.1	21.4	
4-Nov	Z	3.1	2.5	3.4	4.0	3.6	3.4	4.3	3.2	2.7	2.2	2.6	1.8	2.1	1.9	2.0	2.1	3.1	1.9	1.8	2.2	2.1	2.6	2.7	2.7	4.3	
5-Nov	1.8	Z	2.5	3.6	3.6	2.9	3.3	3.5	4.5	2.8	1.7	1.1	1.8	1.8	2.1	2.2	3.7	4.5	4.3	3.5	3.7	2.2	1.9	1.8	2.8	4.5	
6-Nov	1.3	1.0	Z	1.2	2.0	2.4	3.4	3.7	4.2	3.3	2.3	3.2	2.3	2.6	3.6	4.8	5.3	5.5	5.2	6.5	8.0	6.5	4.0	2.5	3.7	8.0	
7-Nov	2.2	2.4	2.0	Z	3.2	3.2	10.5	15.1	14.3	C	C	C	C	C	C	3.0	3.1	3.9	2.9	2.9	3.2	2.6	3.2	2.5	--	15.1	
8-Nov	0.9	0.4	0.5	1.0	Z	1.1	0.8	0.9	0.7	0.5	0.5	0.7	0.5	0.5	0.6	1.3	1.4	0.0	0.0	0.0	0.0	0.7	0.1	0.1	0.6	1.4	
9-Nov	0.2	0.5	0.7	1.8	5.9	Z	2.6	2.4	2.8	1.3	1.5	2.4	2.6	4.7	5.1	5.6	5.2	4.8	5.3	7.5	6.3	5.6	3.3	3.3	3.5	7.5	
10-Nov	Z	4.0	4.2	4.2	4.9	6.7	8.2	7.2	7.9	7.8	6.5	5.1	4.8	3.6	2.6	5.1	7.1	18.5	16.4	7.6	12.1	10.8	9.3	10.0	7.6	18.5	
11-Nov	6.2	Z	9.7	3.9	3.0	4.2	4.2	3.4	2.1	1.8	1.9	1.7	2.1	2.8	2.9	3.9	8.3	12.0	20.7	20.8	14.3	8.6	3.0	6.4	6.4	20.8	
12-Nov	7.9	4.8	Z	2.0	0.8	1.2	4.0	2.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9	0.9	0.6	3.8	9.0	7.0	4.5	0.9	2.2	9.0	
13-Nov	5.4	5.6	7.6	Z	16.7	10.7	16.9	9.9	8.2	5.7	3.9	3.2	2.7	2.2	7.0	7.9	5.7	6.6	7.0	9.1	7.9	4.9	12.1	14.0	7.9	16.9	
14-Nov	16.3	6.5	2.4	0.6	Z	1.4	1.7	2.5	1.9	1.3	0.8	0.9	0.6	0.8	0.5	0.5	1.7	3.9	0.4	6.8	19.1	19.6	7.3	11.6	4.7	19.6	
15-Nov	1.5	1.3	5.4	18.3	12.5	Z	1.4	15.9	6.7	2.9	2.4	4.0	5.4	1.2	0.4	0.3	0.9	15.9	7.0	3.7	2.1	4.4	4.0	0.5	1.3	5.1	18.3
16-Nov	Z	0.9	3.8	1.4	4.5	8.2	10.7	7.3	6.3	6.8	6.0	4.4	4.1	5.1	6.9	11.3	12.7	16.8	15.7	8.6	10.6	0.8	0.5	0.5	6.7	16.8	
17-Nov	0.3	Z	0.4	0.4	0.3	0.4	0.3	0.3	0.5	0.2	0.1	0.1	0.3	0.4	0.7	1.5	0.1	3.3	1.1	9.3	21.2	10.0	5.1	5.3	2.7	21.2	
18-Nov	10.7	6.3	Z	7.7	15.0	13.6	12.8	13.3	15.9	9.1	10.9	4.7	3.0	2.9	4.2	8.2	15.2	18.8	19.4	17.9	17.6	13.9	9.9	9.1	11.3	19.4	
19-Nov	12.4	8.0	6.5	Z	7.9	9.4	2.6	3.9	3.3	3.5	3.8	1.3	3.1	3.5	2.3	6.3	14.2	12.8	15.1	12.2	5.5	3.8	1.4	0.6	6.2	15.1	
20-Nov	0.2	0.2	0.2	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	0.1	0.3	2.6	1.2	0.3	0.3	1.2	1.5	0.4	2.6	
21-Nov	1.4	0.5	1.6	5.0	8.0	Z	7.4	7.0	7.1	5.7	4.1	4.0	3.3	3.2	3.6	3.8	4.1	6.3	6.3	6.1	6.8	8.3	6.0	5.7	5.0	8.3	
22-Nov	Z	5.6	4.0	3.1	3.2	3.9	5.5	6.3	7.5	6.0	9.5	9.7	8.1	9.9	10.9	10.9	11.6	21.1	23.0	19.6	8.0	3.8	3.0	2.2	8.5	23.0	
23-Nov	1.7	Z	2.5	2.3	2.6	4.3	5.0	6.0	6.7	5.2	5.4	5.3	5.6	5.1	7.5	11.4	23.1	22.8	25.0	12.8	6.0	3.8	2.3	1.5	7.6	25.0	
24-Nov	1.3	1.1	Z	1.1	0.9	1.2	1.9	1.2	2.5	1.6	2.3	0.2	0.2	0.1	1.0	1.7	5.7	20.3	23.0	3.8	2.6	1.5	1.6	1.6	3.4	23.0	
25-Nov	1.9	4.5	5.2	Z	2.3	4.6	3.4	3.1	3.0	0.9	2.1	1.2	1.1	1.0	0.8	0.1	5.3	12.9	6.9	4.2	2.7	3.7	3.6	5.6	3.5	12.9	
26-Nov	11.2	16.3	12.6	8.7	Z	10.8	13.5	6.1	12.7	12.0	5.3	4.2	4.2	7.2	12.8	11.1	16.8	22.0	21.0	15.3	6.5	1.8	6.8	12.9	10.9	22.0	
27-Nov	12.0	7.7	2.8	8.2	17.8	Z	18.7	9.2	9.6	6.6	6.0	6.1	6.4	11.5	15.4	11.8	7.2	3.1	3.9	1.6	0.5	0.4	0.2	0.2	7.3	18.7	
28-Nov	Z	0.4	0.6	0.2	0.2	0.2	0.1	0.3	0.2	0.2	0.1	0.1	0.2	0.2	0.1	0.2	1.9	0.9	0.3	0.1	0.4	0.4	0.3	0.2	0.3	1.9	
29-Nov	0.4	Z	0.4	0.3	0.4	0.2	0.2	0.1	0.5	0.1	0.0	0.1	0.3	0.0	0.0	0.0	0.1	0.5	0.0	0.1	0.0	0.0	0.0	0.1	0.2	0.5	
30-Nov	0.0	0.2	Z	0.2	0.1	0.0	0.0	7.5	11.7	9.9	12.6	18.3	7.7	13.0	15.5	28.2	29.5	27.7	29.1	31.9	29.2	7.5	5.5	2.9	12.5	31.9	

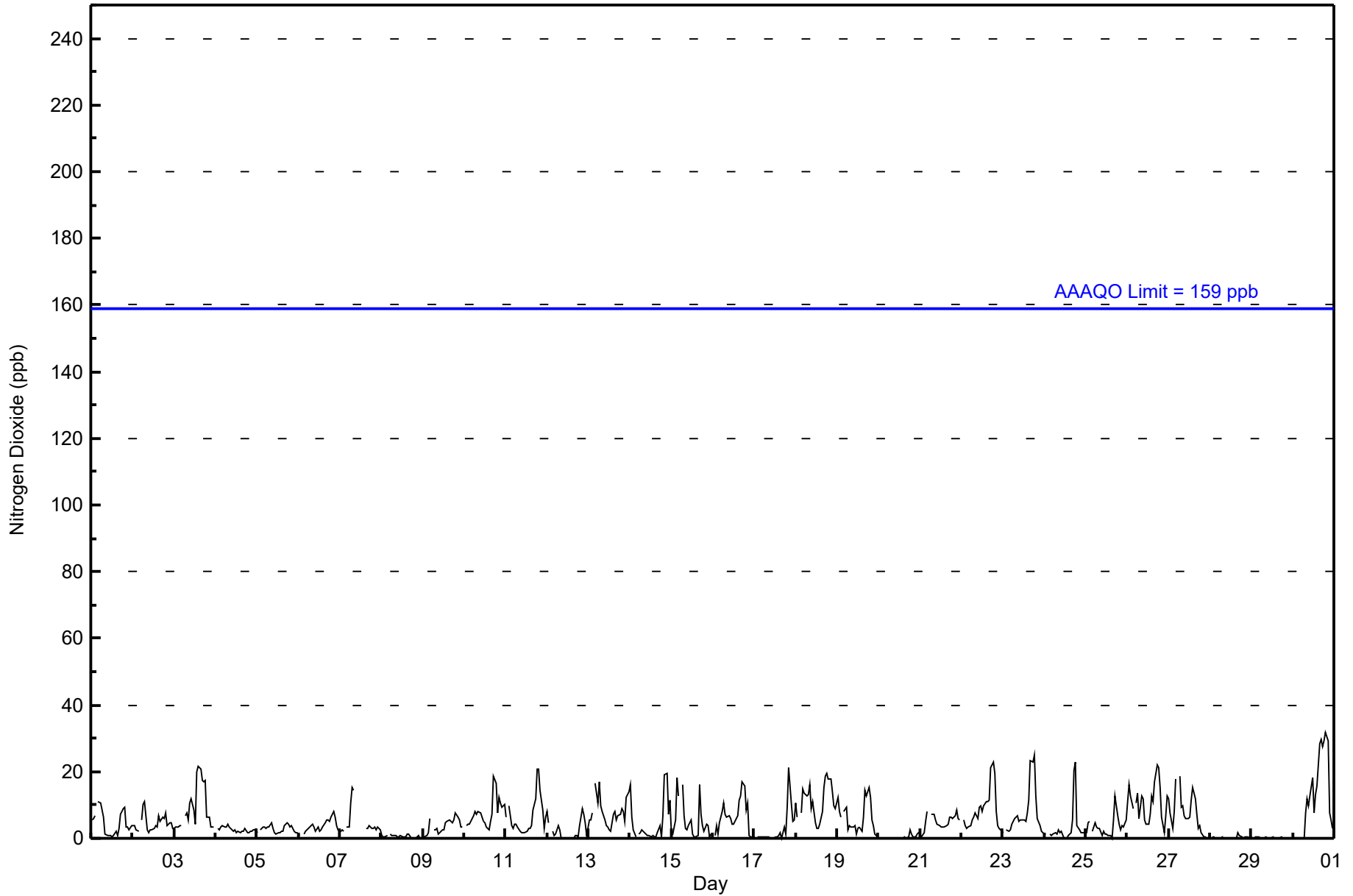
4.4	3.8	3.6	3.4	5.4	4.4	6.1	5.3	5.0	3.8	3.7	3.4	2.6	3.8	4.7	5.7	7.8	9.7	9.8	8.0	7.4	4.9	3.7	3.9	Diurnal Average	
16.3	16.3	12.6	18.3	17.8	13.6	18.7	15.1	15.9	12.0	12.6	18.3	8.1	19.8	21.4	28.2	29.5	27.7	29.1	31.9	29.2	19.6	12.1	14.0	Diurnal Maximum	

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



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

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb**  
**Patricia McInnes - November 2023**





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

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb**  
**Patricia McInnes - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	665	97.22	97.22
21 - 40	19	2.78	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 684

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Patricia McInnes - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 20	32	16	20	18	32	47	93	30	54	38	62	62	46	58	30	27	665
21 - 40	2	0	1	1	0	0	4	5	2	2	0	0	2	0	0	0	19
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	<b>34</b>	<b>16</b>	<b>21</b>	<b>19</b>	<b>32</b>	<b>47</b>	<b>97</b>	<b>35</b>	<b>56</b>	<b>40</b>	<b>62</b>	<b>62</b>	<b>48</b>	<b>58</b>	<b>30</b>	<b>27</b>	<b>684</b>

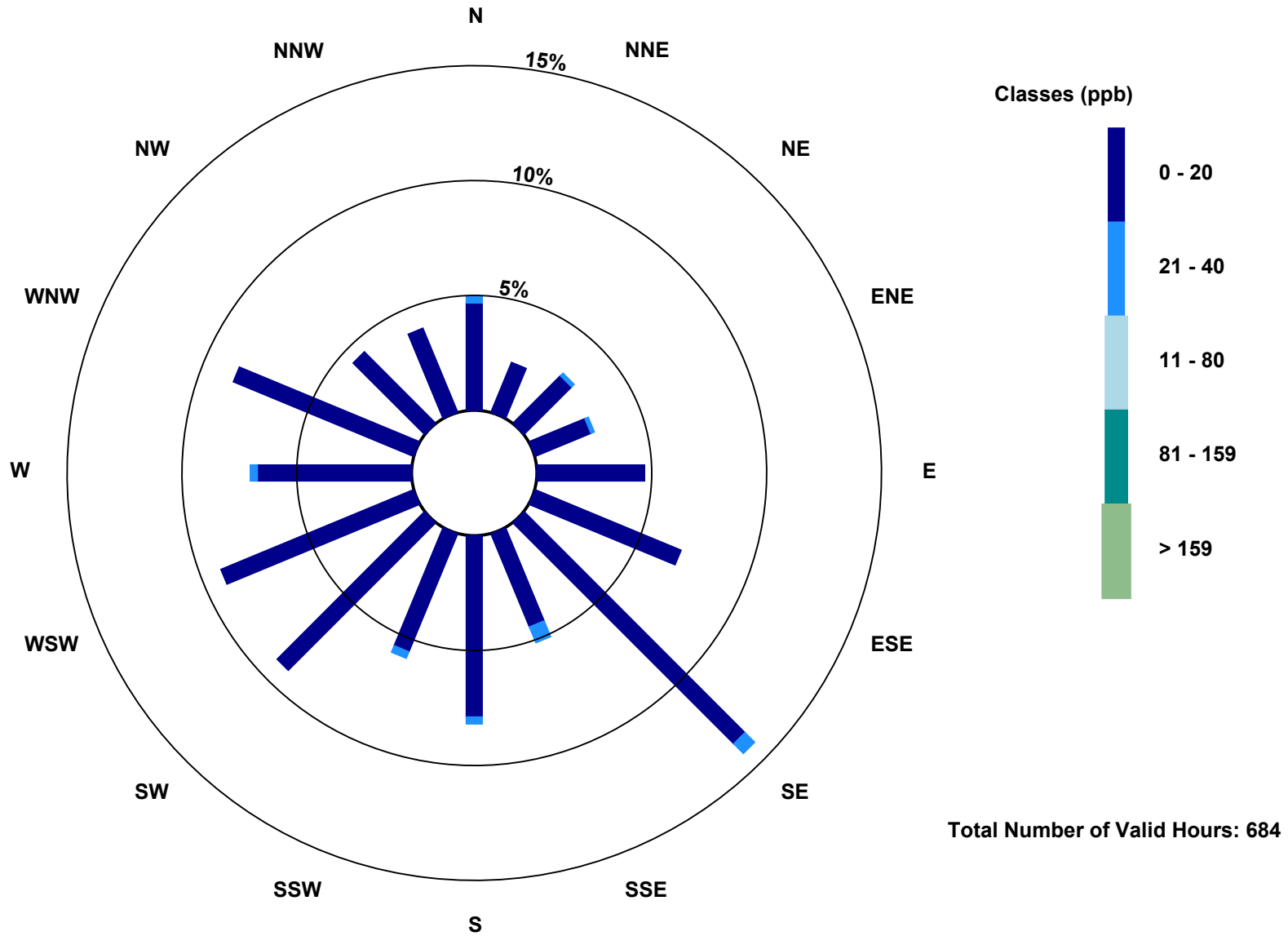
Total Number of Valid Hours: 684

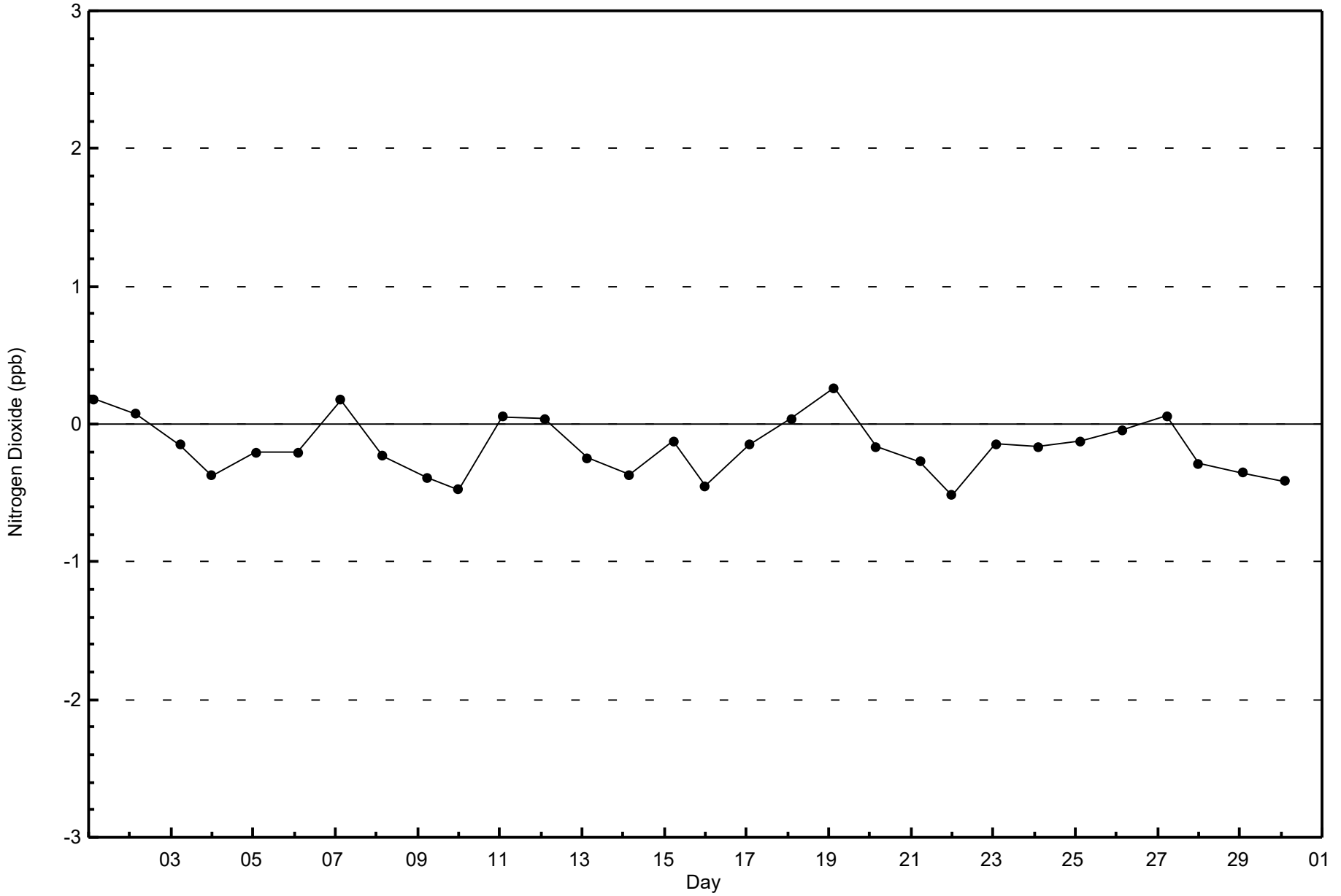
Total Number of Hours: 720

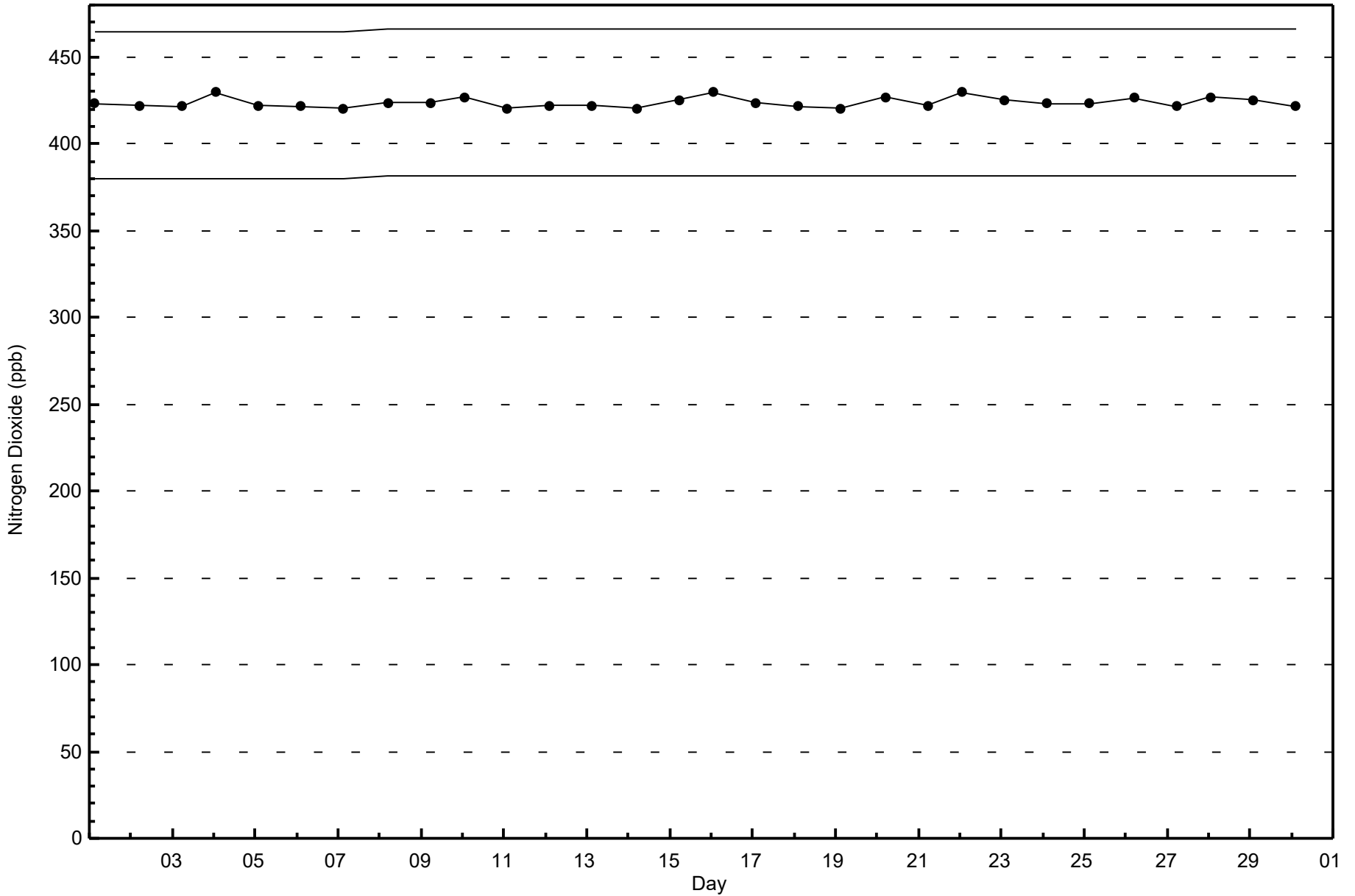


Wood Buffalo Environmental Association  
Wind Rose Nov 2023

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











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

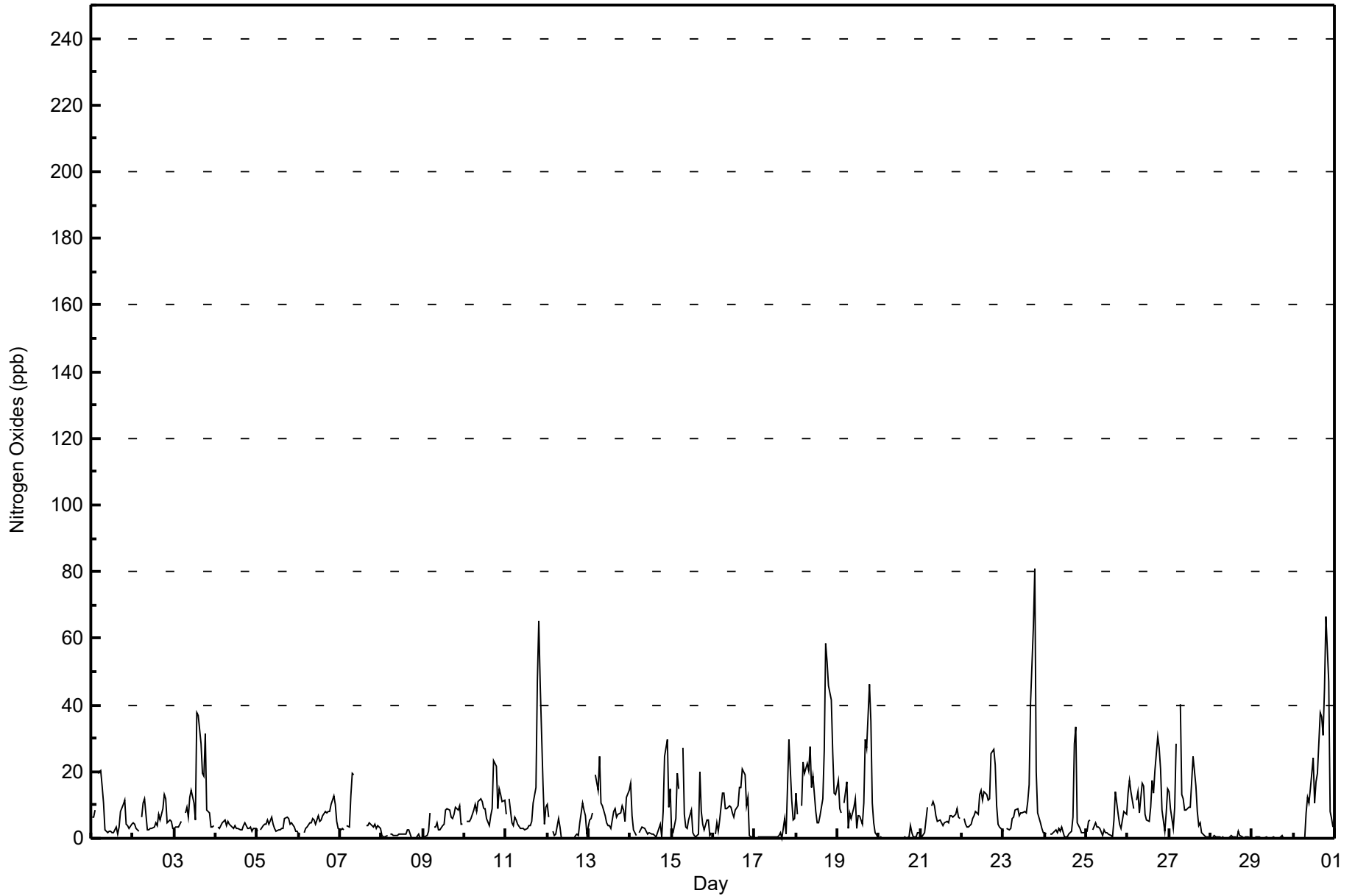
**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Patricia McInnes - November 2023**

Maximum Value: 80.8 ppb on Nov 23 19:00      Maximum Daily Average: 21.3 ppb on Nov 18 Minimum Value: 0.0 ppb on Nov 8 21:00      Minimum Daily Average: 0.2 ppb on Nov 29 Maximum Diurnal Average: 17.4 ppb at hour 19      Minimum Diurnal Average: 3.8 ppb at hour 4 Monthly Average: 7.49 ppb      Percentiles: P <sub>1</sub> = 0.0 P <sub>10</sub> = 0.3 Q <sub>1</sub> = 1.6 Median = 4.5 Q <sub>3</sub> = 9.1 P <sub>90</sub> = 17.0 P <sub>99</sub> = 47.0																						Hours in Service: 720 Hours of Data: 684 Hours of Missing Data: 36 Hours of Calibration: 36 Percent Operational Time: 100.0				
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	6.3	6.4	8.6	Z	19.6	20.5	15.6	10.7	2.5	1.8	1.9	2.1	1.6	1.5	3.4	1.4	3.4	7.9	10.1	11.3	4.3	3.7	3.0	4.3	6.6	20.5
2-Nov	4.7	4.4	3.2	2.3	Z	6.2	10.5	11.9	2.7	2.5	2.9	3.1	3.5	4.7	4.0	7.3	5.7	8.8	13.3	12.0	4.7	5.4	5.0	3.1	5.7	13.3
3-Nov	3.0	3.5	3.6	4.4	5.0	Z	7.8	9.5	6.5	12.3	14.5	10.5	5.6	37.7	37.1	28.6	19.5	18.5	31.4	8.5	7.5	3.6	3.6	3.7	12.4	37.7
4-Nov	Z	3.2	2.8	3.8	4.5	5.6	4.0	5.0	4.0	3.4	2.9	3.7	2.9	2.9	2.6	2.7	3.8	4.8	2.9	2.9	3.2	2.3	2.9	3.1	3.5	5.6
5-Nov	2.0	Z	2.7	3.7	4.1	4.0	5.5	4.4	6.4	4.1	2.9	2.2	2.6	2.7	3.0	3.1	6.0	6.4	6.1	4.4	4.5	3.2	2.3	2.1	3.8	6.4
6-Nov	1.4	1.2	Z	1.7	2.9	3.3	4.8	4.9	5.8	5.3	4.3	6.6	5.0	5.5	6.9	7.9	7.7	8.1	8.2	10.3	12.5	10.0	5.1	3.1	5.8	12.5
7-Nov	2.6	2.8	2.3	Z	4.0	3.5	12.6	19.7	19.1	C	C	C	C	C	C	3.7	3.7	4.7	3.8	3.5	4.0	3.0	3.9	2.8	--	19.7
8-Nov	0.9	0.4	0.5	1.0	Z	1.2	1.2	1.0	1.0	0.7	1.2	1.5	1.2	1.1	1.2	2.6	2.7	0.0	0.0	0.1	0.0	1.2	0.1	0.1	0.9	2.7
9-Nov	0.2	0.5	0.7	1.9	7.5	Z	3.5	3.5	4.8	2.5	2.4	3.8	4.2	8.3	8.7	8.4	6.5	6.1	7.3	9.4	8.4	9.5	4.1	4.2	5.1	9.5
10-Nov	Z	5.0	5.1	5.1	5.9	8.5	10.4	8.3	10.9	12.0	11.1	8.8	8.9	5.8	3.8	6.6	8.9	23.2	21.6	9.1	14.9	13.3	10.9	11.5	10.0	23.2
11-Nov	7.1	Z	11.9	4.6	3.6	6.3	5.5	4.4	2.9	2.8	3.0	2.5	3.0	3.9	3.9	4.9	10.7	15.4	47.5	65.3	46.0	16.3	4.1	9.3	12.4	65.3
12-Nov	10.2	6.2	Z	2.3	0.9	1.5	6.1	3.2	0.1	0.0	0.1	0.1	0.1	0.0	0.0	0.0	1.1	1.2	0.8	4.6	10.5	8.4	6.7	1.1	2.8	10.5
13-Nov	5.6	5.8	7.8	Z	19.0	14.4	24.8	10.7	9.8	6.8	4.8	3.9	3.6	2.8	8.1	9.0	6.2	7.2	7.6	9.6	8.3	5.0	12.3	14.2	9.0	24.8
14-Nov	16.5	6.6	2.5	0.7	Z	1.6	2.4	3.5	2.8	2.1	1.4	1.6	1.1	1.2	0.7	0.6	1.9	4.4	0.5	8.0	24.7	29.5	9.4	14.7	6.0	29.5
15-Nov	1.7	1.5	5.8	19.6	14.7	Z	27.2	7.1	3.3	3.1	5.6	8.5	1.6	0.7	0.4	1.1	19.8	8.2	4.3	2.4	5.4	5.7	0.6	1.5	6.5	27.2
16-Nov	Z	1.2	4.5	1.9	5.3	13.6	13.8	8.9	8.9	9.8	9.4	7.4	6.4	8.4	9.7	15.4	15.3	20.9	19.2	9.7	12.5	0.9	0.6	0.6	8.9	20.9
17-Nov	0.4	Z	0.5	0.6	0.4	0.5	0.5	0.4	0.6	0.4	0.2	0.3	0.5	0.6	0.9	1.8	0.1	5.8	1.3	15.2	29.5	11.5	5.6	5.9	3.6	29.5
18-Nov	13.4	7.4	Z	9.6	23.0	19.6	22.6	20.1	27.6	15.0	18.8	8.1	4.6	4.5	6.8	11.7	26.2	58.4	52.9	45.6	41.6	26.0	13.5	13.2	21.3	58.4
19-Nov	17.2	9.0	7.8	Z	10.4	17.0	2.8	7.7	5.8	9.2	12.1	2.9	6.8	6.8	4.0	10.4	29.9	27.3	46.4	35.2	10.6	4.9	1.7	0.6	12.4	46.4
20-Nov	0.2	0.2	0.2	0.0	Z	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.2	0.1	0.1	0.4	0.2	0.4	3.9	1.6	0.4	0.4	1.6	1.8	0.5	3.9
21-Nov	1.5	0.6	1.6	5.3	9.1	Z	9.9	11.1	9.9	6.8	5.1	5.6	4.5	4.0	4.6	5.0	4.8	6.8	6.9	6.4	7.1	8.7	6.2	6.1	6.0	11.1
22-Nov	Z	5.8	4.2	3.2	3.4	4.3	6.0	6.8	8.2	7.2	13.0	14.4	11.6	14.0	13.3	11.6	11.8	25.2	26.7	22.2	9.9	4.4	3.5	2.6	10.1	26.7
23-Nov	2.0	Z	2.9	2.6	3.1	6.1	6.4	8.4	8.8	6.8	7.7	7.4	8.1	7.6	11.1	16.3	40.7	63.6	80.8	19.9	7.7	4.6	2.9	1.7	14.2	80.8
24-Nov	1.5	1.3	Z	1.2	1.1	1.5	2.4	1.7	3.1	2.3	3.2	0.4	0.4	0.2	1.3	2.0	6.5	28.3	33.4	4.5	3.2	1.9	1.9	1.9	4.6	33.4
25-Nov	2.3	5.1	5.5	Z	2.4	4.8	3.5	3.3	3.1	1.0	2.6	1.7	1.5	1.3	1.0	0.3	5.6	14.1	7.2	4.4	2.8	5.6	7.9	7.3	4.1	14.1
26-Nov	13.7	17.5	14.1	9.1	Z	11.3	14.1	7.6	16.4	15.8	7.3	5.6	5.3	9.4	17.6	13.3	20.5	30.4	27.0	20.6	8.6	2.2	7.7	14.7	13.5	30.4
27-Nov	13.8	8.9	3.0	9.3	28.5	Z	40.2	13.1	12.0	8.6	8.4	9.5	9.4	17.1	24.5	15.5	8.2	3.7	4.8	1.8	0.6	0.6	0.3	0.3	10.5	40.2
28-Nov	Z	0.5	0.7	0.3	0.3	0.2	0.2	0.4	0.2	0.2	0.2	0.4	0.6	0.4	0.2	0.2	2.0	0.9	0.3	0.1	0.4	0.4	0.3	0.2	0.4	2.0
29-Nov	0.4	Z	0.4	0.4	0.4	0.2	0.2	0.1	0.6	0.1	0.1	0.2	0.5	0.0	0.0	0.0	0.1	0.7	0.0	0.1	0.0	0.0	0.1	0.1	0.2	0.7
30-Nov	0.0	0.2	Z	0.2	0.1	0.0	0.0	7.8	12.3	10.7	14.8	24.1	10.7	16.8	19.7	37.7	36.4	31.0	44.8	66.3	46.9	8.0	5.9	3.2	17.3	66.3
																								Diurnal Average		
																								Diurnal Maximum		
5.2 4.2 4.1 3.8 7.2 6.2 8.8 6.8 6.7 5.3 5.6 5.1 4.0 5.9 6.8 7.7 10.5 14.8 17.4 13.8 11.4 6.7 4.5 4.6 17.2 17.5 14.1 19.6 28.5 20.5 40.2 20.1 27.6 15.8 18.8 24.1 11.6 37.7 37.1 37.7 40.7 63.6 80.8 66.3 46.9 29.5 13.5 14.7																										
Z - zerospan      C - Calibration																										



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

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Patricia McInnes - November 2023**





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

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Patricia McInnes - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	634	92.69	92.69
21 - 40	36	5.26	97.95
41 - 80	13	1.90	99.85
81 - 159	0	0.00	99.85
> 159	0	0.00	99.85

Total Number of Valid Hours: 684

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Patricia McInnes - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 20	32	15	19	18	31	46	87	24	43	36	62	62	46	57	30	26	634
21 - 40	2	1	2	1	1	0	8	5	9	3	0	0	2	1	0	1	36
11 - 80	0	0	0	0	0	1	2	6	3	1	0	0	0	0	0	0	13
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	<b>34</b>	<b>16</b>	<b>21</b>	<b>19</b>	<b>32</b>	<b>47</b>	<b>97</b>	<b>35</b>	<b>55</b>	<b>40</b>	<b>62</b>	<b>62</b>	<b>48</b>	<b>58</b>	<b>30</b>	<b>27</b>	<b>683</b>

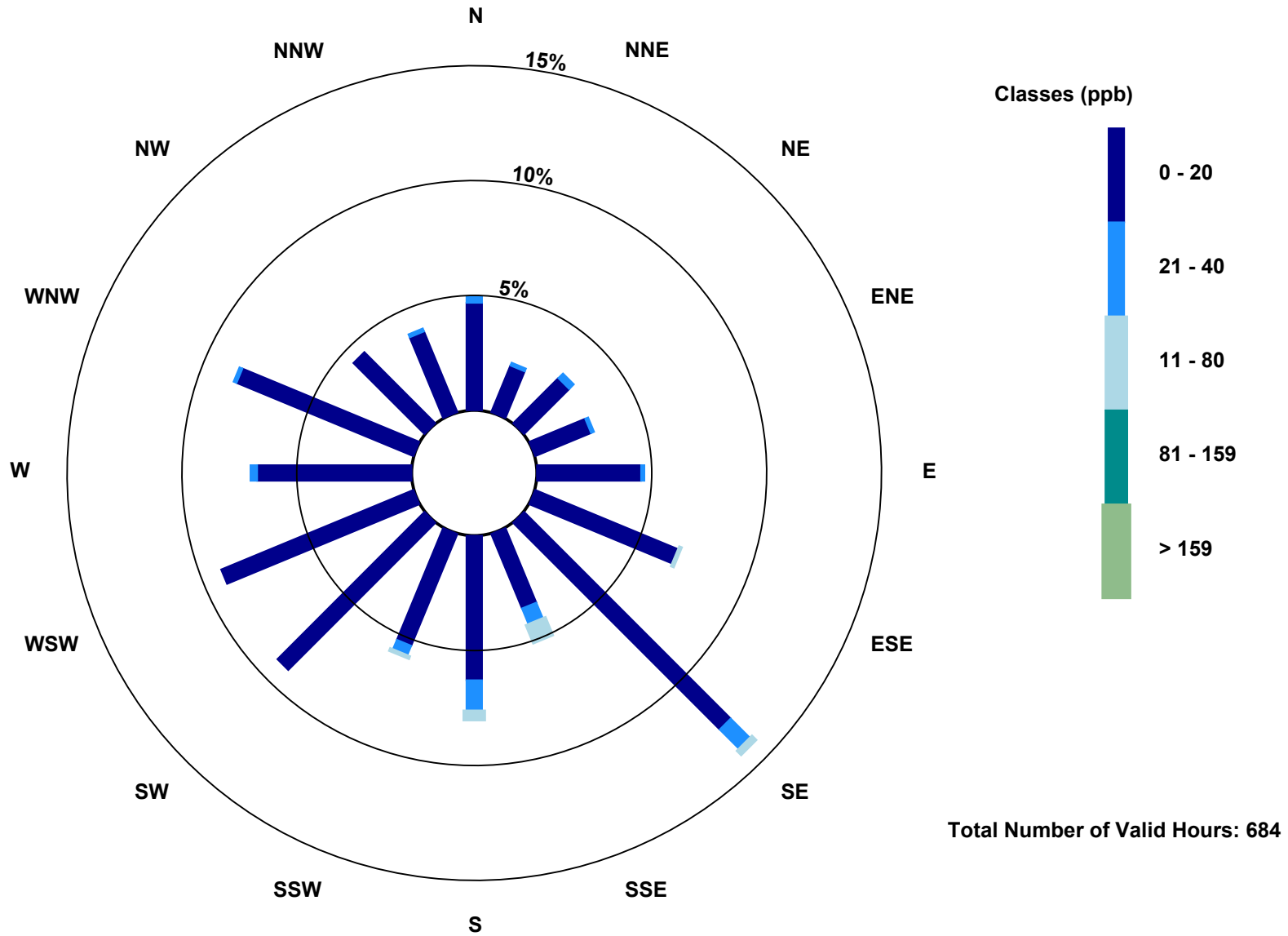
Total Number of Valid Hours: 684

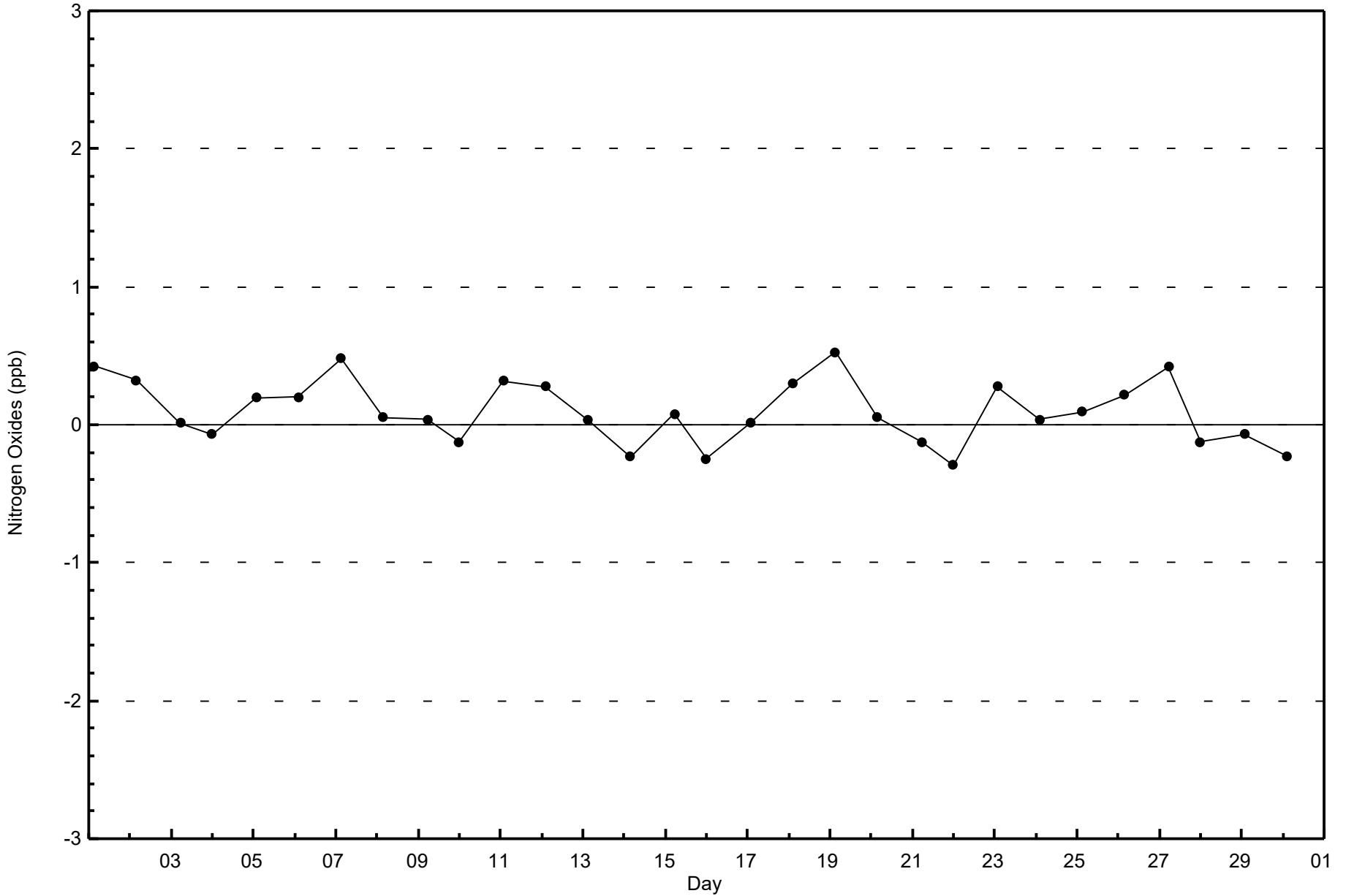
Total Number of Hours: 720

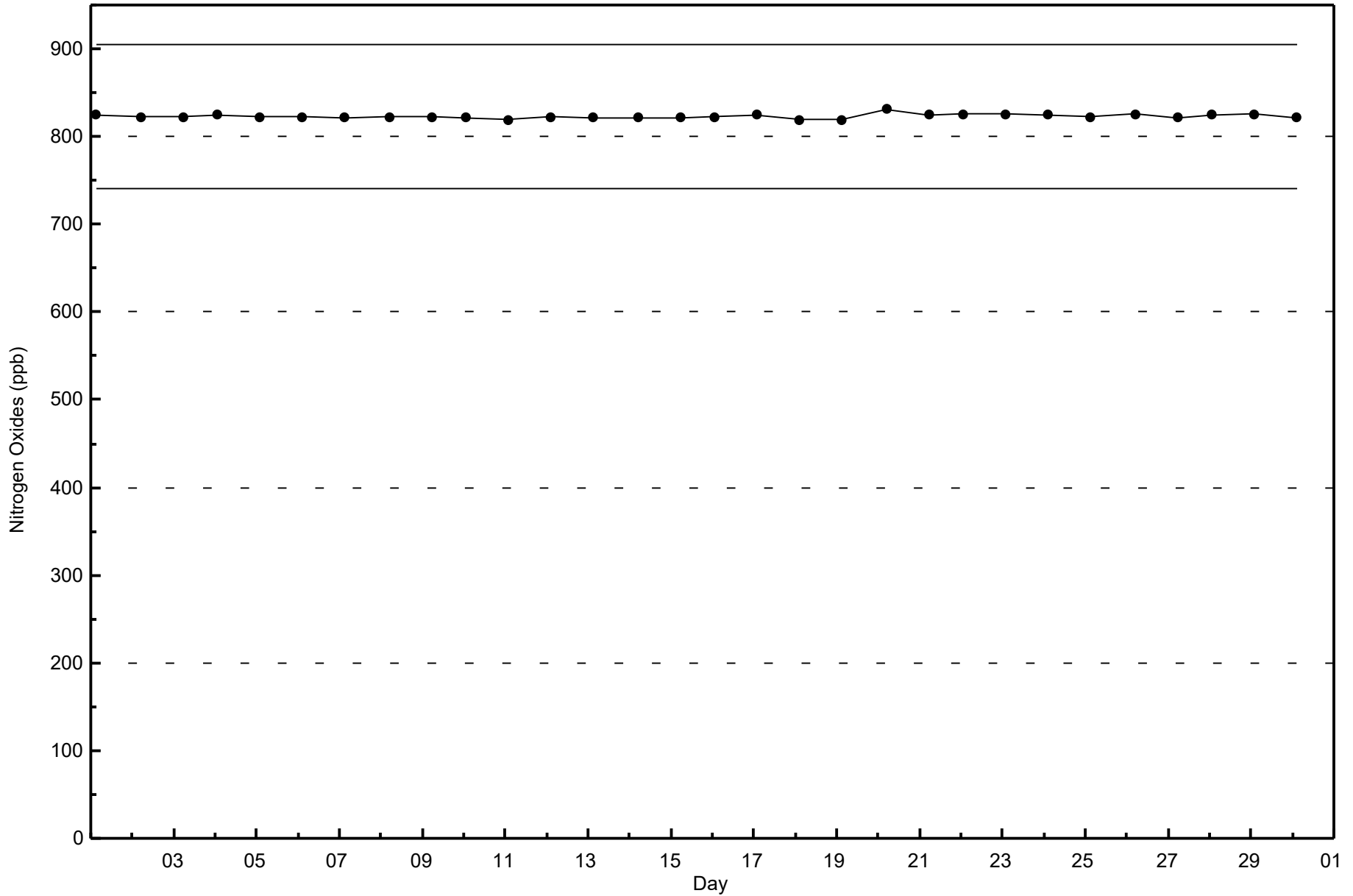


Wood Buffalo Environmental Association  
Wind Rose Nov 2023

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









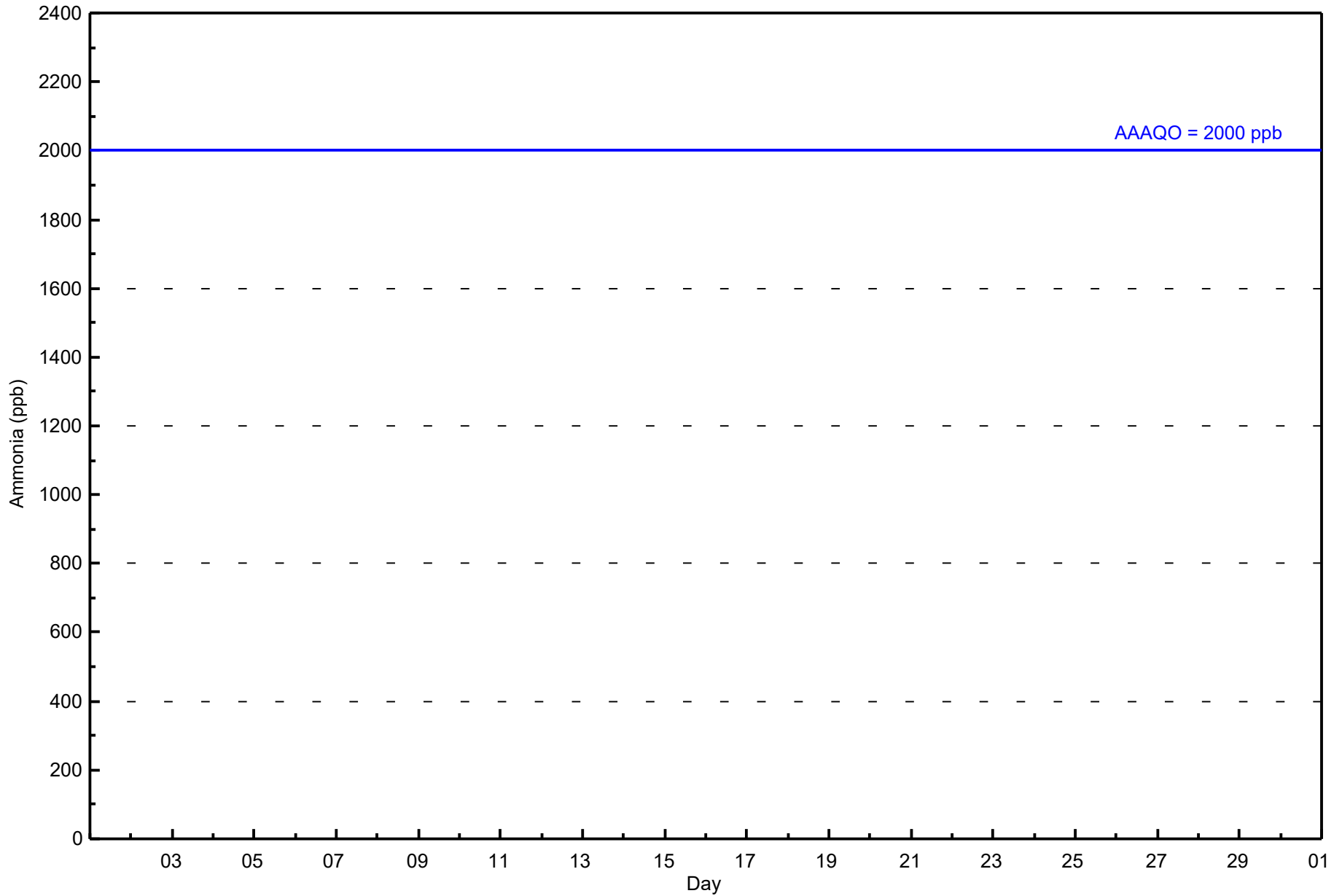
Number of Exceedences (AAAQO): 1-hr: 0		Hours in Service: 720																									
Maximum Value: 0.0 ppb on Nov 1 01:00		Maximum Daily Average: 0.0 ppb on Nov 3																									
Minimum Value: 0.0 ppb on Nov 1 01:00		Hours of Data: 628																									
Maximum Diurnal Average: 0.0 ppb at hour 1		Hours of Missing Data: 92																									
Monthly Average: 0.00 ppb		Hours of Calibration: 45																									
Minimum Daily Average: 0.0 ppb on Nov 3		Percent Operational Time: 93.5																									
Minimum Diurnal Average: 0.0 ppb at hour 1		Percentiles: P <sub>1</sub> = 0.0 P <sub>10</sub> = 0.0 Q <sub>1</sub> = 0.0 Median = 0.0 Q <sub>3</sub> = 0.0 P <sub>90</sub> = 0.0 P <sub>99</sub> = 0.0																									
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Nov	0.0	0.0	Z	RE	RE	0.0	0.0	0.0	C	C	C	C	C	C	C	C	C	M	M	M	M	M	M	M	--	0.0	
2-Nov	M	M	M	M	M	M	M	M	M	C	C	C	C	C	C	C	RE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	--	0.0
3-Nov	0.0	0.0	0.0	0.0	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
4-Nov	0.0	0.0	0.0	0.0	0.0	Z	RE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5-Nov	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
6-Nov	0.0	Z	RE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7-Nov	0.0	0.0	Z	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
8-Nov	0.0	0.0	0.0	Z	RE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9-Nov	0.0	0.0	0.0	0.0	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
10-Nov	0.0	0.0	0.0	0.0	0.0	Z	RE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11-Nov	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
12-Nov	0.0	Z	RE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13-Nov	0.0	0.0	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
14-Nov	0.0	0.0	0.0	Z	RE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15-Nov	0.0	0.0	0.0	0.0	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
16-Nov	0.0	0.0	0.0	0.0	0.0	Z	RE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17-Nov	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
18-Nov	0.0	Z	RE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19-Nov	0.0	0.0	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
20-Nov	0.0	0.0	0.0	Z	RE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
21-Nov	0.0	0.0	0.0	0.0	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
22-Nov	0.0	0.0	0.0	0.0	0.0	Z	RE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23-Nov	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
24-Nov	0.0	Z	RE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25-Nov	0.0	0.0	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
26-Nov	0.0	0.0	0.0	Z	RE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
27-Nov	0.0	0.0	0.0	0.0	Z	RE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
28-Nov	0.0	0.0	0.0	0.0	0.0	Z	RE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
29-Nov	Z	RE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30-Nov	0.0	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
																								Diurnal Average			
																								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 (NH<sub>3</sub>) - ppb**  
**Patricia McInnes - November 2023**





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

**Ammonia (NH<sub>3</sub>) - ppb**  
**Patricia McInnes - November 2023**

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

Total Number of Valid Hours: 628

Total Number of Hours: 720



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

**Ammonia (NH<sub>3</sub>) - ppb**  
**Patricia McInnes - November 2023**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	26	9	21	19	30	44	91	34	47	33	58	60	47	55	27	27	628
6 - 10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 - 15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16 - 20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21 - 25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	26	9	21	19	30	44	91	34	47	33	58	60	47	55	27	27	628

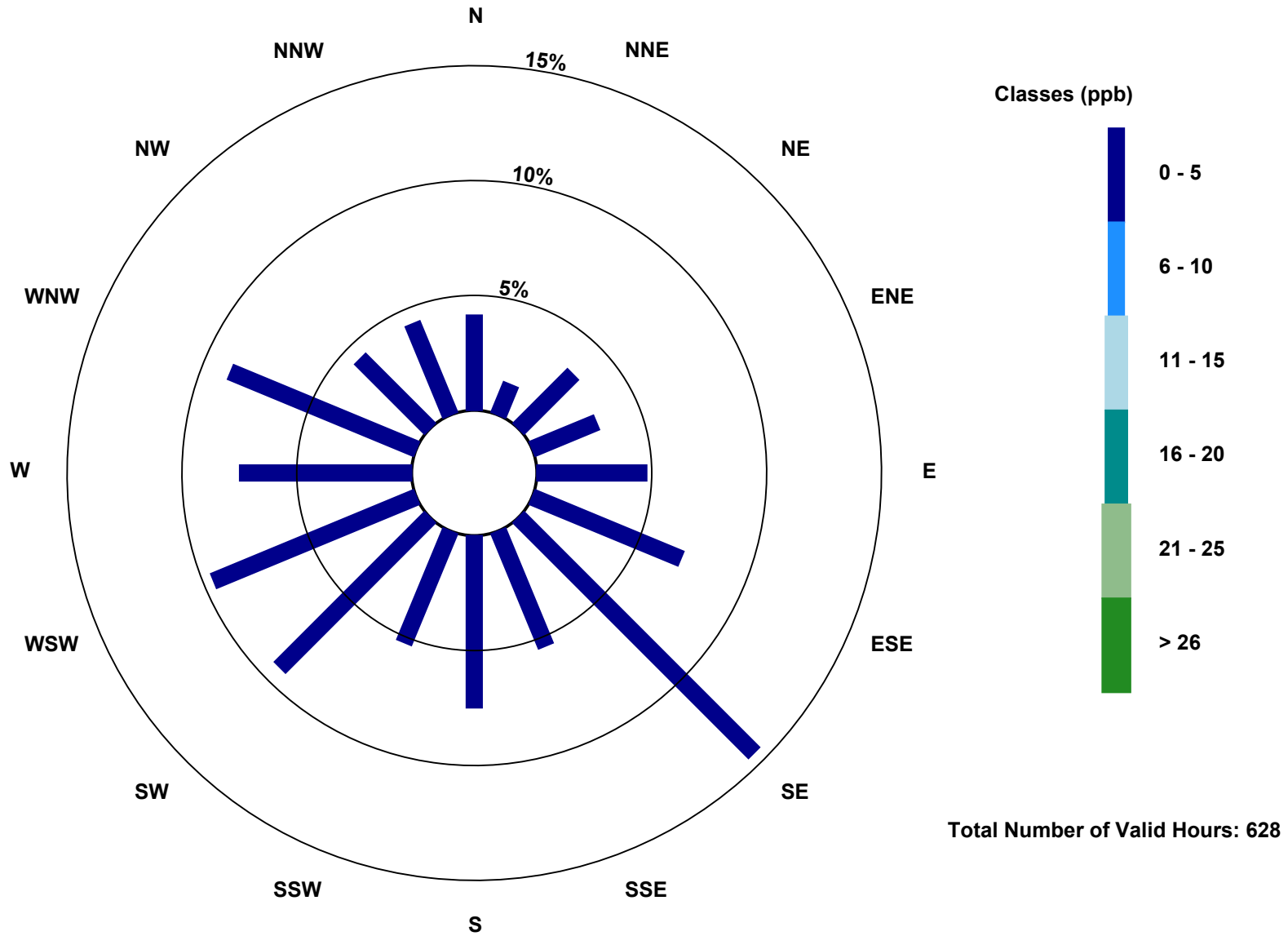
Total Number of Valid Hours: 628

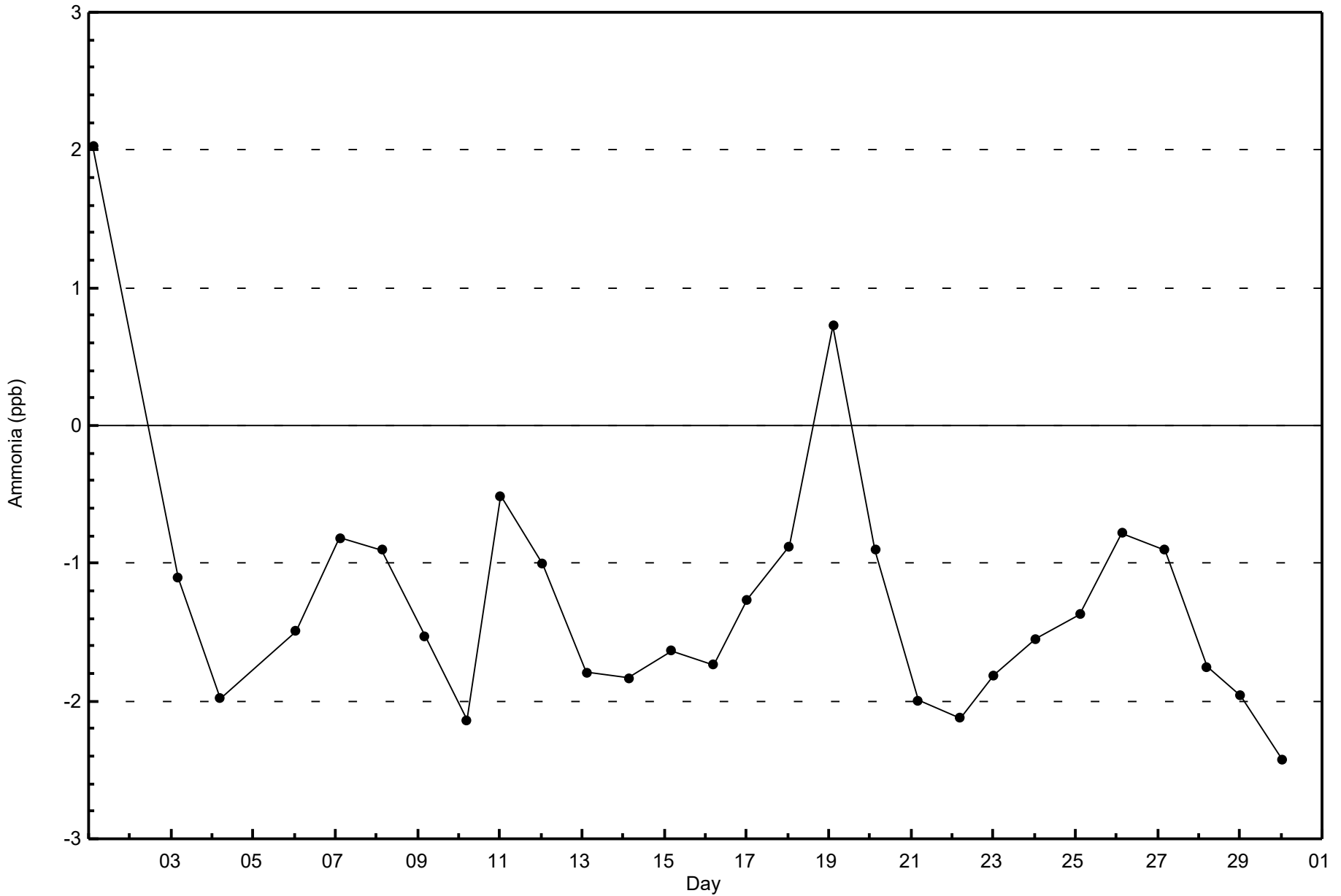
Total Number of Hours: 720

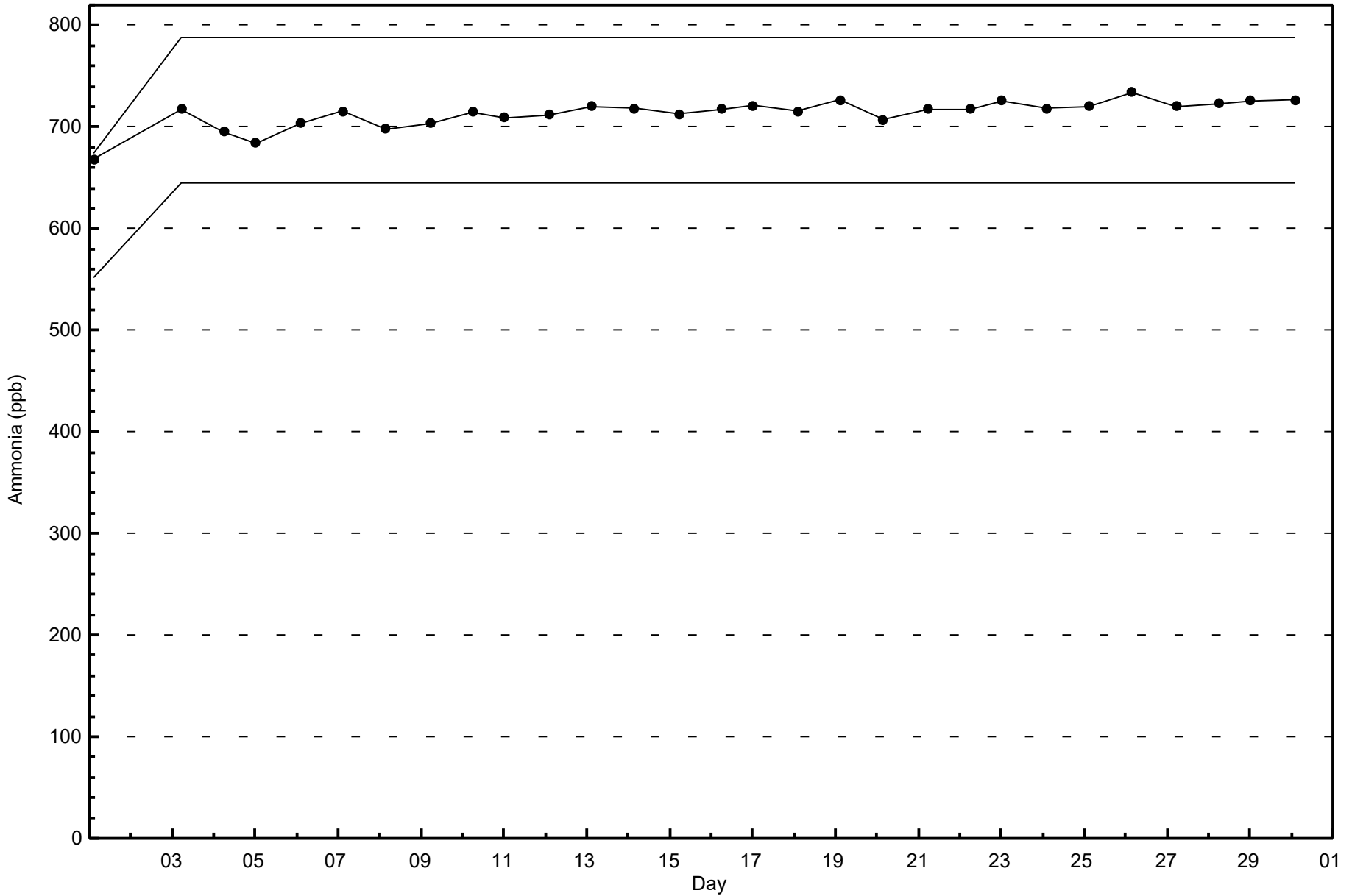


Wood Buffalo Environmental Association  
Wind Rose Nov 2023

Ammonia (NH<sub>3</sub>) - ppb  
Patricia McInnes









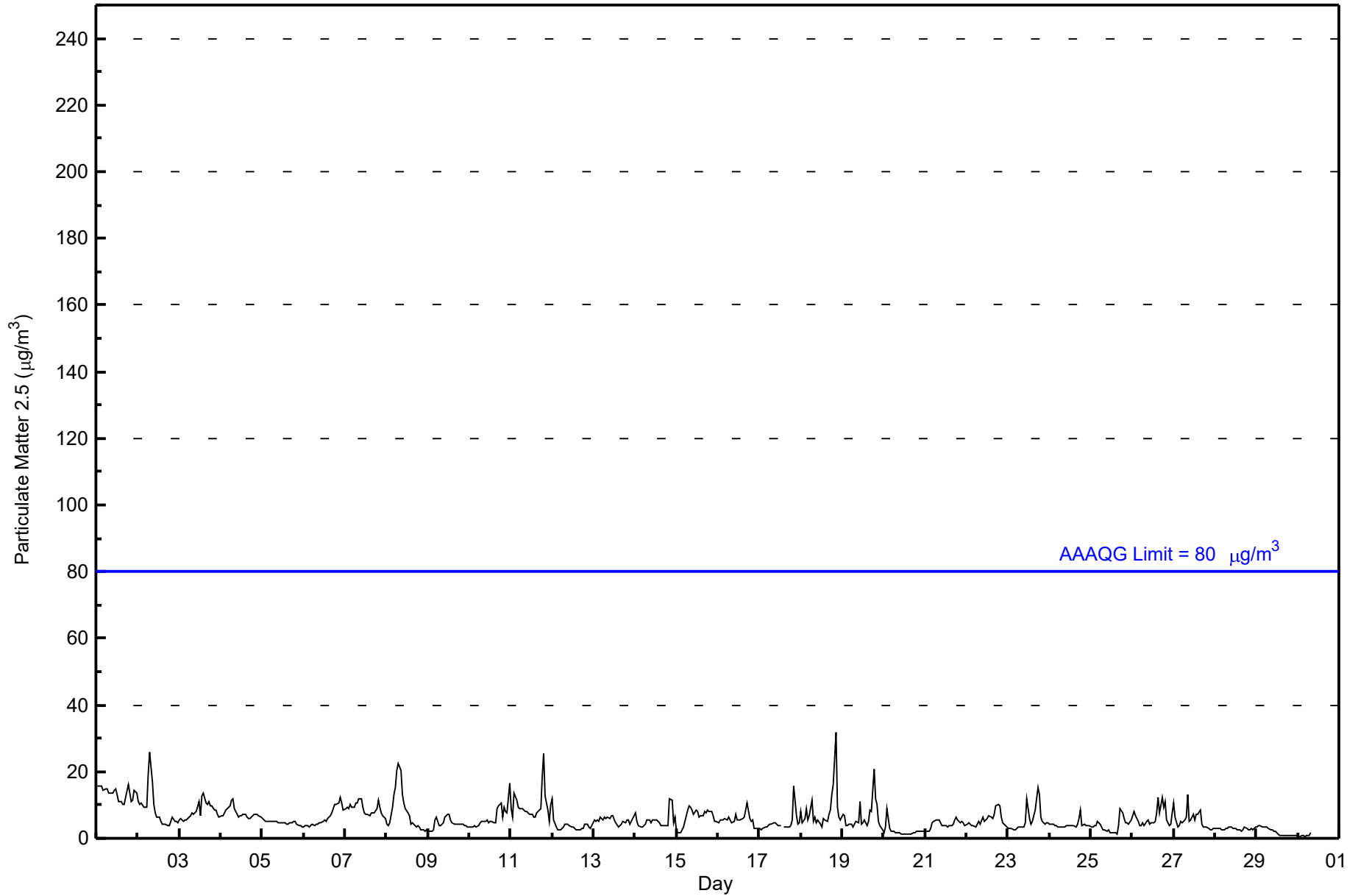
# Wood Buffalo Environmental Association

## Summary of Hour Averages

# Particulate Matter 2.5 (PM<sub>2.5</sub>) - µg/m<sup>3</sup>

## Patricia McInnes - November 2023

Number of Exceedences (AAQO):		1-hr: 0		24-hr: 0		Hours in Service:		720																																																															
Maximum Value: 31.7 µg/m <sup>3</sup> on Nov 18 21:00		Maximum Daily Average: 13.5 µg/m <sup>3</sup> on Nov 1				Hours of Data:		703																																																															
Minimum Value: 0.6 µg/m <sup>3</sup> on Nov 30 05:00		Minimum Daily Average: 2.0 µg/m <sup>3</sup> on Nov 29				Hours of Missing Data:		17																																																															
Maximum Diurnal Average: 7.8 µg/m <sup>3</sup> at hour 19		Minimum Diurnal Average: 4.9 µg/m <sup>3</sup> at hour 23				Hours of Calibration:		1																																																															
Monthly Average: 5.92 µg/m <sup>3</sup>		Percentiles: P <sub>1</sub> = 0.8 P <sub>10</sub> = 2.6 Q <sub>1</sub> = 3.6 Median = 5.0 Q <sub>3</sub> = 7.3 P <sub>90</sub> = 10.6 P <sub>99</sub> = 18.9				Percent Operational Time:		97.8																																																															
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																																													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																																															
1-Nov	15.6	15.8	15.6	15.6	14.3	14.6	14.8	13.7	13.4	13.4	14.2	14.8	13.1	11.2	10.9	10.0	10.3	12.3	16.0	13.5	11.0	11.5	14.4	13.8	13.5	16.0																																													
2-Nov	10.9	10.3	10.5	9.3	9.2	9.4	18.9	25.8	17.1	10.3	7.6	6.2	6.3	4.9	4.2	4.2	4.3	3.8	4.0	4.9	6.2	5.2	5.2	4.8	8.5	25.8																																													
3-Nov	5.5	5.8	5.2	5.5	5.5	5.9	6.6	7.5	7.1	7.7	8.1	11.1	6.7	12.7	13.4	10.6	10.0	10.9	9.7	9.6	8.3	8.3	7.1	6.5	8.1	13.4																																													
4-Nov	6.6	6.9	7.7	8.5	9.0	9.8	11.4	11.7	8.9	7.2	6.3	6.7	6.6	7.3	7.3	6.4	5.8	6.0	6.8	7.0	7.3	7.2	6.9	6.4	7.6	11.7																																													
5-Nov	5.8	5.5	5.3	5.1	5.1	5.1	5.2	5.3	4.9	4.8	4.8	4.6	4.7	4.5	4.4	4.4	4.6	4.5	5.1	4.9	4.2	3.8	3.7	3.5	4.7	5.8																																													
6-Nov	3.6	3.7	3.6	3.6	3.6	4.2	3.9	4.2	4.4	4.6	4.8	5.3	5.4	5.2	6.0	6.7	7.6	8.7	10.3	10.4	10.6	12.1	10.4	8.6	6.3	12.1																																													
7-Nov	8.7	9.2	9.0	10.0	9.2	9.3	10.7	10.6	11.9	11.7	9.5	7.7	7.1	7.2	7.0	7.7	7.5	7.6	9.0	11.4	9.5	7.4	7.0	6.0	8.8	11.9																																													
8-Nov	4.1	3.7	4.6	9.4	13.3	15.1	20.3	22.3	20.2	13.3	10.8	9.1	7.6	6.6	4.4	4.5	4.2	3.6	3.7	3.2	2.6	2.4	2.3	2.4	8.1	22.3																																													
9-Nov	2.1	2.3	2.3	2.7	5.3	6.3	3.7	3.7	4.3	4.6	6.6	7.1	7.3	5.6	4.7	4.2	4.3	4.2	4.2	4.4	4.1	3.9	3.9	3.3	4.4	7.3																																													
10-Nov	3.2	3.2	3.5	3.6	3.6	3.7	4.7	5.3	5.2	5.1	5.6	4.6	5.0	4.9	4.6	4.7	9.0	9.7	10.7	6.6	9.5	8.0	7.8	16.3	6.2	16.3																																													
11-Nov	8.8	6.5	13.4	11.6	9.1	9.0	8.8	8.8	8.1	7.9	7.8	7.4	7.4	6.4	6.2	7.5	7.8	8.8	18.8	25.5	12.6	8.3	5.2	10.0	9.7	25.5																																													
12-Nov	11.8	5.4	3.6	2.6	2.4	2.7	3.5	4.4	4.3	4.1	3.9	3.6	3.2	3.0	2.6	2.6	2.8	2.9	2.8	4.3	4.2	3.5	3.0	3.7	3.8	11.8																																													
13-Nov	5.4	5.2	5.3	5.1	6.3	5.7	6.2	5.8	6.2	6.1	6.7	6.6	5.7	4.6	3.4	3.9	4.4	5.2	4.6	5.4	5.4	4.1	5.0	6.9	5.4	6.9																																													
14-Nov	7.8	4.9	3.9	3.3	3.4	3.7	4.3	5.5	5.4	4.8	5.4	5.7	5.4	5.2	4.6	4.0	3.9	4.0	3.7	4.0	11.8	11.4	4.7	6.3	5.3	11.8																																													
15-Nov	1.9	1.5	1.8	2.6	3.4	5.1	8.7	9.6	9.3	8.3	7.2	8.3	8.1	6.4	6.6	6.6	7.9	7.8	8.5	8.2	8.0	6.9	5.3	5.0	6.4	9.6																																													
16-Nov	4.7	5.4	5.6	5.5	5.7	5.7	6.3	5.4	4.6	5.3	7.0	5.6	5.4	5.6	5.9	6.3	8.3	10.7	6.1	5.2	5.6	2.9	2.9	3.0	5.6	10.7																																													
17-Nov	3.2	2.8	2.9	3.2	3.6	3.9	4.2	4.3	4.6	4.5	4.1	3.7	3.6	C	3.3	3.5	3.5	3.5	3.6	5.6	15.5	6.8	4.3	4.8	4.5	15.5																																													
18-Nov	8.0	4.6	6.0	9.0	5.6	6.7	11.4	5.3	6.3	4.8	5.3	4.4	3.6	5.8	5.5	5.1	7.4	8.4	13.2	16.2	31.7	9.2	6.6	5.4	8.1	31.7																																													
19-Nov	7.4	6.8	4.0	3.8	4.3	4.4	3.2	4.1	5.0	4.7	10.9	4.2	4.7	5.6	3.8	4.9	8.5	8.2	20.7	11.7	10.2	5.0	3.9	2.7	6.4	20.7																																													
20-Nov	1.7	3.3	9.0	3.2	2.2	2.3	1.9	1.8	1.9	1.6	1.3	1.2	1.3	1.4	1.4	1.4	1.4	1.6	1.9	2.3	2.3	2.2	2.2	2.2	2.2	9.0																																													
21-Nov	2.1	2.0	2.2	2.9	4.6	5.2	5.5	5.3	5.7	4.6	3.9	3.9	3.8	3.3	3.7	3.9	4.3	5.6	6.5	5.5	4.5	5.1	4.6	4.0	4.3	6.5																																													
22-Nov	4.3	4.8	4.4	3.9	4.0	3.6	4.3	4.9	4.3	6.6	5.0	5.5	5.7	6.9	6.3	6.1	7.0	9.7	10.1	9.6	6.4	4.6	4.2	3.4	5.7	10.1																																													
23-Nov	3.1	2.9	3.0	2.7	2.7	3.1	3.2	3.3	3.4	3.3	4.5	11.8	5.9	4.0	5.0	6.8	8.3	15.1	13.0	6.5	5.2	4.4	4.6	4.6	5.4	15.1																																													
24-Nov	4.4	4.4	4.1	3.8	3.6	3.5	3.4	3.4	3.5	3.5	3.8	3.7	3.8	4.0	3.7	3.5	4.4	6.0	8.4	3.8	4.0	4.0	4.0	3.8	4.1	8.4																																													
25-Nov	3.5	3.5	3.8	3.9	4.9	4.2	3.3	2.6	2.4	2.1	2.4	1.8	1.7	1.5	1.6	1.2	4.0	8.9	7.5	6.0	4.7	4.5	4.2	5.7	3.7	8.9																																													
26-Nov	6.6	8.3	6.8	5.0	3.9	3.9	4.5	3.9	5.2	5.5	4.2	4.9	4.5	5.3	7.7	12.5	7.7	12.3	9.3	10.8	5.3	3.6	4.1	7.7	6.4	12.5																																													
27-Nov	10.6	6.4	3.4	4.0	5.0	4.6	5.7	6.3	13.1	5.1	5.7	7.0	5.5	7.0	7.1	8.5	4.3	3.6	3.3	3.5	2.8	2.7	2.7	2.8	5.4	13.1																																													
28-Nov	3.1	3.1	2.9	2.9	2.7	2.6	2.8	3.0	3.2	3.2	3.2	2.9	2.9	2.7	2.4	2.3	2.7	3.3	3.1	2.6	2.7	2.8	2.4	3.4	2.9	3.4																																													
29-Nov	3.6	3.8	3.6	3.5	3.3	3.2	3.4	3.0	2.7	2.5	2.3	1.9	1.5	1.0	0.9	0.8	0.8	0.8	0.8	0.9	0.8	1.0	0.8	0.8	2.0	3.8																																													
30-Nov	0.6	0.6	0.6	0.7	0.6	0.6	1.0	1.9	M	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	--	1.9																																													
																								5.6	5.1	5.2	5.2	5.3	5.6	6.5	6.8	6.8	5.9	6.0	5.9	5.3	5.3	5.1	5.3	5.8	6.8	7.8	7.4	7.5	5.6	4.9	5.4	Diurnal Average																							
																								15.6	15.8	15.6	15.6	14.3	15.1	20.3	25.8	20.2	13.4	14.2	14.8	13.1	12.7	13.4	12.5	10.3	15.1	20.7	25.5	31.7	12.1	14.4	16.3	Diurnal Maximum																							
C - Calibration																								M - Maintenance																								UO - Unstable Operation																							
Alberta Ambient Air Quality Guideline/Objectives: 1-hr 80 µg/m <sup>3</sup>																								24-hr 29 µg/m <sup>3</sup>																																															







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

**Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$**   
**Patricia McInnes - November 2023**

<b>Concentration Ranges (<math>\mu\text{g}/\text{m}^3</math>)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	414	58.89	58.89
6 - 15	271	38.55	97.44
16 - 25	16	2.28	99.72
26 - 80	2	0.28	100.00
> 81.0	0	0.00	100.00

Total Number of Valid Hours: 703

Total Number of Hours: 720



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

**Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$**   
**Patricia McInnes - November 2023**

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	
0 - 5	23	6	7	10	21	19	55	9	16	13	43	60	44	52	17	19	414
6 - 15	11	7	13	9	12	31	43	25	41	27	19	2	2	6	15	8	271
16 - 25	2	0	0	0	0	0	1	3	2	3	2	0	1	2	0	0	16
26 - 80	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	2
> 81.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	<b>37</b>	<b>13</b>	<b>20</b>	<b>19</b>	<b>33</b>	<b>50</b>	<b>99</b>	<b>38</b>	<b>59</b>	<b>43</b>	<b>64</b>	<b>62</b>	<b>47</b>	<b>60</b>	<b>32</b>	<b>27</b>	<b>703</b>

Total Number of Valid Hours: 703

Total Number of Hours: 720



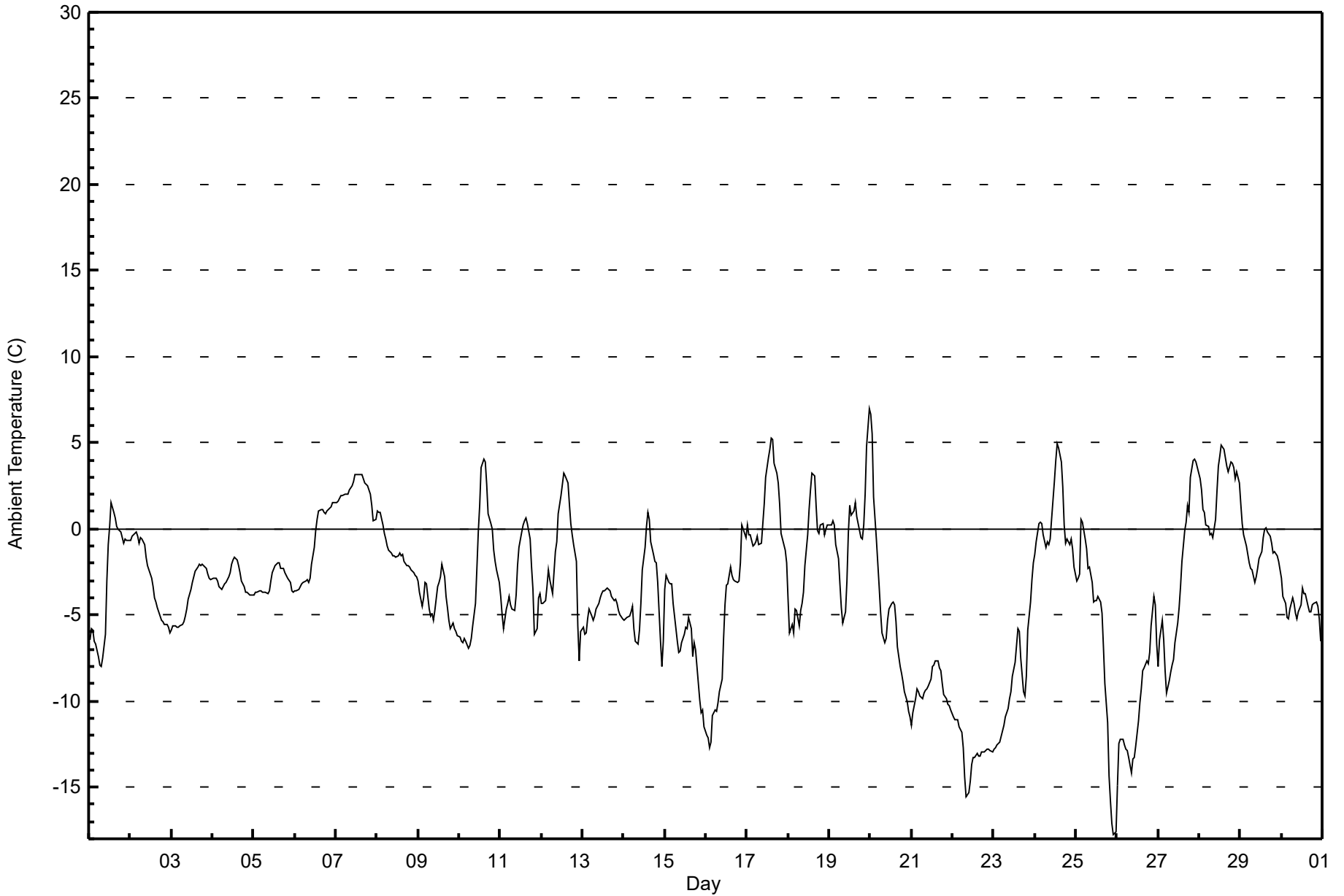


Maximum Value: 7.0 C on Nov 20 00:00																				Maximum Daily Average: 2.4 C on Nov 28					Hours in Service:	720																						
Minimum Value: -17.7 C on Nov 25 23:00																				Minimum Daily Average: -12.9 C on Nov 22					Hours of Data:	720																						
Maximum Diurnal Average: -1.4 C at hour 15																				Minimum Diurnal Average: -5.1 C at hour 9					Hours of Missing Data:	0																						
Monthly Average: -3.58 C																				Percentiles: P <sub>1</sub> = -14.6 P <sub>10</sub> = -9.9 Q <sub>1</sub> = -5.8 Median = -3.2 Q <sub>3</sub> = -0.5 P <sub>90</sub> = 1.6 P <sub>99</sub> = 4.7					Hours of Calibration:	0																						
																									Percent Operational Time:	100.0																						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Nov	-6.4	-5.8	-5.9	-6.6	-6.7	-7.4	-7.9	-8.0	-7.5	-6.1	-3.0	-0.9	0.1	1.5	0.9	0.6	0.1	-0.1	-0.2	-0.5	-0.9	-0.6	-0.7	-0.7	-3.0	1.5																						
2-Nov	-0.7	-0.5	-0.4	-0.2	-0.4	-0.8	-0.5	-0.6	-0.9	-1.6	-2.1	-2.4	-2.9	-3.4	-4.0	-4.2	-4.6	-5.1	-5.3	-5.4	-5.5	-5.5	-5.7	-6.0	-2.9	-0.2																						
3-Nov	-5.9	-5.7	-5.6	-5.7	-5.7	-5.6	-5.6	-5.4	-5.1	-4.6	-4.1	-3.5	-3.1	-2.8	-2.4	-2.2	-2.1	-2.1	-2.0	-2.2	-2.3	-2.6	-2.8	-2.9	-3.8	-2.0																						
4-Nov	-2.9	-2.9	-2.9	-3.1	-3.4	-3.5	-3.4	-3.2	-3.1	-2.8	-2.5	-2.1	-1.8	-1.7	-1.8	-2.1	-2.5	-3.0	-3.4	-3.7	-3.6	-3.8	-3.8	-3.9	-2.9	-1.7																						
5-Nov	-3.8	-3.7	-3.7	-3.6	-3.6	-3.7	-3.7	-3.7	-3.8	-3.6	-3.1	-2.6	-2.2	-2.0	-2.0	-2.0	-2.3	-2.3	-2.5	-2.7	-2.9	-3.1	-3.6	-3.7	-3.1	-2.0																						
6-Nov	-3.6	-3.6	-3.5	-3.4	-3.2	-3.1	-3.0	-2.9	-3.1	-2.9	-2.1	-1.1	-0.1	0.5	1.0	1.1	1.1	0.9	0.9	1.1	1.2	1.3	1.5	1.5	-1.0	1.5																						
7-Nov	1.5	1.6	1.8	1.9	1.9	2.0	2.0	2.0	2.2	2.5	2.7	3.1	3.1	3.1	3.2	3.1	2.9	2.7	2.5	2.3	2.0	1.3	0.5	0.6	2.2	3.2																						
8-Nov	1.0	1.0	1.0	0.2	-0.3	-0.6	-1.0	-1.3	-1.4	-1.6	-1.6	-1.6	-1.5	-1.4	-1.6	-1.5	-1.9	-2.1	-2.1	-2.2	-2.4	-2.6	-2.7	-2.8	-1.3	1.0																						
9-Nov	-3.1	-3.7	-4.5	-4.0	-3.1	-3.2	-4.7	-5.1	-4.9	-5.3	-4.7	-3.3	-3.1	-2.8	-2.1	-2.7	-3.9	-4.6	-5.3	-5.8	-5.4	-5.8	-6.0	-6.2	-4.3	-2.1																						
10-Nov	-6.3	-6.6	-6.6	-6.4	-6.5	-6.9	-6.7	-6.4	-5.7	-4.4	-2.3	-0.2	1.4	3.5	4.1	3.9	2.6	0.9	0.3	0.0	-1.2	-1.9	-2.4	-3.1	-2.4	4.1																						
11-Nov	-3.9	-5.0	-5.8	-4.6	-4.3	-3.9	-4.4	-4.7	-4.7	-3.9	-2.2	-1.0	-0.2	0.3	0.5	0.6	0.3	-0.6	-2.2	-3.5	-6.1	-5.8	-4.0	-3.7	-3.0	0.6																						
12-Nov	-4.3	-4.4	-4.2	-3.4	-2.4	-3.0	-3.8	-2.6	-1.3	-0.7	0.9	1.9	2.6	3.3	3.1	2.7	1.4	0.3	-0.4	-0.9	-1.9	-5.7	-7.7	-5.9	-1.5	3.3																						
13-Nov	-5.7	-6.1	-6.0	-5.2	-4.7	-5.0	-5.3	-5.1	-4.7	-4.3	-4.0	-3.8	-3.6	-3.6	-3.4	-3.5	-3.6	-3.9	-4.2	-4.1	-4.3	-4.8	-5.0	-5.2	-4.5	-3.4																						
14-Nov	-5.3	-5.2	-5.1	-5.0	-4.8	-4.5	-5.8	-6.6	-6.7	-5.9	-4.3	-2.4	-1.1	0.2	1.0	0.6	-0.8	-1.5	-1.9	-1.9	-3.1	-6.5	-8.0	-6.5	-3.8	1.0																						
15-Nov	-3.5	-2.7	-3.1	-3.2	-3.2	-4.3	-5.8	-6.5	-7.2	-7.1	-6.6	-6.1	-5.7	-5.8	-5.1	-5.8	-7.4	-6.6	-7.0	-8.0	-9.9	-10.7	-10.5	-11.5	-6.4	-2.7																						
16-Nov	-12.0	-12.1	-12.7	-12.4	-10.8	-10.5	-10.6	-10.1	-9.5	-8.7	-6.3	-4.4	-3.3	-3.2	-2.2	-2.7	-2.9	-3.0	-3.1	-3.0	-2.0	0.2	0.0	-0.5	-6.1	0.2																						
17-Nov	0.2	-0.3	-0.4	-1.0	-0.9	-0.7	-0.5	-0.9	-0.9	0.3	1.5	3.0	4.2	4.6	5.3	5.2	3.8	3.2	2.7	1.4	-0.3	-0.9	-1.3	-2.0	1.1	5.3																						
18-Nov	-4.1	-6.0	-5.6	-6.0	-4.7	-4.7	-5.7	-4.7	-4.4	-3.7	-2.1	-0.3	1.1	2.3	3.2	3.1	1.4	-0.1	-0.3	0.2	0.3	-0.3	0.0	0.3	-1.7	3.2																						
19-Nov	0.3	0.2	0.5	0.3	-0.9	-1.7	-3.2	-4.6	-5.5	-4.9	-3.1	-0.3	1.3	0.8	1.1	1.6	0.7	0.3	-0.5	-0.6	0.2	2.0	4.7	7.0	-0.2	7.0																						
20-Nov	6.6	5.5	1.9	-0.6	-2.0	-3.4	-4.9	-6.1	-6.6	-6.3	-5.3	-4.7	-4.4	-4.3	-4.4	-5.4	-6.9	-8.0	-8.4	-8.9	-9.4	-10.1	-10.6	-10.9	-4.9	6.6																						
21-Nov	-11.4	-10.6	-9.9	-9.3	-9.5	-9.7	-9.8	-9.6	-9.4	-9.3	-9.2	-8.8	-8.0	-8.0	-7.6	-7.7	-8.0	-8.3	-9.0	-9.6	-9.8	-10.2	-10.3	-10.5	-9.3	-7.6																						
22-Nov	-10.9	-11.1	-11.1	-11.1	-11.5	-11.8	-12.7	-14.4	-15.5	-15.3	-14.7	-13.7	-13.3	-13.3	-13.1	-13.2	-13.2	-13.0	-13.0	-12.9	-12.8	-12.8	-12.9	-12.9	-12.9	-10.9																						
23-Nov	-12.8	-12.7	-12.5	-12.4	-12.0	-11.7	-11.4	-10.9	-10.5	-9.9	-9.4	-8.6	-7.8	-6.8	-5.8	-5.9	-7.5	-9.5	-9.7	-8.6	-5.9	-4.3	-2.9	-2.0	-8.8	-2.0																						
24-Nov	-1.5	-0.7	0.3	0.4	0.3	-0.3	-1.1	-0.8	-0.9	-0.6	0.5	2.7	4.0	4.9	4.7	3.9	2.5	0.2	-0.9	-0.6	-0.9	-0.6	-1.2	-2.2	0.5	4.9																						
25-Nov	-3.0	-2.9	-2.6	0.6	0.4	-0.6	-1.1	-2.3	-2.2	-3.1	-4.2	-4.2	-4.1	-4.0	-4.2	-4.9	-6.9	-9.0	-11.2	-14.3	-15.8	-17.1	-17.7	-17.6	-6.3	0.6																						
26-Nov	-14.9	-12.5	-12.2	-12.2	-12.5	-12.8	-12.9	-13.3	-14.2	-13.3	-13.3	-12.6	-11.2	-10.1	-9.3	-8.3	-8.1	-7.7	-7.8	-7.2	-5.7	-3.9	-4.4	-6.7	-10.3	-3.9																						
27-Nov	-8.0	-6.5	-5.3	-6.4	-8.3	-9.6	-8.8	-8.3	-7.9	-7.6	-6.6	-5.4	-4.6	-3.4	-1.9	-0.1	0.4	1.4	1.0	3.0	4.0	4.1	3.8	3.5	-3.2	4.1																						
28-Nov	2.9	2.3	1.2	1.0	0.2	0.1	-0.3	-0.3	-0.5	0.6	2.2	3.6	4.2	4.9	4.6	4.1	3.6	3.3	3.8	3.8	3.5	2.9	3.3	2.7	2.4	4.9																						
29-Nov	1.4	0.3	-0.4	-1.0	-1.5	-2.0	-2.3	-2.4	-3.1	-2.8	-2.3	-1.7	-1.3	-0.5	0.0	0.1	-0.2	-0.4	-0.9	-1.4	-1.3	-1.5	-1.9	-2.3	-1.2	1.4																						
30-Nov	-2.9	-4.0	-4.3	-5.1	-5.2	-4.7	-4.0	-4.3	-4.9	-5.2	-4.8	-4.4	-3.4	-3.8	-3.8	-4.5	-4.8	-4.8	-4.4	-4.3	-4.3	-4.5	-5.2	-6.5	-4.5	-2.9																						
																								-4.1	-4.1	-4.3	-4.3	-4.3	-4.6	-5.0	-5.1	-5.1	-4.7	-3.9	-2.9	-2.2	-1.7	-1.4	-1.5	-2.2	-2.7	-3.1	-3.4	-3.6	-3.8	-3.9	-4.0	Diurnal Average
																								6.6	5.5	1.9	1.9	1.9	2.0	2.0	2.0	2.2	2.5	2.7	3.6	4.2	4.9	5.3	5.2	3.8	3.3	3.8	3.8	4.0	4.1	4.7	7.0	Diurnal Maximum



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

**Ambient Temperature (AT) - C**  
**Patricia McInnes - November 2023**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C  
Patricia McInnes - November 2023**

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	0	0.00	0.00
-20 - 0	571	79.31	79.31
0 - 10	149	20.69	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



**Wood Buffalo Environmental Association**

**Summary of Hour Averages**

**Relative Humidity (RH) - %**

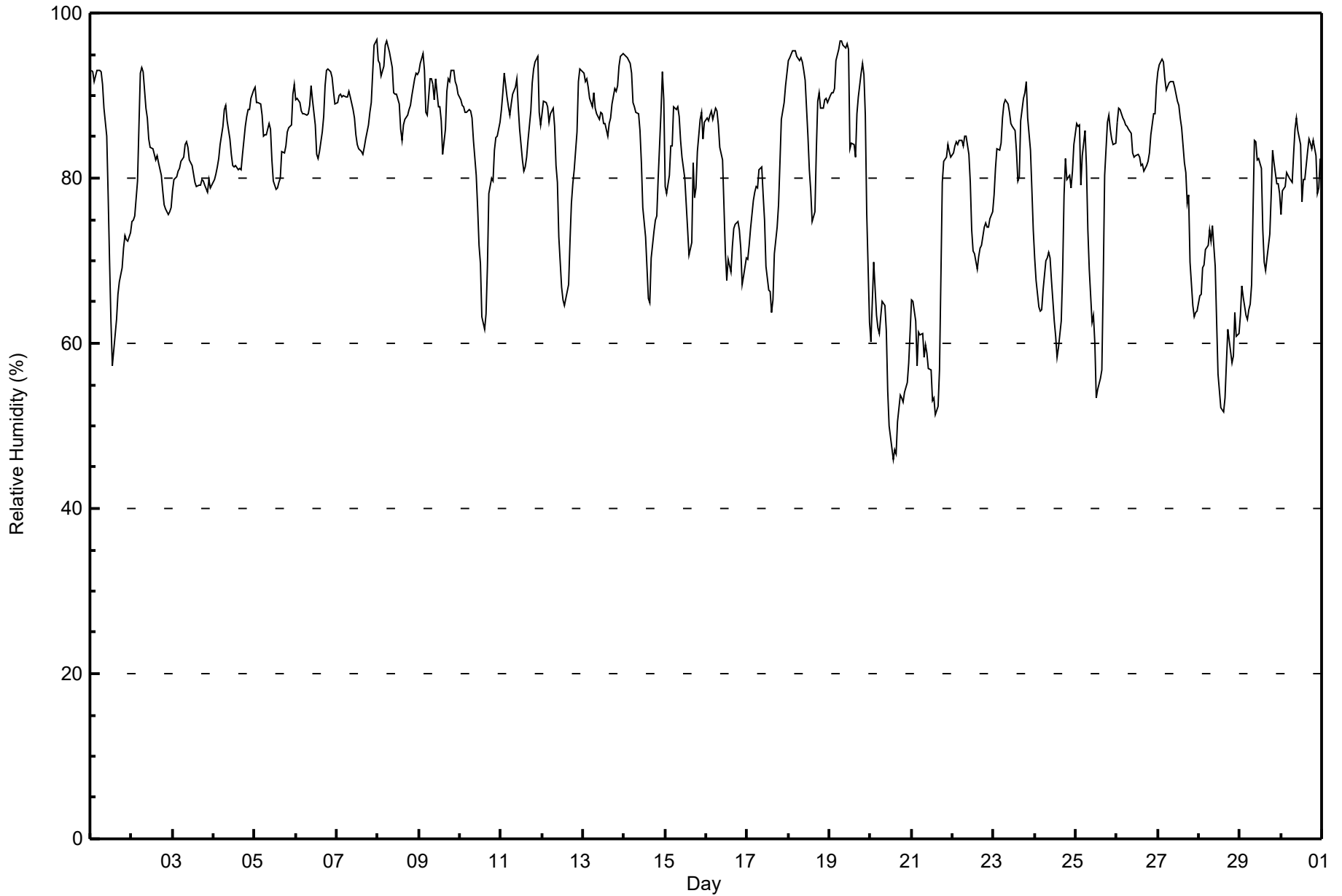
**Patricia McInnes - November 2023**

Maximum Value: 96.8 % on Nov 8 00:00      Maximum Daily Average: 91.1 % on Nov 8																						Hours in Service:	720			
Minimum Value: 45.9 % on Nov 20 14:00      Minimum Daily Average: 56.9 % on Nov 20																						Hours of Data:	720			
Maximum Diurnal Average: 84.8 % at hour 7      Minimum Diurnal Average: 72.3 % at hour 15																						Hours of Missing Data:	0			
Monthly Average: 80.73 %      Percentiles: P <sub>1</sub> = 51.7 P <sub>10</sub> = 63.7 Q <sub>1</sub> = 74.6 Median = 83.4 Q <sub>3</sub> = 88.7 P <sub>90</sub> = 92.5 P <sub>99</sub> = 96.1																						Hours of Calibration:	0			
																						Percent Operational Time:	100.0			
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	93.1	92.9	91.7	92.5	93.1	93.1	92.9	91.3	88.4	85.1	77.9	69.9	62.7	57.4	60.9	62.8	65.9	67.5	69.1	71.5	73.0	72.5	72.4	73.4	78.0	93.1
2-Nov	74.8	75.0	75.5	79.7	86.3	92.8	93.3	92.9	88.5	87.2	84.7	83.7	83.5	83.0	82.3	82.7	81.9	80.3	78.5	76.8	76.3	75.5	75.9	76.5	82.0	93.3
3-Nov	78.4	79.8	80.2	80.8	81.1	82.1	82.5	84.0	84.5	83.8	82.3	81.5	80.5	79.5	79.1	79.1	79.9	79.6	79.1	78.3	79.9	78.7	79.1	80.5	84.5	90.7
4-Nov	79.8	80.5	81.3	82.4	84.0	86.2	88.3	88.9	86.9	84.7	82.8	81.6	81.4	81.6	81.0	81.2	81.0	82.9	86.3	87.5	88.4	88.3	89.7	90.7	84.5	90.7
5-Nov	91.1	89.2	89.2	89.0	87.6	85.2	85.3	85.2	86.7	86.0	82.3	79.7	78.6	78.8	79.4	80.0	83.2	83.1	83.9	85.6	86.2	86.4	90.1	91.4	85.1	91.4
6-Nov	89.5	89.6	89.1	88.2	87.7	87.8	87.6	87.7	88.9	91.3	89.5	86.4	82.9	82.4	83.3	85.6	87.4	91.1	93.0	93.2	92.9	92.2	90.6	89.0	88.6	93.2
7-Nov	89.1	90.0	90.1	89.9	90.1	89.9	89.8	90.6	89.8	88.4	87.3	85.2	84.1	83.6	83.2	82.9	83.8	84.8	86.5	87.9	89.2	92.7	96.1	96.8	88.4	96.8
8-Nov	94.3	94.0	92.4	93.5	96.1	96.7	95.9	95.2	93.4	90.4	90.1	90.2	89.0	85.9	84.6	86.5	87.2	87.6	88.3	88.8	90.1	92.1	92.7	92.5	91.1	96.7
9-Nov	92.8	93.8	95.1	93.1	87.9	87.6	92.1	92.0	91.4	89.5	92.0	88.6	88.7	87.0	82.9	85.9	90.5	92.0	91.7	93.0	93.0	91.7	91.3	90.2	90.6	95.1
10-Nov	89.4	88.9	88.7	88.0	88.0	88.3	88.2	87.3	84.6	80.3	76.5	71.9	69.6	63.2	61.7	63.6	69.3	78.1	80.1	79.7	83.3	85.0	85.1	86.7	80.2	89.4
11-Nov	88.3	90.4	92.8	89.8	88.6	87.6	89.1	90.2	91.0	92.0	88.6	85.9	82.2	80.9	81.4	82.6	84.6	88.2	91.5	93.2	94.1	94.7	88.0	86.4	88.4	94.7
12-Nov	87.7	89.3	89.2	88.7	86.7	87.7	88.5	86.2	81.6	79.5	72.9	66.9	65.2	64.6	65.3	67.2	72.3	77.0	79.3	81.0	85.6	91.7	93.2	93.0	80.8	93.2
13-Nov	92.8	91.7	92.1	91.1	89.6	88.7	90.4	88.5	87.7	87.2	87.9	87.8	86.6	86.7	85.2	86.7	87.2	89.0	90.9	90.5	91.1	93.5	94.8	95.1	89.7	95.1
14-Nov	95.0	94.7	94.6	93.8	92.7	89.1	88.7	88.0	87.8	85.7	81.9	76.4	72.8	69.1	65.5	64.9	70.3	73.5	75.0	75.4	80.0	88.0	92.9	89.5	82.7	95.0
15-Nov	79.0	78.1	80.4	83.9	84.0	88.7	88.3	88.7	87.4	84.6	82.5	80.0	76.9	74.0	70.8	72.2	81.8	77.7	78.9	83.1	87.1	87.9	84.8	86.8	82.0	88.7
16-Nov	87.3	86.9	87.6	88.1	87.1	88.4	88.2	86.4	83.7	82.2	76.6	71.0	67.5	70.2	68.6	71.7	73.9	74.4	74.8	73.7	71.5	67.1	68.1	70.3	77.7	88.4
17-Nov	70.1	71.9	73.9	77.4	78.4	79.0	78.8	81.0	81.4	78.0	74.9	69.3	66.5	66.3	63.8	65.2	70.9	74.1	76.7	81.9	87.2	89.1	91.2	92.7	76.6	92.7
18-Nov	94.2	94.5	95.4	95.4	95.5	94.8	94.2	94.7	94.1	93.1	91.8	85.0	81.0	78.4	74.8	75.9	83.3	89.4	90.4	88.4	88.5	89.5	89.7	89.2	89.2	95.5
19-Nov	90.1	90.4	90.4	90.8	94.2	95.7	96.6	96.6	96.1	95.7	96.2	95.6	83.6	84.3	84.2	82.5	87.9	89.8	92.6	93.9	92.5	87.6	75.8	62.5	89.4	96.6
20-Nov	60.1	65.1	69.9	63.3	61.8	61.1	63.1	65.1	64.6	61.5	54.3	50.0	47.4	45.9	47.1	46.7	50.4	53.7	53.3	53.0	54.1	55.2	57.6	61.3	56.9	69.9
21-Nov	65.2	65.1	62.7	57.3	61.4	60.9	61.2	58.3	59.9	58.7	56.9	56.8	53.0	53.3	51.3	52.3	56.7	68.0	79.5	82.0	82.5	84.0	83.2	82.6	64.7	84.0
22-Nov	83.0	83.9	84.5	84.1	84.5	84.6	83.9	85.2	85.1	82.9	79.5	73.7	71.2	70.9	69.0	70.4	71.5	71.9	74.0	74.6	74.1	74.1	75.1	76.0	77.8	85.2
23-Nov	77.9	81.2	83.6	83.4	84.3	87.3	89.0	89.4	88.9	87.9	86.6	86.3	85.7	83.2	79.6	80.1	86.9	89.6	90.3	91.6	87.3	83.4	78.6	73.7	84.8	91.6
24-Nov	70.4	67.7	64.3	63.9	64.0	66.4	70.0	70.3	70.9	70.4	67.7	62.6	60.8	58.3	59.5	62.6	68.9	78.0	82.4	79.9	80.4	78.8	80.9	84.0	70.1	84.0
25-Nov	86.6	86.2	86.5	79.2	82.7	85.8	81.4	73.7	68.9	62.6	63.3	60.0	53.4	54.4	55.8	56.9	67.6	80.3	86.8	87.6	86.0	84.8	84.1	84.3	75.0	87.6
26-Nov	86.8	88.6	88.3	87.3	86.9	86.5	86.3	86.0	85.5	83.0	82.5	82.8	82.8	82.5	81.6	81.6	80.9	81.5	82.1	83.1	85.2	87.8	87.8	91.2	84.9	91.2
27-Nov	93.0	93.7	94.4	94.0	92.1	90.6	91.5	91.6	91.7	91.8	91.1	89.3	88.9	87.3	86.0	81.9	80.7	76.9	77.9	69.8	64.6	63.3	63.8	63.9	83.7	94.4
28-Nov	65.7	65.8	69.2	69.5	71.3	71.9	73.7	72.4	74.3	69.3	62.7	56.3	54.2	52.1	51.7	53.4	57.6	61.7	59.0	57.6	58.5	63.8	60.9	61.3	63.1	74.3
29-Nov	63.4	67.0	65.6	63.3	62.9	64.0	64.7	67.1	84.5	84.4	82.3	82.4	81.2	73.7	69.8	68.8	70.3	73.2	77.9	83.4	81.9	79.3	79.3	78.2	73.7	84.5
30-Nov	75.6	78.5	79.0	80.7	80.3	80.0	79.5	82.9	85.9	87.3	85.8	84.1	77.1	79.9	79.9	83.2	84.7	84.2	83.6	84.6	82.7	78.1	78.7	82.4	81.6	87.3
																						Diurnal Average				
																						Diurnal Maximum				



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

**Relative Humidity (RH) - %**  
**Patricia McInnes - November 2023**







Maximum Speed: 36 km/h on Nov 20 04:00	Maximum Daily Speed Average: 19.2 km/h on Nov 20	Hours in Service: 720
Minimum Speed Value: 0 km/h on Nov 19 10:00	Minimum Daily Speed Average: 3.6 km/h on Nov 19	Hours of Data: 720
Maximum Diurnal Speed Average: 5.3 km/h at hour 2	Minimum Diurnal Speed Average: 0.7 km/h at hour 18	Hours of Missing Data: 0
Monthly Average Velocity: 2.4 km/h 245.9 deg	Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 4 Q <sub>1</sub> = 6 Median = 9 Q <sub>3</sub> = 13 P <sub>90</sub> = 19 P <sub>99</sub> = 27	Percent Operational Time: 100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	SW4	SSW6	SSW6	SSW4	S4	S5	SSW6	S6	SSW7	SSW8	S7	S9	S9	S9	S8	SW10	SW9	SW4	SW5	SSW6	SSW7	S7	S5	S6	SSW6.3	SW10
2-Nov	S5	S6	SSW7	NW4	N6	N8	N12	N11	N17	N19	NNE15	NNE15	NNE15	NNE16	NNE16	NNE12	NNE12	NE9	NE8	E6	ESE6	ENE7	E7	ESE7	NNE7.4	N19
3-Nov	S6	ESE7	ESE8	SE7	SE8	SE7	ESE5	SE6	SE7	SE4	NE5	NNE4	N9	NNE10	N8	N8	N8	N6	NE7	E7	ENE7	NE8	NE7	NE7	ENE4.1	NNE10
4-Nov	ENE5	ENE8	E7	ENE8	E8	E10	ESE8	E8	E10	ESE11	ESE13	ESE12	ESE14	ESE14	ESE15	ESE14	E15	ESE16	E16	E13	E11	ENE10	ENE11	E11.2	ESE16	
5-Nov	ENE10	E11	E9	ENE7	ENE10	E11	E10	ENE8	E10	E10	E10	E10	E8	E8	E9	E10	E8	E8	ESE7	ESE9	ESE8	ESE11	ESE9	ESE10	E8.8	E11
6-Nov	SE10	SE10	SE12	SE12	SE10	SE10	SE11	SE12	SE12	ESE12	ESE10	ESE10	ESE11	ESE11	ESE12	ESE12	ESE11	SE11	SE10	SE8	SE6	SSE7	S8	S9	SE9.8	ESE12
7-Nov	SSW8	SSW7	SSW8	SW9	SW6	SW6	S3	SE4	SE4	SSE6	SSE7	S9	SSW9	SSW8	SW8	SSW6	SW6	SSW7	SSW9	SW8	SSW7	SW9	S6	SSW7	SSW6.5	SW9
8-Nov	WSW12	W13WNW21	NW18	NW10	NW12WNW10	W12WNW14WNW19	NW19	NW18	NW19	NW22	NW22	NW18	NW17	NW16	NW15	NW16	NW13	NW11	NW9	WNW8	WNW14.6	NW22	NW22	WNW14.6	NW22	
9-Nov	WNW7	WNW4	W4	WNW4	N3	SSE1	SW7	SSW6	S6	S9	S10	SE9	SE9	SE12	SE9	SE10	SE13	SE14	SE12	SE11	SE13	SE11	SE12	SE11	SE6.3	SE14
10-Nov	SE12	SE12	SE13	SE15	SE13	SE12	SE13	SE15	SE13	SE11	SE8	SE9	SE8	S11	S13	S10	SSE10	SSE7	S10	S9	S9	SSE9	SSE10	SSE9	SSE10.2	SE15
11-Nov	SE8	S7	SE8	SE11	ESE15	ESE18	SE17	ESE19	SE20	ESE21	SE19	SE17	SE18	SE12	ESE13	SE10	SE7	SE6	SSE4	SE4	S4	SSW7	SW12	S6	SE10.8	ESE21
12-Nov	SSW7	SSW10	SSW9	SW8WSW14WSW11	SW7	W8	W13	W18	W21WNW23	W21	W19	W20	W18	WSW8	WSW9WSW10	WSW6	SW6	WSW4	WNW4	NNW8	W10.6	WNW23	WNW23	W10.6	WNW23	
13-Nov	N8	NW7	NW5	N4	ENE5	ESE6	E4	NE6	NE9	NE9	NE10	NE12	NE18	NE14	NNE11	N9	N10	N9	N8	NNW11	NNW13	NNW13	NNW12	NNE7.7	NE18	
14-Nov	NW12	WNW9	WNW8	WNW8	WNW4WSW10	SW12	SW12	SW14	SW10	SW12	SW10WSW14	WSW12	WSW14WSW13	WSW8	WSW9WSW14	WSW9	S5	S4	S3	SW7	WSW8.4	WSW18	WSW18	WSW8.4	WSW18	
15-Nov	SW11	SW10	SSW2	ENE2	N5	NNW10	NNW18	NNW19	NNW18	NNW15	NNW14	NW11	NW13	SW13	NW11	W7	SW4	SW6	WSW5	NW6	WNW4	WNW7	W7	WSW7	NNW7.0	NNW19
16-Nov	WSW10WSW12	SW6WSW11	SSW5	SSE5	SE7	SE7	SE9	SE8	SE7	SE7	SE6	ESE8	ESE7	ESE7	SE6	SSE4	SSW5	SW7	SW6WSW14WSW17WSW19	SSW5.0	WSW19	WSW19	SSW5.0	WSW19		
17-Nov	WSW21WSW23WSW21	WSW19WSW22WSW23WSW22WSW18WSW20WSW22WSW22WSW16WSW14WSW12	SW5	W10	W11WSW11	S3	S4	SSW7	SSW8	SW6	WSW14.7	WSW23	WSW23	WSW14.7	WSW23											
18-Nov	S3	SSW4	S6	S5	SSE6	S6	SSW4	S5	SSE5	S7	SSE6	SSE7	S7	SSE8	SSE6	SSE7	S3	ESE3	S5	S3	SSE5	WNW2	SSW4	SSE1	S4.7	SSE8
19-Nov	S2	WSW3	SSE7	SE3	SSW2	SW1	WSW1	WSW3	W3	W0	SW3	SW4	E5	SSE4	S5	S3	S3	SSW4	SSE5	S4	SSW8	SSW9WSW16	W21	SW3.6	W21	
20-Nov	W20	W28WNW33WNW36WNW33WNW30WNW27WNW19WNW17	W24WNW22	W24WNW26WNW24WNW22WNW18	NW11	NW9	NW10	NW8WNW10WSW11WSW11	SW7	WNW19.2	WNW36	WNW36	WNW19.2	WNW36												
21-Nov	WSW7	W6	NNW3	E4	E8	ESE9	ESE10	E11	E12	ENE13	E15	E15	E10	NE11	ENE11	NE12	NE11	NNE11	N14	NNW15	NNW16	N16	N15	N15	NE7.3	NNW16
22-Nov	N15	N13	N14	N14	N10	N10	N13	N11	NNW8	N9	NNE9	NE6	NNE7	NE8	NNW3	WNW3	NNW3	ENE5	SE5	SE6	ESE7	SE8	SE9	SE10	NNE5.4	N15
23-Nov	ESE13	SE10	SE9	SE12	SE13	SE12	SE10	SE9	SE8	SE9	SE7	SE6	SE6	SE5	SSE6	SSE6	SSE5	SSE5	S5	SW8	SW11	SW13	SW17	SW20	SSE7.2	SW20
24-Nov	SW21	SW25	SW27	SW26	SW25	SW20	SW16	SW17	SW9	SW11	SW8WSW12	W11	W9	WSW9	WSW9	SW7	S3	SSW7	SW12	SW11	SW15	SW12	SSW12	SW13.4	SW27	
25-Nov	SSW11	S6	WSW7	NW14	NNW15	N15	N25	N24	NNW22	NNW30	NNW25	NNW20	NNW20	NNW17	NNW17	NNW19	N11	N7	NW4	W5	W2	WSW4	W3	SW3	NNW11.2	NNW30
26-Nov	SE1	ESE5	SE4	ESE4	ESE4	NE1	SE1	S4	ESE2	ESE5	SE6	S5	S7	SSE6	SE4	SSE5	SE4	SSE4	SE4	S4	SW9	SW11	SSE3	SSE4	SSE3.6	SW11
27-Nov	S4	SSW7	SW7	SSW4	SE4	SSE3	SE6	SE6	SE7	SE7	SSE7	SSE7	SE6	SSE5	SE6	S8	SSW8	SW11	SSW8	W19	W23	W23	W23WSW22	SW5.9	W23	
28-Nov	WSW22WSW17WSW17WSW22WSW23WSW21WSW24WSW21WSW22	W24	W23	W22	W21	W20WSW16	W17	W8	WNW6WNW17WNW19	W16	W18WNW19WNW18	W18.3	WSW24	W18.3	WSW24											
29-Nov	W16	W19	W17WNW12	W12WNW15WNW15WNW17WNW15WNW15WNW13WNW10WNW14WNW18WNW20WNW20WNW18WNW14WNW15	WNW9WNW13	NW15WNW15WNW14	WNW14.9	WNW20	WNW14	WNW14	WNW14.9	WNW20														
30-Nov	WNW14WNW12WNW10WNW11	W11	W10WNW10	N5	NNE4	NNW5	ENE2	SE1	WNW7	NNE7	NNE5	NE4	W4	W3	SSE2	SE4	SSW5	SW6	WSW5	SW10	WNW4.1	WNW14	WNW4.1	WNW14		

WSW4.7WSW5.3WSW4.6WSW3.7WSW2.4WSW2.2WSW2.1	W1.2WSW1.3	W1.6	W1.3WSW1.7	W1.8WNW1.5	W1.7	W1.9	W0.9	SW0.7	SW1.9	SW2.1	SW2.8WSW3.9WSW4.1	SW4.2	Diurnal Average
WSW22	W28WNW33WNW36WNW33WNW30WNW27	N24	WSW22NNW30	NNW25	W24WNW26WNW24	NW22WNW20WNW18	NW16WNW17WNW19	W23	W23	W23	WSW22	Diurnal Maximum	

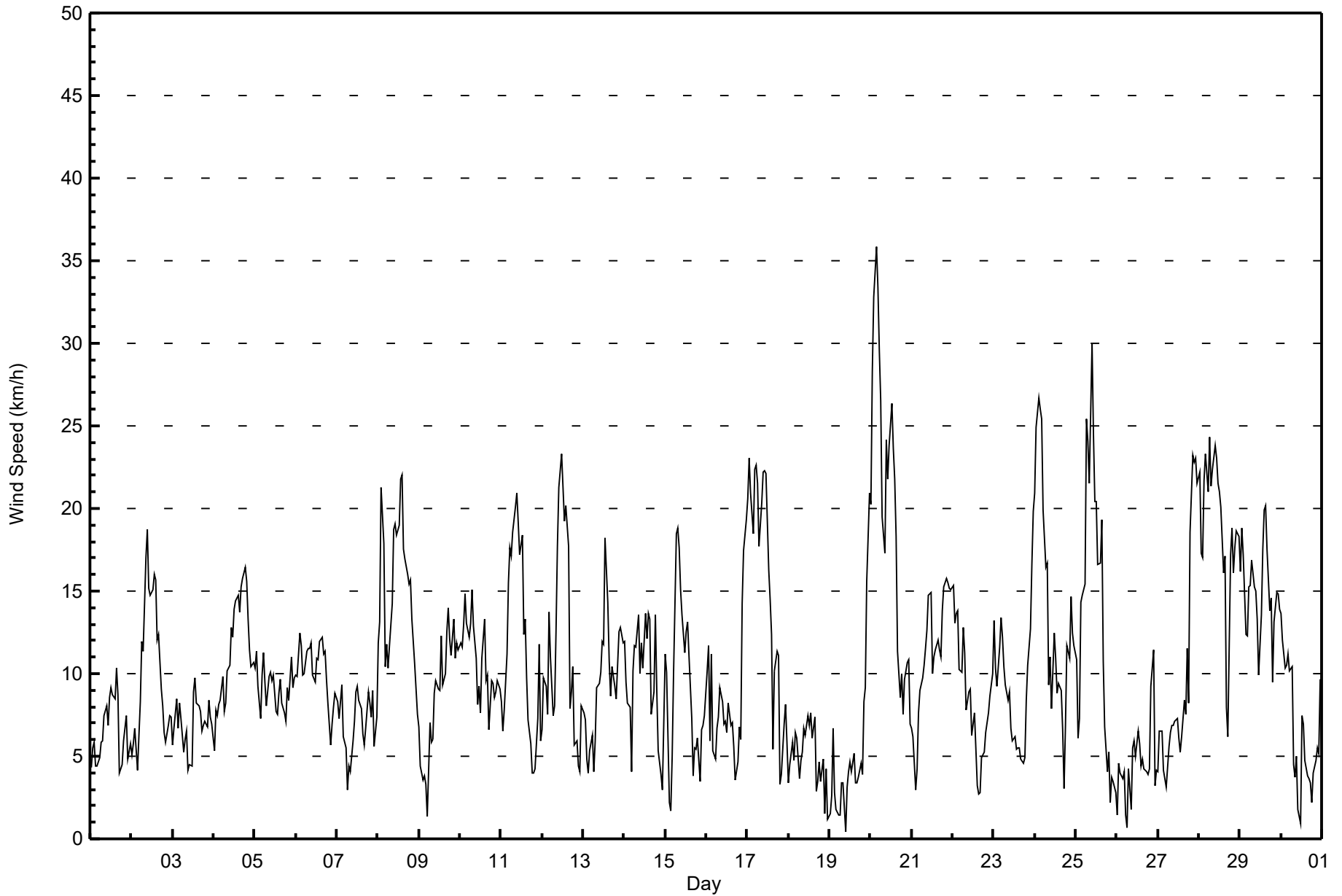
All monthly, daily, and diurnal averages have been calculated using vector methods



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

**Wind Speed (WS) - km/h**  
**Patricia McInnes - November 2023**

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





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

**Wind Speed (WS) - km/h**  
**Patricia McInnes - November 2023**

<b>Wind Speed Ranges (km/h)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	136	18.89	18.89
6 - 11	339	47.08	65.97
12 - 19	180	25.00	90.97
20 - 28	60	8.33	99.31
29 - 38	5	0.69	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Wind Speed (WS) - km/h  
Patricia McInnes - November 2023**

<b>Wind Speed Ranges (km/h)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 5	4	3	2	6	3	7	16	19	27	11	9	7	8	7	3	4	136
6 - 11	18	6	14	12	25	25	58	20	31	32	36	20	11	15	11	5	339
12 - 19	13	7	5	2	5	17	26	0	1	1	13	20	14	26	16	14	180
20 - 28	2	0	0	0	0	1	1	0	0	0	7	18	16	9	2	4	60
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	1	5
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	<b>37</b>	<b>16</b>	<b>21</b>	<b>20</b>	<b>33</b>	<b>50</b>	<b>101</b>	<b>39</b>	<b>59</b>	<b>44</b>	<b>65</b>	<b>65</b>	<b>49</b>	<b>61</b>	<b>32</b>	<b>28</b>	<b>720</b>

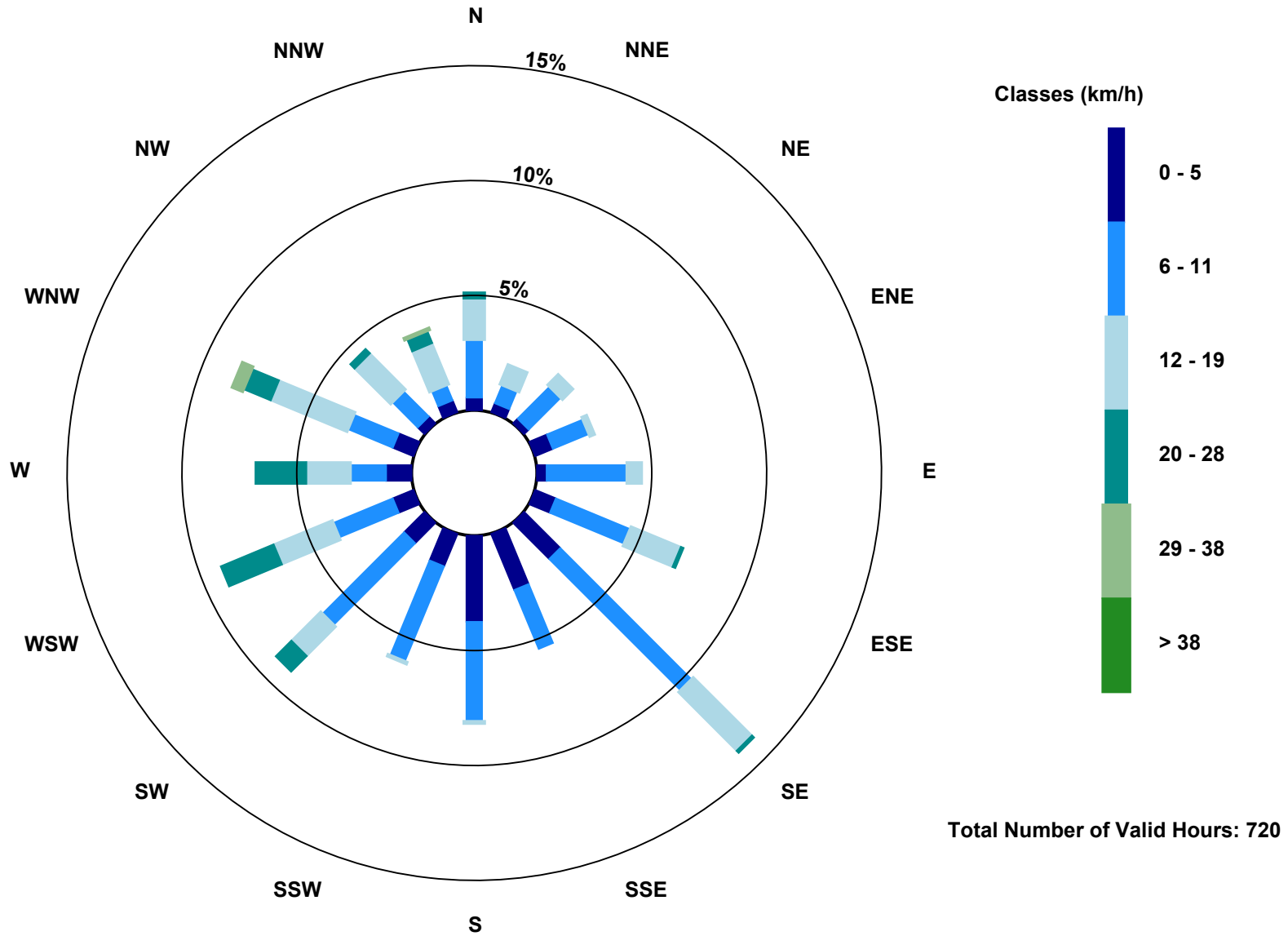
Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 2023

Wind Speed (WS) - km/h  
Patricia McInnes





**Wood Buffalo Environmental Association**

**Summary of Hour Averages**

**Wind Direction (WD) - deg**

**Patricia McInnes - November 2023**

Direction of Maximum Speed: 292 deg on Nov 20 04:00																		Hours in Service: 720	
Direction of Maximum Daily Speed Average: 286.8 deg on Nov 20																		Hours of Data: 720	
Direction of Minimum Speed: 269 deg on Nov 19 10:00									Direction of Minimum Daily Speed Average: 3.6 deg on Nov 19									Hours of Missing Data: 0	
Monthly Average Direction: 245.9 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-Nov	224	209	213	198	169	190	193	186	196	209	187	175	186	191	189	222	222	220	218	198	193	183	174	176	196.7
2-Nov	180	191	213	316	6	6	0	352	9	5	15	15	21	23	20	27	19	40	52	93	121	68	89	122	24.9
3-Nov	178	123	105	136	126	138	116	133	139	144	47	25	6	13	3	352	8	8	45	80	57	36	49	51	65.7
4-Nov	63	78	87	77	83	97	102	89	97	107	111	112	106	112	105	104	101	103	104	97	94	82	76	77	96.8
5-Nov	75	80	79	59	72	82	87	77	81	87	91	89	93	84	85	89	92	99	115	118	109	117	123	119	91.6
6-Nov	126	127	124	127	125	126	125	128	132	123	122	118	122	116	120	118	121	124	129	136	145	162	179	191	129.4
7-Nov	203	198	204	222	220	216	169	134	144	158	164	190	192	213	214	210	224	206	210	219	213	224	189	211	202.1
8-Nov	243	259	294	311	318	307	288	281	298	303	304	309	306	311	310	308	311	307	306	311	313	319	319	303	302.8
9-Nov	300	302	263	291	8	158	219	209	186	182	174	141	140	128	124	125	128	130	132	130	129	137	136	133	144.8
10-Nov	133	133	131	130	132	135	136	135	142	140	145	132	133	176	181	171	166	168	181	183	169	167	161	150	149.4
11-Nov	146	181	138	125	123	117	125	121	127	123	125	130	132	127	121	140	132	140	168	133	179	205	224	176	134.8
12-Nov	192	203	208	235	249	241	214	267	272	267	279	282	272	268	267	264	256	250	252	246	231	251	284	335	259.4
13-Nov	349	312	313	350	74	102	80	38	50	50	47	46	48	34	36	13	356	3	3	355	344	339	338	329	15.4
14-Nov	310	296	286	286	293	248	235	223	228	219	218	219	241	229	250	253	258	242	254	237	187	180	181	216	243.3
15-Nov	232	235	207	64	350	347	334	346	343	342	333	312	320	309	307	277	214	225	249	309	289	294	272	248	309.7
16-Nov	252	248	235	238	213	159	128	131	137	140	141	130	125	121	122	120	126	158	208	223	216	246	245	243	194.6
17-Nov	248	246	245	243	249	246	247	248	246	248	251	250	242	241	241	236	264	265	248	187	173	213	209	215	244.4
18-Nov	183	196	191	182	158	169	193	180	168	178	155	154	171	149	165	159	190	116	174	170	160	288	195	162	169.9
19-Nov	174	247	157	142	204	232	251	252	270	269	233	231	90	157	182	181	172	193	162	177	205	204	254	261	215.2
20-Nov	259	274	285	292	294	291	288	299	282	277	285	281	302	301	286	300	307	311	315	307	286	257	246	221	286.8
21-Nov	249	260	348	85	99	112	110	91	84	78	79	87	86	48	64	51	41	13	359	346	346	355	1	357	42.5
22-Nov	359	2	1	3	356	1	4	350	340	358	25	36	24	39	333	292	332	73	125	125	120	136	131	129	20.8
23-Nov	123	126	134	128	129	127	131	133	127	134	143	137	138	130	150	157	159	160	173	218	217	217	222	226	158.2
24-Nov	227	229	231	235	230	228	219	232	232	226	224	257	272	278	252	245	231	171	205	222	232	232	215	207	231.3
25-Nov	198	187	250	306	339	355	355	357	334	339	340	330	337	335	340	330	355	9	318	270	276	254	271	233	333.2
26-Nov	145	116	134	120	119	56	138	189	115	103	140	178	174	150	135	156	128	147	139	189	218	217	161	148	157.4
27-Nov	190	208	221	201	141	153	143	138	143	135	151	151	138	164	144	182	204	230	212	271	281	273	260	257	223.0
28-Nov	254	251	243	253	249	255	256	256	255	259	266	266	270	263	255	263	270	289	286	298	279	267	290	293	264.6
29-Nov	280	269	276	291	279	290	290	300	293	292	297	293	283	287	291	290	289	293	297	302	295	304	299	298	290.3
30-Nov	300	289	289	291	280	274	288	4	28	336	59	142	299	22	28	40	265	268	154	131	201	236	243	229	289.2

236.8 237.1 239.1 256.4 245.3 239.1 251.9 259.2 246.2 262.6 260.5 249.1 277.1 294.4 270.3 264.1 261.7 228.5 232.6 235.6 232.9 241.2 239.7 235.0

Diurnal Average

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

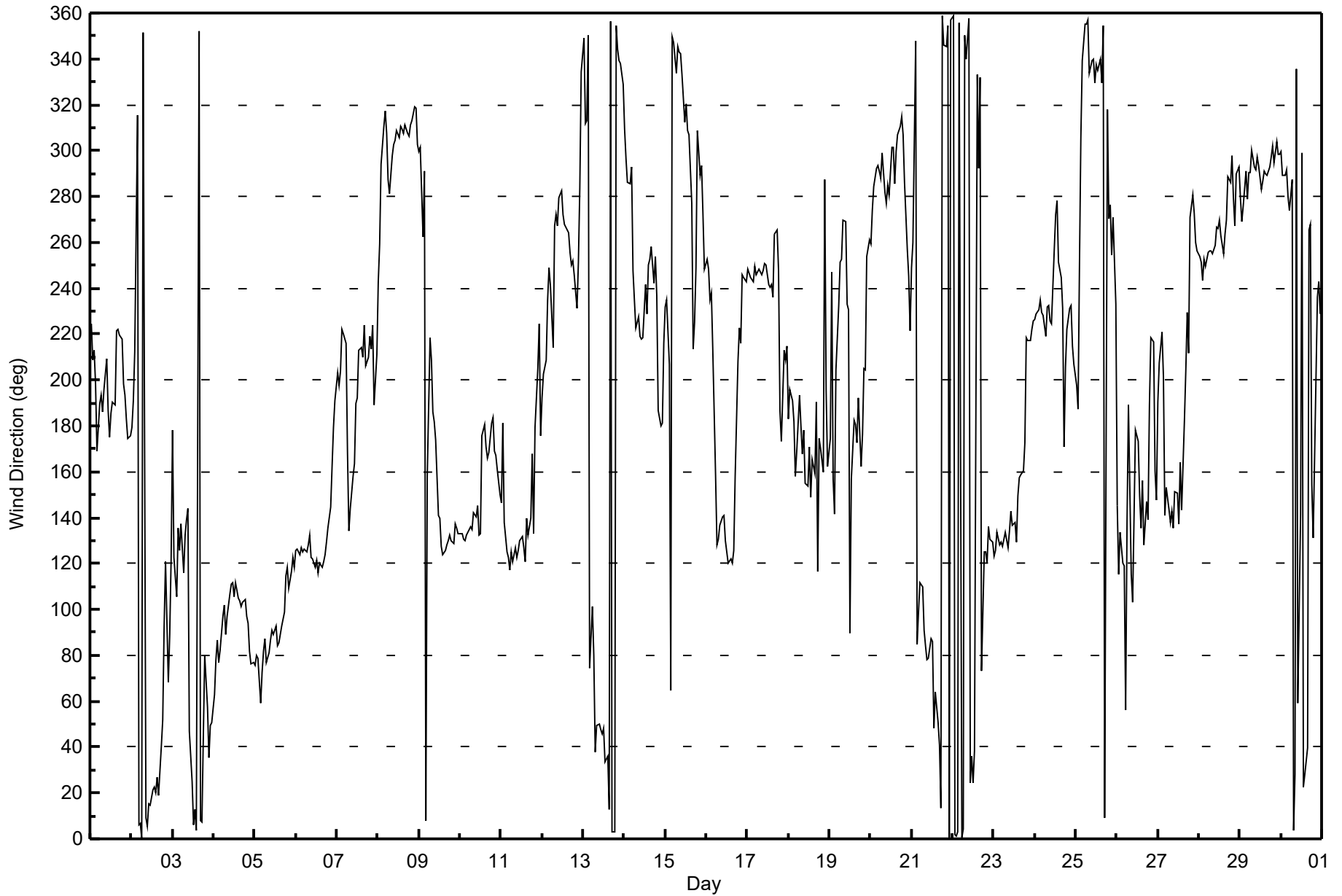


**Wood Buffalo Environmental Association**  
**Summary of Hour Standard Deviations**

**Wind Direction (WD) - deg**  
**Patricia McInnes - November 2023**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 86 deg on Nov 26 06:00															Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0										
Minimum Value: 6 deg on Nov 16 01:00																									
Percentiles: P <sub>1</sub> = 8 P <sub>10</sub> = 10 Q <sub>1</sub> = 11 Median = 14 Q <sub>3</sub> = 18 P <sub>90</sub> = 29 P <sub>99</sub> = 72																									
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Nov	18	14	12	36	19	17	16	15	16	13	20	15	17	16	12	12	9	15	18	19	16	13	17	11	36
2-Nov	13	12	16	47	12	21	16	15	13	16	14	15	13	11	15	15	13	17	18	22	18	23	19	30	47
3-Nov	20	17	19	21	16	16	19	16	18	44	28	43	16	15	22	18	12	16	17	18	17	12	14	11	44
4-Nov	20	15	14	14	12	13	14	13	13	15	12	13	14	14	13	13	15	13	13	12	14	13	11	11	20
5-Nov	15	11	12	18	14	13	12	15	12	13	13	13	15	13	12	13	12	13	18	13	12	13	15	13	18
6-Nov	16	16	15	14	14	14	12	13	16	12	16	14	15	12	13	12	12	12	13	12	14	13	13	13	16
7-Nov	15	14	15	13	18	16	31	12	13	14	16	18	24	19	16	16	13	13	15	13	15	11	12	20	31
8-Nov	10	11	18	10	11	10	13	11	11	9	9	10	9	10	10	10	9	9	10	10	10	11	10	10	18
9-Nov	7	9	24	37	52	72	18	18	21	14	19	17	17	14	15	14	12	11	11	12	12	12	12	10	72
10-Nov	11	12	11	11	12	11	11	12	16	20	17	16	14	21	12	12	13	13	10	10	9	9	11	11	21
11-Nov	11	28	27	14	13	13	14	13	13	13	13	17	14	14	13	15	14	29	33	21	18	12	21	27	33
12-Nov	34	11	11	17	10	12	23	41	12	10	11	11	11	11	10	10	10	11	12	36	17	17	26	11	41
13-Nov	12	19	20	41	22	18	22	19	14	13	13	11	13	11	13	12	15	14	17	19	16	8	12	9	41
14-Nov	10	10	11	11	32	13	12	14	10	14	13	24	15	15	15	12	15	11	7	21	27	21	39	24	39
15-Nov	10	10	71	84	63	16	10	11	10	11	14	15	17	17	18	14	17	23	29	17	23	14	12	10	84
16-Nov	6	7	19	11	37	40	16	15	18	20	14	15	16	9	11	8	17	34	19	9	23	11	11	10	40
17-Nov	9	9	10	10	9	9	8	8	8	9	8	8	11	11	12	38	9	13	13	71	44	12	8	14	71
18-Nov	20	12	8	12	15	15	21	14	12	11	13	13	15	15	20	13	35	23	12	28	14	81	53	76	81
19-Nov	71	61	28	65	40	70	47	35	41	52	53	29	28	45	18	21	27	22	14	25	26	19	27	12	71
20-Nov	12	13	13	11	11	12	11	9	12	12	13	12	16	13	12	10	10	12	14	20	10	8	10	25	25
21-Nov	15	18	44	40	13	16	16	16	15	14	12	14	28	16	17	19	17	23	15	12	11	14	15	14	44
22-Nov	15	15	15	15	16	14	15	13	19	20	17	24	24	21	40	33	40	27	17	14	16	13	14	13	40
23-Nov	12	15	14	13	12	12	13	14	14	14	19	15	14	16	13	13	6	17	20	8	11	11	11	11	20
24-Nov	11	10	10	11	10	11	11	14	26	19	17	12	15	17	14	9	21	40	23	8	13	11	10	12	40
25-Nov	13	49	37	13	25	16	16	17	11	13	12	14	12	12	12	9	20	13	27	13	55	11	11	34	55
26-Nov	64	21	16	58	22	86	86	69	64	22	28	26	20	21	24	26	23	25	21	19	12	11	72	27	86
27-Nov	25	16	14	11	29	17	10	11	13	11	12	17	14	17	11	17	17	12	21	29	10	11	9	10	29
28-Nov	10	13	13	8	8	9	8	10	8	9	10	11	11	14	12	13	22	33	14	9	13	11	13	11	33
29-Nov	11	9	12	14	11	14	10	11	11	10	11	15	12	11	11	10	10	11	10	12	10	11	10	9	15
30-Nov	10	8	10	8	8	8	12	40	60	14	63	81	52	30	31	26	32	22	53	33	18	12	11	9	81
															71 61 71 84 63 86 86 69 64 52 63 81 52 45 40 38 40 40 53 71 55 81 72 76										
Diurnal Maximum																									







## **WOOD BUFFALO ENVIRONMENTAL ASSOCIATION**

CONTINUOUS AMBIENT AIR QUALITY  
MONITORING PROGRAM  
MONTHLY REPORT

### **AMS07 ATHABASCA VALLEY NOVEMBER 2023**

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

December 22, 2023

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - ATHABASCA VALLEY (AMS07)  
NOVEMBER 2023

MONTHLY SUMMARY

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	35	37	99.72	10.3	0	1.2	0
TRS (ppb) Average	681	36	39	99.58	1.1	0	0.3	0
THC (ppm) Average	662	34	58	96.67	2.6	-	2.3	-
NMHC (ppm) Average	662	34	58	96.67	0.246	-	0.013	-
CH4(ppm) Average	662	34	58	96.67	2.6	-	2.3	-
O3 (ppb) Average	683	34	37	99.58	45.9	0	35.6	-
NO2 (ppb) Average	680	36	40	99.44	30.5	0	14.9	-
NO (ppb) Average	680	36	40	99.44	63.2	-	11.4	-
NOX (ppb) Average	680	36	40	99.44	92	-	23.1	-
PM2.5 (ug/m3) Average	716	2	4	99.72	68.1	0	17.3	0
CO(ppm) Average	683	34	37	99.58	0.8	0	0.3	-
Temperature 2 m (C) Average	720	0	0	100	6.3	-	3.1	-
Relative Humidity (%) Average	720	0	0	100	95.9	-	92.9	-
Barometric Pressure (inHg) Average	720	0	0	100	29.5	-	29.4	-
Wind Speed 10 m (km/h) Average	681	0	39	94.58	39	-	21	-
Wind Direction 10 m (deg) Average	681	0	39	94.58	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - ATHABASCA VALLEY (AMS07)  
 NOVEMBER 2023

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile						
					Min	P10	Q1	Median	Q3	P90	Max
SO2 (ppb) Average	683	0.2	0.5	-	0	0	0	0.1	0.2	0.3	10.3
TRS (ppb) Average	681	0.19	0.1	-	0.1	0.1	0.1	0.2	0.2	0.3	1.1
THC (ppm) Average	662	2.05	0.1	-	1.9	2	2	2	2.1	2.2	2.6
NMHC (ppm) Average	662	0.004	0.02	-	0	0	0	0	0	0	0.246
CH4(ppm) Average	662	2.05	0.1	-	1.9	2	2	2	2.1	2.2	2.6
O3 (ppb) Average	683	20.39	9.5	-	3.6	7.5	12.5	19.9	28.8	33.6	45.9
NO2 (ppb) Average	680	7.48	5.8	-	0.3	1.4	2.8	6.3	10.5	14.7	30.5
NO (ppb) Average	680	3.38	6.2	-	0	0.1	0.5	1.7	3.8	7.8	63.2
NOX (ppb) Average	680	10.87	10.9	-	0.3	1.8	3.4	8.5	13.9	21.9	92
PM2.5 (ug/m3) Average	716	6.26	4.8	-	0.8	3	3.7	4.9	7.1	10.6	68.1
CO(ppm) Average	683	0.18	0.1	-	0.1	0.1	0.1	0.2	0.2	0.3	0.8
Temperature 2 m (C) Average	720	-3.22	4.4	-	-15.5	-9.5	-5.5	-2.5	-0.5	2.2	6.3
Relative Humidity (%) Average	720	77.5	10.6	-	42.6	61.9	72.5	79.7	84.9	89.4	95.9
Barometric Pressure (inHg) Average	720	28.94	0.3	-	28.4	28.6	28.7	28.9	29.1	29.3	29.5
Wind Speed 10 m (km/h) Average	681	9.3	6	-	0	3	6	8	12	17	39
Wind Direction 10 m (deg) Average	681	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - ATHABASCA VALLEY (AMS07)  
NOVEMBER 2023

OPERATIONAL NOTES

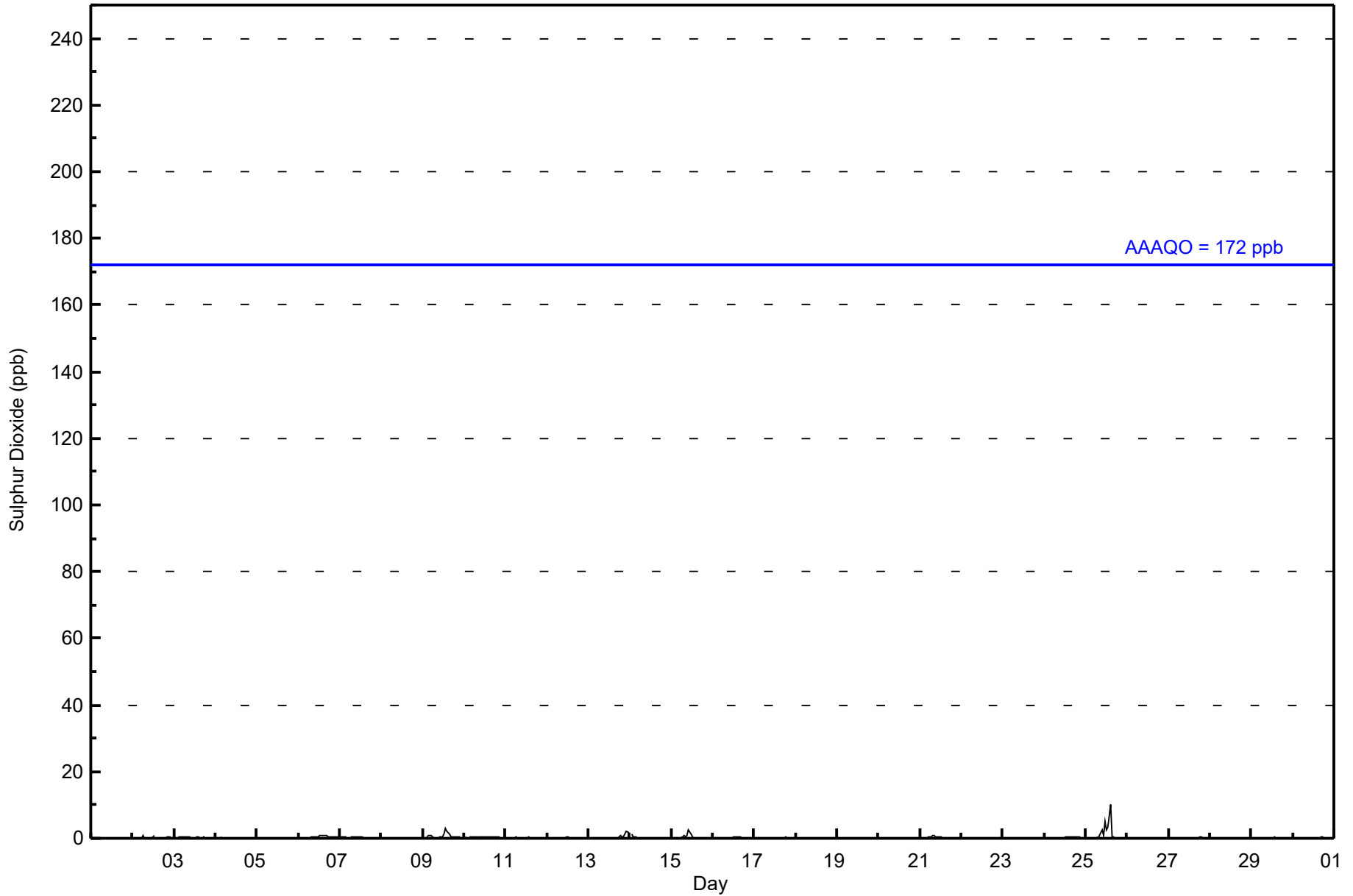
Parameter	Period Start	Period End	Duration (Hours)	Notes
SO2, TRS, THC/NMHC/CH4, O3, CO	01 Nov 2023 12:00	01 Nov 2023 12:00	1	Maintenance - sample manifold cleaned
SO2	02 Nov 2023 14:00	02 Nov 2023 14:00	1	Maintenance - WBEA internal audit
TRS	02 Nov 2023 12:00	02 Nov 2023 13:00	2	Maintenance - WBEA internal audit
THC/NMHC/CH4	02 Nov 2023 15:00	02 Nov 2023 15:00	1	Maintenance - WBEA internal audit
THC/NMHC/CH4	23 Nov 2023 16:00	24 Nov 2023 12:00	21	Unstable Operations - flatline in analyzer output signal
THC/NMHC/CH4	24 Nov 2023 13:00	24 Nov 2023 13:00	1	Maintenance - analyzer rebooted
O3	03 Nov 2023 11:00	03 Nov 2023 12:00	2	Maintenance - WBEA internal audit
NO2	02 Nov 2023 12:00	02 Nov 2023 15:00	4	Maintenance - WBEA internal audit
PM2.5	03 Nov 2023 12:00	03 Nov 2023 12:00	1	Maintenance - WBEA internal audit
PM2.5	30 Nov 2023 10:00	30 Nov 2023 10:00	1	Maintenance - firmware update
CO	03 Nov 2023 10:00	03 Nov 2023 11:00	2	Maintenance - WBEA internal audit
Wind Speed, Wind Direction	08 Nov 2023 07:00	10 Nov 2023 11:00	39	Intermittent unstable operation





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

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Athabasca Valley - November 2023**





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

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Athabasca Valley - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 10	683	100.00	100.00
11 - 20	0	0.00	100.00
21 - 60	0	0.00	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 683

Total Number of Hours: 720





**Wood Buffalo Environmental Association  
Frequency Distribution**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Athabasca Valley - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 10	14	15	12	24	40	52	202	30	13	28	29	47	42	21	25	52	646
11 - 20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	<b>14</b>	<b>15</b>	<b>12</b>	<b>24</b>	<b>40</b>	<b>52</b>	<b>202</b>	<b>30</b>	<b>13</b>	<b>28</b>	<b>29</b>	<b>47</b>	<b>42</b>	<b>21</b>	<b>25</b>	<b>52</b>	<b>646</b>

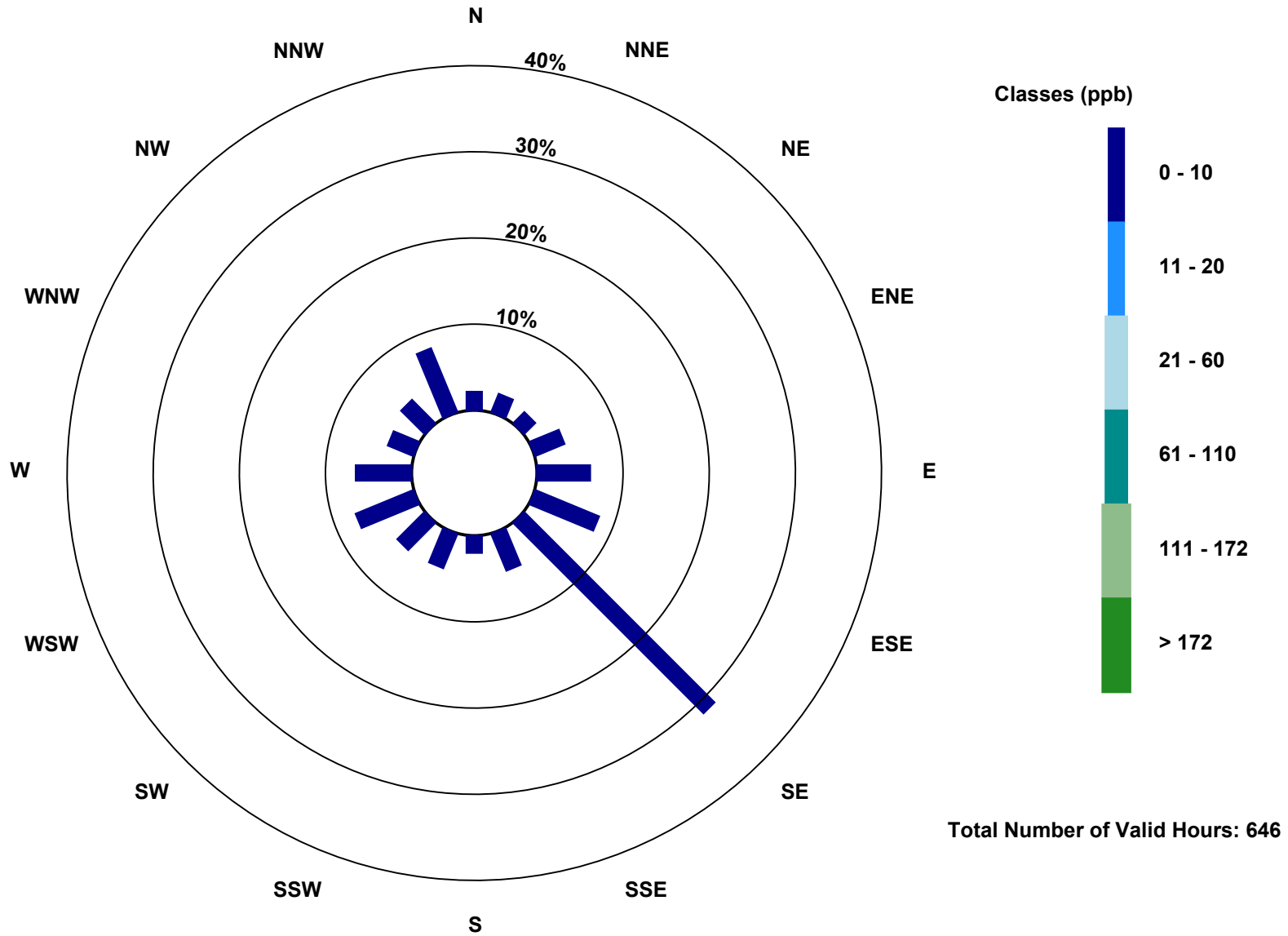
Total Number of Valid Hours: 646

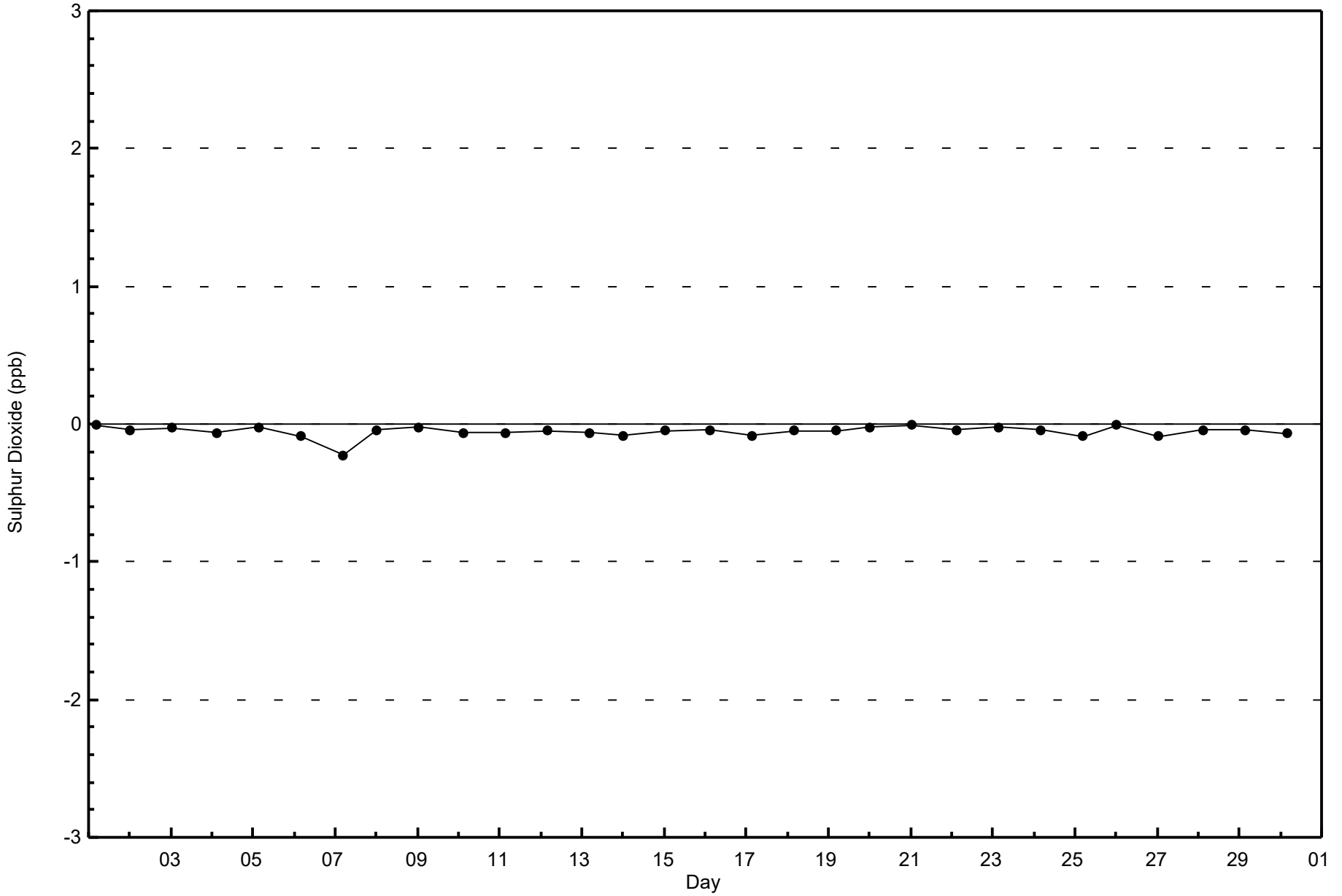
Total Number of Hours: 720

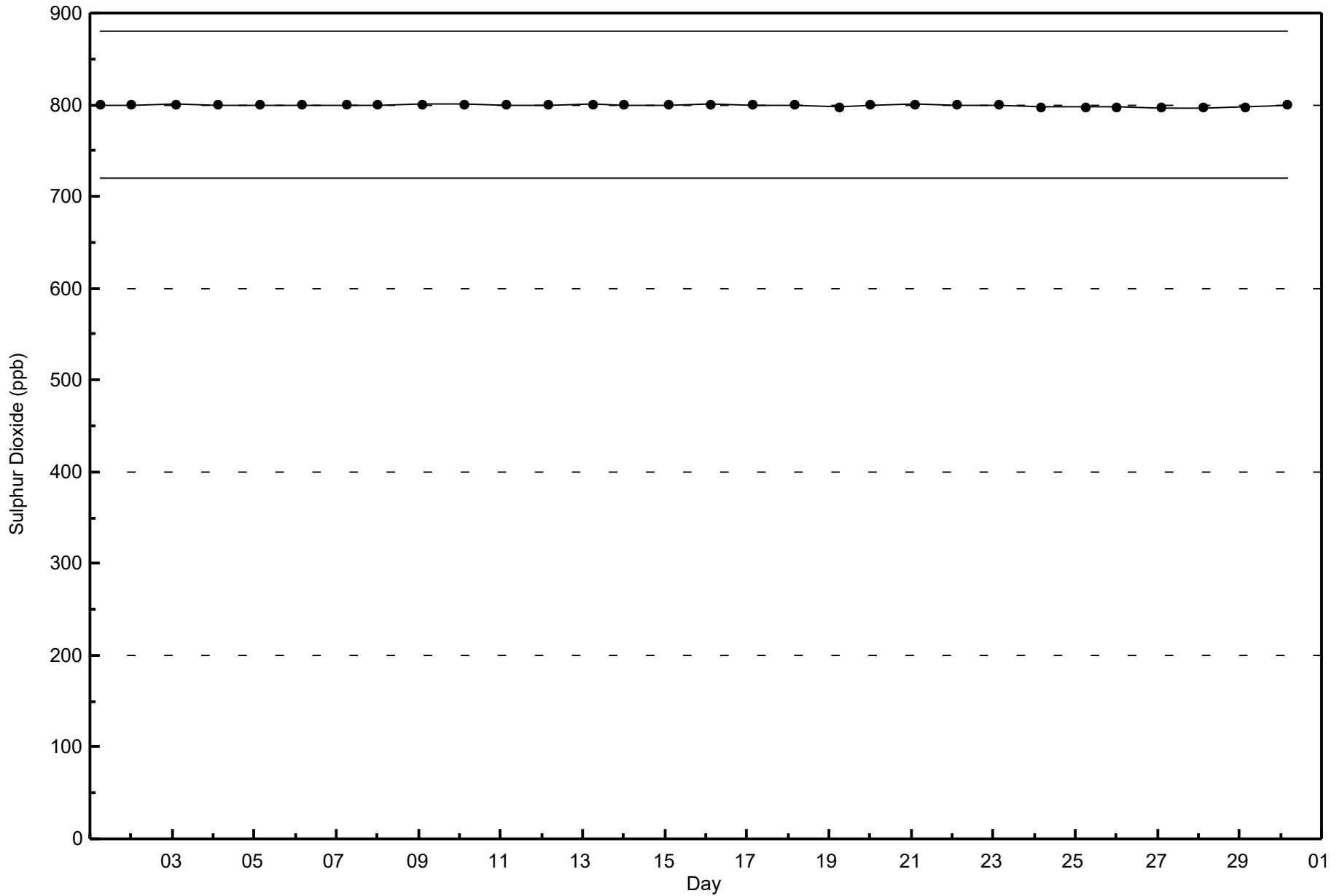


Wood Buffalo Environmental Association  
Wind Rose Nov 2023

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





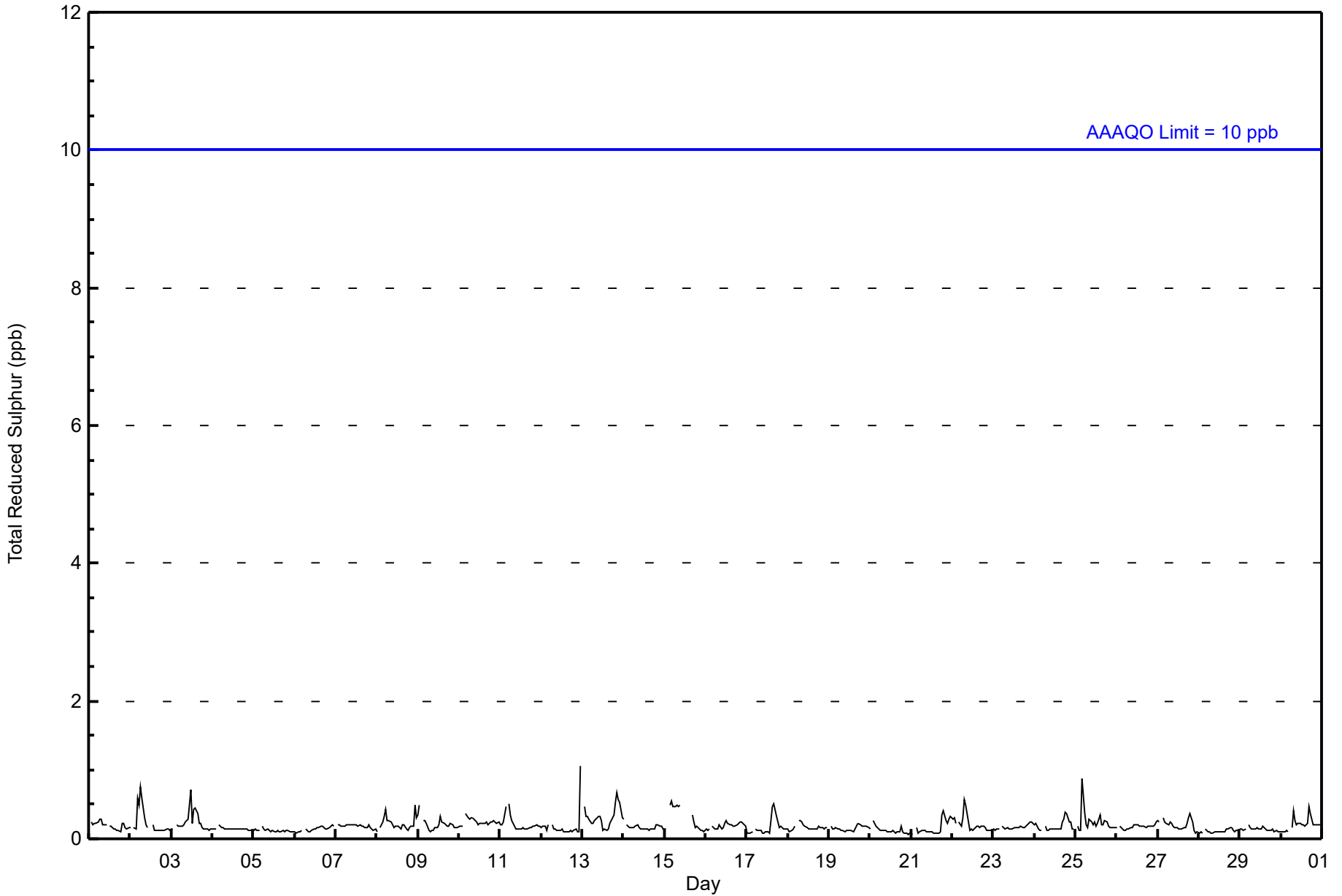






**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Total Reduced Sulphur (TRS) - ppb**  
**Athabasca Valley - November 2023**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Total Reduced Sulphur (TRS) - ppb  
Athabasca Valley - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
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  
Athabasca Valley - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	13	15	11	23	41	51	201	31	12	30	32	45	43	23	21	52	644
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	13	15	11	23	41	51	201	31	12	30	32	45	43	23	21	52	644

Total Number of Valid Hours: 644

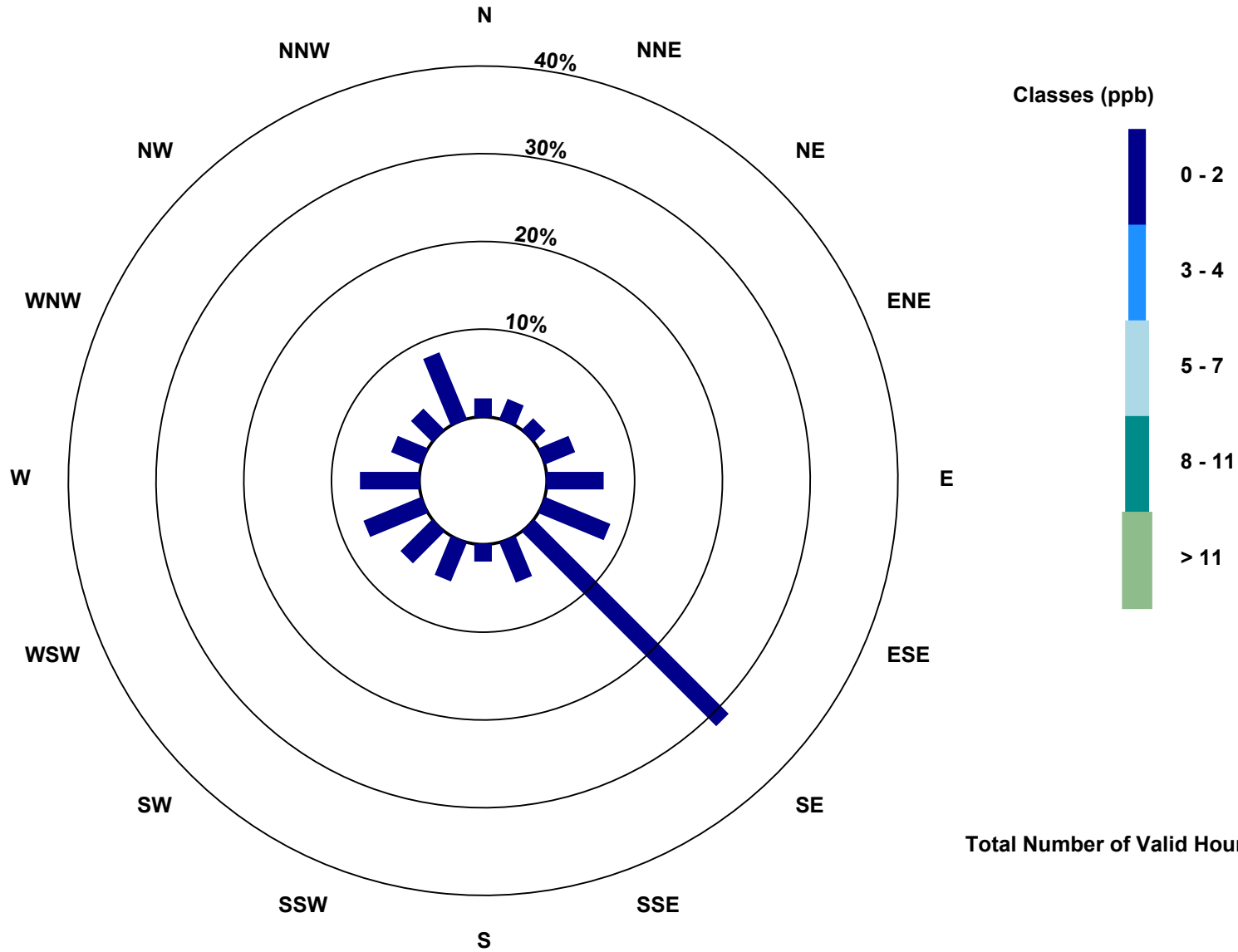
Total Number of Hours: 720



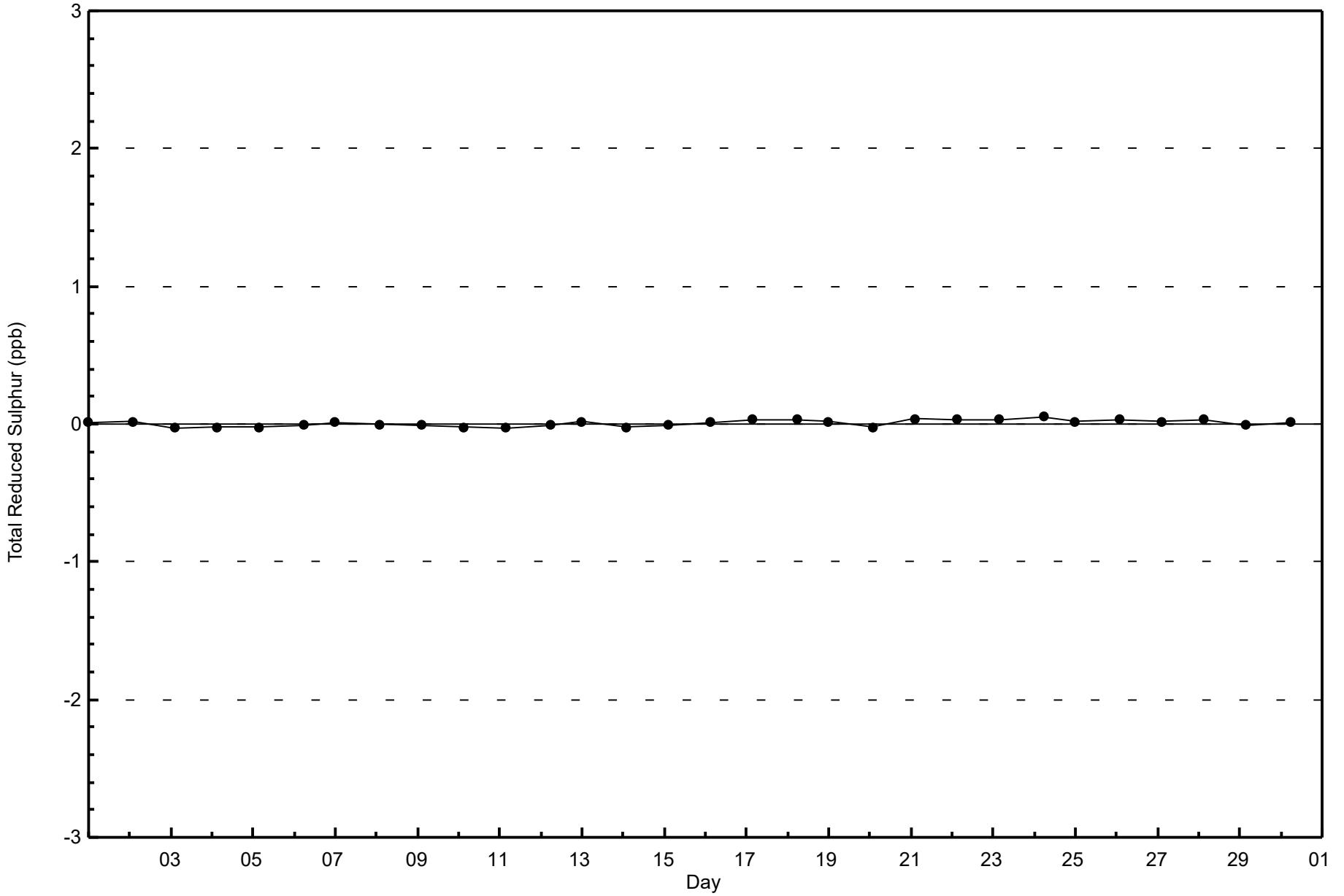


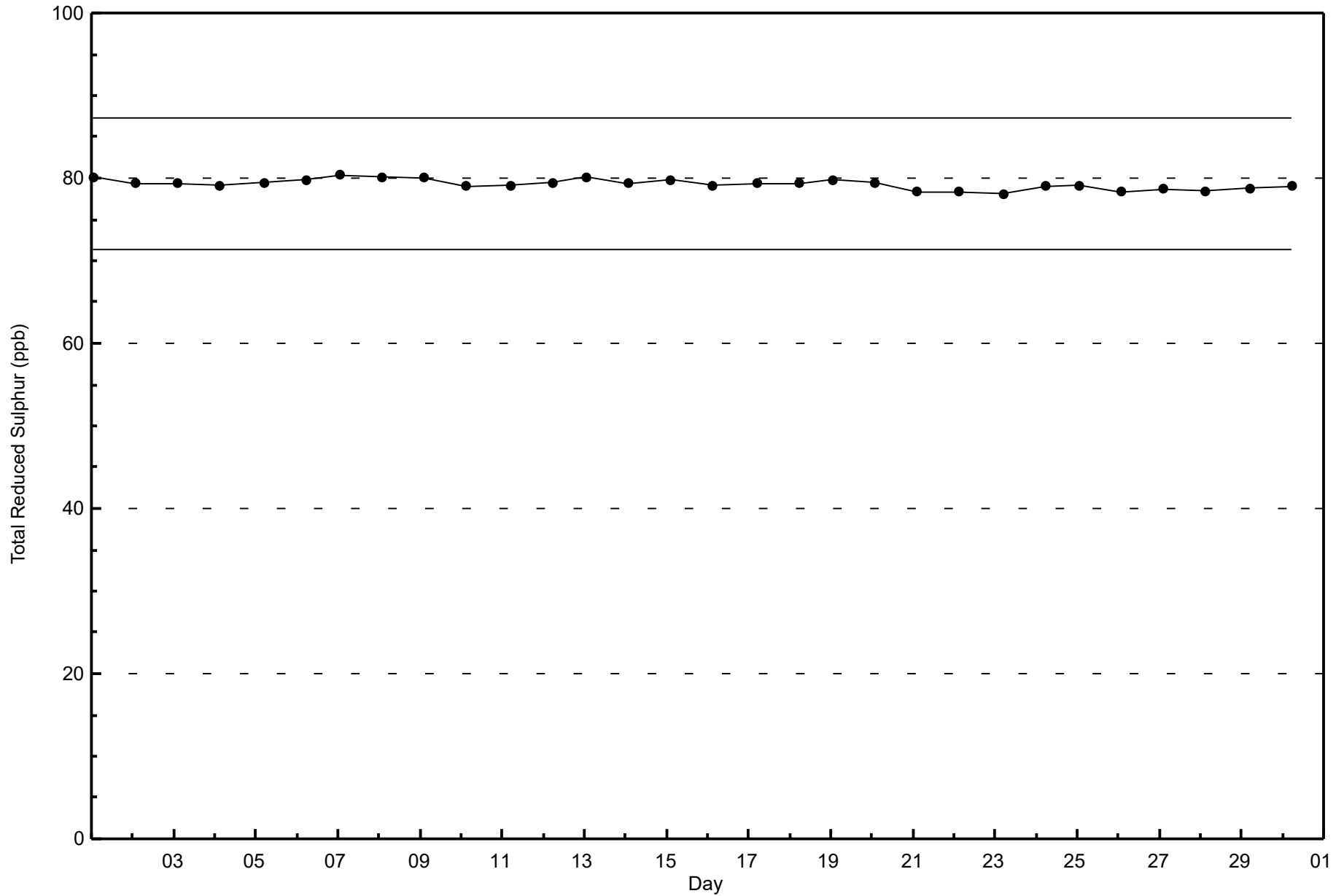
Wood Buffalo Environmental Association  
Wind Rose Nov 2023

Total Reduced Sulphur (TRS) - ppb  
Athabasca Valley



Total Number of Valid Hours: 644







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

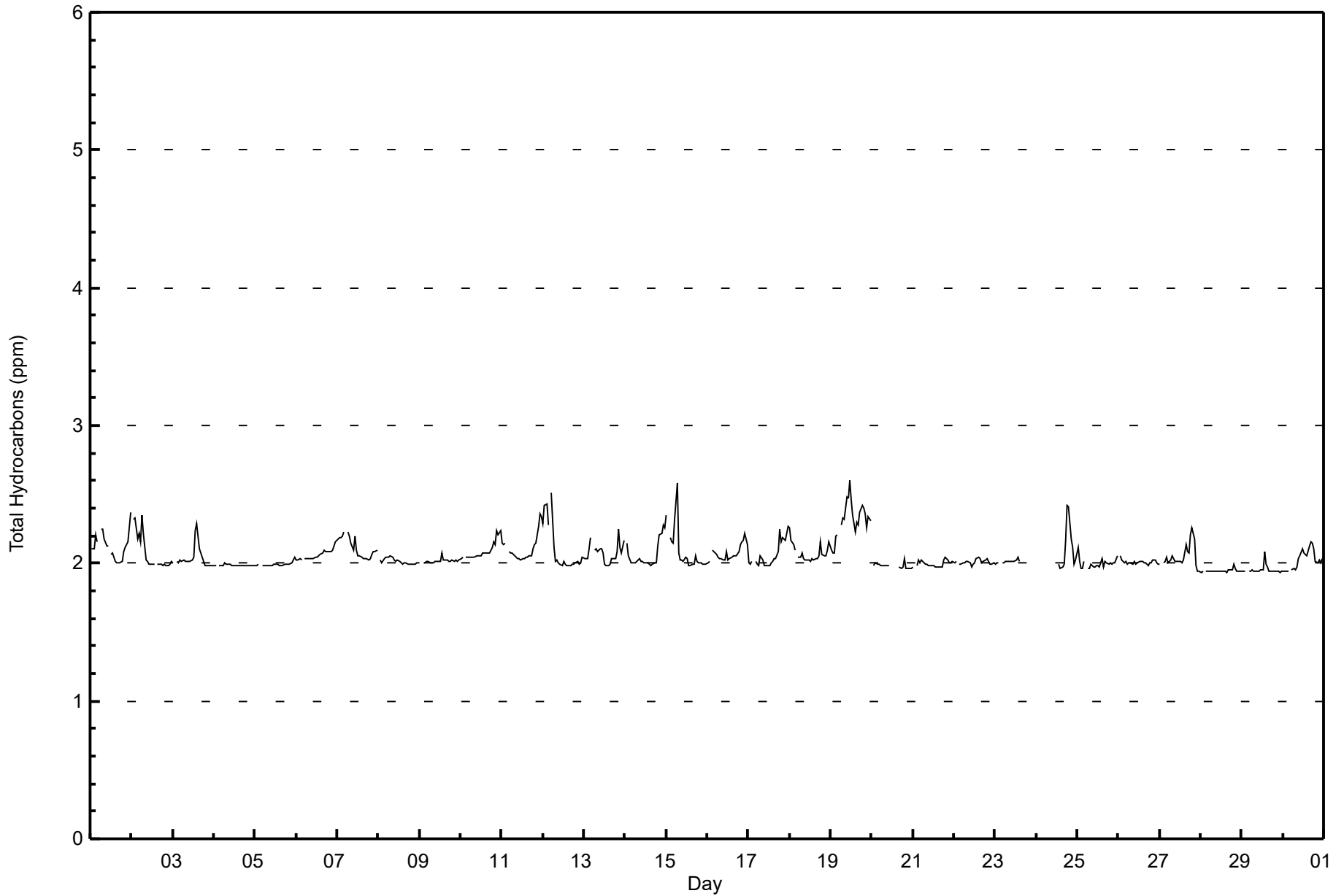
**Total Hydrocarbons (THC) - ppm**  
**Athabasca Valley - November 2023**

Maximum Value: 2.6 ppm on Nov 19 12:00		Maximum Daily Average: 2.3 ppm on Nov 19		Hours in Service: 720																						
Minimum Value: 1.9 ppm on Nov 29 23:00		Minimum Daily Average: 1.9 ppm on Nov 28		Hours of Data: 662																						
Maximum Diurnal Average: 2.1 ppm at hour 24		Minimum Diurnal Average: 2.0 ppm at hour 16		Hours of Missing Data: 58																						
Monthly Average: 2.05 ppm		Percentiles: P <sub>1</sub> = 1.9 P <sub>10</sub> = 2.0 Q <sub>1</sub> = 2.0 Median = 2.0 Q <sub>3</sub> = 2.1 P <sub>90</sub> = 2.2 P <sub>99</sub> = 2.4		Hours of Calibration: 34																						
				Percent Operational Time: 96.7																						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	2.1	2.1	2.1	2.2	2.2	Z	2.3	2.2	2.2	2.1	2.1	M	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.2	2.4	2.1	2.4
2-Nov	Z	2.3	2.3	2.2	2.2	2.2	2.4	2.2	2.0	2.0	2.0	2.0	2.0	M	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.4
3-Nov	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.2	2.3	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.3
4-Nov	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
5-Nov	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
6-Nov	2.0	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.2
7-Nov	2.2	2.2	2.2	2.2	2.2	Z	2.2	2.2	2.1	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	2.2
8-Nov	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1
9-Nov	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1
10-Nov	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	2.1	2.1	2.1	2.1	2.2	2.1	2.2	2.2	2.2	2.1	2.2
11-Nov	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	2.2	2.3	2.4	2.3	2.1	2.4
12-Nov	2.3	2.4	2.4	2.3	Z	2.5	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.5
13-Nov	2.0	2.0	2.0	2.1	2.2	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.3	2.1	2.1	2.2	2.1	2.3
14-Nov	Z	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.2	2.2	2.3	2.3	2.1	2.3
15-Nov	2.3	Z	2.2	2.2	2.1	2.3	2.6	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.6
16-Nov	2.0	2.0	Z	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.1	2.1	2.2
17-Nov	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.1	2.3
18-Nov	2.3	2.2	2.1	2.1	Z	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.2	2.1	2.1	2.0	2.1	2.2	2.1	2.3
19-Nov	2.1	2.1	2.1	2.2	2.2	Z	2.3	2.3	2.3	2.5	2.5	2.6	2.5	2.4	2.2	2.3	2.3	2.4	2.4	2.4	2.4	2.3	2.3	2.3	2.3	2.6
20-Nov	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	C	C	C	C	C	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
21-Nov	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
22-Nov	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
23-Nov	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	2.0
24-Nov	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	M	2.0	2.0	2.0	2.0	2.2	2.4	2.4	2.2	2.1	2.0	2.0	--	2.4
25-Nov	2.1	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	2.1	2.0	2.1
26-Nov	Z	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1
27-Nov	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.2	2.3	2.2	2.0	1.9	1.9	2.0	2.3
28-Nov	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	2.0
29-Nov	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	1.9	2.1	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.1
30-Nov	1.9	1.9	1.9	1.9	Z	1.9	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.2
																								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 - November 2023**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Total Hydrocarbons (THC) - ppm  
Athabasca Valley - November 2023**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2.0	461	69.64	69.64
2.1 - 3.0	201	30.36	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 662

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Total Hydrocarbons (THC) - ppm  
Athabasca Valley - November 2023**

<b>Concentration Ranges (ppm)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	12	10	10	23	30	28	103	7	4	21	20	42	38	20	22	37	427
2.1 - 3.0	2	5	2	1	10	21	91	23	9	5	4	3	3	1	3	15	198
3.1 - 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	14	15	12	24	40	49	194	30	13	26	24	45	41	21	25	52	625

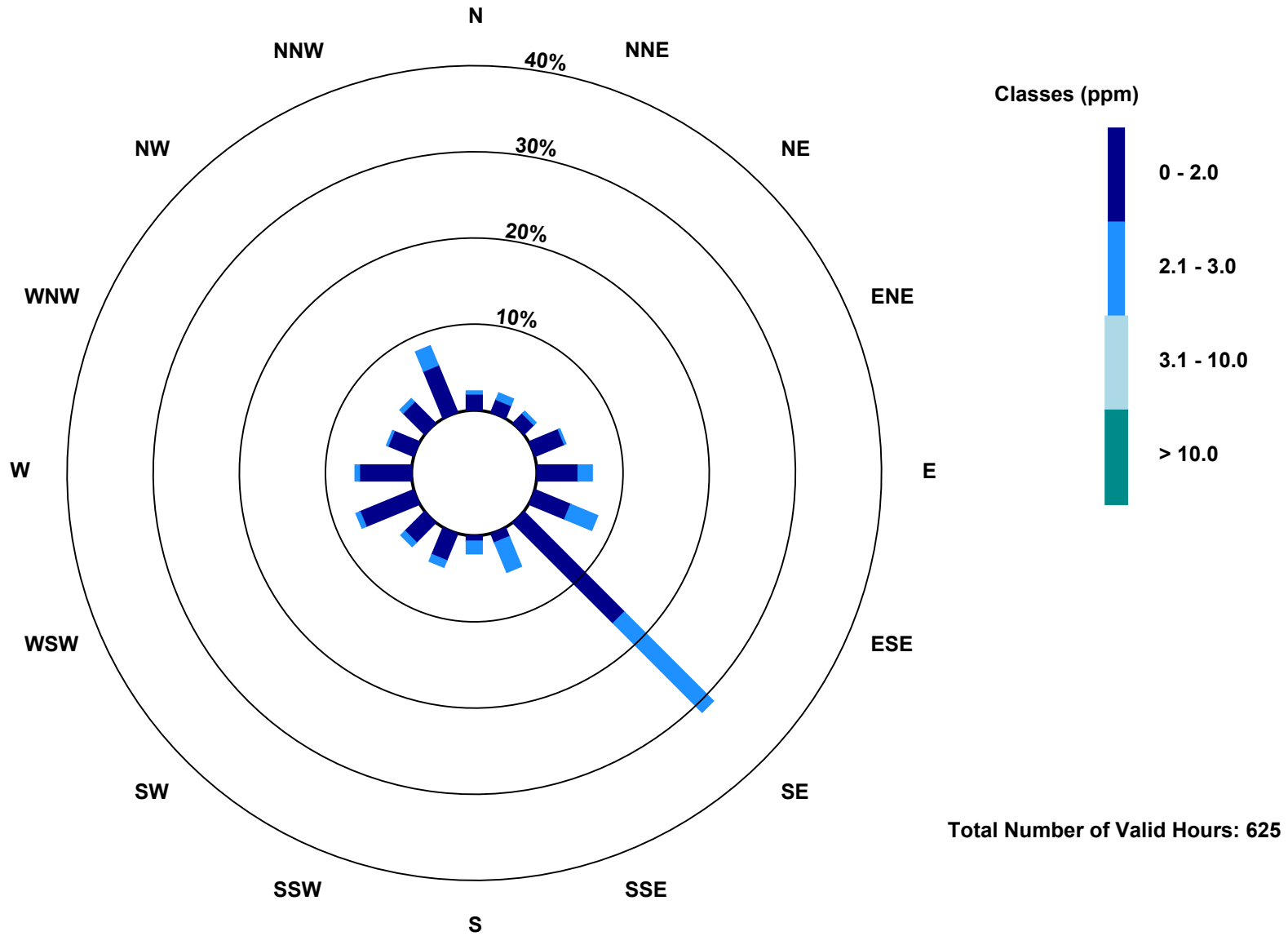
Total Number of Valid Hours: 625

Total Number of Hours: 720

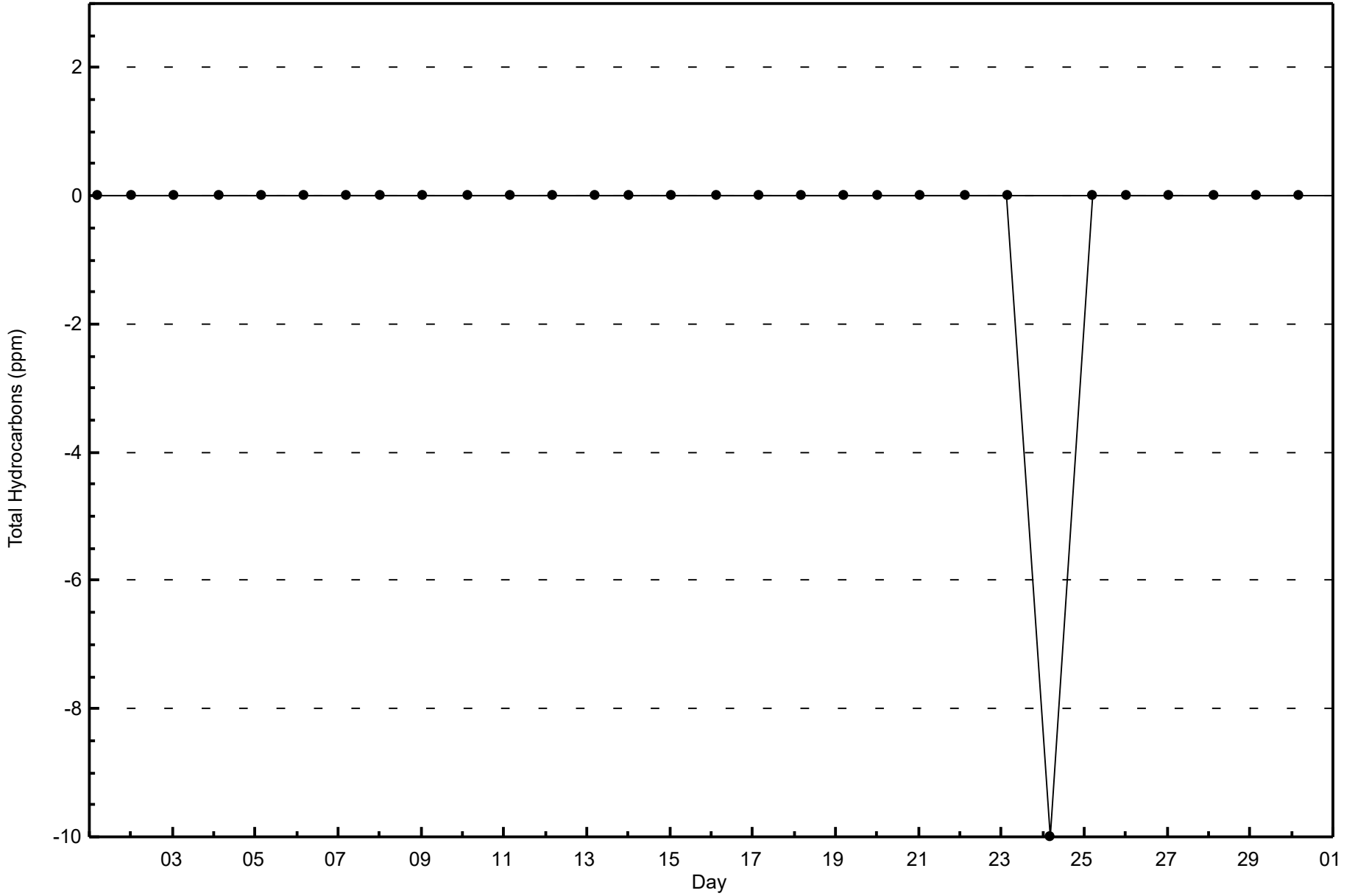


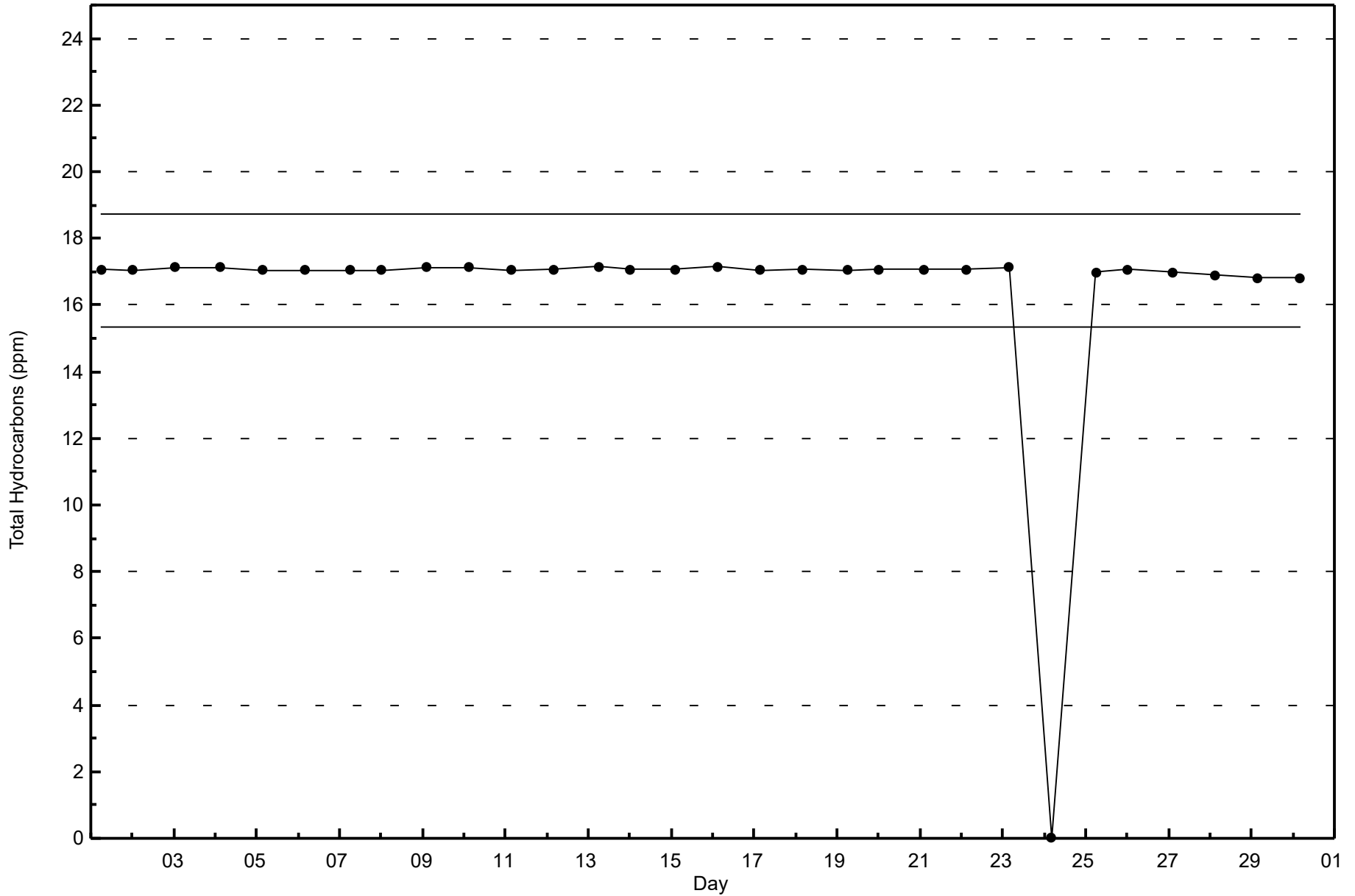
Wood Buffalo Environmental Association  
Wind Rose Nov 2023

Total Hydrocarbons (THC) - ppm  
Athabasca Valley



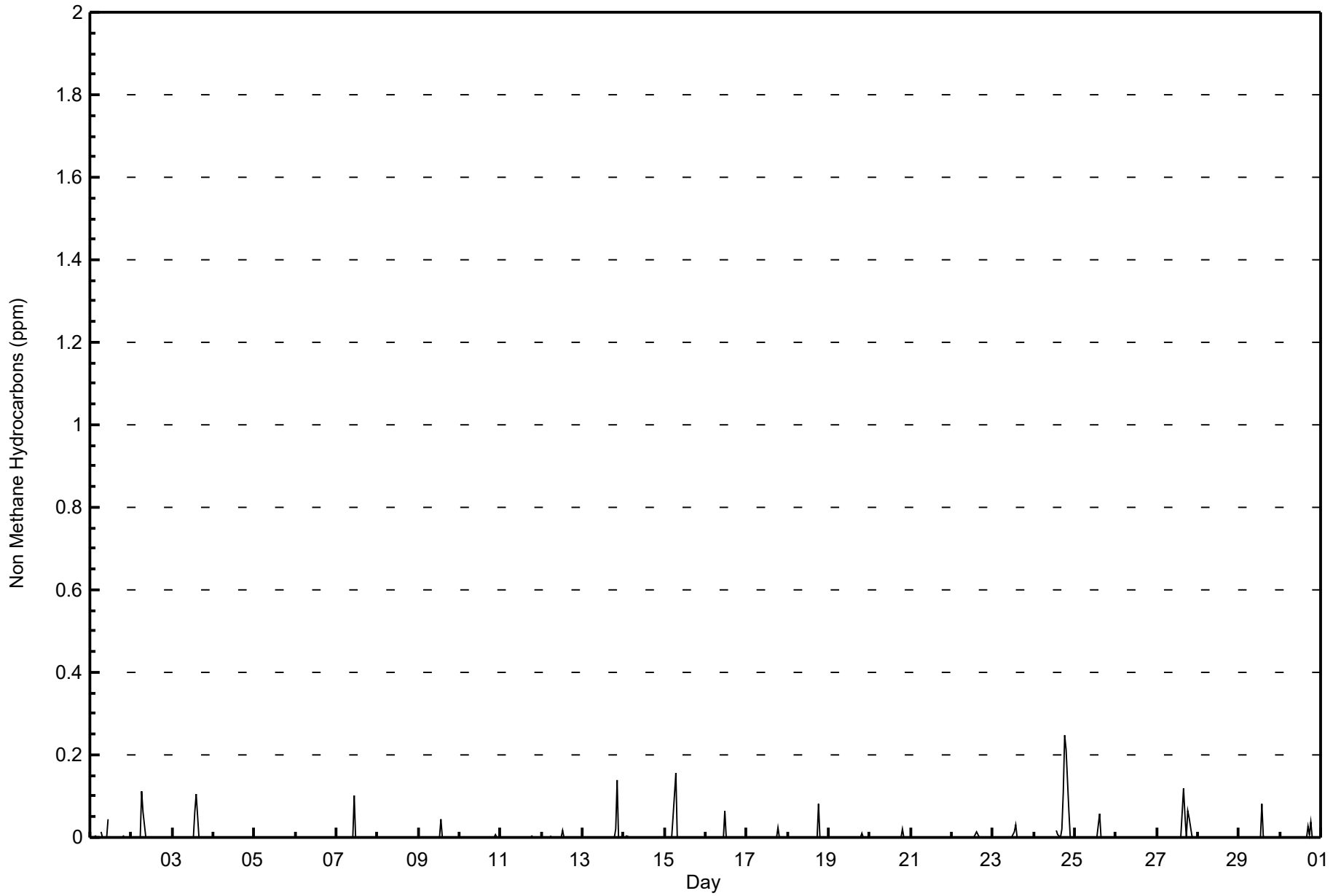








Maximum Value: 0.246 ppm on Nov 24 19:00		Maximum Daily Average: 0.013 ppm on Nov 27		Hours in Service:	720																					
Minimum Value: 0.000 ppm on Nov 1 01:00		Minimum Daily Average: 0.000 ppm on Nov 4		Hours of Data:	662																					
Maximum Diurnal Average: 0.016 ppm at hour 19		Minimum Diurnal Average: 0.000 ppm at hour 1		Hours of Missing Data:	58																					
Monthly Average: 0.004 ppm		Percentiles: P <sub>1</sub> = 0.0 P <sub>10</sub> = 0.0 Q <sub>1</sub> = 0.0 Median = 0.0 Q <sub>3</sub> = 0.0 P <sub>90</sub> = 0.0 P <sub>99</sub> = 0.1		Hours of Calibration:	34																					
				Percent Operational Time:	96.7																					
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	0.000	0.000	0.000	0.004	0.000	Z	0.015	0.000	0.000	0.000	0.043	M	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.000	0.000	0.000	0.000	0.003	0.043
2-Nov	Z	0.000	0.000	0.000	0.000	0.000	0.110	0.060	0.000	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	0.008	0.110
3-Nov	0.000	Z	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.061	0.103	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.007	0.103
4-Nov	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
5-Nov	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
6-Nov	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
7-Nov	0.000	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.102	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.102
8-Nov	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
9-Nov	0.000	Z	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.045	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.045
10-Nov	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.006	0.000	0.000	0.000	0.006
11-Nov	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.002
12-Nov	0.000	0.000	0.000	0.000	Z	0.004	0.000	0.000	0.000	0.000	0.000	0.016	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.016
13-Nov	0.000	0.000	0.000	0.001	0.001	Z	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.020	0.139	0.000	0.000	0.004	0.007	0.139
14-Nov	Z	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	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002
15-Nov	0.000	Z	0.000	0.000	0.000	0.052	0.158	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.009	0.158
16-Nov	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	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	0.003	0.064
17-Nov	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.025	0.000	0.000	0.000	0.000	0.000	0.001	0.025
18-Nov	0.000	0.000	0.000	0.000	Z	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.081	0.000	0.000	0.000	0.000	0.000	0.004	0.081
19-Nov	0.000	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.010	0.000	0.000	0.000	0.000	0.000	0.010
20-Nov	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	0.000	0.020	0.000	0.000	0.000	0.000	0.001	0.020
21-Nov	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
22-Nov	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.015	0.008	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.015
23-Nov	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.014	0.031	0.000	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	--	0.031
24-Nov	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	M	0.016	0.007	0.000	0.020	0.110	0.246	0.212	0.065	0.000	0.000	0.000	0.000	--	0.246
25-Nov	0.000	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.057	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.057
26-Nov	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.001	0.000	0.000	0.001
27-Nov	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.119	0.054	0.000	0.065	0.047	0.005	0.000	0.000	0.000	0.000	0.000	0.013	0.119
28-Nov	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001
29-Nov	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.083	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.083
30-Nov	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.028	0.008	0.038	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.038
																								Diurnal Average		
																								Diurnal Maximum		
Z - zerospan																										
C - Calibration																										
M - Maintenance																										
UO - Unstable Operation																										





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Non Methane Hydrocarbons (NMHC) - ppm  
Athabasca Valley - November 2023**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 0.005	623	94.11	94.11
0.006 - 0.05	22	3.32	97.43
0.06 - 0.1	14	2.11	99.55
> 0.1	3	0.45	100.00

Total Number of Valid Hours: 662

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Non Methane Hydrocarbons (NMHC) - ppm  
Athabasca Valley - November 2023**

<b>Concentration Ranges (ppm)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 0.005	13	14	12	24	40	47	180	26	13	25	23	43	38	20	24	44	586
0.006 - 0.05	1	1	0	0	0	1	8	2	0	1	1	2	2	1	0	2	22
0.06 - 0.1	0	0	0	0	0	1	5	1	0	0	0	0	1	0	1	5	14
> 0.1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	1	3
<b>Totals</b>	14	15	12	24	40	49	194	30	13	26	24	45	41	21	25	52	625

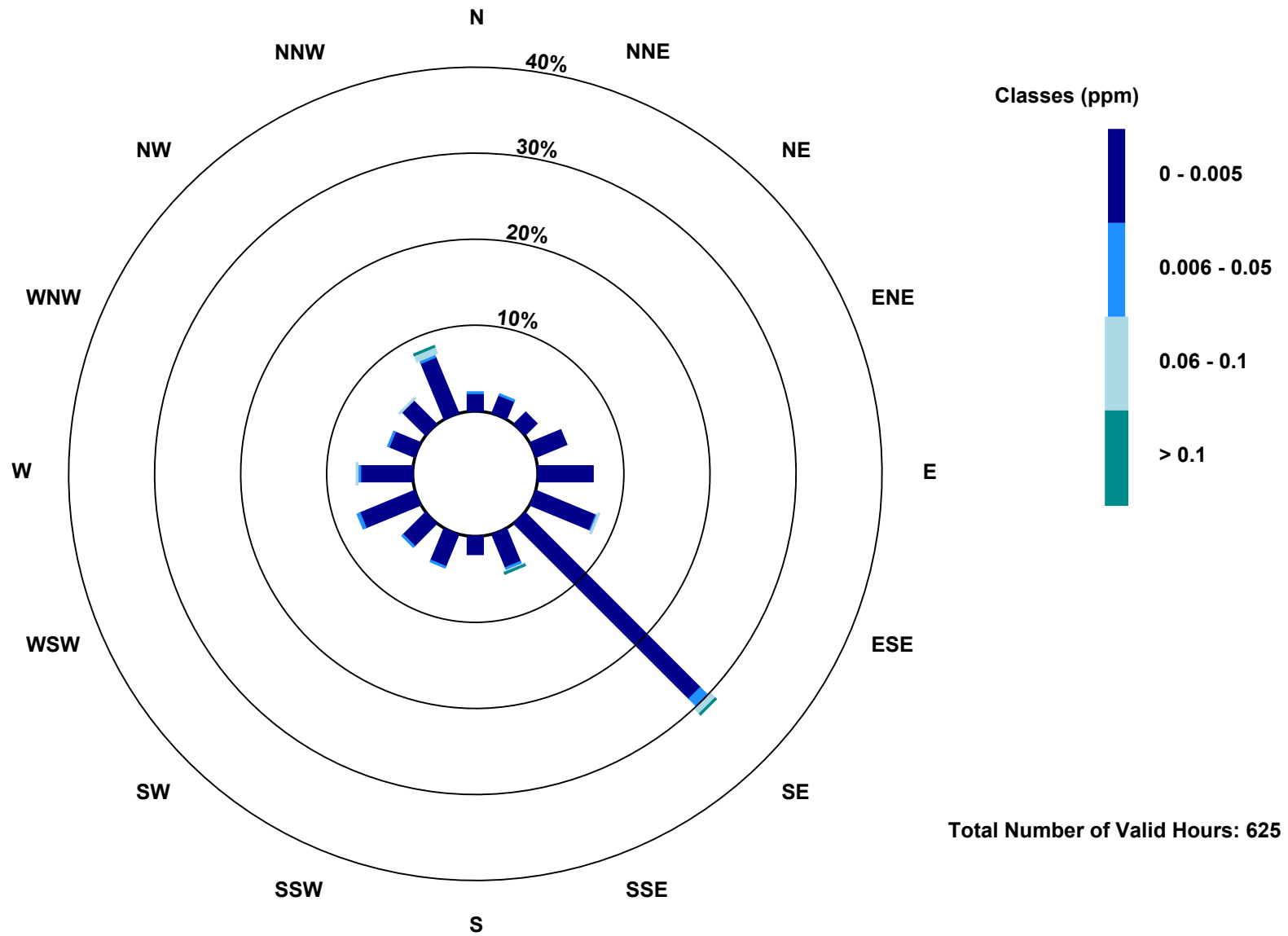
Total Number of Valid Hours: 625

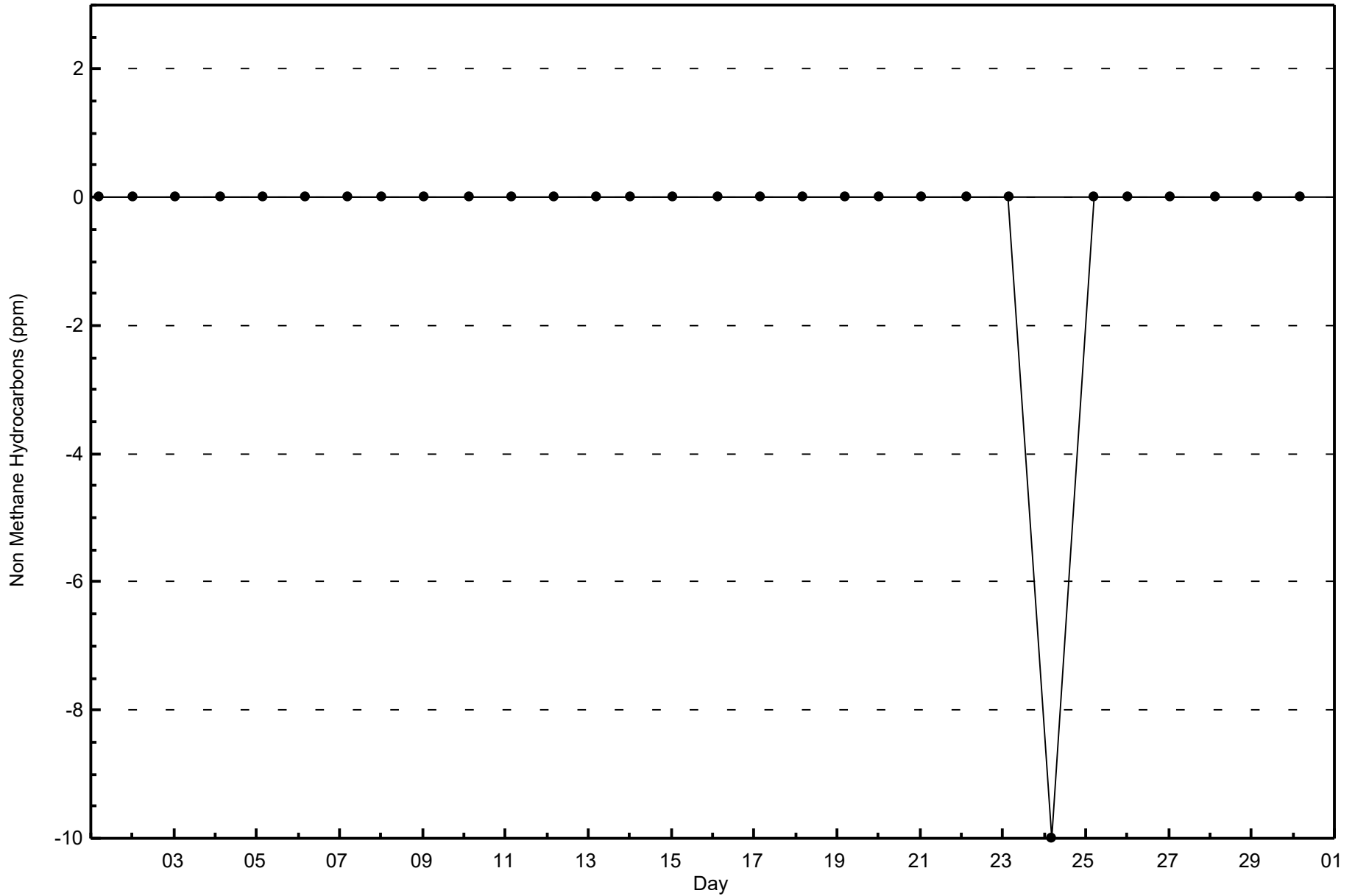
Total Number of Hours: 720



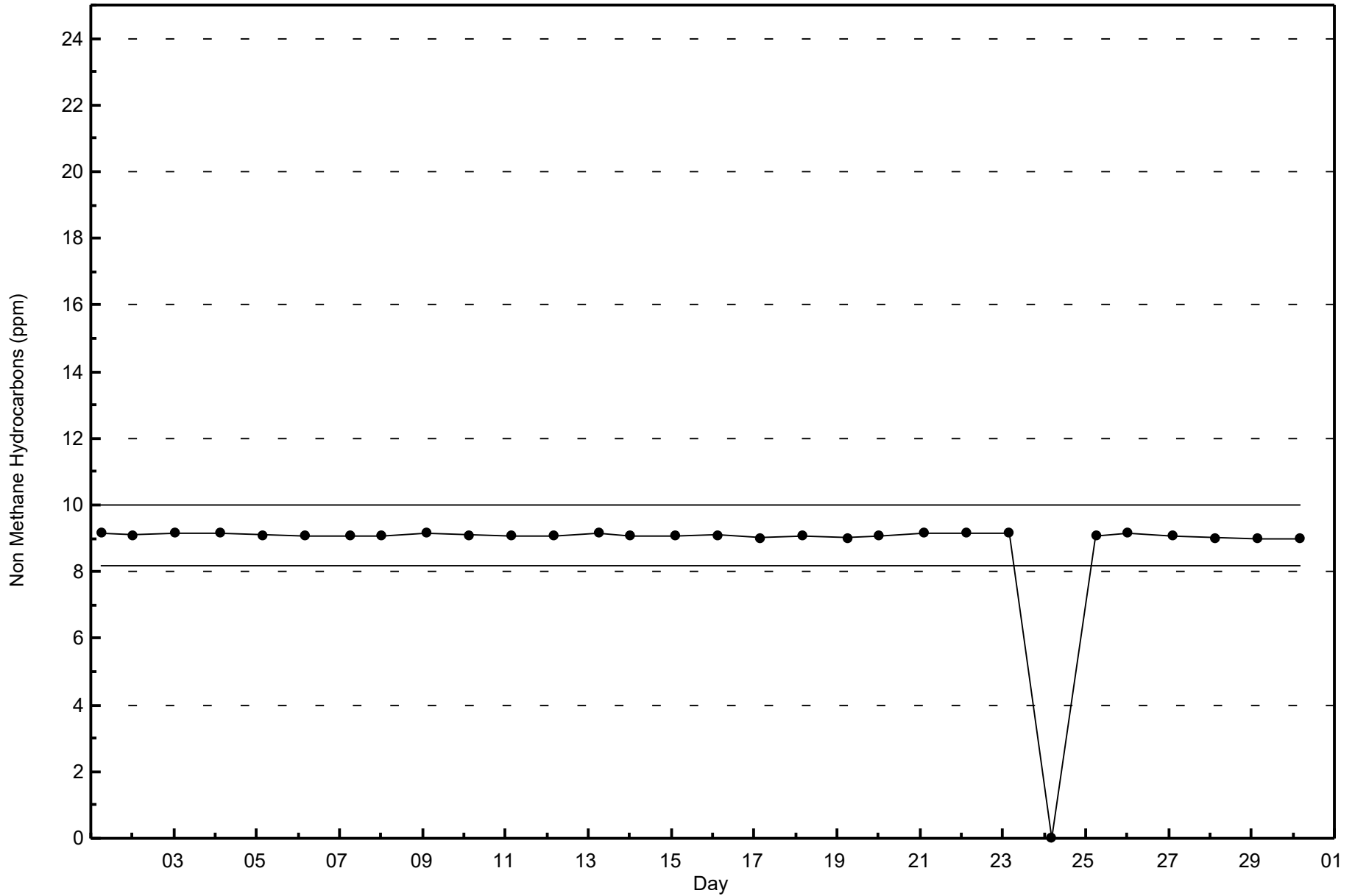
Wood Buffalo Environmental Association  
Wind Rose Nov 2023

Non Methane Hydrocarbons (NMHC) - ppm  
Athabasca Valley











Wood Buffalo Environmental Association

Summary of Hour Averages

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

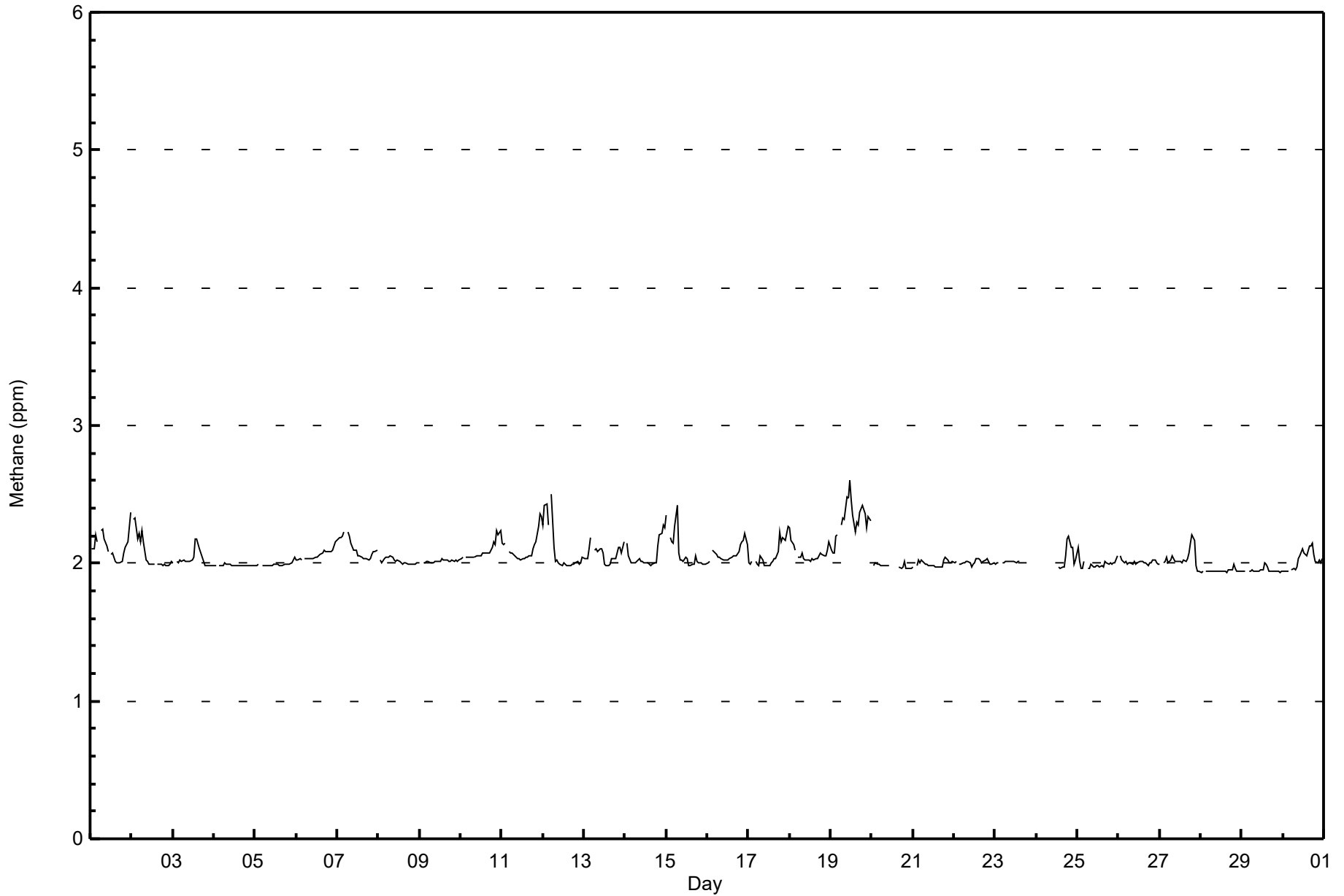
Athabasca Valley - November 2023

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 2.6 ppm on Nov 19 12:00	Maximum Daily Average: 2.3 ppm on Nov 19		Hours of Data:	662
Minimum Value: 1.9 ppm on Nov 29 23:00	Minimum Daily Average: 1.9 ppm on Nov 28		Hours of Missing Data:	58
Maximum Diurnal Average: 2.1 ppm at hour 24	Minimum Diurnal Average: 2.0 ppm at hour 15		Hours of Calibration:	34
Monthly Average: 2.05 ppm	Percentiles: P <sub>1</sub> = 1.9 P <sub>10</sub> = 2.0 Q <sub>1</sub> = 2.0 Median = 2.0 Q <sub>3</sub> = 2.1 P <sub>90</sub> = 2.2 P <sub>99</sub> = 2.4		Percent Operational Time:	96.7

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	2.1	2.1	2.1	2.2	2.2	Z	2.2	2.2	2.2	2.1	2.1	M	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.2	2.4	2.1	2.4
2-Nov	Z	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.0	2.0	2.0	2.0	2.0	M	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.3
3-Nov	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.2	2.2	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.2
4-Nov	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
5-Nov	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
6-Nov	2.0	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.2
7-Nov	2.2	2.2	2.2	2.2	2.2	Z	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.2
8-Nov	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1
9-Nov	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
10-Nov	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	2.1	2.1	2.1	2.1	2.2	2.1	2.2	2.2	2.2	2.1	2.2
11-Nov	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	2.2	2.3	2.4	2.3	2.1	2.4
12-Nov	2.3	2.4	2.4	2.3	Z	2.5	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.5
13-Nov	2.0	2.0	2.0	2.1	2.2	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.2	2.1	2.2
14-Nov	Z	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.2	2.2	2.3	2.3	2.1	2.3
15-Nov	2.3	Z	2.2	2.2	2.1	2.3	2.4	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.4
16-Nov	2.0	2.0	Z	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	2.2	2.2	2.2	2.1	2.1	2.2
17-Nov	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.2	2.2	2.2	2.2	2.2	2.3	2.1	2.3
18-Nov	2.3	2.2	2.1	2.1	Z	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.0	2.1	2.2	2.1	2.3
19-Nov	2.1	2.1	2.1	2.2	2.2	Z	2.3	2.3	2.3	2.5	2.5	2.6	2.5	2.4	2.2	2.3	2.3	2.4	2.4	2.4	2.4	2.3	2.3	2.3	2.3	2.6
20-Nov	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	C	C	C	C	C	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
21-Nov	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
22-Nov	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
23-Nov	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	UO	UO	UO	UO	UO	UO	UO	UO	UO	2.0
24-Nov	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	M	2.0	2.0	2.0	2.0	2.1	2.2	2.2	2.1	2.1	2.0	2.0	--	2.2
25-Nov	2.1	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	2.1	2.0	2.1
26-Nov	Z	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1
27-Nov	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.2	2.2	2.0	1.9	1.9	2.0	2.2
28-Nov	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	2.0
29-Nov	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	1.9	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
30-Nov	1.9	1.9	1.9	1.9	Z	1.9	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	2.0	2.0	2.0	2.0	2.0	2.0	2.1

2.1	2.1	2.1	2.1	2.1	2.0	2.1	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	2.1	2.1	2.1	Diurnal Average
2.3	2.4	2.4	2.3	2.2	2.5	2.4	2.3	2.3	2.5	2.5	2.6	2.5	2.4	2.2	2.3	2.3	2.4	2.4	2.4	2.4	2.4	2.3	2.4	2.4	2.4	2.4	Diurnal Maximum

Z - zerospan                      C - Calibration                      M - Maintenance                      UO - Unstable Operation





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

**Methane (CH<sub>4</sub>) - ppm**  
**Athabasca Valley - November 2023**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2.0	466	70.39	70.39
2.1 - 3.0	196	29.61	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 662

Total Number of Hours: 720



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

**Methane (CH<sub>4</sub>) - ppm**  
**Athabasca Valley - November 2023**

<b>Concentration</b> <b>Ranges (ppm)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	12	10	10	23	30	28	107	7	4	21	20	42	39	20	22	37	432
2.1 - 3.0	2	5	2	1	10	21	87	23	9	5	4	3	2	1	3	15	193
3.1 - 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	14	15	12	24	40	49	194	30	13	26	24	45	41	21	25	52	625

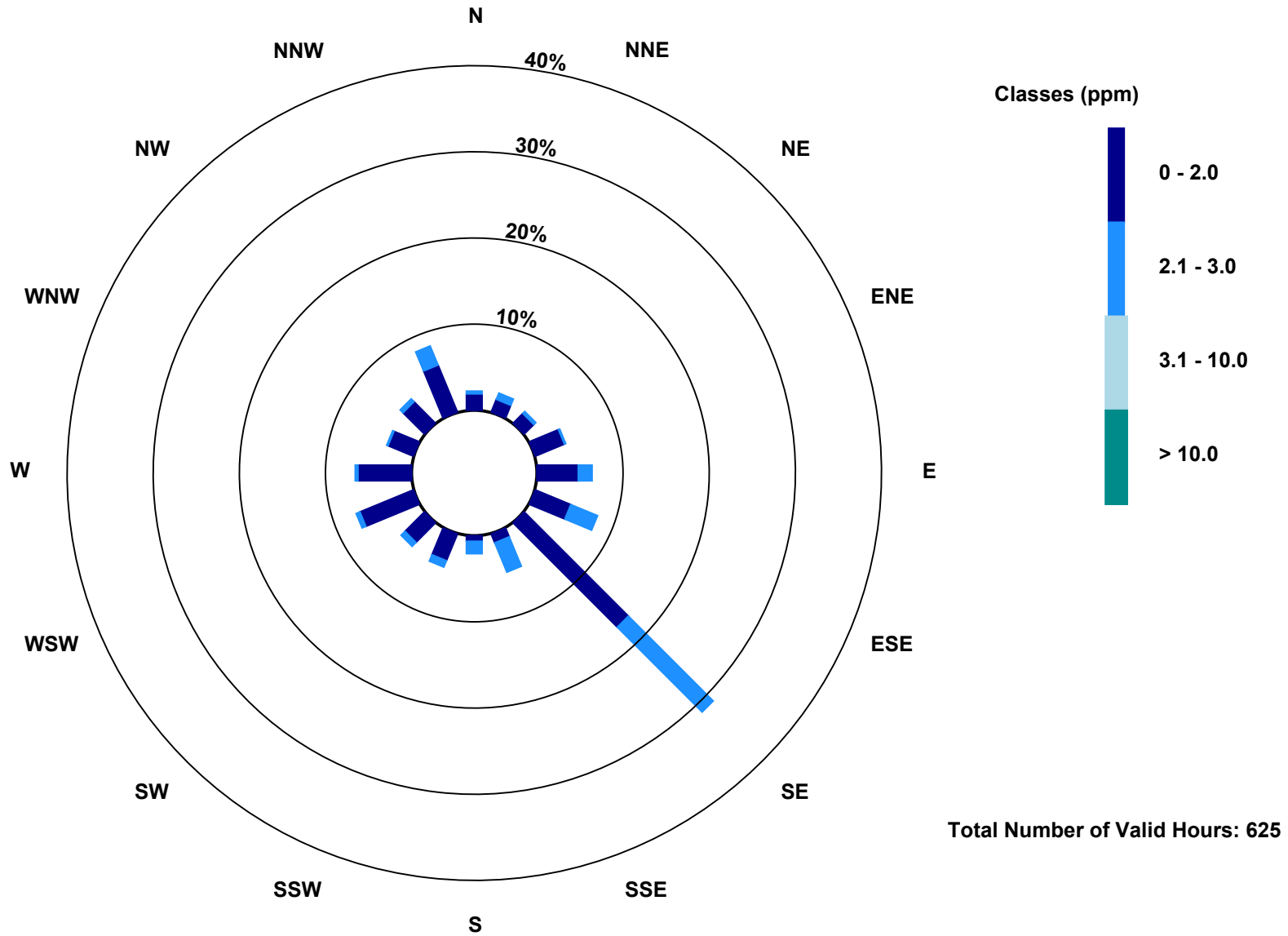
Total Number of Valid Hours: 625

Total Number of Hours: 720

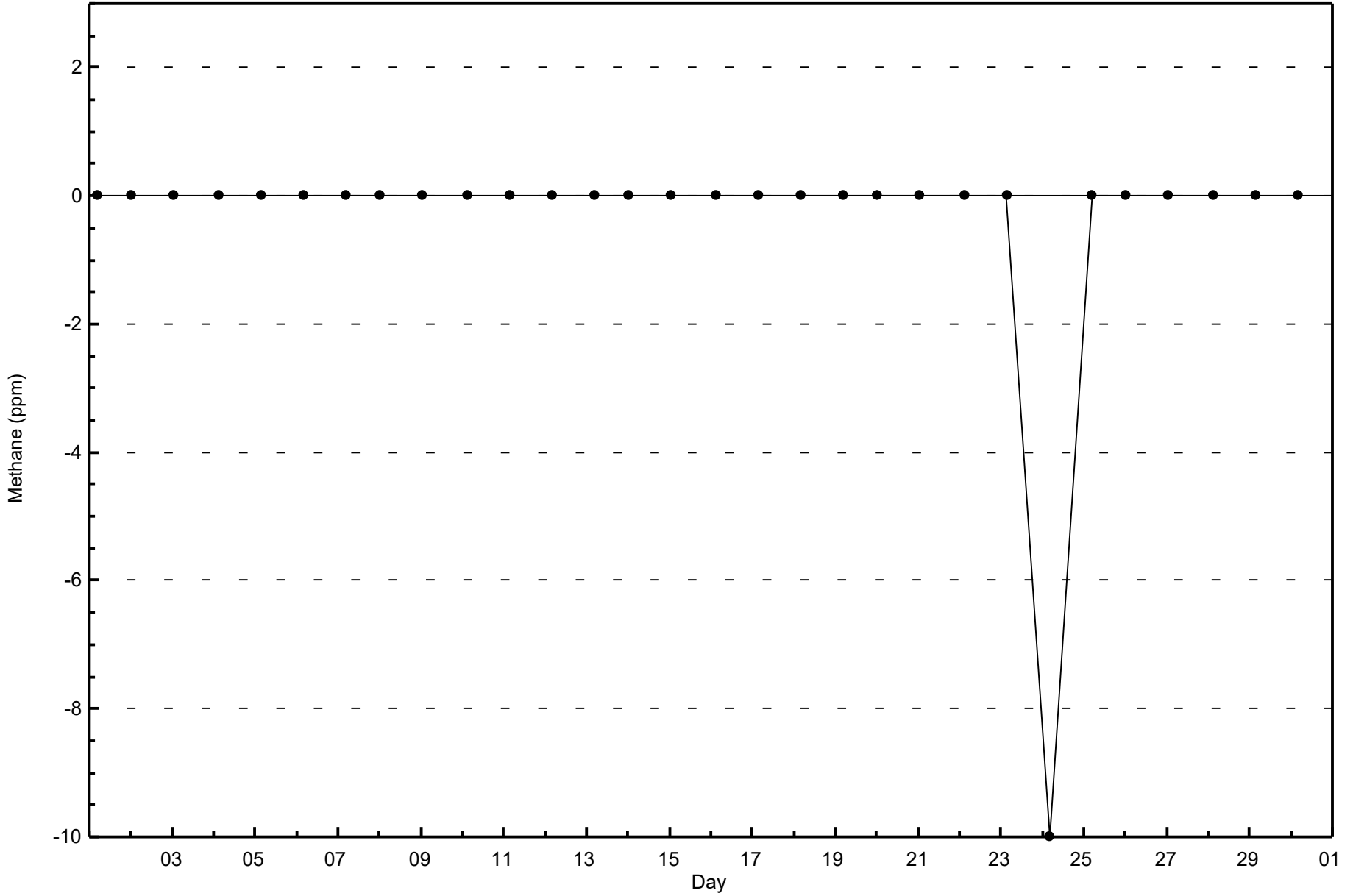


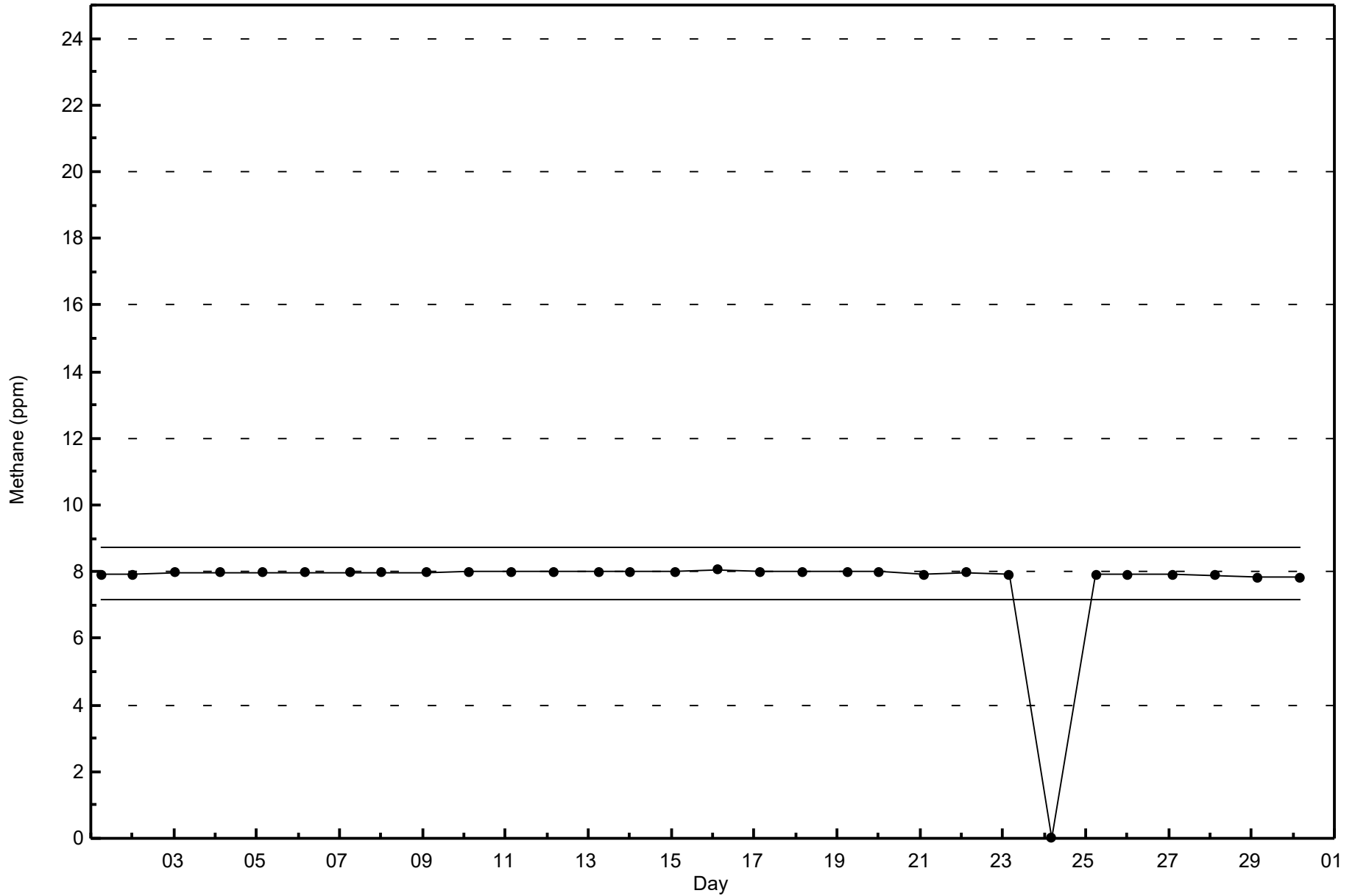
Wood Buffalo Environmental Association  
Wind Rose Nov 2023

Methane (CH<sub>4</sub>) - ppm  
Athabasca Valley



Total Number of Valid Hours: 625









Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 45.9 ppb on Nov 29 14:00	Maximum Daily Average: 35.6 ppb on Nov 29		Hours of Data:	683
Minimum Value: 3.6 ppb on Nov 30 18:00	Minimum Daily Average: 6.1 ppb on Nov 19		Hours of Missing Data:	37
Maximum Diurnal Average: 24.7 ppb at hour 14	Minimum Diurnal Average: 16.9 ppb at hour 20		Hours of Calibration:	34
Monthly Average: 20.39 ppb	Percentiles: P <sub>1</sub> = 4.2 P <sub>10</sub> = 7.5 Q <sub>1</sub> = 12.5 Median = 19.9 Q <sub>3</sub> = 28.8 P <sub>90</sub> = 33.6 P <sub>99</sub> = 37.8		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-Nov	14.1	Z	13.0	9.2	9.2	5.5	4.8	5.1	7.9	11.0	14.6	M	17.9	18.9	22.6	22.5	19.6	15.6	13.3	9.6	6.1	7.9	12.6	9.6	12.3	22.6	
2-Nov	9.0	13.9	Z	15.3	7.4	6.0	6.1	13.5	25.1	26.1	27.3	30.3	31.7	30.8	32.8	32.5	29.9	32.4	33.0	34.5	35.3	34.5	33.9	31.5	24.9	35.3	
3-Nov	31.0	31.5	29.4	Z	27.0	24.5	24.1	22.4	22.4	22.3	M	M	17.2	8.3	7.4	7.9	8.6	11.2	21.6	29.4	28.6	29.7	29.1	29.0	22.0	31.5	
4-Nov	28.8	29.2	30.0	30.3	Z	29.6	26.2	28.4	28.3	28.7	29.9	31.4	32.7	33.7	34.4	34.2	34.6	34.3	34.4	34.3	33.6	33.1	32.4	32.0	31.5	34.6	
5-Nov	31.1	30.3	29.9	29.3	29.5	Z	30.4	30.2	29.8	30.0	30.0	29.1	29.7	29.5	29.6	29.7	29.6	28.9	27.4	26.9	27.5	26.9	25.7	24.2	28.9	31.1	
6-Nov	Z	25.0	24.5	24.4	23.5	21.7	20.4	19.7	17.9	18.3	18.3	16.0	15.2	13.3	12.0	9.5	8.5	9.0	8.7	8.4	7.6	7.4	7.0	7.3	14.9	25.0	
7-Nov	8.7	Z	9.2	9.2	8.1	7.3	6.7	9.1	8.9	11.4	11.9	14.5	19.5	19.8	17.2	17.8	15.1	14.9	17.4	14.5	11.2	12.8	16.2	10.9	12.7	19.8	
8-Nov	19.9	21.8	Z	10.9	8.6	6.2	7.7	7.8	9.4	15.2	16.1	15.6	16.3	19.4	21.8	19.5	19.5	20.7	21.6	22.1	22.3	21.9	21.3	20.5	16.8	22.3	
9-Nov	20.3	20.0	15.4	Z	16.8	16.1	16.4	15.2	14.9	16.7	20.8	23.4	22.2	19.9	20.0	18.1	16.3	17.3	16.9	12.9	15.6	16.3	16.4	16.5	17.6	23.4	
10-Nov	16.4	16.4	16.3	17.1	Z	17.5	16.7	18.9	19.6	21.0	22.3	23.4	23.1	20.2	18.7	16.5	15.8	13.5	9.3	7.5	11.9	9.6	12.0	9.6	16.2	23.4	
11-Nov	15.0	16.6	15.3	17.4	16.8	Z	14.3	15.8	19.0	20.7	22.4	23.0	22.4	20.9	20.2	18.1	13.6	12.4	10.1	9.0	7.0	5.7	7.2	6.1	15.2	23.0	
12-Nov	Z	5.8	5.8	8.7	5.0	6.1	16.8	20.6	18.2	26.4	28.3	33.6	35.7	35.4	34.6	34.6	27.7	26.1	23.0	17.2	11.8	21.4	12.7	6.9	20.1	35.7	
13-Nov	7.5	Z	8.1	7.5	5.0	7.3	7.6	7.1	8.1	7.7	7.8	14.0	29.5	30.9	31.4	28.6	20.8	20.0	22.0	19.9	16.4	19.4	22.1	17.6	15.9	31.4	
14-Nov	13.1	17.5	Z	27.2	27.1	23.9	21.4	18.7	15.5	19.3	21.5	Z	C	C	C	C	31.4	21.8	15.4	22.6	11.7	7.6	7.6	8.3	11.1	18.0	31.4
15-Nov	12.5	14.5	14.6	Z	13.1	8.7	5.9	12.3	19.6	21.7	23.2	19.8	20.5	26.5	28.4	26.5	15.3	7.3	19.4	19.8	18.9	23.0	25.6	26.8	18.4	28.4	
16-Nov	26.7	22.7	16.0	15.2	Z	17.7	17.9	18.3	19.5	20.1	21.4	22.1	21.7	20.2	20.5	18.3	16.9	17.8	14.3	10.1	10.8	12.9	11.8	24.2	18.1	26.7	
17-Nov	35.0	34.5	32.5	32.4	27.9	Z	30.2	20.5	22.6	30.0	30.4	30.8	28.9	26.4	20.8	9.9	4.6	6.0	5.4	6.8	5.6	7.4	5.8	7.0	20.1	35.0	
18-Nov	Z	10.0	8.8	10.6	11.5	11.8	10.7	9.4	10.6	11.5	13.0	14.4	15.7	15.3	15.2	12.9	12.3	10.8	8.8	10.3	10.4	11.6	7.1	6.1	11.3	15.7	
19-Nov	8.2	Z	10.7	6.9	3.9	4.3	3.8	4.1	4.5	5.2	6.0	7.7	8.9	9.9	10.7	7.5	4.2	4.0	4.1	4.3	4.5	5.6	4.8	7.0	6.1	10.7	
20-Nov	9.7	24.6	Z	24.3	28.1	31.2	32.8	32.1	31.8	33.3	35.5	36.1	36.4	36.4	38.5	36.4	31.9	30.1	24.3	35.9	27.7	30.7	32.8	32.0	31.0	38.5	
21-Nov	30.7	30.0	28.3	Z	26.0	21.4	24.3	28.3	27.9	29.6	31.0	30.8	31.1	32.5	33.4	34.3	33.8	32.1	24.8	20.6	24.5	26.3	25.7	25.1	28.4	34.3	
22-Nov	26.0	25.6	27.0	28.4	Z	28.5	27.1	22.7	21.6	24.2	29.0	28.7	30.4	26.0	25.9	24.7	22.7	17.3	14.5	18.0	21.6	24.6	25.5	26.1	24.6	30.4	
23-Nov	26.8	26.0	25.2	25.1	24.6	Z	21.6	21.2	20.8	20.0	19.4	19.9	19.8	18.8	17.6	15.9	14.0	17.2	17.1	13.1	14.6	13.1	12.7	12.1	19.0	26.8	
24-Nov	Z	9.3	24.7	31.8	32.6	32.1	31.7	30.4	28.1	26.2	28.9	27.3	30.2	32.4	28.3	21.3	6.4	6.5	5.4	4.7	7.7	6.3	19.6	19.4	21.4	32.6	
25-Nov	9.9	Z	29.7	27.2	16.4	24.4	34.3	38.7	32.2	37.6	39.7	37.0	38.7	38.5	35.8	36.9	28.9	23.2	18.8	16.9	14.5	12.1	12.7	10.8	26.7	39.7	
26-Nov	11.1	15.3	Z	17.9	20.1	17.9	16.7	18.7	19.2	18.5	22.2	20.8	20.3	19.0	20.2	20.5	20.6	23.3	22.0	19.4	18.4	18.2	20.2	22.8	19.3	23.3	
27-Nov	22.2	21.7	20.7	Z	14.8	13.8	12.0	12.2	13.2	17.0	16.8	16.1	16.3	15.5	13.8	11.7	9.1	5.6	4.6	4.5	5.6	26.4	32.2	32.8	15.6	32.8	
28-Nov	34.4	34.7	34.5	35.4	Z	34.0	33.5	33.0	32.8	33.2	33.9	34.8	35.9	36.4	36.2	35.1	19.8	10.3	12.8	12.3	30.2	33.2	36.0	37.6	30.9	37.6	
29-Nov	36.5	33.8	34.3	33.3	35.2	Z	32.6	33.6	35.6	33.3	34.1	33.2	32.4	45.9	40.6	37.1	35.6	34.4	34.7	35.4	35.5	37.4	36.9	37.2	35.6	45.9	
30-Nov	Z	34.8	33.9	33.3	33.8	26.1	27.4	21.3	16.9	11.4	12.8	10.9	12.3	15.1	17.2	6.7	3.7	3.6	10.7	17.0	15.6	15.3	15.1	10.7	17.6	34.8	

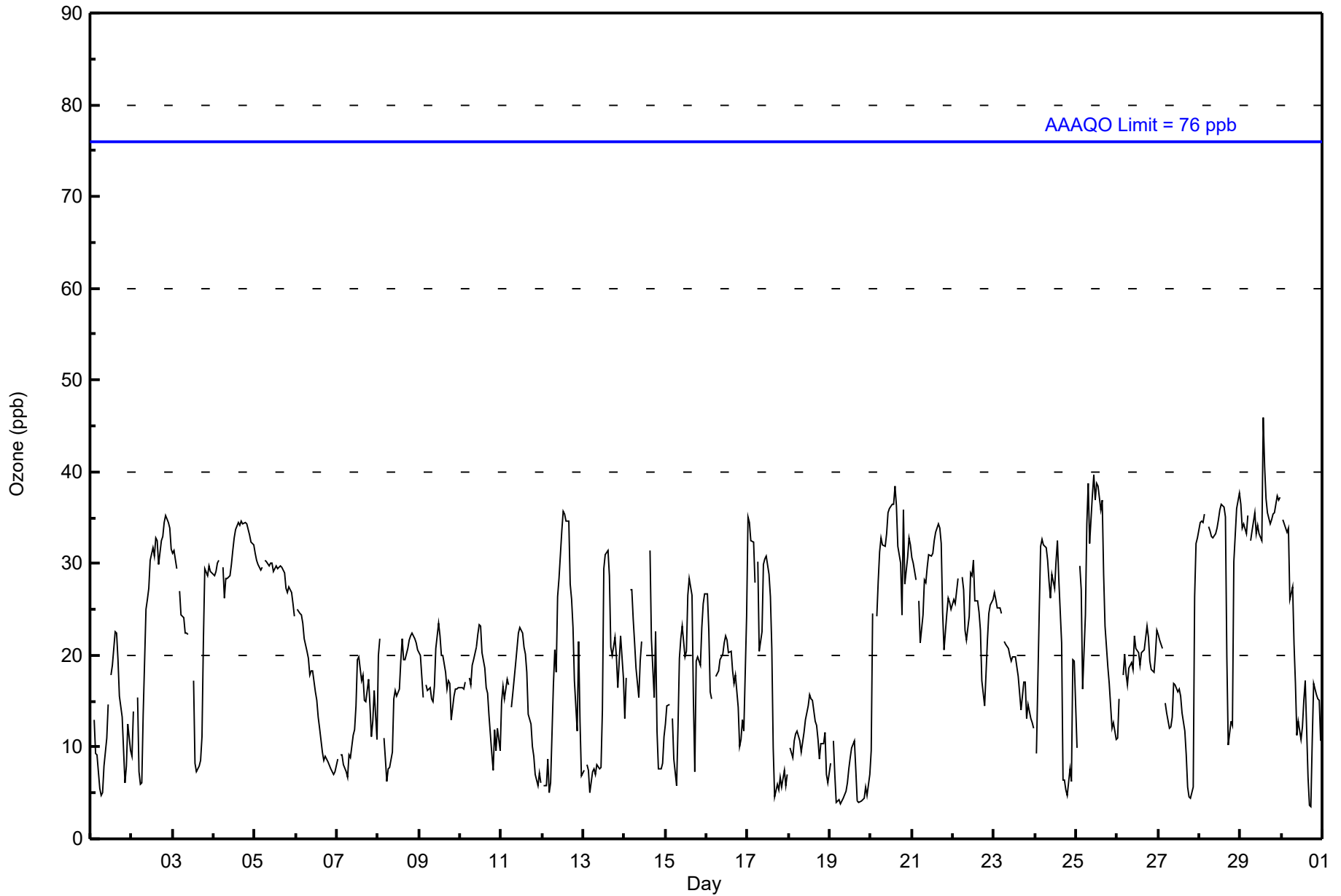
20.2	22.6	21.5	21.1	18.9	17.7	19.4	19.6	20.1	21.6	23.0	23.9	24.6	24.7	24.3	22.5	18.7	17.4	17.4	16.9	17.0	18.6	19.4	19.0	Diurnal Average	
36.5	34.8	34.5	35.4	35.2	34.0	34.3	38.7	35.6	37.6	39.7	37.0	38.7	45.9	40.6	37.1	35.6	34.4	34.7	35.9	35.5	37.4	36.9	37.6	Diurnal Maximum	

Z - zerospan      C - Calibration      M - Maintenance  
 Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 76 ppb



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

**Ozone (O<sub>3</sub>) - ppb**  
**Athabasca Valley - November 2023**





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

**Ozone (O<sub>3</sub>) - ppb**  
**Athabasca Valley - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	361	52.86	52.86
21 - 50	322	47.14	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 (O<sub>3</sub>) - ppb**  
**Athabasca Valley - November 2023**

<b>Concentration</b> <b>Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 20	4	7	1	3	10	33	160	27	10	19	10	4	6	4	12	21	331
21 - 50	11	8	10	21	30	15	44	2	3	8	19	44	34	20	15	31	315
51 - 82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 83	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	15	15	11	24	40	48	204	29	13	27	29	48	40	24	27	52	646

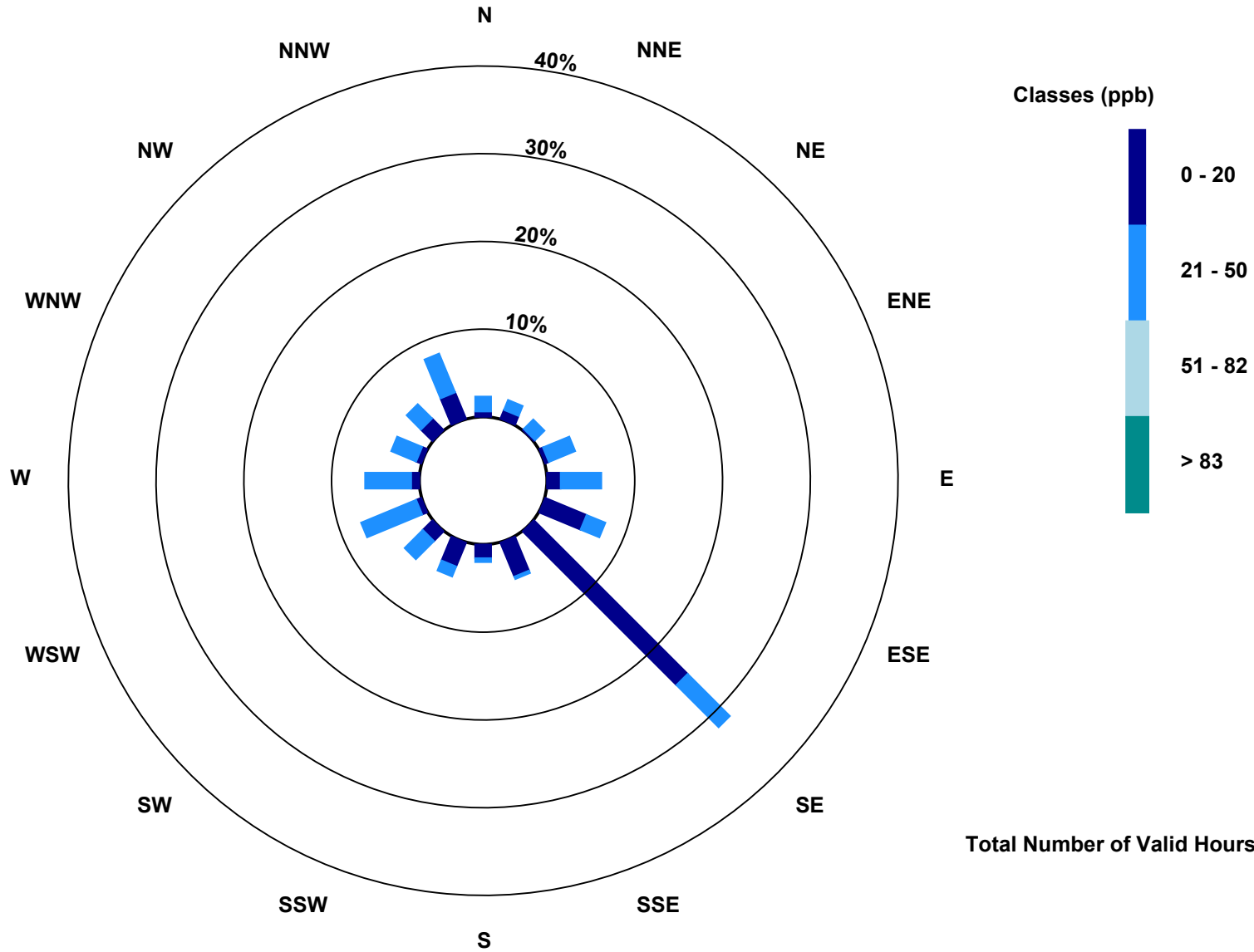
Total Number of Valid Hours: 646

Total Number of Hours: 720

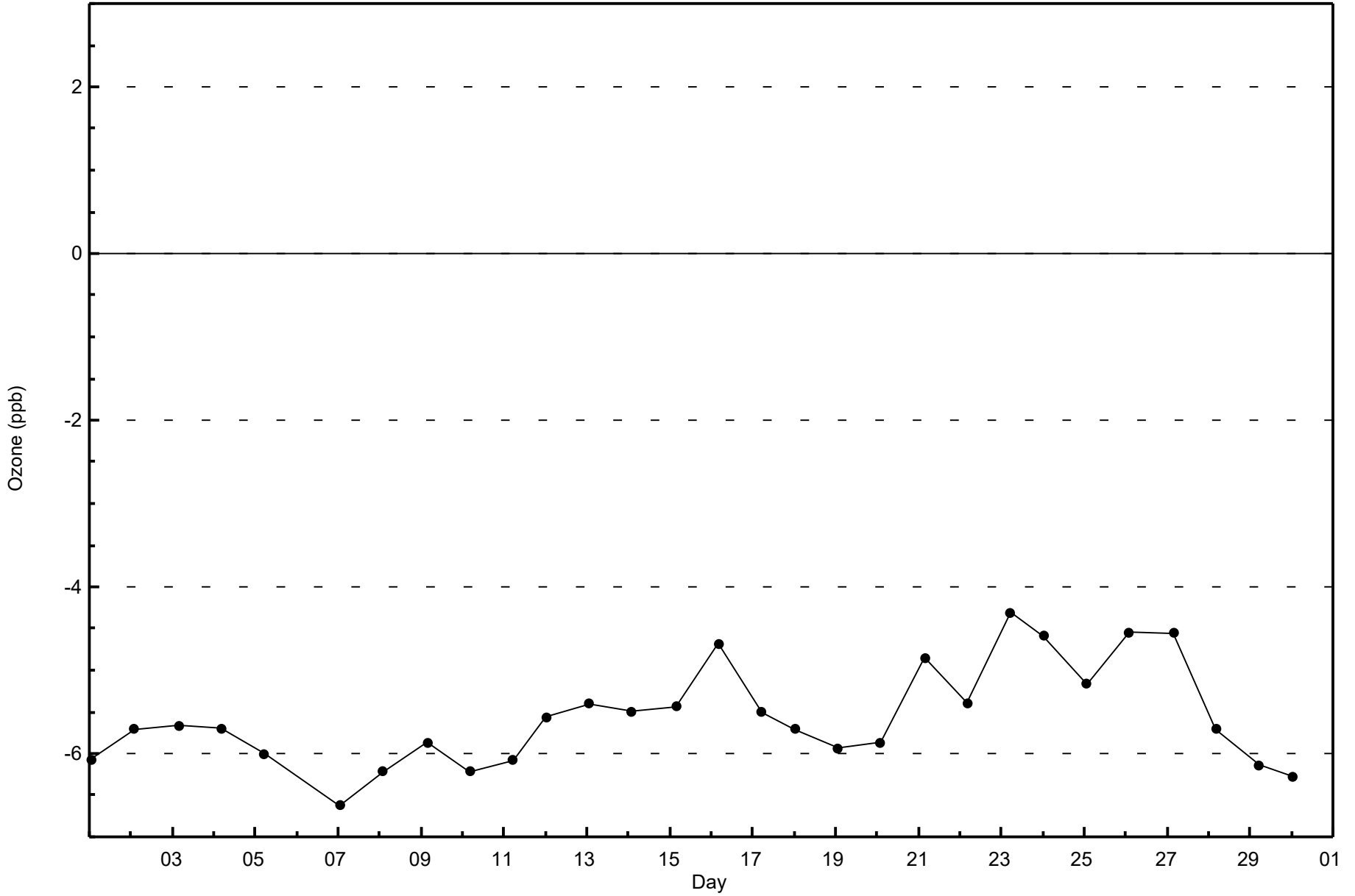


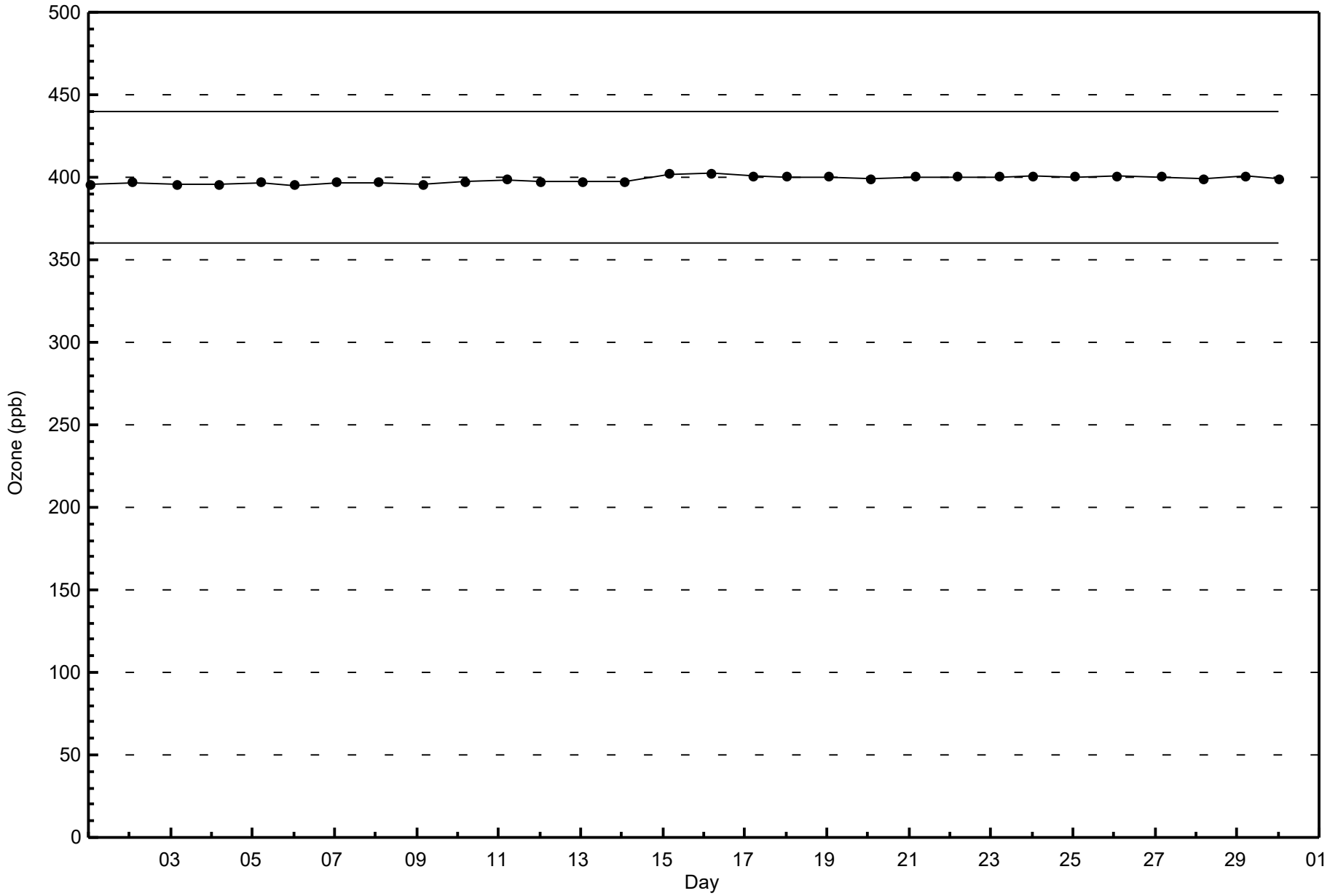
Wood Buffalo Environmental Association  
Wind Rose Nov 2023

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



Total Number of Valid Hours: 646

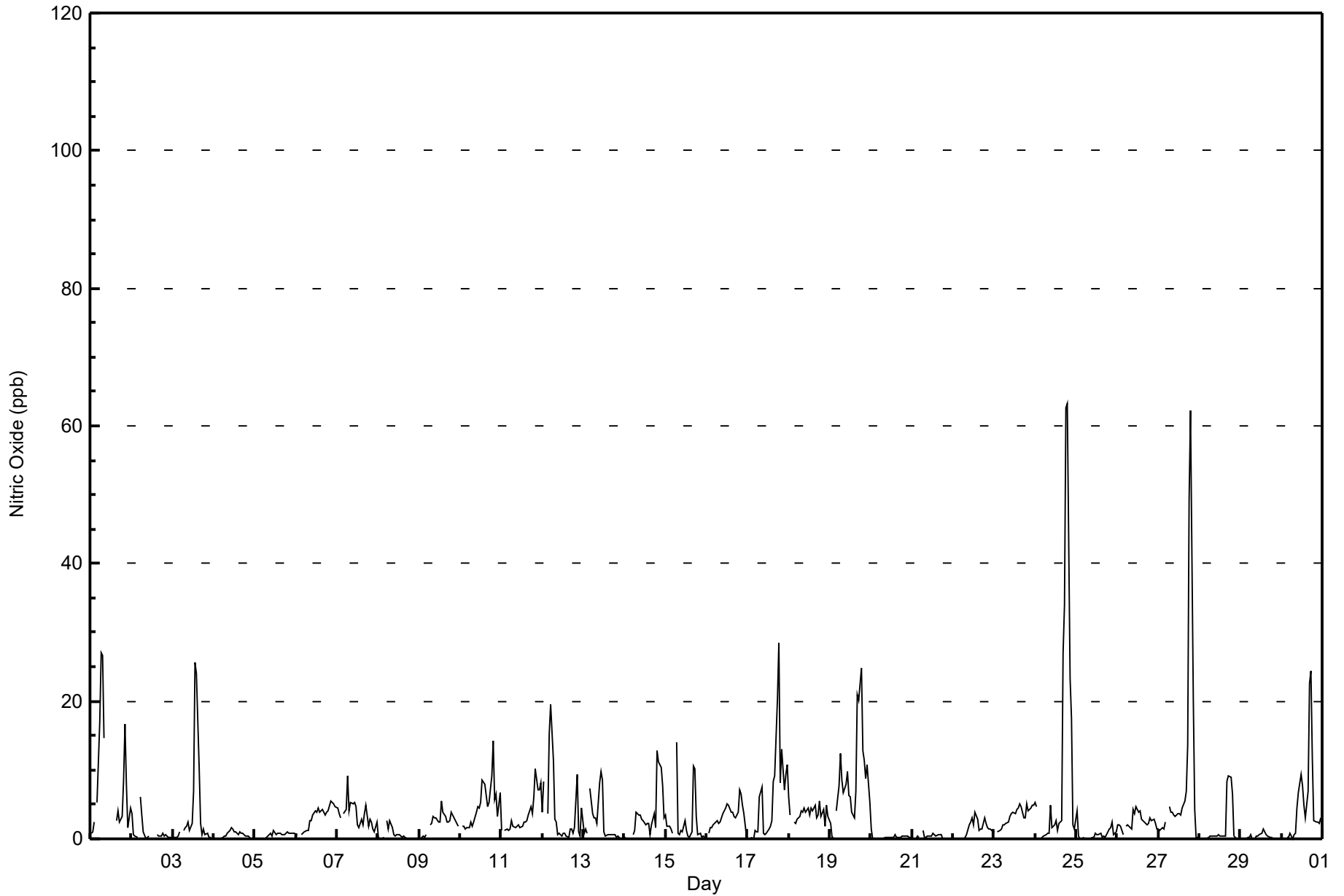






Maximum Value: 63.2 ppb on Nov 24 20:00																				Maximum Daily Average: 11.4 ppb on Nov 24					Hours in Service: 720		
Minimum Value: 0.0 ppb on Nov 22 02:00																				Minimum Daily Average: 0.3 ppb on Nov 20					Hours of Data: 680		
Maximum Diurnal Average: 8.0 ppb at hour 19																				Minimum Diurnal Average: 0.7 ppb at hour 4					Hours of Missing Data: 40		
Monthly Average: 3.38 ppb																				Percentiles: P <sub>1</sub> = 0.0 P <sub>10</sub> = 0.1 Q <sub>1</sub> = 0.5 Median = 1.7 Q <sub>3</sub> = 3.8 P <sub>90</sub> = 7.8 P <sub>99</sub> = 27.1					Hours of Calibration: 36		
																									Percent Operational Time: 99.4		
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Nov	0.9	1.1	2.5	Z	5.4	17.0	27.0	26.7	14.6	C	C	C	C	C	C	2.7	4.1	2.5	3.2	8.4	16.7	7.9	1.7	4.4	--	27.0	
2-Nov	3.7	0.7	0.4	0.2	Z	6.0	3.4	1.0	0.1	0.2	0.5	M	M	M	M	0.6	0.4	0.5	0.7	0.5	0.5	0.1	0.2	0.3	1.1	6.0	
3-Nov	0.1	0.1	0.3	0.5	1.0	Z	1.2	1.7	1.7	2.5	1.1	2.2	6.9	25.6	24.0	10.1	2.2	0.7	1.5	0.6	0.8	0.2	0.1	0.0	3.7	25.6	
4-Nov	Z	0.0	0.0	0.0	0.0	0.2	0.3	0.3	0.8	1.3	1.7	1.4	1.0	1.0	0.7	1.0	0.8	0.7	0.5	0.4	0.3	0.2	0.1	0.1	0.6	1.7	
5-Nov	0.0	Z	0.1	0.1	0.1	0.0	0.0	0.1	0.7	0.8	0.4	1.1	0.6	0.9	0.7	0.9	0.7	0.5	0.7	0.9	0.7	0.9	0.8	0.7	0.5	1.1	
6-Nov	0.7	0.5	Z	0.7	0.7	0.9	1.2	1.3	2.6	2.6	3.4	4.0	3.8	4.4	3.8	4.2	3.9	3.4	3.9	4.1	5.5	5.3	5.1	4.6	3.1	5.5	
7-Nov	4.5	3.6	3.0	Z	3.6	4.2	9.2	4.0	5.2	5.1	5.3	4.7	2.1	1.7	2.8	2.1	3.7	4.8	1.8	2.8	2.5	1.4	0.9	2.5	3.5	9.2	
8-Nov	0.2	0.1	0.1	0.1	Z	2.7	1.5	2.6	1.7	0.6	0.5	0.7	0.6	0.4	0.3	0.3	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.6	2.7	
9-Nov	0.0	0.0	0.5	0.1	0.6	Z	2.0	2.2	3.2	3.1	3.0	2.4	2.5	5.4	3.9	3.2	2.4	2.5	2.7	3.8	3.0	2.6	2.1	1.9	2.3	5.4	
10-Nov	Z	1.8	1.8	1.4	1.6	1.7	2.4	1.8	2.4	3.9	4.6	4.4	5.2	8.5	7.9	6.2	4.6	5.3	9.1	14.3	5.7	6.4	3.3	6.8	4.8	14.3	
11-Nov	1.1	Z	1.2	1.5	1.1	1.4	2.7	1.8	1.5	1.8	2.0	1.7	1.9	2.5	2.4	2.6	3.4	4.7	3.6	6.1	10.2	7.2	7.1	8.1	3.4	10.2	
12-Nov	3.9	8.4	Z	3.6	15.2	19.4	11.3	2.9	2.5	0.6	0.8	0.4	0.7	0.8	0.4	0.3	1.4	1.5	0.9	1.6	9.3	1.0	0.5	4.5	4.0	19.4	
13-Nov	0.8	1.4	0.8	Z	7.3	3.6	3.0	3.0	2.3	8.2	9.8	8.6	1.1	0.5	0.7	0.6	0.6	0.6	0.6	0.2	0.3	0.1	0.1	0.1	2.4	9.8	
14-Nov	0.2	0.1	0.1	0.0	Z	0.6	1.2	3.9	3.4	3.4	2.9	2.6	2.1	2.1	0.5	2.1	0.5	2.1	3.7	1.7	12.9	11.2	10.4	7.7	3.0	3.4	12.9
15-Nov	3.4	1.9	1.8	1.4	0.9	Z	14.1	0.8	0.6	1.2	1.0	2.7	1.2	0.4	0.3	0.9	10.6	10.1	3.2	0.5	0.9	0.2	0.3	0.1	2.6	14.1	
16-Nov	Z	0.7	1.6	1.7	2.1	2.4	2.6	2.3	2.4	3.7	4.1	4.4	5.0	4.8	3.9	3.8	3.3	3.1	3.9	7.0	6.5	5.0	3.7	0.3	3.4	7.0	
17-Nov	0.1	Z	0.2	0.1	1.1	1.1	1.0	6.0	7.6	0.9	0.7	0.8	1.4	1.8	2.6	8.4	9.2	20.3	28.4	8.1	12.9	7.2	9.4	10.9	6.1	28.4	
18-Nov	6.1	3.6	Z	2.4	2.3	2.8	3.3	4.0	3.9	4.5	3.8	4.4	3.5	4.4	4.1	5.0	3.0	3.4	5.4	3.3	4.2	1.8	5.0	3.2	3.8	6.1	
19-Nov	2.2	0.3	0.3	Z	4.1	7.8	12.4	8.5	6.6	8.0	9.7	6.3	6.2	3.9	3.0	6.8	20.9	20.1	24.9	12.9	11.4	8.7	10.7	5.3	8.7	24.9	
20-Nov	1.5	0.0	0.0	0.0	Z	0.0	0.1	0.0	0.2	0.2	0.2	0.2	0.1	0.2	0.5	0.3	0.2	0.1	0.4	0.4	0.5	0.4	0.1	0.1	0.3	1.5	
21-Nov	0.1	0.0	0.0	0.3	0.3	Z	1.2	0.2	0.3	0.4	0.4	0.5	0.8	0.6	0.4	0.6	0.6	0.5	0.0	0.1	0.0	0.0	0.0	0.0	0.3	1.2	
22-Nov	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.6	2.1	2.4	3.1	2.0	3.8	2.7	1.2	1.3	1.5	3.0	2.3	1.7	1.5	1.5	1.1	1.4	3.8	
23-Nov	0.9	Z	1.0	1.3	1.4	2.0	2.0	2.3	2.5	3.3	3.7	3.8	3.6	4.3	4.4	5.0	4.6	3.0	3.1	5.0	4.0	4.4	4.9	4.8	3.3	5.0	
24-Nov	5.3	4.7	Z	0.1	0.2	0.5	0.5	0.8	0.8	4.9	1.7	2.1	2.5	1.2	2.2	2.7	27.1	34.1	62.6	63.2	23.4	17.5	2.0	1.5	11.4	63.2	
25-Nov	4.1	0.5	0.1	Z	0.1	0.0	0.0	0.0	0.1	0.2	0.3	0.9	0.6	0.5	0.8	0.2	0.4	0.1	0.9	1.4	1.6	2.5	0.6	1.0	0.7	4.1	
26-Nov	2.0	2.1	1.9	0.7	Z	1.8	2.0	1.9	1.5	4.4	3.7	4.7	3.9	4.1	2.8	2.6	2.5	2.1	2.2	3.0	2.7	2.8	2.3	1.5	2.6	4.7	
27-Nov	1.3	1.3	1.7	1.4	2.5	Z	4.7	3.8	3.8	3.5	3.2	3.6	3.6	3.5	4.5	5.5	6.9	13.7	49.2	62.2	20.4	4.3	0.1	0.1	8.9	62.2	
28-Nov	Z	0.0	0.0	0.0	0.1	0.2	0.5	0.4	0.4	0.5	0.4	0.6	0.5	0.4	0.5	0.4	8.3	9.2	9.0	6.5	0.5	0.3	0.1	0.0	1.7	9.2	
29-Nov	0.0	Z	0.0	0.0	0.2	0.3	0.6	0.1	0.0	0.3	0.4	0.6	0.7	1.3	1.0	0.6	0.4	0.2	0.1	0.1	0.1	0.0	0.0	0.0	0.3	1.3	
30-Nov	0.0	0.1	Z	0.2	0.2	0.9	0.1	0.5	0.8	4.4	6.8	9.4	7.8	4.9	3.1	7.0	22.5	24.5	11.9	2.7	2.5	2.3	2.3	3.0	5.1	24.5	
																								Diurnal Average			
																								Diurnal Maximum			
1.7 1.3 0.8 0.7 2.1 3.1 3.7 2.8 2.5 2.6 2.7 2.9 2.6 3.4 3.1 2.9 5.1 5.9 8.0 7.8 5.3 3.4 2.4 2.3																											
6.1 8.4 3.0 3.6 15.2 19.4 27.0 26.7 14.6 8.2 9.8 9.4 7.8 25.6 24.0 10.1 27.1 34.1 62.6 63.2 23.4 17.5 10.7 10.9																											
Z - zerospan C - Calibration M - Maintenance																											







**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Nitric Oxide (NO) - ppb  
Athabasca Valley - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	664	97.65	97.65
21 - 40	12	1.76	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: 680

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitric Oxide (NO) - ppb  
Athabasca Valley - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 20	10	13	11	25	39	48	200	25	12	27	31	45	44	23	24	50	627
21 - 40	0	1	0	0	0	1	3	2	1	1	0	0	0	0	1	2	12
41 - 80	0	0	0	0	0	0	2	2	0	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
<b>Totals</b>	10	14	11	25	39	49	205	29	13	28	31	45	44	23	25	52	643

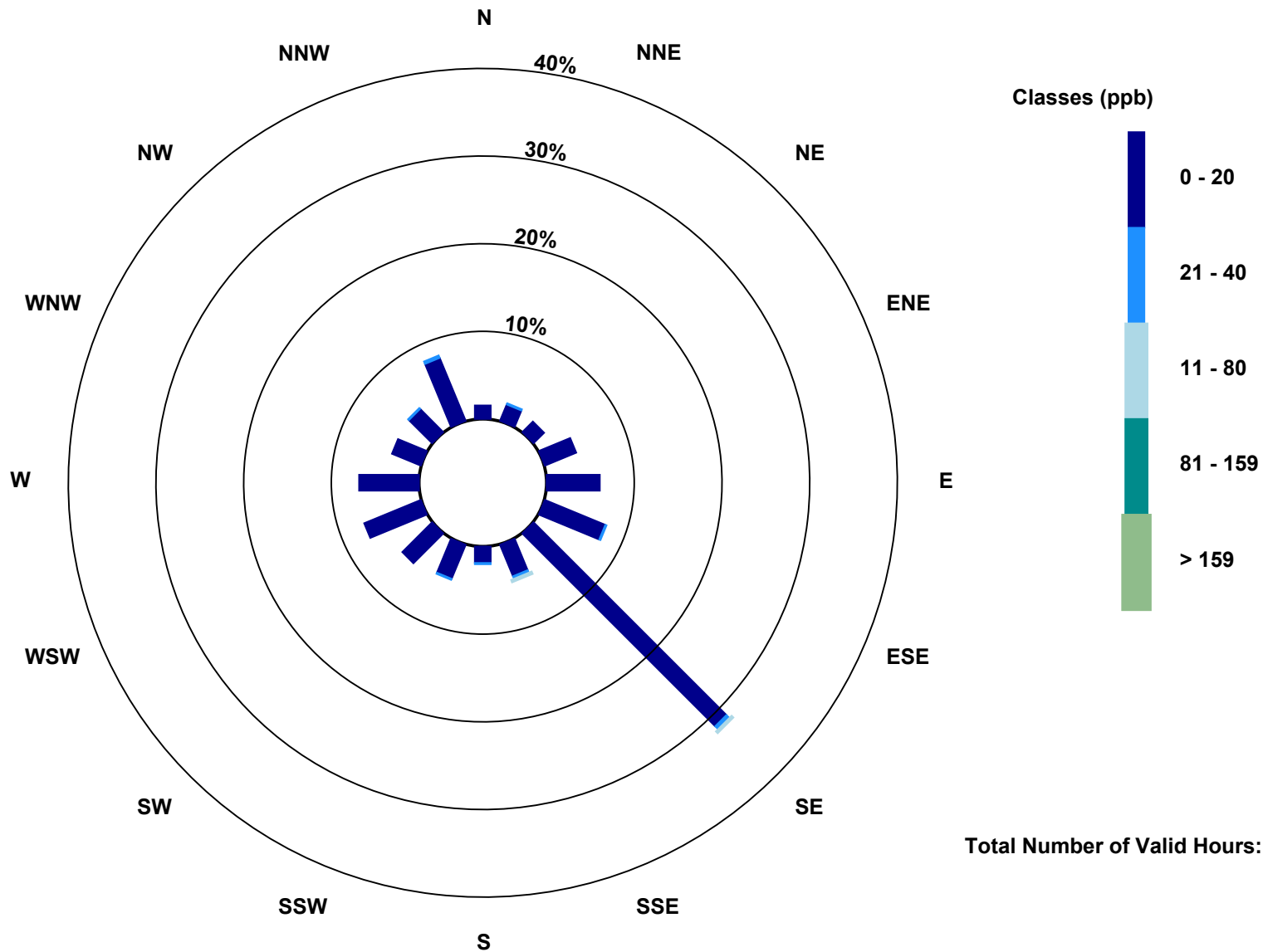
Total Number of Valid Hours: 643

Total Number of Hours: 720

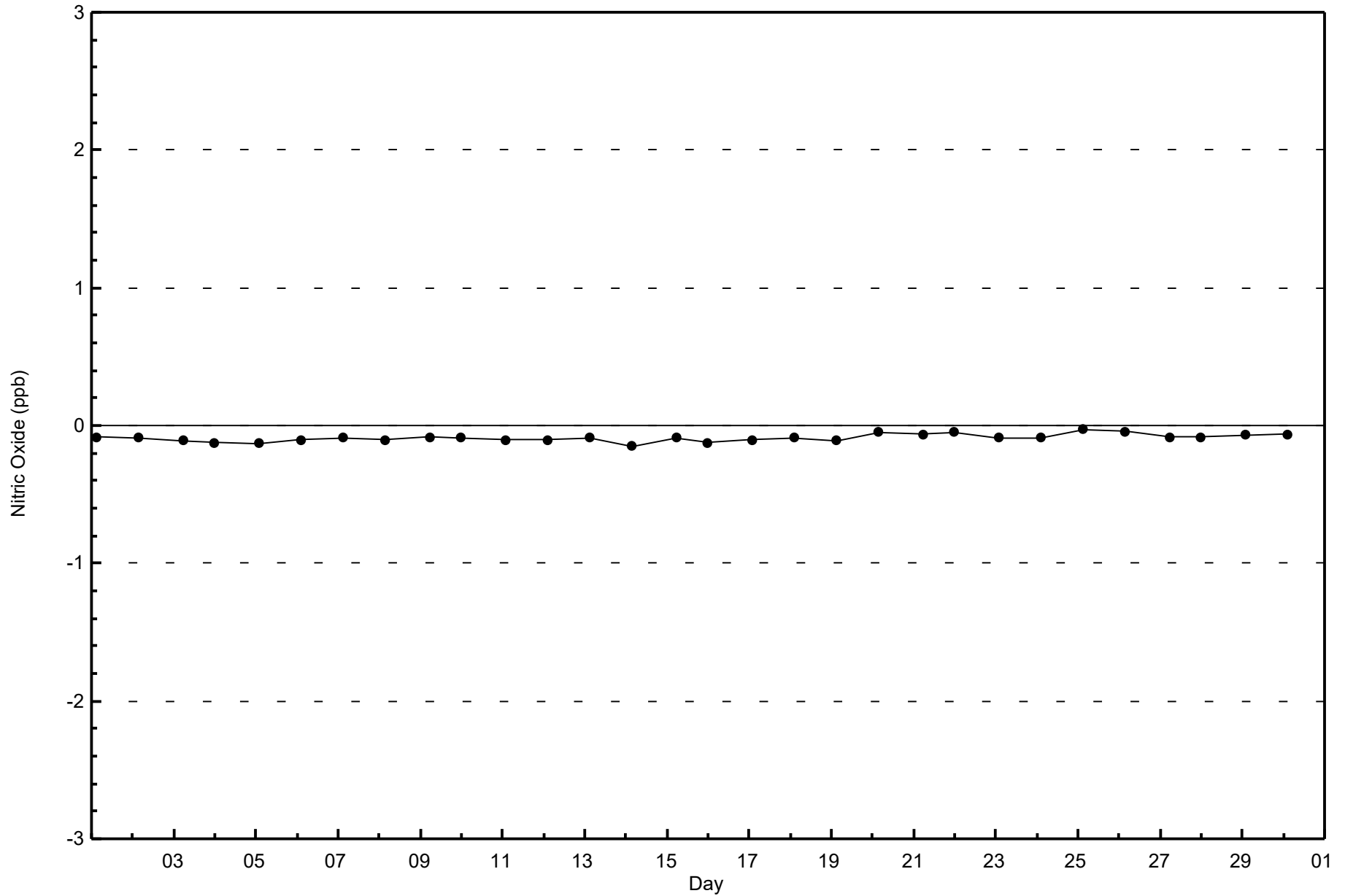


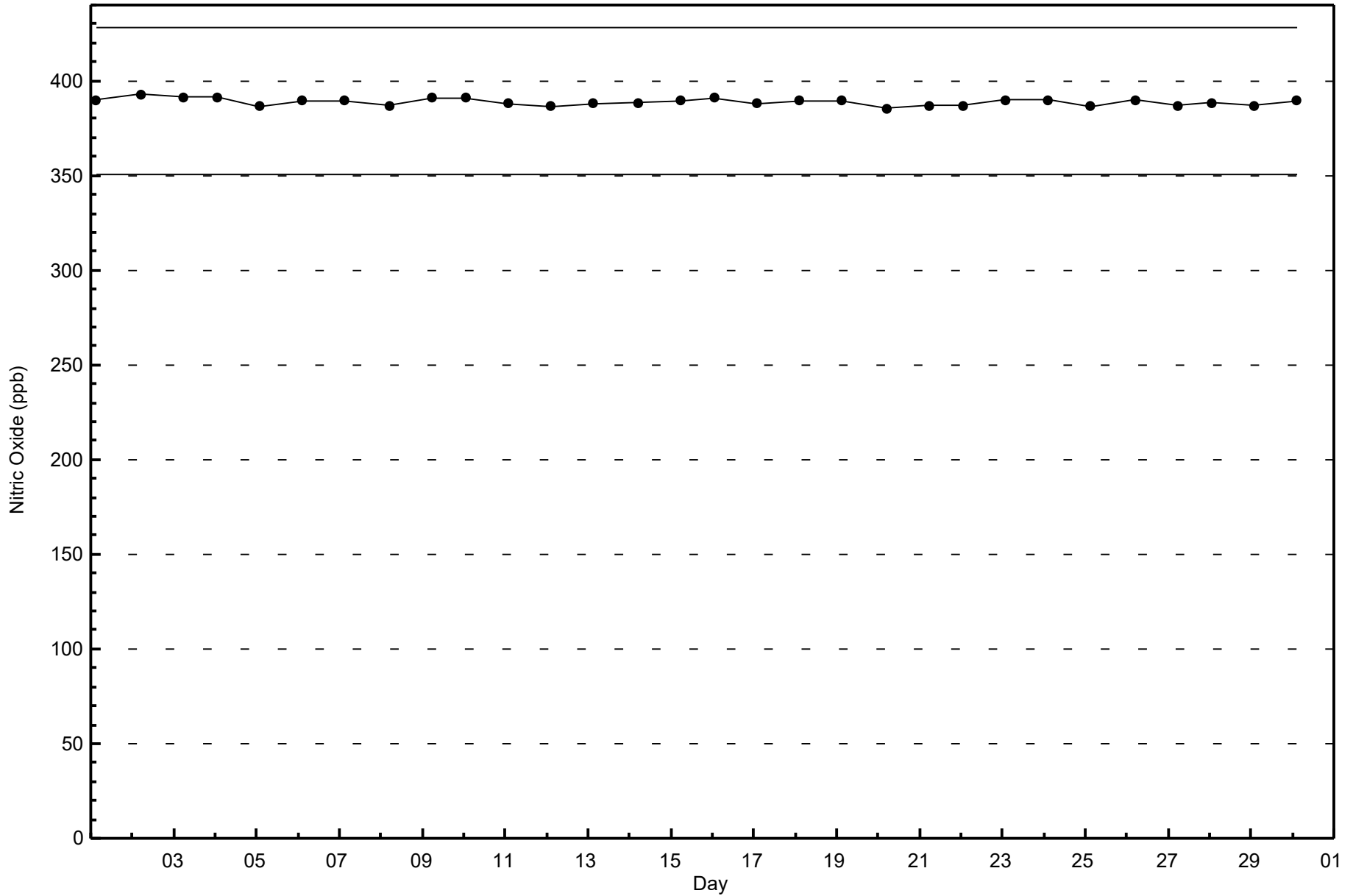
Wood Buffalo Environmental Association  
Wind Rose Nov 2023

Nitric Oxide (NO) - ppb  
Athabasca Valley



Total Number of Valid Hours: 643







Wood Buffalo Environmental Association

Summary of Hour Averages

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

Athabasca Valley - November 2023

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 30.5 ppb on Nov 30 18:00	Maximum Daily Average: 14.9 ppb on Nov 30		Hours of Data:	680
Minimum Value: 0.3 ppb on Nov 5 06:00	Minimum Daily Average: 1.6 ppb on Nov 5		Hours of Missing Data:	40
Maximum Diurnal Average: 11.8 ppb at hour 18	Minimum Diurnal Average: 4.2 ppb at hour 4		Hours of Calibration:	36
Monthly Average: 7.48 ppb	Percentiles: P <sub>1</sub> = 0.5 P <sub>10</sub> = 1.4 Q <sub>1</sub> = 2.8 Median = 6.3 Q <sub>3</sub> = 10.5 P <sub>90</sub> = 14.7 P <sub>99</sub> = 26.0		Percent Operational Time:	99.4

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	7.5	7.5	7.3	Z	10.7	16.1	18.2	17.6	13.8	C	C	C	C	C	C	6.4	10.1	13.3	12.2	16.9	20.5	18.1	10.8	13.7	--	20.5
2-Nov	13.5	7.1	8.5	5.2	Z	17.9	19.9	13.1	2.4	2.2	2.3	M	M	M	M	4.1	6.7	4.3	3.6	1.7	1.5	1.7	1.9	3.8	6.4	19.9
3-Nov	2.6	1.9	4.3	5.4	6.7	Z	8.2	9.4	9.0	8.3	6.4	9.7	11.0	22.1	23.7	21.9	20.3	17.1	7.4	1.1	2.2	1.3	1.4	1.2	8.8	23.7
4-Nov	Z	0.7	0.7	0.5	0.6	1.6	5.1	2.5	2.8	3.5	3.5	2.6	2.2	2.7	1.8	2.1	1.9	2.2	1.5	0.9	0.9	0.5	0.5	0.3	1.8	5.1
5-Nov	0.5	Z	0.9	1.6	0.9	0.3	0.4	0.6	0.6	0.5	0.9	2.1	1.1	1.1	0.6	0.5	1.0	1.3	3.3	3.3	2.6	3.3	4.1	5.1	1.6	5.1
6-Nov	3.7	3.8	Z	3.1	3.3	4.3	4.8	4.5	5.7	4.6	4.0	4.5	4.2	4.6	4.6	6.3	7.1	6.4	6.3	6.5	7.4	7.7	7.9	8.1	5.4	8.1
7-Nov	9.2	9.8	8.7	Z	8.7	9.3	11.8	10.4	12.1	11.1	10.4	8.7	4.1	4.1	7.0	7.2	9.8	9.8	5.8	5.7	6.0	3.8	5.3	11.5	8.3	12.1
8-Nov	2.3	1.4	1.4	1.9	Z	4.5	3.2	3.3	3.3	2.0	1.6	1.7	1.6	1.4	1.5	2.1	2.3	3.0	2.5	2.5	2.4	2.5	2.8	2.9	2.4	4.5
9-Nov	2.4	2.5	6.3	3.6	3.7	Z	2.2	2.8	3.3	2.7	4.3	4.2	4.4	6.6	5.9	6.8	8.1	6.5	5.8	10.5	7.6	6.6	5.8	5.2	5.1	10.5
10-Nov	Z	5.6	6.1	5.4	6.1	6.1	7.6	6.1	6.2	6.6	6.4	6.1	7.2	10.0	11.9	14.4	14.7	16.6	21.2	21.8	16.1	16.4	13.0	13.5	10.7	21.8
11-Nov	8.2	Z	6.6	5.1	4.8	5.0	7.6	5.8	4.0	3.7	3.3	3.5	4.1	4.9	5.9	7.4	11.2	11.5	11.9	12.5	13.7	13.5	9.4	10.9	7.6	13.7
12-Nov	8.9	12.7	Z	5.6	11.7	14.5	10.7	7.6	8.0	1.8	1.9	1.2	2.0	2.0	1.6	1.4	6.4	7.0	8.4	12.4	16.8	4.0	10.2	16.9	7.6	16.9
13-Nov	13.8	9.4	10.4	Z	15.8	13.5	13.1	13.8	12.7	14.0	14.2	11.3	2.4	1.1	1.2	3.3	8.8	9.2	6.7	8.6	12.0	8.8	7.7	13.2	9.8	15.8
14-Nov	18.3	12.8	5.6	2.6	Z	3.1	2.2	5.9	8.8	5.9	4.2	3.0	2.9	3.4	4.7	2.4	11.6	16.4	8.7	19.7	23.9	22.5	19.0	13.1	9.6	23.9
15-Nov	12.5	8.7	7.1	7.1	7.4	Z	16.8	12.0	6.9	5.8	4.2	6.8	5.4	2.4	1.8	4.1	14.7	20.1	8.4	8.0	9.7	5.3	3.9	3.1	7.9	20.1
16-Nov	Z	5.3	12.0	11.3	11.3	9.1	8.0	7.7	7.5	7.7	6.3	6.4	7.4	9.2	8.9	11.5	12.2	10.8	14.6	18.6	16.9	14.2	14.1	4.6	10.2	18.6
17-Nov	0.8	Z	2.6	2.0	5.7	3.4	2.3	11.8	9.1	1.6	1.5	1.6	3.5	5.6	11.4	22.6	24.8	24.0	25.2	20.4	18.8	14.0	15.2	10.8	10.4	25.2
18-Nov	11.1	7.5	Z	6.2	5.1	5.3	6.3	7.4	6.0	5.7	4.9	4.5	4.1	5.2	5.0	8.1	7.4	8.8	10.4	8.3	8.0	5.0	9.8	9.8	7.0	11.1
19-Nov	7.3	4.2	2.5	Z	6.8	5.3	6.2	4.3	3.8	3.5	3.6	2.8	3.2	2.7	3.1	6.8	10.7	10.3	11.0	10.7	9.7	10.1	10.5	9.3	6.5	11.0
20-Nov	7.3	1.2	0.8	0.5	Z	0.8	1.3	1.6	2.0	1.5	1.1	0.9	0.6	0.9	1.9	1.9	4.0	5.4	11.0	6.8	3.6	2.5	1.7	1.8	2.7	11.0
21-Nov	2.1	2.6	3.3	7.0	4.4	Z	6.7	3.3	3.3	2.4	1.8	2.0	2.6	1.5	1.2	1.4	1.5	2.3	7.9	11.7	7.4	5.3	5.8	6.8	4.1	11.7
22-Nov	Z	5.5	4.3	4.0	4.5	5.3	6.4	11.5	12.5	10.1	6.4	7.3	5.5	10.1	11.8	12.0	12.6	16.5	19.3	15.2	9.6	7.7	6.3	5.0	9.1	19.3
23-Nov	4.3	Z	5.6	4.8	5.1	6.5	8.4	7.9	8.1	8.4	8.4	7.3	6.8	7.8	8.2	9.8	11.9	8.2	7.1	10.8	8.8	9.7	9.9	10.0	8.0	11.9
24-Nov	10.8	12.3	Z	1.3	1.2	1.8	1.7	2.8	4.7	7.7	4.3	4.0	5.3	4.5	8.0	14.3	29.9	27.8	29.0	28.8	24.8	24.8	10.0	11.2	11.8	29.9
25-Nov	19.4	7.6	1.0	Z	9.5	6.9	1.0	1.2	6.3	3.1	1.9	4.6	2.6	2.7	5.2	3.6	9.5	14.2	16.8	12.8	12.6	14.0	11.3	11.1	7.8	19.4
26-Nov	13.7	11.9	10.4	6.8	Z	9.2	11.6	10.0	8.6	10.8	7.5	9.8	10.7	11.8	10.3	10.0	9.7	8.0	9.1	11.2	11.1	11.1	8.7	5.3	9.9	13.7
27-Nov	5.5	5.9	6.5	7.4	10.4	Z	10.1	12.0	11.0	6.7	6.3	6.7	6.4	7.3	9.1	11.7	12.8	13.5	21.1	26.9	19.9	7.0	1.2	0.7	9.8	26.9
28-Nov	Z	1.0	1.1	0.9	0.9	1.1	1.4	1.4	1.4	1.2	1.3	1.8	1.7	1.6	2.5	3.7	18.3	25.4	19.9	21.6	7.0	1.6	1.7	1.1	5.2	25.4
29-Nov	1.3	Z	1.3	2.3	1.9	2.6	4.2	3.8	2.3	4.0	2.9	3.8	4.1	5.5	3.3	2.1	2.5	3.4	3.0	2.6	2.1	1.5	1.6	0.9	2.7	5.5
30-Nov	1.3	1.6	Z	2.6	2.3	8.6	6.7	13.5	15.4	21.1	20.5	22.6	20.7	16.9	13.7	25.7	30.1	30.5	20.9	13.6	13.5	13.6	11.9	15.1	14.9	30.5

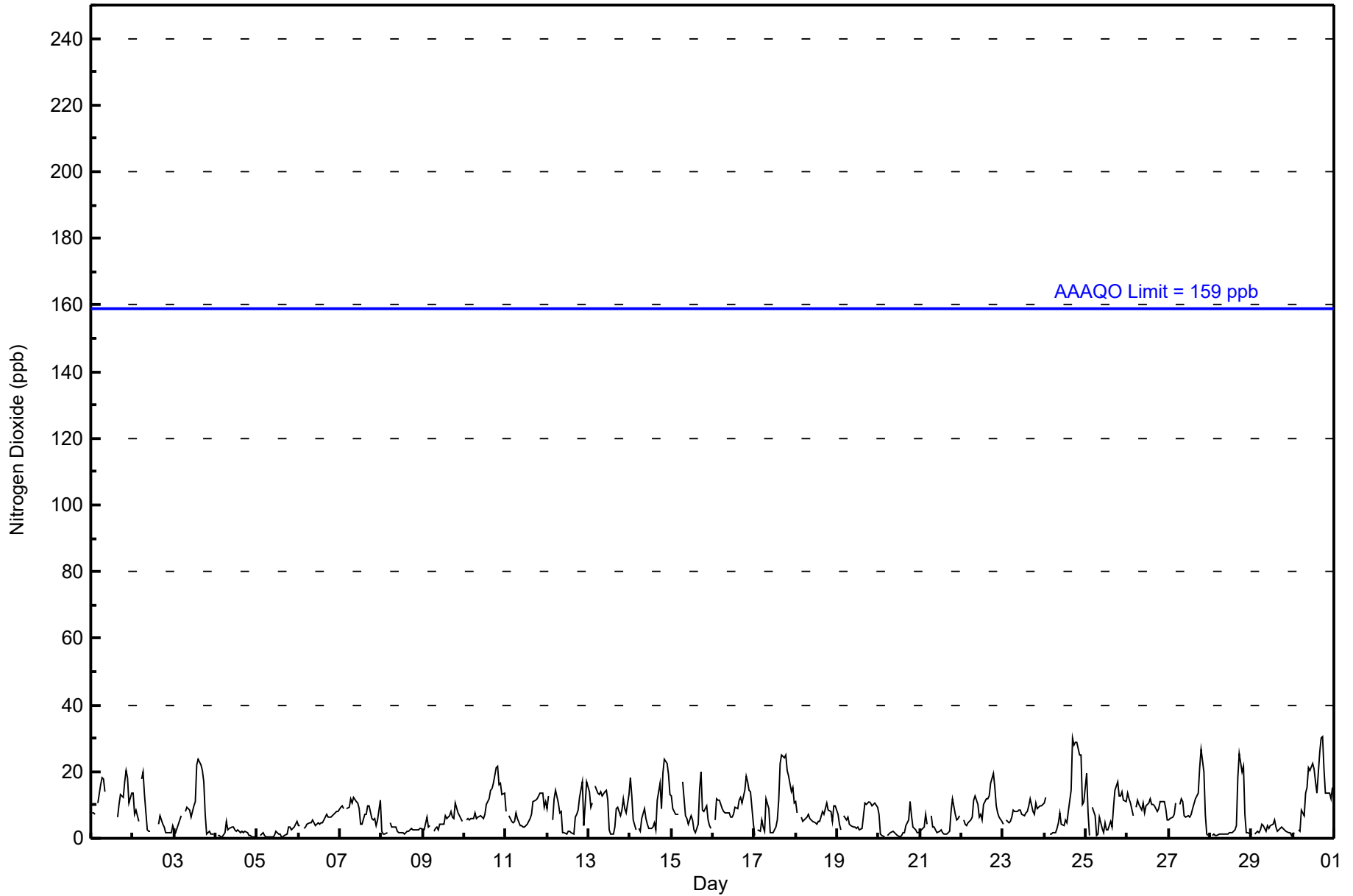
7.5	6.0	5.0	4.2	6.0	6.5	7.1	7.2	6.7	5.8	5.0	5.4	4.9	5.7	6.3	7.9	11.1	11.8	11.3	11.7	10.6	8.6	7.4	7.5	Diurnal Average	
19.4	12.8	12.0	11.3	15.8	17.9	19.9	17.6	15.4	21.1	20.5	22.6	20.7	22.1	23.7	25.7	30.1	30.5	29.0	28.8	24.8	24.8	19.0	16.9	Diurnal Maximum	

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



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

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb**  
**Athabasca Valley - November 2023**







**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Athabasca Valley - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	650	95.59	95.59
21 - 40	30	4.41	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 (NO<sub>2</sub>) - ppb  
Athabasca Valley - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 20	9	9	11	25	39	47	195	25	13	27	31	45	43	23	23	48	613
21 - 40	1	5	0	0	0	2	10	4	0	1	0	0	1	0	2	4	30
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	10	14	11	25	39	49	205	29	13	28	31	45	44	23	25	52	643

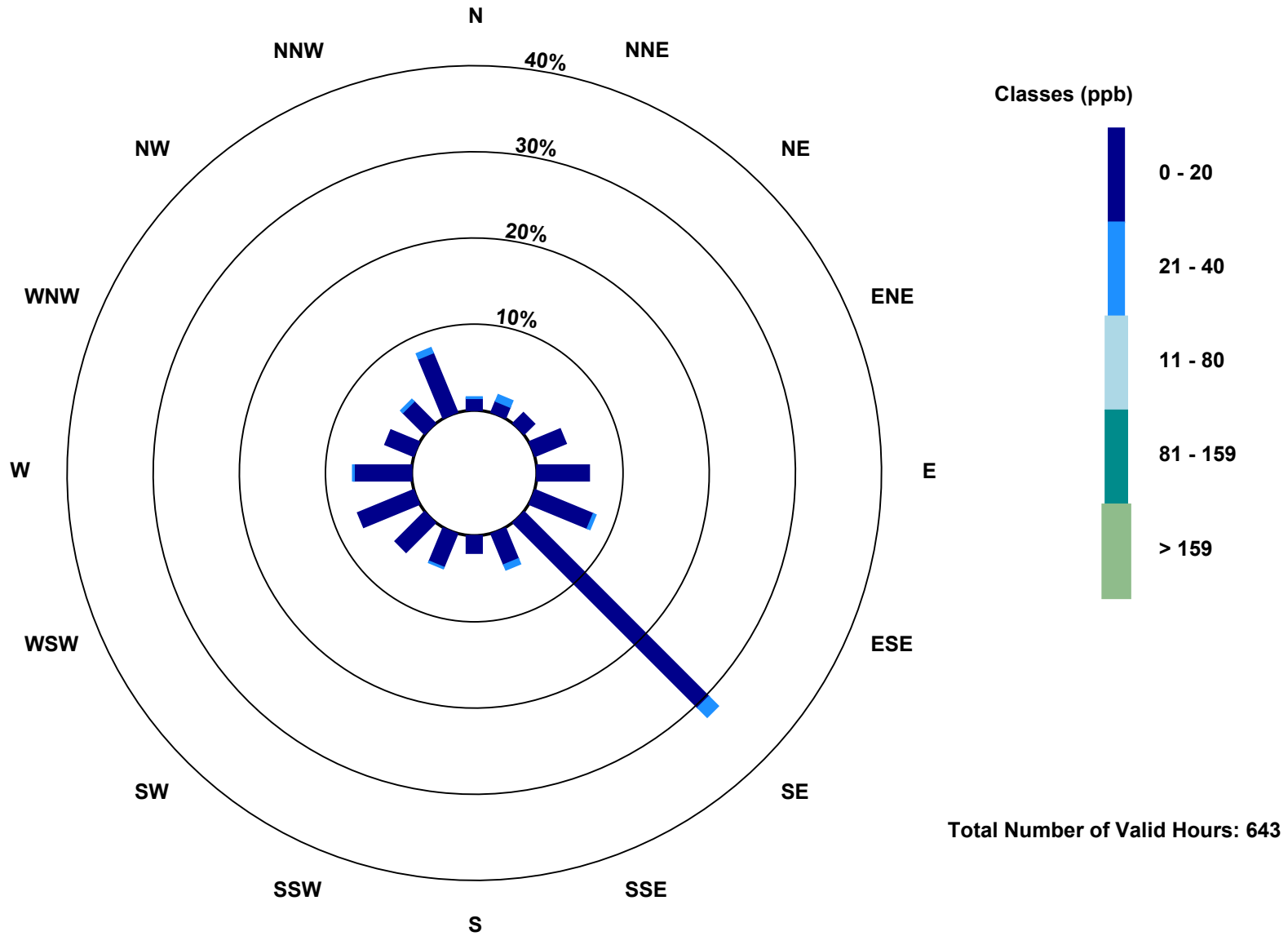
Total Number of Valid Hours: 643

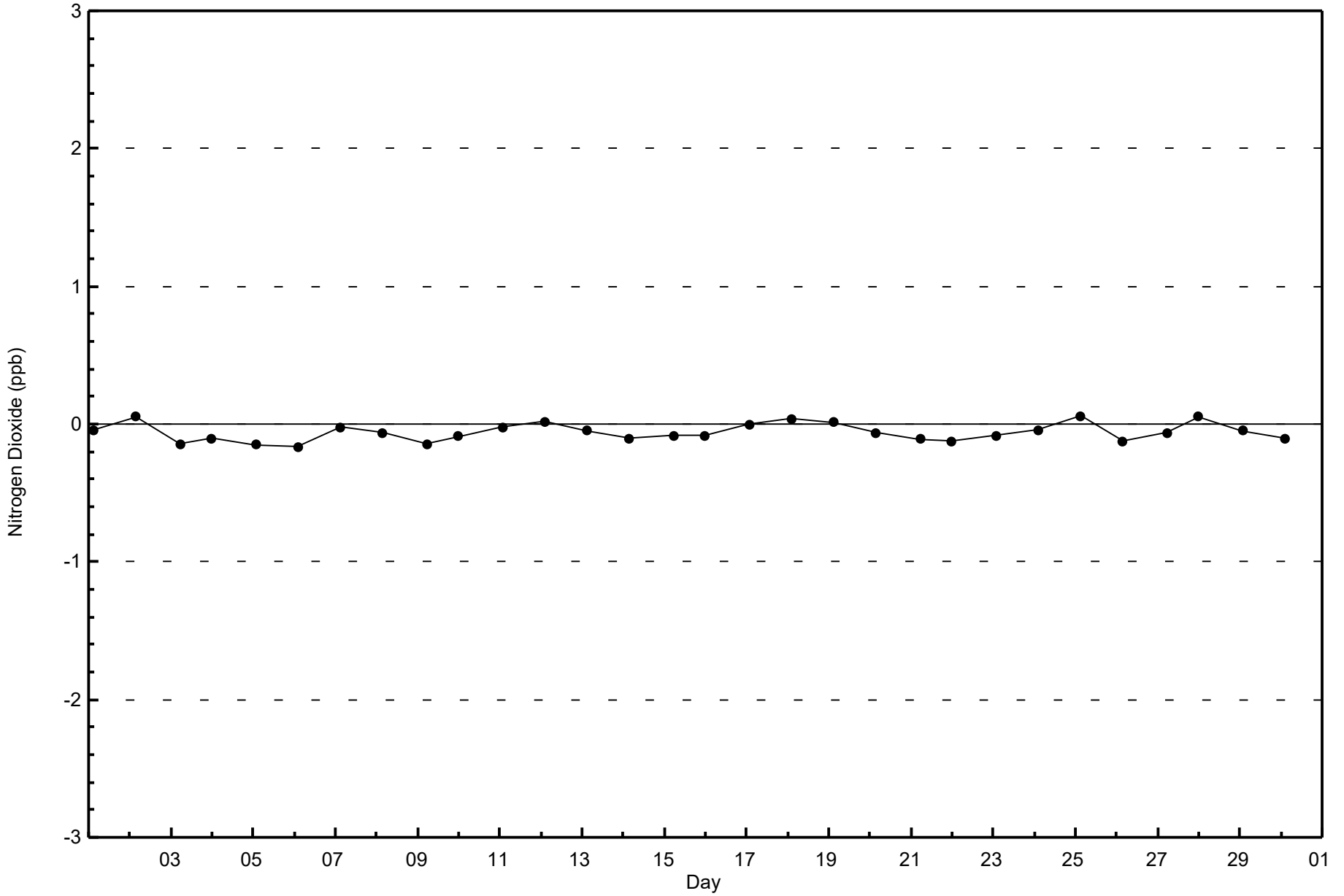
Total Number of Hours: 720

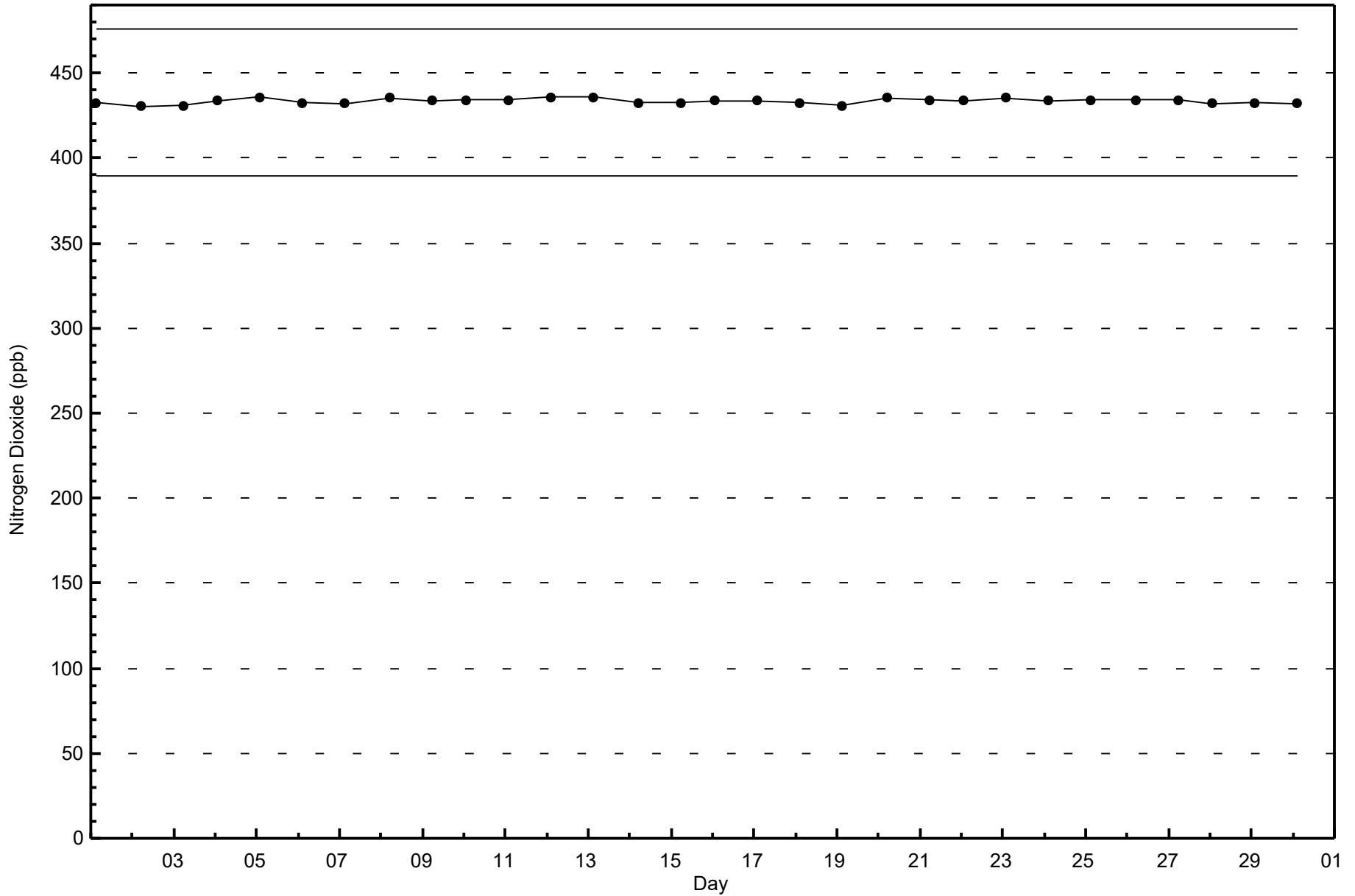


Wood Buffalo Environmental Association  
Wind Rose Nov 2023

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









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

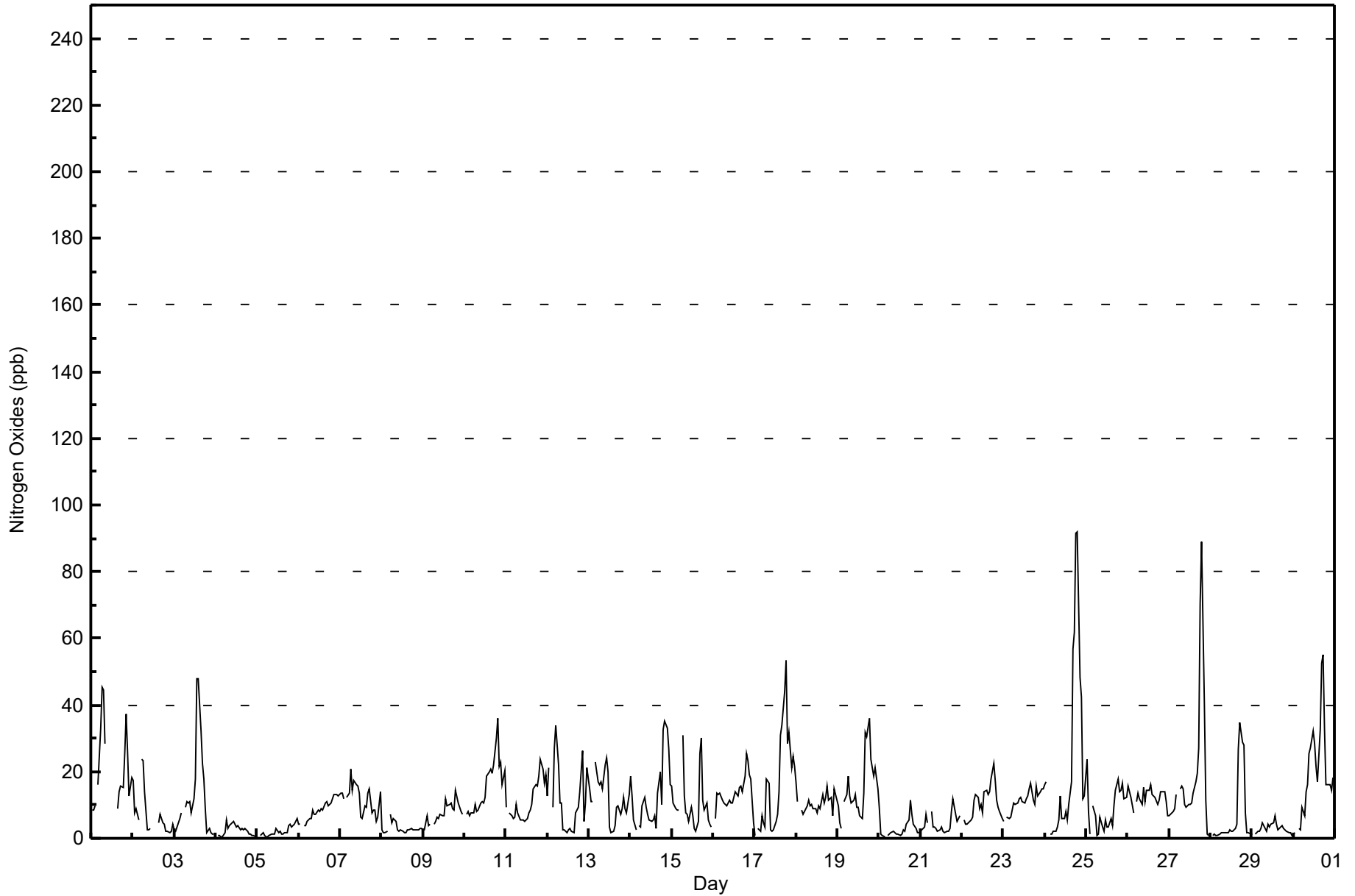
**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Athabasca Valley - November 2023**

Maximum Value: 92.0 ppb on Nov 24 20:00																					Maximum Daily Average: 23.1 ppb on Nov 24				Hours in Service: 720																					
Minimum Value: 0.3 ppb on Nov 5 06:00																					Minimum Daily Average: 2.1 ppb on Nov 5				Hours of Data: 680																					
Maximum Diurnal Average: 19.6 ppb at hour 20																					Minimum Diurnal Average: 4.9 ppb at hour 4				Hours of Missing Data: 40																					
Monthly Average: 10.87 ppb																					Percentiles: P <sub>1</sub> = 0.6 P <sub>10</sub> = 1.8 Q <sub>1</sub> = 3.4 Median = 8.5 Q <sub>3</sub> = 13.9 P <sub>90</sub> = 21.9 P <sub>99</sub> = 53.9				Hours of Calibration: 36																					
																									Percent Operational Time: 99.4																					
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																						
1-Nov	8.4	8.6	9.8	Z	16.1	33.1	45.2	44.3	28.4	C	C	C	C	C	C	9.1	14.2	15.8	15.4	25.3	37.2	26.0	12.5	18.1	--	45.2																				
2-Nov	17.2	7.8	8.9	5.4	Z	23.9	23.3	14.1	2.5	2.4	2.8	M	M	M	M	4.7	7.1	4.8	4.3	2.2	2.0	1.8	2.1	4.1	7.5	23.9																				
3-Nov	2.7	2.0	4.6	5.9	7.7	Z	9.4	11.1	10.7	10.8	7.5	11.9	17.9	47.7	47.7	32.0	22.5	17.8	8.9	1.7	3.0	1.5	1.5	1.2	12.5	47.7																				
4-Nov	Z	0.7	0.7	0.5	0.6	1.8	5.4	2.8	3.6	4.8	5.2	4.0	3.2	3.7	2.5	3.1	2.7	2.9	2.0	1.3	1.2	0.7	0.6	0.4	2.4	5.4																				
5-Nov	0.5	Z	1.0	1.7	1.0	0.3	0.4	0.7	1.3	1.3	1.3	3.2	1.7	2.0	1.3	1.4	1.7	1.8	4.0	4.2	3.3	4.2	4.9	5.8	2.1	5.8																				
6-Nov	4.4	4.3	Z	3.8	4.0	5.2	6.0	5.8	8.3	7.2	7.4	8.5	8.0	9.0	8.4	10.5	11.0	9.8	10.2	10.6	12.9	13.0	13.0	12.7	8.4	13.0																				
7-Nov	13.7	13.4	11.7	Z	12.3	13.5	21.0	14.4	17.3	16.2	15.7	13.4	6.2	5.8	9.8	9.3	13.5	14.6	7.6	8.5	8.5	5.2	6.2	14.0	11.8	21.0																				
8-Nov	2.5	1.5	1.5	2.0	Z	7.2	4.7	5.9	5.0	2.6	2.1	2.4	2.2	1.8	1.8	2.4	2.4	3.1	2.6	2.6	2.4	2.5	2.8	2.9	2.9	7.2																				
9-Nov	2.4	2.5	6.8	3.7	4.3	Z	4.2	5.0	6.5	5.8	7.3	6.6	6.9	12.0	9.8	10.0	10.5	9.0	8.5	14.3	10.6	9.2	7.9	7.1	7.4	14.3																				
10-Nov	Z	7.4	7.9	6.8	7.7	7.8	10.0	7.9	8.6	10.5	11.0	10.5	12.4	18.5	19.8	20.6	19.3	21.9	30.3	36.1	21.8	22.8	16.3	20.3	15.5	36.1																				
11-Nov	9.3	Z	7.8	6.6	5.9	6.4	10.3	7.6	5.5	5.5	5.3	5.2	6.0	7.4	8.3	10.0	14.6	16.2	15.5	18.6	23.9	20.7	16.5	19.0	11.0	23.9																				
12-Nov	12.8	21.1	Z	9.2	26.9	33.9	22.0	10.5	10.5	2.4	2.7	1.6	2.7	2.8	2.0	1.7	7.8	8.5	9.3	14.0	26.1	5.0	10.7	21.4	11.5	33.9																				
13-Nov	14.6	10.8	11.2	Z	23.1	17.1	16.1	16.8	15.0	22.2	24.0	19.9	3.5	1.6	1.9	3.9	9.4	9.8	7.3	8.8	12.3	8.9	7.8	13.3	12.1	24.0																				
14-Nov	18.5	12.9	5.7	2.6	Z	3.7	3.4	9.8	12.2	9.3	7.1	5.6	5.0	5.5	6.8	2.9	13.7	20.1	10.4	32.6	35.1	32.9	26.7	16.1	13.0	35.1																				
15-Nov	15.9	10.6	8.9	8.5	8.3	Z	30.9	12.8	7.5	7.0	5.2	9.5	6.6	2.8	2.1	5.0	25.3	30.2	11.6	8.5	10.6	5.5	4.2	3.2	10.5	30.9																				
16-Nov	Z	6.0	13.6	13.0	13.4	11.5	10.6	10.0	9.9	11.4	10.4	10.8	12.4	14.0	12.8	15.3	15.5	13.9	18.5	25.6	23.4	19.2	17.8	4.9	13.6	25.6																				
17-Nov	0.9	Z	2.8	2.1	6.8	4.5	3.3	17.8	16.7	2.5	2.2	2.4	4.9	7.4	14.0	31.0	34.0	44.3	53.6	28.5	31.7	21.2	24.6	21.7	16.5	53.6																				
18-Nov	17.2	11.1	Z	8.6	7.4	8.1	9.6	11.4	9.9	10.2	8.7	8.9	7.6	9.6	9.1	13.1	10.4	12.2	15.8	11.6	12.2	6.8	14.8	13.0	10.7	17.2																				
19-Nov	9.5	4.5	2.8	Z	10.9	13.1	18.6	12.8	10.4	11.5	13.3	9.1	9.4	6.6	6.1	13.6	31.6	30.4	35.9	23.6	21.1	18.8	21.2	14.6	15.2	35.9																				
20-Nov	8.8	1.2	0.8	0.5	Z	0.8	1.4	1.6	2.2	1.7	1.3	1.1	0.7	1.1	2.4	2.2	4.2	5.5	11.4	7.2	4.1	2.9	1.8	1.9	2.9	11.4																				
21-Nov	2.2	2.6	3.3	7.3	4.7	Z	7.9	3.5	3.6	2.8	2.2	2.5	3.4	2.1	1.6	2.0	2.1	2.8	7.9	11.8	7.4	5.3	5.8	6.8	4.4	11.8																				
22-Nov	Z	5.5	4.3	4.0	4.5	5.3	6.4	11.6	13.1	12.2	8.8	10.4	7.5	13.9	14.5	13.2	13.9	18.0	22.3	17.5	11.3	9.2	7.8	6.1	10.5	22.3																				
23-Nov	5.2	Z	6.6	6.1	6.5	8.5	10.4	10.2	10.6	11.7	12.1	11.1	10.4	12.1	12.6	14.8	16.5	11.2	10.2	15.8	12.8	14.1	14.8	14.8	11.3	16.5																				
24-Nov	16.1	17.0	Z	1.4	1.4	2.3	2.2	3.6	5.5	12.6	6.0	6.1	7.8	5.7	10.2	17.0	57.0	61.9	91.6	92.0	48.2	42.3	12.0	12.7	23.1	92.0																				
25-Nov	23.5	8.1	1.1	Z	9.6	6.9	1.0	1.2	6.4	3.3	2.2	5.5	3.2	3.2	6.0	3.8	9.9	14.3	17.7	14.2	14.2	16.5	11.9	12.1	8.5	23.5																				
26-Nov	15.7	14.0	12.3	7.5	Z	11.0	13.6	11.9	10.1	15.2	11.2	14.5	14.6	15.9	13.1	12.6	12.2	10.1	11.3	14.2	13.8	13.9	11.0	6.8	12.5	15.9																				
27-Nov	6.8	7.2	8.2	8.8	12.9	Z	14.8	15.8	14.8	10.2	9.5	10.3	10.0	10.8	13.6	17.2	19.7	27.2	70.3	89.1	40.3	11.3	1.3	0.8	18.7	89.1																				
28-Nov	Z	1.0	1.1	0.9	1.0	1.3	1.9	1.8	1.8	1.7	1.7	2.4	2.2	2.0	3.0	4.1	26.6	34.6	28.9	28.1	7.5	1.9	1.8	1.1	6.9	34.6																				
29-Nov	1.3	Z	1.3	2.3	2.1	2.9	4.8	3.9	2.3	4.3	3.3	4.4	4.8	6.8	4.3	2.7	2.9	3.6	3.1	2.7	2.2	1.5	1.6	0.9	3.0	6.8																				
30-Nov	1.3	1.7	Z	2.8	2.5	9.5	6.8	14.0	16.2	25.5	27.3	32.0	28.5	21.8	16.8	32.7	52.6	55.0	32.8	16.3	16.0	15.9	14.2	18.1	20.0	55.0																				
																					9.3	7.3	5.8	4.9	8.1	9.6	10.9	10.0	9.2	8.4	7.8	8.3	7.5	9.1	9.4	10.7	16.2	17.7	19.3	19.6	15.9	12.0	9.9	9.9	Diurnal Average	
																					23.5	21.1	13.6	13.0	26.9	33.9	45.2	44.3	28.4	25.5	27.3	32.0	28.5	47.7	47.7	32.7	57.0	61.9	91.6	92.0	48.2	42.3	26.7	21.7	Diurnal Maximum	
Z - zerospan																					C - Calibration			M - Maintenance																						



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

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Athabasca Valley - November 2023**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Athabasca Valley - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	600	88.24	88.24
21 - 40	64	9.41	97.65
41 - 80	13	1.91	99.56
81 - 159	3	0.44	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<sub>x</sub>) - ppb  
Athabasca Valley - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 20	9	9	11	24	37	42	172	17	12	24	31	44	43	23	23	42	563
21 - 40	1	4	0	1	2	6	27	8	1	3	0	1	1	0	1	8	64
11 - 80	0	1	0	0	0	1	5	2	0	1	0	0	0	0	1	2	13
81 - 159	0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	3
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	<b>10</b>	<b>14</b>	<b>11</b>	<b>25</b>	<b>39</b>	<b>49</b>	<b>205</b>	<b>29</b>	<b>13</b>	<b>28</b>	<b>31</b>	<b>45</b>	<b>44</b>	<b>23</b>	<b>25</b>	<b>52</b>	<b>643</b>

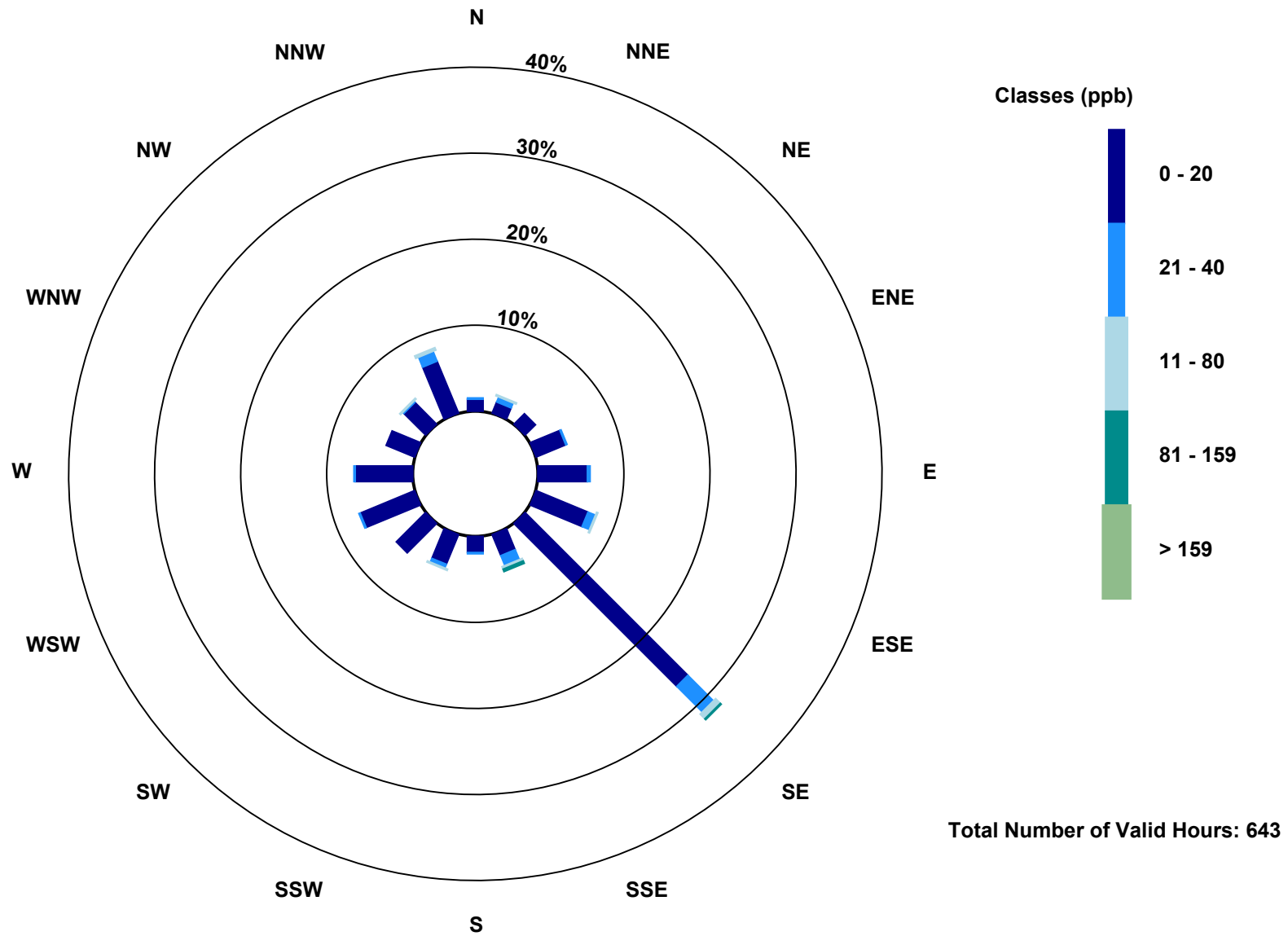
Total Number of Valid Hours: 643

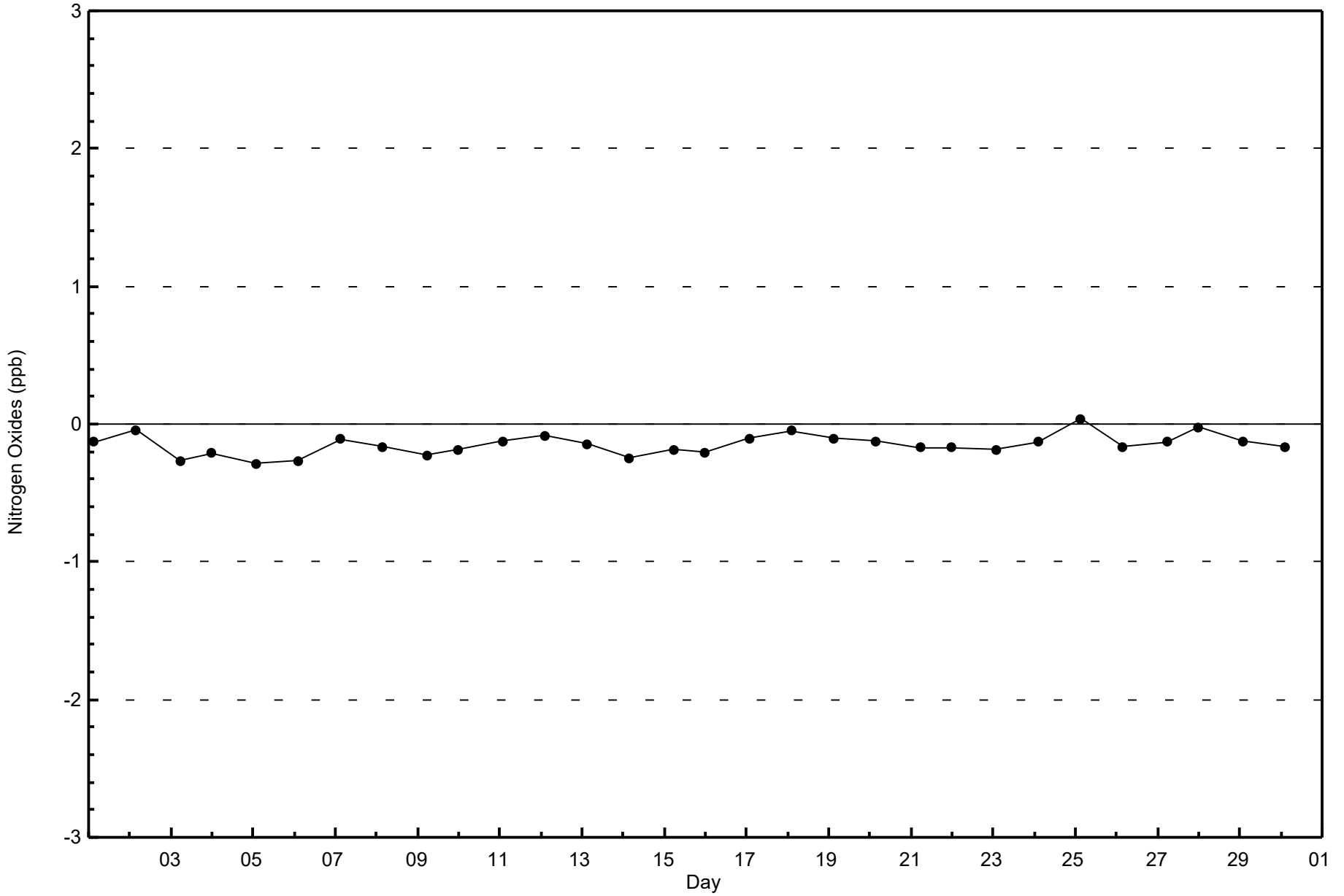
Total Number of Hours: 720

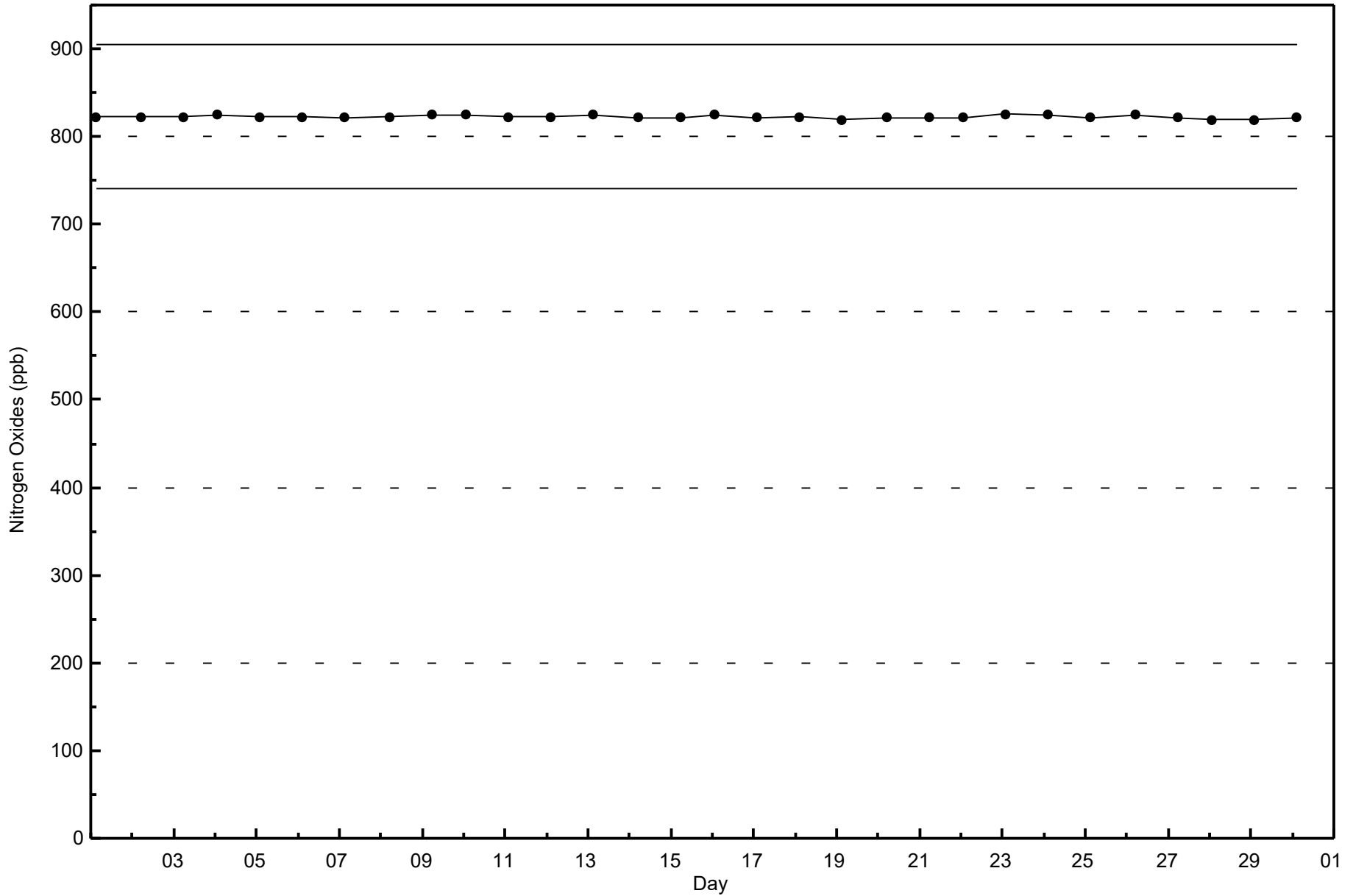


Wood Buffalo Environmental Association  
Wind Rose Nov 2023

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









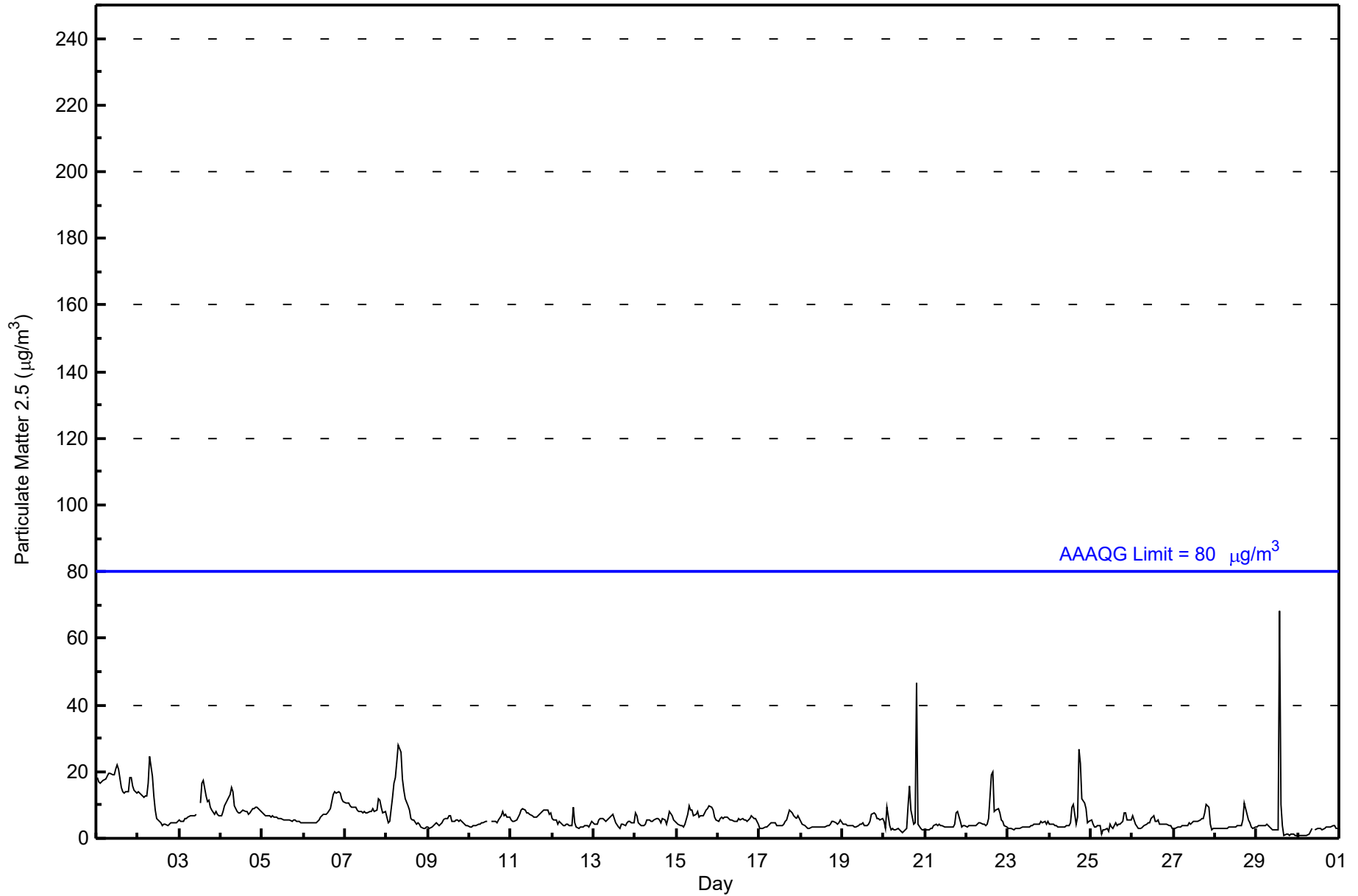
# Wood Buffalo Environmental Association

## Summary of Hour Averages

# Particulate Matter 2.5 (PM<sub>2.5</sub>) - µg/m<sup>3</sup>

## Athabasca Valley - November 2023

Number of Exceedences (AAAQO):		1-hr: 0		24-hr: 0		Hours in Service:		720																																								
Maximum Value: 68.1 µg/m <sup>3</sup> on Nov 29 14:00		Maximum Daily Average: 17.3 µg/m <sup>3</sup> on Nov 1				Hours of Data:		716																																								
Minimum Value: 0.8 µg/m <sup>3</sup> on Nov 30 01:00		Minimum Daily Average: 2.5 µg/m <sup>3</sup> on Nov 30				Hours of Missing Data:		4																																								
Maximum Diurnal Average: 8.6 µg/m <sup>3</sup> at hour 20		Minimum Diurnal Average: 5.2 µg/m <sup>3</sup> at hour 2				Hours of Calibration:		2																																								
Monthly Average: 6.26 µg/m <sup>3</sup>		Percentiles: P <sub>1</sub> = 1.0 P <sub>10</sub> = 3.0 Q <sub>1</sub> = 3.7 Median = 4.9 Q <sub>3</sub> = 7.1 P <sub>90</sub> = 10.6 P <sub>99</sub> = 22.2				Percent Operational Time:		99.7																																								
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Nov	18.3	17.0	16.7	16.8	17.2	17.6	18.8	19.5	19.6	19.1	19.1	20.7	21.9	20.8	15.4	14.1	13.6	14.1	14.0	18.4	18.3	15.8	14.2	13.7	17.3	21.9																						
2-Nov	14.1	13.5	13.3	12.2	12.6	12.6	16.5	24.4	18.6	12.6	8.7	6.0	4.9	4.9	3.9	4.0	4.4	4.0	4.2	4.7	4.5	4.6	4.8	4.9	9.1	24.4																						
3-Nov	5.7	4.9	5.2	5.9	6.1	6.2	6.6	6.8	6.8	6.8	7.3	M	10.5	16.5	17.4	12.7	11.1	11.4	9.3	8.6	7.4	8.0	7.1	6.7	8.5	17.4																						
4-Nov	6.8	7.9	9.8	10.8	11.6	13.2	15.4	13.9	9.9	7.9	7.6	7.8	8.2	8.5	7.9	7.9	7.2	7.8	8.8	9.1	9.4	9.2	9.0	8.2	9.3	15.4																						
5-Nov	7.5	7.1	6.8	6.8	6.6	6.6	6.8	6.5	6.3	6.1	6.0	6.0	5.7	5.6	5.6	5.5	5.3	5.3	5.6	5.5	4.9	4.9	4.7	4.7	5.9	7.5																						
6-Nov	4.5	4.7	4.7	4.7	4.6	4.7	4.7	4.8	5.1	5.5	6.3	7.4	7.0	7.1	7.8	9.1	11.2	13.3	14.0	13.5	14.1	13.4	11.7	11.1	8.1	14.1																						
7-Nov	10.5	10.6	10.4	9.7	9.5	9.5	9.1	8.3	8.1	8.1	7.7	8.2	7.7	7.5	8.0	8.2	8.8	8.2	8.6	11.9	11.2	9.1	7.7	8.0	8.9	11.9																						
8-Nov	6.5	4.5	5.0	12.1	16.7	18.3	22.8	27.9	26.0	17.9	14.2	11.8	9.9	8.5	5.8	5.3	5.3	4.4	4.5	4.1	3.3	3.1	2.9	3.2	10.2	27.9																						
9-Nov	3.3	3.1	3.4	3.6	4.3	4.6	3.9	4.2	4.7	5.3	5.9	5.8	6.7	6.7	5.2	4.9	5.4	5.3	5.1	5.6	4.8	4.4	4.0	3.7	4.7	6.7																						
10-Nov	3.5	3.4	3.7	3.8	3.9	4.1	4.4	4.6	4.8	4.9	5.0	C	C	5.1	5.1	5.0	4.6	5.4	6.7	8.2	6.9	7.2	6.4	6.5	5.1	8.2																						
11-Nov	5.5	5.2	5.3	5.5	6.2	7.3	8.6	8.9	8.3	7.8	7.7	7.2	6.6	6.5	6.4	6.4	6.9	7.4	8.0	8.6	8.5	8.6	7.1	7.8	7.2	8.9																						
12-Nov	6.0	5.7	5.6	4.4	4.9	4.5	3.7	3.9	4.1	4.1	3.8	3.7	9.5	4.7	3.3	3.2	3.3	3.2	3.3	3.7	4.0	3.4	4.4	5.2	4.4	9.5																						
13-Nov	4.3	4.1	4.4	5.4	5.9	6.0	5.6	5.2	5.5	6.2	6.7	7.0	5.9	4.8	3.5	2.8	4.1	4.4	3.8	4.5	4.9	5.3	4.7	4.7	5.0	7.0																						
14-Nov	7.8	6.7	4.8	3.9	3.8	3.9	4.2	5.5	5.7	5.0	5.2	5.6	5.7	6.1	5.6	4.7	5.8	5.4	4.2	5.8	8.2	6.9	5.7	5.0	5.5	8.2																						
15-Nov	4.7	4.2	3.7	3.6	3.6	4.3	7.1	9.7	8.6	8.3	6.6	7.3	8.1	6.2	6.9	7.0	7.8	8.5	9.0	9.6	9.5	8.3	6.4	5.3	6.8	9.7																						
16-Nov	5.1	5.7	6.2	6.1	6.4	6.3	6.0	5.6	5.4	5.1	5.2	5.3	5.8	5.5	5.8	5.7	5.6	5.0	5.8	6.7	6.3	5.8	5.9	4.3	5.7	6.7																						
17-Nov	3.1	2.8	2.9	3.2	3.6	4.0	4.1	4.7	4.6	4.5	4.0	3.7	3.8	3.8	4.2	5.1	5.5	8.3	7.9	7.7	7.0	6.1	6.6	5.8	4.9	8.3																						
18-Nov	5.2	4.1	3.7	3.3	3.1	3.0	3.2	3.4	3.4	3.5	3.3	3.3	3.3	3.4	3.4	3.9	3.8	4.2	5.1	5.1	4.7	4.2	4.8	5.5	3.9	5.5																						
19-Nov	4.3	4.1	4.2	3.9	3.7	3.7	3.6	3.5	3.6	3.8	4.3	4.0	4.7	3.8	3.6	4.2	5.3	7.1	7.5	7.1	6.0	5.8	5.6	5.7	4.7	7.5																						
20-Nov	4.9	3.0	9.4	3.7	2.5	2.8	2.4	2.6	2.8	2.6	2.0	1.8	2.4	3.1	9.8	15.8	8.6	4.1	4.6	46.4	4.3	3.0	2.5	2.7	6.2	46.4																						
21-Nov	2.5	2.4	2.4	2.9	3.2	4.0	4.2	3.9	4.2	3.8	3.7	3.5	3.5	3.4	3.3	3.4	3.6	4.1	7.6	7.9	5.0	3.5	3.6	3.6	3.9	7.9																						
22-Nov	3.5	4.0	4.0	3.9	4.0	4.0	4.1	4.8	4.9	4.3	4.3	3.9	4.0	6.1	19.2	19.8	8.0	8.6	8.7	7.6	5.6	5.0	3.6	3.4	6.2	19.8																						
23-Nov	2.9	2.8	2.8	2.6	2.8	2.9	3.0	3.2	3.3	3.4	3.4	3.4	3.5	3.6	3.8	4.0	4.3	4.2	4.3	5.0	4.7	5.0	4.4	5.0	3.7	5.0																						
24-Nov	4.4	4.2	4.1	3.9	3.7	3.6	3.4	3.4	3.5	3.5	3.7	3.7	4.7	9.2	10.1	4.3	6.2	26.7	22.3	12.0	10.4	9.1	4.6	5.1	7.1	26.7																						
25-Nov	5.4	4.3	3.3	3.3	3.8	3.8	1.5	2.5	2.5	2.8	2.3	4.1	3.4	3.2	4.8	3.7	4.4	4.1	5.3	7.7	7.7	5.6	5.5	5.4	4.2	7.7																						
26-Nov	6.6	5.3	4.1	3.1	2.8	3.0	3.5	3.9	4.3	4.7	4.7	5.9	6.6	5.2	5.0	5.4	4.4	4.3	4.0	4.3	4.4	3.8	3.8	2.9	4.4	6.6																						
27-Nov	3.1	2.8	3.2	3.3	3.5	3.7	3.8	3.8	3.9	4.5	4.4	4.9	5.0	5.0	5.1	5.4	5.9	6.0	7.8	10.1	9.2	4.3	2.8	2.9	4.8	10.1																						
28-Nov	3.1	3.1	3.0	2.8	2.9	2.8	3.0	3.1	3.3	3.3	3.2	3.3	3.6	3.6	3.8	3.8	5.6	10.7	7.1	5.6	4.5	3.3	3.1	3.3	4.0	10.7																						
29-Nov	3.6	3.8	3.7	3.8	3.8	4.0	4.4	3.8	2.8	2.7	2.6	2.5	2.4	68.1	10.0	3.8	1.0	1.3	1.4	1.0	1.3	1.1	1.0	0.9	5.6	68.1																						
30-Nov	0.8	0.9	1.0	0.9	0.8	1.0	1.5	2.2	3.0	M	2.7	2.8	3.0	2.8	2.7	3.0	3.5	3.5	3.4	3.4	3.8	3.8	3.2	3.1	2.5	3.8																						
																								5.6	5.2	5.4	5.3	5.6	5.9	6.3	6.9	6.6	6.1	5.7	5.7	6.1	8.3	6.7	6.4	6.0	7.0	7.1	8.6	6.8	6.0	5.4	5.3	Diurnal Average
																								18.3	17.0	16.7	16.8	17.2	18.3	22.8	27.9	26.0	19.1	19.1	20.7	21.9	68.1	19.2	19.8	13.6	26.7	22.3	46.4	18.3	15.8	14.2	13.7	Diurnal Maximum
C - Calibration M - Maintenance																																																
Alberta Ambient Air Quality Guideline/Objectives: 1-hr 80 µg/m <sup>3</sup> 24-hr 29 µg/m <sup>3</sup>																																																





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$   
Athabasca Valley - November 2023**

<b>Concentration Ranges (<math>\mu\text{g}/\text{m}^3</math>)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	419	58.52	58.52
6 - 15	262	36.59	95.11
16 - 25	30	4.19	99.30
26 - 80	5	0.70	100.00
> 81.0	0	0.00	100.00

Total Number of Valid Hours: 716

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Particulate Matter 2.5 (PM<sub>2.5</sub>) - μg/m<sup>3</sup>  
Athabasca Valley - November 2023**

Concentration Ranges (μg/m <sup>3</sup> )	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	12	13	6	8	18	26	111	7	6	13	23	46	32	16	15	36	388
6 - 15	3	1	6	18	22	25	91	18	7	18	8	3	10	6	9	13	258
16 - 25	0	0	0	0	1	3	8	6	0	0	1	0	1	1	3	4	28
26 - 80	0	0	0	0	0	0	0	1	0	0	0	0	1	1	0	0	3
> 81.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	15	14	12	26	41	54	210	32	13	31	32	49	44	24	27	53	677

Total Number of Valid Hours: 677

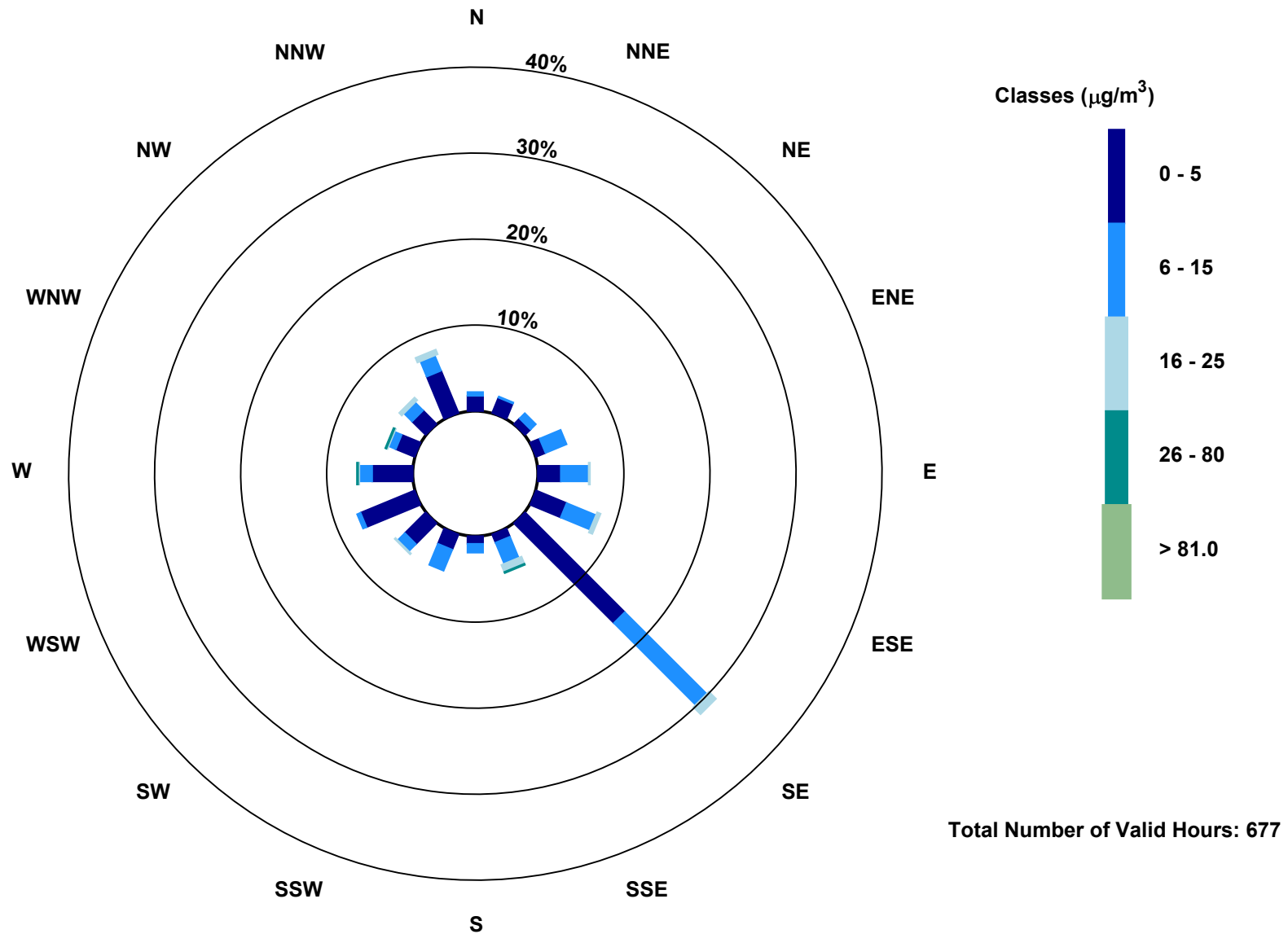
Total Number of Hours: 720





Wood Buffalo Environmental Association  
Wind Rose Nov 2023

Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$   
Athabasca Valley

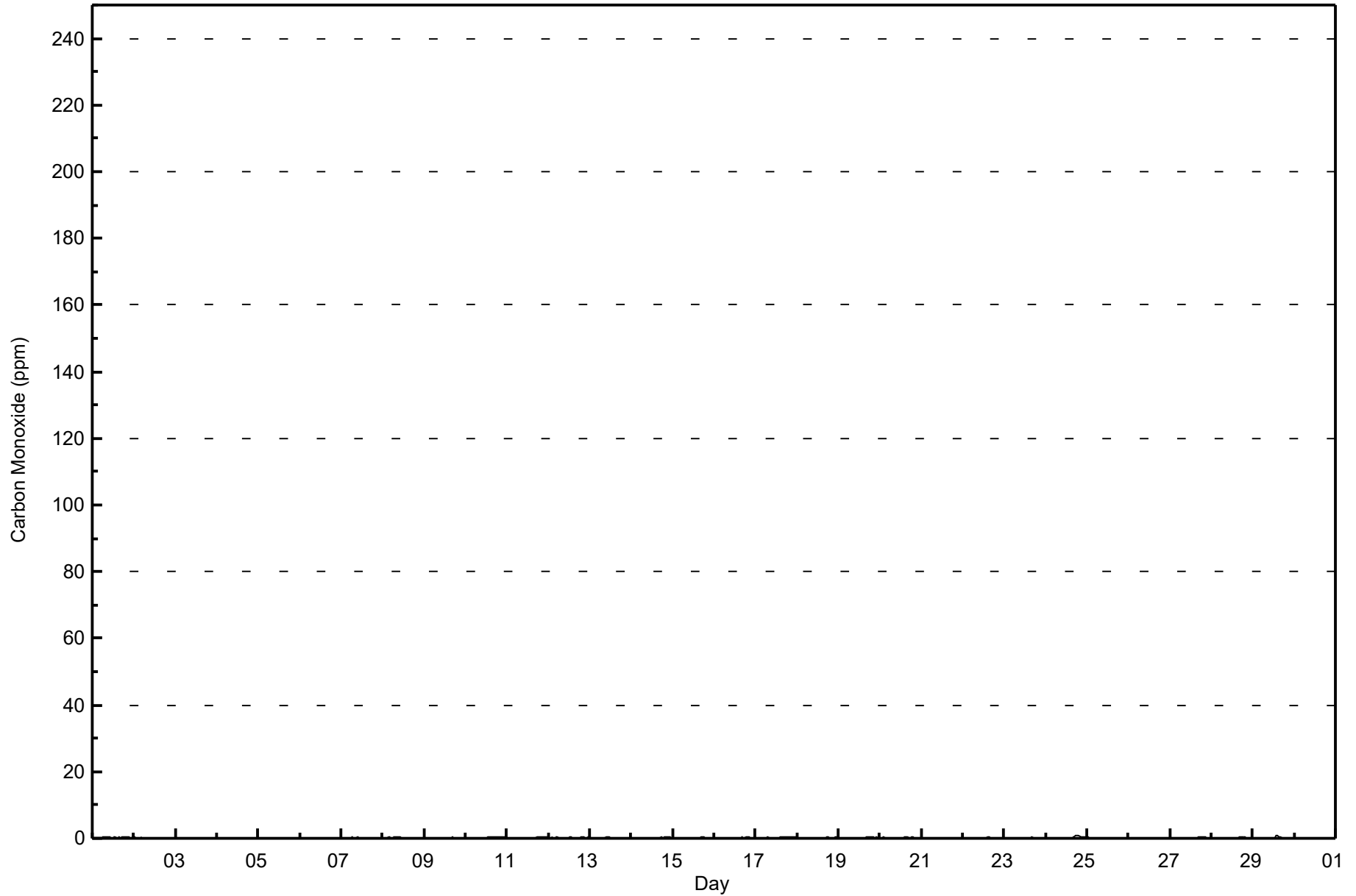






**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Carbon Monoxide (CO) - ppm**  
**Athabasca Valley - November 2023**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Carbon Monoxide (CO) - ppm  
Athabasca Valley - November 2023**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 0.3	661	96.78	96.78
0.4 - 0.5	14	2.05	98.83
0.6 - 0.7	7	1.02	99.85
0.8 - 1.4	1	0.15	100.00
1.5 - 10	0	0.00	100.00
> 10	0	0.00	100.00

Total Number of Valid Hours: 683

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

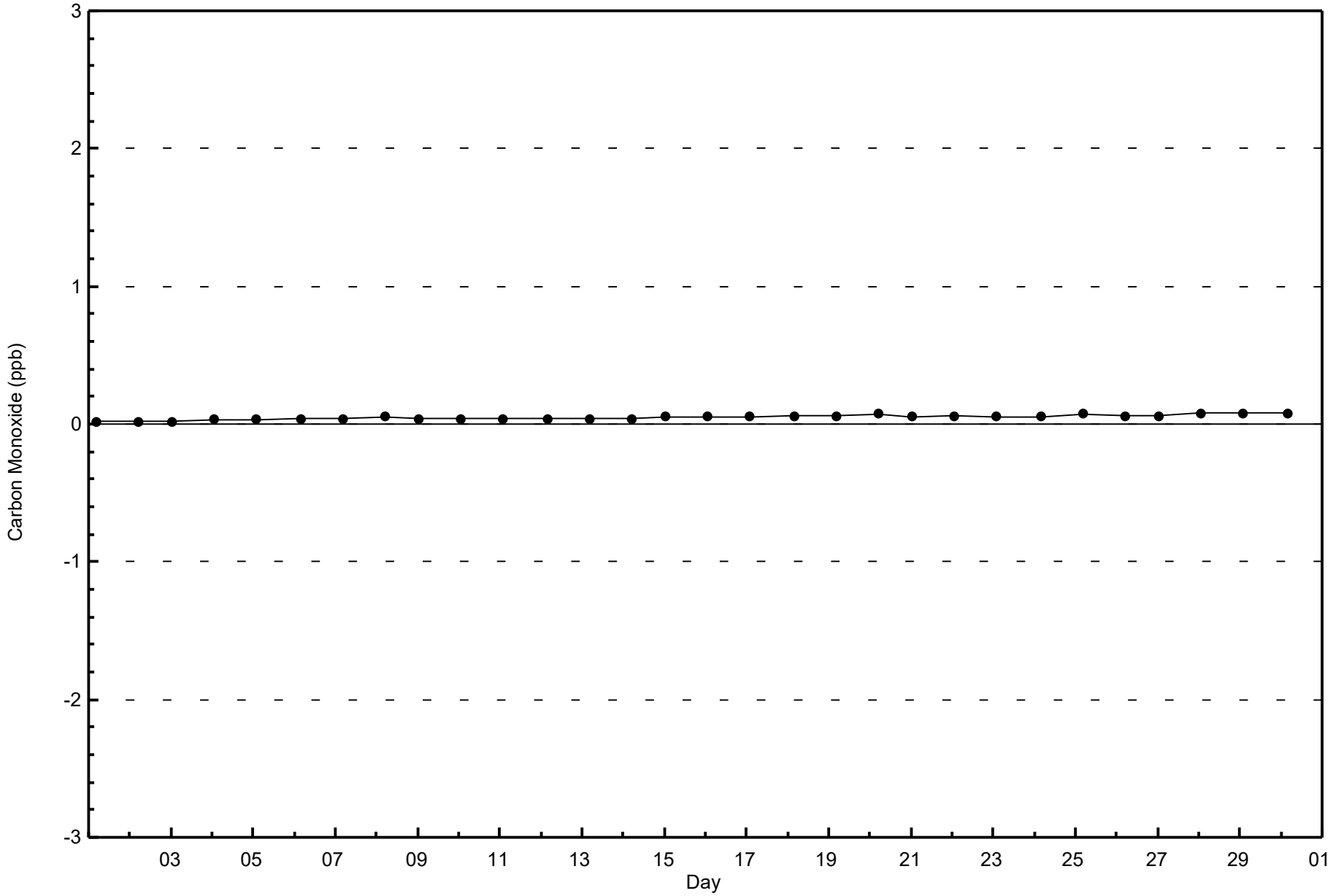
**Carbon Monoxide (CO) - ppm  
Athabasca Valley - November 2023**

<b>Concentration Ranges (ppm)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 0.3	15	15	12	24	40	51	196	26	12	29	28	43	37	21	25	52	626
0.4 - 0.5	0	0	0	0	0	1	5	1	0	1	0	0	3	1	0	0	12
0.6 - 0.7	0	0	0	0	0	0	0	3	0	0	0	0	3	1	0	0	7
0.8 - 1.4	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
1.5 - 10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	15	15	12	24	40	52	202	30	12	30	28	43	43	23	25	52	646

Total Number of Valid Hours: 646

Total Number of Hours: 720

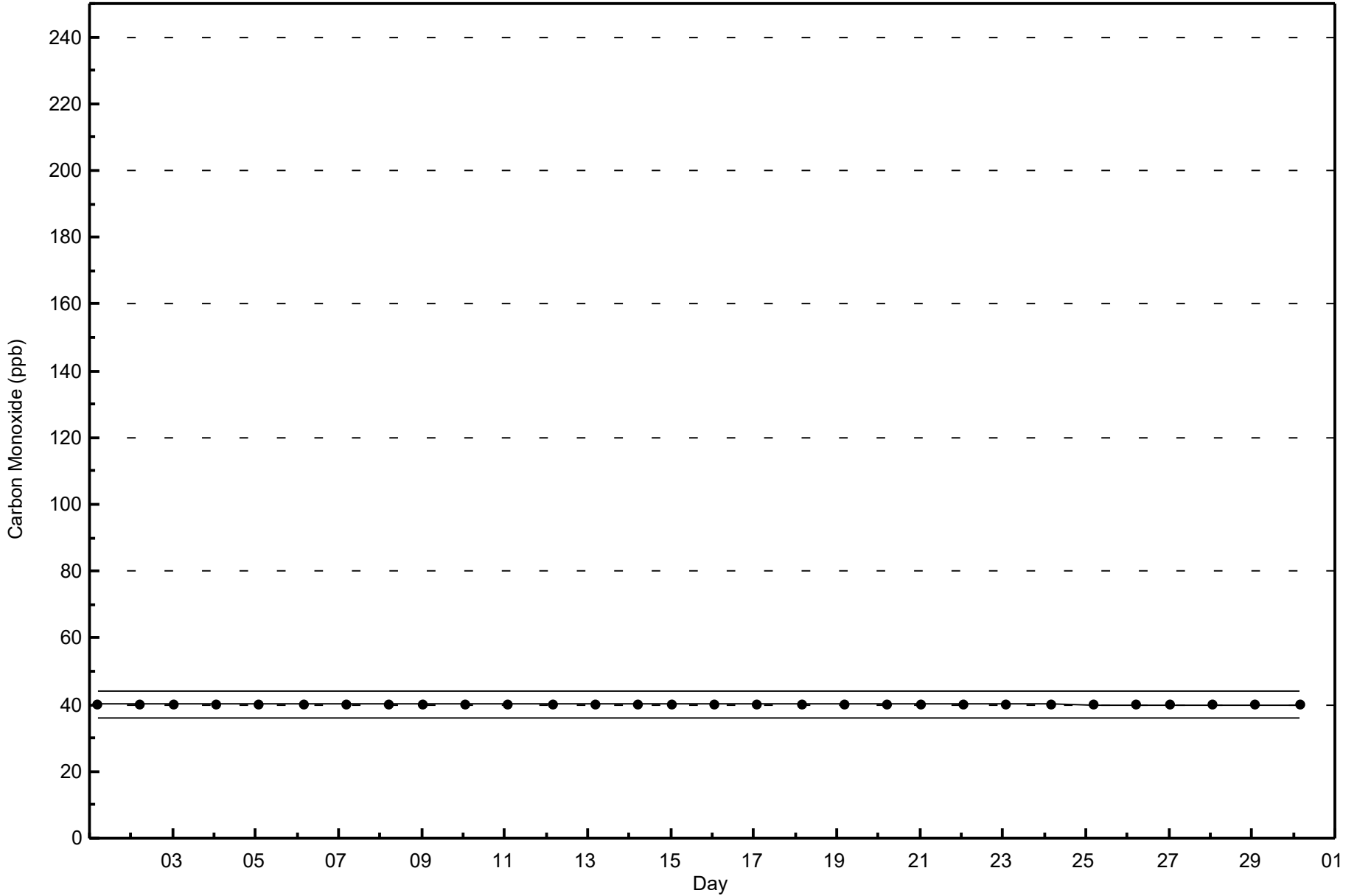






**Wood Buffalo Environmental Association**  
**Span Responses**

**Carbon Monoxide (CO) - ppb**  
**Athabasca Valley - November 2023**







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

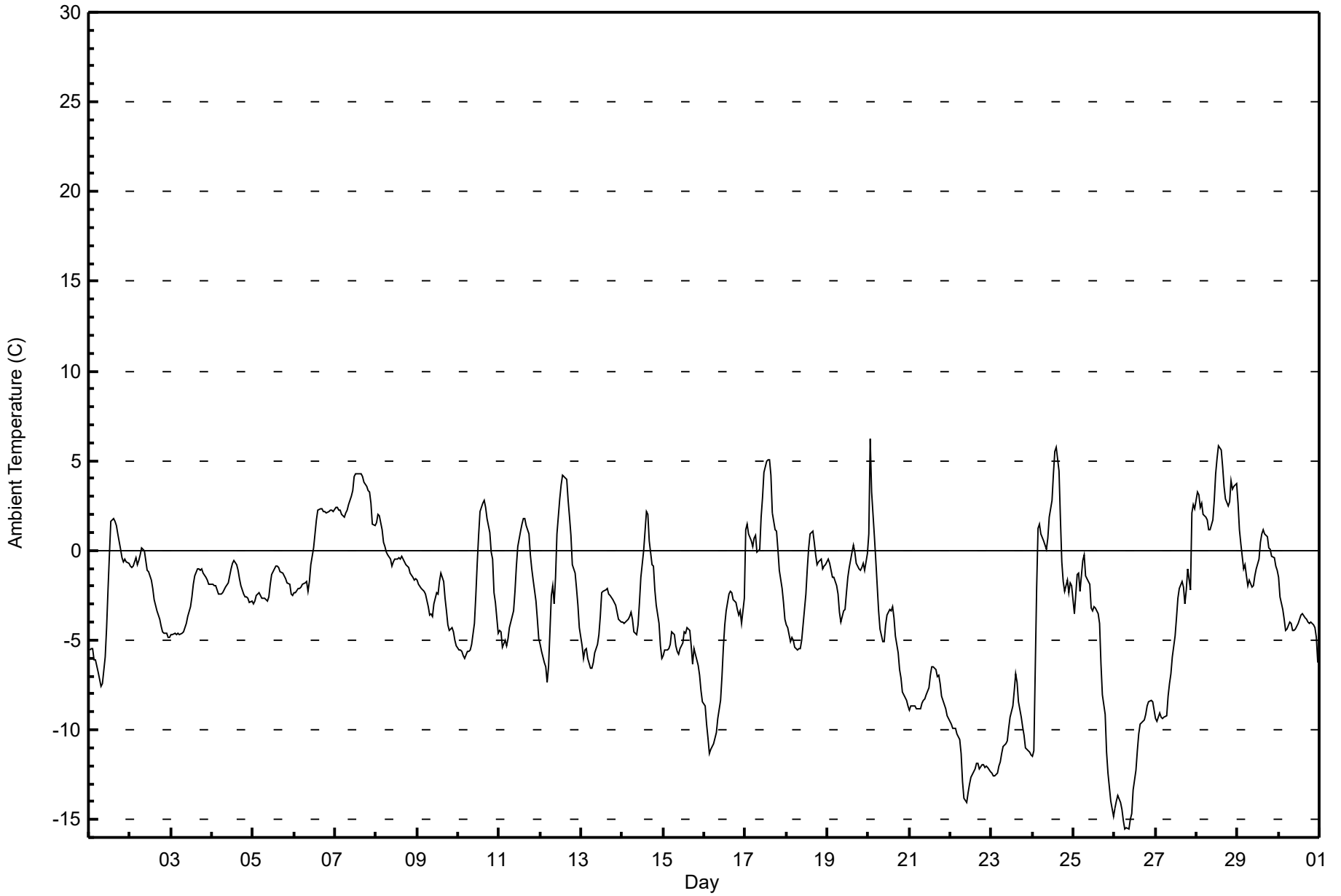
**Ambient Temperature (AT) - C**  
**Athabasca Valley - November 2023**

Maximum Value: 6.3 C on Nov 20 02:00																				Maximum Daily Average: 3.1 C on Nov 28					Hours in Service: 720				
Minimum Value: -15.5 C on Nov 26 09:00																				Minimum Daily Average: -12.1 C on Nov 26					Hours of Data: 720				
Maximum Diurnal Average: -0.9 C at hour 15																				Minimum Diurnal Average: -4.5 C at hour 9					Hours of Missing Data: 0				
Monthly Average: -3.22 C																				Percentiles: P <sub>1</sub> = -14.4 P <sub>10</sub> = -9.5 Q <sub>1</sub> = -5.5 Median = -2.5 Q <sub>3</sub> = -0.5 P <sub>90</sub> = 2.2 P <sub>99</sub> = 5.0					Hours of Calibration: 0				
																				Percent Operational Time: 100.0									
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24					
1-Nov	-5.6	-5.4	-5.5	-6.1	-6.1	-6.8	-7.2	-7.6	-7.4	-5.9	-4.3	-2.2	-0.3	1.6	1.8	1.6	1.4	0.9	0.1	-0.4	-0.7	-0.5	-0.7	-0.7	-2.7	1.8			
2-Nov	-0.8	-0.9	-0.8	-0.4	-0.8	-0.6	-0.3	0.2	0.0	-0.5	-1.1	-1.2	-1.7	-2.1	-2.8	-3.0	-3.4	-3.8	-4.2	-4.6	-4.6	-4.6	-4.8	-4.9	-2.2	0.2			
3-Nov	-4.7	-4.7	-4.6	-4.7	-4.6	-4.7	-4.6	-4.5	-4.3	-4.1	-3.7	-3.2	-2.6	-1.9	-1.4	-1.1	-1.1	-1.1	-1.0	-1.3	-1.5	-1.7	-1.9	-1.9	-2.9	-1.0			
4-Nov	-1.9	-1.9	-2.0	-2.2	-2.5	-2.5	-2.3	-2.2	-2.0	-1.8	-1.4	-1.0	-0.7	-0.6	-0.8	-1.1	-1.6	-2.0	-2.4	-2.6	-2.6	-2.7	-2.9	-2.8	-1.9	-0.6			
5-Nov	-3.0	-2.8	-2.5	-2.4	-2.5	-2.7	-2.7	-2.7	-2.8	-2.6	-1.9	-1.3	-1.0	-0.9	-0.9	-0.9	-1.2	-1.3	-1.4	-1.6	-1.8	-1.9	-2.5	-2.5	-2.0	-0.9			
6-Nov	-2.4	-2.3	-2.2	-2.1	-2.0	-1.9	-1.8	-1.7	-2.3	-1.8	-0.8	0.1	0.9	1.7	2.2	2.3	2.4	2.2	2.2	2.1	2.2	2.2	2.2	2.2	0.2	2.4			
7-Nov	2.4	2.4	2.3	2.2	2.0	1.9	2.1	2.2	2.5	3.0	3.4	4.1	4.3	4.2	4.3	4.3	4.1	3.8	3.6	3.4	3.3	2.7	1.5	1.4	3.0	4.3			
8-Nov	1.5	2.0	1.9	1.1	0.4	0.2	-0.1	-0.3	-0.5	-0.9	-0.6	-0.5	-0.4	-0.4	-0.5	-0.3	-0.5	-0.8	-0.8	-0.9	-1.3	-1.5	-1.7	-1.6	-0.3	2.0			
9-Nov	-1.7	-1.9	-2.2	-2.2	-2.3	-2.5	-3.2	-3.6	-3.6	-3.7	-3.0	-2.3	-2.4	-1.8	-1.3	-1.7	-2.6	-3.4	-4.2	-4.5	-4.3	-4.6	-5.0	-5.3	-3.0	-1.3			
10-Nov	-5.5	-5.6	-5.7	-5.8	-6.0	-5.6	-5.7	-5.6	-5.3	-4.1	-2.5	-0.7	0.9	2.2	2.7	2.8	2.4	1.7	1.0	-0.1	-0.5	-2.4	-2.9	-4.6	-2.3	2.8			
11-Nov	-4.4	-4.5	-5.4	-5.0	-5.4	-4.9	-4.3	-4.0	-3.4	-2.3	-0.9	0.2	1.1	1.5	1.8	1.8	1.4	0.9	-0.2	-1.0	-1.6	-2.8	-3.8	-4.9	-2.1	1.8			
12-Nov	-5.3	-5.7	-6.2	-6.5	-7.3	-6.5	-2.5	-1.9	-3.0	-1.5	0.9	2.9	3.6	4.2	4.1	3.9	2.8	1.8	0.8	-0.8	-1.3	-2.1	-3.0	-4.3	-1.4	4.2			
13-Nov	-5.3	-6.0	-5.6	-5.5	-6.0	-6.6	-6.5	-6.2	-5.7	-5.3	-4.7	-3.7	-2.3	-2.3	-2.2	-2.1	-2.4	-2.5	-2.7	-2.9	-3.0	-3.4	-3.8	-4.0	-4.2	-2.1			
14-Nov	-4.0	-4.1	-4.0	-3.8	-3.7	-3.4	-3.8	-4.5	-4.7	-4.1	-2.9	-1.5	0.0	1.0	2.2	2.0	0.5	-0.8	-0.9	-2.2	-3.0	-4.0	-5.3	-6.0	-2.5	2.2			
15-Nov	-5.9	-5.5	-5.6	-5.5	-5.3	-4.6	-4.7	-5.3	-5.6	-5.8	-5.4	-5.1	-4.6	-4.6	-2.3	-4.4	-5.3	-6.3	-5.4	-5.8	-6.4	-7.0	-7.8	-8.4	-5.6	-4.3			
16-Nov	-8.7	-9.7	-10.5	-11.3	-11.1	-10.8	-10.5	-10.2	-9.4	-8.4	-7.0	-5.4	-4.1	-3.4	-2.4	-2.3	-2.4	-2.8	-2.9	-3.3	-3.6	-3.4	-4.1	-2.6	-6.3	-2.3			
17-Nov	1.1	1.4	0.9	0.5	0.2	0.7	0.9	-0.1	0.1	1.9	2.9	4.4	5.0	5.1	5.0	4.2	2.1	1.2	1.1	0.1	-1.1	-2.1	-2.9	-3.9	1.2	5.1			
18-Nov	-4.2	-4.3	-5.1	-4.8	-5.0	-5.4	-5.6	-5.5	-5.5	-5.0	-4.1	-2.5	-1.1	0.1	0.9	1.1	0.4	-0.3	-0.8	-0.7	-0.5	-1.0	-0.9	-0.8	-2.5	1.1			
19-Nov	-0.5	-0.8	-1.1	-1.5	-1.5	-2.0	-2.4	-3.4	-4.0	-3.3	-3.3	-2.3	-1.5	-1.0	-0.1	0.3	-0.1	-0.7	-1.0	-1.1	-0.9	-0.8	-1.1	-0.2	-1.4	0.3			
20-Nov	0.9	6.3	3.2	0.7	-0.6	-1.9	-3.3	-4.4	-5.1	-5.1	-4.2	-3.6	-3.3	-3.4	-3.2	-3.8	-4.7	-5.7	-6.7	-7.1	-7.9	-8.2	-8.3	-8.7	-3.7	6.3			
21-Nov	-8.9	-8.7	-8.6	-8.6	-8.9	-8.9	-8.8	-8.5	-8.4	-8.3	-8.0	-7.7	-7.0	-6.5	-6.5	-6.6	-7.0	-6.9	-7.5	-8.2	-8.6	-8.8	-9.2	-9.4	-8.1	-6.5			
22-Nov	-9.7	-9.9	-9.9	-9.9	-10.3	-10.5	-11.3	-12.9	-13.8	-14.0	-13.5	-13.0	-12.7	-12.5	-12.1	-11.9	-11.9	-12.2	-12.0	-11.9	-12.1	-12.1	-12.1	-12.3	-11.9	-9.7			
23-Nov	-12.4	-12.6	-12.6	-12.4	-12.1	-11.8	-11.3	-10.9	-10.7	-10.6	-9.9	-9.3	-8.6	-7.8	-6.9	-7.4	-8.4	-9.3	-9.8	-10.3	-11.0	-11.2	-11.2	-11.4	-10.4	-6.9			
24-Nov	-11.5	-11.2	-2.1	1.2	1.5	0.9	0.5	0.3	0.1	0.7	1.9	2.8	4.3	5.5	5.7	4.4	1.8	-0.6	-1.8	-2.3	-1.7	-2.3	-1.8	-1.9	-0.2	5.7			
25-Nov	-3.5	-2.4	-1.3	-1.3	-2.2	-0.5	-0.2	-1.4	-1.6	-1.9	-3.2	-3.4	-3.1	-3.2	-3.5	-4.1	-6.3	-8.1	-9.1	-11.2	-12.4	-13.2	-14.0	-14.9	-5.3	-0.2			
26-Nov	-14.3	-14.0	-13.7	-14.1	-14.4	-15.1	-15.5	-15.5	-15.5	-15.0	-14.6	-13.4	-12.2	-11.1	-10.2	-9.7	-9.6	-9.5	-9.1	-8.7	-8.4	-8.4	-8.4	-8.9	-12.1	-8.4			
27-Nov	-9.4	-9.5	-9.1	-9.3	-9.4	-9.3	-9.2	-8.1	-7.4	-6.9	-6.0	-4.8	-3.7	-2.7	-2.1	-1.8	-2.0	-3.0	-2.2	-1.1	-2.2	2.1	2.6	2.3	-4.7	2.6			
28-Nov	3.3	3.1	2.4	2.6	2.0	1.9	1.7	1.1	1.2	1.7	2.8	4.3	5.1	5.9	5.6	4.7	3.5	2.9	2.5	2.7	3.9	3.4	3.6	3.7	3.1	5.9			
29-Nov	2.6	1.2	0.4	-1.0	-0.8	-1.4	-2.0	-1.7	-2.1	-2.0	-1.5	-1.1	-0.5	0.4	1.0	1.2	0.9	0.7	0.2	0.0	-0.3	-0.4	-0.9	-1.1	-0.3	2.6			
30-Nov	-1.5	-2.6	-3.3	-3.9	-4.5	-4.4	-4.0	-4.1	-4.4	-4.5	-4.4	-4.1	-3.8	-3.6	-3.5	-3.8	-3.9	-4.0	-4.1	-4.0	-4.2	-4.3	-4.9	-6.2	-4.0	-1.5			
																								Diurnal Average					
																								Diurnal Maximum					



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

**Ambient Temperature (AT) - C**  
**Athabasca Valley - November 2023**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C  
Athabasca Valley - November 2023**

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	0	0.00	0.00
-20 - 0	563	78.19	78.19
0 - 10	157	21.81	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



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

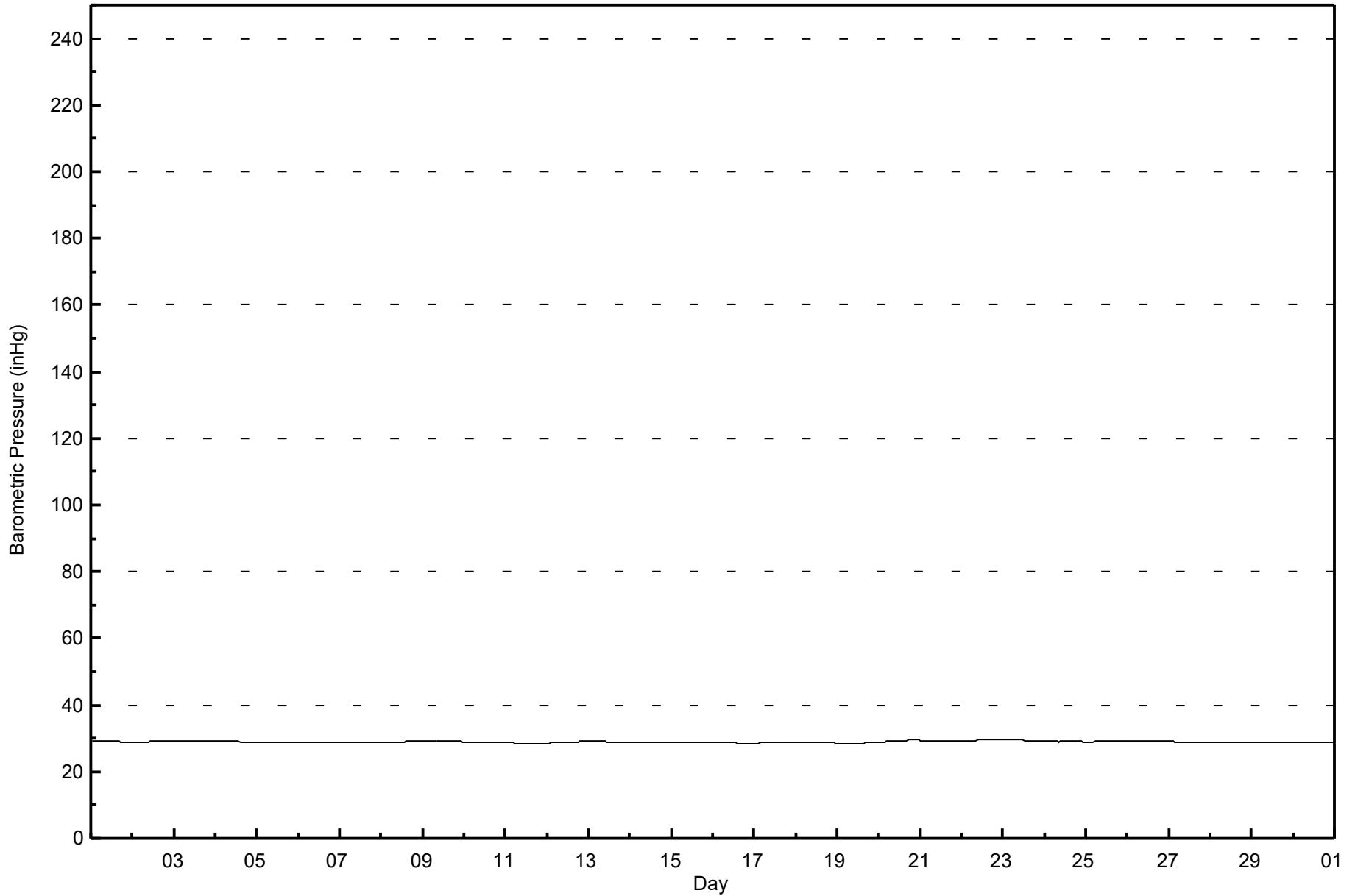
**Barometric Pressure (BP) - inHg**  
**Athabasca Valley - November 2023**

Maximum Value: 29.5 inHg on Nov 23 01:00      Maximum Daily Average: 29.4 inHg on Nov 22																						Hours in Service: 720 Hours of Data: 720					
Minimum Value: 28.4 inHg on Nov 11 16:00      Minimum Daily Average: 28.5 inHg on Nov 11 Maximum Diurnal Average: 29.0 inHg at hour 11      Minimum Diurnal Average: 28.9 inHg at hour 24 Monthly Average: 28.94 inHg      Percentiles: P <sub>1</sub> = 28.4 P <sub>10</sub> = 28.6 Q <sub>1</sub> = 28.7 Median = 28.9 Q <sub>3</sub> = 29.1 P <sub>90</sub> = 29.3 P <sub>99</sub> = 29.5																						Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0					
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Nov	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	29.0	29.0	29.0	29.0	29.0	28.9	28.9	28.9	29.1	29.2	
2-Nov	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	29.0	29.0	29.0	29.0	29.0	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.0	29.1
3-Nov	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	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1
4-Nov	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	28.9	28.9	28.9	28.9	28.9	28.9	29.0	29.1
5-Nov	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	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-Nov	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.8
7-Nov	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
8-Nov	28.7	28.7	28.7	28.8	28.8	28.8	28.8	28.8	28.8	28.9	28.9	28.9	28.9	29.0	29.0	29.0	29.1	29.1	29.1	29.1	29.2	29.2	29.2	29.2	29.2	29.0	29.2
9-Nov	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.3	29.3	29.2	29.2	29.2	29.2	29.2	29.1	29.1	29.1	29.1	29.1	29.1	29.0	29.0	29.2	29.3	29.3
10-Nov	29.0	29.0	29.0	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.7	28.7	28.8	28.8	29.0
11-Nov	28.7	28.7	28.7	28.6	28.6	28.6	28.6	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	28.5	28.5	28.5	28.5	28.5	28.5	28.7
12-Nov	28.5	28.6	28.6	28.6	28.7	28.7	28.7	28.8	28.8	28.8	28.8	28.9	28.9	28.9	28.9	29.0	29.0	29.0	29.0	29.0	29.1	29.1	29.1	29.1	29.1	28.9	29.1
13-Nov	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.0	29.0	29.0	28.9	28.9	28.8	28.8	28.8	28.8	28.8	28.7	28.7	28.7	28.7	28.7	28.9	29.1
14-Nov	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.7
15-Nov	28.6	28.6	28.6	28.6	28.6	28.7	28.7	28.7	28.8	28.8	28.8	28.8	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.8	28.9
16-Nov	28.9	28.9	28.9	28.9	28.9	28.9	28.8	28.8	28.8	28.8	28.7	28.7	28.7	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.7	28.9
17-Nov	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	28.7	28.8	28.8	28.8	28.8	28.8	28.8	28.7	28.8	28.8
18-Nov	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	28.6	28.6	28.6	28.6	28.6	28.7	28.7	28.8
19-Nov	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.7	28.7	28.7	28.7	28.6	28.7	28.7
20-Nov	28.7	28.8	28.9	29.0	29.0	29.1	29.2	29.2	29.2	29.3	29.3	29.3	29.3	29.4	29.4	29.4	29.4	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.3	29.5	29.5
21-Nov	29.4	29.4	29.4	29.4	29.4	29.3	29.3	29.3	29.2	29.2	29.2	29.2	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	29.4
22-Nov	29.3	29.3	29.3	29.4	29.4	29.4	29.4	29.4	29.4	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.4	29.5	
23-Nov	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.4	29.4	29.4	29.4	29.4	29.4	29.4	29.3	29.3	29.3	29.3	29.2	29.4	29.5	
24-Nov	29.2	29.2	29.1	29.1	29.1	29.1	29.1	29.1	29.0	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.0	29.0	29.0	29.1	29.2	
25-Nov	29.0	29.0	29.0	29.0	29.0	29.1	29.1	29.1	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	29.2	29.3	
26-Nov	29.3	29.3	29.3	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.1	29.1	29.1	29.1	29.1	29.1	29.2	29.3	
27-Nov	29.1	29.1	29.0	29.0	29.0	29.0	29.0	28.9	28.9	28.9	28.8	28.8	28.8	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.9	29.1	
28-Nov	28.7	28.7	28.7	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8
29-Nov	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	29.0	29.0	29.0	29.0	28.9	29.0	
30-Nov	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.8	28.8	28.9	29.0	
28.9 28.9 28.9 28.9 28.9 28.9 28.9 28.9 28.9 29.0 29.0 28.9 28.9 28.9 28.9 28.9 28.9 28.9 28.9 28.9 28.9 28.9 28.9 28.9 28.9 28.9 28.9 28.9																						Diurnal Average					
29.5 29.5																						Diurnal Maximum					



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

**Barometric Pressure (BP) - inHg**  
**Athabasca Valley - November 2023**





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

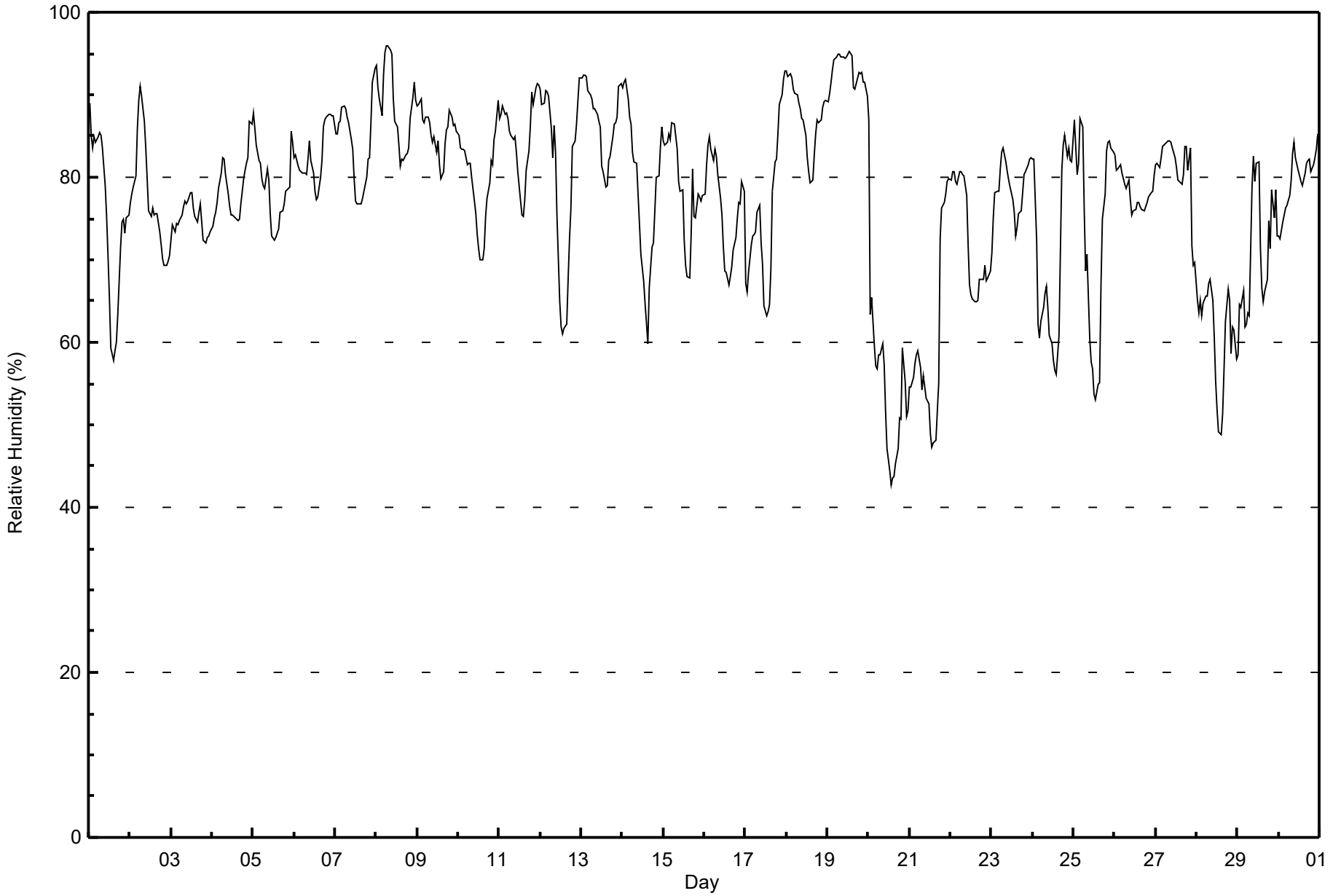
**Relative Humidity (RH) - %**  
**Athabasca Valley - November 2023**

Maximum Value: 95.9 % on Nov 8 08:00      Maximum Daily Average: 92.9 % on Nov 19 Minimum Value: 42.6 % on Nov 20 14:00      Minimum Daily Average: 54.5 % on Nov 20 Maximum Diurnal Average: 81.2 % at hour 24      Minimum Diurnal Average: 69.5 % at hour 15 Monthly Average: 77.50 %      Percentiles: P <sub>1</sub> = 47.3 P <sub>10</sub> = 61.9 Q <sub>1</sub> = 72.5 Median = 79.7 Q <sub>3</sub> = 84.9 P <sub>90</sub> = 89.4 P <sub>99</sub> = 94.9																						Hours in Service: 720	Hours of Data: 720	Hours of Missing Data: 0	Hours of Calibration: 0	Percent Operational Time: 100.0																							
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Nov	89.1	85.1	83.5	84.9	84.2	84.8	85.4	85.2	83.6	79.0	75.3	70.4	65.5	59.4	57.8	58.9	60.0	63.3	71.6	74.6	74.9	73.2	75.1	75.3	75.0	89.1																							
2-Nov	76.9	77.9	78.7	80.1	85.9	89.3	90.9	89.8	86.7	83.6	79.8	75.9	75.3	76.2	75.4	75.6	75.7	73.5	71.8	70.2	69.4	69.4	69.8	70.5	77.8	90.9																							
3-Nov	72.4	74.3	73.4	74.4	74.2	74.7	75.4	76.5	77.1	76.7	77.2	78.2	78.1	76.3	75.3	74.5	75.8	76.8	74.6	72.3	72.0	72.8	72.9	73.5	75.0	78.2																							
4-Nov	74.1	75.1	75.7	77.0	78.6	80.5	82.3	82.3	80.4	78.0	76.5	75.5	75.5	75.3	75.0	74.8	74.9	76.8	79.9	80.8	81.6	82.4	86.7	86.4	78.6	86.7																							
5-Nov	87.9	86.0	83.9	82.1	81.7	79.8	79.0	78.7	81.1	79.7	75.5	72.8	72.3	72.7	73.3	73.8	75.8	75.9	76.8	78.3	78.5	78.7	85.6	84.2	78.9	87.9																							
6-Nov	82.4	82.7	81.3	80.9	80.7	80.6	80.5	80.4	82.2	84.3	82.0	80.6	78.3	77.3	77.7	80.0	82.1	86.0	87.0	87.2	87.6	87.6	87.5	87.4	82.7	87.6																							
7-Nov	85.3	85.2	86.6	86.7	88.5	88.7	88.3	87.3	86.6	84.5	83.3	79.9	77.1	76.8	76.7	76.8	77.5	78.4	80.0	82.1	82.5	86.6	91.5	93.3	83.8	93.3																							
8-Nov	93.5	90.8	89.5	87.5	92.4	95.0	95.9	95.9	95.5	94.8	89.5	86.8	86.1	83.9	81.4	82.2	82.1	82.7	82.9	83.6	87.1	89.7	91.6	89.2	88.7	95.9																							
9-Nov	88.7	88.9	89.6	86.9	86.6	87.4	87.3	86.6	85.1	84.3	84.9	83.1	84.4	81.6	79.9	80.7	84.1	85.8	86.1	88.1	87.3	86.3	86.4	85.6	85.6	89.6																							
10-Nov	85.1	83.6	83.4	83.5	83.2	81.5	81.6	81.8	80.1	77.1	75.5	73.0	71.4	70.1	70.0	71.4	75.2	77.4	79.2	82.1	81.5	84.5	85.6	89.3	79.5	89.3																							
11-Nov	87.1	87.7	88.7	87.6	87.8	87.1	85.6	85.2	84.6	84.9	83.1	80.6	77.2	75.4	75.2	77.3	80.9	83.3	86.2	90.4	88.8	90.8	91.3	91.2	84.9	91.3																							
12-Nov	90.6	88.8	89.0	90.6	90.3	89.8	85.9	82.4	86.3	83.1	75.5	64.9	61.9	61.1	61.7	62.2	67.6	72.6	76.3	83.7	84.4	86.5	89.3	92.0	79.9	92.0																							
13-Nov	92.1	92.4	92.3	92.2	90.5	90.0	89.5	88.2	88.3	87.6	86.9	86.1	81.4	80.7	78.8	79.0	82.1	82.6	85.0	86.5	86.6	87.2	91.0	91.3	87.0	92.4																							
14-Nov	90.8	91.6	91.9	89.6	87.3	86.4	83.1	81.9	81.8	77.9	74.4	70.7	67.5	64.8	62.3	59.8	66.6	71.6	72.0	75.9	80.0	80.1	83.8	86.1	78.2	91.9																							
15-Nov	84.4	83.8	84.2	85.3	84.6	86.6	86.4	84.9	83.4	79.4	78.3	78.4	72.4	69.3	68.0	67.8	73.3	81.0	75.3	75.1	77.9	77.7	77.1	77.9	78.9	86.6																							
16-Nov	78.0	81.6	83.9	84.8	83.3	82.0	83.4	82.5	80.3	77.5	75.4	71.6	68.7	68.5	66.9	68.0	69.2	71.2	72.7	75.1	77.0	76.8	79.4	78.3	76.5	84.8																							
17-Nov	67.1	66.1	68.4	71.8	72.9	73.0	73.4	75.8	76.7	72.1	69.4	64.4	63.2	63.7	64.6	69.0	78.3	81.9	82.2	85.2	88.9	90.0	91.9	92.9	75.1	92.9																							
18-Nov	92.9	92.3	92.5	92.0	90.7	90.2	90.0	89.0	88.3	87.1	86.9	85.2	82.4	80.8	79.4	79.7	82.8	85.3	87.0	86.7	87.0	88.5	89.2	89.4	87.3	92.9																							
19-Nov	89.2	90.2	91.6	93.0	94.2	94.5	94.9	94.9	94.5	94.5	94.4	94.6	94.9	95.3	94.8	90.8	90.7	91.4	92.8	92.6	92.7	91.5	91.5	89.8	92.9	95.3																							
20-Nov	86.9	63.3	65.4	59.5	57.1	56.8	58.5	58.4	59.8	57.3	51.5	47.2	44.3	42.6	43.6	43.7	45.3	47.2	50.8	50.7	59.3	55.2	51.1	51.6	54.5	86.9																							
21-Nov	54.7	54.6	55.8	57.5	58.5	58.9	57.0	54.2	55.8	54.6	53.2	52.5	49.0	47.2	47.9	48.1	51.7	55.0	72.6	76.3	76.9	78.0	79.4	79.8	59.6	79.8																							
22-Nov	79.7	80.7	80.6	79.5	79.2	80.6	80.6	80.3	80.2	77.9	71.9	66.9	65.8	65.2	64.9	64.8	65.1	67.7	67.6	67.6	69.3	67.4	67.7	68.7	72.5	80.7																							
23-Nov	70.8	75.0	78.1	78.3	78.4	81.0	83.0	83.6	81.9	80.7	79.7	78.8	77.3	75.8	72.9	73.9	75.6	76.0	78.2	80.4	80.6	81.5	82.2	82.4	78.6	83.6																							
24-Nov	82.2	82.3	72.5	62.2	60.5	62.5	64.2	66.0	66.8	64.3	60.9	59.9	57.7	56.5	56.1	60.8	71.1	80.9	83.9	85.1	82.6	83.6	82.1	81.8	70.3	85.1																							
25-Nov	86.9	83.6	80.3	81.7	87.1	86.1	76.2	68.7	70.7	60.3	57.6	56.8	53.8	53.1	55.0	55.1	66.7	75.0	77.9	83.2	84.3	84.3	83.6	83.0	73.0	87.1																							
26-Nov	82.7	80.8	81.1	81.5	80.6	79.9	79.2	78.6	79.6	77.3	75.4	76.0	76.0	76.9	77.0	76.5	76.1	75.9	76.5	77.0	77.6	78.1	78.3	80.2	78.3	82.7																							
27-Nov	81.4	81.6	81.3	82.4	83.7	83.8	84.2	84.4	84.4	84.2	83.6	82.3	81.3	79.7	79.5	79.2	80.3	83.7	83.7	80.9	83.5	71.7	69.3	69.6	80.8	84.4																							
28-Nov	65.0	63.5	65.1	63.3	64.7	65.5	65.7	67.2	67.7	65.1	60.7	55.2	51.9	49.1	48.9	51.3	56.9	62.6	66.5	65.2	58.6	61.8	61.6	57.9	60.9	67.7																							
29-Nov	58.5	64.5	64.3	66.3	61.9	62.1	63.6	63.2	78.7	82.5	79.5	81.6	81.8	71.6	66.6	64.9	66.0	67.6	74.7	71.4	78.5	75.1	78.4	72.9	70.7	82.5																							
30-Nov	72.9	72.5	74.6	75.4	76.3	76.7	77.9	79.6	82.9	84.3	82.4	80.9	80.2	79.5	78.9	80.6	81.7	82.0	82.2	80.7	81.5	82.3	83.4	85.3	79.8	85.3																							
																								81.0	80.2	80.2	79.9	80.2	80.5	80.3	79.8	80.4	78.5	76.0	73.7	71.8	70.2	69.5	70.0	73.0	75.7	77.8	79.0	79.9	80.0	81.1	81.2	Diurnal Average	
																								93.5	92.4	92.5	93.0	94.2	95.0	95.9	95.9	95.5	94.8	94.4	94.6	94.9	95.3	94.8	90.8	90.7	91.4	92.8	92.6	92.7	91.5	91.9	93.3	Diurnal Maximum	



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

**Relative Humidity (RH) - %**  
**Athabasca Valley - November 2023**





Maximum Speed: 39 km/h on Nov 20 03:00	Maximum Daily Speed Average: 20.0 km/h on Nov 20	Hours in Service: 720
Minimum Speed Value: 0 km/h on Nov 11 22:00	Minimum Daily Speed Average: 0.7 km/h on Nov 30	Hours of Data: 681
Maximum Diurnal Speed Average: 2.6 km/h at hour 2	Minimum Diurnal Speed Average: 0.5 km/h at hour 8	Hours of Missing Data: 39
Monthly Average Velocity: 1.3 km/h 185.6 deg	Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 3 Q <sub>1</sub> = 6 Median = 8 Q <sub>3</sub> = 12 P <sub>90</sub> = 17 P <sub>99</sub> = 30	Percent Operational Time: 94.6

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Nov	SSE5	SSE5	SSE7	SSE6	SSE6	SE7	SE6	SE7	SE8	ESE7	SE8	ESE8	E6	E5	SSW7	SSW6	SSW6	SSW3	SW2	SSE1	SE2	SE5	SSE5	S5	SSE4.7	ESE8	
2-Nov	SE4	SE3	ESE3	W2	NNW4	NNW5	NNW8	NNW14	NNW16	NNW17	N12	N14	N12	N12	N11	N9	N8	NNE7	NE9	E12	E8	NE5	E7	ESE6	NNE6.3	NNW17	
3-Nov	S4	E7	ESE7	SSE6	SE8	SSE9	SE7	SE7	SE8	SE9	ENE3	NNW7	NNW11	NNW11	NW9	NNW8	NNW8	NNW7	ENE6	ENE6	NE4	NNE6	NE4	NE3	ENE2.3	NNW11	
4-Nov	NE4	ENE5	ENE5	ENE7	E7	E7	ESE5	E6	E8	ESE9	ESE9	ESE10	ESE12	ESE11	E12	ESE11	E11	E12	E13	E12	E11	ENE9	ENE6	ENE7	E8.3	E13	
5-Nov	ENE6	ENE6	E7	ENE5	ENE7	ENE8	E7	ENE7	ENE7	E9	E10	E9	E8	E8	ENE10	E10	E10	E8	E6	E7	E7	ESE9	ESE10	ESE9	E7.6	E10	
6-Nov	SE9	SE7	ESE10	SE11	SE10	SE9	ESE12	SE14	ESE12	SE14	SE15	SE11	SE11	ESE12	ESE15	ESE13	ESE14	ESE15	ESE12	SE11	SE10	SE11	SE8	SE7	SE11.4	ESE15	
7-Nov	SE7	SE6	SE6	SE5	SE6	SE6	SE7	SE7	SE5	SE8	SE9	SSE8	S8	S7	SSW5	SSW5	S5	SSW5	SSW6	SSW6	S5	SW8	S4	SSE4	SSE5.1	SE9	
8-Nov	SW6	WSW10	W18	NW21	NW11	NW6	UO	UO	UO	UO	UO	UO	UO	NNW15	NNW18	NNW19	NNW11	NW10	NW9	NW9	NW9	UO	UO	UO	UO	---	NW21
9-Nov	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	SE5	SE4	SE9	SE11	SE10	ESE10	UO	UO	UO	UO	UO	UO	---	SE11
10-Nov	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	SE17	SE15	SE11	SE11	SE12	SE13	SE14	SE11	SE9	SE10	SE7	SE9	---	SE17
11-Nov	ESE7	SSE8	SE7	SE11	SE8	SE12	SE11	SE13	ESE18	SE17	SE20	SE18	SE15	SE12	SE12	SE12	SE7	SE6	SE4	SE6	SSE4	SSE0	S4	SE4	SE9.7	SE20	
12-Nov	SSE3	SSE4	SE3	SSW3	SSE3	ENE2	WSW11	WSW5	WSW2	WSW11	W12	W22	W25	W23	W21	W21	W10	WSW10	W4	SSE1	SSW5	SW7	NW4	NNW7	W7.6	W25	
13-Nov	NNW5	SE1	NNE1	E3	ESE6	ESE5	E4	E4	E3	E4	E4	NE5	NE6	NNE11	NNE9	NNE7	N8	N10	N10	NNW10	NNW11	NNW14	NW13	NW13	N4.8	NNW14	
14-Nov	NW14	WNW9	W11	W9	NW5	SW7	WSW15	SW7	SSE5	S7	S7	SSW8	SSW9	SSW9	SW8	WSW13	W7	ESE0	SW3	SE4	SE9	SE7	SE6	SSE4	SW4.4	WSW15	
15-Nov	SE8	SE7	ESE8	ESE6	E4	N5	NNW18	NNW20	NNW20	NW18	NW16	NW10	NW13	NW14	NW12	NW7	SE1	ESE2	W5	W8	W11	W12	WSW10	WSW4	NW6.2	NNW20	
16-Nov	SSW7	SSE6	SE5	SE5	SE8	SE10	SE10	SE9	SE9	SE12	SE14	SE12	SE11	SE9	SE9	SE10	SE9	SE8	SE6	SE6	SE8	SE10	ESE8	SE2	SE8.2	SE14	
17-Nov	SW14	SW15	SE5	SSW6	SSW10	SW20	SW17	S9	SW17	WSW22	WSW19	WSW17	SW9	ENE3	NNE3	NW2	N2	SE4	SE7	SE9	SE6	ESE4	SE4	ESE4	SW6.6	WSW22	
18-Nov	SE5	SE7	SE6	SE7	SE8	SE9	SE8	SE6	SE9	SE9	SE9	SE9	SE9	SE7	SE9	SE9	ESE7	ESE7	SE6	SE6	SE6	ENE4	SE4	ESE3	SE6.9	SE9	
19-Nov	SE4	NE2	E1	NNE1	WSW1	SSW2	WSW1	SW3	S2	SSE1	SW7	S3	SSW3	SW7	SSW5	E3	S3	SE2	SSE3	SSE3	SSE4	SE8	SE5	SE8	S2.5	SE8	
20-Nov	SSW1	W28	W39	NNW39	NNW34	NNW32	W29	NNW25	W24	NNW16	NNW22	W28	NNW31	NW32	NNW19	NNW19	NNW15	NW11	NW10	WNW9	WSW11	WSW12	WSW10	SW6	NNW20.0	W39	
21-Nov	WSW4	W4	NE2	ESE6	E6	ESE5	ESE8	E8	ENE9	ENE9	ENE12	E12	E9	ENE9	ENE11	NE11	NE8	NNE8	NNW15	NNW18	NNW19	NNW18	NNW19	NNW19	NNE5.9	NNW19	
22-Nov	NNW18	NNW14	NNW15	NNW13	NNW13	NNW12	NNW15	NNW15	NNW11	NNW8	NNE7	NNW7	NNW7	NNW7	W5	SW4	SSW2	ENE5	ESE5	SE7	SE6	SE8	SE10	SE10	NNW5.0	NNW18	
23-Nov	SE11	SE8	SE8	SE11	SE11	SE10	SE12	SE14	SE13	SE8	SE10	SE12	SE11	SE9	SE10	SE12	SE14	SE15	SE10	SE13	SE11	SE10	ESE10	SE11.0	SE15		
24-Nov	ESE11	ESE9	SSW10	SW22	SW27	WSW21	SW22	SW14	W3	SSW6	SW6	SW11	WSW9	WSW9	WSW7	W3	SSW0	SSE2	SE3	SSE4	ESE3	SSE3	SSE4	SE3	SW6.8	SW27	
25-Nov	SE4	SSW6	SW14	WSW6	NNW6	NNW12	NNW22	NNW19	NNW10	NNW32	NNW30	NNW20	NNW17	NNW17	NNW14	NW16	N8	NNW6	W2	SW3	SW1	SW3	SSW2	ESE2	NW9.0	NNW32	
26-Nov	SSE3	SE7	SE6	ESE6	SE6	SE7	SE7	SE7	ESE3	SE9	SE9	SE7	SE8	SE8	SE6	SE9	SE10	SE12	SE11	SE9	SE9	SE10	SE13	SE14	SE8.0	SE14	
27-Nov	SE11	SE11	SE9	SE8	SE7	SE6	SE7	SE6	SE8	SE11	SE11	SE12	SE12	SE10	SE8	SE8	SE6	S3	SE3	SSE5	SE5	WSW14	WSW21	WSW17	SSE6.7	WSW21	
28-Nov	WSW14	WSW7	WSW12	WSW20	WSW25	WSW24	WSW24	WSW23	WSW26	WSW24	WSW24	W17	W19	W12	WSW11	W5	SE2	W3	S3	SE4	WSW8	WSW18	W10	NNW15	WSW13.9	WSW26	
29-Nov	W17	WSW13	W9	WSW5	WSW11	SW10	WSW9	NNW11	NNW11	WSW6	NNW8	W8	WSW6	W12	W20	W22	W19	W16	W16	NNW16	W15	NNW15	NNW12	W17	W12.2	W22	
30-Nov	W13	WSW13	WSW10	SW5	SW7	S2	N3	NNW6	NNW4	NNE3	NNE3	NNE2	NNE2	NNW5	N4	NNW4	NNW2	NNE2	ESE4	SE7	ESE7	SE7	SE7	SSE5	WSW0.7	WSW13	

SSW2.0	SSW2.6	SSW2.3	SW2.5	SSW2.1	SSW2.5	SW2.5	W0.5	S0.9	SSE1.4	S1.1	S1.8	SW1.0	NNW1.0	WSW0.9	SW0.7	ESE1.1	ESE1.6	ESE1.8	ESE2.1	SE2.4	S1.9	SSE2.1	SSE1.4	Diurnal Average	
NNW18	W28	W39	NNW39	NNW34	NNW32	W29	NNW25	WSW26	NNW32	NNW30	W28	NNW31	NW32	W21	W22	W19	W16	W16	NNW18	NNW19	NNW18	WSW21	NNW19	Diurnal Maximum	

UO - Unstable Operation  
 All monthly, daily, and diurnal averages have been calculated using vector methods





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

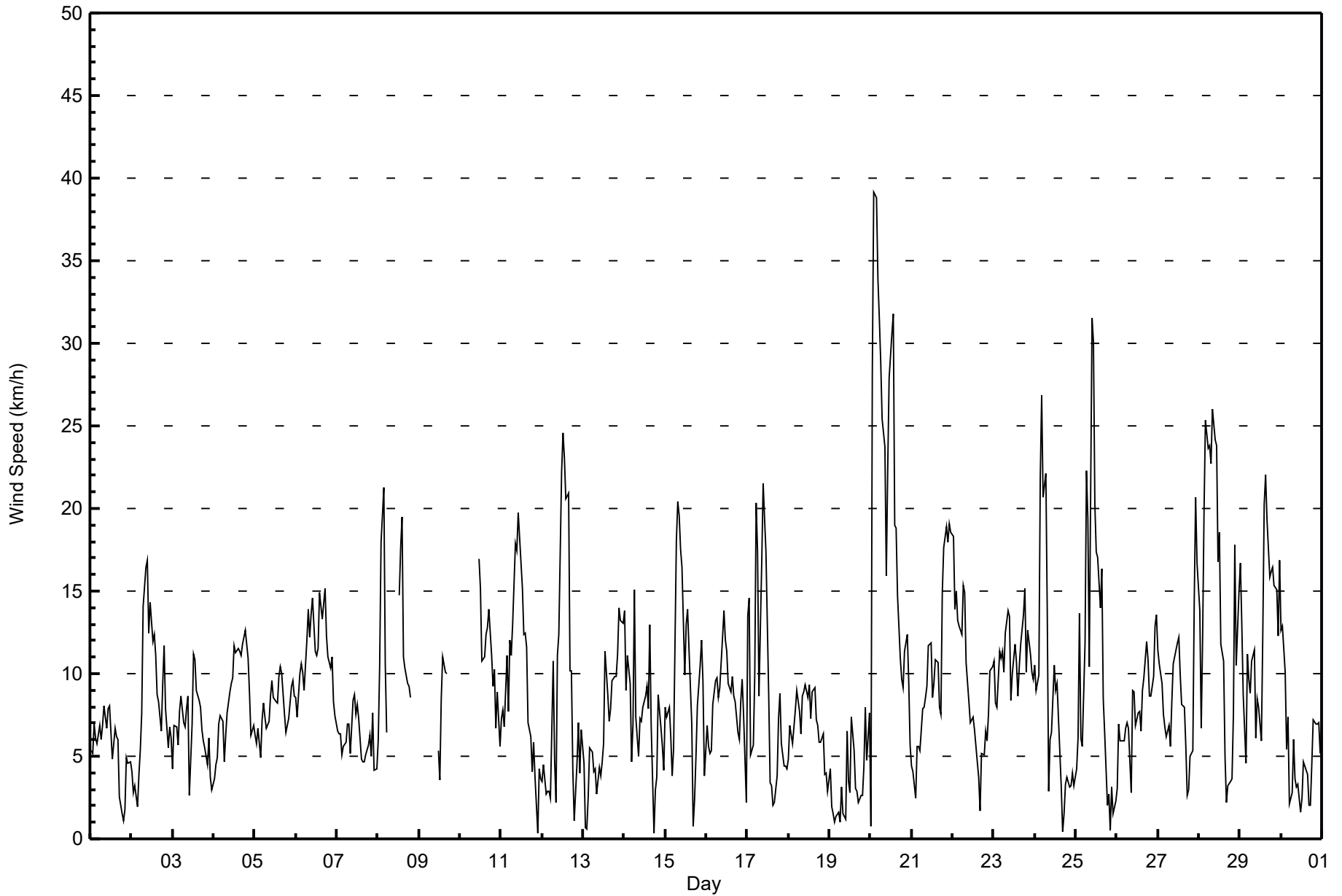
**Wind Speed (WS) - km/h**  
**Athabasca Valley - November 2023**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 13 km/h on Nov 20 02:00	Hours of Data: 681
Minimum Value: 1 km/h on Nov 30 12:00	Hours of Missing Data: 39
Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 1 Q <sub>1</sub> = 2 Median = 2 Q <sub>3</sub> = 3 P <sub>90</sub> = 4 P <sub>99</sub> = 7	Hours of Calibration: 0
	Percent Operational Time: 94.6

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

5	13	8	7	7	7	7	7	7	8	9	7	5	6	6	5	6	4	3	4	4	4	7	4	4	
Diurnal Maximum																									

UO - Unstable Operation





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

**Wind Speed (WS) - km/h**  
**Athabasca Valley - November 2023**

<b>Wind Speed Ranges (km/h)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	168	24.67	24.67
6 - 11	342	50.22	74.89
12 - 19	129	18.94	93.83
20 - 28	33	4.85	98.68
29 - 38	7	1.03	99.71
> 38	2	0.29	100.00

Total Number of Valid Hours: 681

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Wind Speed (WS) - km/h  
Athabasca Valley - November 2023**

<b>Wind Speed Ranges (km/h)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 5	4	8	8	8	9	15	32	24	9	16	8	7	10	0	3	7	168
6 - 11	7	7	4	17	26	29	147	8	4	15	14	19	8	7	12	18	342
12 - 19	4	0	0	1	6	10	32	0	0	0	6	12	14	11	9	24	129
20 - 28	0	0	0	0	0	0	1	0	0	0	4	11	10	2	2	3	33
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	1	3	1	2	7
> 38	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	2
<b>Totals</b>	<b>15</b>	<b>15</b>	<b>12</b>	<b>26</b>	<b>41</b>	<b>54</b>	<b>212</b>	<b>32</b>	<b>13</b>	<b>31</b>	<b>32</b>	<b>49</b>	<b>44</b>	<b>24</b>	<b>27</b>	<b>54</b>	<b>681</b>

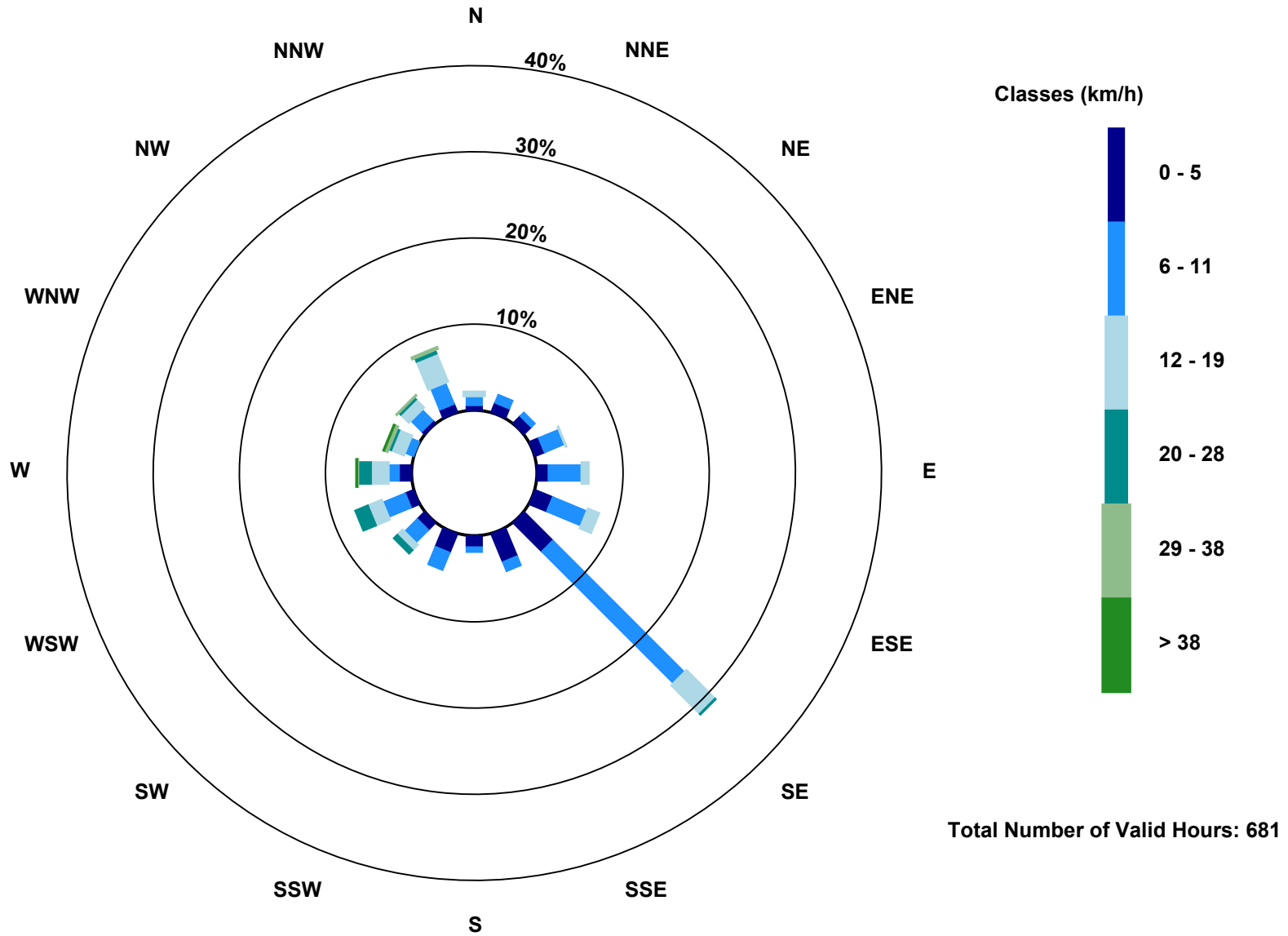
Total Number of Valid Hours: 681

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 2023

Wind Speed (WS) - km/h  
Athabasca Valley





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

**Wind Direction (WD) - deg**  
**Athabasca Valley - November 2023**

Direction of Maximum Speed: 279 deg on Nov 20 03:00		Hours in Service:	720
Direction of Maximum Daily Speed Average: 284.6 deg on Nov 20		Hours of Data:	681
Direction of Minimum Speed: 166 deg on Nov 11 22:00		Hours of Missing Data:	39
Direction of Minimum Daily Speed Average: 0.7 deg on Nov 30		Percent Operational Time:	94.6
Monthly Average Direction: 185.6 deg			

Day	Hourly Period Ending At (MST)																								Daily Average	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	166	150	151	150	149	143	136	132	126	117	129	123	97	101	204	207	202	203	220	159	139	141	147	173	147.2	
2-Nov	144	144	122	264	348	327	337	335	337	348	4	352	1	9	5	8	11	28	50	80	85	52	82	118	12.8	
3-Nov	183	88	102	158	129	151	132	137	142	133	76	335	339	334	322	343	343	348	61	78	44	30	43	41	58.1	
4-Nov	47	67	66	74	81	89	107	84	94	105	114	106	107	107	99	104	98	100	97	90	87	77	68	61	92.7	
5-Nov	58	60	81	67	62	69	79	72	71	80	87	101	92	86	76	85	87	91	98	99	98	112	121	117	86.8	
6-Nov	124	136	121	132	132	129	120	124	123	127	124	124	127	120	122	122	120	121	123	127	131	136	135	133	125.8	
7-Nov	142	139	132	124	130	129	130	125	129	128	132	154	184	191	209	212	191	197	206	211	187	221	178	147	161.3	
8-Nov	226	245	277	309	323	321	UO	UO	UO	UO	UO	UO	UO	296	301	302	301	309	307	307	310	UO	UO	UO	UO	--
9-Nov	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	127	127	130	132	131	120	UO	UO	UO	UO	UO	UO	--
10-Nov	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	134	134	141	137	135	141	140	140	138	143	134	126	136	--
11-Nov	123	150	125	134	132	132	140	124	121	125	127	127	129	132	125	133	138	143	139	129	161	166	173	138	131.1	
12-Nov	163	151	139	211	147	68	240	251	256	244	261	274	273	270	263	261	259	257	279	148	203	234	305	338	258.8	
13-Nov	346	127	22	83	110	106	93	87	90	82	83	50	40	23	33	22	350	1	359	339	341	330	325	322	9.7	
14-Nov	310	300	280	281	314	233	239	227	148	178	186	194	197	200	228	253	277	104	231	131	133	134	138	148	227.9	
15-Nov	145	138	122	109	82	350	328	328	330	325	319	325	317	314	318	313	143	107	261	279	277	267	251	246	312.7	
16-Nov	211	165	128	143	133	130	131	129	135	133	133	132	133	133	134	137	131	129	132	129	131	133	122	133	134.9	
17-Nov	235	231	137	205	196	227	229	191	225	237	245	240	224	62	15	326	3	135	133	125	133	120	132	118	214.4	
18-Nov	129	133	138	135	128	134	130	129	132	135	129	128	131	128	133	134	122	122	127	126	132	74	131	114	128.9	
19-Nov	132	48	91	29	256	200	257	217	184	147	225	182	208	217	202	99	191	137	157	148	157	145	146	128	169.1	
20-Nov	210	270	279	283	294	287	279	300	271	285	286	277	297	305	286	294	298	314	312	294	256	241	238	229	284.6	
21-Nov	237	268	49	112	92	123	102	83	76	73	77	86	89	75	67	53	39	18	336	335	337	339	336	335	27.6	
22-Nov	335	332	333	341	337	335	336	336	338	348	13	341	334	347	277	233	207	71	123	132	135	145	137	130	345.6	
23-Nov	126	140	145	134	130	134	135	134	134	135	131	132	134	132	125	133	128	132	133	135	133	134	129	122	132.4	
24-Nov	121	107	200	230	232	237	233	224	275	202	214	223	238	258	239	265	209	159	139	158	118	150	150	136	217.2	
25-Nov	142	202	226	243	322	334	346	347	329	327	335	323	334	328	331	322	360	333	275	235	233	233	201	107	325.2	
26-Nov	153	132	128	110	134	145	136	129	110	132	138	134	132	143	128	136	136	133	135	140	142	135	134	129	133.9	
27-Nov	130	128	133	136	136	146	146	144	143	140	141	142	139	144	140	146	141	191	145	152	126	249	240	238	158.0	
28-Nov	249	238	254	252	249	250	246	249	246	248	254	260	263	262	247	259	139	264	191	127	249	243	262	284	251.2	
29-Nov	274	257	260	241	248	234	244	295	301	257	292	269	249	277	280	278	278	277	279	295	276	295	292	276	275.4	
30-Nov	280	258	246	215	218	179	353	342	348	24	14	30	12	348	351	341	331	14	116	132	120	132	139	147	258.7	

193.2	199.4	211.8	220.1	208.9	207.5	228.6	263.7	182.9	167.3	177.3	184.3	222.6	292.5	244.1	217.2	119.5	112.3	122.9	120.9	140.3	182.5	166.9	159.3
Diurnal Average																							

UO - Unstable Operation  
 All monthly, daily, and diurnal averages have been calculated using vector methods



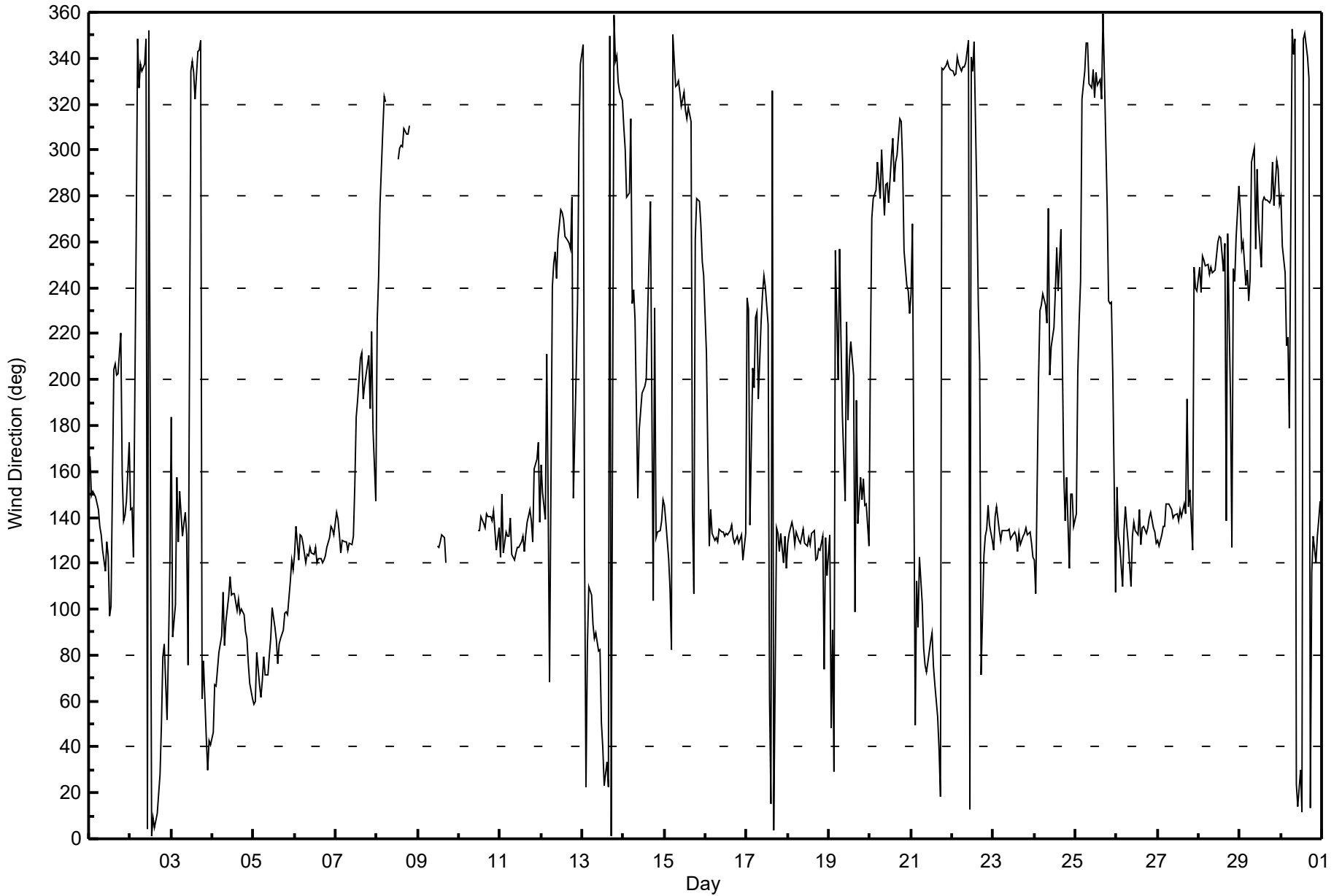
**Wood Buffalo Environmental Association**  
**Summary of Hour Standard Deviations**

**Wind Direction (WD) - deg**  
**Athabasca Valley - November 2023**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 103 deg on Nov 14 18:00	Hours of Data: 681
Minimum Value: 8 deg on Nov 22 02:00	Hours of Missing Data: 39
Percentiles: P <sub>1</sub> = 9 P <sub>10</sub> = 11 Q <sub>1</sub> = 14 Median = 19 Q <sub>3</sub> = 30 P <sub>90</sub> = 56 P <sub>99</sub> = 93	Hours of Calibration: 0
	Percent Operational Time: 94.6

Day	Hourly Period Ending At (MST)																								Daily Maximum		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Nov	25	15	13	21	18	17	13	13	13	22	14	13	17	30	24	19	15	28	67	93	64	28	38	34	93		
2-Nov	38	77	46	61	27	26	19	10	12	17	20	19	23	17	19	19	21	28	23	13	14	33	20	30	77		
3-Nov	74	21	26	34	21	20	15	15	20	17	54	16	12	11	17	18	15	16	25	18	30	16	32	37	74		
4-Nov	22	22	16	12	11	17	31	17	18	21	21	21	20	20	19	20	19	20	20	16	15	15	17	12	31		
5-Nov	15	20	21	36	20	13	16	23	10	11	15	22	17	14	10	10	12	13	20	19	19	19	16	18	36		
6-Nov	20	25	18	18	18	19	14	14	14	14	13	16	15	16	13	13	12	11	12	13	13	12	12	11	25		
7-Nov	17	15	15	16	16	15	12	22	23	14	13	30	29	27	23	25	19	18	20	18	22	20	39	28	39		
8-Nov	25	12	22	10	8	9	UO	UO	UO	UO	UO	UO	UO	10	10	9	10	12	11	11	13	UO	UO	UO	UO	25	
9-Nov	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	18	15	19	18	18	17	UO	UO	UO	UO	UO	19		
10-Nov	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	12	12	17	13	11	13	UO	10	10	12	25	16	28	28
11-Nov	27	36	43	17	30	23	21	17	15	16	15	17	18	19	19	18	22	38	46	22	34	96	39	64	96		
12-Nov	51	32	57	46	30	76	21	74	83	14	13	12	9	11	11	10	11	17	46	72	34	60	44	15	83		
13-Nov	35	97	91	74	36	31	32	24	52	20	51	41	25	17	19	17	14	17	19	18	9	9	9	9	97		
14-Nov	10	17	8	9	42	71	11	56	29	26	25	22	14	14	23	14	24	103	89	54	20	24	44	44	103		
15-Nov	19	20	27	28	41	48	12	9	8	11	13	21	15	14	21	24	88	43	79	25	17	12	52	87	88		
16-Nov	37	35	31	37	21	13	18	25	17	15	12	13	13	14	12	12	17	20	24	19	25	17	25	78	78		
17-Nov	13	64	62	56	32	15	38	52	39	11	11	12	45	41	63	67	60	48	27	19	36	35	36	39	67		
18-Nov	41	20	21	18	21	18	16	22	17	17	16	17	14	23	18	19	24	23	23	28	24	45	62	62	62		
19-Nov	51	70	52	84	57	64	85	63	67	68	12	67	77	14	59	60	42	57	43	54	44	19	40	26	85		
20-Nov	97	10	12	12	13	14	13	13	16	19	15	11	14	11	16	13	12	9	12	22	11	10	28	51	97		
21-Nov	37	49	51	30	22	41	28	21	24	16	12	18	21	15	13	23	24	24	10	10	10	13	9	8	51		
22-Nov	8	8	9	17	13	10	12	10	17	21	25	20	17	23	30	44	78	17	35	26	20	21	14	14	78		
23-Nov	15	20	18	13	15	14	14	11	12	13	16	14	13	13	15	12	13	13	12	15	11	14	18	20	20		
24-Nov	13	20	55	13	10	12	10	18	96	63	42	12	27	10	14	37	98	82	57	36	47	53	50	42	98		
25-Nov	39	46	16	41	30	20	18	18	20	10	12	15	18	13	13	9	21	16	74	80	93	50	88	61	93		
26-Nov	54	15	18	28	26	25	20	38	79	18	16	26	17	15	20	15	15	12	14	15	14	14	15	14	79		
27-Nov	17	16	14	24	19	27	29	30	18	14	16	15	15	21	20	21	42	65	44	28	35	59	8	12	65		
28-Nov	16	46	17	10	10	9	10	9	10	10	10	12	12	22	17	59	70	58	55	49	41	10	21	12	70		
29-Nov	15	11	17	71	14	12	20	24	18	28	63	24	21	18	11	10	11	12	12	16	10	17	18	9	71		
30-Nov	11	12	14	37	12	66	48	16	44	30	52	52	49	19	22	27	69	61	55	16	27	18	12	27	69		
Diurnal Maximum																											
97 97 91 84 57 76 85 74 96 68 63 67 77 41 63 67 98 103 89 93 93 96 88 87																											

UO - Unstable Operation







## WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY  
MONITORING PROGRAM  
MONTHLY REPORT

### **AMS08 FORT CHIPEWYAN NOVEMBER 2023**

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

December 22, 2023

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FORT CHIPEWYAN (AMS08)  
 NOVEMBER 2023

MONTHLY SUMMARY

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2(ppb) Average	685	34	35	99.86	4.5	0	2.1	0
TRS (ppb) Average	685	34	35	99.86	0.6	0	0.3	0
O3(ppb) Average	687	32	33	99.86	37.8	0	34.9	-
NO2(ppb) Average	683	35	37	99.72	20	0	7.4	-
NO(ppb) Average	683	35	37	99.72	7.4	-	1	-
NOX(ppb) Average	683	35	37	99.72	22.3	-	8.4	-
PM2.5(ug/m3) Average	692	1	28	96.25	46.4	0	23.6	0
CO(ppm) Average	681	33	39	99.17	0.2	0	0.1	-
CO2(ppm) Average	686	33	34	99.86	449.4	-	443.9	-
Temperature 2 m (C) Average	720	0	0	100	0.8	-	-1.4	-
Relative Humidity (%) Average	720	0	0	100	99.2	-	95.4	-
Wind Speed 10 m (km/h) Average	720	0	0	100	36	-	29	-
Wind Direction 10 m (deg) Average	720	0	0	100	-	-	-	-
PC(mm) Total	719	0	1	99.86	1	-	7.2	-
Leaf Wetness (% of range) Average	720	0	0	100	13.1	-	3.5	-
Global Solar Radiation (W/m2) Average	720	0	0	100	311.7	-	55.9	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FORT CHIPEWYAN (AMS08)  
NOVEMBER 2023

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	0.27	0.7	-	0	0	0	0	0.1	0.7	4.5
TRS (ppb) Average	685	0.16	0.1	-	0.1	0.1	0.1	0.1	0.2	0.2	0.6
O3(ppb) Average	687	25.15	7.2	-	0.5	14.9	20.9	26.7	30.5	33	37.8
NO2(ppb) Average	683	1.8	3	-	0.1	0.2	0.3	0.6	1.5	4.9	20
NO(ppb) Average	683	0.13	0.5	-	0	0	0	0	0.1	0.2	7.4
NOX(ppb) Average	683	1.93	3.2	-	0.1	0.2	0.3	0.7	1.8	5.2	22.3
PM2.5(ug/m3) Average	692	8.38	6.6	-	0.8	3.2	3.9	6.4	10.2	16	46.4
CO(ppm) Average	681	0.03	0	-	0	0	0	0	0.1	0.1	0.2
CO2(ppm) Average	686	433.21	5.3	-	423	426.5	428.5	433.1	436.7	440	449.4
Temperature 2 m (C) Average	720	-6.19	4.9	-	-22.6	-12.2	-8.4	-5.2	-2.4	-1.3	0.8
Relative Humidity (%) Average	720	86.4	7.1	-	53.6	77.2	82.9	87.1	91.5	94.2	99.2
Wind Speed 10 m (km/h) Average	720	13	7	-	0	5	7	12	17	24	36
Wind Direction 10 m (deg) Average	720	-	-	-	-	-	-	-	-	-	-
Precipitation (mm) Total	719	-	-	19.66	-	-	-	-	-	-	-
Leaf Wetness (% of range) Average	720	2.25	0.8	-	1.5	1.8	1.8	1.9	2.5	3.1	13.1
Global Solar Radiation (W/m2) Average	720	24.87	50.3	-	0	0	0	0	25	92.7	311.7

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FORT CHIPEWYAN (AMS08)  
NOVEMBER 2023

OPERATIONAL NOTES

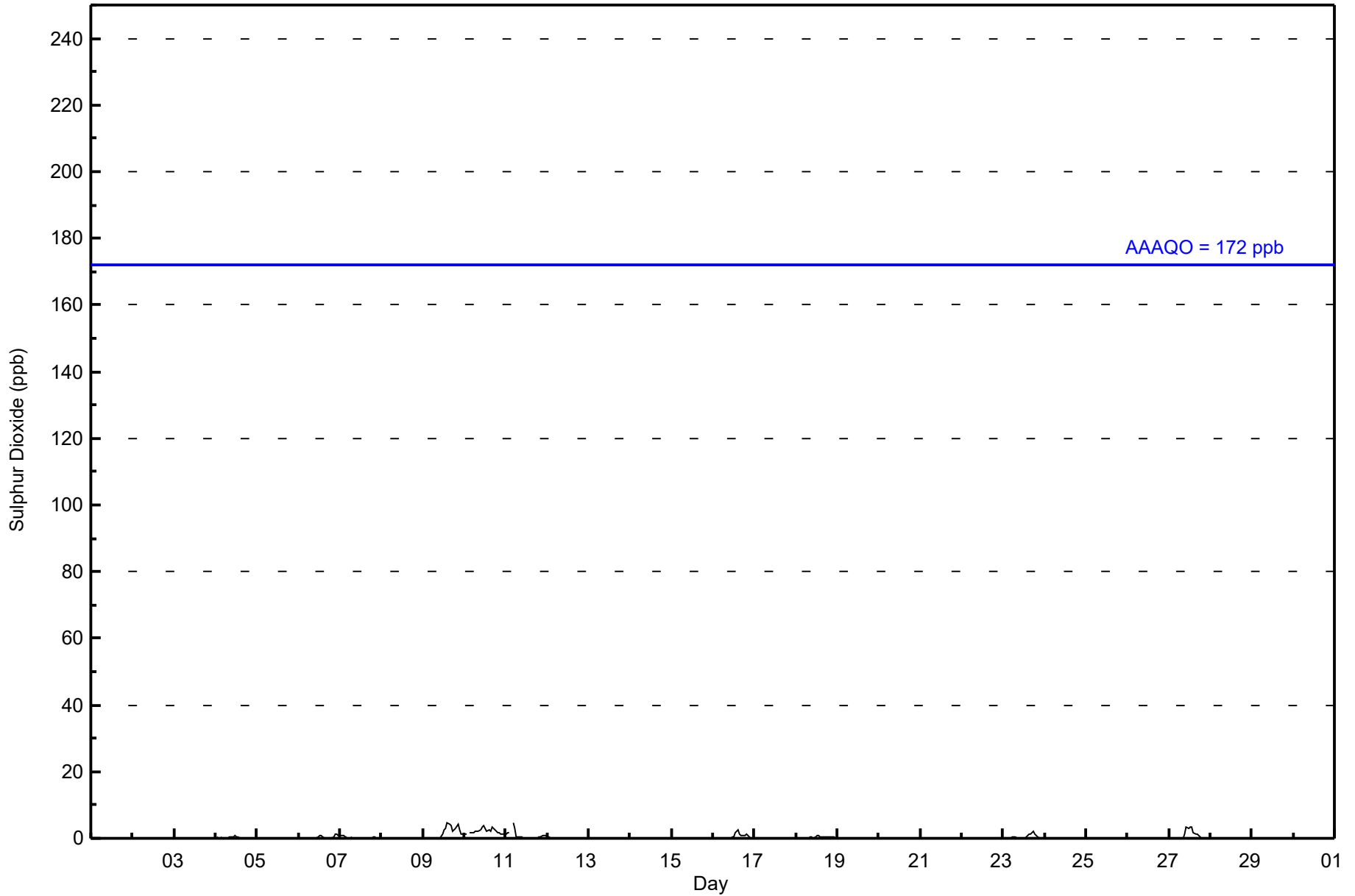
Parameter	Period Start	Period End	Duration (Hours)	Notes
SO2, TRS, NO2, PM2.5, CO, CO2	15 Nov 2023 04:00	15 Nov 2023 04:00	1	Station power failure
O3	06 Nov 2023 01:00	06 Nov 2023 01:00	1	DAS Failure - data not recorded
NO2, CO	06 Nov 2023 12:00	06 Nov 2023 12:00	1	Station power failure
CO	06 Nov 2023 13:00	06 Nov 2023 16:00	4	Stabilization after power failure
PM2.5	05 Nov 2023 12:00	06 Nov 2023 11:00	24	Unstable Operation - flatline in analyzer output signal
PM2.5	30 Nov 2023 10:00	30 Nov 2023 11:00	2	Maintenance - firmware update
Precipitation Collector	15 Nov 2023 04:00	15 Nov 2023 04:00	1	DAS Failure - data not recorded





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

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Fort Chipewyan - November 2023**





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

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Fort Chipewyan - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 10	685	100.00	100.00
11 - 20	0	0.00	100.00
21 - 60	0	0.00	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



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

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Fort Chipewyan - November 2023**

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	4	7	71	106	27	29	33	41	23	9	23	116	88	45	43	685
11 - 20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	20	4	7	71	106	27	29	33	41	23	9	23	116	88	45	43	685

Total Number of Valid Hours: 685

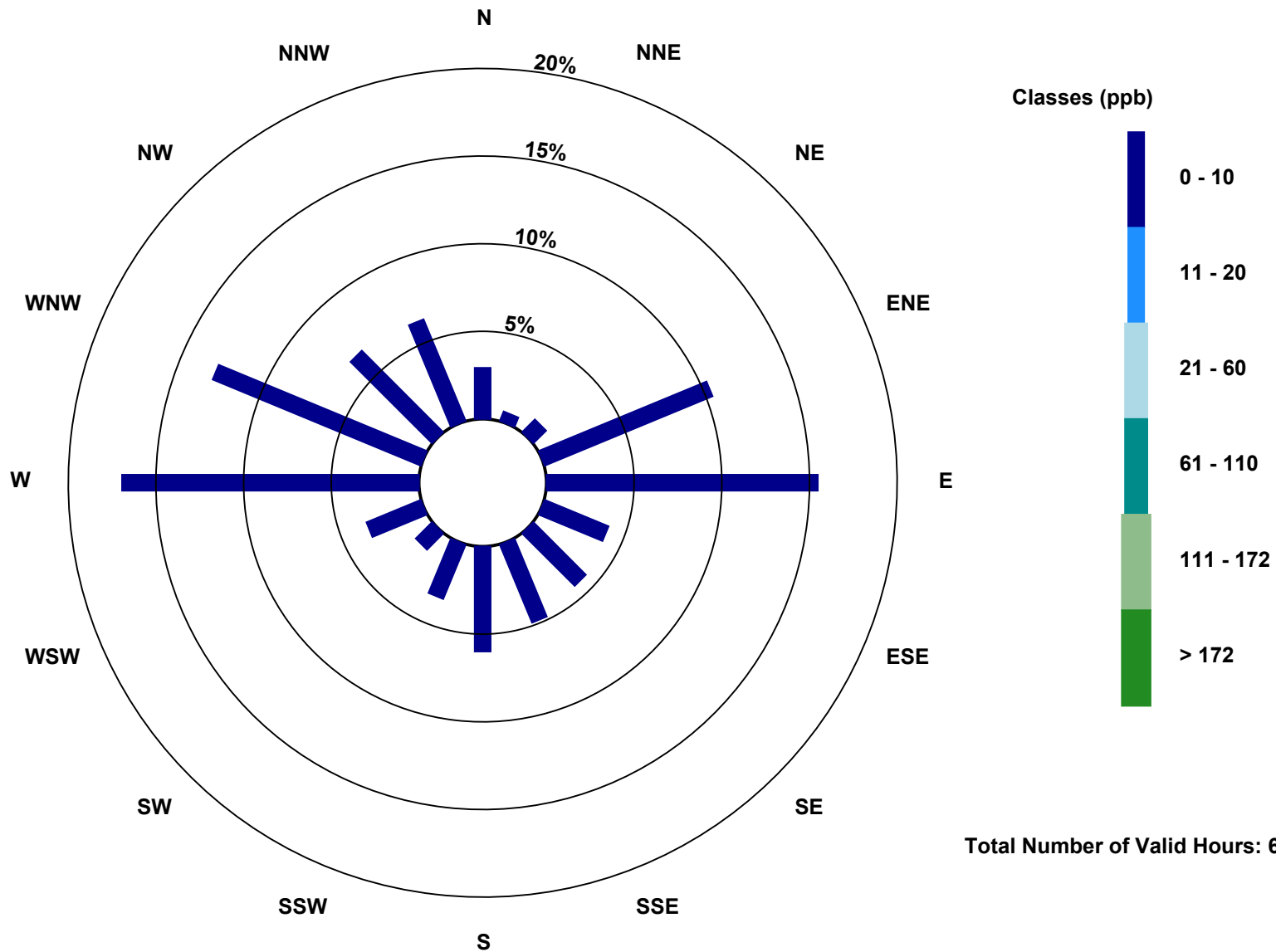
Total Number of Hours: 720



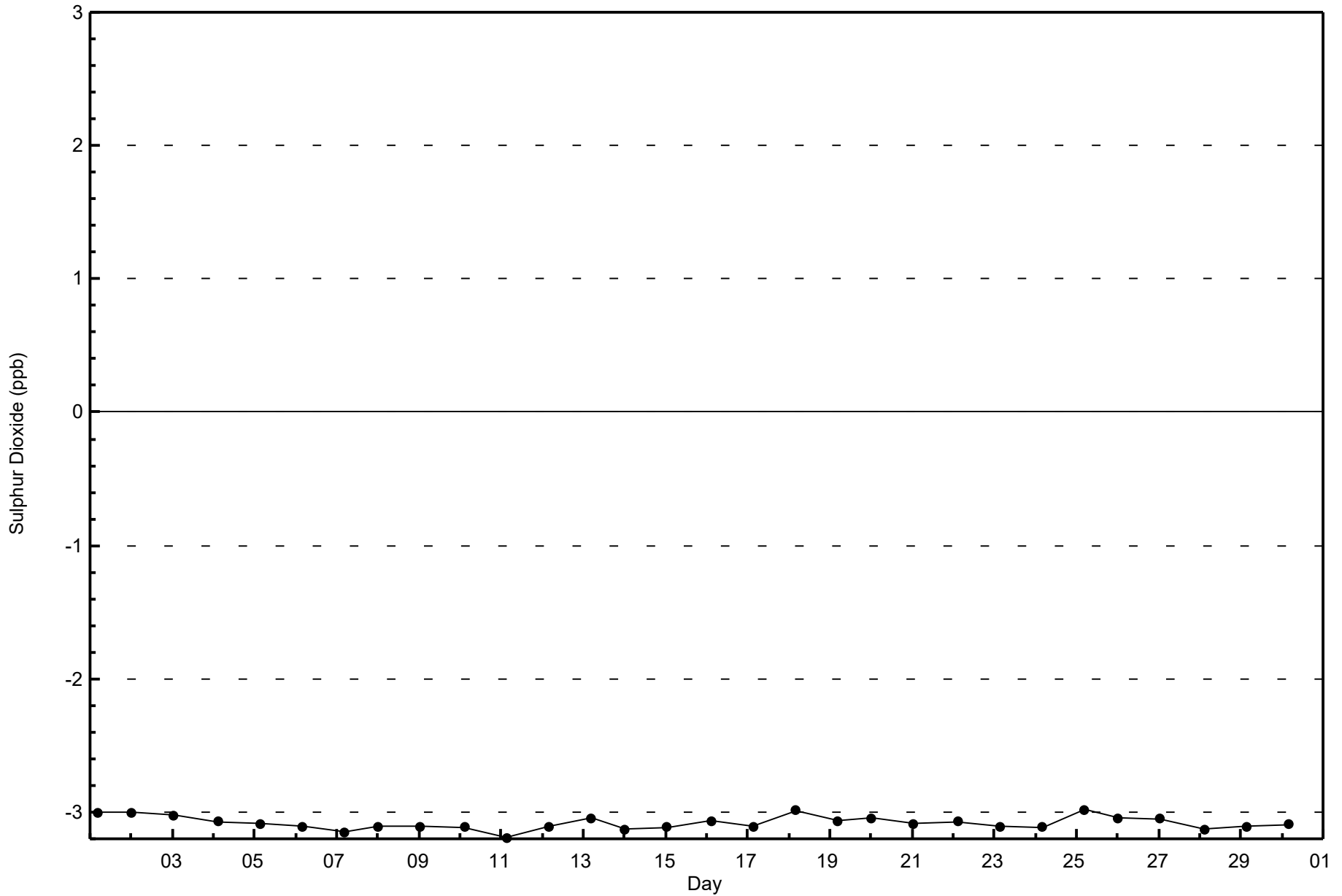


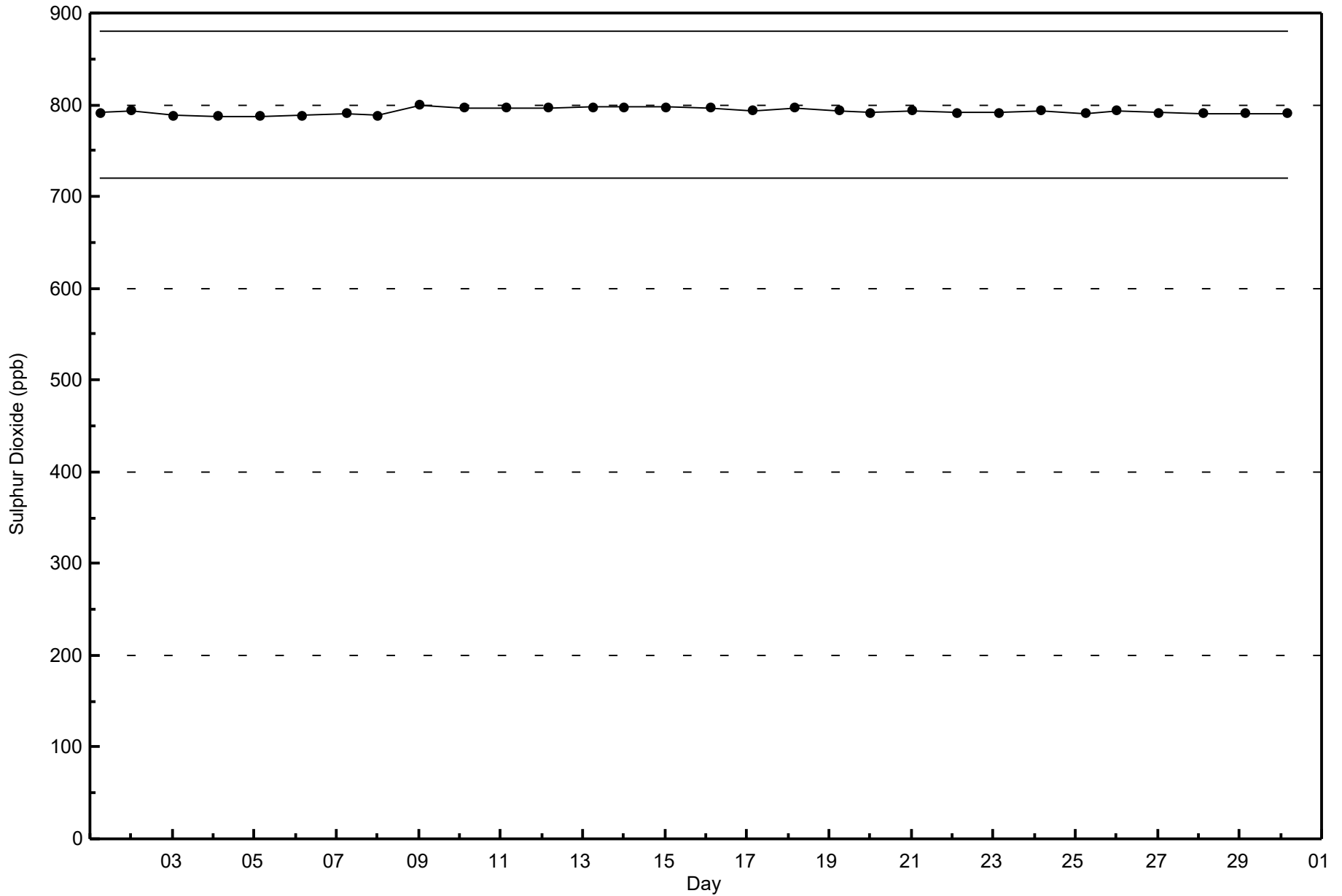
Wood Buffalo Environmental Association  
Wind Rose Nov 2023

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

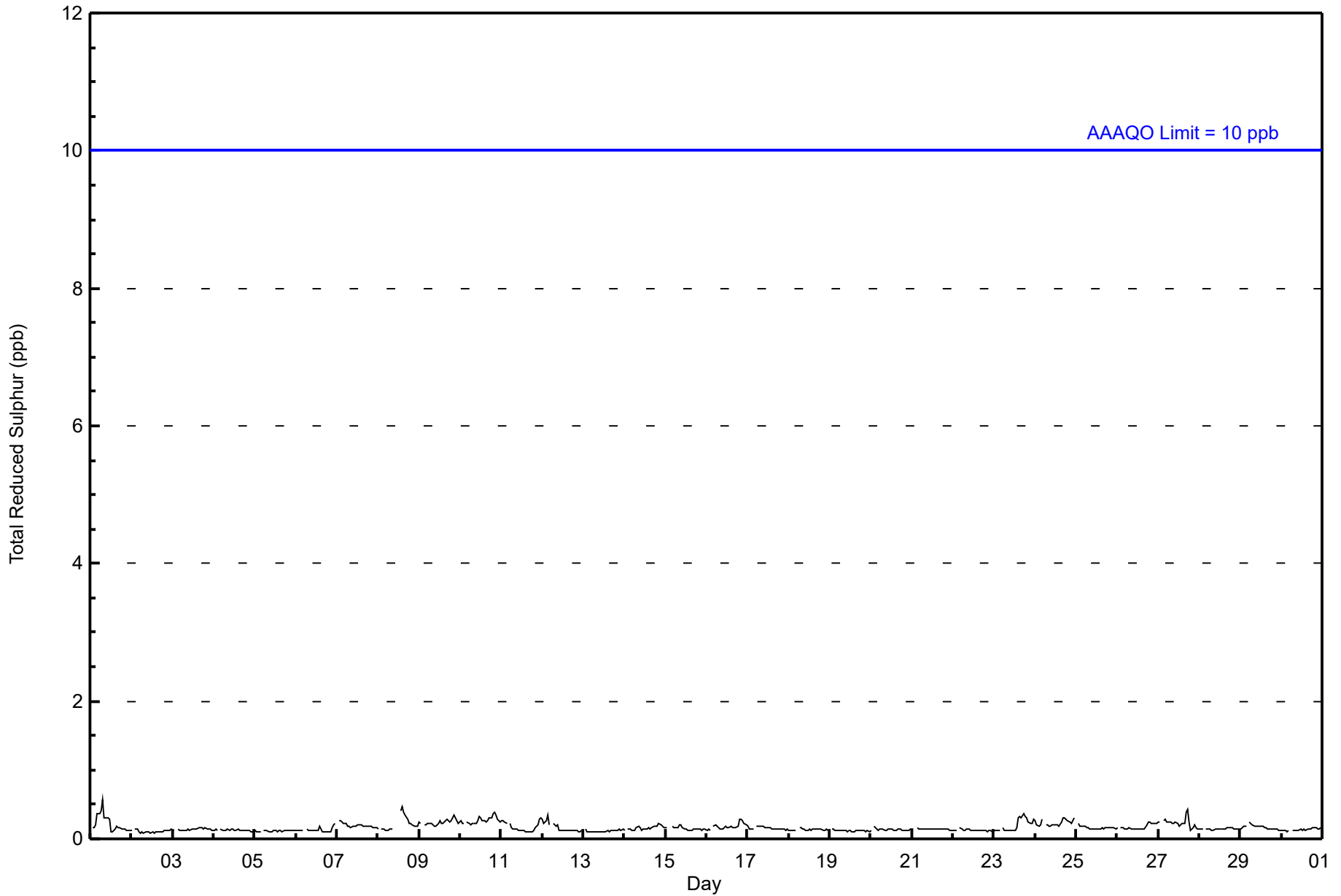


Total Number of Valid Hours: 685











**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Total Reduced Sulphur (TRS) - ppb  
Fort Chipewyan - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2	685	100.00	100.00
3 - 4	0	0.00	100.00
5 - 7	0	0.00	100.00
8 - 11	0	0.00	100.00
> 11	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



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

**Total Reduced Sulphur (TRS) - ppb**  
**Fort Chipewyan - November 2023**

<b>Concentration</b> <b>Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	21	3	10	70	106	26	30	32	41	23	9	22	118	87	50	37	685
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	21	3	10	70	106	26	30	32	41	23	9	22	118	87	50	37	685

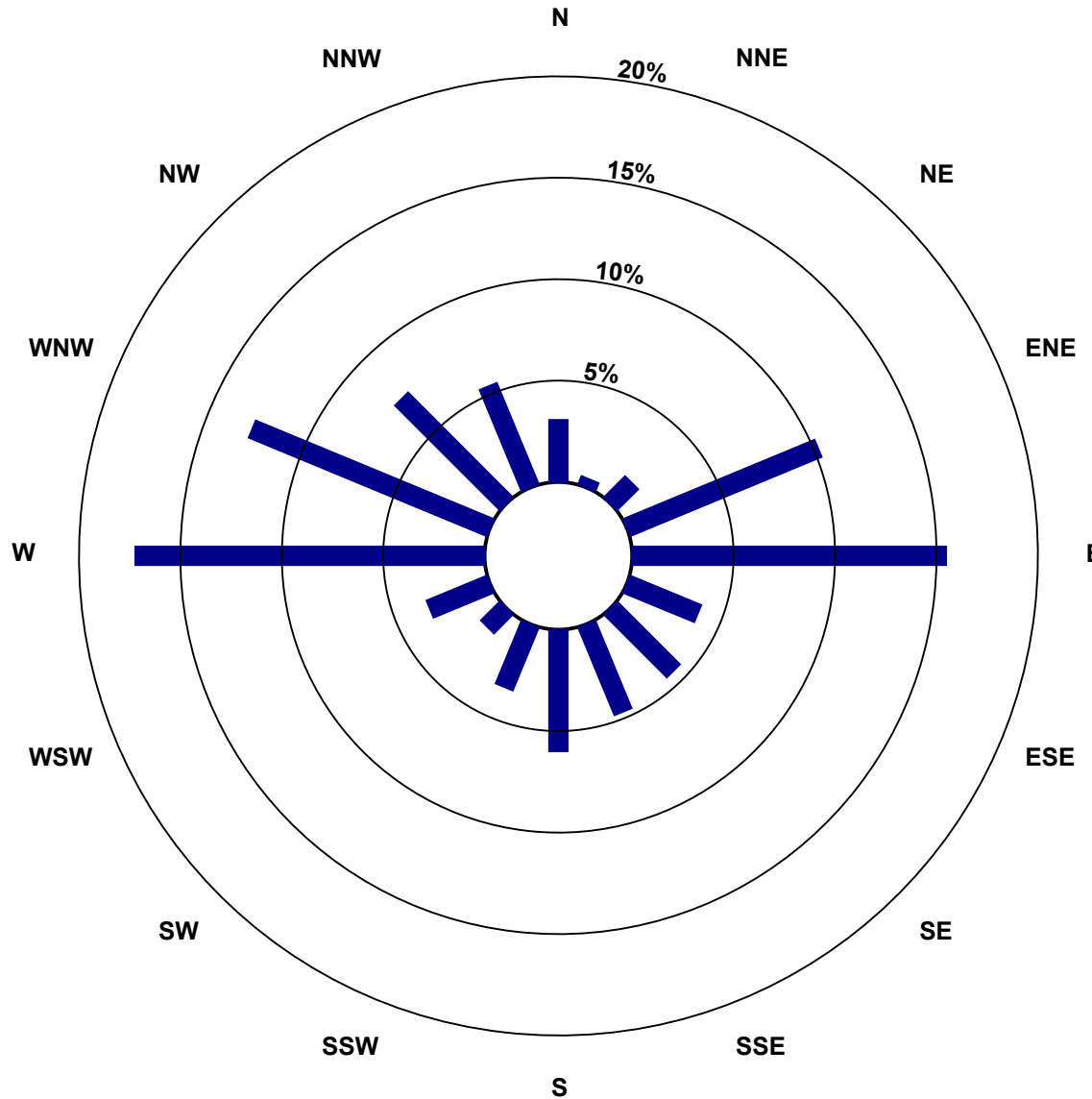
Total Number of Valid Hours: 685

Total Number of Hours: 720

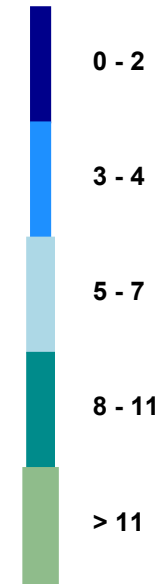


Wood Buffalo Environmental Association  
Wind Rose Nov 2023

Total Reduced Sulphur (TRS) - ppb  
Fort Chipewyan

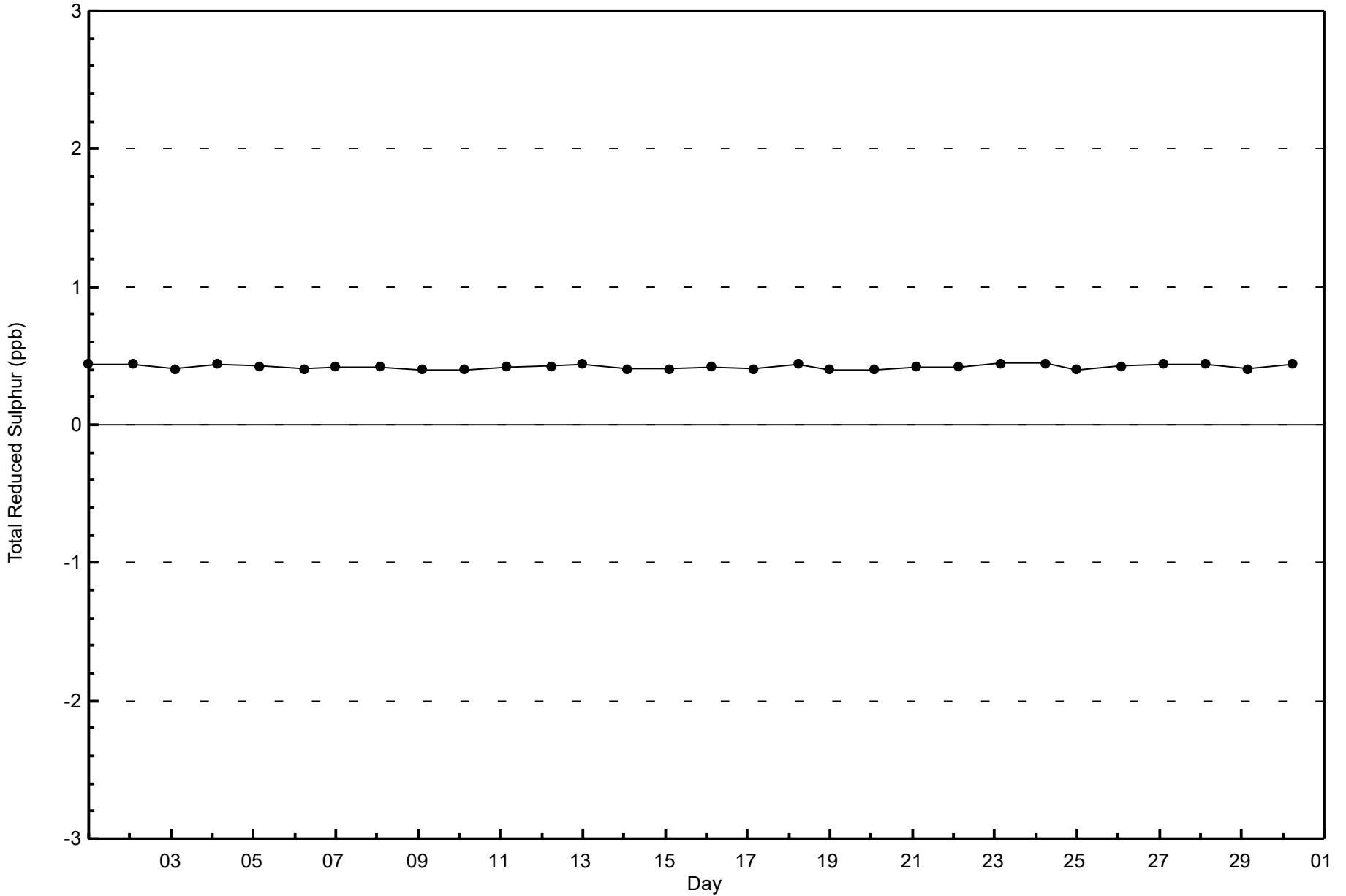


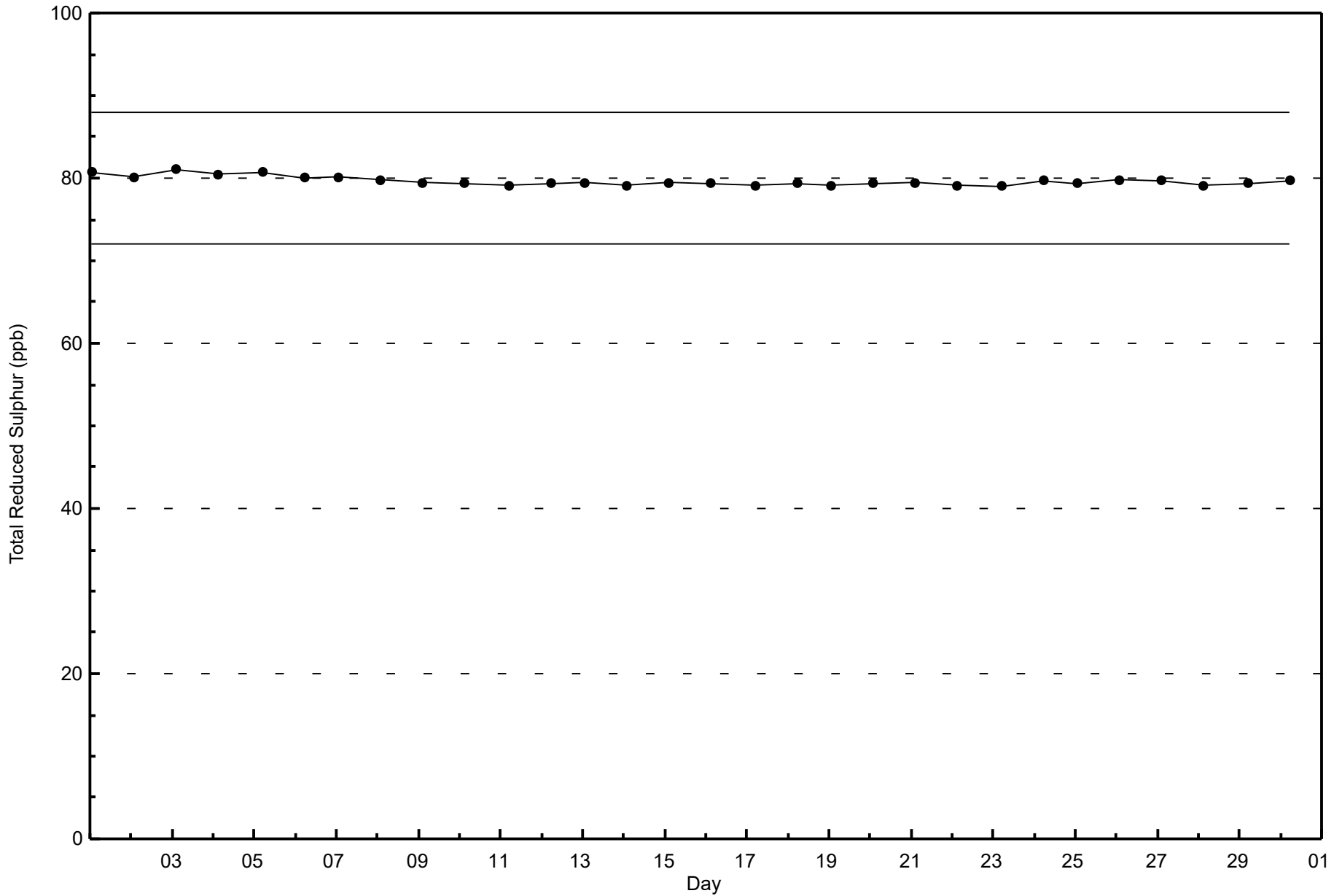
Classes (ppb)



Total Number of Valid Hours: 685





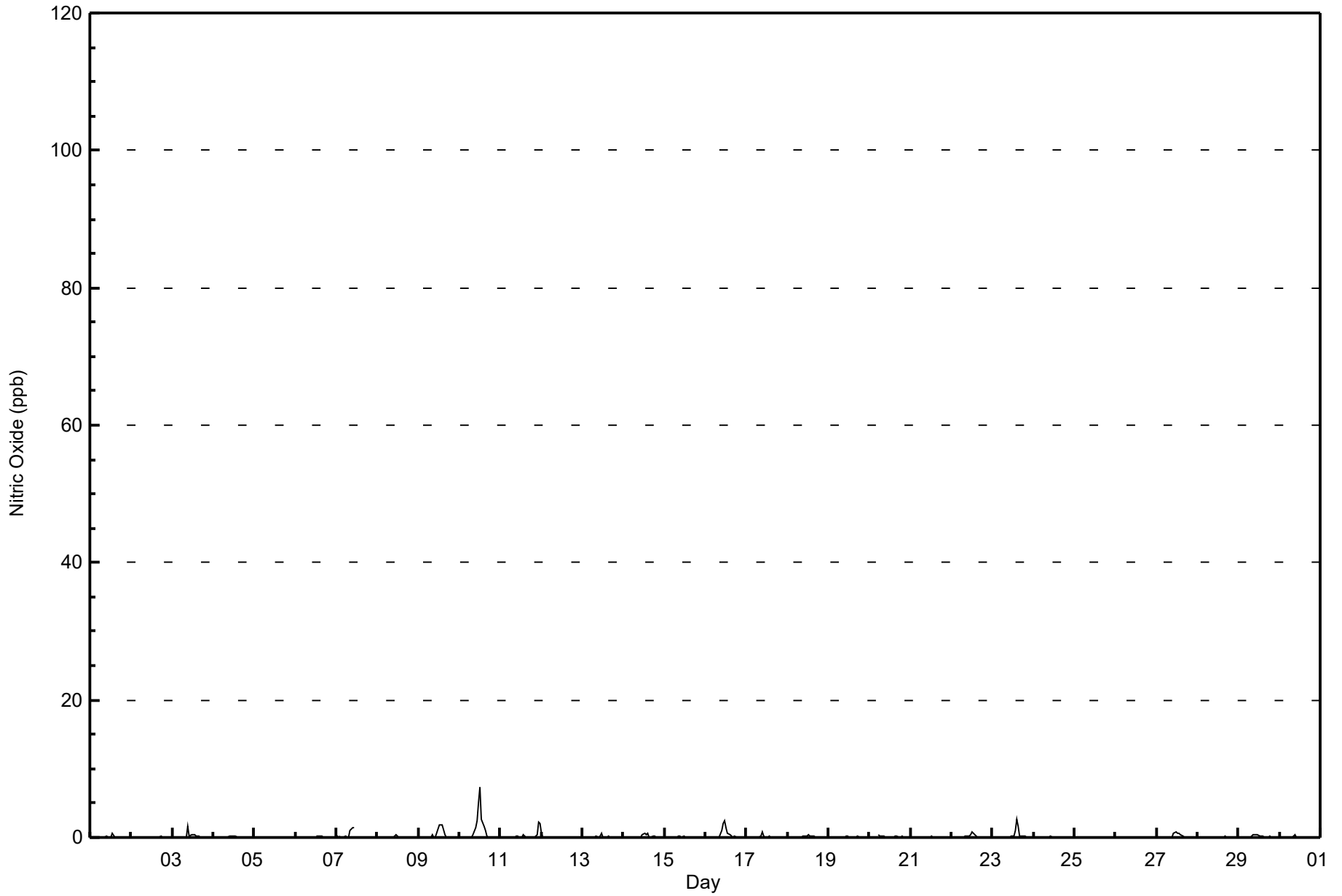






**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Nitric Oxide (NO) - ppb**  
**Fort Chipewyan - November 2023**





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

**Nitric Oxide (NO) - ppb**  
**Fort Chipewyan - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	683	100.00	100.00
21 - 40	0	0.00	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 683

Total Number of Hours: 720



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

**Nitric Oxide (NO) - ppb**  
**Fort Chipewyan - November 2023**

<b>Concentration</b> <b>Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	20	4	10	68	100	28	30	33	40	23	10	24	115	88	50	40	683
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	20	4	10	68	100	28	30	33	40	23	10	24	115	88	50	40	683

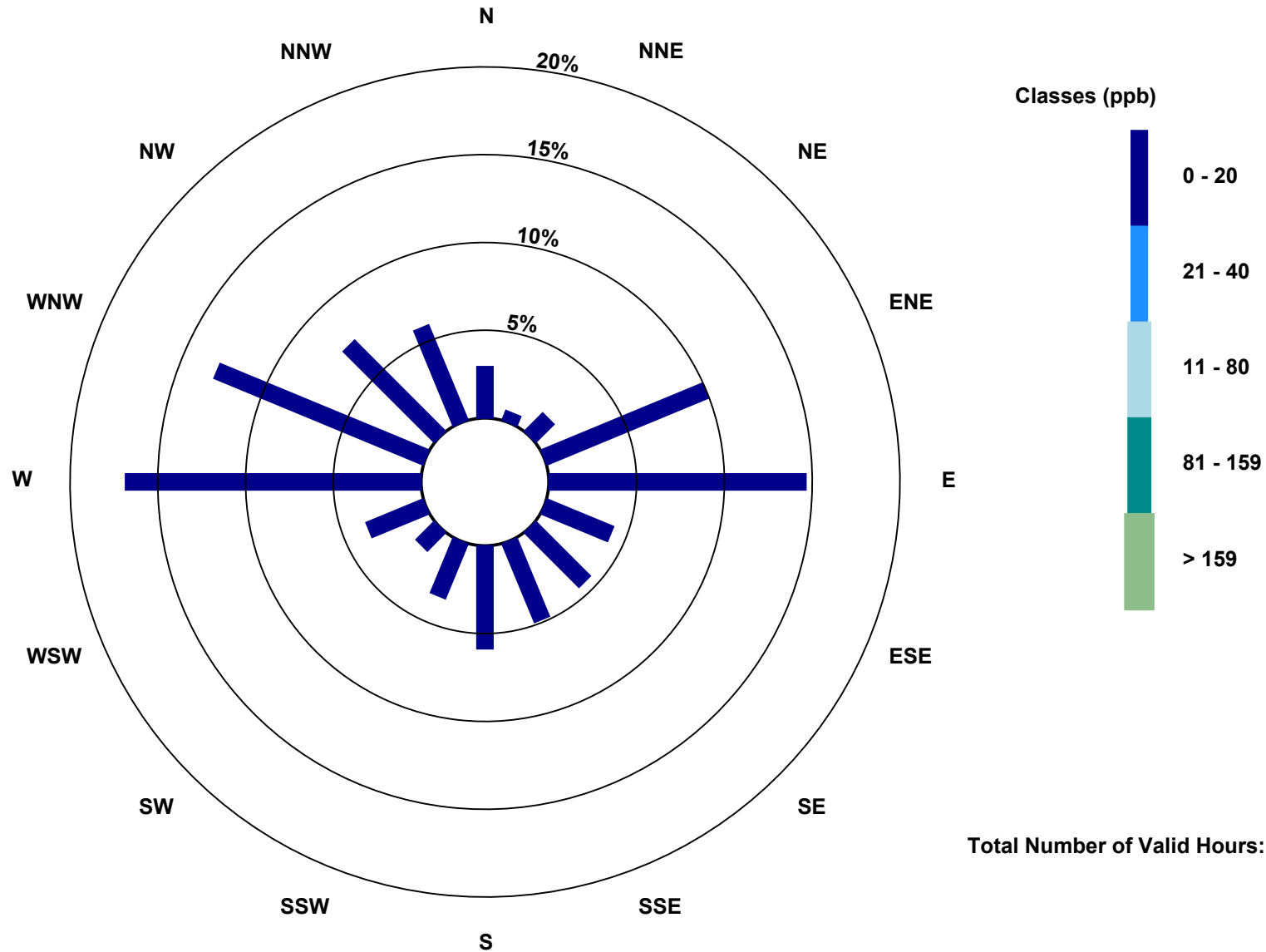
Total Number of Valid Hours: 683

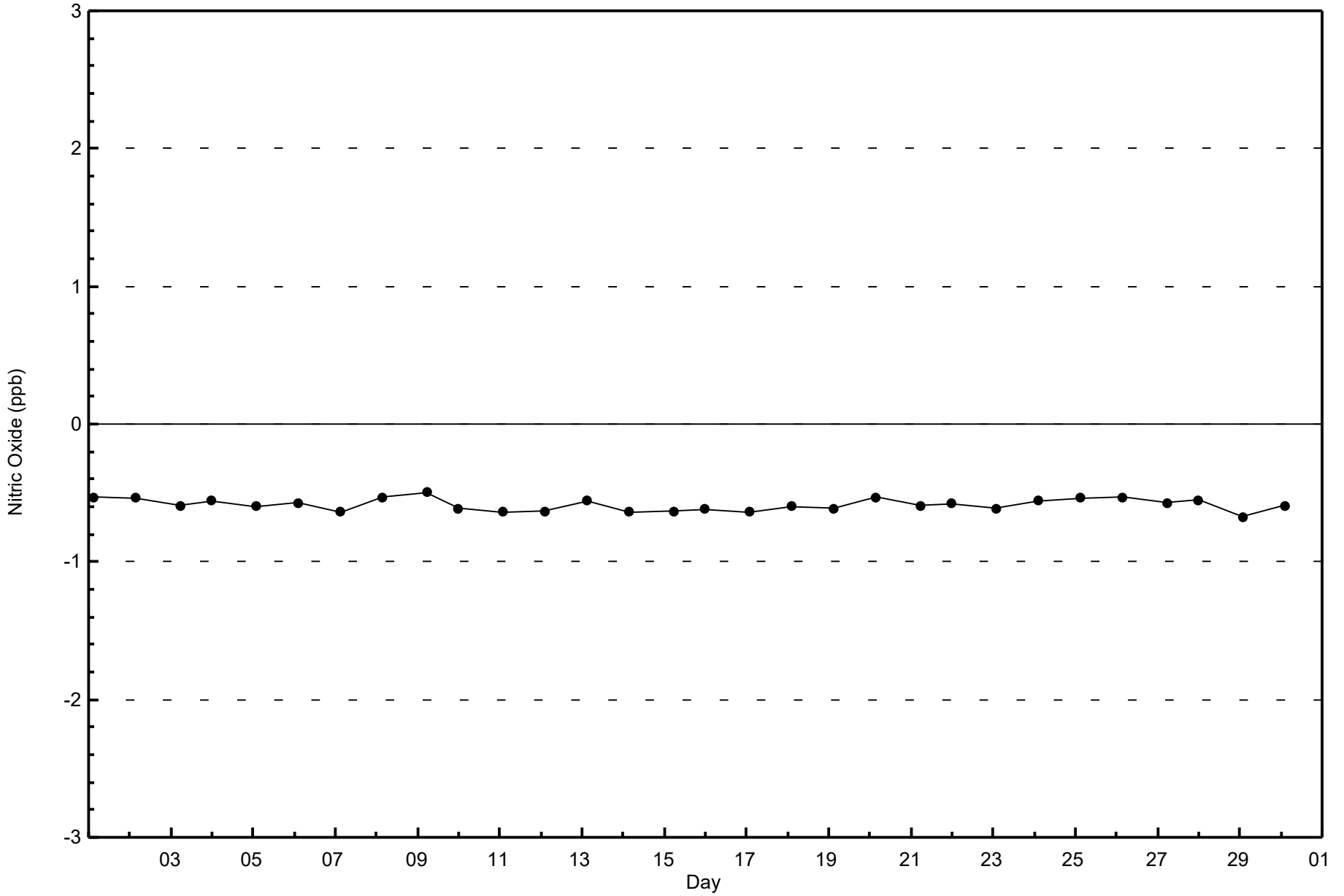
Total Number of Hours: 720



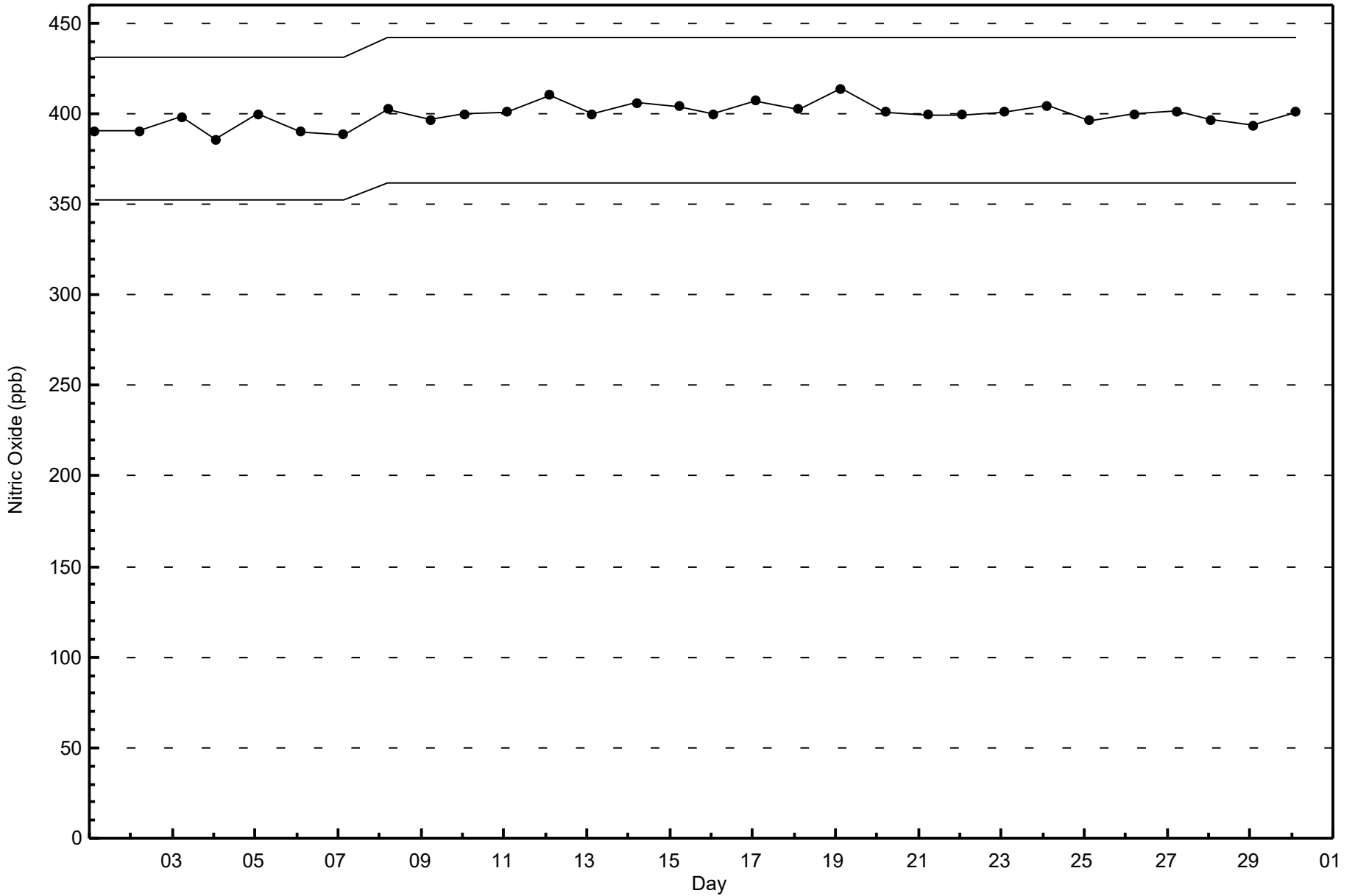
Wood Buffalo Environmental Association  
Wind Rose Nov 2023

Nitric Oxide (NO) - ppb  
Fort Chipewyan











Wood Buffalo Environmental Association

Summary of Hour Averages

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

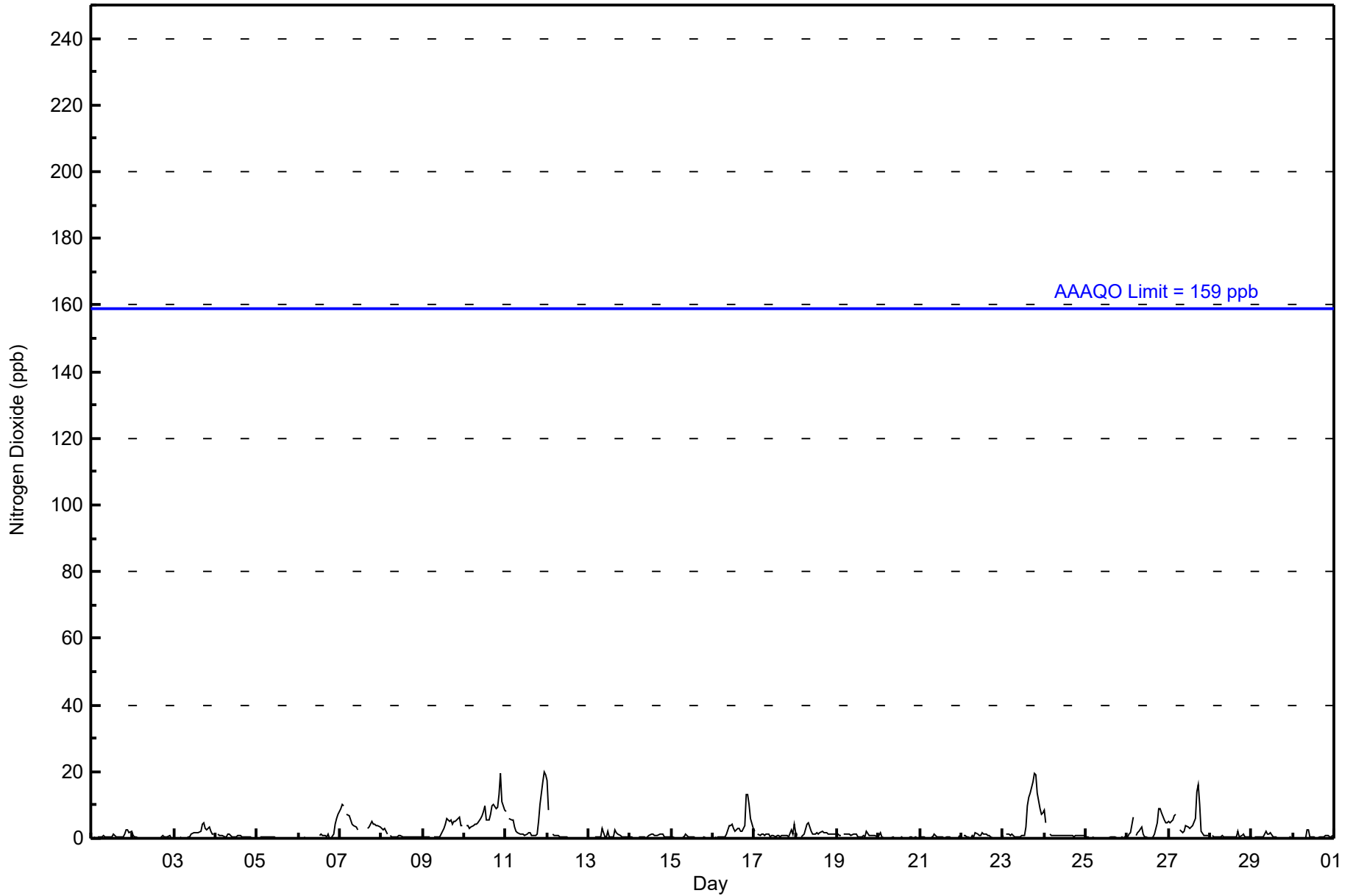
Fort Chipewyan - November 2023

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 20.0 ppb on Nov 11 23:00	Maximum Daily Average: 7.4 ppb on Nov 10		Hours of Data:	683
Minimum Value: 0.1 ppb on Nov 20 17:00	Minimum Daily Average: 0.2 ppb on Nov 5		Hours of Missing Data:	37
Maximum Diurnal Average: 3.0 ppb at hour 22	Minimum Diurnal Average: 1.0 ppb at hour 8		Hours of Calibration:	35
Monthly Average: 1.80 ppb	Percentiles: P <sub>1</sub> = 0.1 P <sub>10</sub> = 0.2 Q <sub>1</sub> = 0.3 Median = 0.6 Q <sub>3</sub> = 1.5 P <sub>90</sub> = 4.9 P <sub>99</sub> = 17.1		Percent Operational Time:	99.7

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Nov	0.2	0.2	0.3	Z	0.4	0.4	0.4	0.8	0.4	0.4	0.5	0.5	0.3	1.4	0.3	0.3	0.5	0.5	0.4	1.3	2.6	2.4	1.5	2.1	0.8	2.6	
2-Nov	0.9	0.4	0.3	0.2	Z	0.2	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.2	0.1	0.1	0.2	0.8	0.3	0.3	0.6	0.7	0.2	0.1	0.3	0.9	
3-Nov	0.1	0.2	0.2	0.2	0.4	Z	0.2	0.2	0.5	0.5	1.2	1.6	1.7	1.6	1.8	2.1	4.3	4.6	3.0	2.4	3.5	2.3	1.4	1.2	1.5	4.6	
4-Nov	Z	1.2	1.0	0.9	0.8	0.6	0.5	1.2	1.1	0.6	0.6	0.5	0.6	0.7	0.4	0.4	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.6	1.2	
5-Nov	0.2	Z	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.2	0.2	0.2	0.4	
6-Nov	0.2	0.1	Z	0.3	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	PF	0.8	1.1	0.9	0.7	0.5	1.1	0.2	0.2	1.3	4.2	5.8	7.0	1.1	7.0
7-Nov	8.7	10.1	9.9	Z	7.0	6.9	5.6	4.4	4.0	3.2	2.5	C	C	C	C	C	2.8	3.5	4.9	4.3	4.4	3.7	3.7	3.6	5.2	10.1	
8-Nov	3.1	2.4	2.9	1.2	Z	0.7	0.6	0.5	0.5	0.6	0.7	0.8	0.5	0.4	0.5	0.3	0.4	0.4	0.4	0.4	0.3	0.3	0.3	0.5	0.8	3.1	
9-Nov	0.3	0.3	0.5	0.4	0.5	Z	0.4	0.3	0.4	0.3	0.3	2.0	2.9	4.3	5.8	5.2	5.3	4.3	4.9	5.1	6.0	6.3	3.9	4.0	2.8	6.3	
10-Nov	Z	3.7	3.7	3.1	3.2	3.7	4.4	4.3	4.8	5.8	6.9	8.2	9.8	5.6	5.3	7.4	9.9	10.3	8.7	9.3	13.1	19.3	11.0	8.5	7.4	19.3	
11-Nov	7.9	Z	6.1	5.5	5.5	3.6	2.2	1.5	1.4	1.3	1.1	1.0	1.2	1.5	1.5	0.9	0.9	0.9	1.2	4.9	10.3	17.1	20.0	19.2	5.1	20.0	
12-Nov	17.3	8.5	Z	1.2	1.0	1.0	0.8	0.6	0.5	0.4	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	1.5	17.3	
13-Nov	0.2	0.2	0.2	Z	0.5	0.6	0.5	0.5	2.9	0.6	0.6	2.0	0.4	0.4	0.4	2.6	1.6	1.1	0.7	0.4	0.3	0.4	0.4	0.6	0.8	2.9	
14-Nov	0.4	0.6	0.2	0.2	Z	0.5	0.3	0.3	0.3	0.2	0.3	1.0	1.4	1.2	0.7	1.0	1.0	1.4	1.1	1.1	0.5	0.5	0.5	0.4	0.7	1.4	
15-Nov	0.4	0.3	0.2	PF	0.1	Z	0.3	0.3	1.3	0.7	0.4	0.6	0.4	0.3	0.2	0.1	0.2	0.2	0.2	0.3	0.2	0.2	0.2	0.2	0.3	1.3	
16-Nov	Z	0.5	0.2	0.3	0.3	0.4	0.3	0.3	1.2	3.9	4.0	4.1	2.9	2.2	3.1	2.8	2.2	2.2	3.8	13.0	13.1	10.0	6.1	3.0	3.5	13.1	
17-Nov	2.2	Z	1.1	0.9	1.1	1.1	0.9	1.1	1.3	0.5	0.7	0.7	0.6	0.8	0.8	0.6	0.9	0.8	0.8	0.8	0.4	2.5	1.2	4.2	1.1	4.2	
18-Nov	1.7	1.0	Z	0.6	1.0	1.2	4.1	4.7	3.4	2.3	1.4	1.4	1.5	1.4	1.6	2.1	1.9	1.9	1.9	1.4	1.4	1.4	1.4	1.2	1.8	4.7	
19-Nov	1.1	0.9	0.9	Z	1.2	1.1	1.3	1.1	1.0	1.1	1.2	1.1	0.5	0.5	0.5	0.7	0.4	2.1	0.8	0.9	0.7	0.7	0.7	0.6	0.9	2.1	
20-Nov	1.0	1.5	0.6	0.1	Z	0.2	0.2	0.2	0.3	0.2	0.1	0.1	0.1	0.4	0.2	0.2	0.1	0.2	0.3	0.6	0.2	0.3	0.2	0.2	0.3	1.5	
21-Nov	0.2	0.3	0.3	0.2	0.2	Z	0.4	0.5	1.3	0.7	0.6	0.3	0.5	0.4	0.2	0.4	0.3	0.5	0.2	0.1	0.2	0.2	0.2	0.9	0.4	1.3	
22-Nov	Z	0.7	0.7	0.4	0.3	0.2	0.7	0.4	1.6	1.2	0.9	0.9	1.5	1.2	1.1	1.0	0.8	0.4	0.2	0.2	0.2	0.2	0.2	0.2	0.7	1.6	
23-Nov	0.7	Z	1.4	1.4	1.0	1.1	0.9	0.6	0.6	0.6	0.6	0.7	0.9	3.6	9.6	12.3	13.4	17.1	19.3	19.2	13.4	9.1	7.0	7.6	6.2	19.3	
24-Nov	8.5	4.8	Z	1.1	1.0	0.9	0.8	0.9	0.9	0.9	0.8	0.8	0.8	0.8	0.7	0.9	0.7	0.6	0.7	0.8	0.7	0.8	1.0	0.8	1.3	8.5	
25-Nov	0.5	0.3	0.2	Z	0.3	0.2	0.2	0.1	0.2	0.1	0.1	0.1	0.1	0.2	0.3	0.4	0.3	0.3	0.2	0.2	0.2	0.4	0.2	0.7	0.3	0.7	
26-Nov	0.6	1.1	1.6	6.5	Z	0.8	1.8	2.3	3.2	1.1	0.3	0.3	0.2	0.1	0.1	0.3	1.1	4.7	8.9	8.7	7.5	5.7	4.7	4.8	2.9	8.9	
27-Nov	5.2	4.6	5.4	6.6	7.0	Z	2.5	2.2	1.6	2.2	3.9	3.4	2.8	3.5	3.9	5.8	13.9	16.0	10.0	2.0	0.9	0.9	0.7	0.7	4.6	16.0	
28-Nov	Z	0.7	0.6	0.6	0.5	0.5	0.5	0.7	0.5	0.5	0.4	0.4	0.4	0.3	0.5	0.6	2.0	0.6	0.8	1.2	0.6	0.5	0.5	0.6	0.6	2.0	
29-Nov	0.3	Z	0.5	0.3	0.3	0.3	0.3	0.4	2.0	1.2	1.2	1.7	0.4	0.6	0.4	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.2	0.5	2.0	
30-Nov	0.3	0.2	Z	0.2	0.2	0.2	0.2	0.2	2.7	2.4	0.4	0.3	0.3	0.2	0.2	0.3	0.5	0.6	0.3	0.9	0.8	0.3	0.6	1.0	0.6	2.7	

2.5	1.8	1.6	1.4	1.4	1.1	1.1	1.0	1.3	1.1	1.1	1.3	1.2	1.2	1.4	1.7	2.2	2.6	2.5	2.7	2.8	3.0	2.5	2.5	Diurnal Average	
17.3	10.1	9.9	6.6	7.0	6.9	5.6	4.7	4.8	5.8	6.9	8.2	9.8	5.6	9.6	12.3	13.9	17.1	19.3	19.2	13.4	19.3	20.0	19.2	Diurnal Maximum	

Z - zerspan      C - Calibration      PF - Power Failure  
 Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 159 ppb





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Fort Chipewyan - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	683	100.00	100.00
21 - 40	0	0.00	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 683

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Fort Chipewyan - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 20	20	4	10	68	100	28	30	33	40	23	10	24	115	88	50	40	683
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	20	4	10	68	100	28	30	33	40	23	10	24	115	88	50	40	683

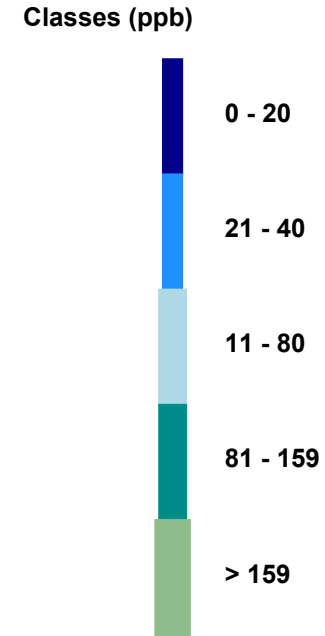
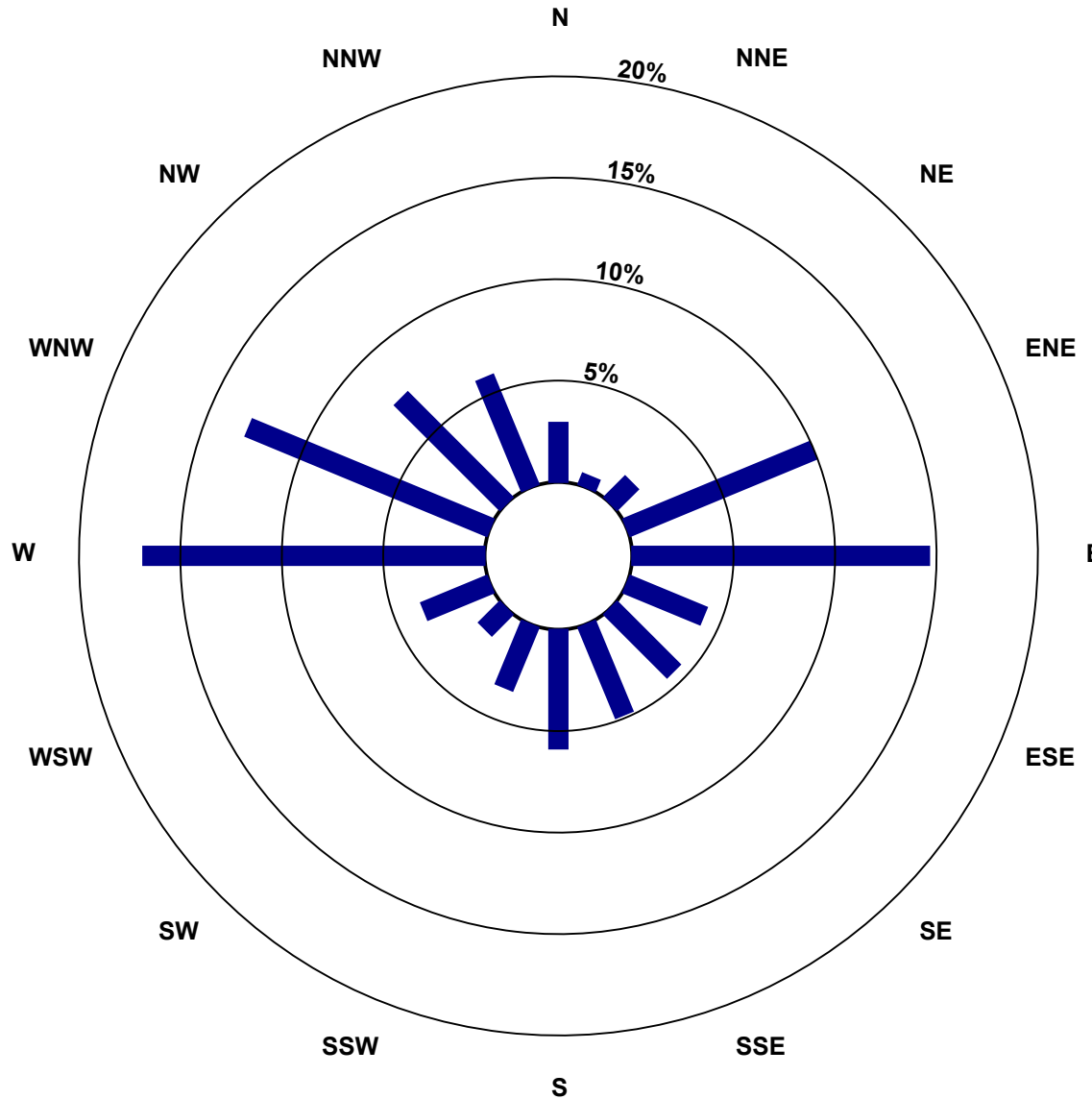
Total Number of Valid Hours: 683

Total Number of Hours: 720

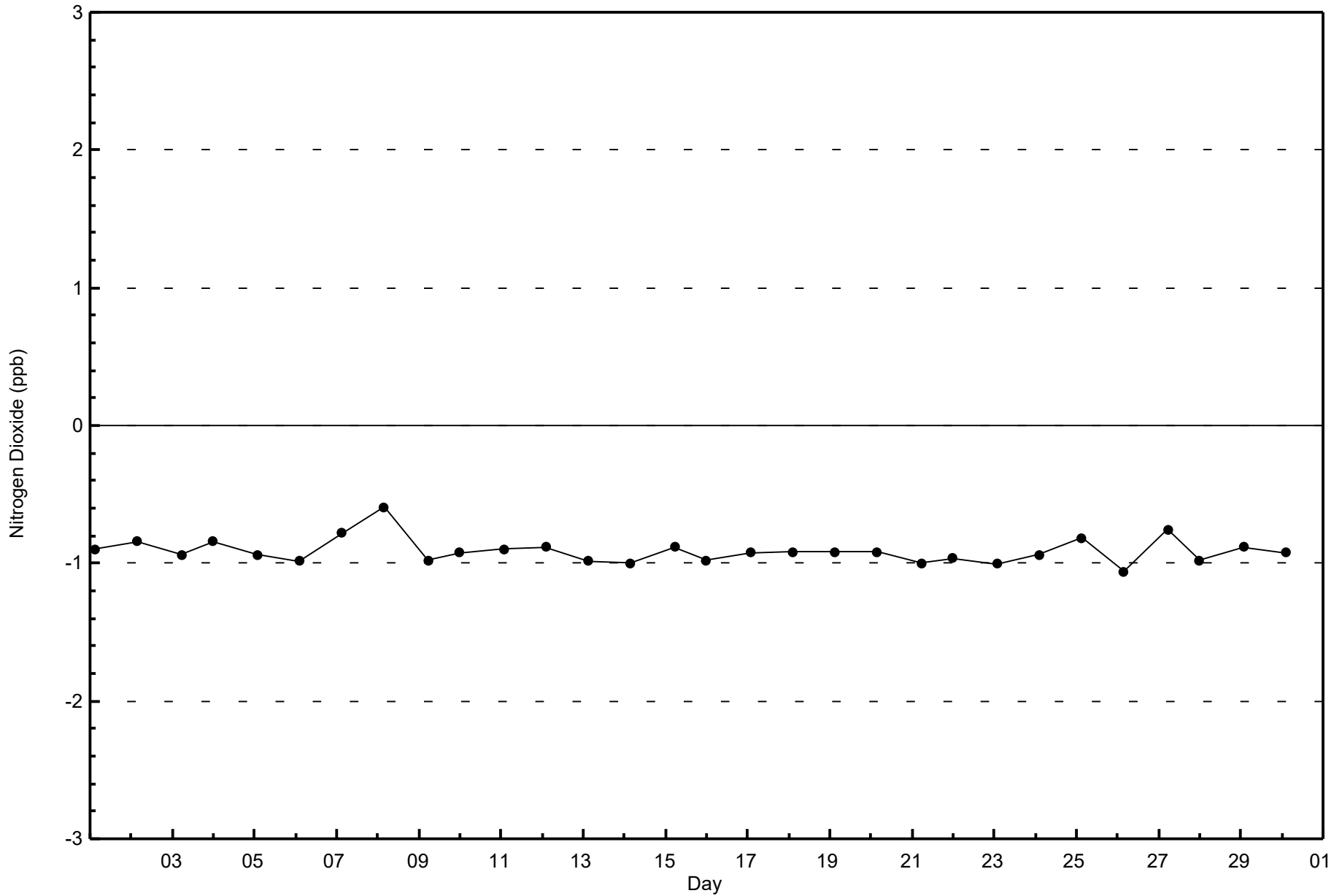


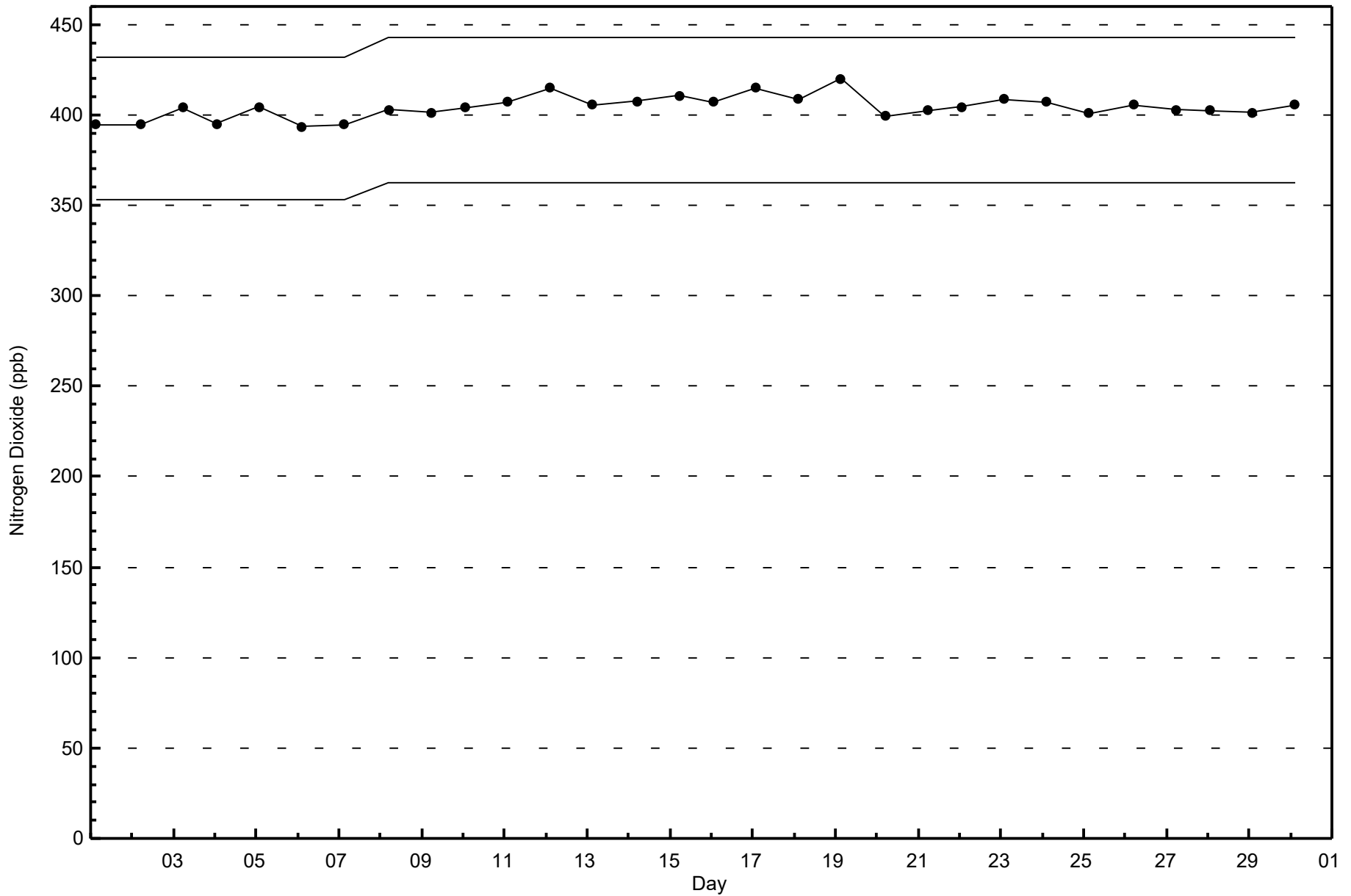
Wood Buffalo Environmental Association  
Wind Rose Nov 2023

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



Total Number of Valid Hours: 683









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

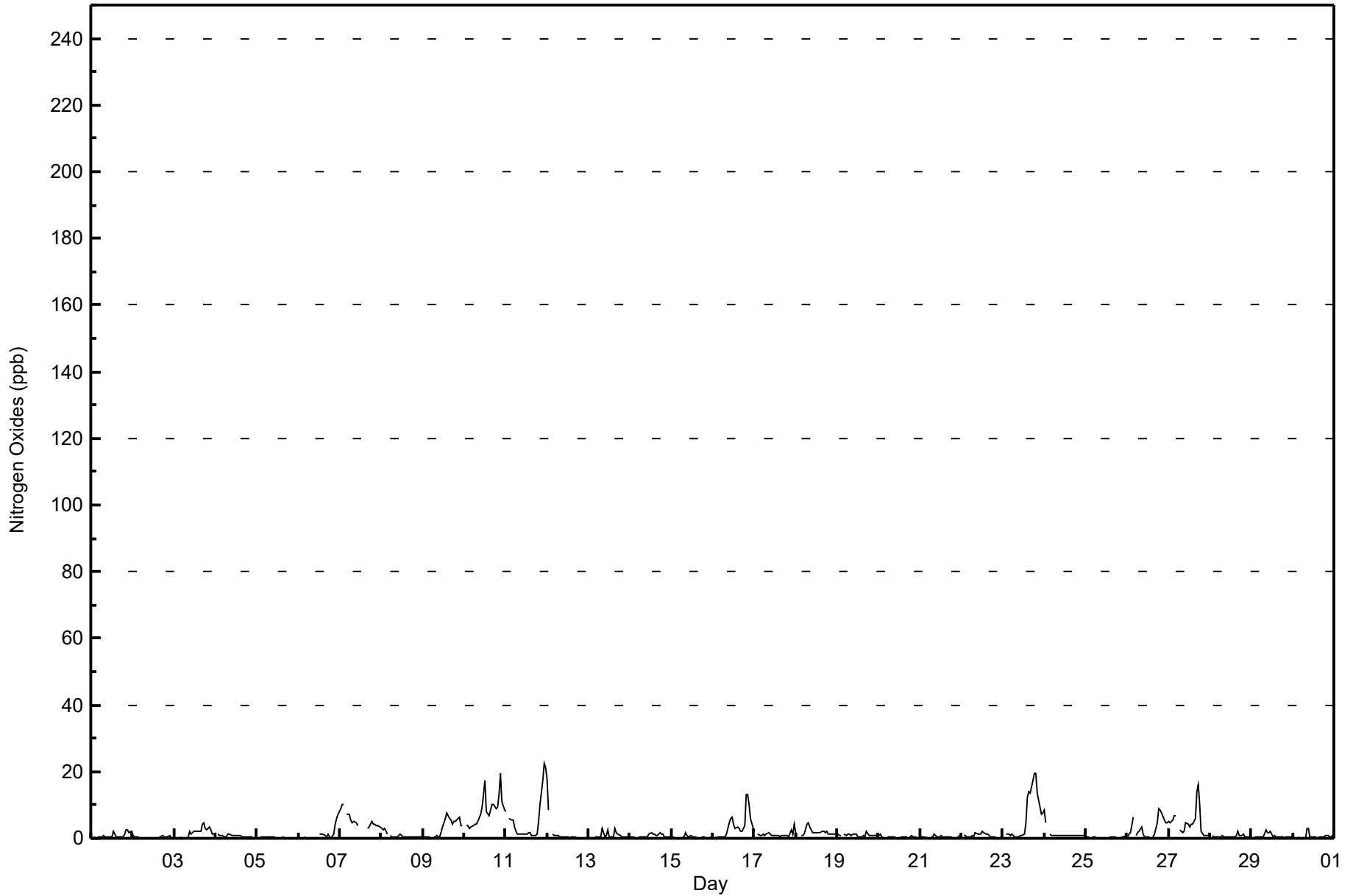
**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Fort Chipewyan - November 2023**

Maximum Value: 22.3 ppb on Nov 11 23:00      Maximum Daily Average: 8.4 ppb on Nov 10																				Hours in Service: 720 Hours of Data: 683																												
Minimum Value: 0.1 ppb on Nov 2 12:00      Minimum Daily Average: 0.2 ppb on Nov 5 Maximum Diurnal Average: 3.1 ppb at hour 22      Minimum Diurnal Average: 1.0 ppb at hour 8 Monthly Average: 1.93 ppb      Percentiles: P <sub>1</sub> = 0.1 P <sub>10</sub> = 0.2 Q <sub>1</sub> = 0.3 Median = 0.7 Q <sub>3</sub> = 1.8 P <sub>90</sub> = 5.2 P <sub>99</sub> = 17.3																				Hours of Missing Data: 37 Hours of Calibration: 35 Percent Operational Time: 99.7																												
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Nov	0.2	0.2	0.3	Z	0.4	0.4	0.4	0.8	0.4	0.5	0.5	0.5	0.3	2.0	0.3	0.3	0.5	0.5	0.4	1.3	2.6	2.4	1.5	2.1	0.8	2.6																						
2-Nov	0.9	0.4	0.3	0.2	Z	0.2	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.2	0.1	0.1	0.2	0.9	0.3	0.3	0.6	0.7	0.2	0.1	0.3	0.9																						
3-Nov	0.1	0.2	0.2	0.2	0.4	Z	0.2	0.2	0.5	2.2	1.3	2.0	2.2	2.0	2.1	2.3	4.4	4.6	3.0	2.4	3.5	2.3	1.4	1.2	1.7	4.6																						
4-Nov	Z	1.2	1.0	0.9	0.8	0.6	0.5	1.2	1.2	0.7	0.8	0.7	0.7	0.9	0.7	0.4	0.4	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.6	1.2																						
5-Nov	0.2	Z	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.2	0.2	0.2	0.4																						
6-Nov	0.2	0.1	Z	0.3	0.2	0.1	0.1	0.1	0.1	0.1	0.1	PF	1.1	1.3	1.1	0.9	0.6	1.1	0.2	0.2	1.3	4.2	5.8	7.0	1.2	7.0																						
7-Nov	8.8	10.2	10.0	Z	7.1	7.0	5.6	4.5	5.0	4.6	4.0	C	C	C	C	C	2.9	3.5	4.9	4.3	4.4	3.7	3.7	3.6	5.4	10.2																						
8-Nov	3.1	2.4	2.9	1.2	Z	0.7	0.6	0.5	0.5	0.6	1.0	1.1	0.5	0.4	0.5	0.3	0.4	0.4	0.4	0.4	0.3	0.3	0.3	0.5	0.8	3.1																						
9-Nov	0.3	0.3	0.5	0.4	0.5	Z	0.4	0.3	0.8	0.3	0.3	3.3	4.8	6.0	7.6	5.7	5.4	4.3	4.9	5.1	6.0	6.3	3.9	4.0	3.1	7.6																						
10-Nov	Z	3.7	3.8	3.1	3.2	3.7	4.4	4.3	5.2	7.2	9.4	13.2	17.2	8.2	6.9	8.4	10.0	10.3	8.7	9.3	13.1	19.4	11.0	8.5	8.4	19.4																						
11-Nov	7.9	Z	6.1	5.5	5.5	3.6	2.2	1.5	1.4	1.5	1.3	1.1	1.3	1.8	1.7	0.9	0.9	0.9	1.2	4.9	10.3	17.5	22.3	21.2	5.3	22.3																						
12-Nov	17.8	8.5	Z	1.2	1.0	1.0	0.8	0.6	0.5	0.4	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	1.5	17.8																						
13-Nov	0.2	0.2	0.2	Z	0.5	0.6	0.5	0.5	3.1	0.6	0.7	2.7	0.5	0.4	0.4	2.8	1.6	1.1	0.7	0.4	0.3	0.4	0.4	0.6	0.8	3.1																						
14-Nov	0.4	0.6	0.2	0.2	Z	0.5	0.3	0.3	0.3	0.2	0.3	1.4	1.9	1.5	1.3	1.0	1.0	1.6	1.3	1.2	0.5	0.5	0.5	0.4	0.7	1.9																						
15-Nov	0.4	0.3	0.2	PF	0.2	Z	0.3	0.3	1.5	0.8	0.5	0.7	0.5	0.4	0.2	0.1	0.2	0.2	0.2	0.3	0.2	0.2	0.2	0.2	0.4	1.5																						
16-Nov	Z	0.5	0.2	0.3	0.3	0.4	0.3	0.4	1.3	4.8	6.0	6.5	4.4	2.8	3.5	3.0	2.2	2.3	3.8	13.0	13.1	10.0	6.1	3.0	3.8	13.1																						
17-Nov	2.2	Z	1.1	0.9	1.1	1.1	0.9	1.1	1.5	1.3	0.8	0.7	0.7	1.0	0.9	0.6	0.9	0.8	0.8	0.8	0.4	2.5	1.2	4.3	1.2	4.3																						
18-Nov	1.7	1.0	Z	0.6	1.0	1.2	4.1	4.7	3.5	2.6	1.6	1.6	1.8	1.6	1.8	2.2	1.9	1.9	1.9	1.4	1.4	1.4	1.4	1.2	1.9	4.7																						
19-Nov	1.1	0.9	0.9	Z	1.2	1.1	1.3	1.1	1.0	1.2	1.4	1.3	0.6	0.5	0.5	0.7	0.4	2.2	0.8	0.9	0.7	0.7	0.7	0.6	1.0	2.2																						
20-Nov	1.0	1.5	0.6	0.1	Z	0.6	0.5	0.4	0.4	0.2	0.1	0.1	0.1	0.5	0.3	0.4	0.3	0.2	0.3	0.7	0.2	0.3	0.2	0.2	0.4	1.5																						
21-Nov	0.2	0.3	0.3	0.2	0.2	Z	0.4	0.5	1.3	0.7	0.6	0.3	0.7	0.4	0.2	0.4	0.3	0.5	0.2	0.1	0.2	0.2	0.2	0.9	0.4	1.3																						
22-Nov	Z	0.7	0.7	0.4	0.3	0.2	0.7	0.4	1.7	1.4	1.2	1.3	2.3	1.8	1.4	1.1	0.8	0.4	0.2	0.2	0.2	0.2	0.2	0.2	0.8	2.3																						
23-Nov	0.7	Z	1.4	1.4	1.0	1.1	0.9	0.6	0.6	0.6	0.7	0.8	1.1	4.7	12.3	13.9	13.5	17.2	19.5	19.4	13.4	9.1	7.0	7.6	6.5	19.5																						
24-Nov	8.5	4.8	Z	1.1	1.0	0.9	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.8	0.7	1.0	0.7	0.6	0.7	0.8	0.7	0.8	1.0	0.8	1.3	8.5																						
25-Nov	0.5	0.3	0.2	Z	0.3	0.2	0.2	0.1	0.2	0.1	0.1	0.1	0.1	0.2	0.3	0.4	0.3	0.3	0.2	0.2	0.2	0.4	0.2	0.7	0.3	0.7																						
26-Nov	0.6	1.1	1.6	6.5	Z	0.8	1.8	2.3	3.2	1.2	0.3	0.3	0.3	0.1	0.1	0.3	1.1	4.7	8.9	8.7	7.5	5.7	4.7	4.8	2.9	8.9																						
27-Nov	5.2	4.6	5.4	6.6	7.0	Z	2.5	2.2	1.6	2.3	4.6	4.2	3.4	4.1	4.4	6.0	13.9	16.1	10.0	2.0	0.9	0.9	0.7	0.7	4.8	16.1																						
28-Nov	Z	0.7	0.6	0.6	0.5	0.5	0.7	0.5	0.5	0.4	0.4	0.4	0.4	0.6	0.7	2.2	0.7	0.8	1.2	0.6	0.5	0.5	0.6	0.7	0.7	2.2																						
29-Nov	0.4	Z	0.6	0.4	0.3	0.4	0.4	0.5	2.4	1.6	1.6	2.2	0.5	0.7	0.5	0.3	0.3	0.3	0.3	0.2	0.3	0.2	0.3	0.2	0.6	2.4																						
30-Nov	0.3	0.2	Z	0.2	0.2	0.2	0.2	0.2	2.9	2.8	0.4	0.3	0.4	0.2	0.2	0.3	0.5	0.6	0.3	0.9	0.8	0.3	0.6	1.0	0.6	2.9																						
																								2.5	1.8	1.6	1.4	1.4	1.1	1.1	1.0	1.5	1.4	1.4	1.7	1.7	1.6	1.8	1.9	2.3	2.6	2.5	2.7	2.8	3.1	2.6	2.6	Diurnal Average
																								17.8	10.2	10.0	6.6	7.1	7.0	5.6	4.7	5.2	7.2	9.4	13.2	17.2	8.2	12.3	13.9	13.9	17.2	19.5	19.4	13.4	19.4	22.3	21.2	Diurnal Maximum
Z - zerospan      C - Calibration      PF - Power Failure																																																



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

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Fort Chipewyan - November 2023**





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

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Fort Chipewyan - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	681	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: 683

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Fort Chipewyan - November 2023**

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	4	10	68	100	28	30	33	40	22	9	24	115	88	50	40	681
21 - 40	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	2
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	20	4	10	68	100	28	30	33	40	23	10	24	115	88	50	40	683

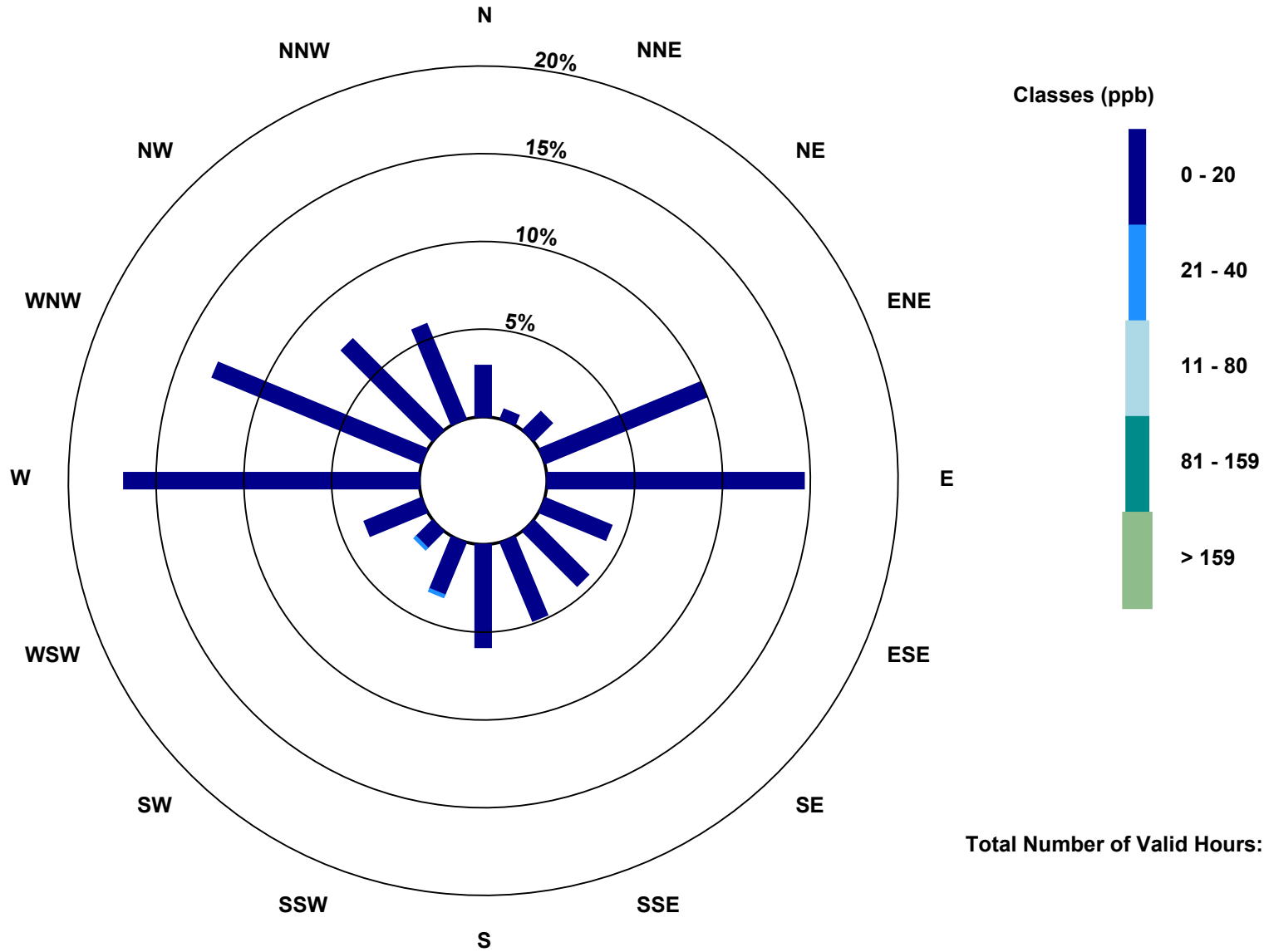
Total Number of Valid Hours: 683

Total Number of Hours: 720

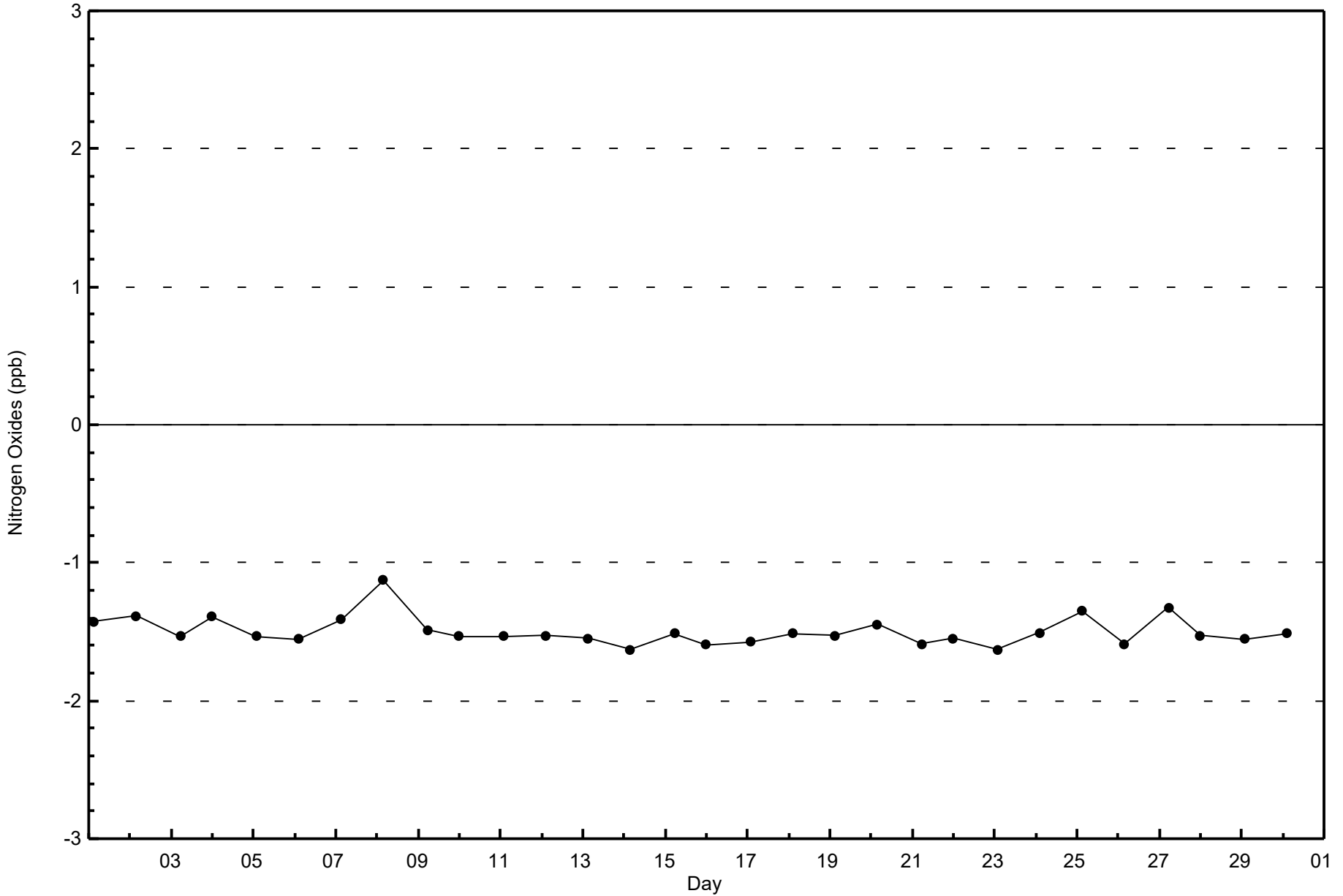


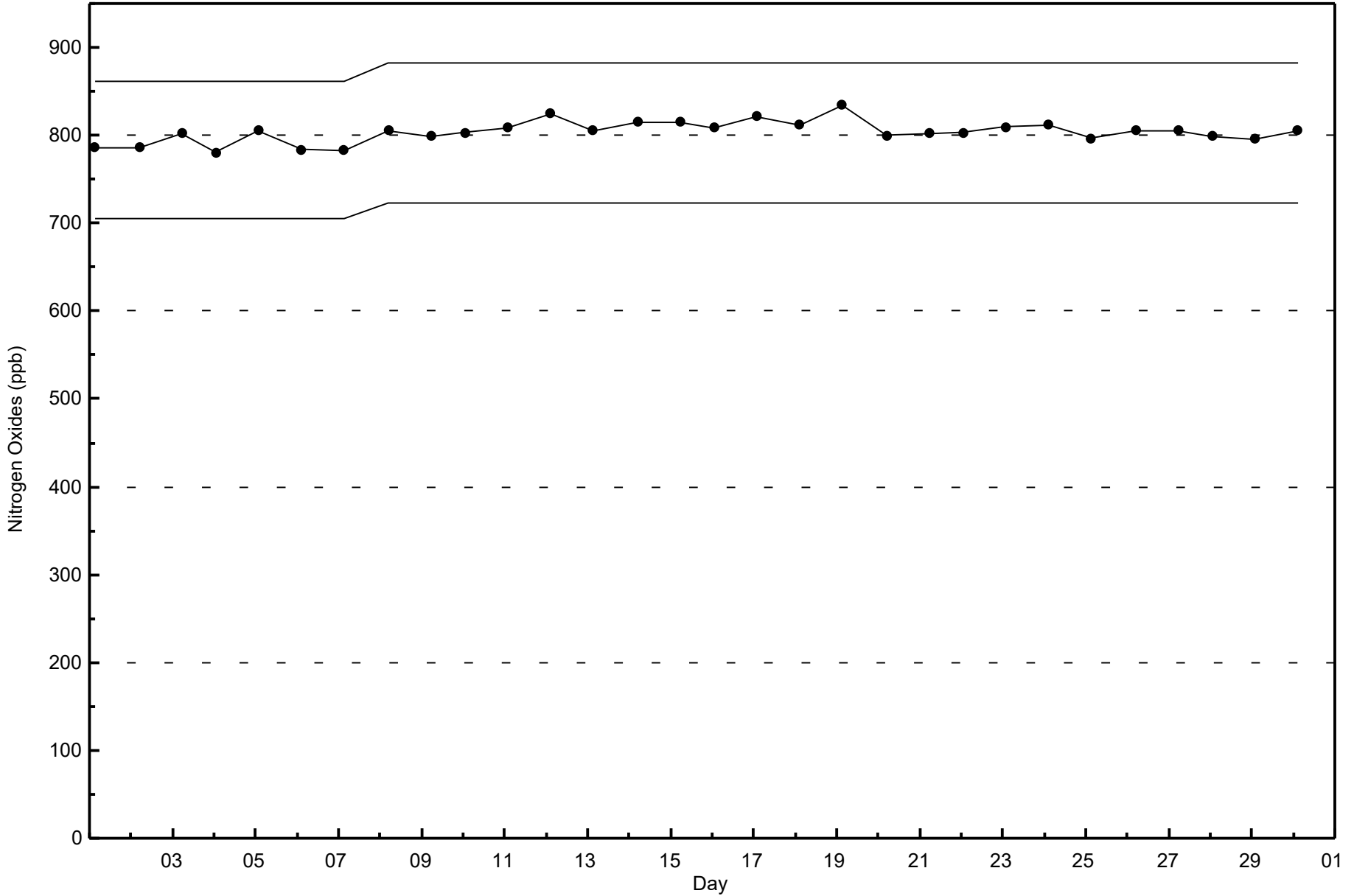
Wood Buffalo Environmental Association  
Wind Rose Nov 2023

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



Total Number of Valid Hours: 683

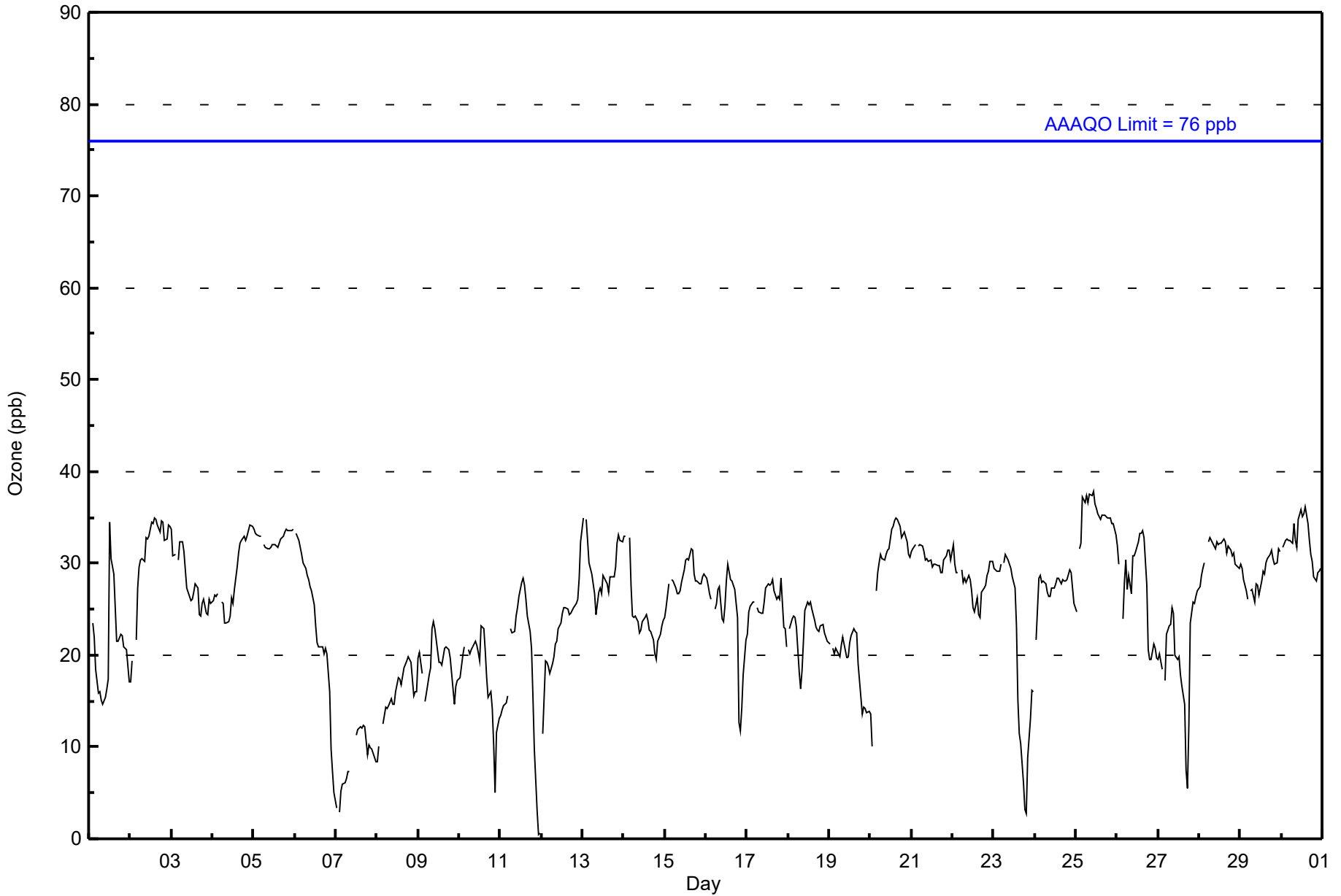






Number of Exceedences (AAAQO):		1-hr: 0		24-hr: 0		Hours in Service:															720																												
Maximum Value: 37.8 ppb on Nov 25 11:00				Maximum Daily Average: 34.9 ppb on Nov 25		Hours of Data:															687																												
Minimum Value: 0.5 ppb on Nov 11 23:00				Minimum Daily Average: 8.7 ppb on Nov 7		Hours of Missing Data:															33																												
Maximum Diurnal Average: 27.0 ppb at hour 14				Minimum Diurnal Average: 23.0 ppb at hour 22		Hours of Calibration:															32																												
Monthly Average: 25.15 ppb				Percentiles: P <sub>1</sub> = 4.7 P <sub>10</sub> = 14.9 Q <sub>1</sub> = 20.9 Median = 26.7 Q <sub>3</sub> = 30.5 P <sub>90</sub> = 33.0 P <sub>99</sub> = 36.5		Percent Operational Time:															99.9																												
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Nov	23.3	Z	23.5	21.9	18.5	15.9	16.0	15.1	14.6	15.3	16.3	17.5	34.5	30.5	28.9	25.2	21.4	21.5	22.3	22.1	20.9	20.8	20.5	17.0	21.0	34.5																							
2-Nov	17.1	19.3	Z	21.6	27.2	29.7	30.4	30.6	30.2	32.8	32.6	33.0	34.4	34.4	35.0	34.8	34.1	33.4	34.6	34.5	32.4	32.6	34.2	34.0	31.0	35.0																							
3-Nov	33.8	30.9	31.0	Z	30.4	32.4	32.4	31.2	29.2	27.3	26.8	25.9	26.1	26.8	27.7	27.3	24.5	24.2	25.6	26.0	24.6	24.5	26.0	25.6	27.8	33.8																							
4-Nov	25.9	26.5	26.3	26.7	Z	25.7	25.6	23.5	23.7	24.2	26.2	25.6	27.2	29.7	31.1	32.1	32.5	32.9	32.5	33.0	33.6	33.6	34.2	34.0	28.5	34.2																							
5-Nov	33.6	33.2	33.0	32.9	32.9	Z	32.0	31.7	31.5	31.6	31.7	32.1	32.0	31.9	31.7	32.3	32.7	33.0	33.4	33.8	33.6	33.5	33.6	33.7	32.7	33.8																							
6-Nov	DF	33.2	32.6	31.8	30.9	30.0	29.4	28.7	28.2	27.4	27.0	25.5	23.2	21.4	20.9	20.9	21.0	20.1	20.8	20.1	16.0	9.7	7.4	5.0	23.1	33.2																							
7-Nov	3.3	Z	2.9	5.2	6.0	6.1	6.6	7.3	7.4	C	C	C	11.3	11.9	12.1	12.1	12.4	12.2	9.1	10.2	9.9	9.7	9.3	8.3	8.7	12.4																							
8-Nov	8.4	10.1	Z	12.5	13.5	14.4	14.1	14.5	15.2	14.6	14.7	16.1	17.5	17.5	16.7	17.7	18.7	19.3	19.9	19.5	19.2	15.6	16.1	16.0	15.7	19.9																							
9-Nov	19.7	20.3	18.0	Z	15.0	15.8	17.9	18.6	22.8	23.6	22.9	20.4	19.2	19.1	19.0	20.7	20.9	20.8	20.5	19.7	16.3	14.7	16.6	17.2	19.1	23.6																							
10-Nov	17.5	18.8	20.0	20.9	Z	20.6	20.2	20.7	20.9	21.6	21.1	20.4	19.4	23.2	22.9	20.4	17.6	15.5	16.0	14.2	10.2	5.0	11.6	13.1	17.9	23.2																							
11-Nov	13.4	14.1	14.5	14.8	15.5	Z	22.8	22.4	22.5	24.2	25.1	26.3	27.9	28.3	27.6	26.1	24.2	22.5	20.7	15.6	9.7	3.1	0.5	0.6	18.4	28.3																							
12-Nov	Z	11.5	19.4	19.3	18.7	18.1	19.0	19.8	21.2	21.5	22.9	23.5	24.6	25.2	25.1	24.4	24.6	24.9	25.1	25.6	26.0	28.4	32.4	22.9	32.4																								
13-Nov	35.0	Z	34.8	32.4	30.1	28.9	27.8	26.7	24.4	26.9	27.4	26.6	28.7	28.4	27.7	26.9	28.6	28.5	29.6	32.1	33.1	32.6	32.4	29.5	35.0																								
14-Nov	33.0	33.0	Z	32.8	27.7	24.2	24.1	24.3	23.6	22.4	22.7	23.6	24.0	24.4	23.8	22.7	22.5	21.6	20.1	19.6	21.6	22.2	23.2	23.9	24.4	33.0																							
15-Nov	24.1	25.2	27.8	Z	28.2	28.1	27.4	26.6	26.7	27.0	27.9	29.3	30.4	30.6	30.3	31.6	31.4	28.9	28.1	28.0	27.8	27.8	28.5	28.9	28.3	31.6																							
16-Nov	28.3	27.6	26.7	26.2	Z	25.0	25.6	27.1	27.5	23.9	23.6	25.4	28.1	29.9	28.2	28.0	27.7	27.1	24.1	12.7	11.8	14.2	17.9	21.7	24.3	29.9																							
17-Nov	22.2	24.7	25.4	25.7	25.8	Z	25.1	24.8	24.6	24.6	25.8	27.3	27.7	27.5	27.7	28.3	27.0	26.1	26.4	26.1	28.4	23.0	22.9	20.8	25.6	28.4																							
18-Nov	Z	22.8	24.0	24.3	24.1	23.0	18.2	16.3	18.3	21.5	24.9	25.7	25.5	25.9	25.0	23.8	23.1	22.7	22.5	23.1	23.3	22.4	21.9	21.5	22.8	25.9																							
19-Nov	21.2	Z	20.7	20.1	20.7	20.1	19.9	21.1	22.0	20.5	19.7	19.9	21.3	22.1	23.0	22.5	22.4	19.1	15.4	13.5	14.4	14.3	13.7	13.9	19.2	23.0																							
20-Nov	13.5	10.1	Z	27.0	29.0	30.0	31.0	30.5	30.4	30.9	31.4	31.6	33.7	34.0	34.6	34.9	34.8	34.1	32.7	33.2	33.4	32.3	31.0	30.6	30.2	34.9																							
21-Nov	31.3	31.6	32.1	Z	31.9	32.0	31.9	31.3	30.4	30.6	30.3	30.3	29.6	30.0	29.9	29.8	29.7	29.0	29.0	30.4	30.9	31.4	31.5	30.4	30.7	32.1																							
22-Nov	32.0	29.9	28.9	29.0	Z	29.3	27.8	28.3	28.0	28.7	28.2	27.1	25.2	24.7	26.2	24.4	24.0	26.8	27.3	27.6	28.6	29.1	30.3	30.1	27.9	32.0																							
23-Nov	29.4	29.2	29.1	29.1	29.8	Z	30.1	30.9	30.3	30.0	29.5	28.5	27.2	23.2	15.1	11.5	10.4	6.1	3.1	2.7	8.9	13.1	16.1	16.0	20.8	30.9																							
24-Nov	Z	21.6	28.3	28.6	27.9	28.1	27.7	26.9	26.4	26.5	27.3	27.4	27.8	28.4	28.4	27.8	28.2	28.1	28.0	28.2	29.4	29.0	27.2	25.7	27.5	29.4																							
25-Nov	24.8	Z	31.5	32.2	37.1	36.6	37.4	36.6	37.5	37.3	37.8	36.4	35.9	35.3	34.8	35.3	35.2	35.3	34.9	35.0	34.9	34.4	34.4	33.1	34.9	37.8																							
26-Nov	31.9	29.9	Z	24.0	27.9	30.4	27.2	28.7	26.7	30.8	30.8	31.3	32.3	33.3	33.3	33.5	32.8	27.5	20.6	19.6	19.6	21.2	20.7	19.7	27.6	33.5																							
27-Nov	19.5	20.2	18.5	Z	17.2	22.2	23.2	23.3	25.2	24.6	19.9	19.6	19.9	17.8	16.6	14.6	7.5	5.5	12.3	23.5	25.7	25.6	26.4	27.0	19.8	27.0																							
28-Nov	27.4	28.7	29.5	30.0	Z	32.3	32.8	32.6	32.2	31.6	32.3	32.1	32.1	32.2	32.6	32.3	31.1	31.9	31.4	30.9	31.1	29.8	29.7	29.4	31.1	32.8																							
29-Nov	29.9	29.5	28.2	27.0	26.2	Z	27.0	27.1	25.7	27.7	27.6	26.5	28.1	29.2	28.8	30.1	30.5	30.9	31.4	30.4	29.9	30.0	31.6	31.3	28.9	31.6																							
30-Nov	Z	31.7	32.5	32.7	32.5	32.5	32.1	34.3	32.5	31.7	34.8	35.8	35.1	35.5	36.1	34.4	32.5	30.9	30.2	28.6	28.0	28.9	29.1	29.4	32.3	36.1																							
																								24.0	24.6	25.6	25.1	25.0	25.2	25.4	25.4	25.3	26.2	26.5	26.6	26.9	27.0	26.6	26.2	25.4	24.7	24.2	23.9	23.7	23.0	23.6	23.4	Diurnal Average	
																								35.0	33.2	34.8	32.9	37.1	36.6	37.4	36.6	37.5	37.3	37.8	36.4	35.9	35.5	36.1	35.3	35.2	35.3	34.9	35.0	34.9	34.4	34.4	34.0	Diurnal Maximum	
Z - zerospan      C - Calibration      DF - DAS Failure																																																	
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 76 ppb																																																	







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

**Ozone (O<sub>3</sub>) - ppb**  
**Fort Chipewyan - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	157	22.85	22.85
21 - 50	530	77.15	100.00
51 - 82	0	0.00	100.00
> 83	0	0.00	100.00

Total Number of Valid Hours: 687

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Ozone (O<sub>3</sub>) - ppb  
Fort Chipewyan - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 20	0	1	4	14	9	2	6	10	31	13	4	13	22	7	10	11	157
21 - 50	21	3	6	55	95	25	23	22	10	8	5	10	98	80	40	29	530
51 - 82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 83	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	21	4	10	69	104	27	29	32	41	21	9	23	120	87	50	40	687

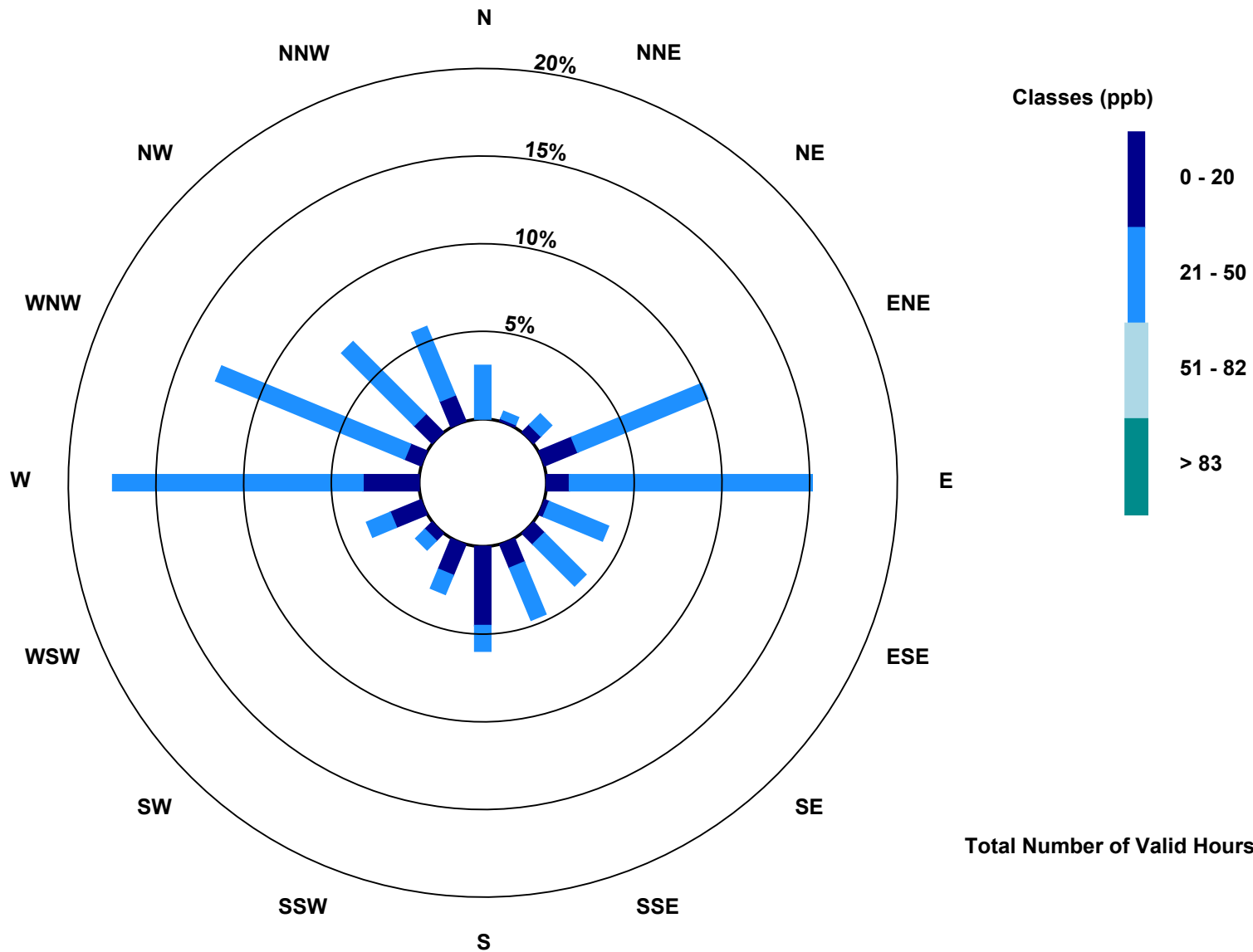
Total Number of Valid Hours: 687

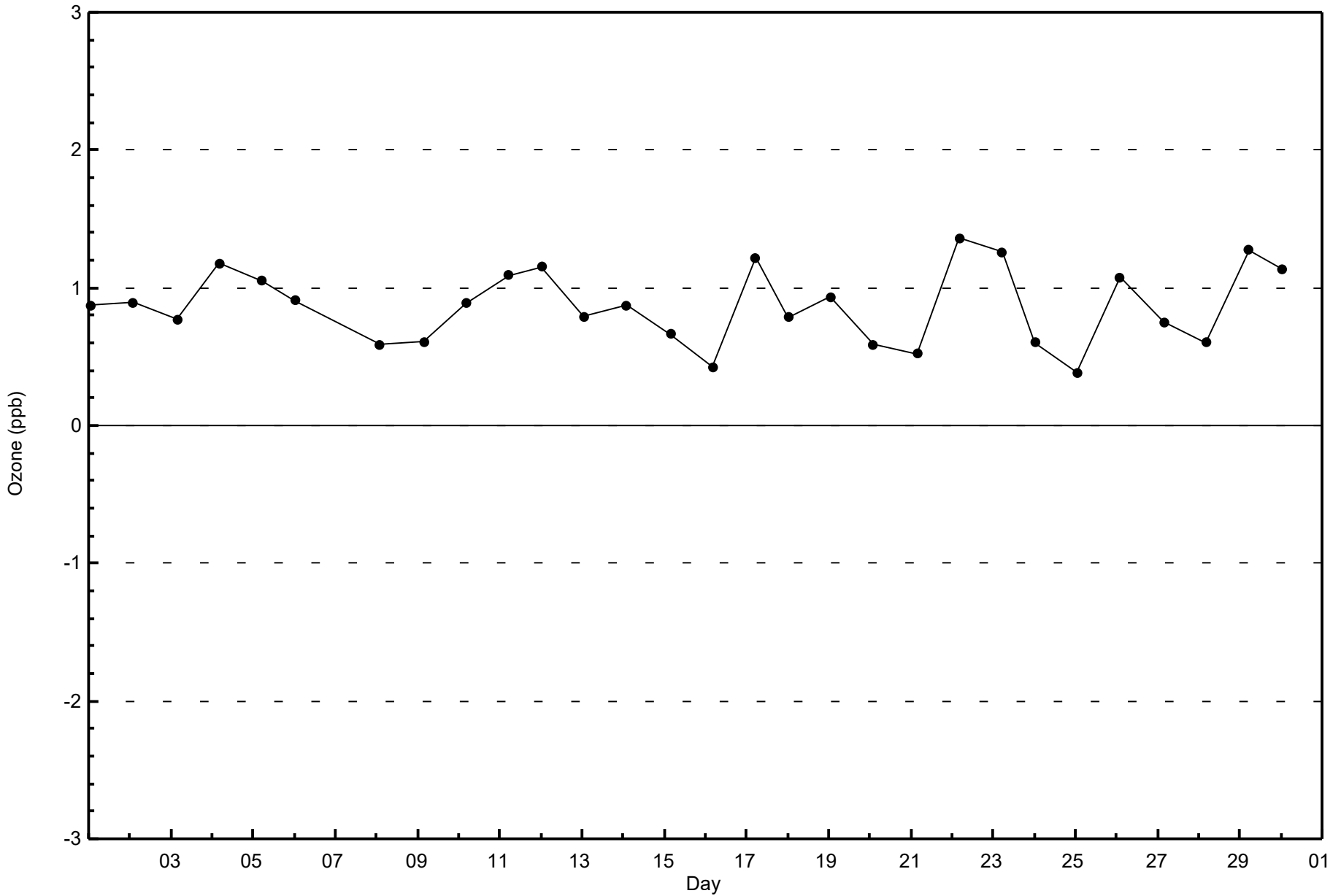
Total Number of Hours: 720

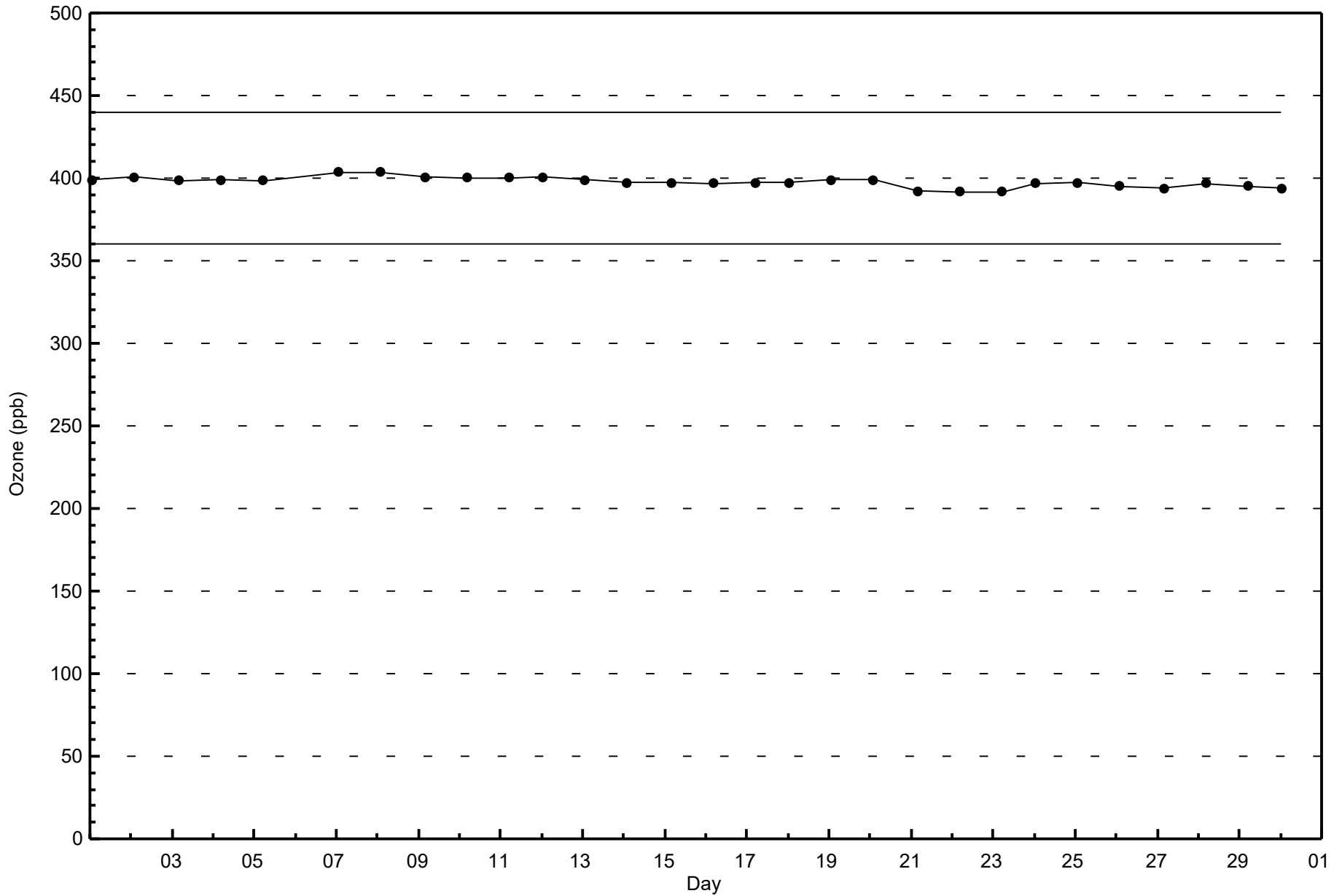


Wood Buffalo Environmental Association  
Wind Rose Nov 2023

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









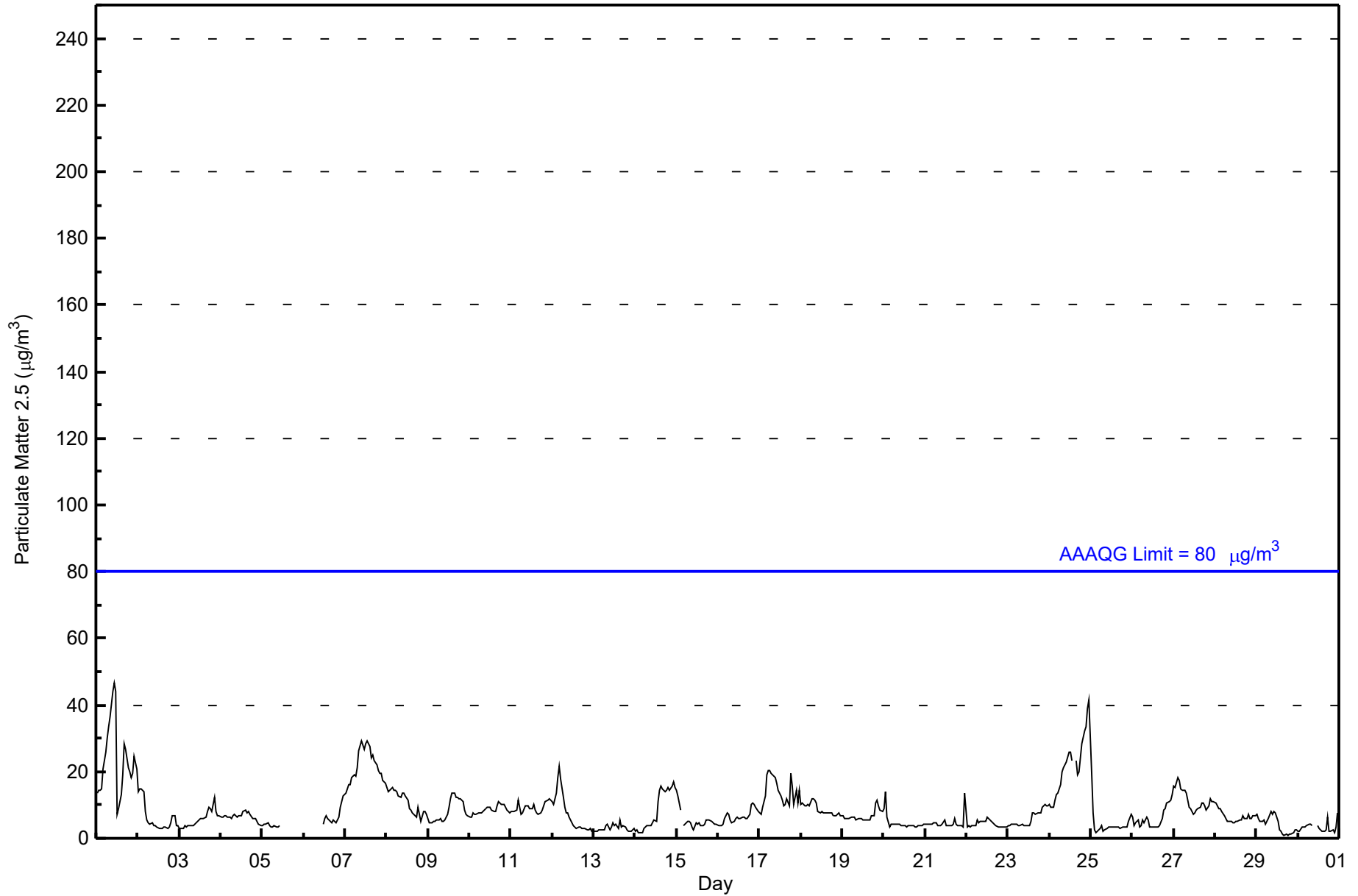
Wood Buffalo Environmental Association

Summary of Hour Averages

Particulate Matter 2.5 (PM<sub>2.5</sub>) - µg/m<sup>3</sup>

Fort Chipewyan - November 2023

Number of Exceedences (AAAQO):		1-hr: 0	24-hr: 0																		Hours in Service:	720				
Maximum Value: 46.4 µg/m <sup>3</sup> on Nov 1 11:00		Maximum Daily Average: 23.6 µg/m <sup>3</sup> on Nov 1																	Hours of Data:	692						
Minimum Value: 0.8 µg/m <sup>3</sup> on Nov 29 19:00		Minimum Daily Average: 3.1 µg/m <sup>3</sup> on Nov 13																	Hours of Missing Data:	28						
Maximum Diurnal Average: 9.6 µg/m <sup>3</sup> at hour 24		Minimum Diurnal Average: 7.2 µg/m <sup>3</sup> at hour 15																	Hours of Calibration:	1						
Monthly Average: 8.38 µg/m <sup>3</sup>		Percentiles: P <sub>1</sub> = 1.6 P <sub>10</sub> = 3.2 Q <sub>1</sub> = 3.9 Median = 6.4 Q <sub>3</sub> = 10.2 P <sub>90</sub> = 16.0 P <sub>99</sub> = 33.4																	Percent Operational Time:	96.3						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	13.8	14.2	14.6	14.9	20.9	25.8	30.2	33.4	36.6	44.2	46.4	44.1	7.4	8.9	13.0	19.3	28.5	26.6	21.1	19.9	18.4	19.5	24.7	20.9	23.6	46.4
2-Nov	14.2	14.7	15.0	13.8	8.1	5.3	4.8	4.4	4.5	3.8	3.8	3.4	2.9	3.2	2.9	3.2	3.2	3.1	3.2	4.6	6.6	6.9	3.6	3.7	6.0	15.0
3-Nov	3.1	2.9	3.0	3.7	3.3	3.6	3.8	3.8	3.9	4.4	4.7	5.6	6.1	6.0	6.0	6.5	8.0	9.4	9.0	8.2	12.1	8.1	6.7	6.7	5.8	12.1
4-Nov	6.5	6.4	6.7	6.6	6.4	6.3	6.1	6.7	7.4	6.5	6.9	6.8	7.0	8.0	8.5	7.7	7.9	7.2	6.1	5.9	5.8	5.1	4.2	3.7	6.5	8.5
5-Nov	3.7	4.4	4.4	4.7	3.9	3.5	3.4	3.9	3.6	3.6	3.9	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	--	4.7
6-Nov	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	4.1	5.9	6.8	6.0	5.0	4.9	5.7	5.0	4.5	6.3	9.3	10.8	12.5	--	12.5
7-Nov	13.6	14.8	16.0	16.0	18.4	19.3	18.6	21.1	26.2	29.4	27.8	26.9	28.4	29.1	27.4	24.0	24.9	23.4	22.2	20.2	19.6	19.3	17.3	16.7	21.7	29.4
8-Nov	15.4	14.0	14.4	15.4	14.5	14.6	13.8	12.8	12.5	13.7	13.5	12.9	11.4	9.0	8.7	7.4	7.1	6.3	9.3	7.1	5.0	7.9	8.2	7.1	10.9	15.4
9-Nov	5.7	4.6	4.7	5.1	5.3	5.5	5.3	5.8	5.2	5.0	5.3	7.0	9.2	12.0	13.4	13.7	12.5	12.5	12.1	11.8	11.0	8.4	7.3	6.7	8.1	13.7
10-Nov	6.4	6.5	7.6	7.3	7.3	7.5	7.5	7.6	8.0	8.8	9.1	9.2	9.4	8.5	8.1	8.2	9.6	10.9	10.0	10.3	10.2	9.2	8.4	7.7	8.5	10.9
11-Nov	8.2	8.2	8.0	8.5	11.6	9.3	7.2	7.8	9.6	9.8	9.8	9.0	9.0	10.0	8.4	7.4	7.1	7.6	8.5	9.6	10.9	11.3	11.7	11.4	9.2	11.7
12-Nov	11.0	10.2	13.8	18.4	21.5	17.9	12.4	9.5	7.6	7.7	6.4	4.8	3.8	3.2	2.9	3.3	3.3	3.1	3.1	3.0	2.6	2.6	2.9	2.1	7.4	21.5
13-Nov	2.1	2.2	2.0	2.7	2.4	2.7	2.7	3.9	4.3	2.7	3.5	4.7	3.7	4.1	3.1	5.4	3.5	3.9	3.5	2.4	2.3	2.2	2.3	2.8	3.1	5.4
14-Nov	2.3	2.5	1.8	1.7	1.9	3.0	3.3	3.8	3.8	3.8	4.6	5.3	5.1	10.8	14.5	15.7	14.9	14.1	14.3	15.4	14.5	15.7	16.8	15.4	8.5	16.8
15-Nov	14.3	12.7	8.4	PF	3.8	4.1	5.0	5.0	4.6	3.2	2.4	4.7	4.3	4.5	3.7	3.8	4.4	5.6	5.5	5.6	5.3	4.7	4.4	4.2	5.4	14.3
16-Nov	3.9	4.0	3.8	4.4	5.9	7.8	7.0	5.5	4.7	5.2	5.8	6.3	6.0	6.1	6.6	6.5	6.1	5.9	7.0	10.2	10.5	10.3	9.1	8.0	6.5	10.5
17-Nov	7.4	7.3	9.1	12.7	19.1	20.4	20.2	19.6	18.5	18.2	16.5	14.2	12.7	11.6	9.8	10.1	12.0	9.7	19.4	15.7	10.3	14.3	10.8	14.2	13.9	20.4
18-Nov	10.1	10.5	9.6	9.7	10.1	9.8	11.9	12.1	11.6	10.5	7.9	7.7	8.0	7.5	7.8	7.6	7.6	7.6	7.6	6.9	6.8	7.0	7.6	6.8	8.8	12.1
19-Nov	6.7	6.1	5.8	6.1	5.9	6.3	6.3	6.5	5.6	6.1	5.8	6.0	5.7	5.6	5.5	5.6	5.5	6.6	6.8	10.6	11.4	9.6	8.6	8.0	6.8	11.4
20-Nov	9.0	13.9	6.4	3.5	4.2	4.4	4.1	4.2	4.2	4.1	3.9	3.7	3.7	3.6	3.7	3.6	3.6	3.7	3.5	3.5	3.6	4.0	3.7	4.3	4.6	13.9
21-Nov	4.4	4.2	4.2	4.3	4.0	4.6	4.6	3.9	4.0	3.8	4.1	5.4	4.0	3.9	3.7	3.7	4.3	6.0	4.2	3.8	3.6	3.7	3.5	13.4	4.6	13.4
22-Nov	3.4	3.9	3.5	3.8	3.9	4.0	5.4	4.7	4.9	5.0	5.0	5.1	6.3	5.8	4.9	4.6	4.3	3.8	3.5	3.2	3.5	3.3	3.4	3.5	4.3	6.3
23-Nov	3.7	3.8	4.1	4.1	4.1	4.2	4.0	3.9	4.1	4.0	3.9	3.9	4.0	5.1	7.7	7.6	7.3	7.8	7.7	7.7	9.2	10.3	9.8	9.8	5.9	10.3
24-Nov	10.2	9.2	9.2	11.6	13.2	13.6	16.1	20.0	21.2	21.9	22.7	25.8	25.7	23.2	C	23.3	19.1	19.8	24.3	28.4	32.1	33.6	39.2	41.5	22.0	41.5
25-Nov	19.5	7.8	2.4	1.7	2.0	3.1	3.6	2.1	2.5	2.9	3.4	3.5	3.3	3.4	3.6	3.2	3.4	3.2	3.3	3.4	3.5	3.4	4.9	7.1	4.2	19.5
26-Nov	6.4	3.8	4.5	5.6	3.5	4.0	5.4	4.8	6.4	5.7	3.4	3.4	3.3	3.2	3.6	3.4	3.7	6.0	8.3	9.0	10.5	10.9	11.6	13.2	6.0	13.2
27-Nov	15.9	15.1	18.3	17.3	14.8	14.6	14.5	13.7	11.4	9.2	8.7	7.4	7.5	8.7	9.0	9.3	10.7	10.8	9.8	8.6	9.8	11.8	10.9	11.0	11.6	18.3
28-Nov	10.7	9.8	9.1	8.7	7.9	6.8	6.1	5.3	5.0	5.1	4.7	4.5	4.9	4.9	5.3	5.7	6.6	6.0	6.1	7.0	5.9	5.8	6.7	6.9	6.5	10.7
29-Nov	7.0	5.9	5.1	5.2	5.3	4.4	5.0	6.0	8.0	7.2	8.1	7.8	5.1	2.5	2.0	1.4	0.8	1.4	0.8	1.2	1.4	1.6	2.6	2.5	4.1	8.1
30-Nov	2.1	2.0	3.2	3.5	3.5	3.8	4.1	4.1	4.0	M	M	3.7	3.0	2.5	2.0	2.0	2.5	6.3	1.9	2.2	2.5	1.9	3.6	7.4	3.3	7.4
																								Diurnal Average		
																								Diurnal Maximum		
																								C - Calibration      M - Maintenance      UO - Unstable Operation      PF - Power Failure Alberta Ambient Air Quality Guideline/Objectives: 1-hr 80 µg/m <sup>3</sup> 24-hr 29 µg/m <sup>3</sup>		







**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$   
Fort Chipewyan - November 2023**

<b>Concentration Ranges (<math>\mu\text{g}/\text{m}^3</math>)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	290	41.91	41.91
6 - 15	327	47.25	89.16
16 - 25	52	7.51	96.68
26 - 80	23	3.32	100.00
> 81.0	0	0.00	100.00

Total Number of Valid Hours: 692

Total Number of Hours: 720



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

**Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$**   
**Fort Chipewyan - November 2023**

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	
0 - 5	19	3	4	24	35	10	12	7	1	5	2	6	53	55	27	27	290
6 - 15	2	1	4	37	48	10	18	26	41	17	7	12	43	26	19	16	327
16 - 25	0	0	2	9	4	2	0	0	0	0	0	3	21	8	2	1	52
26 - 80	0	0	0	1	6	0	1	0	0	1	1	2	7	1	3	0	23
> 81.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	21	4	10	71	93	22	31	33	42	23	10	23	124	90	51	44	692

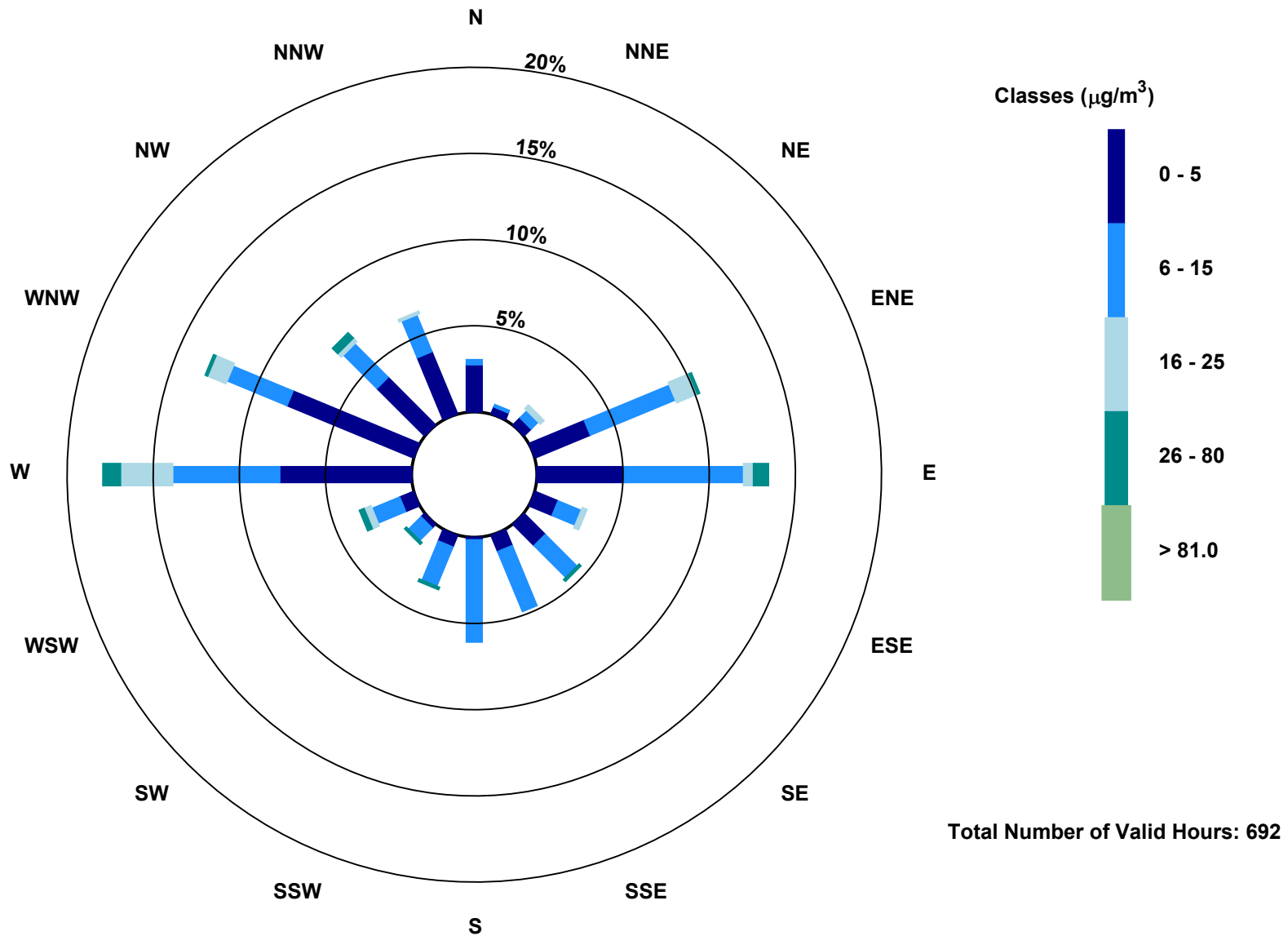
Total Number of Valid Hours: 692

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 2023

Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$   
Fort Chipewyan

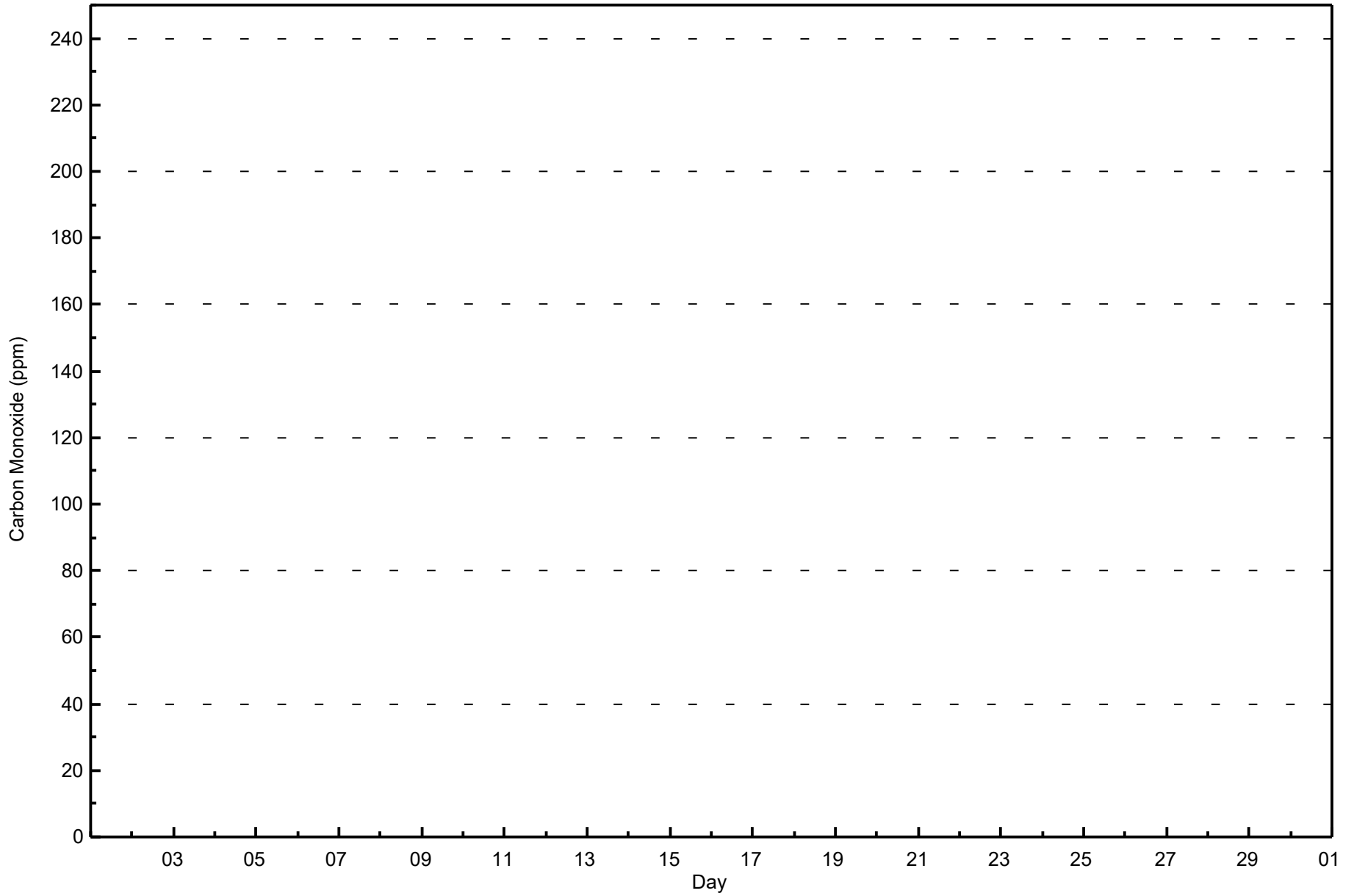






**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Carbon Monoxide (CO) - ppm**  
**Fort Chipewyan - November 2023**





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

**Carbon Monoxide (CO) - ppm**  
**Fort Chipewyan - November 2023**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 0.3	681	100.00	100.00
0.4 - 0.5	0	0.00	100.00
0.6 - 0.7	0	0.00	100.00
0.8 - 1.4	0	0.00	100.00
1.5 - 10	0	0.00	100.00
> 10	0	0.00	100.00

Total Number of Valid Hours: 681

Total Number of Hours: 720



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

**Carbon Monoxide (CO) - ppm**  
**Fort Chipewyan - November 2023**

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	20	4	10	70	105	27	30	27	39	23	10	23	115	86	51	41	681
0.4 - 0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.6 - 0.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.8 - 1.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1.5 - 10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	20	4	10	70	105	27	30	27	39	23	10	23	115	86	51	41	681

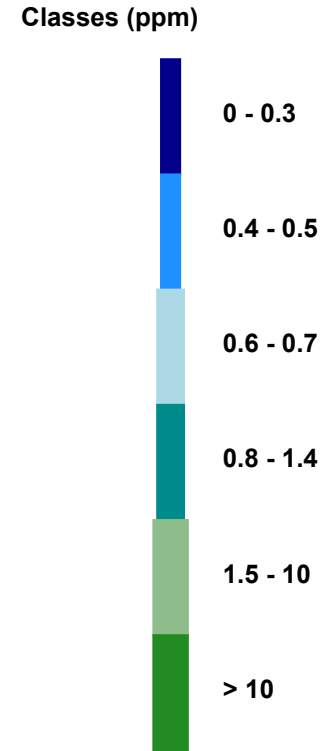
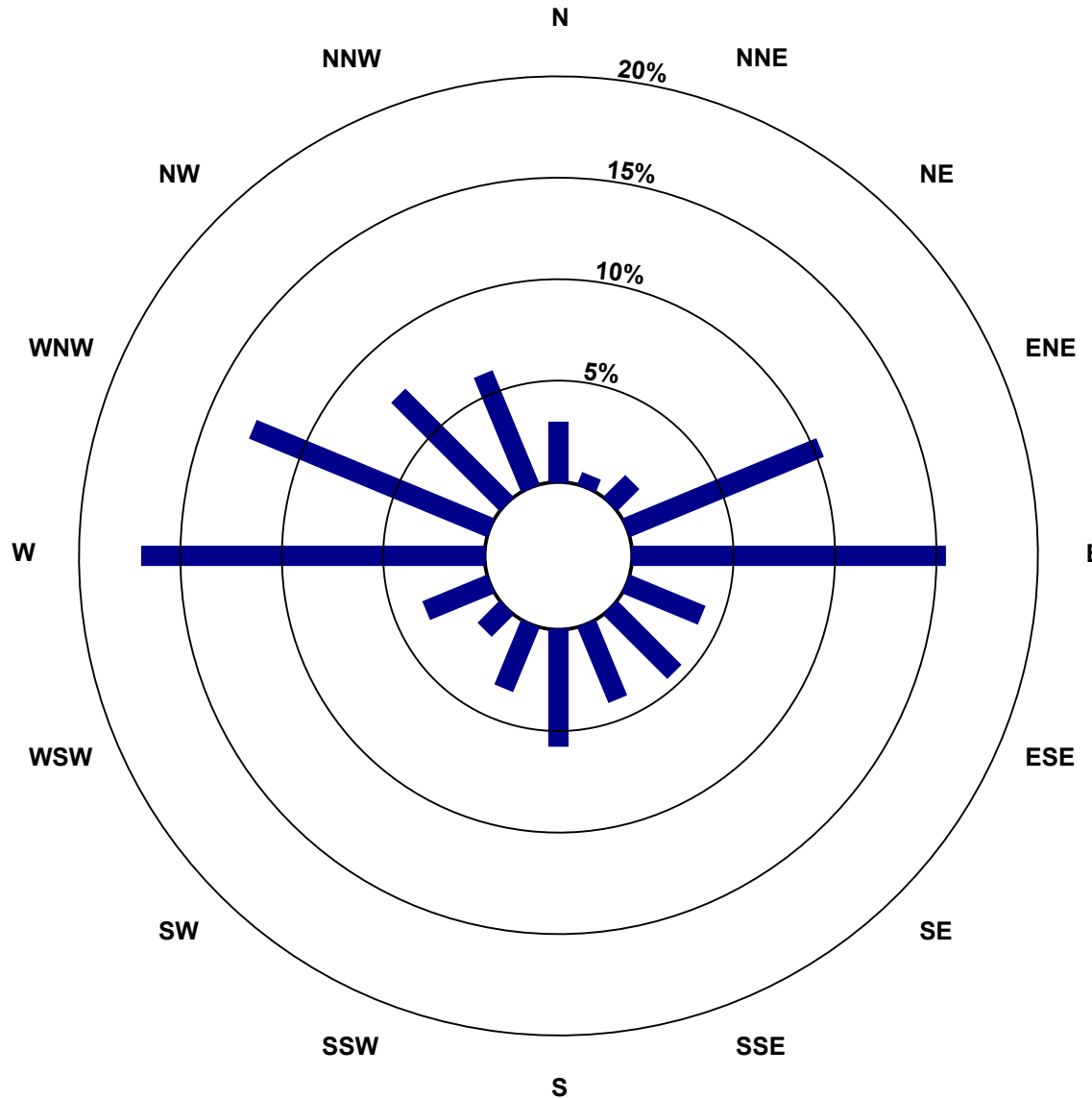
Total Number of Valid Hours: 681

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 2023

Carbon Monoxide (CO) - ppm  
Fort Chipewyan



Total Number of Valid Hours: 681



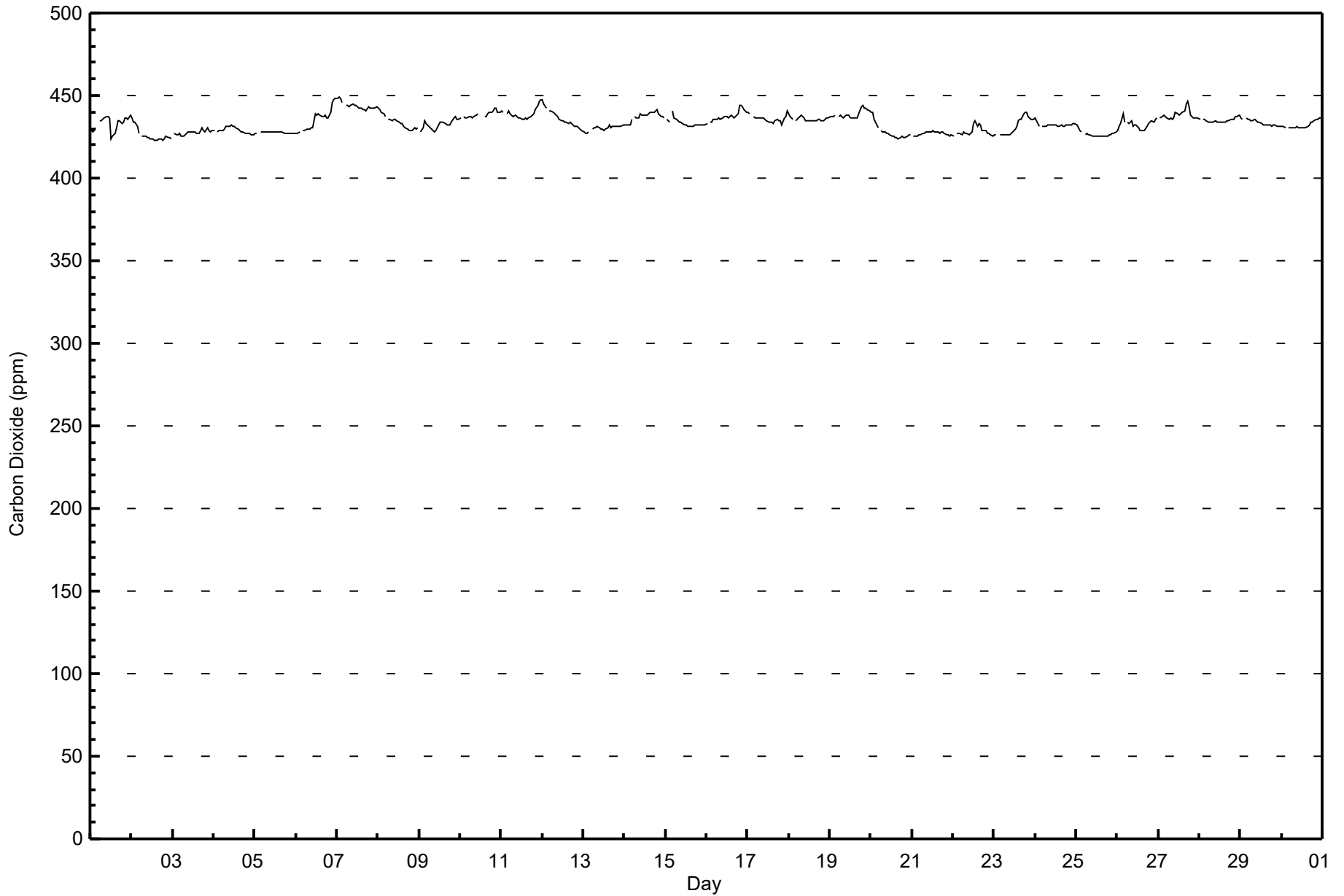


Number of Exceedences (AAAQO):		1-hr: 0	24-hr: 0	Hours in Service:																	720					
Maximum Value: 449.4 ppm on Nov 7 02:00		Maximum Daily Average: 443.9 ppm on Nov 7																	Hours of Data:	686						
Minimum Value: 423.0 ppm on Nov 2 15:00		Minimum Daily Average: 426.0 ppm on Nov 2																	Hours of Missing Data:	34						
Maximum Diurnal Average: 434.6 ppm at hour 1		Minimum Diurnal Average: 432.2 ppm at hour 14																	Hours of Calibration:	33						
Monthly Average: 433.21 ppm		Percentiles: P <sub>1</sub> = 423.7 P <sub>10</sub> = 426.5 Q <sub>1</sub> = 428.5 Median = 433.1 Q <sub>3</sub> = 436.7 P <sub>90</sub> = 440.0 P <sub>99</sub> = 447.1																	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-Nov	428.7	428.4	428.8	430.4	Z	434.8	435.0	435.9	436.9	437.1	437.2	436.5	423.7	425.5	427.2	430.1	434.7	435.1	433.1	433.7	436.1	436.2	435.5	438.0	433.0	438.0
2-Nov	436.1	433.8	433.8	431.5	427.4	Z	425.8	425.8	425.6	424.9	424.9	424.1	423.4	423.3	423.0	423.0	423.5	423.7	423.1	423.4	425.0	424.9	424.2	424.0	426.0	436.1
3-Nov	Z	427.0	426.4	426.4	426.9	425.5	425.5	426.3	427.5	427.9	428.0	428.1	428.0	427.7	427.4	427.5	429.1	430.2	428.4	427.7	430.2	429.0	428.1	428.5	427.7	430.2
4-Nov	428.4	Z	428.4	428.4	429.1	429.2	429.4	431.0	431.5	431.5	431.9	431.2	431.7	430.7	429.6	428.6	428.1	427.8	427.4	427.5	427.3	427.0	426.8	426.4	429.0	431.9
5-Nov	426.9	427.4	Z	427.9	427.9	427.9	428.0	428.2	428.2	428.0	428.1	428.1	428.2	428.0	428.0	428.0	427.7	427.4	427.3	427.0	427.0	427.0	427.3	427.2	427.7	428.2
6-Nov	427.3	427.5	427.7	Z	428.6	429.2	429.3	429.7	430.0	430.4	430.7	439.2	438.3	439.2	438.4	437.3	437.1	437.7	436.4	436.3	440.2	445.9	447.4	448.5	435.3	448.5
7-Nov	448.6	449.4	448.6	445.8	Z	444.2	443.9	443.6	443.9	445.1	443.9	444.3	443.4	442.6	442.3	441.5	441.2	440.9	443.1	442.2	442.4	442.2	442.5	443.2	443.9	449.4
8-Nov	442.6	441.2	439.8	438.6	437.5	Z	435.9	435.2	434.6	435.6	435.7	434.8	433.7	432.7	432.8	431.5	430.4	429.7	429.1	428.8	428.8	430.5	430.0	430.5	433.9	442.6
9-Nov	Z	428.1	430.2	434.5	432.9	432.4	430.3	430.0	428.6	427.9	428.7	432.1	433.7	433.5	434.2	433.0	431.8	431.8	432.5	433.6	436.2	436.9	435.5	435.8	432.4	436.9
10-Nov	436.6	Z	437.0	436.7	436.8	437.0	437.1	436.8	437.2	437.9	439.0	C	C	C	437.3	437.6	438.9	439.6	439.8	441.0	442.0	442.2	440.1	440.1	438.5	442.2
11-Nov	440.9	440.2	Z	439.4	440.4	438.7	438.0	437.6	437.8	437.1	436.3	436.0	435.5	436.0	436.3	435.9	436.7	437.2	437.9	439.3	441.3	444.0	446.3	447.3	439.0	447.3
12-Nov	447.8	445.2	442.7	Z	440.5	440.7	440.0	439.1	437.9	437.5	435.9	435.1	434.6	433.9	433.5	433.4	433.5	432.8	432.2	431.8	431.2	430.8	430.0	428.6	436.0	447.8
13-Nov	427.6	427.4	427.3	428.0	Z	429.9	430.4	430.6	431.4	430.1	429.4	429.7	429.1	429.8	430.8	431.9	430.3	431.2	431.2	431.2	431.1	431.2	431.6	432.2	430.1	432.2
14-Nov	432.1	432.4	431.8	432.1	435.4	Z	437.0	436.3	436.7	439.1	438.3	438.2	438.3	438.2	438.8	439.7	440.0	440.2	441.0	441.4	438.8	437.7	437.0	436.4	437.3	441.4
15-Nov	Z	435.6	434.2	PF	440.3	436.5	435.2	434.7	434.1	433.5	432.7	432.3	432.0	431.5	431.7	431.5	431.6	432.3	432.5	432.5	432.4	432.5	432.3	432.4	433.4	440.3
16-Nov	432.8	Z	434.0	434.2	435.2	436.0	435.9	436.4	435.9	436.8	437.3	437.4	437.0	436.4	437.8	437.1	436.7	437.5	439.3	443.8	444.2	443.1	441.7	440.1	437.7	444.2
17-Nov	440.2	439.0	Z	437.1	436.6	436.5	436.3	436.4	436.3	436.1	435.5	434.5	433.9	433.8	433.6	433.4	434.4	435.7	435.2	434.4	432.0	436.6	437.6	440.3	435.9	440.3
18-Nov	438.7	437.5	435.4	Z	434.5	435.6	437.1	438.1	437.5	436.3	434.7	434.4	434.6	434.3	434.5	435.2	434.8	435.3	435.5	434.9	435.1	436.0	436.4	436.6	435.8	438.7
19-Nov	437.0	436.9	437.3	437.9	Z	437.6	438.0	437.4	436.9	437.9	438.3	438.3	436.8	436.6	436.1	436.3	436.1	438.9	442.9	443.7	442.8	442.1	441.9	440.9	438.6	443.7
20-Nov	440.0	440.2	435.7	431.8	430.5	Z	428.5	428.2	427.9	427.4	427.0	426.6	425.7	425.2	424.7	424.3	424.0	424.4	425.3	424.8	424.9	425.6	426.1	426.1	428.0	440.2
21-Nov	Z	425.8	425.8	425.7	426.1	426.5	426.9	427.4	428.2	428.0	427.9	428.2	428.6	428.0	427.8	427.6	427.4	427.8	427.7	426.7	426.3	425.9	425.7	426.7	427.1	428.6
22-Nov	425.4	Z	427.5	427.4	426.9	426.6	427.7	427.2	426.9	426.3	427.0	427.9	433.2	434.6	431.0	432.8	432.2	429.2	428.9	428.5	427.5	427.0	426.0	425.8	428.4	434.6
23-Nov	426.4	426.6	Z	426.7	426.5	426.6	426.4	426.2	426.3	426.5	427.0	428.3	429.2	431.4	434.4	435.2	436.0	438.6	439.9	439.9	437.6	436.0	435.3	435.7	431.4	439.9
24-Nov	436.6	434.4	431.4	Z	431.3	431.4	431.6	432.1	432.4	432.4	432.1	432.1	431.8	431.3	431.5	432.1	431.5	431.8	432.1	432.1	431.8	432.1	433.1	433.4	432.3	436.6
25-Nov	432.3	430.7	428.7	Z	428.1	426.6	426.7	426.3	426.3	425.7	425.3	425.4	425.5	425.5	425.7	425.4	425.4	425.6	425.8	426.0	426.3	426.8	426.9	427.6	426.7	432.3
26-Nov	428.5	431.4	432.7	438.8	434.2	Z	434.0	433.0	435.2	431.3	432.1	432.4	430.9	429.2	429.0	428.9	429.2	431.0	432.9	433.8	434.5	434.3	435.7	436.3	432.6	438.8
27-Nov	Z	436.6	437.2	438.0	437.4	436.4	436.0	436.5	435.9	436.4	439.7	438.9	438.4	439.2	439.6	440.6	445.2	447.0	443.4	437.8	436.4	436.8	436.4	436.1	438.5	447.0
28-Nov	435.9	Z	435.3	435.3	435.0	434.2	434.0	434.1	434.3	434.4	433.8	433.8	434.1	433.9	433.9	434.2	435.0	435.1	435.5	435.9	436.0	437.4	437.6	437.8	435.1	437.8
29-Nov	436.8	435.5	Z	436.2	435.9	435.5	434.8	434.7	435.3	434.6	434.2	434.0	433.3	432.6	432.3	432.1	432.0	431.8	431.7	431.8	431.9	431.8	431.1	431.0	433.5	436.8
30-Nov	431.4	430.9	430.3	Z	430.4	430.4	430.6	430.2	430.8	431.2	430.3	430.1	430.5	430.5	430.6	431.6	432.6	433.6	434.1	435.1	435.8	435.6	436.5	436.7	432.2	436.7
434.6 434.0 433.1 433.2 433.0 433.0 432.9 432.8 432.9 432.8 432.8 432.8 432.3 432.2 432.5 432.6 432.9 433.4 433.5 433.6 433.8 434.2 434.1 434.3																								Diurnal Average		
448.6 449.4 448.6 445.8 440.5 444.2 443.9 443.6 443.9 445.1 443.9 444.3 443.4 442.6 442.3 441.5 445.2 447.0 443.4 443.8 444.2 445.9 447.4 448.5																								Diurnal Maximum		
Z - zerspan		C - Calibration			PF - Power Failure																					



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

**Carbon Dioxide (CO<sub>2</sub>) - ppm**  
**Fort Chipewyan - November 2023**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Carbon Dioxide (CO<sub>2</sub>) - ppm  
Fort Chipewyan - November 2023**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
400 - 420	0	0.00	0.00
420 - 440	630	91.84	91.84
440 - 460	56	8.16	100.00
460 - 480	0	0.00	100.00
480 - 500	0	0.00	100.00
> 500	0	0.00	100.00

Total Number of Valid Hours: 686

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Carbon Dioxide (CO<sub>2</sub>) - ppm  
Fort Chipewyan - November 2023**

Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
400 - 420	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
420 - 440	20	3	7	64	100	27	28	30	34	15	8	14	107	83	49	41	630
440 - 460	0	1	3	6	5	0	3	1	5	8	2	9	8	3	2	0	56
460 - 480	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
480 - 500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	20	4	10	70	105	27	31	31	39	23	10	23	115	86	51	41	686

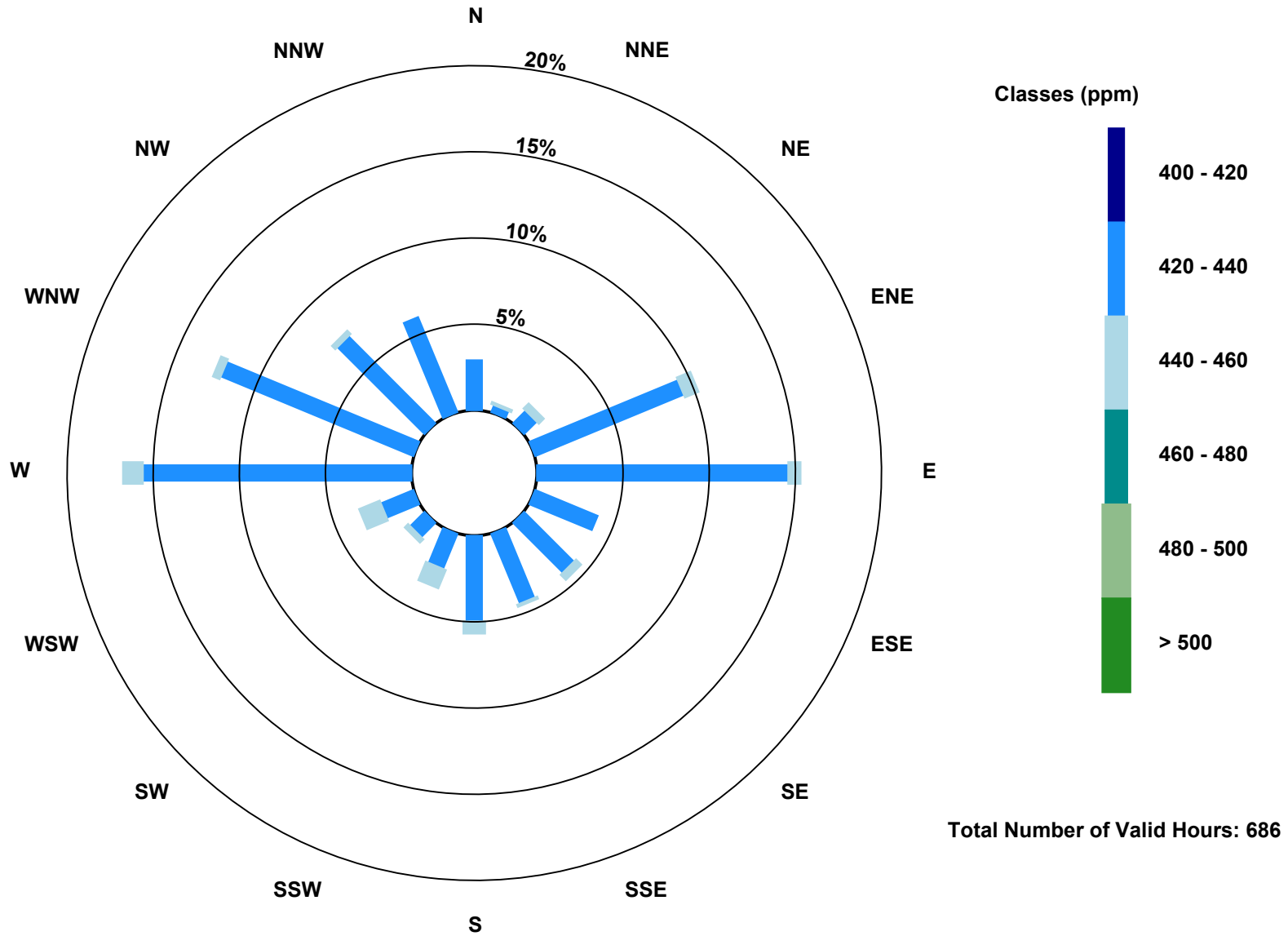
Total Number of Valid Hours: 686

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 2023

Carbon Dioxide (CO<sub>2</sub>) - ppm  
Fort Chipewyan



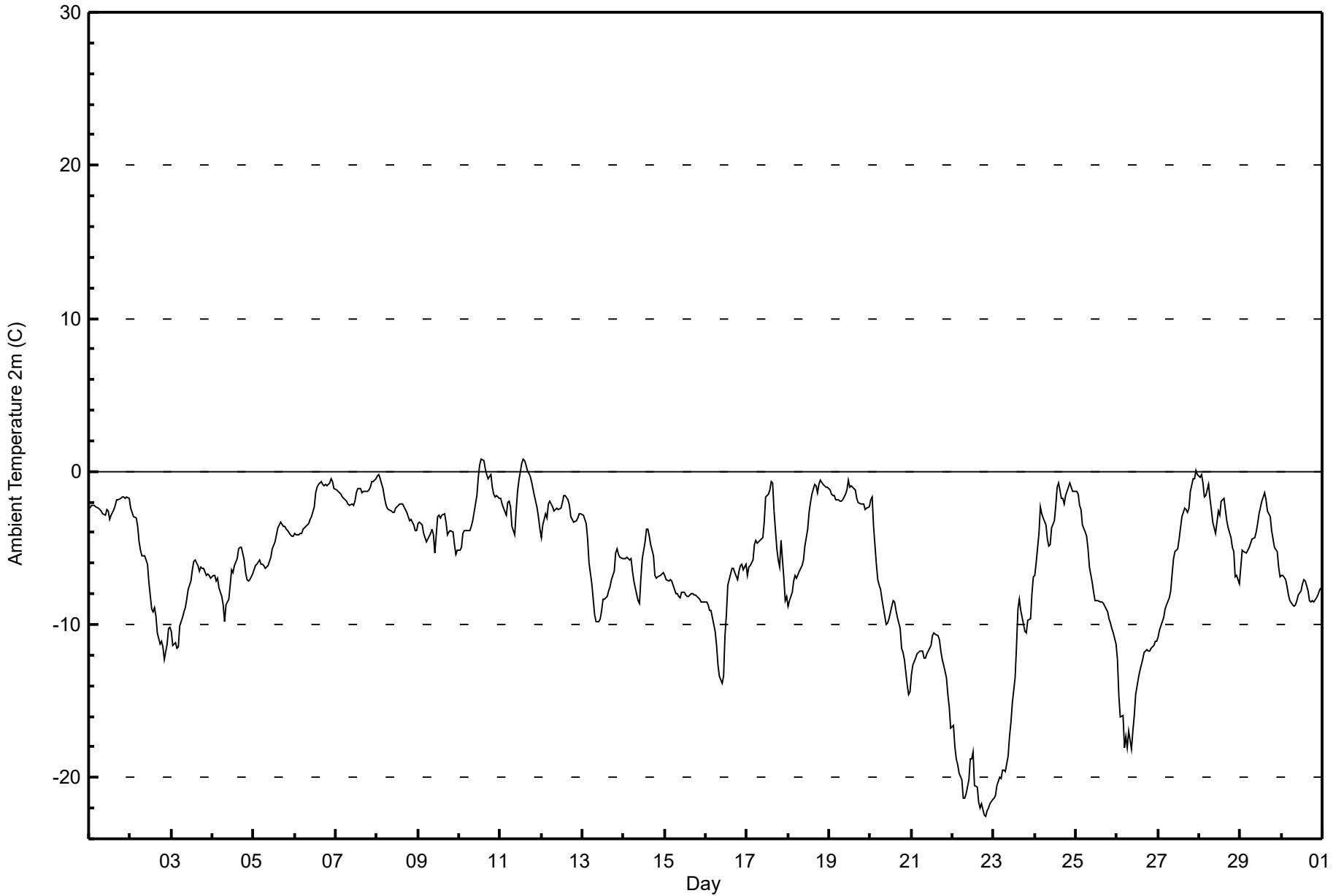


Maximum Value: 0.8 C on Nov 10 14:00      Maximum Daily Average: -1.4 C on Nov 7																				Hours in Service: 720 Hours of Data: 720						
Minimum Value: -22.6 C on Nov 22 20:00      Minimum Daily Average: -20.5 C on Nov 22 Maximum Diurnal Average: -4.9 C at hour 15      Minimum Diurnal Average: -7.3 C at hour 9 Monthly Average: -6.19 C      Percentiles: P <sub>1</sub> = -21.6 P <sub>10</sub> = -12.2 Q <sub>1</sub> = -8.4 Median = -5.2 Q <sub>3</sub> = -2.4 P <sub>90</sub> = -1.3 P <sub>99</sub> = 0.2																				Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	-2.4	-2.3	-2.2	-2.3	-2.3	-2.4	-2.5	-2.6	-2.7	-2.9	-2.5	-2.6	-3.2	-2.9	-2.5	-2.3	-1.9	-1.8	-1.8	-1.7	-1.7	-1.7	-1.7	-1.8	-2.3	-1.7
2-Nov	-2.4	-2.7	-3.0	-3.1	-3.6	-4.6	-5.1	-5.5	-5.5	-5.8	-6.0	-7.2	-9.0	-9.2	-8.9	-9.5	-10.5	-11.3	-11.1	-11.4	-12.2	-11.3	-10.3	-10.2	-7.5	-2.4
3-Nov	-10.4	-11.4	-11.2	-11.6	-11.5	-10.1	-9.6	-9.2	-8.9	-8.4	-7.7	-7.2	-6.5	-5.9	-5.8	-6.1	-6.5	-6.3	-6.3	-6.4	-6.8	-6.7	-6.8	-7.0	-8.1	-5.8
4-Nov	-6.8	-6.8	-7.2	-7.0	-7.7	-8.2	-8.7	-9.8	-8.7	-8.3	-7.4	-6.5	-6.6	-6.1	-5.7	-5.0	-4.9	-4.9	-5.7	-6.6	-7.0	-7.1	-7.1	-6.7	-6.9	-4.9
5-Nov	-6.4	-6.2	-6.0	-5.8	-6.1	-6.1	-6.1	-6.3	-6.2	-5.9	-5.6	-5.0	-4.6	-4.1	-3.7	-3.5	-3.3	-3.6	-3.8	-3.9	-4.1	-4.2	-4.2	-4.2	-4.9	-3.3
6-Nov	-4.0	-4.1	-4.2	-4.1	-4.0	-3.7	-3.6	-3.5	-3.4	-3.1	-2.9	-2.3	-1.4	-1.0	-0.8	-0.7	-0.8	-0.9	-0.8	-0.9	-0.8	-0.5	-0.7	-1.1	-2.2	-0.5
7-Nov	-1.2	-1.3	-1.4	-1.5	-1.7	-1.8	-2.0	-2.1	-2.2	-2.1	-2.2	-2.0	-1.4	-1.2	-1.2	-1.4	-1.3	-1.3	-1.3	-1.2	-1.1	-0.7	-0.6	-0.4	-1.4	-0.4
8-Nov	-0.3	-0.2	-0.5	-1.1	-1.7	-2.1	-2.4	-2.5	-2.6	-2.7	-2.6	-2.4	-2.2	-2.1	-2.1	-2.2	-2.3	-2.7	-2.9	-3.2	-3.2	-3.5	-3.9	-3.9	-2.3	-0.2
9-Nov	-3.4	-3.3	-3.5	-4.1	-4.3	-4.6	-4.3	-4.1	-3.8	-4.2	-5.4	-3.0	-2.9	-3.0	-2.9	-2.7	-3.3	-4.1	-3.9	-3.9	-4.0	-4.8	-5.4	-5.1	-3.9	-2.7
10-Nov	-5.2	-5.0	-4.1	-3.9	-3.8	-3.9	-3.8	-3.5	-3.2	-2.1	-1.5	-0.4	0.4	0.8	0.7	0.2	-0.2	-0.5	-0.2	-1.0	-1.4	-1.6	-1.6	-1.8	-1.9	0.8
11-Nov	-1.8	-2.2	-2.4	-2.8	-2.1	-2.0	-2.3	-3.6	-4.1	-2.5	-1.3	-0.6	0.5	0.8	0.7	0.5	0.1	-0.3	-0.7	-1.1	-1.5	-2.4	-3.1	-3.7	-1.6	0.8
12-Nov	-4.3	-3.5	-2.8	-3.0	-2.2	-1.9	-2.3	-2.6	-2.5	-2.4	-2.5	-2.4	-2.1	-1.6	-1.6	-1.8	-2.2	-2.9	-3.2	-3.3	-3.2	-3.0	-2.8	-2.8	-2.6	-1.6
13-Nov	-2.8	-3.1	-3.4	-4.4	-5.9	-7.4	-8.4	-9.3	-9.9	-9.8	-9.6	-9.1	-8.4	-8.4	-8.2	-7.8	-7.6	-7.1	-6.5	-5.4	-5.0	-5.4	-5.6	-5.7	-6.8	-2.8
14-Nov	-5.7	-5.6	-5.6	-5.8	-5.7	-6.5	-7.2	-7.7	-8.4	-8.7	-7.0	-5.7	-4.6	-3.8	-3.7	-4.2	-4.8	-5.5	-6.8	-7.0	-6.9	-6.8	-6.7	-6.6	-6.1	-3.7
15-Nov	-6.8	-7.1	-7.1	-7.0	-7.2	-7.4	-8.0	-8.0	-8.2	-8.2	-7.9	-7.9	-8.0	-8.2	-8.1	-8.0	-8.0	-8.0	-8.1	-8.2	-8.4	-8.5	-8.5	-8.5	-7.9	-6.8
16-Nov	-8.6	-8.7	-9.1	-9.1	-9.5	-10.5	-11.4	-12.6	-13.4	-13.9	-13.4	-10.8	-9.3	-7.4	-6.7	-6.3	-6.3	-6.6	-7.1	-6.5	-6.2	-6.1	-6.4	-6.1	-8.8	-6.1
17-Nov	-6.8	-6.2	-6.2	-5.8	-4.8	-4.5	-4.7	-4.6	-4.4	-4.4	-3.3	-1.7	-1.5	-1.2	-0.7	-0.8	-2.6	-5.1	-5.8	-6.2	-4.5	-6.9	-8.4	-8.2	-4.5	-0.7
18-Nov	-8.8	-8.4	-7.9	-7.2	-6.8	-7.0	-6.5	-6.3	-6.1	-5.8	-4.8	-3.8	-2.7	-2.0	-1.4	-0.8	-0.9	-1.4	-0.9	-0.6	-0.8	-0.9	-1.0	-1.0	-3.9	-0.6
19-Nov	-1.2	-1.5	-1.6	-1.6	-1.9	-1.8	-1.9	-2.0	-1.9	-1.5	-1.2	-0.6	-1.0	-0.9	-1.1	-1.2	-1.8	-2.0	-2.1	-2.1	-2.2	-2.5	-2.4	-2.3	-1.7	-0.6
20-Nov	-1.8	-1.6	-3.6	-6.1	-7.1	-7.5	-7.7	-8.3	-9.5	-10.0	-9.9	-9.6	-8.8	-8.4	-8.6	-9.0	-9.6	-10.3	-11.5	-11.8	-12.3	-13.9	-14.6	-14.4	-9.0	-1.6
21-Nov	-13.2	-12.7	-12.2	-11.9	-11.8	-11.7	-11.7	-12.2	-12.2	-11.9	-11.7	-11.3	-10.7	-10.6	-10.6	-10.7	-11.0	-11.8	-12.3	-12.6	-13.5	-14.6	-15.4	-16.8	-12.3	-10.6
22-Nov	-16.6	-18.0	-18.8	-19.2	-19.7	-20.1	-21.3	-21.4	-21.1	-20.2	-18.8	-18.8	-18.3	-20.5	-20.6	-21.6	-22.0	-21.8	-22.5	-22.6	-22.2	-22.0	-21.8	-21.4	-20.5	-16.6
23-Nov	-21.3	-21.1	-20.5	-19.9	-20.0	-19.5	-19.5	-19.6	-18.6	-17.3	-16.4	-15.2	-13.4	-11.3	-9.0	-8.4	-9.1	-10.0	-10.5	-10.5	-9.7	-9.6	-8.0	-6.9	-14.4	-6.9
24-Nov	-6.8	-6.0	-4.0	-2.3	-2.7	-3.1	-3.5	-4.5	-4.9	-4.8	-3.7	-3.2	-2.3	-1.0	-0.7	-1.8	-1.7	-2.1	-1.6	-1.3	-0.7	-1.0	-1.3	-1.3	-2.8	-0.7
25-Nov	-1.3	-1.5	-2.2	-2.5	-3.5	-4.0	-4.2	-5.1	-6.3	-7.2	-7.9	-8.4	-8.4	-8.4	-8.5	-8.5	-8.6	-8.8	-9.1	-9.7	-9.9	-10.3	-10.6	-11.3	-6.9	-1.3
26-Nov	-12.3	-14.6	-16.1	-16.0	-18.1	-17.3	-18.1	-17.0	-18.1	-17.0	-16.0	-14.6	-13.5	-13.0	-12.6	-12.2	-11.8	-11.7	-11.8	-11.7	-11.5	-11.3	-11.1	-11.1	-14.1	-11.1
27-Nov	-10.8	-10.4	-9.8	-9.5	-9.0	-8.7	-8.3	-7.8	-6.7	-5.7	-5.2	-5.0	-4.4	-3.7	-3.0	-2.4	-2.5	-2.7	-2.4	-1.3	-0.5	0.1	-0.2	-5.0	0.1	
28-Nov	-0.4	-0.2	-0.7	-1.6	-1.6	-0.9	-1.7	-2.5	-3.3	-4.1	-3.3	-2.6	-2.9	-1.9	-1.7	-2.5	-3.3	-3.7	-4.4	-5.0	-5.3	-6.9	-6.8	-7.4	-3.1	-0.2
29-Nov	-6.2	-5.1	-5.2	-5.3	-5.1	-5.0	-4.6	-4.4	-4.3	-3.9	-3.4	-2.7	-1.9	-1.7	-1.4	-1.8	-2.6	-3.0	-3.9	-4.4	-5.0	-5.2	-6.2	-6.9	-4.1	-1.4
30-Nov	-6.8	-6.8	-7.1	-7.5	-8.0	-8.5	-8.7	-8.8	-8.7	-8.5	-8.1	-7.8	-7.3	-7.1	-7.1	-7.8	-8.4	-8.6	-8.5	-8.6	-8.3	-8.0	-7.8	-7.6	-7.9	-6.8
																								Diurnal Average		
																								Diurnal Maximum		



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

**Ambient Temperature 2m (AT 2m) - C**  
**Fort Chipewyan - November 2023**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Ambient Temperature 2m (AT 2m) - C  
Fort Chipewyan - November 2023**

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	20	2.78	2.78
-20 - 0	690	95.83	98.61
0 - 10	10	1.39	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720





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

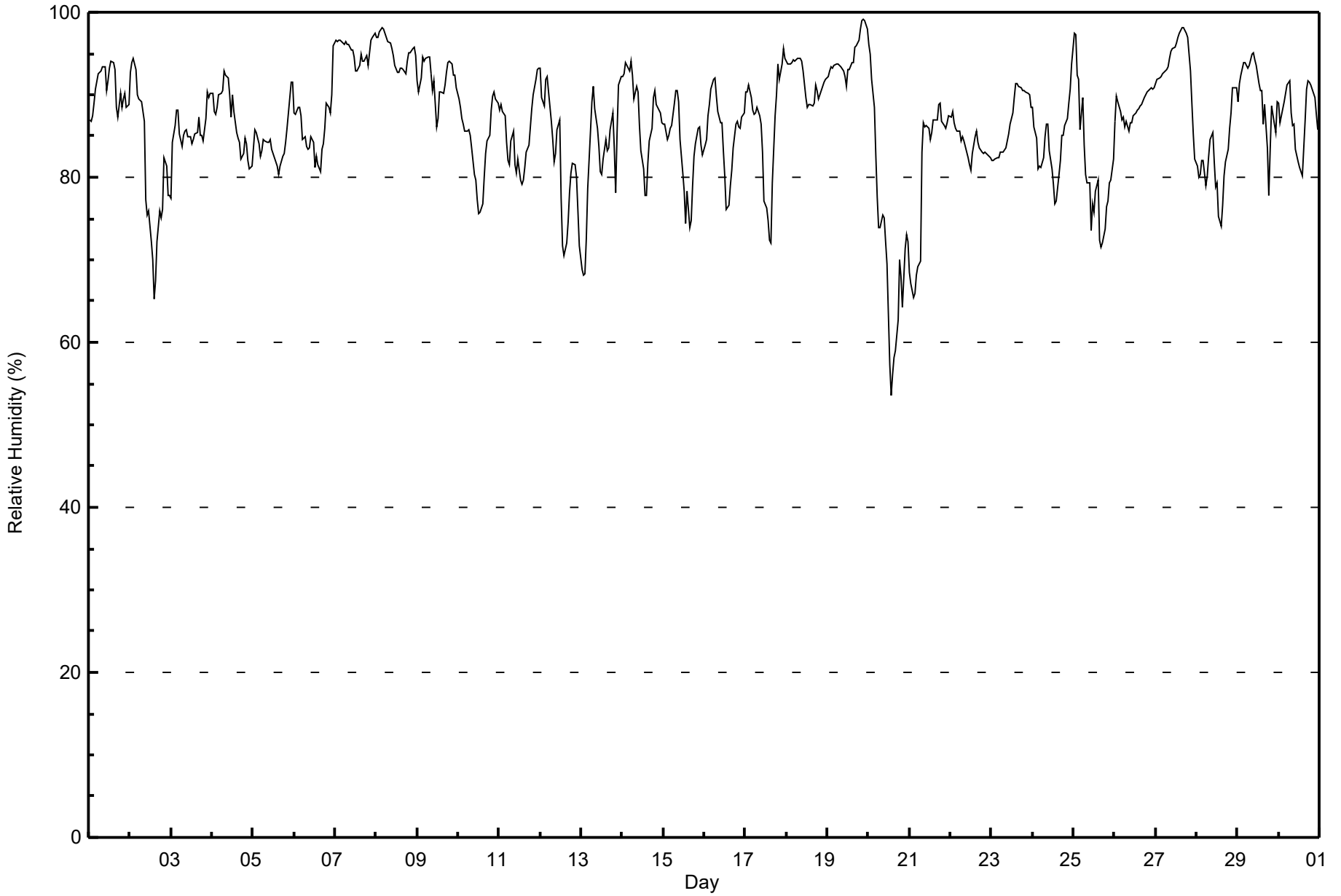
**Relative Humidity (RH) - %**  
**Fort Chipewyan - November 2023**

Maximum Value: 99.2 % on Nov 19 22:00      Maximum Daily Average: 95.4 % on Nov 7																						Hours in Service: 720 Hours of Data: 720				
Minimum Value: 53.6 % on Nov 20 14:00      Minimum Daily Average: 72.4 % on Nov 20 Maximum Diurnal Average: 88.1 % at hour 4      Minimum Diurnal Average: 82.3 % at hour 14 Monthly Average: 86.40 %      Percentiles: P <sub>1</sub> = 65.2 P <sub>10</sub> = 77.2 Q <sub>1</sub> = 82.9 Median = 87.1 Q <sub>3</sub> = 91.5 P <sub>90</sub> = 94.2 P <sub>99</sub> = 98.0																						Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0				
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	87.0	86.8	87.5	89.0	90.7	92.6	92.7	92.8	93.4	93.3	90.5	91.7	93.3	94.1	94.0	93.1	88.6	87.3	90.2	88.4	89.5	90.1	88.4	88.8	90.6	94.1
2-Nov	92.7	93.9	94.5	93.0	89.9	89.5	89.2	89.1	86.8	77.2	75.4	75.9	72.1	70.1	65.2	67.4	72.2	76.0	75.0	76.1	82.4	81.4	77.9	77.8	80.9	94.5
3-Nov	77.4	84.3	86.3	88.1	88.2	85.3	83.7	85.0	85.5	85.7	84.9	84.9	84.1	84.6	85.2	85.5	87.3	85.1	85.1	84.5	87.2	90.3	89.6	90.3	85.8	90.3
4-Nov	90.1	88.0	87.7	88.5	90.1	90.2	90.5	92.8	92.4	92.1	90.0	87.4	90.0	88.0	85.5	84.7	84.2	82.2	82.9	84.8	84.1	82.0	81.0	81.4	87.1	92.8
5-Nov	83.6	85.8	85.4	84.1	82.6	83.2	84.6	84.4	84.3	84.3	84.6	83.4	82.3	81.8	81.3	80.4	81.4	82.5	82.9	84.3	85.9	89.7	91.5	91.5	84.4	91.5
6-Nov	87.9	87.6	88.5	88.5	87.5	84.5	84.8	83.8	83.3	83.5	84.9	84.2	81.1	82.5	81.5	80.7	83.3	84.1	86.0	89.0	88.6	87.7	89.9	96.0	85.8	96.0
7-Nov	96.6	96.5	96.6	96.6	96.4	96.1	96.4	96.1	96.1	95.4	95.4	94.6	93.0	92.8	93.5	94.9	94.0	94.0	94.7	93.5	95.1	96.6	96.9	97.5	95.4	97.5
8-Nov	96.9	96.9	97.6	98.1	98.0	97.5	96.9	96.5	96.3	95.6	94.8	93.6	92.7	92.6	93.2	93.2	93.0	92.6	94.1	95.0	95.0	95.6	95.7	94.8	95.3	98.1
9-Nov	91.7	90.4	92.0	94.6	94.1	94.5	94.5	94.6	92.5	90.6	91.6	86.1	87.2	90.3	90.3	90.2	91.2	92.7	93.9	94.1	93.7	92.4	92.4	90.9	91.9	94.6
10-Nov	89.5	88.4	87.1	86.4	85.6	85.7	85.7	85.1	83.6	80.3	79.6	77.2	75.7	75.7	76.8	80.0	82.9	84.5	85.0	88.1	89.9	90.4	89.5	89.0	84.2	90.4
11-Nov	88.2	88.8	87.9	87.5	84.2	82.0	81.6	84.4	85.6	81.5	80.5	82.2	79.6	79.2	79.7	81.1	83.0	83.9	86.1	88.4	89.9	91.9	93.0	93.3	85.1	93.3
12-Nov	93.2	89.6	88.7	91.8	92.2	90.3	86.8	84.6	81.9	82.9	85.8	87.0	77.4	71.7	70.5	72.0	74.6	78.1	80.5	81.7	81.6	80.0	75.9	71.7	82.1	93.2
13-Nov	68.9	68.1	68.3	72.5	78.6	85.6	89.2	90.9	88.4	86.0	83.7	80.6	80.4	82.2	84.6	83.2	83.6	85.8	87.8	83.5	78.1	85.4	91.1	92.3	82.4	92.3
14-Nov	92.2	92.5	93.9	93.2	92.8	94.0	92.3	89.5	91.0	90.4	86.3	83.2	81.0	77.9	77.8	81.7	84.4	85.9	89.6	90.5	88.9	88.2	87.8	86.6	88.0	94.0
15-Nov	86.5	86.4	84.6	85.2	85.9	86.3	89.0	90.6	90.5	89.2	84.5	80.5	78.4	74.5	78.3	73.9	74.8	79.0	82.6	84.1	86.0	86.1	83.9	82.7	83.5	90.6
16-Nov	83.9	84.6	87.4	88.8	90.6	91.9	92.0	89.9	88.0	86.6	86.5	83.2	80.2	76.2	76.6	79.0	80.8	83.6	86.5	86.9	86.2	86.0	87.2	87.9	85.4	92.0
17-Nov	90.3	90.4	91.2	89.7	88.1	87.6	87.9	88.4	87.5	86.5	83.1	77.1	76.2	74.7	72.3	72.0	79.4	87.4	90.0	93.8	91.9	93.7	95.6	94.5	86.2	95.6
18-Nov	94.0	93.7	93.7	93.9	94.2	94.0	94.3	94.4	94.3	94.1	92.9	89.6	88.6	88.8	88.7	88.6	89.0	91.1	90.6	89.5	90.4	91.1	91.6	91.9	91.8	94.4
19-Nov	92.2	93.0	93.3	93.3	93.5	93.7	93.7	93.6	93.4	92.9	92.2	91.0	93.1	93.0	93.9	93.9	95.8	95.9	96.6	98.0	99.0	99.2	99.0	97.9	94.6	99.2
20-Nov	96.1	95.0	91.8	88.5	82.6	77.7	73.9	73.9	75.4	75.0	72.3	69.5	57.2	53.6	56.1	58.2	58.9	62.7	70.0	68.0	64.3	71.4	73.0	72.2	72.4	96.1
21-Nov	68.5	67.2	65.4	65.9	68.2	69.1	69.8	83.1	86.6	86.2	86.3	85.9	84.5	85.4	86.9	87.0	87.0	88.8	88.9	86.7	86.3	86.0	86.6	87.4	81.0	88.9
22-Nov	87.2	87.9	86.6	86.0	85.5	85.6	84.5	84.8	84.4	83.0	82.3	81.6	80.8	82.9	84.9	85.6	84.2	83.6	83.1	82.8	83.1	82.9	82.8	82.3	84.1	87.9
23-Nov	82.1	82.1	82.1	82.4	82.3	83.0	83.0	83.0	83.6	84.4	85.3	86.4	87.9	89.7	91.4	91.4	91.0	90.8	90.5	90.6	90.4	90.2	89.9	88.5	86.7	91.4
24-Nov	88.5	86.1	84.8	81.1	81.4	81.3	82.3	84.9	86.4	86.4	83.2	81.1	79.2	76.7	77.2	80.3	82.1	85.1	86.3	87.1	89.0	90.6	93.7	84.2	93.7	
25-Nov	97.5	97.3	92.4	91.9	85.8	89.7	83.9	80.3	79.4	79.3	73.6	76.7	75.8	78.3	79.7	72.5	71.6	72.0	73.7	76.5	77.2	79.3	79.6	82.2	81.1	97.5
26-Nov	86.8	89.8	89.2	88.0	86.9	87.4	86.1	86.8	85.6	86.7	86.7	87.4	87.9	88.1	88.4	88.7	88.9	89.7	90.1	90.4	90.6	90.8	90.7	90.8	88.4	90.8
27-Nov	91.3	91.8	92.1	92.2	92.6	92.8	93.1	93.4	94.4	95.2	95.6	95.8	96.3	96.9	97.5	98.1	98.1	97.9	97.5	96.9	92.9	89.0	85.3	82.2	93.7	98.1
28-Nov	81.3	80.0	80.3	82.1	82.1	78.9	80.2	82.6	84.7	85.4	81.8	78.9	79.3	75.3	74.0	76.6	80.1	81.8	83.4	85.9	87.7	90.9	90.9	90.8	82.3	90.9
29-Nov	89.1	91.3	92.3	93.9	93.9	93.6	93.2	93.5	94.9	95.0	94.3	93.5	91.4	90.5	90.6	86.4	88.8	83.5	77.7	83.4	88.6	86.5	85.4	89.2	90.0	95.0
30-Nov	89.0	86.6	88.3	89.1	90.2	91.2	91.8	87.7	86.2	86.5	83.4	81.9	81.2	80.6	80.2	87.0	90.6	91.7	91.5	91.3	90.1	89.7	87.6	85.8	87.5	91.8
																								Diurnal Average		
																								Diurnal Maximum		



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

**Relative Humidity (RH) - %**  
**Fort Chipewyan - November 2023**





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

**Relative Humidity (RH) - %**  
**Fort Chipewyan - November 2023**

<b>Concentration Ranges (%)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	0	0.00	0.00
20 - 40	0	0.00	0.00
40 - 60	5	0.69	0.69
60 - 80	102	14.17	14.86
80 - 100	613	85.14	100.00

Total Number of Valid Hours: 720

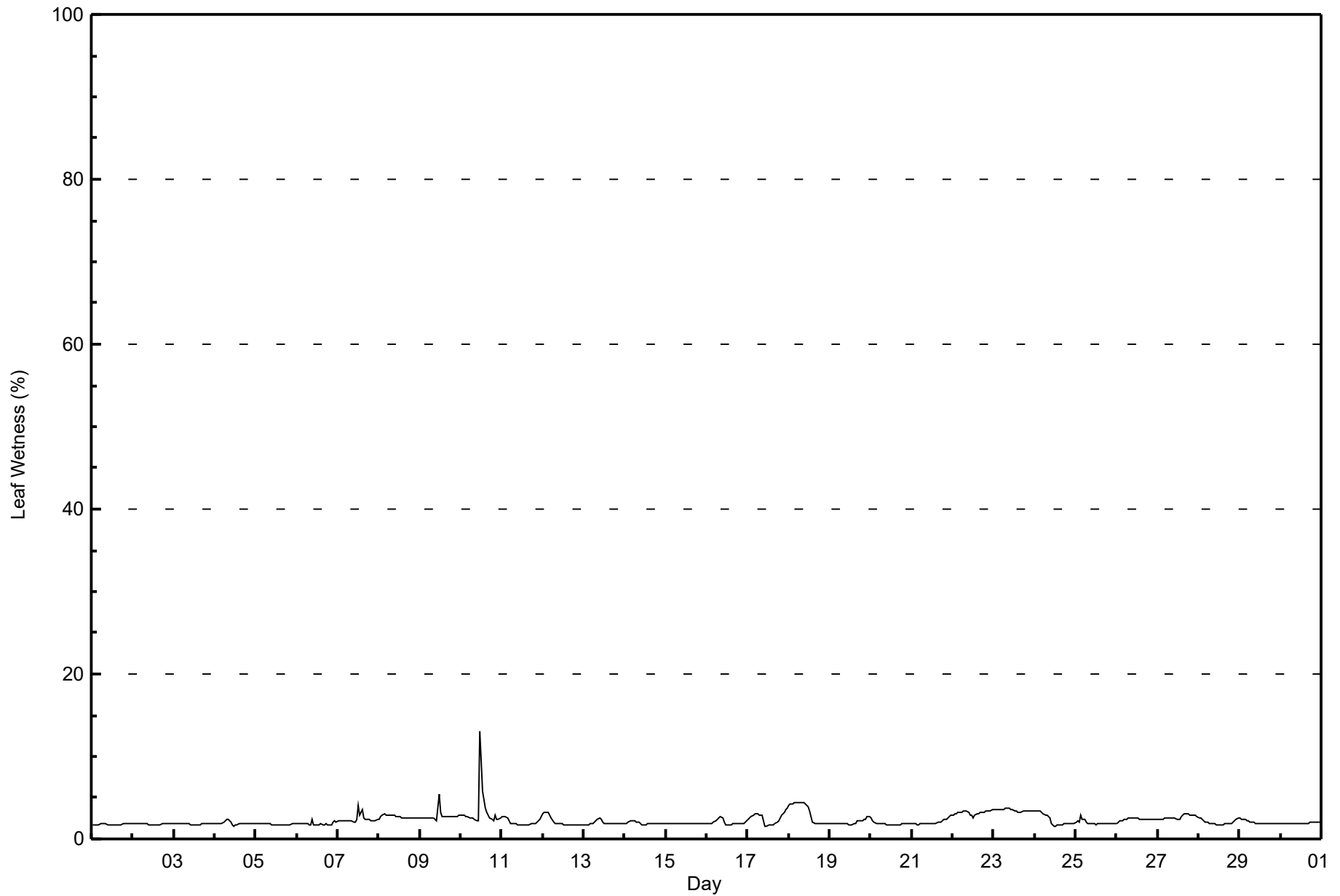
Total Number of Hours: 720





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

**Leaf Wetness (LW) - %**  
**Fort Chipewyan - November 2023**





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

**Leaf Wetness (LW) - %**  
**Fort Chipewyan - November 2023**

<b>Concentration Ranges (%)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 0.3	0	0.00	0.00
0.4 - 0.5	0	0.00	0.00
0.6 - 0.7	0	0.00	0.00
0.8 - 1.4	0	0.00	0.00
1.5 - 10	719	99.86	99.86
> 10	1	0.14	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association

Summary of Hour Averages

Precipitation (PC) - mm

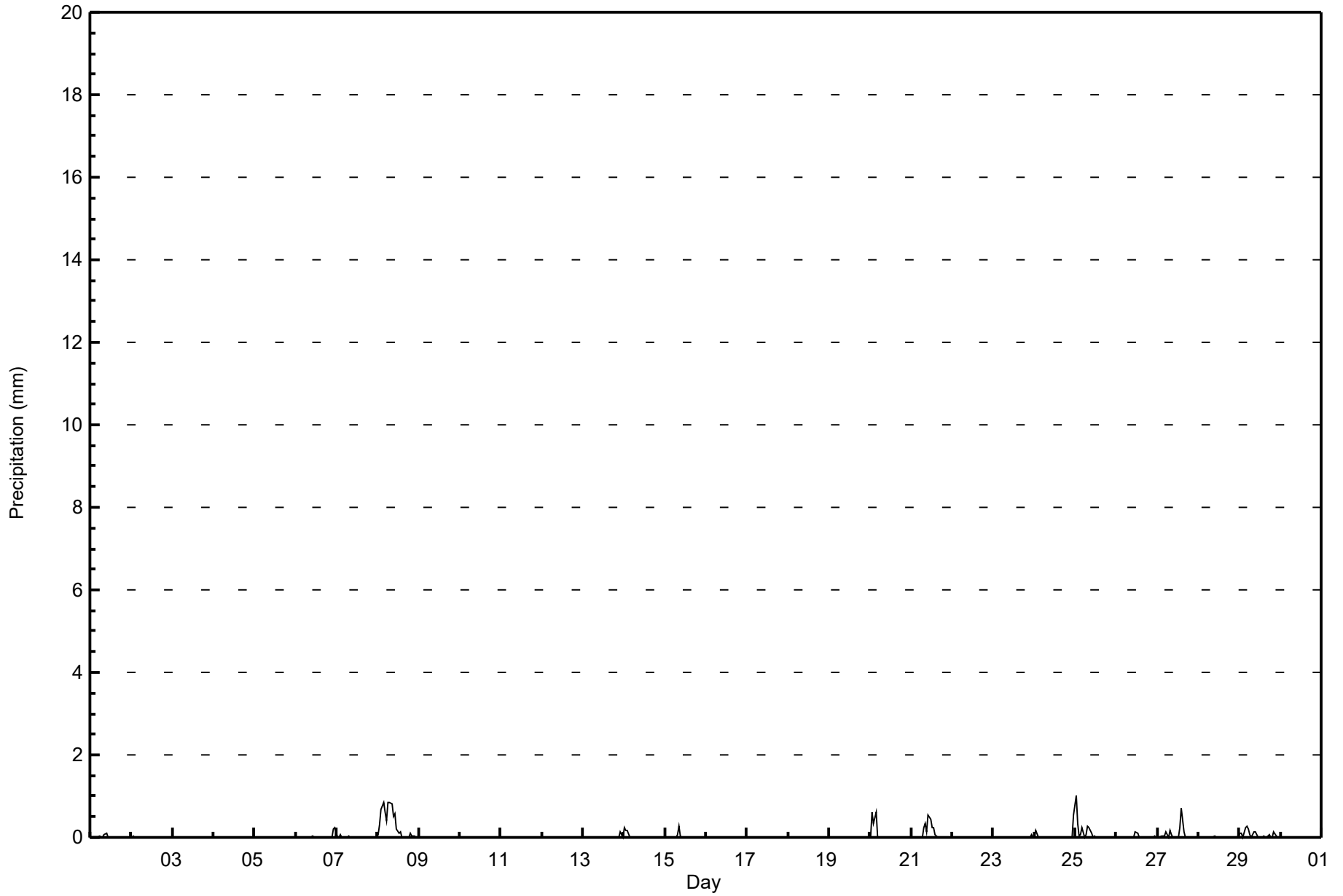
Fort Chipewyan - November 2023

Maximum Value: 1.0 mm on Nov 25 01:00		Maximum Daily Total: 7.2 mm on Nov 8		Hours in Service: 720																							
Minimum Value: 0.0 mm on Nov 1 01:00		Minimum Daily Total: 0.0 mm on Nov 3		Hours of Data: 719																							
Maximum Diurnal Total: 2.0 mm at hour 9		Minimum Diurnal Total: 0.0 mm at hour 17		Hours of Missing Data: 1																							
Monthly Total: 19.66 mm		Percentiles: P <sub>1</sub> = 0.0 P <sub>10</sub> = 0.0 Q <sub>1</sub> = 0.0 Median = 0.0 Q <sub>3</sub> = 0.0 P <sub>90</sub> = 0.1 P <sub>99</sub> = 0.6		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-Nov	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.1	
2-Nov	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	
3-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
4-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
5-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
6-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.5	0.2	
7-Nov	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	
8-Nov	0.1	0.3	0.7	0.9	0.6	0.4	0.8	0.9	0.8	0.5	0.6	0.2	0.1	0.2	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.0	7.2	0.9	
9-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
10-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
11-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
12-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
13-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	
14-Nov	0.3	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.3	
15-Nov	0.0	0.0	0.0	DF	0.0	0.0	0.0	0.1	0.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.3	
16-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
17-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
18-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
19-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
20-Nov	0.0	0.6	0.3	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.5	0.6	
21-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.4	0.1	0.5	0.4	0.2	0.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.2	0.5	
22-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
23-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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	0.1	
24-Nov	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.7	0.5	
25-Nov	1.0	0.3	0.1	0.1	0.2	0.0	0.1	0.3	0.2	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	2.4	1.0	
26-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.3	0.1	
27-Nov	0.0	0.0	0.1	0.1	0.1	0.1	0.0	0.2	0.1	0.0	0.0	0.0	0.0	0.2	0.7	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.6	0.7	
28-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	
29-Nov	0.1	0.1	0.0	0.3	0.3	0.2	0.1	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.1	0.1	0.0	0.0	1.7	0.3	
30-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
		1.5	1.7	1.3	1.8	1.1	0.8	1.0	1.6	2.0	1.1	1.2	0.8	0.4	0.6	0.8	0.1	0.0	0.1	0.0	0.1	0.2	0.1	0.4	0.8	Diurnal Average	
		1.0	0.6	0.7	0.9	0.6	0.4	0.8	0.9	0.8	0.5	0.6	0.4	0.2	0.3	0.7	0.1	0.0	0.1	0.0	0.1	0.1	0.1	0.2	0.5	Diurnal Maximum	
DF - DAS Failure																											



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

**Precipitation (PC) - mm**  
**Fort Chipewyan - November 2023**







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

**Precipitation (PC) - mm**  
**Fort Chipewyan - November 2023**

<b>Concentration Ranges (mm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 0.3	703	97.77	97.77
0.4 - 0.5	5	0.70	98.47
0.6 - 0.7	6	0.83	99.30
0.8 - 1.4	5	0.70	100.00
1.5 - 10	0	0.00	100.00
> 10	0	0.00	100.00

Total Number of Valid Hours: 719

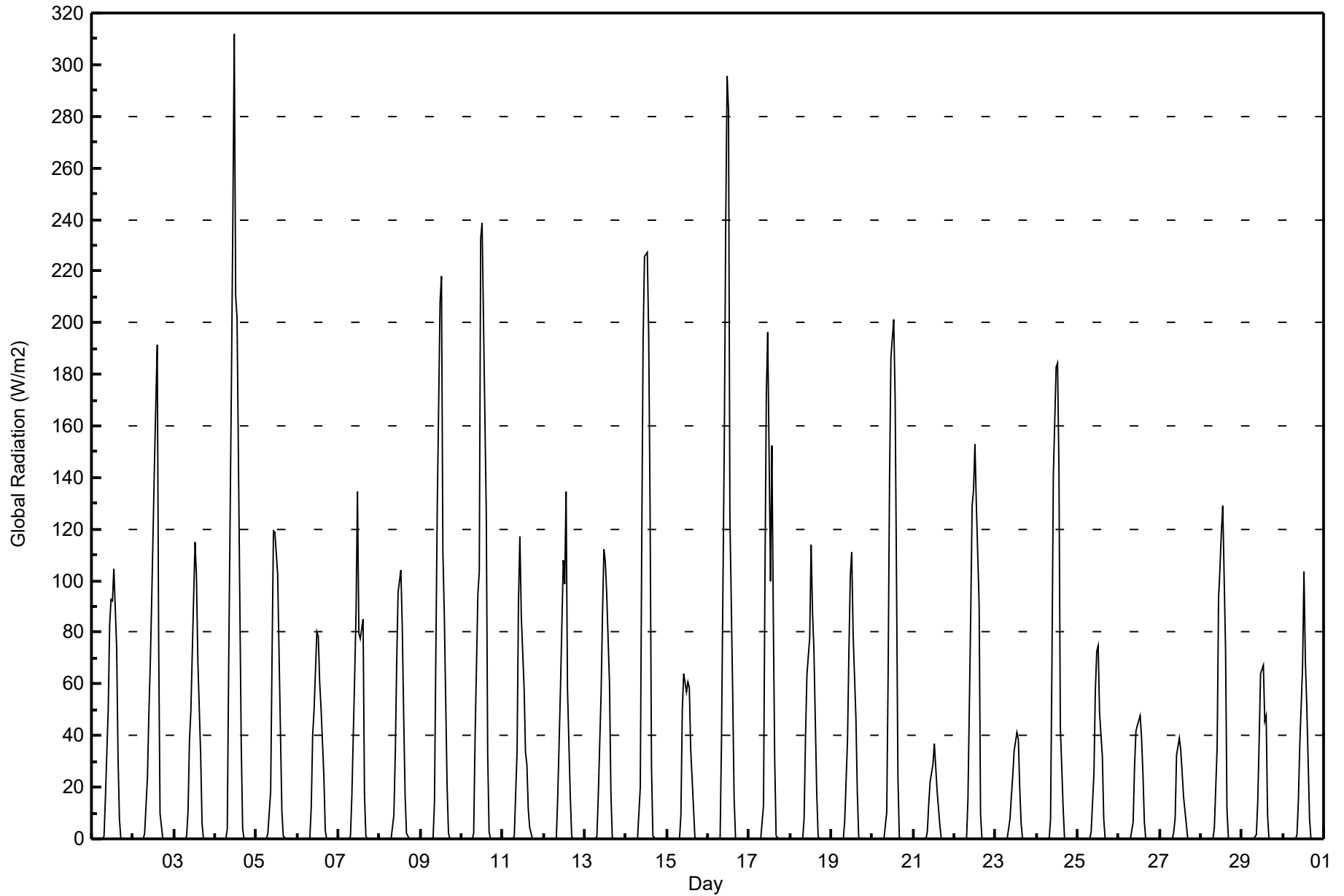
Total Number of Hours: 720



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

**Global Radiation (GR) - W/m2**  
**Fort Chipewyan - November 2023**

Maximum Value: 311.7 W/m2 on Nov 4 12:00      Maximum Daily Average: 55.9 W/m2 on Nov 4																						Hours in Service:	720				
Minimum Value: 0.0 W/m2 on Nov 1 01:00      Minimum Daily Average: 6.5 W/m2 on Nov 21																						Hours of Data:	720				
Maximum Diurnal Average: 122.6 W/m2 at hour 12      Minimum Diurnal Average: 0.0 W/m2 at hour 3																						Hours of Missing Data:	0				
Monthly Average: 24.87 W/m2      Percentiles: P <sub>1</sub> = 0.0 P <sub>10</sub> = 0.0 Q <sub>1</sub> = 0.0 Median = 0.0 Q <sub>3</sub> = 25.0 P <sub>90</sub> = 92.7 P <sub>99</sub> = 226.9																						Hours of Calibration:	0				
																						Percent Operational Time:	100.0				
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	16.2	50.3	82.8	92.6	92.3	104.8	74.3	31.7	7.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	23.1	104.8
2-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0	23.8	48.3	67.5	91.7	144.7	169.5	191.5	76.7	9.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	34.4	191.5
3-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9	10.6	37.7	49.1	93.6	115.2	101.3	68.7	32.7	6.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	21.5	115.2
4-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.6	65.9	178.4	240.8	311.7	210.3	202.0	90.5	35.5	3.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	55.9	311.7
5-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.2	18.3	71.2	119.4	118.7	102.6	71.4	41.0	10.7	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	23.2	119.4
6-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	12.5	40.0	49.6	80.1	78.5	60.6	50.5	24.4	3.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	16.7	80.1
7-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9	16.8	63.1	88.6	134.5	79.6	77.6	85.4	17.6	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	23.6	134.5
8-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	9.3	32.3	67.6	95.4	104.1	81.7	47.5	17.4	2.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	19.1	104.1
9-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	14.4	74.0	129.0	208.5	217.9	111.2	87.1	20.9	2.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	36.1	217.9
10-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.4	39.8	95.1	103.8	232.6	238.6	201.2	125.8	33.1	2.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	44.8	238.6
11-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	34.0	92.4	117.1	86.2	58.4	33.6	28.9	11.3	4.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	19.5	117.1
12-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	15.9	36.7	58.7	108.2	98.5	134.6	58.2	16.2	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	22.0	134.6
13-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9	17.0	56.4	87.0	112.5	107.6	94.9	60.1	18.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	23.1	112.5
14-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	20.2	113.1	193.3	225.9	227.2	194.6	126.1	27.5	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	47.1	227.2
15-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.2	50.0	64.0	56.9	60.9	58.6	34.7	12.1	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.5	64.0
16-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	38.3	154.6	238.0	295.8	282.3	124.6	56.0	15.5	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	50.2	295.8
17-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	13.0	98.5	171.8	196.3	100.0	152.6	85.9	30.1	0.9	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	35.4	196.3
18-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	8.4	39.4	63.7	78.1	114.1	87.6	73.3	17.9	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.1	114.1
19-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.3	38.7	73.5	102.0	111.3	78.9	46.5	17.8	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	19.9	111.3
20-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.4	63.9	138.9	186.4	201.3	170.9	99.9	23.8	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	37.3	201.3
21-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.9	13.5	22.5	28.6	37.1	27.4	18.5	4.9	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.5	37.1
22-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15.0	87.4	129.1	135.0	153.0	129.7	90.8	9.7	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	31.2	153.0
23-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.7	16.2	24.6	33.9	41.2	38.8	19.6	5.7	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.8	41.2
24-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.8	68.2	141.0	182.6	184.4	143.4	43.5	11.9	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	32.6	184.4
25-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.8	25.5	57.4	72.6	74.7	48.8	32.3	7.8	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	13.4	74.7
26-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.4	28.1	41.8	43.9	48.0	38.8	24.9	6.4	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.9	48.0
27-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.5	8.4	32.5	39.0	34.3	25.3	16.5	5.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.8	39.0
28-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.1	35.7	93.4	104.6	119.0	129.0	73.4	11.2	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	23.8	129.0
29-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.5	14.8	38.5	63.9	67.4	45.4	47.8	9.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12.0	67.4
30-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.5	14.6	36.6	66.7	103.7	69.0	51.6	7.4	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.6	103.7
																						Diurnal Average					
																						Diurnal Maximum					





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

**Global Radiation (GR) - W/m<sup>2</sup>**  
**Fort Chipewyan - November 2023**

<b>Concentration Ranges (W/m<sup>2</sup>)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	533	74.03	74.03
21 - 100	124	17.22	91.25
101 - 300	62	8.61	99.86
301 - 600	1	0.14	100.00
601 - 900	0	0.00	100.00
> 900	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



Maximum Speed: 36 km/h on Nov 10 06:00	Maximum Daily Speed Average: 28.4 km/h on Nov 5	Hours in Service: 720
Minimum Speed Value: 0 km/h on Nov 21 13:00	Minimum Daily Speed Average: 0.4 km/h on Nov 1	Hours of Data: 720
Maximum Diurnal Speed Average: 2.2 km/h at hour 4	Minimum Diurnal Speed Average: 0.1 km/h at hour 24	Hours of Missing Data: 0
Monthly Average Velocity: 0.1 km/h 302.2 deg	Percentiles: P <sub>1</sub> = 2 P <sub>10</sub> = 5 Q <sub>1</sub> = 7 Median = 12 Q <sub>3</sub> = 17 P <sub>90</sub> = 24 P <sub>99</sub> = 31	Percent Operational Time: 100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	W11	W10	W8	W9	W8	WSW8	W8	W5	SW5	SW6	SSW5	E8	E13	E11	E12	E9	E9	E9	E9	ENE7	ENE4	ENE4	W2	WNW3	E0.4	E13
2-Nov	NNW5	NNW8	NNW9	N11	N13	N12	N10	NNW8	N10	N10	N10	N12	N13	NNW10	N8	N6	N5	N7	NNE6	N6	W2	SSE3	SSE10	SSE8	N6.7	N13
3-Nov	ESE13	SE12	SE16	SE7	ESE12	E8	E11	ESE14	SE9	SE7	E4	E7	E9	E12	E14	E13	ENE8	ENE8	NE8	NE9	ENE8	E11	ESE13	E13	E9.3	SE16
4-Nov	E15	E18	E14	E13	E15	E16	E14	E9	E11	E17	E14	E12	E16	ENE16	ENE21	E25	E27	E31	E31	E31	E31	E30	ENE26	E29	E19.9	E31
5-Nov	E30	ENE28	ENE29	ENE29	ENE29	ENE28	ENE25	ENE23	ENE25	ENE23	ENE26	E30	E31	E31	E31	ENE28	E31	E30	E31	E32	E30	E29	E29	E30	ENE28.4	E32
6-Nov	E31	E30	E28	E27	E24	ESE24	ESE24	ESE24	ESE25	ESE24	ESE23	SE18	SSE17	SSE15	SSE15	SSE11	SE8	ENE9	E9	ESE9	S5	WSW5	WSW6	WSW7	ESE14.9	E31
7-Nov	WSW5	W5	WSW6	W7	W7	W6	W6	W5	WNW4	NW1	SE3	ENE4	E3	E4	E9	E7	E10	ENE9	ENE10	ENE12	ENE13	ENE14	NE12	NE11	ENE2.9	ENE14
8-Nov	NE11	NNE9	NNW6	NNW11	NNW12	NNW13	NNW14	NNW14	NNW14	NNW13	NNW12	NNW11	NW13	NW15	NW14	NW12	NW10	NW9	NW9	NW9	WNW7	W5	W6	W5	NNW9.6	NW15
9-Nov	WNW7	W4	WSW2	WSW5	WSW4	W3	SSW4	S9	SSE12	SE12	ESE14	SSE20	SSE25	S26	S25	SSE24	SSE19	SSE17	SSE21	S23	SSE21	SSE18	SSE15	S21	S13.1	S26
10-Nov	S20	SSE17	S24	S31	S34	S36	S26	S27	S21	S18	S21	S28	S27	S24	S21	S22	S25	S21	S20	S16	S15	S16	S15	S14	S22.3	S36
11-Nov	S20	S19	SSE15	SE15	SSE26	SSE28	SE27	ESE23	ESE25	SE25	SE28	SE26	SE24	SE20	SE25	SE19	SE19	SSE19	SSE18	S21	SSW18	SSW8	SSW7	SW11	SSE18.4	SE28
12-Nov	SSW10	WSW12	W19	W19	W17	WNW14	NW13	WNW11	WNW14	W19	W20	W23	W22	W21	W19	W17	W16	W21	W19	W19	W18	W16	W19	WNW18	W17.0	W23
13-Nov	WNW20	WNW14	WNW14	WNW11	W7	W8	WNW7	NW7	NW8	NNW4	NE4	ENE8	ESE8	E7	E7	ENE8	ENE12	NE13	NE11	ENE17	ENE19	ENE18	ENE15	NE13	NNE4.8	WNW20
14-Nov	NE11	ENE7	E8	ESE5	W4	W8	W10	W6	SSW4	SSW8	SSW15	S15	SSW12	WSW17	WSW17	WSW11	W11	W11	WNW6	NW7	NW7	NNW7	NW5	NW5	WSW4.5	WSW17
15-Nov	NW5	NW6	NNW4	NW5	NNW8	NNW7	NW8	NW10	WNW10	WNW13	WNW16	WNW17	WNW20	WNW20	W15	W14	W15	W16	W15	W14	W12	W11	W11	W8	WNW11.0	WNW20
16-Nov	W9	W7	SW8	SW6	SSW6	SSW5	S6	ESE6	SE11	ESE14	ESE13	ESE15	ESE15	SE23	SSE13	SSE10	SSE8	SE8	SE8	S10	SE8	SSE7	SE6	SSW7	SSE6.5	ESE15
17-Nov	SSW10	W12	W15	W18	W17	W16	WNW16	WNW15	WNW14	WNW14	WNW17	WNW18	WNW16	WNW12	NW8	WNW6	W7	WSW7	WSW5	W6	NW4	ENE5	E4	E5	W9.6	WNW18
18-Nov	E9	ENE10	E13	E12	E13	E16	ENE17	E18	E18	ENE17	ENE21	E25	ENE23	ENE23	ENE18	ENE17	ENE20	ENE18	ENE14	ENE20	ENE20	ENE16	ENE19	ENE20	ENE17.3	E25
19-Nov	ENE20	ENE23	ENE20	ENE18	ENE15	NE12	ENE11	ENE15	ENE18	ENE14	ENE10	ENE8	E8	E5	ESE2	SSE3	ESE3	W4	W6	WSW6	SSW5	SSW7	WSW5	W11	ENE6.6	ENE23
20-Nov	W25	W31	WNW33	WNW35	WNW31	WNW33	WNW31	WNW25	WNW25	WNW24	WNW25	W23	WNW27	WNW24	WNW26	WNW27	WNW21	WNW18	WNW16	WNW17	WNW16	W13	W14	W13	WNW23.6	WNW35
21-Nov	W14	WNW15	WNW15	WNW13	W10	WNW7	W6	WNW8	WNW4	W2	NNW2	WNW2	E0	NNW3	N5	N5	NNW5	NNW5	NNW9	N10	N9	N10	NNE3	NW5	NW5.7	WNW15
22-Nov	NW5	WNW9	NW6	NNW8	NNW7	NNW4	WNW3	NNW5	N6	N5	N3	NNE3	SSW3	E4	E7	E8	E6	E8	E10	E10	E8	E9	E12	E15	ENE3.3	E15
23-Nov	E14	ENE11	E10	ESE12	E16	E14	E14	E13	E11	E10	E9	E7	E4	E4	SSE5	S12	S13	S11	SSW12	S10	S11	SSW12	SSW14	SW13	SE6.6	E16
24-Nov	SW12	WSW15	W17	W21	W22	W20	W20	W18	W18	W16	W15	W14	W16	WNW12	WSW10	W14	W12	W12	W13	W9	W11	W10	NW11	NW10	W14.0	W22
25-Nov	NW12	NW14	NNW18	NNW14	NNW15	NW13	NW21	NNW17	NW19	NW19	NW18	NW18	NW13	NW12	NW12	NW16	WNW14	NW10	WNW11	WNW12	WNW9	WNW8	NW5	NW4	NW13.1	NW21
26-Nov	W4	W5	ENE1	ENE5	ENE5	WSW1	E4	ENE4	E3	E3	E4	SE3	SSE4	SSE5	SE5	SE7	SSE6	SW6	SW4	W5	SSW1	SSE1	SW4	ENE1	SE1.7	SE7
27-Nov	NE4	E5	ESE8	ESE8	E13	E13	E11	E12	ESE13	ESE11	SE10	SE9	SE8	S8	S8	SSW10	SSW10	SW12	WSW9	W12	W17	W18	W21	W23	S3.2	W23
28-Nov	W22	WNW22	WNW23	W22	W20	WNW19	W20	WNW18	W16	W17	W17	W13	W11	W12	W13	W11	W9	WNW13	WNW11	WNW9	WNW11	W7	WNW11	WNW12	W15.0	WNW23
29-Nov	WNW11	NW10	WNW8	WNW12	WNW11	WNW12	NW11	WNW10	WNW11	WNW13	WNW14	WNW13	WNW15	WNW16	WNW18	NW19	NW16	NW17	NW15	NW13	NW13	NNW11	NNW12	NW7	NW12.4	NW19
30-Nov	NW6	NNW9	NNW8	NNW6	N5	NNW6	NNW6	NNW7	WNW6	WNW11	NW10	WNW9	W9	W9	W8	WSW8	W7	WNW3	W6	WNW2	W4	W5	W4	W4	WNW5.9	WNW11

NNW0.6	NW1.7	NW1.8	NW2.2	NW1.6	NW1.5	NW1.6	N1.3	NNE0.8	NE0.2	ENE0.3	SE1.2	SSE1.0	SSW0.6	SSE1.2	S1.3	SSE1.5	SSE0.5	SE0.4	ESE0.5	ESE0.5	ESE0.8	SSE0.5	WSW0.1	Diurnal Average	
E31	W31	WNW33	WNW35	S34	S36	WNW31	S27	ESE25	SE25	SE28	E30	E31	ENE31	E31	ENE28	E31	E31	E31	E32	E31	E30	E29	E30	Diurnal Maximum	

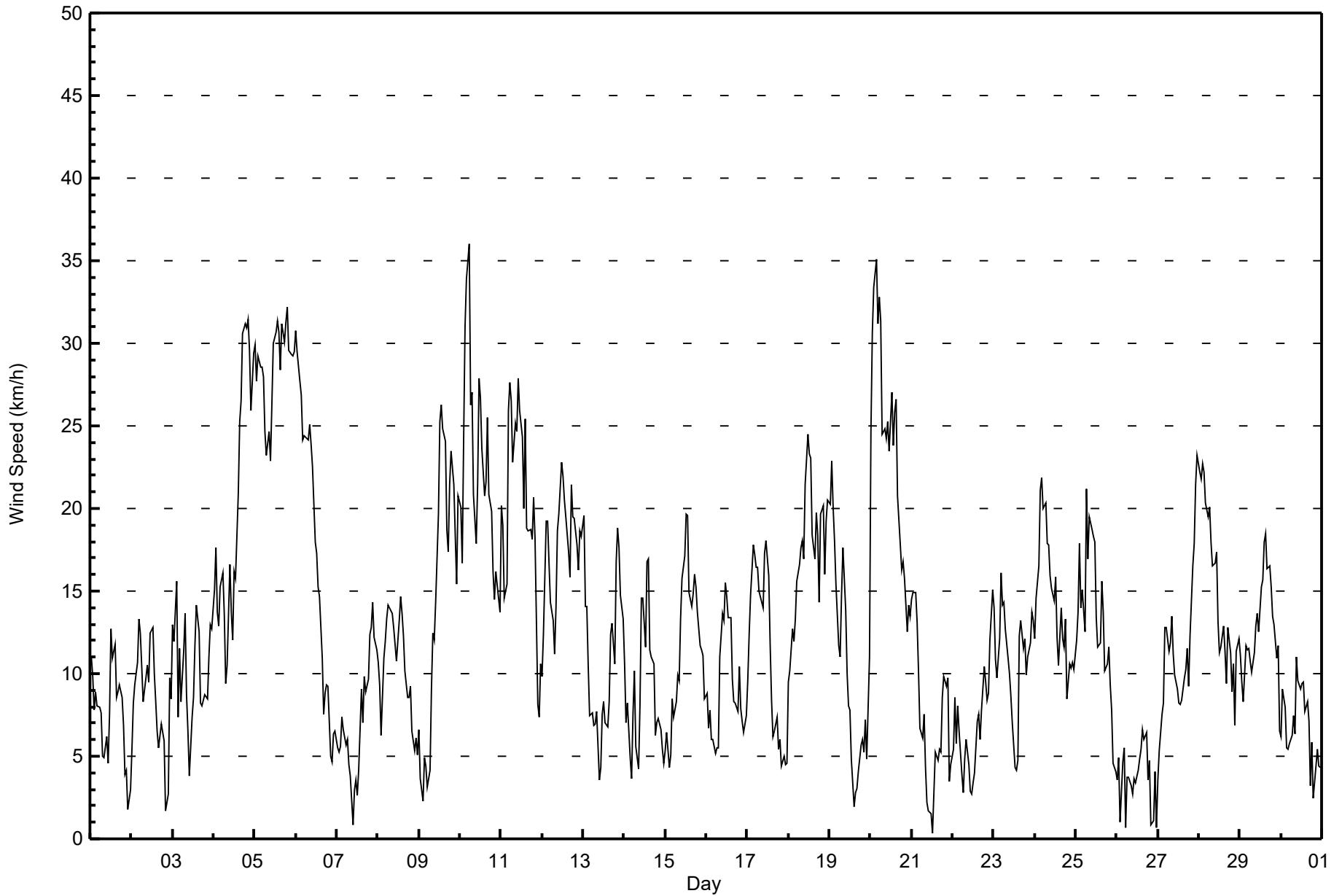
All monthly, daily, and diurnal averages have been calculated using vector methods



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

**Wind Speed (WS) - km/h**  
**Fort Chipewyan - November 2023**

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





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h  
Fort Chipewyan - November 2023**

<b>Wind Speed Ranges (km/h)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	110	15.28	15.28
6 - 11	239	33.19	48.47
12 - 19	238	33.06	81.53
20 - 28	100	13.89	95.42
29 - 38	33	4.58	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720





**Wood Buffalo Environmental Association  
Frequency Distribution**

**Wind Speed (WS) - km/h  
Fort Chipewyan - November 2023**

<b>Wind Speed Ranges (km/h)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	5	2	1	11	14	3	3	6	1	7	2	9	19	7	10	10	110
6 - 11	12	2	5	16	36	6	13	7	8	10	5	11	40	26	21	21	239
12 - 19	4	0	4	22	33	11	8	13	10	6	3	4	47	39	21	13	238
20 - 28	0	0	0	20	6	8	7	7	20	0	0	0	17	14	1	0	100
29 - 38	0	0	0	4	20	0	0	0	3	0	0	0	1	5	0	0	33
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	21	4	10	73	109	28	31	33	42	23	10	24	124	91	53	44	720

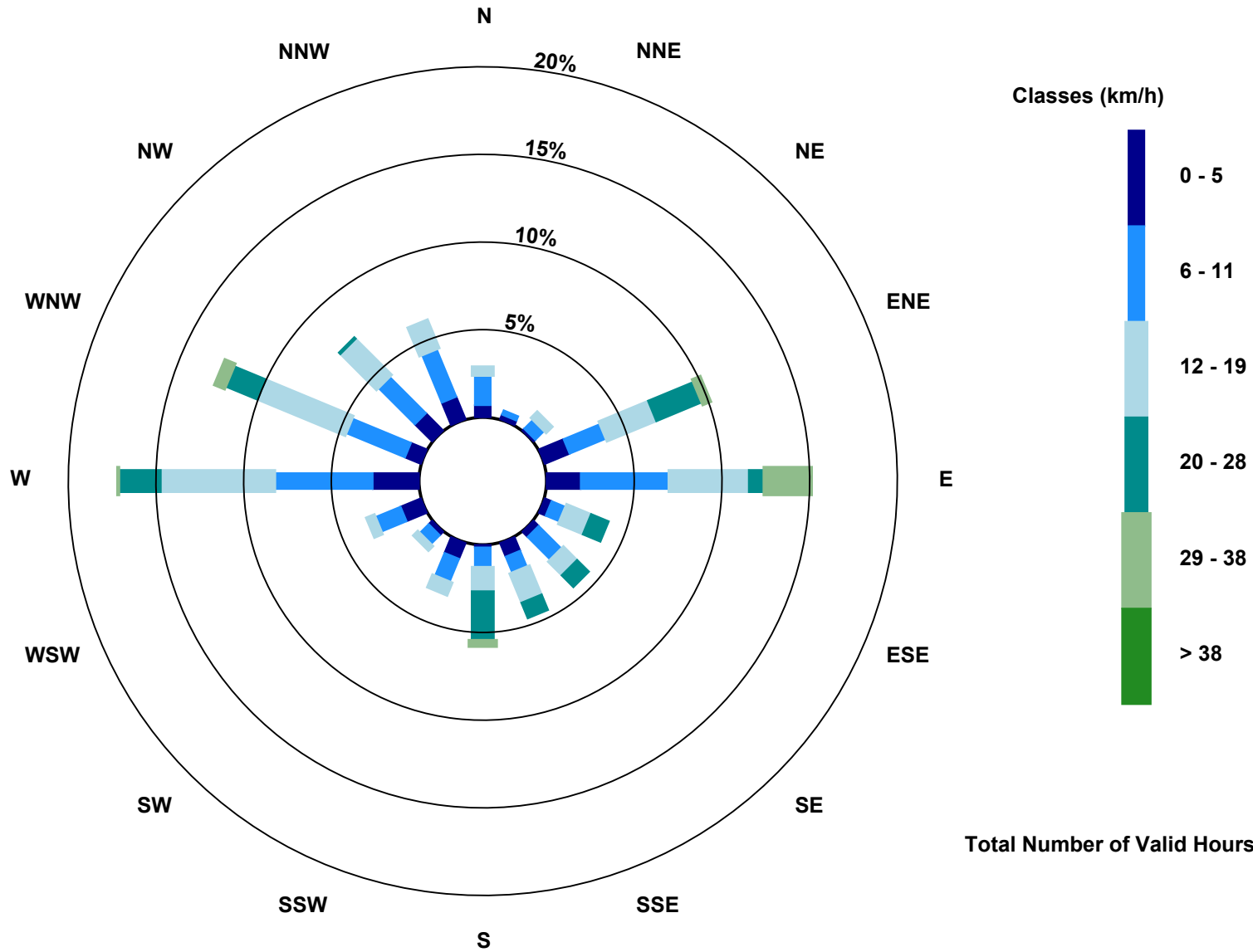
Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 2023

Wind Speed (WS) - km/h  
Fort Chipewyan





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

**Wind Direction (WD) - deg**  
**Fort Chipewyan - November 2023**

Direction of Maximum Speed: 180 deg on Nov 10 06:00	Hours in Service: 720
Direction of Maximum Daily Speed Average: 78.7 deg on Nov 5	Hours of Data: 720
Direction of Minimum Speed: 80 deg on Nov 21 13:00	Hours of Missing Data: 0
Direction of Minimum Daily Speed Average: 0.4 deg on Nov 1	Percent Operational Time: 100.0
Monthly Average Direction: 302.2 deg	

Day	Hourly Period Ending At (MST)																								Daily Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Nov	275	276	276	275	260	255	272	275	236	226	213	101	91	84	79	89	88	80	84	78	75	63	270	298	86.5
2-Nov	348	345	344	349	355	350	355	345	358	9	356	1	2	343	351	354	349	3	20	2	273	158	168	150	356.2
3-Nov	120	132	143	133	107	96	98	114	134	125	91	97	86	84	80	91	77	65	54	51	69	94	106	99	99.7
4-Nov	85	87	88	82	83	86	94	80	90	91	81	87	83	72	75	92	87	87	86	81	79	79	76	79	83.4
5-Nov	79	73	71	72	70	71	70	70	72	71	72	81	80	79	82	78	82	80	83	86	89	90	90	88	78.7
6-Nov	90	92	90	96	98	110	115	115	113	116	117	129	154	152	154	153	127	77	84	112	173	245	253	251	114.1
7-Nov	254	260	257	265	277	273	267	271	283	315	126	67	96	90	91	95	80	75	70	72	66	67	56	50	62.1
8-Nov	40	28	342	338	339	338	337	336	332	333	329	329	325	324	323	324	320	318	315	311	295	269	266	281	329.2
9-Nov	295	270	245	246	252	267	201	191	163	130	118	165	166	179	176	167	156	151	161	171	167	167	164	177	169.4
10-Nov	171	162	177	177	185	180	181	178	178	185	185	185	186	182	175	176	177	188	190	184	185	187	181	174	180.5
11-Nov	179	181	154	134	162	159	144	120	110	131	133	125	127	142	139	144	146	151	158	179	195	195	193	214	149.2
12-Nov	211	256	270	273	274	291	304	292	283	276	273	267	272	274	270	274	268	267	266	274	274	274	278	283	273.3
13-Nov	290	299	296	291	278	278	284	320	314	345	40	67	107	87	80	71	58	55	56	72	74	68	69	54	30.4
14-Nov	48	65	89	119	275	270	276	272	210	202	198	183	209	244	251	255	261	281	282	316	326	328	312	325	253.6
15-Nov	324	326	330	326	343	329	322	304	301	290	295	299	293	302	276	271	265	267	279	281	272	264	269	275	290.3
16-Nov	280	273	230	230	202	203	176	111	125	119	110	105	104	142	147	153	149	133	138	190	137	164	136	203	148.9
17-Nov	212	260	278	281	278	281	282	289	289	283	282	286	285	292	310	288	261	255	255	270	310	76	97	83	280.1
18-Nov	80	78	90	79	82	81	78	80	79	77	76	79	74	76	69	64	75	67	64	72	70	67	71	69	74.5
19-Nov	70	74	73	66	59	51	61	69	71	70	70	66	88	79	123	160	111	262	259	255	199	208	247	267	72.0
20-Nov	274	279	291	294	300	293	294	287	283	282	283	275	293	297	297	291	290	282	287	292	289	274	279	276	287.8
21-Nov	279	284	287	282	273	302	279	288	283	278	332	290	80	348	353	352	348	335	345	357	2	3	15	317	311.3
22-Nov	319	291	315	330	333	328	294	339	349	355	350	25	200	88	84	84	96	96	101	98	95	88	90	86	56.5
23-Nov	84	77	85	102	90	89	88	86	88	97	93	97	82	94	163	186	184	190	195	186	185	209	206	218	131.1
24-Nov	228	242	272	277	277	274	269	267	269	272	268	265	277	283	257	268	263	273	281	267	265	281	306	313	271.0
25-Nov	321	326	336	331	330	318	317	328	326	320	322	324	322	321	306	308	302	305	293	286	289	287	326	316	317.1
26-Nov	273	273	58	75	77	241	89	78	99	87	85	130	156	147	144	129	166	219	221	266	206	157	214	63	145.9
27-Nov	56	79	109	102	98	101	101	97	103	122	131	131	146	177	175	195	207	216	243	263	272	276	279	280	178.8
28-Nov	278	282	282	280	279	286	281	286	278	277	278	271	274	265	273	276	276	282	285	286	293	274	285	290	280.1
29-Nov	302	311	296	291	298	298	304	299	285	283	288	290	303	300	299	316	317	317	321	316	317	331	332	325	305.9
30-Nov	310	327	336	344	1	334	330	328	300	300	317	297	277	271	264	252	259	283	275	285	278	271	269	269	297.6

317.8 319.1 315.8 311.3 320.7 305.2 315.4 358.4 32.2 40.4 76.1 134.9 155.3 195.5 161.5 178.4 152.7 152.9 136.1 120.2 123.2 121.1 150.0 237.2  
 Diurnal Average

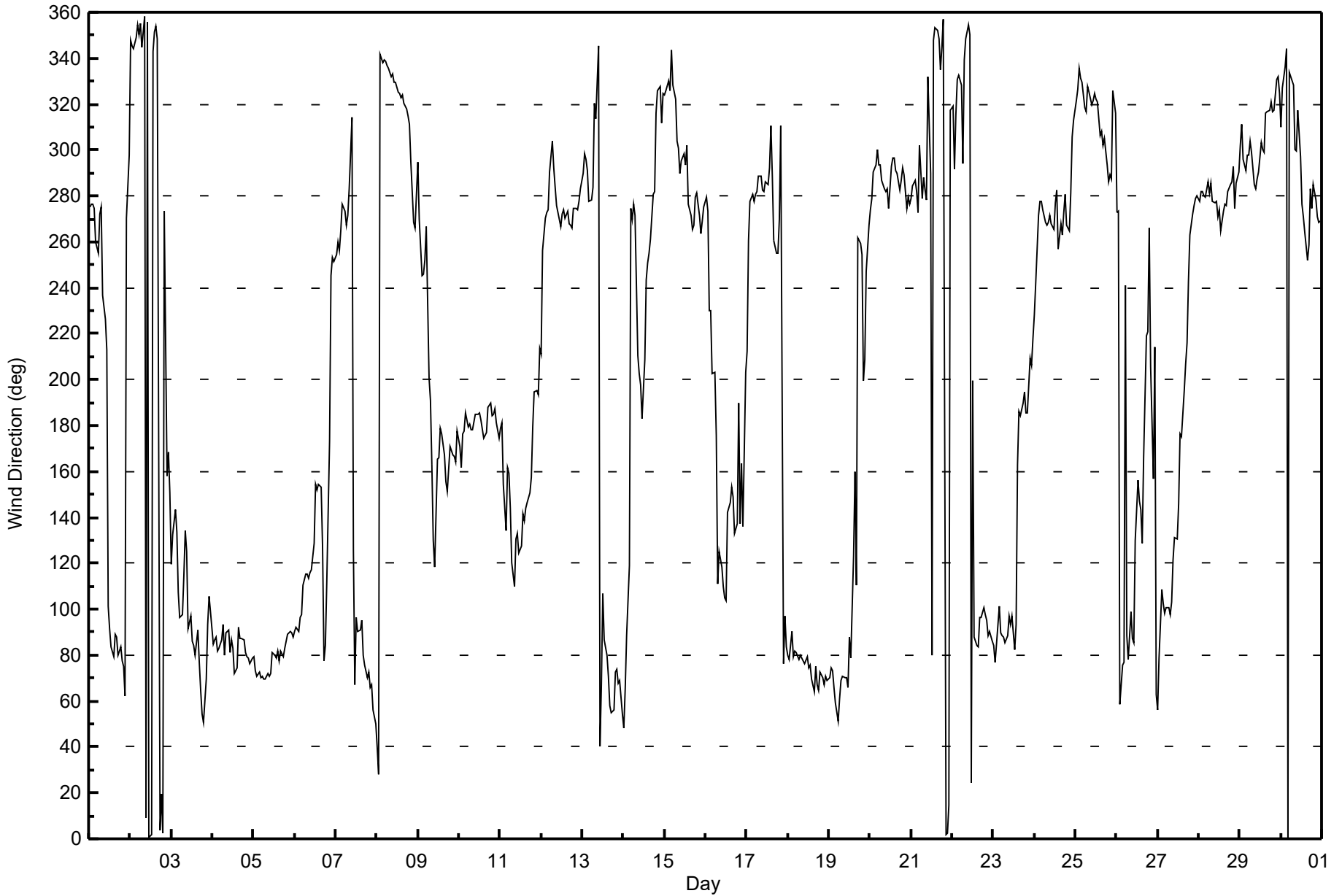
All monthly, daily, and diurnal averages have been calculated using vector methods



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

**Wind Direction (WD) - deg**  
**Fort Chipewyan - November 2023**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 89 deg on Nov 26 03:00 Minimum Value: 4 deg on Nov 11 09:00 Percentiles: P <sub>1</sub> = 4 P <sub>10</sub> = 6 Q <sub>1</sub> = 9 Median = 14 Q <sub>3</sub> = 19 P <sub>90</sub> = 25 P <sub>99</sub> = 69														Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0												
Day	Hourly Period Ending At (MST)																								Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	14	14	14	13	15	14	15	19	15	10	24	9	5	6	4	5	6	6	6	11	26	23	65	39	65	
2-Nov	19	18	20	21	21	22	23	24	24	25	26	23	23	29	30	28	15	13	8	16	79	48	20	17	79	
3-Nov	8	13	6	19	9	14	7	9	11	13	29	10	11	5	7	8	9	10	5	9	9	19	7	6	29	
4-Nov	5	8	8	6	6	6	9	7	13	9	5	5	5	9	5	5	4	4	5	4	5	4	5	6	5	13
5-Nov	5	6	6	6	7	6	7	7	7	7	6	5	5	5	5	6	5	5	5	4	5	4	4	4	4	7
6-Nov	4	4	4	4	7	5	4	4	4	4	4	11	11	9	11	11	24	5	8	10	21	22	21	15	24	
7-Nov	15	13	15	16	15	17	15	16	21	76	29	17	18	8	6	9	5	6	8	6	7	8	9	10	76	
8-Nov	12	17	22	16	17	19	19	20	21	23	24	25	21	20	19	21	20	19	17	14	18	15	15	17	25	
9-Nov	17	23	60	21	24	31	28	15	14	10	7	12	10	11	10	10	11	12	12	9	9	9	10	8	60	
10-Nov	9	10	10	9	8	7	8	7	8	9	9	8	9	10	10	9	7	7	7	7	9	9	10	10	10	
11-Nov	9	11	13	21	11	10	7	12	4	12	8	6	6	11	10	9	10	12	11	10	10	14	15	11	21	
12-Nov	10	19	14	13	13	15	17	15	15	15	15	15	15	15	16	15	14	14	14	15	15	15	14	15	19	
13-Nov	15	16	17	16	23	15	19	17	10	35	32	14	18	17	14	7	11	9	12	7	7	9	9	10	35	
14-Nov	11	13	10	10	34	14	14	25	31	12	10	8	22	15	15	17	13	17	12	21	21	22	26	28	34	
15-Nov	29	25	41	23	25	25	24	19	19	14	15	16	16	19	15	15	14	15	14	13	14	15	15	19	41	
16-Nov	13	18	13	18	22	18	18	48	28	26	13	6	7	21	11	16	19	20	21	14	20	28	22	21	48	
17-Nov	15	23	11	11	11	10	10	12	14	13	12	14	14	17	15	28	20	15	20	21	37	17	25	22	37	
18-Nov	7	6	9	5	5	7	7	5	5	8	11	6	6	6	8	10	7	10	8	7	6	8	6	7	11	
19-Nov	6	5	6	7	8	10	10	12	9	9	10	14	9	15	52	27	26	26	13	16	21	9	28	15	52	
20-Nov	14	14	15	15	16	15	15	16	14	14	14	14	16	16	16	14	14	14	14	14	15	15	13	13	16	
21-Nov	13	14	14	14	16	19	18	13	21	56	69	69	77	27	27	22	22	18	16	18	18	16	50	40	77	
22-Nov	37	8	18	13	18	62	46	21	17	26	33	53	25	42	11	8	17	19	8	7	8	14	8	6	62	
23-Nov	7	9	9	9	7	5	6	5	6	8	6	8	11	24	44	8	8	9	8	12	10	11	9	9	44	
24-Nov	11	15	15	14	13	13	13	13	12	13	14	15	15	14	18	15	15	13	14	14	14	22	12	16	22	
25-Nov	20	23	23	25	23	22	19	26	23	22	22	23	23	24	21	18	17	18	18	15	15	16	24	24	26	
26-Nov	45	21	89	19	9	77	19	20	23	20	15	34	17	12	16	10	13	30	46	21	73	64	18	72	89	
27-Nov	25	11	9	7	4	5	6	4	7	9	10	10	13	11	18	9	9	8	16	15	14	13	14	14	25	
28-Nov	14	13	13	13	13	13	13	13	11	11	12	14	15	14	17	12	11	15	12	12	11	24	12	13	24	
29-Nov	18	21	20	15	15	14	15	15	13	13	14	15	16	16	15	19	17	18	21	19	18	24	23	21	24	
30-Nov	23	25	26	28	22	35	26	24	23	18	20	24	17	15	16	14	23	49	18	41	11	13	17	17	49	
	45	25	89	28	34	77	46	48	31	76	69	69	77	42	52	28	26	49	46	41	79	64	65	72		
	Diurnal Maximum																									





## WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY  
MONITORING PROGRAM  
MONTHLY REPORT

### **AMS09 BARGE LANDING NOVEMBER 2023**

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

December 22, 2023

## WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - BARGE LANDING (AMS09)

NOVEMBER 2023

## MONTHLY SUMMARY

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2 (ppb) Average	686	33	34	99.86	4.9	0	1.4	0
TRS(ppb) Average	686	34	34	100	3.3	0	1.4	0
THC(ppm) Average	636	32	84	92.78	4.5	-	2.8	-
NMHC(ppm) Average	636	32	84	92.78	0.259	-	0.097	-
CH4(ppm) Average	636	32	84	92.78	4.2	-	2.7	-
NO2 (ppb) Average	685	35	35	100	32.8	0	17.8	-
NO (ppb) Average	685	35	35	100	78.4	-	32.7	-
NOX (ppb) Average	685	35	35	100	98.6	-	47	-
PM2.5(ug/m3) Average	719	1	1	100	37.7	0	18.3	0
Temperature (C) Average	720	0	0	100	5.6	-	1.7	-
Relative Humidity (%) Average	720	0	0	100	97.9	-	95.9	-
Barometric Pressure (inHg) Average	720	0	0	100	29.4	-	29.4	-
Wind Speed 20 m (km/h) Average	720	0	0	100	29	-	17	-
Wind Direction 20 m (deg) Average	720	0	0	100	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - BARGE LANDING (AMS09)  
NOVEMBER 2023

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile						
					Min	P10	Q1	Median	Q3	P90	Max
SO2 (ppb) Average	686	0.4	0.8	-	0	0	0	0.1	0.3	1.2	4.9
TRS(ppb) Average	686	0.5	0.5	-	0.1	0.2	0.2	0.3	0.5	1.2	3.3
THC(ppm) Average	636	2.11	0.3	-	1.8	1.9	2	2	2.2	2.4	4.5
NMHC(ppm) Average	636	0.012	0.034	-	0	0	0	0	0	0	0.259
CH4(ppm) Average	636	2.1	0.2	-	1.8	1.9	2	2	2.1	2.3	4.2
NO2 (ppb) Average	685	9.72	6.9	-	0.1	0.5	3.5	9.4	14.5	19	32.8
NO (ppb) Average	685	6.63	12.6	-	0	0	0	0.8	6.6	22	78.4
NOX (ppb) Average	685	16.35	17.3	-	0.1	0.6	3.8	11.5	22.2	39.3	98.6
PM2.5(ug/m3) Average	719	7.54	5	-	0.6	2.8	4.1	6.1	9.8	13.8	37.7
Temperature (C) Average	720	-4.1	4.4	-	-17.5	-10.4	-6.4	-3.7	-0.8	1.2	5.6
Relative Humidity (%) Average	720	84.01	10.1	-	47.6	69.5	78.7	85.7	91.8	94.8	97.9
Barometric Pressure (inHg) Average	720	28.85	0.3	-	28.3	28.5	28.6	28.8	29	29.2	29.4
Wind Speed 20 m (km/h) Average	720	8.8	5	-	0	4	6	8	11	15	29
Wind Direction 20 m (deg) Average	720	-	-	-	-	-	-	-	-	-	-



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - BARGE LANDING (AMS09)  
NOVEMBER 2023

OPERATIONAL NOTES

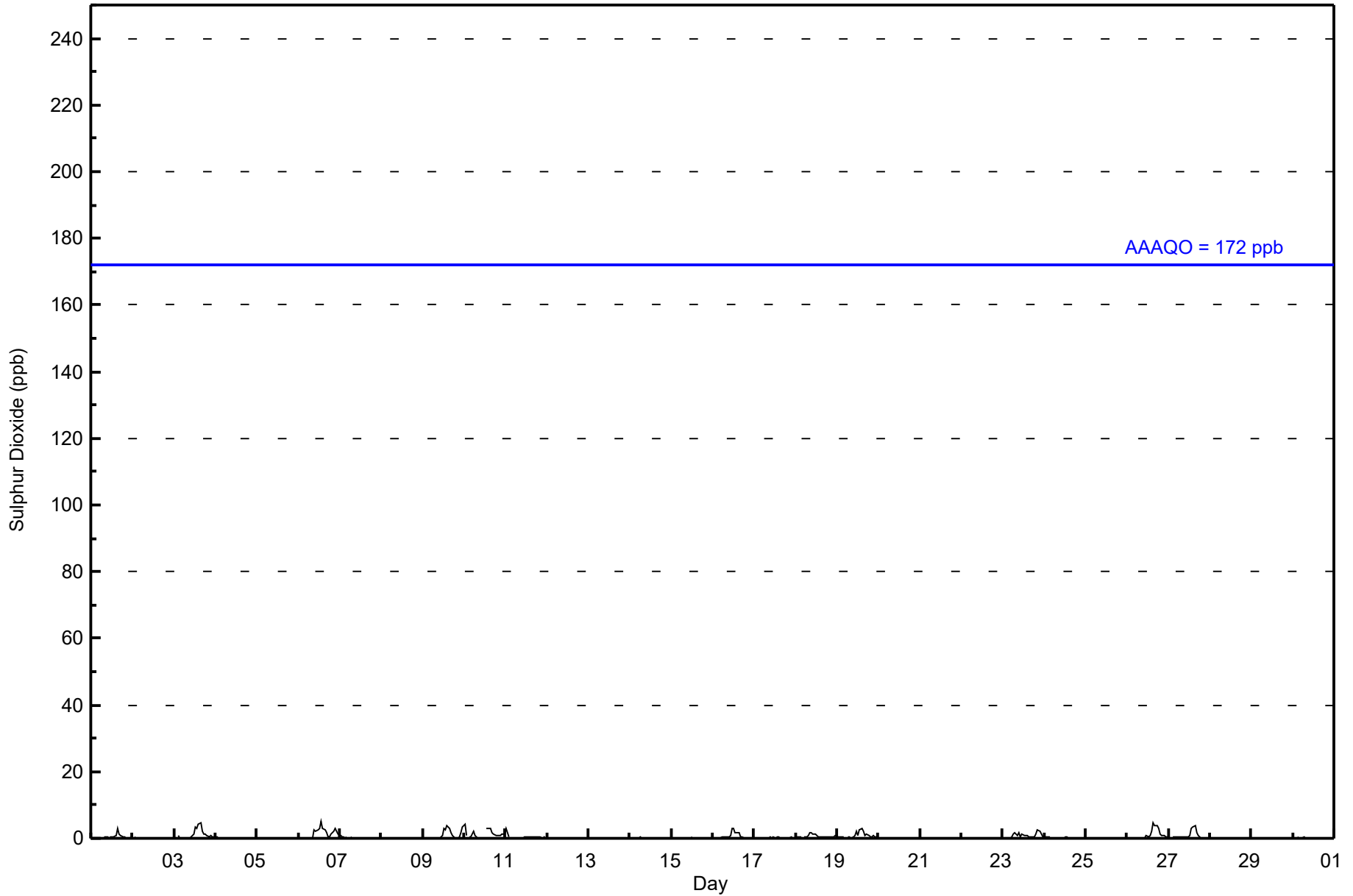
Parameter	Period Start	Period End	Duration (Hours)	Notes
SO2	15 Nov 2023 11:00	15 Nov 2023 11:00	1	Maintenance - station operator activities
THC/ NMHC/ CH4	14 Nov 2023 16:00	15 Nov 2023 01:00	10	Unstable Operation - excessive baseline drift
THC/ NMHC/ CH4	15 Nov 2023 03:00	15 Nov 2023 03:00	1	Unstable Operation - excessive baseline drift
THC/ NMHC/ CH4	15 Nov 2023 11:00	15 Nov 2023 14:00	4	Maintenance - analyzer recalibration
	16 Nov 2023 04:00	17 Nov 2023 11:00	32	Unstable Operation - excessive baseline drift
	17 Nov 2023 12:00	17 Nov 2023 16:00	5	Maintenance - replaced analyzer





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

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Barge Landing - November 2023**





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

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Barge Landing - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 10	686	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: 686

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Barge Landing - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 10	39	33	25	22	33	28	30	104	88	70	42	44	34	45	20	29	686
11 - 20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	<b>39</b>	<b>33</b>	<b>25</b>	<b>22</b>	<b>33</b>	<b>28</b>	<b>30</b>	<b>104</b>	<b>88</b>	<b>70</b>	<b>42</b>	<b>44</b>	<b>34</b>	<b>45</b>	<b>20</b>	<b>29</b>	<b>686</b>

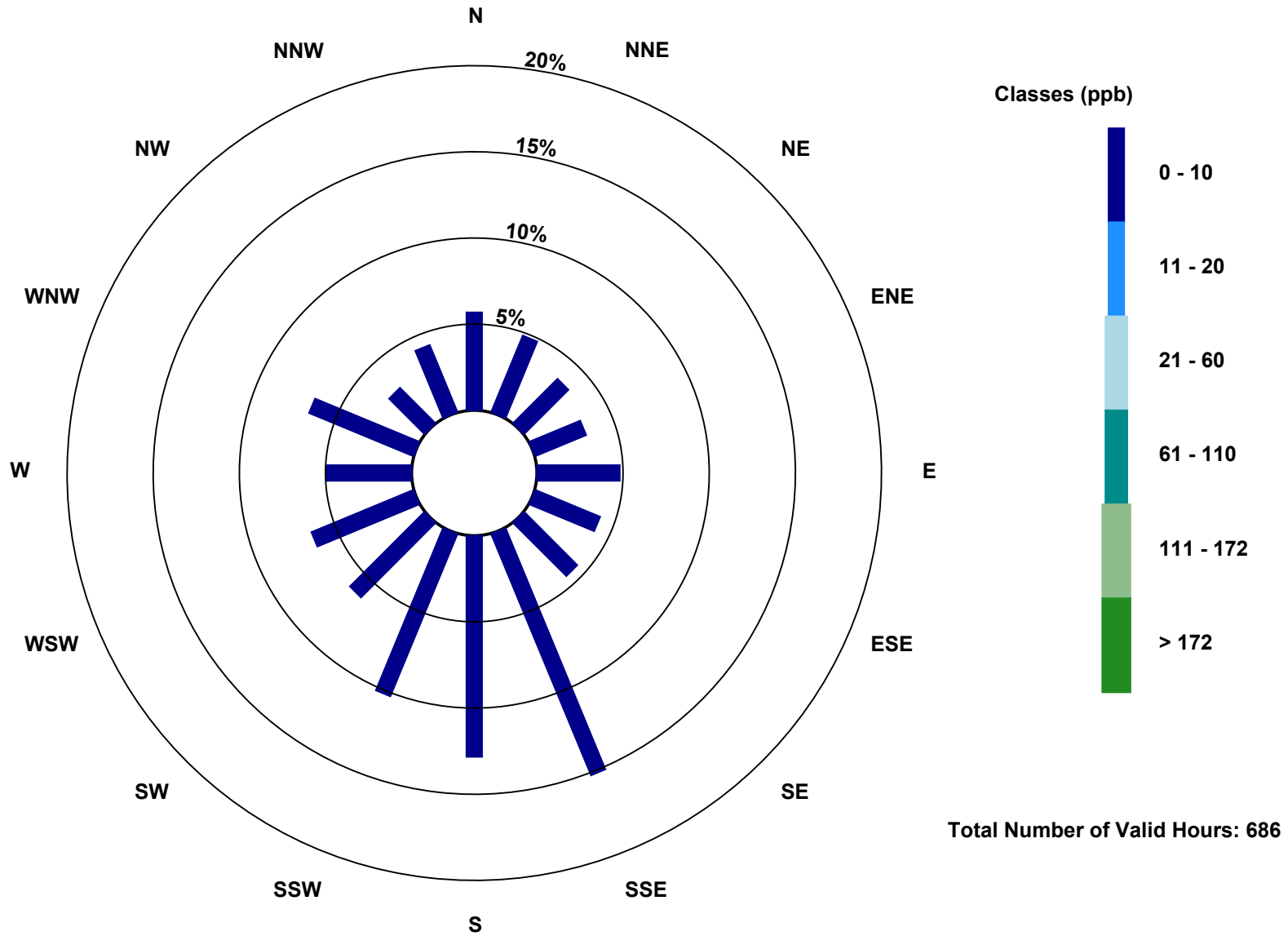
Total Number of Valid Hours: 686

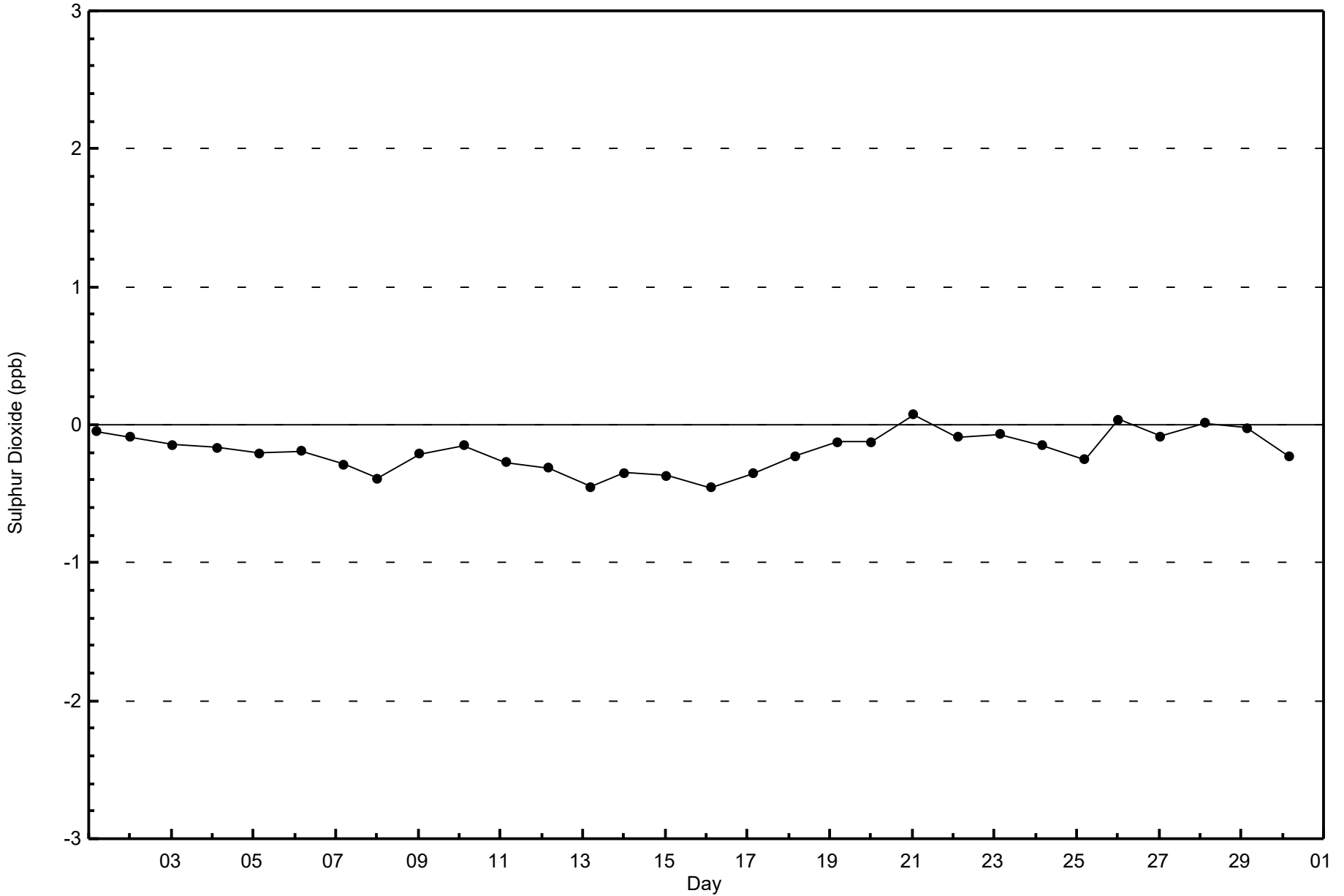
Total Number of Hours: 720

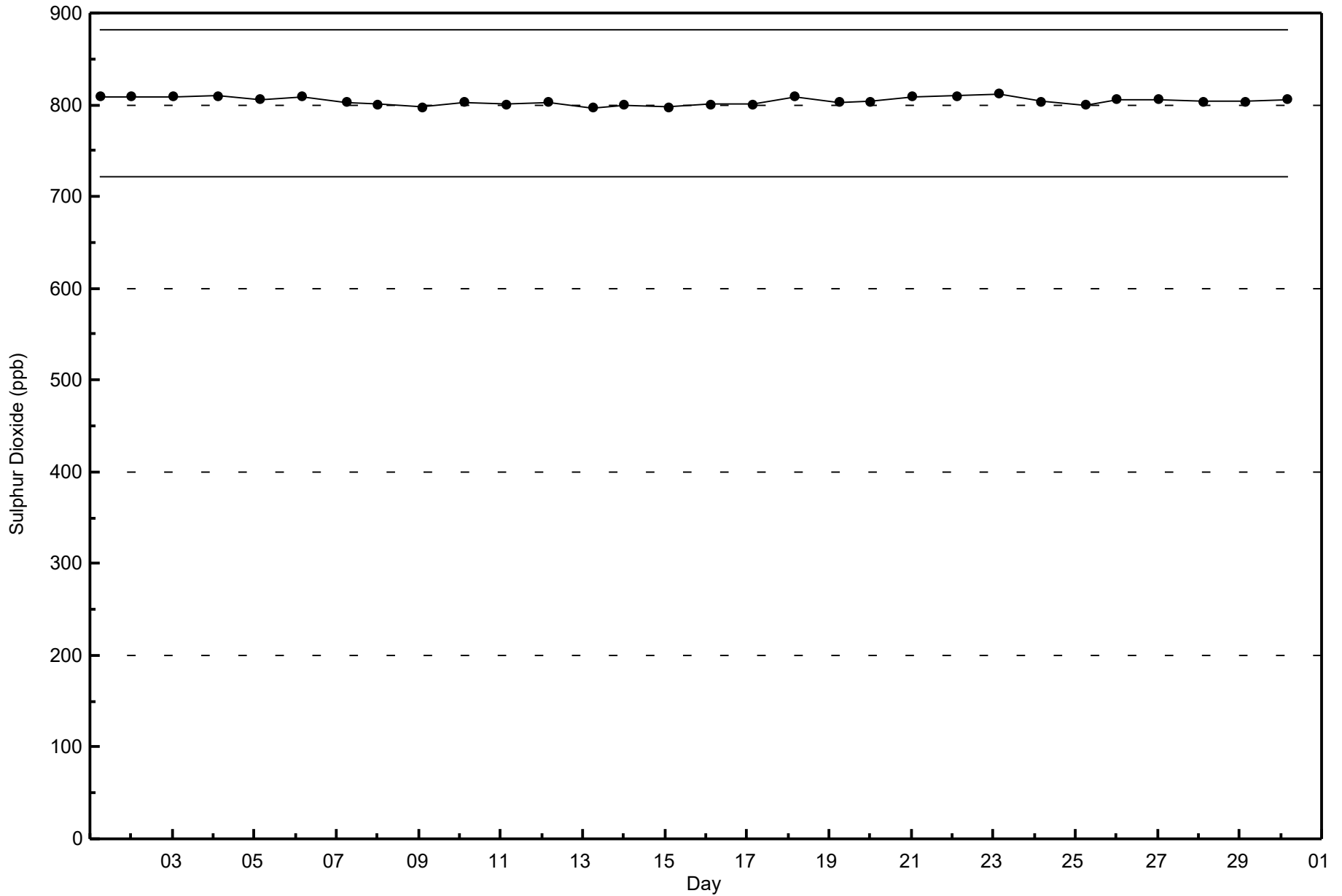


Wood Buffalo Environmental Association  
Wind Rose Nov 2023

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











Wood Buffalo Environmental Association

Summary of Hour Averages

Total Reduced Sulphur (TRS) - ppb

Barge Landing - November 2023

Number of Exceedences (AAAQO):		1-hr: 0		24-hr: 0		Hours in Service:														720							
Maximum Value: 3.3 ppb on Nov 26 19:00		Maximum Daily Average: 1.4 ppb on Nov 19														Hours of Data:		686									
Minimum Value: 0.1 ppb on Nov 20 09:00		Minimum Daily Average: 0.2 ppb on Nov 20														Hours of Missing Data:		34									
Maximum Diurnal Average: 0.6 ppb at hour 16		Minimum Diurnal Average: 0.4 ppb at hour 5														Hours of Calibration:		34									
Monthly Average: 0.50 ppb		Percentiles: P <sub>1</sub> = 0.1 P <sub>10</sub> = 0.2 Q <sub>1</sub> = 0.2 Median = 0.3 Q <sub>3</sub> = 0.5 P <sub>90</sub> = 1.2 P <sub>99</sub> = 2.1														Percent Operational Time:		100.0									
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Nov	Z	0.5	0.5	0.4	0.3	0.5	0.7	0.8	1.4	C	C	C	C	0.8	0.9	1.2	0.9	0.9	0.7	0.7	0.5	0.4	0.5	0.7	0.7	1.4	
2-Nov	0.9	Z	0.4	0.4	0.3	0.5	0.5	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.2	0.2	0.3	1.4	0.5	0.2	0.2	0.4	1.4		
3-Nov	0.2	0.4	Z	0.3	0.2	0.2	0.2	0.3	0.2	0.3	0.3	0.5	0.5	1.5	1.1	0.9	0.6	0.7	1.0	0.9	0.7	0.7	0.5	0.5	1.5		
4-Nov	0.4	1.1	2.0	Z	0.5	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	0.4	2.0		
5-Nov	0.3	0.4	0.3	0.4	Z	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.4		
6-Nov	0.2	0.2	0.2	0.2	0.2	Z	0.2	0.2	0.4	1.2	0.5	0.4	0.6	1.0	0.8	1.1	0.9	0.4	0.5	0.8	1.6	2.8	1.4	0.4	2.8		
7-Nov	Z	0.4	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.2	0.3	0.3	0.3	0.3	0.3	0.2	0.4		
8-Nov	0.2	Z	0.3	0.4	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.4	0.4	0.3	0.3	0.2	0.3	0.3	0.3	0.3	0.2	0.2	0.3	0.3	0.4		
9-Nov	0.3	0.2	Z	0.3	0.2	0.2	0.2	0.2	0.3	0.4	0.4	0.5	0.4	0.8	0.8	0.4	0.8	0.7	0.5	0.4	0.4	0.6	1.1	1.8	1.8		
10-Nov	1.8	0.7	0.6	Z	0.4	1.0	0.8	0.5	0.4	0.3	0.9	0.8	1.1	1.2	0.9	1.2	0.9	0.7	1.0	1.1	1.0	0.9	0.9	0.8	1.8		
11-Nov	0.9	0.8	0.6	0.3	Z	0.3	0.4	0.4	0.4	0.4	0.4	0.5	0.4	0.5	0.5	0.6	0.7	0.6	0.6	0.6	0.5	0.3	0.6	0.4	0.9		
12-Nov	0.3	0.3	0.3	0.3	0.3	Z	0.2	0.2	0.3	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.3	0.3	0.3		
13-Nov	Z	0.3	0.2	0.3	0.3	0.3	0.4	0.3	0.3	0.2	0.3	0.2	0.2	0.3	0.3	0.2	0.2	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.4		
14-Nov	0.2	Z	0.2	0.2	0.2	0.3	0.4	0.3	0.3	0.4	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.2	0.3	0.2	0.3	0.3	0.4		
15-Nov	0.3	0.3	Z	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.4		
16-Nov	0.2	0.2	0.2	Z	0.4	0.5	0.7	0.7	0.7	0.6	0.6	1.4	1.0	0.8	1.4	1.6	0.5	0.3	0.2	0.2	0.3	0.3	0.2	0.2	1.6		
17-Nov	0.3	0.3	0.3	0.3	Z	0.3	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	0.1	0.2	0.2	0.2	0.3	0.3		
18-Nov	0.9	0.9	0.8	1.1	0.7	Z	0.7	1.3	2.0	1.7	1.8	1.5	1.2	0.9	1.0	0.8	0.9	0.9	1.5	1.4	1.3	1.3	1.5	1.7	2.0		
19-Nov	Z	1.6	1.6	1.5	1.6	1.6	1.9	1.7	1.5	1.5	1.5	2.7	1.2	1.3	1.1	1.4	1.4	1.6	1.5	1.2	0.8	1.3	1.1	0.3	2.7		
20-Nov	0.3	Z	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.1	0.1	0.2	0.2	0.2	0.2	0.1	0.2	0.2	0.2	0.3		
21-Nov	0.2	0.2	Z	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.4	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.4		
22-Nov	0.3	0.2	0.3	Z	0.3	0.2	0.2	0.2	0.2	0.2	0.6	0.3	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.3	0.3	0.4	0.4	0.6		
23-Nov	0.3	0.3	0.3	0.3	Z	0.8	1.2	1.3	0.8	0.9	0.3	0.3	0.4	0.4	0.5	0.6	0.5	0.8	0.8	1.6	1.7	1.1	0.9	0.5	1.7		
24-Nov	0.4	0.3	0.3	0.3	0.3	Z	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4		
25-Nov	Z	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.4	0.3	0.4	0.4	0.3	0.3	0.3	0.4	0.4	0.4		
26-Nov	0.3	Z	0.3	0.3	0.3	0.3	0.3	0.2	0.3	0.3	0.4	1.4	1.0	1.0	1.8	2.8	2.0	2.8	3.3	2.4	1.7	1.3	1.5	1.3	3.3		
27-Nov	1.0	0.9	Z	1.0	1.2	1.2	1.3	1.4	1.2	0.9	1.1	1.1	1.2	2.4	1.7	1.8	1.0	0.6	0.3	0.3	0.2	0.2	0.2	0.2	2.4		
28-Nov	0.2	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	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2		
29-Nov	0.2	0.2	0.2	0.2	Z	0.2	0.2	0.2	0.2	0.3	0.2	0.3	0.2	0.2	0.3	0.3	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3		
30-Nov	0.3	0.3	0.3	0.3	0.3	Z	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.4		
																								Diurnal Average		0.5	
																								Diurnal Maximum		1.8	
Z - zerospan C - Calibration																											
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 10 ppb 24-hr 3 ppb																											





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Total Reduced Sulphur (TRS) - ppb  
Barge Landing - November 2023**

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

Total Number of Valid Hours: 686

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Total Reduced Sulphur (TRS) - ppb  
Barge Landing - November 2023**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	40	34	24	22	32	27	31	103	84	65	45	44	34	45	20	31	681
3 - 4	0	0	0	0	1	0	0	2	1	1	0	0	0	0	0	0	5
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	40	34	24	22	33	27	31	105	85	66	45	44	34	45	20	31	686

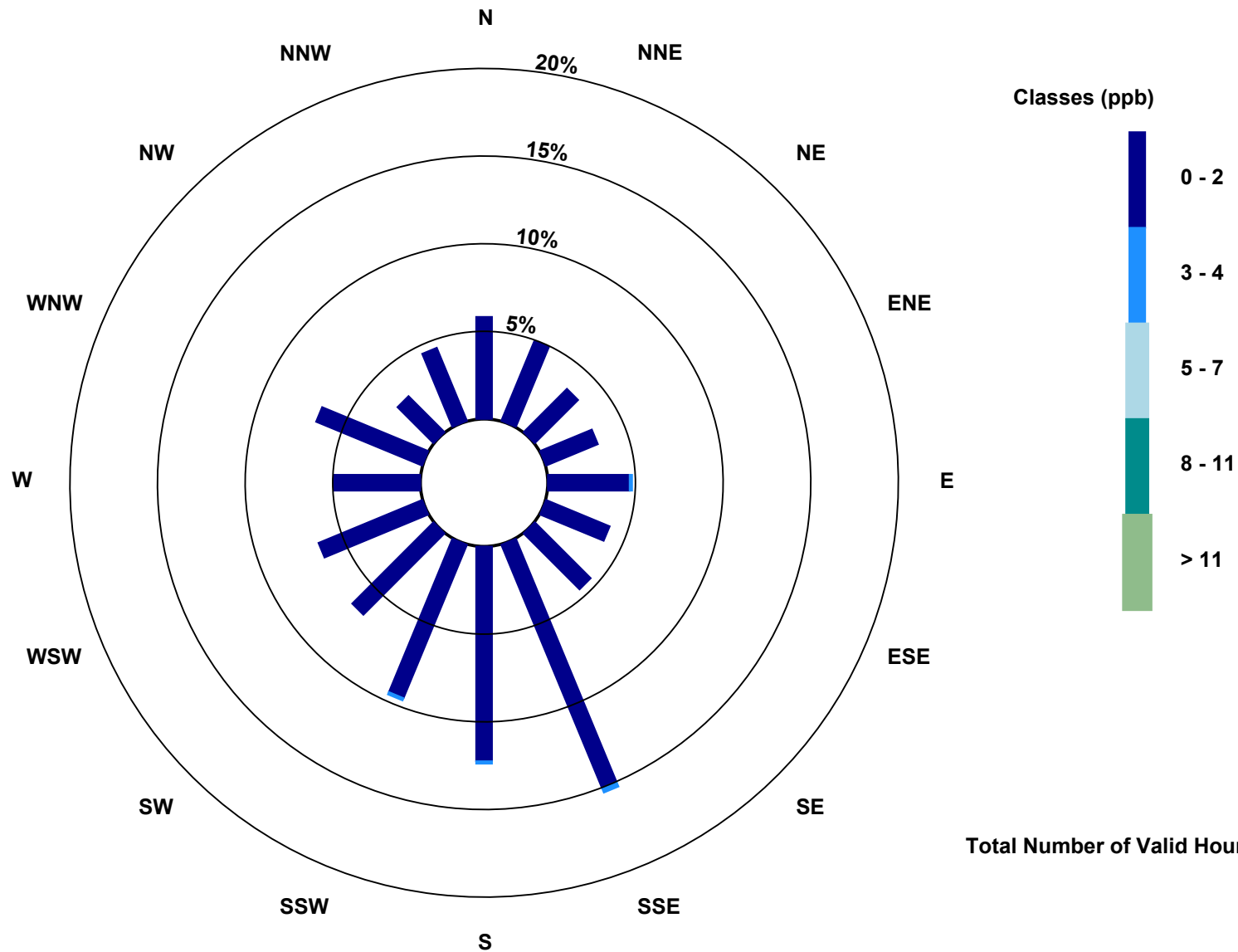
Total Number of Valid Hours: 686

Total Number of Hours: 720

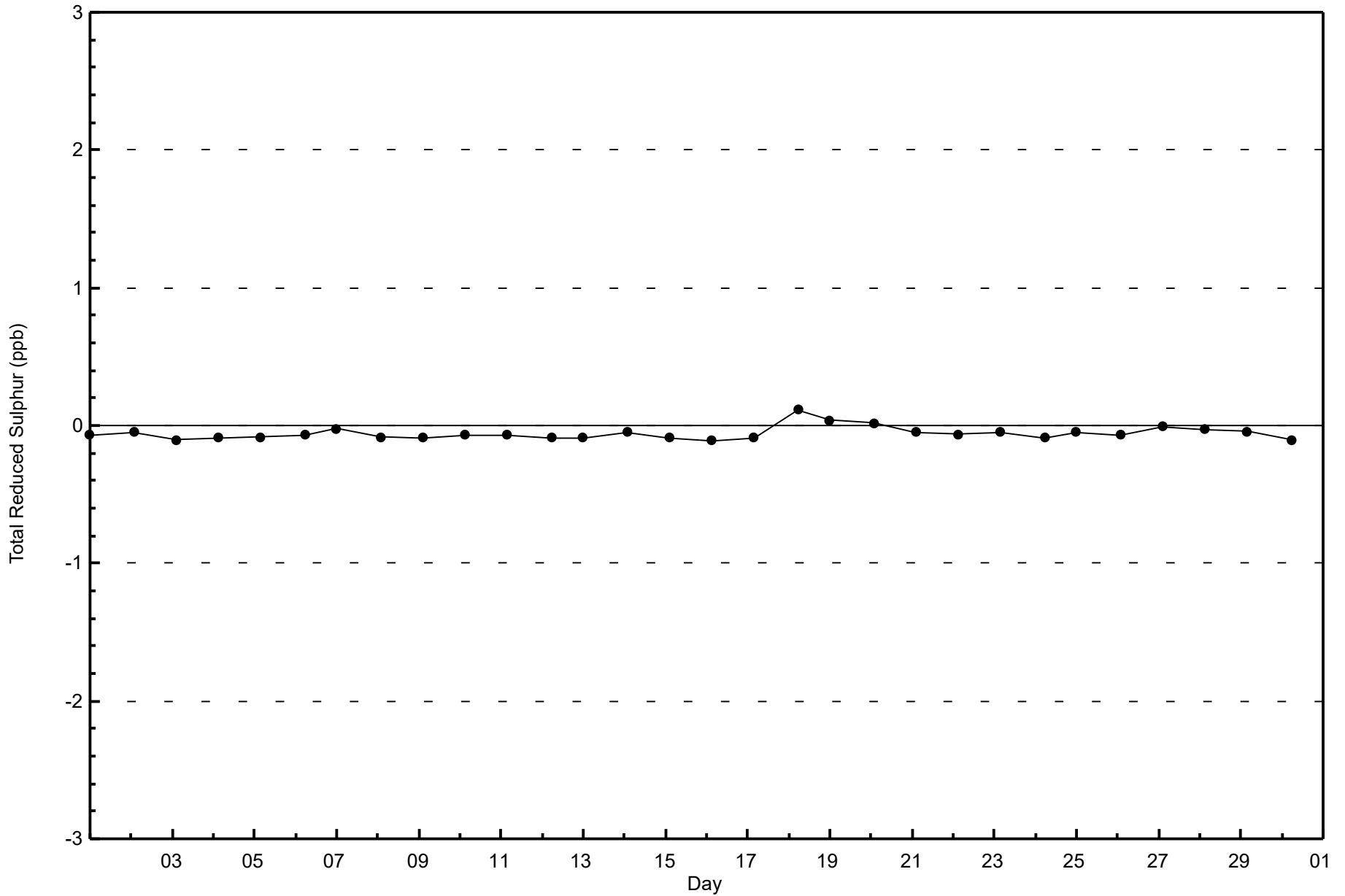


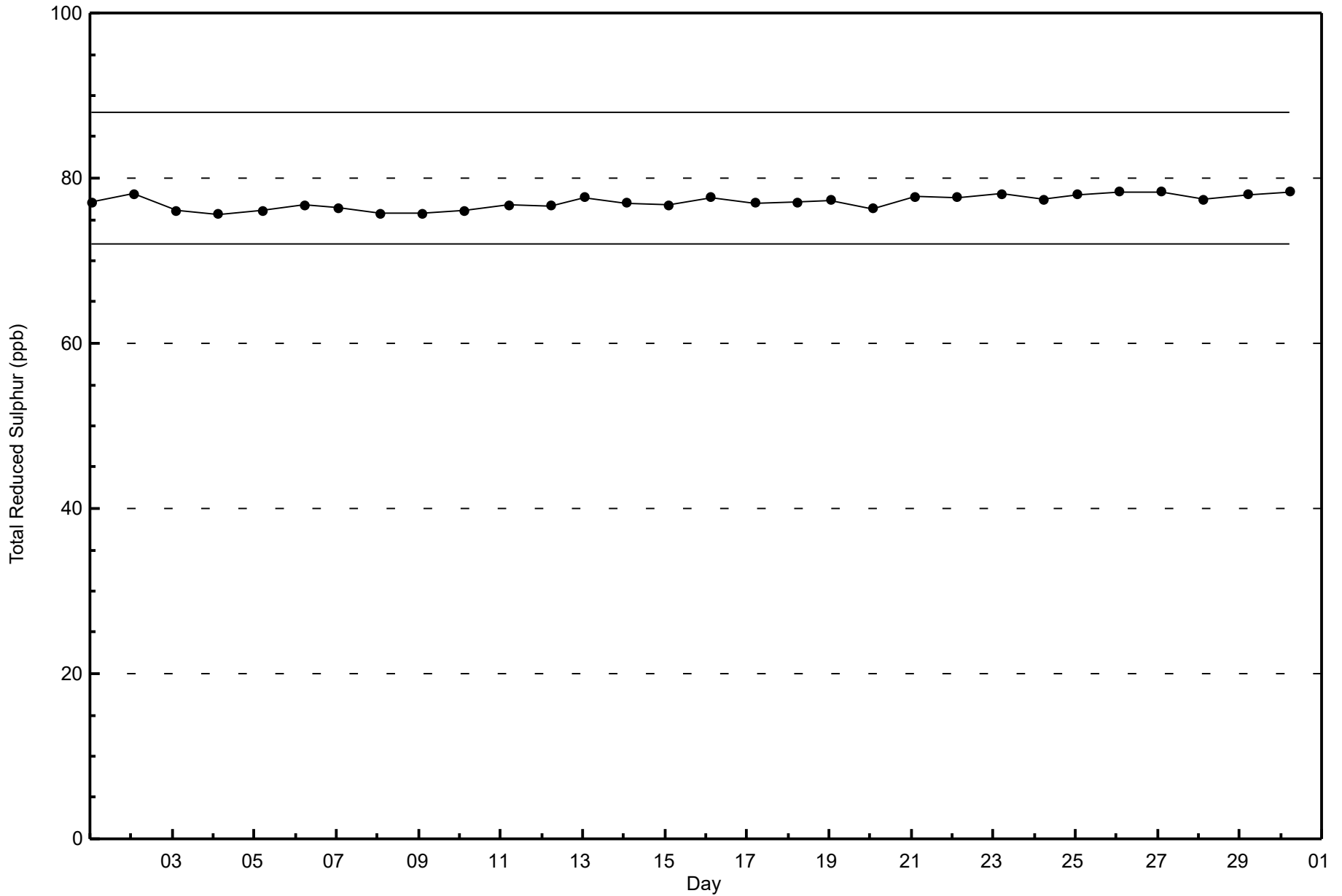
Wood Buffalo Environmental Association  
Wind Rose Nov 2023

Total Reduced Sulphur (TRS) - ppb  
Barge Landing



Total Number of Valid Hours: 686







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

**Total Hydrocarbons (THC) - ppm**  
**Barge Landing - November 2023**

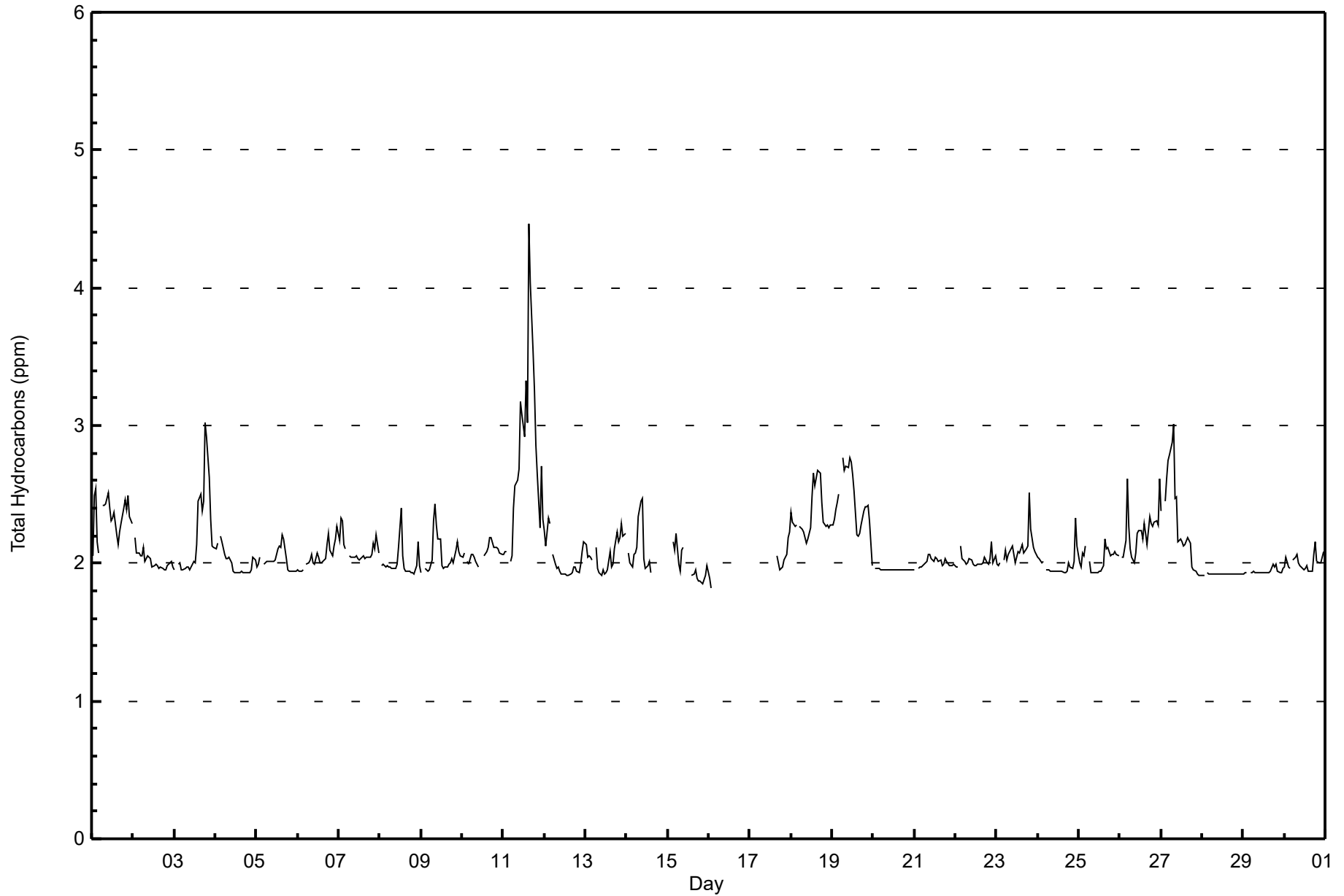
Maximum Value: 4.5 ppm on Nov 11 16:00		Maximum Daily Average: 2.8 ppm on Nov 11		Hours in Service: 720																						
Minimum Value: 1.8 ppm on Nov 16 02:00		Minimum Daily Average: 1.9 ppm on Nov 28		Hours of Data: 636																						
Maximum Diurnal Average: 2.2 ppm at hour 16		Minimum Diurnal Average: 2.1 ppm at hour 1		Hours of Missing Data: 84																						
Monthly Average: 2.11 ppm		Percentiles: P <sub>1</sub> = 1.9 P <sub>10</sub> = 1.9 Q <sub>1</sub> = 2.0 Median = 2.0 Q <sub>3</sub> = 2.2 P <sub>90</sub> = 2.4 P <sub>99</sub> = 3.1		Hours of Calibration: 32																						
				Percent Operational Time: 92.8																						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	2.1	2.5	2.5	2.2	2.1	Z	2.4	2.4	2.4	2.5	2.4	2.3	2.3	2.4	2.2	2.1	2.2	2.3	2.4	2.5	2.4	2.5	2.3	2.3	2.3	2.5
2-Nov	Z	2.2	2.1	2.1	2.1	2.1	2.1	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	2.0	2.0	2.0	2.0	2.0	2.2
3-Nov	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.5	2.5	2.4	2.5	3.0	2.9	2.6	2.3	2.1	2.1	3.0	
4-Nov	2.1	2.1	Z	2.2	2.2	2.1	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.2	
5-Nov	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.2	2.2	2.0	2.0	1.9	1.9	1.9	1.9	1.9	2.2	
6-Nov	1.9	1.9	1.9	2.0	Z	2.0	2.0	2.0	2.1	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.1	2.2	2.1	2.1	2.1	2.1	2.2	2.3	2.3	
7-Nov	2.2	2.3	2.3	2.1	2.1	Z	2.1	2.0	2.0	2.0	2.1	2.0	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.2	2.1	2.3	
8-Nov	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.4	2.1	2.0	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.2	2.0	2.4	
9-Nov	1.9	Z	2.0	2.0	1.9	2.0	2.0	2.3	2.4	2.3	2.2	2.2	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.2	2.1	2.1	2.4	
10-Nov	2.0	2.1	Z	2.0	2.0	2.1	2.1	2.0	2.0	2.0	C	C	C	2.1	2.1	2.1	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.2	
11-Nov	2.1	2.1	2.1	Z	2.0	2.1	2.4	2.6	2.6	2.7	3.2	3.1	2.9	3.3	3.0	4.5	4.0	3.5	3.3	2.9	2.6	2.3	2.7	2.3	4.5	
12-Nov	2.2	2.1	2.3	2.3	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	2.0	2.0	1.9	1.9	2.0	2.1	2.2	2.3	
13-Nov	2.1	2.0	2.1	2.0	2.0	Z	2.1	2.0	1.9	1.9	2.0	1.9	1.9	2.0	2.1	2.0	2.1	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.3	
14-Nov	Z	2.1	2.0	2.0	2.1	2.1	2.1	2.3	2.5	2.5	2.0	2.0	2.0	2.0	1.9	UO	UO	UO	UO	UO	UO	UO	UO	UO	2.5	
15-Nov	UO	Z	UO	2.2	2.1	2.2	2.0	1.9	2.1	2.1	M	M	M	M	1.9	1.9	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.2	
16-Nov	1.9	1.8	Z	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	1.9	
17-Nov	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	M	M	M	M	M	2.1	2.0	2.0	2.0	2.0	2.1	2.2	2.2	2.2	
18-Nov	2.4	2.3	2.3	2.3	Z	2.3	2.2	2.2	2.2	2.1	2.2	2.3	2.5	2.7	2.6	2.7	2.7	2.7	2.4	2.3	2.3	2.3	2.3	2.3	2.7	
19-Nov	2.3	2.3	2.4	2.4	2.5	Z	2.8	2.7	2.7	2.7	2.8	2.7	2.6	2.5	2.2	2.2	2.2	2.3	2.4	2.4	2.4	2.4	2.3	2.0	2.8	
20-Nov	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	2.0	2.0	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
21-Nov	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	
22-Nov	2.0	2.0	Z	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.2	2.0	2.1	2.2	
23-Nov	2.0	2.0	2.0	Z	2.0	2.1	2.0	2.1	2.1	2.1	2.1	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.5	2.2	2.1	2.1	2.1	2.5	
24-Nov	2.0	2.0	2.0	2.0	Z	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.3	2.1	2.3	
25-Nov	2.0	2.0	2.1	2.1	2.1	Z	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.2	
26-Nov	Z	2.0	2.0	2.2	2.6	2.3	2.1	2.0	2.0	2.1	2.2	2.2	2.2	2.2	2.3	2.2	2.1	2.3	2.3	2.3	2.3	2.3	2.3	2.6	2.6	
27-Nov	2.4	Z	2.4	2.6	2.7	2.8	2.9	3.0	2.5	2.5	2.2	2.2	2.2	2.1	2.1	2.2	2.2	2.1	2.0	1.9	1.9	1.9	1.9	1.9	3.0	
28-Nov	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	
29-Nov	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	1.9	1.9	1.9	2.0	2.0	
30-Nov	2.0	2.0	2.0	2.0	Z	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	2.1	2.2	2.0	2.0	2.0	2.0	2.1	2.2	
																								Diurnal Average		
																								Diurnal Maximum		
																								2.1 2.1 2.1 2.1 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 2.1 2.1 2.1 2.1 2.1 2.1		
																								2.4 2.5 2.5 2.6 2.7 2.8 2.9 3.0 2.7 2.7 3.2 3.1 2.9 3.3 3.0 4.5 4.0 3.5 3.3 2.9 2.6 2.5 2.7 2.6		
																								Z - zerspan C - Calibration M - Maintenance UO - Unstable Operation		





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

**Total Hydrocarbons (THC) - ppm**  
**Barge Landing - November 2023**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Total Hydrocarbons (THC) - ppm  
Barge Landing - November 2023**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2.0	360	56.60	56.60
2.1 - 3.0	269	42.30	98.90
3.1 - 10.0	7	1.10	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 636

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Total Hydrocarbons (THC) - ppm  
Barge Landing - November 2023**

<b>Concentration Ranges (ppm)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	19	22	21	15	21	24	19	23	20	28	19	35	31	39	11	13	360
2.1 - 3.0	19	10	4	7	12	4	8	75	57	29	15	4	2	2	8	13	269
3.1 - 10.0	1	0	0	0	0	0	0	1	0	2	0	0	0	0	1	2	7
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	39	32	25	22	33	28	27	99	77	59	34	39	33	41	20	28	636

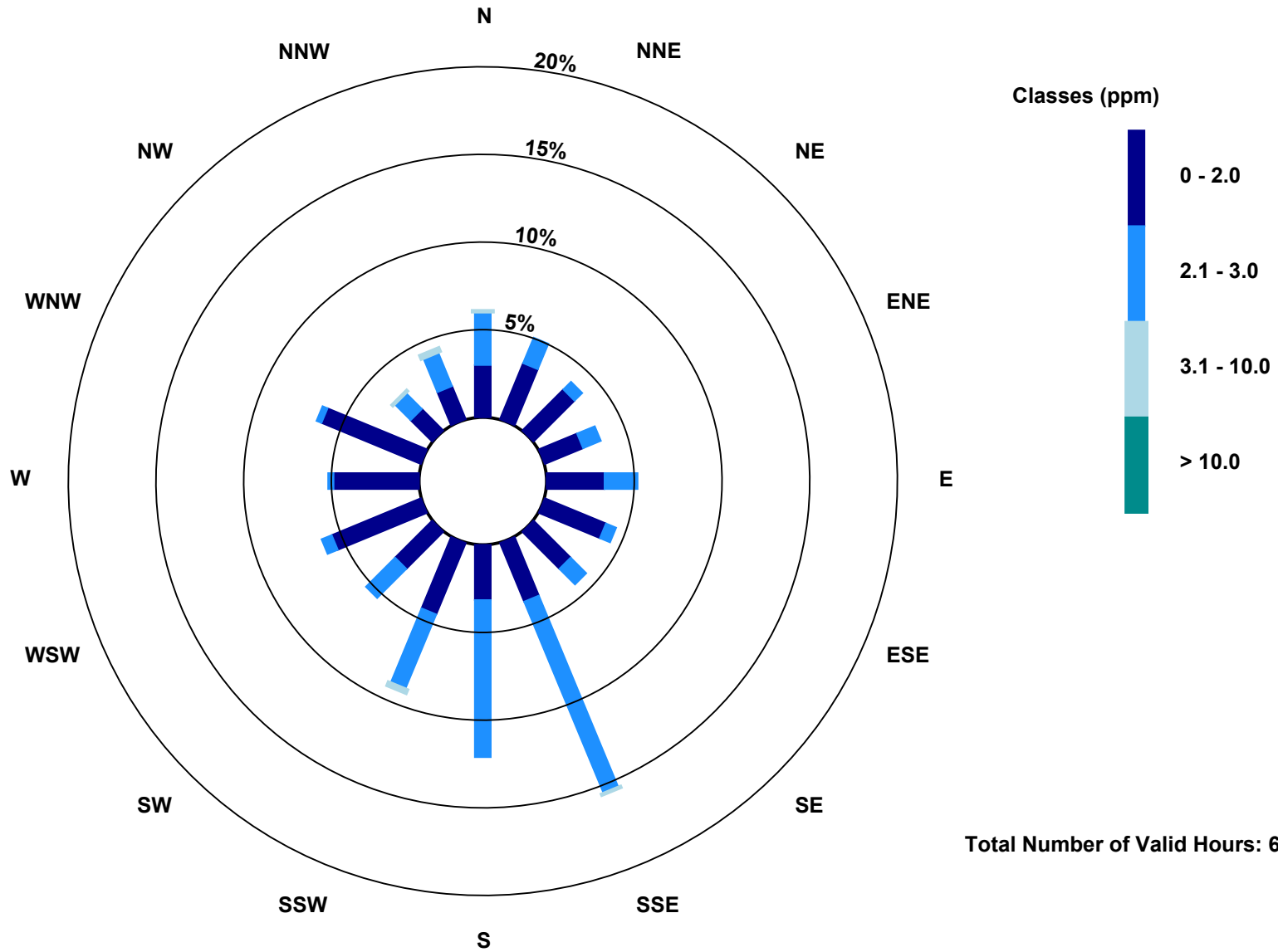
Total Number of Valid Hours: 636

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 2023

Total Hydrocarbons (THC) - ppm  
Barge Landing



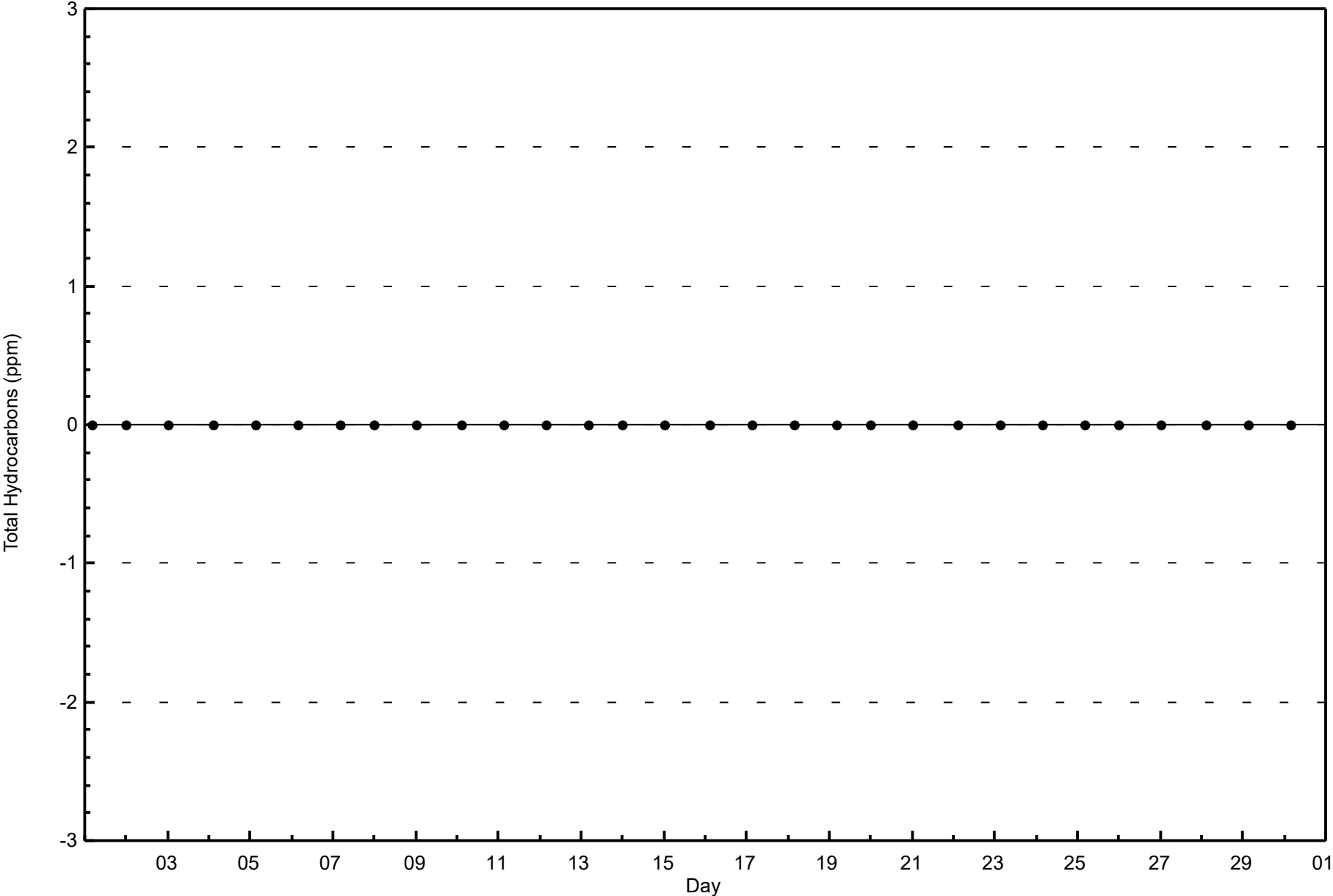


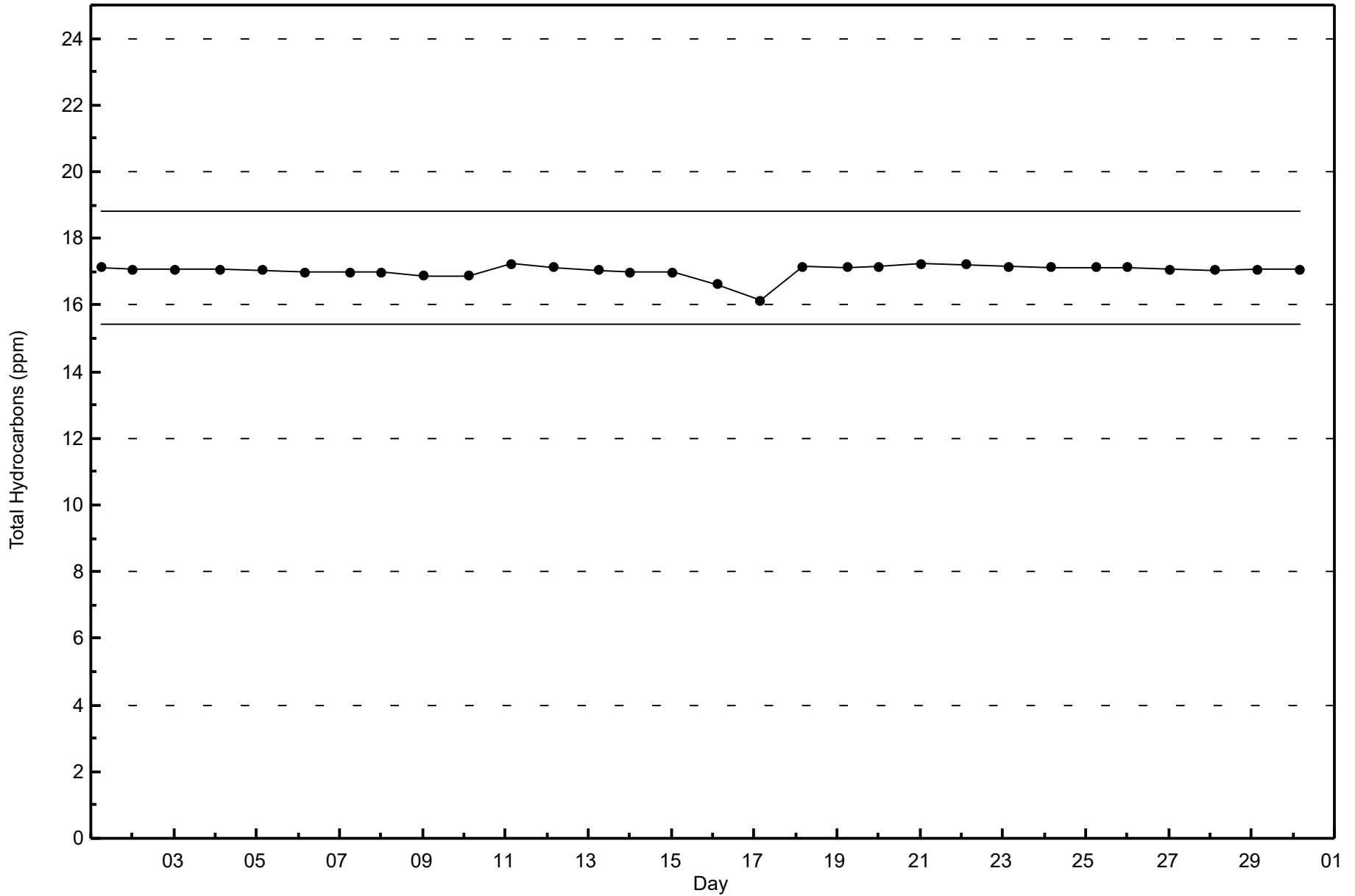
Wood Buffalo Environmental Association

Zero Responses

Total Hydrocarbons (THC) - ppm

Barge Landing - November 2023







Summary of Hour Averages

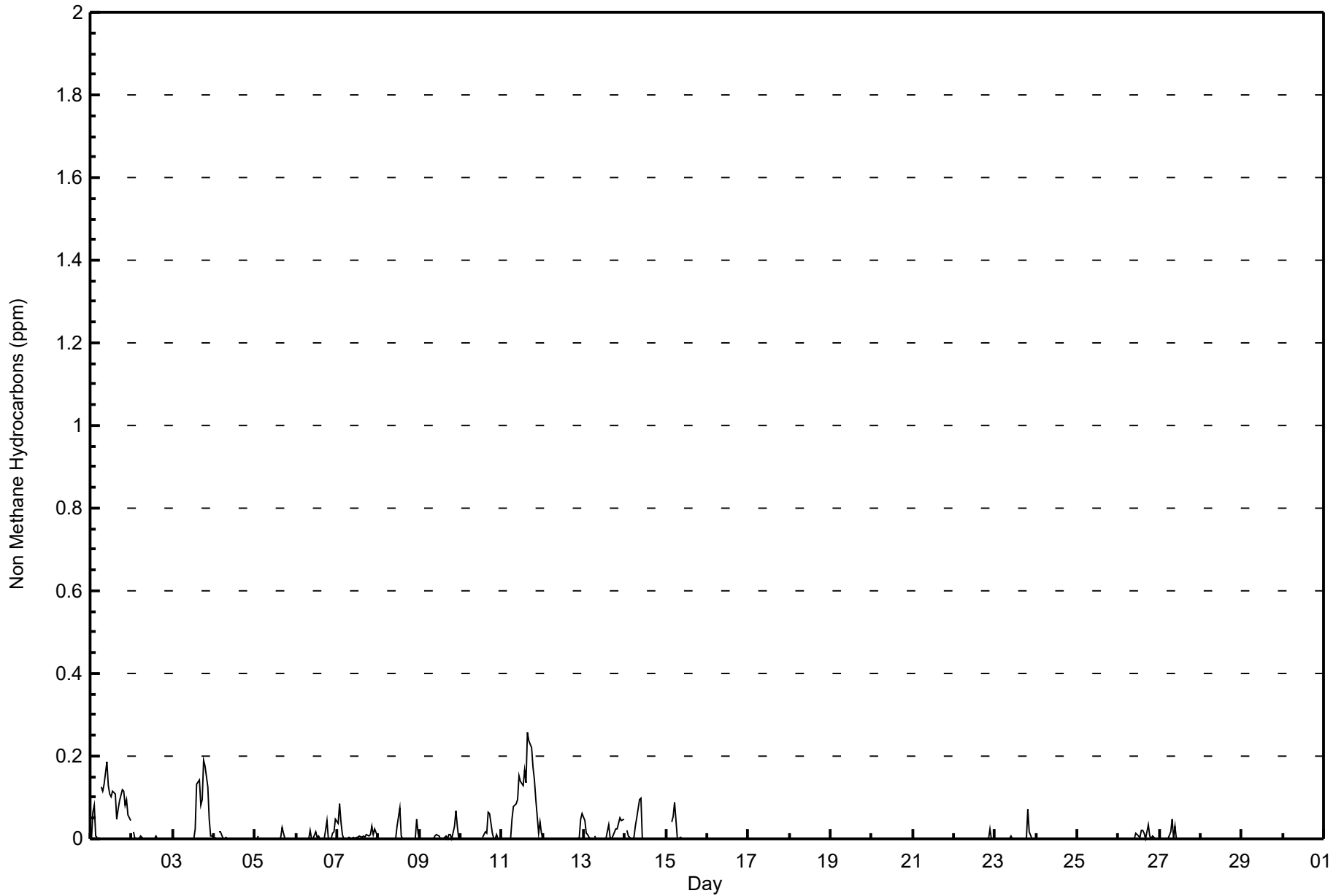
Barge Landing - November 2023

Maximum Value: 0.259 ppm on Nov 11 16:00		Maximum Daily Average: 0.097 ppm on Nov 11		Hours in Service:	720																						
Minimum Value: 0.000 ppm on Nov 1 01:00		Minimum Daily Average: 0.000 ppm on Nov 18		Hours of Data:	636																						
Maximum Diurnal Average: 0.021 ppm at hour 19		Minimum Diurnal Average: 0.003 ppm at hour 5		Hours of Missing Data:	84																						
Monthly Average: 0.012 ppm		Percentiles: P <sub>1</sub> = 0.0 P <sub>10</sub> = 0.0 Q <sub>1</sub> = 0.0 Median = 0.0 Q <sub>3</sub> = 0.0 P <sub>90</sub> = 0.0 P <sub>99</sub> = 0.2		Hours of Calibration:	32																						
				Percent Operational Time:	92.8																						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Nov	0.000	0.064	0.082	0.007	0.004	Z	0.125	0.117	0.131	0.188	0.129	0.108	0.102	0.114	0.108	0.047	0.072	0.092	0.120	0.117	0.081	0.097	0.059	0.046	0.087	0.188	
2-Nov	Z	0.018	0.000	0.000	0.000	0.007	0.002	0.000	0.001	0.001	0.000	0.000	0.000	0.000	0.006	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.018	
3-Nov	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.025	0.132	0.143	0.081	0.095	0.191	0.177	0.127	0.047	0.006	0.007	0.045	0.191	
4-Nov	0.000	0.002	Z	0.018	0.017	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.018	
5-Nov	0.000	0.000	0.005	Z	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.001	0.000	0.000	0.004	0.026	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.026	
6-Nov	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.021	0.000	0.000	0.016	0.004	0.008	0.000	0.000	0.000	0.019	0.044	0.001	0.000	0.015	0.018	0.046	0.008	0.046	
7-Nov	0.039	0.084	0.041	0.012	0.001	Z	0.004	0.003	0.000	0.002	0.001	0.003	0.003	0.006	0.005	0.006	0.004	0.009	0.007	0.011	0.030	0.010	0.024	0.005	0.014	0.084	
8-Nov	Z	0.000	0.001	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.031	0.076	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.048	0.012	0.008	0.076	
9-Nov	0.000	Z	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.006	0.009	0.006	0.000	0.000	0.000	0.008	0.000	0.011	0.010	0.001	0.031	0.067	0.030	0.000	0.008	0.067	
10-Nov	0.000	0.000	Z	0.000	0.000	0.001	0.001	0.000	0.000	0.000	C	C	C	0.004	0.018	0.014	0.064	0.062	0.012	0.002	0.001	0.011	0.000	0.002	0.009	0.064	
11-Nov	0.001	0.001	0.001	Z	0.000	0.000	0.047	0.078	0.085	0.094	0.153	0.141	0.129	0.166	0.135	0.259	0.236	0.221	0.172	0.142	0.094	0.013	0.040	0.015	0.097	0.259	
12-Nov	0.004	0.000	0.002	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.001	0.000	0.002	0.061	0.061	0.005	0.061	
13-Nov	0.045	0.013	0.009	0.003	0.001	Z	0.008	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.034	0.002	0.000	0.005	0.025	0.025	0.038	0.051	0.044	0.048	0.015	0.051	
14-Nov	Z	0.019	0.008	0.000	0.000	0.003	0.029	0.049	0.094	0.097	0.000	0.000	0.001	0.000	0.000	UO	UO	UO	UO	UO	UO	UO	UO	UO	--	0.097	
15-Nov	UO	Z	UO	0.041	0.053	0.089	0.000	0.000	0.002	0.003	M	M	M	M	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	--	0.089		
16-Nov	0.000	0.000	Z	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	--	0.000	
17-Nov	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	M	M	M	M	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	--	0.000	
18-Nov	0.000	0.000	0.000	0.000	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-Nov	0.000	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		
20-Nov	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		
21-Nov	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		
22-Nov	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.024	0.000	0.000	0.001	0.024	
23-Nov	0.000	0.000	0.000	Z	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	0.072	0.017	0.000	0.000	0.000	0.004	0.072	
24-Nov	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		
25-Nov	0.000	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		
26-Nov	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.015	0.009	0.005	0.019	0.020	0.015	0.001	0.034	0.006	0.000	0.007	0.000	0.000	0.000	0.006	0.034	
27-Nov	0.000	Z	0.000	0.000	0.000	0.000	0.016	0.047	0.000	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	0.004	0.047		
28-Nov	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		
29-Nov	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		
30-Nov	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		
		0.004	0.008	0.006	0.003	0.003	0.004	0.008	0.011	0.012	0.015	0.012	0.012	0.012	0.013	0.016	0.018	0.017	0.020	0.021	0.020	0.015	0.012	0.011	0.009	Diurnal Average	
		0.045	0.084	0.082	0.041	0.053	0.089	0.125	0.117	0.131	0.188	0.153	0.141	0.129	0.166	0.135	0.259	0.236	0.221	0.191	0.177	0.127	0.097	0.059	0.061	Diurnal Maximum	
Z - zerospan		C - Calibration					M - Maintenance					UO - Unstable Operation															



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

**Non Methane Hydrocarbons (NMHC) - ppm**  
**Barge Landing - November 2023**







**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Non Methane Hydrocarbons (NMHC) - ppm  
Barge Landing - November 2023**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 0.005	504	79.25	79.25
0.006 - 0.05	83	13.05	92.30
0.06 - 0.1	40	6.29	98.58
> 0.1	9	1.42	100.00

Total Number of Valid Hours: 636

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Non Methane Hydrocarbons (NMHC) - ppm  
Barge Landing - November 2023**

<b>Concentration Ranges (ppm)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 0.005	28	28	23	18	27	28	27	55	58	45	30	39	32	38	13	15	504
0.006 - 0.05	3	3	2	4	4	0	0	29	11	8	3	0	1	3	4	8	83
0.06 - 0.1	6	1	0	0	2	0	0	13	8	4	1	0	0	0	2	3	40
> 0.1	2	0	0	0	0	0	0	2	0	2	0	0	0	0	1	2	9
<b>Totals</b>	39	32	25	22	33	28	27	99	77	59	34	39	33	41	20	28	636

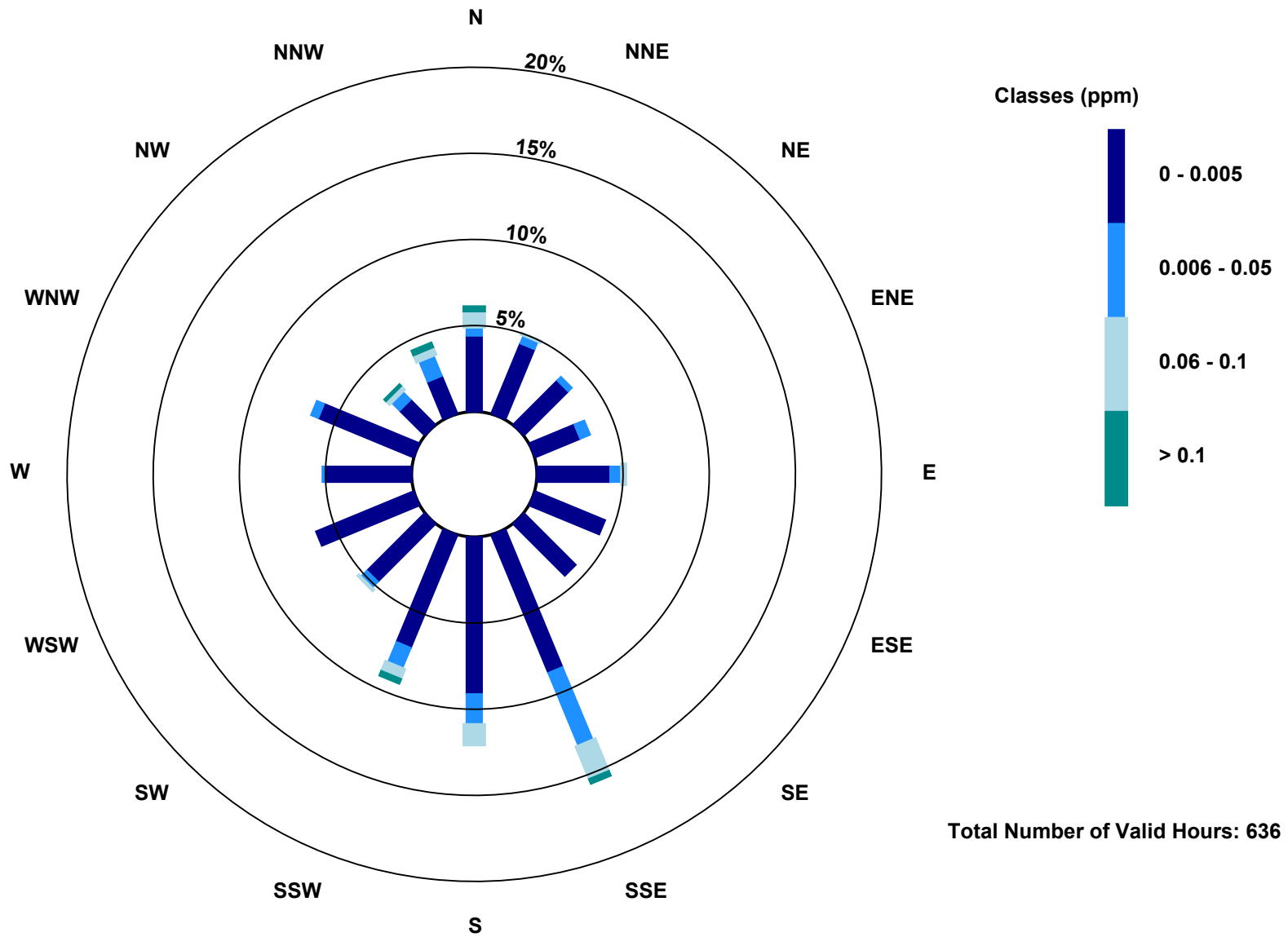
Total Number of Valid Hours: 636

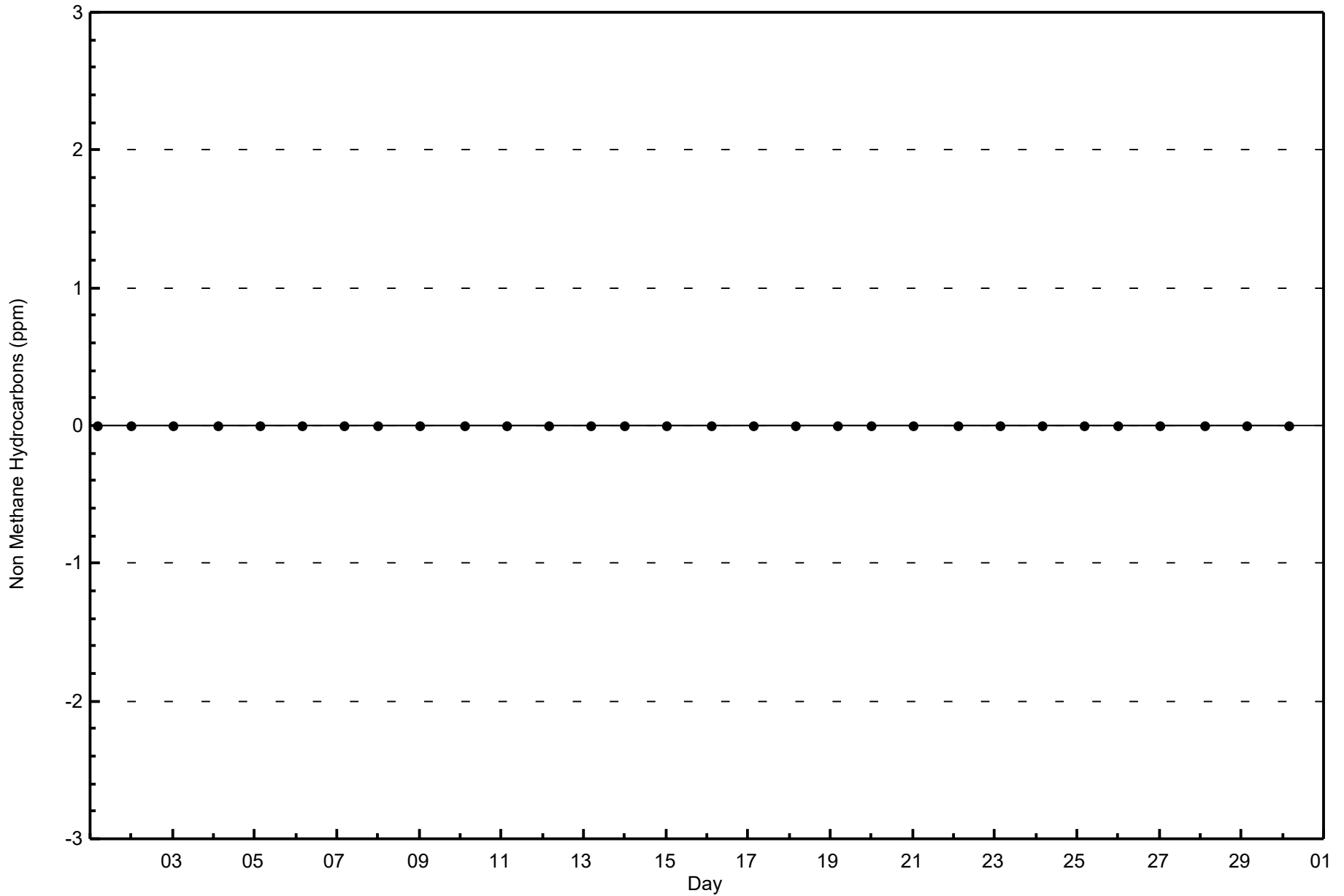
Total Number of Hours: 720

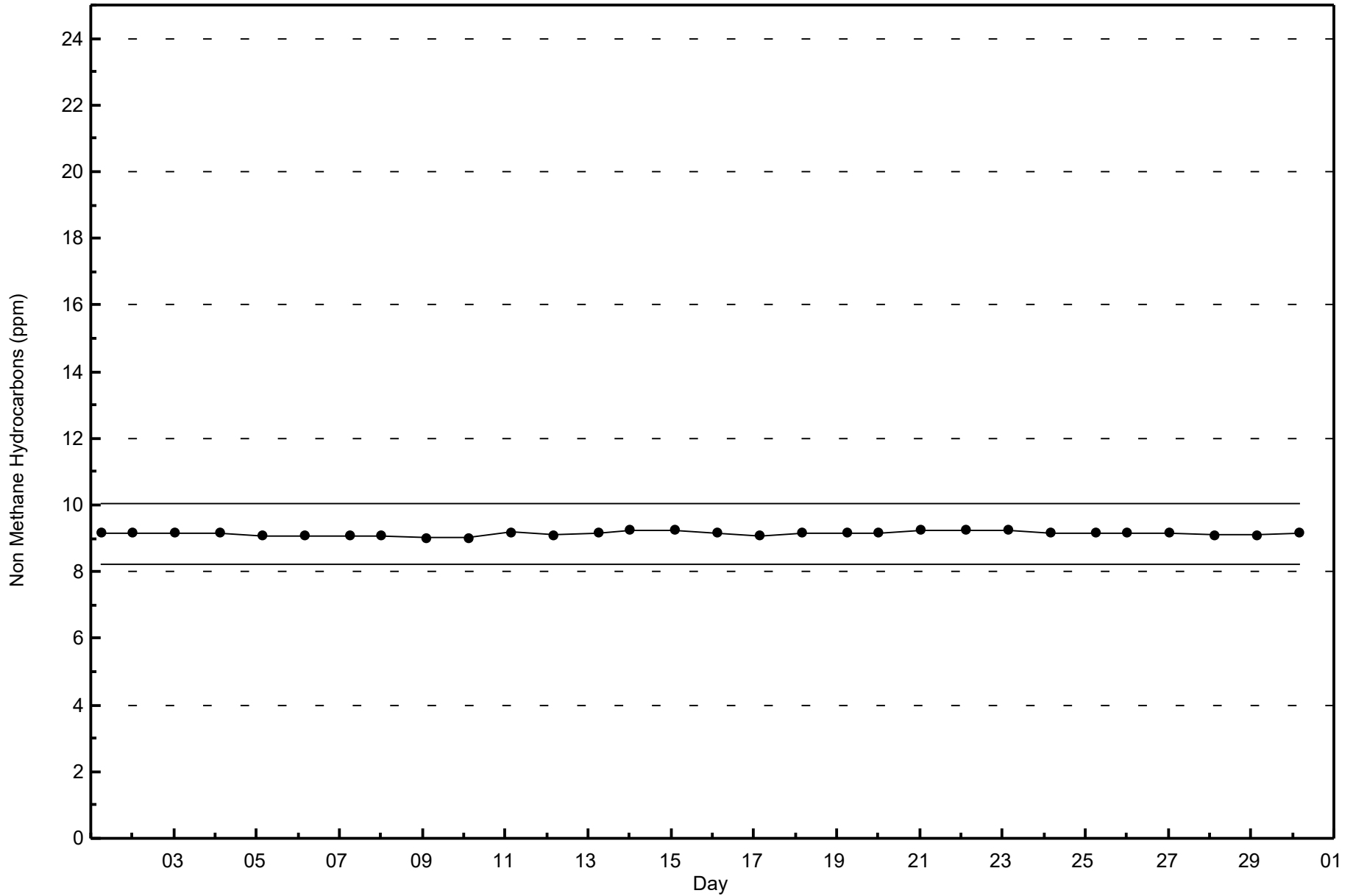


Wood Buffalo Environmental Association  
Wind Rose Nov 2023

Non Methane Hydrocarbons (NMHC) - ppm  
Barge Landing





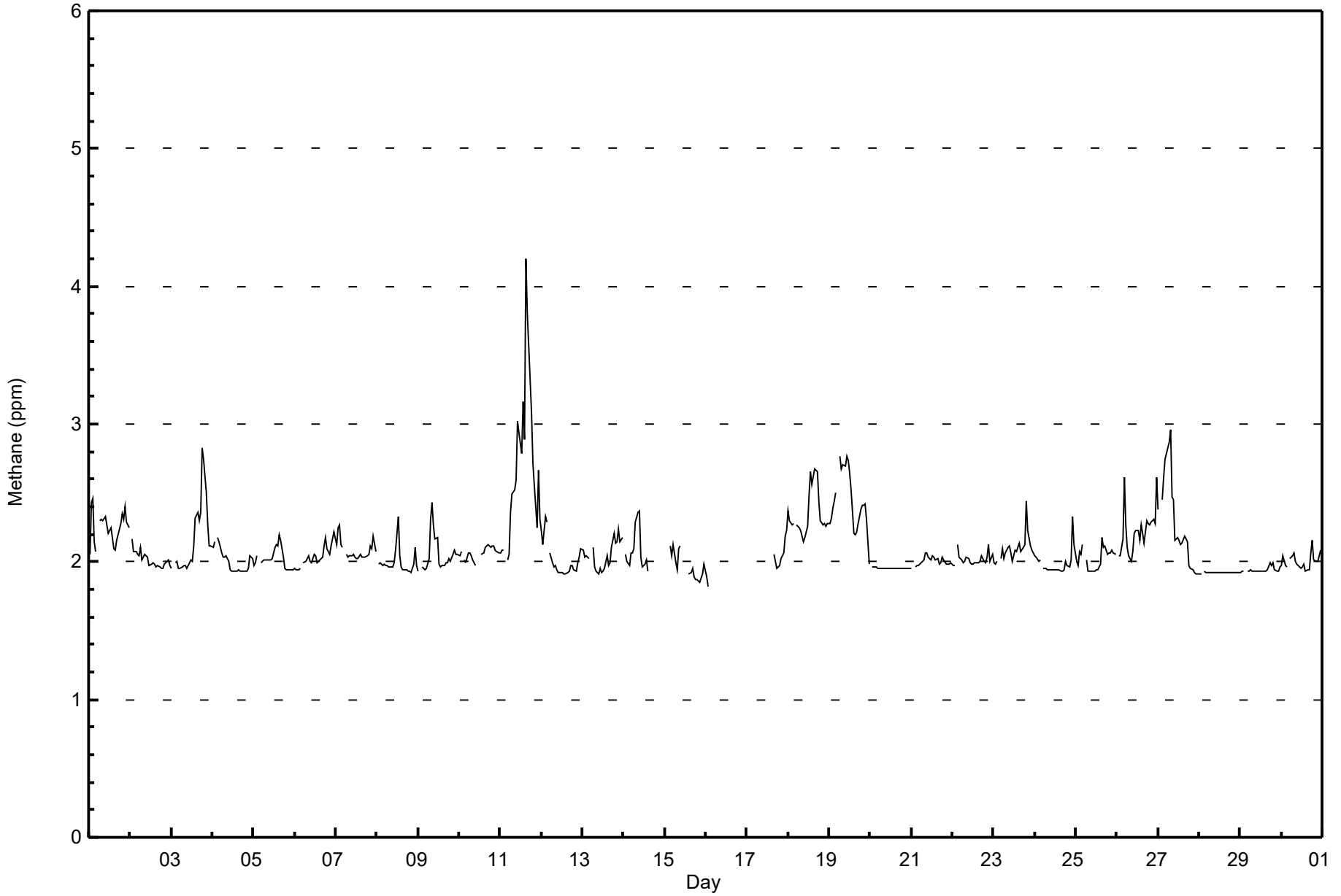






**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Methane (CH<sub>4</sub>) - ppm**  
**Barge Landing - November 2023**





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

**Methane (CH<sub>4</sub>) - ppm**  
**Barge Landing - November 2023**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2.0	367	57.70	57.70
2.1 - 3.0	264	41.51	99.21
3.1 - 10.0	5	0.79	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 636

Total Number of Hours: 720





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

**Methane (CH<sub>4</sub>) - ppm**  
**Barge Landing - November 2023**

Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	19	25	21	15	22	24	19	24	20	28	19	35	31	39	12	14	367
2.1 - 3.0	19	7	4	7	11	4	8	74	57	29	15	4	2	2	7	14	264
3.1 - 10.0	1	0	0	0	0	0	0	1	0	2	0	0	0	0	1	0	5
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	39	32	25	22	33	28	27	99	77	59	34	39	33	41	20	28	636

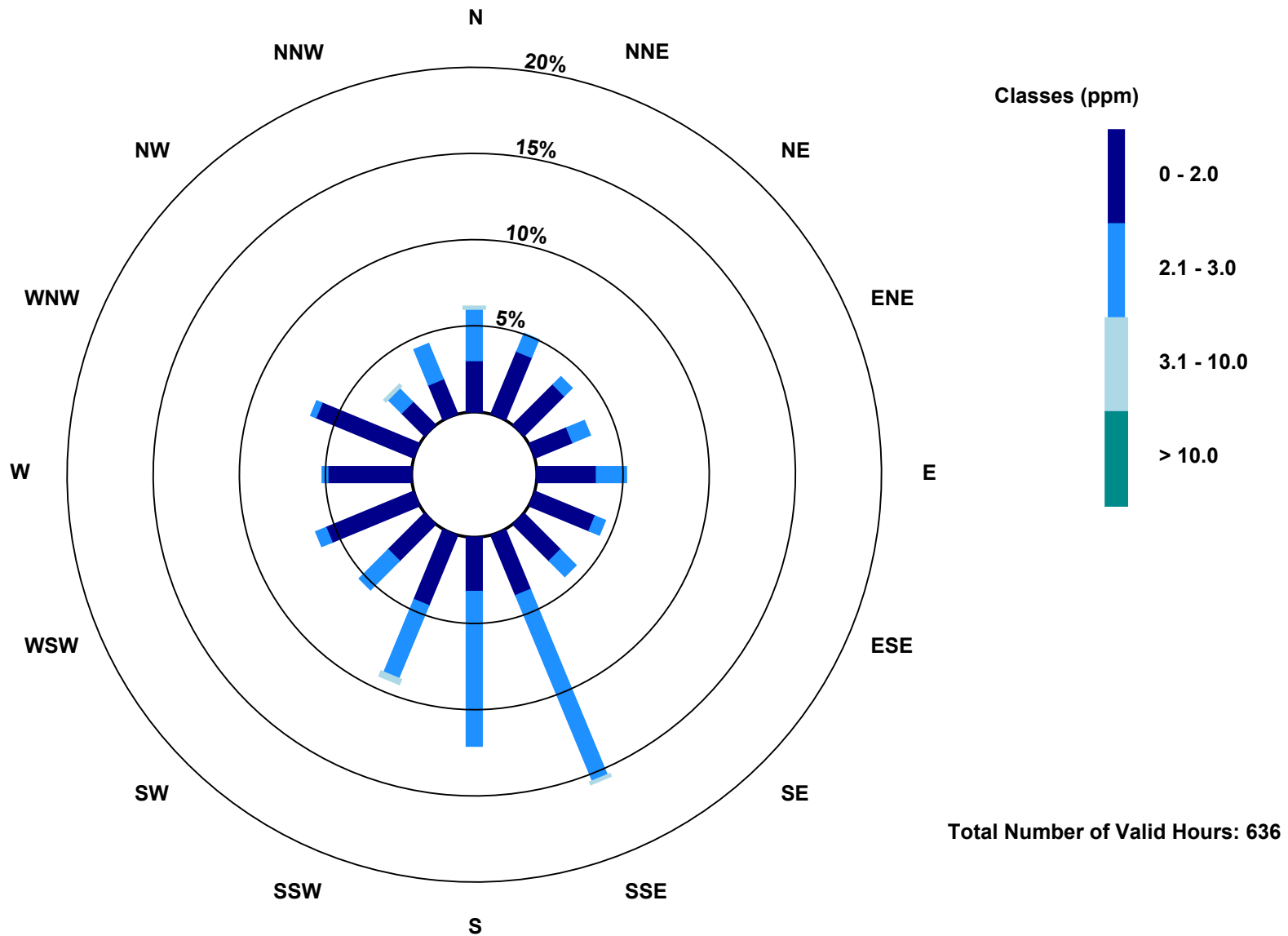
Total Number of Valid Hours: 636

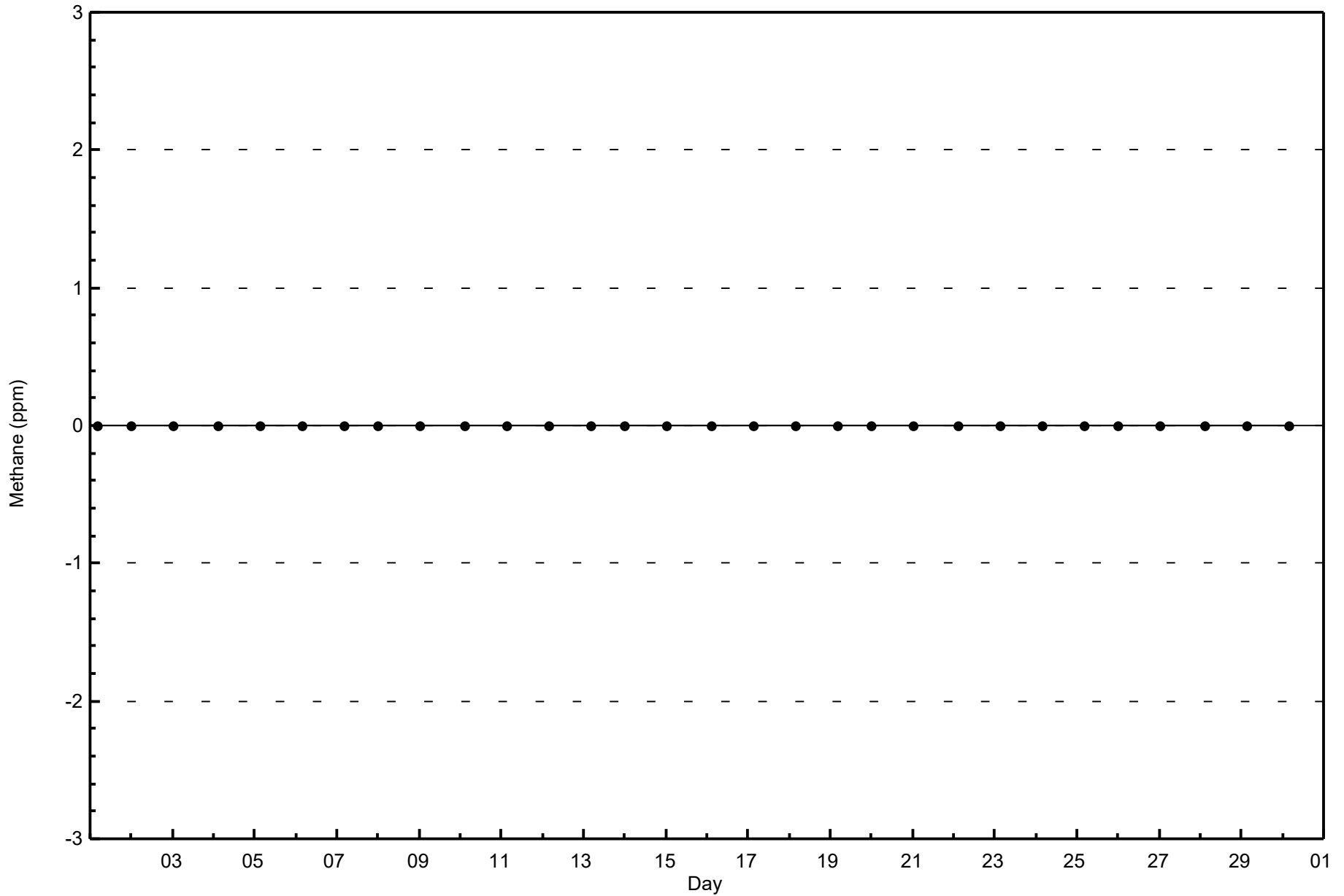
Total Number of Hours: 720

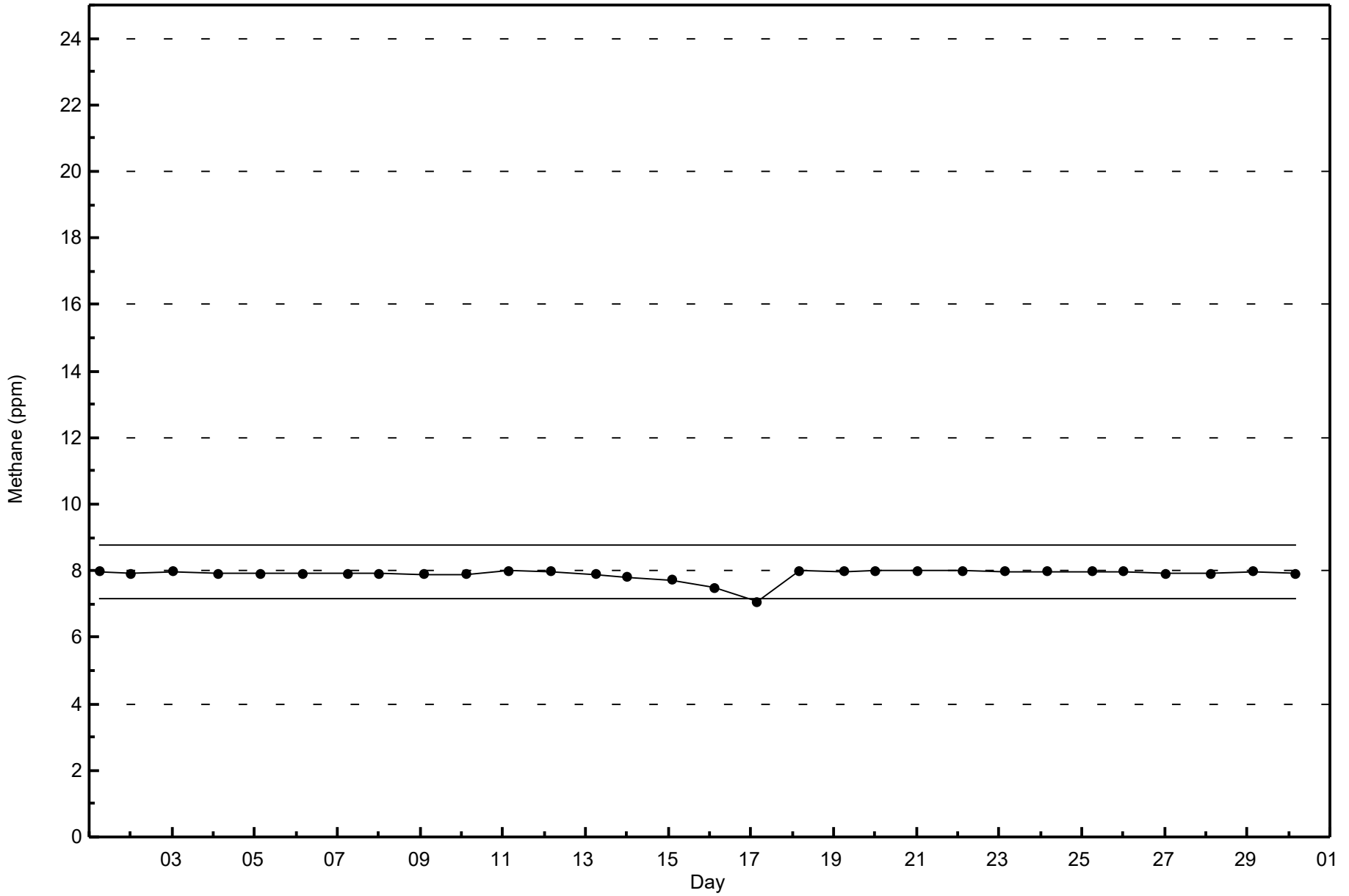


Wood Buffalo Environmental Association  
Wind Rose Nov 2023

Methane (CH<sub>4</sub>) - ppm  
Barge Landing









Wood Buffalo Environmental Association

Summary of Hour Averages

Nitric Oxide (NO) - ppb

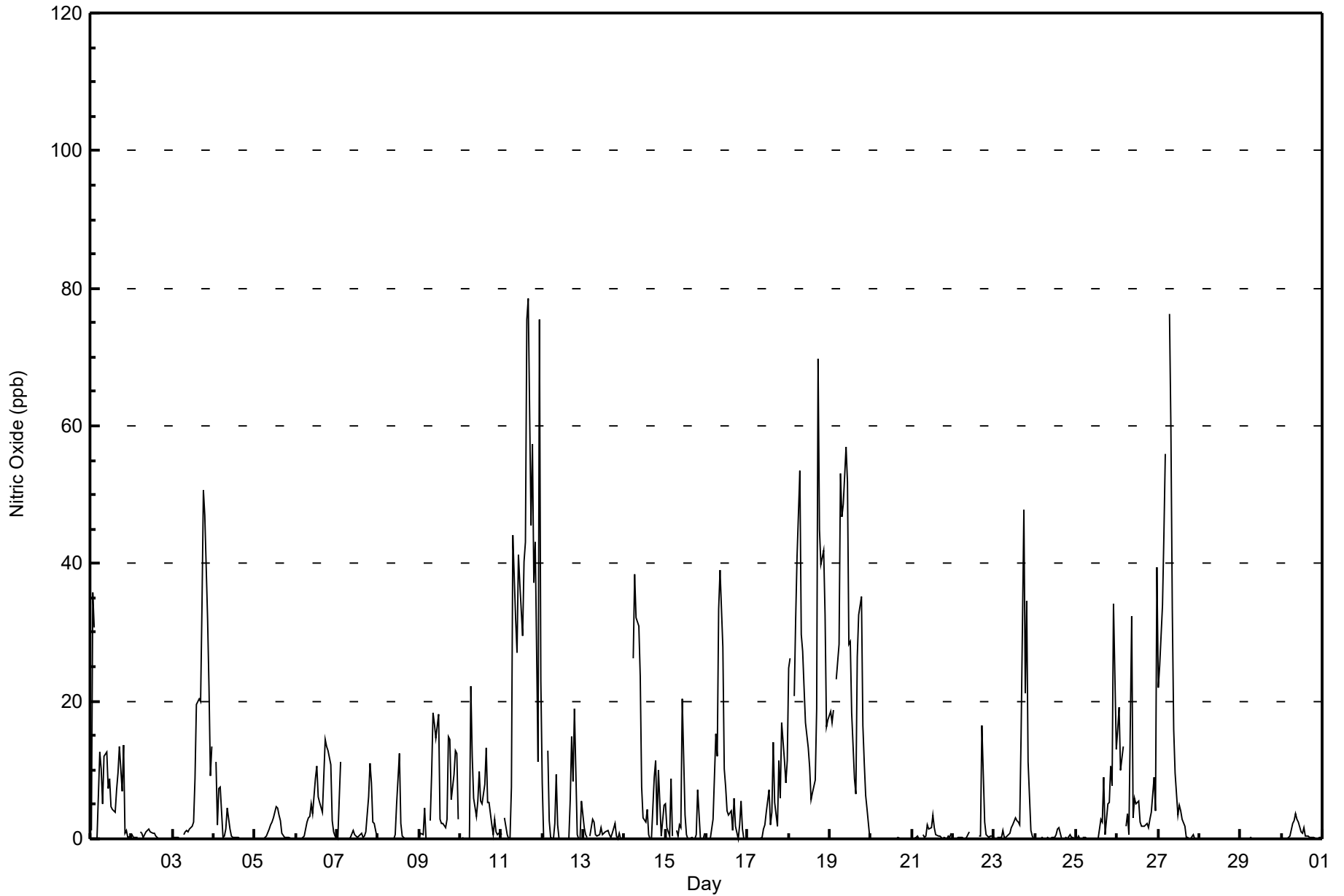
Barge Landing - November 2023

Maximum Value: 78.4 ppb on Nov 11 17:00      Maximum Daily Average: 32.7 ppb on Nov 11																						Hours in Service:	720			
Minimum Value: 0.0 ppb on Nov 4 21:00      Minimum Daily Average: 0.0 ppb on Nov 28																						Hours of Data:	685			
Maximum Diurnal Average: 10.9 ppb at hour 18      Minimum Diurnal Average: 3.9 ppb at hour 1																						Hours of Missing Data:	35			
Monthly Average: 6.63 ppb      Percentiles: P <sub>1</sub> = 0.0 P <sub>10</sub> = 0.0 Q <sub>1</sub> = 0.0 Median = 0.8 Q <sub>3</sub> = 6.6 P <sub>90</sub> = 22.0 P <sub>99</sub> = 57.0																						Hours of Calibration:	35			
																						Percent Operational Time:	100.0			
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	1.2	35.8	30.7	Z	0.0	12.7	10.3	5.2	12.0	12.5	7.4	8.7	4.7	4.2	3.9	7.1	9.5	13.5	7.0	13.6	0.7	1.2	0.2	0.5	8.8	35.8
2-Nov	0.6	0.2	0.2	0.2	Z	1.0	0.8	0.2	1.1	1.1	1.5	1.1	0.9	0.8	0.4	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.5	1.5
3-Nov	0.0	0.2	0.1	0.2	0.1	Z	0.5	1.1	1.2	0.9	1.3	1.8	2.4	8.7	19.5	20.3	20.0	34.0	50.7	47.0	31.9	22.0	9.2	13.5	12.5	50.7
4-Nov	Z	11.1	2.0	7.4	7.4	0.2	0.4	1.4	4.5	1.4	0.3	0.2	0.1	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.6	11.1
5-Nov	0.0	Z	0.0	0.1	0.0	0.0	0.2	0.4	1.3	2.1	2.5	3.0	4.6	4.4	3.5	2.7	0.8	0.1	0.3	0.2	0.1	0.0	0.0	0.0	1.2	4.6
6-Nov	0.0	0.0	Z	0.1	0.2	0.4	2.3	3.1	3.3	5.2	3.7	8.8	10.6	6.1	5.4	3.8	9.2	14.4	13.3	12.8	10.8	2.7	1.0	0.3	5.1	14.4
7-Nov	0.0	5.6	11.2	Z	0.1	0.0	0.0	0.0	0.1	1.3	0.6	0.4	0.2	0.4	0.9	0.1	0.4	0.9	6.1	11.0	8.1	2.4	2.3	0.1	2.3	11.2
8-Nov	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.1	0.6	5.0	12.3	2.3	0.5	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.9	12.3
9-Nov	0.0	0.9	0.7	4.4	0.1	Z	2.7	9.3	18.3	16.8	14.6	18.2	2.9	2.3	2.2	1.7	2.8	14.8	14.4	5.8	9.4	12.9	12.5	2.8	7.4	18.3
10-Nov	Z	0.2	0.1	0.1	0.1	0.0	22.1	12.1	6.0	3.2	5.5	9.7	5.5	5.1	7.9	13.3	5.3	5.3	2.1	0.7	2.9	1.1	0.6	1.0	4.8	22.1
11-Nov	0.6	Z	3.1	0.5	0.1	0.1	7.5	44.1	32.0	27.1	41.3	37.1	29.4	40.2	43.2	75.4	78.4	45.5	57.4	37.2	43.0	11.2	75.4	22.9	32.7	78.4
12-Nov	8.1	0.2	Z	12.8	2.7	0.2	0.0	2.3	9.3	2.0	0.1	0.1	0.0	0.0	0.0	5.6	14.9	8.3	18.9	0.6	0.1	0.1	5.6	4.0	18.9	
13-Nov	1.6	0.5	0.2	Z	0.4	2.9	2.5	0.5	0.4	0.7	1.5	0.6	0.8	1.1	1.3	0.7	0.3	0.9	2.2	0.4	0.1	0.8	0.0	0.1	0.9	2.9
14-Nov	0.0	0.0	0.0	0.0	Z	26.3	38.5	32.1	30.9	23.6	7.4	3.0	2.4	4.3	0.5	0.0	0.1	8.9	11.4	2.1	9.9	0.4	2.6	4.8	9.1	38.5
15-Nov	5.0	1.6	0.5	8.8	0.5	Z	1.2	0.5	2.1	1.7	20.3	3.5	0.5	0.0	0.0	0.3	0.0	0.0	0.6	7.1	0.0	0.0	0.0	0.8	2.4	20.3
16-Nov	Z	0.0	0.0	1.5	2.9	15.2	12.1	33.3	39.1	27.8	10.2	7.5	4.0	3.4	4.0	1.1	5.9	1.9	0.0	1.9	5.5	1.5	0.0	0.0	7.8	39.1
17-Nov	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.2	1.4	2.0	3.8	7.1	2.1	3.9	14.1	5.3	1.9	11.5	5.9	17.0	11.5	8.1	11.3	4.7	17.0
18-Nov	24.8	26.1	Z	20.8	32.0	41.1	53.5	29.7	27.2	22.0	16.9	13.3	10.5	5.7	6.6	8.6	19.0	69.9	44.9	39.8	41.9	32.5	16.3	17.3	27.0	69.9
19-Nov	18.4	16.9	18.7	Z	23.2	28.3	53.2	46.7	48.7	57.0	51.8	28.3	28.7	18.3	8.8	6.6	26.5	32.6	35.2	16.4	10.9	6.3	4.3	0.0	25.5	57.0
20-Nov	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
21-Nov	0.0	0.1	0.2	0.4	0.1	Z	0.7	0.2	0.4	2.0	1.4	1.5	3.5	1.7	0.6	0.4	0.5	0.2	0.1	0.2	0.1	0.3	0.2	0.9	0.7	3.5
22-Nov	Z	0.0	0.0	0.1	0.2	0.1	0.1	0.0	0.1	0.9	C	C	C	C	C	0.4	0.3	16.5	2.4	0.6	0.5	0.2	0.4	0.5	1.3	16.5
23-Nov	0.1	Z	0.2	0.2	0.1	1.1	0.2	0.3	0.6	0.7	1.7	2.1	3.0	2.6	2.4	2.1	15.1	47.8	21.1	34.5	11.2	1.2	0.3	0.0	6.5	47.8
24-Nov	0.0	0.0	Z	0.0	0.3	0.0	0.0	0.2	0.0	0.0	0.2	0.1	0.7	1.4	1.6	0.0	0.0	0.0	0.1	0.0	0.7	0.3	0.1	0.0	0.3	1.6
25-Nov	0.0	0.4	0.0	Z	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	2.8	2.3	9.0	0.6	5.0	5.2	10.5	7.8	34.1	13.0	4.0	34.1
26-Nov	15.8	19.1	9.9	13.3	Z	1.9	3.6	0.6	32.3	3.0	5.8	5.0	5.5	2.5	1.9	1.9	1.9	2.2	1.7	2.8	3.9	9.0	4.1	39.5	8.1	39.5
27-Nov	22.0	25.1	34.0	44.2	56.0	Z	76.2	59.7	33.4	15.8	9.6	3.5	4.9	4.1	2.8	1.9	0.1	0.3	0.0	0.0	0.5	0.0	0.0	0.0	17.1	76.2
28-Nov	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
29-Nov	0.0	Z	0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
30-Nov	0.0	0.1	Z	0.0	0.1	0.4	2.3	2.6	3.8	2.9	2.5	1.0	0.8	1.7	0.3	0.4	0.2	0.1	0.2	0.1	0.0	0.0	0.1	0.3	0.9	3.8
																								Diurnal Average		
																								Diurnal Maximum		
																								Z - zerospan      C - Calibration		



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

**Nitric Oxide (NO) - ppb**  
**Barge Landing - November 2023**





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

**Nitric Oxide (NO) - ppb**  
**Barge Landing - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	613	89.49	89.49
21 - 40	46	6.72	96.20
41 - 80	26	3.80	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitric Oxide (NO) - ppb  
Barge Landing - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	34	32	22	19	29	24	30	88	73	54	44	43	34	43	18	26	613
21 - 40	4	0	0	1	0	1	3	14	7	7	1	1	0	1	1	5	46
11 - 80	1	0	1	0	2	1	0	7	5	4	1	1	0	0	1	2	26
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	39	32	23	20	31	26	33	109	85	65	46	45	34	44	20	33	685

Total Number of Valid Hours: 685

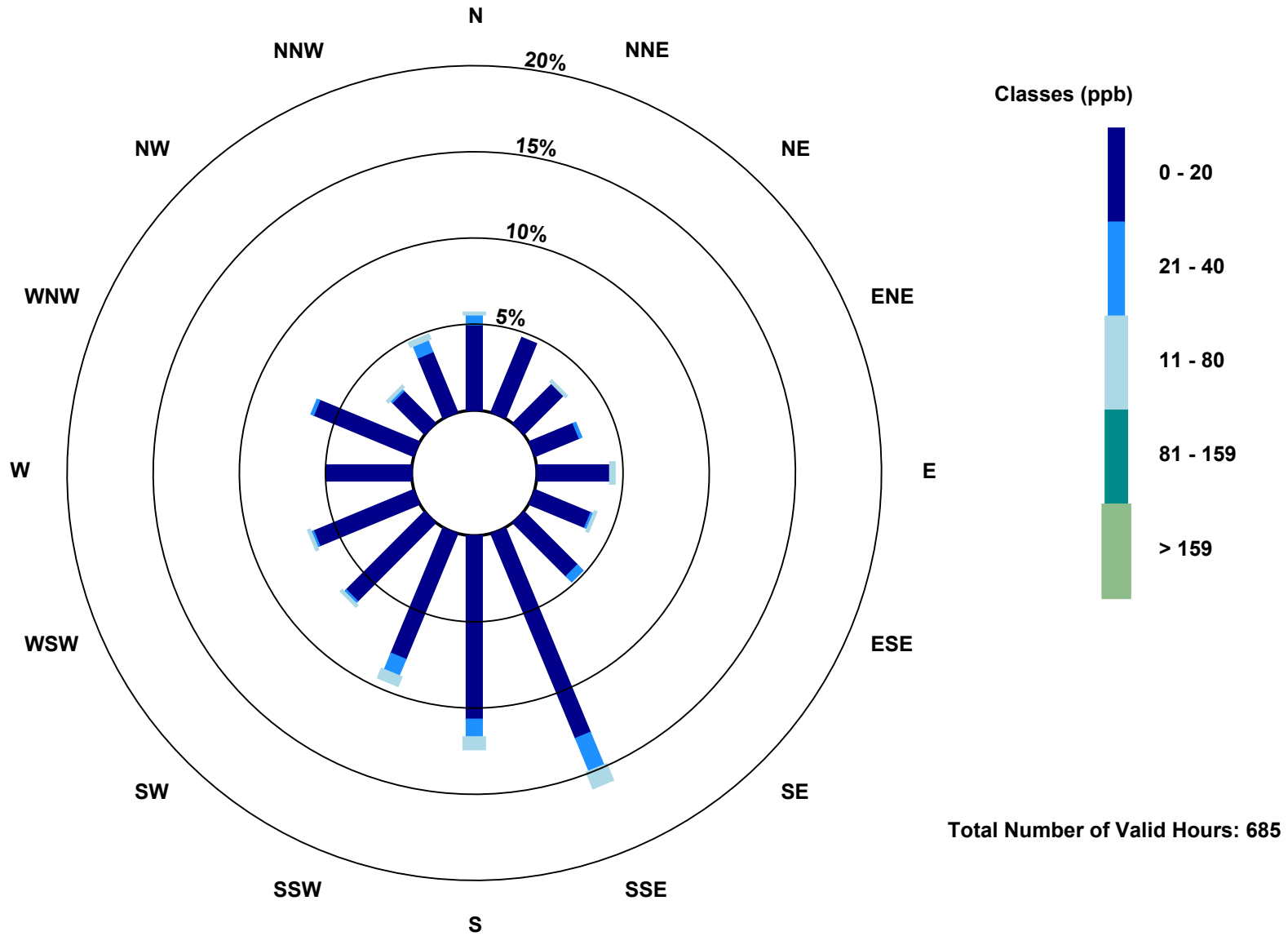
Total Number of Hours: 720

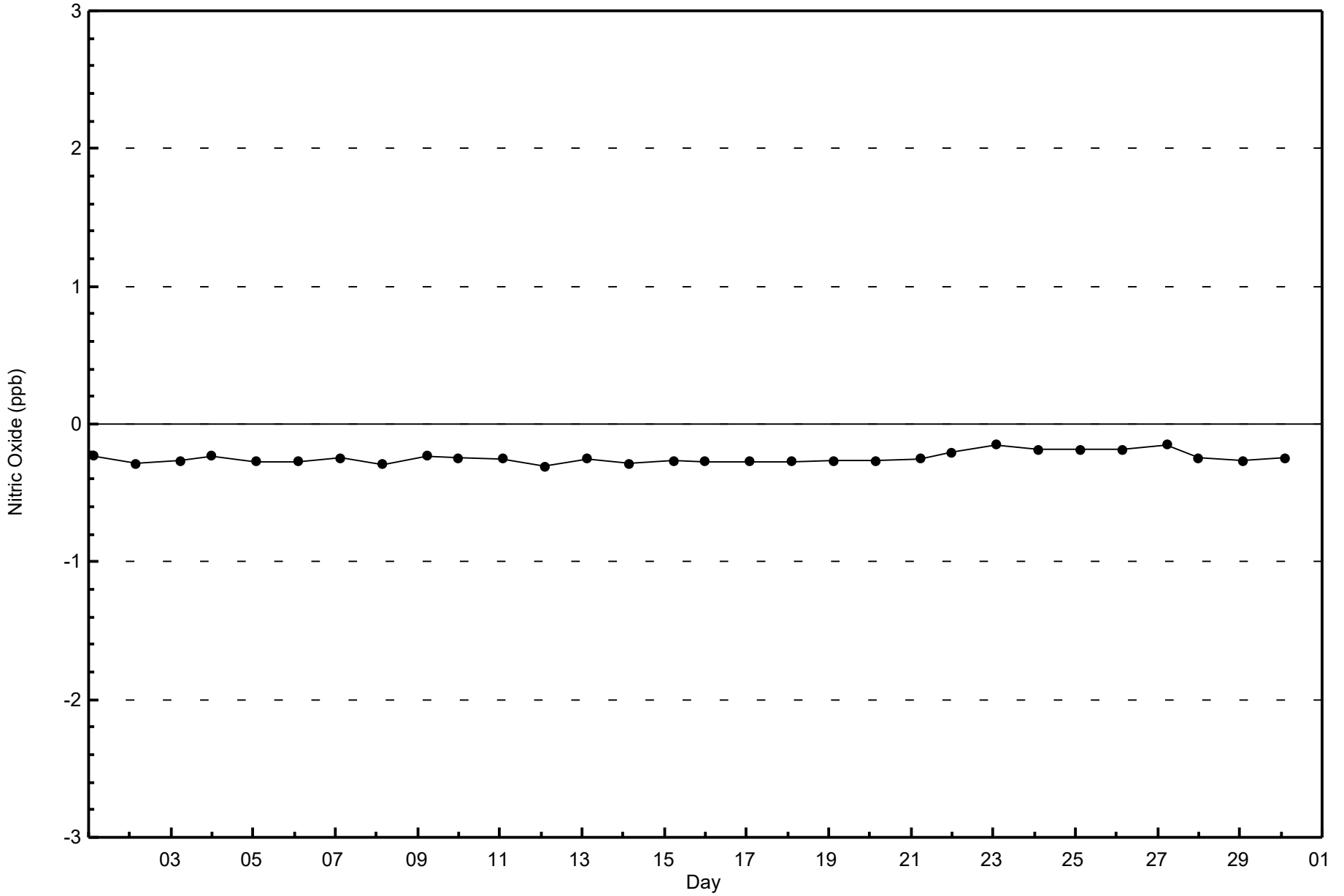


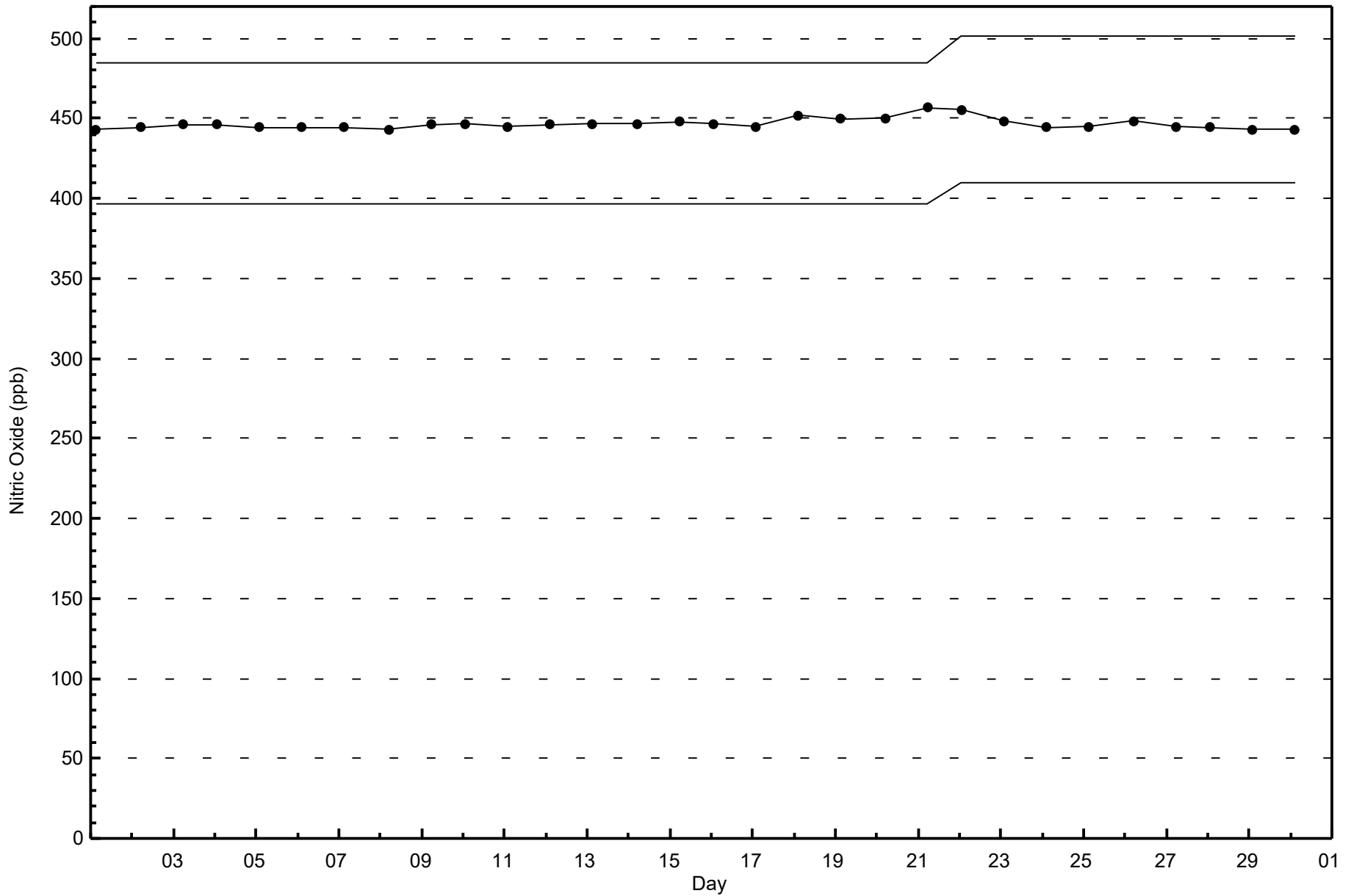


Wood Buffalo Environmental Association  
Wind Rose Nov 2023

Nitric Oxide (NO) - ppb  
Barge Landing









# Wood Buffalo Environmental Association

## Summary of Hour Averages

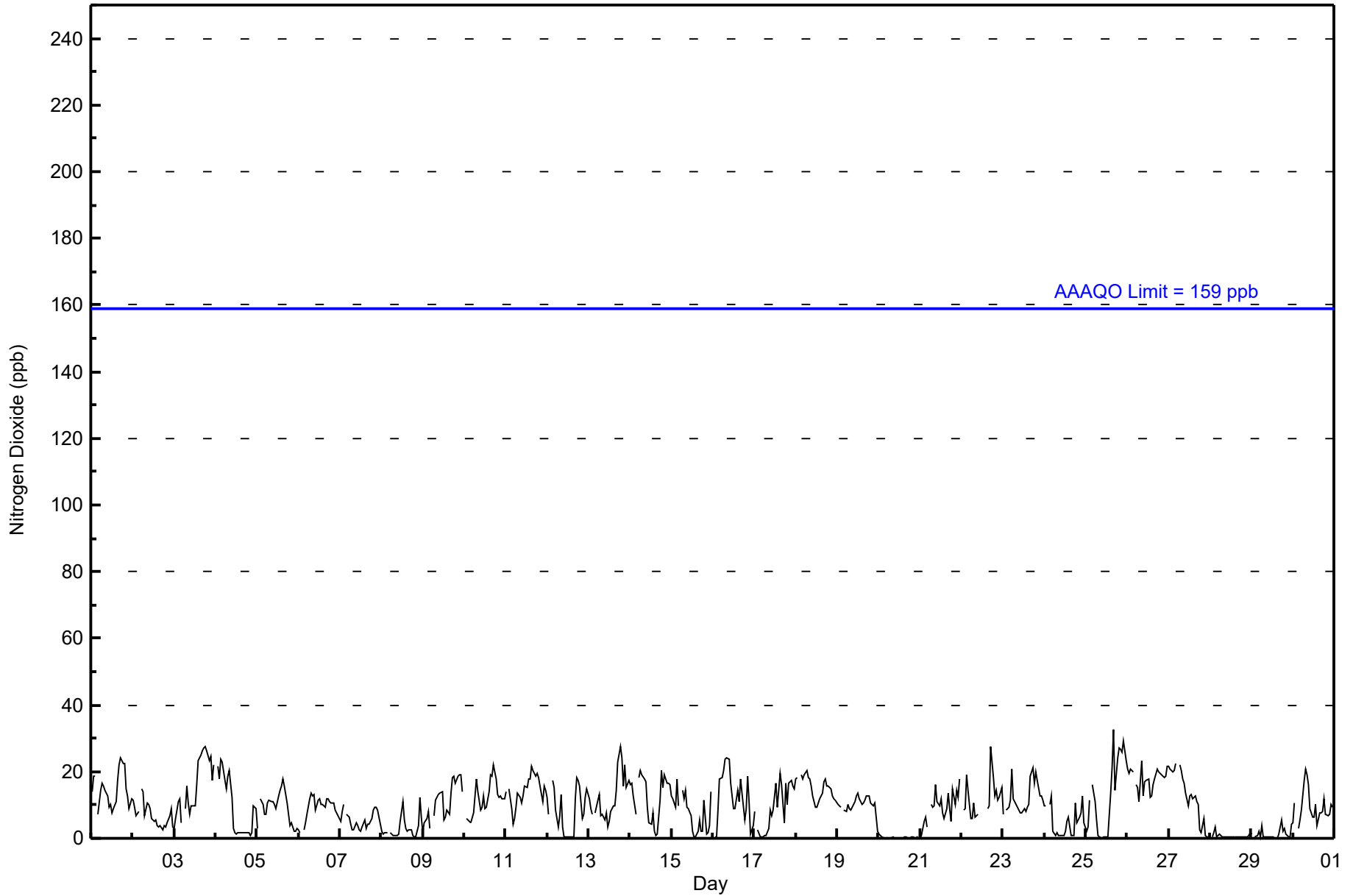
## Nitrogen Dioxide (NO<sub>2</sub>) - ppb Barge Landing - November 2023

Number of Exceedences (AAAQO):		1-hr: 0	24-hr: 0																		Hours in Service:	720																											
Maximum Value: 32.8 ppb on Nov 25 17:00		Maximum Daily Average: 17.8 ppb on Nov 26																	Hours of Data:	685																													
Minimum Value: 0.1 ppb on Nov 20 07:00		Minimum Daily Average: 0.3 ppb on Nov 20																	Hours of Missing Data:	35																													
Maximum Diurnal Average: 12.2 ppb at hour 19		Minimum Diurnal Average: 7.2 ppb at hour 12																	Hours of Calibration:	35																													
Monthly Average: 9.72 ppb		Percentiles: P <sub>1</sub> = 0.2 P <sub>10</sub> = 0.5 Q <sub>1</sub> = 3.5 Median = 9.4 Q <sub>3</sub> = 14.5 P <sub>90</sub> = 19.0 P <sub>99</sub> = 26.7																	Percent Operational Time:	100.0																													
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Nov	14.1	18.8	18.7	Z	7.2	14.2	16.4	15.6	14.5	12.9	9.4	10.1	7.7	8.7	11.2	17.5	22.0	24.0	22.6	22.6	14.9	12.7	8.8	11.7	14.6	24.0																							
2-Nov	11.6	9.4	6.9	8.2	Z	15.0	13.8	6.7	10.7	10.3	8.7	5.9	5.0	5.5	3.9	3.6	3.8	2.6	3.8	3.2	4.6	6.9	9.0	3.2	7.1	15.0																							
3-Nov	2.9	5.8	11.1	11.9	4.5	Z	8.9	15.6	10.8	7.3	9.8	9.9	9.8	16.0	23.5	25.0	26.1	27.3	27.4	26.2	23.1	24.6	17.5	22.1	16.0	27.4																							
4-Nov	Z	21.8	17.6	23.9	22.8	17.3	15.0	18.6	20.3	12.1	2.8	1.7	1.4	1.5	1.7	1.6	1.9	1.6	1.7	1.5	0.7	1.8	9.6	8.9	9.0	23.9																							
5-Nov	2.8	Z	12.0	10.1	7.0	7.1	10.8	11.4	11.1	11.2	10.0	8.7	12.7	14.5	15.5	17.6	15.5	10.6	7.0	4.0	4.7	2.0	2.1	3.1	9.2	17.6																							
6-Nov	2.6	1.8	Z	2.5	4.8	7.1	12.0	13.7	12.9	13.1	8.4	11.5	11.9	10.0	10.0	9.5	11.9	11.9	11.1	10.7	10.4	8.6	7.5	6.8	9.2	13.7																							
7-Nov	5.2	8.2	10.2	Z	7.4	6.4	4.3	2.6	2.4	4.6	3.7	2.7	2.0	3.4	5.5	2.9	4.4	4.3	5.9	8.4	9.4	9.3	8.6	4.4	5.5	10.2																							
8-Nov	2.3	1.4	1.5	1.8	Z	1.5	1.3	1.0	0.8	0.8	1.4	4.9	11.0	5.5	2.9	2.0	2.5	2.4	0.7	0.5	0.3	4.0	12.3	6.2	3.0	12.3																							
9-Nov	1.5	4.5	6.0	8.0	2.8	Z	6.8	11.3	12.2	13.2	13.7	13.9	5.3	6.4	8.4	7.0	13.5	18.4	18.5	16.6	18.5	19.1	19.2	13.8	11.2	19.2																							
10-Nov	Z	5.8	5.6	5.1	4.5	7.5	12.6	17.8	14.0	8.3	9.3	12.5	8.8	9.2	13.9	19.0	18.6	22.0	18.0	13.1	12.3	12.8	12.0	12.0	11.9	22.0																							
11-Nov	14.1	Z	14.9	8.7	4.3	5.8	9.4	13.7	12.1	10.8	12.8	15.5	15.3	17.9	17.7	21.5	20.2	18.5	19.5	18.2	15.5	11.2	15.7	14.5	14.3	21.5																							
12-Nov	12.2	7.4	Z	17.5	15.3	8.6	3.5	6.6	13.3	3.6	0.4	0.4	0.5	0.5	0.5	0.5	11.7	18.4	17.5	15.7	5.8	7.4	12.3	15.0	8.5	18.4																							
13-Nov	11.8	8.8	7.0	Z	7.6	11.5	13.1	6.7	7.2	5.6	7.6	3.2	4.9	8.0	9.8	9.7	14.5	23.0	27.7	24.2	15.7	22.1	15.2	17.4	12.3	27.7																							
14-Nov	15.9	16.7	12.5	7.1	Z	18.1	20.5	19.0	18.0	16.9	9.4	4.8	4.4	7.6	2.0	1.0	1.4	11.4	20.3	15.2	19.1	16.5	16.6	16.3	12.6	20.5																							
15-Nov	12.9	11.8	9.2	18.0	9.7	Z	14.4	11.8	14.5	9.5	8.7	6.8	2.1	0.3	0.4	2.1	5.6	2.0	2.3	11.3	1.1	1.8	3.7	14.1	7.6	18.0																							
16-Nov	Z	0.5	0.3	8.5	17.8	18.3	20.3	23.7	24.0	23.8	16.5	12.5	8.7	9.0	14.6	10.9	17.9	13.5	5.7	9.0	18.5	11.1	1.4	3.9	12.6	24.0																							
17-Nov	8.1	Z	2.5	0.6	0.6	0.6	0.7	0.7	3.1	8.5	6.8	8.6	16.6	9.3	14.4	19.3	16.3	4.6	16.5	10.0	16.5	17.4	15.6	14.7	9.2	19.3																							
18-Nov	17.6	18.3	Z	18.9	17.8	19.1	20.5	18.2	17.6	15.6	12.6	9.5	9.3	10.5	11.9	13.5	16.8	17.6	15.5	15.6	14.9	12.7	11.9	11.6	15.1	20.5																							
19-Nov	10.3	9.6	9.4	Z	8.4	8.2	10.1	8.9	8.3	10.0	11.2	12.5	13.6	12.0	10.1	10.5	11.5	12.7	12.5	10.7	10.3	9.7	10.6	2.0	10.1	13.6																							
20-Nov	1.1	0.7	0.3	0.2	Z	0.2	0.1	0.1	0.4	0.2	0.1	0.1	0.1	0.1	0.1	0.4	0.5	0.2	0.2	0.3	0.4	0.2	0.3	0.2	0.3	1.1																							
21-Nov	0.2	1.0	5.1	6.3	3.6	Z	10.3	9.3	9.9	15.9	11.1	9.6	11.8	7.8	6.1	8.7	13.5	8.9	5.2	14.9	10.0	14.2	12.3	17.8	9.3	17.8																							
22-Nov	Z	8.5	8.9	18.9	14.2	6.0	6.0	10.4	6.2	7.2	C	C	C	C	C	9.0	9.9	27.7	18.4	12.6	14.4	11.4	12.3	15.3	12.1	27.7																							
23-Nov	7.3	Z	8.6	9.4	11.5	20.9	11.8	11.0	9.2	8.5	7.7	7.5	8.7	8.2	9.3	10.0	18.6	21.0	16.5	20.1	17.3	12.8	12.6	11.3	12.2	21.0																							
24-Nov	9.9	9.8	Z	10.1	12.8	2.0	0.8	1.6	1.0	0.9	1.0	0.8	2.3	5.1	6.3	0.7	0.9	0.9	10.4	4.7	6.4	7.8	12.6	4.7	4.9	12.8																							
25-Nov	2.3	3.5	11.5	Z	16.0	11.1	5.6	0.8	0.5	0.2	0.3	0.5	0.6	0.5	13.5	21.2	32.8	14.3	24.0	27.2	26.6	25.9	29.1	23.3	12.7	32.8																							
26-Nov	20.9	19.5	20.8	19.9	Z	16.3	15.4	11.0	23.2	12.8	16.9	17.3	17.9	12.2	12.6	16.3	17.7	20.6	19.8	19.3	19.2	18.4	18.8	21.8	17.8	23.2																							
27-Nov	21.7	20.9	20.1	20.2	22.4	Z	22.0	20.5	17.6	16.7	13.5	9.7	12.7	13.3	12.0	12.6	11.2	10.0	2.5	1.6	5.9	0.7	0.6	0.5	12.6	22.4																							
28-Nov	Z	0.5	1.8	3.4	0.5	1.3	0.8	0.4	0.5	0.5	0.5	0.4	0.3	0.4	0.4	0.4	0.4	0.6	0.3	0.3	0.3	0.3	0.4	1.8	0.7	3.4																							
29-Nov	1.1	Z	0.5	0.7	2.2	0.5	3.8	0.3	0.5	0.5	0.5	0.4	0.3	0.2	0.2	0.2	1.1	5.5	2.2	3.1	1.3	0.5	0.3	4.3	1.3	5.5																							
30-Nov	4.5	10.4	Z	3.0	5.3	8.3	17.5	20.8	19.0	16.3	8.9	6.4	6.5	10.3	3.8	7.5	7.7	8.1	11.8	7.2	6.8	7.4	10.2	9.3	9.4	20.8																							
																								8.6	9.0	8.9	9.7	9.2	9.3	10.3	10.3	10.5	9.3	7.7	7.2	7.3	7.4	8.4	9.4	11.7	12.2	12.2	11.6	10.8	10.4	10.6	10.4	Diurnal Average	
																								21.7	21.8	20.8	23.9	22.8	20.9	22.0	23.7	24.0	23.8	16.9	17.3	17.9	17.9	23.5	25.0	32.8	27.7	27.7	27.2	26.6	25.9	29.1	23.3	Diurnal Maximum	
Z - zerospan C - Calibration																																																	
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 159 ppb																																																	



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

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb**  
**Barge Landing - November 2023**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Barge Landing - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	636	92.85	92.85
21 - 40	49	7.15	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Barge Landing - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 20	31	31	22	18	26	25	30	100	79	64	42	45	34	43	17	29	636
21 - 40	8	1	1	2	5	1	3	9	6	1	4	0	0	1	3	4	49
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	<b>39</b>	<b>32</b>	<b>23</b>	<b>20</b>	<b>31</b>	<b>26</b>	<b>33</b>	<b>109</b>	<b>85</b>	<b>65</b>	<b>46</b>	<b>45</b>	<b>34</b>	<b>44</b>	<b>20</b>	<b>33</b>	<b>685</b>

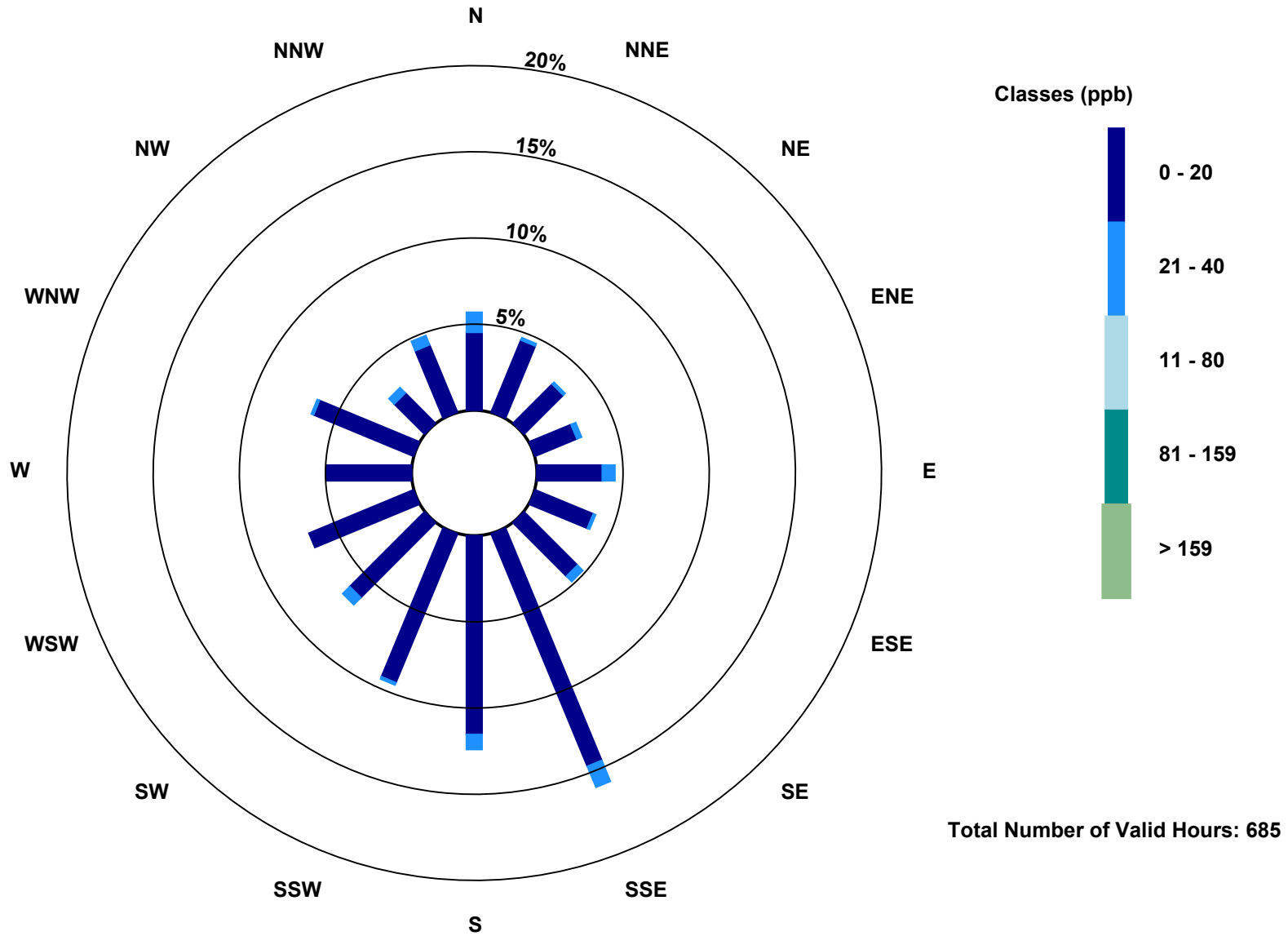
Total Number of Valid Hours: 685

Total Number of Hours: 720

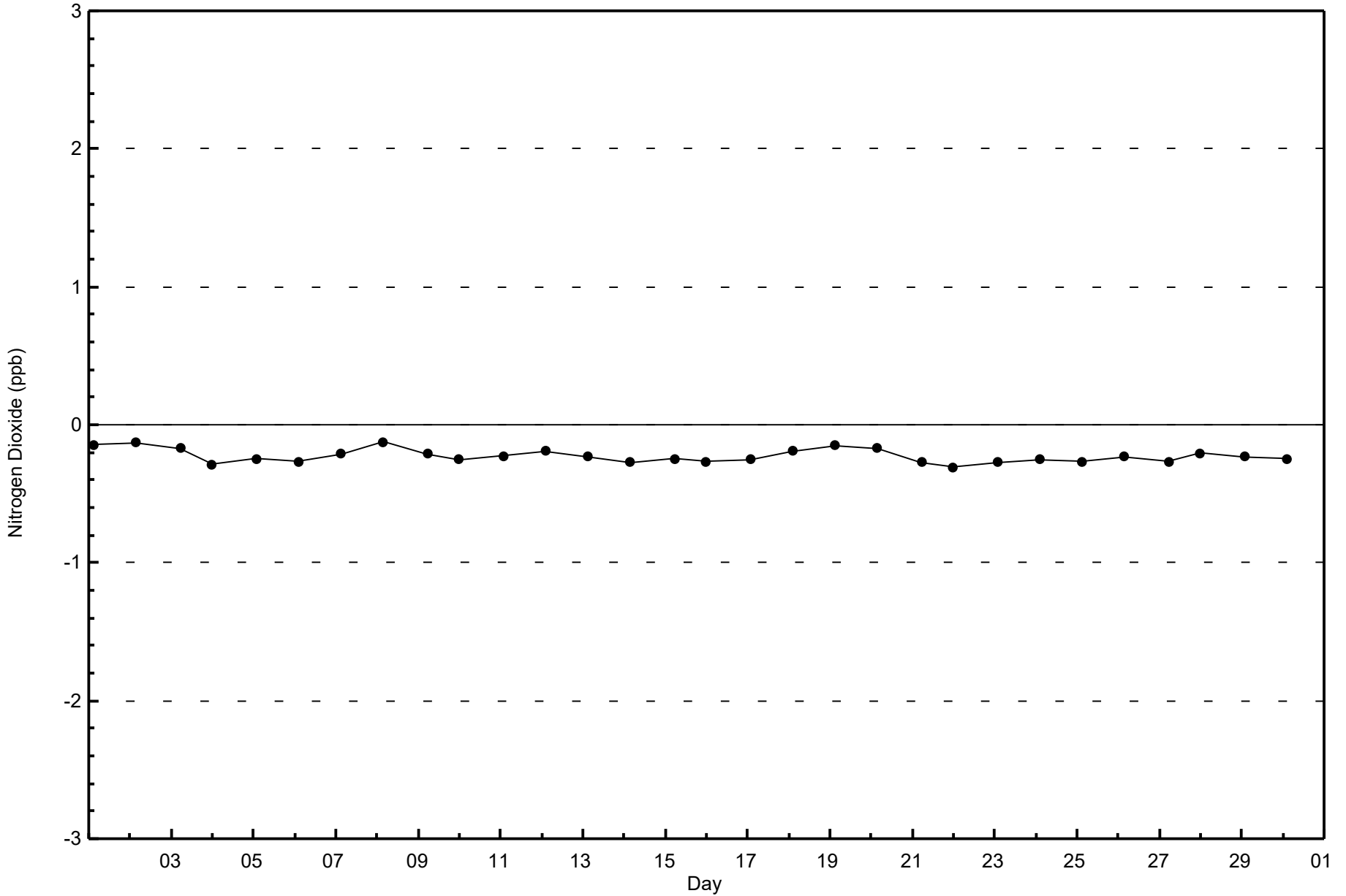


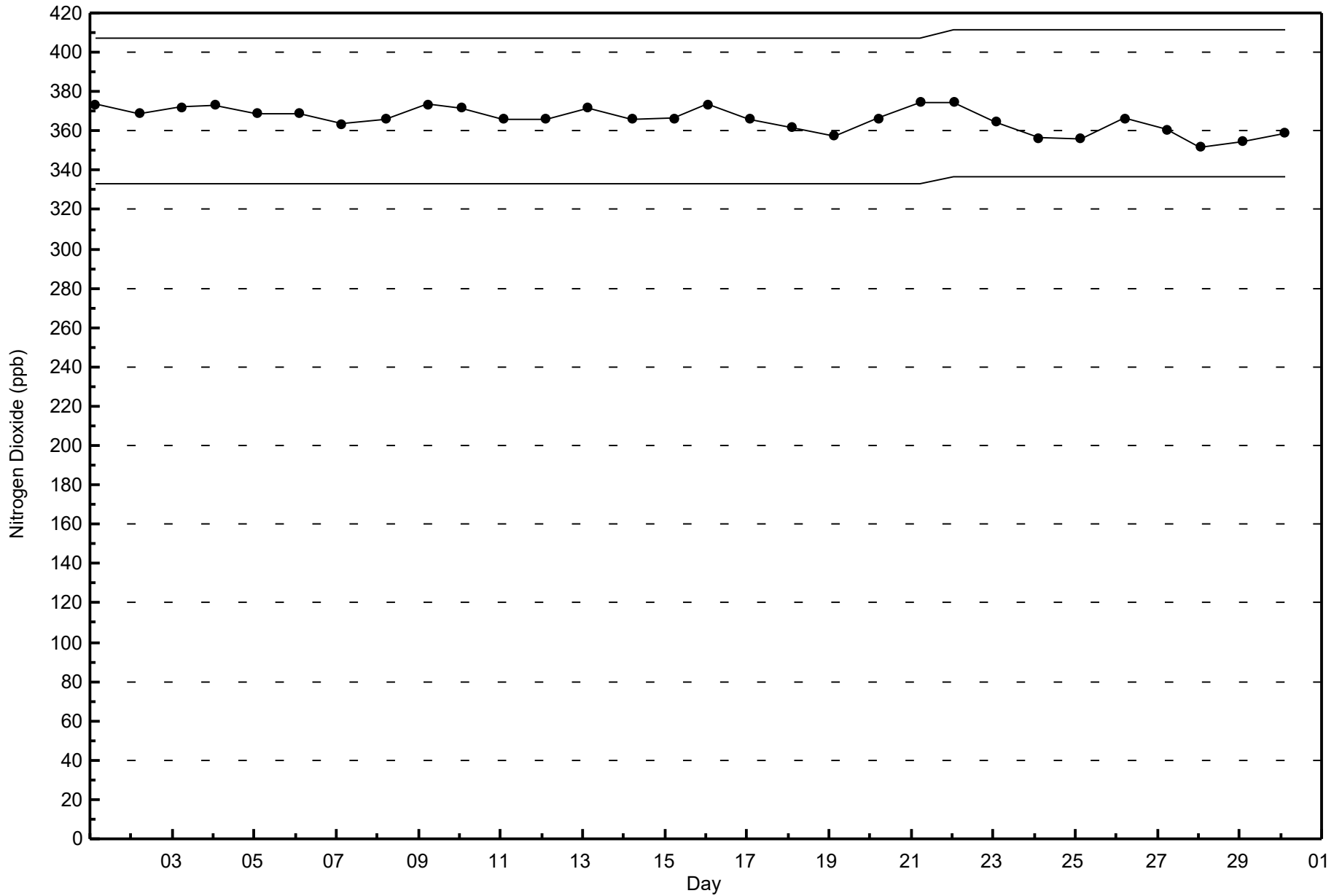
Wood Buffalo Environmental Association  
Wind Rose Nov 2023

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











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

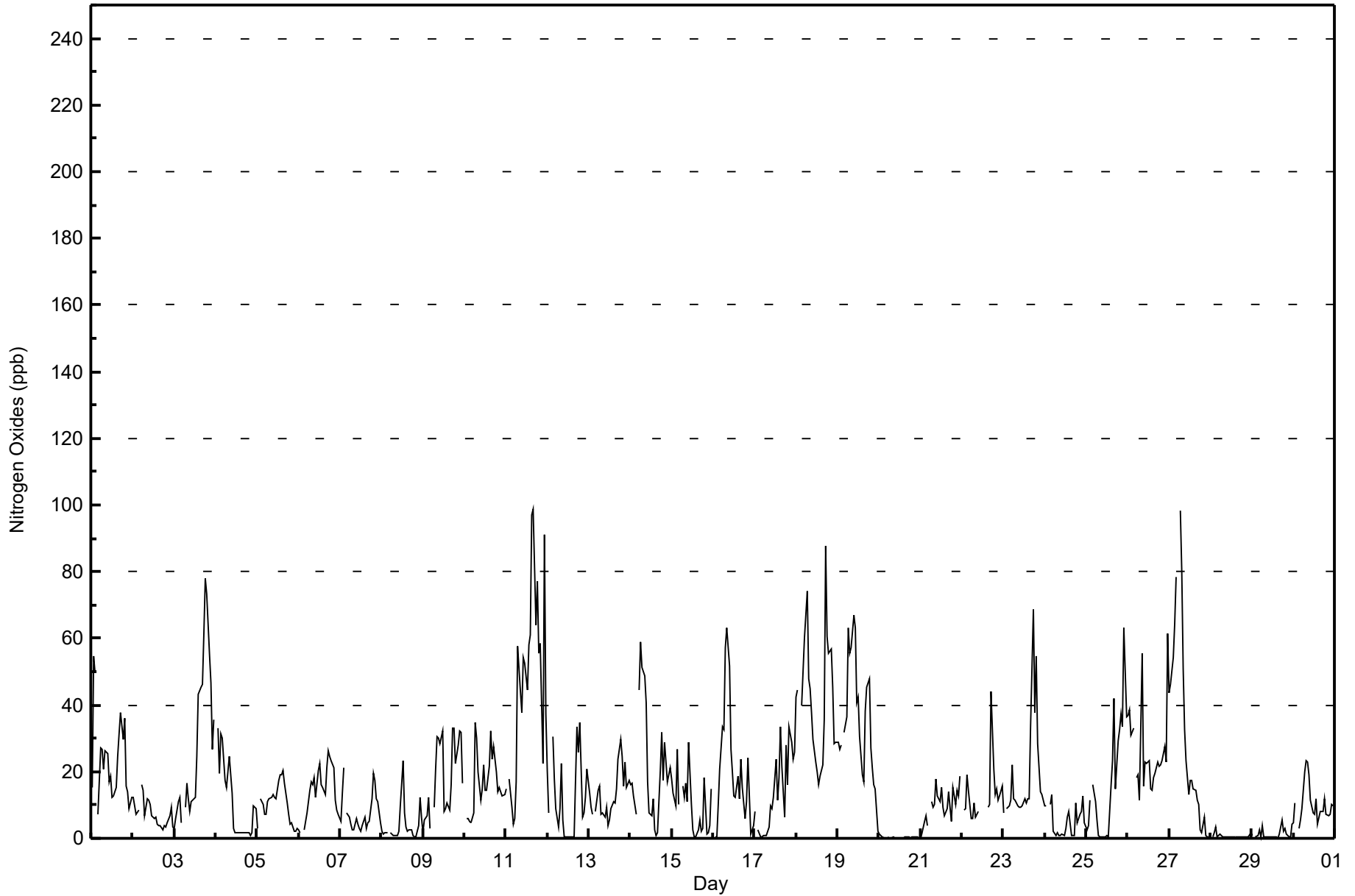
**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Barge Landing - November 2023**

Maximum Value: 98.6 ppb on Nov 11 17:00      Maximum Daily Average: 47.0 ppb on Nov 11																						Hours in Service: 720 Hours of Data: 685																											
Minimum Value: 0.1 ppb on Nov 20 15:00      Minimum Daily Average: 0.3 ppb on Nov 20 Maximum Diurnal Average: 23.1 ppb at hour 18      Minimum Diurnal Average: 11.6 ppb at hour 14 Monthly Average: 16.35 ppb      Percentiles: P <sub>1</sub> = 0.1 P <sub>10</sub> = 0.6 Q <sub>1</sub> = 3.8 Median = 11.5 Q <sub>3</sub> = 22.2 P <sub>90</sub> = 39.3 P <sub>99</sub> = 78.2																						Hours of Missing Data: 35 Hours of Calibration: 35 Percent Operational Time: 100.0																											
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Nov	15.3	54.6	49.4	Z	7.2	26.9	26.7	20.8	26.5	25.4	16.8	18.8	12.4	12.9	15.1	24.6	31.5	37.5	29.6	36.2	15.6	13.9	9.0	12.2	23.4	54.6																							
2-Nov	12.2	9.6	7.1	8.4	Z	16.0	14.6	6.9	11.8	11.4	10.2	7.0	5.9	6.3	4.3	3.8	3.9	2.6	3.8	3.2	4.6	6.9	9.1	3.2	7.5	16.0																							
3-Nov	2.9	6.0	11.2	12.1	4.6	Z	9.4	16.7	12.0	8.2	11.1	11.7	12.2	24.7	43.0	45.3	46.1	61.3	78.1	73.2	55.0	46.6	26.7	35.6	28.4	78.1																							
4-Nov	Z	32.9	19.6	31.3	30.2	17.5	15.4	20.0	24.8	13.5	3.1	1.9	1.5	1.6	1.8	1.6	1.9	1.7	1.7	1.5	0.7	1.8	9.6	8.9	10.6	32.9																							
5-Nov	2.8	Z	12.0	10.2	7.0	7.1	11.0	11.8	12.4	13.3	12.5	11.7	17.3	18.9	19.0	20.3	16.3	10.7	7.3	4.2	4.8	2.0	2.1	3.1	10.3	20.3																							
6-Nov	2.6	1.8	Z	2.6	5.0	7.5	14.3	16.8	16.2	18.3	12.1	20.3	22.5	16.1	15.4	13.3	21.1	26.3	24.4	23.5	21.2	11.3	8.5	7.1	14.3	26.3																							
7-Nov	5.2	13.8	21.4	Z	7.5	6.4	4.3	2.6	2.5	5.9	4.3	3.1	2.2	3.8	6.4	3.0	4.8	5.2	12.0	19.4	17.5	11.7	10.9	4.5	7.7	21.4																							
8-Nov	2.3	1.4	1.5	1.8	Z	1.5	1.3	1.0	0.8	0.9	2.0	9.9	23.3	7.8	3.4	2.2	2.6	2.4	0.7	0.5	0.3	4.0	12.4	6.2	3.9	23.3																							
9-Nov	1.5	5.4	6.7	12.4	2.9	Z	9.5	20.6	30.5	30.0	28.3	32.1	8.2	8.7	10.6	8.7	16.3	33.2	32.9	22.4	27.9	32.0	31.7	16.6	18.7	33.2																							
10-Nov	Z	6.0	5.7	5.2	4.6	7.5	34.7	29.9	20.0	11.5	14.8	22.2	14.3	14.3	21.8	32.3	23.9	27.3	20.1	13.8	15.2	13.9	12.6	13.0	16.7	34.7																							
11-Nov	14.7	Z	18.0	9.2	4.4	5.9	16.9	57.8	44.1	37.9	54.1	52.6	44.7	58.1	60.9	96.9	98.6	64.0	76.9	55.4	58.5	22.4	91.1	37.4	47.0	98.6																							
12-Nov	20.3	7.6	Z	30.3	18.0	8.8	3.5	8.9	22.6	5.6	0.5	0.5	0.5	0.5	0.5	0.5	17.3	33.3	25.8	34.6	6.4	7.5	12.4	20.6	12.4	34.6																							
13-Nov	13.4	9.3	7.2	Z	8.0	14.4	15.6	7.2	7.6	6.3	9.1	3.8	5.7	9.1	11.1	10.4	14.8	23.9	29.9	24.6	15.8	22.9	15.2	17.5	13.2	29.9																							
14-Nov	15.9	16.7	12.5	7.1	Z	44.4	59.0	51.1	48.9	40.5	16.8	7.8	6.8	11.9	2.5	1.0	1.5	20.3	31.7	17.3	29.0	16.9	19.2	21.1	21.7	59.0																							
15-Nov	17.9	13.4	9.7	26.8	10.2	Z	15.6	12.3	16.6	11.2	29.0	10.3	2.6	0.3	0.4	2.4	5.6	2.0	2.9	18.4	1.1	1.8	3.7	14.9	10.0	29.0																							
16-Nov	Z	0.5	0.3	10.0	20.7	33.5	32.4	57.0	63.1	51.6	26.7	20.0	12.7	12.4	18.6	12.0	23.8	15.4	5.7	10.9	24.0	12.6	1.4	3.9	20.4	63.1																							
17-Nov	8.1	Z	2.5	0.6	0.6	0.6	0.7	0.7	3.3	9.9	8.8	12.4	23.7	11.4	18.3	33.4	21.6	6.5	28.0	15.9	33.5	28.9	23.7	26.0	13.9	33.5																							
18-Nov	42.4	44.4	Z	39.7	49.8	60.2	74.0	47.9	44.8	37.6	29.5	22.8	19.8	16.2	18.5	22.1	35.8	87.5	60.4	55.4	56.8	45.2	28.2	28.9	42.1	87.5																							
19-Nov	28.7	26.5	28.1	Z	31.6	36.5	63.3	55.6	57.0	67.0	63.0	40.8	42.3	30.3	18.9	17.1	38.0	45.3	47.7	27.1	21.2	16.0	14.9	2.0	35.6	67.0																							
20-Nov	1.1	0.7	0.3	0.2	Z	0.2	0.1	0.1	0.4	0.2	0.1	0.1	0.1	0.1	0.1	0.5	0.6	0.2	0.2	0.3	0.4	0.2	0.3	0.2	0.3	1.1																							
21-Nov	0.2	1.1	5.3	6.7	3.7	Z	11.0	9.5	10.3	17.9	12.5	11.1	15.3	9.5	6.7	9.1	14.0	9.1	5.3	15.1	10.1	14.5	12.5	18.7	10.0	18.7																							
22-Nov	Z	8.5	8.9	19.0	14.4	6.1	6.1	10.4	6.3	8.1	Z	Z	Z	Z	Z	9.4	10.2	44.2	20.8	13.2	14.9	11.6	12.7	15.8	13.4	44.2																							
23-Nov	7.4	Z	8.8	9.6	11.6	22.0	12.0	11.3	9.8	9.2	9.4	9.6	11.7	10.8	11.7	12.1	33.7	68.8	37.6	54.6	28.5	14.0	12.9	11.3	18.6	68.8																							
24-Nov	9.9	9.8	Z	10.1	13.1	2.0	0.8	1.8	1.0	0.9	1.2	0.9	3.0	6.5	7.9	0.7	0.9	0.9	10.5	4.7	7.1	8.1	12.7	4.7	5.2	13.1																							
25-Nov	2.3	3.9	11.5	Z	16.1	11.2	5.6	0.8	0.5	0.2	0.3	0.5	0.7	0.5	16.3	23.5	41.8	14.9	29.0	32.4	37.1	33.7	63.2	36.3	16.6	63.2																							
26-Nov	36.7	38.6	30.7	33.2	Z	18.2	19.0	11.6	55.5	15.8	22.7	22.3	23.4	14.7	14.5	18.2	19.6	22.8	21.5	22.1	23.1	27.4	22.9	61.3	25.9	61.3																							
27-Nov	43.7	46.0	54.1	64.4	78.4	Z	98.2	80.2	51.0	32.5	23.1	13.2	17.6	17.4	14.8	14.5	11.3	10.3	2.5	1.6	6.4	0.7	0.6	0.5	29.7	98.2																							
28-Nov	Z	0.5	1.8	3.4	0.5	1.3	0.8	0.4	0.5	0.5	0.5	0.5	0.3	0.4	0.4	0.4	0.4	0.6	0.3	0.3	0.3	0.3	0.4	1.8	0.7	3.4																							
29-Nov	1.1	Z	0.5	0.7	2.3	0.5	3.9	0.3	0.5	0.5	0.5	0.5	0.4	0.2	0.2	0.2	1.1	5.5	2.2	3.1	1.3	0.5	0.3	4.3	1.3	5.5																							
30-Nov	4.5	10.5	Z	3.0	5.4	8.7	19.8	23.4	22.8	19.2	11.4	7.4	7.3	12.0	4.1	7.9	7.9	8.2	12.0	7.3	6.8	7.4	10.3	9.6	10.3	23.4																							
																								12.5	14.8	13.4	14.3	14.3	14.6	20.0	19.9	20.8	17.0	15.0	13.0	12.3	11.6	12.7	14.9	18.9	23.1	22.0	20.4	18.2	14.6	16.4	14.9	Diurnal Average	
																								43.7	54.6	54.1	64.4	78.4	60.2	98.2	80.2	63.1	67.0	63.0	52.6	44.7	58.1	60.9	96.9	98.6	87.5	78.1	73.2	58.5	46.6	91.1	61.3	Diurnal Maximum	
Z - zerospan      C - Calibration																																																	



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

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Barge Landing - November 2023**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Barge Landing - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	497	72.55	72.55
21 - 40	121	17.66	90.22
41 - 80	62	9.05	99.27
81 - 159	5	0.73	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Barge Landing - November 2023**

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	31	21	16	22	21	22	50	52	48	35	42	33	39	16	23	497
21 - 40	7	0	1	3	6	3	8	41	23	8	9	2	1	4	1	4	121
11 - 80	6	1	1	1	3	2	3	16	9	8	2	1	0	1	2	6	62
81 - 159	0	0	0	0	0	0	0	2	1	1	0	0	0	0	1	0	5
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	39	32	23	20	31	26	33	109	85	65	46	45	34	44	20	33	685

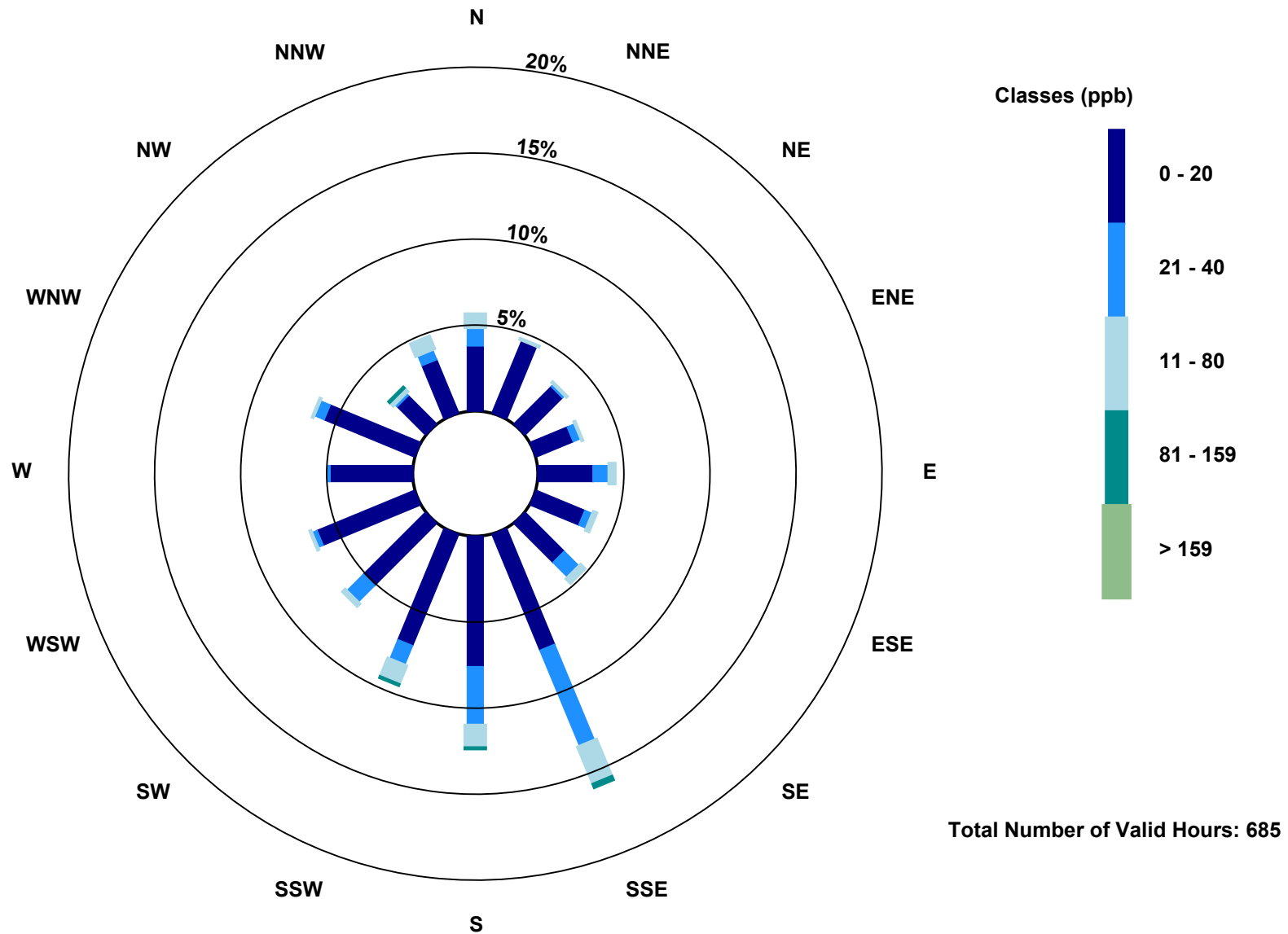
Total Number of Valid Hours: 685

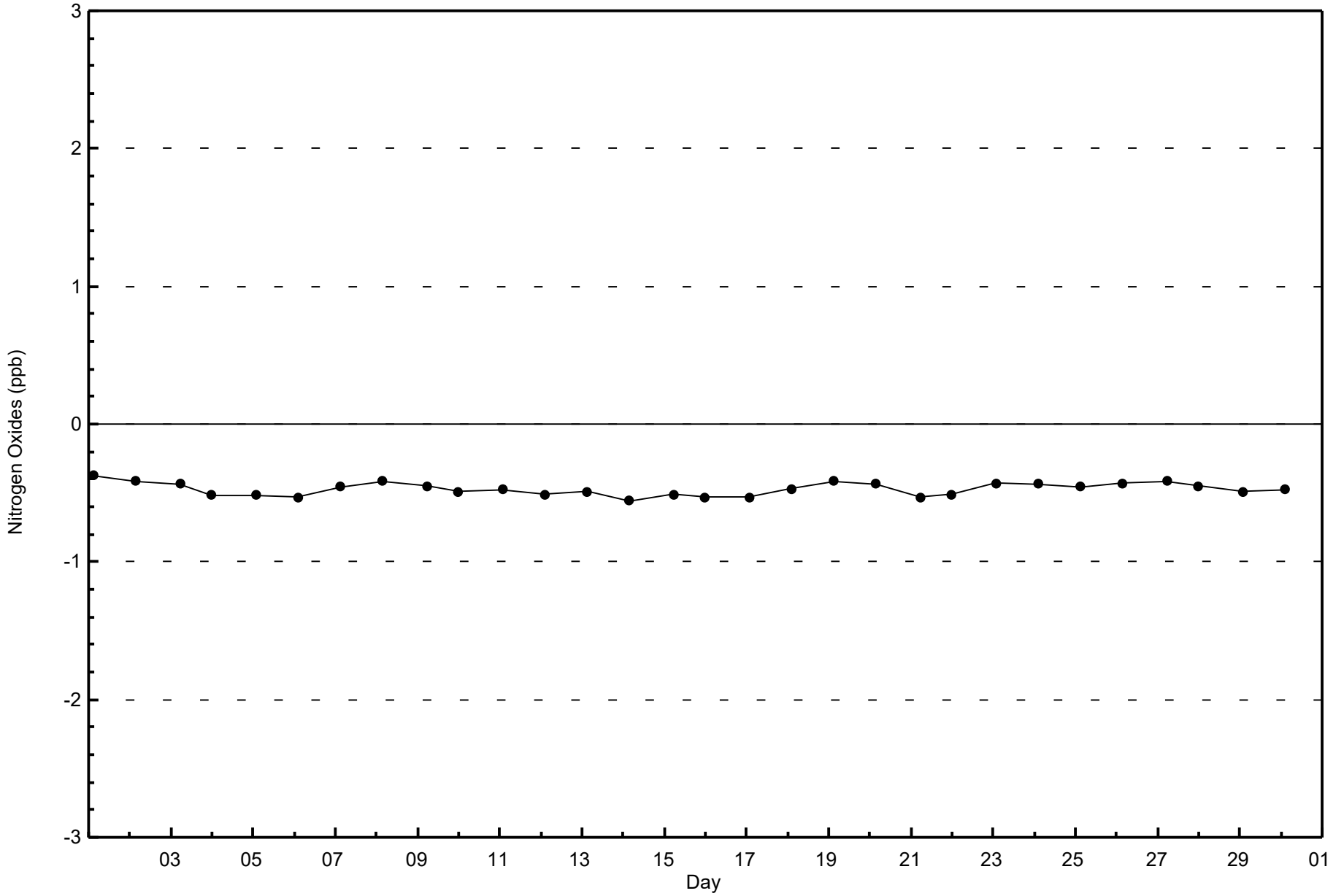
Total Number of Hours: 720



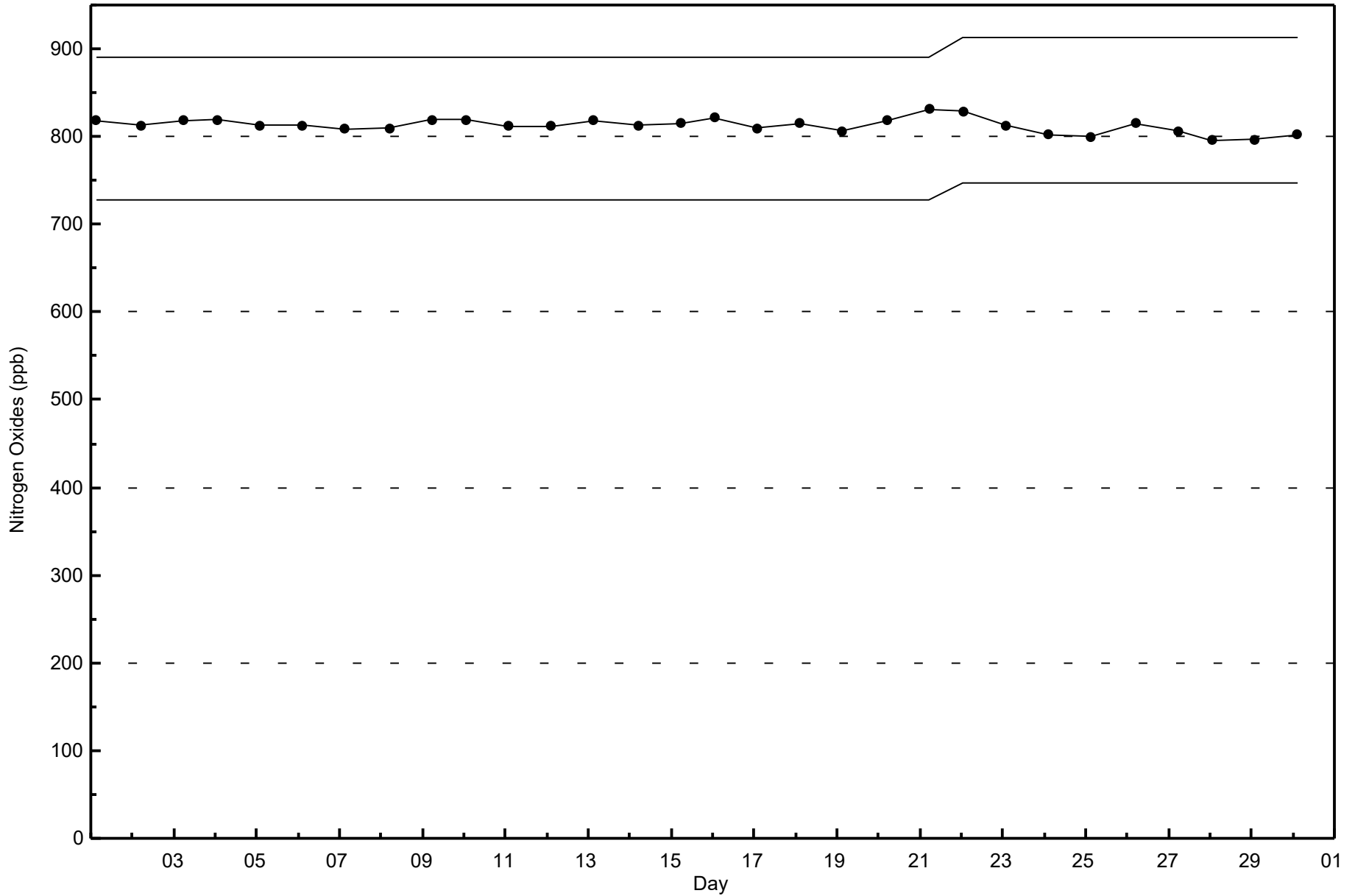
Wood Buffalo Environmental Association  
Wind Rose Nov 2023

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









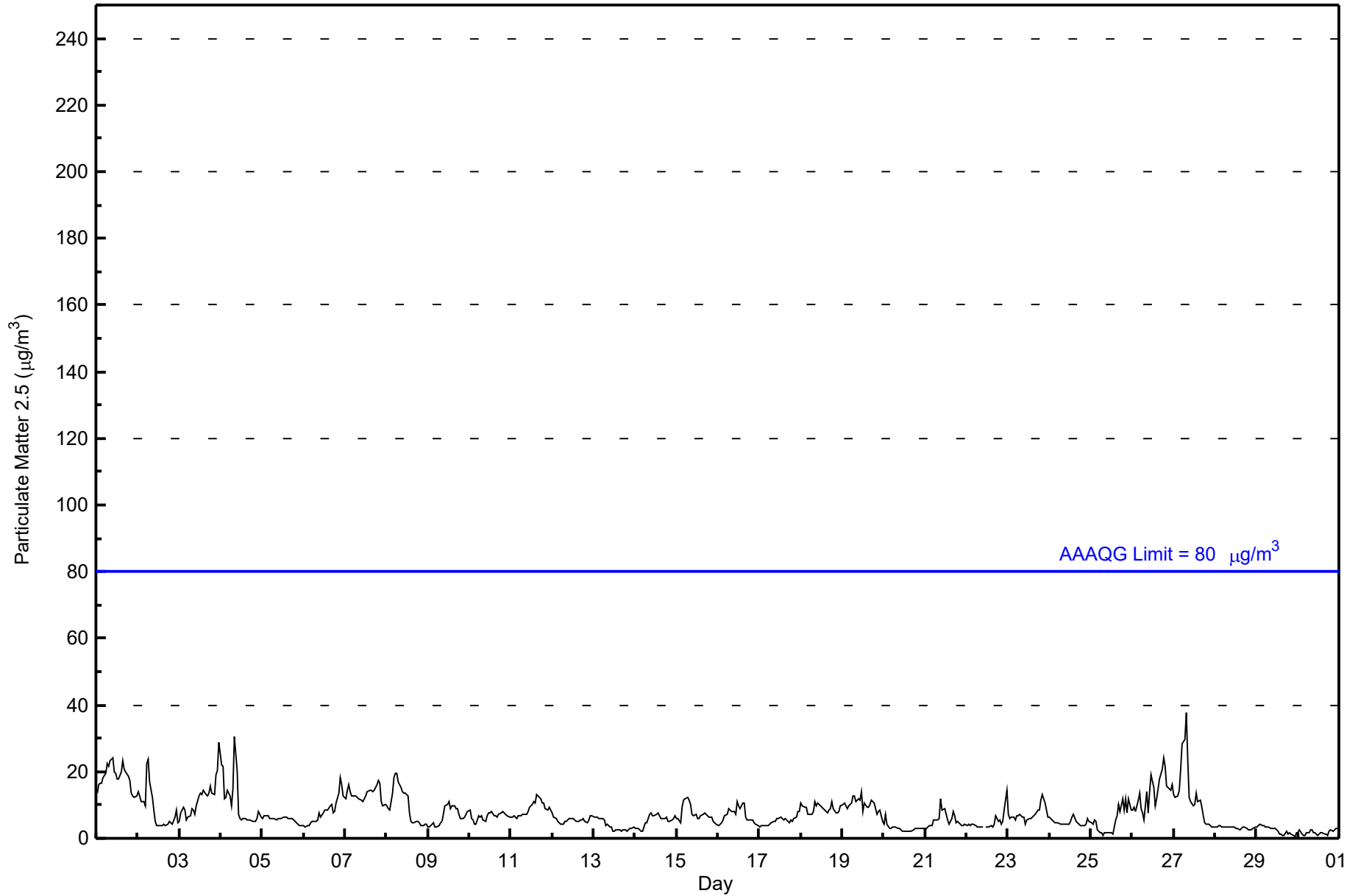


Number of Exceedences (AAAQO):		1-hr: 0		24-hr: 0		Hours in Service:		720																																								
Maximum Value: 37.7 µg/m <sup>3</sup> on Nov 27 08:00		Maximum Daily Average: 18.3 µg/m <sup>3</sup> on Nov 1				Hours of Data:		719																																								
Minimum Value: 0.6 µg/m <sup>3</sup> on Nov 29 23:00		Minimum Daily Average: 1.8 µg/m <sup>3</sup> on Nov 30				Hours of Missing Data:		1																																								
Maximum Diurnal Average: 8.8 µg/m <sup>3</sup> at hour 9		Minimum Diurnal Average: 6.9 µg/m <sup>3</sup> at hour 3				Hours of Calibration:		1																																								
Monthly Average: 7.54 µg/m <sup>3</sup>		Percentiles: P <sub>1</sub> = 1.0 P <sub>10</sub> = 2.8 Q <sub>1</sub> = 4.1 Median = 6.1 Q <sub>3</sub> = 9.8 P <sub>90</sub> = 13.8 P <sub>99</sub> = 23.8				Percent Operational Time:		100.0																																								
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Nov	13.7	16.3	16.4	16.6	18.1	19.3	22.5	21.4	23.4	24.0	19.9	19.5	17.9	18.0	20.1	23.5	20.9	19.9	18.7	17.6	13.8	12.9	12.4	12.8	18.3	24.0																						
2-Nov	13.8	12.5	11.0	10.9	9.9	22.3	23.8	17.1	12.4	8.4	5.2	3.7	3.9	3.7	4.1	3.8	4.3	5.0	4.5	4.3	6.3	8.4	4.5	8.6	23.8	23.8																						
3-Nov	5.3	7.5	9.1	8.5	5.6	6.5	7.0	9.0	8.4	7.3	9.6	12.8	13.8	13.0	14.4	13.0	12.5	13.6	15.6	13.4	13.1	19.2	20.2	28.6	12.0	28.6																						
4-Nov	22.0	21.4	11.8	12.2	14.5	12.5	9.8	14.7	30.5	20.3	7.2	5.8	5.7	6.0	5.9	5.7	5.4	5.1	4.9	5.0	6.1	8.2	6.2	10.5	30.5	30.5																						
5-Nov	5.8	6.7	6.6	6.7	6.1	5.9	5.8	5.8	5.6	5.8	5.7	5.8	6.2	6.3	6.3	6.1	5.8	5.9	5.3	4.9	4.7	4.0	3.9	3.7	5.6	6.7																						
6-Nov	3.7	3.6	3.8	3.9	4.5	5.1	5.0	5.1	5.3	7.7	6.3	7.4	8.6	8.6	8.4	9.7	10.2	7.7	8.1	10.4	13.6	18.2	16.0	12.6	8.1	18.2																						
7-Nov	11.9	14.6	16.0	13.8	12.6	12.7	12.6	12.3	11.9	11.3	11.1	12.0	12.6	13.9	14.5	14.4	14.2	14.5	16.3	17.5	16.5	11.1	9.7	10.0	13.3	17.5																						
8-Nov	9.8	9.0	8.4	13.7	18.4	19.6	19.4	16.9	15.3	14.0	13.6	13.8	12.9	7.7	5.1	4.6	4.6	5.0	4.9	4.6	4.0	3.8	4.3	4.3	9.9	19.6																						
9-Nov	3.5	3.5	4.1	4.7	3.4	3.4	3.9	4.6	5.1	7.1	9.9	10.0	11.2	8.9	9.9	9.5	8.8	8.9	7.1	5.9	5.8	6.4	7.2	8.2	6.7	11.2																						
10-Nov	8.3	5.7	5.7	4.4	4.4	6.7	6.4	6.7	5.7	4.9	6.6	7.6	7.7	8.1	6.9	7.0	6.4	7.0	7.7	8.2	7.5	7.3	6.8	6.1	6.7	8.3																						
11-Nov	6.5	6.4	6.8	6.1	6.6	6.8	6.7	7.2	7.2	7.0	7.9	9.5	10.0	10.8	10.5	13.0	12.7	12.1	10.5	10.6	8.9	8.7	9.3	8.4	8.8	13.0																						
12-Nov	7.7	6.2	5.7	5.0	4.5	4.3	4.4	5.0	5.3	5.4	5.9	6.0	5.9	5.6	4.9	5.1	5.3	5.6	5.9	5.0	4.6	5.6	6.7	7.0	5.5	7.7																						
13-Nov	6.4	6.3	6.3	6.1	6.0	6.0	5.5	3.7	4.4	3.4	3.4	2.3	2.3	2.7	2.5	2.4	2.1	2.5	2.5	2.3	2.6	2.9	3.1	3.3	3.8	6.4																						
14-Nov	2.9	3.0	2.8	1.9	2.0	3.5	4.7	4.8	7.3	7.5	6.8	6.9	7.3	7.6	6.9	6.1	5.8	5.9	6.2	5.2	5.1	5.4	6.0	6.6	5.3	7.6																						
15-Nov	5.8	5.9	4.9	9.3	11.6	11.9	12.4	11.4	10.3	7.2	6.6	7.4	5.8	5.8	6.6	7.0	7.8	7.2	6.7	6.5	6.4	5.2	4.8	4.2	7.4	12.4																						
16-Nov	3.9	4.2	4.8	5.3	6.6	7.3	8.8	8.3	8.1	7.9	7.1	10.8	9.7	8.9	10.4	10.7	6.5	5.6	5.6	5.4	5.6	4.7	4.1	3.8	6.8	10.8																						
17-Nov	3.4	3.7	3.6	3.8	3.9	4.0	4.4	4.7	5.0	5.2	5.8	5.8	6.3	5.8	5.5	5.8	5.6	5.6	5.4	5.2	5.8	6.5	8.2	8.2	5.3	8.2																						
18-Nov	10.6	9.9	9.5	9.3	7.3	7.3	7.1	8.1	11.1	9.8	10.6	9.8	9.2	8.8	8.4	7.8	8.6	9.0	10.8	9.0	7.7	7.7	8.0	9.6	9.0	11.1																						
19-Nov	10.0	10.4	9.8	9.1	9.9	10.4	12.9	12.6	11.0	12.0	11.5	14.2	7.9	10.6	9.3	9.2	10.0	11.4	10.8	8.9	7.1	8.1	8.7	5.2	10.0	14.2																						
20-Nov	4.3	7.4	4.4	3.0	3.0	3.4	3.2	3.2	3.0	3.0	2.7	2.1	2.3	2.0	2.0	2.0	2.2	2.3	2.8	3.1	3.1	2.9	3.1	3.0	3.1	7.4																						
21-Nov	3.1	3.1	3.6	3.7	3.9	5.4	5.4	5.4	6.0	11.7	8.5	8.7	7.3	5.4	4.3	6.0	8.2	7.0	4.9	5.2	4.0	3.8	3.8	4.1	5.5	11.7																						
22-Nov	3.9	4.2	3.8	4.2	4.3	3.7	3.3	3.3	3.4	3.4	C	3.4	3.4	3.4	3.7	3.6	4.1	6.6	5.2	5.4	4.2	5.0	8.4	14.6	4.7	14.6																						
23-Nov	7.3	6.1	6.6	6.3	5.6	6.8	7.0	7.2	6.2	6.3	4.4	5.7	6.1	5.8	6.5	6.6	7.1	8.5	8.6	11.5	13.2	10.5	8.4	6.4	7.3	13.2																						
24-Nov	6.1	5.7	5.0	4.7	4.6	4.5	4.2	4.4	4.3	4.1	4.1	4.3	5.1	6.2	7.0	5.3	4.7	4.0	3.9	3.9	4.0	4.2	6.0	5.2	4.8	7.0																						
25-Nov	4.8	4.4	5.6	5.0	2.6	1.8	1.9	0.9	1.8	1.7	1.5	1.6	1.6	1.4	5.6	6.6	10.1	7.9	11.8	8.6	11.9	7.8	11.8	8.6	5.3	11.9																						
26-Nov	8.3	9.2	8.0	11.6	13.5	8.8	7.6	5.5	13.9	7.6	14.2	19.0	15.2	9.8	11.7	15.0	17.8	20.9	24.2	21.6	15.8	14.7	14.4	16.0	13.5	24.2																						
27-Nov	13.3	12.3	12.7	14.3	20.7	28.3	29.8	37.7	23.7	12.5	10.8	9.8	10.1	13.7	10.8	11.4	9.2	6.7	4.5	4.2	4.1	3.7	3.6	3.4	13.0	37.7																						
28-Nov	3.3	3.3	3.6	3.7	3.4	3.2	3.2	3.4	3.4	3.4	3.5	3.5	3.1	2.8	2.7	2.9	3.3	3.3	3.0	2.7	2.6	2.5	2.9	3.3	3.2	3.7																						
29-Nov	3.4	3.8	4.3	4.0	3.9	3.5	3.4	3.2	3.2	3.1	3.1	2.8	2.2	1.3	1.1	0.9	1.0	2.2	1.2	1.7	1.1	0.7	0.6	1.8	2.4	4.3																						
30-Nov	1.6	2.3	1.3	0.8	0.9	1.5	1.6	2.4	2.5	1.8	1.6	1.0	1.4	1.7	1.6	1.1	1.3	1.1	2.1	2.3	2.0	2.6	2.8	2.9	1.8	2.9																						
																								7.2	7.3	6.9	7.1	7.4	8.2	8.5	8.5	8.8	7.8	7.4	7.8	7.4	7.1	7.2	7.5	7.5	7.5	7.7	7.3	6.9	7.0	7.4	7.4	Diurnal Average
																								22.0	21.4	16.4	16.6	20.7	28.3	29.8	37.7	30.5	24.0	19.9	19.5	17.9	18.0	20.1	23.5	20.9	20.9	24.2	21.6	16.5	19.2	20.2	28.6	Diurnal Maximum
C - Calibration																																																
Alberta Ambient Air Quality Guideline/Objectives: 1-hr 80 µg/m <sup>3</sup> 24-hr 29 µg/m <sup>3</sup>																																																



Wood Buffalo Environmental Association  
Hourly Averages

Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$   
Barge Landing - November 2023





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$   
Barge Landing - November 2023**

<b>Concentration Ranges (<math>\mu\text{g}/\text{m}^3</math>)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	292	40.61	40.61
6 - 15	375	52.16	92.77
16 - 25	47	6.54	99.30
26 - 80	5	0.70	100.00
> 81.0	0	0.00	100.00

Total Number of Valid Hours: 719

Total Number of Hours: 720



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

**Particulate Matter 2.5 (PM<sub>2.5</sub>) - μg/m<sup>3</sup>**  
**Barge Landing - November 2023**

Concentration Ranges (μg/m <sup>3</sup> )	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	21	12	12	11	9	14	15	10	12	30	23	39	27	29	10	18	292
6 - 15	17	21	12	7	22	14	19	86	62	37	23	8	7	15	10	15	375
16 - 25	3	1	1	2	3	0	0	14	14	4	0	0	2	2	0	1	47
26 - 80	0	0	0	2	0	0	0	1	1	1	0	0	0	0	0	0	5
> 81.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	41	34	25	22	34	28	34	111	89	72	46	47	36	46	20	34	719

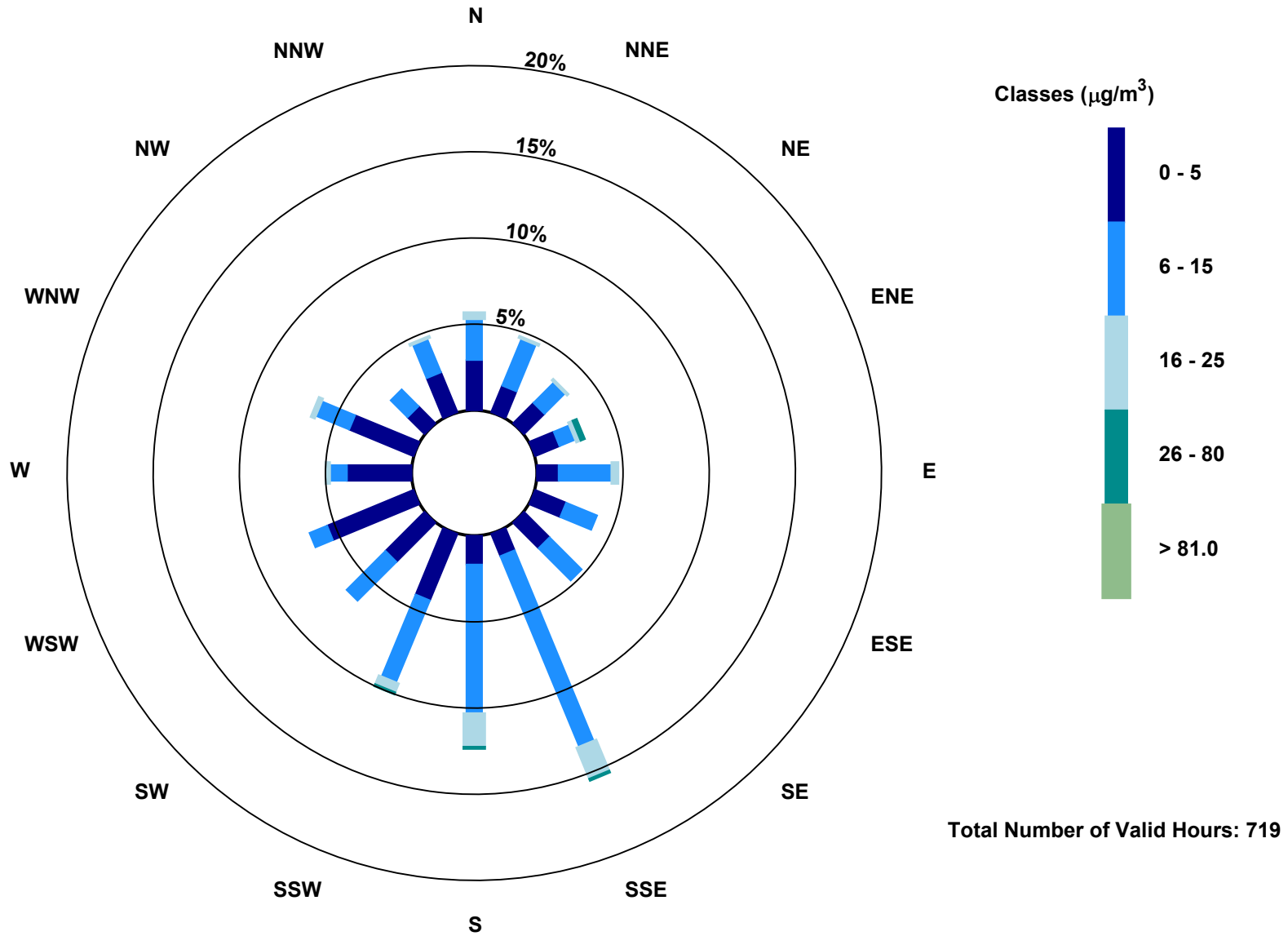
Total Number of Valid Hours: 719

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 2023

Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$   
Barge Landing





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

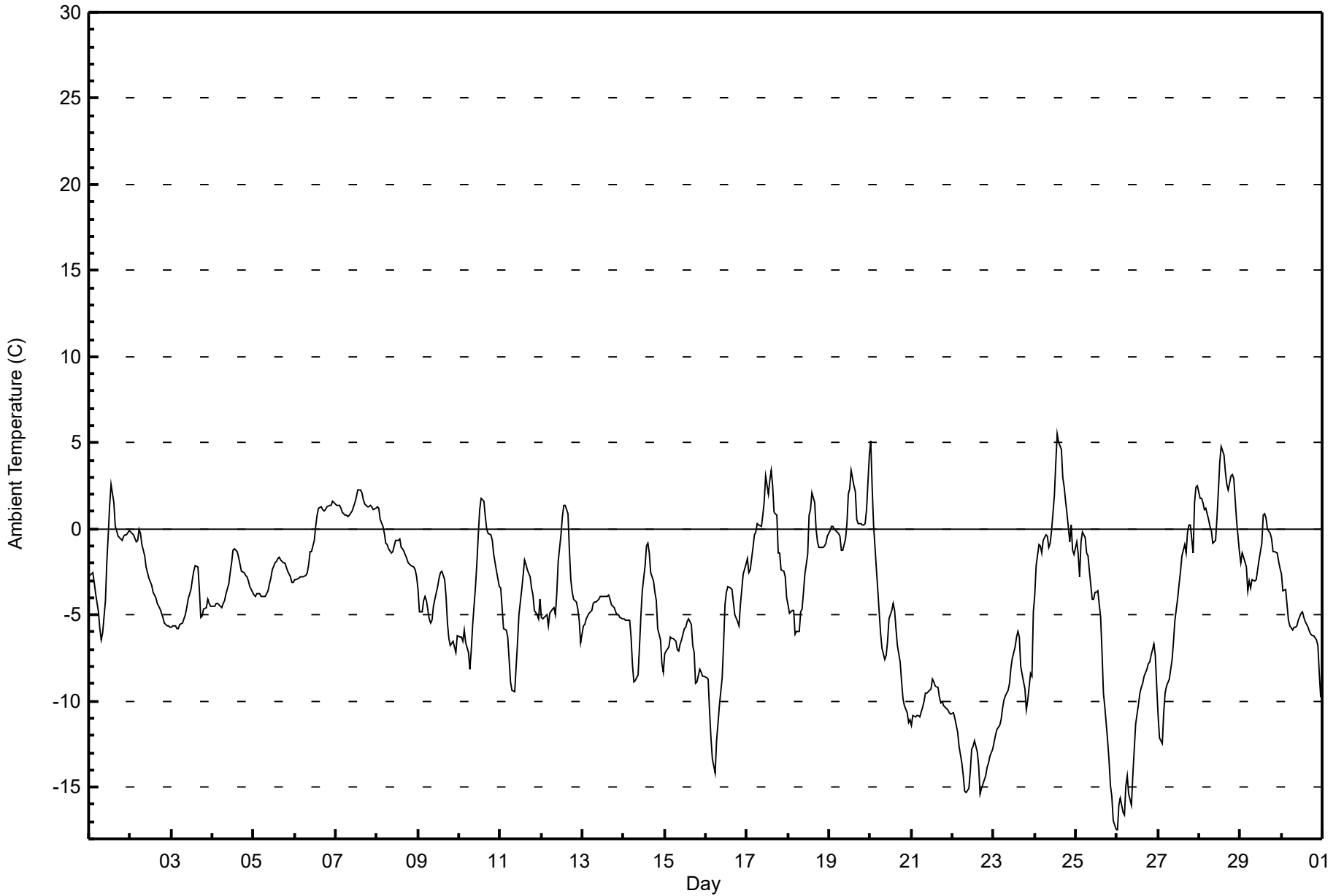
**Ambient Temperature (AT) - C**  
**Barge Landing - November 2023**

Maximum Value: 5.6 C on Nov 24 14:00      Maximum Daily Average: 1.7 C on Nov 28 Minimum Value: -17.5 C on Nov 26 01:00      Minimum Daily Average: -13.4 C on Nov 22 Maximum Diurnal Average: -1.8 C at hour 14      Minimum Diurnal Average: -5.5 C at hour 8 Monthly Average: -4.10 C      Percentiles: P <sub>1</sub> = -15.6 P <sub>10</sub> = -10.4 Q <sub>1</sub> = -6.4 Median = -3.7 Q <sub>3</sub> = -0.8 P <sub>90</sub> = 1.2 P <sub>99</sub> = 3.9																						Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0					
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Nov	-2.7	-2.6	-2.5	-3.1	-3.8	-4.9	-5.8	-6.4	-6.0	-4.1	-1.9	-0.4	1.3	2.6	1.5	0.1	-0.1	-0.4	-0.6	-0.7	-0.4	-0.3	-0.3	-0.1	-1.7	2.6	
2-Nov	-0.2	-0.3	-0.4	-0.7	-0.7	-0.1	-0.3	-0.9	-1.6	-2.2	-2.5	-2.9	-3.3	-3.6	-3.9	-4.0	-4.3	-4.7	-4.9	-5.1	-5.5	-5.6	-5.6	-5.7	-2.9	-0.1	
3-Nov	-5.7	-5.7	-5.7	-5.8	-5.8	-5.6	-5.4	-5.2	-5.0	-4.6	-4.1	-3.5	-3.0	-2.4	-2.1	-2.2	-3.5	-5.1	-5.0	-4.6	-4.6	-4.1	-4.3	-4.5	-4.5	-2.1	
4-Nov	-4.5	-4.5	-4.3	-4.3	-4.4	-4.6	-4.3	-4.1	-3.7	-3.2	-2.6	-2.0	-1.3	-1.2	-1.1	-1.6	-2.1	-2.4	-2.5	-2.7	-2.8	-3.0	-3.4	-3.7	-3.1	-1.2	
5-Nov	-3.8	-3.9	-3.8	-3.8	-3.9	-3.9	-3.9	-3.9	-3.9	-3.6	-3.2	-2.9	-2.4	-2.0	-1.9	-1.7	-1.7	-1.8	-2.0	-2.0	-2.2	-2.5	-2.8	-3.1	-3.1	-2.9	-1.7
6-Nov	-2.9	-3.0	-2.9	-2.8	-2.8	-2.8	-2.7	-2.6	-2.1	-1.3	-1.3	-0.6	0.2	0.8	1.2	1.2	1.1	1.0	1.1	1.3	1.4	1.4	1.6	1.5	-0.6	1.6	
7-Nov	1.4	1.4	1.3	1.2	1.0	0.8	0.8	0.7	0.8	1.1	1.3	1.5	1.9	2.2	2.3	2.1	1.7	1.4	1.3	1.3	1.3	1.3	1.1	1.2	1.3	2.3	
8-Nov	1.3	1.2	0.6	0.2	-0.3	-0.8	-1.0	-1.2	-1.4	-1.3	-1.0	-0.6	-0.6	-0.6	-1.1	-1.1	-1.3	-1.8	-1.9	-2.1	-2.1	-2.2	-2.4	-2.8	-1.0	1.3	
9-Nov	-3.6	-4.8	-4.8	-4.2	-3.9	-4.1	-5.3	-5.5	-5.3	-4.5	-4.1	-3.4	-2.8	-2.6	-2.5	-2.9	-3.9	-5.4	-6.3	-6.8	-6.6	-6.8	-7.2	-6.2	-4.7	-2.5	
10-Nov	-6.3	-6.3	-6.6	-5.9	-6.6	-7.2	-8.1	-7.0	-5.6	-3.3	-2.0	-0.3	1.1	1.8	1.6	0.7	-0.1	-0.3	-0.3	-0.6	-1.5	-2.0	-2.5	-3.4	-2.9	1.8	
11-Nov	-3.5	-4.6	-5.8	-5.9	-6.3	-7.6	-8.9	-9.4	-9.5	-8.0	-6.6	-5.0	-3.5	-2.7	-1.8	-2.1	-2.4	-2.8	-3.4	-3.8	-4.8	-4.9	-5.2	-4.1	-5.1	-1.8	
12-Nov	-5.2	-5.3	-5.1	-5.0	-5.7	-4.9	-4.7	-4.5	-5.0	-3.7	-1.9	-0.3	0.7	1.4	1.4	0.9	-1.2	-2.9	-3.7	-4.1	-4.2	-4.7	-5.3	-6.6	-3.3	1.4	
13-Nov	-5.6	-5.5	-5.2	-5.1	-4.9	-4.7	-4.3	-4.3	-4.2	-4.1	-3.9	-3.9	-3.9	-3.9	-4.0	-3.9	-4.1	-4.4	-4.6	-4.9	-4.9	-5.0	-5.2	-5.2	-4.6	-3.9	
14-Nov	-5.2	-5.3	-5.3	-5.3	-6.3	-7.9	-8.9	-8.8	-8.5	-6.9	-5.1	-3.6	-2.1	-1.0	-0.8	-1.4	-2.6	-3.0	-3.7	-4.2	-5.8	-6.4	-7.8	-8.3	-5.2	-0.8	
15-Nov	-7.2	-7.1	-6.9	-6.3	-6.4	-6.4	-6.5	-7.0	-7.1	-6.7	-6.4	-5.8	-5.7	-5.4	-5.2	-5.5	-6.8	-7.2	-9.0	-8.9	-8.2	-8.3	-8.6	-8.5	-7.0	-5.2	
16-Nov	-8.6	-8.7	-10.6	-12.1	-13.4	-14.2	-12.3	-11.3	-10.3	-8.7	-6.7	-4.4	-3.7	-3.4	-3.4	-3.5	-4.3	-5.0	-5.4	-5.6	-4.4	-3.5	-2.6	-2.1	-7.0	-2.1	
17-Nov	-1.7	-2.6	-2.4	-1.1	-0.3	-0.2	0.3	0.2	0.2	0.8	1.6	3.1	2.0	2.9	3.4	2.5	1.0	0.8	-1.4	-1.4	-2.4	-2.5	-2.8	-4.0	-0.2	3.4	
18-Nov	-4.4	-4.9	-4.7	-4.8	-6.1	-6.0	-5.9	-4.8	-4.7	-3.7	-2.6	-1.5	0.8	1.1	2.1	1.5	0.0	-0.8	-1.1	-1.1	-1.1	-1.0	-0.8	-0.4	-2.3	2.1	
19-Nov	-0.1	0.2	0.2	0.0	-0.1	-0.3	-0.4	-1.2	-1.3	-0.6	0.3	2.0	2.4	3.4	2.5	2.2	0.6	0.3	0.3	0.2	0.2	0.3	1.1	4.3	0.7	4.3	
20-Nov	5.1	2.4	0.2	-2.3	-3.5	-4.8	-6.1	-6.9	-7.5	-7.4	-6.6	-5.2	-4.7	-4.3	-4.7	-5.8	-6.8	-7.8	-8.9	-9.8	-10.3	-10.7	-11.2	-11.1	-5.8	5.1	
21-Nov	-11.4	-10.8	-10.9	-10.8	-10.8	-10.9	-10.4	-10.0	-9.6	-9.5	-9.4	-9.3	-8.7	-8.9	-9.1	-9.2	-9.7	-10.1	-10.0	-10.3	-10.5	-10.5	-10.7	-10.8	-10.1	-8.7	
22-Nov	-10.6	-11.0	-11.4	-11.8	-12.6	-13.6	-14.3	-15.3	-15.4	-15.1	-14.1	-12.8	-12.6	-12.3	-12.9	-13.8	-15.4	-15.0	-14.6	-14.4	-13.9	-13.6	-13.2	-12.8	-13.4	-10.6	
23-Nov	-12.4	-12.0	-11.7	-11.4	-11.1	-10.5	-10.0	-9.7	-9.4	-9.0	-8.1	-7.5	-6.8	-6.3	-5.9	-6.3	-8.0	-8.9	-9.3	-10.5	-10.0	-8.4	-8.5	-4.8	-9.0	-4.8	
24-Nov	-3.8	-2.1	-0.9	-1.0	-1.4	-0.7	-0.3	-0.4	-1.0	-0.8	-0.1	2.0	3.8	5.6	5.0	4.6	3.0	2.4	1.6	0.9	-0.7	0.2	-1.2	-1.5	0.5	5.6	
25-Nov	-0.8	-1.5	-2.8	-0.7	-0.2	-0.5	-1.4	-1.6	-2.5	-4.1	-4.1	-3.7	-3.7	-3.6	-5.2	-7.2	-9.5	-10.3	-12.3	-13.5	-14.9	-15.6	-16.9	-17.4	-6.4	-0.2	
26-Nov	-17.5	-16.1	-15.6	-16.4	-16.6	-14.9	-14.4	-15.4	-16.0	-14.2	-12.8	-11.3	-10.2	-9.5	-9.2	-8.9	-8.6	-8.2	-7.8	-7.8	-7.4	-6.7	-7.3	-9.1	-11.7	-6.7	
27-Nov	-10.8	-12.1	-12.5	-10.7	-9.6	-9.2	-8.7	-8.2	-7.6	-6.6	-5.3	-4.0	-3.2	-2.5	-1.6	-0.9	-1.4	-0.2	0.2	0.2	-1.4	1.5	2.4	2.5	-4.6	2.5	
28-Nov	1.8	1.8	1.6	1.1	1.2	0.6	0.1	-0.1	-0.9	-0.6	0.6	2.2	3.9	4.8	4.3	3.3	2.6	2.3	3.1	3.2	2.9	1.7	0.5	-1.3	1.7	4.8	
29-Nov	-2.0	-1.4	-1.6	-2.2	-3.6	-3.0	-3.4	-2.9	-3.1	-3.0	-2.4	-1.8	-0.8	0.8	0.9	0.6	0.0	-0.3	-0.6	-1.3	-1.3	-1.4	-1.9	-2.3	-1.6	0.9	
30-Nov	-2.6	-3.6	-3.5	-4.4	-5.3	-5.6	-5.9	-5.7	-5.7	-5.6	-5.3	-4.9	-4.8	-5.1	-5.4	-5.7	-5.9	-6.1	-6.2	-6.2	-6.4	-6.8	-8.4	-9.8	-5.6	-2.6	
																								Diurnal Average			
																								Diurnal Maximum			



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

**Ambient Temperature (AT) - C**  
**Barge Landing - November 2023**







**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C  
Barge Landing - November 2023**

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	0	0.00	0.00
-20 - 0	595	82.64	82.64
0 - 10	125	17.36	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



**Wood Buffalo Environmental Association**

**Summary of Hour Averages**

**Relative Humidity (RH) - %**

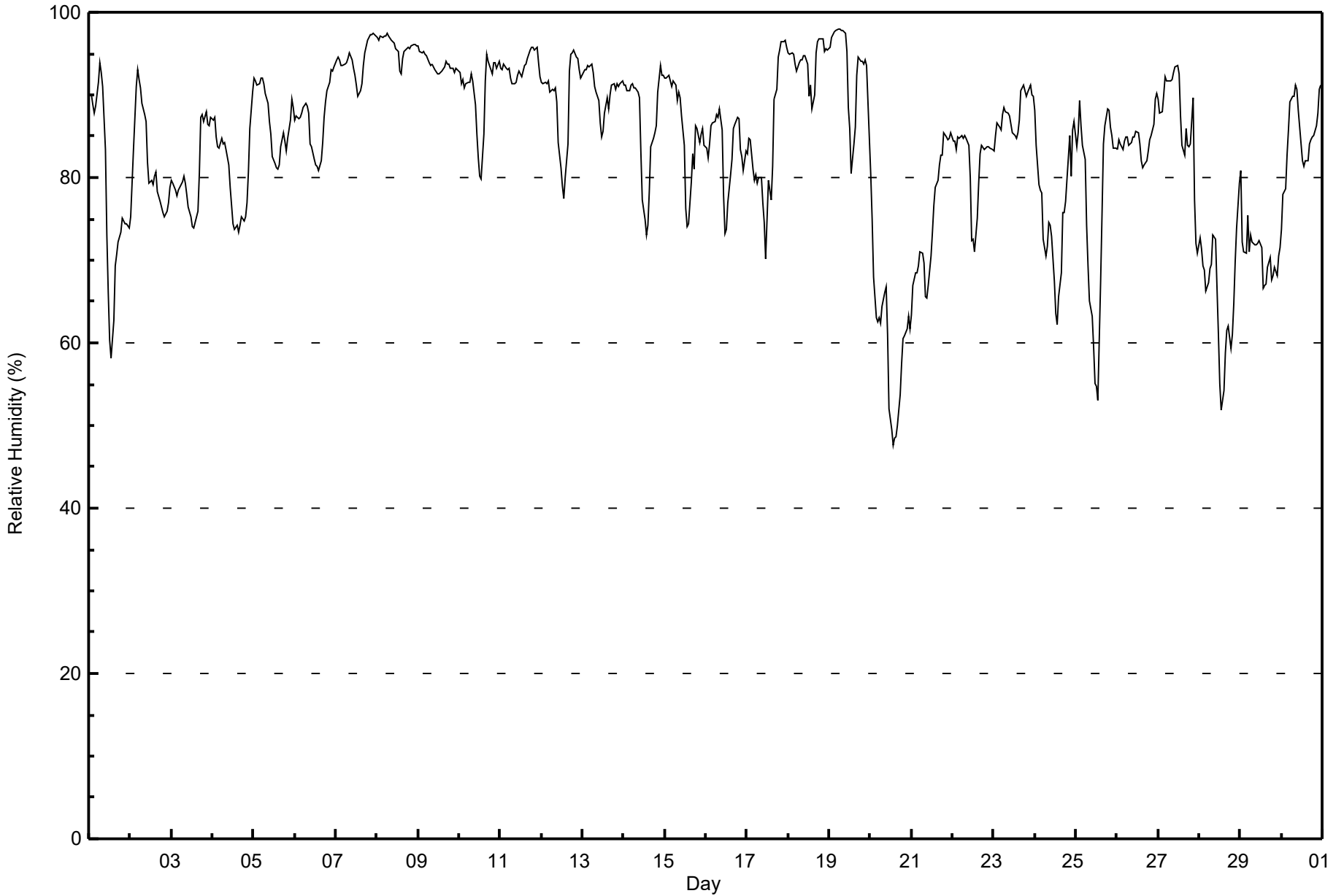
**Barge Landing - November 2023**

Maximum Value: 97.9 % on Nov 19 07:00      Maximum Daily Average: 95.9 % on Nov 8																						Hours in Service: 720 Hours of Data: 720																										
Minimum Value: 47.6 % on Nov 20 14:00      Minimum Daily Average: 60.3 % on Nov 20 Maximum Diurnal Average: 86.6 % at hour 24      Minimum Diurnal Average: 76.7 % at hour 14 Monthly Average: 84.01 %      Percentiles: P <sub>1</sub> = 53.1 P <sub>10</sub> = 69.5 Q <sub>1</sub> = 78.7 Median = 85.7 Q <sub>3</sub> = 91.8 P <sub>90</sub> = 94.8 P <sub>99</sub> = 97.4																						Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0																										
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Nov	90.0	89.9	88.7	87.8	88.7	91.5	93.9	92.7	91.1	83.4	73.1	66.1	60.3	58.1	62.8	69.4	70.7	72.2	73.4	75.0	74.7	74.5	74.4	73.9	78.2	93.9																						
2-Nov	75.2	79.3	83.4	91.0	93.1	91.8	90.8	89.1	87.6	86.8	81.9	79.4	79.7	79.2	80.2	80.8	78.4	77.2	76.5	75.8	75.3	75.9	77.0	78.8	81.8	93.1																						
3-Nov	79.7	79.3	78.6	77.8	78.4	78.7	79.5	80.1	79.2	78.0	76.5	75.3	74.0	73.9	74.5	75.9	80.5	87.3	87.6	86.9	88.0	86.4	86.3	87.2	80.4	88.0																						
4-Nov	87.0	87.3	84.8	83.7	83.6	84.7	84.1	84.2	83.5	81.5	78.8	76.7	74.3	73.8	74.3	73.4	74.2	75.2	74.8	75.3	76.9	80.7	86.0	90.3	80.4	90.3																						
5-Nov	92.1	91.8	91.3	91.3	92.0	92.0	91.4	90.3	88.9	86.7	85.3	82.5	81.6	81.2	81.1	81.5	83.8	85.4	84.3	83.3	84.7	86.9	89.6	88.5	87.0	92.1																						
6-Nov	87.0	87.4	87.1	87.2	87.9	88.4	88.9	88.6	87.8	84.1	83.7	82.3	81.5	81.3	80.8	82.0	84.3	87.3	89.2	90.5	91.6	93.1	92.9	93.5	87.0	93.5																						
7-Nov	94.2	94.5	94.2	93.5	93.5	93.7	94.0	94.3	95.0	94.3	93.3	92.4	91.2	89.8	90.6	91.4	93.5	95.1	96.5	97.0	97.4	97.3	97.4	97.2	94.2	97.4																						
8-Nov	96.9	96.7	97.1	97.0	97.1	97.2	97.4	97.2	96.6	96.4	96.3	95.6	95.2	92.9	92.5	94.4	95.2	95.6	95.8	95.7	95.9	96.1	96.1	96.0	95.9	97.4																						
9-Nov	95.9	95.3	95.1	95.2	95.0	94.8	93.9	93.5	93.7	93.4	93.1	92.6	92.5	92.7	92.8	93.4	94.1	93.7	93.7	93.2	93.2	92.7	93.2	93.1	93.7	95.9																						
10-Nov	92.7	91.4	91.9	90.9	91.3	91.5	91.6	92.6	91.7	88.8	85.3	82.4	80.2	79.9	85.3	91.7	94.9	94.1	93.0	92.5	93.9	93.9	93.2	94.2	90.4	94.9																						
11-Nov	93.2	93.0	93.8	93.2	93.1	93.3	92.0	91.4	91.4	91.6	92.4	92.9	92.2	92.8	93.5	93.8	94.4	95.4	95.8	95.8	95.3	95.7	93.9	92.3	93.4	95.8																						
12-Nov	91.5	91.4	91.5	91.3	91.6	90.3	90.7	90.5	90.8	89.1	84.3	81.2	79.0	77.4	80.0	84.0	92.8	94.9	95.0	95.5	94.7	94.4	93.1	92.0	89.5	95.5																						
13-Nov	92.8	93.1	93.0	93.5	93.4	93.7	92.7	91.0	90.4	89.4	86.6	84.9	85.7	87.8	89.7	88.3	90.1	91.2	91.4	90.6	91.4	91.0	91.4	91.6	90.6	93.7																						
14-Nov	91.3	91.2	90.5	90.5	91.1	91.4	90.8	90.8	90.3	89.7	83.1	77.2	74.9	73.0	74.3	78.2	83.8	84.7	85.5	86.4	90.4	93.5	92.4	92.3	86.6	93.5																						
15-Nov	92.1	92.0	92.4	91.7	91.0	91.7	91.1	89.3	90.4	89.6	87.5	83.9	76.3	74.1	74.3	79.5	82.9	81.0	86.2	86.0	84.2	85.3	85.9	83.9	85.9	92.4																						
16-Nov	83.6	82.3	84.1	86.3	86.6	86.7	87.6	87.3	88.2	85.8	77.8	73.2	73.7	77.0	80.4	82.2	86.0	86.4	87.3	87.2	83.4	82.5	80.8	83.3	83.3	88.2																						
17-Nov	82.9	84.8	84.5	81.0	79.7	80.3	79.3	80.1	80.0	77.0	74.6	70.2	79.6	78.4	77.3	81.3	89.6	90.7	94.5	95.4	96.4	96.5	96.6	95.8	84.4	96.6																						
18-Nov	95.0	94.9	95.2	94.9	93.7	92.9	93.9	94.3	94.2	94.8	94.8	93.8	89.8	91.2	88.3	90.0	95.1	96.5	96.7	96.8	96.7	95.3	95.7	95.4	94.2	96.8																						
19-Nov	95.8	97.0	97.4	97.6	97.8	97.9	97.9	97.7	97.8	97.4	95.2	88.5	86.0	80.6	84.1	86.2	92.4	94.6	94.0	94.0	93.8	94.2	93.6	84.7	93.2	97.9																						
20-Nov	80.4	74.9	68.0	63.1	62.6	63.0	62.4	64.4	66.1	66.7	61.0	52.1	49.5	47.6	48.5	48.7	50.0	53.7	57.4	60.4	60.9	61.7	63.2	61.7	60.3	80.4																						
21-Nov	63.4	66.9	68.5	68.4	69.3	70.9	70.8	69.7	65.6	65.4	67.0	70.5	73.4	76.7	78.8	79.6	81.6	82.7	82.7	85.4	84.9	84.6	84.7	85.4	74.9	85.4																						
22-Nov	84.4	84.5	83.3	84.9	84.7	85.1	84.8	85.1	84.7	83.9	80.0	72.4	72.5	71.0	75.2	79.4	82.8	83.9	83.4	83.6	83.7	83.7	83.6	83.5	81.8	85.1																						
23-Nov	83.2	85.0	86.6	86.0	85.7	87.6	88.4	88.0	87.8	87.5	86.4	85.5	85.1	84.8	85.4	86.9	90.5	91.2	90.6	89.8	90.4	91.2	90.0	89.8	87.7	91.2																						
24-Nov	88.2	83.9	79.1	78.5	78.1	72.5	70.5	71.8	74.5	74.2	72.9	67.4	63.6	62.2	65.6	68.5	75.8	75.7	77.2	79.9	85.2	80.1	85.7	86.7	75.7	88.2																						
25-Nov	83.7	85.4	89.3	86.3	83.9	82.2	74.3	69.4	65.1	63.3	59.4	55.0	54.7	53.0	67.4	75.5	84.0	86.2	88.2	88.1	86.2	85.0	83.5	83.6	76.4	89.3																						
26-Nov	83.3	84.6	84.1	83.4	84.3	84.9	85.0	84.0	84.2	85.0	84.9	85.5	85.5	84.1	82.1	81.2	81.5	82.0	83.2	84.7	85.2	86.4	89.5	90.2	84.5	90.2																						
27-Nov	89.4	87.7	87.9	89.9	92.2	91.7	91.7	91.8	92.6	93.4	93.6	92.5	87.4	84.0	82.7	86.0	83.8	83.8	84.1	89.6	77.4	72.1	70.9	87.0	87.0	93.6																						
28-Nov	72.7	71.4	69.3	68.8	66.3	67.3	68.9	69.5	73.0	72.5	66.7	61.3	55.1	51.9	54.2	58.8	61.5	62.0	59.4	61.0	64.7	69.8	74.0	79.3	65.8	79.3																						
29-Nov	80.9	72.2	71.0	70.9	75.4	71.0	73.0	72.2	71.9	71.8	72.1	72.4	71.6	66.7	66.9	67.2	69.2	70.4	67.6	68.1	69.2	68.2	70.5	71.6	70.9	80.9																						
30-Nov	73.8	78.0	78.6	82.8	85.7	89.1	89.8	89.8	91.1	90.7	88.1	84.1	82.0	81.4	82.1	82.0	84.0	84.5	84.8	85.1	86.2	87.7	90.8	91.3	85.1	91.3																						
																								86.4	86.2	86.0	85.9	86.2	86.3	86.0	85.7	85.5	84.4	81.8	79.0	77.8	76.7	78.2	80.3	83.5	84.5	85.0	85.4	86.1	86.0	86.6	86.6	Diurnal Average
																								96.9	97.0	97.4	97.6	97.8	97.9	97.9	97.7	97.8	97.4	96.3	95.6	95.2	92.9	93.5	94.4	95.2	96.5	96.7	97.0	97.4	97.3	97.4	97.2	Diurnal Maximum



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

**Relative Humidity (RH) - %**  
**Barge Landing - November 2023**

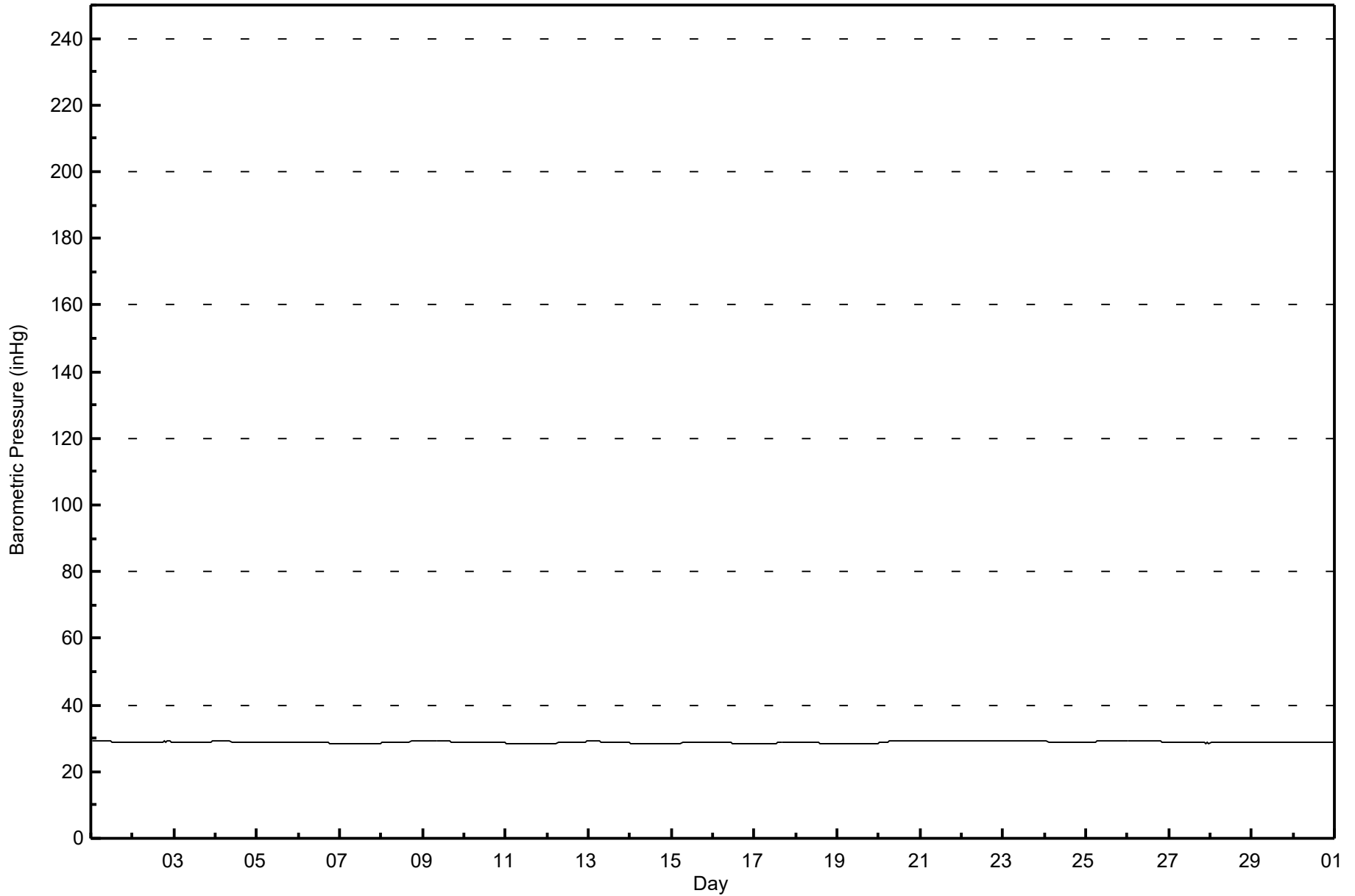






**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Barometric Pressure (BP) - inHg**  
**Barge Landing - November 2023**





Maximum Speed: 29 km/h on Nov 20 05:00	Maximum Daily Speed Average: 16.5 km/h on Nov 20	Hours in Service: 720
Minimum Speed Value: 0 km/h on Nov 26 08:00	Minimum Daily Speed Average: 2.3 km/h on Nov 11	Hours of Data: 720
Maximum Diurnal Speed Average: 3.7 km/h at hour 3	Minimum Diurnal Speed Average: 0.9 km/h at hour 16	Hours of Missing Data: 0
Monthly Average Velocity: 2.1 km/h 212.4 deg	Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 4 Q <sub>1</sub> = 6 Median = 8 Q <sub>3</sub> = 11 P <sub>90</sub> = 15 P <sub>99</sub> = 24	Percent Operational Time: 100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	SSE4	SSW5	SSW6	SSW6	S8	SSE8	SSE10	S12	SSE10	SSE8	S7	S6	S8	S8	S9	SSE9	SSE10	S9	S7	S9	SSE9	SSE7	SSE9	SSE8	S7.7	S12
2-Nov	SSE6	SSW8	SSE1	NW3	NNW7	NNE14	N13	N19	N17	N16	N18	NNE19	NNE19	NNE19	NE16	NE12	NE10	NE10	ENE6	NE7	NE5	ENE6	E9	ESE6	NNE8.8	NNE19
3-Nov	SSW5	SSE8	SE7	ESE8	SSE4	ESE5	ESE5	ESE5	E7	ESE5	E4	ENE4	NNE4	N4	N6	N4	NW4	N5	N3	NNW3	N6	ENE4	ENE6	ENE5	ENE2.5	SSE8
4-Nov	E5	NE5	ENE6	E6	E7	ENE4	E7	E5	ENE5	E5	E9	ESE10	E10	E11	E10	E10	ESE11	E7	ESE9	ESE8	ENE4	NNE6	NNE7	E6.9	E11	
5-Nov	NNE9	NNE10	NNE9	NNE9	NE9	NE9	NE8	NE8	NE8	NE7	NNE8	NNE9	NNE9	NNE8	NNE6	NNE7	NE6	E6	ESE8	SE8	ESE8	SE7	SE8	SE7	NE6.0	NNE10
6-Nov	ESE6	SE5	SE6	SE6	SE7	SSE8	SE6	SE6	SSE7	SSE12	SSE11	SSE11	S9	SSE10	S9	SSE11	SSE9	SSE9	SSE10	SSE10	S8	SSE10	S9	S7	SSE8.2	SSE12
7-Nov	SSW6	SSW8	SSW7	SSW9	SSW9	SW8	WSW6	WSW4	SSW4	SSW4	SW4	WSW5	WSW4	SSW1	W2	NNW3	NNW3	WNW1	S5	SSE6	S8	S10	S9	SSW8	SSW4.6	S10
8-Nov	SW9	W11WNW13	W13WNW13	WNW11	W8	W10WNW10	WNW7	WNW9	NW6	NW7	NW8	NW11	WNW5	NW5	WNW5	WNW6	WNW7	NW6	NW5	WNW5	W4	WNW7.7	W13	WNW7.7	W13	
9-Nov	WNW3	SW0	SSW3	SSW4	SSW3	SSW1	SW5	WSW3	SSW4	S5	SW5	SW6	SSE14	S11	S12	SSE14	SSE8	SE6	SSE8	SSE9	SSE11	SSE8	SSE10	S9	S6.0	SSE14
10-Nov	S7	S8	SSE9	SSE15	SSE15	SSW7	SSW6	SSE13	SSE10	S11	SSE11	SSE14	S11	S12	SSE12	SSE13	SSE14	SSE16	SSE15	SSE13	SSE13	SSE12	SSE12	SSE11	SSE11.6	SSE16
11-Nov	SSE10	S7	SE10	SE11	SE9	S1	NW5	E2	NNW1	N4	NNW9	NNW11	NNW9	N5	E2	NW5	SSE8	SSW6	SSW7	SSW6	SW6	SW9	SSW8	SSW11	SSW2.3	SE11
12-Nov	SSW8	SSW10	SSW10	SW10	SSW10	SW13	SW11	SSW8	S6	SW7	WSW15	W15	W13	WSW13	WSW13	W7	ESE1	ESE6	WNW4	WNW8	NW8	NW7	NNW9	N4	WSW6.6	W15
13-Nov	NNW6	NW3	E1	E4	NE5	E5	ENE8	ENE10	E8	ENE7	NE9	NNE11	NNE13	NE16	NNE20	NNE22	N14	N12	N12	NNW12	NNW13	NNW9	NNW9	NW8	NNE8.3	NNE22
14-Nov	NNW8	NNW8	WNW6	W5	W4	S5	SSE9	SSE11	SSE10	SSE8	S10	S12	S12	SSW11	SW11	SW11	SW9	SSW9	SSW8	SSW6	S5	SSW4	S6	SSW8	SSW5.9	S12
15-Nov	SW8	NNW6	NNW7	N13	NNE11	NNE11	N12	N13	N8	NNW10	NNW6	NNE0	WNW8	W6	SW4	SSW6	SSW9	W11	NNW6	WNW6	WNW5	WNW2	S5	SSW8	NW4.0	N13
16-Nov	SSW8	SW6	SW8	SSW7	S7	SE9	SE8	SE7	SSE7	S8	SSE11	SSE9	S9	SSE10	S8	W4	WNW5	WNW5	SSW6	S10	SSW9	SW8	WSW9	SSW6	S6.2	SSE11
17-Nov	S9	S8	SW10	WSW25	WSW16	WSW20	WSW20	WSW20	SW13	SW11	SW12	S10	SSE12	S12	SSW8	SSW6	SW5	WNW4	W4	SW5	S8	S7	S8	SSE7	SW9.3	WSW25
18-Nov	SSE9	SSE9	S9	S7	SE8	SSE8	S9	S10	SSE9	SSE7	S6	S5	S5	SSW7	SSW8	S4	SW7	S6	SSE8	SSE7	S6	SSE9	SSE6	SSE6	S7.0	S10
19-Nov	S3	SE3	S4	ESE8	WSW4	NNW5	NE3	SSE3	S4	ESE4	WSW2	SSW6	SE8	SE5	SSW6	SW2	SSE5	S7	SSE6	SSE8	SSE9	SSE10	SSW6	WSW11	SSE3.8	WSW11
20-Nov	W17	WNW24	WNW29	WNW29	W29	W27	WNW22	W18	W8	W12	W11	W15	W19	WNW20	WNW17	WNW21	WNW14	W12	W9	WSW10	W11	W12	WSW10	WNW9	W16.5	W29
21-Nov	WNW6	W1	SE5	ESE6	ESE5	SSE4	E4	NE4	ENE8	NE11	NE11	NE12	NNE11	NNE15	NNE16	NNE16	N17	NNE16	NNE16	N13	N14	N14	N15	N15	NNE8.8	N17
22-Nov	N18	N15	N13	N10	N13	NNE12	NNE13	NNW6	NW5	N3	ENE4	ENE4	NE5	ENE5	NE3	NE3	ENE6	E7	SE5	ESE4	SE2	SSE4	SE6	SE8	NNE4.8	N18
23-Nov	SE9	SSE9	SSE8	SE10	SSE8	SSE7	S8	SSE9	SSE9	S7	S6	S8	S9	S8	S8	S7	S7	SSW6	S8	SSE9	SSE13	SSE14	S12	S17	SSE8.7	S17
24-Nov	S15	S16	SSW16	S16	SSW10	WSW20	WSW22	SSW10	SW10	SW13	WSW13	SW7	SSW6	SSW6	SW8	SW8	SSW10	SSW14	SSW14	SW9	SSW10	SSW13	S12	SSW12	SSW11.5	WSW22
25-Nov	SSW12	SSW7	SW4	N14	N18	N21	N21	NNW16	NNW27	NNW23	NNW23	NNW18	NNW17	NNW19	N15	N10	NNE7	NNE6	E4	SW1	SE4	SW4	SW4	SW1	NNW9.4	NNW27
26-Nov	SSE4	E3	SE3	ESE5	E6	ESE5	SE6	N0	ESE8	SE7	SSE6	SSE7	SSE8	SSE9	SSE8	SSE9	SSE8	S7	E2	SSE5	SSE8	E11	NNW1	NNW9	SE4.5	E11
27-Nov	NW7	WNW3	SSW4	SSE5	SSE3	SSW3	S3	S5	S7	S6	S7	S8	SSE9	SSE11	S10	S8	SSW9	SW16	SSW11	SSW9	S6	WSW21	WSW22	WSW24	SSW7.0	WSW24
28-Nov	WSW21	WSW22	WSW23	WSW20	WSW19	SW16	WSW16	WSW17	SW12	SW7	W7	WSW9	W13	WSW10	WSW8	WSW8	SSW8	SW7	WSW15	WSW13	W14	W11	W13	WSW10	WSW12.8	WSW23
29-Nov	SW11	WSW12	WSW14	WSW10	W7	W9	WNW5	WSW8	WSW6	W5	W8	WSW10	WSW8	WNW18	WNW15	WNW17	WNW12	WNW11	NW14	WNW8	NW11	WNW12	WNW9	NW9	W9.6	WNW18
30-Nov	NNW7	NNW3	WNW5	S2	NNW1	ENE7	E4	E2	SE5	SE4	SSE6	E6	ENE8	ENE9	E8	ESE6	ESE5	E6	E7	ENE6	ESE1	SE2	E4	N2	E3.3	ENE9

SW3.5 SW3.3 SW3.7 SW3.0 SW2.1WSW2.1WSW1.8 SW1.7 S1.5SSW1.4 SW1.5SSW1.4SSW1.2 SW1.0 SW1.1WSW0.9SSW1.5SSW1.9 S2.1SSW2.8SSW2.7SSW3.1SSW3.3SSW3.3	Diurnal Average
WSW21WNW24WNW29WNW29 W29 W27WSW22WSW20NNW27 NNW23 NNW23 NNE19 NNE19WNW20 NNE20 NNE22 N17 SSE16 NNE16 WSW13 N14 WSW21WSW22WSW24	Diurnal Maximum

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



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

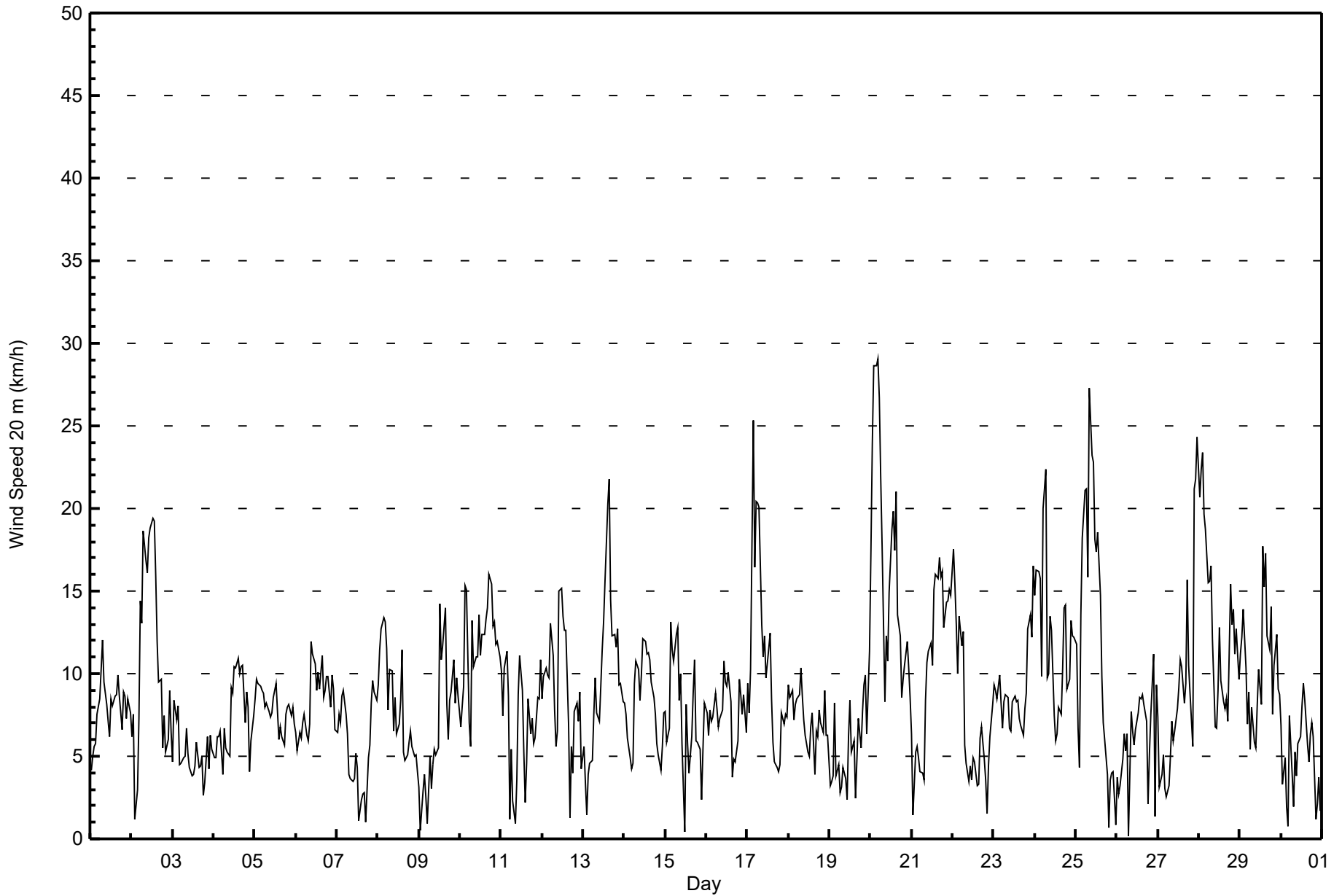
**Wind Speed 20 m (WS20m) - km/h**  
**Barge Landing - November 2023**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 9 km/h on Nov 20 03:00														Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0											
Minimum Value: 1 km/h on Nov 9 01:00																									
Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 1 Q <sub>1</sub> = 1 Median = 2 Q <sub>3</sub> = 3 P <sub>90</sub> = 4 P <sub>99</sub> = 7																									
Day	Hourly Period Ending At (MST)																							Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23		24
1-Nov	1	1	1	1	2	2	2	2	3	2	2	2	2	2	2	1	2	1	2	2	1	2	1	1	3
2-Nov	1	2	2	2	2	3	4	5	5	5	5	5	4	4	4	4	3	3	2	2	1	2	2	2	5
3-Nov	1	2	1	2	2	2	1	1	1	2	1	1	1	2	1	2	1	1	1	1	2	2	2	1	2
4-Nov	1	1	1	2	1	1	2	2	1	1	2	2	3	2	2	2	2	3	2	2	2	2	2	2	3
5-Nov	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	1	1	1	2	1	2	2	2	1	2
6-Nov	1	1	2	2	1	1	2	2	3	3	3	3	3	3	2	3	2	2	2	3	2	2	2	1	3
7-Nov	1	1	1	2	2	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	2	2	2	2	2
8-Nov	2	3	3	3	4	3	2	2	3	2	2	2	2	3	3	2	1	2	1	1	1	1	1	1	4
9-Nov	1	1	1	1	1	1	1	2	1	1	1	1	3	3	3	3	3	2	1	1	2	1	1	1	3
10-Nov	1	2	2	3	4	2	3	2	2	3	3	3	3	2	2	2	2	3	2	2	2	3	3	2	4
11-Nov	2	2	2	2	2	1	3	3	2	2	1	2	2	2	2	2	2	1	1	2	1	1	2	3	3
12-Nov	2	1	2	2	2	2	3	2	2	2	4	4	4	4	3	3	1	2	2	2	3	1	2	2	4
13-Nov	2	1	1	1	2	1	2	2	2	1	2	3	4	5	5	5	4	3	4	3	3	3	2	2	5
14-Nov	2	2	1	1	1	1	1	1	2	2	2	3	3	3	3	2	2	2	2	2	2	1	1	2	3
15-Nov	2	2	2	4	3	3	4	4	2	3	3	1	4	2	1	1	1	3	2	2	2	2	2	1	4
16-Nov	1	2	2	2	1	1	2	1	2	2	2	2	3	3	2	1	1	2	1	2	2	3	4	4	4
17-Nov	2	2	6	5	8	5	4	4	3	3	3	2	2	2	2	2	2	2	1	2	2	2	2	2	8
18-Nov	1	1	2	1	1	2	2	2	1	2	2	1	2	2	2	2	1	2	1	1	1	1	2	2	2
19-Nov	2	2	3	4	2	2	1	2	2	3	2	1	2	1	2	1	3	1	1	1	2	2	2	3	4
20-Nov	8	8	9	8	9	7	7	6	6	4	4	5	6	6	6	7	6	3	3	2	2	2	2	3	9
21-Nov	2	2	1	1	2	1	2	2	2	3	3	3	4	4	4	4	4	4	4	4	4	4	4	4	4
22-Nov	4	4	4	2	3	3	4	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	2	4
23-Nov	1	2	2	2	2	1	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	3	3	3
24-Nov	2	3	4	3	4	6	6	5	3	2	2	2	1	1	3	2	2	3	2	3	6	4	2	2	6
25-Nov	3	3	2	7	5	6	6	5	8	6	6	7	4	5	4	2	2	3	2	2	1	2	1	1	8
26-Nov	1	2	1	1	2	2	4	2	2	2	1	2	2	2	2	2	2	2	1	2	2	4	2	1	4
27-Nov	1	2	1	1	1	2	1	1	1	1	2	2	2	2	2	2	2	3	3	3	2	4	5	5	5
28-Nov	4	4	4	4	4	3	3	3	5	1	2	3	5	3	3	2	2	3	5	4	3	3	2	2	5
29-Nov	2	4	3	4	4	3	3	2	3	1	2	2	2	6	5	4	3	3	5	2	3	4	2	2	6
30-Nov	2	2	1	2	2	2	1	1	1	1	1	2	2	2	2	1	1	1	1	2	2	1	1	1	2
Diurnal Maximum																									
8 8 9 8 9 7 7 6 8 6 6 7 6 6 6 7 6 4 5 4 6 4 5 5																									



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

**Wind Speed 20 m (WS20m) - km/h**  
**Barge Landing - November 2023**







**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Wind Speed 20 m (WS20m) - km/h  
Barge Landing - November 2023**

<b>Wind Speed Ranges (km/h)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	164	22.78	22.78
6 - 11	403	55.97	78.75
12 - 19	125	17.36	96.11
20 - 28	25	3.47	99.58
29 - 38	3	0.42	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Wind Speed 20 m (WS20m) - km/h  
Barge Landing - November 2023**

Wind Speed Ranges (km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	10	2	8	9	15	13	11	12	14	13	13	6	8	15	8	7	164
6 - 11	5	18	13	14	19	15	23	80	63	53	26	15	14	16	11	18	403
12 - 19	24	12	4	0	0	0	0	19	12	6	7	13	12	9	1	6	125
20 - 28	2	2	0	0	0	0	0	0	0	0	0	13	1	4	0	3	25
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	0	3
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	41	34	25	23	34	28	34	111	89	72	46	47	36	46	20	34	720

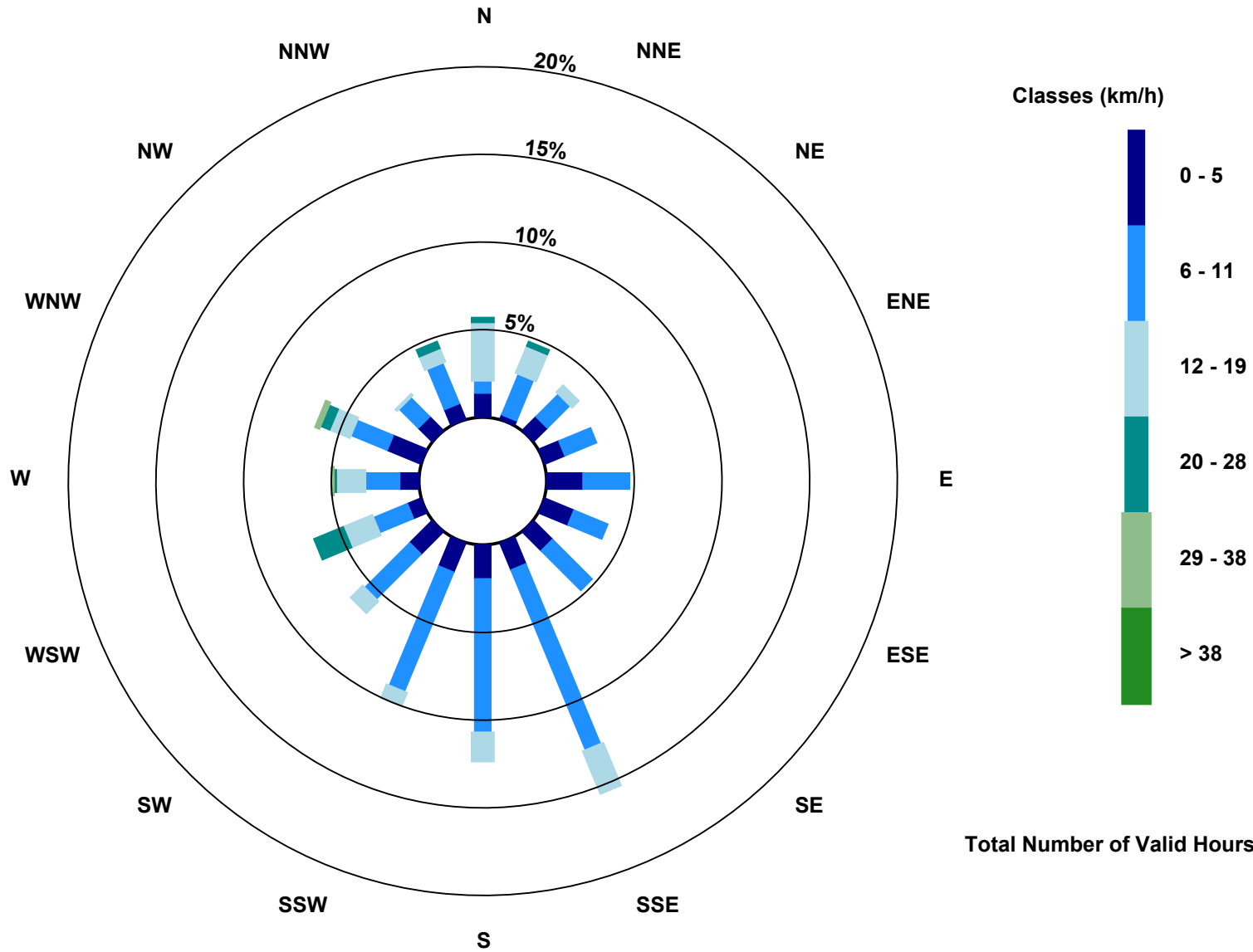
Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 2023

Wind Speed 20 m (WS20m) - km/h  
Barge Landing





Direction of Maximum Speed: 275 deg on Nov 20 05:00		Hours in Service:	720
Direction of Maximum Daily Speed Average: 277.7 deg on Nov 20		Hours of Data:	720
Direction of Minimum Speed: 354 deg on Nov 26 08:00		Hours of Missing Data:	0
Direction of Minimum Daily Speed Average: 2.3 deg on Nov 11		Percent Operational Time:	100.0
Monthly Average Direction: 212.4 deg			

Day	Hourly Period Ending At (MST)																								Daily Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Nov	167	198	197	200	189	162	166	173	165	165	169	176	179	177	170	163	155	170	176	169	163	162	153	161	170.3
2-Nov	164	193	152	326	347	14	8	4	359	354	4	15	17	27	37	40	34	42	65	53	55	70	90	113	24.4
3-Nov	195	148	131	111	162	123	122	107	101	103	98	71	12	351	356	356	322	350	356	335	6	74	68	59	77.8
4-Nov	87	53	73	81	86	65	82	87	77	81	97	101	109	101	95	90	87	112	92	111	106	58	30	32	87.6
5-Nov	28	33	24	30	36	34	37	36	39	38	25	24	24	20	13	20	43	84	114	128	122	136	127	125	50.0
6-Nov	112	135	131	144	141	153	146	146	160	159	152	155	176	164	172	160	163	153	160	163	177	165	174	181	157.7
7-Nov	192	200	212	192	202	230	240	238	207	207	216	244	255	202	268	338	331	301	176	165	178	178	191	210	207.4
8-Nov	235	261	286	276	283	283	275	276	284	293	285	311	316	310	307	295	313	294	292	298	312	307	298	276	287.6
9-Nov	288	232	199	202	209	197	227	238	200	189	217	219	158	169	173	153	158	146	152	161	167	167	168	186	175.6
10-Nov	178	169	168	166	157	192	209	160	160	171	168	167	176	169	164	157	163	162	162	161	155	162	160	153	164.9
11-Nov	166	184	132	134	144	190	306	101	330	349	340	335	335	354	91	314	166	209	206	205	231	231	201	207	201.2
12-Nov	192	208	206	214	201	231	233	208	183	233	257	268	265	256	256	274	111	118	290	288	306	313	327	1	246.1
13-Nov	334	307	83	86	51	84	76	59	79	71	44	30	24	36	19	13	2	360	350	348	342	340	340	324	16.7
14-Nov	331	332	303	268	262	190	153	167	167	183	180	190	198	228	234	226	205	192	213	175	206	175	209	202.8	
15-Nov	229	328	334	1	26	14	3	10	357	344	337	28	299	281	234	204	213	276	331	283	289	289	190	203	321.0
16-Nov	202	214	215	197	171	146	132	140	149	172	158	166	172	168	169	272	286	285	200	187	202	215	245	210	186.0
17-Nov	169	175	223	248	247	243	248	243	236	226	217	186	165	185	192	194	232	282	270	214	187	183	183	162	219.1
18-Nov	157	163	170	171	141	158	171	171	164	164	171	184	189	199	194	187	217	182	147	160	180	151	160	165	169.6
19-Nov	170	126	175	112	257	327	41	150	174	120	241	199	139	135	206	221	148	178	157	151	148	155	194	253	168.3
20-Nov	262	283	286	283	275	281	289	281	275	259	265	267	279	289	282	294	284	276	278	251	263	260	254	289	277.7
21-Nov	303	260	135	123	112	153	98	42	58	44	43	40	26	21	25	12	6	15	22	3	0	4	8	6	22.7
22-Nov	8	7	360	356	11	21	12	338	322	0	65	72	53	63	46	34	68	101	124	121	142	158	143	129	31.4
23-Nov	140	148	153	139	159	164	173	165	162	184	173	180	174	180	177	184	189	192	183	165	155	161	175	180	168.1
24-Nov	183	191	196	188	192	237	237	211	220	232	237	218	200	202	229	230	210	212	204	232	203	209	191	192	211.0
25-Nov	211	212	234	349	360	357	353	341	334	333	334	342	334	337	7	8	18	23	86	215	124	224	227	221	342.0
26-Nov	155	101	143	103	98	104	136	354	109	125	167	163	157	156	159	158	157	172	87	166	168	86	293	333	138.9
27-Nov	313	298	192	147	160	202	169	170	173	170	169	176	166	161	169	183	210	223	206	203	182	251	244	249	208.4
28-Nov	247	244	242	243	240	227	237	245	229	217	264	248	269	257	255	256	210	226	255	249	265	272	259	243	246.0
29-Nov	228	257	256	252	262	280	284	255	247	271	262	245	254	290	292	288	296	296	311	297	308	300	301	322	279.5
30-Nov	332	330	282	183	331	65	99	84	140	143	152	90	78	78	81	108	118	80	79	77	107	128	93	11	87.2

214.2 223.9 222.8 215.5 221.1 249.8 247.5 221.3 188.3 202.8 225.9 210.8 213.6 217.1 222.1 254.4 198.8 198.9 188.5 192.1 192.3 200.9 201.1 211.7

Diurnal Average

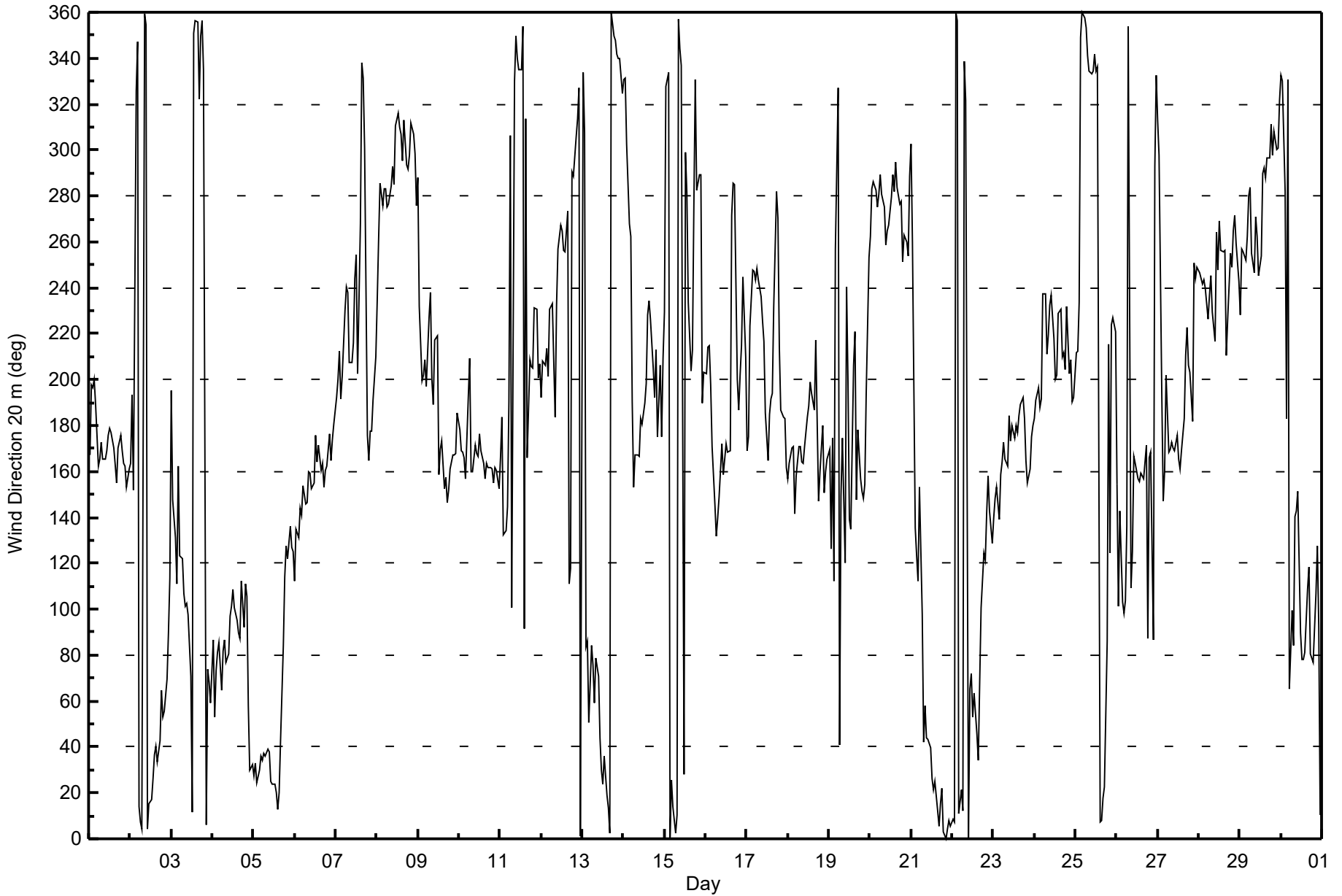
All monthly, daily, and diurnal averages have been calculated using vector methods



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

**Wind Direction 20 m (WD20m) - deg**  
**Barge Landing - November 2023**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 100 deg on Nov 15 12:00		Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0																								
Minimum Value: 6 deg on Nov 9 19:00																										
Percentiles: P <sub>1</sub> = 7 P <sub>10</sub> = 11 Q <sub>1</sub> = 13 Median = 16 Q <sub>3</sub> = 22 P <sub>90</sub> = 35 P <sub>99</sub> = 83																										
Day	Hourly Period Ending At (MST)																								Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	20	22	14	13	11	16	15	11	14	15	21	29	22	23	14	16	9	10	24	10	9	13	10	11	29	
2-Nov	21	18	74	41	15	13	15	16	17	16	17	14	13	13	14	17	18	19	33	18	22	25	11	22	74	
3-Nov	19	11	12	17	35	19	13	15	14	15	20	30	28	31	18	27	17	14	19	31	34	56	21	22	56	
4-Nov	18	19	17	15	13	22	19	15	14	17	17	16	17	15	15	15	17	20	15	15	39	19	15	39		
5-Nov	13	13	12	13	16	13	15	12	15	15	13	14	12	11	12	11	18	13	10	10	10	12	10	11	18	
6-Nov	10	16	19	13	10	11	12	12	16	15	14	14	21	19	18	13	13	11	13	15	15	13	15	12	21	
7-Nov	11	12	13	13	15	13	16	16	17	30	22	25	21	38	47	32	50	53	11	9	15	13	14	14	53	
8-Nov	15	15	14	15	15	14	15	14	16	18	15	21	17	17	14	16	15	13	14	13	13	14	11	10	21	
9-Nov	12	86	23	21	34	76	44	55	22	23	21	23	15	18	14	11	18	17	6	7	10	7	9	17	86	
10-Nov	13	14	16	12	13	30	32	8	17	14	16	12	16	13	10	9	10	9	9	9	7	7	9	7	32	
11-Nov	15	32	18	6	14	71	51	85	79	60	13	15	21	40	90	49	19	28	27	24	11	11	11	16	90	
12-Nov	15	10	15	14	13	12	12	18	31	29	14	16	17	19	16	25	74	41	65	14	21	23	12	61	74	
13-Nov	23	38	63	14	31	26	15	12	13	14	15	12	15	16	12	13	17	14	16	17	16	24	14	14	63	
14-Nov	13	16	22	13	11	27	8	11	10	15	17	17	18	17	11	10	13	19	24	46	33	27	11	46		
15-Nov	43	19	18	17	18	18	16	15	16	19	23	100	19	29	39	23	16	27	10	27	21	67	15	12	100	
16-Nov	15	25	17	20	19	14	22	15	14	15	13	15	18	13	13	52	20	33	14	13	18	25	30	31	52	
17-Nov	21	28	28	13	22	14	14	13	15	14	16	18	9	12	21	29	31	37	46	47	13	18	17	16	47	
18-Nov	15	17	9	20	17	13	10	11	10	16	14	26	29	15	15	48	15	25	11	11	14	11	16	29	48	
19-Nov	59	65	73	12	56	23	37	67	26	69	57	17	16	15	28	34	55	18	16	25	22	10	31	16	73	
20-Nov	15	18	17	17	15	15	16	18	83	18	19	20	18	18	19	18	18	15	20	11	9	11	12	29	83	
21-Nov	37	89	12	25	25	42	21	42	16	14	14	14	17	12	12	17	15	13	12	16	16	15	14	15	89	
22-Nov	15	16	16	15	14	15	14	19	12	23	23	30	21	20	30	17	14	14	8	16	39	14	19	8	39	
23-Nov	10	13	12	14	15	16	15	14	15	16	18	17	16	17	14	15	18	14	12	9	6	10	10	10	18	
24-Nov	11	12	13	13	26	15	15	42	24	11	12	23	25	17	27	16	16	15	12	17	37	20	10	15	42	
25-Nov	10	28	35	28	18	18	18	17	15	14	14	18	16	15	18	14	13	22	24	88	56	11	14	43	88	
26-Nov	25	77	27	14	9	16	27	90	23	36	18	21	13	14	14	13	12	13	66	29	20	24	80	9	90	
27-Nov	10	47	34	30	35	34	27	16	11	13	16	16	13	14	15	20	18	11	18	19	40	12	11	13	47	
28-Nov	13	12	11	13	12	10	11	12	19	18	25	23	21	25	23	18	20	23	16	18	16	11	10	15	25	
29-Nov	9	18	12	28	59	18	41	17	30	15	12	12	27	17	17	14	16	16	14	14	24	14	13	13	59	
30-Nov	12	63	29	81	80	14	17	37	15	22	16	25	14	12	15	22	25	19	16	34	77	45	20	53	81	
		59	89	74	81	80	76	51	90	83	69	57	100	29	40	90	52	74	53	66	88	77	67	80	61	
		Diurnal Maximum																								





## WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY  
MONITORING PROGRAM  
MONTHLY REPORT

### **AMS11 LOWER CAMP NOVEMBER 2023**

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

December 22, 2023

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - LOWER CAMP (AMS11)

NOVEMBER 2023

MONTHLY SUMMARY

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2 (ppb) Average	686	34	34	100	143	0	13.2	0
H2S (ppb) Average	684	35	36	99.86	29.8	4	3.3	1
THC (ppm) Average	684	34	36	99.72	3.9	-	2.6	-
CH4(ppm) Average	684	34	36	99.72	3.8	-	2.5	-
NMHC(ppm) Average	684	34	36	99.72	0.097	-	0.043	-
Temperature (C) Average	720	0	0	100	5.9	-	2.3	-
Relative Humidity (%) Average	720	0	0	100	98.8	-	94.2	-
Barometric Pressure (inHg) Average	720	0	0	100	29.6	-	29.6	-
Wind Speed 10 m (km/h) Average	720	0	0	100	36	-	22	-
Wind Direction 10 m (deg) Average	720	0	0	100	-	-	-	-

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



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - LOWER CAMP (AMS11)  
NOVEMBER 2023

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile						
					Min	P10	Q1	Median	Q3	P90	Max
SO2 (ppb) Average	686	2.18	8.1	-	0	0	0.1	0.4	1.4	4.6	143
H2S (ppb) Average	684	0.65	1.9	-	0	0	0.1	0.2	0.4	1.4	29.8
THC (ppm) Average	684	2.16	0.2	-	2	2	2	2.1	2.2	2.4	3.9
CH4(ppm) Average	684	2.15	0.2	-	2	2	2	2.1	2.2	2.3	3.8
NMHC(ppm) Average	684	0.007	0.016	-	0	0	0	0	0	0	0.097
Temperature 2 m (C) Average	720	-3.43	4.1	-	-16	-9.5	-5.6	-3.1	-0.5	1.7	5.9
Relative Humidity (%) Average	720	83.04	10.6	-	47.7	68.5	77.4	85.3	91.5	94.9	98.8
Barometric Pressure (inHg) Average	720	29.04	0.3	-	28.5	28.7	28.8	29	29.2	29.4	29.6
Wind Speed 10 m (km/h) Average	720	8.8	6	-	0	2	4	8	13	16	36
Wind Direction 10 m (deg) Average	720	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - LOWER CAMP (AMS11)  
NOVEMBER 2023

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
H2S	22 Nov 2023 13:00	22 Nov 2023 13:00	1	Maintenance - station operator activities
THC/NMHC/CH4	30 Nov 2023 11:00	30 Nov 2023 12:00	2	Maintenance - replaced support gas cylinder



Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Lower Camp - November 2023

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 143.0 ppb on Nov 15 17:00	Maximum Daily Average: 13.2 ppb on Nov 7		Hours of Data:	686
Minimum Value: 0.0 ppb on Nov 8 12:00	Minimum Daily Average: 0.0 ppb on Nov 13		Hours of Missing Data:	34
Maximum Diurnal Average: 6.0 ppb at hour 17	Minimum Diurnal Average: 0.8 ppb at hour 10		Hours of Calibration:	34
Monthly Average: 2.18 ppb	Percentiles: P <sub>1</sub> = 0.0 P <sub>10</sub> = 0.0 Q <sub>1</sub> = 0.1 Median = 0.4 Q <sub>3</sub> = 1.4 P <sub>90</sub> = 4.6 P <sub>99</sub> = 29.2		Percent Operational Time:	100.0

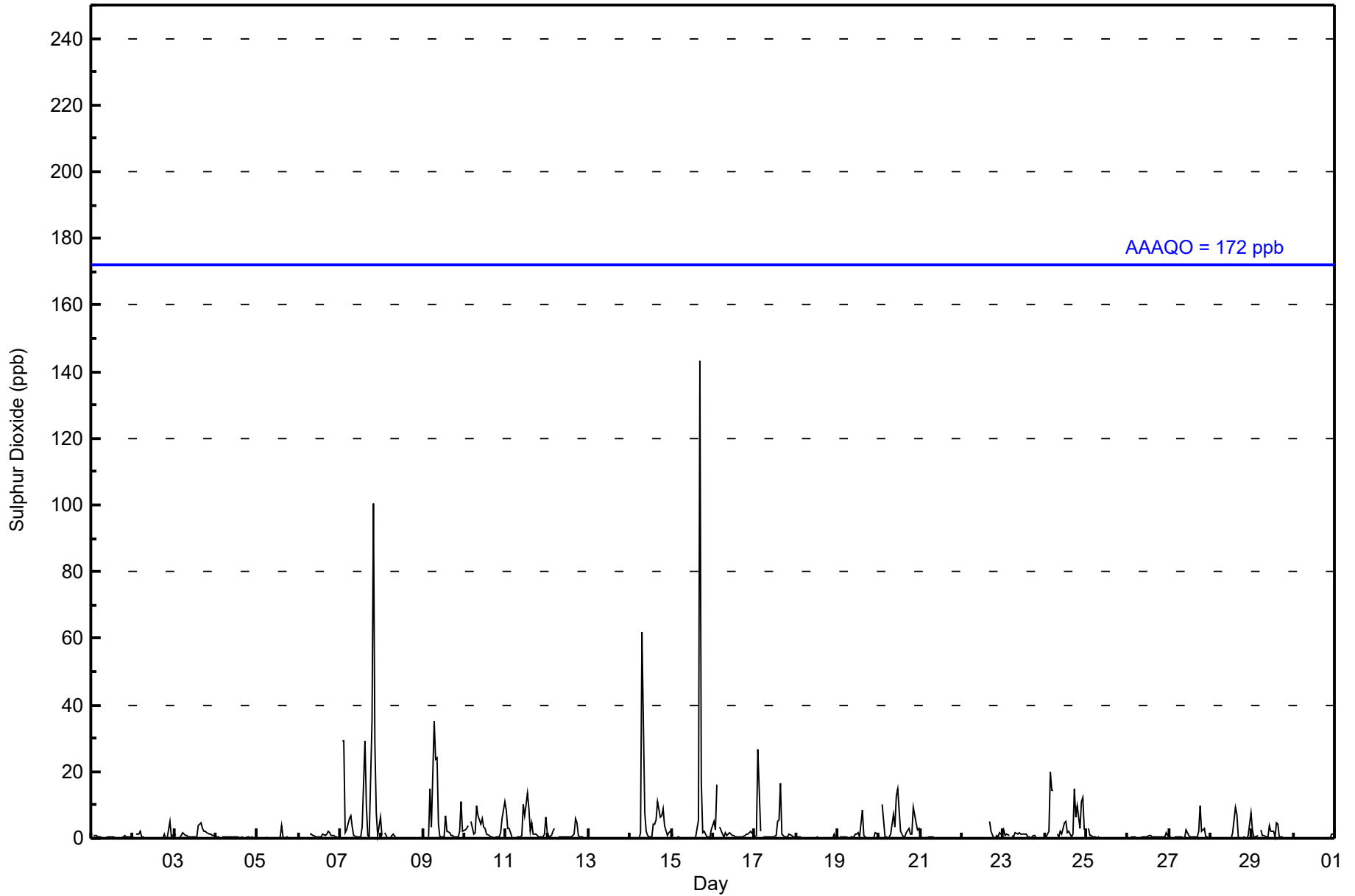
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Nov	Z	0.6	0.9	0.8	0.3	0.2	0.2	0.2	0.2	0.2	0.3	0.2	0.4	0.2	0.1	0.2	0.2	0.2	0.5	0.9	0.6	0.6	0.4	0.5	0.4	0.9																						
2-Nov	0.8	Z	1.4	1.5	2.0	0.6	0.3	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	1.4	0.1	0.1	5.0	0.4	0.7	0.7	5.0																							
3-Nov	1.9	0.7	Z	0.3	0.9	1.7	1.0	0.7	0.3	0.2	0.3	0.3	0.6	3.8	4.5	3.0	2.1	1.9	1.6	1.3	1.2	1.0	0.7	1.3	4.5																							
4-Nov	0.6	0.4	0.5	Z	0.4	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.3	0.2	0.2	0.2	0.2	0.3	0.3	0.6																							
5-Nov	0.1	0.1	0.2	0.2	Z	0.2	0.2	0.2	0.1	0.1	0.1	0.2	0.2	0.5	3.8	0.3	0.2	0.2	0.2	0.2	0.1	0.1	0.2	0.1	0.3																							
6-Nov	0.1	0.1	0.2	0.2	0.2	Z	1.1	1.1	0.7	1.1	0.5	0.4	0.4	0.6	1.2	1.0	1.3	2.2	1.5	0.8	0.7	0.5	0.2	0.1	0.7																							
7-Nov	Z	29.2	29.3	1.6	2.7	5.8	6.6	3.3	1.1	0.4	0.4	0.2	0.3	3.5	29.3	9.6	1.0	0.5	35.0	100.3	28.7	7.7	0.7	6.3	13.2																							
8-Nov	0.7	Z	1.6	0.1	0.0	0.1	0.8	1.3	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	0.2																							
9-Nov	0.0	0.1	Z	0.3	15.0	3.3	35.1	23.8	24.2	4.1	0.6	0.3	0.6	6.6	2.0	1.8	0.8	0.7	0.5	0.6	0.3	2.2	10.9	2.1	5.9																							
10-Nov	2.7	2.8	3.9	Z	5.3	1.4	1.7	9.9	6.7	4.2	6.1	3.4	3.1	1.1	0.8	0.5	0.3	0.2	0.2	0.5	0.6	1.7	5.7	11.1	3.2																							
11-Nov	8.6	2.8	2.8	0.4	Z	0.2	0.2	0.3	0.2	0.8	10.1	6.8	13.7	9.0	2.1	4.5	1.3	1.3	0.8	0.4	0.3	0.3	1.5	6.5	3.2																							
12-Nov	1.7	0.6	0.8	2.3	2.8	Z	0.4	0.3	0.2	0.3	0.3	0.3	0.3	0.3	0.4	1.3	6.0	4.7	0.8	0.2	0.3	0.1	0.1	0.1	1.1																							
13-Nov	Z	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0																							
14-Nov	0.0	Z	0.0	0.0	0.0	0.0	1.7	61.7	7.7	2.0	0.8	0.5	0.4	4.4	4.1	5.6	11.0	6.3	6.6	8.8	3.8	1.0	1.5	2.1	5.7																							
15-Nov	1.6	0.7	Z	0.4	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.5	5.4	143.0	16.9	1.7	2.3	0.5	0.3	0.2	2.3	7.7																							
16-Nov	4.9	2.7	16.3	Z	3.4	1.1	0.5	1.7	0.7	1.5	1.4	1.0	0.7	0.5	0.4	0.3	0.3	0.5	0.7	1.1	1.2	1.9	1.9	0.7	2.0																							
17-Nov	0.6	0.7	26.8	2.0	Z	0.5	0.4	0.4	0.3	0.4	0.4	0.5	0.9	4.9	5.7	16.7	1.2	0.6	0.5	0.6	1.1	0.7	0.5	0.5	2.9																							
18-Nov	0.3	0.3	0.2	0.2	0.2	Z	0.2	0.2	0.1	0.2	0.2	0.1	0.3	0.2	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1	1.2	0.2	0.2																							
19-Nov	Z	0.5	0.2	0.2	0.2	0.2	0.2	0.2	0.4	0.6	1.4	1.1	1.5	0.5	8.7	0.7	0.3	0.2	0.2	0.1	0.2	0.1	1.8	1.4	0.9																							
20-Nov	0.5	Z	10.3	0.6	0.3	0.2	0.4	1.4	7.1	3.5	12.9	15.0	2.3	1.3	0.4	0.4	1.5	3.0	1.3	1.2	9.3	4.5	2.5	2.9	3.6																							
21-Nov	0.5	0.3	Z	0.2	0.2	0.3	0.3	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1																							
22-Nov	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	C	C	C	C	5.1	2.3	0.0	0.0	0.9	0.4	1.8	1.0	0.6																							
23-Nov	2.4	1.0	1.4	0.7	Z	0.9	0.6	1.6	1.5	1.6	1.3	1.3	1.2	1.2	0.6	0.6	0.1	1.0	0.7	0.2	0.1	0.1	0.1	0.2	0.9																							
24-Nov	0.2	0.3	2.1	19.7	14.3	14.3	Z	1.3	0.6	1.9	1.5	4.8	5.3	1.8	2.1	0.5	1.2	15.0	6.2	9.8	3.0	11.0	12.4	2.6	5.7																							
25-Nov	Z	3.0	1.0	0.8	0.4	0.3	0.2	0.2	0.1	0.1	0.1	0.1	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.3																							
26-Nov	0.1	Z	0.3	0.3	0.3	0.2	0.1	0.2	0.5	0.3	0.4	0.6	0.7	0.7	0.5	0.3	0.2	0.3	0.2	0.3	0.3	0.5	1.5	0.8	0.4																							
27-Nov	0.7	0.5	Z	0.5	0.5	0.4	0.2	0.2	0.2	0.2	2.5	0.9	0.4	0.3	0.3	0.2	0.3	2.2	9.8	2.1	3.0	0.5	0.4	0.2	1.2																							
28-Nov	0.1	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	1.7	9.2	7.0	0.5	0.2	0.2	0.3	0.1	0.1	0.7	7.7	1.2																							
29-Nov	2.4	0.4	0.4	0.9	Z	2.4	0.9	0.9	0.3	0.6	3.9	2.1	2.3	0.6	4.5	4.3	0.3	0.2	0.1	0.1	0.0	0.0	0.0	0.0	1.2																							
30-Nov	0.0	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.4	1.4	0.1																							
																								1.3	1.9	4.0	1.4	2.0	1.3	1.9	3.7	1.8	0.8	1.5	1.4	1.2	1.4	2.8	2.3	6.0	2.0	2.4	4.4	1.9	1.4	1.6	1.7	Diurnal Average
																								8.6	29.2	29.3	19.7	15.0	14.3	35.1	61.7	24.2	4.2	12.9	15.0	13.7	9.0	29.3	16.7	143.0	16.9	35.0	100.3	28.7	11.0	12.4	11.1	Diurnal Maximum

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



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

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Lower Camp - November 2023**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Lower Camp - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 10	658	95.92	95.92
11 - 20	16	2.33	98.25
21 - 60	9	1.31	99.56
61 - 110	2	0.29	99.85
111 - 172	1	0.15	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 686

Total Number of Hours: 720



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

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Lower Camp - November 2023**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	25	12	12	22	26	169	60	9	3	10	23	55	78	78	42	34	658
11 - 20	0	0	0	0	0	2	4	0	4	1	0	1	4	0	0	0	16
21 - 60	0	0	0	0	0	0	0	3	3	3	0	0	0	0	0	0	9
61 - 110	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	2
111 - 172	0	0	0	0	0	0	0	0	1	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
<b>Totals</b>	25	12	12	22	26	171	64	12	13	14	23	56	82	78	42	34	686

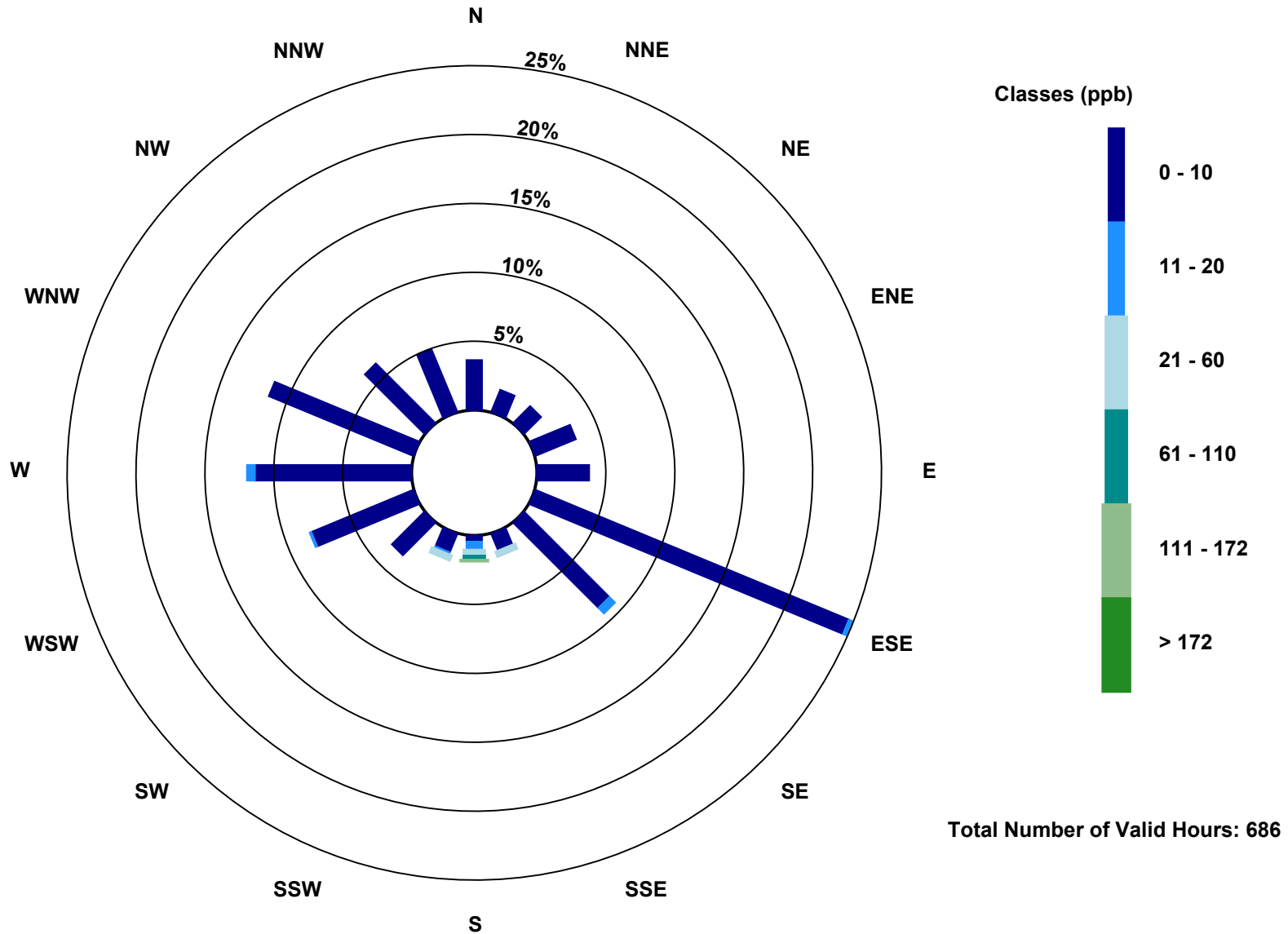
Total Number of Valid Hours: 686

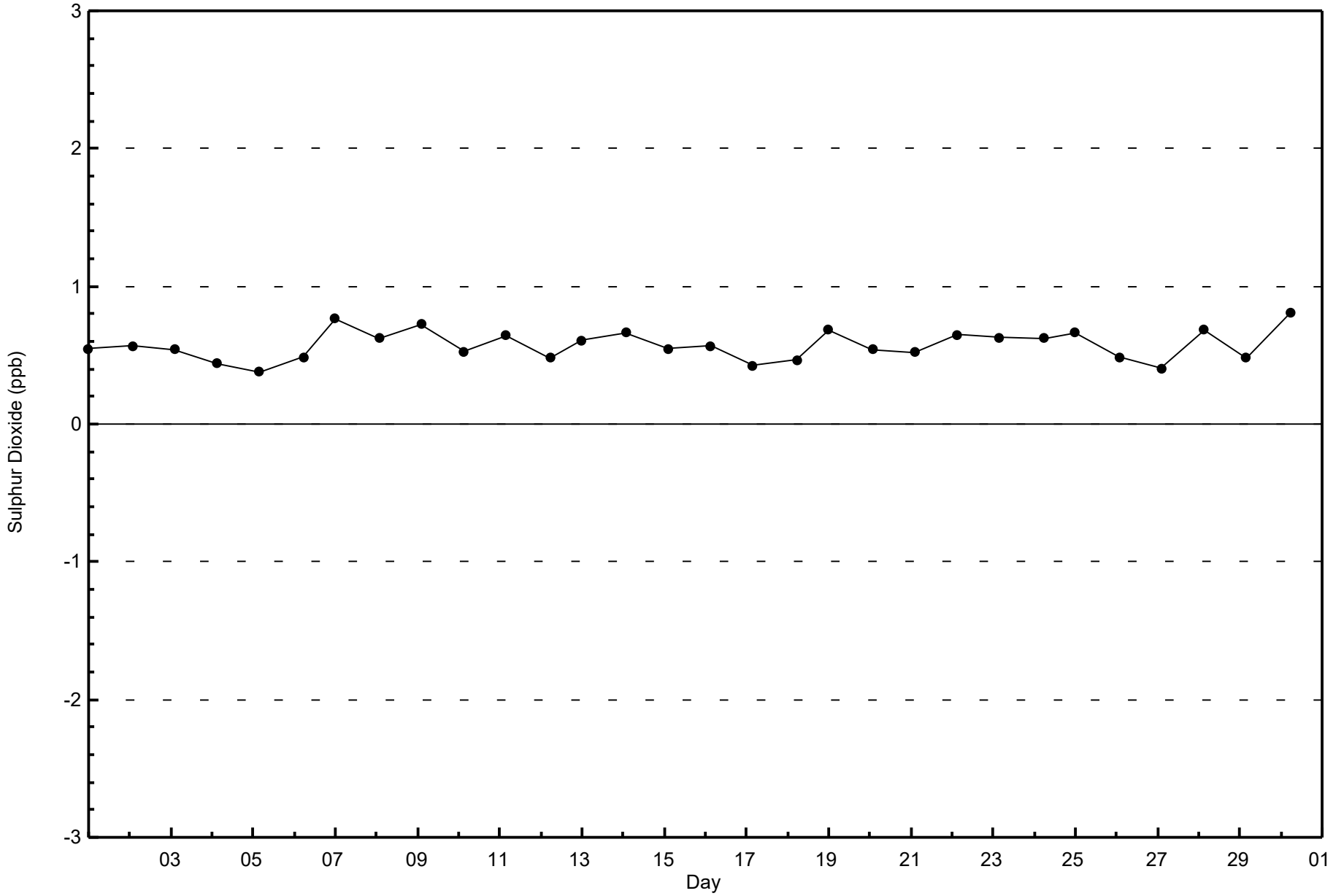
Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 2023

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



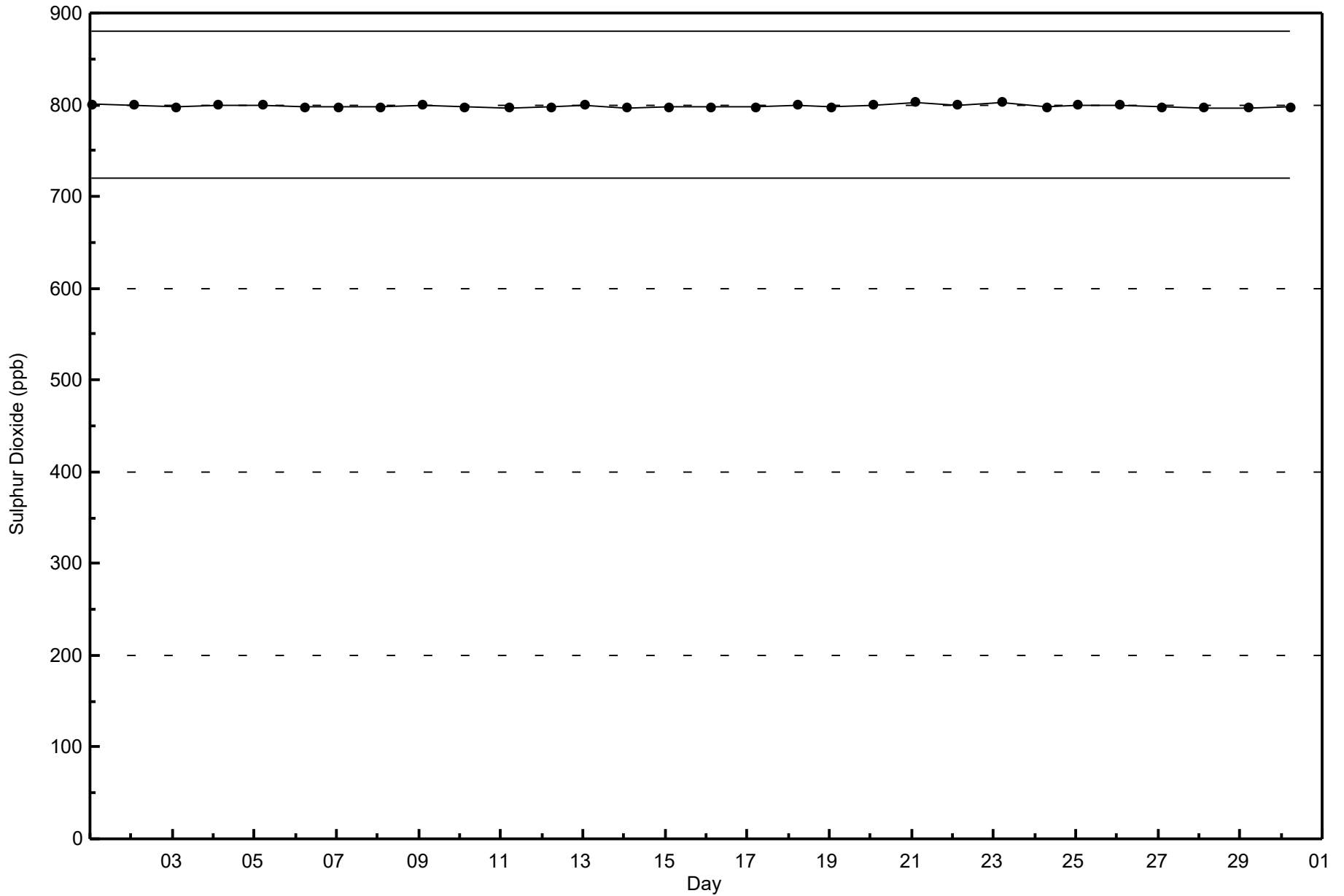






**Wood Buffalo Environmental Association**  
**Span Responses**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Lower Camp - November 2023**





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

**Hydrogen Sulphide (H<sub>2</sub>S) - ppb**  
**Lower Camp - November 2023**

Number of Exceedences (AAAQO):	1-hr: 4	24-hr: 1	Hours in Service:	720
Maximum Value: 29.8 ppb on Nov 15 17:00	Maximum Daily Average: 3.3 ppb on Nov 7		Hours of Data:	684
Minimum Value: 0.0 ppb on Nov 2 13:00	Minimum Daily Average: 0.0 ppb on Nov 4		Hours of Missing Data:	36
Maximum Diurnal Average: 1.5 ppb at hour 20	Minimum Diurnal Average: 0.2 ppb at hour 12		Hours of Calibration:	35
Monthly Average: 0.65 ppb	Percentiles: P <sub>1</sub> = 0.0 P <sub>10</sub> = 0.0 Q <sub>1</sub> = 0.1 Median = 0.2 Q <sub>3</sub> = 0.4 P <sub>90</sub> = 1.4 P <sub>99</sub> = 8.2		Percent Operational Time:	99.9

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	0.9	Z	0.4	0.3	0.2	0.3	0.3	0.4	0.4	0.2	0.2	0.1	0.2	0.1	0.3	0.5	0.7	0.5	0.3	0.3	0.2	0.3	0.2	0.2	0.3	0.3
2-Nov	0.5	0.2	Z	0.9	1.1	0.7	0.5	0.2	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.3	0.0	0.0	1.1	0.1	0.1	0.3	1.1
3-Nov	0.2	0.1	0.2	Z	0.3	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.1	0.1	0.2	0.4	1.9	2.2	1.9	1.2	1.0	0.7	0.5	0.5	2.2
4-Nov	0.2	0.0	0.0	0.0	Z	0.0	0.0	0.1	0.0	0.1	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.2
5-Nov	0.0	0.0	0.0	0.1	0.1	Z	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.2	1.1	0.4	0.2	0.1	0.2	0.2	0.2	0.3	0.3	0.2	0.2	1.1
6-Nov	Z	0.2	0.1	0.2	0.1	0.3	0.4	0.2	0.3	0.3	0.2	0.2	0.1	0.2	0.4	0.3	0.3	0.4	0.4	0.3	0.4	0.3	0.3	0.2	0.3	0.4
7-Nov	0.4	Z	6.0	0.2	0.3	0.8	2.3	1.7	2.7	1.1	0.5	0.3	0.2	1.1	6.4	2.6	0.7	0.4	9.3	22.8	8.8	2.9	0.2	3.9	3.3	22.8
8-Nov	0.2	0.2	Z	0.2	0.2	0.3	0.3	0.2	0.2	0.2	0.3	0.4	0.3	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.2	0.1	0.1	0.1	0.2	0.4
9-Nov	0.9	0.7	0.4	Z	5.2	1.4	9.5	3.8	3.7	0.6	0.1	0.1	0.2	0.7	0.2	0.3	0.4	0.4	0.3	0.4	0.2	0.4	1.3	0.2	1.4	9.5
10-Nov	0.3	0.6	0.4	0.3	Z	0.3	0.2	1.7	1.4	0.4	0.2	0.1	0.2	0.1	0.3	0.1	0.2	0.1	0.2	0.2	0.1	0.4	0.4	1.1	0.4	1.7
11-Nov	0.4	1.0	0.8	0.1	0.4	Z	0.1	0.4	0.1	0.1	0.3	0.5	0.9	0.3	0.1	0.4	0.2	0.1	0.2	0.3	0.2	0.1	0.9	2.4	0.5	2.4
12-Nov	Z	0.5	0.2	0.3	0.4	0.1	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.2	0.5	1.5	0.6	1.4	0.3	1.1	0.3	0.3	0.3	1.5
13-Nov	0.1	Z	0.3	0.0	0.4	0.6	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	0.1	0.6
14-Nov	0.0	0.0	Z	0.0	0.0	0.2	16.3	1.3	0.3	0.1	0.0	0.0	0.3	0.0	0.1	4.7	3.6	12.7	8.0	3.4	0.8	1.4	2.0	2.4	2.4	16.3
15-Nov	1.9	1.2	1.0	Z	0.3	0.3	0.2	0.0	0.1	0.2	0.2	0.1	0.1	0.2	0.2	0.4	29.8	3.0	0.3	0.3	0.5	0.0	0.0	0.0	1.8	29.8
16-Nov	0.1	0.1	4.8	4.5	0.7	Z	0.2	0.3	0.2	0.3	0.3	0.2	0.2	0.1	0.3	0.2	0.3	0.4	0.4	1.2	0.8	0.5	0.5	0.1	0.7	4.8
17-Nov	0.0	0.0	6.9	0.5	0.1	Z	0.0	0.0	0.1	0.1	0.0	0.1	0.1	0.5	0.2	4.0	1.7	1.5	0.8	1.1	2.8	1.9	1.0	0.9	1.1	6.9
18-Nov	Z	0.4	0.1	0.1	0.1	0.1	0.2	0.3	0.2	0.3	0.1	0.3	0.6	0.9	1.3	0.5	0.4	1.0	1.4	1.5	2.1	1.6	1.1	0.3	0.7	2.1
19-Nov	1.0	Z	0.6	1.0	1.8	2.5	2.6	1.9	2.6	2.7	1.8	0.7	0.9	0.4	2.8	0.6	0.4	0.3	0.2	0.2	0.3	0.4	1.9	0.6	1.2	2.8
20-Nov	0.0	0.1	Z	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.3	0.2	0.2	0.2	0.1	0.3
21-Nov	0.1	0.1	0.1	Z	0.0	0.2	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	0.1	0.3
22-Nov	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	M	0.0	0.0	0.1	0.5	0.2	0.0	0.3	0.6	0.2	0.2	0.1	0.6
23-Nov	0.6	0.4	0.2	0.1	0.2	Z	0.1	0.1	0.4	0.2	0.2	0.1	0.2	0.2	0.3	0.3	0.5	1.1	0.5	0.3	0.3	0.5	0.8	0.6	0.4	1.1
24-Nov	Z	1.0	0.9	4.5	2.0	3.5	0.6	0.3	0.0	0.7	0.1	0.3	0.6	0.1	0.0	0.0	0.1	7.6	1.8	2.6	0.4	2.1	3.5	0.6	1.4	7.6
25-Nov	0.3	Z	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.3
26-Nov	0.0	0.2	Z	0.7	0.8	0.5	0.2	0.6	0.8	0.6	1.0	0.4	0.1	0.2	0.4	0.2	0.3	0.2	0.5	0.2	0.1	0.4	1.2	1.7	0.5	1.7
27-Nov	2.6	1.3	2.1	Z	1.1	0.7	0.5	0.2	0.2	0.3	0.5	0.2	0.1	0.0	0.1	0.2	0.5	0.9	3.3	0.2	0.6	0.0	0.0	0.0	0.7	3.3
28-Nov	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.4	2.4	2.7	0.0	0.0	0.1	0.1	0.0	0.0	0.1	0.3	0.3	2.7
29-Nov	0.3	0.1	0.1	0.1	0.2	Z	0.2	0.2	0.2	0.1	0.4	0.2	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.1	0.4
30-Nov	Z	0.0	0.0	0.0	0.2	0.2	0.0	0.1	0.2	0.0	0.2	C	C	C	C	C	0.1	0.2	0.3	0.3	0.4	0.3	0.4	0.7	0.2	0.7

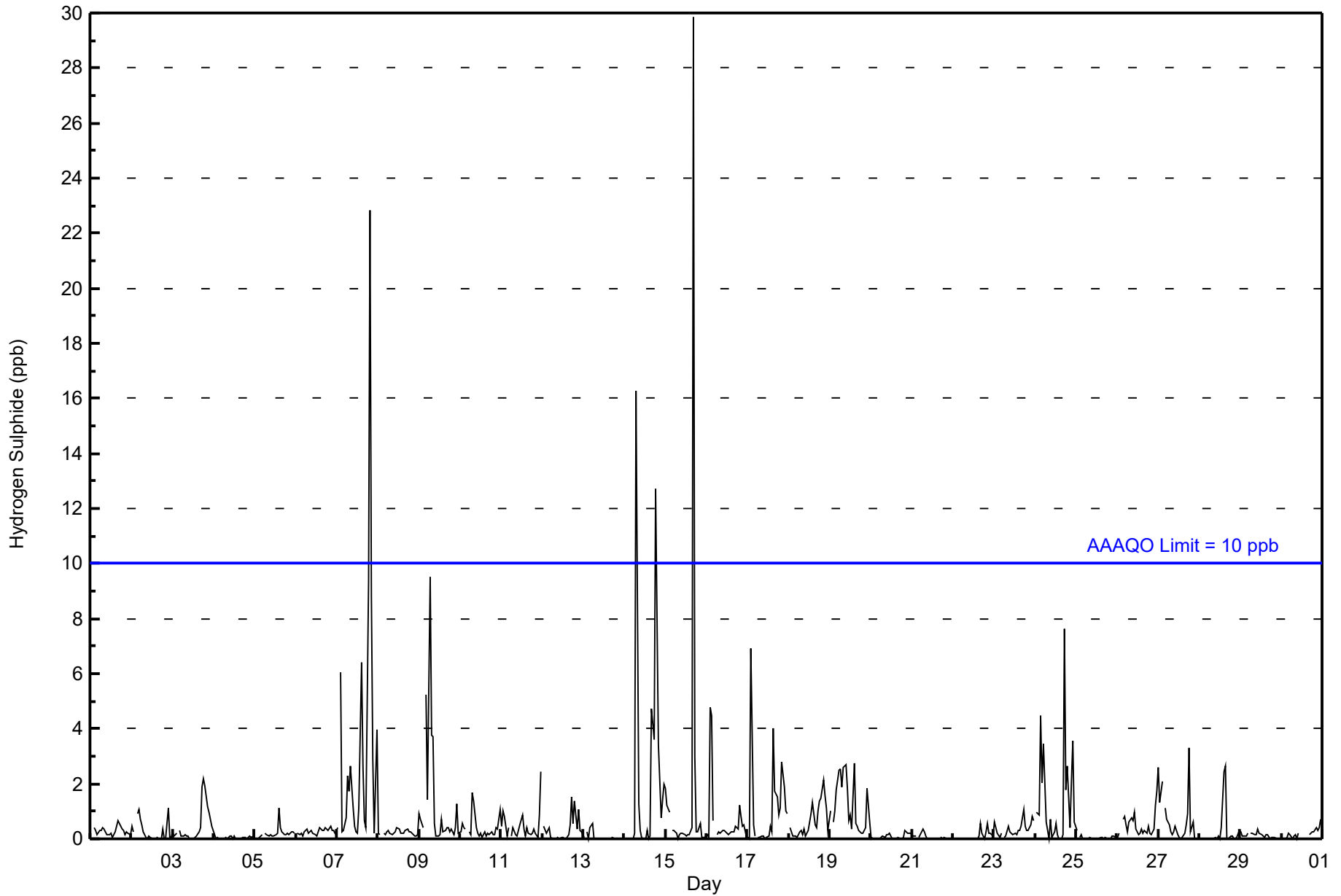
0.4	0.3	1.0	0.6	0.6	0.5	0.6	1.0	0.5	0.3	0.2	0.2	0.2	0.2	0.6	0.5	1.5	0.9	1.2	1.5	0.8	0.6	0.6	0.6	0.6	0.6	0.6	Diurnal Average
2.6	1.3	6.9	4.5	5.2	3.5	9.5	16.3	3.7	2.7	1.8	0.7	0.9	1.1	6.4	4.0	29.8	7.6	12.7	22.8	8.8	2.9	3.5	3.9	3.9	3.9	3.9	Diurnal Maximum

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



Wood Buffalo Environmental Association  
Hourly Averages

Hydrogen Sulphide (H<sub>2</sub>S) - ppb  
Lower Camp - November 2023





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Hydrogen Sulphide (H<sub>2</sub>S) - ppb  
Lower Camp - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2	646	94.44	94.44
3 - 4	23	3.36	97.81
5 - 7	6	0.88	98.68
8 - 11	5	0.73	99.42
> 11	4	0.58	100.00

Total Number of Valid Hours: 684

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Hydrogen Sulphide (H<sub>2</sub>S) - ppb  
Lower Camp - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 2	26	11	9	21	22	167	58	9	2	9	24	58	76	77	41	36	646
3 - 4	0	0	0	0	1	2	3	2	4	2	1	0	6	2	0	0	23
5 - 7	0	0	0	0	0	0	0	0	2	3	0	1	0	0	0	0	6
8 - 11	0	0	0	0	0	1	1	1	2	0	0	0	0	0	0	0	5
> 11	0	0	0	0	0	1	0	0	3	0	0	0	0	0	0	0	4
<b>Totals</b>	<b>26</b>	<b>11</b>	<b>9</b>	<b>21</b>	<b>23</b>	<b>171</b>	<b>62</b>	<b>12</b>	<b>13</b>	<b>14</b>	<b>25</b>	<b>59</b>	<b>82</b>	<b>79</b>	<b>41</b>	<b>36</b>	<b>684</b>

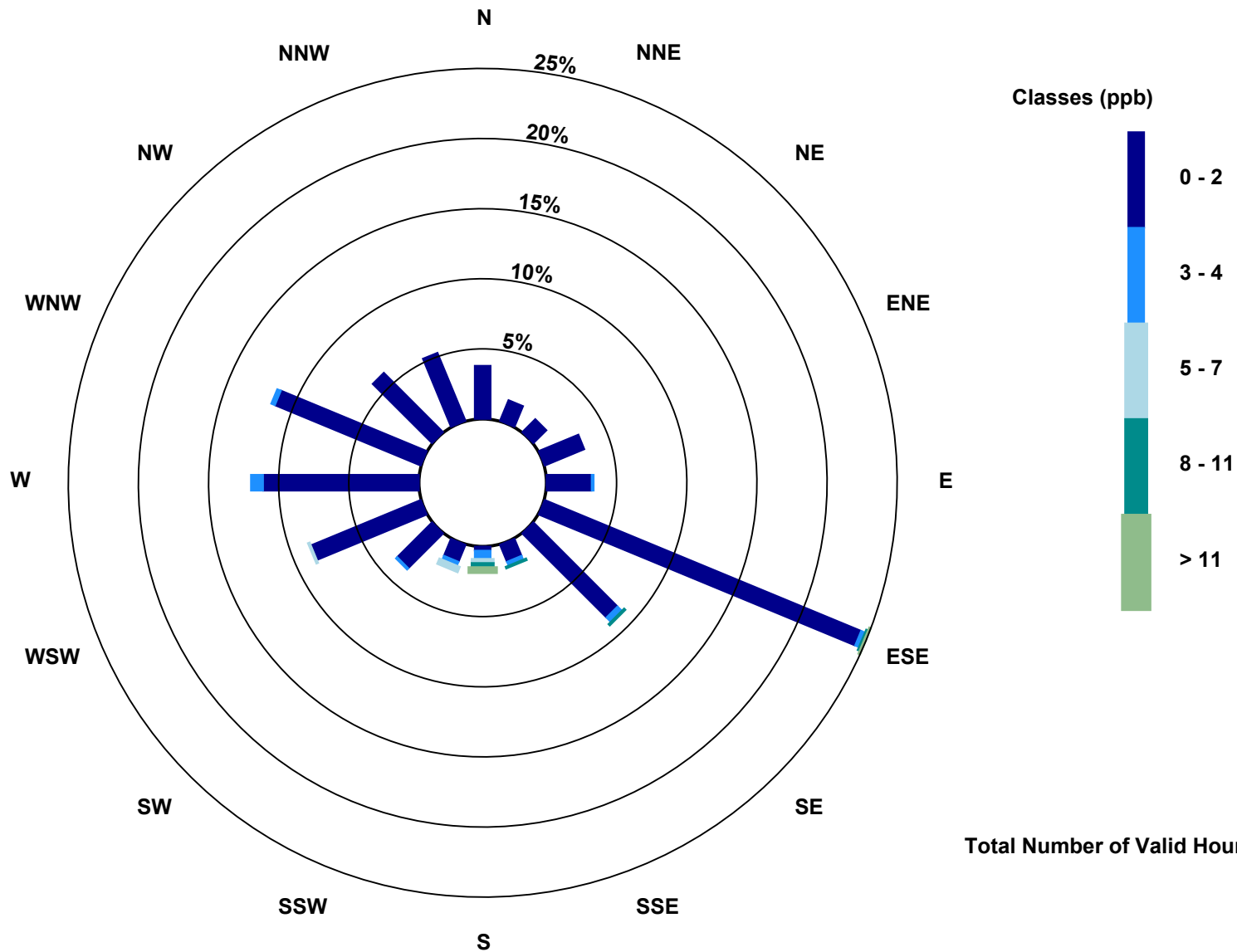
Total Number of Valid Hours: 684

Total Number of Hours: 720

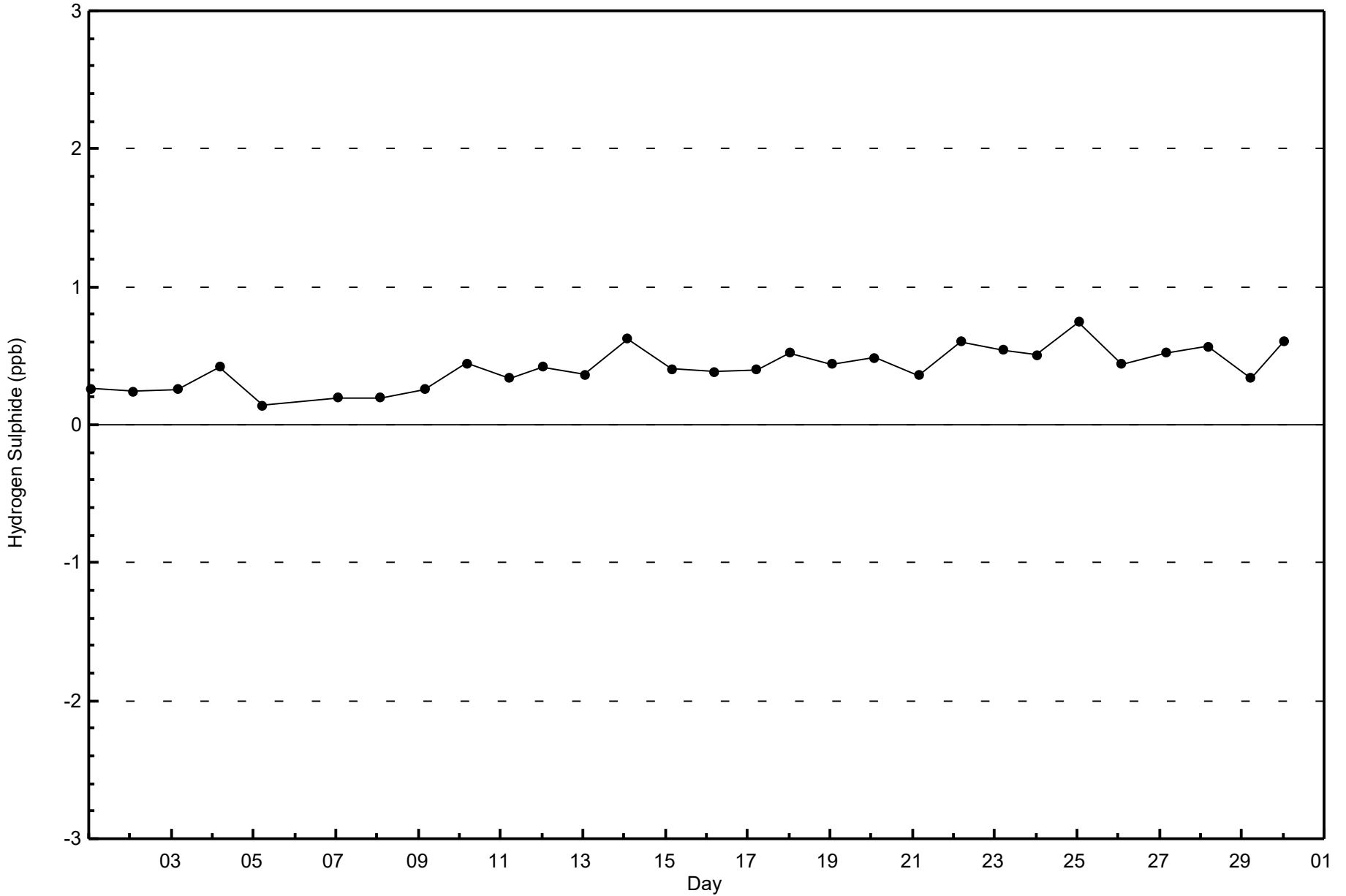


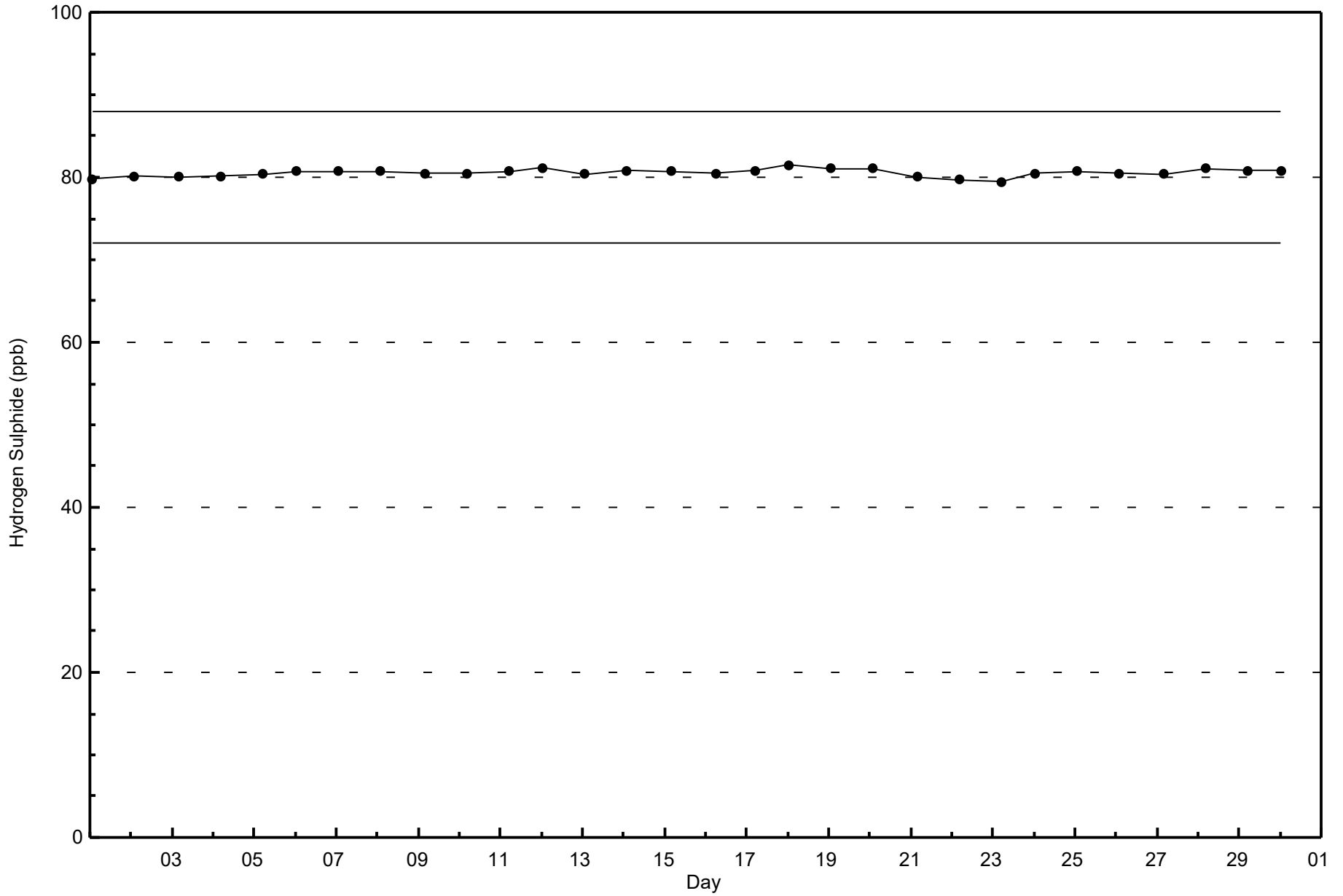
Wood Buffalo Environmental Association  
Wind Rose Nov 2023

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



Total Number of Valid Hours: 684









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

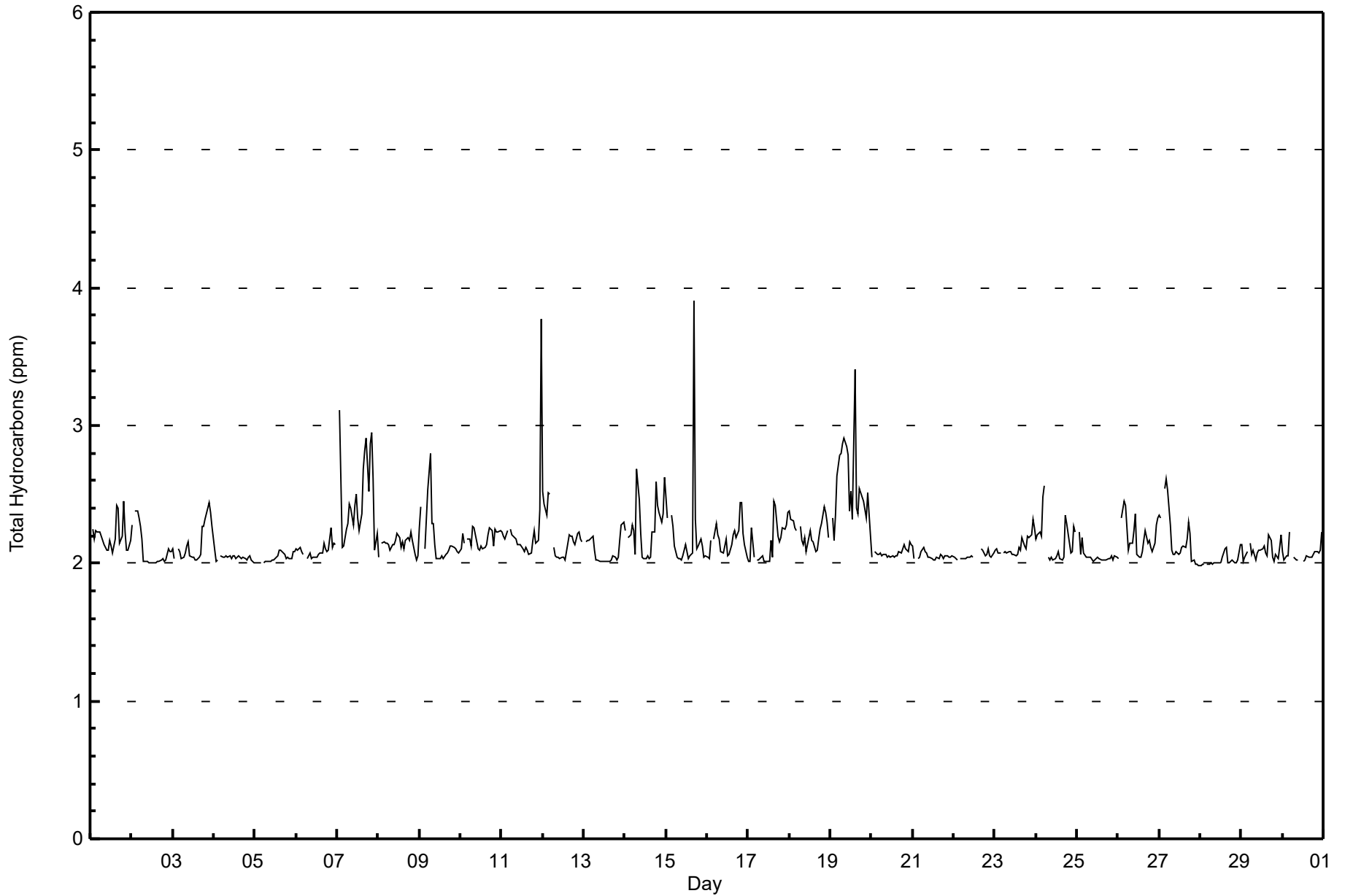
**Total Hydrocarbons (THC) - ppm**  
**Lower Camp - November 2023**

Maximum Value: 3.9 ppm on Nov 15 17:00		Maximum Daily Average: 2.6 ppm on Nov 19		Hours in Service: 720																																													
Minimum Value: 2.0 ppm on Nov 28 00:00		Minimum Daily Average: 2.0 ppm on Nov 28		Hours of Data: 684																																													
Maximum Diurnal Average: 2.2 ppm at hour 5		Minimum Diurnal Average: 2.1 ppm at hour 14		Hours of Missing Data: 36																																													
Monthly Average: 2.16 ppm		Percentiles: P <sub>1</sub> = 2.0 P <sub>10</sub> = 2.0 Q <sub>1</sub> = 2.0 Median = 2.1 Q <sub>3</sub> = 2.2 P <sub>90</sub> = 2.4 P <sub>99</sub> = 2.9		Hours of Calibration: 34																																													
				Percent Operational Time: 99.7																																													
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Nov	Z	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.2	2.1	2.1	2.2	2.4	2.4	2.1	2.2	2.5	2.2	2.1	2.1	2.2	2.2	2.5																							
2-Nov	2.3	Z	2.4	2.4	2.3	2.3	2.2	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.4																						
3-Nov	2.1	2.0	Z	2.1	2.1	2.0	2.0	2.1	2.1	2.2	2.1	2.0	2.0	2.0	2.0	2.0	2.1	2.3	2.3	2.3	2.4	2.4	2.4	2.3	2.1	2.4																							
4-Nov	2.1	2.0	2.0	Z	2.1	2.0	2.0	2.1	2.0	2.1	2.0	2.1	2.0	2.1	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.0	2.0	2.1	2.1																						
5-Nov	2.0	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.1	2.1	2.0	2.1	2.1																						
6-Nov	2.1	2.1	2.1	2.1	2.1	Z	2.0	2.1	2.1	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.3	2.1	2.1	2.1	2.1	2.1	2.3																						
7-Nov	Z	3.1	2.6	2.1	2.1	2.2	2.3	2.4	2.4	2.3	2.4	2.5	2.3	2.2	2.4	2.7	2.8	2.9	2.5	2.9	2.9	2.6	2.1	2.2	2.5	3.1																							
8-Nov	2.0	Z	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.1	2.2	2.1	2.2	2.2	2.2	2.2	2.2	2.1	2.0	2.1	2.1	2.2	2.2																						
9-Nov	2.3	2.4	Z	2.1	2.3	2.5	2.8	2.3	2.3	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	2.1	2.1	2.1	2.8																						
10-Nov	2.1	2.2	2.1	Z	2.2	2.2	2.1	2.3	2.3	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.3	2.2	2.1	2.2	2.2	2.2	2.2	2.2	2.3	2.3																						
11-Nov	2.2	2.2	2.2	2.2	Z	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.1	2.2	2.4	3.8	2.2	3.8																							
12-Nov	2.5	2.4	2.4	2.5	2.5	Z	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	2.1	2.2	2.2	2.2	2.2	2.2	2.5																							
13-Nov	Z	2.2	2.2	2.2	2.2	2.2	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.0	2.0	2.2	2.3	2.3	2.1	2.3																							
14-Nov	2.2	Z	2.2	2.2	2.3	2.2	2.1	2.7	2.5	2.2	2.0	2.0	2.1	2.0	2.0	2.0	2.2	2.2	2.6	2.4	2.4	2.3	2.4	2.6	2.3	2.7																							
15-Nov	2.5	2.3	Z	2.4	2.3	2.1	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.0	2.1	2.1	3.9	2.3	2.1	2.1	2.2	2.1	2.0	2.1	2.2	3.9																							
16-Nov	2.0	2.0	2.2	Z	2.2	2.3	2.2	2.2	2.1	2.1	2.1	2.2	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.4	2.4	2.2	2.1	2.0	2.2	2.4																							
17-Nov	2.0	2.0	2.3	2.0	Z	2.0	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.2	2.0	2.5	2.4	2.2	2.2	2.2	2.2	2.3	2.2	2.3	2.4	2.1	2.5																						
18-Nov	2.4	2.3	2.3	2.3	2.2	Z	2.3	2.2	2.1	2.2	2.1	2.2	2.2	2.2	2.2	2.1	2.1	2.2	2.2	2.3	2.4	2.4	2.3	2.2	2.2	2.4																							
19-Nov	Z	2.3	2.2	2.4	2.6	2.8	2.8	2.9	2.9	2.8	2.8	2.4	2.5	2.3	3.4	2.4	2.4	2.5	2.5	2.5	2.4	2.3	2.5	2.2	2.6	3.4																							
20-Nov	2.0	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.1	2.0	2.1	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.2																							
21-Nov	2.1	2.0	Z	2.0	2.0	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.0	2.1	2.1	2.0	2.0	2.1	2.1	2.1																							
22-Nov	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.0	C	C	C	C	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.1	2.1	2.1																							
23-Nov	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	2.2	2.1	2.1	2.2	2.2	2.2	2.3	2.3	2.1	2.3																							
24-Nov	2.2	2.2	2.2	2.2	2.5	2.6	Z	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.0	2.0	2.0	2.0	2.3	2.3	2.2	2.1	2.1	2.3	2.2	2.6																							
25-Nov	Z	2.2	2.1	2.2	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.1	2.2																							
26-Nov	2.0	Z	2.3	2.4	2.4	2.3	2.1	2.1	2.1	2.1	2.2	2.4	2.1	2.0	2.0	2.1	2.2	2.2	2.1	2.2	2.1	2.1	2.1	2.3	2.3	2.2	2.4																						
27-Nov	2.4	2.3	Z	2.5	2.6	2.5	2.3	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.3	2.2	2.0	2.0	2.0	2.0	2.0	2.2	2.6																							
28-Nov	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.1																							
29-Nov	2.1	2.0	2.0	2.1	Z	2.1	2.1	2.1	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.0	2.0	2.1	2.0	2.1	2.2	2.2																							
30-Nov	2.1	2.0	2.1	2.0	2.2	Z	2.0	2.0	2.0	2.0	2.0	M	M	2.0	2.0	2.1	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.2																							
																								2.2	2.2	2.2	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	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	Diurnal Average
																								2.5	3.1	2.6	2.5	2.6	2.8	2.8	2.9	2.9	2.8	2.8	2.5	2.5	2.3	3.4	2.7	3.9	2.9	2.6	2.9	2.9	2.6	2.5	3.8	2.1	Diurnal Maximum
Z - zerospan																								C - Calibration				M - Maintenance																					



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

**Total Hydrocarbons (THC) - ppm**  
**Lower Camp - November 2023**





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

**Total Hydrocarbons (THC) - ppm**  
**Lower Camp - November 2023**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2.0	210	30.70	30.70
2.1 - 3.0	470	68.71	99.42
3.1 - 10.0	4	0.58	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 - November 2023**

<b>Concentration Ranges (ppm)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	18	8	10	12	10	11	8	3	0	2	14	36	13	17	22	26	210
2.1 - 3.0	7	4	2	8	16	160	54	8	12	12	9	20	69	61	20	8	470
3.1 - 10.0	0	0	0	0	0	0	2	1	1	0	0	0	0	0	0	0	4
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	25	12	12	20	26	171	64	12	13	14	23	56	82	78	42	34	684

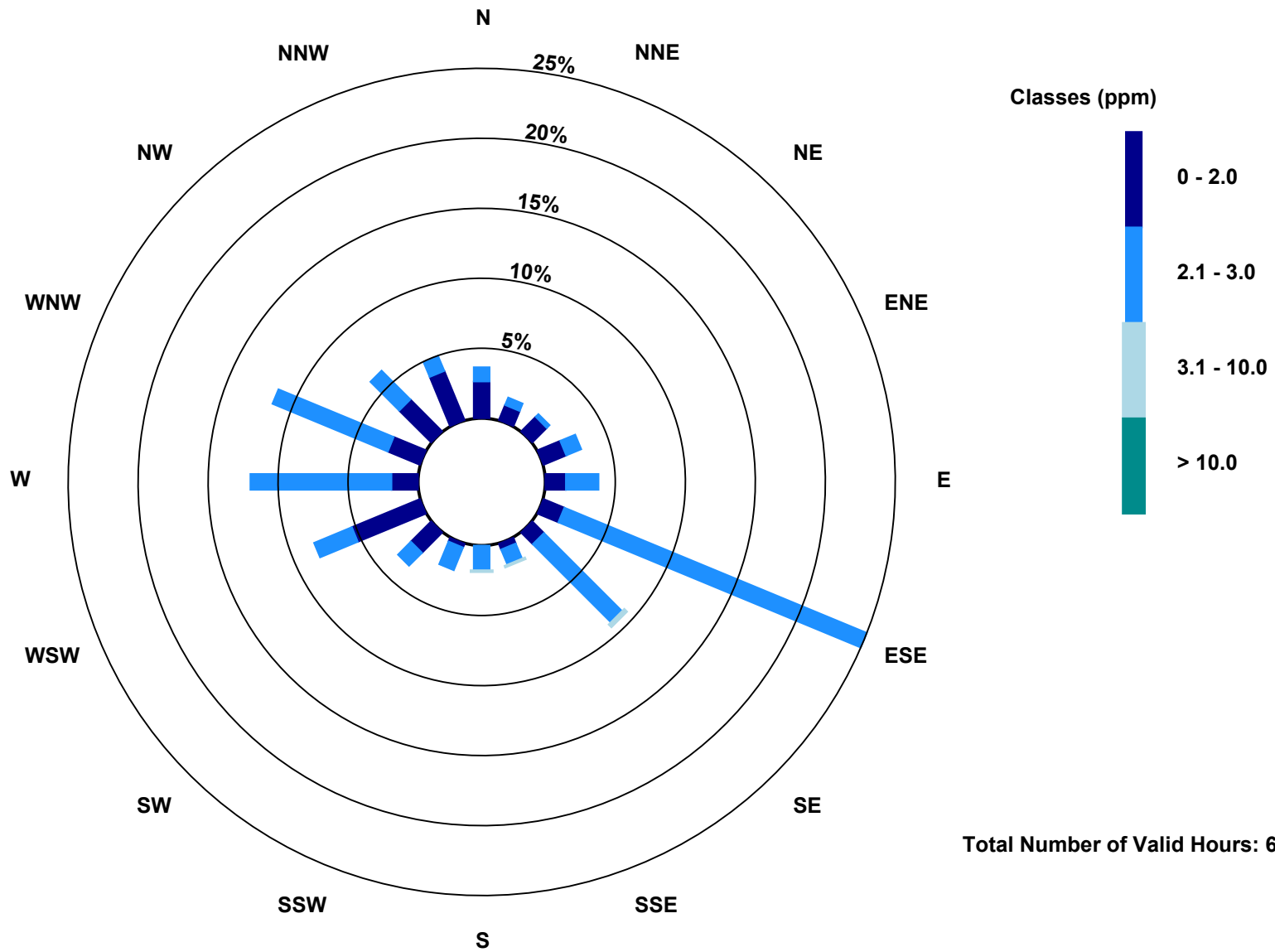
Total Number of Valid Hours: 684

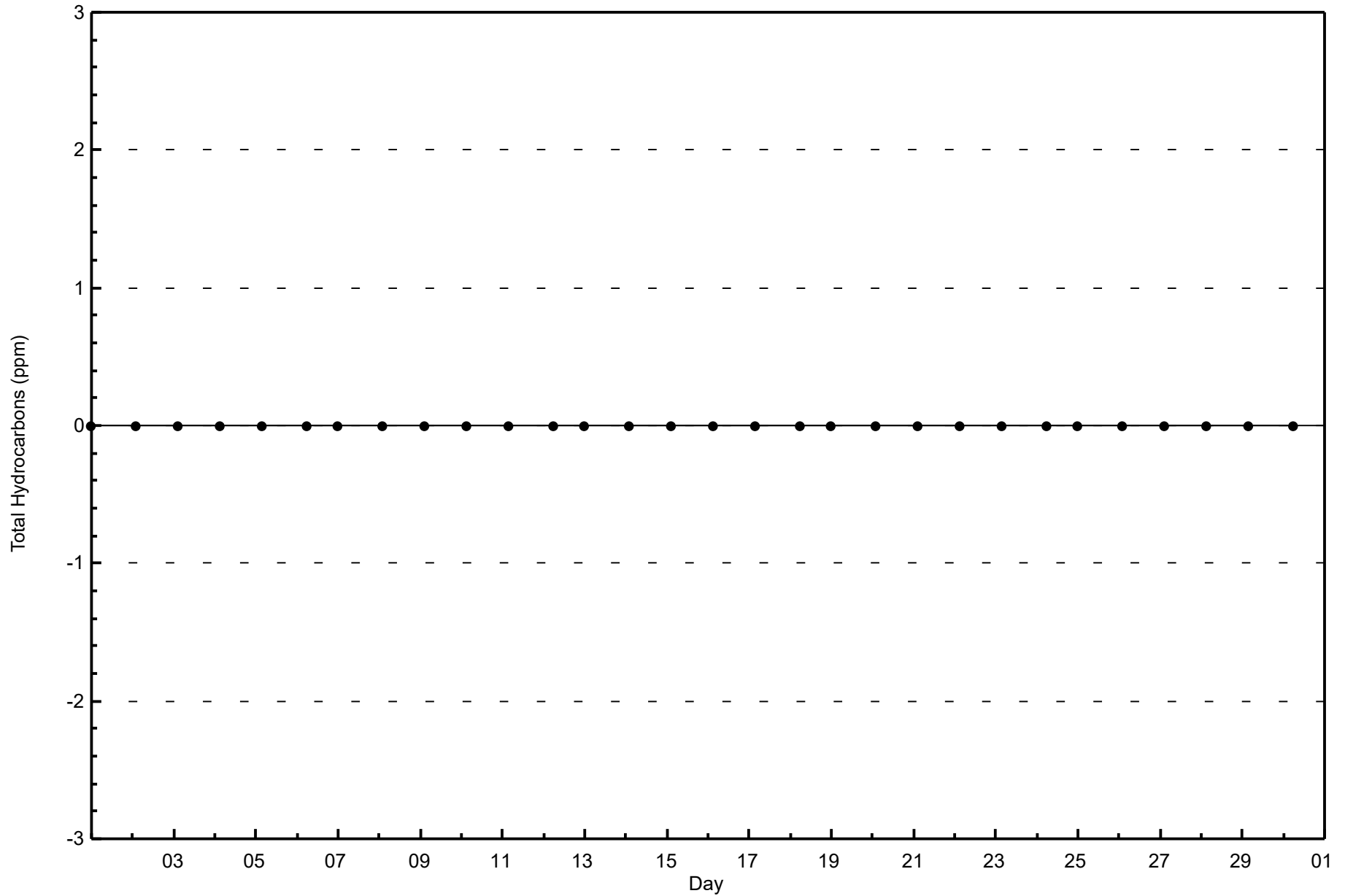
Total Number of Hours: 720

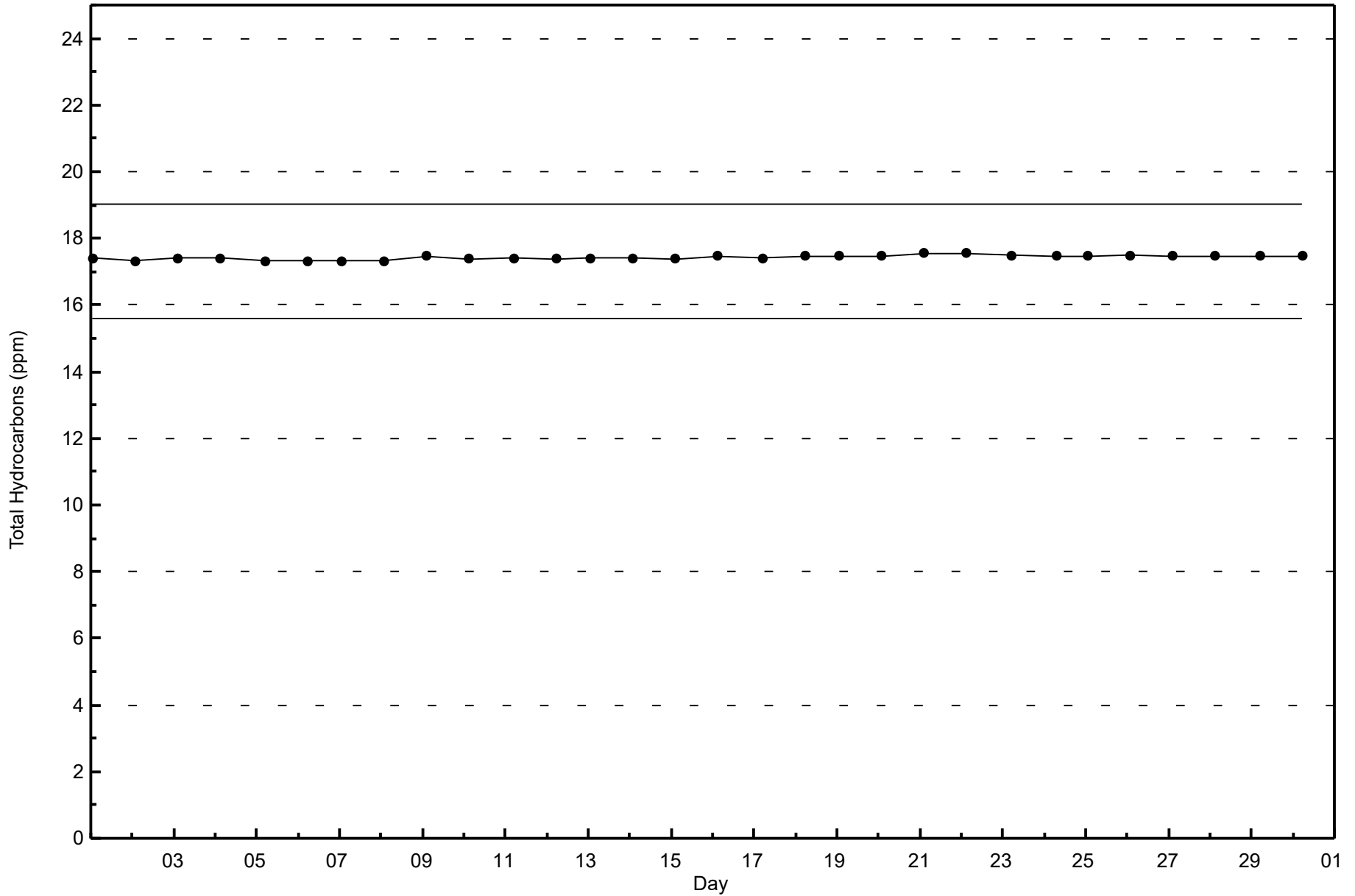


**Wood Buffalo Environmental Association**  
**Wind Rose Nov 2023**

**Total Hydrocarbons (THC) - ppm**  
**Lower Camp**









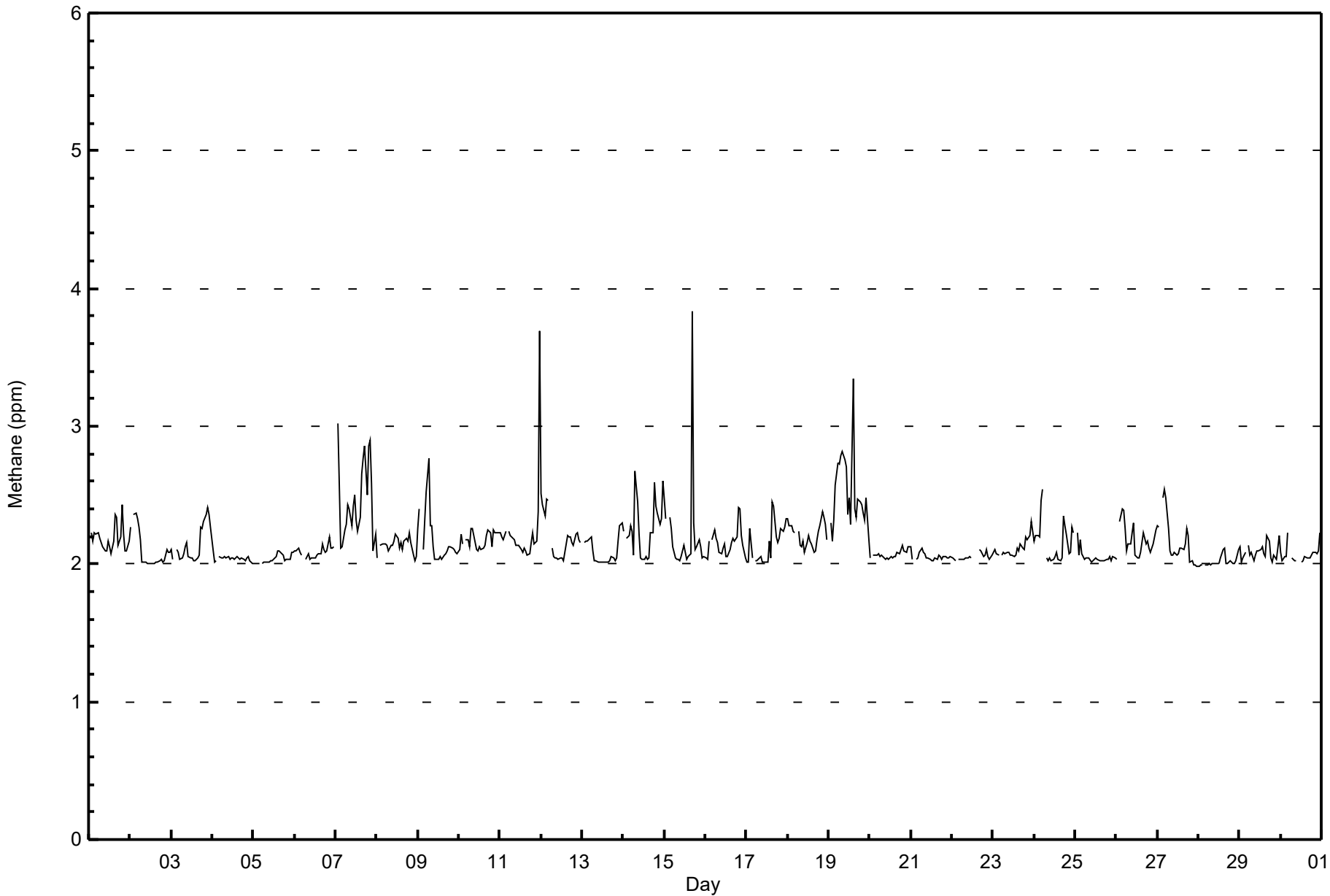
Number of Exceedences (AAAQO):		1-hr: 0		24-hr: 0		Hours in Service:														720																														
Maximum Value: 3.8 ppm on Nov 15 17:00		Maximum Daily Average: 2.5 ppm on Nov 19		Hours of Data:														684																																
Minimum Value: 2.0 ppm on Nov 28 00:00		Minimum Daily Average: 2.0 ppm on Nov 28		Hours of Missing Data:														36																																
Maximum Diurnal Average: 2.2 ppm at hour 5		Minimum Diurnal Average: 2.1 ppm at hour 14		Hours of Calibration:														34																																
Monthly Average: 2.15 ppm		Percentiles: P <sub>1</sub> = 2.0 P <sub>10</sub> = 2.0 Q <sub>1</sub> = 2.0 Median = 2.1 Q <sub>3</sub> = 2.2 P <sub>90</sub> = 2.3 P <sub>99</sub> = 2.8		Percent Operational Time:														99.7																																
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																								
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																										
1-Nov	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.2	2.1	2.1	2.2	2.4	2.3	2.1	2.2	2.4	2.2	2.1	2.1	2.2	2.2	2.1	2.4																							
2-Nov	2.3	Z	2.4	2.4	2.3	2.3	2.2	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.4																							
3-Nov	2.1	2.0	Z	2.1	2.1	2.0	2.0	2.1	2.1	2.2	2.1	2.0	2.0	2.0	2.0	2.0	2.1	2.3	2.3	2.3	2.4	2.4	2.4	2.3	2.1	2.4																								
4-Nov	2.1	2.0	2.0	Z	2.1	2.0	2.0	2.1	2.0	2.1	2.0	2.0	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.0	2.0	2.1	2.1																							
5-Nov	2.0	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.1	2.1	2.0	2.1	2.1																							
6-Nov	2.1	2.1	2.1	2.1	2.1	Z	2.0	2.1	2.1	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.2																							
7-Nov	Z	3.0	2.6	2.1	2.1	2.2	2.3	2.4	2.4	2.3	2.4	2.5	2.3	2.2	2.3	2.7	2.8	2.9	2.5	2.9	2.9	2.6	2.1	2.2	2.5	3.0																								
8-Nov	2.0	Z	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	2.1	2.2	2.2	2.2	2.2	2.2	2.1	2.0	2.1	2.1	2.2																								
9-Nov	2.3	2.4	Z	2.1	2.3	2.5	2.8	2.3	2.3	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	2.1	2.1	2.1	2.8																							
10-Nov	2.1	2.2	2.1	Z	2.2	2.2	2.1	2.3	2.3	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.1	2.2	2.2	2.2	2.2	2.2	2.3																								
11-Nov	2.2	2.2	2.2	2.2	Z	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.1	2.2	2.4	3.7	2.2	3.7																								
12-Nov	2.5	2.4	2.3	2.5	2.5	Z	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	2.1	2.2	2.2	2.2	2.2	2.2	2.5																								
13-Nov	Z	2.2	2.2	2.2	2.2	2.2	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.0	2.0	2.2	2.3	2.3	2.1	2.3																								
14-Nov	2.2	Z	2.2	2.2	2.3	2.2	2.1	2.7	2.5	2.2	2.0	2.0	2.0	2.1	2.0	2.0	2.2	2.2	2.6	2.4	2.4	2.3	2.3	2.6	2.3	2.7																								
15-Nov	2.5	2.3	Z	2.3	2.3	2.1	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.0	2.1	2.1	3.8	2.3	2.1	2.1	2.2	2.1	2.0	2.1	2.2	3.8																								
16-Nov	2.0	2.0	2.2	Z	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.4	2.4	2.2	2.1	2.0	2.2	2.4																								
17-Nov	2.0	2.0	2.3	2.0	Z	2.0	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.2	2.0	2.4	2.4	2.2	2.2	2.2	2.2	2.3	2.2	2.3	2.1	2.4																								
18-Nov	2.3	2.3	2.3	2.2	2.2	Z	2.2	2.1	2.1	2.2	2.1	2.2	2.2	2.2	2.2	2.1	2.1	2.2	2.2	2.3	2.4	2.3	2.3	2.2	2.2	2.4																								
19-Nov	Z	2.3	2.2	2.3	2.6	2.7	2.7	2.8	2.8	2.8	2.7	2.4	2.5	2.3	3.3	2.4	2.3	2.5	2.5	2.4	2.4	2.3	2.5	2.2	2.5	3.3																								
20-Nov	2.0	Z	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	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1																							
21-Nov	2.1	2.0	Z	2.0	2.0	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.0	2.1	2.1	2.0	2.0	2.1	2.1	2.1	2.1																							
22-Nov	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.0	C	C	C	C	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.1	2.1	2.1																								
23-Nov	2.1	2.1	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.3	2.2	2.1	2.3																								
24-Nov	2.2	2.2	2.2	2.2	2.5	2.5	Z	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.0	2.0	2.0	2.0	2.3	2.3	2.2	2.1	2.1	2.3	2.2	2.5																								
25-Nov	Z	2.2	2.1	2.2	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.1	2.2																								
26-Nov	2.0	Z	2.3	2.4	2.4	2.3	2.1	2.1	2.1	2.2	2.3	2.1	2.0	2.0	2.1	2.2	2.2	2.1	2.2	2.1	2.1	2.1	2.1	2.2	2.3	2.2	2.4																							
27-Nov	2.3	2.3	Z	2.5	2.5	2.5	2.3	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.3	2.2	2.0	2.0	2.0	2.0	2.2	2.5																								
28-Nov	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.1																							
29-Nov	2.1	2.0	2.0	2.1	Z	2.1	2.1	2.1	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.0	2.0	2.1	2.0	2.1	2.2	2.1	2.2																								
30-Nov	2.1	2.0	2.1	2.0	2.2	Z	2.0	2.0	2.0	2.0	M	M	2.0	2.0	2.1	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2																							
																								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	2.2	2.2	2.2	2.2	2.2	Diurnal Average
																								2.5	3.0	2.6	2.5	2.6	2.7	2.8	2.8	2.8	2.8	2.7	2.5	2.5	2.3	3.3	2.7	3.8	2.9	2.6	2.9	2.9	2.6	2.5	3.7	2.1	2.1	Diurnal Maximum
Z - zerospan																								C - Calibration				M - Maintenance																						





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

**Methane (CH<sub>4</sub>) - ppm**  
**Lower Camp - November 2023**





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

**Methane (CH<sub>4</sub>) - ppm**  
**Lower Camp - November 2023**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2.0	214	31.29	31.29
2.1 - 3.0	467	68.27	99.56
3.1 - 10.0	3	0.44	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 684

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Methane (CH<sub>4</sub>) - ppm  
Lower Camp - November 2023**

<b>Concentration Ranges (ppm)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	18	8	10	12	12	11	8	3	0	2	14	36	15	17	22	26	214
2.1 - 3.0	7	4	2	8	14	160	54	9	12	12	9	20	67	61	20	8	467
3.1 - 10.0	0	0	0	0	0	0	2	0	1	0	0	0	0	0	0	0	3
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	25	12	12	20	26	171	64	12	13	14	23	56	82	78	42	34	684

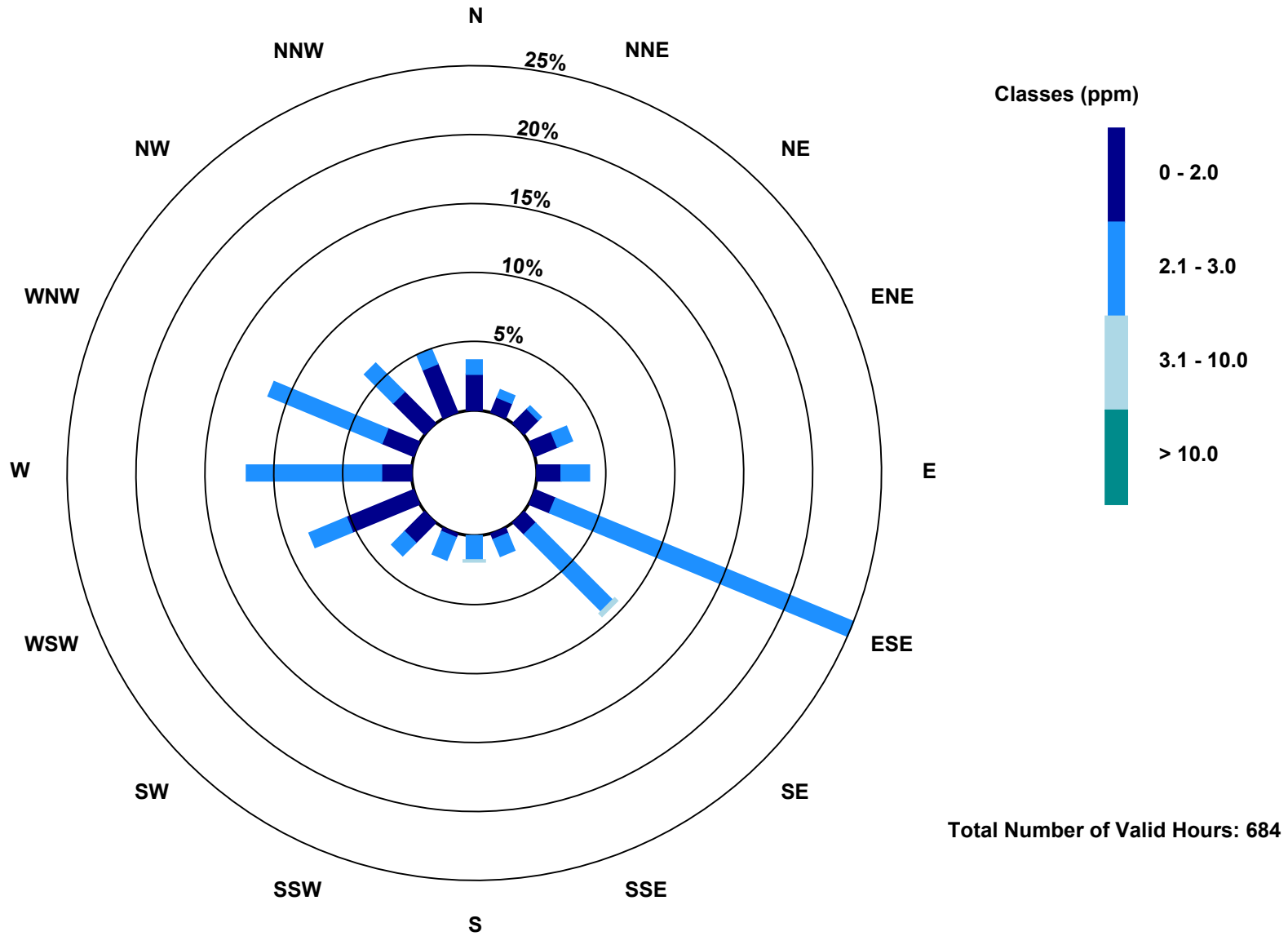
Total Number of Valid Hours: 684

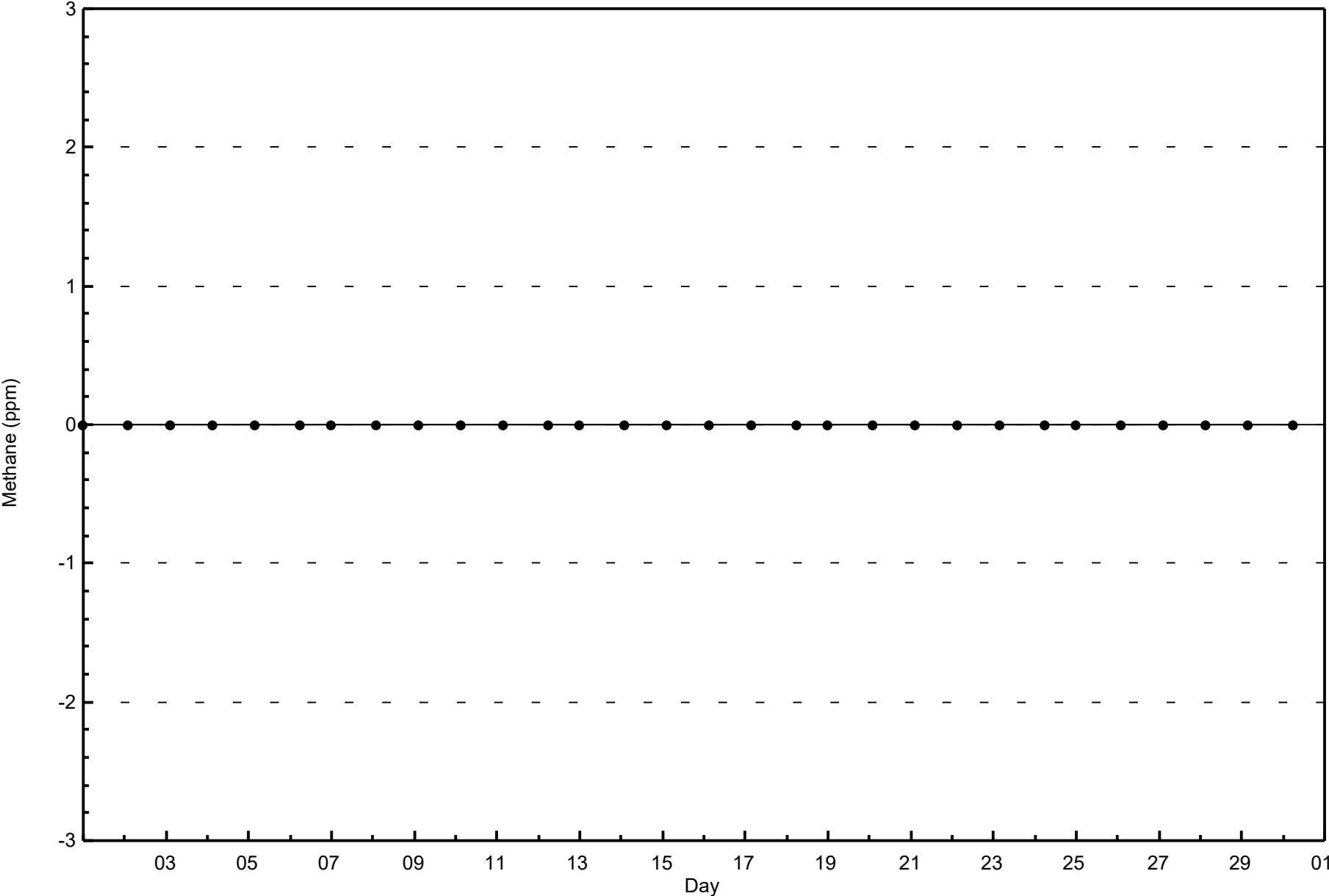
Total Number of Hours: 720

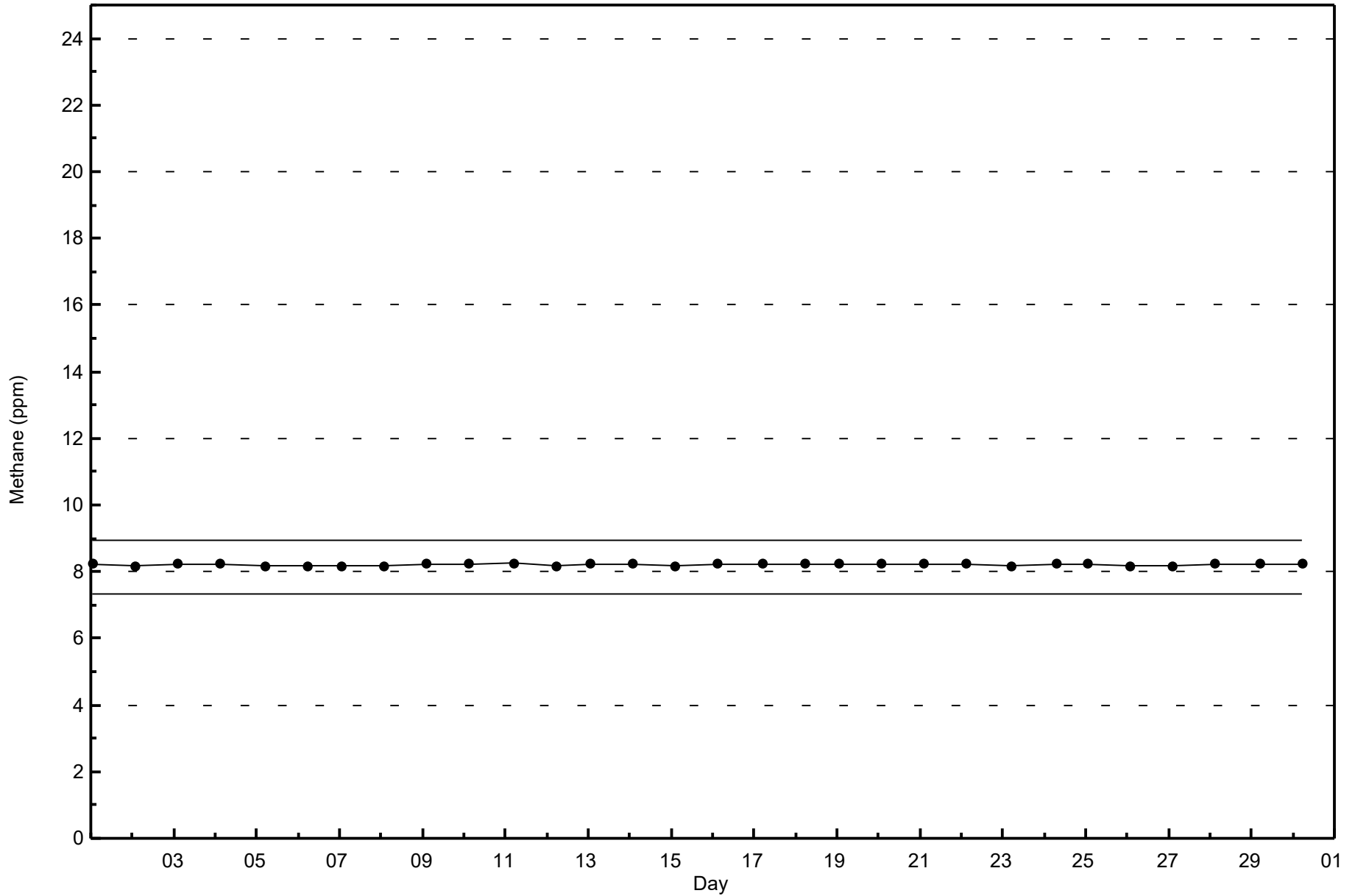


Wood Buffalo Environmental Association  
Wind Rose Nov 2023

Methane (CH<sub>4</sub>) - ppm  
Lower Camp





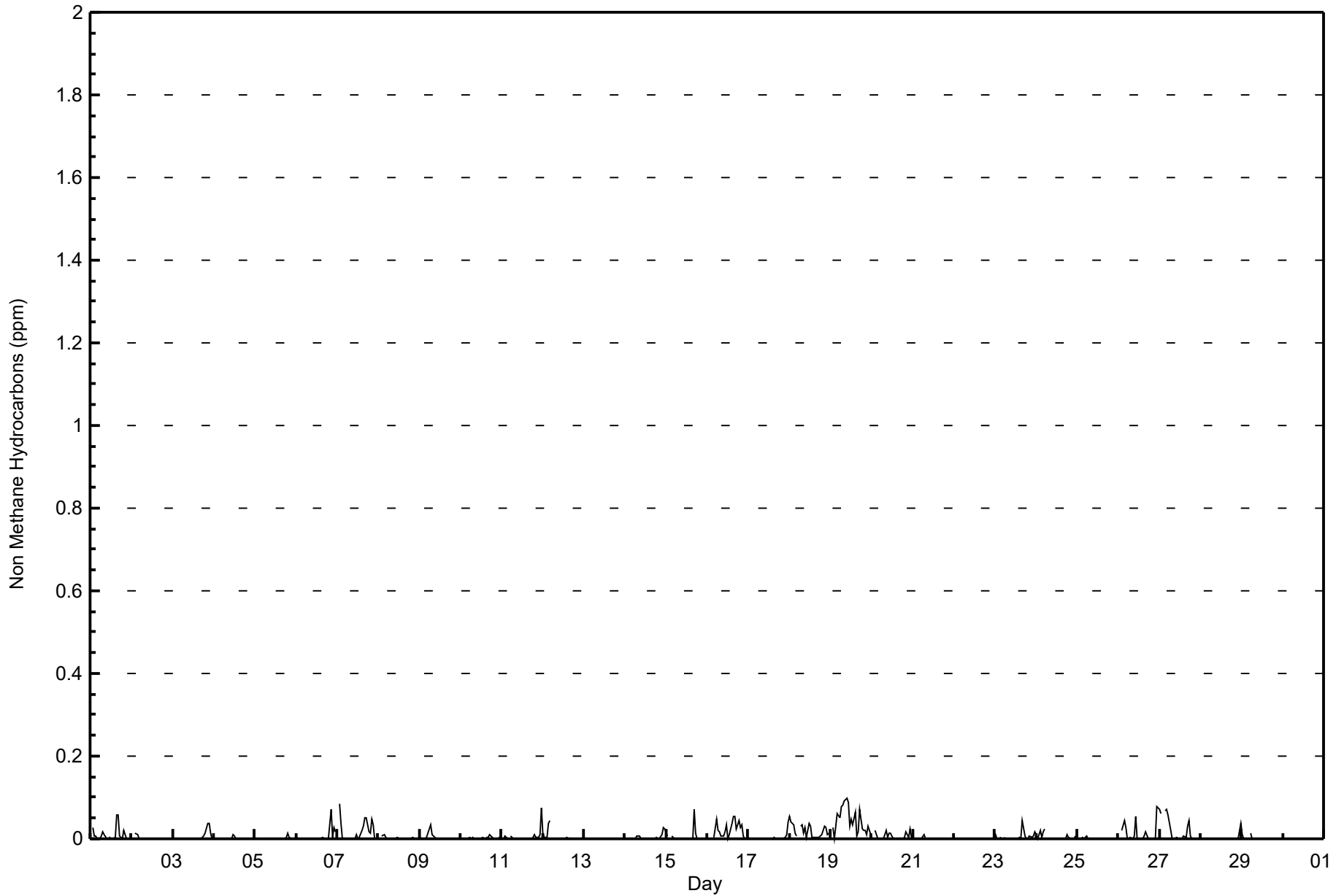




Summary of Hour Averages

Lower Camp - November 2023

Maximum Value: 0.097 ppm on Nov 19 10:00		Maximum Daily Average: 0.043 ppm on Nov 19		Hours in Service: 720																						
Minimum Value: 0.000 ppm on Nov 1 10:00		Minimum Daily Average: 0.000 ppm on Nov 30		Hours of Data: 684																						
Maximum Diurnal Average: 0.012 ppm at hour 17		Minimum Diurnal Average: 0.002 ppm at hour 14		Hours of Missing Data: 36																						
Monthly Average: 0.007 ppm		Percentiles: P <sub>1</sub> = 0.0 P <sub>10</sub> = 0.0 Q <sub>1</sub> = 0.0 Median = 0.0 Q <sub>3</sub> = 0.0 P <sub>90</sub> = 0.0 P <sub>99</sub> = 0.1		Hours of Calibration: 34																						
				Percent Operational Time: 99.7																						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	Z	0.027	0.008	0.007	0.001	0.001	0.008	0.017	0.010	0.000	0.000	0.003	0.000	0.000	0.003	0.058	0.058	0.007	0.001	0.021	0.009	0.001	0.000	0.001	0.010	0.058
2-Nov	0.004	Z	0.014	0.010	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	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.014	
3-Nov	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	0.000	0.000	0.000	0.000	0.004	0.005	0.013	0.037	0.037	0.012	0.002	0.005	0.037
4-Nov	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.011	0.006	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.011	
5-Nov	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.014	0.003	0.000	0.000	0.001	0.014	
6-Nov	0.007	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.000	0.000	0.000	0.001	0.070	0.004	0.026	0.016	0.006	0.070
7-Nov	Z	0.084	0.037	0.001	0.000	0.001	0.000	0.000	0.002	0.002	0.001	0.009	0.001	0.002	0.021	0.031	0.051	0.050	0.018	0.014	0.046	0.034	0.000	0.001	0.018	0.084
8-Nov	0.000	Z	0.008	0.010	0.003	0.001	0.001	0.000	0.000	0.000	0.001	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.002	0.000	0.000	0.000	0.001	0.010	
9-Nov	0.005	0.004	Z	0.000	0.003	0.013	0.035	0.009	0.006	0.003	0.000	0.000	0.000	0.001	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.035	
10-Nov	0.000	0.001	0.000	Z	0.001	0.002	0.000	0.005	0.000	0.000	0.000	0.000	0.000	0.002	0.001	0.003	0.003	0.009	0.003	0.000	0.000	0.001	0.001	0.002	0.009	
11-Nov	0.001	0.002	0.006	0.001	Z	0.008	0.004	0.000	0.001	0.000	0.000	0.001	0.000	0.001	0.000	0.000	0.000	0.000	0.003	0.010	0.002	0.003	0.012	0.073	0.006	0.073
12-Nov	0.013	0.002	0.005	0.039	0.045	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.001	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.005	0.045	
13-Nov	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.001	0.000	0.001	
14-Nov	0.001	Z	0.000	0.000	0.000	0.001	0.000	0.007	0.008	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.000	0.001	0.011	0.026	0.025	0.004	0.026
15-Nov	0.012	0.007	Z	0.008	0.004	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.071	0.013	0.000	0.000	0.000	0.000	0.000	0.005	0.071	
16-Nov	0.000	0.000	0.000	Z	0.005	0.046	0.019	0.017	0.008	0.006	0.015	0.032	0.000	0.012	0.037	0.053	0.053	0.024	0.044	0.027	0.034	0.006	0.001	0.000	0.019	0.053
17-Nov	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.001	0.000	0.000	0.000	0.002	0.011	0.041	0.003	0.041	
18-Nov	0.055	0.040	0.033	0.015	0.008	Z	0.029	0.032	0.013	0.027	0.003	0.036	0.032	0.003	0.004	0.003	0.002	0.003	0.008	0.009	0.031	0.028	0.011	0.012	0.019	0.055
19-Nov	Z	0.028	0.000	0.030	0.061	0.050	0.077	0.083	0.092	0.097	0.087	0.031	0.046	0.033	0.064	0.006	0.016	0.070	0.025	0.019	0.021	0.010	0.031	0.010	0.043	0.097
20-Nov	0.000	Z	0.019	0.000	0.000	0.000	0.000	0.000	0.019	0.002	0.014	0.012	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.016	0.005	0.023	0.005	0.005	0.023
21-Nov	0.000	0.000	Z	0.000	0.000	0.001	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	0.010	
22-Nov	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	C	C	C	C	0.000	0.000	0.000	0.000	0.001	0.001	0.000	0.001	
23-Nov	0.009	0.000	0.001	0.002	Z	0.004	0.000	0.000	0.001	0.001	0.000	0.000	0.000	0.000	0.004	0.001	0.044	0.007	0.000	0.000	0.006	0.004	0.006	0.017	0.005	0.044
24-Nov	0.010	0.000	0.020	0.004	0.016	0.024	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.001	0.009	0.003	0.000	0.001	0.001	0.006	0.004	0.024
25-Nov	Z	0.000	0.000	0.005	0.000	0.007	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.007
26-Nov	0.000	Z	0.021	0.044	0.028	0.001	0.000	0.003	0.000	0.007	0.053	0.001	0.000	0.000	0.000	0.007	0.016	0.001	0.000	0.000	0.001	0.001	0.077	0.076	0.015	0.077
27-Nov	0.071	0.060	Z	0.067	0.070	0.059	0.019	0.000	0.000	0.001	0.005	0.001	0.001	0.001	0.001	0.008	0.003	0.029	0.045	0.006	0.000	0.000	0.000	0.000	0.019	0.071
28-Nov	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.002	0.036	0.002	0.036
29-Nov	0.010	0.000	0.000	0.000	Z	0.013	0.000	0.001	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.013
30-Nov	0.000	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	M	M	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
																								Diurnal Average		
																								Diurnal Maximum		
Z - zerospan      C - Calibration      M - Maintenance																										







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

**Non Methane Hydrocarbons (NMHC) - ppm**  
**Lower Camp - November 2023**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 0.005	527	77.05	77.05
0.006 - 0.05	135	19.74	96.78
0.06 - 0.1	22	3.22	100.00
> 0.1	0	0.00	100.00

Total Number of Valid Hours: 684

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Non Methane Hydrocarbons (NMHC) - ppm  
Lower Camp - November 2023**

<b>Concentration Ranges (ppm)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 0.005	24	11	12	18	19	112	38	8	6	9	22	51	59	68	38	32	527
0.006 - 0.05	1	0	0	2	6	56	20	2	6	5	0	4	20	9	3	1	135
0.06 - 0.1	0	1	0	0	1	3	6	2	1	0	1	1	3	1	1	1	22
> 0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	25	12	12	20	26	171	64	12	13	14	23	56	82	78	42	34	684

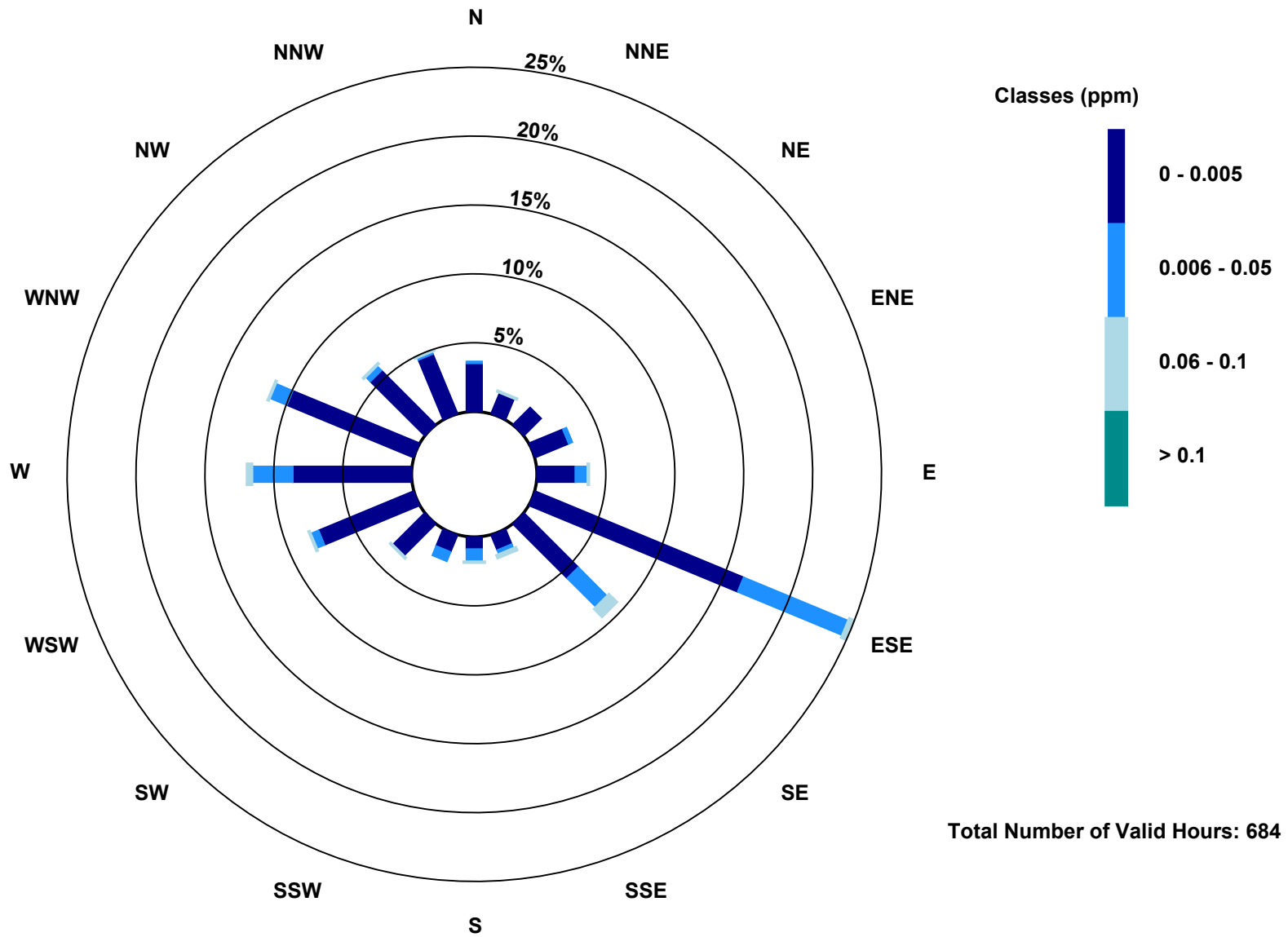
Total Number of Valid Hours: 684

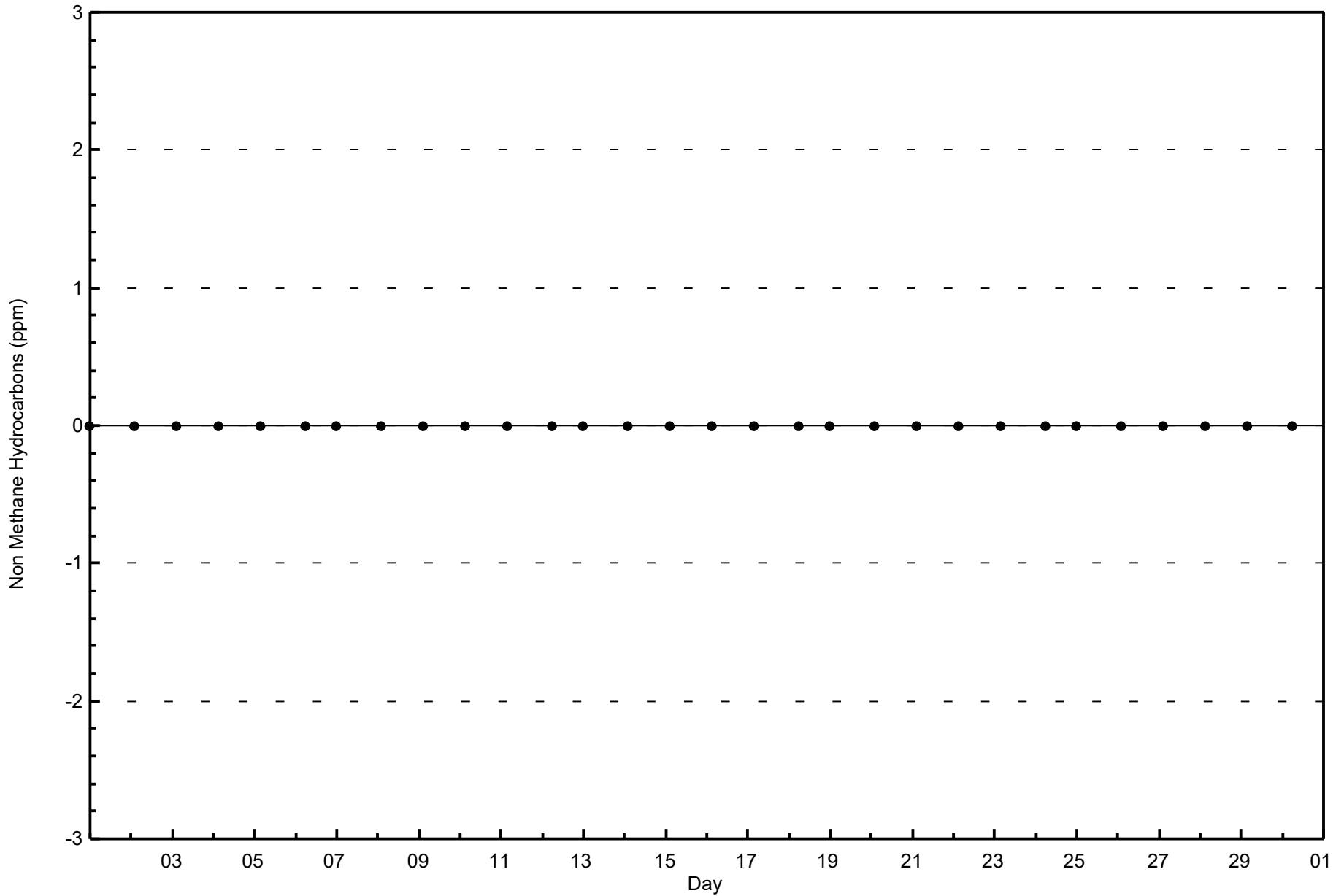
Total Number of Hours: 720

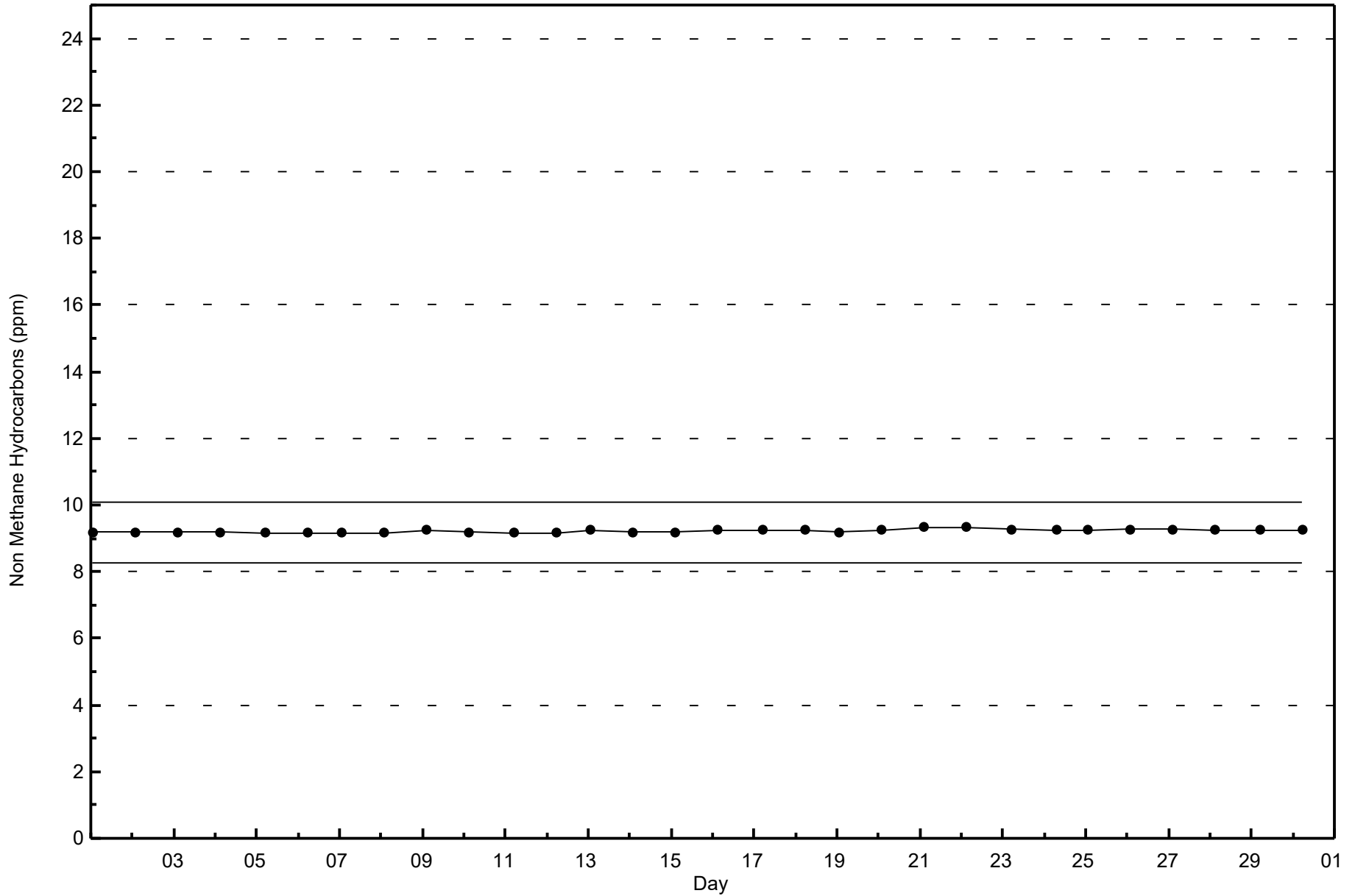


Wood Buffalo Environmental Association  
Wind Rose Nov 2023

Non Methane Hydrocarbons (NMHC) - ppm  
Lower Camp









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

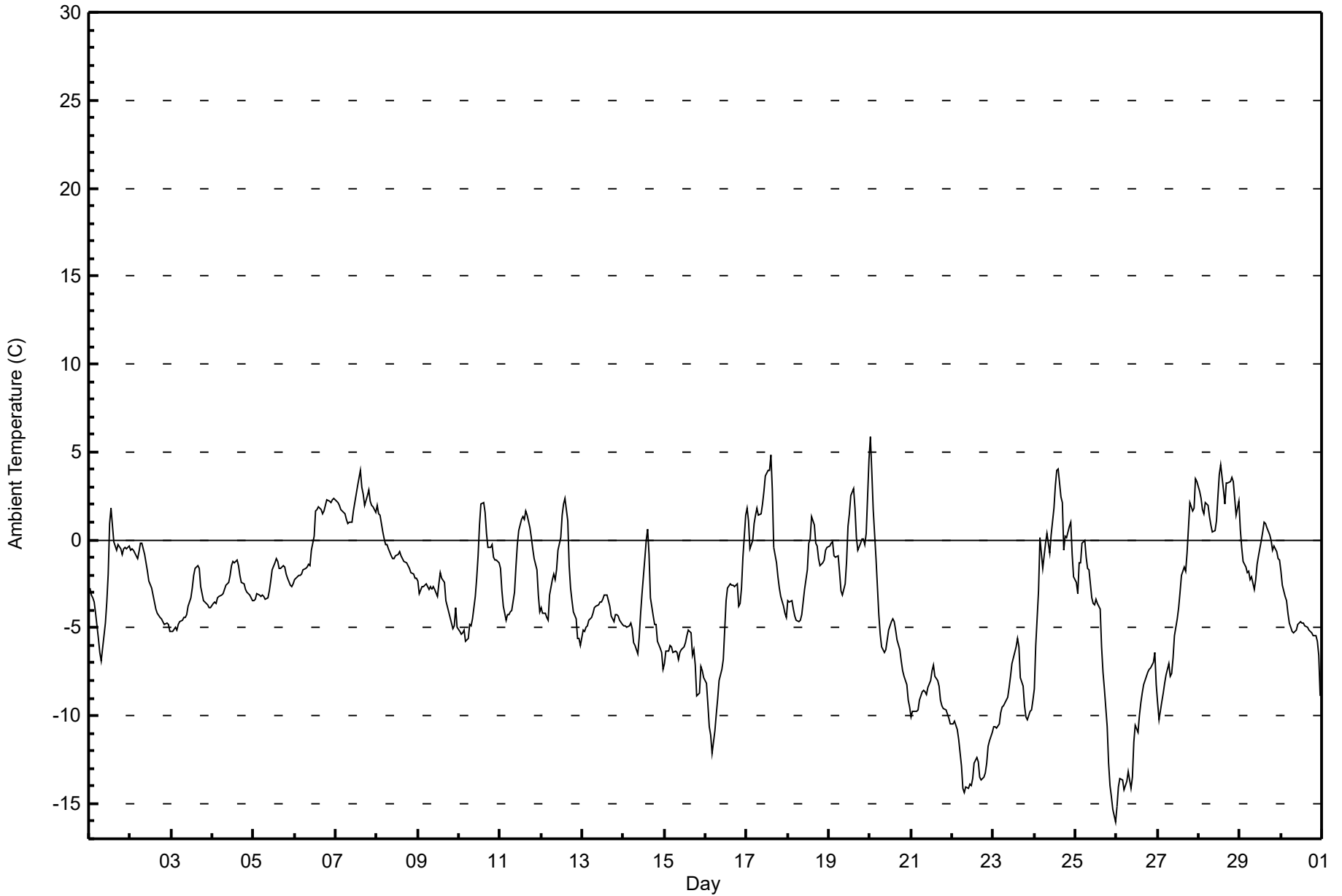
**Ambient Temperature (AT) - C**  
**Lower Camp - November 2023**

Maximum Value: 5.9 C on Nov 20 01:00																				Maximum Daily Average: 2.3 C on Nov 28					Hours in Service: 720				
Minimum Value: -16.0 C on Nov 26 00:00																				Minimum Daily Average: -12.6 C on Nov 22					Hours of Data: 720				
Maximum Diurnal Average: -1.4 C at hour 15																				Minimum Diurnal Average: -4.4 C at hour 9					Hours of Missing Data: 0				
Monthly Average: -3.43 C																				Percentiles: P <sub>1</sub> = -14.1 P <sub>10</sub> = -9.5 Q <sub>1</sub> = -5.6 Median = -3.1 Q <sub>3</sub> = -0.5 P <sub>90</sub> = 1.7 P <sub>99</sub> = 3.9					Hours of Calibration: 0				
																				Percent Operational Time: 100.0									
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24					
1-Nov	-2.7	-3.1	-3.3	-3.5	-4.2	-5.6	-6.4	-6.9	-6.1	-4.7	-3.5	-1.9	0.9	1.8	-0.1	-0.4	-0.6	-0.3	-0.5	-0.8	-0.5	-0.4	-0.5	-0.3	-2.2	1.8			
2-Nov	-0.6	-0.5	-0.6	-0.9	-1.1	-0.7	-0.2	-0.2	-0.9	-1.3	-1.8	-2.4	-2.7	-3.1	-3.6	-4.0	-4.2	-4.4	-4.5	-4.6	-4.8	-4.8	-4.8	-5.2	-2.6	-0.2			
3-Nov	-5.2	-5.2	-4.9	-5.1	-4.8	-4.6	-4.6	-4.4	-4.4	-4.2	-3.8	-3.3	-2.7	-2.0	-1.6	-1.5	-1.6	-2.7	-3.0	-3.5	-3.7	-3.7	-3.9	-3.9	-3.7	-1.5			
4-Nov	-3.6	-3.6	-3.6	-3.3	-3.2	-3.2	-3.0	-2.8	-2.6	-2.4	-2.0	-1.4	-1.2	-1.3	-1.2	-1.5	-2.0	-2.4	-2.5	-2.8	-3.0	-3.1	-3.1	-3.4	-2.6	-1.2			
5-Nov	-3.5	-3.4	-3.1	-3.2	-3.2	-3.2	-3.2	-3.4	-3.3	-2.9	-2.3	-1.7	-1.3	-1.0	-1.2	-1.6	-1.6	-1.5	-1.6	-1.9	-2.2	-2.6	-2.6	-2.5	-2.4	-1.0			
6-Nov	-2.3	-2.2	-2.1	-2.0	-1.9	-1.7	-1.6	-1.5	-1.4	-1.5	-0.6	0.2	1.7	1.7	1.9	1.8	1.5	1.6	2.0	2.3	2.2	2.1	2.3	2.3	0.2	2.3			
7-Nov	2.2	2.2	1.9	1.7	1.6	1.5	1.1	0.9	1.0	1.0	1.6	2.1	2.6	3.1	3.9	3.0	2.6	2.0	2.5	2.9	2.2	2.0	1.9	1.5	2.0	3.9			
8-Nov	2.0	1.4	1.4	0.4	0.0	-0.3	-0.3	-0.5	-0.9	-1.1	-1.1	-0.9	-0.8	-0.7	-0.9	-1.1	-1.2	-1.3	-1.5	-1.6	-1.8	-2.0	-2.2	-2.2	-0.7	2.0			
9-Nov	-2.3	-3.1	-2.7	-2.6	-2.6	-2.5	-2.8	-2.7	-2.8	-2.7	-2.8	-3.2	-2.5	-1.9	-2.2	-2.5	-3.4	-3.8	-4.1	-4.4	-5.0	-4.9	-3.8	-5.0	-3.2	-1.9			
10-Nov	-5.2	-5.4	-5.3	-5.2	-5.8	-5.6	-4.8	-4.9	-4.5	-3.2	-2.1	-0.9	0.9	2.0	2.1	1.6	0.4	-0.4	-0.4	-0.3	-1.0	-1.2	-1.2	-1.3	-2.2	2.1			
11-Nov	-1.6	-2.9	-3.8	-4.6	-4.3	-4.2	-4.1	-4.0	-3.0	-1.6	-0.3	0.5	1.1	1.4	1.1	1.6	1.4	0.7	0.1	-0.5	-1.1	-1.7	-3.1	-4.1	-1.5	1.6			
12-Nov	-3.8	-4.2	-4.2	-4.4	-4.6	-3.1	-2.2	-2.0	-2.3	-1.7	-0.6	0.1	1.4	2.0	2.4	1.1	-1.5	-2.7	-3.4	-4.1	-4.5	-5.6	-5.6	-6.0	-2.5	2.4			
13-Nov	-5.1	-5.2	-4.9	-4.9	-4.6	-4.4	-4.2	-3.9	-3.8	-3.7	-3.6	-3.5	-3.4	-3.1	-3.2	-3.4	-3.8	-4.4	-4.7	-4.3	-4.2	-4.3	-4.6	-4.8	-4.2	-3.1			
14-Nov	-4.9	-4.9	-5.0	-4.9	-4.7	-5.0	-5.9	-6.0	-6.5	-5.6	-4.2	-3.0	-1.1	-0.1	0.6	-0.8	-3.3	-4.4	-4.8	-4.8	-5.8	-6.2	-6.4	-7.3	-4.4	0.6			
15-Nov	-7.1	-6.3	-6.3	-6.0	-6.1	-6.4	-6.3	-6.4	-6.8	-6.4	-6.2	-6.1	-5.8	-5.5	-5.1	-5.3	-6.6	-6.2	-7.1	-8.8	-8.7	-7.2	-7.4	-7.8	-6.6	-5.1			
16-Nov	-8.1	-9.4	-10.6	-11.1	-12.2	-10.9	-9.9	-9.0	-8.0	-7.4	-6.8	-5.1	-3.5	-2.8	-2.5	-2.6	-2.6	-2.6	-2.5	-3.8	-3.6	-2.7	-1.0	1.4	-5.7	1.4			
17-Nov	1.8	1.1	-0.5	0.0	1.0	1.4	1.8	1.4	1.4	2.0	2.8	3.7	3.9	4.0	4.8	2.9	-0.4	-1.3	-2.1	-2.7	-3.2	-3.8	-4.2	-4.4	0.5	4.8			
18-Nov	-3.5	-3.5	-3.5	-3.9	-4.3	-4.6	-4.7	-4.6	-4.3	-3.6	-2.8	-1.7	-0.2	0.1	1.3	0.8	-0.2	-0.3	-1.1	-1.4	-1.3	-1.2	-0.6	-0.4	-2.1	1.3			
19-Nov	-0.3	-0.2	-0.1	-0.9	-1.0	-0.9	-1.9	-2.9	-3.2	-2.5	-1.2	0.7	1.5	2.6	2.9	1.8	0.1	-0.6	-0.2	0.0	0.0	-0.3	0.3	4.6	-0.1	4.6			
20-Nov	5.9	3.9	1.7	-1.1	-2.7	-4.2	-5.3	-6.1	-6.4	-6.3	-5.7	-5.1	-4.7	-4.5	-4.7	-5.1	-5.7	-6.3	-6.9	-7.4	-7.7	-8.2	-9.1	-9.5	-4.6	5.9			
21-Nov	-10.1	-9.8	-9.8	-9.7	-9.6	-9.1	-8.6	-8.6	-8.6	-8.8	-8.4	-8.0	-7.4	-7.1	-7.8	-8.0	-8.3	-9.1	-9.5	-9.6	-9.7	-9.9	-10.2	-10.5	-9.0	-7.1			
22-Nov	-10.5	-10.3	-10.5	-10.8	-11.3	-12.9	-14.1	-14.4	-14.1	-14.1	-13.9	-14.0	-13.5	-12.7	-12.4	-12.6	-13.5	-13.6	-13.5	-13.2	-12.7	-11.7	-11.5	-10.9	-12.6	-10.3			
23-Nov	-10.7	-10.6	-10.7	-10.5	-9.8	-9.5	-9.4	-9.3	-9.0	-8.4	-7.8	-7.0	-6.4	-6.1	-5.6	-6.1	-7.9	-8.3	-9.5	-10.1	-10.3	-9.7	-9.7	-9.1	-8.8	-5.6			
24-Nov	-8.5	-6.0	-2.9	0.1	-0.8	-1.7	-0.2	0.4	-0.2	-0.7	0.2	1.8	3.1	4.0	4.0	2.4	2.1	-0.6	0.2	0.1	0.8	1.0	-0.8	-2.1	-0.2	4.0			
25-Nov	-2.4	-3.1	-1.3	-1.3	-0.2	-0.1	-1.0	-1.6	-1.7	-3.3	-3.7	-3.7	-3.4	-3.6	-3.9	-6.1	-7.5	-8.5	-10.6	-12.7	-14.0	-14.6	-15.4	-16.0	-5.8	-0.1			
26-Nov	-15.2	-14.1	-13.6	-13.6	-14.2	-14.0	-13.8	-13.2	-14.1	-13.5	-11.5	-10.5	-10.9	-10.0	-9.2	-8.7	-8.2	-7.8	-7.5	-7.4	-7.3	-7.0	-6.4	-8.2	-10.8	-6.4			
27-Nov	-9.3	-10.2	-9.2	-8.7	-8.2	-7.7	-7.1	-7.8	-7.6	-6.7	-5.5	-4.5	-3.8	-3.0	-2.1	-1.6	-1.8	-0.8	0.6	2.1	1.6	1.8	3.4	3.3	-3.9	3.4			
28-Nov	2.7	2.3	1.7	1.5	2.1	2.0	1.3	0.8	0.4	0.5	1.1	2.5	3.7	4.3	2.9	2.0	3.3	3.3	3.3	3.6	3.3	2.4	1.4	2.2	2.3	4.3			
29-Nov	0.6	-0.4	-1.3	-1.6	-1.9	-1.8	-2.3	-2.1	-2.8	-2.3	-1.4	-0.9	0.0	0.5	1.0	1.0	0.7	0.3	-0.1	-0.6	-0.4	-0.6	-1.1	-1.2	-0.8	1.0			
30-Nov	-1.8	-2.6	-3.2	-3.5	-4.1	-4.7	-5.2	-5.3	-5.2	-5.1	-4.8	-4.6	-4.7	-4.7	-4.9	-5.0	-5.1	-5.2	-5.3	-5.5	-5.5	-5.8	-6.6	-8.8	-4.9	-1.8			
																								Diurnal Average					
																								Diurnal Maximum					



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

**Ambient Temperature (AT) - C**  
**Lower Camp - November 2023**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C  
Lower Camp - November 2023**

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	0	0.00	0.00
-20 - 0	576	80.00	80.00
0 - 10	144	20.00	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720





**Wood Buffalo Environmental Association**

**Summary of Hour Averages**

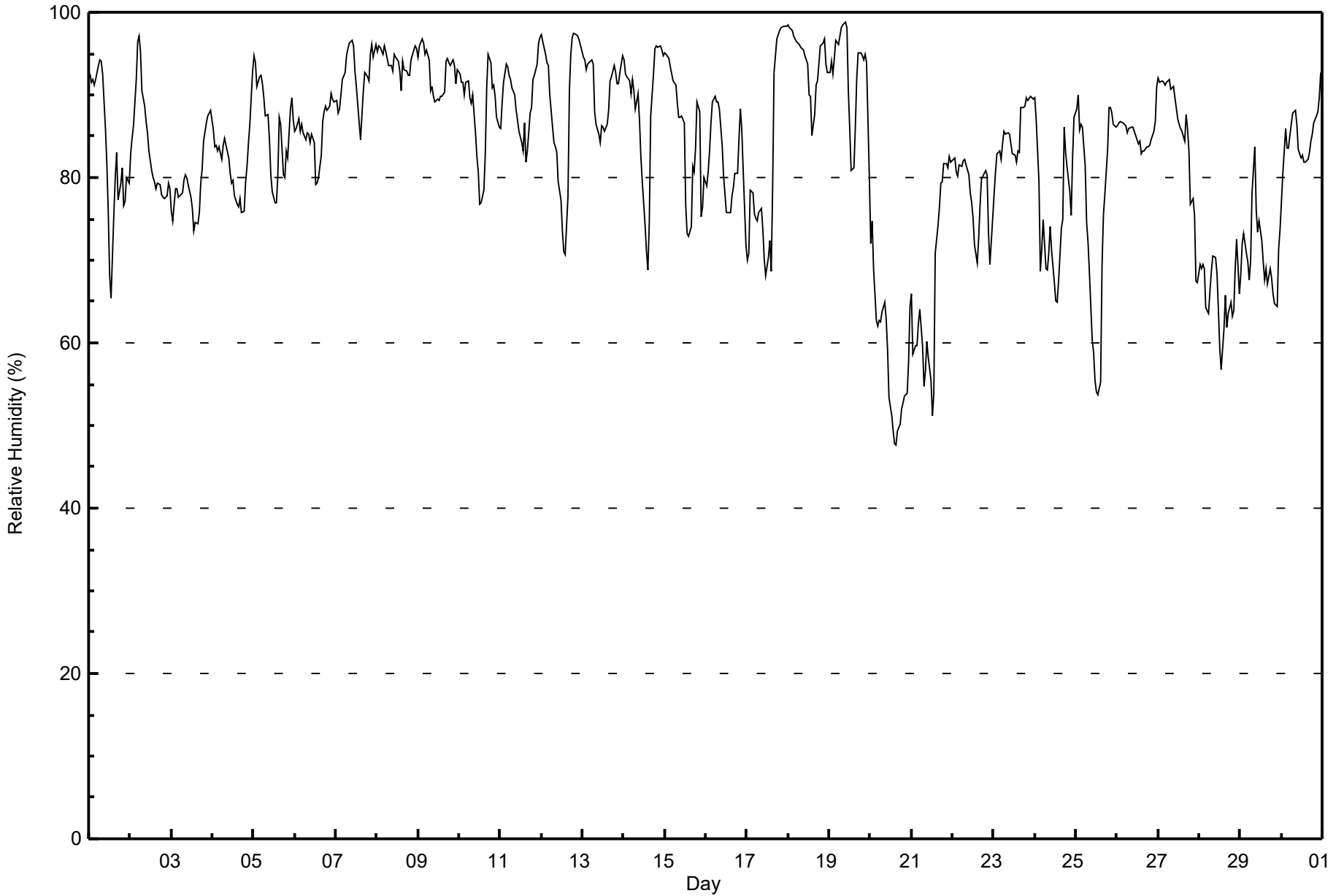
**Relative Humidity (RH) - %  
Lower Camp - November 2023**

Maximum Value: 98.8 % on Nov 19 10:00      Maximum Daily Average: 94.2 % on Nov 8																						Hours in Service: 720 Hours of Data: 720																											
Minimum Value: 47.7 % on Nov 20 16:00      Minimum Daily Average: 58.3 % on Nov 20 Maximum Diurnal Average: 85.8 % at hour 3      Minimum Diurnal Average: 75.3 % at hour 14 Monthly Average: 83.04 %      Percentiles: P <sub>1</sub> = 52.2 P <sub>10</sub> = 68.5 Q <sub>1</sub> = 77.4 Median = 85.3 Q <sub>3</sub> = 91.5 P <sub>90</sub> = 94.9 P <sub>99</sub> = 98.2																						Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0																											
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Nov	92.6	91.6	91.8	91.1	91.9	93.6	94.2	94.2	92.5	85.9	81.7	76.0	68.1	65.4	75.6	80.0	83.1	77.2	79.4	81.2	76.5	77.1	80.0	79.4	83.3	94.2																							
2-Nov	82.9	84.8	86.3	91.8	96.4	97.1	95.3	90.5	88.6	86.7	85.5	83.1	80.8	80.0	79.5	78.6	79.4	79.1	78.0	77.6	77.5	77.8	79.3	78.6	84.0	97.1																							
3-Nov	76.0	74.8	78.6	78.7	77.7	77.8	78.1	79.6	80.4	80.1	79.2	77.6	76.2	73.5	74.5	74.4	75.8	79.4	81.0	84.3	86.6	87.5	87.8	88.1	79.5	88.1																							
4-Nov	85.8	83.8	83.8	83.2	83.8	82.3	84.0	84.8	83.9	82.4	80.6	79.3	79.6	77.7	76.8	76.5	77.5	75.7	75.9	79.5	81.4	84.1	86.5	92.8	81.7	92.8																							
5-Nov	94.8	93.8	91.0	92.2	92.4	91.3	89.7	87.5	87.7	84.6	80.4	78.3	77.0	76.9	80.4	87.3	86.5	80.4	80.0	83.3	82.3	88.4	89.7	87.0	85.9	94.8																							
6-Nov	85.7	85.9	87.1	85.6	86.5	85.4	84.5	85.4	85.3	84.2	85.2	84.3	79.2	79.3	80.1	82.7	86.9	88.0	88.7	88.1	88.7	90.2	89.5	89.2	85.6	90.2																							
7-Nov	89.3	87.7	88.3	90.1	91.9	92.7	94.7	95.6	96.3	96.6	95.9	92.9	91.0	88.9	84.5	87.7	90.6	92.7	92.2	91.7	95.0	96.1	94.6	96.1	92.2	96.6																							
8-Nov	95.2	95.9	95.8	94.9	96.0	95.3	94.5	93.5	93.5	92.9	94.9	94.5	94.0	92.9	90.6	94.1	93.1	92.9	92.4	92.4	94.2	95.5	95.9	95.6	94.2	96.0																							
9-Nov	94.6	95.9	96.9	96.4	94.9	95.4	94.2	90.5	91.1	89.9	89.1	89.5	89.4	89.9	89.9	90.3	94.1	94.4	93.9	93.6	94.3	93.5	91.3	93.0	92.7	96.9																							
10-Nov	92.5	91.6	91.6	90.1	91.6	91.7	89.7	89.0	90.0	85.4	82.6	80.7	76.8	77.0	78.5	82.9	90.8	94.9	93.9	90.8	91.2	89.9	87.3	86.1	87.8	94.9																							
11-Nov	85.9	89.0	91.5	93.7	93.3	92.4	91.8	90.9	90.1	88.1	87.0	85.6	84.3	83.1	86.7	81.9	83.3	87.8	88.6	91.8	92.3	93.7	96.2	96.9	89.4	96.9																							
12-Nov	97.3	96.5	95.0	93.9	93.5	90.0	86.1	84.2	83.7	83.1	79.5	77.4	73.5	71.0	70.7	77.8	90.6	94.8	96.9	97.4	97.3	97.1	96.6	95.9	88.3	97.4																							
13-Nov	94.6	94.2	93.0	93.8	93.9	94.3	93.8	87.9	86.4	85.2	84.2	86.2	86.2	85.6	86.4	88.2	91.6	92.2	93.6	92.8	91.4	91.4	92.7	94.7	90.6	94.7																							
14-Nov	94.2	92.5	92.3	91.8	90.2	91.9	90.4	88.4	90.2	87.0	82.6	79.4	74.2	71.0	68.9	74.7	87.5	92.5	95.7	95.9	95.8	96.0	95.4	94.7	88.0	96.0																							
15-Nov	95.0	94.9	94.4	93.4	92.5	91.7	91.2	89.0	87.4	87.2	87.5	86.7	76.6	73.2	72.9	74.1	81.4	80.6	83.5	89.1	88.0	75.3	76.4	80.0	85.1	95.0																							
16-Nov	78.9	80.8	83.2	86.6	89.2	89.8	89.2	89.1	88.3	84.0	80.1	78.0	75.7	75.7	75.7	77.8	78.8	80.5	80.5	84.7	88.3	85.8	80.9	71.7	82.2	89.8																							
17-Nov	70.0	70.8	78.5	78.2	75.6	75.0	74.7	75.7	76.3	73.7	70.2	68.1	70.3	72.3	68.6	78.8	92.8	96.8	97.3	97.7	98.2	98.3	98.3	98.2	81.4	98.3																							
18-Nov	98.4	98.2	97.8	97.2	96.8	96.4	96.0	95.8	95.6	95.4	94.8	93.8	89.9	89.9	85.0	87.7	91.2	91.7	93.7	95.9	96.3	96.7	93.7	92.6	94.2	98.4																							
19-Nov	92.7	94.0	92.5	94.5	96.6	96.0	97.1	98.1	98.5	98.8	98.2	90.6	85.9	80.9	81.1	86.1	92.0	95.0	95.1	94.8	94.2	94.9	93.9	80.1	92.6	98.8																							
20-Nov	72.1	74.8	69.0	62.7	62.0	62.7	62.5	63.7	65.0	62.8	59.1	53.3	51.3	49.4	47.8	47.7	49.4	50.2	52.0	52.7	53.5	53.9	57.8	64.4	58.3	74.8																							
21-Nov	65.9	58.6	59.7	59.6	62.3	64.1	59.4	54.7	56.6	60.1	58.3	55.5	51.1	53.9	70.9	74.3	76.4	79.3	79.5	81.7	81.6	81.2	82.5	81.8	67.0	82.5																							
22-Nov	82.3	82.3	80.7	80.2	81.6	81.4	82.0	82.2	81.5	80.4	78.1	77.0	75.1	71.9	69.6	72.7	76.7	79.8	80.5	80.9	80.4	73.5	69.5	75.1	78.1	82.3																							
23-Nov	77.9	80.7	82.8	83.2	82.1	84.1	85.6	85.3	85.5	85.3	84.0	82.8	82.7	81.8	83.2	83.1	88.4	88.4	88.6	89.6	89.4	89.9	89.7	89.5	85.1	89.9																							
24-Nov	89.7	87.1	79.5	68.7	71.4	74.9	69.0	68.8	70.8	74.0	71.2	67.3	65.1	64.9	67.4	73.9	74.9	86.2	83.0	81.3	78.3	75.5	82.5	87.3	75.5	89.7																							
25-Nov	88.4	90.0	85.8	86.4	86.2	81.3	74.5	72.3	68.5	60.4	58.9	55.4	54.2	53.7	55.2	69.4	75.4	77.9	83.5	88.6	88.5	87.7	86.4	86.1	75.6	90.0																							
26-Nov	86.3	86.6	86.7	86.6	86.5	86.2	85.5	85.9	86.0	86.0	85.5	85.1	84.1	84.5	82.8	83.3	83.3	83.7	83.7	83.9	84.5	85.6	86.8	91.0	85.4	91.0																							
27-Nov	92.0	91.5	91.7	91.5	91.2	91.5	91.9	90.7	90.9	90.9	89.7	87.2	86.5	86.0	85.6	84.5	87.6	85.9	83.3	76.7	77.4	75.4	67.5	67.2	85.6	92.0																							
28-Nov	69.4	69.0	69.4	69.0	64.2	63.6	66.2	68.6	70.5	70.3	68.5	64.1	59.3	56.8	61.6	65.8	61.9	63.6	64.8	63.3	63.9	69.0	72.5	66.0	65.9	72.5																							
29-Nov	68.3	72.0	73.1	70.8	69.8	67.6	69.8	78.1	83.6	76.2	73.3	74.8	72.4	69.9	67.6	69.0	67.0	69.1	67.8	65.9	64.8	64.5	71.4	73.8	70.8	83.6																							
30-Nov	77.2	80.5	86.0	83.5	83.6	85.1	87.7	88.0	88.1	86.4	83.4	82.3	82.7	81.8	81.9	82.2	83.0	84.4	85.3	86.5	87.5	87.9	89.6	92.8	84.9	92.8																							
																								85.5	85.7	85.8	85.3	85.5	85.4	84.8	84.3	84.4	82.8	81.0	78.9	76.4	75.3	76.0	78.9	82.4	83.8	84.4	85.1	85.3	85.1	85.4	85.5	Diurnal Average	
																								98.4	98.2	97.8	97.2	96.8	97.1	97.1	98.1	98.5	98.8	98.2	94.5	94.0	92.9	90.6	94.1	94.1	96.8	97.3	97.7	98.2	98.3	98.3	98.2	98.2	Diurnal Maximum



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

**Relative Humidity (RH) - %**  
**Lower Camp - November 2023**





**Wood Buffalo Environmental Association**

**Summary of Hour Averages**

**Barometric Pressure (BP) - inHg**

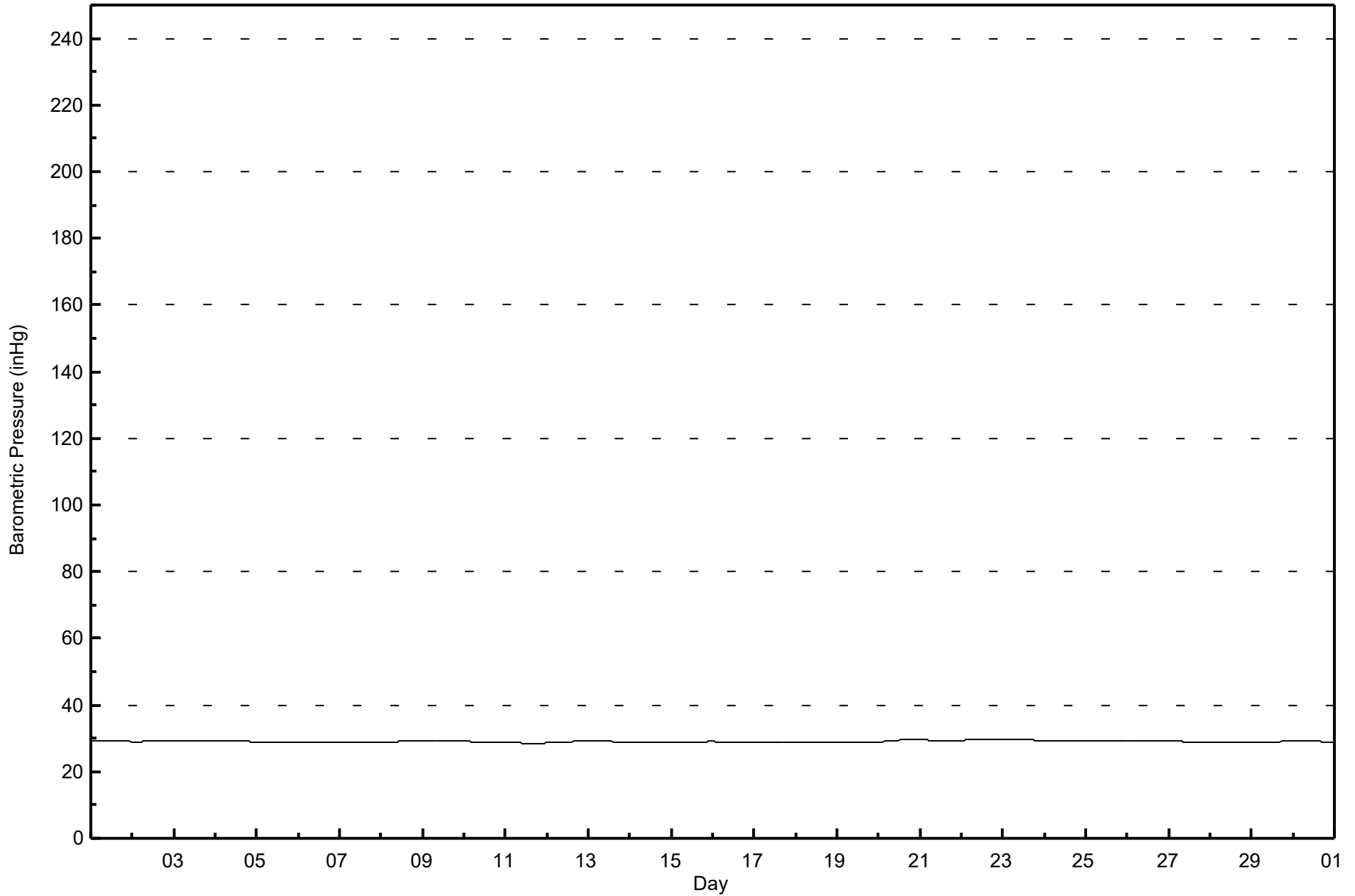
**Lower Camp - November 2023**

<b>Maximum Value: 29.6 inHg on Nov 22 18:00</b> <b>Maximum Daily Average: 29.6 inHg on Nov 22</b>																						Hours in Service: 720 Hours of Data: 720					
<b>Minimum Value: 28.5 inHg on Nov 11 15:00</b> <b>Minimum Daily Average: 28.6 inHg on Nov 11</b> <b>Maximum Diurnal Average: 29.1 inHg at hour 11</b> <b>Minimum Diurnal Average: 29.0 inHg at hour 24</b> <b>Monthly Average: 29.04 inHg</b> <b>Percentiles: P<sub>1</sub> = 28.5 P<sub>10</sub> = 28.7 Q<sub>1</sub> = 28.8 Median = 29.0 Q<sub>3</sub> = 29.2 P<sub>90</sub> = 29.4 P<sub>99</sub> = 29.6</b>																						Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0					
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Nov	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	29.1	29.1	29.1	29.1	29.1	29.1	29.0	29.0	29.0	29.2	29.3	
2-Nov	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.1	29.1	29.1	29.1	29.1	29.2	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
3-Nov	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	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
4-Nov	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.1	29.1	29.1	29.1	29.1	29.0	29.0	29.0	29.0	29.0	29.0	29.1	29.2
5-Nov	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	28.9	28.9	28.9	28.9	28.9	28.9	28.9	29.0
6-Nov	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.9
7-Nov	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8
8-Nov	28.8	28.8	28.8	28.9	28.9	28.9	28.9	29.0	29.0	29.0	29.0	29.1	29.1	29.1	29.1	29.2	29.2	29.2	29.2	29.3	29.3	29.3	29.3	29.3	29.3	29.1	29.3
9-Nov	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.4	29.3	29.3	29.3	29.3	29.3	29.3	29.2	29.2	29.2	29.2	29.2	29.2	29.1	29.1	29.1	29.3	29.4	
10-Nov	29.1	29.1	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	28.8	28.9	28.9	28.9	28.8	28.8	28.8	28.8	28.8	28.9	29.1	29.1
11-Nov	28.8	28.8	28.8	28.7	28.7	28.7	28.6	28.6	28.6	28.6	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.6	28.6	28.6	28.6	28.6	28.6	28.8
12-Nov	28.6	28.7	28.7	28.7	28.8	28.8	28.8	28.9	28.9	28.9	28.9	29.0	29.0	29.0	29.0	29.0	29.1	29.1	29.1	29.1	29.1	29.2	29.2	29.2	29.2	29.0	29.2
13-Nov	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.1	29.1	29.1	29.0	29.0	28.9	28.9	28.9	28.9	28.9	28.8	28.8	28.8	28.8	28.8	29.1	29.2
14-Nov	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.8
15-Nov	28.7	28.7	28.7	28.8	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	29.0	29.0	28.9	29.0
16-Nov	29.0	29.0	29.0	29.0	29.0	29.0	28.9	28.9	28.9	28.8	28.8	28.8	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.6	28.6	28.8	29.0	
17-Nov	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	28.8	28.9	28.9	28.9	28.9	28.9	28.9	28.8	28.9	
18-Nov	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	28.7	28.7	28.7	28.7	28.7	28.7	28.8	28.9	
19-Nov	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	28.8	28.8	28.7	28.8	
20-Nov	28.8	28.9	29.0	29.1	29.1	29.2	29.3	29.3	29.3	29.4	29.4	29.4	29.5	29.5	29.5	29.5	29.5	29.6	29.6	29.6	29.6	29.5	29.6	29.5	29.4	29.6	
21-Nov	29.5	29.5	29.5	29.5	29.5	29.4	29.4	29.4	29.3	29.3	29.3	29.3	29.3	29.2	29.2	29.2	29.3	29.3	29.3	29.3	29.3	29.3	29.4	29.4	29.4	29.5	
22-Nov	29.4	29.4	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.6	29.6	29.6	29.6	29.6	29.6	29.6	29.6	29.6	29.6	29.6	29.6	29.6	29.6	29.6	29.6	29.6	
23-Nov	29.6	29.6	29.6	29.6	29.6	29.6	29.6	29.6	29.6	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.4	29.4	29.4	29.4	29.3	29.3	29.5	29.6	
24-Nov	29.3	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.1	29.1	29.1	29.1	29.2	29.3	
25-Nov	29.1	29.1	29.1	29.1	29.1	29.2	29.2	29.2	29.2	29.3	29.3	29.3	29.4	29.4	29.4	29.4	29.4	29.4	29.4	29.4	29.4	29.4	29.4	29.4	29.3	29.4	
26-Nov	29.4	29.4	29.4	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.2	29.2	29.2	29.2	29.2	29.2	29.3	29.4	
27-Nov	29.2	29.2	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	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.9	29.2	
28-Nov	28.8	28.8	28.8	28.8	28.8	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9
29-Nov	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.1	29.1	29.1	29.0	29.1	
30-Nov	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	28.9	29.0	29.1	
29.0																								Diurnal Average			
29.6																								Diurnal Maximum			



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

**Barometric Pressure (BP) - inHg**  
**Lower Camp - November 2023**





Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed (WS) - km/h

Lower Camp - November 2023

Maximum Speed: 36 km/h on Nov 20 04:00	Maximum Daily Speed Average: 21.5 km/h on Nov 20	Hours in Service: 720
Minimum Speed Value: 0 km/h on Nov 11 23:00	Minimum Daily Speed Average: 0.4 km/h on Nov 3	Hours of Data: 720
Maximum Diurnal Speed Average: 3.0 km/h at hour 7	Minimum Diurnal Speed Average: 0.2 km/h at hour 15	Hours of Missing Data: 0
Monthly Average Velocity: 0.8 km/h 211.9 deg	Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 2 Q <sub>1</sub> = 4 Median = 8 Q <sub>3</sub> = 13 P <sub>90</sub> = 16 P <sub>99</sub> = 28	Percent Operational Time: 100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Nov	SE3	SE7	ESE8	ESE7	SE8	ESE8	ESE9	ESE11	ESE11	ESE12	ESE14	ESE12	ESE11	ESE10	ESE7	WSW1	NNW1	ESE2	ESE4	ESE4	SE7	ESE6	ESE9	ESE3	ESE7.2	ESE14	
2-Nov	SSE2	ESE4	ESE1	WNW2	W4	W6	NW8	NNW14	NNW15	NNW16	N15	N16	N13	N13	N13	N9	NNE8	NE4	ESE2	NE7	E2	E1	E9	E8	N5.8	N16	
3-Nov	SSE6	SE7	ESE9	E6	SSE5	SE4	SE5	ESE5	ENE5	N4	N4	NNW5	NNW4	NW2	NW6	WNW5	NNW6	W5	WNW4	W5	W4	W4	W5	W5	NW0.4	ESE9	
4-Nov	NNE2	N4	WNW1	N4	ESE4	SE4	NNE3	NNE4	ENE10	ENE12	E13	E16	E14	E15	E15	E13	E14	E16	ENE11	NE7	NE7	NNE6		ENE8.2	E16		
5-Nov	N6	NNE6	N8	NNE8	NNE8	NNE8	NE7	NNW2	NE8	NE8	ENE6	ENE3	ENE6	ENE4	WNW3	WNW6	NW2	E8	E12	E8	ESE5	ESE8	E8	ESE12	ENE4.6	E12	
6-Nov	E9	ESE12	ESE16	ESE11	ESE11	SE12	SE12	ESE15	ESE16	SE11	ESE13	ESE14	ESE14	ESE11	ESE11	ESE13	ESE12	ESE11	SE10	SSE11	SE8	SE8	SE8	SE7	ESE11.2	ESE16	
7-Nov	SE6	SSE5	SSW6	SW4	SW5	WSW2	SSW1	WNW2	W3	WNW2	WNW4	WNW4	W4	WSW2	SSW5	W2	W3	WNW3	S4	S4	SSE4	SSW4	SW12	S4	SW2.8	SW12	
8-Nov	SW15	WSW15	W20	WNW21	WNW19	WNW15	W14	W16	W17	W15	W12	W14	WNW15	WNW13	W16	WNW13	WNW14	W14	W12	WNW13	WNW10	WNW7	W6	W6	W13.5	WNW21	
9-Nov	NW5	W2	WSW2	SSW2	S2	ESE2	S4	SSE4	SSW4	SE8	SSE10	SE13	SE11	ESE14	SSE8	SE10	ESE16	SE8	SE8	ESE14	ESE10	ESE11	ESE12	ESE13	SE6.9	ESE16	
10-Nov	ESE9	E4	ESE8	SSW2	SE2	E7	NNE4	SW1	N1	ESE4	ESE7	ESE10	ESE10	ESE11	ESE13	ESE13	ESE13	ESE13	ESE12	ESE9	ESE12	ESE10	ESE12	SE12	ESE7.9	ESE13	
11-Nov	SE11	SE8	ESE10	ESE10	ESE10	ESE15	ESE5	E10	ESE21	ESE23	ESE27	ESE25	ESE20	SE11	ESE18	SE11	SE11	SE10	SE5	SE8	SE11	ESE6	WSW0	SE1	ESE11.7	ESE27	
12-Nov	SE6	ESE7	SE8	SE9	SE9	WSW10	WSW17	WSW15	WSW15	WSW16	WSW17	WSW15	W16	W15	W10	WSW3	SSW2	W0	NNW1	NW3	WNW2	WNW2	W3	W4	WSW5.8	WSW17	
13-Nov	W4	W3	WNW3	W3	W3	W3	N2	NE8	NE9	NE9	N6	N9	N8	N9	NNW14	NNW8	WNW7	W5	WNW5	WNW6	NW9	NW7	WNW8	WNW8	NNW4.8	NNW14	
14-Nov	WNW9	WNW8	WNW6	W5	NW3	ENE2	SW6	S2	SE5	SE5	ESE10	ESE13	ESE9	SSW5	SW4	SW3	WSW2	E0	ESE3	ESE4	ESE4	ESE5	WNW2	W3	S1.5	ESE13	
15-Nov	WNW3	WNW3	W4	WNW7	WNW9	WNW9	NNW1	NNW1	NNW9	NNW9	NNW9	NNW9	NNW9	NNW9	NNW9	NNW5	SW5	S5	W8	WNW5	W4	WNW4	WNW14	WNW4	SSW7	WNW6.2	WNW14
16-Nov	SSW10	SW13	SSW5	SSE4	ESE6	ESE7	E10	ESE9	ESE15	ESE12	SE13	ESE12	ESE12	ESE11	ESE11	SE11	ESE11	ESE5	ENE2	W3	ESE5	ESE6	SSW6	WSW19	SE6.4	WSW19	
17-Nov	SW18	SW9	S2	SW11	WSW15	WSW21	WSW25	WSW23	WSW21	WSW17	WSW11	WSW7	WSW4	SW3	SW7	W2	NW2	W2	W3	W1	WNW0	ESE3	NW1	E3	WSW8.1	WSW25	
18-Nov	E4	ESE5	ESE9	ESE8	ESE7	ESE8	ESE8	ESE9	ESE11	ESE11	ESE12	ESE8	SE8	ESE6	SE9	SE9	ESE9	SE6	W2	W1	NW1	ESE3	SE3	SE5	ESE6.4	ESE12	
19-Nov	W2	SE5	SE6	SE1	ESE4	SSW1	SW2	ESE4	WNW2	SE6	SSE3	W3	ESE6	ESE8	SE4	ESE8	ESE5	ESE4	ESE5	ESE7	ESE11	ESE13	SE6	WSW11	SE3.7	ESE13	
20-Nov	WSW11	WNW29	W30	WNW36	WNW35	W32	W30	W26	W20	W20	W19	W20	WNW29	WNW30	WNW26	WNW25	WNW23	WNW19	WNW16	W14	W13	WNW12	W4	NW2	W21.5	WNW36	
21-Nov	NW3	WNW5	ENE3	ENE5	WNW2	NNW1	ENE7	E5	N4	ENE10	ENE9	ENE11	ENE9	NNE9	N14	NNW14	NNW14	NNW16	NNW12	NNW11	NNW11	NNW13	NNW10	NNW10	N6.4	NNW16	
22-Nov	NNW8	NNW10	NNW12	NNW9	NNW12	N10	NNW6	NW5	NNW7	N6	NNW7	NW7	NNW6	NNW4	WSW3	SW5	WSW3	ENE3	WNW1	WNW3	WNW3	SSE4	SE9	ESE12	NNW3.7	ESE12	
23-Nov	ESE15	ESE13	ESE14	ESE16	ESE14	ESE12	ESE5	SE5	SE4	SE6	SE9	ESE9	ESE9	ESE10	ESE10	SE10	ESE9	ESE10	ESE11	ESE13	ESE15	ESE19	ESE18	ESE17	ESE11.3	ESE19	
24-Nov	ESE14	ESE15	SE9	S8	SE7	S5	SW10	WSW8	W9	SSW3	SW10	SW7	WSW5	WSW5	SW5	W4	WSW4	SE4	ESE4	ESE3	SW8	S5	SE5	SE8	S4.1	ESE15	
25-Nov	SE8	SE3	W6	WNW5	NW13	NNW19	NNW27	NNW13	NW18	NW25	NW21	NW20	NW17	NW20	NW18	NNW11	NNW7	NW6	WNW2	NW2	WNW1	NW2	N1	N2	NW9.9	NNW27	
26-Nov	NNW1	NNW1	NW1	N1	WNW2	WNW3	WNW2	NW3	SE0	ESE4	ESE9	ESE12	ESE13	ESE12	ESE10	ESE10	ESE8	ESE8	ESE8	ESE9	ESE11	ESE11	SE2	W2	ESE4.7	ESE13	
27-Nov	W1	SE2	WNW3	W3	NW1	NNE1	ESE8	ESE14	ESE13	ESE15	ESE12	ESE15	ESE14	ESE13	ESE14	ESE13	ESE10	ESE8	S3	SW11	SW8	WSW14	WSW22	WSW21	SSE4.8	WSW22	
28-Nov	W17	WSW17	WSW19	W14	WSW20	WSW17	WSW19	W17	W13	W13	WSW16	WSW14	SW13	WSW5	S3	W3	WSW12	WSW11	WSW18	WSW15	WSW18	W16	WSW12	W14	WSW13.7	WSW20	
29-Nov	WSW14	WSW15	WSW10	WSW10	WSW12	WSW14	WSW14	WSW15	SW17	WSW13	W15	WSW13	W14	W20	W22	WNW19	W16	WNW16	WNW16	WNW12	W17	WNW14	WNW15	W14	W14.3	W22	
30-Nov	WNW9	WNW5	WNW3	NW5	WNW5	NW2	W3	W2	N1	E3	ENE3	ENE4	NE6	NNE6	NE7	NE3	NW1	NNW1	NW3	W2	WNW4	W5	W4	W3	NW1.9	WNW9	

SSW2.2	SW1.9	SW1.9	WSW1.9	WSW2.0	W2.1	W3.0	W2.0	WSW0.9	SE0.5	SE1.2	ESE1.4	ESE1.1	ENE0.2	WNW0.2	SE0.3	SE0.6	SE0.6	S0.7	SSE1.0	S1.2	SSE1.1	S1.6	SSW1.8	Diurnal Average
SW18	WNW29	W30	WNW36	WNW35	W32	W30	W26	WSW21	NW25	ESE27	ESE25	WNW29	WNW30	WNW26	WNW25	WNW23	WNW19	WSW18	E16	WSW18	ESE19	WSW22	WSW21	Diurnal Maximum

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



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

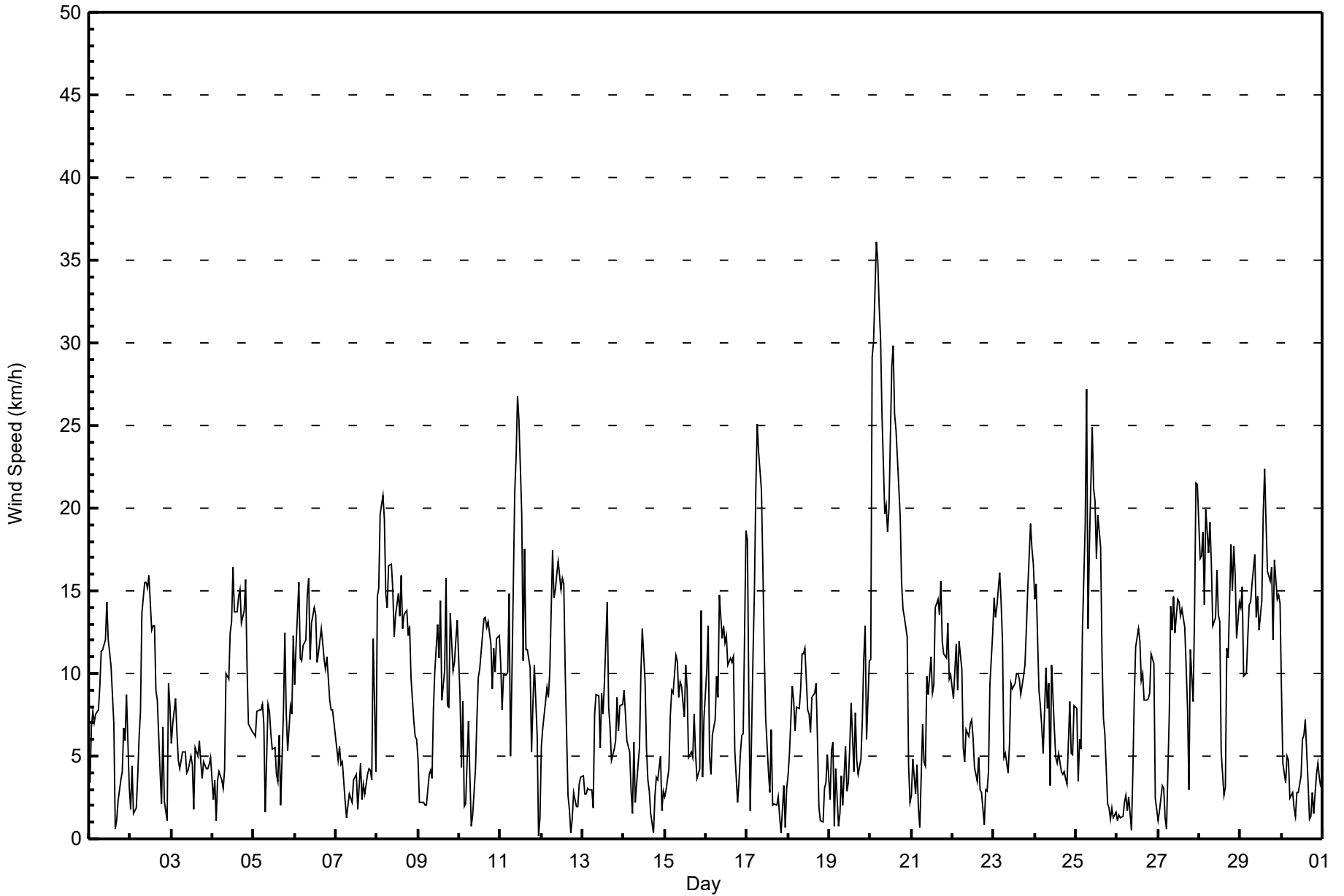
**Wind Speed (WS) - km/h**  
**Lower Camp - November 2023**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 8 km/h on Nov 20 02:00 Minimum Value: 1 km/h on Nov 30 23:00 Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 1 Q <sub>1</sub> = 2 Median = 2 Q <sub>3</sub> = 3 P <sub>90</sub> = 4 P <sub>99</sub> = 7																		Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0							
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Nov	1	2	2	1	1	2	2	2	2	3	2	1	2	2	2	1	1	2	1	2	1	2	1	2	3
2-Nov	1	1	1	1	1	1	3	4	4	4	4	4	3	3	4	3	3	3	3	1	2	2	4	2	4
3-Nov	3	2	3	4	2	2	2	2	1	1	1	1	1	1	2	2	2	2	1	1	1	1	1	1	4
4-Nov	2	1	1	1	3	2	2	2	3	2	2	3	3	2	2	2	3	2	3	3	2	1	1	1	3
5-Nov	1	2	2	1	1	1	2	2	1	1	2	2	1	1	2	1	1	3	3	2	2	3	2	3	3
6-Nov	3	4	5	3	3	4	4	3	4	4	3	3	2	4	3	3	2	2	3	3	2	2	2	2	5
7-Nov	2	2	2	1	1	1	1	1	1	2	2	2	1	1	2	1	1	2	2	1	2	3	2	2	3
8-Nov	4	3	5	7	5	4	3	4	3	3	2	3	3	2	3	3	2	2	2	2	2	1	1	1	7
9-Nov	1	1	1	1	1	2	2	1	1	3	3	4	4	5	3	4	3	3	2	4	3	4	3	3	5
10-Nov	3	2	4	1	1	3	2	2	2	3	2	3	2	2	2	3	3	2	4	3	3	3	3	4	4
11-Nov	3	3	4	4	4	5	5	6	4	3	5	6	7	4	3	4	3	3	3	2	3	3	2	1	7
12-Nov	2	1	2	2	3	4	4	3	3	3	4	3	3	3	3	1	1	1	1	1	1	1	2	2	4
13-Nov	2	1	1	1	1	1	1	2	1	2	2	2	2	3	3	3	2	1	1	2	2	2	1	2	3
14-Nov	2	1	1	1	2	1	2	1	2	2	2	2	3	2	1	2	1	1	1	2	1	2	1	2	3
15-Nov	2	1	1	1	2	2	2	2	2	2	2	2	4	3	2	2	2	3	2	1	2	3	2	2	4
16-Nov	2	3	3	2	2	3	3	3	4	3	3	2	2	2	2	2	2	3	3	1	2	2	4	4	4
17-Nov	4	6	2	4	3	5	4	5	4	3	3	3	2	2	2	1	1	1	2	1	1	1	1	2	6
18-Nov	2	2	2	2	2	2	1	2	2	2	2	3	2	1	2	2	2	2	1	1	1	2	2	3	3
19-Nov	1	3	2	2	1	2	1	1	2	3	2	1	4	2	2	2	1	2	1	2	2	3	3	6	6
20-Nov	4	8	8	8	7	7	6	6	6	5	6	5	6	5	5	5	4	5	4	3	3	4	3	2	8
21-Nov	1	2	2	1	1	1	3	2	2	2	2	3	2	2	2	3	3	4	3	2	3	3	2	2	4
22-Nov	2	3	3	2	3	3	1	1	2	2	1	2	2	2	3	1	2	1	1	1	2	2	3	3	3
23-Nov	3	4	3	3	4	4	2	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	3	4
24-Nov	2	3	3	4	2	2	3	4	3	3	3	3	2	2	2	1	3	1	2	1	3	3	2	2	4
25-Nov	2	2	2	2	5	6	6	5	8	6	5	6	4	4	4	3	2	2	2	1	1	1	1	1	8
26-Nov	1	1	1	1	1	1	1	2	2	3	2	2	2	3	2	2	2	3	2	2	2	3	2	2	3
27-Nov	1	1	1	1	1	1	4	2	2	2	2	2	2	2	2	2	1	2	2	4	4	6	5	5	6
28-Nov	5	4	4	3	5	4	4	4	3	3	3	3	3	2	2	3	2	4	5	4	3	4	3	3	5
29-Nov	2	4	3	3	2	3	3	3	3	3	3	3	5	4	5	4	3	3	5	2	3	3	3	3	5
30-Nov	3	1	2	1	1	1	1	1	1	1	1	1	2	2	2	2	1	2	1	1	1	1	1	1	3
Diurnal Maximum																									



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

**Wind Speed (WS) - km/h**  
**Lower Camp - November 2023**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h  
Lower Camp - November 2023**

<b>Wind Speed Ranges (km/h)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	259	35.97	35.97
6 - 11	247	34.31	70.28
12 - 19	178	24.72	95.00
20 - 28	28	3.89	98.89
29 - 38	8	1.11	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720





**Wood Buffalo Environmental Association  
Frequency Distribution**

**Wind Speed (WS) - km/h  
Lower Camp - November 2023**

<b>Wind Speed Ranges (km/h)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 5	11	5	2	11	7	31	21	9	12	11	10	14	46	40	19	10	259
6 - 11	9	8	10	11	9	80	42	4	1	4	10	9	7	14	14	15	247
12 - 19	6	0	0	1	10	61	4	0	0	0	5	32	24	18	5	12	178
20 - 28	0	0	0	0	0	5	0	0	0	0	0	7	6	5	4	1	28
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	3	5	0	0	8
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	26	13	12	23	26	177	67	13	13	15	25	62	86	82	42	38	720

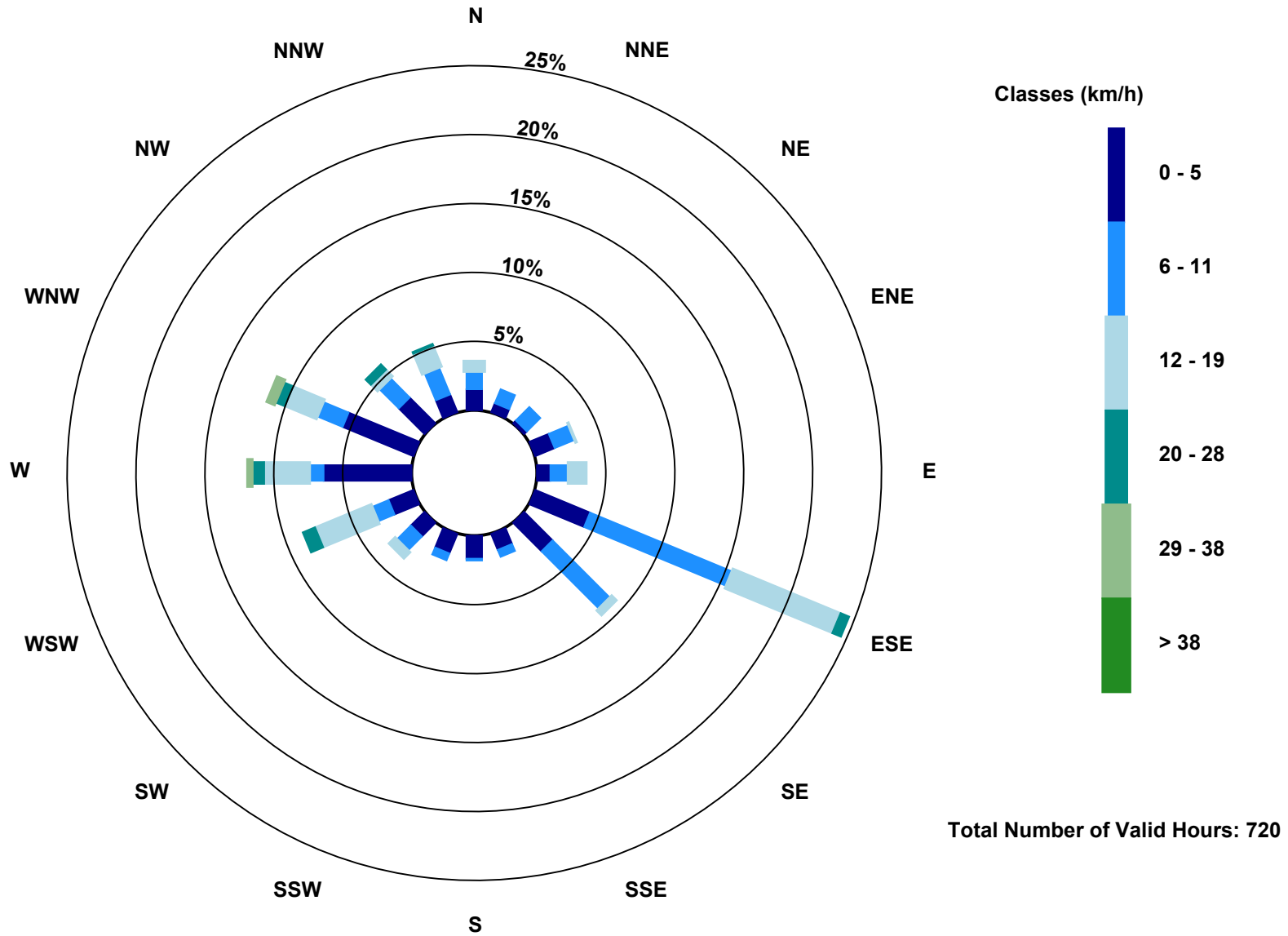
Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 2023

Wind Speed (WS) - km/h  
Lower Camp





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

**Wind Direction (WD) - deg**  
**Lower Camp - November 2023**

Direction of Maximum Speed: 284 deg on Nov 20 04:00 Direction of Maximum Daily Speed Average: 279.0 deg on Nov 20	Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0
Direction of Minimum Speed: 240 deg on Nov 11 23:00 Direction of Minimum Daily Speed Average: 0.4 deg on Nov 3	Percent Operational Time: 100.0
Monthly Average Direction: 211.9 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-Nov	126	125	115	119	125	123	120	119	115	114	115	118	114	115	106	256	327	102	110	117	125	122	116	109	117.1
2-Nov	149	109	119	293	278	281	318	334	347	346	356	350	353	358	355	10	20	54	107	39	95	101	90	86	1.8
3-Nov	153	143	114	90	167	142	146	104	71	355	6	335	341	310	321	299	335	277	283	266	277	269	270	278	306.5
4-Nov	19	7	297	11	104	135	27	26	73	75	78	90	100	86	85	83	86	87	87	76	49	47	16	77.0	
5-Nov	7	19	3	17	15	21	36	328	41	56	66	65	63	77	288	291	318	90	99	101	111	104	99	114	57.5
6-Nov	97	113	114	118	113	124	125	119	119	130	116	115	116	118	122	123	120	121	138	147	138	135	133	135	121.9
7-Nov	145	159	203	231	214	241	205	283	260	294	287	284	272	249	199	273	274	288	190	178	162	198	228	188	221.2
8-Nov	234	246	275	288	282	282	278	277	278	275	278	281	282	292	278	291	282	280	280	285	288	287	276	280	278.0
9-Nov	305	281	254	204	169	102	179	158	200	143	150	145	139	123	152	132	113	124	136	113	118	114	119	111	132.2
10-Nov	109	83	113	202	132	86	33	224	355	110	111	116	115	120	121	123	120	121	121	106	106	103	120	127	114.1
11-Nov	133	136	121	111	110	105	107	101	106	104	109	109	113	125	111	135	135	130	146	125	124	120	240	139	115.8
12-Nov	124	121	127	126	126	242	253	253	242	247	257	251	259	259	276	247	208	281	338	307	287	288	266	264	243.6
13-Nov	265	280	292	277	281	275	5	40	54	35	5	352	352	349	336	340	302	272	285	293	316	309	295	295	328.8
14-Nov	289	290	282	276	319	77	219	175	136	134	122	118	121	213	223	219	245	90	119	122	106	106	301	273	171.5
15-Nov	282	287	272	290	311	312	311	321	316	307	306	317	289	303	292	226	182	272	290	260	300	284	303	211	293.2
16-Nov	211	216	207	151	119	109	100	106	117	121	129	121	117	120	121	124	123	117	61	277	115	118	211	239	137.9
17-Nov	234	234	178	234	245	251	257	251	242	244	247	249	249	228	216	273	309	277	265	260	282	120	323	95	244.6
18-Nov	88	119	122	117	116	120	120	115	116	117	110	116	125	117	124	124	119	127	279	268	323	113	141	129	119.1
19-Nov	275	125	124	128	121	212	234	114	303	130	154	264	120	120	144	122	120	110	117	113	117	118	124	257	129.8
20-Nov	245	286	276	284	282	281	275	279	268	266	274	267	282	282	284	282	285	285	285	281	279	282	278	312	279.0
21-Nov	311	291	59	74	300	340	74	79	4	71	65	73	66	18	351	343	341	343	343	334	333	343	337	335	2.9
22-Nov	334	338	341	335	347	349	348	322	337	1	337	316	332	344	241	228	244	62	282	295	288	147	131	113	340.0
23-Nov	119	116	121	111	115	123	112	129	130	129	125	119	121	123	115	129	119	116	112	113	115	121	120	119	118.9
24-Nov	117	122	134	188	135	191	228	243	262	201	222	231	243	250	232	267	243	137	110	114	228	191	129	125	185.8
25-Nov	128	125	275	294	322	335	341	324	308	312	308	321	308	307	317	335	333	320	287	323	286	304	352	354	319.0
26-Nov	334	336	322	3	292	303	283	314	130	102	112	110	105	114	115	114	116	116	121	120	123	118	130	272	113.3
27-Nov	279	129	296	276	320	29	110	116	118	113	110	118	121	118	117	120	117	119	186	230	230	251	244	252	149.7
28-Nov	259	255	257	263	250	247	248	260	260	262	247	242	236	238	181	270	247	254	247	242	241	260	256	269	251.8
29-Nov	252	248	248	247	248	243	245	257	234	249	265	254	279	281	277	283	280	282	290	285	281	286	282	281	267.1
30-Nov	293	300	298	306	284	304	264	263	3	94	78	73	49	31	42	41	312	341	310	262	292	273	265	270	324.7

209.0 215.3 216.1 258.3 257.6 261.8 266.6 263.0 242.6 138.7 136.3 122.6 118.6 65.1 290.1 143.6 135.5 124.4 182.8 168.7 174.5 167.9 185.6 206.1  
 Diurnal Average

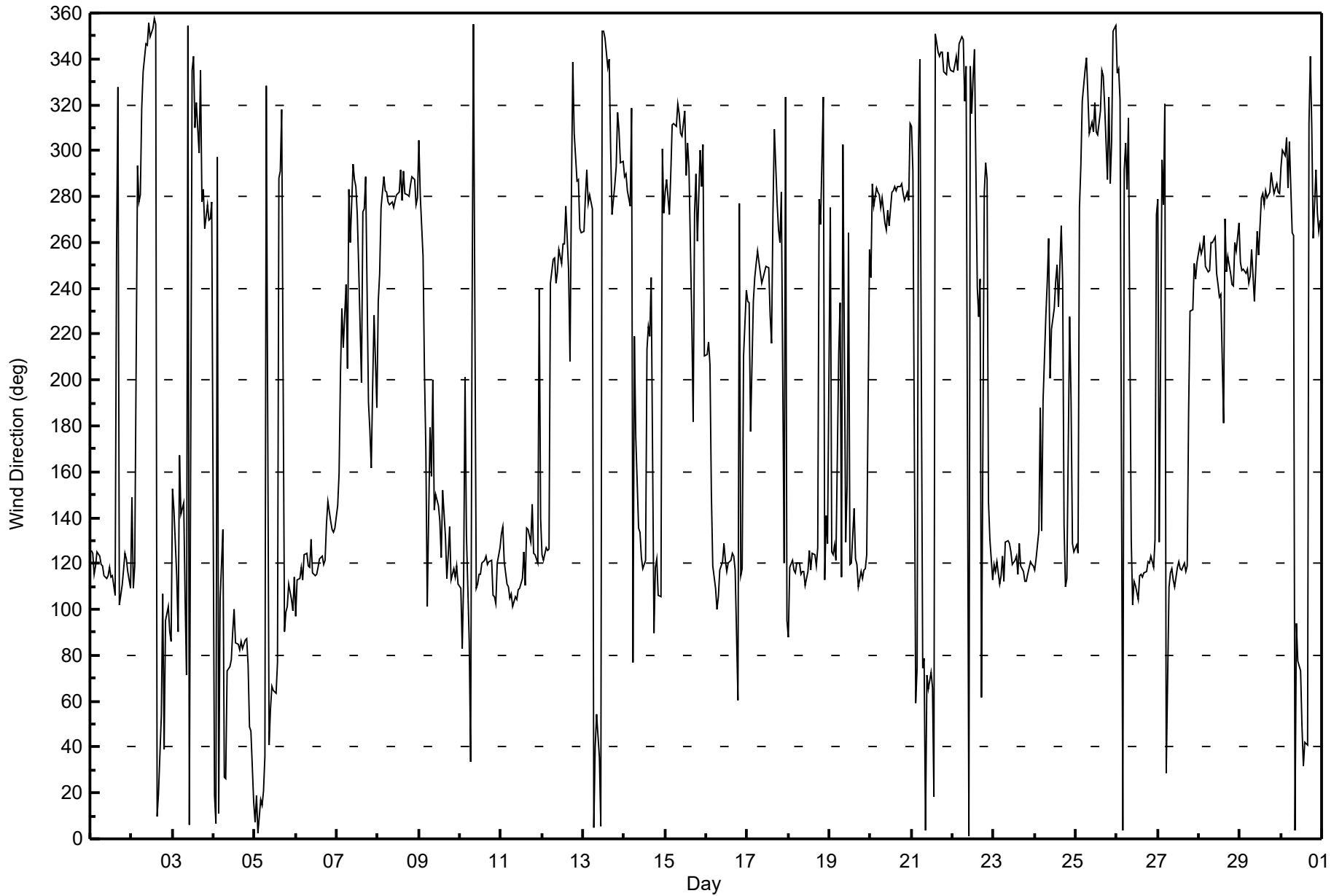
All monthly, daily, and diurnal averages have been calculated using vector methods



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

**Wind Direction (WD) - deg**  
**Lower Camp - November 2023**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 100 deg on Nov 14 18:00 Minimum Value: 5 deg on Nov 1 12:00 Percentiles: P <sub>1</sub> = 7 P <sub>10</sub> = 11 Q <sub>1</sub> = 13 Median = 19 Q <sub>3</sub> = 35 P <sub>90</sub> = 61 P <sub>99</sub> = 90																			Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0						
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Nov	40	12	11	11	11	12	13	10	13	12	8	5	9	8	16	68	75	80	41	35	10	25	6	70	80
2-Nov	75	15	73	44	19	18	17	17	16	16	16	19	21	21	19	25	22	86	90	24	68	83	31	14	90
3-Nov	39	31	26	65	42	47	30	39	21	31	28	25	25	61	21	21	18	31	25	13	19	17	18	18	65
4-Nov	74	42	66	51	72	68	74	67	18	13	13	15	12	13	11	11	14	11	12	12	16	21	14	11	74
5-Nov	11	26	21	7	12	10	55	70	10	19	20	32	26	56	34	12	67	28	14	20	40	17	22	15	70
6-Nov	17	16	17	18	16	25	21	12	13	25	11	11	10	20	17	15	13	14	27	25	26	22	19	20	27
7-Nov	22	29	31	16	18	32	46	28	16	34	23	7	15	57	27	48	16	20	38	27	36	63	14	58	63
8-Nov	18	12	14	12	14	11	11	11	11	12	11	10	10	12	10	11	10	9	11	10	10	12	10	12	18
9-Nov	13	35	25	55	45	81	32	30	30	24	25	24	26	22	31	24	13	24	20	17	28	24	22	16	81
10-Nov	25	73	43	50	79	37	63	99	97	65	27	15	12	10	10	10	10	8	19	30	13	23	15	17	99
11-Nov	22	19	15	34	28	23	91	67	8	9	9	10	22	24	8	26	22	19	60	23	14	53	83	89	91
12-Nov	27	15	13	11	19	45	13	13	11	13	13	12	11	11	12	49	58	82	70	39	55	61	44	34	82
13-Nov	43	43	35	14	26	40	75	18	15	16	25	13	20	14	16	23	22	20	21	26	23	27	11	10	75
14-Nov	12	11	15	11	37	81	22	77	28	22	13	10	18	28	21	27	48	100	57	34	28	51	73	37	100
15-Nov	57	36	35	20	21	17	16	18	18	15	14	19	18	13	31	27	29	30	33	33	46	12	60	18	60
16-Nov	15	13	47	45	24	33	20	26	13	15	14	14	15	17	12	11	10	73	84	39	47	33	60	13	84
17-Nov	14	61	88	16	14	12	10	12	11	13	13	21	31	61	16	55	54	42	53	56	82	31	50	59	88
18-Nov	47	40	11	11	16	12	12	11	10	10	9	25	27	11	10	13	8	22	57	61	79	75	50	34	79
19-Nov	40	53	16	98	26	81	61	34	70	35	62	56	38	12	41	13	34	41	23	12	9	8	55	27	98
20-Nov	18	16	14	10	12	11	12	12	15	14	16	17	12	11	12	11	11	13	13	12	12	13	29	70	70
21-Nov	51	36	67	31	45	91	29	51	52	15	21	16	24	32	14	13	14	16	16	16	19	15	18	16	91
22-Nov	19	17	18	19	16	16	24	22	22	25	20	27	32	36	61	17	26	60	63	19	16	48	26	13	63
23-Nov	13	14	13	10	19	21	46	36	49	26	12	14	12	10	10	19	10	13	8	8	7	7	7	10	49
24-Nov	8	10	35	38	17	37	21	29	28	53	14	28	31	22	25	34	53	37	70	57	47	56	28	12	70
25-Nov	17	77	31	22	24	18	16	19	14	14	14	18	15	13	19	17	17	22	73	69	66	35	61	49	77
26-Nov	58	47	51	74	50	42	63	75	92	71	15	10	9	13	12	11	15	14	12	11	10	12	81	54	92
27-Nov	86	70	17	14	46	70	57	8	8	9	9	7	9	7	7	7	6	10	67	18	23	19	13	14	86
28-Nov	17	14	12	14	14	15	14	17	14	16	13	13	13	35	58	77	13	21	14	15	14	13	14	14	77
29-Nov	13	14	19	19	11	12	13	18	10	15	13	16	15	12	12	12	11	11	12	10	10	12	11	12	19
30-Nov	19	29	24	29	33	31	32	39	72	65	53	32	19	15	21	55	53	56	33	48	22	12	16	19	72
	86	77	88	98	79	91	91	99	97	71	62	56	38	61	61	77	75	100	90	69	82	83	83	89	
Diurnal Maximum																									





## WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY  
MONITORING PROGRAM  
MONTHLY REPORT

### **AMS13 FORT MCKAY SOUTH NOVEMBER 2023**

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

December 22, 2023

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FORT McKAY SOUTH (AMS13)  
NOVEMBER 2023

MONTHLY SUMMARY

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2(ppb) Average	686	34	34	100	9.9	0	2.5	0
TRS(ppb) Average	685	35	35	100	3.5	0	1.1	0
THC(ppm) Average	626	32	94	91.39	4.8	-	2.7	-
NMHC(ppm) Average	626	32	94	91.39	0.246	-	0.077	-
CH4(ppm) Average	626	32	94	91.39	4.6	-	2.7	-
O3(ppb) Average	684	34	36	99.72	37.4	0	33.1	-
NO2(ppb) Average	686	34	34	100	26.1	0	13.2	-
NO(ppb) Average	686	34	34	100	129.7	-	55.1	-
NOX(ppb) Average	686	34	34	100	135.8	-	61.6	-
PM2.5(ug/m3) Average	718	1	2	99.86	35.8	0	14.8	0
ET(C) Average	720	0	0	100	5.1	-	1.8	-
RH(%) Average	720	0	0	100	98	-	96.3	-
WS(km/h) Average	717	0	3	99.58	21	-	11	-
WD(deg) Average	717	0	3	99.58	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FORT MCKAY SOUTH (AMS13)  
 NOVEMBER 2023

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile						
					Min	P10	Q1	Median	Q3	P90	Max
SO2(ppb) Average	686	0.67	0.9	-	0	0.1	0.2	0.4	0.7	1.4	9.9
TRS(ppb) Average	685	0.56	0.4	-	0.2	0.3	0.4	0.4	0.6	1	3.5
THC(ppm) Average	626	2.23	0.3	-	1.9	2	2.1	2.2	2.3	2.5	4.8
NMHC(ppm) Average	626	0.006	0.027	-	0	0	0	0	0	0	0.246
CH4(ppm) Average	626	2.23	0.2	-	1.9	2	2.1	2.2	2.3	2.4	4.6
O3(ppb) Average	684	14.31	10	-	1.4	2.3	4.8	13.2	22	29.5	37.4
NO2(ppb) Average	686	7.08	5.6	-	0	0.3	1.9	6.4	10.9	14.8	26.1
NO(ppb) Average	686	7.14	17.6	-	0	0	0.1	0.4	4	20.8	129.7
NOX(ppb) Average	686	14.21	19.6	-	0	0.4	2.3	8.5	16.9	33.7	135.8
PM2.5(ug/m3) Average	718	5.66	3.9	-	0.4	2.1	3.3	4.6	7	10.3	35.8
Temperature 2 m (C) Average	720	-4.62	4.7	-	-19.5	-11	-7.4	-4	-1.2	1.1	5.1
Relative Humidity (%) Average	720	84.21	10.2	-	48.2	69.2	78.8	86.4	91.8	94.9	98
Wind Speed 10 m (km/h) Average	717	6.1	4	-	0	2	3	5	8	12	21
Wind Direction 10 m (deg) Average	717	-	-	-	-	-	-	-	-	-	-



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FORT MCKAY SOUTH (AMS13)  
NOVEMBER 2023

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
THC/NMHC/CH4	17 Nov 2023 21:00	17 Nov 2023 21:00	1	Unstable Operation - excessive baseline drift
THC/NMHC/CH4	19 Nov 2023 02:00	21 Nov 2023 11:00	58	Analyzer Failure - lamp stability issue
THC/NMHC/CH4	21 Nov 2023 12:00	21 Nov 2023 14:00	3	Maintenance - replaced analyzer
PM2.5	30 Nov 2023 10:00	30 Nov 2023 10:00	1	Maintenance - firmware update
O3	07 Nov 2023 22:00	07 Nov 2023 23:00	2	Unstable Operation - inconsistent response
Wind Speed, Wind Direction	09 Nov 2023 02:00	09 Nov 2023 02:00	1	Flat line in sensor output signal
Wind Speed, Wind Direction	13 Nov 2023 03:00	13 Nov 2023 03:00	1	Flat line in sensor output signal
Wind Speed, Wind Direction	18 Nov 2023 04:00	18 Nov 2023 04:00	1	Flat line in sensor output signal



Wood Buffalo Environmental Association

Summary of Hour Averages

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

Fort McKay South - November 2023

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 9.9 ppb on Nov 16 14:00	Maximum Daily Average: 2.5 ppb on Nov 10		Hours of Data:	686
Minimum Value: 0.0 ppb on Nov 13 03:00	Minimum Daily Average: 0.0 ppb on Nov 20		Hours of Missing Data:	34
Maximum Diurnal Average: 1.1 ppb at hour 14	Minimum Diurnal Average: 0.4 ppb at hour 23		Hours of Calibration:	34
Monthly Average: 0.67 ppb	Percentiles: P <sub>1</sub> = 0.0 P <sub>10</sub> = 0.1 Q <sub>1</sub> = 0.2 Median = 0.4 Q <sub>3</sub> = 0.7 P <sub>90</sub> = 1.4 P <sub>99</sub> = 5.2		Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	Z	1.3	0.4	0.3	0.3	0.7	0.7	0.3	0.5	0.3	0.6	1.0	0.6	1.4	1.7	3.8	2.1	0.8	0.5	0.5	0.5	0.4	0.4	0.4	0.8	3.8
2-Nov	0.4	Z	0.4	0.3	0.3	0.5	0.3	0.2	0.2	0.2	0.2	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.2	0.5
3-Nov	0.7	1.7	Z	0.9	0.3	0.3	0.3	0.3	0.6	0.8	1.1	1.5	3.2	3.7	4.3	5.3	3.0	0.9	0.7	0.7	1.1	1.0	1.0	0.7	1.5	5.3
4-Nov	0.7	0.5	0.4	Z	0.5	0.6	0.6	0.5	0.5	0.6	0.4	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.5	0.7
5-Nov	0.3	0.3	0.3	0.3	Z	0.3	0.2	0.3	0.3	0.4	0.3	0.3	0.3	0.4	0.4	0.3	0.3	0.4	0.3	0.3	0.2	0.2	0.2	0.2	0.3	0.4
6-Nov	0.3	0.2	0.3	0.6	0.9	Z	0.5	0.4	0.4	0.5	C	C	C	C	0.6	0.5	0.4	0.6	0.5	0.5	0.4	0.6	1.3	1.8	0.6	1.8
7-Nov	Z	0.8	0.7	0.6	0.5	0.4	0.4	0.4	0.3	0.5	0.4	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.4	0.3	0.4	0.4	0.4	0.3	0.4	0.8
8-Nov	0.3	Z	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	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.3
9-Nov	0.2	0.2	Z	0.0	0.1	0.2	1.1	0.9	0.5	0.3	0.7	0.9	3.3	0.9	2.1	3.0	1.2	0.8	0.5	0.4	0.4	0.5	0.4	0.4	0.8	3.3
10-Nov	0.5	4.9	6.0	Z	5.2	1.0	7.2	4.4	6.7	3.1	0.9	0.9	1.0	0.9	1.4	1.8	2.2	3.7	1.7	1.9	0.8	0.4	0.3	0.2	2.5	7.2
11-Nov	0.5	0.7	0.6	2.0	Z	0.5	0.5	0.6	0.5	0.7	0.9	0.9	1.1	1.8	2.4	1.5	1.3	0.9	0.8	1.1	1.2	1.2	1.5	2.3	1.1	2.4
12-Nov	1.9	1.1	1.1	0.8	1.2	Z	0.3	0.5	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	0.4	1.9
13-Nov	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.2	0.2	0.3	0.2	0.3	0.2	0.3
14-Nov	0.3	Z	0.2	0.3	0.4	0.4	0.4	0.5	0.5	0.6	0.5	0.5	0.4	0.6	0.5	0.4	0.4	0.3	0.4	0.3	0.3	0.3	0.3	0.6	0.4	0.6
15-Nov	0.9	0.5	Z	0.4	0.3	0.3	0.3	0.2	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	0.4	0.2	0.9
16-Nov	0.2	0.2	0.3	Z	0.5	0.8	0.7	1.3	1.1	0.9	1.5	6.5	5.8	9.9	2.4	1.0	1.3	0.7	0.6	0.6	0.9	1.0	0.6	0.6	1.7	9.9
17-Nov	0.6	0.4	0.4	0.4	Z	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.4	0.4	0.5	0.6	0.5	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.6
18-Nov	0.6	0.9	1.3	2.3	2.8	Z	1.7	1.2	0.6	0.9	0.8	0.8	0.8	1.1	0.9	0.9	1.7	2.1	2.3	2.1	1.8	1.7	1.4	1.2	1.4	2.8
19-Nov	Z	0.9	0.8	0.8	0.9	0.7	0.8	1.0	1.4	1.6	2.4	2.8	1.2	1.9	3.9	1.4	0.6	0.8	0.8	0.7	0.7	0.6	0.4	0.4	1.2	3.9
20-Nov	0.3	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.2	0.0	0.3
21-Nov	0.2	0.3	Z	0.3	0.3	0.4	0.4	0.4	0.4	0.6	0.5	0.6	0.6	0.7	0.6	0.5	0.5	0.5	0.4	0.4	0.4	0.3	0.3	0.3	0.4	0.7
22-Nov	0.3	0.2	0.1	Z	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.3	0.2	0.2	0.1	0.3
23-Nov	0.9	2.4	1.6	2.3	Z	1.0	0.9	1.1	1.0	0.7	1.1	2.8	0.6	1.2	1.3	0.5	0.4	0.6	0.8	0.8	0.6	0.5	0.4	0.5	1.1	2.8
24-Nov	0.5	0.5	0.5	0.5	0.5	Z	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.4	0.4	0.3	0.4	0.3	0.3	0.3	0.4	0.5
25-Nov	Z	0.3	0.2	0.3	0.3	0.3	0.2	0.3	0.3	0.5	0.5	0.3	0.1	0.1	0.2	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.2	0.2	0.5
26-Nov	0.2	Z	0.2	0.3	0.3	0.2	0.4	0.4	0.4	0.3	0.5	0.9	0.7	2.7	4.5	3.0	2.6	1.5	0.7	0.8	0.8	0.9	0.5	0.5	1.0	4.5
27-Nov	0.8	1.0	Z	1.5	1.7	2.0	2.0	2.1	1.8	1.4	0.8	0.7	1.2	1.2	1.8	1.6	1.1	0.8	0.8	0.7	0.5	0.5	0.5	0.4	1.2	2.1
28-Nov	0.4	0.4	0.4	Z	0.3	0.2	0.3	0.2	0.2	0.2	0.3	0.2	0.2	0.3	0.3	0.3	0.2	0.3	0.2	0.3	0.3	0.3	0.2	0.3	0.3	0.4
29-Nov	0.3	0.2	0.3	0.3	Z	0.2	0.2	0.3	0.2	0.3	0.3	0.3	0.2	0.3	0.3	0.2	0.3	0.3	0.2	0.3	0.3	0.3	0.3	0.2	0.3	0.3
30-Nov	0.3	0.3	0.3	0.2	0.3	Z	0.4	0.3	0.3	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.3	0.4

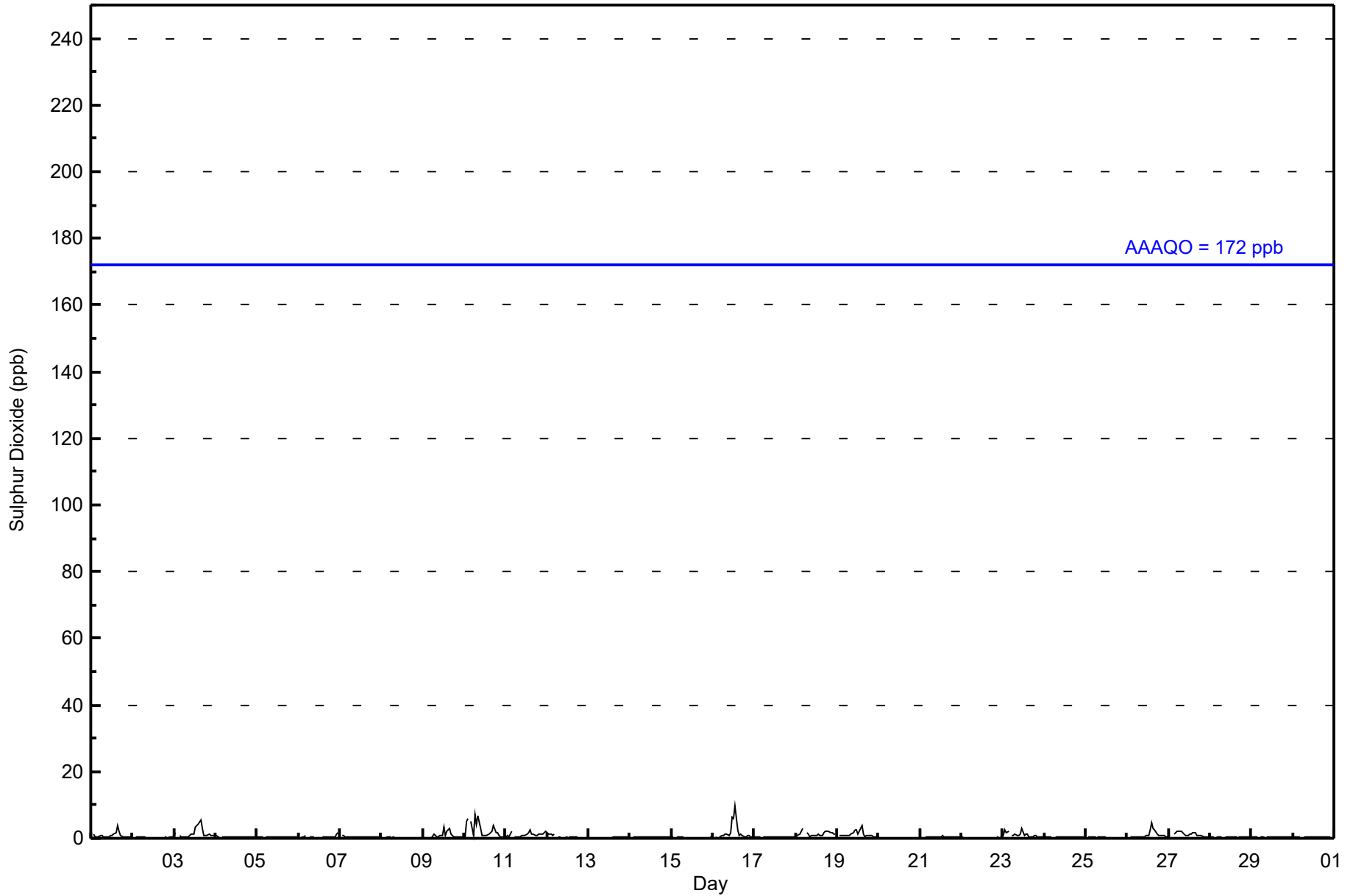
0.5	0.8	0.7	0.6	0.7	0.5	0.7	0.6	0.7	0.6	0.6	0.6	0.9	0.8	1.1	1.1	1.0	0.7	0.6	0.5	0.5	0.5	0.5	0.4	0.5	Diurnal Average	
1.9	4.9	6.0	2.3	5.2	2.0	7.2	4.4	6.7	3.1	2.4	6.5	5.8	9.9	4.5	5.3	3.0	3.7	2.3	2.1	1.8	1.7	1.5	2.3	Diurnal Maximum		

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



Wood Buffalo Environmental Association  
Hourly Averages

Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Fort McKay South - November 2023





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

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Fort McKay South - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 10	686	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: 686

Total Number of Hours: 720



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

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Fort McKay South - November 2023**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	64	37	13	5	11	5	17	55	126	71	59	59	49	46	33	33	683
11 - 20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	64	37	13	5	11	5	17	55	126	71	59	59	49	46	33	33	683

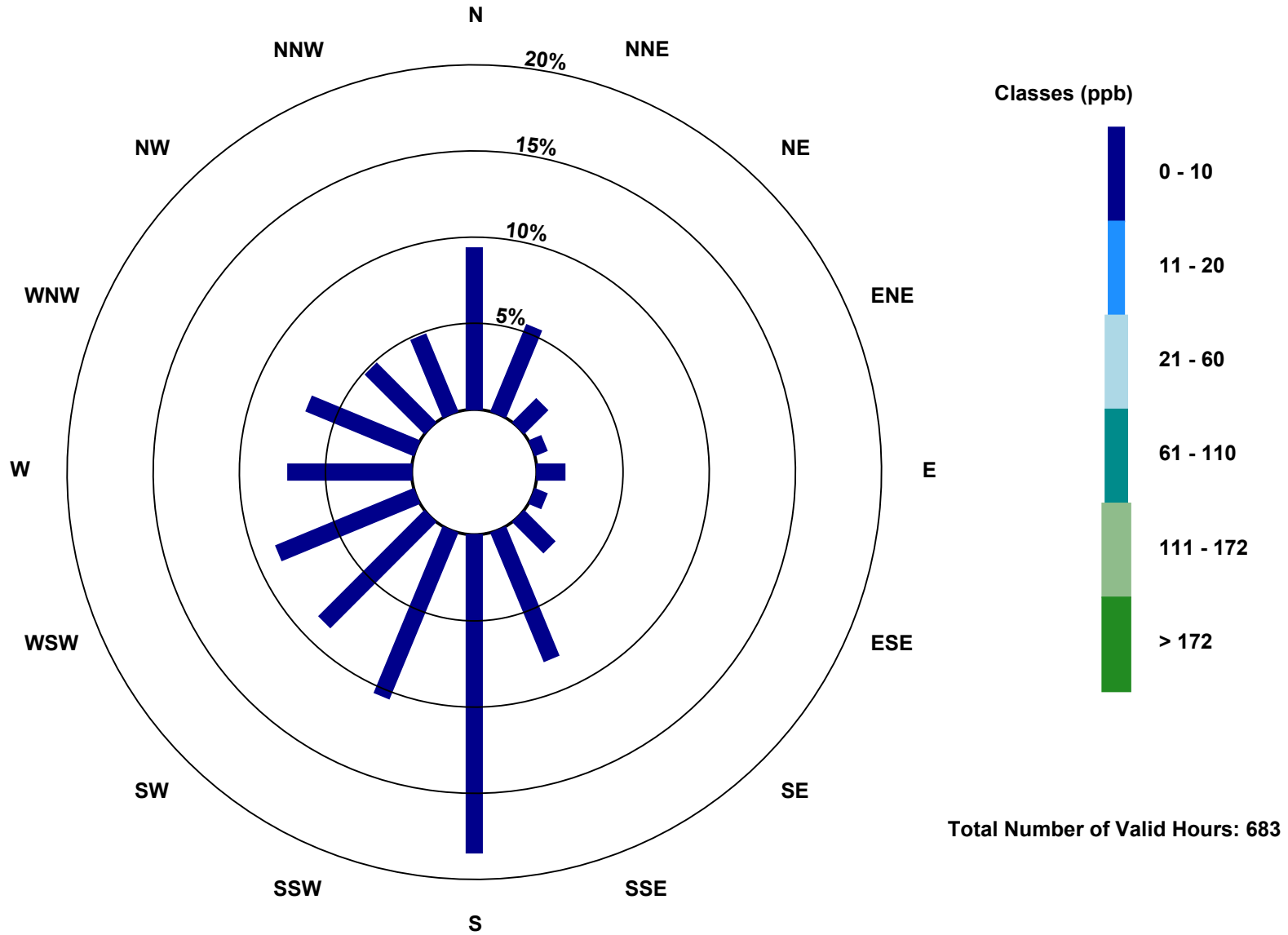
Total Number of Valid Hours: 683

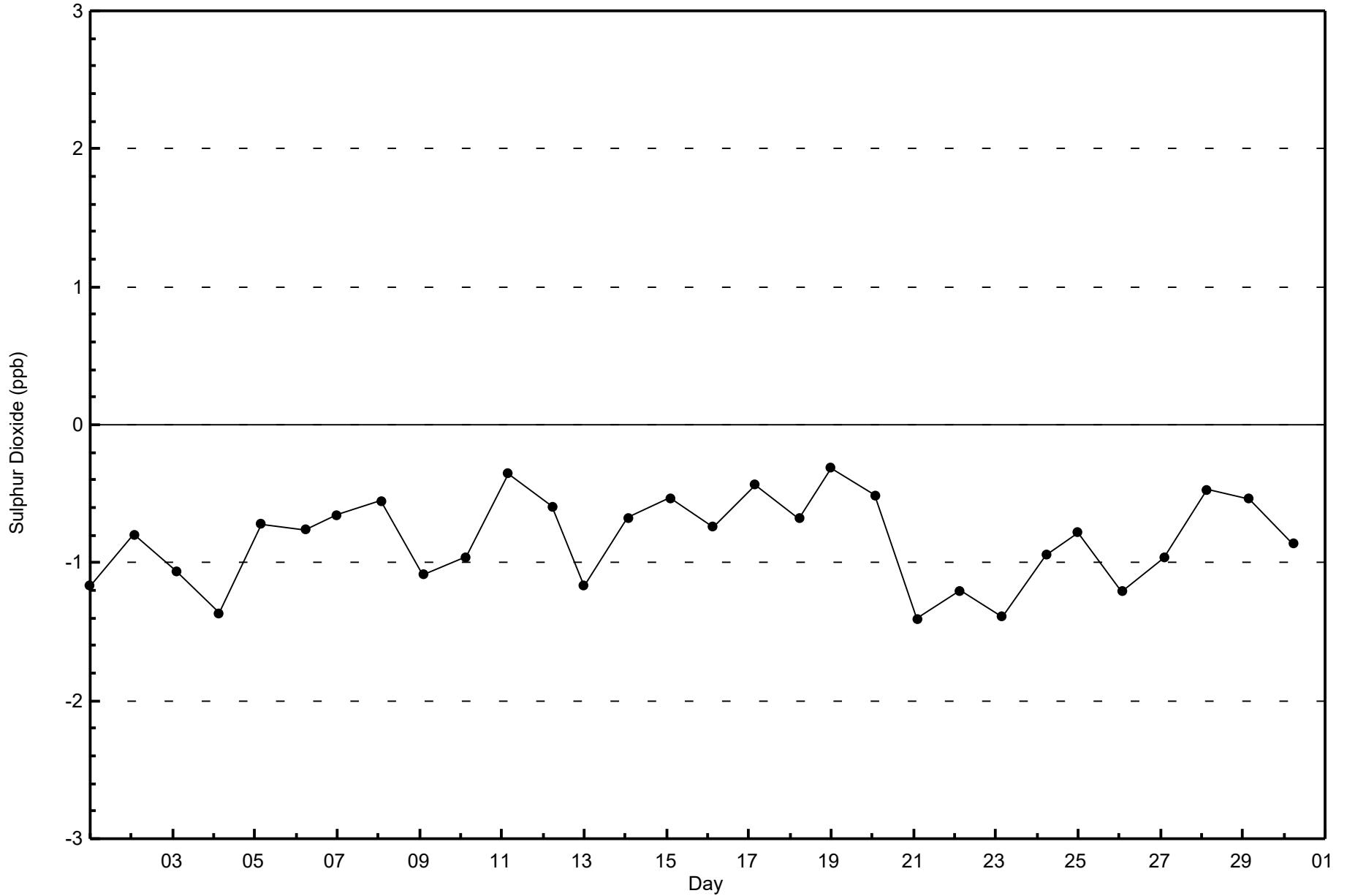
Total Number of Hours: 720

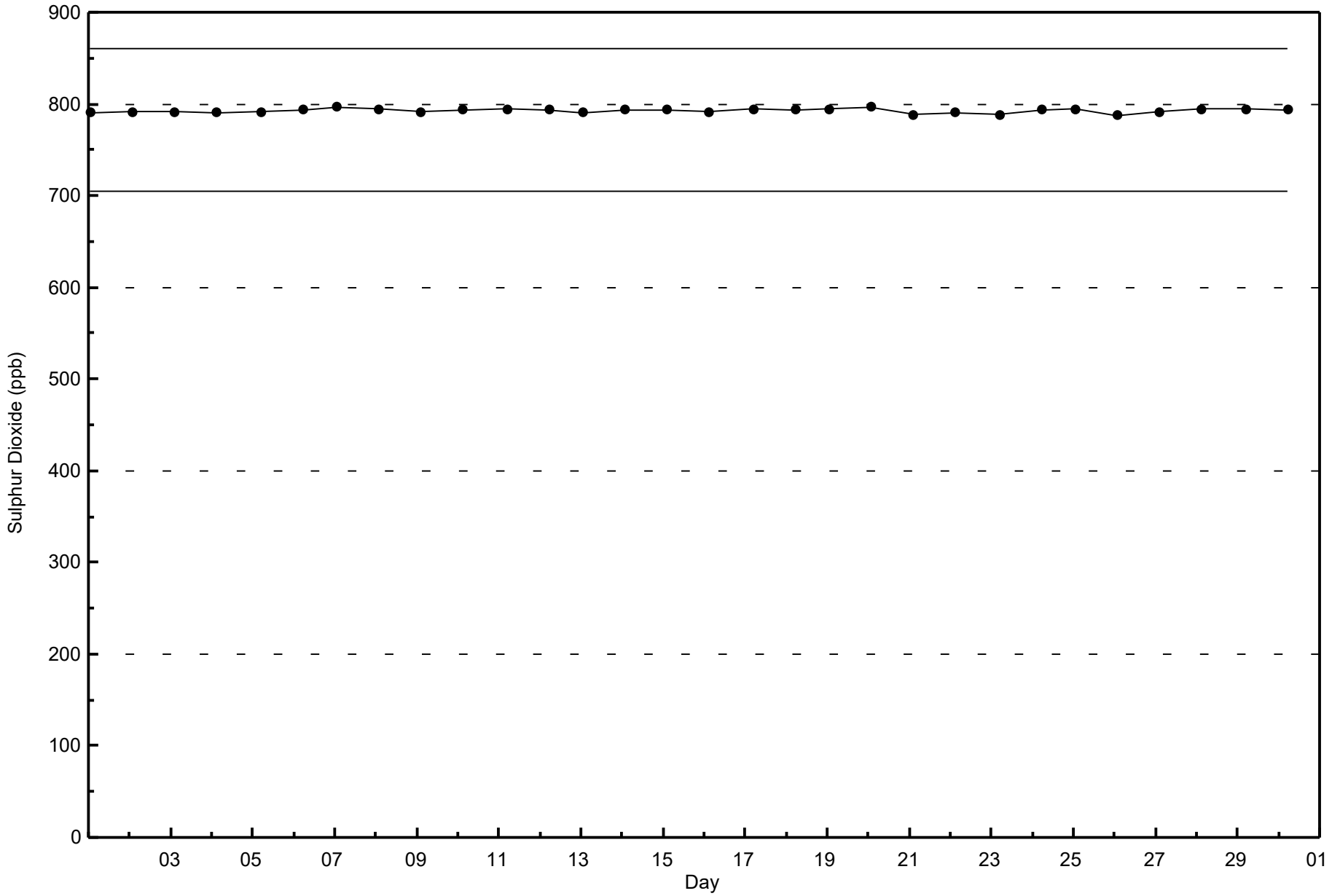


Wood Buffalo Environmental Association  
Wind Rose Nov 2023

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







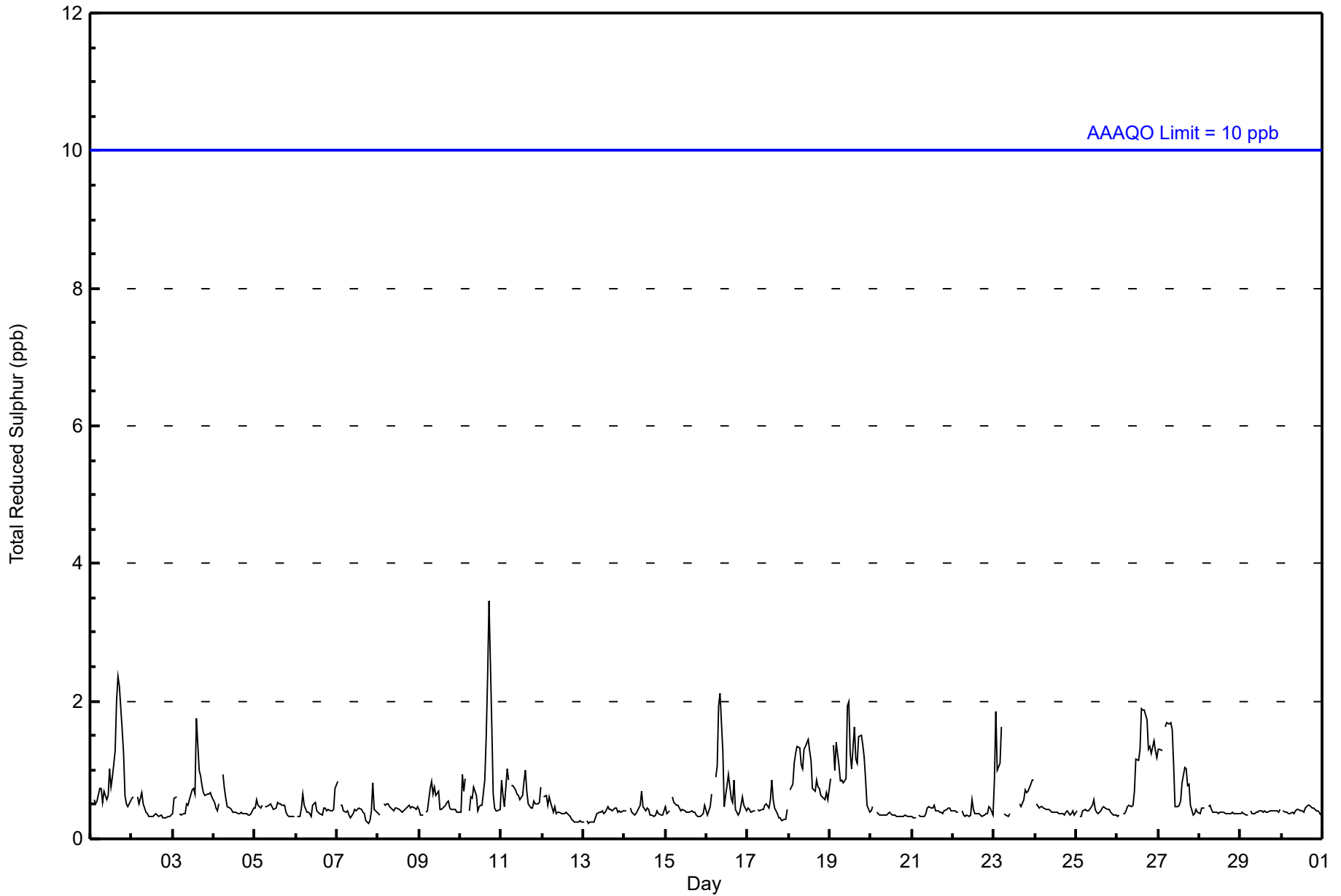






**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Total Reduced Sulphur (TRS) - ppb**  
**Fort McKay South - November 2023**





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

**Total Reduced Sulphur (TRS) - ppb**  
**Fort McKay South - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2	684	99.85	99.85
3 - 4	1	0.15	100.00
5 - 7	0	0.00	100.00
8 - 11	0	0.00	100.00
> 11	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Total Reduced Sulphur (TRS) - ppb  
Fort McKay South - November 2023**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	63	37	13	5	11	3	17	60	124	71	57	60	49	43	32	36	681
3 - 4	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	63	37	13	5	11	3	17	60	125	71	57	60	49	43	32	36	682

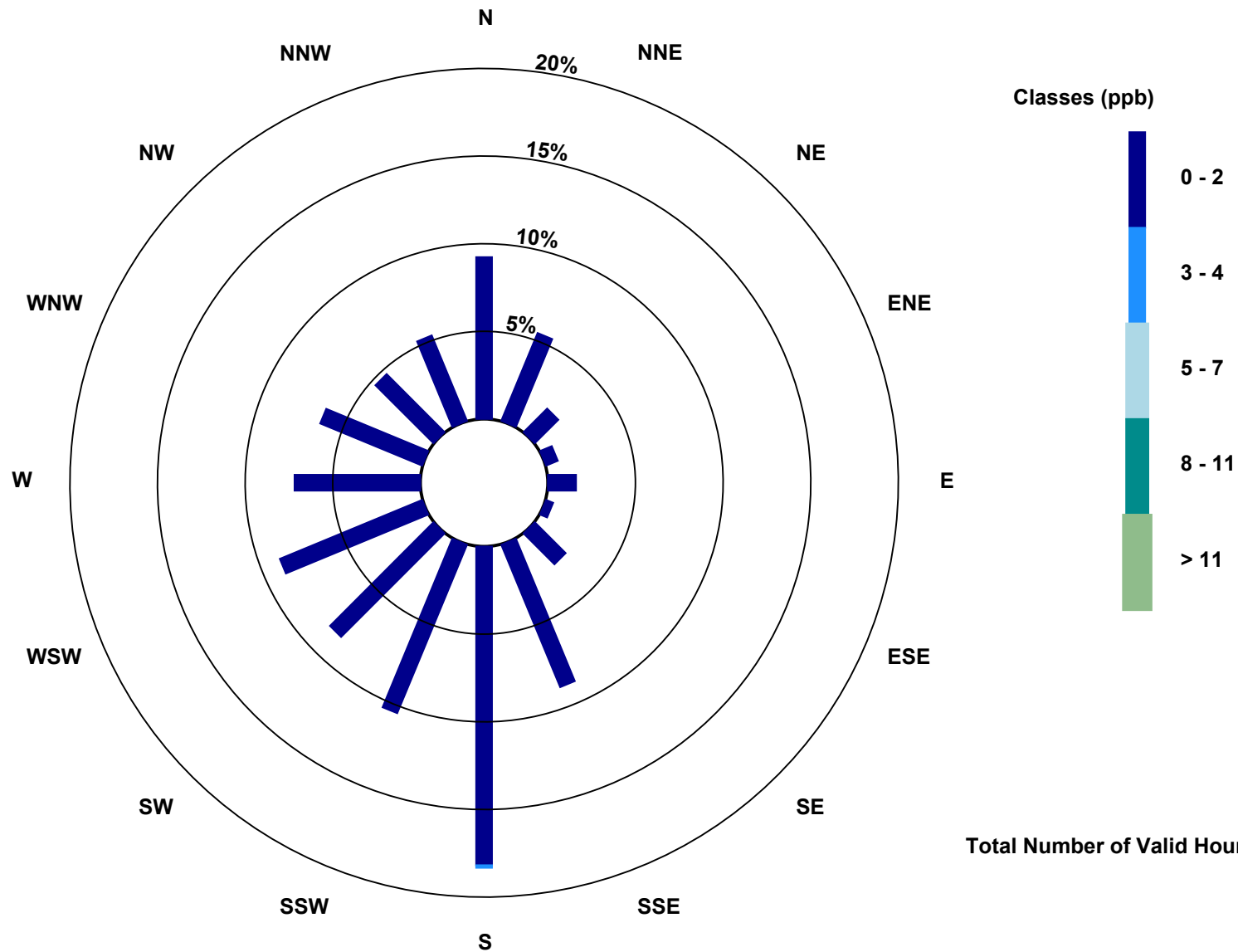
Total Number of Valid Hours: 682

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 2023

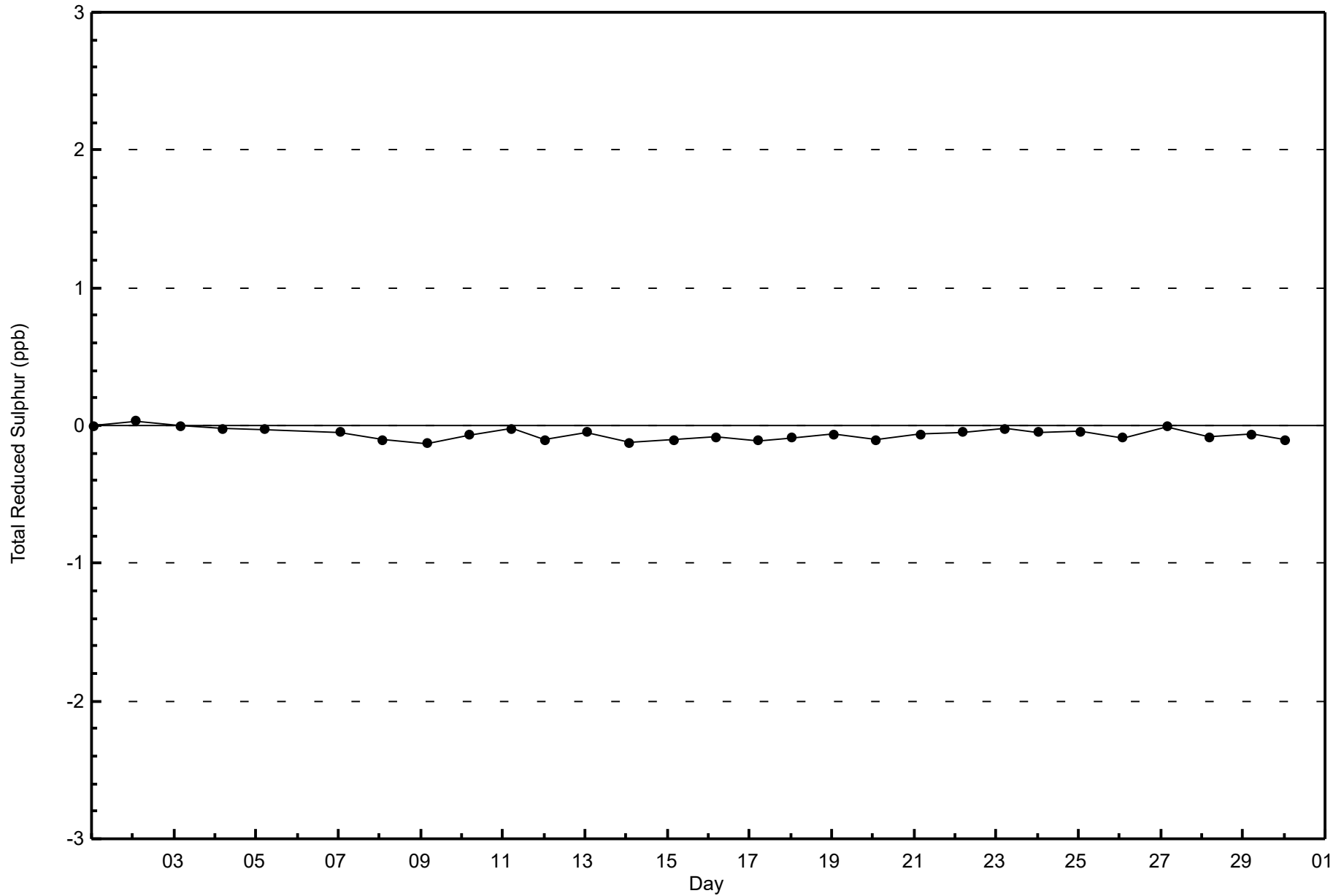
Total Reduced Sulphur (TRS) - ppb  
Fort McKay South

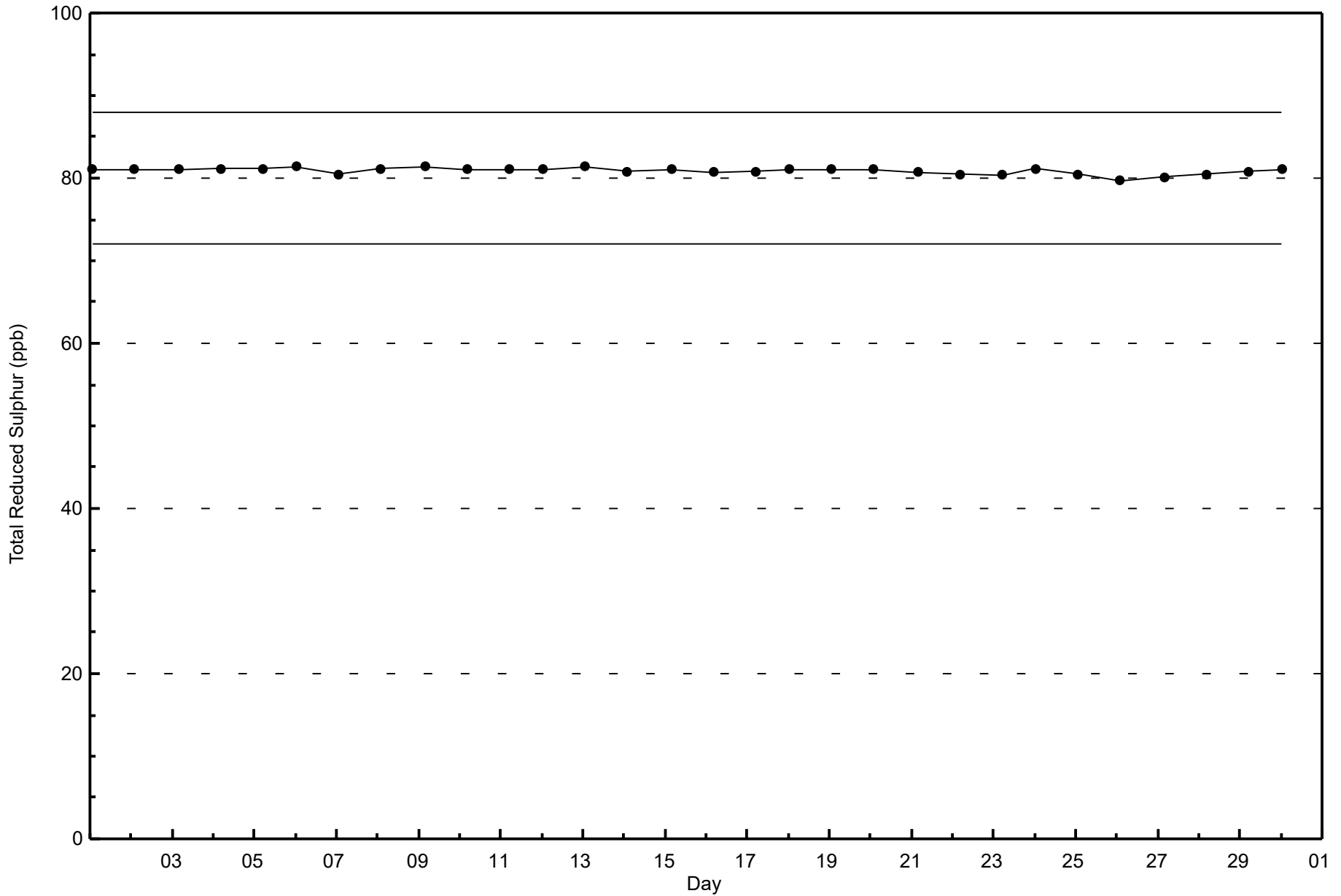




Wood Buffalo Environmental Association  
Zero Responses

Total Reduced Sulphur (TRS) - ppb  
Fort McKay South - November 2023







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

**Total Hydrocarbons (THC) - ppm**  
**Fort McKay South - November 2023**

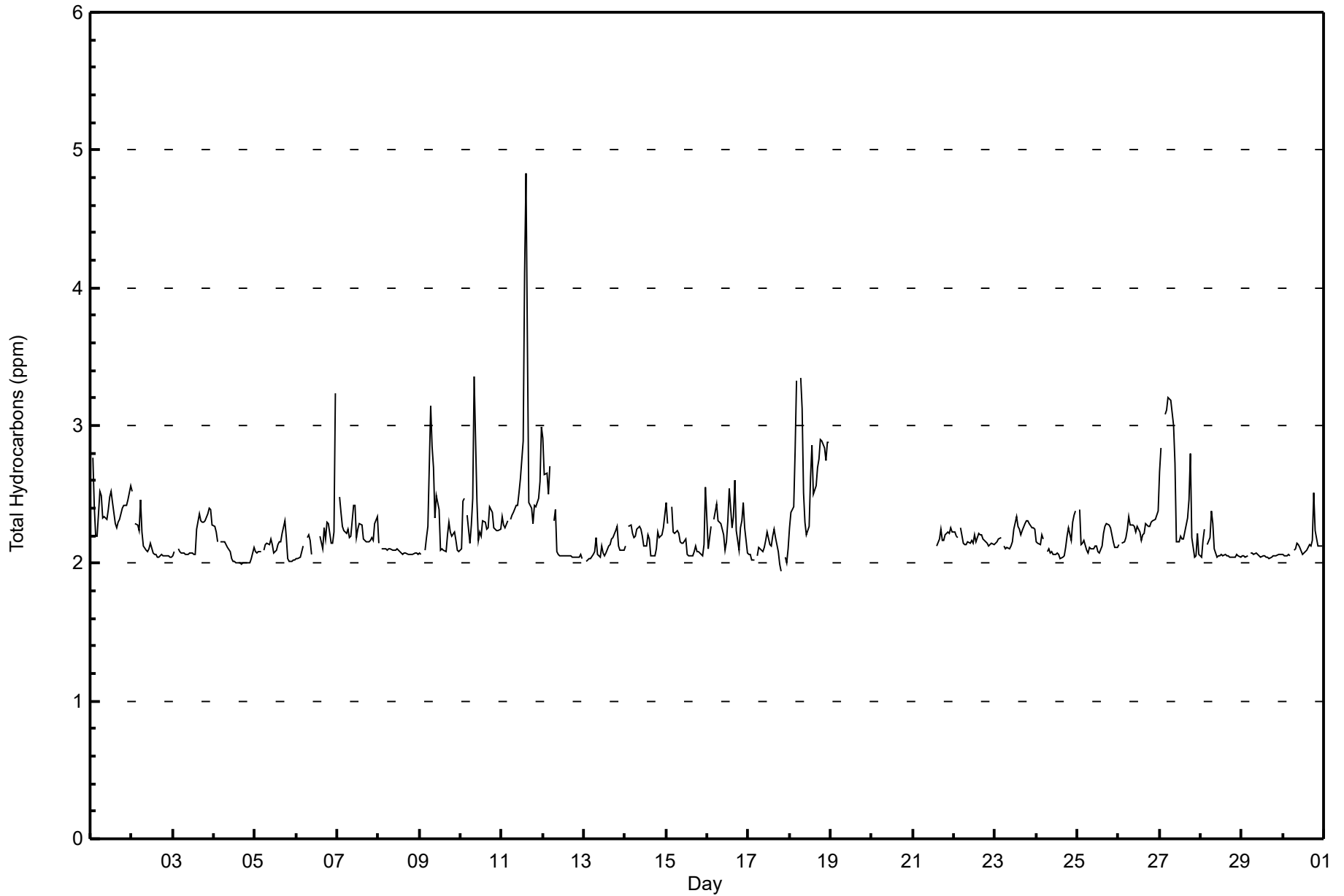
Maximum Value: 4.8 ppm on Nov 11 15:00		Maximum Daily Average: 2.7 ppm on Nov 18		Hours in Service: 720																																												
Minimum Value: 1.9 ppm on Nov 17 20:00		Minimum Daily Average: 2.1 ppm on Nov 29		Hours of Data: 626																																												
Maximum Diurnal Average: 2.3 ppm at hour 7		Minimum Diurnal Average: 2.2 ppm at hour 11		Hours of Missing Data: 94																																												
Monthly Average: 2.23 ppm		Percentiles: P <sub>1</sub> = 2.0 P <sub>10</sub> = 2.0 Q <sub>1</sub> = 2.1 Median = 2.2 Q <sub>3</sub> = 2.3 P <sub>90</sub> = 2.5 P <sub>99</sub> = 3.2		Hours of Calibration: 32																																												
				Percent Operational Time: 91.4																																												
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Nov	Z	2.8	2.4	2.2	2.2	2.5	2.5	2.3	2.3	2.3	2.4	2.5	2.5	2.4	2.3	2.3	2.3	2.3	2.4	2.4	2.4	2.4	2.5	2.6	2.4	2.8																						
2-Nov	2.5	Z	2.3	2.3	2.2	2.5	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.1	2.5																						
3-Nov	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	2.2	2.4	2.3	2.3	2.3	2.4	2.4	2.4	2.3	2.2	2.4																							
4-Nov	2.3	2.2	2.2	Z	2.2	2.2	2.2	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.3																							
5-Nov	2.1	2.1	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.1	2.2	2.2	2.2	2.3	2.2	2.0	2.0	2.0	2.0	2.1	2.3																							
6-Nov	2.0	2.0	2.0	2.1	2.1	Z	2.2	2.2	2.2	2.1	C	C	C	C	2.2	2.1	2.3	2.2	2.3	2.3	2.1	2.1	2.2	3.2	3.2																							
7-Nov	Z	2.5	2.4	2.3	2.2	2.2	2.3	2.2	2.2	2.4	2.4	2.2	2.2	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.5																							
8-Nov	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1																							
9-Nov	2.1	2.1	Z	2.1	2.2	2.3	3.1	2.8	2.7	2.3	2.5	2.4	2.1	2.1	2.1	2.1	2.2	2.3	2.2	2.2	2.2	2.2	2.1	2.1	3.1																							
10-Nov	2.1	2.4	2.5	Z	2.4	2.1	2.3	2.5	3.4	2.4	2.2	2.2	2.2	2.3	2.3	2.2	2.3	2.4	2.4	2.3	2.2	2.2	2.2	2.3	3.4																							
11-Nov	2.3	2.3	2.3	2.3	Z	2.3	2.4	2.4	2.4	2.4	2.5	2.6	2.9	4.1	4.8	3.6	2.4	2.4	2.3	2.4	2.4	2.5	2.6	3.0	4.8																							
12-Nov	2.9	2.6	2.7	2.5	2.7	Z	2.3	2.4	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.9																							
13-Nov	Z	2.0	2.0	2.0	2.0	2.1	2.1	2.2	2.1	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.3	2.1	2.1	2.1	2.1	2.3																							
14-Nov	2.1	Z	2.3	2.3	2.2	2.2	2.2	2.2	2.3	2.3	2.2	2.1	2.1	2.2	2.2	2.0	2.1	2.1	2.1	2.2	2.2	2.2	2.3	2.4	2.4																							
15-Nov	2.4	2.3	Z	2.4	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.6	2.6																							
16-Nov	2.1	2.2	2.3	Z	2.3	2.4	2.3	2.3	2.3	2.2	2.1	2.2	2.3	2.5	2.3	2.3	2.6	2.2	2.1	2.3	2.3	2.4	2.3	2.1	2.6																							
17-Nov	2.1	2.1	2.0	2.0	Z	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.1	2.1	2.2	2.2	2.2	2.1	2.0	1.9	UO	2.0	2.0	2.1	2.2																							
18-Nov	2.3	2.4	2.4	2.8	3.3	Z	3.3	3.1	2.5	2.3	2.2	2.3	2.6	2.9	2.5	2.6	2.7	2.8	2.9	2.9	2.8	2.7	2.9	2.9	3.3																							
19-Nov	Z	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--																							
20-Nov	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--																							
21-Nov	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	M	M	M	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.3																							
22-Nov	2.2	2.2	2.2	Z	2.3	2.1	2.1	2.1	2.2	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.3																							
23-Nov	2.1	2.2	2.2	2.2	Z	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.3	2.3	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.3																							
24-Nov	2.2	2.2	2.1	2.2	2.2	Z	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	2.3	2.2	2.3	2.4	2.4	2.4																							
25-Nov	Z	2.4	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	2.3	2.3	2.3	2.3	2.2	2.2	2.1	2.1	2.4																							
26-Nov	2.1	Z	2.1	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.2	2.3	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.4	2.4																							
27-Nov	2.7	2.8	Z	3.1	3.1	3.2	3.2	3.1	3.0	2.7	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.5	2.8	2.2	2.0	2.1	2.2	2.1	3.2																							
28-Nov	2.0	2.2	2.2	Z	2.1	2.2	2.4	2.3	2.1	2.0	2.1	2.0	2.1	2.1	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.0	2.4																							
29-Nov	2.1	2.1	2.0	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1																							
30-Nov	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	2.2	2.5	2.2	2.1	2.1	2.1	2.1	2.5																							
																								2.2	2.3	2.2	2.2	2.3	2.2	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	Diurnal Average	
																								2.9	2.8	2.7	3.1	3.3	3.2	3.3	3.1	3.4	2.7	2.5	2.6	2.9	4.1	4.8	3.6	2.7	2.8	2.9	2.9	2.8	2.7	2.9	3.2	Diurnal Maximum
Z - zerospan																								C - Calibration				M - Maintenance				AF - Analyzer Failure				UO - Unstable Operation												





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

**Total Hydrocarbons (THC) - ppm**  
**Fort McKay South - November 2023**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Total Hydrocarbons (THC) - ppm  
Fort McKay South - November 2023**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2.0	65	10.38	10.38
2.1 - 3.0	547	87.38	97.76
3.1 - 10.0	14	2.24	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 626

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Total Hydrocarbons (THC) - ppm  
Fort McKay South - November 2023**

<b>Concentration Ranges (ppm)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	0	1	5	0	9	3	7	1	3	5	3	10	7	4	5	1	64
2.1 - 3.0	62	29	8	5	2	2	10	50	109	57	50	42	31	29	27	32	545
3.1 - 10.0	0	1	0	0	0	0	0	0	6	3	1	2	0	0	1	0	14
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	62	31	13	5	11	5	17	51	118	65	54	54	38	33	33	33	623

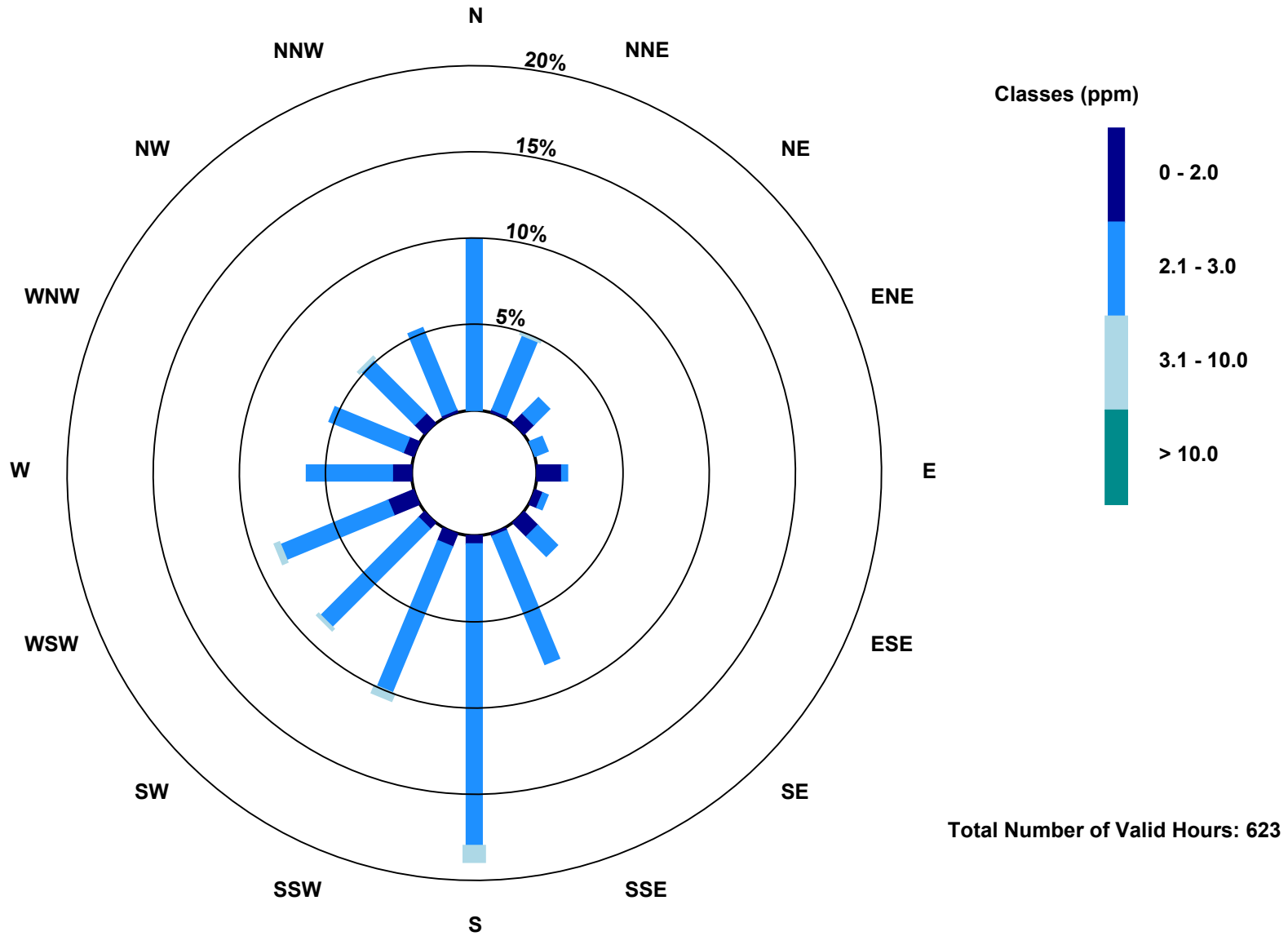
Total Number of Valid Hours: 623

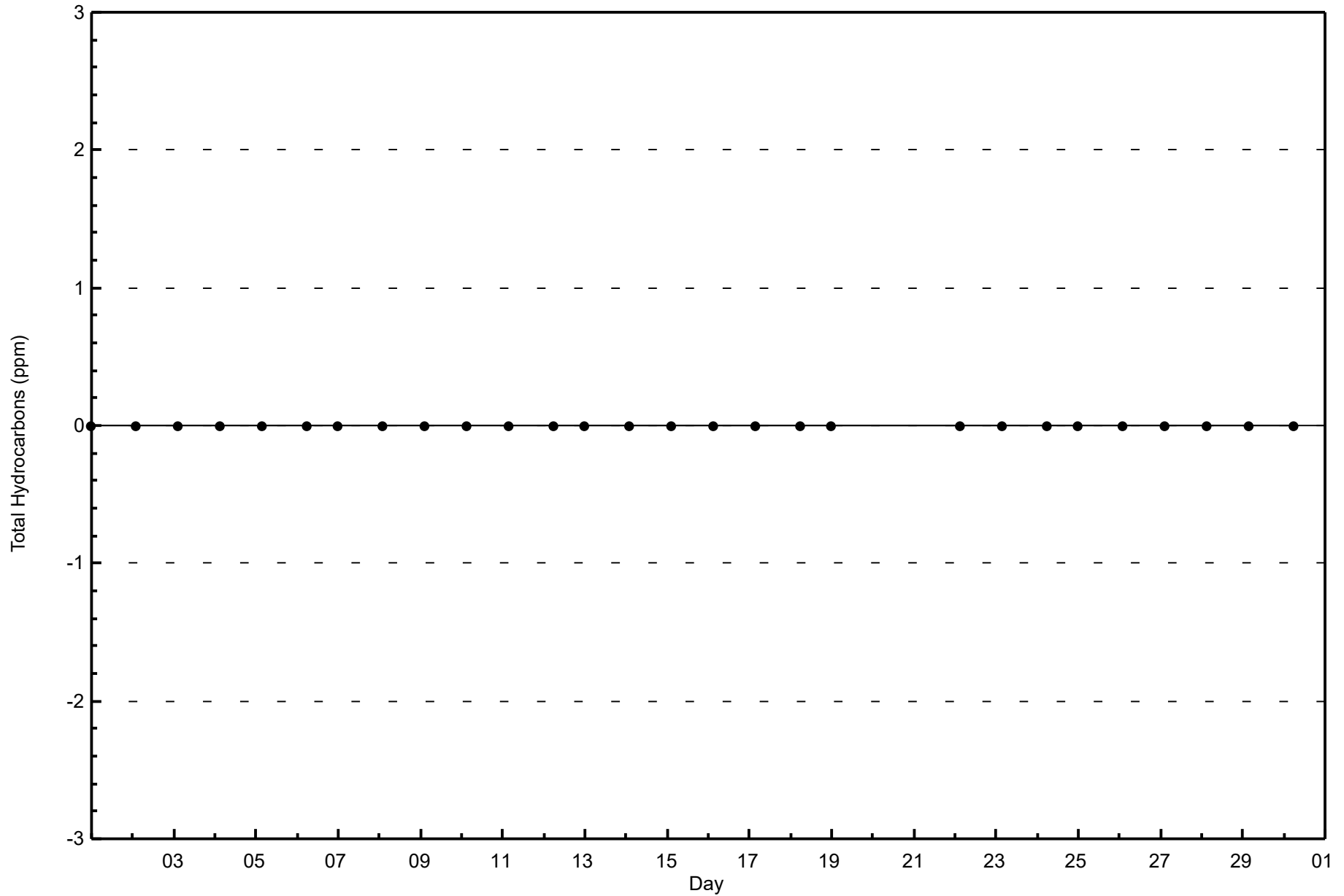
Total Number of Hours: 720

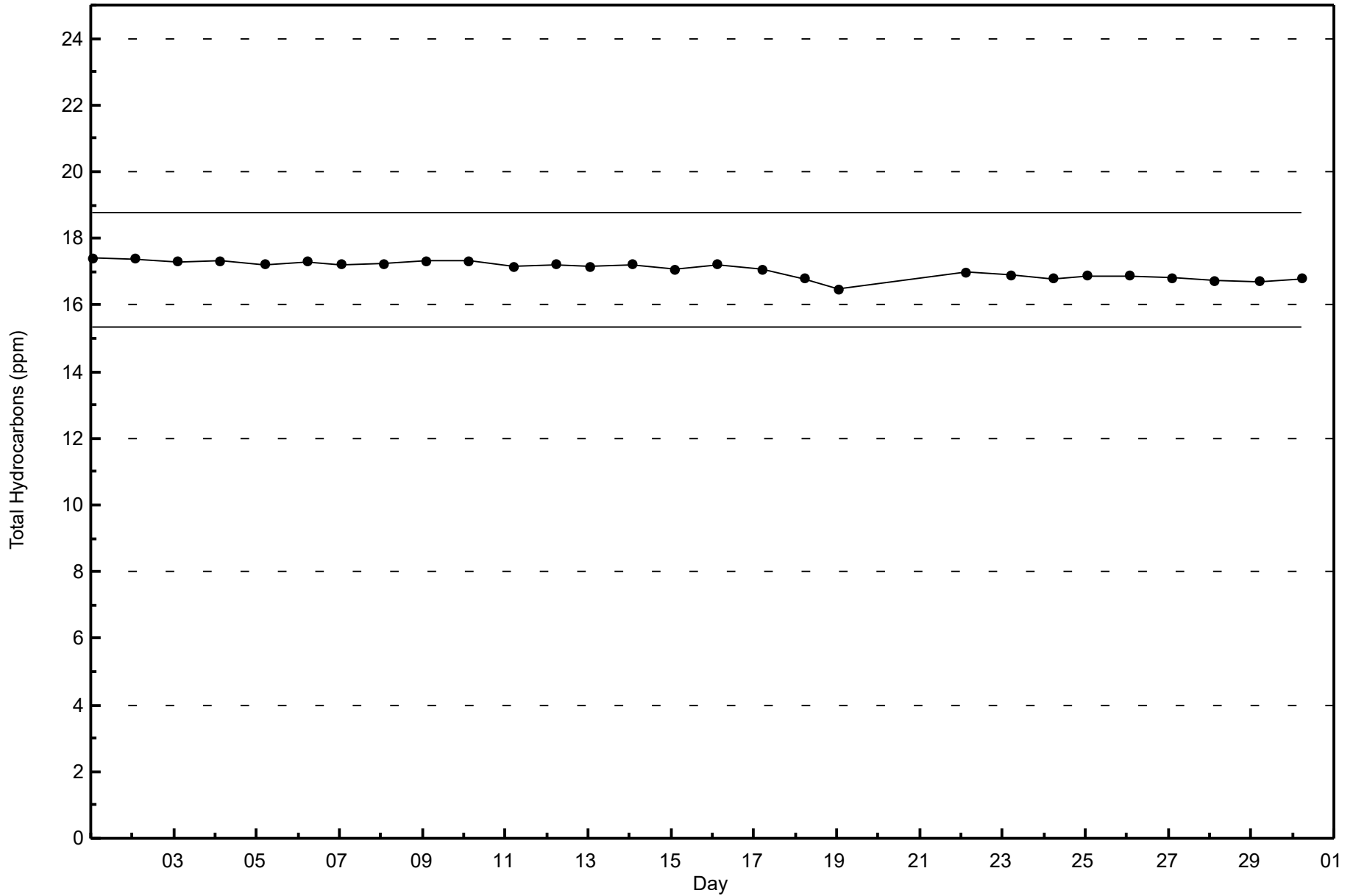


Wood Buffalo Environmental Association  
Wind Rose Nov 2023

Total Hydrocarbons (THC) - ppm  
Fort McKay South







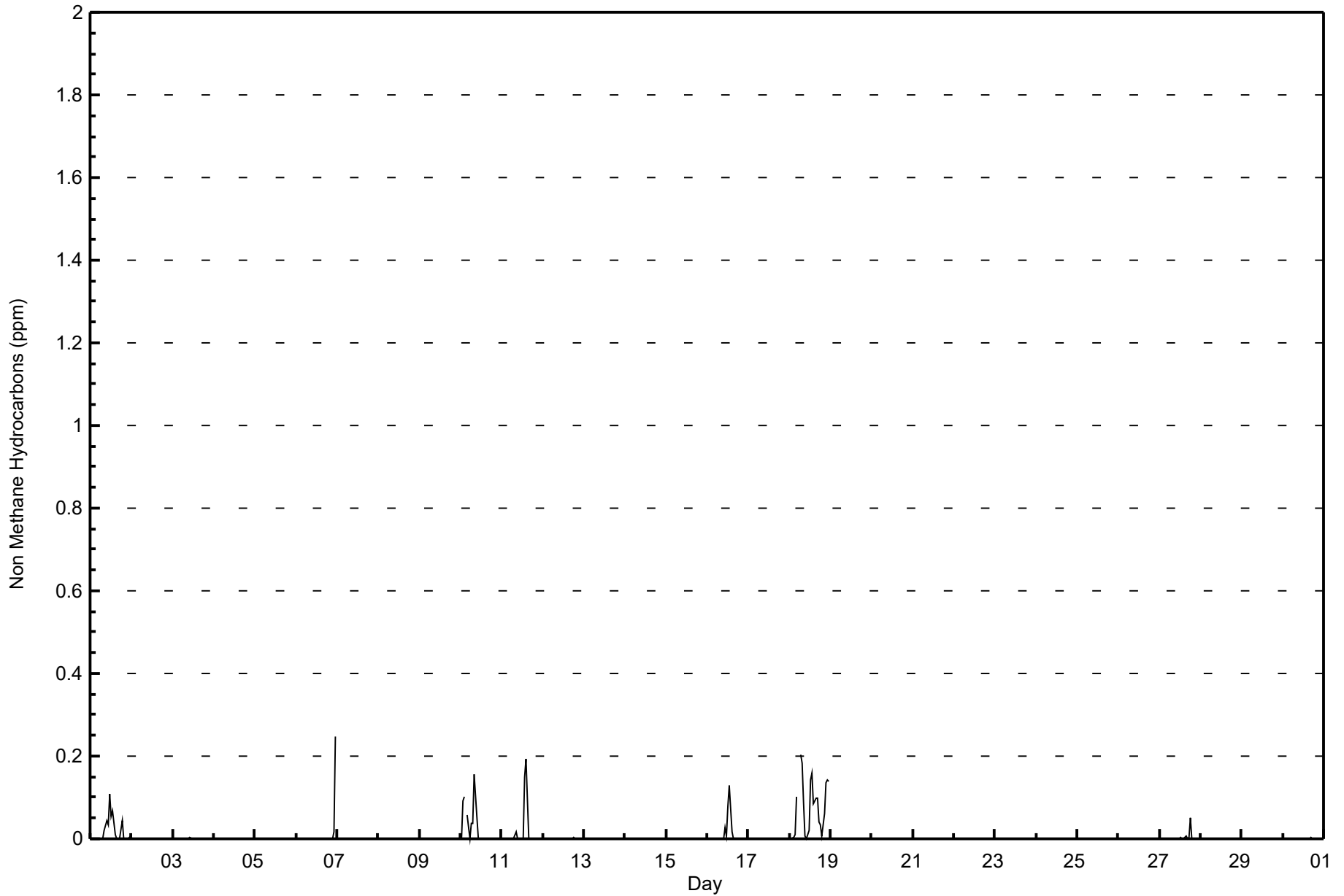


Maximum Value: 0.246 ppm on Nov 7 00:00		Maximum Daily Average: 0.077 ppm on Nov 18		Hours in Service: 720																																												
Minimum Value: 0.000 ppm on Nov 1 02:00		Minimum Daily Average: 0.000 ppm on Nov 2		Hours of Data: 626																																												
Maximum Diurnal Average: 0.020 ppm at hour 14		Minimum Diurnal Average: 0.000 ppm at hour 1		Hours of Missing Data: 94																																												
Monthly Average: 0.006 ppm		Percentiles: P <sub>1</sub> = 0.0 P <sub>10</sub> = 0.0 Q <sub>1</sub> = 0.0 Median = 0.0 Q <sub>3</sub> = 0.0 P <sub>90</sub> = 0.0 P <sub>99</sub> = 0.1		Hours of Calibration: 32																																												
				Percent Operational Time: 91.4																																												
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Nov	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.020	0.043	0.033	0.109	0.054	0.067	0.009	0.000	0.000	0.000	0.046	0.000	0.000	0.000	0.000	0.007	0.017	0.109																						
2-Nov	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000																						
3-Nov	0.000	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	0.000	0.000	0.000	0.000	0.000	0.002																						
4-Nov	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000																						
5-Nov	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000																						
6-Nov	0.000	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	C	C	C	C	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.016	0.246	0.014	0.246																						
7-Nov	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000																						
8-Nov	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000																						
9-Nov	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000																						
10-Nov	0.000	0.092	0.101	Z	0.056	0.000	0.038	0.037	0.157	0.050	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.023	0.157																						
11-Nov	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.017	0.002	0.000	0.000	0.000	0.151	0.192	0.095	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.020	0.192																						
12-Nov	0.000	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.003																						
13-Nov	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000																						
14-Nov	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000																						
15-Nov	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000																						
16-Nov	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.028	0.007	0.079	0.130	0.016	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.130																						
17-Nov	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	UO	0.000	0.000	0.000	0.000																						
18-Nov	0.000	0.000	0.002	0.010	0.103	Z	0.204	0.184	0.090	0.008	0.000	0.019	0.142	0.160	0.084	0.100	0.099	0.041	0.036	0.008	0.060	0.137	0.143	0.139	0.077	0.204																						
19-Nov	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	--	--																					
20-Nov	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	--																					
21-Nov	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	M	M	M	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	--	0.000																						
22-Nov	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000																						
23-Nov	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000																						
24-Nov	0.000	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000																						
25-Nov	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000																						
26-Nov	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000																						
27-Nov	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.000	0.000	0.007	0.000	0.004	0.051	0.000	0.000	0.000	0.000	0.000	0.003	0.051																						
28-Nov	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000																						
29-Nov	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000																						
30-Nov	0.000	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004																						
																								0.000	0.004	0.004	0.000	0.007	0.000	0.009	0.008	0.011	0.004	0.002	0.005	0.011	0.020	0.011	0.007	0.004	0.002	0.005	0.000	0.002	0.005	0.006	0.014	Diurnal Average
																								0.000	0.092	0.101	0.010	0.103	0.000	0.204	0.184	0.157	0.050	0.033	0.109	0.142	0.160	0.192	0.100	0.099	0.041	0.051	0.008	0.060	0.137	0.143	0.246	Diurnal Maximum
Z - zerospan																								C - Calibration				M - Maintenance				AF - Analyzer Failure				UO - Unstable Operation												



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

**Non Methane Hydrocarbons (NMHC) - ppm**  
**Fort McKay South - November 2023**







**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Non Methane Hydrocarbons (NMHC) - ppm  
Fort McKay South - November 2023**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 0.005	578	92.33	92.33
0.006 - 0.05	23	3.67	96.01
0.06 - 0.1	18	2.88	98.88
> 0.1	7	1.12	100.00

Total Number of Valid Hours: 626

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Non Methane Hydrocarbons (NMHC) - ppm  
Fort McKay South - November 2023**

<b>Concentration Ranges (ppm)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 0.005	62	30	13	5	11	5	15	44	94	59	51	52	38	33	32	32	576
0.006 - 0.05	0	0	0	0	0	0	0	6	12	1	2	0	0	0	0	1	22
0.06 - 0.1	0	0	0	0	0	0	2	1	9	3	1	2	0	0	0	0	18
> 0.1	0	1	0	0	0	0	0	0	3	2	0	0	0	0	1	0	7
<b>Totals</b>	<b>62</b>	<b>31</b>	<b>13</b>	<b>5</b>	<b>11</b>	<b>5</b>	<b>17</b>	<b>51</b>	<b>118</b>	<b>65</b>	<b>54</b>	<b>54</b>	<b>38</b>	<b>33</b>	<b>33</b>	<b>33</b>	<b>623</b>

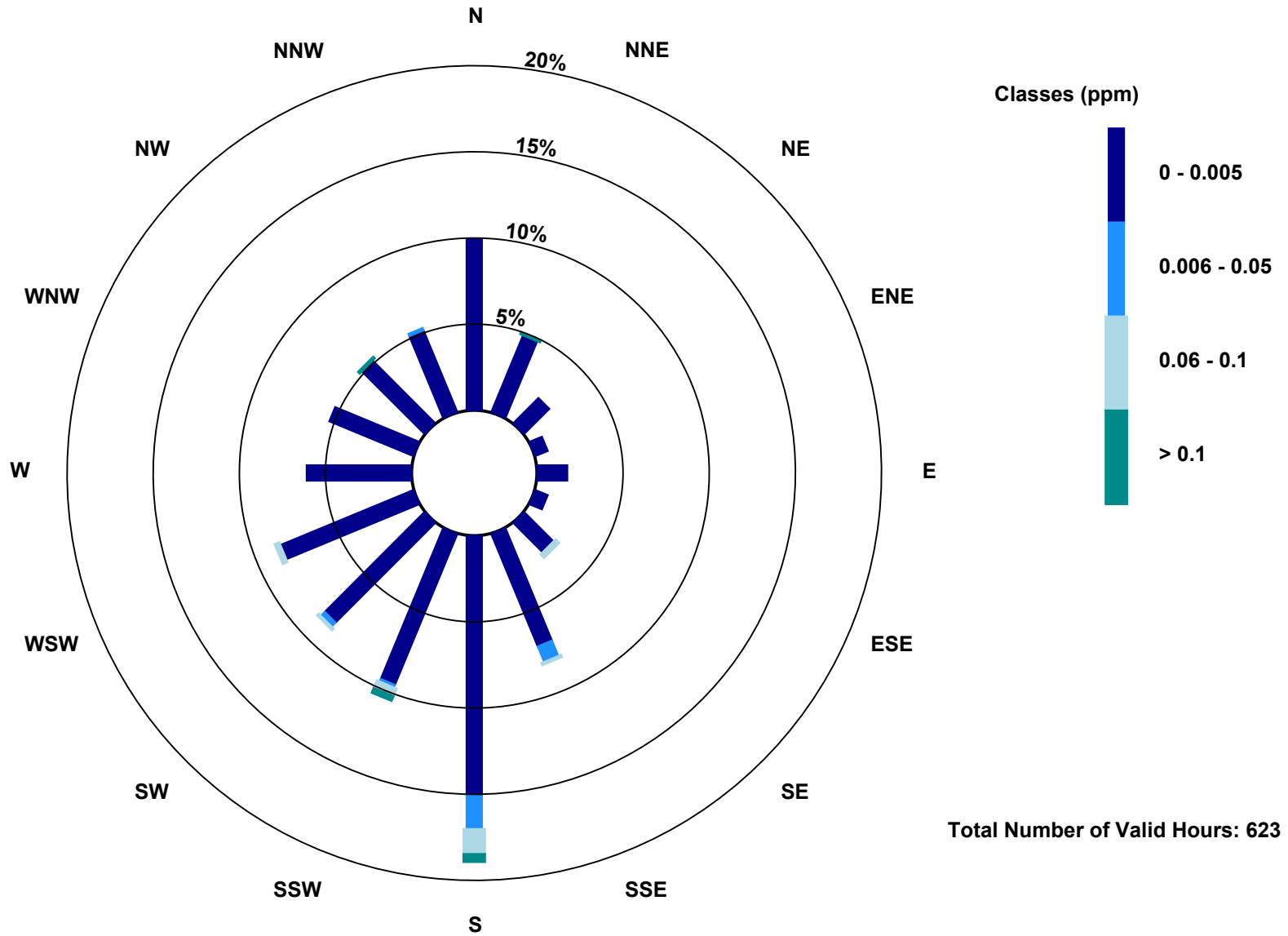
Total Number of Valid Hours: 623

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 2023

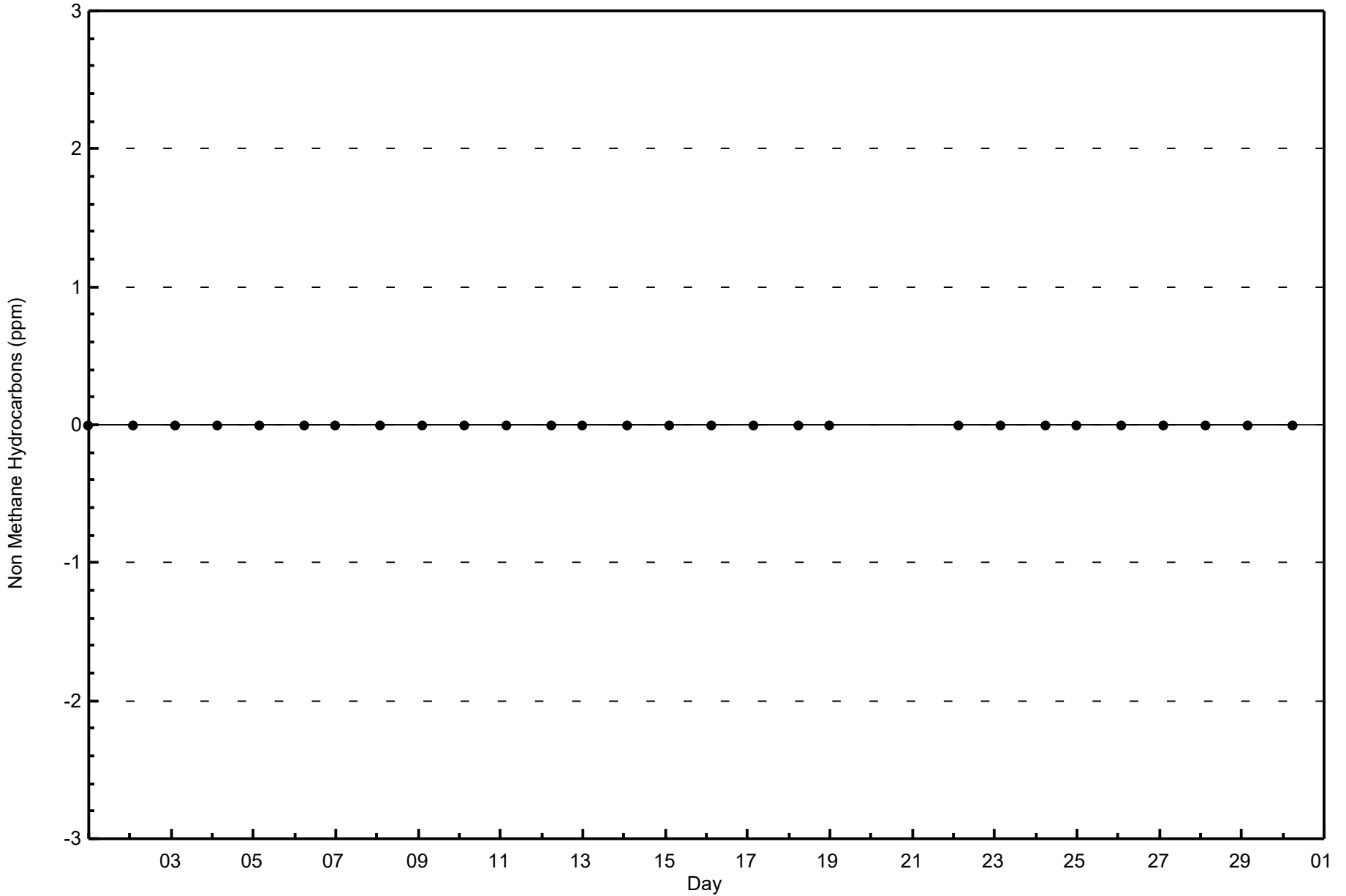
Non Methane Hydrocarbons (NMHC) - ppm  
Fort McKay South

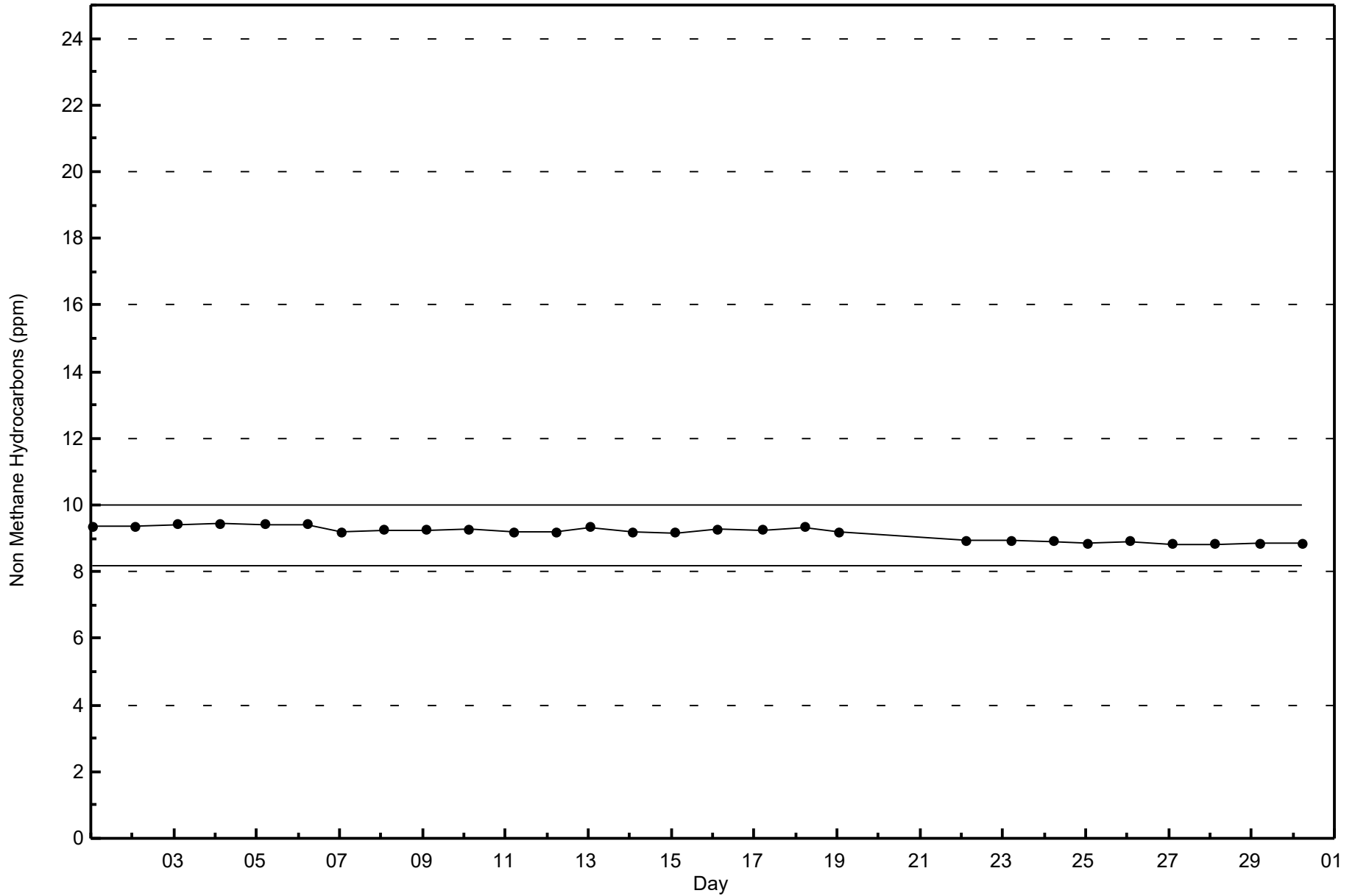




Wood Buffalo Environmental Association  
Zero Responses

Non Methane Hydrocarbons (NMHC) - ppm  
Fort McKay South - November 2023





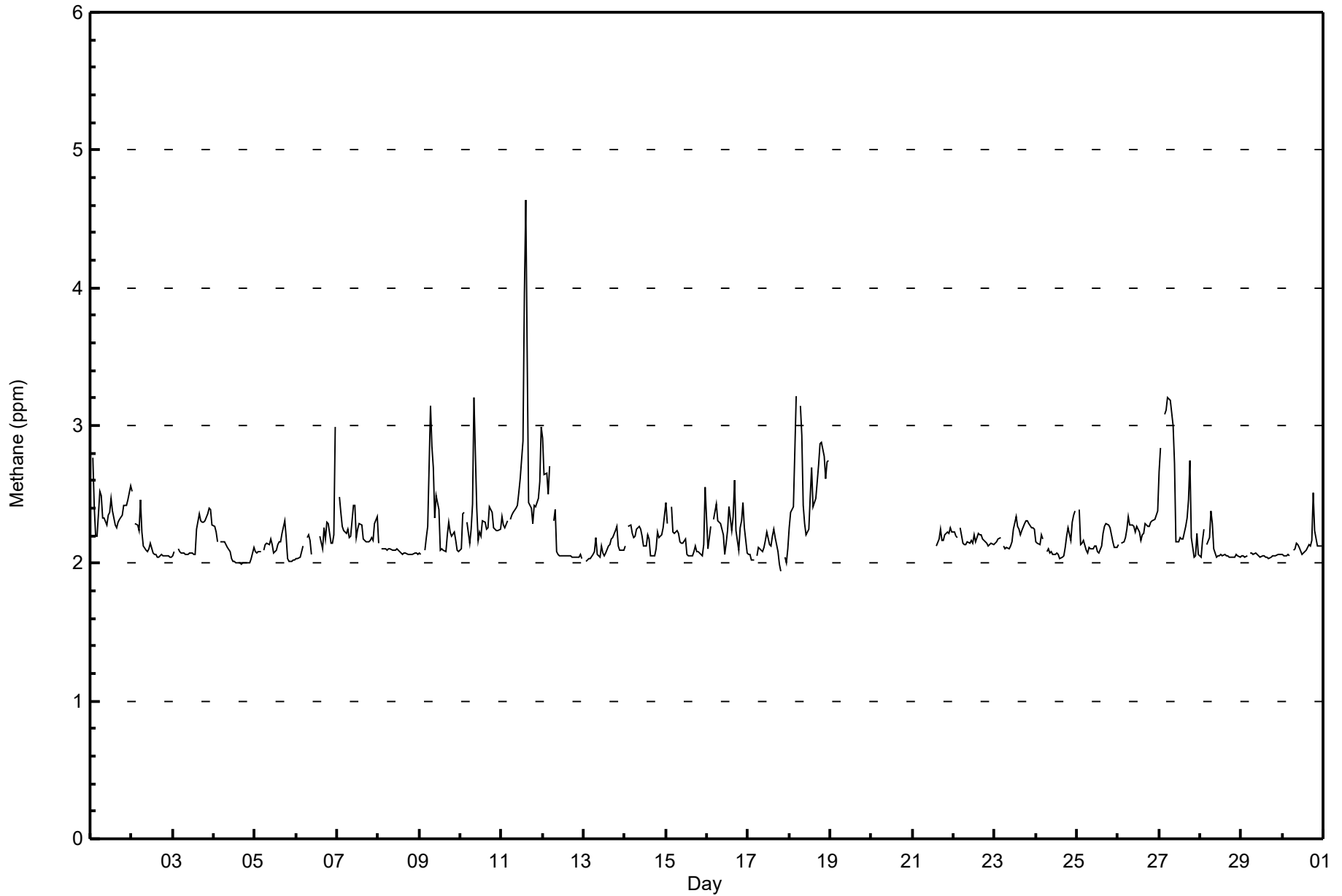


Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 4.6 ppm on Nov 11 15:00	Maximum Daily Average: 2.7 ppm on Nov 11		Hours of Data:	626
Minimum Value: 1.9 ppm on Nov 17 20:00	Minimum Daily Average: 2.1 ppm on Nov 29		Hours of Missing Data:	94
Maximum Diurnal Average: 2.3 ppm at hour 7	Minimum Diurnal Average: 2.2 ppm at hour 12		Hours of Calibration:	32
Monthly Average: 2.23 ppm	Percentiles: P <sub>1</sub> = 2.0 P <sub>10</sub> = 2.0 Q <sub>1</sub> = 2.1 Median = 2.2 Q <sub>3</sub> = 2.3 P <sub>90</sub> = 2.4 P <sub>99</sub> = 3.2		Percent Operational Time:	91.4

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Nov	Z	2.8	2.4	2.2	2.2	2.5	2.5	2.3	2.3	2.3	2.4	2.4	2.5	2.4	2.3	2.3	2.3	2.3	2.4	2.4	2.4	2.4	2.5	2.6	2.4	2.8	
2-Nov	2.5	Z	2.3	2.3	2.2	2.5	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.1	2.5	
3-Nov	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	2.2	2.4	2.3	2.3	2.3	2.3	2.4	2.4	2.4	2.3	2.2	2.4	
4-Nov	2.3	2.2	2.2	Z	2.2	2.2	2.2	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.3	
5-Nov	2.1	2.1	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.1	2.2	2.2	2.2	2.3	2.2	2.0	2.0	2.0	2.0	2.0	2.1	2.3	
6-Nov	2.0	2.0	2.0	2.1	2.1	Z	2.2	2.2	2.2	2.1	C	C	C	C	2.2	2.1	2.3	2.2	2.3	2.3	2.1	2.1	2.2	3.0	2.2	3.0	
7-Nov	Z	2.5	2.4	2.3	2.2	2.2	2.3	2.2	2.2	2.4	2.4	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.5	
8-Nov	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	
9-Nov	2.1	2.1	Z	2.1	2.2	2.3	3.1	2.8	2.7	2.3	2.5	2.4	2.1	2.1	2.1	2.1	2.2	2.3	2.2	2.2	2.2	2.2	2.1	2.1	2.3	3.1	
10-Nov	2.1	2.4	2.4	Z	2.3	2.1	2.2	2.4	3.2	2.4	2.2	2.2	2.2	2.3	2.3	2.2	2.3	2.4	2.4	2.3	2.2	2.2	2.2	2.3	2.3	3.2	
11-Nov	2.3	2.3	2.3	2.3	Z	2.3	2.4	2.4	2.4	2.4	2.5	2.6	2.9	4.0	4.6	3.5	2.4	2.4	2.3	2.4	2.4	2.5	2.6	3.0	2.7	4.6	
12-Nov	2.9	2.6	2.7	2.5	2.7	Z	2.3	2.4	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.2	2.9	
13-Nov	Z	2.0	2.0	2.0	2.0	2.1	2.1	2.2	2.1	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.3	2.1	2.1	2.1	2.1	2.1	2.3	
14-Nov	2.1	Z	2.3	2.3	2.2	2.2	2.2	2.2	2.3	2.3	2.2	2.1	2.1	2.2	2.2	2.0	2.1	2.1	2.1	2.2	2.2	2.2	2.3	2.4	2.2	2.4	
15-Nov	2.4	2.3	Z	2.4	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.6	2.2	2.6	
16-Nov	2.1	2.2	2.3	Z	2.3	2.4	2.3	2.3	2.3	2.2	2.1	2.1	2.2	2.4	2.2	2.3	2.6	2.2	2.1	2.3	2.3	2.4	2.3	2.1	2.3	2.6	
17-Nov	2.1	2.1	2.0	2.0	Z	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.1	2.1	2.2	2.2	2.2	2.1	2.0	1.9	UO	2.0	2.0	2.1	2.1	2.2	
18-Nov	2.3	2.4	2.4	2.8	3.2	Z	3.1	2.9	2.4	2.3	2.2	2.3	2.5	2.7	2.4	2.5	2.6	2.7	2.9	2.9	2.8	2.6	2.7	2.7	2.6	3.2	
19-Nov	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	--	--
20-Nov	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	--
21-Nov	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	M	M	M	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	--	2.3	
22-Nov	2.2	2.2	2.2	Z	2.3	2.1	2.1	2.1	2.2	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.2	2.3	
23-Nov	2.1	2.2	2.2	2.2	Z	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.3	2.3	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.3	
24-Nov	2.2	2.2	2.1	2.2	2.2	Z	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	2.3	2.2	2.3	2.4	2.4	2.1	2.4	
25-Nov	Z	2.4	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	2.3	2.3	2.3	2.3	2.2	2.2	2.1	2.1	2.2	2.4	
26-Nov	2.1	Z	2.1	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.2	2.3	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.4	2.3	2.4	
27-Nov	2.7	2.8	Z	3.1	3.1	3.2	3.2	3.1	3.0	2.7	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.5	2.7	2.2	2.0	2.1	2.2	2.1	2.5	3.2	
28-Nov	2.0	2.2	2.2	Z	2.1	2.2	2.4	2.3	2.1	2.0	2.1	2.0	2.1	2.1	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.0	2.1	2.4	
29-Nov	2.1	2.1	2.0	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	
30-Nov	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	2.2	2.5	2.2	2.1	2.1	2.1	2.1	2.1	2.5	

2.2	2.3	2.2	2.2	2.3	2.2	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	Diurnal Average	
2.9	2.8	2.7	3.1	3.2	3.2	3.2	3.1	3.2	2.7	2.5	2.6	2.9	4.0	4.6	3.5	2.6	2.7	2.9	2.9	2.8	2.6	2.7	3.0	Diurnal Maximum		

Z - zerospan      C - Calibration      M - Maintenance      AF - Analyzer Failure      UO - Unstable Operation





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

**Methane (CH<sub>4</sub>) - ppm**  
**Fort McKay South - November 2023**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2.0	65	10.38	10.38
2.1 - 3.0	549	87.70	98.08
3.1 - 10.0	12	1.92	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 626

Total Number of Hours: 720





**Wood Buffalo Environmental Association  
Frequency Distribution**

**Methane (CH<sub>4</sub>) - ppm  
Fort McKay South - November 2023**

Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	0	1	5	0	9	3	7	1	3	5	3	10	7	4	5	1	64
2.1 - 3.0	62	29	8	5	2	2	10	50	110	58	50	42	31	29	27	32	547
3.1 - 10.0	0	1	0	0	0	0	0	0	5	2	1	2	0	0	1	0	12
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	62	31	13	5	11	5	17	51	118	65	54	54	38	33	33	33	623

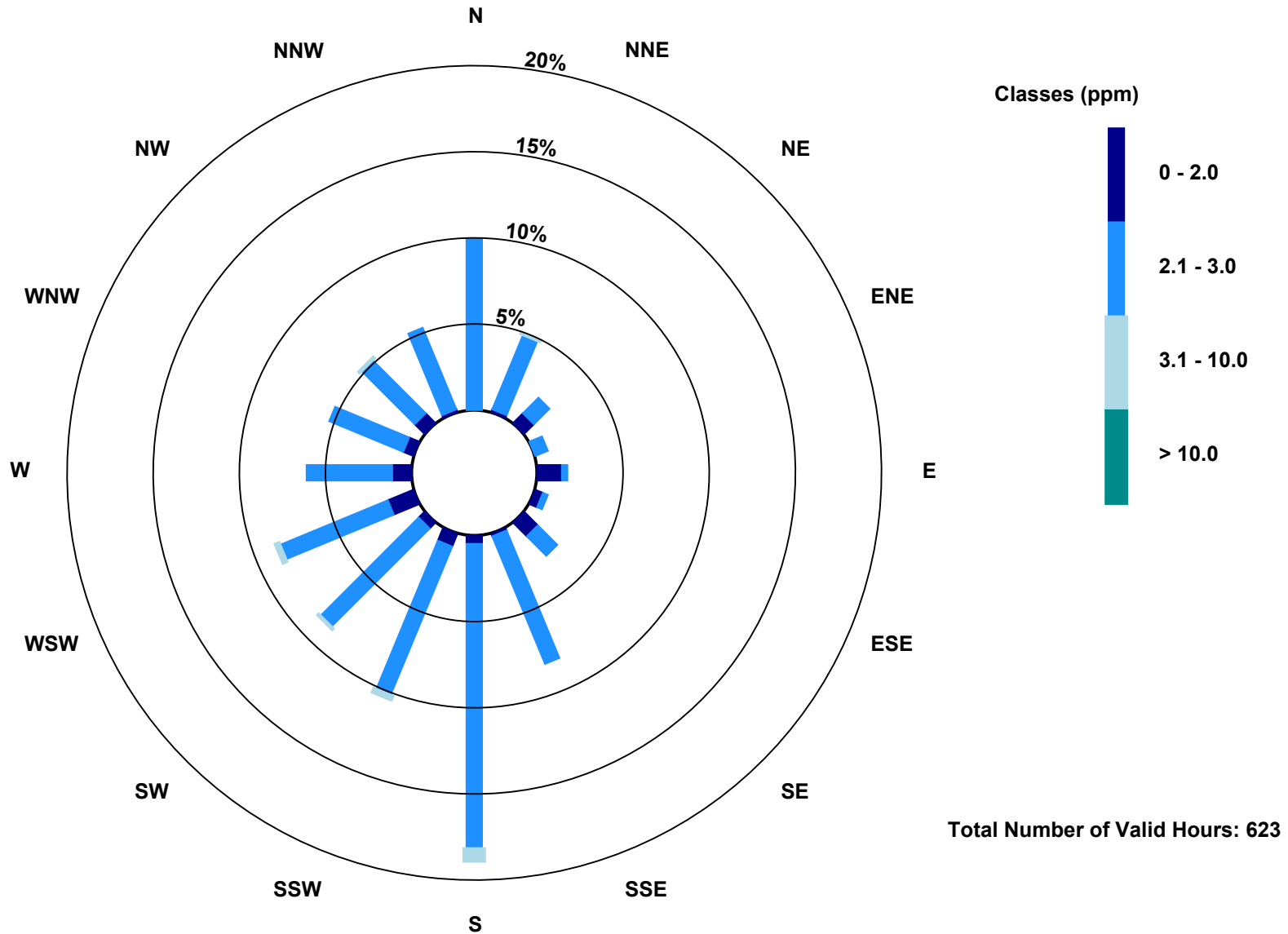
Total Number of Valid Hours: 623

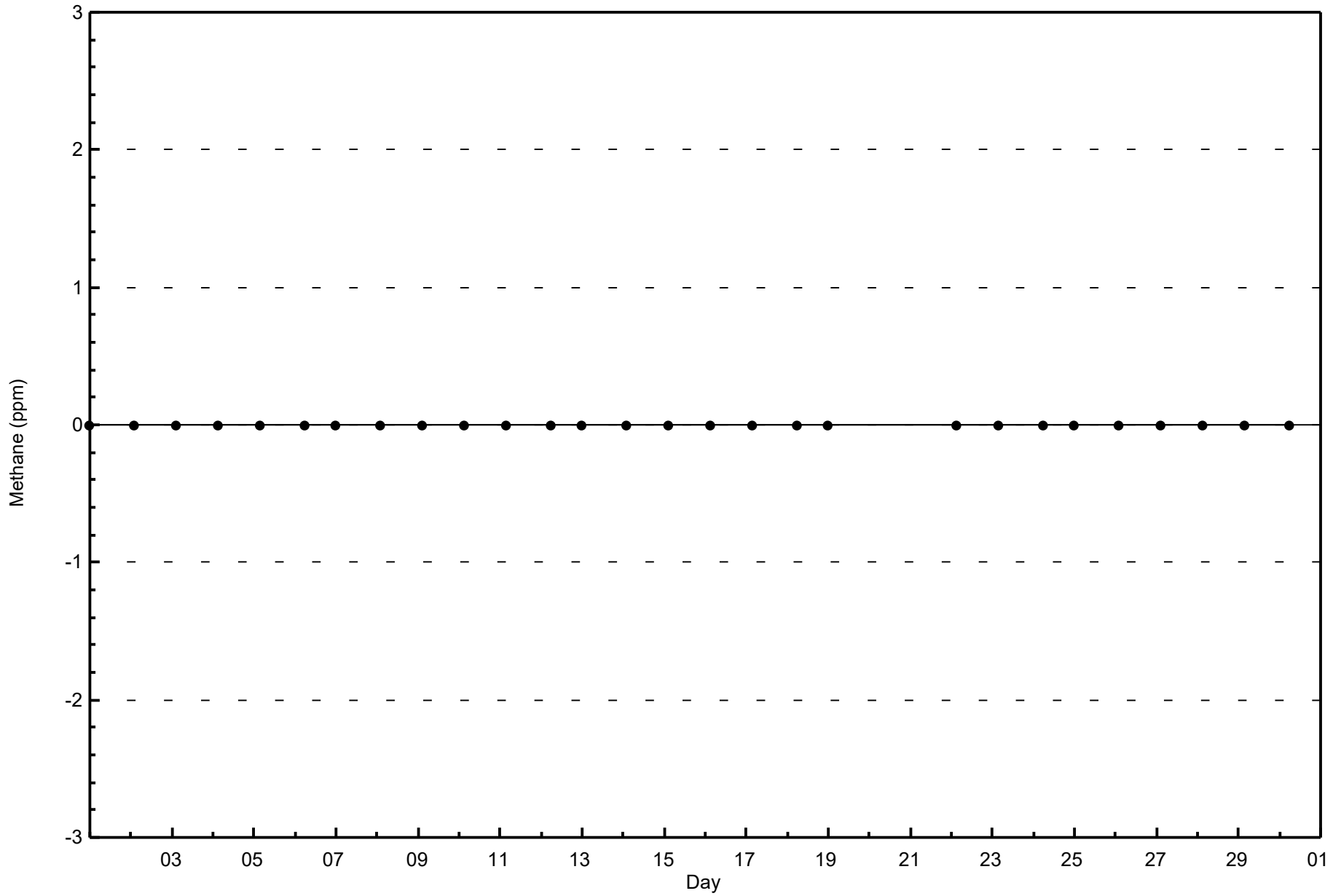
Total Number of Hours: 720

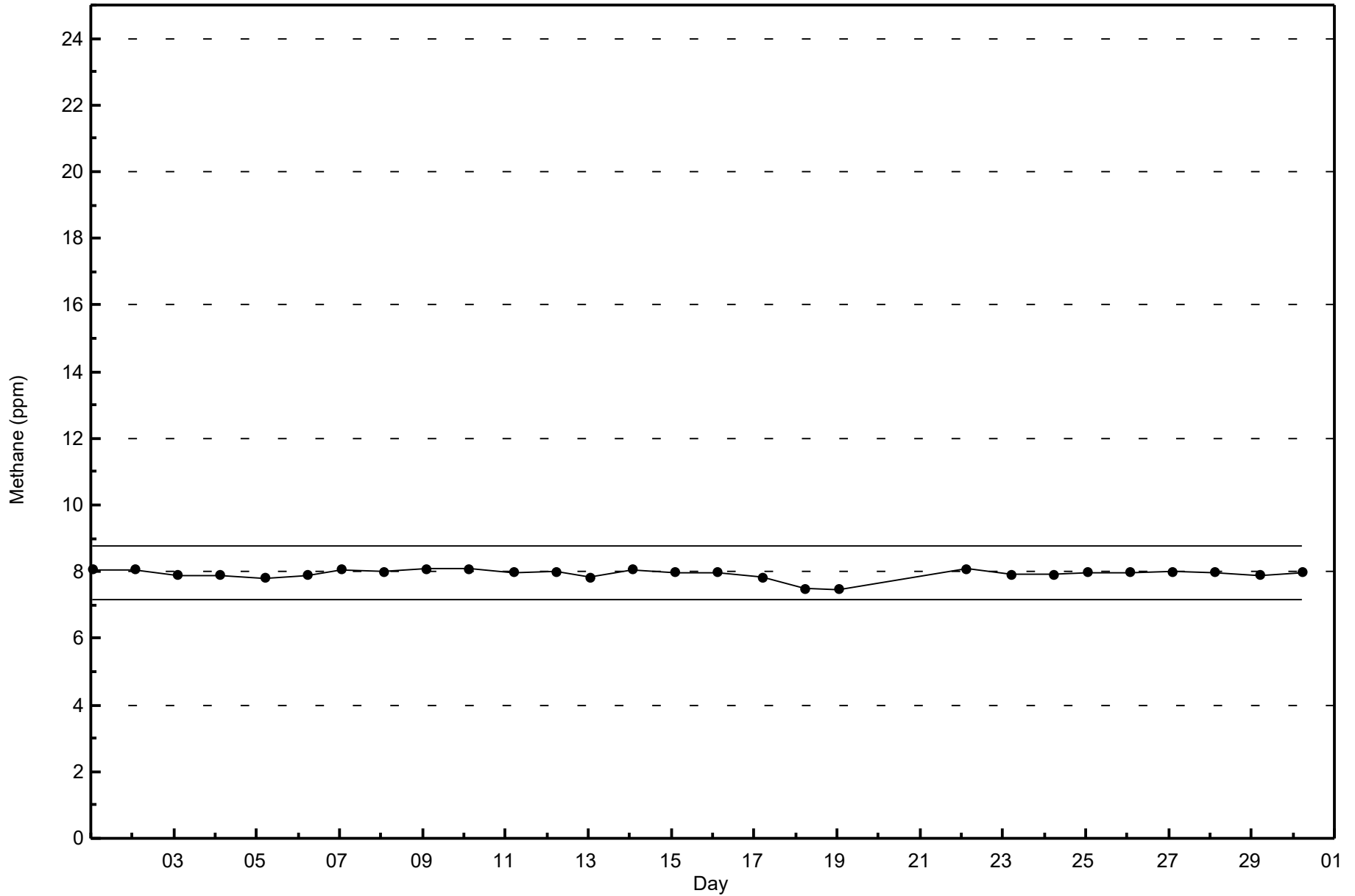


Wood Buffalo Environmental Association  
Wind Rose Nov 2023

Methane (CH<sub>4</sub>) - ppm  
Fort McKay South









Summary of Hour Averages

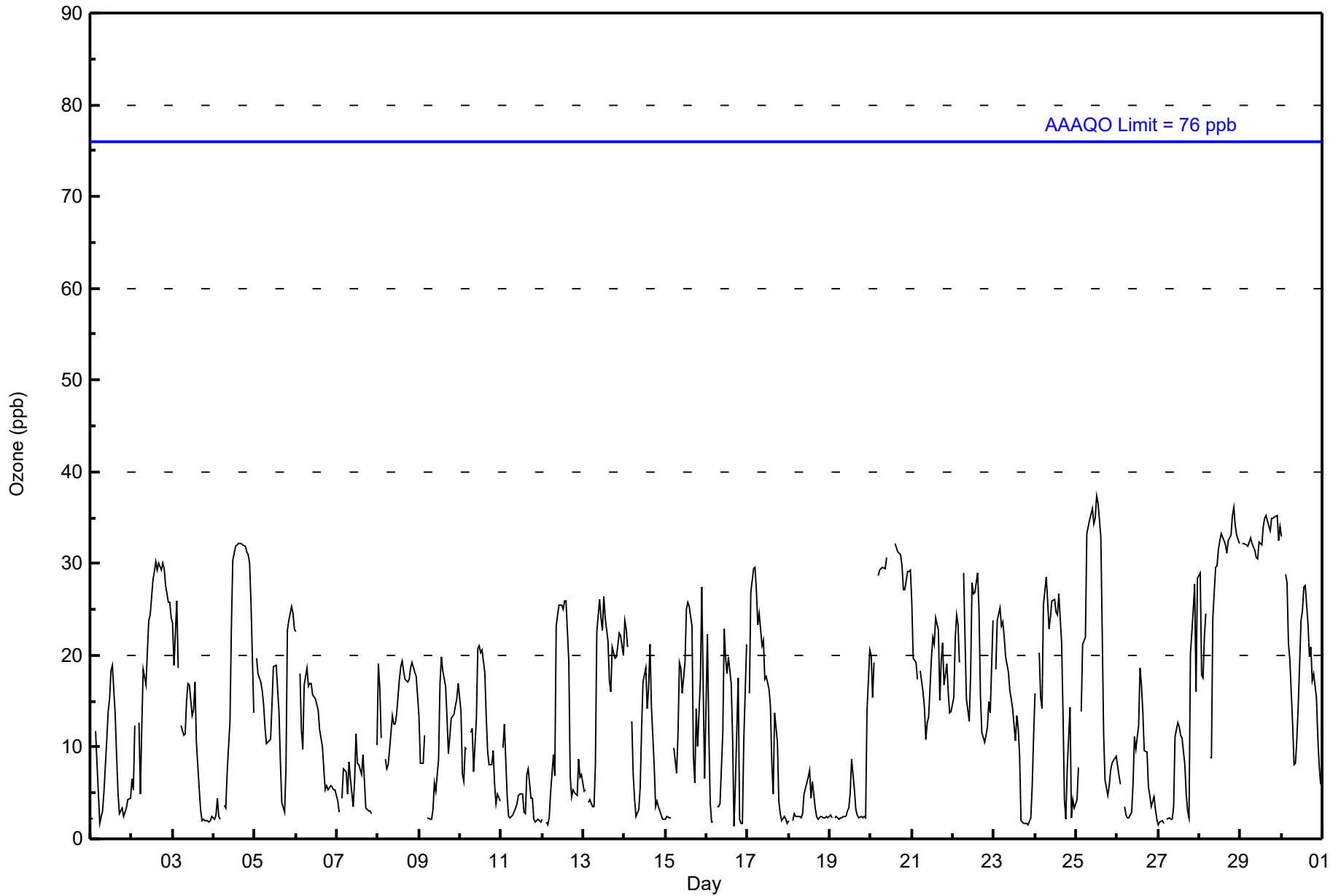
Fort McKay South - November 2023

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 37.4 ppb on Nov 25 13:00	Maximum Daily Average: 33.1 ppb on Nov 29		Hours of Data:	684
Minimum Value: 1.4 ppb on Nov 16 17:00	Minimum Daily Average: 3.3 ppb on Nov 18		Hours of Missing Data:	36
Maximum Diurnal Average: 20.1 ppb at hour 14	Minimum Diurnal Average: 11.7 ppb at hour 18		Hours of Calibration:	34
Monthly Average: 14.31 ppb	Percentiles: P <sub>1</sub> = 1.6 P <sub>10</sub> = 2.3 Q <sub>1</sub> = 4.8 Median = 13.2 Q <sub>3</sub> = 22.0 P <sub>90</sub> = 29.5 P <sub>99</sub> = 35.1		Percent Operational Time:	99.7

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	2.4	2.2	Z	11.7	8.2	1.6	2.4	3.1	5.2	10.9	13.8	15.3	18.2	18.9	13.5	9.2	5.0	2.8	3.3	2.5	2.9	3.4	4.2	4.4	7.2	18.9
2-Nov	6.5	5.4	12.4	Z	12.7	4.9	12.3	18.4	16.8	20.4	23.8	24.5	28.3	29.2	30.2	29.3	30.0	29.3	30.1	29.5	27.6	25.8	25.7	24.1	21.6	30.2
3-Nov	23.4	18.9	25.9	18.6	Z	12.3	11.3	11.5	15.1	17.0	16.8	13.4	14.0	17.1	10.5	5.5	3.2	2.0	2.2	1.9	1.9	1.8	1.9	2.4	10.8	25.9
4-Nov	2.1	2.6	4.4	2.5	2.1	Z	3.6	3.3	7.3	12.7	23.1	30.4	31.2	31.8	32.1	32.2	32.2	32.1	31.9	31.2	31.0	30.1	25.8	13.7	19.5	32.2
5-Nov	Z	19.6	18.0	17.1	16.2	14.7	12.1	10.4	10.7	10.8	14.6	18.8	18.9	16.4	13.9	8.4	4.0	2.8	7.8	22.7	23.9	25.3	24.5	22.8	15.4	25.3
6-Nov	22.6	Z	18.0	12.0	9.8	16.8	18.5	16.7	16.9	16.9	15.7	15.3	14.7	14.1	12.0	10.0	7.6	5.3	5.9	5.4	5.8	5.7	5.4	5.3	12.0	22.6
7-Nov	4.1	2.9	Z	4.5	7.6	7.3	4.9	8.4	6.6	3.5	6.2	11.5	8.2	8.0	6.9	9.2	6.4	3.3	3.0	3.0	2.8	UO	UO	10.2	6.1	11.5
8-Nov	19.1	16.5	11.0	Z	8.7	7.6	8.0	9.7	13.5	12.6	12.4	13.5	17.3	18.8	19.4	18.4	17.5	17.1	17.5	18.6	19.2	18.1	17.6	15.6	15.1	19.4
9-Nov	13.3	8.2	8.3	11.3	Z	2.2	2.1	2.1	3.2	6.1	5.2	8.6	16.9	19.9	18.3	16.6	13.2	9.3	11.1	13.1	13.5	14.5	15.3	16.9	10.8	19.9
10-Nov	13.8	7.1	6.3	10.0	9.8	Z	11.6	12.1	7.3	13.1	20.7	21.0	20.2	20.7	18.2	13.4	9.6	8.0	8.1	9.6	6.0	3.8	4.9	4.2	11.3	21.0
11-Nov	Z	10.0	12.5	4.5	2.5	2.3	2.4	2.6	3.4	3.7	4.8	4.8	4.8	2.8	2.7	7.1	7.7	4.5	4.4	2.2	1.9	2.1	2.0	1.8	4.2	12.5
12-Nov	2.2	Z	1.8	1.5	2.3	5.0	9.1	6.9	23.2	24.5	25.4	25.4	25.0	25.9	25.9	19.3	6.8	4.6	5.3	5.0	4.7	8.8	6.7	7.0	11.8	25.9
13-Nov	5.1	5.3	Z	3.9	4.2	3.5	3.6	8.1	22.6	26.1	24.0	22.8	26.3	24.0	21.5	17.3	16.0	20.9	19.6	19.9	21.1	22.4	22.1	19.9	16.5	26.3
14-Nov	23.7	22.9	20.9	Z	12.8	7.1	4.3	2.4	3.2	5.7	12.1	17.1	18.7	14.1	16.4	21.2	14.5	8.0	3.5	4.2	3.6	2.6	2.1	2.1	10.6	23.7
15-Nov	2.1	2.4	2.3	2.2	Z	9.9	7.1	11.5	19.3	18.6	15.9	19.2	25.0	25.7	25.3	23.2	9.1	6.2	14.3	10.1	17.4	27.4	16.4	6.5	13.8	27.4
16-Nov	22.2	11.7	4.0	1.9	1.8	Z	3.5	3.5	3.8	11.6	22.9	19.6	18.0	19.9	16.9	11.0	1.4	6.2	17.5	2.2	1.6	1.6	10.8	21.2	10.2	22.9
17-Nov	Z	15.8	26.9	29.4	29.5	27.0	23.4	24.5	21.0	21.6	17.4	17.7	16.4	14.5	8.2	4.9	13.8	10.5	4.1	2.8	1.9	2.4	2.1	1.7	14.7	29.5
18-Nov	2.0	Z	1.9	2.7	2.4	2.4	2.4	2.4	2.7	4.8	5.5	6.7	7.4	4.4	6.3	3.4	2.4	2.2	2.2	2.4	2.3	2.3	2.4	2.3	3.3	7.4
19-Nov	2.5	2.2	Z	2.3	2.4	2.1	2.3	2.3	2.4	2.4	3.1	3.4	5.0	8.6	5.3	3.2	2.5	2.4	2.5	2.3	2.4	2.3	14.0	20.7	4.3	20.7
20-Nov	20.0	15.4	19.2	Z	28.6	29.3	29.4	29.6	29.5	30.6	C	C	C	C	32.1	31.7	31.3	31.0	29.7	27.2	27.1	29.1	29.1	29.2	27.9	32.1
21-Nov	25.6	19.6	19.2	17.4	Z	18.3	16.0	14.3	10.9	12.7	13.3	19.7	22.0	21.3	24.1	22.7	15.0	19.4	21.4	16.8	19.1	16.0	13.7	13.9	17.9	25.6
22-Nov	15.3	21.9	24.4	23.3	19.2	Z	28.9	21.9	15.3	12.9	17.8	27.9	26.7	26.9	29.0	24.9	15.7	11.5	10.5	11.2	12.2	15.0	13.7	23.9	19.6	29.0
23-Nov	Z	18.5	23.8	25.1	23.1	23.6	22.0	19.9	18.2	16.2	15.3	14.2	10.6	13.5	12.1	9.0	2.0	1.6	1.7	1.6	1.5	2.3	5.8	11.3	12.7	25.1
24-Nov	15.9	Z	20.2	15.4	14.1	25.5	28.6	26.0	22.9	24.1	26.0	26.1	24.7	24.4	26.7	21.4	13.5	4.3	2.1	7.6	14.4	2.3	4.3	3.3	17.1	28.6
25-Nov	4.2	7.8	Z	13.9	21.3	21.9	33.3	34.0	34.8	36.1	34.2	34.9	37.4	36.6	32.9	22.4	11.4	6.3	4.7	5.8	7.5	8.3	8.6	9.1	20.3	37.4
26-Nov	7.9	6.8	6.0	Z	3.5	2.6	2.3	2.3	2.9	6.0	11.1	9.8	12.3	18.6	16.8	13.8	9.7	9.4	5.7	4.8	3.5	4.5	3.2	2.1	7.2	18.6
27-Nov	1.5	1.8	1.9	1.8	Z	2.1	2.2	2.2	2.1	3.5	11.1	12.6	12.2	11.3	11.1	8.1	4.8	3.0	2.3	20.2	24.8	27.8	16.1	28.4	9.3	28.4
28-Nov	29.0	17.8	17.6	22.1	24.5	Z	8.8	8.8	24.2	29.5	29.7	31.5	32.5	33.2	32.5	32.1	31.1	32.5	33.0	35.3	36.2	34.2	33.1	32.2	27.9	36.2
29-Nov	Z	32.2	32.2	32.0	32.0	32.3	32.8	32.1	31.4	30.7	30.5	32.3	32.1	34.0	35.0	35.2	34.6	33.5	34.9	34.9	35.1	35.2	32.5	34.1	33.1	35.2
30-Nov	33.0	Z	28.8	27.9	21.3	19.6	12.5	8.1	8.2	10.8	14.4	23.8	24.8	27.4	27.5	23.3	19.9	20.9	17.3	18.0	15.3	11.0	8.0	6.0	18.6	33.0

12.8	11.8	14.7	12.6	12.8	12.1	12.1	12.0	13.5	15.2	16.8	18.7	19.6	20.1	19.4	16.9	13.1	11.7	11.9	12.4	12.9	13.3	12.8	13.2	Diurnal Average	
33.0	32.2	32.2	32.0	32.0	32.3	33.3	34.0	34.8	36.1	34.2	34.9	37.4	36.6	35.0	35.2	34.6	33.5	34.9	35.3	36.2	35.2	33.1	34.1	Diurnal Maximum	

Z - zerospan                      C - Calibration                      UO - Unstable Operation  
 Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 76 ppb





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

**Ozone (O<sub>3</sub>) - ppb**  
**Fort McKay South - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	491	71.78	71.78
21 - 50	193	28.22	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 (O<sub>3</sub>) - ppb**  
**Fort McKay South - November 2023**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	49	21	1	3	1	2	8	52	120	63	45	37	19	25	23	20	489
21 - 50	16	14	12	2	10	3	7	7	7	7	13	25	29	17	10	14	193
51 - 82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 83	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	65	35	13	5	11	5	15	59	127	70	58	62	48	42	33	34	682

Total Number of Valid Hours: 682

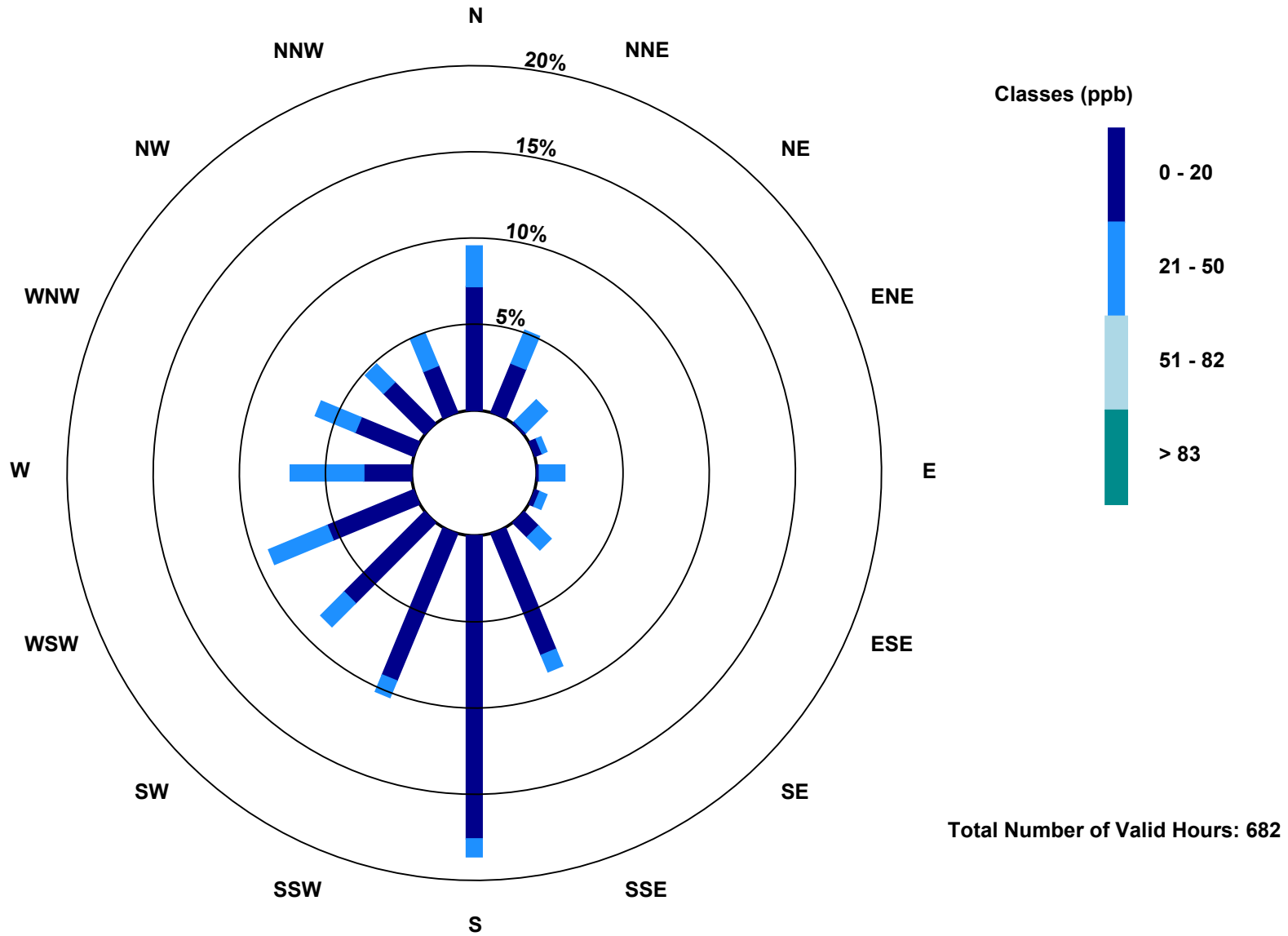
Total Number of Hours: 720

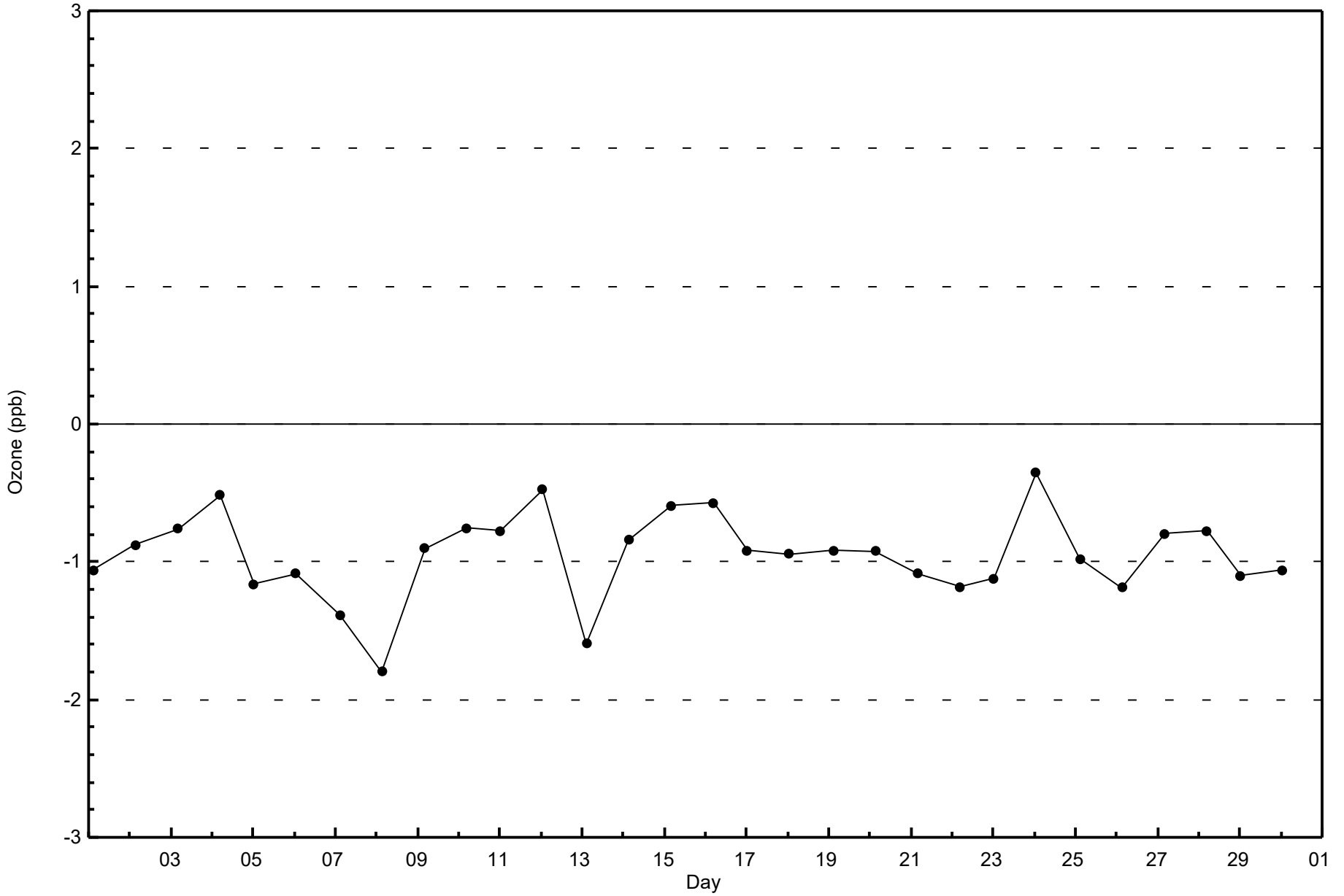


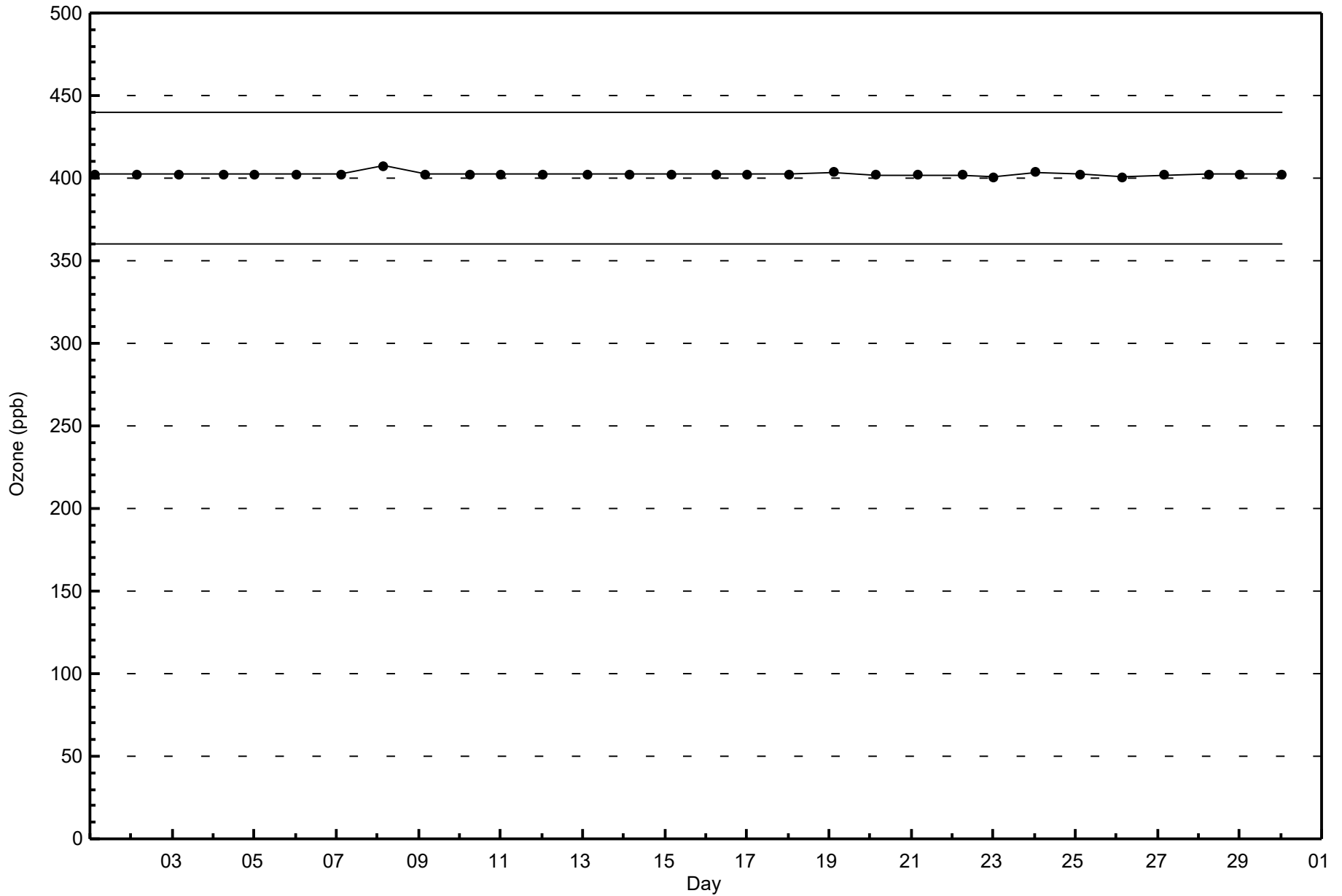


Wood Buffalo Environmental Association  
Wind Rose Nov 2023

Ozone (O<sub>3</sub>) - ppb  
Fort McKay South

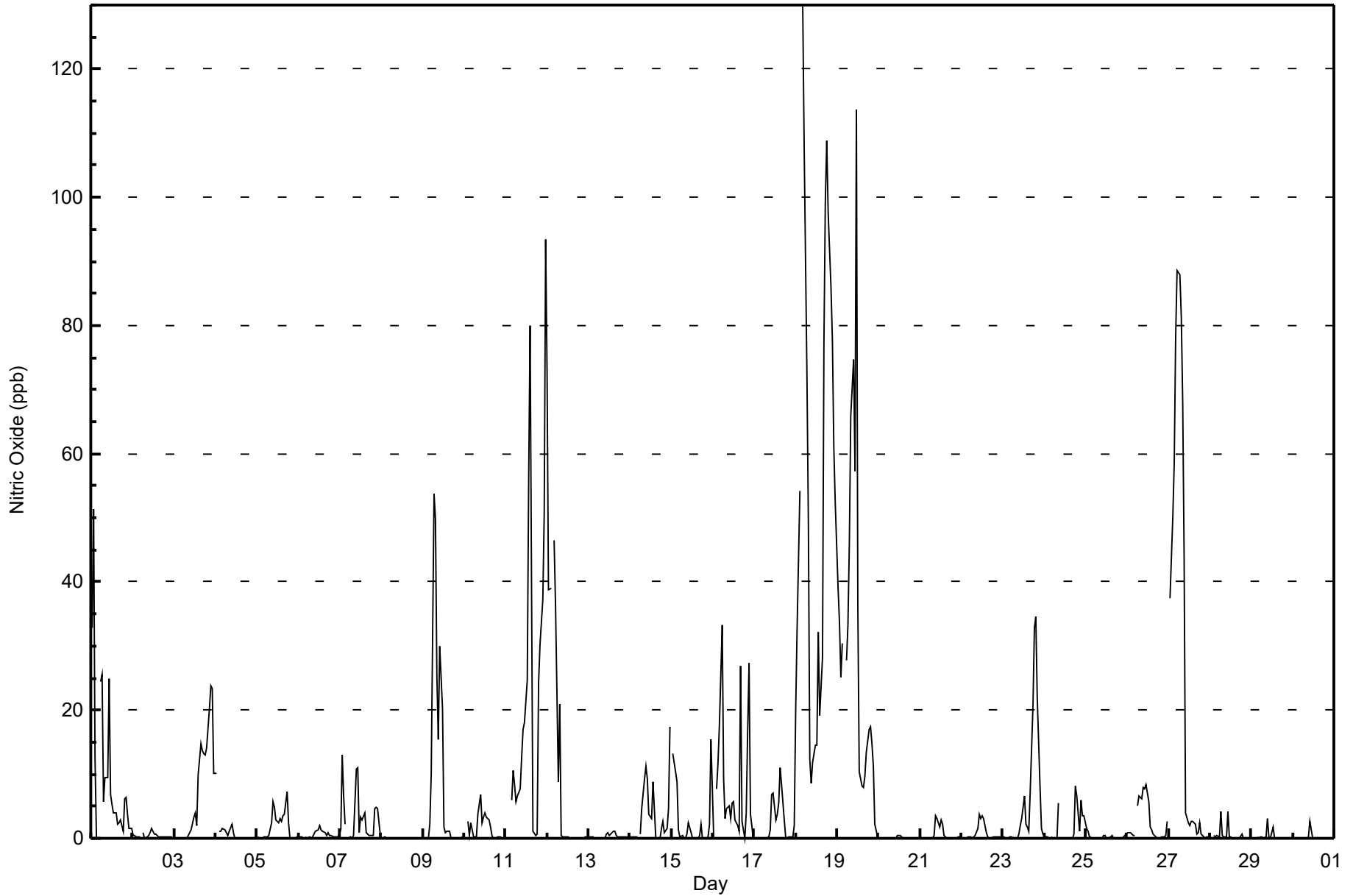








Maximum Value: 129.7 ppb on Nov 18 05:00																						Maximum Daily Average: 55.1 ppb on Nov 18																						Hours in Service: 720					
Minimum Value: 0.0 ppb on Nov 3 02:00																						Minimum Daily Average: 0.0 ppb on Nov 8																						Hours of Data: 686					
Maximum Diurnal Average: 13.6 ppb at hour 6																						Minimum Diurnal Average: 4.0 ppb at hour 16																						Hours of Missing Data: 34					
Monthly Average: 7.14 ppb																						Percentiles: P <sub>1</sub> = 0.0 P <sub>10</sub> = 0.0 Q <sub>1</sub> = 0.1 Median = 0.4 Q <sub>3</sub> = 4.0 P <sub>90</sub> = 20.8 P <sub>99</sub> = 89.4																						Hours of Calibration: 34					
																						Percent Operational Time: 100.0																											
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Nov	32.9	51.4	12.5	0.1	Z	24.4	25.5	5.8	9.5	9.5	24.9	6.8	5.3	3.9	4.0	2.2	2.4	2.9	1.0	6.3	6.3	3.7	1.6	1.6	10.6	51.4																							
2-Nov	0.5	0.5	0.3	0.2	0.1	Z	0.9	0.1	0.3	0.5	0.8	1.5	0.6	0.6	0.4	0.3	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.1	0.4	1.5																							
3-Nov	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	1.0	1.3	3.2	3.9	2.1	9.8	14.7	13.6	13.3	13.0	14.2	20.3	23.9	23.3	10.2	7.3	23.9																							
4-Nov	10.2	Z	1.0	1.1	1.6	1.2	0.8	0.5	1.1	2.3	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.9	10.2																							
5-Nov	0.1	0.1	Z	0.1	0.1	0.2	0.2	0.3	2.5	5.8	4.8	2.9	2.4	3.0	2.8	3.4	3.8	7.3	2.4	0.0	0.0	0.0	0.0	0.1	1.9	7.3																							
6-Nov	0.1	0.1	0.1	Z	0.2	0.1	0.1	0.1	0.2	0.7	1.0	1.4	2.0	1.3	1.1	0.8	0.5	0.8	0.4	0.5	0.3	0.3	0.2	0.2	0.6	2.0																							
7-Nov	1.4	13.0	6.5	2.2	Z	0.2	0.3	0.1	0.5	10.8	11.0	0.8	3.2	2.9	4.1	0.8	0.7	0.4	0.5	0.5	4.6	5.0	4.6	0.4	3.2	13.0																							
8-Nov	0.0	0.0	0.1	0.1	0.0	Z	0.1	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	0.0	0.0	0.0	0.1	0.0	0.1																							
9-Nov	Z	0.0	0.0	0.1	2.2	9.8	53.8	49.7	25.3	15.5	30.0	20.3	1.8	0.9	1.1	1.1	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.2	9.2	53.8																							
10-Nov	0.0	Z	2.7	0.4	2.3	0.2	0.2	0.3	3.8	6.9	2.4	3.3	3.9	3.2	2.8	1.7	0.4	0.1	0.1	0.1	0.2	0.2	0.1	0.0	1.5	6.9																							
11-Nov	0.0	0.1	Z	5.9	10.6	8.4	5.7	6.7	7.7	12.6	17.0	18.0	24.8	56.2	80.0	40.0	1.1	0.5	0.6	24.3	30.1	37.3	50.7	93.4	23.1	93.4																							
12-Nov	72.9	38.7	39.0	Z	46.4	36.5	8.9	20.8	0.5	0.2	0.2	0.2	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2	11.5	72.9																							
13-Nov	0.2	0.3	0.2	0.1	Z	0.0	0.0	0.0	0.0	0.1	0.7	1.0	0.5	0.8	1.0	1.2	0.4	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.4	1.2																							
14-Nov	0.1	0.2	0.2	0.2	0.2	Z	0.7	4.7	9.3	11.3	9.3	3.8	3.1	8.8	4.5	0.0	0.0	0.0	1.6	2.6	1.0	1.6	4.6	17.4	3.7	17.4																							
15-Nov	Z	13.3	10.3	8.8	1.3	0.3	0.4	0.0	0.0	0.6	2.5	1.0	0.0	0.0	0.0	0.0	0.5	2.1	0.0	0.0	0.1	0.1	2.2	15.4	2.6	15.4																							
16-Nov	0.0	Z	7.7	11.6	17.7	33.3	9.3	3.1	4.7	5.0	3.1	5.6	5.7	2.8	1.9	1.2	26.9	2.7	0.1	3.9	16.6	27.3	3.8	0.0	8.4	33.3																							
17-Nov	0.0	0.0	Z	0.1	0.0	0.1	0.0	0.0	0.3	1.4	6.7	7.1	2.9	3.8	5.5	11.0	8.5	2.6	0.0	0.1	0.2	0.1	0.2	1.9	2.3	11.0																							
18-Nov	19.8	32.7	54.2	Z	129.7	108.2	71.9	49.2	12.4	8.6	11.9	14.6	14.6	32.1	19.3	28.2	77.1	99.4	108.9	97.6	86.0	77.7	61.0	52.4	55.1	129.7																							
19-Nov	39.2	33.7	25.1	30.5	Z	27.7	33.3	46.0	66.0	74.8	57.3	113.8	36.3	10.4	8.1	8.0	9.7	13.4	16.9	17.3	14.9	11.3	2.3	0.2	30.3	113.8																							
20-Nov	0.1	0.0	0.1	0.1	0.1	Z	0.0	0.0	0.0	0.0	0.1	0.4	0.4	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.4																							
21-Nov	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	3.5	3.1	1.8	2.8	2.3	0.4	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.2	0.2	0.7	3.5																							
22-Nov	0.0	Z	0.1	0.1	0.2	0.1	0.1	0.1	0.5	1.6	3.6	3.0	3.6	3.2	0.9	0.3	0.0	0.0	0.2	0.3	0.3	0.2	0.2	0.2	0.8	3.6																							
23-Nov	0.2	0.2	Z	0.1	0.1	0.2	0.0	0.0	0.0	0.8	1.9	3.1	6.7	2.3	1.8	1.0	7.2	20.7	32.8	34.6	22.0	8.0	1.5	0.6	6.3	34.6																							
24-Nov	0.5	0.3	0.2	Z	0.2	0.1	0.1	0.0	5.5	C	C	C	C	0.0	0.0	0.0	0.0	0.7	8.2	6.7	1.2	6.0	3.4	3.5	1.9	8.2																							
25-Nov	1.6	1.0	0.3	0.2	Z	0.1	0.0	0.0	0.0	0.1	0.5	0.4	0.0	0.0	0.2	0.3	0.0	0.0	0.0	0.0	0.0	0.2	0.7	0.3	1.6																								
26-Nov	0.8	0.9	0.8	0.5	0.4	Z	5.1	6.7	6.1	7.9	7.7	8.4	5.7	1.7	1.2	0.7	0.5	0.0	0.0	0.0	0.2	0.2	0.4	2.6	2.5	8.4																							
27-Nov	Z	37.4	50.2	58.7	78.2	88.7	87.8	81.4	67.9	43.7	4.0	2.4	2.1	2.7	2.8	2.2	0.7	0.9	2.4	0.6	0.1	0.1	0.3	0.1	26.8	88.7																							
28-Nov	0.0	Z	0.4	0.2	0.4	0.3	4.2	0.3	0.2	0.2	4.1	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.5	4.2																							
29-Nov	0.0	0.1	Z	0.1	0.1	0.2	0.1	0.1	0.1	3.1	0.2	0.1	1.7	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	3.1																							
30-Nov	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.3	2.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	2.6																							
																								7.2	9.0	8.5	4.9	11.7	13.6	10.3	9.2	7.5	7.9	7.4	7.8	4.6	4.8	5.1	4.0	5.1	5.6	6.3	7.0	6.8	6.8	5.4	6.7	Diurnal Average	
																								72.9	51.4	54.2	58.7	129.7	108.2	87.8	81.4	67.9	74.8	57.3	113.8	36.3	56.2	80.0	40.0	77.1	99.4	108.9	97.6	86.0	77.7	61.0	93.4	Diurnal Maximum	
Z - zerospan C - Calibration																																																	





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

**Nitric Oxide (NO) - ppb**  
**Fort McKay South - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	616	89.80	89.80
21 - 40	35	5.10	94.90
41 - 80	24	3.50	98.40
81 - 159	10	1.46	99.85
> 159	0	0.00	99.85

Total Number of Valid Hours: 686

Total Number of Hours: 720



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

**Nitric Oxide (NO) - ppb**  
**Fort McKay South - November 2023**

<b>Concentration</b> <b>Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 20	61	36	13	5	11	5	16	54	111	50	46	52	47	44	29	34	614
21 - 40	2	0	0	0	0	0	1	5	6	10	6	2	1	1	1	0	35
41 - 80	0	1	0	0	0	0	0	0	10	5	4	3	0	0	1	0	24
81 - 159	0	0	0	0	0	0	0	0	0	6	3	1	0	0	0	0	10
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	<b>63</b>	<b>37</b>	<b>13</b>	<b>5</b>	<b>11</b>	<b>5</b>	<b>17</b>	<b>59</b>	<b>127</b>	<b>71</b>	<b>59</b>	<b>58</b>	<b>48</b>	<b>45</b>	<b>31</b>	<b>34</b>	<b>683</b>

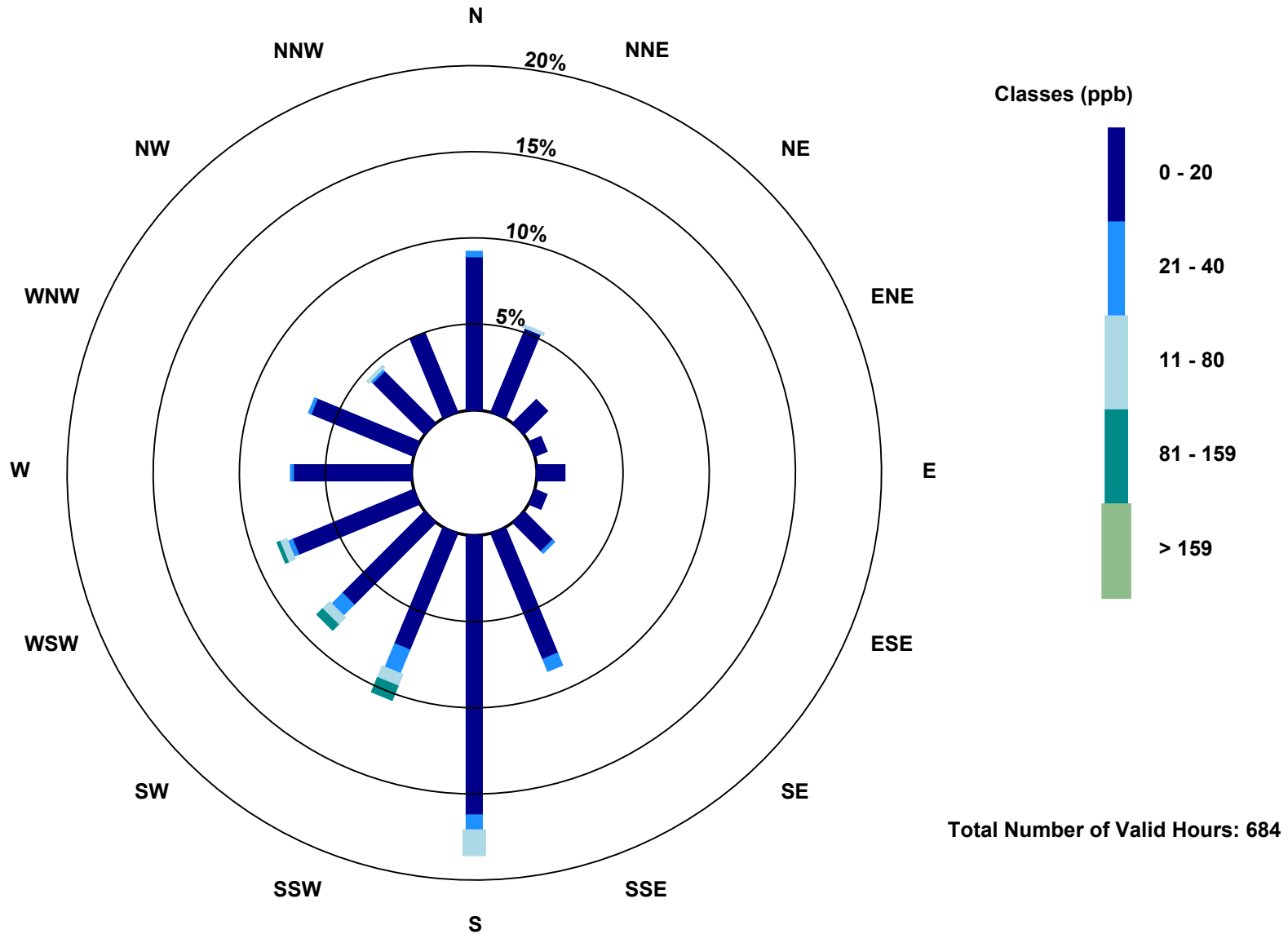
Total Number of Valid Hours: 684

Total Number of Hours: 720

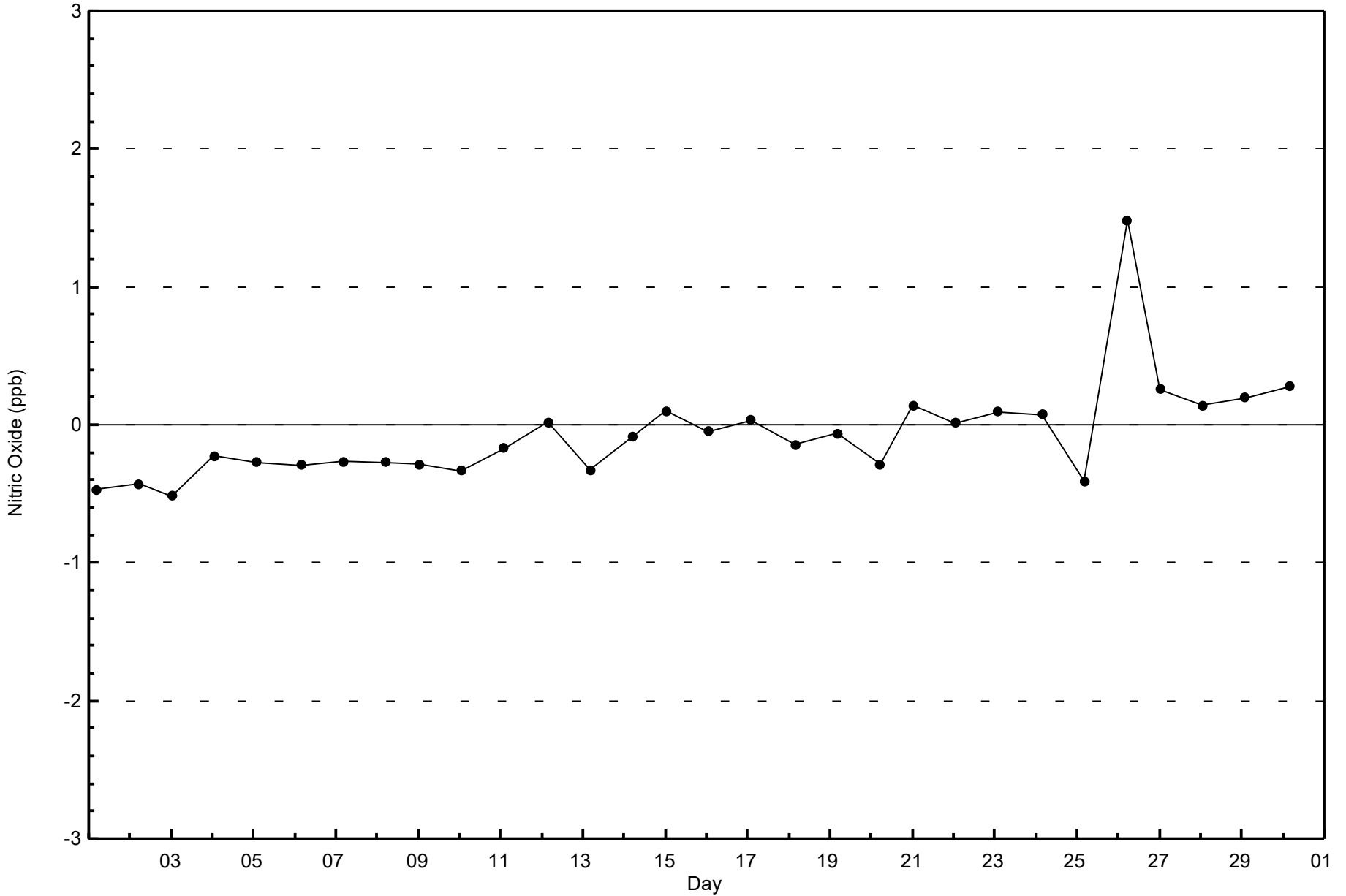


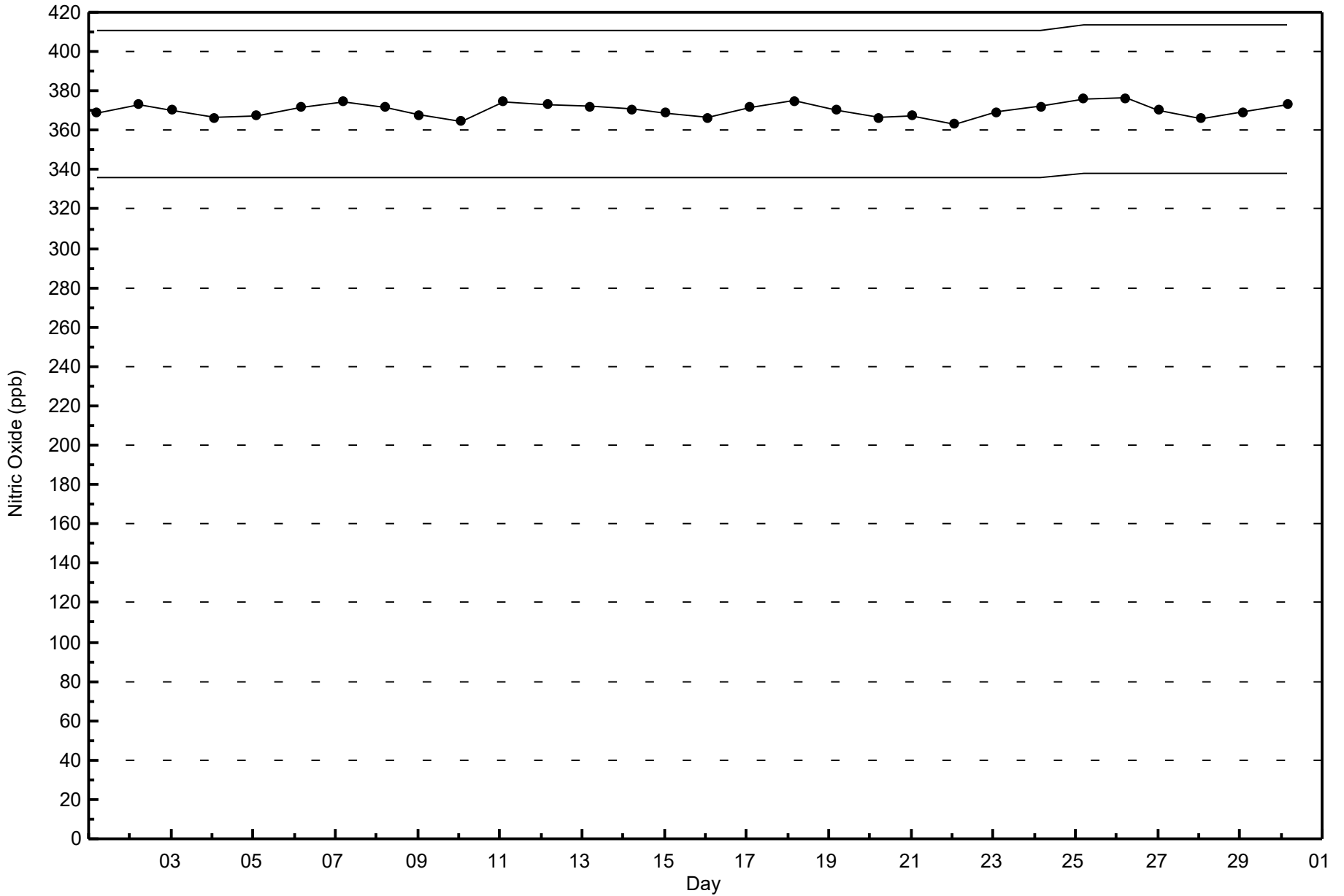
Wood Buffalo Environmental Association  
Wind Rose Nov 2023

Nitric Oxide (NO) - ppb  
Fort McKay South











Wood Buffalo Environmental Association

Summary of Hour Averages

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

Fort McKay South - November 2023

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 26.1 ppb on Nov 28 07:00	Maximum Daily Average: 13.2 ppb on Nov 3		Hours of Data:	686
Minimum Value: 0.0 ppb on Nov 12 17:00	Minimum Daily Average: 0.1 ppb on Nov 20		Hours of Missing Data:	34
Maximum Diurnal Average: 8.9 ppb at hour 7	Minimum Diurnal Average: 5.8 ppb at hour 22		Hours of Calibration:	34
Monthly Average: 7.08 ppb	Percentiles: P <sub>1</sub> = 0.0 P <sub>10</sub> = 0.3 Q <sub>1</sub> = 1.9 Median = 6.4 Q <sub>3</sub> = 10.9 P <sub>90</sub> = 14.8 P <sub>99</sub> = 20.9		Percent Operational Time:	100.0

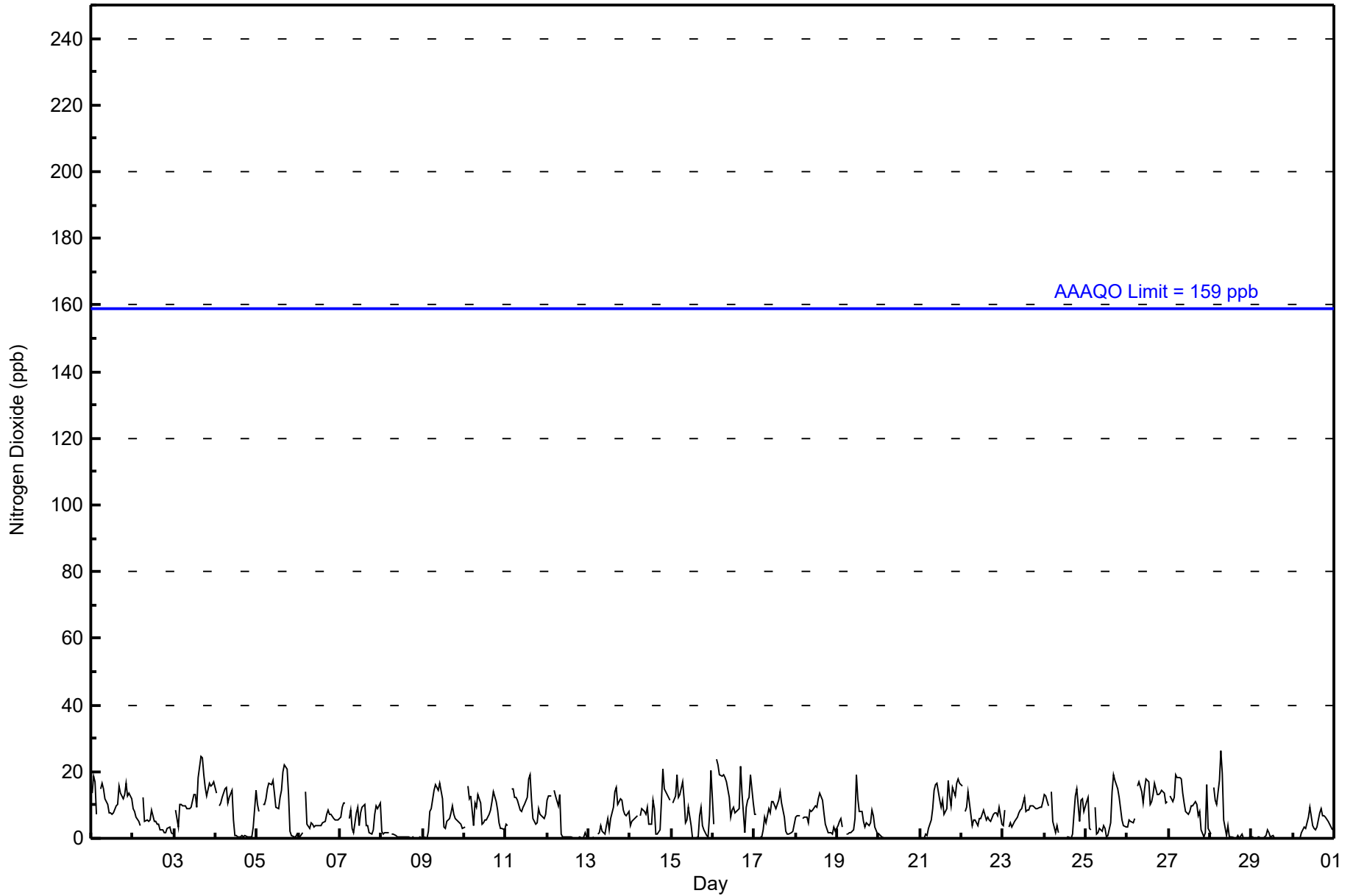
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Nov	13.7	18.5	16.8	7.3	Z	14.7	16.6	14.7	11.9	10.0	7.5	7.8	7.4	7.5	9.8	10.0	15.7	13.5	12.0	13.2	16.4	12.8	13.5	11.9	12.3	18.5																							
2-Nov	9.0	8.2	6.4	5.2	3.9	Z	12.3	4.9	5.4	5.0	5.3	8.4	4.9	5.2	4.3	4.1	2.5	2.6	1.5	1.8	2.8	3.4	1.9	1.3	4.8	12.3																							
3-Nov	Z	8.5	3.2	10.2	10.1	9.8	9.7	8.9	9.1	8.9	9.3	13.0	13.2	9.2	18.3	24.5	24.2	19.2	15.4	12.8	16.4	15.5	16.3	17.1	13.2	24.5																							
4-Nov	13.5	Z	9.7	10.5	12.1	14.7	15.4	10.7	12.4	14.5	5.7	0.9	0.8	0.6	0.5	0.7	0.6	0.7	0.5	0.4	0.3	0.4	3.3	14.4	6.2	15.4																							
5-Nov	10.1	8.1	Z	10.0	10.1	11.7	14.7	16.5	16.2	17.3	13.4	9.2	9.0	12.1	14.4	19.9	22.0	20.8	13.2	2.2	0.8	0.4	0.5	1.3	11.0	22.0																							
6-Nov	0.5	0.6	1.8	Z	13.8	4.3	3.1	4.5	4.3	3.4	3.7	3.8	3.7	3.7	4.6	5.2	7.1	8.5	7.0	7.1	5.9	5.6	5.4	5.6	4.9	13.8																							
7-Nov	6.5	9.3	10.7	10.4	Z	5.9	8.3	2.9	1.8	7.6	9.3	3.9	7.7	9.2	10.3	4.0	3.9	1.8	1.4	2.4	7.3	9.7	8.8	10.7	6.7	10.7																							
8-Nov	2.2	1.2	1.5	1.8	1.7	Z	1.3	1.1	0.7	0.6	0.6	0.6	0.4	0.4	0.4	0.3	0.3	0.2	0.3	0.2	0.2	0.2	0.3	0.2	0.7	2.2																							
9-Nov	Z	0.3	0.1	2.0	8.1	9.0	14.2	16.3	15.4	14.5	16.4	12.0	3.4	3.1	4.9	5.8	7.8	9.8	7.4	5.8	4.9	4.7	4.3	2.9	7.5	16.4																							
10-Nov	3.5	Z	15.8	11.7	12.8	3.9	10.7	9.5	13.0	10.4	4.3	4.8	5.7	5.7	7.3	8.4	10.9	14.0	11.1	8.3	4.7	3.1	2.8	2.4	8.0	15.8																							
11-Nov	4.1	3.7	Z	14.8	14.7	12.2	12.3	11.5	8.6	8.0	9.2	10.1	12.2	17.6	19.1	11.5	6.1	4.2	4.5	8.7	7.2	6.2	5.9	7.1	9.5	19.1																							
12-Nov	11.6	12.5	12.7	Z	14.4	12.9	9.9	13.1	1.2	0.4	0.4	0.4	0.3	0.3	0.3	0.2	0.0	0.1	0.1	0.3	0.1	0.4	1.9	0.4	4.1	14.4																							
13-Nov	0.1	0.2	0.2	0.4	Z	1.2	1.7	3.9	2.1	1.3	3.7	6.1	2.6	5.8	9.4	14.0	15.1	10.1	11.7	11.5	8.6	7.3	6.8	8.2	5.7	15.1																							
14-Nov	3.8	5.0	5.3	6.4	6.9	Z	6.6	8.7	8.2	7.2	9.2	4.4	4.2	11.3	9.0	1.3	1.4	2.7	11.5	20.7	15.0	13.2	12.3	11.4	8.1	20.7																							
15-Nov	Z	10.4	12.9	19.2	12.3	13.3	17.0	11.9	4.5	5.5	9.3	4.0	0.0	0.1	0.2	0.6	6.6	9.2	3.8	2.6	0.8	0.3	6.8	20.5	7.5	20.5																							
16-Nov	4.4	Z	23.7	22.0	19.1	18.7	19.1	18.1	17.0	12.1	6.5	8.3	9.5	7.6	8.4	8.7	21.7	13.4	1.6	9.5	11.6	12.1	19.2	10.4	13.2	23.7																							
17-Nov	7.0	7.2	Z	0.6	0.6	2.6	6.2	4.6	8.8	7.8	11.0	10.9	8.9	10.0	11.3	13.8	10.8	6.3	2.0	1.3	1.1	1.7	2.0	4.2	6.1	13.8																							
18-Nov	6.4	6.8	6.6	Z	6.1	6.3	6.2	4.7	8.5	8.1	8.3	9.6	9.4	12.0	13.6	11.4	7.8	4.3	3.0	1.6	1.5	1.4	3.3	2.0	6.5	13.6																							
19-Nov	3.9	5.2	6.1	3.2	Z	1.4	1.2	1.9	1.5	2.4	6.0	19.0	11.7	8.1	8.2	5.0	3.6	4.5	3.7	4.8	8.4	6.8	3.5	1.1	5.3	19.0																							
20-Nov	1.1	0.7	0.3	0.1	0.1	Z	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	0.1	0.1	0.1	1.1																							
21-Nov	Z	0.2	0.2	1.1	0.9	2.9	5.7	8.7	14.6	16.2	16.6	11.5	9.5	11.4	7.4	9.0	17.4	12.5	9.8	15.3	12.9	16.4	17.7	16.7	10.2	17.7																							
22-Nov	15.6	Z	8.2	9.5	13.9	7.4	3.7	5.5	5.5	3.7	6.1	5.9	7.2	8.4	5.5	6.2	5.5	5.2	7.2	7.6	7.5	6.9	9.5	4.4	7.2	15.6																							
23-Nov	4.0	8.4	Z	3.4	4.5	3.3	4.2	5.1	6.4	7.5	8.3	8.9	12.4	8.2	8.6	8.3	9.9	9.8	9.2	9.1	8.8	9.5	9.5	11.1	7.8	12.4																							
24-Nov	13.0	12.6	9.6	Z	13.9	5.0	1.9	3.8	1.7	C	C	C	C	0.4	0.4	0.1	1.1	7.3	12.7	14.7	4.9	11.6	11.8	8.0	7.1	14.7																							
25-Nov	10.9	12.4	3.1	2.6	Z	9.4	1.4	1.9	2.8	2.2	3.9	3.0	0.4	0.8	4.6	13.9	19.1	17.5	14.7	12.2	8.7	5.5	4.0	3.2	6.9	19.1																							
26-Nov	3.5	5.5	4.9	4.8	5.8	Z	15.8	17.1	13.9	10.7	14.9	17.9	17.1	10.1	10.9	13.0	16.4	13.0	13.3	13.5	14.3	13.7	10.7	11.1	11.8	17.9																							
27-Nov	Z	12.8	10.9	12.4	19.2	18.4	18.3	17.9	13.5	10.6	8.0	7.4	8.0	9.7	9.9	11.0	10.1	6.9	8.1	2.7	0.6	1.7	16.1	2.8	10.3	19.2																							
28-Nov	1.2	Z	15.4	11.5	10.2	17.5	26.1	19.4	5.7	0.9	3.9	0.6	0.3	0.3	0.2	0.2	0.9	0.1	1.2	0.1	0.2	0.2	0.2	0.3	5.1	26.1																							
29-Nov	0.4	0.4	Z	0.4	0.3	0.2	0.2	0.1	1.0	2.5	1.5	0.3	0.8	0.1	0.1	0.1	0.0	0.0	0.1	0.0	0.1	0.1	0.1	0.1	0.4	2.5																							
30-Nov	0.1	0.2	0.1	Z	0.2	1.8	3.5	3.1	4.6	6.2	9.4	3.8	3.1	2.6	3.4	7.6	9.1	6.9	6.9	6.5	5.2	4.2	3.3	2.6	4.1	9.4																							
																								6.0	6.4	7.4	7.3	8.6	8.3	8.9	8.4	7.3	7.1	7.3	6.8	6.0	6.1	6.8	7.3	8.6	7.5	6.5	6.6	5.9	5.8	6.7	6.5	Diurnal Average	
																								15.6	18.5	23.7	22.0	19.2	18.7	26.1	19.4	17.0	17.3	16.6	19.0	17.1	17.6	19.1	24.5	24.2	20.8	15.4	20.7	16.4	16.4	19.2	20.5	Diurnal Maximum	

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



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

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb**  
**Fort McKay South - November 2023**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Fort McKay South - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	676	98.54	98.54
21 - 40	10	1.46	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 686

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Fort McKay South - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 20	62	37	13	5	11	5	17	59	127	71	55	58	48	44	31	31	674
21 - 40	1	0	0	0	0	0	0	0	1	0	4	0	0	1	0	3	10
41 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	<b>63</b>	<b>37</b>	<b>13</b>	<b>5</b>	<b>11</b>	<b>5</b>	<b>17</b>	<b>59</b>	<b>128</b>	<b>71</b>	<b>59</b>	<b>58</b>	<b>48</b>	<b>45</b>	<b>31</b>	<b>34</b>	<b>684</b>

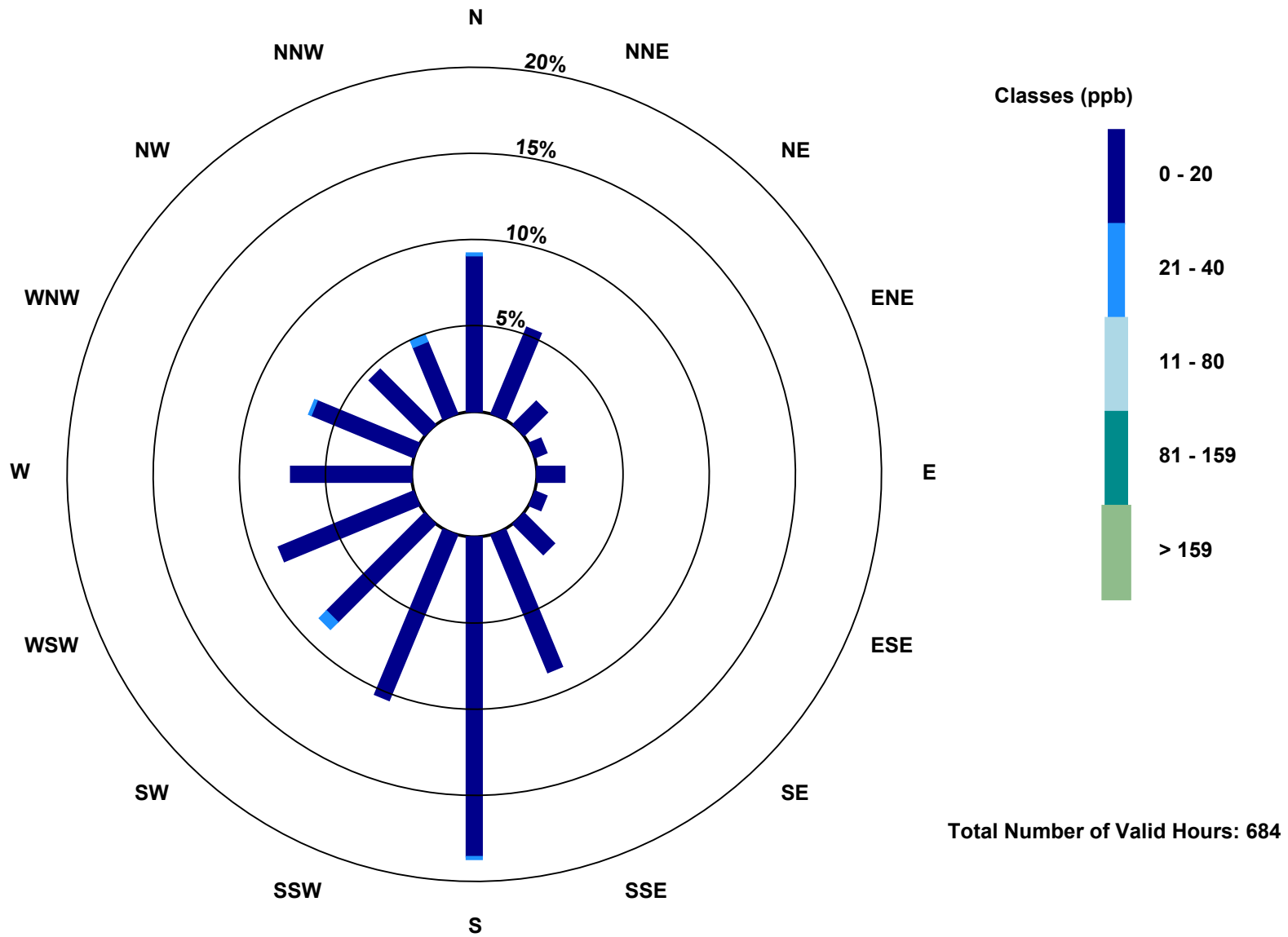
Total Number of Valid Hours: 684

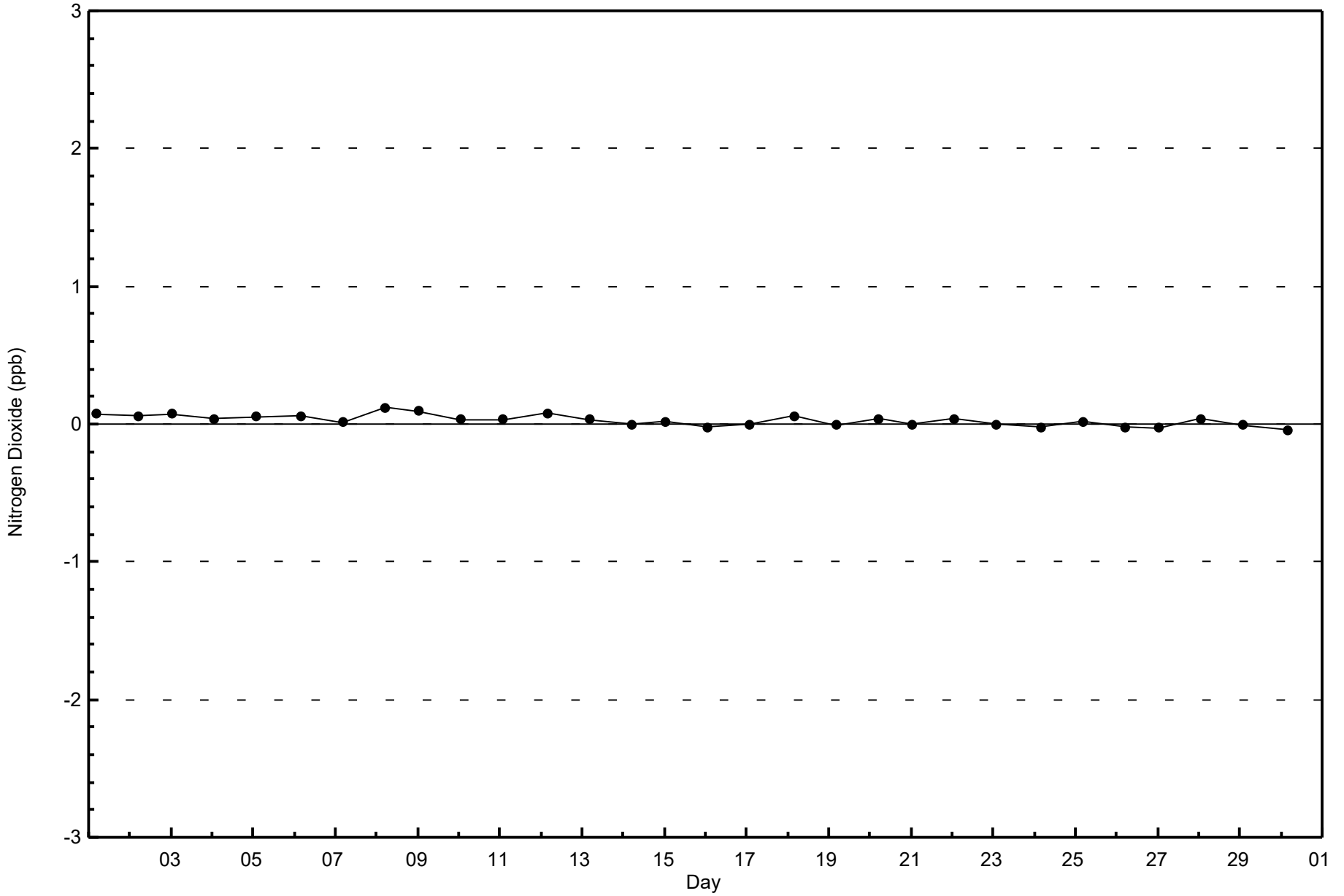
Total Number of Hours: 720



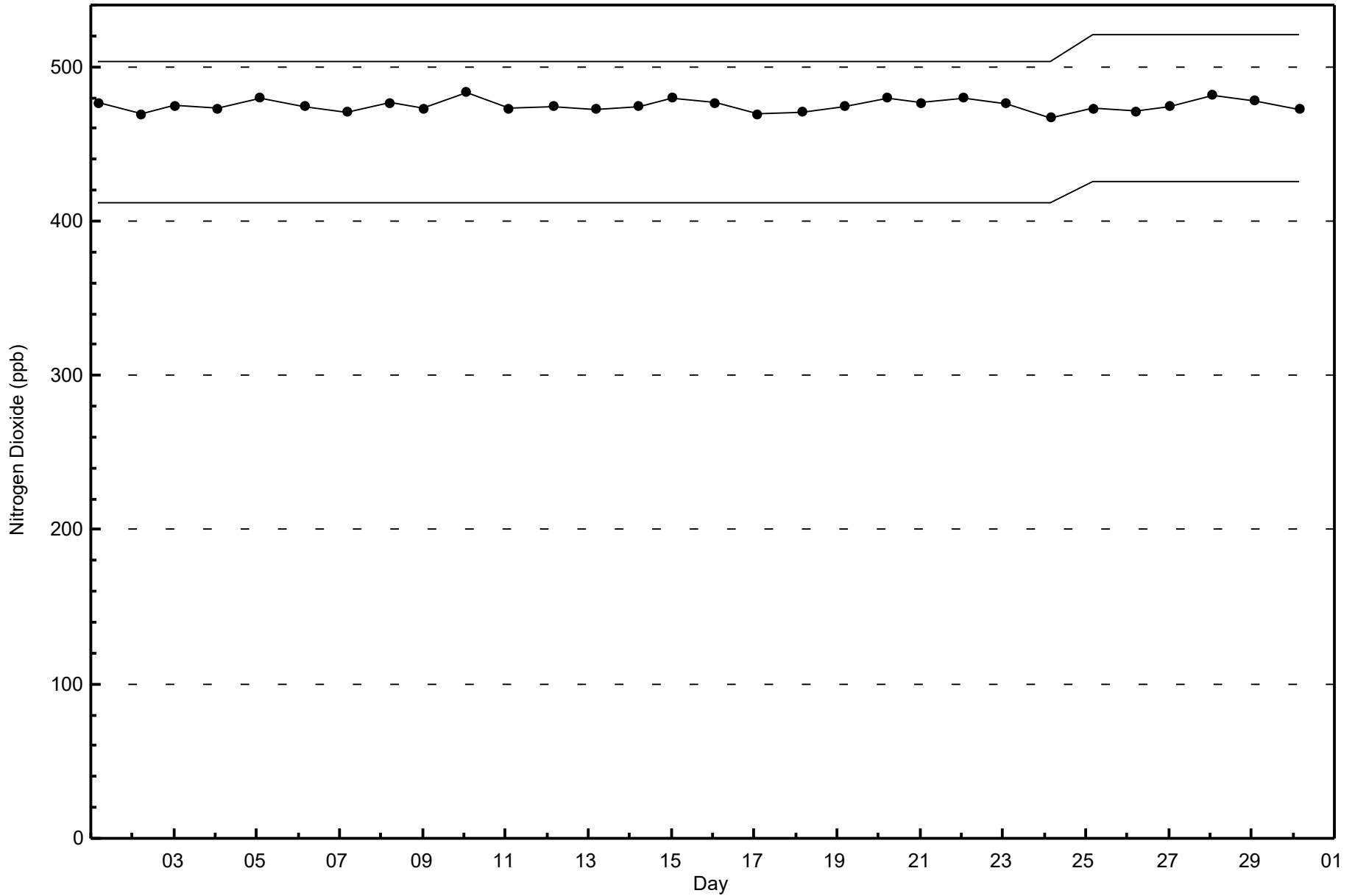
Wood Buffalo Environmental Association  
Wind Rose Nov 2023

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







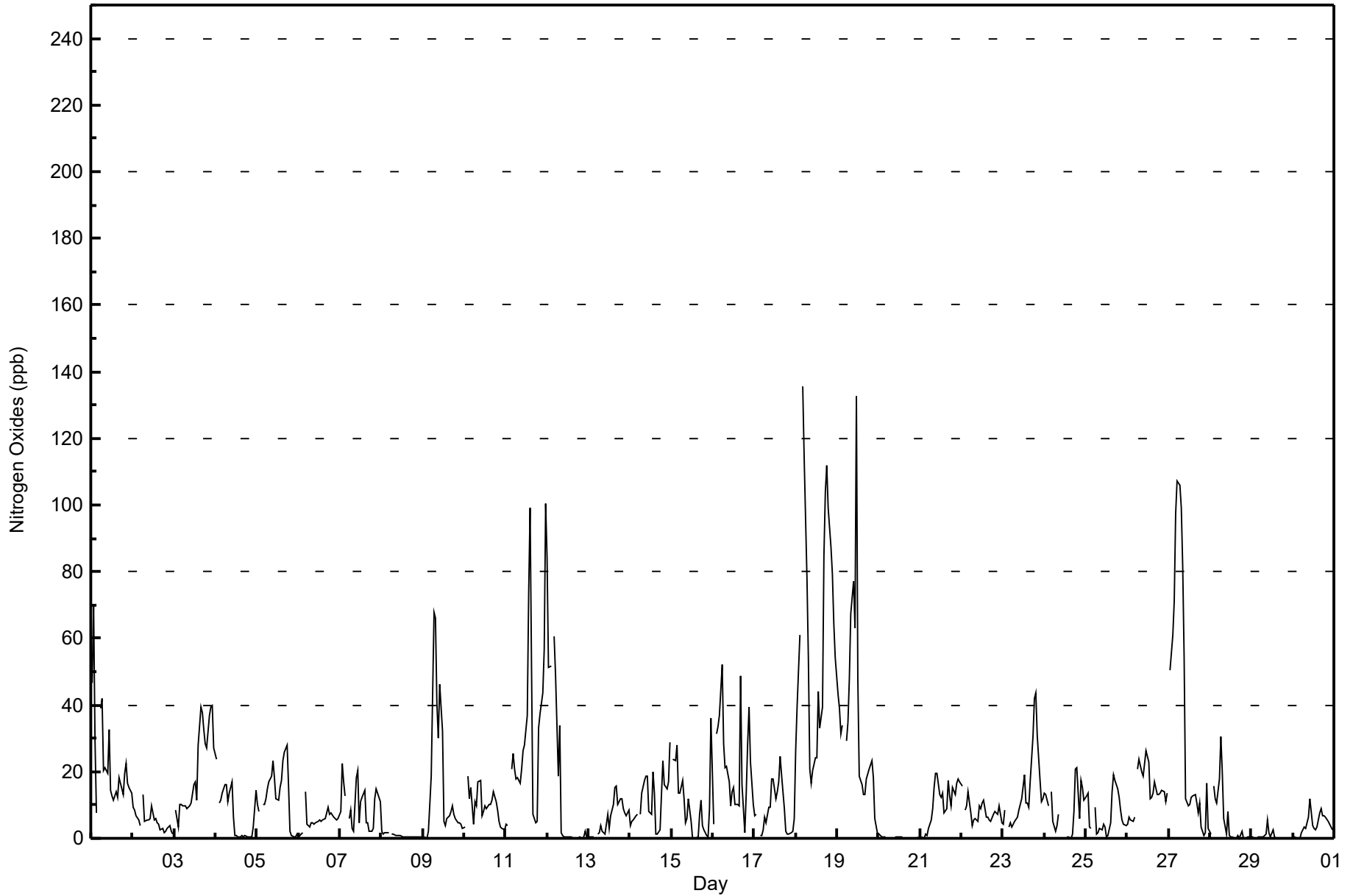




**Wood Buffalo Environmental Association**  
**Summary of Hour Averages**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Fort McKay South - November 2023**

Maximum Value: 135.8 ppb on Nov 18 05:00		Maximum Daily Average: 61.6 ppb on Nov 18		Hours in Service: 720																																													
Minimum Value: 0.0 ppb on Nov 20 08:00		Minimum Daily Average: 0.2 ppb on Nov 20		Hours of Data: 686																																													
Maximum Diurnal Average: 21.9 ppb at hour 6		Minimum Diurnal Average: 10.6 ppb at hour 13		Hours of Missing Data: 34																																													
Monthly Average: 14.21 ppb		Percentiles: P <sub>1</sub> = 0.0 P <sub>10</sub> = 0.4 Q <sub>1</sub> = 2.3 Median = 8.5 Q <sub>3</sub> = 16.9 P <sub>90</sub> = 33.7 P <sub>99</sub> = 100.9		Hours of Calibration: 34																																													
				Percent Operational Time: 100.0																																													
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Nov	46.6	69.9	29.3	7.4	Z	39.1	42.1	20.5	21.4	19.5	32.4	14.6	12.7	11.4	13.8	12.2	18.1	16.4	13.0	19.5	22.7	16.5	15.1	13.5	22.9	69.9																							
2-Nov	9.5	8.7	6.7	5.4	4.0	Z	13.2	5.0	5.7	5.5	6.1	9.9	5.5	5.8	4.7	4.4	2.7	2.8	1.7	2.0	3.1	3.7	2.2	1.4	5.2	13.2																							
3-Nov	Z	8.5	3.2	10.2	10.1	9.8	9.7	8.9	9.5	9.9	10.6	16.2	17.1	11.3	28.1	39.2	37.8	32.5	28.4	27.0	36.7	39.4	39.6	27.3	20.5	39.6																							
4-Nov	23.7	Z	10.7	11.6	13.7	15.9	16.2	11.2	13.5	16.8	6.5	0.9	0.8	0.6	0.5	0.7	0.6	0.7	0.5	0.4	0.3	0.4	3.3	14.6	7.1	23.7																							
5-Nov	10.2	8.2	Z	10.1	10.2	11.9	14.9	16.8	18.7	23.1	18.2	12.1	11.4	15.1	17.2	23.3	25.8	28.1	15.6	2.2	0.8	0.4	0.5	1.4	12.9	28.1																							
6-Nov	0.6	0.7	1.9	Z	14.0	4.4	3.2	4.6	4.5	4.1	4.7	5.2	5.7	5.0	5.7	6.0	7.6	9.3	7.4	7.6	6.2	5.9	5.6	5.8	5.5	14.0																							
7-Nov	7.9	22.3	17.2	12.6	Z	6.1	8.6	3.0	2.3	18.4	20.3	4.7	10.9	12.1	14.4	4.8	4.6	2.2	1.9	2.9	11.9	14.7	13.4	11.1	9.9	22.3																							
8-Nov	2.2	1.2	1.6	1.9	1.7	Z	1.4	1.1	0.7	0.7	0.7	0.7	0.5	0.4	0.4	0.3	0.3	0.2	0.3	0.2	0.2	0.2	0.3	0.3	0.8	2.2																							
9-Nov	Z	0.3	0.1	2.1	10.3	18.8	68.0	66.0	40.7	30.0	46.4	32.3	5.2	4.0	6.0	6.9	7.9	9.8	7.4	5.8	4.9	4.7	4.4	3.1	16.7	68.0																							
10-Nov	3.5	Z	18.5	12.1	15.1	4.1	10.9	9.8	16.8	17.3	6.7	8.1	9.6	8.9	10.1	10.1	11.3	14.1	11.2	8.4	4.9	3.3	2.9	2.4	9.6	18.5																							
11-Nov	4.1	3.8	Z	20.7	25.3	20.6	18.0	18.2	16.3	20.6	26.2	28.1	37.0	73.8	99.1	51.5	7.2	4.7	5.1	33.0	37.3	43.5	56.6	100.5	32.7	100.5																							
12-Nov	84.5	51.2	51.7	Z	60.8	49.3	18.8	33.9	1.7	0.6	0.6	0.6	0.5	0.4	0.3	0.2	0.0	0.1	0.1	0.3	0.1	0.4	2.1	0.6	15.6	84.5																							
13-Nov	0.3	0.5	0.4	0.5	Z	1.2	1.7	3.9	2.1	1.4	4.4	7.1	3.1	6.6	10.4	15.2	15.5	10.3	11.9	11.7	8.8	7.5	7.0	8.4	6.1	15.5																							
14-Nov	3.9	5.2	5.5	6.6	7.1	Z	7.3	13.4	17.5	18.5	8.2	7.3	20.1	13.5	1.3	1.4	2.7	13.1	23.3	16.0	14.8	16.9	28.8	11.8	28.8																								
15-Nov	Z	23.7	23.2	28.0	13.6	13.6	17.4	11.9	4.5	6.1	11.8	5.0	0.0	0.1	0.2	0.6	7.1	11.3	3.8	2.6	0.9	0.4	9.0	35.9	10.0	35.9																							
16-Nov	4.4	Z	31.4	33.6	36.8	52.0	28.4	21.2	21.7	17.1	9.6	13.9	15.2	10.4	10.3	9.9	48.6	16.1	1.7	13.4	28.2	39.4	23.0	10.4	21.6	52.0																							
17-Nov	7.0	7.2	Z	0.7	0.6	2.7	6.2	4.6	9.1	9.2	17.7	18.0	11.8	13.8	16.8	24.8	19.3	8.9	2.0	1.4	1.3	1.8	2.2	6.1	8.4	24.8																							
18-Nov	26.2	39.5	60.8	Z	135.8	114.5	78.1	53.9	20.9	16.7	20.2	24.2	24.0	44.1	32.9	39.6	84.9	103.7	111.9	99.2	87.5	79.1	64.3	54.4	61.6	135.8																							
19-Nov	43.1	38.9	31.2	33.7	Z	29.1	34.5	47.9	67.5	77.2	63.3	132.8	48.0	18.5	16.3	13.0	13.3	17.9	20.6	22.1	23.3	18.1	5.8	1.3	35.5	132.8																							
20-Nov	1.2	0.7	0.4	0.2	0.2	Z	0.0	0.0	0.0	0.0	0.2	0.5	0.5	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.2	0.2	1.2																							
21-Nov	Z	0.2	0.2	1.1	0.9	2.9	5.7	8.7	15.1	19.7	19.7	13.3	12.3	13.7	7.8	9.0	17.4	12.5	9.8	15.4	12.9	16.5	17.9	16.9	10.9	19.7																							
22-Nov	15.6	Z	8.3	9.6	14.1	7.5	3.8	5.6	6.0	5.3	9.7	8.9	10.8	11.6	6.4	6.5	5.5	5.2	7.4	7.9	7.8	7.1	9.7	4.6	8.0	15.6																							
23-Nov	4.2	8.6	Z	3.5	4.6	3.5	4.2	5.1	6.4	8.3	10.2	12.0	19.1	10.5	10.4	9.3	17.1	30.5	42.0	43.7	30.8	17.5	11.0	11.7	14.1	43.7																							
24-Nov	13.5	12.9	9.8	Z	14.1	5.1	2.0	3.8	7.2	C	C	C	C	0.4	0.4	0.1	1.1	8.0	20.9	21.4	6.1	17.6	15.2	11.5	9.0	21.4																							
25-Nov	12.5	13.4	3.4	2.8	Z	9.5	1.4	1.9	2.8	2.3	4.4	3.4	0.4	0.8	4.8	14.2	19.1	17.5	14.7	12.2	8.7	5.5	4.2	3.9	7.1	19.1																							
26-Nov	4.3	6.4	5.7	5.3	6.2	Z	20.9	23.8	20.0	18.6	22.6	26.3	22.8	11.8	12.1	13.7	16.9	13.0	13.3	13.5	14.5	13.9	11.1	13.7	14.4	26.3																							
27-Nov	Z	50.2	61.1	71.1	97.4	107.1	106.1	99.3	81.4	54.3	12.0	9.8	10.1	12.4	12.7	13.2	10.8	7.8	10.5	3.3	0.7	1.8	16.4	2.9	37.1	107.1																							
28-Nov	1.2	Z	15.8	11.7	10.6	17.8	30.3	19.7	5.9	1.1	8.0	0.8	0.4	0.4	0.2	0.2	0.9	0.1	1.9	0.1	0.2	0.2	0.2	0.3	5.6	30.3																							
29-Nov	0.4	0.5	Z	0.5	0.4	0.4	0.3	0.2	1.1	5.6	1.7	0.4	2.5	0.2	0.1	0.1	0.0	0.0	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.6	5.6																						
30-Nov	0.1	0.2	0.1	Z	0.2	1.8	3.5	3.1	4.6	6.5	12.0	3.8	3.1	2.6	3.4	7.6	9.1	6.9	6.9	6.5	5.2	4.2	3.3	2.6	4.2	12.0																							
																								13.2	15.3	15.9	12.1	20.3	21.9	19.2	17.6	14.8	15.0	14.7	14.5	10.6	10.9	12.0	11.3	13.7	13.1	12.8	13.6	12.7	12.6	12.1	13.2	Diurnal Average	
																								84.5	69.9	61.1	71.1	135.8	114.5	106.1	99.3	81.4	77.2	63.3	132.8	48.0	73.8	99.1	51.5	84.9	103.7	111.9	99.2	87.5	79.1	64.3	100.5	Diurnal Maximum	
Z - zerspan																								C - Calibration																									





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Fort McKay South - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	560	81.63	81.63
21 - 40	74	10.79	92.42
41 - 80	36	5.25	97.67
81 - 159	15	2.19	99.85
> 159	0	0.00	99.85

Total Number of Valid Hours: 686

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Fort McKay South - November 2023**

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	35	13	5	11	5	14	49	101	40	41	49	45	41	28	28	558
21 - 40	10	1	0	0	0	0	3	9	12	13	7	5	3	3	2	6	74
11 - 80	0	1	0	0	0	0	0	1	11	12	8	2	0	1	0	0	36
81 - 159	0	0	0	0	0	0	0	0	3	6	3	2	0	0	1	0	15
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	63	37	13	5	11	5	17	59	127	71	59	58	48	45	31	34	683

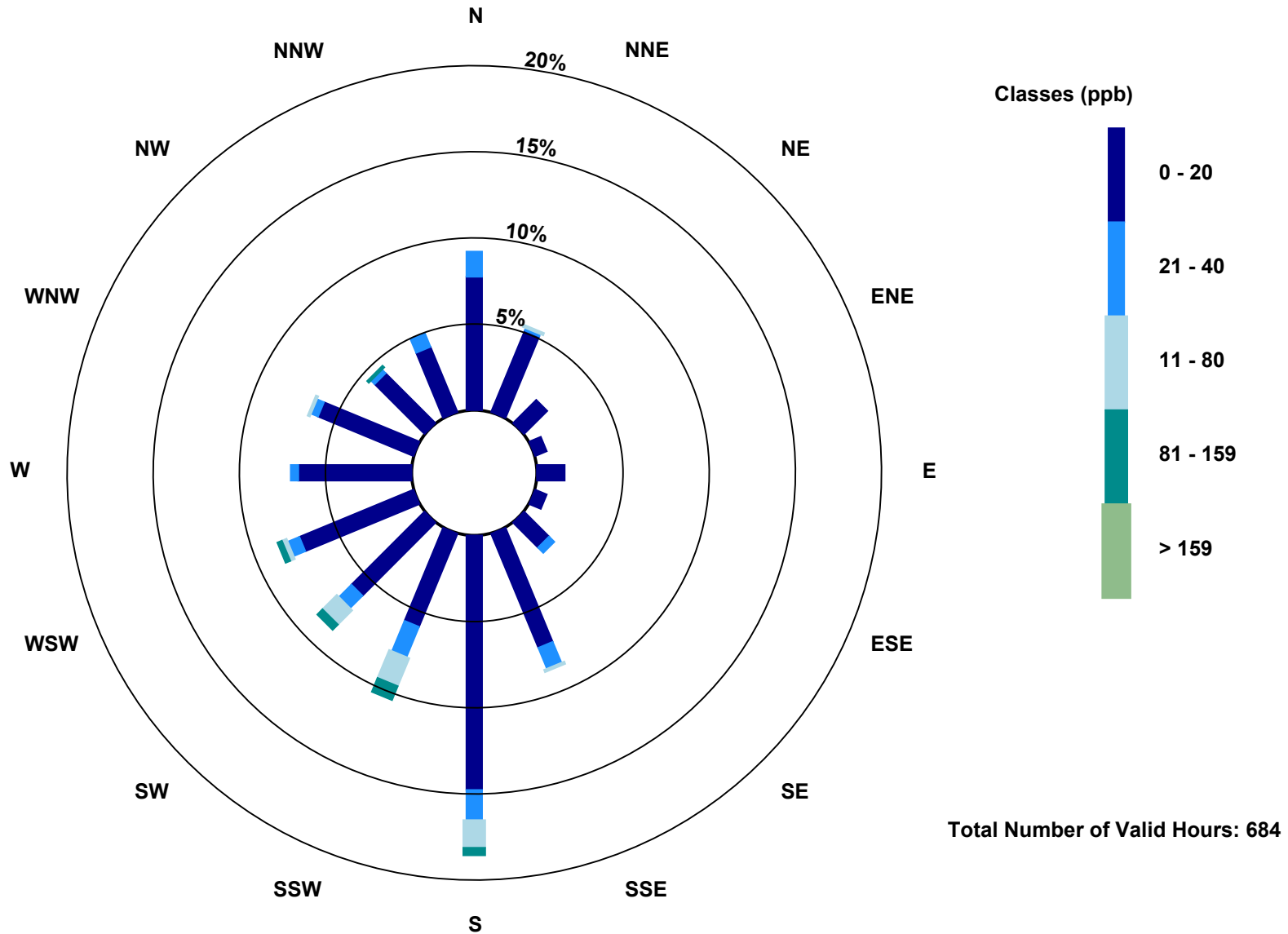
Total Number of Valid Hours: 684

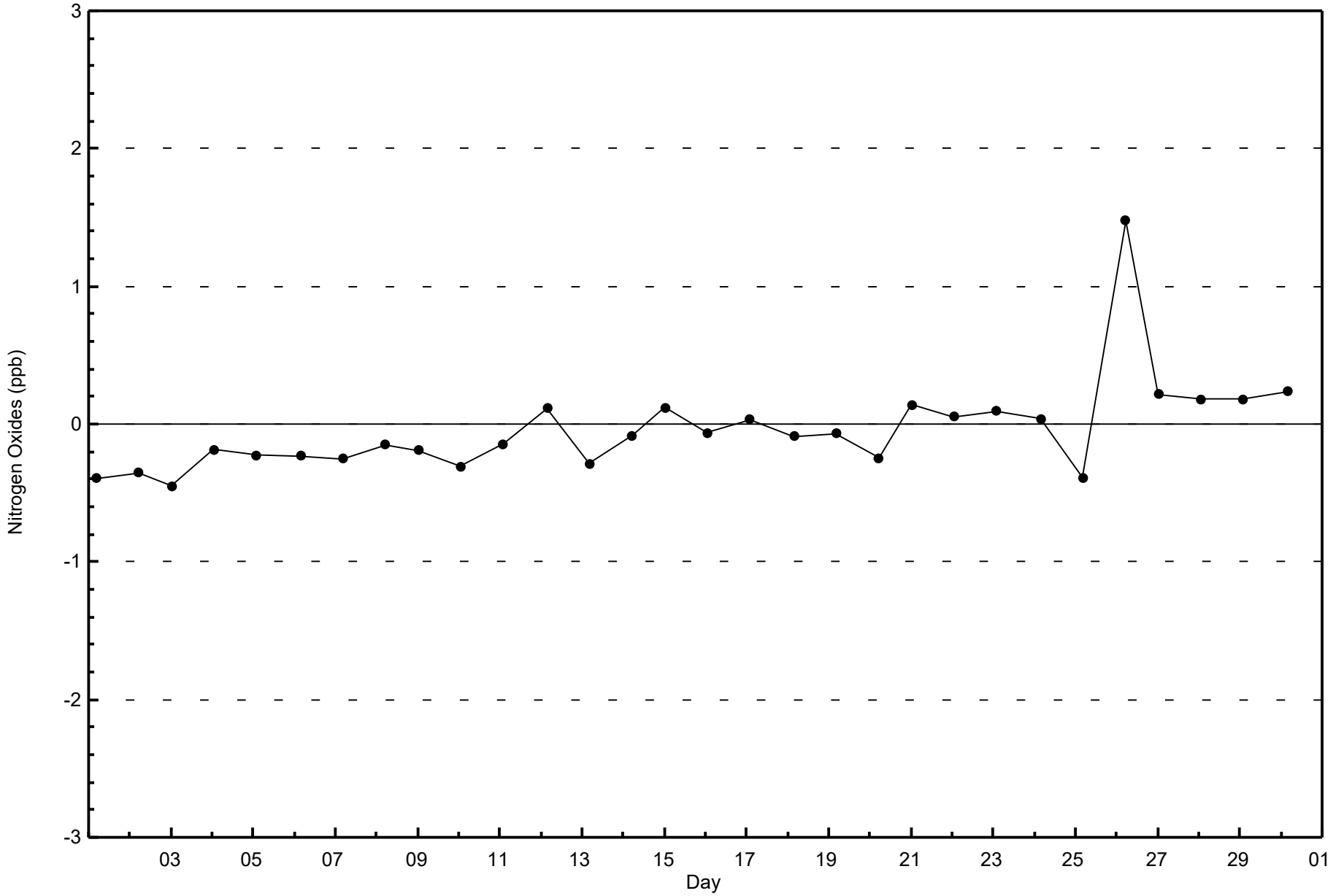
Total Number of Hours: 720

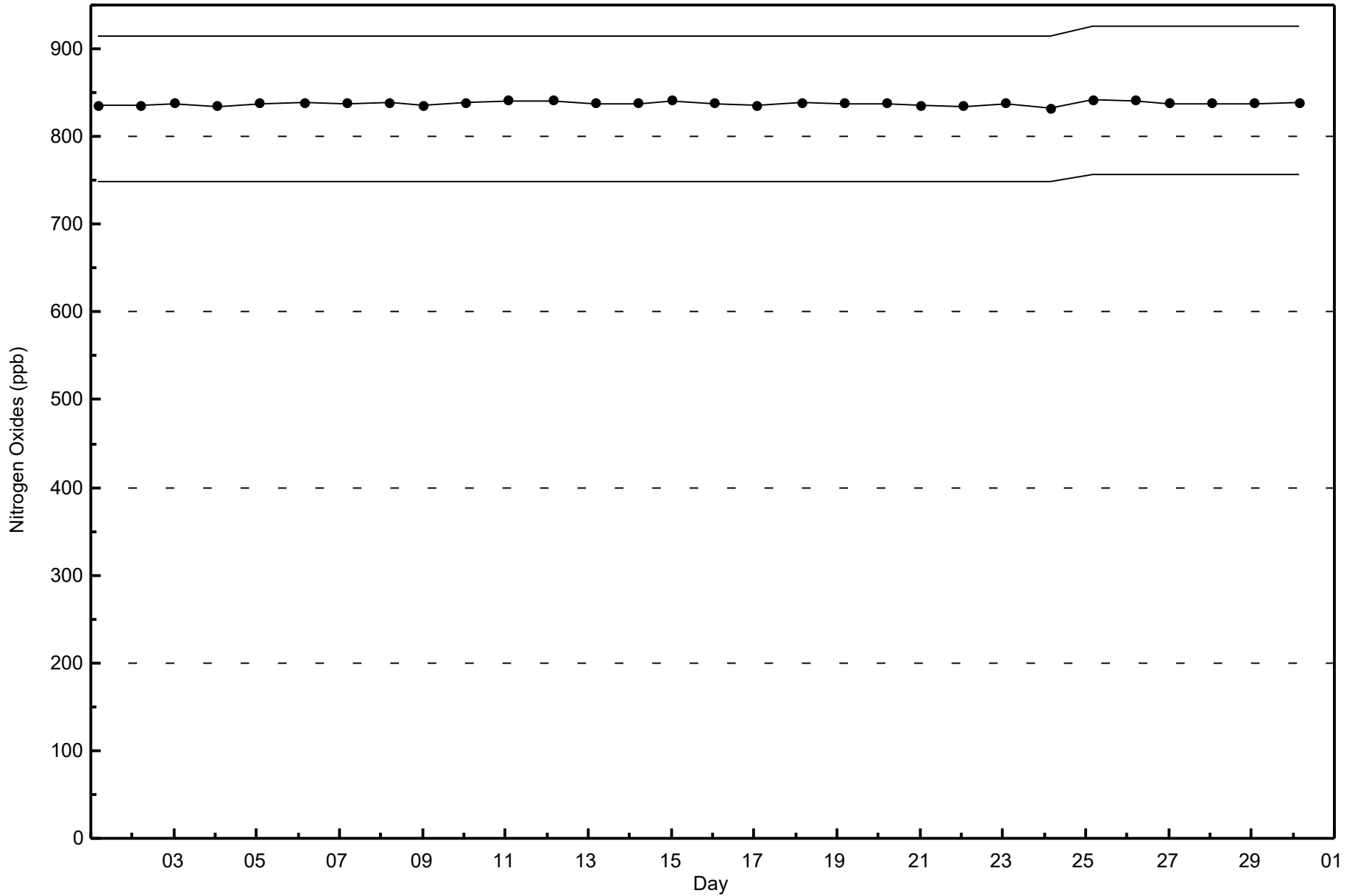


Wood Buffalo Environmental Association  
Wind Rose Nov 2023

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











Wood Buffalo Environmental Association

Summary of Hour Averages

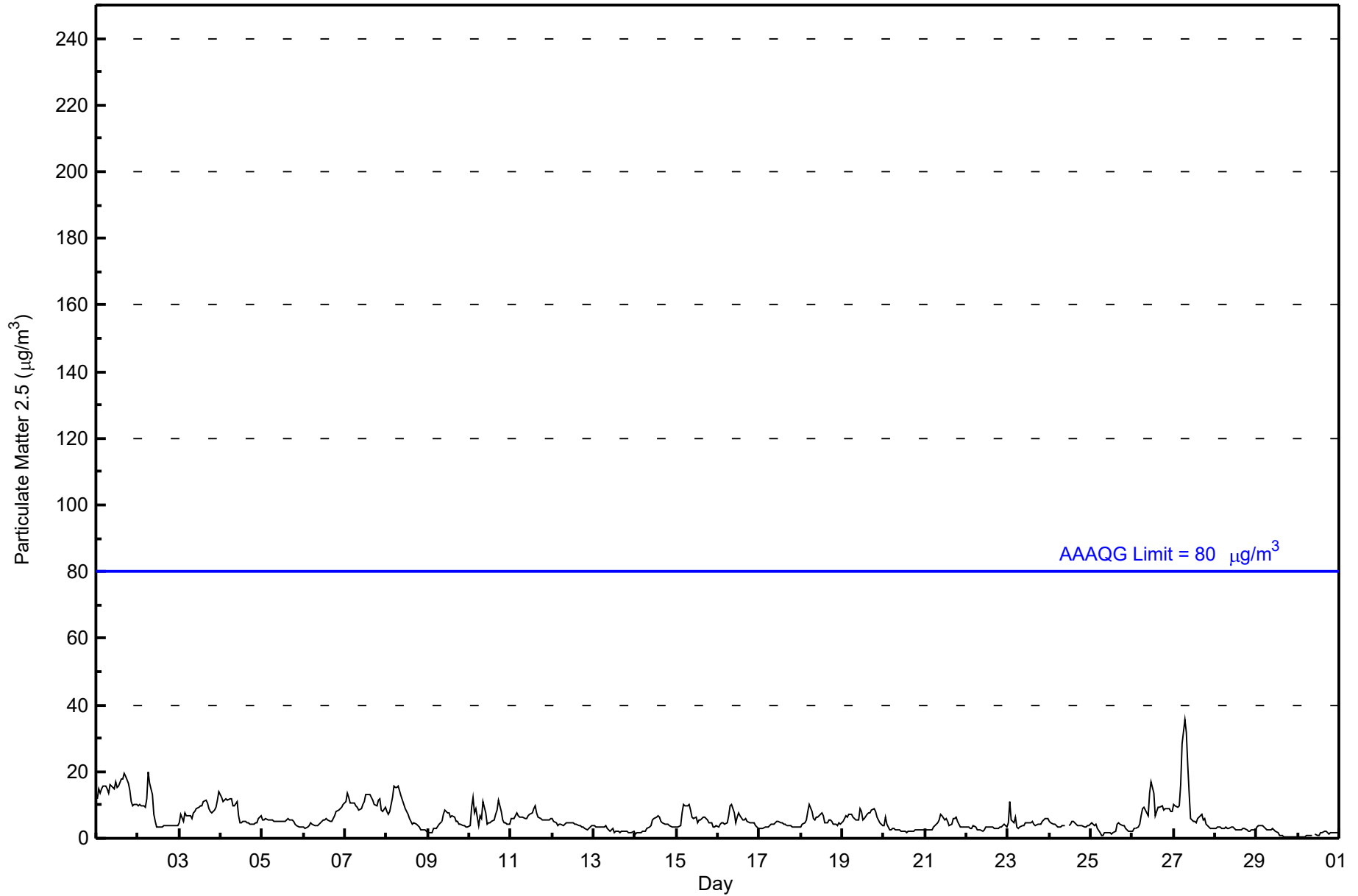
Particulate Matter 2.5 (PM<sub>2.5</sub>) - µg/m<sup>3</sup>

Fort McKay South - November 2023

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 35.8 µg/m <sup>3</sup> on Nov 27 07:00	Maximum Daily Average: 14.8 µg/m <sup>3</sup> on Nov 1		Hours of Data:	718
Minimum Value: 0.4 µg/m <sup>3</sup> on Nov 30 01:00	Minimum Daily Average: 1.2 µg/m <sup>3</sup> on Nov 30		Hours of Missing Data:	2
Maximum Diurnal Average: 7.3 µg/m <sup>3</sup> at hour 7	Minimum Diurnal Average: 4.4 µg/m <sup>3</sup> at hour 22		Hours of Calibration:	1
Monthly Average: 5.66 µg/m <sup>3</sup>	Percentiles: P <sub>1</sub> = 0.5 P <sub>10</sub> = 2.1 Q <sub>1</sub> = 3.3 Median = 4.6 Q <sub>3</sub> = 7.0 P <sub>90</sub> = 10.3 P <sub>99</sub> = 17.9		Percent Operational Time:	99.9

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Nov	11.9	14.8	13.5	14.8	15.8	15.6	14.9	13.5	16.2	15.2	15.0	17.0	15.2	15.6	17.7	17.9	19.4	18.7	16.6	14.3	11.0	9.9	10.1	10.0	14.8	19.4																						
2-Nov	9.9	10.1	9.7	9.8	9.4	11.8	20.0	16.5	13.2	7.3	4.9	3.4	3.4	3.3	3.3	3.7	3.6	3.6	3.7	3.7	3.7	3.9	3.7	3.8	7.1	20.0																						
3-Nov	4.5	7.4	5.1	7.7	6.6	6.6	6.6	6.1	7.6	7.8	8.9	9.4	9.9	9.8	11.2	11.6	10.4	8.9	7.9	7.4	8.6	9.5	11.6	13.8	8.5	13.8																						
4-Nov	12.1	10.9	11.4	11.7	11.3	11.8	11.9	9.8	9.6	11.0	6.8	4.6	4.9	5.0	4.9	4.6	4.5	4.4	4.3	4.3	4.6	4.8	5.8	6.6	7.6	12.1																						
5-Nov	5.4	5.5	5.9	5.6	5.4	5.5	5.5	5.2	5.1	5.2	5.2	5.1	5.0	5.3	5.3	6.1	5.7	5.6	5.2	4.3	3.9	3.5	3.4	3.3	5.0	6.1																						
6-Nov	3.2	3.2	3.3	4.0	4.7	4.3	3.8	3.7	3.8	4.2	4.9	5.5	5.7	5.9	5.5	4.9	5.3	5.9	6.9	7.9	8.4	8.7	9.2	10.0	5.5	10.0																						
7-Nov	10.9	13.7	12.5	10.8	10.5	10.5	9.7	9.4	8.6	8.9	10.0	11.1	13.0	13.3	13.0	12.3	11.6	10.1	9.7	11.4	11.7	8.6	8.0	9.2	10.8	13.7																						
8-Nov	8.1	7.2	8.2	12.3	15.6	15.1	15.4	15.8	12.7	11.2	10.1	8.9	7.2	6.1	5.0	4.3	4.6	4.2	4.0	3.4	2.6	2.4	2.5	2.3	7.9	15.8																						
9-Nov	1.9	1.6	1.7	2.9	3.1	3.1	4.0	4.9	5.2	7.1	8.3	7.6	7.5	6.3	6.9	6.6	5.1	4.9	4.4	4.1	4.0	3.9	3.4	3.3	4.6	8.3																						
10-Nov	3.8	9.1	12.1	7.5	8.8	4.0	6.7	5.8	11.2	7.5	4.3	4.6	4.8	5.0	5.5	7.1	8.5	11.3	8.1	5.6	4.8	4.5	4.3	4.3	6.6	12.1																						
11-Nov	6.1	6.1	5.9	7.6	6.8	6.2	6.3	6.2	5.8	5.8	6.7	7.2	7.7	8.9	9.8	7.8	6.3	5.8	5.7	5.7	5.6	5.6	5.6	6.0	6.5	9.8																						
12-Nov	6.0	5.2	4.6	3.7	4.3	4.2	3.7	4.0	4.7	4.8	4.7	4.7	4.5	4.4	4.2	4.0	3.6	3.4	3.3	3.0	2.5	2.9	3.4	3.9	4.1	6.0																						
13-Nov	3.7	3.6	3.5	3.3	3.3	3.2	3.5	3.6	2.9	2.1	2.5	2.8	1.9	2.2	2.3	1.8	2.0	2.0	2.1	2.1	1.9	1.7	1.9	2.0	2.6	3.7																						
14-Nov	1.3	1.5	1.6	1.6	2.2	2.2	2.2	2.8	3.3	3.9	5.7	6.0	6.6	6.8	6.2	5.2	4.7	4.3	4.4	4.3	3.9	3.6	3.5	3.5	3.8	6.8																						
15-Nov	3.6	3.4	4.0	7.6	10.1	9.7	9.8	10.3	8.3	6.4	6.0	6.2	4.7	5.3	5.7	6.4	6.2	5.9	5.4	4.8	4.8	3.5	3.4	3.9	6.1	10.3																						
16-Nov	3.5	4.1	4.5	4.5	4.4	4.8	7.0	9.9	10.2	7.8	4.7	6.5	7.8	7.0	5.7	5.4	6.0	5.0	4.5	4.6	4.6	4.6	3.6	3.1	5.6	10.2																						
17-Nov	3.0	2.9	3.1	3.3	3.4	3.4	4.0	4.1	4.3	4.6	5.2	5.3	4.8	4.5	4.3	4.3	3.9	3.8	3.6	3.5	3.2	3.3	3.5	3.5	3.9	5.3																						
18-Nov	3.5	4.4	4.7	5.6	7.9	10.1	7.9	6.1	5.7	6.2	6.5	7.2	7.4	6.8	4.8	4.6	5.4	5.4	5.1	4.4	4.3	4.0	4.7	4.2	5.7	10.1																						
19-Nov	5.0	6.1	6.8	6.2	7.4	7.2	6.5	5.9	5.5	5.7	8.7	7.9	5.4	5.8	7.3	7.8	7.5	8.6	8.8	8.0	6.4	5.4	4.7	3.9	6.6	8.8																						
20-Nov	3.7	6.6	4.3	2.6	2.7	3.0	2.9	2.7	2.6	2.4	2.2	2.0	1.9	1.7	2.0	2.0	2.0	2.2	2.3	2.3	2.3	2.4	2.4	2.5	2.7	6.6																						
21-Nov	2.6	2.3	2.4	2.7	2.7	3.2	4.2	4.8	5.6	7.3	7.0	5.6	6.0	4.9	3.7	4.2	5.7	5.8	6.4	5.1	3.6	3.3	3.3	3.3	4.4	7.3																						
22-Nov	3.3	3.3	3.1	3.0	3.8	3.4	2.7	2.7	2.4	2.1	2.6	3.2	3.5	3.3	3.2	3.2	3.0	2.8	3.1	3.3	3.5	3.7	4.4	3.5	3.2	4.4																						
23-Nov	4.5	11.0	5.7	4.6	6.3	3.3	3.0	3.4	4.0	3.6	4.5	4.6	4.5	5.0	4.4	3.9	4.2	4.2	4.4	5.0	6.0	5.9	6.0	4.9	11.0	11.0																						
24-Nov	5.0	4.8	4.4	4.1	3.9	3.6	3.6	3.7	3.8	3.7	C	3.6	4.1	5.2	4.9	4.0	3.9	3.7	3.7	3.7	3.4	3.4	3.9	3.7	4.0	5.2																						
25-Nov	4.5	4.1	3.8	4.1	3.0	1.7	1.0	0.9	1.6	1.6	1.6	1.8	1.3	1.6	2.1	4.2	4.6	4.3	4.0	3.8	3.2	2.5	2.1	2.1	2.7	4.6																						
26-Nov	2.3	3.0	3.1	3.4	4.1	6.7	8.7	9.1	7.6	6.9	13.5	17.0	13.4	6.8	8.1	9.3	9.3	9.5	8.3	8.8	8.8	8.9	7.9	8.2	8.0	17.0																						
27-Nov	10.0	9.9	9.3	9.7	16.1	28.4	35.8	31.7	22.0	13.5	5.8	5.1	5.2	4.8	6.0	6.7	7.0	5.7	5.7	4.2	3.3	3.0	3.0	2.8	10.6	35.8																						
28-Nov	2.8	3.2	3.3	3.2	3.0	3.0	3.2	3.0	3.0	3.2	3.2	3.0	2.7	2.4	2.4	2.7	2.8	2.9	2.6	2.1	2.0	2.3	2.4	2.6	2.8	3.3																						
29-Nov	3.2	3.8	3.9	3.6	3.3	3.0	2.7	2.7	2.6	2.8	2.6	2.1	1.5	1.0	0.9	0.8	0.6	0.6	0.5	0.6	0.5	0.4	0.5	0.4	1.9	3.9																						
30-Nov	0.4	0.5	0.5	0.5	0.5	0.7	0.9	0.8	1.0	M	1.4	0.9	1.0	1.5	1.9	2.3	2.0	1.7	1.5	1.9	1.9	1.6	1.6	1.5	1.2	2.3																						
																								5.0	5.8	5.5	5.7	6.3	6.6	7.3	7.0	6.7	6.2	6.0	6.0	5.8	5.5	5.6	5.7	5.6	5.5	5.2	4.9	4.6	4.4	4.5	4.6	Diurnal Average
																								12.1	14.8	13.5	14.8	16.1	28.4	35.8	31.7	22.0	15.2	15.0	17.0	15.2	15.6	17.7	17.9	19.4	18.7	16.6	14.3	11.7	9.9	11.6	13.8	Diurnal Maximum

C - Calibration M - Maintenance  
 Alberta Ambient Air Quality Guideline/Objectives: 1-hr 80 µg/m<sup>3</sup> 24-hr 29 µg/m<sup>3</sup>





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$   
Fort McKay South - November 2023**

<b>Concentration Ranges (<math>\mu\text{g}/\text{m}^3</math>)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	442	61.56	61.56
6 - 15	256	35.65	97.21
16 - 25	17	2.37	99.58
26 - 80	3	0.42	100.00
> 81.0	0	0.00	100.00

Total Number of Valid Hours: 718

Total Number of Hours: 720



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

**Particulate Matter 2.5 (PM<sub>2.5</sub>) - μg/m<sup>3</sup>**  
**Fort McKay South - November 2023**

Concentration Ranges (μg/m <sup>3</sup> )	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	31	25	11	3	10	4	12	26	60	42	41	49	47	31	22	26	440
6 - 15	33	13	2	2	1	1	4	31	64	31	20	14	4	15	10	10	255
16 - 25	2	0	0	0	0	0	1	4	8	0	0	0	0	1	1	0	17
26 - 80	0	0	0	0	0	0	0	0	1	2	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
<b>Totals</b>	66	38	13	5	11	5	17	61	133	75	61	63	51	47	33	36	715

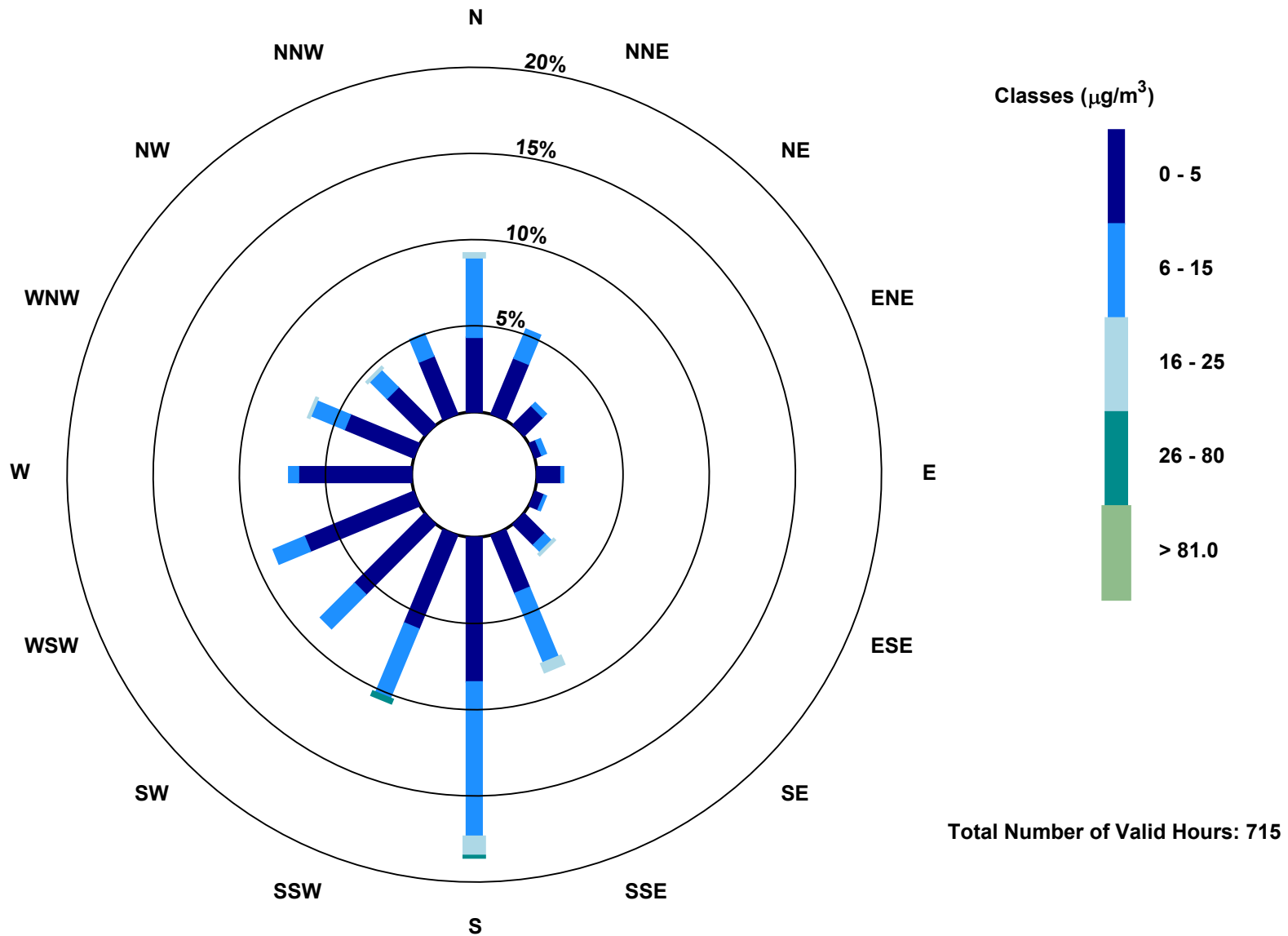
Total Number of Valid Hours: 715

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 2023

Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$   
Fort McKay South

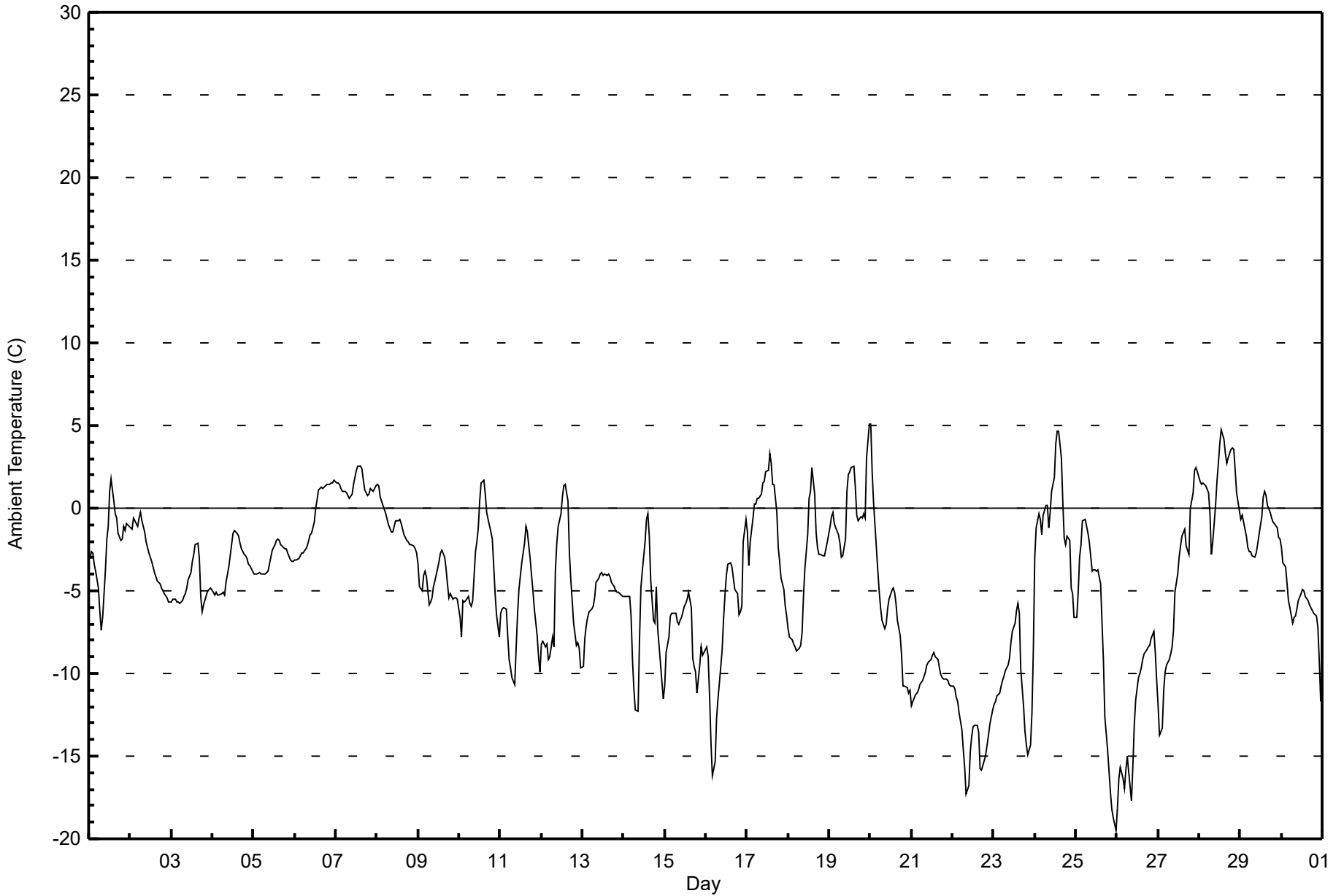




**Wood Buffalo Environmental Association**  
**Summary of Hour Averages**

**Ambient Temperature (AT) - C**  
**Fort McKay South - November 2023**

Maximum Value: 5.1 C on Nov 20 00:00      Maximum Daily Average: 1.8 C on Nov 28 Minimum Value: -19.5 C on Nov 26 00:00      Minimum Daily Average: -13.8 C on Nov 22 Maximum Diurnal Average: -1.9 C at hour 15      Minimum Diurnal Average: -6.1 C at hour 8 Monthly Average: -4.62 C      Percentiles: P <sub>1</sub> = -16.9 P <sub>10</sub> = -11.0 Q <sub>1</sub> = -7.4 Median = -4.0 Q <sub>3</sub> = -1.2 P <sub>90</sub> = 1.1 P <sub>99</sub> = 3.8																						Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0				
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	-3.0	-2.6	-2.7	-3.4	-3.8	-4.8	-6.2	-7.4	-6.6	-3.7	-1.9	-1.1	1.0	1.8	0.4	-0.3	-0.6	-1.6	-2.0	-1.9	-1.1	-1.4	-1.0	-1.1	-2.3	1.8
2-Nov	-1.1	-1.2	-0.6	-0.9	-1.1	-0.6	-0.3	-0.8	-1.5	-2.1	-2.4	-2.8	-3.2	-3.6	-3.9	-4.1	-4.4	-4.6	-4.8	-5.0	-5.2	-5.4	-5.7	-5.7	-3.0	-0.3
3-Nov	-5.7	-5.5	-5.5	-5.6	-5.7	-5.8	-5.6	-5.4	-5.2	-4.8	-4.3	-3.9	-3.2	-2.8	-2.2	-2.1	-3.0	-5.3	-6.2	-5.8	-5.2	-5.0	-4.9	-4.9	-4.7	-2.1
4-Nov	-5.1	-5.2	-5.1	-5.2	-5.3	-5.2	-5.1	-5.2	-4.5	-3.6	-2.9	-2.2	-1.6	-1.4	-1.5	-1.7	-2.1	-2.5	-2.8	-2.9	-3.1	-3.4	-3.5	-3.8	-3.5	-1.4
5-Nov	-4.0	-4.0	-4.0	-3.9	-4.0	-4.0	-4.0	-4.0	-3.8	-3.4	-3.0	-2.5	-2.2	-2.0	-1.9	-1.9	-2.2	-2.4	-2.4	-2.4	-2.7	-3.1	-3.2	-3.2	-3.1	-1.9
6-Nov	-3.2	-3.2	-3.0	-2.9	-2.7	-2.7	-2.4	-2.3	-1.9	-1.6	-1.5	-0.9	0.0	0.5	1.1	1.3	1.2	1.3	1.4	1.5	1.5	1.5	1.6	1.7	-0.6	1.7
7-Nov	1.5	1.5	1.5	1.2	1.0	1.0	1.0	0.7	0.6	0.9	1.4	1.9	2.3	2.6	2.5	2.4	1.7	1.1	0.8	0.9	1.2	1.1	1.1	1.4	1.4	2.6
8-Nov	1.5	1.3	0.7	0.2	-0.1	-0.4	-0.7	-1.0	-1.4	-1.4	-1.1	-0.7	-0.8	-0.7	-0.9	-1.2	-1.6	-1.9	-2.1	-2.2	-2.2	-2.3	-2.4	-2.7	-1.0	1.5
9-Nov	-3.4	-4.8	-5.0	-4.1	-3.8	-4.2	-5.8	-5.7	-5.4	-4.8	-4.4	-3.6	-3.2	-2.7	-2.6	-3.0	-3.7	-4.6	-5.4	-5.2	-5.5	-5.4	-5.4	-5.5	-4.5	-2.6
10-Nov	-6.6	-7.8	-5.6	-5.7	-5.6	-5.4	-5.7	-5.9	-5.6	-2.6	-2.0	-1.1	0.4	1.5	1.7	0.9	-0.2	-0.7	-1.4	-1.9	-3.5	-5.1	-6.5	-7.8	-3.4	1.7
11-Nov	-6.4	-6.1	-6.1	-6.1	-7.7	-9.1	-9.7	-10.2	-10.6	-8.5	-6.5	-4.9	-3.3	-2.7	-2.2	-1.1	-1.4	-3.0	-4.1	-5.0	-6.1	-7.8	-9.0	-9.9	-6.1	-1.1
12-Nov	-8.2	-8.1	-8.4	-8.2	-9.2	-9.0	-7.8	-8.4	-3.8	-2.1	-1.1	-0.3	0.7	1.3	1.5	0.4	-2.7	-4.3	-5.6	-7.0	-8.3	-8.1	-8.4	-9.7	-5.2	1.5
13-Nov	-9.6	-7.9	-7.1	-6.7	-6.2	-6.1	-5.9	-5.4	-4.5	-4.2	-4.0	-3.9	-4.1	-4.0	-4.1	-4.0	-4.2	-4.5	-4.7	-5.0	-5.1	-5.1	-5.2	-5.3	-5.3	-3.9
14-Nov	-5.3	-5.3	-5.4	-5.3	-6.5	-9.2	-11.0	-12.2	-12.3	-8.1	-4.8	-3.8	-2.0	-0.7	-0.3	-1.7	-4.3	-6.8	-6.9	-4.7	-7.3	-9.4	-10.5	-11.5	-6.5	-0.3
15-Nov	-10.8	-8.7	-7.8	-6.5	-6.4	-6.4	-6.4	-6.9	-7.0	-6.8	-6.6	-5.9	-5.8	-5.5	-5.1	-6.0	-9.0	-9.5	-9.9	-11.2	-9.5	-8.4	-8.9	-8.7	-7.7	-5.1
16-Nov	-8.4	-9.0	-11.3	-14.1	-16.2	-15.3	-12.7	-11.5	-10.6	-8.6	-6.7	-5.3	-4.0	-3.4	-3.3	-3.5	-4.3	-4.9	-5.1	-6.4	-6.3	-5.9	-2.0	-0.6	-7.5	-0.6
17-Nov	-1.5	-3.5	-2.0	-0.6	0.2	0.2	0.6	0.6	0.8	1.6	1.7	2.2	2.3	3.3	2.7	1.5	1.5	-0.3	-2.3	-3.2	-4.3	-4.9	-5.9	-6.6	-0.7	3.3
18-Nov	-7.3	-7.8	-8.0	-8.2	-8.4	-8.7	-8.5	-8.3	-7.6	-5.3	-3.7	-1.6	0.6	1.0	2.5	0.8	-1.4	-2.3	-2.8	-2.8	-2.9	-2.9	-2.4	-2.1	-4.1	2.5
19-Nov	-1.1	-0.5	-0.2	-0.9	-1.2	-1.6	-2.2	-2.9	-2.9	-1.8	1.0	2.1	2.2	2.4	2.6	1.2	-0.4	-0.8	-0.5	-0.6	-0.4	-0.6	3.0	5.1	0.0	5.1
20-Nov	5.1	2.2	0.3	-2.4	-3.7	-5.0	-6.0	-6.8	-7.3	-7.0	-6.1	-5.5	-5.0	-4.9	-5.1	-5.8	-6.8	-7.7	-8.9	-10.7	-10.8	-10.9	-11.2	-11.0	-5.9	5.1
21-Nov	-12.0	-11.7	-11.3	-11.2	-11.1	-10.7	-10.4	-10.2	-9.9	-9.5	-9.3	-9.2	-8.9	-8.7	-9.0	-9.2	-9.6	-10.1	-10.2	-10.4	-10.3	-10.4	-10.7	-10.8	-10.2	-8.7
22-Nov	-10.7	-10.9	-11.4	-11.7	-12.4	-13.4	-14.6	-15.7	-17.3	-16.8	-14.8	-13.8	-13.2	-13.2	-13.2	-13.6	-15.8	-15.8	-15.2	-14.9	-14.4	-13.8	-13.1	-12.2	-13.8	-10.7
23-Nov	-11.9	-11.7	-11.3	-11.1	-10.7	-10.4	-10.1	-9.8	-9.5	-9.0	-8.2	-7.5	-6.9	-6.2	-5.7	-6.3	-9.8	-12.0	-13.5	-14.3	-14.9	-14.3	-12.4	-8.6	-10.3	-5.7
24-Nov	-2.9	-1.2	-0.3	-0.7	-1.6	-0.4	0.2	0.2	-1.2	-0.3	1.1	1.9	3.9	4.7	4.7	3.1	0.4	-1.8	-2.2	-1.7	-1.9	-4.9	-5.1	-6.6	-0.5	4.7
25-Nov	-6.6	-5.1	-2.9	-2.2	-0.7	-0.6	-1.1	-1.6	-2.1	-3.8	-3.7	-3.7	-3.8	-3.8	-4.6	-7.0	-9.3	-12.6	-14.7	-15.9	-17.2	-18.2	-18.8	-19.5	-7.5	-0.6
26-Nov	-18.2	-16.3	-15.7	-16.3	-16.9	-15.9	-15.0	-16.0	-17.7	-15.6	-13.1	-11.6	-10.2	-10.0	-9.7	-9.2	-8.8	-8.5	-8.4	-8.3	-7.8	-7.5	-8.7	-10.4	-12.3	-7.5
27-Nov	-11.9	-13.7	-13.3	-11.0	-9.9	-9.5	-9.1	-8.8	-8.4	-7.4	-5.1	-4.0	-3.0	-2.3	-1.7	-1.3	-2.3	-2.6	-2.8	0.0	1.0	2.3	2.5	2.2	-5.0	2.5
28-Nov	1.6	1.4	1.5	1.5	1.3	1.0	-0.3	-2.8	-2.0	0.2	1.6	2.7	3.9	4.7	4.2	3.3	2.7	3.0	3.6	3.6	3.6	2.3	1.0	-0.2	1.8	4.7
29-Nov	-0.7	-0.4	-0.9	-1.7	-2.4	-2.6	-2.6	-2.9	-2.9	-2.7	-2.2	-1.6	-0.5	0.7	1.0	0.7	0.2	-0.2	-0.6	-0.9	-0.9	-1.2	-1.8	-1.8	-1.2	1.0
30-Nov	-2.4	-3.3	-3.6	-4.6	-5.6	-6.1	-6.9	-6.6	-6.5	-6.1	-5.6	-5.2	-4.9	-5.0	-5.3	-5.6	-5.9	-6.0	-6.2	-6.3	-6.6	-7.2	-9.2	-11.7	-5.9	-2.4
																								Diurnal Average		
																								Diurnal Maximum		





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C  
Fort McKay South - November 2023**

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	0	0.00	0.00
-20 - 0	604	83.89	83.89
0 - 10	116	16.11	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720





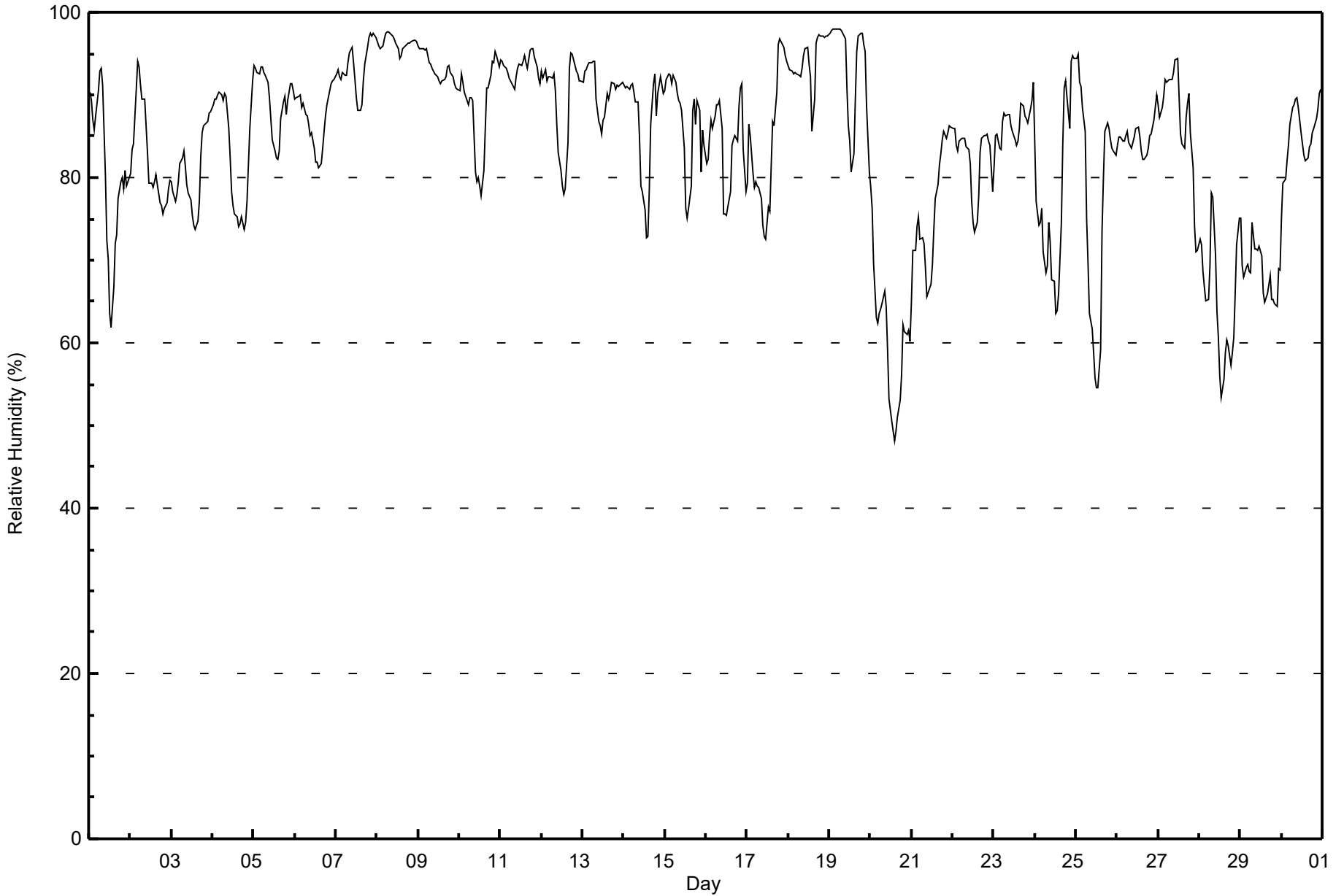
**Wood Buffalo Environmental Association**

**Summary of Hour Averages**

**Relative Humidity (RH) - %**

**Fort McKay South - November 2023**

<b>Maximum Value: 98.0 % on Nov 19 05:00</b> <b>Maximum Daily Average: 96.3 % on Nov 8</b>																						<b>Hours in Service: 720</b> <b>Hours of Data: 720</b>																											
<b>Minimum Value: 48.2 % on Nov 20 15:00</b> <b>Minimum Daily Average: 60.4 % on Nov 20</b>																						<b>Hours of Missing Data: 0</b> <b>Hours of Calibration: 0</b>																											
<b>Maximum Diurnal Average: 86.8 % at hour 2</b> <b>Minimum Diurnal Average: 77.0 % at hour 14</b>																						<b>Percent Operational Time: 100.0</b>																											
<b>Monthly Average: 84.21 %</b> <b>Percentiles: P<sub>1</sub> = 53.5 P<sub>10</sub> = 69.2 Q<sub>1</sub> = 78.8 Median = 86.4 Q<sub>3</sub> = 91.8 P<sub>90</sub> = 94.9 P<sub>99</sub> = 97.7</b>																																																	
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Nov	90.4	89.3	86.9	85.8	87.5	90.5	92.8	93.2	91.2	80.1	72.4	70.2	63.5	61.8	66.7	72.0	73.0	77.4	79.5	79.9	78.6	80.9	78.9	80.0	80.1	93.2																							
2-Nov	80.5	83.4	84.1	90.7	94.1	93.4	91.2	89.4	89.5	86.3	83.1	79.2	79.4	78.8	79.4	80.4	79.2	77.0	76.7	75.6	76.2	77.0	78.6	79.7	82.6	94.1																							
3-Nov	79.5	78.3	77.1	78.0	79.5	81.7	82.4	83.2	81.4	79.2	78.1	77.2	75.5	74.2	73.8	74.7	77.1	82.6	85.5	86.2	86.7	86.8	87.7	88.0	80.6	88.0																							
4-Nov	88.8	89.5	89.5	90.0	90.3	90.0	89.3	90.2	89.9	85.9	82.3	78.4	76.6	75.6	75.3	74.1	74.4	75.2	73.6	74.6	77.2	81.5	85.9	91.7	82.9	91.7																							
5-Nov	93.5	93.3	92.7	92.5	93.4	93.3	92.7	92.3	91.6	89.6	87.2	84.5	83.2	82.4	82.3	83.3	87.2	89.2	89.8	87.7	89.4	91.4	91.4	90.5	89.3	93.5																							
6-Nov	89.5	89.7	89.9	90.0	88.4	88.9	87.7	87.5	86.5	85.1	85.5	83.6	81.9	81.9	81.2	81.7	83.6	85.5	87.4	88.9	90.5	91.4	91.8	91.9	87.1	91.9																							
7-Nov	92.6	93.1	92.2	91.8	92.7	92.4	92.4	93.9	95.2	95.8	93.8	91.9	89.6	88.1	88.2	88.9	91.6	93.7	95.8	96.9	97.5	97.2	97.5	97.0	93.3	97.5																							
8-Nov	96.5	95.9	95.6	96.0	96.8	97.5	97.7	97.6	97.3	97.1	96.8	96.3	95.6	94.5	94.7	95.6	95.8	96.1	96.2	96.3	96.5	96.7	96.7	96.5	96.3	97.7																							
9-Nov	96.0	95.6	95.6	95.6	95.5	95.6	93.8	93.8	93.2	93.0	92.6	92.1	91.6	91.4	91.7	91.9	92.3	93.4	93.6	92.8	92.2	91.4	90.9	90.7	93.2	96.0																							
10-Nov	90.6	92.5	91.6	90.3	89.8	88.8	89.6	89.7	89.4	80.6	79.5	80.0	79.0	77.8	80.8	85.9	90.9	90.9	92.5	94.1	93.9	95.3	94.8	93.4	88.4	95.3																							
11-Nov	94.3	94.2	93.6	93.1	92.7	92.1	91.7	91.4	90.7	92.2	93.1	93.8	93.6	94.1	94.7	94.0	93.2	95.3	95.7	95.7	94.5	93.4	92.0	91.3	93.3	95.7																							
12-Nov	92.9	92.1	93.0	91.6	92.1	92.2	92.1	92.5	90.4	86.4	83.0	80.8	78.9	77.9	78.6	84.2	93.2	95.1	95.0	94.3	92.9	92.6	91.7	91.7	89.4	95.1																							
13-Nov	91.5	92.8	93.0	93.5	93.8	93.9	94.1	94.0	89.4	86.7	86.2	85.2	86.9	87.3	90.1	89.6	90.4	91.5	91.3	90.8	91.2	91.0	91.1	91.5	90.7	94.1																							
14-Nov	91.2	90.9	91.0	90.7	91.3	91.4	90.3	89.1	89.1	84.9	79.0	78.3	76.1	72.8	72.8	78.4	86.5	91.4	92.5	87.5	90.2	92.2	91.2	90.2	86.6	92.5																							
15-Nov	90.5	91.9	92.5	92.3	91.4	92.3	91.6	90.2	89.2	89.1	88.1	83.5	76.2	75.0	76.2	78.9	88.2	89.5	86.5	89.4	88.2	80.6	85.7	83.9	86.7	92.5																							
16-Nov	81.7	82.3	85.0	87.0	85.9	87.4	88.7	88.8	89.3	86.0	75.6	75.5	75.4	76.5	78.2	83.9	84.6	85.0	84.4	88.6	90.9	91.3	83.5	78.3	83.9	91.3																							
17-Nov	79.4	86.4	85.1	80.5	78.8	79.4	79.0	78.8	77.5	74.2	72.9	72.5	76.5	75.9	81.6	86.9	86.2	90.4	96.1	96.8	96.4	95.8	94.7	94.1	84.0	96.8																							
18-Nov	93.5	93.1	92.9	92.5	92.7	92.5	92.3	92.2	93.2	94.7	95.5	95.7	93.7	92.2	85.7	89.4	96.2	97.0	97.2	97.2	97.1	97.0	97.1	97.1	94.1	97.2																							
19-Nov	97.5	97.8	97.9	97.9	98.0	97.9	97.9	97.8	97.5	96.7	90.9	86.3	84.5	80.7	82.9	89.6	95.2	97.1	97.5	97.5	96.2	95.2	88.6	80.7	93.3	98.0																							
20-Nov	78.7	76.2	69.6	63.1	62.5	63.5	64.1	64.7	66.3	64.5	59.1	53.2	50.5	49.2	48.2	49.4	51.0	53.0	56.1	62.3	61.4	61.1	61.6	60.2	60.4	78.7																							
21-Nov	64.9	71.2	71.2	74.1	75.3	72.6	72.8	72.0	69.2	65.6	66.0	67.0	69.5	73.8	77.4	79.2	81.6	82.9	84.7	85.7	84.7	85.4	86.2	86.0	75.8	86.2																							
22-Nov	85.9	86.0	83.9	83.3	84.4	84.8	84.8	84.7	83.7	83.4	81.8	77.2	74.6	73.4	74.5	77.6	83.1	84.7	85.1	85.1	85.2	84.4	83.8	78.4	82.2	86.0																							
23-Nov	81.4	85.1	85.3	83.5	83.4	86.8	87.8	87.4	87.6	87.7	86.3	85.6	84.6	83.9	84.3	86.0	89.0	88.6	87.5	87.1	86.6	88.3	89.4	91.5	86.4	91.5																							
24-Nov	84.3	77.1	74.2	74.6	76.2	71.0	68.4	69.3	74.6	72.2	67.6	67.4	63.6	63.8	66.0	74.6	84.0	90.9	91.8	89.7	86.0	94.0	94.8	94.4	77.9	94.8																							
25-Nov	94.3	94.9	91.5	90.9	88.5	85.5	75.1	69.7	63.6	61.7	58.7	55.8	54.6	54.5	59.1	73.6	79.9	85.6	86.6	85.9	84.6	83.6	83.2	82.7	76.8	94.9																							
26-Nov	83.9	84.9	85.0	84.4	84.4	85.1	85.6	84.2	83.6	84.3	84.8	86.0	86.0	84.9	83.2	82.2	82.3	82.7	83.6	85.1	85.3	86.9	88.6	90.0	84.9	90.0																							
27-Nov	88.9	87.3	88.4	89.8	91.9	91.6	91.8	91.8	91.9	92.7	94.3	94.3	89.6	85.2	84.1	83.6	87.4	88.9	90.2	85.5	81.1	74.1	71.0	71.2	86.9	94.3																							
28-Nov	72.6	71.8	68.7	66.7	65.0	65.2	69.4	78.1	77.6	70.5	63.7	60.6	56.0	53.3	55.5	58.9	60.4	59.6	57.2	58.8	60.7	65.8	71.8	75.0	65.1	78.1																							
29-Nov	75.1	69.3	67.9	69.1	69.4	68.6	68.6	74.6	71.4	71.3	71.3	71.7	70.5	66.1	64.9	65.5	65.9	68.2	65.3	65.3	64.7	64.4	69.0	68.9	68.6	75.1																							
30-Nov	75.1	79.3	79.8	82.0	83.8	86.4	88.4	88.8	89.5	89.7	88.6	85.4	84.0	82.7	82.0	82.4	83.8	84.1	85.4	85.9	87.1	88.3	90.2	90.6	85.1	90.6																							
																								86.5	86.8	86.2	86.0	86.3	86.4	86.1	86.4	85.7	83.6	81.3	79.6	78.0	77.0	77.8	80.5	83.6	85.4	86.0	86.2	86.1	86.5	86.6	86.2	Diurnal Average	
																								97.5	97.8	97.9	97.9	98.0	97.9	97.9	97.8	97.5	97.1	96.8	96.3	95.6	94.5	94.7	95.6	96.2	97.1	97.5	97.5	97.5	97.2	97.5	97.1	97.1	Diurnal Maximum





Maximum Speed: 21 km/h on Nov 25 10:00	Maximum Daily Speed Average: 11.2 km/h on Nov 20	Hours in Service: 720
Minimum Speed Value: 0 km/h on Nov 2 04:00	Minimum Daily Speed Average: 0.2 km/h on Nov 30	Hours of Data: 717
Maximum Diurnal Speed Average: 3.0 km/h at hour 3	Minimum Diurnal Speed Average: 0.6 km/h at hour 14	Hours of Missing Data: 3
Monthly Average Velocity: 1.6 km/h 244.1 deg	Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 2 Q <sub>1</sub> = 3 Median = 5 Q <sub>3</sub> = 8 P <sub>90</sub> = 12 P <sub>99</sub> = 17	Percent Operational Time: 99.6

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	S1	S2	SW3	SSW4	S5	SSE6	S7	S7	S6	SSE9	SSE7	SE7	S7	SSE8	S7	SSE4	S5	S4	S4	SSE5	S5	S2	SSE5	S4	S5.0	SSE9
2-Nov	S3	SSE3	W2	SE0	N5	N7	N14	N16	N16	N18	NNE16	N16	N14	NNE14	NNE12	NE8	NE8	NNE7	NE5	NE4	NNE3	NE2	E3	SSE4	NNE7.0	N18
3-Nov	S5	SSE8	SSE6	ESE4	S2	N0	SSE1	ENE1	NE2	E2	ENE2	NNE4	N4	N6	N7	N5	NNW3	WNW2	W2	WNW3	N2	NW3	N4	N3	NNE0.9	SSE8
4-Nov	NW3	NNW3	N3	NNW3	N3	N4	N3	NNW3	N3	NNE3	NE4	E5	ESE6	ESE7	E7	E7	E7	E6	E5	E6	E5	NE4	NNE5	NNE6	ENE3.3	E7
5-Nov	NNE7	NNE7	NNE8	NNE8	NNE7	NNE6	NNE6	NNE6	NNE6	NNE6	NNE7	NNE8	NNE7	NNE7	N6	N5	NNW4	NNW2	ESE3	SE5	SE5	SE7	SE5	SE4	NNE4.2	NNE8
6-Nov	ESE3	SE2	SE2	SSE4	SSE5	S6	S8	SSE8	SSE11	SSE11	SSE9	SSE11	SSE11	SSE11	SSE9	SSE10	S9	SSE11	SSE11	S11	S8	S7	S6	SSW5	SSE7.7	SSE11
7-Nov	SSW5	SSW5	SSW6	S8	SSW6	SW5	SW3	WSW3	SW2	SSW1	WSW5	WSW5	WSW4	WSW7	WSW5	WNW2	N3	WSW1	S4	S4	S6	S6	S5	SSW6	SSW3.7	S8
8-Nov	WSW7	W9	WNW10	WNW8	NW5	NW4	WNW4	WNW5	WNW7	WNW6	WNW6	NW6	NW7	NW7	NW8	NW6	NW5	WNW5	WNW6	WNW6	NW6	NW5	NW4	W3	WNW5.7	WNW10
9-Nov	W3	UO	S2	S3	SW2	SSW1	WSW5	SSW3	SW5	SSW5	SW5	SSW6	SSE13	S11	SSE11	SSE12	S10	S7	S9	S12	S9	S13	S14	S11	S6.9	S14
10-Nov	SSW3	SSW4	S14	S13	S16	S13	S11	S12	S8	S9	S11	SSE11	S9	S12	S12	S11	S11	S14	SSW7	SSW6	S3	SSW1	SSW4	SSW6	S9.1	S16
11-Nov	SSW6	WSW2	S5	SSE7	SSW3	WSW2	WNW2	NNW3	NNW2	NNW5	N5	N5	N4	NNE4	NW3	S6	SSW5	SW5	SSW4	SSW4	WSW3	SW3	SW3	SSW4	SW1.4	SSE7
12-Nov	S5	S4	SSW5	SW4	SW3	SW5	SSW5	SSW4	WSW9	WSW7	W9	W10	W9	W10	W8	W3	SSW2	WSW2	SSW2	WNW1	SW2	NW4	NW1	NW2	WSW4.0	W10
13-Nov	WSW4	NW2	UO	W1	NNW1	W1	WNW1	N3	NE5	NE6	NNE6	NNE8	N12	NNE12	N18	N16	N14	N12	N12	NNW10	NNW10	NNW8	NNW8	NNW6	N7.0	N18
14-Nov	NNW6	NNW6	WNW3	W3	WSW4	S3	S4	S5	S4	SSE6	S10	S11	S10	SSW7	SW6	SSW4	S3	S3	SE2	SW4	S2	WSW2	W2	WSW3	SSW3.1	S11
15-Nov	SSW3	NNW3	NNW5	N9	NNE11	N9	N11	N10	N12	N11	N4	WNW4	SW3	SSW4	SW4	NW5	NW4	W4	W5	WNW5	SW4	SW5	SW5	SW5	NNW4.0	N12
16-Nov	SW7	WSW7	SW4	S5	SSW2	SSW3	S4	SSW2	SSW3	SSE5	SSE11	SSE9	S7	S7	S4	W2	WNW3	WNW3	SW3	S5	SSW2	SE2	WSW10	SW12	SSW4.1	SW12
17-Nov	SSW9	SSE2	WSW8	WSW14	WSW14	WSW13	WSW13	SW13	SW12	SW9	S6	SSE9	S7	S7	S5	SSW4	W5	NW4	SW2	SSW3	SW3	S3	S3	SSW2	SSW6.0	WSW14
18-Nov	SSW2	SSW4	SW2	UO	WSW2	SSW1	S2	S3	S3	S3	S1	SSE1	SE2	SSW3	S6	SW2	WSW3	SSW2	SW2	SW2	SSW1	S3	SSW2	S2	SSW2.2	S6
19-Nov	SSW1	SW1	SSE2	S3	WSW1	W1	S1	WSW3	SSW2	SSW1	S1	SW4	SSE5	SSE7	S4	SW1	SW3	SSW2	S2	S4	SSE6	S4	WSW8	WSW10	SSW2.6	WSW10
20-Nov	W10	WNW16	WNW20	WNW18	WNW17	WNW14	WNW12	WNW13	W14	W12	W8	WNW12	WNW15	WNW14	WNW14	WNW9	WNW7	WNW7	W4	W6	W6	W10	W9	W8	WNW11.2	WNW20
21-Nov	WSW1	S2	SSW2	SSW1	SSW1	SSW3	N3	N5	NNE6	NNE6	NNE6	NNE9	NNE10	NNE12	NNE12	N14	N14	N14	N11	N13	N13	N11	N10	N12	N7.1	N14
22-Nov	N11	N11	N11	N11	N10	NNE8	NNE7	NNW4	NW3	WNW2	N3	ENE1	NE4	N5	NNE2	NNW2	WNW2	SW2	SSW1	W1	W1	S3	S5	SSE8	N3.0	N11
23-Nov	SSE7	S5	S9	SSE10	S11	S8	S6	S10	SSE7	S6	SSE6	S7	S9	S7	S7	SSW4	WSW3	WSW3	SSW3	SSW3	SSE4	S7	S7	SSE8	S6.3	S11
24-Nov	SSW10	S10	SSW12	S11	S8	SW11	SW3	SSW4	SW5	SSW5	SSE5	SSW2	SSW2	SW3	SSW4	S5	S7	S6	W2	SSW6	S6	SSW4	S5	SSW5.5	SSW12	S11
25-Nov	S5	SW6	W5	NNW7	N13	N16	N21	NNW14	NNW21	N21	NNW14	NNW15	NNW16	NNW16	NNW15	N10	NNW4	SW2	WSW4	WSW3	SSW2	SW1	WSW1	WSW1	NNW8.0	N21
26-Nov	NNW1	WSW1	SW0	NNW2	W2	NW1	S2	WNW2	SW1	SW2	SSE5	SSE4	SE5	SE8	SSE8	SSE7	SSE6	S4	NW1	SW2	S4	N2	SW2	NNW5	S1.8	SE8
27-Nov	WNW3	SSW2	S3	SW2	S2	SSW0	SSW1	S2	S3	SSW2	S6	S6	S6	SSE8	SSE7	SSE3	SSW3	S2	S3	WSW8	WSW11	SW11	SW9	WSW11	SSW3.9	WSW11
28-Nov	WSW10	WSW12	SW12	WSW12	WSW12	SW9	SW6	SW2	WSW7	W9	W8	W10	W8	WSW6	W7	W7	SW5	WSW8	WSW12	WSW10	W10	WNW7	WSW7	WSW5	WSW8.0	SW12
29-Nov	WSW8	W9	W10	WSW7	W7	W10	W8	WSW9	WSW10	W9	W7	WSW6	WNW8	WNW12	WNW12	WNW11	NW8	NW7	NW11	WNW7	NW9	NW7	NW7	NW7	WNW7.8	WNW12
30-Nov	WNW5	NNW3	W5	W3	NW2	N4	WSW2	SW2	S3	S3	SSE4	SE4	E4	NE5	ENE5	SE5	SE2	NE3	ENE1	NNW3	NNW3	W2	SW2	SSW2	N0.2	WNW5

SW2.7	WSW2.3	WSW3.0	WSW2.4	WSW2.0	W2.1	W1.9	W1.7	W2.0	W1.3	SW0.8	SSW0.8	WSW0.7	WSW0.6	W0.8	WSW0.8	WSW1.1	WSW1.2	SW1.3	SW1.9	WSW1.8	SW1.7	SW2.4	SW2.7	Diurnal Average	
N11	WNW16	WNW20	WNW18	WNW17	N16	N21	N16	NNW21	N21	NNE16	N16	NNW16	NNW16	N18	N16	N14	N14	N12	N13	N13	S13	S14	SW12	Diurnal Maximum	

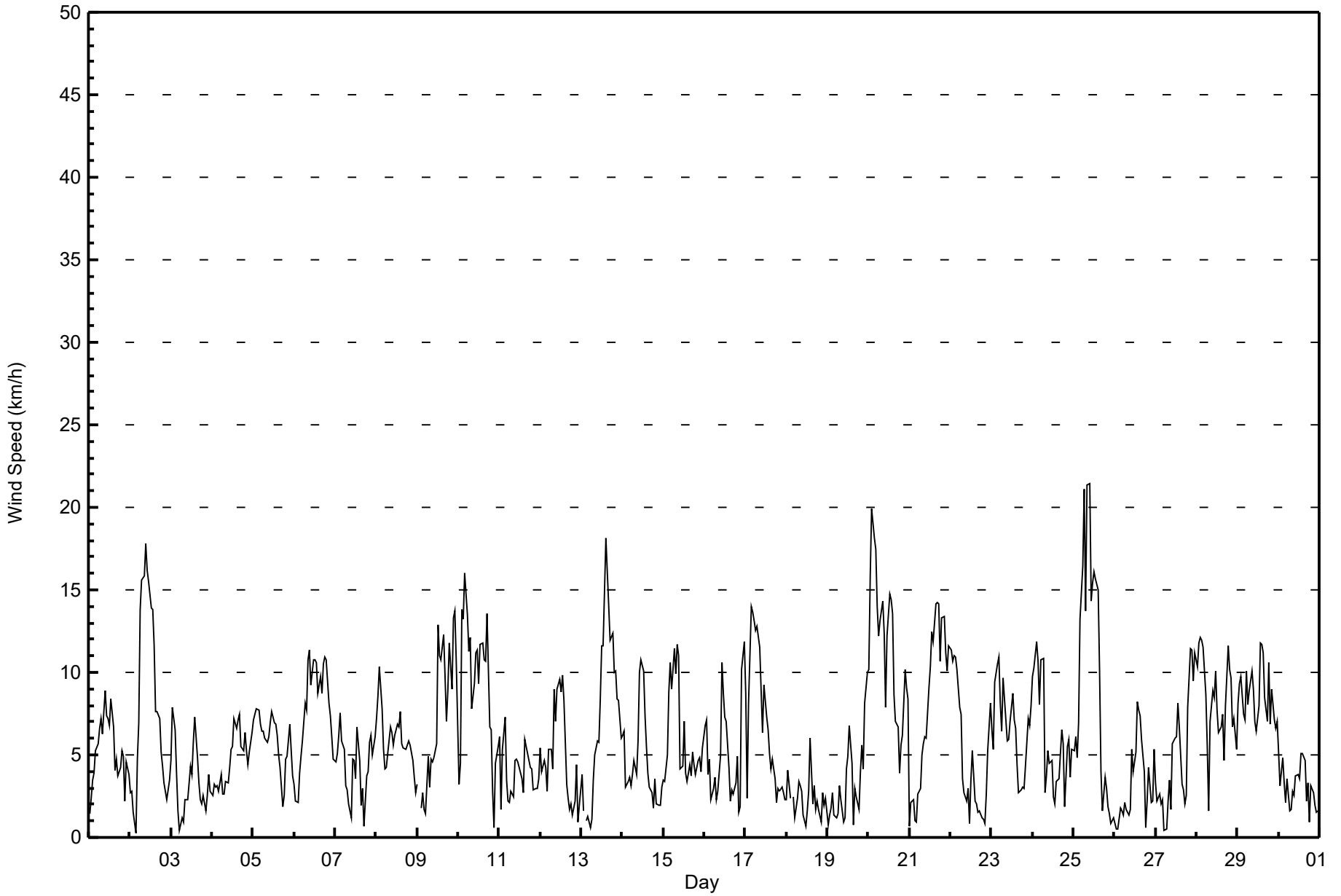
UO - Unstable Operation  
 All monthly, daily, and diurnal averages have been calculated using vector methods



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

**Wind Speed (WS) - km/h**  
**Fort McKay South - November 2023**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 8 km/h on Nov 20 03:00														Hours in Service: 720 Hours of Data: 717 Hours of Missing Data: 3 Hours of Calibration: 0 Percent Operational Time: 99.6																											
Minimum Value: 0 km/h on Nov 30 21:00																																									
Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 1 Q <sub>1</sub> = 1 Median = 2 Q <sub>3</sub> = 2 P <sub>90</sub> = 3 P <sub>99</sub> = 6																																									
Day	Hourly Period Ending At (MST)																								Daily Maximum																
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																	
1-Nov	1	1	1	1	1	1	1	1	1	2	2	1	2	2	3	1	1	1	2	1	1	1	1	1	1	3															
2-Nov	1	1	2	1	1	2	4	4	4	4	3	4	4	3	3	2	3	2	2	1	1	2	1	2	4																
3-Nov	1	2	2	2	1	1	2	1	1	1	1	1	2	1	1	2	1	1	2	2	2	1	1	2	2																
4-Nov	1	1	1	1	1	1	2	2	1	1	2	2	2	2	2	2	2	2	2	2	2	1	1	1	2																
5-Nov	1	2	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	2	1	2	1	1	2																
6-Nov	1	1	1	2	1	2	2	2	2	2	2	2	2	3	2	2	2	2	2	2	2	1	1	1	3																
7-Nov	1	1	2	1	2	2	1	1	1	1	2	2	1	2	2	1	2	1	0	1	1	1	1	2	2																
8-Nov	3	3	4	3	4	2	1	2	2	2	2	2	2	2	2	2	2	1	2	2	2	1	1	1	4																
9-Nov	1	UO	1	1	1	1	1	1	1	1	1	2	3	2	3	2	2	1	1	2	3	2	2	3	3																
10-Nov	3	2	2	2	2	3	2	2	1	4	3	2	2	2	2	2	2	2	2	1	2	2	2	1	4																
11-Nov	2	1	2	3	1	2	2	2	1	2	1	2	2	1	2	3	1	1	1	1	1	1	1	1	3																
12-Nov	1	1	2	2	1	1	1	1	3	3	4	3	3	4	3	2	1	1	1	1	2	2	2	1	4																
13-Nov	1	1	UO	1	1	1	1	1	2	2	2	2	3	3	4	4	3	2	3	2	2	2	2	2	4																
14-Nov	1	2	1	1	1	1	1	1	1	2	2	2	2	3	2	1	1	1	1	3	1	1	1	2	3																
15-Nov	2	2	2	2	3	2	3	3	3	4	4	3	3	2	2	1	1	2	1	1	1	2	1	1	4																
16-Nov	2	2	2	1	1	2	1	1	1	3	2	2	2	2	1	1	1	1	1	2	1	1	4	3	4																
17-Nov	3	2	4	4	4	4	4	3	3	3	1	2	2	1	1	1	2	1	1	1	1	2	1	1	4																
18-Nov	1	1	1	UO	1	1	0	1	1	1	1	1	1	2	2	2	1	1	1	1	1	1	2	1	2																
19-Nov	1	2	1	2	2	1	2	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	4	4	4																
20-Nov	7	7	8	7	7	6	5	4	4	5	4	4	5	5	5	4	3	2	3	2	2	3	3	4	8																
21-Nov	1	2	2	1	1	1	1	1	1	2	2	3	2	3	3	3	3	3	2	3	4	3	2	3	4																
22-Nov	3	3	3	2	2	2	2	1	1	1	1	1	2	2	1	1	1	1	1	1	1	1	1	2	3																
23-Nov	3	3	2	3	2	2	1	2	1	2	1	2	1	2	1	1	1	1	1	1	1	1	1	2	3																
24-Nov	2	3	3	2	2	4	4	4	3	2	2	1	2	2	2	2	1	2	2	3	1	2	2	1	4																
25-Nov	2	3	3	5	3	4	6	5	6	6	4	4	4	4	5	2	2	1	1	1	1	1	1	1	6																
26-Nov	1	1	1	1	1	1	4	2	1	2	2	1	2	1	2	2	1	1	1	1	1	2	1	1	4																
27-Nov	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	2	2	1	1	3	4	3	3	4	4																
28-Nov	3	3	3	3	3	3	2	2	3	3	3	4	3	3	3	3	2	4	4	4	4	3	2	2	4																
29-Nov	2	3	3	4	3	3	2	2	2	3	2	2	3	4	4	3	3	2	3	2	3	3	3	3	4																
30-Nov	2	1	1	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	2	0	1	1	1	2																
														Diurnal Maximum				7	7	8	7	7	6	6	5	6	6	4	4	5	5	5	4	3	4	4	4	4	3	4	4
UO - Unstable Operation																																									





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

**Wind Speed (WS) - km/h**  
**Fort McKay South - November 2023**

<b>Wind Speed Ranges (km/h)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	379	52.86	52.86
6 - 11	261	36.40	89.26
12 - 19	73	10.18	99.44
20 - 28	4	0.56	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**  
**Fort McKay South - November 2023**

Wind Speed Ranges (km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	25	6	10	5	6	3	14	19	67	63	47	32	22	20	19	21	379
6 - 11	18	26	3	0	5	2	3	40	56	12	10	23	27	14	14	8	261
12 - 19	21	6	0	0	0	0	0	2	11	1	4	8	2	12	0	6	73
20 - 28	2	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	4
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	66	38	13	5	11	5	17	61	134	76	61	63	51	47	33	36	717

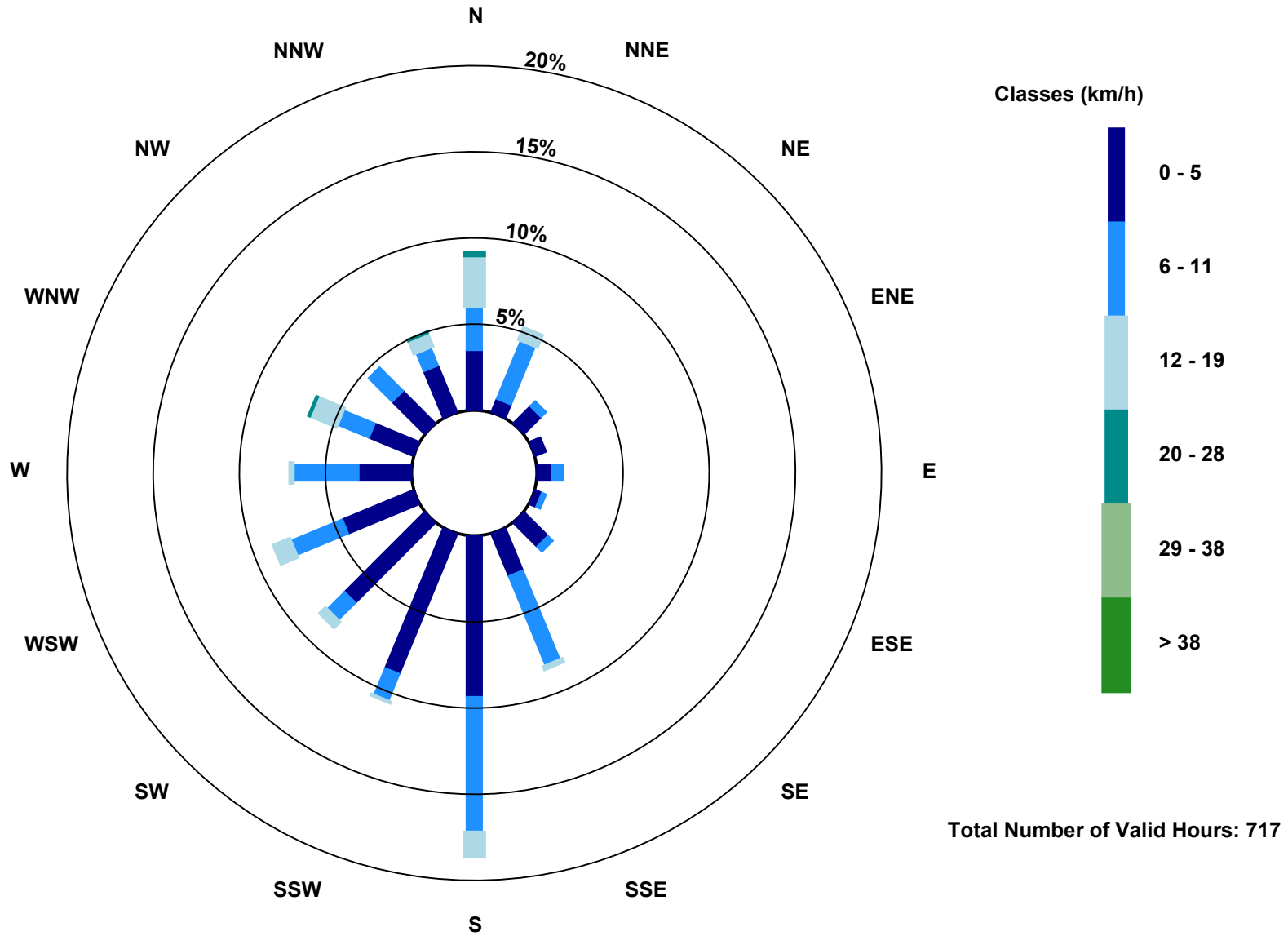
Total Number of Valid Hours: 717

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 2023

Wind Speed (WS) - km/h  
Fort McKay South







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

**Wind Direction (WD) - deg**  
**Fort McKay South - November 2023**

Direction of Maximum Speed: 351 deg on Nov 25 10:00	Hours in Service: 720
Direction of Maximum Daily Speed Average: 285.1 deg on Nov 20	Hours of Data: 717
Direction of Minimum Speed: 127 deg on Nov 2 04:00	Hours of Missing Data: 3
Direction of Minimum Daily Speed Average: 0.2 deg on Nov 30	Percent Operational Time: 99.6
Monthly Average Direction: 244.1 deg	

Day	Hourly Period Ending At (MST)																								Daily Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Nov	176	188	228	203	179	163	178	178	172	166	149	135	173	154	169	167	185	186	183	162	179	188	168	175	171.4
2-Nov	188	163	261	127	360	0	0	2	355	4	12	9	9	17	25	37	43	27	48	40	32	53	91	162	15.1
3-Nov	181	163	159	110	176	4	160	63	55	92	68	17	7	357	10	2	341	290	262	284	9	326	350	356	23.3
4-Nov	323	337	349	346	355	358	2	328	2	13	53	88	104	108	86	93	96	93	86	91	88	45	24	17	57.8
5-Nov	17	20	15	16	16	14	17	15	22	24	17	25	18	14	8	353	339	346	113	129	137	144	138	126	28.1
6-Nov	113	145	142	162	167	184	172	168	168	165	161	160	164	164	167	168	173	166	168	171	179	173	176	195	167.5
7-Nov	203	198	196	189	206	222	232	245	214	207	248	240	246	243	246	294	7	244	181	182	185	170	187	212	212.1
8-Nov	249	264	292	292	307	305	284	282	288	290	300	310	317	311	318	313	304	292	298	299	309	316	307	266	296.4
9-Nov	262	UO	181	178	214	199	239	196	216	204	229	210	158	169	163	162	175	178	176	176	180	173	177	180	180.6
10-Nov	207	201	180	181	173	184	189	174	176	170	173	167	173	170	178	180	187	184	203	202	183	209	201	193	181.0
11-Nov	196	250	179	153	195	256	289	345	335	342	0	9	10	16	318	181	197	228	199	206	245	230	224	198	224.7
12-Nov	179	171	194	216	228	221	213	208	249	243	272	279	267	259	273	275	196	238	195	287	229	306	310	308	245.9
13-Nov	251	321	UO	267	328	264	299	5	53	50	28	19	10	12	8	6	3	0	355	347	345	342	346	331	0.9
14-Nov	328	328	293	278	258	189	183	187	189	162	177	176	194	219	210	182	184	138	231	185	256	262	240	203.8	
15-Nov	205	346	334	352	14	8	1	4	358	350	11	302	306	309	235	199	226	310	320	265	274	290	227	233	329.6
16-Nov	232	242	221	180	193	193	185	204	196	166	160	158	172	178	173	279	286	286	236	173	197	144	241	221	199.8
17-Nov	194	150	239	249	239	240	240	236	226	217	169	164	172	182	181	213	261	305	219	208	229	183	184	201	218.8
18-Nov	203	211	223	UO	243	193	191	180	182	175	191	159	135	210	179	220	254	208	223	220	204	184	197	191	199.6
19-Nov	197	229	167	178	251	262	184	238	192	198	171	216	151	154	183	222	216	198	189	184	166	176	244	255	201.0
20-Nov	272	296	303	295	296	293	293	291	268	271	272	284	289	293	287	289	282	286	278	265	264	262	266	278	285.1
21-Nov	239	171	195	196	193	197	354	9	12	29	29	30	17	14	21	7	2	7	8	3	2	2	358	0	9.2
22-Nov	358	5	358	352	2	15	16	338	306	302	5	62	42	9	30	335	301	222	213	263	259	186	180	168	358.7
23-Nov	158	170	171	161	169	172	174	169	165	172	151	178	180	175	174	194	249	237	208	197	168	183	169	168	173.9
24-Nov	192	189	192	182	176	235	234	205	229	197	151	202	207	234	198	188	179	183	266	205	177	207	175	175	198.4
25-Nov	169	231	278	345	1	0	358	344	338	351	346	341	330	342	344	4	348	215	245	251	238	222	255	239	341.0
26-Nov	335	245	227	345	268	310	169	294	230	217	168	151	142	143	151	159	158	186	306	222	188	6	231	347	171.3
27-Nov	296	206	179	217	180	205	199	184	170	194	171	180	172	166	162	157	210	183	178	244	250	236	221	238	206.9
28-Nov	241	242	234	241	242	229	226	230	248	261	273	259	276	254	263	261	222	256	255	253	259	284	257	243	250.8
29-Nov	240	264	267	256	269	269	273	252	256	263	263	249	288	303	295	302	307	304	322	303	314	313	309	316	283.6
30-Nov	294	339	268	271	305	3	238	233	179	181	166	125	88	51	72	137	125	46	58	346	344	279	235	255	0.3

230.6 245.5 240.0 239.6 252.8 261.9 269.0 265.7 265.9 269.9 214.9 213.5 243.8 248.3 271.1 252.8 248.5 249.3 233.6 230.9 237.0 232.1 227.6 229.8

Diurnal Average

UO - Unstable Operation

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



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

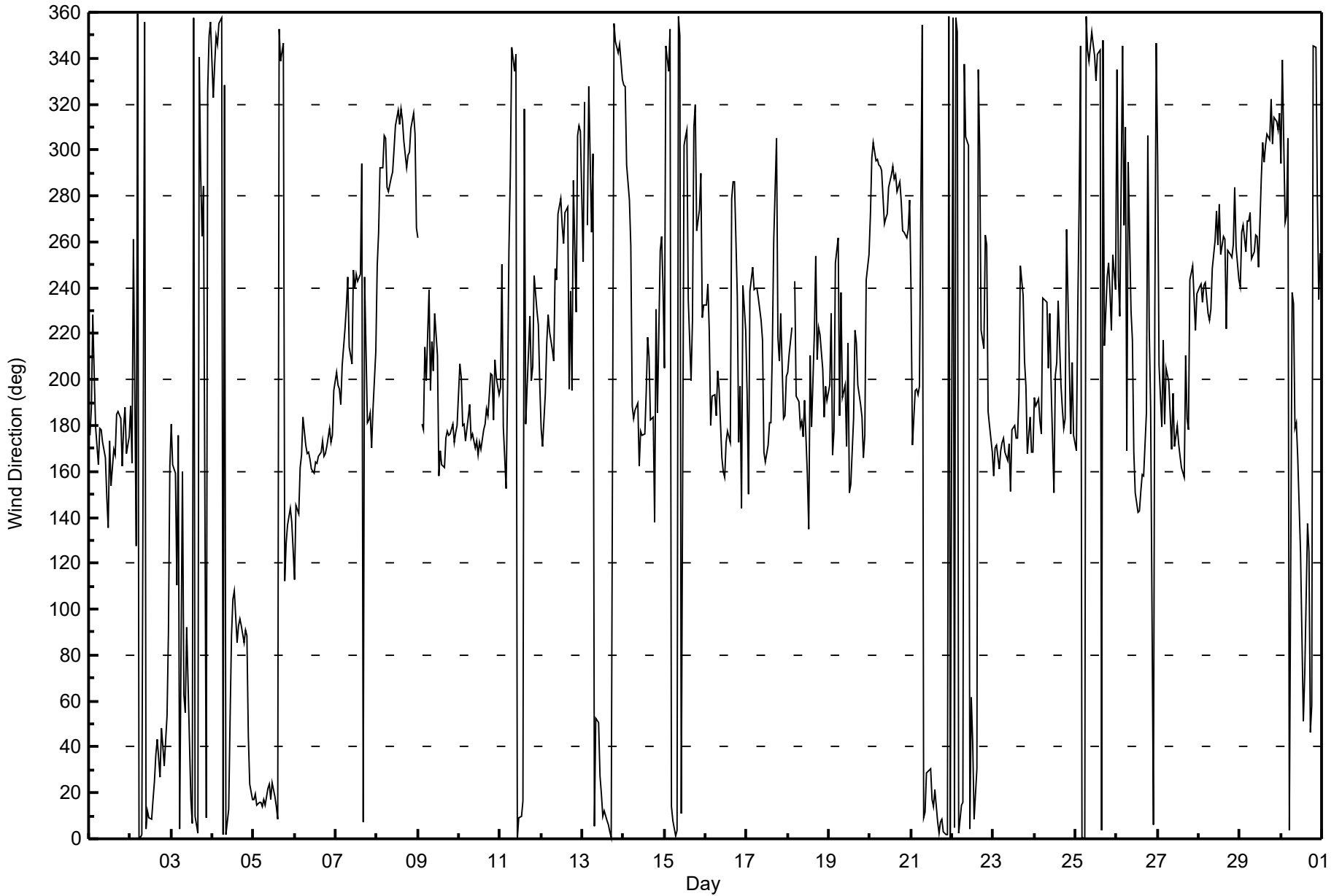
**Wind Direction (WD) - deg**  
**Fort McKay South - November 2023**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 97 deg on Nov 26 07:00	Hours of Data: 717
Minimum Value: 7 deg on Nov 10 08:00	Hours of Missing Data: 3
Percentiles: P <sub>1</sub> = 8 P <sub>10</sub> = 13 Q <sub>1</sub> = 17 Median = 24 Q <sub>3</sub> = 37 P <sub>90</sub> = 63 P <sub>99</sub> = 90	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-Nov	60	51	38	34	10	14	10	8	16	12	19	21	30	19	14	17	19	13	16	11	19	66	20	22	66
2-Nov	30	55	82	96	19	16	16	18	17	16	17	16	17	20	20	23	26	20	24	25	23	62	63	34	96
3-Nov	21	9	16	47	77	83	85	63	23	40	56	25	35	26	19	19	22	26	26	32	86	33	28	50	86
4-Nov	29	19	33	25	36	24	54	19	23	15	36	29	32	28	26	23	23	28	23	24	30	24	16	14	54
5-Nov	15	15	15	13	16	17	15	12	15	15	15	19	17	17	15	17	12	51	30	20	15	15	17	25	51
6-Nov	25	47	46	23	11	19	10	15	12	15	13	13	15	13	13	13	12	12	11	11	13	11	11	17	47
7-Nov	14	15	17	12	19	21	22	19	40	64	31	28	32	19	15	53	14	63	10	10	10	7	20	25	64
8-Nov	24	26	28	28	30	28	32	31	26	27	26	22	24	20	21	26	22	22	22	23	22	17	19	23	32
9-Nov	17	UO	34	37	34	68	26	39	27	29	24	30	12	14	12	10	12	8	8	10	17	9	9	12	68
10-Nov	64	48	10	9	8	12	12	7	12	14	15	12	14	11	11	10	12	8	24	17	46	86	28	17	86
11-Nov	14	88	21	16	27	48	79	48	53	28	23	44	44	31	31	33	19	23	22	19	35	34	15	35	88
12-Nov	23	42	34	23	52	27	26	41	20	34	33	30	34	31	31	47	21	58	42	62	67	44	89	48	89
13-Nov	13	66	UO	47	78	77	65	34	25	24	23	15	16	16	16	16	14	16	15	17	20	13	17	78	
14-Nov	17	17	22	25	13	19	20	13	12	15	12	13	13	25	29	33	39	30	77	89	43	57	45	34	89
15-Nov	34	44	28	15	16	19	16	16	15	17	28	40	31	40	43	25	19	17	17	19	27	29	27	16	44
16-Nov	18	16	53	14	42	34	28	26	24	25	13	12	15	14	10	58	39	59	34	27	64	63	32	20	64
17-Nov	23	58	31	20	21	19	19	20	20	25	30	15	11	12	15	21	28	44	54	32	44	42	31	25	58
18-Nov	26	24	44	UO	30	76	30	32	20	62	66	89	67	41	16	76	18	65	41	25	70	54	68	45	89
19-Nov	91	76	75	53	64	64	61	36	34	82	64	37	19	10	18	73	31	31	42	23	26	17	41	29	91
20-Nov	39	28	26	30	29	28	26	23	25	29	39	32	28	28	28	28	31	28	50	14	15	19	24	42	50
21-Nov	91	76	56	77	74	29	35	27	19	29	24	20	20	17	18	16	17	16	16	16	16	17	15	17	91
22-Nov	16	16	16	14	16	16	15	29	24	27	25	97	41	33	47	36	43	20	64	55	72	21	16	12	97
23-Nov	26	52	11	12	14	16	15	10	10	12	12	15	12	14	10	14	24	20	24	17	18	7	18	17	52
24-Nov	21	20	16	11	11	23	27	96	70	37	42	49	71	79	67	43	21	18	14	88	22	13	21	21	96
25-Nov	28	31	59	43	16	17	17	16	19	17	19	20	20	19	21	17	51	74	18	33	45	57	61	47	74
26-Nov	74	53	87	43	47	60	97	59	70	64	21	24	23	11	11	12	15	16	85	70	17	91	67	15	97
27-Nov	29	42	28	40	37	90	87	23	13	87	16	16	11	11	11	76	40	39	53	35	23	25	25	22	90
28-Nov	23	19	19	20	20	24	40	81	20	31	33	28	36	49	45	35	39	38	26	29	32	31	22	25	81
29-Nov	22	26	24	70	37	21	25	19	18	21	22	25	31	24	26	24	22	21	18	20	22	17	21	19	70
30-Nov	30	39	24	55	74	43	53	45	24	36	18	28	39	23	30	21	43	37	86	51	21	37	51	41	86

91	88	87	96	78	90	97	96	70	87	66	97	71	79	67	76	51	74	86	89	86	91	89	50	
Diurnal Maximum																								

UO - Unstable Operation





## WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY  
MONITORING PROGRAM  
MONTHLY REPORT

**AMS14  
ANZAC  
NOVEMBER 2023**

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

December 22, 2023

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - ANZAC (AMS14)  
NOVEMBER 2023

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

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2(ppb) Average	686	34	34	100	9.5	0	2.2	0
TRS(ppb) Average	685	35	35	100	1.3	0	0.4	0
THC(ppm) Average	684	34	36	99.72	3	-	2.1	-
NMHC(ppm) Average	684	34	36	99.72	0.806	-	0.059	-
CH4(ppm) Average	684	34	36	99.72	2.3	-	2.1	-
NO2(ppb) Average	685	35	35	100	16.4	0	5.3	-
NO(ppb) Average	685	35	35	100	12.1	-	2.6	-
NOX(ppb) Average	685	35	35	100	24	-	6.5	-
O3(ppb) Average	680	37	40	99.58	36.7	0	33.5	-
PM2.5(ug/m3) Average	720	0	0	100	47.8	0	15.1	0
AT 2m(C) Average	696	0	24	96.67	11.3	-	2.1	-
RH(%) Average	693	0	27	96.25	100	-	96.4	-
WS(km/h) Average	720	0	0	100	42	-	24	-
WD(deg) Average	720	0	0	100	-	-	-	-
Leaf Wetness (% of range) Average	719	0	1	99.86	82.1	-	15.3	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - ANZAC (AMS14)  
 NOVEMBER 2023

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile						
					Min	P10	Q1	Median	Q3	P90	Max
SO2(ppb) Average	686	0.42	0.8	-	0	0	0.1	0.2	0.4	0.9	9.5
TRS(ppb) Average	685	0.18	0.1	-	0.1	0.1	0.1	0.2	0.2	0.3	1.3
THC(ppm) Average	684	2.03	0.1	-	2	2	2	2	2	2.1	3
NMHC (ppm) Average	684	0.004	0.036	-	0	0	0	0	0	0	0.806
CH4(ppm) Average	684	2.03	0	-	2	2	2	2	2	2.1	2.3
NO2(ppb) Average	685	2.39	2.5	-	0.1	0.4	0.8	1.6	3	5.5	16.4
NO(ppb) Average	685	0.56	1.3	-	0	0	0	0.1	0.5	1.4	12.1
NOX(ppb) Average	685	2.95	3.3	-	0.1	0.5	0.9	1.8	3.6	6.9	24
O3(ppb) Average	680	24.8	7.6	-	5.7	13.2	19	26.6	31	33.5	36.7
PM2.5(ug/m3) Average	720	5.88	4.7	-	0.7	2.5	3.4	4.4	6.6	11	47.8
Temperature 2 m (C) Average	696	-3.85	4.7	-	-17.1	-10.4	-6.4	-3.9	-0.1	1.7	11.3
Relative Humidity (%) Average	693	80.6	12.6	-	44.5	61.8	71.3	83.3	90.9	95.1	100
Wind Speed 20 m (km/h) Average	720	11.6	6	-	0	5	7	11	15	20	42
Wind Direction 20 m (deg) Average	720	191.7	-	-	-	-	-	-	-	-	-
Leaf Wetness (% of range) Average	719	1.67	6.3	-	0	0	0	0	1.2	3.7	82.1

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - ANZAC (AMS14)  
NOVEMBER 2023

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
THC/NMHC/CH4	23 Nov 2023 13:00	23 Nov 2023 14:00	2	Maintenance - replaced support gas cylinder
O3	21 Nov 2023 12:00	21 Nov 2023 14:00	3	Maintenance - analyzer replaced
Relative Humidity, Temperature	07 Nov 2023 14:00	07 Nov 2023 14:00	1	Maintenance - sensor replaced
Relative Humidity, Temperature	07 Nov 2023 15:00	08 Nov 2023 12:00	22	Unstable Operation - flatline in sensor output signal
Relative Humidity, Temperature	08 Nov 2023 13:00	08 Nov 2023 13:00	1	Maintenance - sensor replaced
Relative Humidity	06 Nov 2023 17:00	06 Nov 2023 19:00	3	Sensor operated out of range
Surface Leaf Wetness	08 Nov 2023 01:00	08 Nov 2023 01:00	1	Sensor operated out of range



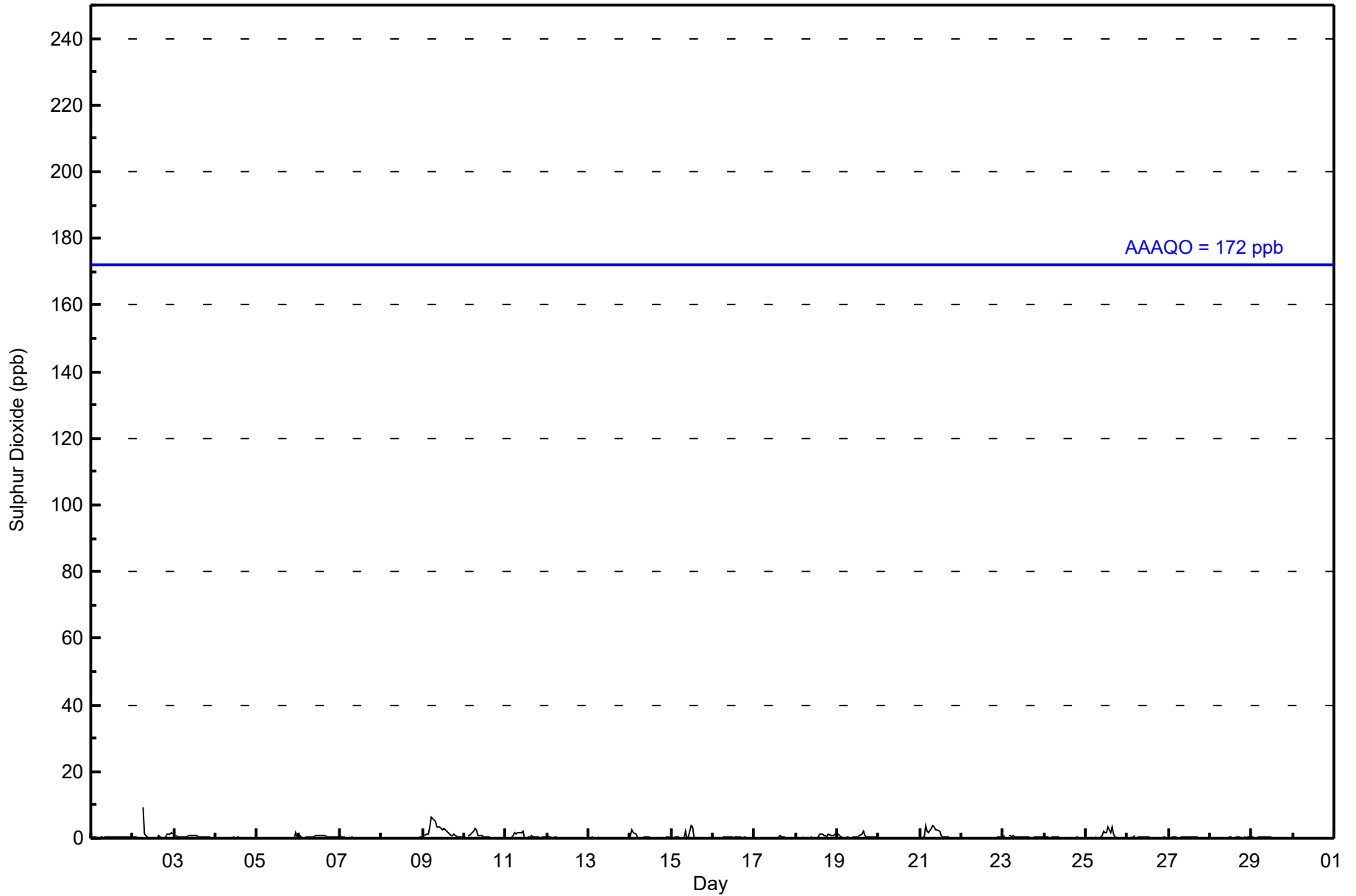
Number of Exceedences (AAAQO):		1-hr: 0		24-hr: 0		Hours in Service: 720														Daily Average		Daily Maximum																																															
Maximum Value: 9.5 ppb on Nov 2 07:00		Maximum Daily Average: 2.2 ppb on Nov 9		Hours of Data: 686														Hours of Missing Data: 34		Hours of Calibration: 34																																																	
Minimum Value: 0.0 ppb on Nov 4 20:00		Minimum Daily Average: 0.0 ppb on Nov 20		Hours of Missing Data: 34														Hours of Calibration: 34		Percent Operational Time: 100.0																																																	
Maximum Diurnal Average: 0.9 ppb at hour 7		Minimum Diurnal Average: 0.2 ppb at hour 21		Percentiles: P <sub>1</sub> = 0.0 P <sub>10</sub> = 0.0 Q <sub>1</sub> = 0.1 Median = 0.2 Q <sub>3</sub> = 0.4 P <sub>90</sub> = 0.9 P <sub>99</sub> = 3.6																																																																	
Monthly Average: 0.42 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-Nov	0.3	0.3	0.3	0.4	Z	0.4	0.4	0.2	0.3	0.4	0.5	0.4	0.5	0.6	0.4	0.3	0.3	0.3	0.4	0.3	0.4	0.2	0.2	0.4	0.4	0.6																																											
2-Nov	0.5	0.4	0.3	0.2	0.1	Z	9.5	1.3	0.3	0.1	0.1	0.1	0.1	0.0	0.1	0.9	0.6	0.1	0.1	0.6	1.1	1.3	1.6	1.3	0.9	9.5																																											
3-Nov	Z	0.8	0.5	0.3	0.5	0.6	0.5	0.6	0.7	0.8	0.7	0.8	0.8	0.7	0.6	0.6	0.5	0.4	0.3	0.2	0.2	0.2	0.2	0.2	0.5	0.8																																											
4-Nov	0.2	Z	0.2	0.2	0.2	0.1	0.1	0.2	0.1	0.1	0.1	0.3	0.1	0.1	0.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.3																																											
5-Nov	0.0	0.0	Z	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.2	0.2	0.0	0.1	0.1	0.1	0.1	0.1	0.1	1.5	0.6	0.1	1.5																																											
6-Nov	1.1	0.8	0.2	Z	0.3	0.4	0.2	0.3	0.3	0.6	0.7	0.9	0.8	0.9	0.7	0.8	0.5	0.5	0.5	0.4	0.4	0.4	0.4	0.4	0.5	1.1																																											
7-Nov	0.3	0.3	0.3	0.3	Z	0.3	0.2	0.3	0.1	0.1	0.1	C	C	C	C	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.3																																											
8-Nov	0.0	0.0	0.0	0.0	0.1	Z	0.0	0.1	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.3	0.3	0.1	0.3																																											
9-Nov	Z	0.8	1.3	1.2	3.4	6.5	5.5	4.9	3.5	3.5	3.4	2.6	2.8	2.6	2.1	1.1	0.7	0.8	1.3	0.8	0.5	0.6	0.5	0.4	2.2	6.5																																											
10-Nov	0.5	Z	0.7	0.8	1.1	2.1	2.8	2.7	0.8	0.6	0.7	0.4	0.3	0.3	0.3	0.1	0.2	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.6	2.8																																											
11-Nov	0.2	0.1	Z	0.2	1.0	1.6	1.4	1.6	1.6	1.7	2.2	0.2	0.2	0.3	0.2	0.8	0.2	0.3	0.3	0.3	0.2	0.3	0.3	0.4	0.7	2.2																																											
12-Nov	0.3	0.3	0.2	Z	0.3	0.3	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.3																																											
13-Nov	0.0	0.1	0.3	0.1	Z	0.2	0.1	0.0	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.3																																											
14-Nov	0.9	2.5	1.7	1.2	0.5	Z	0.2	0.1	0.2	0.4	0.5	0.4	0.2	0.1	0.1	0.0	0.0	0.0	0.1	0.1	0.2	0.2	0.2	0.2	0.4	2.5																																											
15-Nov	Z	0.2	0.3	0.4	0.2	0.1	0.2	0.2	2.0	0.0	0.2	3.6	3.5	0.3	0.1	0.1	0.0	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.5	3.6																																											
16-Nov	0.1	Z	0.1	0.1	0.1	0.2	0.2	0.3	0.5	0.6	0.5	0.5	0.2	0.3	0.3	0.2	0.3	0.2	0.3	0.2	0.1	0.1	0.1	0.1	0.2	0.6																																											
17-Nov	0.1	0.1	Z	0.1	0.0	0.1	0.1	0.1	0.2	0.0	0.1	0.0	0.1	0.1	0.2	0.8	0.3	0.2	0.2	0.2	0.1	0.1	0.0	0.0	0.1	0.8																																											
18-Nov	0.0	0.0	0.1	Z	0.2	0.0	0.2	0.2	0.2	0.2	0.1	0.2	0.2	0.3	1.1	1.1	1.0	0.7	0.5	1.1	0.8	0.9	1.0	1.1	0.5	1.1																																											
19-Nov	1.1	0.7	0.4	0.4	Z	0.3	0.3	0.1	0.1	0.3	0.2	0.5	0.6	0.8	1.2	2.0	0.8	0.3	0.3	0.5	0.4	0.3	0.3	0.2	0.5	2.0																																											
20-Nov	0.1	0.1	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.2	0.2	0.1	0.0	0.2																																											
21-Nov	Z	0.1	0.4	3.9	2.1	1.5	2.8	3.8	3.2	2.6	2.4	2.1	0.8	0.6	0.5	0.4	0.3	0.1	0.0	0.0	0.0	0.0	0.1	0.0	1.2	3.9																																											
22-Nov	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.0	0.1	0.0	0.0	0.0	0.2	0.4	0.4	0.1	0.4																																											
23-Nov	0.2	0.8	Z	1.0	0.7	0.6	0.7	0.5	0.5	0.4	0.3	0.3	0.5	0.3	0.4	0.3	0.1	0.1	0.2	0.2	0.3	0.4	0.3	0.3	0.4	1.0																																											
24-Nov	0.3	0.5	0.3	Z	0.4	0.5	0.5	0.3	0.2	0.2	0.1	0.2	0.1	0.1	0.2	0.2	0.1	0.1	0.2	0.3	0.2	0.1	0.1	0.2	0.2	0.5																																											
25-Nov	0.1	0.1	0.1	0.1	Z	0.2	0.1	0.0	0.1	0.9	1.9	1.7	1.9	3.3	1.5	3.5	1.1	0.5	0.2	0.1	0.0	0.0	0.0	0.0	0.8	3.5																																											
26-Nov	0.0	0.0	0.2	0.5	0.8	Z	0.4	0.3	0.2	0.3	0.4	0.3	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.0	0.3	0.2	0.1	0.2	0.8																																											
27-Nov	Z	0.2	0.2	0.3	0.2	0.1	0.2	0.2	0.2	0.3	0.3	0.3	0.4	0.5	0.3	0.3	0.3	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.2	0.5																																											
28-Nov	0.1	Z	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.1	0.2	0.3	0.3	0.2	0.1	0.3	0.2	0.3	0.2	0.1	0.2	0.2	0.3	0.2	0.2	0.3																																											
29-Nov	0.4	0.2	Z	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.2	0.2	0.4																																											
30-Nov	0.2	0.2	0.2	Z	0.2	0.1	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.2	0.1	0.1	0.2	0.1	0.2	0.1	0.1	0.2	0.1	0.2																																											
																								Diurnal Average		Diurnal Maximum																																											
																								0.3 1.1		0.4 2.5		0.3 1.7		0.5 3.9		0.5 3.4		0.7 6.5		0.9 9.5		0.6 4.9		0.5 3.5		0.5 3.5		0.6 3.4		0.6 3.6		0.5 3.3		0.5 2.1		0.4 3.5		0.5 1.1		0.3 0.8		0.2 1.3		0.2 1.1		0.2 1.1		0.2 1.3		0.3 1.6		0.3 1.3	
Z - zerospan C - Calibration																																																																					
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 172 ppb 24-hr 48 ppb																																																																					





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

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Anzac - November 2023**





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

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Anzac - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 10	686	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: 686

Total Number of Hours: 720



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

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Anzac - November 2023**

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	15	15	37	45	96	46	33	24	24	53	137	86	31	25	11	686
11 - 20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	8	15	15	37	45	96	46	33	24	24	53	137	86	31	25	11	686

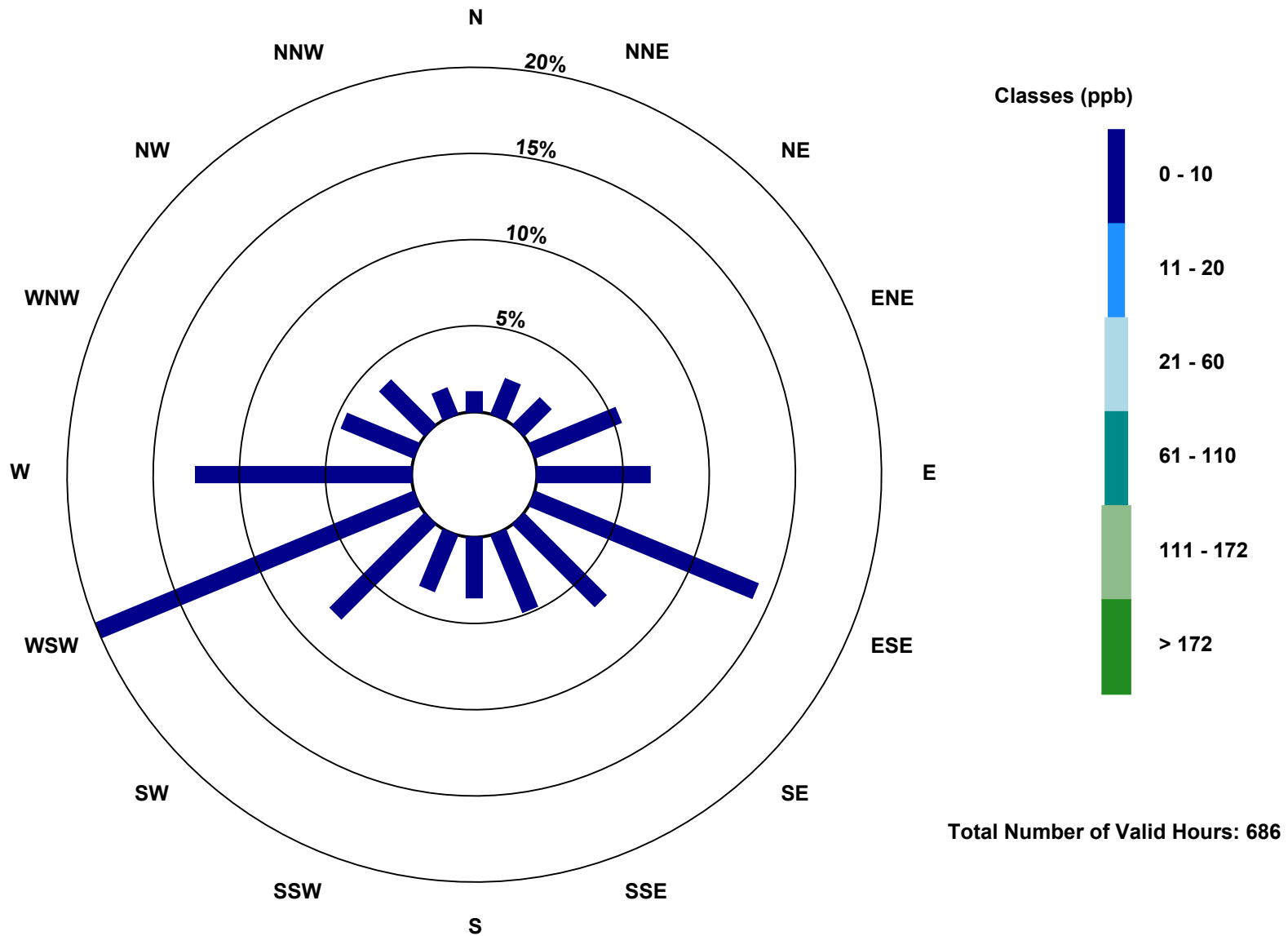
Total Number of Valid Hours: 686

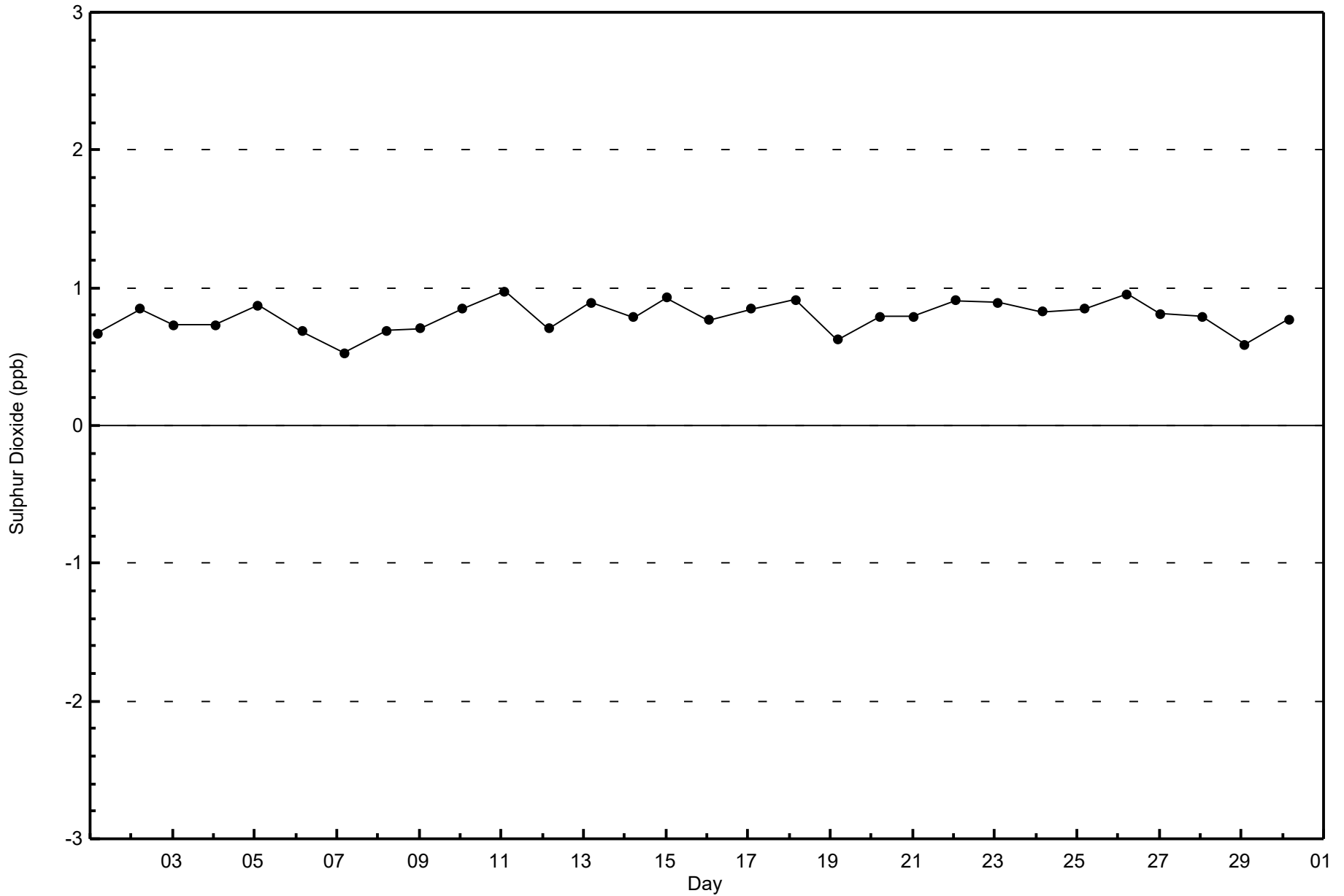
Total Number of Hours: 720

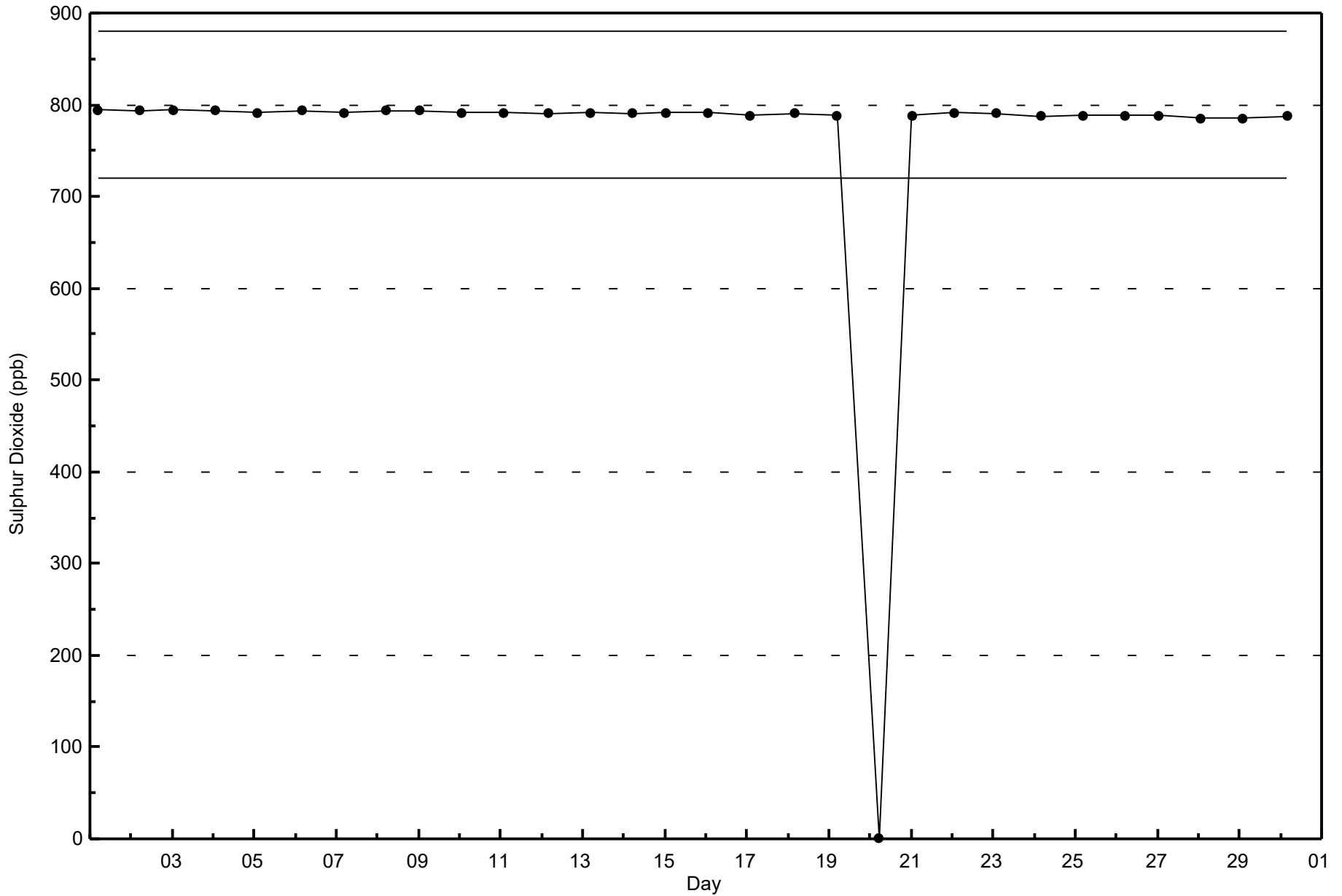


Wood Buffalo Environmental Association  
Wind Rose Nov 2023

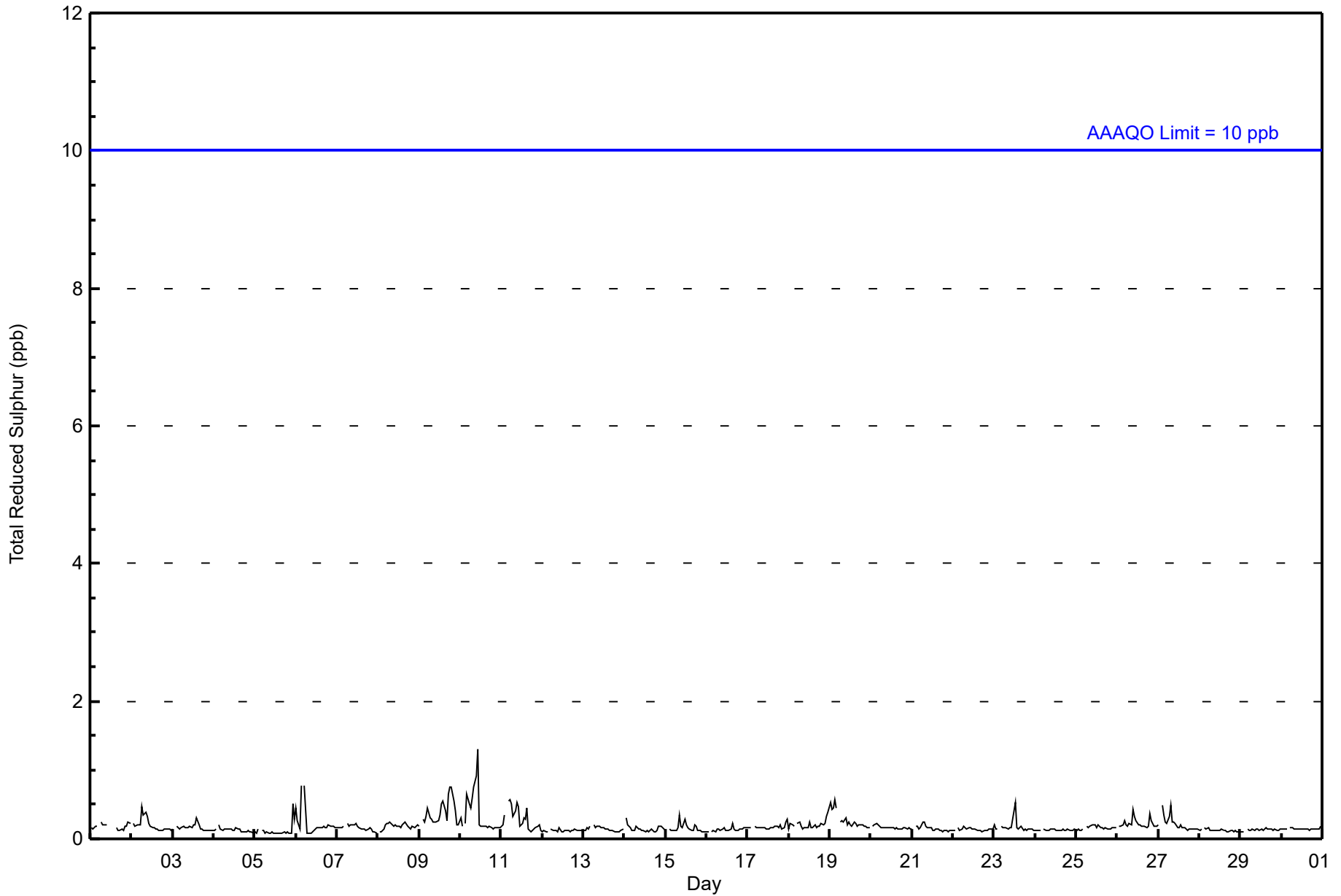
Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Anzac















**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Total Reduced Sulphur (TRS) - ppb  
Anzac - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2	685	100.00	100.00
3 - 4	0	0.00	100.00
5 - 7	0	0.00	100.00
8 - 11	0	0.00	100.00
> 11	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



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

**Total Reduced Sulphur (TRS) - ppb**  
**Anzac - November 2023**

<b>Concentration</b> <b>Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 2	8	16	14	37	48	95	44	34	24	25	52	133	88	31	25	11	685
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	8	16	14	37	48	95	44	34	24	25	52	133	88	31	25	11	685

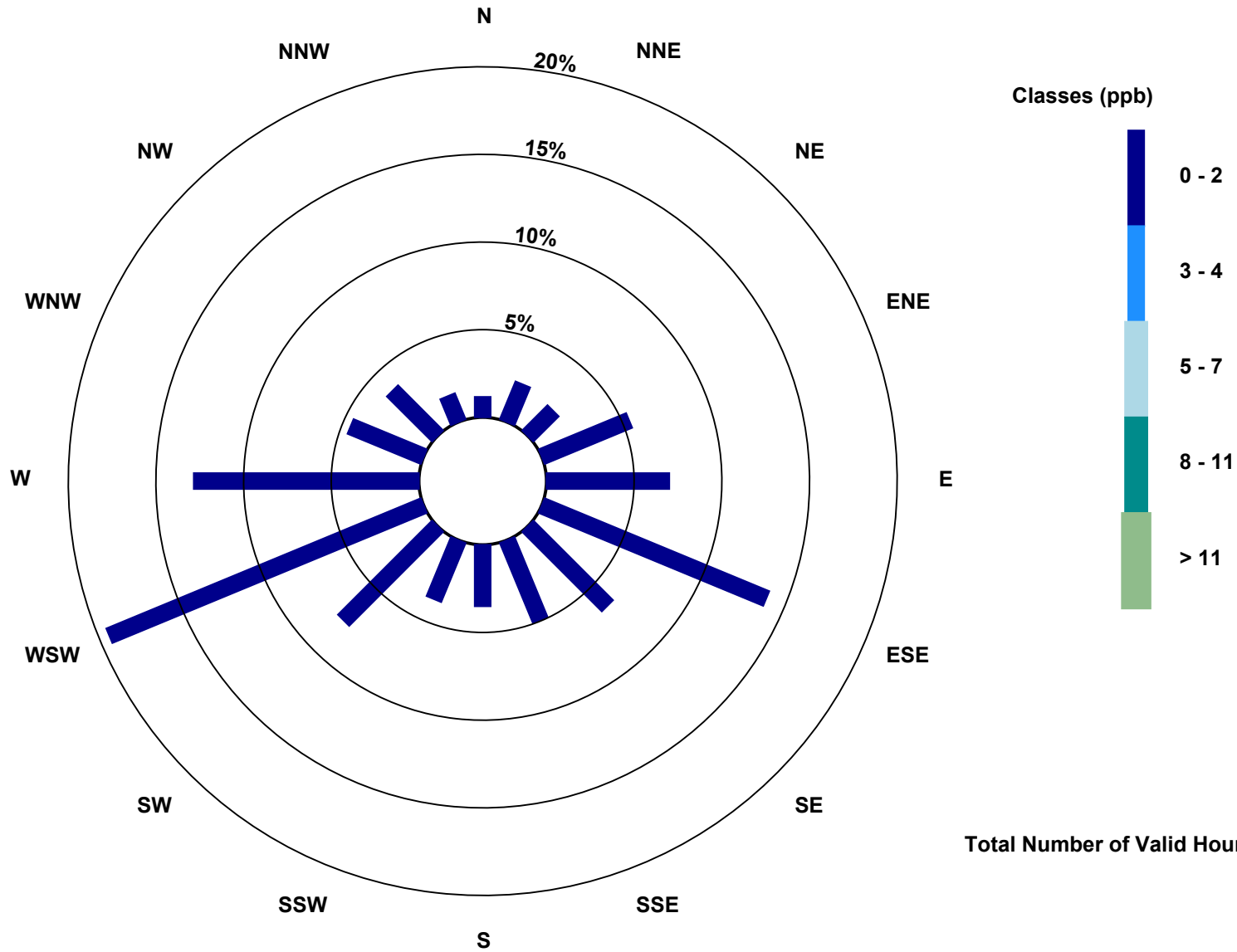
Total Number of Valid Hours: 685

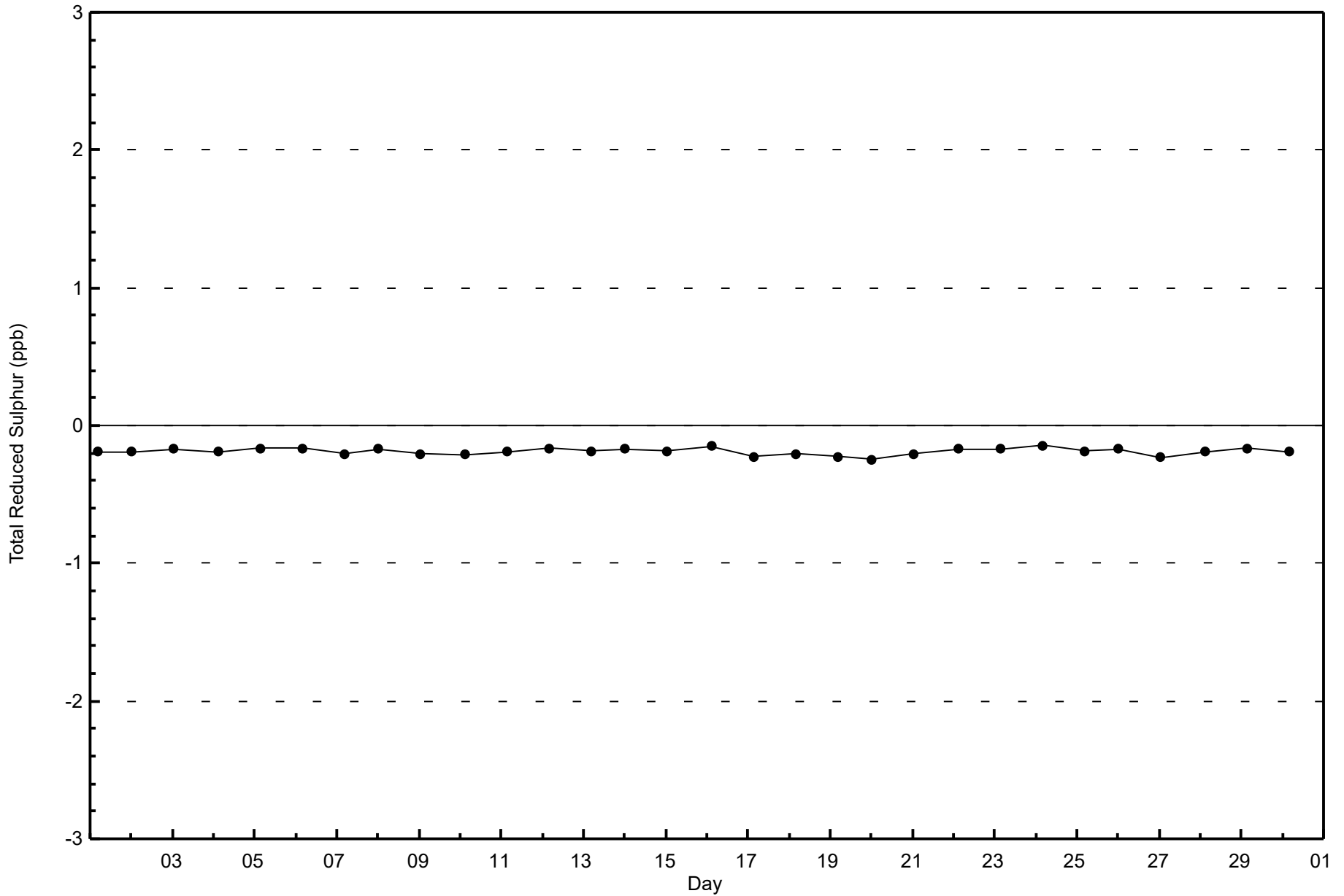
Total Number of Hours: 720

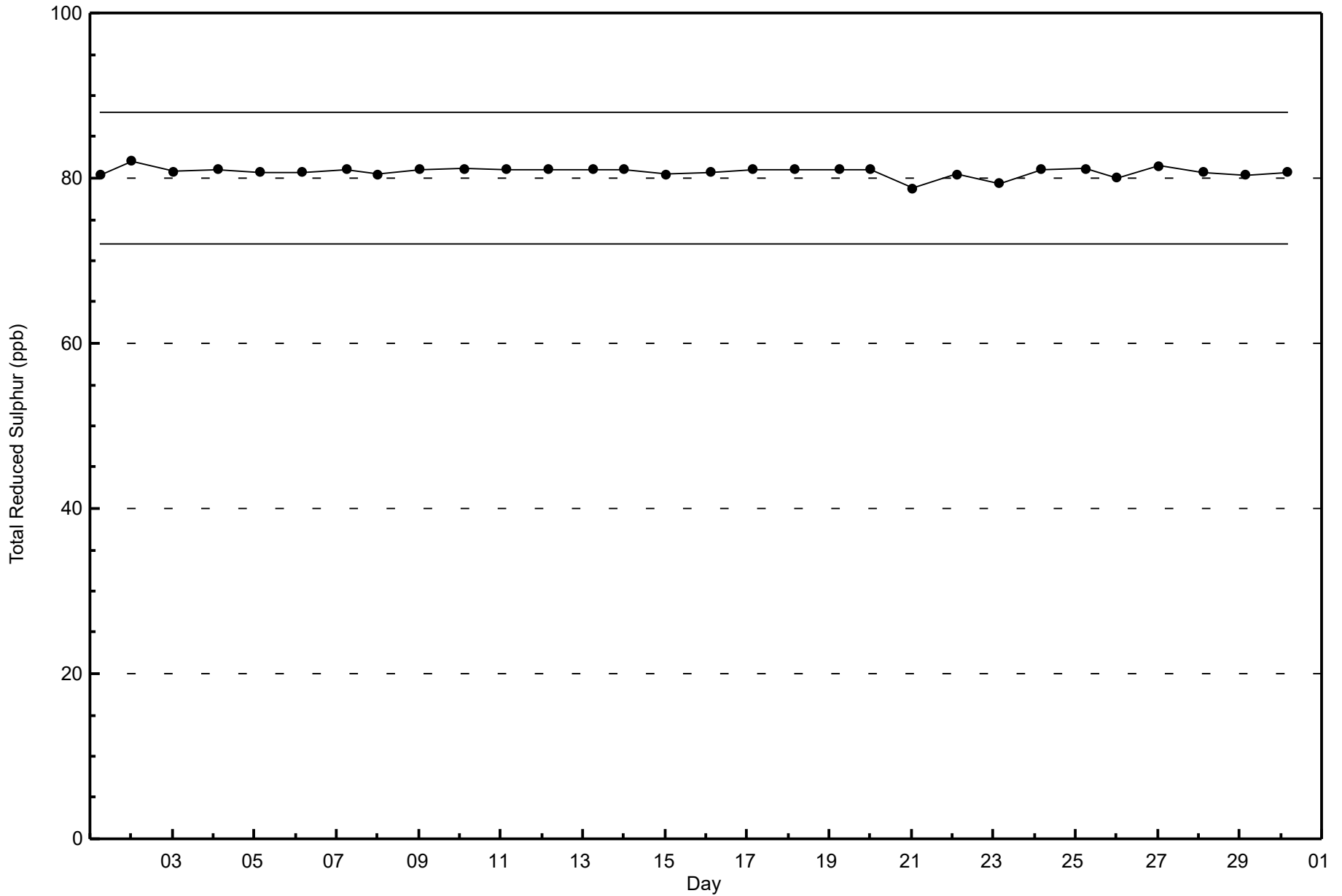


Wood Buffalo Environmental Association  
Wind Rose Nov 2023

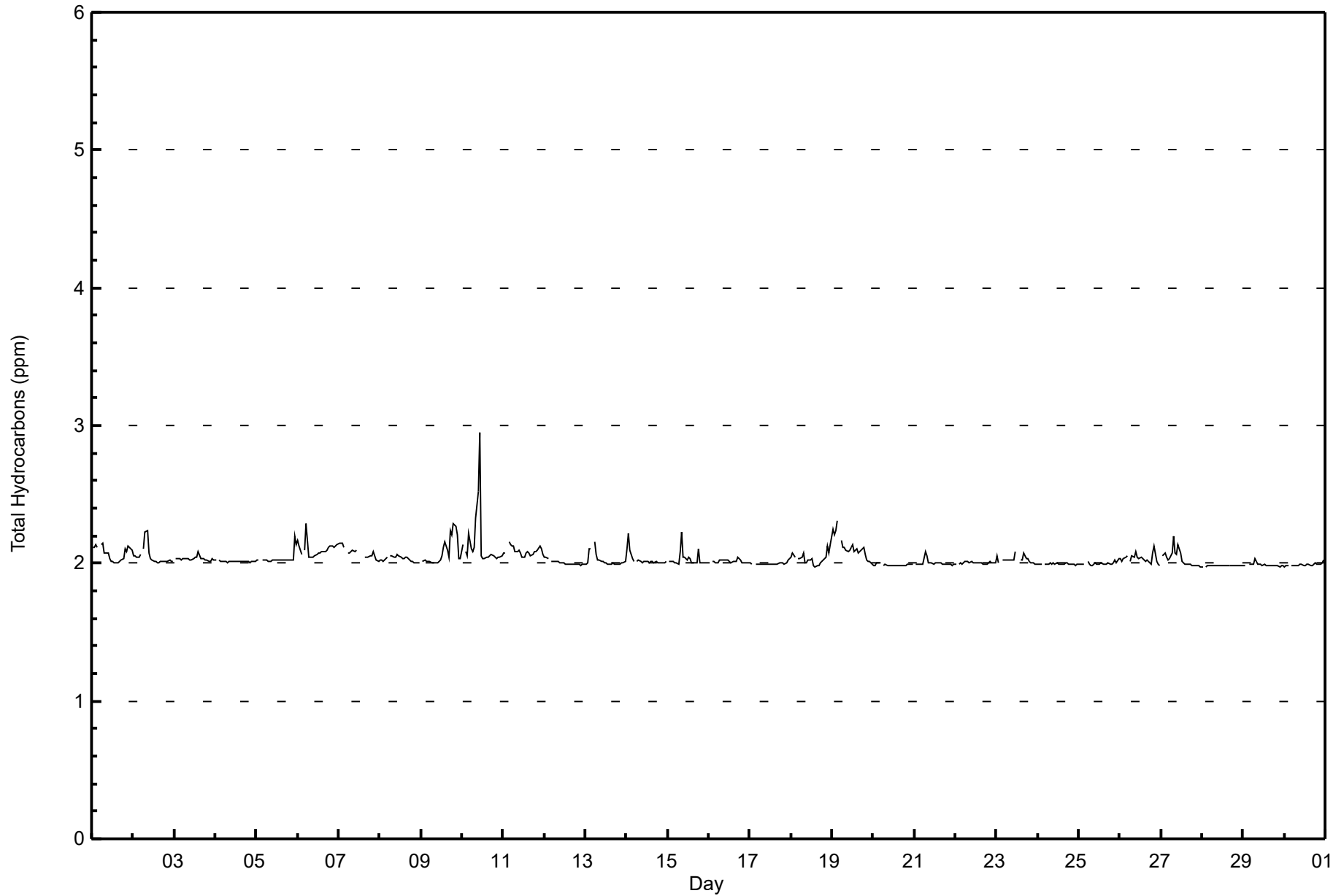
Total Reduced Sulphur (TRS) - ppb  
Anzac













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

**Total Hydrocarbons (THC) - ppm**  
**Anzac - November 2023**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2.0	530	77.49	77.49
2.1 - 3.0	154	22.51	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 684

Total Number of Hours: 720





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

**Total Hydrocarbons (THC) - ppm**  
**Anzac - November 2023**

<b>Concentration</b> <b>Ranges (ppm)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 2.0	7	12	14	34	29	44	25	20	18	16	50	129	76	23	24	9	530
2.1 - 3.0	1	3	1	3	16	50	21	13	6	8	3	8	10	8	1	2	154
3.1 - 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	<b>8</b>	<b>15</b>	<b>15</b>	<b>37</b>	<b>45</b>	<b>94</b>	<b>46</b>	<b>33</b>	<b>24</b>	<b>24</b>	<b>53</b>	<b>137</b>	<b>86</b>	<b>31</b>	<b>25</b>	<b>11</b>	<b>684</b>

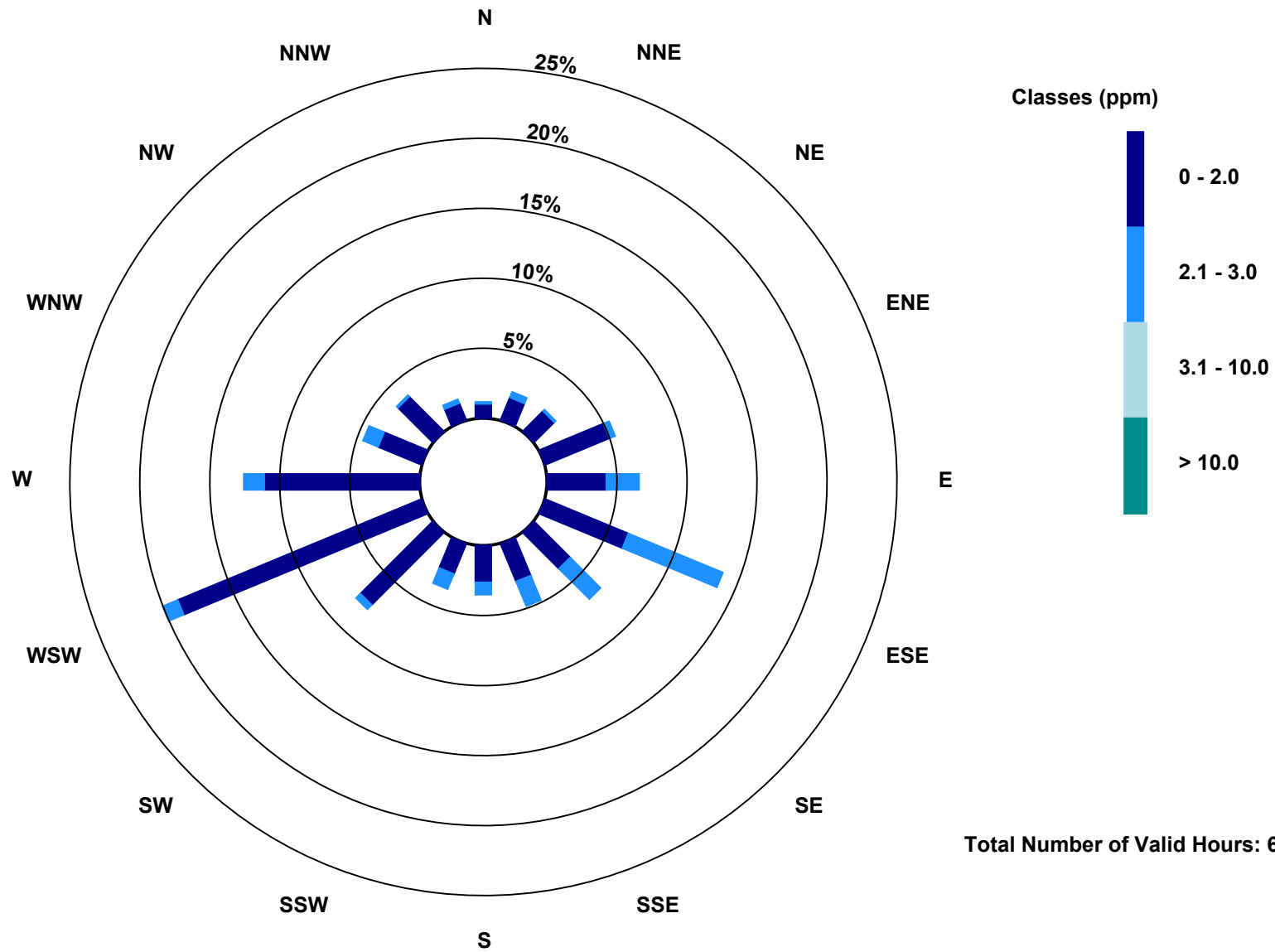
Total Number of Valid Hours: 684

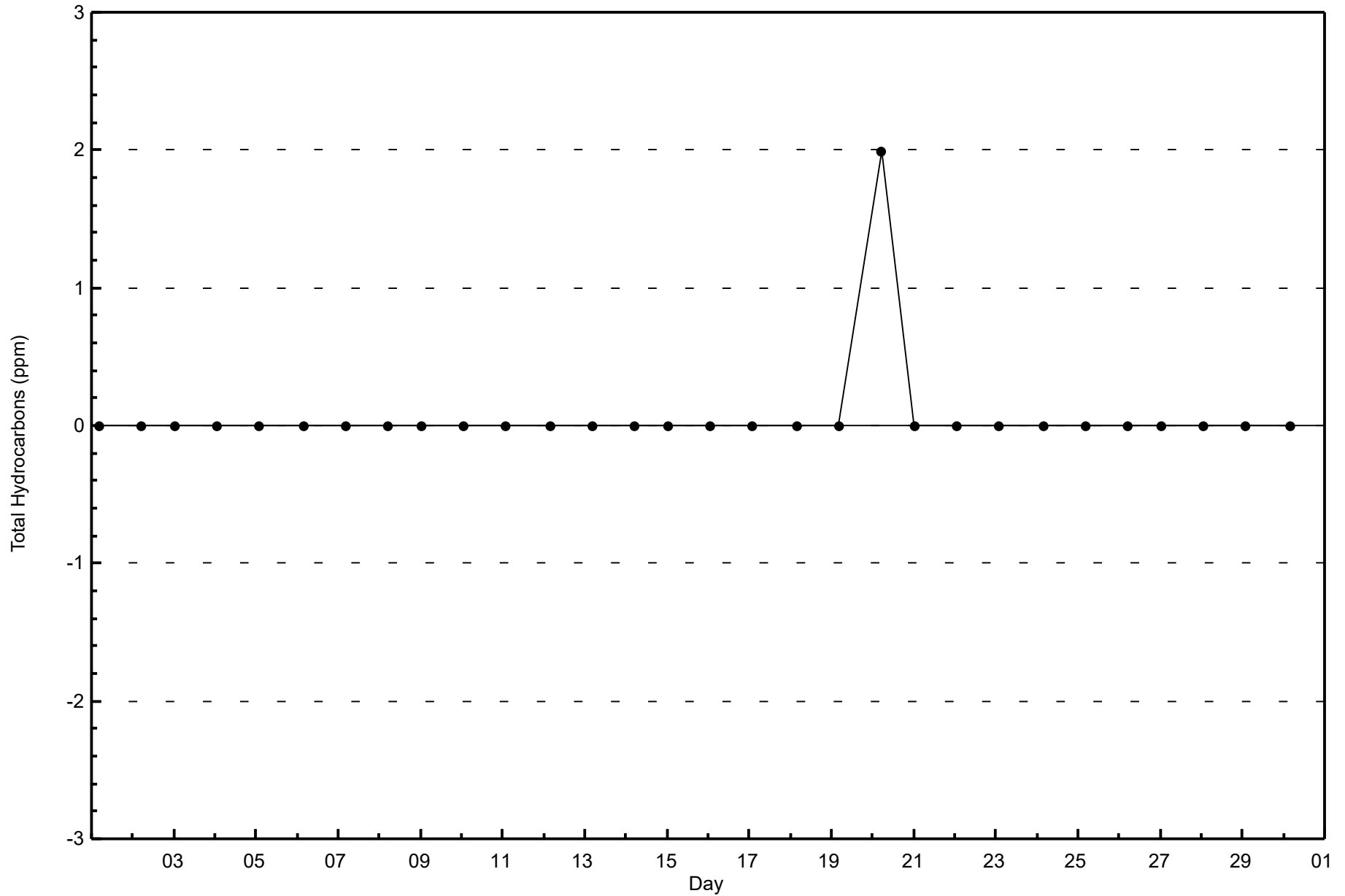
Total Number of Hours: 720

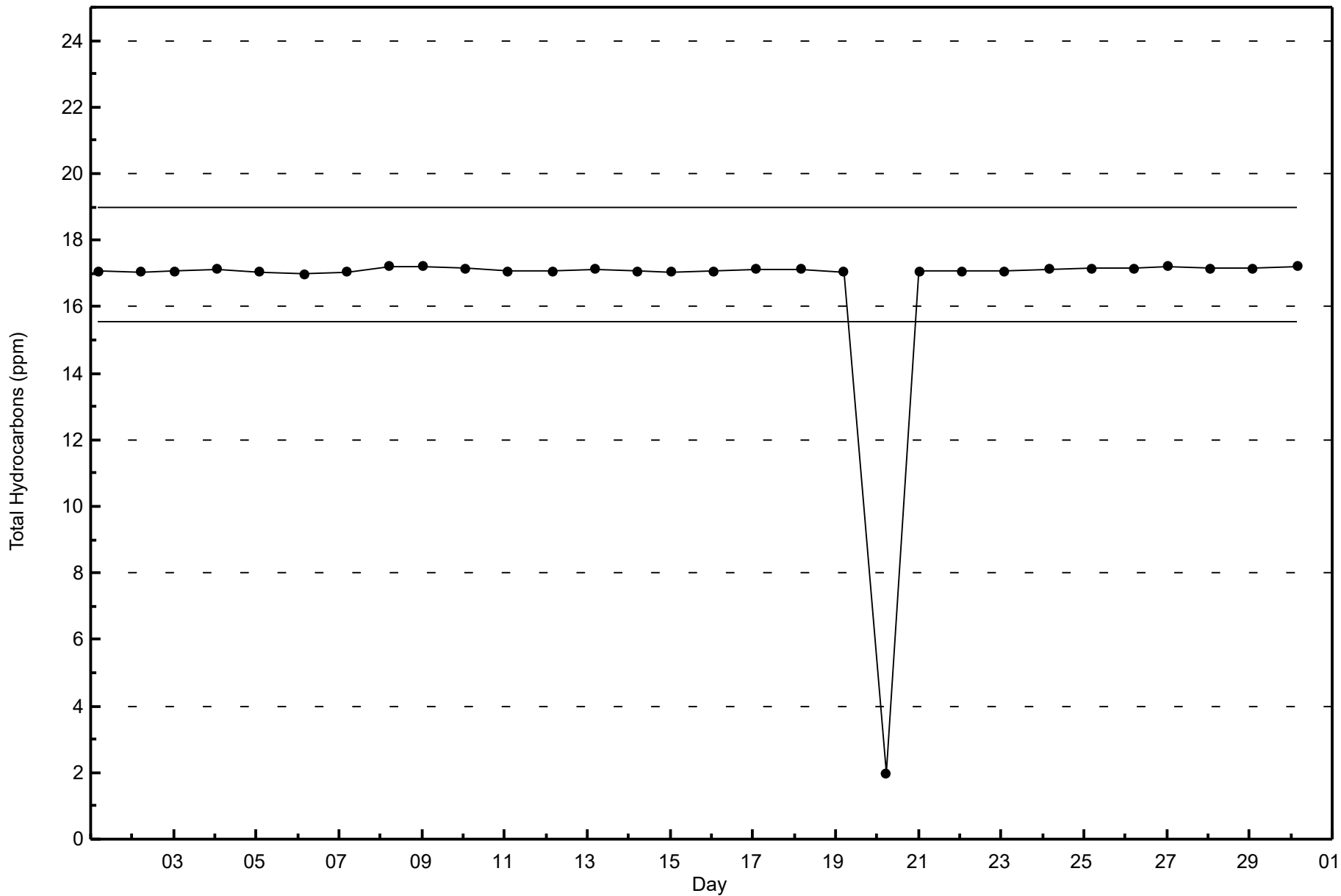


Wood Buffalo Environmental Association  
Wind Rose Nov 2023

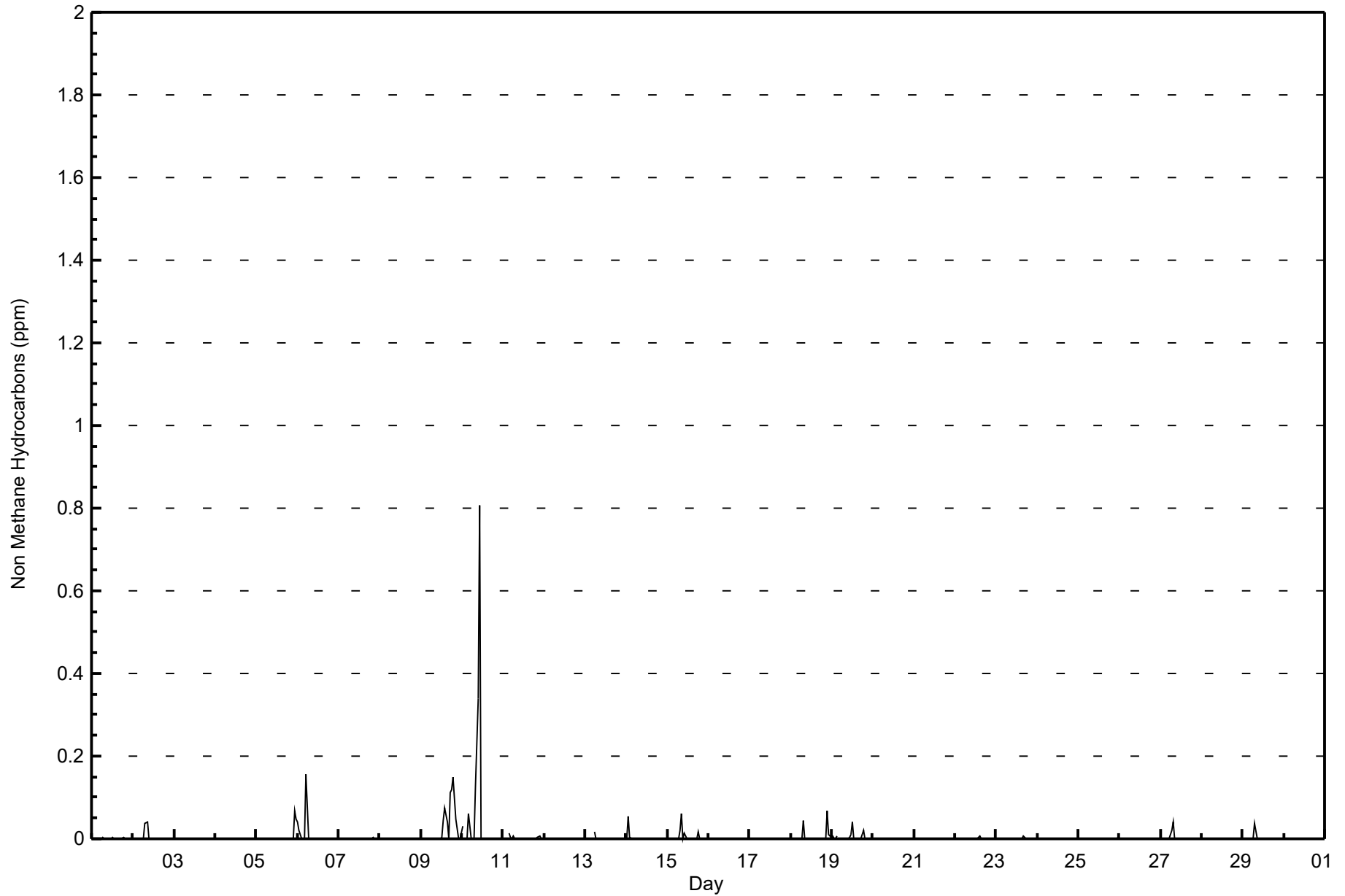
Total Hydrocarbons (THC) - ppm  
Anzac













**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Non Methane Hydrocarbons (NMHC) - ppm  
Anzac - November 2023**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 0.005	643	94.01	94.01
0.006 - 0.05	29	4.24	98.25
0.06 - 0.1	9	1.32	99.56
> 0.1	3	0.44	100.00

Total Number of Valid Hours: 684

Total Number of Hours: 720



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

**Non Methane Hydrocarbons (NMHC) - ppm**  
**Anzac - November 2023**

<b>Concentration Ranges (ppm)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 0.005	7	15	14	37	41	72	45	32	24	24	52	135	83	26	25	11	643
0.006 - 0.05	1	0	1	0	3	12	1	1	0	0	1	2	3	4	0	0	29
0.06 - 0.1	0	0	0	0	1	7	0	0	0	0	0	0	0	1	0	0	9
> 0.1	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	3
<b>Totals</b>	<b>8</b>	<b>15</b>	<b>15</b>	<b>37</b>	<b>45</b>	<b>94</b>	<b>46</b>	<b>33</b>	<b>24</b>	<b>24</b>	<b>53</b>	<b>137</b>	<b>86</b>	<b>31</b>	<b>25</b>	<b>11</b>	<b>684</b>

Total Number of Valid Hours: 684

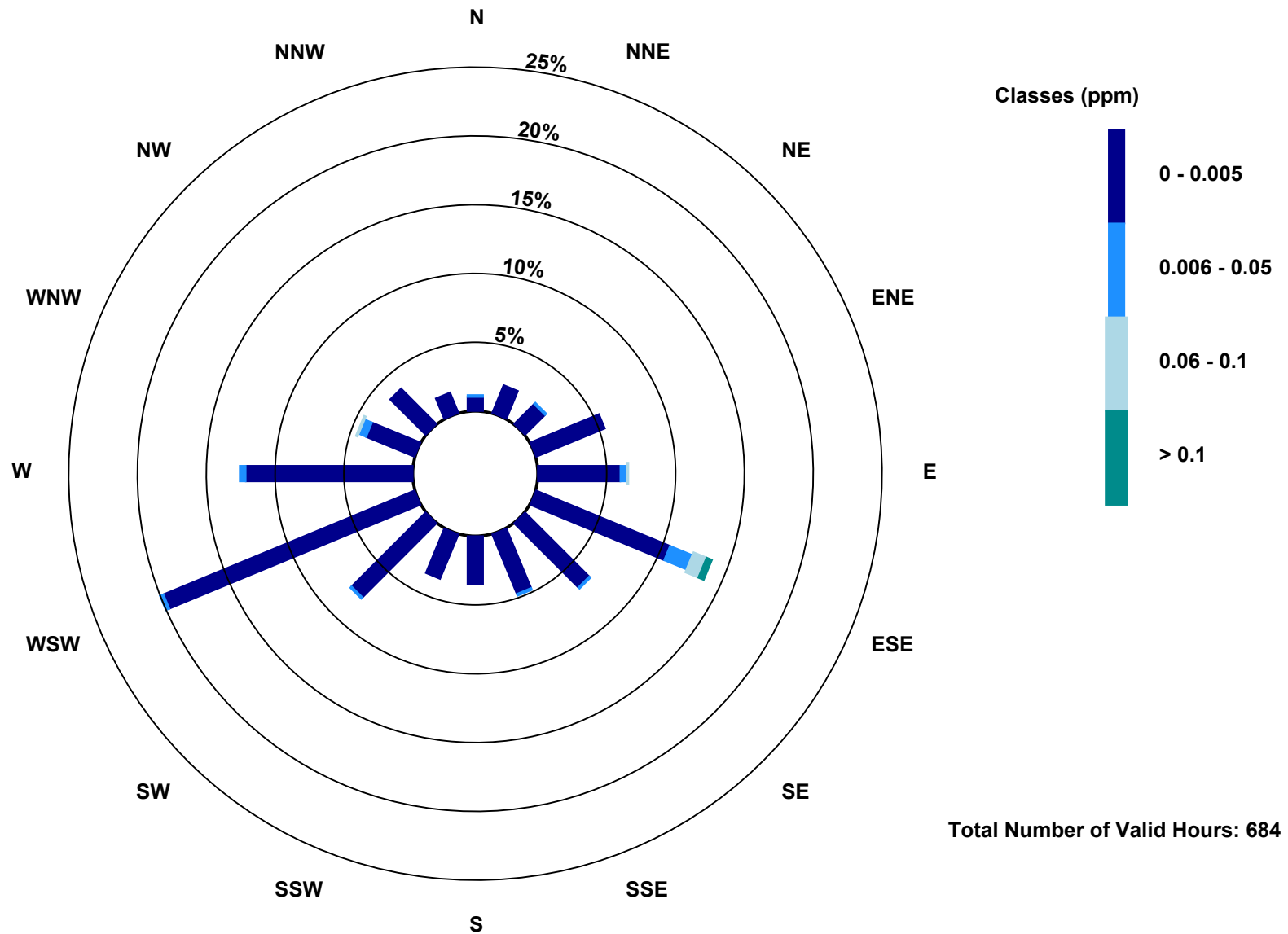
Total Number of Hours: 720

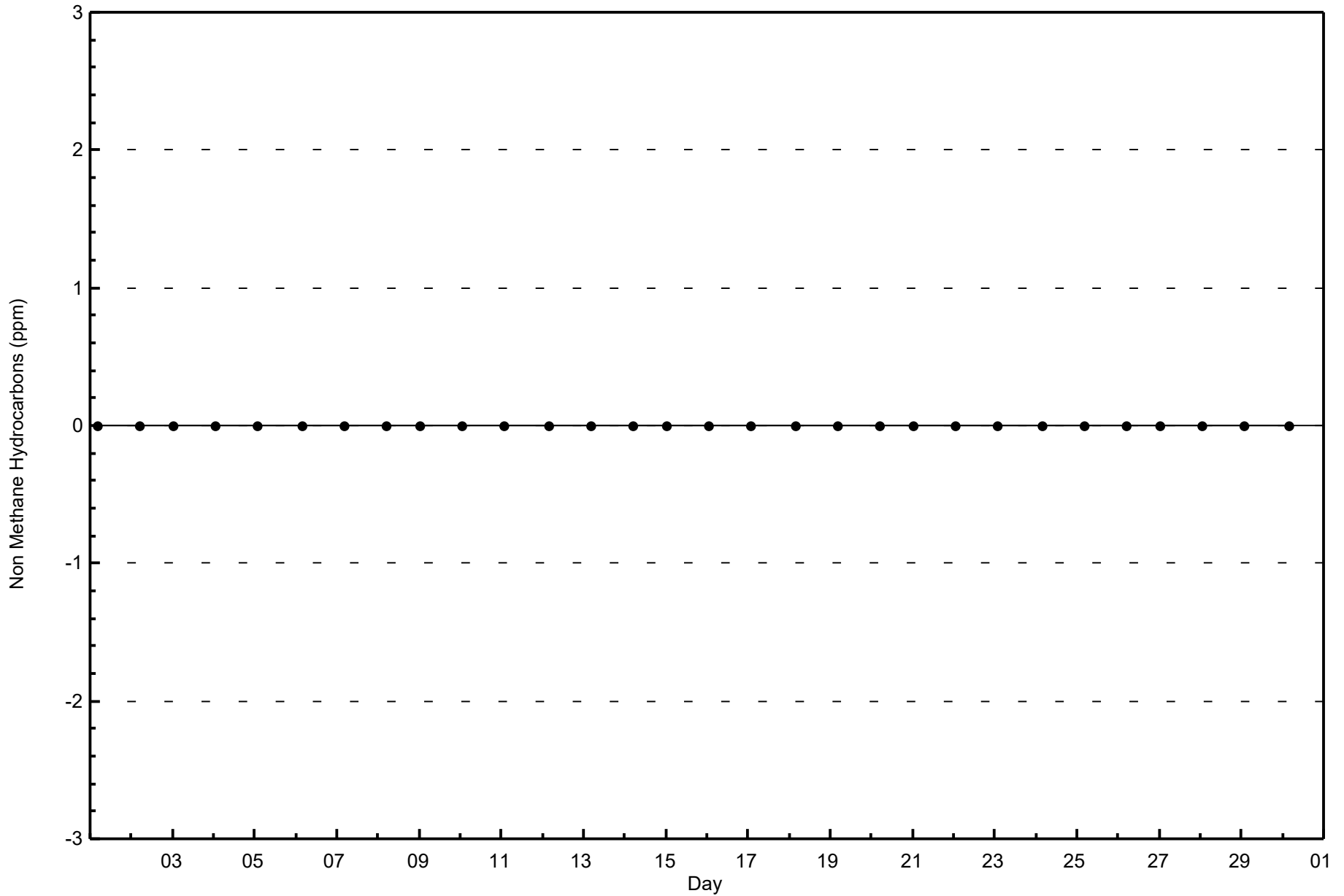


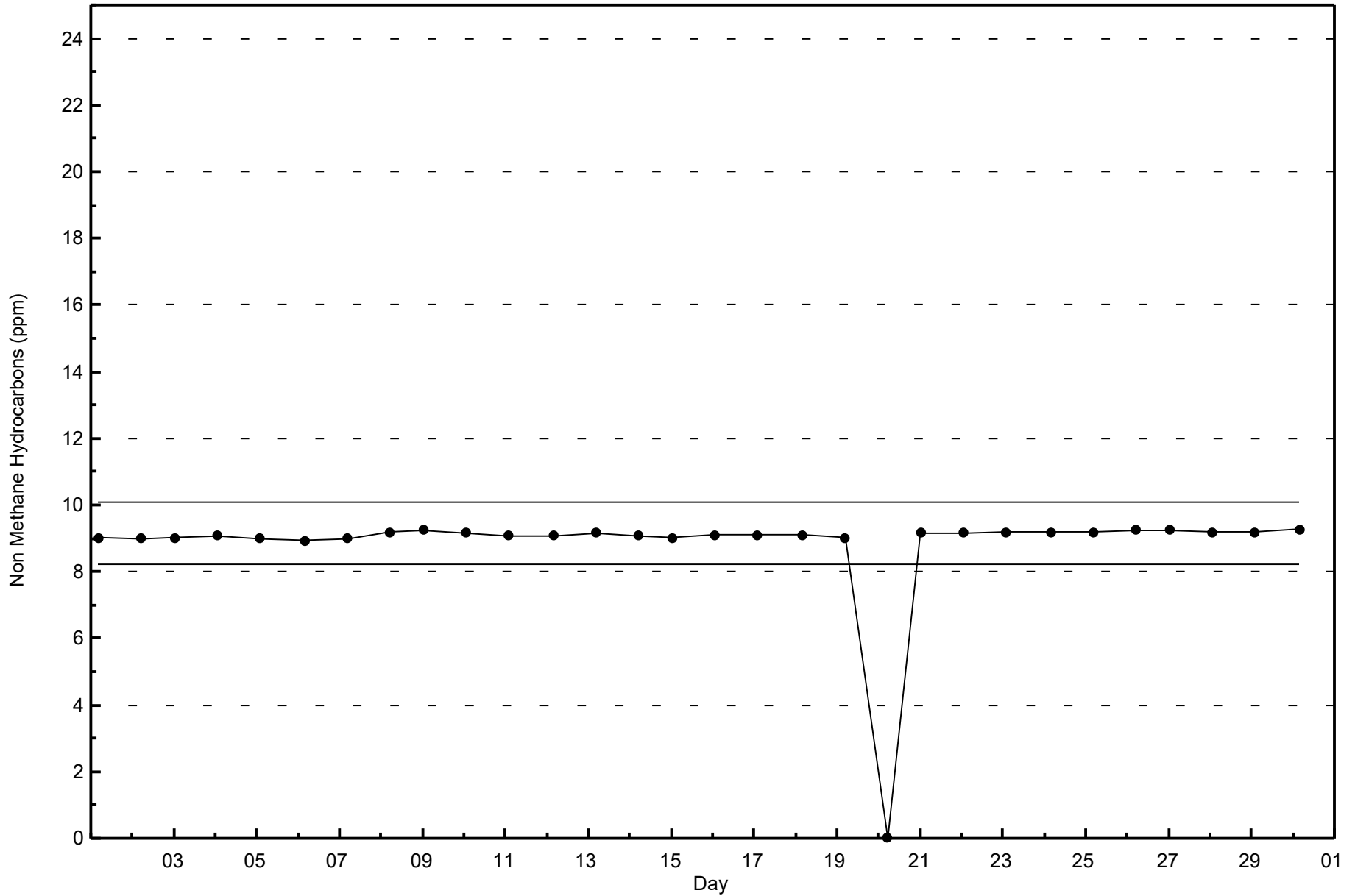


Wood Buffalo Environmental Association  
Wind Rose Nov 2023

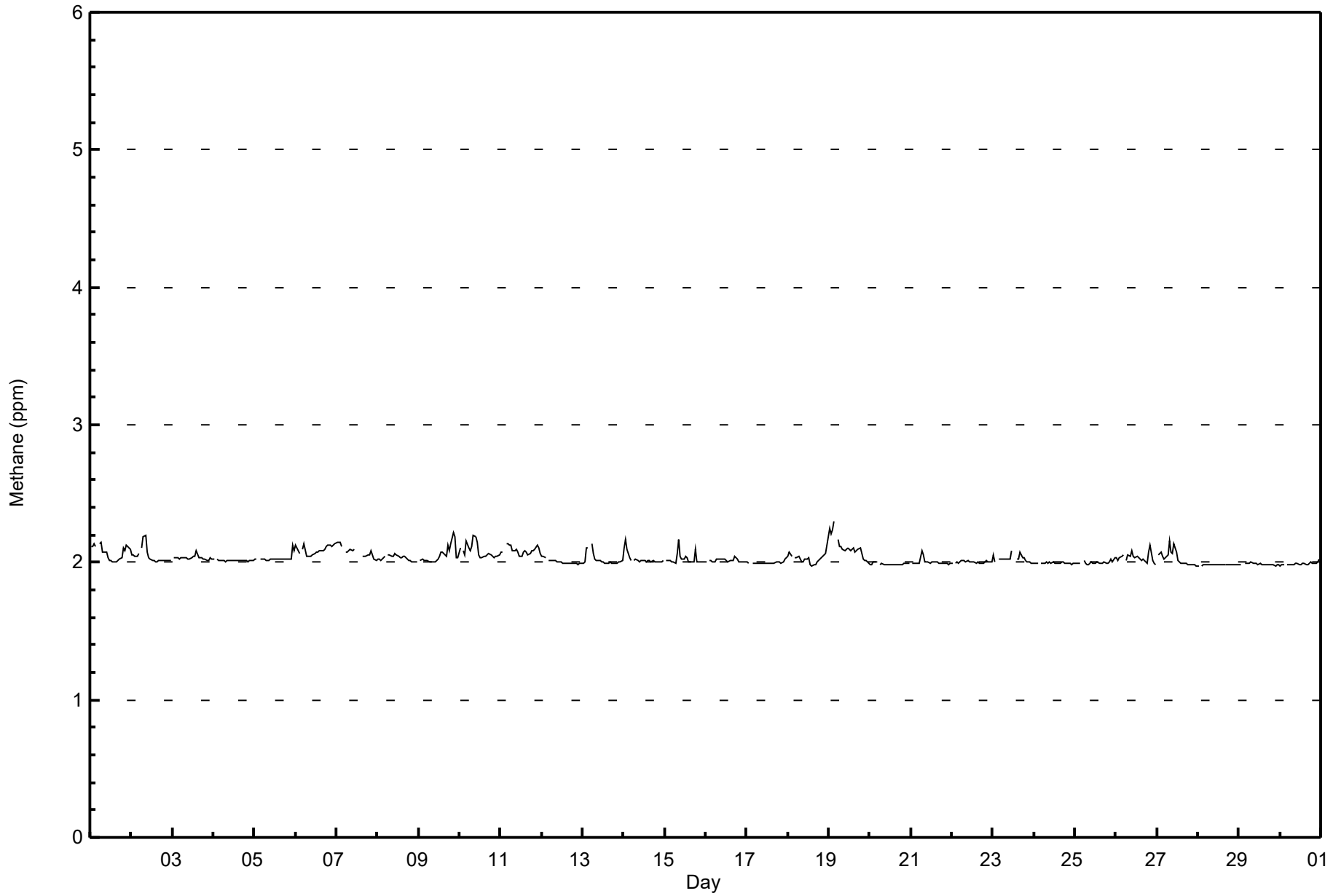
Non Methane Hydrocarbons (NMHC) - ppm  
Anzac













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

**Methane (CH<sub>4</sub>) - ppm**  
**Anzac - November 2023**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2.0	532	77.78	77.78
2.1 - 3.0	152	22.22	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 684

Total Number of Hours: 720



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

**Methane (CH<sub>4</sub>) - ppm**  
**Anzac - November 2023**

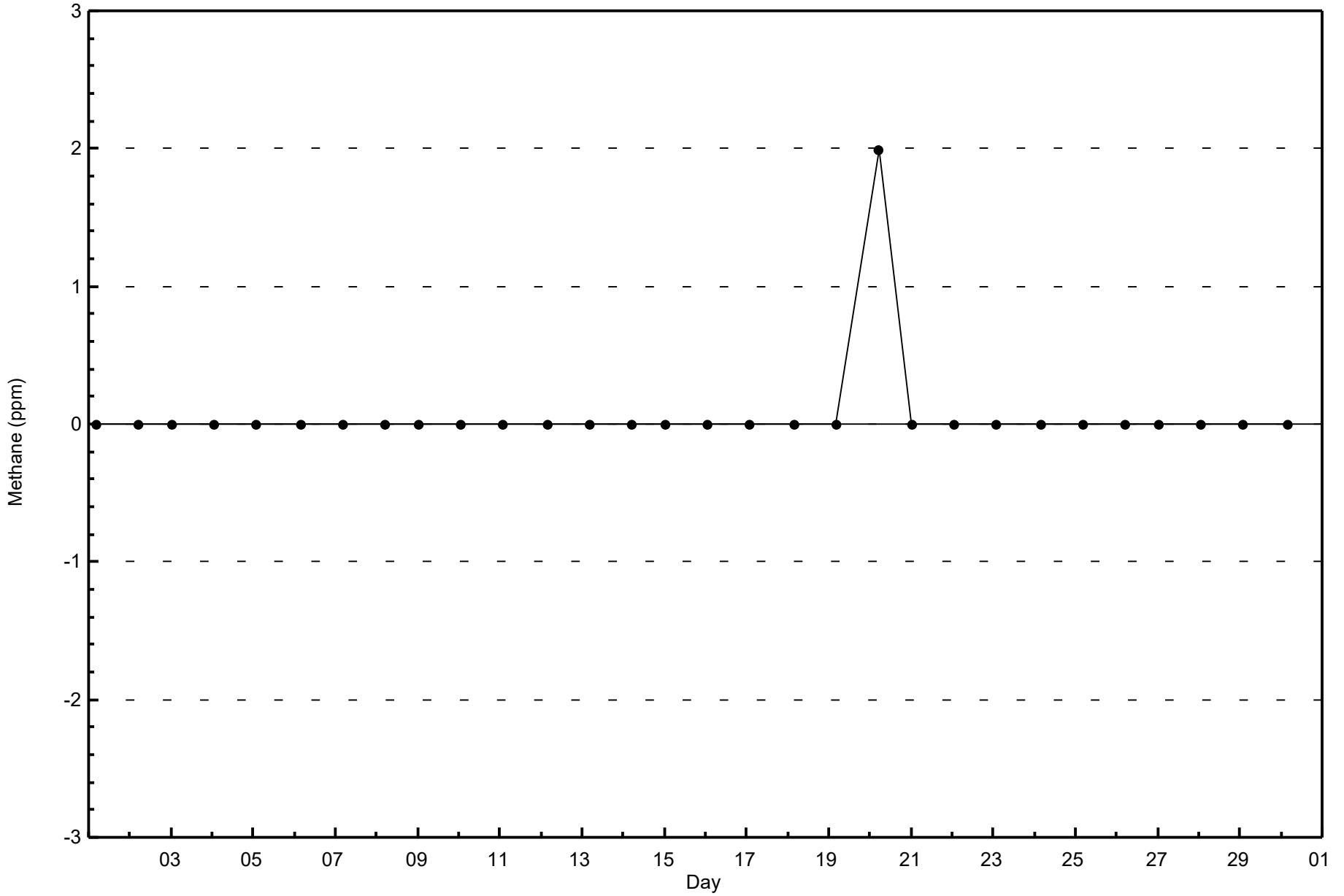
Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	7	12	14	34	29	45	25	21	18	16	50	129	76	23	24	9	532
2.1 - 3.0	1	3	1	3	16	49	21	12	6	8	3	8	10	8	1	2	152
3.1 - 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	8	15	15	37	45	94	46	33	24	24	53	137	86	31	25	11	684

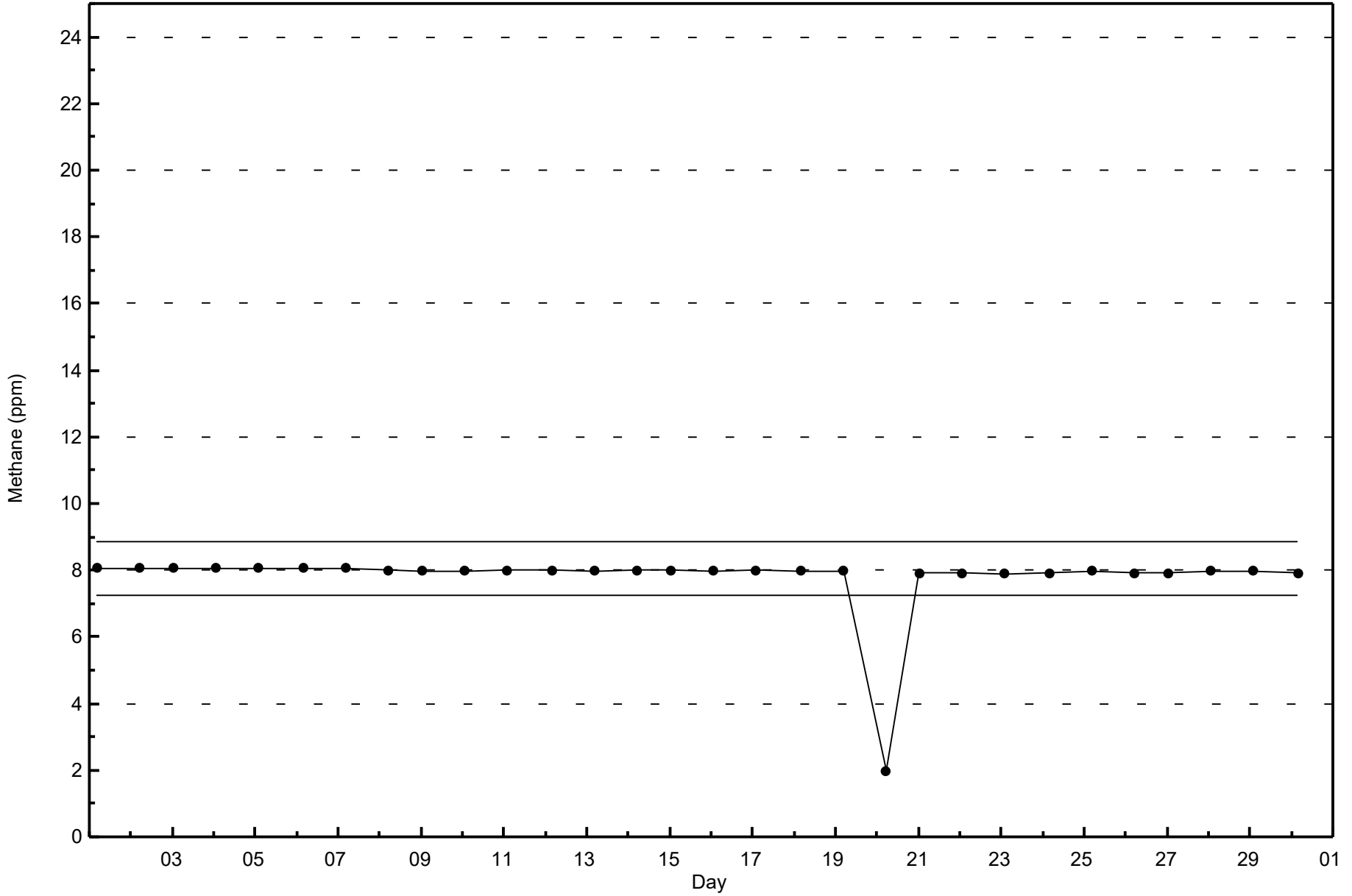
Total Number of Valid Hours: 684

Total Number of Hours: 720











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

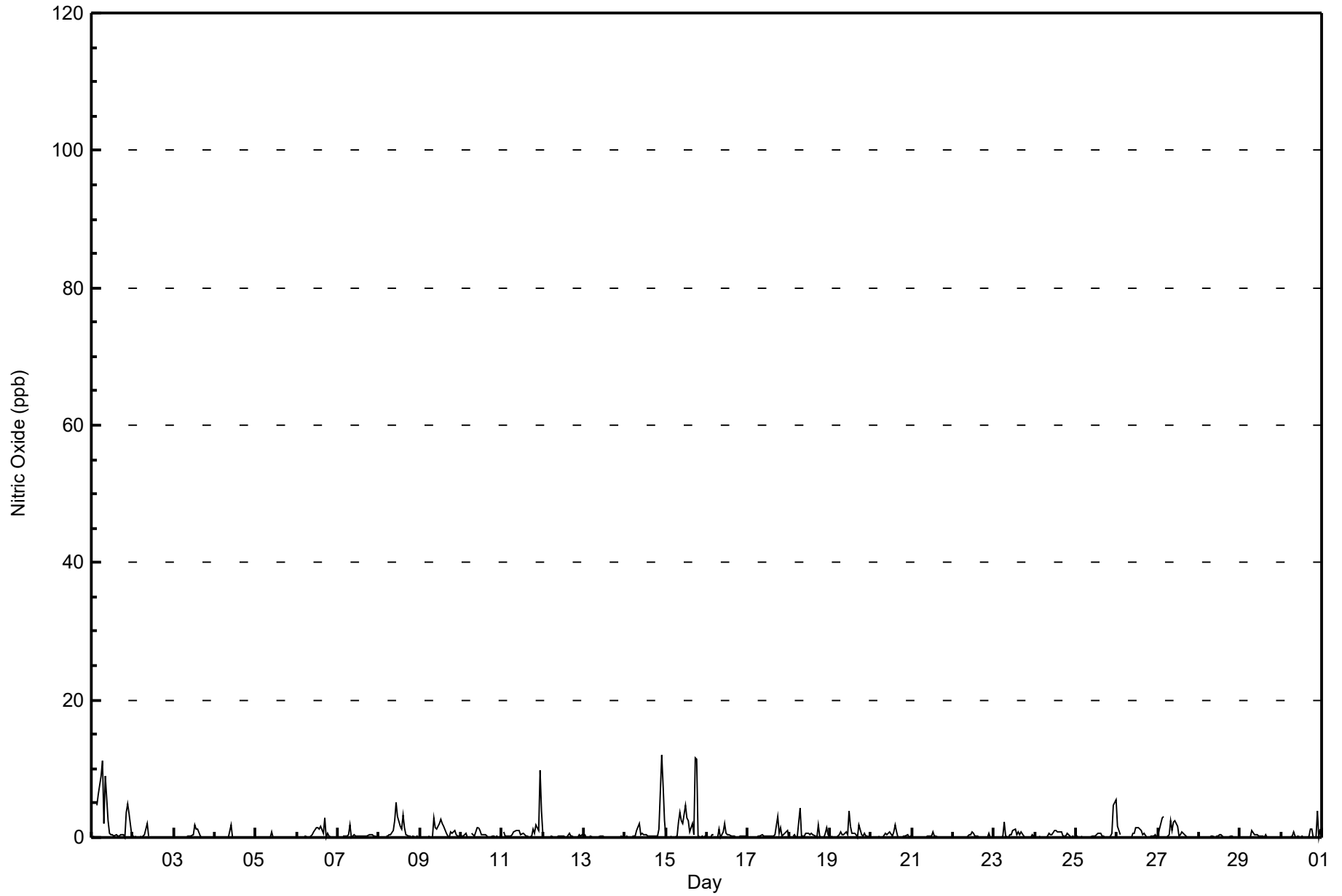
**Nitric Oxide (NO) - ppb**  
**Anzac - November 2023**

Maximum Value: 12.1 ppb on Nov 14 22:00		Maximum Daily Average: 2.6 ppb on Nov 1		Hours in Service: 720																						
Minimum Value: 0.0 ppb on Nov 2 16:00		Minimum Daily Average: 0.0 ppb on Nov 5		Hours of Data: 685																						
Maximum Diurnal Average: 1.0 ppb at hour 23		Minimum Diurnal Average: 0.2 ppb at hour 1		Hours of Missing Data: 35																						
Monthly Average: 0.56 ppb		Percentiles: P <sub>1</sub> = 0.0 P <sub>10</sub> = 0.0 Q <sub>1</sub> = 0.0 Median = 0.1 Q <sub>3</sub> = 0.5 P <sub>90</sub> = 1.4 P <sub>99</sub> = 7.7		Hours of Calibration: 35																						
				Percent Operational Time: 100.0																						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	0.1	0.2	Z	4.6	6.4	9.0	11.3	2.1	9.0	2.4	0.7	0.4	0.4	0.2	0.3	0.1	0.2	0.3	0.3	0.0	3.7	4.9	3.4	0.3	2.6	11.3
2-Nov	0.1	0.0	0.2	Z	0.1	0.1	0.2	0.4	2.0	0.2	C	C	C	C	C	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	2.0
3-Nov	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.1	0.1	0.2	0.5	1.9	1.2	1.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	1.9
4-Nov	0.0	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	1.8	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	0.1	1.8
5-Nov	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8
6-Nov	0.0	Z	0.0	0.0	0.0	0.1	0.1	0.1	0.3	0.5	0.8	1.5	1.5	1.3	1.7	0.7	2.8	0.1	0.7	0.2	0.1	0.0	0.0	0.0	0.5	2.8
7-Nov	0.0	0.0	Z	0.1	0.2	0.1	0.4	1.7	0.1	0.3	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.2	0.4	0.3	0.5	0.2	0.1	0.1	0.3	1.7
8-Nov	0.1	0.1	0.1	Z	0.1	0.1	0.5	0.5	1.0	2.4	5.0	3.1	1.6	1.1	3.2	1.4	0.4	0.2	0.1	0.1	0.2	0.1	0.1	0.0	0.9	5.0
9-Nov	0.2	0.1	0.1	0.0	Z	0.1	0.1	0.0	2.9	1.3	1.2	2.0	2.6	2.1	1.6	0.7	0.2	0.1	0.8	0.6	1.0	0.5	0.1	0.2	0.8	2.9
10-Nov	0.2	0.2	0.4	0.5	0.1	Z	0.6	0.3	0.3	1.5	1.5	1.0	0.4	0.5	0.4	0.2	0.1	0.1	0.1	0.2	0.1	0.1	0.0	0.3	0.4	1.5
11-Nov	Z	0.9	0.3	0.1	0.1	0.2	0.5	0.7	1.1	1.1	0.9	0.3	0.5	0.4	0.3	0.2	0.0	0.1	1.3	0.7	1.8	1.1	9.8	3.9	1.1	9.8
12-Nov	0.4	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.1	0.1	0.1	0.6	0.2	0.1	0.1	0.1	0.1	0.5	0.2	0.5	0.2	0.6
13-Nov	0.3	0.0	Z	0.0	0.2	0.1	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	0.0	0.0	0.1	0.0	0.1	0.3
14-Nov	0.1	0.1	0.1	Z	0.1	0.1	0.1	1.1	2.1	0.4	0.5	0.4	0.4	0.3	0.2	0.2	0.2	0.3	0.2	0.2	1.2	12.1	7.4	2.5	1.3	12.1
15-Nov	0.1	0.0	0.0	0.2	Z	0.1	0.1	2.1	3.6	2.5	2.0	4.6	2.8	2.5	0.7	1.9	0.4	11.5	11.4	0.3	0.1	0.1	0.1	0.1	2.1	11.5
16-Nov	0.1	0.1	0.0	0.3	0.3	Z	0.0	1.2	0.1	0.8	2.0	0.7	0.4	0.3	0.2	0.2	0.1	0.0	0.1	0.2	0.1	0.2	0.1	0.2	0.3	2.0
17-Nov	Z	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.4	0.2	0.2	0.2	0.1	0.2	0.2	0.2	0.3	3.0	0.6	1.5	0.2	0.5	0.8	1.1	0.4	3.0
18-Nov	0.1	Z	0.1	0.3	0.0	0.3	4.3	0.2	0.3	0.2	0.6	0.6	0.4	0.6	0.4	0.2	0.0	1.9	0.1	0.0	0.0	0.7	1.4	0.4	0.6	4.3
19-Nov	0.0	0.1	Z	0.1	0.0	0.3	0.7	0.4	0.5	0.7	0.5	3.9	1.6	0.6	0.5	0.4	0.0	1.8	0.5	0.2	0.6	0.2	0.1	0.1	0.6	3.9
20-Nov	0.0	0.0	0.1	Z	0.1	0.1	0.1	0.1	0.6	0.5	0.7	0.7	0.2	0.9	1.9	0.9	0.1	0.1	0.1	0.1	0.2	0.5	0.1	0.1	0.4	1.9
21-Nov	0.3	0.0	0.0	0.0	Z	0.0	0.0	0.1	0.1	0.1	0.1	0.2	0.9	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.9
22-Nov	0.0	0.0	0.0	0.1	0.0	Z	0.0	0.0	0.1	0.4	0.4	0.8	0.7	0.2	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.2	0.8
23-Nov	Z	0.0	0.0	0.0	0.0	0.3	2.3	0.1	0.1	0.5	0.3	1.1	1.3	0.5	0.8	0.5	0.8	0.1	0.0	0.1	0.0	0.0	0.5	0.2	0.4	2.3
24-Nov	0.3	Z	0.1	0.0	0.1	0.0	0.0	0.1	0.7	0.3	0.4	1.0	1.0	0.9	0.9	0.9	0.2	0.2	0.1	0.5	0.1	0.1	0.1	0.1	0.4	1.0
25-Nov	0.1	0.1	Z	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.3	0.4	0.6	0.5	0.3	0.1	0.0	0.0	0.0	0.2	0.6	4.6	5.5	0.6	5.5
26-Nov	1.7	1.1	0.3	Z	0.0	0.0	0.0	0.0	0.1	0.7	0.6	1.4	1.4	1.1	1.0	0.4	0.6	0.0	0.0	0.1	0.1	0.1	0.4	0.0	0.5	1.7
27-Nov	0.3	1.2	2.8	3.1	Z	0.0	0.4	2.5	0.9	2.2	2.4	1.5	0.2	0.3	0.9	0.3	0.1	0.1	0.0	0.1	0.1	0.0	0.0	0.0	0.8	3.1
28-Nov	0.0	0.0	0.0	0.0	0.0	Z	0.0	0.3	0.2	0.1	0.1	0.2	0.4	0.3	0.1	0.0	0.0	0.1	0.3	0.2	0.0	0.0	0.0	0.1	0.1	0.4
29-Nov	Z	0.1	0.0	0.1	0.0	0.0	0.1	1.0	0.4	0.4	0.4	0.4	0.1	0.1	0.2	0.1	0.3	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.2	1.0
30-Nov	0.0	Z	0.0	0.1	0.0	0.1	0.1	0.8	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.1	1.2	1.3	0.1	0.0	3.9	0.1	1.1	0.4	3.9
																								Diurnal Average		
																								Diurnal Maximum		
																								0.2 0.2 0.2 0.4 0.3 0.5 0.7 0.5 0.9 0.8 0.8 0.9 0.7 0.6 0.6 0.4 0.2 0.7 0.6 0.2 0.3 0.9 1.0 0.6		
																								1.7 1.2 2.8 4.6 6.4 9.0 11.3 2.5 9.0 2.5 5.0 4.6 2.8 2.5 3.2 1.9 2.8 11.5 11.4 1.5 3.7 12.1 9.8 5.5		
Z - zerospan C - Calibration																										



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

**Nitric Oxide (NO) - ppb**  
**Anzac - November 2023**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Nitric Oxide (NO) - ppb  
Anzac - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	685	100.00	100.00
21 - 40	0	0.00	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitric Oxide (NO) - ppb  
Anzac - November 2023**

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	16	15	38	46	97	41	34	26	24	54	135	88	32	19	12	685
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	8	16	15	38	46	97	41	34	26	24	54	135	88	32	19	12	685

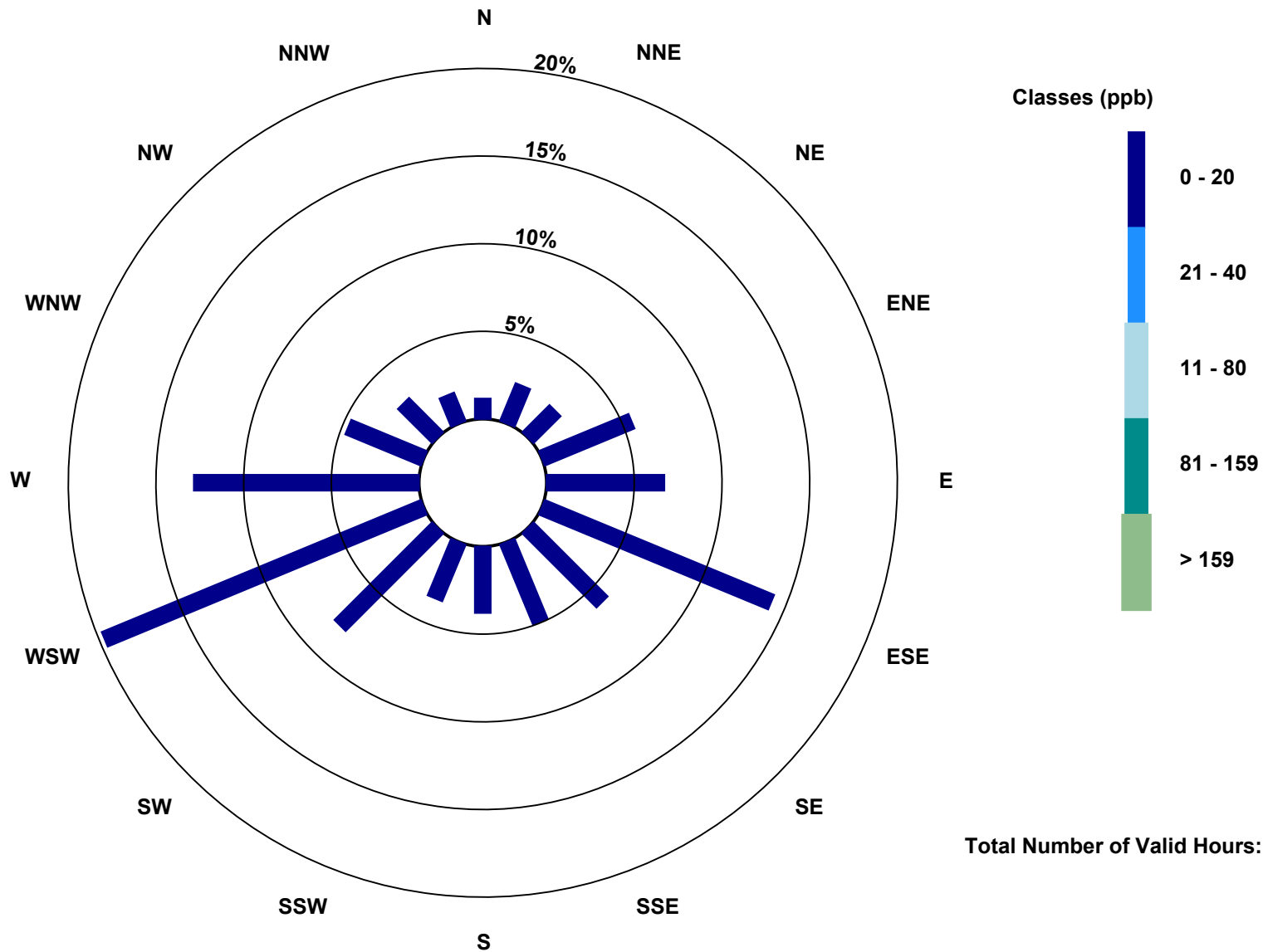
Total Number of Valid Hours: 685

Total Number of Hours: 720

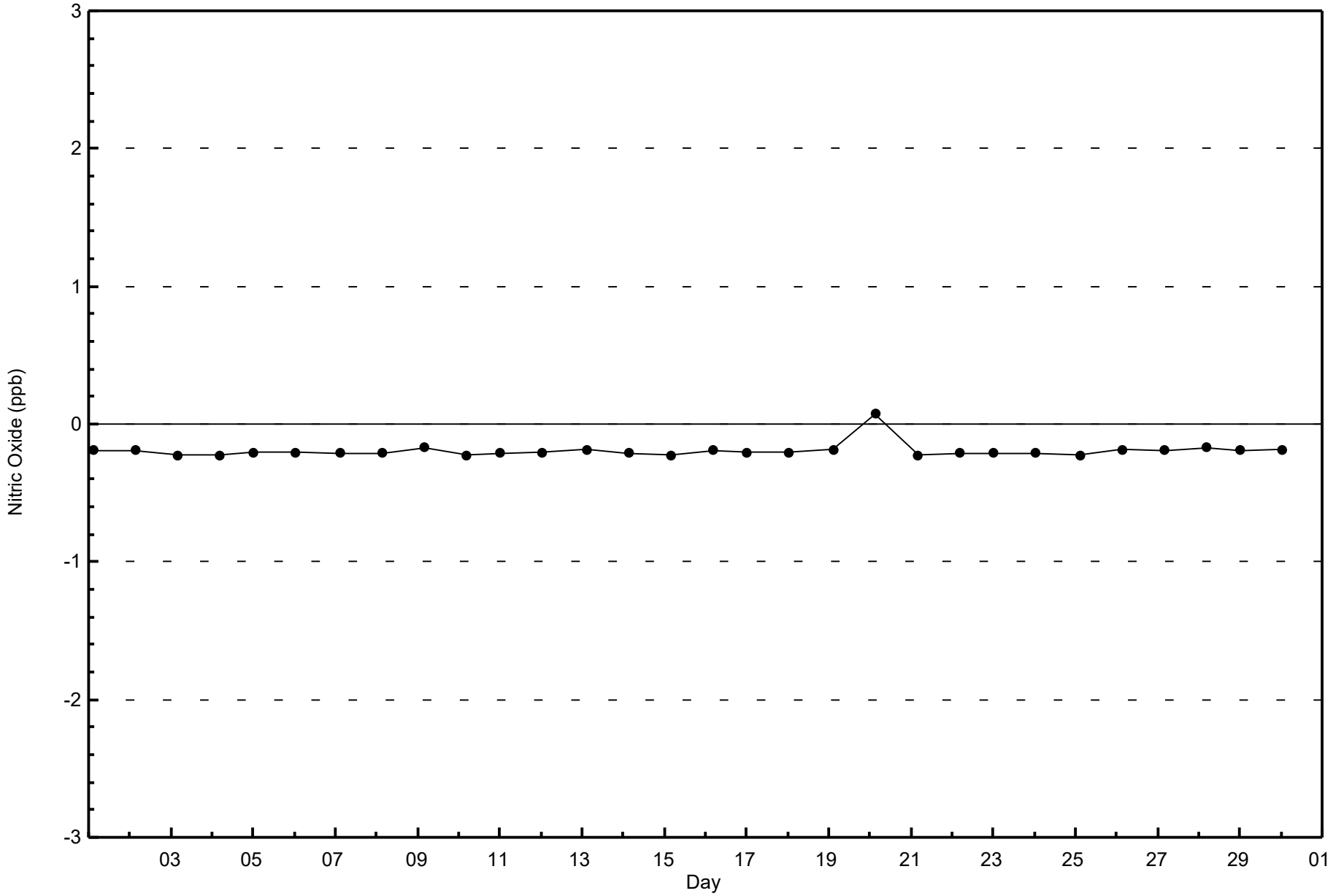


Wood Buffalo Environmental Association  
Wind Rose Nov 2023

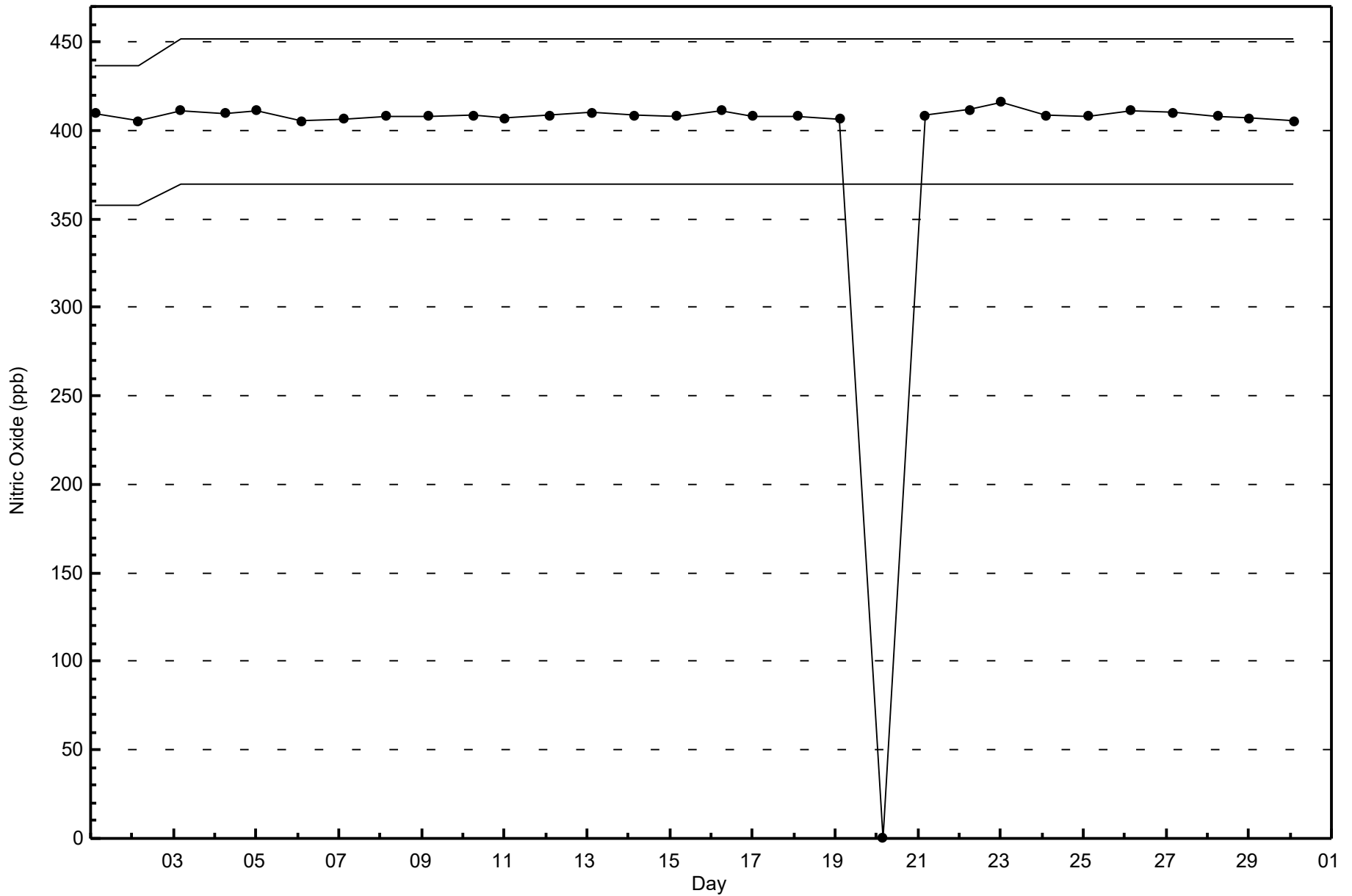
Nitric Oxide (NO) - ppb  
Anzac



Total Number of Valid Hours: 685









Wood Buffalo Environmental Association

Summary of Hour Averages

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

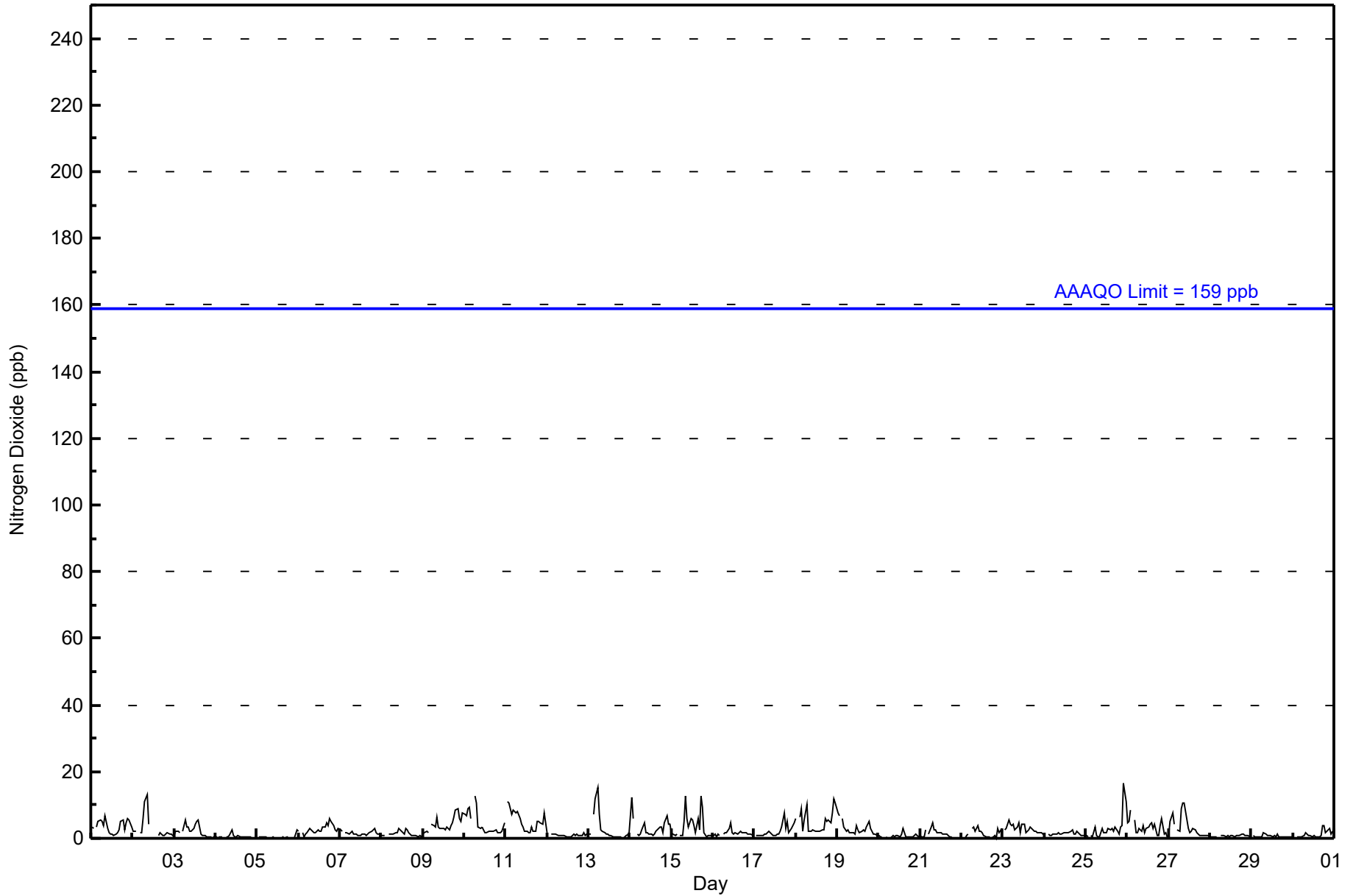
Anzac - November 2023

Number of Exceedences (AAAQO):		1-hr: 0	24-hr: 0	Hours in Service: 720																	720																											
Maximum Value: 16.4 ppb on Nov 25 23:00		Maximum Daily Average: 5.3 ppb on Nov 11																	Hours of Data: 685																													
Minimum Value: 0.1 ppb on Nov 21 20:00		Minimum Daily Average: 0.4 ppb on Nov 5																	Hours of Missing Data: 35																													
Maximum Diurnal Average: 3.3 ppb at hour 9		Minimum Diurnal Average: 1.7 ppb at hour 14																	Hours of Calibration: 35																													
Monthly Average: 2.39 ppb		Percentiles: P <sub>1</sub> = 0.1 P <sub>10</sub> = 0.4 Q <sub>1</sub> = 0.8 Median = 1.6 Q <sub>3</sub> = 3.0 P <sub>90</sub> = 5.5 P <sub>99</sub> = 12.0																	Percent Operational Time: 100.0																													
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Nov	3.2	2.9	Z	3.5	5.0	5.6	5.2	3.9	6.7	2.9	1.6	1.3	1.2	1.0	1.3	1.7	2.4	4.9	5.4	2.7	4.7	5.9	5.5	3.5	3.6	6.7																						
2-Nov	2.2	2.2	2.1	Z	1.7	1.6	6.0	11.2	13.1	4.4	C	C	C	C	C	0.7	1.5	1.0	0.8	1.4	1.5	1.2	1.3	1.0	3.1	13.1																						
3-Nov	1.0	2.3	2.0	1.7	Z	2.2	5.5	3.6	3.3	2.1	2.0	3.1	4.2	5.1	5.4	1.4	1.0	0.9	0.7	0.5	0.3	0.3	0.2	0.3	2.1	5.5																						
4-Nov	0.3	0.2	0.5	0.3	0.3	Z	0.6	0.6	0.9	2.6	0.7	0.4	0.4	0.7	0.5	0.5	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.5	2.6																						
5-Nov	Z	0.3	0.3	0.3	0.3	0.6	0.2	0.2	0.2	0.6	0.2	0.2	0.2	0.2	0.2	0.3	0.2	0.4	0.2	0.2	0.2	1.2	2.5	0.4	2.5																							
6-Nov	2.0	Z	1.6	0.6	1.4	1.7	2.8	2.5	2.3	1.7	1.9	2.4	2.1	2.2	3.3	3.4	4.8	3.9	6.0	5.1	3.9	2.6	2.2	2.8	2.7	6.0																						
7-Nov	2.4	2.1	Z	1.6	1.5	1.4	1.6	2.0	1.1	1.3	1.0	0.9	1.0	1.2	1.1	1.0	1.4	1.5	2.3	2.7	2.9	1.7	1.2	1.1	1.6	2.9																						
8-Nov	1.0	0.9	0.8	Z	1.3	1.2	1.3	1.2	1.5	1.7	3.0	2.5	1.7	1.4	3.1	2.4	1.5	1.0	0.9	0.7	0.7	0.5	0.7	0.6	1.4	3.1																						
9-Nov	1.1	1.5	2.3	1.6	Z	4.4	3.9	3.5	6.2	3.5	3.0	2.9	3.0	2.7	3.2	2.7	4.0	4.6	6.5	8.3	9.0	6.1	5.2	7.8	4.2	9.0																						
10-Nov	7.1	6.9	9.0	9.3	6.0	Z	12.6	10.6	3.5	3.0	3.4	2.4	1.6	1.7	2.0	2.2	2.1	2.1	2.5	1.9	1.8	1.8	2.1	4.8	4.4	12.6																						
11-Nov	Z	11.2	10.8	7.2	8.4	8.0	7.8	8.0	6.1	4.3	3.6	2.0	2.0	1.8	1.9	3.4	2.3	2.0	5.2	4.9	4.7	4.2	7.8	4.6	5.3	11.2																						
12-Nov	1.8	Z	1.3	1.1	1.1	1.2	0.9	0.7	0.7	0.9	0.7	0.6	0.5	0.5	0.5	1.4	1.0	1.1	0.8	0.9	0.9	1.8	1.0	1.4	1.0	1.8																						
13-Nov	1.3	1.3	Z	7.4	11.7	15.3	7.0	2.7	2.1	1.6	1.4	1.3	1.0	0.8	0.5	0.3	0.3	0.3	0.2	0.2	0.3	0.7	1.4	2.6	15.3	12.1																						
14-Nov	6.8	12.1	6.1	Z	1.3	0.9	1.1	2.7	4.6	1.6	1.6	1.1	1.3	1.0	1.2	2.2	2.4	3.5	3.4	1.9	4.6	6.6	4.1	4.4	3.3	12.1																						
15-Nov	1.5	1.1	1.0	1.3	Z	1.0	0.9	4.9	12.8	6.0	3.5	5.8	5.7	3.9	1.6	6.0	2.4	12.5	9.5	1.7	0.6	0.7	0.8	1.0	3.7	12.8																						
16-Nov	0.8	1.1	0.6	1.3	1.0	Z	1.2	1.9	1.6	3.1	4.6	1.9	1.4	1.5	1.4	1.9	2.1	1.8	1.9	1.6	1.2	1.2	1.1	0.9	1.6	4.6																						
17-Nov	Z	0.8	0.8	0.8	0.9	0.9	1.1	1.1	2.3	1.5	1.2	0.8	0.7	1.4	1.3	2.1	3.2	7.6	3.0	4.9	1.6	3.0	3.8	4.6	2.1	7.6																						
18-Nov	5.8	Z	6.2	9.1	2.1	5.4	10.2	2.3	2.2	2.3	2.6	2.0	2.1	2.1	2.1	2.7	2.4	6.0	4.9	5.7	4.7	7.8	12.0	10.6	4.9	12.0																						
19-Nov	7.7	6.8	Z	6.1	3.3	2.1	2.6	1.6	1.7	1.6	1.1	3.7	2.7	1.8	2.2	2.4	2.1	3.3	5.0	3.0	2.2	1.2	1.2	1.0	2.9	7.7																						
20-Nov	0.7	0.4	0.5	Z	0.3	0.2	0.2	0.2	0.9	0.6	1.0	1.0	0.4	1.4	2.9	1.7	0.4	0.4	0.5	0.4	0.6	1.2	0.7	0.5	0.7	2.9																						
21-Nov	0.9	0.5	0.5	2.4	Z	1.3	3.3	4.7	2.6	2.4	1.8	1.6	1.6	1.3	1.2	1.1	1.0	0.6	0.3	0.1	0.1	0.1	0.1	0.1	1.3	4.7																						
22-Nov	0.1	0.1	0.1	1.0	1.4	Z	3.0	3.4	2.2	3.8	2.2	2.2	1.6	0.7	0.5	0.5	0.3	0.2	0.5	1.0	0.1	3.0	1.9	2.8	1.4	3.8																						
23-Nov	Z	2.6	2.9	5.5	4.3	3.7	4.4	2.5	3.2	4.8	1.9	4.3	4.3	1.9	2.0	2.5	3.6	2.6	2.2	2.1	1.8	1.7	1.5	1.3	2.9	5.5																						
24-Nov	1.3	Z	1.2	0.9	0.8	1.1	1.2	1.4	1.6	1.4	1.2	1.8	1.9	1.6	1.9	2.3	2.7	1.4	1.1	2.1	1.3	0.9	0.8	0.7	1.4	2.7																						
25-Nov	0.8	0.6	Z	0.7	0.6	3.6	0.9	0.6	0.4	2.8	1.9	1.6	1.9	3.0	2.6	2.8	2.0	3.2	2.0	1.4	3.3	3.9	16.4	11.0	3.0	16.4																						
26-Nov	4.6	5.1	8.5	Z	5.6	1.9	1.5	2.9	2.3	3.8	1.7	3.0	3.5	4.4	4.5	3.1	4.3	0.9	0.9	4.0	5.9	1.4	1.7	0.5	3.3	8.5																						
27-Nov	1.0	5.2	7.6	4.4	Z	2.5	2.1	8.9	10.7	10.8	7.9	2.9	1.9	2.3	3.1	2.5	1.7	1.2	1.0	0.8	0.8	0.8	0.7	0.7	3.5	10.8																						
28-Nov	0.6	0.6	0.5	0.6	0.6	Z	0.8	0.9	0.9	0.6	0.7	0.6	1.0	1.0	0.6	0.9	0.9	1.0	1.4	1.1	1.0	0.9	0.7	0.6	0.8	1.4																						
29-Nov	Z	0.9	0.6	0.5	0.5	0.6	0.6	1.5	1.3	1.0	1.0	0.7	0.6	0.7	0.6	1.1	0.6	0.5	0.4	0.5	0.4	0.5	0.3	0.4	0.7	1.5																						
30-Nov	0.3	Z	0.5	0.4	0.4	0.6	0.9	1.9	1.2	0.8	0.8	0.6	0.8	0.5	0.5	0.4	0.9	3.8	3.7	1.8	2.5	3.1	1.3	2.3	1.3	3.8																						
																								2.3	2.8	2.7	2.8	2.5	2.8	3.0	3.1	3.3	2.7	2.0	1.9	1.8	1.7	1.8	1.9	1.9	2.5	2.5	2.1	2.1	2.2	2.6	2.5	Diurnal Average
																								7.7	12.1	10.8	9.3	11.7	15.3	12.6	11.2	13.1	10.8	7.9	5.8	5.7	5.1	5.4	6.0	4.8	12.5	9.5	8.3	9.0	7.8	16.4	11.0	Diurnal Maximum
Z - zerospan C - Calibration																																																
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 159 ppb																																																



Wood Buffalo Environmental Association  
Hourly Averages

Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Anzac - November 2023





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

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb**  
**Anzac - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	685	100.00	100.00
21 - 40	0	0.00	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Anzac - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 20	8	16	15	38	46	97	41	34	26	24	54	135	88	32	19	12	685
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	<b>8</b>	<b>16</b>	<b>15</b>	<b>38</b>	<b>46</b>	<b>97</b>	<b>41</b>	<b>34</b>	<b>26</b>	<b>24</b>	<b>54</b>	<b>135</b>	<b>88</b>	<b>32</b>	<b>19</b>	<b>12</b>	<b>685</b>

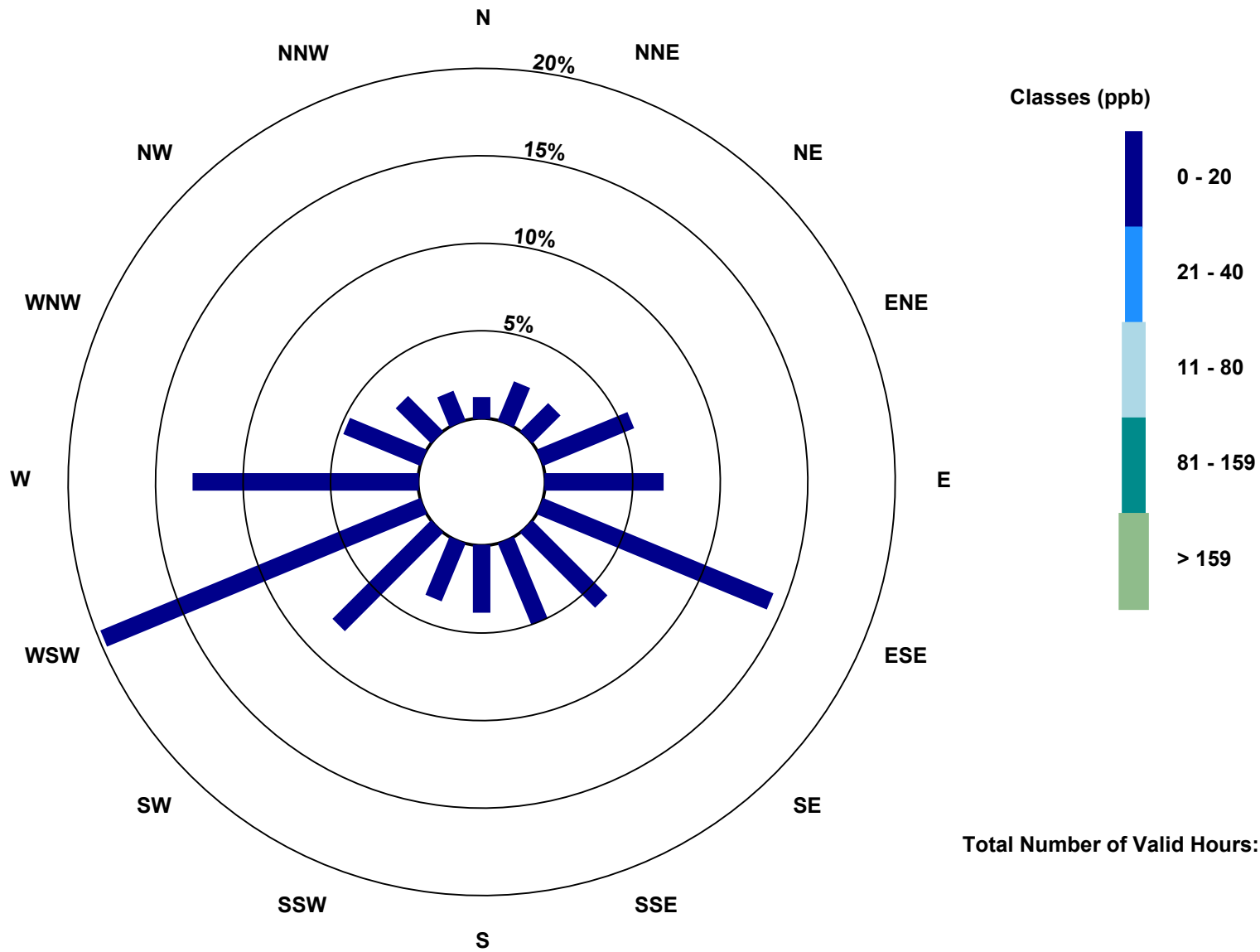
Total Number of Valid Hours: 685

Total Number of Hours: 720

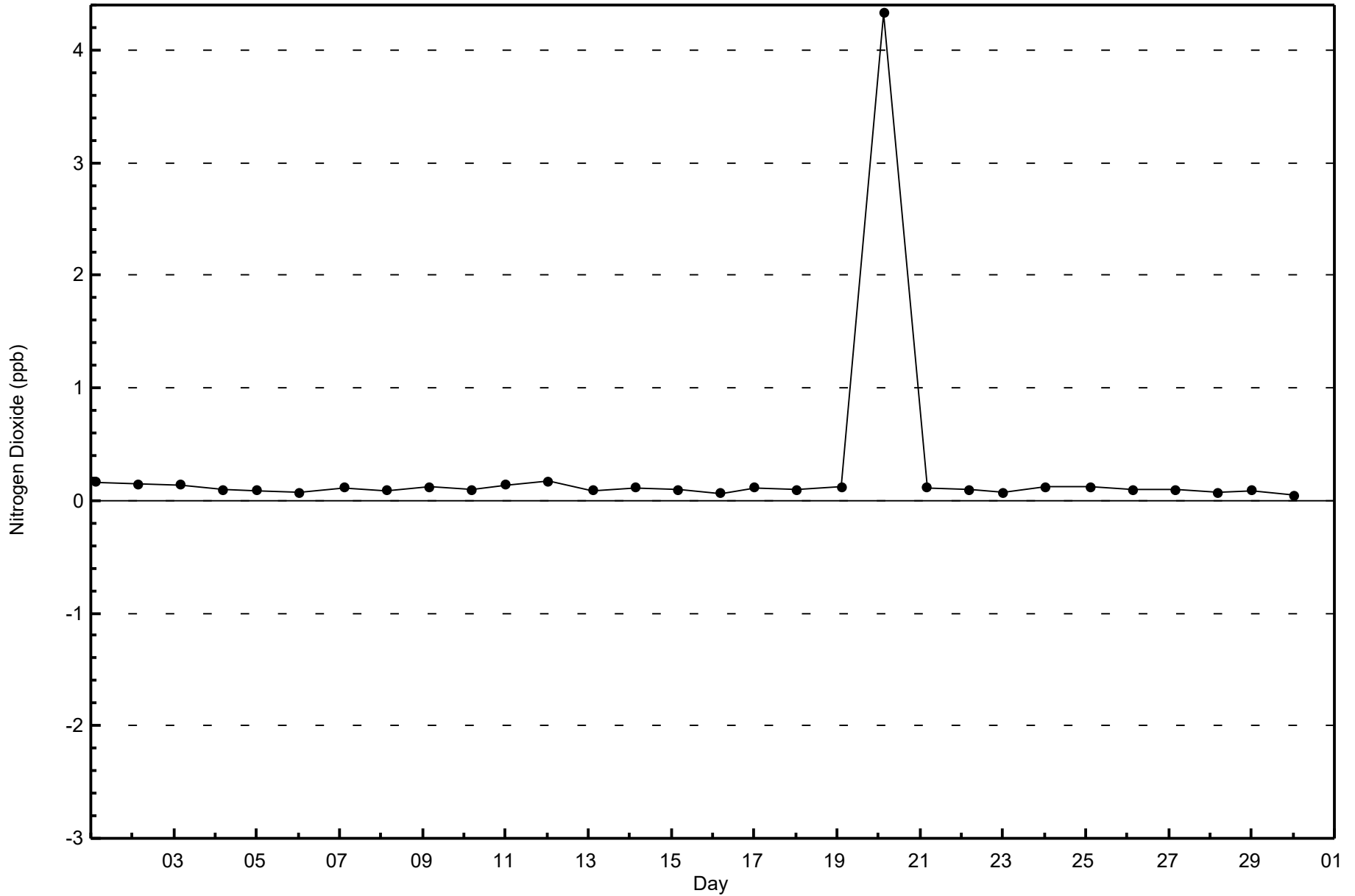


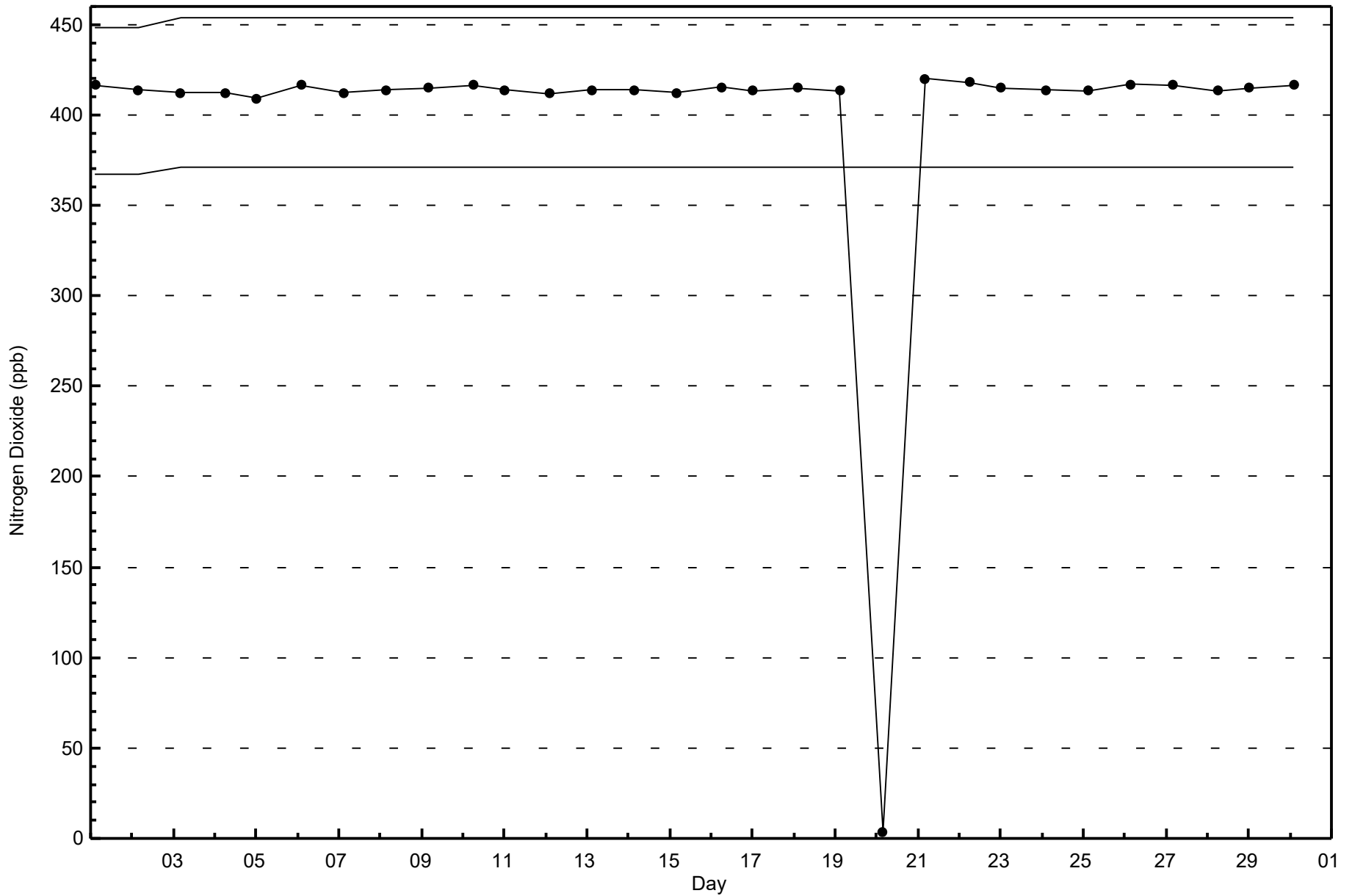
Wood Buffalo Environmental Association  
Wind Rose Nov 2023

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



Total Number of Valid Hours: 685









Wood Buffalo Environmental Association

Summary of Hour Averages

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

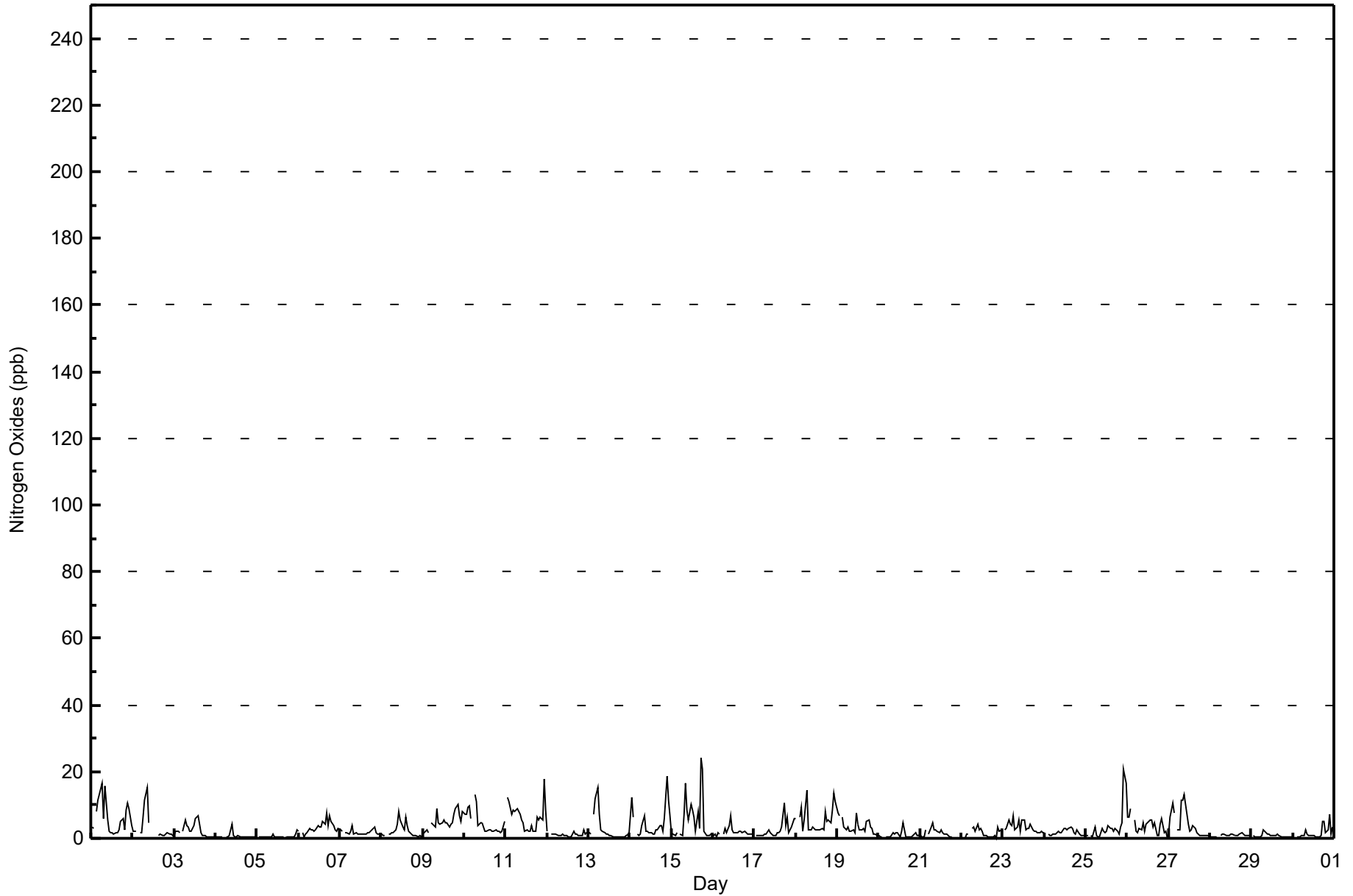
Anzac - November 2023

Maximum Value: 24.0 ppb on Nov 15 18:00																				Maximum Daily Average: 6.5 ppb on Nov 11					Hours in Service: 720	
Minimum Value: 0.1 ppb on Nov 22 00:00																				Minimum Daily Average: 0.5 ppb on Nov 5					Hours of Data: 685	
Maximum Diurnal Average: 4.2 ppb at hour 9																				Minimum Diurnal Average: 2.1 ppb at hour 17					Hours of Missing Data: 35	
Monthly Average: 2.95 ppb																				Percentiles: P <sub>1</sub> = 0.1 P <sub>10</sub> = 0.5 Q <sub>1</sub> = 0.9 Median = 1.8 Q <sub>3</sub> = 3.6 P <sub>90</sub> = 6.9 P <sub>99</sub> = 16.4					Hours of Calibration: 35	
																									Percent Operational Time: 100.0	
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	3.3	3.1	Z	8.1	11.4	14.6	16.5	6.0	15.7	5.3	2.3	1.7	1.6	1.2	1.6	1.8	2.6	5.2	5.7	2.7	8.4	10.8	8.9	3.8	6.2	16.5
2-Nov	2.3	2.2	2.3	Z	1.8	1.7	6.2	11.6	15.1	4.6	C	C	C	C	C	0.7	1.5	1.0	0.8	1.4	1.5	1.2	1.3	1.0	3.3	15.1
3-Nov	1.0	2.3	2.0	1.7	Z	2.2	5.5	3.6	3.4	2.2	2.2	3.6	6.1	6.3	6.6	1.6	1.0	0.9	0.7	0.5	0.3	0.3	0.2	0.3	2.4	6.6
4-Nov	0.3	0.2	0.5	0.3	0.3	Z	0.6	0.6	0.9	4.4	0.8	0.5	0.4	0.7	0.5	0.5	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.6	4.4
5-Nov	Z	0.3	0.3	0.3	0.3	0.6	0.2	0.2	0.2	1.4	0.2	0.2	0.2	0.2	0.2	0.3	0.2	0.4	0.2	0.2	0.2	1.2	2.5	0.5	2.5	
6-Nov	2.0	Z	1.6	0.6	1.4	1.8	2.9	2.6	2.6	2.2	2.7	3.9	3.6	3.5	5.0	4.1	7.6	4.0	6.7	5.3	4.0	2.6	2.2	2.8	3.3	7.6
7-Nov	2.4	2.1	Z	1.7	1.7	1.5	2.0	3.7	1.2	1.6	1.2	1.1	1.2	1.4	1.3	1.1	1.5	1.7	2.7	3.0	3.4	1.9	1.3	1.2	1.8	3.7
8-Nov	1.1	1.0	0.9	Z	1.4	1.3	1.8	1.7	2.5	4.1	8.0	5.6	3.3	2.5	6.3	3.8	1.9	1.2	1.0	0.8	0.9	0.6	0.8	0.6	2.3	8.0
9-Nov	1.3	1.6	2.4	1.6	Z	4.5	4.0	3.5	9.1	4.8	4.2	4.9	5.6	4.8	4.8	3.4	4.2	4.7	7.3	8.9	10.0	6.6	5.3	8.0	5.0	10.0
10-Nov	7.3	7.1	9.4	9.8	6.1	Z	13.2	10.9	3.8	4.5	4.9	3.4	2.0	2.2	2.4	2.4	2.2	2.2	2.6	2.1	1.9	1.9	2.1	5.1	4.8	13.2
11-Nov	Z	12.1	11.1	7.3	8.5	8.2	8.3	8.7	7.2	5.4	4.5	2.3	2.5	2.2	2.2	3.6	2.3	2.1	6.5	5.6	6.5	5.3	17.6	8.5	6.5	17.6
12-Nov	2.2	Z	1.4	1.2	1.2	1.3	1.0	0.8	0.8	1.1	0.9	0.8	0.6	0.6	0.6	2.0	1.2	1.2	0.9	1.0	1.0	2.3	1.2	1.9	1.2	2.3
13-Nov	1.6	1.3	Z	7.4	11.9	15.4	7.0	2.7	2.1	1.7	1.5	1.4	1.1	0.8	0.5	0.3	0.3	0.3	0.3	0.2	0.2	0.3	0.8	1.4	2.6	15.4
14-Nov	6.9	12.2	6.2	Z	1.4	1.0	1.2	3.8	6.7	2.0	2.1	1.5	1.7	1.3	1.4	2.4	2.6	3.8	3.6	2.1	5.8	18.7	11.5	6.9	4.7	18.7
15-Nov	1.6	1.1	1.0	1.5	Z	1.1	1.0	7.0	16.4	8.5	5.5	10.4	8.5	6.4	2.3	7.9	2.8	24.0	20.9	2.0	0.7	0.8	0.9	1.1	5.8	24.0
16-Nov	0.9	1.2	0.6	1.6	1.3	Z	1.2	3.1	1.7	3.9	6.6	2.6	1.8	1.8	1.6	2.1	2.2	1.8	2.0	1.8	1.3	1.4	1.2	1.1	1.9	6.6
17-Nov	Z	0.9	0.9	0.9	1.0	1.0	1.3	1.3	2.7	1.7	1.4	1.0	0.8	1.6	1.5	2.3	3.5	10.6	3.6	6.4	1.8	3.5	4.6	5.7	2.6	10.6
18-Nov	5.9	Z	6.3	9.4	2.1	5.7	14.5	2.5	2.5	2.5	3.2	2.6	2.5	2.7	2.5	2.9	2.4	7.9	5.0	5.7	4.7	8.5	13.4	11.0	5.5	14.5
19-Nov	7.7	6.9	Z	6.2	3.3	2.4	3.3	2.0	2.2	2.3	1.6	7.6	4.3	2.4	2.7	2.8	2.1	5.1	5.5	3.2	2.8	1.4	1.3	1.1	3.5	7.7
20-Nov	0.7	0.4	0.6	Z	0.4	0.3	0.3	0.3	1.5	1.1	1.7	1.7	0.6	2.3	4.8	2.6	0.5	0.5	0.6	0.5	0.8	1.7	0.8	0.6	1.1	4.8
21-Nov	1.2	0.5	0.5	2.4	Z	1.3	3.3	4.8	2.7	2.5	1.9	1.8	2.5	1.5	1.3	1.1	1.0	0.6	0.3	0.1	0.1	0.1	0.1	0.1	1.4	4.8
22-Nov	0.1	0.1	0.1	1.1	1.4	Z	3.0	3.4	2.3	4.2	2.6	3.0	2.3	0.9	0.8	0.5	0.3	0.2	0.5	1.0	0.1	3.5	1.9	2.8	1.6	4.2
23-Nov	Z	2.6	2.9	5.5	4.3	4.0	6.7	2.6	3.3	5.3	2.2	5.4	5.6	2.4	2.8	3.0	4.4	2.7	2.2	2.2	1.8	1.7	2.0	1.5	3.4	6.7
24-Nov	1.6	Z	1.3	0.9	0.9	1.1	1.2	1.5	2.3	1.7	1.6	2.8	2.9	2.5	2.8	3.2	2.9	1.6	1.2	2.6	1.4	1.0	0.9	0.8	1.8	3.2
25-Nov	0.9	0.7	Z	0.8	0.6	3.6	0.9	0.6	0.4	2.9	2.1	1.9	2.3	3.6	3.1	3.1	2.1	3.2	2.0	1.4	3.5	4.5	21.0	16.5	3.5	21.0
26-Nov	6.3	6.2	8.8	Z	5.6	1.9	1.5	2.9	2.4	4.5	2.3	4.4	4.9	5.5	5.5	3.5	4.9	0.9	0.9	4.1	6.0	1.5	2.1	0.5	3.8	8.8
27-Nov	1.3	6.4	10.4	7.5	Z	2.5	2.5	11.4	11.6	13.0	10.3	4.4	2.1	2.6	4.0	2.8	1.8	1.3	1.0	0.9	0.9	0.8	0.7	0.7	4.4	13.0
28-Nov	0.6	0.6	0.5	0.6	0.6	Z	0.8	1.2	1.1	0.7	0.8	0.8	1.4	1.3	0.7	0.9	0.9	1.1	1.7	1.3	1.0	0.9	0.7	0.7	0.9	1.7
29-Nov	Z	1.0	0.6	0.6	0.5	0.6	0.7	2.5	1.7	1.4	1.4	0.8	0.7	0.9	0.7	1.4	0.7	0.5	0.4	0.5	0.4	0.5	0.3	0.5	0.8	2.5
30-Nov	0.3	Z	0.5	0.5	0.4	0.7	1.0	2.7	1.3	0.9	0.9	0.7	0.9	0.5	0.5	0.4	1.0	5.0	5.0	1.9	2.5	7.0	1.4	3.4	1.7	7.0
																								Diurnal Average		
																								Diurnal Maximum		
Z - zerospan      C - Calibration																										



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

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Anzac - November 2023**





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

**Leaf Wetness (LW) - %**  
**Anzac - November 2023**

<b>Concentration Ranges (%)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 0.3	472	65.65	65.65
0.4 - 0.5	16	2.23	67.87
0.6 - 0.7	16	2.23	70.10
0.8 - 1.4	52	7.23	77.33
1.5 - 10	145	20.17	97.50
> 10	14	1.95	99.44

Total Number of Valid Hours: 719

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Anzac - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 20	8	16	15	38	46	97	41	34	26	23	54	133	88	32	19	12	682
21 - 40	0	0	0	0	0	0	0	0	0	1	0	2	0	0	0	0	3
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	<b>8</b>	<b>16</b>	<b>15</b>	<b>38</b>	<b>46</b>	<b>97</b>	<b>41</b>	<b>34</b>	<b>26</b>	<b>24</b>	<b>54</b>	<b>135</b>	<b>88</b>	<b>32</b>	<b>19</b>	<b>12</b>	<b>685</b>

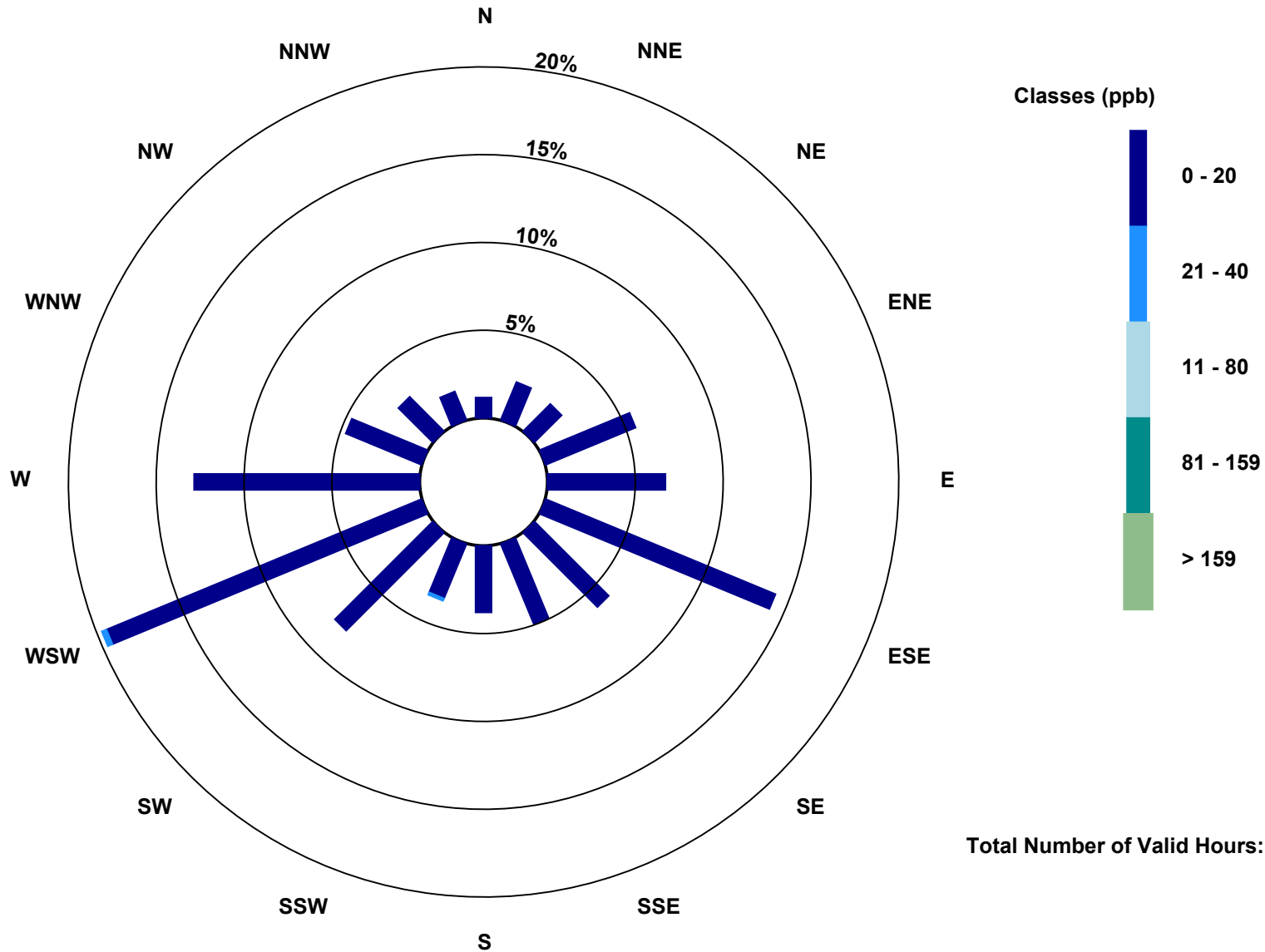
Total Number of Valid Hours: 685

Total Number of Hours: 720

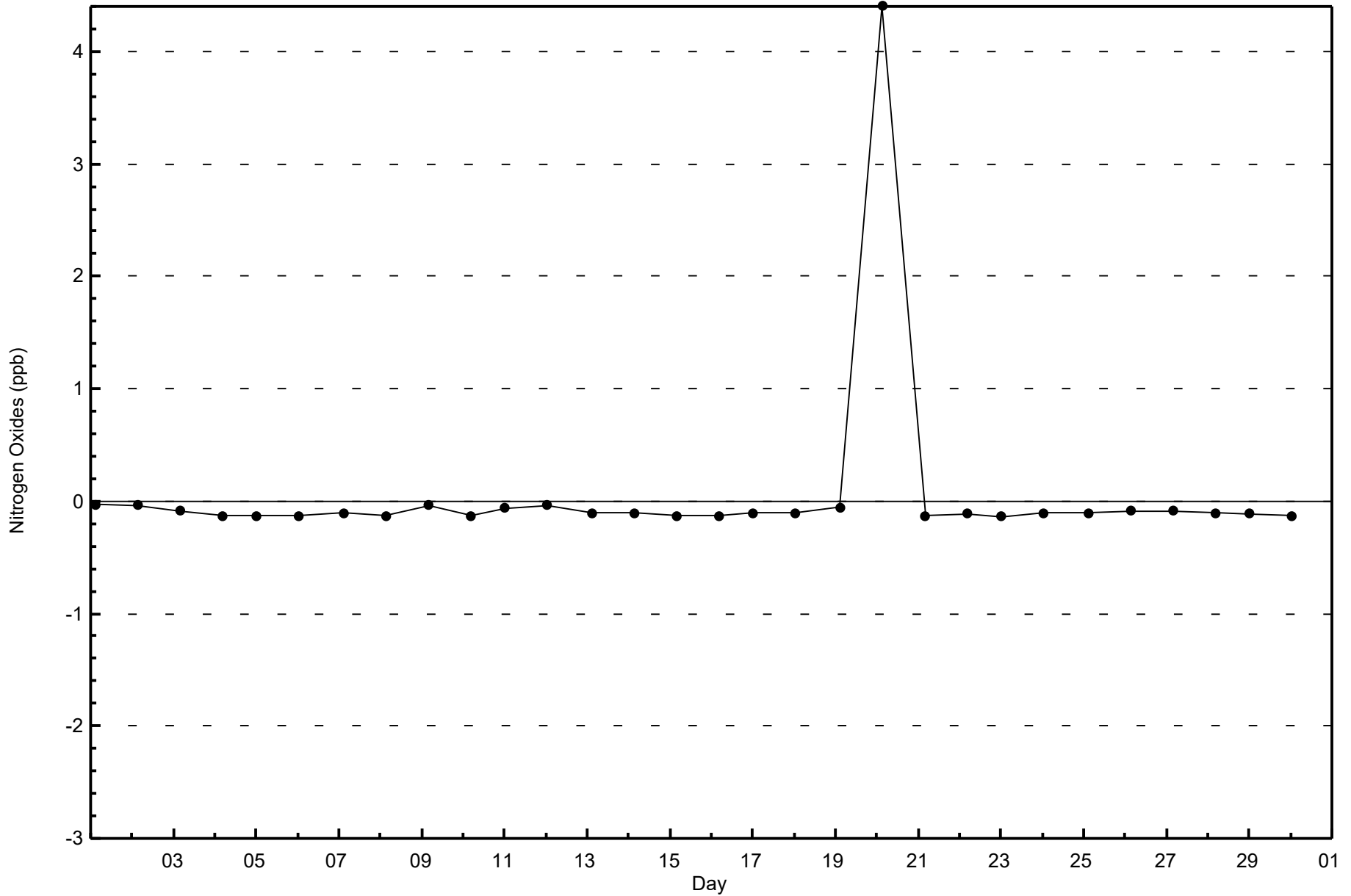


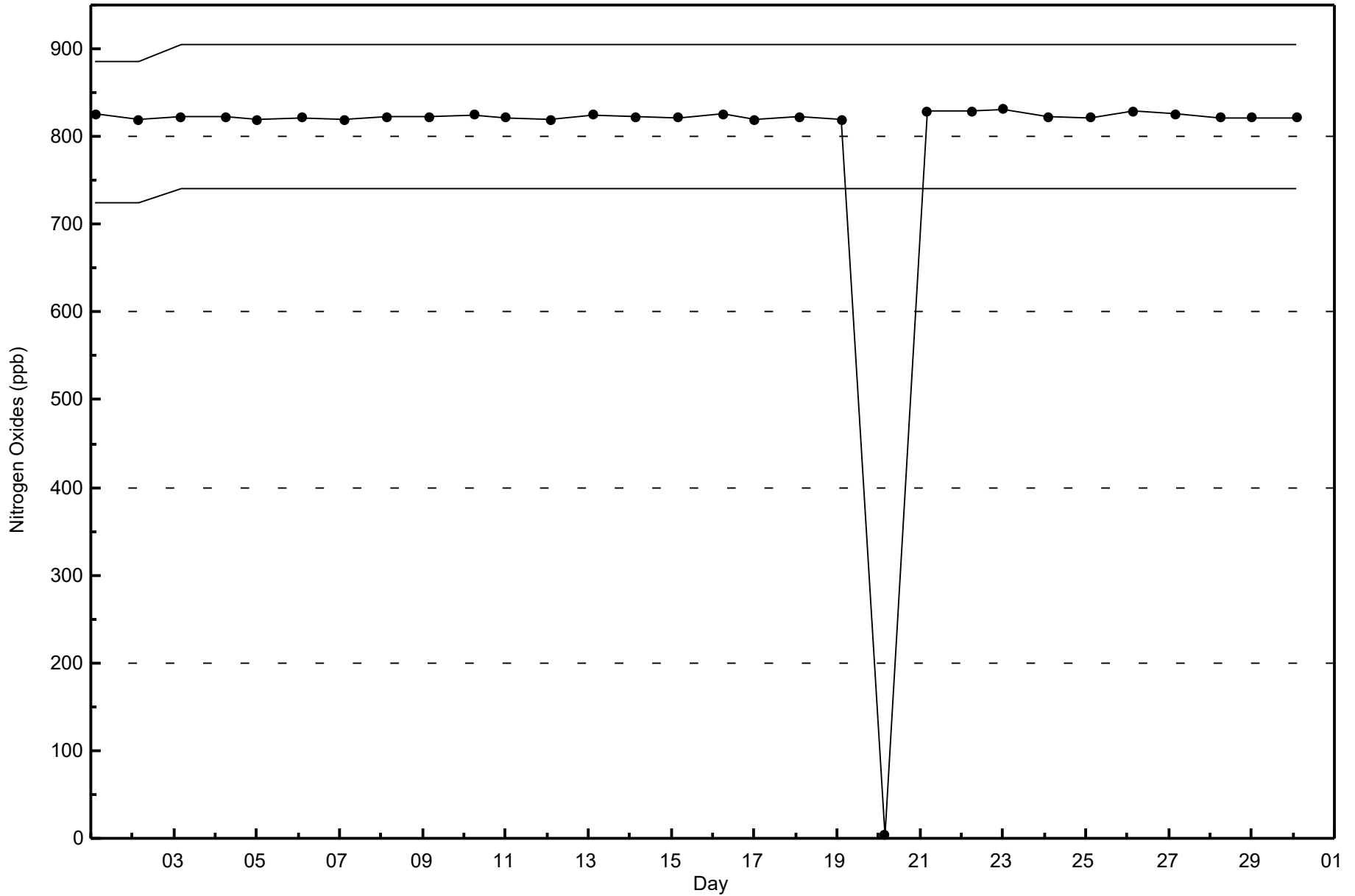
Wood Buffalo Environmental Association  
Wind Rose Nov 2023

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



Total Number of Valid Hours: 685







Wood Buffalo Environmental Association

Summary of Hour Averages

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

Anzac - November 2023

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 36.7 ppb on Nov 25 12:00	Maximum Daily Average: 33.5 ppb on Nov 29		Hours of Data:	680
Minimum Value: 5.7 ppb on Nov 6 19:00	Minimum Daily Average: 14.5 ppb on Nov 6		Hours of Missing Data:	40
Maximum Diurnal Average: 27.8 ppb at hour 15	Minimum Diurnal Average: 22.2 ppb at hour 9		Hours of Calibration:	37
Monthly Average: 24.80 ppb	Percentiles: P <sub>1</sub> = 7.2 P <sub>10</sub> = 13.2 Q <sub>1</sub> = 19.0 Median = 26.6 Q <sub>3</sub> = 31.0 P <sub>90</sub> = 33.5 P <sub>99</sub> = 35.9		Percent Operational Time:	99.6

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Nov	Z	9.5	10.8	10.2	7.6	7.1	5.8	8.1	7.6	13.8	23.7	28.0	28.7	30.3	31.6	30.3	26.4	21.5	19.8	15.7	18.2	14.2	14.9	23.0	17.7	31.6																							
2-Nov	28.6	Z	29.8	30.3	29.7	28.6	23.2	15.9	13.5	21.4	24.7	25.5	29.2	30.9	32.4	32.6	33.1	33.0	33.0	33.3	32.5	30.9	30.9	31.0	28.4	33.3																							
3-Nov	30.3	29.3	Z	28.4	27.8	25.2	20.5	22.2	23.3	27.2	25.5	23.6	21.9	20.8	20.4	23.6	24.6	23.6	24.6	25.3	25.9	24.5	24.5	25.1	24.7	30.3																							
4-Nov	24.9	25.0	25.8	Z	26.7	29.2	30.4	31.3	30.5	29.7	30.1	30.4	31.1	31.7	32.2	32.9	33.3	32.4	31.9	31.2	30.5	29.9	29.2	28.6	29.9	33.3																							
5-Nov	27.8	27.4	27.1	27.3	Z	27.2	28.0	28.0	28.0	27.6	27.8	27.6	27.3	27.0	26.8	26.6	26.9	26.8	27.0	26.8	26.5	26.3	25.0	23.2	27.0	28.0																							
6-Nov	22.9	21.4	21.7	21.7	19.8	Z	16.7	16.7	16.6	15.9	14.3	C	C	C	C	C	6.5	7.2	5.7	7.2	9.5	11.3	12.6	13.1	14.5	22.9																							
7-Nov	Z	13.2	12.1	14.1	16.3	17.9	16.5	15.7	14.9	16.3	17.7	17.6	18.5	19.1	19.0	18.7	16.7	17.3	16.0	15.0	12.2	21.3	26.4	26.5	17.3	26.5																							
8-Nov	24.4	Z	20.8	12.0	8.2	7.6	7.6	7.7	9.3	11.7	12.8	13.8	14.3	15.4	16.6	19.6	18.3	19.7	20.8	20.7	21.4	21.3	20.9	20.4	15.9	24.4																							
9-Nov	19.6	19.2	Z	20.7	20.4	18.2	18.8	19.3	16.7	18.3	18.8	19.0	18.3	18.3	17.9	17.4	14.7	14.6	13.7	11.0	10.0	12.8	14.7	13.4	16.8	20.7																							
10-Nov	15.3	16.1	14.4	Z	15.9	11.4	10.5	12.9	21.2	24.8	23.8	27.2	32.5	30.3	28.7	27.6	25.9	24.5	24.8	24.9	23.5	23.7	23.4	19.7	21.9	32.5																							
11-Nov	13.3	11.6	11.2	15.2	Z	12.5	10.8	10.2	12.8	16.2	17.9	19.5	19.7	20.3	20.2	18.9	18.6	17.3	13.2	10.1	8.8	11.1	17.0	23.9	15.2	23.9																							
12-Nov	28.6	28.9	29.2	29.4	29.4	Z	29.2	28.6	28.7	29.7	29.5	31.9	33.9	33.8	33.9	32.7	30.5	29.3	28.2	28.2	28.3	28.3	28.1	26.6	29.8	33.9																							
13-Nov	Z	24.8	16.0	11.2	8.0	8.5	16.4	20.6	20.9	22.1	23.6	25.3	26.9	27.3	28.1	29.0	28.7	27.9	27.8	27.8	28.0	27.4	26.7	25.0	23.0	29.0																							
14-Nov	18.2	Z	18.7	23.1	25.0	23.3	21.2	21.3	24.8	27.1	26.5	27.9	29.2	30.1	30.7	30.8	30.8	29.5	29.8	31.6	28.6	23.5	26.6	26.2	26.3	31.6																							
15-Nov	28.5	29.0	Z	30.5	33.4	34.7	34.8	28.6	8.9	17.7	21.8	20.9	19.5	21.4	26.3	21.5	20.9	8.9	13.2	26.1	28.9	28.6	28.5	27.8	24.4	34.8																							
16-Nov	27.5	27.5	25.7	Z	25.4	25.4	25.3	25.0	24.1	22.7	21.6	26.1	30.4	32.7	33.1	34.7	31.3	29.9	30.7	35.2	35.8	35.5	35.9	36.2	29.5	36.2																							
17-Nov	35.7	35.5	34.8	34.0	Z	33.4	32.9	32.5	31.1	32.1	33.3	34.3	35.9	34.8	35.3	31.0	29.4	26.0	28.9	27.1	29.8	28.7	23.0	20.0	31.3	35.9																							
18-Nov	16.9	14.5	15.2	16.5	24.5	Z	15.2	21.6	23.7	23.9	20.2	23.4	26.6	34.1	34.5	33.2	31.6	26.2	23.0	25.2	22.9	18.0	16.3	15.8	22.7	34.5																							
19-Nov	Z	13.9	13.0	12.9	12.0	12.4	12.1	10.6	10.5	13.2	15.8	15.2	16.9	19.5	17.9	15.9	14.4	10.4	9.4	16.9	24.4	28.0	27.7	27.3	16.1	28.0																							
20-Nov	28.1	Z	21.4	22.8	25.7	31.4	34.5	33.5	32.7	33.8	34.1	34.5	34.8	33.8	32.3	33.0	33.6	33.4	32.5	32.3	31.7	31.6	32.6	33.2	31.6	34.8																							
21-Nov	32.3	33.0	Z	30.6	30.6	30.0	27.9	26.4	27.4	27.7	28.3	M	M	M	C	C	29.3	29.9	30.4	32.0	33.1	32.2	32.2	31.8	30.3	33.1																							
22-Nov	31.1	29.6	30.6	Z	26.4	22.3	22.3	21.7	24.9	22.4	24.9	25.9	27.3	27.8	27.9	27.1	26.2	25.7	25.7	27.0	28.0	25.2	26.3	25.1	26.1	31.1																							
23-Nov	24.2	24.3	23.3	20.3	Z	20.2	18.6	19.5	18.3	16.5	18.6	15.9	15.8	17.1	17.7	17.5	13.9	15.5	18.4	25.2	26.5	28.0	29.3	29.9	20.6	29.9																							
24-Nov	30.2	32.7	33.1	34.4	35.1	Z	32.4	31.9	31.3	31.1	31.4	30.5	30.5	31.7	31.5	30.7	29.3	30.8	31.2	30.3	31.1	32.0	33.7	33.6	31.8	35.1																							
25-Nov	Z	32.4	31.1	29.5	29.1	26.8	29.6	34.2	36.1	32.5	35.9	36.7	36.5	34.9	35.3	34.7	34.9	31.1	30.6	29.3	25.2	20.6	7.1	11.2	29.8	36.7																							
26-Nov	13.5	Z	18.1	19.2	21.1	23.1	23.1	20.9	22.6	19.0	23.6	22.1	18.6	16.4	18.1	21.9	19.8	29.4	29.5	15.7	11.5	23.7	25.4	24.2	20.9	29.5																							
27-Nov	19.0	12.3	Z	11.6	14.7	12.6	14.0	9.2	7.1	7.2	12.0	21.9	23.6	26.6	30.4	30.7	31.2	31.3	31.5	31.5	31.0	31.0	31.0	31.8	21.9	31.8																							
28-Nov	32.4	33.4	33.6	Z	33.4	32.6	32.1	32.1	33.3	33.9	33.4	34.4	34.1	33.8	34.3	32.9	32.2	30.3	29.2	29.3	29.1	30.4	30.7	31.3	32.3	34.4																							
29-Nov	31.4	32.4	33.2	34.1	Z	34.3	34.2	33.7	33.6	33.8	33.4	33.0	32.2	32.3	32.1	32.2	32.8	33.4	33.4	34.5	34.2	35.2	36.0	35.9	33.5	36.0																							
30-Nov	35.4	34.6	34.2	34.6	34.9	Z	32.7	30.8	30.5	30.2	31.1	33.0	33.9	33.3	34.4	35.0	34.6	31.7	28.1	28.8	27.3	29.6	28.0	25.5	31.8	35.4																							
																								25.6	24.5	23.4	23.0	23.2	22.2	22.6	22.4	22.2	23.3	24.5	25.9	26.7	27.3	27.8	27.6	26.0	25.0	24.7	25.2	25.2	25.5	25.5	25.5	Diurnal Average	
																								35.7	35.5	34.8	34.6	35.1	34.7	34.8	34.2	36.1	33.9	35.9	36.7	36.5	34.9	35.3	35.0	34.9	33.4	33.4	35.2	35.8	35.5	36.0	36.2	Diurnal Maximum	

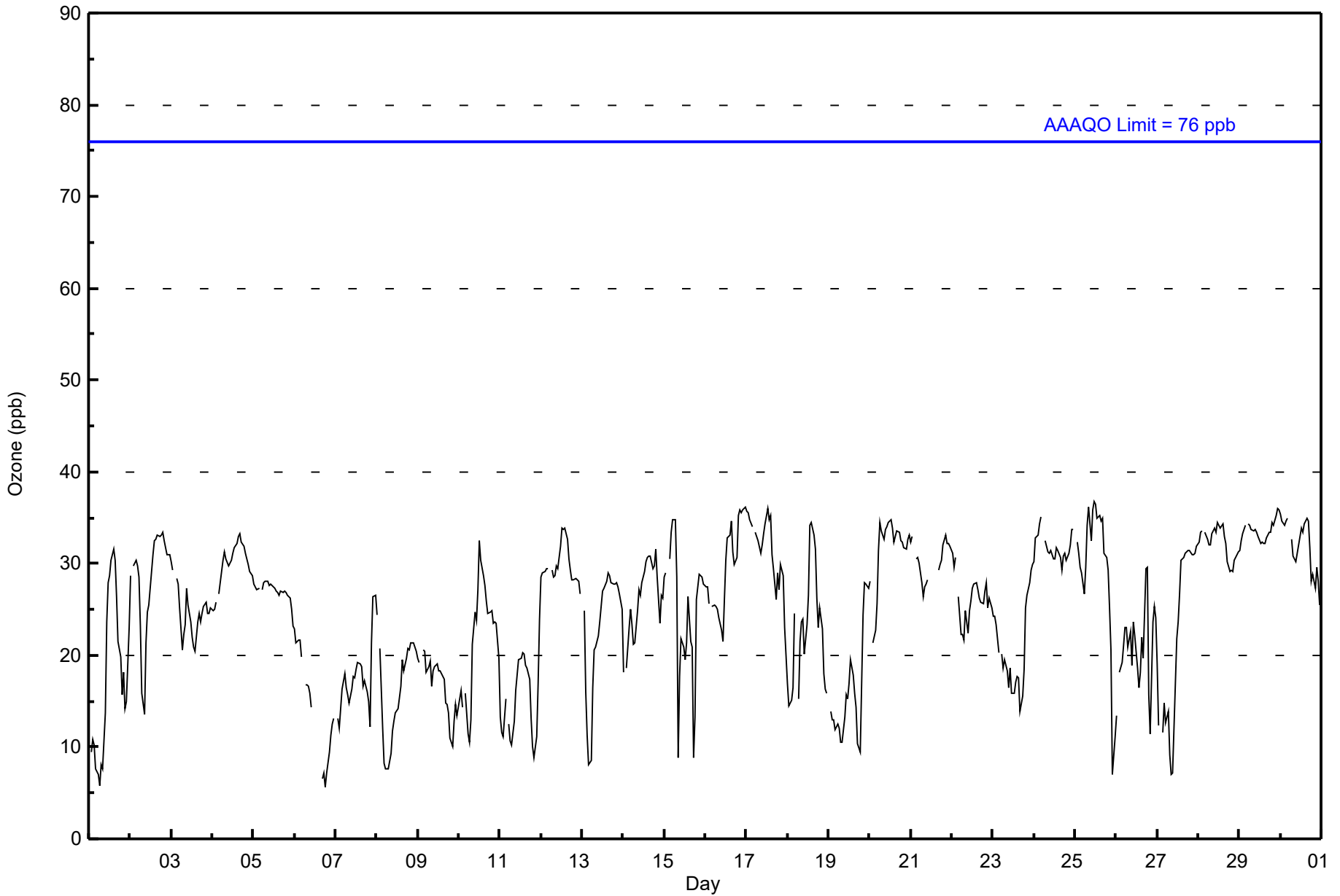
Z - zerospan      C - Calibration      M - Maintenance  
 Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 76 ppb





Wood Buffalo Environmental Association  
Hourly Averages

Ozone (O<sub>3</sub>) - ppb  
Anzac - November 2023





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

**Ozone (O<sub>3</sub>) - ppb**  
**Anzac - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	197	28.97	28.97
21 - 50	483	71.03	100.00
51 - 82	0	0.00	100.00
> 83	0	0.00	100.00

Total Number of Valid Hours: 680

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Ozone (O<sub>3</sub>) - ppb  
Anzac - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 20	1	4	1	3	13	60	26	13	14	12	7	10	21	8	2	2	197
21 - 50	7	12	13	32	33	30	18	19	12	14	46	124	68	24	21	10	483
51 - 82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 83	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	<b>8</b>	<b>16</b>	<b>14</b>	<b>35</b>	<b>46</b>	<b>90</b>	<b>44</b>	<b>32</b>	<b>26</b>	<b>26</b>	<b>53</b>	<b>134</b>	<b>89</b>	<b>32</b>	<b>23</b>	<b>12</b>	<b>680</b>

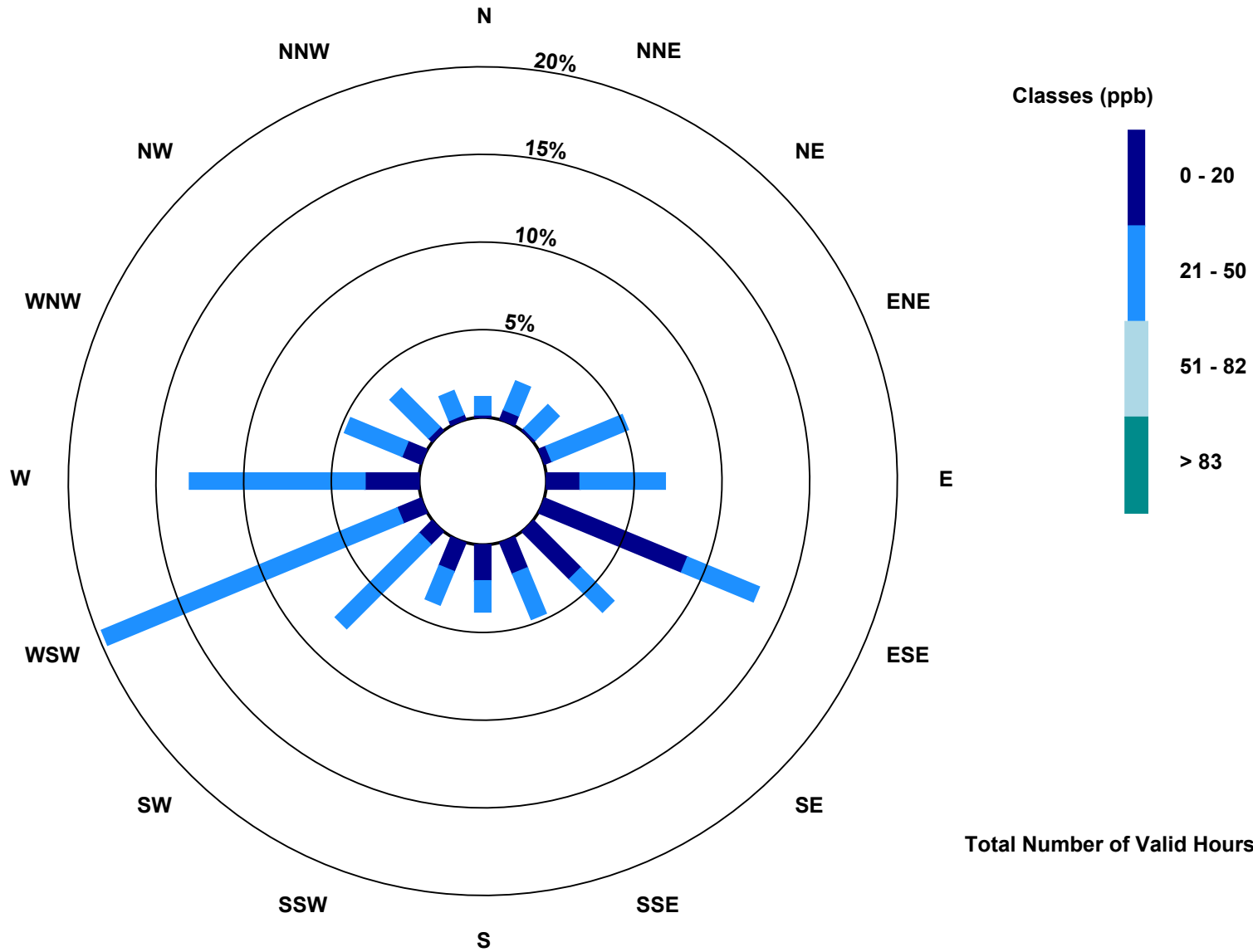
Total Number of Valid Hours: 680

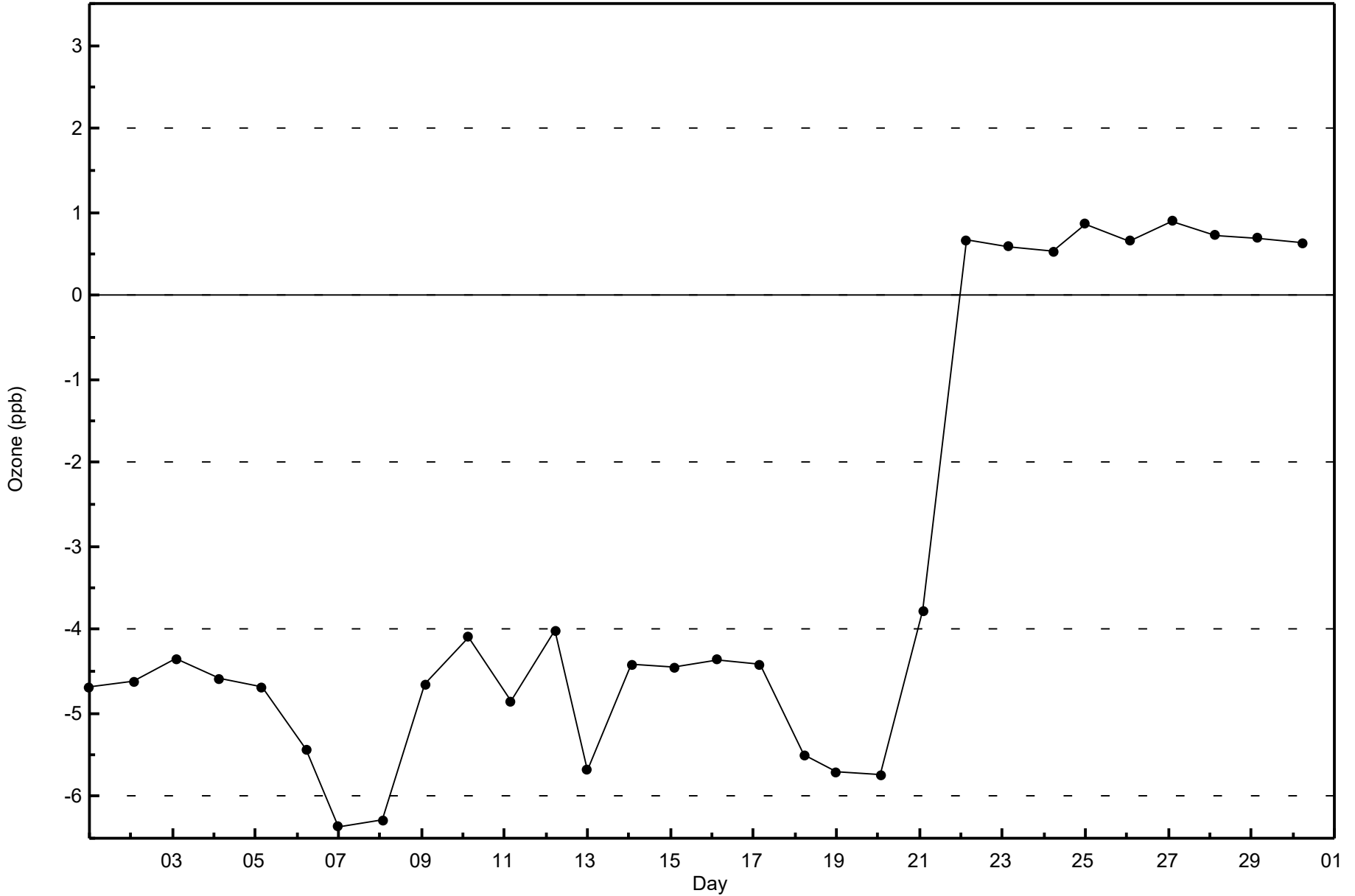
Total Number of Hours: 720

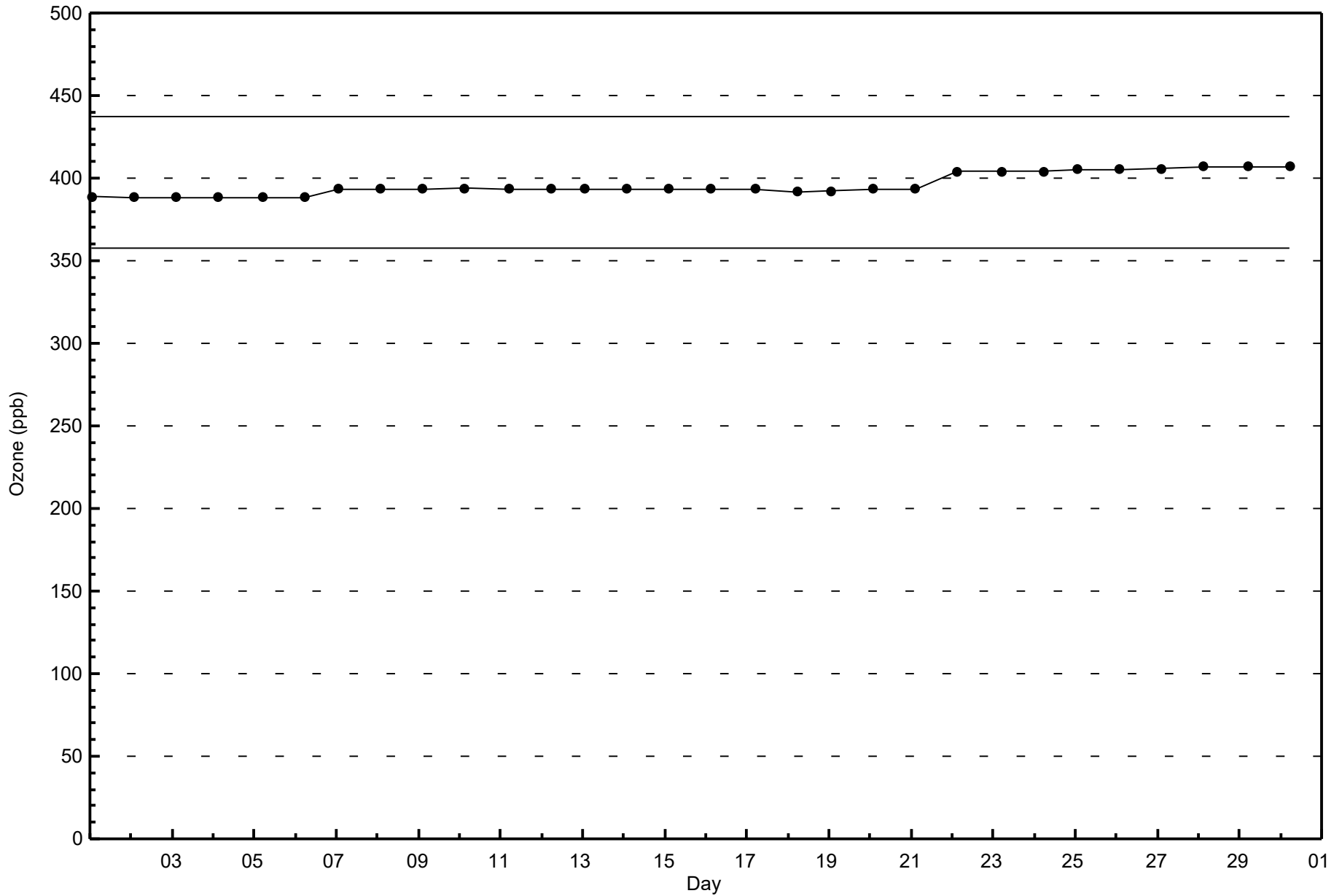


Wood Buffalo Environmental Association  
Wind Rose Nov 2023

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









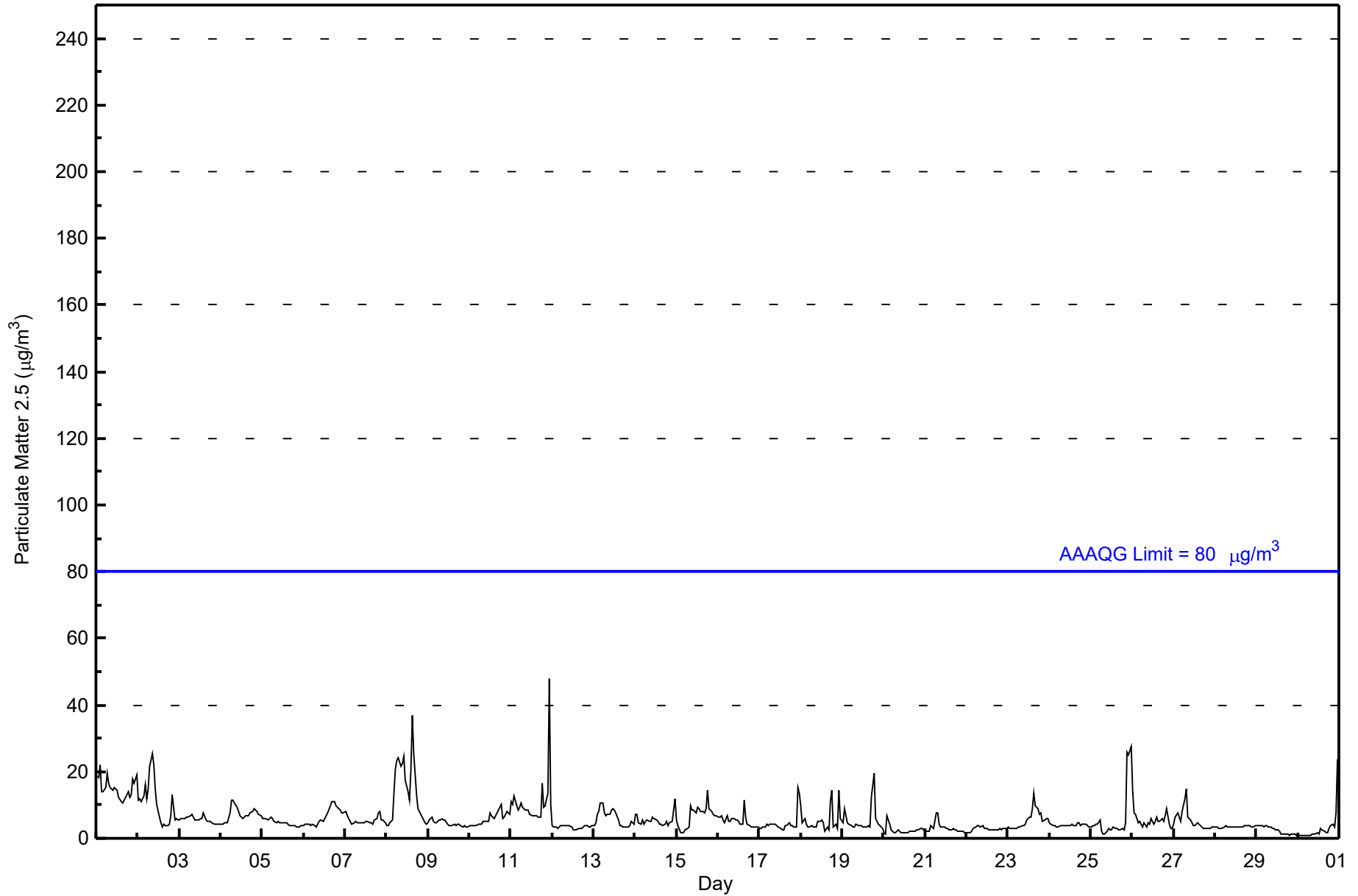
**Wood Buffalo Environmental Association**

**Summary of Hour Averages**

**Particulate Matter 2.5 (PM<sub>2.5</sub>) - µg/m<sup>3</sup>**

**Anzac - November 2023**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 47.8 µg/m <sup>3</sup> on Nov 11 23:00 Minimum Value: 0.7 µg/m <sup>3</sup> on Nov 30 06:00 Maximum Diurnal Average: 7.9 µg/m <sup>3</sup> at hour 23 Monthly Average: 5.88 µg/m <sup>3</sup>		Maximum Daily Average: 15.1 µg/m <sup>3</sup> on Nov 1 Minimum Daily Average: 2.4 µg/m <sup>3</sup> on Nov 20 Minimum Diurnal Average: 5.0 µg/m <sup>3</sup> at hour 4 Percentiles: P <sub>1</sub> = 0.9 P <sub>10</sub> = 2.5 Q <sub>1</sub> = 3.4 Median = 4.4 Q <sub>3</sub> = 6.6 P <sub>90</sub> = 11.0 P <sub>99</sub> = 24.5		Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0																						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	18.7	18.3	22.1	14.1	14.1	15.2	19.5	16.5	15.2	14.5	15.3	14.8	14.3	12.5	10.8	10.7	11.5	12.5	14.2	12.2	13.3	17.8	16.3	19.3	15.1	22.1
2-Nov	11.2	11.8	11.0	12.5	16.1	12.0	15.0	21.7	25.3	21.9	14.8	10.0	6.5	4.9	3.3	4.0	3.8	3.9	4.2	6.6	13.1	5.6	5.9	5.6	10.5	25.3
3-Nov	5.6	6.0	5.7	6.0	6.4	6.5	6.8	7.2	6.4	5.5	5.6	5.7	5.9	6.1	7.6	5.7	5.2	5.2	5.0	4.8	4.4	4.2	4.3	4.4	5.7	7.6
4-Nov	4.3	4.3	4.6	4.5	4.8	7.6	11.4	11.4	10.5	9.3	7.9	6.9	6.4	6.0	6.6	6.6	6.7	7.6	8.2	8.8	8.4	7.9	7.2	6.8	7.3	11.4
5-Nov	6.1	5.8	5.8	5.7	5.9	6.2	5.9	5.2	4.8	4.9	4.8	4.7	4.6	4.5	4.5	4.3	4.0	3.9	3.7	3.7	3.4	3.4	3.7	3.9	4.7	6.2
6-Nov	4.0	4.1	4.1	4.2	4.0	4.0	3.9	3.6	4.4	5.2	5.4	5.1	5.8	6.6	7.7	9.6	10.8	11.0	11.1	9.8	9.1	8.5	7.6	7.7	6.5	11.1
7-Nov	8.1	6.8	6.0	5.0	4.4	4.6	4.9	4.7	4.5	4.7	4.7	4.6	5.1	5.2	4.7	4.6	4.2	5.3	6.1	7.8	7.9	5.4	5.5	4.5	5.4	8.1
8-Nov	3.7	3.7	4.7	5.7	13.4	20.9	23.2	24.1	21.6	22.4	24.6	17.6	14.1	11.4	20.3	36.9	25.3	13.2	8.8	7.8	7.3	5.6	4.8	4.1	14.4	36.9
9-Nov	4.5	5.5	6.2	5.0	4.9	4.6	5.4	5.4	5.7	5.4	5.4	4.3	4.0	3.9	3.9	4.1	4.0	4.3	4.1	3.7	3.6	3.6	3.5	3.4	4.5	6.2
10-Nov	3.7	3.6	3.9	3.8	4.0	4.1	4.3	4.4	5.0	5.1	4.9	4.9	7.6	6.9	5.9	6.8	7.7	8.6	10.2	6.1	6.3	7.4	8.1	7.4	5.9	10.2
11-Nov	11.0	10.2	12.6	9.9	8.3	9.3	10.6	9.4	8.6	8.6	8.3	7.4	6.8	6.6	6.6	6.6	6.2	6.5	16.6	9.5	9.9	13.6	47.8	10.0	10.9	47.8
12-Nov	3.8	3.5	3.5	3.0	3.4	3.7	3.8	3.8	3.9	3.8	3.6	3.2	2.6	2.5	2.7	2.8	2.9	2.9	3.6	4.0	3.9	3.4	3.4	3.7	3.4	4.0
13-Nov	3.7	4.5	7.2	8.1	10.5	10.8	7.7	6.6	7.4	7.2	8.7	8.7	8.4	7.5	5.6	3.9	3.7	3.4	3.3	3.4	3.3	3.9	4.9	4.1	6.1	10.8
14-Nov	7.3	7.1	4.5	4.2	5.6	4.4	5.0	5.6	5.2	5.3	6.5	6.1	5.5	5.0	4.4	4.2	4.0	4.3	5.3	3.6	4.8	5.0	8.3	11.8	5.5	11.8
15-Nov	5.4	3.9	1.5	1.7	1.9	2.5	3.0	3.5	9.7	8.6	8.3	7.7	9.4	8.7	8.2	8.1	7.7	9.0	14.5	9.0	7.9	7.1	6.9	6.6	6.7	14.5
16-Nov	6.3	6.5	6.8	5.4	4.7	6.9	5.2	5.2	5.8	6.0	5.7	5.5	4.9	4.4	4.2	11.3	6.2	4.3	3.7	3.4	3.3	3.3	3.3	3.5	5.2	11.3
17-Nov	3.1	3.1	3.5	3.4	4.0	3.9	4.1	4.3	4.2	4.1	3.6	3.4	2.9	2.7	2.6	3.9	3.9	4.5	3.6	3.8	3.3	3.3	15.4	13.4	4.5	15.4
18-Nov	9.6	4.8	5.8	4.1	3.3	3.2	3.7	3.3	3.3	3.3	5.2	4.9	5.6	4.5	2.2	3.3	2.6	10.8	14.5	3.3	4.3	3.1	14.4	6.0	5.4	14.5
19-Nov	4.8	9.1	6.6	4.5	4.4	3.9	3.6	3.6	4.2	3.8	3.7	3.9	3.5	3.3	3.3	3.7	3.3	12.3	19.7	5.8	5.1	4.1	3.8	2.9	5.3	19.7
20-Nov	1.8	1.5	6.7	4.3	2.3	2.2	1.6	1.9	2.4	1.9	1.9	1.7	1.6	1.7	1.8	1.9	1.9	2.3	2.3	2.6	2.7	2.9	2.8	2.4	2.4	6.7
21-Nov	2.2	2.0	2.0	3.6	3.2	3.1	7.4	7.4	4.4	3.6	3.2	3.3	2.9	2.8	2.7	2.6	2.9	2.7	2.4	2.3	1.9	2.0	2.0	1.7	3.1	7.4
22-Nov	1.5	1.8	1.9	2.2	2.9	3.5	3.6	3.7	3.4	3.7	3.1	3.1	3.0	2.7	2.6	2.6	2.5	2.5	2.6	2.8	2.4	2.8	2.8	2.8	2.8	3.7
23-Nov	3.3	2.8	3.0	3.0	3.1	3.1	3.3	3.4	3.7	4.0	4.4	5.4	6.2	6.5	8.8	13.4	9.7	8.8	7.4	7.5	4.9	5.6	6.0	6.0	5.5	13.4
24-Nov	4.8	4.1	3.7	3.7	3.5	3.5	3.6	3.7	3.6	3.8	3.9	4.0	4.0	4.1	3.9	3.9	4.5	4.5	4.0	4.1	4.3	4.2	3.6	3.4	3.9	4.8
25-Nov	3.6	3.7	3.9	4.1	4.4	5.5	2.0	1.3	1.4	2.3	3.1	2.6	2.7	3.5	2.9	2.9	2.4	2.7	2.8	2.6	4.8	26.0	25.2	27.4	6.0	27.4
26-Nov	14.3	7.7	7.1	4.8	5.3	4.0	3.3	4.5	3.6	4.5	4.4	5.8	4.4	5.1	6.4	4.9	5.2	6.1	5.1	6.8	8.9	4.4	3.1	2.9	5.5	14.3
27-Nov	4.1	6.4	7.4	6.3	5.1	8.1	11.7	14.9	6.5	5.7	5.4	4.0	3.7	4.4	4.6	3.7	3.3	3.1	3.2	3.1	3.1	3.1	3.2	3.4	5.3	14.9
28-Nov	3.4	3.2	3.1	3.0	3.1	3.4	3.6	3.5	3.5	3.5	3.6	3.3	3.4	3.4	3.2	3.3	3.4	3.8	3.9	3.8	3.7	3.6	3.6	3.7	3.5	3.9
29-Nov	3.7	3.7	3.7	3.8	3.6	3.8	3.6	3.4	3.3	3.1	3.1	2.6	2.4	2.0	1.4	1.4	1.4	1.5	1.3	1.0	1.1	1.2	1.2	0.9	2.4	3.8
30-Nov	0.9	0.7	0.7	0.8	0.7	0.7	0.7	1.0	1.3	1.4	1.3	1.5	1.4	2.8	2.7	2.2	1.6	1.6	2.9	3.9	4.3	3.4	7.8	23.9	2.9	23.9
																								Diurnal Average		
																								Diurnal Maximum		
5.6 5.3 5.6 5.0 5.4 5.8 6.4 6.6 6.4 6.2 6.1 5.6 5.3 5.1 5.2 6.1 5.4 5.8 6.6 5.3 5.5 5.8 7.9 6.9																										
18.7 18.3 22.1 14.1 16.1 20.9 23.2 24.1 25.3 22.4 24.6 17.6 14.3 12.5 20.3 36.9 25.3 13.2 19.7 12.2 13.3 26.0 47.8 27.4																										
Alberta Ambient Air Quality Guideline/Objectives: 1-hr 80 µg/m <sup>3</sup> 24-hr 29 µg/m <sup>3</sup>																										







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

**Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$**   
**Anzac - November 2023**

<b>Concentration Ranges (<math>\mu\text{g}/\text{m}^3</math>)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	462	64.17	64.17
6 - 15	229	31.81	95.97
16 - 25	25	3.47	99.44
26 - 80	4	0.56	100.00
> 81.0	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



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

**Particulate Matter 2.5 (PM<sub>2.5</sub>) - µg/m<sup>3</sup>**  
**Anzac - November 2023**

Concentration Ranges (µg/m <sup>3</sup> )	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	8	13	11	21	21	56	20	13	14	13	43	114	65	19	22	9	462
6 - 15	0	3	4	19	27	44	26	20	9	10	10	22	20	9	3	3	229
16 - 25	0	0	0	0	0	0	1	2	3	3	1	5	7	3	0	0	25
26 - 80	0	0	0	0	0	0	0	0	1	0	1	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
<b>Totals</b>	8	16	15	40	48	100	47	35	27	26	55	141	93	32	25	12	720

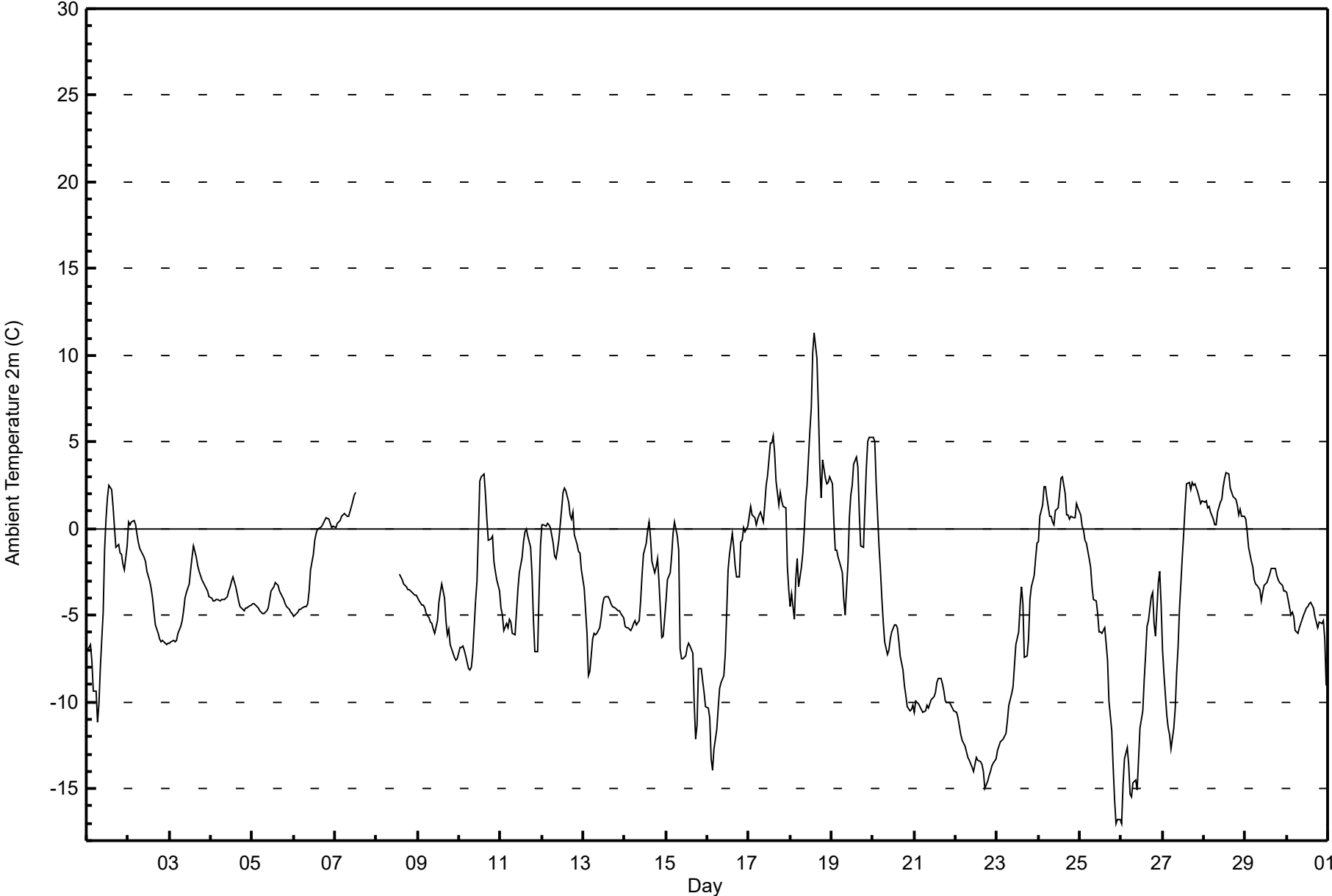
Total Number of Valid Hours: 720

Total Number of Hours: 720





Maximum Value: 11.3 C on Nov 18 15:00		Maximum Daily Average: 2.1 C on Nov 18		Hours in Service: 720																						
Minimum Value: -17.1 C on Nov 25 22:00		Minimum Daily Average: -13.2 C on Nov 22		Hours of Data: 696																						
Maximum Diurnal Average: -1.4 C at hour 15		Minimum Diurnal Average: -5.3 C at hour 9		Hours of Missing Data: 24																						
Monthly Average: -3.85 C		Percentiles: P <sub>1</sub> = -15.1 P <sub>10</sub> = -10.4 Q <sub>1</sub> = -6.4 Median = -3.9 Q <sub>3</sub> = -0.1 P <sub>90</sub> = 1.7 P <sub>99</sub> = 5.3		Hours of Calibration: 0																						
				Percent Operational Time: 96.7																						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	-6.9	-6.8	-6.7	-7.6	-9.4	-9.4	-11.2	-10.1	-8.0	-4.8	-1.2	0.6	1.7	2.5	2.2	1.3	0.1	-1.1	-0.9	-1.4	-1.5	-2.1	-2.4	-1.0	-3.5	2.5
2-Nov	0.3	0.3	0.4	0.4	0.2	-0.3	-0.8	-1.2	-1.5	-1.6	-1.9	-2.5	-3.0	-3.4	-4.0	-4.8	-5.5	-6.1	-6.4	-6.5	-6.5	-6.6	-6.7	-6.6	-3.1	0.4
3-Nov	-6.6	-6.5	-6.5	-6.5	-6.4	-6.1	-5.6	-5.3	-4.8	-4.0	-3.7	-3.2	-2.4	-1.6	-1.0	-1.6	-2.2	-2.4	-2.7	-3.0	-3.3	-3.5	-3.6	-3.9	-4.0	-1.0
4-Nov	-4.0	-4.2	-4.1	-4.1	-4.1	-4.2	-4.1	-4.1	-4.1	-3.9	-3.6	-3.3	-3.0	-2.8	-3.3	-3.8	-4.2	-4.5	-4.7	-4.7	-4.6	-4.5	-4.5	-4.4	-4.0	-2.8
5-Nov	-4.3	-4.3	-4.4	-4.6	-4.7	-4.8	-4.9	-4.9	-4.7	-4.6	-4.1	-3.6	-3.3	-3.1	-3.2	-3.3	-3.6	-3.9	-4.1	-4.3	-4.5	-4.7	-4.8	-4.9	-4.2	-3.1
6-Nov	-5.0	-5.0	-4.8	-4.7	-4.6	-4.5	-4.5	-4.5	-4.3	-3.6	-2.4	-1.5	-0.7	-0.2	0.0	0.1	0.1	0.3	0.5	0.6	0.5	0.3	0.1	0.1	-2.0	0.6
7-Nov	0.1	0.3	0.3	0.5	0.7	0.9	0.8	0.7	0.7	1.3	1.6	1.9	2.1	M	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	--	2.1
8-Nov	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	M	-2.6	-2.8	-3.0	-3.2	-3.4	-3.5	-3.5	-3.6	-3.8	-3.9	-3.9	--	-2.6
9-Nov	-4.0	-4.2	-4.4	-4.4	-4.6	-4.9	-5.2	-5.4	-5.5	-5.8	-6.1	-5.3	-4.3	-3.6	-3.2	-4.0	-5.3	-6.1	-5.8	-6.7	-7.2	-7.4	-7.6	-7.5	-5.4	-3.2
10-Nov	-6.9	-6.8	-6.8	-7.0	-7.4	-8.1	-8.1	-8.0	-7.2	-4.2	-3.0	-0.2	2.8	3.0	3.2	2.0	0.5	-0.7	-0.6	-0.4	-1.9	-2.5	-2.9	-3.6	-3.1	3.2
11-Nov	-4.6	-5.0	-5.9	-5.5	-5.7	-5.2	-5.4	-6.1	-6.1	-4.8	-3.6	-2.6	-1.7	-0.8	-0.2	0.0	-0.4	-1.1	-2.6	-5.2	-7.1	-7.1	-3.7	-1.0	-3.8	0.0
12-Nov	0.2	0.2	0.2	0.3	0.2	0.1	-0.8	-1.6	-1.7	-1.3	-0.6	1.1	2.1	2.3	2.2	1.5	0.8	0.5	1.0	-0.4	-0.9	-1.4	-1.4	-2.4	0.0	2.3
13-Nov	-3.4	-4.7	-6.0	-8.5	-8.2	-6.3	-6.1	-6.1	-6.0	-5.7	-5.1	-4.5	-4.0	-3.9	-4.1	-4.3	-4.5	-4.6	-4.6	-4.7	-4.8	-4.9	-5.2	-5.2	-5.2	-3.4
14-Nov	-5.6	-5.7	-5.7	-5.8	-5.7	-5.5	-5.3	-5.6	-5.3	-4.2	-2.7	-1.5	-0.8	-0.1	0.4	-0.5	-1.9	-2.5	-2.2	-1.8	-3.0	-6.3	-6.2	-5.2	-3.7	0.4
15-Nov	-4.2	-3.0	-2.5	-1.6	-0.3	0.4	-0.4	-1.2	-6.9	-7.5	-7.5	-7.4	-6.9	-6.6	-6.8	-7.2	-10.1	-12.1	-11.3	-8.1	-8.1	-8.8	-9.5	-10.3	-6.2	0.4
16-Nov	-10.4	-10.9	-13.3	-13.9	-12.7	-11.5	-10.4	-9.2	-8.9	-8.5	-7.3	-4.9	-2.4	-1.5	-0.2	-1.1	-2.1	-2.8	-2.8	-0.7	-0.7	0.0	-0.2	0.1	-5.7	0.1
17-Nov	0.7	1.3	0.8	0.7	0.2	0.5	0.8	0.9	0.4	1.3	2.5	3.0	4.9	4.9	5.4	4.4	2.8	1.4	2.1	1.6	1.3	1.2	-2.1	-3.5	1.6	5.4
18-Nov	-4.5	-3.7	-5.2	-2.8	-1.7	-3.3	-2.2	-1.4	-0.1	1.6	2.5	5.7	6.9	10.2	11.3	9.8	7.0	3.7	1.7	3.9	2.9	2.6	2.7	3.0	2.1	11.3
19-Nov	2.6	0.4	-1.2	-1.2	-1.7	-2.2	-2.6	-4.1	-5.0	-2.0	0.6	1.9	2.5	3.7	4.1	3.6	0.9	-1.0	-1.1	1.3	3.5	5.0	5.3	5.2	0.8	5.3
20-Nov	5.3	5.0	2.6	-1.0	-2.4	-4.0	-5.4	-6.6	-7.2	-7.0	-6.4	-6.0	-5.6	-5.5	-5.7	-6.4	-7.4	-8.1	-9.0	-9.6	-10.3	-10.5	-10.4	-10.2	-5.5	5.3
21-Nov	-10.6	-10.0	-10.1	-10.3	-10.5	-10.6	-10.5	-10.2	-10.3	-10.1	-9.9	-9.7	-9.4	-8.9	-8.6	-8.6	-9.0	-9.4	-9.9	-10.0	-10.0	-10.2	-10.4	-10.5	-9.9	-8.6
22-Nov	-10.6	-10.9	-11.4	-11.9	-12.3	-12.6	-12.9	-13.2	-13.4	-13.8	-14.0	-13.6	-13.2	-13.4	-13.4	-13.6	-14.0	-15.0	-14.6	-14.2	-14.0	-13.7	-13.5	-13.3	-13.2	-10.6
23-Nov	-12.8	-12.5	-12.3	-12.1	-12.0	-11.8	-11.1	-10.2	-9.6	-9.2	-7.9	-6.7	-5.9	-4.5	-3.4	-4.4	-7.4	-7.3	-6.4	-4.1	-3.4	-2.7	-1.7	-0.9	-7.5	-0.9
24-Nov	-0.7	0.7	1.4	2.4	2.4	1.7	0.7	0.4	0.2	1.0	1.2	2.0	2.9	3.0	2.0	0.8	0.8	0.5	0.7	0.6	0.7	1.4	1.2	1.2	1.2	3.0
25-Nov	0.8	0.2	-0.1	-0.7	-0.9	-1.7	-2.2	-3.4	-4.1	-4.1	-4.9	-5.9	-5.9	-6.0	-5.7	-6.6	-7.6	-9.9	-11.7	-13.7	-15.7	-17.1	-16.8	-16.7	-6.7	0.8
26-Nov	-17.0	-14.7	-13.3	-12.6	-13.6	-15.4	-15.5	-14.7	-14.5	-15.1	-13.3	-11.5	-10.5	-8.7	-7.3	-5.6	-5.3	-3.9	-3.6	-5.5	-6.2	-3.1	-2.4	-4.4	-9.9	-2.4
27-Nov	-7.0	-8.4	-10.7	-11.5	-11.9	-12.7	-11.5	-10.3	-8.3	-6.9	-4.7	-1.7	-0.2	1.2	2.6	2.7	2.3	2.7	2.5	2.6	2.1	1.8	1.5	1.6	-3.4	2.7
28-Nov	1.5	1.6	1.2	1.3	0.9	0.6	0.2	0.2	1.0	1.5	1.7	2.4	2.9	3.2	3.2	2.3	2.1	1.8	1.7	1.3	0.8	1.1	0.7	0.7	1.5	3.2
29-Nov	0.5	-0.2	-1.1	-1.9	-2.2	-2.9	-3.2	-3.3	-3.5	-4.2	-3.7	-3.3	-3.1	-2.9	-2.6	-2.3	-2.3	-2.3	-2.7	-2.9	-3.1	-3.3	-3.6	-3.6	-2.6	0.5
30-Nov	-3.7	-4.1	-5.0	-4.8	-5.1	-5.9	-6.0	-5.7	-5.5	-5.3	-4.9	-4.6	-4.5	-4.4	-4.2	-4.6	-5.0	-5.4	-5.7	-5.4	-5.4	-5.3	-6.4	-9.1	-5.2	-3.7
																								Diurnal Average		
																								Diurnal Maximum		
-4.2 -4.2 -4.6 -4.8 -4.9 -5.2 -5.3 -5.3 -5.3 -4.7 -3.9 -2.9 -2.2 -1.7 -1.4 -1.9 -2.9 -3.5 -3.7 -3.6 -3.9 -4.0 -4.1 -4.1																										
5.3 5.0 2.6 2.4 2.4 1.7 0.8 0.9 1.0 1.6 2.5 5.7 6.9 10.2 11.3 9.8 7.0 3.7 2.5 3.9 3.5 5.0 5.3 5.2																										
M - Maintenance UO - Unstable Operation																										





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Ambient Temperature 2m (AT 2m) - C  
Anzac - November 2023**

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	0	0.00	0.00
-20 - 0	524	75.29	75.29
0 - 10	170	24.43	99.71
10 - 20	2	0.29	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 696

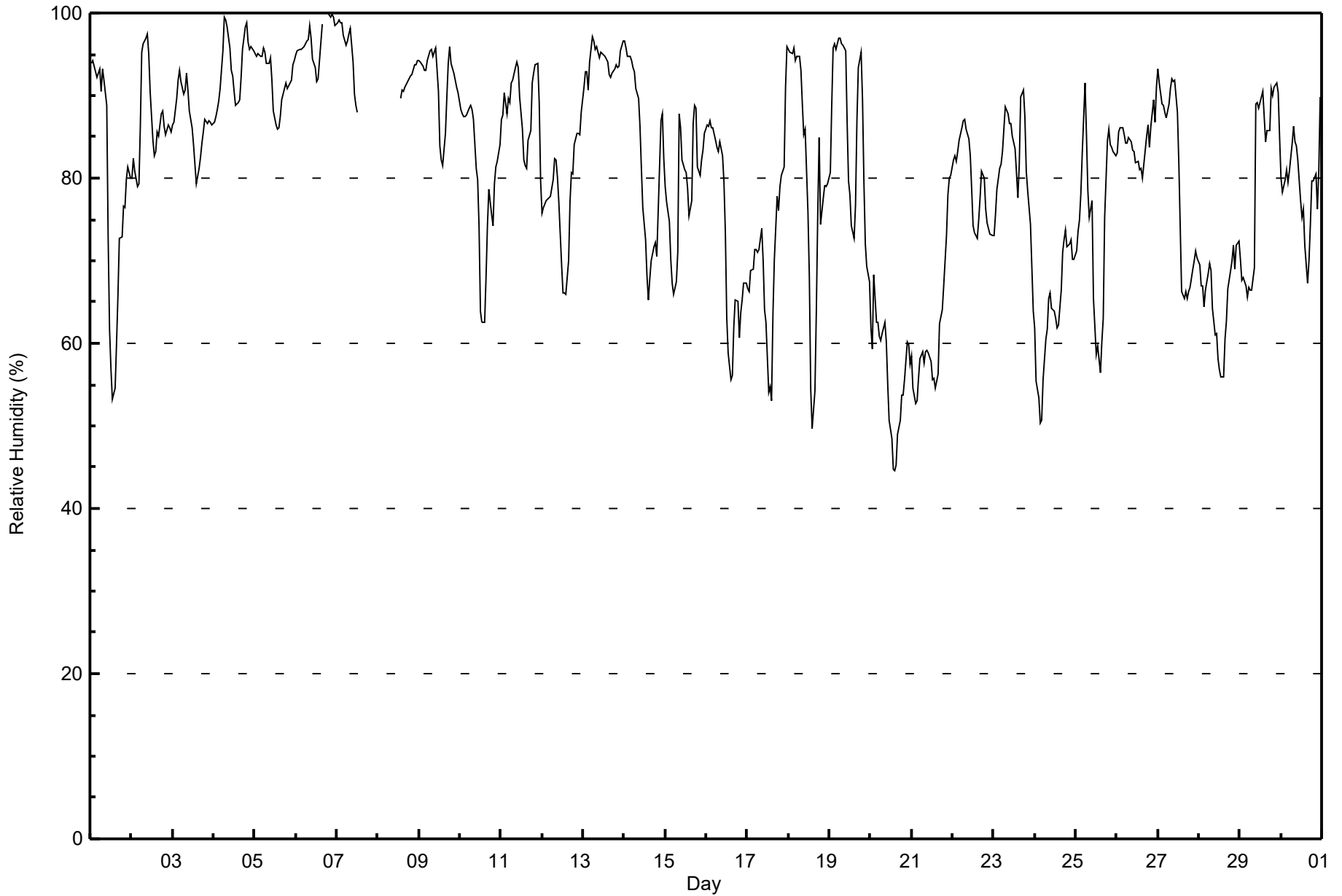
Total Number of Hours: 720



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

**Relative Humidity (RH) - %**  
**Anzac - November 2023**

Maximum Value: 100.0 % on Nov 6 20:00																						Maximum Daily Average: 96.4 % on Nov 6																						Hours in Service: 720			
Minimum Value: 44.5 % on Nov 20 15:00																						Minimum Daily Average: 56.2 % on Nov 20																						Hours of Data: 693			
Maximum Diurnal Average: 85.3 % at hour 9																						Minimum Diurnal Average: 71.2 % at hour 15																						Hours of Missing Data: 27			
Monthly Average: 80.60 %																						Percentiles: P <sub>1</sub> = 50.7 P <sub>10</sub> = 61.8 Q <sub>1</sub> = 71.3 Median = 83.3 Q <sub>3</sub> = 90.9 P <sub>90</sub> = 95.1 P <sub>99</sub> = 98.9																						Hours of Calibration: 0			
																						Percent Operational Time: 96.3																									
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																					
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																							
1-Nov	93.9	94.2	93.5	92.9	92.2	93.3	90.6	93.3	91.8	88.9	72.9	61.7	56.9	53.2	54.7	60.0	65.8	72.7	72.9	76.6	76.5	79.8	81.3	80.0	78.7	94.2																					
2-Nov	80.0	82.4	80.9	79.0	79.3	86.3	95.2	96.2	97.0	97.5	95.1	90.5	84.6	82.6	83.2	85.6	85.1	87.9	88.2	86.3	85.3	86.5	86.1	85.7	86.9	97.5																					
3-Nov	86.5	86.7	89.6	91.9	93.0	91.6	90.1	90.7	92.7	90.6	88.2	86.1	84.1	81.6	79.3	81.2	82.6	84.2	85.6	87.1	86.5	87.0	86.9	86.4	87.1	93.0																					
4-Nov	86.7	87.5	88.3	89.4	90.8	95.5	99.5	99.2	98.4	95.8	93.0	92.5	90.6	88.8	89.2	89.5	92.1	95.5	98.3	98.7	96.5	95.7	96.0	95.4	93.4	99.5																					
5-Nov	95.1	94.8	95.1	94.7	94.8	95.8	95.2	94.0	93.9	94.5	91.9	88.2	86.5	85.9	86.1	87.4	89.5	90.8	91.5	90.9	91.1	91.8	93.7	94.2	92.0	95.8																					
6-Nov	94.9	95.5	95.5	95.5	95.8	95.9	96.6	96.7	98.5	97.0	94.3	93.4	91.6	92.1	94.3	98.6	OR	OR	OR	100.0	99.6	99.9	99.4	98.5	96.4	100.0																					
7-Nov	98.9	99.1	98.8	98.8	97.2	96.0	96.6	97.5	98.2	94.0	90.2	88.8	88.0	M	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	--	99.1																					
8-Nov	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	M	89.6	90.6	90.5	91.1	91.7	92.0	92.4	92.6	93.7	93.7	94.2	--	94.2																					
9-Nov	94.2	94.1	93.6	93.1	93.0	94.2	95.4	95.7	94.7	95.3	95.8	90.6	83.9	82.1	81.6	85.5	89.8	93.9	95.9	93.9	92.7	91.8	91.1	90.4	91.8	95.9																					
10-Nov	88.3	87.8	87.5	87.4	87.6	88.5	88.8	88.2	87.1	81.1	79.8	74.2	63.9	62.6	62.5	68.0	74.3	78.7	75.6	74.2	79.3	81.4	82.1	84.1	79.7	88.8																					
11-Nov	87.1	87.7	90.3	87.8	89.7	89.2	91.6	91.9	93.4	94.1	93.5	89.8	85.9	82.1	81.5	81.2	84.7	85.8	91.4	92.7	93.8	94.0	89.2	79.7	88.7	94.1																					
12-Nov	75.8	76.5	77.3	77.5	77.6	77.7	79.9	82.3	82.3	80.1	77.1	69.5	66.1	66.1	66.0	70.1	77.1	80.7	80.5	84.0	85.4	85.5	85.3	88.1	77.9	88.1																					
13-Nov	91.0	92.9	92.8	90.6	94.0	97.1	96.6	95.7	95.9	94.6	95.2	95.1	94.9	94.8	94.1	92.6	92.2	92.7	93.2	93.7	93.5	93.5	95.4	96.7	94.1	97.1																					
14-Nov	96.7	95.8	94.8	94.8	94.3	93.4	92.8	90.8	89.7	86.2	81.2	76.4	72.5	68.1	65.3	67.7	70.0	71.7	72.1	70.6	76.0	86.9	87.7	82.4	82.4	96.7																					
15-Nov	79.1	77.2	74.7	70.2	67.3	65.9	67.4	71.1	87.8	86.0	82.2	81.1	80.7	78.9	75.4	77.2	86.6	88.8	88.4	81.4	80.4	82.2	83.4	85.5	79.1	88.8																					
16-Nov	86.5	86.3	86.9	86.0	86.1	84.5	83.7	83.3	84.4	82.7	79.5	73.4	63.0	58.7	55.5	56.1	61.8	65.2	65.1	60.7	63.7	65.3	67.3	67.3	73.0	86.9																					
17-Nov	66.6	66.2	68.7	69.1	71.4	71.3	71.1	71.3	73.9	70.0	64.1	62.6	54.1	54.7	53.1	63.6	70.2	77.9	76.1	79.0	80.4	81.3	91.1	95.9	71.0	95.9																					
18-Nov	95.7	95.2	95.1	95.8	94.2	94.7	94.8	93.0	89.1	85.2	85.9	76.0	68.1	54.3	49.7	54.2	63.9	75.6	85.0	74.3	77.7	79.1	79.0	79.4	80.6	95.8																					
19-Nov	80.7	88.8	95.8	96.3	95.6	96.9	96.9	96.3	96.0	95.4	86.9	79.6	77.9	74.3	72.8	76.8	87.0	93.5	95.2	89.5	79.5	72.1	69.4	67.5	85.8	96.9																					
20-Nov	61.8	59.3	68.4	62.5	62.6	60.8	60.3	61.1	62.5	60.1	55.1	50.7	48.4	44.7	44.5	45.3	48.9	50.7	53.8	53.8	55.6	60.2	59.9	57.4	56.2	68.4																					
21-Nov	58.5	54.6	52.7	53.1	55.8	58.1	58.9	57.7	59.0	59.1	58.9	57.8	55.7	55.7	54.5	56.3	62.3	63.2	64.1	66.9	73.0	77.9	79.9	80.3	61.4	80.3																					
22-Nov	82.2	82.6	82.1	83.2	84.6	86.1	87.0	87.1	85.9	84.8	82.7	78.6	74.2	73.4	72.8	75.0	77.6	80.9	80.0	76.3	74.6	73.9	73.3	73.0	79.7	87.1																					
23-Nov	73.0	75.5	78.7	81.1	81.6	83.3	86.0	88.6	87.7	86.6	86.7	85.2	83.6	80.8	77.6	81.7	89.9	90.7	87.5	80.8	78.4	74.4	69.2	63.9	81.4	90.7																					
24-Nov	61.8	55.4	53.3	50.4	50.7	55.5	60.5	61.7	65.5	66.2	64.3	63.9	63.0	61.8	62.1	66.4	71.0	72.5	73.8	71.8	72.0	72.6	70.2	70.2	64.0	73.8																					
25-Nov	71.1	73.5	75.0	78.2	83.1	91.5	85.3	78.4	75.3	77.3	65.4	62.1	58.7	59.6	56.4	60.1	63.0	75.2	84.6	86.0	84.1	83.7	83.2	82.7	74.7	91.5																					
26-Nov	83.0	85.6	86.1	86.1	85.2	84.2	84.3	84.9	84.5	83.5	83.3	81.9	82.1	81.0	81.2	80.0	81.8	85.1	86.4	83.8	86.2	89.4	86.8	91.1	84.5	91.1																					
27-Nov	93.2	91.5	88.9	88.9	87.9	87.3	89.0	90.8	92.0	91.8	91.9	88.0	81.9	74.1	66.3	65.4	66.3	65.4	66.2	66.7	69.0	70.0	71.2	70.3	79.7	93.2																					
28-Nov	69.4	67.0	66.9	64.4	66.4	68.4	69.7	68.8	64.3	61.0	61.3	58.1	56.8	56.0	55.9	60.6	62.6	66.5	68.8	70.1	71.9	69.0	71.9	72.3	65.3	72.3																					
29-Nov	70.1	67.7	68.0	67.0	65.5	66.8	66.4	66.4	69.2	89.0	89.1	88.4	89.9	90.6	87.5	84.4	85.7	85.8	90.9	89.9	91.1	91.6	90.4	85.0	80.7	91.6																					
30-Nov	80.0	78.4	79.8	81.0	79.5	80.9	84.2	86.3	84.4	83.9	82.1	77.2	75.3	76.2	71.9	67.3	69.9	74.4	79.6	79.7	80.4	76.3	80.8	89.9	79.1	89.9																					
																						82.1	82.1	82.7	82.3	82.7	83.8	84.6	84.8	85.3	84.6	81.6	78.0	74.6	72.6	71.2	73.4	76.5	79.9	81.5	81.1	81.6	82.3	82.6	82.3	Diurnal Average	
																						98.9	99.1	98.8	98.8	97.2	97.1	99.5	99.2	98.5	97.5	95.8	95.1	94.9	94.8	94.3	98.6	92.2	95.5	98.3	100.0	99.6	99.9	99.4	98.5	Diurnal Maximum	
M - Maintenance																						UO - Unstable Operation						OR - Out of Range																			







**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Relative Humidity (RH) - %  
Anzac - November 2023**

<b>Concentration Ranges (%)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	0	0.00	0.00
20 - 40	0	0.00	0.00
40 - 60	54	7.79	7.79
60 - 80	226	32.61	40.40
80 - 100	412	59.45	99.86

Total Number of Valid Hours: 693

Total Number of Hours: 720



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

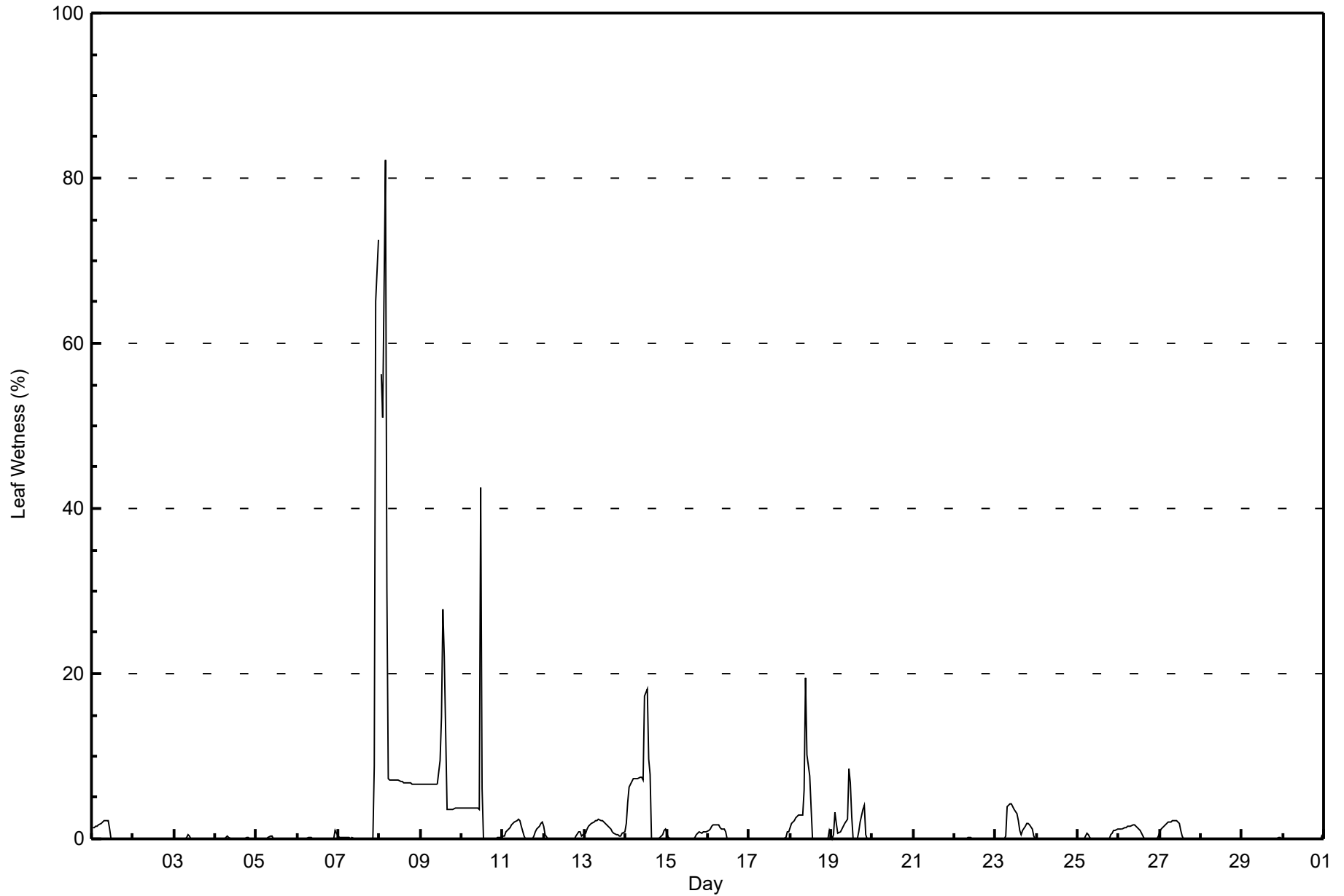
**Leaf Wetness (LW) - %**  
**Anzac - November 2023**

Maximum Value: 82.1 % on Nov 8 04:00      Maximum Daily Average: 15.3 % on Nov 8																				Hours in Service: 720 Hours of Data: 719 Hours of Missing Data: 1 Hours of Calibration: 0 Percent Operational Time: 99.9							
Minimum Value: 0.0 % on Nov 1 12:00      Minimum Daily Average: 0.0 % on Nov 2 Maximum Diurnal Average: 3.8 % at hour 4      Minimum Diurnal Average: 0.4 % at hour 16 Monthly Average: 1.67 %      Percentiles: P <sub>1</sub> = 0.0 P <sub>10</sub> = 0.0 Q <sub>1</sub> = 0.0 Median = 0.0 Q <sub>3</sub> = 1.2 P <sub>90</sub> = 3.7 P <sub>99</sub> = 26.8																											
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Nov	1.4	1.4	1.4	1.6	1.8	1.9	2.1	2.2	2.3	2.3	1.2	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	0.8	2.3	
2-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.5	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5
4-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.3	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.3
5-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.3	0.4	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4
6-Nov	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.1	1.0	0.6	0.1	1.0	1.0
7-Nov	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	8.9	65.0	72.6	6.2	72.6	
8-Nov	OR	56.3	51.0	82.1	30.4	7.2	7.2	7.2	7.2	7.1	7.1	7.0	7.0	6.9	6.8	6.8	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	15.3	82.1	
9-Nov	6.7	6.7	6.7	6.7	6.7	6.6	6.6	6.6	6.6	6.6	6.6	9.5	14.8	27.8	22.1	3.5	3.5	3.6	3.6	3.6	3.6	3.7	3.7	3.7	7.5	27.8	
10-Nov	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.6	42.6	6.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.2	0.2	3.8	42.6	
11-Nov	0.3	0.3	0.8	1.1	1.4	1.6	1.8	2.0	2.3	2.3	2.1	1.6	0.4	0.0	0.0	0.0	0.0	0.4	0.8	1.1	1.5	1.9	2.0	1.1	2.3	2.3	
12-Nov	1.5	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.9	0.8	0.3	0.6	0.2	1.5	
13-Nov	0.7	1.1	1.5	1.7	1.9	2.0	2.2	2.2	2.3	2.3	2.2	2.1	1.9	1.7	1.4	1.1	0.9	0.7	0.6	0.5	0.4	0.3	0.6	0.9	1.4	2.3	
14-Nov	1.8	4.4	6.3	7.0	7.4	7.4	7.3	7.4	7.4	7.4	7.1	17.2	18.1	9.6	7.7	0.0	0.1	0.1	0.1	0.0	0.2	0.5	0.9	1.1	5.3	18.1	
15-Nov	0.7	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.5	0.7	0.8	0.7	0.8	0.8	0.9	0.3	0.9	
16-Nov	1.0	1.2	1.5	1.7	1.8	1.7	1.6	1.4	1.2	1.2	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	1.8	
17-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.8	0.9	0.1	0.9	
18-Nov	1.4	1.9	2.2	2.5	2.7	2.8	3.0	3.0	5.9	19.4	10.1	7.6	3.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	2.8	19.4	19.4	
19-Nov	0.0	0.4	3.2	1.8	0.7	0.9	1.2	1.5	1.8	2.4	8.5	6.7	2.7	0.0	0.0	0.0	0.8	2.0	3.6	4.1	0.5	0.0	0.0	1.8	8.5	8.5	
20-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
21-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
22-Nov	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
23-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.4	3.9	4.3	4.2	3.9	3.5	3.0	2.2	1.0	0.6	1.0	1.5	1.9	1.9	1.7	1.2	0.4	0.0	1.5	4.3	
24-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25-Nov	0.0	0.0	0.0	0.0	0.0	0.7	0.6	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.4	0.7	0.9	1.1	1.2	0.2	1.2	
26-Nov	1.3	1.3	1.2	1.3	1.4	1.5	1.6	1.6	1.6	1.7	1.6	1.3	1.1	0.7	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.8	1.7	
27-Nov	0.8	1.2	1.5	1.7	1.9	2.0	2.1	2.2	2.3	2.3	2.2	1.8	1.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	2.3	
28-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
29-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.1	0.1
30-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.4	0.4
																								Diurnal Average			
																								Diurnal Maximum			
OR - Out of Range																											



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

**Leaf Wetness (LW) - %**  
**Anzac - November 2023**





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

**Leaf Wetness (LW) - %**  
**Anzac - November 2023**

<b>Concentration Ranges (%)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 0.3	472	65.65	65.65
0.4 - 0.5	16	2.23	67.87
0.6 - 0.7	16	2.23	70.10
0.8 - 1.4	52	7.23	77.33
1.5 - 10	145	20.17	97.50
> 10	14	1.95	99.44

Total Number of Valid Hours: 719

Total Number of Hours: 720



# Wood Buffalo Environmental Association

## Summary of Hour Averages

# Wind Speed (WS) - km/h

## Anzac - November 2023

Maximum Speed: 42 km/h on Nov 20 04:00	Maximum Daily Speed Average: 23.3 km/h on Nov 20	Hours in Service: 720
Minimum Speed Value: 0 km/h on Nov 15 17:00	Minimum Daily Speed Average: 1.9 km/h on Nov 26	Hours of Data: 720
Maximum Diurnal Speed Average: 5.6 km/h at hour 2	Minimum Diurnal Speed Average: 2.3 km/h at hour 17	Hours of Missing Data: 0
Monthly Average Velocity: 4.0 km/h 232.1 deg	Percentiles: P <sub>1</sub> = 2 P <sub>10</sub> = 5 Q <sub>1</sub> = 7 Median = 11 Q <sub>3</sub> = 15 P <sub>90</sub> = 20 P <sub>99</sub> = 30	Percent Operational Time: 100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	S6	SSW4	S5	S4	SSW5	S4	SSW4	SSE4	SSE4	SSE5	S4	WSW6	WSW8	WSW7	WSW7	SW3	S2	SW3	SSE5	NNW4	S2	S3	SSW5	WSW7	SSW3.6	WSW8
2-Nov	WSW7	WSW7	WSW8	WSW10	W13	WNW13	WNW12	WNW12	WNW12	WNW14	NW17	NW18	NW15	NW16	NW14	NW14	NW10	NNW7	NW8	NNW2	WSW1	NNW5	NNE5	E4	WNW8.6	NW18
3-Nov	E4	ESE7	ESE8	ESE11	SE10	ESE9	ESE7	ESE9	ESE10	ESE10	ESE8	ESE6	E5	E2	NNE8	NE6	NE4	NE5	NNE7	NNE8	NE6	NNE7	NE7	E5.5	ESE11	
4-Nov	NE6	ENE6	ENE6	ENE7	ENE8	E11	E11	E12	E11	E14	E14	E13	E13	E12	ENE16	ENE14	E16	E15	E18	ENE17	E16	E14	E14	ENE15	E12.3	E18
5-Nov	ENE14	ENE12	ENE12	ENE14	ENE13	ENE12	ENE11	E10	ENE11	ENE12	ENE11	ENE10	ENE11	ENE9	ENE8	ENE7	NE8	ENE8	E9	E8	E8	E8	E8	ESE10	ENE10.1	ENE14
6-Nov	E8	ESE10	ESE11	ESE13	ESE11	ESE11	ESE13	ESE13	ESE16	ESE14	ESE15	ESE16	ESE15	ESE15	ESE16	ESE14	ESE14	ESE11	ESE10	ESE8	ESE9	SE8	SE8	ESE8	ESE11.9	ESE16
7-Nov	SE7	SE5	SE4	SSE5	S5	SSW5	S4	SSE5	SE5	SE6	SE8	SSE8	S7	S6	SSW7	S5	S3	S7	SSW5	SW8	WSW9	WSW16	WSW15	WSW14	SSW5.3	WSW16
8-Nov	SW16	WSW18	WSW21	WSW21	WSW21	WSW19	WSW19	W18	WSW18	W18	W20	W20	W20	W20	W20	W20	W19	W17	W18	W16	W14	W12	W11	W10	W17.4	WSW21
9-Nov	W10	W10	W11	W10	W8	W6	WNW6	NW2	SSW5	SE3	SE10	ESE10	ESE11	E10	ESE12	ESE12	ESE10	ESE12	ESE12	ESE12	ESE12	ESE13	ESE8	ESE11	ESE4.1	ESE13
10-Nov	ESE13	ESE16	ESE15	ESE15	ESE13	E12	E14	ESE11	ESE12	ESE15	ESE12	SE12	SSE16	SSE15	SSE12	SSE12	SE12	SSE12	SSE16	S13	SE6	SE11	SE11	ESE12	SE11.8	ESE16
11-Nov	SE15	ESE11	ESE13	ESE10	E12	E16	E18	E18	E18	E18	ESE18	ESE21	ESE19	E13	ESE11	ESE11	ESE10	ESE8	SE8	ESE4	SSW3	SSW4	SW9	WSW12	ESE10.6	ESE21
12-Nov	WSW13	WSW14	WSW14	WSW16	WSW16	WSW16	WSW19	WSW16	WSW15	WSW15	WSW14	WSW16	WSW18	WSW17	WSW16	WSW18	WSW16	SW13	WSW14	WSW10	WSW9	WSW10	WSW11	W8	WSW14.3	WSW19
13-Nov	W9	WNW9	W5	W1	NNE4	NE6	ENE7	ENE8	ENE7	ENE8	ENE9	ENE10	NE11	NE11	NE13	NE14	NE9	NNE9	NNE10	N6	N4	WNW6	WNW6	WNW10	NNE5.0	NE14
14-Nov	W12	W12	W16	WSW17	WSW16	W16	WSW15	WSW12	WSW10	WSW13	SW13	SW14	SW14	SW12	SW14	SW9	SSW8	SW9	SW9	SW9	SW5	SSE6	SSE8	SSE9	WSW10.0	WSW17
15-Nov	SSE9	S7	S10	SSW9	SSW11	SW21	SW24	WSW20	WNW21	WNW17	WNW19	WNW17	W17	W16	WNW15	WNW5	ENE0	SSW3	WSW7	WSW10	W11	W12	W12	WSW8	WSW10.1	SW24
16-Nov	W6	SW5	SSE6	SSE6	SSE6	SE9	ESE10	ESE13	ESE13	ESE9	ESE9	SE8	SSE8	SSE7	SSE6	S7	SSE7	S8	SSW8	SW13	WSW14	WSW18	WSW17	SW18	S6.1	SW18
17-Nov	SW14	WSW23	WSW22	SW16	SW15	SW15	SW14	WSW17	WSW14	SW12	WSW13	WSW15	WSW14	SW10	SW13	SW9	SW7	SW10	WSW10	SW8	WSW7	WSW8	WSW4	SE7	SW12.0	WSW23
18-Nov	SE7	SE9	SE8	SE13	SE11	SE10	SE11	SSE10	S9	S8	SE6	SE8	SSE5	S11	SSW10	S8	SE8	SE8	SE9	SE10	SE8	ESE10	ESE6	ESE6	SE8.1	SE13
19-Nov	ESE8	SE5	SE8	ESE6	E4	ENE5	E2	NNE3	NNE3	N3	ENE2	W4	WNW9	WNW7	NW5	WNW7	NNE2	SE2	SW6	WSW8	WSW13	WSW22	WSW24	WSW23	WSW3.3	WSW24
20-Nov	WSW27	WSW26	WSW34	W42	W31	W36	W33	W35	W30	W29	W28	WSW24	W23	W25	W22	W19	W16	W14	W14	W14	W11	WSW11	WSW12	WSW10	W23.3	W42
21-Nov	W9	W10	NW8	NE3	ENE7	E8	E10	E9	E11	E13	ENE13	ENE14	ENE13	E11	ENE10	NE9	NNE8	N11	NNE11	N10	N8	NNW9	NNW11	NNW9	NE6.0	ENE14
22-Nov	NW10	NNW12	NNW10	NW9	NW10	NW8	NW7	WNW7	NW8	NW10	NW8	W5	NW4	NNW6	N4	NNW3	NNE4	NNE6	E6	ESE9	ESE10	ESE9	ESE10	ESE10	NNW3.4	NNW12
23-Nov	ESE11	ESE12	ESE10	ESE9	ESE12	ESE12	ESE12	ESE9	ESE7	ESE9	SE8	ESE7	ESE5	ESE5	SSE7	SSE5	SSE5	SSE9	S10	SSW12	SSW12	S12	SSW15	SSW19	SSE7.8	SSW19
24-Nov	SSW16	SSW20	SSW20	SW19	SW24	SW23	WSW19	SW17	WSW17	WSW18	WSW20	WSW20	WSW19	WSW17	WSW14	WSW13	SW10	SW10	WSW9	SW10	SW10	WSW13	WSW16	SW15	SW15.6	SW24
25-Nov	WSW17	WSW20	WSW22	W21	W20	WNW23	NW28	NW34	NW22	WNW19	WNW28	NW26	WNW24	WNW21	WNW21	WNW22	WNW17	NW13	NW10	WNW8	W5	WNW5	WSW3	S2	WNW16.7	NW34
26-Nov	SE6	SE7	ESE7	ESE7	E6	ENE7	E6	SE6	E2	NNW2	NNE3	SW4	SW5	SW3	SW5	WSW4	WSW6	W9	W8	SSE3	SSW7	SW13	SW10	N6	SSW1.9	SW13
27-Nov	E5	SE7	SSE5	SW5	SSE3	ESE5	ESE6	SE8	SE8	ESE8	SE9	SSE10	SE9	SSW10	SW15	SW16	SW17	SW20	WSW21	WSW22	WSW22	WSW21	WSW22	WSW20	SW8.2	WSW22
28-Nov	WSW21	WSW24	WSW21	WSW21	WSW22	WSW23	WSW20	WSW20	WSW24	WSW27	WSW23	WSW21	WSW19	WSW17	WSW16	WSW13	WSW15	WSW15	WSW15	WSW13	WSW10	WSW11	WSW18	WSW19	WSW18.7	WSW27
29-Nov	W18	W21	W18	W17	WSW19	WSW15	W15	W13	W15	W16	W16	W15	WSW15	WSW17	WSW17	W15	W16	W17	W16	W17	W16	W16	W15	W17	W16.3	W21
30-Nov	WNW17	W17	W15	W13	W13	W11	WSW9	WSW10	W10	WSW10	WSW12	W11	WSW11	W10	W12	W11	W8	WSW5	SW5	WSW6	SW4	SSW4	SE6	S6	W9.0	W17

SW4.8	SW5.6	SW5.5	SW5.4	SW4.8	SW4.1	SW3.7	SW3.4	SW2.9	SW3.1	WSW2.8	SW3.4	SW3.9	WSW4.1	WSW4.2	WSW3.4	WSW2.3	SW2.8	SW3.4	SW3.9	SW3.9	SW5.0	SW5.4	SW4.8	Diurnal Average	
WSW27	WSW26	WSW34	W42	W31	W36	W33	W35	W30	W29	WNW28	WNW26	WNW24	W25	W22	WNW22	W19	SW20	WSW21	WSW22	WSW22	WSW22	WSW24	WSW23	Diurnal Maximum	

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



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

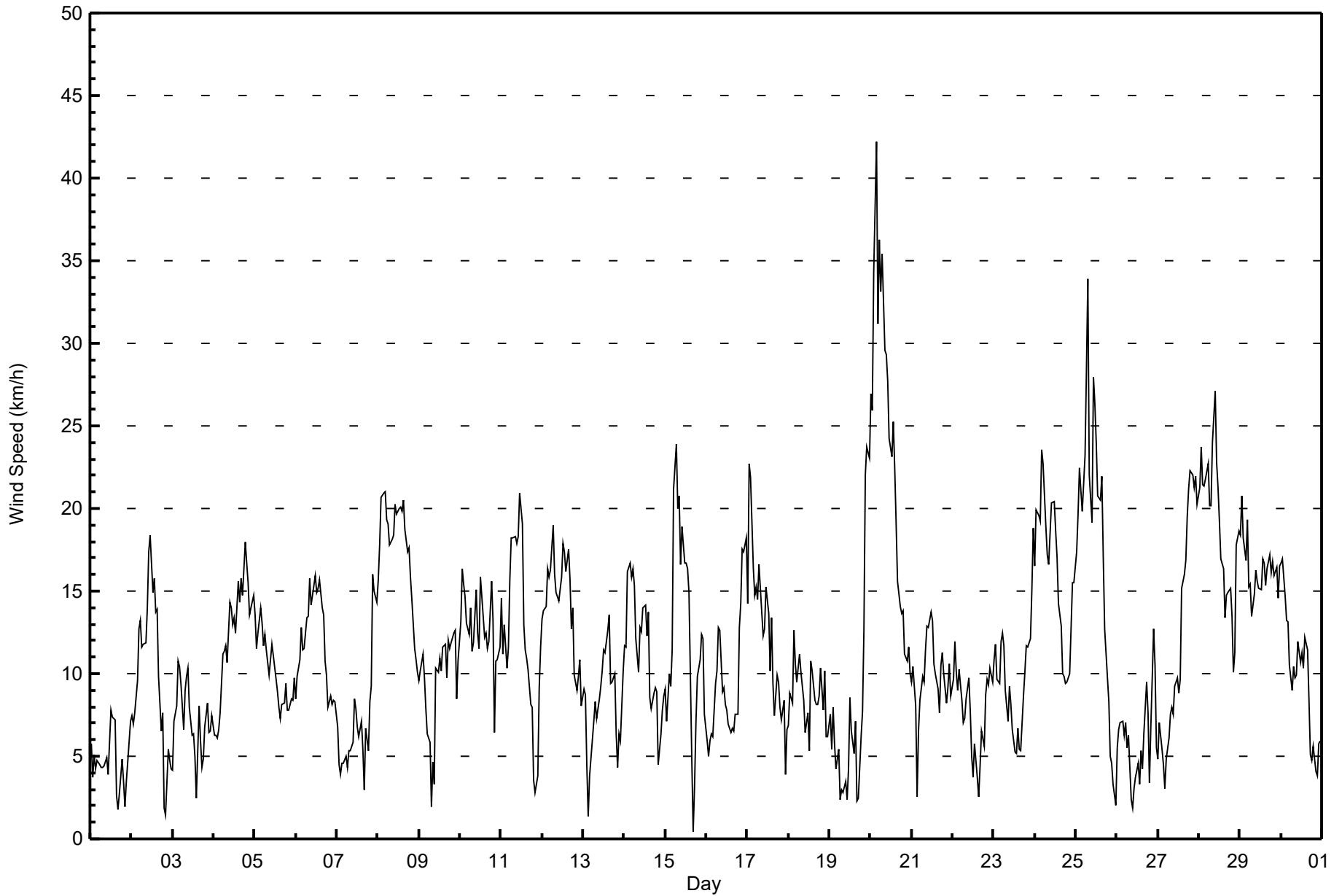
**Wind Speed (WS) - km/h**  
**Anzac - November 2023**

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



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

**Wind Speed (WS) - km/h**  
**Anzac - November 2023**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h  
Anzac - November 2023**

<b>Wind Speed Ranges (km/h)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	100	13.89	13.89
6 - 11	298	41.39	55.28
12 - 19	248	34.44	89.72
20 - 28	65	9.03	98.75
29 - 38	8	1.11	99.86
> 38	1	0.14	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720





**Wood Buffalo Environmental Association  
Frequency Distribution**

**Wind Speed (WS) - km/h  
Anzac - November 2023**

<b>Wind Speed Ranges (km/h)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	3	7	3	3	8	4	6	12	12	11	11	5	5	2	3	5	100
6 - 11	5	9	10	21	19	58	37	17	13	8	16	34	23	10	12	6	298
12 - 19	0	0	2	16	21	37	4	6	2	5	23	67	45	12	7	1	248
20 - 28	0	0	0	0	0	1	0	0	0	2	5	34	13	8	2	0	65
29 - 38	0	0	0	0	0	0	0	0	0	0	0	1	6	0	1	0	8
> 38	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
<b>Totals</b>	8	16	15	40	48	100	47	35	27	26	55	141	93	32	25	12	720

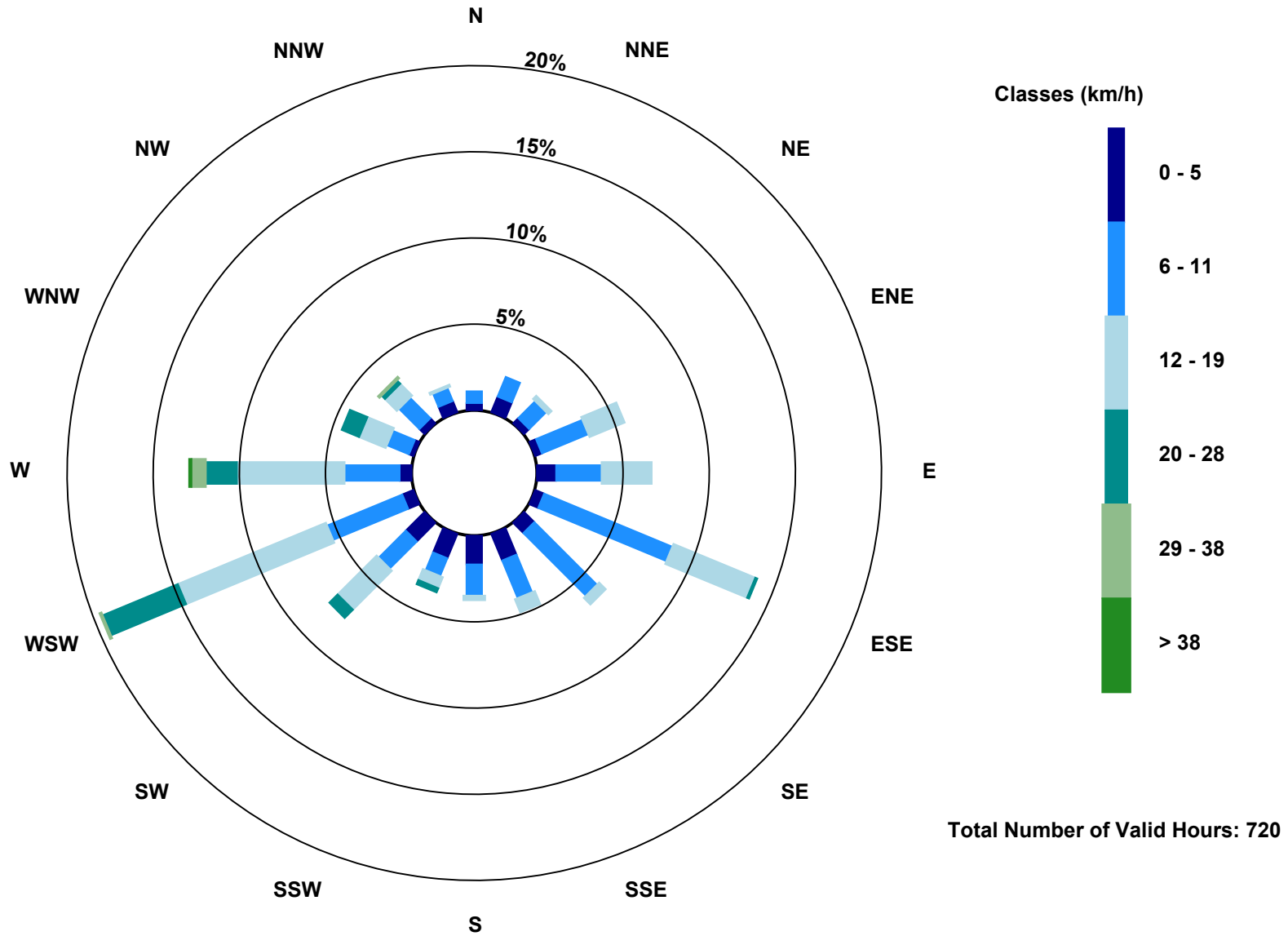
Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 2023

Wind Speed (WS) - km/h  
Anzac





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

**Wind Direction (WD) - deg**  
**Anzac - November 2023**

Direction of Maximum Speed: 263 deg on Nov 20 04:00	Hours in Service: 720
Direction of Maximum Daily Speed Average: 263.0 deg on Nov 20	Hours of Data: 720
Direction of Minimum Speed: 58 deg on Nov 15 17:00	Hours of Missing Data: 0
Direction of Minimum Daily Speed Average: 1.9 deg on Nov 26	Percent Operational Time: 100.0
Monthly Average Direction: 232.1 deg	

Day	Hourly Period Ending At (MST)																								Daily Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Nov	169	196	173	176	194	186	203	155	165	156	190	239	243	251	239	231	171	216	151	347	187	182	205	255	203.5
2-Nov	252	244	245	253	267	289	286	288	287	303	315	314	313	310	321	316	326	345	324	332	246	345	22	93	301.3
3-Nov	97	113	113	121	125	123	110	117	118	121	121	112	118	99	86	19	36	49	38	33	29	41	31	36	90.4
4-Nov	54	57	72	69	78	79	89	86	88	88	86	85	82	85	69	67	79	81	80	77	80	81	81	76	79.2
5-Nov	74	73	74	74	76	68	72	75	80	76	72	77	75	77	72	67	52	73	85	92	87	90	99	107	77.1
6-Nov	97	107	104	107	102	105	110	114	114	109	108	109	107	113	110	115	114	114	110	113	121	127	125	119	111.1
7-Nov	130	143	136	156	185	192	173	147	131	134	138	149	169	188	195	185	170	191	203	222	239	245	244	242	191.9
8-Nov	235	241	242	254	255	255	255	259	257	264	274	272	271	273	272	275	270	270	270	270	272	272	272	265	262.9
9-Nov	266	272	277	275	273	281	282	315	195	142	125	109	104	94	106	102	103	107	107	114	118	119	118	113	122.8
10-Nov	117	119	119	117	107	87	92	102	105	110	114	125	157	147	147	147	145	147	167	181	145	138	130	121	128.3
11-Nov	125	118	121	106	95	98	99	93	97	98	105	108	110	100	106	107	119	121	138	123	207	203	235	239	112.0
12-Nov	243	245	245	246	240	240	250	252	244	248	244	239	247	251	246	244	240	234	242	248	253	255	257	259	245.7
13-Nov	266	298	271	278	30	55	67	69	76	68	67	69	54	50	53	46	35	30	31	10	349	294	283	288	32.1
14-Nov	277	270	263	258	257	259	255	244	241	241	231	228	219	215	218	222	209	220	227	232	216	153	151	153	235.6
15-Nov	158	180	173	194	212	220	225	256	297	287	284	283	278	272	283	286	58	208	243	254	263	271	268	257	254.9
16-Nov	262	236	155	167	153	137	122	118	116	118	118	129	158	167	156	185	153	169	199	230	244	241	240	235	181.1
17-Nov	234	240	241	232	221	228	227	237	246	232	246	250	240	230	222	216	233	236	238	228	243	254	244	143	234.2
18-Nov	124	134	129	137	136	128	139	161	172	174	144	136	157	188	199	173	136	145	140	141	132	114	122	111	145.2
19-Nov	122	125	134	114	87	77	88	29	30	4	71	278	289	294	319	299	14	137	227	253	242	246	239	240	243.0
20-Nov	240	243	258	263	265	264	270	264	261	259	264	258	262	276	272	276	275	279	280	279	272	249	247	246	263.0
21-Nov	259	274	307	38	75	83	94	94	83	83	73	57	67	80	70	55	20	2	14	10	350	332	341	343	40.0
22-Nov	325	327	334	319	312	312	306	303	316	317	325	279	314	335	351	336	14	28	98	116	119	114	117	110	342.8
23-Nov	112	116	110	107	115	114	122	123	114	120	132	121	119	120	163	168	151	165	175	192	194	191	200	209	147.5
24-Nov	197	206	210	217	227	236	243	232	245	246	250	252	256	256	243	231	236	241	229	236	238	239	236	236	235.1
25-Nov	244	252	257	263	273	295	311	316	315	291	301	304	303	299	293	293	296	313	304	286	281	290	249	187	291.4
26-Nov	134	125	113	113	89	77	88	132	83	340	19	217	233	230	233	250	252	267	262	167	208	229	234	354	195.4
27-Nov	95	132	166	220	147	102	116	126	129	122	131	150	143	199	219	225	229	232	243	246	249	248	248	250	215.7
28-Nov	251	249	254	253	252	250	253	253	246	246	251	250	245	248	252	248	243	248	246	249	239	237	249	255	249.1
29-Nov	261	260	261	259	255	256	262	263	267	261	262	262	251	250	256	261	261	264	262	271	276	272	271	270	262.1
30-Nov	282	275	270	269	273	262	256	258	271	254	256	264	254	269	271	278	276	243	230	244	227	206	142	187	261.4

222.2 228.0 227.0 228.3 229.6 232.7 232.1 233.8 233.6 228.9 238.1 236.2 234.4 242.7 242.3 249.4 236.4 227.2 225.0 231.8 233.3 232.1 230.6 227.0  
 Diurnal Average

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



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

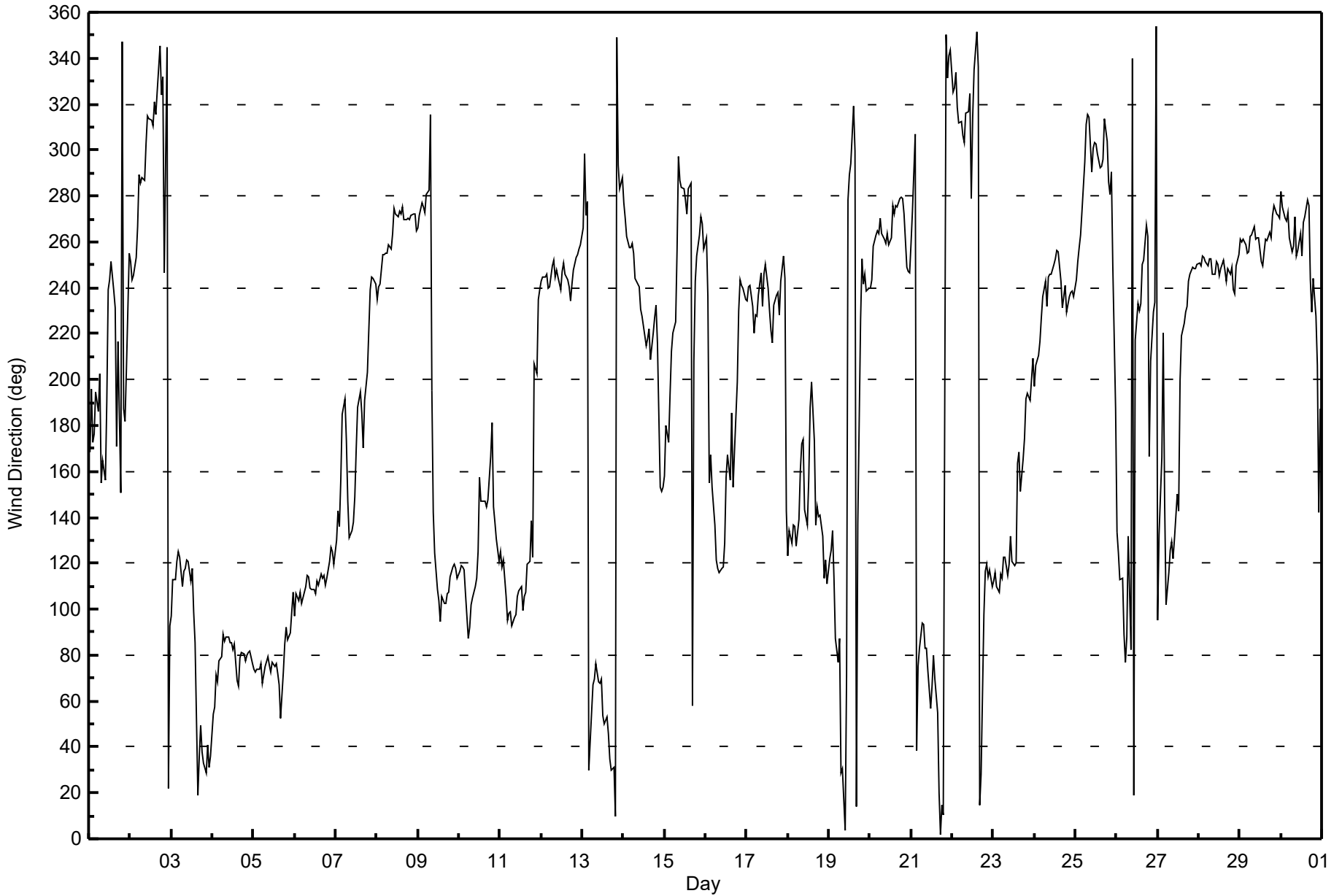
**Wind Direction (WD) - deg**  
**Anzac - November 2023**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 83 deg on Nov 26 10:00 Minimum Value: 5 deg on Nov 18 20:00 Percentiles: P <sub>1</sub> = 8 P <sub>10</sub> = 12 Q <sub>1</sub> = 14 Median = 16 Q <sub>3</sub> = 18 P <sub>90</sub> = 24 P <sub>99</sub> = 72																			Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0						
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Nov	8	13	14	15	17	25	18	16	16	10	40	23	16	18	18	48	52	31	12	72	72	26	20	15	72
2-Nov	12	15	14	15	15	14	14	14	13	15	12	12	15	16	17	13	18	19	16	72	81	18	28	26	81
3-Nov	31	14	16	11	12	13	15	11	11	11	12	18	14	19	55	13	17	16	16	11	12	13	17	13	55
4-Nov	15	18	18	17	16	15	15	15	16	14	15	16	16	17	14	14	15	17	15	15	14	14	14	15	18
5-Nov	16	15	14	14	13	14	13	14	14	14	15	15	16	16	16	20	15	14	15	17	15	16	14	14	20
6-Nov	14	15	14	13	14	13	12	13	12	14	14	14	15	14	15	13	13	14	14	14	12	11	9	9	15
7-Nov	9	13	12	23	19	21	15	14	11	15	15	16	23	34	15	15	18	16	20	19	19	16	16	15	34
8-Nov	18	17	16	18	16	16	16	16	15	16	16	15	15	15	16	15	14	15	16	15	15	14	14	14	18
9-Nov	14	14	15	16	20	24	25	79	32	71	14	17	15	16	14	15	14	13	14	11	10	9	18	12	79
10-Nov	11	9	11	12	15	11	14	12	13	13	14	25	20	20	18	11	11	14	14	18	23	7	8	10	25
11-Nov	8	9	8	13	11	14	14	15	15	14	14	13	12	16	16	16	10	13	9	24	58	32	15	13	58
12-Nov	15	16	16	17	16	16	16	17	15	17	16	17	17	17	17	15	16	18	17	15	15	15	16	19	19
13-Nov	12	18	24	67	34	17	16	16	16	18	17	19	29	26	17	15	17	13	16	33	32	18	15	13	67
14-Nov	17	17	16	16	16	16	18	16	14	14	16	17	17	19	14	18	19	12	16	16	39	14	9	12	39
15-Nov	13	16	15	19	18	15	16	34	15	13	14	16	16	18	18	27	81	29	17	16	16	14	14	16	81
16-Nov	21	22	21	18	18	6	12	10	10	14	14	15	24	20	29	20	14	16	16	17	18	16	15	17	29
17-Nov	18	18	16	17	14	17	19	16	15	18	21	18	19	18	15	15	23	10	14	13	16	9	27	15	27
18-Nov	10	7	8	14	6	6	9	19	19	15	14	14	38	18	17	13	12	7	8	5	18	37	36	12	38
19-Nov	45	19	9	12	21	24	79	32	32	33	51	72	15	19	20	13	47	31	17	18	15	17	17	18	79
20-Nov	16	17	19	16	18	17	16	15	17	17	17	18	20	16	16	15	15	14	13	14	18	15	15	15	20
21-Nov	14	15	18	60	13	17	14	20	16	18	15	17	17	16	21	17	23	16	17	17	17	14	14	14	60
22-Nov	15	13	14	12	12	12	11	12	13	12	16	44	54	22	28	22	17	12	19	12	12	13	12	13	54
23-Nov	13	11	12	13	12	12	12	12	18	13	14	13	15	14	29	16	12	11	15	14	16	16	16	18	29
24-Nov	17	16	15	17	17	16	16	17	17	16	15	16	15	16	16	15	14	20	16	17	17	18	18	16	20
25-Nov	19	16	16	15	15	14	13	13	14	13	14	14	14	14	13	12	12	9	14	11	26	37	29	69	69
26-Nov	11	13	14	13	14	15	26	9	79	83	77	43	26	25	23	35	26	16	19	42	11	16	19	42	83
27-Nov	50	12	15	16	26	13	12	9	9	10	10	13	10	27	15	15	16	16	17	17	16	17	16	17	50
28-Nov	17	16	16	16	17	18	18	18	19	18	18	17	18	17	16	17	16	15	15	16	16	16	18	16	19
29-Nov	16	16	16	17	16	18	18	16	14	15	16	17	17	17	16	16	16	16	16	15	16	16	15	15	18
30-Nov	14	15	15	15	15	16	18	14	15	19	16	18	17	19	20	15	18	23	20	16	22	41	10	12	41
																			50 22 24 67 34 25 79 79 79 83 77 72 54 34 55 48 81 31 20 72 81 41 36 69						
Diurnal Maximum																									



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

**Wind Direction (WD) - deg**  
**Anzac - November 2023**





## WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY  
MONITORING PROGRAM  
MONTHLY REPORT

**AMS17  
WAPASU  
NOVEMBER 2023**

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

December 22, 2023

## WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - WAPASU (AMS17)

NOVEMBER 2023

## MONTHLY SUMMARY

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2 (ppb) Average	687	32	33	99.86	29.2	0	9.5	0
H2S (ppb) Average	684	35	36	99.86	0.7	0	0.3	0
THC (ppm) Average	687	32	33	99.86	3	-	2.5	-
O3 (ppb) Average	686	33	34	99.86	39.7	0	34.1	-
NO2 (ppb) Average	685	35	35	100	31	0	10.6	-
NO (ppb) Average	685	35	35	100	24.8	-	4	-
NOX (ppb) Average	685	35	35	100	46.4	-	12.5	-
PM2.5 (ug/m3) Average	717	2	3	99.86	20.7	0	13.4	0
Temperature 2 m (C) Average	720	0	0	100	5.4	-	2.4	-
Relative Humidity (%) Average	720	0	0	100	100	-	98.5	-
Wind Speed 10 m (km/h) Average	718	0	2	99.72	24	-	15	-
Wind Direction 10 m (deg) Average	718	0	2	99.72	-	-	-	-
Precipitation (mm) Total	720	0	0	100	1.2	-	14	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - WAPASU (AMS17)  
 NOVEMBER 2023

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile						
					Min	P10	Q1	Median	Q3	P90	Max
SO2 (ppb) Average	687	1.23	3.4	-	0	0	0	0	0.6	3.5	29.2
H2S (ppb) Average	684	0.16	0.1	-	0	0	0.1	0.1	0.2	0.3	0.7
THC (ppm) Average	687	2.32	0.1	-	2.2	2.3	2.3	2.3	2.3	2.4	3
O3 (ppb) Average	686	24.39	7.7	-	2.5	13.2	19.7	25.5	30.4	33.6	39.7
NO2 (ppb) Average	685	3.89	4	-	0.1	0.4	1.1	2.5	5.6	9.4	31
NO (ppb) Average	685	0.46	1.6	-	0	0	0	0.1	0.2	0.9	24.8
NOX (ppb) Average	685	4.35	5	-	0.1	0.4	1.1	2.7	5.8	10.2	46.4
PM2.5 (ug/m3) Average	717	5.13	3.1	-	0.5	2.1	3.2	4.5	6.1	9.1	20.7
Temperature 2 m (C) Average	720	-4.81	4.8	-	-23.5	-11.1	-7.3	-4.4	-1.5	0.6	5.4
Relative Humidity (%) Average	720	87.23	8.4	-	49.9	77.3	83.2	88.1	93.2	97.2	100
Wind Speed 10 m (km/h) Average	718	8.8	4	-	1	4	6	8	12	14	24
Wind Direction 10 m (deg) Average	718	-	-	-	-	-	-	-	-	-	-
Precipitation (mm) Total	720	-	-	26.68	-	-	-	-	-	-	-



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - WAPASU (AMS17)  
NOVEMBER 2023

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
SO2, H2S, THC, O3	21 Nov 2023 15:00	21 Nov 2023 15:00	1	Maintenance - sample manifold cleaned
PM2.5	30 Nov 2023 10:00	30 Nov 2023 10:00	1	Maintenance - firmware update
Wind Speed, Wind Direction	02 Nov 2023 03:00	02 Nov 2023 04:00	2	Flat line in sensor output signal



# Wood Buffalo Environmental Association

## Summary of Hour Averages

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

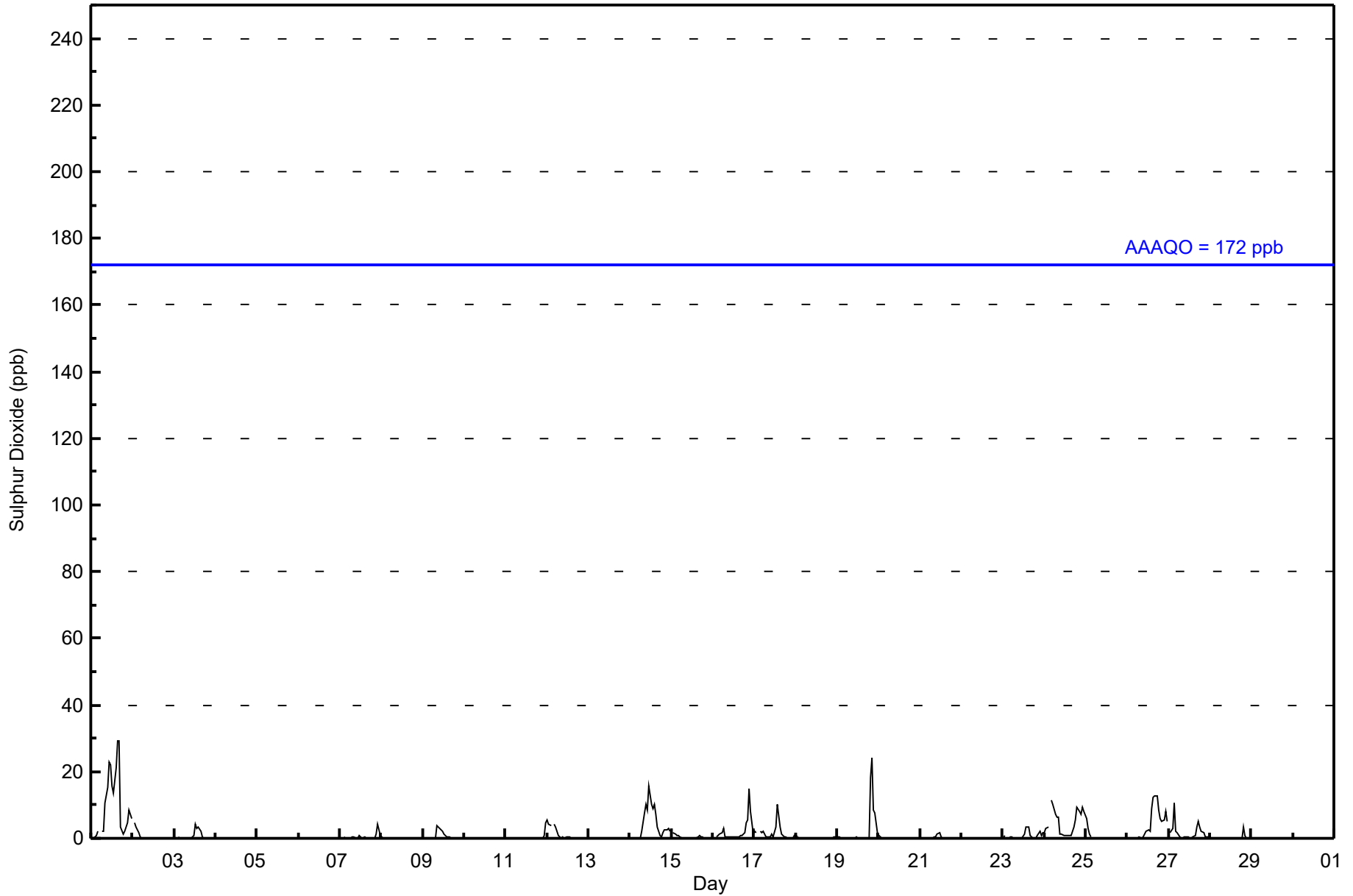
## Wapasu - November 2023

Number of Exceedences (AAAQO):		1-hr: 0		24-hr: 0		Hours in Service:		720																																								
Maximum Value: 29.2 ppb on Nov 1 16:00		Maximum Daily Average: 9.5 ppb on Nov 1				Hours of Data:		687																																								
Minimum Value: 0.0 ppb on Nov 1 01:00		Minimum Daily Average: 0.0 ppb on Nov 4				Hours of Missing Data:		33																																								
Maximum Diurnal Average: 2.0 ppb at hour 16		Minimum Diurnal Average: 0.4 ppb at hour 8				Hours of Calibration:		32																																								
Monthly Average: 1.23 ppb		Percentiles: P <sub>1</sub> = 0.0 P <sub>10</sub> = 0.0 Q <sub>1</sub> = 0.0 Median = 0.0 Q <sub>3</sub> = 0.6 P <sub>90</sub> = 3.5 P <sub>99</sub> = 16.0				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-Nov	0.0	0.0	0.2	0.9	2.1	Z	2.0	2.3	10.7	15.3	23.1	22.2	15.7	13.7	21.3	29.2	29.1	3.3	1.4	2.2	3.4	4.6	8.7	6.0	9.5	29.2																						
2-Nov	Z	4.5	3.3	1.9	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	0.4	4.5																						
3-Nov	0.0	Z	0.2	0.0	0.1	0.1	0.1	0.0	0.1	0.1	0.1	0.7	4.3	2.9	3.3	1.9	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	4.3																						
4-Nov	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0																						
5-Nov	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0																						
6-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	C	C	C	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0																						
7-Nov	0.0	0.0	0.0	0.6	Z	0.1	0.2	0.3	0.2	0.0	0.1	0.7	0.5	0.2	0.3	0.1	0.0	0.0	0.0	0.0	0.2	1.4	4.2	1.0	0.4	4.2																						
8-Nov	0.2	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2																						
9-Nov	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.9	3.3	2.9	2.0	1.1	0.8	0.5	0.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	3.9																						
10-Nov	0.0	Z	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.1	0.0	0.1	0.0	0.1	0.1	0.0	0.0	0.0	0.1	0.1	0.0	0.1	0.1	0.0	0.1																						
11-Nov	0.2	0.2	Z	0.2	0.2	0.2	0.2	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	0.7	4.5	0.3	4.5																						
12-Nov	5.5	4.2	3.9	Z	4.3	3.5	1.0	0.3	0.2	0.2	0.1	0.4	0.6	0.4	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	1.1	5.5																						
13-Nov	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0																						
14-Nov	0.0	0.0	0.0	0.0	0.0	Z	0.0	2.0	7.5	10.1	8.4	15.6	10.1	8.9	10.3	7.1	3.5	0.8	0.6	1.7	2.6	2.5	2.8	2.0	4.2	15.6																						
15-Nov	Z	1.8	1.2	0.9	0.7	0.3	0.2	0.1	0.0	0.1	0.1	0.1	0.0	0.1	0.1	0.2	0.9	0.6	0.6	0.2	0.1	0.1	0.0	0.1	0.4	1.8																						
16-Nov	0.1	Z	0.4	0.9	1.2	1.6	2.8	0.6	0.3	0.2	0.4	0.4	0.5	0.3	0.4	0.3	0.8	0.8	1.5	4.8	5.6	15.0	7.9	1.3	2.1	15.0																						
17-Nov	2.0	1.5	Z	2.2	1.6	1.9	1.4	0.6	0.3	0.6	1.2	0.3	3.2	10.1	6.9	3.5	1.4	0.5	0.2	0.0	0.0	0.1	0.0	0.7	1.7	10.1																						
18-Nov	1.2	0.3	0.0	Z	0.1	0.0	0.2	0.1	0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.2	0.3	0.4	0.1	1.2																						
19-Nov	0.4	0.3	0.2	0.2	Z	0.0	0.0	0.0	0.0	0.0	0.2	0.6	0.1	0.2	0.1	0.2	0.1	0.0	0.2	18.0	24.1	8.5	7.8	1.4	2.7	24.1																						
20-Nov	0.7	0.4	0.2	0.1	0.1	Z	0.0	0.1	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.7																						
21-Nov	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.6	1.1	1.8	0.5	0.0	M	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	1.8																						
22-Nov	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0																						
23-Nov	0.2	0.7	Z	0.1	0.4	0.2	0.1	0.1	0.1	0.1	0.1	0.2	1.2	3.5	3.3	3.6	0.9	0.0	0.0	0.0	1.0	2.1	0.7	1.5	0.9	3.6																						
24-Nov	1.8	2.9	3.5	Z	11.3	10.1	7.2	6.3	6.5	1.4	1.4	1.0	0.7	0.9	0.9	0.7	2.3	3.3	5.4	9.3	8.1	7.0	9.1	7.9	4.7	11.3																						
25-Nov	5.8	3.0	1.4	0.3	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	5.8																						
26-Nov	0.0	0.0	0.0	0.0	0.0	Z	0.2	0.3	0.2	0.6	1.1	2.3	2.6	2.1	8.7	12.3	12.9	12.8	8.3	6.1	5.1	5.4	8.0	4.9	4.1	12.9																						
27-Nov	Z	1.9	2.9	10.8	2.0	1.5	0.2	0.1	0.1	0.3	0.3	0.2	0.2	0.1	0.3	0.7	3.6	5.1	3.5	2.1	1.7	0.5	0.4	0.6	1.7	10.8																						
28-Nov	0.5	Z	0.2	0.1	0.1	0.1	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.2	0.1	3.2	0.6	0.2	0.2	0.2	0.3	3.2																						
29-Nov	0.1	0.0	Z	0.0	0.1	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1																						
30-Nov	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0																						
																								0.7	0.9	0.7	0.8	1.0	0.8	0.5	0.4	1.0	1.1	1.4	1.7	1.4	1.5	2.0	2.0	1.9	0.9	0.7	1.6	1.8	1.6	1.7	1.1	Diurnal Average
																								5.8	4.5	3.9	10.8	11.3	10.1	7.2	6.3	10.7	15.3	23.1	22.2	15.7	13.7	21.3	29.2	29.1	12.8	8.3	18.0	24.1	15.0	9.1	7.9	Diurnal Maximum
Z - zerospan      C - Calibration      M - Maintenance																																																
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 172 ppb      24-hr 48 ppb																																																



Wood Buffalo Environmental Association  
Hourly Averages

Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Wapasu - November 2023





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

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Wapasu - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 10	669	97.38	97.38
11 - 20	12	1.75	99.13
21 - 60	6	0.87	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 687

Total Number of Hours: 720



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

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Wapasu - November 2023**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	41	18	13	8	21	27	61	109	106	51	74	23	21	25	22	47	667
11 - 20	0	0	0	0	0	0	0	2	3	4	3	0	0	0	0	0	12
21 - 60	0	0	0	0	0	0	0	0	1	3	2	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
<b>Totals</b>	41	18	13	8	21	27	61	111	110	58	79	23	21	25	22	47	685

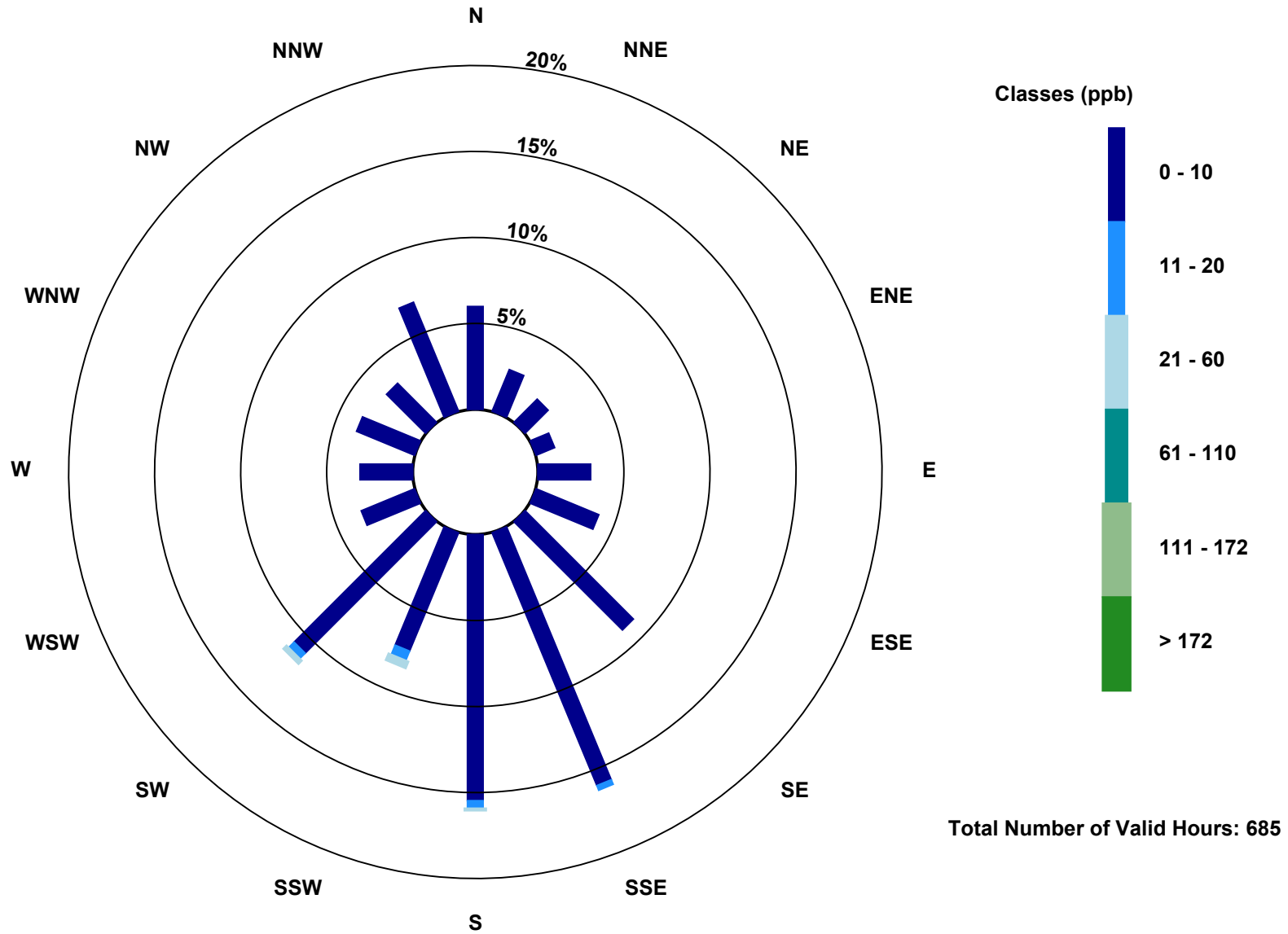
Total Number of Valid Hours: 685

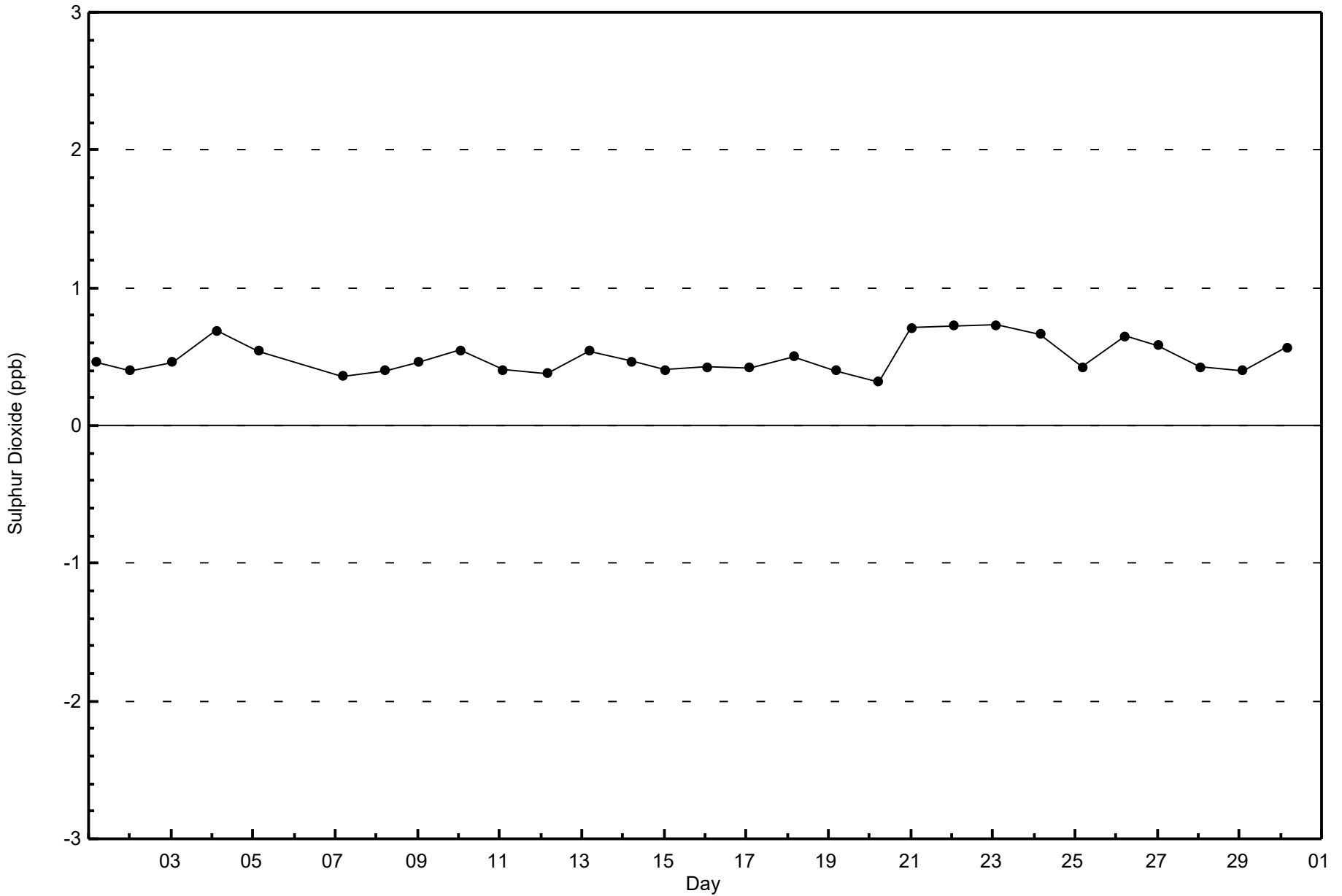
Total Number of Hours: 720

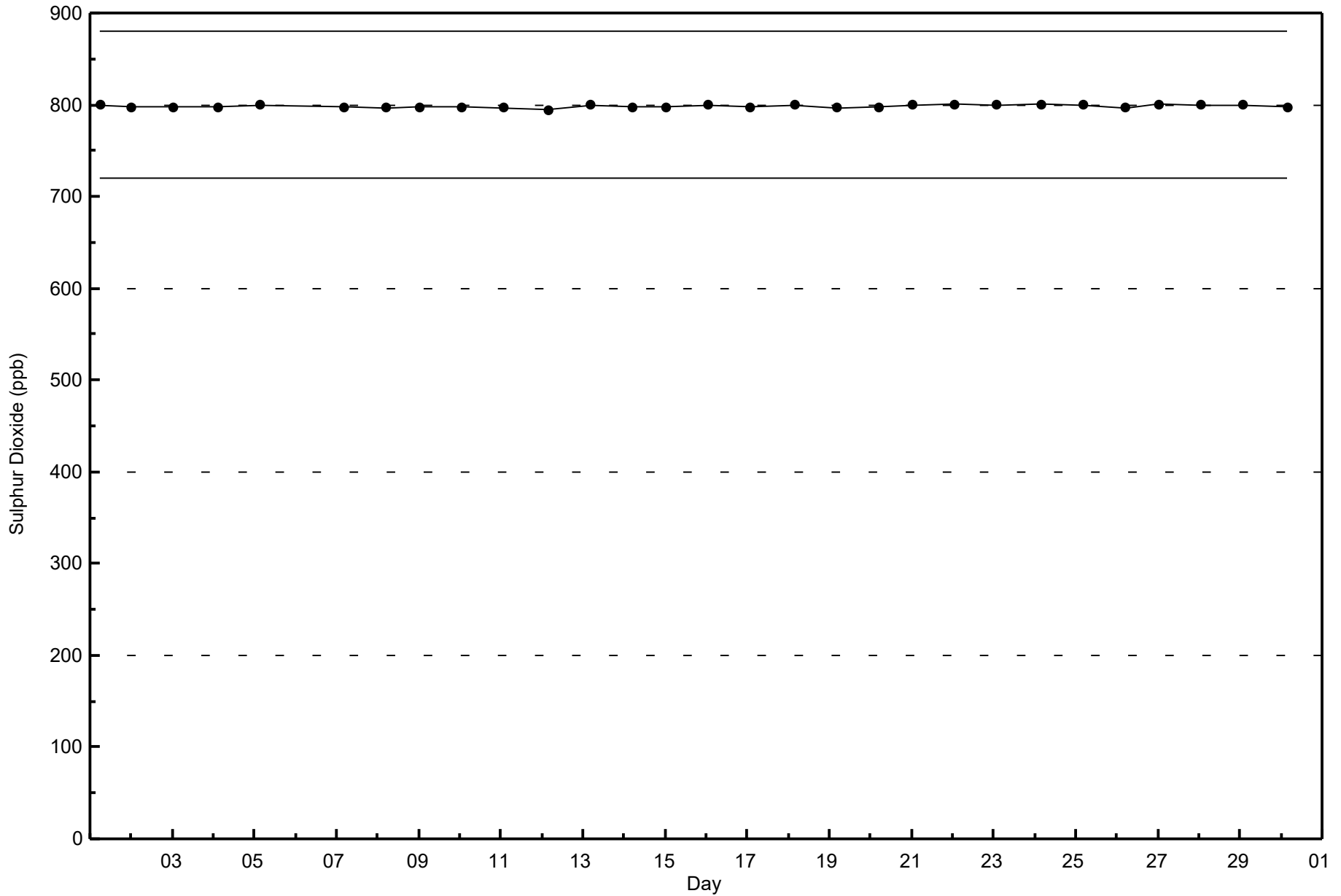


Wood Buffalo Environmental Association  
Wind Rose Nov 2023

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

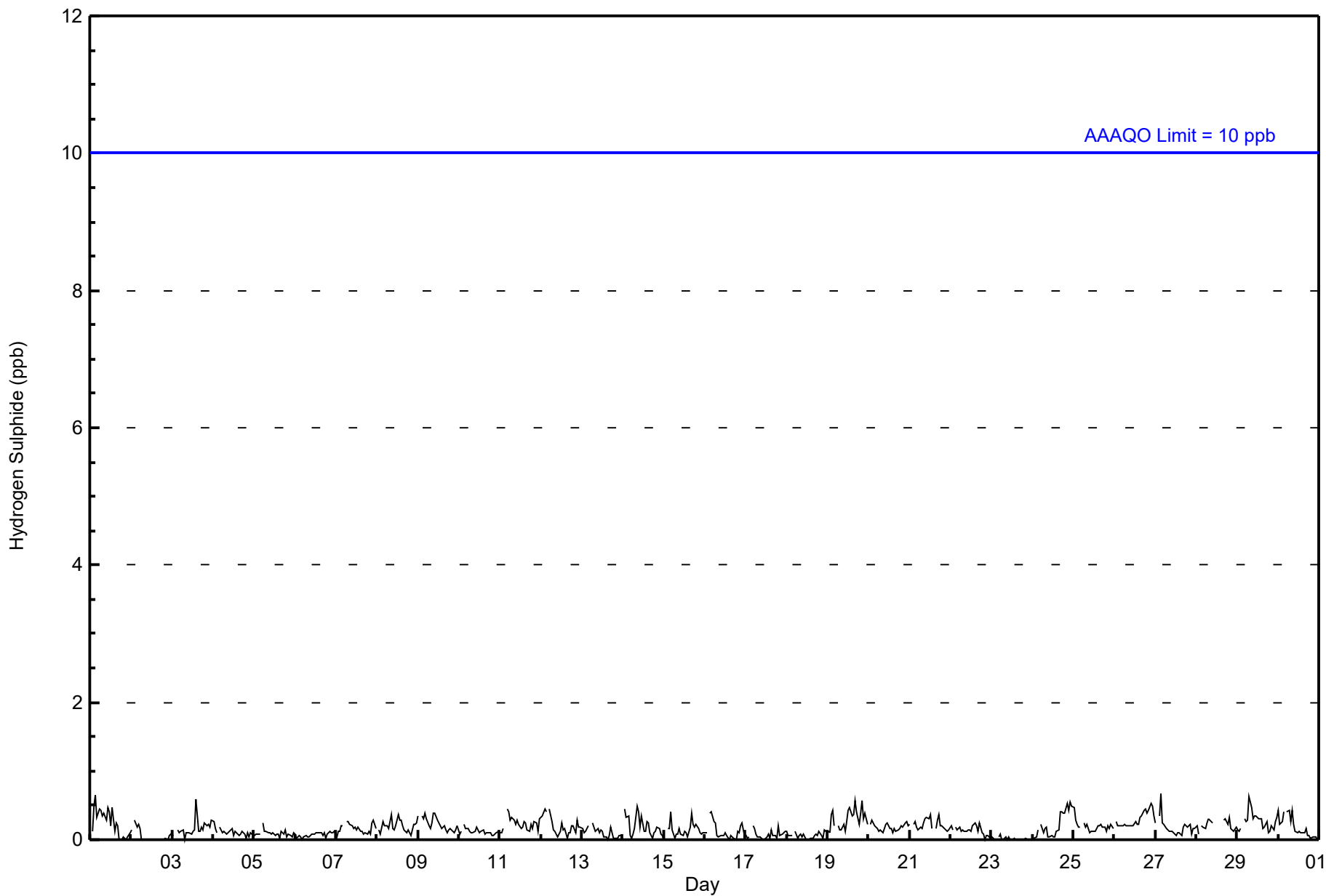














**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Hydrogen Sulphide (H<sub>2</sub>S) - ppb**  
**Wapasu - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2	684	100.00	100.00
3 - 4	0	0.00	100.00
5 - 7	0	0.00	100.00
8 - 11	0	0.00	100.00
> 11	0	0.00	100.00

Total Number of Valid Hours: 684

Total Number of Hours: 720



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

**Hydrogen Sulphide (H<sub>2</sub>S) - ppb**  
**Wapasu - November 2023**

<b>Concentration</b> <b>Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 2	39	18	13	9	20	28	61	110	113	57	77	19	21	26	23	48	682
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	39	18	13	9	20	28	61	110	113	57	77	19	21	26	23	48	682

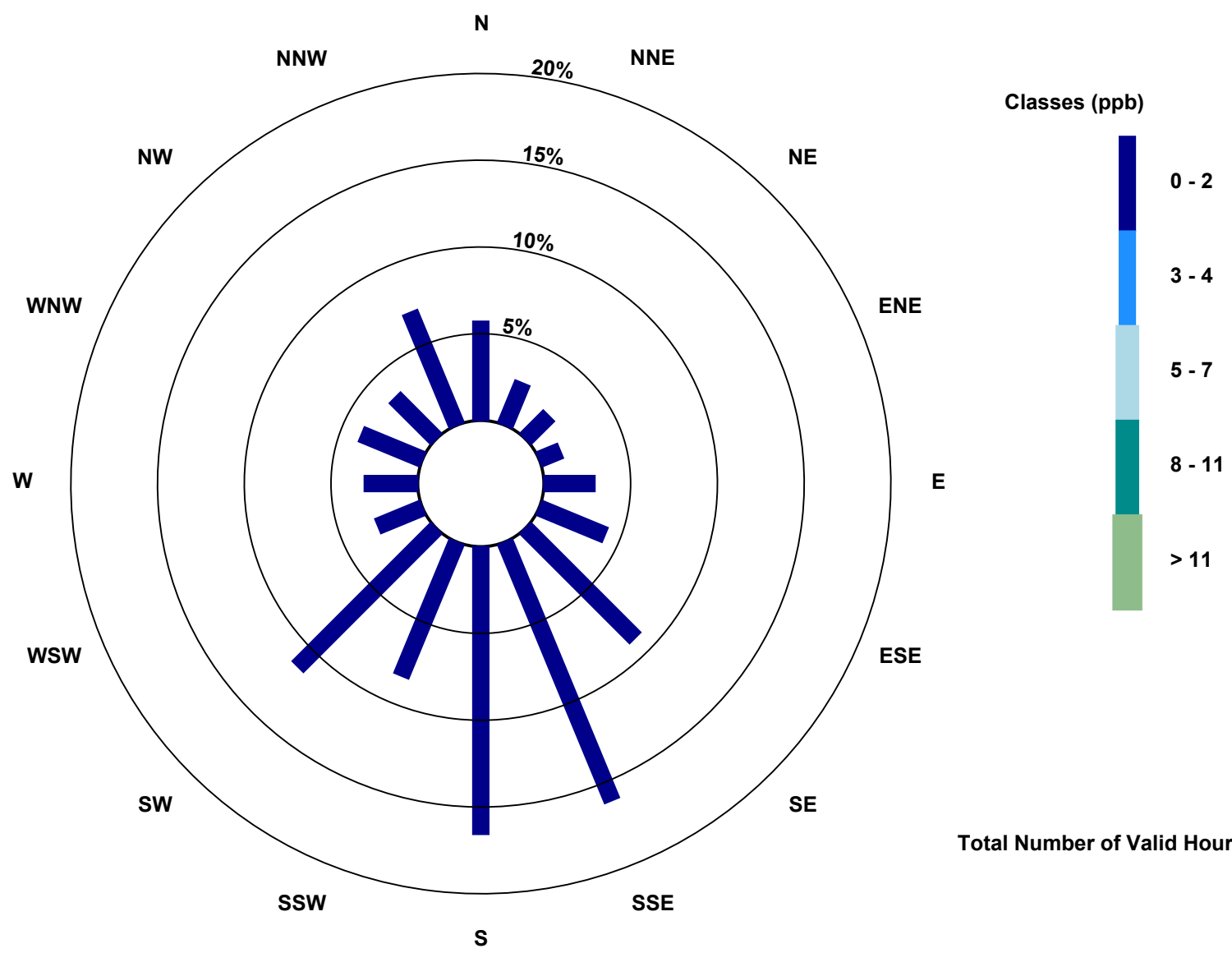
Total Number of Valid Hours: 682

Total Number of Hours: 720

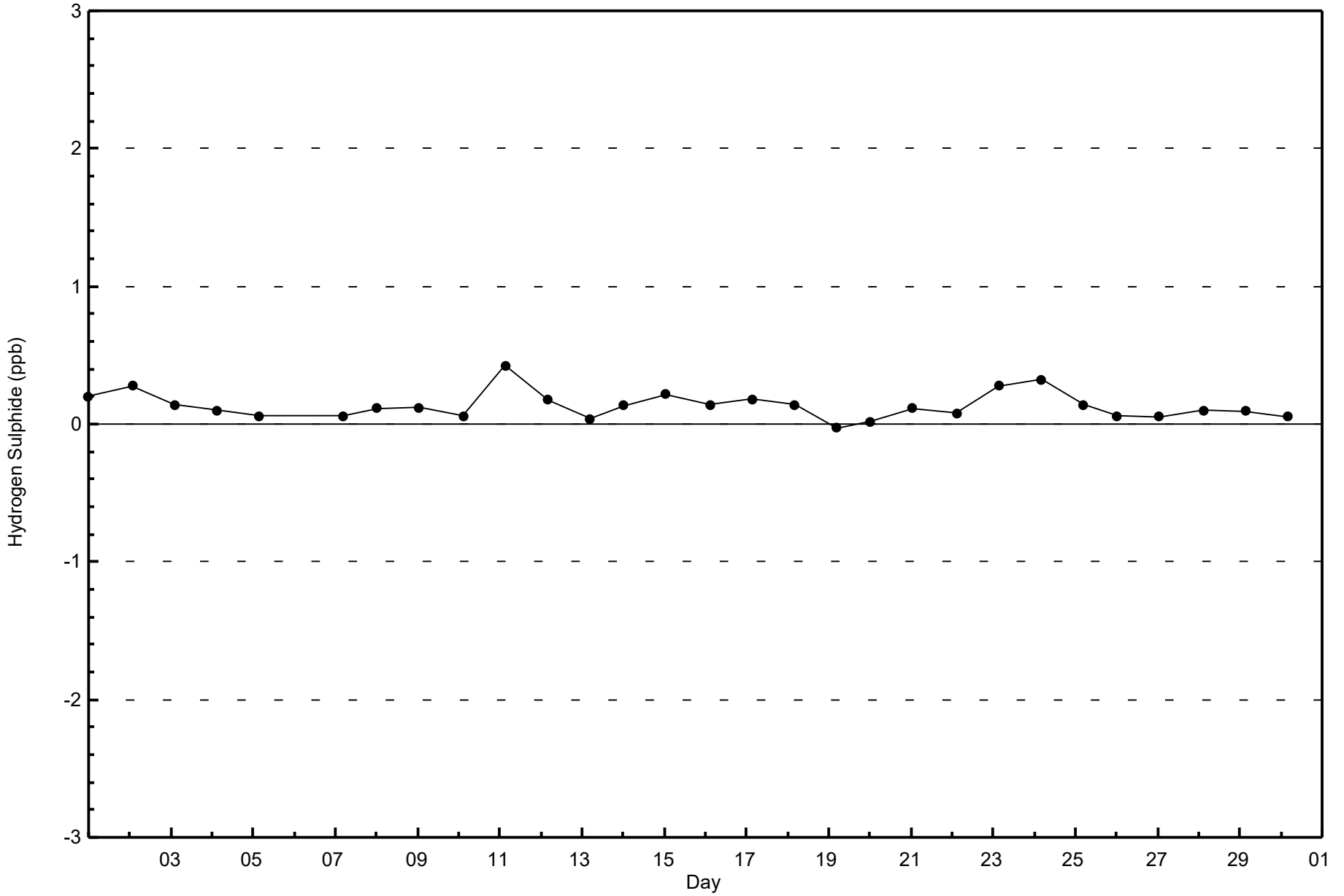


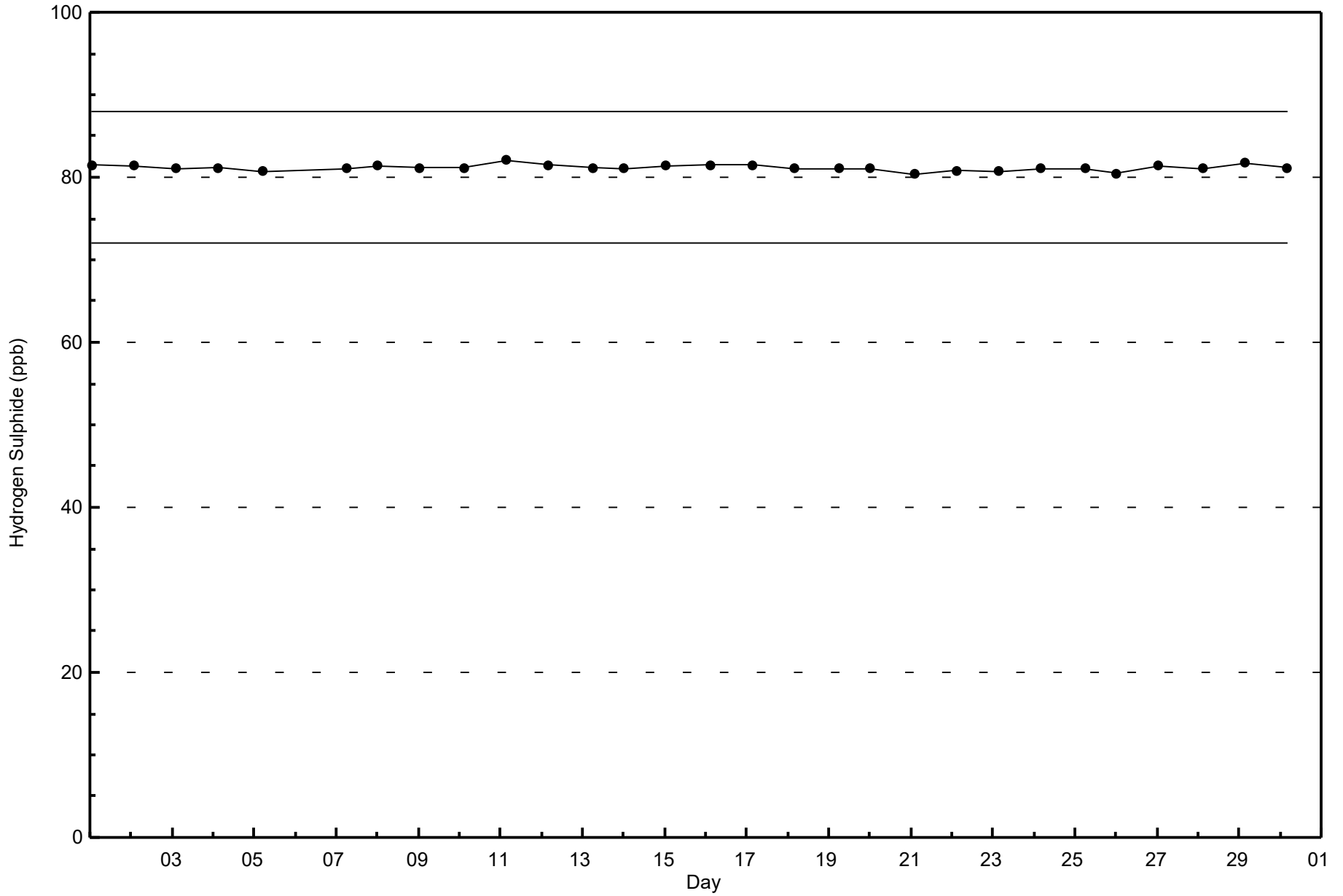
Wood Buffalo Environmental Association  
Wind Rose Nov 2023

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



Total Number of Valid Hours: 682







Wood Buffalo Environmental Association

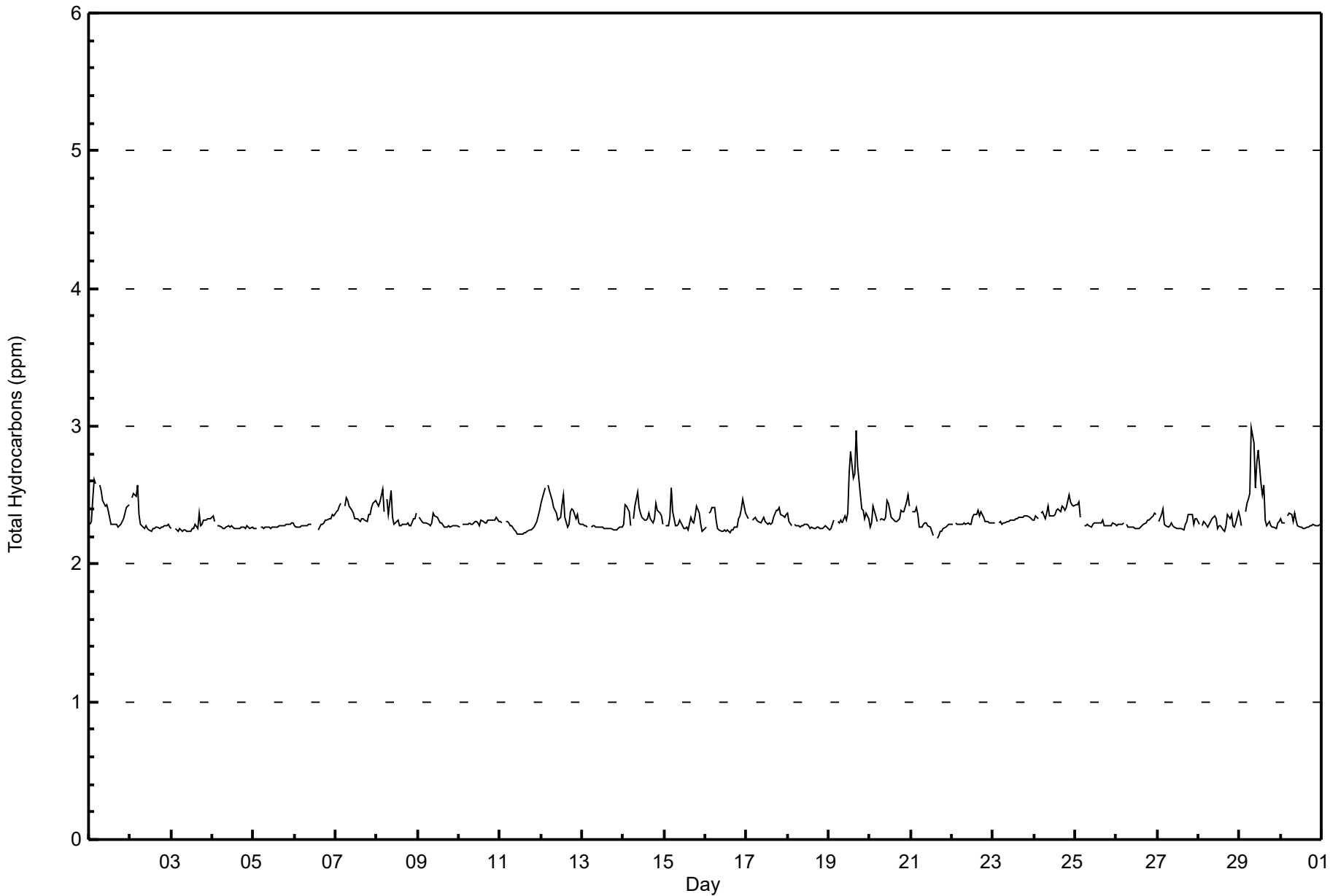
Summary of Hour Averages

Total Hydrocarbons (THC) - ppm

Wapasu - November 2023

Maximum Value: 3.0 ppm on Nov 29 08:00																				Maximum Daily Average: 2.5 ppm on Nov 29					Hours in Service: 720			
Minimum Value: 2.2 ppm on Nov 21 16:00																				Minimum Daily Average: 2.3 ppm on Nov 13					Hours of Data: 687			
Maximum Diurnal Average: 2.4 ppm at hour 4																				Minimum Diurnal Average: 2.3 ppm at hour 16					Hours of Missing Data: 33			
Monthly Average: 2.32 ppm																				Percentiles: P <sub>1</sub> = 2.2 P <sub>10</sub> = 2.3 Q <sub>1</sub> = 2.3 Median = 2.3 Q <sub>3</sub> = 2.3 P <sub>90</sub> = 2.4 P <sub>99</sub> = 2.7					Hours of Calibration: 32			
																									Percent Operational Time: 99.9			
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24				
1-Nov	2.3	2.3	2.5	2.6	2.6	Z	2.6	2.5	2.5	2.4	2.4	2.4	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.4	2.4	2.4	2.4	2.3	2.6	
2-Nov	Z	2.5	2.5	2.5	2.6	2.4	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.6
3-Nov	2.3	Z	2.3	2.2	2.2	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	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.4	
4-Nov	2.3	2.3	Z	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	
5-Nov	2.3	2.3	2.3	Z	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	
6-Nov	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	C	C	C	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.4	2.4	2.3	2.4	2.4	
7-Nov	2.4	2.4	2.4	2.4	Z	2.4	2.5	2.5	2.4	2.4	2.4	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.4	2.4	2.4	2.4	2.5	2.4	2.5	
8-Nov	2.4	2.4	2.5	2.5	2.4	Z	2.5	2.4	2.5	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.4	2.4	2.5	
9-Nov	Z	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.4	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.4	
10-Nov	2.3	Z	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	
11-Nov	2.3	2.3	Z	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.4	2.4	2.3	2.4	
12-Nov	2.4	2.5	2.5	Z	2.6	2.5	2.5	2.4	2.4	2.4	2.3	2.3	2.4	2.5	2.3	2.3	2.3	2.4	2.4	2.4	2.3	2.4	2.3	2.3	2.3	2.4	2.6	
13-Nov	2.3	2.3	2.3	2.3	Z	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.3	
14-Nov	2.3	2.4	2.4	2.4	2.3	Z	2.3	2.4	2.5	2.4	2.4	2.3	2.3	2.3	2.3	2.4	2.3	2.3	2.3	2.4	2.4	2.4	2.4	2.3	2.3	2.4	2.5	
15-Nov	Z	2.3	2.3	2.3	2.6	2.4	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.4	2.4	2.4	2.3	2.2	2.2	2.3	2.6		
16-Nov	2.3	Z	2.4	2.4	2.4	2.4	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.4	2.5	2.4	2.3	2.5		
17-Nov	2.3	2.3	Z	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.4	2.4	2.4	2.4	2.3	2.3	2.4	2.3	2.4		
18-Nov	2.4	2.3	2.3	Z	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.4	
19-Nov	2.3	2.3	2.3	2.3	Z	2.3	2.3	2.3	2.3	2.3	2.3	2.4	2.7	2.8	2.6	2.7	3.0	2.7	2.5	2.4	2.4	2.3	2.4	2.3	2.4	3.0		
20-Nov	2.3	2.3	2.4	2.4	2.3	Z	2.3	2.3	2.3	2.3	2.5	2.4	2.3	2.3	2.3	2.3	2.3	2.3	2.4	2.4	2.4	2.4	2.5	2.4	2.4	2.5		
21-Nov	Z	2.4	2.4	2.4	2.4	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.2	M	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.4	
22-Nov	2.3	Z	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.4	2.4	2.4	2.3	2.4	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.4	
23-Nov	2.3	2.3	Z	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.4	2.3	2.3	2.3	2.3	2.3	2.3	2.4	
24-Nov	2.3	2.3	2.3	Z	2.4	2.4	2.3	2.4	2.4	2.4	2.4	2.3	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.5	2.4	2.4	2.4	2.4	2.4	2.5	
25-Nov	2.4	2.4	2.4	2.3	Z	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.4	
26-Nov	2.3	2.3	2.3	2.3	2.3	Z	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.4	2.4	2.3	2.4	2.4	
27-Nov	Z	2.3	2.4	2.4	2.3	Z	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.4	2.4	2.4	2.3	2.3	2.3	2.3	2.3	2.4	
28-Nov	2.3	Z	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.3	2.4	2.3	2.4	2.3	2.3	2.3	2.3	2.4	2.3	2.4	
29-Nov	2.3	2.3	Z	2.4	2.4	2.5	2.5	3.0	2.9	2.6	2.7	2.8	2.6	2.5	2.6	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	3.0	
30-Nov	2.3	2.3	2.3	Z	2.3	2.4	2.4	2.3	2.4	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.4	
																								Diurnal Average				
																								Diurnal Maximum				
Z - zerospan      C - Calibration      M - Maintenance																												







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

**Total Hydrocarbons (THC) - ppm**  
**Wapasu - November 2023**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2.0	0	0.00	0.00
2.1 - 3.0	687	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: 687

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Total Hydrocarbons (THC) - ppm  
Wapasu - November 2023**

<b>Concentration Ranges (ppm)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2.1 - 3.0	41	18	13	8	21	27	61	111	110	58	79	23	21	25	22	47	685
3.1 - 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	41	18	13	8	21	27	61	111	110	58	79	23	21	25	22	47	685

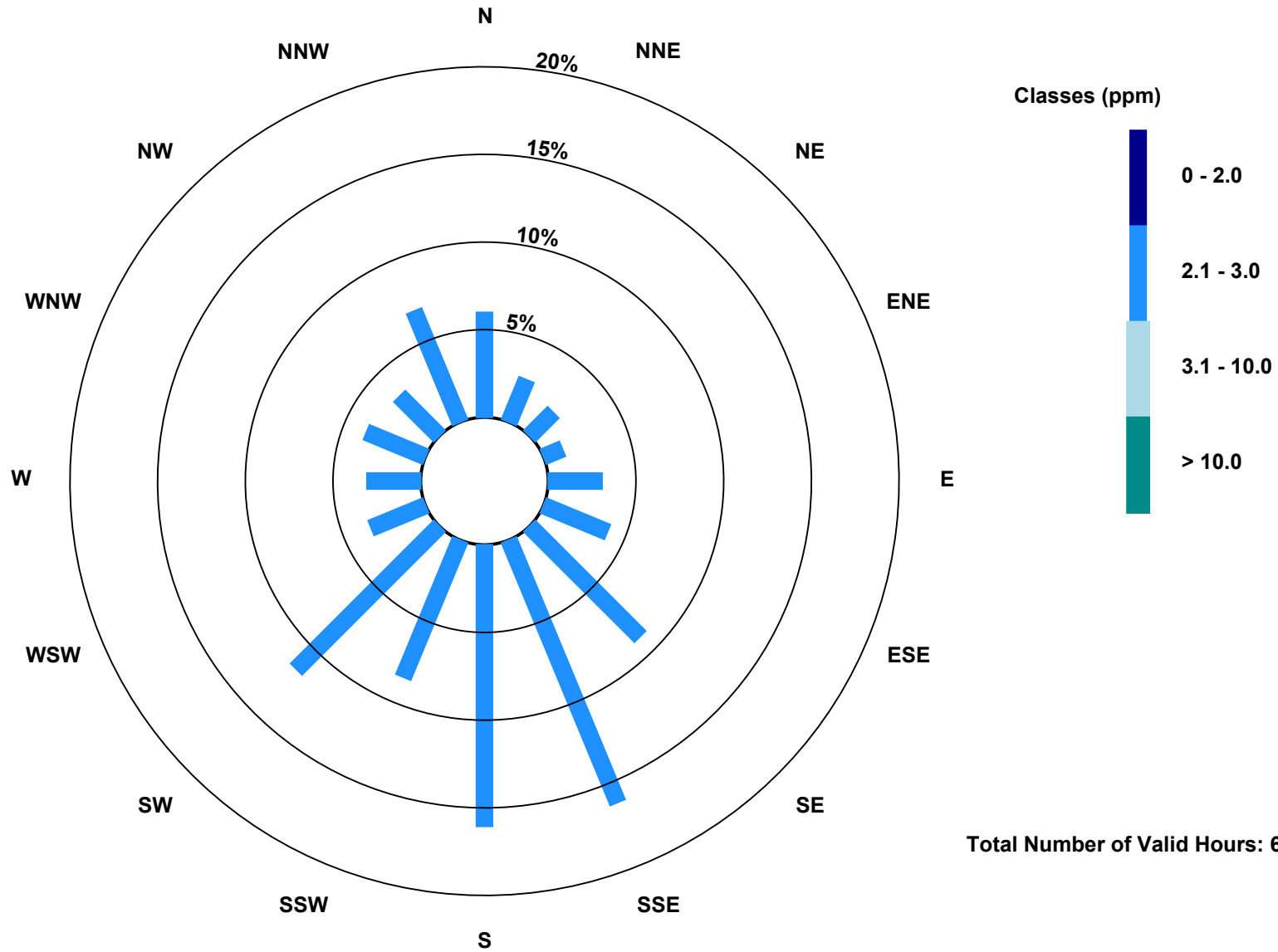
Total Number of Valid Hours: 685

Total Number of Hours: 720

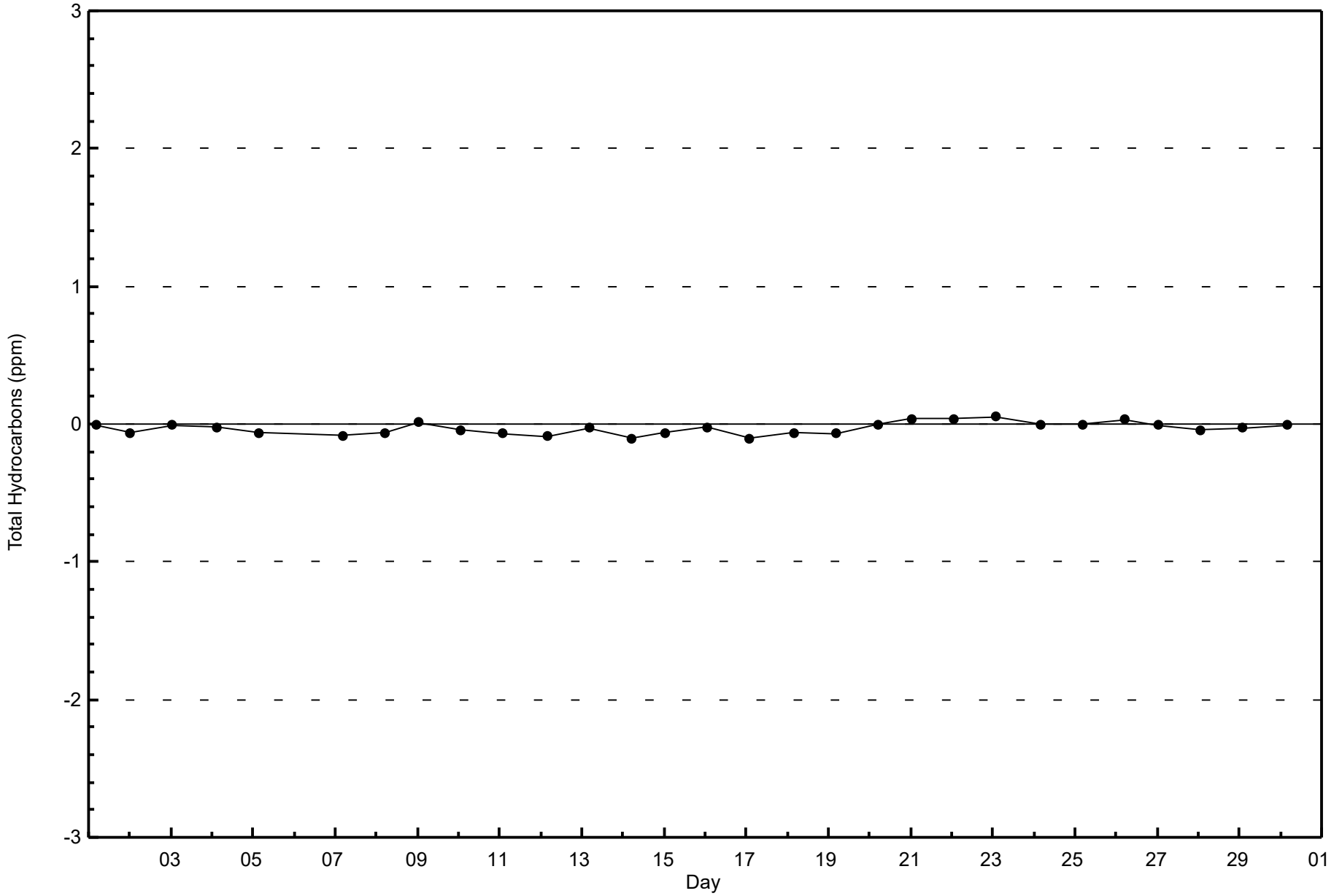


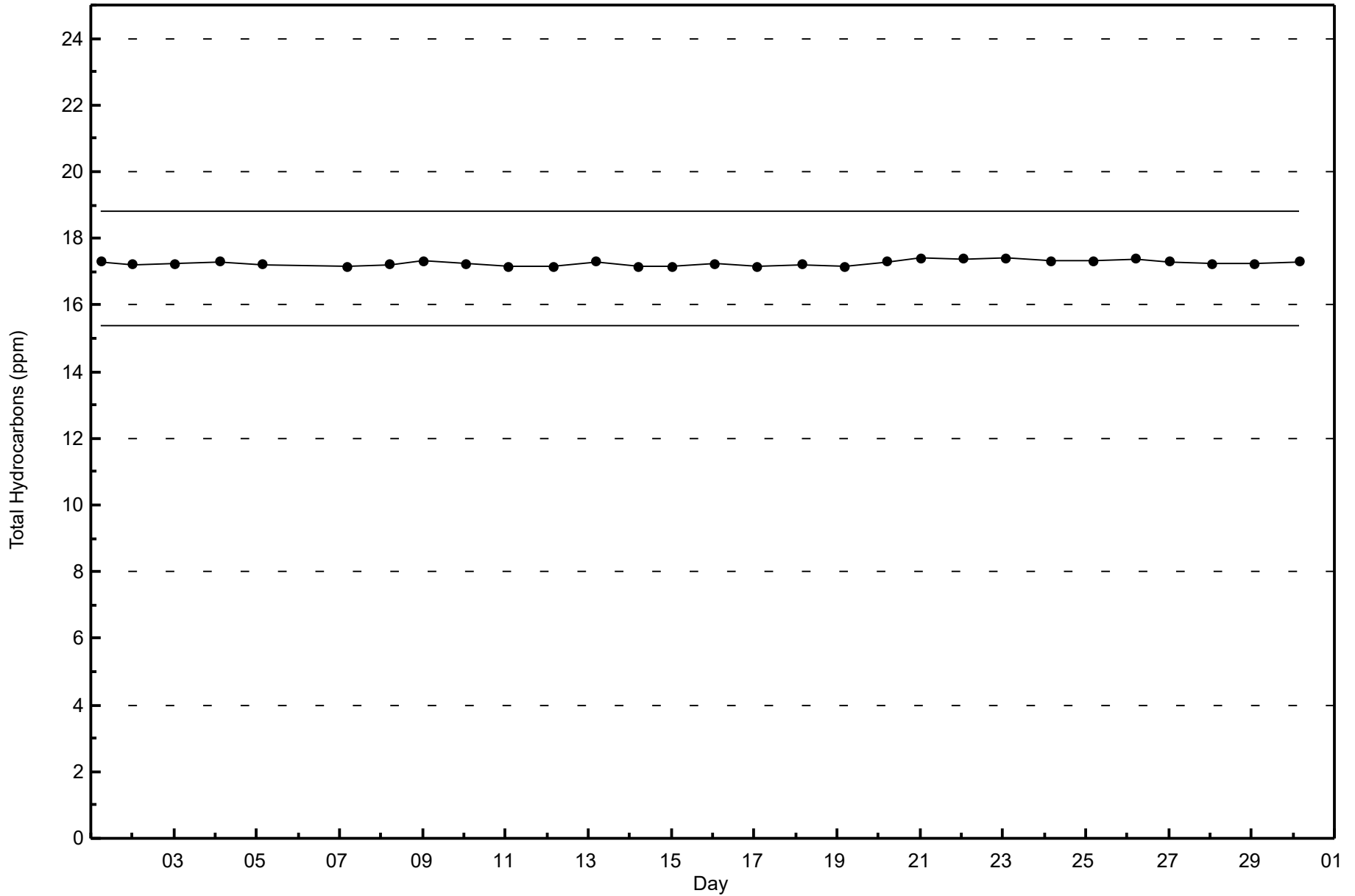
Wood Buffalo Environmental Association  
Wind Rose Nov 2023

Total Hydrocarbons (THC) - ppm  
Wapasu



Total Number of Valid Hours: 685







# Wood Buffalo Environmental Association

## Summary of Hour Averages

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

Wapasu - November 2023

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 39.7 ppb on Nov 25 10:00	Maximum Daily Average: 34.1 ppb on Nov 4		Hours of Data:	686
Minimum Value: 2.5 ppb on Nov 19 17:00	Minimum Daily Average: 10.8 ppb on Nov 19		Hours of Missing Data:	34
Maximum Diurnal Average: 27.0 ppb at hour 14	Minimum Diurnal Average: 20.8 ppb at hour 4		Hours of Calibration:	33
Monthly Average: 24.39 ppb	Percentiles: P <sub>1</sub> = 4.4 P <sub>10</sub> = 13.2 Q <sub>1</sub> = 19.7 Median = 25.5 Q <sub>3</sub> = 30.4 P <sub>90</sub> = 33.6 P <sub>99</sub> = 36.9		Percent Operational Time:	99.9

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	20.8	Z	11.4	4.7	5.1	6.4	7.7	5.8	10.7	17.7	19.6	21.1	25.8	28.5	28.1	23.2	14.9	23.4	23.6	21.9	18.6	16.8	16.9	20.8	17.1	28.5
2-Nov	21.4	18.1	Z	13.2	9.5	21.7	24.4	24.9	25.7	26.6	C	C	C	C	34.3	32.9	34.1	34.1	32.7	30.3	27.2	27.0	26.4	27.0	25.9	34.3
3-Nov	28.5	30.2	29.6	Z	31.6	29.6	28.8	29.5	28.5	28.1	27.7	27.8	24.7	27.4	28.2	30.2	24.5	19.4	13.4	15.9	20.1	15.2	13.8	20.0	24.9	31.6
4-Nov	27.6	30.6	33.2	32.9	Z	35.3	36.6	35.0	34.0	35.0	35.5	36.1	35.8	35.8	36.2	36.4	35.7	34.6	34.0	34.1	33.3	33.1	32.4	31.9	34.1	36.6
5-Nov	31.3	31.5	31.6	31.5	31.0	Z	31.0	31.2	30.7	30.5	30.6	30.5	30.7	30.4	30.4	30.4	30.0	29.6	29.9	29.7	30.0	29.7	29.5	29.1	30.5	31.6
6-Nov	28.5	27.8	27.1	27.4	26.9	26.7	26.2	25.2	24.1	23.3	21.9	18.6	17.6	17.4	16.5	16.0	15.4	13.3	11.9	11.2	10.5	9.5	9.3	9.3	19.2	28.5
7-Nov	Z	12.2	12.0	12.1	13.7	14.4	12.5	12.7	13.1	14.6	14.6	15.4	16.5	18.6	17.4	14.5	13.4	13.3	13.8	9.8	9.9	9.1	5.8	9.0	13.0	18.6
8-Nov	12.9	Z	9.8	5.1	7.1	5.6	6.7	7.8	4.5	15.1	19.8	19.7	18.7	21.6	21.6	21.7	22.5	21.3	21.3	22.1	22.1	16.5	12.3	8.7	15.0	22.5
9-Nov	12.2	16.7	Z	21.8	22.0	21.5	23.3	25.1	19.9	16.5	18.4	20.0	21.2	22.8	23.2	23.8	23.7	23.6	23.1	23.2	22.7	21.9	23.5	25.1	21.5	25.1
10-Nov	24.8	25.5	26.8	Z	24.9	26.4	27.0	28.3	29.7	29.3	30.1	30.2	29.8	29.3	28.4	27.7	26.9	26.4	25.9	24.8	24.1	24.4	24.7	24.8	27.0	30.2
11-Nov	25.5	26.6	25.6	25.5	Z	28.3	26.7	25.0	27.1	29.0	30.5	29.5	28.3	26.5	24.6	23.0	21.3	20.1	19.1	18.1	17.6	17.5	16.5	11.3	23.6	30.5
12-Nov	9.8	7.7	8.8	9.1	8.3	Z	17.8	22.0	23.8	24.8	27.3	26.8	24.2	21.7	26.9	27.2	23.6	20.8	14.8	15.1	21.8	22.4	28.4	29.1	20.1	29.1
13-Nov	Z	28.1	25.8	24.3	30.7	32.7	31.0	30.0	31.8	31.5	31.2	30.9	30.9	31.4	31.3	31.2	31.5	29.7	29.1	26.8	24.2	24.7	24.5	26.9	29.1	32.7
14-Nov	27.5	Z	12.2	21.8	28.4	28.9	24.4	18.5	11.6	13.6	18.0	17.8	20.8	21.1	19.6	17.0	19.9	21.8	22.3	20.0	21.0	18.6	17.2	21.2	20.1	28.9
15-Nov	24.3	23.1	Z	11.7	7.3	14.1	21.0	21.2	21.4	19.3	23.8	28.3	25.4	26.3	26.6	19.8	20.1	24.2	20.8	17.6	21.3	30.9	34.2	33.1	22.4	34.2
16-Nov	29.8	25.5	23.4	Z	20.4	15.4	18.5	30.4	34.9	34.0	33.0	30.0	30.7	30.5	29.8	28.9	28.8	28.4	27.6	22.3	22.1	22.9	22.8	28.1	26.9	34.9
17-Nov	30.1	31.2	30.8	29.0	Z	27.1	27.2	27.6	27.6	28.1	28.9	31.2	29.1	25.5	27.6	27.6	24.7	21.7	19.6	11.1	12.7	15.9	15.5	14.5	24.5	31.2
18-Nov	15.7	20.2	22.5	24.5	25.8	Z	28.3	27.2	25.7	25.1	25.0	26.3	26.8	27.4	27.3	26.3	23.0	22.4	23.3	23.0	23.3	26.2	25.5	25.2	24.6	28.3
19-Nov	Z	22.1	20.1	17.0	18.6	18.4	16.4	9.6	7.1	11.9	16.6	15.3	8.0	8.2	9.2	5.4	2.5	2.7	3.3	4.0	2.9	4.3	8.1	17.0	10.8	22.1
20-Nov	21.3	Z	11.7	19.3	23.2	27.6	30.0	29.4	30.0	30.5	26.5	28.9	33.4	34.1	34.0	33.6	32.4	31.7	28.9	29.2	25.9	17.2	13.3	19.8	26.6	34.1
21-Nov	16.8	17.7	Z	17.9	24.3	32.3	30.3	29.3	28.0	28.0	27.5	27.0	31.5	35.2	M	34.9	33.1	32.6	31.7	31.3	31.7	31.5	30.6	30.6	28.8	35.2
22-Nov	31.2	31.6	32.3	Z	34.4	35.4	35.4	35.4	34.9	32.5	34.7	32.8	31.2	28.1	25.9	19.7	18.2	25.7	32.1	32.4	33.5	34.0	34.1	33.9	31.3	35.4
23-Nov	32.4	32.5	31.5	30.9	Z	30.5	29.9	28.5	27.0	25.5	24.2	23.7	22.0	20.4	19.4	18.3	18.1	19.5	20.1	20.3	20.6	22.3	24.9	24.7	24.7	32.5
24-Nov	26.0	25.2	26.5	21.7	22.8	Z	26.9	24.5	23.2	27.4	27.6	29.2	30.2	29.1	26.9	23.9	21.9	21.5	21.5	21.6	17.7	17.1	19.2	18.6	23.9	30.2
25-Nov	Z	19.1	19.5	26.5	26.3	31.5	34.8	35.7	36.5	39.7	38.3	37.5	36.6	36.7	35.7	34.7	30.8	36.8	37.1	37.7	37.6	34.4	24.7	19.7	32.5	39.7
26-Nov	18.0	Z	26.8	26.2	25.1	27.8	30.5	33.6	32.3	32.5	33.4	32.7	31.9	32.4	29.7	27.1	24.3	20.1	17.2	17.5	16.6	14.9	12.2	14.6	25.1	33.6
27-Nov	17.7	18.7	Z	12.3	23.2	25.6	25.5	24.2	22.8	23.5	24.3	24.4	24.4	24.1	23.5	22.3	20.2	21.4	20.7	22.4	23.4	27.3	26.8	28.2	22.9	28.2
28-Nov	28.7	28.8	30.0	Z	31.6	35.9	32.8	32.5	28.7	30.7	32.2	33.5	34.7	35.6	36.3	35.4	32.8	29.9	33.2	29.4	36.2	37.7	34.9	28.4	32.6	37.7
29-Nov	30.4	33.0	30.8	27.5	Z	19.7	17.7	4.1	5.8	20.6	13.3	11.3	18.6	22.1	18.1	31.9	33.7	30.5	34.1	34.4	31.9	35.1	34.5	33.3	24.9	35.1
30-Nov	30.5	32.4	32.0	27.1	25.6	Z	23.1	28.8	24.2	27.8	32.3	33.6	34.7	36.1	36.1	34.7	32.3	28.4	24.4	22.6	21.5	21.7	25.5	26.6	28.8	36.1

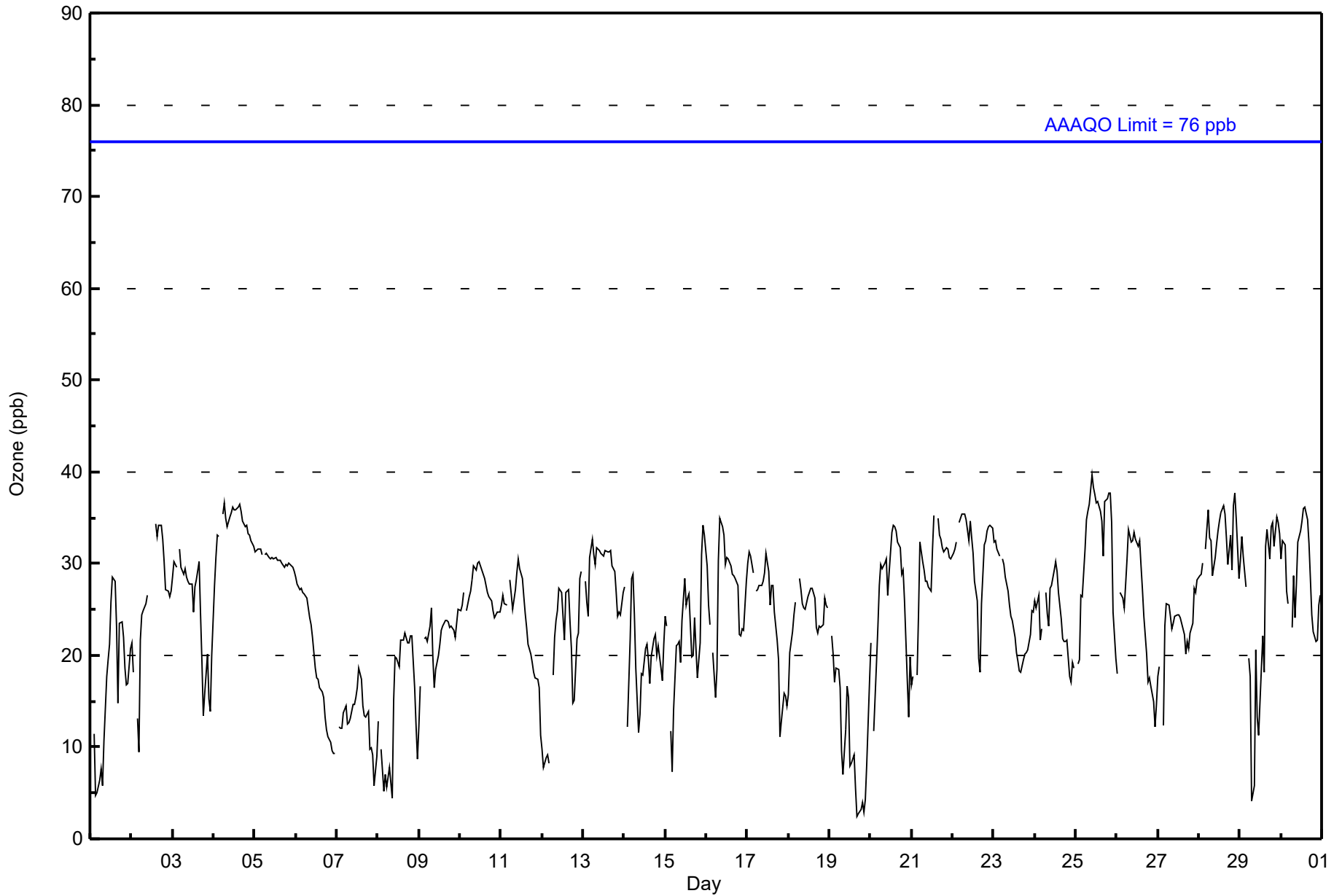
24.0	24.7	23.7	20.8	21.9	24.8	25.1	24.8	24.2	25.8	26.4	26.6	26.7	27.0	26.6	26.0	24.5	24.3	23.7	22.7	22.7	22.7	22.3	23.0	Diurnal Average	
32.4	33.0	33.2	32.9	34.4	35.9	36.6	35.7	36.5	39.7	38.3	37.5	36.6	36.7	36.3	36.4	35.7	36.8	37.1	37.7	37.6	37.7	34.9	33.9	Diurnal Maximum	

Z - zerospan      C - Calibration      M - Maintenance  
 Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 76 ppb



Wood Buffalo Environmental Association  
Hourly Averages

Ozone (O<sub>3</sub>) - ppb  
Wapasu - November 2023







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

**Ozone (O<sub>3</sub>) - ppb**  
**Wapasu - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	191	27.84	27.84
21 - 50	495	72.16	100.00
51 - 82	0	0.00	100.00
> 83	0	0.00	100.00

Total Number of Valid Hours: 686

Total Number of Hours: 720



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

**Ozone (O<sub>3</sub>) - ppb**  
**Wapasu - November 2023**

<b>Concentration</b> <b>Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 20	2	3	3	0	5	6	9	22	46	38	21	1	6	5	12	11	190
21 - 50	34	15	9	9	16	21	53	87	69	20	58	21	16	19	11	37	495
51 - 82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 83	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	<b>36</b>	<b>18</b>	<b>12</b>	<b>9</b>	<b>21</b>	<b>27</b>	<b>62</b>	<b>109</b>	<b>115</b>	<b>58</b>	<b>79</b>	<b>22</b>	<b>22</b>	<b>24</b>	<b>23</b>	<b>48</b>	<b>685</b>

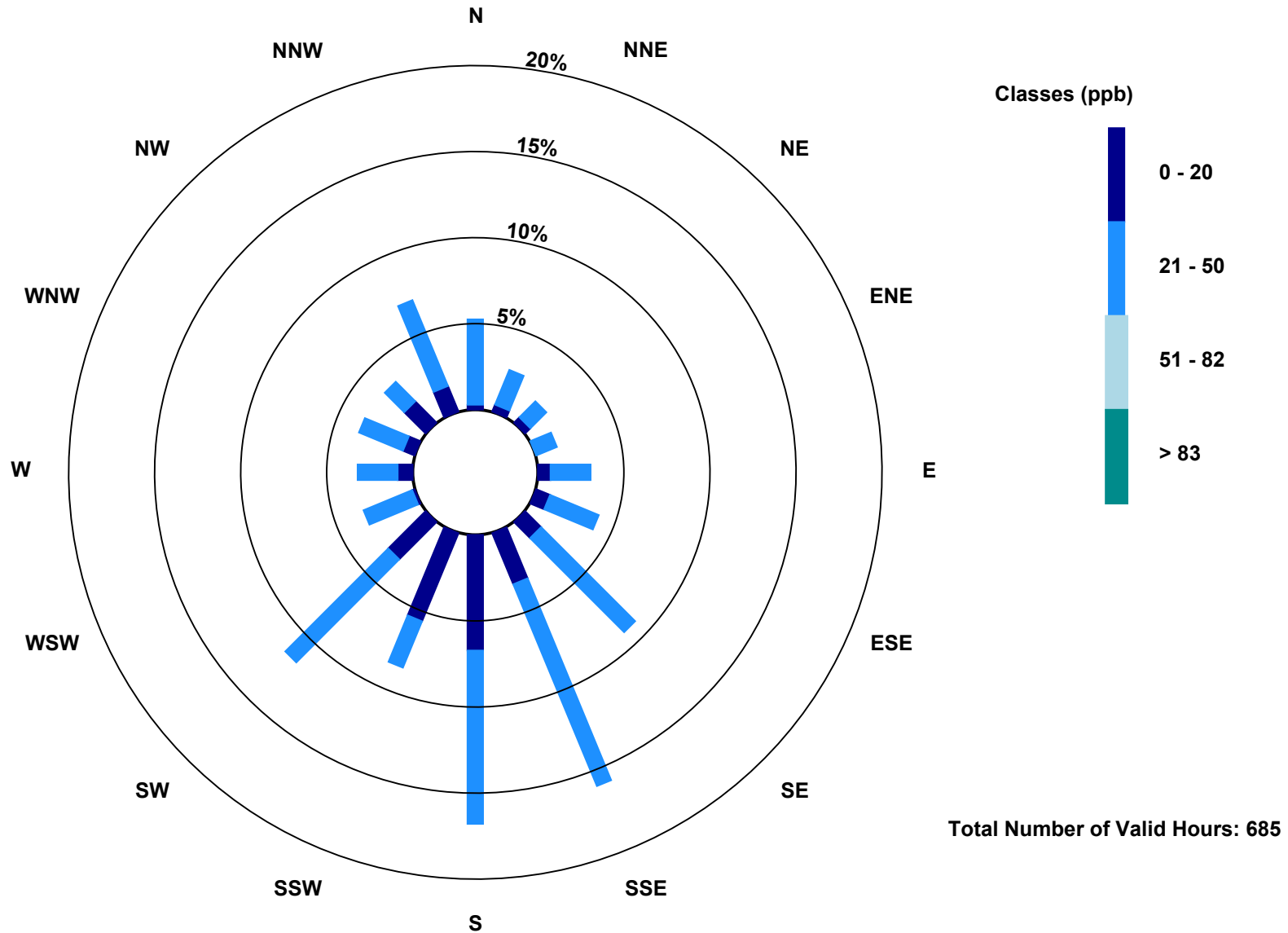
Total Number of Valid Hours: 685

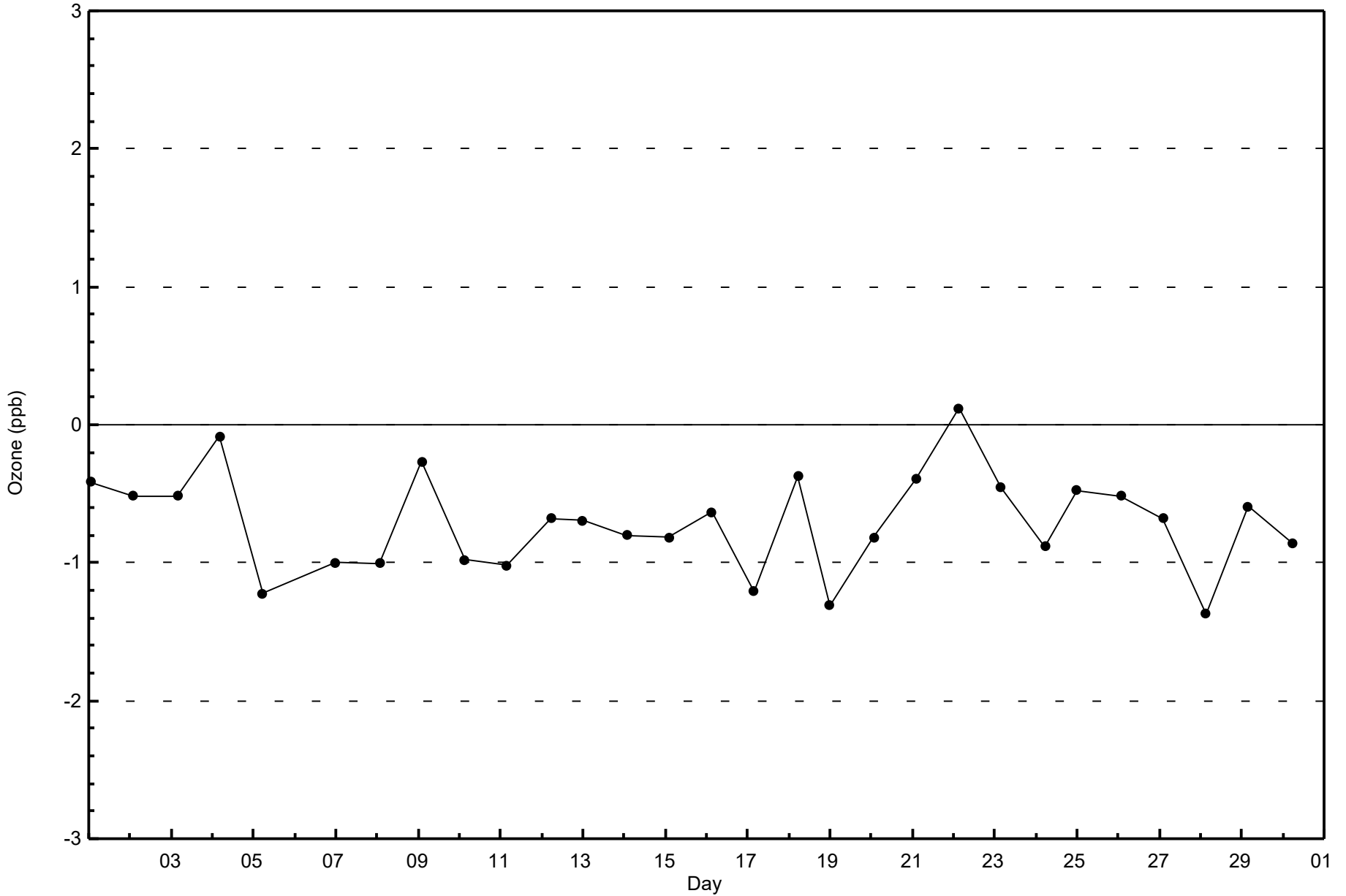
Total Number of Hours: 720

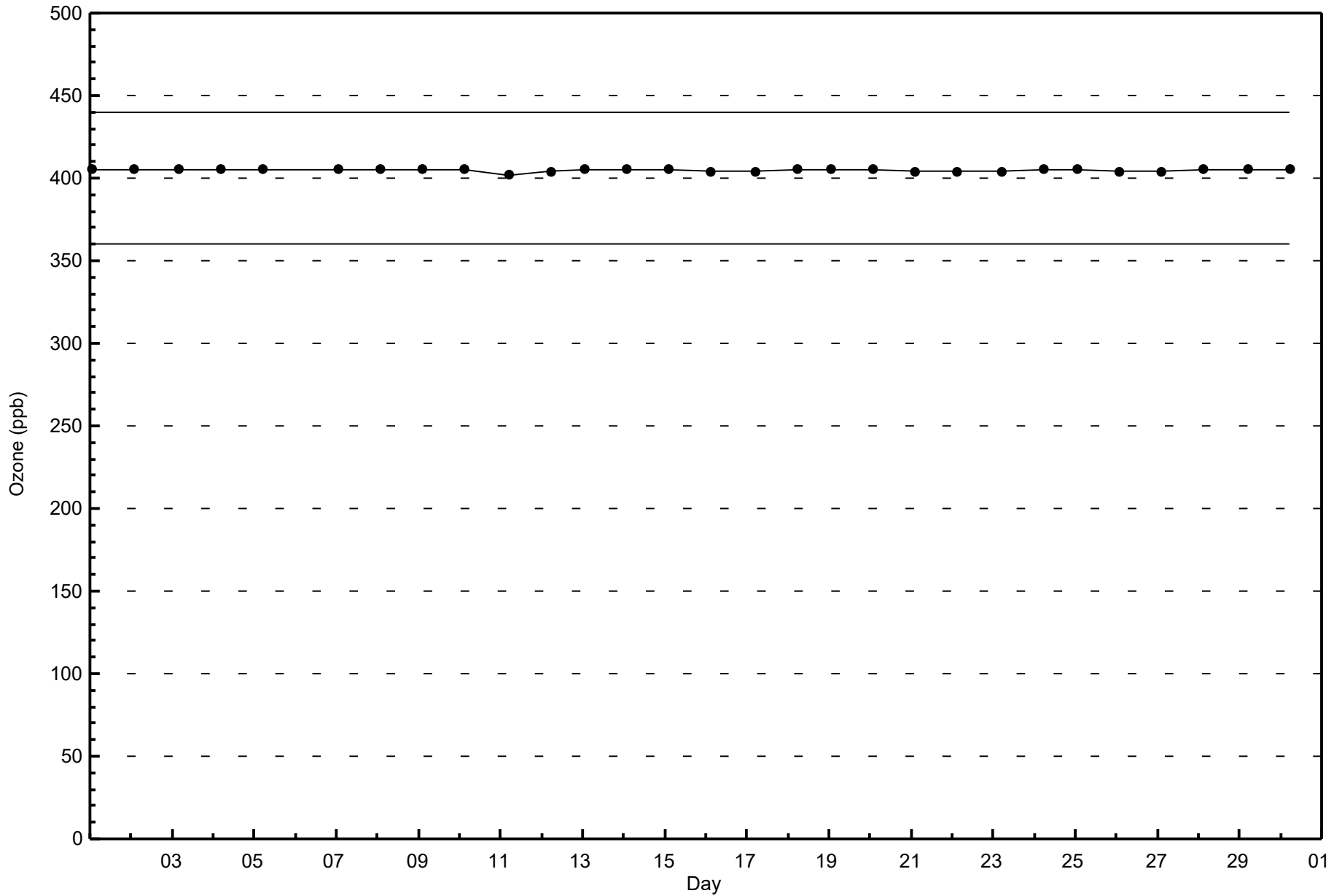


Wood Buffalo Environmental Association  
Wind Rose Nov 2023

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









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

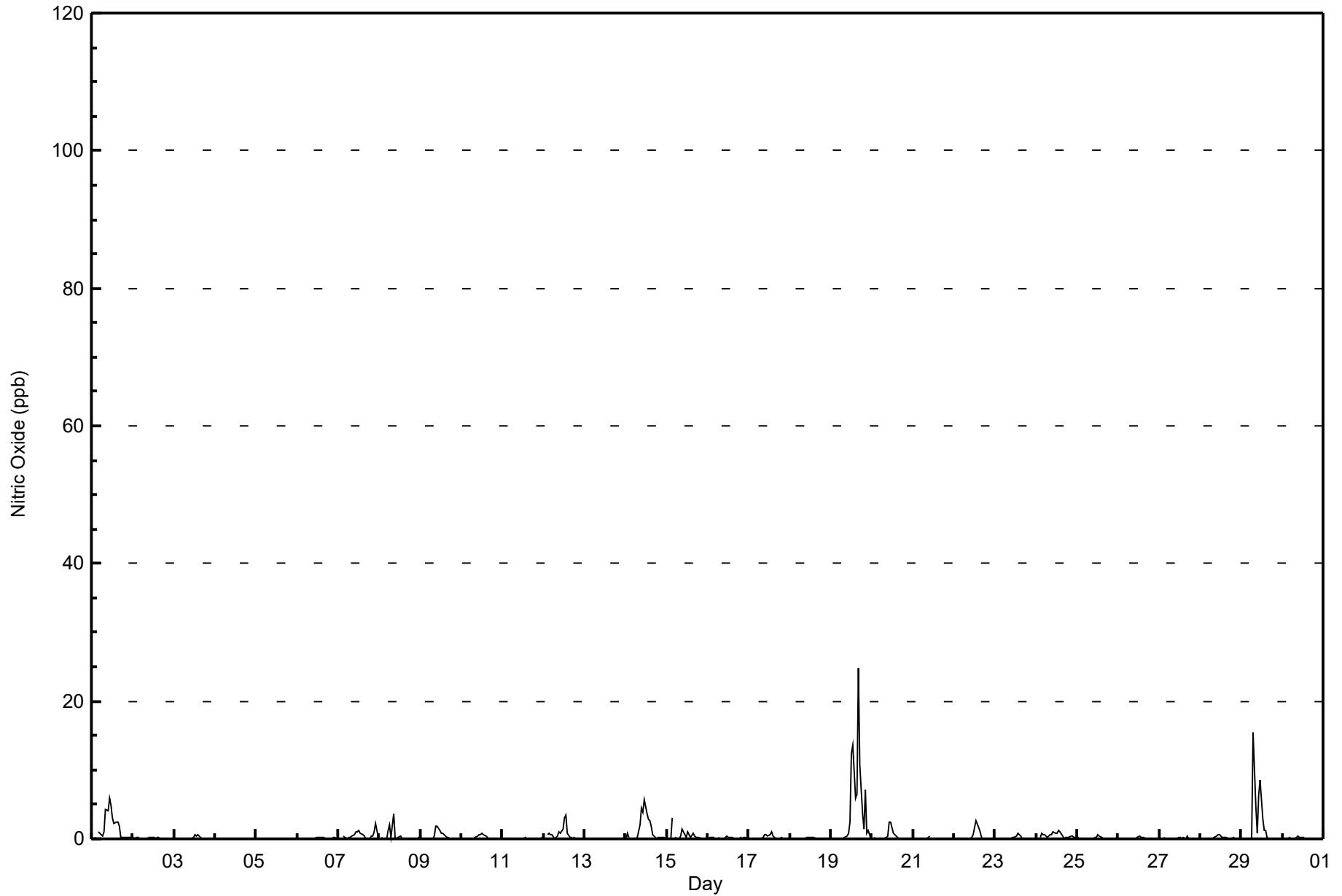
**Nitric Oxide (NO) - ppb**  
**Wapasu - November 2023**

Maximum Value: 24.8 ppb on Nov 19 17:00		Maximum Daily Average: 4.0 ppb on Nov 19		Hours in Service: 720																						
Minimum Value: 0.0 ppb on Nov 3 03:00		Minimum Daily Average: 0.0 ppb on Nov 5		Hours of Data: 685																						
Maximum Diurnal Average: 1.3 ppb at hour 13		Minimum Diurnal Average: 0.0 ppb at hour 1		Hours of Missing Data: 35																						
Monthly Average: 0.46 ppb		Percentiles: P <sub>1</sub> = 0.0 P <sub>10</sub> = 0.0 Q <sub>1</sub> = 0.0 Median = 0.1 Q <sub>3</sub> = 0.2 P <sub>90</sub> = 0.9 P <sub>99</sub> = 6.5		Hours of Calibration: 35																						
				Percent Operational Time: 100.0																						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	0.1	0.1	0.2	Z	0.9	0.5	0.5	1.0	4.2	4.1	5.8	4.8	3.1	2.2	2.4	2.5	1.8	0.2	0.1	0.1	0.2	0.1	0.1	0.1	1.5	5.8
2-Nov	0.1	0.1	0.1	0.1	Z	0.1	0.1	0.0	0.1	0.2	0.2	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	0.1	0.2
3-Nov	0.0	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.1	0.1	0.2	0.7	0.5	0.5	0.2	0.1	0.0	0.1	0.1	0.1	0.0	0.1	0.1	0.1	0.7
4-Nov	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
5-Nov	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.3	0.2	0.3	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.1	0.1	0.3
7-Nov	0.0	0.1	Z	0.4	0.2	0.1	0.1	0.3	0.4	0.6	0.9	0.9	1.2	0.9	0.5	0.3	0.1	0.0	0.0	0.4	0.4	0.9	2.2	0.2	0.5	2.2
8-Nov	0.0	0.0	0.1	Z	0.1	1.2	2.0	0.2	3.7	0.2	0.0	0.2	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.4	3.7
9-Nov	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.4	1.9	1.7	1.2	0.9	0.8	0.6	0.2	0.1	0.1	0.1	0.1	0.0	0.1	0.1	0.1	0.4	1.9
10-Nov	0.1	0.1	0.1	0.1	0.1	Z	0.1	0.1	0.2	0.5	0.5	0.7	0.8	0.6	0.4	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.8
11-Nov	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.0	0.1
12-Nov	0.2	Z	0.5	0.8	0.7	0.5	0.1	0.1	0.5	1.1	0.8	1.5	3.0	3.4	0.8	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.6	3.4
13-Nov	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
14-Nov	0.1	0.8	0.2	Z	0.0	0.0	0.0	0.2	2.0	4.5	4.0	5.8	3.6	2.9	2.7	1.8	0.6	0.1	0.1	0.2	0.2	0.1	0.1	0.1	1.3	5.8
15-Nov	0.1	0.1	0.1	3.1	Z	0.1	0.1	0.1	0.5	1.4	1.1	0.2	1.0	0.6	0.2	0.9	0.4	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.5	3.1
16-Nov	0.1	0.1	0.1	0.2	0.1	Z	0.1	0.1	0.0	0.0	0.2	0.3	0.3	0.2	0.2	0.0	0.0	0.0	0.0	0.3	0.1	0.2	0.2	0.0	0.1	0.3
17-Nov	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.6	0.7	0.3	0.6	1.1	0.4	0.2	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.2	1.1
18-Nov	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.2	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
19-Nov	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.1	0.4	0.7	2.4	12.4	13.6	5.9	6.5	24.8	10.7	3.6	1.4	7.1	0.8	1.3	0.0	4.0	24.8
20-Nov	0.0	0.1	0.1	Z	0.0	0.1	0.1	0.1	0.1	0.4	2.4	2.5	0.8	0.6	0.4	0.1	0.0	0.0	0.1	0.0	0.0	0.1	0.1	0.1	0.4	2.5
21-Nov	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.1	0.3	0.5	C	C	C	C	C	C	0.0	0.0	0.0	0.0	0.0	0.0	0.0	--	0.5
22-Nov	0.0	0.0	0.0	0.0	0.1	Z	0.1	0.1	0.0	0.0	0.1	0.6	1.6	2.7	1.6	1.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.4	2.7
23-Nov	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.2	0.5	0.8	0.6	0.3	0.1	0.0	0.0	0.1	0.0	0.1	0.0	0.1	0.1	0.8
24-Nov	0.1	Z	0.2	0.8	0.6	0.6	0.1	0.3	0.5	0.6	1.0	0.9	0.8	1.2	1.0	0.5	0.1	0.2	0.3	0.2	0.4	0.4	0.2	0.2	0.5	1.2
25-Nov	0.2	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.3	0.6	0.4	0.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.6
26-Nov	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.3	0.2	0.3	0.1	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.1	0.3
27-Nov	0.0	0.0	0.0	0.2	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.1	0.1	0.1	0.1	0.4	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.1	0.4
28-Nov	0.1	0.0	0.0	0.1	0.0	Z	0.0	0.1	0.2	0.4	0.5	0.5	0.4	0.2	0.1	0.3	0.1	0.1	0.1	0.2	0.1	0.0	0.1	0.1	0.2	0.5
29-Nov	Z	0.1	0.1	0.1	0.1	0.1	0.1	15.4	4.7	0.9	6.3	8.5	2.9	1.2	1.3	0.1	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.0	1.8	15.4
30-Nov	0.0	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.3	0.2	0.1	0.2	0.1	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.1	0.1	0.1	0.3
																								Diurnal Average		
																								Diurnal Maximum		
Z - zerospan C - Calibration																										



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

**Nitric Oxide (NO) - ppb**  
**Wapasu - November 2023**





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

**Nitric Oxide (NO) - ppb**  
**Wapasu - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	684	99.85	99.85
21 - 40	1	0.15	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720





**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitric Oxide (NO) - ppb  
Wapasu - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	42	16	11	8	19	25	61	113	111	57	84	22	20	25	21	47	682
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
41 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	42	16	11	8	19	25	61	113	111	57	84	22	21	25	21	47	683

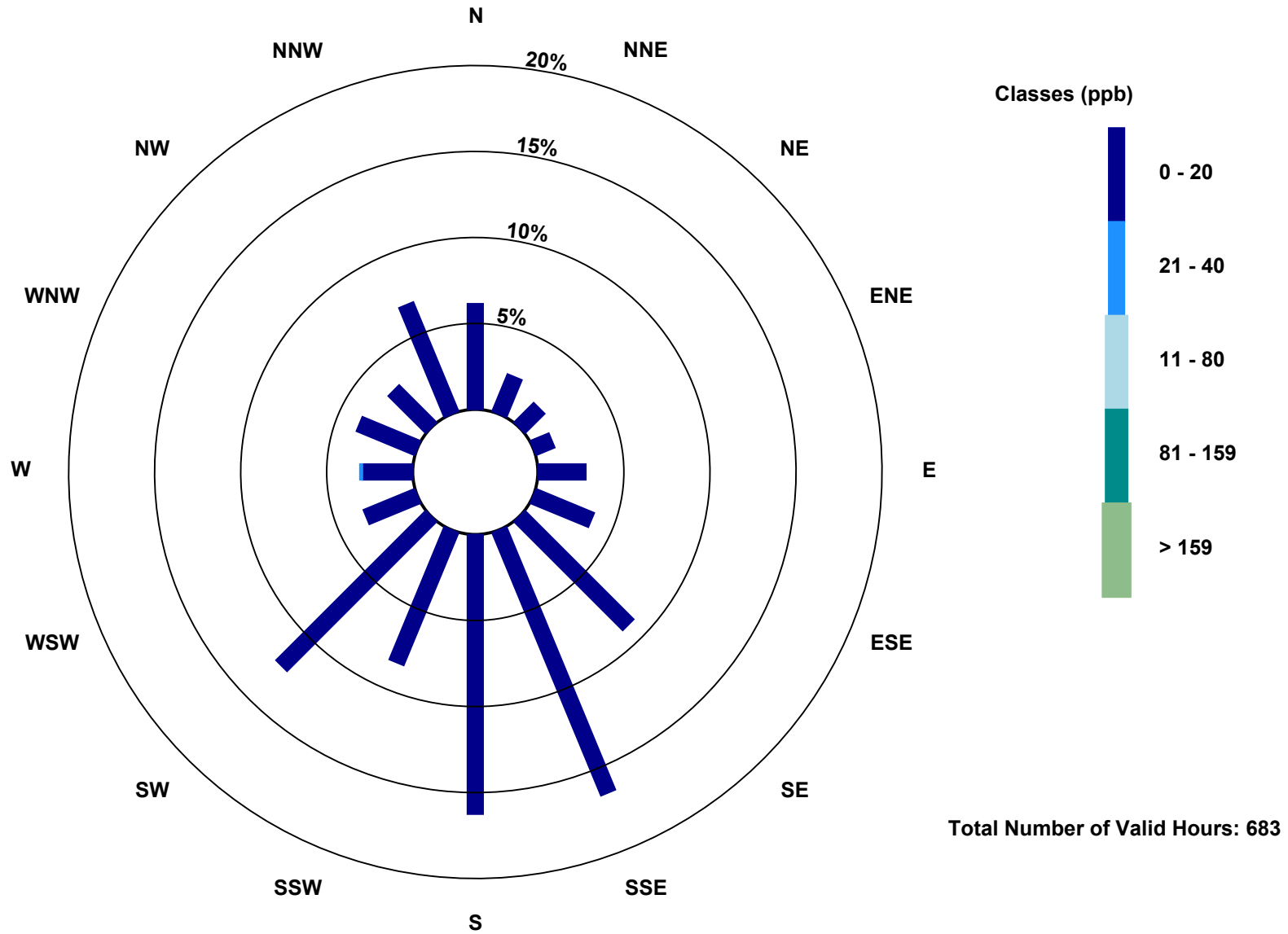
Total Number of Valid Hours: 683

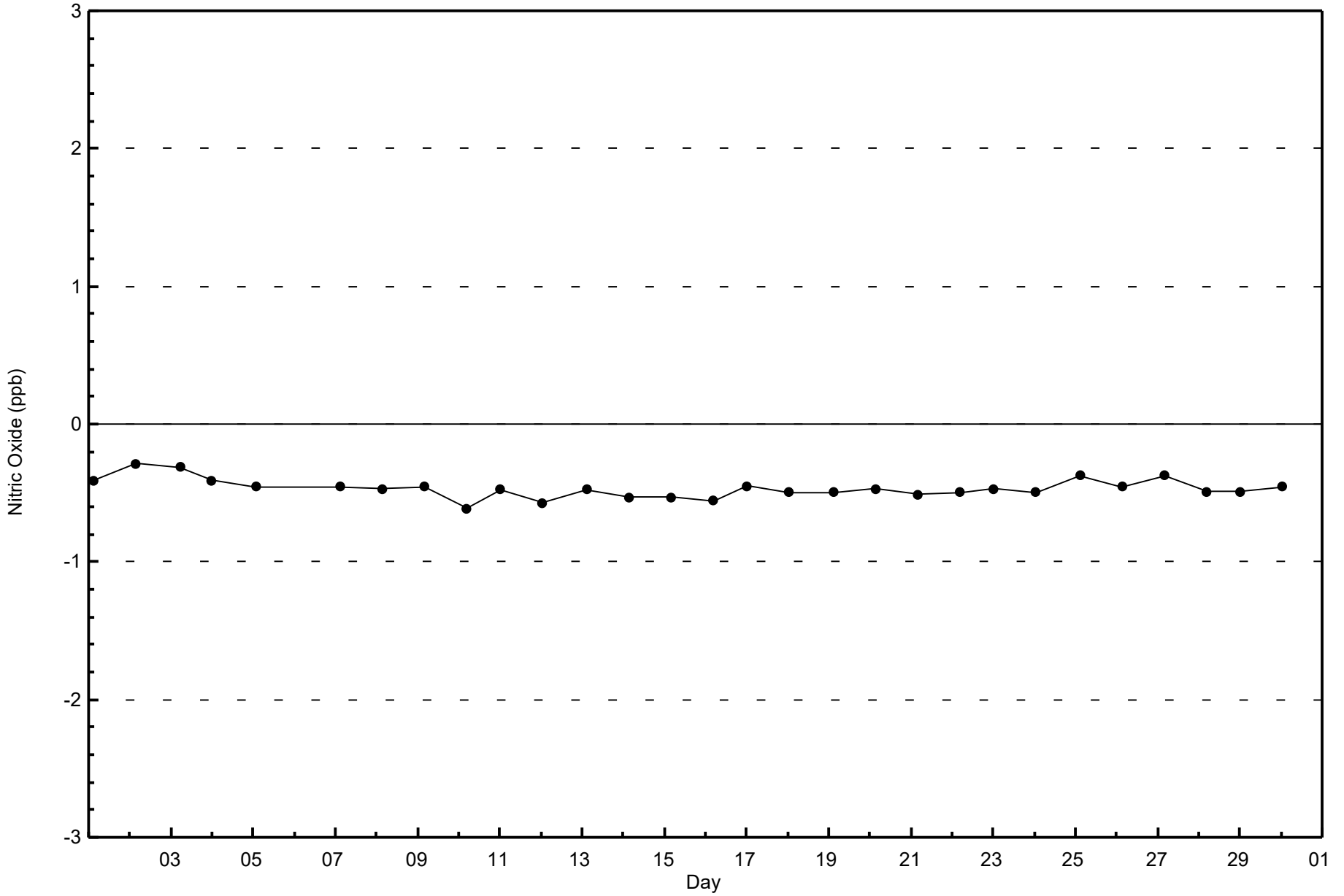
Total Number of Hours: 720

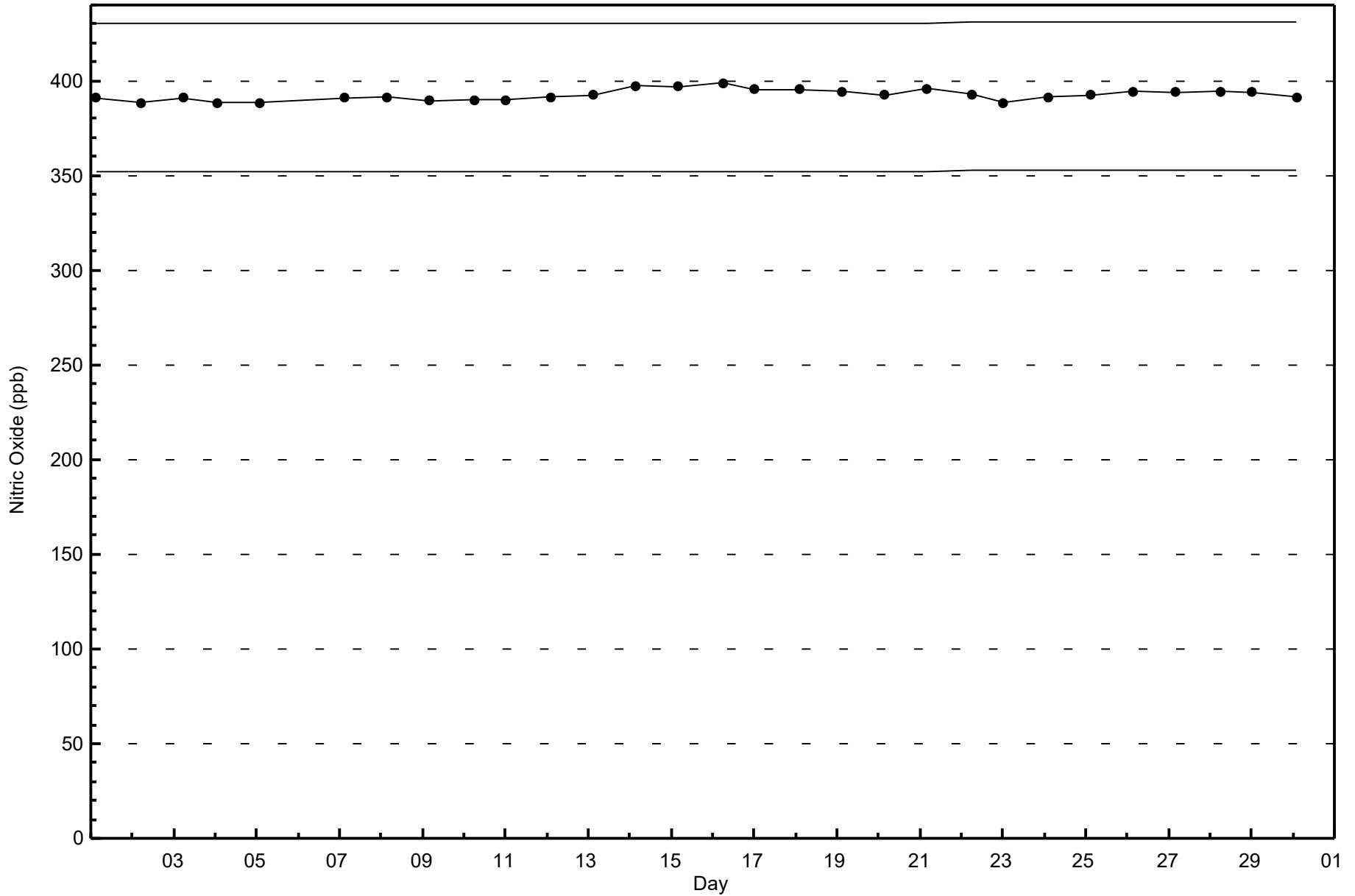


Wood Buffalo Environmental Association  
Wind Rose Nov 2023

Nitric Oxide (NO) - ppb  
Wapasu









# Wood Buffalo Environmental Association

## Summary of Hour Averages

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

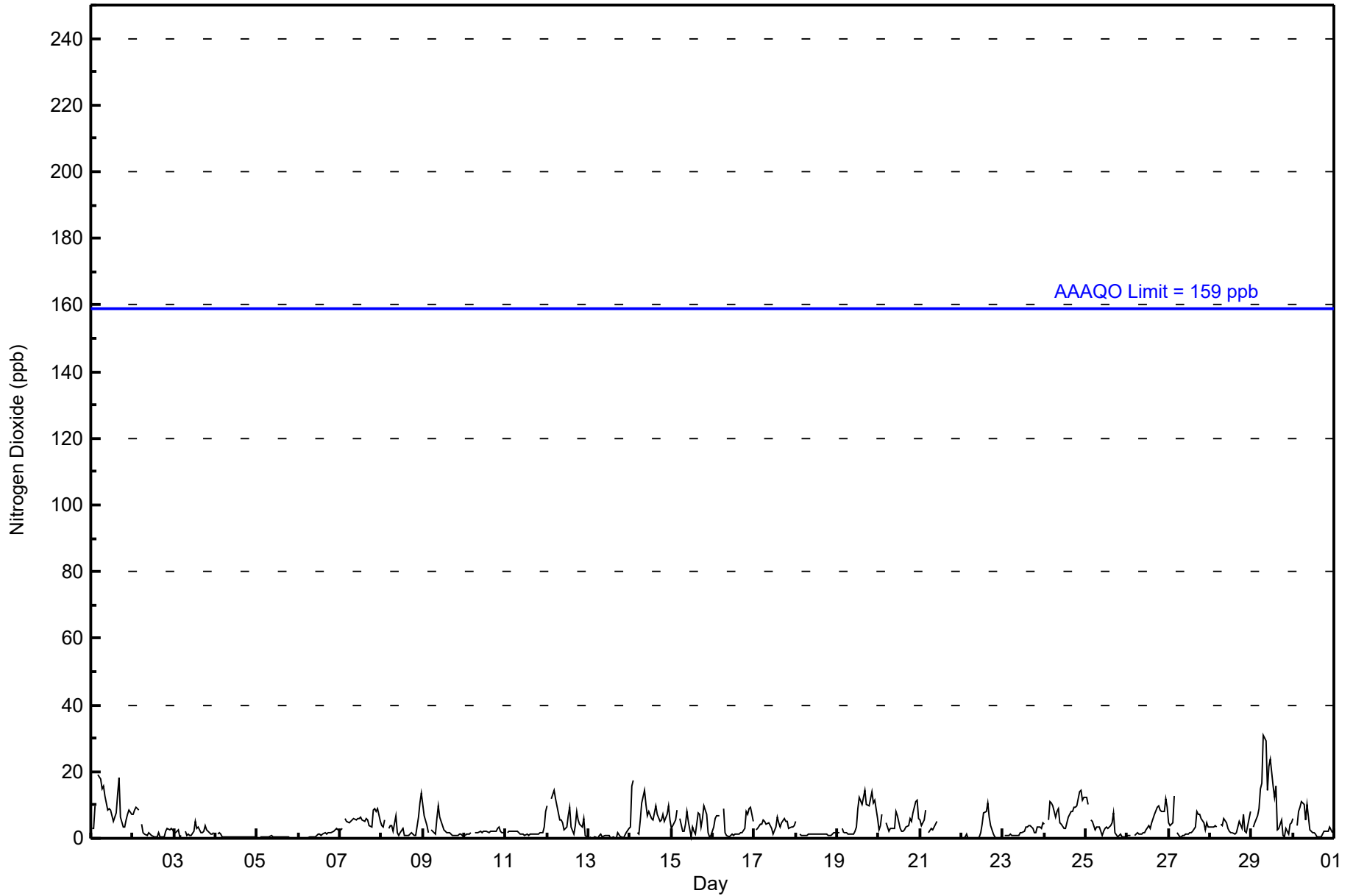
## Wapasu - November 2023

Number of Exceedences (AAAQO):		1-hr: 0		24-hr: 0		Hours in Service:		720																																									
Maximum Value: 31.0 ppb on Nov 29 08:00		Maximum Daily Average: 10.6 ppb on Nov 29		Minimum Value: 0.1 ppb on Nov 21 18:00		Minimum Daily Average: 0.4 ppb on Nov 5		Hours of Data: 685																																									
Maximum Diurnal Average: 4.7 ppb at hour 4		Minimum Diurnal Average: 3.2 ppb at hour 19		Hours of Missing Data: 35		Hours of Calibration: 35		Percent Operational Time: 100.0																																									
Monthly Average: 3.89 ppb		Percentiles: P <sub>1</sub> = 0.1 P <sub>10</sub> = 0.4 Q <sub>1</sub> = 1.1 Median = 2.5 Q <sub>3</sub> = 5.6 P <sub>90</sub> = 9.4 P <sub>99</sub> = 17.6																																															
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Nov	3.0	2.9	9.8	Z	18.9	17.9	14.8	15.5	12.8	8.3	8.9	8.6	6.7	5.2	7.6	13.0	18.2	6.2	3.3	3.6	5.4	7.0	8.3	7.4	9.3	18.9																							
2-Nov	7.1	8.5	9.5	8.4	Z	4.1	1.6	1.2	0.7	1.7	1.3	0.7	0.6	0.4	0.6	1.5	0.4	0.4	0.5	2.0	2.8	2.6	2.8	2.7	2.7	9.5																							
3-Nov	1.6	1.5	2.7	0.5	0.7	Z	2.2	0.9	1.1	1.0	1.0	2.0	5.1	2.9	3.4	1.8	1.7	2.1	3.9	2.4	1.5	1.4	1.4	1.9	1.9	5.1																							
4-Nov	Z	1.4	1.5	1.2	0.5	0.4	0.4	0.6	0.4	0.4	0.4	0.3	0.4	0.5	0.5	0.4	0.5	0.6	0.4	0.4	0.3	0.3	0.3	0.3	0.5	1.5																							
5-Nov	0.3	Z	0.3	0.4	0.4	0.3	0.3	0.3	0.3	0.9	0.5	0.5	0.4	0.4	0.6	0.5	0.3	0.4	0.4	0.2	0.2	0.2	0.2	0.2	0.4	0.9																							
6-Nov	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.4	0.6	0.4	0.4	1.1	1.1	1.0	1.4	1.5	1.4	1.5	1.5	1.8	2.1	2.7	2.9	2.7	1.1	2.9																							
7-Nov	2.4	3.0	Z	5.9	4.9	4.5	5.1	5.7	5.8	5.4	5.9	5.9	6.5	5.4	5.0	6.0	5.4	3.7	3.5	8.6	8.9	8.1	9.1	4.9	5.6	9.1																							
8-Nov	3.8	3.4	5.5	Z	2.8	3.8	3.9	2.2	6.9	1.9	0.8	1.6	2.8	0.8	0.7	0.7	0.7	1.6	1.4	0.8	0.9	6.3	10.6	13.4	3.4	13.4																							
9-Nov	10.0	6.6	3.8	1.8	Z	2.6	1.9	1.1	6.0	9.7	6.3	3.9	2.7	2.1	1.9	1.6	1.4	0.8	1.0	0.8	0.8	1.3	1.2	0.9	3.1	10.0																							
10-Nov	1.0	1.1	1.2	1.4	1.7	Z	1.9	1.9	1.8	2.1	1.8	2.1	2.1	2.0	1.7	2.2	2.2	2.1	2.0	3.0	3.3	2.3	1.9	1.8	1.9	3.3																							
11-Nov	Z	1.6	2.3	2.2	2.2	2.0	2.0	2.0	1.3	1.2	1.1	1.0	1.1	1.0	1.1	1.1	1.4	1.2	1.2	1.2	1.7	1.9	3.2	8.1	1.9	8.1																							
12-Nov	9.8	Z	11.7	13.2	14.3	11.8	7.5	5.4	5.3	4.7	2.4	3.3	6.6	9.5	3.2	1.4	3.9	8.0	5.7	4.3	3.3	5.9	1.0	0.3	6.2	14.3																							
13-Nov	0.2	0.3	Z	0.3	0.3	0.2	0.8	1.1	0.4	0.7	0.9	0.9	0.7	0.2	0.4	0.2	0.2	1.9	0.3	0.3	0.2	0.9	1.7	3.0	0.7	3.0																							
14-Nov	3.3	15.5	17.5	Z	1.6	1.1	5.6	10.5	14.2	10.3	6.9	7.9	5.8	5.6	7.7	9.6	7.1	5.1	5.4	7.1	5.1	7.2	9.7	5.6	7.6	17.5																							
15-Nov	3.0	3.7	5.7	8.5	Z	6.1	2.0	2.2	4.1	8.2	5.0	0.3	3.5	2.1	1.4	7.8	7.2	3.4	6.1	9.6	7.2	1.5	0.5	0.9	4.3	9.6																							
16-Nov	3.2	5.8	6.8	6.8	6.9	Z	8.9	1.6	0.7	0.5	0.9	1.1	1.0	1.2	1.3	1.3	1.5	1.6	2.8	8.1	7.2	8.9	9.3	5.2	4.0	9.3																							
17-Nov	Z	2.7	3.0	4.3	4.3	5.5	4.9	4.1	4.5	3.8	2.9	1.4	3.5	6.5	4.5	3.5	4.8	6.0	5.0	5.2	3.1	3.4	3.3	4.0	4.1	6.5																							
18-Nov	5.1	Z	1.4	0.8	0.7	0.9	0.9	1.1	1.1	1.1	1.2	1.2	1.1	1.3	1.1	1.1	1.3	1.1	1.1	1.0	1.0	1.4	1.5	1.8	1.3	5.1																							
19-Nov	1.8	1.8	Z	3.1	1.9	1.7	1.4	1.3	1.1	1.4	2.1	3.6	8.8	12.1	10.1	12.2	14.2	10.3	9.7	11.8	14.1	10.8	11.3	5.8	6.6	14.2																							
20-Nov	2.4	3.9	7.3	Z	4.5	3.2	2.1	3.1	2.8	3.0	8.0	6.9	2.8	2.2	2.2	2.4	3.4	3.9	6.0	5.1	7.6	11.2	11.4	6.0	4.8	11.4																							
21-Nov	5.5	3.9	5.4	8.4	Z	1.7	2.9	2.6	3.6	4.2	4.9	C	C	C	C	C	C	0.1	0.1	0.1	0.1	0.1	0.1	0.1	--	8.4																							
22-Nov	0.2	0.2	0.5	1.4	0.1	Z	0.1	0.1	0.2	0.2	0.4	1.7	4.1	7.5	7.9	10.7	6.5	4.0	1.1	0.4	0.2	0.2	0.2	0.5	2.1	10.7																							
23-Nov	Z	0.8	0.7	1.0	1.3	1.0	0.7	0.9	1.0	1.0	1.7	1.6	2.3	3.2	3.5	4.0	3.8	3.0	1.7	1.7	3.2	3.6	3.0	4.7	2.1	4.7																							
24-Nov	4.2	Z	5.7	11.0	10.4	9.6	6.2	8.1	8.9	4.7	4.3	3.1	2.9	4.5	6.2	8.1	8.1	9.3	9.5	9.7	13.9	14.2	11.4	12.4	8.1	14.2																							
25-Nov	12.2	10.3	Z	5.6	5.1	2.6	3.2	3.4	3.4	0.9	2.2	2.8	3.2	2.9	3.7	4.6	7.8	1.8	0.4	0.7	1.1	0.4	0.3	0.6	3.4	12.2																							
26-Nov	0.8	0.9	1.0	Z	0.8	1.4	1.5	1.4	1.4	1.9	1.7	2.7	3.8	3.0	4.7	5.8	7.1	9.5	9.8	8.3	7.9	8.2	11.8	9.4	4.6	11.8																							
27-Nov	4.8	4.0	4.7	12.7	Z	1.5	0.5	0.6	0.8	0.9	1.3	1.3	1.6	1.6	2.2	3.5	7.9	7.1	7.1	6.0	4.8	2.6	4.5	3.5	3.7	12.7																							
28-Nov	3.4	3.5	3.6	3.8	3.3	Z	4.1	3.9	6.0	4.7	3.0	2.2	1.7	1.8	1.3	1.6	3.2	4.9	3.1	7.2	2.3	1.6	3.7	8.0	3.6	8.0																							
29-Nov	Z	3.2	4.6	6.7	9.0	15.0	16.5	31.0	29.3	14.3	21.4	23.7	15.8	12.3	15.6	2.7	2.8	5.6	1.0	0.5	3.0	1.4	4.4	4.5	10.6	31.0																							
30-Nov	5.8	Z	4.0	7.9	9.2	10.9	10.2	5.5	10.2	6.4	2.5	1.5	1.7	1.1	0.3	0.5	0.5	1.3	2.1	2.1	2.2	3.4	2.4	1.8	4.1	10.9																							
																								3.8	3.6	4.6	4.7	4.2	4.4	3.8	4.0	4.6	3.5	3.4	3.3	3.5	3.5	3.5	3.8	4.3	3.6	3.2	3.8	3.9	4.0	4.4	4.1	Diurnal Average	
																								12.2	15.5	17.5	13.2	18.9	17.9	16.5	31.0	29.3	14.3	21.4	23.7	15.8	12.3	15.6	13.0	18.2	10.3	9.8	11.8	14.1	14.2	11.8	13.4	Diurnal Maximum	
Z - zerospan C - Calibration																																																	
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 159 ppb																																																	



Wood Buffalo Environmental Association  
Hourly Averages

Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Wapasu - November 2023





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

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb**  
**Wapasu - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	681	99.42	99.42
21 - 40	4	0.58	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Wapasu - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	42	16	11	8	19	25	61	113	111	57	84	22	19	24	20	47	679
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	2	1	1	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
<b>Totals</b>	42	16	11	8	19	25	61	113	111	57	84	22	21	25	21	47	683

Total Number of Valid Hours: 683

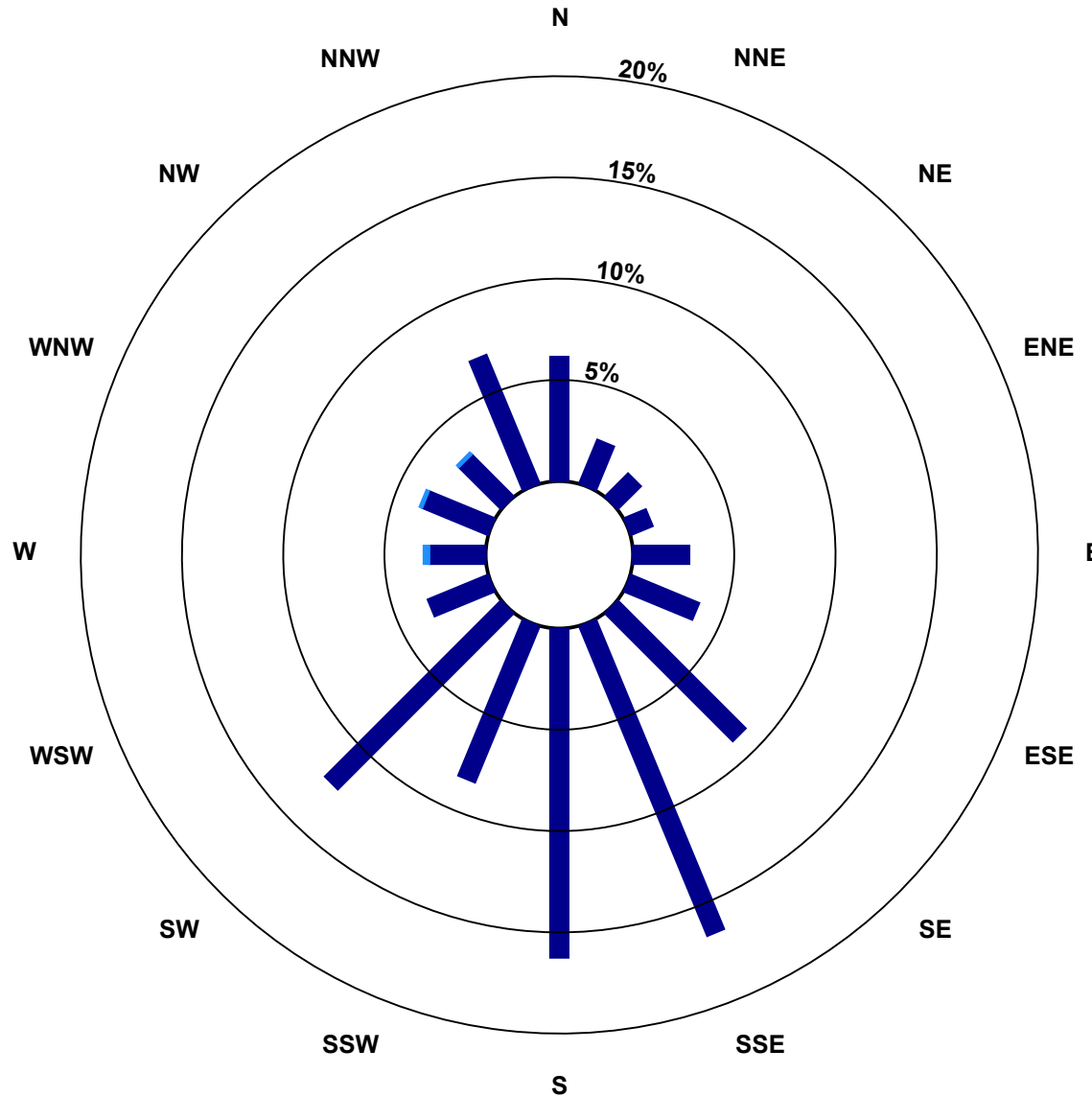
Total Number of Hours: 720



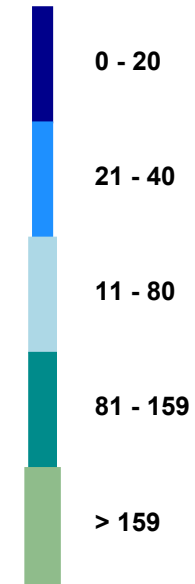


Wood Buffalo Environmental Association  
Wind Rose Nov 2023

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



Classes (ppb)

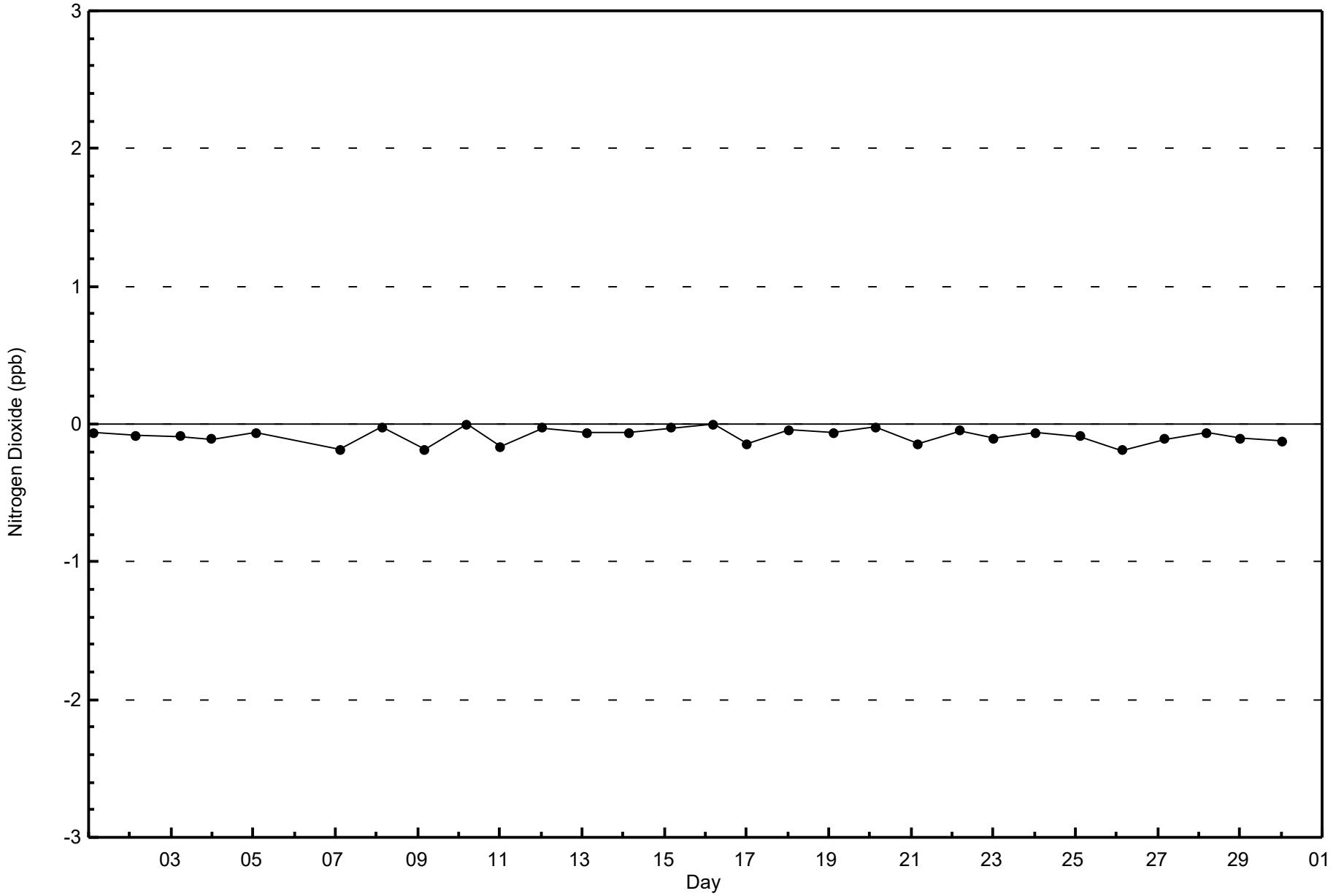


Total Number of Valid Hours: 683



**Wood Buffalo Environmental Association**  
**Zero Responses**

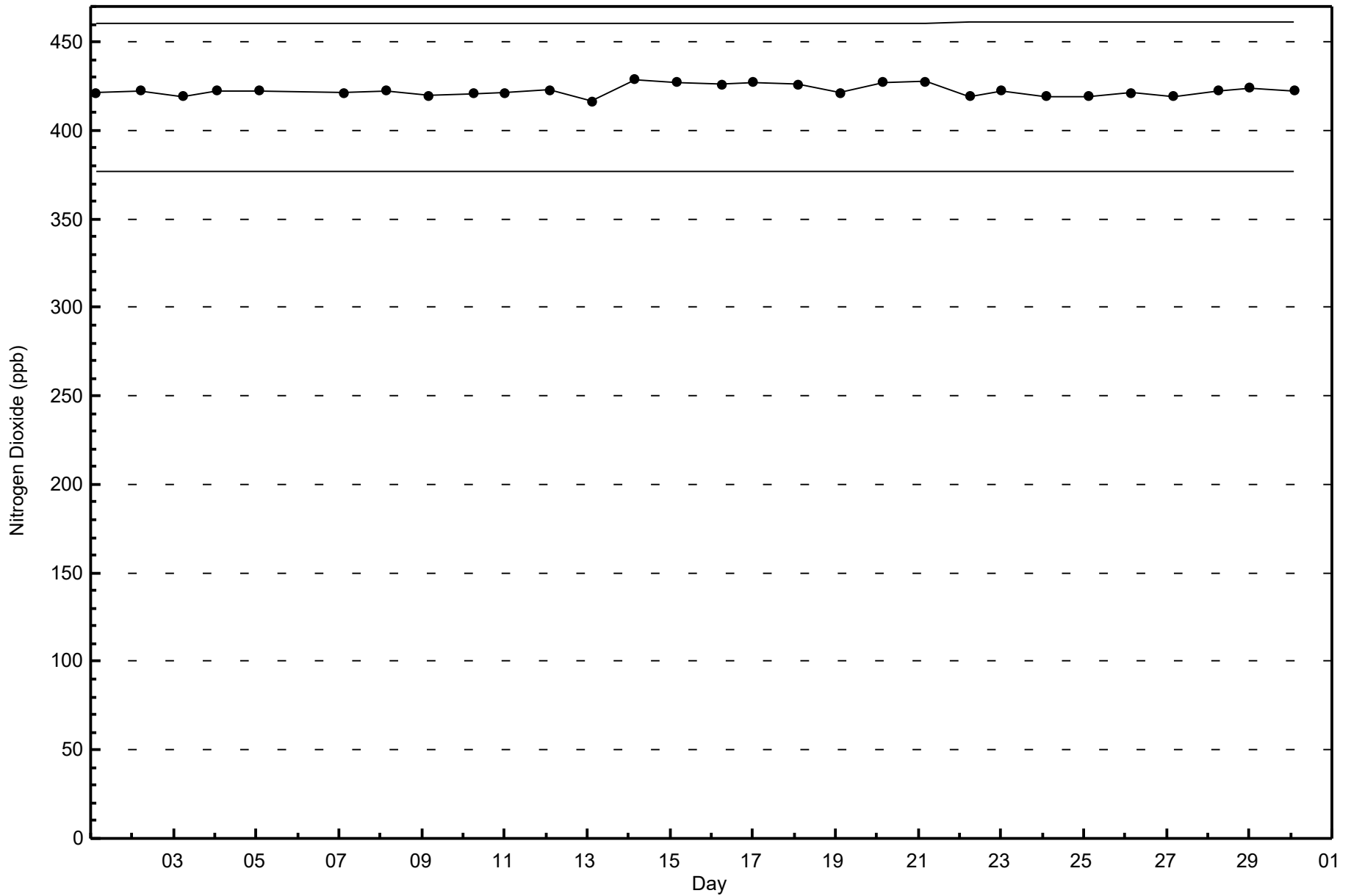
**Nitrogen Dioxide (NO<sub>2</sub>) - ppb**  
**Wapasu - November 2023**





Wood Buffalo Environmental Association  
Span Responses

Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Wapasu - November 2023





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

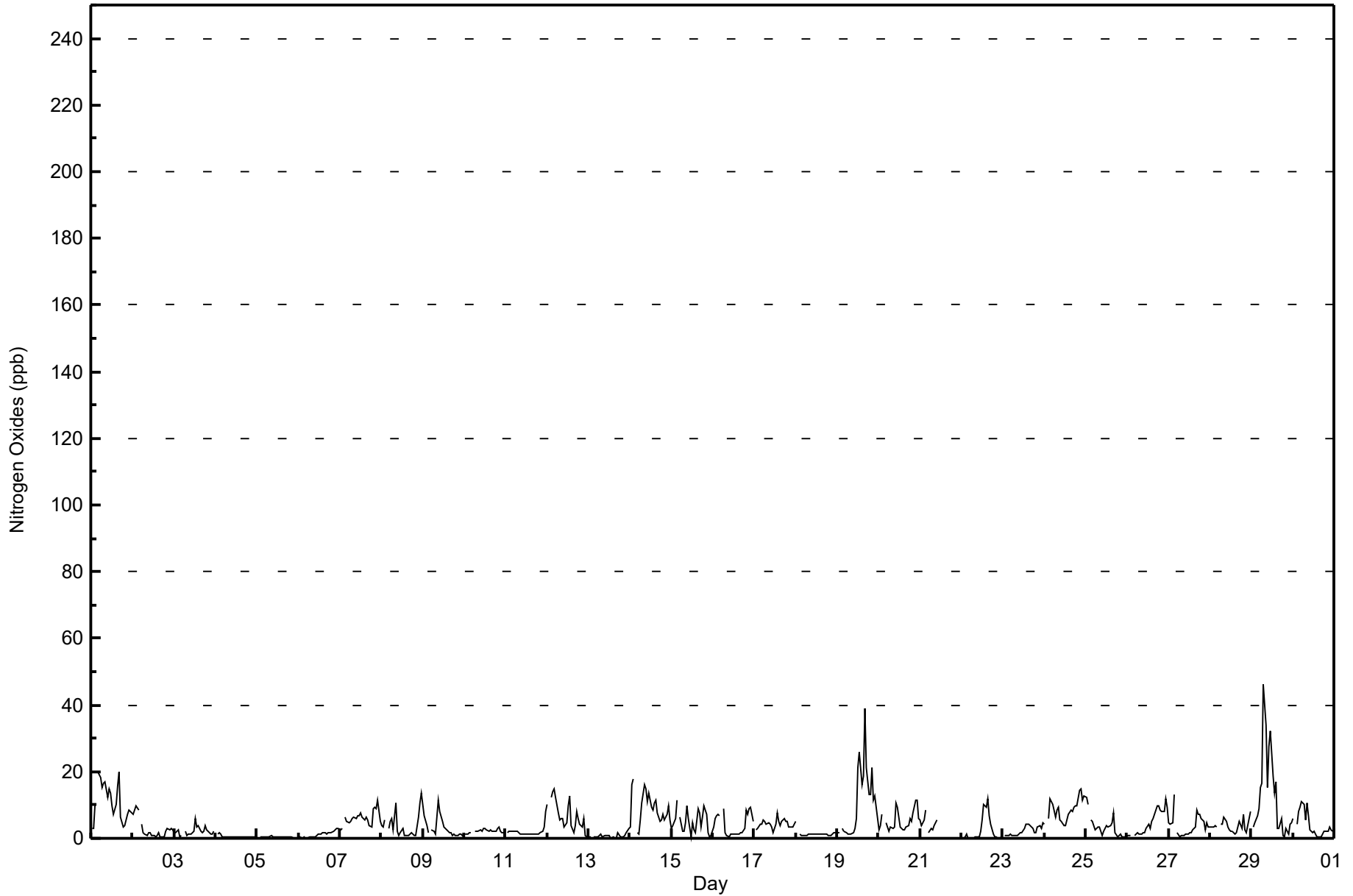
**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Wapasu - November 2023**

Maximum Value: 46.4 ppb on Nov 29 08:00																						Maximum Daily Average: 12.5 ppb on Nov 29																						Hours in Service: 720	
Minimum Value: 0.1 ppb on Nov 21 21:00																						Minimum Daily Average: 0.4 ppb on Nov 5																						Hours of Data: 685	
Maximum Diurnal Average: 5.3 ppb at hour 17																						Minimum Diurnal Average: 3.4 ppb at hour 19																						Hours of Missing Data: 35	
Monthly Average: 4.35 ppb																						Percentiles: P <sub>1</sub> = 0.2 P <sub>10</sub> = 0.4 Q <sub>1</sub> = 1.1 Median = 2.7 Q <sub>3</sub> = 5.8 P <sub>90</sub> = 10.2 P <sub>99</sub> = 21.2																						Hours of Calibration: 35	
																						Percent Operational Time: 100.0																							
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																					
1-Nov	3.1	3.0	10.0	Z	19.8	18.4	15.3	16.5	17.0	12.4	14.7	13.4	9.8	7.4	10.0	15.5	20.0	6.4	3.4	3.7	5.6	7.1	8.4	7.5	10.8	20.0																			
2-Nov	7.2	8.6	9.6	8.5	Z	4.2	1.7	1.2	0.8	1.9	1.5	0.8	0.7	0.5	0.7	1.6	0.5	0.4	0.5	2.0	2.8	2.6	2.9	2.7	2.8	9.6																			
3-Nov	1.6	1.5	2.7	0.5	0.7	Z	2.2	0.9	1.1	1.1	1.1	2.2	5.8	3.4	3.9	2.0	1.8	2.1	4.0	2.5	1.6	1.4	1.5	2.0	2.1	5.8																			
4-Nov	Z	1.4	1.5	1.2	0.5	0.4	0.4	0.6	0.5	0.4	0.4	0.3	0.4	0.5	0.5	0.4	0.5	0.6	0.4	0.4	0.3	0.3	0.3	0.3	0.6	1.5																			
5-Nov	0.3	Z	0.3	0.4	0.4	0.3	0.3	0.3	0.3	0.9	0.5	0.5	0.4	0.4	0.6	0.5	0.3	0.4	0.4	0.4	0.2	0.2	0.2	0.2	0.4	0.9																			
6-Nov	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.4	0.6	0.4	0.4	1.4	1.4	1.2	1.7	1.6	1.4	1.5	1.5	1.8	2.1	2.8	3.1	2.8	1.1	3.1																			
7-Nov	2.4	3.1	Z	6.3	5.1	4.6	5.2	6.0	6.2	6.0	6.8	6.8	7.7	6.3	5.5	6.3	5.5	3.7	3.5	9.0	9.3	9.0	11.3	5.1	6.1	11.3																			
8-Nov	3.8	3.4	5.6	Z	2.9	5.0	5.9	2.4	10.6	2.1	0.8	1.8	3.1	0.8	0.7	0.7	0.7	1.6	1.4	0.8	0.9	6.3	10.6	13.5	3.7	13.5																			
9-Nov	10.0	6.6	3.8	1.8	Z	2.6	1.9	1.1	6.4	11.6	8.0	5.1	3.6	2.9	2.5	1.8	1.5	0.9	1.1	0.9	0.8	1.4	1.3	1.0	3.4	11.6																			
10-Nov	1.1	1.2	1.3	1.5	1.8	Z	2.0	2.0	2.0	2.6	2.3	2.8	2.9	2.6	2.1	2.4	2.3	2.1	2.0	3.0	3.3	2.3	1.9	1.8	2.2	3.3																			
11-Nov	Z	1.6	2.3	2.2	2.2	2.0	2.0	2.0	1.3	1.2	1.1	1.1	1.1	1.1	1.2	1.2	1.4	1.2	1.2	1.2	1.8	2.0	3.3	8.2	1.9	8.2																			
12-Nov	10.0	Z	12.2	14.0	15.0	12.3	7.6	5.5	5.8	5.8	3.2	4.8	9.6	12.9	4.0	1.5	4.0	8.1	5.8	4.4	3.4	6.0	1.0	0.3	6.8	15.0																			
13-Nov	0.2	0.3	Z	0.3	0.3	0.2	0.8	1.1	0.4	0.7	1.0	1.0	0.8	0.2	0.4	0.2	0.2	1.9	0.3	0.3	0.2	0.9	1.7	3.0	0.7	3.0																			
14-Nov	3.4	16.3	17.7	Z	1.6	1.1	5.6	10.7	16.2	14.8	10.9	13.7	9.4	8.5	10.4	11.4	7.7	5.2	5.5	7.3	5.3	7.3	9.8	5.7	8.9	17.7																			
15-Nov	3.1	3.8	5.8	11.6	Z	6.2	2.1	2.3	4.6	9.6	6.1	0.5	4.5	2.7	1.6	8.7	7.6	3.5	6.2	9.7	7.3	1.6	0.6	0.9	4.8	11.6																			
16-Nov	3.3	5.9	6.9	7.0	7.0	Z	9.0	1.7	0.7	0.5	1.1	1.4	1.3	1.4	1.5	1.3	1.5	1.6	2.8	8.4	7.3	9.1	9.5	5.2	4.2	9.5																			
17-Nov	Z	2.7	3.0	4.3	4.3	5.5	4.9	4.1	4.7	4.4	3.6	1.7	4.1	7.6	4.9	3.7	4.9	6.0	5.1	5.3	3.2	3.5	3.3	4.1	4.3	7.6																			
18-Nov	5.1	Z	1.4	0.8	0.7	0.9	0.9	1.1	1.1	1.2	1.4	1.4	1.3	1.4	1.2	1.1	1.3	1.1	1.1	1.0	1.0	1.4	1.5	1.8	1.4	5.1																			
19-Nov	1.8	1.8	Z	3.1	1.9	1.7	1.4	1.3	1.2	1.8	2.8	6.0	21.2	25.7	16.0	18.7	39.0	21.0	13.3	13.2	21.2	11.6	12.6	5.8	10.6	39.0																			
20-Nov	2.4	4.0	7.4	Z	4.5	3.3	2.2	3.2	2.9	3.4	10.4	9.4	3.6	2.8	2.6	2.5	3.4	3.9	6.1	5.1	7.6	11.3	11.5	6.1	5.2	11.5																			
21-Nov	5.5	3.9	5.4	8.4	Z	1.7	2.9	2.6	3.7	4.5	5.4	C	C	C	C	C	C	0.1	0.1	0.1	0.1	0.1	0.1	0.1	--	8.4																			
22-Nov	0.2	0.2	0.5	1.4	0.2	Z	0.2	0.2	0.2	0.2	0.5	2.3	5.7	10.2	9.5	11.8	6.6	4.1	1.1	0.4	0.2	0.2	0.2	0.5	2.5	11.8																			
23-Nov	Z	0.8	0.7	1.0	1.3	1.0	0.7	0.9	1.0	1.1	1.9	1.8	2.8	4.0	4.1	4.3	3.9	3.0	1.7	1.8	3.2	3.7	3.0	4.8	2.3	4.8																			
24-Nov	4.3	Z	5.9	11.8	11.0	10.2	6.3	8.4	9.4	5.3	5.3	4.0	3.7	5.7	7.2	8.6	8.2	9.5	9.8	9.9	14.3	14.6	11.6	12.6	8.6	14.6																			
25-Nov	12.4	10.3	Z	5.6	5.1	2.6	3.2	3.4	3.4	0.9	2.3	3.1	3.8	3.3	4.0	4.7	7.8	1.8	0.4	0.7	1.1	0.4	0.3	0.6	3.5	12.4																			
26-Nov	0.8	0.9	1.0	Z	0.8	1.4	1.5	1.4	1.4	1.9	1.8	2.9	4.1	3.2	5.0	5.9	7.1	9.6	9.9	8.4	7.9	8.2	11.8	9.4	4.6	11.8																			
27-Nov	4.8	4.0	4.7	12.9	Z	1.5	0.5	0.6	0.8	0.9	1.3	1.5	1.7	1.7	2.3	3.6	8.3	7.1	7.2	6.1	4.9	2.6	4.5	3.5	3.8	12.9																			
28-Nov	3.5	3.5	3.6	3.9	3.3	Z	4.1	4.0	6.2	5.1	3.5	2.7	2.1	2.0	1.4	1.9	3.3	5.0	3.2	7.4	2.4	1.6	3.8	8.1	3.7	8.1																			
29-Nov	Z	3.3	4.7	6.8	9.1	15.1	16.6	46.4	34.0	15.2	27.7	32.2	18.7	13.5	16.9	2.8	2.8	5.7	1.0	0.5	3.1	1.4	4.4	4.5	12.5	46.4																			
30-Nov	5.8	Z	4.1	8.0	9.3	11.0	10.3	5.6	10.4	6.7	2.7	1.6	1.9	1.2	0.4	0.5	0.5	1.3	2.2	2.1	2.2	3.5	2.5	1.9	4.2	11.0																			
																								Diurnal Average																					
																								Diurnal Maximum																					
																								Z - zerospan C - Calibration																					



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

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Wapasu - November 2023**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Wapasu - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	676	98.69	98.69
21 - 40	8	1.17	99.85
41 - 80	1	0.15	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Wapasu - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 20	42	15	11	8	19	25	61	113	109	57	84	22	18	24	19	47	674
21 - 40	0	1	0	0	0	0	0	0	2	0	0	0	3	0	2	0	8
41 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	42	16	11	8	19	25	61	113	111	57	84	22	21	25	21	47	683

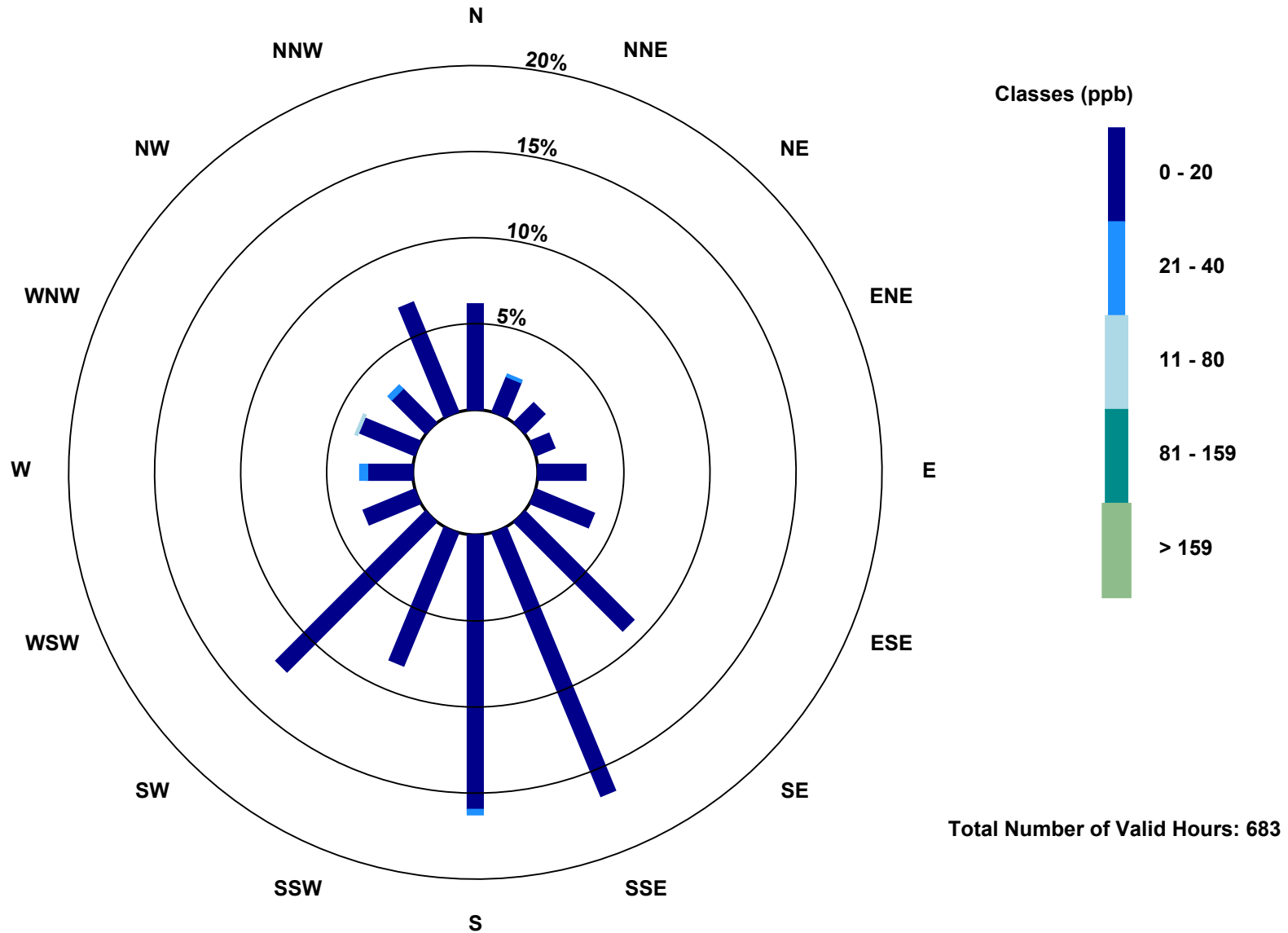
Total Number of Valid Hours: 683

Total Number of Hours: 720

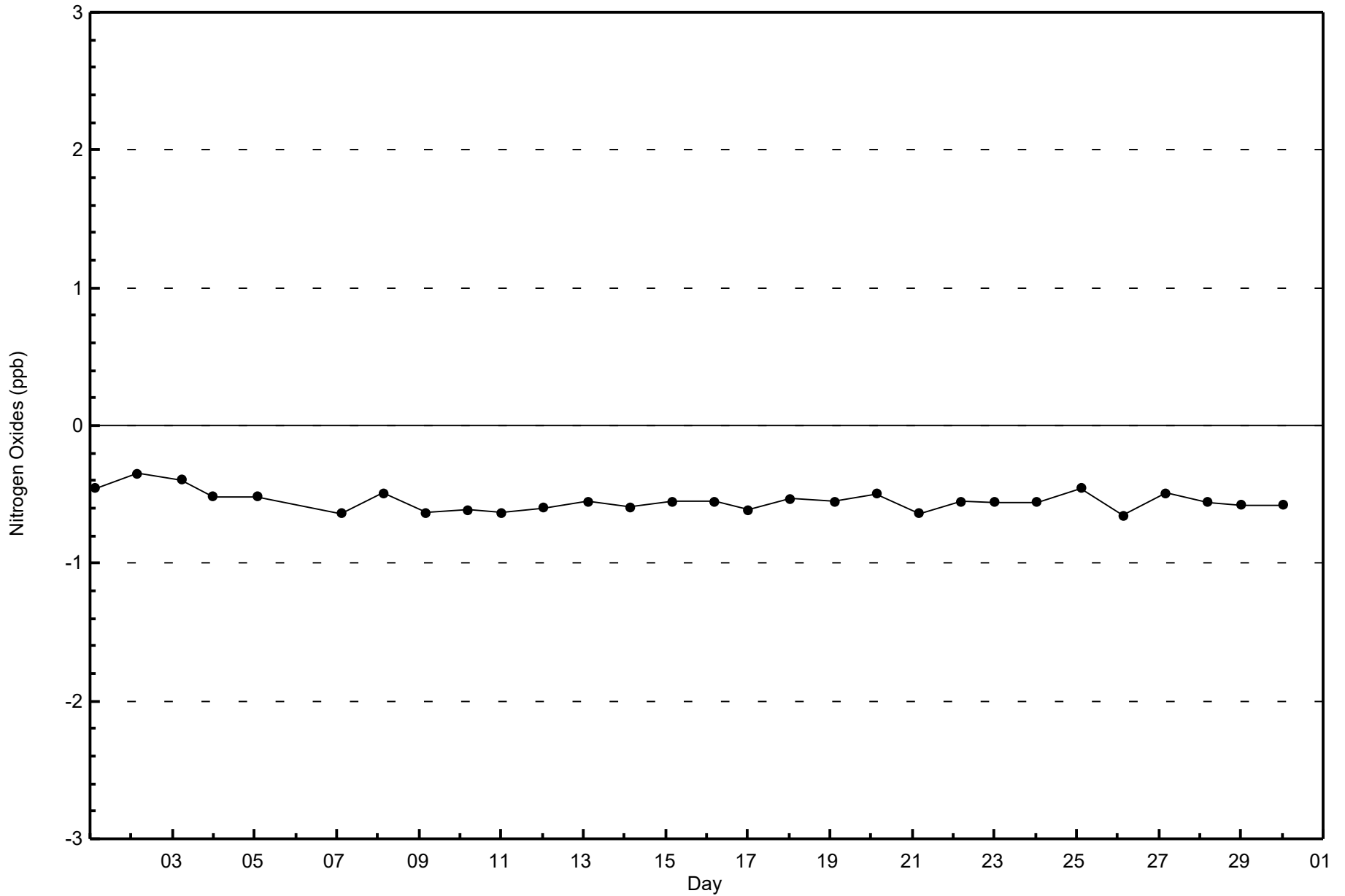


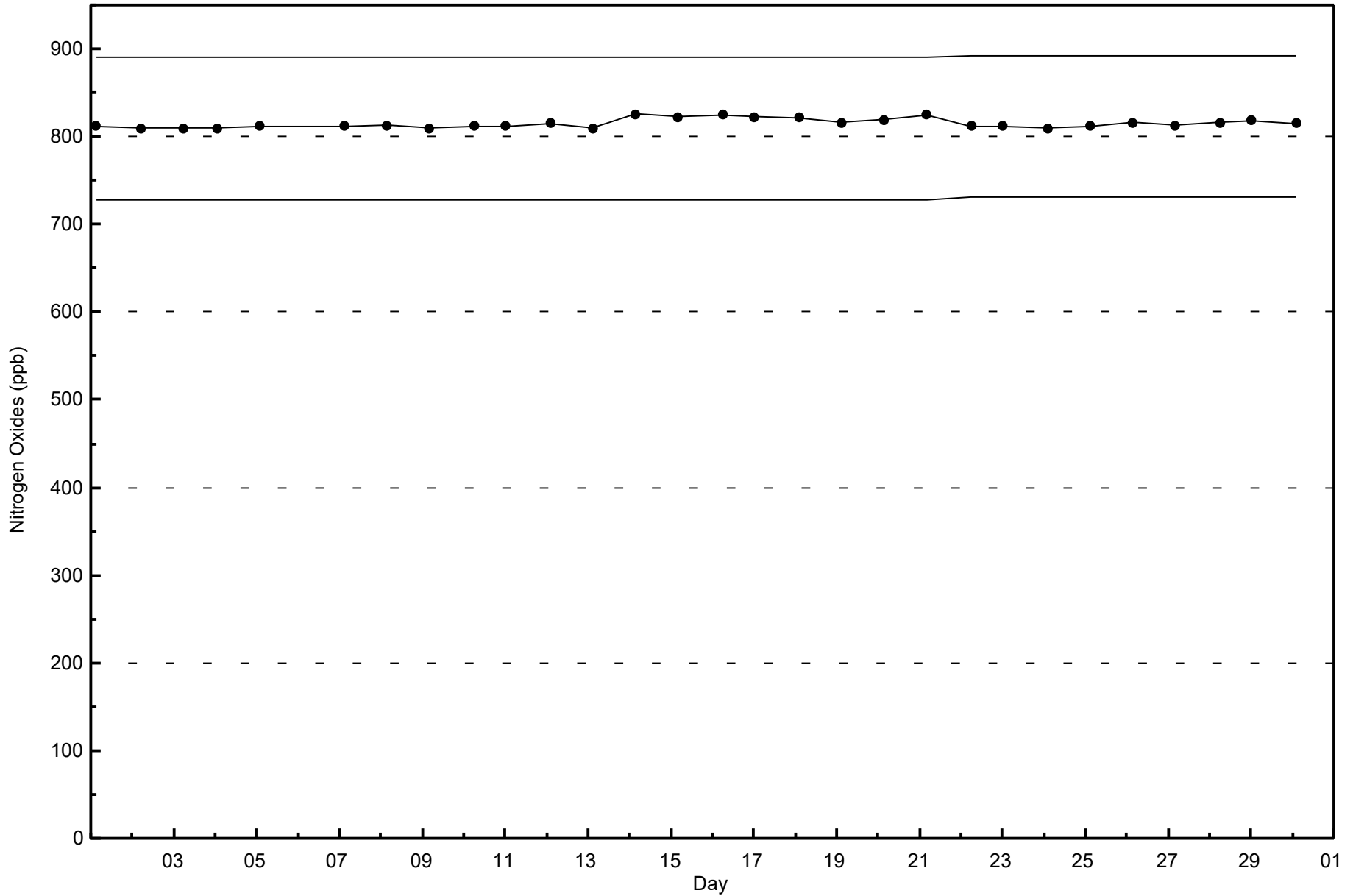
Wood Buffalo Environmental Association  
Wind Rose Nov 2023

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



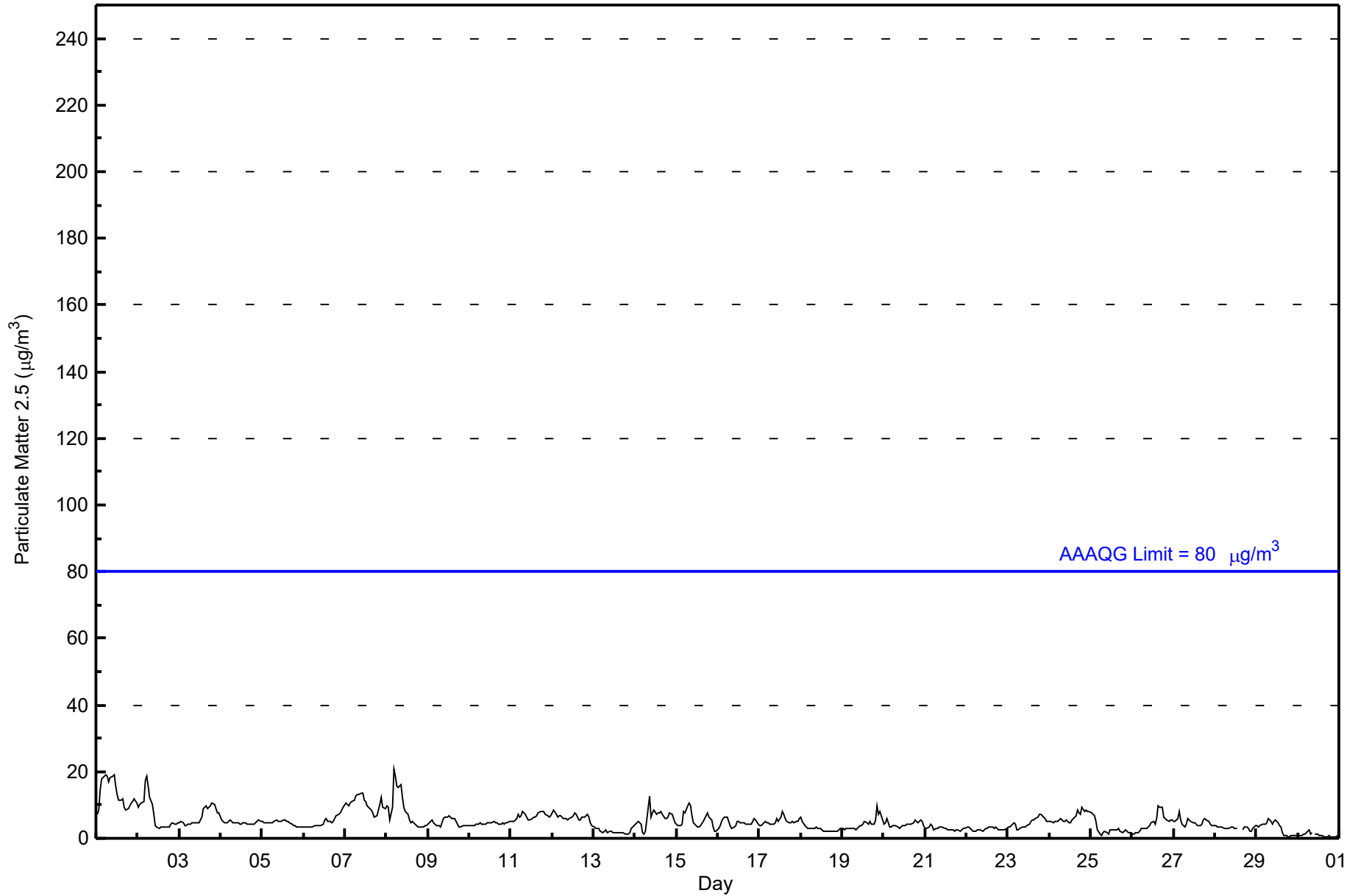








Number of Exceedences (AAAQO):		1-hr: 0	24-hr: 0	Hours in Service: 720																	720																												
Maximum Value: 20.7 µg/m <sup>3</sup> on Nov 8 05:00		Maximum Daily Average: 13.4 µg/m <sup>3</sup> on Nov 1																	Hours of Data: 717																														
Minimum Value: 0.5 µg/m <sup>3</sup> on Nov 30 23:00		Minimum Daily Average: 1.0 µg/m <sup>3</sup> on Nov 30																	Hours of Missing Data: 3																														
Maximum Diurnal Average: 5.8 µg/m <sup>3</sup> at hour 9		Minimum Diurnal Average: 4.7 µg/m <sup>3</sup> at hour 24																	Hours of Calibration: 2																														
Monthly Average: 5.13 µg/m <sup>3</sup>		Percentiles: P <sub>1</sub> = 0.6 P <sub>10</sub> = 2.1 Q <sub>1</sub> = 3.2 Median = 4.5 Q <sub>3</sub> = 6.1 P <sub>90</sub> = 9.1 P <sub>99</sub> = 18.4																	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-Nov	7.3	8.4	14.4	17.6	18.4	19.1	18.8	17.1	18.1	18.5	19.1	15.6	12.9	11.6	11.6	11.8	9.2	8.5	9.1	9.7	10.6	10.9	11.7	10.8	13.4	19.1																							
2-Nov	9.4	10.1	10.6	10.9	17.5	18.6	15.7	12.5	10.0	7.4	3.9	3.4	3.0	3.3	3.3	3.4	3.5	3.5	3.4	4.1	4.6	4.4	4.4	4.7	7.3	18.6																							
3-Nov	4.6	5.2	4.6	3.7	3.9	4.2	4.2	4.5	4.7	4.7	4.7	4.6	5.7	6.2	9.0	9.9	9.0	9.4	9.8	10.8	10.2	9.1	7.6	7.5	6.6	10.8																							
4-Nov	5.6	5.1	4.7	4.6	4.6	5.5	5.1	4.6	4.5	4.6	4.6	4.3	4.4	4.6	4.5	4.2	4.2	4.2	4.1	4.3	4.5	5.0	5.4	5.2	4.7	5.6																							
5-Nov	5.0	4.7	4.7	4.5	4.6	4.6	4.7	4.9	5.7	5.2	5.2	5.1	5.3	5.3	4.5	4.9	4.5	4.5	4.2	4.0	3.7	3.5	3.4	3.2	3.3	4.6	5.7																						
6-Nov	3.4	3.4	3.2	3.4	3.3	3.5	3.9	3.9	3.8	3.7	3.7	4.0	5.6	5.8	5.3	5.0	4.8	5.2	6.1	6.6	7.2	7.7	8.6	9.3	5.0	9.3																							
7-Nov	10.5	10.1	9.6	10.8	11.2	11.5	12.9	13.2	13.0	13.6	13.7	11.5	11.1	9.7	8.8	8.5	7.5	6.4	6.7	8.3	10.4	12.4	9.4	8.8	10.4	13.7																							
8-Nov	9.6	9.2	5.4	9.2	20.7	18.5	15.7	15.2	16.0	12.2	9.3	7.9	7.1	5.4	4.7	5.0	4.6	3.9	3.5	3.4	3.4	3.6	3.8	3.9	8.4	20.7																							
9-Nov	4.2	4.8	5.5	4.8	4.2	3.9	3.8	3.5	4.5	5.8	6.2	6.3	6.8	6.5	5.9	5.7	5.0	4.1	3.6	3.5	3.6	3.7	3.6	3.6	4.7	6.8																							
10-Nov	3.8	3.8	3.8	4.0	4.3	4.4	4.6	4.4	4.2	4.3	4.5	4.7	4.8	4.8	4.9	4.8	4.5	4.3	4.2	4.5	4.4	4.5	4.7	5.0	4.4	5.0																							
11-Nov	5.1	4.9	5.0	6.1	7.2	6.5	6.8	7.9	7.3	6.3	5.7	5.7	6.1	6.3	6.5	6.7	7.4	7.9	7.9	7.9	7.4	6.7	6.3	7.0	6.6	7.9																							
12-Nov	7.5	8.4	7.2	6.3	6.6	6.7	6.1	6.1	5.8	5.6	6.0	6.2	6.8	7.8	7.3	5.6	5.3	6.3	6.2	6.5	7.2	6.3	4.5	3.8	6.3	8.4																							
13-Nov	3.2	3.1	3.1	2.9	2.0	1.9	2.1	2.5	1.8	2.1	2.0	1.7	1.8	1.7	1.8	1.7	1.6	1.8	1.5	1.4	1.4	1.8	2.9	3.9	2.2	3.9																							
14-Nov	4.4	4.9	4.9	4.2	1.7	1.3	2.2	5.7	12.8	6.4	7.6	8.4	7.4	7.5	7.6	7.9	7.3	6.1	5.7	6.5	7.8	7.1	6.1	4.8	6.1	12.8																							
15-Nov	4.1	3.8	3.8	4.1	7.9	7.6	9.6	10.8	9.7	7.0	4.8	3.9	3.5	3.5	3.7	5.3	5.8	6.9	7.6	6.2	5.6	3.5	2.1	2.3	5.5	10.8																							
16-Nov	2.8	3.9	5.0	5.8	6.3	6.2	5.2	3.8	3.0	3.5	3.8	4.9	5.2	4.8	4.7	4.5	4.4	4.4	4.3	4.4	5.0	6.1	5.3	4.2	4.6	6.3																							
17-Nov	3.8	3.6	4.3	4.9	4.5	4.5	4.3	4.3	4.2	4.5	5.8	4.9	6.2	7.9	7.3	6.0	5.2	4.7	4.9	5.0	4.9	4.9	5.2	6.0	5.1	7.9																							
18-Nov	6.5	5.0	4.0	3.5	2.9	2.8	2.9	2.8	3.0	3.3	3.2	2.9	2.5	2.1	2.1	2.2	2.2	1.9	1.9	2.2	2.3	2.3	2.5	3.1	2.9	6.5																							
19-Nov	3.0	2.7	2.8	2.9	2.9	3.1	3.2	2.9	2.7	3.6	3.8	4.0	4.3	5.2	4.6	4.3	5.2	4.4	4.1	5.3	9.9	7.4	8.2	5.4	4.4	9.9																							
20-Nov	4.4	4.7	5.8	3.2	3.4	3.7	3.8	3.8	3.4	3.0	3.5	3.6	3.6	4.3	4.2	4.3	4.4	4.6	5.3	5.0	4.8	5.6	5.0	3.6	4.2	5.8																							
21-Nov	3.0	2.8	3.5	4.2	3.7	2.7	2.9	2.9	3.3	3.5	3.3	3.1	2.9	2.4	2.5	2.4	2.4	2.3	2.4	2.4	2.3	2.4	2.9	3.1	2.9	4.2																							
22-Nov	3.2	3.2	2.9	2.7	2.1	2.2	2.4	2.5	2.5	2.3	2.5	2.8	3.1	3.5	3.3	3.6	2.9	3.4	2.7	2.5	2.4	2.6	2.7	2.9	2.8	3.6																							
23-Nov	3.3	3.5	4.0	4.6	4.1	2.6	2.7	2.9	3.2	3.4	3.6	3.8	4.4	5.2	5.5	5.3	5.7	6.2	7.3	7.1	6.7	6.1	4.9	5.0	4.6	7.3																							
24-Nov	5.2	5.1	4.7	5.0	5.1	5.1	5.9	5.6	5.2	5.1	5.4	4.8	4.7	5.3	5.9	6.7	8.3	7.5	7.3	9.2	8.0	8.3	8.0	8.2	6.2	9.2																							
25-Nov	7.6	7.0	7.0	5.2	2.6	1.1	1.0	1.6	2.0	1.7	1.5	2.4	2.5	2.5	2.5	2.5	2.9	2.0	1.8	2.1	2.5	2.1	1.8	1.5	2.8	7.6																							
26-Nov	1.4	1.4	1.8	1.8	2.0	3.0	3.1	3.0	2.9	3.4	3.9	4.8	5.2	4.3	5.9	9.7	9.5	9.4	6.6	5.8	5.7	5.2	5.5	5.5	4.6	9.7																							
27-Nov	4.9	4.9	6.0	7.9	5.4	4.0	3.4	4.1	5.7	5.7	5.2	4.8	4.5	4.3	4.0	3.9	4.3	5.5	5.8	5.7	5.0	4.1	3.9	3.9	4.9	7.9																							
28-Nov	3.7	3.4	3.4	3.4	3.4	2.9	2.9	2.9	3.1	3.3	3.2	3.1	3.1	3.0	C	C	2.7	3.4	3.2	3.2	2.3	2.2	3.0	3.7	3.1	3.7																							
29-Nov	3.8	3.4	3.6	4.0	4.3	4.4	4.6	6.0	5.3	4.3	5.3	5.6	4.7	3.7	3.5	1.6	0.9	1.0	0.6	0.5	0.7	0.7	0.9	1.0	3.1	6.0																							
30-Nov	0.7	0.9	0.7	1.2	1.5	1.8	2.4	1.1	1.8	M	1.5	1.1	0.7	0.9	0.8	0.6	0.6	0.6	0.7	0.6	0.5	0.5	0.5	0.9	1.0	2.4																							
																								4.8	4.8	5.0	5.2	5.7	5.6	5.6	5.8	5.4	5.2	5.0	5.0	5.0	5.1	5.1	4.9	4.8	4.7	4.9	5.2	5.0	4.8	4.7	Diurnal Average		
																								10.5	10.1	14.4	17.6	20.7	19.1	18.8	17.1	18.1	18.5	19.1	15.6	12.9	11.6	11.6	11.8	9.5	9.4	9.8	10.8	10.6	12.4	11.7	10.8	Diurnal Maximum	
C - Calibration M - Maintenance																																																	
Alberta Ambient Air Quality Guideline/Objectives: 1-hr 80 µg/m <sup>3</sup> 24-hr 29 µg/m <sup>3</sup>																																																	





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

**Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$**   
**Wapasu - November 2023**

<b>Concentration Ranges (<math>\mu\text{g}/\text{m}^3</math>)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	494	68.90	68.90
6 - 15	207	28.87	97.77
16 - 25	16	2.23	100.00
26 - 80	0	0.00	100.00
> 81.0	0	0.00	100.00

Total Number of Valid Hours: 717

Total Number of Hours: 720



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

**Particulate Matter 2.5 (PM<sub>2.5</sub>) - μg/m<sup>3</sup>**  
**Wapasu - November 2023**

Concentration Ranges (μg/m <sup>3</sup> )	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	31	16	13	10	18	23	53	94	65	16	46	13	16	23	15	42	494
6 - 15	8	2	0	0	3	5	12	22	47	42	34	9	7	3	4	7	205
16 - 25	3	0	0	0	0	0	0	0	3	2	4	0	0	0	4	0	16
26 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 81.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	42	18	13	10	21	28	65	116	115	60	84	22	23	26	23	49	715

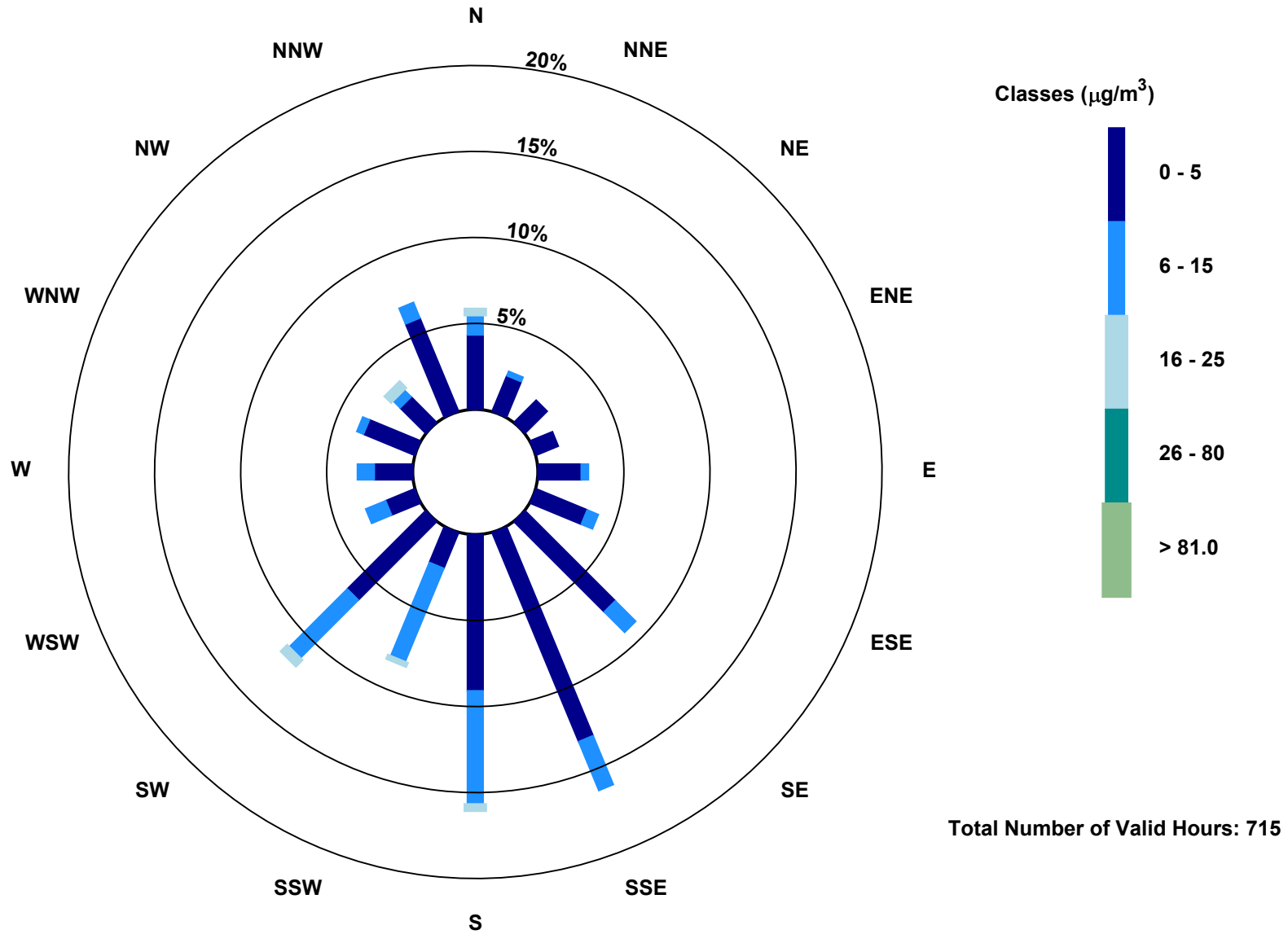
Total Number of Valid Hours: 715

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 2023

Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$   
Wapasu





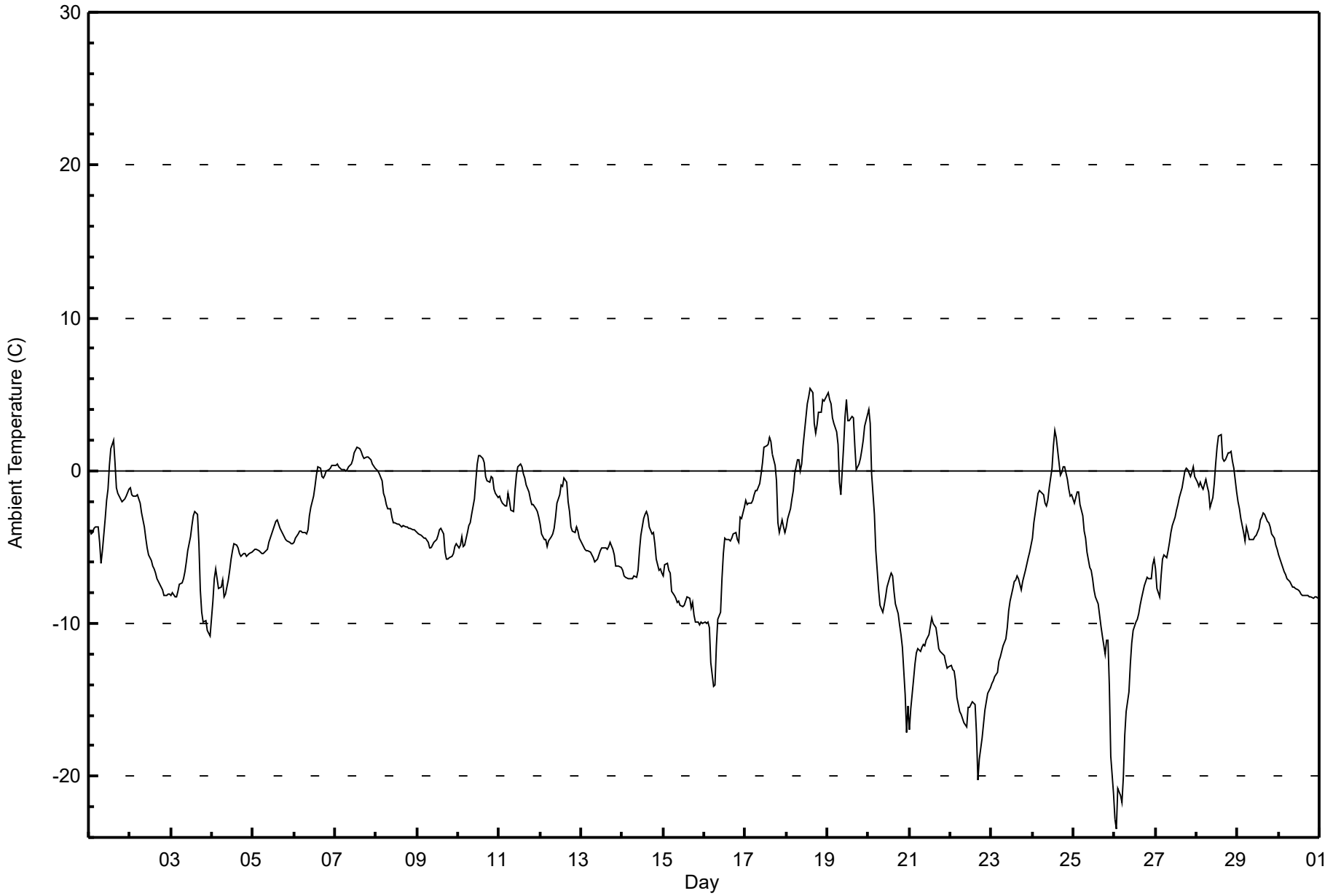
Maximum Value: 5.4 C on Nov 18 15:00      Maximum Daily Average: 2.4 C on Nov 19																						Hours in Service: 720 Hours of Data: 720				
Minimum Value: -23.5 C on Nov 26 02:00      Minimum Daily Average: -15.6 C on Nov 22 Maximum Diurnal Average: -3.2 C at hour 15      Minimum Diurnal Average: -5.8 C at hour 8 Monthly Average: -4.81 C      Percentiles: P <sub>1</sub> = -19.8 P <sub>10</sub> = -11.1 Q <sub>1</sub> = -7.3 Median = -4.4 Q <sub>3</sub> = -1.5 P <sub>90</sub> = 0.6 P <sub>99</sub> = 4.6																						Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0				
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	-3.9	-4.1	-4.0	-3.8	-3.7	-3.7	-4.7	-6.0	-5.2	-3.1	-2.0	-1.2	0.3	1.4	2.0	0.5	-1.1	-1.5	-1.9	-2.0	-2.0	-1.8	-1.6	-1.2	-2.3	2.0
2-Nov	-1.1	-1.6	-1.7	-1.7	-1.6	-1.8	-2.1	-2.8	-3.7	-4.4	-5.1	-5.5	-5.9	-6.3	-6.4	-6.7	-7.1	-7.4	-7.6	-7.8	-8.1	-8.2	-8.1	-8.0	-5.0	-1.1
3-Nov	-8.1	-8.0	-8.2	-8.2	-7.9	-7.5	-7.3	-7.1	-6.6	-5.9	-5.2	-4.4	-3.5	-2.9	-2.6	-2.8	-4.8	-7.8	-9.3	-9.9	-9.8	-10.4	-10.6	-10.8	-7.1	-2.6
4-Nov	-8.5	-7.1	-6.5	-7.1	-7.7	-7.6	-7.2	-8.3	-8.1	-7.2	-6.6	-5.8	-5.2	-4.7	-4.8	-5.1	-5.4	-5.6	-5.4	-5.4	-5.6	-5.5	-5.4	-5.4	-6.3	-4.7
5-Nov	-5.3	-5.1	-5.1	-5.2	-5.4	-5.4	-5.4	-5.3	-5.2	-4.7	-4.4	-4.1	-3.6	-3.3	-3.2	-3.5	-3.8	-4.1	-4.3	-4.5	-4.6	-4.7	-4.8	-4.8	-4.6	-3.2
6-Nov	-4.7	-4.4	-4.1	-4.0	-4.0	-4.0	-4.1	-4.1	-3.8	-3.0	-2.4	-1.7	-1.0	-0.3	0.3	0.2	-0.4	-0.5	-0.3	-0.1	0.0	0.2	0.4	0.3	-1.9	0.4
7-Nov	0.3	0.4	0.3	0.1	0.1	0.1	0.0	0.1	0.2	0.4	0.7	1.1	1.4	1.5	1.5	1.2	1.0	0.8	0.9	0.9	0.8	0.7	0.4	0.2	0.6	1.5
8-Nov	0.1	0.0	-0.2	-0.7	-1.5	-1.7	-2.2	-2.5	-2.5	-3.0	-3.4	-3.4	-3.5	-3.5	-3.6	-3.7	-3.6	-3.7	-3.7	-3.7	-3.8	-3.8	-3.9	-4.0	-2.7	0.1
9-Nov	-4.1	-4.2	-4.2	-4.3	-4.4	-4.5	-4.7	-5.0	-5.0	-4.9	-4.7	-4.5	-4.3	-3.9	-3.8	-4.2	-5.3	-5.8	-5.8	-5.7	-5.6	-5.4	-5.0	-4.8	-4.7	-3.8
10-Nov	-5.0	-4.8	-4.4	-5.0	-4.9	-4.0	-3.6	-3.4	-2.9	-1.9	-0.7	0.4	1.0	1.0	0.8	0.5	-0.4	-0.7	-0.7	-0.4	-0.5	-1.2	-1.5	-1.7	-1.8	1.0
11-Nov	-1.7	-1.9	-2.1	-2.3	-2.3	-1.5	-1.9	-2.6	-2.7	-1.3	-0.3	0.2	0.4	0.3	-0.2	-0.4	-0.9	-1.4	-1.9	-2.2	-2.2	-2.5	-2.7	-3.0	-1.5	0.4
12-Nov	-3.5	-4.2	-4.5	-4.5	-4.9	-4.6	-4.3	-4.1	-3.8	-3.0	-2.2	-1.6	-0.9	-1.0	-0.4	-0.7	-2.0	-2.7	-3.7	-3.9	-4.1	-3.7	-4.0	-4.4	-3.2	-0.4
13-Nov	-4.8	-5.0	-5.1	-5.3	-5.2	-5.4	-5.6	-5.7	-5.9	-5.8	-5.5	-5.2	-5.1	-5.1	-5.1	-5.0	-4.7	-5.2	-5.5	-6.3	-6.3	-6.3	-6.4	-6.4	-5.4	-4.7
14-Nov	-6.5	-6.9	-7.0	-7.1	-7.1	-7.1	-7.1	-6.9	-6.9	-6.5	-5.2	-4.2	-3.2	-2.8	-2.7	-3.0	-3.7	-4.2	-4.0	-4.8	-5.8	-6.5	-6.5	-6.7	-5.5	-2.7
15-Nov	-6.8	-6.1	-6.1	-6.5	-6.7	-7.9	-8.2	-8.4	-8.6	-8.5	-8.8	-8.9	-8.8	-8.5	-8.3	-8.4	-9.0	-8.7	-9.4	-9.9	-9.9	-10.1	-9.9	-10.0	-8.4	-6.1
16-Nov	-9.9	-10.0	-9.9	-10.2	-12.5	-14.1	-14.0	-11.5	-9.7	-9.3	-7.0	-5.4	-4.4	-4.5	-4.5	-4.6	-4.4	-4.2	-4.1	-4.5	-4.7	-3.1	-3.1	-2.4	-7.2	-2.4
17-Nov	-1.9	-2.2	-2.2	-2.1	-1.9	-1.6	-1.3	-1.3	-0.9	-0.2	0.5	1.6	1.6	1.7	2.2	1.9	1.1	0.4	-0.6	-3.4	-4.1	-3.2	-3.7	-4.1	-1.0	2.2
18-Nov	-3.7	-3.1	-2.5	-1.8	-1.3	-0.2	0.7	0.7	0.0	0.5	1.6	3.5	4.3	4.8	5.4	5.1	3.1	2.4	3.0	3.8	3.8	4.7	4.6	4.7	1.8	5.4
19-Nov	5.1	4.6	4.4	3.5	3.1	2.5	1.7	-0.8	-1.6	1.6	3.5	4.7	3.3	3.2	3.6	3.4	1.7	0.1	0.4	0.8	1.3	2.0	2.9	3.6	2.4	5.1
20-Nov	4.0	3.1	-0.2	-2.9	-5.3	-6.5	-7.8	-8.8	-9.3	-8.8	-8.2	-7.6	-7.0	-6.7	-6.9	-7.9	-8.7	-9.4	-10.1	-10.8	-11.6	-14.6	-17.2	-15.4	-7.7	4.0
21-Nov	-16.9	-15.5	-13.7	-12.7	-11.9	-11.6	-11.9	-11.6	-11.4	-11.5	-11.1	-10.7	-10.2	-9.6	-10.0	-10.2	-10.9	-11.6	-11.8	-11.9	-12.1	-12.5	-12.9	-12.8	-12.0	-9.6
22-Nov	-12.7	-13.0	-13.1	-13.7	-14.9	-15.7	-16.0	-16.2	-16.5	-16.8	-15.5	-15.5	-15.3	-15.1	-15.3	-17.3	-20.2	-18.9	-17.5	-16.6	-15.7	-15.2	-14.6	-14.2	-15.6	-12.7
23-Nov	-13.9	-13.7	-13.5	-13.2	-12.5	-12.2	-11.9	-11.4	-11.0	-10.2	-9.2	-8.5	-7.7	-7.2	-7.1	-6.9	-7.1	-7.8	-7.3	-6.9	-6.5	-5.7	-5.3	-4.9	-9.2	-4.9
24-Nov	-4.4	-3.4	-2.1	-1.5	-1.3	-1.4	-1.6	-2.1	-2.3	-1.9	-1.1	0.2	1.7	2.6	2.2	0.5	-0.3	-0.1	0.3	0.2	-0.6	-1.2	-1.7	-1.5	-0.9	2.6
25-Nov	-2.1	-1.7	-1.4	-1.4	-2.3	-2.9	-4.0	-4.4	-5.3	-6.4	-6.5	-7.0	-7.8	-8.2	-8.7	-9.4	-10.2	-10.8	-12.0	-11.1	-11.1	-14.1	-18.7	-21.2	-7.9	-1.4
26-Nov	-22.8	-23.5	-20.8	-21.3	-21.7	-20.0	-17.4	-15.8	-14.5	-12.6	-11.3	-10.4	-9.9	-9.7	-9.3	-8.9	-8.4	-7.5	-7.2	-7.0	-7.1	-7.0	-6.2	-5.8	-12.8	-5.8
27-Nov	-6.4	-7.7	-8.2	-6.9	-5.8	-5.5	-5.7	-5.2	-4.7	-4.1	-3.6	-3.1	-2.6	-2.3	-1.7	-1.1	-0.6	0.0	0.1	0.1	-0.4	-0.1	0.2	-0.4	-3.1	0.2
28-Nov	-0.7	-1.0	-0.7	-1.0	-1.2	-0.6	-1.0	-1.4	-2.4	-1.8	-0.8	0.4	1.6	2.3	2.4	0.8	0.6	0.7	1.2	1.1	1.2	0.6	0.2	-1.4	0.0	2.4
29-Nov	-2.0	-2.5	-3.2	-4.1	-4.6	-3.7	-4.1	-4.5	-4.5	-4.5	-4.3	-4.2	-3.8	-3.2	-3.1	-2.7	-2.9	-3.3	-3.4	-3.7	-4.1	-4.4	-4.9	-5.1	-3.8	-2.0
30-Nov	-5.5	-5.8	-6.3	-6.6	-6.8	-7.1	-7.2	-7.4	-7.6	-7.6	-7.7	-7.8	-7.9	-8.1	-8.2	-8.2	-8.2	-8.2	-8.2	-8.3	-8.3	-8.3	-8.3	-8.4	-7.6	-5.5
																								Diurnal Average		
																								Diurnal Maximum		





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

**Ambient Temperature (AT) - C**  
**Wapasu - November 2023**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C  
Wapasu - November 2023**

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	8	1.11	1.11
-20 - 0	597	82.92	84.03
0 - 10	115	15.97	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 720

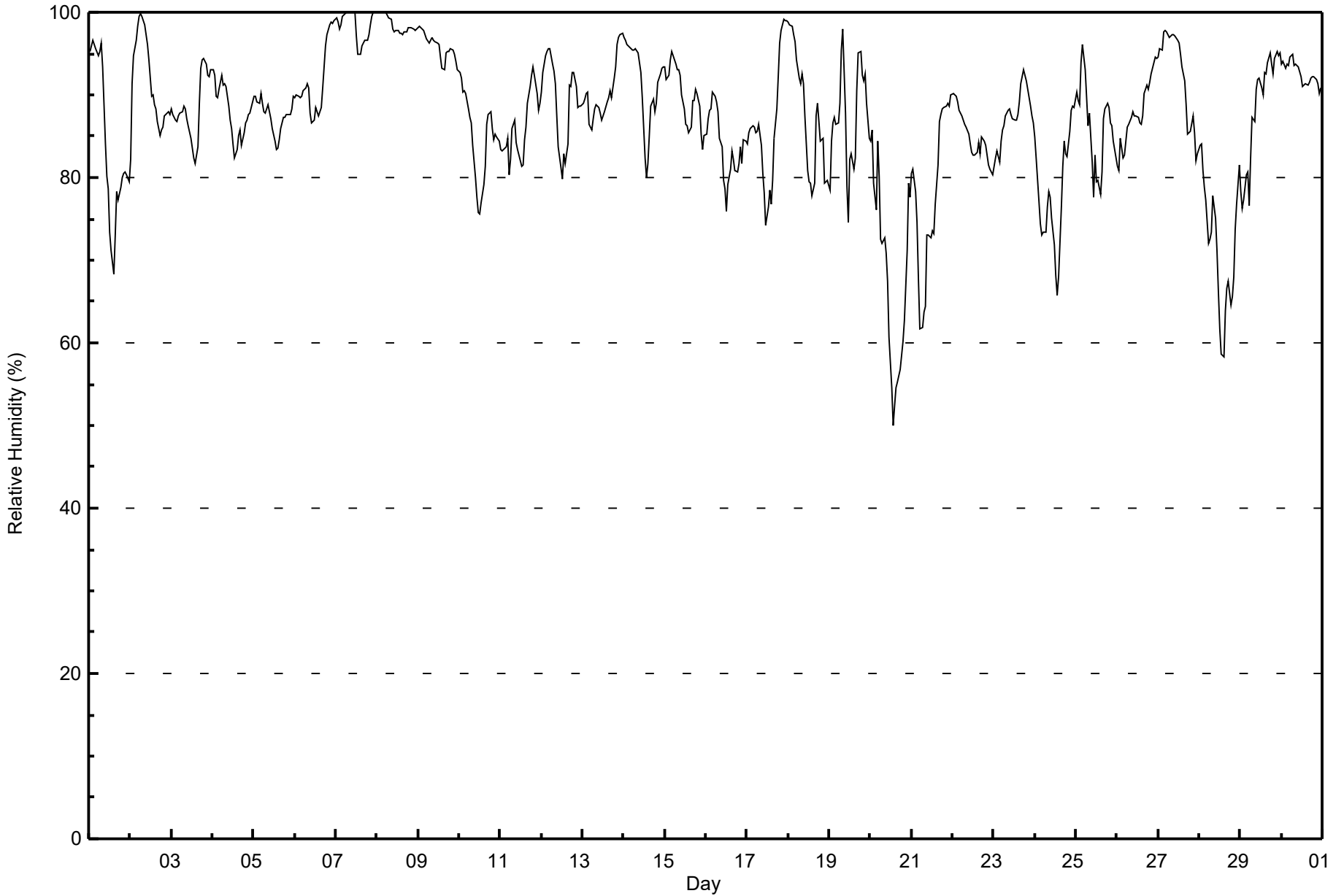
Total Number of Hours: 720



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

**Relative Humidity (RH) - %**  
**Wapasu - November 2023**

Maximum Value: 100.0 % on Nov 7 07:00		Maximum Daily Average: 98.5 % on Nov 8		Hours in Service:	720																																											
Minimum Value: 49.9 % on Nov 20 14:00		Minimum Daily Average: 68.3 % on Nov 20		Hours of Data:	720																																											
Maximum Diurnal Average: 89.6 % at hour 2		Minimum Diurnal Average: 82.0 % at hour 14		Hours of Missing Data:	0																																											
Monthly Average: 87.23 %		Percentiles: P <sub>1</sub> = 58.5 P <sub>10</sub> = 77.3 Q <sub>1</sub> = 83.2 Median = 88.1 Q <sub>3</sub> = 93.2 P <sub>90</sub> = 97.2 P <sub>99</sub> = 100.0		Hours of Calibration:	0																																											
				Percent Operational Time:	100.0																																											
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Nov	95.3	95.9	96.6	96.1	95.5	94.7	95.3	96.3	93.3	84.1	80.2	78.6	73.3	71.3	68.4	73.1	78.2	77.3	78.8	79.9	80.5	80.6	80.3	79.6	84.3	96.6																						
2-Nov	82.2	91.4	94.7	96.6	98.2	99.5	99.8	99.5	98.5	97.4	96.2	94.3	89.8	90.0	88.9	88.4	86.8	85.1	85.8	86.1	87.5	87.9	87.9	87.6	91.7	99.8																						
3-Nov	88.4	87.6	86.9	86.8	87.5	87.9	88.0	88.6	88.4	87.2	86.3	84.7	83.5	82.3	81.7	83.8	89.0	93.3	94.2	94.4	93.8	92.4	92.2	93.0	88.4	94.4																						
4-Nov	93.1	92.4	89.9	89.7	90.7	92.5	91.2	91.3	91.1	88.7	87.0	86.0	84.0	82.4	83.4	85.1	85.7	83.9	85.4	86.5	87.0	87.7	87.8	89.1	88.0	93.1																						
5-Nov	89.8	89.9	89.1	89.0	90.2	88.9	87.9	87.9	88.8	88.0	87.1	86.0	84.0	83.3	83.6	84.5	85.9	87.3	87.3	87.6	87.6	87.6	88.3	89.9	87.5	90.2																						
6-Nov	89.7	90.0	89.8	89.6	89.8	90.5	90.9	91.3	90.9	87.7	86.6	86.9	88.5	88.0	87.4	88.5	90.8	93.3	95.9	97.2	98.5	98.8	98.7	99.0	91.6	99.0																						
7-Nov	99.4	98.8	97.9	98.5	99.5	99.9	100.0	100.0	100.0	100.0	100.0	100.0	97.2	94.9	94.9	96.0	96.3	96.6	96.6	97.3	98.5	99.5	99.9	100.0	98.4	100.0																						
8-Nov	100.0	100.0	100.0	100.0	100.0	100.0	99.6	99.3	99.2	98.0	97.7	97.8	97.8	97.5	97.4	97.3	97.7	97.7	98.1	98.1	98.2	97.9	97.8	98.0	98.5	100.0																						
9-Nov	98.1	98.2	98.0	97.8	97.3	96.8	96.2	96.6	96.9	96.7	96.5	96.2	96.1	94.6	93.2	93.0	95.1	95.3	95.3	95.6	95.4	95.0	94.0	93.1	95.9	98.2																						
10-Nov	92.7	92.0	90.3	90.5	90.2	88.3	87.3	86.6	83.9	80.0	77.6	75.7	75.7	77.0	79.2	81.4	86.4	87.6	87.9	86.0	84.6	85.2	85.0	84.5	84.8	92.7																						
11-Nov	83.3	83.2	83.4	83.8	84.7	80.4	82.2	86.0	86.9	84.2	83.4	82.7	81.4	81.6	84.6	86.1	89.1	91.0	92.4	93.3	92.4	90.2	88.1	89.0	86.0	93.3																						
12-Nov	90.4	92.7	94.8	95.3	95.6	95.6	93.7	92.8	91.4	87.5	83.7	81.3	79.8	82.9	81.6	84.0	91.2	91.1	92.7	92.8	90.9	88.6	88.6	88.7	89.5	95.6																						
13-Nov	89.0	89.5	90.2	90.3	86.5	85.8	87.1	88.3	88.8	88.5	87.7	86.9	87.5	88.0	89.1	89.7	90.4	89.7	92.1	93.4	96.2	96.9	97.3	97.5	90.3	97.5																						
14-Nov	97.0	96.6	96.0	95.7	95.5	95.4	95.4	95.6	95.2	93.9	92.7	89.6	82.4	80.0	81.7	85.2	88.7	89.5	88.0	89.0	91.4	92.5	93.2	93.4	91.4	97.0																						
15-Nov	93.3	91.9	92.3	94.2	95.3	94.7	93.8	93.0	93.0	92.3	89.9	88.3	86.4	86.3	85.5	86.0	89.3	89.2	90.7	90.2	88.7	85.2	83.4	85.1	89.9	95.3																						
16-Nov	85.3	87.2	88.1	88.4	90.3	89.9	89.2	88.0	84.8	83.7	79.7	78.6	76.0	79.1	81.1	83.3	82.2	80.9	80.8	81.7	83.8	81.8	84.5	84.4	83.9	90.3																						
17-Nov	84.0	85.5	86.0	86.3	86.2	85.4	85.6	86.4	83.8	80.5	78.1	74.2	76.5	78.4	76.7	79.6	84.7	88.3	92.1	96.4	97.9	99.1	98.9	99.0	86.2	99.1																						
18-Nov	98.9	98.5	98.3	97.3	96.5	94.2	92.0	91.3	92.6	91.3	87.5	80.9	79.5	79.3	77.8	79.3	87.5	89.1	86.7	84.4	84.8	79.4	79.5	79.7	87.8	98.9																						
19-Nov	78.4	84.4	86.6	87.2	86.5	86.7	88.9	95.4	98.0	87.7	79.1	74.6	82.2	82.8	81.1	82.4	90.6	95.2	95.3	92.3	91.6	92.5	89.0	84.8	87.2	98.0																						
20-Nov	84.4	85.8	79.3	76.2	84.4	80.2	72.6	72.1	72.7	70.8	67.5	60.7	54.6	49.9	52.4	54.6	55.3	56.7	58.5	60.1	62.8	71.1	79.3	77.6	68.3	85.8																						
21-Nov	80.5	81.0	78.3	74.6	67.8	61.7	61.9	63.7	64.4	73.1	73.0	72.7	73.5	73.3	76.9	81.6	86.8	87.7	88.2	88.6	88.7	89.0	88.6	90.0	77.7	90.0																						
22-Nov	90.1	90.0	89.9	89.1	88.1	87.5	86.9	86.5	86.1	85.3	84.0	83.1	82.7	82.7	83.1	84.2	82.9	84.8	84.3	83.9	82.8	81.5	81.1	80.4	85.0	90.1																						
23-Nov	81.4	82.4	83.1	81.9	84.4	85.7	86.2	87.5	88.1	88.3	87.6	87.1	87.0	86.9	87.6	89.2	91.3	93.0	92.5	91.7	90.8	88.7	87.5	86.6	87.4	93.0																						
24-Nov	85.0	82.3	77.1	74.3	73.1	73.4	73.4	76.4	78.2	77.5	75.2	71.9	68.1	65.8	68.0	76.4	81.4	84.4	82.9	82.6	85.5	88.1	88.6	88.5	78.3	88.6																						
25-Nov	90.3	89.3	88.8	93.9	96.1	93.1	89.7	86.3	87.8	81.9	77.7	82.7	79.6	79.7	78.0	80.7	87.1	88.3	89.0	88.5	86.6	86.2	84.4	82.4	86.2	96.1																						
26-Nov	81.3	80.8	84.8	82.4	82.7	84.5	86.2	86.5	87.3	88.0	87.5	87.5	87.2	86.6	86.5	87.5	90.2	91.1	90.6	91.5	92.5	93.9	94.5	94.4	87.7	94.5																						
27-Nov	94.6	95.5	95.5	97.6	97.7	97.6	97.0	97.2	97.3	97.2	97.2	96.7	96.3	94.9	93.3	91.6	88.8	85.3	85.5	85.6	87.5	85.4	82.0	82.9	92.5	97.7																						
28-Nov	83.9	84.1	80.8	78.8	77.3	72.0	72.6	73.5	77.9	75.1	71.2	66.3	61.7	58.7	58.3	63.9	66.6	67.4	64.6	65.5	68.1	73.8	76.8	81.6	71.7	84.1																						
29-Nov	78.3	76.2	77.4	80.3	80.7	76.7	82.4	87.3	86.8	90.7	91.9	92.0	90.8	90.0	92.8	92.5	93.9	95.2	93.8	92.6	94.4	95.3	94.7	95.1	88.4	95.3																						
30-Nov	93.7	94.1	93.3	93.8	93.6	94.5	95.0	93.6	93.7	93.6	93.4	92.3	91.0	91.2	91.4	91.3	91.5	92.1	92.1	92.3	91.9	91.3	90.2	90.8	92.6	95.0																						
																								89.1	89.6	89.2	89.2	89.4	88.5	88.3	88.8	88.9	87.3	85.4	83.9	82.5	82.0	82.2	84.0	86.7	87.6	87.9	88.2	88.7	88.8	88.7	88.8	Diurnal Average
																								100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	97.8	97.5	97.4	97.3	97.7	97.7	98.1	98.1	98.5	99.5	99.9	100.0	Diurnal Maximum





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

**Relative Humidity (RH) - %**  
**Wapasu - November 2023**

<b>Concentration Ranges (%)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	0	0.00	0.00
20 - 40	0	0.00	0.00
40 - 60	9	1.25	1.25
60 - 80	103	14.31	15.56
80 - 100	595	82.64	98.19

Total Number of Valid Hours: 720

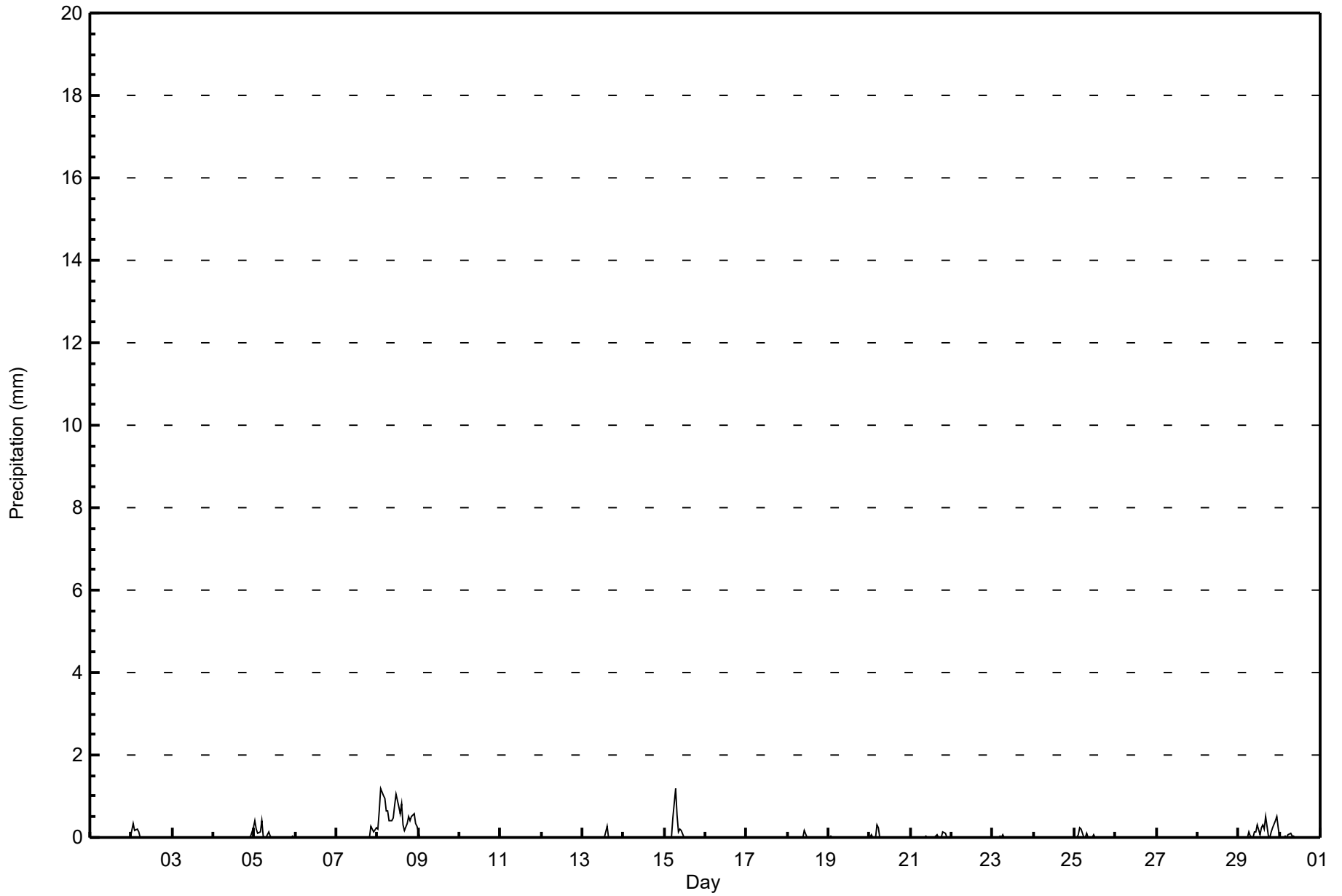
Total Number of Hours: 720





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

**Precipitation (PC) - mm**  
**Wapasu - November 2023**





# Wood Buffalo Environmental Association

## Summary of Hour Averages

# Wind Speed (WS) - km/h

## Wapasu - November 2023

Maximum Speed: 24 km/h on Nov 25 10:00	Maximum Daily Speed Average: 14.3 km/h on Nov 11	Hours in Service: 720
Minimum Speed Value: 1 km/h on Nov 19 07:00	Minimum Daily Speed Average: 2.2 km/h on Nov 22	Hours of Data: 718
Maximum Diurnal Speed Average: 4.1 km/h at hour 23	Minimum Diurnal Speed Average: 2.3 km/h at hour 5	Hours of Missing Data: 2
Monthly Average Velocity: 3.2 km/h 192.3 deg	Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 4 Q <sub>1</sub> = 6 Median = 8 Q <sub>3</sub> = 12 P <sub>90</sub> = 14 P <sub>99</sub> = 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-Nov	W2	SW3	SSW5	SSW4	SW6	SW7	S5	S6	S6	SSW5	SW7	SW5	SSW6	SW9	SSW7	SSW6	SSW6	S5	S6	S5	SSW6	SSW6	S5	SW7	SSW5.4	SW9		
2-Nov	SW5	SSW4	UO	UO	N8	N10	N11	N12	N13	N13	N12	N11	N13	N11	N8	N9	N8	NNE5	NE3	NE2	E2	S3	S3	SSE3	N6.0	N13		
3-Nov	SE6	SSE5	S7	SSE8	SSE8	S5	S4	SSE5	SSE4	SE3	E3	ESE4	ESE4	ESE5	E4	E4	SE3	E4	ESE4	SE5	ESE4	SSE4	SE4	ESE6	SE4.2	SSE8		
4-Nov	SE6	ESE7	SE6	SE7	SE8	SE10	SE15	SE13	SSE8	SSE10	SSE12	SSE11	SSE10	SE9	SE10	ESE9	SE11	SE12	SE12	SE12	ESE11	SE12	SE12	SE10	SE9.9	SE15		
5-Nov	SE9	SE10	SE11	SE11	SE8	ESE9	SE12	SE10	SE10	SE8	SE9	SE7	ESE8	SE9	ESE8	ESE8	ESE7	ESE9	SE10	SE9	SE11	SE9	SE8	SE8	SE9.0	SE12		
6-Nov	SSE10	SE11	SSE11	SE13	SSE11	SSE13	SSE14	SSE12	SSE11	S10	S11	S12	S12	S11	SSE12	S11	S12	S11	S12	S12	S12	S10	S10	S9	SSE11.1	SSE14		
7-Nov	SSW8	SSW10	SSW10	SW8	SSW9	SSW9	SW7	SW8	SW7	SSW7	SSW8	SW8	SSW9	SSW10	SSW8	SSW6	S5	S5	S6	SSW6	SSW7	SW8	SW11	SW10	SSW7.8	SW11		
8-Nov	SW10	WSW8	W8	NW13	NW12	NW8	NW11	NW9	NW10	NNW13	NNW14	NNW15	NNW14	NNW15	NNW15	NNW14	NNW13	NNW13	NNW12	NNW12	NNW12	NNW11	NNW9	NNW7	NW10.6	NNW15		
9-Nov	NNW8	N8	N5	NW3	W2	W1	SSW3	SSW5	SSW6	S8	S9	S10	S10	SSE12	S12	S10	SSE12	SSE13	SSE12	SSE13	SSE13	SSE15	SSE15	SSE16	S7.0	SSE16		
10-Nov	SSE14	SSE15	SSE17	SSE16	SSE16	S15	SSE16	S13	S14	SSE15	S15	S15	S14	S16	S15	S13	SSE16	S13	S12	S13	S11	S11	S12	S12	S14.1	SSE17		
11-Nov	SSE13	SSE13	SSE12	SSE14	SSE16	SE17	SE17	SE19	SE20	SE21	SE22	SSE21	SSE19	SSE15	SSE16	SSE15	SSE13	SSE13	S11	S10	S10	S9	S8	SSW8	SSE14.3	SSE22		
12-Nov	S8	S7	SSW6	SSW7	SSW7	SW9	SW10	WSW12	WSW11	W11	W12	W12	W10	WSW9	WSW9	WSW7	WSW7	W5	WNV2	NW3	NNW6	N6	N6	NNE6	WSW5.6	W12		
13-Nov	NE6	ENE3	ESE2	ENE3	ENE5	E5	E4	ENE5	E7	E8	E8	E8	ENE10	ENE9	E7	ENE11	ENE11	NE5	N4	NNW4	NW5	N4	NNW5	N5	ENE4.9	ENE11		
14-Nov	NNW6	NNW7	NW5	NW5	NW5	W4	SW5	SSW7	S6	S7	SSW8	SSW10	SSW12	SSW12	SW12	SW11	SW10	SW8	SW8	SSW6	S6	SSE8	SSE6	SSE6	SSW5.3	SSW12		
15-Nov	S7	SSE5	WNV1	NE3	NNE5	NNE8	N8	N10	N12	NNW15	NNW14	NNW12	NNW9	NW6	WNV3	SSW5	SSW6	SW9	W7	WNV4	NW6	NW8	WNV6	W5	NW4.3	NNW15		
16-Nov	WSW5	SW7	SW7	SW6	SSE5	SSE6	SSE7	SE8	SSE12	SSE15	SSE13	S12	S11	S11	S10	S9	S9	S8	SSW8	SSW6	S6	SW11	SW11	SW13	S8.0	SSE15		
17-Nov	SW13	SW14	SW12	SW14	SW13	SW11	SW9	SW15	SW16	SW14	SW17	SW17	SW15	SW12	SW12	SW10	WSW7	SW6	SW6	SSE5	SSE6	SSE5	SSE6	SSE7	SW10.1	SW17		
18-Nov	SSE7	SE7	SSE7	SSE8	SSE9	SSE12	SSE12	SSE11	S10	S10	S10	SSE10	SSE9	SSE8	S8	S8	SSE8	SSE7	SSE7	SSE7	SSE7	S8	SSE7	SE6	SSE8.3	SSE12		
19-Nov	SSE5	ESE5	ESE6	SSE3	SE6	SE9	NE1	E1	E3	SSE5	ESE3	NNW2	NW6	NNE1	E1	SW1	W2	S4	S5	SSE6	S6	S7	SW11	SW14	S2.9	SW14		
20-Nov	SW13	W14	W18	NNW18	NNW18	NNW18	NNW18	NNW18	NNW18	NNW15	NNW13	NNW14	NNW14	W13	NNW16	NNW16	NNW17	NNW14	NNW13	NNW12	WNV9	WNV7	W5	S2	SSW4	SW5	WNV12.0	W18
21-Nov	SE3	SSE3	SE4	E3	E5	E7	SSE4	SE3	E4	ESE5	ESE7	ESE7	ENE7	E8	ENE8	NE6	NNE8	NE9	NE7	NNE8	NNE9	NNE7	NNE6	NNE7	ENE4.6	NNE9		
22-Nov	NNE8	N7	N7	N9	NNE8	NE9	NE6	NE6	NNE4	NE4	ESE1	NW4	N5	NNW3	NNE1	NE2	ESE4	SE6	SSE6	SSE7	SSE7	SSE9	SSE11	SSE12	ENE2.2	SSE12		
23-Nov	SSE12	SSE11	SSE11	SSE13	SSE13	SSE12	S10	SSE10	SSE10	S9	S8	S8	S9	S9	S9	SSW9	S8	S9	S10	S9	S9	S11	S11	SSW12	S9.7	SSE13		
24-Nov	S11	SSW12	SSW13	SW16	SW14	SW17	SW15	SW12	SW12	SW10	SW10	SW9	SW7	SW7	SW6	SSW6	S6	SSW7	SSW10	SW9	SSW8	SSW7	SSW8	SW8	SW9.8	SW17		
25-Nov	SSW7	WSW6	NNW7	NNW18	NNW21	N24	NNW23	N21	NNW23	NNW24	NNW19	NNW21	NNW21	NNW20	NNW17	NNW14	N10	N9	N6	N9	N7	NNE2	SE3	SE4	NNW12.6	NNW24		
26-Nov	SE4	SE5	SE6	SE4	ESE4	ESE4	SSE5	SSE4	SE4	SSE5	S6	SSW6	S6	SSW6	S6	S5	S6	SSW5	S4	S5	SE5	SSE5	SSE5	SSE4	SSE4.7	SSW6		
27-Nov	S4	S5	SSE7	SSE6	S6	S8	S9	S9	SSE10	S10	S12	S10	S10	S10	S10	SSW10	SSW12	SW12	SW13	SW12	SW12	SW14	WSW12	SW9	SSW8.6	WSW14		
28-Nov	SW9	SW8	SW10	SW8	SW10	WSW12	WSW11	SW10	SW10	SW12	WSW12	SW11	WSW11	WSW10	WSW9	SW8	SW10	SW11	SW11	SSW8	SW8	WSW9	W8	W7	WSW9.5	WSW12		
29-Nov	W8	W8	W7	W5	WNV4	NW5	WNV4	WNV5	NW6	WNV5	W7	W8	W7	WNV7	NW6	NW8	NNW13	NNW10	NW8	NW8	NNW9	NNW11	NNW12	NNW13	NW6.7	NNW13		
30-Nov	NNW12	NNW10	NNW10	N8	N8	N7	N6	N6	N6	N6	N4	NNE5	N5	N6	N5	E3	ESE2	ESE3	SSE3	SE2	SSE3	SE3	SE4	SE4	SSE4	N3.1	NNW12	

S3.9	S3.8	SSW3.8	SSW3.0	S2.3	S2.5	S2.8	S2.8	SSW2.7	SSW2.9	SSW3.6	SSW3.6	SSW2.9	SSW3.2	SSW3.3	SSW2.8	S2.9	S3.2	S3.6	S3.5	S3.2	S3.8	S4.1	S4.1	Diurnal Average	
SSE14	SSE15	W18	NNW18	NNW21	N24	NNW23	NNW21	NNW23	NNW24	SSE22	NNW21	NNW21	NNW20	NNW17	SSE15	SSE16	S13	SW13	SSE13	SSE13	SSE15	SSE15	SSE16	Diurnal Maximum	

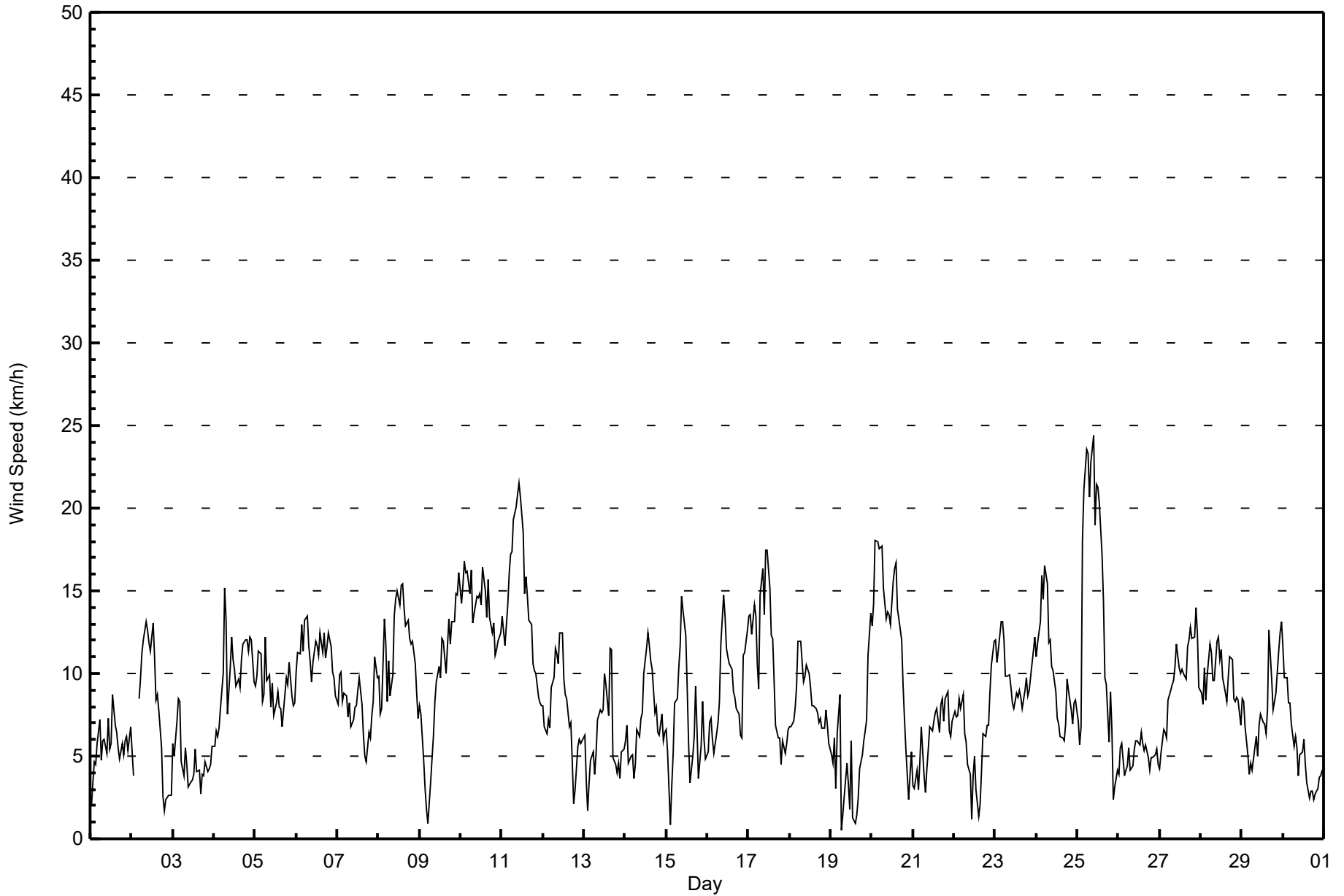
UO - Unstable Operation  
 All monthly, daily, and diurnal averages have been calculated using vector methods





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

**Wind Speed (WS) - km/h**  
**Wapasu - November 2023**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h  
Wapasu - November 2023**

<b>Wind Speed Ranges (km/h)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	159	22.14	22.14
6 - 11	379	52.79	74.93
12 - 19	167	23.26	98.19
20 - 28	13	1.81	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  
Wapasu - November 2023**

<b>Wind Speed Ranges (km/h)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 5	8	7	7	4	14	15	18	23	18	9	6	3	7	8	8	4	159
6 - 11	28	11	6	6	7	13	34	46	75	45	51	15	11	4	13	14	379
12 - 19	6	0	0	0	0	0	11	45	22	6	28	5	5	14	2	23	167
20 - 28	1	0	0	0	0	0	2	2	0	0	0	0	0	0	0	8	13
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	<b>43</b>	<b>18</b>	<b>13</b>	<b>10</b>	<b>21</b>	<b>28</b>	<b>65</b>	<b>116</b>	<b>115</b>	<b>60</b>	<b>85</b>	<b>23</b>	<b>23</b>	<b>26</b>	<b>23</b>	<b>49</b>	<b>718</b>

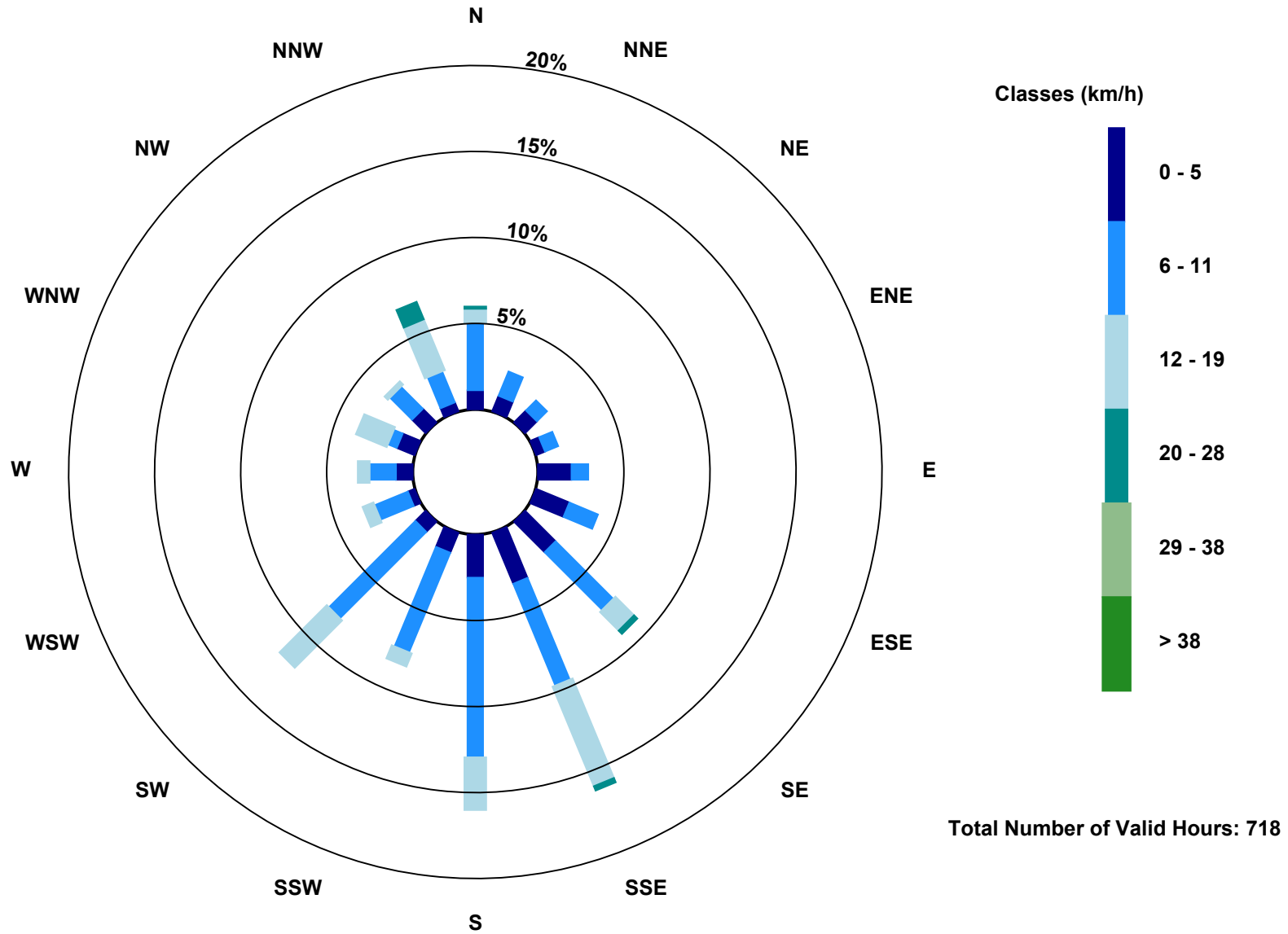
Total Number of Valid Hours: 718

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 2023

Wind Speed (WS) - km/h  
Wapasu





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

**Wind Speed (WS) - km/h**  
**Wapasu - November 2023**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 7 km/h on Nov 25 06:00	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 Nov 26 01:00	
Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 1 Q <sub>1</sub> = 2 Median = 2 Q <sub>3</sub> = 3 P <sub>90</sub> = 4 P <sub>99</sub> = 6	

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

UO - Unstable Operation



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

**Wind Direction (WD) - deg**  
**Wapasu - November 2023**

Direction of Maximum Speed: 338 deg on Nov 25 10:00		Hours in Service: 720
Direction of Maximum Daily Speed Average: 155.0 deg on Nov 11		Hours of Data: 718
Direction of Minimum Speed: 43 deg on Nov 19 07:00	Direction of Minimum Daily Speed Average: 2.2 deg on Nov 22	Hours of Missing Data: 2
Monthly Average Direction: 192.3 deg		Percent Operational Time: 99.7

Day	Hourly Period Ending At (MST)																								Daily Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Nov	260	224	210	212	217	221	186	175	184	197	217	222	210	223	210	211	192	178	178	190	194	196	191	223	204.4
2-Nov	222	205	UO	UO	354	358	359	359	359	355	358	1	3	360	6	1	6	15	35	43	92	186	182	149	0.6
3-Nov	124	168	171	161	149	185	176	164	158	132	93	108	116	108	99	88	138	91	102	132	102	147	135	108	135.1
4-Nov	127	121	132	133	144	140	137	140	149	147	152	156	148	140	124	121	129	129	135	124	122	124	129	125	134.8
5-Nov	124	128	128	128	125	120	126	126	131	130	129	124	122	129	123	122	117	122	132	138	137	142	146	145	128.9
6-Nov	147	146	149	146	155	153	157	159	166	174	174	171	172	169	166	171	169	170	170	178	178	182	187	188	165.9
7-Nov	195	206	207	216	205	210	221	218	214	209	209	216	213	206	207	196	185	180	184	201	213	215	220	225	208.7
8-Nov	235	250	277	310	314	310	313	312	314	332	337	339	338	336	332	337	337	339	336	337	339	342	344	339	325.8
9-Nov	339	350	357	325	280	259	194	196	194	185	183	187	181	166	170	171	155	156	161	159	161	159	162	160	169.6
10-Nov	165	163	164	168	165	170	166	171	172	167	178	179	181	179	172	175	163	170	169	181	189	171	173	169	171.3
11-Nov	160	155	157	154	149	145	146	144	145	145	146	147	149	160	154	155	161	156	169	175	180	179	182	193	155.0
12-Nov	191	190	195	203	201	222	235	244	245	259	266	262	264	257	252	251	253	259	290	312	341	358	359	25	250.1
13-Nov	37	63	120	73	68	88	89	73	88	92	88	92	73	77	81	71	76	35	351	330	323	10	341	9	63.6
14-Nov	347	341	326	305	306	264	226	196	184	191	193	200	204	202	219	220	223	223	218	193	182	161	165	162	211.5
15-Nov	169	166	294	41	30	26	3	358	351	343	343	336	343	320	283	212	208	235	276	282	319	311	286	269	325.1
16-Nov	240	227	227	216	168	160	155	141	154	154	158	178	180	182	176	176	176	181	194	193	182	222	220	226	184.8
17-Nov	223	221	227	230	227	221	229	236	235	234	234	234	226	224	234	236	241	233	217	151	149	168	156	149	223.4
18-Nov	153	144	147	152	151	152	156	168	175	173	173	168	162	167	175	176	157	161	166	153	162	171	157	145	161.6
19-Nov	150	120	119	162	128	132	43	96	93	155	117	337	316	17	88	236	270	182	177	167	176	182	216	230	170.6
20-Nov	235	271	275	288	294	300	304	301	299	294	283	274	289	294	287	294	294	294	301	286	277	190	213	217	286.2
21-Nov	139	150	142	94	82	91	147	126	100	107	116	103	78	81	78	45	33	36	42	32	27	22	23	18	68.0
22-Nov	12	8	356	359	23	39	39	34	27	45	118	322	351	330	13	38	104	140	147	154	158	162	163	157	66.2
23-Nov	155	160	160	157	154	158	170	167	163	174	183	179	184	189	190	195	186	179	181	185	188	188	190	199	175.2
24-Nov	189	196	203	221	220	221	223	221	223	228	225	224	233	221	214	198	173	204	205	228	203	201	202	216	213.9
25-Nov	211	248	329	346	348	349	345	349	345	338	341	342	345	345	347	347	355	3	352	357	9	22	139	140	345.3
26-Nov	133	142	137	144	120	122	151	149	139	153	174	196	187	199	178	179	171	192	186	180	146	156	162	155	162.2
27-Nov	170	177	158	155	176	173	175	170	166	173	172	184	188	190	189	196	211	229	229	228	232	236	240	232	198.5
28-Nov	224	223	232	232	235	248	240	236	228	236	239	235	243	241	242	236	235	229	234	212	233	247	271	261	236.9
29-Nov	268	268	263	261	300	308	293	295	311	293	276	268	261	295	311	325	337	334	322	326	332	336	343	341	308.8
30-Nov	338	342	348	350	352	350	356	350	350	10	12	356	9	9	88	111	123	155	135	155	138	141	131	156	6.6

187.9 190.9 193.5 199.9 187.7 182.2 190.1 190.2 192.9 195.2 198.4 209.7 210.2 204.8 196.0 193.3 182.7 186.3 189.7 185.1 182.6 186.2 190.0 189.2

Diurnal Average

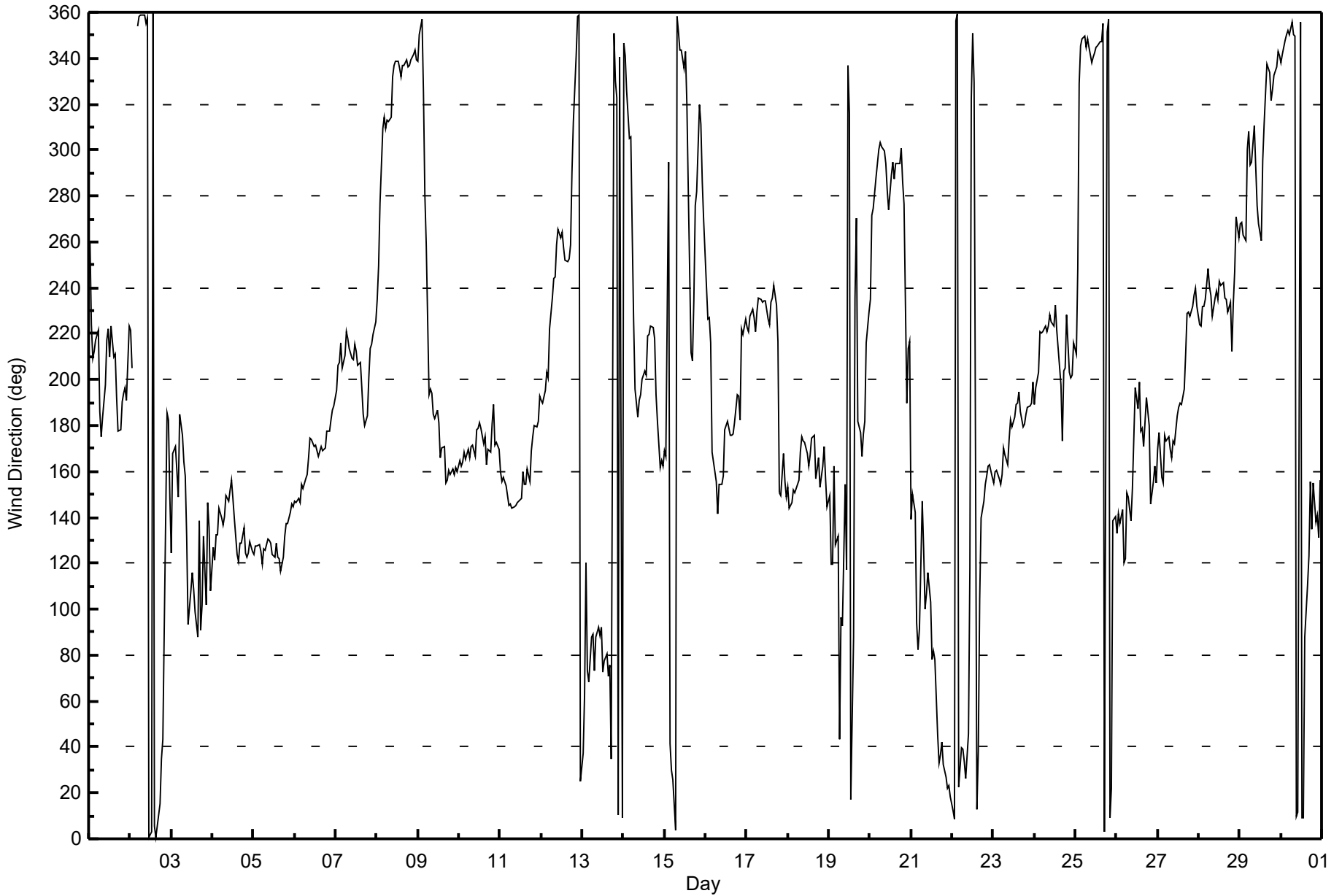
UO - Unstable Operation

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



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

**Wind Direction (WD) - deg**  
**Wapasu - November 2023**





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

**Wind Direction (WD) - deg**  
**Wapasu - November 2023**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 88 deg on Nov 15 03:00	Hours of Data: 718
Minimum Value: 7 deg on Nov 17 23:00	Hours of Missing Data: 2
Percentiles: P <sub>1</sub> = 11 P <sub>10</sub> = 16 Q <sub>1</sub> = 19 Median = 24 Q <sub>3</sub> = 27 P <sub>90</sub> = 30 P <sub>99</sub> = 74	Hours of Calibration: 0
	Percent Operational Time: 99.7

Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Nov	37	19	19	21	20	15	25	15	25	27	20	30	27	19	24	21	25	22	24	24	25	26	25	25	37
2-Nov	21	26	UO	UO	19	24	26	25	24	24	26	25	26	25	29	28	28	30	55	74	28	43	37	53	74
3-Nov	21	31	27	21	22	34	41	25	20	33	23	25	22	25	38	23	36	22	19	18	12	13	16	13	41
4-Nov	18	16	26	18	17	19	17	16	16	20	21	24	23	23	21	25	21	21	20	21	23	22	21	24	26
5-Nov	27	25	22	24	25	29	21	24	22	23	22	25	22	21	23	22	21	19	19	17	17	21	18	19	29
6-Nov	18	19	19	18	19	19	21	22	25	28	29	29	29	26	25	26	26	27	27	27	26	29	28	29	29
7-Nov	28	23	23	22	24	25	22	24	24	24	23	21	26	24	24	28	28	28	28	28	20	20	19	17	28
8-Nov	18	25	26	27	24	28	24	23	26	19	18	18	18	18	18	19	17	16	17	16	17	18	15	28	
9-Nov	15	24	25	32	72	77	48	27	29	29	29	28	29	24	27	25	21	20	21	21	23	22	21	20	77
10-Nov	25	23	26	26	23	26	25	26	27	25	29	30	28	27	26	27	22	24	25	28	30	24	24	23	30
11-Nov	22	18	22	21	18	18	16	17	17	19	19	19	23	23	21	21	21	20	24	27	26	25	24	23	27
12-Nov	23	23	20	22	22	19	18	20	22	26	26	25	27	24	24	22	24	23	31	24	18	29	23	27	31
13-Nov	26	21	41	27	25	28	28	25	26	24	29	27	25	48	36	22	24	48	26	46	30	44	31	27	48
14-Nov	24	17	25	24	24	29	28	30	26	28	27	26	26	20	19	17	16	17	25	21	14	22	14	30	30
15-Nov	12	19	88	54	28	30	27	23	22	17	18	19	22	25	46	19	24	15	33	30	31	24	29	33	88
16-Nov	23	17	17	19	20	12	14	16	18	19	23	29	29	27	26	25	26	26	26	28	26	18	26	16	29
17-Nov	19	21	17	16	16	20	25	18	18	21	18	17	17	20	19	17	19	15	23	15	10	9	7	7	25
18-Nov	10	10	12	16	16	17	22	23	27	26	26	24	22	21	25	23	15	15	19	13	15	19	18	14	27
19-Nov	17	32	24	61	24	18	86	55	67	27	31	79	28	77	87	53	53	27	19	21	22	25	26	17	87
20-Nov	17	31	28	31	29	28	27	30	28	27	28	29	29	28	28	27	28	27	27	29	30	46	26	26	46
21-Nov	37	23	12	23	19	20	32	48	26	23	24	25	25	25	24	28	25	28	26	27	28	27	29	28	48
22-Nov	30	27	24	25	30	26	26	28	27	32	88	35	35	53	63	58	22	14	20	16	20	23	24	20	88
23-Nov	19	20	20	19	19	21	25	25	21	26	27	27	26	26	28	28	27	24	25	25	26	26	27	25	28
24-Nov	30	27	24	19	20	19	17	20	17	16	15	15	16	17	22	24	18	22	24	35	22	21	24	20	35
25-Nov	21	38	25	21	21	22	19	21	19	18	17	19	19	18	19	18	24	27	20	25	29	13	37	8	38
26-Nov	16	12	8	21	33	26	13	32	31	20	27	26	26	24	27	23	23	23	24	25	24	25	20	14	33
27-Nov	13	20	18	19	25	27	26	25	23	28	26	28	27	28	29	25	23	16	16	15	16	15	17	16	29
28-Nov	14	15	17	18	15	21	19	17	14	15	17	18	20	20	19	14	15	15	18	24	25	22	30	25	30
29-Nov	26	26	25	26	28	25	29	24	21	25	26	26	25	26	24	20	16	18	20	18	18	18	19	16	29
30-Nov	14	20	18	19	19	19	22	19	16	30	26	27	25	23	31	14	17	17	34	38	27	16	17	14	38

37	38	88	61	72	77	86	55	67	33	88	79	35	77	87	58	53	48	55	74	31	46	37	53	
Diurnal Maximum																								

UO - Unstable Operation





## WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY  
MONITORING PROGRAM  
MONTHLY REPORT

### **AMS18 STONY MOUNTAIN NOVEMBER 2023**

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

December 22, 2023

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - STONY MOUNTAIN (AMS18)  
NOVEMBER 2023

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	1.9	0	0.6	0
TRS(ppb) Average	684	36	36	100	0.4	0	0.3	0
THC(ppm) Average	685	35	35	100	2.3	-	2.1	-
NMHC(ppm) Average	685	35	35	100	0.189	-	0.008	-
CH4(ppm) Average	685	35	35	100	2.1	-	2.1	-
O3 (ppb) Average	685	35	35	100	38	0	34.2	-
NO2 (ppb) Average	684	36	36	100	7.4	0	3.1	-
NO (ppb) Average	684	36	36	100	1.7	-	0.3	-
NOX (ppb) Average	684	36	36	100	7.4	-	3.2	-
PM2.5 (ug/m3) Average	718	1	2	99.86	21	0	16.8	0
CO(ppm) Average	686	34	34	100	0.2	0	0.2	0
CO2(ppm) Average	685	35	35	100	444.1	0	438.5	0
Temperature 2 m (C) Average	720	0	0	100	8.2	-	3.7	-
Relative Humidity (%) Average	698	0	22	96.94	100	-	97.6	-
Wind Speed 20 m (km/h) Average	641	0	79	89.03	34	-	21	-
Wind Direction 20 m (deg) Average	641	0	79	89.03	-	-	-	-
Precipitation (mm) Total	712	0	8	98.89	1.1	-	5	-
Leaf Wetness (% of range) Average	720	0	0	100	25	-	10.8	-
Global Solar Radiation (W/m2) Average	720	0	0	100	438.1	-	74.9	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - STONY MOUNTAIN (AMS18)  
NOVEMBER 2023

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	0.16	0.2	-	0	0	0	0.1	0.2	0.3	1.9
TRS (ppb) Average	684	0.2	0	-	0.1	0.2	0.2	0.2	0.2	0.2	0.4
THC (ppm) Average	685	2.03	0	-	2	2	2	2	2	2.1	2.3
NMHC(ppm) Average	685	0.001	0.007	-	0	0	0	0	0	0	0.189
CH4(ppm) Average	685	2.03	0	-	2	2	2	2	2	2.1	2.1
O3 (ppb) Average	685	25.94	6.6	-	4.1	16	21.3	27.4	31.4	33.4	38
NO2 (ppb) Average	684	1.09	1	-	0	0.2	0.4	0.8	1.4	2.4	7.4
NO (ppb) Average	684	0.08	0.2	-	0	0	0	0	0.1	0.2	1.7
NOX (ppb) Average	684	1.15	1.1	-	0	0.2	0.4	0.8	1.5	2.6	7.4
PM2.5 (ug/m3) Average	718	5.05	3.4	-	0.5	1.9	3.1	4.1	6.1	8.9	21
CO(ppm) Average	686	0.15	0	-	0.1	0.1	0.1	0.2	0.2	0.2	0.2
CO2(ppm) Average	685	427.61	6	-	415.1	419.7	422.4	428.7	432.3	434.9	444.1
Temperature 2 m (C) Average	720	-2.89	4	-	-13.7	-7.9	-5.2	-2.9	-0.2	1.7	8.2
Relative Humidity (%) Average	698	78.6	12.7	-	39	60.1	70.3	80	88.2	95.7	100
Wind Speed 20 m (km/h) Average	641	12.8	5	-	1	6	9	13	16	19	34
Wind Direction 20 m (deg) Average	641	-	-	-	-	-	-	-	-	-	-
Precipitation (mm) Total	712	-	-	8.49	-	-	-	-	-	-	-
Surface Wetness (% of range) Average	720	2.91	3	-	1.4	1.7	1.9	2	3.1	4.2	25
Global Solar Radiation (W/m2) Average	720	28.81	60.4	-	0	0	0	0.3	27.2	103.1	438.1

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - STONY MOUNTAIN (AMS18)  
NOVEMBER 2023

MONTHLY SUMMARY

Parameter	Period Start	Period End	Duration (Hours)	Notes
PM2.5	30 Nov 2023 09:00	30 Nov 2023 09:00	1	Maintenance - firmware update
Relative Humidity	06 Nov 2023 19:00	07 Nov 2023 16:00	22	Sensor operated out of range
Wind Speed, Wind Direction	04 Nov 2023 00:00	04 Nov 2023 00:00	1	Flat line in sensor output signal - Sensor frozen
Wind Speed, Wind Direction	05 Nov 2023 13:00	06 Nov 2023 12:00	24	Flat line in sensor output signal - Sensor frozen
Wind Speed, Wind Direction	07 Nov 2023 09:00	09 Nov 2023 12:00	52	Flat line in sensor output signal - Sensor frozen
Wind Speed, Wind Direction	09 Nov 2023 18:00	09 Nov 2023 19:00	2	Flat line in sensor output signal - Sensor frozen
Precipitation Collector	03 Nov 2023 01:00	03 Nov 2023 08:00	8	DAS Failure - data not recorded



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

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Stony Mountain - November 2023**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 1.9 ppb on Nov 19 14:00	Maximum Daily Average: 0.6 ppb on Nov 21
Minimum Value: 0.0 ppb on Nov 1 07:00	Hours of Data: 685
Maximum Diurnal Average: 0.3 ppb at hour 14	Hours of Missing Data: 35
Monthly Average: 0.16 ppb	Hours of Calibration: 35
Minimum Daily Average: 0.0 ppb on Nov 29	Percent Operational Time: 100.0
Minimum Diurnal Average: 0.1 ppb at hour 20	
Percentiles: P <sub>1</sub> = 0.0 P <sub>10</sub> = 0.0 Q <sub>1</sub> = 0.0 Median = 0.1 Q <sub>3</sub> = 0.2 P <sub>90</sub> = 0.3 P <sub>99</sub> = 1.2	

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Nov	Z	0.0	0.0	0.0	0.1	0.1	0.0	0.1	0.0	0.1	0.0	0.1	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.1	0.1	0.0	0.1	0.2	0.1	0.2	
2-Nov	0.5	Z	0.2	0.3	0.2	0.2	0.4	0.2	0.4	0.5	0.6	0.2	0.3	0.3	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.2	0.2	0.2	0.2	0.2	0.6
3-Nov	0.1	0.2	Z	0.1	0.1	0.2	0.1	0.2	0.1	0.2	0.2	0.2	0.2	0.2	0.3	0.4	0.3	0.2	0.2	0.1	0.2	0.2	0.2	0.2	0.2	0.4	
4-Nov	0.2	0.2	0.1	Z	0.2	0.3	0.2	0.2	0.1	0.1	0.2	0.2	0.3	0.3	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.3	
5-Nov	0.0	0.0	0.0	0.1	Z	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.1	
6-Nov	0.0	0.1	0.0	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.4	0.2	0.3	0.3	0.4	Z	0.5	0.1	0.0	0.0	0.1	0.2	0.2	0.2	0.5	
7-Nov	0.2	0.1	0.1	0.0	0.1	Z	0.2	0.1	0.1	0.1	0.2	C	C	C	C	C	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	
8-Nov	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.1	0.2	0.1	0.2	0.1	0.2	0.2	
9-Nov	0.2	Z	0.1	0.3	0.4	0.2	0.3	0.3	0.3	0.2	0.3	0.1	0.2	0.2	0.1	0.0	0.2	0.2	0.3	0.2	0.1	0.4	0.3	0.3	0.2	0.4	
10-Nov	0.2	0.3	Z	0.3	0.3	0.4	0.2	0.3	0.3	0.7	0.5	0.2	0.2	0.3	0.4	0.3	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.7	
11-Nov	0.8	0.4	0.3	Z	0.1	0.3	0.2	0.3	0.3	0.3	0.3	0.1	0.1	0.3	0.1	0.0	0.0	0.0	0.1	0.1	0.0	0.1	0.0	0.0	0.0	0.8	
12-Nov	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	
13-Nov	0.1	0.1	0.0	0.1	0.3	Z	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.2	0.0	0.0	0.1	0.1	0.1	0.0	0.2	0.1	0.1	0.3	
14-Nov	Z	0.1	0.2	0.3	0.2	0.3	0.3	0.3	0.2	0.1	0.1	0.1	0.0	0.2	0.1	0.1	0.1	0.1	0.1	0.2	0.0	0.1	0.1	0.2	0.1	0.3	
15-Nov	0.1	0.1	Z	0.1	0.1	0.1	0.1	0.1	0.1	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	
16-Nov	0.0	0.0	0.0	Z	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.1	
17-Nov	0.0	0.0	0.0	0.1	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	
18-Nov	0.1	0.1	0.1	0.1	0.1	Z	0.1	0.1	0.1	0.1	0.3	0.6	1.0	1.2	1.1	0.9	0.7	0.7	0.5	0.4	1.0	1.2	1.3	0.9	0.5	1.3	
19-Nov	Z	0.6	0.6	0.6	0.7	0.8	1.0	0.5	0.3	0.3	0.9	0.9	0.6	1.9	1.1	0.2	0.1	0.2	0.3	0.3	0.2	0.5	0.4	0.2	0.6	1.9	
20-Nov	0.1	Z	0.1	0.1	0.1	0.2	0.2	0.2	0.1	0.2	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.2	0.2	0.1	0.1	0.1	0.1	0.2	
21-Nov	0.2	0.8	Z	0.4	0.4	1.6	1.3	1.5	1.0	1.1	1.6	1.2	0.4	0.3	0.1	0.2	0.1	0.1	0.3	0.3	0.2	0.2	0.1	0.1	0.1	1.6	
22-Nov	0.1	0.2	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.1	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	0.2	
23-Nov	0.0	0.1	0.2	0.4	Z	0.4	0.3	0.1	0.1	0.1	0.2	0.2	0.3	0.4	0.2	0.3	0.2	0.2	0.3	0.1	0.2	0.2	0.2	0.2	0.2	0.4	
24-Nov	0.1	0.1	0.1	0.1	0.2	Z	0.1	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.2	
25-Nov	Z	0.0	0.0	0.0	0.0	0.0	0.1	0.4	0.1	0.2	0.2	0.1	0.0	0.1	0.0	0.1	0.1	0.1	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.4	
26-Nov	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.4	0.5	0.3	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.2	0.2	0.1	0.1	0.5	
27-Nov	0.2	0.2	Z	0.1	0.1	0.1	0.1	0.1	0.3	0.2	0.2	0.2	0.2	0.2	0.3	0.2	0.3	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	
28-Nov	0.3	0.3	0.2	Z	0.2	0.2	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.0	0.0	0.1	0.0	0.0	0.1	0.1	0.0	0.1	0.3	
29-Nov	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
30-Nov	0.0	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.1	0.0	0.1	0.1	0.0	0.1	0.0	0.1	0.0	0.1	0.1	0.1	

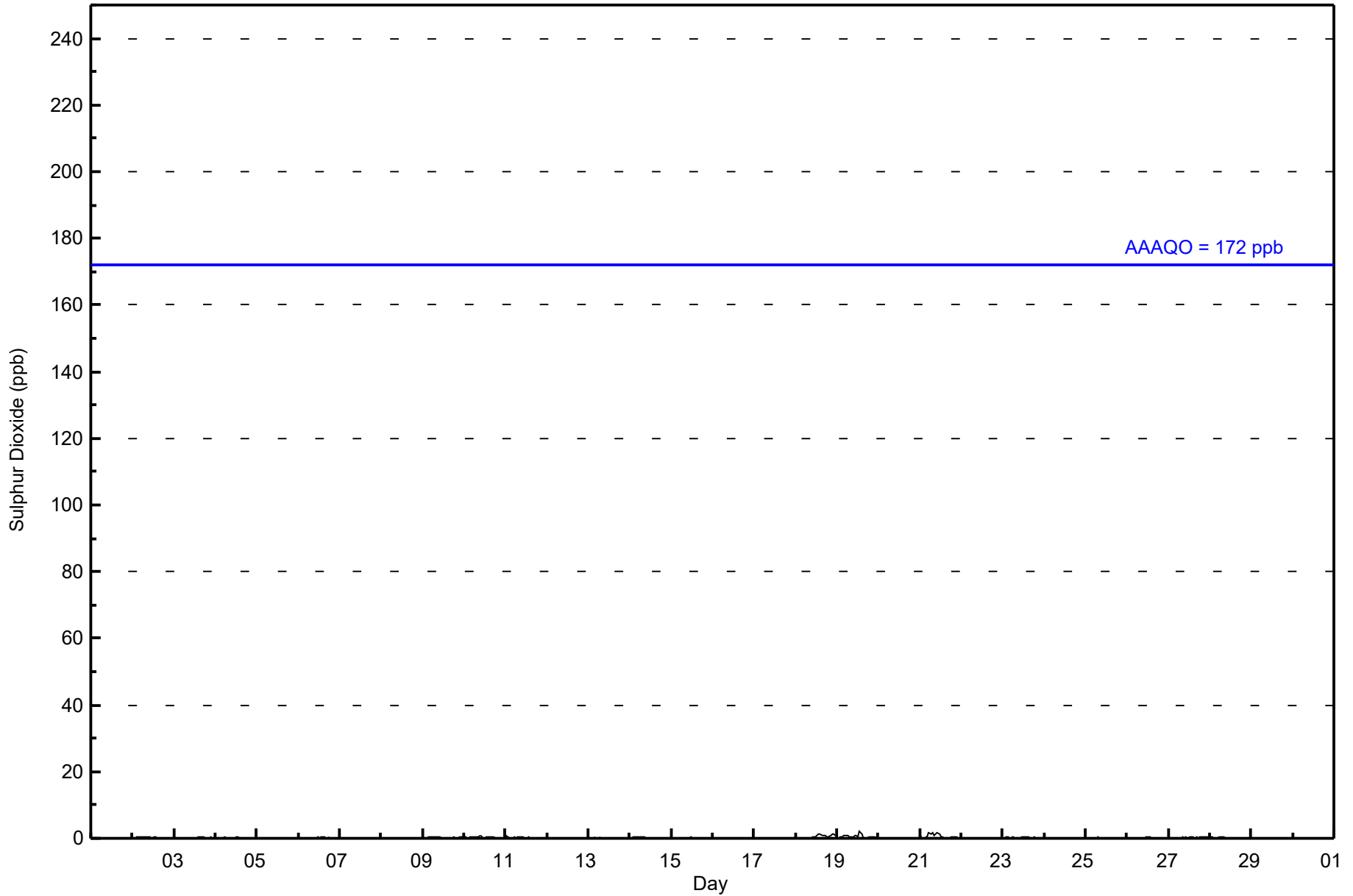
0.1	0.2	0.1	0.1	0.2	0.2	0.2	0.2	0.1	0.2	0.2	0.2	0.2	0.2	0.3	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	Diurnal Average
0.8	0.8	0.6	0.6	0.7	1.6	1.3	1.5	1.0	1.1	1.6	1.2	1.0	1.9	1.1	0.9	0.7	0.7	0.5	0.4	1.0	1.2	1.3	0.9	0.9	0.9	0.9	Diurnal Maximum

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



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

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Stony Mountain - November 2023**





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

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Stony Mountain - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 10	685	100.00	100.00
11 - 20	0	0.00	100.00
21 - 60	0	0.00	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Stony Mountain - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 10	11	30	18	20	20	12	14	11	43	59	85	57	98	78	42	15	613
11 - 20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	<b>11</b>	<b>30</b>	<b>18</b>	<b>20</b>	<b>20</b>	<b>12</b>	<b>14</b>	<b>11</b>	<b>43</b>	<b>59</b>	<b>85</b>	<b>57</b>	<b>98</b>	<b>78</b>	<b>42</b>	<b>15</b>	<b>613</b>

Total Number of Valid Hours: 613

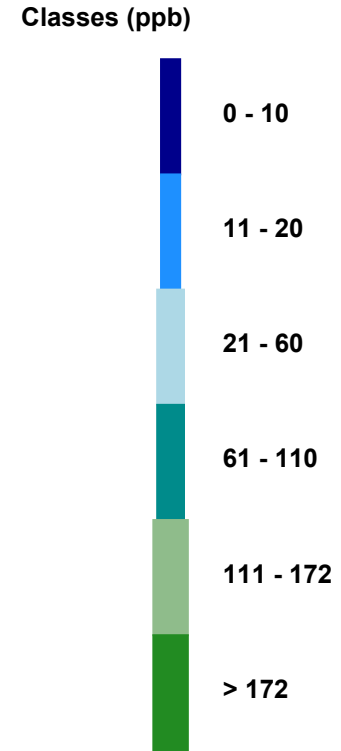
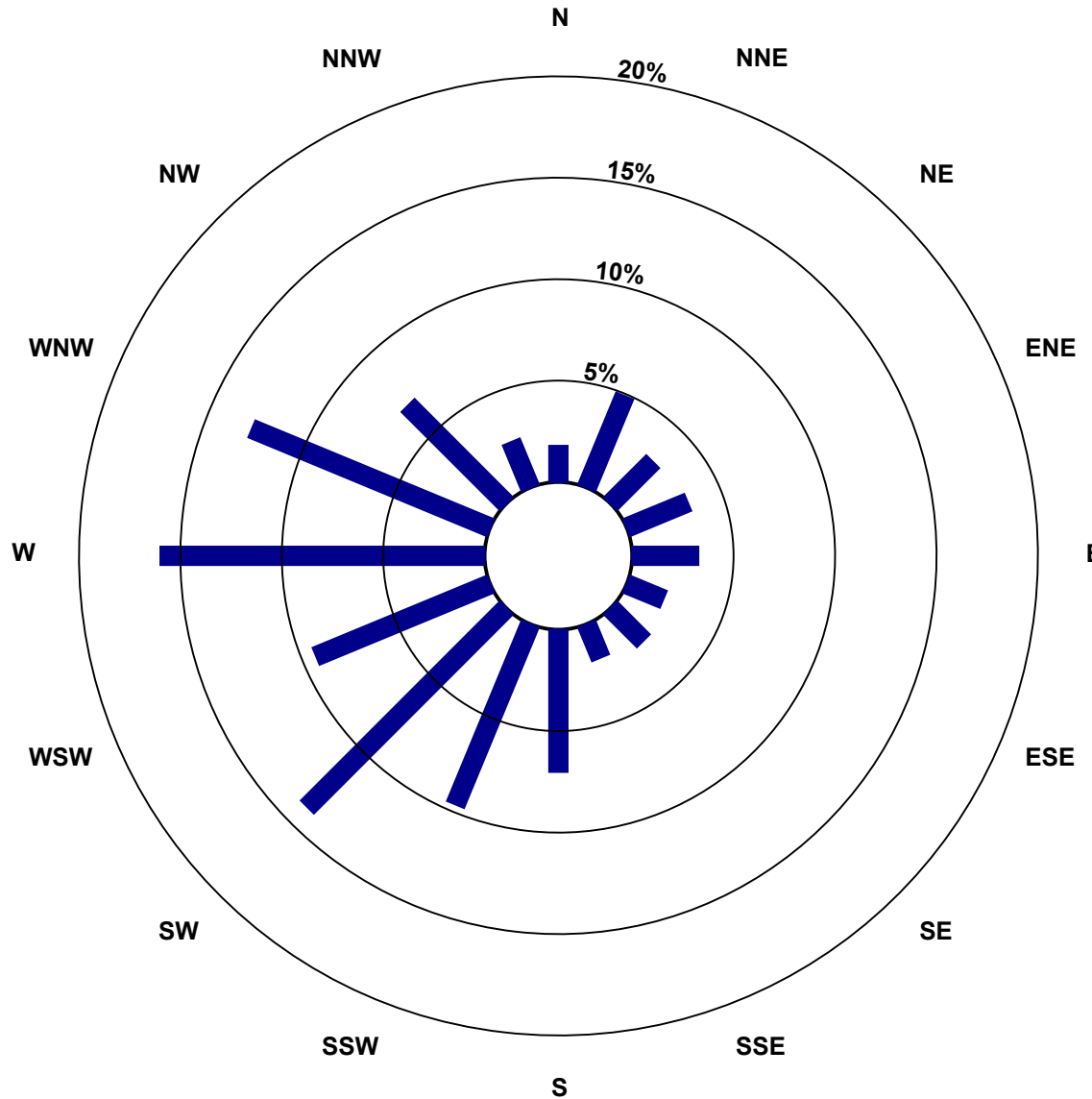
Total Number of Hours: 720



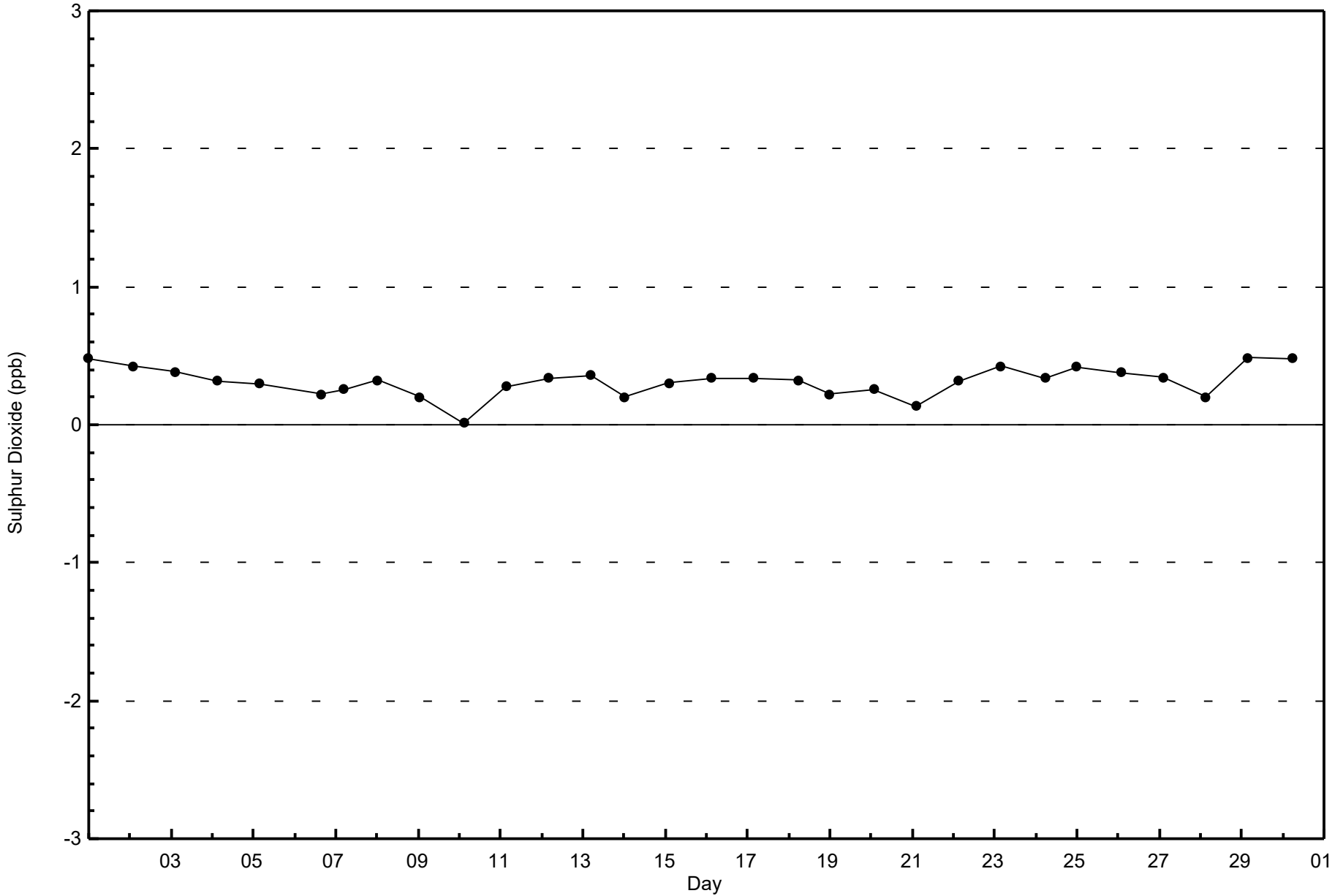


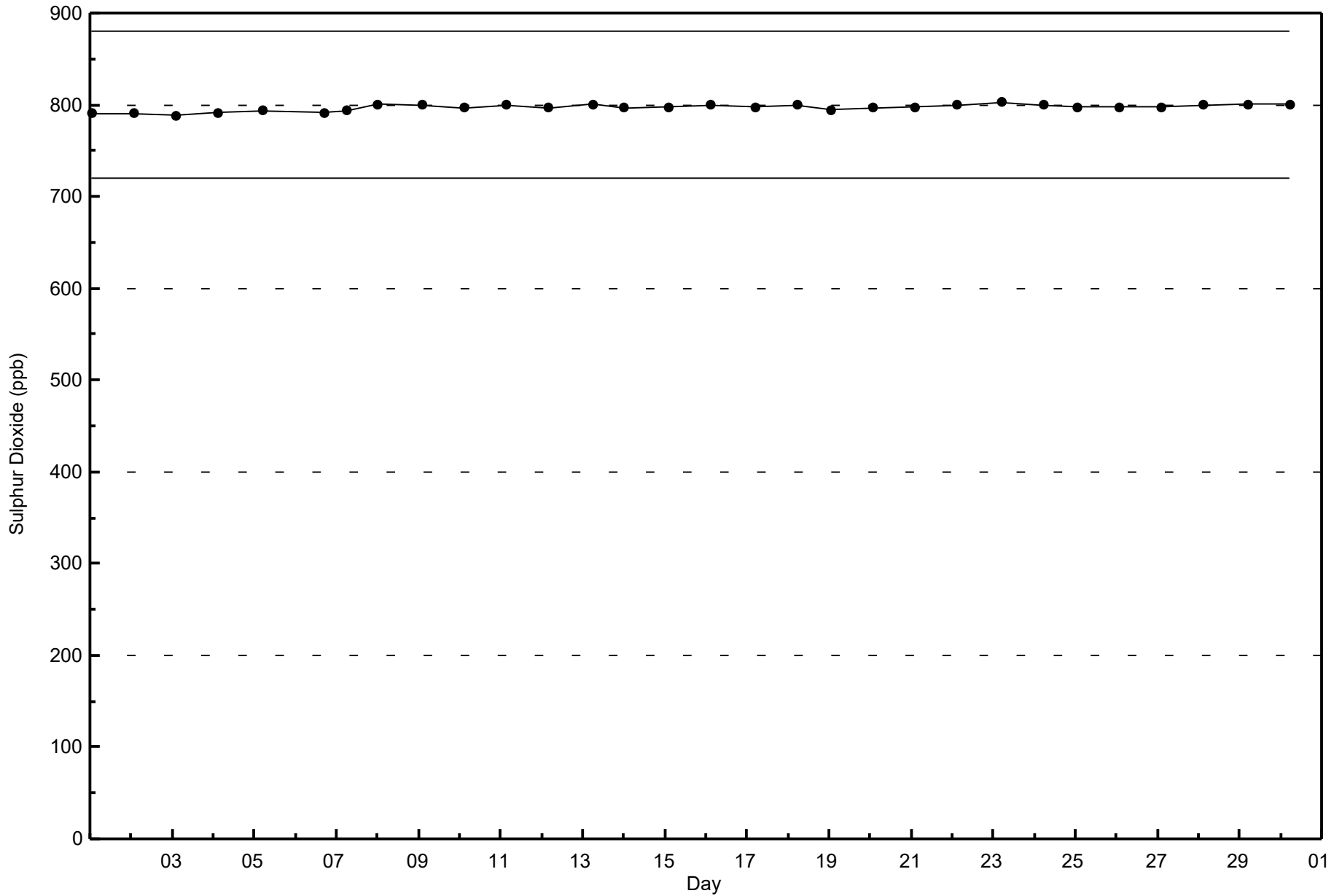
Wood Buffalo Environmental Association  
Wind Rose Nov 2023

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



Total Number of Valid Hours: 613



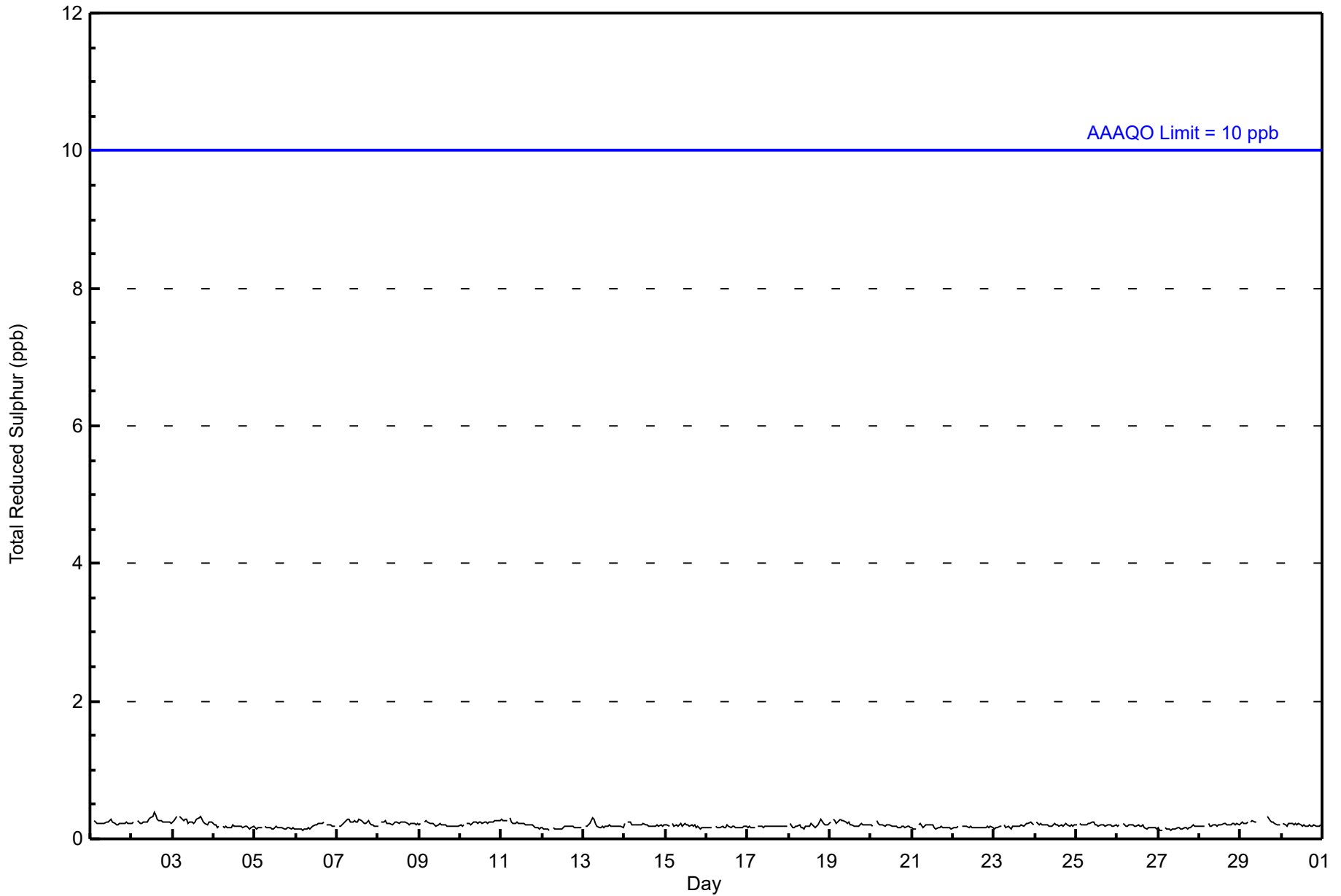






**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Total Reduced Sulphur (TRS) - ppb**  
**Stony Mountain - November 2023**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Total Reduced Sulphur (TRS) - ppb  
Stony Mountain - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2	684	100.00	100.00
3 - 4	0	0.00	100.00
5 - 7	0	0.00	100.00
8 - 11	0	0.00	100.00
> 11	0	0.00	100.00

Total Number of Valid Hours: 684

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Total Reduced Sulphur (TRS) - ppb  
Stony Mountain - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	11	31	17	20	20	13	13	12	44	58	86	54	99	76	38	15	607
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	11	31	17	20	20	13	13	12	44	58	86	54	99	76	38	15	607

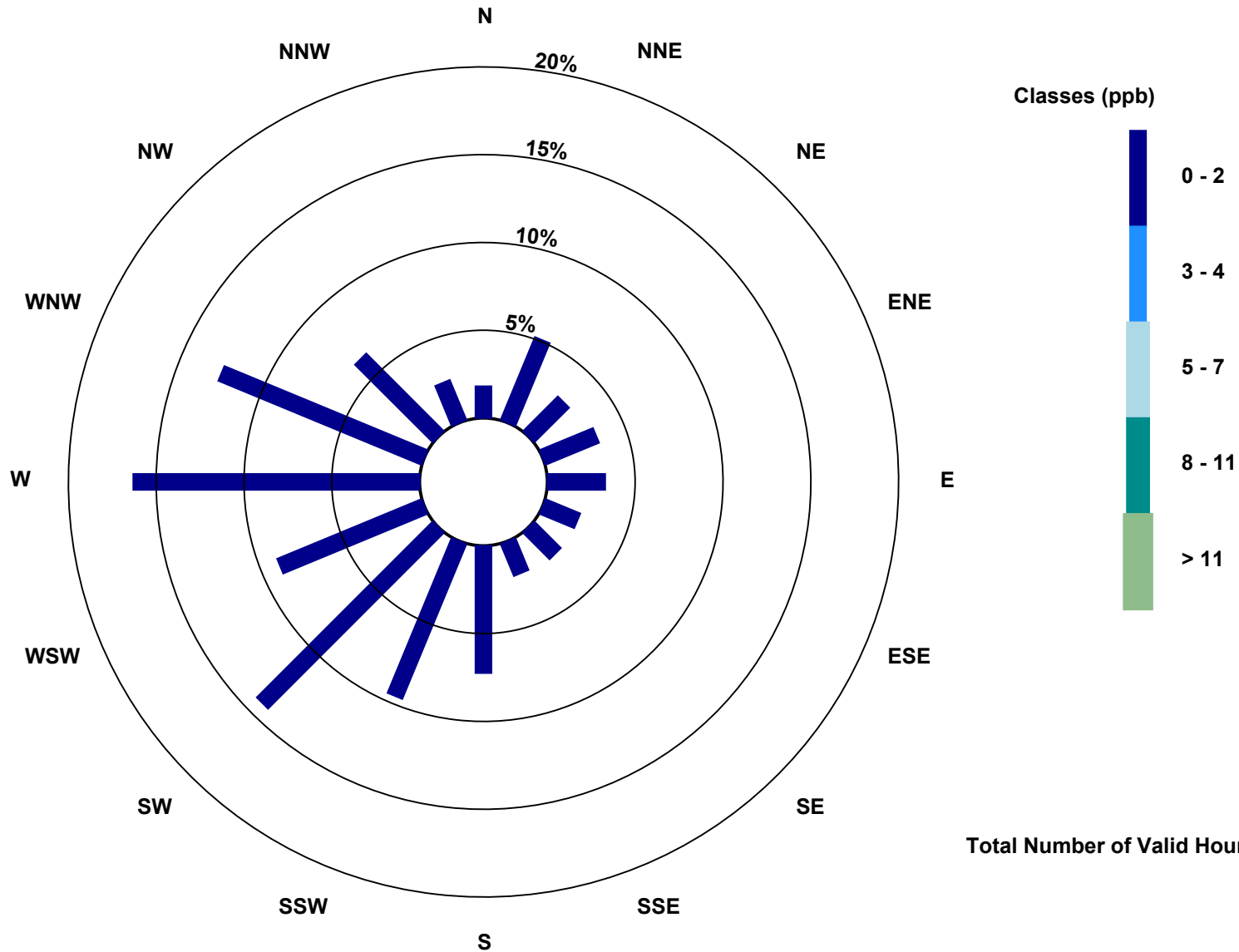
Total Number of Valid Hours: 607

Total Number of Hours: 720

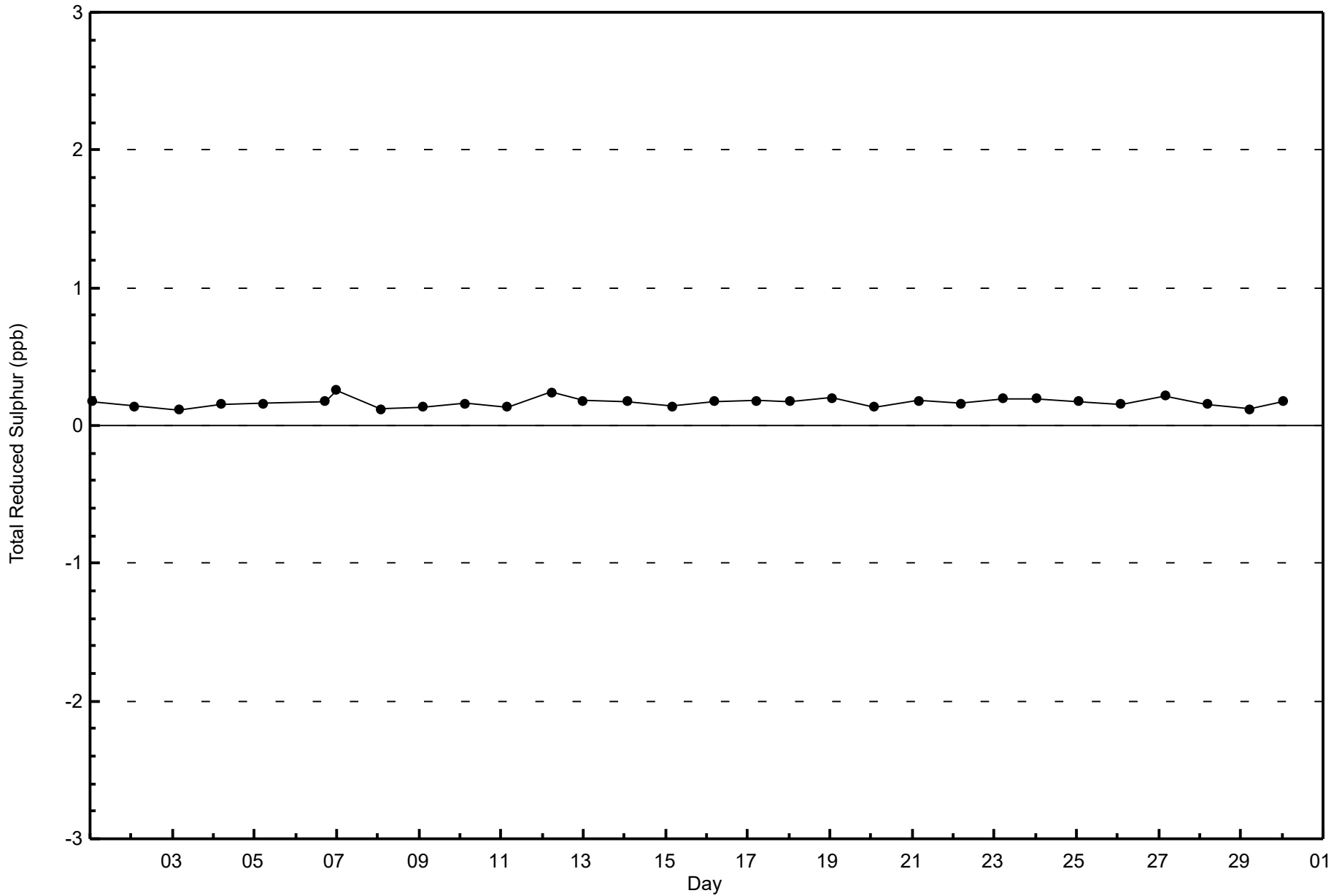


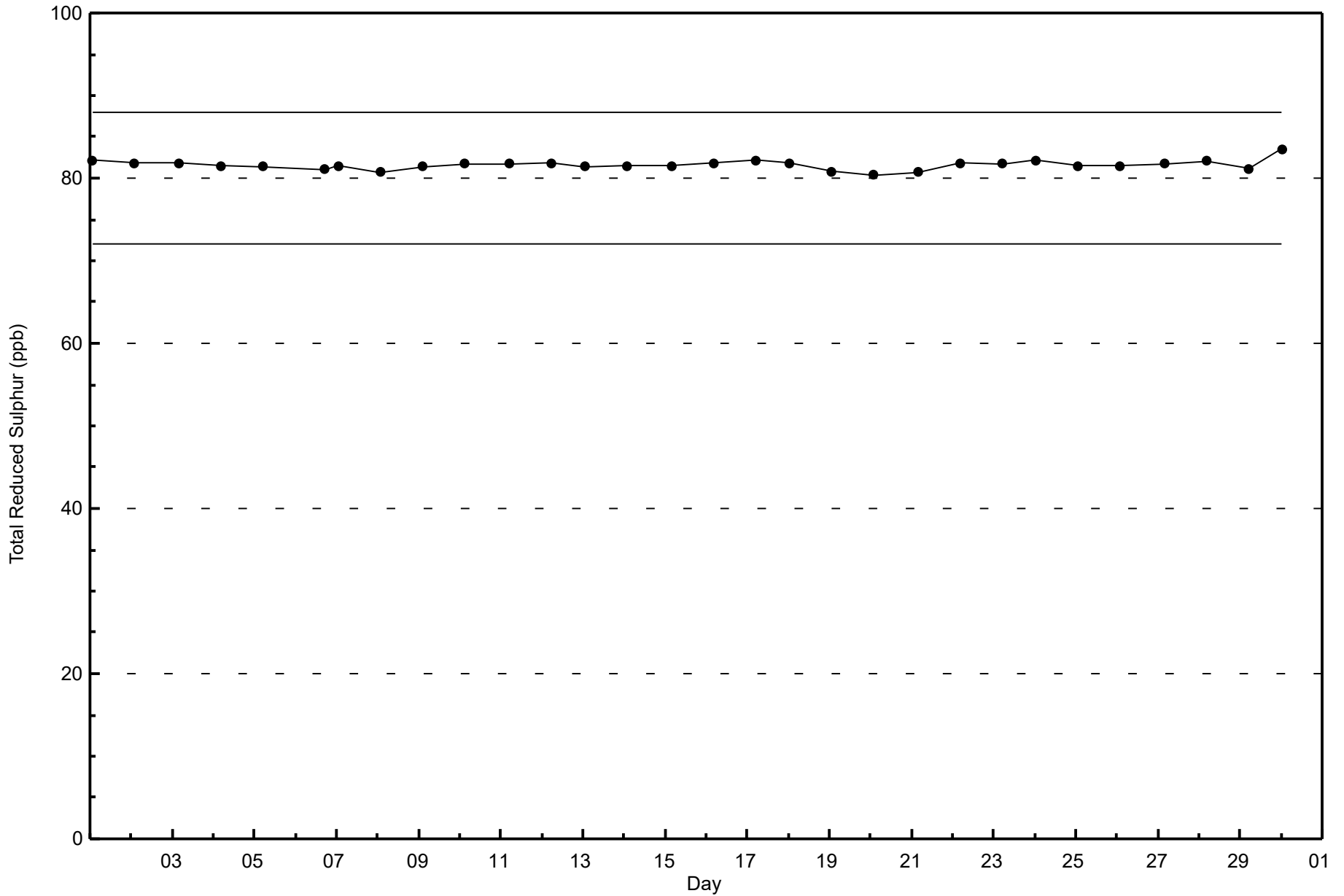
Wood Buffalo Environmental Association  
Wind Rose Nov 2023

Total Reduced Sulphur (TRS) - ppb  
Stony Mountain











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

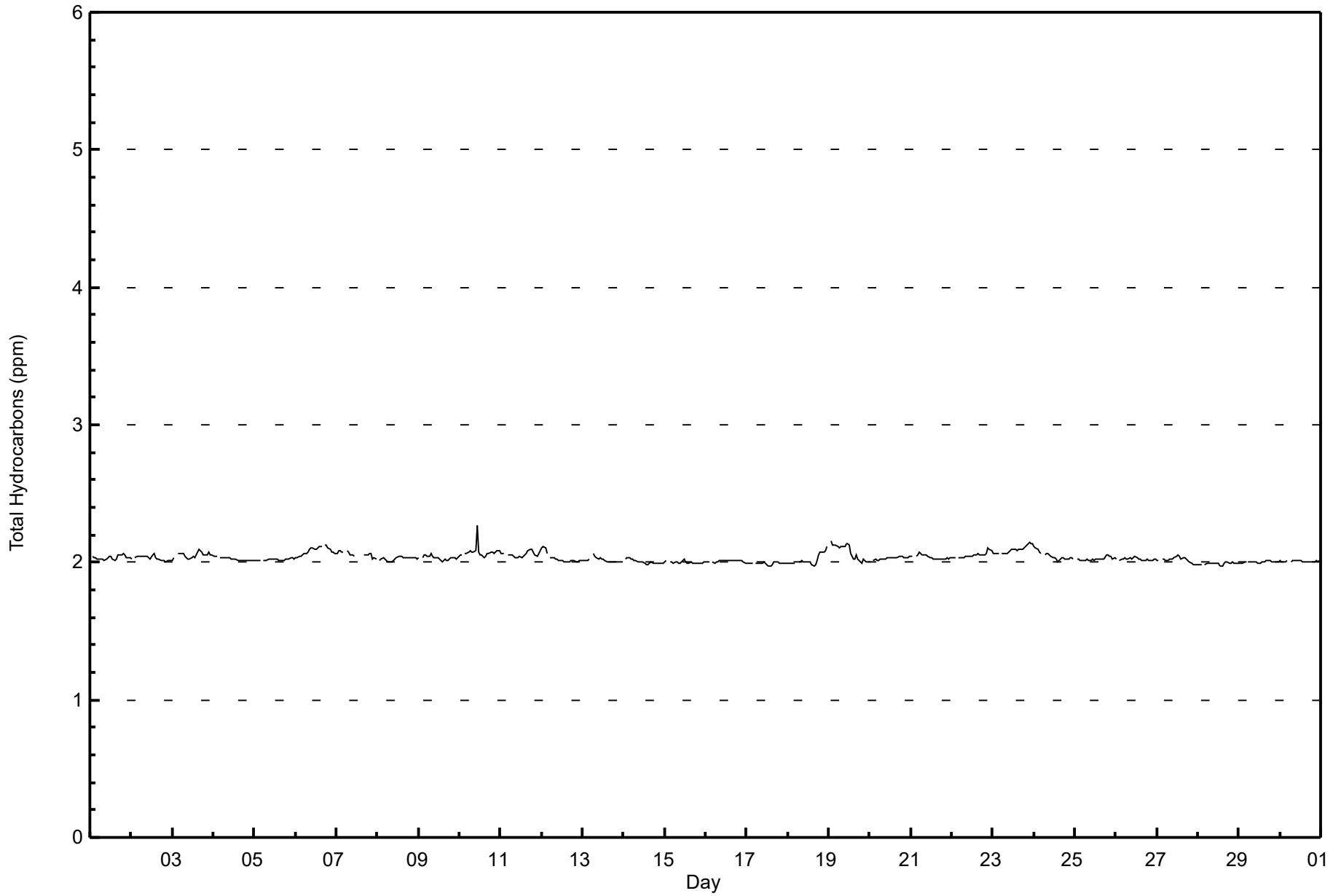
**Total Hydrocarbons (THC) - ppm**  
**Stony Mountain - November 2023**

Maximum Value: 2.3 ppm on Nov 10 11:00																				Maximum Daily Average: 2.1 ppm on Nov 23					Hours in Service: 720				
Minimum Value: 2.0 ppm on Nov 28 15:00																				Minimum Daily Average: 2.0 ppm on Nov 28					Hours of Data: 685				
Maximum Diurnal Average: 2.0 ppm at hour 11																				Minimum Diurnal Average: 2.0 ppm at hour 15					Hours of Missing Data: 35				
Monthly Average: 2.03 ppm																				Percentiles: P <sub>1</sub> = 2.0 P <sub>10</sub> = 2.0 Q <sub>1</sub> = 2.0 Median = 2.0 Q <sub>3</sub> = 2.0 P <sub>90</sub> = 2.1 P <sub>99</sub> = 2.1					Hours of Calibration: 35				
																									Percent Operational Time: 100.0				
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24					
1-Nov	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	
2-Nov	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	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
3-Nov	2.0	2.0	Z	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
4-Nov	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
5-Nov	2.0	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
6-Nov	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	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
7-Nov	2.1	2.1	2.1	2.1	2.1	Z	2.1	2.1	2.1	2.0	2.0	C	C	C	C	C	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1
8-Nov	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
9-Nov	2.0	Z	2.0	2.0	2.1	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1
10-Nov	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.3	2.1	2.1	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.3
11-Nov	2.1	2.1	2.1	Z	2.1	2.0	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	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1
12-Nov	2.1	2.1	2.1	2.1	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1
13-Nov	2.0	2.0	2.0	2.0	2.0	Z	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1
14-Nov	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
15-Nov	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
16-Nov	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
17-Nov	2.0	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
18-Nov	2.0	2.0	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
19-Nov	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	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.2
20-Nov	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
21-Nov	2.0	2.0	Z	2.0	2.1	2.1	2.1	2.0	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1
22-Nov	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
23-Nov	2.1	2.1	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
24-Nov	2.1	2.1	2.1	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1
25-Nov	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1
26-Nov	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
27-Nov	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1
28-Nov	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
29-Nov	2.0	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
30-Nov	2.0	2.0	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
																								Diurnal Average					
																								Diurnal Maximum					
Z - zerospan C - Calibration																													



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

**Total Hydrocarbons (THC) - ppm**  
**Stony Mountain - November 2023**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Total Hydrocarbons (THC) - ppm  
Stony Mountain - November 2023**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2.0	524	76.50	76.50
2.1 - 3.0	161	23.50	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Total Hydrocarbons (THC) - ppm  
Stony Mountain - November 2023**

<b>Concentration Ranges (ppm)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	10	27	16	17	15	5	8	5	13	24	51	55	94	74	39	15	468
2.1 - 3.0	1	3	2	3	5	7	6	6	30	35	34	2	4	4	3	0	145
3.1 - 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	11	30	18	20	20	12	14	11	43	59	85	57	98	78	42	15	613

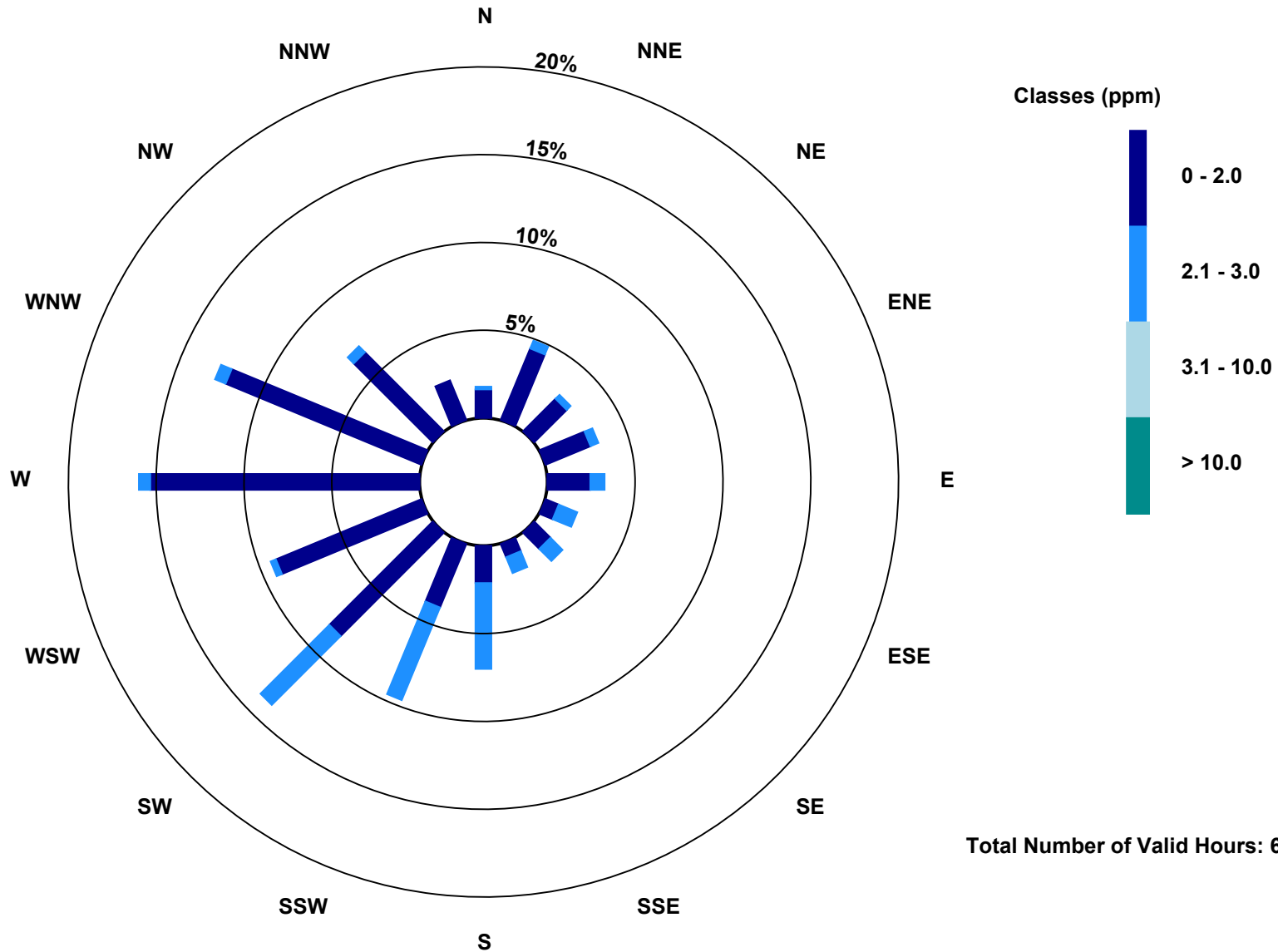
Total Number of Valid Hours: 613

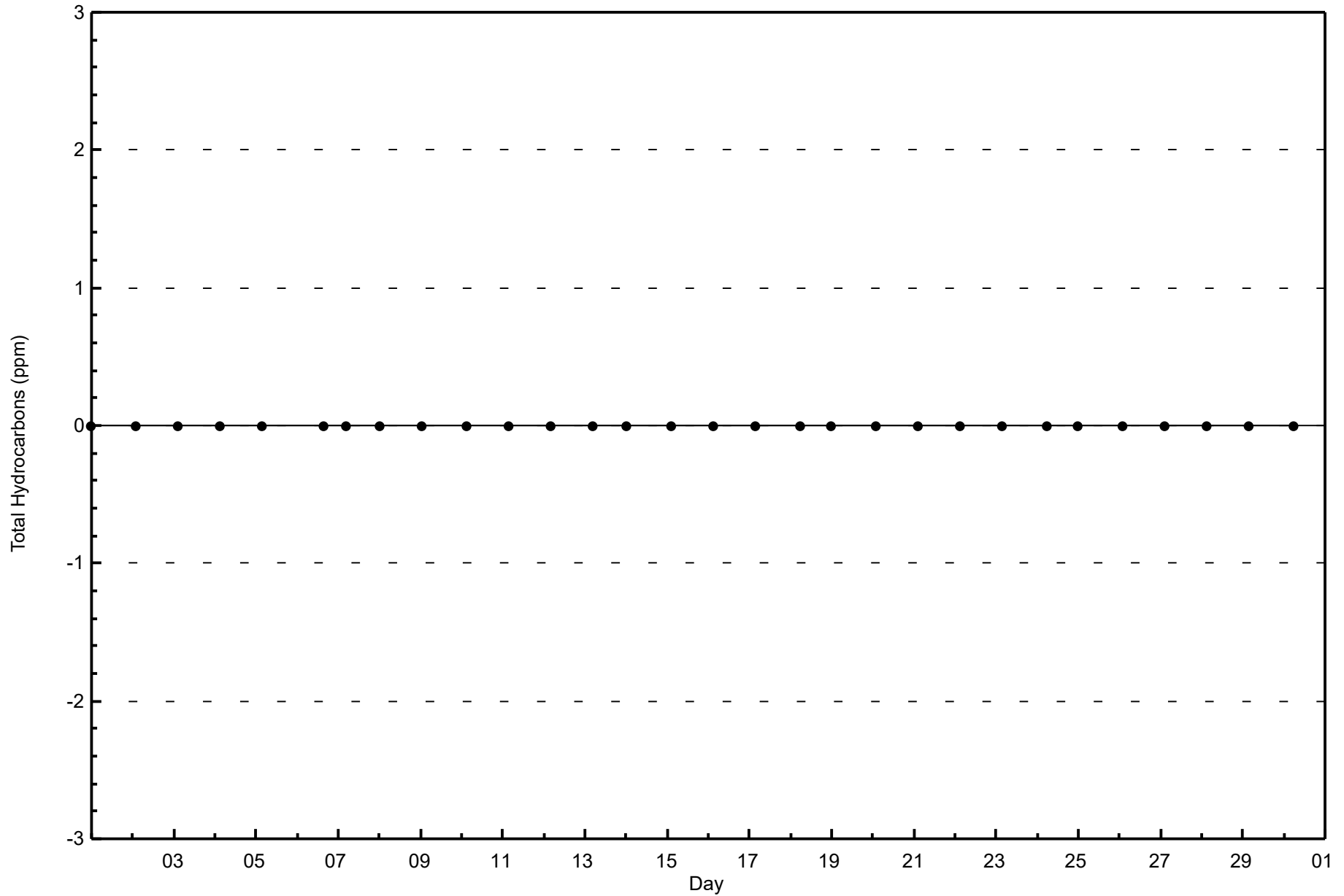
Total Number of Hours: 720



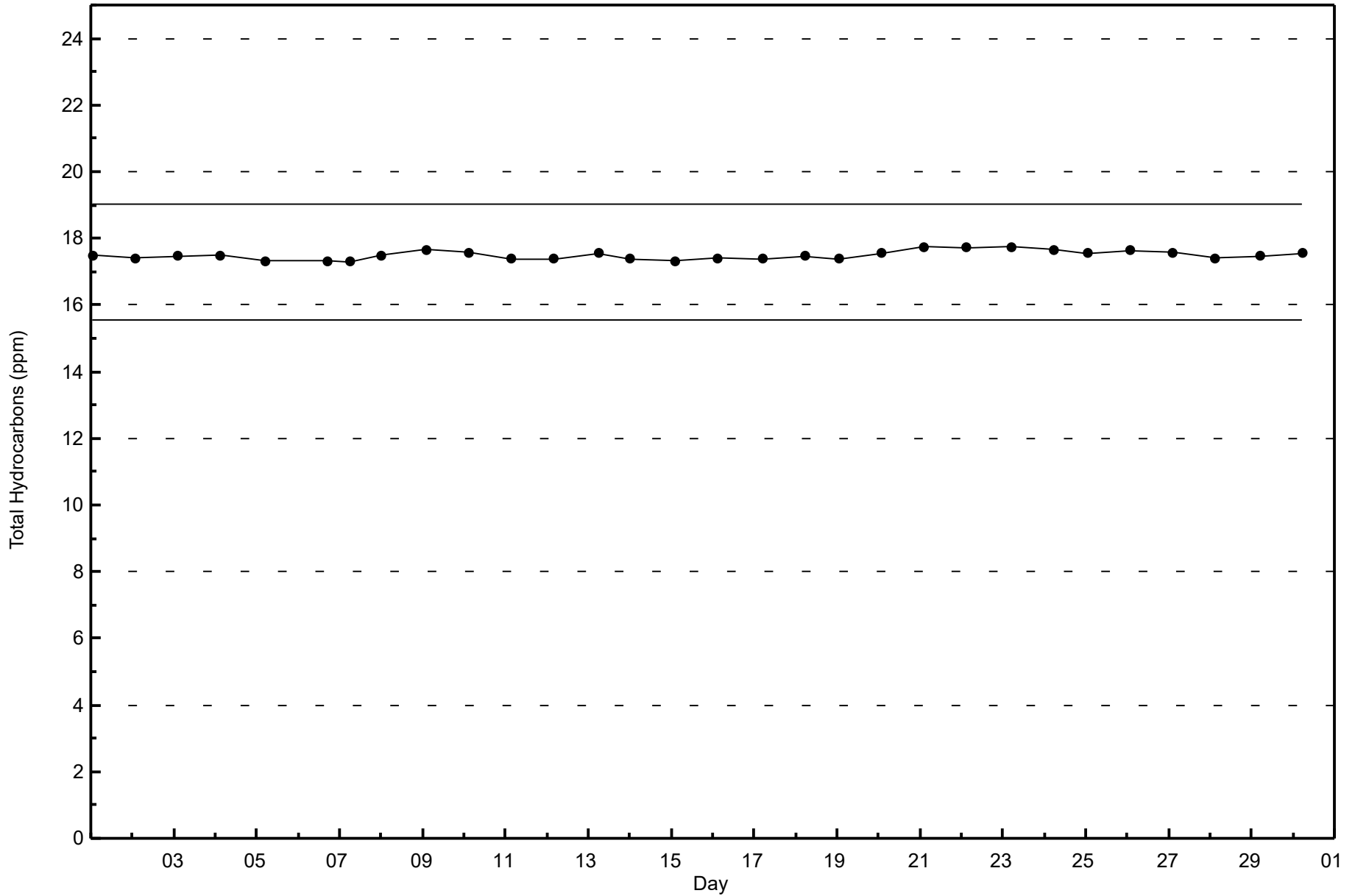
Wood Buffalo Environmental Association  
Wind Rose Nov 2023

Total Hydrocarbons (THC) - ppm  
Stony Mountain



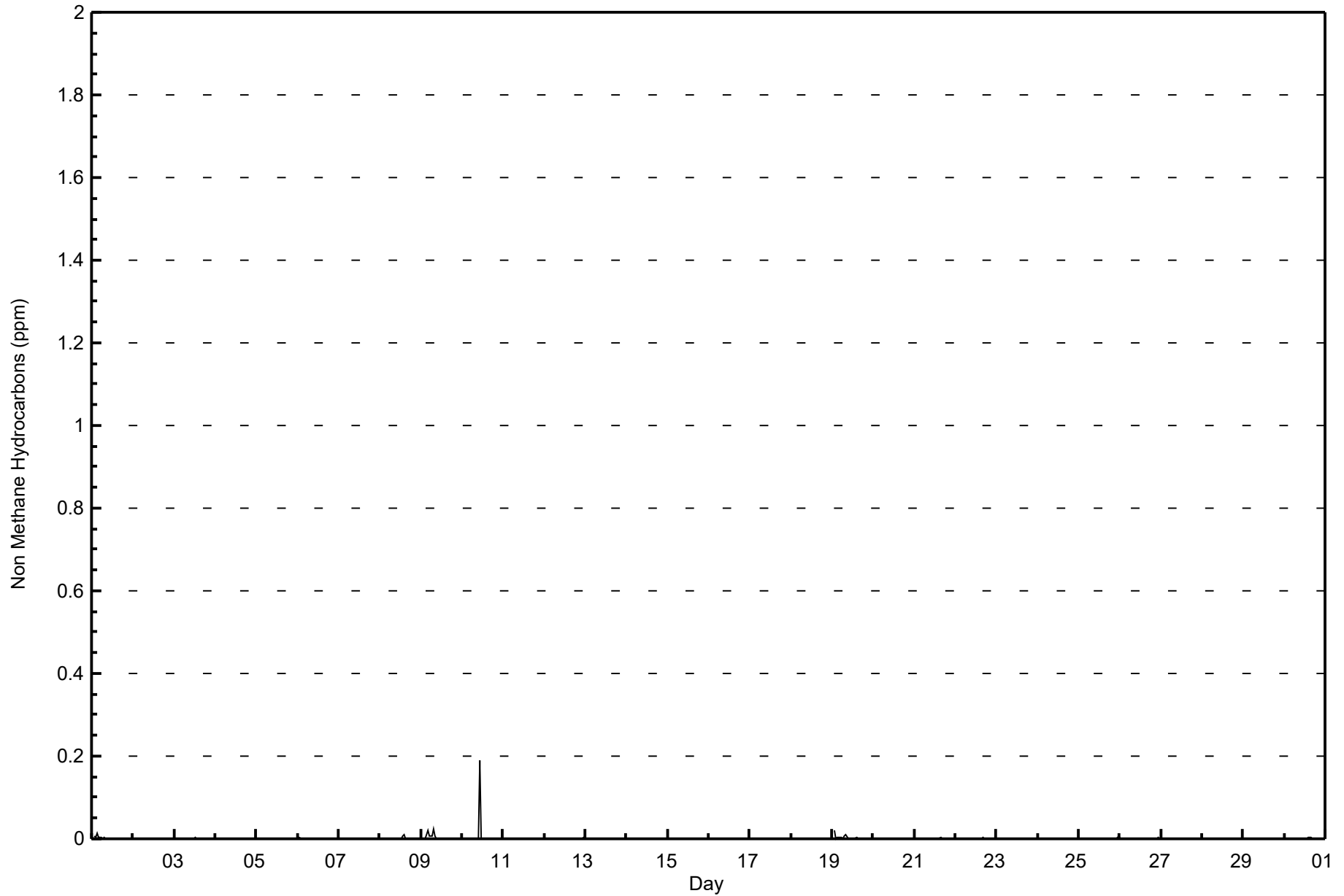








Maximum Value: 0.189 ppm on Nov 10 11:00      Maximum Daily Average: 0.008 ppm on Nov 10																				Hours in Service:	720					
Minimum Value: 0.000 ppm on Nov 1 07:00      Minimum Daily Average: 0.000 ppm on Nov 4																				Hours of Data:	685					
Maximum Diurnal Average: 0.006 ppm at hour 11      Minimum Diurnal Average: 0.000 ppm at hour 1																				Hours of Missing Data:	35					
Monthly Average: 0.001 ppm      Percentiles: P <sub>1</sub> = 0.0 P <sub>10</sub> = 0.0 Q <sub>1</sub> = 0.0 Median = 0.0 Q <sub>3</sub> = 0.0 P <sub>90</sub> = 0.0 P <sub>99</sub> = 0.0																				Hours of Calibration:	35					
																				Percent Operational Time:	100.0					
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	Z	0.008	0.004	0.013	0.002	0.002	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	0.001	0.013
2-Nov	0.000	Z	0.002	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002
3-Nov	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004
4-Nov	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
5-Nov	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
6-Nov	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	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003
7-Nov	0.000	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	C	C	C	C	C	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
8-Nov	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.006	0.010	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.010
9-Nov	0.000	Z	0.000	0.012	0.019	0.005	0.008	0.024	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	0.000	0.000	0.000	0.003	0.024
10-Nov	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.189	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.008	0.189
11-Nov	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
12-Nov	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.002	0.000	0.002
13-Nov	0.000	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
14-Nov	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
15-Nov	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
16-Nov	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
17-Nov	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
18-Nov	0.000	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
19-Nov	Z	0.021	0.000	0.005	0.003	0.003	0.000	0.008	0.011	0.000	0.001	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	0.002	0.021
20-Nov	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
21-Nov	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003
22-Nov	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003
23-Nov	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001
24-Nov	0.000	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
25-Nov	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.006	0.000	0.006
26-Nov	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.002
27-Nov	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
28-Nov	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
29-Nov	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
30-Nov	0.000	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002
																								Diurnal Average		
																								Diurnal Maximum		
																								Z - zerospan      C - Calibration		





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Non Methane Hydrocarbons (NMHC) - ppm  
Stony Mountain - November 2023**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 0.005	671	97.96	97.96
0.006 - 0.05	13	1.90	99.85
0.06 - 0.1	0	0.00	99.85
> 0.1	1	0.15	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



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

**Non Methane Hydrocarbons (NMHC) - ppm**  
**Stony Mountain - November 2023**

<b>Concentration</b> <b>Ranges (ppm)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 0.005	11	30	18	20	20	12	14	11	43	57	85	57	94	77	42	15	606
0.006 - 0.05	0	0	0	0	0	0	0	0	0	1	0	0	4	1	0	0	6
0.06 - 0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 0.1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
<b>Totals</b>	11	30	18	20	20	12	14	11	43	59	85	57	98	78	42	15	613

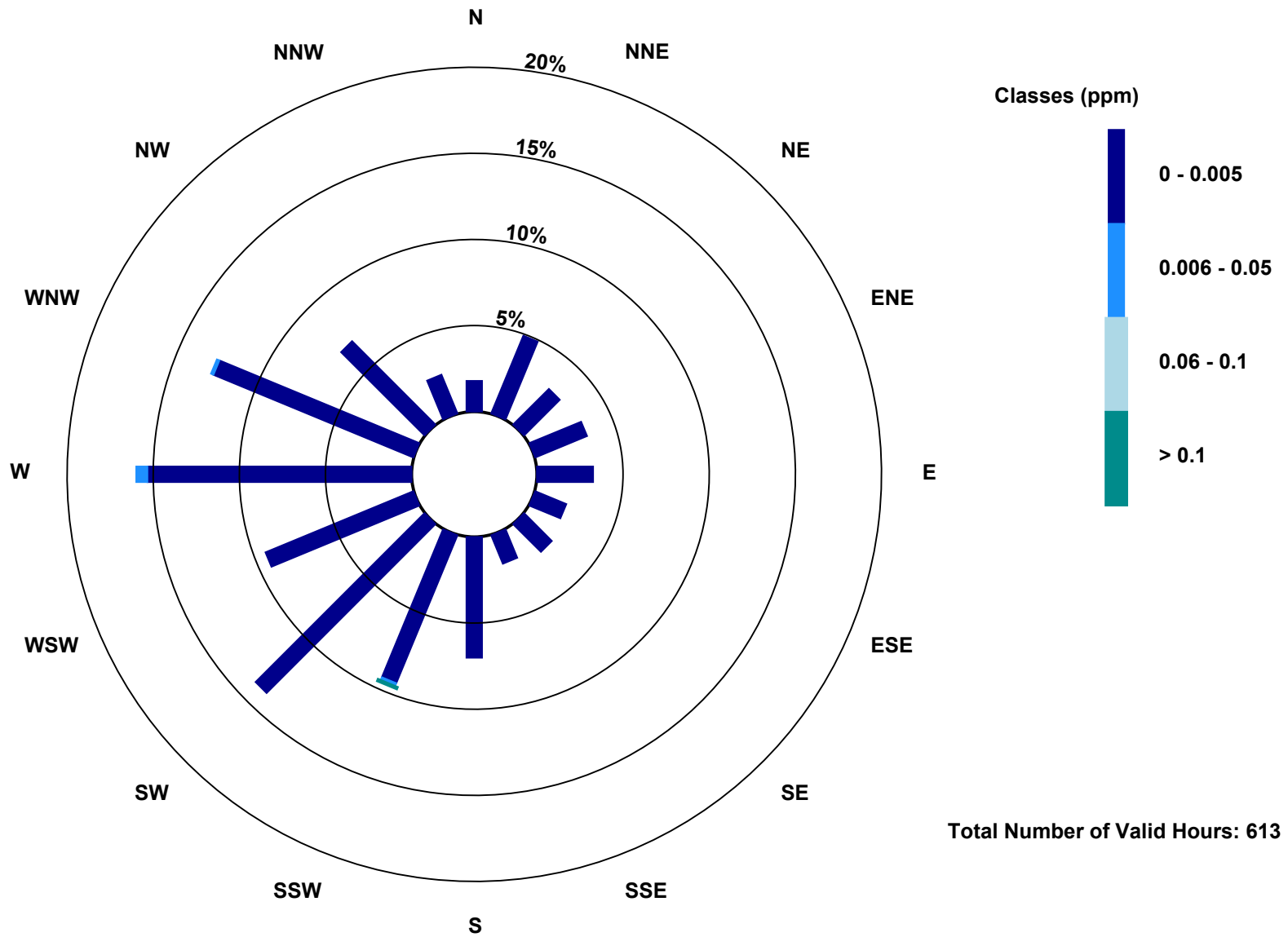
Total Number of Valid Hours: 613

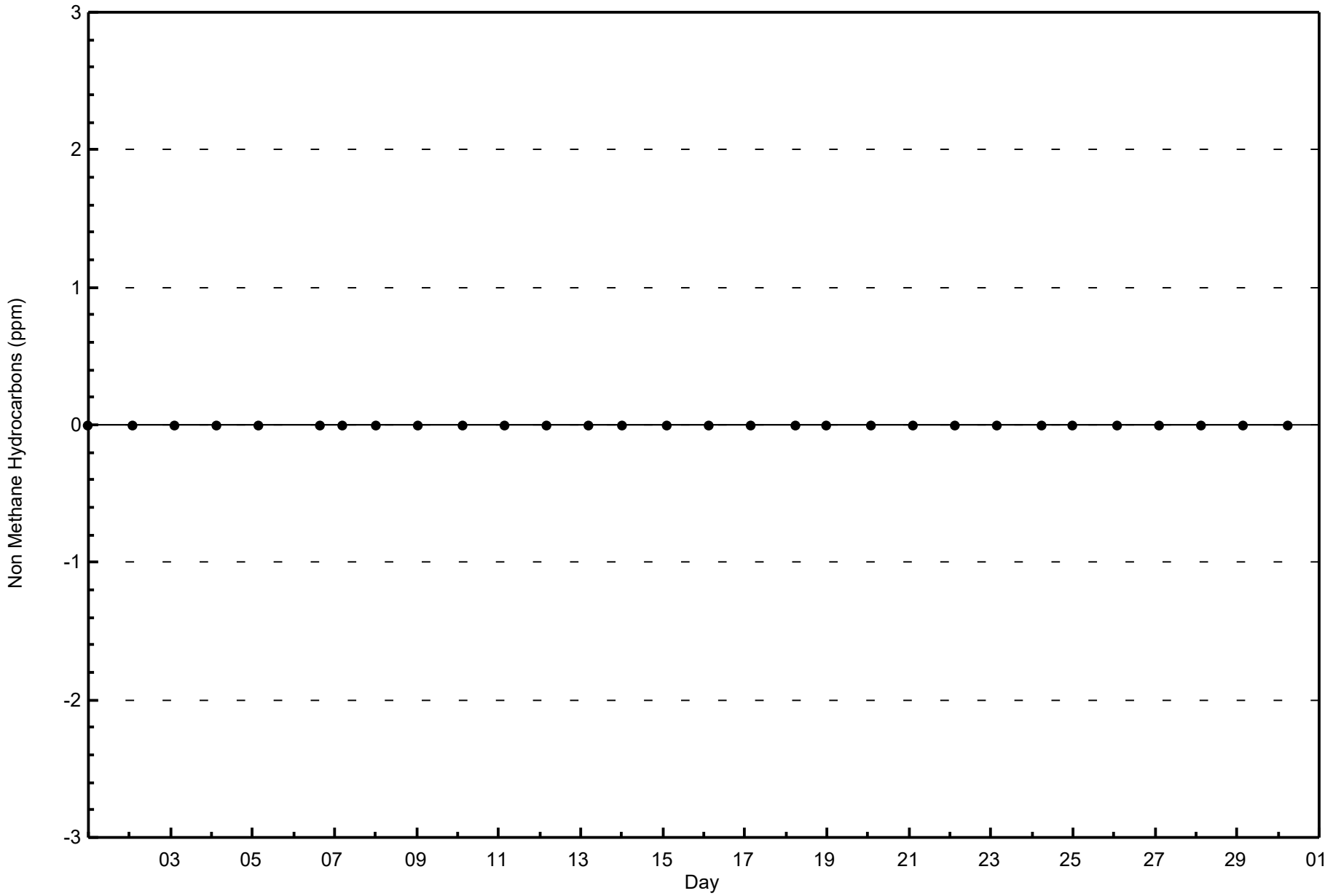
Total Number of Hours: 720

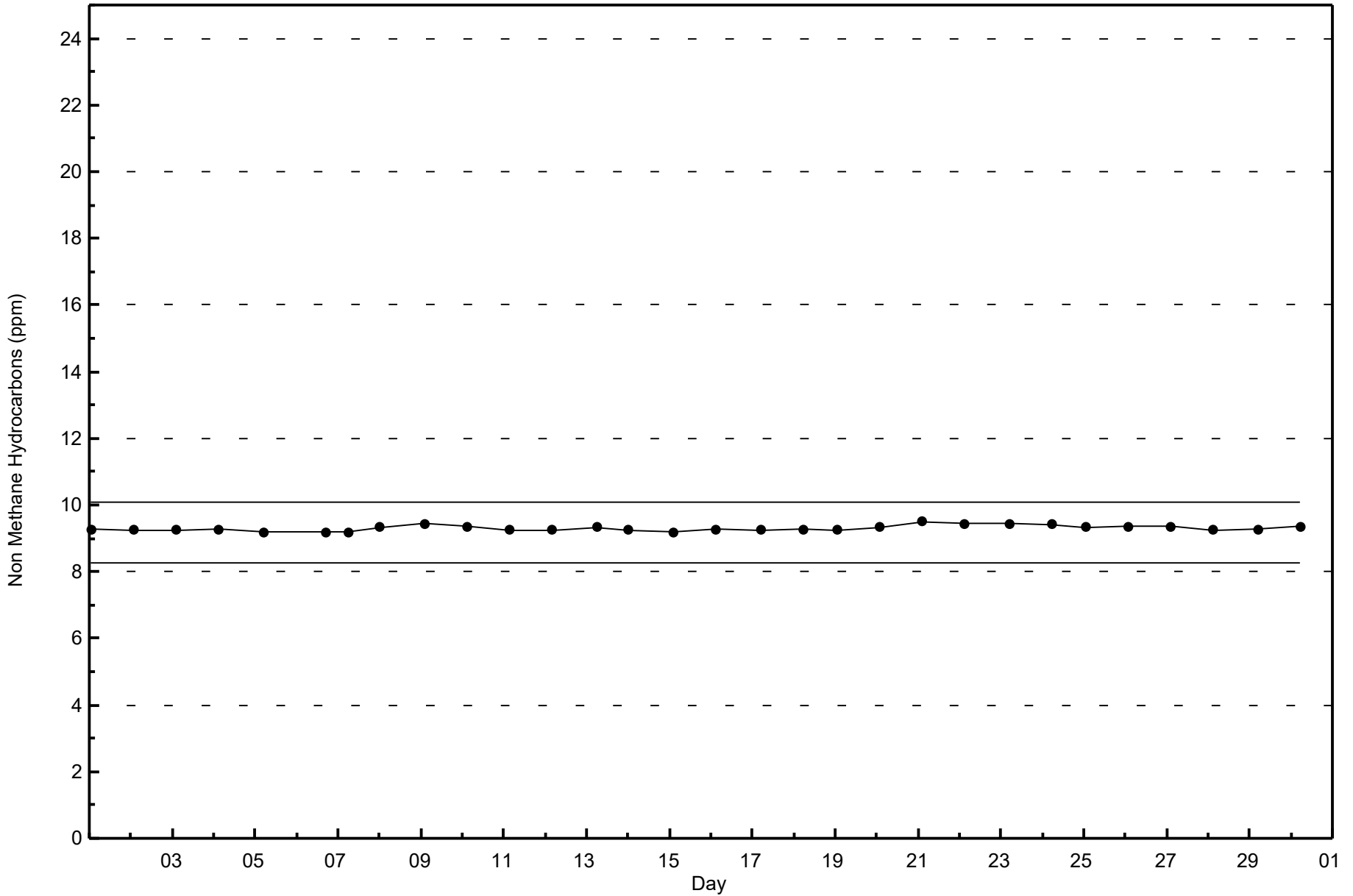


Wood Buffalo Environmental Association  
Wind Rose Nov 2023

Non Methane Hydrocarbons (NMHC) - ppm  
Stony Mountain









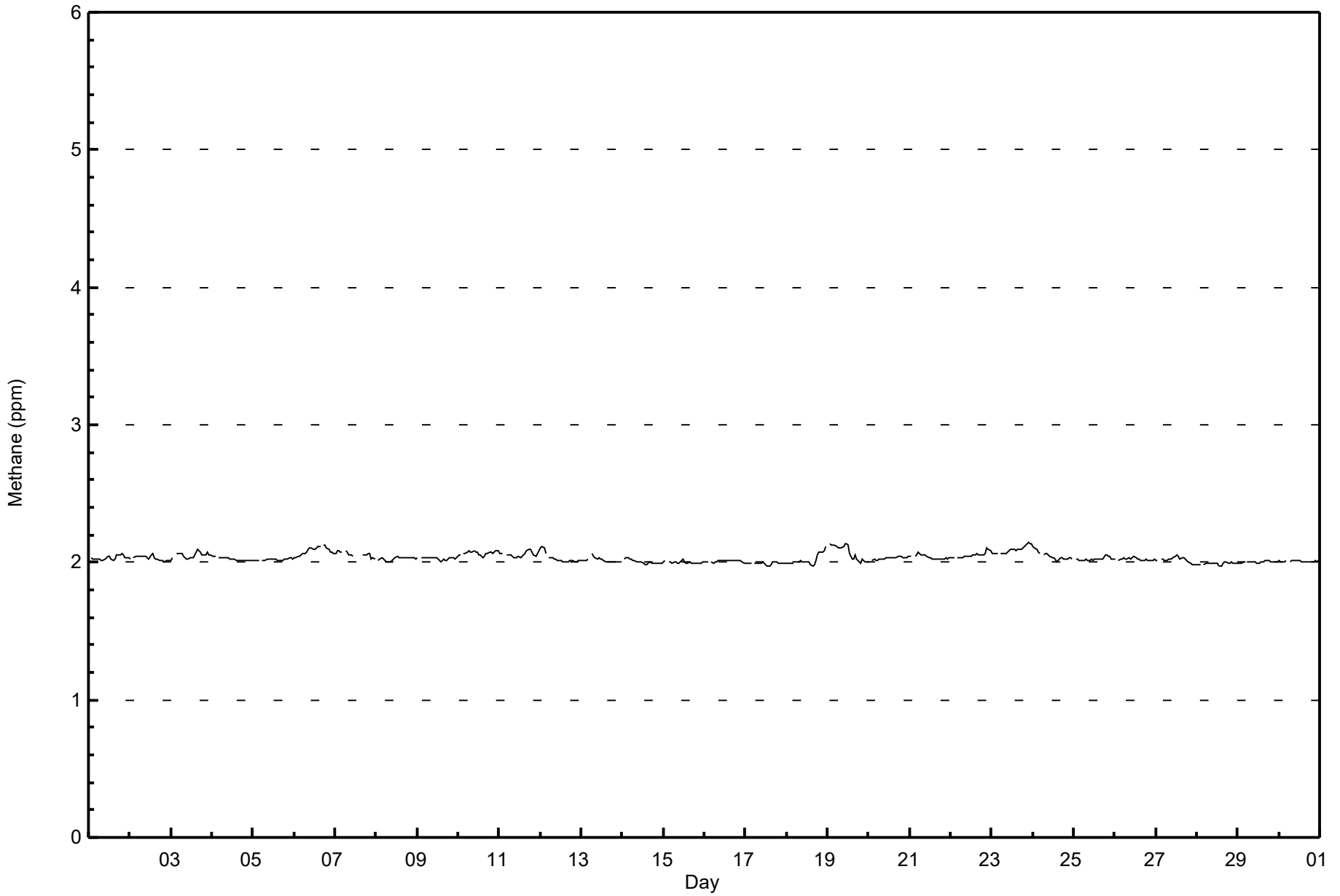


Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 2.1 ppm on Nov 23 22:00	Maximum Daily Average: 2.1 ppm on Nov 23		Hours of Data:	685
Minimum Value: 2.0 ppm on Nov 28 15:00	Minimum Daily Average: 2.0 ppm on Nov 28		Hours of Missing Data:	35
Maximum Diurnal Average: 2.0 ppm at hour 4	Minimum Diurnal Average: 2.0 ppm at hour 15		Hours of Calibration:	35
Monthly Average: 2.03 ppm	Percentiles: P <sub>1</sub> = 2.0 P <sub>10</sub> = 2.0 Q <sub>1</sub> = 2.0 Median = 2.0 Q <sub>3</sub> = 2.0 P <sub>90</sub> = 2.1 P <sub>99</sub> = 2.1		Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24				
1-Nov	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.1	2.1	
2-Nov	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	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
3-Nov	2.0	2.0	Z	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
4-Nov	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
5-Nov	2.0	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
6-Nov	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
7-Nov	2.1	2.1	2.1	2.1	2.1	Z	2.1	2.1	2.1	2.0	2.0	C	C	C	C	C	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.1	2.1	
8-Nov	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
9-Nov	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
10-Nov	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
11-Nov	2.1	2.1	2.1	Z	2.1	2.0	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	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1
12-Nov	2.1	2.1	2.1	2.1	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1
13-Nov	2.0	2.0	2.0	2.0	2.0	Z	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1
14-Nov	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
15-Nov	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
16-Nov	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
17-Nov	2.0	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
18-Nov	2.0	2.0	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
19-Nov	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1
20-Nov	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
21-Nov	2.0	2.0	Z	2.0	2.1	2.1	2.1	2.0	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1
22-Nov	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
23-Nov	2.1	2.1	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
24-Nov	2.1	2.1	2.1	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1
25-Nov	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.1
26-Nov	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
27-Nov	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1
28-Nov	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
29-Nov	2.0	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
30-Nov	2.0	2.0	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0

2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	Diurnal Average
2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	Diurnal Maximum

Z - zerospan      C - Calibration





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Methane (CH<sub>4</sub>) - ppm  
Stony Mountain - November 2023**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2.0	527	76.93	76.93
2.1 - 3.0	158	23.07	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Methane (CH<sub>4</sub>) - ppm  
Stony Mountain - November 2023**

<b>Concentration Ranges (ppm)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	10	27	16	17	15	5	8	5	13	24	51	55	94	74	40	15	469
2.1 - 3.0	1	3	2	3	5	7	6	6	30	35	34	2	4	4	2	0	144
3.1 - 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	11	30	18	20	20	12	14	11	43	59	85	57	98	78	42	15	613

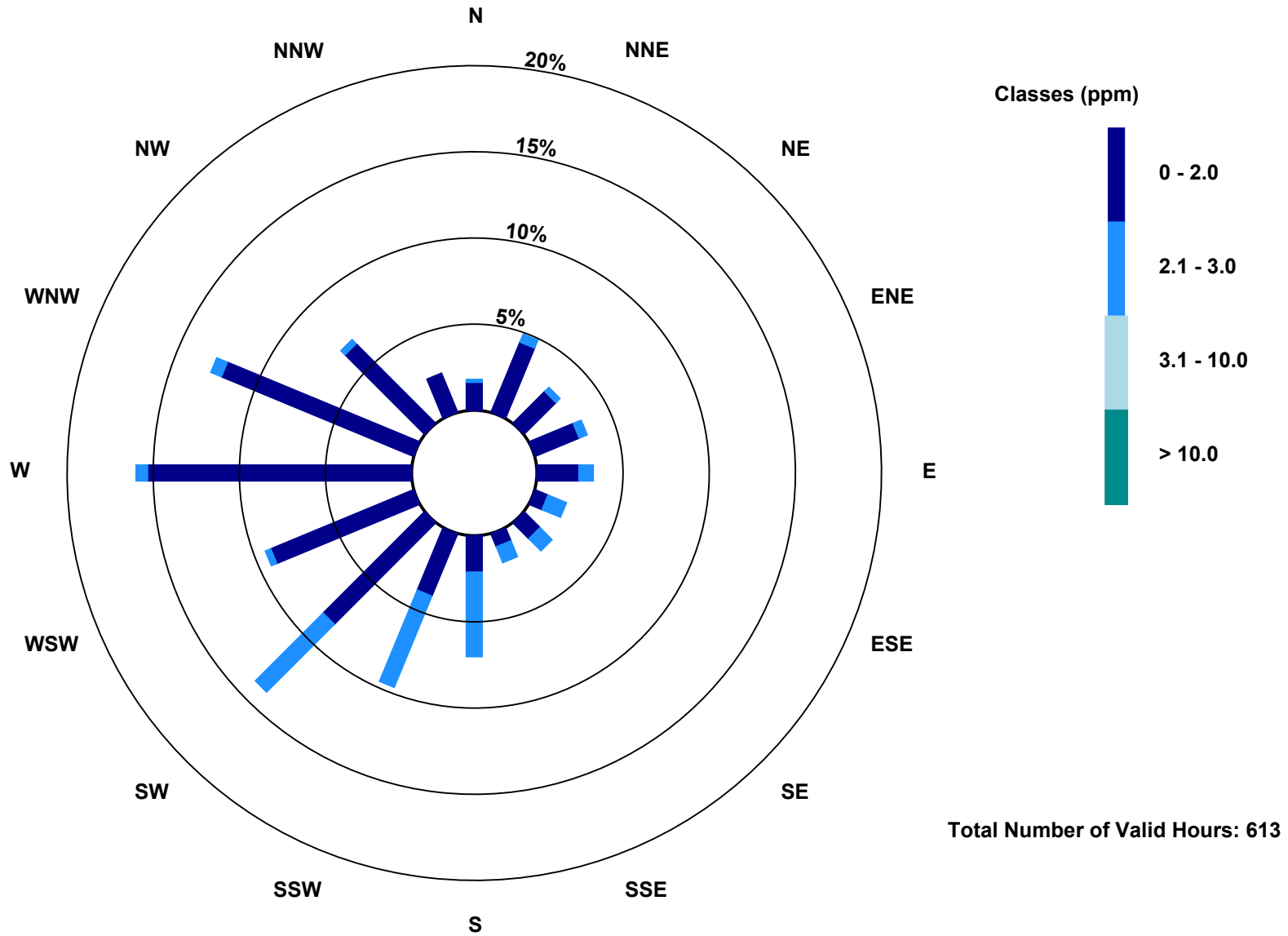
Total Number of Valid Hours: 613

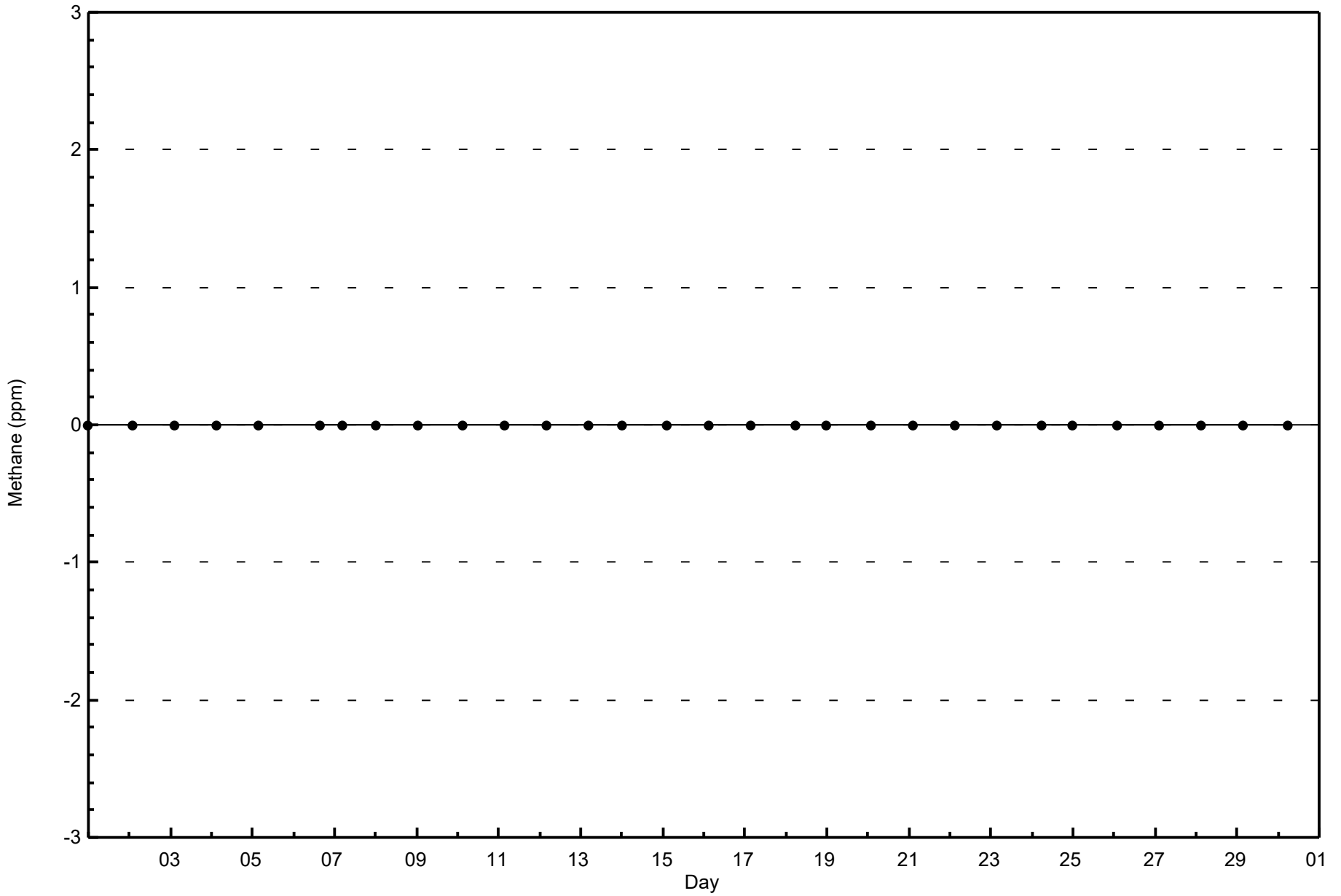
Total Number of Hours: 720

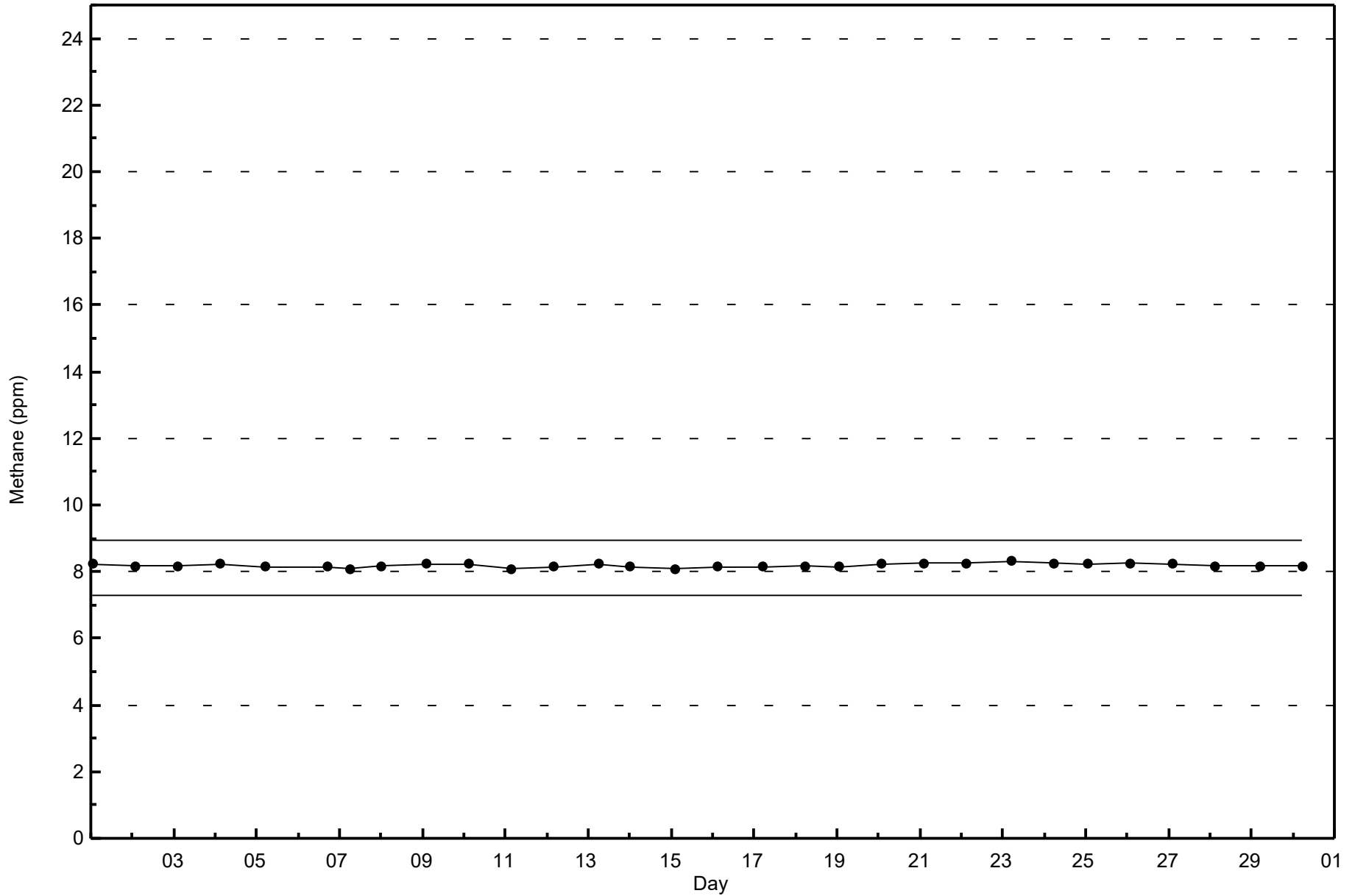


Wood Buffalo Environmental Association  
Wind Rose Nov 2023

Methane (CH<sub>4</sub>) - ppm  
Stony Mountain









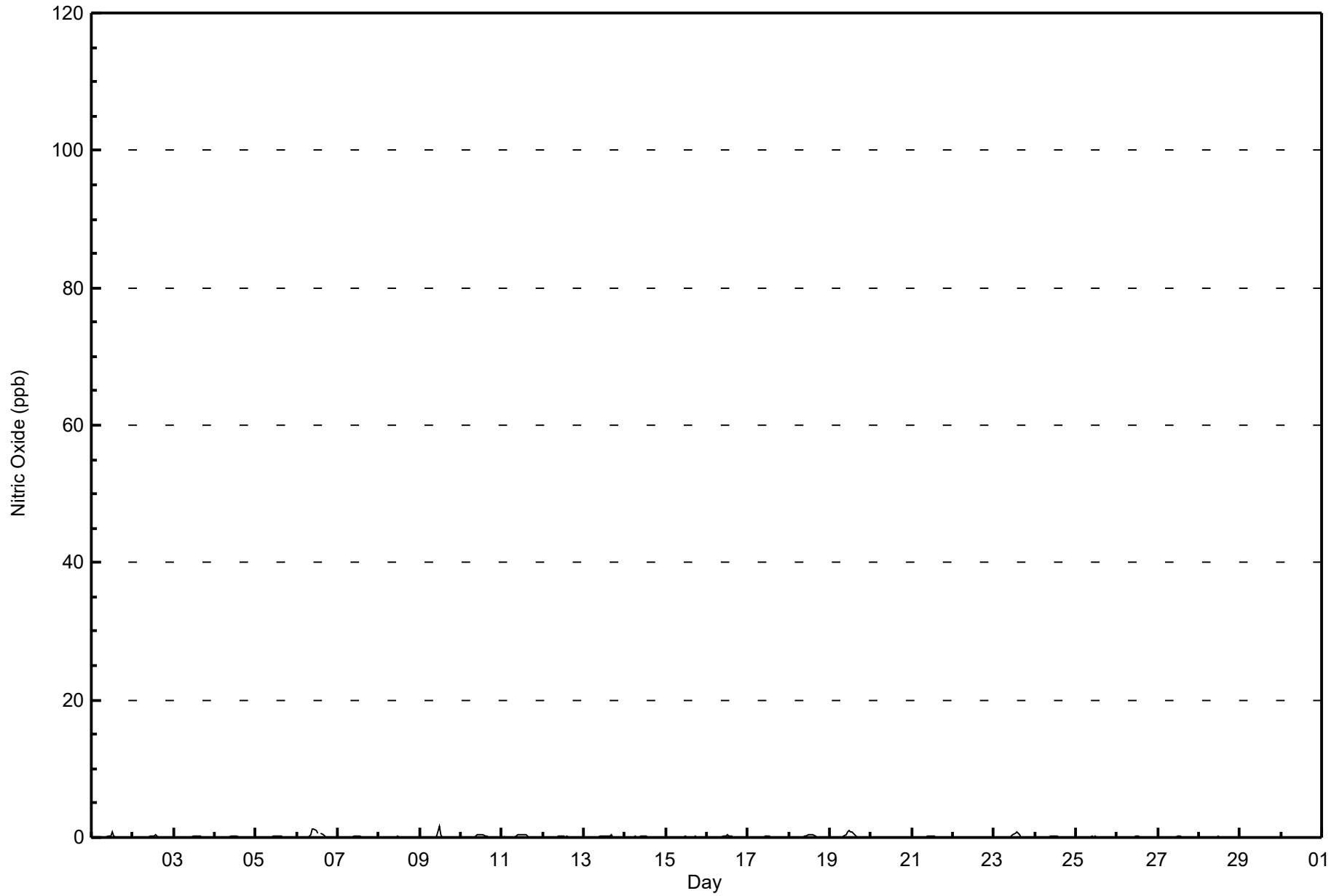
Maximum Value: 1.7 ppb on Nov 9 12:00		Maximum Daily Average: 0.3 ppb on Nov 6		Hours in Service: 720																						
Minimum Value: 0.0 ppb on Nov 8 17:00		Minimum Daily Average: 0.0 ppb on Nov 20		Hours of Data: 684																						
Maximum Diurnal Average: 0.3 ppb at hour 12		Minimum Diurnal Average: 0.0 ppb at hour 1		Hours of Missing Data: 36																						
Monthly Average: 0.08 ppb		Percentiles: P <sub>1</sub> = 0.0 P <sub>10</sub> = 0.0 Q <sub>1</sub> = 0.0 Median = 0.0 Q <sub>3</sub> = 0.1 P <sub>90</sub> = 0.2 P <sub>99</sub> = 0.8		Hours of Calibration: 36																						
				Percent Operational Time: 100.0																						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.8	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.8
2-Nov	0.0	0.0	0.1	0.0	Z	0.0	0.0	0.1	0.1	0.1	0.2	0.1	0.3	0.3	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.3
3-Nov	0.0	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.2
4-Nov	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2
5-Nov	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.2	0.2	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2
6-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.3	1.2	1.2	1.1	0.7	Z	0.6	0.4	0.1	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.0	0.3	1.2
7-Nov	0.1	0.1	Z	0.0	0.0	0.1	0.0	0.0	0.1	0.1	0.2	0.2	0.2	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2
8-Nov	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	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-Nov	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.1	0.1	1.7	0.3	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	1.7
10-Nov	0.0	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.1	0.4	0.4	0.4	0.4	0.3	0.3	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.4
11-Nov	Z	0.3	0.0	0.0	0.0	0.0	0.1	0.0	0.2	0.3	0.5	0.4	0.4	0.5	0.4	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.5
12-Nov	0.1	Z	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	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.2
13-Nov	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.1	0.1	0.1	0.2	0.3	0.2	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.5
14-Nov	0.0	0.0	0.0	Z	0.0	0.0	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
15-Nov	0.0	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.3	0.1	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3
16-Nov	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.3	0.3	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.3
17-Nov	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1
18-Nov	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.3	0.5	0.5	0.5	0.2	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.5
19-Nov	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.1	0.4	0.8	1.0	0.9	0.8	0.4	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	1.0
20-Nov	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
21-Nov	0.0	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.1	0.2	0.2	0.3	0.3	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.3
22-Nov	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	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
23-Nov	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.4	0.6	0.7	0.6	0.3	0.1	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.1	0.7
24-Nov	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2
25-Nov	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
26-Nov	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
27-Nov	0.0	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.1	0.1	0.2	0.2	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2
28-Nov	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
29-Nov	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	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
30-Nov	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	C	C	C	C	C	C	0.0	0.0	0.0	0.0	0.0	0.0	0.0	--	0.0
																								Diurnal Average		
																								Diurnal Maximum		
Z - zerospan		C - Calibration																								





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

**Nitric Oxide (NO) - ppb**  
**Stony Mountain - November 2023**





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

**Nitric Oxide (NO) - ppb**  
**Stony Mountain - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	684	100.00	100.00
21 - 40	0	0.00	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 684

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitric Oxide (NO) - ppb  
Stony Mountain - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 20	9	31	19	20	21	12	13	10	46	58	85	54	100	75	39	15	607
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	9	31	19	20	21	12	13	10	46	58	85	54	100	75	39	15	607

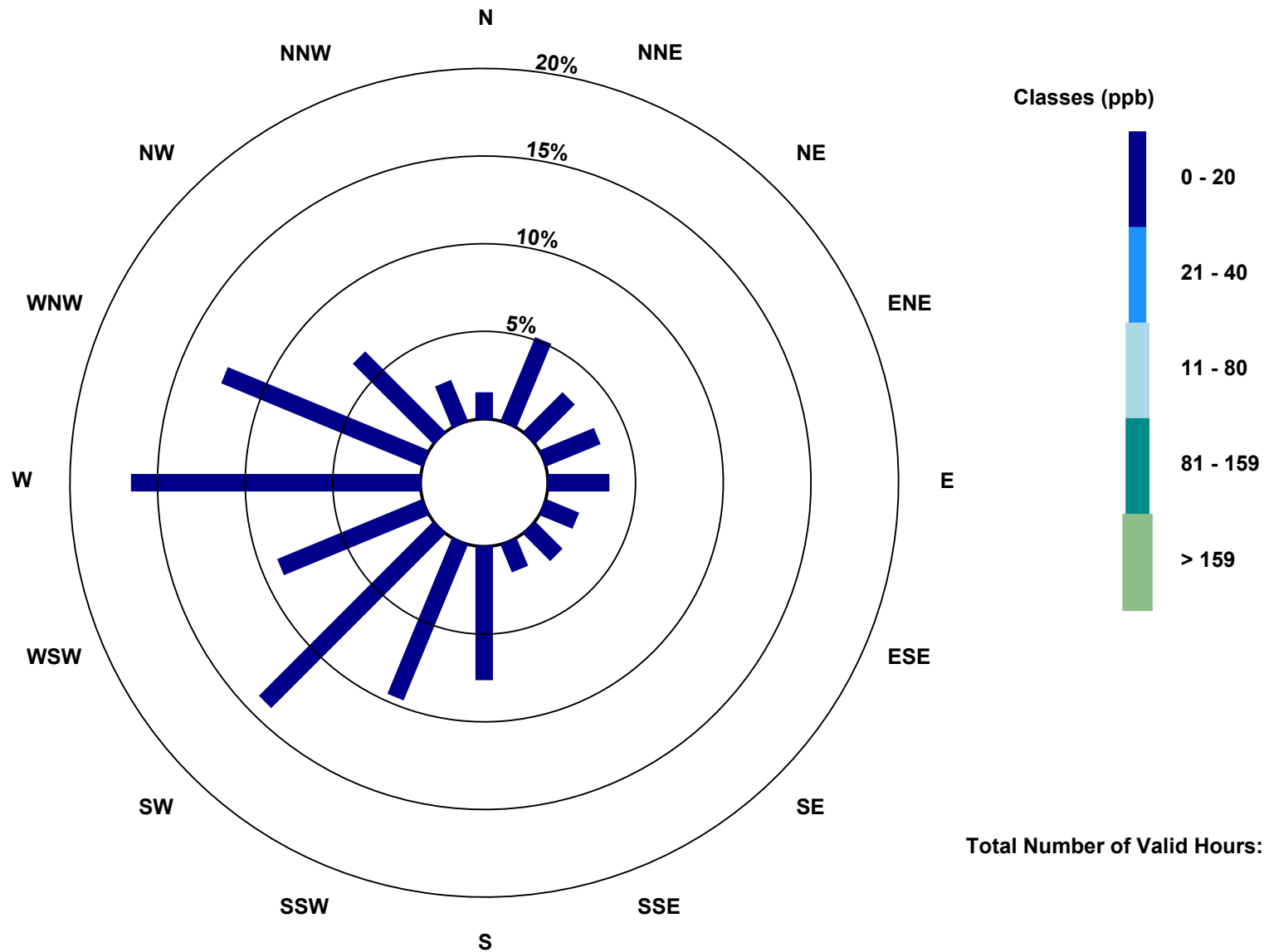
Total Number of Valid Hours: 607

Total Number of Hours: 720

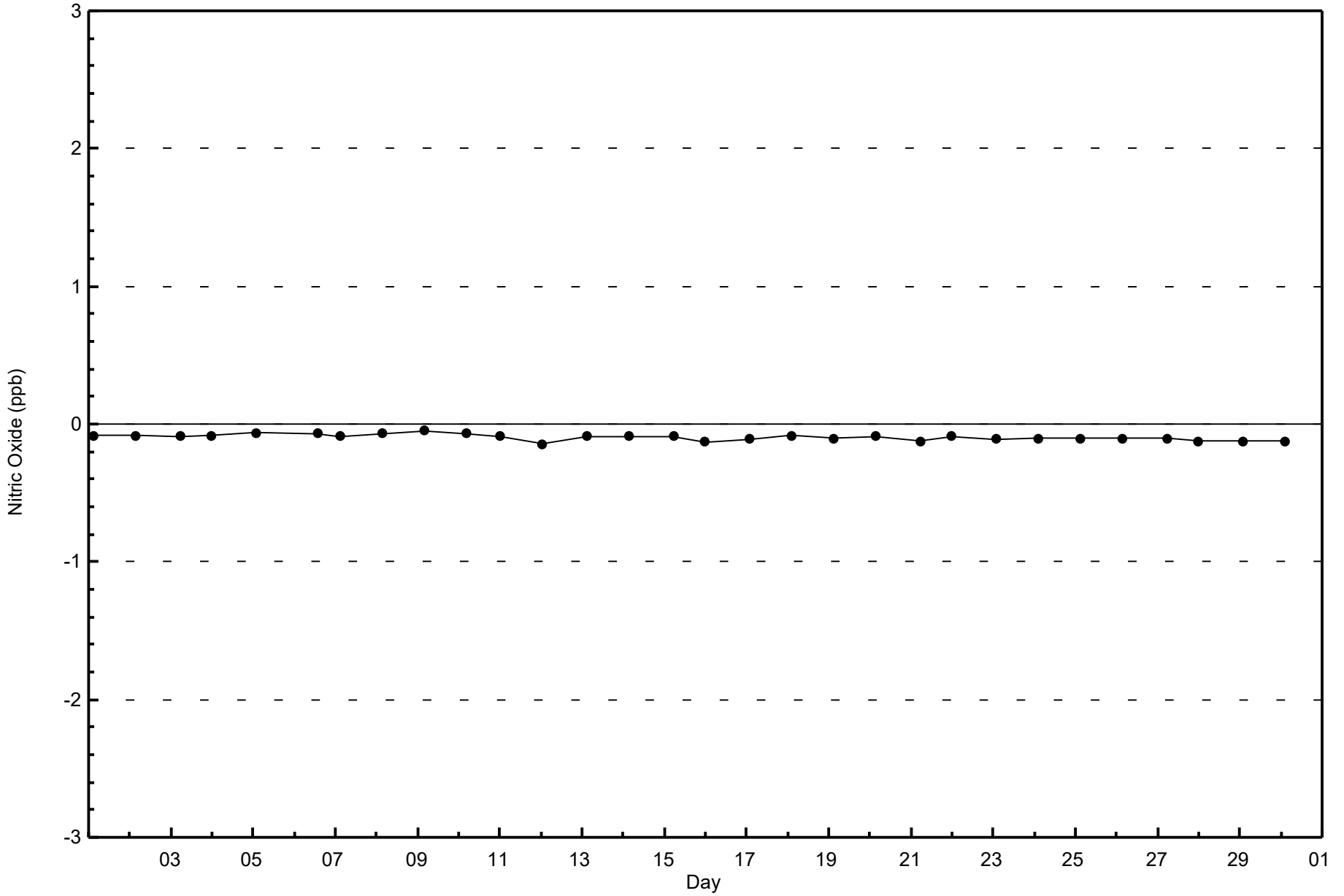


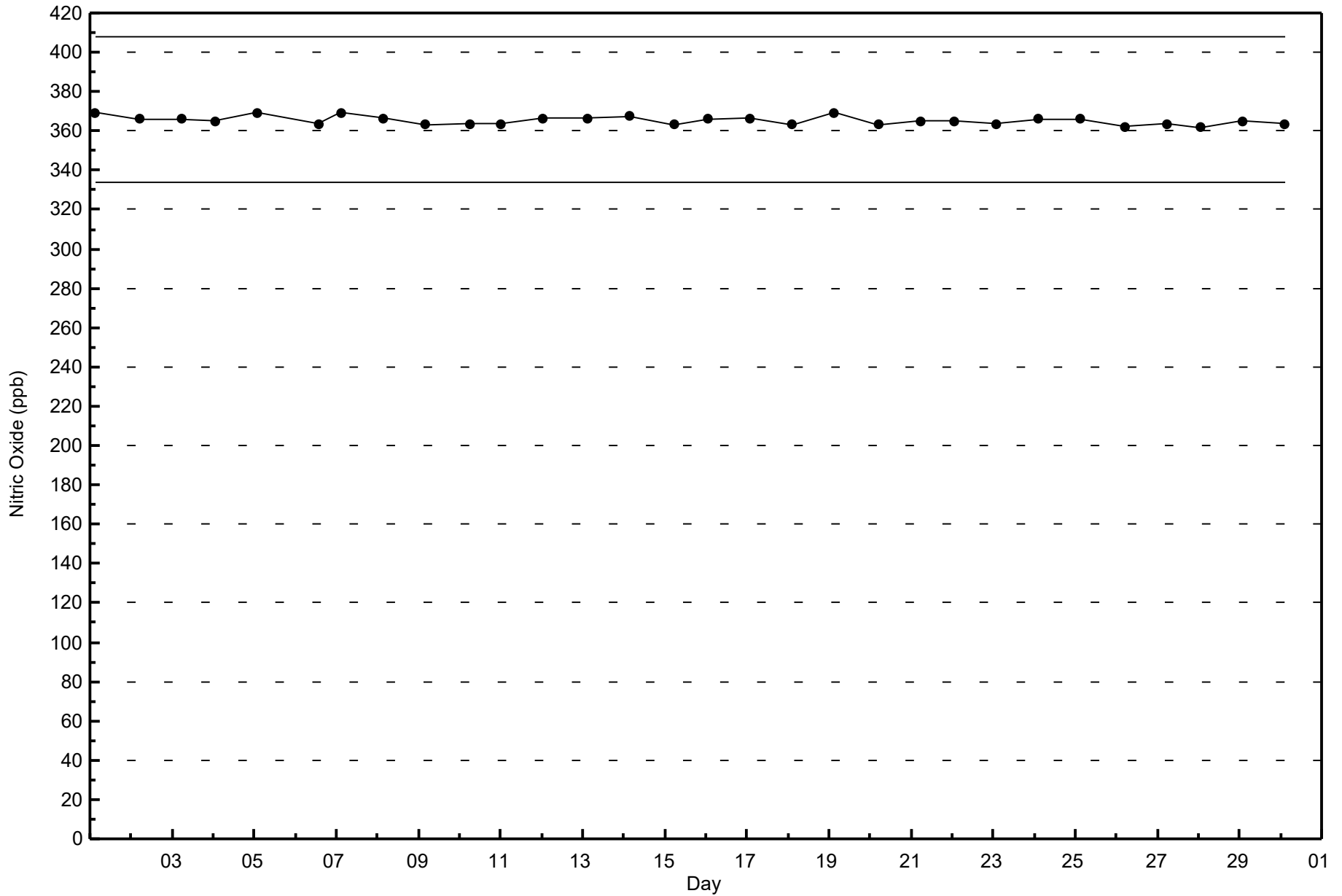
Wood Buffalo Environmental Association  
Wind Rose Nov 2023

Nitric Oxide (NO) - ppb  
Stony Mountain



Total Number of Valid Hours: 607







Wood Buffalo Environmental Association

Summary of Hour Averages

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

Stony Mountain - November 2023

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 7.4 ppb on Nov 23 22:00	Maximum Daily Average: 3.1 ppb on Nov 23		Hours of Data:	684
Minimum Value: 0.0 ppb on Nov 20 06:00	Minimum Daily Average: 0.1 ppb on Nov 20		Hours of Missing Data:	36
Maximum Diurnal Average: 1.2 ppb at hour 21	Minimum Diurnal Average: 0.9 ppb at hour 4		Hours of Calibration:	36
Monthly Average: 1.09 ppb	Percentiles: P <sub>1</sub> = 0.0 P <sub>10</sub> = 0.2 Q <sub>1</sub> = 0.4 Median = 0.8 Q <sub>3</sub> = 1.4 P <sub>90</sub> = 2.4 P <sub>99</sub> = 4.4		Percent Operational Time:	100.0

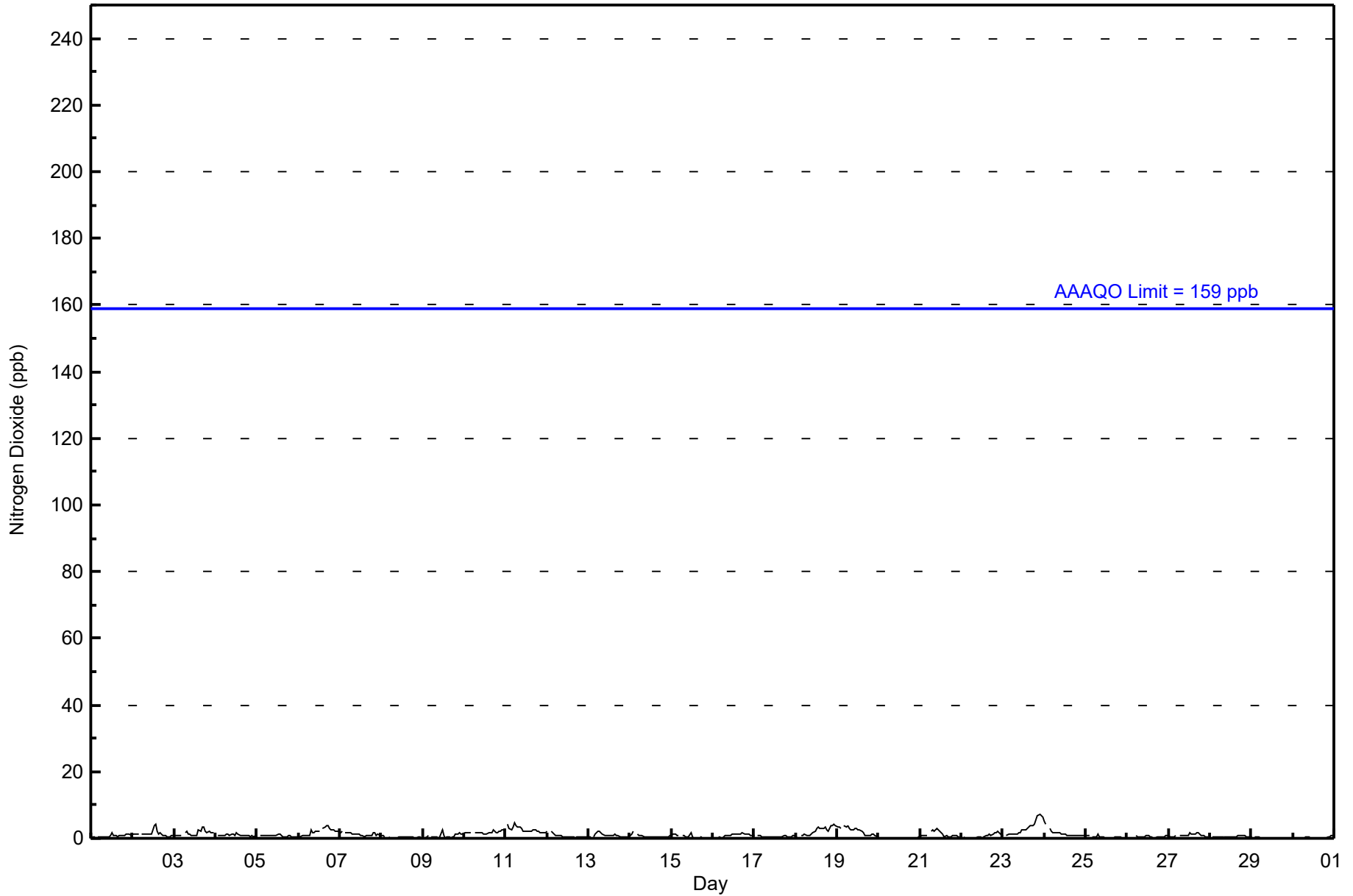
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Nov	0.3	0.4	0.4	Z	0.4	0.3	0.3	0.3	0.3	0.6	0.6	0.8	1.8	0.8	0.7	0.6	0.7	0.9	1.0	1.0	1.4	1.1	1.1	1.0	0.7	1.8																						
2-Nov	1.3	1.3	1.2	1.4	Z	1.4	1.4	1.1	1.1	1.1	1.4	1.4	3.9	4.1	2.0	1.3	1.5	0.9	0.8	0.8	0.6	0.6	0.7	0.8	1.4	4.1																						
3-Nov	0.9	0.8	0.9	1.0	1.0	Z	1.6	2.2	1.3	1.1	0.9	1.0	1.0	1.0	2.5	2.3	3.4	3.3	2.2	1.9	2.2	1.9	1.8	1.5	1.6	3.4																						
4-Nov	Z	1.0	0.9	0.9	0.8	0.9	1.1	1.2	1.0	1.2	1.1	1.0	1.5	1.2	0.8	0.8	0.8	0.9	0.8	0.8	0.6	0.7	0.6	0.9	0.9	1.5																						
5-Nov	0.9	Z	0.8	0.9	0.7	0.7	0.9	0.8	0.9	0.7	1.0	1.0	1.2	1.1	0.7	0.5	0.5	0.6	0.8	0.8	0.6	0.6	0.6	0.4	0.8	1.2																						
6-Nov	0.4	0.6	0.7	0.7	0.7	0.7	0.8	2.7	1.6	1.9	2.2	2.2	2.0	Z	2.9	3.4	3.9	4.0	3.1	2.6	2.4	2.1	2.0	2.0	2.0	4.0																						
7-Nov	1.9	2.0	Z	1.6	1.7	1.6	1.6	1.4	1.2	1.2	1.1	1.1	1.0	0.8	0.6	0.7	0.9	1.0	1.0	1.9	1.9	1.0	1.1	0.9	1.3	2.0																						
8-Nov	0.8	0.7	0.6	Z	0.3	0.2	0.1	0.2	0.2	0.2	0.3	0.4	0.4	0.4	0.3	0.4	0.3	0.3	0.3	0.2	0.2	0.3	0.3	0.2	0.3	0.8																						
9-Nov	0.2	0.2	0.3	0.8	Z	0.4	0.4	0.4	0.4	0.2	0.4	2.6	0.8	0.2	0.3	0.4	0.2	0.3	0.5	1.3	1.4	1.5	1.1	1.4	0.7	2.6																						
10-Nov	1.9	1.9	1.9	1.9	1.8	Z	1.7	1.6	1.5	1.9	1.6	1.4	1.3	1.4	1.6	1.6	1.8	2.5	1.6	1.6	2.0	2.1	2.4	2.4	1.8	2.5																						
11-Nov	Z	4.1	3.1	2.7	3.5	4.7	3.8	3.4	3.3	2.8	2.3	2.2	2.0	2.1	2.2	2.2	2.4	2.5	2.3	2.0	1.7	1.6	1.6	1.9	2.6	4.7																						
12-Nov	2.1	Z	2.1	1.6	1.3	1.0	0.9	0.8	0.7	0.6	0.5	0.6	0.5	0.4	0.4	0.3	0.2	0.3	0.3	0.3	0.3	0.4	0.4	0.5	0.7	2.1																						
13-Nov	0.4	0.4	Z	0.5	1.2	2.3	2.0	1.9	1.2	0.9	0.8	0.8	0.7	0.7	1.0	1.3	1.0	0.7	0.5	0.4	0.4	0.4	0.6	0.6	0.9	2.3																						
14-Nov	0.8	1.3	2.0	Z	1.4	1.0	0.9	0.7	0.6	0.6	0.6	0.5	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.6	0.5	0.5	0.6	0.8	0.7	2.0																						
15-Nov	0.9	1.2	1.2	0.7	0.7	Z	0.8	0.7	0.6	0.5	0.5	1.6	0.4	0.1	0.1	0.1	0.1	0.6	0.1	0.1	0.1	0.1	0.1	0.1	0.5	1.6																						
16-Nov	Z	0.2	0.2	0.2	0.4	0.2	0.3	0.7	0.7	0.7	0.8	1.2	1.3	1.1	1.2	1.3	1.4	1.5	1.4	1.4	1.4	1.1	1.0	0.8	0.9	1.5																						
17-Nov	0.7	Z	0.7	0.7	0.6	0.6	0.6	0.6	0.5	0.6	0.6	0.6	0.5	0.5	0.5	0.6	0.6	0.7	0.7	0.6	0.6	0.6	0.8	0.7	0.6	0.8																						
18-Nov	0.6	0.6	Z	0.8	0.9	1.1	0.9	1.0	1.0	1.3	1.6	2.3	3.0	3.2	3.1	3.0	3.1	3.3	2.5	2.1	3.8	3.7	4.1	3.7	2.2	4.1																						
19-Nov	3.6	3.3	3.1	Z	3.9	3.5	3.7	2.8	2.5	2.5	3.0	2.9	2.6	2.5	2.1	1.5	0.9	0.8	0.9	0.8	1.4	1.2	0.8	0.6	2.2	3.9																						
20-Nov	0.2	0.2	0.2	0.1	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.3	0.1	0.3																						
21-Nov	0.4	1.0	0.8	0.8	1.0	Z	2.1	2.7	2.2	2.4	2.8	2.3	1.7	1.1	0.6	0.7	0.4	0.5	0.5	0.9	1.0	0.7	0.5	0.4	1.2	2.8																						
22-Nov	Z	0.3	0.1	0.1	0.2	0.2	0.1	0.1	0.2	0.6	0.4	0.3	0.2	0.5	0.7	1.0	1.2	0.9	1.1	1.9	1.8	2.3	1.5	1.0	0.7	2.3																						
23-Nov	0.7	Z	0.8	1.4	1.1	1.3	1.3	1.1	1.3	1.5	1.8	2.4	2.6	2.5	2.8	3.3	3.8	3.9	4.3	5.4	6.7	7.4	6.6	6.3	3.1	7.4																						
24-Nov	5.0	4.3	Z	2.8	2.2	1.9	1.8	1.8	1.6	1.5	1.3	1.1	1.1	1.0	0.8	0.7	0.8	0.8	0.8	0.8	1.0	1.0	1.0	1.0	1.6	5.0																						
25-Nov	0.9	0.9	0.9	Z	0.6	0.5	0.6	1.1	0.5	0.6	0.5	0.2	0.2	0.1	0.1	0.2	0.1	0.4	0.4	0.4	0.3	0.2	0.1	0.2	0.4	1.1																						
26-Nov	0.1	0.1	0.1	0.1	Z	0.9	0.6	0.5	0.5	0.5	0.5	0.7	0.8	0.6	0.3	0.2	0.2	0.3	0.3	0.3	0.3	0.6	0.7	0.7	0.4	0.9																						
27-Nov	0.7	0.6	0.5	0.6	0.8	Z	0.8	0.8	0.9	0.8	0.9	1.0	1.5	1.3	1.2	1.4	1.6	1.6	1.2	1.0	0.8	0.5	0.4	0.4	0.9	1.6																						
28-Nov	Z	0.3	0.3	0.4	0.4	0.4	0.4	0.5	0.5	0.4	0.4	0.4	0.4	0.4	0.3	0.5	0.8	0.8	0.8	0.8	0.8	0.6	0.5	0.5	0.5	0.8																						
29-Nov	0.5	Z	0.4	0.4	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.5																						
30-Nov	0.1	0.1	Z	0.1	0.1	0.1	0.2	0.3	0.3	0.3	0.3	C	C	C	C	C	C	C	0.1	0.1	0.2	0.3	0.6	0.7	0.8	0.8																						
																								1.1	1.1	1.0	0.9	1.1	1.0	1.1	1.1	1.0	1.0	1.0	1.2	1.2	1.1	1.1	1.1	1.2	1.2	1.0	1.1	1.2	1.2	1.1	1.1	Diurnal Average
																								5.0	4.3	3.1	2.8	3.9	4.7	3.8	3.4	3.3	2.8	3.0	2.9	3.9	4.1	3.1	3.4	3.9	4.0	4.3	5.4	6.7	7.4	6.6	6.3	Diurnal Maximum

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



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

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb**  
**Stony Mountain - November 2023**







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

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb**  
**Stony Mountain - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	684	100.00	100.00
21 - 40	0	0.00	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 684

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Stony Mountain - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 20	9	31	19	20	21	12	13	10	46	58	85	54	100	75	39	15	607
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	9	31	19	20	21	12	13	10	46	58	85	54	100	75	39	15	607

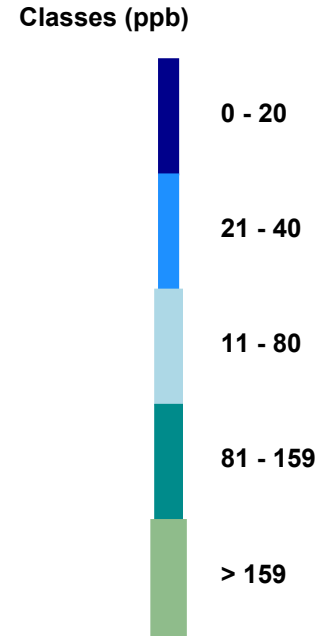
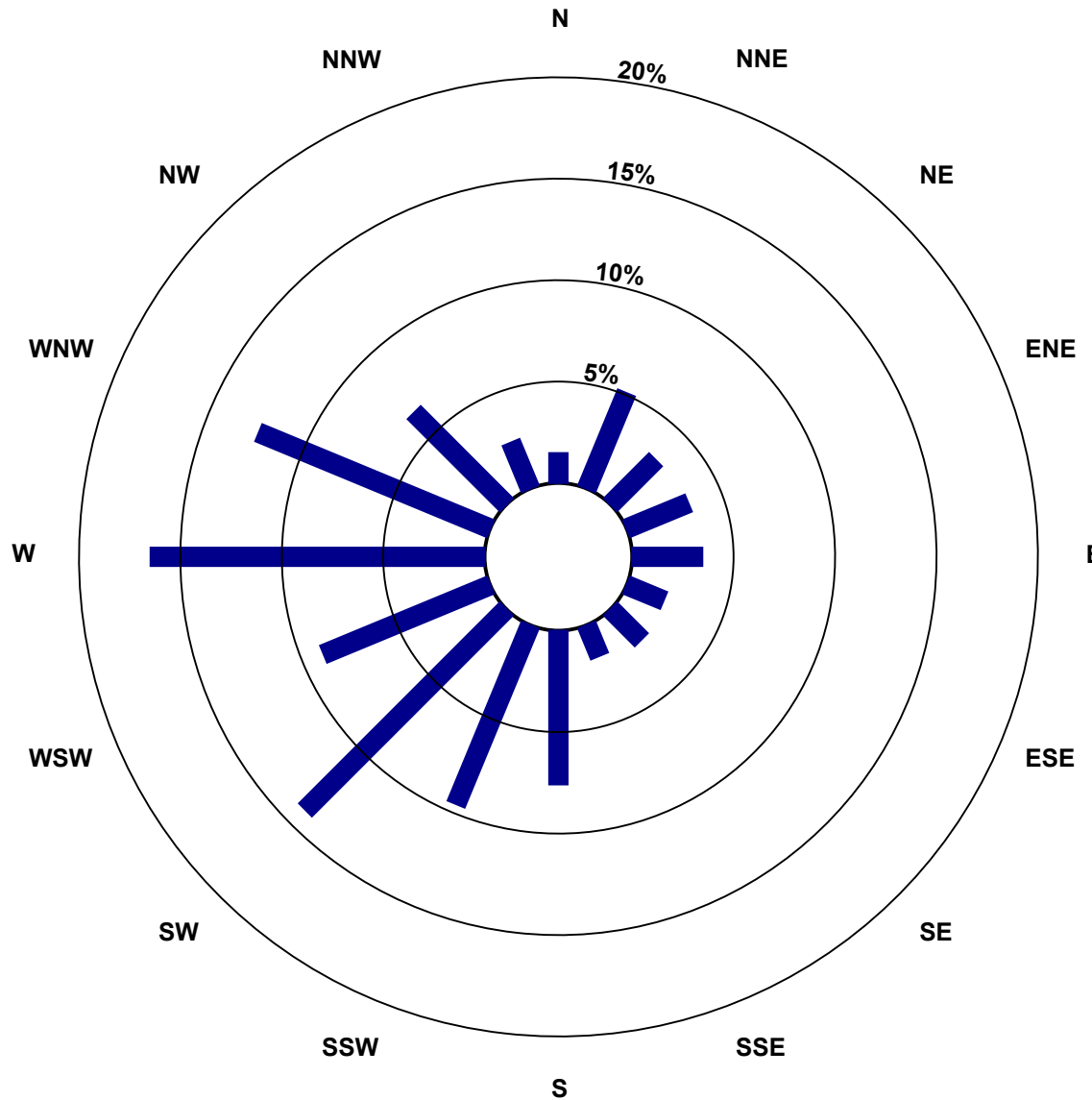
Total Number of Valid Hours: 607

Total Number of Hours: 720

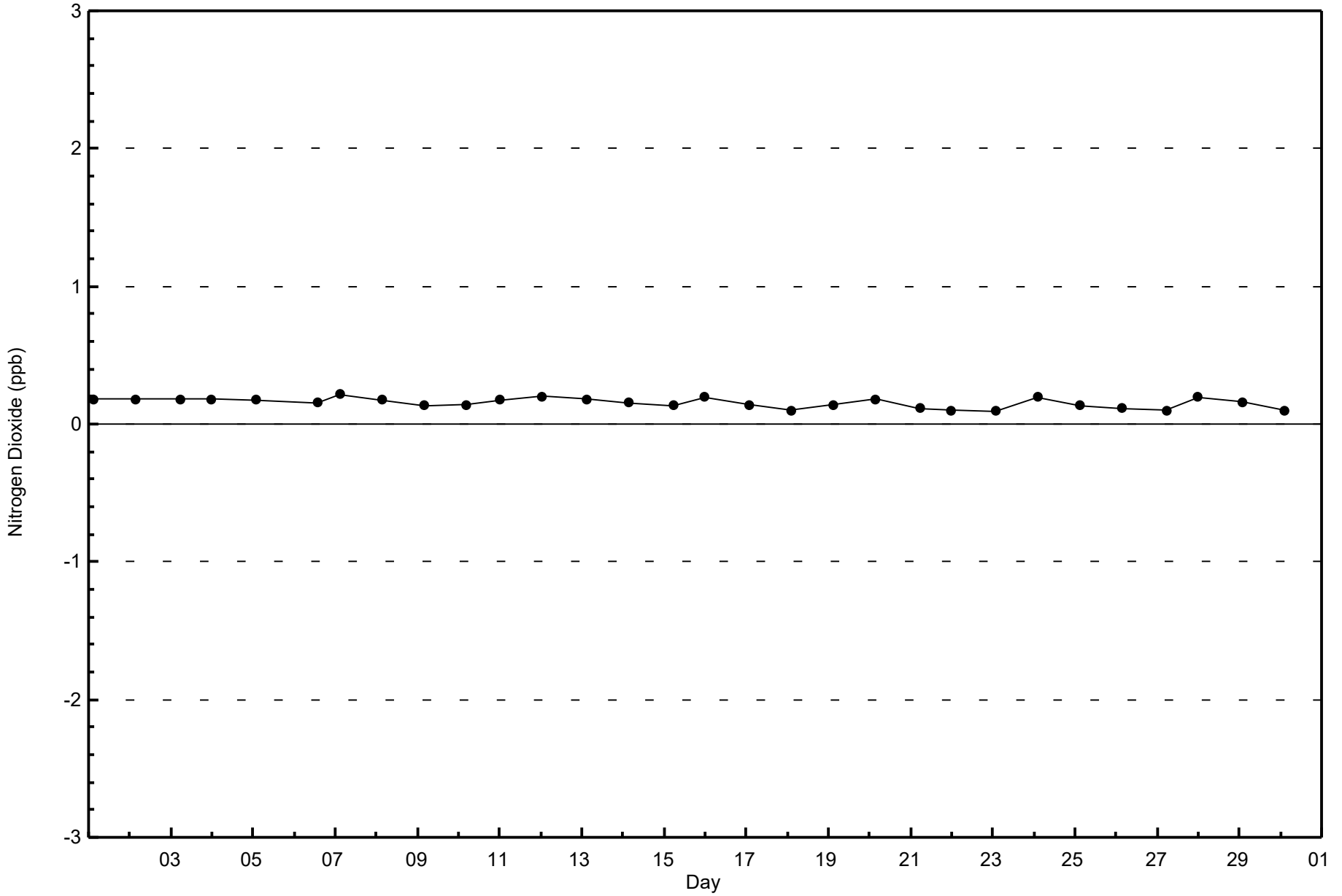


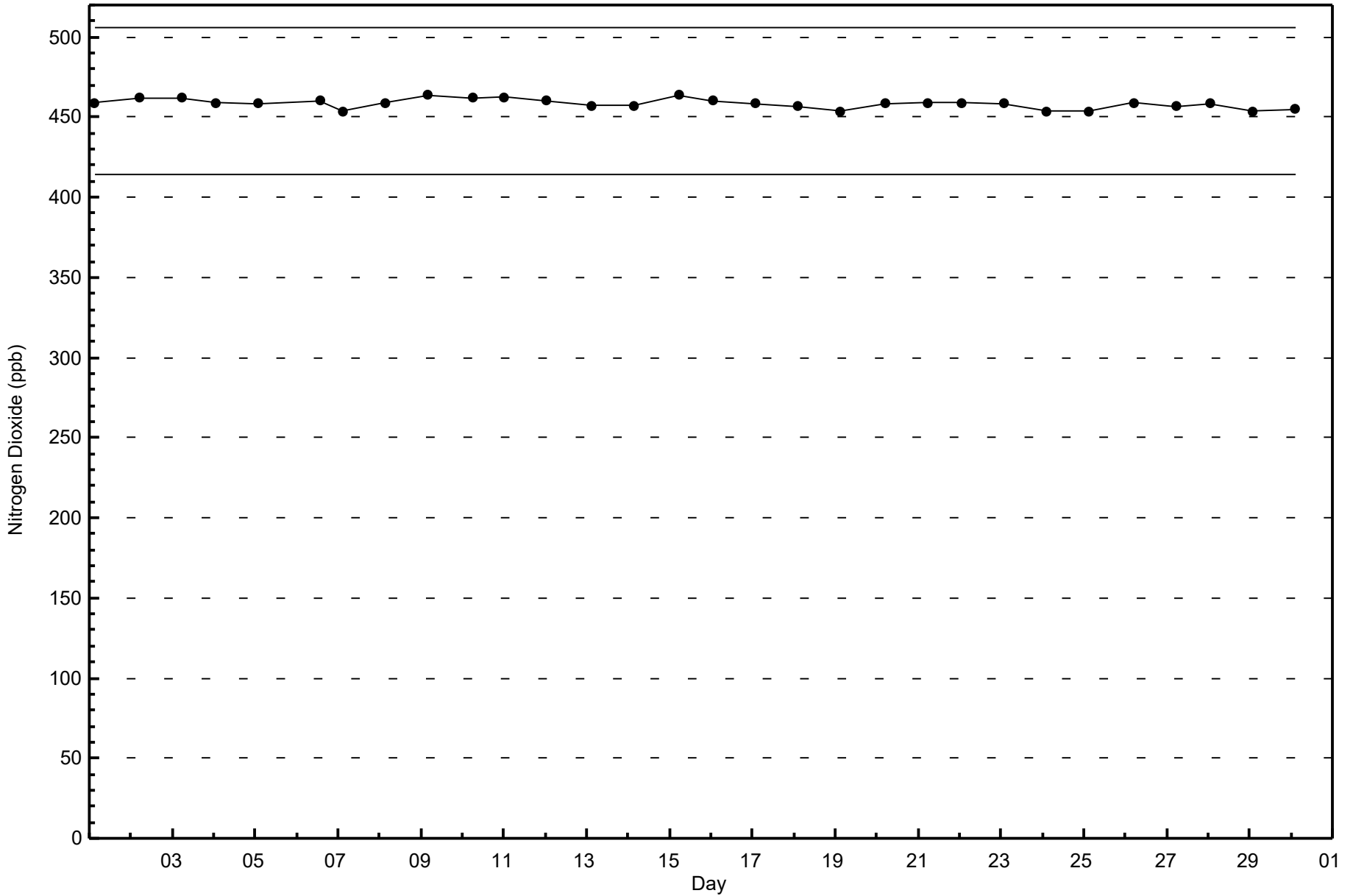
Wood Buffalo Environmental Association  
Wind Rose Nov 2023

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



Total Number of Valid Hours: 607







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

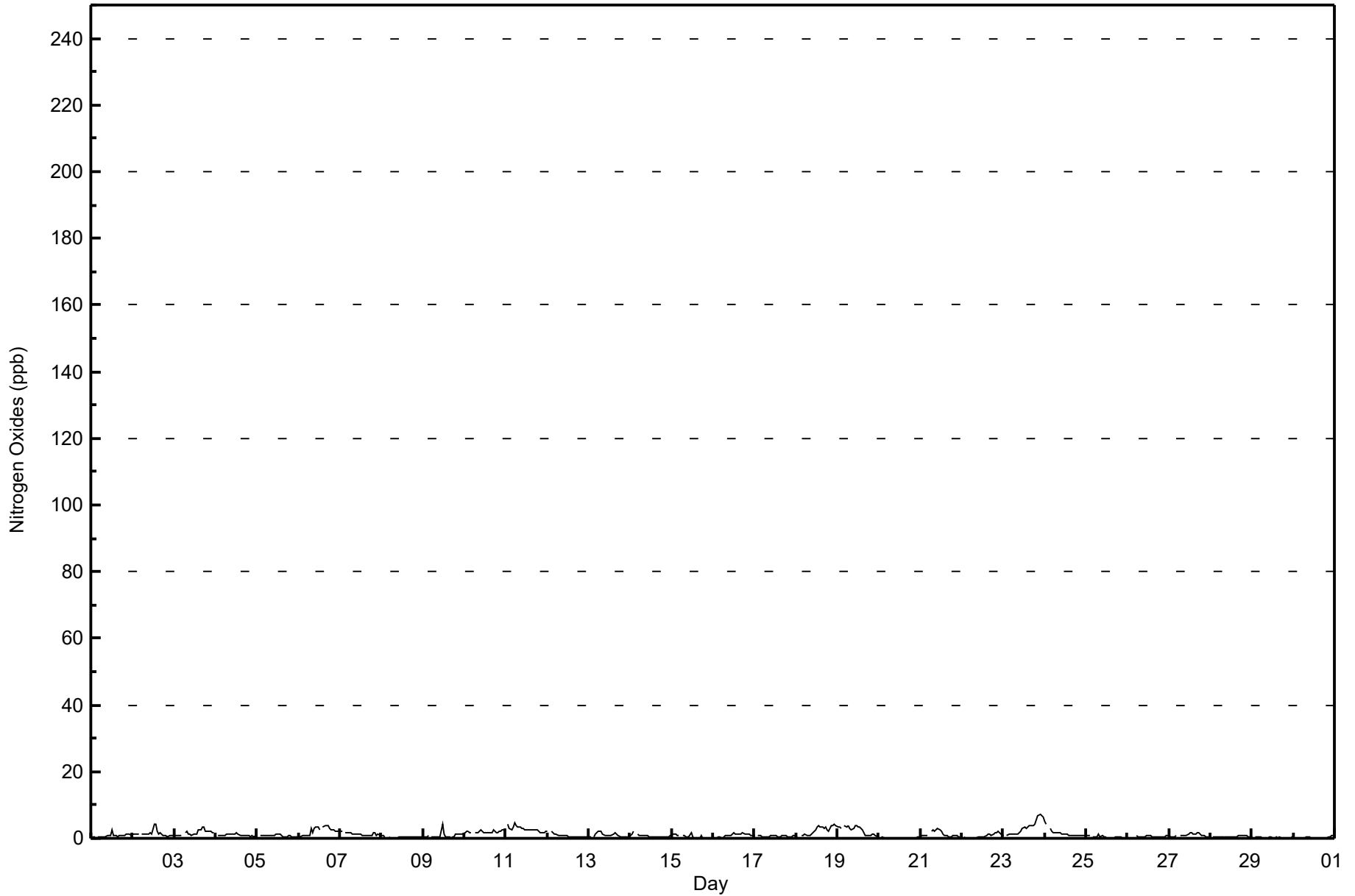
**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Stony Mountain - November 2023**

Maximum Value: 7.4 ppb on Nov 23 22:00		Maximum Daily Average: 3.2 ppb on Nov 23		Hours in Service: 720																							
Minimum Value: 0.0 ppb on Nov 20 07:00		Minimum Daily Average: 0.1 ppb on Nov 20		Hours of Data: 684																							
Maximum Diurnal Average: 1.5 ppb at hour 13		Minimum Diurnal Average: 0.9 ppb at hour 4		Hours of Missing Data: 36																							
Monthly Average: 1.15 ppb		Percentiles: P <sub>1</sub> = 0.0 P <sub>10</sub> = 0.2 Q <sub>1</sub> = 0.4 Median = 0.8 Q <sub>3</sub> = 1.5 P <sub>90</sub> = 2.6 P <sub>99</sub> = 4.5		Hours of Calibration: 36																							
				Percent Operational Time: 100.0																							
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Nov	0.3	0.4	0.4	Z	0.4	0.3	0.3	0.3	0.3	0.7	0.7	1.0	2.6	0.9	0.8	0.6	0.7	0.9	1.0	1.0	1.4	1.1	1.1	1.0	0.8	2.6	
2-Nov	1.3	1.3	1.3	1.4	Z	1.4	1.4	1.2	1.2	1.2	1.6	1.5	4.2	4.4	2.2	1.4	1.6	0.9	0.8	0.8	0.6	0.6	0.7	0.8	1.5	4.4	
3-Nov	0.9	0.8	0.9	1.0	1.0	Z	1.6	2.2	1.4	1.2	1.0	1.1	1.1	1.1	2.7	2.5	3.5	3.4	2.3	2.0	2.3	2.0	1.8	1.6	1.7	3.5	
4-Nov	Z	1.0	0.9	0.9	0.8	0.9	1.1	1.2	1.1	1.3	1.2	1.1	1.7	1.3	0.9	0.8	0.8	0.9	0.8	0.8	0.6	0.7	0.6	0.9	1.0	1.7	
5-Nov	0.9	Z	0.8	0.9	0.7	0.7	0.9	0.8	1.0	0.8	1.1	1.2	1.4	1.3	0.8	0.6	0.5	0.6	0.8	0.8	0.6	0.6	0.6	0.4	0.8	1.4	
6-Nov	0.4	0.6	0.7	0.7	0.7	0.7	0.8	2.8	1.9	3.1	3.4	3.3	2.7	Z	3.5	3.8	4.0	4.0	3.1	2.7	2.5	2.2	2.1	2.0	2.2	4.0	
7-Nov	2.0	2.1	Z	1.6	1.7	1.7	1.6	1.4	1.3	1.3	1.3	1.3	1.2	0.9	0.7	0.8	0.9	1.0	1.0	1.9	1.9	1.0	1.1	0.9	1.3	2.1	
8-Nov	0.8	0.7	0.6	Z	0.3	0.2	0.1	0.2	0.2	0.2	0.3	0.5	0.4	0.4	0.3	0.4	0.3	0.4	0.3	0.3	0.2	0.2	0.3	0.3	0.2	0.3	0.8
9-Nov	0.2	0.2	0.3	0.8	Z	0.4	0.4	0.4	0.4	0.3	0.5	4.3	1.1	0.2	0.4	0.4	0.2	0.3	0.5	1.3	1.4	1.5	1.1	1.4	0.8	4.3	
10-Nov	1.9	1.9	1.9	1.9	1.8	Z	1.7	1.6	1.6	2.3	2.0	1.8	1.7	1.7	1.9	1.8	1.8	2.5	1.6	1.6	2.0	2.1	2.4	2.4	1.9	2.5	
11-Nov	Z	4.4	3.1	2.7	3.5	4.7	3.9	3.4	3.5	3.1	2.8	2.6	2.4	2.6	2.4	2.5	2.6	2.4	2.1	1.8	1.7	1.7	2.0	2.8	4.7		
12-Nov	2.2	Z	2.2	1.7	1.4	1.1	1.0	0.9	0.8	0.7	0.6	0.8	0.6	0.5	0.5	0.4	0.3	0.3	0.4	0.3	0.3	0.4	0.4	0.5	0.8	2.2	
13-Nov	0.4	0.4	Z	0.5	1.2	2.3	2.0	2.0	1.2	1.0	0.9	0.9	0.8	0.9	1.3	1.5	1.5	0.7	0.5	0.4	0.4	0.4	0.6	0.6	1.0	2.3	
14-Nov	0.8	1.3	2.0	Z	1.4	1.0	1.0	0.7	0.7	0.7	0.7	0.6	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.6	0.5	0.5	0.6	0.8	0.7	2.0	
15-Nov	0.9	1.2	1.2	0.7	0.7	Z	0.8	0.7	0.6	0.5	0.5	1.9	0.5	0.1	0.1	0.1	0.1	0.1	0.8	0.1	0.1	0.1	0.1	0.1	0.5	1.9	
16-Nov	Z	0.2	0.2	0.2	0.4	0.2	0.3	0.7	0.8	0.8	1.0	1.5	1.6	1.3	1.3	1.4	1.4	1.5	1.4	1.4	1.4	1.1	1.0	0.8	1.0	1.6	
17-Nov	0.7	Z	0.7	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.7	0.6	0.6	0.6	0.8	0.7	0.6	0.8
18-Nov	0.6	0.6	Z	0.8	0.9	1.1	0.9	1.0	1.0	1.4	1.8	2.6	3.5	3.7	3.6	3.2	3.1	3.3	2.5	2.2	3.8	3.7	4.1	3.7	2.3	4.1	
19-Nov	3.6	3.3	3.1	Z	3.9	3.5	3.7	2.8	2.6	2.9	3.8	3.9	3.5	3.3	2.5	1.6	0.9	0.8	0.9	0.8	1.4	1.2	0.8	0.6	2.4	3.9	
20-Nov	0.2	0.2	0.2	0.1	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.3	0.1	0.3
21-Nov	0.4	1.0	0.8	0.8	1.0	Z	2.1	2.7	2.3	2.6	3.0	2.6	2.0	1.3	0.7	0.7	0.4	0.5	0.5	0.9	1.0	0.7	0.5	0.4	1.3	3.0	
22-Nov	Z	0.3	0.1	0.1	0.2	0.2	0.1	0.1	0.2	0.6	0.4	0.3	0.3	0.6	0.8	1.1	1.2	0.9	1.1	1.9	1.8	2.3	1.5	1.0	0.7	2.3	
23-Nov	0.7	Z	0.8	1.4	1.1	1.3	1.3	1.1	1.3	1.6	2.0	2.8	3.2	3.2	3.4	3.6	3.9	3.9	4.3	5.5	6.7	7.4	6.7	6.3	3.2	7.4	
24-Nov	5.0	4.3	Z	2.8	2.2	1.9	1.8	1.8	1.7	1.7	1.5	1.3	1.3	1.2	0.9	0.8	0.8	0.8	0.8	0.8	0.8	1.0	1.0	1.0	1.6	5.0	
25-Nov	0.9	0.9	0.9	Z	0.6	0.5	0.6	1.1	0.5	0.8	0.5	0.3	0.2	0.1	0.1	0.2	0.1	0.4	0.4	0.4	0.3	0.2	0.1	0.2	0.5	1.1	
26-Nov	0.1	0.1	0.1	0.1	Z	0.9	0.6	0.5	0.5	0.5	0.6	0.9	1.0	0.7	0.3	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.6	0.7	0.7	0.5	1.0
27-Nov	0.7	0.6	0.5	0.6	0.8	Z	0.8	0.8	0.9	0.9	1.0	1.2	1.7	1.5	1.3	1.5	1.6	1.6	1.2	1.0	0.8	0.5	0.4	0.4	1.0	1.7	
28-Nov	Z	0.3	0.3	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.4	0.5	0.8	0.8	0.8	0.8	0.8	0.8	0.6	0.5	0.5	0.5	0.8
29-Nov	0.5	Z	0.4	0.4	0.3	0.2	0.2	0.2	0.2	0.2	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.5
30-Nov	0.1	0.1	Z	0.1	0.1	0.1	0.2	0.3	0.3	0.3	0.3	C	C	C	C	C	C	C	0.1	0.1	0.2	0.3	0.6	0.7	0.8	--	0.8
																								Diurnal Average			
																								Diurnal Maximum			
																								1.1 1.1 1.0 0.9 1.1 1.1 1.1 1.1 1.0 1.1 1.2 1.5 1.5 1.3 1.2 1.2 1.2 1.2 1.1 1.1 1.2 1.2 1.1 1.1			
																								5.0 4.4 3.1 2.8 3.9 4.7 3.9 3.4 3.5 3.1 3.8 4.3 4.2 4.4 3.6 3.8 4.0 4.0 4.3 5.5 6.7 7.4 6.7 6.3			
Z - zerospan C - Calibration																											



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

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Stony Mountain - November 2023**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Stony Mountain - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	684	100.00	100.00
21 - 40	0	0.00	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 684

Total Number of Hours: 720





**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Stony Mountain - November 2023**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	9	31	19	20	21	12	13	10	46	58	85	54	100	75	39	15	607
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	9	31	19	20	21	12	13	10	46	58	85	54	100	75	39	15	607

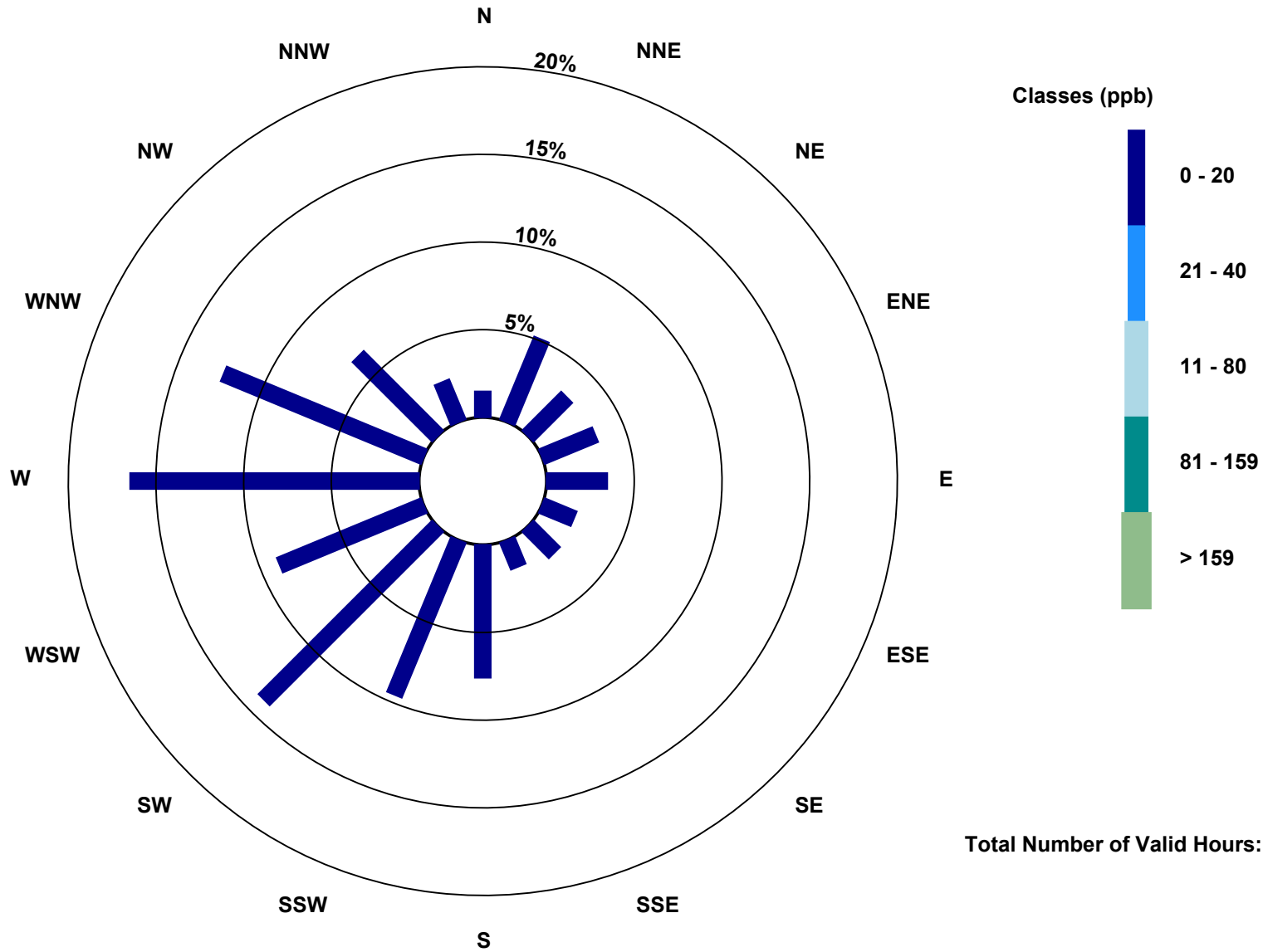
Total Number of Valid Hours: 607

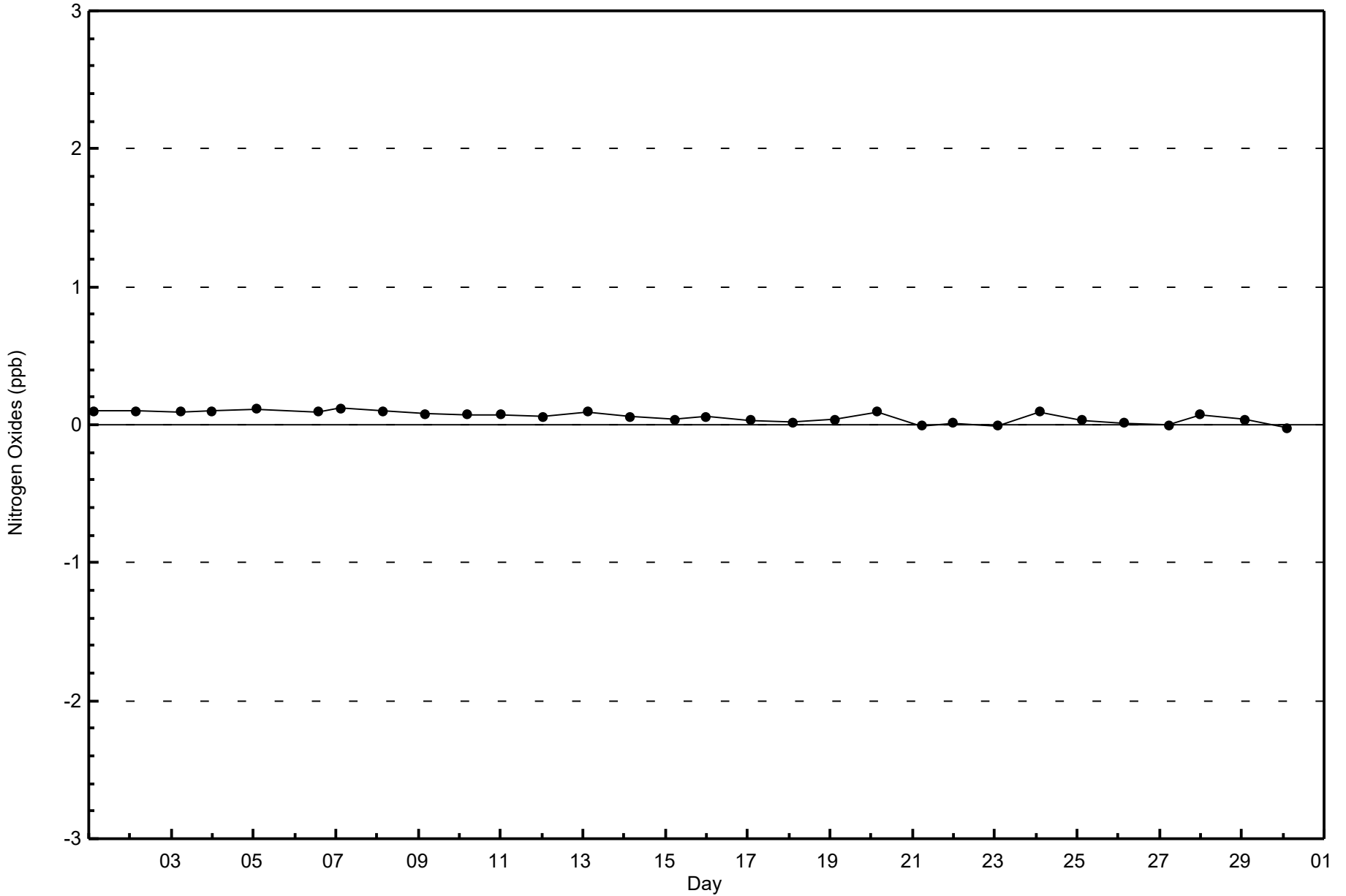
Total Number of Hours: 720

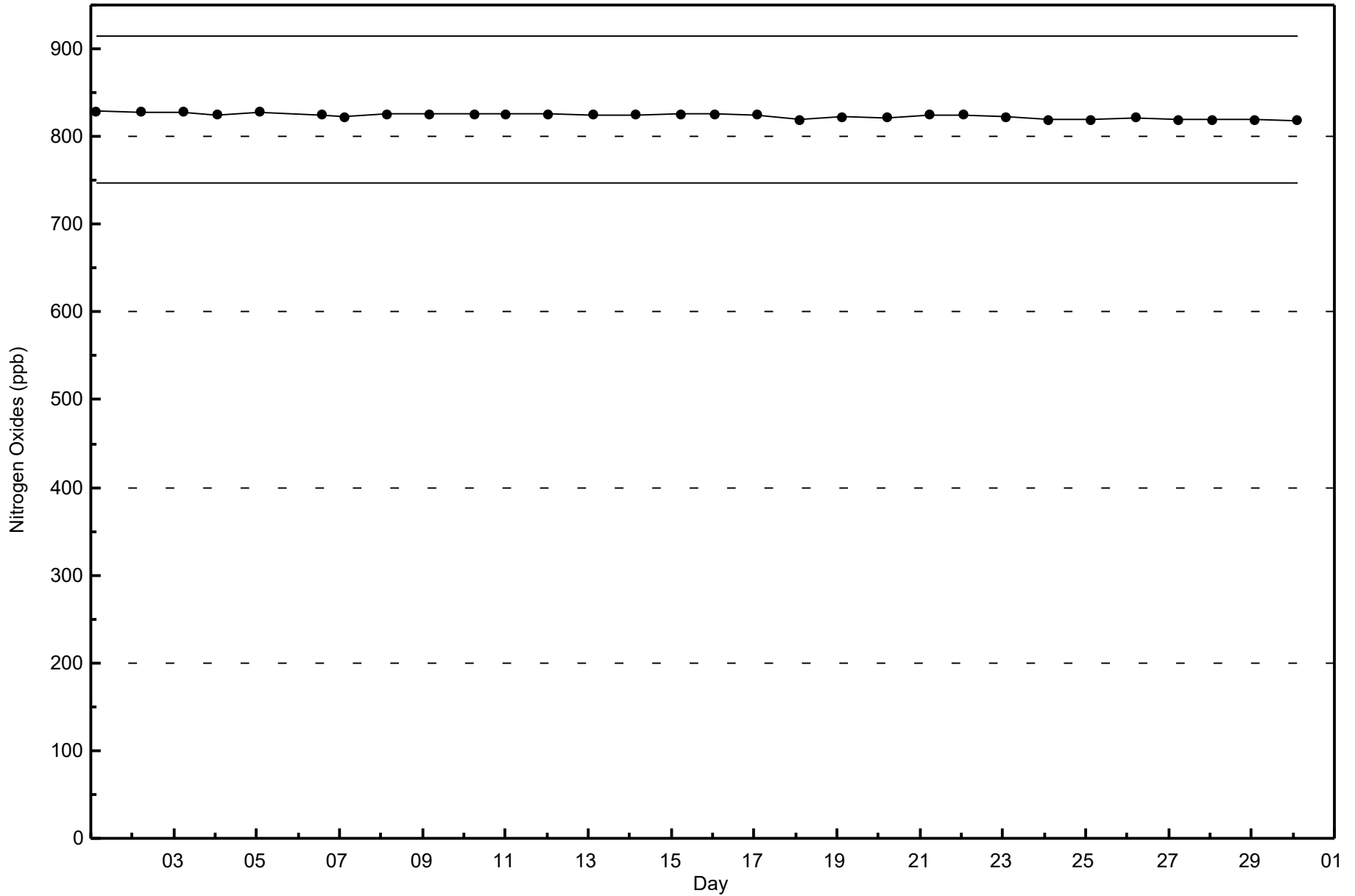


Wood Buffalo Environmental Association  
Wind Rose Nov 2023

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





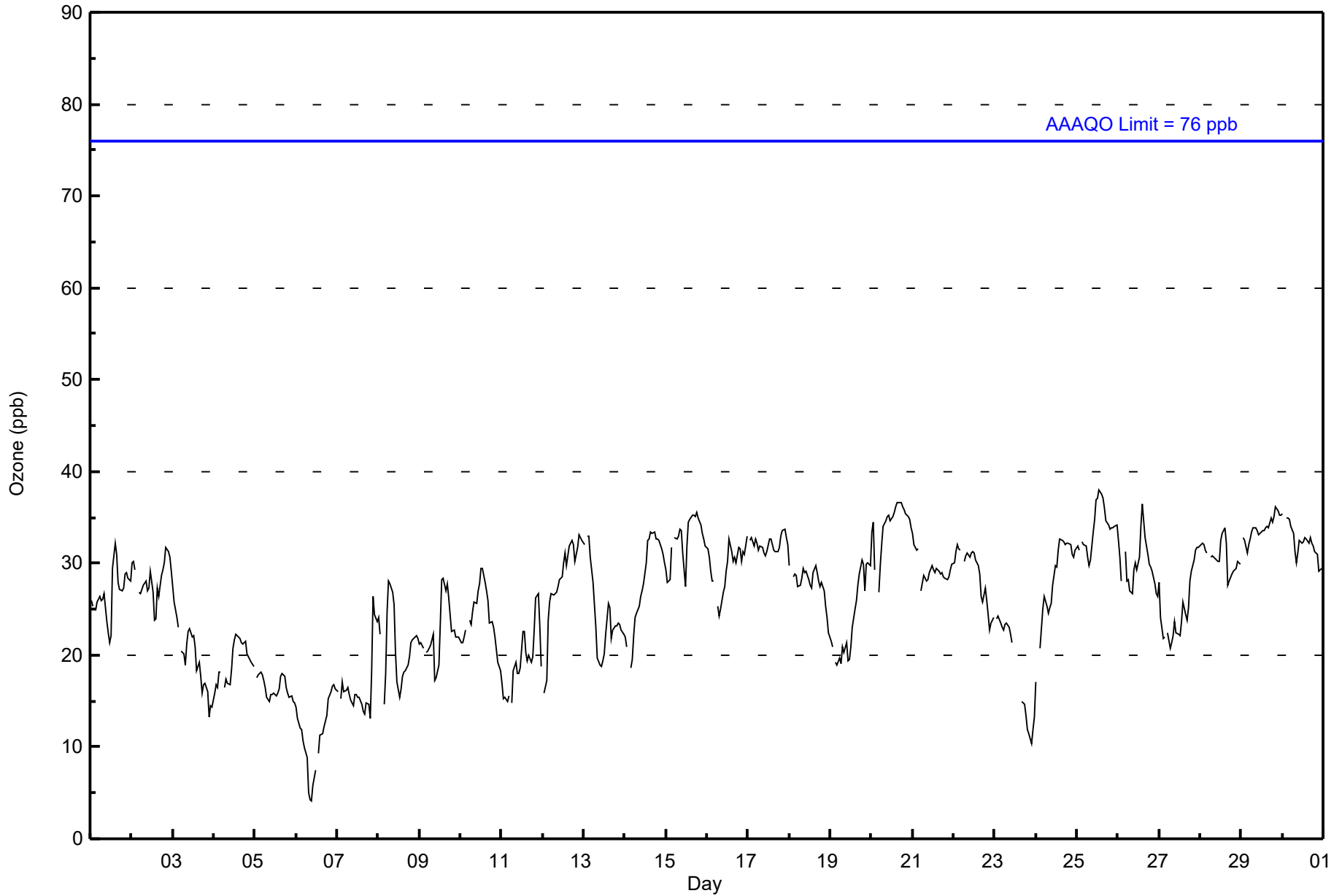




Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 38.0 ppb on Nov 25 14:00	Maximum Daily Average: 34.2 ppb on Nov 20		Hours of Data:	685
Minimum Value: 4.1 ppb on Nov 6 10:00	Minimum Daily Average: 11.2 ppb on Nov 6		Hours of Missing Data:	35
Maximum Diurnal Average: 27.6 ppb at hour 15	Minimum Diurnal Average: 24.7 ppb at hour 4		Hours of Calibration:	35
Monthly Average: 25.94 ppb	Percentiles: P <sub>1</sub> = 9.8 P <sub>10</sub> = 16.0 Q <sub>1</sub> = 21.3 Median = 27.4 Q <sub>3</sub> = 31.4 P <sub>90</sub> = 33.4 P <sub>99</sub> = 36.6		Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Nov	26.0	25.3	Z	24.9	25.7	26.3	26.0	26.1	26.6	23.7	22.4	21.4	22.1	29.4	32.1	31.0	28.0	27.1	27.0	27.3	28.8	28.9	28.4	28.0	26.6	32.1																							
2-Nov	30.0	30.2	29.2	Z	26.8	26.7	27.1	27.6	28.0	27.0	27.3	29.1	26.9	23.8	23.9	27.3	26.5	28.7	29.3	30.0	31.7	31.3	30.7	29.2	28.2	31.7																							
3-Nov	27.5	25.7	24.1	23.0	Z	20.4	20.1	19.0	21.2	22.5	22.9	21.9	22.1	20.8	18.3	19.2	17.7	15.9	16.8	16.9	15.9	13.3	14.4	14.4	19.7	27.5																							
4-Nov	15.9	16.8	16.4	18.1	18.1	Z	16.4	17.4	17.0	16.7	18.4	20.7	21.6	22.2	21.9	21.3	21.3	21.4	20.1	19.8	19.6	19.3	18.8	19.2	22.2	19.2																							
5-Nov	Z	17.6	17.8	18.1	17.8	17.2	16.5	15.4	14.9	15.7	15.8	15.9	15.5	15.8	16.4	17.7	18.1	17.7	16.5	15.9	15.4	15.6	15.0	14.8	16.4	18.1																							
6-Nov	14.4	13.1	12.0	11.9	10.7	9.9	8.9	5.1	4.3	4.1	5.8	7.4	Z	9.3	11.2	11.4	12.2	12.7	13.4	15.2	16.1	16.6	16.8	16.3	11.2	16.8																							
7-Nov	16.0	Z	15.3	17.0	15.9	16.1	16.5	15.8	15.1	14.5	15.7	15.8	15.4	15.4	14.7	13.8	13.6	14.8	14.7	13.2	18.4	26.4	24.4	23.7	16.6	26.4																							
8-Nov	24.1	22.2	Z	14.7	17.9	24.7	28.0	27.7	26.9	25.5	20.3	17.0	15.4	16.3	17.7	18.2	18.4	18.9	19.8	21.3	21.6	22.0	22.2	21.7	21.0	28.0																							
9-Nov	21.2	21.4	20.8	Z	20.3	20.4	21.1	21.6	22.2	17.2	17.5	18.9	23.6	28.2	28.3	27.0	27.8	26.2	24.4	22.6	22.8	22.0	22.0	21.9	22.6	28.3																							
10-Nov	21.3	21.4	21.9	22.7	Z	23.8	23.4	24.7	25.8	25.6	26.9	27.7	29.4	29.5	27.9	27.1	25.9	23.6	23.7	23.1	21.9	20.6	19.2	18.4	24.1	29.5																							
11-Nov	16.9	15.2	15.5	14.9	15.6	Z	14.7	18.2	19.2	18.1	17.9	18.7	22.5	22.6	20.2	19.4	20.0	19.2	19.8	22.7	26.2	26.6	23.2	18.8	19.4	26.6																							
12-Nov	Z	15.9	17.2	23.8	25.7	26.6	26.5	26.6	26.9	27.4	28.2	28.5	30.1	31.1	29.7	31.9	32.2	32.5	32.0	30.1	31.7	33.1	32.8	32.5	28.4	33.1																							
13-Nov	32.1	Z	32.9	33.0	30.7	27.9	25.5	23.1	19.6	19.0	18.7	19.4	20.2	22.3	25.6	25.2	21.8	22.8	23.1	23.5	23.3	22.7	22.3	24.3	33.0	33.0																							
14-Nov	22.0	20.9	Z	18.7	19.5	22.0	24.1	24.6	25.3	26.3	26.9	27.7	30.0	32.4	32.6	33.5	33.3	33.4	32.7	32.7	32.5	31.6	31.0	30.1	28.0	33.5																							
15-Nov	29.3	27.9	28.2	31.7	Z	32.8	32.7	32.9	33.6	33.5	31.2	27.4	31.9	34.5	34.8	35.3	35.2	35.1	35.5	34.9	34.1	33.2	32.7	31.9	32.6	35.5																							
16-Nov	31.5	30.6	29.1	28.1	28.1	Z	25.4	24.2	25.1	26.8	27.4	29.1	30.2	32.6	31.2	30.1	30.7	30.1	31.7	31.5	30.2	31.3	31.0	32.9	29.5	32.9																							
17-Nov	Z	32.4	32.9	31.9	32.6	32.2	31.4	31.8	31.7	31.1	30.7	31.3	32.7	32.6	32.0	31.5	31.3	31.3	31.7	32.9	33.5	33.7	32.8	32.0	32.1	33.7																							
18-Nov	29.8	Z	28.6	28.8	28.7	27.4	27.5	28.4	29.4	29.0	29.1	28.2	27.6	27.3	28.9	29.7	28.9	28.0	27.5	27.9	27.0	25.2	24.0	22.4	27.8	29.8																							
19-Nov	21.4	20.9	Z	19.3	18.9	19.7	19.1	20.9	20.3	21.4	19.4	19.5	20.8	23.0	25.0	25.9	27.6	28.9	30.4	29.9	27.0	29.8	30.0	29.8	23.9	30.4																							
20-Nov	33.4	34.4	29.3	Z	26.8	29.7	32.0	34.0	34.7	35.0	35.2	34.6	35.0	35.6	36.2	36.6	36.6	36.5	36.2	35.8	35.4	35.1	34.7	33.9	34.2	36.6																							
21-Nov	33.3	32.1	31.5	31.5	Z	27.1	28.7	28.4	28.1	28.2	28.9	29.8	29.3	29.0	29.4	29.2	28.8	28.9	28.5	28.4	28.2	28.5	29.3	29.9	29.3	33.3																							
22-Nov	30.0	31.2	32.1	31.5	31.5	Z	30.2	30.8	31.1	30.6	31.1	31.3	31.1	30.4	29.8	28.8	26.3	25.9	27.3	26.0	24.4	22.8	23.5	24.1	28.8	32.1																							
23-Nov	Z	23.9	24.2	23.5	23.1	22.7	23.3	23.6	23.0	22.2	21.3	C	C	C	C	C	14.9	14.6	13.4	11.8	11.4	10.4	11.9	13.2	18.5	24.2																							
24-Nov	17.0	Z	20.7	22.9	25.1	26.4	25.3	24.5	25.2	25.6	27.7	29.7	29.6	31.5	32.6	32.5	32.3	32.1	32.2	32.2	32.1	30.9	30.7	31.4	28.3	32.6																							
25-Nov	31.9	31.5	Z	32.3	32.1	31.9	30.6	29.8	30.4	33.4	34.8	36.9	37.1	38.0	37.5	37.1	36.1	34.7	34.1	33.8	33.8	33.8	34.0	34.2	33.9	38.0																							
26-Nov	32.5	30.7	28.1	Z	31.3	28.0	28.2	27.1	26.7	29.3	30.0	29.2	30.7	33.9	36.5	34.7	32.8	31.0	29.9	29.7	29.1	27.8	26.7	26.3	30.0	36.5																							
27-Nov	27.9	24.1	21.8	21.9	Z	22.5	20.7	21.3	22.2	23.6	22.5	22.2	22.2	23.6	25.8	24.4	23.8	25.1	28.1	29.2	30.3	31.5	31.8	31.8	25.1	31.8																							
28-Nov	32.0	32.1	32.0	31.4	31.2	Z	30.7	30.8	30.6	30.4	30.2	30.2	32.4	33.3	33.9	32.2	27.7	28.1	28.9	29.2	29.3	29.5	30.1	29.9	30.7	33.9																							
29-Nov	Z	32.7	32.6	31.0	32.1	32.6	33.4	33.8	33.9	33.6	33.2	33.3	33.6	33.6	33.9	34.0	33.9	34.9	34.5	35.1	36.1	35.7	35.2	35.2	33.8	36.1																							
30-Nov	35.4	Z	35.0	35.0	34.8	34.0	33.2	31.3	30.0	31.1	32.5	32.2	32.4	32.8	32.7	32.2	32.9	32.2	31.8	31.2	31.0	29.2	29.3	29.4	32.2	35.4																							
																								26.1	25.2	25.2	24.7	24.8	25.2	24.9	24.9	25.0	24.9	25.0	25.3	26.8	27.3	27.6	27.5	26.5	26.4	26.5	26.5	26.6	26.7	26.3	26.0	Diurnal Average	
																								35.4	34.4	35.0	35.0	34.8	34.0	33.4	34.0	34.7	35.0	35.2	36.9	37.1	38.0	37.5	37.1	36.6	36.5	36.2	35.8	36.1	35.7	35.2	35.2	Diurnal Maximum	

Z - zerospan C - Calibration  
 Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 76 ppb





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Ozone (O<sub>3</sub>) - ppb  
Stony Mountain - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	154	22.48	22.48
21 - 50	531	77.52	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 (O<sub>3</sub>) - ppb  
Stony Mountain - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 20	2	5	12	9	9	3	5	3	13	18	16	0	1	4	0	0	100
21 - 50	9	25	7	10	12	10	7	9	30	40	66	53	100	74	41	15	508
51 - 82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 83	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	<b>11</b>	<b>30</b>	<b>19</b>	<b>19</b>	<b>21</b>	<b>13</b>	<b>12</b>	<b>12</b>	<b>43</b>	<b>58</b>	<b>82</b>	<b>53</b>	<b>101</b>	<b>78</b>	<b>41</b>	<b>15</b>	<b>608</b>

Total Number of Valid Hours: 608

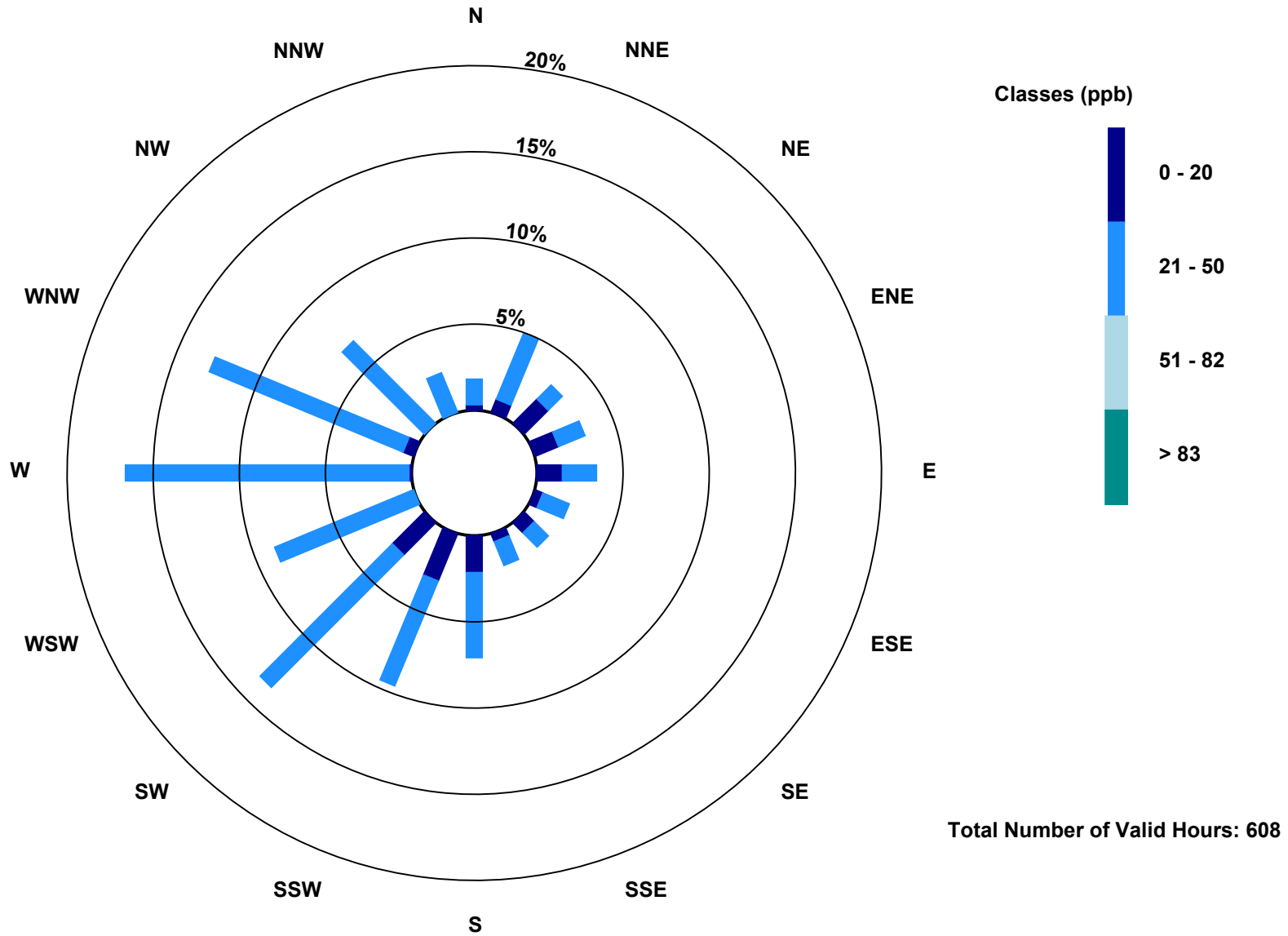
Total Number of Hours: 720

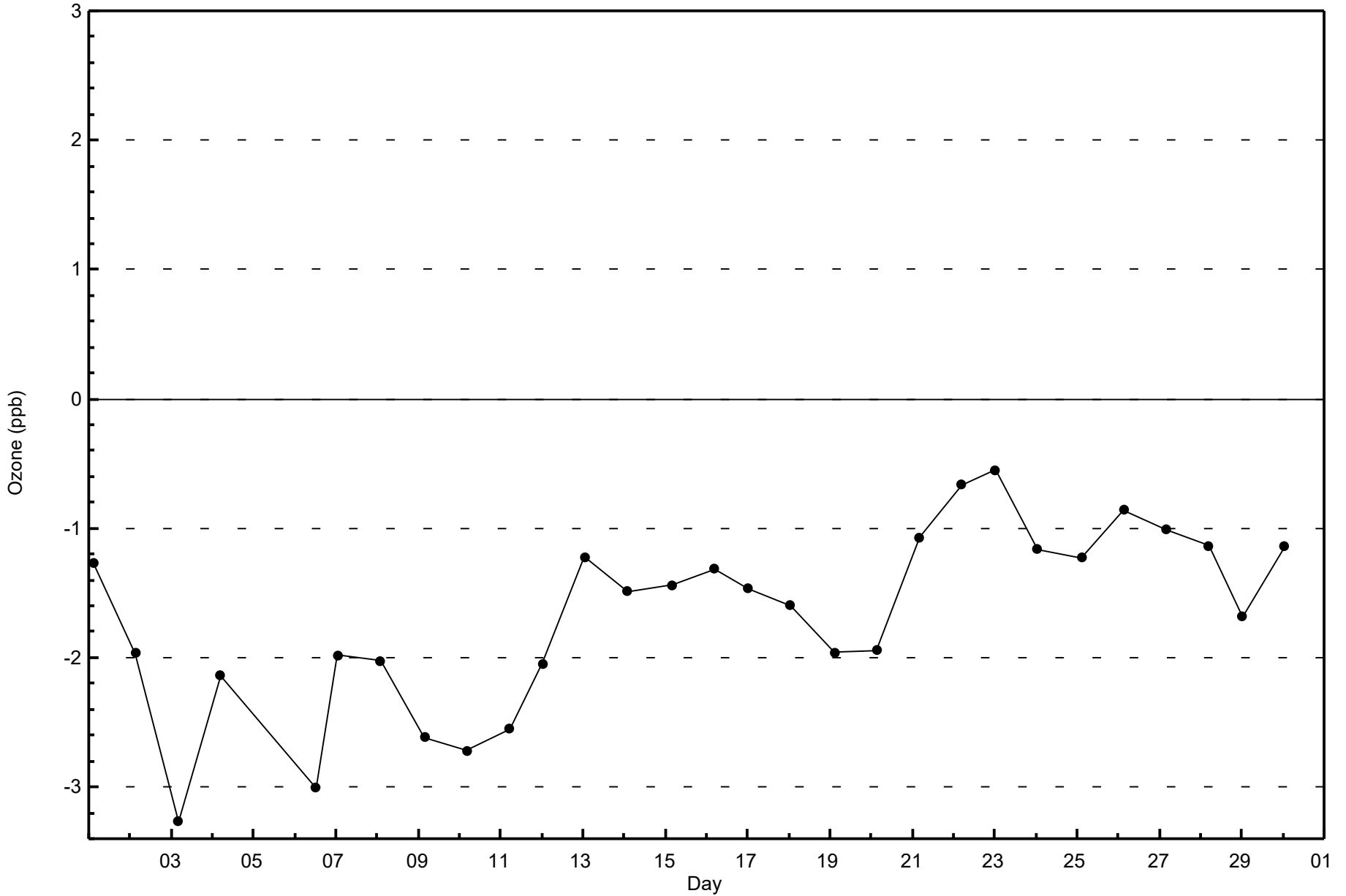


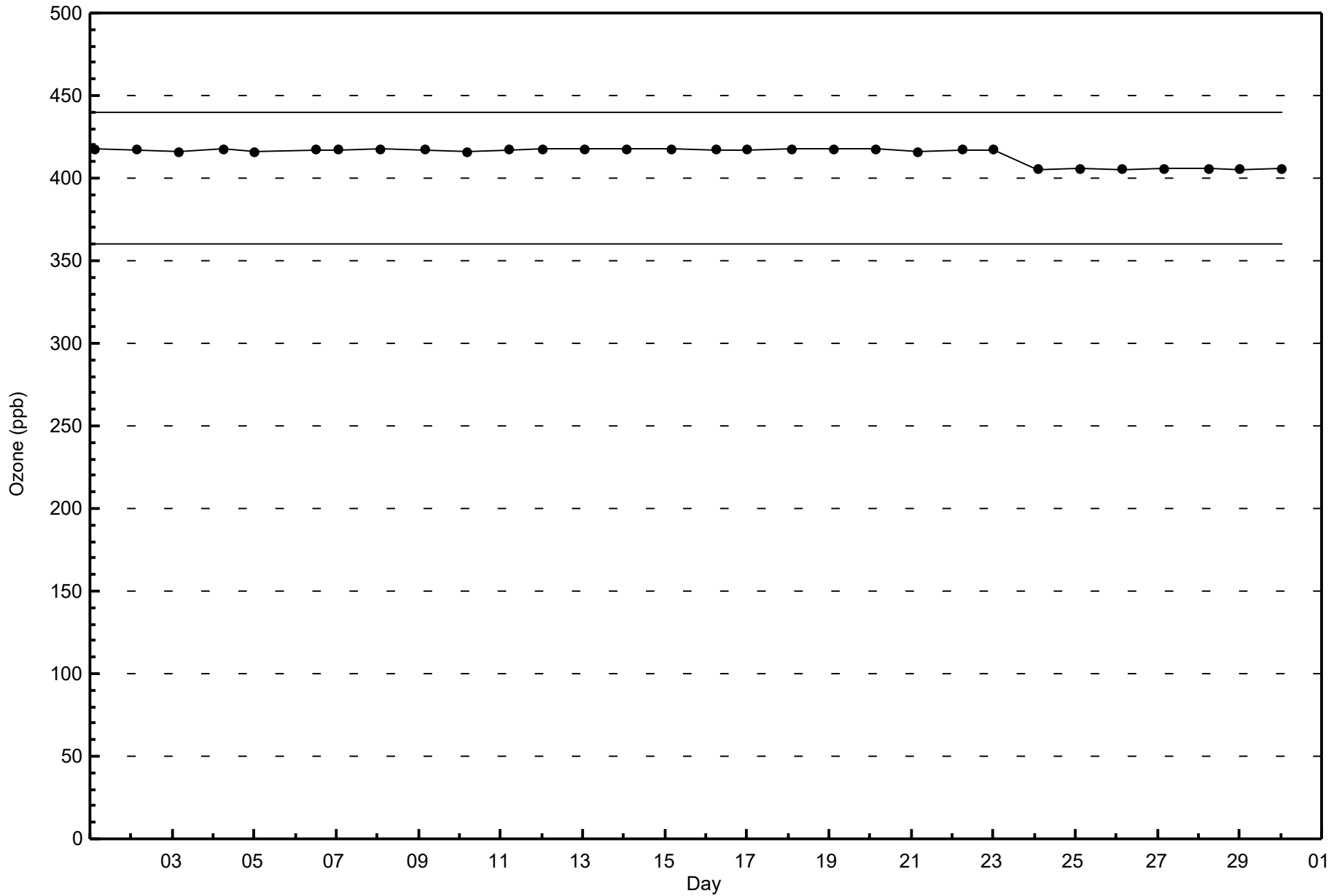


Wood Buffalo Environmental Association  
Wind Rose Nov 2023

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





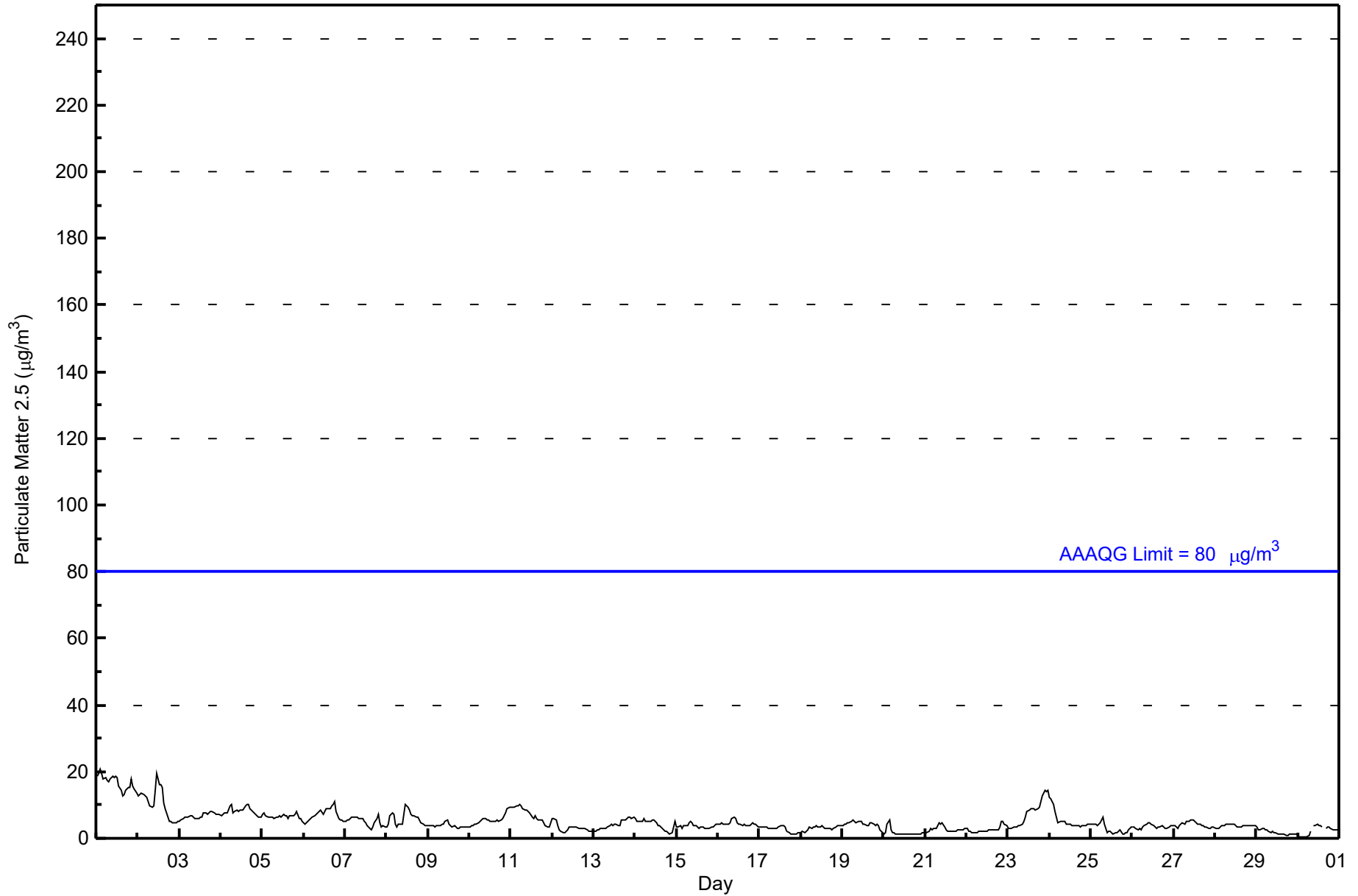




Summary of Hour Averages

Stony Mountain - November 2023

Number of Exceedences (AAAQO):		1-hr: 0	24-hr: 0	Hours in Service: 720																	720																												
Maximum Value: 21.0 µg/m <sup>3</sup> on Nov 1 03:00		Maximum Daily Average: 16.8 µg/m <sup>3</sup> on Nov 1																	Hours of Data: 718																														
Minimum Value: 0.5 µg/m <sup>3</sup> on Nov 30 05:00		Minimum Daily Average: 1.7 µg/m <sup>3</sup> on Nov 20																	Hours of Missing Data: 2																														
Maximum Diurnal Average: 5.8 µg/m <sup>3</sup> at hour 12		Minimum Diurnal Average: 4.6 µg/m <sup>3</sup> at hour 22																	Hours of Calibration: 1																														
Monthly Average: 5.05 µg/m <sup>3</sup>		Percentiles: P <sub>1</sub> = 1.0 P <sub>10</sub> = 1.9 Q <sub>1</sub> = 3.1 Median = 4.1 Q <sub>3</sub> = 6.1 P <sub>90</sub> = 8.9 P <sub>99</sub> = 18.4																	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-Nov	18.5	19.6	21.0	19.3	17.9	18.3	17.2	16.8	18.0	18.8	18.4	18.6	18.4	15.6	14.3	12.8	13.3	14.5	15.1	15.4	17.9	15.8	14.6	13.6	16.8	21.0																							
2-Nov	12.6	13.1	13.6	13.1	12.9	12.4	10.9	9.6	9.3	9.7	14.6	19.6	16.1	15.9	15.1	10.4	8.9	6.3	5.2	5.0	4.6	4.8	4.8	4.9	10.6	19.6																							
3-Nov	5.1	5.6	6.1	6.2	6.3	6.3	6.6	6.9	6.2	5.9	6.0	6.0	6.3	6.4	7.6	7.5	7.4	7.6	7.9	8.3	7.7	7.2	7.1	7.1	6.7	8.3																							
4-Nov	6.7	7.3	7.7	7.5	7.6	9.9	10.0	7.8	8.2	8.6	8.1	8.6	8.4	8.5	9.7	10.2	10.2	9.0	8.1	7.8	7.2	6.7	6.2	6.5	8.2	10.2																							
5-Nov	7.4	7.6	6.8	6.3	6.3	6.4	6.3	6.1	6.5	6.6	6.8	6.2	7.0	6.8	6.8	6.1	6.8	6.7	6.7	7.0	8.1	6.0	6.0	5.0	6.6	8.1																							
6-Nov	4.7	4.4	5.2	5.3	5.7	6.2	6.7	7.1	7.6	8.1	8.5	7.4	7.9	9.1	8.7	9.0	9.6	10.0	10.9	8.1	6.1	5.7	5.4	5.1	7.2	10.9																							
7-Nov	5.1	5.3	5.5	6.0	6.4	6.4	6.3	6.3	6.1	5.9	5.8	5.2	4.5	3.7	2.9	2.7	3.5	4.7	5.8	7.0	4.8	3.4	3.6	3.5	5.0	7.0																							
8-Nov	3.3	4.3	6.8	7.5	7.4	4.4	3.3	4.1	4.1	4.0	7.2	10.4	9.5	8.3	7.2	6.8	6.6	6.4	6.2	5.3	4.8	4.3	3.8	3.7	5.8	10.4																							
9-Nov	3.7	3.8	3.7	3.7	3.6	3.9	3.8	4.0	4.4	4.3	5.0	5.4	4.4	3.8	3.5	3.7	3.2	3.1	3.0	3.2	3.3	3.4	3.5	3.5	3.8	5.4																							
10-Nov	3.5	3.7	4.0	4.2	4.3	4.5	5.0	5.5	5.9	6.0	5.7	5.6	5.1	5.1	5.2	5.2	5.4	5.2	5.5	6.0	6.6	7.5	8.9	9.5	5.5	9.5																							
11-Nov	9.2	9.2	9.3	9.7	9.9	10.0	9.8	8.8	8.5	8.4	8.0	7.6	6.5	6.1	6.7	6.1	5.4	5.4	5.5	4.8	3.7	3.5	3.6	4.8	7.1	10.0																							
12-Nov	5.9	6.1	5.6	3.7	2.7	2.0	1.8	1.8	2.1	2.7	3.5	3.3	3.3	3.3	3.1	3.0	3.1	3.0	3.1	2.4	2.2	2.3	2.3	3.1	6.1																								
13-Nov	2.3	2.2	2.5	2.5	2.8	3.2	3.1	3.0	3.5	3.9	4.1	3.8	4.1	4.3	3.6	3.7	5.4	5.6	5.4	5.8	6.2	6.3	6.0	6.6	4.2	6.6																							
14-Nov	5.9	5.1	4.9	5.0	5.0	5.8	5.2	5.0	5.1	5.2	5.6	5.5	4.6	3.8	3.6	3.3	2.8	2.2	2.0	1.7	1.4	1.5	3.6	4.9	4.1	5.9																							
15-Nov	3.5	3.4	3.7	3.2	3.6	3.6	4.0	4.7	5.1	4.7	3.7	3.8	3.2	2.8	3.5	3.4	2.9	2.8	2.8	3.0	3.3	3.4	3.7	4.1	3.6	5.1																							
16-Nov	4.1	4.4	4.5	4.3	4.2	4.3	4.1	4.7	6.1	6.4	5.9	4.9	4.4	4.2	4.0	4.2	3.9	4.0	4.0	4.6	4.1	4.1	3.4	4.5	6.4																								
17-Nov	3.4	3.3	3.3	3.3	3.2	3.0	3.0	3.0	3.0	3.1	3.1	3.3	3.7	3.9	3.6	3.2	2.3	1.6	1.4	1.3	1.4	1.4	1.5	1.9	2.7	3.9																							
18-Nov	1.8	2.2	1.9	2.2	2.7	3.2	3.1	3.4	3.4	3.7	3.5	3.4	3.6	3.4	3.1	2.9	3.0	3.0	2.7	2.9	3.6	3.6	3.7	3.8	3.1	3.8																							
19-Nov	4.0	4.1	4.4	4.6	4.7	5.0	5.5	5.1	4.8	4.9	5.3	5.0	4.4	4.0	3.6	3.7	4.7	4.7	4.1	3.8	4.1	3.6	2.4	1.5	4.3	5.5																							
20-Nov	1.3	1.7	4.1	5.4	2.7	1.8	1.5	1.3	1.1	1.1	1.2	1.3	1.3	1.2	1.1	1.1	1.1	1.2	1.3	1.3	1.4	1.5	1.5	1.6	1.7	5.4																							
21-Nov	1.7	1.7	2.1	2.8	2.7	2.9	3.1	3.9	4.8	4.2	4.5	3.6	2.5	2.1	2.0	2.0	2.1	2.1	2.1	2.4	2.6	2.5	2.4	2.9	2.7	4.8																							
22-Nov	2.8	2.3	1.9	1.8	1.7	1.8	1.9	2.0	2.1	2.1	2.1	2.3	2.3	2.5	2.7	2.5	2.6	2.6	2.7	3.5	5.2	5.2	4.3	3.6	2.7	5.2																							
23-Nov	2.9	2.8	3.1	3.5	3.5	3.6	3.7	4.0	4.3	5.0	6.2	8.2	8.6	8.7	8.8	8.8	8.6	8.9	9.4	10.8	12.6	14.2	14.1	14.3	7.4	14.3																							
24-Nov	12.2	11.9	10.4	8.2	6.2	4.9	5.1	5.3	5.2	4.9	4.4	4.2	4.0	4.0	3.9	3.7	3.7	3.6	3.6	3.9	3.9	3.7	4.0	4.3	5.4	12.2																							
25-Nov	4.3	4.4	4.3	4.1	4.0	4.5	5.4	6.2	4.2	1.8	2.3	2.1	1.7	1.3	1.5	1.6	2.0	2.5	1.3	1.5	1.7	1.9	2.4	3.3	2.9	6.2																							
26-Nov	3.4	3.5	3.0	2.4	3.0	2.7	3.5	3.8	4.4	4.7	4.7	4.4	3.9	3.4	3.1	3.2	3.6	3.9	3.6	2.9	3.0	3.3	3.8	3.9	3.6	4.7																							
27-Nov	4.0	3.7	3.1	3.6	4.3	4.6	4.4	5.1	5.3	5.0	5.5	5.4	5.1	4.6	4.0	4.1	4.0	3.7	3.4	3.3	3.1	3.1	3.3	3.3	4.1	5.5																							
28-Nov	3.1	3.0	3.2	3.3	3.7	4.0	4.1	4.2	4.3	4.3	4.3	4.2	3.8	3.5	3.3	3.3	3.8	3.8	3.8	3.8	3.8	3.8	3.6	3.7	3.7	4.3																							
29-Nov	3.5	2.7	2.7	3.1	3.0	2.7	2.5	2.0	1.9	2.0	1.7	1.5	1.3	1.3	1.3	1.3	1.3	0.7	1.0	1.4	1.4	1.4	1.4	1.2	1.8	3.5																							
30-Nov	0.7	0.6	0.5	0.5	0.5	0.5	1.0	2.3	M	3.9	3.6	4.2	3.7	3.6	3.4	C	3.2	3.4	3.2	3.0	2.5	2.4	2.5	2.7	2.4	4.2																							
																								5.0	5.1	5.3	5.2	5.1	5.1	5.1	5.1	5.4	5.3	5.6	5.8	5.4	5.2	5.0	4.8	4.8	4.7	4.7	4.7	4.8	4.6	4.6	4.7	Diurnal Average	
																								18.5	19.6	21.0	19.3	17.9	18.3	17.2	16.8	18.0	18.8	18.4	19.6	18.4	15.9	15.1	12.8	13.3	14.5	15.1	15.4	17.9	15.8	14.6	14.3	Diurnal Maximum	
C - Calibration M - Maintenance																																																	
Alberta Ambient Air Quality Guideline/Objectives: 1-hr 80 µg/m <sup>3</sup> 24-hr 29 µg/m <sup>3</sup>																																																	





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$   
Stony Mountain - November 2023**

<b>Concentration Ranges (<math>\mu\text{g}/\text{m}^3</math>)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	501	69.78	69.78
6 - 15	198	27.58	97.35
16 - 25	19	2.65	100.00
26 - 80	0	0.00	100.00
> 81.0	0	0.00	100.00

Total Number of Valid Hours: 718

Total Number of Hours: 720



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

**Particulate Matter 2.5 (PM<sub>2.5</sub>) - μg/m<sup>3</sup>**  
**Stony Mountain - November 2023**

Concentration Ranges (μg/m <sup>3</sup> )	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	7	21	10	9	4	9	7	8	27	34	55	52	95	73	37	11	459
6 - 15	3	8	9	12	17	4	7	4	20	25	32	3	1	7	5	4	161
16 - 25	1	2	0	0	0	0	0	0	1	2	3	2	8	0	0	0	19
26 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 81.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	11	31	19	21	21	13	14	12	48	61	90	57	104	80	42	15	639

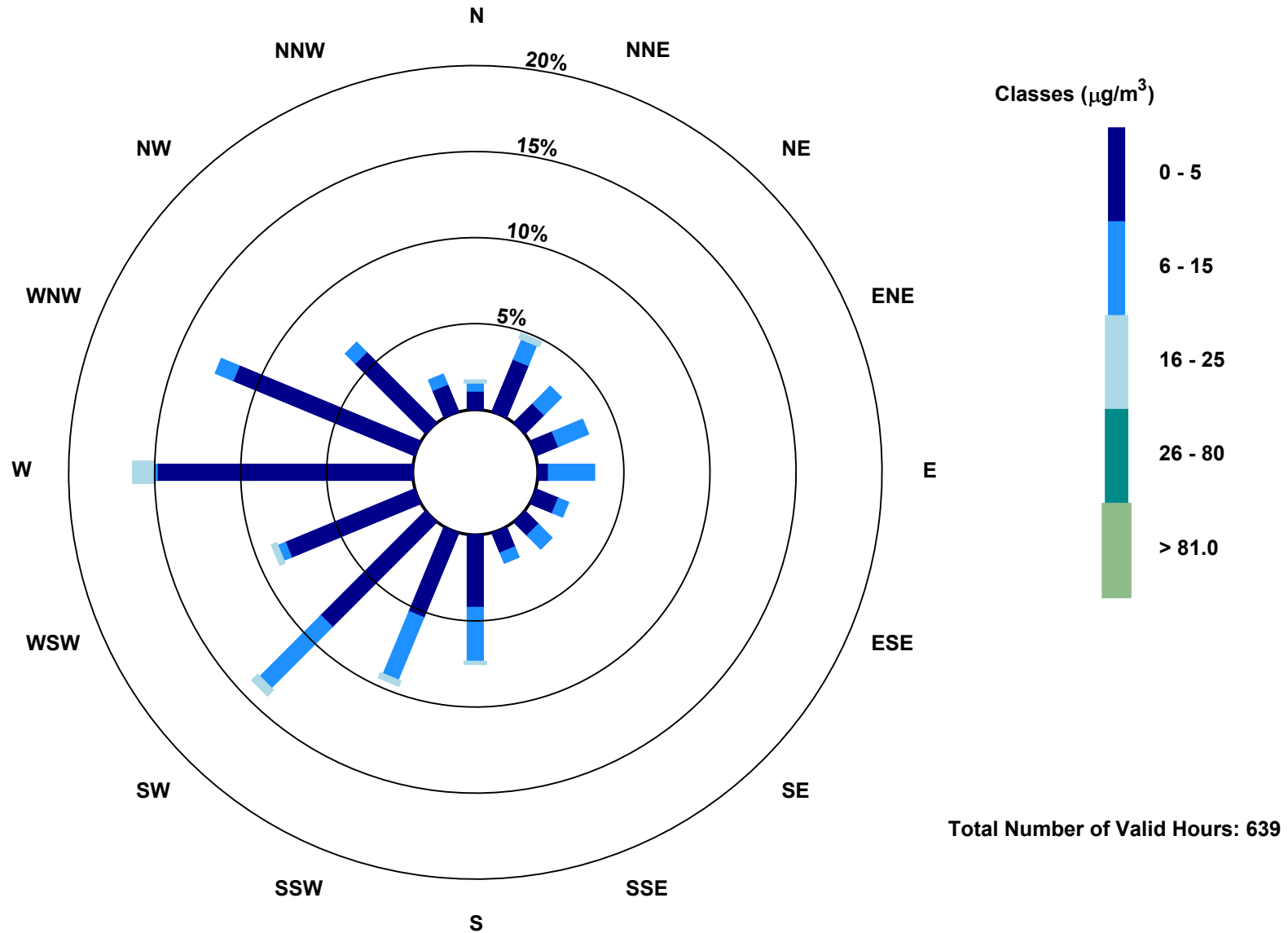
Total Number of Valid Hours: 639

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 2023

Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$   
Stony Mountain



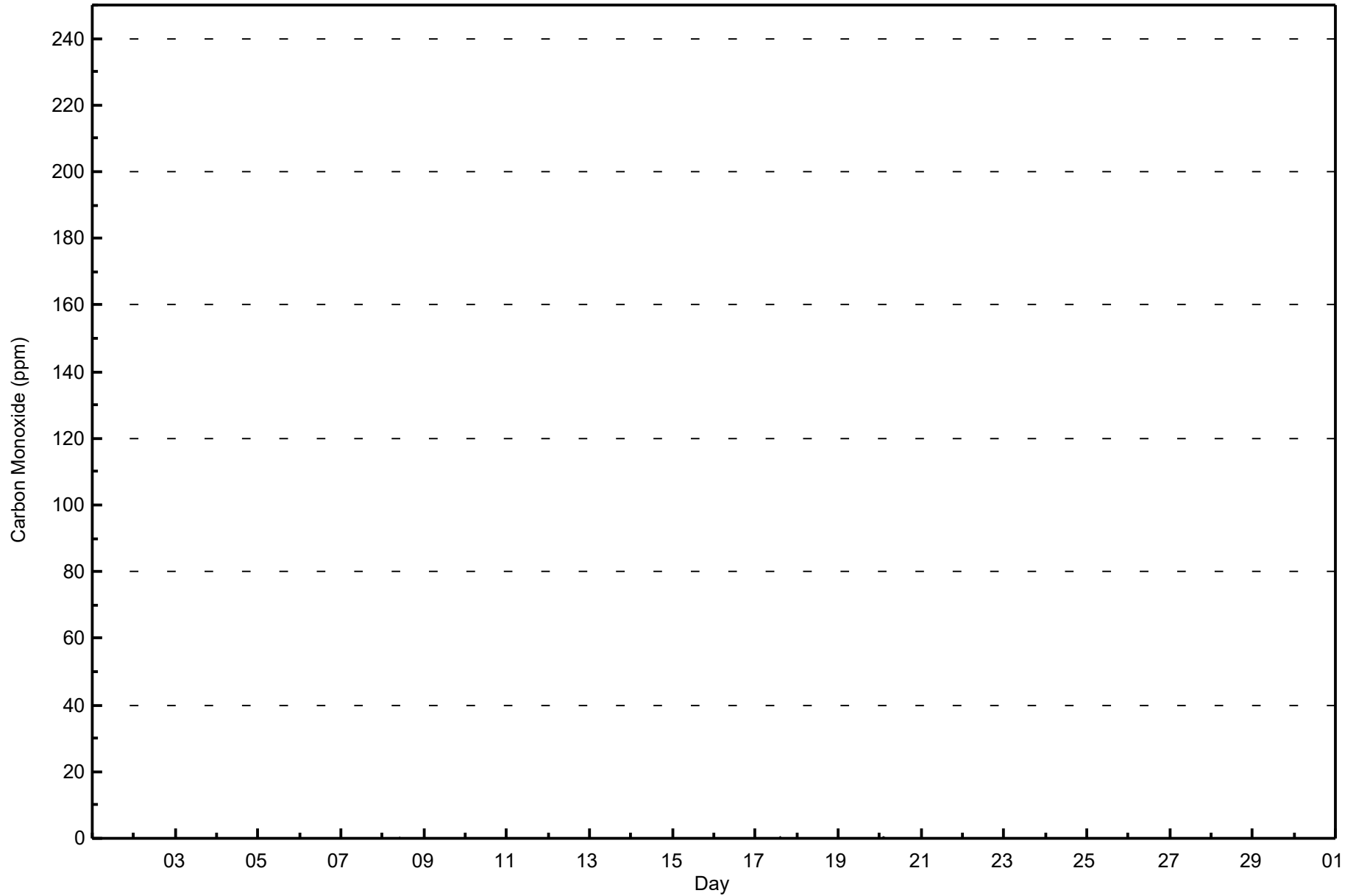






**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Carbon Monoxide (CO) - ppm**  
**Stony Mountain - November 2023**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Carbon Monoxide (CO) - ppm  
Stony Mountain - November 2023**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 0.3	686	100.00	100.00
0.4 - 0.5	0	0.00	100.00
0.6 - 0.7	0	0.00	100.00
0.8 - 1.4	0	0.00	100.00
1.5 - 10	0	0.00	100.00
> 10	0	0.00	100.00

Total Number of Valid Hours: 686

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Carbon Monoxide (CO) - ppm  
Stony Mountain - November 2023**

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	11	29	19	19	21	13	13	11	45	59	84	57	98	79	40	15	613
0.4 - 0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.6 - 0.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.8 - 1.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1.5 - 10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	11	29	19	19	21	13	13	11	45	59	84	57	98	79	40	15	613

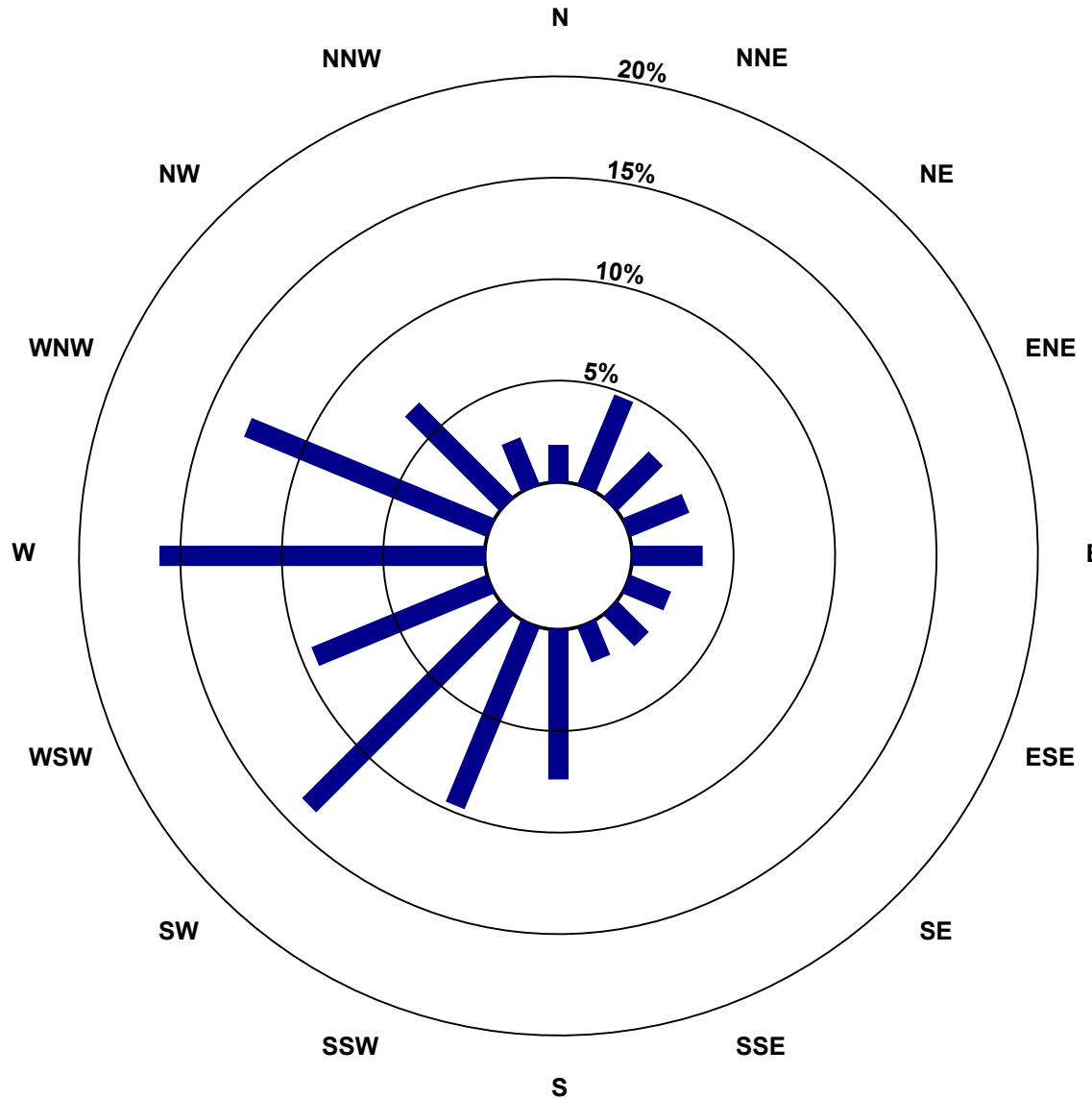
Total Number of Valid Hours: 613

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 2023

Carbon Monoxide (CO) - ppm  
Stony Mountain



Classes (ppm)



Total Number of Valid Hours: 613

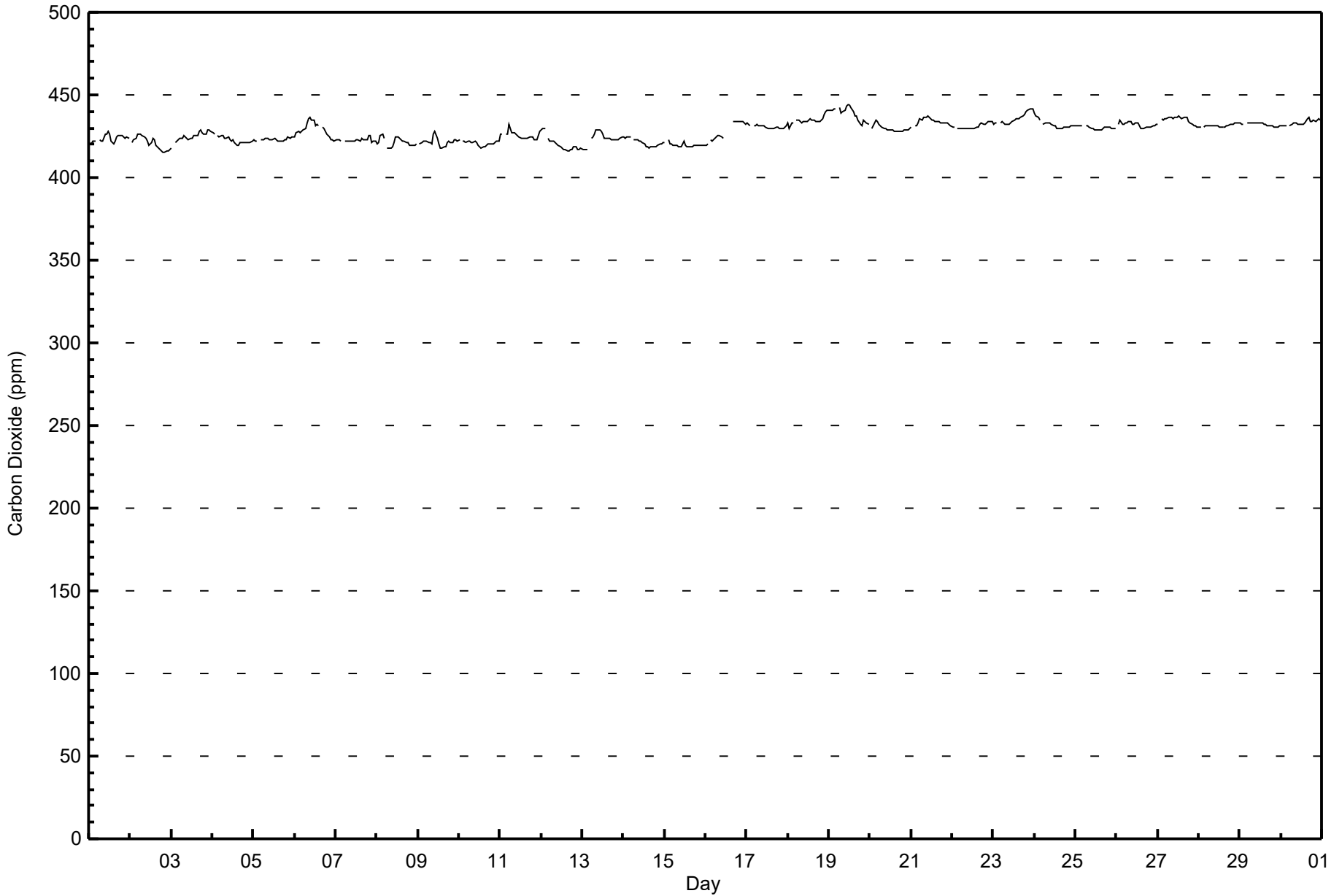


Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 444.1 ppm on Nov 19 13:00	Maximum Daily Average: 438.5 ppm on Nov 19		Hours of Data:	685
Minimum Value: 415.1 ppm on Nov 2 21:00	Minimum Daily Average: 419.7 ppm on Nov 15		Hours of Missing Data:	35
Maximum Diurnal Average: 428.3 ppm at hour 6	Minimum Diurnal Average: 426.6 ppm at hour 16		Hours of Calibration:	35
Monthly Average: 427.61 ppm	Percentiles: P <sub>1</sub> = 416.5 P <sub>10</sub> = 419.7 Q <sub>1</sub> = 422.4 Median = 428.7 Q <sub>3</sub> = 432.3 P <sub>90</sub> = 434.9 P <sub>99</sub> = 441.5		Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	420.0	420.7	421.8	422.1	421.7	Z	422.6	422.2	421.8	426.2	426.4	428.1	426.4	422.2	420.0	421.7	424.6	425.5	425.6	425.1	424.7	424.0	424.3	424.1	423.5	428.1
2-Nov	Z	421.4	422.8	424.1	426.0	426.1	426.4	425.5	424.3	424.0	422.3	419.8	421.5	423.4	422.5	419.4	419.0	416.9	416.0	415.3	415.1	415.8	416.2	417.1	420.9	426.4
3-Nov	417.9	Z	420.9	422.4	422.6	423.7	423.9	425.6	424.5	423.5	422.9	423.8	423.8	425.2	425.6	425.3	428.3	429.2	426.8	426.2	426.6	429.0	428.5	427.9	425.0	429.2
4-Nov	426.8	426.6	Z	425.0	424.8	425.4	425.3	423.6	423.5	424.2	423.1	422.2	423.1	421.5	419.6	419.8	420.8	421.3	421.0	421.0	420.9	421.2	421.5	422.3	422.8	426.8
5-Nov	422.5	422.3	422.3	Z	422.8	422.5	422.8	423.3	423.4	423.2	423.0	422.9	423.6	423.3	422.4	421.8	421.6	422.0	422.6	423.2	424.4	423.8	424.6	424.8	423.0	424.8
6-Nov	425.0	426.9	428.1	426.8	427.9	428.6	429.9	432.8	435.9	436.7	434.9	435.1	431.4	431.8	431.0	Z	430.1	430.1	428.2	426.2	424.3	423.0	422.6	422.4	429.1	436.7
7-Nov	422.6	423.2	423.0	422.0	Z	422.2	421.9	422.0	422.0	422.0	421.7	422.0	423.1	422.8	422.4	424.1	422.9	422.7	422.7	425.5	425.7	420.9	422.4	421.7	422.7	425.7
8-Nov	420.5	421.2	425.5	426.5	424.0	Z	417.4	418.0	418.2	418.7	421.5	424.4	424.5	423.4	422.9	422.0	421.7	421.4	421.0	419.8	419.6	419.6	419.6	420.3	421.4	426.5
9-Nov	Z	420.4	421.0	422.4	421.6	422.2	421.3	420.8	420.3	426.1	427.8	424.0	420.7	417.6	418.1	418.8	418.5	420.8	421.7	421.2	421.0	423.2	422.8	422.2	421.5	427.8
10-Nov	422.5	Z	422.4	421.8	421.3	422.0	422.0	421.6	421.0	422.2	420.8	419.8	418.8	417.9	418.8	418.8	419.3	420.4	420.3	420.2	420.3	420.8	421.8	422.0	420.7	422.5
11-Nov	425.9	426.4	Z	425.9	426.6	432.2	429.8	427.1	427.1	426.6	425.4	425.0	423.6	423.7	423.6	423.5	423.8	424.6	424.8	424.8	423.2	423.0	425.6	428.3	425.7	432.2
12-Nov	428.7	429.5	429.7	Z	423.3	422.2	422.0	421.7	421.3	420.5	419.6	419.0	418.0	416.9	416.8	415.9	415.8	416.5	417.3	418.4	418.2	417.1	417.1	417.4	420.1	429.7
13-Nov	417.3	417.1	417.0	417.0	Z	423.4	424.9	426.4	428.7	429.1	428.9	427.6	426.1	424.0	423.5	423.5	423.6	423.0	422.9	422.9	423.1	423.1	423.8	424.3	423.5	429.1
14-Nov	424.2	423.7	424.4	424.9	424.6	Z	422.7	422.7	422.5	422.0	421.7	421.5	420.3	418.7	418.6	418.1	418.6	418.7	419.0	419.1	419.4	420.1	420.6	420.8	421.2	424.9
15-Nov	421.3	Z	422.5	420.3	420.5	419.4	419.6	419.5	418.6	418.5	419.0	421.8	419.8	418.7	418.7	418.7	418.9	419.2	419.1	419.3	419.2	419.6	419.7	419.9	419.7	422.5
16-Nov	419.9	420.4	Z	422.9	422.2	423.6	424.7	425.3	425.3	424.2	423.6	C	C	C	C	C	433.9	434.3	433.6	433.6	434.3	433.7	434.0	432.5	427.9	434.3
17-Nov	432.9	432.4	431.7	Z	431.2	431.3	432.0	431.4	431.2	431.2	431.2	430.8	429.6	429.6	429.8	429.9	429.6	430.5	430.5	430.0	429.9	429.8	430.7	431.2	430.8	432.9
18-Nov	433.0	430.1	433.2	433.4	Z	434.8	434.7	434.1	433.3	434.0	433.8	434.2	434.8	435.2	435.0	434.5	434.2	434.3	433.8	433.6	435.6	438.1	440.0	440.7	434.7	440.7
19-Nov	441.0	440.9	440.6	441.8	441.7	Z	442.1	438.6	439.4	440.3	443.6	443.7	444.1	442.2	439.7	437.1	437.0	434.7	431.8	431.3	435.0	433.8	432.8	432.2	438.5	444.1
20-Nov	Z	429.3	431.3	434.6	433.6	432.4	431.3	430.2	429.8	429.3	429.0	429.2	428.9	428.6	428.3	428.2	428.0	428.0	428.2	428.3	428.7	428.9	428.9	429.5	429.7	434.6
21-Nov	430.1	Z	431.8	431.4	432.9	435.6	434.9	436.3	436.2	436.4	436.9	435.4	435.2	434.5	433.8	433.9	434.1	433.4	433.4	433.4	433.0	432.7	431.8	431.2	433.8	436.9
22-Nov	430.9	430.6	Z	429.5	429.5	429.8	430.0	429.9	429.7	429.7	429.6	429.6	430.0	430.1	430.5	432.2	433.0	432.1	432.1	433.2	434.3	434.0	433.7	431.0	431.0	434.3
23-Nov	432.5	433.3	433.1	Z	433.3	433.6	433.1	432.2	432.1	432.1	432.7	433.7	434.7	435.3	435.9	435.8	436.6	437.4	438.3	439.5	440.3	441.5	441.4	441.2	435.6	441.5
24-Nov	438.8	437.3	436.0	434.7	Z	432.2	432.7	433.0	432.8	432.7	432.0	431.2	431.4	429.9	429.5	429.4	429.7	430.4	430.6	430.7	430.8	431.3	431.4	431.1	432.2	438.8
25-Nov	431.0	431.2	431.3	431.0	431.2	Z	431.2	431.3	430.8	429.8	429.7	429.1	429.0	428.5	428.8	429.0	429.4	430.6	430.3	430.1	430.4	430.0	429.8	429.9	430.1	431.3
26-Nov	Z	432.4	434.4	432.3	431.9	433.1	433.0	434.2	434.3	432.5	432.0	433.0	432.7	431.1	429.3	429.5	429.7	430.3	430.7	430.6	430.6	431.0	431.7	432.2	431.8	434.4
27-Nov	432.0	Z	435.2	435.1	435.2	435.3	436.5	436.3	436.2	435.7	436.3	436.6	437.0	436.2	435.2	436.1	436.7	436.2	434.2	433.1	432.0	431.2	431.0	430.9	434.8	437.0
28-Nov	430.6	430.5	Z	430.7	431.0	430.9	431.0	431.0	431.1	431.2	431.3	431.4	430.9	430.3	430.6	430.8	431.4	431.5	431.8	431.9	432.2	432.7	432.7	432.8	431.3	432.8
29-Nov	432.7	432.4	432.4	Z	433.1	433.2	433.2	433.1	433.1	432.9	433.2	433.3	433.0	432.7	432.5	432.3	431.7	431.2	431.2	431.1	430.7	430.6	430.9	431.0	432.2	433.3
30-Nov	431.1	431.1	431.0	431.1	Z	431.6	432.0	432.7	433.2	432.8	432.1	432.4	432.5	432.1	433.0	435.7	436.4	433.7	434.0	434.4	434.2	434.9	435.2	434.7	433.1	436.4

427.4	427.6	428.1	427.6	427.8	428.3	428.2	428.1	428.1	428.3	428.2	428.3	427.9	427.1	426.8	426.6	427.3	427.4	427.1	427.1	427.2	427.3	427.6	427.7	Diurnal Average	
441.0	440.9	440.6	441.8	441.7	435.6	442.1	438.6	439.4	440.3	443.6	443.7	444.1	442.2	439.7	437.1	437.0	437.4	438.3	439.5	440.3	441.5	441.4	441.2	Diurnal Maximum	

Z - zerspan C - Calibration





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

**Carbon Dioxide (CO<sub>2</sub>) - ppm**  
**Stony Mountain - November 2023**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
400 - 420	90	13.14	13.14
420 - 440	581	84.82	97.96
440 - 460	14	2.04	100.00
460 - 480	0	0.00	100.00
480 - 500	0	0.00	100.00
> 500	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720





**Wood Buffalo Environmental Association  
Frequency Distribution**

**Carbon Dioxide (CO<sub>2</sub>) - ppm  
Stony Mountain - November 2023**

<b>Concentration Ranges (ppm)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
400 - 420	1	7	0	0	2	1	2	2	3	12	5	15	17	9	2	0	78
420 - 440	10	22	19	20	19	10	12	9	40	42	74	37	83	68	36	15	516
440 - 460	0	0	0	0	0	0	0	0	3	2	5	0	0	3	1	0	14
460 - 480	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
480 - 500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	11	29	19	20	21	11	14	11	46	56	84	52	100	80	39	15	608

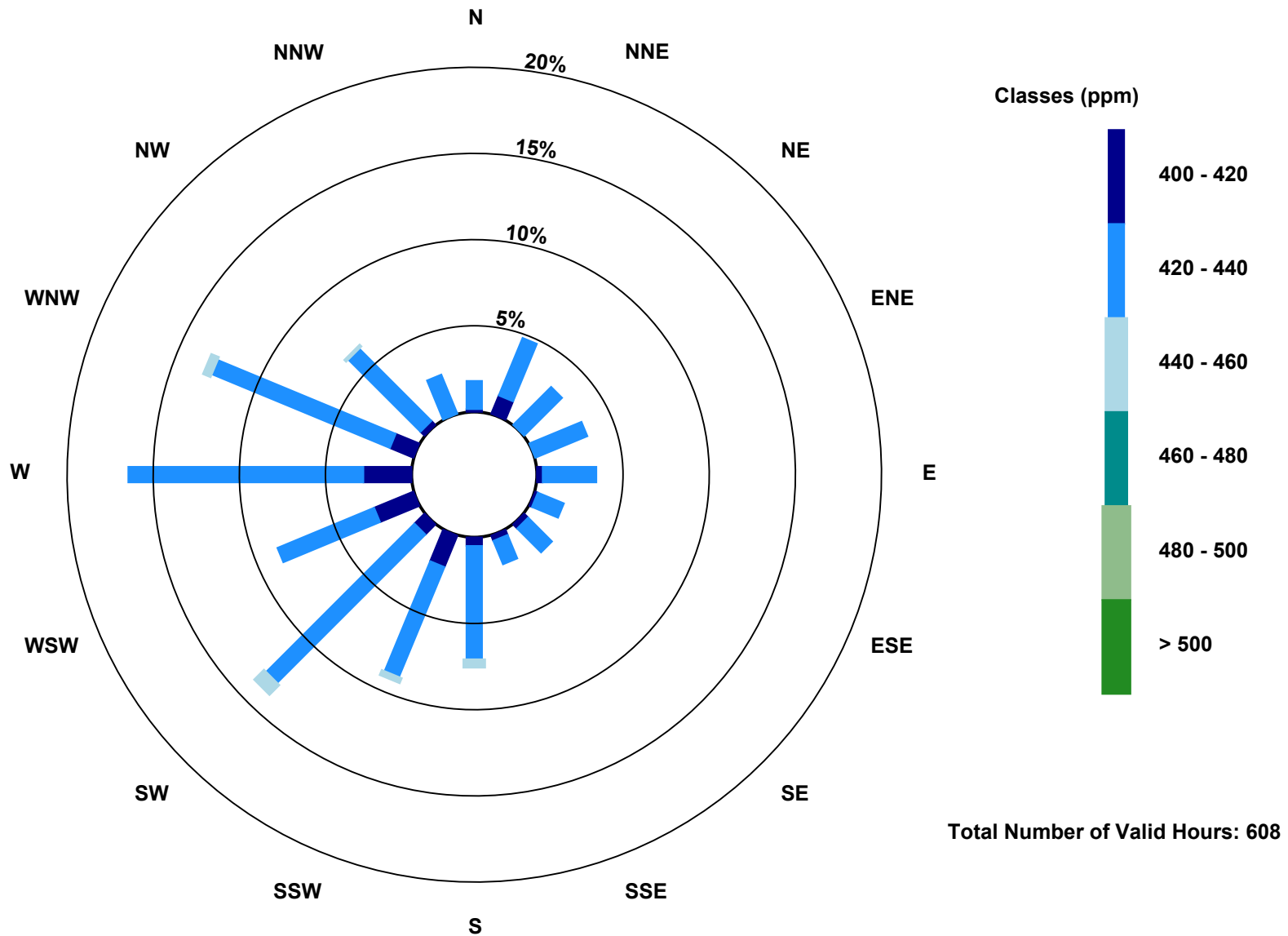
Total Number of Valid Hours: 608

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 2023

Carbon Dioxide (CO<sub>2</sub>) - ppm  
Stony Mountain



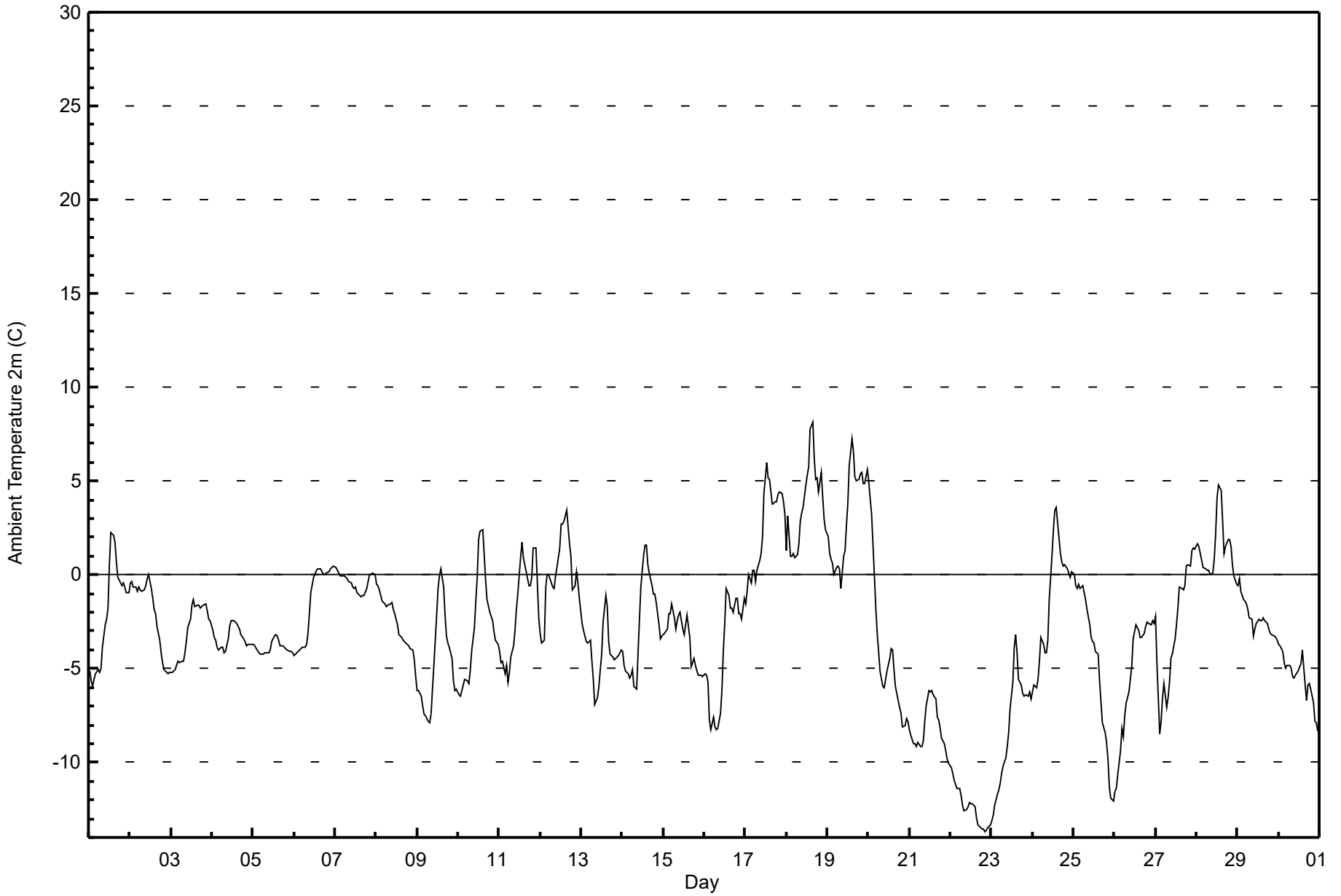


Maximum Value: 8.2 C on Nov 18 16:00																				Maximum Daily Average: 3.7 C on Nov 18					Hours in Service: 720	
Minimum Value: -13.7 C on Nov 22 21:00																				Minimum Daily Average: -12.4 C on Nov 22					Hours of Data: 720	
Maximum Diurnal Average: -0.7 C at hour 15																				Minimum Diurnal Average: -4.2 C at hour 8					Hours of Missing Data: 0	
Monthly Average: -2.89 C																				Percentiles: P <sub>1</sub> = -13.3 P <sub>10</sub> = -7.9 Q <sub>1</sub> = -5.2 Median = -2.9 Q <sub>3</sub> = -0.2 P <sub>90</sub> = 1.7 P <sub>99</sub> = 5.7					Hours of Calibration: 0	
																									Percent Operational Time: 100.0	
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	-5.2	-5.7	-6.0	-5.6	-5.2	-5.1	-5.2	-5.0	-3.9	-2.7	-2.4	-1.8	0.6	2.3	2.1	1.7	0.7	-0.1	-0.5	-0.6	-0.4	-0.7	-0.9	-1.0	-2.1	2.3
2-Nov	-0.5	-0.4	-0.7	-0.7	-0.8	-0.6	-0.8	-0.8	-0.8	-0.6	-0.2	0.0	-0.7	-1.3	-1.8	-2.0	-2.8	-3.5	-4.1	-4.7	-5.1	-5.2	-5.3	-5.2	-2.0	0.0
3-Nov	-5.2	-5.2	-5.0	-4.8	-4.6	-4.6	-4.6	-4.6	-4.2	-3.6	-2.8	-2.4	-1.6	-1.3	-1.7	-1.7	-1.7	-1.7	-1.7	-1.6	-1.5	-1.9	-2.4	-2.5	-3.0	-1.3
4-Nov	-3.0	-3.3	-3.5	-3.9	-4.0	-3.9	-3.9	-4.1	-4.1	-3.4	-2.7	-2.4	-2.4	-2.5	-2.6	-2.7	-2.9	-3.2	-3.4	-3.5	-3.8	-3.7	-3.7	-3.7	-3.3	-2.4
5-Nov	-3.7	-3.8	-3.9	-4.1	-4.2	-4.2	-4.2	-4.2	-4.1	-4.1	-4.0	-3.6	-3.3	-3.2	-3.3	-3.5	-3.7	-3.8	-3.9	-3.9	-4.0	-4.1	-4.1	-4.2	-3.9	-3.2
6-Nov	-4.3	-4.3	-4.1	-4.0	-4.0	-3.8	-3.9	-3.7	-3.1	-2.1	-1.0	-0.2	0.1	0.2	0.3	0.3	0.1	0.0	0.0	0.1	0.1	0.3	0.4	0.4	-1.5	0.4
7-Nov	0.4	0.3	0.1	0.0	-0.1	0.0	-0.1	-0.2	-0.4	-0.4	-0.7	-0.7	-0.7	-1.0	-1.1	-1.1	-1.1	-1.1	-0.7	-0.4	0.1	0.0	0.1	0.0	-0.4	0.4
8-Nov	-0.5	-0.6	-0.8	-1.4	-1.5	-1.6	-1.7	-1.6	-1.6	-1.5	-1.8	-2.1	-2.6	-3.2	-3.2	-3.3	-3.5	-3.6	-3.7	-3.8	-4.0	-4.0	-4.5	-5.5	-2.6	-0.5
9-Nov	-6.2	-6.2	-6.5	-7.0	-7.4	-7.5	-7.8	-7.9	-7.4	-6.1	-4.9	-2.2	-0.7	-0.1	0.3	-0.6	-2.1	-3.3	-3.6	-3.8	-4.5	-5.7	-6.2	-6.1	-4.7	0.3
10-Nov	-6.4	-6.5	-6.2	-5.8	-5.6	-5.7	-5.8	-5.2	-4.0	-2.8	-1.4	-0.1	1.9	2.4	2.4	1.0	-0.3	-1.3	-2.0	-2.2	-2.4	-3.1	-3.5	-3.7	-2.8	2.4
11-Nov	-4.0	-4.7	-4.6	-5.3	-4.8	-5.8	-5.2	-4.4	-3.8	-2.9	-1.9	-1.0	0.9	1.7	0.9	0.5	0.1	-0.6	-0.6	-0.2	1.4	1.5	-0.4	-2.3	-1.9	1.7
12-Nov	-3.1	-3.6	-3.5	-0.6	0.0	0.0	-0.4	-0.7	-0.7	-0.1	0.4	1.4	2.7	2.7	2.9	3.5	2.6	1.7	1.0	-0.8	-0.6	0.2	-0.4	-1.2	0.1	3.5
13-Nov	-2.6	-2.9	-3.3	-3.6	-3.7	-3.5	-4.6	-5.6	-6.9	-6.5	-5.9	-5.0	-4.2	-2.5	-1.1	-1.7	-3.5	-4.2	-4.4	-4.5	-4.5	-4.4	-4.3	-4.0	-4.1	-1.1
14-Nov	-4.1	-4.8	-5.1	-5.3	-5.5	-5.4	-5.1	-6.0	-6.1	-4.1	-2.4	-0.6	1.1	1.6	1.6	0.5	0.1	-0.6	-1.0	-1.0	-1.5	-2.7	-3.4	-3.2	-2.6	1.6
15-Nov	-3.2	-3.1	-2.9	-2.0	-2.1	-1.6	-2.3	-2.9	-2.4	-2.2	-2.0	-2.9	-3.2	-2.7	-2.2	-3.4	-4.9	-4.7	-4.4	-4.8	-5.3	-5.4	-5.3	-5.4	-3.4	-1.6
16-Nov	-5.3	-5.3	-5.7	-7.8	-8.2	-7.6	-8.1	-8.3	-8.2	-7.3	-6.1	-4.0	-2.6	-0.8	-1.1	-1.7	-1.8	-2.0	-1.2	-1.2	-2.0	-2.1	-2.4	-1.2	-4.3	-0.8
17-Nov	-1.5	-0.9	0.0	-0.4	0.3	0.2	-0.4	0.2	0.8	1.1	2.0	4.4	6.0	5.2	5.1	4.4	3.8	3.9	3.9	4.3	4.4	4.4	3.9	3.2	2.4	6.0
18-Nov	1.3	3.1	1.0	1.0	1.1	0.9	1.1	1.7	2.9	3.3	3.6	4.8	5.3	5.8	7.8	8.2	6.2	5.1	5.2	4.4	5.5	4.2	3.0	2.4	3.7	8.2
19-Nov	2.0	1.1	0.9	0.6	0.0	0.4	0.5	0.4	-0.7	1.0	1.3	2.6	3.8	5.8	7.3	6.6	5.2	5.0	5.1	5.4	5.5	4.9	4.9	5.6	3.1	7.3
20-Nov	4.9	4.0	3.2	-0.1	-1.8	-3.1	-4.1	-5.1	-5.9	-6.0	-5.6	-5.1	-4.5	-3.9	-4.0	-5.0	-5.9	-6.7	-7.1	-7.4	-8.1	-8.0	-7.7	-7.8	-4.2	4.9
21-Nov	-8.2	-8.5	-9.0	-9.0	-9.2	-8.9	-9.1	-9.2	-8.9	-7.8	-7.0	-6.1	-6.3	-6.2	-6.4	-6.6	-7.6	-7.7	-8.2	-8.7	-9.0	-9.4	-9.8	-10.0	-8.2	-6.1
22-Nov	-10.3	-10.6	-10.9	-11.1	-11.4	-11.4	-11.7	-12.3	-12.6	-12.5	-12.4	-12.1	-12.2	-12.2	-12.3	-12.9	-13.3	-13.4	-13.5	-13.6	-13.7	-13.7	-13.5	-13.4	-12.4	-10.3
23-Nov	-13.1	-12.8	-12.3	-11.7	-11.5	-11.1	-10.6	-10.2	-9.8	-9.2	-8.4	-7.2	-5.7	-3.9	-3.2	4.2	-5.6	-5.9	-6.3	-6.5	-6.4	-6.5	-6.3	-6.6	-8.1	-3.2
24-Nov	-6.3	-5.9	-6.0	-5.6	-4.6	-3.3	-3.7	-4.1	-4.2	-3.5	-1.3	1.1	2.4	3.4	3.6	2.0	1.1	0.7	0.5	0.5	0.3	0.1	-0.1	0.1	-1.4	3.6
25-Nov	0.0	-0.6	-0.7	-0.5	-0.7	-0.6	-1.0	-1.3	-1.8	-2.7	-3.4	-3.6	-3.7	-4.1	-4.2	-5.6	-6.8	-7.9	-8.4	-8.9	-9.8	-11.3	-11.9	-12.0	-4.7	0.0
26-Nov	-11.6	-11.4	-10.6	-9.4	-8.2	-8.6	-7.5	-6.8	-6.2	-5.6	-4.9	-3.4	-2.6	-2.8	-2.9	-3.3	-3.4	-3.1	-2.8	-2.5	-2.6	-2.7	-2.4	-2.6	-5.3	-2.4
27-Nov	-2.2	-4.7	-8.5	-7.8	-6.5	-5.8	-7.1	-6.6	-5.7	-4.5	-4.2	-3.4	-2.7	-1.7	-0.7	-0.7	-0.8	-0.6	0.4	0.5	0.5	1.3	1.4	1.4	-2.9	1.4
28-Nov	1.6	1.5	1.1	0.8	0.4	0.3	0.2	0.3	0.0	0.1	0.8	2.2	4.1	4.8	4.5	2.9	1.2	1.5	1.9	1.9	1.5	0.6	-0.1	-0.5	1.4	4.8
29-Nov	-0.5	-0.2	-0.9	-1.3	-1.4	-1.5	-1.9	-2.3	-2.4	-3.2	-2.9	-2.6	-2.3	-2.4	-2.5	-2.3	-2.4	-2.6	-2.9	-3.1	-3.2	-3.2	-3.3	-3.5	-2.3	-0.2
30-Nov	-3.7	-3.8	-4.1	-4.7	-5.0	-4.8	-4.8	-4.9	-5.4	-5.5	-5.3	-5.2	-4.9	-4.7	-4.0	-5.9	-6.7	-5.8	-5.8	-6.1	-6.8	-7.8	-7.9	-8.4	-5.5	-3.7
																								Diurnal Average		
																								Diurnal Maximum		



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

**Ambient Temperature 2m (AT 2m) - C**  
**Stony Mountain - November 2023**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Ambient Temperature 2m (AT 2m) - C  
Stony Mountain - November 2023**

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	0	0.00	0.00
-20 - 0	558	77.50	77.50
0 - 10	162	22.50	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720

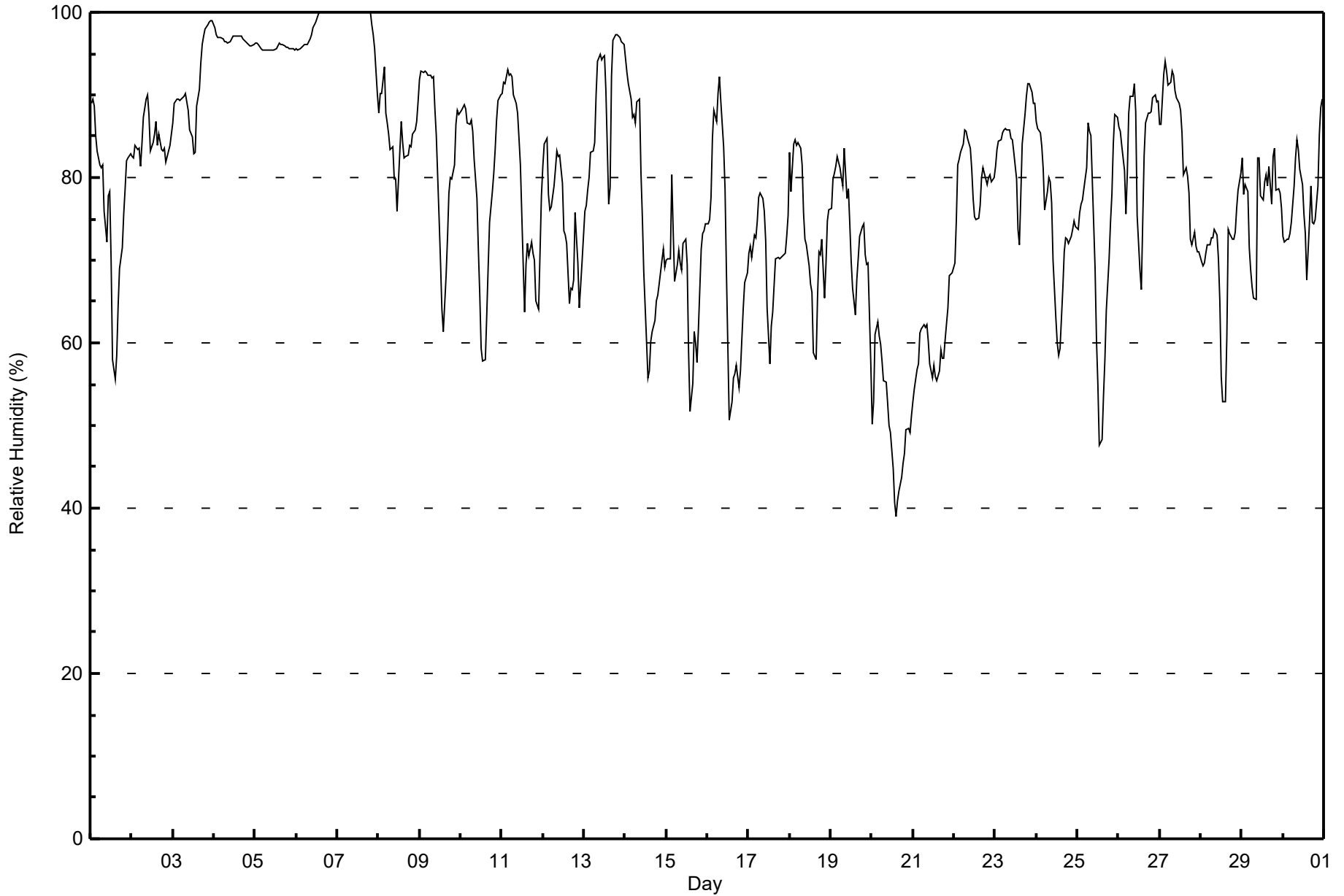


Maximum Value: 100.0 % on Nov 6 16:00		Maximum Daily Average: 97.6 % on Nov 6		Hours in Service: 720																						
Minimum Value: 39.0 % on Nov 20 15:00		Minimum Daily Average: 50.4 % on Nov 20		Hours of Data: 698																						
Maximum Diurnal Average: 83.4 % at hour 8		Minimum Diurnal Average: 68.9 % at hour 15		Hours of Missing Data: 22																						
Monthly Average: 78.60 %		Percentiles: P <sub>1</sub> = 46.5 P <sub>10</sub> = 60.1 Q <sub>1</sub> = 70.3 Median = 80.0 Q <sub>3</sub> = 88.2 P <sub>90</sub> = 95.7 P <sub>99</sub> = 100.0		Hours of Calibration: 0																						
				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-Nov	88.9	89.5	88.7	85.1	83.2	81.5	81.1	81.5	75.9	72.3	77.8	78.4	70.0	57.9	55.6	58.4	64.4	68.9	71.6	75.5	78.6	82.0	82.4	82.9	76.3	89.5
2-Nov	82.5	82.4	84.0	83.3	83.5	81.3	84.1	87.3	89.4	90.0	87.6	83.2	84.3	85.3	86.8	84.0	85.2	83.4	83.2	83.6	81.9	83.2	83.9	85.2	84.5	90.0
3-Nov	86.7	89.0	89.4	89.4	89.4	89.6	89.8	90.2	89.1	88.1	85.8	85.0	82.9	83.1	88.7	90.8	93.8	96.1	97.1	98.0	98.6	98.8	99.0	98.9	91.1	99.0
4-Nov	98.2	97.3	97.0	96.9	97.0	96.8	96.5	96.4	96.3	96.5	96.8	97.0	97.2	97.2	97.1	97.1	97.1	96.8	96.5	96.3	96.1	96.0	96.0	96.1	96.7	98.2
5-Nov	96.2	96.2	96.1	95.6	95.5	95.4	95.4	95.4	95.4	95.4	95.5	95.5	95.5	95.5	95.9	96.2	96.2	96.1	95.9	95.8	95.7	95.7	95.6	95.6	95.7	96.2
6-Nov	95.5	95.5	95.6	95.8	95.9	96.0	96.2	96.4	96.8	97.3	98.1	98.8	99.3	99.8	100.0	100.0	100.0	100.0	OR	OR	OR	OR	OR	OR	97.6	100.0
7-Nov	OR	OR	OR	OR	OR	OR	OR	OR	OR	OR	OR	OR	OR	OR	OR	OR	100.0	100.0	100.0	100.0	98.6	97.3	95.5	90.0	--	100.0
8-Nov	87.7	90.1	90.2	93.4	87.8	86.6	85.2	83.4	83.7	79.8	79.9	76.0	83.2	86.7	84.2	82.3	82.6	82.8	83.9	83.7	85.3	85.7	86.9	89.2	85.0	93.4
9-Nov	91.8	92.9	92.7	92.9	92.6	92.4	92.4	92.0	92.2	88.4	85.1	75.1	69.9	64.1	61.3	68.2	72.8	78.1	80.0	79.9	81.5	86.4	88.2	87.6	83.3	92.9
10-Nov	88.1	88.5	88.8	88.4	86.6	86.5	86.9	85.7	82.2	77.4	71.3	65.9	59.4	57.9	58.0	63.3	69.1	74.5	78.4	80.6	83.4	86.9	89.4	90.0	78.6	90.0
11-Nov	90.2	91.4	91.4	93.0	92.4	92.6	92.3	90.1	89.0	87.8	84.7	81.5	69.4	63.7	69.4	72.0	70.6	72.3	70.9	70.1	65.1	64.1	70.9	77.8	79.7	93.0
12-Nov	81.3	84.1	84.8	78.0	76.1	76.5	78.9	80.9	83.2	82.5	82.7	79.3	73.6	73.1	72.0	64.7	66.7	66.4	67.6	75.8	69.7	64.2	67.0	69.9	75.0	84.8
13-Nov	76.0	76.7	78.5	80.0	83.0	83.3	84.2	90.1	94.1	94.9	94.2	94.5	94.8	90.6	76.7	78.8	92.2	96.6	97.2	97.2	97.1	96.9	96.5	96.1	89.2	97.2
14-Nov	94.4	92.7	91.3	89.5	87.3	87.7	86.7	89.2	89.5	80.6	75.3	68.6	60.2	55.7	56.6	60.1	61.4	62.7	65.1	65.8	67.1	69.9	71.3	69.1	74.9	94.4
15-Nov	69.9	70.1	70.1	80.3	73.6	67.4	69.5	71.1	69.7	68.7	72.0	72.5	69.5	58.9	51.8	55.1	61.4	60.1	57.7	61.8	71.3	73.3	73.5	74.3	67.6	80.3
16-Nov	74.4	74.9	77.6	84.7	88.1	86.8	90.2	92.2	89.1	83.7	78.6	68.4	59.4	50.6	52.9	55.8	56.3	57.3	54.5	56.7	60.6	64.3	67.3	68.5	70.5	92.2
17-Nov	70.9	71.8	70.3	73.1	72.7	74.7	77.7	78.1	77.5	75.9	72.4	64.2	57.5	62.1	63.8	66.9	70.2	70.3	70.2	70.4	70.5	70.9	72.8	75.5	70.8	78.1
18-Nov	83.1	78.2	84.1	84.6	83.8	84.2	83.6	81.5	75.8	72.5	71.9	69.2	67.2	66.1	58.9	58.0	65.6	71.1	70.7	72.6	65.3	69.4	74.7	76.1	73.7	84.6
19-Nov	76.2	79.8	80.5	81.3	82.6	81.2	80.0	78.9	83.5	77.4	78.6	74.4	69.8	66.6	63.4	67.6	70.2	72.9	74.0	74.4	70.6	69.5	69.7	57.4	74.2	83.5
20-Nov	50.2	52.8	61.0	62.5	60.9	59.7	57.9	55.5	55.3	52.7	50.0	49.1	44.7	40.7	39.0	40.8	42.0	43.7	45.4	46.5	49.4	49.7	49.2	51.2	50.4	62.5
21-Nov	52.9	54.3	56.7	57.4	61.1	61.6	62.2	61.9	62.2	60.2	57.5	55.8	57.3	55.9	55.4	56.5	59.2	58.2	58.1	60.3	64.2	68.2	68.3	68.5	59.8	68.5
22-Nov	69.6	74.7	81.6	82.3	83.1	84.1	85.7	85.6	84.7	83.6	81.0	77.4	75.3	74.9	75.0	76.7	80.0	81.3	79.8	79.1	80.1	80.4	79.5	79.9	79.8	85.7
23-Nov	81.3	83.4	84.3	84.5	85.4	85.8	85.9	85.7	85.7	84.8	84.6	83.0	79.8	73.7	71.8	77.9	84.1	87.7	89.9	91.4	91.3	90.3	89.1	88.9	84.6	91.4
24-Nov	86.8	86.0	85.4	83.7	81.0	76.1	78.3	79.9	79.5	77.0	70.1	63.0	60.1	58.5	59.3	66.6	71.0	72.6	72.5	72.0	72.9	73.8	74.8	74.1	74.0	86.8
25-Nov	73.7	75.8	76.8	77.3	78.6	81.2	86.6	85.7	85.1	74.4	69.0	60.4	55.0	47.6	48.2	53.6	57.9	63.9	70.2	74.5	78.0	84.1	87.6	87.4	72.2	87.6
26-Nov	86.2	85.7	83.9	80.9	75.5	80.5	87.8	89.8	89.8	91.3	88.0	75.4	68.8	66.5	74.7	82.7	86.7	87.9	87.8	88.0	89.6	90.0	89.2	89.3	84.0	91.3
27-Nov	86.4	86.4	92.5	94.0	92.9	91.2	91.6	92.9	92.3	90.6	89.7	89.0	88.1	85.5	80.4	81.2	80.2	78.2	72.6	71.9	73.4	71.8	71.0	71.1	84.0	94.0
28-Nov	69.9	69.2	69.7	70.9	71.9	71.9	72.8	72.7	73.8	73.1	70.2	65.1	55.9	52.8	52.9	60.7	73.8	73.3	72.6	72.5	73.4	76.3	78.6	80.5	69.8	80.5
29-Nov	82.4	77.9	79.2	78.4	71.5	68.9	66.7	65.5	65.2	82.3	82.5	77.9	77.3	79.5	80.3	79.0	81.3	76.7	82.5	83.6	78.5	78.6	78.2	76.3	77.1	83.6
30-Nov	72.8	72.2	72.6	72.5	73.3	74.6	79.0	82.4	84.6	83.4	81.0	79.2	75.6	73.3	67.7	74.7	78.9	74.6	74.4	74.9	79.0	85.3	88.5	89.5	77.7	89.5
																								Diurnal Average		
																								Diurnal Maximum		
80.8 81.4 82.6 83.1 82.3 81.9 82.9 83.4 83.1 81.5 79.7 76.0 72.4 69.8 68.9 71.4 75.7 76.8 76.6 77.7 78.2 79.4 80.5 80.6 98.2 97.3 97.0 96.9 97.0 96.8 96.5 96.4 96.8 97.3 98.1 98.8 99.3 99.8 100.0 100.0 100.0 100.0 100.0 100.0 98.6 98.8 99.0 98.9																										
OR - Out of Range																										



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

**Relative Humidity (RH) - %**  
**Stony Mountain - November 2023**





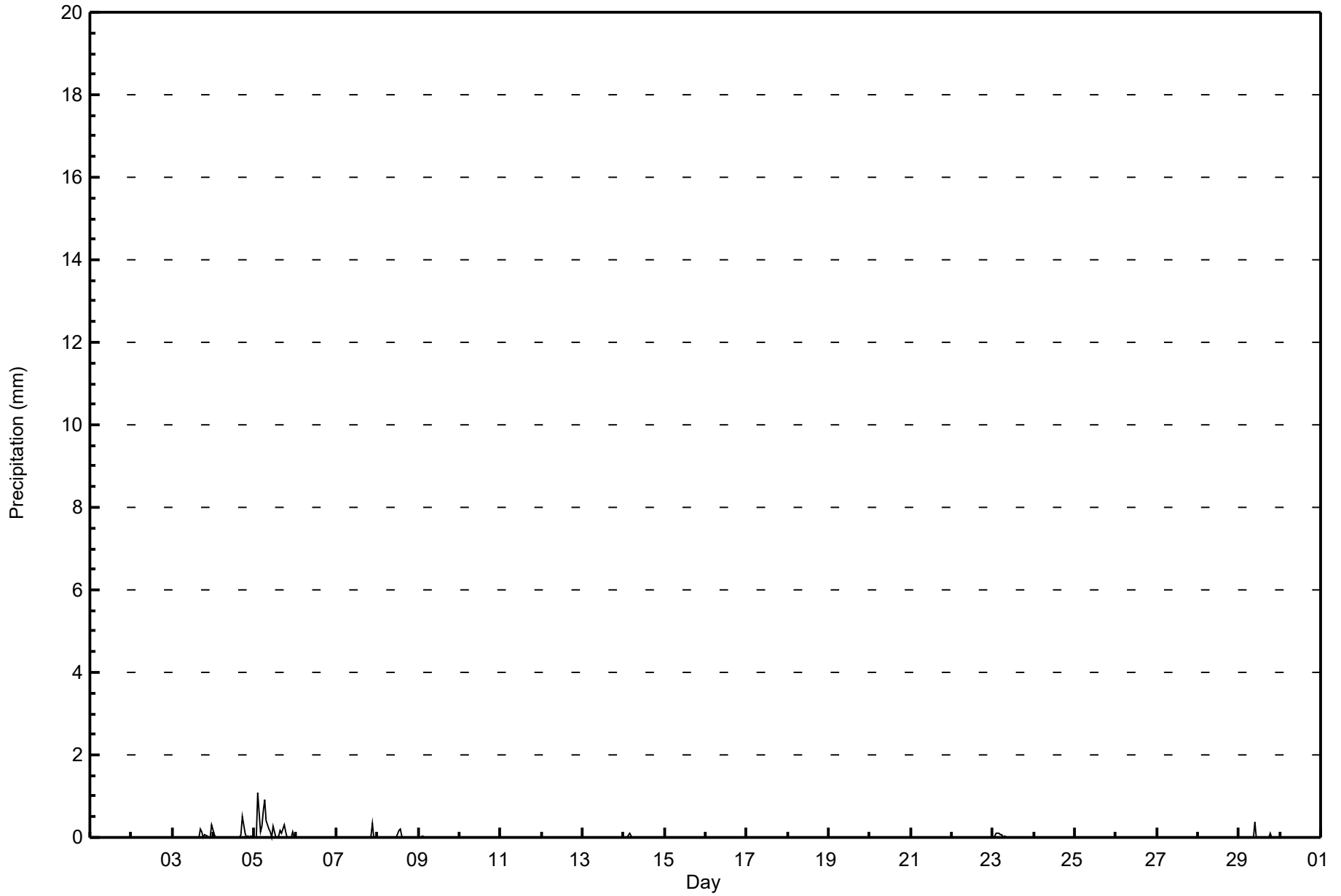
Maximum Value: 1.1 mm on Nov 5 03:00		Maximum Daily Total: 5.0 mm on Nov 5		Hours in Service: 720																															
Minimum Value: 0.0 mm on Nov 1 01:00		Minimum Daily Total: 0.0 mm on Nov 1		Hours of Data: 712																															
Maximum Diurnal Total: 1.2 mm at hour 3		Minimum Diurnal Total: 0.0 mm at hour 11		Hours of Missing Data: 8																															
Monthly Total: 8.49 mm		Percentiles: P <sub>1</sub> = 0.0 P <sub>10</sub> = 0.0 Q <sub>1</sub> = 0.0 Median = 0.0 Q <sub>3</sub> = 0.0 P <sub>90</sub> = 0.0 P <sub>99</sub> = 0.3		Hours of Calibration: 0																															
				Percent Operational Time: 98.9																															
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum									
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24											
1-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
2-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
3-Nov	DF	DF	DF	DF	DF	DF	DF	DF	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.1	0.0	0.1	0.1	0.0	0.0	0.3	--	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
4-Nov	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.5	0.1	0.0	0.1	0.0	0.1	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
5-Nov	0.0	0.0	1.1	0.1	0.3	0.7	0.9	0.4	0.2	0.1	0.0	0.3	0.0	0.0	0.1	0.2	0.1	0.3	0.1	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	
6-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
7-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
8-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
9-Nov	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
10-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14-Nov	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
21-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
22-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23-Nov	0.0	0.1	0.1	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
24-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
26-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
27-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
28-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
29-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		0.1	0.1	1.2	0.3	0.4	0.7	0.9	0.5	0.2	0.5	0.0	0.3	0.2	0.2	0.1	0.2	0.4	1.0	0.3	0.1	0.2	0.4	0.2	0.3	Diurnal Average									
		0.1	0.1	1.1	0.1	0.3	0.7	0.9	0.4	0.2	0.4	0.0	0.3	0.2	0.2	0.1	0.2	0.2	0.5	0.1	0.1	0.1	0.4	0.1	0.3	Diurnal Maximum									
DF - DAS Failure																																			





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

**Precipitation (PC) - mm**  
**Stony Mountain - November 2023**





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

**Precipitation (PC) - mm**  
**Stony Mountain - November 2023**

<b>Concentration Ranges (mm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 0.3	706	99.16	99.16
0.4 - 0.5	3	0.42	99.58
0.6 - 0.7	1	0.14	99.72
0.8 - 1.4	2	0.28	100.00
1.5 - 10	0	0.00	100.00
> 10	0	0.00	100.00

Total Number of Valid Hours: 712

Total Number of Hours: 720



**Wood Buffalo Environmental Association**

**Summary of Hour Averages**

**Leaf Wetness (LW) - %**

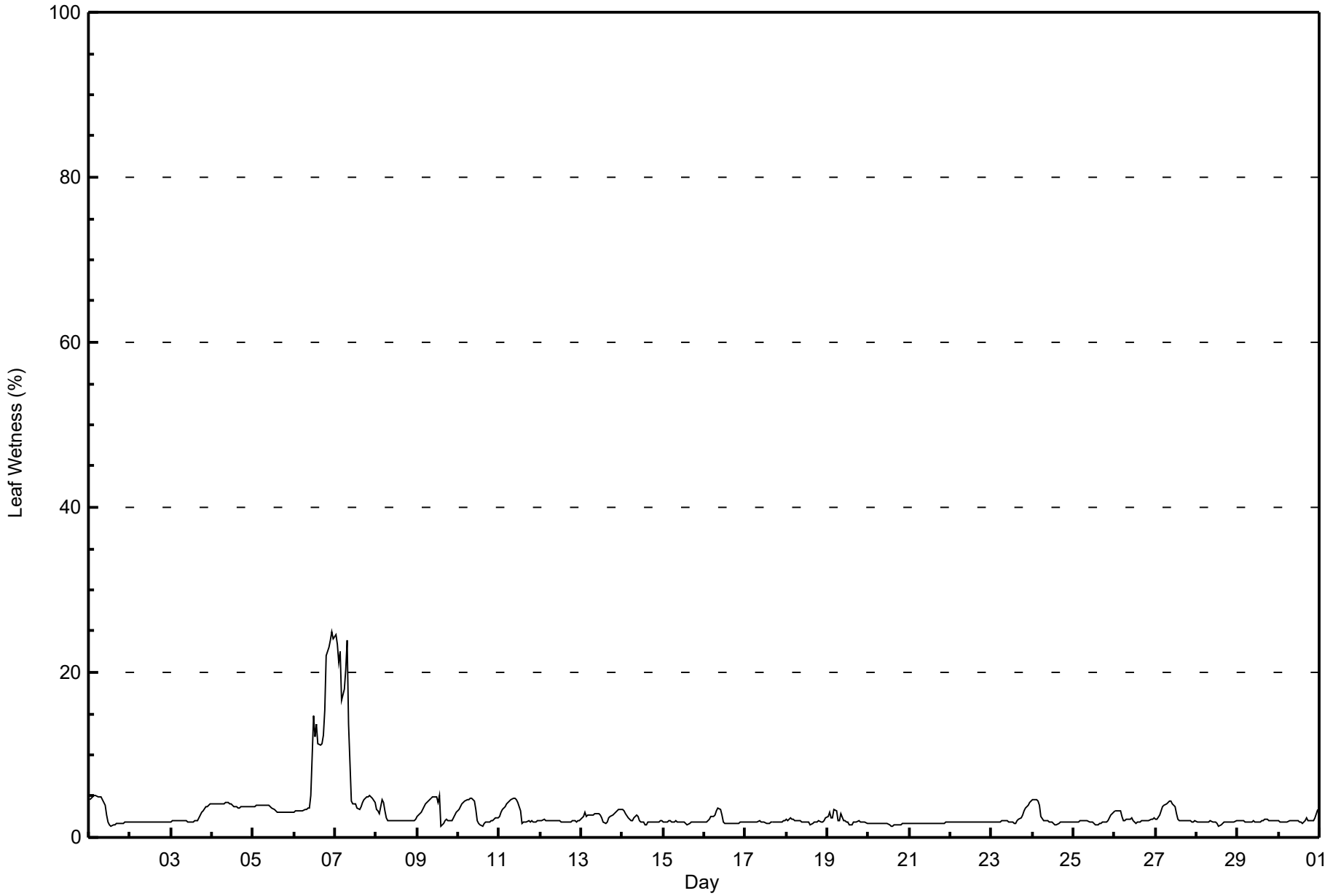
**Stony Mountain - November 2023**

Maximum Value: 25.0 % on Nov 6 23:00		Maximum Daily Average: 10.8 % on Nov 6		Hours in Service: 720																																												
Minimum Value: 1.4 % on Nov 9 15:00		Minimum Daily Average: 1.6 % on Nov 20		Hours of Data: 720																																												
Maximum Diurnal Average: 3.4 % at hour 8		Minimum Diurnal Average: 2.2 % at hour 15		Hours of Missing Data: 0																																												
Monthly Average: 2.91 %		Percentiles: P <sub>1</sub> = 1.5 P <sub>10</sub> = 1.7 Q <sub>1</sub> = 1.9 Median = 2.0 Q <sub>3</sub> = 3.1 P <sub>90</sub> = 4.2 P <sub>99</sub> = 22.4		Hours of Calibration: 0																																												
				Percent Operational Time: 100.0																																												
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Nov	4.5	4.8	4.9	5.0	5.0	5.0	4.9	4.9	4.6	4.0	2.8	1.9	1.5	1.4	1.5	1.6	1.6	1.7	1.7	1.7	1.8	1.8	1.8	1.8	3.0	5.0																						
2-Nov	1.8	1.8	1.9	1.9	1.9	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9																					
3-Nov	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	1.9	2.0	2.0	2.4	2.7	3.0	3.3	3.7	3.8	3.9	4.0	2.4	4.0																						
4-Nov	4.0	4.0	4.0	4.0	4.1	4.1	4.1	4.1	4.2	4.2	4.1	4.0	3.9	3.8	3.7	3.6	3.6	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.9	4.2																						
5-Nov	3.7	3.8	3.9	4.0	4.0	4.0	4.0	4.0	4.0	3.9	3.8	3.7	3.6	3.3	3.2	3.0	3.0	3.0	3.0	3.0	3.0	3.1	3.1	3.1	3.1	3.5	4.0																					
6-Nov	3.1	3.2	3.2	3.2	3.2	3.3	3.3	3.4	3.5	3.5	5.1	14.7	12.2	13.7	11.3	11.1	11.4	12.4	15.4	22.0	23.1	23.9	25.0	24.0	10.8	25.0																						
7-Nov	24.5	23.4	21.2	22.5	16.6	18.0	20.4	23.8	13.8	4.4	4.1	4.1	4.0	3.6	3.3	3.7	4.3	4.6	4.9	4.9	5.1	4.9	4.7	4.2	10.4	24.5																						
8-Nov	3.4	3.1	2.8	4.6	4.3	3.2	2.4	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	2.4	4.6																						
9-Nov	2.6	2.7	3.0	3.3	3.7	4.1	4.4	4.6	4.8	4.9	5.0	4.9	4.3	5.1	1.4	1.6	2.0	2.2	2.1	2.0	2.0	2.3	2.8	3.1	3.3	5.1																						
10-Nov	3.5	3.7	4.0	4.3	4.4	4.5	4.6	4.7	4.7	4.4	3.4	2.0	1.8	1.6	1.4	1.7	1.8	1.9	1.9	2.0	2.0	2.2	2.4	2.4	3.0	4.7																						
11-Nov	2.6	3.0	3.4	3.7	4.1	4.3	4.5	4.7	4.8	4.8	4.6	4.3	3.2	1.8	1.8	1.9	1.9	2.0	1.9	2.0	1.9	1.9	2.0	2.0	3.0	4.8																						
12-Nov	2.1	2.1	2.1	2.1	2.0	2.0	2.1	2.1	2.1	2.1	2.0	2.0	1.9	1.9	1.9	1.8	1.9	1.9	1.9	2.0	2.0	1.9	2.0	2.0	2.0	2.1																						
13-Nov	2.3	2.5	3.1	2.5	2.7	2.8	2.7	2.7	2.8	2.9	2.8	2.7	2.4	1.9	1.6	1.9	2.4	2.6	2.8	2.9	3.0	3.2	3.3	3.4	2.7	3.4																						
14-Nov	3.3	3.2	2.9	2.4	2.1	2.1	2.1	2.3	2.7	2.5	2.0	1.9	1.8	1.6	1.6	1.8	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.2	3.3																						
15-Nov	1.9	1.9	1.9	2.0	2.0	1.9	1.9	2.0	1.9	1.9	1.9	1.9	1.9	1.7	1.5	1.7	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.9	2.0																						
16-Nov	1.9	1.9	2.0	2.2	2.5	2.5	2.8	3.3	3.6	3.4	2.8	1.9	1.8	1.7	1.7	1.7	1.7	1.8	1.7	1.7	1.8	1.8	1.8	1.9	2.2	3.6																						
17-Nov	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	1.9	1.9	1.8	1.7	1.7	1.8	1.8	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	1.9	2.0																						
18-Nov	2.2	2.1	2.4	2.2	2.2	2.1	2.1	2.1	2.0	1.9	1.9	1.9	1.8	1.8	1.5	1.7	1.9	1.9	1.9	2.0	1.9	1.9	2.1	2.4	2.0	2.4																						
19-Nov	2.5	3.1	2.4	2.3	3.3	3.2	2.1	2.1	2.8	2.0	2.0	1.9	1.8	1.6	1.5	1.8	1.9	1.9	2.0	1.9	1.9	1.9	1.9	1.8	2.2	3.3																						
20-Nov	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.6	1.6	1.6	1.4	1.4	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.7																						
21-Nov	1.6	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.6	1.6	1.6	1.7	1.7	1.7	1.7	1.7	1.8	1.8	1.8	1.8	1.7	1.8																						
22-Nov	1.8	1.8	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	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9																						
23-Nov	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	1.7	1.7	2.0	2.1	2.3	2.7	3.1	3.6	3.9	4.2	4.4	2.4	4.4																						
24-Nov	4.5	4.6	4.5	4.4	3.9	2.5	2.0	2.0	2.0	2.0	1.9	1.8	1.7	1.4	1.5	1.7	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.4	4.6																						
25-Nov	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.8	1.7	1.5	1.5	1.7	1.8	1.8	1.8	1.9	2.0	2.3	2.8	3.1	2.0	3.1																						
26-Nov	3.3	3.3	3.2	3.1	2.6	2.0	2.0	2.2	2.1	2.2	2.3	2.1	1.8	1.8	1.8	1.9	2.0	2.0	2.1	2.1	2.1	2.1	2.2	2.3	2.3	3.3																						
27-Nov	2.2	2.2	2.7	3.2	3.7	3.9	4.1	4.3	4.4	4.4	4.1	3.7	2.9	2.2	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	2.0	2.8	4.4																						
28-Nov	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	1.9	1.9	1.9	1.7	1.4	1.5	1.7	1.8	1.8	1.8	1.8	1.8	1.9	1.9	2.0	1.8	2.0																						
29-Nov	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.8	1.8	2.0	1.9	1.9	1.9	1.9	2.0	2.0	2.3	2.2	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.3																						
30-Nov	2.0	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.7	2.1	2.3	2.0	2.0	2.0	2.1	2.4	2.9	3.4	2.1	3.4																						
																								3.3	3.3	3.3	3.4	3.2	3.2	3.2	3.4	3.1	2.7	2.6	2.8	2.5	2.4	2.2	2.3	2.4	2.5	2.6	2.9	3.0	3.1	3.2	3.2	Diurnal Average
																								24.5	23.4	21.2	22.5	16.6	18.0	20.4	23.8	13.8	4.9	5.1	14.7	12.2	13.7	11.3	11.1	11.4	12.4	15.4	22.0	23.1	23.9	25.0	24.0	Diurnal Maximum



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

**Leaf Wetness (LW) - %**  
**Stony Mountain - November 2023**





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

**Leaf Wetness (LW) - %**  
**Stony Mountain - November 2023**

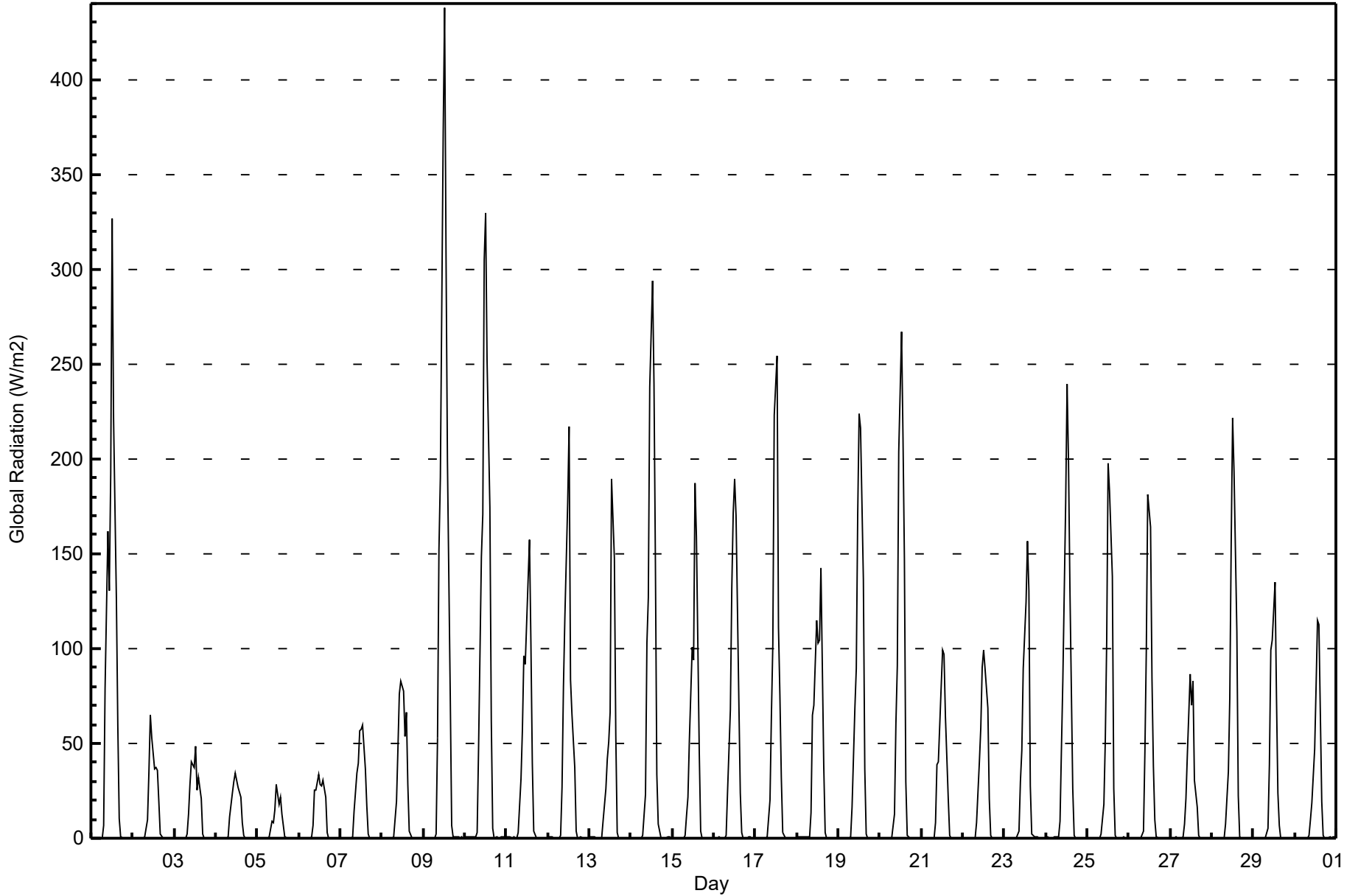
<b>Concentration Ranges (%)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 0.3	0	0.00	0.00
0.4 - 0.5	0	0.00	0.00
0.6 - 0.7	0	0.00	0.00
0.8 - 1.4	7	0.97	0.97
1.5 - 10	689	95.69	96.67
> 10	22	3.06	99.72

Total Number of Valid Hours: 720

Total Number of Hours: 720



Maximum Value: 438.1 W/m2 on Nov 9 13:00      Maximum Daily Average: 74.9 W/m2 on Nov 9																						Hours in Service: 720 Hours of Data: 720				
Minimum Value: 0.0 W/m2 on Nov 1 06:00      Minimum Daily Average: 5.0 W/m2 on Nov 5 Maximum Diurnal Average: 155.5 W/m2 at hour 13      Minimum Diurnal Average: 0.1 W/m2 at hour 6 Monthly Average: 28.81 W/m2      Percentiles: P <sub>1</sub> = 0.0 P <sub>10</sub> = 0.0 Q <sub>1</sub> = 0.0 Median = 0.3 Q <sub>3</sub> = 27.2 P <sub>90</sub> = 103.1 P <sub>99</sub> = 264.7																						Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0				
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	0.2	0.0	0.1	0.1	0.0	0.0	0.2	7.0	79.0	162.0	130.4	192.7	326.8	221.4	125.9	59.8	10.5	0.4	0.3	0.0	0.0	0.0	0.0	0.0	54.9	326.8
2-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	10.0	35.0	64.8	52.7	36.3	37.2	35.4	19.1	2.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12.2	64.8
3-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0	12.6	28.2	40.0	37.4	48.7	25.3	31.9	21.2	1.9	0.0	0.1	0.1	0.1	0.1	0.0	0.0	10.4	48.7
4-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	10.9	23.8	29.9	34.4	30.2	26.8	21.9	8.4	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.9	34.4
5-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	8.8	8.4	14.7	28.1	17.7	21.3	12.4	6.9	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.0	28.1
6-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	6.7	25.2	25.1	33.3	28.6	27.7	30.4	21.5	3.3	0.3	0.3	0.2	0.3	0.2	0.0	0.1	8.5	33.3
7-Nov	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.8	14.0	34.6	39.8	56.7	57.4	59.7	36.6	17.0	2.4	0.1	0.1	0.1	0.1	0.0	0.1	0.0	13.4	59.7
8-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	19.1	47.2	75.9	82.4	77.7	53.4	66.0	28.2	3.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	18.9	82.4
9-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0	52.9	152.3	189.8	371.8	438.1	308.0	198.8	74.4	6.8	0.7	0.5	0.4	0.4	0.4	0.5	0.3	74.9	438.1
10-Nov	0.5	0.4	0.5	0.4	0.5	0.4	0.4	2.7	47.0	148.8	170.4	304.8	329.9	252.1	174.8	62.0	5.4	0.4	0.4	0.2	0.3	0.4	0.4	0.5	62.6	329.9
11-Nov	0.4	0.4	0.6	0.4	0.5	0.2	0.3	3.0	31.1	57.7	96.3	91.9	135.9	157.5	103.2	39.5	3.5	0.3	0.2	0.2	0.2	0.1	0.3	0.3	30.2	157.5
12-Nov	0.4	0.4	0.4	0.2	0.0	0.0	0.0	1.5	27.1	79.9	116.0	176.7	217.3	83.4	65.7	37.4	4.0	0.3	0.4	0.4	0.3	0.0	0.0	0.0	33.8	217.3
13-Nov	0.5	0.7	0.7	0.4	0.2	0.0	0.0	0.4	9.0	26.2	41.8	50.5	66.1	189.4	147.6	54.5	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	24.6	189.4
14-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.2	23.2	103.1	126.6	238.0	293.9	239.2	145.5	33.7	7.7	0.3	0.3	0.3	0.3	0.5	0.5	0.3	50.6	293.9
15-Nov	0.3	0.0	0.0	0.2	0.3	0.2	0.3	1.2	11.7	21.9	51.8	101.0	94.2	187.1	158.9	45.7	3.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	28.3	187.1
16-Nov	0.0	0.0	0.0	0.6	0.4	0.2	0.4	1.3	24.7	68.2	132.3	171.6	189.6	169.9	71.6	23.8	2.6	0.0	0.0	0.2	0.5	0.4	0.3	0.1	35.8	189.6
17-Nov	0.2	0.1	0.1	0.0	0.0	0.0	0.2	0.9	20.1	65.1	102.2	222.8	254.6	111.4	75.1	32.0	3.3	0.3	0.2	0.3	0.2	0.3	0.3	0.3	37.1	254.6
18-Nov	0.5	0.5	0.5	0.6	0.5	0.5	0.4	0.9	13.1	64.5	70.0	115.1	102.6	104.2	142.7	38.3	2.7	0.0	0.0	0.1	0.1	0.0	0.0	0.1	27.4	142.7
19-Nov	0.4	0.2	0.3	0.1	0.2	0.4	0.2	0.5	16.4	68.4	89.3	170.8	223.8	216.6	136.5	36.3	2.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	40.1	223.8
20-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	13.0	60.2	91.1	203.2	267.1	211.5	147.8	29.9	1.7	0.0	0.1	0.0	0.0	0.0	0.0	0.0	42.7	267.1
21-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	8.5	38.7	40.5	79.6	99.1	96.9	64.2	21.0	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	18.7	99.1
22-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.0	39.9	58.2	90.2	99.1	89.5	68.8	20.7	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	19.8	99.1
23-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.0	29.6	45.9	89.6	124.7	156.7	130.4	27.4	2.2	0.5	0.4	0.4	0.4	0.3	0.4	0.4	25.6	156.7
24-Nov	0.4	0.4	0.3	0.3	0.2	0.5	0.4	0.5	9.2	47.0	83.4	176.5	239.2	198.3	132.0	25.8	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	38.2	239.2
25-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.6	17.8	51.2	104.7	197.3	182.9	137.8	25.8	1.6	0.0	0.0	0.0	0.0	0.0	0.5	0.3	30.1	197.3
26-Nov	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	3.9	45.4	99.1	181.1	163.8	84.1	37.9	9.7	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	26.1	181.1
27-Nov	0.1	0.3	0.3	0.5	0.4	0.3	0.2	0.4	7.6	20.7	44.1	86.2	70.1	83.1	30.2	16.0	1.4	0.2	0.0	0.0	0.0	0.0	0.0	0.0	15.1	86.2
28-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.8	34.7	73.9	156.0	221.5	193.0	109.0	22.4	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	34.1	221.5
29-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.5	38.5	99.2	104.4	134.8	74.5	23.5	6.5	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.3	134.8
30-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.6	10.0	18.7	47.2	79.7	114.5	113.0	19.4	1.2	0.0	0.0	0.3	0.5	0.3	0.4	0.4	17.0	114.5
																								Diurnal Average		
																								Diurnal Maximum		





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

**Global Radiation (GR) - W/m2**  
**Stony Mountain - November 2023**

<b>Concentration Ranges (W/m2)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	518	71.94	71.94
21 - 100	126	17.50	89.44
101 - 300	70	9.72	99.17
301 - 600	6	0.83	100.00
601 - 900	0	0.00	100.00
> 900	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720





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

**Wind Speed 20 m (WS20m) - km/h**  
**Stony Mountain - November 2023**

Maximum Speed: 34 km/h on Nov 20 05:00	Maximum Daily Speed Average: 20.4 km/h on Nov 20	Hours in Service: 720
Minimum Speed Value: 1 km/h on Nov 2 23:00	Minimum Daily Speed Average: 3.5 km/h on Nov 3	Hours of Data: 641
Maximum Diurnal Speed Average: 8.6 km/h at hour 21	Minimum Diurnal Speed Average: 5.2 km/h at hour 16	Hours of Missing Data: 79
Monthly Average Velocity: 7.2 km/h 254.2 deg	Percentiles: P <sub>1</sub> = 3 P <sub>10</sub> = 6 Q <sub>1</sub> = 9 Median = 13 Q <sub>3</sub> = 16 P <sub>90</sub> = 19 P <sub>99</sub> = 27	Percent Operational Time: 89.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Nov	W8	W8	W9	W10	W11	W11	W11	W12	WSW11	SW10	SW9	SSW8	S6	SSW7	SW7	SW8	SW9	SW10	SW12	SW12	SW12	SW10	SW10	SW10	WSW8.6	SW12	
2-Nov	WSW10	WNW10	W11	WNW11	WNW10	NW11	NW9	NW10	NNW10	NNW8	NNW8	N9	NE10	NNE10	NNE9	NNE8	NNE10	NNE10	NNE9	NNE8	NNE7	NNE4	SE1	ESE2	NNW6.0	WNW11	
3-Nov	SE6	ESE7	SSE6	SE4	SE2	SE6	SE7	SSE7	S4	SSW6	S6	S6	S2	ENE2	ESE6	ESE6	E4	E5	E6	ESE5	ENE4	N5	NNE5	UO	SE3.5	SE7	
4-Nov	N8	NNE6	NNE7	NE7	NE8	ENE6	ENE6	ENE6	NE6	ENE6	E8	E8	E9	E9	E9	E9	E9	E10	E10	E9	E8	E7	E7	E7	ENE6.8	E10	
5-Nov	ENE6	ENE6	ENE6	ENE7	ENE6	ENE6	ENE5	ENE5	NE5	NE4	NE5	NE3	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	---	ENE7	
6-Nov	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	S5	S7	S9	S10	S12	S11	S11	S12	SSW14	S14	S15	S14	---	S15	
7-Nov	SSW13	SSW13	SSW14	SSW12	SSW11	SSW11	SSW10	SSW10	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	---	SSW14	
8-Nov	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	---	---	
9-Nov	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	S7	SSW10	SSW10	S9	S9	UO	UO	SSW20	SSW17	S13	S16	S17	---	SSW20	
10-Nov	S18	S18	S18	S19	S19	S19	S19	S21	S21	S19	SSW19	SSW22	SSW21	SSW17	S15	SSW18	SSW17	SSW19	SSW19	SSW19	SSW19	SSW19	SSW17	SSW17	SSW16	SSW18.4	SSW22
11-Nov	SSW16	SSW16	SSW17	S15	S15	S15	S16	S14	SSE14	SE14	SE13	SE12	S14	S11	SSW9	SSW11	SSW11	SW14	SW17	WSW14	W17	W17	WSW11	SW12	SSW11.2	W17	
12-Nov	SW14	SW16	SW15	W16	W16	W16	W16	W16	W16	W16	WNW15	W14	W14	W15	W15	W10	W13	W12	W12	WSW11	SW11	WSW14	W14	W10	WNW8	W13.1	W16
13-Nov	WSW6	SW6	SSE4	SSE7	ESE7	E10	E11	ENE12	NNE12	NE14	NNE12	NE12	NE11	ENE12	ENE14	NE11	N9	NNE9	NNE7	N6	NW9	NW7	WNW8	WNW7	NE5.5	ENE14	
14-Nov	WNW13	WNW17	WNW15	WNW17	WNW18	WNW16	W16	W15	WSW15	WSW16	WSW15	WSW13	WSW13	W15	WSW14	WSW12	WSW13	WSW13	WSW15	WSW15	SW14	SW13	SW14	SW14	WSW13.5	WNW18	
15-Nov	SW15	SW16	SW17	SW13	WSW15	WSW17	WSW16	WSW17	WSW15	WSW15	WNW19	NW22	NW18	NW17	NW14	WNW11	WNW7	W10	WNW12	WNW13	WNW12	WNW10	W10	W10	W11.9	NW22	
16-Nov	W10	W9	NW3	SSW6	SSW7	SSW10	SSW12	SW14	SW15	SW16	SSW16	SSW15	SSW14	WSW15	SW12	SW12	SW14	SW13	WSW16	SW15	SW15	WSW16	WSW16	WSW16	SW12.0	SSW16	
17-Nov	WSW15	WSW18	W18	WSW15	W18	W17	WSW16	W18	W19	W19	W18	W14	W12	W9	WSW7	SW9	SW9	WSW14	WSW15	W14	W14	W13	W13	WSW10	WSW14.2	W19	
18-Nov	WSW12	W10	SW12	SW14	SW15	SW16	SW17	SW17	SW18	SW19	SSW19	SSW18	SSW16	SSW18	SSW17	SSW9	SE6	SE9	SSE10	SSE10	SSW10	S10	S9	S11	SSW12.1	SSW19	
19-Nov	S12	SSW10	S11	SSW9	SW7	SW10	SW11	W9	W8	WNW12	WNW11	WNW10	WNW11	NW10	WNW8	W9	W13	W14	W15	WSW17	W22	WNW23	WNW21	WNW25	W10.7	WNW25	
20-Nov	W24	W25	WNW30	WNW33	WNW34	WNW32	NW29	NW27	NW23	NW21	WNW19	WNW22	WNW20	WNW20	WNW21	WNW17	WNW15	W13	W16	W15	WNW12	WNW12	WNW12	NW7	WNW20.4	WNW34	
21-Nov	ENE4	SSE3	ESE7	E7	SE8	ESE10	ESE10	SE11	ESE8	ESE9	ESE11	ENE6	ENE8	NNE8	NNE7	NNE5	N7	N10	NNE10	NE9	NNE8	N10	N9	N10	ENE5.4	SE11	
22-Nov	N11	NNE11	NNE12	NNE10	NE11	NNE8	NNE9	NNE9	NNE8	NNE7	NNE8	NE9	NE9	ENE6	ENE6	NE4	NE3	ENE3	E5	ESE7	SE8	SSE6	SSE6	S8	NE5.4	NNE12	
23-Nov	S9	SSE10	S11	SSW11	S11	S13	S15	SSW17	SSW18	SSW15	SSW16	SW16	SW13	SW12	SW11	SW11	SSW13	SW18	SW18	SW19	SW19	SW19	SW19	SW17	SSW13.9	SW19	
24-Nov	SW18	SW19	SW21	SW22	SW22	SW21	SW23	SW23	SW21	SW19	WSW16	W16	W15	W13	WNW13	WNW10	W11	W12	W13	W15	W16	W20	W19	W20	WSW15.9	SW23	
25-Nov	W18	W17	W19	WNW21	WNW19	NW18	NNW19	NNW20	NNW22	NNW22	NNW22	NNW27	NNW24	NNW26	NNW19	NNW17	NNW13	NW12	NW14	NW14	NNW12	WNW7	WNW7	WNW8	NW15.9	NNW27	
26-Nov	WSW6	SW7	SW9	SW10	SW11	SW12	WSW6	W8	WNW9	WNW10	NW12	NW7	NNW6	NW10	WNW12	WNW13	WNW13	WNW10	W12	W15	W14	W16	W16	W16	W9.4	W16	
27-Nov	W16	WSW10	SW13	SW13	WSW15	SW14	SW14	SW16	SW16	SW15	SW16	SW16	SSW17	SW18	SW20	SW19	SW18	WSW20	W21	W22	W20	WNW20	WNW18	W19	WSW15.2	W22	
28-Nov	W19	W19	W18	W21	W21	W22	W21	W21	W22	W21	W20	W17	WNW15	WNW14	W12	WSW12	SW14	WSW14	WSW14	W14	W13	W13	WNW15	WNW16	W16.5	W22	
29-Nov	WNW14	W15	W16	WNW18	WNW19	WNW18	WNW20	WNW18	WNW18	WNW17	WNW16	WNW17	WNW17	NW19	NW18	NW17	NW15	NW15	NW14	NW14	NW15	NW15	NW13	NW13	WNW15.9	WNW20	
30-Nov	NW13	NW14	NW15	NW13	NW11	WNW8	NW10	WNW8	WNW11	WNW11	NW11	WNW12	NW13	WNW11	NW8	WNW5	WSW6	W7	WSW6	SW9	SW10	WSW9	WSW11	WSW8	WNW9.0	NW15	

WSW7.9	WSW7.9	WSW8.0	WSW7.9	WSW7.9	WSW7.5	WSW7.4	WSW7.0	WSW7.7	W7.2	W6.8	W6.3	W5.6	W6.2	W5.2	WSW5.2	WSW5.0	WSW6.0	WSW7.4	WSW8.1	WSW8.6	W8.2	WSW8.0	WSW8.5	Diurnal Average
W24	W25	WNW30	WNW33	WNW34	WNW32	NW29	NW27	NW23	NNW22	NNW22	NNW27	NNW24	NNW26	WNW21	SW19	SW18	WSW20	W21	W22	W22	WNW23	WNW21	WNW25	Diurnal Maximum

UO - Unstable Operation  
 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**  
**Stony Mountain - November 2023**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 12 km/h on Nov 20 04:00	Hours of Data: 641
Minimum Value: 1 km/h on Nov 3 14:00	Hours of Missing Data: 79
Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 2 Q <sub>1</sub> = 2 Median = 3 Q <sub>3</sub> = 5 P <sub>90</sub> = 6 P <sub>99</sub> = 9	Hours of Calibration: 0
	Percent Operational Time: 89.0

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

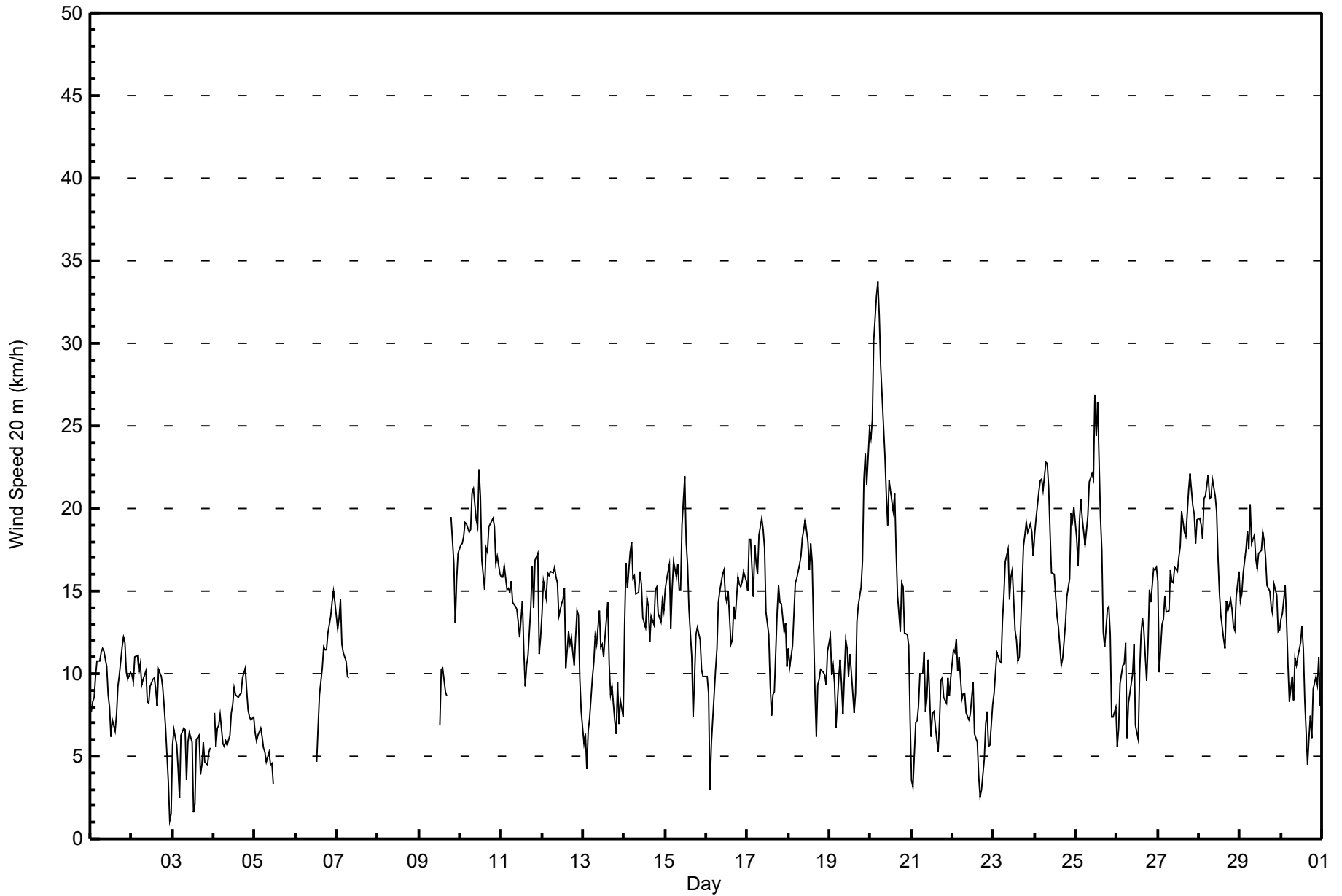
Diurnal Maximum

UO - Unstable Operation



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

**Wind Speed 20 m (WS20m) - km/h**  
**Stony Mountain - November 2023**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Wind Speed 20 m (WS20m) - km/h  
Stony Mountain - November 2023**

<b>Wind Speed Ranges (km/h)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	31	4.84	4.84
6 - 11	247	38.53	43.37
12 - 19	307	47.89	91.26
20 - 28	51	7.96	99.22
29 - 38	5	0.78	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 20 m (WS20m) - km/h  
Stony Mountain - November 2023**

<b>Wind Speed Ranges (km/h)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 5	1	3	7	5	3	2	3	2	2	1	0	0	0	1	1	0	31
6 - 11	10	25	10	13	18	11	8	8	19	22	22	17	22	25	13	4	247
12 - 19	0	3	2	3	0	0	3	2	25	35	60	39	67	41	23	4	307
20 - 28	0	0	0	0	0	0	0	0	2	3	8	1	15	11	4	7	51
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	0	4	1	0	5
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	11	31	19	21	21	13	14	12	48	61	90	57	104	82	42	15	641

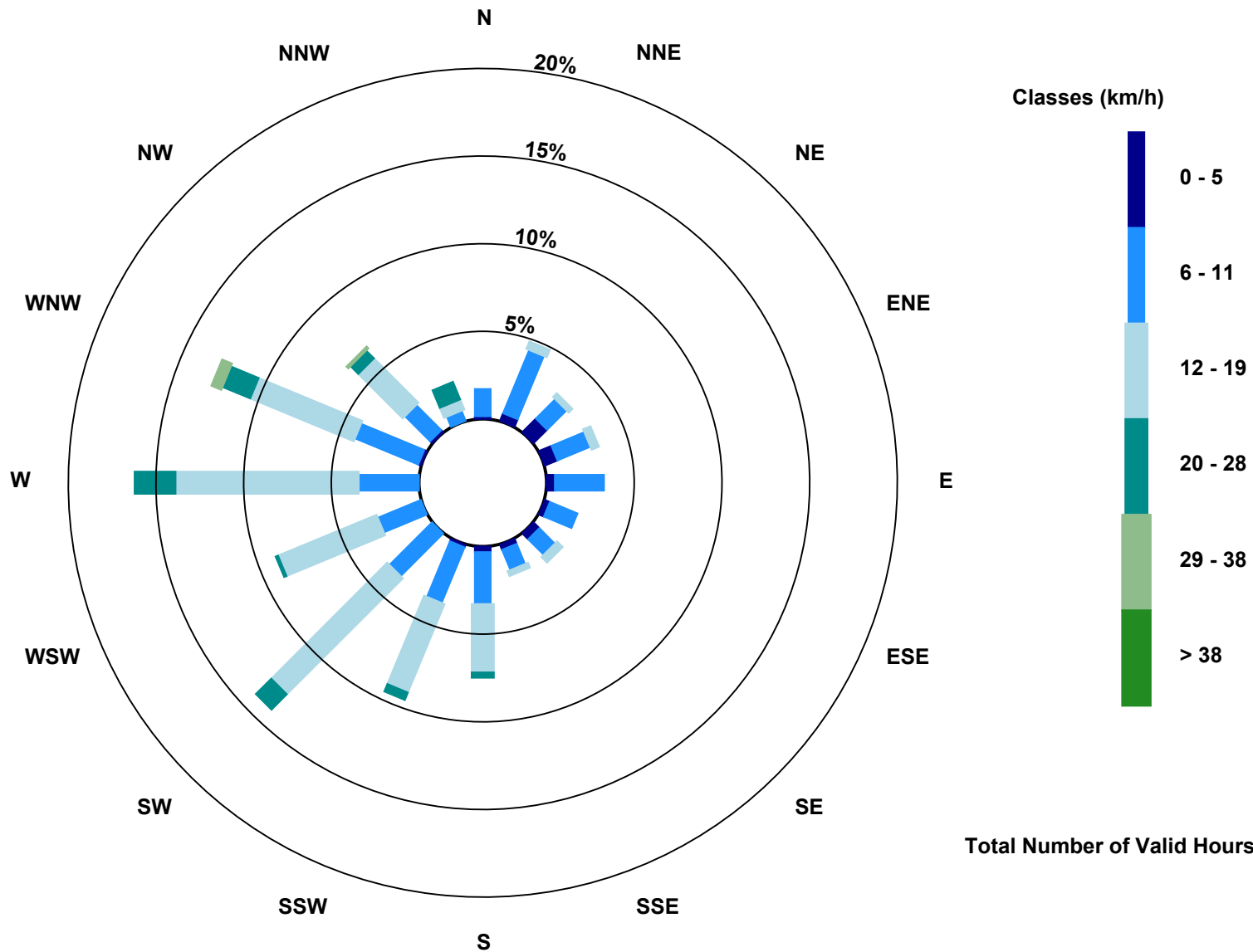
Total Number of Valid Hours: 641

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 2023

Wind Speed 20 m (WS20m) - km/h  
Stony Mountain



Total Number of Valid Hours: 641



Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Direction 20 m (WD20m) - deg

Stony Mountain - November 2023

Direction of Maximum Speed: 300 deg on Nov 20 05:00		Hours in Service:	720
Direction of Maximum Daily Speed Average: 293.5 deg on Nov 20		Hours of Data:	641
Direction of Minimum Speed: 131 deg on Nov 2 23:00		Hours of Missing Data:	79
Direction of Minimum Daily Speed Average: 3.5 deg on Nov 3		Percent Operational Time:	89.0
Monthly Average Direction: 254.2 deg			

Day	Hourly Period Ending At (MST)																								Daily Average	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	266	274	272	269	275	278	268	260	257	236	230	200	179	207	217	215	218	215	218	221	225	217	224	231	238.1	
2-Nov	257	286	278	294	293	305	305	314	330	344	341	349	34	25	29	27	25	13	22	31	16	31	131	109	341.1	
3-Nov	125	121	164	146	135	138	139	159	183	202	191	187	191	70	106	104	98	83	99	112	62	10	32	UO	128.2	
4-Nov	8	19	27	37	49	64	59	41	51	74	88	93	99	95	85	94	100	97	96	82	90	83	80	84	74.9	
5-Nov	75	66	64	67	69	58	47	60	45	44	44	43	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	--	
6-Nov	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	184	175	179	180	176	186	191	189	194	191	191	189	--
7-Nov	193	197	195	196	194	197	204	200	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	--	
8-Nov	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	--	
9-Nov	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	179	194	193	191	179	UO	UO	198	195	179	184	186	--
10-Nov	180	181	181	184	183	185	180	183	182	183	197	198	196	210	190	192	194	194	197	201	201	196	204	202	191.3	
11-Nov	198	197	195	181	185	170	175	169	157	143	136	140	177	189	195	193	209	219	225	251	269	269	245	232	196.5	
12-Nov	224	227	235	263	263	267	267	272	277	284	271	261	267	279	273	260	266	265	255	233	250	271	271	288	262.1	
13-Nov	243	214	158	157	109	91	80	58	33	44	31	42	52	64	74	55	11	15	19	359	324	317	302	287	41.4	
14-Nov	289	297	294	289	286	284	278	275	255	252	244	250	254	260	245	243	246	249	240	240	236	222	222	221	258.2	
15-Nov	219	217	223	225	243	253	248	244	252	256	302	323	318	307	304	299	285	276	284	288	287	291	272	275	270.5	
16-Nov	271	280	317	203	200	211	205	216	219	219	213	209	210	237	221	214	219	228	238	236	227	239	238	255	227.2	
17-Nov	242	255	260	258	263	259	247	261	266	269	269	271	266	262	254	233	234	248	248	264	269	268	263	254	258.6	
18-Nov	248	259	228	223	226	224	227	223	219	216	211	206	208	207	209	211	136	143	149	167	196	188	174	179	208.6	
19-Nov	184	195	185	197	219	221	226	262	277	293	298	283	283	310	285	264	276	260	268	257	271	289	287	284	264.4	
20-Nov	275	279	282	298	300	301	304	307	307	308	302	295	295	293	294	291	287	278	268	277	288	285	296	320	293.5	
21-Nov	59	162	102	85	126	109	114	127	117	107	110	78	57	33	25	15	7	9	18	35	12	7	10	1	61.4	
22-Nov	11	23	26	33	35	29	15	21	18	16	24	52	48	61	59	52	42	72	84	123	146	151	161	171	46.0	
23-Nov	184	163	180	197	183	185	188	193	196	205	209	216	225	228	223	218	213	223	219	221	220	218	220	221	208.3	
24-Nov	223	224	220	220	223	228	224	224	230	236	244	260	265	279	293	291	275	267	266	269	267	274	273	267	247.3	
25-Nov	261	266	273	284	296	323	332	332	332	332	335	333	335	339	335	335	330	323	317	319	317	295	296	292	317.5	
26-Nov	255	233	220	220	217	214	242	273	294	287	304	315	329	317	300	298	299	284	275	273	275	277	278	274	274.8	
27-Nov	271	237	217	227	238	236	219	218	219	221	214	214	212	219	226	222	229	246	262	273	281	283	287	276	241.1	
28-Nov	278	275	272	270	270	265	264	263	263	271	277	276	282	282	265	240	234	246	255	267	279	278	287	291	269.2	
29-Nov	299	276	279	286	287	290	288	299	300	299	300	302	301	304	308	308	312	311	313	312	315	320	323	319	301.3	
30-Nov	308	312	306	306	311	291	304	289	288	297	308	300	306	286	305	293	258	278	253	232	233	240	247	257	287.9	

248.2 246.6 243.3 248.7 251.6 249.4 248.4 250.9 258.6 261.2 264.4 267.3 264.3 270.8 262.4 251.5 249.6 252.4 251.7 249.0 255.7 259.2 255.1 252.9

Diurnal Average

UO - Unstable Operation

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



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

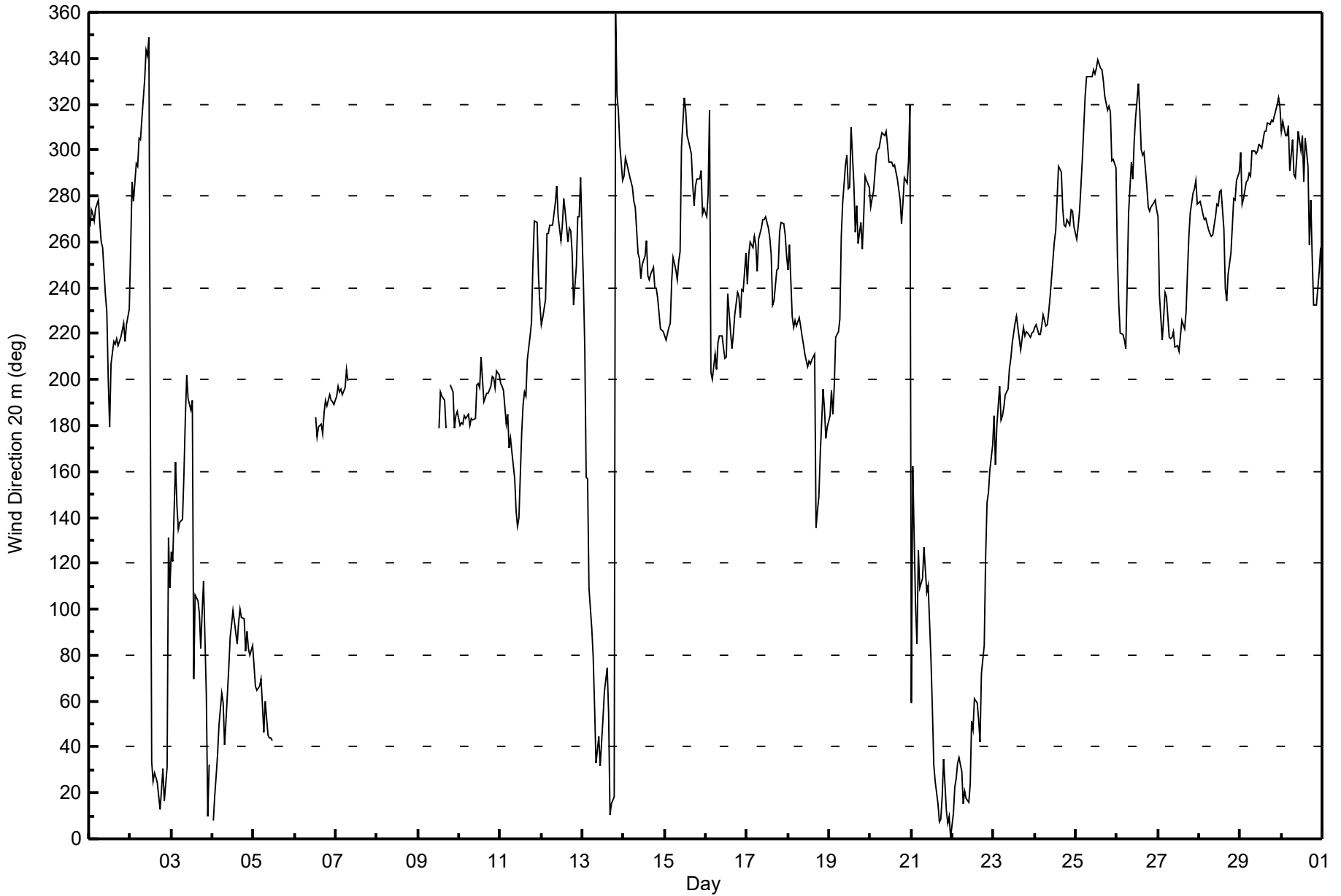
**Wind Direction 20 m (WD20m) - deg**  
**Stony Mountain - November 2023**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 92 deg on Nov 3 13:00	Hours of Data: 641
Minimum Value: 7 deg on Nov 18 19:00	Hours of Missing Data: 79
Percentiles: P <sub>1</sub> = 12 P <sub>10</sub> = 14 Q <sub>1</sub> = 17 Median = 19 Q <sub>3</sub> = 21 P <sub>90</sub> = 24 P <sub>99</sub> = 53	Hours of Calibration: 0
	Percent Operational Time: 89.0

Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Nov	15	14	14	15	17	16	18	19	19	23	25	19	28	35	28	20	16	15	17	18	18	18	19	21	35
2-Nov	24	20	19	17	17	17	17	16	18	19	23	21	23	20	24	23	20	22	21	20	23	48	68	75	75
3-Nov	23	22	12	28	53	28	14	17	33	18	17	20	92	33	14	16	26	17	14	16	21	19	20	UO	92
4-Nov	17	20	18	18	16	16	18	17	17	18	19	18	17	17	16	19	17	17	17	16	17	18	17	16	20
5-Nov	17	18	17	16	16	16	20	20	17	18	19	19	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	20
6-Nov	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	16	21	25	22	22	22	24	25	23	22	19	21	25
7-Nov	23	22	22	23	21	24	24	21	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	24
8-Nov	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	--
9-Nov	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	57	22	22	20	14	UO	UO	17	17	14	13	13	57
10-Nov	13	14	14	15	17	18	16	17	18	20	21	20	22	23	21	18	18	17	17	17	17	15	15	15	23
11-Nov	13	14	14	12	13	12	13	15	18	15	13	17	20	29	23	17	20	17	17	21	21	20	22	15	29
12-Nov	15	14	17	20	20	22	21	20	20	20	22	21	23	22	22	24	22	19	20	14	19	20	19	16	24
13-Nov	26	9	30	18	16	14	15	21	17	18	18	17	17	20	19	17	20	19	28	24	15	20	23	23	30
14-Nov	23	21	21	21	19	21	19	19	22	21	23	25	25	24	25	22	21	19	17	19	18	15	13	14	25
15-Nov	13	15	19	19	20	22	19	19	23	22	28	18	20	21	22	20	18	20	20	19	19	20	20	20	28
16-Nov	23	19	72	19	26	12	13	14	16	17	18	18	20	25	23	17	17	21	21	21	18	17	19	20	72
17-Nov	21	24	21	23	20	21	19	21	21	20	23	21	23	25	26	17	16	16	17	20	19	18	18	23	26
18-Nov	18	19	17	13	14	14	14	15	17	17	16	17	17	16	17	27	26	11	7	15	16	14	16	12	27
19-Nov	11	14	10	17	34	17	14	21	21	15	16	18	24	20	22	19	17	19	19	20	23	20	22	21	34
20-Nov	22	20	22	21	21	20	21	20	21	21	23	22	21	22	21	20	21	21	18	19	18	19	19	24	24
21-Nov	24	43	14	17	17	14	15	14	53	43	36	59	24	24	28	31	17	18	20	22	24	21	21	20	59
22-Nov	18	19	20	19	18	19	20	21	19	20	24	20	18	25	20	26	20	22	15	14	13	17	16	17	26
23-Nov	12	12	16	18	16	17	18	17	19	25	19	19	19	22	20	19	15	15	15	16	17	18	16	15	25
24-Nov	15	17	18	17	17	19	18	19	17	23	23	24	22	20	21	18	17	20	18	19	21	19	19	20	24
25-Nov	22	22	21	21	20	20	18	19	19	23	23	20	19	21	19	18	16	15	15	16	14	18	16	13	23
26-Nov	25	13	13	12	14	18	36	18	17	18	22	28	32	22	21	22	20	21	20	20	21	19	20	19	36
27-Nov	21	30	14	14	16	15	13	13	13	14	16	17	18	18	19	17	20	20	22	20	19	19	20	20	30
28-Nov	20	21	22	21	20	24	23	22	21	21	21	22	22	20	20	23	20	20	21	20	20	18	17	18	24
29-Nov	19	21	20	19	19	21	21	20	20	19	20	21	20	19	19	20	19	20	19	20	18	18	18	20	21
30-Nov	19	19	19	19	19	18	24	22	20	21	22	22	23	23	19	21	14	18	22	16	14	18	16	13	24
Diurnal Maximum																									
26 43 72 28 53 28 36 22 53 43 36 59 92 35 28 31 26 22 28 25 24 48 68 75																									

UO - Unstable Operation







## WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY  
MONITORING PROGRAM  
MONTHLY REPORT

### **AMS19 FIREBAG NOVEMBER 2023**

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

December 22, 2023

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FIREBAG (AMS19)  
 NOVEMBER 2023

MONTHLY SUMMARY

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2 (ppb) Average	687	33	33	100	56.1	0	8.3	0
H2S (ppb) Average	685	35	35	100	2.1	0	0.5	0
THC (ppm) Average	687	33	33	100	2.7	-	2.3	-
NO2 (ppb) Average	686	34	34	100	22.2	0	8.9	-
NO (ppb) Average	686	34	34	100	12.6	-	2.2	-
NOX (ppb) Average	686	34	34	100	29.6	-	10.5	-
Temperature 2 m (C) Average	720	0	0	100	5	-	2	-
Relative Humidity (%) Average	720	0	0	100	98.1	-	97.7	-
Wind Speed 10 m (km/h) Average	720	0	0	100	36	-	23	-
Wind Direction 10 m (deg) Average	720	0	0	100	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FIREBAG (AMS19)  
NOVEMBER 2023

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile							
					Min	P10	Q1	Median	Q3	P90	Max	
SO2 (ppb) Average	687	1.41	3.9	-	0	0	0	0.2	0.8	4.2	56.1	
H2S (ppb) Average	685	0.15	0.2	-	0	0	0.1	0.1	0.2	0.3	2.1	
THC (ppm) Average	687	2.26	0.1	-	2	2.2	2.2	2.2	2.3	2.3	2.7	
NO2 (ppb) Average	686	3.93	3.5	-	0.1	0.4	1.6	3.1	5.3	8.5	22.2	
NO (ppb) Average	686	0.69	1.1	-	0	0	0	0.4	0.8	1.7	12.6	
NOX (ppb) Average	686	4.61	4.1	-	0.1	0.4	1.9	3.7	5.9	9.6	29.6	
Temperature 2 m (C) Average	720	-5.36	4.6	-	-21.2	-12	-7.9	-5	-2.1	0.1	5	
Relative Humidity (%) Average	720	86.35	7.6	-	51.8	76.9	82.7	87.8	91.5	94	98.1	
Wind Speed 10 m (km/h) Average	720	13.2	6	-	0	6	9	13	17	21	36	
Wind Direction 10 m (deg) Average	720	-	-	-	-	-	-	-	-	-	-	

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FIREBAG (AMS19)  
NOVEMBER 2023

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
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No operational issues to report



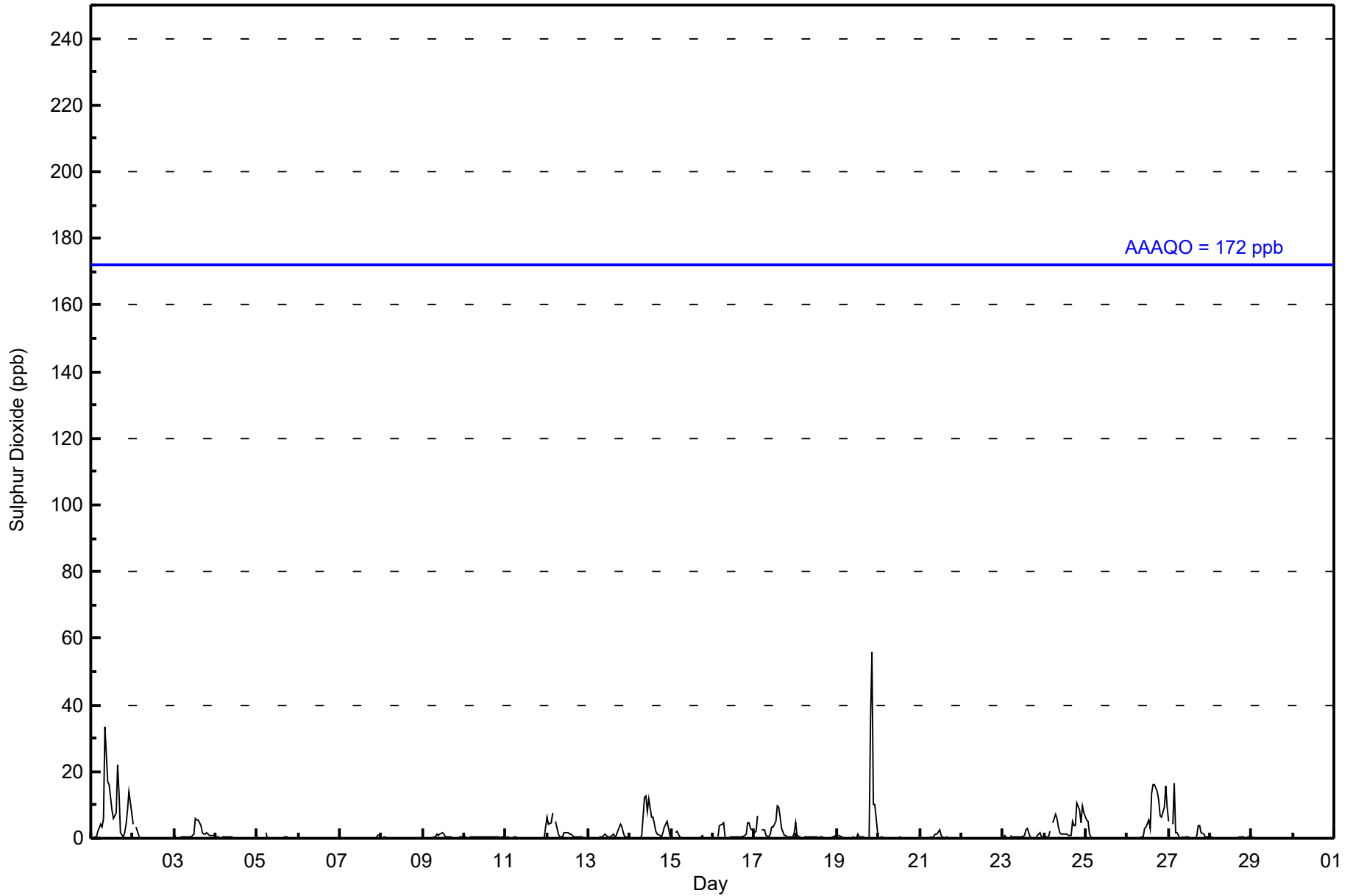
# Wood Buffalo Environmental Association

## Summary of Hour Averages

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

## Firebag - November 2023

Number of Exceedences (AAAQO):		1-hr: 0	24-hr: 0	Hours in Service: 720																	Hours of Data: 687												
Maximum Value: 56.1 ppb on Nov 19 21:00		Maximum Daily Average: 8.3 ppb on Nov 1		Hours of Missing Data: 33																	Hours of Calibration: 33												
Minimum Value: 0.0 ppb on Nov 2 07:00		Minimum Daily Average: 0.0 ppb on Nov 30		Hours of Operational Time: 100.0																													
Maximum Diurnal Average: 3.0 ppb at hour 21		Minimum Diurnal Average: 0.6 ppb at hour 5		Percentiles: P <sub>1</sub> = 0.0 P <sub>10</sub> = 0.0 Q <sub>1</sub> = 0.0 Median = 0.2 Q <sub>3</sub> = 0.8 P <sub>90</sub> = 4.2 P <sub>99</sub> = 16.0																													
Monthly Average: 1.41 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-Nov	Z	0.1	0.4	0.5	2.3	4.3	3.5	5.8	33.3	17.1	16.0	12.3	8.6	6.1	7.8	21.9	13.5	1.5	0.5	1.6	4.1	8.3	14.0	7.6	8.3	33.3							
2-Nov	4.2	Z	3.3	1.0	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	0.1	0.1	0.0	0.4	4.2							
3-Nov	0.0	0.8	Z	0.1	0.2	0.2	0.2	0.5	0.4	0.3	1.4	5.9	5.4	5.6	3.8	1.8	1.2	1.5	1.8	1.1	0.8	0.8	0.7	1.5	5.9								
4-Nov	0.6	0.6	0.4	Z	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.1	0.2	0.1	0.2	0.1	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.6							
5-Nov	0.0	0.1	0.0	0.1	Z	1.8	0.1	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.2	0.4	0.1	0.0	0.0	0.0	0.0	0.1	1.8								
6-Nov	0.0	0.0	0.1	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	0.0	0.0	0.1	0.1	0.1	0.1	0.2							
7-Nov	0.1	0.1	0.1	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	1.2	0.1	1.2							
8-Nov	Z	0.6	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	0.6							
9-Nov	0.0	Z	0.0	0.0	0.0	0.0	0.4	0.4	1.1	0.8	1.1	1.5	1.1	0.5	0.3	0.4	0.3	0.2	0.2	0.2	0.2	0.4	0.3	0.3	0.4	1.5							
10-Nov	0.3	0.3	Z	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.3	0.3	0.2	0.2	0.3	0.3	0.3	0.4							
11-Nov	0.2	0.3	0.5	Z	0.5	0.3	0.3	0.2	0.0	0.1	0.0	0.0	0.1	0.1	0.1	0.0	0.0	0.1	0.1	0.1	0.2	0.2	0.4	3.3	0.3	3.3							
12-Nov	6.3	4.4	4.8	7.8	Z	5.1	1.4	0.5	0.3	0.4	1.6	1.9	1.8	1.2	1.1	0.5	0.4	0.4	0.3	0.2	0.2	0.1	0.2	0.2	1.8	7.8							
13-Nov	0.2	0.2	0.1	0.2	0.2	Z	0.5	0.4	0.3	1.1	0.8	0.4	0.4	0.4	1.4	0.2	0.9	2.3	4.2	3.2	1.7	0.3	0.2	0.1	0.9	4.2							
14-Nov	Z	0.2	0.1	0.1	0.1	0.1	0.1	0.9	12.2	12.8	8.2	12.0	6.4	6.5	4.3	2.1	1.1	0.8	0.3	1.7	3.3	5.2	3.0	0.9	3.6	12.8							
15-Nov	0.2	Z	1.6	2.3	1.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.3	2.3							
16-Nov	0.1	0.1	Z	0.6	3.7	4.4	4.9	0.6	0.2	0.1	0.4	0.4	0.3	0.2	0.3	0.2	0.3	0.3	0.7	1.2	4.5	4.7	2.9	2.2	1.4	4.9							
17-Nov	1.8	2.0	6.8	Z	2.3	2.4	2.5	1.0	0.4	1.4	3.5	3.5	5.1	9.6	9.4	6.5	2.8	1.1	0.7	0.4	0.4	0.3	0.3	1.6	2.9	9.6							
18-Nov	4.7	0.9	0.4	0.2	Z	0.3	0.5	0.5	0.4	0.3	0.3	0.2	0.2	0.2	0.3	0.3	0.1	0.1	0.1	0.2	0.2	0.3	0.5	0.7	0.5	4.7							
19-Nov	0.8	0.6	0.6	0.4	0.2	Z	0.1	0.0	0.0	0.4	0.1	0.2	1.1	0.4	0.3	0.2	0.1	0.1	0.1	35.7	56.1	10.2	10.0	1.6	5.2	56.1							
20-Nov	Z	0.4	0.3	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.3	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.4							
21-Nov	0.0	Z	0.1	0.1	0.0	0.0	0.3	0.1	0.9	1.4	1.3	2.7	0.7	0.4	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.4	2.7							
22-Nov	0.1	0.2	Z	0.2	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.2							
23-Nov	0.2	0.8	0.5	Z	0.8	0.5	0.4	0.4	0.3	0.4	0.5	0.4	0.8	2.6	3.1	1.6	0.2	0.1	0.1	0.2	0.8	1.5	0.3	0.4	0.7	3.1							
24-Nov	0.3	0.4	0.5	2.0	Z	4.6	7.3	5.7	3.3	1.6	1.3	1.2	1.5	1.1	0.7	1.0	5.0	3.8	4.0	10.5	8.5	4.7	9.7	7.7	3.8	10.5							
25-Nov	5.5	5.0	1.4	0.3	0.1	Z	0.1	0.1	0.1	0.1	0.0	0.1	0.1	0.1	0.0	0.0	0.1	0.1	0.1	0.0	0.1	0.1	0.1	0.1	0.6	5.5							
26-Nov	Z	0.1	0.1	0.1	0.2	0.0	0.1	0.1	0.3	0.3	2.9	3.6	5.3	3.0	13.5	16.2	16.0	14.2	11.3	6.7	6.2	9.3	15.5	9.3	5.8	16.2							
27-Nov	5.1	Z	4.4	16.3	1.8	1.5	0.2	0.0	0.2	0.2	0.3	0.2	0.1	0.1	0.0	0.0	0.9	4.0	4.0	1.8	1.1	0.4	0.4	0.6	1.9	16.3							
28-Nov	0.5	0.2	Z	0.1	0.1	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.0	0.0	0.3	0.3	0.3	0.1	0.1	0.5	0.5	0.2	0.5							
29-Nov	0.5	0.2	0.3	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.2	C	C	C	C	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.5							
30-Nov	0.0	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.2							
		1.3	0.7	1.1	1.3	0.6	1.0	0.8	0.6	1.8	1.3	1.3	1.5	1.4	1.3	1.7	1.9	1.5	1.1	1.0	2.2	3.0	1.6	2.0	1.3	Diurnal Average							
		6.3	5.0	6.8	16.3	3.7	5.1	7.3	5.8	33.3	17.1	16.0	12.3	8.6	9.6	13.5	21.9	16.0	14.2	11.3	35.7	56.1	10.2	15.5	9.3	Diurnal Maximum							
Z - zerospan		C - Calibration																															
Alberta Ambient Air Quality Objectives (AAAQO):		1-hr 172 ppb				24-hr 48 ppb																											





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

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Firebag - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 10	667	97.09	97.09
11 - 20	16	2.33	99.42
21 - 60	4	0.58	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 687

Total Number of Hours: 720





**Wood Buffalo Environmental Association  
Frequency Distribution**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Firebag - November 2023**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	34	21	8	10	27	39	32	46	91	62	80	62	36	32	29	58	667
11 - 20	0	0	0	0	0	0	0	0	0	2	9	5	0	0	0	0	16
21 - 60	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	4
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	34	21	8	10	27	39	32	46	91	64	93	67	36	32	29	58	687

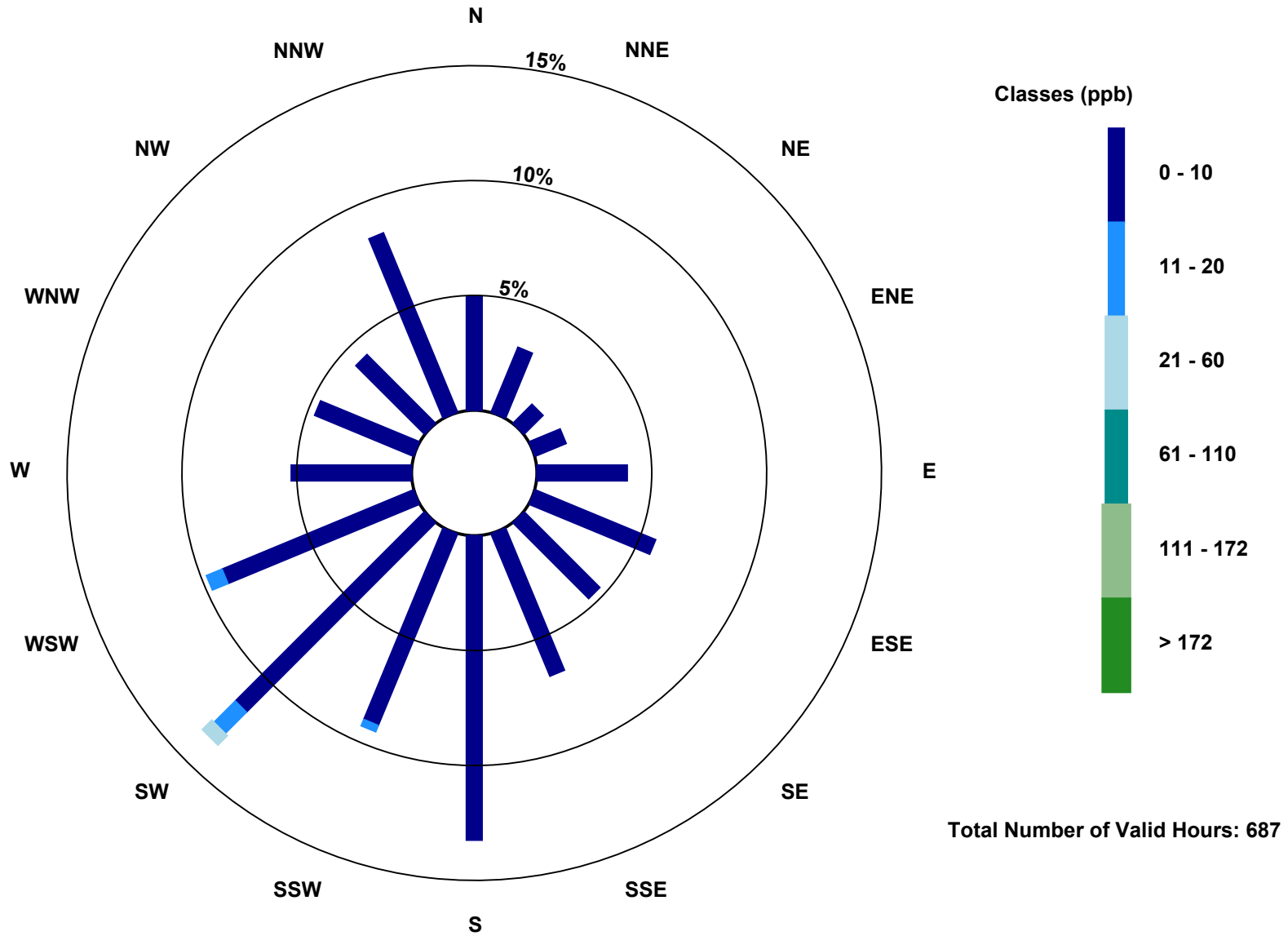
Total Number of Valid Hours: 687

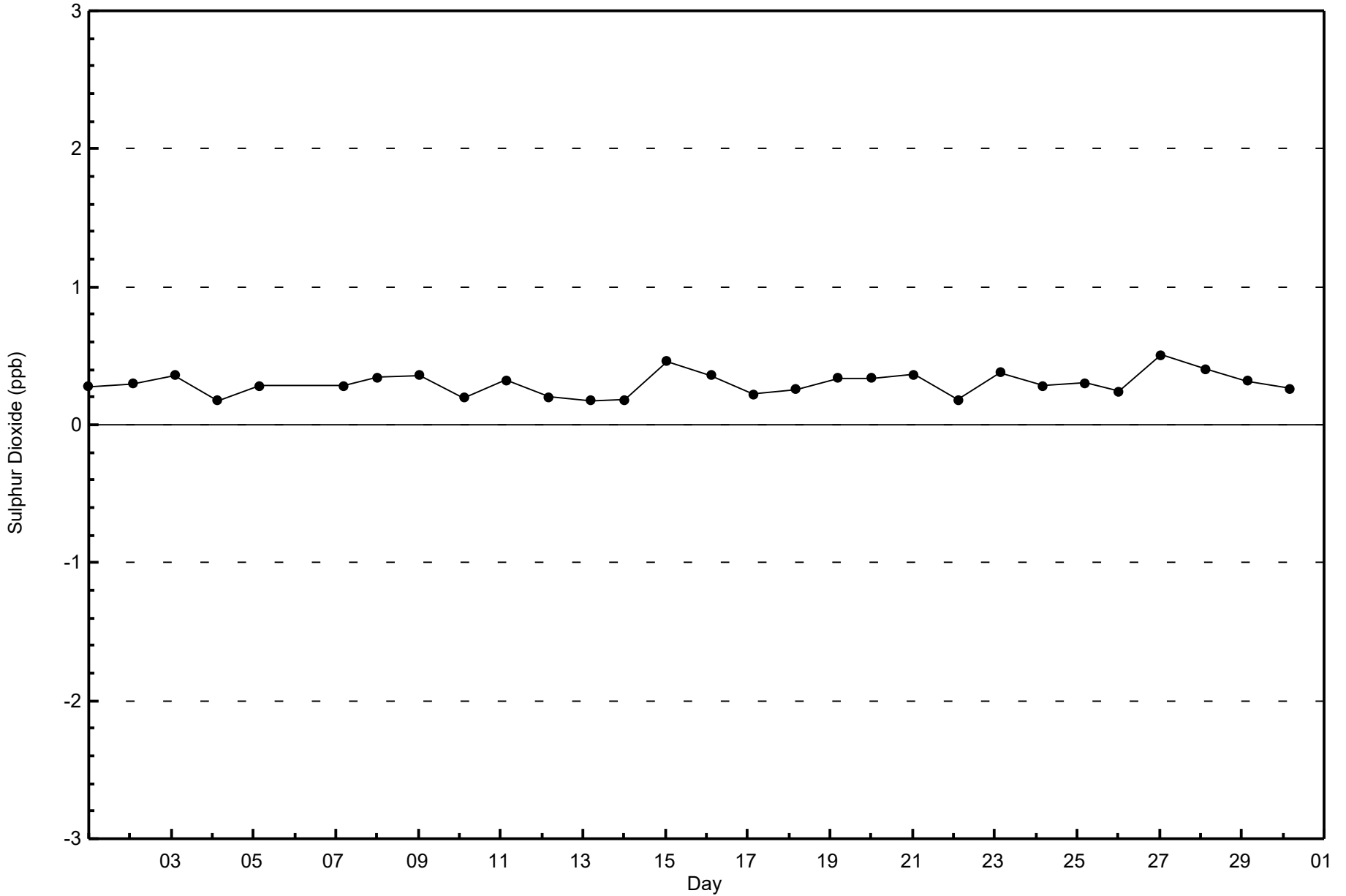
Total Number of Hours: 720

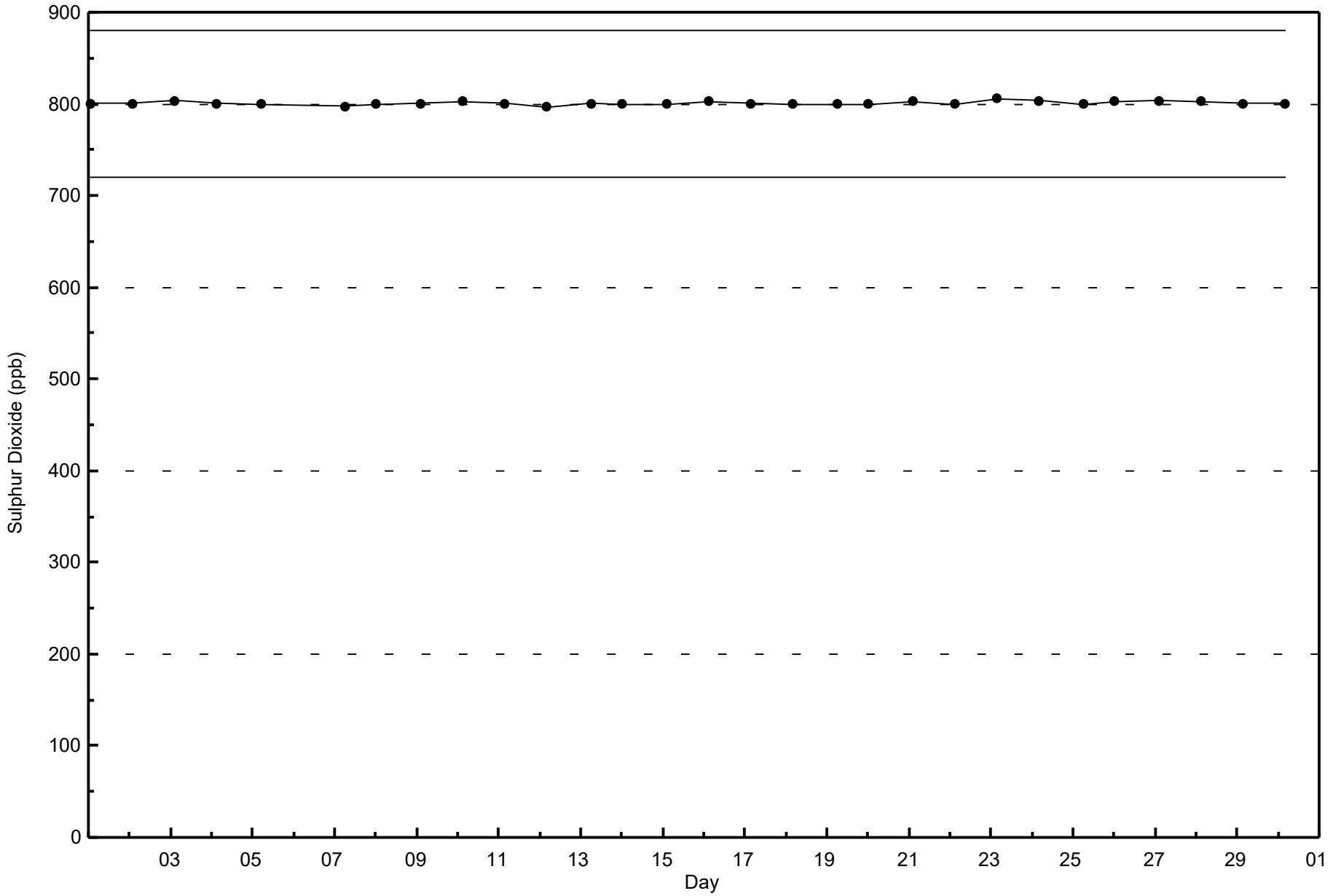


Wood Buffalo Environmental Association  
Wind Rose Nov 2023

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





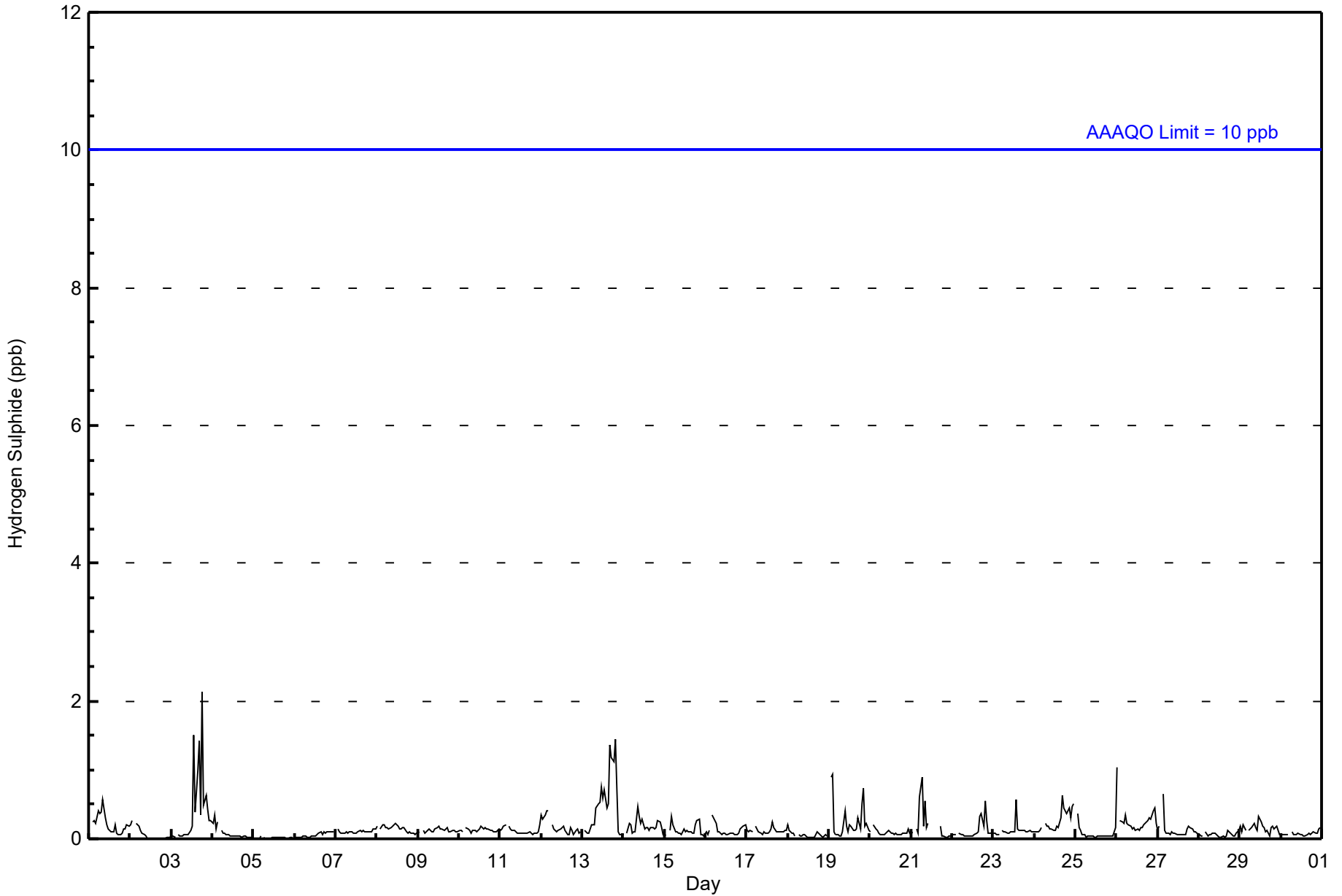






**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Hydrogen Sulphide (H<sub>2</sub>S) - ppb**  
**Firebag - November 2023**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Hydrogen Sulphide (H<sub>2</sub>S) - ppb  
Firebag - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2	685	100.00	100.00
3 - 4	0	0.00	100.00
5 - 7	0	0.00	100.00
8 - 11	0	0.00	100.00
> 11	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Hydrogen Sulphide (H<sub>2</sub>S) - ppb  
Firebag - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 2	35	20	7	8	26	39	31	44	92	65	93	68	35	35	29	58	685
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	<b>35</b>	<b>20</b>	<b>7</b>	<b>8</b>	<b>26</b>	<b>39</b>	<b>31</b>	<b>44</b>	<b>92</b>	<b>65</b>	<b>93</b>	<b>68</b>	<b>35</b>	<b>35</b>	<b>29</b>	<b>58</b>	<b>685</b>

Total Number of Valid Hours: 685

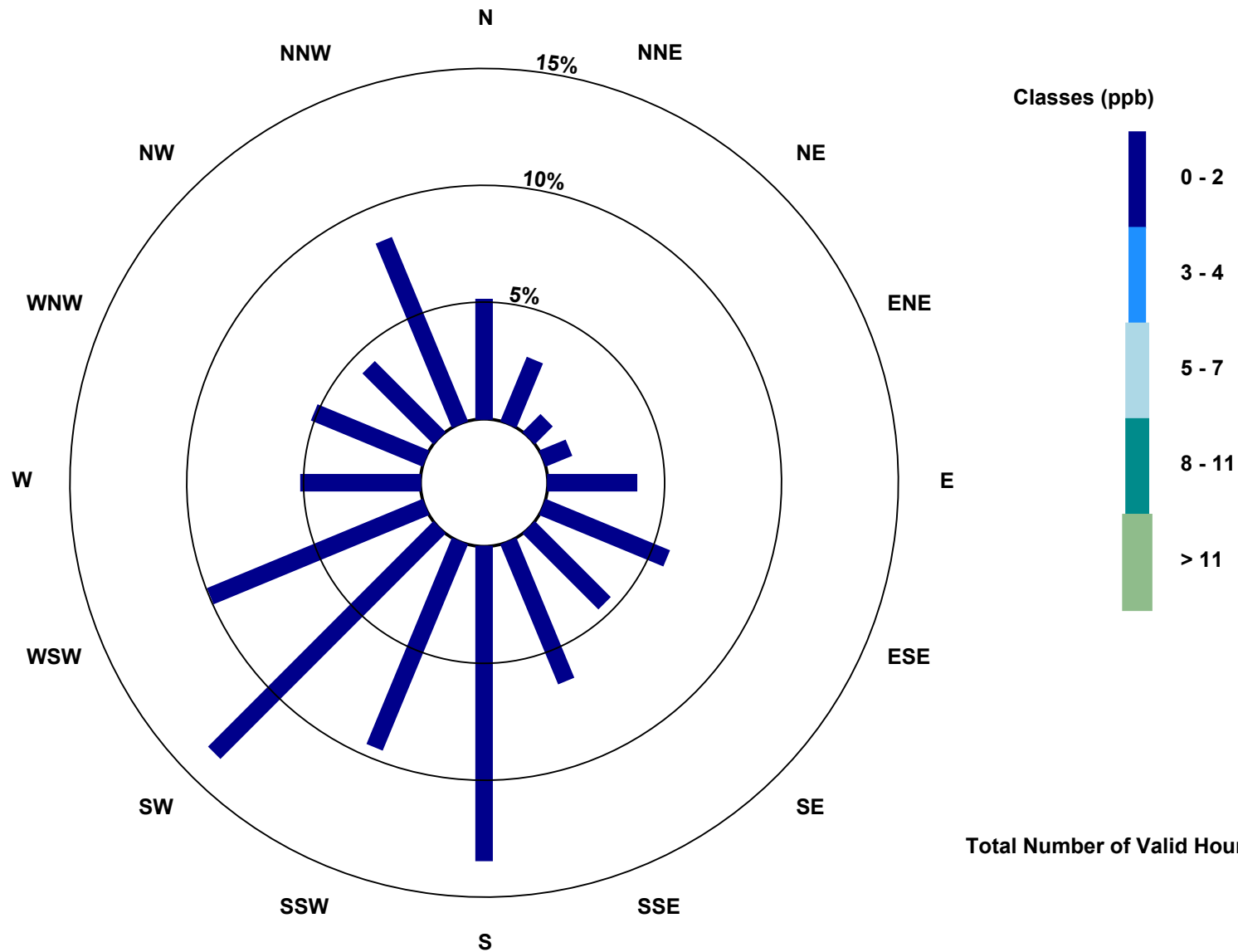
Total Number of Hours: 720



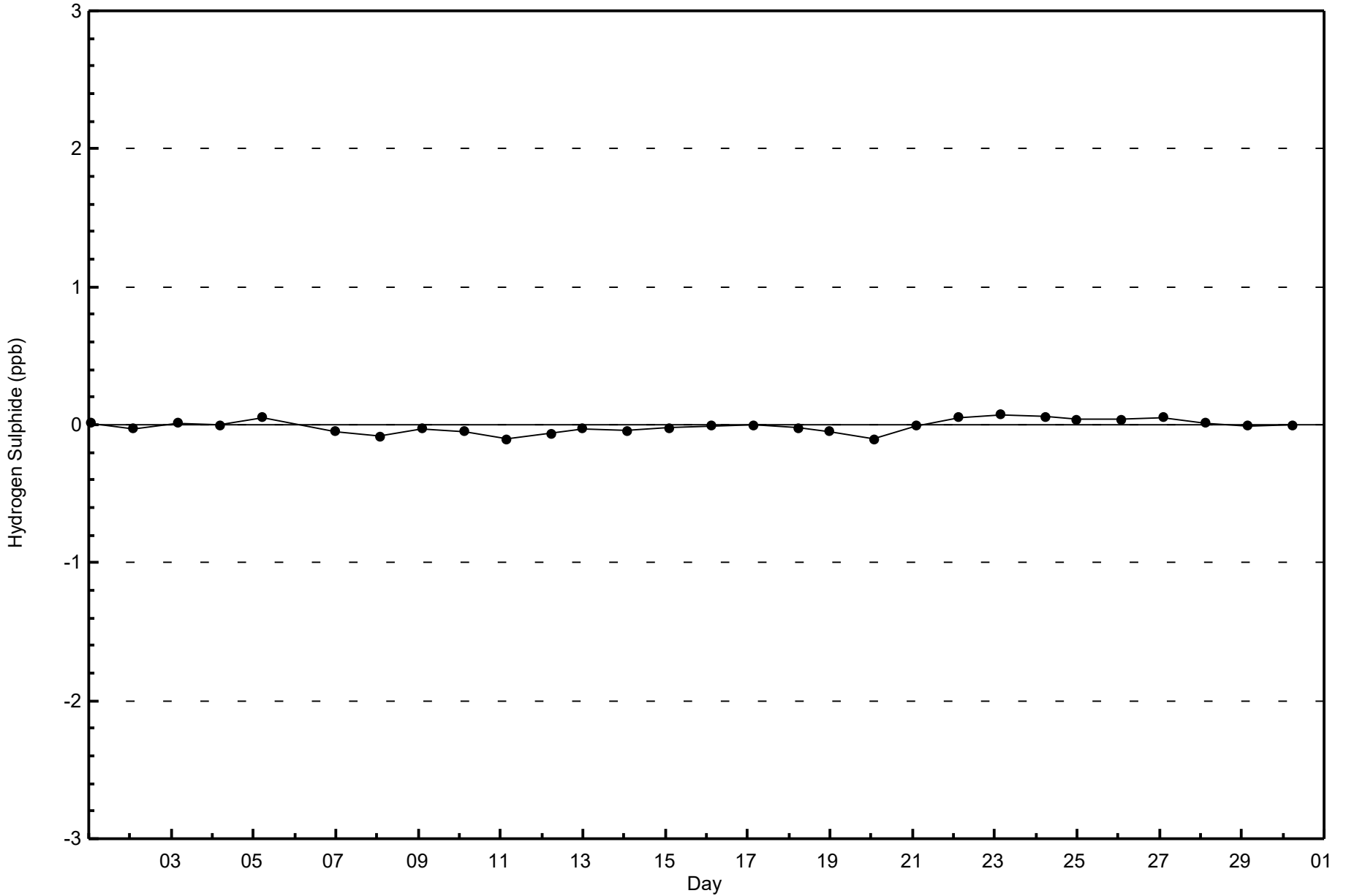


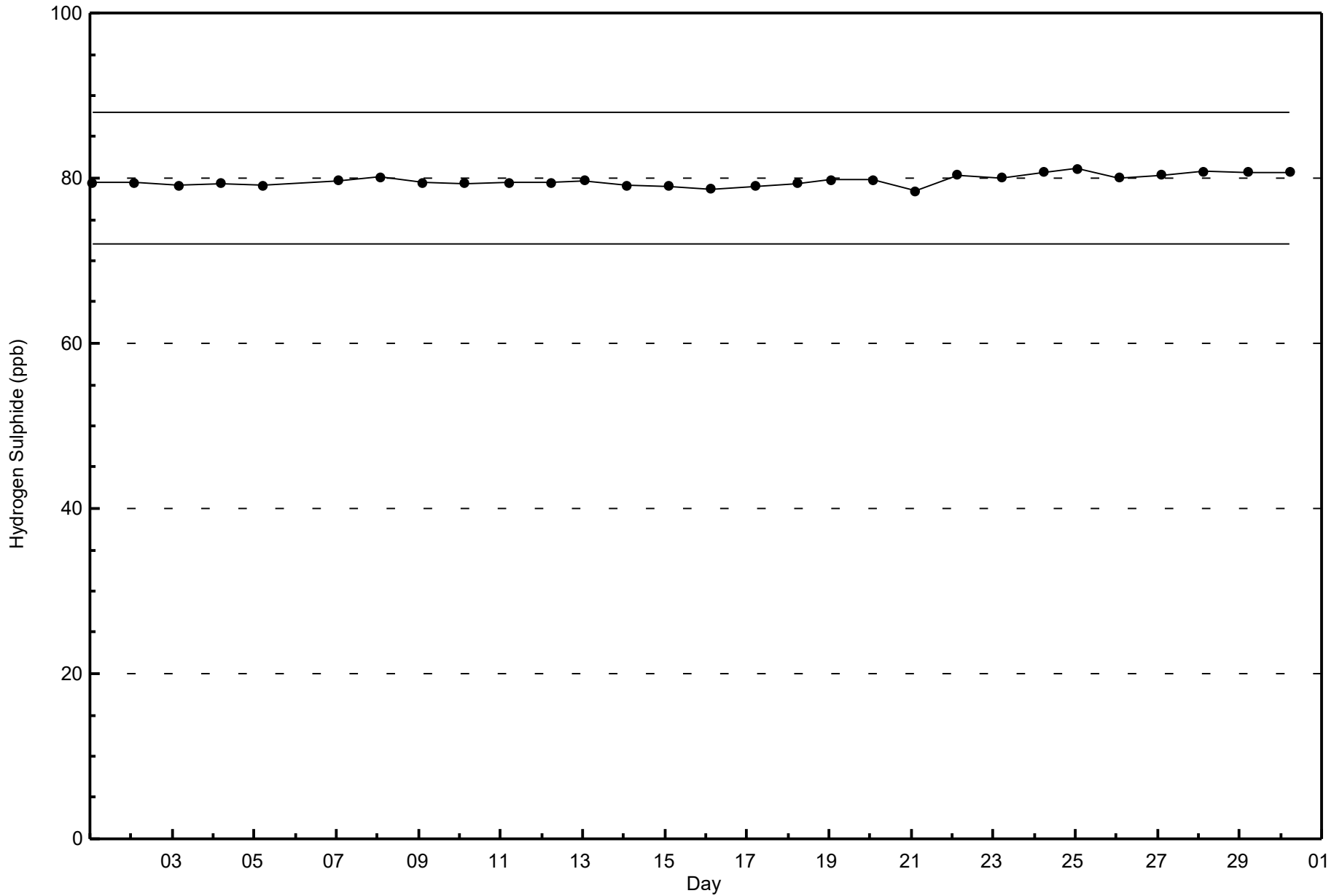
Wood Buffalo Environmental Association  
Wind Rose Nov 2023

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



Total Number of Valid Hours: 685



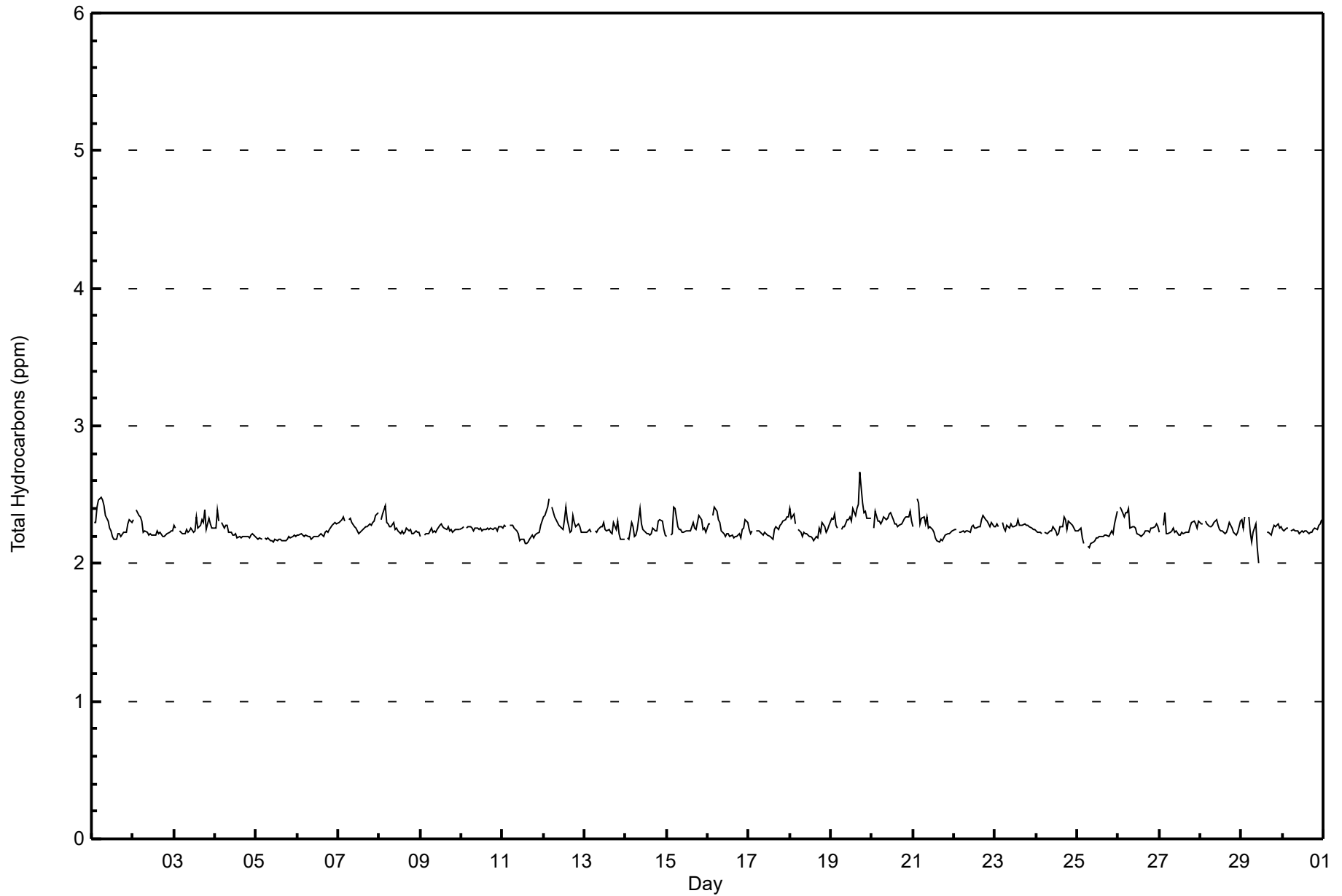




**Wood Buffalo Environmental Association**  
**Summary of Hour Averages**

**Total Hydrocarbons (THC) - ppm**  
**Firebag - November 2023**

Maximum Value: 2.7 ppm on Nov 19 18:00		Maximum Daily Average: 2.3 ppm on Nov 19		Hours in Service: 720																							
Minimum Value: 2.0 ppm on Nov 29 11:00		Minimum Daily Average: 2.2 ppm on Nov 5		Hours of Data: 687																							
Maximum Diurnal Average: 2.3 ppm at hour 4		Minimum Diurnal Average: 2.2 ppm at hour 15		Hours of Missing Data: 33																							
Monthly Average: 2.26 ppm		Percentiles: P <sub>1</sub> = 2.2 P <sub>10</sub> = 2.2 Q <sub>1</sub> = 2.2 Median = 2.2 Q <sub>3</sub> = 2.3 P <sub>90</sub> = 2.3 P <sub>99</sub> = 2.4		Hours of Calibration: 33																							
				Percent Operational Time: 100.0																							
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Nov	Z	2.3	2.3	2.4	2.5	2.5	2.5	2.4	2.4	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.5
2-Nov	2.3	Z	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	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.4
3-Nov	2.3	2.3	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.4	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.4
4-Nov	2.3	2.4	2.3	Z	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.4
5-Nov	2.2	2.2	2.2	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
6-Nov	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	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	2.3	2.3
7-Nov	2.3	2.3	2.3	2.3	2.3	Z	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.4	2.4	2.4	2.4	2.4
8-Nov	Z	2.3	2.4	2.4	2.3	2.3	2.3	2.3	2.3	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.4
9-Nov	2.2	Z	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.2	2.3	2.2	2.3	2.2	2.2	2.3	2.3	2.2	2.2	2.2	2.3
10-Nov	2.3	2.3	Z	2.3	2.3	2.3	2.3	2.2	2.3	2.3	2.2	2.3	2.2	2.2	2.3	2.3	2.2	2.3	2.2	2.3	2.3	2.2	2.3	2.3	2.3	2.3	2.3
11-Nov	2.3	2.3	2.3	Z	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.3
12-Nov	2.3	2.3	2.4	2.5	Z	2.4	2.3	2.3	2.3	2.3	2.3	2.2	2.3	2.4	2.3	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.5
13-Nov	2.2	2.2	2.2	2.2	2.2	Z	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.2	2.3	2.2	2.2	2.3	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.3
14-Nov	Z	2.2	2.2	2.3	2.3	2.2	2.2	2.2	2.2	2.4	2.3	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	2.4
15-Nov	2.2	Z	2.2	2.2	2.4	2.4	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.2	2.3	2.4	2.3	2.2	2.3	2.2	2.2	2.2	2.4
16-Nov	2.3	2.3	Z	2.4	2.4	2.4	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.4
17-Nov	2.2	2.2	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
18-Nov	2.4	2.3	2.4	2.3	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.3	2.3	2.2	2.2	2.3	2.2	2.2	2.4
19-Nov	2.3	2.3	2.4	2.3	2.3	Z	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.4	2.4	2.4	2.4	2.7	2.4	2.4	2.4	2.3	2.3	2.3	2.3	2.3	2.7
20-Nov	Z	2.3	2.4	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.4	2.4	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.4	2.3	2.3	2.3	2.4
21-Nov	2.3	Z	2.5	2.4	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.5
22-Nov	2.2	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.4	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.4
23-Nov	2.3	2.3	2.3	Z	2.3	2.3	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.3
24-Nov	2.2	2.2	2.2	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.3
25-Nov	2.2	2.2	2.3	2.2	2.1	Z	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.4	2.4	2.4	2.4
26-Nov	Z	2.4	2.4	2.3	2.4	2.4	2.4	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.4
27-Nov	2.2	Z	2.3	2.4	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.4
28-Nov	2.3	2.3	Z	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3
29-Nov	2.3	2.3	2.3	Z	2.3	2.2	2.2	2.2	2.3	2.1	2.0	C	C	C	C	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
30-Nov	2.2	2.2	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	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
																								Diurnal Average			
																								Diurnal Maximum			
Z - zerospan C - Calibration																											





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

**Total Hydrocarbons (THC) - ppm**  
**Firebag - November 2023**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2.0	1	0.15	0.15
2.1 - 3.0	686	99.85	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 687

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Total Hydrocarbons (THC) - ppm  
Firebag - November 2023**

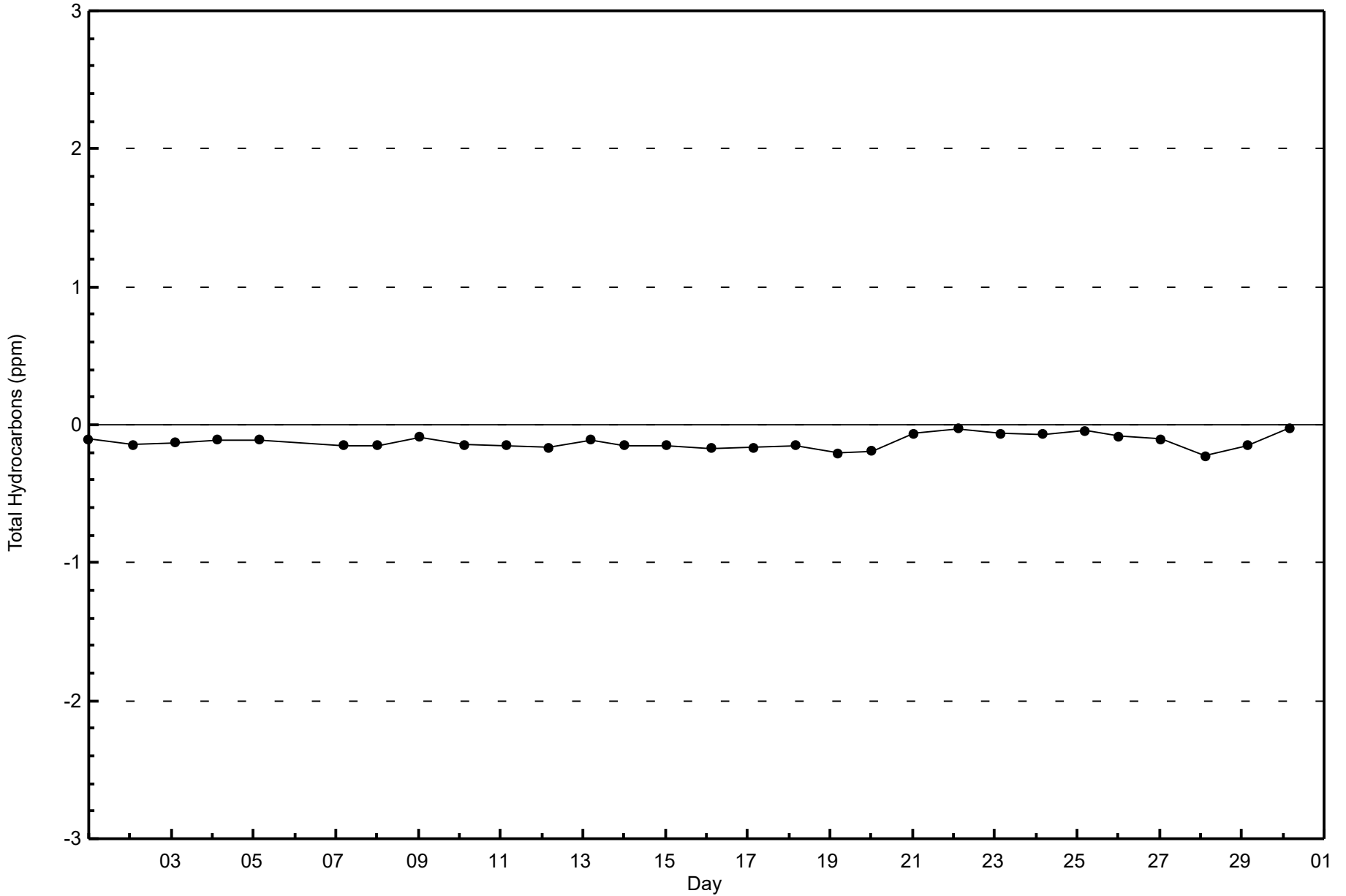
<b>Concentration Ranges (ppm)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
2.1 - 3.0	34	21	8	10	27	39	32	46	91	64	93	67	36	31	29	58	686
3.1 - 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	34	21	8	10	27	39	32	46	91	64	93	67	36	32	29	58	687

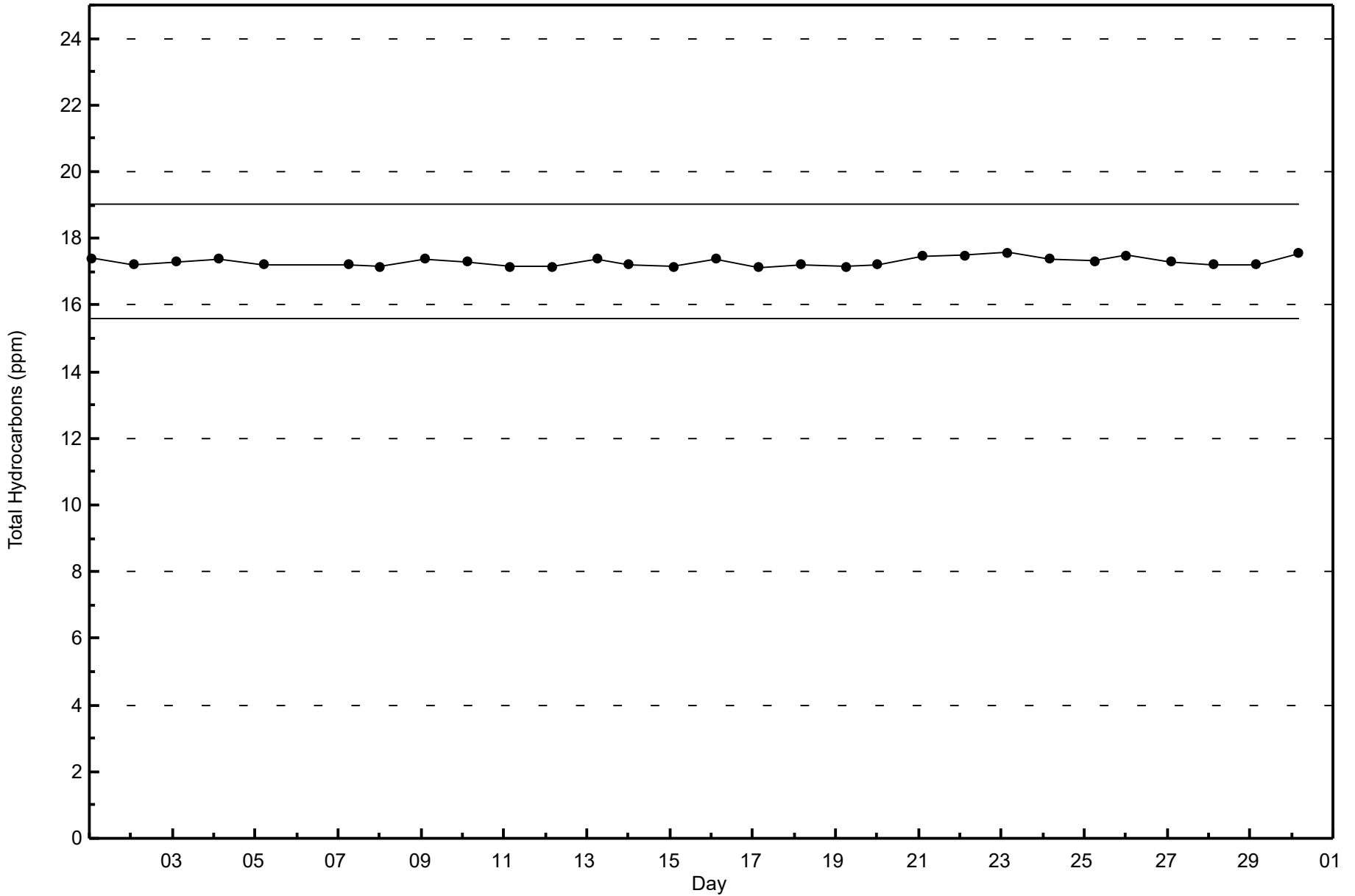
Total Number of Valid Hours: 687

Total Number of Hours: 720











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

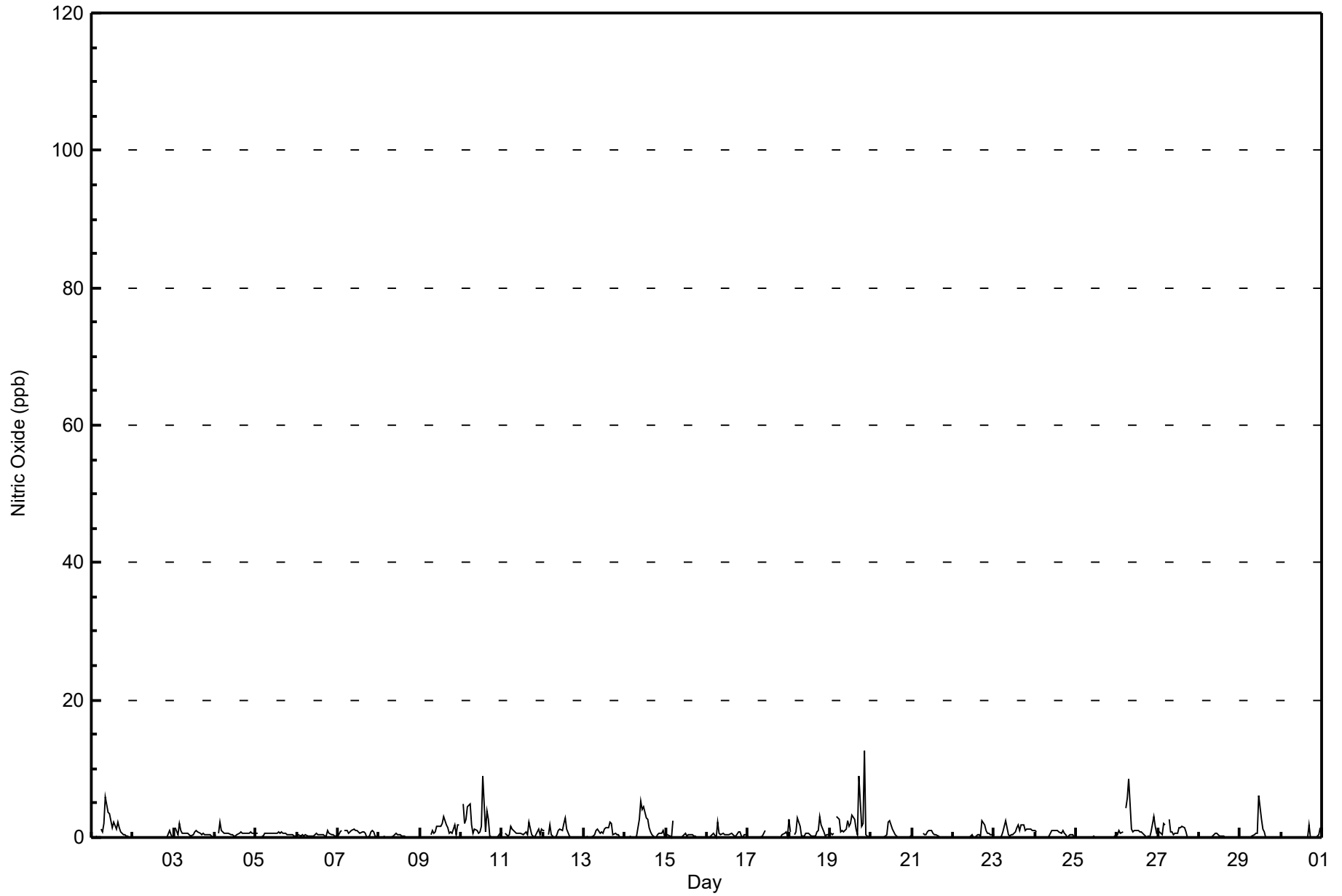
**Nitric Oxide (NO) - ppb**  
**Firebag - November 2023**

Maximum Value: 12.6 ppb on Nov 19 21:00		Maximum Daily Average: 2.2 ppb on Nov 19		Hours in Service: 720																							
Minimum Value: 0.0 ppb on Nov 15 07:00		Minimum Daily Average: 0.1 ppb on Nov 25		Hours of Data: 686																							
Maximum Diurnal Average: 1.3 ppb at hour 14		Minimum Diurnal Average: 0.3 ppb at hour 3		Hours of Missing Data: 34																							
Monthly Average: 0.69 ppb		Percentiles: P <sub>1</sub> = 0.0 P <sub>10</sub> = 0.0 Q <sub>1</sub> = 0.0 Median = 0.4 Q <sub>3</sub> = 0.8 P <sub>90</sub> = 1.7 P <sub>99</sub> = 5.4		Hours of Calibration: 34																							
				Percent Operational Time: 100.0																							
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Nov	0.0	0.0	0.0	0.1	Z	1.2	0.8	2.1	6.0	3.6	3.4	2.4	1.5	2.3	1.2	2.3	1.5	0.9	0.5	0.4	0.2	0.1	0.1	0.0	1.3	6.0	
2-Nov	0.0	0.0	0.1	0.1	0.1	Z	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	1.0	0.3	0.0	0.1	1.0	
3-Nov	Z	1.4	0.5	2.1	1.0	0.6	0.5	0.7	0.6	0.5	0.3	0.5	0.8	1.0	0.9	0.5	0.3	0.5	0.3	0.4	0.3	0.3	0.1	0.1	0.6	2.1	
4-Nov	0.5	Z	0.6	2.3	1.0	0.6	0.6	0.7	0.6	0.4	0.4	0.3	0.2	0.4	0.6	0.9	0.6	0.6	0.6	0.6	0.6	0.8	0.7	0.5	0.7	2.3	
5-Nov	0.5	0.5	Z	0.3	0.3	0.5	0.6	0.5	0.7	0.6	0.5	0.6	0.7	0.8	0.6	0.8	0.5	0.5	0.4	0.4	0.4	0.3	0.2	0.2	0.5	0.8	
6-Nov	0.3	0.4	0.3	0.3	0.2	0.3	0.2	0.2	0.2	0.2	0.1	0.7	0.5	0.3	0.4	0.3	0.3	0.2	1.0	0.6	0.4	0.3	0.3	0.2	0.4	1.0	
7-Nov	0.4	0.8	1.0	Z	1.1	1.0	0.7	0.9	1.1	1.2	1.0	1.0	0.9	0.6	0.8	0.8	0.6	0.1	0.3	0.8	1.1	0.9	0.2	0.1	0.7	1.2	
8-Nov	0.0	0.0	0.0	0.2	Z	0.0	0.0	0.0	0.1	0.5	0.6	0.3	0.3	0.2	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.6	
9-Nov	0.0	0.0	0.0	0.0	0.0	Z	0.3	1.0	0.6	0.7	1.6	1.5	1.7	2.1	3.0	1.9	1.5	0.6	0.8	0.5	1.9	0.5	1.8	1.8	1.0	3.0	
10-Nov	Z	4.8	2.0	2.6	4.4	4.9	1.9	0.5	1.2	1.0	0.6	0.8	1.7	8.9	0.7	3.8	2.6	0.2	0.0	0.0	0.0	0.0	0.1	0.8	1.9	8.9	
11-Nov	0.7	Z	0.6	0.2	0.3	1.5	1.2	1.0	0.7	0.6	0.5	0.5	0.5	0.6	0.7	0.4	2.2	0.4	0.2	0.1	0.5	1.1	0.4	1.1	0.7	2.2	
12-Nov	0.9	1.1	Z	0.4	1.8	0.4	0.0	0.0	0.4	1.0	1.2	1.1	2.0	2.9	1.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	2.9	
13-Nov	0.0	0.0	0.2	Z	0.1	0.3	0.3	0.9	1.2	0.6	0.9	0.5	1.3	1.5	1.3	2.2	2.0	0.5	0.6	0.4	0.4	0.0	0.0	0.0	0.7	2.2	
14-Nov	0.0	0.0	0.0	0.2	Z	0.0	0.0	0.1	2.7	5.4	4.0	4.4	2.9	2.6	1.5	0.9	0.5	0.0	0.0	0.5	0.5	0.6	1.0	0.3	1.2	5.4	
15-Nov	0.4	0.5	0.3	0.1	2.5	Z	0.0	0.0	0.0	0.0	0.1	0.7	0.2	0.5	0.3	0.5	0.1	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.3	2.5	
16-Nov	Z	0.0	0.2	0.4	0.5	0.1	2.2	0.5	0.4	0.7	0.4	0.4	0.5	0.4	0.6	0.4	0.1	0.2	0.7	0.7	0.3	0.1	0.4	0.4	0.5	2.2	
17-Nov	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.6	1.0	C	C	C	C	C	0.0	0.0	0.0	0.0	0.4	0.5	0.8	0.2	0.2	1.0	
18-Nov	2.6	0.7	Z	0.4	0.7	2.9	1.7	0.1	0.1	0.2	0.7	0.6	0.4	0.2	0.2	0.1	0.7	0.9	3.1	1.9	0.8	0.3	0.5	0.4	0.9	3.1	
19-Nov	0.6	0.5	0.6	Z	3.1	2.7	0.8	1.0	0.9	1.2	2.4	1.5	2.0	3.3	2.6	1.2	0.4	9.0	1.6	2.1	12.6	0.5	0.2	0.1	2.2	12.6	
20-Nov	0.0	0.0	0.1	0.0	Z	0.0	0.0	0.0	0.1	0.4	2.2	2.5	1.1	0.8	0.4	0.2	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.1	0.4	2.5	
21-Nov	0.0	0.1	0.1	0.1	0.0	Z	0.6	0.4	0.5	0.8	1.0	1.0	0.7	0.5	0.4	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	1.0	
22-Nov	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.4	0.0	0.1	0.5	0.3	0.3	2.5	1.9	1.0	0.5	0.6	0.3	0.4	0.4	2.5	
23-Nov	0.5	Z	0.1	0.1	0.2	0.8	1.6	2.3	0.4	0.3	0.4	0.5	0.7	1.3	1.9	1.1	1.7	1.8	1.0	1.2	1.2	1.1	1.0	1.0	1.0	2.3	
24-Nov	1.0	0.8	Z	0.1	0.0	0.0	0.0	0.0	0.3	0.7	1.1	1.1	1.0	1.0	0.8	0.6	1.0	0.7	0.3	0.0	0.4	0.5	0.5	0.1	0.5	1.1	
25-Nov	0.1	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.1	0.4	
26-Nov	0.4	0.9	0.6	0.8	Z	4.4	5.6	8.5	1.2	0.9	1.0	1.0	1.1	0.8	0.9	0.7	0.4	0.1	0.1	0.0	0.8	3.0	1.7	0.6	1.5	8.5	
27-Nov	0.7	0.8	0.4	2.0	1.8	Z	2.7	0.9	0.9	0.5	0.7	0.6	1.4	1.4	1.7	1.4	0.7	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.8	2.7	
28-Nov	Z	0.1	0.0	0.1	0.1	0.0	0.0	0.0	0.1	0.5	0.7	0.3	0.2	0.2	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.7	
29-Nov	0.1	Z	0.0	0.0	0.0	0.0	0.0	0.1	0.4	0.7	0.6	6.2	2.6	1.2	0.8	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	6.2	
30-Nov	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8	0.0	0.0	0.0	0.0	0.1	0.3	1.4	0.2	1.8	
		0.4	0.5	0.3	0.5	0.8	0.9	0.8	0.8	0.7	0.8	0.9	1.1	0.9	1.3	0.8	0.8	0.7	0.7	0.5	0.4	0.8	0.4	0.4	0.3	Diurnal Average	
		2.6	4.8	2.0	2.6	4.4	4.9	5.6	8.5	6.0	5.4	4.0	6.2	2.9	8.9	3.0	3.8	2.6	9.0	3.1	2.1	12.6	3.0	1.8	1.8	Diurnal Maximum	
Z - zerspan		C - Calibration																									



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

**Nitric Oxide (NO) - ppb**  
**Firebag - November 2023**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Nitric Oxide (NO) - ppb  
Firebag - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	686	100.00	100.00
21 - 40	0	0.00	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 686

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitric Oxide (NO) - ppb  
Firebag - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	35	19	7	11	26	39	32	43	92	67	92	65	37	35	27	59	686
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	35	19	7	11	26	39	32	43	92	67	92	65	37	35	27	59	686

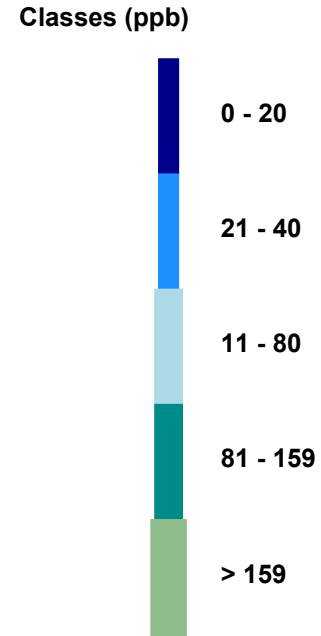
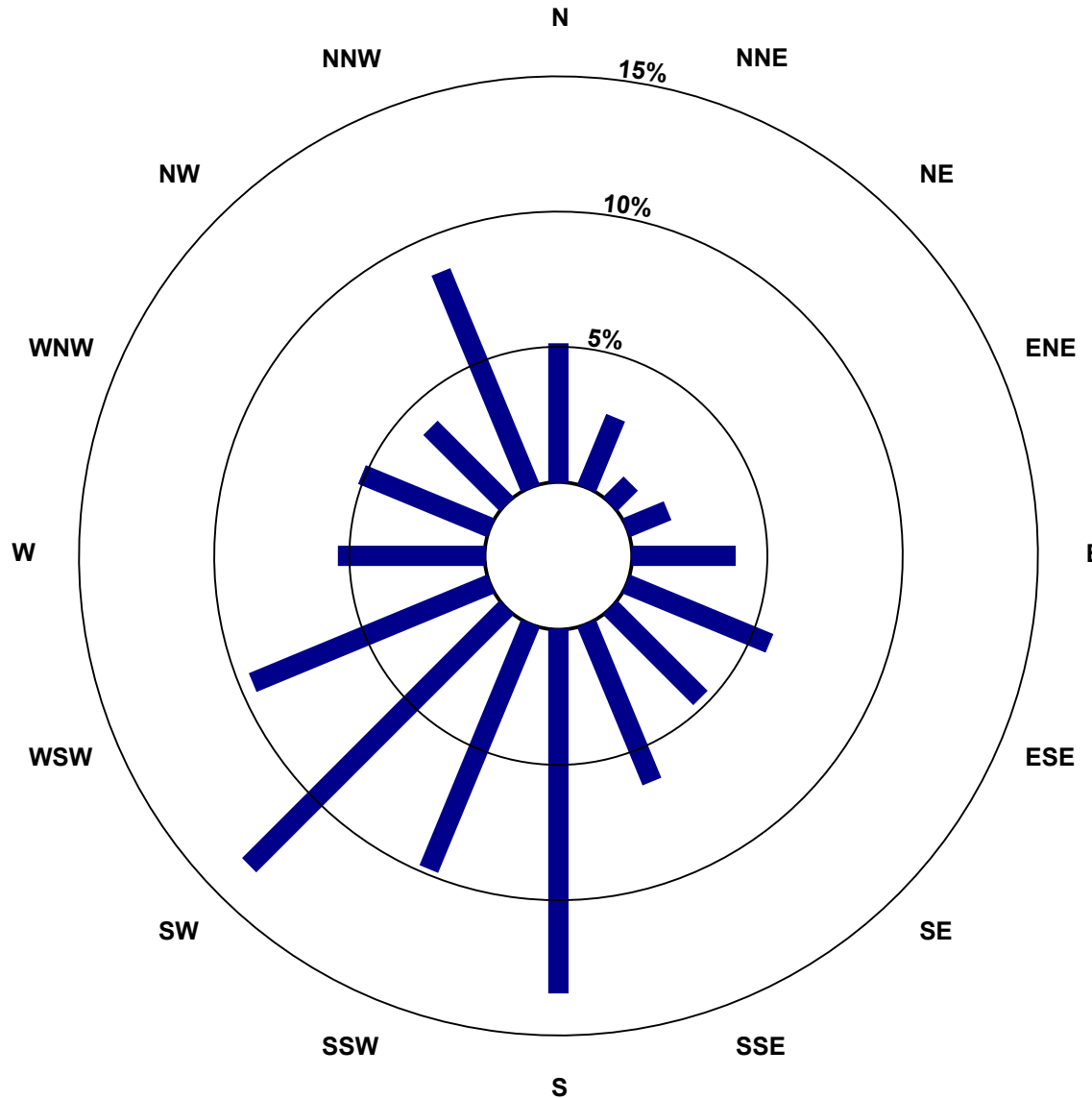
Total Number of Valid Hours: 686

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 2023

Nitric Oxide (NO) - ppb  
Firebag

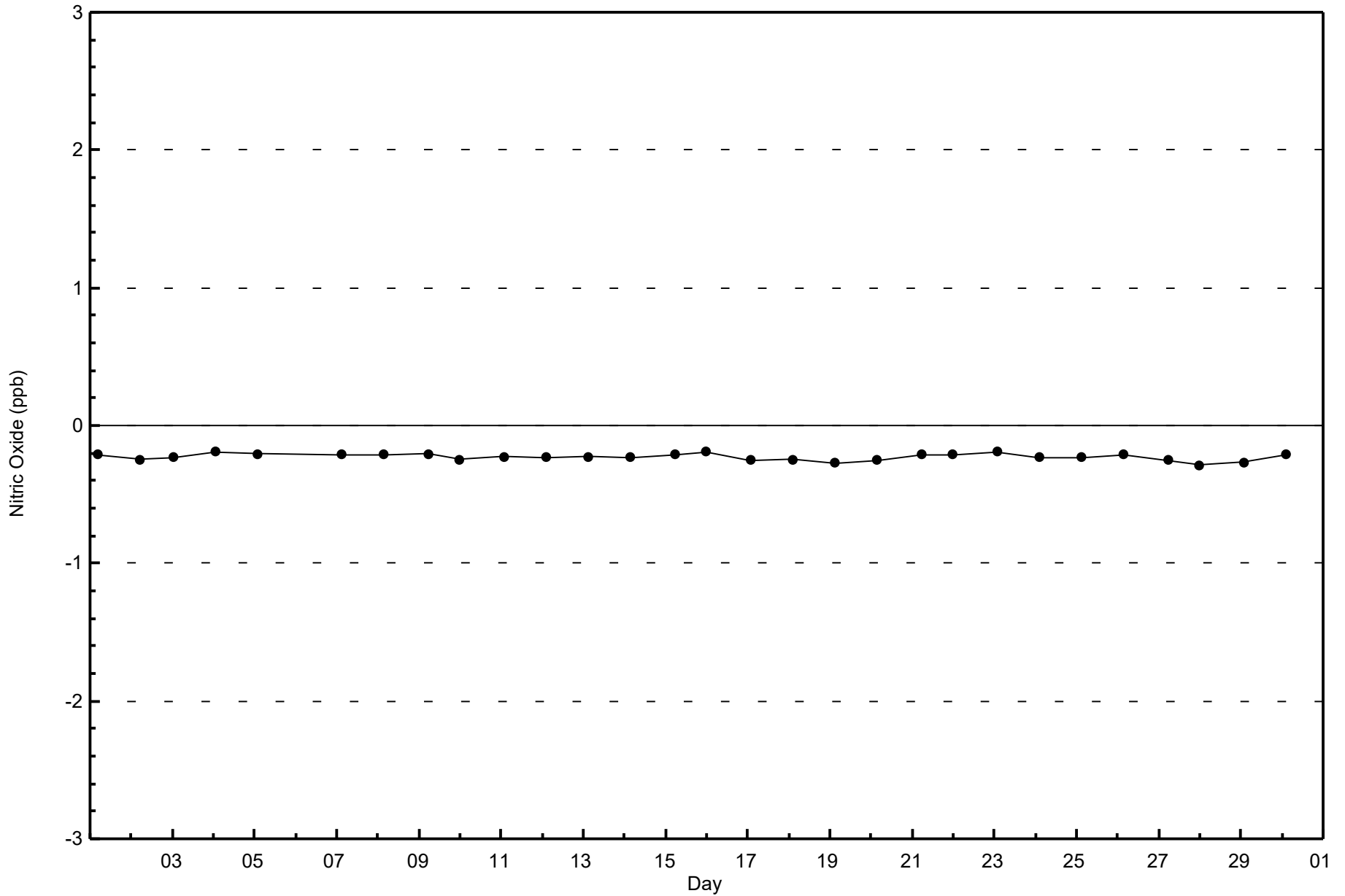


Total Number of Valid Hours: 686

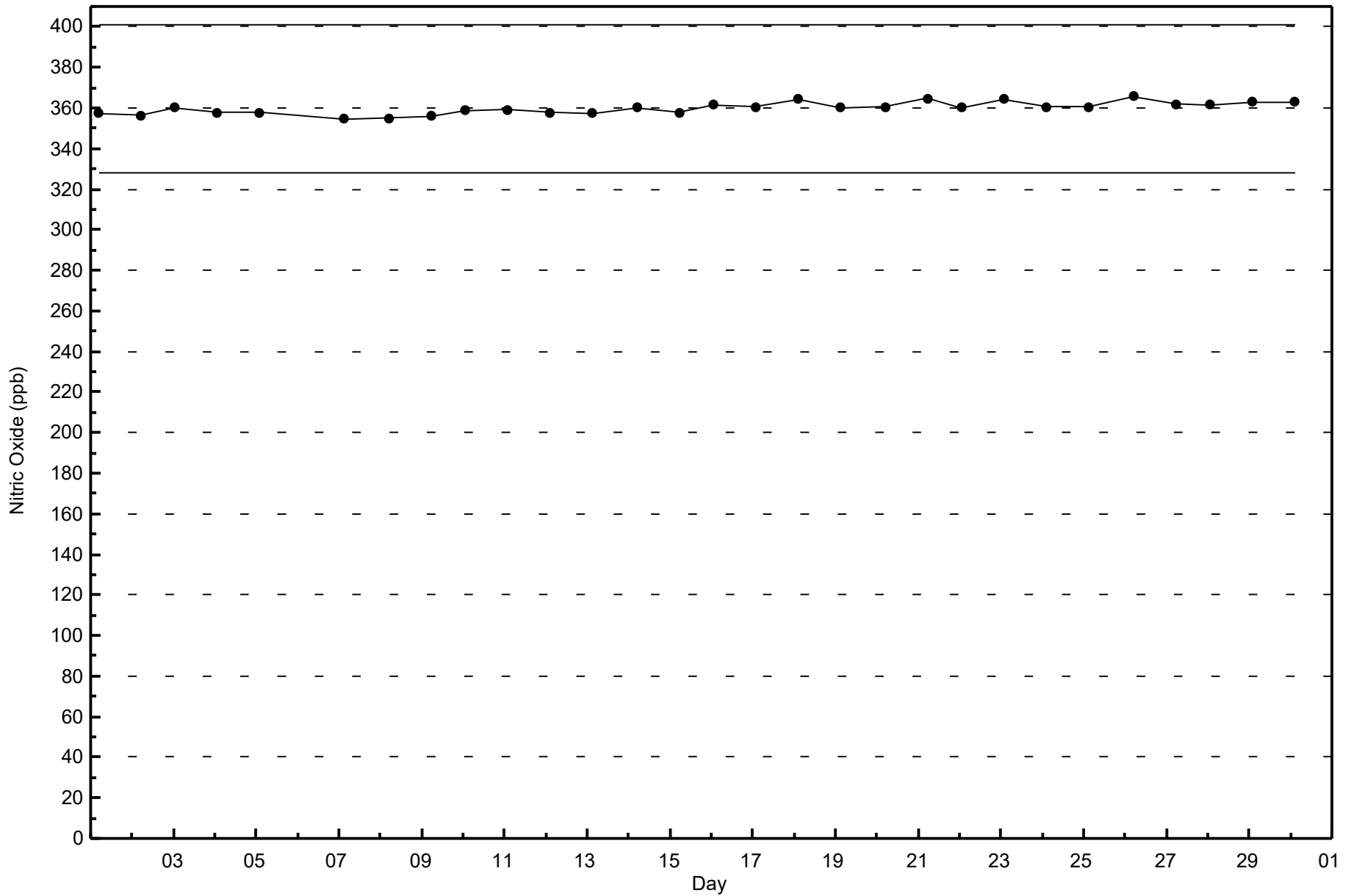


**Wood Buffalo Environmental Association**  
**Zero Responses**

**Nitric Oxide (NO) - ppb**  
**Firebag - November 2023**









Wood Buffalo Environmental Association

Summary of Hour Averages

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

Firebag - November 2023

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 22.2 ppb on Nov 29 12:00	Maximum Daily Average: 8.9 ppb on Nov 26		Hours of Data:	686
Minimum Value: 0.1 ppb on Nov 21 19:00	Minimum Daily Average: 1.4 ppb on Nov 6		Hours of Missing Data:	34
Maximum Diurnal Average: 6.0 ppb at hour 4	Minimum Diurnal Average: 2.6 ppb at hour 13		Hours of Calibration:	34
Monthly Average: 3.93 ppb	Percentiles: P <sub>1</sub> = 0.1 P <sub>10</sub> = 0.4 Q <sub>1</sub> = 1.6 Median = 3.1 Q <sub>3</sub> = 5.3 P <sub>90</sub> = 8.5 P <sub>99</sub> = 16.7		Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	4.1	5.3	5.2	13.6	Z	19.2	18.6	16.7	14.0	6.9	5.4	4.4	3.7	3.1	3.1	8.8	10.2	4.5	1.5	3.0	5.0	8.5	8.0	6.4	7.8	19.2
2-Nov	5.7	6.8	7.5	7.4	9.0	Z	1.7	1.2	0.6	0.4	0.3	0.2	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.3	1.4	7.3	3.9	1.3	2.5	9.0
3-Nov	Z	4.2	2.1	5.0	4.1	3.9	2.0	6.4	3.8	3.5	2.2	2.3	3.8	4.8	4.0	4.0	5.7	8.4	6.4	6.5	4.8	4.8	2.1	2.3	4.2	8.4
4-Nov	3.3	Z	7.4	9.6	5.8	5.1	5.3	3.7	2.0	1.6	1.0	0.8	0.8	1.3	2.0	2.6	2.3	1.9	2.1	1.7	1.7	2.0	1.9	1.6	2.9	9.6
5-Nov	1.4	1.3	Z	1.0	1.1	1.6	1.5	1.5	1.8	1.5	1.5	1.3	1.5	2.2	1.5	2.6	2.2	1.9	1.8	1.6	2.0	1.5	1.3	1.1	1.6	2.6
6-Nov	1.0	1.2	0.7	1.1	0.6	0.8	0.6	0.6	0.5	0.5	0.4	0.5	1.0	1.0	1.3	1.6	1.6	1.8	2.4	2.5	2.9	3.1	3.1	2.7	1.4	3.1
7-Nov	2.5	2.7	2.7	Z	3.5	3.6	5.4	5.0	4.6	3.6	2.3	2.3	2.1	1.8	2.0	2.4	2.3	1.7	2.0	3.5	7.6	9.3	8.6	5.6	3.8	9.3
8-Nov	4.1	3.5	4.2	6.5	Z	1.8	1.9	1.3	1.8	2.9	3.2	1.7	1.5	1.3	0.9	2.2	3.3	1.4	0.6	0.7	0.5	0.4	0.3	0.3	2.0	6.5
9-Nov	0.4	0.4	0.3	0.2	0.9	Z	3.5	3.7	2.0	1.5	2.7	2.9	2.9	2.6	3.3	2.8	2.7	1.5	1.8	1.3	2.7	1.9	2.9	2.8	2.1	3.7
10-Nov	Z	5.8	3.4	4.1	6.3	6.5	4.6	2.9	3.4	2.4	1.7	1.7	2.5	2.9	1.8	4.5	4.4	2.7	2.2	2.0	2.0	1.9	2.2	3.1	3.3	6.5
11-Nov	2.8	Z	3.9	3.1	3.4	4.9	4.3	3.3	2.3	2.1	1.9	1.7	1.6	1.5	1.8	1.6	2.9	1.9	1.9	1.8	1.9	2.4	2.4	5.9	2.7	5.9
12-Nov	9.0	9.3	Z	13.6	19.2	13.4	6.4	5.0	5.0	4.1	3.3	2.8	5.4	8.7	5.9	1.6	3.1	8.4	6.1	2.5	7.6	4.7	0.5	0.3	6.3	19.2
13-Nov	0.2	0.2	1.0	Z	0.3	1.1	2.0	2.8	2.5	2.2	2.2	1.5	2.2	3.1	2.9	3.7	5.8	3.1	5.5	3.9	2.8	0.3	0.2	0.2	2.2	5.8
14-Nov	0.2	0.6	1.5	15.1	Z	2.8	2.6	5.6	13.9	9.9	5.4	5.4	3.9	4.0	4.0	4.9	7.3	5.8	4.9	5.1	5.8	11.0	9.2	4.1	5.8	15.1
15-Nov	2.1	3.1	3.6	4.5	17.5	Z	2.2	1.2	0.8	0.5	0.8	2.5	1.2	2.1	2.2	5.2	3.4	2.0	4.5	11.4	8.5	1.7	1.4	0.4	3.6	17.5
16-Nov	Z	3.7	4.2	5.4	8.9	14.9	12.5	4.4	1.9	1.1	1.1	1.0	1.2	1.5	2.0	1.9	1.6	1.7	2.2	3.2	6.6	7.0	6.3	5.4	4.3	14.9
17-Nov	3.1	Z	5.4	4.5	4.3	5.3	4.7	4.1	4.0	3.2	3.1	C	C	C	C	C	3.9	4.1	4.6	4.1	6.0	4.9	6.9	5.4	4.5	6.9
18-Nov	10.4	6.3	Z	2.8	2.0	4.9	4.0	1.4	1.6	1.4	1.5	1.2	1.1	0.9	1.1	1.1	3.5	3.4	4.4	6.0	3.4	2.1	3.2	4.2	3.1	10.4
19-Nov	6.5	5.0	4.2	Z	6.3	5.5	3.0	4.0	2.8	2.9	3.7	2.1	3.4	5.1	5.8	6.4	8.4	12.3	8.5	11.2	17.0	9.9	9.9	5.4	6.5	17.0
20-Nov	2.5	3.1	6.4	4.3	Z	2.7	1.6	2.9	3.4	2.5	6.0	6.0	3.0	2.3	2.4	2.0	3.5	4.4	3.8	4.1	5.6	8.4	10.2	4.3	4.1	10.2
21-Nov	2.1	8.0	15.6	11.8	4.2	Z	5.9	4.3	5.1	4.3	4.1	3.7	2.7	1.8	1.3	1.1	0.2	0.2	0.1	0.1	0.1	0.1	0.2	0.2	3.4	15.6
22-Nov	Z	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.7	1.1	0.2	0.3	2.5	3.2	3.4	9.5	8.3	4.0	2.2	1.7	1.5	1.7	1.8	9.5
23-Nov	1.3	Z	0.8	1.0	1.8	2.4	3.8	3.7	1.7	1.8	1.5	1.5	1.9	3.1	3.4	3.0	3.6	4.1	2.5	2.4	3.5	3.6	3.4	3.8	2.6	4.1
24-Nov	3.7	3.3	Z	3.3	4.5	5.3	5.8	5.5	5.5	4.7	4.1	3.1	3.1	3.5	4.3	5.6	9.6	8.4	6.0	10.7	10.1	12.0	10.5	9.3	6.2	12.0
25-Nov	8.3	9.6	8.8	Z	0.4	0.3	0.3	0.3	0.4	1.3	1.1	0.3	0.3	0.4	0.2	0.3	0.4	0.2	0.2	0.2	0.2	0.2	3.3	8.9	2.0	9.6
26-Nov	11.4	13.6	8.8	9.7	Z	16.0	13.5	14.4	7.1	3.8	4.2	3.1	3.6	2.8	5.5	6.6	7.0	7.5	7.9	8.2	10.6	14.9	15.1	10.5	8.9	16.0
27-Nov	6.4	6.7	6.6	14.2	5.4	Z	4.8	2.4	4.8	2.7	2.8	1.9	2.8	2.3	3.0	3.2	3.5	5.8	6.7	5.7	4.8	2.7	3.9	2.7	4.6	14.2
28-Nov	Z	3.2	3.5	3.2	3.1	2.6	3.7	3.4	4.7	4.9	3.2	1.2	1.0	1.1	1.4	1.1	3.7	4.9	3.4	2.6	2.6	1.4	3.5	7.1	3.1	7.1
29-Nov	7.7	Z	6.5	10.3	10.4	6.9	8.1	14.6	21.1	10.6	5.5	22.2	15.2	10.5	11.4	3.0	2.9	2.5	5.6	5.6	4.1	6.1	3.5	1.5	8.5	22.2
30-Nov	2.0	1.2	Z	0.4	0.7	0.2	0.2	0.2	0.9	0.2	0.2	0.1	0.1	0.1	0.1	0.7	7.7	4.3	2.7	4.2	6.7	5.9	7.7	9.3	2.4	9.3

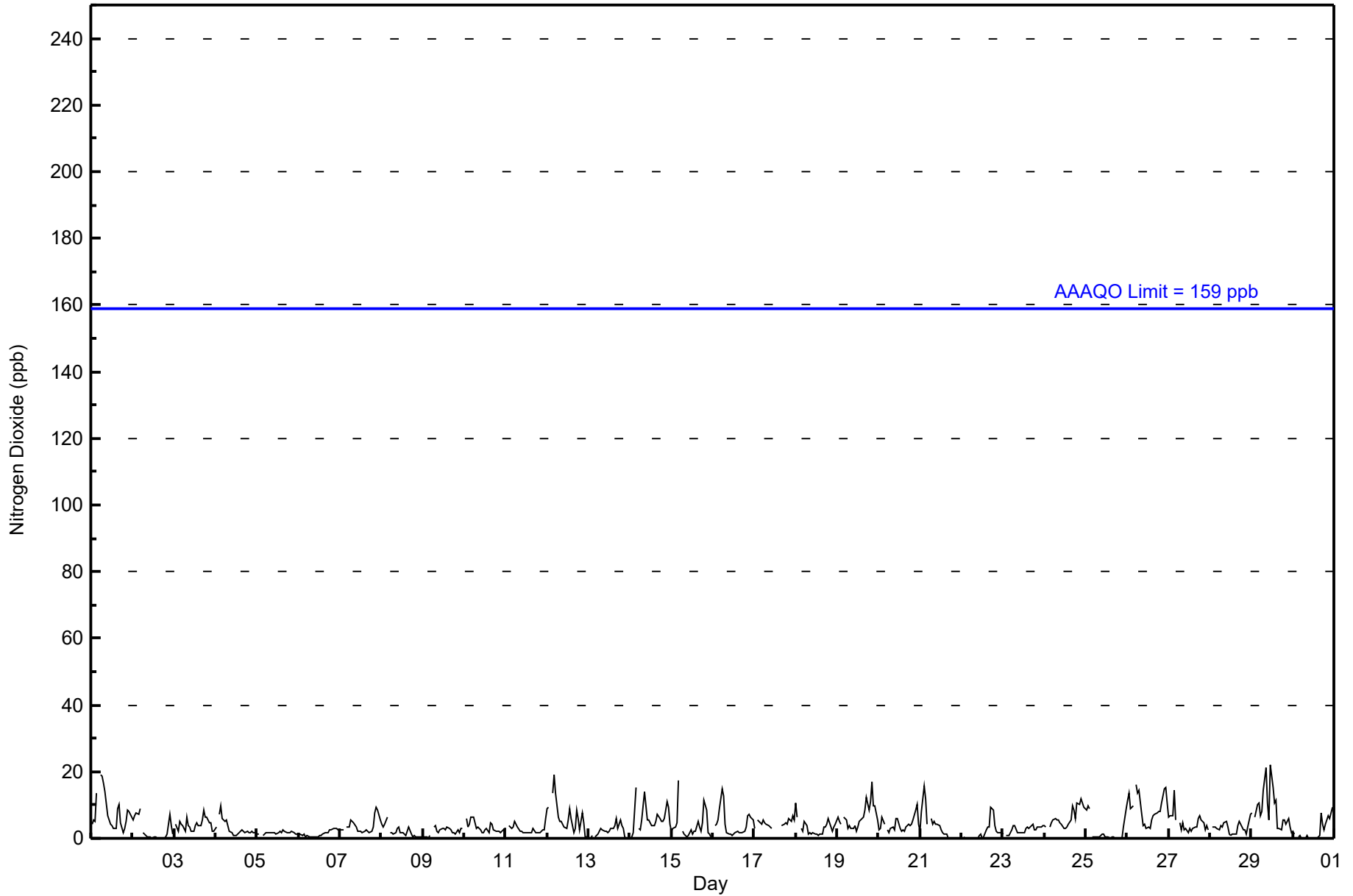
4.1	4.3	4.6	6.0	5.0	5.3	4.5	4.2	4.1	3.0	2.6	2.8	2.6	2.6	2.8	3.0	4.0	4.0	3.7	4.0	4.7	4.7	4.6	3.9	Diurnal Average	
11.4	13.6	15.6	15.1	19.2	19.2	18.6	16.7	21.1	10.6	6.0	22.2	15.2	10.5	11.4	8.8	10.2	12.3	8.5	11.4	17.0	14.9	15.1	10.5	Diurnal Maximum	

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



Wood Buffalo Environmental Association  
Hourly Averages

Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Firebag - November 2023





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Firebag - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	684	99.71	99.71
21 - 40	2	0.29	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 686

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Firebag - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	35	19	7	11	26	39	32	43	92	67	92	65	36	35	26	59	684
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	2
41 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	35	19	7	11	26	39	32	43	92	67	92	65	37	35	27	59	686

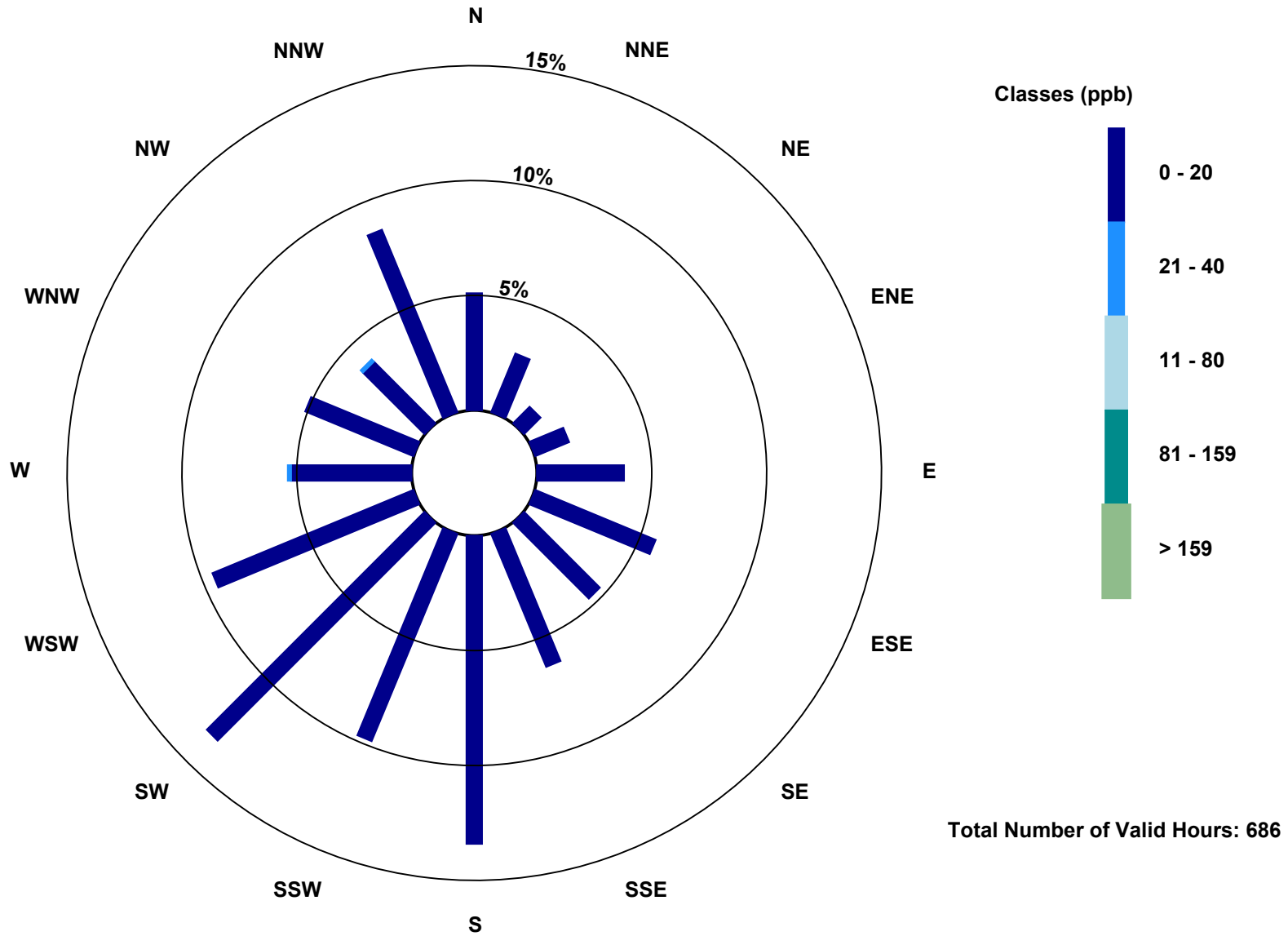
Total Number of Valid Hours: 686

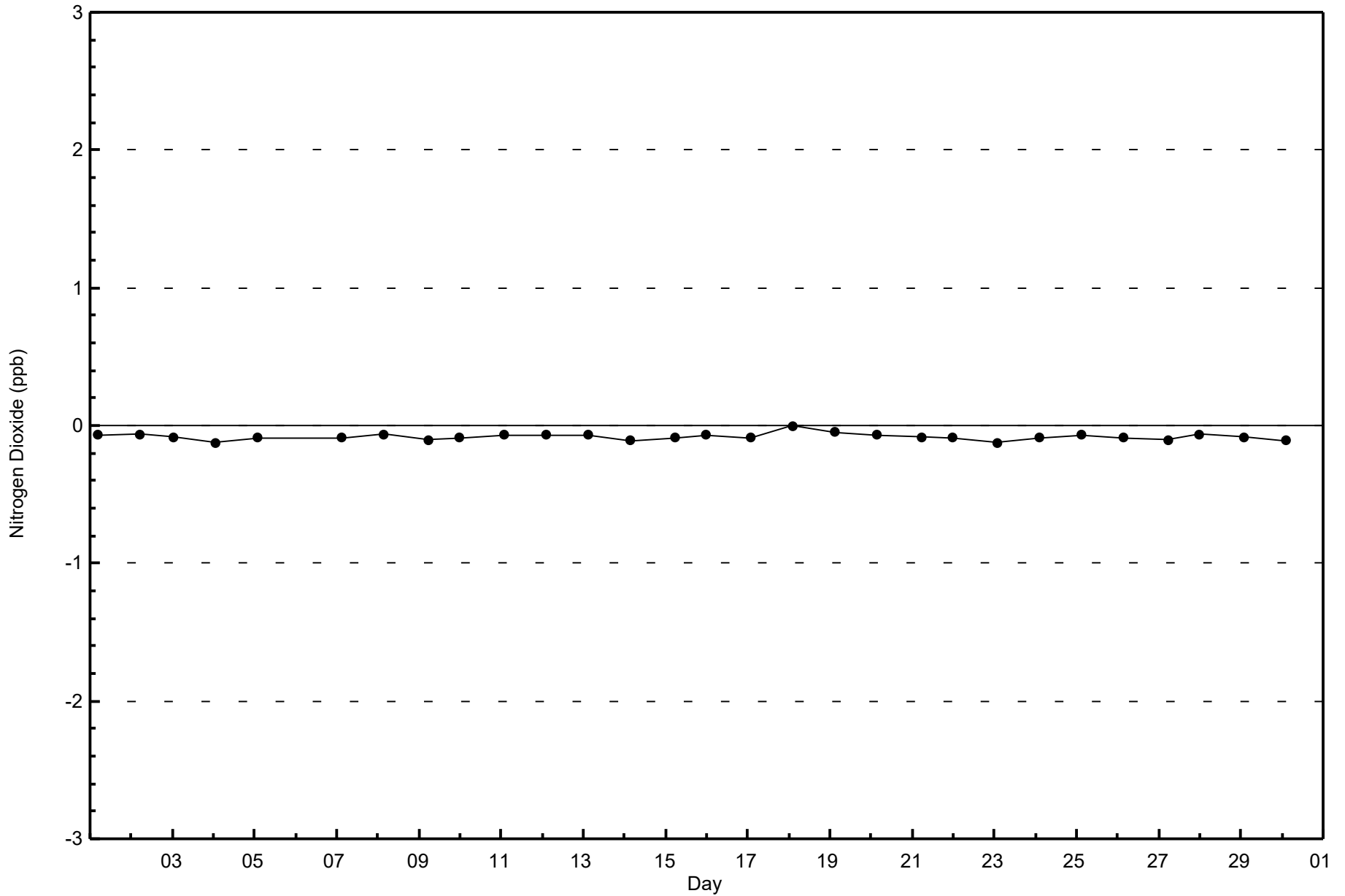
Total Number of Hours: 720

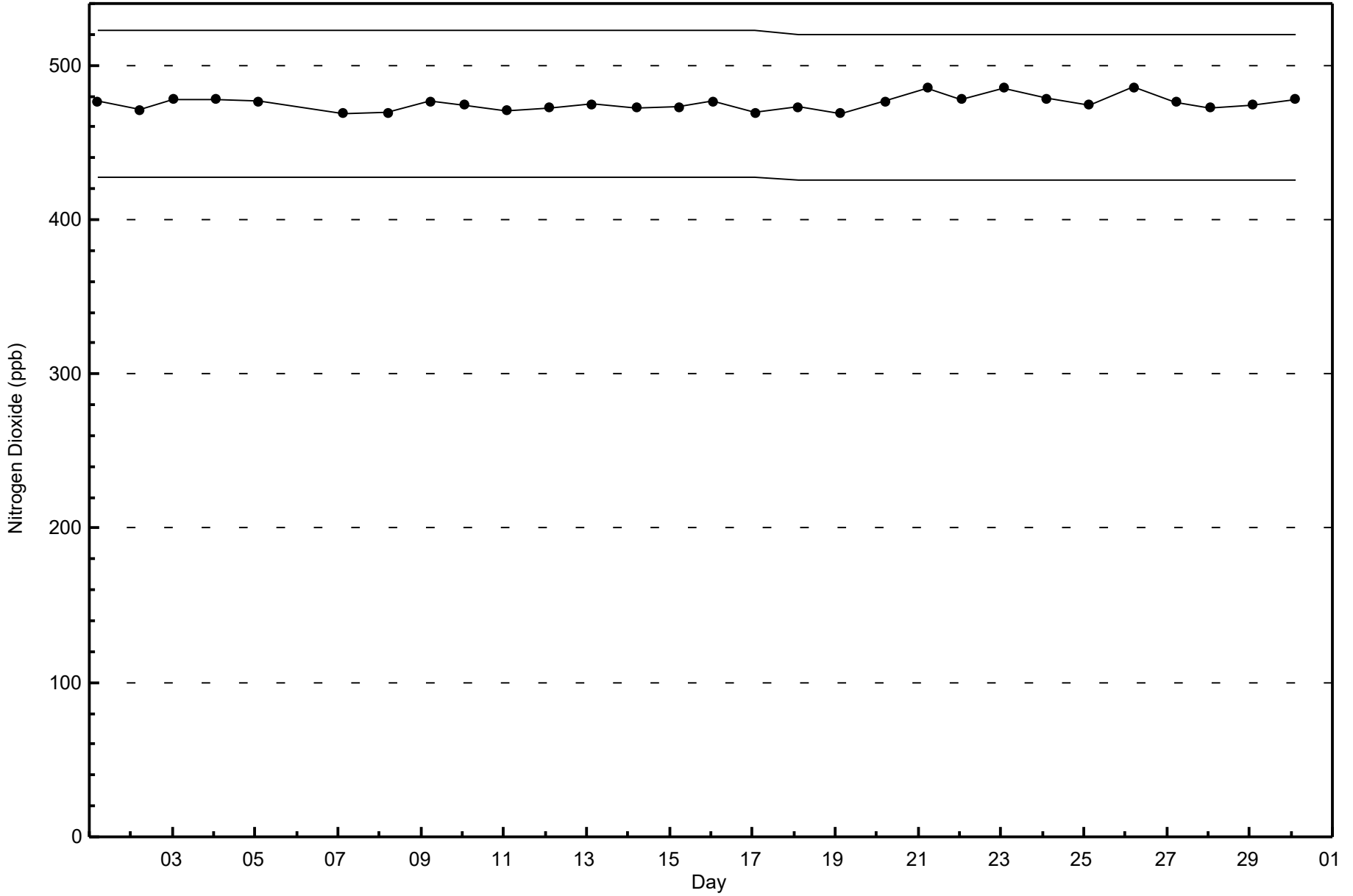


Wood Buffalo Environmental Association  
Wind Rose Nov 2023

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











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

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Firebag - November 2023**

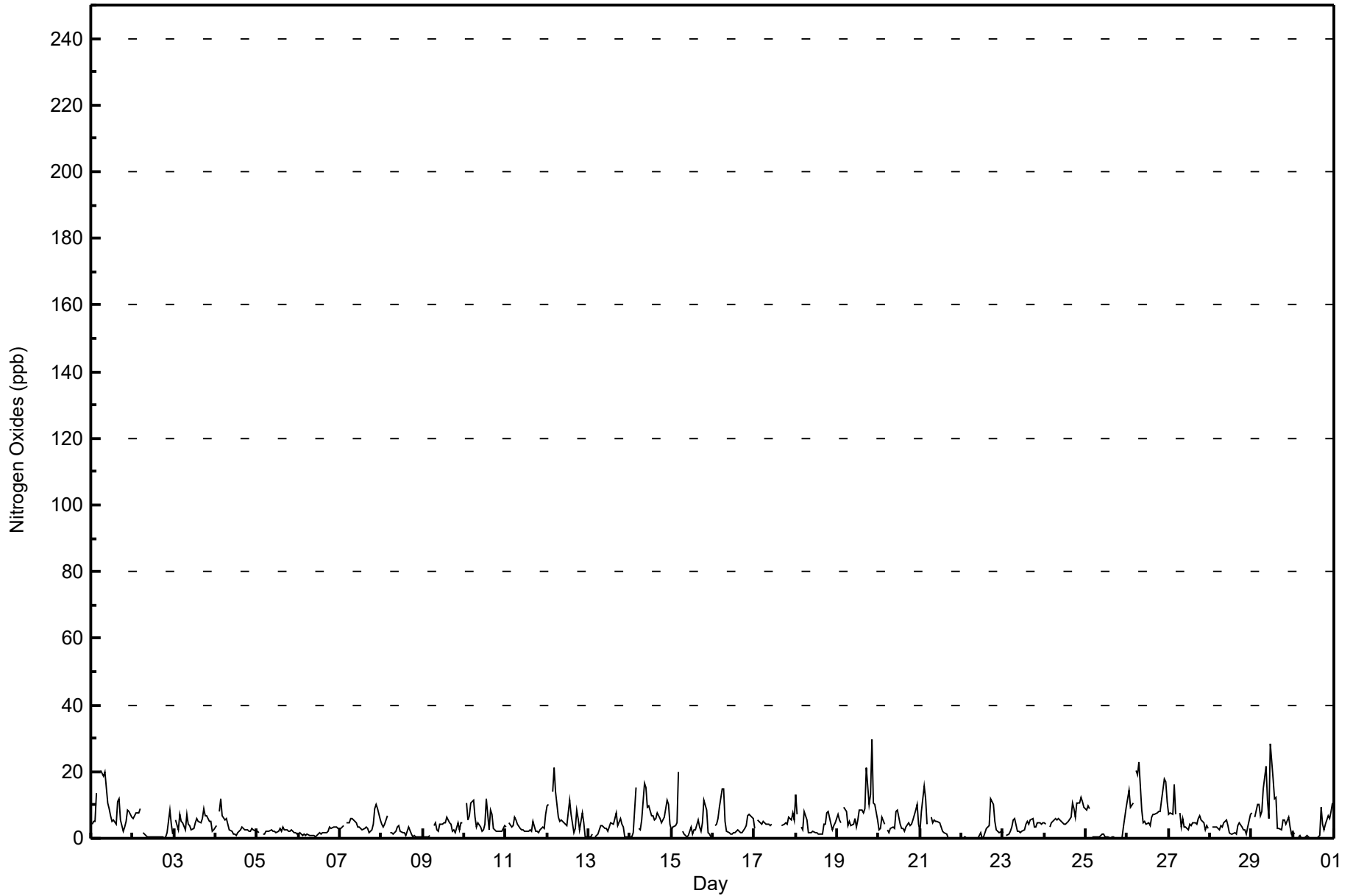
Maximum Value: 29.6 ppb on Nov 19 21:00		Maximum Daily Average: 10.5 ppb on Nov 26		Hours in Service: 720																						
Minimum Value: 0.1 ppb on Nov 30 13:00		Minimum Daily Average: 1.7 ppb on Nov 6		Hours of Data: 686																						
Maximum Diurnal Average: 6.5 ppb at hour 4		Minimum Diurnal Average: 3.5 ppb at hour 13		Hours of Missing Data: 34																						
Monthly Average: 4.61 ppb		Percentiles: P <sub>1</sub> = 0.1 P <sub>10</sub> = 0.4 Q <sub>1</sub> = 1.9 Median = 3.7 Q <sub>3</sub> = 5.9 P <sub>90</sub> = 9.6 P <sub>99</sub> = 20.4		Hours of Calibration: 34																						
				Percent Operational Time: 100.0																						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	4.1	5.3	5.2	13.7	Z	20.4	19.4	18.8	20.0	10.5	8.8	6.8	5.4	4.3	11.1	11.7	5.4	2.0	3.4	5.2	8.6	8.1	6.4	9.1	20.4	
2-Nov	5.7	6.8	7.6	7.5	9.1	Z	1.7	1.2	0.6	0.4	0.4	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.3	1.5	8.3	4.2	1.3	2.6	9.1	
3-Nov	Z	5.6	2.6	7.1	5.1	4.5	2.5	7.1	4.4	4.0	2.5	2.8	4.6	5.8	4.9	4.5	6.0	8.9	6.7	6.9	5.1	5.1	2.2	2.4	4.8	8.9
4-Nov	3.8	Z	8.0	11.9	6.8	5.7	5.9	4.4	2.6	2.0	1.4	1.1	1.0	1.7	2.6	3.5	2.9	2.5	2.7	2.3	2.3	2.8	2.6	2.1	3.6	11.9
5-Nov	1.9	1.8	Z	1.3	1.4	2.1	2.1	2.0	2.5	2.1	2.0	1.9	2.2	3.0	2.1	3.4	2.7	2.4	2.2	2.0	2.4	1.8	1.5	1.3	2.1	3.4
6-Nov	1.3	1.6	1.0	1.4	0.8	1.1	0.8	0.8	0.7	0.7	0.5	1.2	1.5	1.3	1.7	1.9	1.9	2.0	3.4	3.1	3.3	3.4	3.4	2.9	1.7	3.4
7-Nov	2.9	3.5	3.7	Z	4.6	4.6	6.1	5.9	5.7	4.8	3.3	3.3	3.0	2.4	2.8	3.2	2.9	1.8	2.3	4.3	8.7	10.2	8.8	5.7	4.5	10.2
8-Nov	4.1	3.5	4.2	6.7	Z	1.8	1.9	1.3	1.9	3.4	3.8	2.0	1.8	1.5	1.0	2.3	3.4	1.4	0.6	0.7	0.5	0.4	0.3	0.3	2.1	6.7
9-Nov	0.4	0.4	0.3	0.2	0.9	Z	3.8	4.7	2.6	2.2	4.3	4.4	4.6	4.7	6.3	4.7	4.2	2.1	2.6	1.8	4.6	2.4	4.7	4.6	3.1	6.3
10-Nov	Z	10.6	5.4	6.7	10.7	11.4	6.5	3.4	4.6	3.4	2.3	2.5	4.2	11.8	2.5	8.3	7.0	2.9	2.2	2.0	2.0	1.9	2.3	3.9	5.2	11.8
11-Nov	3.5	Z	4.5	3.3	3.7	6.4	5.5	4.3	3.0	2.7	2.4	2.2	2.1	2.1	2.5	2.0	5.1	2.3	2.1	1.9	2.4	3.5	2.8	7.0	3.4	7.0
12-Nov	9.9	10.4	Z	14.0	21.0	13.8	6.4	5.0	5.4	5.1	4.5	3.9	7.4	11.6	7.1	1.8	3.1	8.4	6.1	2.5	7.6	4.7	0.5	0.3	7.0	21.0
13-Nov	0.2	0.2	1.2	Z	0.4	1.4	2.3	3.7	3.7	2.8	3.1	2.0	3.5	4.6	4.2	5.9	7.8	3.6	6.1	4.3	3.2	0.3	0.2	0.2	2.8	7.8
14-Nov	0.2	0.6	1.5	15.3	Z	2.8	2.6	5.7	16.6	15.3	9.4	9.8	6.8	6.6	5.5	5.8	7.8	5.8	4.9	5.6	6.3	11.6	10.2	4.4	7.0	16.6
15-Nov	2.5	3.6	3.9	4.6	20.0	Z	2.2	1.2	0.8	0.5	0.9	3.2	1.4	2.6	2.5	5.7	3.5	2.2	4.5	11.4	8.5	1.7	1.4	0.4	3.9	20.0
16-Nov	Z	3.7	4.4	5.8	9.4	15.0	14.7	4.9	2.3	1.8	1.5	1.4	1.7	1.9	2.6	2.3	1.7	1.9	2.9	3.9	6.9	7.1	6.7	5.8	4.8	15.0
17-Nov	3.1	Z	5.4	4.5	4.3	5.3	4.7	4.1	4.1	3.8	4.1	C	C	C	C	C	3.9	4.1	4.6	4.1	6.4	5.4	7.7	5.6	4.7	7.7
18-Nov	13.0	7.0	Z	3.2	2.7	7.8	5.7	1.5	1.7	1.6	2.2	1.8	1.5	1.1	1.3	1.2	4.2	4.3	7.5	7.9	4.2	2.4	3.7	4.6	4.0	13.0
19-Nov	7.1	5.5	4.8	Z	9.4	8.2	3.8	5.0	3.7	4.1	6.1	3.6	5.4	8.4	8.4	7.6	8.8	21.3	10.1	13.3	29.6	10.4	10.1	5.5	8.7	29.6
20-Nov	2.5	3.1	6.5	4.3	Z	2.7	1.6	2.9	3.5	2.9	8.2	8.5	4.1	3.1	2.8	2.2	3.5	4.5	3.8	4.1	5.6	8.4	10.3	4.4	4.5	10.3
21-Nov	2.1	8.1	15.7	11.9	4.2	Z	6.5	4.7	5.6	5.1	5.1	4.7	3.4	2.3	1.7	1.3	0.2	0.2	0.1	0.1	0.1	0.1	0.2	0.2	3.6	15.7
22-Nov	Z	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.9	1.5	0.2	0.4	3.0	3.5	3.7	12.0	10.2	5.0	2.7	2.3	1.8	2.1	2.2	12.0
23-Nov	1.8	Z	0.9	1.1	2.0	3.2	5.4	6.0	2.1	2.1	1.9	2.0	2.6	4.4	5.3	4.1	5.3	5.9	3.5	3.6	4.7	4.7	4.4	4.8	3.6	6.0
24-Nov	4.7	4.1	Z	3.4	4.5	5.3	5.8	5.5	5.8	5.4	5.2	4.2	4.1	4.5	5.1	6.2	10.6	9.1	6.3	10.7	10.5	12.5	11.0	9.4	6.7	12.5
25-Nov	8.4	9.6	8.8	Z	0.4	0.3	0.3	0.3	0.4	1.4	1.2	0.3	0.3	0.5	0.2	0.3	0.4	0.2	0.2	0.2	0.2	0.2	3.3	9.3	2.0	9.6
26-Nov	11.8	14.5	9.4	10.5	Z	20.4	19.1	22.9	8.3	4.7	5.2	4.1	4.7	3.6	6.4	7.3	7.4	7.6	8.0	8.2	11.4	17.9	16.8	11.1	10.5	22.9
27-Nov	7.1	7.5	7.0	16.2	7.2	Z	7.5	3.3	5.7	3.2	3.5	2.5	4.2	3.7	4.7	4.6	4.2	5.8	6.8	5.7	4.8	2.7	3.9	2.8	5.4	16.2
28-Nov	Z	3.3	3.5	3.3	3.2	2.6	3.7	3.4	4.8	5.4	3.9	1.5	1.2	1.3	1.6	1.2	3.7	4.9	3.4	2.6	2.6	1.4	3.5	7.1	3.2	7.1
29-Nov	7.8	Z	6.5	10.3	10.4	6.9	8.1	14.7	21.5	11.3	6.1	28.4	17.8	11.7	12.2	3.1	2.9	2.5	5.6	5.6	4.1	6.1	3.5	1.5	9.1	28.4
30-Nov	2.0	1.2	Z	0.4	0.7	0.2	0.2	0.2	0.9	0.2	0.2	0.1	0.1	0.1	0.1	0.7	9.5	4.3	2.7	4.2	6.7	6.0	8.0	10.7	2.6	10.7
																								Diurnal Average		
																								Diurnal Maximum		
																								4.5 4.9 4.9 6.5 5.7 6.2 5.2 5.0 4.8 3.8 3.5 3.9 3.5 3.9 3.6 3.8 4.7 4.7 4.1 4.4 5.5 5.1 4.9 4.3		
																								13.0 14.5 15.7 16.2 21.0 20.4 19.4 22.9 21.5 15.3 9.4 28.4 17.8 11.8 12.2 11.1 11.7 21.3 10.2 13.3 29.6 17.9 16.8 11.1		

Z - zerspan C - Calibration



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

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Firebag - November 2023**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Firebag - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	680	99.13	99.13
21 - 40	6	0.87	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 686

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Firebag - November 2023**

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	19	7	11	26	39	32	42	92	67	90	64	36	35	26	59	680
21 - 40	0	0	0	0	0	0	0	1	0	0	2	1	1	0	1	0	6
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	35	19	7	11	26	39	32	43	92	67	92	65	37	35	27	59	686

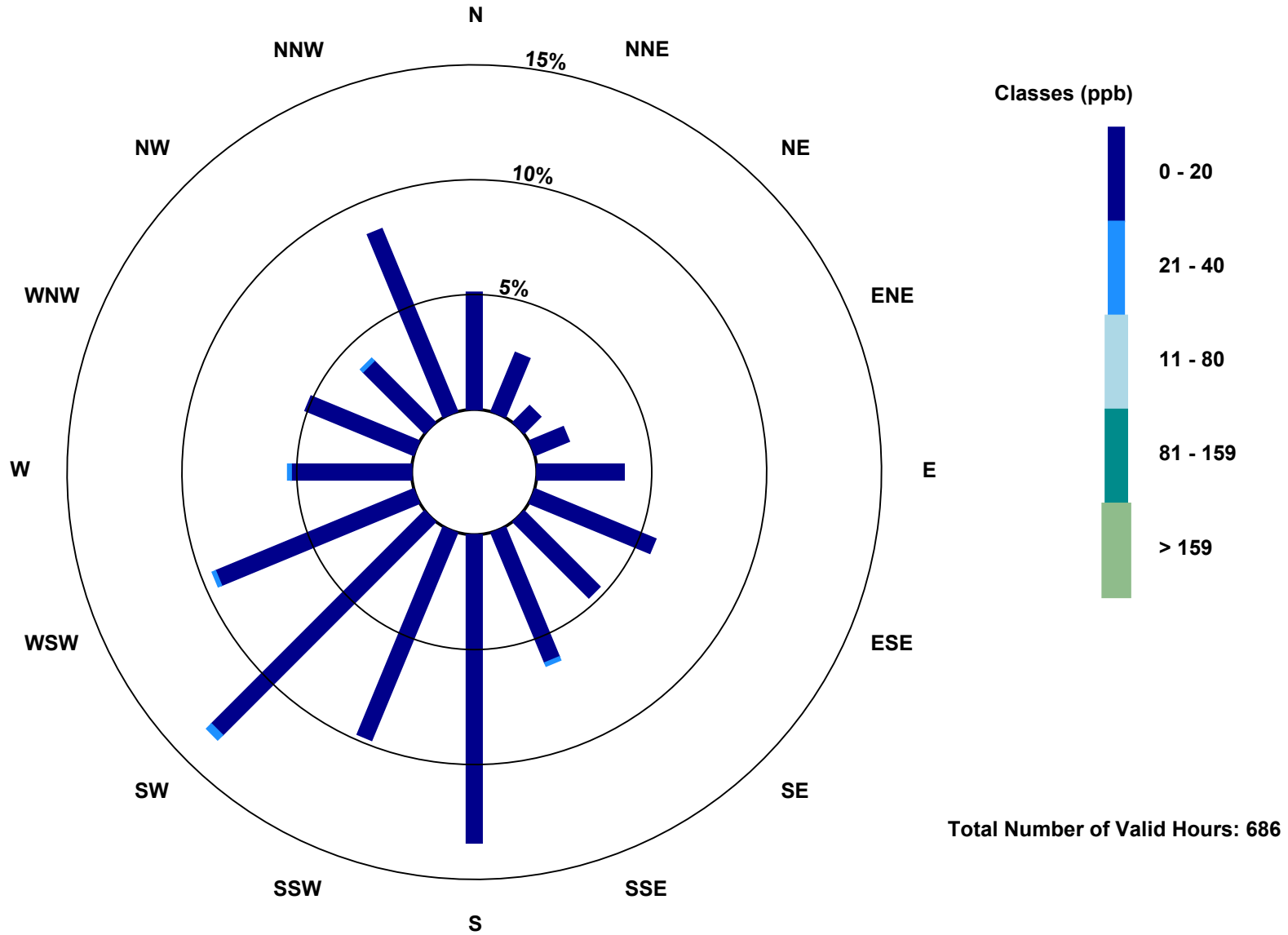
Total Number of Valid Hours: 686

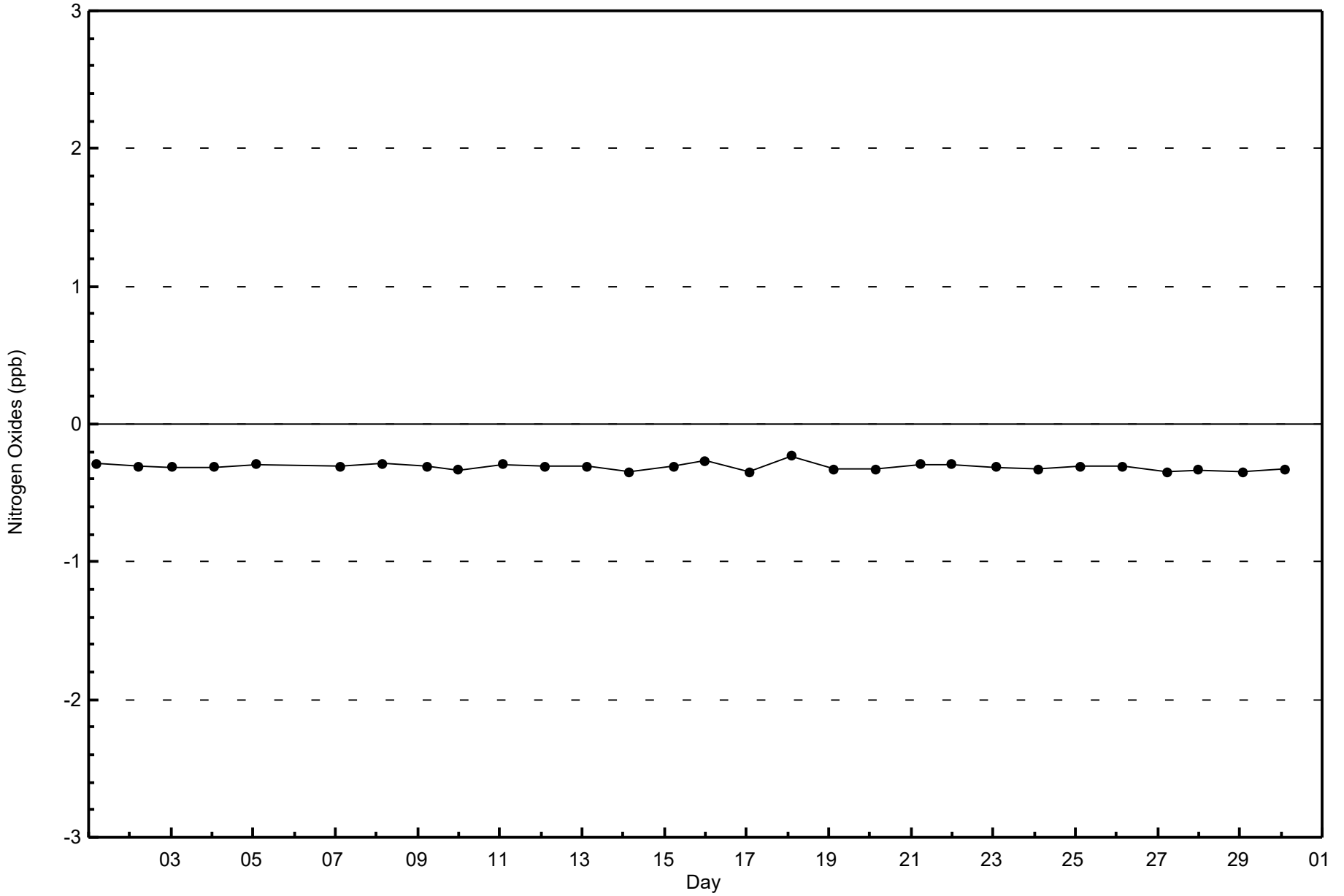
Total Number of Hours: 720

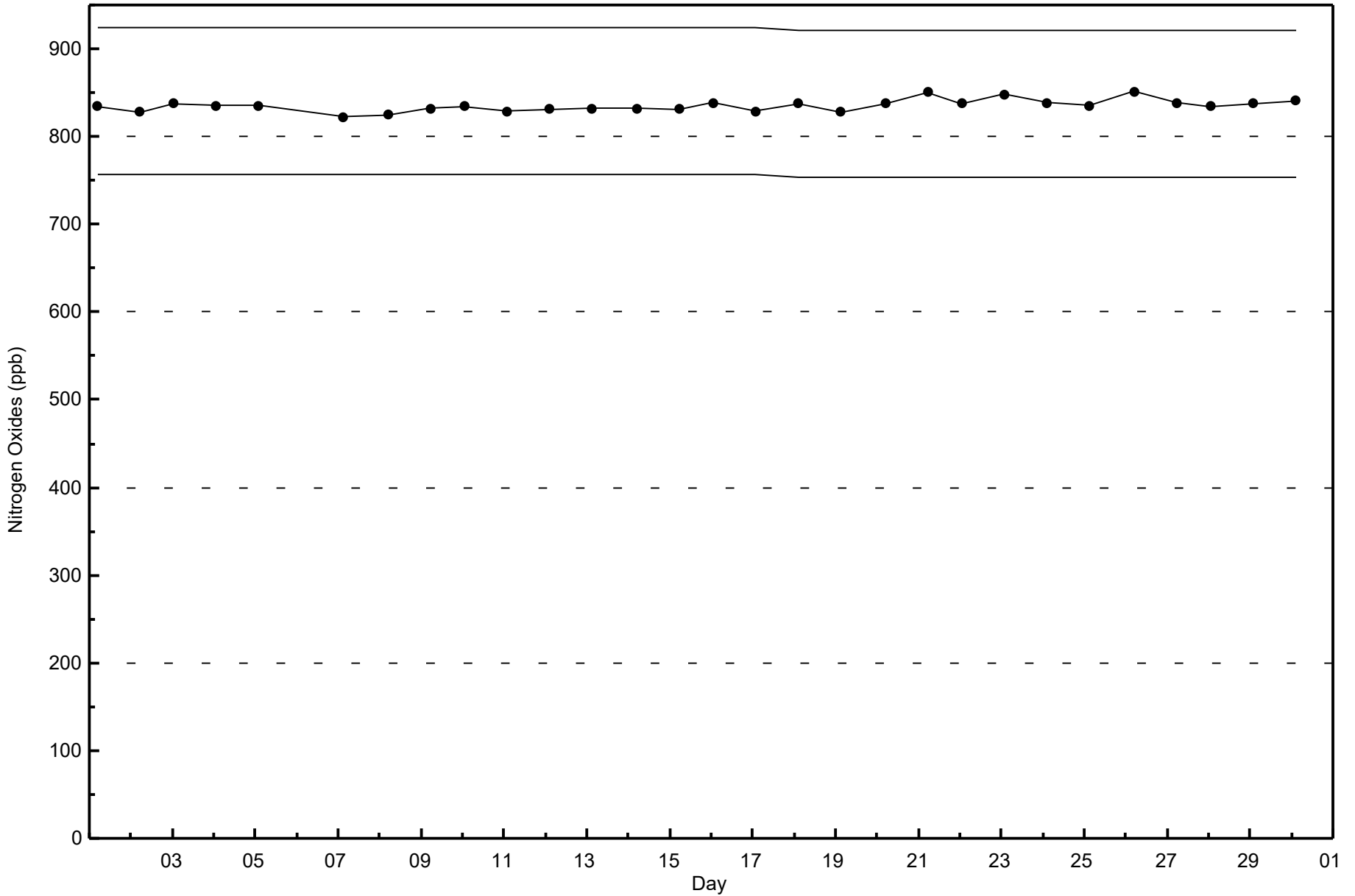


Wood Buffalo Environmental Association  
Wind Rose Nov 2023

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









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

**Ambient Temperature (AT) - C**  
**Firebag - November 2023**

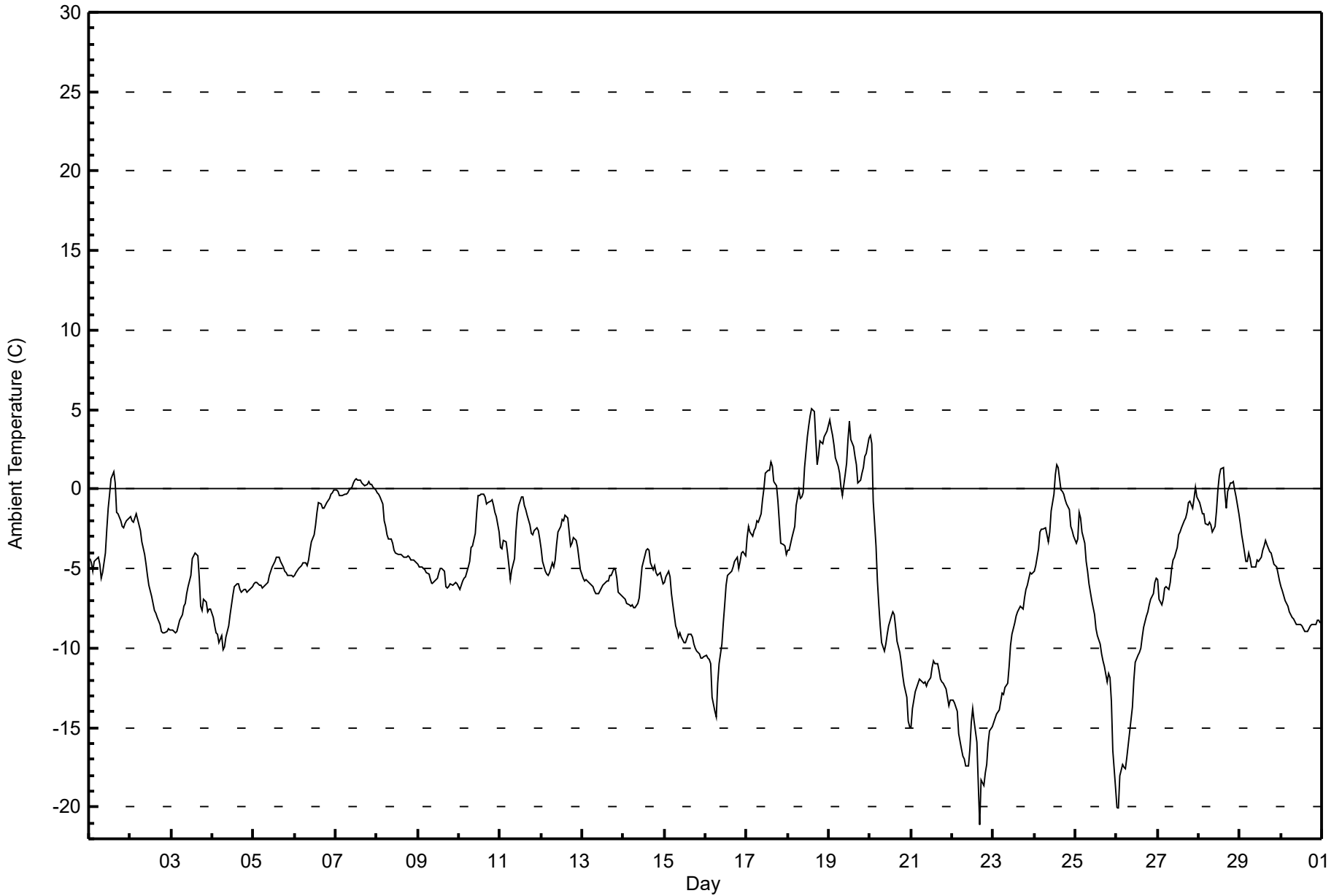
Maximum Value: 5.0 C on Nov 18 15:00      Maximum Daily Average: 2.0 C on Nov 19																				Hours in Service: 720 Hours of Data: 720						
Minimum Value: -21.2 C on Nov 22 17:00      Minimum Daily Average: -16.2 C on Nov 22 Maximum Diurnal Average: -4.1 C at hour 15      Minimum Diurnal Average: -6.5 C at hour 8 Monthly Average: -5.36 C      Percentiles: P <sub>1</sub> = -18.0 P <sub>10</sub> = -12.0 Q <sub>1</sub> = -7.9 Median = -5.0 Q <sub>3</sub> = -2.1 P <sub>90</sub> = 0.1 P <sub>99</sub> = 3.6																				Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	-4.4	-4.7	-5.1	-4.5	-4.4	-4.3	-4.8	-5.6	-5.3	-4.0	-2.5	-1.2	-0.3	0.6	1.1	0.4	-1.5	-1.6	-2.0	-2.4	-2.4	-2.2	-2.0	-1.8	-2.7	1.1
2-Nov	-1.7	-2.0	-2.1	-1.5	-1.9	-2.3	-2.6	-3.3	-4.1	-4.7	-5.4	-6.1	-6.8	-7.2	-7.6	-7.8	-8.1	-8.5	-8.9	-9.1	-9.0	-8.9	-8.8	-8.8	-5.7	-1.5
3-Nov	-8.9	-8.9	-9.0	-9.0	-8.6	-8.3	-7.9	-7.4	-7.2	-6.5	-6.2	-5.5	-4.4	-4.2	-4.0	-4.2	-5.6	-7.4	-7.7	-7.0	-7.1	-7.7	-7.6	-7.6	-7.0	-4.0
4-Nov	-8.0	-8.6	-9.1	-9.2	-9.7	-9.2	-10.1	-9.9	-9.3	-8.6	-7.9	-7.3	-6.6	-6.1	-5.9	-6.0	-6.3	-6.5	-6.3	-6.3	-6.5	-6.4	-6.3	-6.2	-7.6	-5.9
5-Nov	-6.0	-5.9	-5.9	-6.0	-6.1	-6.2	-6.1	-6.0	-5.9	-5.4	-5.2	-4.9	-4.5	-4.3	-4.3	-4.6	-4.9	-5.2	-5.2	-5.4	-5.5	-5.5	-5.5	-5.5	-5.4	-4.3
6-Nov	-5.4	-5.2	-5.0	-4.9	-4.8	-4.6	-4.7	-4.8	-4.5	-3.9	-3.3	-2.9	-2.3	-1.5	-0.8	-0.9	-1.2	-1.2	-1.0	-0.8	-0.6	-0.3	-0.2	-0.1	-2.7	-0.1
7-Nov	0.0	-0.1	-0.4	-0.4	-0.4	-0.3	-0.3	-0.2	0.0	0.1	0.4	0.6	0.7	0.6	0.6	0.4	0.3	0.2	0.3	0.4	0.3	0.3	0.1	0.0	0.1	0.7
8-Nov	-0.2	-0.3	-0.5	-0.9	-2.0	-2.4	-2.9	-3.2	-3.1	-3.4	-3.9	-4.0	-4.1	-4.1	-4.1	-4.2	-4.3	-4.3	-4.2	-4.3	-4.4	-4.4	-4.6	-4.6	-3.3	-0.2
9-Nov	-4.7	-4.9	-4.9	-5.0	-5.1	-5.2	-5.4	-5.7	-5.9	-5.8	-5.8	-5.6	-5.3	-5.0	-5.0	-5.1	-6.1	-6.2	-6.2	-5.9	-6.0	-6.0	-5.9	-6.0	-5.5	-4.7
10-Nov	-6.3	-6.0	-5.8	-5.6	-5.5	-4.9	-4.5	-3.6	-3.5	-2.8	-1.5	-0.4	-0.4	-0.3	-0.3	-0.5	-0.9	-0.9	-0.8	-0.7	-1.0	-1.4	-1.7	-2.7	-2.6	-0.3
11-Nov	-3.7	-3.8	-3.2	-3.3	-4.1	-4.8	-5.7	-5.1	-4.4	-2.7	-1.6	-1.1	-0.5	-0.5	-1.0	-1.3	-1.6	-2.2	-2.7	-2.9	-2.6	-2.5	-2.6	-3.2	-2.8	-0.5
12-Nov	-3.8	-4.6	-5.2	-5.3	-5.4	-5.3	-4.6	-4.9	-4.4	-3.5	-2.7	-2.3	-1.9	-2.0	-1.7	-1.8	-2.7	-3.6	-3.4	-3.1	-3.3	-3.6	-4.4	-5.1	-3.7	-1.7
13-Nov	-5.6	-5.8	-5.7	-5.8	-5.9	-6.0	-6.2	-6.4	-6.6	-6.5	-6.4	-6.2	-6.1	-5.9	-5.8	-5.7	-5.5	-5.4	-5.0	-5.1	-5.6	-6.5	-6.6	-6.8	-6.0	-5.0
14-Nov	-6.8	-7.0	-7.2	-7.3	-7.3	-7.2	-7.5	-7.5	-7.2	-6.8	-5.9	-4.9	-4.2	-3.8	-3.7	-3.9	-4.6	-5.0	-4.8	-5.3	-5.5	-5.2	-5.6	-6.0	-5.8	-3.7
15-Nov	-5.9	-5.5	-5.2	-5.5	-6.5	-7.3	-8.6	-8.9	-9.3	-9.1	-9.3	-9.7	-9.7	-9.4	-9.1	-9.1	-9.3	-9.7	-10.0	-10.2	-10.3	-10.7	-10.6	-10.5	-8.7	-5.2
16-Nov	-10.5	-10.7	-10.7	-11.0	-13.1	-14.0	-14.3	-12.2	-11.0	-9.8	-8.4	-7.3	-6.0	-5.4	-5.2	-5.1	-4.9	-4.5	-4.3	-5.0	-4.6	-4.0	-3.9	-4.2	-7.9	-3.9
17-Nov	-3.0	-2.3	-2.7	-3.0	-2.7	-2.4	-2.0	-2.1	-1.5	-0.7	0.0	1.0	1.1	1.1	1.7	1.5	0.5	0.2	-0.8	-2.1	-3.4	-3.5	-3.6	-4.1	-1.4	1.7
18-Nov	-3.9	-3.9	-3.0	-2.7	-2.3	-1.0	-0.1	-0.6	-0.5	-0.3	1.4	3.3	4.0	4.7	5.0	4.9	3.1	1.5	2.2	3.0	2.9	3.3	3.5	3.7	1.2	5.0
19-Nov	4.4	3.8	3.3	2.7	2.0	1.4	1.0	0.1	-0.4	1.0	1.6	3.1	4.3	3.1	2.7	2.0	1.5	0.4	0.6	1.0	1.3	2.0	2.2	3.2	2.0	4.4
20-Nov	3.4	2.8	-0.7	-3.6	-5.8	-7.3	-8.6	-9.7	-10.2	-9.8	-9.1	-8.6	-8.0	-7.8	-7.9	-8.7	-9.5	-10.3	-10.9	-11.7	-12.3	-13.1	-14.6	-14.9	-8.2	3.4
21-Nov	-14.9	-13.8	-12.7	-12.5	-12.2	-12.0	-12.1	-12.2	-12.2	-12.4	-12.2	-11.8	-11.3	-10.8	-11.0	-11.0	-11.4	-11.9	-12.1	-12.2	-12.5	-13.1	-13.7	-13.3	-12.3	-10.8
22-Nov	-13.2	-13.5	-13.7	-13.9	-15.4	-16.4	-16.8	-16.9	-17.4	-17.4	-16.3	-14.7	-13.8	-14.6	-15.9	-18.6	-21.2	-18.3	-18.6	-17.9	-17.4	-16.0	-15.2	-15.0	-16.2	-13.2
23-Nov	-14.7	-14.4	-14.2	-13.9	-13.3	-12.9	-12.9	-12.5	-12.3	-11.1	-9.9	-9.1	-8.4	-8.0	-7.7	-7.5	-7.4	-7.5	-6.8	-6.3	-6.0	-5.3	-5.3	-5.3	-9.7	-5.3
24-Nov	-5.1	-4.8	-3.7	-2.7	-2.5	-2.6	-2.5	-2.8	-3.3	-2.7	-1.4	-0.3	0.9	1.5	1.4	0.0	-0.1	-0.4	-0.7	-1.0	-1.3	-2.3	-2.6	-2.9	-1.7	1.5
25-Nov	-3.4	-3.2	-1.5	-1.8	-2.7	-3.4	-4.6	-5.2	-6.0	-7.0	-7.5	-7.9	-8.8	-9.2	-9.8	-10.3	-10.8	-11.2	-12.1	-11.6	-11.9	-13.4	-16.5	-18.9	-8.3	-1.5
26-Nov	-20.1	-20.1	-18.0	-17.3	-17.5	-17.6	-16.9	-16.1	-14.5	-13.7	-12.0	-10.9	-10.4	-10.3	-10.0	-9.3	-8.7	-8.0	-7.7	-7.3	-7.0	-6.6	-5.8	-5.6	-12.1	-5.6
27-Nov	-5.7	-6.9	-7.3	-6.9	-6.3	-6.1	-6.3	-5.9	-5.0	-4.5	-4.3	-3.6	-2.9	-2.7	-2.4	-2.0	-1.8	-1.5	-0.9	-0.8	-1.2	-0.6	0.1	-0.5	-3.6	0.1
28-Nov	-0.8	-1.2	-1.6	-1.6	-2.1	-2.3	-2.0	-2.2	-2.7	-2.4	-1.4	-0.1	0.8	1.3	1.4	-0.2	-1.2	-0.2	0.4	0.4	0.5	0.0	-0.5	-1.6	-0.8	1.4
29-Nov	-2.2	-2.9	-3.4	-4.6	-4.5	-4.0	-4.3	-4.9	-4.9	-4.9	-4.5	-4.6	-4.3	-3.8	-3.6	-3.3	-3.5	-3.9	-4.0	-4.4	-4.7	-4.9	-5.4	-5.8	-4.2	-2.2
30-Nov	-6.1	-6.4	-7.0	-7.2	-7.4	-7.7	-8.1	-8.2	-8.4	-8.5	-8.5	-8.5	-8.6	-8.8	-9.0	-8.9	-8.8	-8.6	-8.5	-8.5	-8.5	-8.3	-8.2	-8.4	-8.1	-6.1
																								Diurnal Average		
																								Diurnal Maximum		





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

**Ambient Temperature (AT) - C**  
**Firebag - November 2023**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C  
Firebag - November 2023**

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	3	0.42	0.42
-20 - 0	643	89.31	89.72
0 - 10	74	10.28	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



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

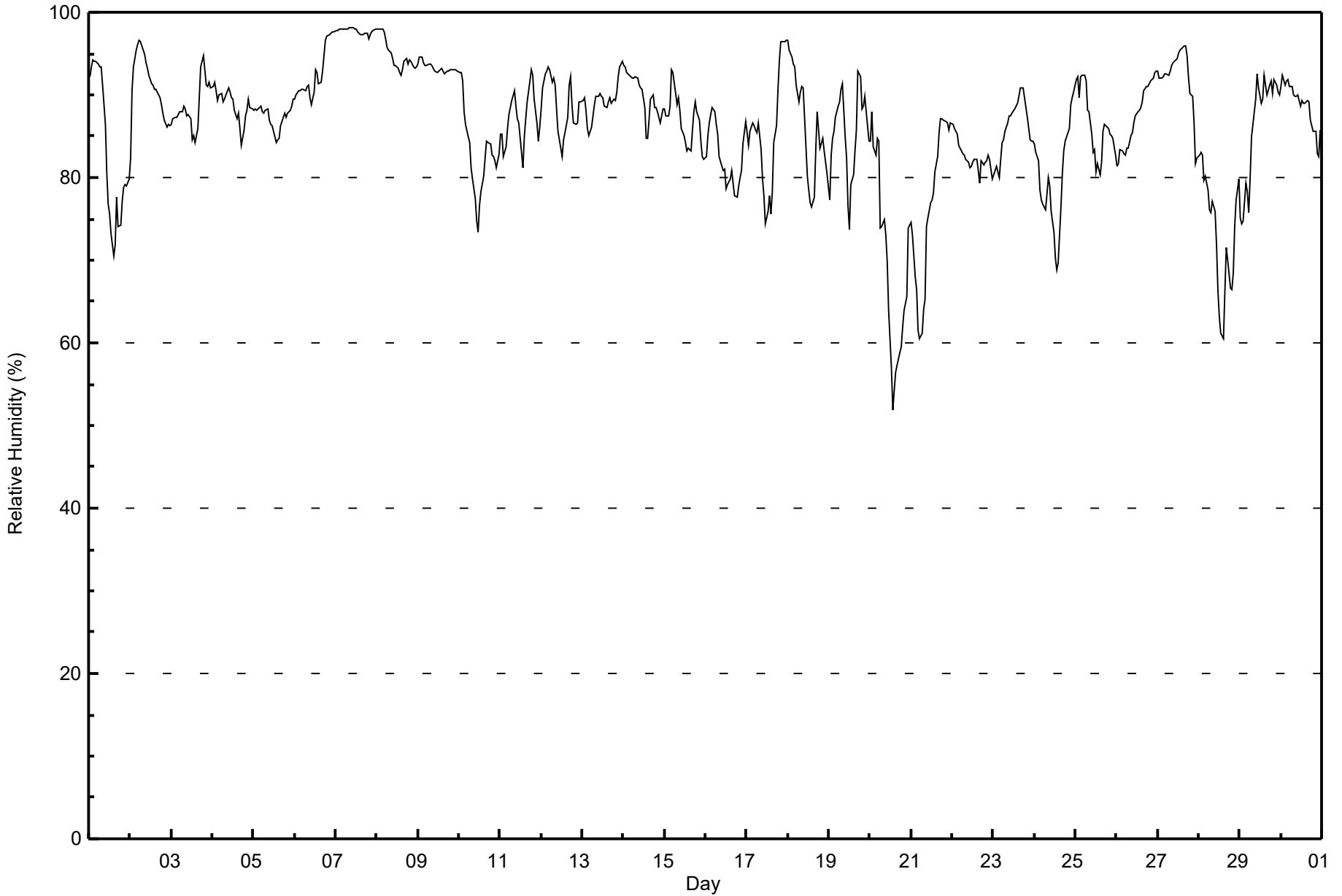
**Relative Humidity (RH) - %**  
**Firebag - November 2023**

Maximum Value: 98.1 % on Nov 7 09:00      Maximum Daily Average: 97.7 % on Nov 7																						Hours in Service:	720																								
Minimum Value: 51.8 % on Nov 20 14:00      Minimum Daily Average: 69.7 % on Nov 20																						Hours of Data:	720																								
Maximum Diurnal Average: 88.1 % at hour 2      Minimum Diurnal Average: 82.9 % at hour 14																						Hours of Missing Data:	0																								
Monthly Average: 86.35 %      Percentiles: P <sub>1</sub> = 60.4 P <sub>10</sub> = 76.9 Q <sub>1</sub> = 82.7 Median = 87.8 Q <sub>3</sub> = 91.5 P <sub>90</sub> = 94.0 P <sub>99</sub> = 98.0																						Hours of Calibration:	0																								
																						Percent Operational Time:	100.0																								
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																					
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																							
1-Nov	92.2	93.4	94.2	94.1	94.0	93.7	93.4	93.4	91.3	86.4	80.6	76.7	75.6	73.2	70.5	71.8	77.6	74.0	74.2	77.1	78.9	79.1	79.0	79.8	83.1	94.2																					
2-Nov	82.3	90.5	93.3	95.3	96.2	96.6	96.4	95.9	95.0	93.9	93.2	92.4	91.3	91.1	90.7	90.6	90.4	89.7	88.8	87.8	87.0	86.1	86.5	86.3	91.1	96.6																					
3-Nov	86.5	87.1	87.3	87.4	87.7	87.9	88.1	88.7	88.4	87.4	87.6	87.1	84.6	85.0	84.3	85.9	89.6	93.4	94.0	94.7	91.2	90.9	91.5	90.9	88.6	94.7																					
4-Nov	91.0	91.5	90.5	89.4	90.1	90.2	89.1	89.4	90.0	90.8	90.3	89.7	89.4	88.2	87.2	87.9	85.9	84.0	85.7	87.5	88.2	89.5	88.5	88.4	88.8	91.5																					
5-Nov	88.2	88.3	88.1	88.5	88.6	88.0	87.8	88.1	88.2	86.9	86.4	86.2	85.0	84.3	84.6	84.8	86.3	87.3	87.7	87.4	87.7	88.1	88.7	89.4	87.3	89.4																					
6-Nov	89.5	90.1	90.6	90.6	90.7	90.7	90.6	91.0	91.2	89.7	88.9	90.4	93.0	92.8	91.3	91.6	92.9	94.7	96.6	97.1	97.4	97.5	97.6	97.7	92.7	97.7																					
7-Nov	97.8	97.8	97.9	97.9	97.9	98.0	98.0	98.1	98.1	98.1	98.1	98.1	98.1	97.9	97.6	97.4	97.3	97.3	97.4	97.4	96.8	97.3	97.7	97.8	97.9	97.7	98.1																				
8-Nov	97.9	98.0	98.0	97.9	97.6	96.8	95.8	95.4	95.1	94.4	93.6	93.5	93.3	92.8	92.4	93.0	94.1	94.4	93.7	94.3	94.2	93.3	93.1	93.3	94.8	98.0																					
9-Nov	93.7	94.6	94.5	93.9	93.6	93.6	93.7	93.7	93.5	93.2	92.9	92.7	92.9	93.1	93.2	92.6	92.8	92.9	92.9	93.1	93.0	93.0	93.0	92.9	93.3	94.6																					
10-Nov	92.7	92.7	91.7	88.0	86.4	84.9	84.3	81.2	79.9	77.5	74.7	73.4	76.6	78.4	80.1	82.3	84.4	84.2	84.2	82.8	82.5	82.0	81.2	83.0	82.9	92.7																					
11-Nov	85.2	85.3	82.6	83.7	85.9	87.6	88.6	89.2	90.6	88.6	87.1	86.6	83.0	81.1	84.9	87.2	89.1	91.7	93.1	92.4	89.6	86.6	84.5	86.1	87.1	93.1																					
12-Nov	88.4	90.8	92.6	93.0	93.4	93.0	91.5	92.1	91.2	88.4	85.6	83.5	82.5	84.6	85.4	87.2	91.1	92.1	88.9	86.7	86.4	86.7	89.2	89.1	88.9	93.4																					
13-Nov	89.3	89.7	88.2	85.9	85.1	86.2	87.4	88.8	89.9	89.8	90.1	89.8	89.7	88.7	88.6	89.2	89.6	89.0	89.6	89.3	90.4	92.2	93.3	94.0	89.3	94.0																					
14-Nov	93.5	93.3	92.8	92.4	92.2	92.0	92.0	92.2	92.0	91.2	90.8	90.7	88.5	84.7	84.7	86.9	89.5	90.0	88.5	88.5	88.0	86.7	87.5	88.4	89.9	93.5																					
15-Nov	88.3	87.4	87.5	88.7	93.1	92.7	90.2	88.7	89.6	88.2	86.0	85.2	84.3	83.3	83.6	83.3	85.8	88.0	89.1	87.9	87.0	84.4	82.5	82.2	87.0	93.1																					
16-Nov	82.5	85.1	86.6	87.6	88.6	88.0	86.5	85.2	82.5	81.3	80.9	81.1	78.6	79.2	79.9	80.9	79.4	77.9	77.6	79.0	80.0	80.9	84.1	86.8	82.5	88.6																					
17-Nov	85.4	83.9	85.6	86.6	86.3	85.8	85.5	86.6	83.4	79.8	77.8	74.5	75.9	77.9	75.5	78.3	84.3	86.3	90.5	94.0	96.4	96.5	96.4	96.6	85.4	96.6																					
18-Nov	96.5	95.5	94.5	93.8	93.4	91.1	89.2	90.3	91.0	90.8	87.2	80.1	78.4	77.0	76.4	77.6	83.5	87.9	85.7	83.5	84.8	83.2	81.8	80.4	86.4	96.5																					
19-Nov	77.2	82.7	84.7	85.6	87.3	88.6	89.2	90.6	91.4	85.0	82.3	76.6	73.8	79.2	80.3	83.1	85.8	92.9	92.3	88.3	88.6	89.9	88.0	84.4	85.3	92.9																					
20-Nov	84.4	87.9	83.7	82.7	84.7	84.4	73.9	74.1	75.0	73.0	69.9	64.0	57.0	51.8	54.2	56.5	57.3	58.9	59.5	61.8	63.9	65.7	73.9	74.3	69.7	87.9																					
21-Nov	74.5	73.0	67.9	66.4	61.5	60.4	61.3	64.1	65.2	74.1	75.1	76.9	77.3	78.1	80.7	82.6	85.4	87.1	87.2	87.0	86.7	86.5	85.8	86.7	76.3	87.2																					
22-Nov	86.4	85.9	85.6	85.3	83.9	83.2	82.9	82.7	82.2	81.9	81.2	81.4	81.9	82.2	82.3	80.8	79.3	82.1	81.4	81.8	82.1	82.7	82.2	79.9	82.5	86.4																					
23-Nov	80.3	80.9	81.4	80.1	82.3	84.2	84.6	85.6	86.6	87.4	87.4	87.8	88.3	88.6	89.1	89.8	90.8	90.9	89.6	88.4	87.2	84.6	84.5	84.4	86.0	90.9																					
24-Nov	84.0	83.0	82.0	78.5	77.3	76.9	76.1	78.0	80.0	79.0	75.9	73.3	70.3	68.8	69.6	76.4	80.5	83.2	84.3	84.8	85.9	88.8	89.7	90.3	79.9	90.3																					
25-Nov	91.8	92.2	89.7	92.2	92.3	92.4	91.7	88.1	87.9	85.2	83.1	83.5	80.7	81.7	80.4	81.8	85.6	86.4	86.1	85.9	85.3	85.1	84.8	82.7	86.5	92.4																					
26-Nov	81.3	81.7	83.4	83.2	82.9	82.8	83.5	83.6	85.1	85.5	86.6	87.4	88.0	88.1	88.4	89.2	90.4	91.0	91.0	91.4	91.7	92.1	92.7	92.9	87.2	92.9																					
27-Nov	92.8	92.0	92.0	92.2	92.6	92.6	92.4	92.8	93.6	93.9	94.1	94.4	95.0	95.4	95.6	95.9	95.9	94.7	92.2	90.2	89.8	86.7	81.7	82.3	92.1	95.9																					
28-Nov	82.7	83.0	82.7	79.7	80.1	78.5	76.0	75.8	77.1	75.9	72.1	66.5	63.2	61.2	60.5	66.2	71.4	69.9	66.7	66.4	68.6	74.1	77.3	79.9	73.1	83.0																					
29-Nov	75.1	74.3	74.7	79.4	78.2	75.8	79.8	84.9	88.0	89.5	92.5	90.9	89.1	89.6	92.3	91.2	90.0	91.2	91.7	90.2	91.8	91.1	90.3	89.9	86.3	92.5																					
30-Nov	91.0	92.4	91.2	91.7	91.8	91.1	91.1	90.0	89.8	89.8	90.0	88.7	89.3	88.9	89.0	89.4	89.1	86.9	86.3	85.6	85.6	83.0	82.5	85.7	88.7	92.4																					
																						87.4	88.1	87.8	87.7	87.8	87.6	87.0	87.3	87.4	86.5	85.4	84.1	83.2	82.9	83.1	84.4	86.2	87.0	86.9	86.7	86.9	86.8	87.0	87.2	Diurnal Average	
																						97.9	98.0	98.0	97.9	97.9	98.0	98.0	98.1	98.1	98.1	98.1	98.1	98.1	97.9	97.6	97.4	97.3	97.3	97.4	97.4	97.1	97.4	97.7	97.8	97.9	Diurnal Maximum



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

**Relative Humidity (RH) - %**  
**Firebag - November 2023**





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

**Relative Humidity (RH) - %**  
**Firebag - November 2023**

<b>Concentration Ranges (%)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	0	0.00	0.00
20 - 40	0	0.00	0.00
40 - 60	7	0.97	0.97
60 - 80	109	15.14	16.11
80 - 100	604	83.89	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



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

**Wind Speed (WS) - km/h**  
**Firebag - November 2023**

Maximum Speed: 36 km/h on Nov 25 06:00	Maximum Daily Speed Average: 22.8 km/h on Nov 10	Hours in Service: 720
Minimum Speed Value: 0 km/h on Nov 22 16:00	Minimum Daily Speed Average: 2.1 km/h on Nov 22	Hours of Data: 720
Maximum Diurnal Speed Average: 6.1 km/h at hour 23	Minimum Diurnal Speed Average: 2.8 km/h at hour 6	Hours of Missing Data: 0
Monthly Average Velocity: 4.7 km/h 223.0 deg	Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 6 Q <sub>1</sub> = 9 Median = 13 Q <sub>3</sub> = 17 P <sub>90</sub> = 21 P <sub>99</sub> = 29	Percent Operational Time: 100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	WNW4	WSW5	SW6	SW7	SW9	SW8	SW7	SW9	SW10	SW9	WSW11	WSW9	SW8	SW12	SW13	SW12	SW9	SSW9	SSW9	SW10	SW11	SW10	SW9	WSW8	SW8.8	SW13
2-Nov	WSW9	W9	WNW5	NNW9	N14	N15	N15	N17	N16	N15	N14	N14	N14	N14	N12	N12	N8	NNE7	NNE6	NW2	ENE1	S5	SSW5	SW6	N7.9	N17
3-Nov	SSE6	S10	S11	S12	SSE9	S8	SSW9	S10	SSE7	SSE4	NE5	ENE5	ENE5	E8	ESE7	ENE6	SSE4	ESE5	E5	ESE5	E6	ESE4	E4	E7	SE4.8	S12
4-Nov	ESE6	SE6	SE6	SE8	SE9	SE9	SE9	SSE10	SSE11	SE11	SSE13	SSE13	SE13	SE10	SE12	ESE12	ESE15	ESE16	ESE16	ESE16	ESE17	ESE19	ESE20	ESE17	SE12.1	ESE20
5-Nov	ESE18	ESE19	ESE19	ESE16	ESE16	ESE18	ESE16	ESE16	ESE14	ESE15	ESE15	ESE14	ESE15	ESE14	ESE14	ESE11	ESE12	ESE13	SE12	SE11	SE11	SE14	SE14	SE15	ESE14.3	ESE19
6-Nov	SE15	SSE14	SSE14	SE16	SSE16	SSE15	SSE19	SSE19	SSE21	S20	S21	S20	S24	S20	S22	S24	S23	S21	S22	S23	S21	S19	S19	SSW17	S18.8	S24
7-Nov	SSW17	SSW16	SW16	SW14	SW14	SW13	SW13	SW12	SW12	SW14	SW14	SW15	SW15	SSW15	SW14	SSW11	SSW10	SSW11	SSW12	SW12	SW12	SW13	SW14	WSW14	SW13.3	SSW17
8-Nov	WSW13	W12	WNW11	NW17	NW19	NW16	NW19	NW16	NW16	NW20	NNW21	NNW20	NNW23	NNW24	NNW23	NNW20	NNW20	NNW19	NNW17	NNW17	NNW17	NNW15	N13	NNW11	NW16.3	NNW24
9-Nov	NNW11	NNW11	NNW8	NNW8	NW7	NW5	SW4	SSW7	SW10	SSW12	S14	S15	SSW14	S18	S19	S16	SSE16	SSE17	S16	SSE17	S15	SSE17	S17	S17	S8.6	S19
10-Nov	S14	S19	S24	S25	S21	S25	S24	S25	S25	S24	S28	S25	S26	S27	S26	S22	S23	S23	SSW23	SSW23	SSW21	SSW21	S20	S18	S22.8	S28
11-Nov	S18	SSE15	SSE15	SSE22	SSE20	SE17	SE17	SSE21	SE23	SE22	SE24	SE24	SSE26	SSE24	SSE21	SSE22	S20	S18	S16	SSW16	SSW15	SSW15	SSW14	SW12	SSE17.6	SSE26
12-Nov	SW9	SW10	SW9	SW11	SW13	WSW14	WSW14	W14	W17	W19	W21	WNW19	WNW17	W12	W13	W11	W8	W7	WNW9	NW7	NNW8	N9	N8	NNE9	W9.7	W21
13-Nov	NNE12	NE5	ENE5	NE7	NE9	ENE8	E8	E10	E13	E13	E16	E16	E18	E19	E16	ENE19	E19	E20	E19	E19	E11	NNE5	N6	N8	ENE11.4	E20
14-Nov	N8	NNW9	NNW8	NW8	NW10	NW9	W7	WSW9	SW9	SW11	SW11	SW13	SW18	SW19	SW18	SW14	SW13	WSW11	WSW12	SW12	SW12	SSW13	SSW13	SSW12	WSW9.2	SW19
15-Nov	SSW11	SSW11	SW6	WSW1	NNE7	NNE9	N14	N16	N17	NNW20	NNW19	NNW21	NNW17	NNW12	NW8	WSW7	SW10	SW10	W10	NW9	NNW10	NNW11	WNW10	W9	NW7.7	NNW21
16-Nov	W8	WSW9	SW9	SW8	SSW9	SSW10	S10	S10	SSE15	SSE20	S19	S20	S18	SSW17	S17	SSW17	SSW16	SSW14	SSW14	SW12	SW14	SW15	SW16	SW14	SSW12.6	S20
17-Nov	WSW20	WSW22	WSW17	WSW17	WSW17	WSW17	WSW16	WSW17	WSW18	WSW21	WSW22	WSW25	WSW21	WSW17	WSW17	WSW15	W11	W12	WSW9	WSW6	SW6	SW7	SSW6	SSW6	WSW14.9	WSW25
18-Nov	S8	S9	SSE9	SSE11	S12	S14	S16	S16	S14	S14	SSW16	SSW15	SSW12	SSW13	SSW13	SSW14	S10	S10	S10	SSE8	S9	S11	S10	S7	S11.4	S16
19-Nov	SE8	ESE5	E10	ESE6	ESE8	ESE11	SE8	SE6	E5	E4	SE5	SSE3	NNW7	NNW6	E3	SW3	W5	WSW6	SW9	SW10	SW9	SW14	SW18	WSW19	S3.3	WSW19
20-Nov	WSW18	W21	WNW29	WNW28	WNW28	WNW27	WNW28	WNW24	WNW21	WNW20	WNW21	WNW22	WNW24	WNW26	WNW26	WNW22	WNW20	WNW17	WNW14	WNW11	WNW10	WNW8	WSW7	SW8	WNW19.6	WNW29
21-Nov	W5	WNW5	NW3	NNE3	NE7	E8	ESE8	SE8	ESE9	ESE9	ESE12	ESE11	E12	ENE11	ENE12	ENE10	NE13	NNE13	NE12	NNE14	NNE14	NNE13	NNE11	NNE13	ENE7.2	NNE14
22-Nov	NNE12	N9	N8	N8	NNE8	NNE8	NE8	NNE6	NNE5	NNE5	E0	N1	N3	N1	ENE1	NNW0	E4	SE5	SSE5	SSE5	S6	S7	S8	S9	NE2.1	NNE12
23-Nov	SSE11	S13	S14	S15	SSE20	S18	S16	S15	S14	S14	SSW14	SSW13	SSW14	SSW14	SSW16	SSW15	SSW17	SSW16	SSW18	SSW18	SW18	SW19	SW21	SW23	SSW15.2	SW23
24-Nov	SW24	SW20	SW23	SW24	WSW22	WSW23	WSW17	WSW20	SW16	WSW15	WSW14	WSW13	W11	WSW12	WSW10	SW11	SW12	SW13	SW16	WSW15	SW14	SW13	SW15	WSW12	SW15.7	WSW24
25-Nov	SW14	W8	NNW16	NNW28	NNW29	NNW36	NNW34	NNW31	NNW32	NNW34	NNW27	NNW32	NNW32	NNW28	NNW23	NNW16	NNW14	N14	N11	N15	N12	NNW6	W3	SW4	NNW19.4	NNW36
26-Nov	SSW3	SSE3	SE5	SSE5	SSE4	SE4	SSE7	SSE4	SE3	SSE6	SSW6	SW7	SW7	SW8	SW7	SW6	SW6	WSW6	WSW6	WSW7	SSW4	SSW5	SSW7	SW4	SSW4.5	SW8
27-Nov	SW5	SSW6	SSW7	SSW7	S8	S10	S10	S11	S11	S12	S12	S12	SSW11	SSW11	SSW11	SW11	SW11	WSW9	WSW11	WSW11	WSW13	W19	W21	W18	SW9.5	W21
28-Nov	WSW17	WSW18	WSW18	W16	WSW15	W13	W15	W16	WSW15	WSW16	W17	W18	W17	W16	W13	WSW11	WSW13	WSW16	WSW15	WSW14	WSW15	W16	WNW13	W15	W15.0	W18
29-Nov	WNW16	WNW14	WNW13	WNW10	WNW11	NW12	NW11	NW12	NW14	NW12	WNW13	W12	WNW14	WNW15	NW13	NW17	NNW22	NNW16	NW14	NW16	NNW14	NNW17	NNW20	NNW21	NW13.8	NNW22
30-Nov	NNW16	NNW15	NNW15	NNW13	NNW13	NNW11	NNW11	NNW11	NNW9	NNW9	NNW10	N9	N9	N8	NNE5	N1	S1	W2	NW2	WSW3	SW2	S3	SSE4	S5	NNW6.3	NNW16

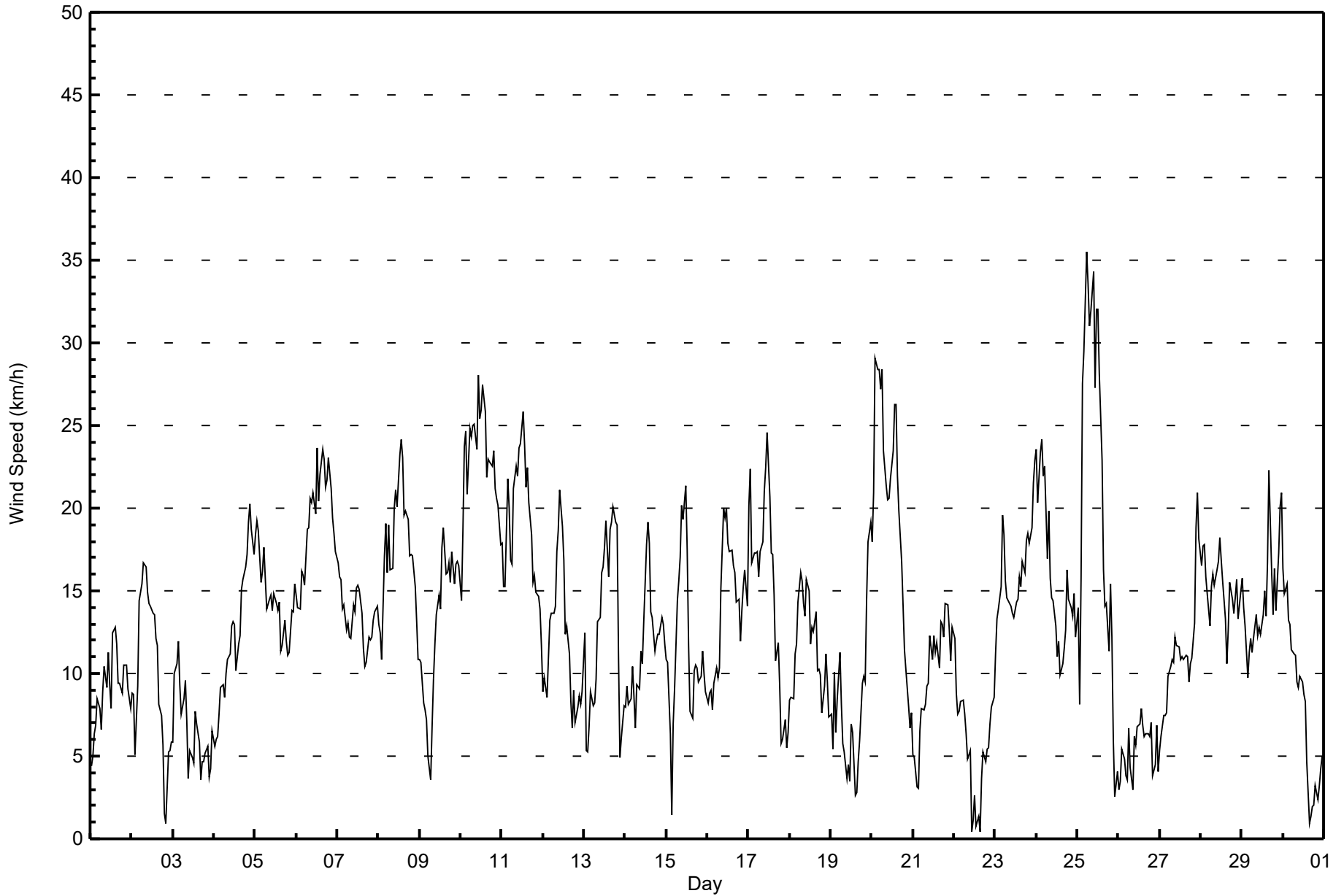
SW5.4 SW5.5 SW4.8 SW4.2	WSW3.3 SW2.8 SW3.2 SW4.1 SW3.7 SW4.3 SW5.0 SW5.2 SW4.6 SW4.8 SW4.9 SW4.8 SW4.6	SSW4.5 SSW5.1 SW5.0 SW4.9 SW5.8 SW6.1 SW5.7	Diurnal Average
SW24 WSW22 WNW29 WNW28 NNW29 NNW36 NNW34 NNW31 NNW32 NNW34 NNW27 NNW32 NNW32 NNW28 NNW26	S24 S23 S23 SSW23 SSW23 SSW21 SSW21 SW21 SW23		Diurnal Maximum

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



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

**Wind Speed (WS) - km/h**  
**Firebag - November 2023**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h  
Firebag - November 2023**

<b>Wind Speed Ranges (km/h)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	71	9.86	9.86
6 - 11	228	31.67	41.53
12 - 19	312	43.33	84.86
20 - 28	100	13.89	98.75
29 - 38	9	1.25	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  
Firebag - November 2023**

<b>Wind Speed Ranges (km/h)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 5	4	5	2	5	7	4	5	10	4	4	6	3	4	3	4	1	71
6 - 11	13	9	4	4	8	10	14	11	24	21	42	21	11	8	10	18	228
12 - 19	19	7	2	2	11	26	10	16	37	36	44	38	20	11	15	18	312
20 - 28	0	0	0	0	1	1	4	10	30	6	4	10	3	14	1	16	100
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	8	9
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	<b>36</b>	<b>21</b>	<b>8</b>	<b>11</b>	<b>27</b>	<b>41</b>	<b>33</b>	<b>47</b>	<b>95</b>	<b>67</b>	<b>96</b>	<b>72</b>	<b>38</b>	<b>37</b>	<b>30</b>	<b>61</b>	<b>720</b>

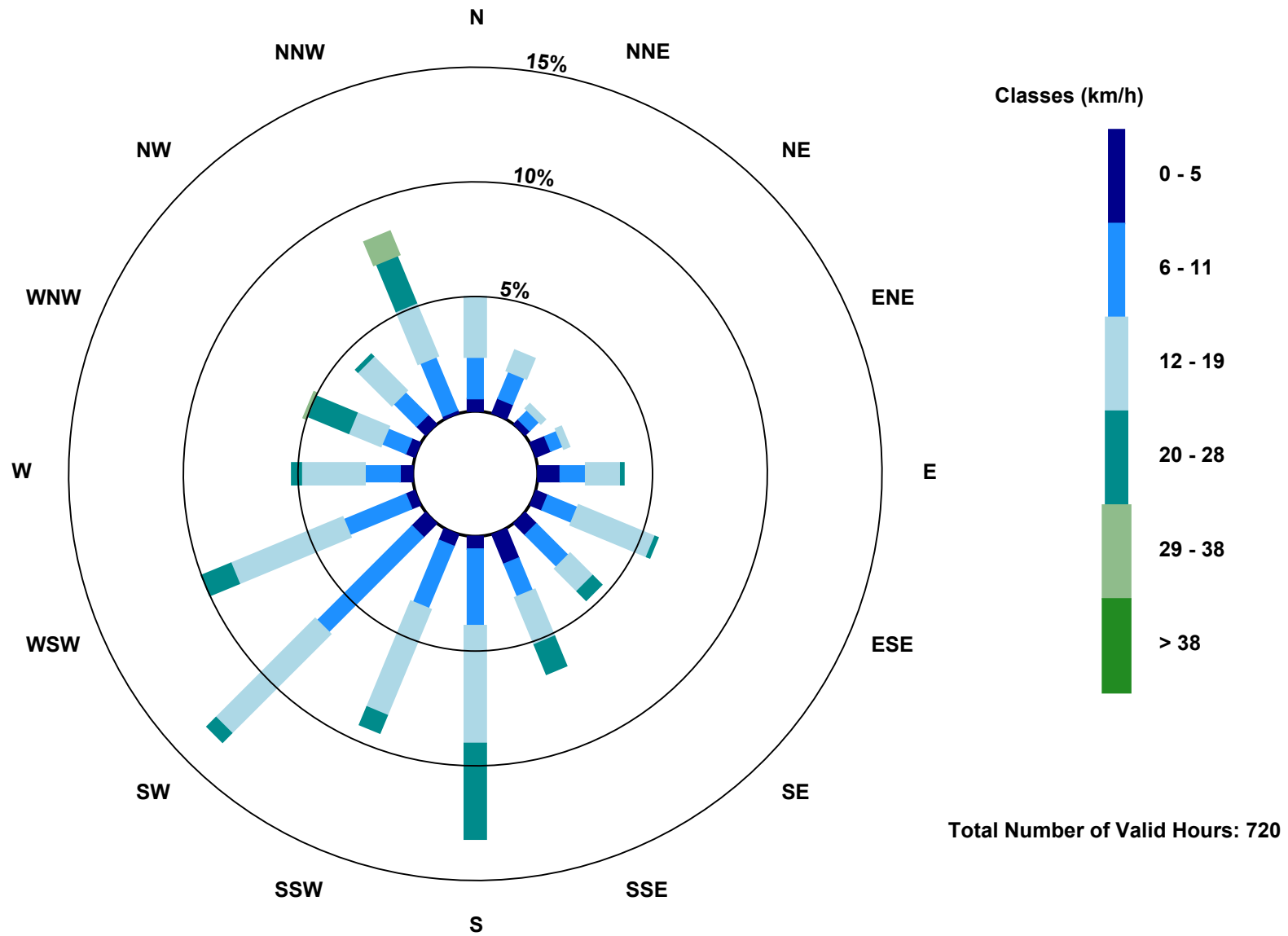
Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 2023

Wind Speed (WS) - km/h  
Firebag





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

**Wind Speed (WS) - km/h**  
**Firebag - November 2023**

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



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

**Wind Direction (WD) - deg**  
**Firebag - November 2023**

Direction of Maximum Speed: 344 deg on Nov 25 06:00	Hours in Service: 720
Direction of Maximum Daily Speed Average: 184.5 deg on Nov 10	Hours of Data: 720
Direction of Minimum Speed: 329 deg on Nov 22 16:00	Hours of Missing Data: 0
Direction of Minimum Daily Speed Average: 2.1 deg on Nov 22	Percent Operational Time: 100.0
Monthly Average Direction: 223.0 deg	

Day	Hourly Period Ending At (MST)																								Daily Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Nov	283	258	236	231	235	236	224	217	222	235	237	249	230	228	231	221	217	213	213	224	230	232	236	245	230.5
2-Nov	256	265	291	337	353	358	3	357	3	355	350	350	0	355	10	7	359	15	20	315	70	181	210	234	349.5
3-Nov	158	171	191	177	162	177	194	185	167	154	50	62	76	101	110	75	158	121	94	108	97	111	90	100	140.4
4-Nov	104	127	132	133	145	141	145	148	148	138	152	156	144	132	128	115	120	123	123	119	122	115	119	119	129.6
5-Nov	117	117	115	108	104	110	115	115	119	116	118	114	116	111	118	121	114	116	129	145	142	141	139	138	119.9
6-Nov	144	148	152	144	160	161	165	160	164	169	171	171	171	171	170	178	179	179	178	184	189	190	190	197	171.6
7-Nov	201	212	219	223	218	217	223	223	219	216	214	217	216	207	214	211	202	195	201	217	217	222	232	241	215.9
8-Nov	248	263	287	305	309	314	312	311	314	323	327	331	331	338	337	332	333	339	344	339	342	347	350	344	324.8
9-Nov	343	347	346	331	322	309	221	205	220	199	185	189	196	179	182	186	168	167	169	168	169	168	170	171	185.3
10-Nov	175	176	171	177	179	178	176	184	182	179	190	190	187	188	187	180	183	186	193	197	198	197	191	179	184.5
11-Nov	171	168	165	162	155	140	139	147	141	143	141	144	148	163	164	159	176	169	179	193	207	212	206	218	163.2
12-Nov	218	219	219	229	231	247	253	259	267	272	274	282	288	275	275	274	278	278	295	306	340	355	6	12	271.9
13-Nov	31	40	68	46	49	72	94	99	89	98	90	90	82	83	91	69	80	92	93	92	84	14	356	351	77.7
14-Nov	357	334	330	310	313	313	265	240	218	221	219	226	219	221	226	228	233	246	241	226	224	209	213	203	238.3
15-Nov	207	210	217	243	31	23	10	354	351	346	334	329	334	325	310	243	230	232	266	316	311	315	301	279	316.1
16-Nov	263	237	228	225	202	194	183	172	164	166	169	176	182	194	191	193	200	203	212	220	231	234	233	231	200.1
17-Nov	247	243	243	244	247	242	248	245	255	252	250	250	247	245	250	258	264	263	253	249	225	215	206	208	246.7
18-Nov	183	179	163	167	173	173	172	174	179	185	199	203	193	193	196	196	190	174	186	167	170	187	182	174	182.5
19-Nov	146	114	101	122	116	122	128	133	87	100	124	155	327	341	101	217	280	241	226	222	217	229	236	253	188.4
20-Nov	255	277	283	291	294	298	301	298	298	291	286	282	288	295	294	294	293	295	299	292	293	288	257	235	289.6
21-Nov	270	287	306	28	45	87	108	131	108	110	107	105	86	78	71	60	35	33	42	32	29	25	14	16	57.9
22-Nov	12	8	358	3	14	26	35	27	23	33	94	350	351	349	78	329	85	134	150	162	170	176	183	176	44.8
23-Nov	167	169	171	171	167	175	169	177	172	188	200	200	200	206	212	211	212	208	209	212	218	217	216	215	196.0
24-Nov	217	214	224	236	239	240	241	243	234	245	249	255	260	252	246	228	222	225	227	240	230	225	227	239	234.6
25-Nov	231	275	331	341	346	344	342	344	342	335	339	345	340	339	346	341	345	357	354	354	351	345	273	222	339.6
26-Nov	207	158	139	150	148	139	162	162	134	168	192	217	219	223	224	226	224	239	237	237	213	199	206	220	199.9
27-Nov	221	212	195	200	185	180	182	186	180	182	182	190	204	206	211	214	223	242	248	250	251	260	265	261	218.6
28-Nov	258	254	256	259	255	276	271	261	256	258	259	265	267	262	260	253	246	248	253	243	248	263	287	279	259.9
29-Nov	282	284	285	291	301	317	309	307	314	306	299	280	285	301	306	314	335	333	317	325	332	327	332	341	311.7
30-Nov	332	338	340	338	346	346	344	342	336	347	348	350	358	7	24	356	172	269	325	241	222	173	155	182	341.3

224.0 224.6 225.5 234.0 237.7 232.3 227.2 222.8 218.5 223.5 223.1 230.3 232.9 227.8 218.6 216.8 215.1 208.3 212.9 217.2 219.0 221.4 223.0 224.6

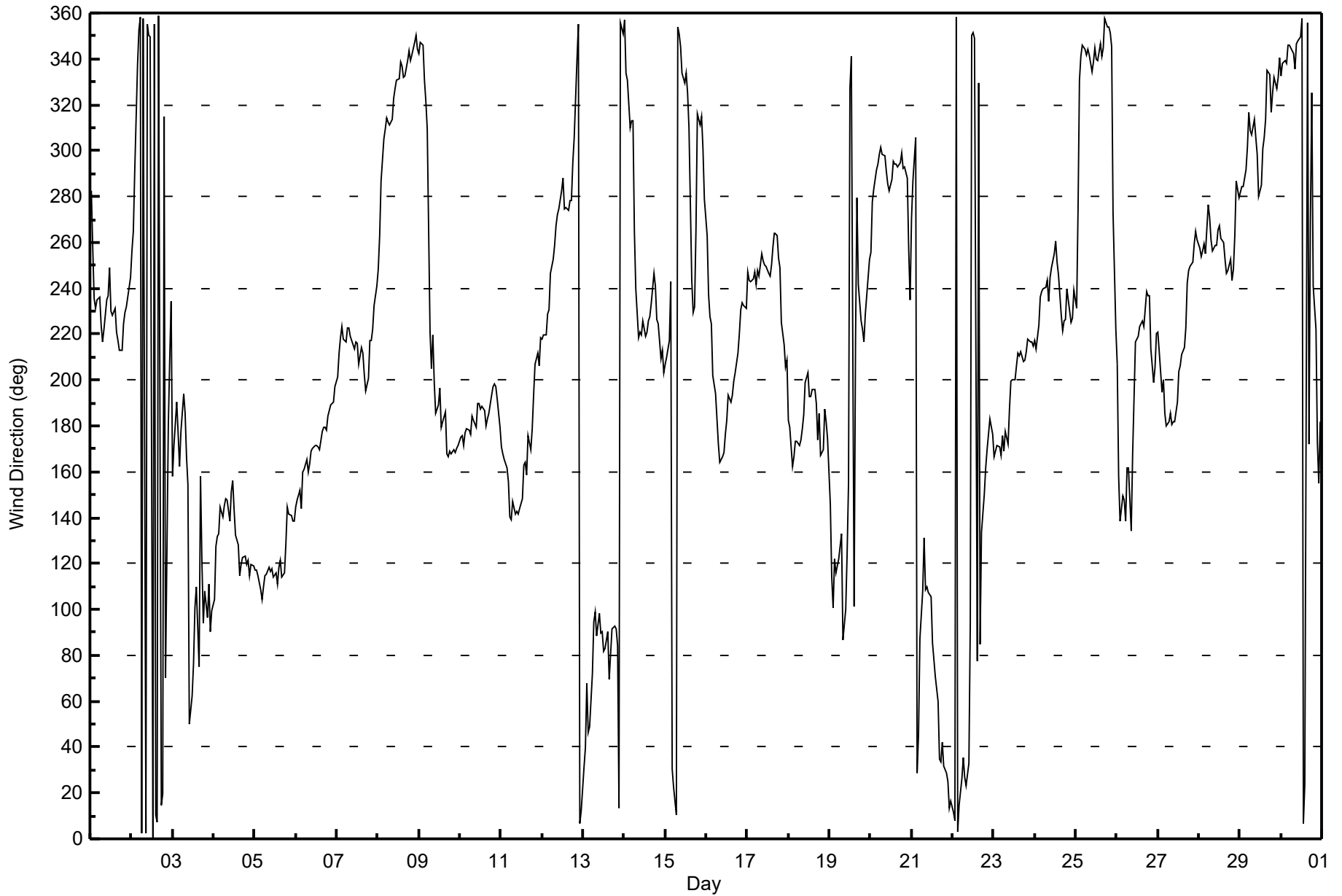
Diurnal Average

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



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

**Wind Direction (WD) - deg**  
**Firebag - November 2023**





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

**Wind Direction (WD) - deg**  
**Firebag - November 2023**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 95 deg on Nov 22 12:00 Minimum Value: 4 deg on Nov 16 06:00 Percentiles: P <sub>1</sub> = 7 P <sub>10</sub> = 8 Q <sub>1</sub> = 10 Median = 12 Q <sub>3</sub> = 15 P <sub>90</sub> = 20 P <sub>99</sub> = 75														Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0													
Day	Hourly Period Ending At (MST)																								Daily Maximum		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Nov	22	15	9	11	12	11	15	8	9	11	14	13	15	12	12	8	10	9	11	12	11	10	11	13	22		
2-Nov	14	16	26	13	13	15	16	16	16	15	15	15	16	18	15	14	17	15	20	81	88	19	19	23	88		
3-Nov	25	11	10	10	15	21	16	10	10	40	13	21	24	13	12	17	41	31	23	19	13	26	13	8	41		
4-Nov	27	19	19	20	13	12	12	12	13	13	12	13	14	18	15	13	13	13	12	13	13	11	13	12	27		
5-Nov	12	11	11	12	10	10	12	13	12	13	13	11	11	11	11	13	14	13	13	15	12	12	13	12	15		
6-Nov	11	12	10	11	12	9	9	10	9	9	9	9	9	11	9	9	9	9	8	8	7	7	7	7	12		
7-Nov	9	11	11	12	10	11	11	11	12	10	11	11	11	11	12	10	13	8	9	12	11	10	10	10	13		
8-Nov	12	15	17	16	13	12	12	12	13	11	11	12	12	12	12	12	11	13	12	12	12	12	12	11	17		
9-Nov	11	11	12	16	25	29	71	18	13	12	10	9	10	9	8	9	7	8	7	8	9	7	8	8	71		
10-Nov	8	8	7	9	8	8	8	8	8	8	8	11	8	8	7	8	8	7	7	7	7	7	9	10	11		
11-Nov	7	7	10	8	9	12	11	10	11	12	12	11	11	11	13	12	10	10	11	8	10	8	7	9	13		
12-Nov	10	8	9	10	10	11	12	13	14	15	15	18	16	18	15	15	14	18	17	11	15	15	14	14	18		
13-Nov	10	15	27	16	13	19	21	23	13	14	10	11	15	15	24	11	15	10	10	10	20	36	29	13	36		
14-Nov	14	12	13	14	12	17	17	14	10	9	11	12	12	10	10	10	13	10	10	9	11	7	8	7	17		
15-Nov	7	9	13	76	16	37	16	15	14	12	13	12	12	18	20	15	8	11	21	15	14	13	15	17	76		
16-Nov	15	13	10	14	8	4	11	13	9	9	10	9	9	8	9	8	7	7	10	9	13	9	13	13	15		
17-Nov	13	10	10	10	10	9	11	9	13	11	12	12	11	11	11	14	14	13	10	21	6	8	13	10	21		
18-Nov	9	6	7	9	7	8	7	8	10	10	12	9	10	8	6	7	12	11	10	9	6	10	9	9	12		
19-Nov	18	59	25	80	39	12	19	24	45	44	24	32	20	19	52	20	12	24	10	9	10	9	12	12	80		
20-Nov	13	19	17	17	16	15	14	15	14	16	17	16	18	16	15	16	16	16	15	16	14	15	15	12	19		
21-Nov	41	17	39	52	15	14	15	23	22	13	15	14	13	16	12	15	11	12	11	11	11	11	12	13	52		
22-Nov	13	14	13	14	16	15	13	15	17	17	77	95	38	55	51	81	15	12	11	10	15	8	9	9	95		
23-Nov	8	8	8	7	8	8	7	8	8	11	9	9	9	9	9	9	9	9	9	8	9	9	9	10	11		
24-Nov	9	11	10	10	10	9	11	9	10	11	12	14	14	13	12	9	9	9	8	11	11	8	9	9	14		
25-Nov	8	22	14	15	15	14	14	13	14	12	13	15	13	12	15	13	14	15	14	15	15	22	44	19	44		
26-Nov	22	30	8	10	27	23	7	48	43	23	11	13	14	12	16	14	10	14	14	10	27	23	11	15	48		
27-Nov	7	14	7	10	10	12	9	8	9	8	8	8	9	10	9	9	10	10	12	11	12	13	14	12	14		
28-Nov	12	11	12	12	12	18	13	13	11	12	13	14	14	13	13	10	10	10	13	10	12	14	22	16	22		
29-Nov	16	16	16	15	12	13	13	12	11	13	19	16	17	16	14	13	13	12	14	11	12	13	12	13	19		
30-Nov	12	13	12	13	15	14	12	12	12	13	12	14	16	15	25	72	76	48	34	36	34	46	14	15	76		
	41	59	39	80	39	37	71	48	45	44	77	95	38	55	52	81	76	48	34	81	88	46	44	23			
Diurnal Maximum																											



## WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY  
MONITORING PROGRAM  
MONTHLY REPORT

### **AMS20 MACKAY RIVER NOVEMBER 2023**

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

December 22, 2023

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - LOWER CAMP (AMS11)

NOVEMBER 2023

MONTHLY SUMMARY

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2 (ppb) Average	686	34	34	100	143	0	13.2	0
H2S (ppb) Average	684	35	36	99.86	29.8	4	3.3	1
THC (ppm) Average	684	34	36	99.72	3.9	-	2.6	-
CH4(ppm) Average	684	34	36	99.72	3.8	-	2.5	-
NMHC(ppm) Average	684	34	36	99.72	0.097	-	0.043	-
Temperature (C) Average	720	0	0	100	5.9	-	2.3	-
Relative Humidity (%) Average	720	0	0	100	98.8	-	94.2	-
Barometric Pressure (inHg) Average	720	0	0	100	29.6	-	29.6	-
Wind Speed 10 m (km/h) Average	720	0	0	100	36	-	22	-
Wind Direction 10 m (deg) Average	720	0	0	100	-	-	-	-

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



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - LOWER CAMP (AMS11)  
 NOVEMBER 2023

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile						
					Min	P10	Q1	Median	Q3	P90	Max
SO2 (ppb) Average	686	2.18	8.1	-	0	0	0.1	0.4	1.4	4.6	143
H2S (ppb) Average	684	0.65	1.9	-	0	0	0.1	0.2	0.4	1.4	29.8
THC (ppm) Average	684	2.16	0.2	-	2	2	2	2.1	2.2	2.4	3.9
CH4(ppm) Average	684	2.15	0.2	-	2	2	2	2.1	2.2	2.3	3.8
NMHC(ppm) Average	684	0.007	0.016	-	0	0	0	0	0	0	0.097
Temperature 2 m (C) Average	720	-3.43	4.1	-	-16	-9.5	-5.6	-3.1	-0.5	1.7	5.9
Relative Humidity (%) Average	720	83.04	10.6	-	47.7	68.5	77.4	85.3	91.5	94.9	98.8
Barometric Pressure (inHg) Average	720	29.04	0.3	-	28.5	28.7	28.8	29	29.2	29.4	29.6
Wind Speed 10 m (km/h) Average	720	8.8	6	-	0	2	4	8	13	16	36
Wind Direction 10 m (deg) Average	720	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - LOWER CAMP (AMS11)  
NOVEMBER 2023

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
H2S	22 Nov 2023 13:00	22 Nov 2023 13:00	1	Maintenance - station operator activities
THC/NMHC/CH4	30 Nov 2023 11:00	30 Nov 2023 12:00	2	Maintenance - replaced support gas cylinder



# Wood Buffalo Environmental Association

## Summary of Hour Averages

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

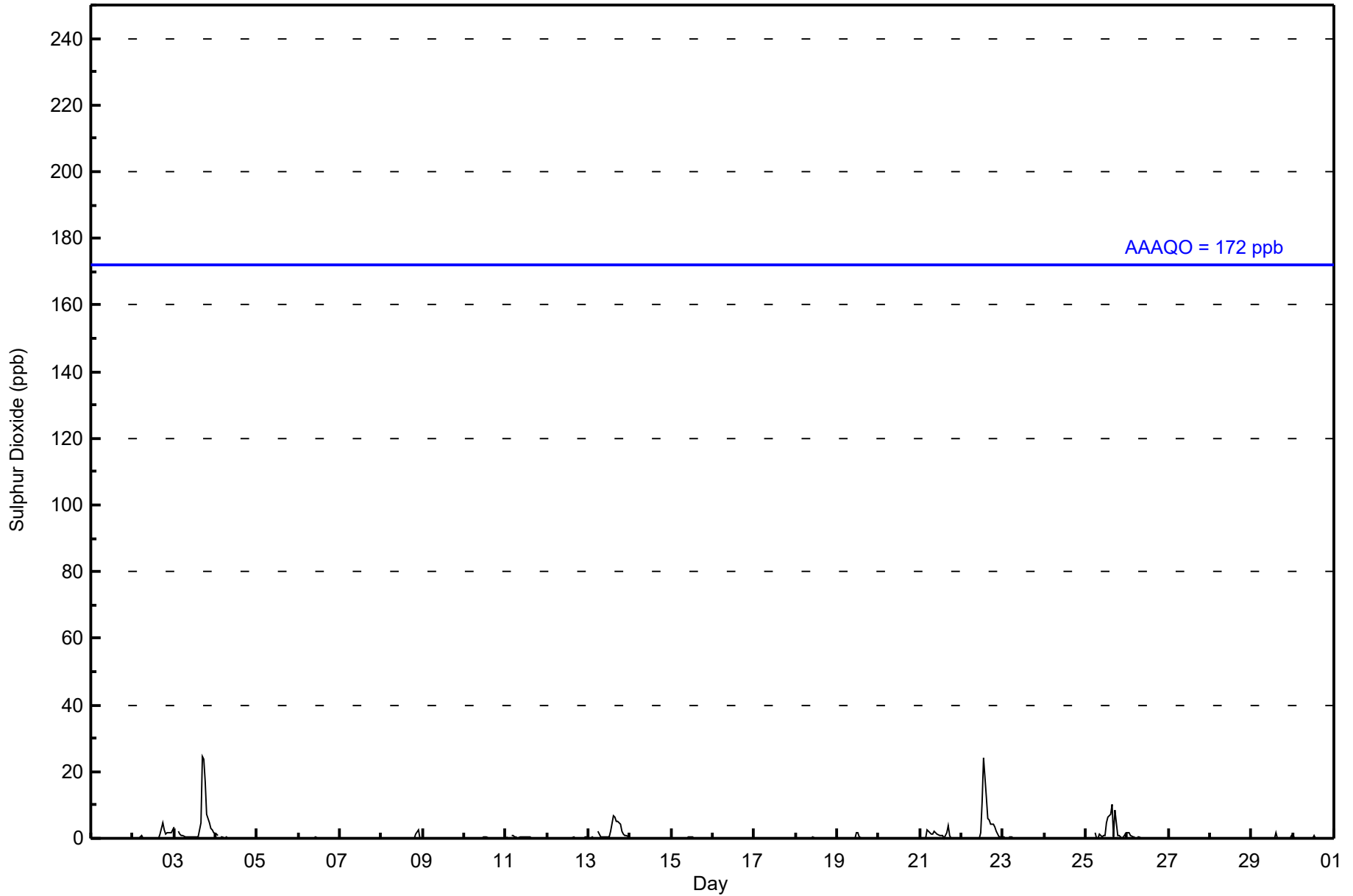
## Mackay River - November 2023

Number of Exceedences (AAAQO):		1-hr: 0		24-hr: 0		Hours in Service:														720																												
Maximum Value: 24.6 ppb on Nov 3 17:00		Maximum Daily Average: 4.4 ppb on Nov 3		Hours of Data:														688																														
Minimum Value: 0.0 ppb on Nov 1 20:00		Minimum Daily Average: 0.0 ppb on Nov 7		Hours of Missing Data:														32																														
Maximum Diurnal Average: 1.6 ppb at hour 18		Minimum Diurnal Average: 0.2 ppb at hour 8		Hours of Calibration:														32																														
Monthly Average: 0.54 ppb		Percentiles: P <sub>1</sub> = 0.0 P <sub>10</sub> = 0.0 Q <sub>1</sub> = 0.0 Median = 0.1 Q <sub>3</sub> = 0.2 P <sub>90</sub> = 1.0 P <sub>99</sub> = 8.6		Percent Operational Time:														100.0																														
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Nov	0.1	0.1	0.1	0.2	0.2	Z	0.1	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.1	0.2	0.1	0.2																					
2-Nov	Z	0.0	0.0	0.0	0.6	1.1	0.1	0.1	0.0	0.0	0.1	0.0	0.0	0.1	0.1	0.0	1.3	4.6	2.4	1.4	1.6	1.8	1.6	2.7	0.9	4.6																						
3-Nov	3.2	Z	2.1	1.4	1.0	0.8	0.6	0.5	0.6	0.5	0.4	0.3	0.2	0.3	0.3	4.6	24.6	23.6	17.1	7.4	4.5	3.1	2.4	1.7	4.4	24.6																						
4-Nov	1.4	1.0	Z	0.4	0.2	0.1	0.3	0.2	0.2	0.1	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.1	0.1	0.1	0.2	1.4																						
5-Nov	0.2	0.0	0.1	Z	0.2	0.0	0.1	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.1	0.1	0.0	0.0	0.1	0.1	0.0	0.1	0.1	0.2																						
6-Nov	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.1	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2																						
7-Nov	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0																						
8-Nov	0.0	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	2.4	0.1	0.0	0.2	2.4																						
9-Nov	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.1	0.0	0.1																						
10-Nov	0.1	Z	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.1	0.3	0.2	0.3	0.1	0.2	0.2	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.1	0.3																						
11-Nov	0.1	0.2	Z	1.0	0.9	0.5	0.3	0.2	0.3	0.5	0.5	0.3	0.3	0.2	0.2	0.2	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.3	1.0																						
12-Nov	0.1	0.1	0.2	Z	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.2	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.1	0.2	0.5	0.2	0.2	0.5																						
13-Nov	0.2	0.2	0.2	0.2	Z	1.9	1.4	0.5	0.5	0.6	0.5	0.4	0.3	2.0	6.6	6.4	5.0	5.2	4.3	2.1	1.3	0.9	0.7	0.6	1.8	6.6																						
14-Nov	0.2	0.2	0.2	0.2	0.1	Z	0.1	0.2	0.0	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	0.1	0.2																						
15-Nov	Z	0.0	0.0	0.0	0.1	0.0	0.2	0.2	0.1	0.1	0.3	0.2	0.4	0.1	0.1	0.1	0.2	0.2	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.4																						
16-Nov	0.2	Z	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.1	0.2																						
17-Nov	0.1	0.0	Z	0.0	0.0	0.0	0.0	0.0	C	C	C	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.1	0.1	0.0	0.0	0.1																						
18-Nov	0.1	0.1	0.2	Z	0.2	0.2	0.1	0.1	0.1	0.2	0.2	0.2	0.1	0.1	0.2	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2																						
19-Nov	0.0	0.0	0.1	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	1.6	1.8	0.6	0.1	0.1	0.1	0.0	0.0	0.1	0.0	0.1	0.2	0.0	0.2	1.8																						
20-Nov	0.0	0.0	0.0	0.1	0.0	Z	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.2	0.0	0.2	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.2																						
21-Nov	Z	0.0	0.0	0.1	2.6	2.3	1.3	1.4	2.0	1.7	1.1	0.8	0.8	0.7	0.1	1.5	3.7	0.8	0.2	0.0	0.0	0.0	0.0	0.2	0.9	3.7																						
22-Nov	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.6	11.2	24.0	12.2	5.9	5.7	4.4	4.4	3.5	2.2	1.1	0.6	0.4	3.4	24.0																						
23-Nov	0.2	0.5	Z	0.6	0.4	0.3	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.0	0.0	0.1	0.1	0.1	0.0	0.1	0.1	0.6																						
24-Nov	0.0	0.0	0.0	Z	0.1	0.1	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.2																						
25-Nov	0.2	0.1	0.0	0.1	Z	1.8	0.2	0.2	1.1	0.6	1.0	0.7	4.8	6.4	7.2	10.3	0.3	8.4	0.6	0.7	0.2	0.2	0.4	1.9	2.1	10.3																						
26-Nov	1.5	1.7	0.8	0.5	0.4	Z	0.3	0.2	0.2	0.1	0.1	0.0	0.1	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	1.7																						
27-Nov	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0																						
28-Nov	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0																						
29-Nov	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9	0.1	1.6																						
30-Nov	1.2	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.8	0.2	0.2	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.2	1.2																						
																								0.4	0.2	0.2	0.2	0.3	0.4	0.2	0.2	0.2	0.2	0.2	0.3	0.7	1.2	1.0	1.0	1.4	1.6	1.0	0.6	0.4	0.4	0.3	0.3	Diurnal Average
																								3.2	1.7	2.1	1.4	2.6	2.3	1.4	1.4	2.0	1.7	1.1	1.6	11.2	24.0	12.2	10.3	24.6	23.6	17.1	7.4	4.5	3.1	2.4	2.7	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 (SO<sub>2</sub>) - ppb**  
**Mackay River - November 2023**





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

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Mackay River - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 10	682	99.13	99.13
11 - 20	3	0.44	99.56
21 - 60	3	0.44	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 688

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Mackay River - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 10	12	34	23	25	28	21	64	60	70	66	49	79	64	37	14	4	650
11 - 20	0	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	3
21 - 60	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	3
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	12	35	25	27	28	22	64	60	70	66	49	79	64	37	14	4	656

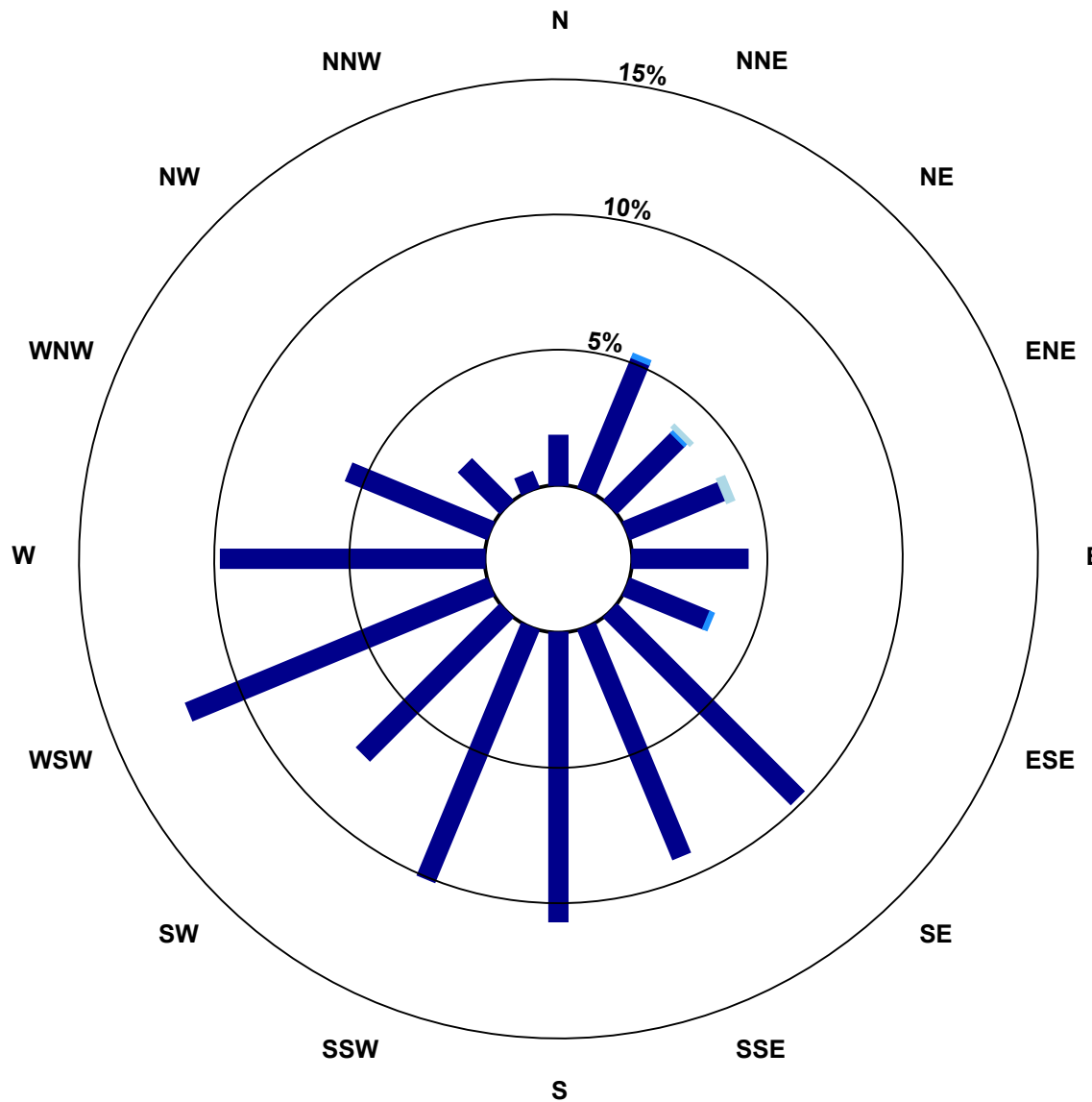
Total Number of Valid Hours: 656

Total Number of Hours: 720

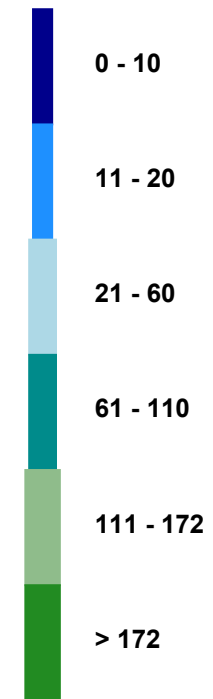


Wood Buffalo Environmental Association  
Wind Rose Nov 2023

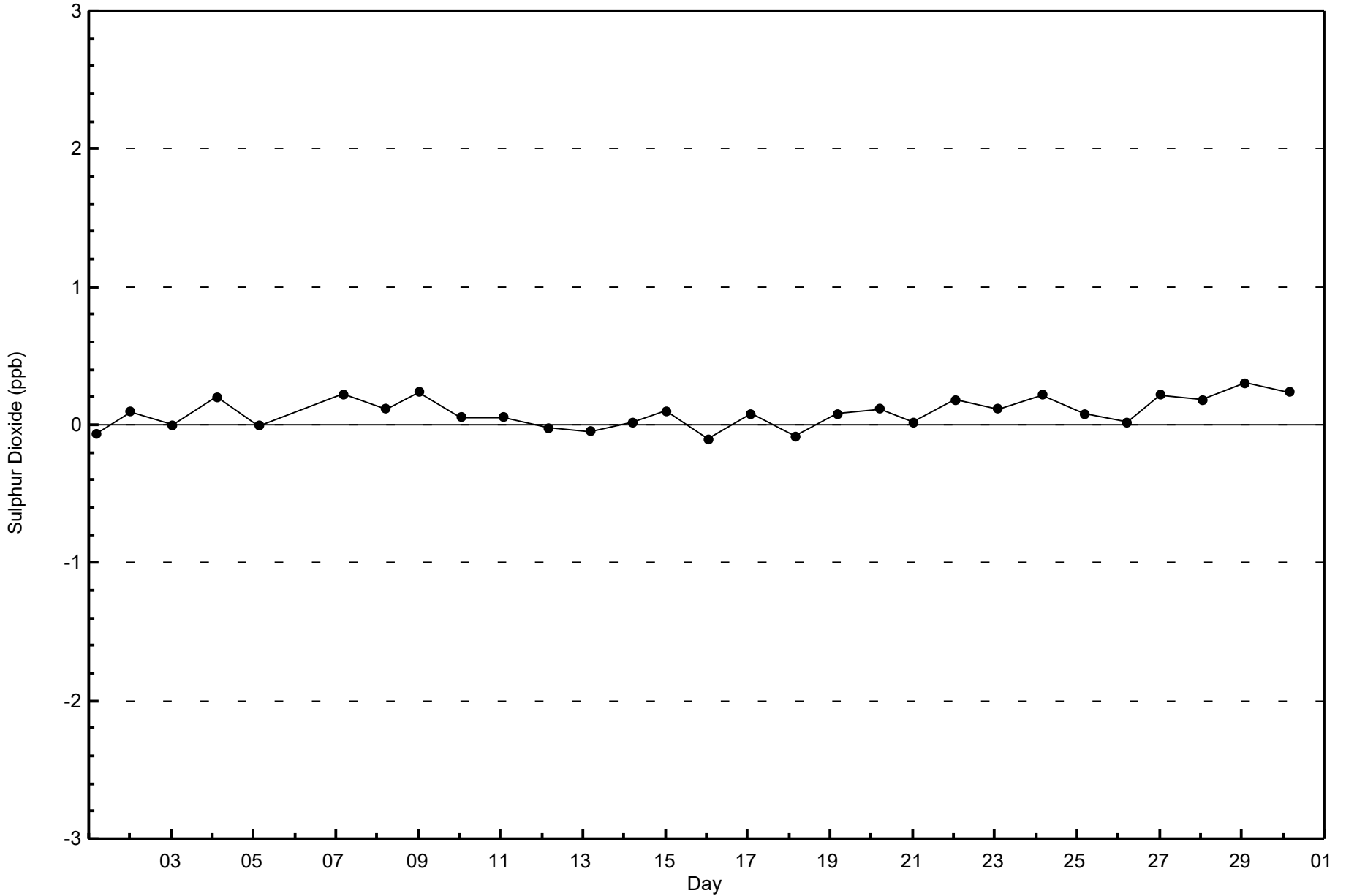
Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Mackay River



Classes (ppb)



Total Number of Valid Hours: 656

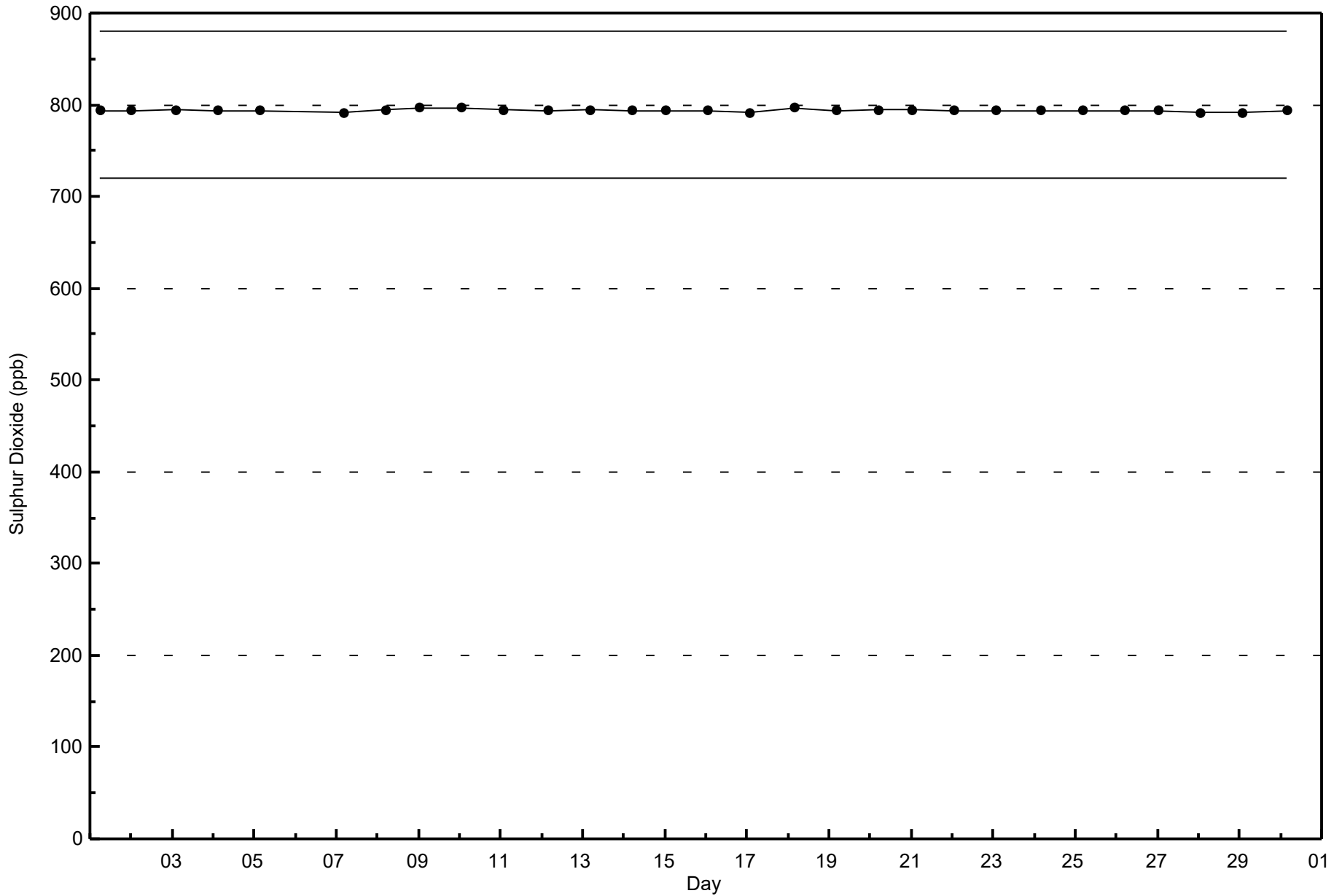






**Wood Buffalo Environmental Association**  
**Span Responses**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Mackay River - November 2023**

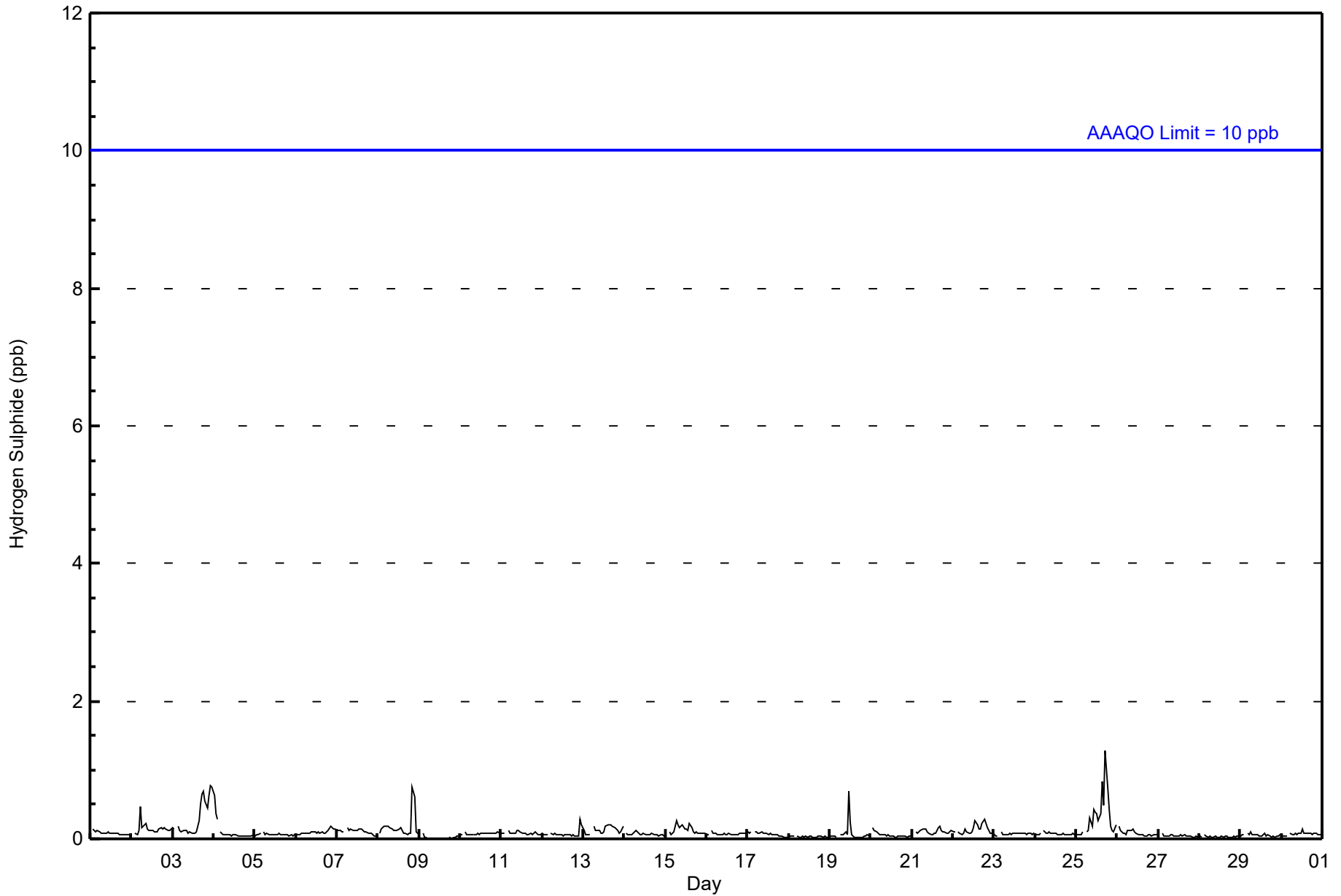






**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Hydrogen Sulphide (H<sub>2</sub>S) - ppb**  
**Mackay River - November 2023**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Hydrogen Sulphide (H<sub>2</sub>S) - ppb  
Mackay River - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2	685	100.00	100.00
3 - 4	0	0.00	100.00
5 - 7	0	0.00	100.00
8 - 11	0	0.00	100.00
> 11	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Hydrogen Sulphide (H<sub>2</sub>S) - ppb  
Mackay River - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 2	13	35	26	27	27	23	59	55	71	69	50	79	63	38	13	4	652
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	13	35	26	27	27	23	59	55	71	69	50	79	63	38	13	4	652

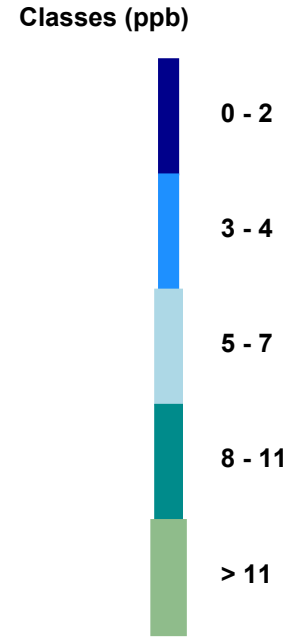
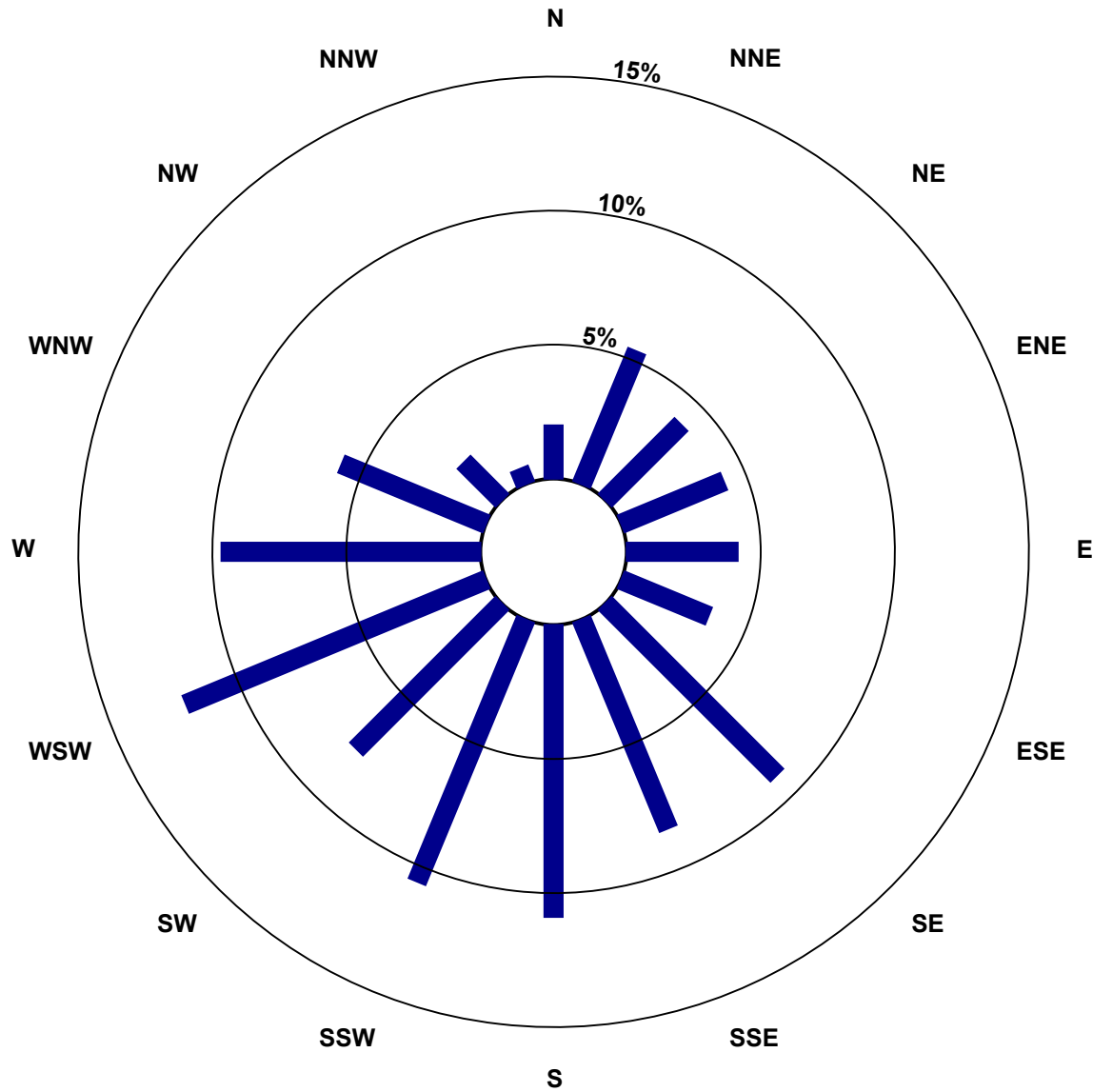
Total Number of Valid Hours: 652

Total Number of Hours: 720

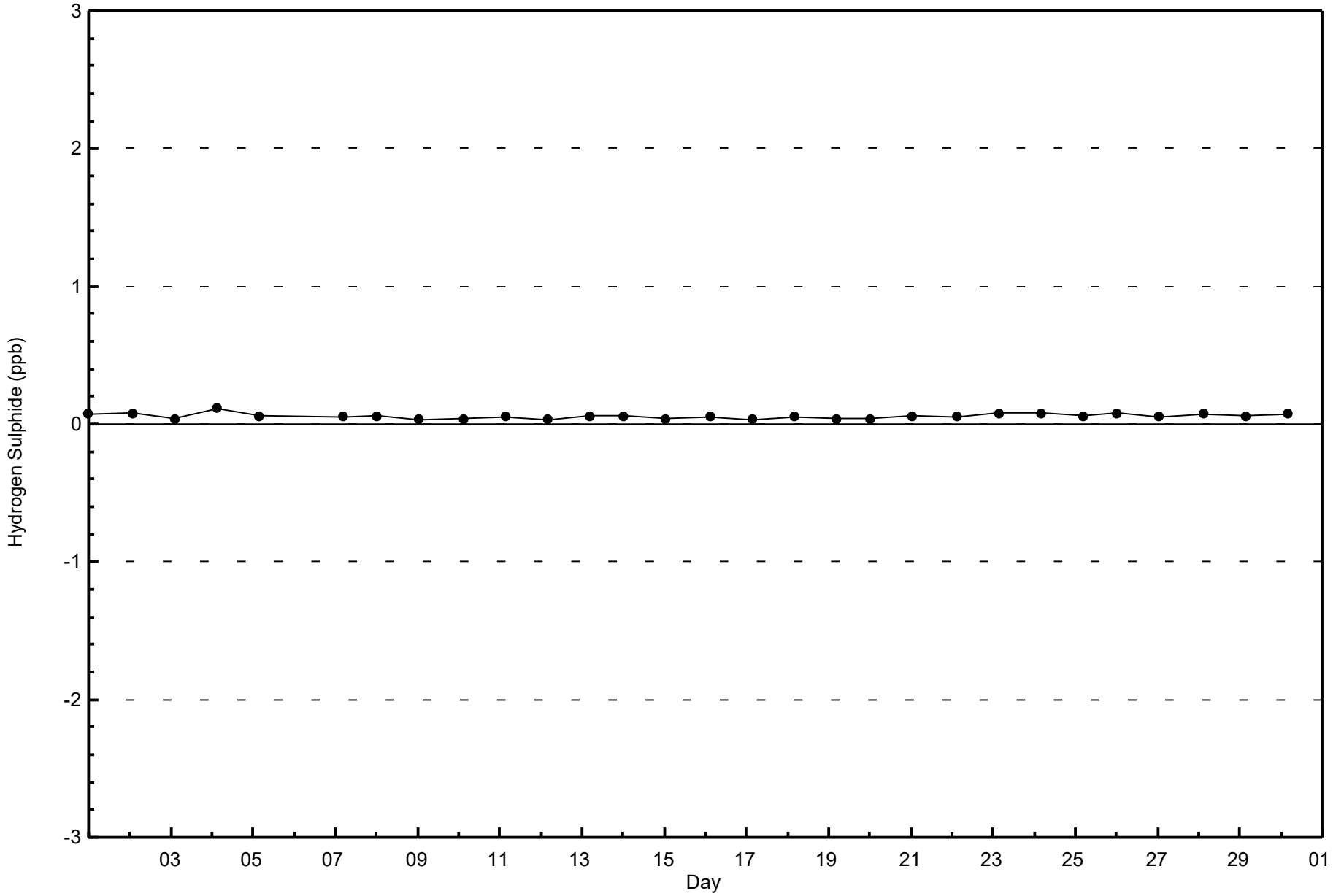


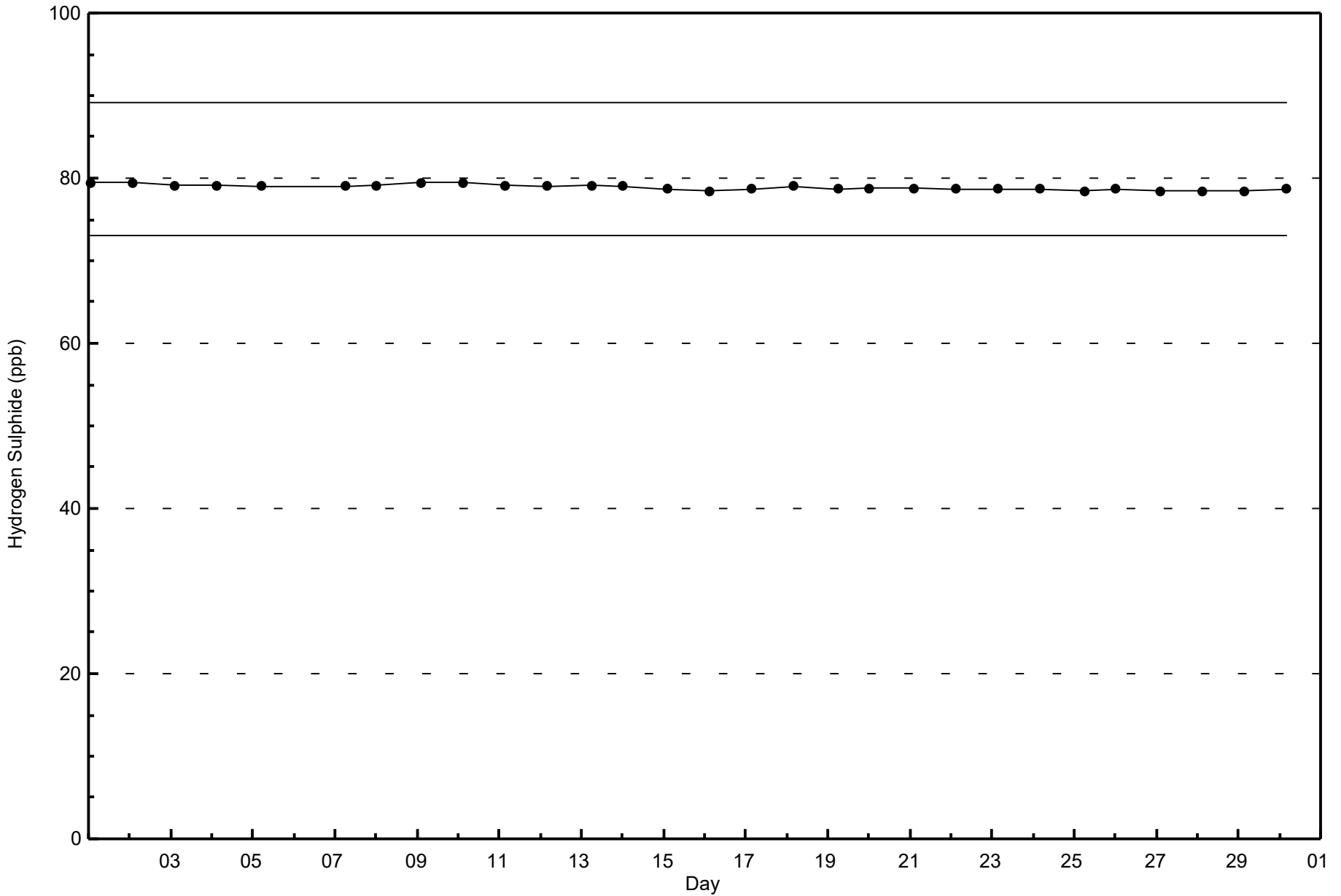
Wood Buffalo Environmental Association  
Wind Rose Nov 2023

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



Total Number of Valid Hours: 652





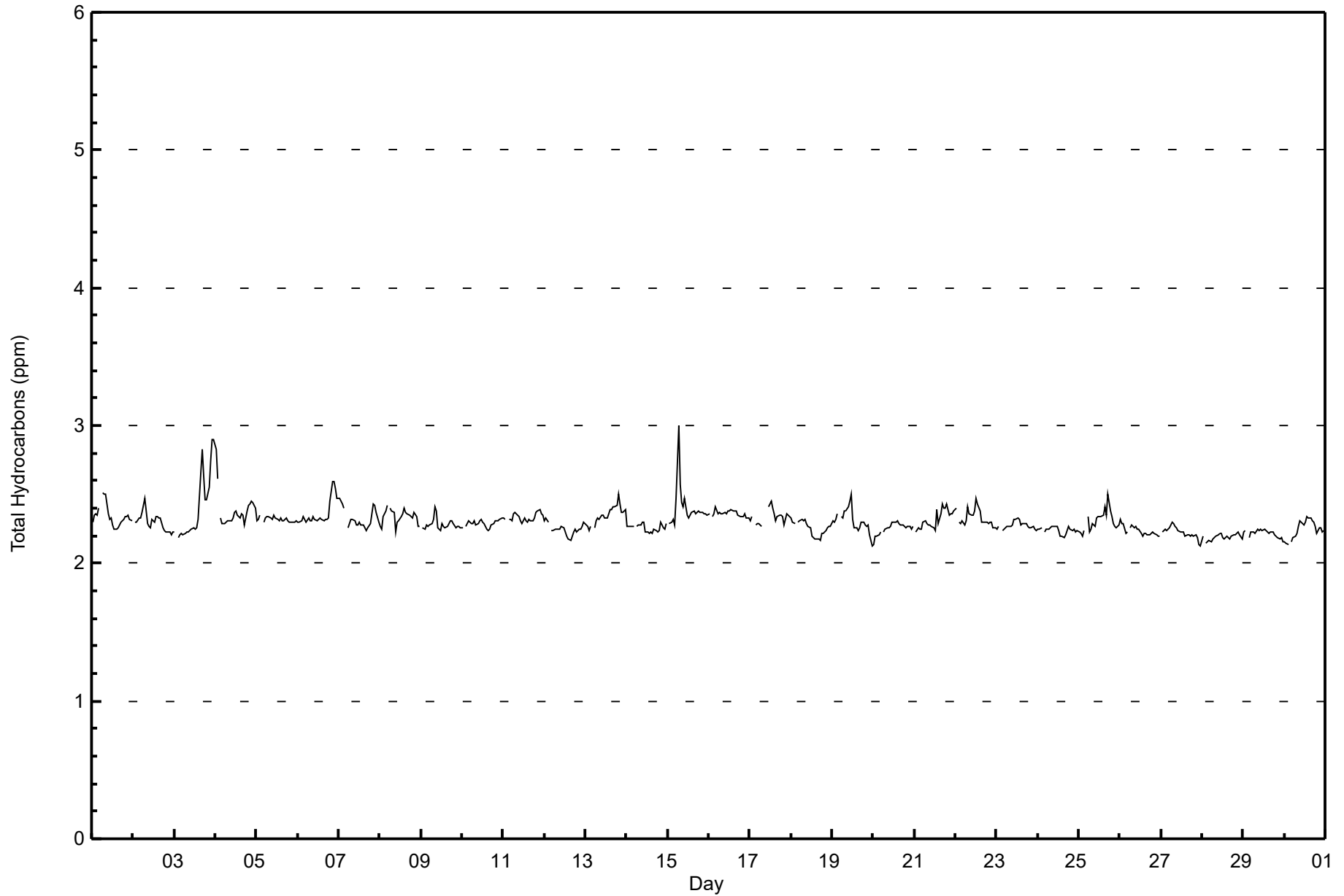






**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Total Hydrocarbons (THC) - ppm**  
**Mackay River - November 2023**





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

**Total Hydrocarbons (THC) - ppm**  
**Mackay River - November 2023**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2.0	0	0.00	0.00
2.1 - 3.0	688	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: 688

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Total Hydrocarbons (THC) - ppm  
Mackay River - November 2023**

<b>Concentration Ranges (ppm)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2.1 - 3.0	12	35	25	27	28	22	64	60	70	66	49	79	64	37	14	4	656
3.1 - 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	12	35	25	27	28	22	64	60	70	66	49	79	64	37	14	4	656

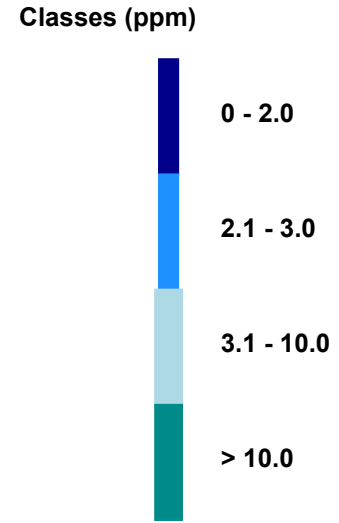
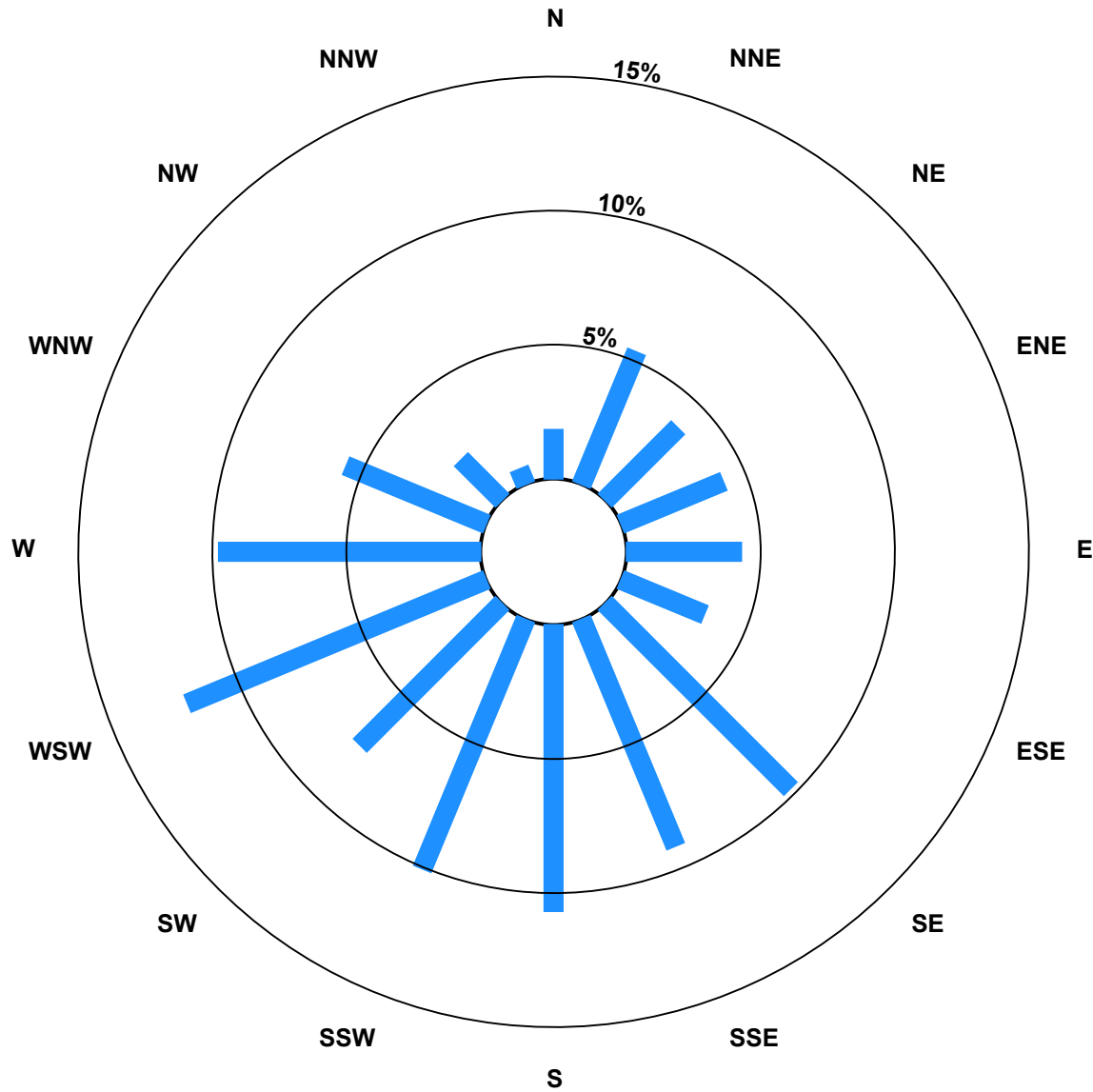
Total Number of Valid Hours: 656

Total Number of Hours: 720

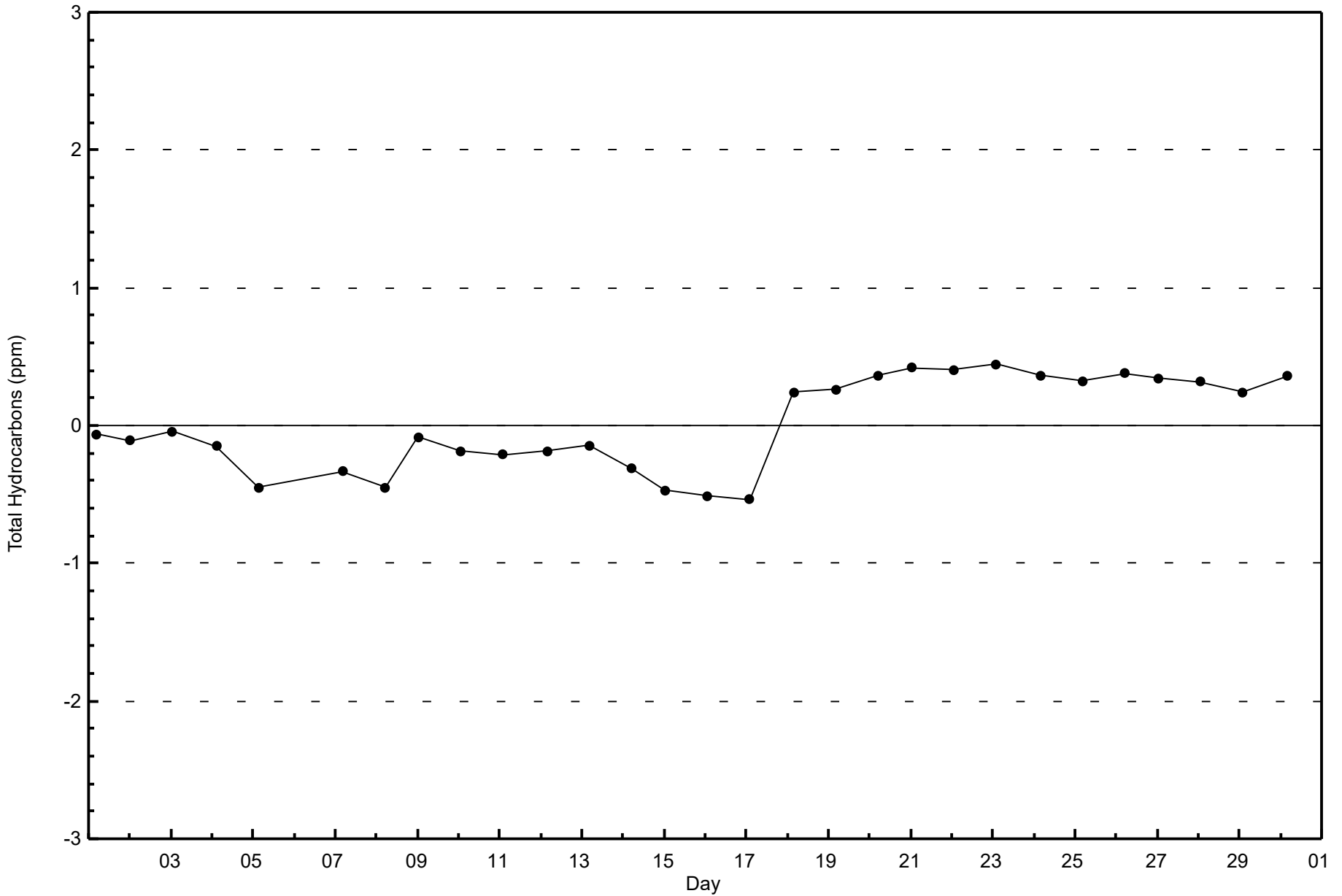


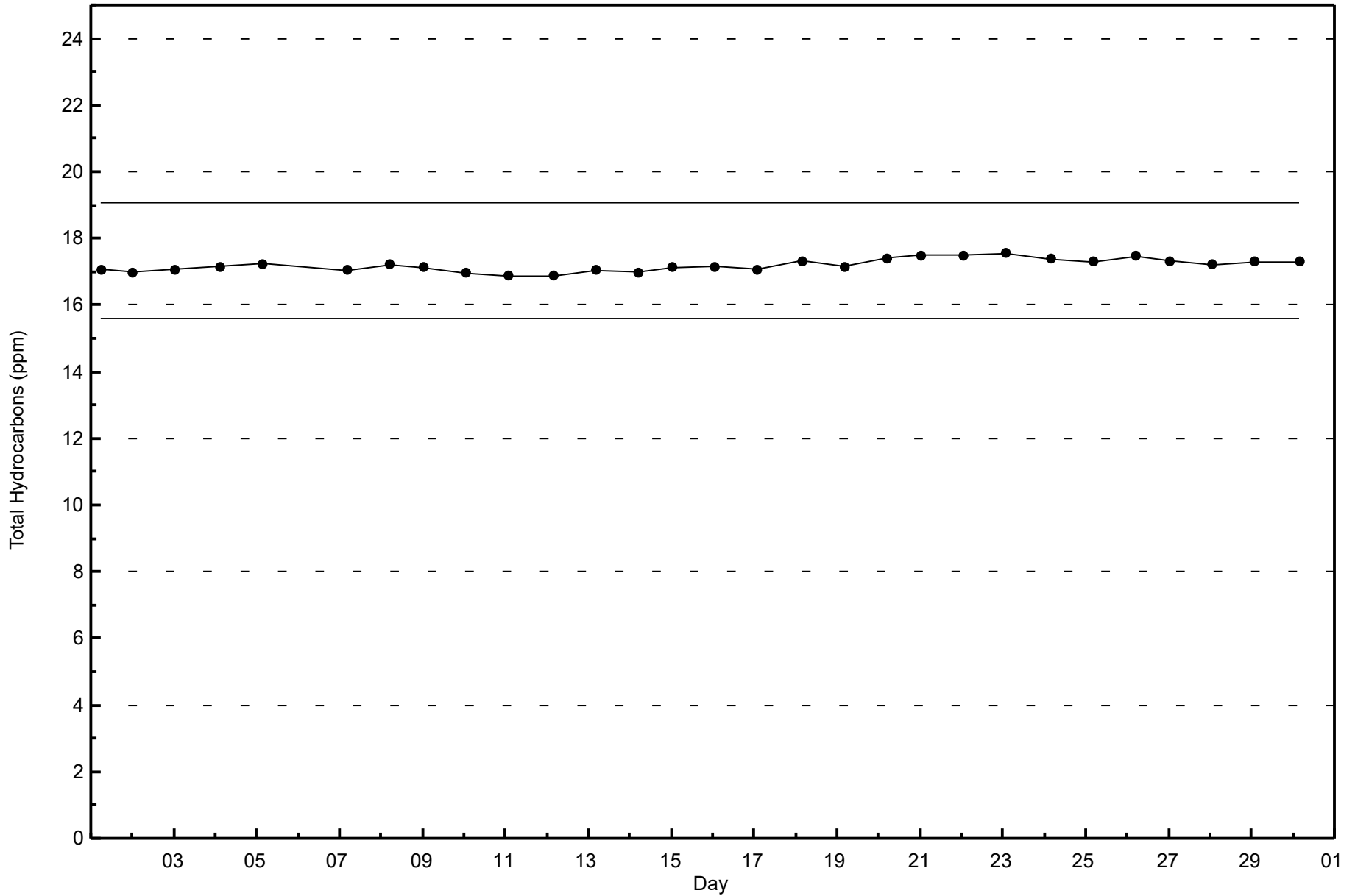
**Wood Buffalo Environmental Association**  
**Wind Rose Nov 2023**

**Total Hydrocarbons (THC) - ppm**  
**Mackay River**



**Total Number of Valid Hours: 656**





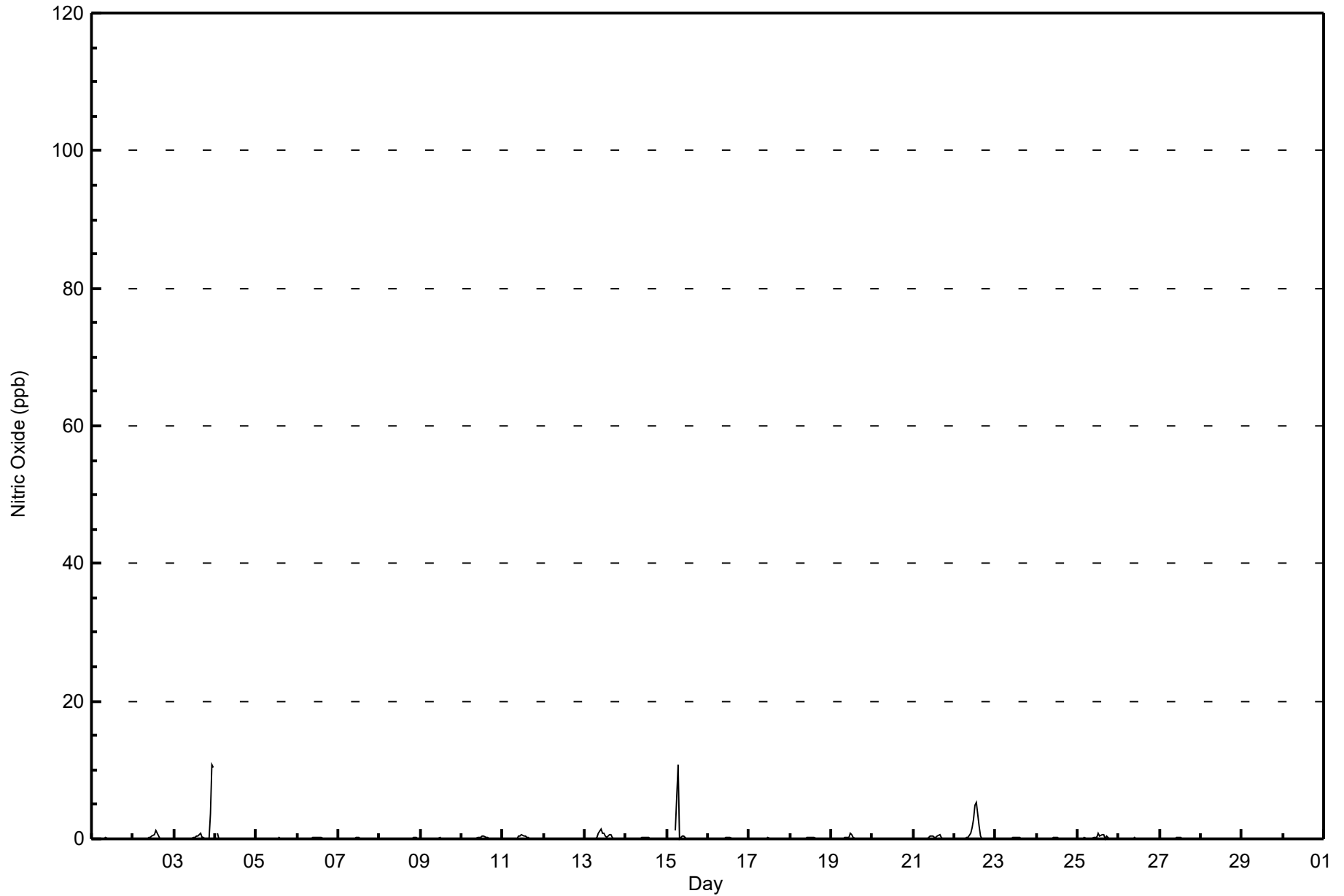






**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Nitric Oxide (NO) - ppb**  
**Mackay River - November 2023**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Nitric Oxide (NO) - ppb  
Mackay River - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	670	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: 670

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

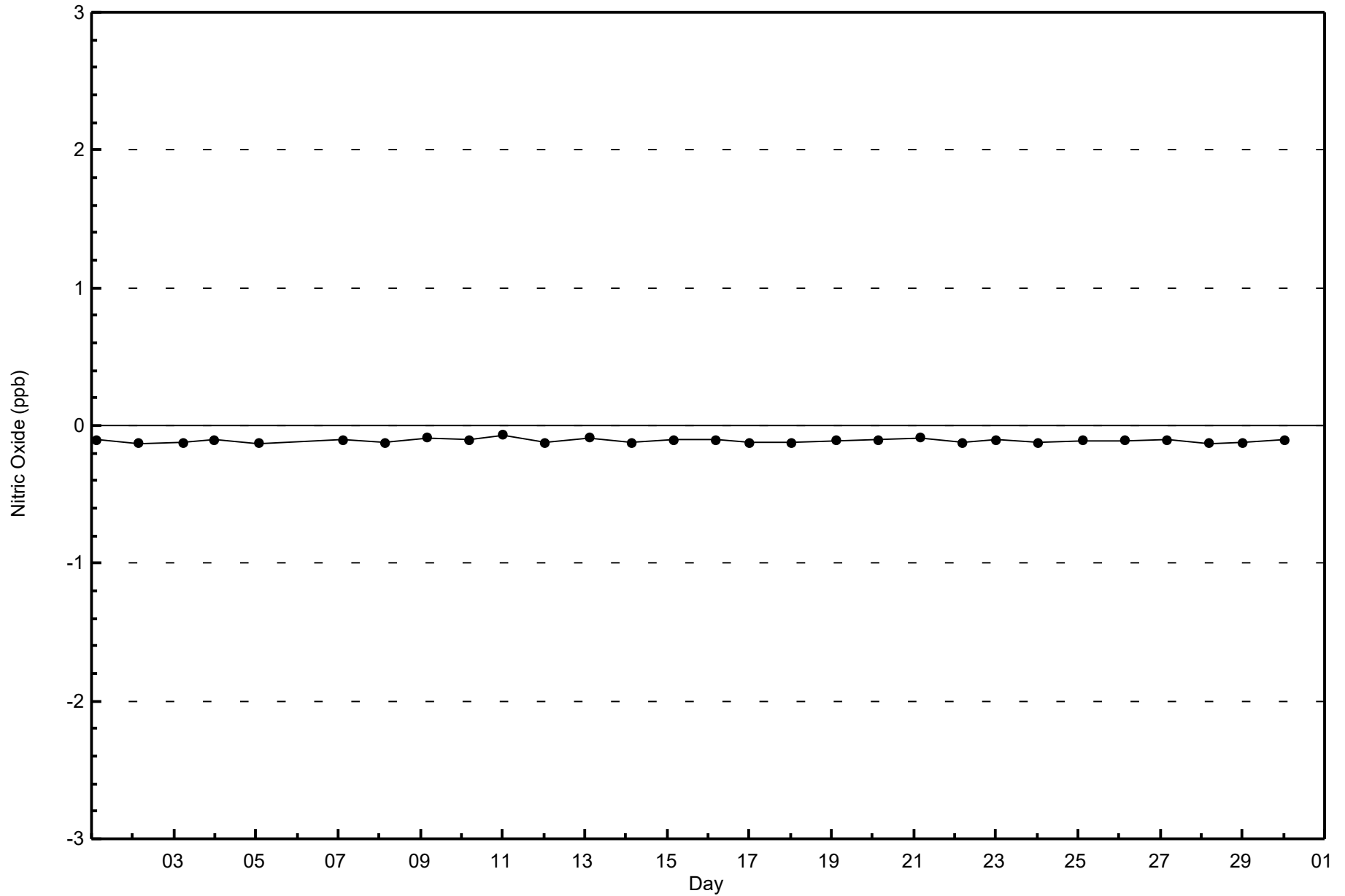
**Nitric Oxide (NO) - ppb  
Mackay River - November 2023**

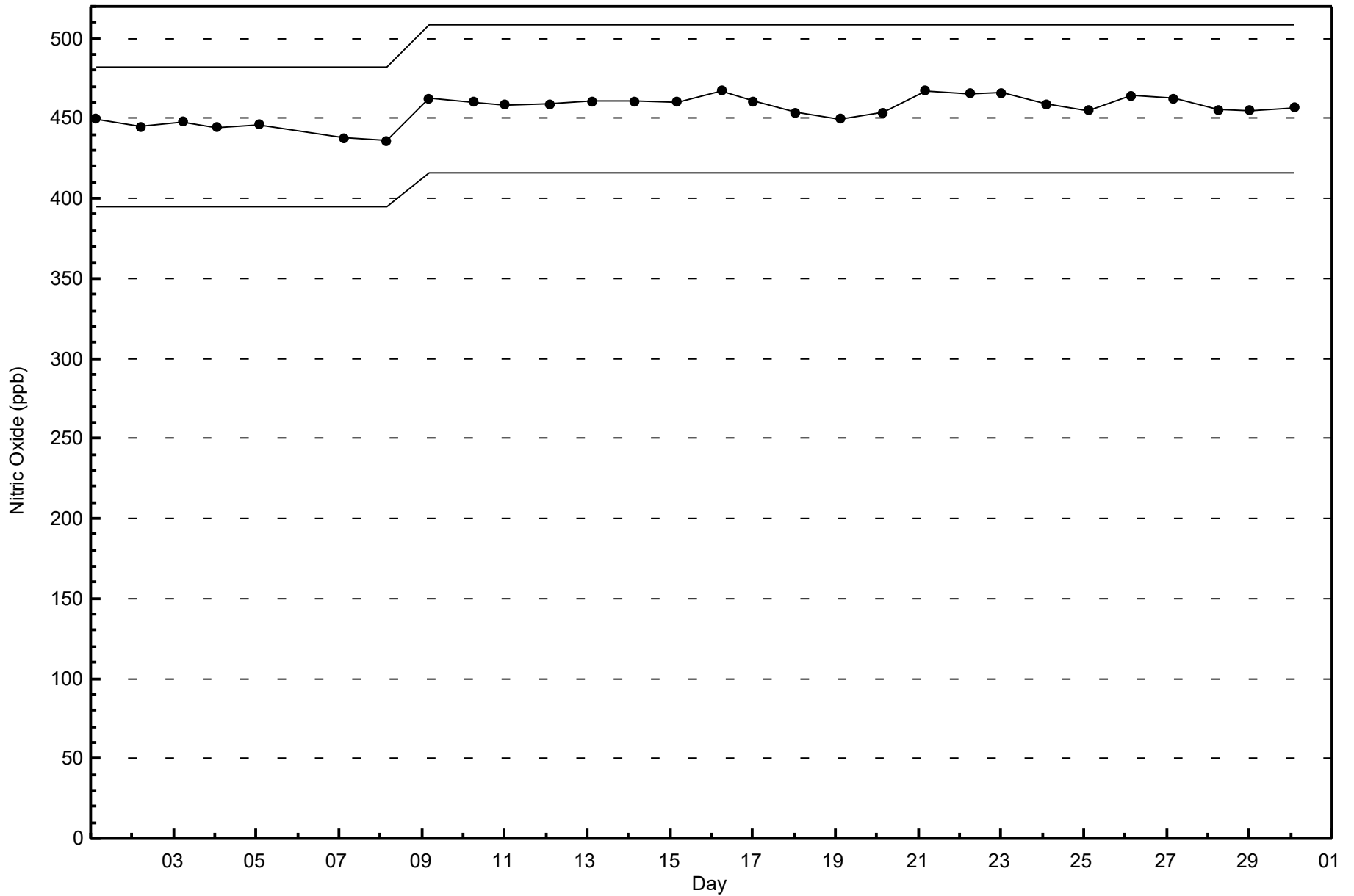
<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 20	13	35	26	27	28	22	59	60	69	65	48	80	57	36	14	4	643
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	13	35	26	27	28	22	59	60	69	65	48	80	57	36	14	4	643

Total Number of Valid Hours: 643

Total Number of Hours: 720









# Wood Buffalo Environmental Association

## Summary of Hour Averages

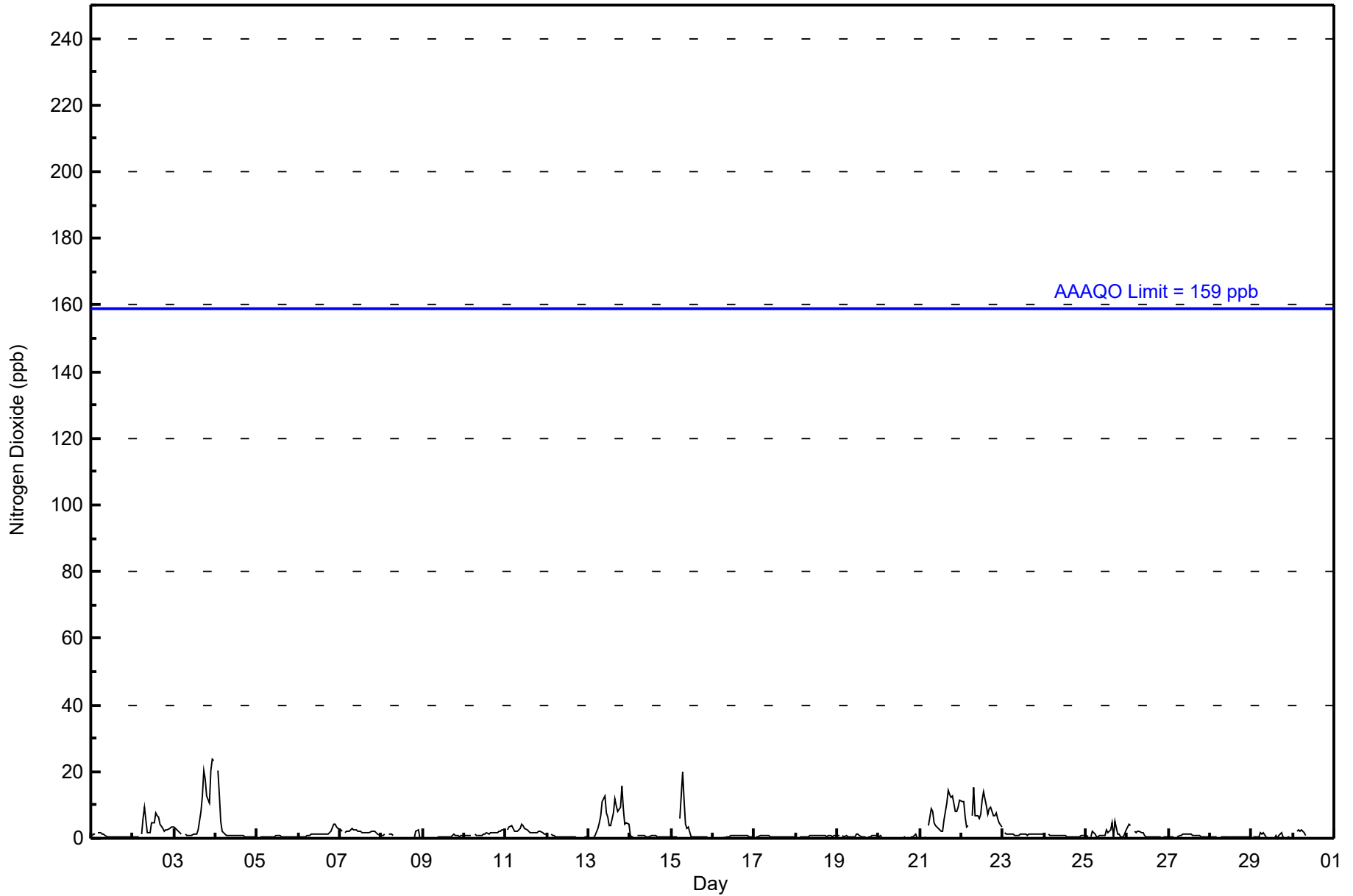
# Nitrogen Dioxide (NO<sub>2</sub>) - ppb Mackay River - November 2023

Number of Exceedences (AAAQO):		1-hr: 0	24-hr: 0																		Hours in Service:	720					
Maximum Value: 23.7 ppb on Nov 3 23:00		Maximum Daily Average: 7.9 ppb on Nov 22																	Hours of Data:	670							
Minimum Value: 0.1 ppb on Nov 8 16:00		Minimum Daily Average: 0.3 ppb on Nov 20																	Hours of Missing Data:	50							
Maximum Diurnal Average: 2.6 ppb at hour 18		Minimum Diurnal Average: 1.2 ppb at hour 4																	Hours of Calibration:	34							
Monthly Average: 1.93 ppb		Percentiles: P <sub>1</sub> = 0.1 P <sub>10</sub> = 0.3 Q <sub>1</sub> = 0.4 Median = 0.8 Q <sub>3</sub> = 1.7 P <sub>90</sub> = 4.6 P <sub>99</sub> = 16.2																	Percent Operational Time:	97.8							
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Nov	0.8	1.3	1.4	Z	1.7	1.5	1.3	1.1	0.7	0.4	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.7	1.7	
2-Nov	0.4	0.4	0.4	0.4	Z	1.3	6.1	9.4	1.9	1.7	1.9	4.6	4.7	7.6	6.9	6.2	4.3	3.0	2.1	2.4	2.5	2.8	3.2	3.3	3.4	9.4	
3-Nov	3.2	2.8	2.0	1.6	1.3	Z	1.1	1.0	1.0	1.0	0.9	1.1	1.3	1.4	2.6	8.1	12.8	20.5	17.8	12.5	10.5	20.2	23.7	23.3	7.5	23.7	
4-Nov	Z	20.4	13.0	5.1	2.0	1.1	1.0	0.9	0.9	0.8	0.8	0.9	0.9	0.8	0.9	0.8	0.7	0.6	0.5	0.5	0.5	0.5	0.4	0.5	2.4	20.4	
5-Nov	0.4	Z	0.4	0.4	0.5	0.6	0.4	0.4	0.5	0.6	0.6	0.7	0.8	0.9	0.6	0.5	0.4	0.3	0.4	0.5	0.5	0.4	0.4	0.4	0.5	0.9	
6-Nov	0.4	0.5	0.5	0.6	0.6	0.7	0.8	1.1	1.1	1.1	1.2	1.2	1.1	1.1	1.2	1.3	1.4	1.4	1.6	2.0	4.1	4.2	3.6	2.9	1.5	4.2	
7-Nov	2.5	2.3	Z	1.9	2.0	2.1	2.4	2.8	2.7	2.4	2.1	2.1	2.1	1.8	1.8	1.7	1.7	1.8	2.2	2.3	2.1	1.5	1.1	1.0	2.0	2.8	
8-Nov	0.9	0.9	1.2	Z	1.1	1.1	1.2	0.9	C	C	C	C	C	0.2	0.2	0.1	0.1	0.1	0.1	0.1	2.1	2.5	0.2	0.1	0.7	2.5	
9-Nov	0.1	0.1	0.1	0.1	Z	0.1	0.1	0.2	0.2	0.3	0.3	0.4	0.3	0.3	0.3	0.3	0.3	0.8	1.1	0.7	0.7	0.6	0.8	0.9	0.4	1.1	
10-Nov	0.9	0.9	0.9	1.0	1.0	Z	1.1	1.0	1.0	1.0	1.0	1.2	1.3	1.5	1.4	1.5	1.6	1.6	1.6	1.7	2.0	2.3	2.4	2.4	1.4	2.4	
11-Nov	Z	2.6	3.2	3.9	3.1	2.3	2.2	2.1	3.1	4.1	3.7	3.0	2.4	2.0	1.9	1.7	1.6	1.5	1.5	2.0	2.1	1.9	1.4	1.2	2.4	4.1	
12-Nov	1.1	Z	1.1	0.9	0.8	0.6	0.5	0.5	0.5	0.5	0.4	0.5	0.4	0.4	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.6	0.3	0.5	1.1	
13-Nov	0.2	0.2	Z	0.4	0.9	2.9	4.5	6.6	10.9	12.5	7.8	6.5	4.0	3.7	7.8	11.8	9.9	7.9	9.5	15.5	9.1	4.2	4.8	4.3	6.3	15.5	
14-Nov	0.8	0.5	0.5	Z	0.7	0.9	0.9	0.9	0.7	0.6	0.5	0.6	0.7	0.7	0.8	0.6	0.6	0.5	0.5	0.4	0.5	0.5	0.5	0.5	0.6	0.9	
15-Nov	0.5	0.4	0.5	0.6	Z	5.8	20.1	11.4	4.4	2.9	3.3	0.5	0.6	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.2	0.2	0.2	2.4	20.1	
16-Nov	0.2	0.2	0.2	0.2	0.2	Z	0.3	0.2	0.3	0.6	0.8	0.8	0.9	0.9	1.0	1.0	0.8	0.7	0.7	0.7	0.7	0.6	0.5	0.6	0.6	1.0	
17-Nov	Z	0.6	0.6	0.7	0.7	0.7	0.7	0.7	0.7	0.6	0.6	0.6	0.5	0.5	0.5	0.4	0.5	0.5	0.4	0.4	0.4	0.3	0.3	0.3	0.5	0.7	
18-Nov	0.5	Z	0.5	0.6	0.6	0.5	0.6	0.6	0.7	0.8	0.9	0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.6	0.9	0.8	0.6	0.8	0.8	0.7	0.9	
19-Nov	0.8	0.7	Z	0.7	0.6	0.7	0.6	0.5	0.5	0.3	0.4	1.1	1.3	0.8	0.5	0.4	0.3	0.2	0.3	0.4	0.7	0.9	1.0	0.8	0.6	1.3	
20-Nov	0.5	0.7	0.3	Z	0.2	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.4	0.2	0.2	0.2	0.6	0.4	1.1	0.2	0.1	0.3	1.1	
21-Nov	0.1	0.1	0.2	0.3	Z	3.7	9.1	8.0	4.6	3.8	3.5	2.4	2.0	2.1	5.3	10.4	14.6	13.3	12.4	12.5	7.9	8.2	9.5	11.3	6.3	14.6	
22-Nov	11.0	11.2	6.4	3.5	3.9	Z	6.6	15.2	6.8	6.8	6.1	7.2	11.6	14.0	9.6	7.0	9.1	9.5	6.9	6.9	7.5	6.1	4.5	3.4	7.9	15.2	
23-Nov	Z	1.7	1.4	1.2	1.2	1.2	1.1	1.0	1.0	1.0	1.1	1.1	1.2	1.1	1.0	1.2	1.2	1.3	1.2	1.1	1.1	1.2	1.1	1.1	1.2	1.7	
24-Nov	1.1	Z	1.1	1.0	0.9	0.8	0.8	0.8	0.8	0.7	0.8	0.7	0.7	0.5	0.5	0.5	0.5	0.5	0.6	0.6	0.6	0.7	0.7	0.7	0.7	1.1	
25-Nov	0.7	0.6	Z	0.5	2.2	1.3	0.3	0.3	1.0	0.8	0.9	0.9	2.7	1.8	2.7	4.8	0.6	5.2	1.2	1.3	0.5	0.4	0.5	2.4	1.5	5.2	
26-Nov	3.3	4.3	3.8	Z	2.0	1.7	2.3	2.1	1.8	1.5	0.8	0.5	0.4	0.3	0.4	0.3	0.3	0.3	0.3	0.5	0.2	0.3	0.4	0.4	1.2	4.3	
27-Nov	0.4	0.3	0.3	0.2	Z	0.6	0.7	0.9	1.1	1.1	1.2	1.2	1.2	1.1	1.0	0.9	0.8	0.8	0.7	0.6	0.5	0.5	0.5	0.5	0.7	1.2	
28-Nov	0.4	0.4	0.4	0.4	0.4	Z	0.4	0.4	0.4	0.5	0.4	0.4	0.3	0.4	0.4	0.4	0.6	0.6	0.6	0.6	0.5	0.5	0.5	0.5	0.5	0.6	
29-Nov	Z	0.5	0.4	0.3	0.3	1.6	1.2	1.5	0.4	0.2	0.2	0.2	0.2	0.2	0.2	0.7	0.2	0.9	1.5	0.3	0.2	0.2	0.3	0.2	0.2	1.6	
30-Nov	0.4	Z	2.3	2.5	2.0	2.4	1.6	0.7	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	--	2.5
																								Diurnal Average			
																								Diurnal Maximum			
																								Z - zerospan      C - Calibration      M - Maintenance			
																								Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 159 ppb			



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

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb**  
**Mackay River - November 2023**







**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Mackay River - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	667	99.55	99.55
21 - 40	3	0.45	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: 670

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Mackay River - November 2023**

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	33	26	26	28	22	59	60	69	65	48	80	57	36	14	4	640
21 - 40	0	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	3
41 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	13	35	26	27	28	22	59	60	69	65	48	80	57	36	14	4	643

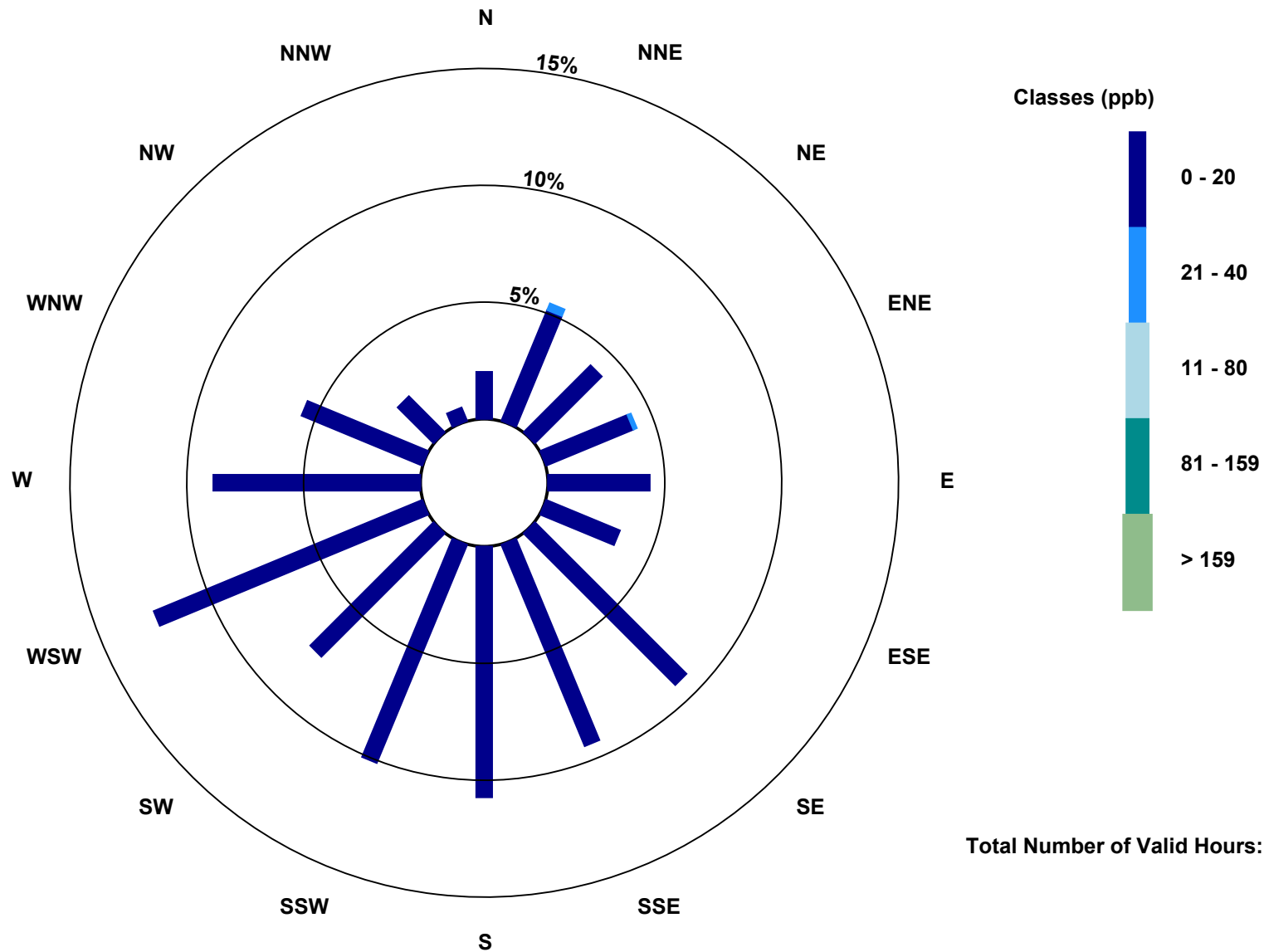
Total Number of Valid Hours: 643

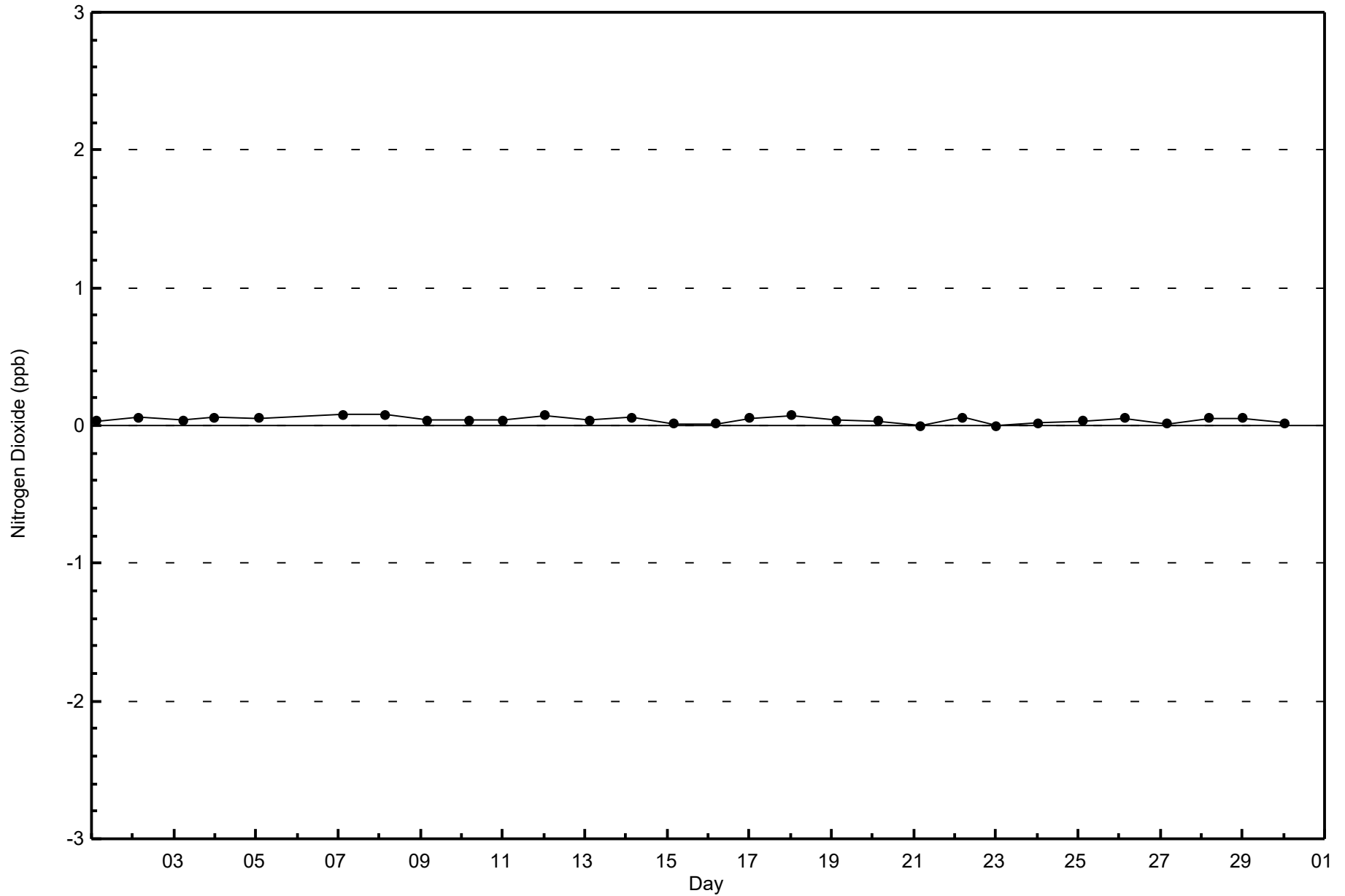
Total Number of Hours: 720

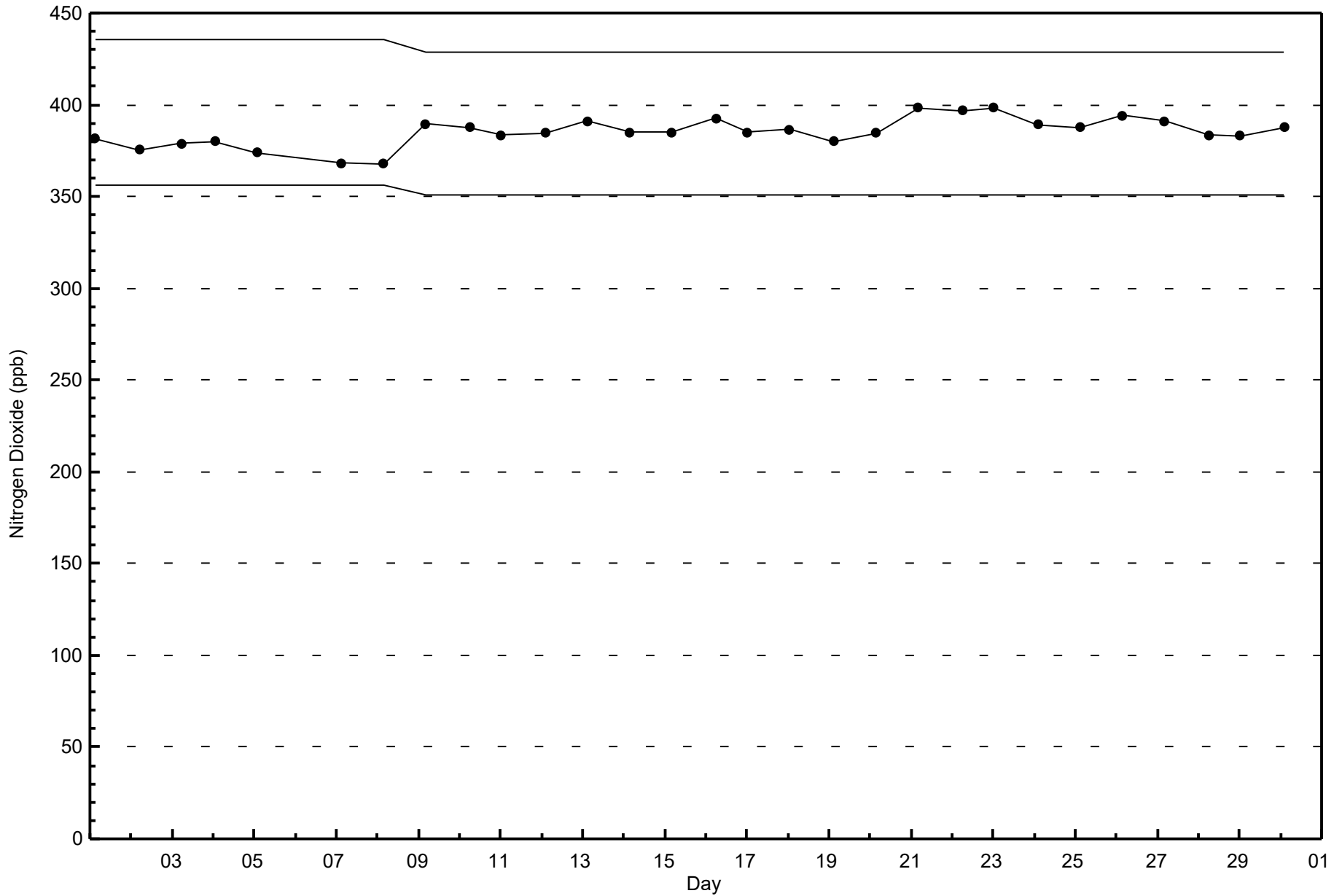


Wood Buffalo Environmental Association  
Wind Rose Nov 2023

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









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

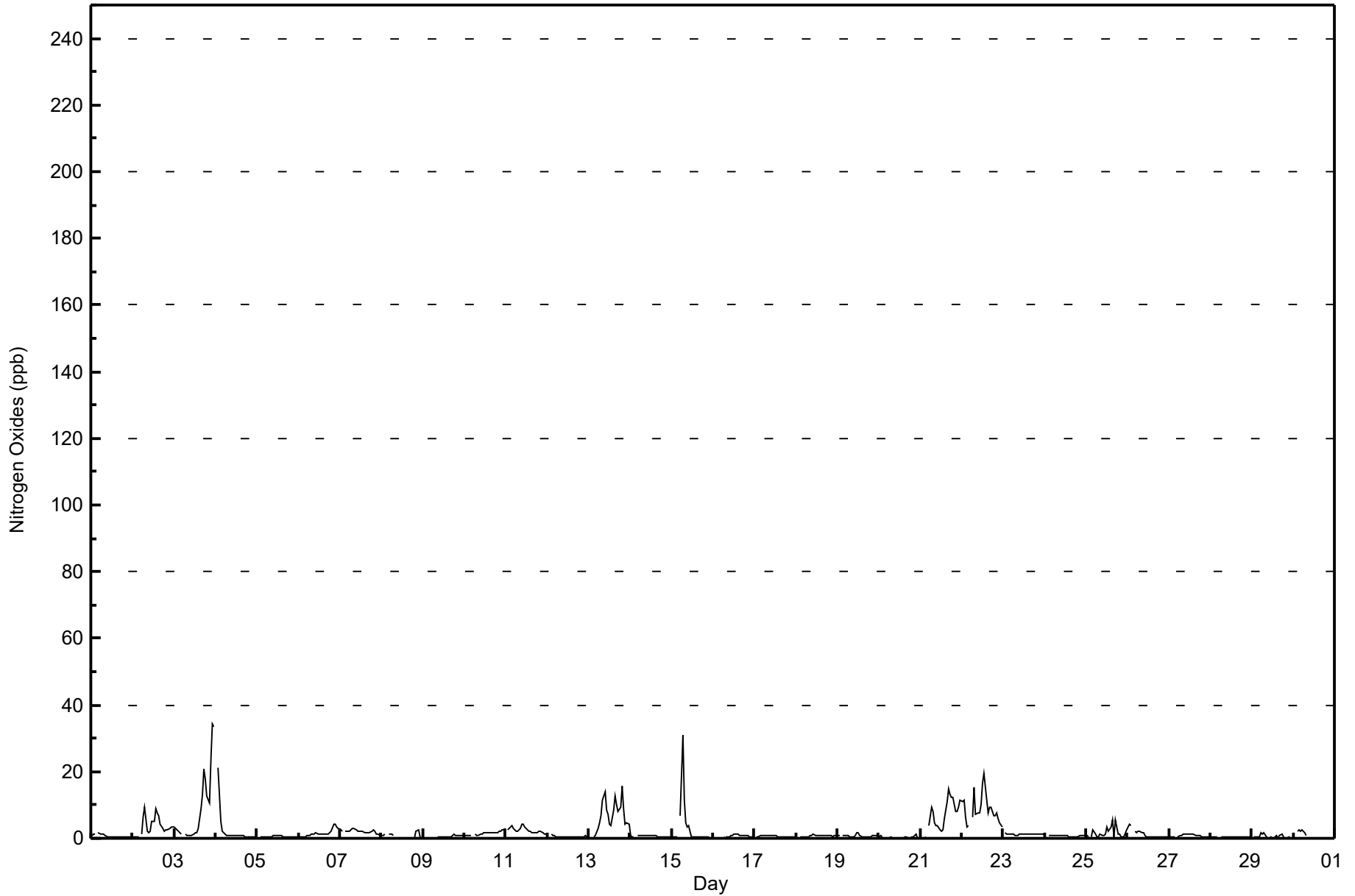
**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Mackay River - November 2023**

Maximum Value: 34.4 ppb on Nov 3 23:00		Maximum Daily Average: 8.7 ppb on Nov 3		Hours in Service: 720																							
Minimum Value: 0.1 ppb on Nov 9 03:00		Minimum Daily Average: 0.3 ppb on Nov 20		Hours of Data: 670																							
Maximum Diurnal Average: 2.7 ppb at hour 7		Minimum Diurnal Average: 1.2 ppb at hour 4		Hours of Missing Data: 50																							
Monthly Average: 2.07 ppb		Percentiles: P <sub>1</sub> = 0.1 P <sub>10</sub> = 0.3 Q <sub>1</sub> = 0.4 Median = 0.8 Q <sub>3</sub> = 1.8 P <sub>90</sub> = 4.8 P <sub>99</sub> = 18.4		Hours of Calibration: 34																							
				Percent Operational Time: 97.8																							
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Nov	0.8	1.3	1.4	Z	1.7	1.5	1.3	1.1	0.8	0.5	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.7	1.7	
2-Nov	0.4	0.4	0.4	0.4	Z	1.4	6.2	9.5	1.9	1.8	2.1	5.1	5.3	8.7	7.7	6.6	4.4	3.0	2.1	2.4	2.5	2.8	3.2	3.3	3.6	9.5	
3-Nov	3.2	2.8	2.0	1.6	1.3	Z	1.1	1.0	1.0	1.0	1.0	1.3	1.6	1.7	3.0	8.9	13.1	20.6	17.9	12.5	10.5	23.9	34.4	33.6	8.7	34.4	
4-Nov	Z	21.3	13.1	5.1	2.0	1.1	1.0	0.9	0.9	0.9	0.9	1.0	1.0	0.9	0.9	0.8	0.7	0.6	0.5	0.5	0.5	0.5	0.4	0.5	2.4	21.3	
5-Nov	0.4	Z	0.4	0.4	0.5	0.6	0.4	0.4	0.5	0.7	0.7	0.8	0.9	1.0	0.7	0.5	0.4	0.3	0.4	0.5	0.5	0.4	0.4	0.4	0.5	1.0	
6-Nov	0.4	0.5	0.5	0.6	0.6	0.7	0.8	1.1	1.2	1.3	1.5	1.4	1.3	1.3	1.4	1.4	1.4	1.4	1.6	2.0	4.1	4.2	3.6	2.9	1.6	4.2	
7-Nov	2.5	2.3	Z	1.9	2.0	2.1	2.4	2.8	2.8	2.5	2.2	2.2	2.2	1.9	1.9	1.8	1.7	1.8	2.2	2.3	2.1	1.5	1.1	1.0	2.1	2.8	
8-Nov	0.9	0.9	1.2	Z	1.1	1.2	1.3	0.9	C	C	C	C	C	0.2	0.2	0.1	0.1	0.1	0.1	0.1	2.3	2.7	0.2	0.1	0.8	2.7	
9-Nov	0.1	0.1	0.1	0.1	Z	0.1	0.1	0.2	0.2	0.3	0.4	0.5	0.4	0.4	0.3	0.3	0.3	0.8	1.1	0.7	0.7	0.6	0.8	0.9	0.4	1.1	
10-Nov	0.9	0.9	0.9	1.0	1.0	Z	1.1	1.0	1.0	1.1	1.2	1.5	1.6	1.8	1.7	1.6	1.6	1.6	1.6	1.7	2.0	2.3	2.4	2.4	1.5	2.4	
11-Nov	Z	2.6	3.2	3.9	3.1	2.3	2.2	2.1	3.2	4.4	4.1	3.5	2.7	2.3	2.1	1.8	1.6	1.5	1.5	2.0	2.1	1.9	1.4	1.2	2.5	4.4	
12-Nov	1.1	Z	1.1	0.9	0.8	0.6	0.5	0.5	0.5	0.5	0.5	0.5	0.4	0.4	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.6	0.3	0.5	1.1	
13-Nov	0.2	0.2	Z	0.4	0.9	2.9	4.5	6.9	11.6	14.0	8.6	7.3	4.3	3.9	8.4	12.5	10.0	7.9	9.5	15.6	9.1	4.2	4.8	4.3	6.6	15.6	
14-Nov	0.8	0.5	0.5	Z	0.7	0.9	0.9	0.9	0.7	0.7	0.7	0.8	0.9	0.8	0.8	0.8	0.6	0.6	0.5	0.5	0.4	0.5	0.5	0.5	0.7	0.9	
15-Nov	0.5	0.4	0.5	0.6	Z	6.9	30.8	11.5	4.5	3.2	3.8	0.6	0.6	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.2	0.2	0.2	2.9	30.8	
16-Nov	0.2	0.2	0.2	0.2	0.2	Z	0.3	0.2	0.3	0.6	0.9	1.0	1.1	1.1	1.1	1.0	0.8	0.7	0.7	0.7	0.7	0.6	0.5	0.6	0.6	1.1	
17-Nov	Z	0.6	0.6	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.6	0.6	0.6	0.5	0.5	0.5	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.6	0.7	
18-Nov	0.5	Z	0.5	0.6	0.6	0.5	0.6	0.6	0.7	0.9	1.1	1.0	0.9	0.9	0.9	0.8	0.7	0.7	0.6	0.9	0.8	0.6	0.8	0.9	0.7	1.1	
19-Nov	0.9	0.8	Z	0.8	0.7	0.8	0.7	0.6	0.6	0.5	0.6	1.8	1.8	1.0	0.6	0.4	0.3	0.2	0.3	0.4	0.7	0.9	1.0	0.8	0.7	1.8	
20-Nov	0.5	0.7	0.3	Z	0.2	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.4	0.2	0.2	0.2	0.6	0.4	1.1	0.2	0.1	0.3	1.1	
21-Nov	0.1	0.1	0.2	0.3	Z	3.7	9.1	8.0	4.7	4.0	3.9	2.7	2.3	2.4	5.8	11.0	14.7	13.3	12.5	12.5	7.9	8.2	9.5	11.3	6.4	14.7	
22-Nov	11.1	11.3	6.4	3.5	3.9	Z	6.6	15.3	7.0	7.6	7.6	10.1	16.4	19.4	11.5	7.5	9.2	9.5	6.9	6.9	7.5	6.1	4.5	3.4	8.7	19.4	
23-Nov	Z	1.7	1.4	1.2	1.2	1.2	1.1	1.0	1.0	1.1	1.2	1.3	1.4	1.3	1.2	1.3	1.2	1.3	1.2	1.1	1.1	1.2	1.1	1.1	1.2	1.7	
24-Nov	1.1	Z	1.1	1.0	0.9	0.8	0.8	0.8	0.8	0.8	0.9	0.9	0.8	0.6	0.5	0.5	0.5	0.5	0.6	0.6	0.6	0.7	0.7	0.7	0.8	1.1	
25-Nov	0.7	0.6	Z	0.5	2.5	1.4	0.3	0.3	1.1	0.9	1.1	1.1	3.5	2.3	3.3	5.4	0.6	5.5	1.2	1.3	0.5	0.4	0.5	2.4	1.6	5.5	
26-Nov	3.3	4.3	3.8	Z	2.0	1.7	2.3	2.1	1.8	1.7	0.9	0.6	0.4	0.3	0.4	0.3	0.3	0.3	0.3	0.5	0.2	0.3	0.4	0.4	1.2	4.3	
27-Nov	0.4	0.3	0.3	0.2	Z	0.6	0.7	0.9	1.1	1.2	1.3	1.3	1.3	1.2	1.1	0.9	0.8	0.8	0.7	0.6	0.5	0.5	0.5	0.5	0.8	1.3	
28-Nov	0.4	0.4	0.4	0.4	0.4	Z	0.4	0.4	0.4	0.5	0.5	0.5	0.4	0.4	0.4	0.4	0.6	0.6	0.6	0.6	0.5	0.5	0.5	0.5	0.5	0.6	
29-Nov	Z	0.5	0.4	0.3	0.3	1.6	1.2	1.5	0.4	0.2	0.2	0.2	0.2	0.2	0.2	0.8	0.2	0.9	1.5	0.3	0.2	0.2	0.3	0.2	0.2	1.6	
30-Nov	0.4	Z	2.3	2.5	2.0	2.4	1.6	0.7	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	--	2.5
		1.3	2.2	1.7	1.2	1.3	1.5	2.7	2.5	1.8	1.9	1.8	1.8	2.0	2.0	2.0	2.4	2.4	2.6	2.3	2.4	2.1	2.3	2.6	2.6	Diurnal Average	
		11.1	21.3	13.1	5.1	3.9	6.9	30.8	15.3	11.6	14.0	8.6	10.1	16.4	19.4	11.5	12.5	14.7	20.6	17.9	15.6	10.5	23.9	34.4	33.6	Diurnal Maximum	
Z - zerspan		C - Calibration			M - Maintenance																						



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

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Mackay River - November 2023**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Mackay River - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	664	99.10	99.10
21 - 40	6	0.90	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: 670

Total Number of Hours: 720





**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Mackay River - November 2023**

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	32	25	26	28	22	59	60	69	65	48	80	57	36	14	4	637
21 - 40	1	3	1	1	0	0	0	0	0	0	0	0	0	0	0	0	6
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	13	35	26	27	28	22	59	60	69	65	48	80	57	36	14	4	643

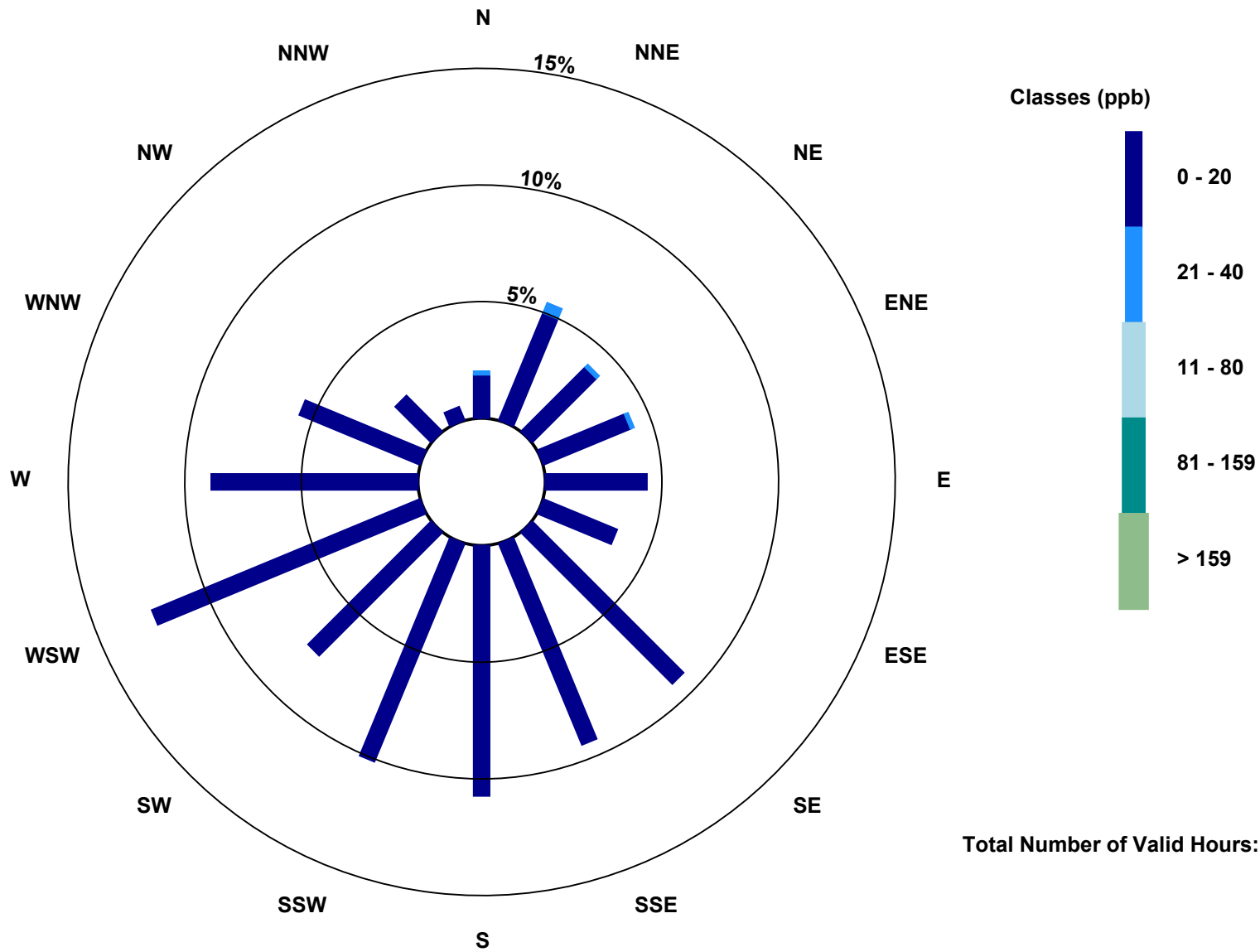
Total Number of Valid Hours: 643

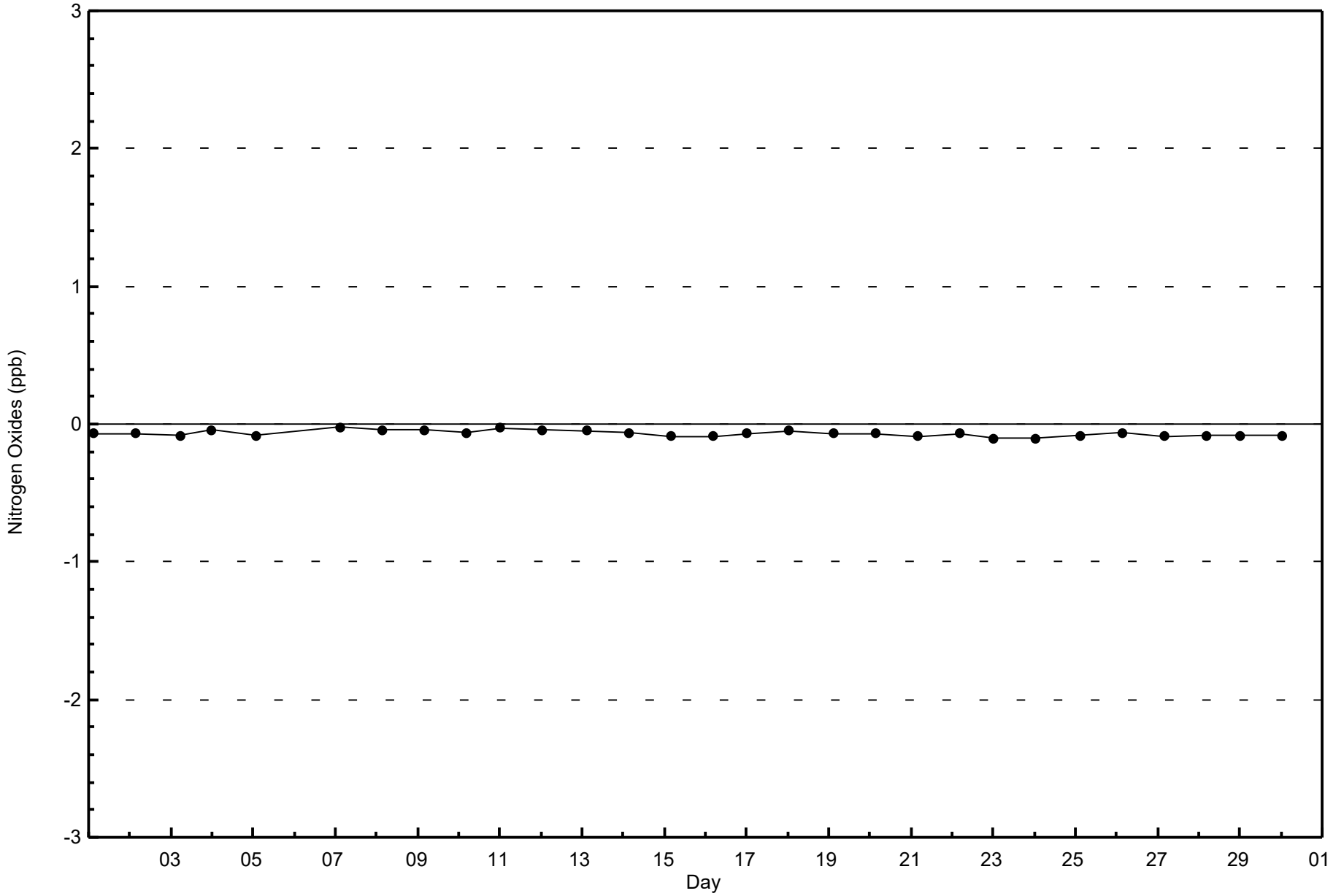
Total Number of Hours: 720

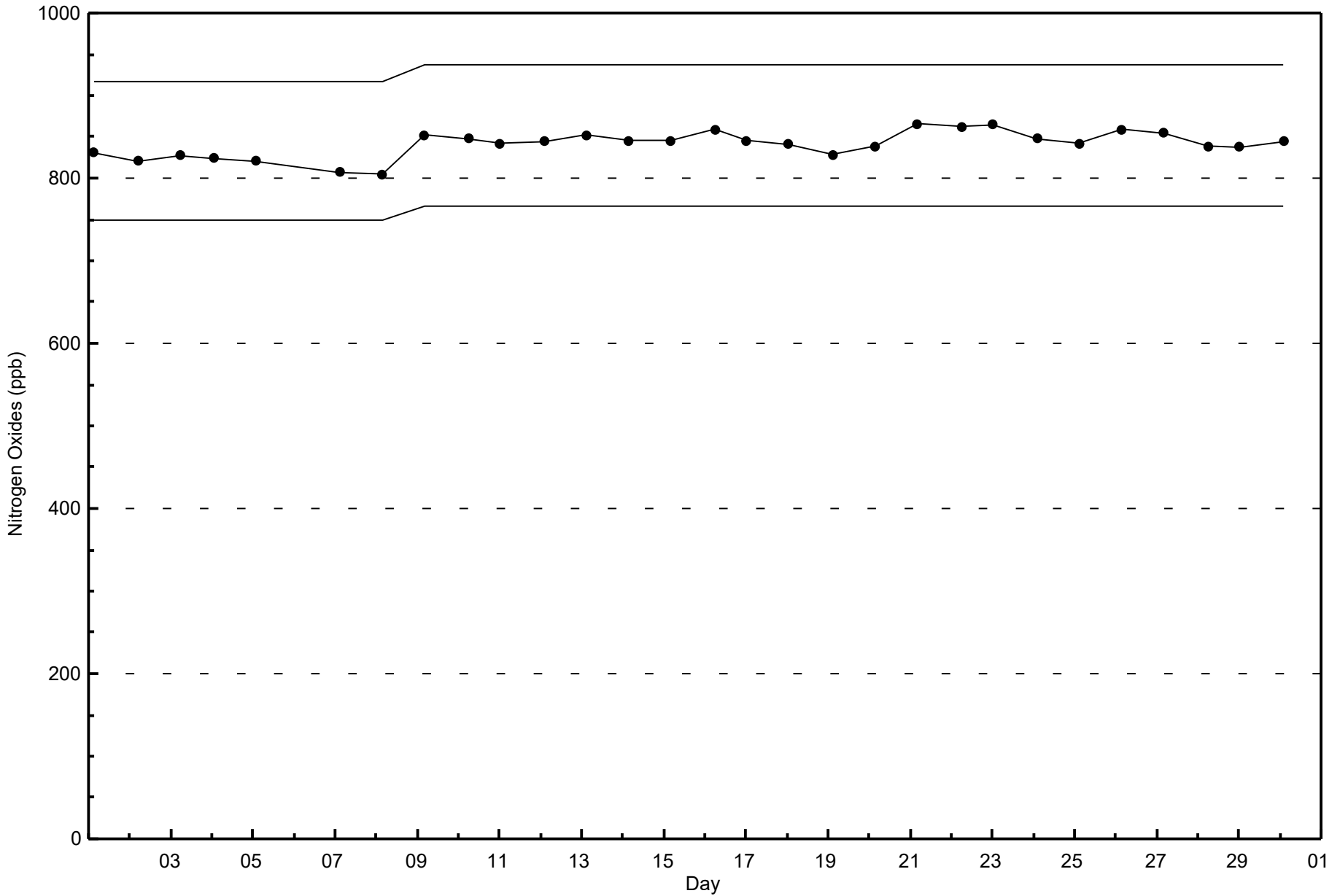


Wood Buffalo Environmental Association  
Wind Rose Nov 2023

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









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

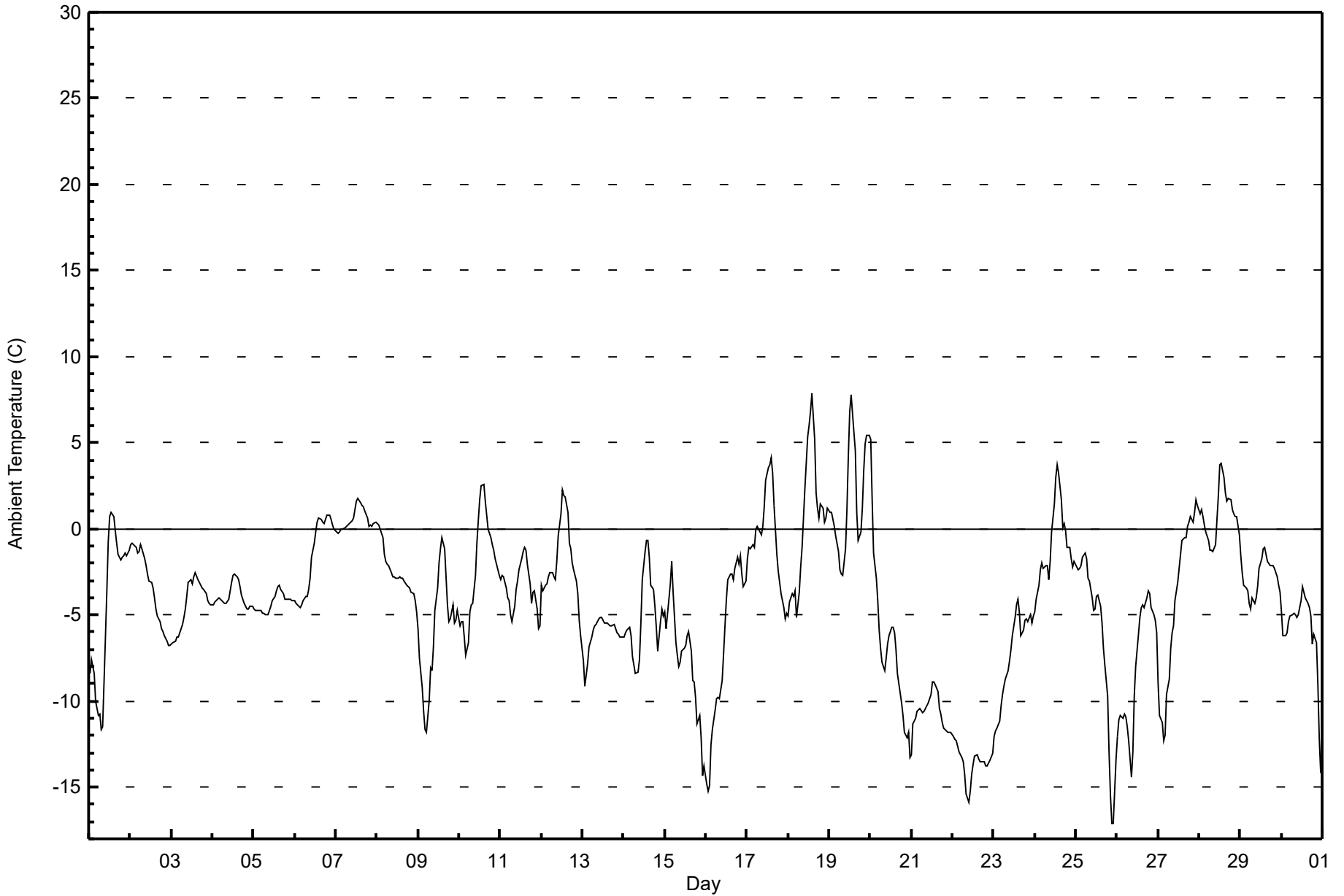
**Ambient Temperature (AT) - C**  
**Mackay River - November 2023**

Maximum Value: 7.9 C on Nov 18 15:00		Maximum Daily Average: 1.8 C on Nov 19		Hours in Service: 720																							
Minimum Value: -17.1 C on Nov 25 22:00		Minimum Daily Average: -13.6 C on Nov 22		Hours of Data: 720																							
Maximum Diurnal Average: -1.6 C at hour 14		Minimum Diurnal Average: -5.6 C at hour 9		Hours of Missing Data: 0																							
Monthly Average: -4.23 C		Percentiles: P <sub>1</sub> = -14.9 P <sub>10</sub> = -10.9 Q <sub>1</sub> = -6.2 Median = -4.0 Q <sub>3</sub> = -1.3 P <sub>90</sub> = 0.8 P <sub>99</sub> = 5.4		Hours of Calibration: 0																							
				Percent Operational Time: 100.0																							
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Nov	-8.4	-7.6	-8.0	-8.4	-10.0	-10.8	-10.7	-11.6	-11.5	-6.3	-3.6	-0.8	0.7	1.0	0.7	-0.1	-0.8	-1.4	-1.8	-1.7	-1.6	-1.4	-1.6	-1.3	-4.5	1.0	
2-Nov	-0.9	-0.9	-0.9	-1.0	-1.4	-1.4	-0.9	-1.2	-1.7	-2.2	-2.6	-3.0	-3.1	-3.5	-4.0	-4.7	-5.1	-5.4	-5.8	-5.9	-6.2	-6.5	-6.7	-6.8	-3.4	-0.9	
3-Nov	-6.7	-6.6	-6.5	-6.3	-6.3	-6.0	-5.6	-5.1	-4.7	-4.0	-3.1	-3.0	-3.2	-2.8	-2.6	-2.9	-3.1	-3.3	-3.4	-3.5	-3.7	-4.1	-4.3	-4.4	-4.4	-2.6	
4-Nov	-4.4	-4.2	-4.2	-4.1	-4.0	-4.1	-4.2	-4.4	-4.4	-4.1	-3.6	-3.1	-2.7	-2.7	-2.8	-3.0	-3.3	-3.8	-4.3	-4.5	-4.7	-4.6	-4.5	-4.5	-3.9	-2.7	
5-Nov	-4.7	-4.7	-4.7	-4.7	-4.8	-4.9	-4.9	-5.0	-5.0	-4.7	-4.5	-4.2	-3.9	-3.6	-3.3	-3.3	-3.5	-3.7	-4.1	-4.1	-4.1	-4.1	-4.2	-4.2	-4.3	-3.3	
6-Nov	-4.2	-4.3	-4.5	-4.5	-4.4	-4.1	-4.0	-3.9	-3.5	-2.9	-1.7	-0.8	-0.2	0.3	0.6	0.6	0.4	0.3	0.5	0.8	0.8	0.5	0.2	0.0	-1.6	0.8	
7-Nov	-0.2	-0.2	-0.2	0.0	0.0	0.0	0.1	0.2	0.3	0.5	0.7	1.1	1.6	1.7	1.5	1.4	1.2	1.0	0.6	0.1	0.2	0.2	0.3	0.4	0.5	1.7	
8-Nov	0.3	0.2	0.0	-0.5	-1.5	-1.9	-2.1	-2.1	-2.5	-2.8	-2.8	-2.9	-2.9	-2.8	-2.8	-2.9	-3.0	-3.3	-3.3	-3.5	-3.7	-3.8	-4.2	-4.8	-2.5	0.3	
9-Nov	-5.8	-7.5	-9.2	-10.6	-11.7	-11.9	-10.0	-8.1	-8.3	-6.8	-4.8	-3.4	-2.0	-1.1	-0.5	-1.2	-2.8	-4.4	-5.4	-5.2	-4.4	-5.5	-5.3	-4.8	-5.9	-0.5	
10-Nov	-5.6	-5.4	-5.4	-6.3	-7.4	-6.6	-4.8	-4.4	-4.4	-2.7	-0.8	0.4	1.7	2.5	2.6	1.6	0.8	0.0	-0.5	-0.9	-1.2	-1.8	-2.1	-2.7	-2.2	2.6	
11-Nov	-3.0	-2.7	-2.8	-3.5	-4.0	-4.1	-5.0	-5.4	-4.5	-3.6	-3.0	-2.4	-1.7	-1.3	-1.1	-1.2	-2.1	-3.2	-4.3	-3.7	-3.6	-4.6	-5.8	-5.6	-3.4	-1.1	
12-Nov	-3.3	-3.6	-3.3	-3.2	-2.8	-2.5	-2.5	-2.8	-2.9	-1.9	-0.4	0.8	2.3	1.9	1.9	0.9	-0.8	-1.2	-2.0	-2.4	-3.0	-3.8	-5.3	-6.2	-1.9	2.3	
13-Nov	-7.6	-9.1	-8.5	-7.8	-6.9	-6.2	-5.9	-5.7	-5.5	-5.2	-5.2	-5.3	-5.4	-5.5	-5.5	-5.6	-5.6	-5.6	-5.8	-6.0	-6.1	-6.3	-6.3	-6.2	-6.2	-5.2	
14-Nov	-6.3	-6.1	-5.9	-5.7	-6.2	-7.4	-7.9	-8.4	-8.3	-7.6	-5.4	-2.9	-1.3	-0.7	-0.7	-1.7	-3.3	-3.5	-4.5	-5.7	-7.1	-5.4	-4.7	-5.0	-5.1	-0.7	
15-Nov	-4.8	-5.8	-4.1	-3.2	-1.9	-3.7	-6.6	-7.3	-8.0	-7.7	-7.1	-6.9	-6.8	-6.2	-5.9	-7.1	-8.8	-8.9	-9.8	-11.3	-10.9	-12.1	-14.3	-13.8	-7.6	-1.9	
16-Nov	-14.8	-15.2	-14.9	-12.5	-11.6	-10.5	-9.9	-9.8	-9.9	-8.8	-7.2	-5.6	-4.1	-2.9	-2.6	-2.7	-3.0	-2.3	-1.7	-2.0	-1.6	-2.6	-3.3	-3.0	-6.8	-1.6	
17-Nov	-1.7	-1.1	-1.2	-0.9	-1.0	0.0	0.1	0.0	-0.3	0.2	1.3	2.8	3.6	3.7	4.1	3.3	1.4	-1.5	-2.5	-3.1	-3.7	-4.5	-5.2	-4.9	-0.5	4.1	
18-Nov	-5.1	-4.3	-3.7	-4.0	-3.6	-5.1	-3.7	-2.2	-1.1	0.6	2.3	5.4	6.0	6.8	7.9	5.2	2.1	1.2	0.6	1.5	1.2	0.4	0.6	1.2	0.4	7.9	
19-Nov	1.0	0.9	0.5	0.1	-0.4	-1.3	-2.4	-2.6	-2.7	-1.2	1.1	4.2	6.8	7.8	5.6	4.5	0.9	-0.7	-0.2	1.2	3.4	4.9	5.5	5.5	1.8	7.8	
20-Nov	5.2	1.7	-1.4	-2.9	-4.2	-5.9	-6.9	-7.7	-8.2	-7.5	-6.7	-6.2	-5.7	-5.7	-6.0	-7.1	-8.4	-9.6	-10.1	-10.8	-11.9	-12.1	-11.8	-13.3	-6.8	5.2	
21-Nov	-13.1	-11.4	-11.0	-10.6	-10.5	-10.4	-10.7	-10.6	-10.4	-10.3	-10.1	-9.6	-8.9	-8.9	-9.1	-9.5	-10.4	-10.7	-11.2	-11.6	-11.7	-11.8	-11.8	-11.8	-10.7	-8.9	
22-Nov	-12.1	-12.2	-12.3	-12.6	-13.0	-13.3	-13.6	-14.3	-15.4	-15.9	-15.2	-14.3	-13.7	-13.2	-13.1	-13.3	-13.5	-13.6	-13.6	-13.7	-13.7	-13.6	-13.4	-13.0	-13.6	-12.1	
23-Nov	-12.1	-11.8	-11.6	-11.1	-10.2	-9.6	-9.1	-8.7	-8.3	-7.7	-7.0	-6.2	-5.2	-4.4	-4.1	-4.8	-6.2	-5.9	-5.3	-5.2	-5.4	-5.0	-5.5	-5.1	-7.3	-4.1	
24-Nov	-4.8	-4.1	-3.3	-2.4	-2.0	-2.3	-2.1	-2.2	-3.0	-1.9	-0.2	1.4	3.0	3.7	3.3	1.7	0.0	0.3	-0.1	-1.1	-1.1	-1.7	-2.2	-1.9	-1.0	3.7	
25-Nov	-2.2	-2.4	-2.3	-2.1	-1.7	-1.4	-1.7	-2.9	-3.1	-4.0	-4.7	-4.7	-3.9	-3.8	-4.5	-5.4	-6.9	-7.9	-9.7	-13.0	-15.5	-17.1	-17.1	-13.4	-6.3	-1.4	
26-Nov	-12.1	-11.1	-10.9	-11.0	-10.8	-10.9	-11.5	-12.3	-14.4	-12.9	-9.7	-8.0	-6.1	-5.1	-4.6	-4.4	-4.5	-4.0	-3.6	-3.8	-4.6	-5.0	-5.3	-6.0	-8.0	-3.6	
27-Nov	-8.9	-10.9	-11.2	-12.3	-12.0	-9.6	-8.7	-6.9	-6.0	-5.6	-4.2	-3.1	-2.3	-1.5	-0.7	-0.5	-0.5	0.1	0.4	0.7	0.3	1.0	1.7	1.4	-4.1	1.7	
28-Nov	0.9	1.1	0.8	0.3	-0.2	-0.7	-1.2	-1.2	-1.3	-1.0	0.6	1.9	3.7	3.8	3.0	2.1	1.6	1.8	1.6	1.1	0.9	0.7	0.7	-0.3	0.9	3.8	
29-Nov	-1.6	-2.5	-3.2	-3.4	-3.6	-4.4	-4.6	-4.0	-4.3	-4.0	-3.3	-2.3	-1.7	-1.1	-1.1	-1.5	-1.9	-2.1	-2.1	-2.1	-2.3	-2.8	-3.2	-3.7	-2.8	-1.1	
30-Nov	-4.8	-6.2	-6.2	-6.0	-5.4	-5.1	-5.0	-4.9	-5.0	-5.2	-5.0	-4.2	-3.4	-3.7	-4.0	-4.4	-4.6	-5.0	-6.7	-6.1	-6.6	-9.1	-12.2	-14.2	-6.0	-3.4	
		-5.1	-5.3	-5.3	-5.4	-5.4	-5.5	-5.5	-5.5	-5.6	-4.9	-3.9	-2.8	-2.0	-1.6	-1.6	-2.2	-3.1	-3.5	-3.9	-4.2	-4.4	-4.7	-5.0	-5.1	Diurnal Average	
		5.2	1.7	0.8	0.3	0.0	0.0	0.1	0.2	0.3	0.6	2.3	5.4	6.8	7.8	7.9	5.2	2.1	1.8	1.6	1.5	3.4	4.9	5.5	5.5	Diurnal Maximum	



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

**Ambient Temperature (AT) - C**  
**Mackay River - November 2023**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C  
Mackay River - November 2023**

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	0	0.00	0.00
-20 - 0	600	83.33	83.33
0 - 10	120	16.67	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



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

**Relative Humidity (RH) - %**  
**Mackay River - November 2023**

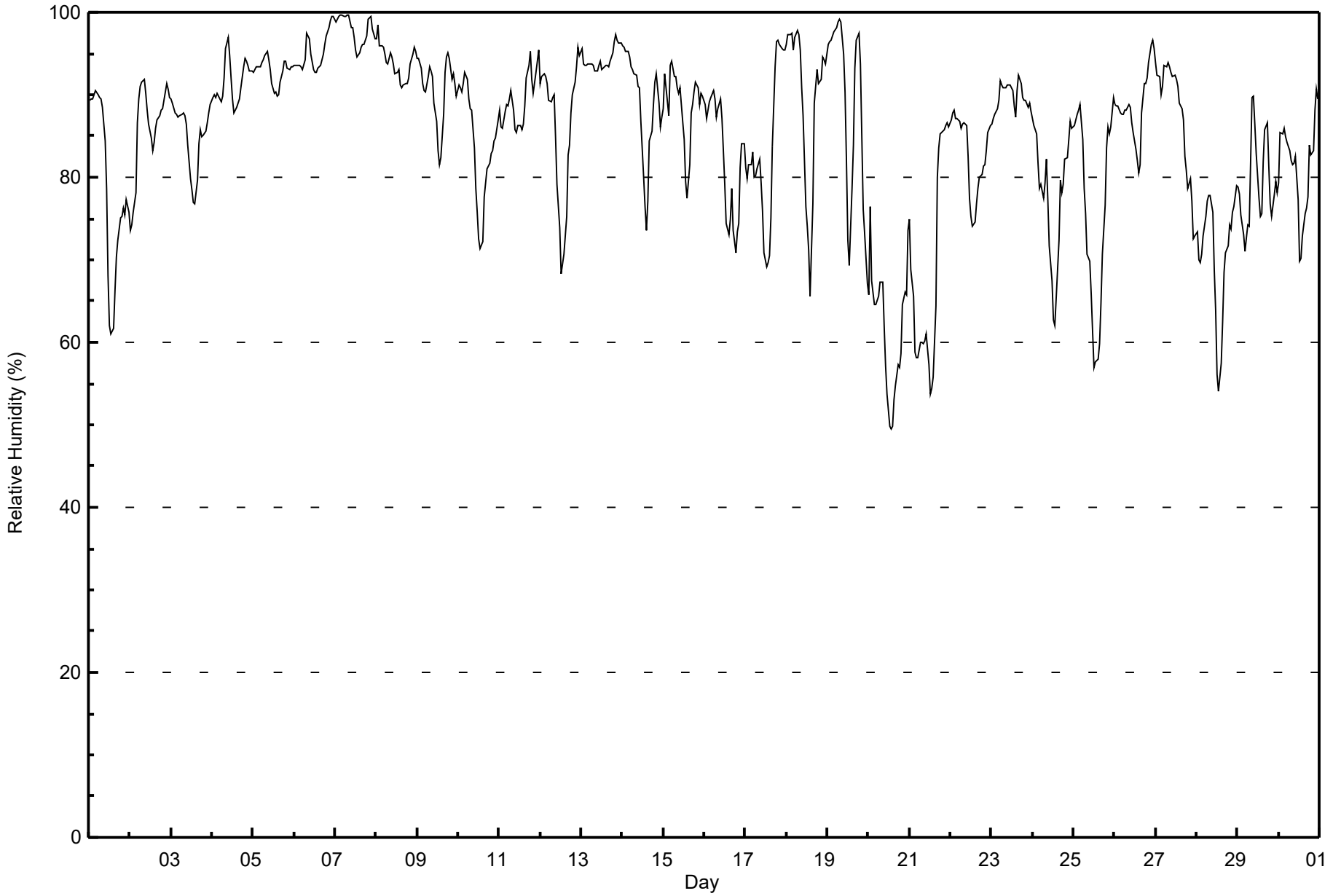
Maximum Value: 99.6 % on Nov 7 08:00																						Maximum Daily Average: 97.9 % on Nov 7																						Hours in Service: 720		
Minimum Value: 49.5 % on Nov 20 14:00																						Minimum Daily Average: 61.5 % on Nov 20																						Hours of Data: 720		
Maximum Diurnal Average: 88.0 % at hour 2																						Minimum Diurnal Average: 76.0 % at hour 14																						Hours of Missing Data: 0		
Monthly Average: 85.02 %																						Percentiles: P <sub>1</sub> = 54.5 P <sub>10</sub> = 70.4 Q <sub>1</sub> = 79.0 Median = 88.1 Q <sub>3</sub> = 92.8 P <sub>90</sub> = 95.5 P <sub>99</sub> = 99.4																						Hours of Calibration: 0		
																																												Percent Operational Time: 100.0		
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																						
1-Nov	89.3	89.5	89.5	90.1	90.5	90.0	89.7	89.5	88.5	84.5	78.7	68.2	62.0	61.0	61.7	66.3	70.4	72.4	75.0	75.2	76.2	75.4	77.3	75.8	78.6	90.5																				
2-Nov	73.6	74.2	75.7	78.2	86.7	89.5	91.1	91.5	91.9	90.1	88.2	86.5	84.7	83.2	84.3	86.0	87.0	87.5	88.2	88.3	89.4	91.4	90.7	89.6	86.1	91.9																				
3-Nov	89.4	89.0	87.8	87.6	87.3	87.5	87.6	87.8	87.4	86.4	84.0	79.8	78.5	76.9	76.7	79.6	84.0	85.8	84.9	85.0	85.6	86.6	87.8	88.8	85.1	89.4																				
4-Nov	89.7	89.9	89.6	90.2	89.9	89.2	89.9	92.0	95.5	96.9	94.7	92.1	89.5	87.7	88.5	89.0	89.5	90.8	93.5	94.5	94.1	93.5	93.0	92.9	91.5	96.9																				
5-Nov	92.8	93.1	93.3	93.4	93.4	93.9	94.2	94.7	95.3	94.3	93.1	91.4	90.1	90.3	89.8	89.9	91.6	92.9	94.2	94.1	93.3	93.0	93.3	93.4	92.9	95.3																				
6-Nov	93.6	93.5	93.6	93.5	93.4	93.1	94.3	97.5	97.2	96.8	94.9	93.1	92.7	92.7	93.3	93.6	94.2	95.0	96.1	97.1	98.1	99.0	99.5	99.4	95.2	99.5																				
7-Nov	98.8	99.2	99.5	99.6	99.6	99.4	99.5	99.6	99.6	98.1	98.1	97.0	95.3	94.5	95.1	95.7	96.1	96.1	97.2	99.1	99.4	99.5	98.0	96.8	97.9	99.6																				
8-Nov	96.7	98.4	95.9	96.0	95.7	94.9	93.9	93.7	95.1	94.6	93.7	92.6	92.7	93.0	91.2	90.9	91.2	91.4	91.4	92.0	93.8	95.0	95.8	95.2	94.0	98.4																				
9-Nov	94.4	94.4	93.3	91.4	90.4	90.4	92.3	93.5	92.8	92.2	89.0	86.8	83.2	81.5	82.3	87.6	92.6	94.6	95.2	94.5	91.9	92.6	91.3	89.8	90.7	95.2																				
10-Nov	91.2	90.8	90.3	91.4	92.8	91.9	89.5	88.3	88.2	83.6	78.6	75.8	72.6	71.4	72.2	77.6	79.3	81.0	81.6	82.9	83.2	84.4	84.8	87.0	83.8	92.8																				
11-Nov	88.1	86.1	85.9	88.0	88.9	88.6	89.5	90.4	88.1	85.8	85.5	86.3	86.3	85.8	86.5	88.7	92.1	93.6	95.3	91.8	90.2	92.6	94.1	95.5	89.3	95.5																				
12-Nov	91.3	92.3	92.6	92.1	91.4	89.3	89.2	89.6	89.9	84.9	79.1	74.0	68.3	69.6	70.6	75.2	82.8	83.9	87.8	89.9	91.6	93.3	95.8	94.7	85.8	95.8																				
13-Nov	95.6	93.8	93.6	93.6	93.8	93.7	93.7	93.6	92.9	92.9	93.5	94.1	93.1	93.3	93.5	93.5	93.3	94.0	95.1	96.5	97.3	96.5	96.3	96.3	94.3	97.3																				
14-Nov	96.0	95.8	95.3	95.2	94.5	93.4	93.0	92.6	92.3	91.0	90.9	86.7	80.1	76.4	73.5	77.1	84.5	85.5	88.8	91.6	92.6	89.0	86.2	87.3	88.7	96.0																				
15-Nov	88.4	92.6	89.2	87.4	93.6	94.1	92.2	92.3	90.8	90.1	90.8	86.7	84.6	79.4	77.5	81.6	87.8	88.8	90.3	91.6	90.9	88.8	90.2	89.9	88.7	94.1																				
16-Nov	88.8	87.2	88.1	89.1	89.7	90.5	89.5	87.3	88.3	89.5	87.2	83.2	79.1	74.3	73.1	74.9	78.7	73.6	70.8	73.5	74.5	81.2	84.1	84.1	82.5	90.5																				
17-Nov	81.2	79.9	81.5	81.6	83.0	80.1	80.1	81.0	82.2	79.3	75.9	70.9	69.2	69.6	70.4	75.1	83.7	93.4	96.4	96.7	96.0	95.6	95.5	95.3	83.1	96.7																				
18-Nov	96.1	97.3	97.4	97.5	95.5	97.0	97.9	97.3	95.4	90.8	87.5	76.4	74.1	71.2	65.6	76.8	89.0	91.0	93.1	91.3	91.8	94.6	94.2	93.7	89.7	97.9																				
19-Nov	96.2	96.5	96.5	97.1	97.7	98.2	98.8	99.1	98.8	94.9	90.3	82.0	72.3	69.4	78.6	83.9	93.1	96.6	97.5	93.8	85.0	76.1	73.2	67.1	88.9	99.1																				
20-Nov	65.8	76.4	67.5	64.5	64.5	65.1	65.6	67.3	67.2	61.9	57.2	53.7	49.8	49.5	49.8	53.0	54.8	57.3	57.0	58.7	64.6	66.1	65.7	73.5	61.5	76.4																				
21-Nov	74.9	68.9	65.6	58.8	58.1	58.1	59.9	60.1	59.8	60.2	61.1	57.3	53.7	54.4	55.8	64.5	80.0	83.6	85.3	85.4	85.8	86.3	86.6	86.1	68.8	86.6																				
22-Nov	86.9	87.8	88.1	87.1	87.2	86.9	85.9	86.5	86.5	86.3	82.5	77.4	75.2	74.0	74.6	76.7	78.6	80.0	80.4	81.4	81.5	83.3	85.4	86.2	82.8	88.1																				
23-Nov	86.4	87.1	87.7	88.4	89.3	91.6	91.2	90.9	90.9	91.2	91.2	91.3	90.5	88.6	87.4	90.5	92.3	91.3	89.7	89.3	89.3	88.5	89.0	88.0	89.6	92.3																				
24-Nov	87.1	86.2	85.3	81.8	78.7	79.1	77.5	79.4	82.3	77.4	71.8	67.5	62.1	65.5	72.3	79.6	78.2	79.1	82.2	82.3	84.5	86.8	85.9	88.0	78.1	87.1																				
25-Nov	86.3	86.9	87.6	88.2	88.8	84.7	78.7	75.5	70.7	69.9	66.0	61.3	57.0	57.7	57.9	59.8	64.7	70.6	76.6	83.6	86.0	85.2	86.1	89.7	75.8	89.7																				
26-Nov	88.9	88.6	88.6	87.7	87.6	87.6	88.2	88.1	88.8	88.4	86.7	85.4	83.4	82.0	80.5	81.5	87.9	91.3	91.4	92.0	93.9	96.1	96.6	95.6	88.6	96.6																				
27-Nov	94.0	92.4	92.2	90.0	90.9	93.5	93.5	93.9	93.5	92.7	92.2	92.3	91.9	91.1	89.0	88.4	86.9	82.6	80.9	78.6	79.7	77.1	72.6	72.9	87.6	94.0																				
28-Nov	73.3	70.0	69.6	70.6	72.9	75.3	77.2	77.7	77.9	75.7	68.8	63.9	56.1	54.0	57.4	62.6	68.5	70.9	71.8	74.2	73.8	75.8	76.4	78.9	70.6	78.9																				
29-Nov	78.7	78.0	75.5	73.0	71.0	72.7	74.2	74.0	89.6	89.8	86.4	82.9	77.5	75.3	75.6	81.8	85.8	86.6	81.4	76.8	75.2	78.0	79.4	78.2	79.1	89.8																				
30-Nov	79.4	85.5	85.3	86.0	85.0	84.2	83.3	82.1	81.6	81.7	82.6	77.3	69.8	70.1	72.9	75.5	76.2	77.6	83.8	82.7	83.3	88.2	90.7	89.5	81.4	90.7																				
																						87.8	88.0	87.4	87.0	87.4	87.4	87.4	87.6	88.0	86.4	84.0	80.5	77.2	76.0	76.4	79.7	83.9	85.3	86.3	86.8	87.0	87.6	87.9	87.9	Diurnal Average
																						98.8	99.2	99.5	99.6	99.6	99.4	99.5	99.6	99.6	98.1	98.1	97.0	95.3	94.5	95.1	95.7	96.1	96.6	97.5	99.1	99.4	99.5	99.5	99.4	Diurnal Maximum





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

**Relative Humidity (RH) - %**  
**Mackay River - November 2023**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Relative Humidity (RH) - %  
Mackay River - November 2023**

<b>Concentration Ranges (%)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	0	0.00	0.00
20 - 40	0	0.00	0.00
40 - 60	26	3.61	3.61
60 - 80	170	23.61	27.22
80 - 100	524	72.78	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720

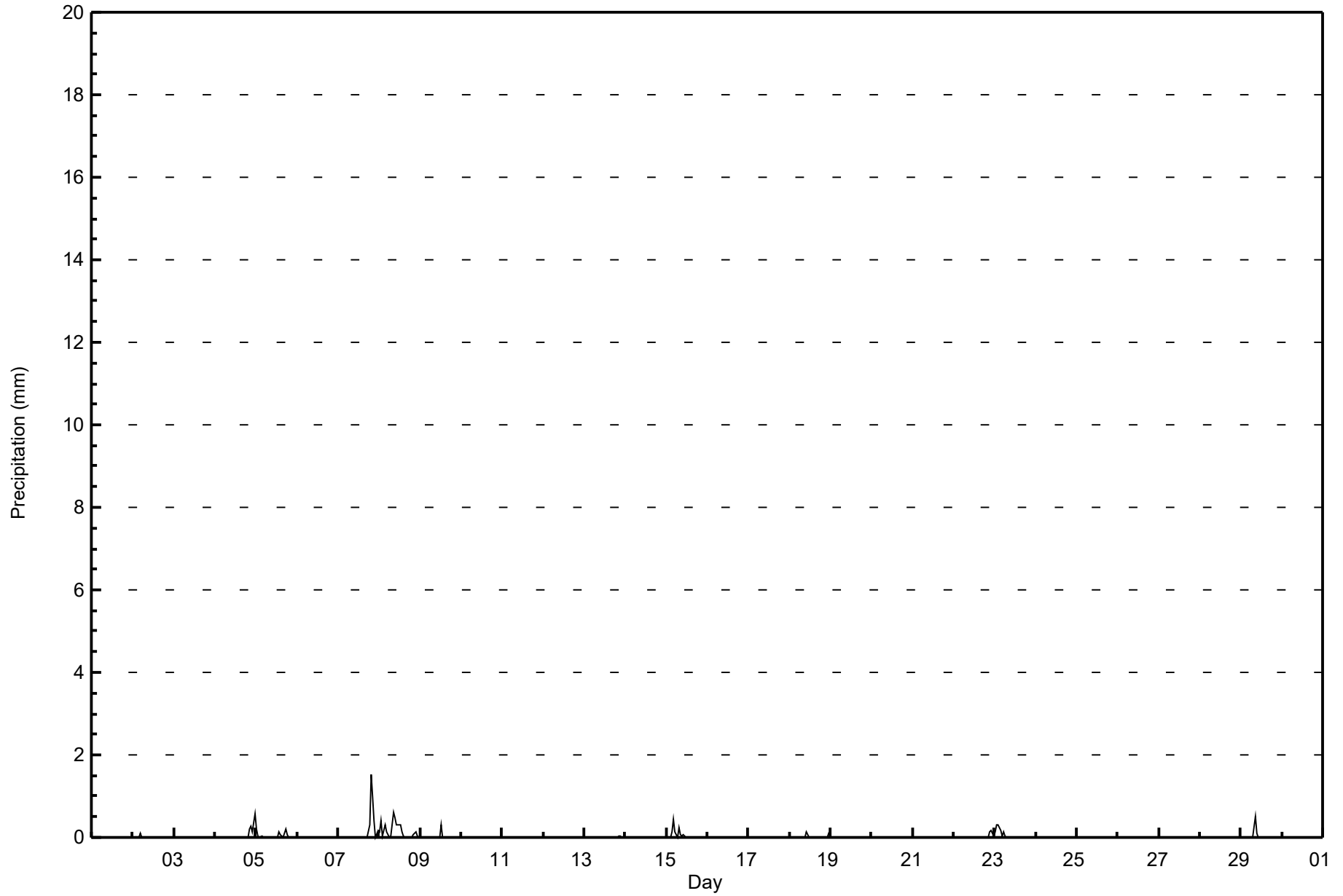


Maximum Value: 1.5 mm on Nov 7 20:00		Maximum Daily Total: 3.6 mm on Nov 8		Hours in Service: 720																																				
Minimum Value: 0.0 mm on Nov 1 01:00		Minimum Daily Total: 0.0 mm on Nov 1		Hours of Data: 719																																				
Maximum Diurnal Total: 1.5 mm at hour 20		Minimum Diurnal Total: 0.0 mm at hour 17		Hours of Missing Data: 1																																				
Monthly Total: 13.01 mm		Percentiles: P <sub>1</sub> = 0.0 P <sub>10</sub> = 0.0 Q <sub>1</sub> = 0.0 Median = 0.0 Q <sub>3</sub> = 0.0 P <sub>90</sub> = 0.0 P <sub>99</sub> = 0.4		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-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0						
2-Nov	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1				
3-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
4-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
5-Nov	0.2	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	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
6-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
7-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	1.5	1.0	0.4	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		
8-Nov	0.1	0.4	0.1	0.3	0.1	0.1	0.0	0.1	0.6	0.5	0.3	0.3	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
9-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
10-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
11-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
12-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
13-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
14-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
15-Nov	0.0	0.0	0.0	0.1	0.5	0.1	0.0	0.3	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
16-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	M	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
18-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
19-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
20-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
21-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
22-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23-Nov	0.1	0.3	0.3	0.2	0.1	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
24-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
26-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
27-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
28-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
29-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		0.4	0.8	0.4	0.7	0.7	0.4	0.1	0.3	1.2	0.6	0.5	0.3	0.6	0.3	0.1	0.1	0.0	0.2	0.4	1.5	1.3	1.0	0.3	0.9	Diurnal Average														
		0.2	0.4	0.3	0.3	0.5	0.2	0.1	0.3	0.6	0.5	0.3	0.3	0.3	0.1	0.1	0.1	0.0	0.2	0.3	1.5	1.0	0.4	0.2	0.6	Diurnal Maximum														
M - Maintenance																																								



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

**Precipitation (PC) - mm**  
**Mackay River - November 2023**





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

**Precipitation (PC) - mm**  
**Mackay River - November 2023**

<b>Concentration Ranges (mm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 0.3	710	98.75	98.75
0.4 - 0.5	5	0.70	99.44
0.6 - 0.7	2	0.28	99.72
0.8 - 1.4	1	0.14	99.86
1.5 - 10	1	0.14	100.00
> 10	0	0.00	100.00

Total Number of Valid Hours: 719

Total Number of Hours: 720

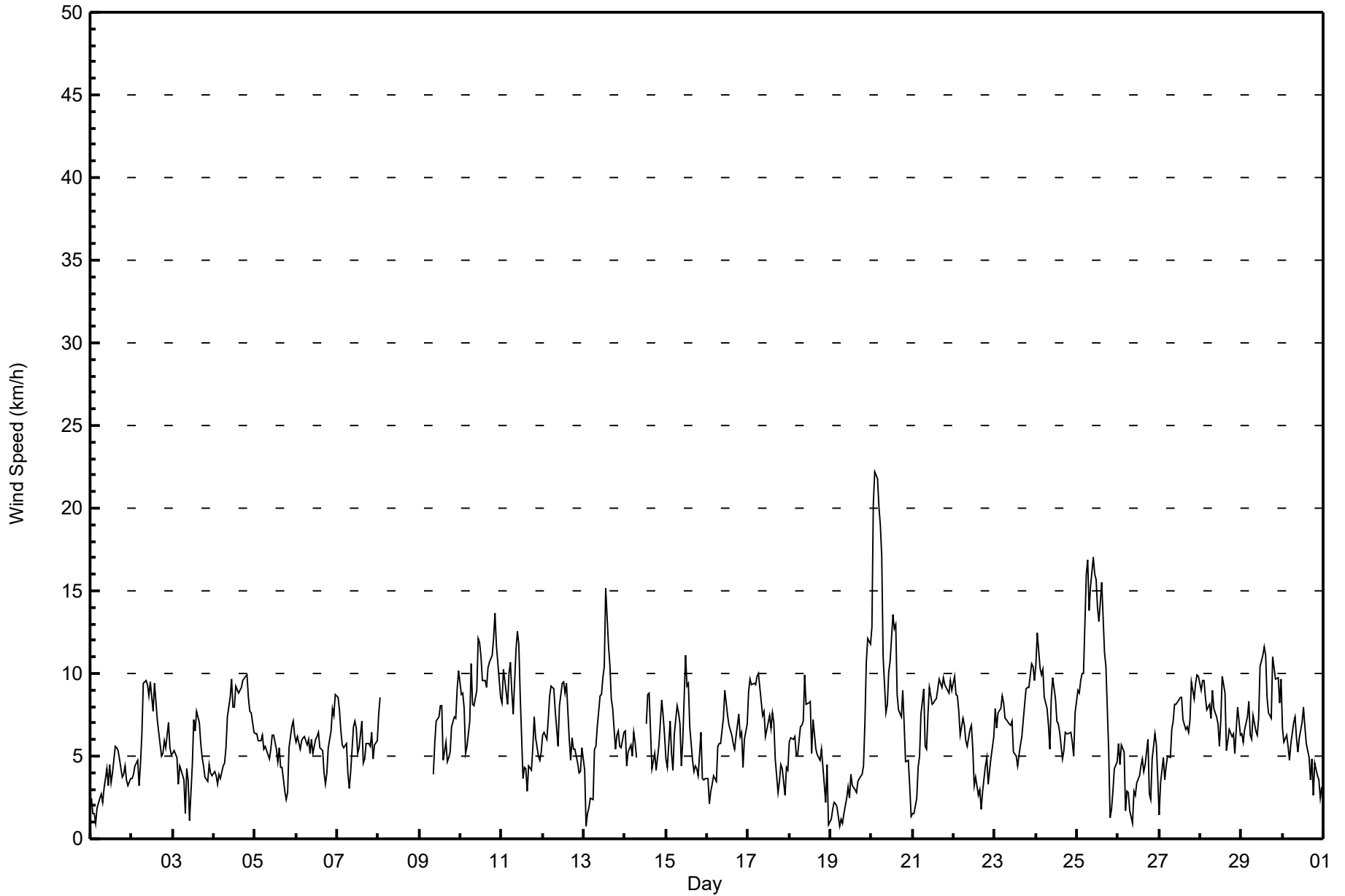


Maximum Speed: 22 km/h on Nov 20 03:00	Maximum Daily Speed Average: 11.2 km/h on Nov 20	Hours in Service: 720
Minimum Speed Value: 1 km/h on Nov 19 06:00	Minimum Daily Speed Average: 2.4 km/h on Nov 26	Hours of Data: 686
Maximum Diurnal Speed Average: 3.0 km/h at hour 23	Minimum Diurnal Speed Average: 0.9 km/h at hour 7	Hours of Missing Data: 34
Monthly Average Velocity: 2.0 km/h 215.6 deg	Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 3 Q <sub>1</sub> = 5 Median = 6 Q <sub>3</sub> = 8 P <sub>90</sub> = 10 P <sub>99</sub> = 17	Percent Operational Time: 95.3

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Nov	SSE2	SE2	SSE2	S1	SE2	SSE2	SSE3	S2	S3	SW4	SW3	SSW4	SSW3	SSE4	S6	SSW5	SSW5	SSW5	SSW4	SSW4	SSW4	SW4	SW3	WSW4	SSW3.1	S6	
2-Nov	WSW4	WSW4	W4	WNW5	W3	WNW5	N6	NNE9	NNE10	NNE9	NE9	NE9	NNE8	NE9	NE8	NE7	ENE6	E5	E5	ESE6	ESE6	ESE7	SE5	SSE5	NE3.6	NNE10	
3-Nov	SE5	ESE5	SE5	SE3	SE4	SE4	SE4	E2	SSE4	SE4	N1	N4	N7	NNE6	NNE8	NNE7	NE6	ENE5	NE4	NE4	NNE3	NNE5	NNE4	NNE4	ENE2.6	NNE8	
4-Nov	NE4	NE4	NE3	ENE4	E4	E4	E5	E5	E7	E9	ESE10	E8	E8	E9	E9	E9	E9	E10	E10	E10	E9	E8	E8	ENE6	E6.9	E10	
5-Nov	ENE6	ENE6	ENE6	NE6	NE6	ENE5	NE6	NE5	ENE5	ENE5	E6	E6	E5	ENE5	ENE6	ENE4	ENE3	ENE2	ENE3	E6	ESE7	ESE7	ESE6	ENE5.0	ESE7		
6-Nov	ESE6	ESE6	ESE5	ESE6	ESE6	ESE6	ESE6	SE6	SE5	SE6	SSE5	SE6	SSE6	SSE6	SSE5	SE5	SE4	SE3	SSE4	S5	SSW6	SSW8	SSW7	SSW9	SSSE5.1	SSW9	
7-Nov	SSW9	SSW8	SSW7	SSW6	SSW6	SSW6	SSW4	SW3	SSW4	S7	SSW7	SSW7	SSW5	SSW5	SSW7	SSW5	SSW5	SW6	SSW6	SSW6	WSW6	SW5	SW6	SW6	SSW5.6	SSW9	
8-Nov	WSW8	W9	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	---	W9	
9-Nov	UO	UO	UO	UO	UO	UO	UO	UO	UO	SE4	SSE6	SSE7	SSE7	SSE8	SSE8	SE5	SSE6	SE5	SE5	SE5	SE7	SSE7	SE7	SSE9	SSE10	---	SSE10
10-Nov	SE9	SSE9	SSE8	SSE5	SE6	SE7	SSE11	SSE8	S8	S9	S12	S12	SSW11	SSW10	S10	S9	S10	S11	S11	S12	S14	S12	S11	SSE9	S9.2	S14	
11-Nov	SSE8	S10	SSE10	SE8	SE10	ESE11	SE9	ESE8	ESE11	SE13	SE12	SE9	SE4	ESE4	SE4	SSE3	SE4	SE4	S5	S7	SSW6	S5	S5	SW5	SE6.5	SE13	
12-Nov	WSW6	WSW6	WSW6	WSW7	WSW9	WSW9	WSW9	WSW8	WSW7	W6	W8	W9	WSW9	WSW9	W9	WSW6	WSW5	WSW6	WSW5	W5	W5	W4	WNW4	NW5	WSW6.6	WSW9	
13-Nov	NNW4	NE1	SE2	ENE2	ENE2	E2	NE5	NE6	NE7	NE9	NE9	NE10	NE10	NNE15	NE12	NE10	NE9	NNE8	NNE5	NNE6	N6	N6	NNW6	WNW6	NNE5.7	NNE15	
14-Nov	WNW6	W4	WSW5	W6	W5	WSW6	SW6	SW5	UO	UO	UO	UO	UO	SW7	SW9	WSW9	SW6	SW4	SSW5	S4	SSW5	S6	S8	S7	S6	SW5.2	WSW9
15-Nov	S5	S4	S7	SSW5	WSW4	N6	N8	N8	N7	NW4	WNW6	WNW11	WNW9	WNW9	W7	WSW5	WSW4	WSW4	W4	W4	W6	W4	WSW4	WSW4	W3.7	WNW11	
16-Nov	WSW4	SSW2	S3	SSE3	SSE4	SE3	SE6	SE6	SSE6	SSE7	S9	S8	S7	S7	S6	S6	S5	SSW6	SW8	SW6	SSW6	S4	SSW6	SSW7	S5.1	S9	
17-Nov	SW9	SW10	SW9	WSW9	WSW9	WSW10	WSW10	WSW9	SW7	SSW8	SSW6	SW7	SW7	SW7	SW8	SW7	SSW5	SE3	SSE3	S4	SSW4	S3	SSW4	SSE4	SW6.2	WSW10	
18-Nov	SSE6	SSE6	SSE6	S6	SSE5	SSE5	S7	SSE7	S7	S10	S8	S8	S8	S5	S7	SSE5	SSE5	SSE5	SSE5	SSE5	SSE3	SE2	SSE5	SE1	SSSE5.6	S10	
19-Nov	NE1	SE2	SE2	SSE2	WSW2	SSW1	S1	SSE1	SSE2	SSW2	WSW3	WNW2	NW4	W3	WSW3	SW3	SW3	WSW4	WSW4	SW4	WSW7	WSW11	W12	WSW12	WSW3.0	W12	
20-Nov	W13	W20	WNW22	WNW22	WNW20	WNW19	WNW17	WNW11	W8	W8	W10	W11	W14	W13	WNW13	WNW9	WNW8	WNW7	WNW9	W7	W5	W5	WSW3	S1	W11.2	WNW22	
21-Nov	S1	SE2	SE2	ENE4	ESE5	ESE8	ESE9	E6	ENE5	ENE8	ENE9	ENE8	ENE8	ENE8	NE8	NNE10	NNE9	NNE9	NNE10	N9	N9	NNE9	NNE10	NNE9	NE6.0	NNE10	
22-Nov	NNE10	NNE9	NNE9	NNE8	NNE6	NNE7	NNE7	NNE6	NNE6	NNE7	NNE7	NNE5	NNE3	ENE4	ESE3	SE3	SE2	SE3	SSE4	SE5	SSE3	SE4	SSE5	SE6	NE3.4	NNE10	
23-Nov	SE8	SE7	SE8	SE8	SE9	SSE8	SSE7	S7	S7	S7	SSW7	SW5	SW5	SW4	SSW5	S6	S6	S8	S9	S9	SSW9	SSW11	SSW10	SSW10	S6.8	SSW11	
24-Nov	SSW11	SSW12	SSW10	SSW10	SW10	SW9	SW8	SW7	WSW5	WSW8	WSW10	W8	W7	W7	W6	WSW5	WSW5	WSW6	WSW6	WSW6	SW6	WSW6	WSW6	WSW5	WSW8	SW7.0	SSW12
25-Nov	WSW9	W9	W10	WNW10	WNW10	NW16	NNW17	NNW14	NW15	NW17	NW16	NW16	NW14	WNW13	NW16	NW13	NW11	NW10	NW5	S1	SSE2	SE3	SE4	SE5	NW8.9	NW17	
26-Nov	SE6	SE4	SE6	SE5	E2	N3	N3	SW2	SSW1	WSW3	W3	SW3	SW4	SSW4	SSW5	SSW4	SW4	SW6	WSW3	WSW2	SW5	SW6	SW6	SSW4	SSW2.4	SW6	
27-Nov	SE1	SE3	SSE5	SE4	SSE4	S5	S5	S7	S7	S8	S8	S8	SSW9	SSW9	SSW7	SSW7	SW7	WSW6	WSW7	W9	WSW8	WSW9	WSW10	SW10	SSW5.6	WSW10	
28-Nov	WSW9	WSW10	WSW10	WSW9	WSW8	WSW8	WSW7	WSW9	WSW8	WSW7	WSW7	W6	W7	W10	W9	WSW5	SW6	WSW7	W6	WSW6	WSW5	W7	W8	W6	WSW7.3	W10	
29-Nov	WSW6	W6	WSW7	WSW7	WSW8	W6	WNW6	W7	W7	W6	W7	WNW10	WNW11	WNW12	WNW11	W9	W8	W7	WNW11	WNW10	WNW10	WNW10	WNW8	WNW10	W8.2	WNW12	
30-Nov	WNW7	W6	W6	W6	W5	W6	W7	W7	W6	WSW5	W6	W7	WNW8	WNW7	W6	SW5	SW4	SSW5	S3	S5	S4	SSW4	S2	SSW3	WSW4.5	WNW8	

SSW2.6SSW2.7SSW2.7 SW2.2 SW2.0 SW1.5 SW0.9 SW1.0 S1.2SSW1.8SSW1.9 SW2.0WSW2.3WSW2.0WSW2.1 SW1.6SSW1.5SSW1.8SSW2.0SSW2.5SSW2.8SSW2.7SSW3.0SSW2.9 W13 W20WNW22WNW22WNW20WNW19WNW17NNW14 NW15 NW17 NW16 NW16 NW14 NNE15 NW16 NW13 NW11 S11 S11 S12 S14 S12 W12WSW12	Diurnal Average
	Diurnal Maximum

UO - Unstable Operation  
 All monthly, daily, and diurnal averages have been calculated using vector methods





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h  
Mackay River - November 2023**

<b>Wind Speed Ranges (km/h)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	263	38.34	38.34
6 - 11	389	56.71	95.04
12 - 19	30	4.37	99.42
20 - 28	4	0.58	100.00
29 - 38	0	0.00	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 686

Total Number of Hours: 720





**Wood Buffalo Environmental Association  
Frequency Distribution**

**Wind Speed (WS) - km/h  
Mackay River - November 2023**

<b>Wind Speed Ranges (km/h)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 5	4	7	8	17	10	5	45	34	25	33	22	30	14	4	4	1	263
6 - 11	9	28	18	11	18	18	19	29	43	37	29	54	47	26	2	1	389
12 - 19	0	1	1	0	0	0	2	0	5	1	0	1	3	6	8	2	30
20 - 28	0	0	0	0	0	0	0	0	0	0	0	0	1	3	0	0	4
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	<b>13</b>	<b>36</b>	<b>27</b>	<b>28</b>	<b>28</b>	<b>23</b>	<b>66</b>	<b>63</b>	<b>73</b>	<b>71</b>	<b>51</b>	<b>85</b>	<b>65</b>	<b>39</b>	<b>14</b>	<b>4</b>	<b>686</b>

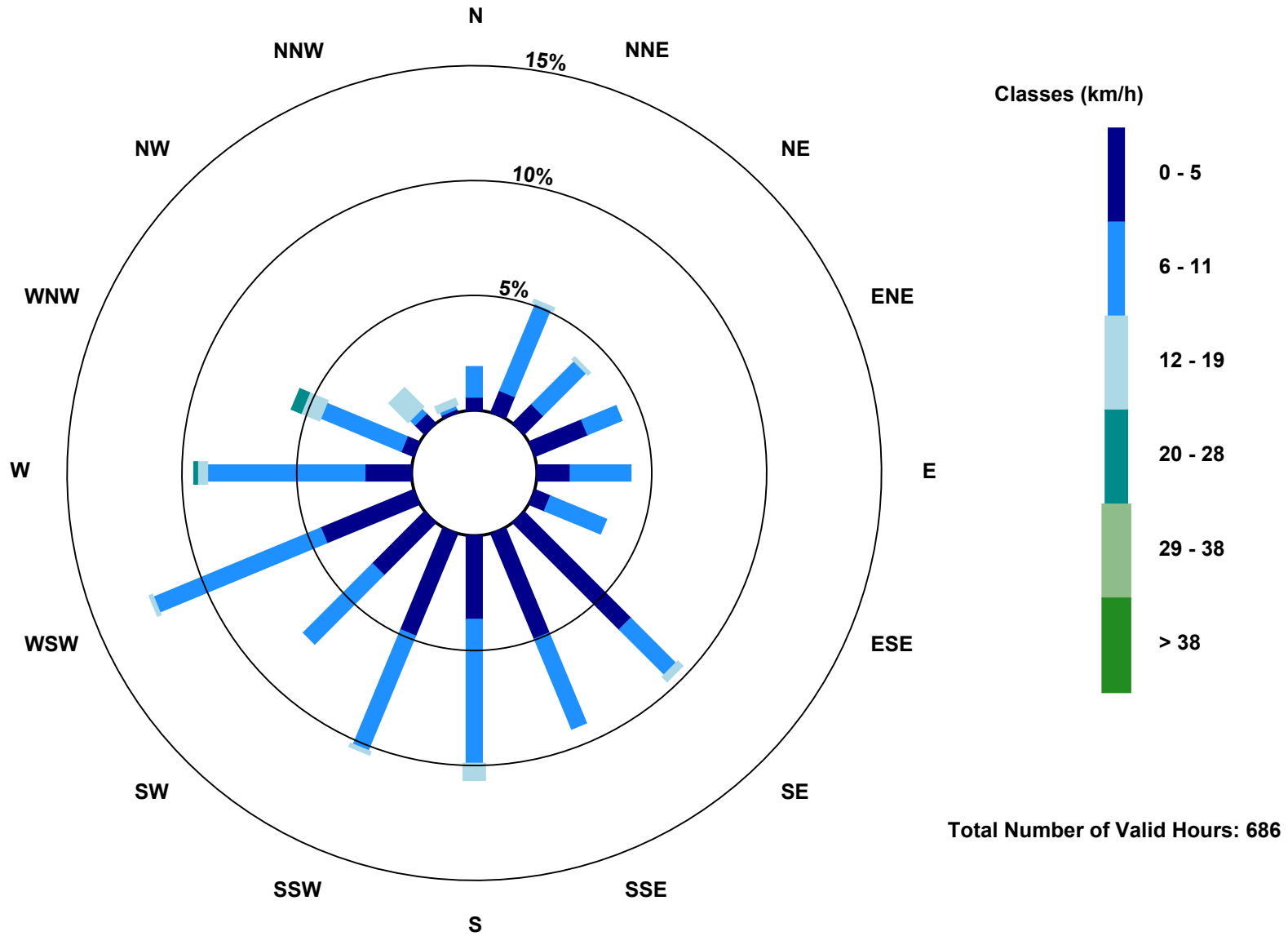
Total Number of Valid Hours: 686

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 2023

Wind Speed (WS) - km/h  
Mackay River





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

**Wind Speed (WS) - km/h**  
**Mackay River - November 2023**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 9 km/h on Nov 20 03:00	Hours of Data: 686
Minimum Value: 1 km/h on Nov 1 05:00	Hours of Missing Data: 34
Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 1 Q <sub>1</sub> = 1 Median = 2 Q <sub>3</sub> = 3 P <sub>90</sub> = 4 P <sub>99</sub> = 6	Hours of Calibration: 0
	Percent Operational Time: 95.3

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

UO - Unstable Operation



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

**Wind Direction (WD) - deg**  
**Mackay River - November 2023**

Direction of Maximum Speed: 282 deg on Nov 20 03:00	Hours in Service: 720
Direction of Maximum Daily Speed Average: 279.0 deg on Nov 20	Hours of Data: 686
Direction of Minimum Speed: 205 deg on Nov 19 06:00	Hours of Missing Data: 34
Direction of Minimum Daily Speed Average: 2.4 deg on Nov 26	Percent Operational Time: 95.3
Monthly Average Direction: 215.6 deg	

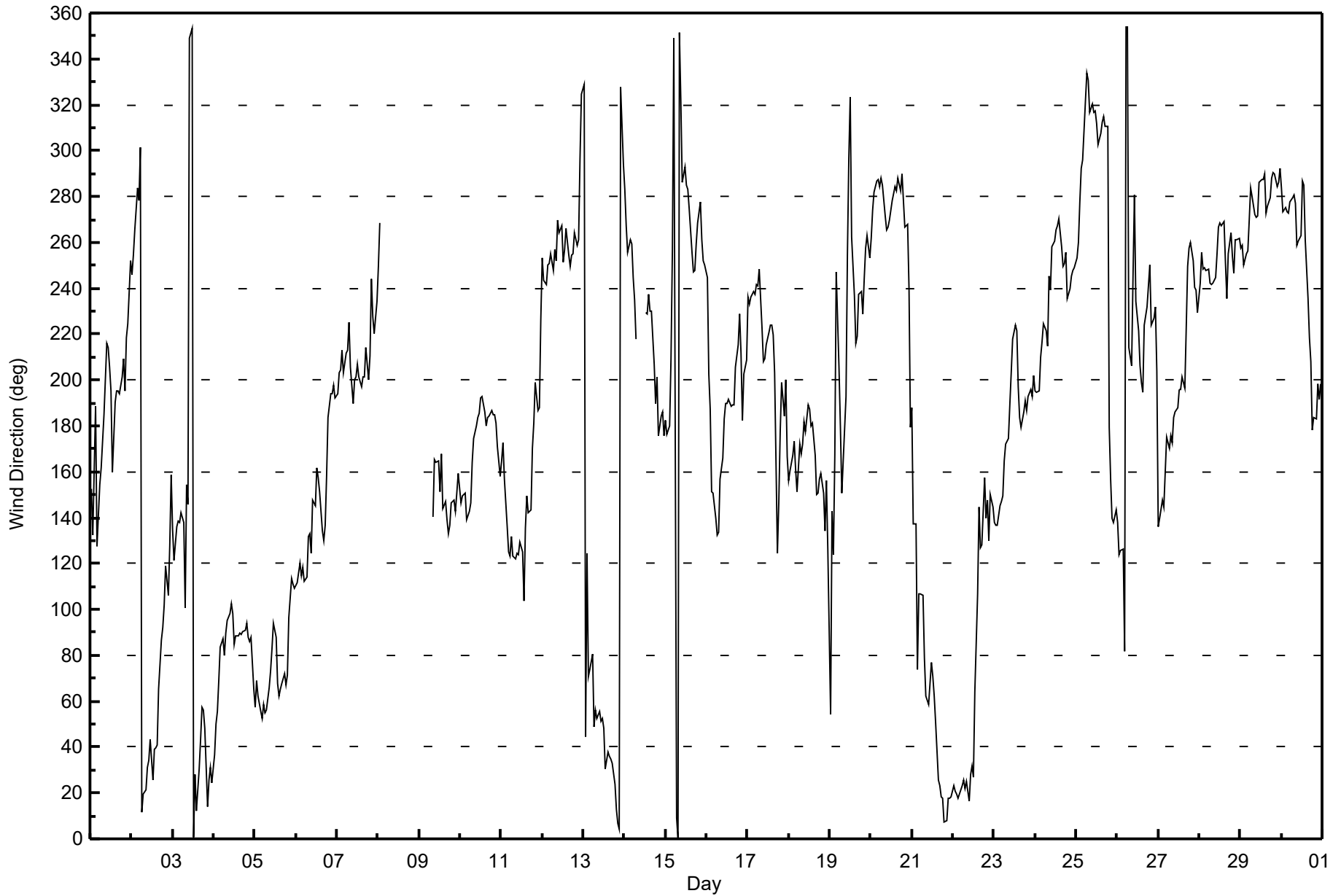
Day	Hourly Period Ending At (MST)																								Daily Average	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	153	132	161	189	127	154	162	173	185	216	214	206	195	160	190	195	195	194	201	209	195	218	225	252	193.4	
2-Nov	246	255	265	284	278	302	11	20	21	31	34	43	25	39	39	41	65	86	92	102	119	106	128	159	43.8	
3-Nov	135	121	136	139	138	142	138	101	154	146	349	354	1	28	12	30	43	57	56	48	14	26	31	25	62.2	
4-Nov	37	50	55	69	84	87	80	90	95	98	103	98	85	89	89	90	89	90	91	94	88	86	88	65	86.7	
5-Nov	57	69	62	56	52	58	55	56	66	73	83	94	88	68	62	66	68	72	67	72	96	113	111	109	75.0	
6-Nov	111	112	120	115	118	112	114	132	133	125	148	145	161	157	151	134	130	137	158	184	194	194	198	192	146.6	
7-Nov	194	203	205	213	203	211	213	225	205	190	200	202	207	201	197	202	202	214	200	210	244	228	220	235	208.3	
8-Nov	249	268	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	--	
9-Nov	UO	UO	UO	UO	UO	UO	UO	UO	UO	140	165	164	165	151	168	144	147	139	133	137	146	148	143	151	159	--
10-Nov	146	150	150	151	139	143	147	164	174	180	183	186	192	193	186	180	184	185	187	185	185	181	171	158	173.6	
11-Nov	165	173	157	136	125	123	132	123	122	125	124	129	125	103	135	149	142	143	170	181	199	187	188	226	144.7	
12-Nov	253	244	242	250	251	255	248	257	252	270	264	267	251	257	266	254	250	255	255	264	259	261	297	324	258.6	
13-Nov	329	44	124	71	74	81	49	56	52	55	51	53	48	30	38	36	35	33	24	13	7	4	327	294	33.6	
14-Nov	283	267	256	261	259	245	235	218	UO	UO	UO	UO	229	229	238	230	230	207	190	202	176	184	186	175	224.3	
15-Nov	183	176	180	209	257	349	9	0	352	322	286	293	285	283	275	256	247	248	259	268	278	261	252	250	279.3	
16-Nov	245	202	187	151	151	140	132	134	157	166	183	190	190	191	188	189	189	206	215	229	212	183	202	209	186.9	
17-Nov	236	233	236	239	237	242	241	249	223	208	209	215	221	224	224	220	203	124	147	178	199	184	200	166	221.7	
18-Nov	156	160	167	173	161	152	172	168	172	182	178	189	188	180	181	167	150	151	157	159	151	134	156	126	168.5	
19-Nov	54	143	124	167	247	205	179	151	165	193	254	297	323	262	237	216	219	237	238	229	244	258	263	253	243.4	
20-Nov	262	274	282	287	287	284	288	285	272	265	266	270	278	281	284	283	288	282	290	278	266	268	240	179	279.0	
21-Nov	188	138	137	74	107	107	106	79	62	60	59	77	71	62	51	26	23	18	18	7	8	18	18	18	47.9	
22-Nov	23	21	20	18	20	23	26	22	25	17	28	32	27	64	107	145	127	128	157	139	148	130	150	144	48.1	
23-Nov	138	137	137	145	147	149	165	172	175	189	203	218	224	222	197	184	180	186	191	187	193	196	193	202	179.2	
24-Nov	195	195	195	210	217	224	222	215	245	239	258	260	265	267	270	258	249	251	256	235	240	246	248	249	234.1	
25-Nov	253	260	278	292	296	322	334	331	317	320	317	317	312	303	308	313	315	311	311	180	157	140	138	144	308.6	
26-Nov	138	124	126	126	82	354	354	214	206	245	281	234	222	206	199	195	224	232	241	250	224	227	232	204	206.1	
27-Nov	136	140	148	145	160	175	170	176	172	184	186	188	196	196	201	197	223	249	258	260	252	240	239	230	205.9	
28-Nov	242	256	248	249	248	248	242	242	242	245	255	266	268	267	269	251	235	255	264	254	247	261	261	262	253.2	
29-Nov	257	259	250	255	256	269	284	280	272	271	272	286	288	287	290	273	276	279	288	290	290	284	286	292	278.5	
30-Nov	284	274	275	273	272	278	280	281	277	258	260	263	287	285	261	236	218	208	178	183	183	198	191	198	258.0	

212.3 212.2 207.2 221.7 218.3 231.5 221.1 223.2 190.3 192.1 212.1 229.2 245.2 245.6 241.5 215.4 204.7 211.5 213.2 206.9 210.5 205.3 205.6 211.0

Diurnal Average

UO - Unstable Operation

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





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

**Wind Direction (WD) - deg**  
**Mackay River - November 2023**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 88 deg on Nov 19 01:00	Hours of Data: 686
Minimum Value: 10 deg on Nov 18 19:00	Hours of Missing Data: 34
Percentiles: P <sub>1</sub> = 14 P <sub>10</sub> = 19 Q <sub>1</sub> = 22 Median = 27 Q <sub>3</sub> = 36 P <sub>90</sub> = 45 P <sub>99</sub> = 71	Hours of Calibration: 0
	Percent Operational Time: 95.3

Day	Hourly Period Ending At (MST)																								Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	42	26	32	72	43	23	26	45	30	24	46	38	37	32	28	23	20	22	17	28	19	34	29	37	72	
2-Nov	53	48	39	26	28	34	31	25	26	25	27	26	29	25	30	28	28	30	26	22	25	19	32	28	53	
3-Nov	25	26	32	38	21	24	34	67	25	32	76	28	33	35	21	23	24	26	22	33	27	23	23	24	76	
4-Nov	25	34	33	31	38	31	31	26	23	26	22	31	31	30	31	30	31	30	30	29	32	34	32	32	38	
5-Nov	28	33	32	28	24	30	25	24	31	33	33	28	29	30	31	31	31	32	26	37	26	20	20	20	37	
6-Nov	21	20	21	20	18	18	20	22	26	23	31	32	31	29	26	27	25	23	28	23	24	23	25	23	32	
7-Nov	25	29	28	32	31	29	30	34	51	29	31	30	31	31	27	25	24	25	23	26	44	40	27	42	51	
8-Nov	47	40	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	47	
9-Nov	UO	UO	UO	UO	UO	UO	UO	UO	UO	18	22	22	22	25	24	24	21	21	20	20	24	23	21	22	25	25
10-Nov	23	23	24	29	29	27	26	29	36	26	23	24	26	22	21	20	20	17	19	19	18	20	23	23	36	
11-Nov	23	22	25	25	19	16	21	18	18	19	20	32	55	34	33	37	26	19	14	17	18	16	23	39	55	
12-Nov	42	44	52	44	49	43	44	46	49	40	45	41	47	46	40	44	38	40	38	35	36	32	28	17	52	
13-Nov	21	87	42	49	36	43	25	26	27	24	28	29	26	22	30	25	27	25	32	26	26	30	23	27	87	
14-Nov	28	38	36	38	39	45	37	21	UO	UO	UO	UO	38	34	44	32	29	21	17	19	17	14	14	16	45	
15-Nov	23	29	14	40	44	24	22	24	23	36	26	26	28	30	43	47	33	38	36	23	21	22	29	24	47	
16-Nov	22	52	31	24	20	31	20	24	35	21	20	22	20	22	19	16	18	19	25	32	27	29	22	22	52	
17-Nov	39	35	38	41	34	45	43	43	35	26	35	31	27	29	28	26	23	26	12	22	17	31	19	33	45	
18-Nov	16	15	14	21	22	19	14	17	21	17	18	22	20	26	19	15	10	13	10	12	19	34	15	84	84	
19-Nov	88	46	73	62	49	71	62	80	57	46	49	66	36	54	46	30	16	17	20	25	42	45	42	43	88	
20-Nov	45	33	32	28	27	28	27	29	37	43	45	41	34	32	27	28	22	23	22	22	35	29	42	52	52	
21-Nov	53	41	36	32	19	22	21	32	40	32	24	31	31	28	26	27	23	25	24	25	25	26	24	23	53	
22-Nov	22	26	23	22	25	24	25	22	25	24	31	33	49	41	35	24	19	29	26	27	28	23	24	23	49	
23-Nov	24	27	23	22	25	23	24	22	23	20	23	28	32	34	24	15	14	14	16	15	17	20	18	20	34	
24-Nov	20	19	18	24	24	26	29	28	37	42	37	45	49	42	38	37	36	39	36	34	39	41	49	41	49	
25-Nov	36	42	33	23	21	20	24	21	19	21	20	20	22	23	22	19	15	17	30	67	42	22	22	21	67	
26-Nov	18	24	21	21	65	48	71	51	70	44	58	49	42	27	23	19	28	29	50	41	23	24	27	47	71	
27-Nov	43	21	12	16	18	15	17	18	22	17	17	20	22	21	23	20	33	50	44	43	41	45	43	37	50	
28-Nov	47	49	41	49	45	45	45	46	42	44	46	49	40	36	38	44	37	48	40	37	44	41	39	42	49	
29-Nov	43	42	38	40	44	33	28	25	33	32	31	28	25	26	26	33	31	29	24	25	27	27	24	22	44	
30-Nov	24	26	26	31	28	26	26	26	29	39	44	42	33	28	42	34	29	19	21	15	15	15	23	22	44	

88	87	73	72	65	71	71	80	70	46	76	66	55	54	46	47	38	50	50	67	44	45	49	84	
Diurnal Maximum																								

UO - Unstable Operation



## WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY  
MONITORING PROGRAM  
MONTHLY REPORT

**AMS21  
CONKLIN  
NOVEMBER 2023**

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

December 22, 2023

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CONKLIN (AMS21)  
NOVEMBER 2023

MONTHLY SUMMARY

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2(ppb) Average	686	32	34	99.72	1.1	0	0.3	0
TRS(ppb) Average	684	34	36	99.72	0.5	0	0.5	0
THC(ppm) Average	688	32	32	100	2.4	-	2.3	-
NMHC(ppm) Average	688	32	32	100	0.013	-	0.001	-
CH4(ppm) Average	688	32	32	100	2.4	-	2.3	-
O3 (ppb) Average	685	32	35	99.58	39.5	0	35.3	-
NO2 (ppb) Average	685	33	35	99.72	15.9	0	4	-
NO (ppb) Average	685	33	35	99.72	10.6	-	2.6	-
NOX (ppb) Average	685	33	35	99.72	26.5	-	5.8	-
PM2.5 (ug/m3) Average	718	2	2	100	42	0	17.6	0
Temperature 2 m (C) Average	720	0	0	100	8.7	-	2.2	-
Relative Humidity (%) Average	720	0	0	100	97.7	-	95.3	-
Wind Speed 10 m (km/h) Average	720	0	0	100	22	-	11	-
Wind Direction 10 m (deg) Average	720	0	0	100	-	-	-	-

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



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CONKLIN (AMS21)  
NOVEMBER 2023

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile						
					Min	P10	Q1	Median	Q3	P90	Max
SO2 (ppb) Average	686	0.15	0.2	-	0	0	0.1	0.1	0.2	0.3	1.1
TRS (ppb) Average	684	0.35	0	-	0.2	0.3	0.3	0.4	0.4	0.4	0.5
THC (ppm) Average	688	2.12	0.1	-	2	2.1	2.1	2.1	2.1	2.2	2.4
NMHC(ppm) Average	688	0	0.001	-	0	0	0	0	0	0	0.013
CH4(ppm) Average	688	2.12	0.1	-	2	2.1	2.1	2.1	2.1	2.2	2.4
O3 (ppb) Average	685	23.72	8.3	-	1.9	13	17.9	24.2	30.8	33.7	39.5
NO2 (ppb) Average	685	1.83	1.5	-	0	0.5	0.9	1.4	2.3	3.4	15.9
NO (ppb) Average	685	0.43	1	-	0	0	0	0.1	0.3	0.9	10.6
NOX (ppb) Average	685	2.25	2.2	-	0.1	0.5	1	1.6	2.6	4.6	26.5
PM2.5 (ug/m3) Average	718	5.89	4	-	0.4	2.4	3.5	4.8	7.1	10.4	42
Temperature 2 m (C) Average	720	-3.17	4.3	-	-18.7	-9.5	-5.2	-2.9	-0.4	1.6	8.7
Relative Humidity (%) Average	720	79.29	12.6	-	39.4	59.6	71.4	81.5	89.3	94.3	97.7
Wind Speed 10 m (km/h) Average	720	6.9	4	-	0	2	4	7	9	11	22
Wind Direction 10 m (deg) Average	720	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CONKLIN (AMS 21)  
NOVEMBER 2023

OPERATIONAL NOTES

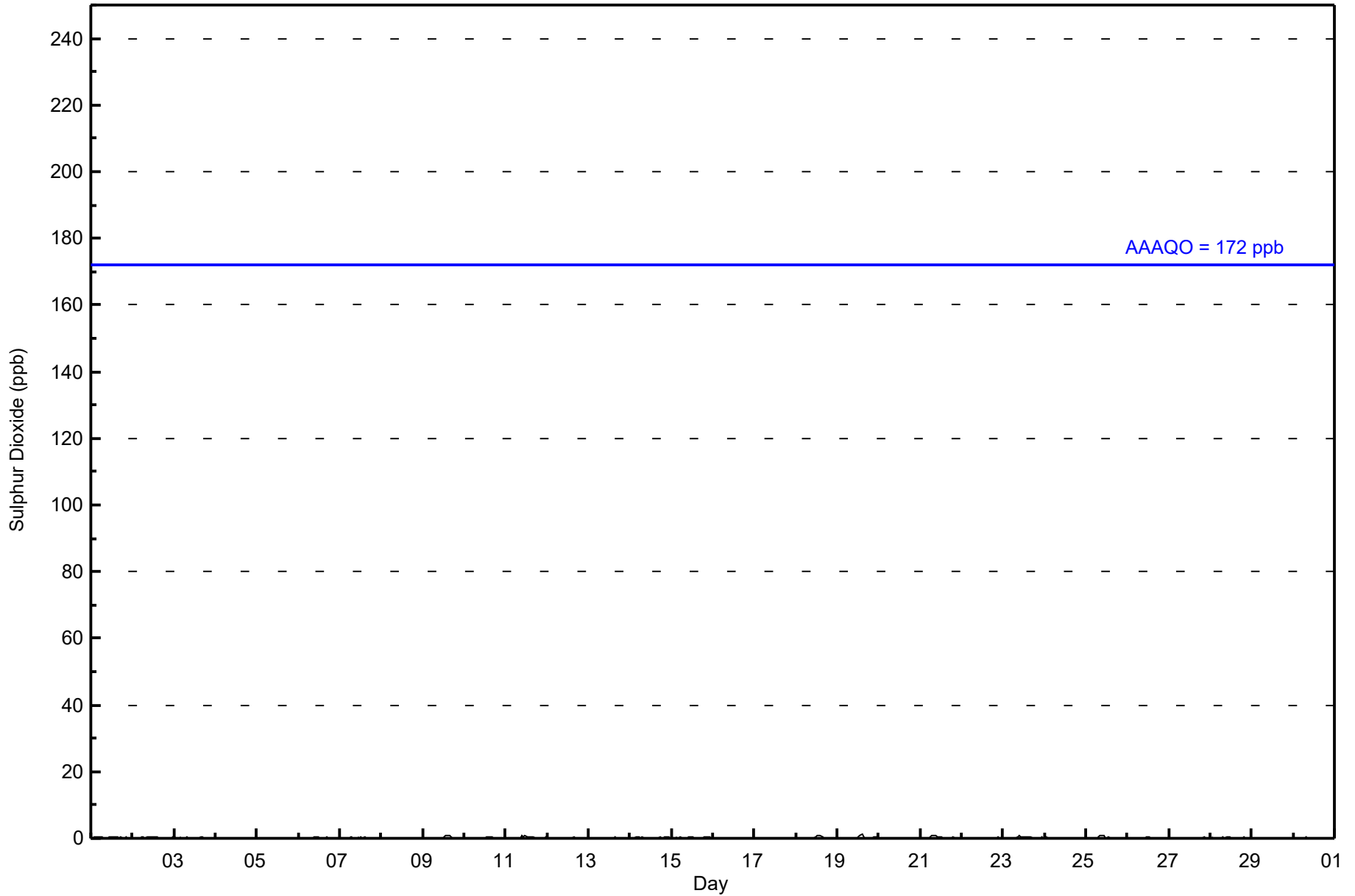
Parameter	Period Start	Period End	Duration (Hours)	Notes
NO2, SO2	07 Nov 2023 09:00	07 Nov 2023 10:00	2	Maintenance - reinitiated daily QA check
TRS	07 Nov 2023 11:00	07 Nov 2023 11:00	1	Maintenance - reinitiated daily QA check
O3	07 Nov 2023 11:00	07 Nov 2023 12:00	2	Maintenance - reinitiated daily QA check
NO2, O3, TRS	30 Nov 2023 16:00	30 Nov 2023 16:00	1	Maintenance - sample manifold cleaned





Wood Buffalo Environmental Association  
Hourly Averages

Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Conklin - November 2023





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

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Conklin - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 10	686	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: 686

Total Number of Hours: 720



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

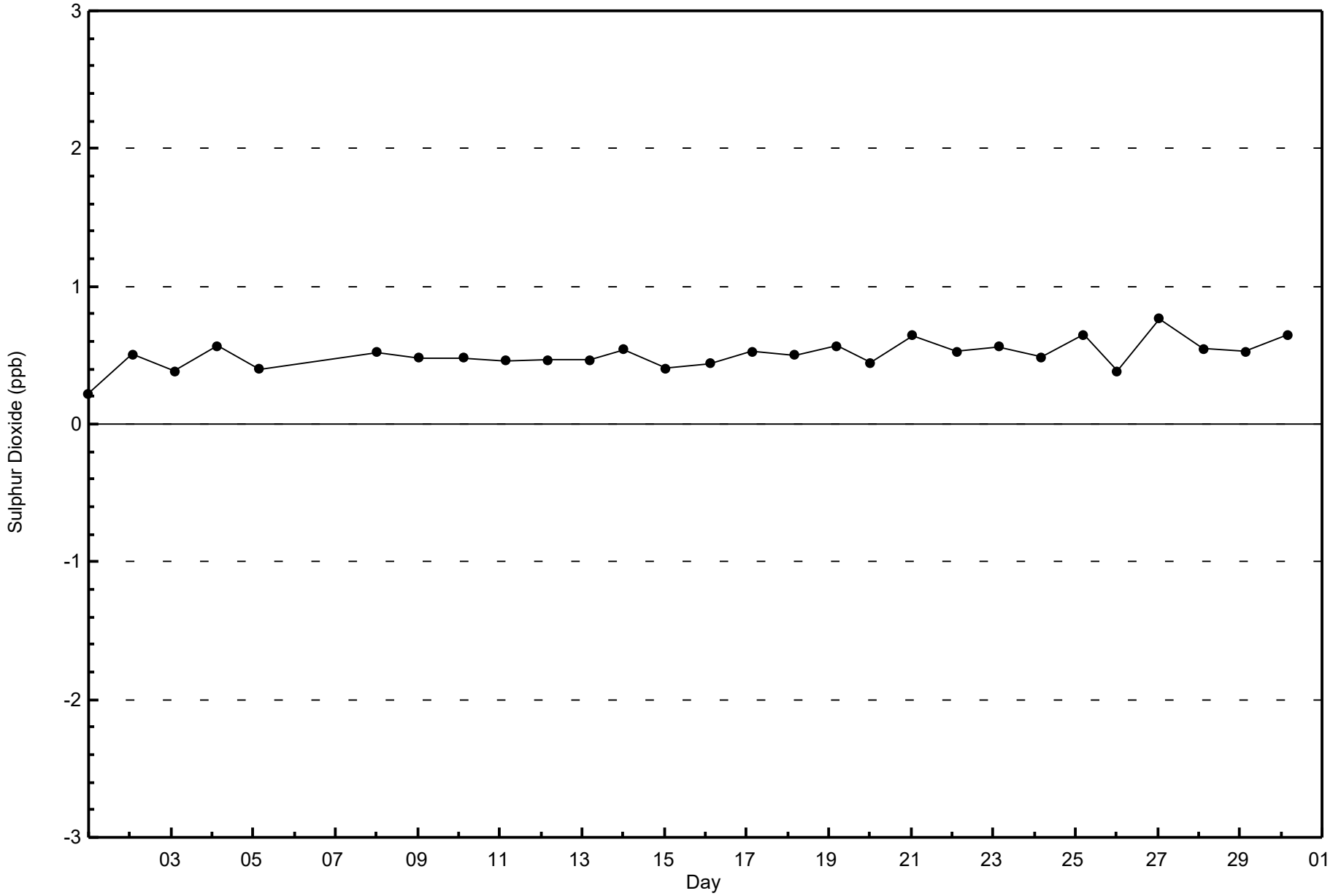
**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Conklin - November 2023**

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	42	21	23	14	6	15	63	82	57	90	24	55	72	56	34	686
11 - 20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	32	42	21	23	14	6	15	63	82	57	90	24	55	72	56	34	686

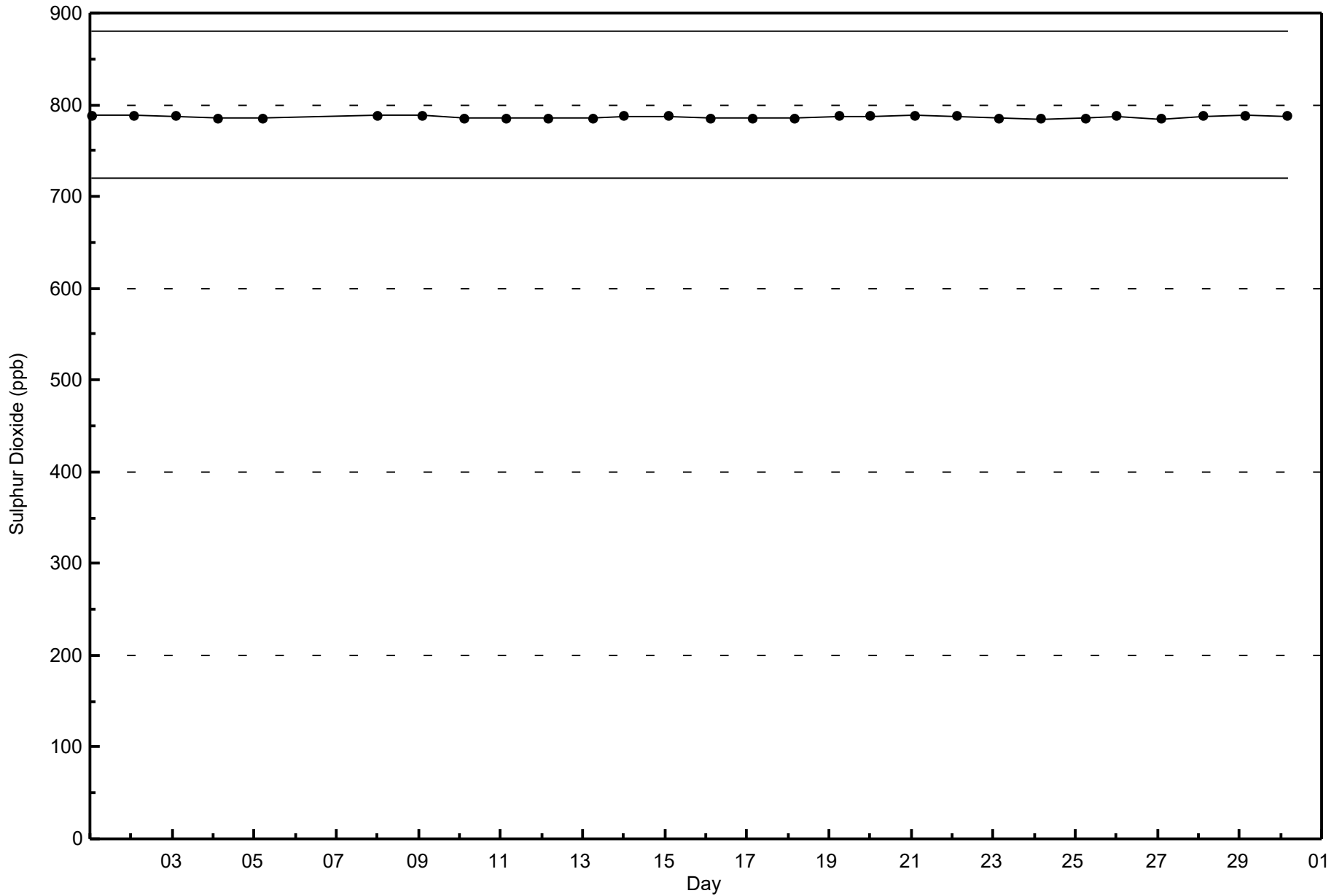
Total Number of Valid Hours: 686

Total Number of Hours: 720

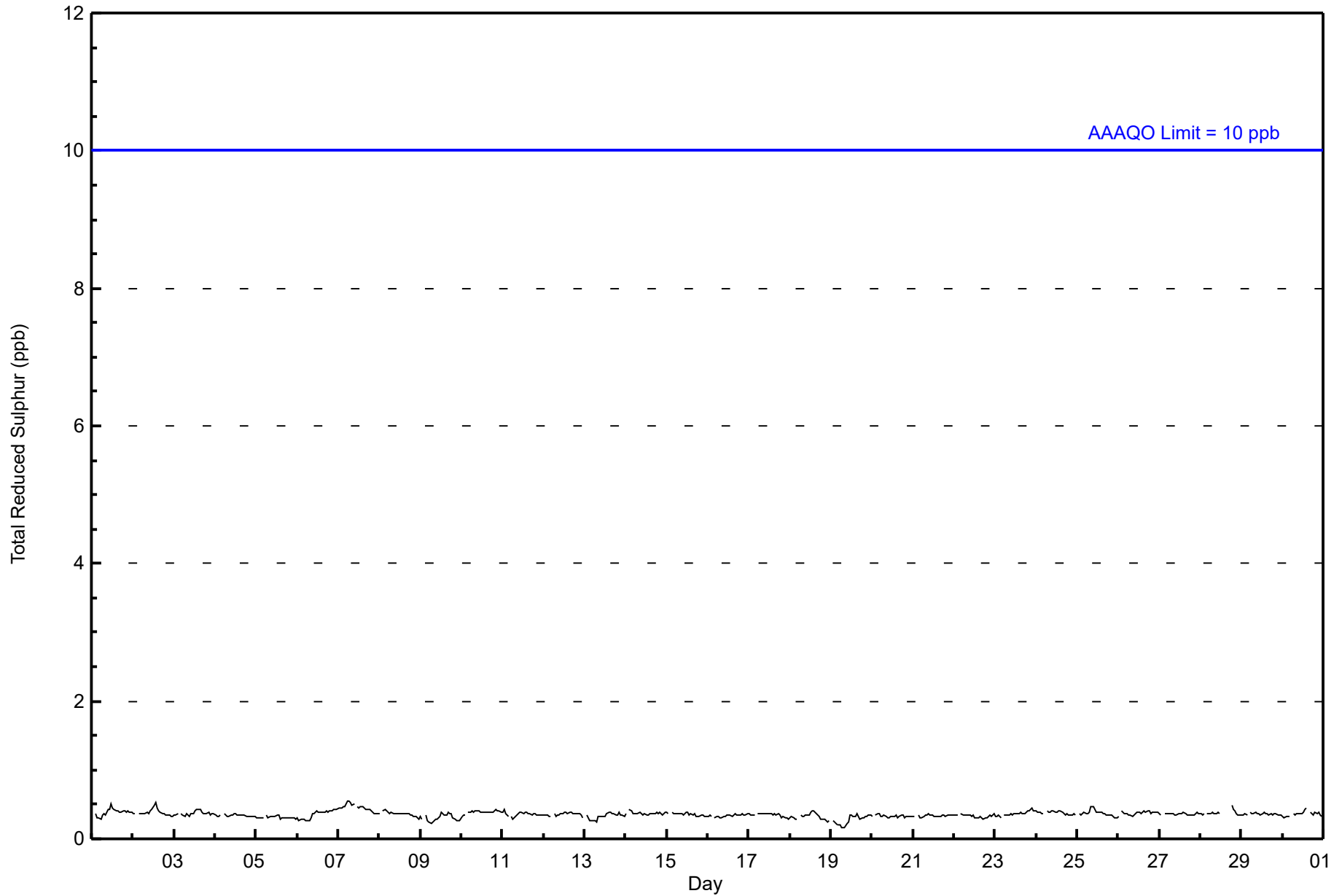














**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Total Reduced Sulphur (TRS) - ppb**  
**Conklin - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2	684	100.00	100.00
3 - 4	0	0.00	100.00
5 - 7	0	0.00	100.00
8 - 11	0	0.00	100.00
> 11	0	0.00	100.00

Total Number of Valid Hours: 684

Total Number of Hours: 720



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

**Total Reduced Sulphur (TRS) - ppb**  
**Conklin - November 2023**

<b>Concentration</b> <b>Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	33	39	22	23	14	6	15	63	82	57	90	21	54	74	57	34	684
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	33	39	22	23	14	6	15	63	82	57	90	21	54	74	57	34	684

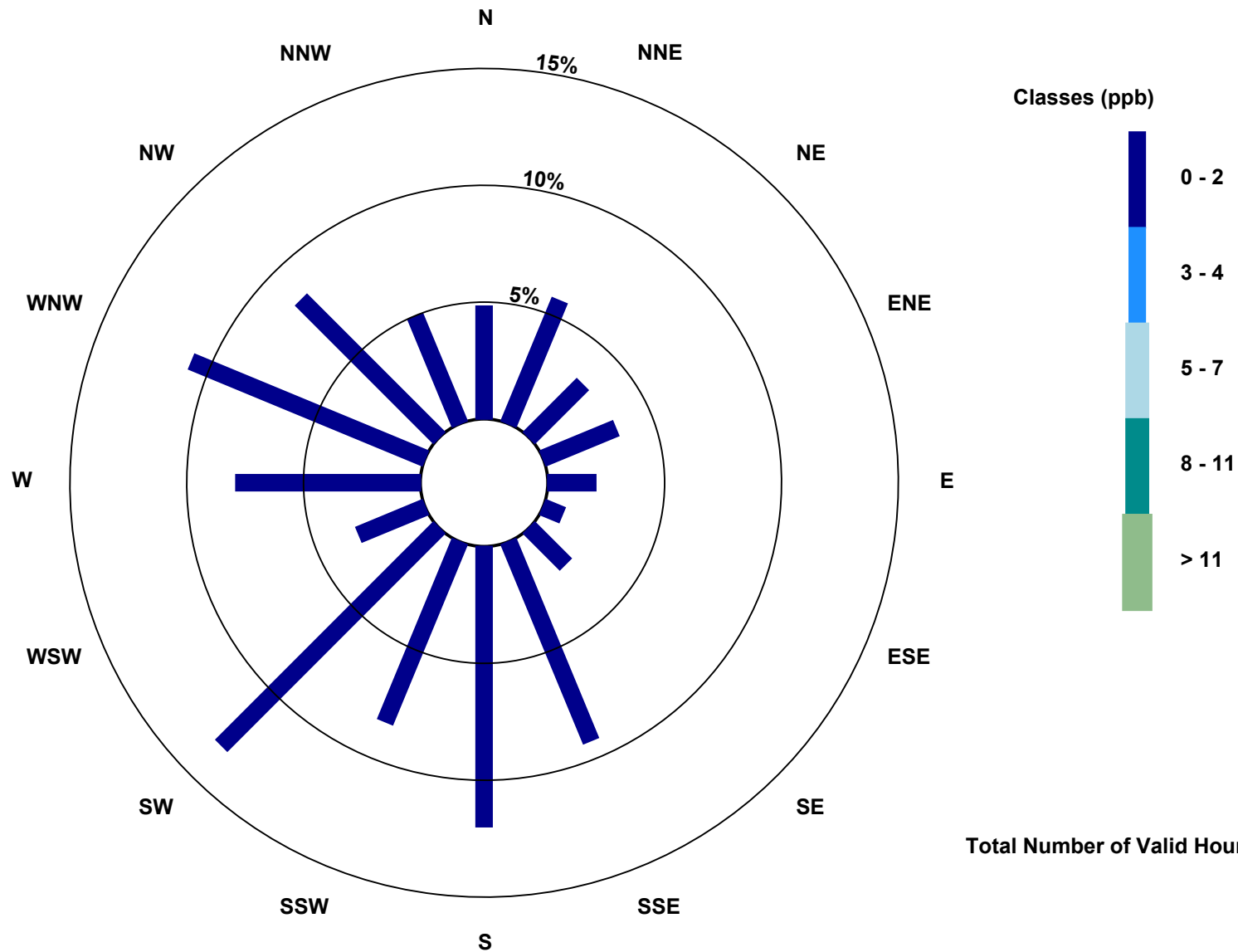
Total Number of Valid Hours: 684

Total Number of Hours: 720

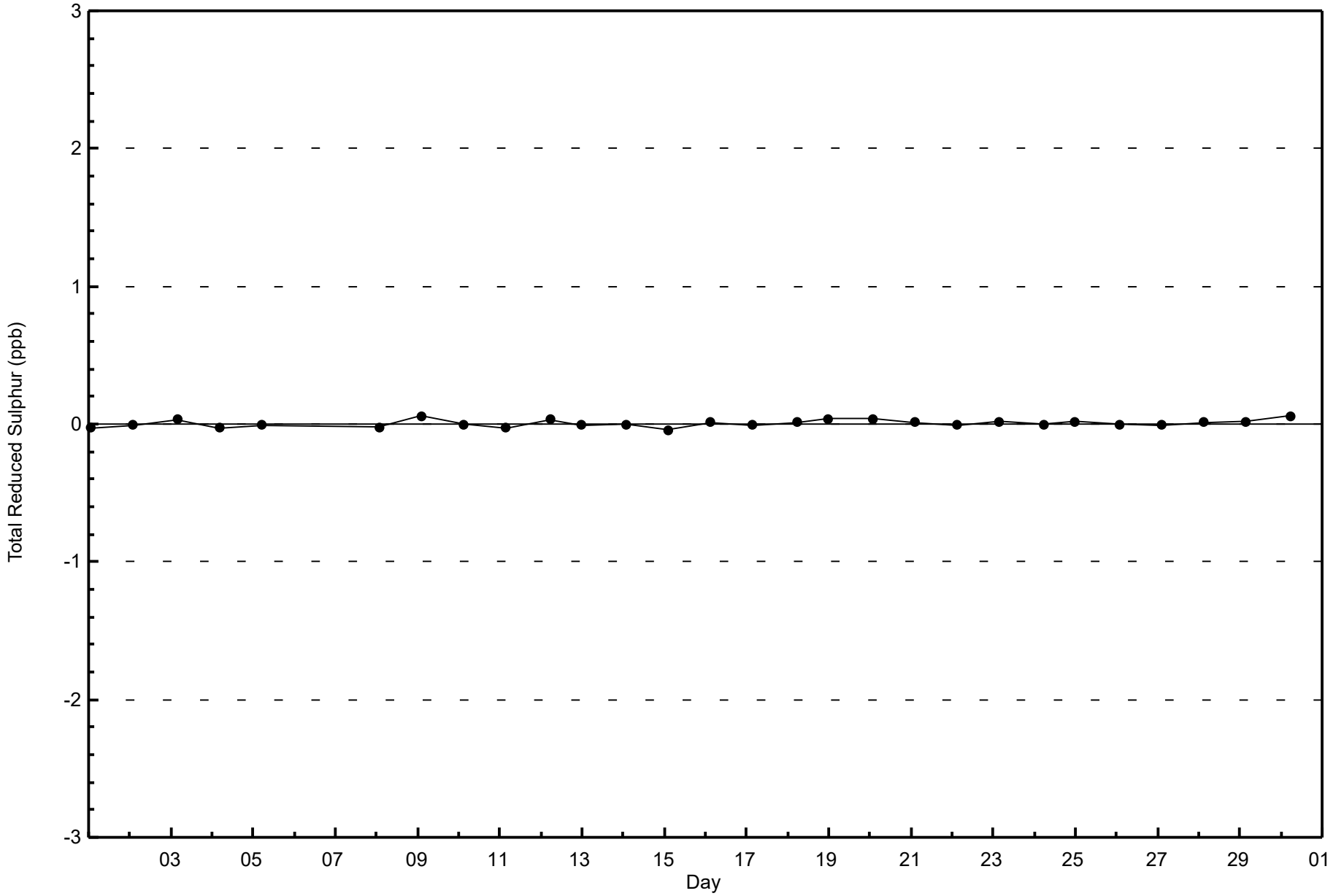


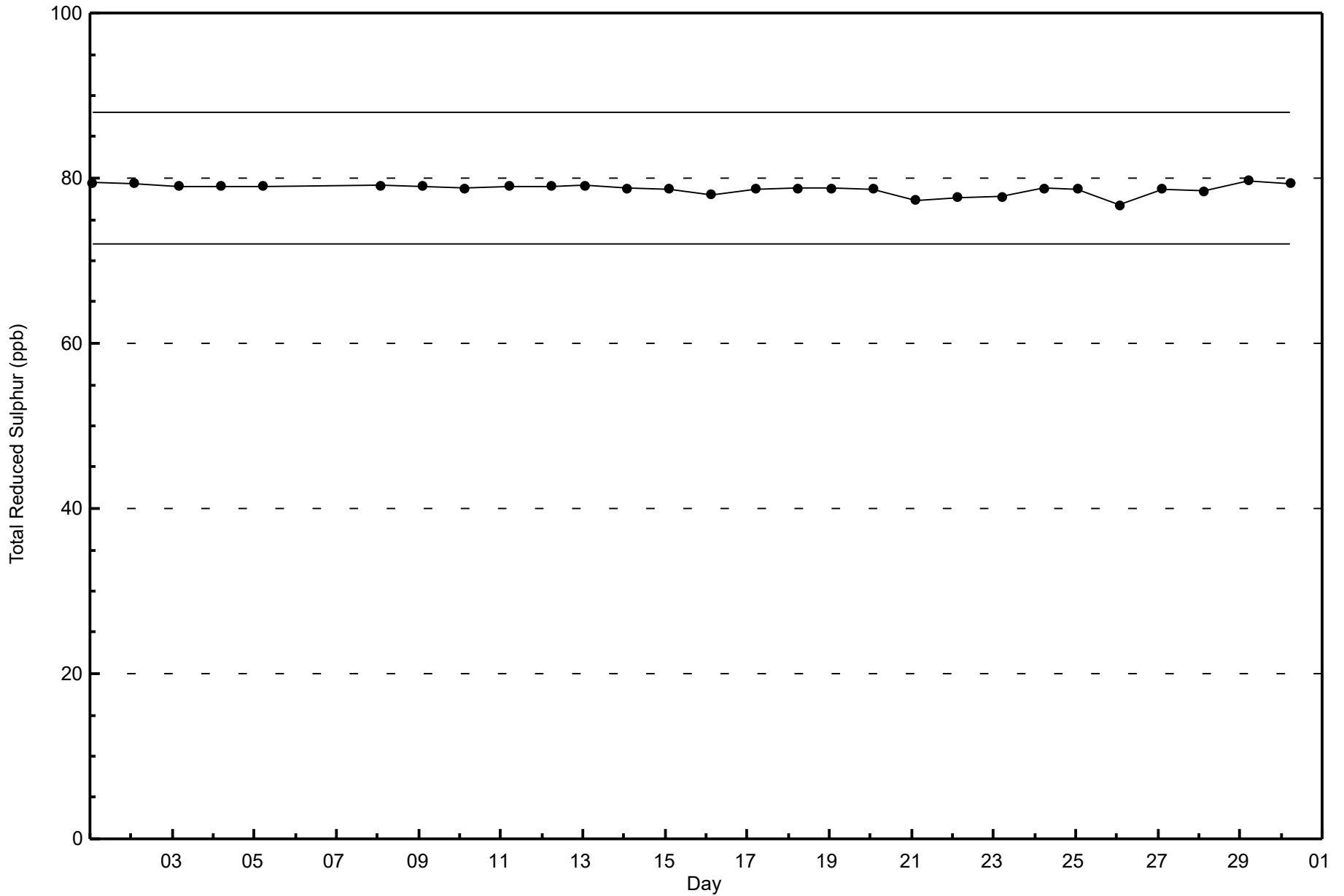
Wood Buffalo Environmental Association  
Wind Rose Nov 2023

Total Reduced Sulphur (TRS) - ppb  
Conklin



Total Number of Valid Hours: 684





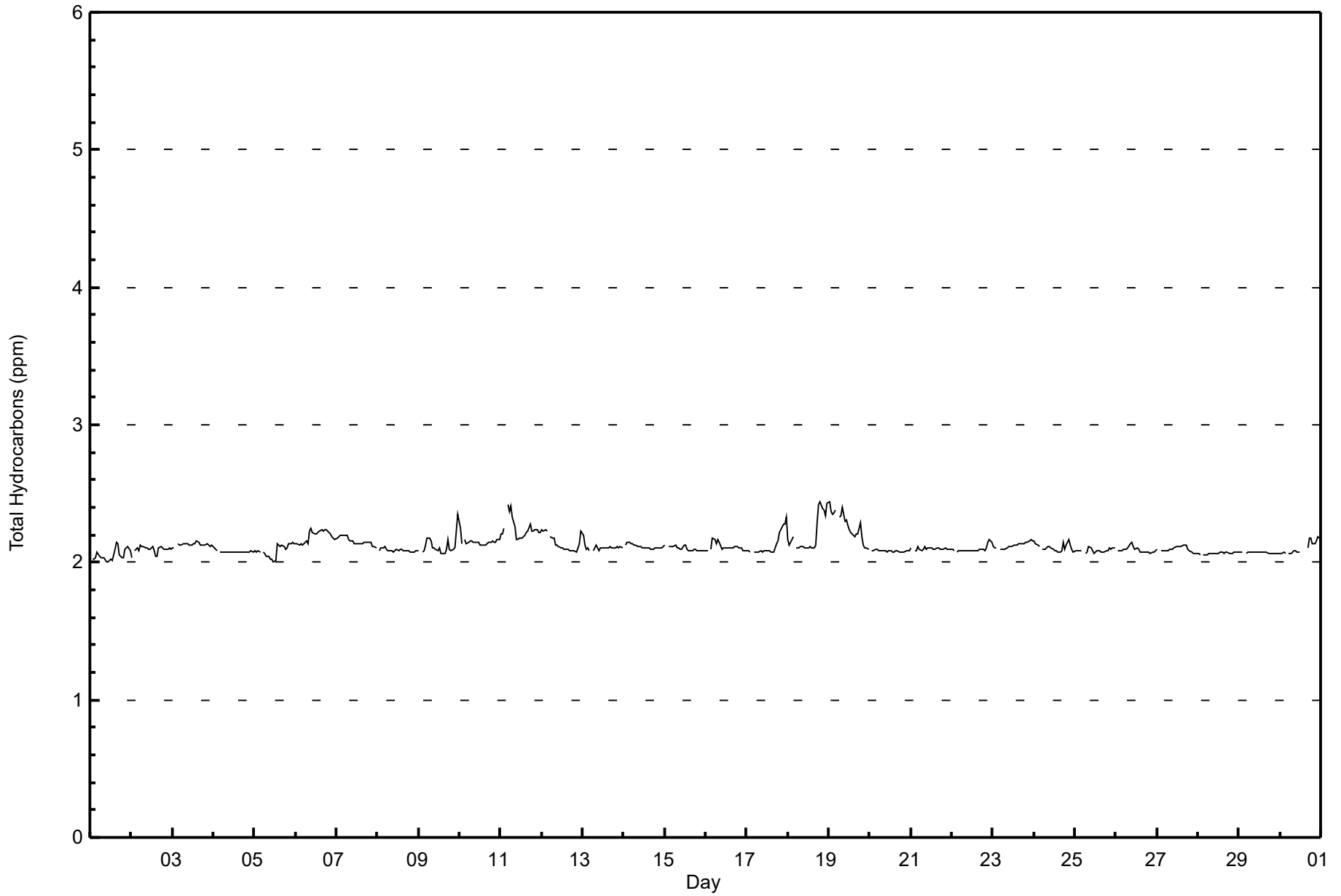






**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Total Hydrocarbons (THC) - ppm**  
**Conklin - November 2023**





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

**Total Hydrocarbons (THC) - ppm**  
**Conklin - November 2023**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2.0	23	3.34	3.34
2.1 - 3.0	665	96.66	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 688

Total Number of Hours: 720



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

**Total Hydrocarbons (THC) - ppm**  
**Conklin - November 2023**

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	6	2	0	0	0	0	2	5	4	4	0	0	0	0	0	23
2.1 - 3.0	32	36	19	23	14	6	15	61	78	54	86	24	55	72	56	34	665
3.1 - 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	32	42	21	23	14	6	15	63	83	58	90	24	55	72	56	34	688

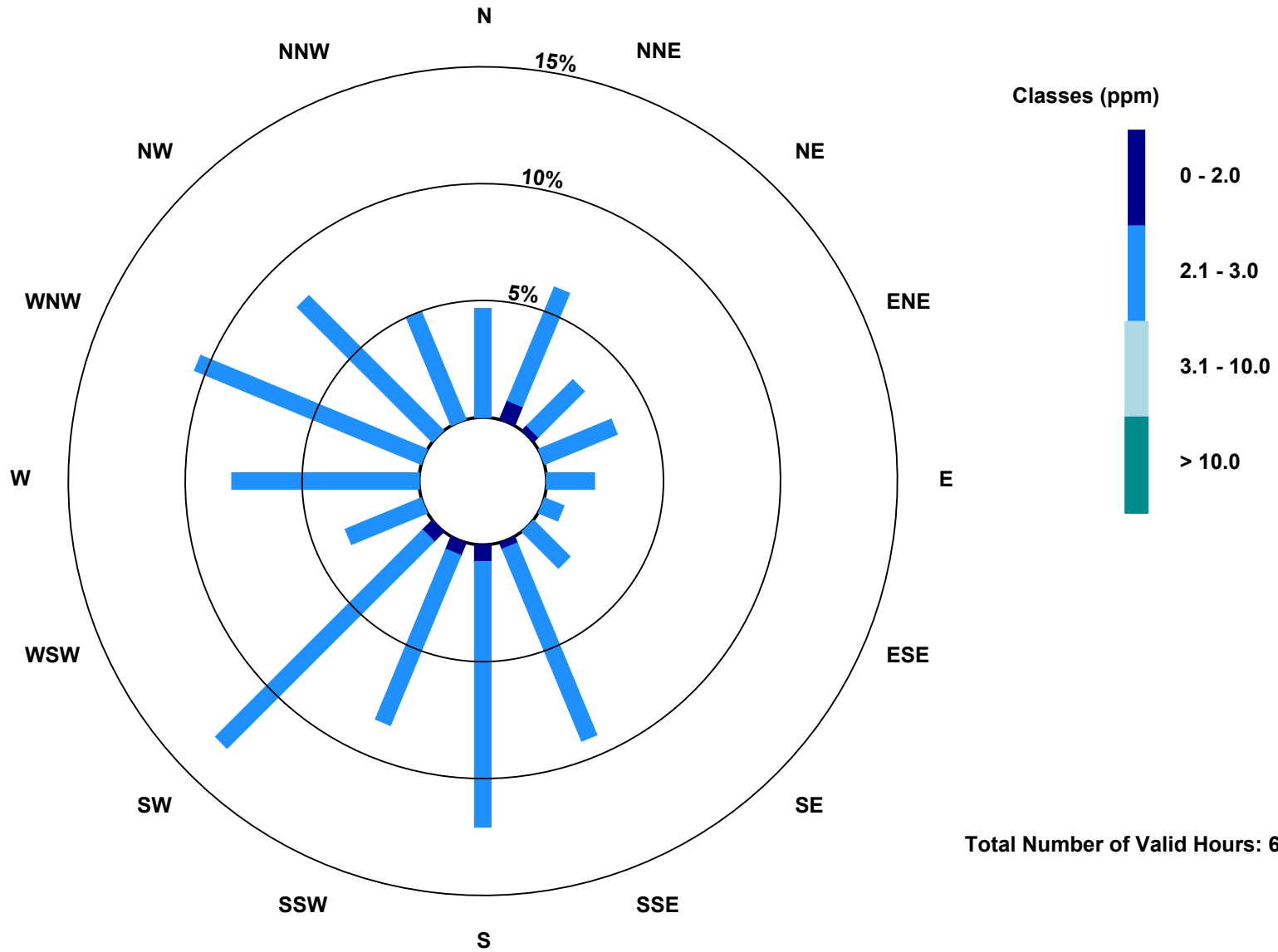
Total Number of Valid Hours: 688

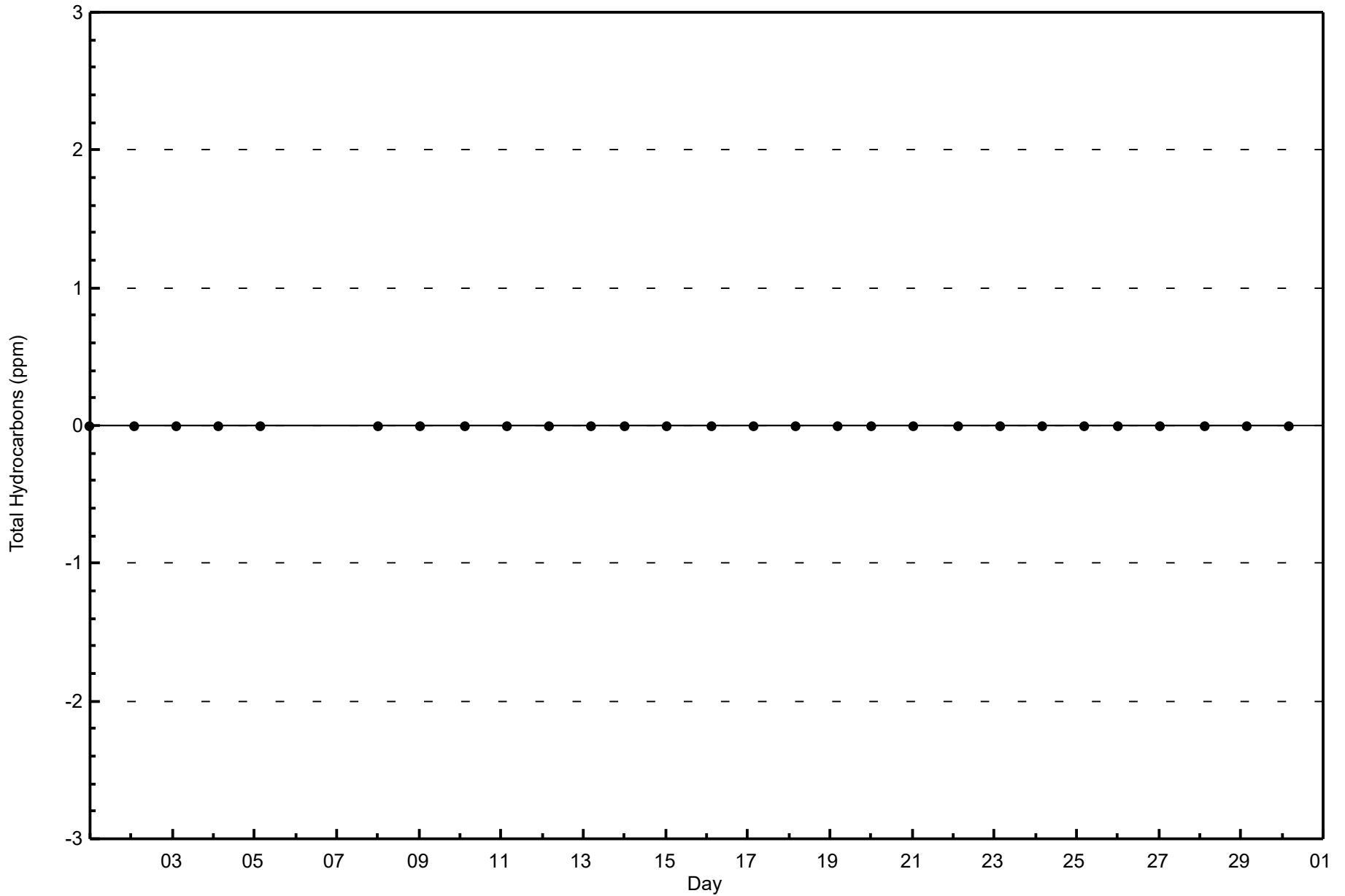
Total Number of Hours: 720

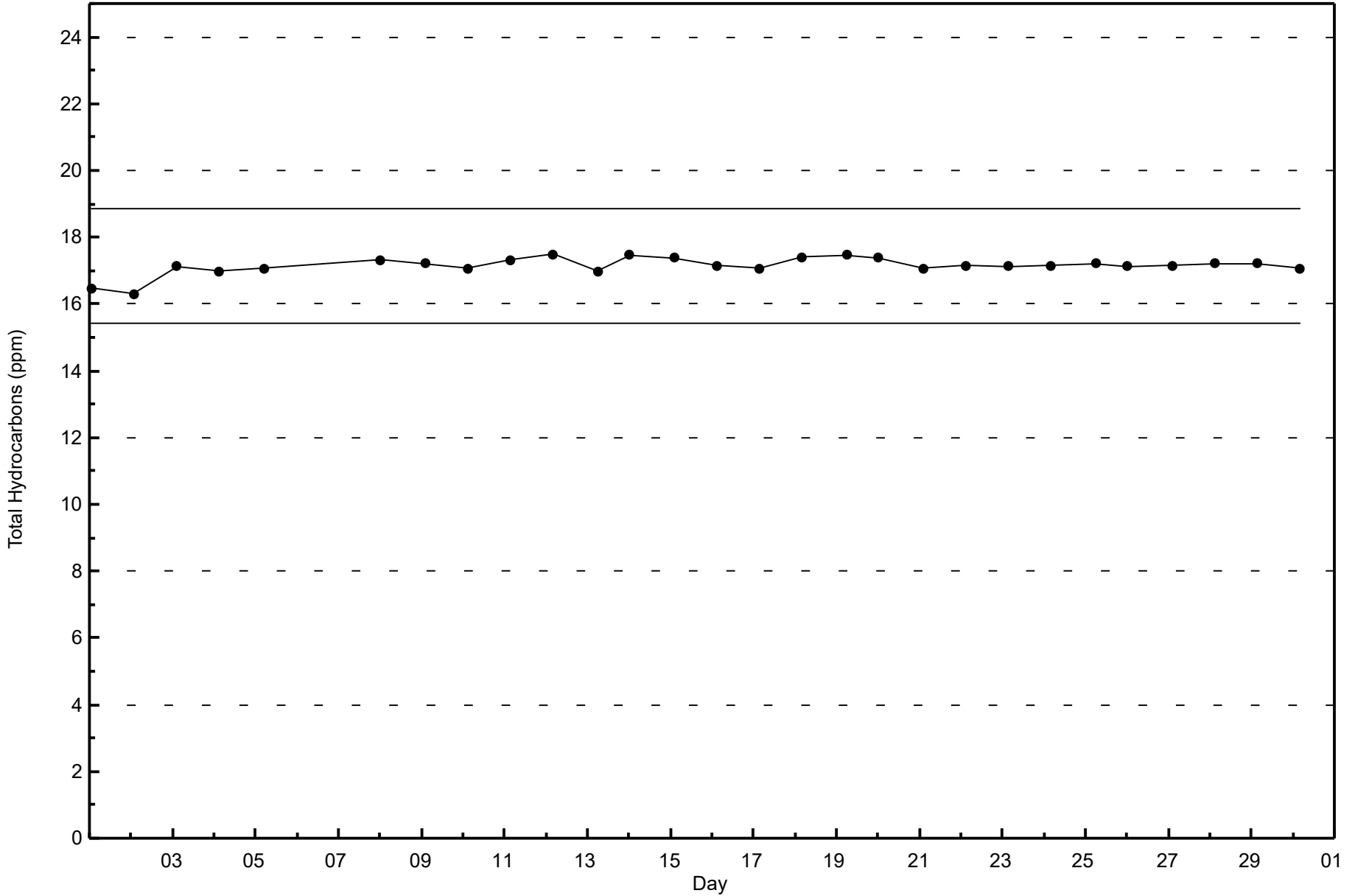


Wood Buffalo Environmental Association  
Wind Rose Nov 2023

Total Hydrocarbons (THC) - ppm  
Conklin

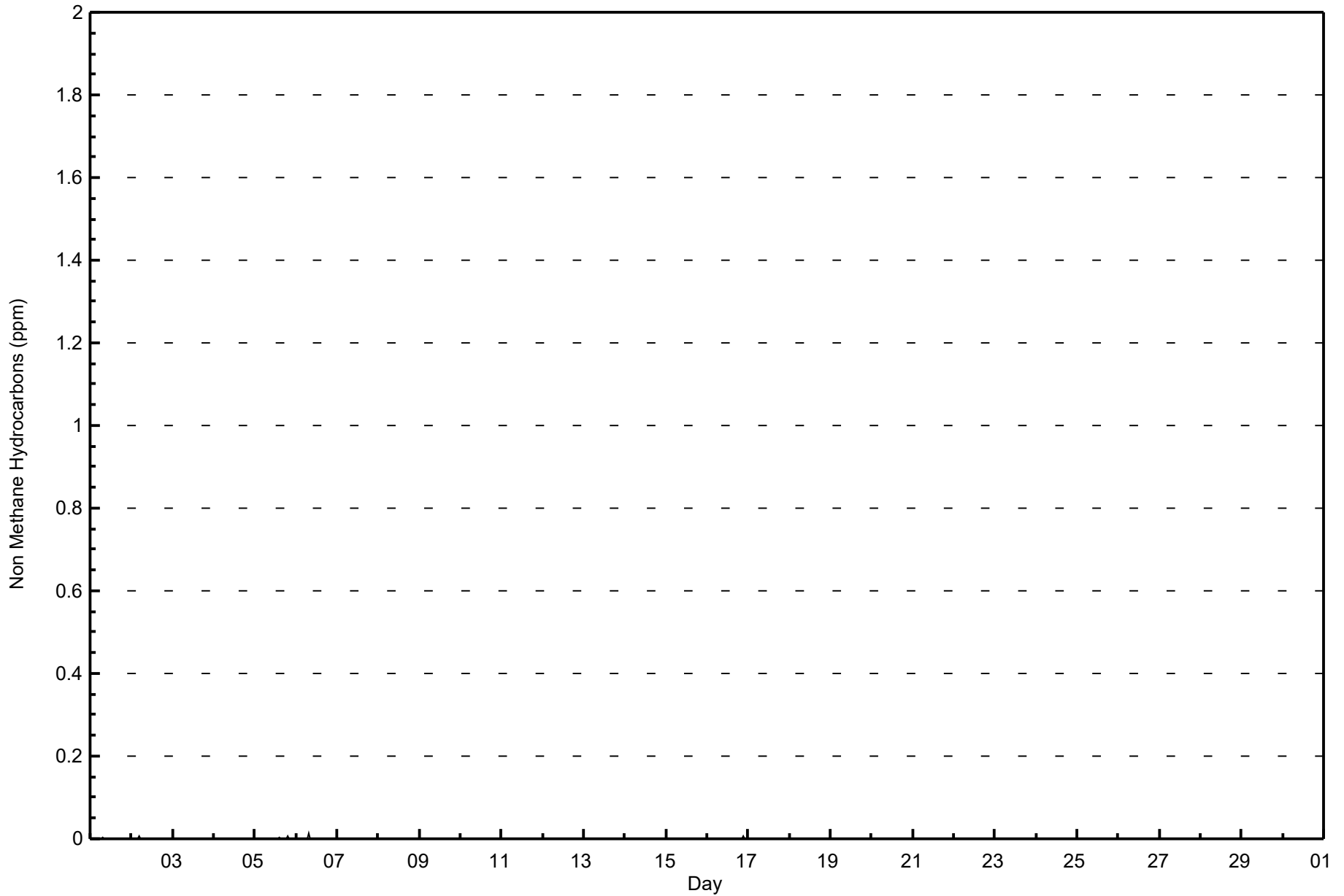














**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Non Methane Hydrocarbons (NMHC) - ppm**  
**Conklin - November 2023**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 0.005	685	99.56	99.56
0.006 - 0.05	3	0.44	100.00
0.06 - 0.1	0	0.00	100.00
> 0.1	0	0.00	100.00

Total Number of Valid Hours: 688

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Non Methane Hydrocarbons (NMHC) - ppm  
Conklin - November 2023**

<b>Concentration Ranges (ppm)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 0.005	31	41	21	23	14	6	15	63	83	58	90	24	55	71	56	34	685
0.006 - 0.05	1	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	3
0.06 - 0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	<b>32</b>	<b>42</b>	<b>21</b>	<b>23</b>	<b>14</b>	<b>6</b>	<b>15</b>	<b>63</b>	<b>83</b>	<b>58</b>	<b>90</b>	<b>24</b>	<b>55</b>	<b>72</b>	<b>56</b>	<b>34</b>	<b>688</b>

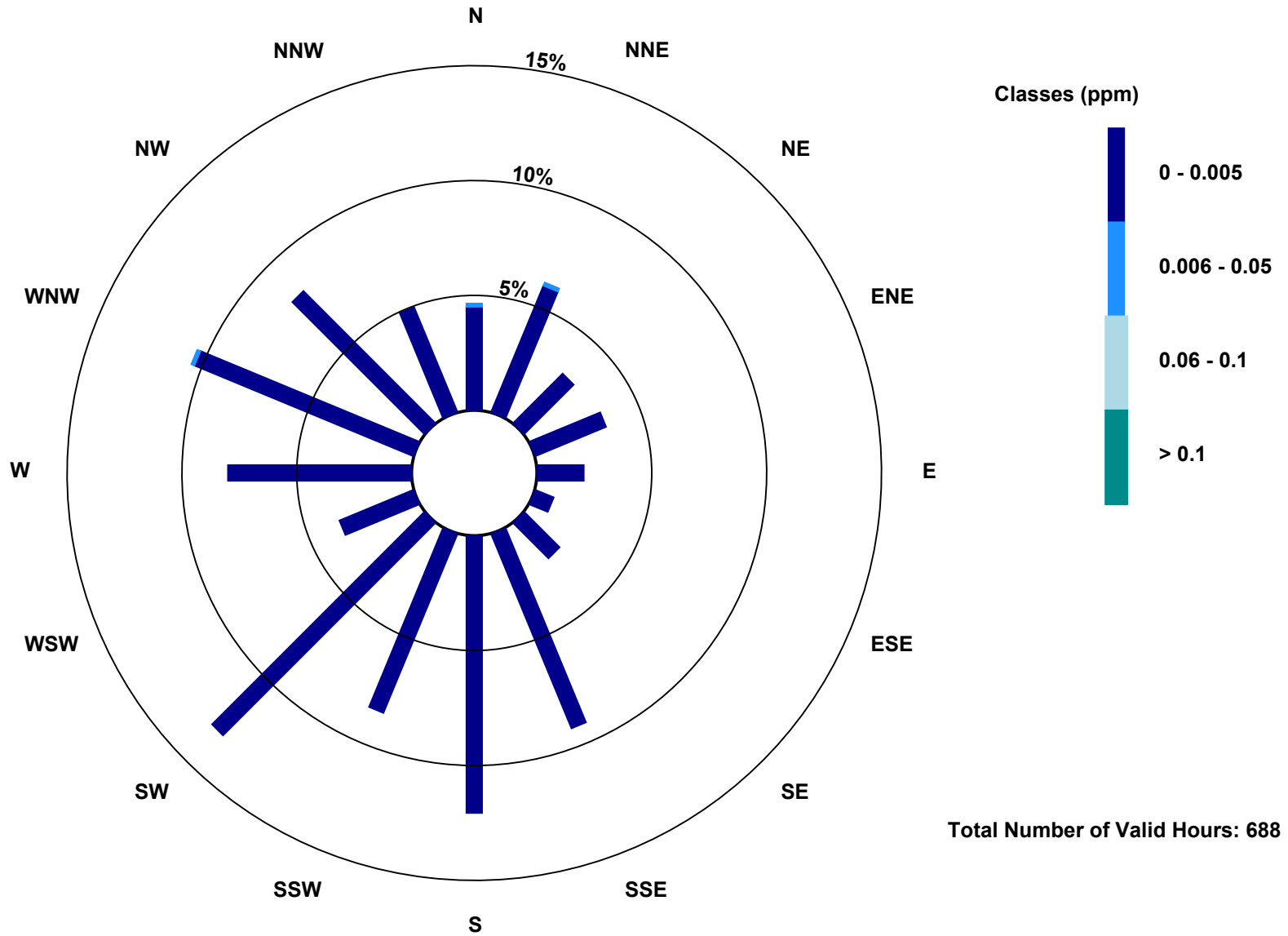
Total Number of Valid Hours: 688

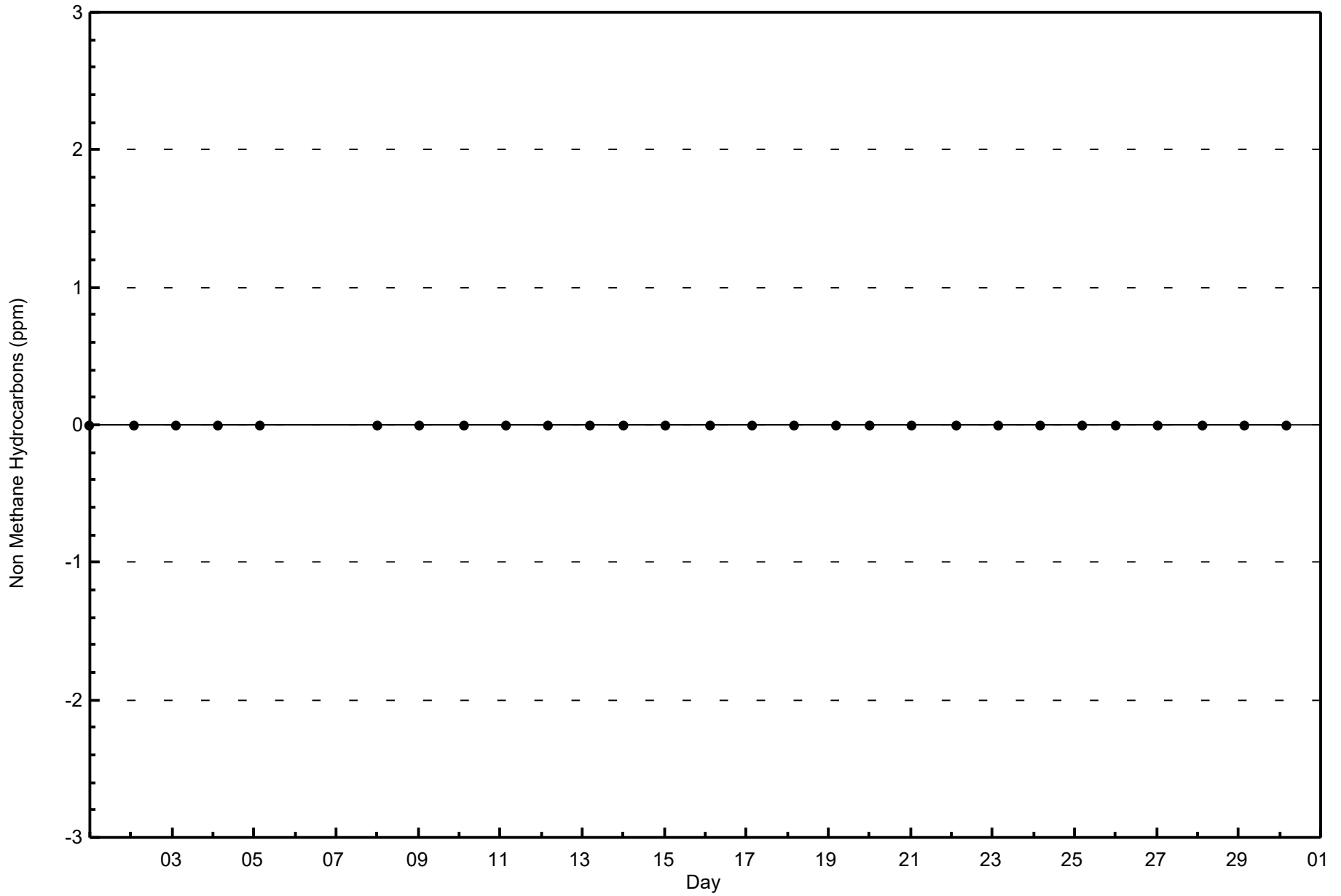
Total Number of Hours: 720

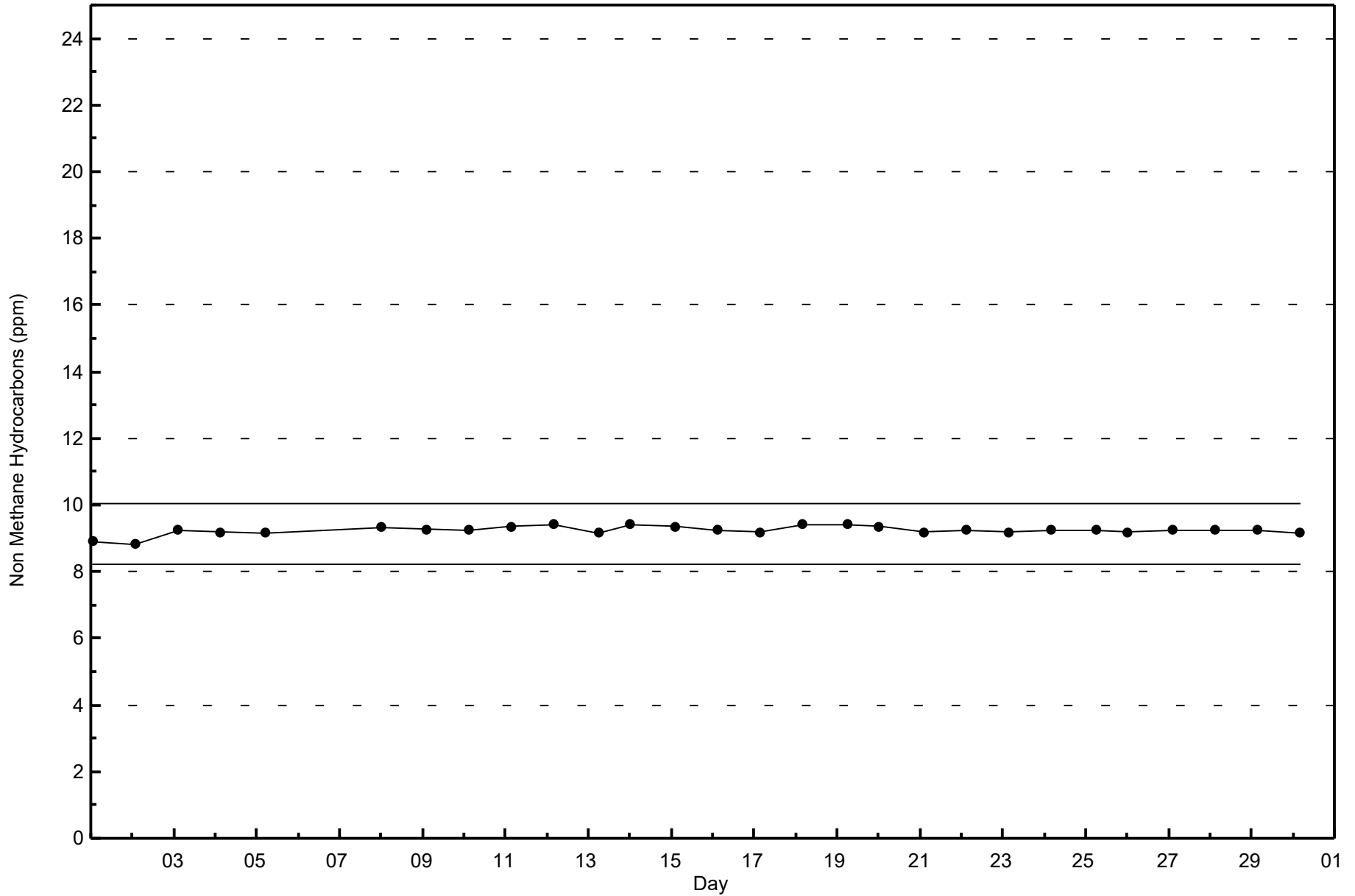


Wood Buffalo Environmental Association  
Wind Rose Nov 2023

Non Methane Hydrocarbons (NMHC) - ppm  
Conklin





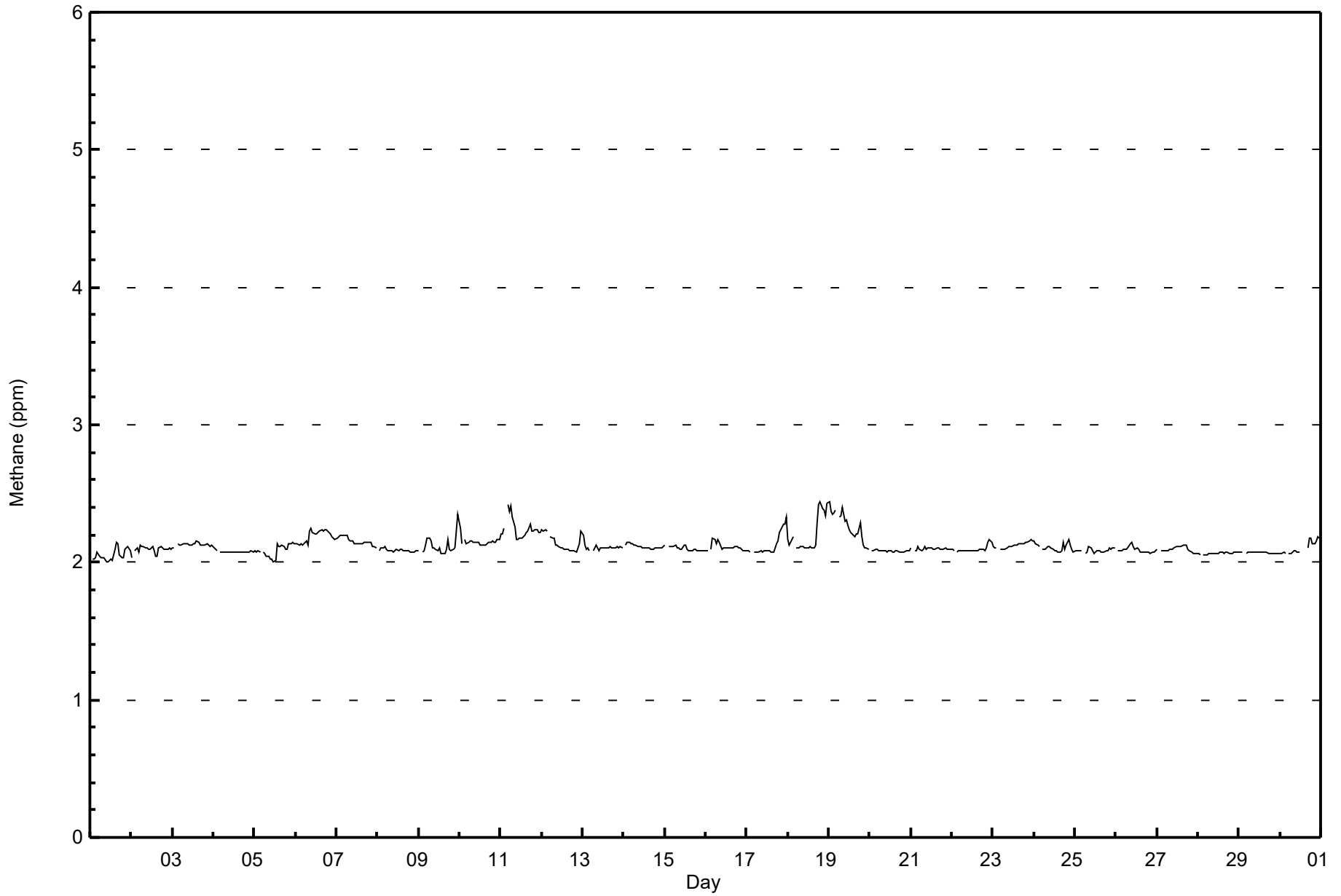






**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Methane (CH<sub>4</sub>) - ppm**  
**Conklin - November 2023**







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

**Methane (CH<sub>4</sub>) - ppm**  
**Conklin - November 2023**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2.0	23	3.34	3.34
2.1 - 3.0	665	96.66	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 688

Total Number of Hours: 720



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

**Methane (CH<sub>4</sub>) - ppm**  
**Conklin - November 2023**

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	6	2	0	0	0	0	2	5	4	4	0	0	0	0	0	23
2.1 - 3.0	32	36	19	23	14	6	15	61	78	54	86	24	55	72	56	34	665
3.1 - 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	32	42	21	23	14	6	15	63	83	58	90	24	55	72	56	34	688

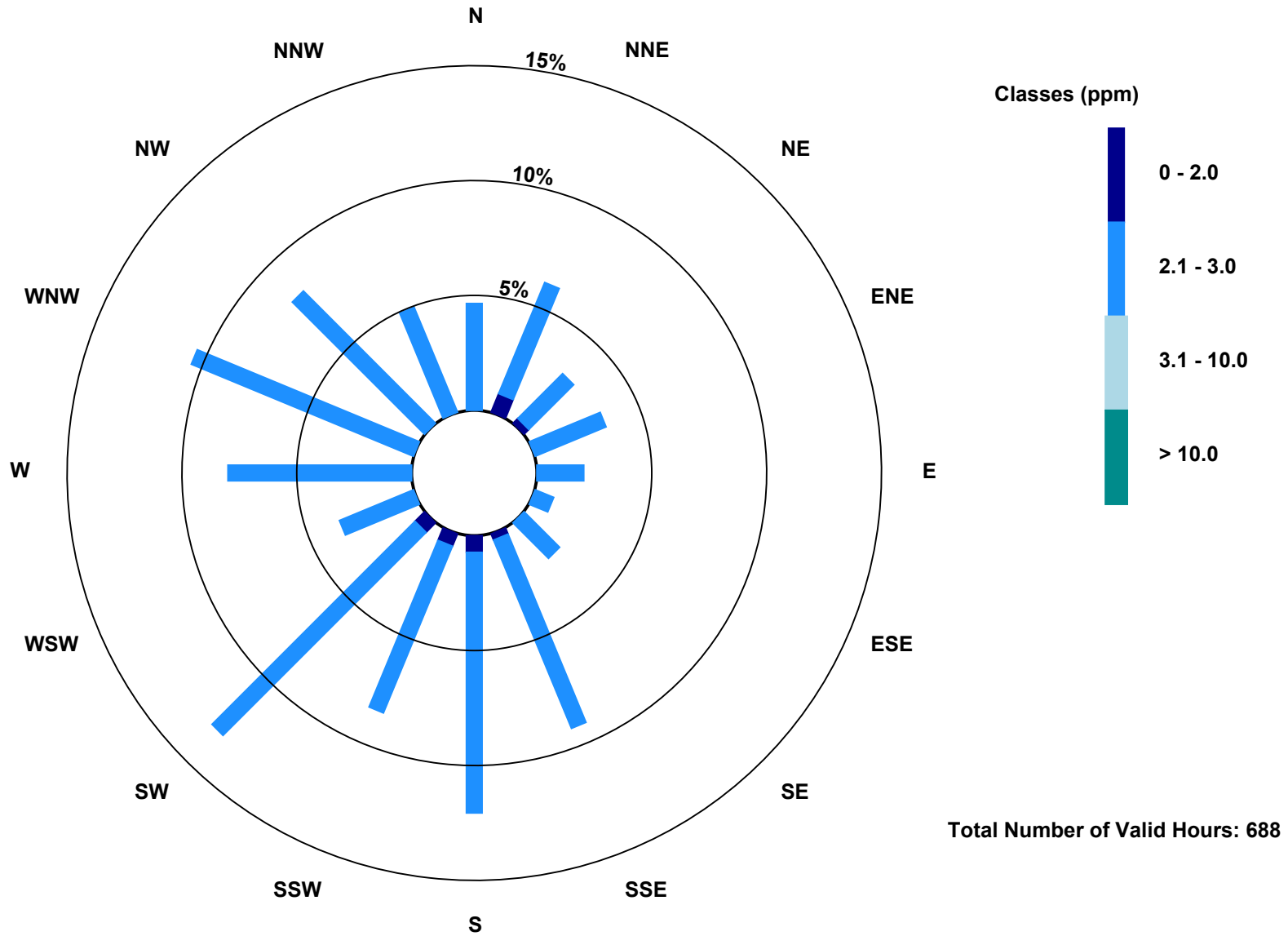
Total Number of Valid Hours: 688

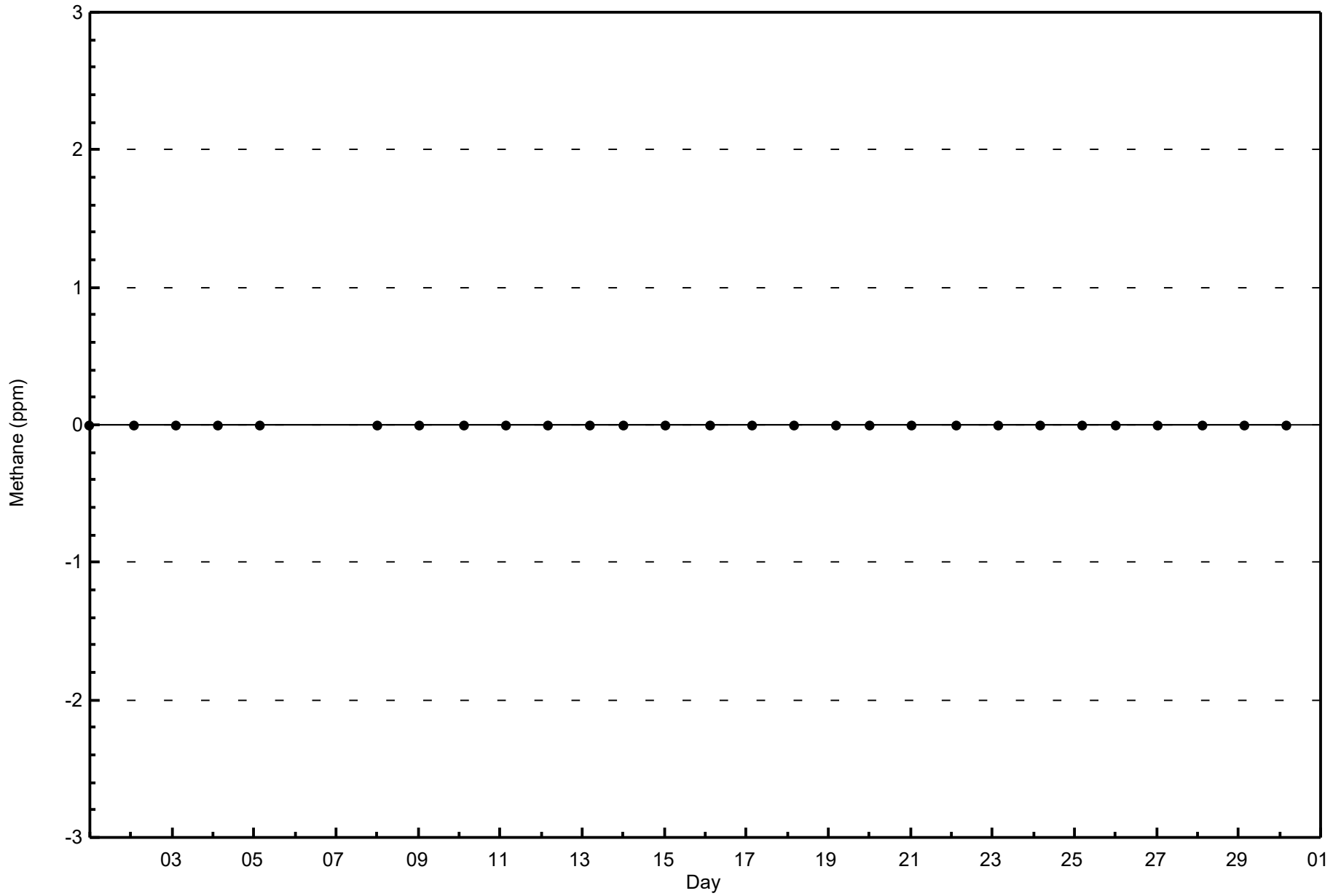
Total Number of Hours: 720

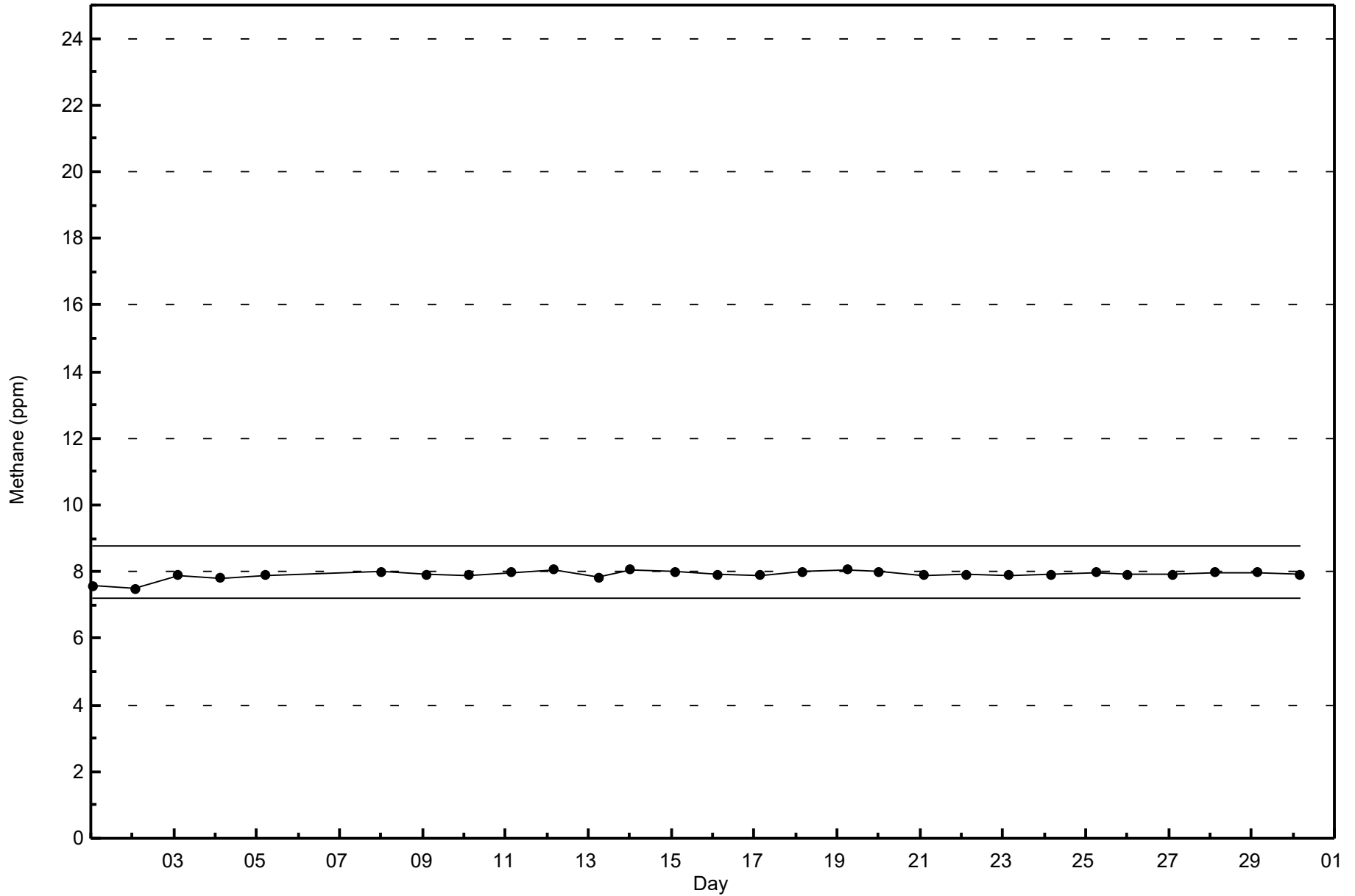


Wood Buffalo Environmental Association  
Wind Rose Nov 2023

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









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

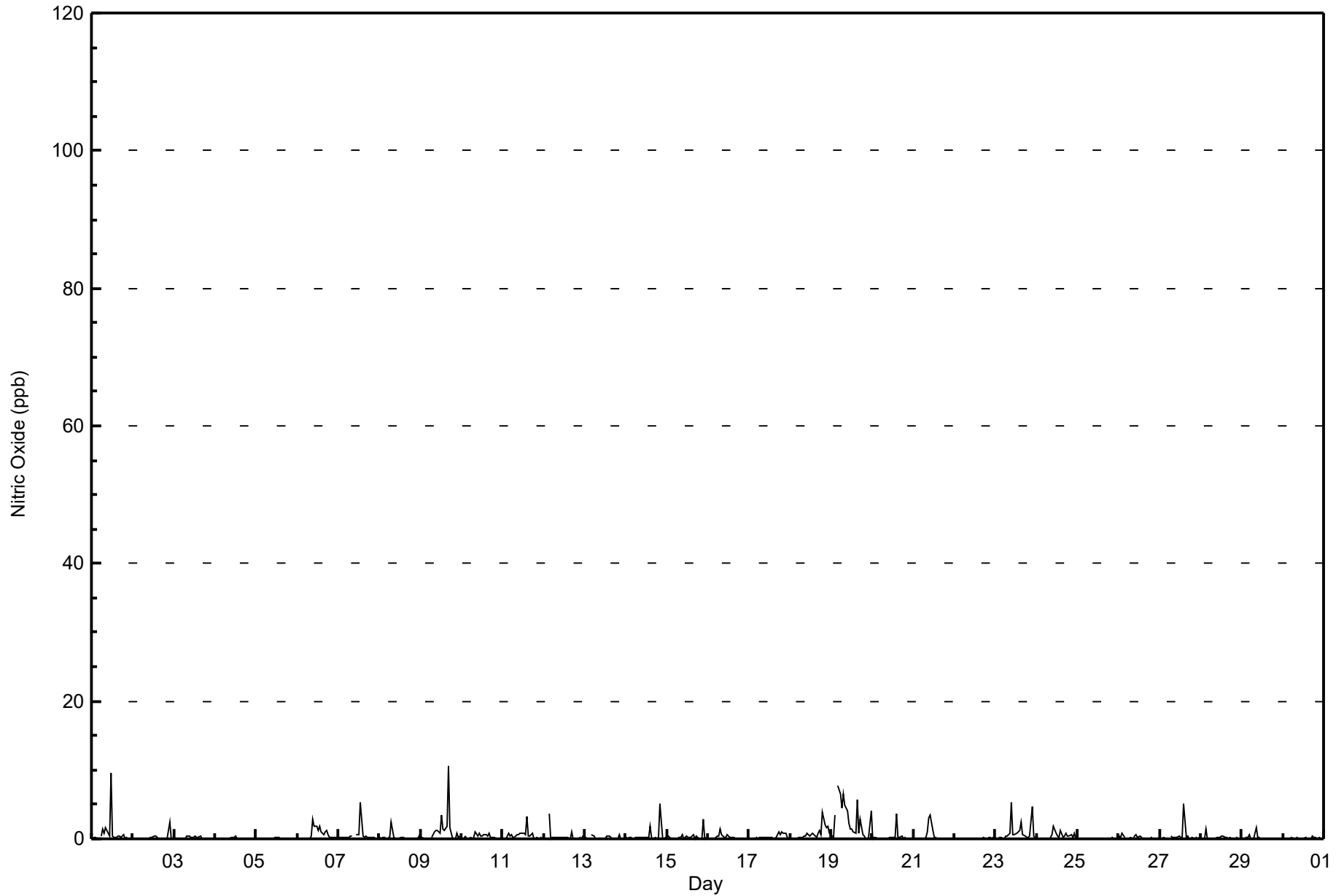
**Nitric Oxide (NO) - ppb**  
**Conklin - November 2023**

Maximum Value: 10.6 ppb on Nov 9 17:00		Maximum Daily Average: 2.6 ppb on Nov 19		Hours in Service: 720																						
Minimum Value: 0.0 ppb on Nov 1 01:00		Minimum Daily Average: 0.0 ppb on Nov 5		Hours of Data: 685																						
Maximum Diurnal Average: 0.8 ppb at hour 10		Minimum Diurnal Average: 0.1 ppb at hour 2		Hours of Missing Data: 35																						
Monthly Average: 0.43 ppb		Percentiles: P <sub>1</sub> = 0.0 P <sub>10</sub> = 0.0 Q <sub>1</sub> = 0.0 Median = 0.1 Q <sub>3</sub> = 0.3 P <sub>90</sub> = 0.9 P <sub>99</sub> = 5.3		Hours of Calibration: 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-Nov	0.0	0.2	0.3	0.0	Z	0.4	1.4	0.9	1.6	0.8	0.3	9.5	0.5	0.3	0.3	0.5	0.2	0.6	0.0	0.3	0.0	0.1	0.1	0.8	9.5	
2-Nov	0.0	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.1	0.1	0.4	0.4	0.1	0.1	0.0	0.0	0.0	0.0	0.0	2.5	0.0	0.0	0.2	2.5
3-Nov	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.4	0.5	0.3	0.3	0.3	0.1	0.3	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.5
4-Nov	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.1	0.2	0.3	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3
5-Nov	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
6-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.4	2.9	1.9	1.7	1.2	1.9	1.0	0.6	0.9	1.1	0.7	0.1	0.2	0.2	0.3	0.2	0.6	2.9
7-Nov	0.2	0.2	0.2	0.2	0.2	0.1	0.2	0.3	0.3	M	0.6	0.6	0.6	5.4	0.4	0.3	0.3	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.5	5.4
8-Nov	0.1	0.1	0.2	0.3	Z	0.2	0.2	2.4	0.2	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	2.4	
9-Nov	0.1	0.1	0.1	0.0	0.0	Z	0.2	0.6	0.9	1.3	1.1	0.9	3.5	1.5	1.2	1.9	10.6	1.7	0.8	0.1	0.0	0.9	0.2	0.3	1.2	10.6
10-Nov	Z	0.0	0.3	0.1	0.1	0.2	0.1	0.3	0.9	0.5	0.8	0.4	0.4	0.6	0.6	0.3	0.7	0.2	0.2	0.2	0.1	0.1	0.0	0.0	0.3	0.9
11-Nov	0.2	Z	0.0	0.9	0.4	0.6	0.2	0.1	0.5	0.5	0.9	0.7	0.8	0.7	3.3	0.3	0.3	0.8	0.1	0.0	0.2	0.1	0.1	0.0	0.5	3.3
12-Nov	0.1	0.0	Z	3.7	0.1	0.2	0.1	0.2	0.2	0.3	0.3	0.2	0.2	0.1	0.1	0.1	1.0	0.0	0.0	0.1	0.1	0.2	0.0	0.5	3.7	
13-Nov	0.3	0.0	0.1	Z	0.7	0.3	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.4	0.4	0.2	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.1	0.2	0.7
14-Nov	0.1	0.1	0.1	0.2	Z	0.3	0.2	0.2	0.1	0.3	0.2	0.2	0.2	0.1	1.7	0.2	0.0	0.2	0.1	0.2	5.1	0.0	0.0	0.3	0.4	5.1
15-Nov	0.2	0.3	0.0	0.0	0.0	Z	0.2	0.1	0.1	0.6	0.1	0.4	0.3	0.2	0.1	0.6	0.1	0.4	0.1	0.0	0.1	2.9	0.0	0.1	0.3	2.9
16-Nov	Z	0.0	0.0	0.1	0.0	0.5	0.5	1.4	0.6	0.3	0.3	0.6	0.3	0.2	0.1	0.3	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.2	1.4
17-Nov	0.0	Z	0.0	0.0	0.2	0.0	0.1	0.1	0.2	0.1	0.2	0.3	0.2	0.1	0.1	0.0	0.1	1.0	0.5	1.0	0.9	0.8	0.2	0.0	0.3	1.0
18-Nov	0.0	0.0	Z	0.0	0.1	0.1	0.3	0.2	0.4	0.3	0.8	0.4	0.6	0.8	0.6	0.2	0.8	1.2	0.6	3.8	2.1	1.6	1.7	0.7	0.8	3.8
19-Nov	0.5	0.1	3.6	Z	7.7	6.5	4.6	6.5	4.8	4.0	2.3	1.4	1.3	1.1	0.7	5.6	0.9	2.8	0.5	0.4	0.1	0.1	0.1	4.1	2.6	7.7
20-Nov	0.1	0.1	0.1	0.1	Z	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.2	0.2	3.6	0.2	0.1	0.4	0.1	0.1	0.1	0.0	0.0	0.0	0.3	3.6
21-Nov	0.0	0.0	0.0	0.0	0.0	Z	0.0	0.1	1.1	3.1	3.5	1.1	0.2	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	3.5
22-Nov	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.3	0.1	0.1	0.2	0.1	0.1	0.4	0.1	0.4
23-Nov	0.1	Z	0.2	0.3	0.1	0.1	0.4	0.4	0.7	5.3	0.7	0.7	0.9	0.9	1.2	2.5	0.5	0.4	0.2	0.2	0.3	4.8	0.3	0.1	0.9	5.3
24-Nov	0.1	0.1	Z	0.0	0.0	0.0	0.0	0.1	0.1	0.7	1.8	0.9	0.4	0.3	1.1	0.1	0.4	0.8	0.4	0.4	0.5	0.1	0.8	0.1	0.4	1.8
25-Nov	0.0	0.0	0.1	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.2
26-Nov	0.4	0.2	0.8	0.1	Z	0.0	0.1	0.1	0.0	0.4	0.5	0.2	0.4	0.2	0.1	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.2	0.8
27-Nov	0.2	0.0	0.1	0.0	0.1	Z	0.3	0.2	0.2	0.2	0.3	0.4	0.2	0.2	5.2	0.2	0.5	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.4	5.2
28-Nov	Z	0.1	0.0	1.4	0.1	0.1	0.1	0.0	0.1	0.3	0.2	0.3	0.3	0.5	0.3	0.2	0.0	0.1	0.0	0.1	0.1	0.1	0.0	0.0	0.2	1.4
29-Nov	0.1	Z	0.1	0.1	0.6	0.1	0.1	0.0	1.7	0.2	0.2	0.1	C	C	C	C	C	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	1.7
30-Nov	0.0	0.0	Z	0.0	0.0	0.3	0.0	0.0	0.1	0.1	0.0	0.0	0.1	0.3	0.2	M	0.0	0.4	0.1	0.2	0.1	0.2	0.1	0.0	0.1	0.4
																								Diurnal Average		
																								Diurnal Maximum		
																								0.1 0.1 0.3 0.3 0.4 0.4 0.3 0.5 0.5 0.8 0.6 0.7 0.5 0.6 0.8 0.5 0.6 0.4 0.2 0.2 0.4 0.5 0.1 0.3		
																								0.5 0.3 3.6 3.7 7.7 6.5 4.6 6.5 4.8 5.3 3.5 9.5 3.5 5.4 5.2 5.6 10.6 2.8 0.8 3.8 5.1 4.8 1.7 4.1		
																								Z - zerospan C - Calibration M - Maintenance		



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

**Nitric Oxide (NO) - ppb**  
**Conklin - November 2023**





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

**Nitric Oxide (NO) - ppb**  
**Conklin - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	685	100.00	100.00
21 - 40	0	0.00	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720





**Wood Buffalo Environmental Association  
Frequency Distribution**

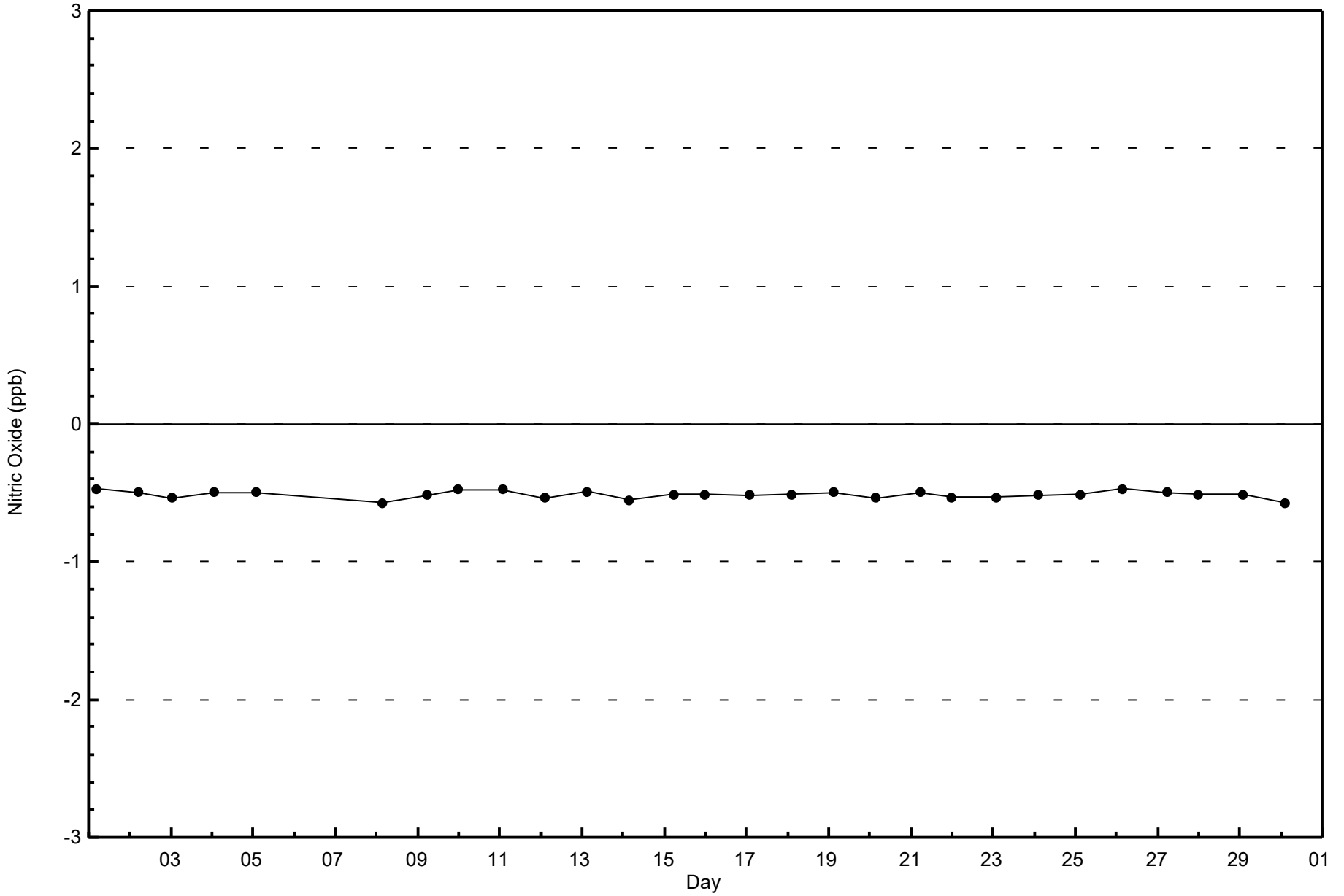
**Nitric Oxide (NO) - ppb  
Conklin - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	31	43	22	23	12	6	15	65	80	60	90	24	56	73	52	33	685
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	31	43	22	23	12	6	15	65	80	60	90	24	56	73	52	33	685

Total Number of Valid Hours: 685

Total Number of Hours: 720

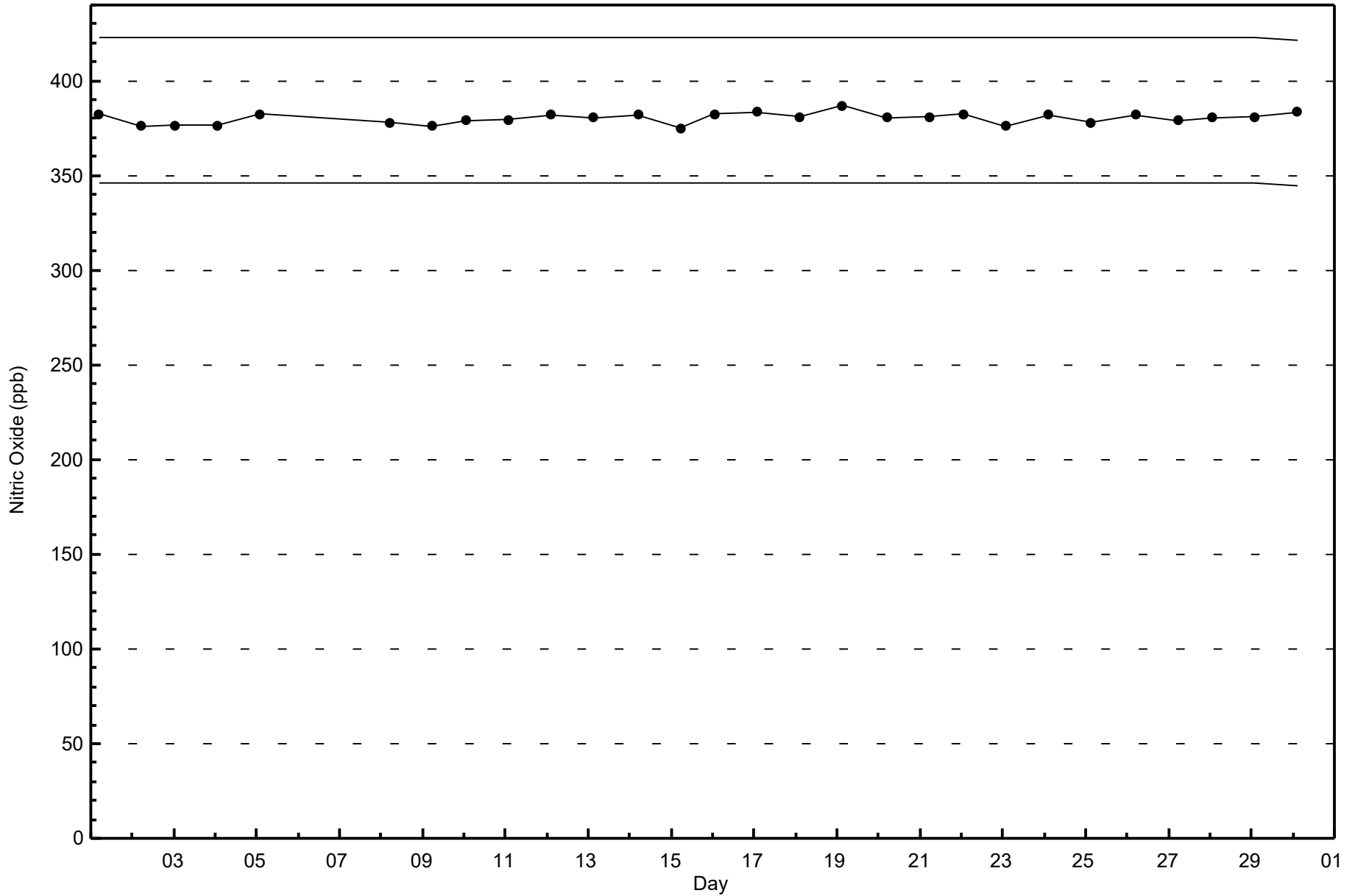






**Wood Buffalo Environmental Association**  
**Span Responses**

**Nitric Oxide (NO) - ppb**  
**Conklin - November 2023**





Wood Buffalo Environmental Association

Summary of Hour Averages

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

Conklin - November 2023

Number of Exceedences (AAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 15.9 ppb on Nov 9 17:00	Maximum Daily Average: 4.0 ppb on Nov 23		Hours of Data:	685
Minimum Value: 0.0 ppb on Nov 1 12:00	Minimum Daily Average: 0.5 ppb on Nov 5		Hours of Missing Data:	35
Maximum Diurnal Average: 3.1 ppb at hour 17	Minimum Diurnal Average: 1.4 ppb at hour 2		Hours of Calibration:	33
Monthly Average: 1.83 ppb	Percentiles: P <sub>1</sub> = 0.2 P <sub>10</sub> = 0.5 Q <sub>1</sub> = 0.9 Median = 1.4 Q <sub>3</sub> = 2.3 P <sub>90</sub> = 3.4 P <sub>99</sub> = 7.2		Percent Operational Time:	99.7

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	0.8	1.1	1.5	1.3	Z	1.6	2.7	1.8	3.0	1.6	1.1	0.0	1.6	1.4	1.4	1.7	1.7	2.5	3.1	1.6	1.7	5.3	2.9	2.1	1.9	5.3
2-Nov	1.2	1.4	1.5	1.4	2.0	Z	3.5	2.9	1.4	1.0	1.5	2.4	5.2	3.9	2.4	1.8	2.1	1.2	0.8	0.7	0.7	2.1	1.0	1.0	1.9	5.2
3-Nov	Z	1.0	1.3	1.0	0.8	0.9	1.3	2.4	4.2	5.3	2.7	2.1	2.7	1.9	2.6	5.1	3.2	2.2	2.1	2.1	2.2	2.0	1.6	1.6	2.3	5.3
4-Nov	1.0	Z	0.8	0.5	0.5	0.5	0.5	0.4	1.1	1.5	1.1	1.4	1.2	0.7	1.1	1.1	0.7	0.6	0.6	0.5	0.7	0.7	0.7	1.1	0.8	1.5
5-Nov	1.0	0.7	Z	0.8	0.6	0.5	0.5	0.4	0.4	0.4	0.5	0.8	1.0	1.0	0.6	0.4	0.5	0.5	0.4	0.4	0.3	0.3	0.2	0.3	0.5	1.0
6-Nov	0.4	0.3	0.4	0.5	0.5	0.5	0.7	0.9	1.2	2.9	2.7	2.7	2.1	3.0	2.9	3.3	4.1	4.2	3.9	3.4	2.9	2.4	2.2	2.3	2.1	4.2
7-Nov	2.1	2.2	2.3	2.4	2.0	1.9	2.2	2.0	2.0	M	2.1	1.9	1.9	2.6	1.1	1.0	1.4	1.2	1.2	1.6	2.2	1.6	1.3	1.1	1.8	2.6
8-Nov	1.1	0.9	1.0	0.8	Z	0.9	0.8	2.1	1.4	0.6	0.4	0.5	0.6	0.7	0.6	0.5	0.6	0.7	0.5	0.6	0.5	0.7	0.9	1.6	0.8	2.1
9-Nov	1.6	1.8	1.5	1.2	1.4	Z	1.5	1.7	1.7	1.8	1.4	1.3	3.2	2.1	2.0	3.8	15.9	5.0	2.7	1.7	1.4	2.4	3.8	3.0	2.8	15.9
10-Nov	Z	2.5	3.1	2.4	2.4	2.5	2.3	3.0	3.5	1.9	1.9	1.6	1.5	1.7	2.0	2.2	2.8	2.4	2.2	2.3	2.2	2.2	2.6	2.5	2.3	3.5
11-Nov	2.8	Z	3.1	5.1	5.0	4.1	3.3	3.4	3.3	3.4	2.9	2.9	2.4	2.3	4.0	2.9	3.5	5.2	2.7	2.5	2.7	2.4	2.3	2.3	3.2	5.2
12-Nov	2.4	2.6	Z	3.6	2.2	2.0	1.9	1.5	1.2	1.4	1.2	1.1	0.9	1.0	1.2	1.3	2.7	0.9	1.0	0.8	0.7	1.1	0.6	1.6	1.5	3.6
13-Nov	0.9	0.9	1.0	Z	1.5	1.6	1.5	1.1	1.4	1.0	0.8	0.5	0.5	1.0	1.5	1.7	0.8	0.6	0.5	0.5	1.4	1.3	0.9	1.3	1.1	1.7
14-Nov	1.2	1.5	2.5	2.8	Z	1.8	1.6	1.5	1.2	0.8	0.8	0.6	0.6	0.6	1.3	1.1	1.2	1.2	1.3	1.3	3.9	1.0	0.9	1.4	1.4	3.9
15-Nov	1.4	1.7	1.4	1.2	1.1	Z	1.8	1.4	1.1	1.6	1.1	2.3	2.3	0.9	0.8	1.8	4.8	4.7	2.6	1.4	1.4	3.9	0.7	1.2	1.9	4.8
16-Nov	Z	0.9	0.4	2.5	2.7	2.0	1.7	3.1	2.5	1.1	1.0	1.7	1.6	1.6	1.5	2.1	2.0	2.0	1.9	1.8	1.7	1.6	1.4	1.4	1.7	3.1
17-Nov	1.3	Z	1.0	1.0	1.2	0.9	0.9	0.9	1.0	1.0	1.0	1.1	0.8	1.3	1.0	1.2	4.0	7.1	2.9	3.4	3.7	2.6	2.1	1.0	1.8	7.1
18-Nov	0.9	1.0	Z	1.0	1.0	1.3	1.4	1.3	1.7	1.5	2.1	2.7	3.6	3.8	3.5	3.3	6.2	5.8	3.8	5.1	5.1	5.8	5.6	4.2	3.1	6.2
19-Nov	3.0	2.5	2.8	Z	3.1	2.8	2.7	2.8	2.0	2.2	2.1	2.6	3.0	3.0	3.3	9.5	7.9	6.7	2.7	1.7	1.6	1.6	1.3	1.7	3.2	9.5
20-Nov	0.5	0.5	0.6	0.3	Z	0.3	0.2	0.3	0.4	0.2	0.5	0.6	0.7	0.5	1.2	1.0	1.4	2.6	0.8	1.2	1.4	1.2	0.8	0.6	0.8	2.6
21-Nov	1.3	1.0	0.7	0.4	0.8	Z	3.4	3.2	4.8	5.8	5.6	2.7	1.5	1.2	0.7	0.7	0.5	0.6	0.9	0.9	0.8	0.8	0.7	0.5	1.7	5.8
22-Nov	Z	0.3	0.1	0.1	0.1	0.2	0.3	0.2	0.2	0.5	0.5	0.3	0.3	0.3	0.4	0.3	0.4	0.8	1.1	0.7	2.2	2.5	1.5	1.8	0.7	2.5
23-Nov	1.3	Z	1.4	2.0	1.4	1.7	1.7	1.7	3.0	4.9	2.9	2.8	2.8	2.6	3.1	5.8	5.1	5.4	5.0	5.3	6.2	9.3	8.8	6.9	4.0	9.3
24-Nov	5.9	4.8	Z	3.1	2.4	2.3	2.2	2.1	2.5	4.1	2.5	1.4	1.4	2.8	2.1	8.5	7.1	4.4	2.3	2.1	1.7	1.5	1.2	3.1	8.5	8.5
25-Nov	1.2	1.3	1.3	Z	1.3	0.9	0.6	1.4	3.8	3.2	1.5	0.2	0.2	0.7	0.5	0.3	0.3	0.3	0.7	0.5	2.4	0.6	1.1	1.4	1.1	3.8
26-Nov	1.3	1.0	8.0	4.9	Z	4.9	3.4	3.1	2.6	2.7	2.1	1.0	1.5	1.7	1.2	1.2	0.9	1.3	0.9	1.2	1.0	1.0	1.3	1.5	2.2	8.0
27-Nov	1.2	0.9	1.0	0.9	1.0	Z	1.5	1.5	1.5	1.3	1.2	1.3	1.7	1.8	4.4	2.0	2.3	2.2	1.8	1.6	1.4	1.1	1.1	1.1	1.6	4.4
28-Nov	Z	0.9	0.8	0.9	0.9	0.8	0.8	0.8	0.8	1.0	1.0	1.1	1.4	1.5	1.3	1.0	1.3	1.4	1.2	1.4	1.4	1.6	1.6	1.3	1.1	1.6
29-Nov	1.5	Z	1.1	1.1	1.2	1.0	0.9	0.7	2.8	1.4	1.2	0.8	C	C	C	C	C	0.5	0.6	0.5	0.4	0.3	0.1	0.2	0.9	2.8
30-Nov	0.9	0.2	Z	0.5	1.6	2.1	1.7	0.8	1.5	1.0	0.6	0.8	0.7	1.3	1.2	M	4.0	3.4	2.2	2.1	1.1	1.4	0.9	0.8	1.4	4.0

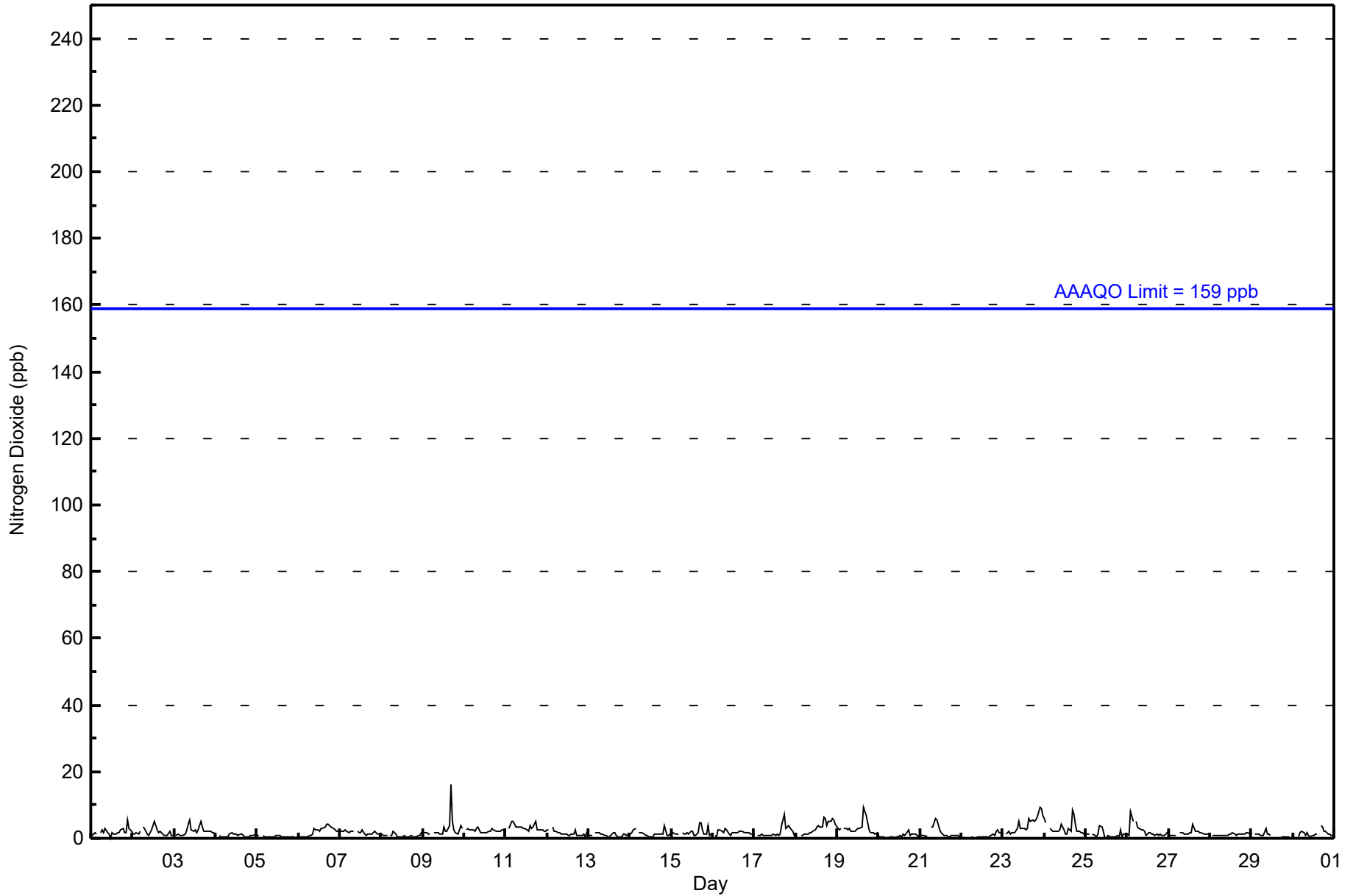
1.5	1.4	1.6	1.6	1.5	1.6	1.7	1.7	2.0	1.9	1.7	1.5	1.7	1.6	1.8	2.2	3.1	2.7	1.9	1.7	1.9	2.1	1.7	1.7	Diurnal Average	
5.9	4.8	8.0	5.1	5.0	4.9	3.5	3.4	4.8	5.8	5.6	2.9	5.2	3.9	4.4	9.5	15.9	7.1	5.0	5.3	6.2	9.3	8.8	6.9	Diurnal Maximum	

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



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

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb**  
**Conklin - November 2023**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Conklin - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	685	100.00	100.00
21 - 40	0	0.00	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Conklin - November 2023**

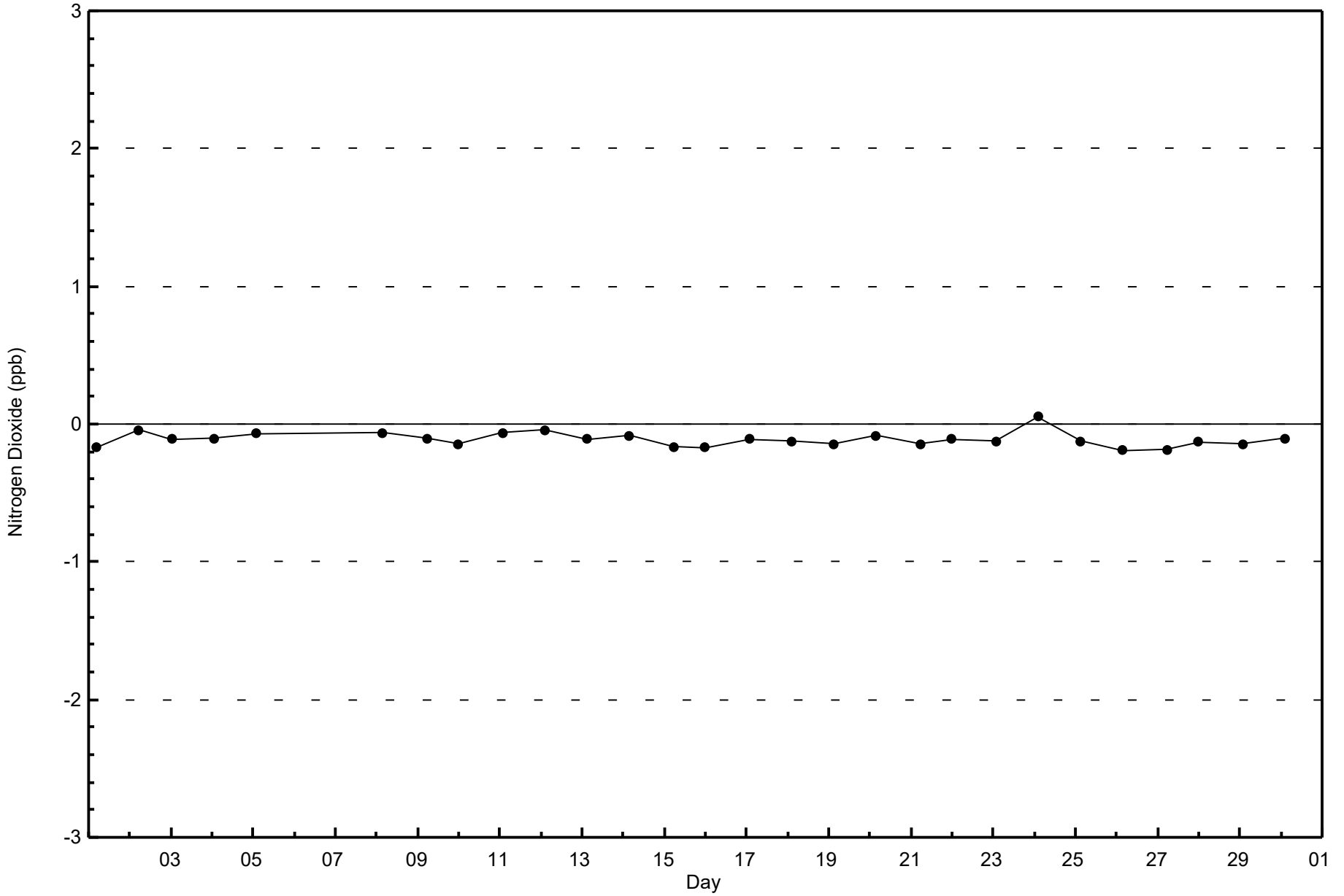
<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 20	31	43	22	23	12	6	15	65	80	60	90	24	56	73	52	33	685
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	31	43	22	23	12	6	15	65	80	60	90	24	56	73	52	33	685

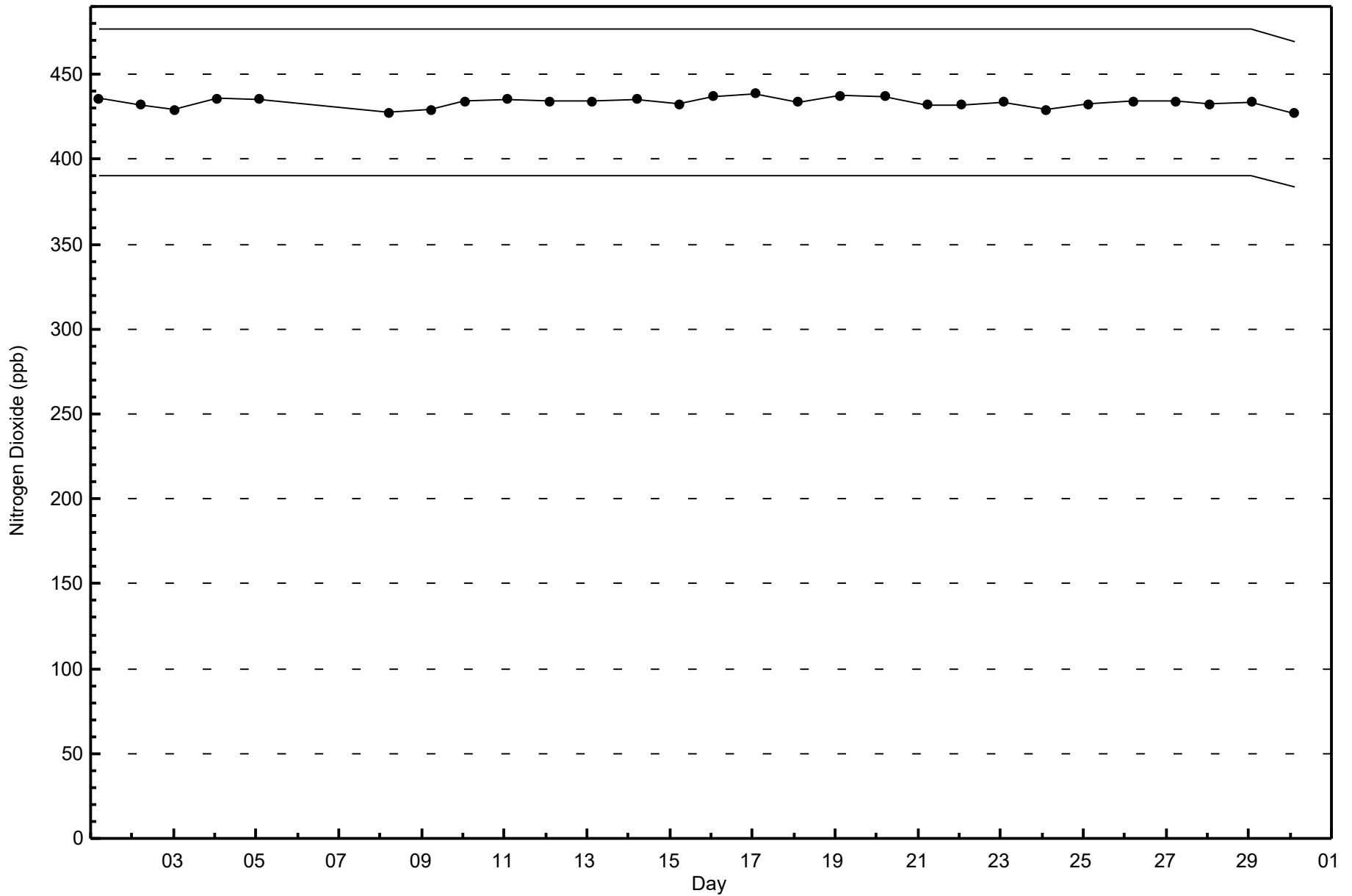
Total Number of Valid Hours: 685

Total Number of Hours: 720











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

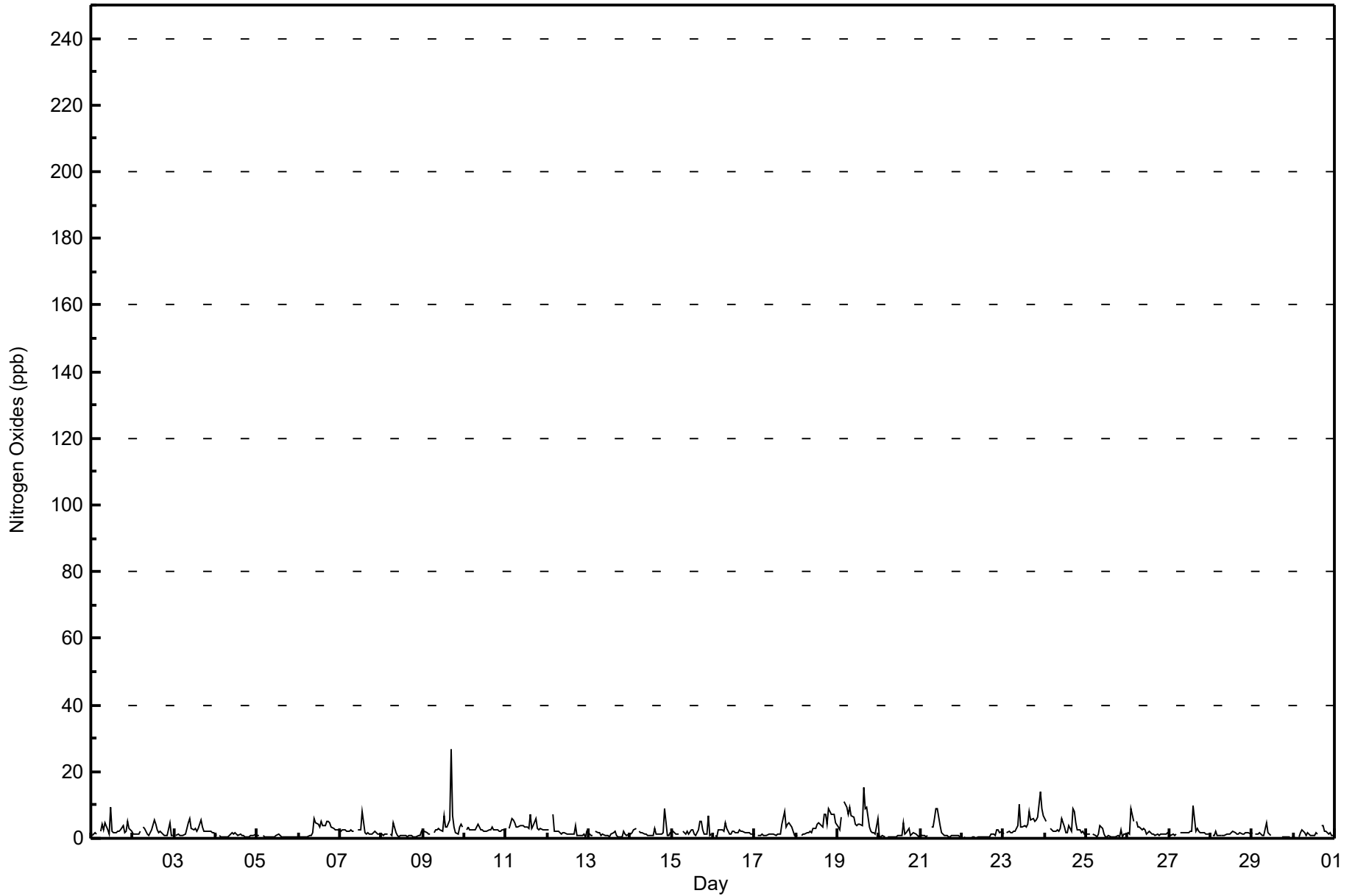
**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Conklin - November 2023**

Maximum Value: 26.5 ppb on Nov 9 17:00		Maximum Daily Average: 5.8 ppb on Nov 19		Hours in Service: 720																							
Minimum Value: 0.1 ppb on Nov 22 05:00		Minimum Daily Average: 0.6 ppb on Nov 5		Hours of Data: 685																							
Maximum Diurnal Average: 3.7 ppb at hour 17		Minimum Diurnal Average: 1.4 ppb at hour 2		Hours of Missing Data: 35																							
Monthly Average: 2.25 ppb		Percentiles: P <sub>1</sub> = 0.2 P <sub>10</sub> = 0.5 Q <sub>1</sub> = 1.0 Median = 1.6 Q <sub>3</sub> = 2.6 P <sub>90</sub> = 4.6 P <sub>99</sub> = 9.5		Hours of Calibration: 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-Nov	0.8	1.3	1.8	1.3	Z	2.0	4.1	2.7	4.6	2.4	1.4	9.5	2.1	1.7	1.7	2.0	2.2	2.7	3.7	1.6	2.0	5.3	3.0	2.2	2.7	9.5	
2-Nov	1.2	1.4	1.5	1.4	2.0	Z	3.5	2.9	1.4	1.0	1.6	2.5	5.6	4.3	2.5	1.9	2.1	1.2	0.8	0.7	0.7	4.6	1.0	1.0	2.0	5.6	
3-Nov	Z	1.0	1.3	1.0	0.8	0.9	1.3	2.8	4.6	5.8	3.0	2.4	3.0	2.0	2.9	5.5	3.2	2.2	2.1	2.1	2.2	2.0	1.6	1.6	2.4	5.8	
4-Nov	1.0	Z	0.8	0.5	0.5	0.5	0.5	0.4	1.1	1.7	1.2	1.6	1.5	0.7	1.2	1.1	0.7	0.6	0.6	0.5	0.7	0.7	0.7	1.1	0.9	1.7	
5-Nov	1.0	0.7	Z	0.8	0.6	0.5	0.5	0.4	0.4	0.4	0.6	0.9	1.2	1.1	0.6	0.4	0.5	0.5	0.4	0.4	0.3	0.3	0.2	0.3	0.6	1.2	
6-Nov	0.4	0.3	0.4	0.5	0.5	0.5	0.8	0.9	1.6	5.8	4.6	4.4	3.3	4.9	3.9	3.9	5.0	5.3	4.6	3.5	3.1	2.6	2.5	2.5	2.7	5.8	
7-Nov	2.3	2.4	2.5	2.6	2.2	2.0	2.4	2.3	2.3	M	2.7	2.5	2.5	8.0	1.5	1.3	1.7	1.3	1.3	1.7	2.3	1.7	1.3	1.2	2.3	8.0	
8-Nov	1.2	1.0	1.2	1.1	Z	1.1	1.0	4.5	1.6	0.7	0.5	0.6	0.7	0.8	0.8	0.6	0.6	0.7	0.5	0.6	0.5	0.7	0.9	2.0	1.0	4.5	
9-Nov	1.7	1.9	1.6	1.2	1.4	Z	1.7	2.3	2.6	3.1	2.5	2.2	6.7	3.6	3.2	5.7	26.5	6.7	3.5	1.8	1.4	3.3	4.0	3.3	4.0	26.5	
10-Nov	Z	2.5	3.4	2.5	2.5	2.7	2.4	3.3	4.4	2.4	2.7	2.0	1.9	2.3	2.6	2.5	3.5	2.6	2.4	2.5	2.3	2.3	2.6	2.5	2.6	4.4	
11-Nov	3.0	Z	3.1	6.0	5.4	4.7	3.5	3.5	3.8	3.9	3.8	3.6	3.2	3.0	7.3	3.2	3.8	6.0	2.8	2.5	2.9	2.5	2.4	2.3	3.7	7.3	
12-Nov	2.5	2.6	Z	7.3	2.3	2.2	2.0	1.7	1.4	1.7	1.5	1.3	1.1	1.1	1.3	1.4	3.7	0.9	1.0	0.9	0.8	1.3	0.6	2.1	1.9	7.3	
13-Nov	1.2	0.9	1.1	Z	2.2	1.9	1.5	1.1	1.5	1.1	0.9	0.6	0.6	1.4	1.9	1.9	0.8	0.6	0.5	0.5	1.9	1.3	0.9	1.4	1.2	2.2	
14-Nov	1.3	1.6	2.6	3.0	Z	2.1	1.8	1.7	1.3	1.1	1.0	0.8	0.8	0.7	3.0	1.3	1.2	1.4	1.4	1.5	9.0	1.0	0.9	1.7	1.8	9.0	
15-Nov	1.6	2.0	1.4	1.2	1.1	Z	2.0	1.5	1.2	2.2	1.2	2.7	2.6	1.1	0.9	2.4	4.9	5.1	2.7	1.4	1.5	6.8	0.7	1.3	2.2	6.8	
16-Nov	Z	0.9	0.4	2.6	2.7	2.5	2.2	4.5	3.1	1.4	1.3	2.3	1.9	1.8	1.6	2.4	2.0	2.1	1.9	1.8	1.7	1.6	1.4	1.4	2.0	4.5	
17-Nov	1.3	Z	1.0	1.0	1.4	0.9	1.0	1.0	1.2	1.1	1.2	1.4	1.0	1.4	1.1	1.2	4.1	8.1	3.4	4.4	4.6	3.4	2.3	1.0	2.1	8.1	
18-Nov	0.9	1.0	Z	1.0	1.1	1.4	1.7	1.5	2.1	1.8	2.9	3.1	4.2	4.6	4.1	3.5	7.0	7.0	4.4	8.9	7.2	7.4	7.3	4.9	3.9	8.9	
19-Nov	3.5	2.6	6.4	Z	10.8	9.3	7.3	9.3	6.8	6.2	4.4	4.0	4.3	4.1	4.0	15.1	8.8	9.5	3.2	2.1	1.7	1.7	1.4	5.8	5.8	15.1	
20-Nov	0.6	0.6	0.7	0.4	Z	0.3	0.2	0.3	0.4	0.3	0.6	0.8	0.9	0.7	4.8	1.2	1.5	3.0	0.9	1.3	1.5	1.2	0.8	0.6	1.0	4.8	
21-Nov	1.3	1.0	0.7	0.4	0.8	Z	3.4	3.3	5.9	8.9	9.1	3.8	1.7	1.4	0.8	0.7	0.5	0.6	0.9	0.9	0.8	0.8	0.7	0.5	2.1	9.1	
22-Nov	Z	0.3	0.1	0.1	0.1	0.2	0.3	0.2	0.2	0.5	0.5	0.3	0.4	0.4	0.4	0.3	0.4	1.1	1.2	0.8	2.4	2.6	1.6	2.2	0.7	2.6	
23-Nov	1.4	Z	1.6	2.3	1.5	1.8	2.1	2.1	3.7	10.2	3.6	3.5	3.7	3.5	4.3	8.3	5.6	5.8	5.2	5.5	6.5	14.1	9.1	7.0	4.9	14.1	
24-Nov	6.0	4.9	Z	3.1	2.4	2.3	2.3	2.2	3.2	5.9	3.4	1.8	1.7	3.9	2.2	8.9	7.9	4.8	2.7	2.6	1.8	2.3	1.3	3.5	3.5	8.9	
25-Nov	1.2	1.3	1.4	Z	1.3	0.9	0.6	1.4	3.8	3.2	1.5	0.2	0.2	0.8	0.5	0.3	0.3	0.3	0.7	0.5	2.6	0.6	1.1	1.4	1.1	3.8	
26-Nov	1.7	1.2	8.8	5.0	Z	4.9	3.5	3.2	2.6	3.1	2.6	1.2	1.9	1.9	1.3	1.3	0.9	1.4	1.0	1.3	1.1	1.1	1.3	1.6	2.3	8.8	
27-Nov	1.4	0.9	1.1	0.9	1.1	Z	1.8	1.7	1.7	1.5	1.5	1.7	1.9	2.0	9.6	2.2	2.8	2.3	1.8	1.7	1.5	1.2	1.2	1.2	1.9	9.6	
28-Nov	Z	1.0	0.8	2.3	1.0	0.9	0.9	0.8	0.9	1.3	1.2	1.4	1.7	2.0	1.6	1.2	1.3	1.5	1.2	1.5	1.5	1.7	1.6	1.3	1.3	2.3	
29-Nov	1.6	Z	1.2	1.2	1.8	1.1	1.0	0.7	4.5	1.6	1.4	0.9	C	C	C	C	C	0.5	0.6	0.5	0.4	0.3	0.1	0.2	1.1	4.5	
30-Nov	0.9	0.2	Z	0.5	1.6	2.4	1.7	0.8	1.6	1.1	0.6	0.8	0.8	1.6	1.4	M	4.0	3.8	2.3	2.3	1.2	1.6	1.0	0.8	1.5	4.0	
		1.6	1.4	1.9	1.9	2.0	2.0	2.2	2.5	2.7	2.3	2.2	2.2	2.2	2.6	2.7	3.7	3.1	2.1	1.9	2.3	2.6	1.9	1.9	Diurnal Average		
		6.0	4.9	8.8	7.3	10.8	9.3	7.3	9.3	6.8	10.2	9.1	9.5	6.7	8.0	9.6	15.1	26.5	9.5	5.2	8.9	9.0	14.1	9.1	7.0	Diurnal Maximum	
Z - zerspan		C - Calibration				M - Maintenance																					



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

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Conklin - November 2023**





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

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Conklin - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	684	99.85	99.85
21 - 40	1	0.15	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Conklin - November 2023**

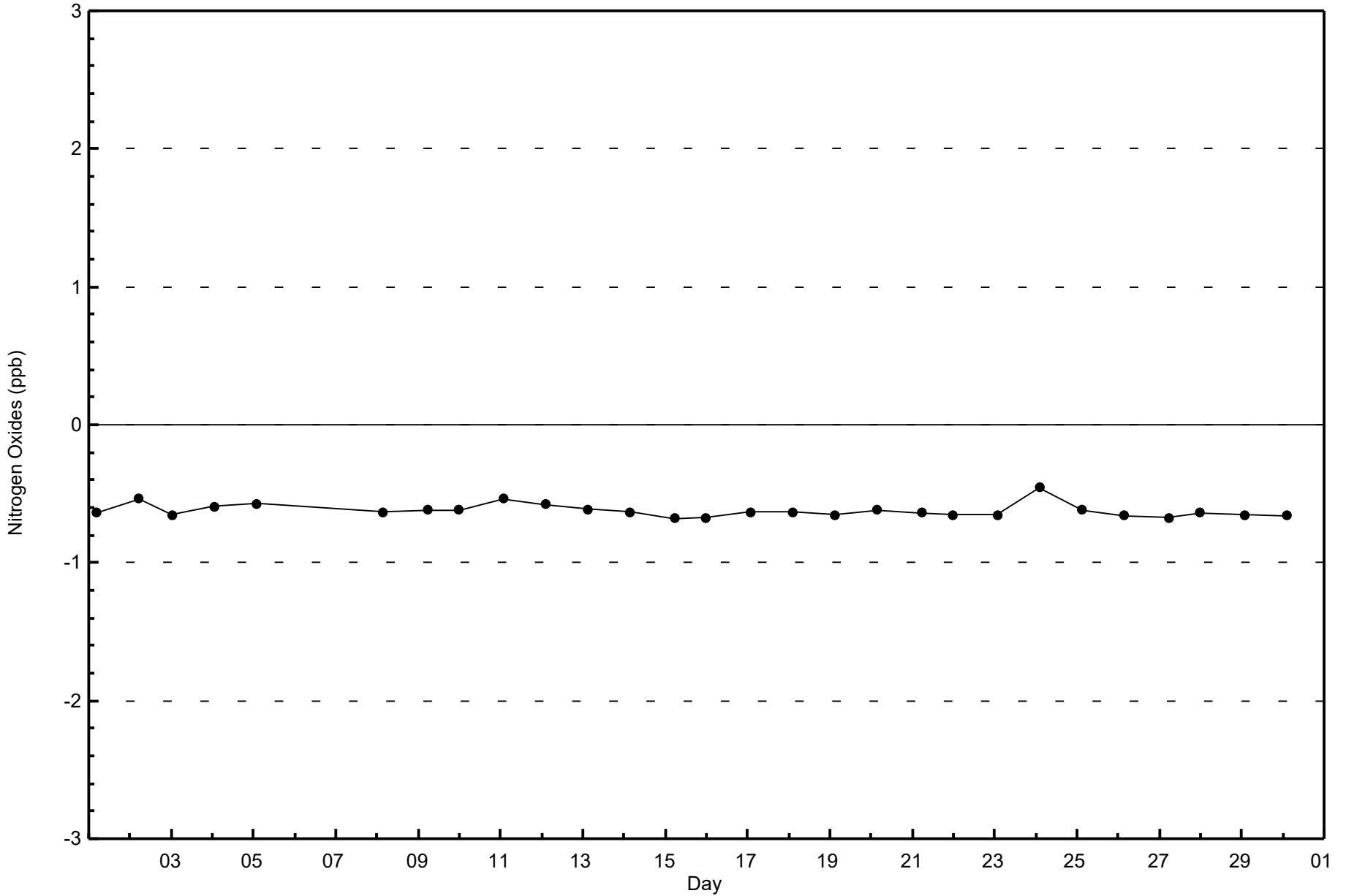
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	31	43	22	23	12	6	15	64	80	60	90	24	56	73	52	33	684
21 - 40	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	31	43	22	23	12	6	15	65	80	60	90	24	56	73	52	33	685

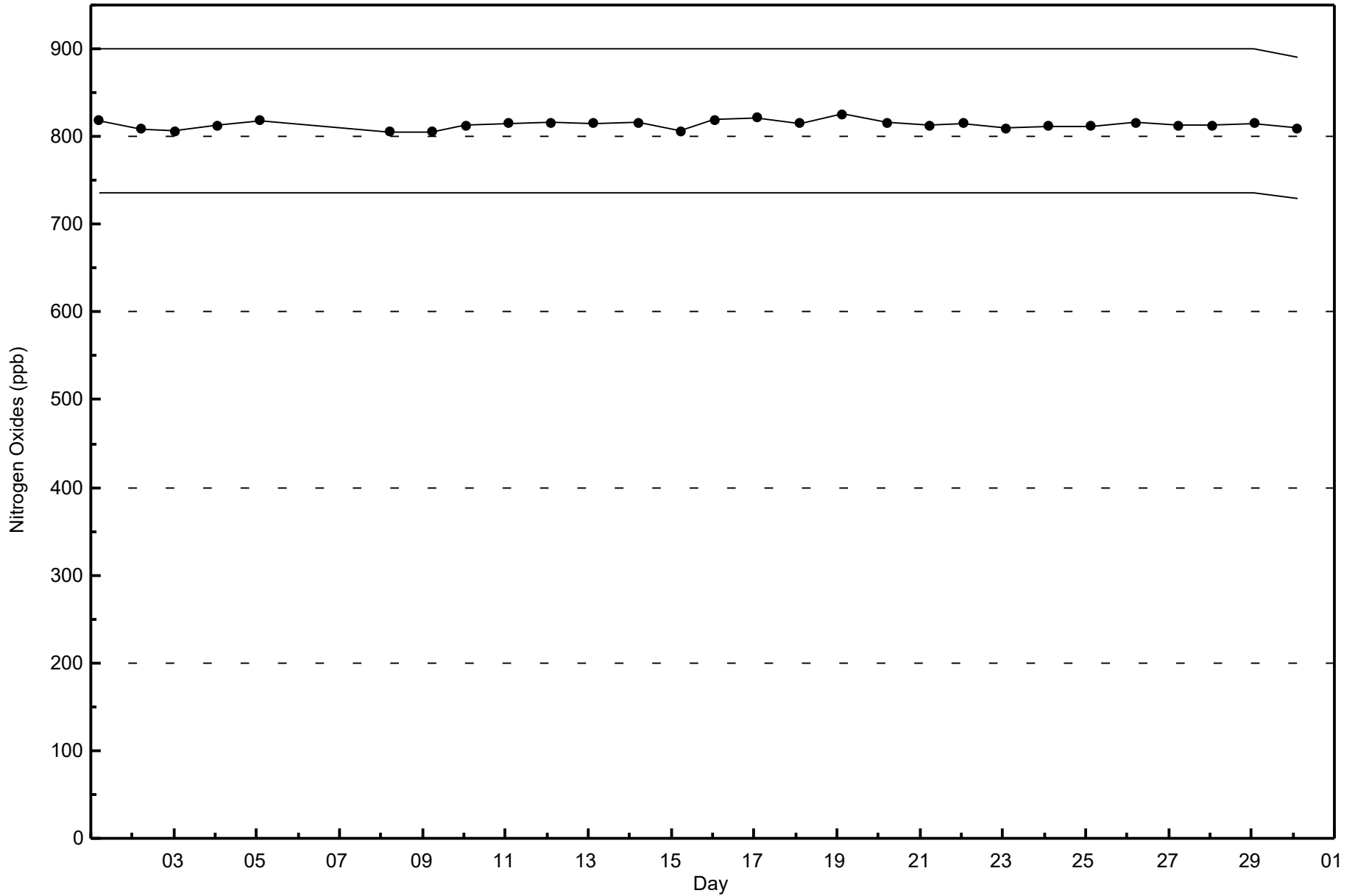
Total Number of Valid Hours: 685

Total Number of Hours: 720











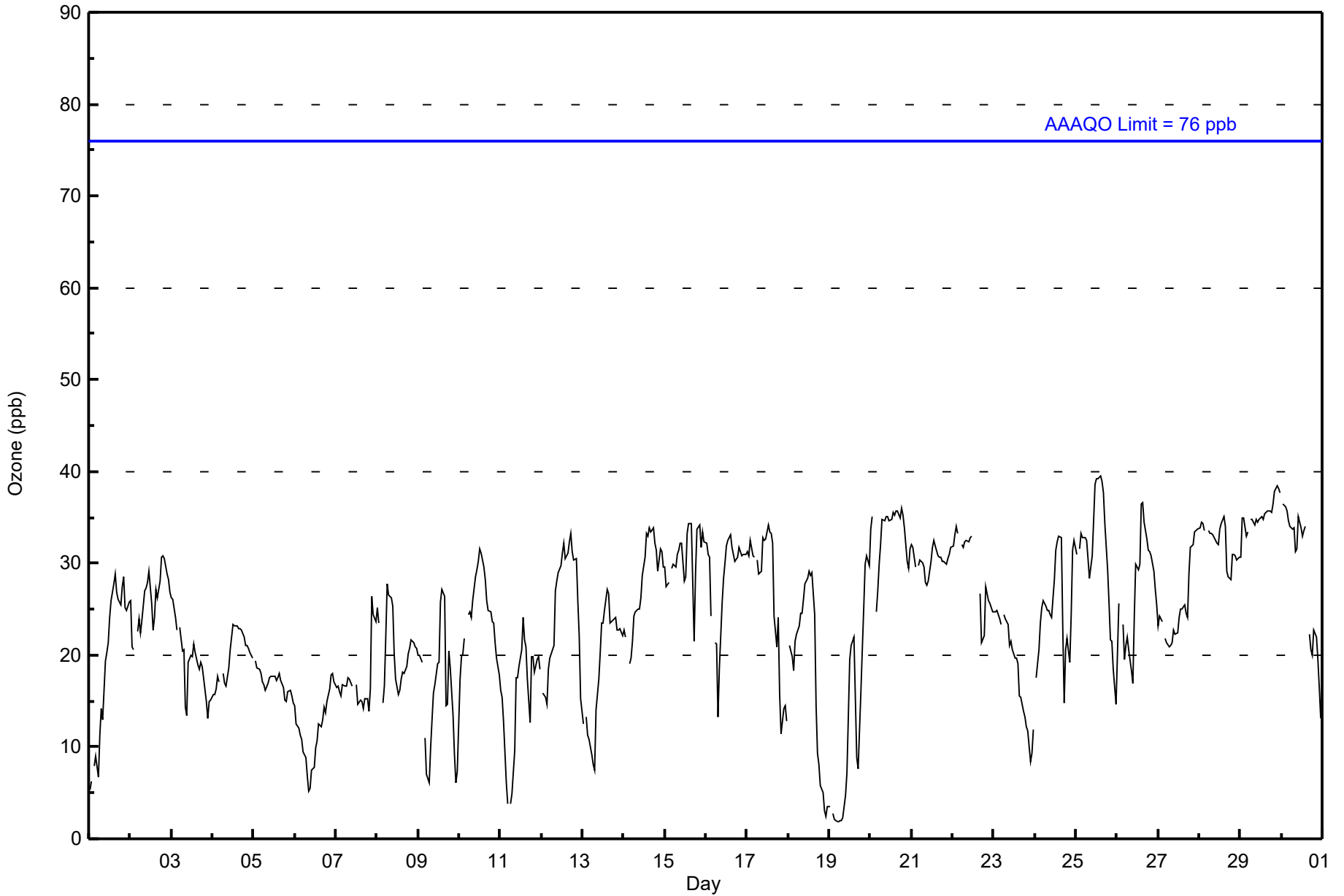
# Wood Buffalo Environmental Association

## Summary of Hour Averages

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

## Conklin - November 2023

Number of Exceedences (AAAQO):		1-hr: 0	24-hr: 0	Hours in Service:																	720					
Maximum Value: 39.5 ppb on Nov 25 15:00		Maximum Daily Average: 35.3 ppb on Nov 29																	Hours of Data:	685						
Minimum Value: 1.9 ppb on Nov 19 06:00		Minimum Daily Average: 11.8 ppb on Nov 6																	Hours of Missing Data:	35						
Maximum Diurnal Average: 27.7 ppb at hour 15		Minimum Diurnal Average: 20.2 ppb at hour 5																	Hours of Calibration:	32						
Monthly Average: 23.72 ppb		Percentiles: P <sub>1</sub> = 2.7 P <sub>10</sub> = 13.0 Q <sub>1</sub> = 17.9 Median = 24.2 Q <sub>3</sub> = 30.8 P <sub>90</sub> = 33.7 P <sub>99</sub> = 37.9																	Percent Operational Time:	99.6						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	5.3	6.2	Z	7.9	9.0	6.7	11.3	14.2	12.9	19.4	20.4	21.4	24.2	26.0	27.7	28.9	26.9	26.1	25.5	27.4	28.6	25.2	24.9	25.8	19.6	28.9
2-Nov	26.0	20.8	20.5	Z	22.6	24.0	22.4	23.7	27.1	27.2	27.9	29.1	25.6	22.7	24.1	27.2	26.2	28.1	30.7	30.8	30.6	28.8	28.3	26.9	26.1	30.8
3-Nov	26.2	26.1	24.2	22.8	Z	23.0	20.4	20.6	14.3	13.4	19.2	20.0	19.8	21.2	20.3	18.9	18.5	19.2	18.7	17.5	15.0	13.2	15.0	15.2	19.2	26.2
4-Nov	15.7	15.8	16.3	17.6	17.2	Z	17.9	16.9	16.6	18.7	20.6	21.9	23.4	23.2	23.1	22.9	22.9	22.8	21.9	21.1	21.0	20.7	20.3	19.7	19.9	23.4
5-Nov	Z	19.4	18.6	18.5	18.0	17.1	16.8	16.2	16.9	17.6	17.8	17.7	17.3	17.5	18.1	17.3	16.5	15.1	15.0	16.1	16.2	15.6	14.9	17.0	19.4	
6-Nov	14.4	12.4	12.1	11.3	10.8	9.5	8.8	6.9	5.2	5.4	7.4	7.8	10.0	10.7	12.5	12.3	13.0	14.3	13.8	14.9	16.3	17.8	18.0	17.1	11.8	18.0
7-Nov	16.5	16.6	16.0	15.6	16.7	16.7	16.6	17.5	17.4	16.6	M	M	16.8	14.6	15.2	15.0	14.1	15.3	15.3	13.9	16.4	26.4	24.4	23.6	17.1	26.4
8-Nov	25.1	23.4	Z	14.8	16.6	22.0	27.8	26.5	26.2	25.4	20.1	17.3	15.8	16.1	17.3	18.2	18.0	18.8	20.1	20.7	21.7	21.3	20.9	20.7	20.6	27.8
9-Nov	20.1	20.0	19.2	Z	11.0	7.0	6.1	9.9	13.0	15.9	16.7	19.1	19.3	25.8	27.1	26.4	14.5	14.6	20.5	18.6	13.4	9.1	6.0	7.3	15.7	27.1
10-Nov	17.3	19.8	20.1	21.8	Z	24.5	24.7	24.2	26.0	28.5	29.2	30.1	31.6	31.1	29.6	28.3	25.9	24.8	24.7	23.7	23.5	21.3	19.7	17.9	24.7	31.6
11-Nov	16.1	15.4	12.9	6.1	3.7	Z	3.9	4.8	9.5	17.5	17.5	18.7	20.6	24.2	21.6	20.9	17.4	12.7	19.8	19.9	18.1	19.6	19.8	18.4	15.6	24.2
12-Nov	Z	15.9	15.4	14.6	18.4	19.7	20.6	21.0	27.0	28.0	29.0	29.7	31.1	32.2	30.6	31.2	32.3	33.2	31.3	30.4	30.5	26.0	22.1	15.2	25.4	33.2
13-Nov	12.5	Z	13.3	11.4	10.8	9.2	8.1	7.5	14.0	17.3	20.2	23.5	23.5	24.9	27.1	26.7	23.5	23.6	24.0	24.0	22.8	22.8	22.9	22.1	19.0	27.1
14-Nov	22.7	21.9	Z	19.1	19.7	21.6	24.2	24.7	25.0	25.0	26.3	28.7	30.6	33.3	33.0	33.9	33.4	33.8	32.1	31.4	29.1	31.6	31.3	29.6	27.9	33.9
15-Nov	29.6	27.4	27.9	Z	29.4	29.9	29.5	31.0	31.4	32.1	32.2	28.0	28.6	33.3	34.3	34.3	27.9	21.6	29.0	33.6	34.1	31.8	33.4	32.3	30.5	34.3
16-Nov	32.2	30.9	30.6	24.2	Z	21.4	21.1	13.3	18.6	25.8	28.4	30.0	31.8	32.5	33.1	31.7	31.0	30.2	30.7	31.8	31.2	30.8	31.0	31.0	28.4	33.1
17-Nov	31.3	30.9	32.5	30.9	30.6	Z	30.3	28.8	29.1	32.8	32.4	32.7	34.2	33.4	33.2	32.1	24.3	21.0	24.1	15.7	11.5	14.3	14.5	12.9	26.7	34.2
18-Nov	Z	21.0	19.8	18.2	21.5	22.3	23.2	24.5	24.6	26.1	27.8	28.4	29.2	28.7	28.9	24.5	14.4	9.3	8.0	5.8	5.0	3.0	2.4	3.5	18.3	29.2
19-Nov	3.6	Z	2.8	2.2	1.9	1.9	1.9	1.9	2.2	4.8	7.2	13.3	19.6	21.0	22.0	15.4	8.8	7.6	16.2	20.7	25.1	29.9	30.8	29.7	12.6	30.8
20-Nov	33.8	35.1	Z	24.8	27.0	29.9	32.0	34.7	34.6	35.0	35.0	34.6	34.7	35.6	35.2	35.6	35.6	34.9	36.0	35.3	33.9	30.3	29.4	31.6	33.2	36.0
21-Nov	32.0	31.7	29.7	Z	29.8	30.4	30.0	29.6	27.9	27.6	28.0	30.2	31.7	32.5	31.9	30.8	30.7	30.7	30.2	30.2	29.9	30.4	31.0	31.7	30.4	32.5
22-Nov	31.9	33.2	34.0	33.3	Z	32.0	31.8	32.4	32.5	32.4	32.8	32.9	C	C	C	C	26.7	21.3	22.1	27.4	26.6	26.0	25.6	24.7	29.4	34.0
23-Nov	24.8	24.7	24.8	23.9	23.3	Z	24.4	24.0	23.4	21.1	21.5	20.6	19.7	19.7	19.1	15.6	15.4	13.8	13.3	12.3	11.7	8.4	9.3	11.9	18.6	24.8
24-Nov	Z	17.6	20.6	23.6	25.1	25.9	25.4	24.8	24.8	24.4	24.1	28.2	31.4	32.4	32.9	32.8	22.9	14.7	20.6	21.9	19.3	24.4	31.4	32.4	25.3	32.9
25-Nov	31.0	Z	31.5	33.3	32.7	32.8	32.5	30.5	28.3	30.8	34.7	38.7	39.2	39.1	39.5	38.9	37.6	34.4	29.3	25.6	21.6	21.5	18.5	14.7	31.2	39.5
26-Nov	20.1	25.7	Z	23.4	19.5	21.0	21.9	20.6	18.2	17.0	24.0	29.8	29.2	29.9	36.4	36.6	34.5	32.7	31.4	31.2	30.7	29.1	27.1	25.5	26.8	36.6
27-Nov	23.2	24.2	23.7	Z	21.8	21.4	20.8	21.0	21.4	22.8	22.3	22.5	24.0	24.9	25.0	25.4	24.6	24.0	28.8	31.7	32.1	33.4	33.5	33.7	25.5	33.7
28-Nov	33.9	34.4	34.3	33.6	Z	33.5	33.2	33.3	33.1	32.5	32.1	32.0	33.7	34.4	35.0	34.0	29.1	28.5	28.2	30.9	30.9	30.8	30.3	30.7	32.3	35.0
29-Nov	30.7	35.0	35.0	32.9	33.4	Z	34.8	34.8	34.2	34.8	34.5	34.7	35.0	34.7	35.4	35.6	35.7	35.6	35.5	36.4	37.8	38.4	38.1	37.7	35.3	38.4
30-Nov	Z	36.5	36.2	35.8	34.6	34.1	33.7	33.8	31.2	31.6	35.1	33.9	33.0	33.6	34.1	M	22.3	20.6	19.9	22.7	22.0	19.6	16.5	13.2	28.8	36.5
																								Diurnal Average		
																								Diurnal Maximum		
Z - zerospan      C - Calibration      M - Maintenance																										
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 76 ppb																										





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

**Ozone (O<sub>3</sub>) - ppb**  
**Conklin - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	233	34.01	34.01
21 - 50	452	65.99	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 (O<sub>3</sub>) - ppb  
Conklin - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	15	19	9	11	0	3	12	45	48	11	25	4	1	7	12	11	233
21 - 50	17	20	11	11	14	3	4	18	32	47	65	19	54	69	45	23	452
51 - 82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 83	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	32	39	20	22	14	6	16	63	80	58	90	23	55	76	57	34	685

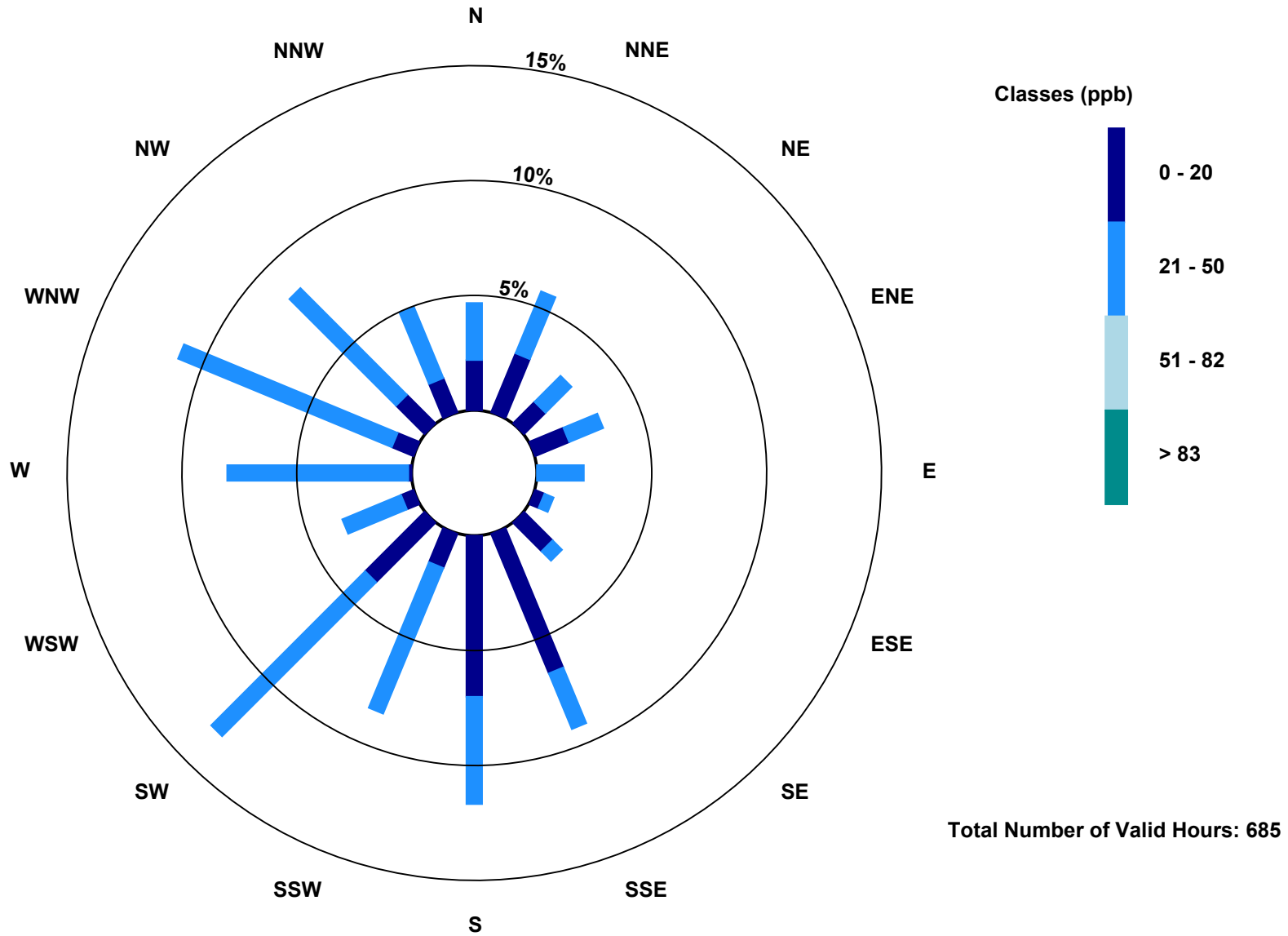
Total Number of Valid Hours: 685

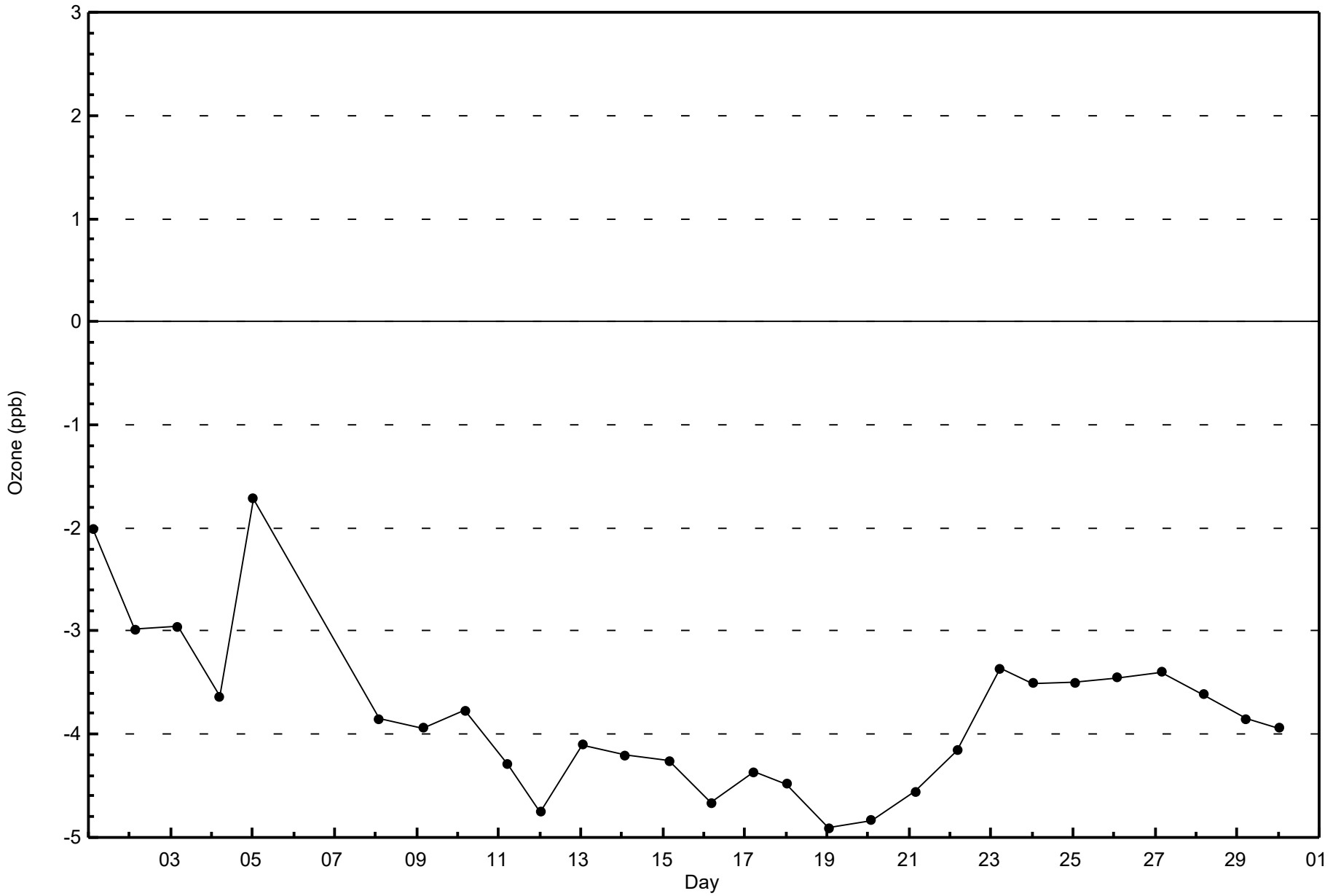
Total Number of Hours: 720



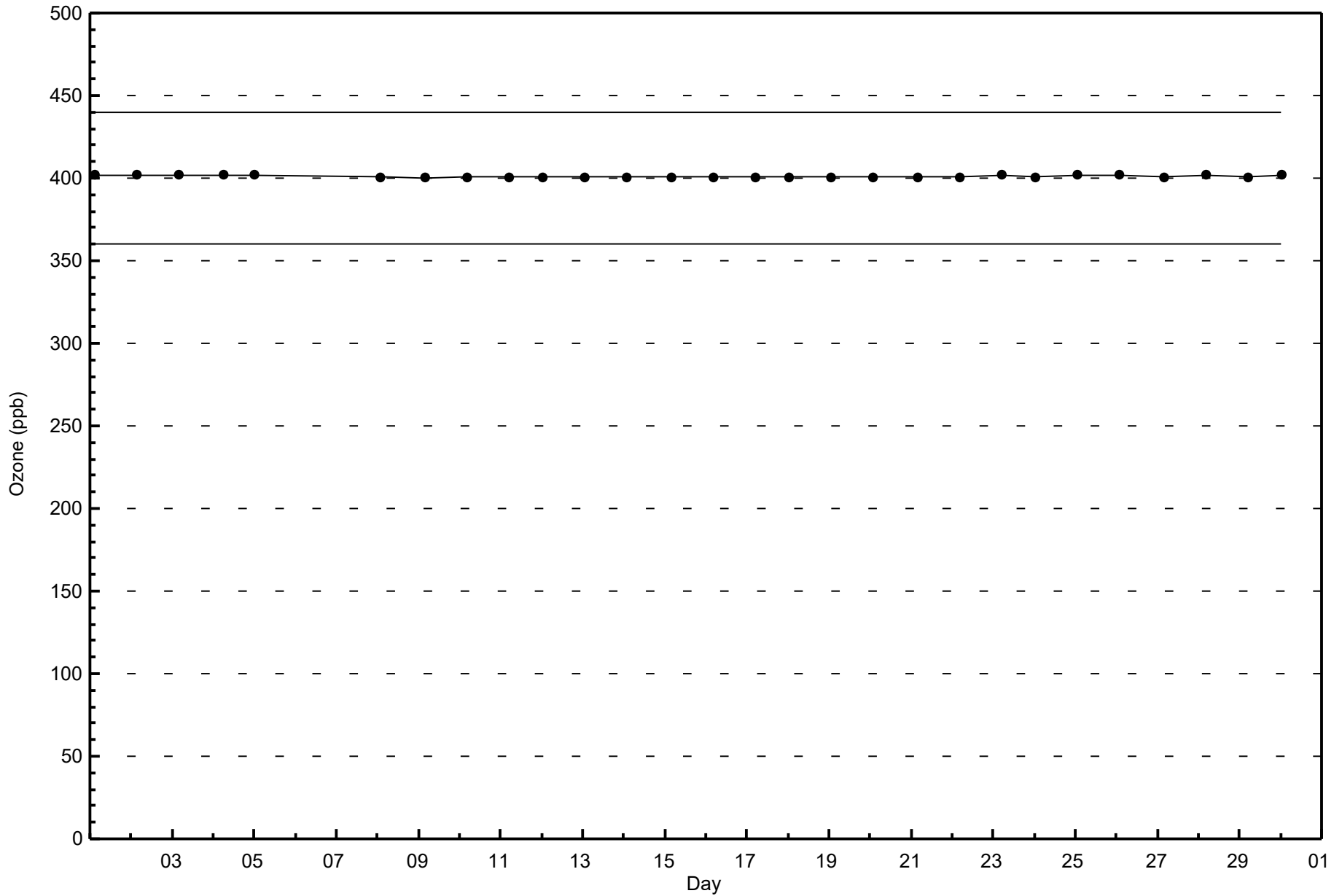
Wood Buffalo Environmental Association  
Wind Rose Nov 2023

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







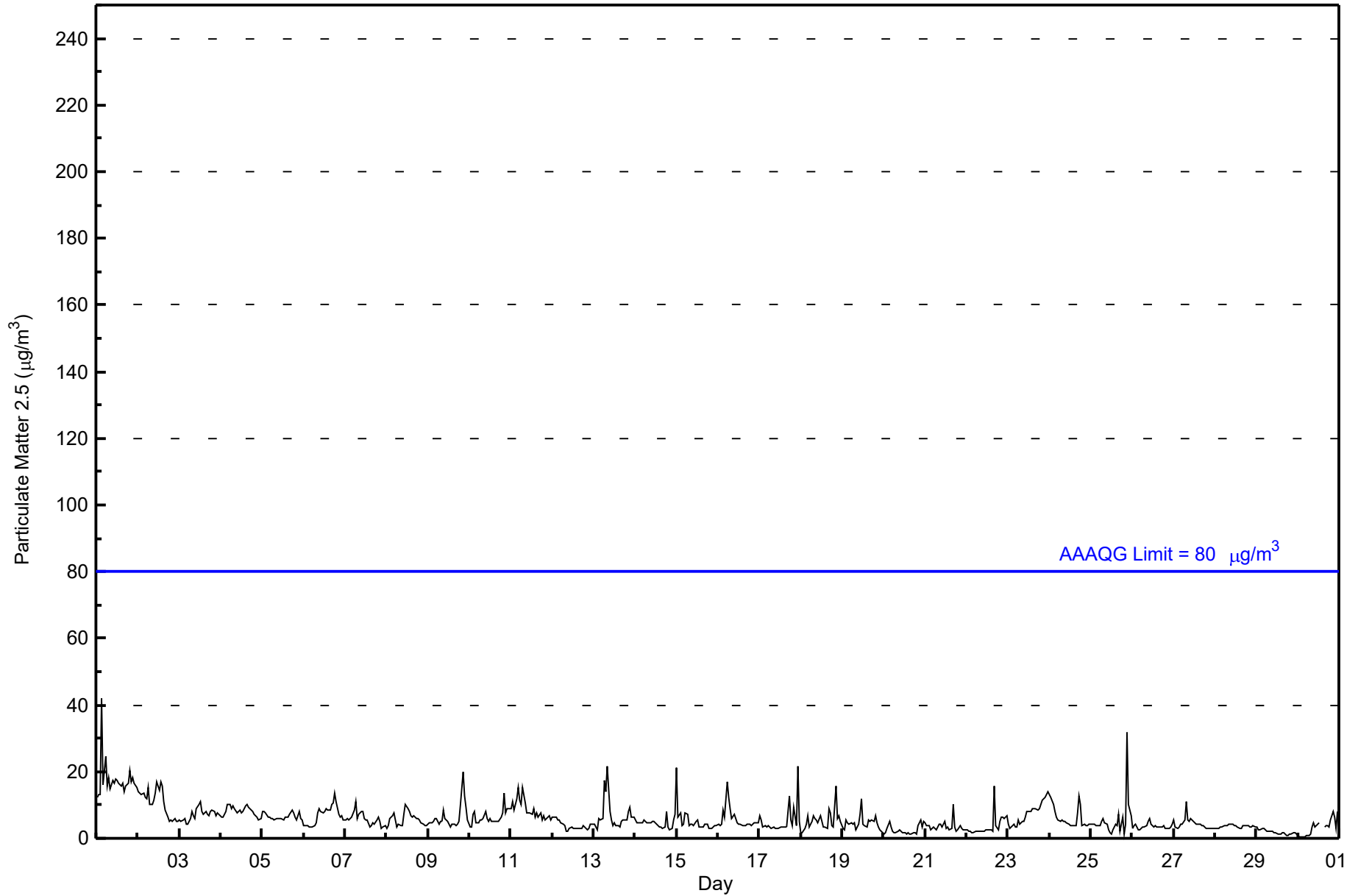




Summary of Hour Averages

Conklin - November 2023

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 42.0 µg/m <sup>3</sup> on Nov 1 04:00 Minimum Value: 0.4 µg/m <sup>3</sup> on Nov 30 03:00 Maximum Diurnal Average: 6.8 µg/m <sup>3</sup> at hour 22 Monthly Average: 5.89 µg/m <sup>3</sup>		Maximum Daily Average: 17.6 µg/m <sup>3</sup> on Nov 1 Minimum Daily Average: 1.9 µg/m <sup>3</sup> on Nov 29 Minimum Diurnal Average: 5.1 µg/m <sup>3</sup> at hour 2 Percentiles: P <sub>1</sub> = 0.9 P <sub>10</sub> = 2.4 Q <sub>1</sub> = 3.5 Median = 4.8 Q <sub>3</sub> = 7.1 P <sub>90</sub> = 10.4 P <sub>99</sub> = 19.8		Hours in Service: 720 Hours of Data: 718 Hours of Missing Data: 2 Hours of Calibration: 2 Percent Operational Time: 100.0																																													
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Nov	12.1	13.0	13.2	42.0	16.3	24.7	15.6	18.1	14.9	17.2	16.4	18.0	17.6	16.4	15.6	16.4	14.2	15.5	16.5	20.4	17.1	18.4	16.4	15.4	17.6	42.0																							
2-Nov	13.9	13.8	13.0	13.4	12.4	11.9	15.2	10.2	10.1	11.3	13.4	16.9	14.4	17.1	15.5	10.9	8.3	6.2	4.9	5.5	5.0	6.1	5.1	5.1	10.8	17.1																							
3-Nov	5.4	5.1	5.4	5.9	4.3	4.4	5.8	7.9	6.8	6.1	8.7	10.1	10.9	8.2	7.1	8.0	7.4	6.9	8.0	8.3	8.2	6.9	7.8	7.3	7.1	10.9																							
4-Nov	6.4	6.4	7.3	7.9	10.1	10.1	9.0	9.7	9.0	7.6	8.2	8.3	7.6	8.2	9.8	10.3	9.5	8.9	8.0	7.2	6.8	6.1	5.6	6.1	8.1	10.3																							
5-Nov	8.2	8.2	7.8	6.3	6.2	6.0	5.8	5.6	5.7	5.8	6.0	6.1	5.7	6.4	6.3	6.6	7.1	8.3	7.7	6.5	5.7	8.3	5.8	5.5	6.6	8.3																							
6-Nov	3.9	3.6	3.8	3.6	3.6	3.5	3.8	4.6	7.7	8.8	7.9	7.7	7.9	8.8	8.5	8.5	10.0	10.7	13.7	11.0	7.1	6.4	6.9	5.7	7.0	13.7																							
7-Nov	5.5	5.8	5.4	5.9	6.4	8.3	10.8	5.9	7.1	7.9	7.9	5.8	5.6	5.4	3.2	4.0	4.6	4.2	5.4	6.3	5.1	3.1	3.5	3.6	5.7	10.8																							
8-Nov	3.1	3.9	5.9	7.0	7.8	5.4	3.2	4.4	3.9	3.8	7.4	10.1	8.8	7.9	7.0	6.5	6.9	6.0	5.8	5.7	4.6	4.1	4.0	4.0	5.7	10.1																							
9-Nov	4.4	4.8	4.5	5.0	5.9	6.0	4.4	5.1	5.1	8.4	5.8	5.2	4.3	3.4	4.2	4.1	3.6	4.3	4.9	9.8	20.0	12.6	9.3	5.7	6.3	20.0																							
10-Nov	3.3	3.4	7.3	8.2	4.5	4.7	5.4	5.5	6.1	8.1	6.0	5.2	5.8	4.9	5.0	4.9	5.0	5.0	6.4	7.7	13.6	7.6	8.9	8.9	6.3	13.6																							
11-Nov	9.1	11.0	8.3	12.0	15.4	11.6	10.1	15.4	10.5	7.5	7.4	7.5	7.2	8.9	6.5	7.5	6.5	7.8	5.6	6.7	5.4	6.2	6.9	5.6	8.6	15.4																							
12-Nov	6.2	6.2	6.1	5.7	5.3	4.5	4.2	3.7	2.1	2.3	3.1	3.2	3.1	3.0	3.0	2.9	2.9	2.9	3.7	3.4	2.7	3.1	4.1	4.1	3.8	6.2																							
13-Nov	4.1	3.4	2.7	5.8	5.7	6.1	17.5	14.1	21.6	8.2	5.5	3.7	4.5	3.9	3.6	3.5	4.9	5.3	5.3	5.5	7.9	9.3	6.5	6.2	6.9	21.6																							
14-Nov	5.7	4.6	4.6	4.9	4.7	5.4	4.9	4.6	4.8	4.8	5.1	5.1	4.4	3.7	3.6	3.2	3.2	3.2	8.2	3.5	2.4	2.8	5.6	7.2	4.6	8.2																							
15-Nov	21.3	6.2	7.6	4.0	4.2	7.5	7.4	3.9	4.4	4.1	3.8	5.2	5.6	3.5	3.5	3.5	4.4	4.1	4.0	3.1	2.9	3.2	3.8	3.9	5.2	21.3																							
16-Nov	4.1	3.9	4.2	8.3	6.4	16.9	12.4	8.9	5.8	7.0	5.7	4.7	4.3	4.1	3.9	4.0	3.9	4.4	4.0	4.0	4.3	4.6	4.6	4.5	5.8	16.9																							
17-Nov	6.8	5.6	3.3	3.7	3.5	3.9	3.5	3.1	3.2	2.9	2.9	3.2	3.3	3.6	3.4	3.2	3.6	12.6	5.3	3.7	9.4	3.6	21.6	5.2	5.2	21.6																							
18-Nov	1.6	1.6	3.1	4.1	6.6	3.2	5.1	6.8	6.1	5.4	4.6	6.9	5.1	3.5	3.6	3.0	8.9	7.6	3.9	3.6	15.6	6.1	6.8	5.2	5.3	15.6																							
19-Nov	2.8	2.6	5.5	4.7	4.4	4.8	4.4	4.8	2.4	4.1	7.1	11.7	4.4	3.8	3.6	5.6	4.9	5.6	5.2	6.9	4.9	3.5	2.4	1.5	4.7	11.7																							
20-Nov	1.2	1.5	3.0	5.0	3.3	2.0	1.7	1.6	2.1	2.5	2.1	1.6	1.5	1.4	1.5	1.4	1.4	1.7	1.5	1.4	3.7	5.7	3.6	5.0	2.4	5.7																							
21-Nov	4.5	4.0	3.8	2.4	2.9	3.3	2.6	3.3	4.2	4.2	3.3	4.9	3.0	3.2	2.5	3.0	10.1	3.3	2.2	2.7	3.9	2.9	2.4	2.6	3.6	10.1																							
22-Nov	2.5	2.1	2.0	1.8	1.7	2.3	2.0	2.0	2.1	2.1	2.2	2.4	2.5	2.4	2.4	2.3	15.6	3.6	2.6	5.0	6.2	6.4	5.8	6.9	3.6	15.6																							
23-Nov	4.1	2.8	3.6	4.3	3.4	3.4	5.3	4.1	5.2	5.0	6.5	7.8	8.1	7.9	8.7	8.8	9.0	8.4	9.0	10.0	11.4	12.5	13.2	13.8	7.4	13.8																							
24-Nov	13.3	12.4	10.3	7.9	6.5	5.3	5.2	5.3	5.2	5.0	4.8	4.3	3.8	3.7	3.7	3.6	7.6	12.6	10.1	3.9	4.3	4.0	4.0	4.2	6.3	13.3																							
25-Nov	4.2	4.1	4.1	3.9	3.7	4.0	5.1	5.8	4.5	4.2	2.7	1.9	1.4	2.4	4.3	3.7	7.4	2.3	6.4	1.5	4.4	31.9	10.4	6.9	5.5	31.9																							
26-Nov	3.1	4.0	4.4	2.4	2.7	3.0	3.2	3.4	3.8	5.1	6.0	4.0	3.5	3.7	3.4	3.2	3.3	3.6	3.7	2.9	2.9	3.1	3.3	4.3	3.6	6.0																							
27-Nov	5.4	3.5	3.0	3.5	4.2	4.4	5.3	10.8	5.4	5.3	6.1	5.0	4.6	4.4	4.1	4.1	4.0	3.9	3.4	2.9	2.9	3.0	3.1	3.1	4.4	10.8																							
28-Nov	2.9	2.9	3.0	3.2	3.5	3.6	3.8	3.9	4.0	4.1	4.0	3.9	3.6	3.3	3.2	3.2	3.7	3.8	3.7	3.6	3.6	3.5	3.7	3.5	3.6	4.1																							
29-Nov	3.2	2.7	2.4	2.8	2.9	2.5	2.3	2.2	2.2	2.3	1.7	1.6	1.3	1.4	1.5	1.7	1.8	0.9	0.8	1.2	1.3	1.9	1.8	1.4	1.9	3.2																							
30-Nov	0.7	0.5	0.4	0.6	0.5	0.7	0.7	1.4	3.4	4.5	3.6	4.4	4.8	C	C	3.2	3.9	4.0	3.2	5.6	8.0	6.5	2.9	8.1	3.3	8.1																							
																								5.8	5.1	5.3	6.5	5.6	6.1	6.2	6.2	6.0	5.8	5.9	6.2	5.6	5.5	5.2	5.2	6.3	5.9	5.8	5.7	6.7	6.8	6.3	5.7	Diurnal Average	
																								21.3	13.8	13.2	42.0	16.3	24.7	17.5	18.1	21.6	17.2	16.4	18.0	17.6	17.1	15.6	16.4	15.6	15.5	16.5	20.4	20.0	31.9	21.6	15.4	Diurnal Maximum	
C - Calibration																																																	
Alberta Ambient Air Quality Guideline/Objectives: 1-hr 80 µg/m <sup>3</sup> 24-hr 29 µg/m <sup>3</sup>																																																	





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

**Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$**   
**Conklin - November 2023**

<b>Concentration Ranges (<math>\mu\text{g}/\text{m}^3</math>)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	428	59.61	59.61
6 - 15	260	36.21	95.82
16 - 25	28	3.90	99.72
26 - 80	2	0.28	100.00
> 81.0	0	0.00	100.00

Total Number of Valid Hours: 718

Total Number of Hours: 720



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

**Particulate Matter 2.5 (PM<sub>2.5</sub>) - μg/m<sup>3</sup>**  
**Conklin - November 2023**

Concentration Ranges (μg/m <sup>3</sup> )	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	20	17	13	8	7	4	9	26	33	24	59	23	57	72	38	18	428
6 - 15	13	23	10	14	7	2	7	39	44	29	31	1	2	5	20	13	260
16 - 25	0	3	0	1	0	0	0	2	8	6	5	0	0	0	0	3	28
26 - 80	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	2
> 81.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	<b>33</b>	<b>43</b>	<b>23</b>	<b>23</b>	<b>14</b>	<b>6</b>	<b>16</b>	<b>67</b>	<b>86</b>	<b>60</b>	<b>95</b>	<b>24</b>	<b>59</b>	<b>77</b>	<b>58</b>	<b>34</b>	<b>718</b>

Total Number of Valid Hours: 718

Total Number of Hours: 720





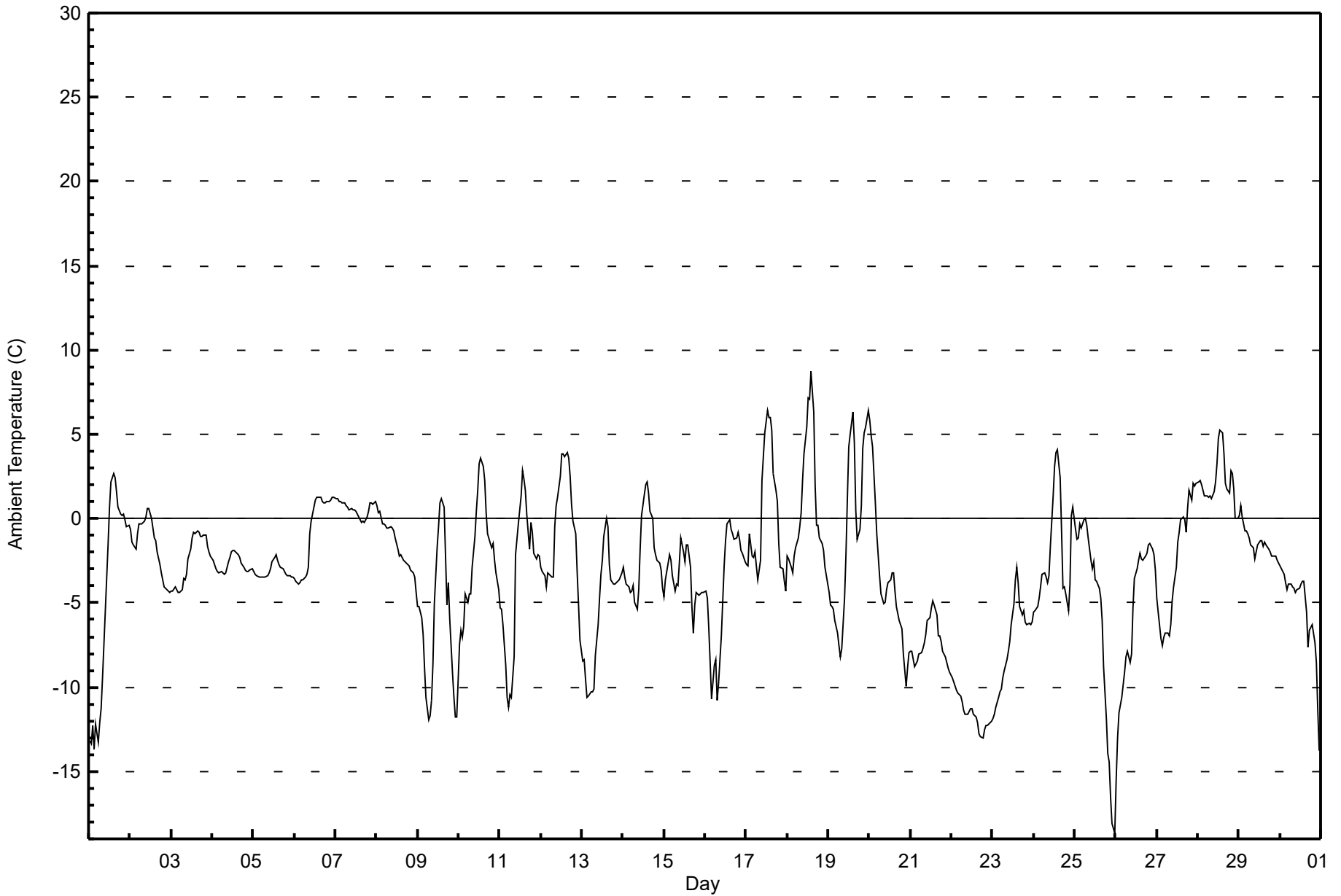
**Wood Buffalo Environmental Association**

**Summary of Hour Averages**

**Ambient Temperature (AT) - C**

**Conklin - November 2023**

Maximum Value: 8.7 C on Nov 18 15:00      Maximum Daily Average: 2.2 C on Nov 28																				Hours in Service: 720 Hours of Data: 720						
Minimum Value: -18.7 C on Nov 26 00:00      Minimum Daily Average: -11.5 C on Nov 22 Maximum Diurnal Average: 0.1 C at hour 15      Minimum Diurnal Average: -5.1 C at hour 8 Monthly Average: -3.17 C      Percentiles: P <sub>1</sub> = -13.6 P <sub>10</sub> = -9.5 Q <sub>1</sub> = -5.2 Median = -2.9 Q <sub>3</sub> = -0.4 P <sub>90</sub> = 1.6 P <sub>99</sub> = 6.0																				Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	-13.2	-13.4	-12.3	-13.7	-12.2	-13.3	-12.1	-11.3	-9.5	-5.5	-3.5	-1.5	0.6	2.2	2.6	2.5	1.6	0.7	0.3	0.2	0.3	-0.1	-0.5	-0.4	-4.6	2.6
2-Nov	-0.6	-1.4	-1.6	-1.8	-0.9	-0.3	-0.3	-0.3	-0.2	0.1	0.6	0.6	0.0	-0.6	-1.1	-1.3	-2.0	-2.7	-3.2	-3.7	-4.0	-4.2	-4.3	-4.3	-1.6	0.6
3-Nov	-4.3	-4.3	-4.1	-4.2	-4.4	-4.4	-4.2	-3.6	-3.6	-3.3	-2.4	-1.8	-1.1	-0.8	-0.9	-0.7	-0.8	-1.1	-1.1	-1.0	-1.0	-1.7	-2.0	-2.2	-2.5	-0.7
4-Nov	-2.5	-2.7	-2.9	-3.2	-3.2	-3.1	-3.2	-3.3	-3.2	-2.6	-2.3	-2.0	-1.9	-1.9	-2.0	-2.2	-2.3	-2.6	-2.9	-3.0	-3.1	-3.1	-3.0	-3.0	-2.7	-1.9
5-Nov	-3.1	-3.3	-3.4	-3.5	-3.5	-3.5	-3.5	-3.5	-3.4	-3.3	-3.0	-2.6	-2.3	-2.1	-2.5	-2.7	-2.9	-3.0	-3.2	-3.3	-3.4	-3.4	-3.5	-3.5	-3.1	-2.1
6-Nov	-3.6	-3.7	-3.9	-3.8	-3.6	-3.7	-3.4	-3.3	-2.9	-0.9	-0.1	0.7	1.1	1.3	1.3	1.2	1.1	0.9	0.9	1.0	1.0	1.1	1.3	1.3	-0.8	1.3
7-Nov	1.2	1.1	1.0	1.0	0.9	0.9	0.8	0.7	0.5	0.6	0.5	0.5	0.4	0.3	-0.1	-0.2	-0.1	-0.2	0.1	0.4	1.0	0.9	0.9	1.0	0.6	1.2
8-Nov	0.7	0.3	0.4	-0.3	-0.3	-0.4	-0.6	-0.5	-0.5	-0.5	-0.7	-1.1	-1.8	-2.2	-2.2	-2.3	-2.5	-2.7	-2.7	-2.8	-3.1	-3.2	-3.4	-4.4	-1.5	0.7
9-Nov	-5.2	-5.2	-5.8	-6.9	-8.8	-10.6	-11.9	-11.7	-10.8	-8.6	-5.1	-1.8	-0.5	1.0	1.2	0.7	-2.2	-5.2	-3.8	-5.9	-9.2	-10.7	-11.8	-11.8	-6.3	1.2
10-Nov	-7.4	-6.6	-7.1	-6.4	-4.5	-5.0	-4.4	-4.4	-2.9	-1.1	0.4	1.7	3.3	3.6	3.1	2.3	0.3	-0.9	-1.5	-1.7	-1.5	-2.5	-3.2	-4.2	-2.1	3.6
11-Nov	-5.3	-5.4	-6.3	-8.7	-10.6	-11.2	-10.4	-10.6	-8.2	-2.1	-1.2	-0.3	1.3	2.9	2.3	1.7	0.3	-1.8	-0.3	-0.8	-2.1	-2.4	-2.2	-2.2	-3.5	2.9
12-Nov	-2.9	-3.1	-3.4	-4.0	-3.2	-3.3	-3.5	-3.5	-0.5	0.8	1.3	2.5	3.8	3.8	3.7	3.9	3.6	2.5	0.9	-0.2	-0.9	-3.1	-5.1	-7.2	-0.7	3.9
13-Nov	-8.5	-8.4	-9.5	-10.6	-10.5	-10.3	-10.3	-10.1	-8.1	-6.3	-4.7	-3.3	-2.5	-1.0	0.0	-0.5	-2.7	-3.6	-3.9	-3.9	-3.8	-3.8	-3.6	-3.2	-5.5	0.0
14-Nov	-2.9	-3.5	-3.9	-4.1	-4.4	-4.3	-4.0	-4.9	-5.4	-4.2	-1.8	0.2	1.5	2.0	2.2	1.5	0.4	0.0	-1.7	-2.1	-2.4	-2.7	-3.1	-4.1	-2.2	2.2
15-Nov	-4.7	-3.7	-2.6	-2.2	-2.5	-3.3	-4.3	-3.9	-4.0	-2.6	-1.1	-2.0	-2.5	-1.6	-1.5	-2.9	-5.3	-6.8	-5.2	-4.4	-4.5	-4.5	-4.4	-4.4	-3.5	-1.1
16-Nov	-4.3	-4.7	-6.5	-8.5	-10.7	-8.7	-8.4	-10.8	-9.8	-7.0	-4.8	-2.8	-1.3	-0.3	0.0	-0.7	-0.9	-1.3	-1.1	-0.8	-1.2	-1.9	-2.1	-2.5	-4.2	0.0
17-Nov	-2.7	-2.8	-0.9	-2.3	-2.3	-2.0	-2.8	-3.6	-2.5	2.3	3.6	5.0	6.4	6.0	6.0	5.2	2.6	1.7	1.0	-1.4	-2.9	-3.0	-3.7	-4.3	0.1	6.4
18-Nov	-2.2	-2.4	-2.9	-3.3	-2.2	-1.7	-1.1	-0.4	0.4	2.3	3.8	5.4	7.2	7.1	8.7	6.3	1.9	-0.4	-0.4	-1.2	-1.4	-1.9	-2.9	-3.4	0.6	8.7
19-Nov	-4.4	-5.1	-5.2	-5.4	-6.0	-6.8	-7.6	-8.2	-7.7	-4.7	-2.1	1.2	4.2	5.0	6.4	4.5	0.5	-1.3	-0.7	0.7	4.1	5.1	5.4	6.4	-0.9	6.4
20-Nov	5.9	5.0	4.3	0.9	-0.9	-2.2	-3.4	-4.4	-5.1	-4.9	-4.2	-3.8	-3.6	-3.2	-3.2	-4.3	-5.3	-6.0	-6.3	-6.5	-8.0	-10.0	-8.9	-8.0	-3.6	5.9
21-Nov	-7.9	-7.8	-8.8	-8.6	-8.4	-8.1	-7.9	-7.7	-7.4	-6.9	-6.1	-5.8	-5.3	-4.9	-5.1	-5.8	-7.0	-7.0	-7.3	-7.9	-8.2	-8.6	-8.9	-9.1	-7.3	-4.9
22-Nov	-9.4	-9.7	-10.0	-10.2	-10.3	-10.5	-10.9	-11.4	-11.6	-11.6	-11.4	-11.3	-11.3	-11.6	-11.8	-12.1	-12.8	-12.9	-13.0	-12.5	-12.2	-12.3	-12.2	-12.0	-11.5	-9.4
23-Nov	-11.8	-11.6	-11.2	-10.6	-10.3	-10.1	-9.5	-9.0	-8.3	-7.9	-7.3	-6.3	-5.0	-3.6	-2.9	-3.8	-5.2	-5.7	-5.5	-6.1	-6.3	-6.2	-6.3	-6.1	-7.4	-2.9
24-Nov	-5.5	-5.5	-5.2	-4.7	-4.1	-3.3	-3.2	-3.5	-3.8	-3.4	-1.6	1.3	3.1	3.9	4.1	2.4	-0.7	-4.1	-4.1	-4.4	-5.4	-3.9	0.2	0.7	-2.1	4.1
25-Nov	-0.6	-1.2	-1.1	-0.3	-0.6	-0.1	0.0	-0.4	-1.2	-2.5	-2.9	-2.5	-3.6	-3.7	-4.1	-4.7	-6.1	-8.7	-11.9	-13.9	-14.4	-16.5	-18.1	-18.7	-5.7	0.0
26-Nov	-15.5	-13.1	-11.5	-10.6	-9.8	-9.2	-8.2	-7.8	-8.5	-8.1	-5.3	-3.5	-3.0	-2.5	-2.1	-2.4	-2.5	-2.2	-2.1	-1.6	-1.5	-1.8	-2.2	-3.1	-5.7	-1.5
27-Nov	-4.7	-5.5	-7.1	-7.5	-7.0	-6.8	-6.8	-6.9	-6.3	-4.9	-4.1	-2.8	-1.4	-0.8	-0.1	0.1	-0.1	-0.8	0.6	1.7	1.1	2.1	1.9	2.1	-2.7	2.1
28-Nov	2.2	2.3	2.0	1.7	1.3	1.4	1.3	1.3	1.2	1.6	2.2	3.2	4.7	5.2	5.1	3.9	2.1	1.7	1.5	2.9	2.7	1.8	0.1	0.0	2.2	5.2
29-Nov	0.2	0.8	0.1	-0.7	-0.7	-0.9	-1.2	-1.6	-1.7	-2.4	-2.0	-1.5	-1.3	-1.3	-1.6	-1.4	-1.6	-1.8	-2.0	-2.2	-2.2	-2.3	-2.5	-2.6	-1.4	0.8
30-Nov	-2.8	-3.0	-3.3	-3.8	-4.2	-3.9	-3.8	-4.1	-4.1	-4.3	-4.2	-4.1	-3.9	-3.7	-3.7	-5.6	-7.6	-6.6	-6.5	-6.3	-7.4	-8.5	-11.3	-13.8	-5.4	-2.8
																								Diurnal Average		
																								Diurnal Maximum		







**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C  
Conklin - November 2023**

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	0	0.00	0.00
-20 - 0	566	78.61	78.61
0 - 10	154	21.39	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



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

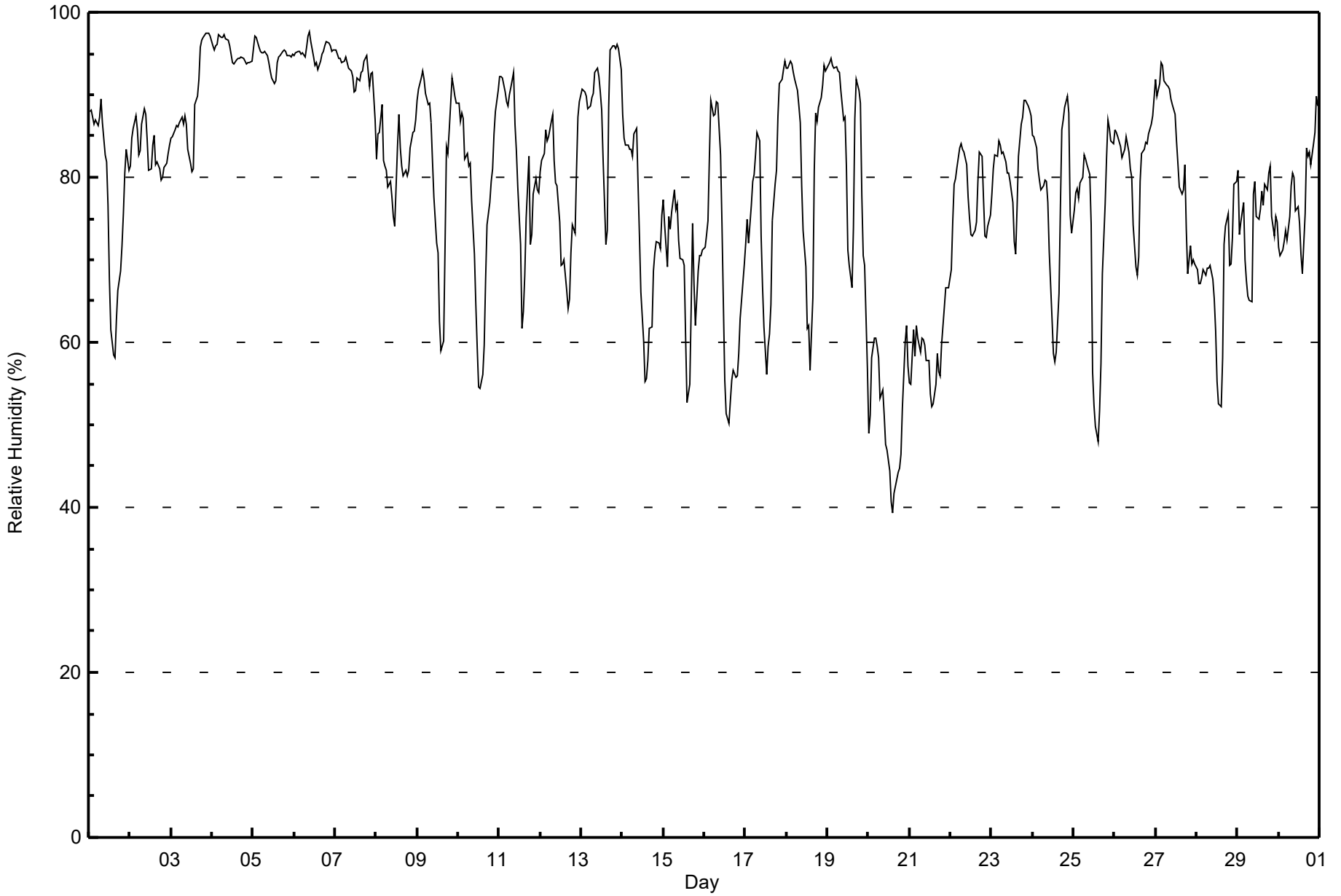
**Relative Humidity (RH) - %**  
**Conklin - November 2023**

Maximum Value: 97.7 % on Nov 6 10:00      Maximum Daily Average: 95.3 % on Nov 6																						Hours in Service: 720 Hours of Data: 720																											
Minimum Value: 39.4 % on Nov 20 15:00      Minimum Daily Average: 51.1 % on Nov 20 Maximum Diurnal Average: 83.9 % at hour 4      Minimum Diurnal Average: 68.1 % at hour 15 Monthly Average: 79.29 %      Percentiles: P <sub>1</sub> = 46.6 P <sub>10</sub> = 59.6 Q <sub>1</sub> = 71.4 Median = 81.5 Q <sub>3</sub> = 89.3 P <sub>90</sub> = 94.3 P <sub>99</sub> = 97.1																						Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0																											
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Nov	87.9	88.1	87.4	86.4	86.9	86.2	87.3	89.4	86.7	82.7	81.8	76.5	67.6	61.6	58.5	58.2	62.8	66.3	68.7	71.8	75.7	80.5	83.5	80.8	77.6	89.4																							
2-Nov	81.3	84.7	85.9	87.4	85.7	82.7	83.3	86.4	88.2	87.6	84.6	80.9	81.0	83.8	85.1	81.5	81.8	81.1	79.6	80.0	81.2	81.6	82.8	83.9	83.4	88.2																							
3-Nov	84.7	84.9	85.8	86.3	86.1	86.6	87.3	86.5	87.4	86.4	83.4	81.7	80.6	81.1	88.9	89.9	91.8	95.7	96.5	97.0	97.5	97.5	97.4	97.1	89.1	97.5																							
4-Nov	95.9	95.5	95.9	96.1	97.2	96.9	97.0	97.2	96.7	96.5	96.0	94.9	93.8	93.8	94.2	94.4	94.3	94.5	94.4	94.0	93.7	93.9	93.9	94.2	95.2	97.2																							
5-Nov	95.6	97.1	96.9	95.7	95.2	95.2	95.2	95.2	94.7	93.9	92.9	92.1	91.3	91.7	93.9	94.5	94.8	95.3	95.5	95.2	94.8	94.7	94.6	94.9	94.6	97.1																							
6-Nov	94.8	95.2	95.2	95.2	94.9	95.1	94.6	95.8	97.1	97.7	96.4	94.5	93.6	93.9	93.1	94.0	94.9	95.2	96.0	96.5	96.3	96.0	95.2	95.4	95.3	97.7																							
7-Nov	95.5	94.9	94.4	94.4	93.9	94.1	94.5	93.9	93.2	92.8	92.3	90.3	90.5	92.1	91.6	92.7	92.9	94.2	94.8	92.9	91.0	92.5	92.7	87.0	92.9	95.5																							
8-Nov	82.3	85.2	85.4	88.8	82.0	81.3	80.9	78.8	79.4	77.7	75.3	74.1	83.8	87.6	83.6	81.3	80.2	80.9	80.2	80.8	83.5	85.4	85.6	86.9	82.1	88.8																							
9-Nov	89.3	90.6	92.1	92.8	91.9	90.2	88.8	89.1	86.6	82.0	77.7	72.0	70.9	62.5	59.0	60.3	71.6	83.7	82.8	85.8	92.0	91.1	89.9	89.0	82.6	92.8																							
10-Nov	89.1	86.8	87.8	87.2	82.3	82.9	81.4	81.7	77.2	70.7	64.6	59.3	54.6	54.5	56.1	59.7	67.5	74.2	77.0	79.4	81.0	85.2	88.0	90.6	75.8	90.6																							
11-Nov	92.3	92.2	92.0	90.4	89.2	88.7	89.9	90.8	92.7	86.5	83.2	78.8	71.9	61.7	63.7	68.2	75.1	82.5	71.9	73.1	77.9	79.8	78.4	78.2	81.2	92.7																							
12-Nov	80.6	82.0	82.9	85.7	84.4	84.9	86.8	87.6	82.0	79.4	79.0	74.6	69.4	69.4	70.0	66.2	64.1	65.2	70.9	74.3	73.3	80.8	87.3	89.1	77.9	89.1																							
13-Nov	90.6	90.6	90.3	89.9	88.4	88.7	89.6	90.2	92.7	93.2	92.3	90.3	88.1	82.1	71.9	73.6	88.5	95.5	95.9	96.0	95.6	96.1	95.6	93.1	89.9	96.1																							
14-Nov	87.6	84.7	83.9	84.0	83.4	83.4	82.5	85.2	85.9	79.2	72.8	66.1	60.1	55.3	55.6	57.8	61.7	61.8	68.6	70.9	72.2	72.1	71.3	75.3	73.4	87.6																							
15-Nov	77.3	74.2	69.2	75.2	73.7	75.8	78.4	76.0	76.7	72.4	70.2	70.1	69.3	60.7	52.7	54.8	64.3	74.3	67.2	62.1	68.7	70.6	70.5	71.1	69.8	78.4																							
16-Nov	71.5	73.1	74.8	82.4	89.3	87.4	87.6	89.2	89.0	82.8	74.4	64.7	55.4	51.3	50.1	52.9	55.5	56.6	55.7	56.0	58.7	62.9	65.2	69.5	69.0	89.3																							
17-Nov	72.1	74.9	72.1	76.6	79.5	80.4	82.7	85.5	84.4	72.9	66.8	61.8	56.1	59.4	61.1	64.5	74.7	79.1	80.9	87.3	91.3	91.9	93.0	94.1	76.8	94.1																							
18-Nov	93.3	93.2	94.1	93.7	92.8	91.9	90.5	88.6	86.7	79.1	73.6	69.1	61.7	62.1	56.6	65.4	80.9	87.9	86.8	88.5	89.6	91.2	93.5	92.9	83.5	94.1																							
19-Nov	93.6	93.8	94.3	93.5	93.3	93.4	92.9	92.7	90.6	86.9	87.3	81.2	71.2	69.3	66.7	74.0	87.1	91.9	90.5	88.9	77.7	70.5	69.4	56.9	83.6	94.3																							
20-Nov	48.9	51.2	58.2	60.5	60.5	59.5	58.1	53.2	54.2	51.2	47.5	47.0	44.4	40.7	39.4	41.6	42.6	44.2	44.8	46.5	52.1	60.0	62.0	57.2	51.1	62.0																							
21-Nov	55.0	54.9	61.5	58.3	62.0	60.5	58.8	60.5	60.4	59.6	57.9	57.7	53.7	52.2	52.5	55.0	58.6	56.5	56.0	59.6	64.3	66.6	66.6	66.6	59.0	66.6																							
22-Nov	68.9	74.5	79.2	79.9	81.2	83.6	84.0	83.5	83.1	81.5	77.7	75.2	73.0	72.9	73.6	74.6	79.5	83.0	82.5	77.5	72.9	72.6	74.0	75.4	77.6	84.0																							
23-Nov	78.0	81.0	82.7	82.5	84.4	84.0	82.8	83.1	81.9	80.6	80.6	79.4	77.0	72.2	70.7	76.3	82.5	86.4	87.3	89.2	89.4	88.6	88.1	87.4	82.3	89.4																							
24-Nov	85.1	85.0	83.6	81.1	79.7	78.4	78.9	79.6	79.5	77.0	71.1	62.9	58.7	57.7	58.9	65.9	76.4	85.7	87.0	88.4	89.9	87.8	75.4	73.2	76.9	89.9																							
25-Nov	76.2	78.1	78.6	77.5	79.2	80.0	82.7	82.3	81.6	80.4	74.2	56.4	52.3	49.8	48.0	51.8	57.5	68.4	76.7	82.5	86.9	85.9	84.4	84.1	73.1	86.9																							
26-Nov	85.7	85.4	84.9	83.7	82.4	82.9	83.3	84.9	83.0	81.0	79.9	74.3	69.2	68.1	70.3	79.5	82.9	83.3	84.2	84.1	85.3	86.4	87.5	89.7	81.7	89.7																							
27-Nov	91.8	89.9	91.3	93.8	93.5	91.8	91.1	91.0	90.7	89.4	88.8	87.6	84.5	81.8	78.9	77.9	78.4	81.5	73.7	68.4	71.7	69.5	70.1	69.4	83.2	93.8																							
28-Nov	68.9	67.1	67.1	67.8	68.9	68.1	69.1	68.9	69.3	67.6	65.2	61.4	55.2	52.5	52.2	58.1	71.9	74.0	75.7	69.3	69.5	72.7	79.2	79.6	67.5	79.6																							
29-Nov	80.8	73.1	74.6	77.0	69.9	67.5	65.6	65.0	64.8	77.9	79.4	75.2	74.8	76.1	78.3	76.7	79.2	78.5	80.5	81.4	75.2	72.9	75.2	74.5	74.8	81.4																							
30-Nov	71.5	70.5	71.2	72.1	73.6	72.4	75.3	79.0	80.6	80.0	76.0	76.4	74.5	70.7	68.4	75.6	83.6	82.6	83.1	81.6	84.1	85.4	89.8	88.6	77.8	89.8																							
																								82.2	82.4	83.1	83.9	83.5	83.1	83.4	83.7	83.2	80.9	78.1	74.2	70.9	68.9	68.1	70.6	75.9	79.3	79.5	80.0	81.1	82.1	82.7	82.2	Diurnal Average	
																								95.9	97.1	96.9	96.1	97.2	96.9	97.0	97.2	97.1	97.7	96.4	94.9	93.8	93.9	94.2	94.5	94.9	95.7	96.5	97.0	97.5	97.5	97.4	97.1	Diurnal Maximum	



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

**Relative Humidity (RH) - %**  
**Conklin - November 2023**





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

**Wind Speed (WS) - km/h**  
**Conklin - November 2023**

Maximum Speed: 22 km/h on Nov 25 13:00	Maximum Daily Speed Average: 10.3 km/h on Nov 20	Hours in Service: 720
Minimum Speed Value: 0 km/h on Nov 11 07:00	Minimum Daily Speed Average: 1.6 km/h on Nov 3	Hours of Data: 720
Maximum Diurnal Speed Average: 3.5 km/h at hour 3	Minimum Diurnal Speed Average: 2.3 km/h at hour 17	Hours of Missing Data: 0
Monthly Average Velocity: 2.9 km/h 253.6 deg	Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 2 Q <sub>1</sub> = 4 Median = 7 Q <sub>3</sub> = 9 P <sub>90</sub> = 11 P <sub>99</sub> = 17	Percent Operational Time: 100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	SSE0	S3	S3	S1	S3	S3	S3	SSE3	SSE3	SSW6	SW6	SW7	SW8	SSW7	S5	S6	SSW6	SSW4	SSW5	SSW5	SW6	SSW5	SW2	SW6	SSW4.2	SW8
2-Nov	SW4	SW1	SSW3	S1	WNW2	NW4	NW4	NW4	NW7	NNW7	NNW7	NNE8	NNE10	NNE9	NNE7	NNE7	NNE8	NNE8	NNE8	NNE6	N5	NE2	ENE2	NE1	N3.9	NNE10
3-Nov	E2	ENE3	SE1	NNE2	N3	E2	NNE2	SSE3	NNW1	NNW2	SSE1	SSE3	ENE1	NNE3	ENE2	ENE3	ENE2	ENE3	ENE2	NE2	N4	NNW6	N4	NNW5	NNE1.6	NNW6
4-Nov	N6	N4	N5	N4	NNE5	NE5	NE6	N5	NNE3	ENE6	ENE6	E6	E7	ENE6	ENE7	E8	E8	E8	E7	ENE7	E6	E6	E6	ENE6	ENE5.0	E8
5-Nov	NE6	NE6	NE6	NE5	NE5	NNE4	NNE5	NNE3	NNE5	NNE4	NE5	NE4	NNE4	N5	NNW6	NNE4	NNE3	N3	N3	NNE2	N2	NNE2	NNE2	NE2	NNE3.8	NE6
6-Nov	ENE2	N2	NNE2	NNW2	NNE1	NNE2	SE0	N1	NNW1	SE8	SSE6	SSE6	SSE7	SSE8	S10	S9	S8	S9	S7	S9	S10	S9	S10	S8	S4.5	S10
7-Nov	S9	S10	S9	S8	S8	S8	SSW6	S8	SSW8	S8	SSW7	SSW9	SW8	SSW8	SW8	SW6	SW7	WSW8	WSW8	SW6	W9	W7	WSW6	WSW10	SSW6.9	WSW10
8-Nov	W11	W10	W12	WNW11	WNW11	WNW9	WNW10	WNW9	WNW8	NW11	NW11	NW12	NW11	NW10	NW11	NW12	NW11	NW10	NW11	NW9	NW9	NW6	NW6	NW4	WNW9.4	NW12
9-Nov	NW4	WNW4	NW4	W0	S1	S1	S2	S4	S3	S4	SE4	SE4	ESE6	SSW6	SSW9	SSW5	SSE4	S5	S6	SSE3	ENE2	SSE1	SSE3	SSE5	S2.5	SSW9
10-Nov	SSE7	SSE6	S5	SSE6	S8	SSE6	S9	SSE7	S8	S11	S12	SSW15	S15	SW13	SSW12	S9	SSE7	S9	S11	S12	S10	SSE7	SSE7	SSE6	S8.7	SSW15
11-Nov	SSE6	S6	SSE7	SSE4	SSE3	S3	ESE0	NNW2	ESE4	SE9	SE9	SE10	SSE7	S10	SSW8	S7	SSE3	SSW3	SW8	SW8	SW4	S6	SW7	WSW12	S4.7	WSW12
12-Nov	SW10	SW14	SW14	SW8	SW10	SW9	SW8	SW7	W8	WNW8	W8	W9	W11	W9	WNW7	W7	W8	W7	SW6	SW8	SW9	S4	SE4	SSE3	WSW7.1	SW14
13-Nov	S4	S4	SSE3	S3	S2	WNW1	NNW2	NNW4	NNW5	N6	N6	NE10	NE8	ENE8	ENE9	NE7	N8	N8	N6	N5	NW6	NW5	NW5	W4	N2.8	NE10
14-Nov	WNW8	WNW9	WNW9	WNW8	WNW9	WNW8	W8	W6	WSW6	SW7	SW10	WSW11	WSW11	WSW12	WSW11	WSW10	WSW7	WSW7	SW6	SW7	SW8	SW9	SW9	SSW8	WSW7.6	WSW12
15-Nov	S8	SSW9	SW11	SW9	SW10	SW6	SSW7	SW10	SW9	SW9	WNW11	NW16	NNW13	WNW9	WNW7	WNW5	W2	SSW3	W4	WNW4	WNW5	W5	W6	W6	WSW5.5	NW16
16-Nov	W6	NNW4	NE3	SSE2	SSE2	S4	SSE3	SSE3	S5	SW9	SSW11	SW11	SW12	SW10	SW10	SW11	SW9	SW9	SW9	SW10	SW12	SW11	SW14	SW7	SW7.0	SW14
17-Nov	SSW7	SW8	WSW11	SW10	SW8	SW7	SW12	SW11	SW9	W13	W10	WNW9	W11	W7	W6	SW5	W2	SSW6	S5	SSE1	SE3	SSE4	SSE4	SSE5	SW5.9	W13
18-Nov	SSE5	SSE5	S5	S5	SSE6	S8	S8	SSW9	SSW8	SSW8	SSW9	SSW6	SSW4	SSW8	SSW4	NNW2	SSE0	SSE2	SSE3	SE3	S1	SSE2	SSE1	SE3	S4.4	SSW9
19-Nov	SE4	SSE1	SSE1	NNW0	SSW1	SSE1	WSW0	SSE1	SSE2	S3	SSE1	S3	WNW5	WNW5	WNW4	SW1	S1	SSW3	S5	SSW6	W9	WNW11	WNW11	WNW14	WSW2.4	WNW14
20-Nov	W15	W16	WNW15	NW18	WNW18	NW17	NW16	NW16	NW12	NW12	WNW10	WNW10	WNW11	WNW11	WNW11	WNW8	WNW6	W6	W9	WNW7	WNW4	NNW3	NNW3	NE2	WNW10.3	WNW18
21-Nov	ENE2	SSW0	NE3	NE3	E2	E4	ESE6	ESE6	ESE5	E5	E6	NE5	ENE5	NE7	N6	NNW6	NNW5	N8	NNE7	NNE7	N7	N8	NNE6	N8	NE4.0	N8
22-Nov	N9	NNE8	NNE8	NNE7	NNE6	N6	N7	N7	N6	N7	NNE7	NNE7	NNE7	NE6	NNE4	NNE3	NNW1	NNW2	NNE2	E3	SSE6	SSE5	SSE4	S4	NNE3.9	N9
23-Nov	SSE5	SE6	S6	S4	SSE5	SSE8	S10	S9	S12	SSW7	SSW9	SW11	SW11	SW9	SSW8	SSW6	S5	SW8	SW11	SW10	SW11	SSW12	SW11	SW12	SSW8.0	SW12
24-Nov	SW14	SW14	SW14	SW17	SW18	SW17	SW17	SW17	SW17	WSW14	SW10	WSW8	W10	W8	WNW6	W5	SSW2	SSW5	SSW5	SSW5	S4	SSW4	W7	W11	WSW9.6	SW18
25-Nov	SW8	WSW9	W8	WNW9	WNW8	NW10	NNW14	NNW12	NNW17	N17	NNW13	NNW21	NNW22	NNW20	NNW16	NNW12	NW7	NW3	NW2	NNW3	NE1	SSW1	SE1	SSE2	NNW8.4	NNW22
26-Nov	S3	S4	S4	SSE4	SSE3	SSE2	SW1	NNW2	NW4	ENE1	NW4	NW5	NNW2	W2	WNW6	WNW8	WNW6	W4	WSW6	WNW6	W7	WNW6	WNW5	WSW2	W2.5	WNW8
27-Nov	SSW5	SW8	SSW9	SW10	SW9	SW7	SSW7	S5	S6	SSW10	SSW10	SSW8	SSW10	SW13	SW13	SW14	SW14	SW11	WSW11	WNW13	WNW10	WNW10	WNW8	WNW10	SW8.3	SW14
28-Nov	W9	W11	W10	W12	W11	W14	W13	W15	W14	W13	WNW11	WNW10	WNW8	WNW8	W8	WSW9	WSW11	WSW9	SW7	W9	WNW8	W7	WNW5	WNW7	W9.7	W15
29-Nov	WNW7	W9	W10	WNW9	WNW10	WNW9	WNW11	NW9	WNW9	NW9	WNW9	WNW10	WNW10	NW10	NW10	NW10	NW10	NW7	NW7	NW8	NW9	NW9	NW8	NW7	WNW8.7	WNW11
30-Nov	NW6	NW6	NW7	NW5	WNW5	WNW4	WNW5	NW5	WNW6	W7	NW8	NW7	NW8	WNW7	WNW5	W2	SSW1	S3	SSE3	S4	SE1	S4	SE3	SSE1	WNW3.3	NW8

SW2.9WSW3.4WSW3.5WSW3.2WSW3.1WSW2.8WSW3.1WSW3.1WSW3.2 W3.1 W3.1 W3.3 W3.4 W3.3 W2.9 W2.3WSW2.6 SW2.9WSW2.8WSW3.1WSW2.4WSW2.4WSW2.9  
W15 W16WNW15WNW18WNW18 NW17 SW17 SW17 SW17 N17 NNW13 NNW21 NNW22 NNW20 NNW16 SW14 SW14 SW11 WSW11 WNW13 SW12 SSW12 SW14 WNW14

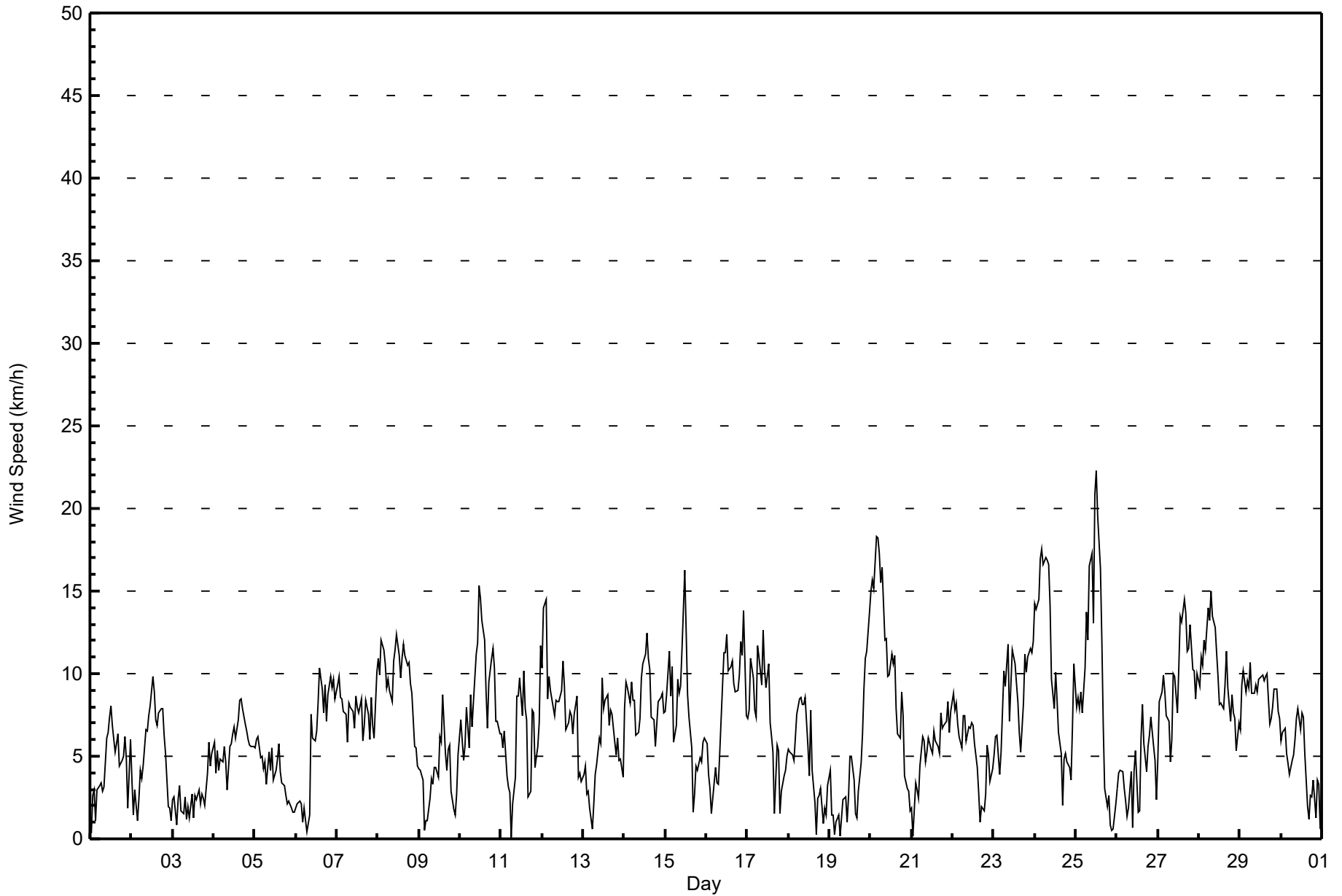
Diurnal Average  
Diurnal Maximum

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



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

**Wind Speed (WS) - km/h**  
**Conklin - November 2023**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h  
Conklin - November 2023**

<b>Wind Speed Ranges (km/h)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	267	37.08	37.08
6 - 11	388	53.89	90.97
12 - 19	62	8.61	99.58
20 - 28	3	0.42	100.00
29 - 38	0	0.00	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Wind Speed (WS) - km/h  
Conklin - November 2023**

<b>Wind Speed Ranges (km/h)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	15	23	15	12	6	3	11	48	43	21	7	2	10	16	15	20	267
6 - 11	17	20	8	11	8	3	5	19	39	36	67	19	39	58	35	4	388
12 - 19	1	0	0	0	0	0	0	0	4	3	21	3	10	5	8	7	62
20 - 28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	3
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	33	43	23	23	14	6	16	67	86	60	95	24	59	79	58	34	720

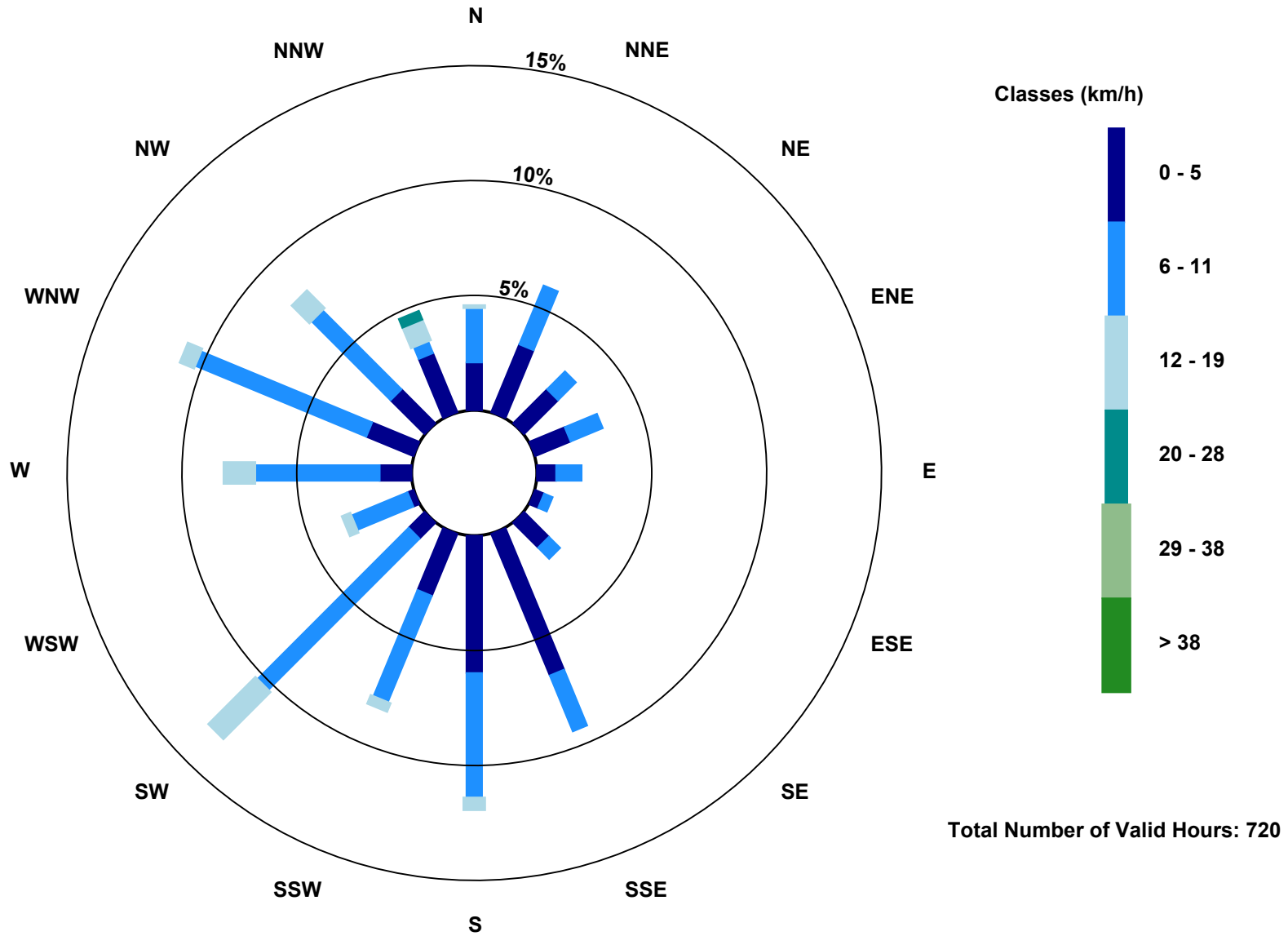
Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 2023

Wind Speed (WS) - km/h  
Conklin







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

**Wind Speed (WS) - km/h**  
**Conklin - November 2023**

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



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

**Wind Direction (WD) - deg**  
**Conklin - November 2023**

Direction of Maximum Speed: 335 deg on Nov 25 13:00 Direction of Maximum Daily Speed Average: 297.7 deg on Nov 20	Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0
Direction of Minimum Speed: 111 deg on Nov 11 07:00 Direction of Minimum Daily Speed Average: 1.6 deg on Nov 3	Percent Operational Time: 100.0
Monthly Average Direction: 253.6 deg	

Day	Hourly Period Ending At (MST)																								Daily Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Nov	167	185	191	190	172	179	187	164	163	208	225	234	227	192	183	190	211	199	196	208	230	212	227	221	204.5
2-Nov	228	227	201	188	303	314	314	312	325	337	336	14	30	24	32	28	26	22	16	26	358	44	78	50	4.4
3-Nov	98	70	136	24	7	85	17	164	332	340	162	168	60	32	60	69	12	72	61	43	10	346	360	343	32.5
4-Nov	358	6	357	7	31	56	34	4	25	77	71	88	94	74	76	88	95	88	84	64	80	79	79	75	64.2
5-Nov	56	55	46	46	44	25	22	25	30	24	36	36	25	11	21	17	12	352	7	24	8	16	26	47	29.7
6-Nov	65	357	18	346	33	15	131	353	336	129	153	153	168	165	176	177	171	180	184	183	188	181	187	186	171.8
7-Nov	184	186	183	182	188	185	194	191	198	188	210	194	217	201	225	219	227	242	242	231	260	279	246	251	211.8
8-Nov	269	266	277	285	296	295	290	297	300	310	316	318	317	313	312	314	317	314	320	317	318	312	309	305	303.6
9-Nov	305	301	312	264	186	182	191	187	182	183	145	133	118	192	203	202	152	170	174	153	57	155	165	147	177.3
10-Nov	154	157	173	157	178	162	172	162	177	187	189	192	191	214	197	183	165	174	178	187	179	156	160	150	179.0
11-Nov	164	178	155	166	159	178	111	329	120	140	129	137	147	188	206	179	150	194	224	231	217	187	214	237	180.2
12-Nov	228	233	233	214	224	225	224	224	268	287	281	274	274	278	282	266	270	263	232	230	233	189	133	161	244.9
13-Nov	172	170	151	178	187	303	337	331	335	352	9	41	50	60	72	48	351	358	354	350	323	319	306	261	11.2
14-Nov	287	303	299	293	285	283	281	276	252	230	224	251	251	254	245	244	240	249	214	221	226	223	216	199	252.6
15-Nov	188	200	218	220	233	219	213	228	216	232	298	325	328	297	302	303	263	207	266	293	287	281	267	277	258.7
16-Nov	273	328	37	148	168	178	167	162	189	214	212	215	217	222	226	220	216	215	226	229	230	233	231	215	219.5
17-Nov	207	221	237	228	214	220	229	221	225	272	280	282	263	268	259	231	269	202	190	160	142	155	154	152	232.2
18-Nov	158	158	181	177	164	178	187	193	193	204	206	192	194	195	208	348	158	168	153	145	176	163	152	145	183.0
19-Nov	146	153	160	330	207	153	255	154	147	179	153	189	295	300	300	232	186	193	175	202	265	293	285	283	252.8
20-Nov	280	280	287	304	303	309	314	311	307	308	301	297	292	295	297	293	289	278	267	283	288	334	336	50	297.7
21-Nov	62	208	42	38	90	88	109	123	105	91	86	38	59	45	10	348	347	355	15	16	355	9	16	7	36.1
22-Nov	4	15	22	17	23	10	11	8	3	4	23	21	32	36	21	19	334	348	23	96	154	157	163	177	23.5
23-Nov	153	146	172	181	148	164	181	175	189	206	209	214	221	217	207	206	186	214	223	217	218	211	215	222	200.9
24-Nov	225	233	231	231	234	233	225	234	235	238	230	252	273	272	291	268	206	195	195	201	179	210	271	262	236.5
25-Nov	234	247	262	292	303	321	328	331	346	351	336	330	335	343	340	334	326	323	321	342	34	204	158	151	326.3
26-Nov	177	178	170	162	168	155	216	333	326	73	317	319	334	275	303	293	303	277	257	287	279	301	301	242	278.4
27-Nov	198	221	207	215	218	217	193	191	184	204	207	207	210	214	226	227	233	232	252	283	291	288	291	283	231.1
28-Nov	281	274	268	271	275	271	272	267	269	280	285	283	287	285	271	254	247	240	234	265	284	280	299	299	271.8
29-Nov	301	270	279	284	288	291	290	311	301	307	303	303	303	308	310	313	317	305	304	310	312	318	322	320	302.5
30-Nov	305	315	308	311	299	294	296	315	284	268	317	307	307	294	288	275	196	170	150	179	145	187	137	166	291.0

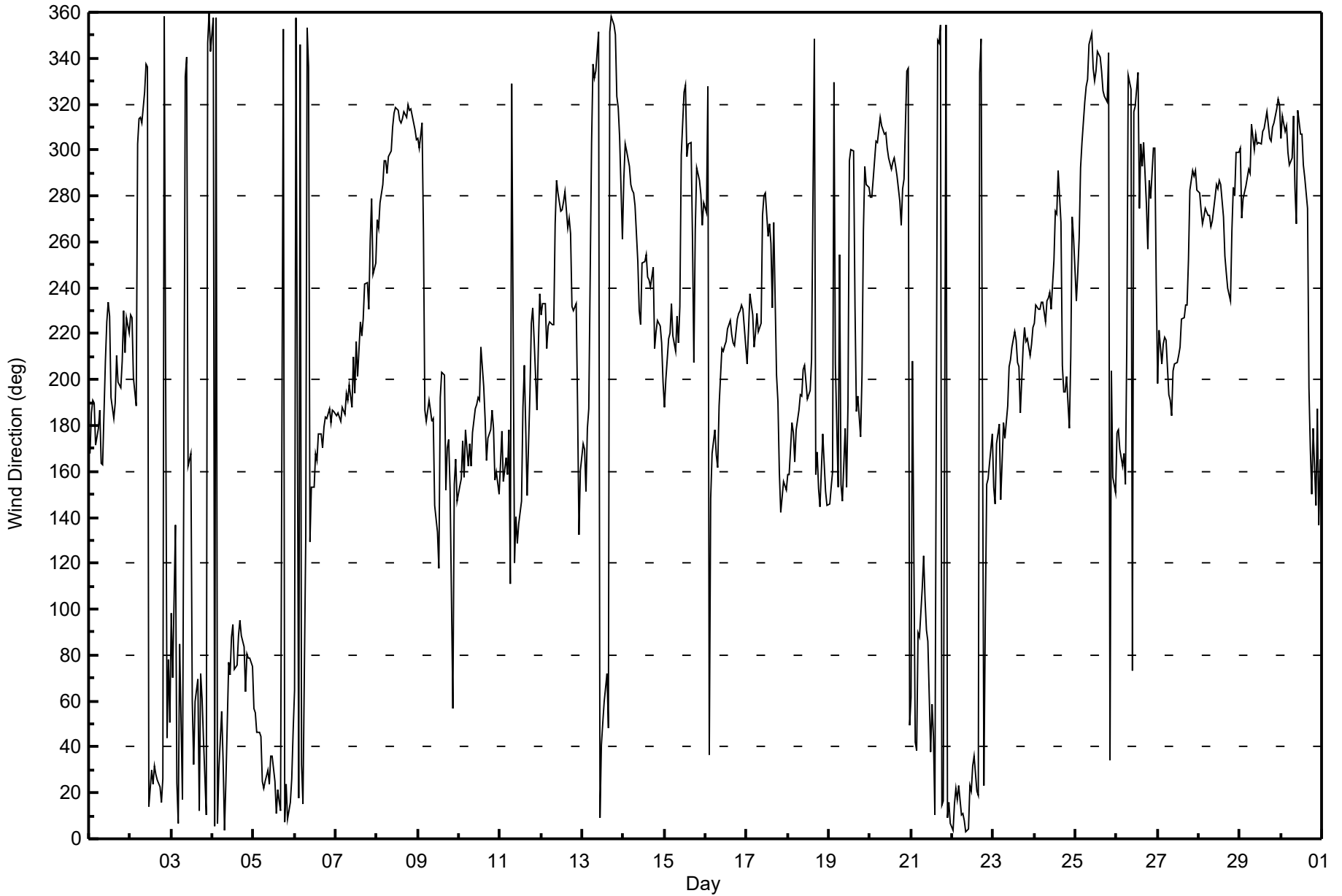
235.5 241.8 245.5 252.4 250.1 250.9 252.5 255.7 256.1 255.9 263.6 274.6 275.3 266.5 266.5 259.8 259.2 238.3 235.0 246.5 255.7 252.6 247.3 242.8  
 Diurnal Average

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



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

**Wind Direction (WD) - deg**  
**Conklin - November 2023**





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

**Wind Direction (WD) - deg**  
**Conklin - November 2023**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 94 deg on Nov 18 17:00 Minimum Value: 11 deg on Nov 24 18:00 Percentiles: P <sub>1</sub> = 14 P <sub>10</sub> = 18 Q <sub>1</sub> = 21 Median = 26 Q <sub>3</sub> = 33 P <sub>90</sub> = 52 P <sub>99</sub> = 91																			Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0						
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Nov	87	34	30	84	19	24	34	27	26	28	21	24	24	30	32	20	18	23	20	26	26	35	67	27	87
2-Nov	42	73	23	73	74	24	24	23	19	17	20	26	22	22	23	26	24	23	24	25	23	64	55	52	74
3-Nov	42	53	76	52	32	64	53	40	83	40	89	17	71	32	35	36	37	39	39	43	30	16	20	16	89
4-Nov	22	25	19	24	20	33	24	23	49	35	36	30	30	34	35	30	29	32	33	31	37	38	36	35	49
5-Nov	34	31	26	30	27	25	23	29	22	21	24	31	24	28	23	24	23	16	20	32	26	56	33	47	56
6-Nov	57	43	27	61	62	40	56	63	65	16	20	20	20	18	19	20	20	19	21	20	22	20	19	18	65
7-Nov	19	21	19	19	20	18	20	22	21	21	26	25	30	27	28	24	27	22	20	20	29	32	23	25	32
8-Nov	25	25	30	33	32	33	34	35	33	30	27	26	24	26	28	26	24	24	22	23	22	24	27	33	35
9-Nov	30	34	28	91	38	65	45	22	35	23	28	45	23	45	23	20	16	16	19	43	58	58	28	12	91
10-Nov	14	15	21	24	23	26	22	32	28	20	21	21	22	24	24	22	26	17	15	16	18	20	23	20	32
11-Nov	18	20	14	27	23	22	92	61	48	18	17	19	23	22	25	21	59	69	32	20	37	24	27	17	92
12-Nov	20	17	18	21	19	19	23	22	36	34	31	33	31	30	32	29	23	20	15	18	18	32	26	23	36
13-Nov	19	25	41	26	18	74	21	16	16	18	33	25	33	36	36	30	25	21	24	22	20	21	28	32	74
14-Nov	32	31	32	36	32	33	30	32	29	23	22	27	27	25	27	20	16	28	20	20	18	19	21	17	36
15-Nov	14	19	23	20	17	24	17	18	17	21	33	21	22	35	33	29	29	21	32	31	34	31	24	26	35
16-Nov	25	48	49	49	31	25	30	26	19	20	17	19	20	21	22	19	18	19	22	20	18	20	20	23	49
17-Nov	24	23	26	18	21	21	19	18	23	28	35	34	28	29	25	25	43	18	25	84	38	25	23	15	84
18-Nov	22	19	21	21	16	13	19	20	18	21	19	32	80	25	61	24	94	20	17	13	77	42	77	17	94
19-Nov	14	90	70	90	70	63	93	54	43	24	81	32	41	33	32	57	60	48	25	21	42	33	31	35	93
20-Nov	32	30	31	31	32	28	26	27	30	30	34	33	33	33	33	33	32	27	24	31	38	32	30	52	52
21-Nov	52	91	22	34	59	35	23	39	60	59	61	64	40	31	29	22	19	20	25	26	22	26	22	20	91
22-Nov	23	23	24	25	25	23	21	21	21	21	26	26	25	29	29	21	57	35	47	38	17	19	20	21	57
23-Nov	19	16	17	57	17	14	17	18	18	34	23	23	23	21	23	19	20	26	20	20	20	18	18	20	57
24-Nov	20	19	21	21	21	21	21	21	21	22	24	33	29	32	34	25	56	11	13	18	13	57	37	29	57
25-Nov	25	28	38	32	29	23	19	20	20	21	23	20	22	20	19	21	19	31	42	28	64	59	81	45	81
26-Nov	32	24	27	19	28	35	93	68	21	84	55	34	94	78	32	34	35	37	25	33	33	38	32	67	94
27-Nov	27	18	19	20	22	28	23	64	35	20	17	18	19	18	22	21	22	22	32	30	31	32	31	30	64
28-Nov	32	29	26	28	28	27	26	25	28	31	33	34	33	34	28	23	19	18	19	26	31	27	29	29	34
29-Nov	29	27	28	32	33	32	32	27	31	31	31	31	32	30	27	26	23	29	30	29	25	25	22	23	33
30-Nov	32	26	28	25	30	33	31	25	31	28	23	30	29	32	37	45	18	20	29	18	76	14	22	92	92
	87	91	76	91	74	74	93	68	83	84	89	64	94	78	61	57	94	69	47	84	77	64	81	92	
Diurnal Maximum																									



## WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY  
MONITORING PROGRAM  
MONTHLY REPORT

**AMS22  
JANVIER  
NOVEMBER 2023**

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

December 22, 2023

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - JANVIER (AMS22)  
NOVEMBER 2023

MONTHLY SUMMARY

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2(ppb) Average	685	33	35	99.72	2.8	0	0.6	0
TRS(ppb) Average	685	34	35	99.86	0.3	0	0.2	0
THC(ppm) Average	665	32	55	96.81	2.2	-	2.1	-
NMHC(ppm) Average	665	32	55	96.81	0.074	-	0.023	-
CH4(ppm) Average	665	32	55	96.81	2.2	-	2.1	-
O3 (ppb) Average	687	32	33	99.86	41.1	0	38.7	-
NO2 (ppb) Average	685	34	35	99.86	7	0	3.6	-
NO (ppb) Average	685	34	35	99.86	10.5	-	1.3	-
NOX (ppb) Average	685	34	35	99.86	14.8	-	4.9	-
PM2.5 (ug/m3) Average	716	2	4	99.72	26	0	14.9	0
Temperature 2 m (C) Average	720	0	0	100	6.8	-	2.2	-
Relative Humidity (%) Average	720	0	0	100	98.2	-	95	-
Wind Speed 20 m (km/h) Average	720	0	0	100	29	-	17	-
Wind Direction 20 m (deg) Average	720	0	0	100	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - JANVIER (AMS22)  
NOVEMBER 2023

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	0.15	0.3	-	0	0	0	0.1	0.2	0.3	2.8
TRS (ppb) Average	685	0.16	0.1	-	0	0.1	0.1	0.2	0.2	0.2	0.3
THC (ppm) Average	665	2.03	0.1	-	1.9	2	2	2	2.1	2.1	2.2
NMHC(ppm) Average	665	0.001	0.008	-	0	0	0	0	0	0	0.074
CH4(ppm) Average	665	2.02	0	-	1.9	2	2	2	2.1	2.1	2.2
O3 (ppb) Average	687	26.3	8.1	-	4.9	15.5	19.9	26.5	33.1	36.6	41.1
NO2 (ppb) Average	685	1.37	1.2	-	0	0.2	0.5	1	1.8	3.1	7
NO (ppb) Average	685	0.43	0.8	-	0	0	0	0.2	0.5	0.9	10.5
NOX (ppb) Average	685	1.79	1.8	-	0	0.3	0.6	1.3	2.3	3.8	14.8
PM2.5 (ug/m3) Average	716	4.79	3.4	-	0.5	1.9	2.7	3.7	5.6	8.5	26
Temperature 2 m (C) Average	720	-3.25	4.1	-	-15.6	-8.8	-5.3	-2.9	-0.7	1.4	6.8
Relative Humidity (%) Average	720	80.48	12.7	-	32.6	62	72.5	83.5	90.9	94.8	98.2
Wind Speed 20 m (km/h) Average	720	8.6	4	-	0	3	5	8	11	14	29
Wind Direction 20 m (deg) Average	720	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - JANVIER (AMS22)  
NOVEMBER 2023

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
SO2, THC/NMHC/CH4	07 Nov 2023 10:00	07 Nov 2023 11:00	2	Maintenance - reinitiated daily QA check
TRS	07 Nov 2023 11:00	07 Nov 2023 11:00	1	Maintenance - reinitiated daily QA check
NO2, O3	07 Nov 2023 12:00	07 Nov 2023 12:00	1	Maintenance - reinitiated daily QA check
THC/NMHC/CH4	20 Nov 2023 18:00	21 Nov 2023 11:00	18	Unstable Operation - zero air generator failed
THC/NMHC/CH4	21 Nov 2023 12:00	21 Nov 2023 14:00	3	Maintenance - zero air generator replaced
PM2.5	30 Nov 2023 10:00	30 Nov 2023 11:00	2	Maintenance - firmware update

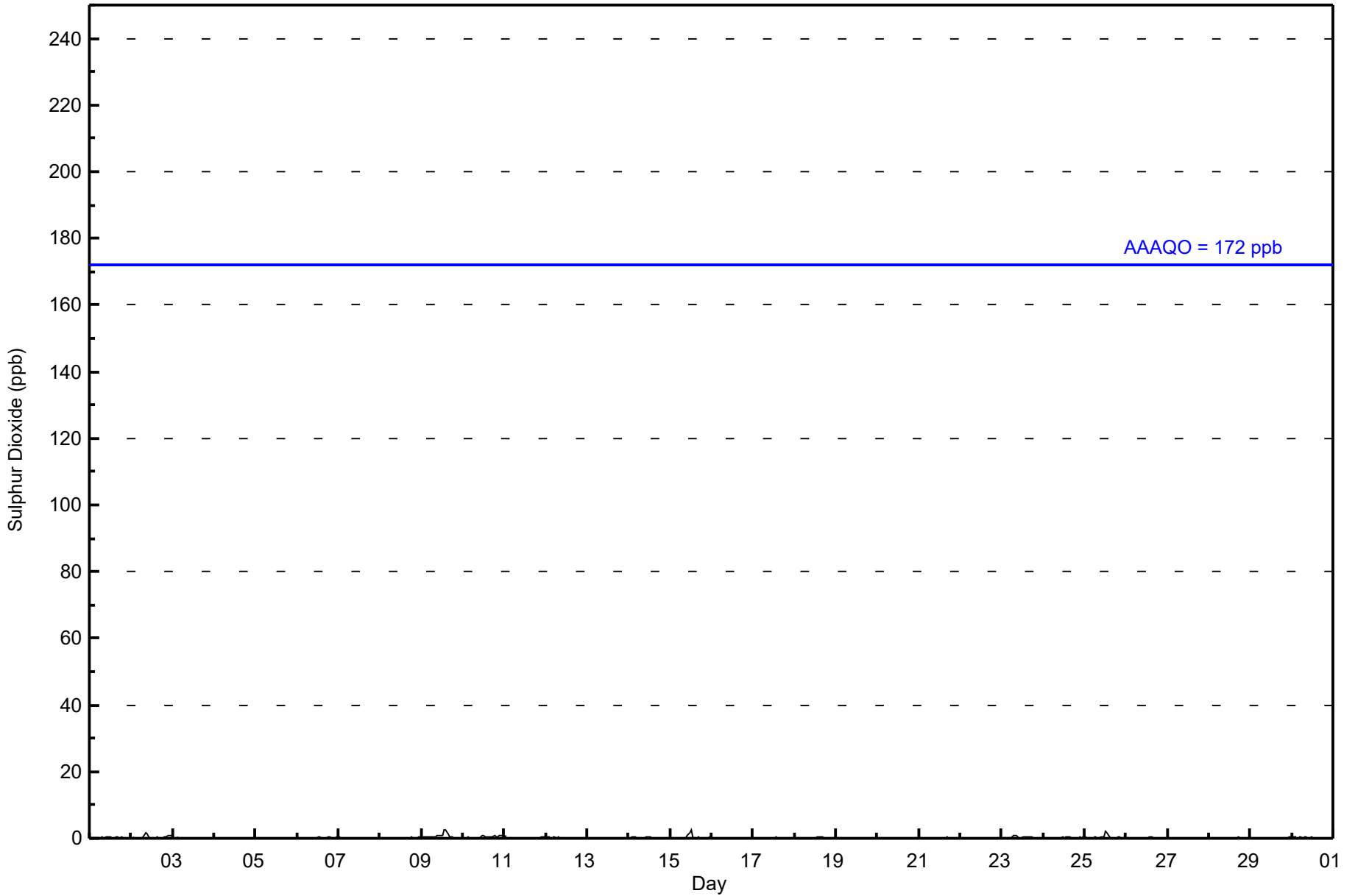






**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Janvier - November 2023**





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

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Janvier - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 10	685	100.00	100.00
11 - 20	0	0.00	100.00
21 - 60	0	0.00	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



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

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Janvier - November 2023**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	35	77	19	17	14	8	9	24	43	102	155	34	47	60	31	10	685
11 - 20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	35	77	19	17	14	8	9	24	43	102	155	34	47	60	31	10	685

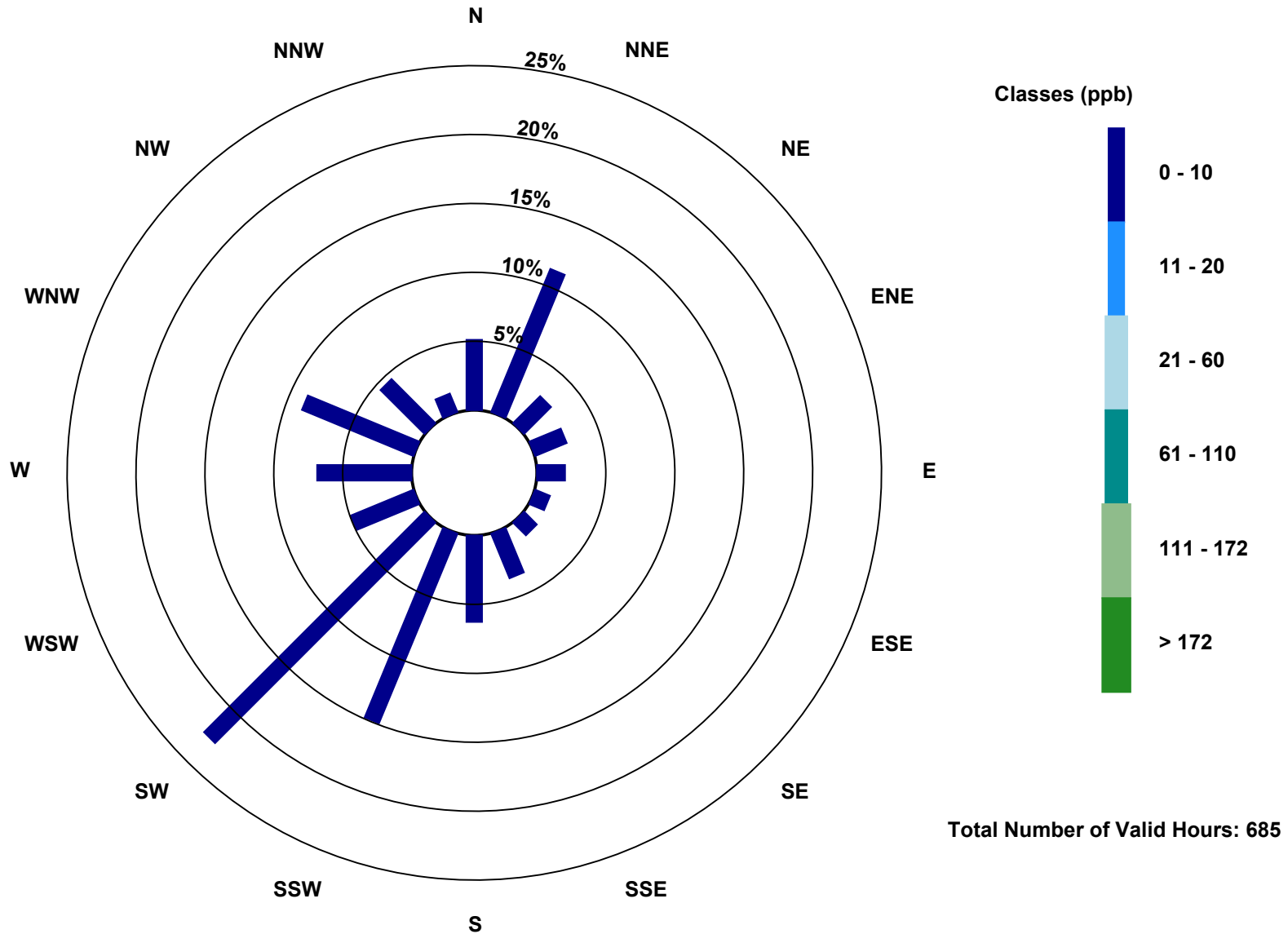
Total Number of Valid Hours: 685

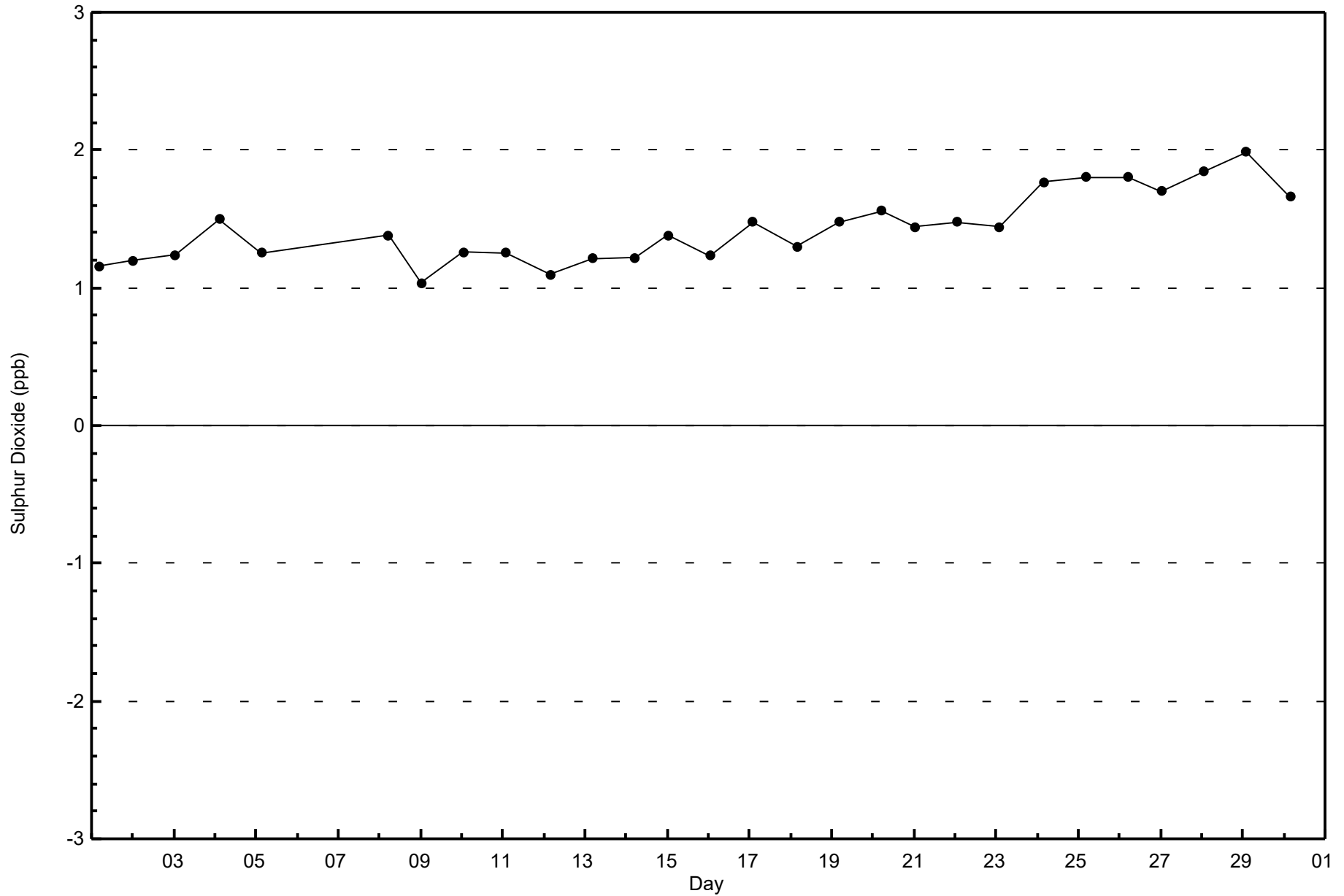
Total Number of Hours: 720

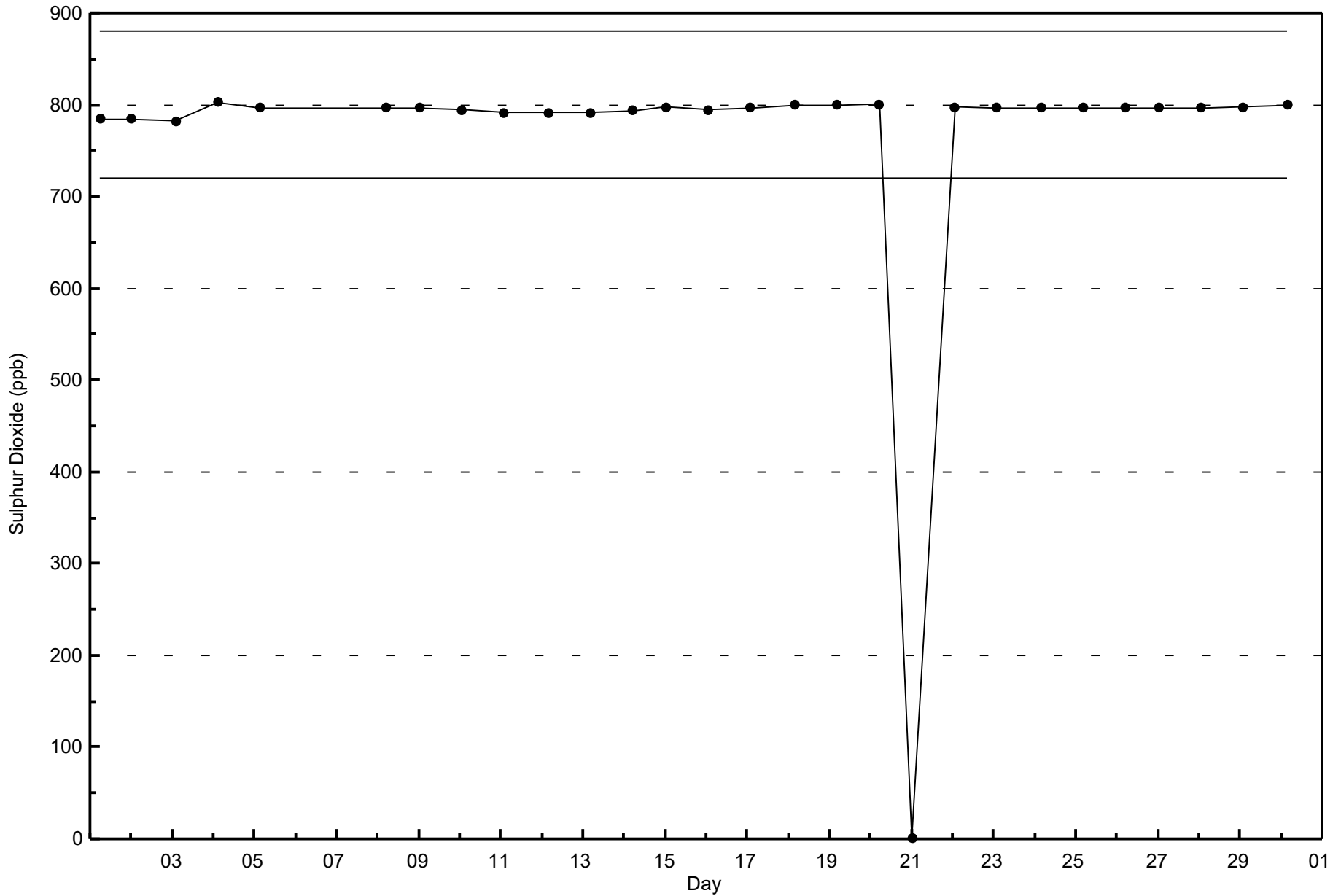


Wood Buffalo Environmental Association  
Wind Rose Nov 2023

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

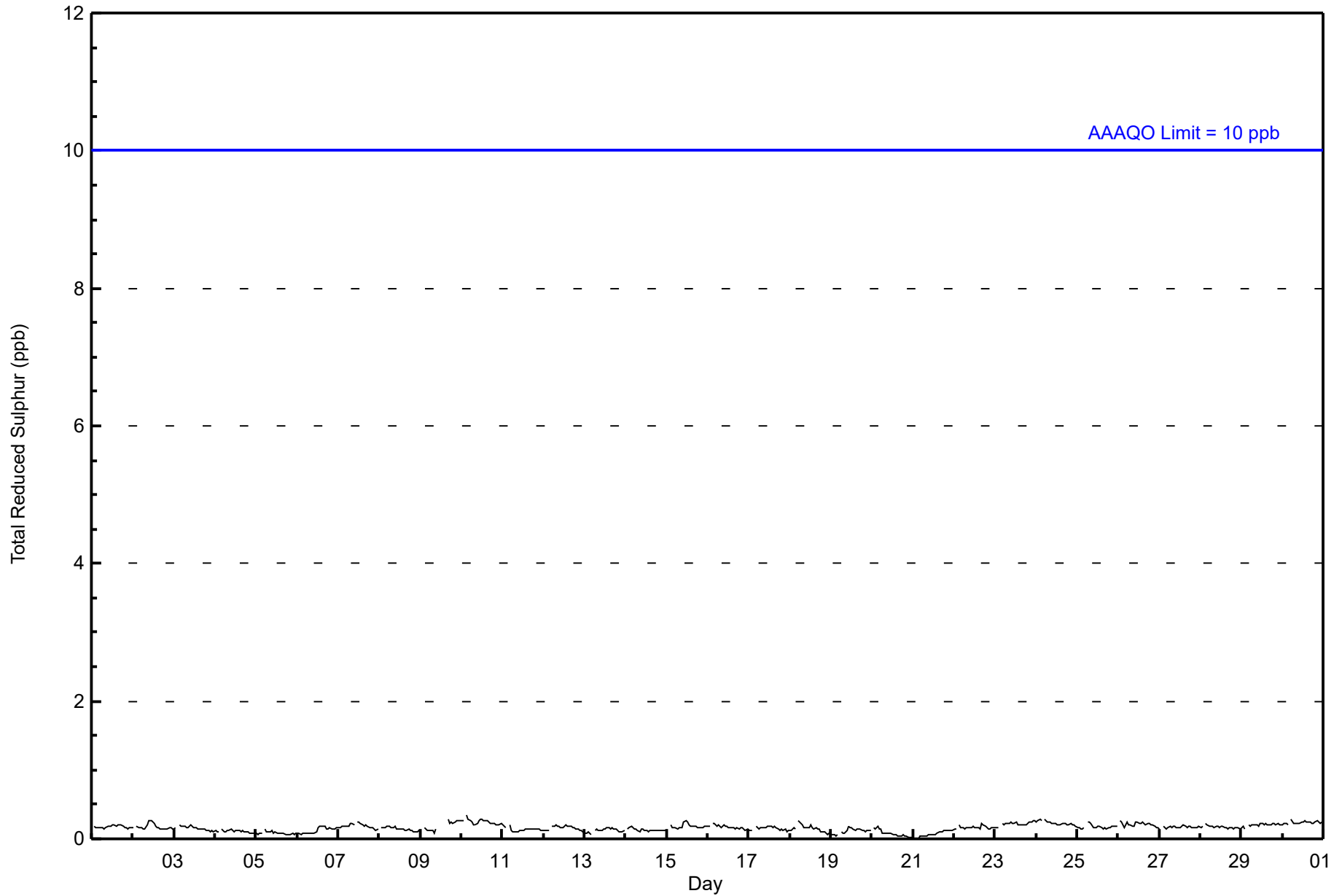














**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Total Reduced Sulphur (TRS) - ppb**  
**Janvier - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2	685	100.00	100.00
3 - 4	0	0.00	100.00
5 - 7	0	0.00	100.00
8 - 11	0	0.00	100.00
> 11	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



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

**Total Reduced Sulphur (TRS) - ppb**  
**Janvier - November 2023**

<b>Concentration</b> <b>Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	35	77	20	17	14	9	9	18	43	104	156	31	49	62	31	10	685
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	35	77	20	17	14	9	9	18	43	104	156	31	49	62	31	10	685

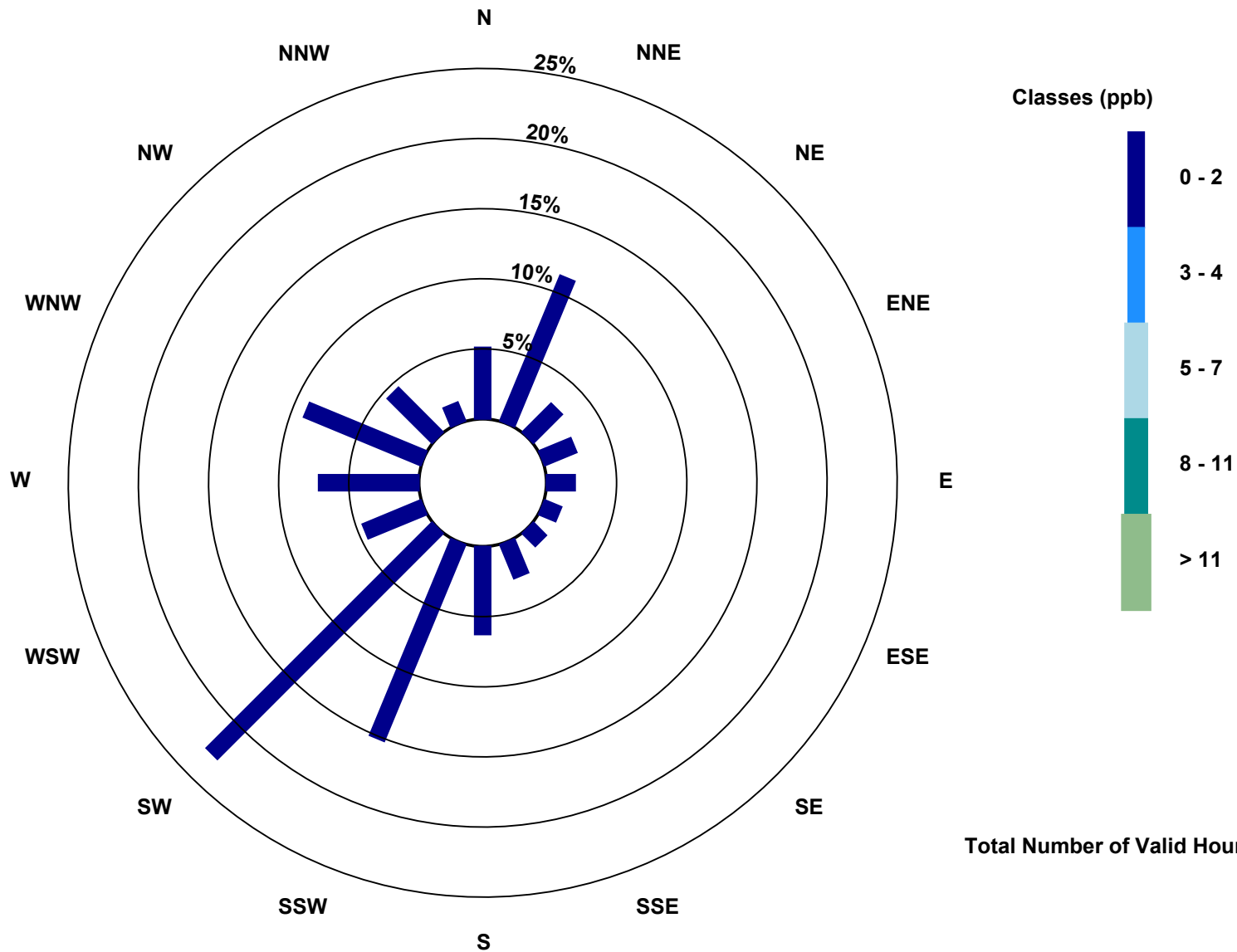
Total Number of Valid Hours: 685

Total Number of Hours: 720

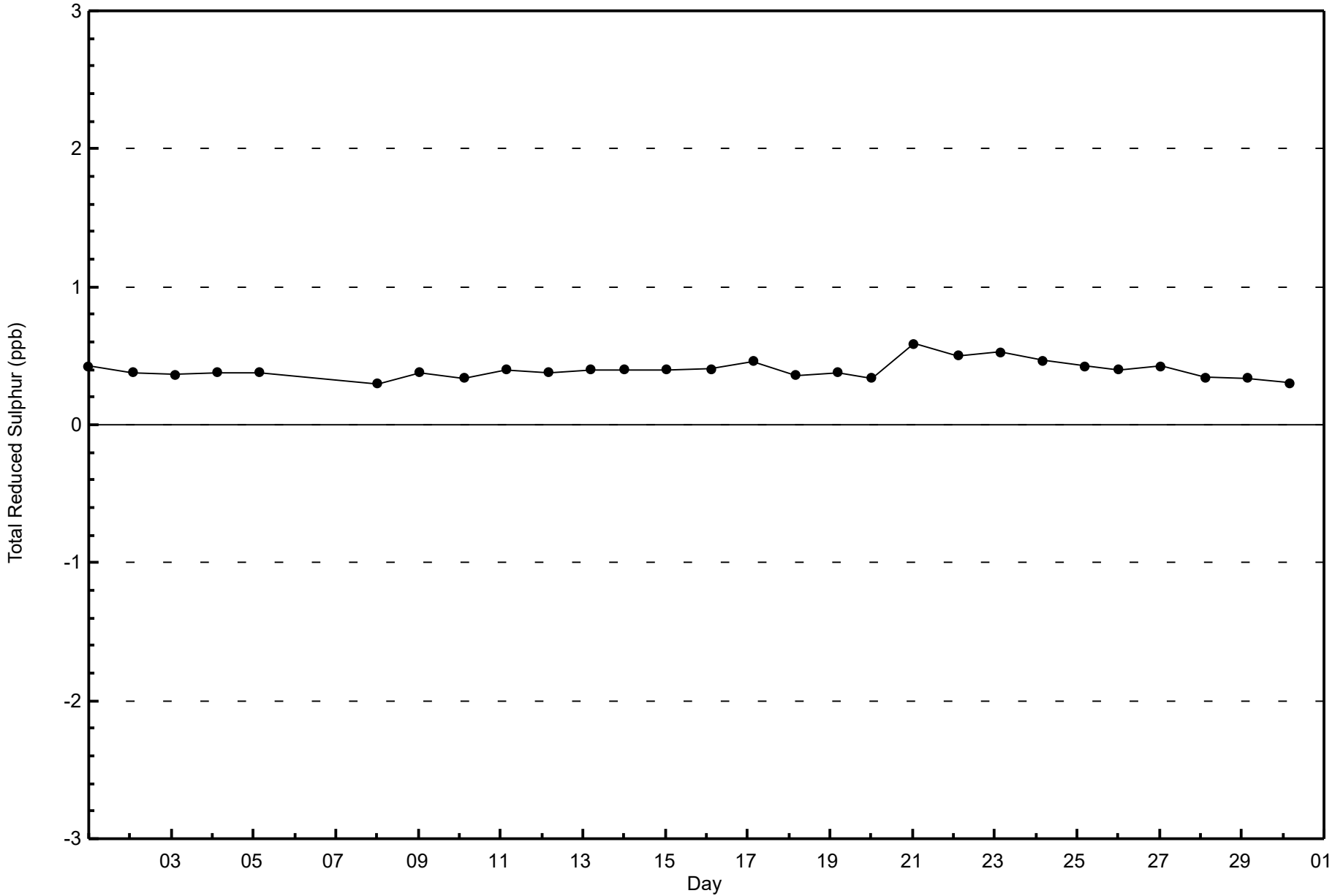


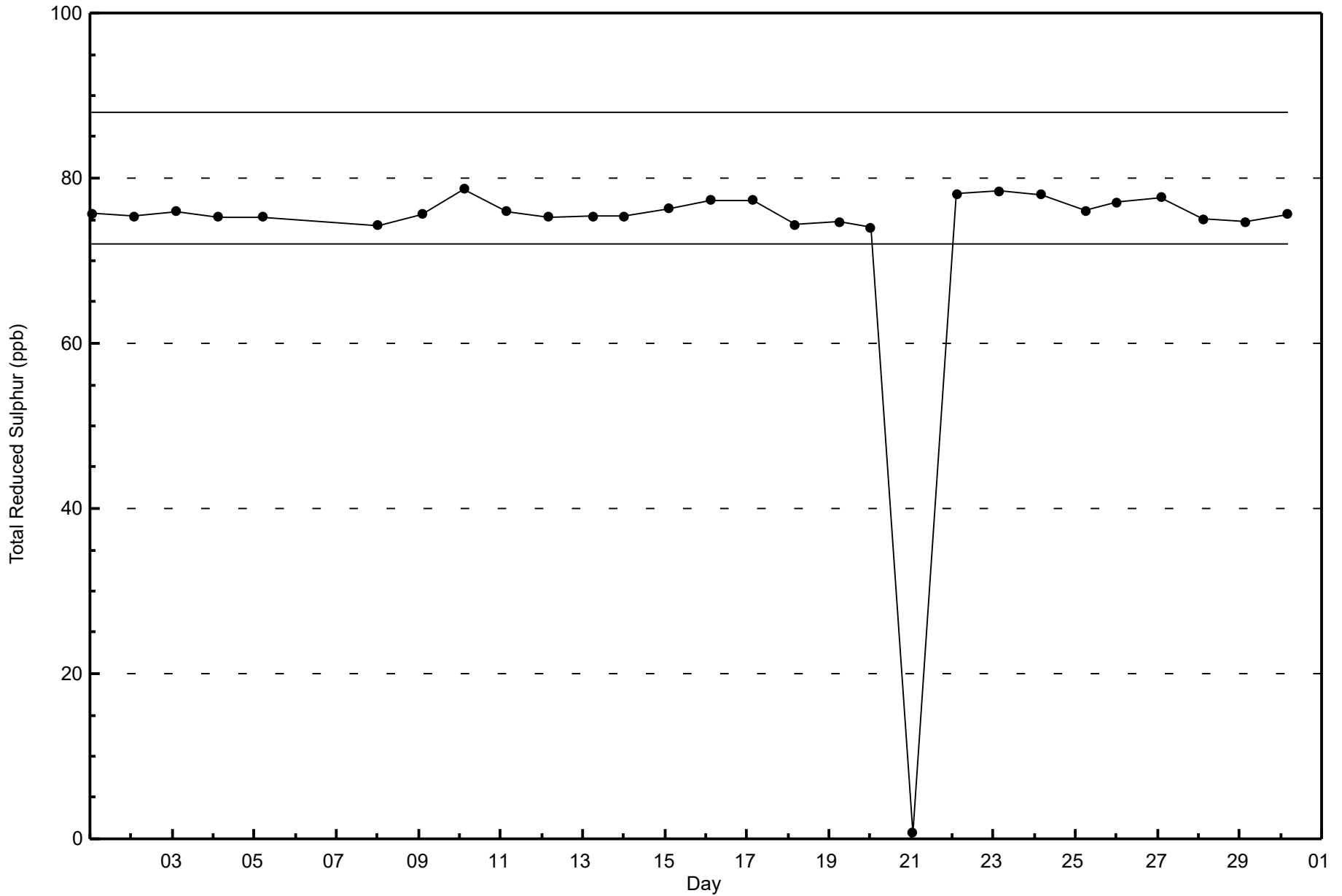
Wood Buffalo Environmental Association  
Wind Rose Nov 2023

Total Reduced Sulphur (TRS) - ppb  
Janvier

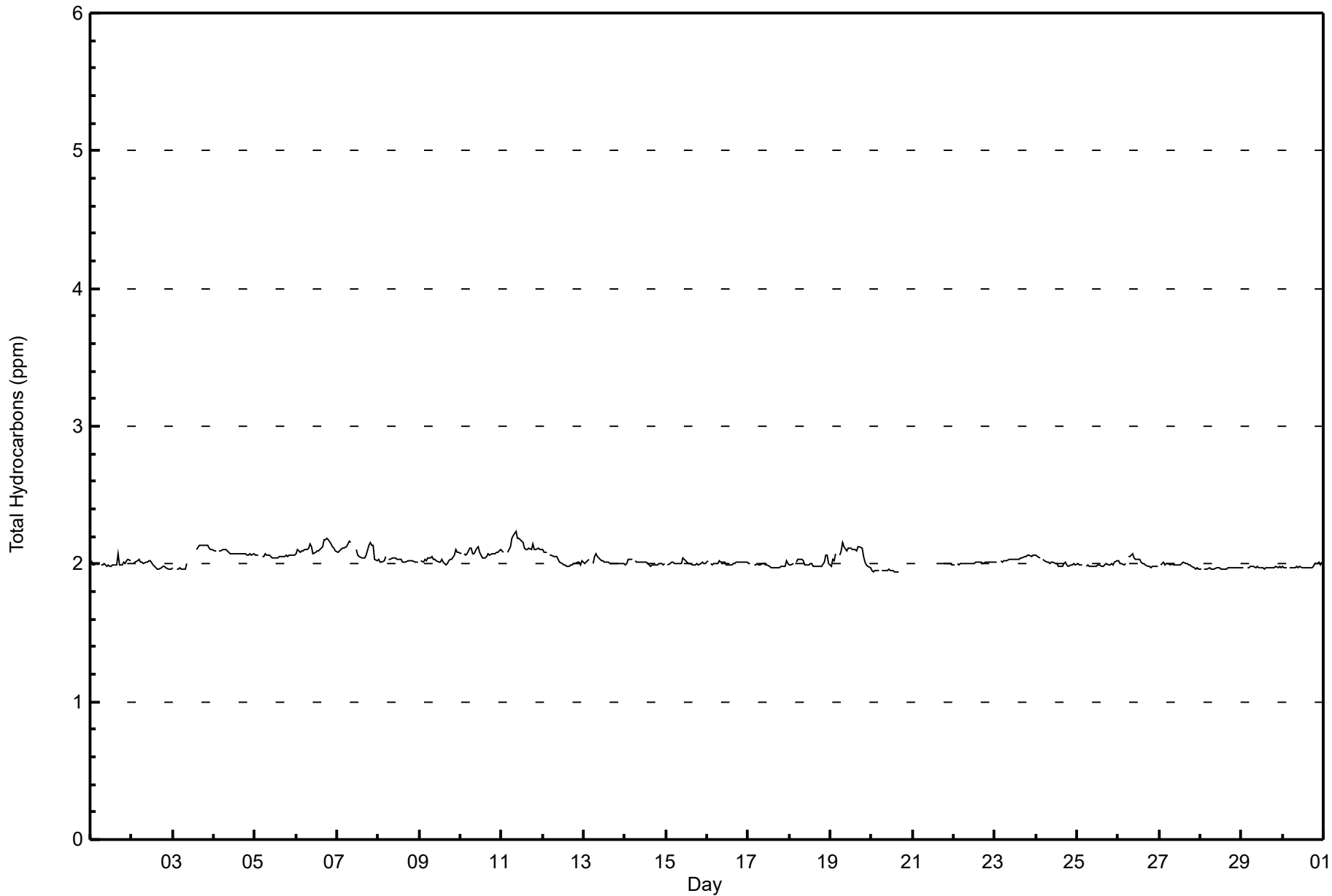


Total Number of Valid Hours: 685













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

**Total Hydrocarbons (THC) - ppm**  
**Janvier - November 2023**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2.0	480	72.18	72.18
2.1 - 3.0	185	27.82	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 665

Total Number of Hours: 720



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

**Total Hydrocarbons (THC) - ppm**  
**Janvier - November 2023**

<b>Concentration</b> <b>Ranges (ppm)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	19	44	5	8	2	4	6	20	17	64	121	33	42	56	29	10	480
2.1 - 3.0	16	31	13	6	10	1	2	3	26	38	34	1	2	1	1	0	185
3.1 - 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	35	75	18	14	12	5	8	23	43	102	155	34	44	57	30	10	665

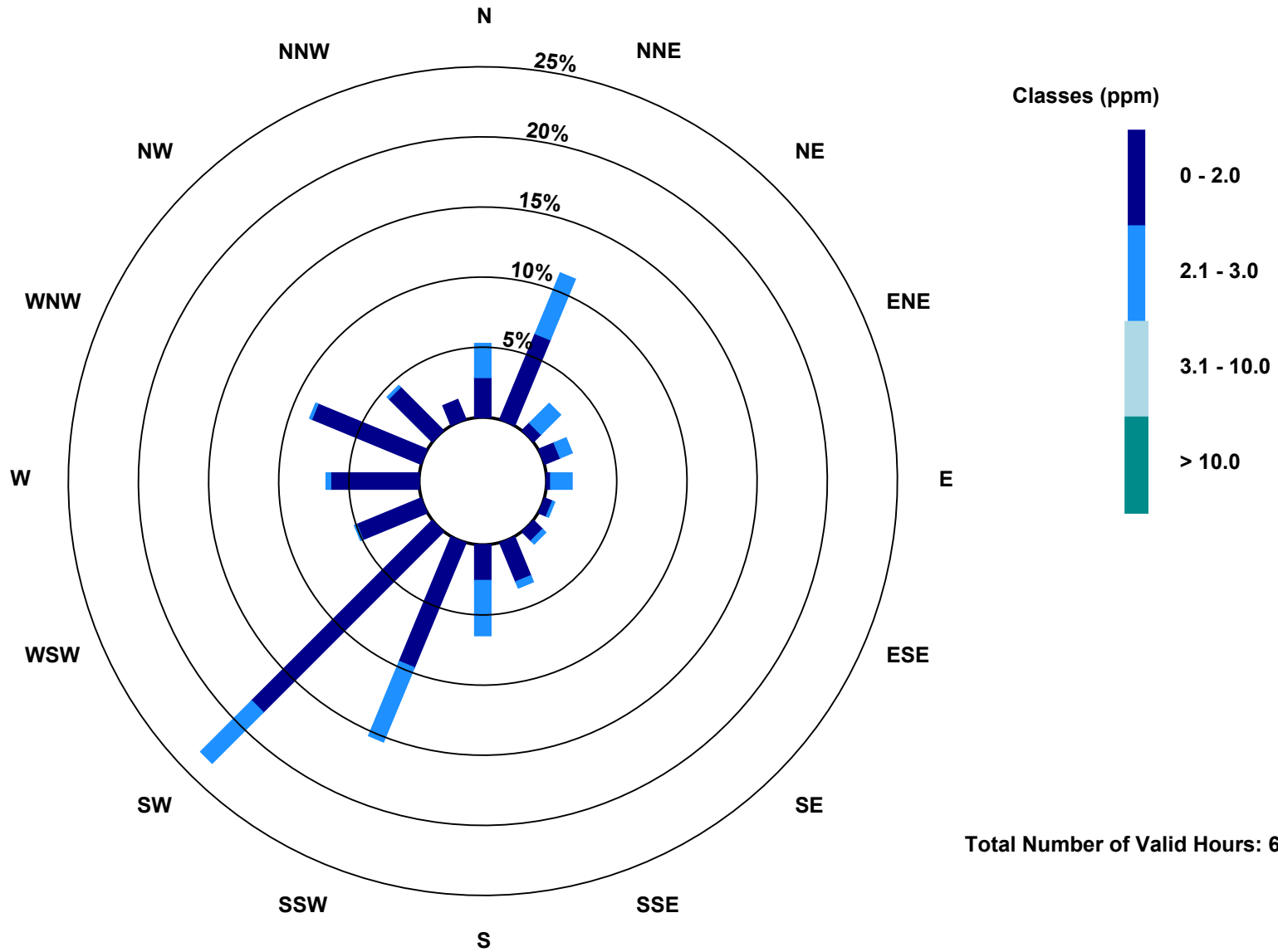
Total Number of Valid Hours: 665

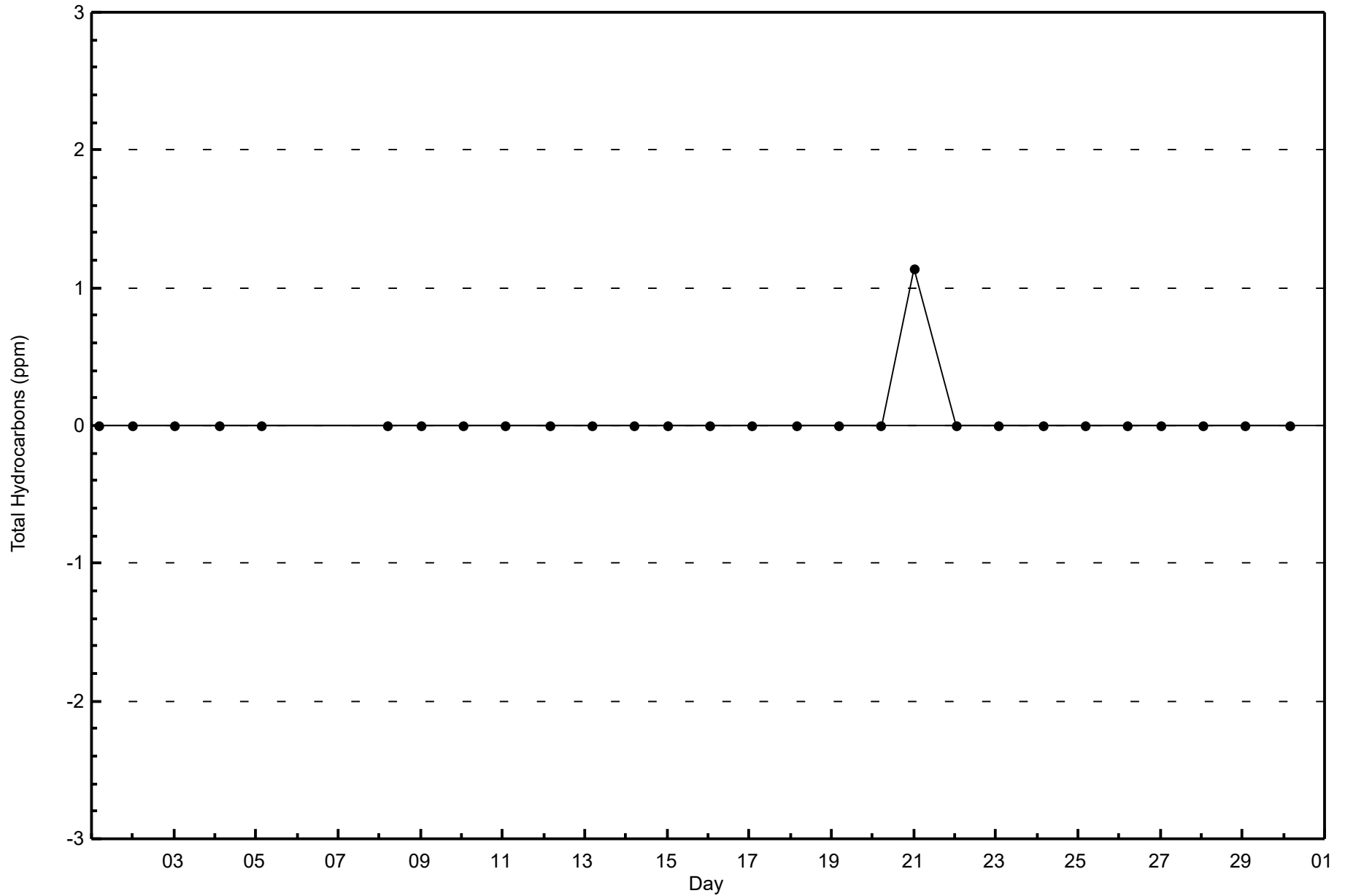
Total Number of Hours: 720

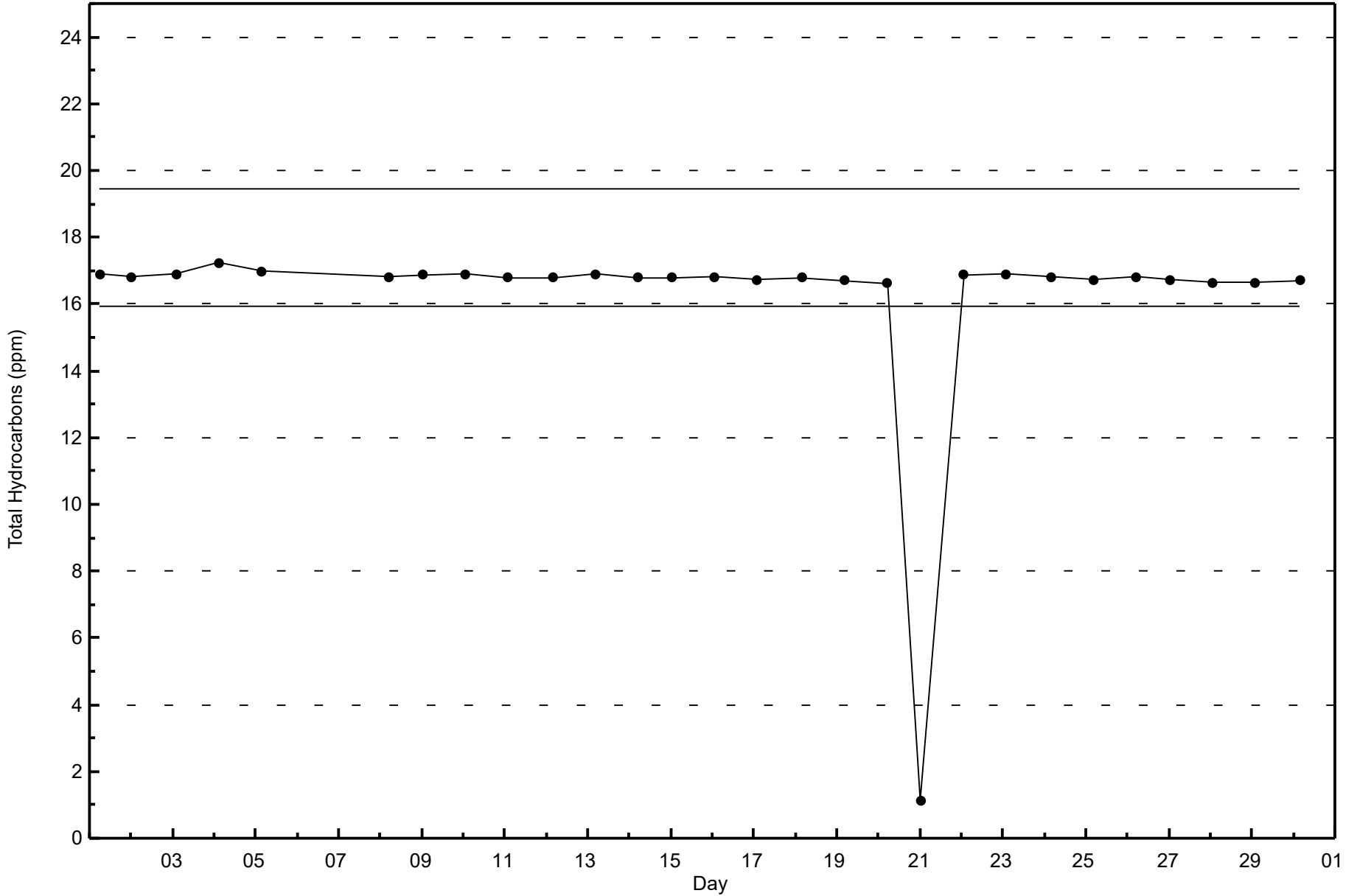


Wood Buffalo Environmental Association  
Wind Rose Nov 2023

Total Hydrocarbons (THC) - ppm  
Janvier

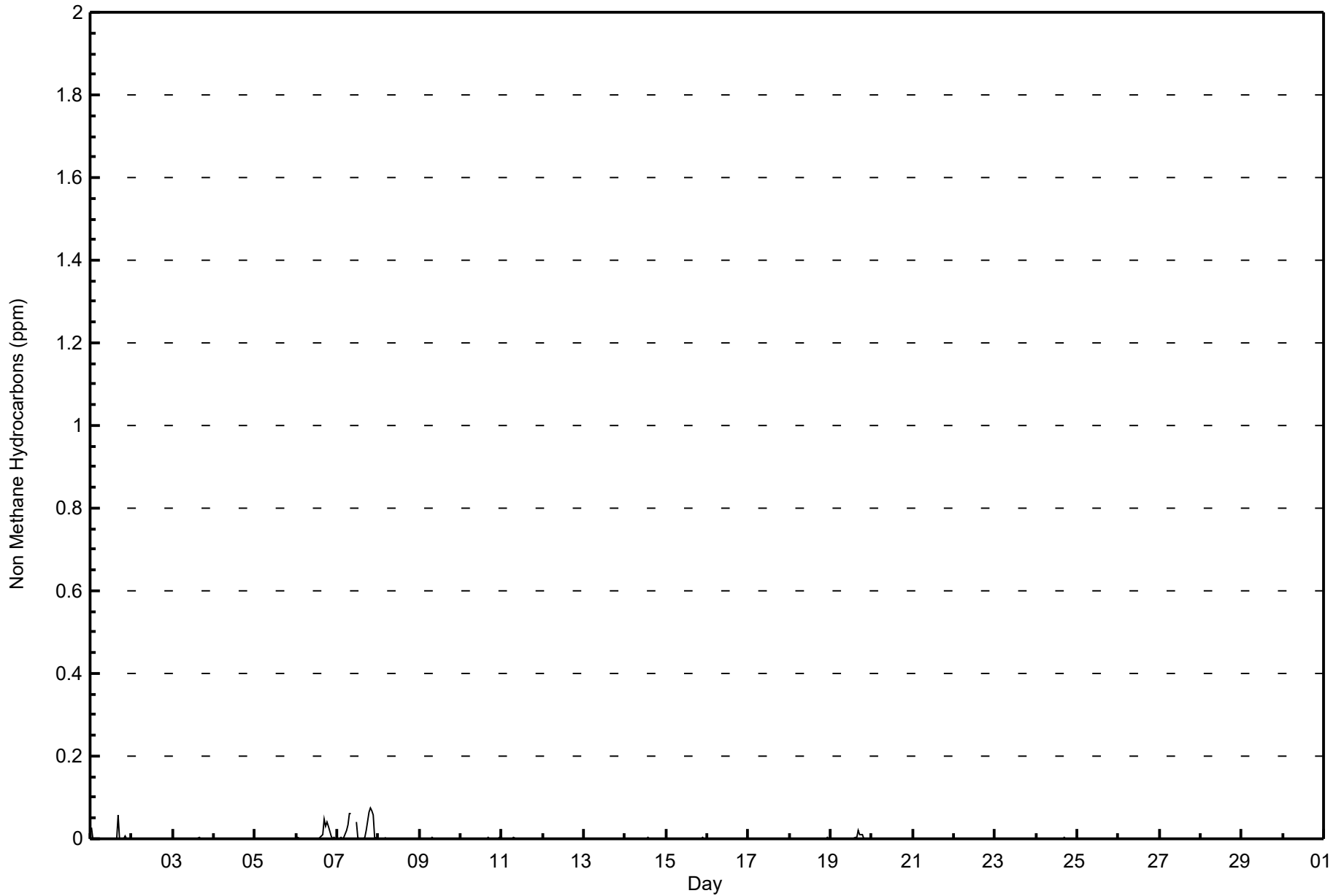








Maximum Value: 0.074 ppm on Nov 7 20:00																				Maximum Daily Average: 0.023 ppm on Nov 7					Hours in Service: 720		
Minimum Value: 0.000 ppm on Nov 1 02:00																				Minimum Daily Average: 0.000 ppm on Nov 2					Hours of Data: 665		
Maximum Diurnal Average: 0.005 ppm at hour 17																				Minimum Diurnal Average: 0.000 ppm at hour 4					Hours of Missing Data: 55		
Monthly Average: 0.001 ppm																				Percentiles: P <sub>1</sub> = 0.0 P <sub>10</sub> = 0.0 Q <sub>1</sub> = 0.0 Median = 0.0 Q <sub>3</sub> = 0.0 P <sub>90</sub> = 0.0 P <sub>99</sub> = 0.1					Hours of Calibration: 32		
																									Percent Operational Time: 96.8		
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Nov	0.027	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	0.058	0.000	0.000	0.000	0.005	0.000	0.000	0.000	0.004	0.058	
2-Nov	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
3-Nov	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	C	C	C	C	C	0.000	0.002	0.002	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002
4-Nov	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
5-Nov	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
6-Nov	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	0.003	0.010	0.048	0.032	0.041	0.032	0.008	0.002	0.002	0.000	0.007	0.048	
7-Nov	0.000	0.000	0.002	0.000	0.005	0.019	0.035	0.061	0.062	M	M	0.039	0.004	0.000	0.000	0.000	0.002	0.020	0.063	0.074	0.067	0.058	0.005	0.000	0.023	0.074	
8-Nov	0.000	0.000	0.000	0.000	0.002	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002
9-Nov	Z	0.000	0.000	0.000	0.000	0.000	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.005	0.005
10-Nov	0.000	Z	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.004	0.001	0.000	0.000	0.000	0.000	0.001	0.005	0.001	0.005	0.005
11-Nov	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003
12-Nov	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.001	0.001
13-Nov	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
14-Nov	0.000	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.002
15-Nov	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.004	0.000	0.000	0.000	0.004	0.004
16-Nov	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.002
17-Nov	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
18-Nov	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.001	0.001	0.001	0.002	0.000	0.000	0.000	0.003	0.000	0.000	0.003
19-Nov	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.001	0.000	0.002	0.002	0.020	0.011	0.010	0.000	0.000	0.000	0.000	0.000	0.002	0.020	0.020
20-Nov	0.000	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	UO	UO	UO	UO	UO	UO	UO	--	0.000	0.000
21-Nov	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	M	M	M	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	--	0.000	0.000
22-Nov	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
23-Nov	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
24-Nov	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.005	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.005	0.005
25-Nov	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
26-Nov	0.000	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001
27-Nov	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
28-Nov	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
29-Nov	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001
30-Nov	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.001	0.001
																								Diurnal Average			
																								Diurnal Maximum			
Z - zerospan																											
C - Calibration																											
M - Maintenance																											
UO - Unstable Operation																											





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Non Methane Hydrocarbons (NMHC) - ppm  
Janvier - November 2023**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 0.005	644	96.84	96.84
0.006 - 0.05	14	2.11	98.95
0.06 - 0.1	7	1.05	100.00
> 0.1	0	0.00	100.00

Total Number of Valid Hours: 665

Total Number of Hours: 720





**Wood Buffalo Environmental Association  
Frequency Distribution**

**Non Methane Hydrocarbons (NMHC) - ppm  
Janvier - November 2023**

<b>Concentration Ranges (ppm)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 0.005	35	75	18	14	12	5	8	23	40	91	149	34	43	57	30	10	644
0.006 - 0.05	0	0	0	0	0	0	0	0	3	6	4	0	1	0	0	0	14
0.06 - 0.1	0	0	0	0	0	0	0	0	0	5	2	0	0	0	0	0	7
> 0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	35	75	18	14	12	5	8	23	43	102	155	34	44	57	30	10	665

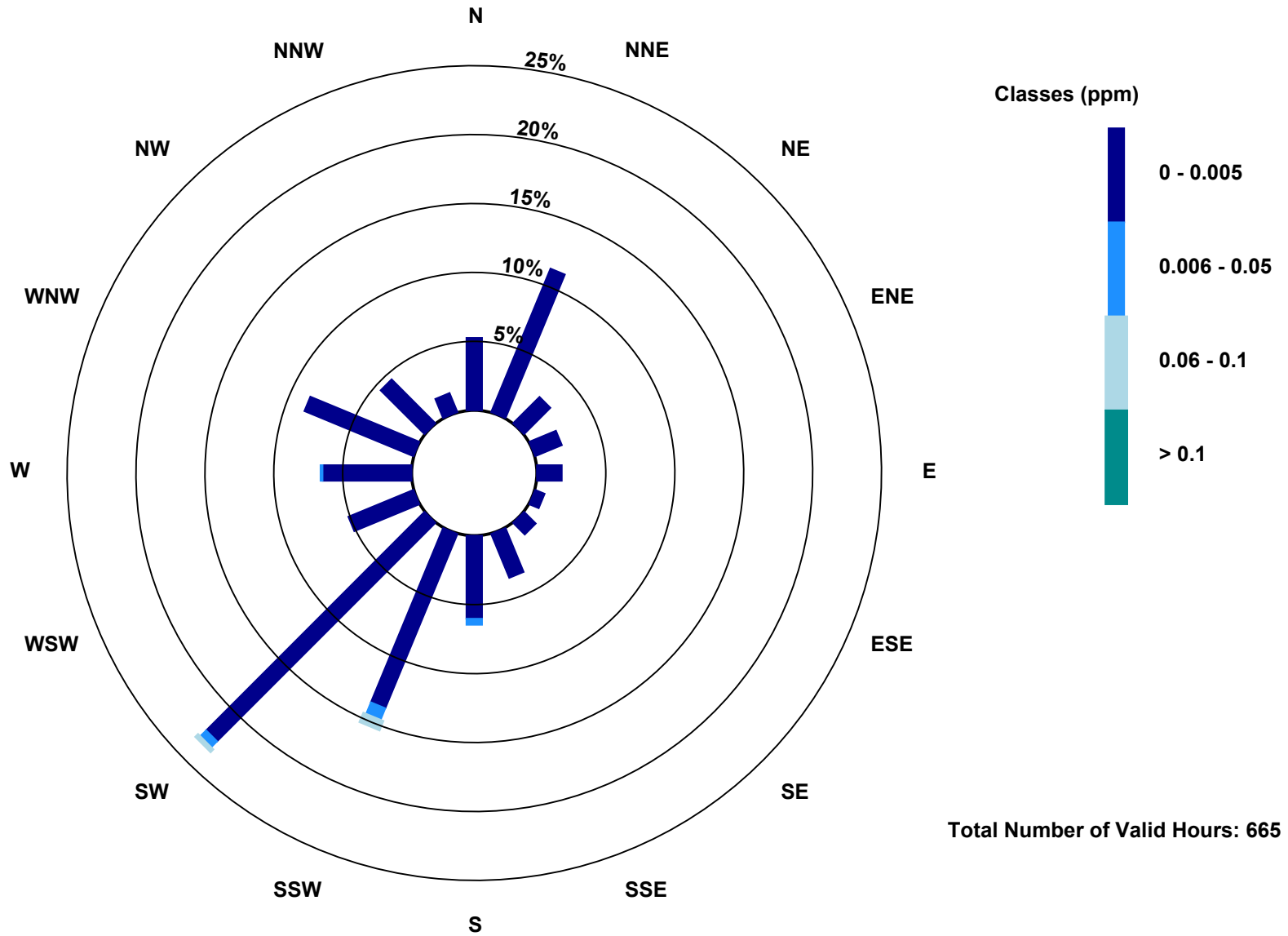
Total Number of Valid Hours: 665

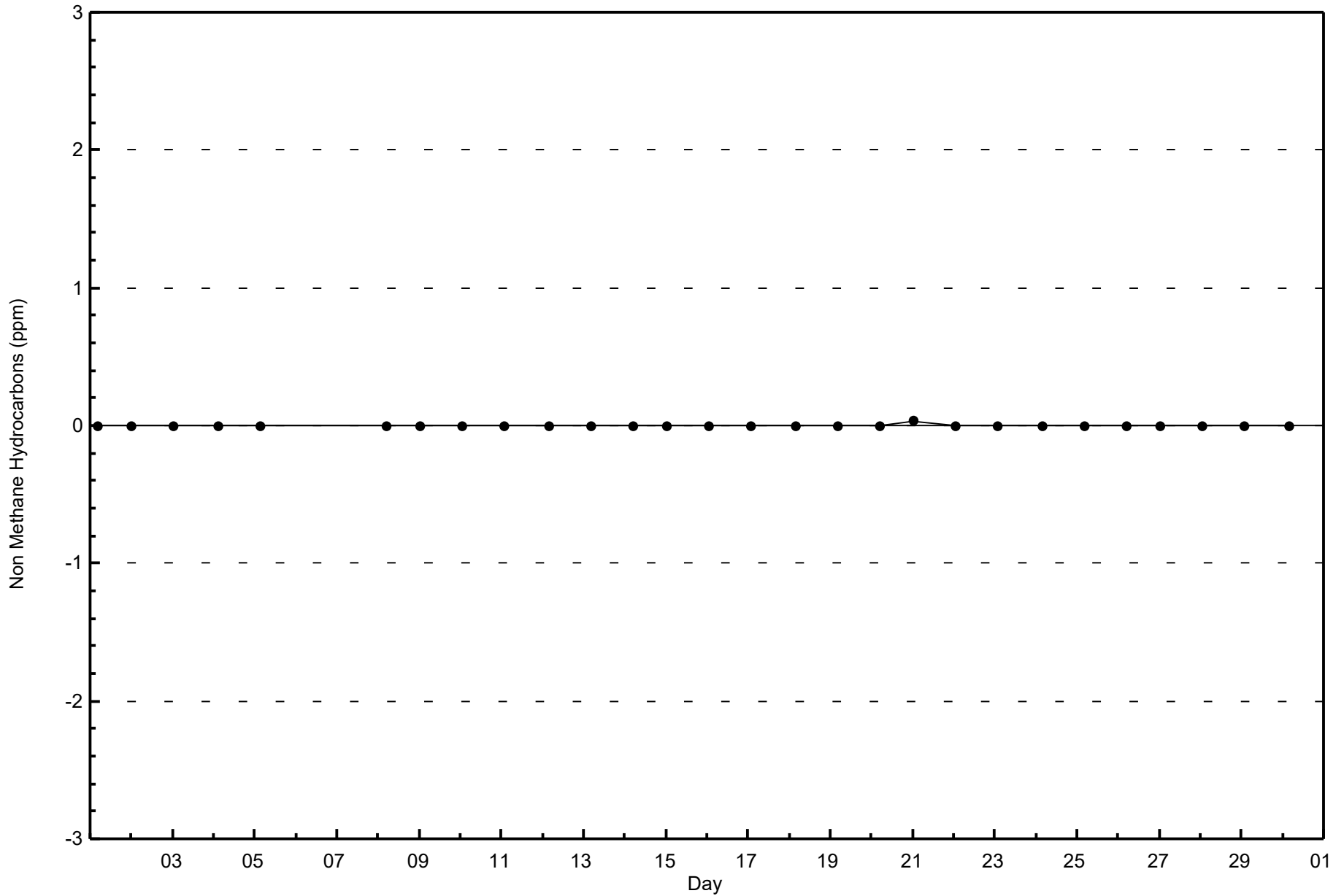
Total Number of Hours: 720

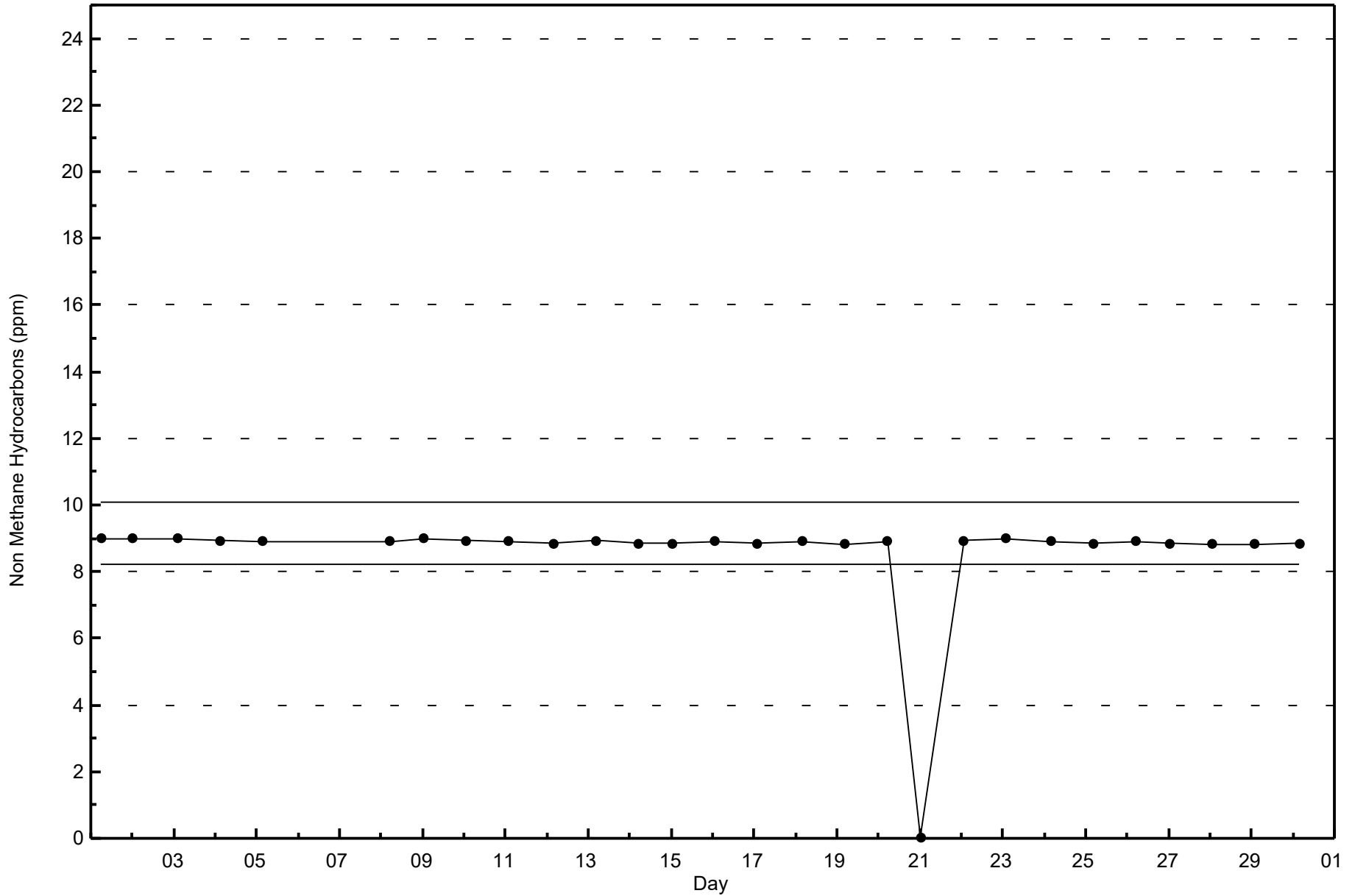


Wood Buffalo Environmental Association  
Wind Rose Nov 2023

Non Methane Hydrocarbons (NMHC) - ppm  
Janvier





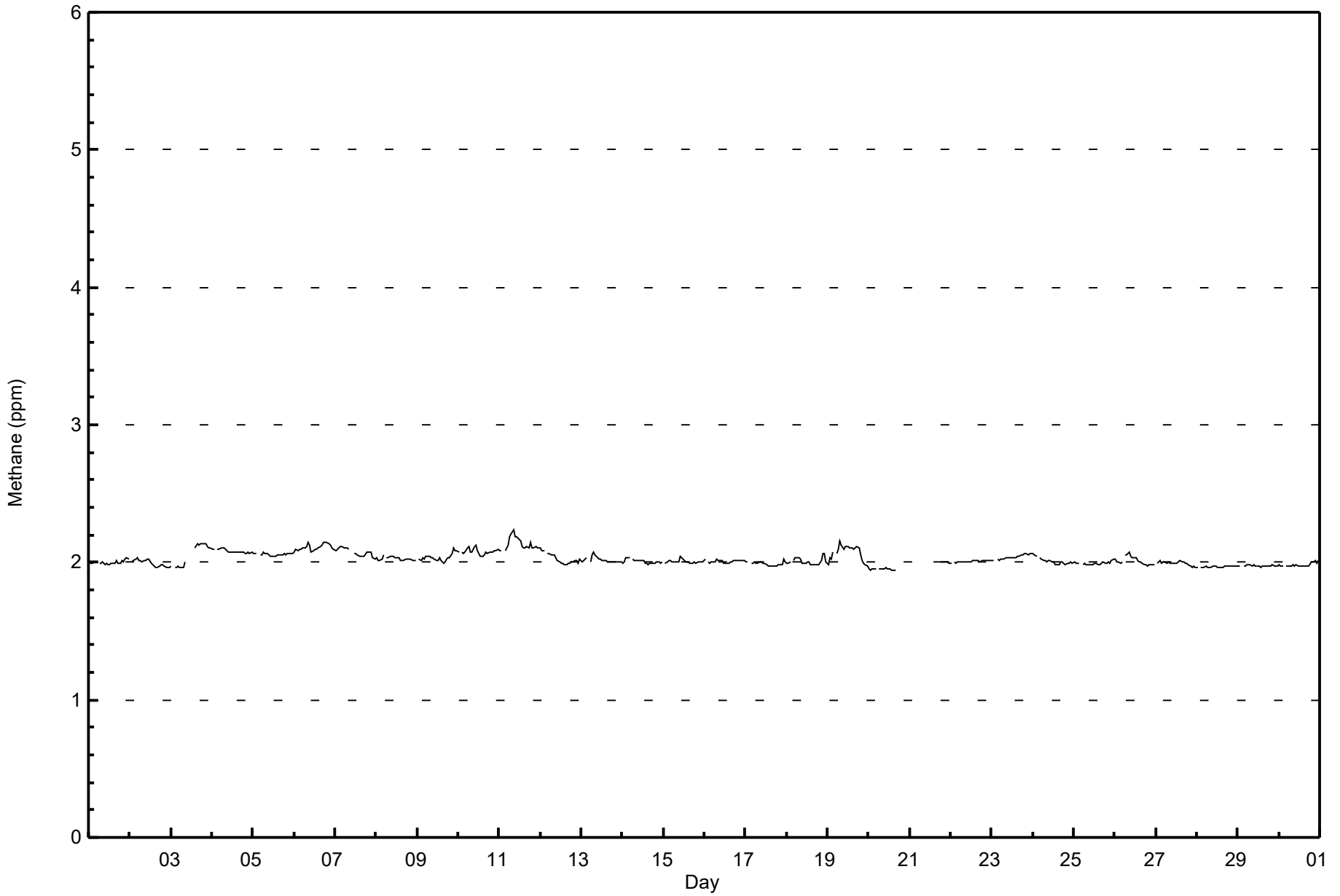






**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Methane (CH<sub>4</sub>) - ppm**  
**Janvier - November 2023**





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

**Methane (CH<sub>4</sub>) - ppm**  
**Janvier - November 2023**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2.0	483	72.63	72.63
2.1 - 3.0	182	27.37	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 665

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Methane (CH<sub>4</sub>) - ppm  
Janvier - November 2023**

<b>Concentration Ranges (ppm)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	19	44	5	8	2	4	6	20	17	65	123	33	42	56	29	10	483
2.1 - 3.0	16	31	13	6	10	1	2	3	26	37	32	1	2	1	1	0	182
3.1 - 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	35	75	18	14	12	5	8	23	43	102	155	34	44	57	30	10	665

Total Number of Valid Hours: 665

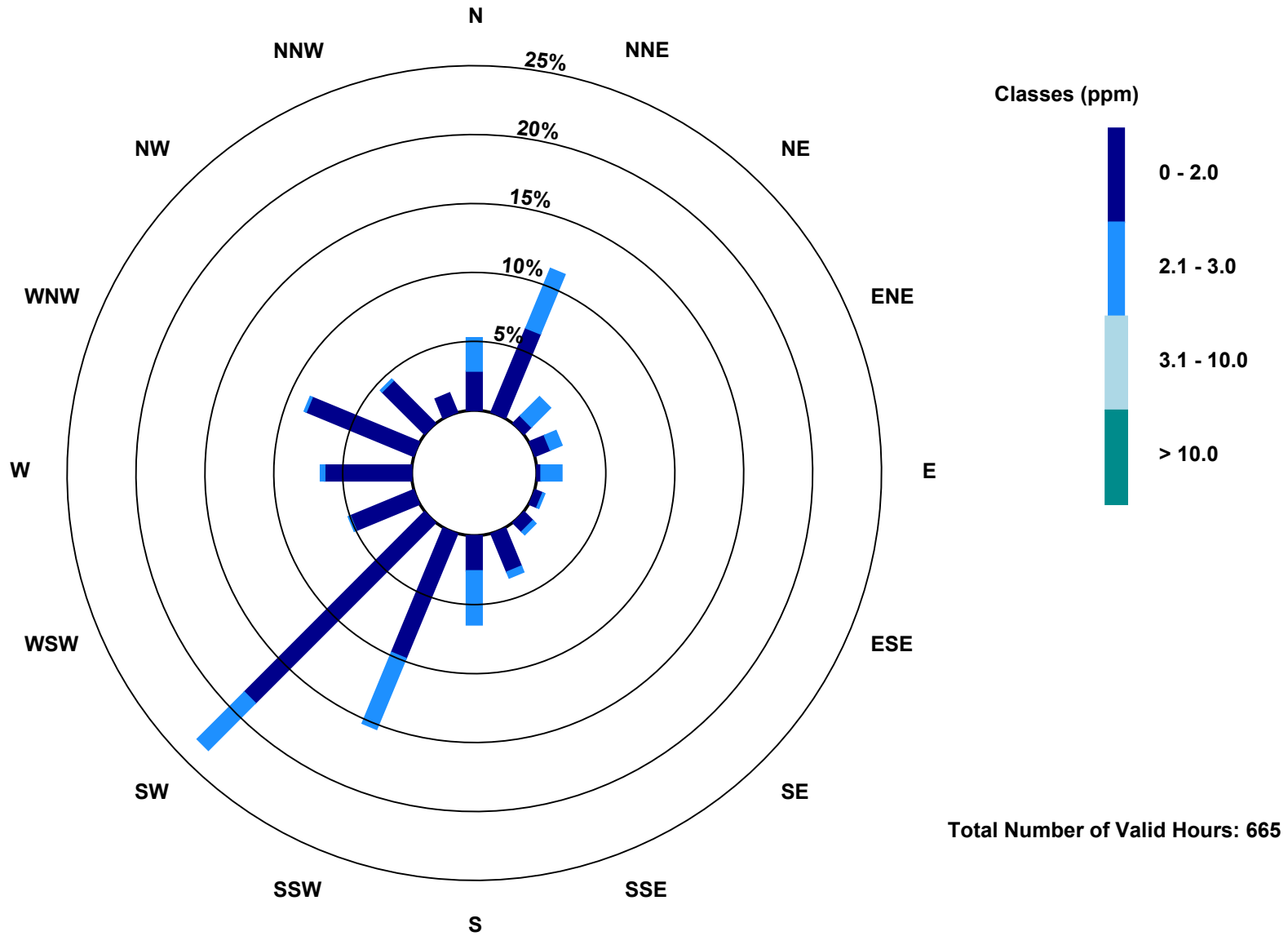
Total Number of Hours: 720

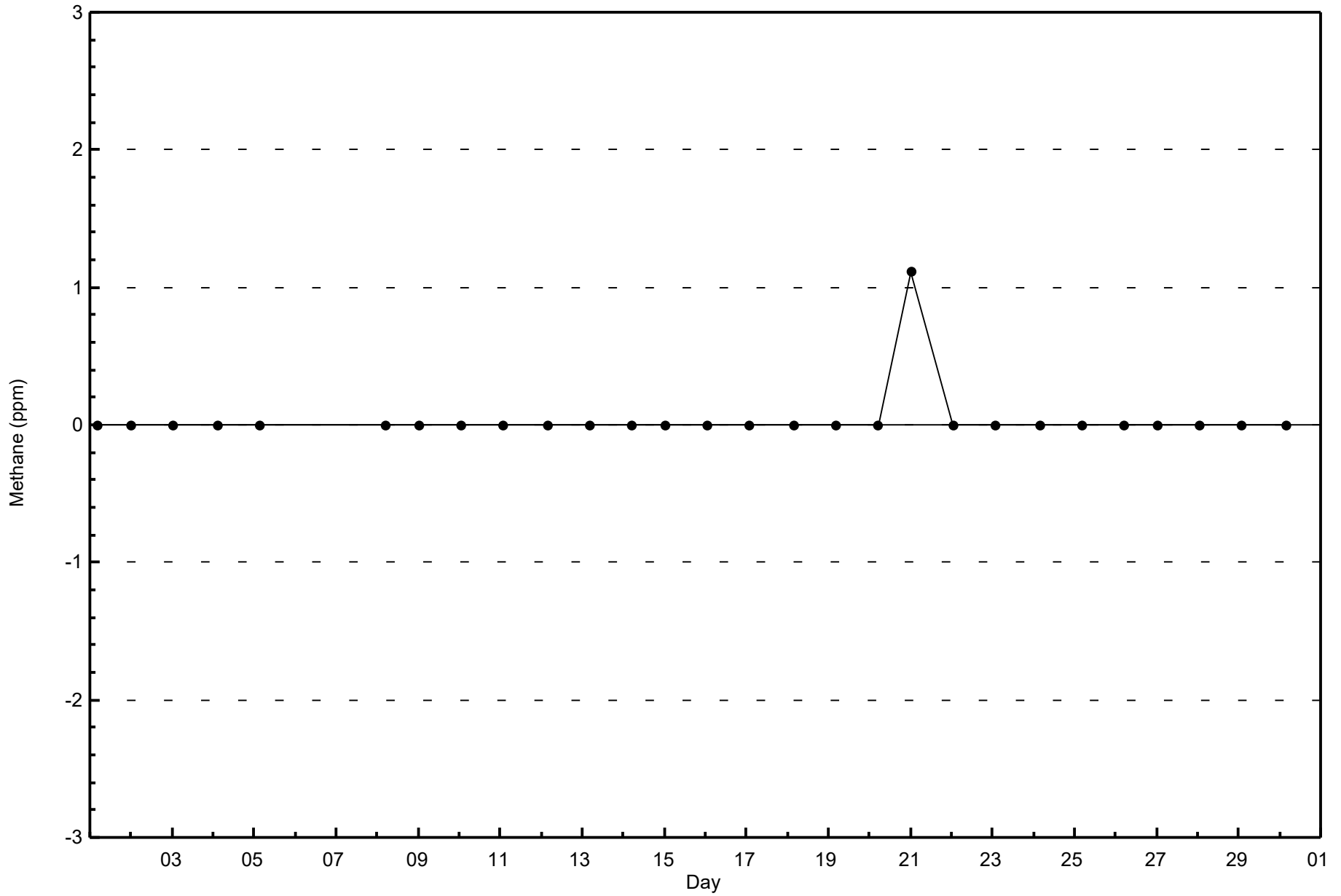


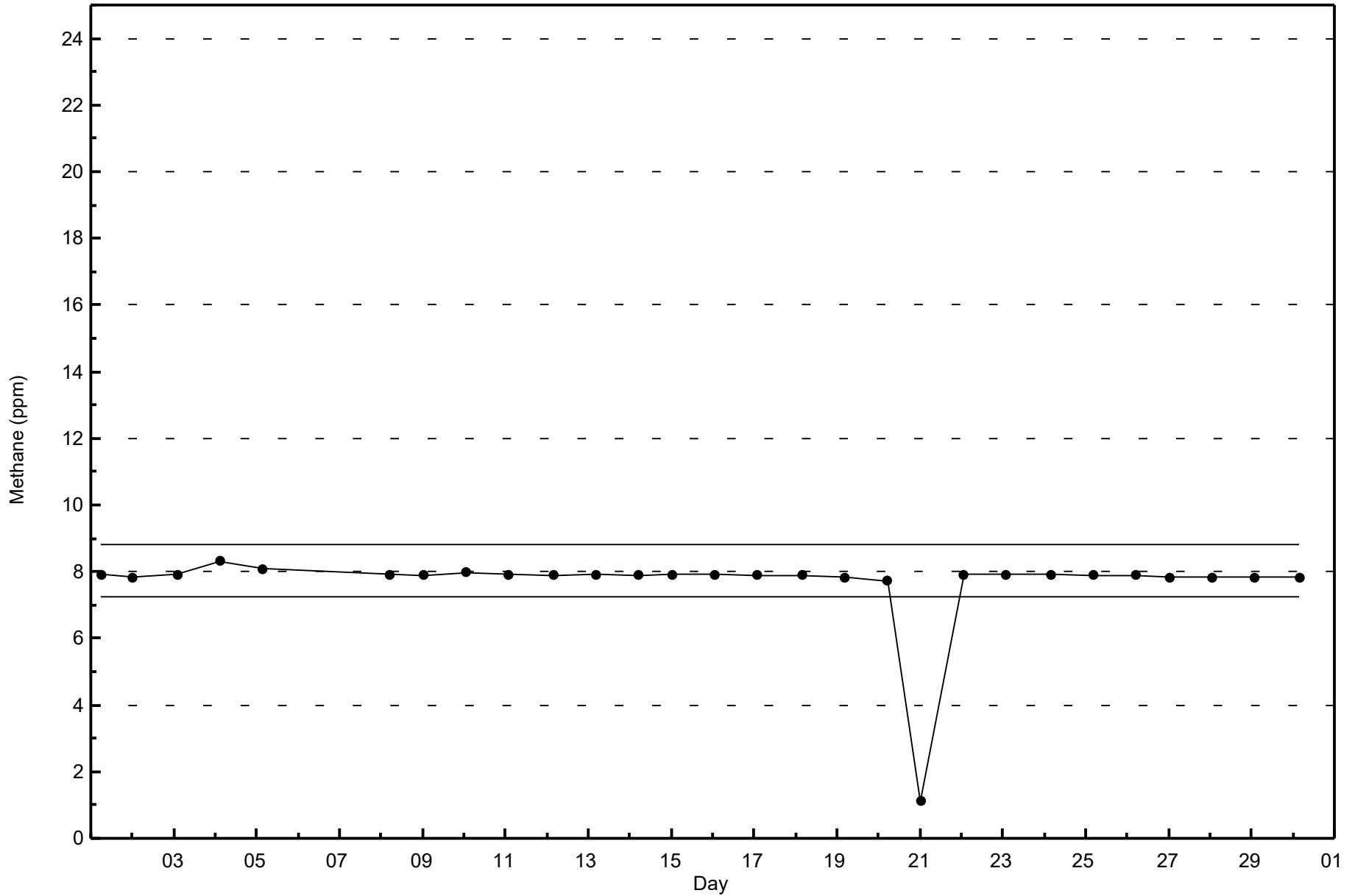


Wood Buffalo Environmental Association  
Wind Rose Nov 2023

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









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

**Nitric Oxide (NO) - ppb**  
**Janvier - November 2023**

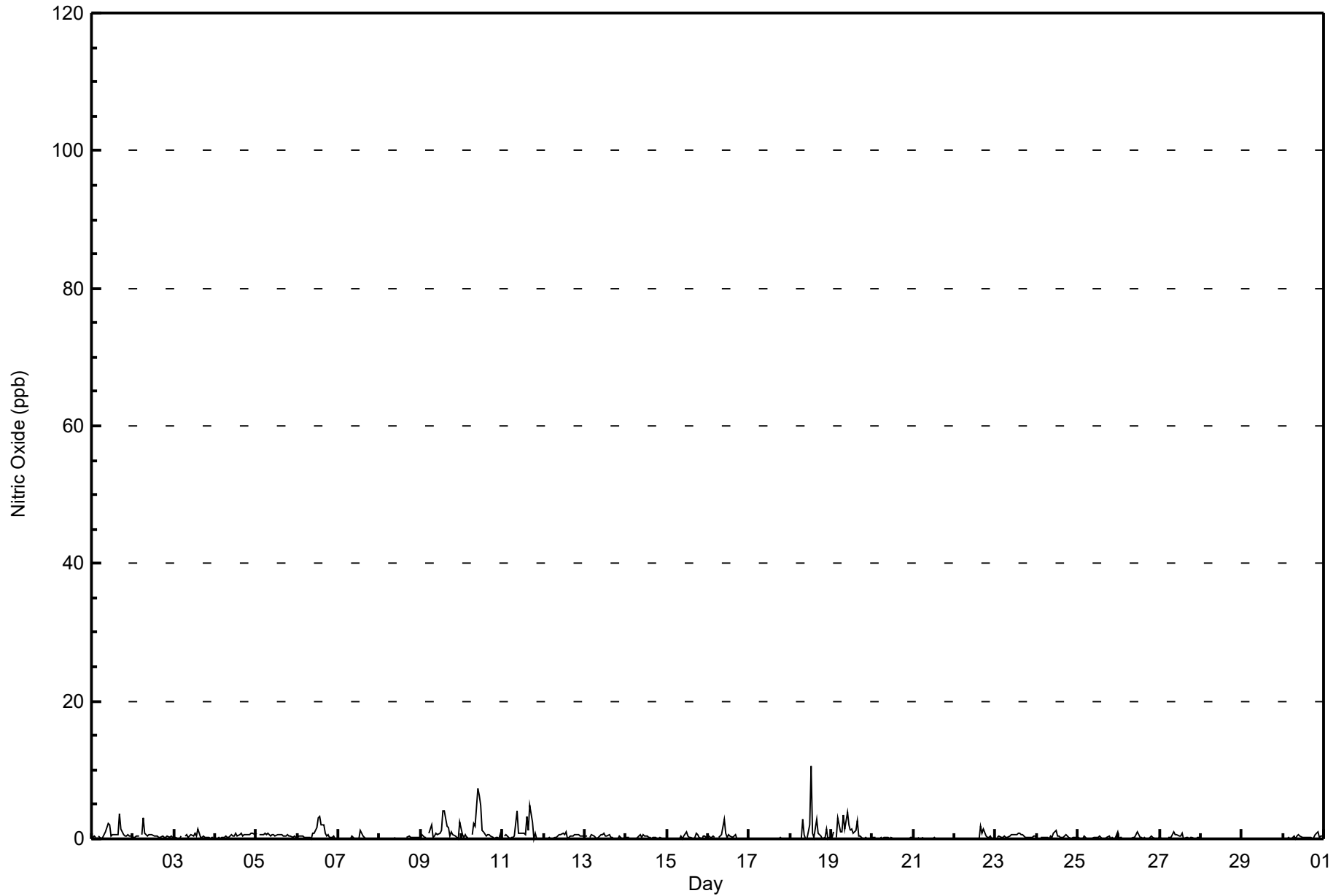
Maximum Value: 10.5 ppb on Nov 18 13:00		Maximum Daily Average: 1.3 ppb on Nov 10		Hours in Service: 720																						
Minimum Value: 0.0 ppb on Nov 4 02:00		Minimum Daily Average: 0.0 ppb on Nov 29		Hours of Data: 685																						
Maximum Diurnal Average: 0.9 ppb at hour 13		Minimum Diurnal Average: 0.2 ppb at hour 23		Hours of Missing Data: 35																						
Monthly Average: 0.43 ppb		Percentiles: P <sub>1</sub> = 0.0 P <sub>10</sub> = 0.0 Q <sub>1</sub> = 0.0 Median = 0.2 Q <sub>3</sub> = 0.5 P <sub>90</sub> = 0.9 P <sub>99</sub> = 4.0		Hours of Calibration: 34																						
				Percent Operational Time: 99.9																						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	0.1	0.3	0.1	Z	0.3	0.1	0.3	0.6	1.0	2.1	2.0	0.4	0.6	0.7	0.6	0.7	3.6	1.4	0.6	0.4	0.4	0.5	0.4	0.4	0.8	3.6
2-Nov	0.1	0.3	0.4	0.3	Z	0.6	3.0	0.7	0.5	0.6	0.7	0.6	0.3	0.4	0.5	0.2	0.3	0.5	0.2	0.3	0.4	0.2	0.4	0.3	0.5	3.0
3-Nov	0.2	0.2	0.0	0.1	0.5	Z	0.4	0.5	0.2	0.4	0.7	0.3	0.9	0.5	1.4	0.2	0.1	0.4	0.1	0.2	0.3	0.1	0.1	0.2	0.3	1.4
4-Nov	Z	0.0	0.1	0.1	0.2	0.1	0.4	0.2	0.3	0.7	0.4	0.4	0.9	0.4	0.7	0.9	0.4	0.6	0.6	0.6	0.7	0.8	0.9	0.7	0.5	0.9
5-Nov	0.8	Z	0.7	0.7	0.7	0.7	0.6	0.7	0.4	0.6	0.6	0.4	0.6	0.6	0.5	0.6	0.4	0.4	0.5	0.4	0.3	0.2	0.3	0.3	0.5	0.8
6-Nov	0.2	0.4	0.4	0.5	0.2	0.2	0.3	0.2	0.1	0.9	0.8	1.7	3.1	3.3	2.1	2.0	0.8	0.4	0.5	0.2	0.1	0.4	0.0	0.1	0.8	3.3
7-Nov	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.3	0.0	0.1	M	0.1	1.2	0.5	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	1.2
8-Nov	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.1	C	C	C	C	C	C	0.1	0.4	0.2	0.2	0.2	0.2	0.1	0.3	--	0.4
9-Nov	0.1	0.5	0.2	0.3	Z	0.8	2.1	0.2	0.3	0.7	0.6	0.8	1.2	4.1	4.1	1.7	1.5	0.4	1.0	0.5	0.4	0.2	0.0	2.4	1.1	4.1
10-Nov	0.6	0.2	0.5	0.1	0.2	Z	0.7	2.1	1.8	7.4	6.2	4.8	1.3	0.9	0.3	0.7	0.5	0.4	0.1	0.0	0.2	0.1	0.0	1.5	1.3	7.4
11-Nov	Z	0.4	0.6	0.1	0.0	0.2	0.2	0.3	4.0	0.9	0.8	0.8	0.8	0.7	3.3	1.3	4.8	2.5	0.0	0.8	0.0	0.0	0.0	0.0	1.0	4.8
12-Nov	0.0	Z	0.0	0.2	0.0	0.1	0.2	0.3	0.4	0.5	0.7	0.7	0.6	1.0	0.1	0.3	0.3	0.4	0.6	0.6	0.5	0.5	0.3	0.4	0.4	1.0
13-Nov	0.5	0.3	Z	0.2	0.6	0.5	0.3	0.1	0.3	0.6	0.7	0.7	0.5	0.5	0.6	0.2	0.3	0.1	0.1	0.1	0.3	0.3	0.1	0.2	0.3	0.7
14-Nov	0.2	0.2	0.2	Z	0.1	0.0	0.0	0.1	0.6	0.3	0.7	0.4	0.4	0.1	0.2	0.0	0.2	0.2	0.0	0.0	0.2	0.0	0.0	0.0	0.2	0.7
15-Nov	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.5	0.1	0.5	0.9	0.5	0.2	0.2	0.0	0.2	0.7	0.5	0.2	0.1	0.5	0.5	0.3	0.3	0.9
16-Nov	0.4	0.2	0.2	0.4	0.2	Z	0.2	0.5	0.6	2.8	0.9	0.2	0.6	0.3	0.1	0.3	0.6	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.4	2.8
17-Nov	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1
18-Nov	0.0	Z	0.0	0.0	0.0	0.0	0.0	2.9	0.6	0.0	0.0	2.0	10.5	0.8	0.1	2.8	0.9	0.7	0.4	0.0	0.3	1.4	0.0	0.1	1.0	10.5
19-Nov	0.2	1.0	Z	0.3	3.1	1.1	1.1	3.5	1.5	3.9	1.9	1.3	1.5	0.8	1.2	2.7	0.5	0.5	0.1	0.0	0.1	0.1	0.0	0.1	1.1	3.9
20-Nov	0.2	0.2	0.2	Z	0.1	0.1	0.0	0.1	0.2	0.2	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.1	0.2
21-Nov	0.2	0.0	0.1	0.2	Z	0.1	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
22-Nov	0.0	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	1.8	0.8	1.3	0.4	0.1	0.1	0.4	0.0	0.1	0.2	1.8
23-Nov	Z	0.2	0.4	0.1	0.2	0.4	0.3	0.2	0.5	0.5	0.5	0.6	0.6	0.7	0.8	0.7	0.5	0.3	0.2	0.2	0.3	0.2	0.5	0.4	0.4	0.8
24-Nov	0.3	Z	0.2	0.3	0.2	0.3	0.2	0.1	0.3	0.2	0.8	1.3	0.4	0.3	0.1	0.3	0.3	0.6	0.3	0.2	0.0	0.2	0.2	0.1	0.3	1.3
25-Nov	0.3	0.0	Z	0.0	0.4	0.0	0.0	0.0	0.1	0.2	0.2	0.1	0.3	0.5	0.1	0.0	0.0	0.2	0.5	0.0	0.1	0.0	0.0	1.0	0.2	1.0
26-Nov	0.0	0.2	0.2	Z	0.0	0.1	0.0	0.0	0.2	0.3	0.7	1.0	0.2	0.2	0.1	0.2	0.0	0.0	0.1	0.3	0.2	0.0	0.0	0.1	0.2	1.0
27-Nov	0.4	0.0	0.0	0.1	Z	0.1	0.1	0.7	0.9	0.5	0.6	0.3	0.3	0.9	0.1	0.3	0.2	0.1	0.2	0.1	0.0	0.0	0.2	0.2	0.3	0.9
28-Nov	0.0	0.0	0.1	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
29-Nov	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
30-Nov	0.0	Z	0.0	0.1	0.0	0.1	0.3	0.0	0.5	0.7	0.4	0.2	0.3	0.2	0.3	0.2	0.3	0.1	0.2	0.7	0.9	0.3	0.4	0.5	0.3	0.9
																								Diurnal Average		
																								Diurnal Maximum		
																								0.2 0.8		
																								0.2 1.0		
																								0.2 0.7		
																								0.2 0.7		
																								0.3 3.1		
																								0.2 1.1		
																								0.4 3.0		
																								0.5 3.5		
																								0.5 4.0		
																								0.8 7.4		
																								0.7 6.2		
																								0.7 4.8		
																								0.9 10.5		
																								0.7 4.1		
																								0.6 4.1		
																								0.6 2.8		
																								0.6 4.8		
																								0.6 2.5		
																								0.4 1.0		
																								0.3 0.8		
																								0.2 0.9		
																								0.2 1.4		
																								0.2 0.9		
																								0.2 2.4		

Z - zerspan      C - Calibration      M - Maintenance



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

**Nitric Oxide (NO) - ppb**  
**Janvier - November 2023**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Nitric Oxide (NO) - ppb  
Janvier - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	685	100.00	100.00
21 - 40	0	0.00	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitric Oxide (NO) - ppb  
Janvier - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 20	35	78	20	17	13	8	10	22	43	106	153	35	47	61	25	12	685
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	<b>35</b>	<b>78</b>	<b>20</b>	<b>17</b>	<b>13</b>	<b>8</b>	<b>10</b>	<b>22</b>	<b>43</b>	<b>106</b>	<b>153</b>	<b>35</b>	<b>47</b>	<b>61</b>	<b>25</b>	<b>12</b>	<b>685</b>

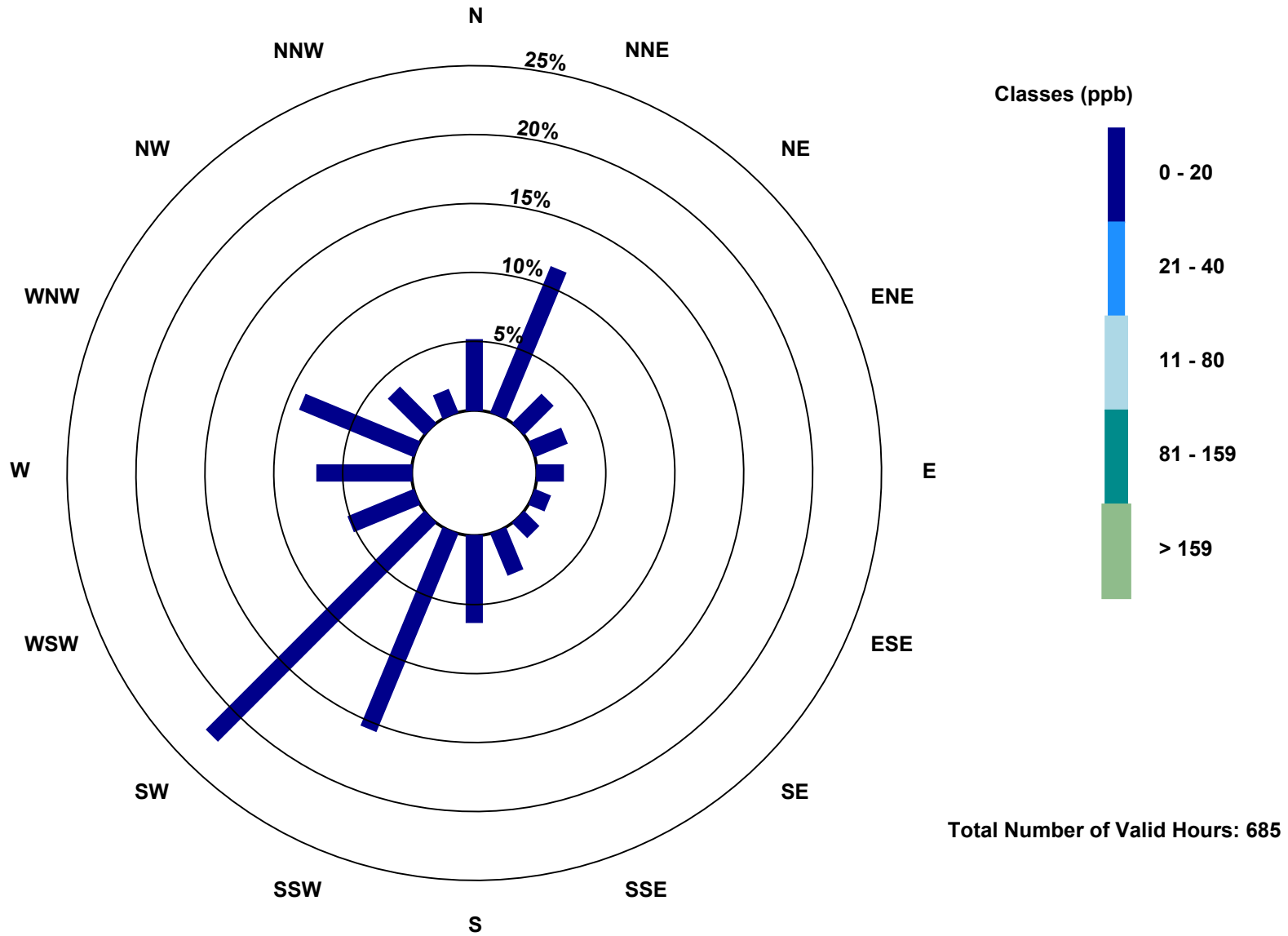
Total Number of Valid Hours: 685

Total Number of Hours: 720

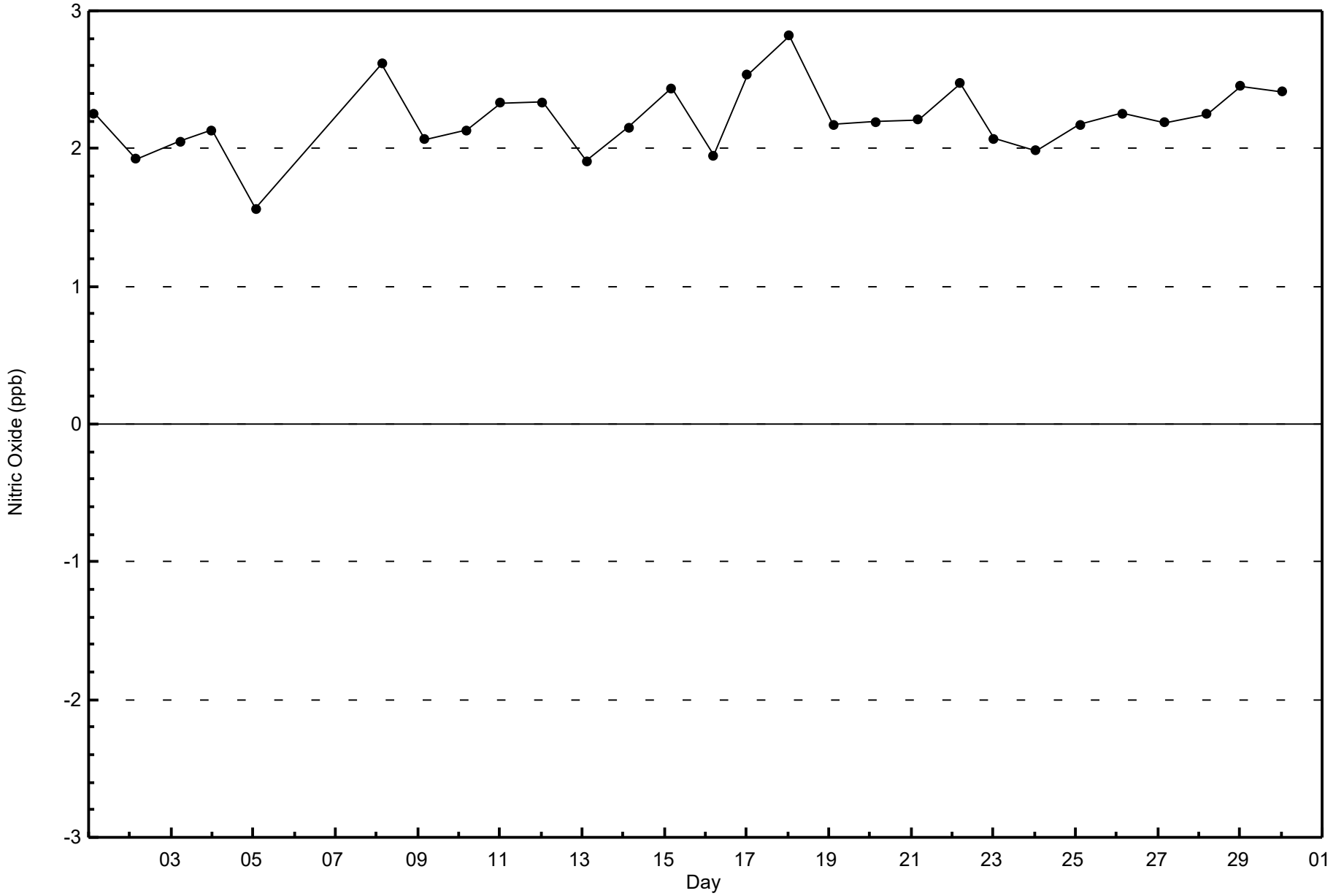


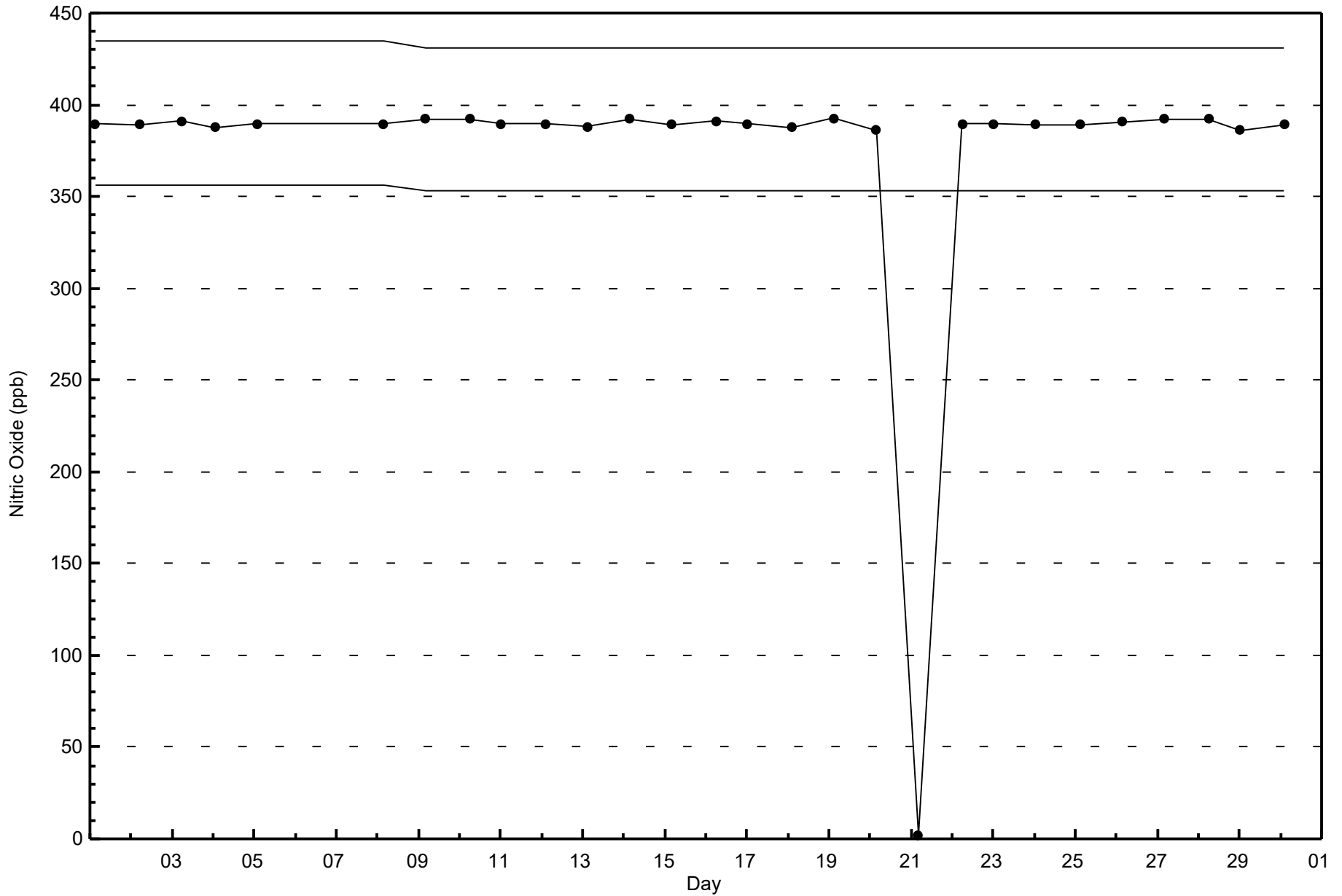
Wood Buffalo Environmental Association  
Wind Rose Nov 2023

Nitric Oxide (NO) - ppb  
Janvier











Wood Buffalo Environmental Association

Summary of Hour Averages

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

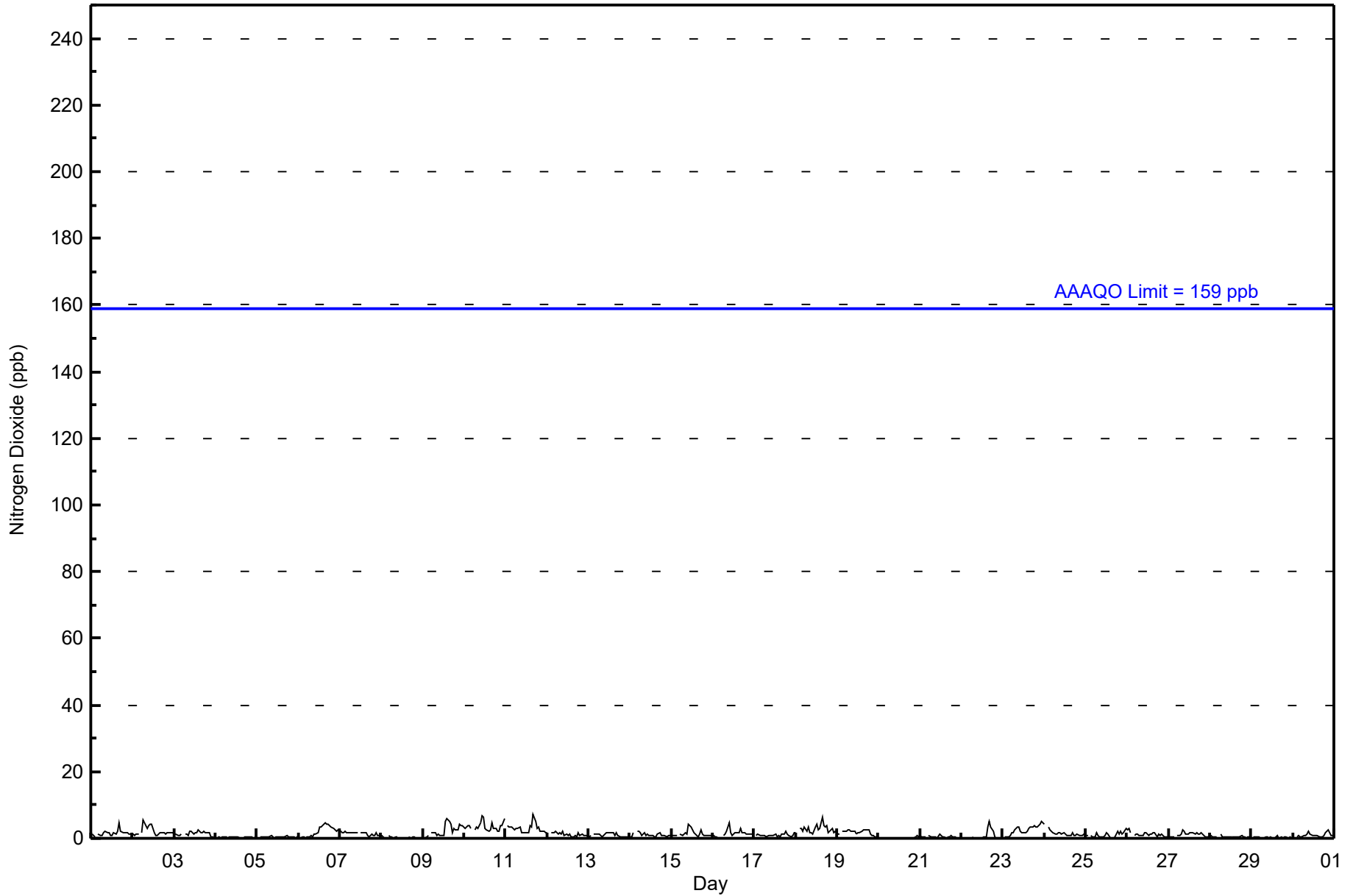
Janvier - November 2023

Number of Exceedences (AAAQO):		1-hr: 0		24-hr: 0		Hours in Service:														720						
Maximum Value: 7.0 ppb on Nov 11 17:00				Maximum Daily Average: 3.6 ppb on Nov 10		Hours of Data:														685						
Minimum Value: 0.0 ppb on Nov 20 02:00				Minimum Daily Average: 0.1 ppb on Nov 20		Hours of Missing Data:														35						
Maximum Diurnal Average: 2.0 ppb at hour 17				Minimum Diurnal Average: 1.0 ppb at hour 2		Hours of Calibration:														34						
Monthly Average: 1.37 ppb				Percentiles: P <sub>1</sub> = 0.0 P <sub>10</sub> = 0.2 Q <sub>1</sub> = 0.5 Median = 1.0 Q <sub>3</sub> = 1.8 P <sub>90</sub> = 3.1 P <sub>99</sub> = 5.2		Percent Operational Time:														99.9						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	1.4	0.7	0.6	Z	1.1	0.7	0.7	1.5	2.3	1.9	1.8	0.8	1.0	1.7	1.4	2.2	4.5	2.3	1.9	1.5	1.7	1.7	1.2	1.1	1.6	4.5
2-Nov	1.1	0.9	1.1	1.3	Z	1.8	5.6	4.7	2.8	3.9	4.4	4.1	1.6	0.8	1.0	1.2	1.5	1.5	1.5	1.4	1.6	1.7	1.6	1.5	2.1	5.6
3-Nov	1.1	1.3	1.0	0.8	1.1	Z	1.2	1.3	1.0	2.1	2.1	1.3	1.5	1.8	2.5	1.6	1.9	2.3	1.6	1.6	1.6	0.6	0.5	0.3	1.4	2.5
4-Nov	Z	0.5	0.3	0.1	0.3	0.4	0.3	0.1	0.4	0.4	0.3	0.3	0.5	0.3	0.2	0.1	0.2	0.3	0.3	0.3	0.3	0.4	0.1	0.3	0.3	0.5
5-Nov	0.2	Z	0.6	0.3	0.4	0.6	0.4	0.6	0.9	0.3	0.2	0.3	0.3	0.4	0.5	0.4	0.6	0.8	0.6	0.3	0.3	0.4	0.2	0.3	0.4	0.9
6-Nov	0.6	0.2	0.4	0.4	0.2	0.3	0.5	0.7	0.5	1.2	1.1	1.9	3.2	3.5	3.9	4.5	4.3	4.1	3.7	3.5	2.9	2.5	2.2	2.4	2.0	4.5
7-Nov	2.1	1.9	1.8	2.0	1.8	1.8	1.5	1.7	1.9	1.6	1.6	M	1.8	1.9	1.9	1.6	0.9	0.6	1.2	0.7	0.9	1.5	0.9	0.7	1.5	2.1
8-Nov	0.8	0.6	0.1	Z	1.0	0.5	0.3	0.1	0.3	0.4	C	C	C	C	C	C	0.4	0.1	0.3	0.4	0.1	0.1	0.1	0.2	--	1.0
9-Nov	0.2	0.1	0.5	0.7	Z	1.9	1.8	1.5	0.7	1.3	0.8	0.7	1.0	4.9	6.0	5.1	4.1	1.6	3.0	2.4	2.6	4.4	3.8	3.9	2.3	6.0
10-Nov	3.0	3.3	4.0	4.0	3.1	Z	2.7	3.2	3.0	4.6	6.6	6.2	2.9	2.4	2.0	2.6	4.7	3.1	2.8	2.1	2.3	3.8	4.0	6.1	3.6	6.6
11-Nov	Z	4.0	3.6	3.3	3.0	2.7	2.8	3.1	3.2	1.9	1.8	1.6	1.7	1.9	3.8	3.5	7.0	5.1	2.9	3.2	2.0	2.3	2.3	1.9	3.0	7.0
12-Nov	1.8	Z	1.8	1.7	1.8	2.1	1.4	1.5	1.4	2.0	1.0	1.2	0.9	1.2	0.4	0.4	0.7	0.6	1.5	0.9	1.3	0.9	0.7	0.9	1.2	2.1
13-Nov	0.6	0.8	Z	1.2	1.4	1.2	1.1	0.7	0.6	1.4	1.5	1.8	1.5	1.8	1.8	1.0	1.7	0.8	0.5	0.4	0.5	0.4	0.4	0.3	1.0	1.8
14-Nov	0.4	0.6	1.6	Z	2.3	2.2	1.8	1.0	1.5	0.8	1.1	1.0	0.9	0.9	0.6	0.6	1.1	1.6	0.7	0.7	1.0	0.5	1.0	0.8	1.1	2.3
15-Nov	0.8	1.0	0.9	1.0	Z	1.2	0.7	1.4	1.8	1.3	4.3	3.2	2.6	1.8	1.3	0.5	1.2	2.4	1.3	1.0	0.8	0.9	0.8	0.9	1.4	4.3
16-Nov	0.7	0.3	0.3	0.2	0.2	Z	0.8	1.2	2.1	4.8	1.6	1.0	1.3	1.5	1.7	1.8	3.0	1.6	1.6	1.4	1.2	1.3	1.2	1.2	1.4	4.8
17-Nov	Z	1.0	1.1	0.8	0.7	0.7	0.9	0.6	0.7	1.0	0.8	0.9	1.1	0.6	0.7	0.6	1.2	1.4	2.2	1.2	1.0	0.3	0.8	1.9	1.0	2.2
18-Nov	1.5	Z	2.8	3.0	2.3	3.2	2.3	3.3	1.7	1.8	1.4	3.3	4.3	2.4	3.0	6.2	3.8	3.5	3.8	1.9	2.7	2.8	1.8	2.0	2.8	6.2
19-Nov	1.1	1.4	Z	2.1	2.3	2.2	2.7	2.7	2.2	2.3	2.1	1.4	1.5	1.5	2.2	2.6	2.5	2.5	2.6	1.1	0.9	0.7	0.6	0.5	1.8	2.7
20-Nov	0.1	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.5	0.8	0.3	0.1	0.8
21-Nov	0.7	0.4	0.5	0.3	Z	0.7	0.6	0.5	0.3	0.3	0.2	1.1	0.9	0.3	0.3	0.2	0.6	0.6	0.7	0.6	0.5	0.1	0.1	0.0	0.5	1.1
22-Nov	0.0	0.0	0.0	0.0	0.0	Z	0.6	0.0	0.1	0.0	0.0	0.2	0.2	0.3	0.3	3.3	5.0	3.2	2.2	0.5	0.2	0.0	0.0	0.1	0.7	5.0
23-Nov	Z	0.4	0.6	0.6	1.0	1.6	1.9	2.6	3.2	3.6	2.1	1.8	1.9	1.9	2.0	2.8	3.2	3.4	3.7	3.6	3.5	4.2	5.0	4.7	2.6	5.0
24-Nov	4.3	Z	3.3	2.4	2.3	1.8	1.4	1.4	1.5	1.5	1.3	1.8	1.3	0.8	0.8	1.0	1.5	1.0	0.7	1.3	0.9	0.9	0.9	1.2	1.5	4.3
25-Nov	0.9	0.8	Z	1.0	0.6	0.5	1.7	0.9	0.3	0.4	0.6	0.8	1.6	1.4	0.0	0.0	0.0	0.3	2.3	1.1	2.3	1.2	1.7	3.1	1.0	3.1
26-Nov	2.6	2.9	1.5	Z	1.0	1.1	1.1	0.8	1.0	1.0	1.5	1.8	0.9	1.2	1.3	1.7	1.7	0.6	1.1	1.0	1.2	0.3	0.5	0.4	1.2	2.9
27-Nov	0.6	0.4	0.4	0.5	Z	0.9	0.9	1.4	2.4	2.2	1.4	1.1	1.6	1.9	1.6	1.4	1.6	1.3	1.3	1.7	0.7	0.4	0.5	0.5	1.2	2.4
28-Nov	0.7	0.6	0.6	0.5	0.4	Z	1.2	0.4	0.3	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.5	0.4	0.7	0.4	0.4	0.2	0.3	0.5	0.5	1.2
29-Nov	Z	0.4	0.3	0.6	0.4	0.2	0.2	0.2	0.3	0.4	0.1	0.3	0.1	0.0	0.6	0.9	0.2	0.3	0.2	0.4	0.4	0.1	0.3	0.2	0.3	0.9
30-Nov	0.3	Z	0.4	0.7	0.5	0.6	0.7	1.0	1.1	2.1	1.3	0.7	1.0	0.7	0.7	0.3	0.4	0.5	0.8	1.9	2.5	1.5	0.8	1.0	0.9	2.5
																								Diurnal Average		
																								Diurnal Maximum		
																								1.1 1.0 1.1 1.2 1.2 1.2 1.3 1.3 1.3 1.6 1.5 1.5 1.4 1.4 1.5 1.7 2.0 1.6 1.6 1.3 1.3 1.2 1.2 1.3		
																								4.3 4.0 4.0 4.0 3.1 3.2 5.6 4.7 3.2 4.8 6.6 6.2 4.3 4.9 6.0 6.2 7.0 5.1 3.8 3.6 3.5 4.4 5.0 6.1		
Z - zerospan C - Calibration M - Maintenance																										
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 159 ppb																										



Wood Buffalo Environmental Association  
Hourly Averages

Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Janvier - November 2023





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

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb**  
**Janvier - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	685	100.00	100.00
21 - 40	0	0.00	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Janvier - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	35	78	20	17	13	8	10	22	43	106	153	35	47	61	25	12	685
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	35	78	20	17	13	8	10	22	43	106	153	35	47	61	25	12	685

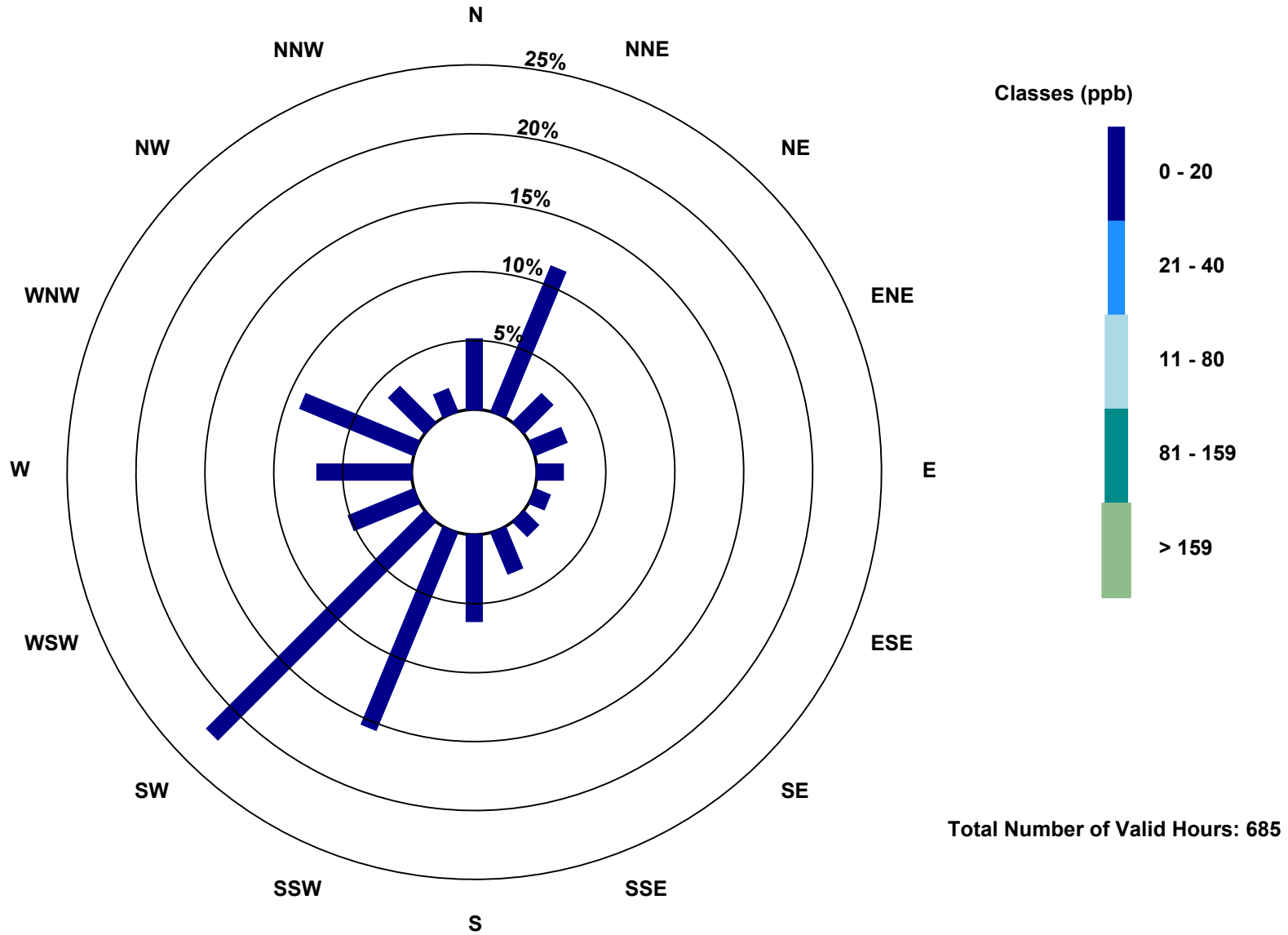
Total Number of Valid Hours: 685

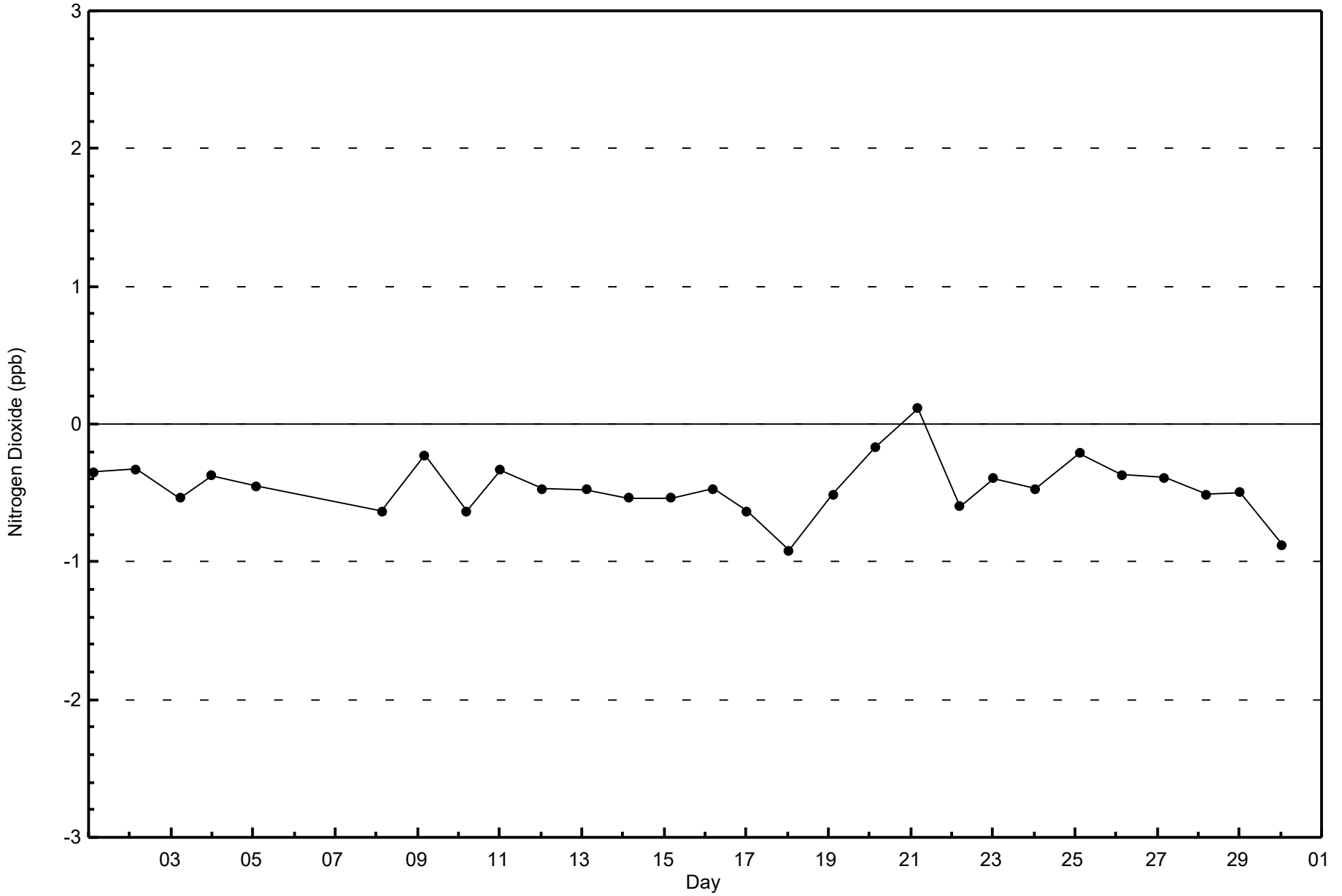
Total Number of Hours: 720



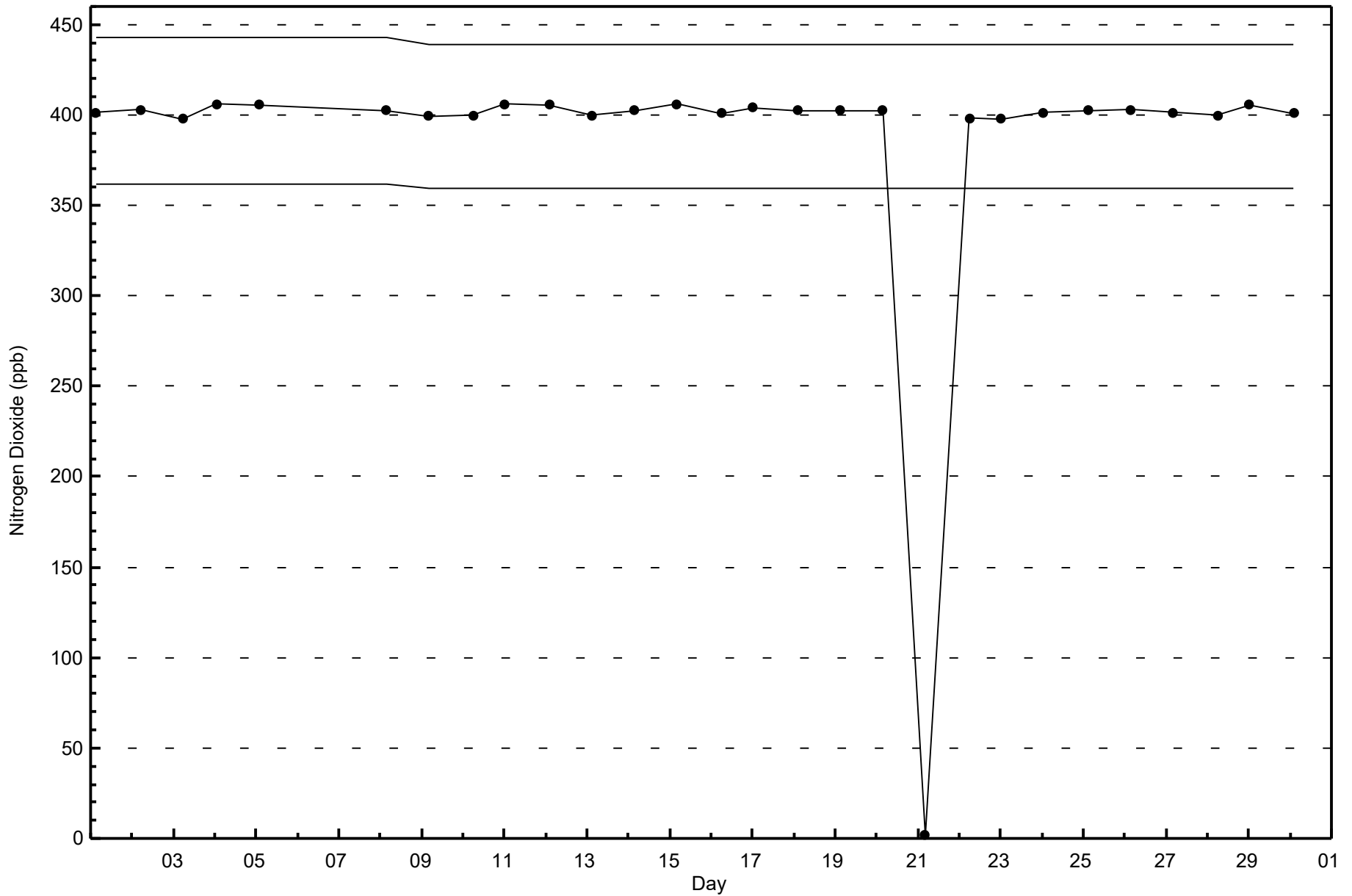
Wood Buffalo Environmental Association  
Wind Rose Nov 2023

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











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

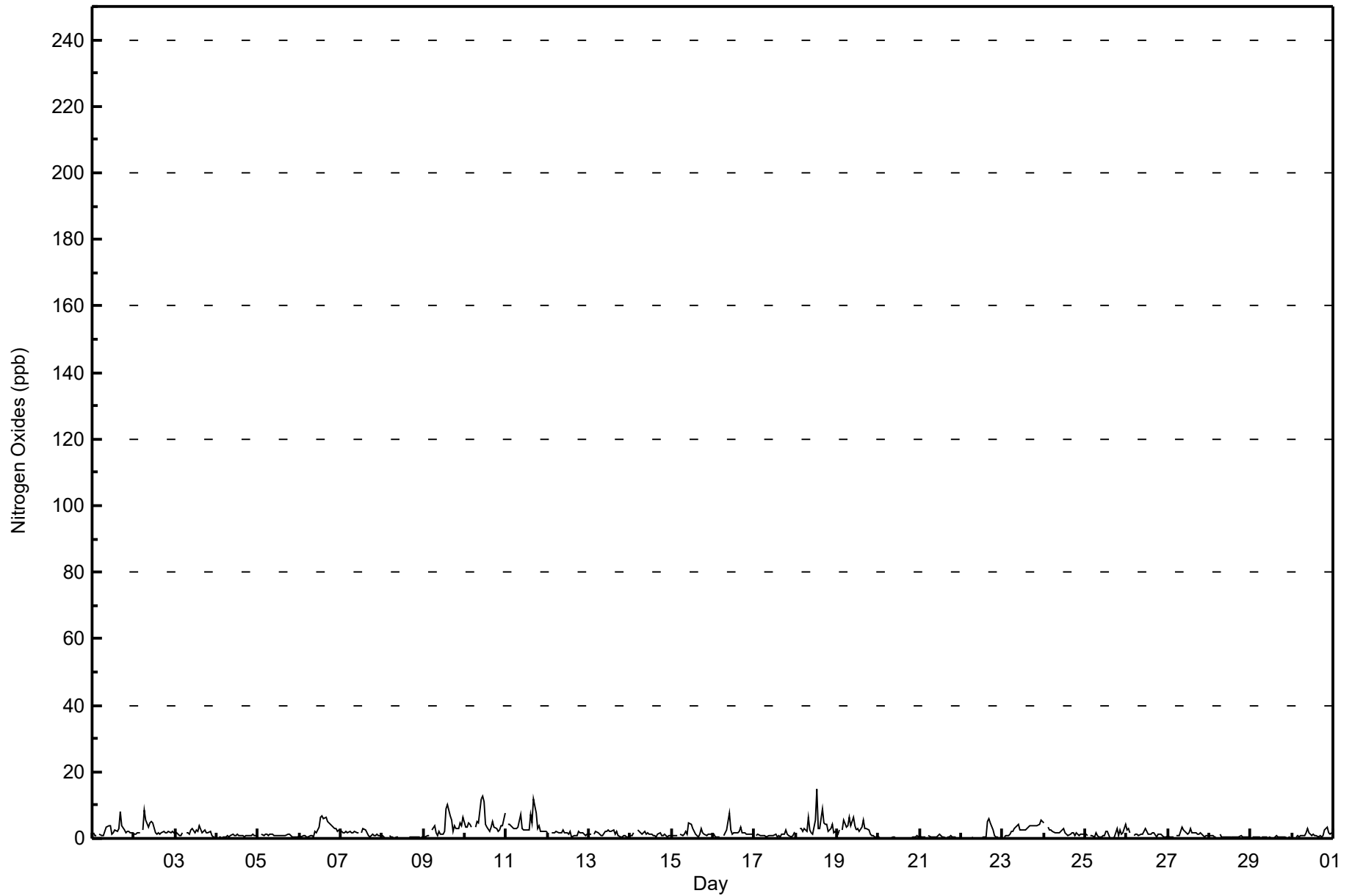
**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Janvier - November 2023**

Maximum Value: 14.8 ppb on Nov 18 13:00		Maximum Daily Average: 4.9 ppb on Nov 10		Hours in Service: 720																											
Minimum Value: 0.0 ppb on Nov 20 07:00		Minimum Daily Average: 0.2 ppb on Nov 20		Hours of Data: 685																											
Maximum Diurnal Average: 2.6 ppb at hour 17		Minimum Diurnal Average: 1.2 ppb at hour 2		Hours of Missing Data: 35																											
Monthly Average: 1.79 ppb		Percentiles: P <sub>1</sub> = 0.0 P <sub>10</sub> = 0.3 Q <sub>1</sub> = 0.6 Median = 1.3 Q <sub>3</sub> = 2.3 P <sub>90</sub> = 3.8 P <sub>99</sub> = 9.0		Hours of Calibration: 34																											
				Percent Operational Time: 99.9																											
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum					
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24							
1-Nov	1.5	1.0	0.7	Z	1.4	0.8	1.0	2.1	3.3	4.0	3.8	1.2	1.6	2.4	2.0	2.9	8.1	3.7	2.5	1.9	2.1	2.2	1.6	1.5	2.3	8.1					
2-Nov	1.2	1.2	1.5	1.6	Z	2.4	8.6	5.4	3.3	4.5	5.1	4.7	1.9	1.2	1.5	1.4	1.8	2.0	1.7	1.7	2.0	1.9	2.0	1.8	2.6	8.6					
3-Nov	1.3	1.5	1.0	0.9	1.6	Z	1.6	1.8	1.2	2.5	2.8	1.6	2.4	2.3	3.9	1.8	2.0	2.7	1.7	1.8	1.9	0.7	0.6	0.5	1.7	3.9					
4-Nov	Z	0.5	0.4	0.2	0.5	0.5	0.7	0.3	0.7	1.1	0.7	0.7	1.4	0.7	0.9	1.0	0.6	0.9	0.9	0.9	1.0	1.2	1.0	1.0	0.8	1.4					
5-Nov	1.0	Z	1.3	1.0	1.1	1.3	1.0	1.3	1.3	0.9	0.8	0.7	0.9	1.0	1.0	1.0	1.0	1.2	1.1	0.7	0.6	0.6	0.5	0.6	0.9	1.3					
6-Nov	0.8	0.6	0.8	0.9	0.4	0.5	0.8	0.9	0.6	2.1	1.9	3.6	6.3	6.8	6.0	6.5	5.1	4.5	4.2	3.7	3.0	2.9	2.2	2.5	2.8	6.8					
7-Nov	2.1	1.9	1.8	2.0	1.8	1.9	1.5	1.8	2.2	1.6	1.7	M	1.9	3.1	2.4	1.8	0.9	0.6	1.2	0.7	0.9	1.5	0.9	0.7	1.6	3.1					
8-Nov	0.8	0.6	0.1	Z	1.0	0.5	0.3	0.1	0.3	0.5	C	C	C	C	C	C	0.5	0.5	0.5	0.6	0.3	0.3	0.2	0.5	--	1.0					
9-Nov	0.3	0.6	0.7	1.0	Z	2.7	3.9	1.7	1.0	2.0	1.4	1.5	2.2	9.0	10.1	6.8	5.6	2.0	4.0	2.9	3.0	4.6	3.8	6.3	3.3	10.1					
10-Nov	3.6	3.5	4.5	4.1	3.3	Z	3.4	5.3	4.8	12.0	12.8	11.0	4.2	3.3	2.3	3.3	5.2	3.5	2.9	2.1	2.5	3.9	4.0	7.6	4.9	12.8					
11-Nov	Z	4.4	4.2	3.4	3.0	2.9	3.0	3.4	7.2	2.8	2.6	2.4	2.5	2.6	7.1	4.8	11.8	7.6	2.9	4.0	2.0	2.3	2.3	1.9	4.0	11.8					
12-Nov	1.8	Z	1.8	1.9	1.8	2.2	1.6	1.8	1.8	2.5	1.7	1.9	1.5	2.2	0.5	0.7	1.0	1.0	2.1	1.5	1.8	1.4	1.0	1.3	1.6	2.5					
13-Nov	1.1	1.1	Z	1.4	2.0	1.7	1.4	0.8	0.9	2.0	2.2	2.5	2.0	2.3	2.4	1.2	2.0	0.9	0.6	0.5	0.8	0.7	0.5	0.5	1.4	2.5					
14-Nov	0.6	0.8	1.8	Z	2.4	2.2	1.8	1.1	2.1	1.1	1.8	1.4	1.3	1.0	0.8	0.6	1.3	1.8	0.7	0.7	1.2	0.5	1.0	0.8	1.2	2.4					
15-Nov	0.8	1.0	0.9	1.0	Z	1.2	0.7	1.4	2.3	1.4	4.8	4.1	3.1	2.0	1.5	0.5	1.4	3.1	1.8	1.2	0.9	1.4	1.3	1.2	1.7	4.8					
16-Nov	1.1	0.5	0.5	0.6	0.4	Z	1.0	1.7	2.7	7.6	2.5	1.2	1.9	1.8	1.8	2.1	3.6	1.6	1.7	1.4	1.2	1.3	1.2	1.2	1.8	7.6					
17-Nov	Z	1.0	1.1	0.8	0.7	0.7	0.9	0.6	0.7	1.0	0.8	0.9	1.1	0.6	0.7	0.6	1.2	1.4	2.3	1.2	1.0	0.3	0.8	1.9	1.0	2.3					
18-Nov	1.5	Z	2.8	3.0	2.3	3.2	2.3	6.2	2.3	1.8	1.4	5.3	14.8	3.2	3.1	9.0	4.7	4.2	4.2	1.9	3.0	4.2	1.8	2.1	3.8	14.8					
19-Nov	1.3	2.4	Z	2.4	5.4	3.3	3.8	6.2	3.7	6.2	4.0	2.7	3.0	2.3	3.4	5.3	3.0	3.0	2.7	1.1	1.0	0.8	0.6	0.6	3.0	6.2					
20-Nov	0.3	0.2	0.2	Z	0.1	0.1	0.0	0.1	0.2	0.2	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.5	1.0	0.5	0.2	1.0					
21-Nov	0.9	0.4	0.6	0.5	Z	0.8	0.6	0.5	0.3	0.3	0.3	1.2	1.0	0.3	0.3	0.2	0.6	0.6	0.7	0.6	0.5	0.1	0.1	0.0	0.5	1.2					
22-Nov	0.0	0.0	0.0	0.0	0.0	Z	0.6	0.0	0.1	0.0	0.0	0.2	0.2	0.3	0.4	5.1	5.8	4.5	2.6	0.6	0.3	0.4	0.0	0.2	0.9	5.8					
23-Nov	Z	0.6	1.0	0.7	1.2	2.0	2.2	2.8	3.7	4.1	2.6	2.4	2.5	2.6	2.8	3.5	3.7	3.7	3.9	3.8	3.8	4.4	5.5	5.1	3.0	5.5					
24-Nov	4.6	Z	3.5	2.7	2.5	2.1	1.6	1.5	1.8	1.7	2.1	3.1	1.7	1.1	0.9	1.3	1.8	1.6	1.0	1.5	0.9	1.1	1.1	1.3	1.8	4.6					
25-Nov	1.2	0.8	Z	1.0	1.0	0.5	1.7	0.9	0.4	0.6	0.8	0.9	1.9	1.9	0.1	0.0	0.0	0.5	2.8	1.1	2.4	1.2	1.7	4.1	1.2	4.1					
26-Nov	2.6	3.1	1.7	Z	1.0	1.2	1.1	0.8	1.2	1.3	2.2	2.8	1.1	1.4	1.4	1.9	1.7	0.6	1.2	1.3	1.4	0.3	0.5	0.5	1.4	3.1					
27-Nov	1.0	0.4	0.4	0.6	Z	1.0	1.0	2.1	3.3	2.7	2.0	1.4	1.9	2.8	1.7	1.7	1.8	1.4	1.5	1.8	0.7	0.4	0.7	0.7	1.4	3.3					
28-Nov	0.7	0.6	0.7	0.5	0.4	Z	1.2	0.4	0.3	0.4	0.4	0.5	0.4	0.3	0.3	0.3	0.5	0.4	0.7	0.4	0.4	0.2	0.3	0.5	0.5	1.2					
29-Nov	Z	0.4	0.3	0.6	0.4	0.2	0.2	0.2	0.3	0.5	0.1	0.3	0.1	0.0	0.6	0.9	0.2	0.3	0.2	0.4	0.4	0.1	0.3	0.2	0.3	0.9					
30-Nov	0.3	Z	0.4	0.8	0.5	0.7	1.0	1.0	1.6	2.8	1.7	0.9	1.3	0.9	1.0	0.5	0.7	0.6	1.0	2.6	3.4	1.8	1.2	1.5	1.2	3.4					
		1.3	1.2	1.3	1.3	1.4	1.5	1.7	1.8	1.8	2.4	2.2	2.2	2.3	2.1	2.1	2.3	2.6	2.0	1.8	1.5	1.5	1.4	1.3	1.6	Diurnal Average					
		4.6	4.4	4.5	4.1	5.4	3.3	8.6	6.2	7.2	12.0	12.8	11.0	14.8	9.0	10.1	9.0	11.8	7.6	4.2	4.0	3.8	4.6	5.5	7.6	Diurnal Maximum					
Z - zerspan		C - Calibration			M - Maintenance																										



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

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Janvier - November 2023**





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

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Janvier - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	685	100.00	100.00
21 - 40	0	0.00	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Janvier - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 20	35	78	20	17	13	8	10	22	43	106	153	35	47	61	25	12	685
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	<b>35</b>	<b>78</b>	<b>20</b>	<b>17</b>	<b>13</b>	<b>8</b>	<b>10</b>	<b>22</b>	<b>43</b>	<b>106</b>	<b>153</b>	<b>35</b>	<b>47</b>	<b>61</b>	<b>25</b>	<b>12</b>	<b>685</b>

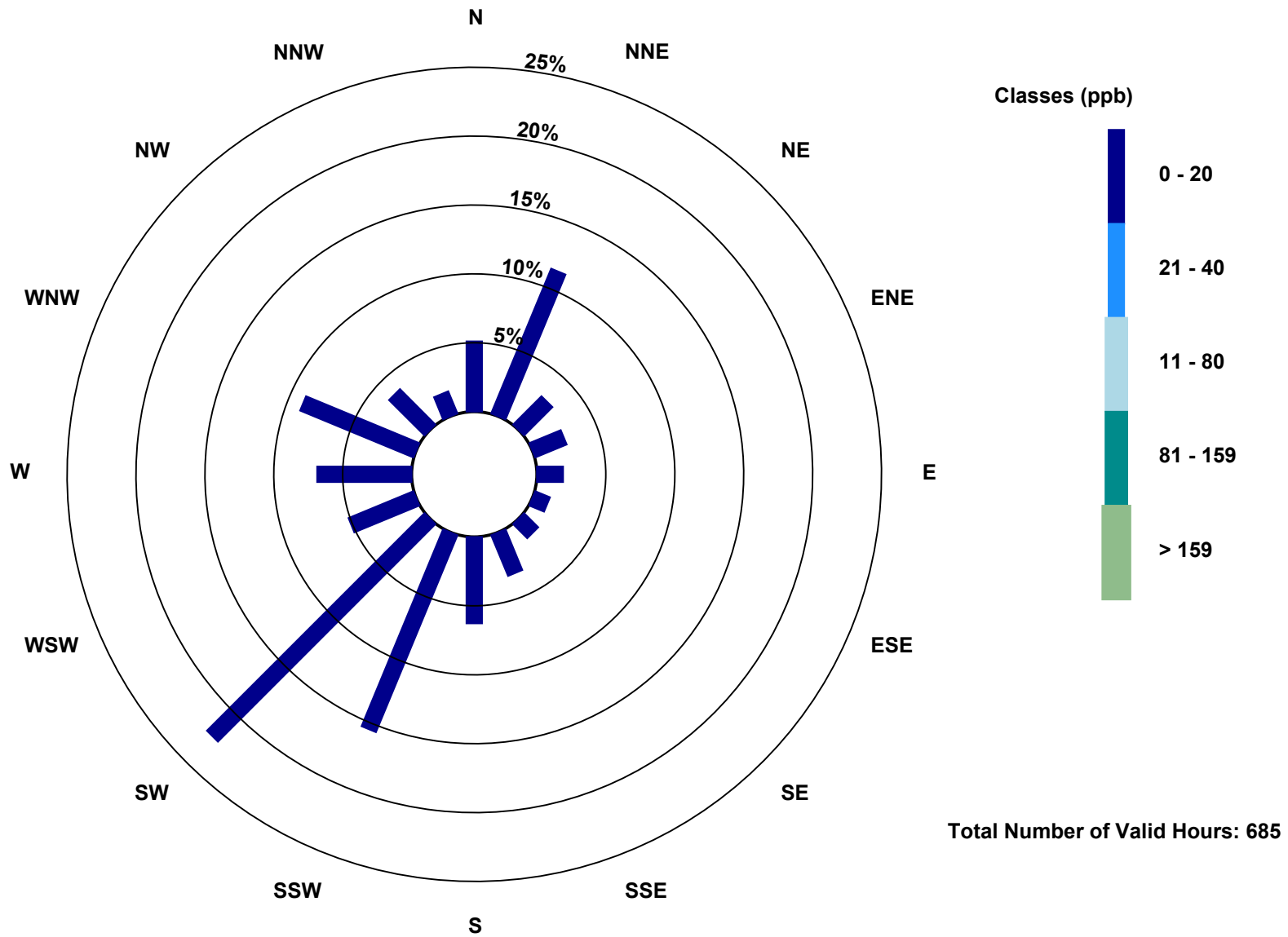
Total Number of Valid Hours: 685

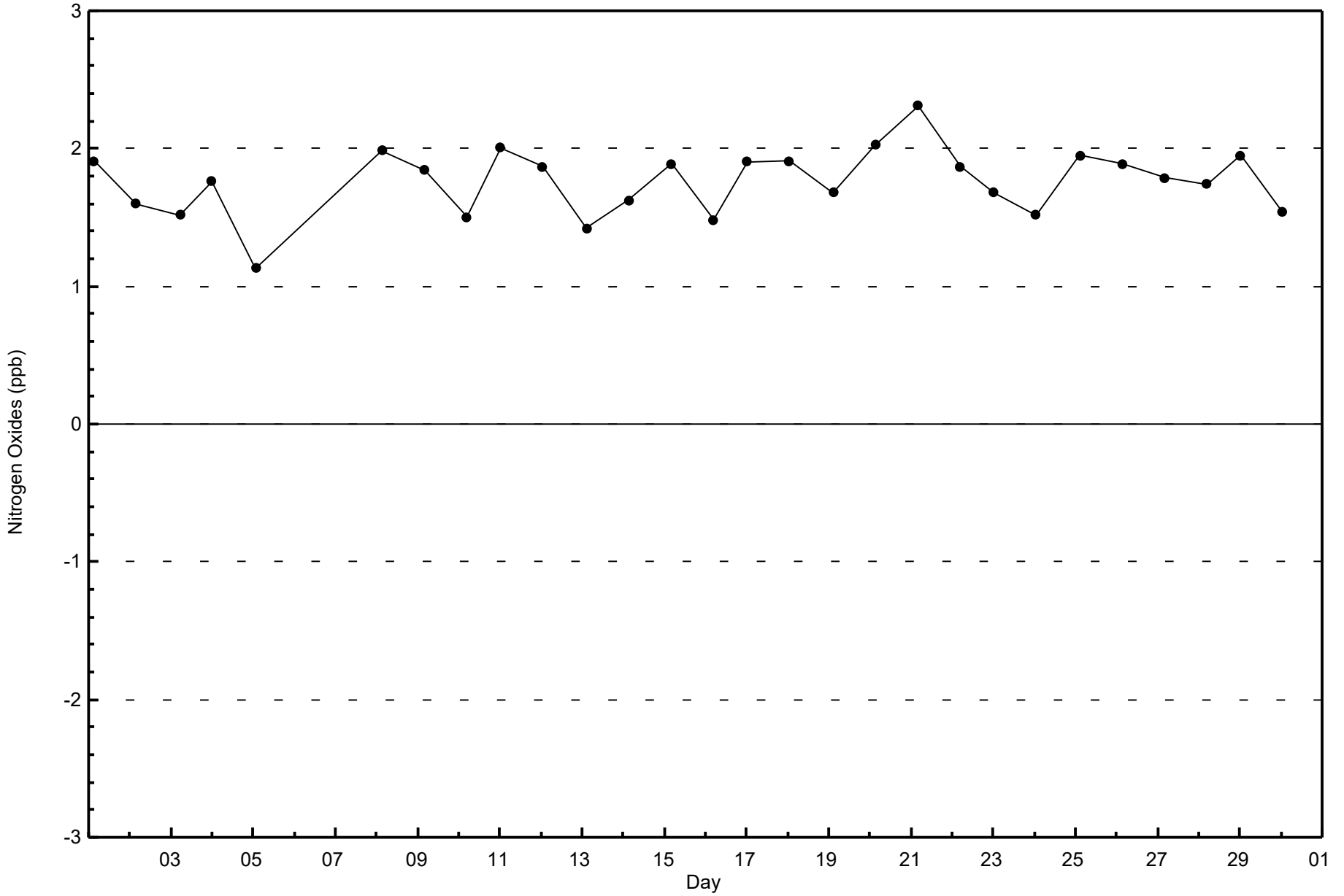
Total Number of Hours: 720

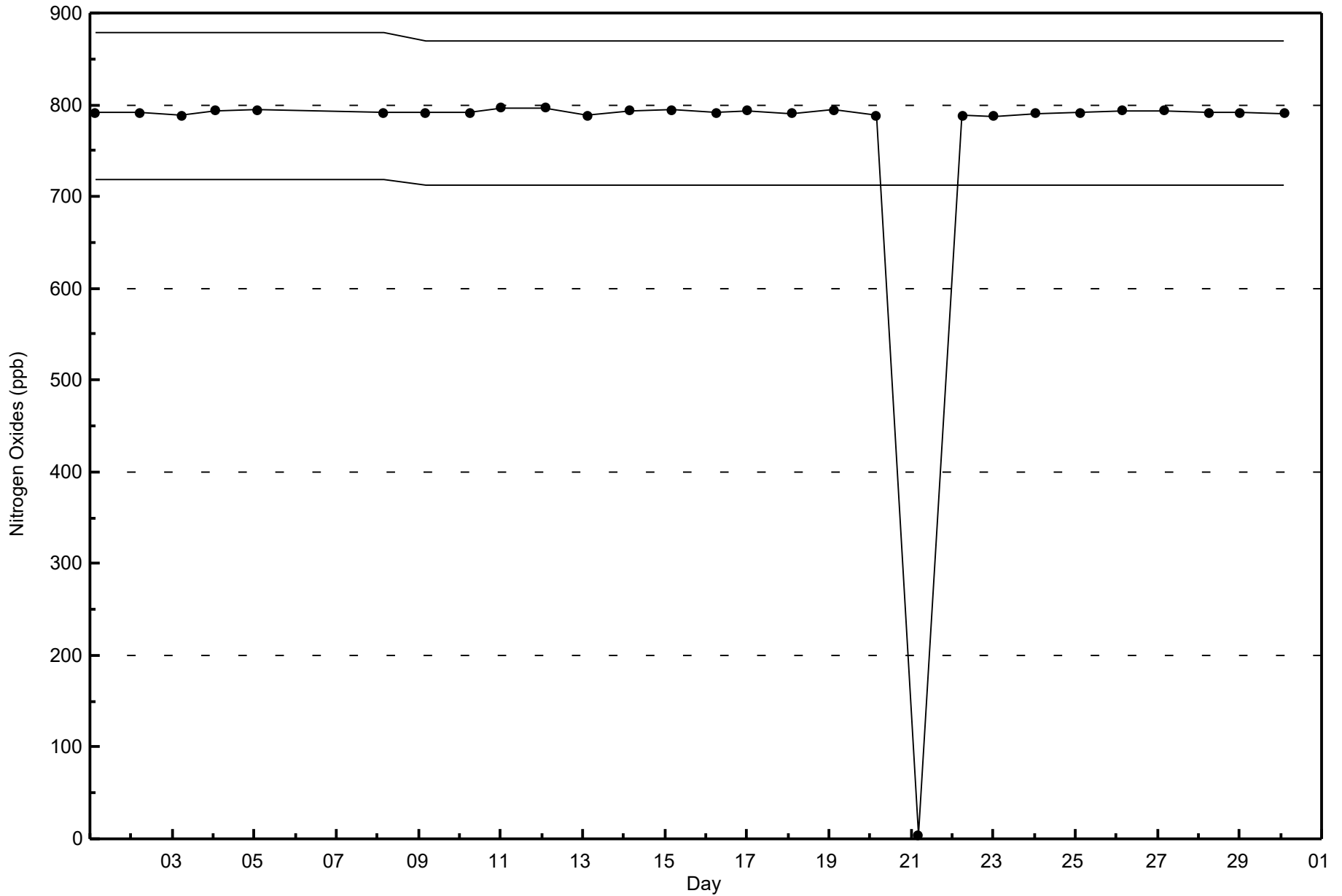


Wood Buffalo Environmental Association  
Wind Rose Nov 2023

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











# Wood Buffalo Environmental Association

## Summary of Hour Averages

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

Janvier - November 2023

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 41.1 ppb on Nov 25 15:00	Maximum Daily Average: 38.7 ppb on Nov 29		Hours of Data:	687
Minimum Value: 4.9 ppb on Nov 19 08:00	Minimum Daily Average: 13.5 ppb on Nov 11		Hours of Missing Data:	33
Maximum Diurnal Average: 29.0 ppb at hour 15	Minimum Diurnal Average: 23.3 ppb at hour 4		Hours of Calibration:	32
Monthly Average: 26.30 ppb	Percentiles: P <sub>1</sub> = 6.0 P <sub>10</sub> = 15.5 Q <sub>1</sub> = 19.9 Median = 26.5 Q <sub>3</sub> = 33.1 P <sub>90</sub> = 36.6 P <sub>99</sub> = 40.5		Percent Operational Time:	99.9

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	13.7	Z	19.0	19.2	19.0	19.1	18.9	18.7	18.8	19.8	22.5	23.7	25.1	25.4	27.5	27.1	22.2	24.0	21.2	26.5	27.1	26.4	27.4	28.3	22.6	28.3
2-Nov	29.5	28.0	Z	24.5	25.7	22.5	19.5	19.1	26.2	28.5	27.5	26.0	29.3	32.0	30.6	31.4	31.5	33.6	34.3	33.7	33.9	33.4	32.7	32.7	29.0	34.3
3-Nov	32.7	30.8	31.6	Z	28.5	26.8	29.1	29.2	24.1	21.9	21.6	23.5	23.6	23.6	21.9	21.7	20.5	18.1	17.7	16.2	16.8	20.6	21.3	22.4	23.7	32.7
4-Nov	23.8	25.4	25.9	26.9	Z	25.0	23.7	23.6	28.4	33.1	33.7	33.8	32.7	32.5	31.7	30.5	29.6	29.5	29.8	29.7	29.3	28.7	27.9	27.0	28.8	33.8
5-Nov	26.0	25.3	25.0	24.6	24.0	Z	21.8	22.5	22.3	24.1	24.9	25.1	25.1	24.7	24.8	25.1	24.7	23.2	22.1	22.7	22.7	23.4	22.6	22.8	23.9	26.0
6-Nov	20.0	19.2	18.4	17.7	18.0	17.1	15.5	14.2	13.7	13.5	14.0	12.2	10.9	10.9	10.4	10.4	12.0	12.7	14.5	16.5	18.8	18.5	18.7	18.4	15.3	20.0
7-Nov	19.0	20.4	19.3	18.7	19.1	20.0	19.5	19.2	19.1	20.6	19.3	M	17.6	19.2	20.0	18.8	18.2	17.7	16.6	16.4	15.3	15.7	28.6	29.1	19.4	29.1
8-Nov	24.1	Z	25.3	18.1	12.8	14.9	19.2	20.9	18.9	16.8	17.5	18.1	17.4	18.1	19.9	20.8	20.9	20.7	22.6	23.4	23.5	24.4	24.2	22.7	20.2	25.3
9-Nov	21.7	21.1	Z	20.2	17.9	15.2	14.0	16.3	16.7	20.6	21.1	22.5	22.8	18.9	18.9	19.4	18.7	19.7	16.1	15.0	14.1	16.1	14.5	14.7	18.1	22.8
10-Nov	17.2	15.3	17.9	Z	21.3	20.6	18.6	14.8	12.3	9.7	17.0	24.5	31.5	33.8	33.8	30.9	27.4	27.4	26.8	26.5	25.4	21.6	20.4	17.5	22.3	33.8
11-Nov	18.6	18.1	15.9	15.1	Z	6.8	5.6	6.1	5.9	10.7	10.7	12.6	13.8	15.0	13.0	12.0	8.5	9.9	12.6	18.5	20.0	19.5	19.8	21.1	13.5	21.1
12-Nov	22.0	24.2	24.0	23.7	23.7	Z	24.2	24.1	24.6	26.8	33.7	34.6	31.8	34.2	34.1	33.0	31.3	30.2	26.6	23.7	24.5	25.4	23.0	24.9	27.3	34.6
13-Nov	Z	18.7	22.1	17.2	13.0	9.5	12.4	17.2	18.4	18.7	19.7	21.9	25.1	25.7	26.3	28.0	27.4	28.6	28.4	27.3	26.1	26.0	27.2	26.0	22.2	28.6
14-Nov	24.3	Z	24.3	22.1	25.0	23.1	21.5	24.6	25.0	27.4	27.9	29.2	31.5	33.7	36.6	37.1	35.6	34.6	35.7	34.6	34.3	33.5	32.7	33.1	29.9	37.1
15-Nov	32.4	32.3	Z	29.3	30.6	33.5	33.8	33.0	32.7	33.2	25.6	25.0	26.4	29.8	30.4	33.1	33.3	29.3	25.3	32.5	30.7	28.6	27.5	29.6	30.3	33.8
16-Nov	28.0	26.1	28.9	Z	27.9	28.0	27.0	23.9	18.0	17.9	24.9	29.1	31.6	32.9	34.4	33.3	31.8	33.7	34.3	33.7	33.2	33.0	33.0	33.3	29.5	34.4
17-Nov	34.2	34.4	34.3	34.2	Z	33.7	32.8	32.9	31.4	30.8	31.8	32.4	33.3	35.2	35.1	34.9	33.5	32.8	31.5	29.9	26.6	24.7	17.7	17.5	31.1	35.2
18-Nov	21.1	19.6	18.9	14.7	13.2	Z	17.6	15.2	16.0	24.9	25.9	20.3	18.5	22.7	22.9	24.7	25.8	22.8	18.8	17.4	13.0	9.8	11.7	13.4	18.6	25.9
19-Nov	Z	8.0	7.5	6.0	5.7	5.0	5.1	4.9	6.6	8.4	12.7	12.1	13.0	16.4	15.7	13.6	16.7	14.6	16.1	21.3	23.8	25.9	29.5	30.5	13.9	30.5
20-Nov	32.9	Z	35.5	23.7	28.1	32.4	36.8	37.0	36.5	37.0	37.3	38.0	38.3	39.2	39.8	39.7	39.6	38.9	38.0	37.2	36.0	31.3	31.8	31.6	35.5	39.8
21-Nov	29.4	22.1	Z	27.4	33.6	33.5	33.2	33.1	33.0	32.9	33.2	32.1	31.8	32.9	33.6	32.5	32.2	31.9	31.5	32.4	33.4	34.3	33.7	35.0	32.1	35.0
22-Nov	35.5	34.8	34.5	Z	33.5	34.1	34.0	34.5	34.4	34.4	34.0	33.5	33.9	34.0	33.7	29.5	23.7	25.9	25.0	29.0	30.2	31.8	31.8	30.5	32.0	35.5
23-Nov	29.9	29.2	28.3	26.7	Z	24.7	24.8	24.4	23.2	22.5	C	C	C	C	20.6	18.7	17.5	16.3	15.9	15.5	15.8	15.0	14.2	14.8	20.9	29.9
24-Nov	16.3	19.4	22.5	24.8	26.0	Z	29.5	29.5	29.4	29.0	29.6	30.6	31.7	35.8	36.8	35.0	36.3	33.4	32.5	32.1	32.4	32.9	32.4	32.1	30.0	36.8
25-Nov	Z	30.6	30.4	29.9	30.2	33.7	32.3	34.0	36.4	39.2	38.7	39.4	40.1	40.1	41.1	40.8	40.0	38.8	35.7	35.9	31.9	28.5	23.3	22.3	34.5	41.1
26-Nov	24.4	Z	23.2	18.0	20.9	22.9	18.5	18.6	19.1	18.4	22.5	24.7	24.7	28.1	30.6	28.4	30.4	34.9	32.2	28.8	27.9	27.5	29.3	27.1	25.3	34.9
27-Nov	24.5	22.1	Z	23.7	25.5	26.0	24.8	22.6	20.8	20.3	20.7	22.1	22.6	24.6	27.2	29.5	29.8	29.6	29.3	31.2	34.6	35.5	35.5	35.6	26.9	35.6
28-Nov	35.0	35.2	35.4	Z	36.0	36.0	35.4	36.9	36.6	36.3	36.0	37.6	39.2	39.6	39.2	38.6	37.3	35.2	34.0	33.1	34.1	36.6	35.7	34.1	36.2	39.6
29-Nov	38.7	40.5	38.6	37.4	Z	36.6	36.7	37.6	38.0	38.7	38.4	38.3	38.2	38.8	38.2	37.9	38.4	38.3	38.4	38.7	40.7	40.5	40.6	41.0	38.7	41.0
30-Nov	40.8	39.9	39.0	38.8	38.9	Z	38.2	36.8	35.9	34.2	35.6	38.3	39.6	40.2	39.9	39.9	38.1	37.3	35.9	33.6	29.7	32.1	32.1	30.5	36.8	40.8

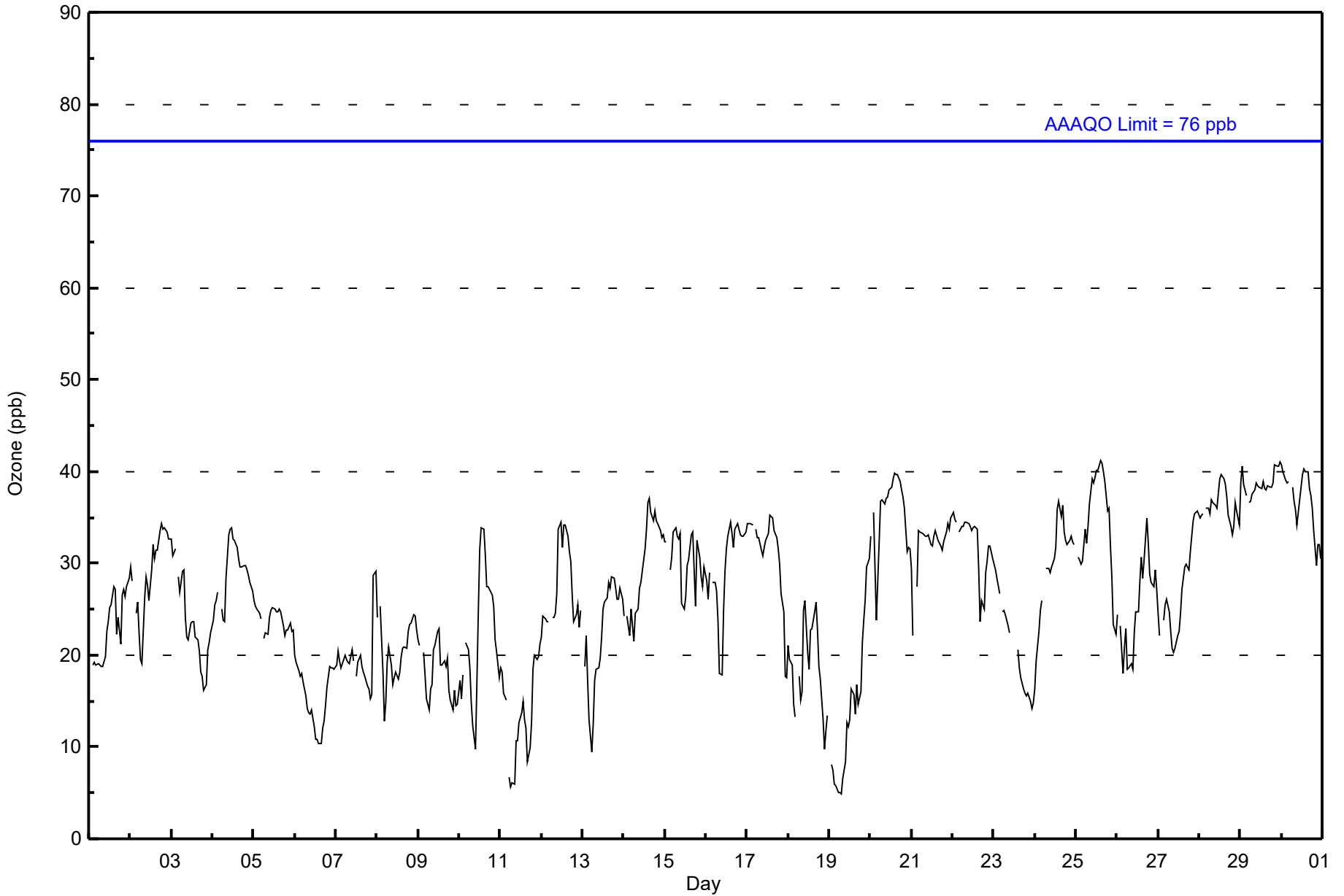
26.5	25.6	25.8	23.3	23.9	24.0	24.1	24.2	24.1	25.0	26.1	27.2	27.6	28.9	29.0	28.5	27.8	27.5	26.6	27.1	26.8	26.7	26.7	26.7	26.7	Diurnal Average	
40.8	40.5	39.0	38.8	38.9	36.6	38.2	37.6	38.0	39.2	38.7	39.4	40.1	40.2	41.1	40.8	40.0	38.9	38.4	38.7	40.7	40.5	40.6	41.0	Diurnal Maximum		

Z - zerospan      C - Calibration      M - Maintenance  
 Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 76 ppb



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

**Ozone (O<sub>3</sub>) - ppb**  
**Janvier - November 2023**





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

**Ozone (O<sub>3</sub>) - ppb**  
**Janvier - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	183	26.64	26.64
21 - 50	504	73.36	100.00
51 - 82	0	0.00	100.00
> 83	0	0.00	100.00

Total Number of Valid Hours: 687

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Ozone (O<sub>3</sub>) - ppb  
Janvier - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 20	10	20	2	0	2	1	4	9	24	52	38	4	5	5	6	1	183
21 - 50	25	58	18	18	11	6	4	15	20	48	117	29	42	57	25	11	504
51 - 82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 83	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	<b>35</b>	<b>78</b>	<b>20</b>	<b>18</b>	<b>13</b>	<b>7</b>	<b>8</b>	<b>24</b>	<b>44</b>	<b>100</b>	<b>155</b>	<b>33</b>	<b>47</b>	<b>62</b>	<b>31</b>	<b>12</b>	<b>687</b>

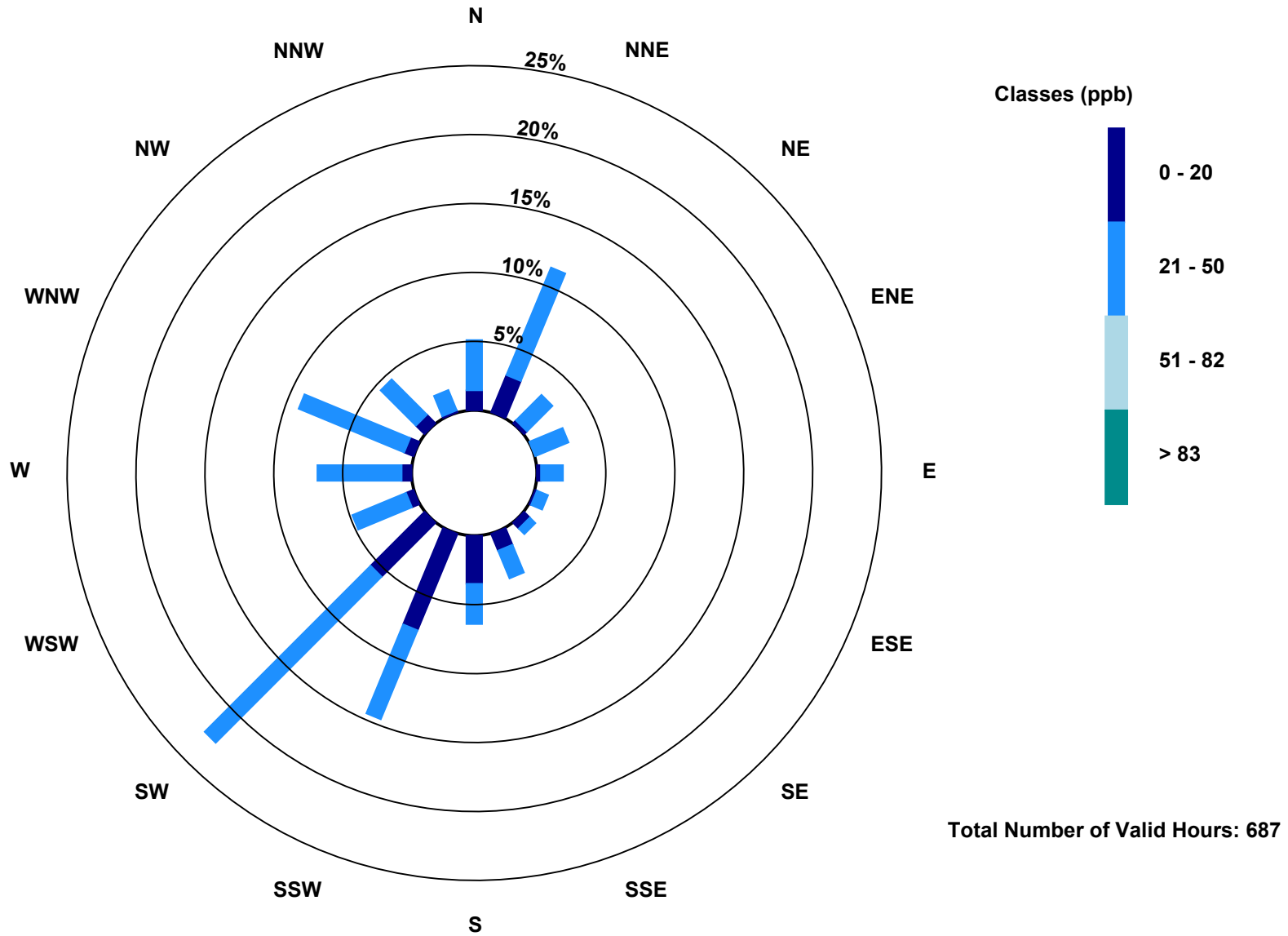
Total Number of Valid Hours: 687

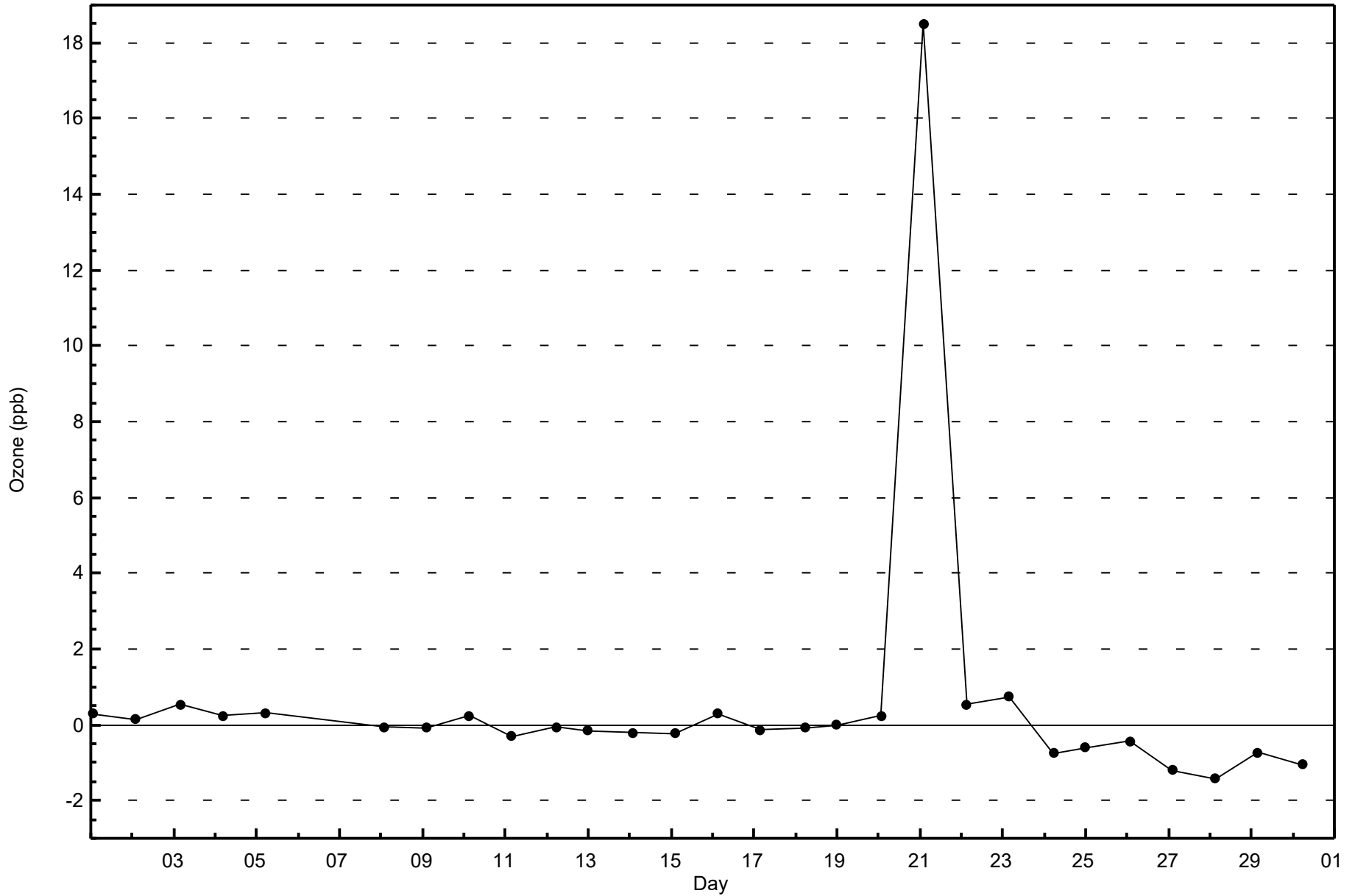
Total Number of Hours: 720

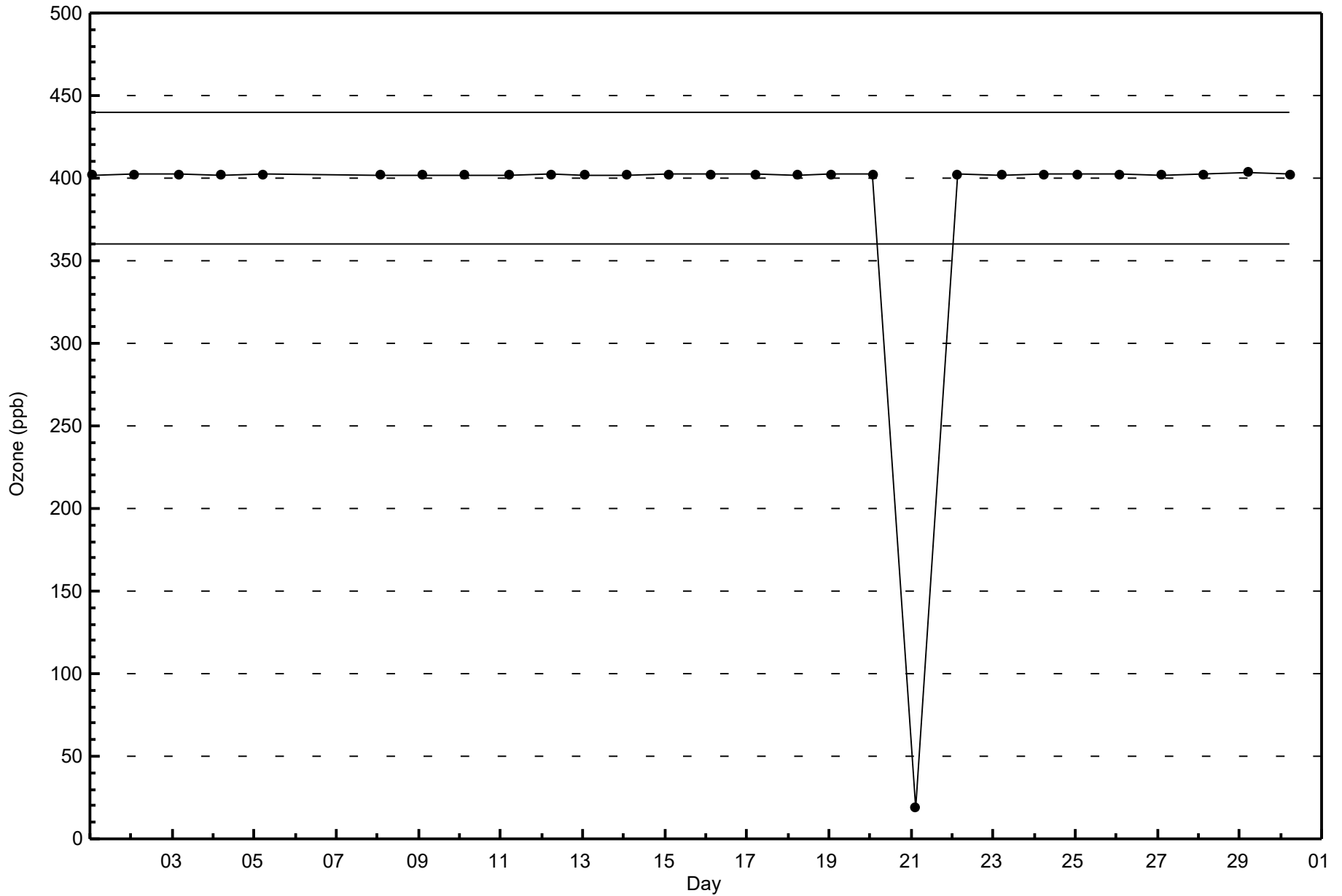


Wood Buffalo Environmental Association  
Wind Rose Nov 2023

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









# Wood Buffalo Environmental Association

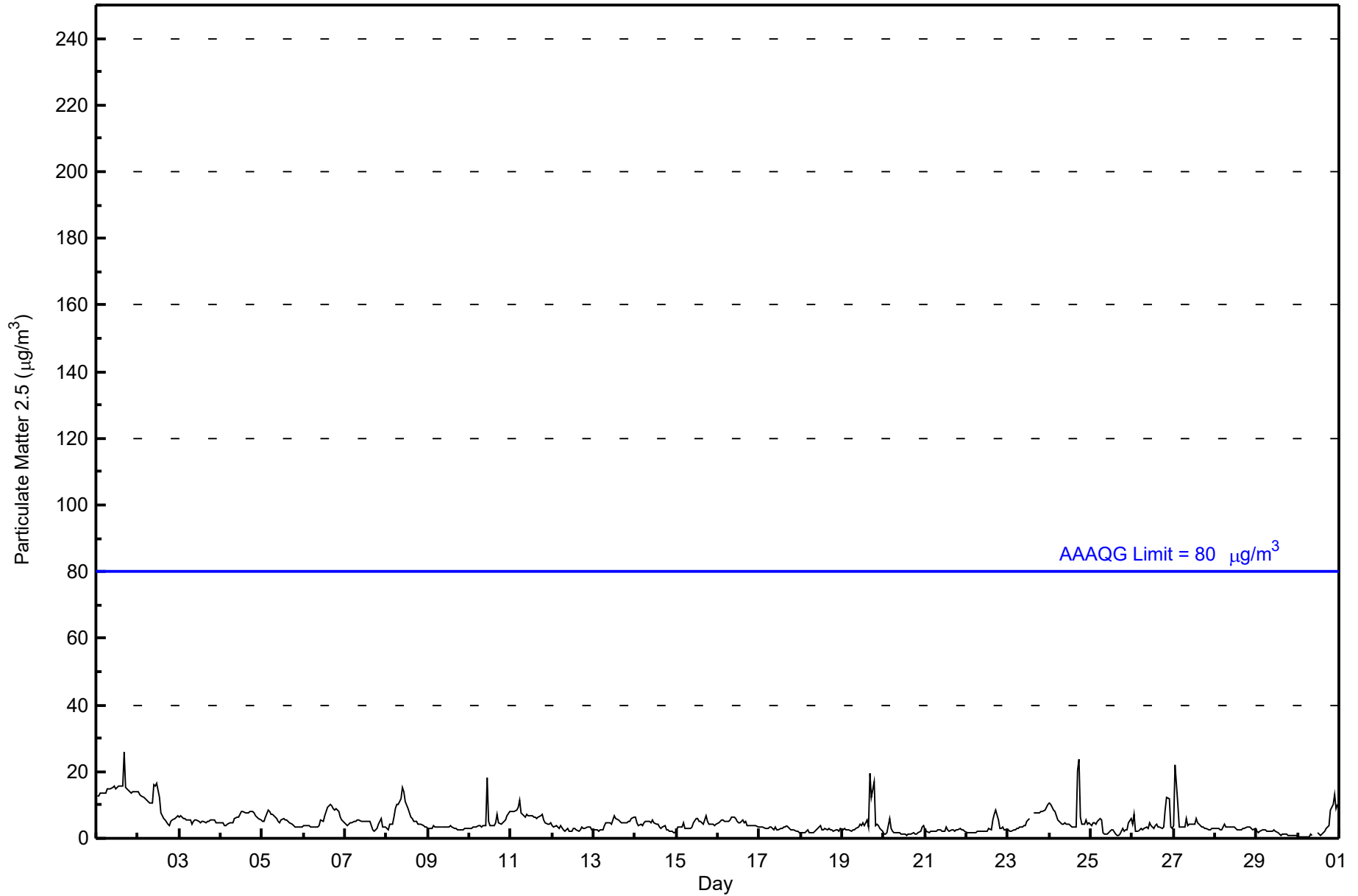
## Summary of Hour Averages

# Particulate Matter 2.5 (PM<sub>2.5</sub>) - µg/m<sup>3</sup>

## Janvier - November 2023

Number of Exceedences (AAAQO):		1-hr: 0	24-hr: 0	Hours in Service: 720																	Daily Average		Daily Maximum																									
Maximum Value: 26.0 µg/m <sup>3</sup> on Nov 1 17:00		Maximum Daily Average: 14.9 µg/m <sup>3</sup> on Nov 1		Hours of Data: 716																	9.6		16.3																									
Minimum Value: 0.5 µg/m <sup>3</sup> on Nov 30 03:00		Minimum Daily Average: 1.7 µg/m <sup>3</sup> on Nov 29		Hours of Missing Data: 4																	5.3		8.4																									
Maximum Diurnal Average: 6.1 µg/m <sup>3</sup> at hour 17		Minimum Diurnal Average: 4.4 µg/m <sup>3</sup> at hour 1		Hours of Calibration: 2																	6.2		8.2																									
Monthly Average: 4.79 µg/m <sup>3</sup>		Percentiles: P <sub>1</sub> = 0.7 P <sub>10</sub> = 1.9 Q <sub>1</sub> = 2.7 Median = 3.7 Q <sub>3</sub> = 5.6 P <sub>90</sub> = 8.5 P <sub>99</sub> = 16.3		Percent Operational Time: 99.7																	5.3		8.4																									
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Nov	12.6	12.7	13.4	13.4	13.7	13.7	14.8	15.0	15.0	15.4	15.6	15.0	15.1	15.7	15.6	15.7	26.0	15.3	14.6	13.8	13.5	13.8	13.9	14.0	14.9	26.0																						
2-Nov	14.0	13.0	12.8	12.4	11.7	11.3	11.1	10.5	10.6	15.9	15.6	16.3	12.3	7.4	6.8	6.1	5.3	4.2	4.0	5.0	5.4	5.7	6.5	6.8	9.6	16.3																						
3-Nov	6.4	6.7	6.0	6.1	5.4	5.5	5.6	4.2	5.1	5.5	5.5	4.9	4.8	4.9	4.8	5.1	5.3	5.6	5.5	5.6	4.9	4.6	4.5	5.3	6.7																							
4-Nov	4.8	4.7	3.9	3.7	4.1	4.5	4.6	4.8	6.1	6.4	6.5	7.0	8.0	8.1	7.7	7.6	7.6	8.1	8.2	7.6	6.8	6.3	6.0	5.5	6.2	8.2																						
5-Nov	5.0	4.9	6.2	8.4	7.9	7.0	7.2	6.6	5.7	4.9	4.9	5.4	5.8	5.7	5.2	5.2	4.7	4.2	3.9	3.5	3.4	3.4	3.4	3.5	5.3	8.4																						
6-Nov	4.0	3.8	3.7	3.7	3.4	3.5	3.6	3.3	3.3	4.0	5.4	5.3	6.6	8.2	9.1	10.3	9.5	8.9	8.5	8.9	8.2	6.4	5.6	4.9	5.9	10.3																						
7-Nov	4.3	4.0	4.4	4.7	4.6	4.9	5.2	5.4	5.5	5.0	5.2	5.1	5.1	5.2	5.2	3.7	2.4	1.9	3.0	4.2	5.2	5.8	3.6	3.3	4.5	5.8																						
8-Nov	3.0	2.7	4.0	4.3	6.3	9.1	10.2	10.1	12.0	15.3	14.1	10.9	8.9	7.5	6.5	6.0	4.9	5.1	4.4	4.1	4.2	3.6	3.3	3.3	6.8	15.3																						
9-Nov	3.1	3.0	3.1	3.6	3.6	3.3	3.3	3.4	3.3	3.4	3.5	3.4	3.3	3.7	3.2	3.1	2.9	2.5	2.5	2.6	2.7	2.9	3.0	3.1	3.1	3.7																						
10-Nov	3.1	3.1	3.4	3.5	3.6	3.7	3.6	3.5	3.9	3.8	18.0	5.0	3.9	3.8	3.8	4.6	7.3	4.9	4.4	4.5	5.0	5.4	6.8	7.9	5.0	18.0																						
11-Nov	8.2	8.1	8.1	8.5	9.2	11.6	7.4	7.1	6.2	7.4	6.9	7.0	6.6	6.2	6.4	5.8	6.1	6.6	7.1	5.6	4.8	4.4	4.4	4.6	6.9	11.6																						
12-Nov	4.0	3.4	3.7	3.4	3.1	3.6	2.7	2.1	2.7	3.1	2.2	2.1	2.8	2.8	2.6	2.2	2.3	3.5	3.1	3.1	3.5	3.3	3.3	2.6	3.0	4.0																						
13-Nov	2.4	2.5	2.4	2.3	2.6	2.4	3.7	4.8	4.6	4.5	4.3	5.7	6.9	6.1	5.4	4.9	4.8	4.8	4.7	4.9	4.9	5.2	5.8	6.2	4.4	6.9																						
14-Nov	6.2	4.6	3.7	4.3	3.7	4.7	5.0	5.0	5.2	4.5	5.5	4.7	4.3	4.1	3.4	3.1	3.2	3.7	2.6	2.5	2.3	2.1	1.7	1.8	3.8	6.2																						
15-Nov	2.7	3.3	3.3	3.3	4.8	3.2	3.0	3.0	3.1	3.4	4.8	6.1	5.8	5.2	4.9	4.4	5.6	6.7	5.3	4.3	4.2	4.1	4.0	4.4	4.3	6.7																						
16-Nov	4.8	5.2	5.4	5.3	5.2	5.0	5.2	5.6	6.4	6.2	6.1	5.0	4.8	4.7	5.5	4.6	5.1	3.9	3.7	3.9	3.8	3.8	3.8	3.5	4.8	6.4																						
17-Nov	3.2	3.3	3.2	3.1	3.2	3.1	3.3	3.4	2.5	3.2	2.5	2.6	2.8	2.8	3.2	3.2	3.8	2.8	2.6	2.4	2.3	2.0	2.0	1.8	2.8	3.8																						
18-Nov	1.7	1.6	1.6	2.1	2.6	1.7	1.7	1.8	1.9	2.6	3.0	3.7	2.7	2.7	2.8	2.6	2.8	2.5	2.4	2.3	2.6	2.3	2.2	3.0	2.4	3.7																						
19-Nov	2.5	2.8	2.3	2.4	2.4	2.3	2.5	2.4	3.0	3.2	4.3	3.7	4.5	3.9	5.6	3.5	19.4	12.3	17.1	3.8	4.0	3.6	3.1	2.2	4.9	19.4																						
20-Nov	1.1	1.1	1.6	5.9	2.8	2.2	1.7	1.7	1.5	1.5	1.4	1.3	1.1	0.9	1.1	1.1	1.2	1.6	1.2	1.5	1.6	2.2	3.6	3.6	1.9	5.9																						
21-Nov	2.4	2.3	1.7	1.9	2.1	2.0	2.0	2.6	2.5	2.5	2.2	2.3	3.2	2.7	2.2	2.6	2.5	2.3	2.5	2.6	2.8	2.6	2.7	2.0	2.4	3.2																						
22-Nov	1.6	1.7	1.6	1.6	1.7	1.9	2.0	2.0	2.0	1.9	2.0	2.1	2.1	2.9	2.6	5.6	7.2	8.4	5.6	3.2	2.8	3.3	2.4	2.5	2.9	8.4																						
23-Nov	2.6	2.3	2.2	2.6	2.5	2.9	3.0	3.2	3.4	3.7	3.9	5.1	6.1	C	C	7.4	7.5	7.7	7.7	8.2	8.1	8.5	9.2	10.1	5.4	10.1																						
24-Nov	10.7	10.0	8.6	8.1	6.7	5.4	4.7	4.4	4.3	4.8	4.4	4.2	3.9	3.5	3.4	3.4	20.2	23.8	6.2	4.2	4.2	5.5	4.4	4.5	6.8	23.8																						
25-Nov	3.8	4.6	4.5	4.4	5.1	5.8	5.7	1.9	1.5	1.2	1.7	2.0	2.7	2.5	1.3	1.0	1.1	1.1	2.8	2.0	2.6	2.6	4.7	5.9	3.0	5.9																						
26-Nov	4.2	7.1	2.3	2.3	2.5	3.0	2.5	3.0	3.6	3.1	4.5	3.7	3.1	3.6	4.1	3.4	3.5	3.2	3.3	8.5	12.2	11.9	3.6	3.0	4.4	12.2																						
27-Nov	4.0	21.9	10.0	3.3	3.4	3.2	3.5	6.1	4.0	4.3	4.0	4.1	4.1	5.9	4.5	3.8	3.4	3.2	3.1	2.8	2.6	2.7	2.8	3.0	4.7	21.9																						
28-Nov	3.0	3.0	3.0	2.7	2.6	4.1	3.4	3.4	3.4	3.6	3.6	3.3	2.9	2.7	2.6	2.6	2.8	3.1	3.3	3.6	3.5	2.8	2.7	2.9	3.1	4.1																						
29-Nov	2.3	1.7	2.1	2.7	2.5	2.6	2.3	2.2	1.9	2.1	2.4	2.0	1.8	1.3	1.0	1.2	1.4	1.2	1.0	0.9	1.1	0.9	0.9	0.7	1.7	2.7																						
30-Nov	0.6	0.5	0.5	0.5	0.5	0.6	0.5	1.1	0.7	M	M	1.6	1.5	0.9	1.3	2.0	2.9	3.6	3.7	8.6	10.1	13.0	8.7	10.3	3.3	13.0																						
																								4.4	5.0	4.4	4.5	4.5	4.6	4.5	4.5	4.5	5.0	5.7	5.0	4.9	4.7	4.6	4.5	6.1	5.5	4.9	4.6	4.8	4.8	4.4	4.5	Diurnal Average
																								14.0	21.9	13.4	13.4	13.7	13.7	14.8	15.0	15.0	15.9	18.0	16.3	15.1	15.7	15.6	15.7	26.0	23.8	17.1	13.8	13.5	13.8	13.9	14.0	Diurnal Maximum
C - Calibration M - Maintenance																																																
Alberta Ambient Air Quality Guideline/Objectives: 1-hr 80 µg/m <sup>3</sup> 24-hr 29 µg/m <sup>3</sup>																																																







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

**Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$**   
**Janvier - November 2023**

<b>Concentration Ranges (<math>\mu\text{g}/\text{m}^3</math>)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	532	74.30	74.30
6 - 15	170	23.74	98.04
16 - 25	13	1.82	99.86
26 - 80	1	0.14	100.00
> 81.0	0	0.00	100.00

Total Number of Valid Hours: 716

Total Number of Hours: 720



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

**Particulate Matter 2.5 (PM<sub>2.5</sub>) - μg/m<sup>3</sup>**  
**Janvier - November 2023**

Concentration Ranges (μg/m <sup>3</sup> )	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	24	62	12	5	5	8	8	22	32	69	120	32	47	55	22	9	532
6 - 15	10	16	9	13	9	1	2	2	14	35	35	2	2	8	9	3	170
16 - 25	1	2	0	0	0	0	0	0	0	4	5	1	0	0	0	0	13
26 - 80	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
> 81.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	35	80	21	18	14	9	10	24	46	109	160	35	49	63	31	12	716

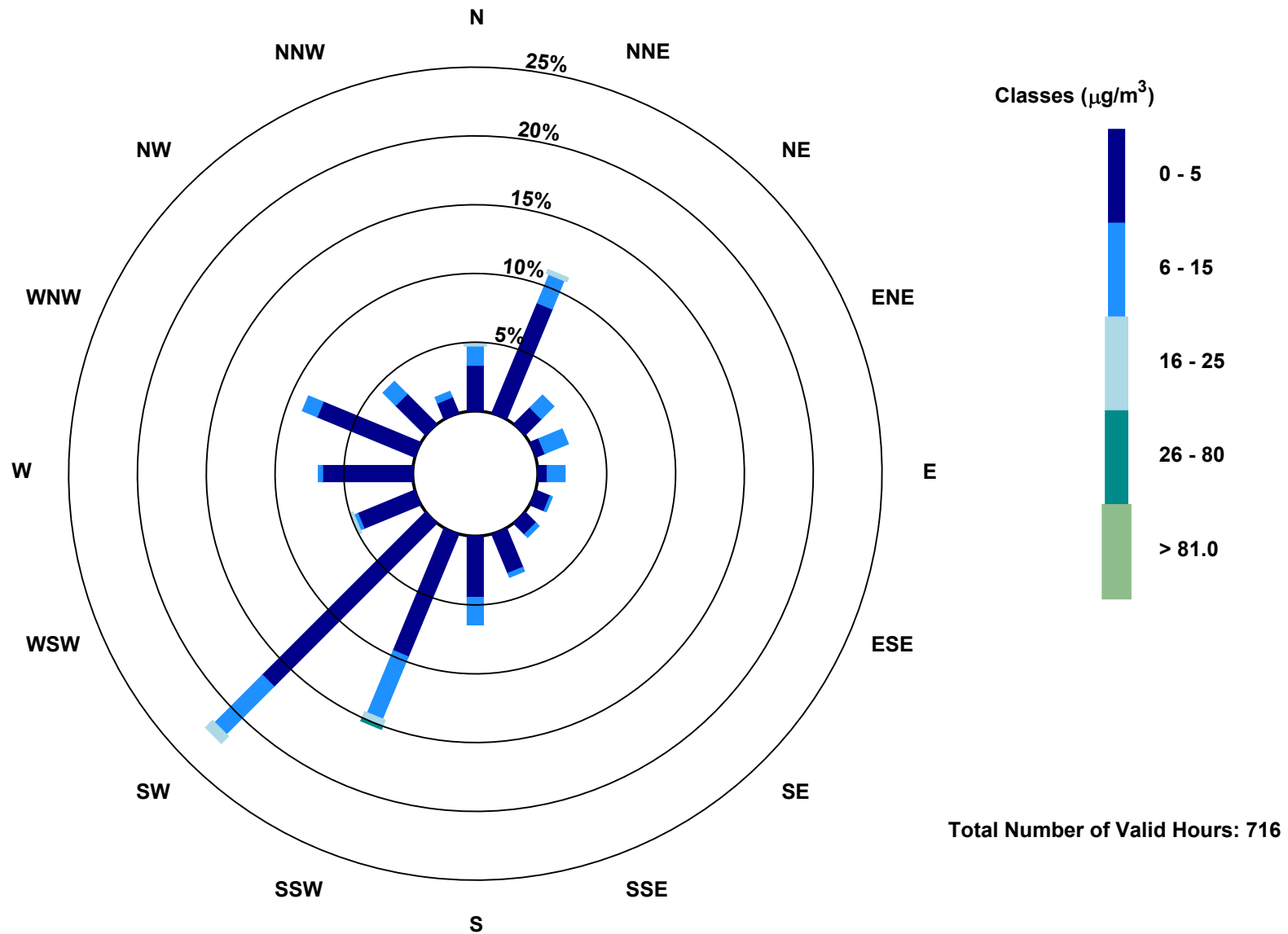
Total Number of Valid Hours: 716

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 2023

Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$   
Janvier





**Wood Buffalo Environmental Association**

**Summary of Hour Averages**

**Ambient Temperature (AT) - C**

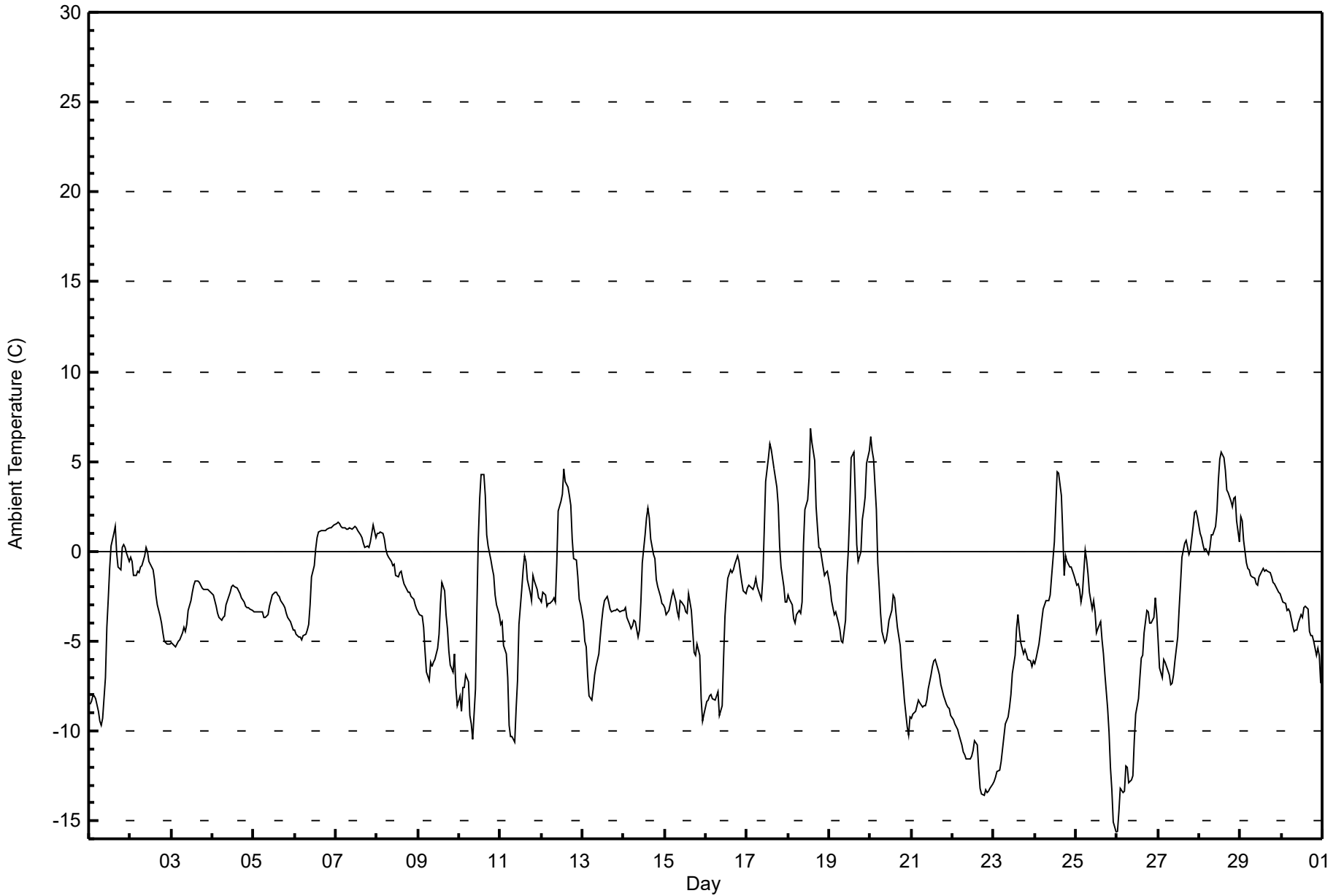
**Janvier - November 2023**

Maximum Value: 6.8 C on Nov 18 14:00      Maximum Daily Average: 2.2 C on Nov 28																				Hours in Service: 720 Hours of Data: 720						
Minimum Value: -15.6 C on Nov 26 00:00      Minimum Daily Average: -11.6 C on Nov 22 Maximum Diurnal Average: -0.5 C at hour 15      Minimum Diurnal Average: -5.1 C at hour 9 Monthly Average: -3.25 C      Percentiles: P <sub>1</sub> = -13.4 P <sub>10</sub> = -8.8 Q <sub>1</sub> = -5.3 Median = -2.9 Q <sub>3</sub> = -0.7 P <sub>90</sub> = 1.4 P <sub>99</sub> = 5.5																				Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	-8.5	-8.4	-8.1	-8.1	-8.2	-8.9	-9.5	-9.6	-9.3	-7.0	-4.2	-2.7	-1.0	0.3	1.0	1.4	-0.1	-0.9	-1.1	0.2	0.4	0.2	-0.1	-0.6	-3.9	1.4
2-Nov	-0.3	-0.6	-1.4	-1.3	-1.1	-1.2	-0.9	-0.8	-0.2	0.2	0.0	-0.6	-0.9	-1.0	-1.6	-2.4	-3.0	-3.6	-4.0	-4.6	-5.0	-5.2	-5.2	-5.2	-2.1	0.2
3-Nov	-5.1	-5.2	-5.3	-5.2	-5.0	-4.9	-4.5	-4.2	-4.4	-4.1	-3.3	-2.7	-2.3	-1.9	-1.7	-1.7	-1.8	-1.9	-2.1	-2.1	-2.1	-2.1	-2.2	-2.3	-3.3	-1.7
4-Nov	-2.5	-2.7	-3.1	-3.5	-3.7	-3.8	-3.7	-3.6	-3.0	-2.5	-2.2	-2.0	-1.9	-2.0	-2.0	-2.2	-2.3	-2.6	-2.8	-3.1	-3.1	-3.1	-3.2	-3.3	-2.8	-1.9
5-Nov	-3.4	-3.4	-3.3	-3.4	-3.4	-3.4	-3.7	-3.7	-3.5	-3.1	-2.7	-2.4	-2.3	-2.3	-2.4	-2.5	-2.7	-3.0	-3.2	-3.4	-3.7	-3.9	-4.2	-4.4	-3.2	-2.3
6-Nov	-4.4	-4.6	-4.8	-4.8	-4.9	-4.7	-4.6	-4.4	-4.1	-3.0	-1.4	-0.8	0.2	0.8	1.1	1.1	1.2	1.1	1.2	1.2	1.3	1.3	1.4	1.5	-1.4	1.5
7-Nov	1.5	1.6	1.5	1.4	1.3	1.3	1.3	1.3	1.3	1.2	1.3	1.4	1.3	1.1	0.9	0.7	0.4	0.2	0.3	0.2	0.5	1.0	1.4	0.8	1.1	1.6
8-Nov	1.0	1.0	1.0	1.0	0.7	0.1	-0.2	-0.3	-0.6	-0.8	-0.7	-1.3	-1.4	-1.2	-1.1	-1.5	-1.8	-2.1	-2.3	-2.3	-2.5	-2.7	-3.0	-3.2	-1.0	1.0
9-Nov	-3.3	-3.5	-3.6	-4.3	-5.5	-6.8	-7.2	-6.2	-6.4	-6.2	-6.0	-5.4	-4.6	-2.9	-1.7	-2.2	-3.5	-4.3	-5.6	-6.3	-6.7	-5.7	-7.6	-8.6	-5.2	-1.7
10-Nov	-8.0	-8.9	-7.6	-7.5	-6.9	-7.3	-9.2	-9.6	-10.4	-7.7	-3.2	0.6	3.0	4.3	4.3	3.1	1.0	0.3	-0.5	-1.0	-1.3	-2.5	-3.0	-3.5	-3.4	4.3
11-Nov	-4.1	-3.9	-5.2	-5.7	-7.0	-9.7	-10.3	-10.3	-10.6	-8.8	-7.2	-4.0	-2.1	-1.0	-0.3	-0.6	-1.6	-2.3	-2.8	-1.4	-1.6	-2.1	-2.6	-2.6	-4.5	-0.3
12-Nov	-2.8	-2.3	-2.5	-3.0	-2.9	-2.9	-2.7	-2.6	-2.8	-0.6	2.2	2.8	3.2	4.6	3.9	3.6	3.1	2.6	0.7	-0.4	-0.5	-1.4	-2.6	-3.0	-0.3	4.6
13-Nov	-3.9	-5.0	-5.3	-6.9	-8.1	-8.3	-7.7	-6.8	-6.4	-5.7	-4.7	-3.9	-3.2	-2.7	-2.5	-2.8	-3.2	-3.4	-3.3	-3.3	-3.2	-3.3	-3.4	-3.3	-4.6	-2.5
14-Nov	-3.3	-3.2	-3.7	-4.1	-4.3	-4.1	-3.8	-3.9	-4.8	-4.3	-2.8	-0.7	0.9	1.9	2.4	1.9	0.6	-0.2	-0.4	-1.6	-2.0	-2.5	-2.9	-3.0	-2.0	2.4
15-Nov	-3.1	-3.5	-3.3	-2.9	-2.5	-2.2	-2.9	-3.4	-3.7	-2.8	-2.9	-3.1	-3.3	-3.4	-2.4	-3.3	-4.5	-5.6	-5.8	-5.1	-5.8	-8.2	-9.5	-9.1	-4.3	-2.2
16-Nov	-8.4	-8.3	-8.0	-8.0	-8.2	-8.3	-8.1	-7.8	-9.1	-8.6	-5.9	-3.6	-2.5	-1.5	-1.0	-1.2	-1.1	-0.7	-0.3	-0.6	-1.1	-1.7	-2.2	-2.3	-4.5	-0.3
17-Nov	-2.0	-1.9	-2.0	-2.1	-1.9	-1.5	-2.0	-2.2	-2.6	-1.5	1.2	3.9	5.2	6.0	5.7	5.2	4.6	3.6	2.5	0.3	-0.9	-2.0	-2.9	-2.8	0.4	6.0
18-Nov	-2.5	-2.6	-2.9	-3.8	-4.0	-3.5	-3.3	-3.4	-2.8	0.4	2.3	2.8	4.1	6.8	6.1	5.0	2.5	1.3	0.2	0.2	-0.9	-1.3	-1.2	-1.1	-0.1	6.8
19-Nov	-2.0	-2.7	-3.1	-3.5	-3.4	-4.0	-4.3	-5.0	-5.1	-3.8	-1.3	0.1	2.2	5.2	5.5	3.1	0.4	-0.6	0.0	1.8	2.3	3.0	4.9	5.6	-0.2	5.6
20-Nov	6.3	5.6	5.1	2.3	-0.6	-2.0	-3.4	-4.4	-5.1	-5.0	-4.4	-3.9	-3.3	-2.5	-2.6	-3.5	-4.3	-5.3	-6.4	-7.2	-8.3	-9.7	-10.2	-9.2	-3.4	6.3
21-Nov	-9.3	-9.1	-8.9	-8.6	-8.3	-8.5	-8.6	-8.6	-8.6	-8.3	-7.7	-6.9	-6.4	-6.1	-6.0	-6.6	-6.9	-7.4	-7.8	-8.0	-8.5	-8.7	-8.7	-9.1	-8.0	-6.0
22-Nov	-9.4	-9.6	-9.8	-9.9	-10.2	-10.8	-11.1	-11.3	-11.5	-11.6	-11.6	-11.4	-11.1	-10.5	-10.8	-12.1	-13.2	-13.5	-13.6	-13.2	-13.4	-13.3	-13.2	-13.0	-11.6	-9.4
23-Nov	-12.8	-12.5	-12.2	-12.2	-11.7	-11.0	-10.3	-9.6	-9.2	-8.6	-8.0	-6.8	-5.8	-4.3	-3.5	-4.4	-5.1	-5.7	-5.4	-5.7	-6.0	-6.1	-6.4	-6.1	-7.9	-3.5
24-Nov	-6.2	-5.9	-5.2	-4.6	-3.9	-3.2	-2.8	-2.7	-2.7	-2.5	-1.4	0.5	2.5	4.4	4.3	3.1	1.0	-1.3	-0.3	-0.6	-0.9	-0.9	-1.1	-1.3	-1.3	4.4
25-Nov	-1.9	-1.8	-2.2	-2.8	-2.3	0.1	-0.5	-1.3	-2.3	-3.2	-2.8	-3.3	-4.5	-4.3	-4.0	-4.9	-5.7	-6.8	-8.8	-10.1	-12.0	-13.2	-15.1	-15.6	-5.4	0.1
26-Nov	-15.6	-14.5	-13.2	-13.5	-13.3	-12.0	-12.0	-12.9	-12.8	-12.5	-10.6	-9.1	-8.2	-7.0	-6.0	-5.8	-4.6	-3.3	-3.4	-4.0	-4.0	-3.7	-2.6	-3.6	-8.7	-2.6
27-Nov	-4.9	-6.5	-7.1	-6.0	-6.2	-6.4	-6.8	-7.4	-7.4	-6.9	-6.1	-4.8	-3.2	-1.8	-0.3	0.5	0.6	0.2	-0.2	0.1	1.4	2.1	2.2	1.9	-3.0	2.2
28-Nov	1.0	0.7	0.4	0.1	0.2	-0.2	0.2	0.9	0.9	1.4	2.3	4.0	5.1	5.6	5.2	4.5	3.4	3.3	2.8	2.5	2.9	3.0	1.7	0.5	2.2	5.6
29-Nov	1.9	1.7	0.6	-0.6	-1.0	-1.1	-1.4	-1.4	-1.5	-1.8	-1.9	-1.4	-1.1	-1.0	-1.1	-1.0	-1.1	-1.2	-1.4	-1.7	-1.8	-2.1	-2.3	-2.4	-1.1	1.9
30-Nov	-2.6	-2.8	-2.9	-3.3	-3.2	-3.4	-4.2	-4.4	-4.4	-4.4	-4.0	-3.6	-3.7	-3.2	-3.0	-3.3	-4.5	-4.7	-4.7	-5.0	-5.8	-5.4	-5.8	-7.3	-4.1	-2.6
																								Diurnal Average		
																								Diurnal Maximum		



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

**Ambient Temperature (AT) - C**  
**Janvier - November 2023**





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

**Ambient Temperature (AT) - C**  
**Janvier - November 2023**

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	0	0.00	0.00
-20 - 0	572	79.44	79.44
0 - 10	148	20.56	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



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

**Relative Humidity (RH) - %**  
**Janvier - November 2023**

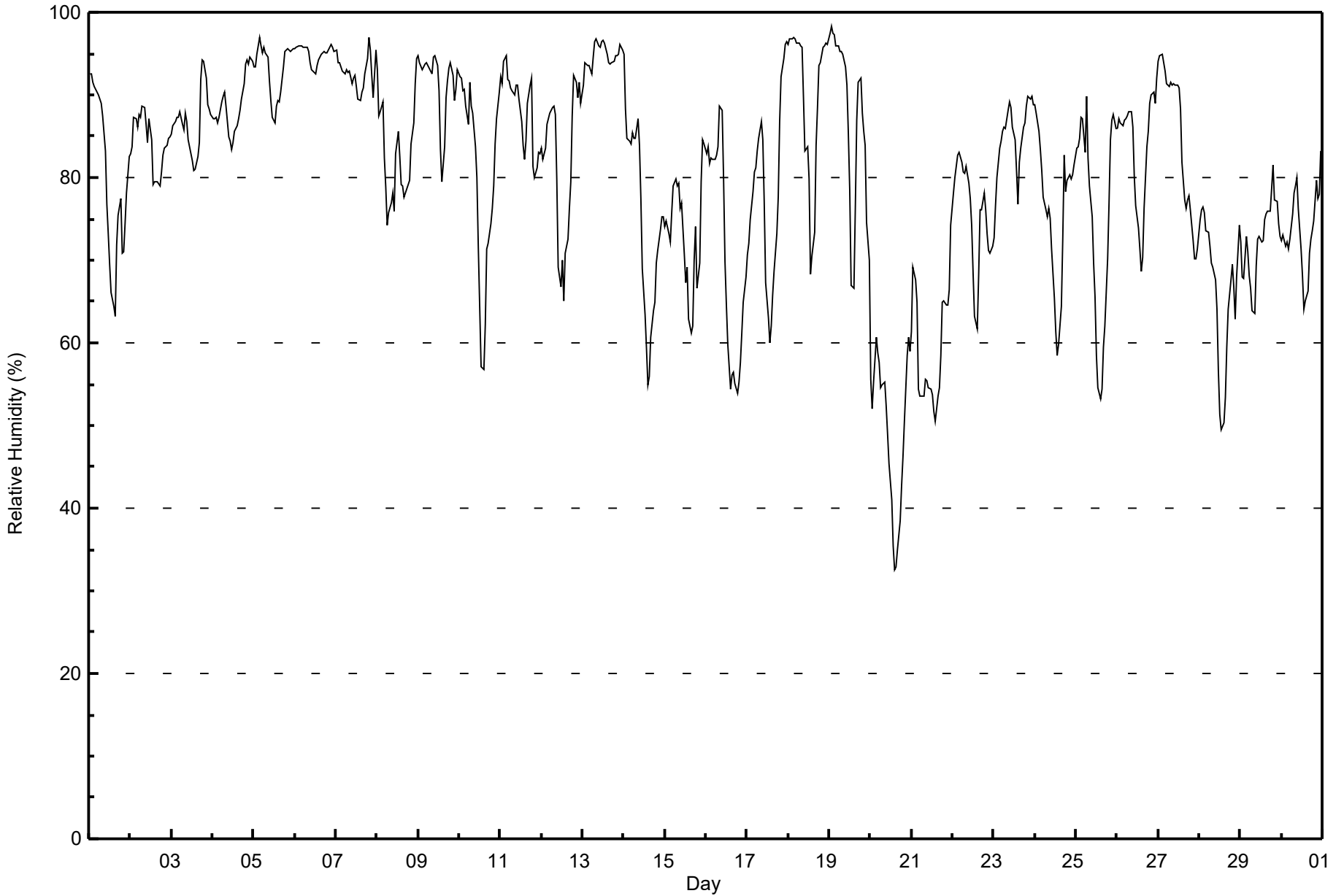
<b>Maximum Value: 98.2 % on Nov 19 02:00</b> <b>Maximum Daily Average: 95.0 % on Nov 6</b>																						<b>Hours in Service: 720</b>				
<b>Minimum Value: 32.6 % on Nov 20 15:00</b> <b>Minimum Daily Average: 49.4 % on Nov 20</b>																						<b>Hours of Data: 720</b>				
<b>Maximum Diurnal Average: 85.4 % at hour 4</b> <b>Minimum Diurnal Average: 69.8 % at hour 15</b>																						<b>Hours of Missing Data: 0</b>				
<b>Monthly Average: 80.48 %</b> <b>Percentiles: P<sub>1</sub> = 45.6 P<sub>10</sub> = 62.0 Q<sub>1</sub> = 72.5 Median = 83.5 Q<sub>3</sub> = 90.9 P<sub>90</sub> = 94.8 P<sub>99</sub> = 96.8</b>																						<b>Hours of Calibration: 0</b>				
																						<b>Percent Operational Time: 100.0</b>				
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	92.5	92.6	91.4	91.1	90.6	90.0	89.5	89.1	87.5	83.3	76.8	73.2	69.5	66.1	64.4	63.3	71.9	75.4	77.5	70.8	71.1	74.5	78.1	82.6	79.7	92.6
2-Nov	82.9	83.8	87.3	87.1	86.2	87.6	87.3	88.7	88.6	86.4	84.2	87.1	84.5	79.2	79.5	79.4	79.5	79.1	80.6	82.8	83.6	83.9	84.8	85.0	84.1	88.7
3-Nov	85.3	86.3	86.9	87.2	87.3	87.9	86.5	85.7	87.9	86.7	84.6	83.0	82.0	80.9	81.1	82.6	84.2	91.8	94.3	94.1	92.1	88.8	88.3	87.7	86.8	94.3
4-Nov	87.2	87.2	87.3	86.6	87.3	89.2	89.9	90.3	88.6	84.9	84.5	83.4	84.3	85.6	86.2	87.1	88.2	89.5	91.3	93.8	94.2	93.8	94.6	94.0	88.7	94.6
5-Nov	93.4	93.4	94.9	97.0	96.0	95.1	95.8	95.1	94.5	91.6	89.4	87.3	86.6	88.7	89.4	89.2	90.3	93.4	95.3	95.5	95.6	95.3	95.3	95.6	93.1	97.0
6-Nov	95.6	95.8	95.9	95.9	95.9	95.8	95.7	95.7	95.3	93.9	93.0	92.8	92.5	93.5	94.3	94.8	95.1	95.3	95.1	95.1	95.7	96.1	95.7	95.3	95.0	96.1
7-Nov	95.4	94.0	93.9	93.5	92.9	92.6	93.1	92.7	92.9	91.3	92.0	92.4	91.1	89.4	89.4	90.4	90.9	92.5	94.4	97.0	95.4	92.3	89.6	95.5	92.7	97.0
8-Nov	93.1	87.4	88.0	89.1	82.3	78.8	74.3	75.7	77.0	78.1	75.9	82.8	85.6	82.5	79.1	79.0	77.7	78.6	79.1	79.6	84.0	86.7	91.4	94.3	82.5	94.3
9-Nov	94.7	93.9	93.1	93.4	93.7	93.8	93.2	93.0	92.5	94.6	94.8	93.6	90.6	83.4	79.5	83.7	89.7	91.8	93.3	93.8	92.3	89.4	90.7	93.0	91.5	94.8
10-Nov	92.2	92.0	90.6	90.6	88.6	86.4	91.5	88.7	87.8	83.8	80.0	71.7	64.4	57.2	56.8	62.3	71.4	72.1	74.3	76.3	78.9	84.1	87.1	90.3	80.0	92.2
11-Nov	92.3	91.3	94.1	94.7	91.9	91.8	90.8	90.5	90.1	91.3	91.3	89.5	86.8	83.9	82.2	84.3	88.9	91.2	92.1	81.3	80.1	81.2	83.0	82.9	88.2	94.7
12-Nov	83.5	82.3	83.5	86.4	87.1	87.8	88.5	88.6	87.6	79.9	69.2	66.8	70.0	65.0	70.8	72.6	76.2	79.4	87.5	92.4	91.6	89.6	91.5	88.9	82.0	92.4
13-Nov	91.2	93.9	93.7	93.5	93.5	92.6	94.6	96.4	96.8	96.0	95.7	96.4	96.7	96.2	95.0	93.9	93.8	93.8	94.0	94.7	94.8	94.8	96.2	95.4	94.7	96.8
14-Nov	94.9	88.4	84.8	84.4	84.1	85.4	84.7	84.7	87.1	83.9	77.4	69.0	63.5	59.2	55.0	55.9	60.6	63.9	65.0	69.6	71.2	73.7	75.3	75.2	74.9	94.9
15-Nov	74.1	74.8	73.2	72.2	75.7	79.0	79.9	78.9	79.3	76.3	76.9	70.7	67.2	69.2	62.9	61.2	62.0	70.0	74.1	66.6	69.6	79.5	84.5	84.1	73.4	84.5
16-Nov	82.9	83.8	81.7	82.4	82.3	82.2	82.6	83.8	88.6	88.1	79.9	69.8	64.6	59.8	54.5	56.0	56.4	55.2	53.9	55.3	57.7	61.2	64.9	68.0	70.7	88.6
17-Nov	70.7	72.1	74.8	78.3	80.7	81.2	83.2	84.7	86.9	84.5	77.0	67.3	63.0	60.0	62.0	65.8	68.6	73.3	77.7	86.9	92.2	94.4	96.1	96.4	78.2	96.4
18-Nov	96.2	96.8	96.8	96.9	96.7	96.3	96.2	95.9	95.7	89.6	83.2	83.7	79.8	68.2	70.4	73.4	83.8	88.5	93.6	93.9	95.8	95.9	96.2	96.2	90.0	96.9
19-Nov	97.5	98.2	97.5	97.3	95.9	96.0	95.3	95.3	94.9	93.4	91.2	85.5	78.5	66.9	66.6	76.5	86.9	91.5	92.1	87.8	85.7	83.9	74.6	70.0	87.5	98.2
20-Nov	55.5	51.9	55.3	60.7	58.8	57.7	54.6	54.9	55.2	52.3	48.9	45.4	41.0	35.5	32.6	32.9	35.0	38.5	42.7	46.3	50.6	58.5	60.7	58.9	49.4	60.7
21-Nov	61.4	69.2	67.6	64.9	54.4	53.6	53.6	53.5	55.6	55.4	54.5	54.4	53.8	51.7	50.5	53.6	54.5	58.5	64.8	65.1	64.5	64.6	66.5	74.2	59.2	74.2
22-Nov	78.1	80.1	81.4	82.7	83.0	81.9	80.8	80.5	81.4	79.3	77.4	74.3	68.4	63.2	61.7	68.3	76.1	76.1	78.1	76.2	73.3	71.2	70.8	71.7	75.7	83.0
23-Nov	72.7	76.5	80.1	83.5	84.4	85.6	86.0	86.0	88.1	89.2	88.4	86.1	84.6	80.8	76.8	81.8	83.6	86.2	86.6	88.6	89.8	89.6	89.9	88.9	84.7	89.9
24-Nov	88.8	87.8	85.6	83.3	80.8	77.7	76.1	75.3	76.3	75.1	71.4	65.5	61.4	58.5	59.8	64.4	72.7	82.7	78.4	79.7	80.3	79.9	80.3	81.6	76.0	88.8
25-Nov	83.6	83.7	84.7	87.3	87.1	83.0	89.8	82.4	79.0	75.2	69.6	65.6	58.5	54.5	53.2	54.3	59.4	62.1	70.2	76.9	84.6	87.0	87.6	85.9	75.2	89.8
26-Nov	85.9	87.1	86.5	86.3	86.9	87.1	87.5	87.9	87.9	86.1	80.2	76.6	73.9	71.3	68.6	70.3	76.3	83.7	85.5	89.1	90.0	90.4	89.0	92.0	83.6	92.0
27-Nov	94.0	94.7	94.9	93.9	92.9	91.3	91.0	91.4	91.2	91.4	91.3	91.2	90.8	88.3	81.8	77.2	76.3	77.4	77.9	76.1	72.4	70.2	70.2	71.3	85.0	94.9
28-Nov	75.0	76.2	76.4	75.8	73.6	73.4	71.6	69.7	69.1	67.6	64.1	56.6	51.3	49.5	50.3	53.4	59.5	64.0	67.6	69.4	66.8	62.9	68.0	74.3	66.1	76.4
29-Nov	72.2	68.0	67.8	72.8	71.0	68.1	66.6	63.9	63.5	69.3	72.5	72.8	72.3	72.4	74.9	75.5	75.9	75.9	78.6	81.6	77.3	77.1	74.4	72.8	72.4	81.6
30-Nov	72.4	73.1	71.7	72.2	71.4	72.5	75.7	78.2	79.0	80.0	76.3	71.4	68.1	64.1	65.0	66.4	70.9	72.5	73.5	74.7	79.6	77.5	77.9	83.2	73.6	83.2
																								Diurnal Average		
																								Diurnal Maximum		





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

**Relative Humidity (RH) - %**  
**Janvier - November 2023**





Maximum Speed: 29 km/h on Nov 20 05:00	Maximum Daily Speed Average: 16.4 km/h on Nov 20	Hours in Service: 720
Minimum Speed Value: 0 km/h on Nov 11 17:00	Minimum Daily Speed Average: 1.5 km/h on Nov 3	Hours of Data: 720
Maximum Diurnal Speed Average: 5.5 km/h at hour 2	Minimum Diurnal Speed Average: 3.4 km/h at hour 18	Hours of Missing Data: 0
Monthly Average Velocity: 4.2 km/h 251.1 deg	Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 3 Q <sub>1</sub> = 5 Median = 8 Q <sub>3</sub> = 11 P <sub>90</sub> = 14 P <sub>99</sub> = 20	Percent Operational Time: 100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	SW5	SSW8	SSW8	SSW8	SSW8	SSW9	SW9	SW9	SW8	SW8	SSW7	SSW7	SW7	SW6	SW5	SW3	SSW4	S5	SSW7	SW8	SSW9	SSW10	SW9	SW8	SSW7.3	SSW10
2-Nov	SW8	SSW6	SSW6	SW6	SW7	SSW6	SW4	NNW3	N5	NNE10	NNE12	N12	N10	N10	N9	N8	N7	N9	NNE8	NNE7	NNE5	NNE4	NNE3	ENE3	N3.8	N12
3-Nov	ENE2	NE4	ENE5	SSW3	E2	NE2	SE4	ESE1	NNE3	NNE1	NNW2	W3	SSW5	SSW2	S4	NE4	N3	NNE1	N2	N3	NNE5	NNE6	NNE5	N6	NNE1.5	N6
4-Nov	NNE7	NNE8	NNE7	NNE8	NNE8	NNE7	NNE5	N4	E5	E9	E8	E8	E8	ENE8	E10	ENE11	E9	E9	E10	ENE8	NE8	ENE7	NE6	NE7	ENE6.8	ENE11
5-Nov	ENE6	NE6	NE7	ENE8	NE7	NE6	NNE5	NNE6	NNE6	NE7	NE6	NE7	NE6	NNE6	NE8	NE7	NE5	NNE4	N3	N4	N5	N3	NNE5	NE5.6	NE8	
6-Nov	NNE3	N3	NNE4	N3	NNE3	NNE1	NNE2	N1	N2	E2	SE4	W2	S4	SSE7	S5	S6	S7	S9	SSW11	SSW11	SSW12	SSW11	SSW11	SSW11	SSW3.4	SSW12
7-Nov	SSW11	SSW15	SSW13	SSW11	SSW10	SSW10	SSW9	SSW9	SSW9	SSW10	SW8	SW8	SW8	SW9	SW9	SW7	SW7	SW8	SSW9	SSW9	SW10	SW10	W10	SW8	SSW9.1	SSW15
8-Nov	WSW10	WSW11	WSW11	W14	WNW17	WNW18	WNW19	WNW15	WNW14	WNW16	NW13	NW15	NW12	NW13	NW14	NW15	NW14	NW13	NW11	NW11	NW9	NW7	WNW6	WNW6	WNW12.0	WNW19
9-Nov	WNW5	WNW5	W5	W5	W4	WSW3	SW5	SW3	SW5	SSW5	S5	SSE6	SSE6	SSE6	SSE5	SE6	SE10	SSE7	S5	SSE7	SSE8	S9	S4	S4	S3.9	SE10
10-Nov	SSW5	S6	S7	S8	S9	S9	S8	S9	SSW10	SSW6	SW5	S6	S14	SSW15	SSW14	SSW13	SSW11	SSW13	SSW12	SSW14	SSW10	S10	S10	S9	SSW9.6	SSW15
11-Nov	S8	S8	SSW7	S5	SE3	E2	NNE2	NNE4	NE3	NNE5	N3	NNE4	N3	NNE2	ESE2	NW2	N0	S3	SW8	SW10	SW10	SSW10	SW11	SW13	SSW2.6	SW13
12-Nov	SW13	SW15	SW15	SW13	SW12	SW12	SW9	SW10	SW13	SW10	WSW13	W16	WSW13	W15	W14	W13	W10	WSW8	WSW4	SW8	SW9	WSW7	SW7	SW8	WSW10.6	W16
13-Nov	S4	SW6	SSW5	SE0	NE1	NNE4	NNE8	NNE7	NNE9	NNE10	NNE8	NNE10	NNE10	NNE10	NNE8	NNE8	NNE8	NNE8	NE6	NNE5	N4	NW4	NW8	WSW4	NNE4.6	NNE10
14-Nov	WSW7	WNW16	WNW14	WNW14	WNW15	W11	W10	WSW7	SW9	SW9	SW10	WSW13	WSW12	SW12	WSW14	WSW11	SW11	SW10	SW10	SW10	SW11	SW10	SW11	SW10	WSW10.0	WNW16
15-Nov	SW10	SW10	SSW10	SSW12	SSW12	SW13	SW11	SW14	S8	SSW9	NNW5	NNW13	NW12	NW9	NNW7	WNW10	WNW6	W3	SW5	W7	W6	WSW4	WNW5	NW6	WSW6.0	SW14
16-Nov	NW5	NNW4	SSE2	ESE2	SSE5	SSE7	SSE3	SSE2	S4	SSW7	SW8	SW10	SW8	SW8	SW9	SSW9	SSW10	SW11	SW13	SW11	SW10	SW13	SSW13	SW15	SSW6.9	SW15
17-Nov	SW14	SW15	SW14	SW13	SW12	SW12	SW14	SW15	SW13	SW13	SW13	SW12	SW12	SW12	SW14	SW13	SW9	SW10	SW8	SSE4	S6	SSE5	SSW7	SSW8	SSW10.7	SW15
18-Nov	SSW6	SSW8	SSW6	SSW5	SSW6	SSW6	SSW5	SSW7	SSW9	SSW12	SSW9	SSW4	SSW5	WSW4	SW5	SSW6	S4	SSE5	S0	SSE1	SW3	S3	SW2	SSW2	SSW5.0	SSW12
19-Nov	E1	WSW2	SSE2	SW2	SSW3	SSW4	SSW4	SSW7	S6	SW6	SW5	SW5	SSW5	SW4	SSW3	SSE0	SSW1	W2	SW8	SW10	SW11	SW11	W7	WSW11	SW4.6	SW11
20-Nov	W17	W21	W21	WNW29	WNW29	WNW26	WNW26	WNW19	WNW18	WNW17	WNW17	WNW19	WNW19	WNW19	WNW22	WNW18	WNW16	WNW10	W9	W9	WNW7	NW4	WNW5	W2	WNW16.4	WNW29
21-Nov	ESE2	SSE1	ESE2	SE4	E4	ESE5	E5	ESE4	ENE6	ENE7	ENE7	NE10	NNE9	NNE10	NNE8	N8	NNE9	NNE10	NNE11	NNE11	NNE10	NNE9	NNE9	NNE12	NE6.0	NNE12
22-Nov	NNE12	NNE11	NNE11	NNE10	NNE10	NNE11	NNE10	NNE9	NNE7	NNE9	NNE9	NNE8	NNE7	NNE6	NNE6	ENE4	ENE3	ENE5	ENE2	ESE2	SSE4	S3	SSW4	SSE3	NNE5.6	NNE12
23-Nov	ESE5	SSE4	S4	NNW2	SE3	S7	S9	SSW10	S8	SSW7	SSW11	SSW11	SW9	SW9	SW8	SSW8	SSW12	SSW12	SSW14	SW14	SW14	SW15	SSW13	SSW16	SSW8.8	SSW16
24-Nov	SW13	SW14	SW17	SW16	SW19	SW17	SW18	SW16	SW15	SW18	SW14	SW10	SW9	W11	WNW13	W9	WSW7	SSW9	SW11	SW10	SW11	SW12	SW13	SSW15	SW12.5	SW19
25-Nov	SSW14	SW12	SW12	SW8	WSW7	NNW12	N12	N17	N20	N15	NNW14	N16	N17	N12	NNW12	NW10	NNW11	NW7	NNW4	N6	N3	NE3	SSW2	SW5	NNW6.5	N20
26-Nov	SSW5	SSW6	SE1	S1	SSW2	SE3	NNE3	N2	WSW2	WSW3	SSE1	NNE4	W3	S3	S2	SW4	W8	W7	SW3	S5	SSW5	SW8	SW8	SW9	SW2.8	SW9
27-Nov	S3	SSW4	SSW9	SW11	SW10	SSW12	SSW10	SSW10	SSW10	SW9	SSW9	SW8	SW7	SSW9	SW12	SW12	SW11	SSW14	SW13	SW10	W14	W16	W19	W15	SSW9.5	W19
28-Nov	WSW13	SW13	WSW13	WSW14	WSW11	SW7	W13	W18	W17	W14	W14	WNW20	WNW18	W18	WNW14	W10	W10	WSW11	WSW10	W4	WNW6	WNW9	WSW8	WSW9	W11.6	WNW20
29-Nov	W16	W14	W12	WSW10	W9	WNW11	WNW13	WNW13	NW9	NW12	WNW13	WNW11	WNW11	WNW14	WNW13	NW14	WNW14	WNW14	WNW12	WNW12	NW13	NW10	WNW11	WNW12	WNW12.0	W16
30-Nov	WNW13	WNW13	NW12	WNW9	WNW12	WNW11	NW5	W7	W8	W8	WNW10	WNW11	NW11	NW6	WNW9	WNW11	WNW9	W7	SW5	SW2	SW6	SSW6	SW6	SW8	WNW7.4	WNW13

SW4.7	WSW5.5	WSW5.0	WSW5.1	WSW4.8	WSW4.4	WSW4.1	WSW4.1	WSW3.6	WSW3.7	W3.7	WNW4.2	W4.1	W4.4	W4.4	W4.1	W3.5	WSW3.4	SW3.9	SW3.7	WSW4.5	SW4.3	WSW5.0	SW5.3	Diurnal Average
W17	W21	W21	WNW29	WNW29	WNW26	WNW26	WNW19	N20	SW18	WNW17	WNW20	WNW19	WNW19	WNW22	WNW18	WNW16	WNW14	SSW14	SW14	SW14	W16	W19	SSW16	Diurnal Maximum

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



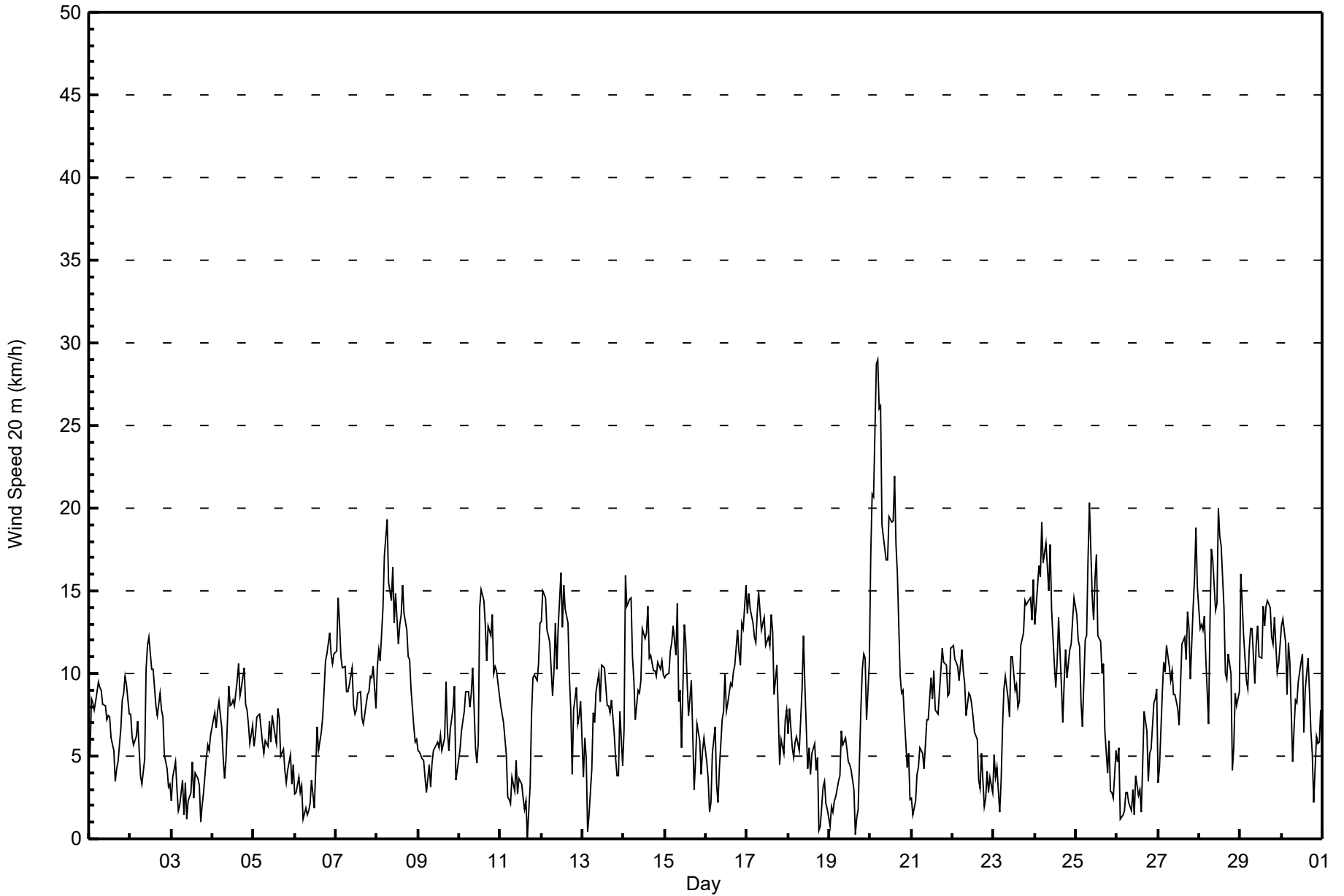
Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

Wind Speed 20 m (WS20m) - km/h

Janvier - November 2023

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





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

**Wind Speed 20 m (WS20m) - km/h**  
**Janvier - November 2023**

<b>Wind Speed Ranges (km/h)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	200	27.78	27.78
6 - 11	348	48.33	76.11
12 - 19	163	22.64	98.75
20 - 28	7	0.97	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 20 m (WS20m) - km/h**  
**Janvier - November 2023**

Wind Speed Ranges (km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	18	27	7	9	6	9	8	16	22	24	21	8	10	4	5	6	200
6 - 11	9	50	14	9	8	0	2	8	23	64	90	18	19	19	13	2	348
12 - 19	7	3	0	0	0	0	0	0	1	21	51	9	19	35	13	4	163
20 - 28	1	0	0	0	0	0	0	0	0	0	0	0	2	4	0	0	7
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	35	80	21	18	14	9	10	24	46	109	162	35	50	64	31	12	720

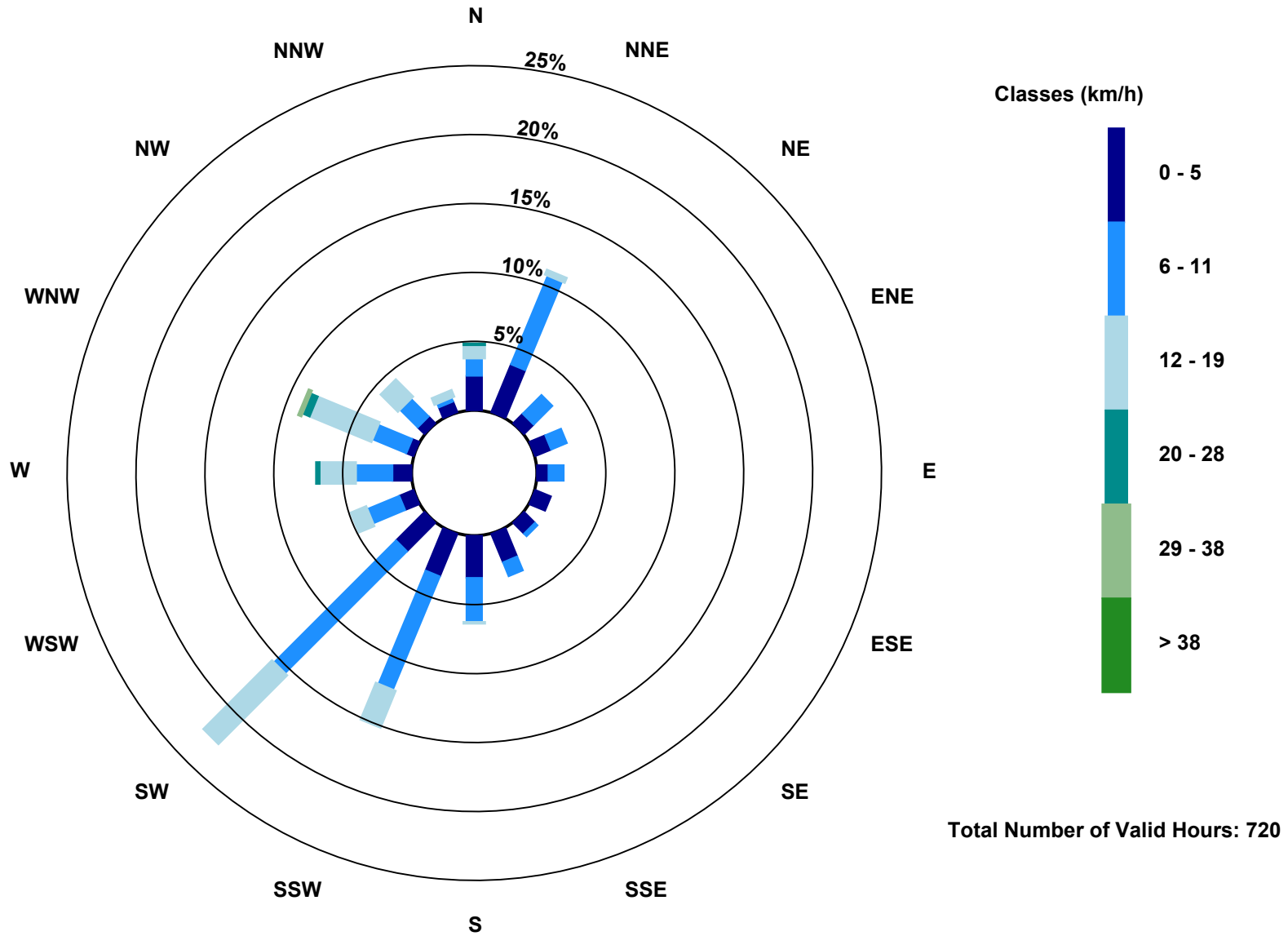
Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 2023

Wind Speed 20 m (WS20m) - km/h  
Janvier





Direction of Maximum Speed: 299 deg on Nov 20 05:00		Hours in Service:	720
Direction of Maximum Daily Speed Average: 289.4 deg on Nov 20		Hours of Data:	720
Direction of Minimum Speed: 349 deg on Nov 11 17:00		Hours of Missing Data:	0
Direction of Minimum Daily Speed Average: 1.5 deg on Nov 3		Percent Operational Time:	100.0
Monthly Average Direction: 251.1 deg			

Day	Hourly Period Ending At (MST)																								Daily Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Nov	216	208	205	207	211	207	220	217	222	226	213	206	219	235	227	226	200	180	192	218	209	205	222	223	213.4
2-Nov	224	213	194	219	227	207	234	337	354	12	13	7	1	1	0	349	359	11	20	20	12	12	17	59	354.5
3-Nov	60	39	70	213	90	56	137	110	12	25	327	279	213	197	172	47	2	21	8	11	16	12	18	8	30.1
4-Nov	20	18	21	32	30	24	15	7	79	86	91	90	83	78	81	77	83	84	82	63	56	59	56	55	61.4
5-Nov	58	50	50	61	45	40	21	32	30	34	50	54	55	19	35	41	44	37	20	6	4	9	7	23	37.3
6-Nov	14	356	22	6	25	26	21	5	10	81	132	279	176	163	172	171	176	183	196	206	209	207	206	206	191.4
7-Nov	207	207	211	212	209	212	211	209	197	208	217	218	228	232	218	229	227	232	211	209	215	235	272	229	217.8
8-Nov	240	257	257	274	288	298	296	300	303	301	309	309	306	307	310	309	317	318	315	312	308	309	293	295	298.3
9-Nov	301	286	275	263	265	243	217	222	222	198	186	162	166	154	151	133	144	168	173	155	168	172	186	178	185.8
10-Nov	199	182	183	188	181	187	185	187	195	212	221	180	187	205	204	195	193	199	205	206	197	188	187	185	194.2
11-Nov	181	185	209	173	141	100	26	31	38	14	358	12	0	25	116	319	349	185	218	222	226	208	225	230	212.4
12-Nov	232	235	231	234	231	229	215	216	231	224	257	261	254	262	266	267	262	245	241	223	233	238	220	218	240.4
13-Nov	178	217	205	133	41	20	24	18	18	28	22	28	28	33	24	20	30	28	35	12	351	323	304	247	17.6
14-Nov	248	294	294	282	286	269	260	249	236	225	226	245	243	236	245	243	232	226	229	220	219	220	215	219	246.7
15-Nov	218	218	217	221	225	220	222	214	189	212	328	330	325	311	330	291	287	260	230	264	268	247	297	312	253.1
16-Nov	314	332	162	116	149	162	165	158	185	211	219	236	231	224	215	197	209	226	230	221	216	214	208	216	213.6
17-Nov	219	233	227	230	227	229	228	232	227	233	231	229	228	231	230	232	227	215	233	148	187	167	193	205	224.0
18-Nov	207	213	209	196	209	205	192	199	195	212	212	208	199	240	234	213	181	164	171	147	221	176	225	211	204.9
19-Nov	92	243	163	218	199	212	196	204	191	216	233	231	206	220	201	157	192	272	230	217	218	215	260	237	219.4
20-Nov	260	275	277	290	299	298	299	297	296	291	287	296	288	292	295	292	293	282	278	275	285	311	288	262	289.4
21-Nov	113	164	107	126	94	117	100	104	65	67	68	36	21	23	32	10	15	12	20	31	26	17	14	17	38.4
22-Nov	18	25	22	21	16	12	25	21	14	17	21	27	21	18	17	73	76	63	70	120	166	178	197	165	27.4
23-Nov	121	162	191	328	142	184	188	199	190	198	193	213	219	222	218	208	196	198	206	220	223	219	212	208	204.5
24-Nov	219	217	220	216	224	230	227	231	218	226	232	223	218	274	286	281	247	201	217	220	226	220	214	212	227.3
25-Nov	207	225	216	222	250	328	351	357	358	354	344	351	353	349	327	326	328	324	347	10	5	45	198	215	329.5
26-Nov	192	201	135	176	196	145	14	2	241	253	163	22	272	191	183	224	264	265	218	178	203	223	222	233	222.3
27-Nov	183	193	205	214	217	212	207	200	208	216	210	217	215	200	221	228	216	212	222	236	272	277	278	269	227.7
28-Nov	239	234	245	245	244	236	265	277	273	269	271	283	284	277	287	265	261	255	255	277	285	300	256	252	265.3
29-Nov	277	281	281	257	278	283	293	293	306	310	296	302	297	291	300	307	298	293	292	292	308	305	296	290	292.9
30-Nov	301	298	304	299	293	302	315	273	277	274	291	294	306	319	298	287	283	259	229	221	217	213	219	216	283.3

235.3 243.9 239.6 244.0 250.3 251.4 256.6 256.8 255.1 258.3 265.4 285.0 274.0 272.9 272.4 270.1 258.9 239.8 234.8 233.4 238.0 233.6 241.0 232.9

Diurnal Average

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

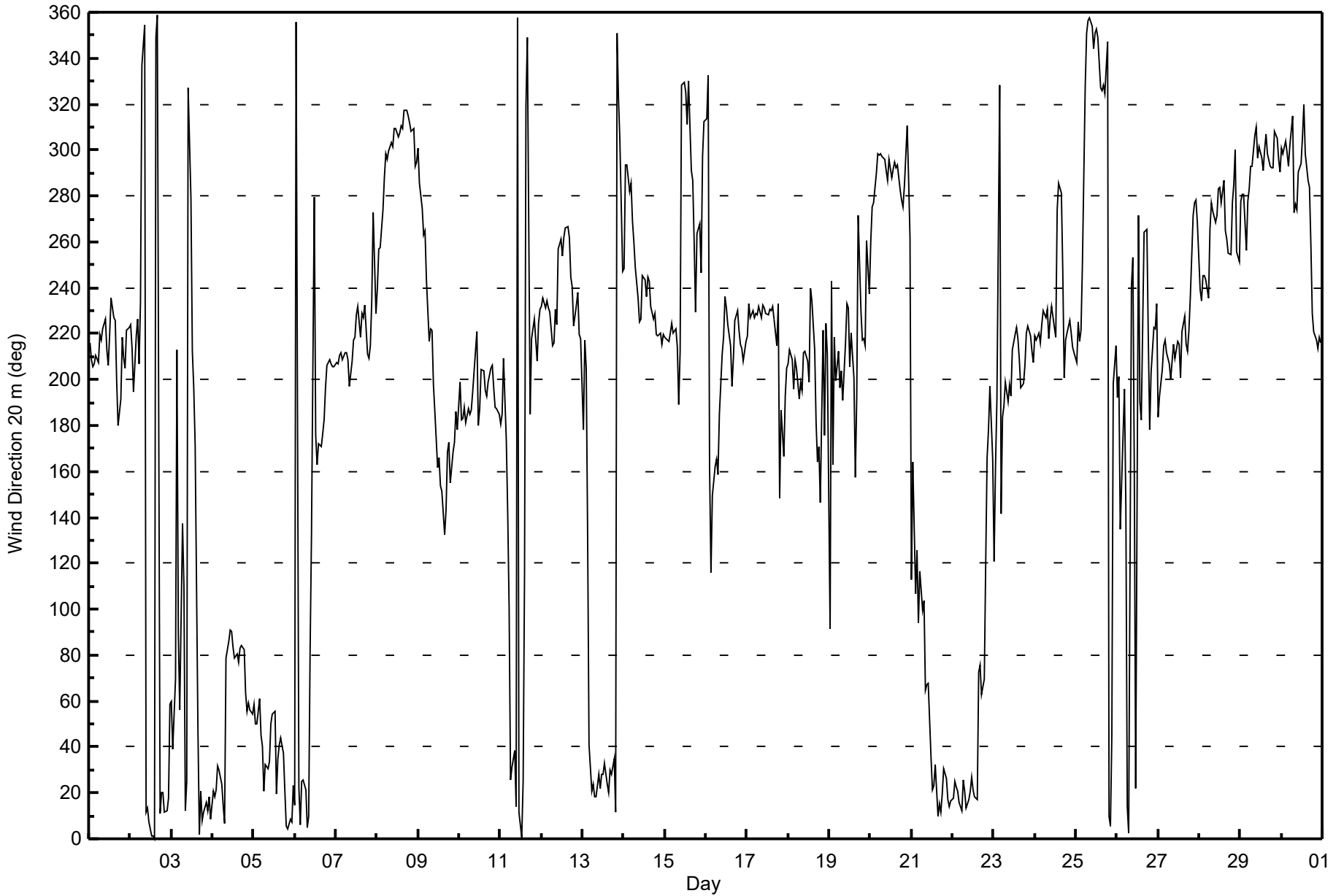




**Wood Buffalo Environmental Association**  
**Summary of Hour Standard Deviations**

**Wind Direction 20 m (WD20m) - deg**  
**Janvier - November 2023**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 94 deg on Nov 11 17:00		Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0																							
Minimum Value: 6 deg on Nov 17 23:00																									
Percentiles: P <sub>1</sub> = 10 P <sub>10</sub> = 13 Q <sub>1</sub> = 15 Median = 19 Q <sub>3</sub> = 25 P <sub>90</sub> = 40 P <sub>99</sub> = 81																									
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Nov	8	9	8	11	12	9	13	12	12	17	21	16	21	24	25	39	24	12	22	14	14	12	15	15	39
2-Nov	15	17	16	13	15	15	31	28	29	21	19	25	28	26	31	33	31	20	19	17	37	32	42	20	42
3-Nov	42	28	48	26	73	52	40	84	17	69	42	42	30	73	21	46	20	39	18	25	21	24	18	20	84
4-Nov	18	18	18	13	12	16	21	19	34	21	27	26	25	20	20	20	22	23	21	19	17	19	19	17	34
5-Nov	19	16	15	17	13	18	14	14	14	16	19	20	18	22	13	15	15	12	18	22	20	20	26	19	26
6-Nov	31	22	20	20	16	32	29	21	30	37	44	62	53	24	22	17	17	16	14	15	16	15	16	15	62
7-Nov	15	17	16	16	16	16	15	17	13	17	17	19	21	19	21	24	21	20	16	14	14	19	19	22	24
8-Nov	21	17	19	20	17	21	19	19	20	17	23	23	23	23	26	23	28	25	24	22	19	23	16	17	28
9-Nov	16	14	15	11	18	34	22	36	26	32	30	25	31	27	27	16	14	38	16	16	15	17	20	51	51
10-Nov	14	14	13	18	16	21	18	15	14	14	34	20	16	17	16	15	11	15	13	13	18	12	13	17	34
11-Nov	13	17	12	17	58	71	45	56	45	24	33	41	44	58	84	49	94	48	20	14	14	14	15	12	94
12-Nov	13	14	15	15	14	14	21	18	14	16	27	18	21	21	20	22	17	27	38	13	12	16	15	10	38
13-Nov	33	13	11	70	50	12	13	16	16	14	17	13	14	14	18	20	19	16	18	31	34	35	19	46	70
14-Nov	18	19	18	17	15	16	16	16	15	19	19	19	22	20	21	18	15	13	15	13	11	12	11	12	22
15-Nov	14	13	13	15	14	14	15	15	24	16	63	36	32	30	34	16	14	31	17	18	19	21	22	13	63
16-Nov	27	40	69	48	23	20	31	33	16	12	20	17	18	16	16	12	12	18	17	17	17	15	15	16	69
17-Nov	16	16	14	15	15	15	15	15	15	14	16	16	16	17	16	15	19	15	17	38	37	31	6	15	38
18-Nov	11	7	16	20	19	16	15	12	19	13	15	23	25	33	23	16	22	14	94	82	76	26	34	77	94
19-Nov	76	26	41	70	36	27	20	11	12	25	20	24	27	31	41	81	75	70	12	13	13	17	49	33	81
20-Nov	24	20	20	19	20	20	20	23	23	23	21	20	20	19	20	18	16	17	13	13	13	31	17	73	73
21-Nov	41	67	65	30	26	23	28	49	35	39	46	21	18	17	23	23	20	21	20	16	19	20	20	19	67
22-Nov	20	18	16	16	20	19	17	18	22	18	19	25	28	30	21	21	23	19	62	48	25	40	29	21	62
23-Nov	17	32	40	64	32	18	16	15	16	18	16	17	20	19	18	13	11	10	12	15	15	15	12	13	64
24-Nov	16	13	16	17	19	17	16	16	16	15	21	20	19	25	15	16	24	10	12	12	14	13	13	13	25
25-Nov	12	15	17	19	33	34	36	29	30	31	39	37	34	35	34	38	30	29	30	18	37	57	72	20	72
26-Nov	31	19	82	57	60	34	51	71	63	59	59	48	54	35	58	14	17	19	26	19	12	17	15	13	82
27-Nov	65	23	11	11	12	13	12	12	12	14	13	16	17	15	18	19	17	13	14	18	25	19	16	17	65
28-Nov	17	14	13	14	16	19	18	16	19	20	22	17	17	18	16	17	22	22	27	88	43	26	22	30	88
29-Nov	18	16	19	18	21	19	18	16	35	28	20	21	19	17	21	25	18	17	16	16	26	21	18	14	35
30-Nov	18	16	18	21	17	21	31	19	16	17	19	20	23	36	21	17	15	22	26	83	15	11	15	10	83
Diurnal Maximum																									
76 67 82 70 73 71 51 84 63 69 63 62 54 73 84 81 94 70 94 88 76 57 72 77																									





## WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY  
MONITORING PROGRAM  
MONTHLY REPORT

### **AMS23 FORT HILLS NOVEMBER 2023**

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

December 22, 2023

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FORT HILLS (AMS23)  
 NOVEMBER 2023

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	689	30	31	99.86	10.5	0	2.4	0
TRS(ppb) Average	688	31	32	99.86	1.7	0	0.9	0
THC(ppm) Average	687	30	33	99.58	5.3	-	3.8	-
NMHC(ppm) Average	687	30	33	99.58	0.967	-	0.497	-
CH4(ppm) Average	687	30	33	99.58	4.7	-	3.3	-
NO2 (ppb) Average	686	32	34	99.72	43.5	0	25.3	-
NO (ppb) Average	686	32	34	99.72	205.7	-	64.5	-
NOX (ppb) Average	686	32	34	99.72	249.2	-	81.9	-
PM2.5 (ug/m3) Average	717	2	3	99.86	37.2	0	17.2	0
Temperature 2 m (C) Average	720	0	0	100	5.7	-	1.6	-
Relative Humidity (%) Average	720	0	0	100	98.5	-	95.7	-
Wind Speed 10 m (km/h) Average	673	0	47	93.47	31	-	18	-
Wind Direction 10 m (deg) Average	673	0	47	93.47	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FORT HILLS (AMS23)  
NOVEMBER 2023

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile						
					Min	P10	Q1	Median	Q3	P90	Max
SO2 (ppb) Average	689	0.57	1.1	-	0	0	0.1	0.2	0.6	1.6	10.5
TRS (ppb) Average	688	0.27	0.2	-	0	0.1	0.1	0.2	0.3	0.6	1.7
THC (ppm) Average	687	2.46	0.6	-	2	2	2.1	2.2	2.6	3.2	5.3
NMHC(ppm) Average	687	0.139	0.176	-	0	0	0	0.1	0.2	0.4	0.967
CH4(ppm) Average	687	2.32	0.4	-	2	2	2	2.2	2.4	2.9	4.7
NO2 (ppb) Average	686	13.52	9.3	-	0.1	1.5	5.9	12.5	20.3	26.6	43.5
NO (ppb) Average	686	13.61	28.5	-	0	0	0.2	2.2	12	37.2	205.7
NOX (ppb) Average	686	27.13	34.8	-	0.1	1.6	6.6	16.2	33	59.7	249.2
PM2.5 (ug/m3) Average	717	6.87	4.7	-	0.4	2.7	3.8	5.8	8.5	12.7	37.2
Temperature 2 m (C) Average	720	-4.17	4.3	-	-15.3	-10.3	-6.8	-3.6	-1.3	1	5.7
Relative Humidity (%) Average	720	82.82	10.5	-	45.6	68.2	77.3	84.8	90.7	94.5	98.5
Wind Speed 10 m (km/h) Average	673	10.1	6	-	1	4	6	9	13	18	31
Wind Direction 10 m (deg) Average	673	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FORT HILLS (AMS23)  
NOVEMBER 2023

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
SO2	08 Nov 2023 10:00	08 Nov 2023 10:00	1	Maintenance - verify daily QA response
TRS	08 Nov 2023 11:00	08 Nov 2023 11:00	1	Maintenance - verify daily QA response
THC/NMHC/CH4	08 Nov 2023 10:00	08 Nov 2023 10:00	1	Maintenance - verify daily QA response
THC/NMHC/CH4	29 Nov 2023 09:00	29 Nov 2023 10:00	2	Maintenance - replaced support gas cylinder
NO2	08 Nov 2023 09:00	08 Nov 2023 10:00	2	Maintenance - verify daily QA response
PM2.5	30 Nov 2023 10:00	30 Nov 2023 10:00	1	Maintenance - firmware update
Wind Speed, Wind Direction	08 Nov 2023 05:00	08 Nov 2023 11:00	7	Flat line in sensor output signal - Sensor frozen
Wind Speed, Wind Direction	08 Nov 2023 17:00	10 Nov 2023 08:00	40	Flat line in sensor output signal - Sensor frozen



Wood Buffalo Environmental Association

Summary of Hour Averages

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

Fort Hills - November 2023

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 10.5 ppb on Nov 9 17:00	Maximum Daily Average: 2.4 ppb on Nov 10		Hours of Data:	689
Minimum Value: 0.0 ppb on Nov 1 05:00	Minimum Daily Average: 0.0 ppb on Nov 14		Hours of Missing Data:	31
Maximum Diurnal Average: 1.1 ppb at hour 14	Minimum Diurnal Average: 0.3 ppb at hour 3		Hours of Calibration:	30
Monthly Average: 0.57 ppb	Percentiles: P <sub>1</sub> = 0.0 P <sub>10</sub> = 0.0 Q <sub>1</sub> = 0.1 Median = 0.2 Q <sub>3</sub> = 0.6 P <sub>90</sub> = 1.6 P <sub>99</sub> = 5.9		Percent Operational Time:	99.9

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Nov	0.0	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.2	3.4	1.3	0.6	0.2	0.1	0.1	0.1	0.1	0.3	3.4	
2-Nov	Z	0.1	0.3	0.5	0.2	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.5	
3-Nov	0.1	Z	0.8	1.2	0.8	0.4	0.4	0.7	0.6	2.5	3.0	2.3	1.7	1.6	2.8	2.9	1.4	1.2	0.8	0.9	0.6	1.0	1.0	0.7	1.3	3.0	
4-Nov	0.6	0.6	Z	0.2	0.2	0.2	0.1	0.1	0.2	0.2	0.1	0.1	0.1	0.0	0.1	0.1	0.2	0.1	0.1	0.1	0.2	0.2	0.2	0.3	0.2	0.6	
5-Nov	0.2	0.2	0.1	Z	0.2	0.1	0.2	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.2	0.2	0.1	0.1	0.1	0.2	0.1	0.2	0.3	
6-Nov	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.7	2.0	4.7	7.9	7.1	5.5	3.3	1.4	1.2	1.6	2.4	1.2	1.0	1.3	0.9	1.8	7.9	
7-Nov	0.5	0.4	0.3	0.2	0.2	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.5	
8-Nov	0.2	0.2	0.1	0.1	0.1	0.0	0.1	0.1	0.1	M	0.1	0.1	0.0	0.1	0.1	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	
9-Nov	Z	0.1	0.6	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.2	0.3	0.9	6.1	6.0	3.8	10.5	3.8	2.4	0.8	0.6	0.5	1.0	3.3	1.8	10.5	
10-Nov	1.8	Z	1.1	2.8	3.6	1.5	0.6	1.1	2.7	5.8	2.8	2.1	5.1	6.1	3.5	2.4	2.7	2.1	1.5	1.2	1.4	1.2	1.1	1.3	2.4	6.1	
11-Nov	1.3	1.3	Z	1.6	0.7	0.7	0.9	0.9	0.9	3.1	2.2	1.3	1.0	2.7	4.0	3.7	2.1	0.9	0.5	0.3	0.3	0.2	0.2	0.2	1.3	4.0	
12-Nov	0.2	0.1	0.1	Z	0.2	0.1	0.1	0.1	0.1	0.1	0.6	1.3	0.4	0.3	0.2	0.3	0.2	0.1	0.1	0.2	0.2	0.1	0.1	0.0	0.2	1.3	
13-Nov	0.1	0.0	0.0	0.1	Z	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	
14-Nov	0.0	0.0	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	
15-Nov	Z	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	
16-Nov	0.0	Z	0.0	0.1	0.0	0.0	0.2	0.3	0.7	0.9	1.0	2.5	2.8	0.4	0.3	0.2	0.3	0.1	0.1	0.0	0.0	0.0	0.1	0.0	0.4	2.8	
17-Nov	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.1	0.0	0.1	0.3	0.5	0.2	0.1	0.1	0.0	0.2	0.1	0.5	
18-Nov	1.0	1.1	1.2	Z	2.0	2.9	1.1	0.6	0.3	0.5	1.0	1.2	2.5	2.0	2.4	2.4	1.2	0.5	0.4	0.9	0.7	0.5	0.5	0.6	1.2	2.9	
19-Nov	0.7	1.9	0.8	1.0	Z	0.7	1.3	0.8	1.2	1.2	0.8	0.9	1.8	2.6	3.1	2.9	3.1	1.3	1.9	2.3	1.4	0.8	0.5	0.5	1.5	3.1	
20-Nov	0.5	0.3	0.2	0.2	0.2	Z	0.2	0.1	0.0	0.0	C	C	C	0.1	0.1	0.1	0.4	0.3	0.4	0.1	0.1	0.1	0.2	0.3	0.2	0.5	
21-Nov	Z	0.1	0.0	0.1	0.1	0.1	0.1	0.2	0.2	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.0	0.1	0.1	0.1	0.2	
22-Nov	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	0.2	0.2	0.5	0.2	0.2	0.1	0.0	0.0	0.2	0.4	0.4	0.2	0.5	
23-Nov	0.2	0.1	Z	0.3	1.0	1.7	2.5	3.8	8.3	2.9	2.4	0.9	0.4	0.4	0.3	0.2	0.2	0.2	0.2	0.5	0.7	1.2	0.4	0.3	1.3	8.3	
24-Nov	0.3	0.3	0.3	Z	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.3	1.0	1.1	1.5	1.8	1.7	0.4	0.1	0.1	0.0	0.0	0.0	0.0	0.4	1.8	
25-Nov	0.2	0.9	0.1	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.1	0.1	0.2	0.1	0.0	0.0	0.1	0.1	0.9	
26-Nov	0.5	0.7	0.0	0.0	0.5	Z	1.3	0.8	0.6	1.1	0.7	0.8	0.4	0.3	0.2	0.6	1.1	0.8	1.0	1.1	2.1	2.4	0.7	0.7	0.8	2.4	
27-Nov	Z	0.5	1.0	0.9	0.9	0.6	0.4	0.4	0.4	0.5	0.2	0.3	0.2	0.2	0.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	1.0	
28-Nov	0.0	Z	0.1	0.1	0.0	0.1	0.2	0.4	0.1	0.0	0.0	0.1	0.4	0.3	0.3	0.2	0.2	0.2	0.1	0.1	0.2	0.2	0.4	0.6	0.2	0.6	
29-Nov	0.6	0.2	Z	0.3	0.3	0.3	0.2	0.3	0.3	0.3	0.2	0.4	0.2	0.1	0.2	0.2	0.2	0.1	0.1	0.1	0.3	0.2	0.2	0.1	0.2	0.6	
30-Nov	0.2	0.2	0.1	Z	0.3	0.4	0.3	0.2	0.1	0.1	0.2	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.0	0.1	0.1	0.4	0.4

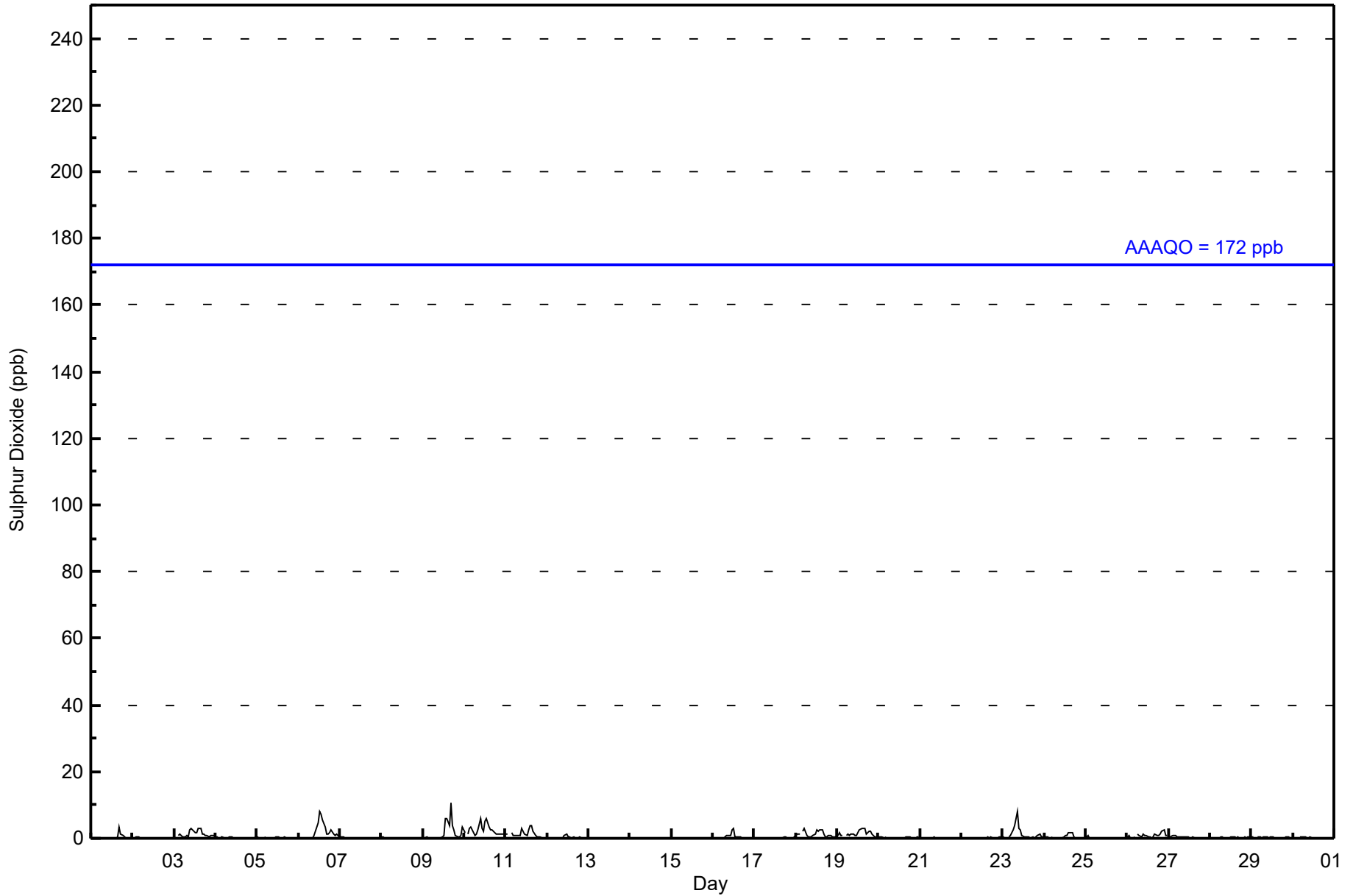
0.4	0.4	0.3	0.4	0.5	0.4	0.4	0.4	0.6	0.7	0.6	0.7	1.0	1.1	1.1	0.9	1.0	0.5	0.5	0.4	0.4	0.3	0.3	0.4	Diurnal Average	
1.8	1.9	1.2	2.8	3.6	2.9	2.5	3.8	8.3	5.8	3.0	4.7	7.9	7.1	6.0	3.8	10.5	3.8	2.4	2.4	2.1	2.4	1.3	3.3	Diurnal Maximum	

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 (SO<sub>2</sub>) - ppb  
Fort Hills - November 2023







**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Fort Hills - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 10	689	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: 689

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Fort Hills - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	39	61	29	12	11	20	59	79	93	78	50	27	13	28	22	24	645
11 - 20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	39	61	29	12	11	20	59	79	93	78	50	27	13	28	22	24	645

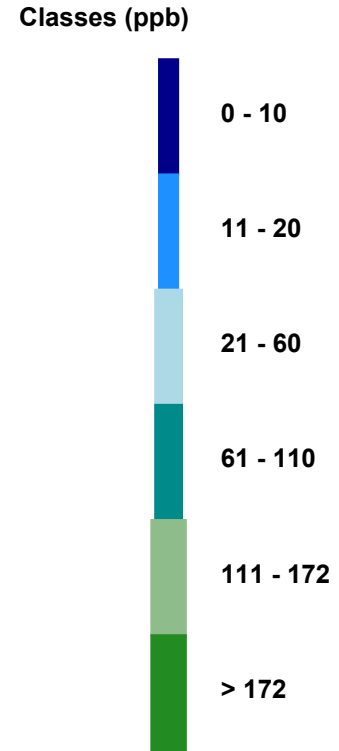
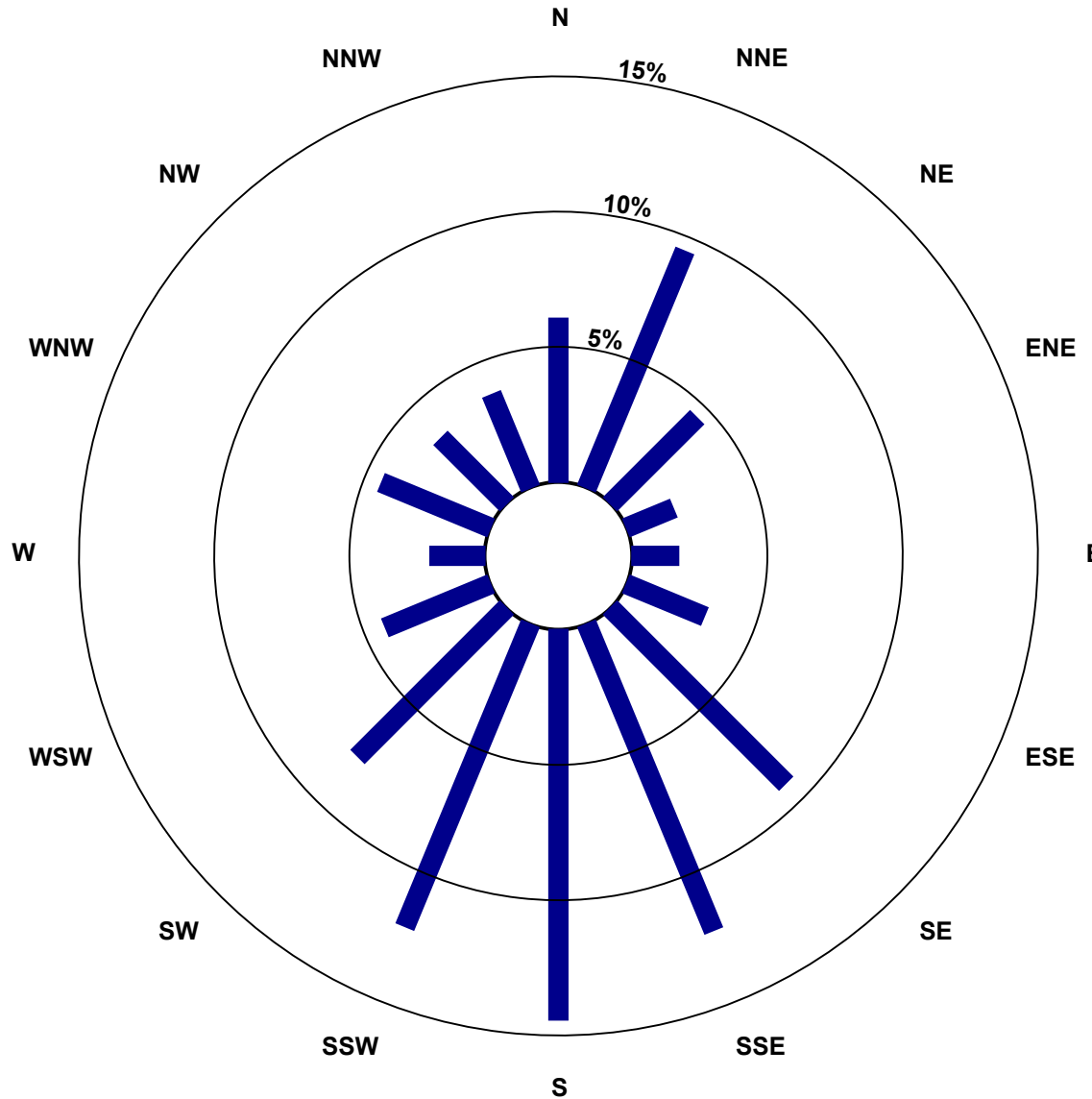
Total Number of Valid Hours: 645

Total Number of Hours: 720

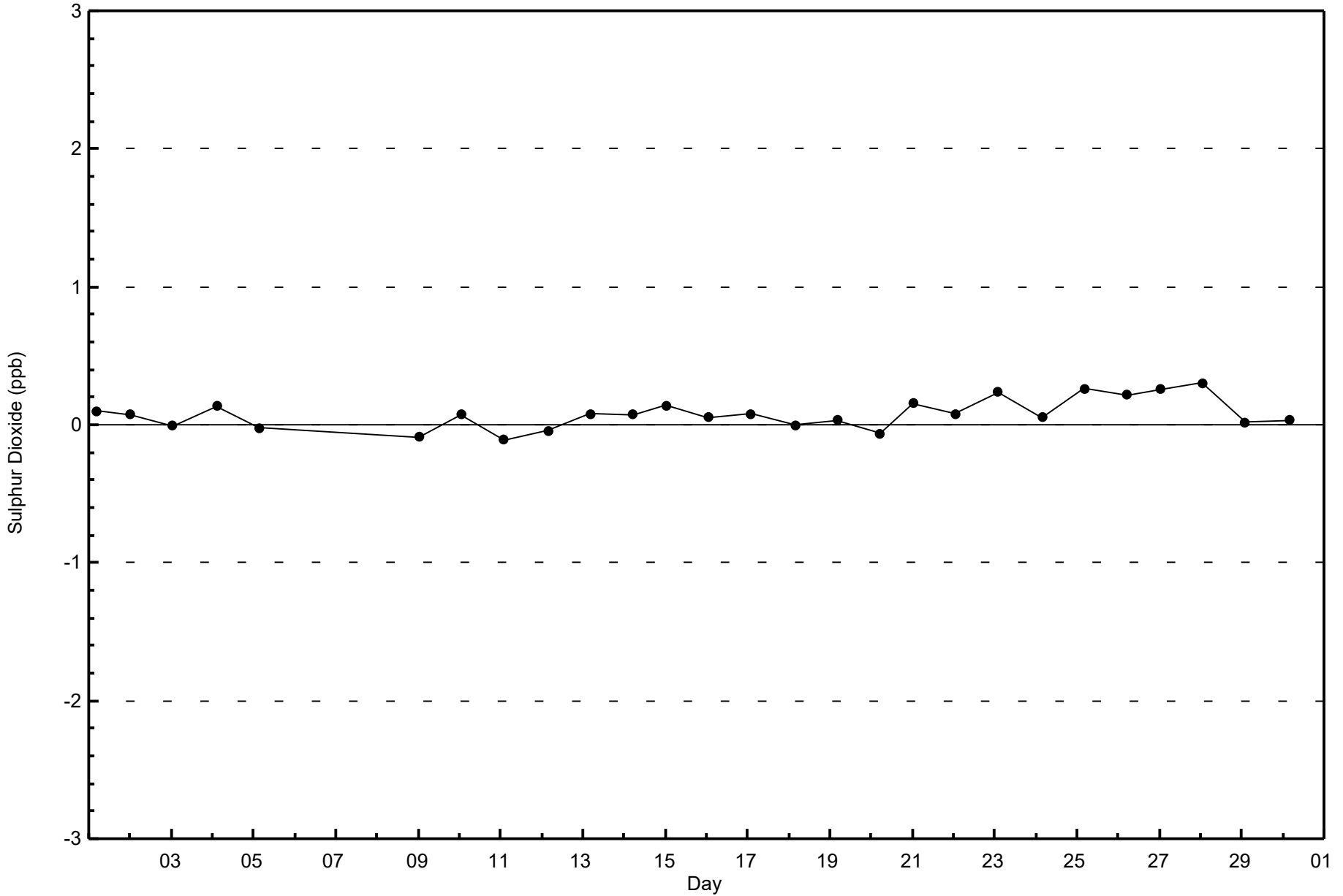


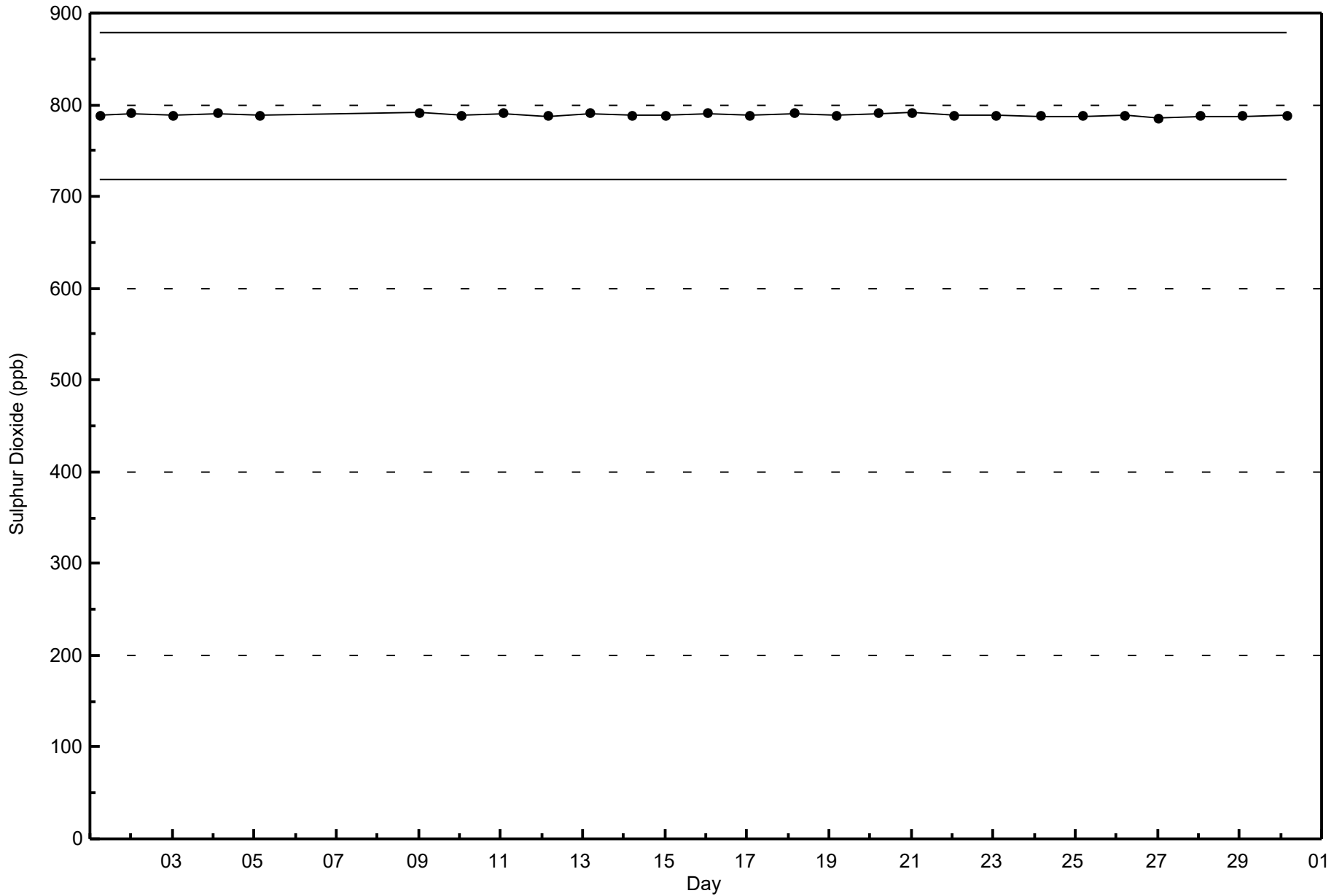
Wood Buffalo Environmental Association  
Wind Rose Nov 2023

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

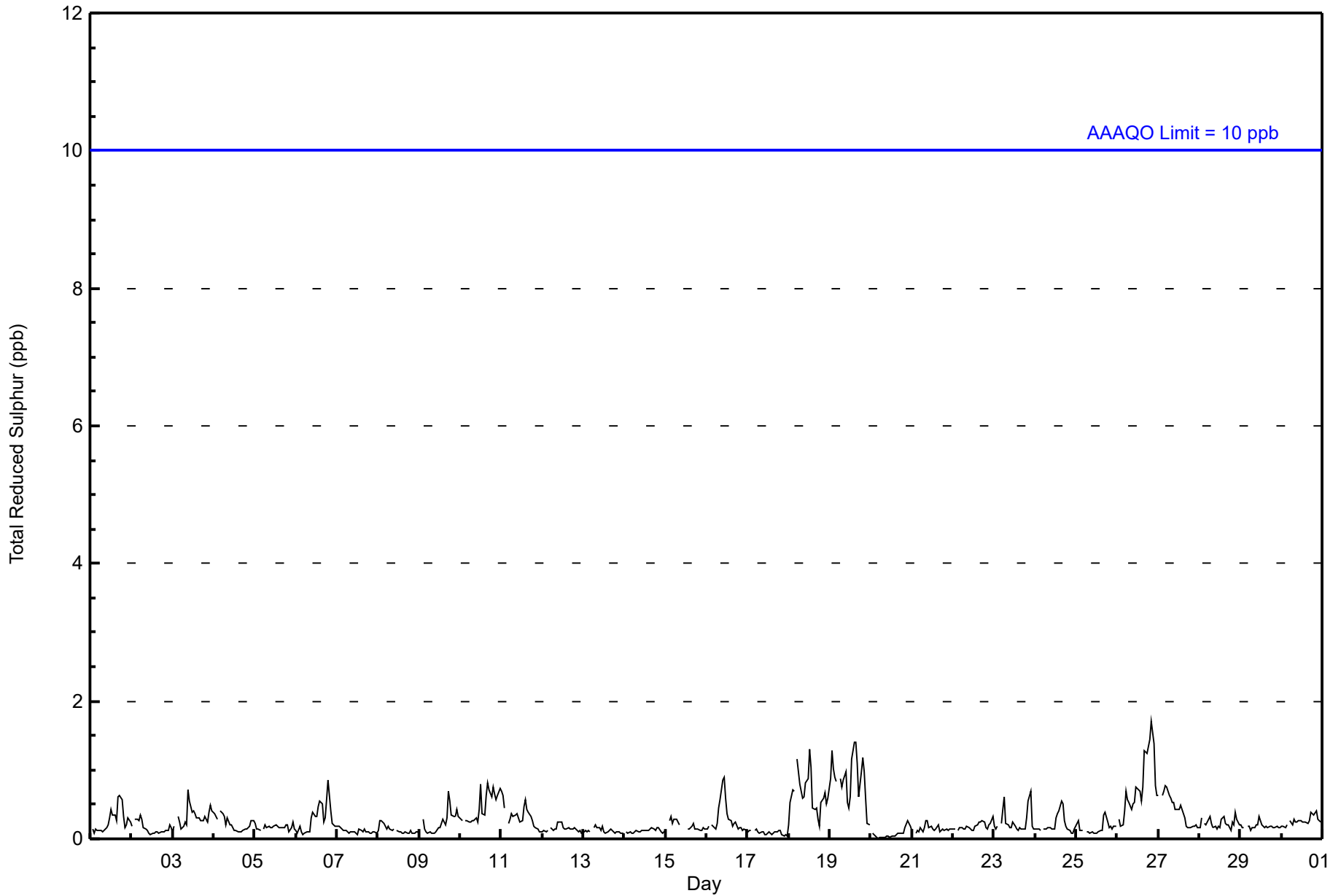


Total Number of Valid Hours: 645











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

**Total Reduced Sulphur (TRS) - ppb**  
**Fort Hills - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2	688	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: 688

Total Number of Hours: 720





**Wood Buffalo Environmental Association  
Frequency Distribution**

**Total Reduced Sulphur (TRS) - ppb  
Fort Hills - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	36	60	29	11	10	19	59	80	95	79	51	25	14	30	23	23	644
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	36	60	29	11	10	19	59	80	95	79	51	25	14	30	23	23	644

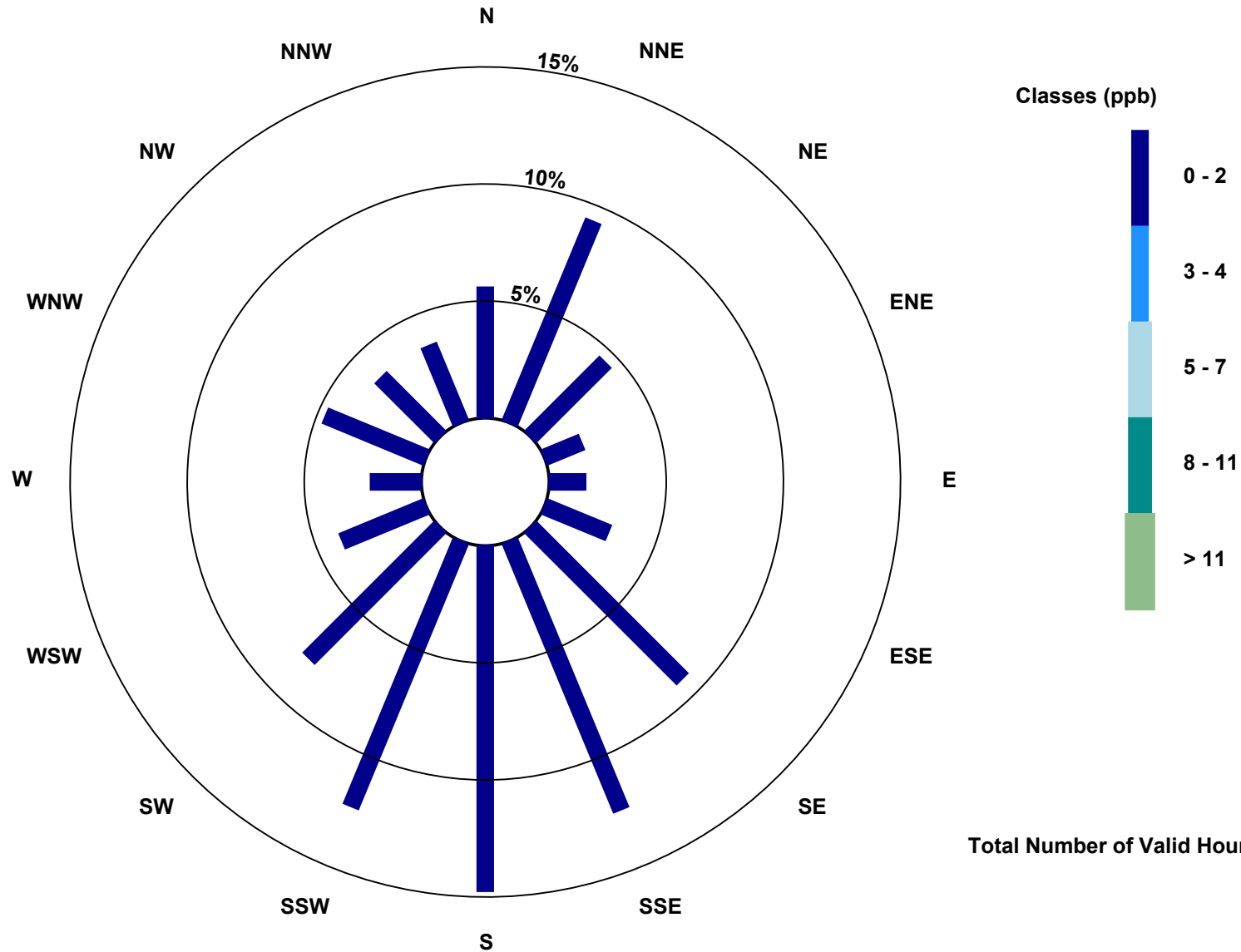
Total Number of Valid Hours: 644

Total Number of Hours: 720

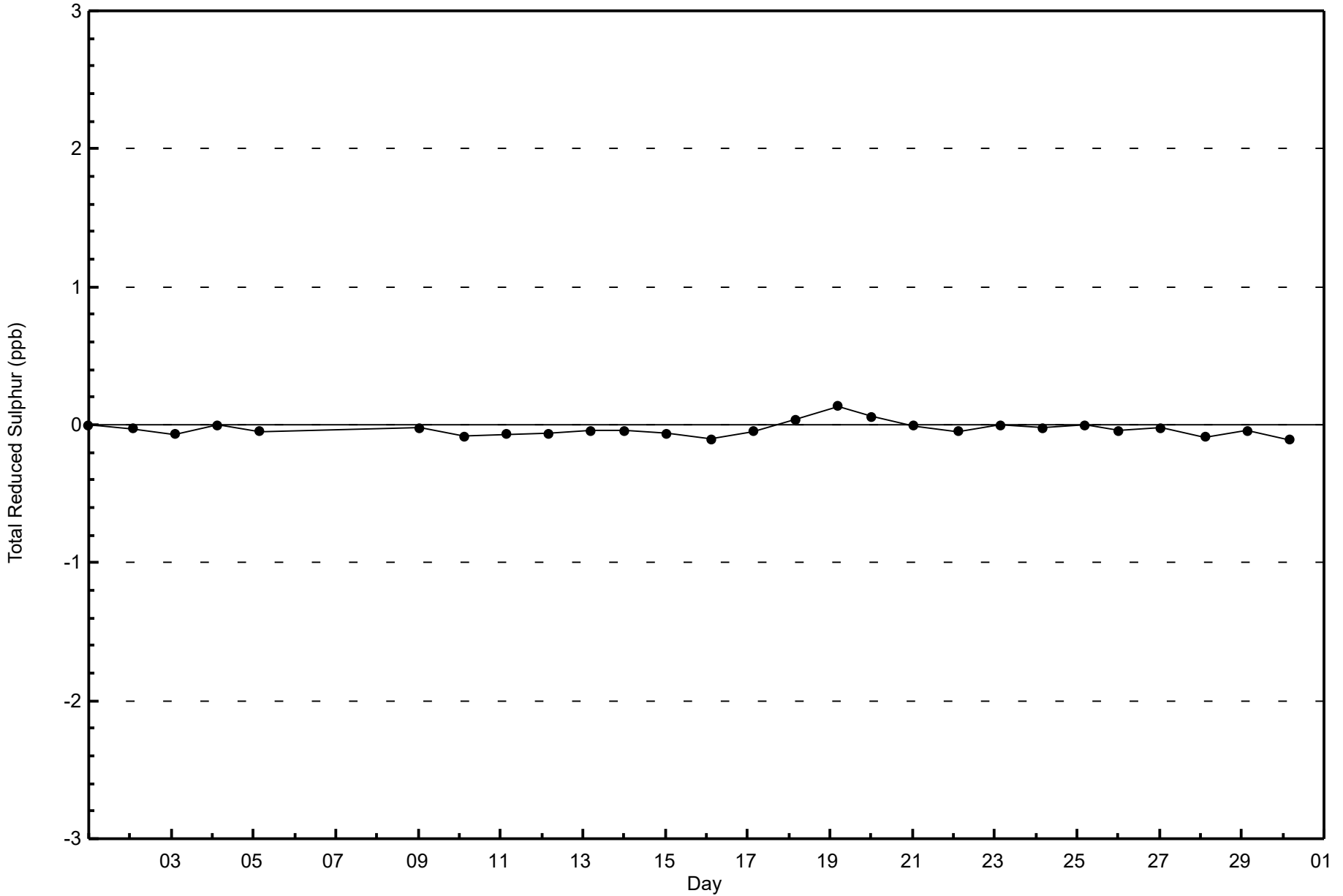


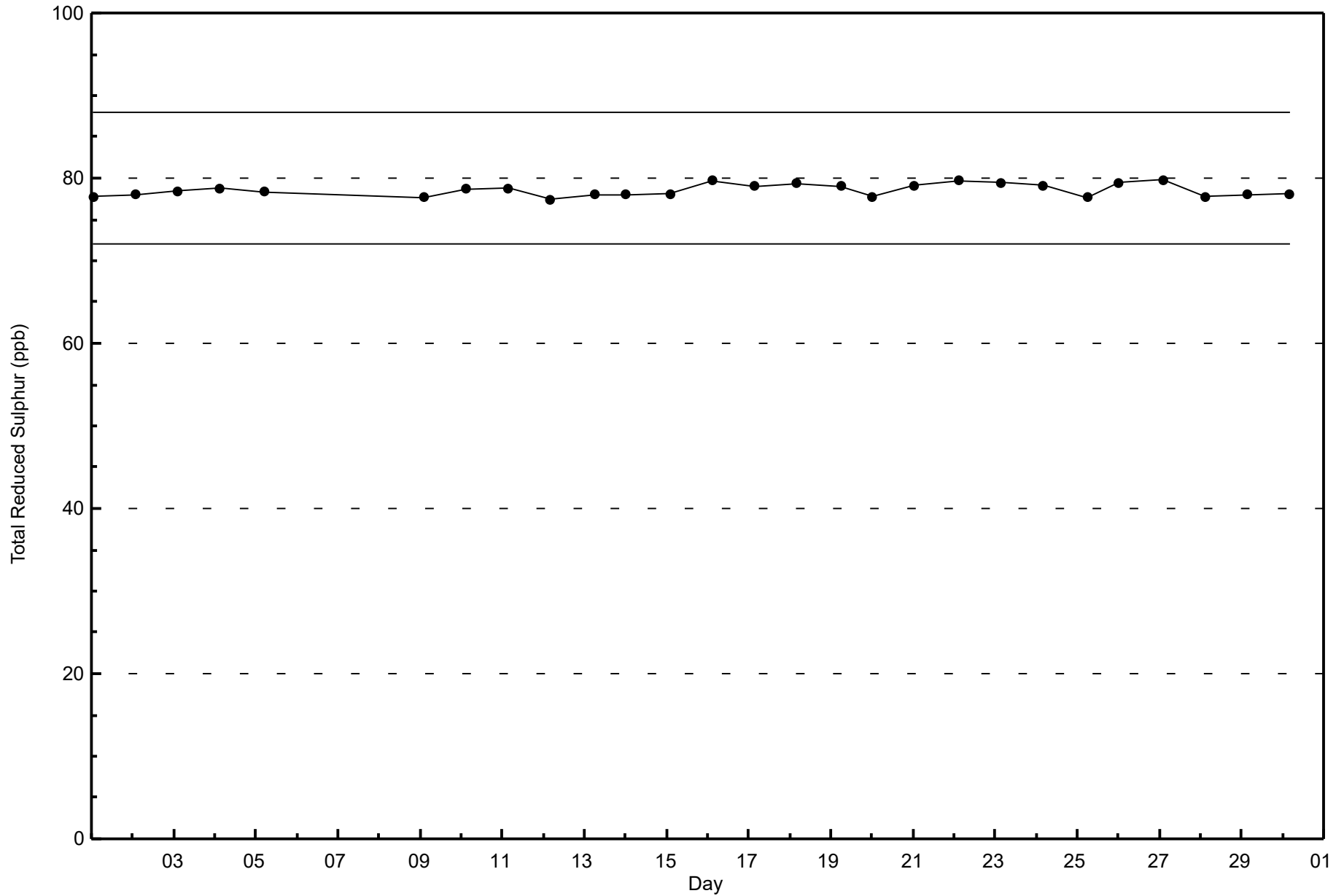
Wood Buffalo Environmental Association  
Wind Rose Nov 2023

Total Reduced Sulphur (TRS) - ppb  
Fort Hills



Total Number of Valid Hours: 644







Wood Buffalo Environmental Association

Summary of Hour Averages

Total Hydrocarbons (THC) - ppm

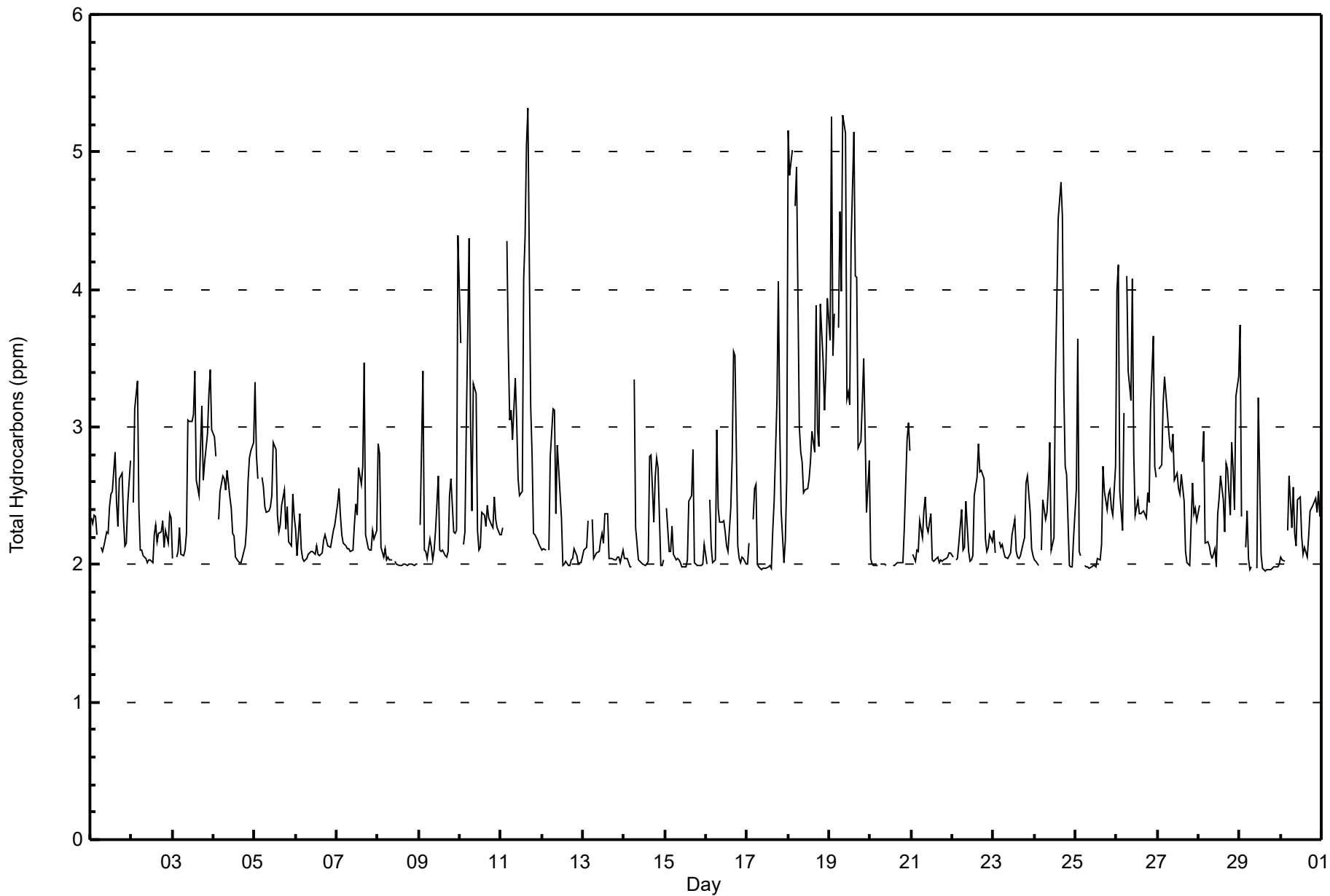
Fort Hills - November 2023

Number of Exceedences (AAAQO):		1-hr: 0		24-hr: 0		Hours in Service:		720																		
Maximum Value: 5.3 ppm on Nov 11 17:00		Maximum Daily Average: 3.8 ppm on Nov 19				Hours of Data:		687																		
Minimum Value: 2.0 ppm on Nov 29 16:00		Minimum Daily Average: 2.1 ppm on Nov 8				Hours of Missing Data:		33																		
Maximum Diurnal Average: 2.7 ppm at hour 17		Minimum Diurnal Average: 2.3 ppm at hour 11				Hours of Calibration:		30																		
Monthly Average: 2.46 ppm		Percentiles: P <sub>1</sub> = 2.0 P <sub>10</sub> = 2.0 Q <sub>1</sub> = 2.1 Median = 2.2 Q <sub>3</sub> = 2.6 P <sub>90</sub> = 3.2 P <sub>99</sub> = 5.0				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-Nov	2.3	2.3	2.4	2.4	2.2	Z	2.1	2.1	2.1	2.2	2.2	2.4	2.5	2.5	2.8	2.5	2.3	2.6	2.7	2.3	2.1	2.2	2.4	2.8	2.4	2.8
2-Nov	Z	2.5	3.1	3.3	2.4	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.2	2.3	2.2	2.2	2.2	2.3	2.1	2.2	2.2	2.4	2.3	2.3	2.3	3.3
3-Nov	2.0	Z	2.1	2.1	2.3	2.1	2.1	2.1	2.2	3.1	3.0	3.0	3.1	3.4	2.6	2.5	2.8	3.2	2.6	2.7	2.9	3.2	3.4	3.0	2.7	3.4
4-Nov	2.9	2.8	Z	2.3	2.5	2.6	2.6	2.5	2.7	2.5	2.4	2.2	2.2	2.1	2.0	2.0	2.0	2.1	2.1	2.3	2.6	2.8	2.8	2.9	2.4	2.9
5-Nov	3.3	2.8	2.6	Z	2.6	2.6	2.4	2.4	2.4	2.4	2.5	2.9	2.8	2.4	2.2	2.3	2.4	2.5	2.3	2.4	2.2	2.1	2.5	2.3	2.5	3.3
6-Nov	2.3	2.1	2.4	2.1	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.1	2.1	2.2	2.2	2.3	2.1	2.4
7-Nov	2.4	2.6	2.4	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.3	2.4	2.4	2.7	2.6	2.7	3.5	2.2	2.1	2.1	2.1	2.3	2.2	2.2	2.3	3.5
8-Nov	2.9	2.8	2.1	2.1	2.1	2.0	2.1	2.0	2.0	M	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.9
9-Nov	Z	2.3	3.4	2.1	2.1	2.0	2.2	2.1	2.0	2.1	2.2	2.6	2.1	2.1	2.1	2.1	2.1	2.1	2.5	2.6	2.2	2.2	2.2	4.4	2.3	4.4
10-Nov	3.6	Z	2.1	2.2	3.0	4.4	3.0	2.4	3.3	3.2	2.2	2.1	2.1	2.4	2.4	2.3	2.4	2.3	2.3	2.3	2.5	2.3	2.3	2.2	2.6	4.4
11-Nov	2.2	2.3	Z	4.4	3.6	3.1	3.1	2.9	3.4	3.0	2.6	2.5	2.5	4.1	4.4	5.1	5.3	3.2	2.8	2.2	2.2	2.2	2.1	2.1	3.1	5.3
12-Nov	2.1	2.1	2.1	Z	2.1	2.8	3.1	3.1	2.4	2.9	2.7	2.3	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.0	2.0	2.0	2.3	3.1
13-Nov	2.1	2.1	2.1	2.3	Z	2.3	2.0	2.1	2.1	2.1	2.2	2.2	2.2	2.4	2.4	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.0	2.1	2.1	2.4
14-Nov	2.0	2.0	2.0	2.0	2.0	Z	3.3	2.3	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.8	2.8	2.3	2.6	2.8	2.7	2.0	2.0	2.0	2.3	3.3
15-Nov	Z	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	2.5	2.5	2.8	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.8
16-Nov	2.0	Z	2.5	2.1	2.0	2.0	3.0	2.4	2.3	2.3	2.3	2.2	2.1	2.1	2.4	2.8	3.5	3.5	2.1	2.0	2.0	2.0	2.0	2.0	2.3	3.5
17-Nov	2.0	2.2	Z	2.3	2.6	2.6	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.3	2.5	3.2	4.1	3.0	2.4	2.0	2.2	2.6	2.3	4.1
18-Nov	5.2	4.8	5.0	Z	4.6	4.9	3.0	2.8	2.7	2.5	2.5	2.6	2.6	2.8	3.0	2.8	3.9	3.0	2.9	3.9	3.5	3.1	3.4	3.9	3.5	5.2
19-Nov	3.6	5.3	3.5	3.8	Z	3.7	4.6	4.0	5.3	5.1	3.2	3.3	3.2	4.3	5.1	4.1	4.1	2.9	2.9	3.2	3.5	3.0	2.4	2.8	3.8	5.3
20-Nov	2.0	2.0	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	C	C	C	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.3	2.9	3.0	2.8	2.2	3.0
21-Nov	Z	2.1	2.0	2.1	2.1	2.3	2.2	2.4	2.5	2.3	2.2	2.4	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.5
22-Nov	2.1	Z	2.0	2.0	2.2	2.4	2.1	2.1	2.5	2.1	2.0	2.0	2.1	2.5	2.6	2.9	2.7	2.7	2.6	2.2	2.1	2.1	2.2	2.2	2.3	2.9
23-Nov	2.3	2.1	Z	2.2	2.1	2.1	2.1	2.1	2.0	2.1	2.1	2.2	2.3	2.1	2.1	2.0	2.1	2.2	2.2	2.6	2.6	2.4	2.1	2.1	2.2	2.6
24-Nov	2.0	2.0	2.0	Z	2.1	2.5	2.3	2.4	2.6	2.9	2.1	2.2	3.3	3.9	4.5	4.8	4.5	3.3	2.7	2.7	2.0	2.0	2.0	2.2	2.7	4.8
25-Nov	2.5	3.6	2.1	2.1	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.7	2.5	2.4	2.5	2.5	2.4	2.4	2.7	2.3	3.6	
26-Nov	4.0	4.2	2.5	2.2	3.1	Z	4.1	3.4	3.2	4.1	2.8	2.4	2.5	2.4	2.4	2.4	2.4	2.3	2.5	2.5	3.1	3.7	2.7	2.6	2.9	4.2
27-Nov	Z	2.7	2.7	3.2	3.4	3.2	3.0	2.8	2.8	2.9	2.6	2.7	2.6	2.5	2.7	2.5	2.1	2.0	2.0	2.0	2.6	2.4	2.4	2.3	2.6	3.4
28-Nov	2.4	Z	2.7	3.0	2.2	2.2	2.1	2.1	2.0	2.1	2.0	2.4	2.5	2.6	2.5	2.2	2.7	2.7	2.4	2.9	2.7	2.4	3.2	3.4	2.5	3.4
29-Nov	3.7	2.3	Z	2.1	2.4	2.0	2.0	2.0	M	M	2.0	3.2	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.2	3.7
30-Nov	2.1	2.0	2.0	Z	2.3	2.6	2.3	2.6	2.2	2.1	2.5	2.5	2.2	2.1	2.1	2.1	2.2	2.4	2.4	2.4	2.5	2.4	2.5	2.4	2.3	2.6
																								Diurnal Average		
																								Diurnal Maximum		
Z - zerspan																										
C - Calibration																										
M - Maintenance																										



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

**Total Hydrocarbons (THC) - ppm**  
**Fort Hills - November 2023**





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

**Total Hydrocarbons (THC) - ppm**  
**Fort Hills - November 2023**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2.0	167	24.31	24.31
2.1 - 3.0	435	63.32	87.63
3.1 - 10.0	85	12.37	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 687

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Total Hydrocarbons (THC) - ppm  
Fort Hills - November 2023**

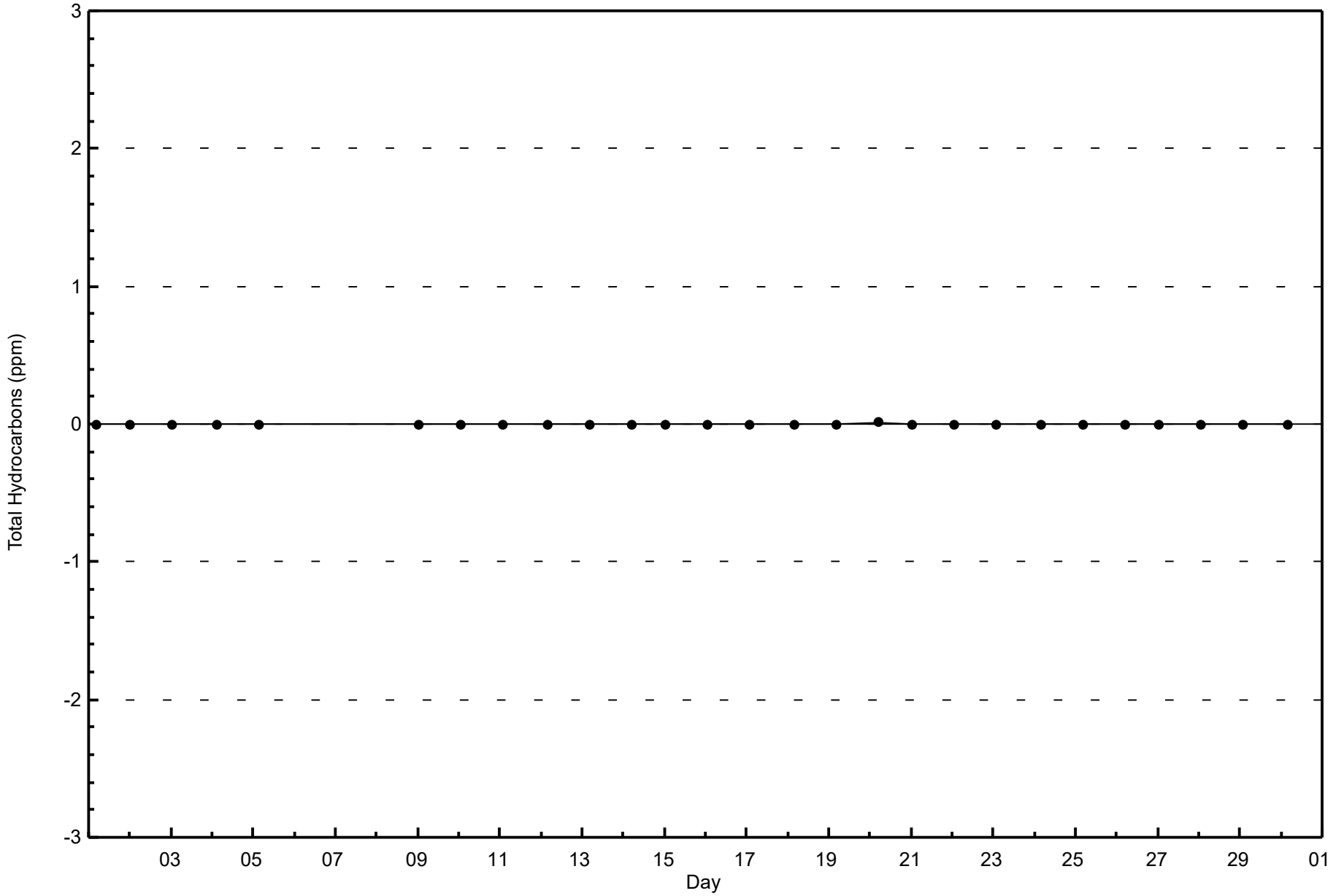
<b>Concentration Ranges (ppm)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	18	20	1	2	2	0	5	5	13	23	1	3	7	23	16	14	153
2.1 - 3.0	18	37	27	9	8	16	29	61	71	47	44	20	5	4	5	8	409
3.1 - 10.0	3	4	1	1	1	4	25	13	9	8	5	4	0	0	1	2	81
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	39	61	29	12	11	20	59	79	93	78	50	27	12	27	22	24	643

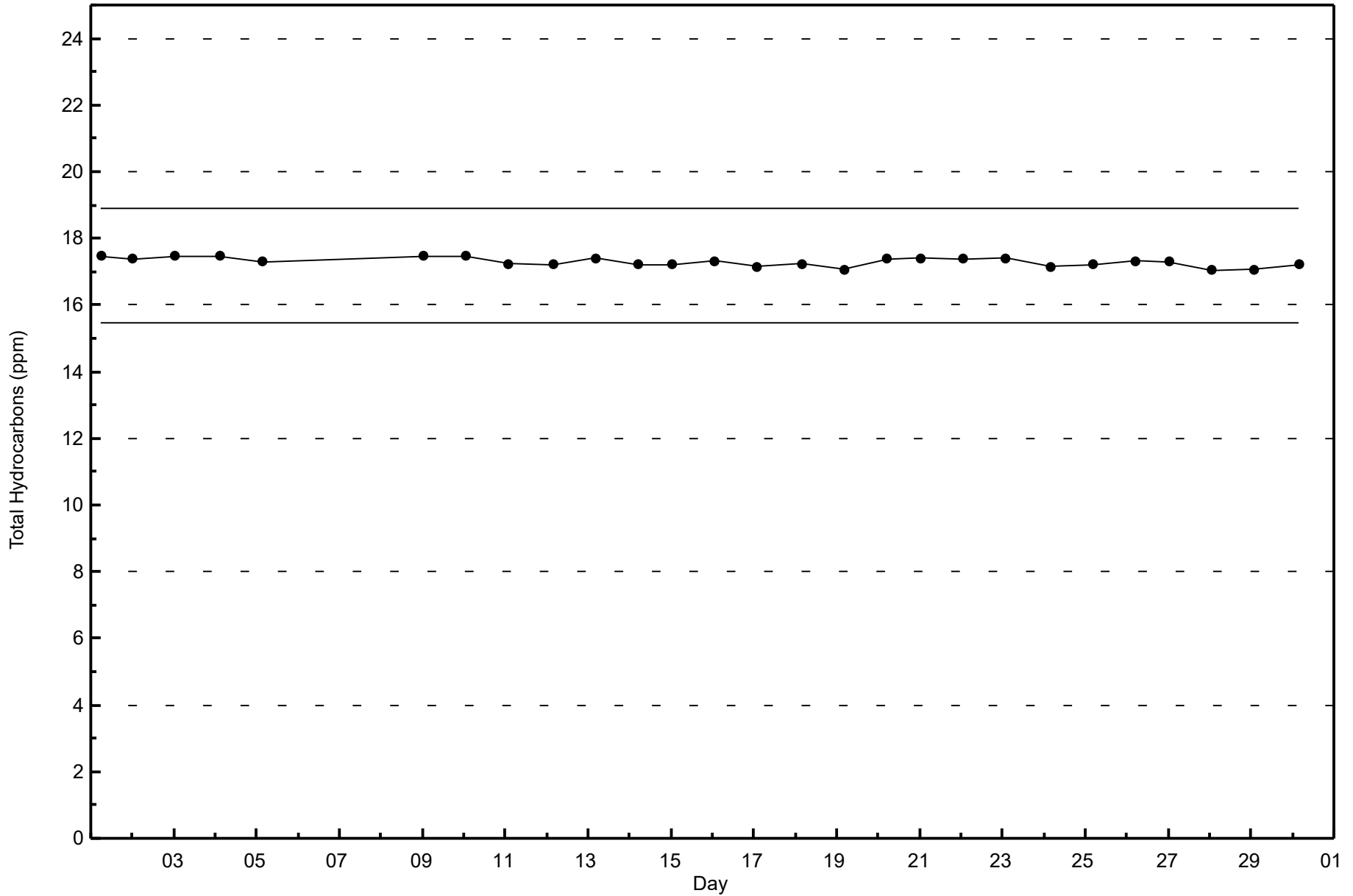
Total Number of Valid Hours: 643

Total Number of Hours: 720







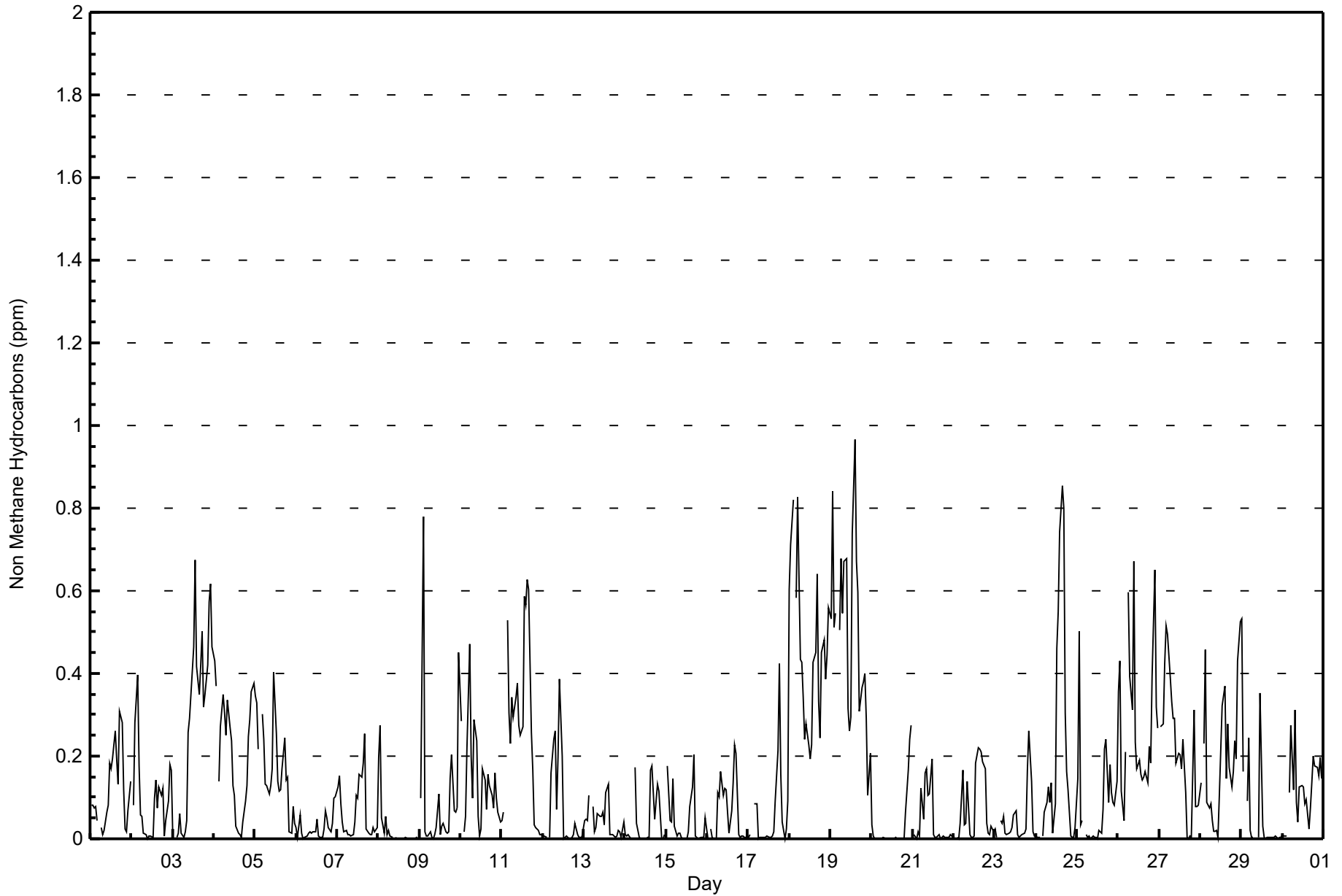




Summary of Hour Averages

Fort Hills - November 2023

Maximum Value: 0.967 ppm on Nov 19 15:00		Maximum Daily Average: 0.497 ppm on Nov 19		Hours in Service:	720																					
Minimum Value: 0.000 ppm on Nov 20 04:00		Minimum Daily Average: 0.028 ppm on Nov 6		Hours of Data:	687																					
Maximum Diurnal Average: 0.187 ppm at hour 17		Minimum Diurnal Average: 0.106 ppm at hour 11		Hours of Missing Data:	33																					
Monthly Average: 0.139 ppm		Percentiles: P <sub>1</sub> = 0.0 P <sub>10</sub> = 0.0 Q <sub>1</sub> = 0.0 Median = 0.1 Q <sub>3</sub> = 0.2 P <sub>90</sub> = 0.4 P <sub>99</sub> = 0.7		Hours of Calibration:	30																					
				Percent Operational Time:	99.6																					
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	0.082	0.080	0.075	0.078	0.044	Z	0.026	0.011	0.021	0.065	0.082	0.184	0.169	0.192	0.262	0.193	0.133	0.310	0.281	0.117	0.025	0.016	0.069	0.138	0.115	0.310
2-Nov	Z	0.080	0.283	0.398	0.176	0.059	0.055	0.013	0.009	0.001	0.006	0.006	0.003	0.099	0.141	0.075	0.125	0.105	0.122	0.005	0.043	0.093	0.178	0.167	0.097	0.398
3-Nov	0.013	Z	0.004	0.012	0.062	0.013	0.005	0.017	0.045	0.256	0.293	0.405	0.465	0.674	0.418	0.348	0.421	0.503	0.320	0.350	0.419	0.574	0.616	0.465	0.291	0.674
4-Nov	0.430	0.369	Z	0.138	0.272	0.350	0.306	0.251	0.337	0.269	0.238	0.129	0.106	0.031	0.013	0.009	0.005	0.041	0.092	0.127	0.248	0.287	0.357	0.377	0.208	0.430
5-Nov	0.346	0.330	0.218	Z	0.303	0.241	0.132	0.129	0.108	0.127	0.171	0.403	0.254	0.140	0.116	0.117	0.169	0.244	0.143	0.148	0.016	0.015	0.076	0.036	0.173	0.403
6-Nov	0.026	0.004	0.056	0.013	0.002	0.003	0.006	0.014	0.018	0.014	0.015	0.016	0.049	0.008	0.002	0.003	0.023	0.069	0.051	0.029	0.017	0.038	0.097	0.102	0.028	0.102
7-Nov	0.124	0.152	0.085	0.042	0.016	0.019	0.010	0.011	0.006	0.009	0.040	0.106	0.100	0.158	0.151	0.182	0.255	0.025	0.015	0.011	0.011	0.027	0.017	0.026	0.067	0.255
8-Nov	0.196	0.275	0.051	0.012	0.055	0.010	0.022	0.007	0.003	M	0.003	0.001	0.002	0.001	0.001	0.000	0.003	0.002	0.001	0.001	0.001	0.001	0.003	0.001	0.028	0.275
9-Nov	Z	0.099	0.781	0.015	0.006	0.005	0.015	0.005	0.000	0.010	0.026	0.107	0.011	0.031	0.038	0.017	0.014	0.018	0.145	0.205	0.069	0.063	0.074	0.450	0.096	0.781
10-Nov	0.285	Z	0.016	0.053	0.221	0.472	0.201	0.097	0.289	0.237	0.053	0.008	0.025	0.170	0.142	0.072	0.154	0.130	0.105	0.075	0.160	0.099	0.064	0.040	0.138	0.472
11-Nov	0.043	0.063	Z	0.527	0.307	0.230	0.343	0.295	0.342	0.377	0.274	0.250	0.270	0.585	0.568	0.626	0.605	0.259	0.164	0.033	0.028	0.021	0.009	0.010	0.271	0.626
12-Nov	0.006	0.007	0.004	Z	0.004	0.159	0.242	0.260	0.073	0.197	0.387	0.199	0.001	0.002	0.007	0.002	0.000	0.005	0.010	0.038	0.012	0.003	0.003	0.002	0.070	0.387
13-Nov	0.045	0.048	0.044	0.106	Z	0.079	0.017	0.028	0.060	0.056	0.053	0.066	0.035	0.112	0.133	0.011	0.011	0.011	0.002	0.006	0.020	0.017	0.003	0.041	0.044	0.133
14-Nov	0.010	0.006	0.011	0.002	0.001	Z	0.174	0.039	0.003	0.001	0.001	0.001	0.001	0.003	0.002	0.167	0.178	0.049	0.092	0.134	0.115	0.001	0.001	0.009	0.043	0.178
15-Nov	Z	0.178	0.045	0.040	0.147	0.029	0.007	0.012	0.012	0.005	0.001	0.000	0.001	0.017	0.078	0.125	0.203	0.008	0.002	0.001	0.002	0.004	0.002	0.051	0.042	0.203
16-Nov	0.002	Z	0.024	0.003	0.001	0.002	0.113	0.103	0.162	0.106	0.123	0.119	0.066	0.013	0.068	0.136	0.227	0.206	0.010	0.002	0.007	0.008	0.003	0.003	0.065	0.227
17-Nov	0.003	0.009	Z	0.086	0.086	0.085	0.001	0.004	0.002	0.005	0.003	0.006	0.003	0.002	0.006	0.018	0.093	0.215	0.423	0.158	0.041	0.002	0.023	0.090	0.059	0.423
18-Nov	0.603	0.713	0.820	Z	0.582	0.828	0.435	0.429	0.341	0.241	0.278	0.227	0.194	0.229	0.427	0.450	0.639	0.332	0.245	0.451	0.481	0.386	0.446	0.561	0.449	0.828
19-Nov	0.534	0.842	0.513	0.547	Z	0.504	0.678	0.546	0.670	0.679	0.317	0.262	0.296	0.739	0.967	0.671	0.595	0.310	0.366	0.381	0.401	0.292	0.105	0.206	0.497	0.967
20-Nov	0.032	0.007	0.001	0.000	0.000	Z	0.000	0.002	0.000	0.001	C	C	C	0.000	0.003	0.001	0.000	0.001	0.000	0.000	0.063	0.167	0.240	0.275	0.040	0.275
21-Nov	Z	0.009	0.002	0.017	0.006	0.123	0.049	0.161	0.170	0.106	0.110	0.192	0.011	0.003	0.004	0.011	0.001	0.002	0.006	0.004	0.004	0.004	0.009	0.007	0.044	0.192
22-Nov	0.003	Z	0.003	0.001	0.037	0.166	0.033	0.038	0.137	0.009	0.003	0.004	0.006	0.183	0.220	0.217	0.212	0.185	0.169	0.037	0.014	0.011	0.030	0.017	0.075	0.220
23-Nov	0.024	0.005	Z	0.044	0.038	0.053	0.014	0.010	0.013	0.016	0.028	0.058	0.069	0.010	0.003	0.006	0.011	0.014	0.022	0.168	0.261	0.141	0.016	0.006	0.045	0.261
24-Nov	0.006	0.002	0.002	Z	0.008	0.065	0.088	0.124	0.090	0.135	0.015	0.086	0.461	0.549	0.742	0.855	0.800	0.306	0.164	0.119	0.008	0.003	0.004	0.026	0.203	0.855
25-Nov	0.146	0.500	0.035	0.044	Z	0.009	0.002	0.006	0.002	0.006	0.005	0.004	0.001	0.021	0.014	0.071	0.217	0.240	0.088	0.180	0.111	0.087	0.082	0.138	0.087	0.500
26-Nov	0.356	0.431	0.116	0.045	0.210	Z	0.598	0.394	0.311	0.672	0.233	0.169	0.190	0.156	0.142	0.148	0.162	0.137	0.224	0.183	0.393	0.650	0.319	0.268	0.283	0.672
27-Nov	Z	0.272	0.279	0.425	0.515	0.494	0.391	0.332	0.290	0.293	0.183	0.207	0.204	0.169	0.242	0.312	0.003	0.001	0.006	0.004	0.311	0.080	0.079	0.081	0.216	0.515
28-Nov	0.135	Z	0.231	0.458	0.088	0.076	0.083	0.043	0.016	0.022	0.002	0.105	0.215	0.323	0.369	0.146	0.278	0.173	0.125	0.163	0.239	0.194	0.431	0.525	0.193	0.525
29-Nov	0.533	0.162	Z	0.091	0.244	0.021	0.002	0.003	M	M	0.003	0.351	0.032	0.004	0.001	0.002	0.003	0.004	0.004	0.004	0.005	0.001	0.004	0.002	0.070	0.533
30-Nov	0.011	0.008	0.005	Z	0.111	0.275	0.119	0.311	0.087	0.040	0.125	0.128	0.127	0.084	0.094	0.024	0.073	0.137	0.200	0.177	0.173	0.153	0.196	0.146	0.122	0.311
																								Diurnal Average		
																								Diurnal Maximum		
Z - zerospan      C - Calibration      M - Maintenance																										





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

**Non Methane Hydrocarbons (NMHC) - ppm**  
**Fort Hills - November 2023**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 0.005	135	19.65	19.65
0.006 - 0.05	188	27.37	47.02
0.06 - 0.1	135	19.65	66.67
> 0.1	229	33.33	100.00

Total Number of Valid Hours: 687

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Non Methane Hydrocarbons (NMHC) - ppm  
Fort Hills - November 2023**

<b>Concentration Ranges (ppm)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 0.005	7	11	2	1	0	0	3	7	15	21	1	2	5	20	15	12	122
0.006 - 0.05	19	21	3	3	3	0	8	25	40	25	6	1	5	4	4	4	171
0.06 - 0.1	3	12	12	6	3	9	8	13	14	16	24	5	0	1	1	1	128
> 0.1	10	17	12	2	5	11	40	34	24	16	19	19	2	2	2	7	222
<b>Totals</b>	39	61	29	12	11	20	59	79	93	78	50	27	12	27	22	24	643

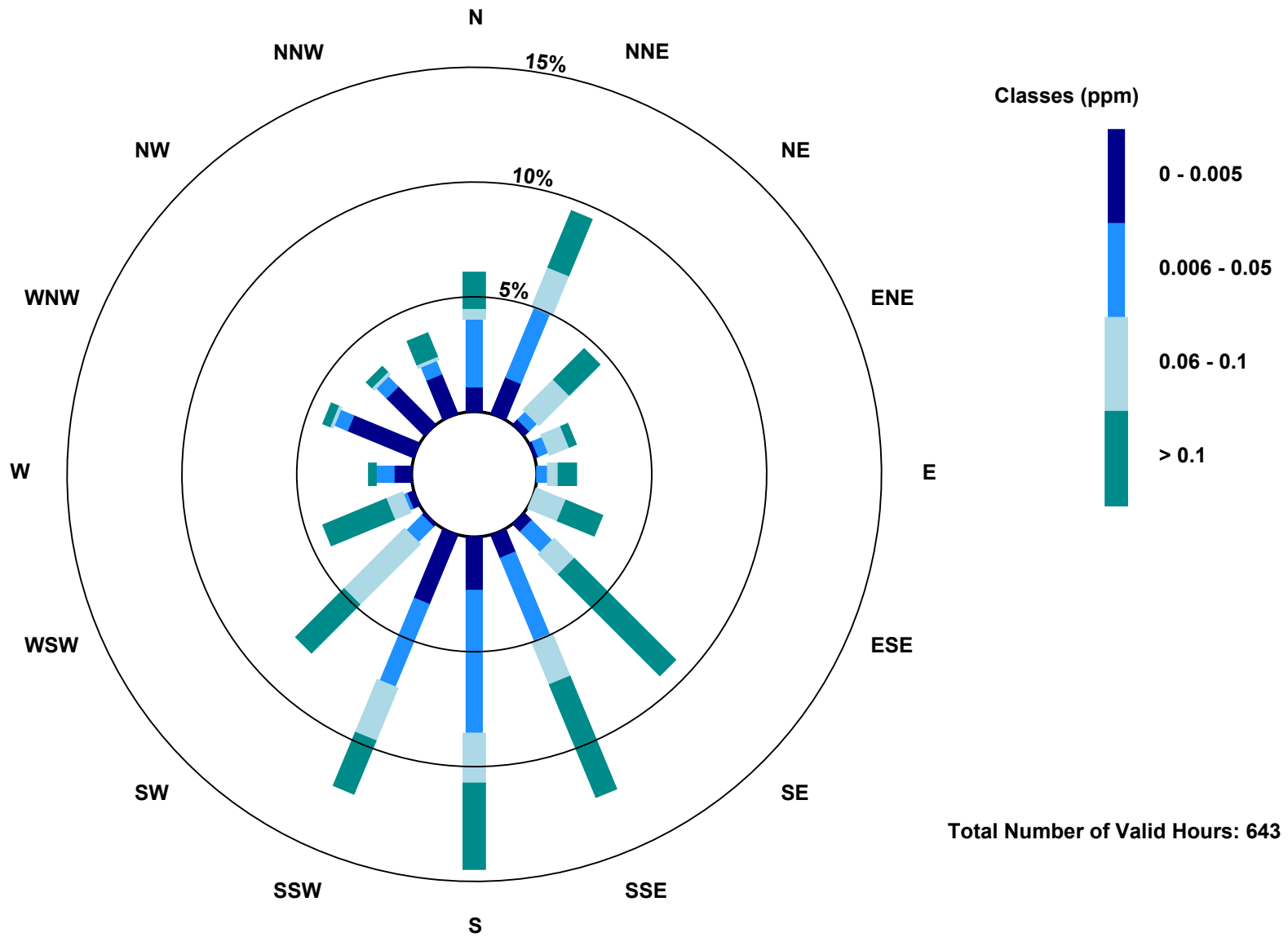
Total Number of Valid Hours: 643

Total Number of Hours: 720

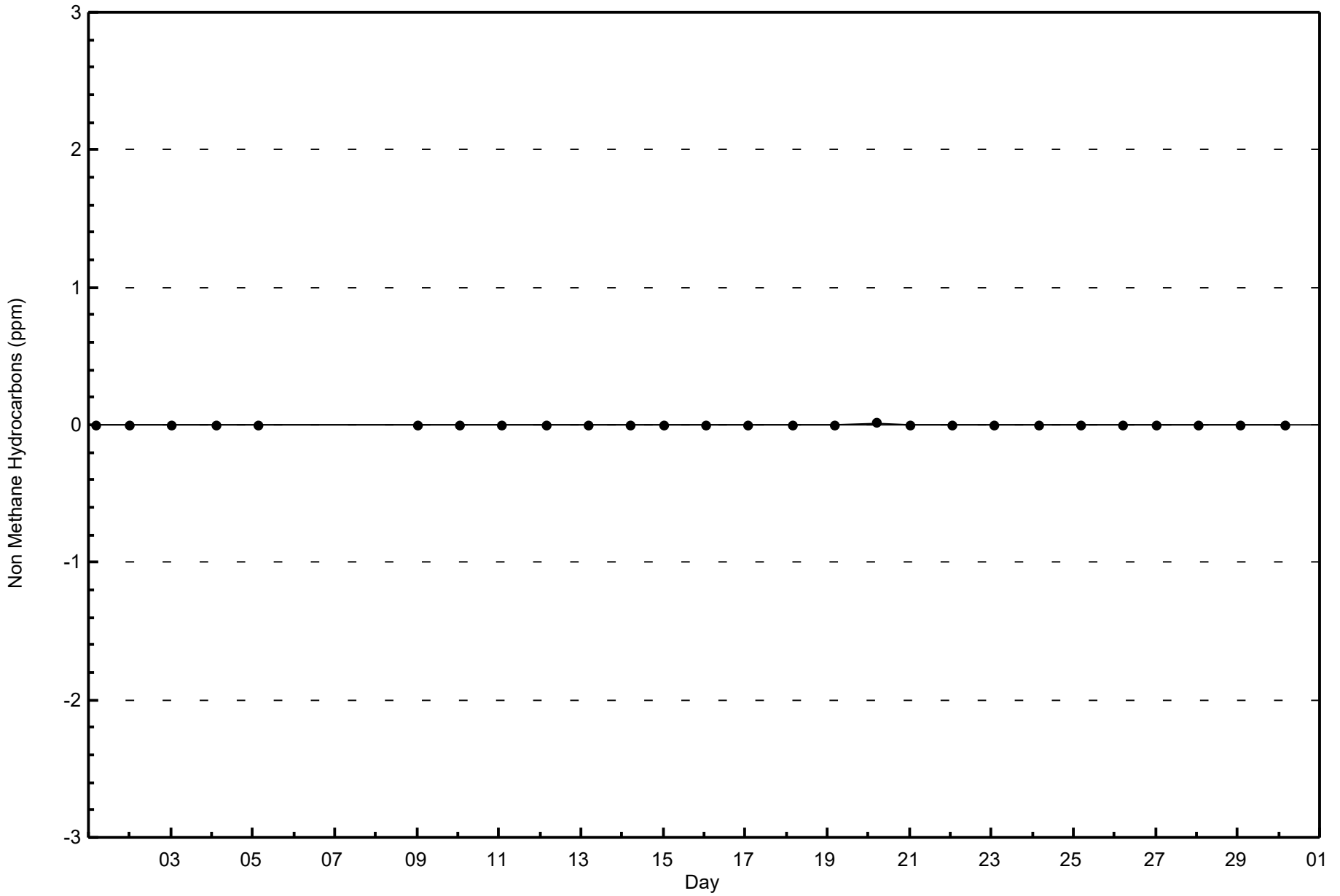


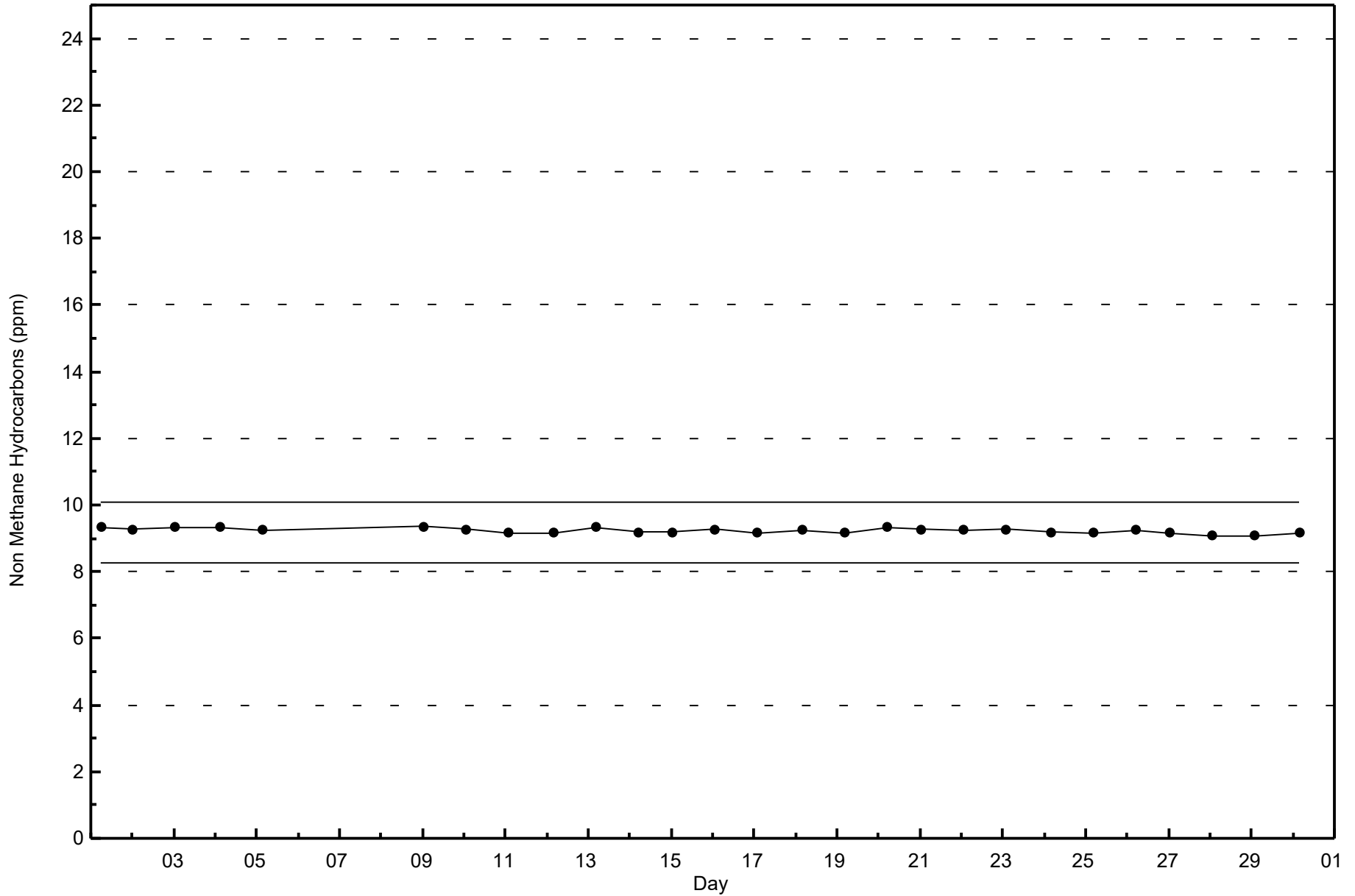
Wood Buffalo Environmental Association  
Wind Rose Nov 2023

Non Methane Hydrocarbons (NMHC) - ppm  
Fort Hills







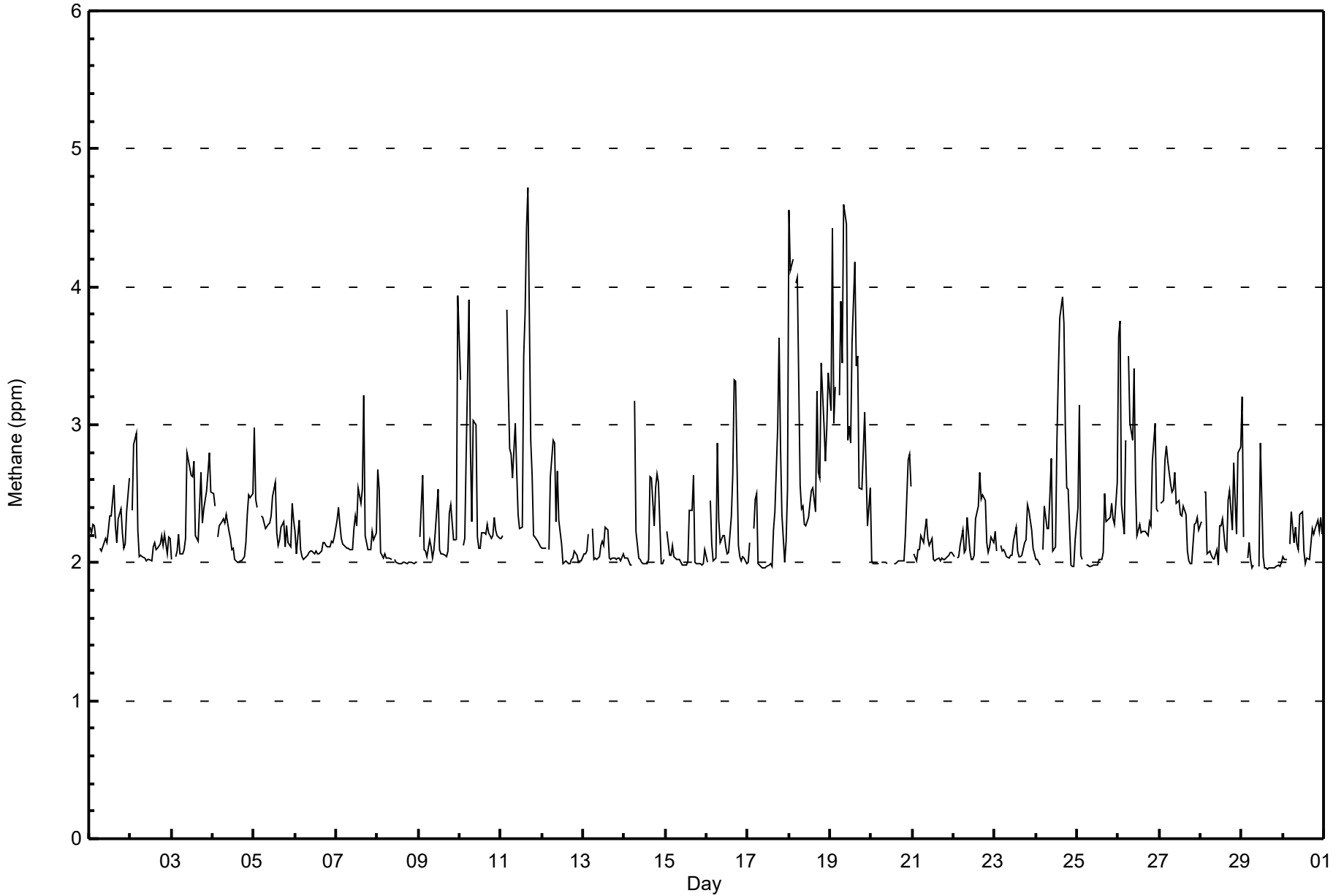






**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Methane (CH<sub>4</sub>) - ppm**  
**Fort Hills - November 2023**





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

**Methane (CH<sub>4</sub>) - ppm**  
**Fort Hills - November 2023**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2.0	193	28.09	28.09
2.1 - 3.0	449	65.36	93.45
3.1 - 10.0	45	6.55	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 687

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Methane (CH<sub>4</sub>) - ppm  
Fort Hills - November 2023**

<b>Concentration Ranges (ppm)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	22	23	1	6	5	1	6	6	13	25	2	3	9	24	16	14	176
2.1 - 3.0	16	38	28	6	5	16	35	66	74	50	46	23	3	3	6	10	425
3.1 - 10.0	1	0	0	0	1	3	18	7	6	3	2	1	0	0	0	0	42
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	39	61	29	12	11	20	59	79	93	78	50	27	12	27	22	24	643

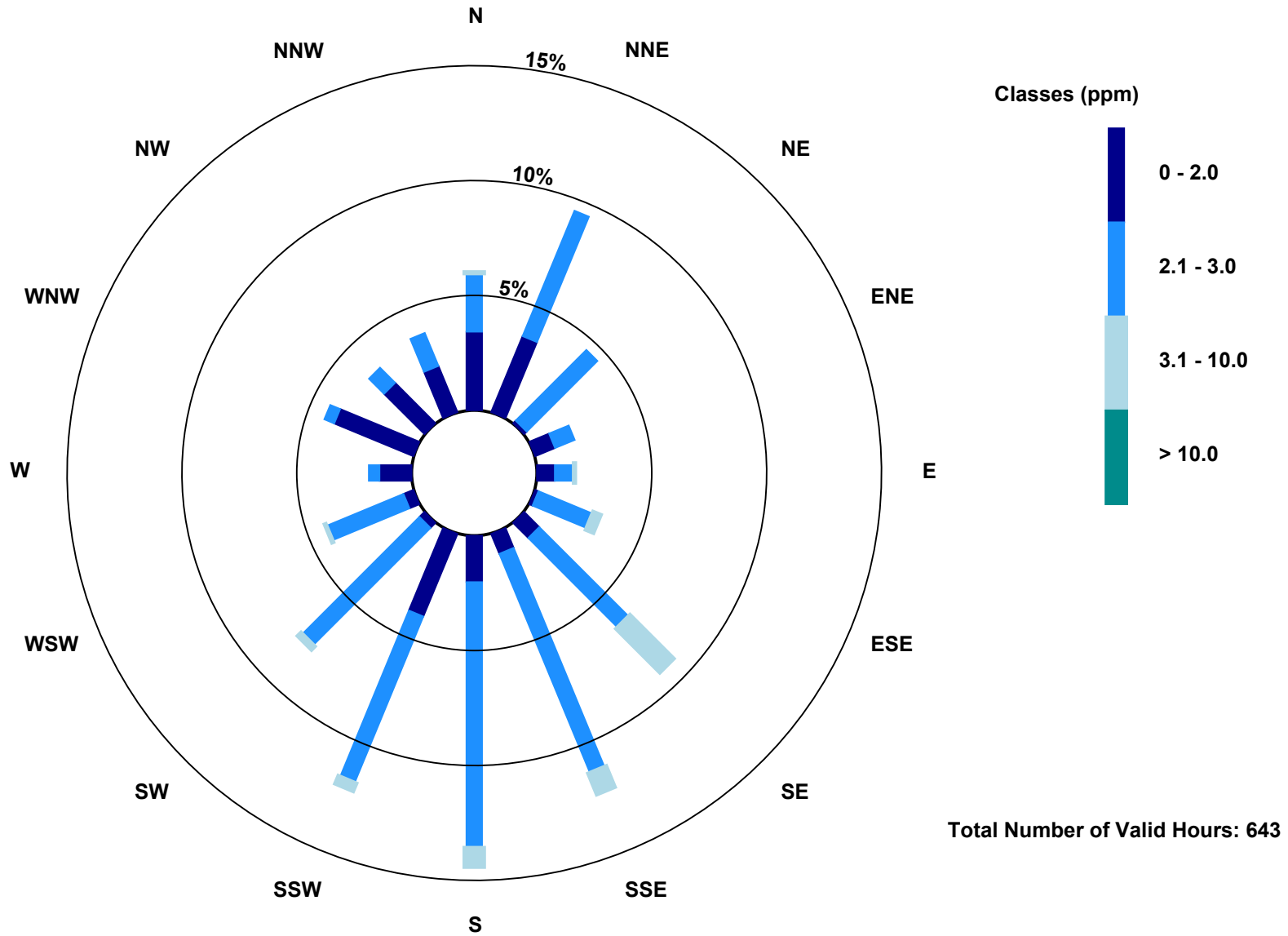
Total Number of Valid Hours: 643

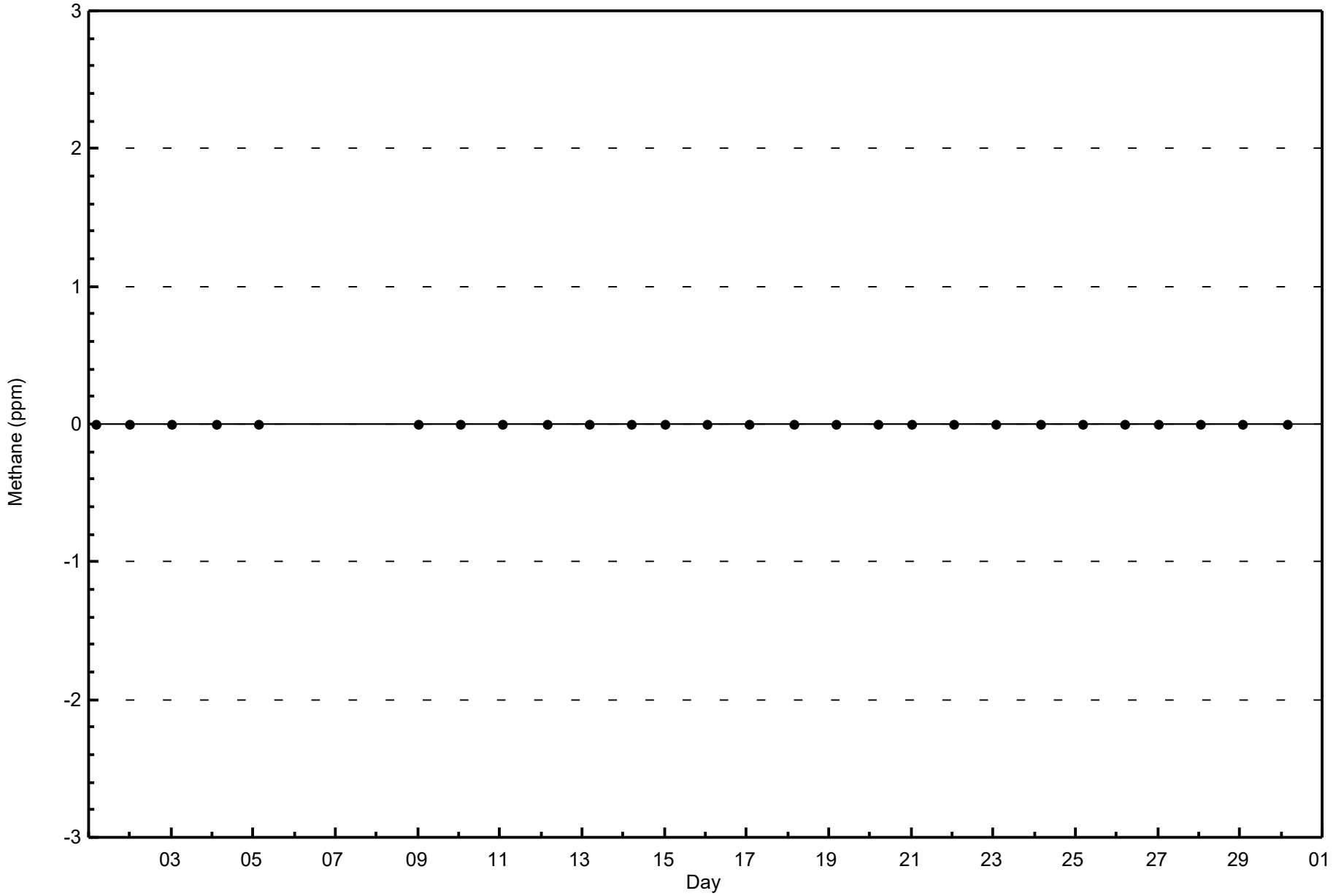
Total Number of Hours: 720



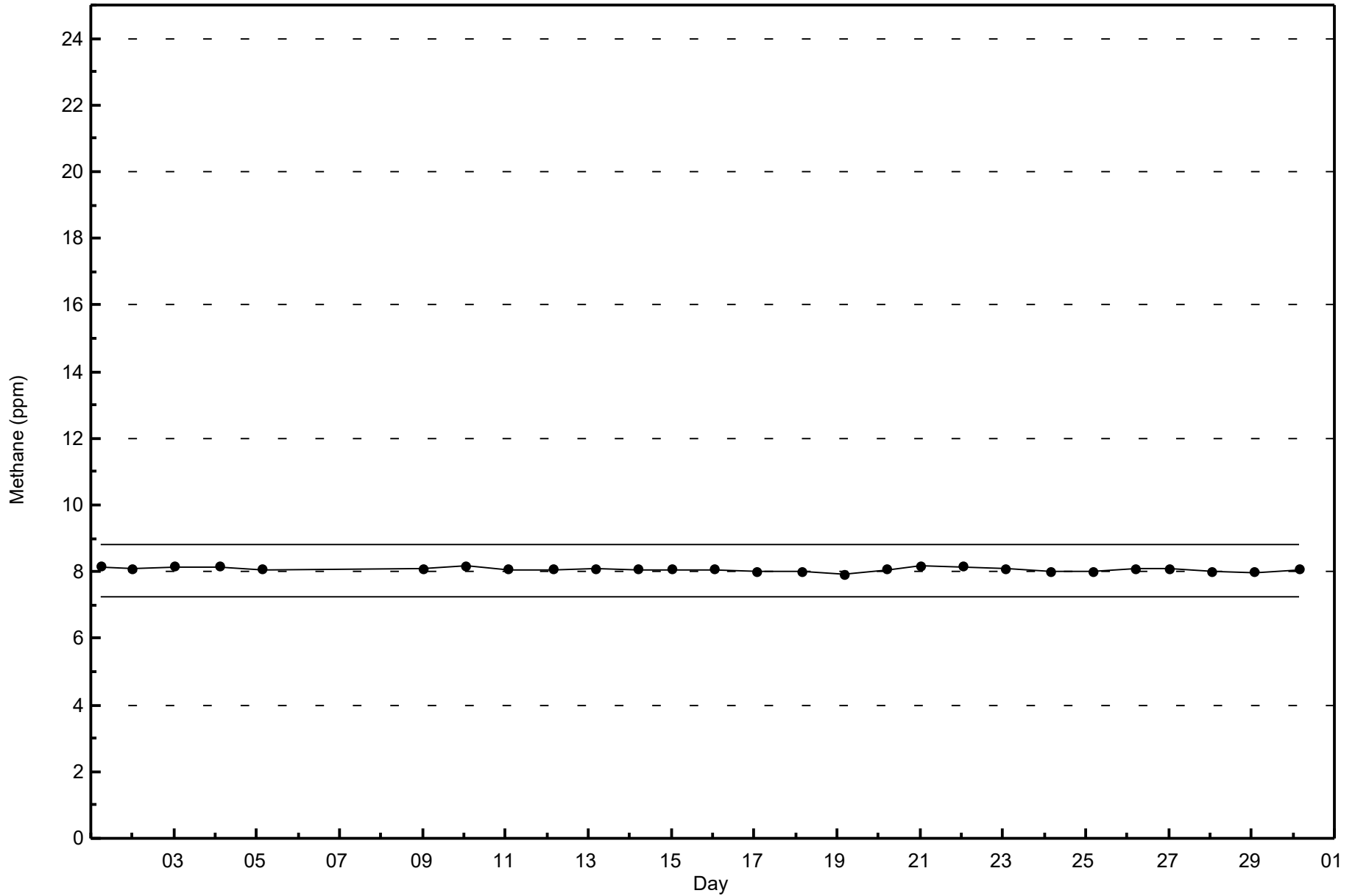
Wood Buffalo Environmental Association  
Wind Rose Nov 2023

Methane (CH<sub>4</sub>) - ppm  
Fort Hills









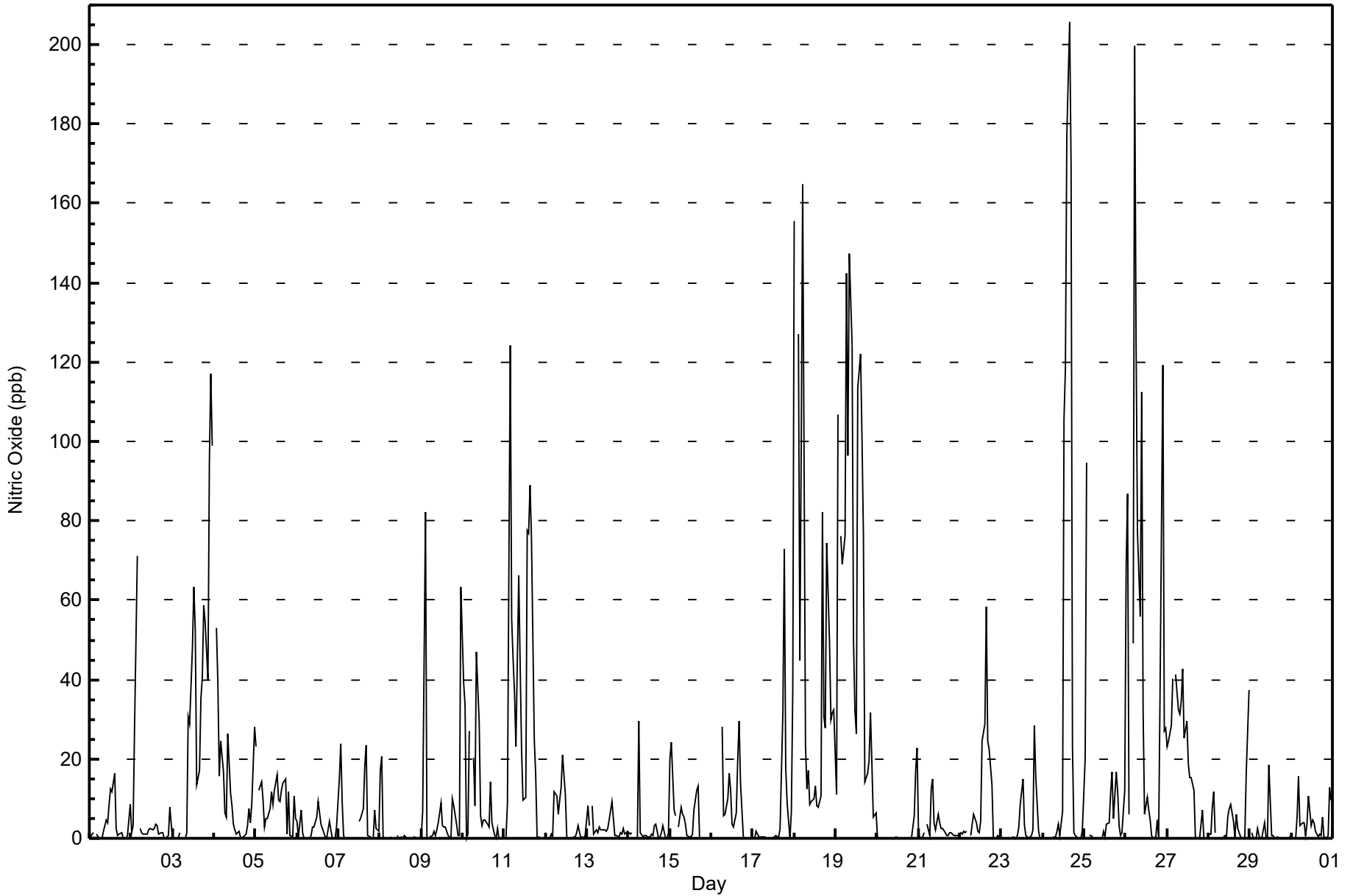


Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 205.7 ppb on Nov 24 16:00	Maximum Daily Average: 64.5 ppb on Nov 19		Hours of Data:	686
Minimum Value: 0.0 ppb on Nov 1 06:00	Minimum Daily Average: 1.3 ppb on Nov 29		Hours of Missing Data:	34
Maximum Diurnal Average: 23.0 ppb at hour 6	Minimum Diurnal Average: 7.1 ppb at hour 21		Hours of Calibration:	32
Monthly Average: 13.61 ppb	Percentiles: P <sub>1</sub> = 0.0 P <sub>10</sub> = 0.0 Q <sub>1</sub> = 0.2 Median = 2.2 Q <sub>3</sub> = 12.0 P <sub>90</sub> = 37.2 P <sub>99</sub> = 143.3		Percent Operational Time:	99.7

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	0.3	1.0	1.5	Z	1.1	0.0	0.2	0.1	1.9	4.8	3.8	8.4	12.4	11.8	16.5	2.6	0.6	0.9	1.5	0.0	0.0	0.0	0.7	8.4	3.4	16.5
2-Nov	1.4	3.2	27.3	71.2	Z	2.5	1.4	1.1	1.1	1.2	2.0	2.4	2.1	2.4	3.5	3.1	1.0	1.3	1.4	0.1	0.1	0.8	8.0	3.5	6.2	71.2
3-Nov	0.0	0.0	0.0	0.1	1.6	Z	0.0	0.0	1.6	30.7	28.9	48.0	63.5	52.7	13.6	17.0	35.3	40.7	58.9	54.5	39.9	95.1	117.2	98.8	34.7	117.2
4-Nov	Z	53.1	39.2	15.6	24.4	16.7	6.4	5.2	26.3	11.5	8.2	3.7	2.2	1.2	1.9	0.4	0.0	0.3	1.0	3.4	7.6	3.8	8.4	28.3	11.7	53.1
5-Nov	23.2	Z	12.2	14.2	9.4	3.0	5.1	5.0	7.5	11.7	8.5	12.0	15.9	9.5	9.2	12.1	13.7	14.8	1.0	11.8	0.9	0.3	10.6	4.9	9.4	23.2
6-Nov	4.3	0.4	7.3	1.4	0.0	0.0	0.0	0.0	0.8	2.8	2.9	5.2	9.2	6.6	3.4	1.5	0.2	0.0	2.1	4.1	0.2	0.1	0.1	3.0	2.3	9.2
7-Nov	14.9	23.9	9.1	0.6	0.0	0.1	0.0	C	C	C	C	C	4.3	5.0	7.6	18.0	23.4	0.8	0.3	0.1	0.1	7.1	2.5	1.6	6.3	23.9
8-Nov	17.3	20.6	0.1	0.0	0.0	0.0	0.0	0.2	M	M	0.6	0.2	0.3	0.2	0.5	0.4	0.1	0.0	0.0	0.0	0.2	0.0	0.0	0.0	1.9	20.6
9-Nov	0.6	6.7	82.3	0.2	Z	0.2	0.7	1.7	0.7	2.1	4.0	9.0	3.3	2.8	2.7	0.8	0.4	0.0	10.0	8.3	3.4	0.7	0.7	63.5	8.9	82.3
10-Nov	39.2	33.4	0.0	0.9	27.1	Z	20.1	8.1	47.1	29.3	5.6	3.2	4.6	4.7	3.5	3.0	14.4	3.9	0.8	0.0	2.4	0.0	0.0	0.0	10.9	47.1
11-Nov	Z	0.3	8.8	124.4	55.1	45.2	36.5	23.1	66.2	43.8	22.4	9.6	10.2	77.6	76.9	89.0	75.8	24.8	16.2	0.3	0.5	0.2	0.1	0.0	35.1	124.4
12-Nov	0.0	Z	0.1	0.9	0.4	11.6	10.7	6.0	9.5	12.9	21.0	11.0	0.2	0.1	0.2	0.1	0.4	0.4	1.4	3.3	0.0	0.4	0.1	0.6	4.0	21.0
13-Nov	8.3	3.3	Z	8.1	1.2	2.2	1.3	2.9	2.3	2.2	2.0	2.0	2.3	4.5	9.3	4.8	0.9	0.5	0.3	1.3	1.1	2.5	1.2	1.9	2.9	9.3
14-Nov	1.3	1.2	1.3	Z	0.0	0.2	29.7	1.3	0.3	0.8	0.6	0.3	0.2	1.1	0.8	3.0	3.6	0.1	0.3	1.5	3.0	0.0	0.0	1.5	2.3	29.7
15-Nov	19.8	24.0	7.0	5.8	Z	3.0	7.7	6.0	5.4	3.6	0.7	0.2	0.3	1.1	7.0	12.0	13.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	5.1	24.0
16-Nov	0.0	0.1	0.1	0.1	0.0	Z	28.2	5.7	6.0	9.9	16.3	11.9	3.7	2.9	6.4	19.6	29.6	13.7	0.2	0.0	0.0	0.0	0.0	0.0	6.7	29.6
17-Nov	Z	0.0	1.7	0.5	0.3	0.3	0.2	0.3	0.0	0.0	0.1	0.1	0.3	0.9	0.2	0.5	2.4	32.0	72.9	17.9	9.0	0.0	6.9	37.7	8.0	72.9
18-Nov	155.4	Z	127.1	44.7	100.1	164.9	23.3	12.3	17.3	8.5	9.4	9.9	13.0	8.1	7.7	10.7	82.4	30.5	27.6	74.3	49.4	29.8	31.6	32.3	46.5	164.9
19-Nov	11.1	106.8	Z	76.2	69.0	76.0	142.5	96.4	147.3	124.4	49.5	32.2	26.4	113.5	122.2	100.8	76.7	14.4	16.2	19.7	31.7	18.9	5.3	6.5	64.5	147.3
20-Nov	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.7	17.1	22.8	2.0	22.8
21-Nov	1.4	0.0	0.2	1.5	Z	3.4	0.5	12.4	14.9	3.8	2.0	5.9	3.8	2.5	2.4	1.5	0.6	0.7	1.5	1.5	0.9	0.9	0.8	0.8	2.8	14.9
22-Nov	1.3	1.0	1.7	1.3	1.9	Z	0.8	3.5	6.0	3.8	1.7	1.4	4.3	24.6	29.0	58.5	24.7	22.3	13.4	0.1	0.0	0.1	0.6	0.1	8.8	58.5
23-Nov	Z	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.1	0.9	3.0	8.5	15.0	3.3	0.6	0.3	0.0	0.8	2.1	28.4	15.5	1.8	0.1	0.0	3.5	28.4
24-Nov	0.0	Z	0.0	0.0	0.0	0.1	0.5	0.2	1.8	3.7	0.7	6.7	105.9	118.4	177.1	205.7	169.8	23.1	1.4	0.6	0.0	0.0	0.0	2.1	35.6	205.7
25-Nov	20.2	94.5	Z	0.6	0.9	0.2	0.1	0.1	0.0	0.0	0.1	1.8	0.3	3.7	3.9	11.4	16.6	5.1	16.7	11.6	3.2	0.8	1.4	12.0	8.9	94.5
26-Nov	68.5	86.8	6.0	Z	49.3	199.8	126.5	77.1	56.0	112.6	32.0	6.0	10.2	7.2	4.7	0.8	0.0	0.5	4.6	0.3	36.9	119.3	27.0	27.6	46.1	199.8
27-Nov	23.2	24.4	28.4	40.4	Z	41.2	32.3	31.5	34.5	42.6	25.2	29.7	18.9	15.4	15.4	12.1	0.4	0.0	0.0	0.0	7.1	0.1	0.0	0.1	18.4	42.6
28-Nov	0.9	1.2	7.7	11.8	1.4	Z	0.0	0.0	0.0	0.7	0.2	5.7	7.3	8.7	4.3	0.5	6.1	2.7	0.5	0.1	0.0	0.5	16.2	37.4	4.9	37.4
29-Nov	Z	1.6	0.0	0.0	2.5	0.5	0.0	0.0	3.8	0.2	0.0	18.6	0.7	0.6	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.2	1.3	18.6
30-Nov	1.2	Z	0.1	5.4	15.8	3.3	4.0	4.0	0.8	3.4	10.8	3.4	4.7	3.8	1.6	0.3	1.0	0.6	5.2	0.2	0.1	0.5	12.7	9.6	4.0	15.8

16.5	19.5	13.7	16.4	14.5	23.0	16.0	10.5	16.4	16.8	9.0	8.9	11.5	16.5	17.7	19.7	19.8	7.8	8.6	8.1	7.1	9.6	9.0	13.5	Diurnal Average	
155.4	106.8	127.1	124.4	100.1	199.8	142.5	96.4	147.3	124.4	49.5	48.0	105.9	118.4	177.1	205.7	169.8	40.7	72.9	74.3	49.4	119.3	117.2	98.8	Diurnal Maximum	

Z - zerospan      C - Calibration      M - Maintenance





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Nitric Oxide (NO) - ppb  
Fort Hills - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	565	82.36	82.36
21 - 40	58	8.45	90.82
41 - 80	33	4.81	95.63
81 - 159	25	3.64	99.27
> 159	5	0.73	100.00

Total Number of Valid Hours: 686

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitric Oxide (NO) - ppb  
Fort Hills - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	31	52	27	10	7	16	26	61	82	63	47	21	15	31	20	18	527
21 - 40	2	3	0	1	2	0	11	10	4	9	2	5	0	0	1	5	55
41 - 80	4	2	1	1	2	0	7	3	6	2	0	1	0	0	2	1	32
81 - 159	2	1	1	0	0	2	11	5	0	1	1	0	0	0	0	0	24
> 159	0	0	0	0	0	2	3	0	0	0	0	0	0	0	0	0	5
<b>Totals</b>	39	58	29	12	11	20	58	79	92	75	50	27	15	31	23	24	643

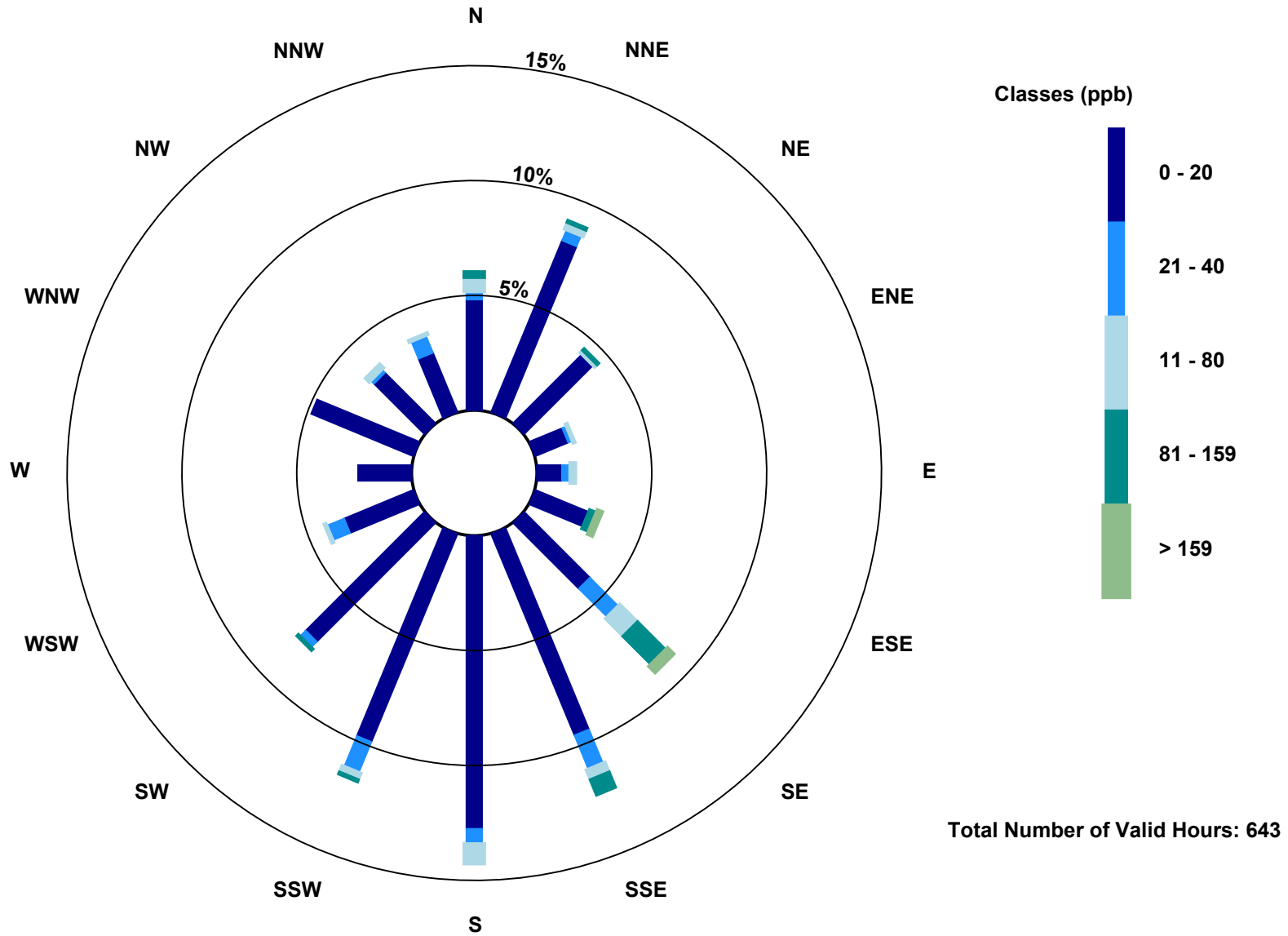
Total Number of Valid Hours: 643

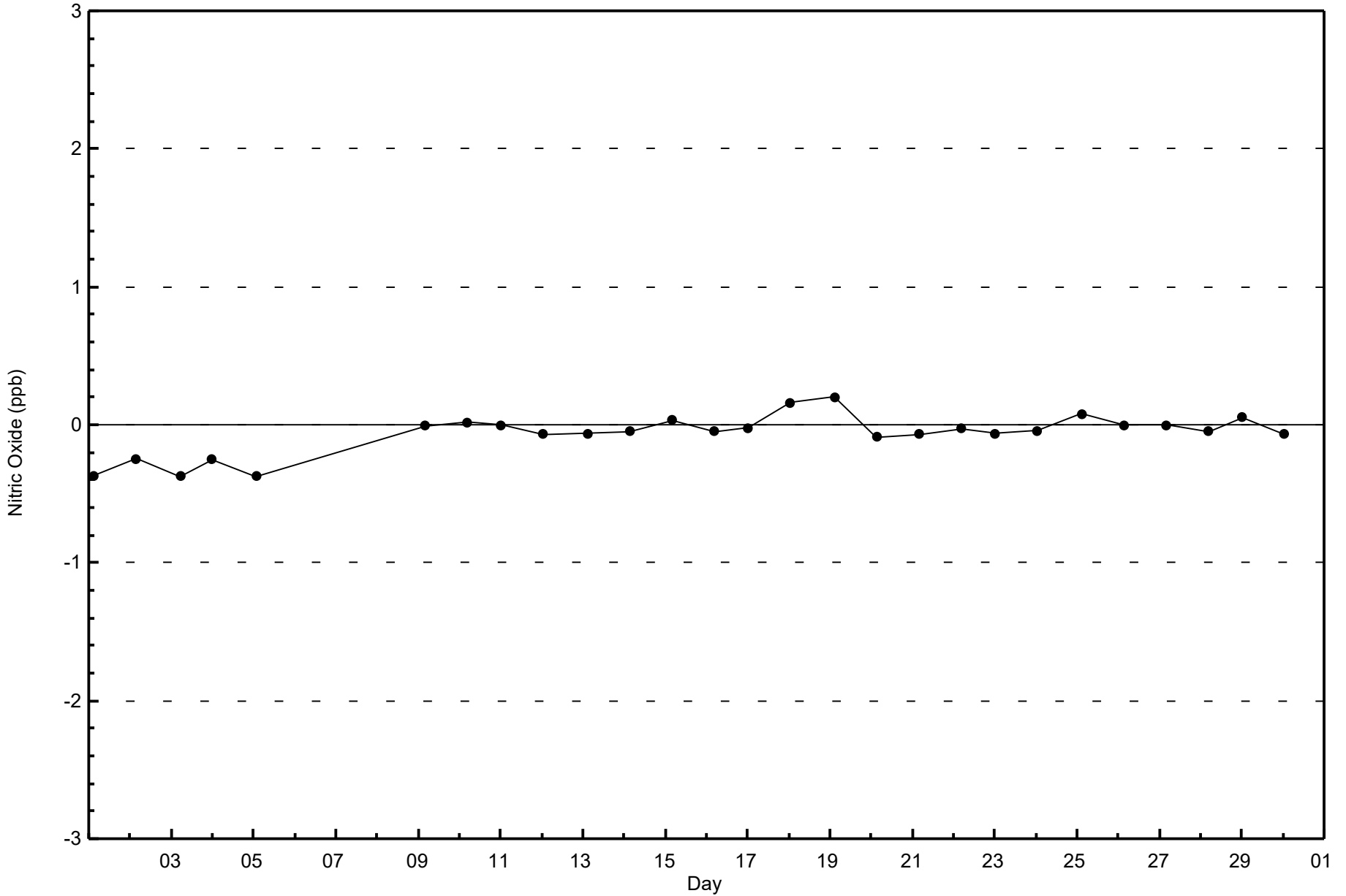
Total Number of Hours: 720

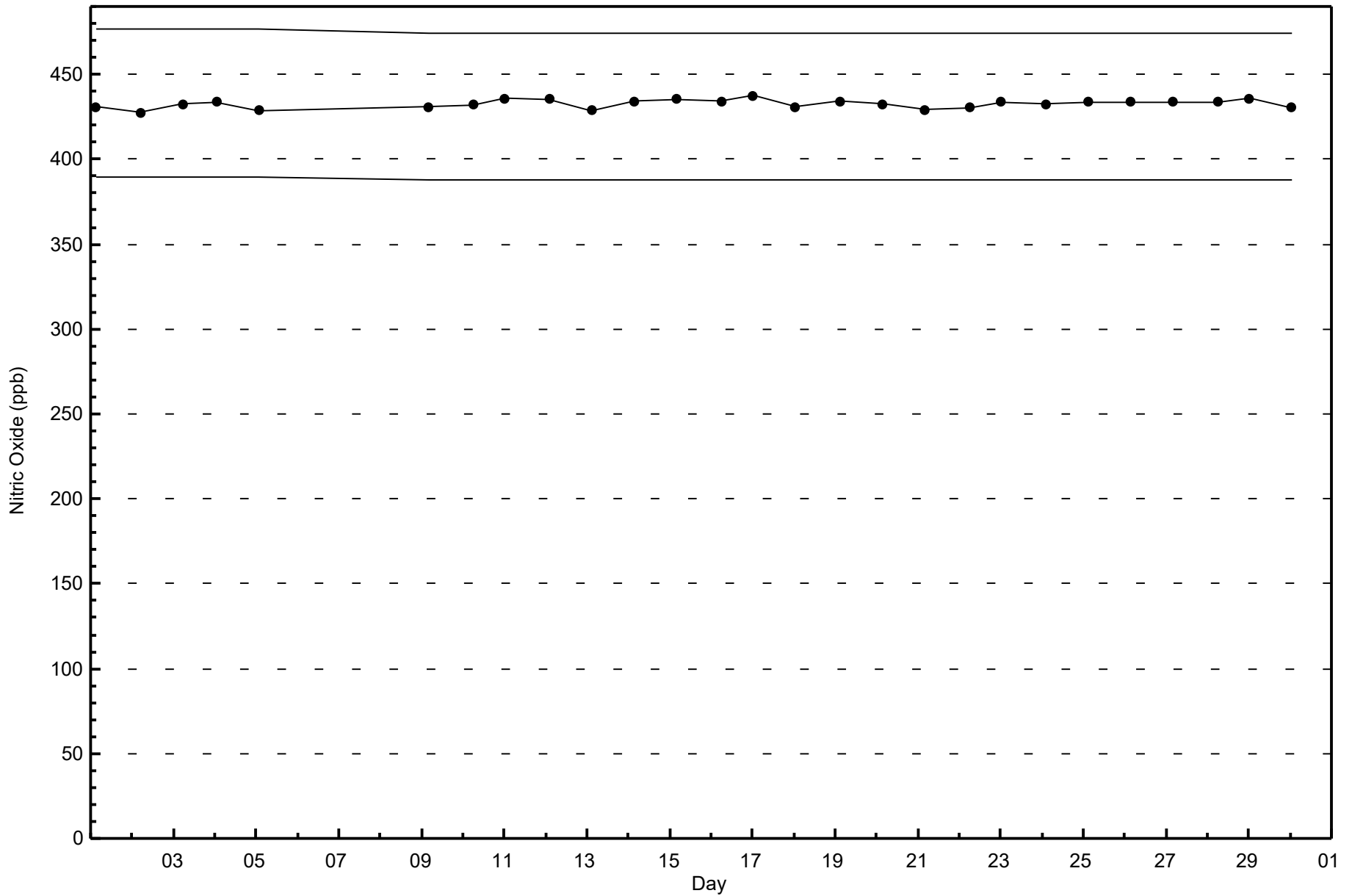


Wood Buffalo Environmental Association  
Wind Rose Nov 2023

Nitric Oxide (NO) - ppb  
Fort Hills











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

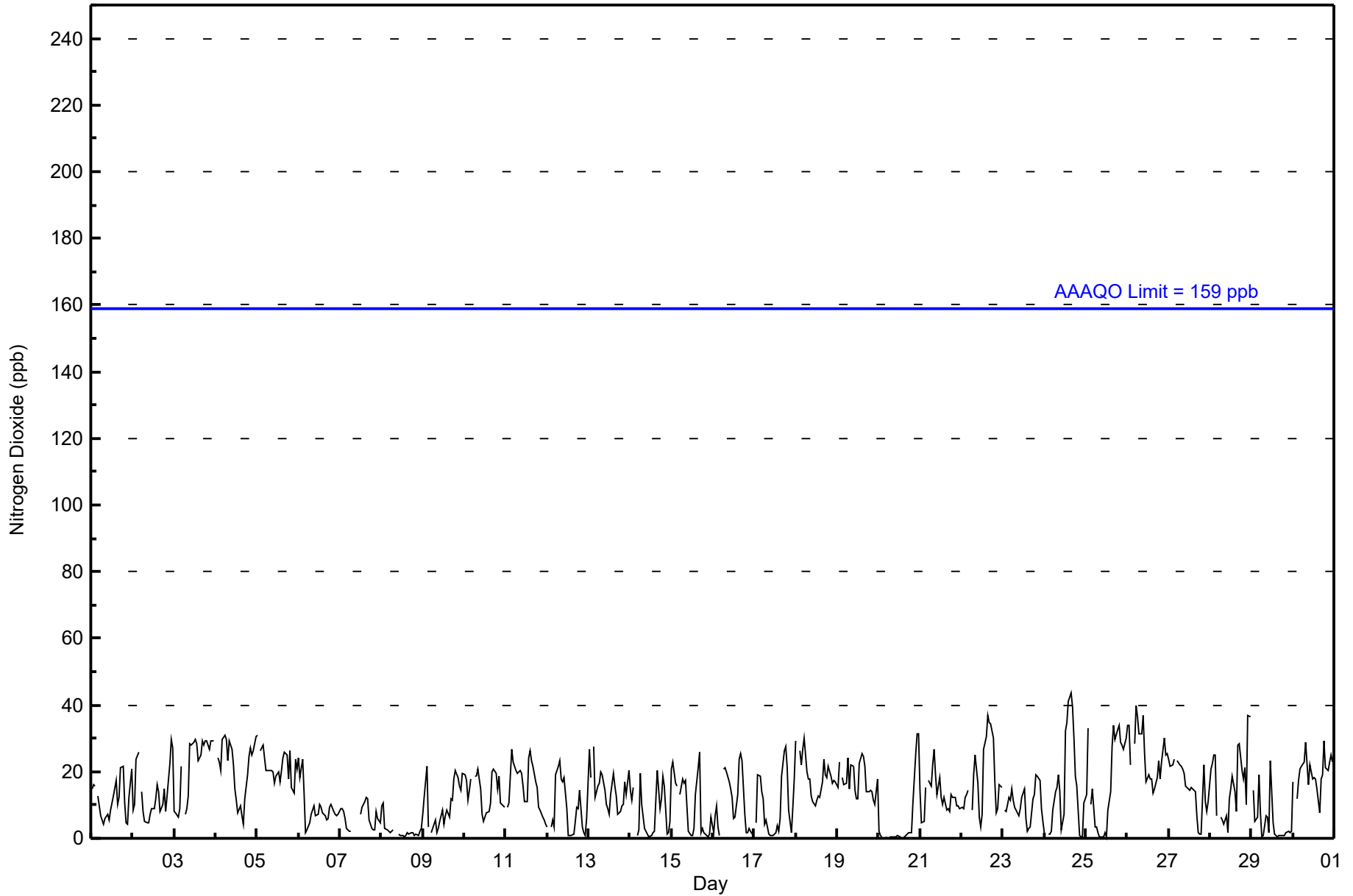
**Nitrogen Dioxide (NO<sub>2</sub>) - ppb**  
**Fort Hills - November 2023**

Number of Exceedences (AAAQO):		1-hr: 0	24-hr: 0																		Hours in Service:	720																											
Maximum Value: 43.5 ppb on Nov 24 16:00		Maximum Daily Average: 25.3 ppb on Nov 26																	Hours of Data:	686																													
Minimum Value: 0.1 ppb on Nov 20 15:00		Minimum Daily Average: 2.4 ppb on Nov 8																	Hours of Missing Data:	34																													
Maximum Diurnal Average: 16.4 ppb at hour 17		Minimum Diurnal Average: 9.8 ppb at hour 11																	Hours of Calibration:	32																													
Monthly Average: 13.52 ppb		Percentiles: P <sub>1</sub> = 0.3 P <sub>10</sub> = 1.5 Q <sub>1</sub> = 5.9 Median = 12.5 Q <sub>3</sub> = 20.3 P <sub>90</sub> = 26.6 P <sub>99</sub> = 36.4																	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-Nov	14.7	16.0	15.6	Z	12.8	6.9	5.3	4.2	5.9	7.1	5.5	8.4	10.7	12.5	17.4	10.2	12.2	21.3	21.7	10.7	4.8	4.3	12.3	20.8	11.4	21.7																							
2-Nov	8.6	10.1	23.8	25.8	Z	14.1	7.9	5.2	4.6	4.8	7.0	8.8	8.7	12.0	15.9	13.8	8.0	10.0	14.7	8.1	12.7	22.6	29.7	27.2	13.2	29.7																							
3-Nov	8.2	7.5	6.5	9.1	21.7	Z	7.2	8.8	12.6	28.6	27.8	28.7	29.6	28.2	23.2	25.2	29.4	28.0	29.2	29.4	26.7	29.2	29.2	29.4	21.9	29.6																							
4-Nov	Z	24.1	22.8	20.4	29.6	31.0	29.8	23.4	29.1	26.6	22.1	14.7	11.6	7.6	9.6	6.7	4.2	11.7	19.1	24.5	27.2	25.2	26.3	30.4	20.8	31.0																							
5-Nov	31.0	Z	26.1	27.9	24.2	20.3	20.3	20.2	20.3	20.1	16.4	18.6	19.8	16.9	20.4	24.2	25.7	25.2	17.8	26.4	15.1	13.6	23.7	20.7	21.5	31.0																							
6-Nov	24.1	18.1	23.8	13.6	1.8	2.6	4.7	7.0	8.4	9.7	6.9	7.3	10.2	9.2	7.5	6.6	5.5	5.9	9.5	10.3	8.0	7.2	6.7	7.1	9.2	24.1																							
7-Nov	9.0	9.0	8.1	6.1	3.1	2.3	2.1	C	C	C	C	C	7.4	9.5	11.0	12.3	11.9	5.6	3.1	2.7	2.5	7.9	5.9	4.6	6.5	12.3																							
8-Nov	9.6	10.7	3.0	2.5	2.3	1.6	2.2	2.6	M	M	1.2	0.7	0.7	0.6	1.0	1.5	1.2	1.6	1.6	0.9	1.2	0.7	2.1	3.0	2.4	10.7																							
9-Nov	7.1	12.2	21.5	3.5	Z	1.8	4.3	5.4	1.7	2.9	5.1	8.4	4.4	6.7	8.4	6.5	11.8	11.5	17.9	20.3	18.2	15.5	14.4	19.7	10.0	21.5																							
10-Nov	18.9	17.2	11.3	14.5	17.8	Z	18.5	18.8	20.6	14.8	7.0	5.0	6.5	7.7	7.9	10.6	20.0	20.8	19.7	14.8	18.5	10.8	10.1	9.2	14.0	20.8																							
11-Nov	Z	9.3	10.6	26.8	22.8	21.6	20.4	19.5	20.3	19.5	15.6	11.0	11.2	24.0	26.1	23.4	21.4	17.1	15.4	9.5	8.4	6.3	5.5	4.2	16.1	26.8																							
12-Nov	3.4	Z	3.5	5.3	3.5	19.1	21.8	23.2	17.7	17.0	18.1	9.0	0.9	0.9	1.0	1.3	5.1	9.3	9.1	14.2	3.2	1.6	0.7	6.1	8.5	23.2																							
13-Nov	26.7	18.4	Z	27.4	12.1	15.8	16.7	20.0	18.9	14.3	10.1	8.7	7.1	13.1	19.3	15.6	12.7	7.3	8.2	9.7	10.1	16.9	13.1	20.4	14.9	27.4																							
14-Nov	14.3	11.4	15.1	Z	0.7	2.7	19.7	10.2	3.1	2.1	1.2	0.6	0.7	1.8	2.3	11.6	20.2	8.9	12.0	18.8	15.8	1.2	1.9	5.0	7.9	20.2																							
15-Nov	20.7	22.7	16.7	15.8	Z	13.0	17.7	16.7	17.2	9.9	2.2	0.8	0.8	2.8	13.1	21.3	25.8	1.7	2.8	1.6	0.9	0.6	1.2	6.4	10.1	25.8																							
16-Nov	1.5	6.8	9.9	3.6	0.7	Z	20.8	21.2	19.9	17.0	14.8	12.2	6.1	6.3	13.1	23.8	25.6	23.5	7.2	1.9	1.8	3.0	2.2	0.7	10.6	25.6																							
17-Nov	Z	4.6	19.1	18.6	14.0	11.8	4.2	5.7	1.3	0.7	0.8	0.8	1.8	3.8	2.1	5.9	18.5	26.3	27.7	21.1	8.5	1.8	9.5	17.9	9.8	27.7																							
18-Nov	29.1	Z	26.3	22.2	26.6	30.0	19.9	18.0	18.0	12.8	11.0	9.8	11.4	12.7	12.1	16.9	23.6	19.2	18.3	21.7	18.8	16.7	17.3	17.1	18.7	30.0																							
19-Nov	15.3	22.8	Z	18.3	16.1	16.7	24.0	14.9	22.0	21.5	14.2	12.0	11.9	22.6	25.5	24.4	21.5	14.0	13.9	14.6	14.0	11.5	10.0	17.7	17.4	25.5																							
20-Nov	2.3	0.9	0.4	Z	0.4	0.2	0.2	0.4	0.5	0.5	0.3	0.7	0.3	0.2	0.1	0.3	0.8	1.5	1.5	1.6	10.5	25.5	31.2	31.5	4.9	31.5																							
21-Nov	14.3	4.6	4.9	15.2	Z	17.3	15.7	22.1	26.7	19.0	13.0	18.1	12.4	10.1	12.3	8.6	8.9	8.2	13.1	12.2	12.1	9.7	9.9	8.8	12.9	26.7																							
22-Nov	9.5	8.8	12.1	13.3	14.3	Z	8.4	19.1	24.9	16.4	6.2	3.3	7.1	26.6	30.7	36.7	34.6	34.2	30.0	16.8	7.8	9.1	15.9	15.4	17.4	36.7																							
23-Nov	Z	8.6	7.9	12.1	11.5	15.0	11.6	9.3	7.5	6.8	8.7	12.2	14.8	6.0	2.3	2.8	3.6	11.9	13.0	19.1	18.6	17.3	8.9	5.0	10.2	19.1																							
24-Nov	1.9	Z	1.1	1.1	2.0	8.6	14.0	15.1	19.0	13.8	2.7	7.0	32.1	34.8	41.2	43.5	39.3	30.2	18.6	15.8	0.7	0.4	0.4	10.8	15.4	43.5																							
25-Nov	13.2	32.9	Z	10.2	15.0	3.2	3.5	1.6	0.3	0.5	0.5	1.8	0.6	8.4	14.1	27.7	33.9	29.7	32.6	33.7	28.7	28.0	26.7	29.9	16.4	33.9																							
26-Nov	33.8	33.9	22.1	Z	28.5	39.9	36.3	31.5	31.3	36.7	25.5	17.1	19.0	18.0	17.8	13.4	14.8	18.1	23.3	17.7	22.8	30.1	25.1	25.3	25.3	39.9																							
27-Nov	23.7	21.8	22.2	23.6	Z	23.4	22.1	21.4	20.6	19.5	15.7	14.8	14.4	15.2	14.8	13.9	6.8	1.9	1.1	1.4	22.2	10.9	7.9	10.9	15.2	23.7																							
28-Nov	20.7	22.6	25.1	25.0	6.7	Z	6.5	5.7	4.1	6.8	1.8	11.8	14.8	18.5	14.0	8.0	27.9	28.6	20.4	17.9	21.2	10.2	36.8	36.4	17.0	36.8																							
29-Nov	Z	14.5	5.1	6.5	19.2	7.7	0.5	0.9	6.8	6.2	1.7	23.1	4.6	1.3	0.7	0.6	0.8	1.0	0.8	0.8	1.5	2.0	1.8	2.3	4.8	23.1																							
30-Nov	16.8	Z	11.8	17.2	20.9	21.4	23.0	29.0	22.3	16.1	22.2	17.6	18.3	17.7	14.7	7.8	17.7	19.1	29.2	21.3	20.4	23.0	25.0	22.9	19.8	29.2																							
																								15.1	14.8	13.9	14.8	13.1	13.9	13.6	13.8	14.5	13.3	9.8	10.1	10.0	11.9	13.3	14.2	16.4	15.1	15.1	14.0	12.8	12.1	13.7	15.6	Diurnal Average	
																								33.8	33.9	26.3	27.9	29.6	39.9	36.3	31.5	31.3	36.7	27.8	28.7	32.1	34.8	41.2	43.5	39.3	34.2	32.6	33.7	28.7	30.1	36.8	36.4	Diurnal Maximum	
Z - zerospan      C - Calibration      M - Maintenance																																																	
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 159 ppb																																																	



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

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb**  
**Fort Hills - November 2023**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Fort Hills - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	522	76.09	76.09
21 - 40	162	23.62	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: 686

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Fort Hills - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	31	40	18	8	6	7	30	56	81	68	41	10	14	31	20	19	480
21 - 40	8	18	11	4	5	11	28	23	11	7	9	17	1	0	3	5	161
11 - 80	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	2
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	39	58	29	12	11	20	58	79	92	75	50	27	15	31	23	24	643

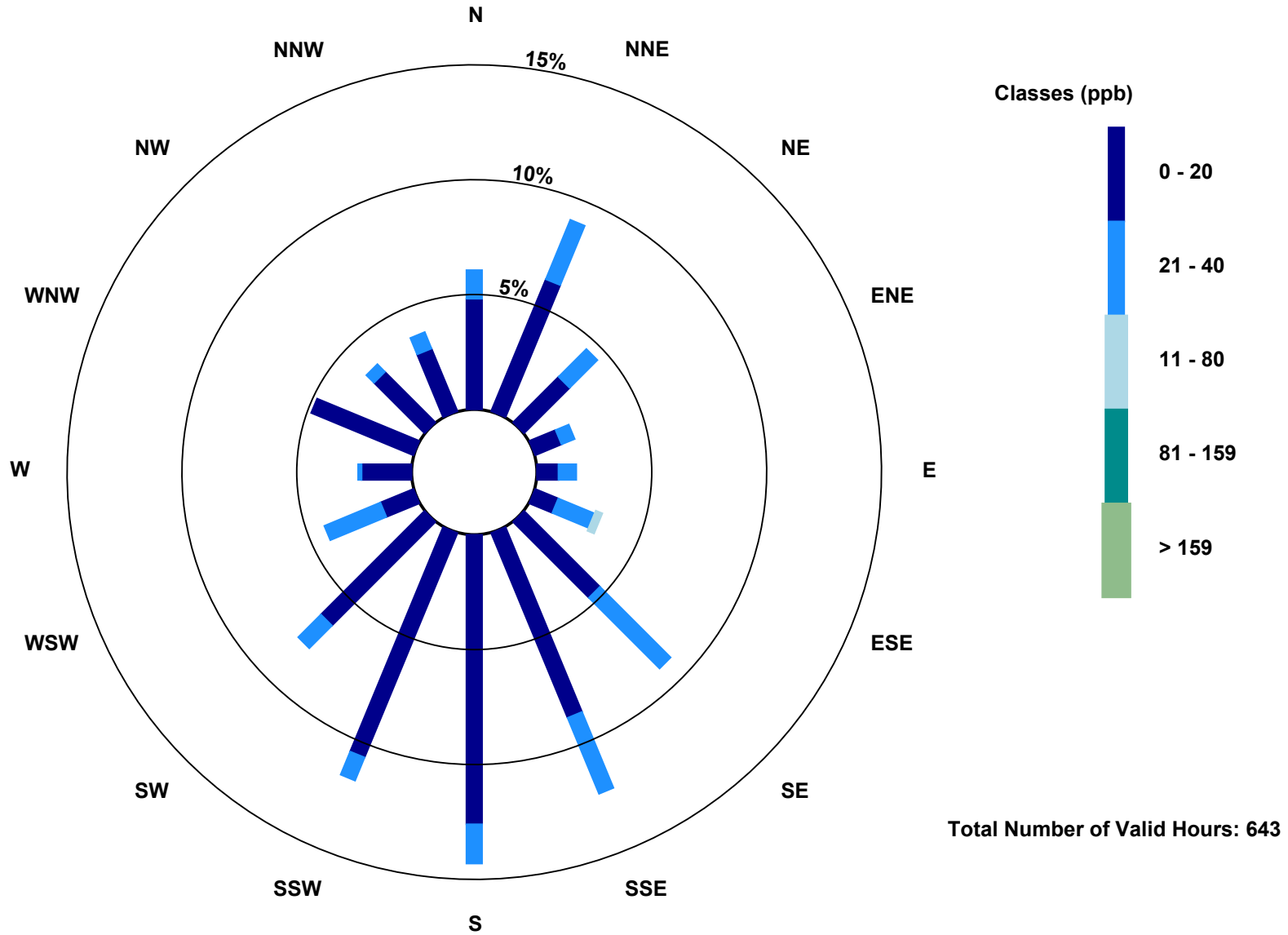
Total Number of Valid Hours: 643

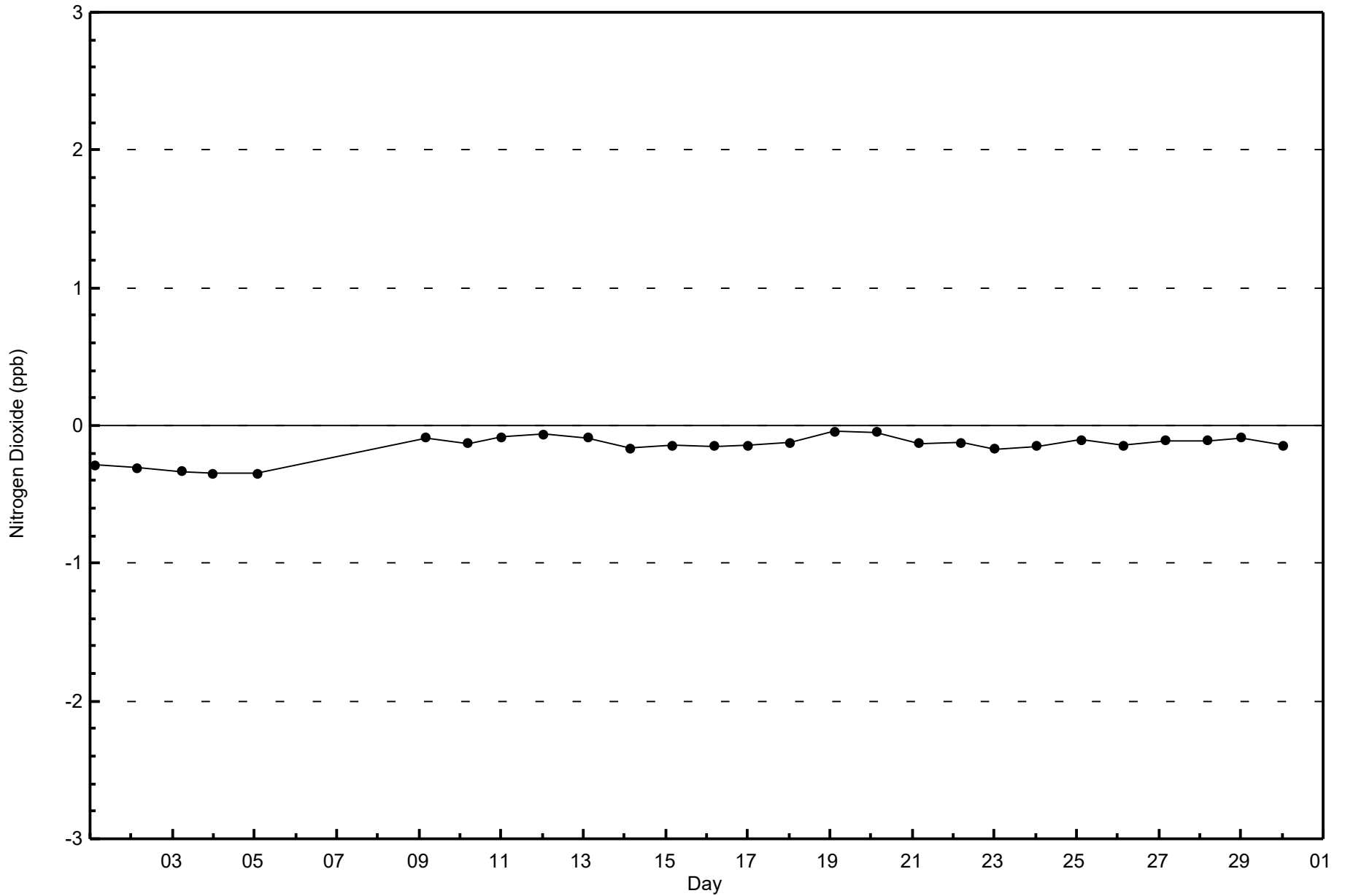
Total Number of Hours: 720

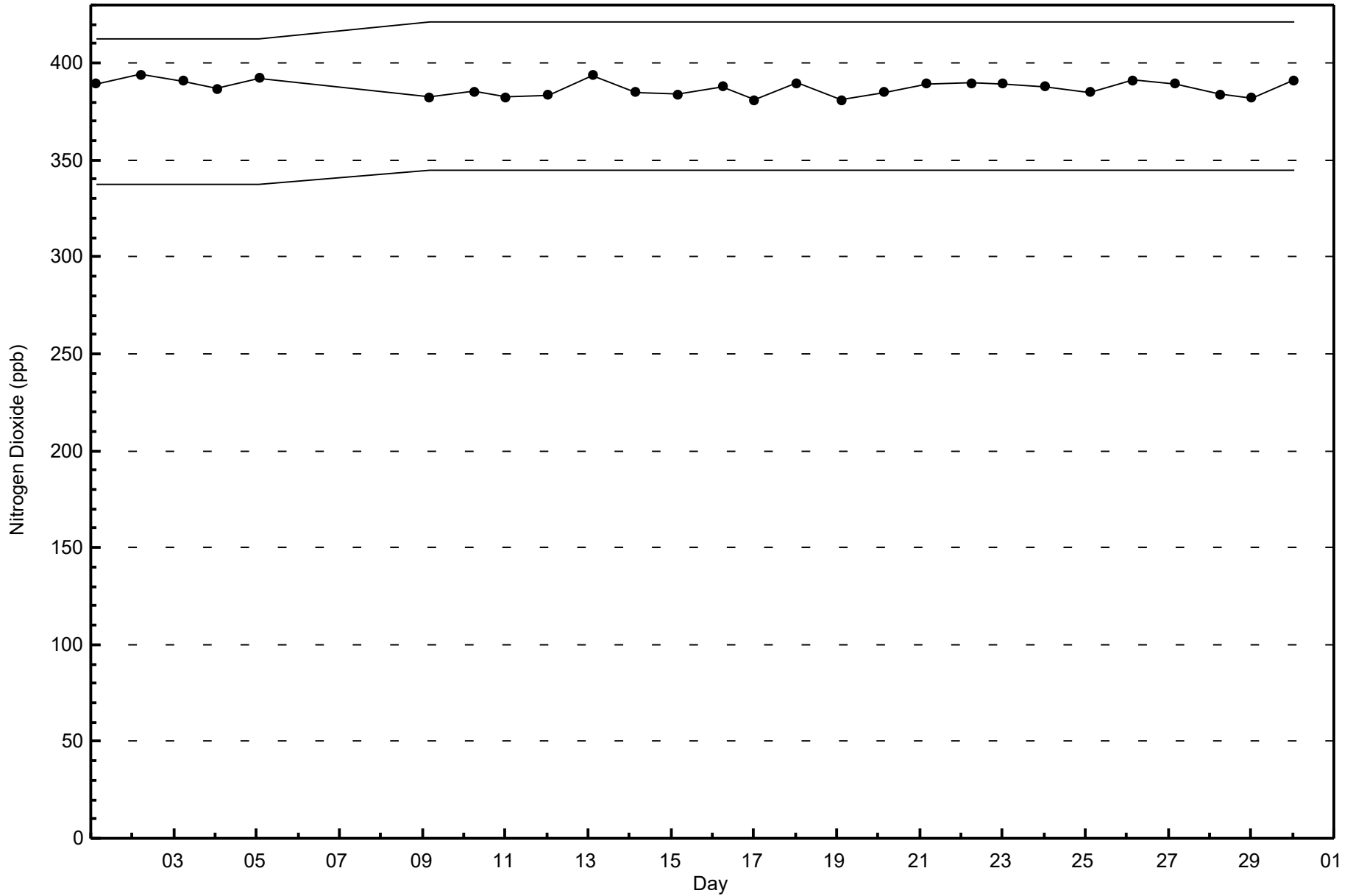


Wood Buffalo Environmental Association  
Wind Rose Nov 2023

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









Wood Buffalo Environmental Association

Summary of Hour Averages

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

Fort Hills - November 2023

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 249.2 ppb on Nov 24 16:00	Maximum Daily Average: 81.9 ppb on Nov 19		Hours of Data:	686
Minimum Value: 0.1 ppb on Nov 20 15:00	Minimum Daily Average: 4.2 ppb on Nov 8		Hours of Missing Data:	34
Maximum Diurnal Average: 36.9 ppb at hour 6	Minimum Diurnal Average: 18.9 ppb at hour 11		Hours of Calibration:	32
Monthly Average: 27.13 ppb	Percentiles: P <sub>1</sub> = 0.3 P <sub>10</sub> = 1.6 Q <sub>1</sub> = 6.6 Median = 16.2 Q <sub>3</sub> = 33.0 P <sub>90</sub> = 59.7 P <sub>99</sub> = 166.9		Percent Operational Time:	99.7

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	15.0	17.0	17.1	Z	13.9	6.9	5.5	4.3	7.8	11.9	9.3	16.8	23.1	24.3	33.9	12.8	12.8	22.2	23.2	10.7	4.8	4.3	13.0	29.2	14.8	33.9
2-Nov	10.0	13.3	51.1	97.0	Z	16.6	9.3	6.3	5.7	6.0	9.0	11.2	10.8	14.4	19.4	16.9	9.0	11.3	16.1	8.2	12.8	23.4	37.7	30.7	19.4	97.0
3-Nov	8.2	7.5	6.5	9.2	23.3	Z	7.2	8.8	14.2	59.3	56.7	76.7	93.1	80.9	36.8	42.2	64.7	68.7	88.1	83.9	66.6	124.3	146.4	128.2	56.6	146.4
4-Nov	Z	77.2	62.0	36.0	54.0	47.7	36.2	28.6	55.4	38.1	30.3	18.4	13.8	8.8	11.5	7.1	4.2	12.0	20.1	27.9	34.8	29.0	34.7	58.7	32.4	77.2
5-Nov	54.2	Z	38.3	42.1	33.6	23.3	25.4	25.2	27.8	31.8	24.9	30.6	35.7	26.4	29.6	36.3	39.4	40.0	18.8	38.2	16.0	13.9	34.3	25.6	30.9	54.2
6-Nov	28.4	18.5	31.1	15.0	1.8	2.6	4.7	7.0	9.2	12.5	9.8	12.5	19.4	15.8	10.9	8.1	5.7	5.9	11.6	14.4	8.2	7.3	6.8	10.1	11.6	31.1
7-Nov	23.9	32.9	17.2	6.7	3.1	2.4	2.1	C	C	C	C	C	11.7	14.5	18.6	30.3	35.3	6.4	3.4	2.8	2.6	15.0	8.4	6.2	12.8	35.3
8-Nov	26.9	31.3	3.1	2.5	2.3	1.6	2.2	2.8	M	M	1.8	0.9	1.0	0.8	1.5	1.9	1.3	1.6	1.6	0.9	1.4	0.7	2.1	3.0	4.2	31.3
9-Nov	7.7	18.9	103.8	3.7	Z	2.0	5.0	7.1	2.4	5.0	9.1	17.4	7.7	9.5	11.1	7.3	12.2	11.5	27.9	28.6	21.6	16.2	15.1	83.2	18.9	103.8
10-Nov	58.1	50.6	11.3	15.4	44.9	Z	38.6	26.9	67.7	44.1	12.6	8.2	11.1	12.4	11.4	13.6	34.4	24.7	20.5	14.8	20.9	10.8	10.1	9.2	24.9	67.7
11-Nov	Z	9.6	19.4	151.2	77.9	66.8	56.9	42.6	86.5	63.3	38.0	20.6	21.4	101.6	103.0	112.4	97.2	41.9	31.6	9.8	8.9	6.5	5.6	4.2	51.1	151.2
12-Nov	3.4	Z	3.6	6.2	3.9	30.7	32.5	29.2	27.2	29.9	39.1	20.0	1.1	1.0	1.2	1.4	5.5	9.7	10.5	17.5	3.2	2.0	0.8	6.7	12.5	39.1
13-Nov	35.0	21.7	Z	35.5	13.3	18.0	18.0	22.9	21.2	16.5	12.1	10.7	9.4	17.6	28.6	20.4	13.6	7.8	8.5	11.0	11.2	19.4	14.3	22.3	17.8	35.5
14-Nov	15.6	12.6	16.4	Z	0.7	2.9	49.4	11.5	3.4	2.9	1.8	0.9	0.9	2.9	3.1	14.6	23.8	9.0	12.3	20.3	18.8	1.2	1.9	6.5	10.1	49.4
15-Nov	40.5	46.7	23.7	21.6	Z	16.0	25.4	22.7	22.6	13.5	2.9	1.0	1.1	3.9	20.1	33.3	38.8	1.7	2.8	1.7	0.9	0.6	1.2	6.4	15.2	46.7
16-Nov	1.5	6.9	10.0	3.7	0.7	Z	49.0	26.9	25.9	26.9	31.1	24.1	9.8	9.2	19.5	43.4	55.2	37.2	7.4	1.9	1.8	3.0	2.2	0.7	17.3	55.2
17-Nov	Z	4.6	20.8	19.1	14.3	12.1	4.4	6.0	1.3	0.7	0.9	0.9	2.1	4.7	2.3	6.4	20.9	58.3	100.6	39.0	17.5	1.8	16.4	55.6	17.9	100.6
18-Nov	184.5	Z	153.4	66.9	126.7	194.9	43.2	30.3	35.3	21.3	20.4	19.7	24.4	20.8	19.8	27.6	106.0	49.7	45.9	96.0	68.2	46.5	48.9	49.4	65.2	194.9
19-Nov	26.4	129.6	Z	94.5	85.1	92.7	166.5	111.3	169.3	145.9	63.7	44.2	38.3	136.1	147.7	125.2	98.2	28.4	30.1	34.3	45.7	30.4	15.3	24.2	81.9	169.3
20-Nov	2.3	0.9	0.4	Z	0.4	0.2	0.2	0.4	0.5	0.5	0.3	0.9	0.3	0.2	0.1	0.3	0.8	1.5	1.5	1.6	10.5	31.2	48.3	54.3	6.9	54.3
21-Nov	15.7	4.6	5.1	16.7	Z	20.7	16.2	34.5	41.6	22.8	15.0	24.0	16.2	12.6	14.7	10.1	9.5	8.9	14.6	13.7	13.0	10.6	10.7	9.6	15.7	41.6
22-Nov	10.8	9.8	13.8	14.6	16.2	Z	9.2	22.6	30.9	20.2	7.9	4.7	11.4	51.2	59.7	95.2	59.3	56.5	43.4	16.9	7.8	9.2	16.5	15.5	26.2	95.2
23-Nov	Z	8.6	7.9	12.1	11.5	15.0	11.7	9.5	7.6	7.7	11.7	20.7	29.8	9.3	2.9	3.1	3.6	12.7	15.1	47.5	34.1	19.1	9.0	5.0	13.7	47.5
24-Nov	1.9	Z	1.1	1.1	2.0	8.7	14.5	15.3	20.8	17.5	3.4	13.7	138.0	153.2	218.3	249.2	209.1	53.3	20.0	16.4	0.7	0.4	0.4	12.9	50.9	249.2
25-Nov	33.4	127.4	Z	10.8	15.9	3.4	3.6	1.7	0.3	0.5	0.6	3.6	0.9	12.1	18.0	39.1	50.5	34.8	49.3	45.3	31.9	28.8	28.1	41.9	25.3	127.4
26-Nov	102.3	120.7	28.1	Z	77.8	239.7	162.8	108.6	87.3	149.3	57.5	23.1	29.2	25.2	22.5	14.2	14.8	18.6	27.9	18.0	59.7	149.4	52.1	52.9	71.4	239.7
27-Nov	46.9	46.2	50.6	64.0	Z	64.6	54.4	52.9	55.1	62.1	40.9	44.5	33.3	30.6	30.2	26.0	7.2	1.9	1.1	1.4	29.3	11.0	7.9	11.0	33.6	64.6
28-Nov	21.6	23.8	32.8	36.8	8.1	Z	6.5	5.7	4.1	7.5	2.0	17.5	22.1	27.2	18.3	8.5	34.0	31.3	20.9	18.0	21.2	10.7	53.0	73.8	22.0	73.8
29-Nov	Z	16.1	5.1	6.5	21.7	8.2	0.5	0.9	10.6	6.4	1.7	41.7	5.3	1.9	0.7	0.6	1.1	1.0	0.8	0.8	1.5	2.0	1.8	2.5	6.1	41.7
30-Nov	18.0	Z	11.9	22.6	36.7	24.7	27.0	33.0	23.1	19.5	33.0	21.0	23.0	21.5	16.3	8.1	18.7	19.7	34.4	21.5	20.5	23.5	37.7	32.5	23.8	37.7

31.7	34.3	27.6	31.2	27.6	36.9	29.6	24.3	30.9	30.1	18.9	19.0	21.5	28.3	31.1	33.9	36.2	22.9	23.7	22.1	19.9	21.7	22.7	29.1	Diurnal Average	
184.5	129.6	153.4	151.2	126.7	239.7	166.5	111.3	169.3	149.3	63.7	76.7	138.0	153.2	218.3	249.2	209.1	68.7	100.6	96.0	68.2	149.4	146.4	128.2	Diurnal Maximum	

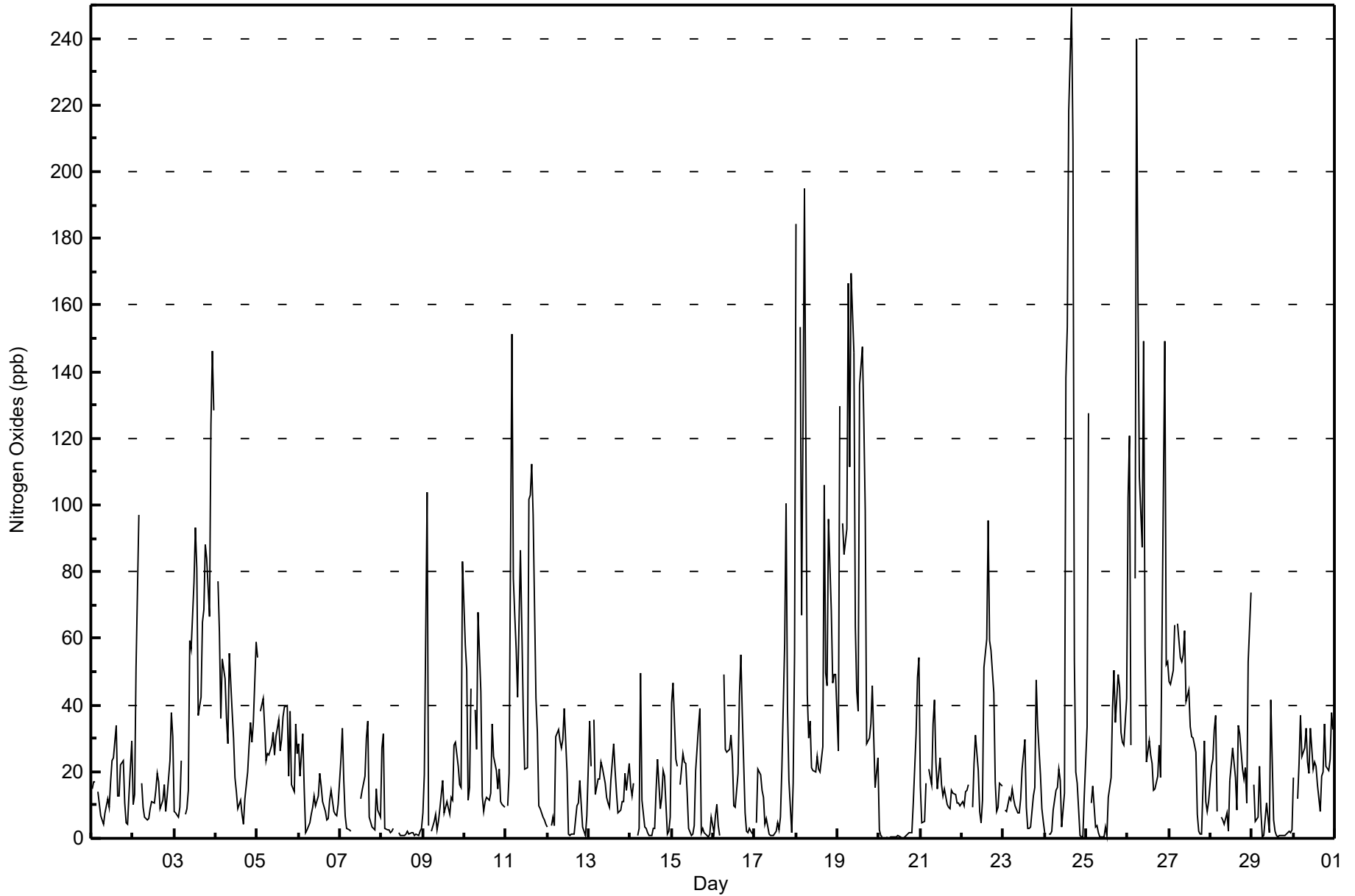
Z - zerspan      C - Calibration      M - Maintenance





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

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Fort Hills - November 2023**





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

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Fort Hills - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	402	58.60	58.60
21 - 40	156	22.74	81.34
41 - 80	78	11.37	92.71
81 - 159	40	5.83	98.54
> 159	9	1.31	99.85

Total Number of Valid Hours: 686

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Fort Hills - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	26	29	11	6	3	6	15	39	68	56	26	8	14	30	18	14	369
21 - 40	5	21	14	3	4	9	12	21	14	9	20	10	1	1	2	5	151
41 - 80	3	6	2	2	3	1	13	12	7	9	3	8	0	0	2	4	75
81 - 159	5	2	1	1	1	1	13	6	3	1	1	1	0	0	1	1	38
> 159	0	0	0	0	0	3	5	1	0	0	0	0	0	0	0	0	9
<b>Totals</b>	39	58	28	12	11	20	58	79	92	75	50	27	15	31	23	24	642

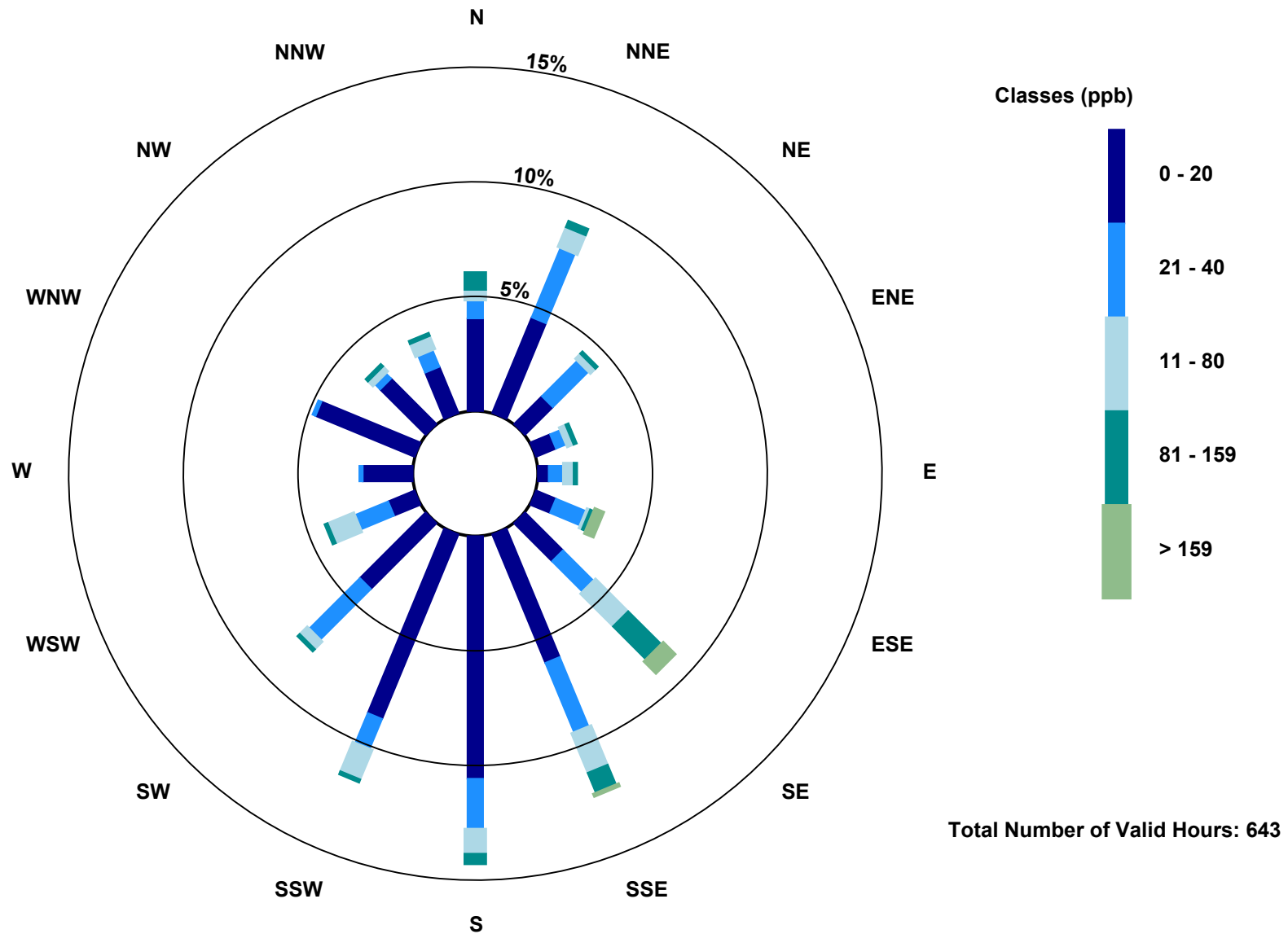
Total Number of Valid Hours: 643

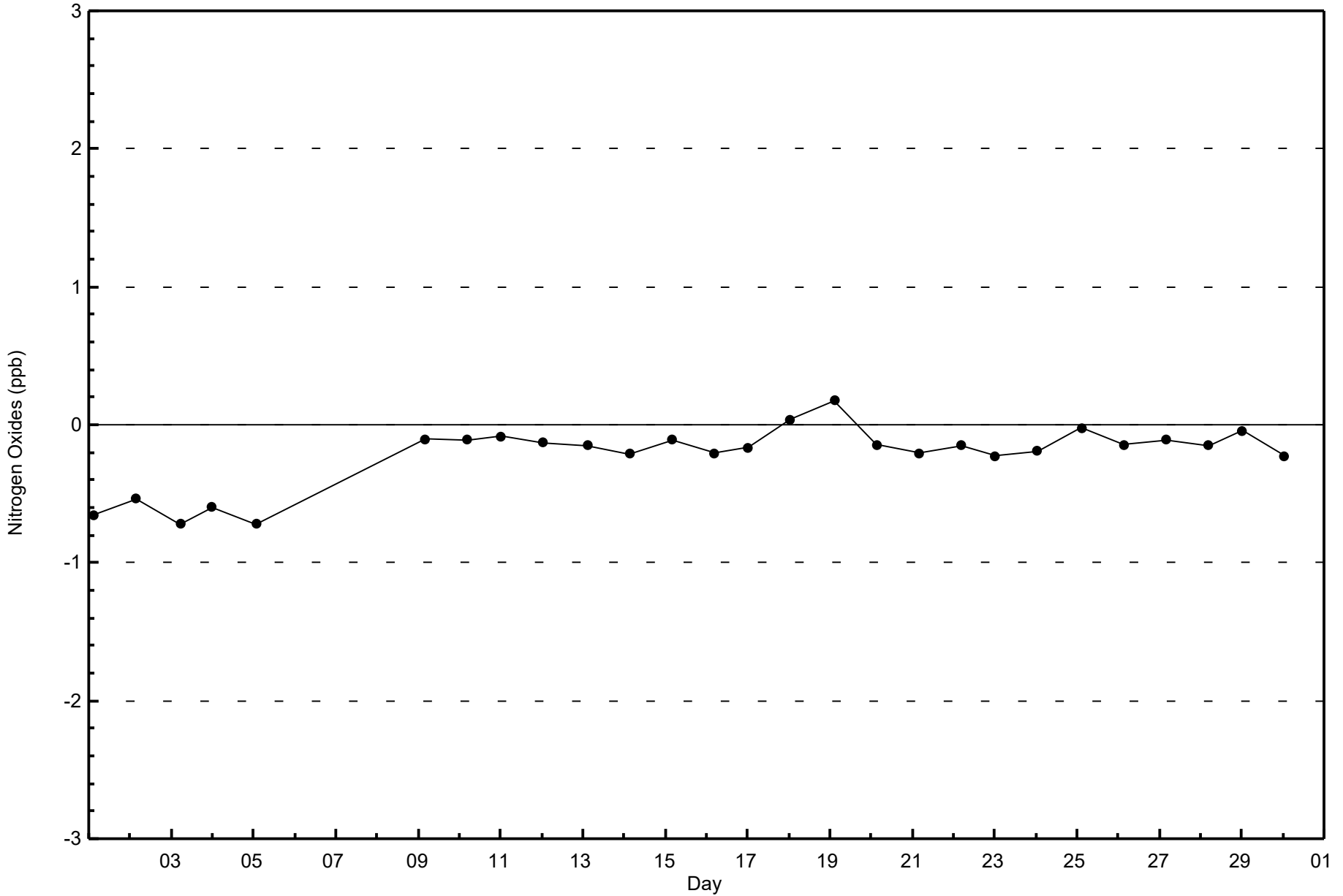
Total Number of Hours: 720

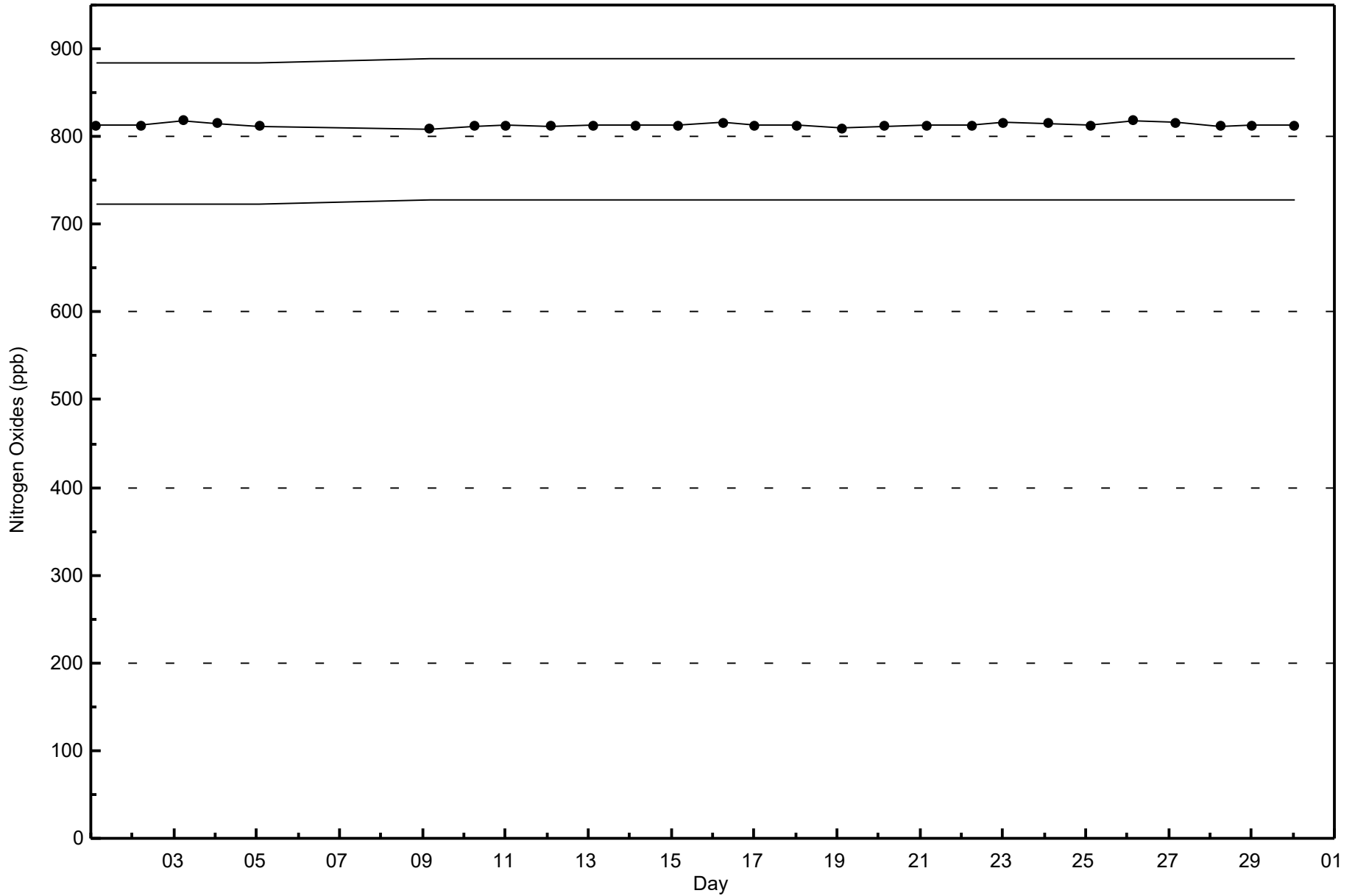


Wood Buffalo Environmental Association  
Wind Rose Nov 2023

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





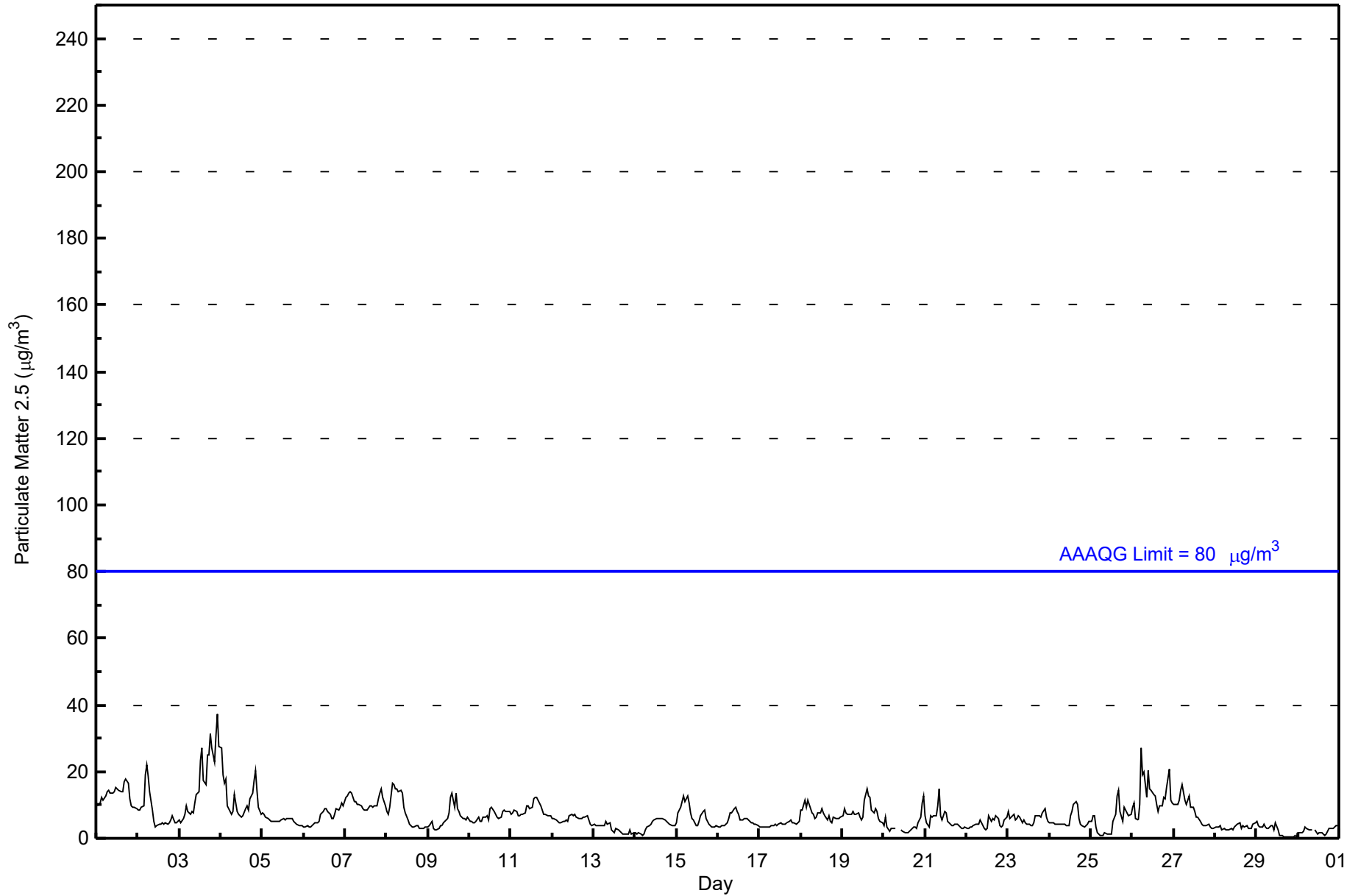




Summary of Hour Averages

Fort Hills - November 2023

Number of Exceedences (AAAQO):		1-hr: 0	24-hr: 0																		Hours in Service:	720																										
Maximum Value: 37.2 µg/m <sup>3</sup> on Nov 3 23:00		Maximum Daily Average: 17.2 µg/m <sup>3</sup> on Nov 3																	Hours of Data:	717																												
Minimum Value: 0.4 µg/m <sup>3</sup> on Nov 29 20:00		Minimum Daily Average: 2.2 µg/m <sup>3</sup> on Nov 29																	Hours of Missing Data:	3																												
Maximum Diurnal Average: 7.5 µg/m <sup>3</sup> at hour 17		Minimum Diurnal Average: 6.3 µg/m <sup>3</sup> at hour 11																	Hours of Calibration:	2																												
Monthly Average: 6.87 µg/m <sup>3</sup>		Percentiles: P <sub>1</sub> = 0.7 P <sub>10</sub> = 2.7 Q <sub>1</sub> = 3.8 Median = 5.8 Q <sub>3</sub> = 8.5 P <sub>90</sub> = 12.7 P <sub>99</sub> = 26.7																	Percent Operational Time:	99.9																												
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Nov	9.9	10.3	10.7	12.3	11.6	12.8	13.9	14.2	13.5	13.4	13.9	15.1	14.7	14.4	13.9	14.0	16.8	18.0	16.6	12.0	9.8	9.4	9.2	9.1	12.9	18.0																						
2-Nov	8.6	8.5	9.4	9.9	19.1	21.9	18.5	14.0	8.4	5.1	3.4	3.7	4.1	4.2	4.6	4.3	4.5	4.1	4.8	5.5	6.7	4.8	4.8	4.9	7.8	21.9																						
3-Nov	5.5	4.6	6.0	7.1	9.6	8.0	7.4	7.8	7.8	10.7	13.1	14.1	23.3	27.3	17.4	15.9	25.2	25.0	31.5	27.0	22.8	30.8	37.2	27.5	17.2	37.2																						
4-Nov	27.0	18.9	16.4	17.6	9.9	8.0	7.2	8.1	13.0	8.1	7.1	6.9	6.2	6.8	9.1	9.7	8.5	11.7	13.4	17.2	20.4	14.4	9.3	7.3	11.8	27.0																						
5-Nov	7.7	7.1	6.3	5.9	5.7	5.1	5.0	5.1	4.9	5.0	5.0	5.5	5.8	5.7	5.9	6.0	6.1	6.1	5.2	4.7	4.1	3.7	3.9	3.6	5.4	7.7																						
6-Nov	3.6	3.4	3.8	3.6	3.5	3.8	4.5	4.5	4.6	5.3	7.1	8.1	9.1	9.1	7.9	7.1	6.1	6.0	7.1	9.0	8.4	9.4	10.4	9.8	6.5	10.4																						
7-Nov	12.2	12.8	13.4	13.9	13.7	10.9	10.8	10.3	10.1	9.7	8.9	8.4	8.4	8.7	9.7	9.6	9.3	9.8	9.8	11.9	13.7	14.9	12.3	9.6	10.9	14.9																						
8-Nov	7.9	7.2	9.4	16.5	15.9	14.9	14.7	14.2	14.3	13.6	9.5	7.7	5.7	4.1	3.6	3.6	3.6	3.7	3.6	3.1	3.0	3.1	3.3	3.4	7.9	16.5																						
9-Nov	3.5	3.7	5.1	2.9	2.4	2.6	3.1	3.8	3.8	4.5	5.3	5.9	7.6	12.3	13.5	9.2	13.4	8.8	7.9	6.8	6.0	5.8	5.6	6.3	6.2	13.5																						
10-Nov	5.2	5.0	4.5	4.5	5.0	6.2	5.1	4.9	6.4	6.5	6.6	5.4	8.9	9.5	7.9	7.3	6.2	6.1	6.4	8.0	8.5	7.9	7.9	8.0	6.6	9.5																						
11-Nov	7.4	7.6	8.3	8.0	6.7	6.7	7.3	7.3	7.8	9.9	9.8	9.0	9.5	12.1	12.2	12.4	11.3	9.7	8.3	7.4	7.0	6.8	6.9	6.6	8.6	12.4																						
12-Nov	6.0	5.9	5.7	5.2	4.7	4.7	5.3	5.0	5.4	5.3	6.6	7.3	6.9	7.0	6.4	5.8	5.9	6.1	6.2	6.5	6.7	5.3	4.4	4.0	5.8	7.3																						
13-Nov	4.1	3.6	3.7	4.0	3.7	3.8	3.7	5.0	4.3	4.8	2.6	2.3	1.9	3.0	2.6	2.3	1.6	1.4	1.4	1.2	1.3	2.4	1.3	1.5	2.8	5.0																						
14-Nov	1.5	1.4	1.5	1.2	1.0	1.1	2.7	3.6	3.9	4.2	5.0	5.4	5.8	6.0	6.1	6.1	6.0	5.3	4.9	4.6	4.4	3.9	3.8	3.9	3.9	6.1																						
15-Nov	4.8	7.6	9.1	10.9	12.5	11.0	12.7	10.6	7.5	5.8	5.3	4.0	3.9	5.2	6.7	7.9	8.6	5.7	5.3	4.3	3.5	3.6	3.5	4.0	6.8	12.7																						
16-Nov	3.4	3.4	3.6	3.7	3.9	4.5	6.1	7.5	7.8	8.8	9.1	7.9	7.1	5.5	5.6	5.9	6.0	5.7	5.0	4.7	4.5	4.3	4.0	3.9	5.5	9.1																						
17-Nov	3.4	3.3	3.5	3.4	3.5	3.5	3.5	3.6	3.9	4.0	4.0	4.2	4.5	4.4	4.2	4.3	4.5	4.9	5.6	4.8	4.7	4.2	4.6	4.9	4.2	5.6																						
18-Nov	8.4	8.5	11.4	9.3	11.2	10.3	7.5	7.3	5.8	6.2	7.8	7.8	8.9	7.6	6.8	5.4	7.0	5.1	4.5	6.3	5.8	6.0	5.7	6.5	7.4	11.4																						
19-Nov	6.7	8.9	7.8	7.3	7.3	7.4	8.0	7.3	7.2	7.7	6.2	5.4	6.4	11.3	14.9	12.7	12.4	8.6	7.7	9.1	8.2	6.1	5.0	4.6	8.1	14.9																						
20-Nov	4.0	6.2	3.3	2.3	2.8	3.0	3.1	3.0	C	C	2.5	2.0	1.8	1.7	1.8	2.1	2.6	3.3	3.3	3.0	4.5	6.4	10.6	12.5	3.9	12.5																						
21-Nov	6.8	4.6	3.4	6.6	6.4	6.9	6.8	9.9	14.7	6.7	5.3	8.0	7.5	5.1	4.7	4.0	3.9	4.0	4.2	4.2	3.2	3.2	3.1	3.2	5.7	14.7																						
22-Nov	3.2	3.1	3.3	3.4	3.9	4.2	4.3	4.4	5.6	3.9	2.8	2.7	3.2	6.7	5.1	6.0	5.3	6.8	6.1	3.9	3.4	3.9	5.4	6.4	4.5	6.8																						
23-Nov	8.0	5.9	6.3	7.1	5.4	6.1	6.6	6.3	4.7	5.4	4.7	4.2	4.1	3.6	3.7	4.8	6.7	6.7	7.0	6.5	7.8	9.1	6.2	5.0	5.9	9.1																						
24-Nov	4.7	4.7	4.6	4.3	4.1	4.2	4.1	4.2	4.2	4.1	3.9	3.9	6.7	8.2	10.1	11.2	10.3	5.8	4.3	3.8	3.4	3.9	4.3	5.1	5.3	11.2																						
25-Nov	5.0	6.8	6.7	3.5	1.7	1.0	1.0	1.0	1.7	1.3	1.4	1.4	1.3	5.1	7.4	12.5	14.5	8.0	5.3	9.4	8.3	7.5	6.9	7.0	5.2	14.5																						
26-Nov	9.4	10.8	5.9	5.6	10.4	27.2	19.1	20.1	12.4	20.2	14.7	14.3	13.1	12.5	10.0	7.9	9.6	9.9	12.2	11.7	15.1	20.6	11.5	10.8	13.1	27.2																						
27-Nov	10.4	10.0	10.2	11.5	14.4	16.2	11.6	10.2	11.3	12.7	9.5	9.5	8.0	6.5	6.4	5.0	4.1	3.8	3.8	3.7	4.2	3.4	3.1	3.1	8.0	16.2																						
28-Nov	3.4	3.4	3.5	3.7	2.5	2.8	2.5	2.4	2.6	2.8	2.6	3.2	3.9	4.2	4.5	3.2	4.0	3.5	3.7	2.9	3.1	3.0	4.2	4.7	3.3	4.7																						
29-Nov	4.9	3.7	3.3	3.5	4.3	3.4	3.0	3.1	3.7	3.8	2.6	4.5	2.4	1.0	0.8	0.6	0.6	0.5	0.5	0.4	0.6	0.6	1.0	0.6	2.2	4.9																						
30-Nov	1.6	1.6	1.6	2.3	3.2	2.9	2.6	2.4	2.5	M	2.5	1.5	1.9	1.8	1.6	1.0	1.1	2.0	3.0	2.8	2.8	3.3	3.8	3.8	2.3	3.8																						
																								Diurnal Average																								
																								Diurnal Maximum																								
																								6.6	6.4	6.4	6.7	7.0	7.5	7.1	7.0	7.0	7.1	6.3	6.3	6.8	7.4	7.2	6.9	7.5	6.9	7.0	6.9	6.9	7.1	6.8	6.4	Diurnal Average
																								27.0	18.9	16.4	17.6	19.1	27.2	19.1	20.1	14.7	20.2	14.7	15.1	23.3	27.3	17.4	15.9	25.2	25.0	31.5	27.0	22.8	30.8	37.2	27.5	Diurnal Maximum
C - Calibration M - Maintenance																																																
Alberta Ambient Air Quality Guideline/Objectives: 1-hr 80 µg/m <sup>3</sup> 24-hr 29 µg/m <sup>3</sup>																																																







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

**Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$**   
**Fort Hills - November 2023**

<b>Concentration Ranges (<math>\mu\text{g}/\text{m}^3</math>)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	344	47.98	47.98
6 - 15	341	47.56	95.54
16 - 25	24	3.35	98.88
26 - 80	8	1.12	100.00
> 81.0	0	0.00	100.00

Total Number of Valid Hours: 717

Total Number of Hours: 720



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

**Particulate Matter 2.5 (PM<sub>2.5</sub>) - μg/m<sup>3</sup>**  
**Fort Hills - November 2023**

Concentration Ranges (μg/m <sup>3</sup> )	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	25	34	16	4	5	8	18	21	32	39	37	15	6	26	19	13	318
6 - 15	9	25	9	7	6	12	41	56	62	40	16	11	7	5	5	10	321
16 - 25	2	4	2	1	0	0	1	6	1	1	0	1	1	0	0	3	23
26 - 80	5	0	2	0	0	0	1	0	0	0	0	0	0	0	0	0	8
> 81.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	41	63	29	12	11	20	61	83	95	80	53	27	14	31	24	26	670

Total Number of Valid Hours: 670

Total Number of Hours: 720





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

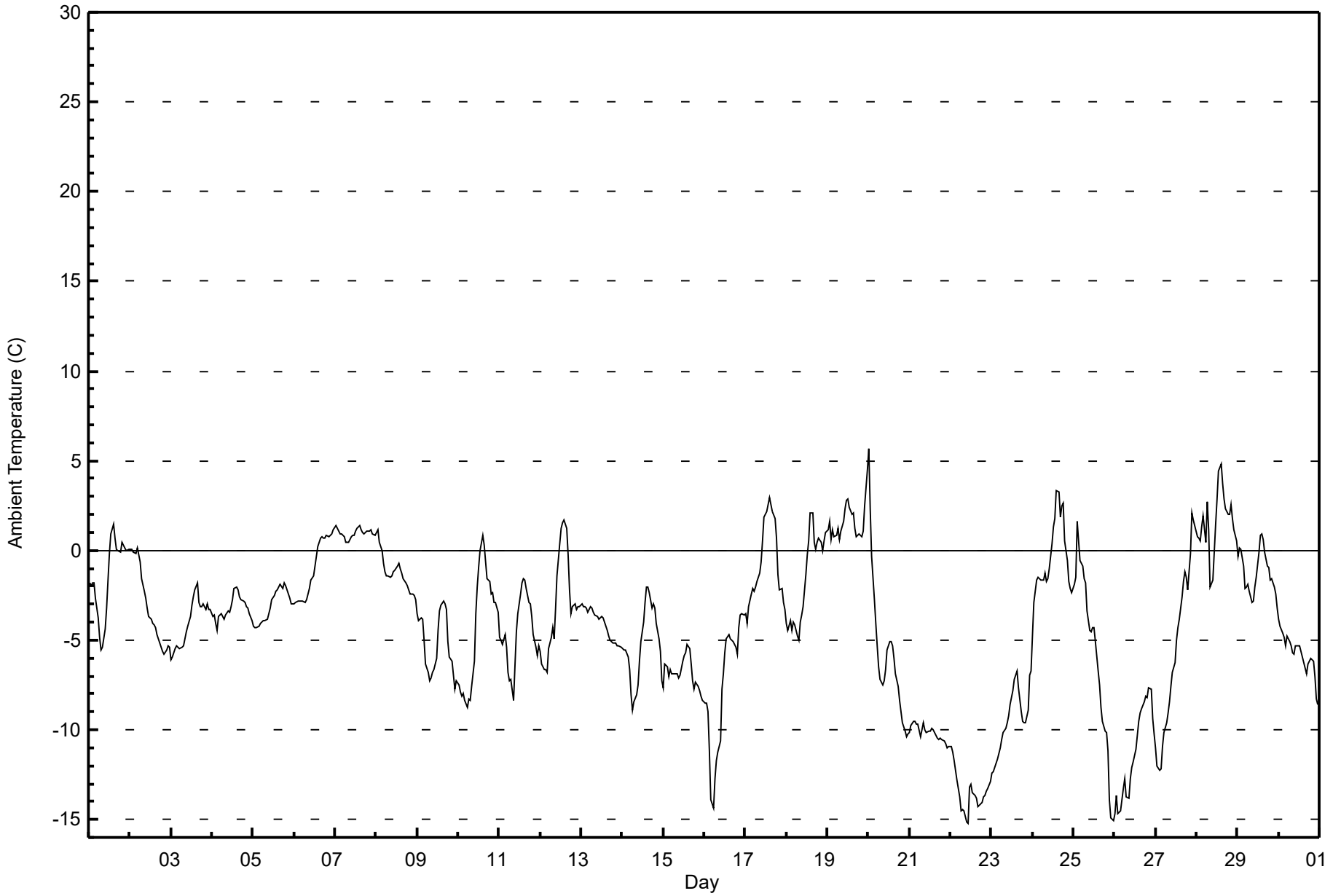
**Ambient Temperature (AT) - C**  
**Fort Hills - November 2023**

Maximum Value: 5.7 C on Nov 20 01:00      Maximum Daily Average: 1.6 C on Nov 28																				Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0						
Minimum Value: -15.3 C on Nov 22 11:00      Minimum Daily Average: -13.5 C on Nov 22 Maximum Diurnal Average: -2.4 C at hour 15      Minimum Diurnal Average: -5.5 C at hour 9 Monthly Average: -4.17 C      Percentiles: P <sub>1</sub> = -14.5 P <sub>10</sub> = -10.3 Q <sub>1</sub> = -6.8 Median = -3.6 Q <sub>3</sub> = -1.3 P <sub>90</sub> = 1.0 P <sub>99</sub> = 2.9																										
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	-1.8	-1.9	-1.8	-1.8	-2.7	-3.8	-4.8	-5.6	-5.4	-4.3	-3.2	-1.6	-0.2	0.9	1.4	0.7	0.1	0.0	-0.1	0.4	0.3	0.1	0.0	0.1	-1.5	1.4
2-Nov	0.1	0.1	-0.1	-0.2	0.2	-0.2	-0.7	-1.6	-2.2	-2.7	-3.2	-3.7	-3.9	-4.1	-4.2	-4.3	-4.7	-5.2	-5.4	-5.6	-5.8	-5.5	-5.3	-5.4	-3.1	0.2
3-Nov	-6.1	-5.9	-5.5	-5.4	-5.4	-5.5	-5.4	-5.3	-4.9	-4.5	-4.2	-3.7	-3.0	-2.6	-2.2	-1.8	-2.9	-3.2	-3.2	-3.0	-3.3	-3.0	-3.3	-3.3	-4.0	-1.8
4-Nov	-3.7	-3.6	-4.1	-4.4	-3.7	-3.5	-3.7	-3.9	-3.6	-3.3	-3.5	-3.1	-2.8	-2.1	-2.0	-2.2	-2.6	-2.8	-2.8	-2.9	-3.1	-3.2	-3.6	-3.9	-3.3	-2.0
5-Nov	-4.2	-4.3	-4.3	-4.3	-4.1	-4.0	-3.9	-4.0	-3.8	-3.5	-3.2	-2.8	-2.5	-2.3	-2.2	-2.1	-1.9	-2.2	-1.8	-2.0	-2.2	-2.7	-3.0	-3.0	-3.1	-1.8
6-Nov	-3.0	-2.9	-2.9	-2.8	-2.8	-2.8	-2.9	-2.8	-2.4	-2.1	-1.6	-1.4	-0.9	-0.4	0.3	0.7	0.7	0.7	0.7	0.9	0.8	0.8	1.0	1.2	-1.0	1.2
7-Nov	1.4	1.2	1.1	0.9	0.9	0.7	0.5	0.5	0.5	0.8	0.8	0.9	1.1	1.3	1.4	1.2	1.0	0.9	1.1	1.1	1.1	1.2	0.9	0.8	1.0	1.4
8-Nov	1.0	1.1	0.4	0.0	-0.7	-1.2	-1.4	-1.4	-1.5	-1.4	-1.2	-1.1	-0.9	-0.7	-1.0	-1.2	-1.6	-1.8	-2.0	-2.2	-2.4	-2.4	-2.5	-2.7	-1.2	1.1
9-Nov	-3.5	-3.9	-3.8	-3.8	-5.0	-6.3	-6.8	-7.3	-7.1	-6.8	-6.6	-6.0	-4.5	-3.3	-3.1	-2.8	-3.0	-3.3	-5.1	-5.9	-6.2	-7.0	-7.7	-7.3	-5.3	-2.8
10-Nov	-7.5	-7.9	-8.1	-8.0	-8.3	-8.8	-8.3	-8.4	-7.6	-6.1	-3.5	-2.0	-0.9	0.0	0.8	0.3	-0.7	-1.6	-1.7	-2.5	-2.4	-2.9	-2.9	-3.4	-4.3	0.8
11-Nov	-4.8	-5.0	-5.3	-4.7	-5.4	-6.8	-7.2	-7.2	-8.4	-6.4	-4.6	-3.5	-2.4	-1.8	-1.6	-1.7	-2.1	-2.9	-3.0	-3.7	-4.7	-5.4	-5.9	-5.3	-4.6	-1.6
12-Nov	-5.6	-6.3	-6.6	-6.6	-6.8	-5.5	-4.8	-4.3	-4.9	-3.3	-1.4	0.4	1.2	1.5	1.7	1.2	-0.3	-2.2	-3.5	-3.1	-3.0	-3.3	-3.2	-3.1	-3.0	1.7
13-Nov	-3.0	-3.1	-3.1	-3.2	-3.4	-3.2	-3.2	-3.5	-3.6	-3.7	-3.9	-3.8	-3.7	-3.8	-4.2	-4.5	-4.7	-5.0	-5.2	-5.2	-5.2	-5.3	-5.3	-5.4	-4.1	-3.0
14-Nov	-5.5	-5.5	-5.6	-5.9	-6.6	-8.0	-8.9	-8.4	-8.0	-7.5	-6.2	-5.1	-4.0	-2.9	-2.0	-2.0	-2.4	-3.2	-2.9	-3.2	-4.1	-4.9	-5.7	-7.3	-5.2	-2.0
15-Nov	-7.6	-6.4	-6.5	-7.1	-6.6	-6.9	-6.9	-6.9	-6.9	-7.1	-6.9	-6.2	-5.8	-5.7	-5.3	-5.4	-6.3	-7.2	-7.8	-7.3	-7.6	-7.8	-8.1	-8.4	-6.9	-5.3
16-Nov	-8.5	-8.5	-9.0	-11.1	-13.9	-14.4	-12.7	-11.7	-11.2	-10.6	-7.8	-6.9	-5.7	-4.9	-4.7	-5.0	-5.0	-5.1	-5.4	-5.8	-4.3	-3.6	-3.5	-3.6	-7.6	-3.5
17-Nov	-3.5	-4.1	-3.1	-2.4	-2.2	-2.3	-2.0	-1.7	-1.3	-0.6	0.6	1.8	2.2	2.5	2.9	2.6	2.2	1.7	0.7	-1.3	-2.2	-2.2	-2.9	-3.3	-0.7	2.9
18-Nov	-4.1	-4.4	-3.9	-4.5	-4.0	-4.2	-4.8	-5.0	-4.0	-3.6	-3.1	-1.3	-0.3	0.6	2.1	2.1	0.4	0.1	0.4	0.7	0.5	0.0	0.6	1.0	-1.6	2.1
19-Nov	1.2	1.6	0.6	1.1	0.8	0.8	1.2	0.6	1.1	1.6	2.3	2.8	2.9	2.4	2.0	2.1	1.3	0.8	0.9	0.8	0.7	1.0	2.5	4.5	1.6	4.5
20-Nov	5.7	2.3	-0.3	-2.8	-4.1	-5.3	-6.5	-7.2	-7.5	-7.3	-6.7	-5.5	-5.1	-5.1	-5.3	-6.0	-6.9	-7.6	-8.4	-9.0	-9.6	-10.1	-10.4	-10.3	-5.8	5.7
21-Nov	-10.1	-9.8	-9.5	-9.5	-9.7	-9.7	-10.4	-10.0	-9.6	-10.0	-10.2	-10.1	-10.1	-9.9	-10.0	-10.3	-10.4	-10.5	-10.5	-10.6	-10.6	-10.8	-11.0	-10.9	-10.2	-9.5
22-Nov	-10.9	-11.2	-11.7	-12.3	-12.8	-13.7	-14.5	-14.5	-14.5	-15.2	-15.3	-13.2	-13.0	-13.5	-13.6	-13.8	-14.3	-14.2	-14.0	-13.8	-13.7	-13.5	-13.3	-12.9	-13.5	-10.9
23-Nov	-12.4	-12.3	-12.1	-11.7	-11.3	-11.0	-10.6	-10.2	-9.9	-9.6	-9.2	-8.6	-7.8	-7.2	-6.9	-6.7	-7.7	-9.0	-9.5	-9.6	-9.6	-8.9	-6.9	-6.7	-9.4	-6.7
24-Nov	-4.8	-2.9	-1.6	-1.5	-1.6	-1.6	-1.7	-1.3	-1.8	-1.6	-1.1	0.4	1.3	1.8	3.4	3.2	1.8	2.5	2.7	0.6	-0.5	-1.7	-2.2	-2.4	-0.4	3.4
25-Nov	-1.9	-1.5	1.7	0.5	-0.6	-0.8	-1.6	-1.8	-3.3	-4.4	-4.5	-4.3	-4.3	-5.1	-6.7	-7.5	-8.8	-9.5	-10.1	-10.1	-11.2	-13.9	-14.9	-15.0	-5.8	1.7
26-Nov	-14.7	-13.7	-14.7	-14.5	-13.9	-13.3	-12.7	-13.7	-13.8	-12.7	-12.1	-11.8	-11.1	-10.3	-9.5	-9.1	-8.8	-8.5	-8.1	-8.2	-7.7	-7.8	-9.4	-10.2	-11.3	-7.7
27-Nov	-11.0	-12.0	-12.3	-12.2	-10.9	-10.2	-9.6	-9.1	-8.5	-7.6	-6.8	-6.2	-5.0	-4.3	-3.8	-2.6	-1.7	-1.2	-1.5	-2.2	-0.2	2.1	1.7	1.4	-5.6	2.1
28-Nov	0.7	0.7	0.5	1.3	2.0	0.5	2.7	1.1	-2.0	-1.6	-0.1	1.4	2.9	4.4	4.8	3.7	2.9	2.3	2.0	2.0	2.6	1.8	1.1	0.5	1.6	4.8
29-Nov	-0.3	0.2	0.1	-0.9	-2.1	-2.0	-1.9	-2.3	-2.9	-2.9	-2.1	-1.5	-0.1	0.8	0.9	0.6	-0.1	-0.9	-1.0	-1.7	-1.6	-2.0	-2.4	-3.2	-1.2	0.9
30-Nov	-3.9	-4.2	-4.6	-4.9	-5.3	-4.7	-5.1	-5.3	-5.7	-5.8	-5.4	-5.4	-5.3	-5.6	-5.9	-6.6	-6.9	-6.4	-6.2	-6.1	-6.2	-7.0	-8.3	-8.6	-5.8	-3.9
																								Diurnal Average		
																								Diurnal Maximum		



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

**Ambient Temperature (AT) - C**  
**Fort Hills - November 2023**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C  
Fort Hills - November 2023**

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	0	0.00	0.00
-20 - 0	580	80.56	80.56
0 - 10	140	19.44	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



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

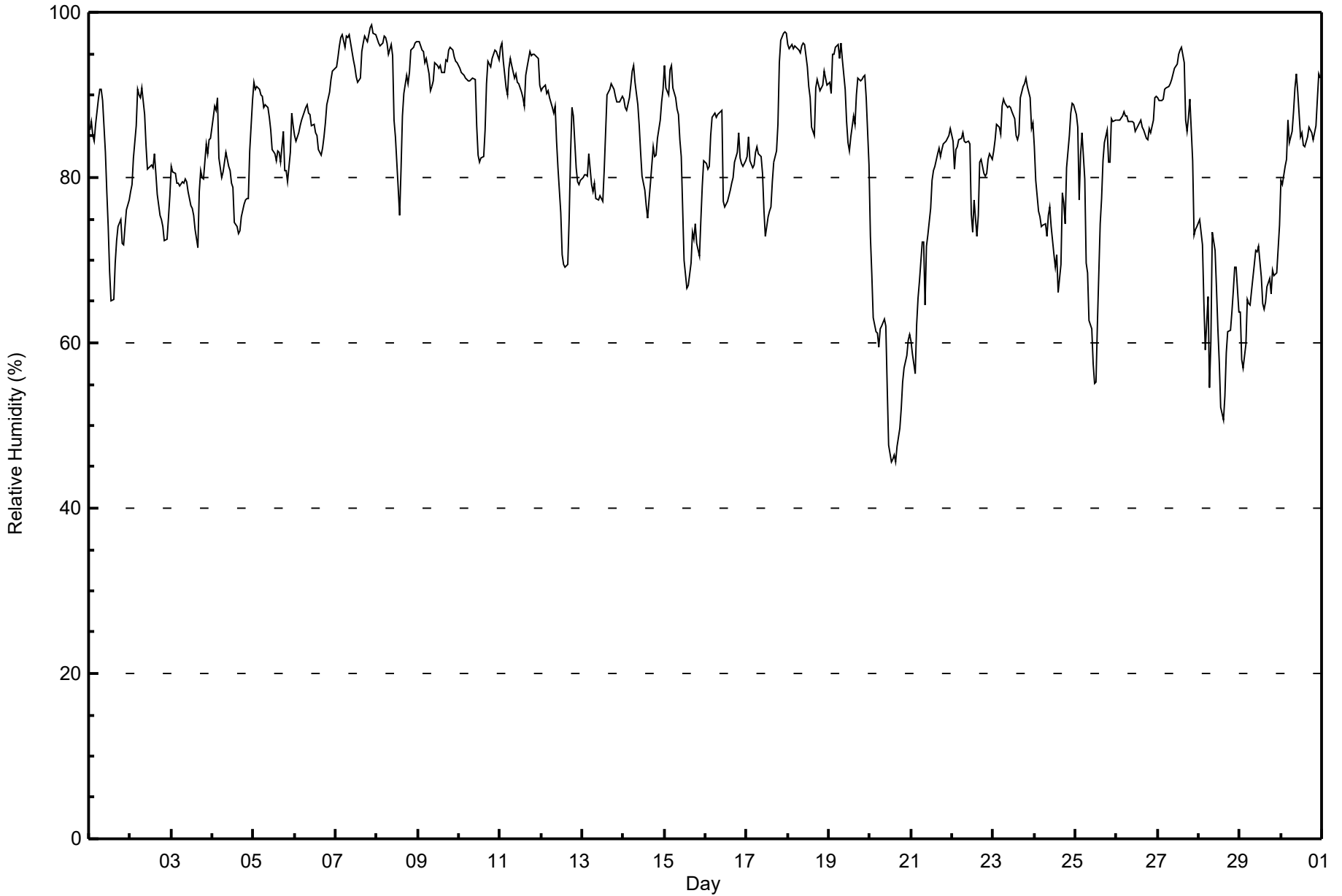
**Relative Humidity (RH) - %**  
**Fort Hills - November 2023**

Maximum Value: 98.5 % on Nov 7 22:00      Maximum Daily Average: 95.7 % on Nov 7																						Hours in Service: 720 Hours of Data: 720																										
Minimum Value: 45.6 % on Nov 20 16:00      Minimum Daily Average: 56.7 % on Nov 20 Maximum Diurnal Average: 85.4 % at hour 24      Minimum Diurnal Average: 77.4 % at hour 14 Monthly Average: 82.82 %      Percentiles: P <sub>1</sub> = 51.0 P <sub>10</sub> = 68.2 Q <sub>1</sub> = 77.3 Median = 84.8 Q <sub>3</sub> = 90.7 P <sub>90</sub> = 94.5 P <sub>99</sub> = 97.2																						Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0																										
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Nov	85.7	86.8	85.2	84.5	86.4	89.5	90.6	90.8	89.4	83.0	78.3	74.1	68.7	65.1	65.3	69.6	72.3	74.0	75.0	72.1	71.8	74.1	76.1	77.3	78.6	90.8																						
2-Nov	78.3	79.1	82.4	86.2	90.7	90.1	89.7	90.8	87.6	84.0	81.1	81.1	81.5	81.2	82.9	80.6	77.9	75.5	75.0	74.0	72.3	72.6	75.1	77.7	81.1	90.8																						
3-Nov	81.4	80.8	80.5	79.2	79.3	79.0	79.5	79.3	79.8	79.4	78.4	76.7	76.3	75.4	73.7	71.5	78.2	80.8	80.1	79.8	84.1	82.9	84.6	84.8	79.4	84.8																						
4-Nov	87.3	88.6	88.2	89.7	82.3	80.0	80.7	81.9	83.1	81.4	80.9	79.3	78.8	74.6	74.1	73.3	73.5	75.3	76.8	77.3	77.5	77.4	83.3	89.3	80.6	89.7																						
5-Nov	91.5	90.6	91.0	90.7	90.1	89.8	88.5	88.7	88.4	87.3	85.7	83.3	82.9	82.0	83.2	83.1	81.9	85.6	80.8	80.8	79.4	83.0	87.7	86.3	85.9	91.5																						
6-Nov	85.1	84.4	85.5	86.3	87.0	87.4	88.4	88.8	87.9	87.6	86.3	86.5	85.5	85.1	83.4	82.8	83.6	85.0	86.7	88.8	90.4	91.9	92.8	93.1	87.1	93.1																						
7-Nov	93.5	94.6	95.9	97.0	97.3	95.8	97.2	97.0	97.2	95.3	94.2	93.5	92.2	91.5	92.0	95.2	96.3	97.1	96.4	97.2	98.1	98.5	97.5	97.3	95.7	98.5																						
8-Nov	96.8	96.2	96.0	96.3	97.0	96.9	96.2	94.9	96.1	94.8	87.0	84.9	78.6	75.5	81.1	87.5	90.1	92.5	91.4	92.7	95.4	95.7	96.2	96.5	91.9	97.0																						
9-Nov	96.4	96.5	95.5	95.3	94.0	94.4	92.5	90.5	91.1	91.7	93.8	93.5	93.2	93.5	92.7	92.7	94.3	94.0	95.5	95.7	95.4	94.5	94.0	93.8	93.9	96.5																						
10-Nov	93.2	92.7	92.5	92.4	92.1	91.7	91.7	91.9	92.0	91.8	86.3	82.7	81.9	82.3	82.5	85.7	91.3	94.1	93.3	94.4	94.9	95.5	95.3	94.2	90.7	95.5																						
11-Nov	95.7	96.3	94.1	90.9	90.1	93.3	94.3	93.6	92.1	92.6	91.5	91.3	90.4	89.7	88.6	92.4	93.4	95.2	94.8	94.9	95.0	94.6	94.4	91.2	92.9	96.3																						
12-Nov	90.5	90.8	91.1	90.1	90.6	89.6	88.5	87.7	88.6	84.4	81.3	75.8	70.6	69.4	69.1	69.5	75.1	82.9	88.5	87.4	81.3	79.5	79.2	79.7	82.5	91.1																						
13-Nov	80.0	80.3	80.3	80.2	82.8	79.1	78.4	79.3	77.5	77.3	77.8	77.4	77.0	80.9	90.0	90.3	90.7	91.3	90.7	89.8	89.2	89.2	89.1	89.8	83.7	91.3																						
14-Nov	89.5	88.5	88.2	89.7	91.1	92.9	93.6	91.4	88.9	86.2	83.1	80.2	78.5	76.6	75.1	77.3	79.4	83.7	82.5	82.8	84.7	86.9	89.2	90.6	85.4	93.6																						
15-Nov	93.6	90.8	90.1	93.0	93.5	90.9	89.6	88.4	87.6	84.7	82.5	70.0	68.3	66.7	67.0	69.6	73.4	72.5	74.5	72.0	70.6	74.9	79.1	82.0	80.2	93.6																						
16-Nov	81.7	81.0	81.4	85.1	87.3	87.9	87.3	87.7	87.8	88.1	77.1	76.5	76.8	77.1	78.5	79.4	80.1	81.8	83.1	85.5	82.4	81.7	81.4	82.1	82.4	88.1																						
17-Nov	82.5	84.8	82.0	81.1	81.6	83.1	83.8	82.8	82.5	80.4	76.1	72.9	75.3	76.0	76.4	79.5	81.8	83.2	86.4	93.9	96.6	97.4	97.6	97.5	84.0	97.6																						
18-Nov	96.2	95.7	96.1	95.6	96.0	95.8	95.3	95.1	96.0	96.2	96.1	93.5	91.0	89.7	86.1	85.2	90.8	91.9	91.2	90.5	91.1	92.9	92.0	91.2	93.0	96.2																						
19-Nov	91.5	90.2	94.9	94.8	95.8	96.1	94.5	96.2	94.3	90.6	86.8	84.2	83.2	85.0	87.5	86.5	90.0	92.1	91.7	91.9	92.3	92.4	89.7	81.6	90.6	96.2																						
20-Nov	72.9	68.3	63.0	61.4	61.1	59.6	61.7	62.0	62.9	62.0	54.5	47.6	45.6	46.0	46.5	45.6	47.5	49.6	52.0	55.3	57.0	58.4	60.3	61.1	56.7	72.9																						
21-Nov	60.2	58.7	56.4	62.3	65.5	67.4	72.1	72.3	64.7	71.6	73.0	76.3	79.7	80.9	81.3	82.8	83.6	82.5	83.4	84.1	84.4	84.7	85.0	85.9	74.9	85.9																						
22-Nov	84.5	81.0	83.3	83.7	84.5	84.8	85.5	84.4	84.3	84.3	84.0	75.6	73.4	77.3	72.9	75.5	81.9	82.2	80.5	80.2	80.6	82.1	82.9	82.1	81.3	85.5																						
23-Nov	83.3	84.6	86.4	86.2	85.2	88.6	89.4	89.1	88.5	88.6	88.5	87.9	87.2	85.1	84.6	85.3	89.7	91.0	91.4	92.0	91.1	89.7	86.0	86.7	87.8	92.0																						
24-Nov	83.8	79.6	76.0	75.2	74.1	74.2	74.4	72.9	75.5	76.5	74.1	70.7	69.2	70.7	66.2	69.5	78.1	76.9	74.4	81.2	85.0	87.8	89.0	88.8	76.8	89.0																						
25-Nov	87.6	86.1	77.2	82.7	85.4	79.9	69.7	68.4	62.6	61.8	57.4	55.1	55.3	62.3	74.5	77.4	82.0	84.2	85.8	81.9	81.9	87.1	86.8	87.0	75.8	87.6																						
26-Nov	87.0	87.0	87.0	87.4	88.0	87.4	87.5	86.8	86.7	86.8	86.6	85.6	86.2	86.6	86.9	86.1	85.7	84.7	84.5	85.9	85.4	87.0	89.7	89.9	86.8	89.9																						
27-Nov	89.6	89.3	89.4	89.5	90.6	90.8	91.0	91.3	91.9	92.6	93.2	93.7	94.8	95.4	95.8	93.9	86.9	85.6	87.3	89.5	82.1	73.0	73.7	74.0	88.5	95.8																						
28-Nov	75.0	73.5	71.9	65.0	59.1	65.6	54.6	60.1	73.5	71.1	66.6	61.6	57.7	52.1	50.8	53.6	58.7	61.4	61.5	63.8	66.3	69.2	69.1	63.7	63.6	75.0																						
29-Nov	63.7	58.0	56.9	59.9	65.2	64.8	64.6	66.3	69.5	71.3	71.0	71.6	68.0	64.8	64.1	64.9	66.8	67.8	65.9	68.8	68.2	68.4	71.4	74.2	66.5	74.2																						
30-Nov	79.7	79.1	81.4	82.1	86.9	84.2	85.6	88.0	90.8	92.6	90.3	84.9	85.4	84.0	83.8	84.8	86.1	85.8	85.5	84.6	86.3	89.5	92.6	92.1	86.1	92.6																						
																								85.2	84.5	84.0	84.4	85.0	85.0	84.5	84.6	84.6	83.9	81.5	78.9	77.8	77.4	77.9	79.0	81.4	82.7	82.9	83.6	83.7	84.4	85.4	85.4	Diurnal Average
																								96.8	96.5	96.1	97.0	97.3	96.9	97.2	97.0	97.2	96.2	96.1	93.7	94.8	95.4	95.8	95.2	96.3	97.1	96.4	97.2	98.1	98.5	97.6	97.5	Diurnal Maximum



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

**Relative Humidity (RH) - %**  
**Fort Hills - November 2023**







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

**Relative Humidity (RH) - %**  
**Fort Hills - November 2023**

<b>Concentration Ranges (%)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	0	0.00	0.00
20 - 40	0	0.00	0.00
40 - 60	28	3.89	3.89
60 - 80	198	27.50	31.39
80 - 100	494	68.61	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



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

**Wind Speed (WS) - km/h**  
**Fort Hills - November 2023**

Maximum Speed: 31 km/h on Nov 25 09:00	Maximum Daily Speed Average: 17.5 km/h on Nov 20	Hours in Service: 720
Minimum Speed Value: 1 km/h on Nov 3 16:00	Minimum Daily Speed Average: 1.6 km/h on Nov 3	Hours of Data: 673
Maximum Diurnal Speed Average: 3.7 km/h at hour 23	Minimum Diurnal Speed Average: 0.6 km/h at hour 5	Hours of Missing Data: 47
Monthly Average Velocity: 2.0 km/h 207.0 deg	Percentiles: P <sub>1</sub> = 2 P <sub>10</sub> = 4 Q <sub>1</sub> = 6 Median = 9 Q <sub>3</sub> = 13 P <sub>90</sub> = 18 P <sub>99</sub> = 26	Percent Operational Time: 93.5

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Nov	SE5	S6	S6	SSW8	S8	S10	SSE7	SSE6	S8	SSE7	SE7	SE8	SE11	SE12	SE11	S10	SSE8	S10	S10	S11	S9	SE9	SE9	SE9	SSE7.9	SE12	
2-Nov	SSE6	ESE5	SE4	NNE5	NNE17	NNE18	N24	N23	N20	N20	NNE23	NNE20	NNE20	NNE15	NE14	NNE16	NNE14	NE14	NE9	NE8	NE5	ESE4	ESE7	SE5	NNE11.4	N24	
3-Nov	NW5	S3	SSE9	SSE12	S9	SSE7	S7	SSE5	SE6	SSE7	SSE5	E2	ENE3	NE2	SSE2	WSW1	NNW3	NNE5	N4	N3	N4	N4	N3	NE2	SSE1.6	SSE12	
4-Nov	N2	SE1	NNW2	NNW1	E4	ESE5	ESE5	ESE3	ENE3	ESE6	ESE6	ESE11	ESE11	E9	ENE10	E10	ENE8	ENE7	ENE7	NE7	NE8	NE9	NE10	NNE10	ENE5.4	ESE11	
5-Nov	NNE12	NNE13	NNE12	NNE12	NNE13	NNE10	NE11	NE9	NE9	NNE8	NE8	NE9	NNE9	NNE7	N8	NNE8	NNE8	NNE7	ESE6	SE9	SSE14	SSE13	SSE8	SSE10	NE6.3	SSE14	
6-Nov	SSE10	SSE11	SSE8	SSE7	SSE7	S6	S6	S8	S10	S10	SSE15	SSE16	S15	S14	SSW12	SSW11	S9	SSW7	SSW7	SSW8	SSW5	S5	SSW6	S7	S8.9	SSE16	
7-Nov	SSW8	SSW8	SSW7	S8	S11	SSW11	S9	S8	S10	SSW9	SW9	SW8	WSW8	SW9	WSW7	SW7	SSW7	S8	SSW12	SSW10	S8	S9	SSW11	SW11	SSW8.5	SSW12	
8-Nov	SW12	WSW12	W13	W9	UO	UO	UO	UO	UO	UO	UO	UO	NNW17	NNW18	NNW17	NNW12	NW6	UO	UO	UO	UO	UO	UO	UO	---	NNW18	
9-Nov	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	---	---	
10-Nov	UO	UO	UO	UO	UO	UO	UO	UO	S5	S10	SSE16	S16	S14	SSW14	SSW12	SSE9	SSE8	SSE11	S9	SSE9	S8	S11	S11	S11	---	SSE16	
11-Nov	S7	SSW6	SSE10	SSE10	S4	NW5	NNW3	SE4	NNW4	N5	NNW6	NNW6	WNW4	S3	S2	SSW5	S5	SSW6	S9	S9	S8	SSE9	S8	S10	S3.5	SSE10	
12-Nov	SSE9	SSE8	S8	S7	S6	SW10	SSW9	SW12	SW15	SW16	WSW20	W20	W18	W13	NNW13	NNW12	NW4	NNE3	NNE2	WNW6	NW10	WNW8	NW8	N6	WSW6.7	W20	
13-Nov	NNE8	N8	NNE6	NNE6	N7	ENE5	E6	ENE8	E7	ENE8	NE11	NE12	NE17	NE17	NNE16	NNE21	N18	NNE18	N20	N19	N15	N17	N15	N13	NNE11.4	NNE21	
14-Nov	N13	N10	N8	NW6	NW2	SSE7	SE12	SSE11	S11	S12	S18	S16	SSW18	SSW17	SW18	SW17	SW15	SSW9	SSW8	SW13	SSW13	S11	S8	SE3	SSW7.6	SSW18	
15-Nov	NNW6	NNE15	NNE13	NNE16	NNE15	NNE16	NNE17	NNE18	N14	NNW6	NNW6	WNW7	WSW6	SSW5	WSW12	WSW9	WNW8	W5	NW12	NW16	WSW2	S6	S8	NNW6.4	NNE18		
16-Nov	SSW10	SW11	SW9	S7	SE10	SE10	SSE9	S7	SSW6	SW4	SSE2	S12	S12	SSW13	SW8	WSW7	SSW7	S8	S9	SSE10	S11	S14	SSW15	SSW17	S8.6	SSW17	
17-Nov	SSW18	SSW15	SW15	SW13	SW17	SW20	SSW20	SSW20	SSW22	SSW22	SSW22	SSW22	SSW20	SSW18	SSW19	SSW21	SW13	SW12	SW13	WSW4	SE7	S7	SE4	SSE7	SE7	SSW13.7	SSW22
18-Nov	SE9	SE7	SE7	SE8	SE8	SE9	SSE6	SSE7	SSE10	SSE12	SSE13	SSE11	SE12	SE17	SSE13	SSE8	SE11	SE8	SE8	SSE10	SSE11	SE7	SE9	S4	SSE9.1	SE17	
19-Nov	SE7	SE7	SSW3	SE3	NW2	N1	ESE3	SW3	SE5	SE6	S5	SW7	SE9	SE7	SSE4	SE3	SE7	S5	SSE6	SSE10	SSE11	SSE12	S11	SW11	SSE5.0	SSE12	
20-Nov	W19	W25	WNW26	WNW22	WNW27	WNW30	WNW26	WNW25	WNW19	W16	W14	WNW14	WNW23	WNW25	WNW23	WNW22	WNW17	WNW12	WNW7	WSW6	SW4	W7	WSW11	WSW9	WNW17.5	WNW30	
21-Nov	W4	NW6	NE2	SSW3	NNW3	SSW3	SW3	NNW5	NE8	NE11	NE11	NE13	N14	N18	NNE19	N20	NNE23	NNE22	NNE19	NNE20	NNE20	NNE19	NNE16	N18	NNE11.0	NNE23	
22-Nov	NNE18	NNE19	NNE16	NNE14	NNE15	NNE15	NNE14	NNE10	NE9	NW5	NW5	SSW1	NNE3	E3	SSE4	SE5	SE6	SSE8	SSE9	SSE8	S9	SSW9	S8	SSE10	NE3.5	NNE19	
23-Nov	SSE9	S8	SSW7	SSE10	S11	S8	SSW8	SSW9	SSW8	SSW10	SSW9	SSW10	S11	SSW12	SSW14	SSW13	S11	SSE10	SSE10	SSE15	SSE14	SSE17	S21	S17	S10.7	S21	
24-Nov	SSW18	SSW25	SSW25	SSW17	SSW19	SW28	SW25	SW14	SW13	SW9	SE8	ESE8	ESE8	ESE7	ESE8	SE8	SW14	SW15	SSW11	SSW14	S8	SSE9	SE11	SSW11.1	SW28		
25-Nov	ESE10	SE5	NNW13	N22	N21	N26	N20	NNW19	NNW31	NNW24	NNW27	NNW20	NNW18	N15	NNE16	NNE11	NE7	NE8	ENE8	NNE9	ENE3	SSW5	SW3	SW2	N11.7	NNW31	
26-Nov	E2	SSE2	SSE4	SE5	SE6	SE4	SSE7	SSE5	SE6	SSE4	S5	S8	S7	SSE9	SSE10	SSE12	S8	N2	SE3	S7	SE9	NNE3	NNW10	N9	SSE3.9	SSE12	
27-Nov	NW5	WSW2	SSE6	SSE7	SSE5	SSW5	SSW6	S6	SSW6	SSW7	SSW9	SSW8	S9	S10	S10	SSW19	SSW17	SSW15	S13	SSE9	WSW13	SW21	SW24	SW18	SSW9.1	SW24	
28-Nov	SW15	SW16	WSW18	WSW14	SW8	S14	SW12	SW9	SE9	SSE9	S13	SSW13	SW16	SW11	WSW8	WSW7	SW11	SW14	SW14	SW11	WSW12	WSW12	WSW10	WSW11	SW10.6	WSW18	
29-Nov	SW8	WNW10	WNW15	WNW5	NW5	WNW9	WNW11	WNW7	W6	WNW7	W7	WSW7	W9	NW13	NW15	NW14	NW14	NNW11	NW14	NW7	WNW7	WNW7	WNW6	NW5	WNW8.5	WNW15	
30-Nov	N5	N6	NNW2	SSE3	N6	NNE8	NNE8	NE3	WSW1	S2	ESE3	NE6	E6	E6	ESE4	SE6	ESE4	SE4	E4	ESE4	S2	WSW2	N2	NW4	ENE2.1	NNE8	

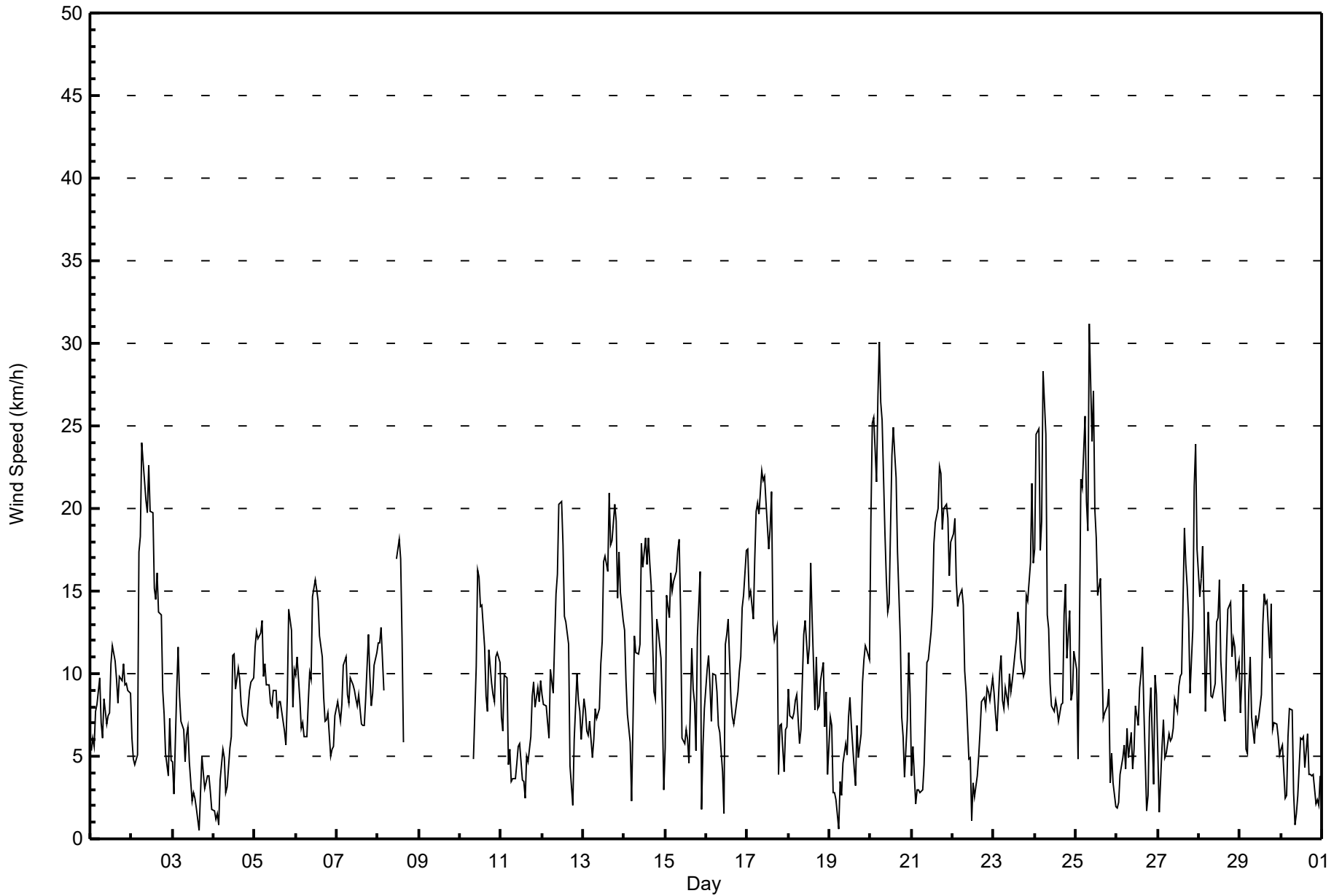
SSW2.3	SW2.6	WSW2.8	SW1.3	WSW0.6	SW1.5	WSW1.3	WSW1.5	SSW1.4	SSW2.3	SSW2.4	SSW2.1	SW1.6	SSW1.7	SW1.7	WSW2.0	SSW1.5	SSW1.6	S2.1	S2.8	S3.2	S3.5	SSW3.7	S3.0	Diurnal Average	
W19	W25	WNW26	N22	WNW27	WNW30	WNW26	WNW25	NNW31	NNW24	NNW27	SSW20	WNW23	WNW25	WNW23	WNW22	NNE23	NNE22	N20	NNE20	NNE20	SW21	SW24	N18	Diurnal Maximum	

UO - Unstable Operation  
 All monthly, daily, and diurnal averages have been calculated using vector methods



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

**Wind Speed (WS) - km/h**  
**Fort Hills - November 2023**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h  
Fort Hills - November 2023**

<b>Wind Speed Ranges (km/h)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	126	18.72	18.72
6 - 11	331	49.18	67.90
12 - 19	166	24.67	92.57
20 - 28	48	7.13	99.70
29 - 38	2	0.30	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 673

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Wind Speed (WS) - km/h  
Fort Hills - November 2023**

<b>Wind Speed Ranges (km/h)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	11	6	5	4	5	10	16	12	13	9	6	6	2	2	11	8	126
6 - 11	9	16	18	8	6	10	41	56	69	37	17	13	5	13	6	7	331
12 - 19	11	33	6	0	0	0	4	15	13	25	25	7	6	7	7	7	166
20 - 28	10	8	0	0	0	0	0	0	1	9	5	1	2	9	0	3	48
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	2
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	41	63	29	12	11	20	61	83	96	80	53	27	15	32	24	26	673

Total Number of Valid Hours: 673

Total Number of Hours: 720





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

**Wind Speed (WS) - km/h**  
**Fort Hills - November 2023**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 8 km/h on Nov 25 09:00	Hours of Data: 673
Minimum Value: 0 km/h on Nov 6 23:00	Hours of Missing Data: 47
Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 1 Q <sub>1</sub> = 1 Median = 2 Q <sub>3</sub> = 3 P <sub>90</sub> = 4 P <sub>99</sub> = 7	Hours of Calibration: 0
	Percent Operational Time: 93.5

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

UO - Unstable Operation



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

**Wind Direction (WD) - deg**  
**Fort Hills - November 2023**

Direction of Maximum Speed: 341 deg on Nov 25 09:00	Hours in Service: 720
Direction of Maximum Daily Speed Average: 286.1 deg on Nov 20	Hours of Data: 673
Direction of Minimum Speed: 249 deg on Nov 3 16:00	Hours of Missing Data: 47
Direction of Minimum Daily Speed Average: 1.6 deg on Nov 3	Percent Operational Time: 93.5
Monthly Average Direction: 207.0 deg	

Day	Hourly Period Ending At (MST)																								Daily Average	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	136	173	181	203	189	181	154	154	169	165	143	131	125	131	135	176	167	169	173	179	173	146	129	133	158.2	
2-Nov	150	114	128	15	19	15	9	7	9	9	13	17	20	31	35	29	32	36	37	49	55	108	114	132	26.4	
3-Nov	306	188	168	164	189	160	175	147	144	166	154	87	61	36	152	249	334	15	2	354	355	7	1	38	149.0	
4-Nov	355	141	344	347	101	110	116	102	64	112	102	122	118	85	76	81	78	72	66	54	47	40	40	22	77.0	
5-Nov	25	18	15	17	31	22	37	36	36	31	37	37	30	21	3	14	25	23	112	143	149	151	147	149	44.8	
6-Nov	147	156	153	162	161	175	180	177	184	188	167	167	175	170	194	195	191	193	194	196	198	189	199	187	177.4	
7-Nov	196	199	207	186	191	206	187	190	175	194	222	236	237	228	245	217	193	185	201	202	190	186	208	218	203.5	
8-Nov	230	253	281	274	UO	UO	UO	UO	UO	UO	UO	UO	332	338	339	337	323	UO	UO	UO	UO	UO	UO	UO	--	
9-Nov	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	--	
10-Nov	UO	UO	UO	UO	UO	UO	UO	UO	UO	191	173	162	175	185	197	192	162	163	165	172	163	170	177	173	171	--
11-Nov	169	204	155	147	171	320	333	140	336	350	348	328	295	174	187	209	183	210	180	170	174	165	174	169	181.4	
12-Nov	151	154	170	187	177	225	209	228	215	228	251	275	280	278	289	292	325	21	20	283	307	300	311	350	254.8	
13-Nov	13	359	16	19	349	64	80	73	88	76	48	46	44	40	28	17	6	12	10	7	359	11	9	6	23.3	
14-Nov	6	7	359	322	305	162	139	153	171	169	188	186	196	202	215	228	234	212	206	222	206	185	190	125	198.4	
15-Nov	334	15	14	14	20	12	16	13	12	357	338	330	299	258	209	241	243	282	259	321	317	251	170	176	344.6	
16-Nov	198	214	215	182	138	134	155	173	193	230	166	178	187	203	229	243	209	183	172	158	187	186	201	203	189.2	
17-Nov	206	206	234	227	220	219	213	212	206	205	204	201	197	202	213	224	235	233	239	135	171	140	147	132	208.1	
18-Nov	144	143	136	140	133	146	165	164	166	157	154	150	144	144	160	147	134	139	142	148	168	145	143	171	149.0	
19-Nov	135	139	202	137	319	7	118	232	144	141	176	214	130	127	150	125	133	191	152	149	147	151	191	228	159.0	
20-Nov	278	279	287	297	283	289	288	288	287	280	280	288	295	301	302	295	292	289	290	249	227	267	256	250	286.1	
21-Nov	272	307	54	202	344	201	233	348	54	56	44	35	8	10	17	11	12	18	12	15	16	13	12	10	15.0	
22-Nov	15	15	17	17	26	32	28	16	44	322	315	204	14	93	148	143	140	157	162	165	190	195	172	164	46.6	
23-Nov	155	188	201	155	183	190	208	209	194	193	209	201	185	199	199	207	186	168	155	154	153	160	182	173	181.7	
24-Nov	198	211	210	205	211	225	229	221	230	216	138	130	120	136	115	116	142	217	236	211	198	171	156	125	198.6	
25-Nov	120	128	345	6	6	1	355	341	341	341	343	347	337	6	17	20	40	51	58	31	61	208	225	223	359.6	
26-Nov	95	165	167	136	128	136	157	161	128	167	181	181	172	155	161	158	171	4	124	188	132	31	347	349	152.3	
27-Nov	313	256	161	149	163	202	196	187	201	205	208	209	185	183	188	195	210	204	170	164	237	232	236	233	205.5	
28-Nov	229	234	237	252	235	171	221	232	143	160	183	210	235	222	246	241	230	231	231	224	246	254	243	256	225.8	
29-Nov	220	283	294	300	306	298	303	284	280	291	277	247	280	310	309	305	324	327	317	314	290	294	292	322	298.2	
30-Nov	350	353	333	148	10	31	19	43	257	176	123	49	81	100	120	137	115	130	101	105	173	238	355	318	62.6	

200.2 230.9 245.5 227.5 247.2 236.2 239.6 241.9 200.5 203.1 197.5 207.3 218.4 199.4 228.3 237.1 210.7 202.8 179.6 170.4 189.2 185.1 194.2 189.8

Diurnal Average

UO - Unstable Operation

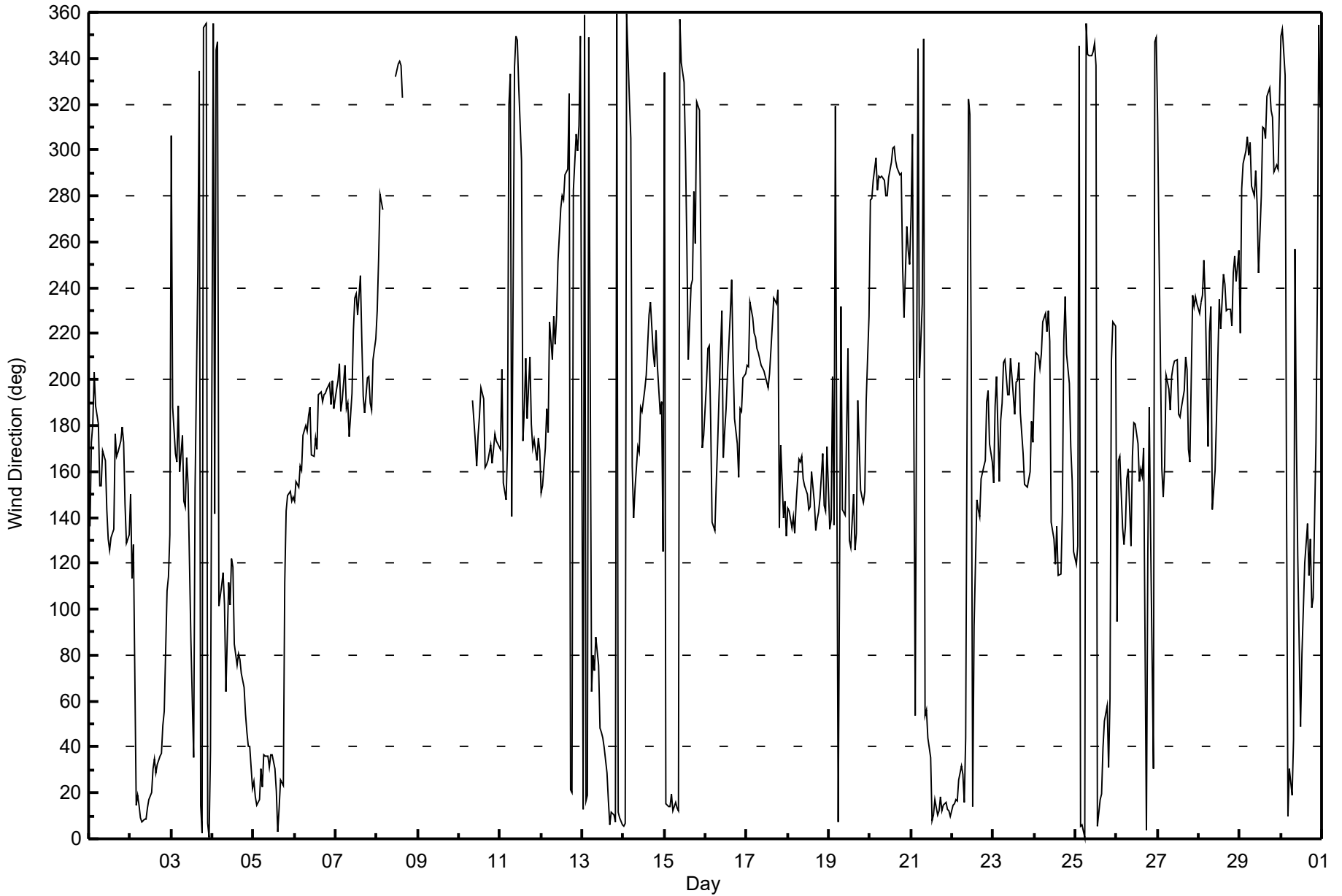
All monthly, daily, and diurnal averages have been calculated using vector methods





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

**Wind Direction (WD) - deg**  
**Fort Hills - November 2023**





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

**Wind Direction (WD) - deg**  
**Fort Hills - November 2023**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 90 deg on Nov 19 06:00	Hours of Data: 673
Minimum Value: 5 deg on Nov 23 20:00	Hours of Missing Data: 47
Percentiles: P <sub>1</sub> = 6 P <sub>10</sub> = 9 Q <sub>1</sub> = 10 Median = 13 Q <sub>3</sub> = 20 P <sub>90</sub> = 40 P <sub>99</sub> = 81	Hours of Calibration: 0
	Percent Operational Time: 93.5

Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Nov	14	29	27	8	12	11	19	17	13	25	16	19	10	11	8	14	17	18	13	11	16	14	12	15	29
2-Nov	23	23	28	63	9	10	11	13	13	14	12	11	9	12	13	11	13	11	22	11	14	26	24	54	63
3-Nov	16	58	8	14	22	17	19	16	9	18	27	62	57	67	75	89	46	9	21	37	23	17	40	64	89
4-Nov	52	70	81	88	33	21	16	50	36	20	24	19	20	20	15	17	19	19	14	9	9	10	10	88	
5-Nov	9	10	11	11	13	13	12	10	11	12	11	12	11	16	11	13	15	28	23	12	7	7	7	9	28
6-Nov	10	8	14	11	9	10	11	10	9	9	11	11	11	9	11	10	11	9	7	8	11	9	8	8	14
7-Nov	7	8	12	9	11	8	9	10	7	13	12	11	12	10	13	8	11	9	11	13	9	10	11	7	13
8-Nov	7	12	11	15	UO	UO	UO	UO	UO	UO	UO	UO	11	10	10	11	12	UO	UO	UO	UO	UO	UO	UO	15
9-Nov	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	--
10-Nov	UO	UO	UO	UO	UO	UO	UO	UO	UO	17	15	7	7	8	7	8	21	14	5	9	6	5	6	9	21
11-Nov	10	10	26	13	55	28	56	59	28	29	16	20	44	48	59	28	34	10	13	18	11	7	12	20	59
12-Nov	14	14	15	20	23	9	11	11	6	9	8	16	12	16	15	14	78	67	62	22	20	20	20	18	78
13-Nov	10	12	18	15	15	33	20	15	20	19	10	9	9	11	12	10	12	11	10	12	14	10	10	10	33
14-Nov	11	15	23	14	58	9	7	10	9	12	11	11	9	10	10	9	12	15	8	8	19	42	49	58	
15-Nov	32	9	14	10	12	10	9	9	11	15	15	14	19	22	38	8	16	14	15	33	12	64	18	18	64
16-Nov	15	8	8	26	13	14	28	16	11	23	65	13	12	10	15	10	14	10	18	24	12	14	12	14	65
17-Nov	7	9	15	14	9	6	7	7	7	7	7	7	7	7	8	11	11	10	73	20	18	28	23	13	73
18-Nov	11	9	13	15	7	6	13	18	20	7	7	12	9	10	9	28	9	20	20	14	9	22	9	43	43
19-Nov	18	39	63	58	64	90	55	49	17	13	33	20	15	15	23	20	20	30	14	13	17	12	14	24	90
20-Nov	18	14	15	16	13	11	10	12	19	14	16	17	17	13	13	12	12	12	21	20	61	28	13	19	61
21-Nov	58	29	71	70	38	80	52	36	25	12	9	14	12	10	9	11	11	9	12	11	9	9	11	11	80
22-Nov	12	11	9	9	16	12	13	15	21	31	18	89	57	62	22	17	18	14	9	13	7	8	14	10	89
23-Nov	9	14	15	12	12	11	12	8	10	10	7	11	11	10	9	8	9	10	11	5	6	8	10	9	15
24-Nov	14	9	9	10	10	7	14	36	10	14	12	14	17	10	17	17	23	16	12	18	6	24	13	11	36
25-Nov	20	68	15	15	11	15	16	13	12	12	14	14	14	24	8	9	12	12	13	9	88	24	17	48	88
26-Nov	43	54	23	15	21	28	33	25	19	45	20	11	15	10	10	9	20	64	51	18	31	64	12	9	64
27-Nov	34	52	14	16	27	14	12	12	9	9	13	11	9	11	12	9	8	10	11	14	19	8	8	9	52
28-Nov	9	9	9	13	58	21	25	52	18	27	11	25	8	21	35	29	9	10	12	12	9	14	11	12	58
29-Nov	16	37	13	45	54	31	12	11	17	18	32	16	20	14	14	17	14	14	16	11	12	13	19	20	54
30-Nov	27	16	23	45	32	14	13	50	85	82	51	14	20	25	26	22	27	32	28	25	57	40	20	13	85
	58	70	81	88	64	90	56	59	85	82	65	89	57	67	75	89	78	67	73	37	88	64	42	64	

Diurnal Maximum

UO - Unstable Operation



## WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY  
MONITORING PROGRAM  
MONTHLY REPORT

### **AMS25 WASKŌW OHCI PIMÂTISIWIN NOVEMBER 2023**

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

December 22, 2023

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - WASKŌW OHCI PIMĀTISIWIN (AMS25)  
 NOVEMBER 2023

MONTHLY SUMMARY

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	673	31	47	97.78	5.2	0	2	0
H2S(ppb) Average	685	33	35	99.72	1.8	0	0.9	0
Temperature 2 m (C) Average	720	0	0	100	5	0	1.4	0
Relative Humidity (%) Average	720	0	0	100	99.4	-	96.9	-
Wind Speed 10 m (km/h) Average	718	0	2	99.72	19	0	10	0
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 - WASKŌW OHCI PIMĀTISIWIN (AMS25)  
 NOVEMBER 2023

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile						
					Min	P10	Q1	Median	Q3	P90	Max
SO2 (ppb) Average	673	0.39	0.7	-	0	0	0	0.1	0.4	1	5.2
H2S (ppb) Average	685	0.28	0.3	-	0	0.1	0.1	0.1	0.4	0.8	1.8
Temperature 2 m (C) Average	720	-4.39	4.4	-	-17.8	-10.6	-6.7	-3.9	-1.1	0.9	5
Relative Humidity (%) Average	720	84.48	10.4	-	47.8	69.5	78.4	86.2	92.6	96	99.4
Wind Speed 10 m (km/h) Average	718	4.1	3	-	0	1	2	3	5	8	19
Wind Direction 10 m (deg) Average	718	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - WASKŌW OHCI PIMĀTISIWIN (AMS25)

NOVEMBER 2023

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
SO2	07 Nov 2023 12:00	07 Nov 2023 12:00	1	Maintenance - reinitiated daily QA check
SO2	14 Nov 2023 19:00	15 Nov 2023 08:00	14	Unstable Operation - flatline in analyzer output signal
SO2	15 Nov 2023 09:00	15 Nov 2023 09:00	1	Maintenance - analyzer rebooted
H2S	07 Nov 2023 12:00	07 Nov 2023 13:00	2	Maintenance - reinitiated daily QA check
Wind Speed, Wind Direction	09 Nov 2023 02:00	09 Nov 2023 02:00	1	Flat line in sensor output signal
Wind Speed, Wind Direction	22 Nov 2023 17:00	22 Nov 2023 17:00	1	Flat line in sensor output signal



Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 5.2 ppb on Nov 10 04:00	Maximum Daily Average: 2.0 ppb on Nov 10		Hours of Data:	673
Minimum Value: 0.0 ppb on Nov 2 10:00	Minimum Daily Average: 0.0 ppb on Nov 13		Hours of Missing Data:	47
Maximum Diurnal Average: 0.7 ppb at hour 15	Minimum Diurnal Average: 0.2 ppb at hour 23		Hours of Calibration:	31
Monthly Average: 0.39 ppb	Percentiles: P <sub>1</sub> = 0.0 P <sub>10</sub> = 0.0 Q <sub>1</sub> = 0.0 Median = 0.1 Q <sub>3</sub> = 0.4 P <sub>90</sub> = 1.0 P <sub>99</sub> = 4.1		Percent Operational Time:	97.8

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Nov	0.3	0.1	0.1	0.1	0.0	Z	0.3	0.1	0.3	0.3	0.4	0.3	0.7	0.6	1.3	2.2	0.9	0.8	0.7	0.5	0.3	0.3	0.4	0.8	0.5	2.2	
2-Nov	Z	0.8	0.4	0.2	0.1	0.2	0.0	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.8	
3-Nov	0.2	Z	0.7	0.5	0.2	0.1	0.1	0.2	0.1	0.3	0.8	1.3	2.7	3.6	4.1	5.0	3.2	1.4	0.9	0.7	1.0	0.8	0.6	0.4	1.3	5.0	
4-Nov	0.4	0.3	Z	0.3	0.3	0.2	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.4	
5-Nov	0.0	0.0	0.0	Z	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	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	0.1
6-Nov	0.0	0.0	0.0	0.0	0.2	0.4	0.8	1.1	1.6	0.5	1.6	3.8	2.7	2.7	2.1	0.7	0.8	1.2	2.4	0.8	0.4	0.4	0.5	0.7	1.1	3.8	
7-Nov	0.5	0.4	0.4	0.3	0.2	0.2	0.2	0.2	0.2	0.1	0.1	M	0.2	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.1	0.1	0.1	0.0	0.2	0.5	
8-Nov	0.1	0.0	0.1	0.0	0.0	Z	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	0.0	0.1	0.1
9-Nov	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.4	1.1	1.5	0.9	1.4	1.5	0.8	0.7	0.4	0.3	0.5	0.3	0.3	0.2	0.5	1.5	
10-Nov	0.3	Z	2.2	5.2	4.3	0.7	4.2	1.8	2.3	2.7	0.9	2.5	2.7	1.4	1.5	1.5	1.7	1.5	1.3	2.3	1.2	1.0	1.0	1.0	2.0	5.2	
11-Nov	1.9	1.1	Z	1.0	0.6	0.3	0.4	0.3	0.3	0.4	0.4	0.4	0.6	0.9	1.0	0.8	0.6	0.9	0.5	0.4	0.2	0.1	0.1	0.4	0.6	1.9	
12-Nov	0.4	0.1	0.2	Z	0.3	0.2	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.4	
13-Nov	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
14-Nov	0.0	0.0	0.0	0.0	0.0	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.0	0.1	0.0	0.0	UO	UO	UO	UO	UO	UO	0.2	
15-Nov	UO	UO	UO	UO	UO	UO	UO	UO	M	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	--	0.0	
16-Nov	0.1	Z	0.0	0.0	0.1	0.2	0.3	0.6	0.8	1.1	1.3	5.2	4.5	3.1	1.6	1.0	0.5	0.3	0.2	0.3	0.3	0.3	0.2	0.3	1.0	5.2	
17-Nov	0.2	0.2	Z	0.3	0.2	0.2	0.2	0.2	0.1	0.2	0.2	0.3	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.3	
18-Nov	0.3	0.3	0.3	Z	0.8	0.7	0.6	0.5	0.4	0.6	0.9	0.4	0.3	0.3	0.3	0.4	0.7	0.7	0.7	0.5	0.7	0.5	0.3	0.3	0.5	0.9	
19-Nov	0.4	0.3	0.3	0.3	Z	0.5	0.5	0.7	0.6	0.6	0.5	0.5	0.6	0.8	0.9	0.8	0.2	0.3	0.3	0.3	0.3	0.6	0.4	0.2	0.5	0.9	
20-Nov	0.2	0.0	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	
21-Nov	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	C	C	C	C	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	
22-Nov	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1	
23-Nov	0.2	0.2	Z	2.3	2.2	1.4	0.7	0.9	0.7	0.6	0.8	2.0	0.6	0.3	0.8	0.3	0.2	0.4	0.4	0.4	1.0	1.4	0.7	0.8	0.8	2.3	
24-Nov	0.5	0.3	0.2	Z	0.2	0.1	0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.5	
25-Nov	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.2	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	
26-Nov	0.0	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.1	0.1	0.4	0.5	1.0	3.8	4.8	4.1	2.6	1.2	1.0	1.1	0.9	0.4	0.4	1.0	4.8	
27-Nov	Z	0.5	0.4	0.5	0.5	0.5	0.6	0.6	0.7	0.5	0.4	0.7	0.9	1.6	1.9	1.5	0.6	0.6	0.4	0.2	0.1	0.1	0.1	0.0	0.6	1.9	
28-Nov	0.0	Z	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.1	
29-Nov	0.1	0.0	Z	0.2	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.2	
30-Nov	0.1	0.0	0.0	Z	0.1	0.0	0.1	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	

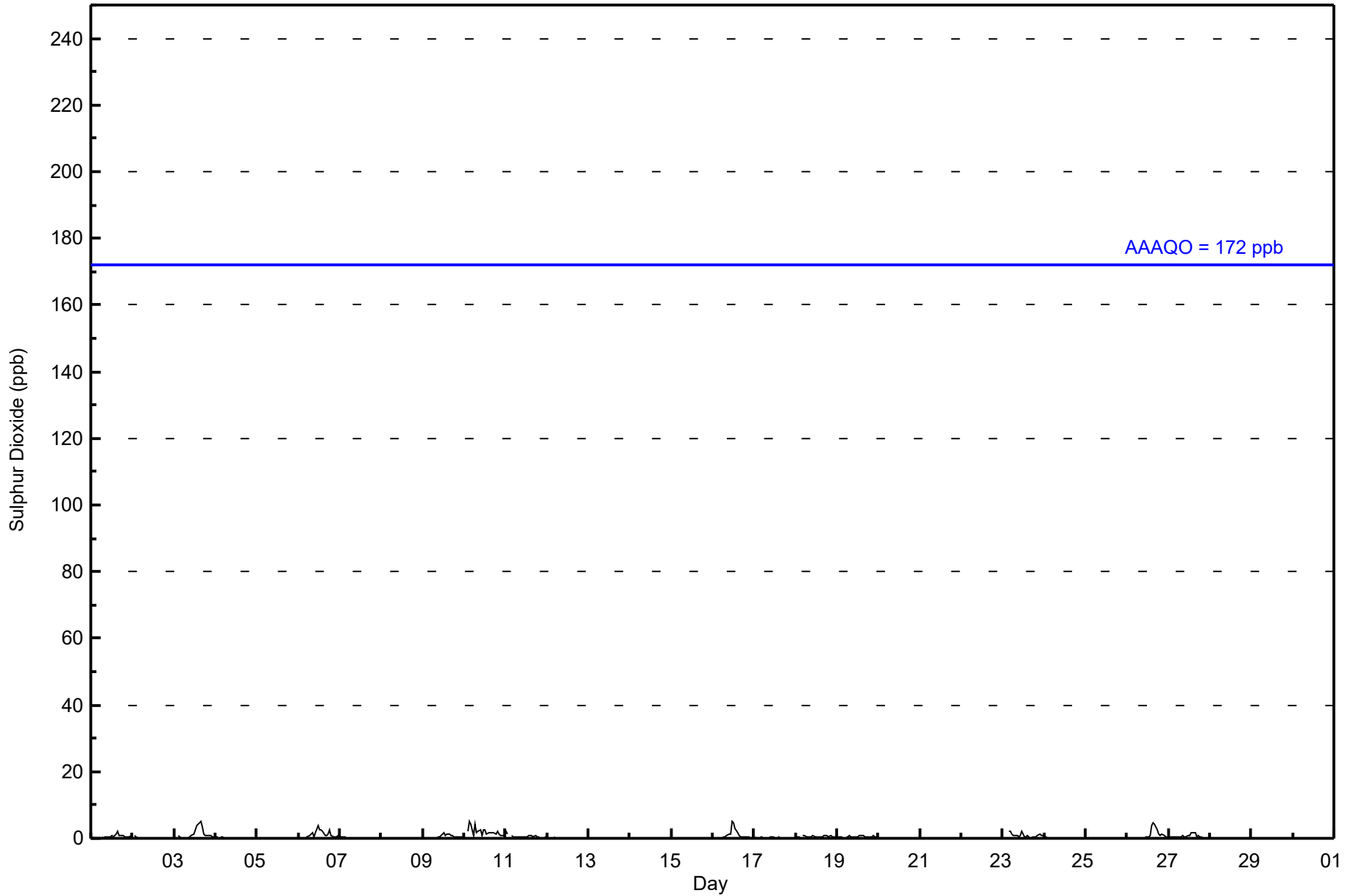
0.2	0.2	0.2	0.5	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.7	0.7	0.6	0.7	0.7	0.5	0.4	0.3	0.3	0.3	0.3	0.2	0.2	Diurnal Average	
1.9	1.1	2.2	5.2	4.3	1.4	4.2	1.8	2.3	2.7	1.6	5.2	4.5	3.6	4.1	5.0	4.1	2.6	2.4	2.3	1.2	1.4	1.0	1.0	Diurnal Maximum		

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



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

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Waskow ohci Pimatisiwin - November 2023**







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

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Waskow ohci Pimatisiwin - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 10	673	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: 673

Total Number of Hours: 720



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

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Waskow ohci Pimatisiwin - November 2023**

<b>Concentration</b> <b>Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	38	31	16	15	20	17	59	138	66	31	35	48	60	46	20	31	671
11 - 20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	38	31	16	15	20	17	59	138	66	31	35	48	60	46	20	31	671

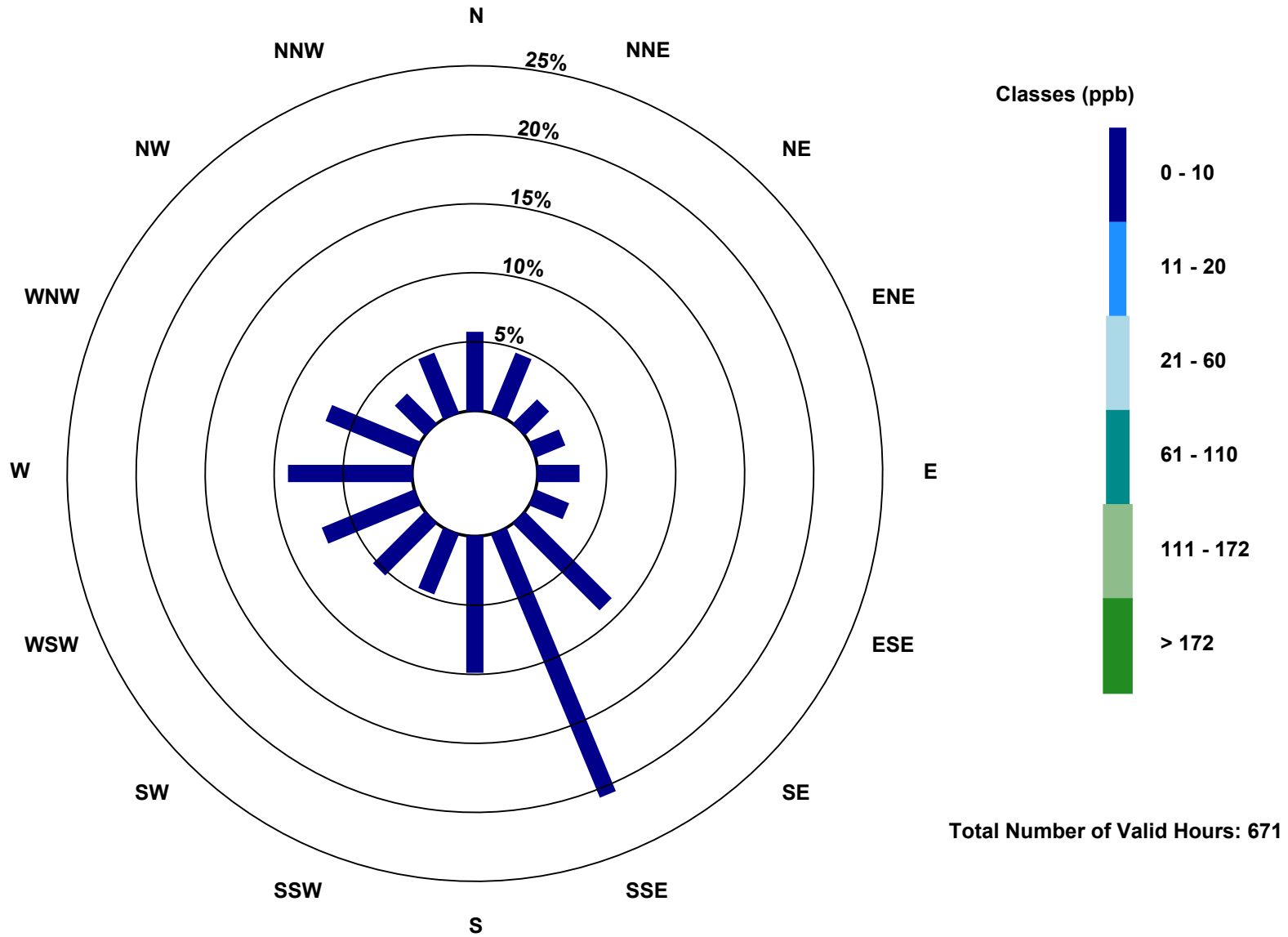
Total Number of Valid Hours: 671

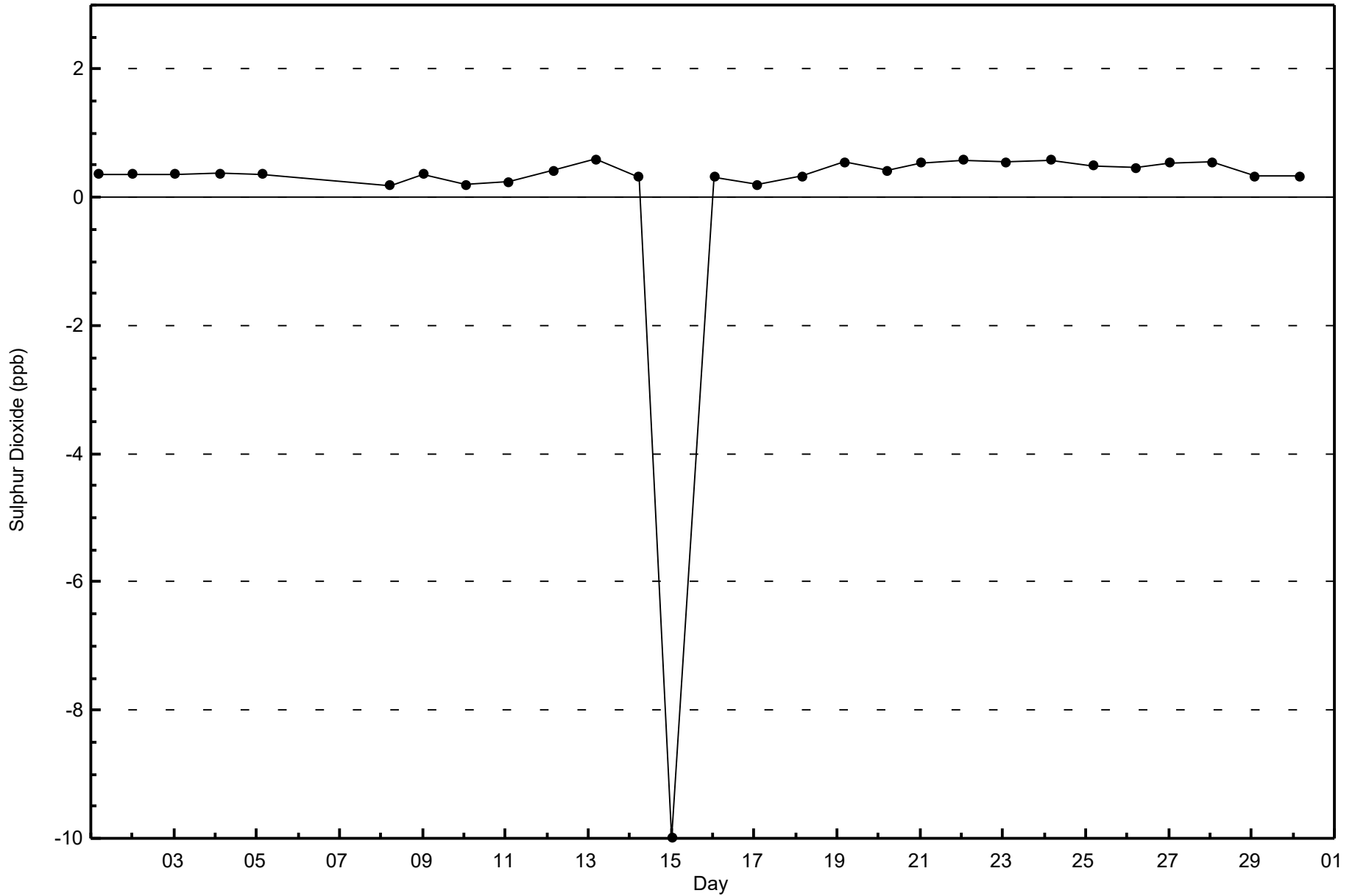
Total Number of Hours: 720

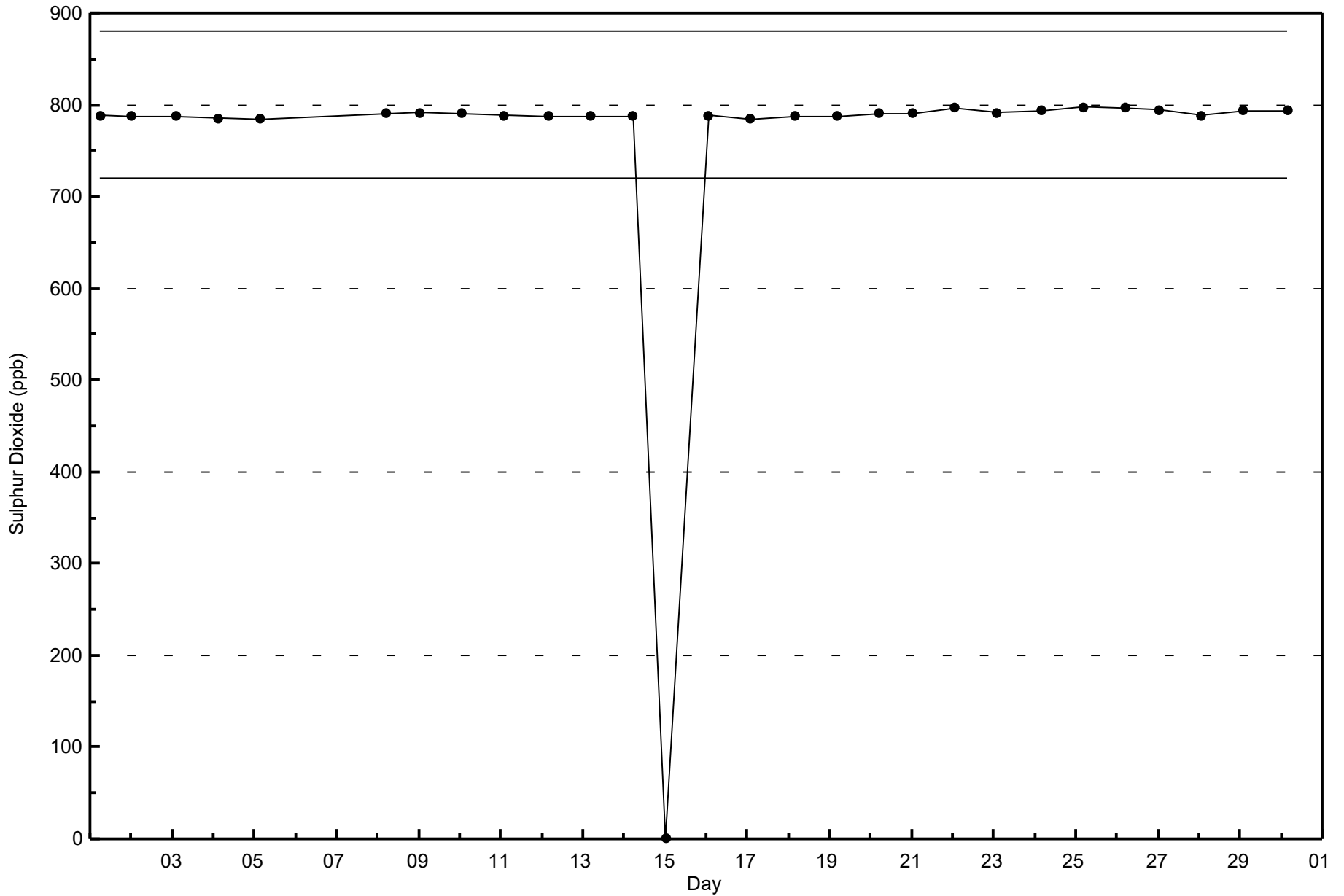


Wood Buffalo Environmental Association  
Wind Rose Nov 2023

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

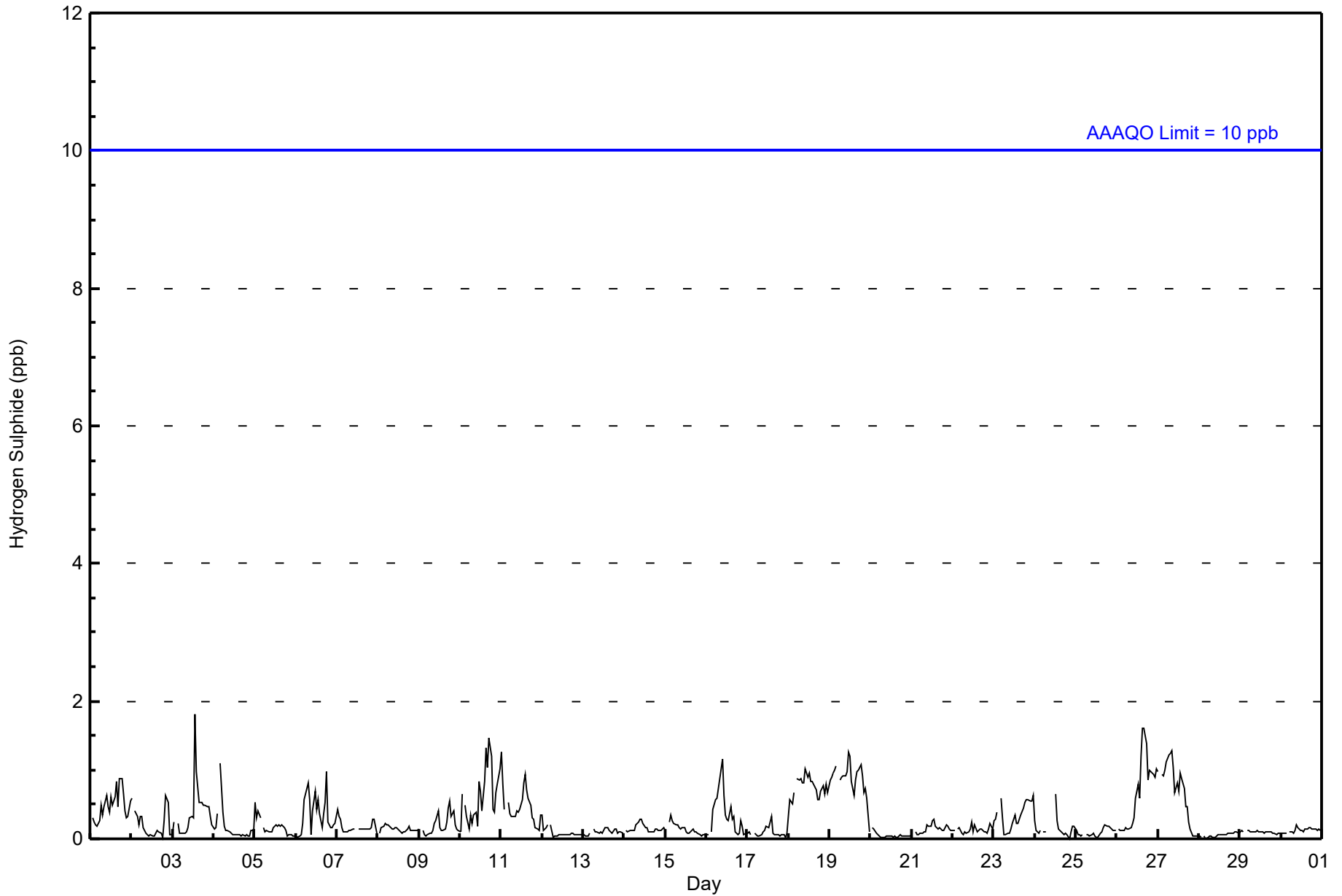








Number of Exceedences (AAAQO):		1-hr: 0		24-hr: 0		Hours in Service: 720														Daily Average		Daily Maximum							
Maximum Value: 1.8 ppb on Nov 3 14:00		Maximum Daily Average: 0.9 ppb on Nov 19		Hours of Data: 685														Daily Average		Daily Maximum									
Minimum Value: 0.0 ppb on Nov 28 05:00		Minimum Daily Average: 0.0 ppb on Nov 20		Hours of Missing Data: 35														Daily Average		Daily Maximum									
Maximum Diurnal Average: 0.3 ppb at hour 14		Minimum Diurnal Average: 0.2 ppb at hour 24		Hours of Calibration: 33														Daily Average		Daily Maximum									
Monthly Average: 0.28 ppb		Percentiles: P <sub>1</sub> = 0.0 P <sub>10</sub> = 0.1 Q <sub>1</sub> = 0.1 Median = 0.1 Q <sub>3</sub> = 0.4 P <sub>90</sub> = 0.8 P <sub>99</sub> = 1.3		Percent Operational Time: 99.7														Daily Average		Daily Maximum									
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24					
1-Nov	Z	0.3	0.3	0.2	0.2	0.3	0.5	0.3	0.5	0.6	0.5	0.4	0.6	0.5	0.6	0.8	0.5	0.9	0.9	0.7	0.4	0.3	0.3	0.5	0.5	0.9			
2-Nov	0.6	Z	0.4	0.3	0.2	0.3	0.3	0.2	0.1	0.1	0.0	0.1	0.0	0.0	0.1	0.1	0.1	0.1	0.0	0.3	0.6	0.5	0.1	0.1	0.2	0.6			
3-Nov	0.1	0.2	Z	0.2	0.1	0.1	0.1	0.1	0.1	0.2	0.3	0.3	0.3	1.8	1.0	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.3	0.2	0.4	1.8			
4-Nov	0.1	0.2	0.4	Z	1.1	0.4	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.0	0.1	0.0	0.0	0.1	0.1	0.1	0.2	1.1			
5-Nov	0.5	0.3	0.4	0.3	Z	0.2	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	0.0	0.0	0.0	0.2	0.5			
6-Nov	0.0	0.0	0.0	0.1	0.2	0.6	0.7	0.8	0.6	0.1	0.4	0.7	0.4	0.6	0.4	0.2	0.4	0.5	1.0	0.2	0.2	0.2	0.2	0.2	0.4	1.0			
7-Nov	0.4	0.3	0.3	0.2	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	0.2	0.3	0.3	0.1	0.2	0.4			
8-Nov	Z	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.2	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	0.2			
9-Nov	0.1	Z	0.1	0.1	0.0	0.1	0.1	0.1	0.1	0.2	0.3	0.4	0.2	0.1	0.1	0.1	0.2	0.4	0.5	0.3	0.4	0.2	0.1	0.1	0.2	0.5			
10-Nov	0.1	0.7	Z	0.5	0.3	0.1	0.3	0.2	0.3	0.4	0.2	0.8	0.7	0.4	0.8	1.3	1.0	1.5	1.2	0.4	0.4	0.7	0.8	1.0	0.6	1.5			
11-Nov	1.3	0.8	0.4	Z	0.5	0.4	0.3	0.3	0.3	0.4	0.4	0.4	0.6	0.8	0.9	0.7	0.6	0.5	0.3	0.3	0.2	0.1	0.1	0.4	0.5	1.3			
12-Nov	0.4	0.1	0.2	0.2	Z	0.2	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	0.4			
13-Nov	0.1	0.0	0.0	0.0	0.1	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2			
14-Nov	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.3	0.3	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.3			
15-Nov	0.1	Z	0.2	0.3	0.3	0.2	0.2	0.2	0.2	0.1	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.1	0.1	0.3			
16-Nov	0.1	0.1	Z	0.1	0.4	0.6	0.6	0.7	0.9	1.2	0.6	0.3	0.3	0.3	0.5	0.3	0.3	0.1	0.1	0.1	0.3	0.2	0.1	0.1	0.3	1.2			
17-Nov	0.1	0.1	0.1	Z	0.1	0.1	0.0	0.0	0.1	0.1	0.1	0.2	0.2	0.2	0.3	0.1	0.1	0.1	0.1	0.0	0.1	0.1	0.0	0.1	0.1	0.3			
18-Nov	0.3	0.6	0.5	0.7	Z	0.9	0.8	0.9	0.8	0.8	1.0	0.9	1.0	0.8	0.8	0.8	0.7	0.6	0.6	0.7	0.8	0.7	0.8	0.7	0.7	1.0			
19-Nov	0.9	0.9	1.0	1.0	1.1	Z	0.9	0.9	0.9	0.9	1.0	1.3	1.2	0.8	0.6	0.9	1.0	1.0	1.1	0.9	0.7	0.7	0.6	0.1	0.9	1.3			
20-Nov	Z	0.2	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2			
21-Nov	0.1	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.3	0.3	0.2	0.1	0.2	0.1	0.1	0.1	0.2	0.2	0.1	0.1	0.1	0.3			
22-Nov	0.1	0.1	Z	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.3	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.1	0.3			
23-Nov	0.3	0.3	0.4	Z	0.6	0.3	0.1	0.1	0.1	0.1	0.1	0.2	0.4	0.2	0.2	0.3	0.3	0.4	0.5	0.6	0.6	0.6	0.6	0.6	0.3	0.6			
24-Nov	0.3	0.1	0.1	0.1	Z	0.1	0.1	C	C	C	C	C	0.7	0.3	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.2	0.2	0.2	0.7			
25-Nov	0.1	0.1	0.1	0.0	0.1	Z	0.1	0.1	0.0	0.1	0.1	0.0	0.0	0.0	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.2			
26-Nov	Z	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.2	0.2	0.3	0.6	0.8	0.6	1.2	1.6	1.6	1.4	0.9	1.0	1.0	0.9	0.9	1.0	0.7	1.6			
27-Nov	1.0	Z	0.9	0.9	1.0	1.1	1.2	1.3	1.3	1.0	0.7	0.8	0.7	1.0	0.9	0.7	0.5	0.5	0.2	0.1	0.0	0.0	0.0	0.0	0.7	1.3			
28-Nov	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	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-Nov	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			
30-Nov	0.1	0.1	0.1	0.1	Z	0.1	0.1	0.1	0.1	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2			
																								Diurnal Average			Diurnal Maximum		
																								0.3 0.2 0.3 0.2 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.2 0.2 0.2			1.3 0.9 1.0 1.0 1.1 1.1 1.2 1.3 1.3 1.2 1.0 1.3 1.2 1.8 1.2 1.6 1.6 1.5 1.2 1.0 1.0 0.9 0.9 1.0		
Z - zerospan      C - Calibration      M - Maintenance																													
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 10 ppb    24-hr 3 ppb																													





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

**Hydrogen Sulphide (H<sub>2</sub>S) - ppb**  
**Waskow ohci Pimatisiwin - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2	685	100.00	100.00
3 - 4	0	0.00	100.00
5 - 7	0	0.00	100.00
8 - 11	0	0.00	100.00
> 11	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720





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

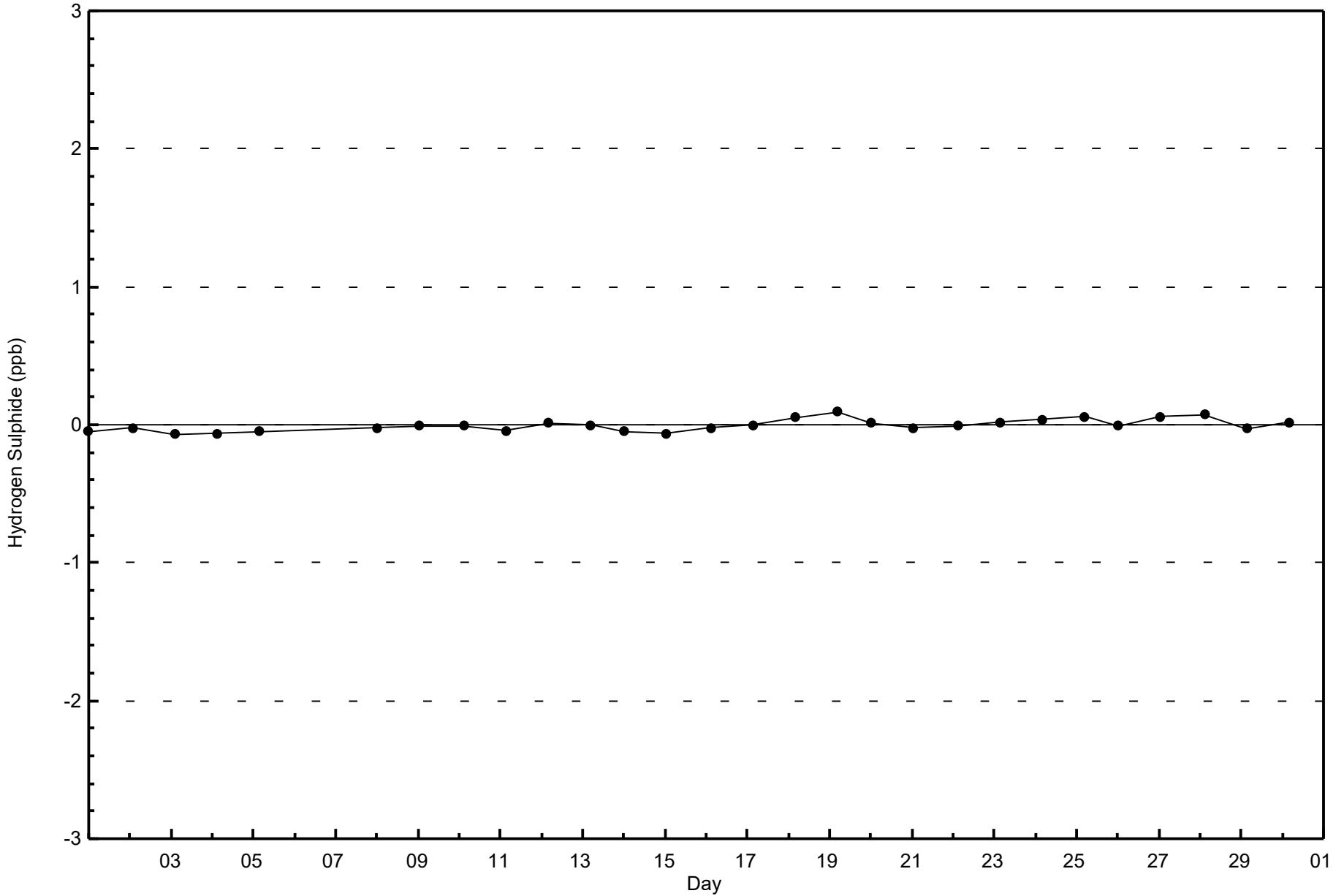
**Hydrogen Sulphide (H<sub>2</sub>S) - ppb**  
**Waskow ohci Pimatisiwin - November 2023**

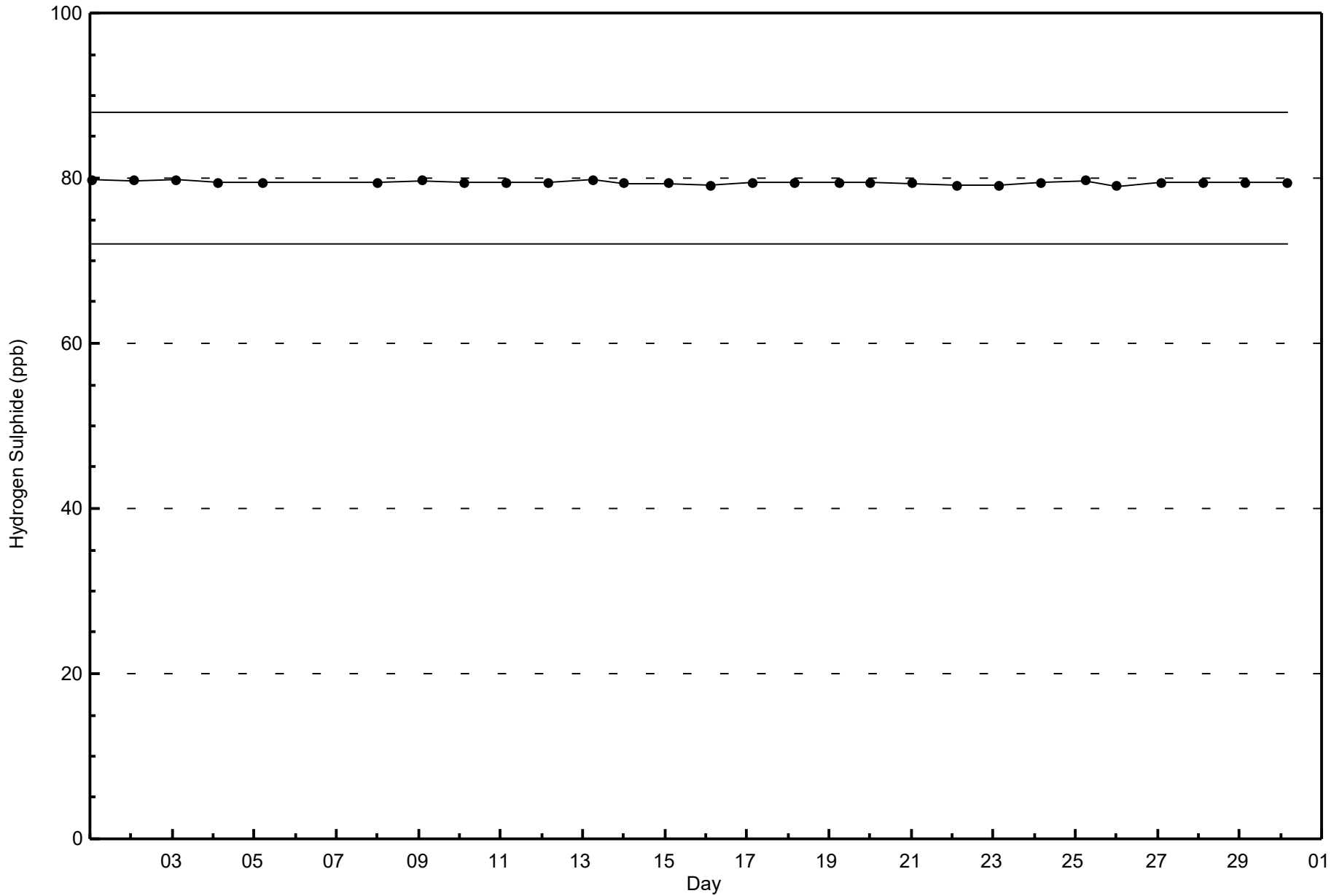
Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	43	31	18	15	20	16	58	144	63	32	34	48	61	48	21	32	684
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	43	31	18	15	20	16	58	144	63	32	34	48	61	48	21	32	684

Total Number of Valid Hours: 684

Total Number of Hours: 720







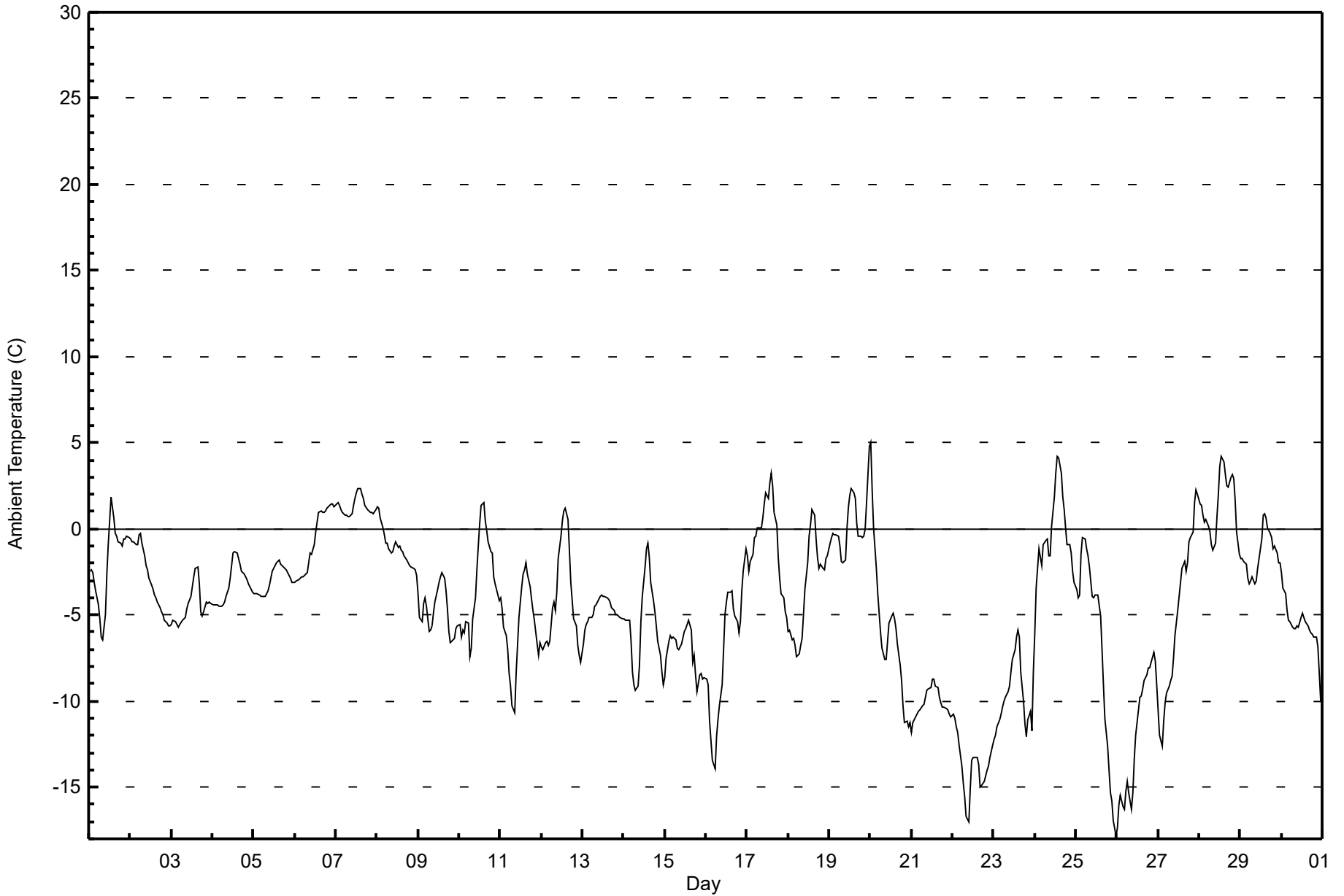


Maximum Value: 5.0 C on Nov 20 01:00      Maximum Daily Average: 1.4 C on Nov 28																						Hours in Service: 720 Hours of Data: 720				
Minimum Value: -17.8 C on Nov 26 00:00      Minimum Daily Average: -13.8 C on Nov 22																						Hours of Missing Data: 0 Hours of Calibration: 0				
Maximum Diurnal Average: -2.1 C at hour 15      Minimum Diurnal Average: -5.7 C at hour 9																						Percent Operational Time: 100.0				
Monthly Average: -4.39 C      Percentiles: P <sub>1</sub> = -16.1 P <sub>10</sub> = -10.6 Q <sub>1</sub> = -6.7 Median = -3.9 Q <sub>3</sub> = -1.1 P <sub>90</sub> = 0.9 P <sub>99</sub> = 3.3																										
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	-2.5	-2.4	-2.5	-3.1	-3.6	-4.4	-5.2	-6.3	-6.5	-5.0	-2.6	-0.9	0.5	1.9	0.6	-0.3	-0.4	-0.8	-0.8	-1.0	-0.6	-0.6	-0.4	-0.5	-2.0	1.9
2-Nov	-0.6	-0.8	-0.7	-0.9	-0.9	-0.3	-0.3	-0.9	-1.6	-2.2	-2.4	-2.9	-3.3	-3.5	-3.8	-4.0	-4.2	-4.6	-4.8	-5.0	-5.3	-5.5	-5.7	-5.6	-2.9	-0.3
3-Nov	-5.6	-5.3	-5.4	-5.6	-5.7	-5.6	-5.3	-5.2	-5.1	-4.7	-4.3	-3.9	-3.4	-2.8	-2.3	-2.2	-3.2	-4.9	-5.1	-4.8	-4.2	-4.4	-4.3	-4.3	-4.5	-2.2
4-Nov	-4.4	-4.4	-4.4	-4.4	-4.5	-4.5	-4.4	-4.3	-3.9	-3.4	-2.8	-2.1	-1.4	-1.3	-1.4	-1.7	-2.1	-2.5	-2.7	-2.8	-3.0	-3.2	-3.4	-3.7	-3.2	-1.3
5-Nov	-3.8	-3.8	-3.8	-3.8	-3.9	-3.9	-3.9	-3.9	-3.6	-3.3	-2.9	-2.4	-2.1	-1.9	-1.9	-1.8	-2.0	-2.2	-2.3	-2.4	-2.5	-2.9	-3.1	-3.1	-3.0	-1.8
6-Nov	-3.1	-3.0	-2.9	-2.9	-2.8	-2.8	-2.6	-2.5	-2.0	-1.4	-1.5	-0.9	-0.2	0.4	0.9	1.0	0.9	1.0	1.0	1.2	1.4	1.4	1.4	1.3	-0.7	1.4
7-Nov	1.5	1.5	1.4	1.1	0.9	0.8	0.8	0.7	0.7	0.9	1.4	1.7	2.1	2.3	2.4	2.1	1.7	1.3	1.1	1.0	1.0	1.0	0.9	1.1	1.3	2.4
8-Nov	1.3	1.2	0.6	0.1	-0.3	-0.8	-0.9	-1.1	-1.4	-1.4	-1.0	-0.8	-1.0	-1.0	-1.2	-1.3	-1.5	-1.8	-2.0	-2.1	-2.2	-2.3	-2.4	-2.7	-1.1	1.3
9-Nov	-3.8	-5.1	-5.4	-4.4	-4.0	-4.5	-6.0	-5.9	-5.6	-4.9	-4.3	-3.5	-3.1	-2.8	-2.5	-2.8	-3.6	-4.7	-5.9	-6.6	-6.4	-6.3	-5.8	-5.7	-4.7	-2.5
10-Nov	-5.6	-6.3	-5.9	-6.1	-5.4	-5.4	-7.4	-6.9	-5.2	-4.0	-2.3	-1.0	0.3	1.4	1.5	0.4	-0.1	-0.8	-1.3	-1.4	-2.8	-3.2	-3.5	-4.1	-3.1	1.5
11-Nov	-4.0	-4.7	-5.7	-6.2	-7.0	-8.4	-9.2	-10.3	-10.6	-8.4	-6.8	-5.2	-3.3	-2.6	-2.4	-2.0	-2.6	-3.4	-4.1	-4.7	-5.3	-6.7	-7.4	-6.6	-5.7	-2.0
12-Nov	-6.9	-7.0	-6.6	-6.5	-6.7	-6.5	-4.6	-4.2	-4.7	-3.7	-1.7	-0.4	0.5	1.0	1.2	0.6	-1.2	-3.1	-4.2	-5.2	-5.6	-6.8	-7.4	-7.7	-4.1	1.2
13-Nov	-6.7	-5.9	-5.6	-5.4	-5.1	-5.1	-4.9	-4.5	-4.4	-4.1	-3.9	-3.9	-3.9	-4.0	-4.0	-4.1	-4.2	-4.6	-4.7	-5.0	-5.0	-5.1	-5.2	-5.2	-4.8	-3.9
14-Nov	-5.2	-5.3	-5.3	-5.3	-6.5	-8.3	-9.0	-9.4	-9.1	-7.9	-5.4	-3.9	-2.2	-1.2	-0.8	-1.6	-3.1	-4.2	-4.8	-5.6	-6.5	-7.4	-8.3	-9.0	-5.6	-0.8
15-Nov	-8.7	-7.5	-6.6	-6.2	-6.4	-6.3	-6.5	-7.0	-7.0	-6.9	-6.7	-6.0	-5.8	-5.6	-5.3	-5.9	-7.8	-7.4	-8.5	-9.4	-8.4	-8.4	-8.7	-8.7	-7.1	-5.3
16-Nov	-8.8	-9.0	-11.2	-12.3	-13.5	-13.9	-12.1	-11.1	-10.3	-9.1	-7.0	-5.0	-4.3	-3.7	-3.7	-3.6	-4.7	-5.0	-5.4	-6.1	-5.4	-3.6	-2.5	-1.1	-7.2	-1.1
17-Nov	-1.6	-2.5	-1.9	-1.5	-0.5	-0.4	0.0	0.0	0.0	0.6	1.5	2.1	1.8	2.6	3.3	2.5	1.0	0.2	-1.6	-2.8	-3.8	-4.0	-4.8	-5.1	-0.6	3.3
18-Nov	-5.9	-5.9	-6.5	-6.4	-6.8	-7.5	-7.2	-6.7	-6.4	-5.0	-3.5	-2.0	-0.5	0.2	1.2	0.8	-0.6	-1.6	-2.3	-2.0	-2.3	-2.4	-1.8	-1.6	-3.4	1.2
19-Nov	-0.9	-0.5	-0.2	-0.3	-0.3	-0.4	-1.0	-1.9	-2.0	-1.8	0.0	1.2	1.9	2.4	2.1	1.7	0.3	-0.4	-0.4	-0.5	-0.4	0.0	1.6	4.8	0.2	4.8
20-Nov	5.0	2.2	0.1	-2.3	-3.7	-4.9	-6.0	-6.9	-7.6	-7.6	-6.5	-5.4	-5.1	-4.9	-5.2	-5.8	-6.7	-7.9	-8.8	-10.3	-11.3	-11.2	-11.5	-11.3	-6.0	5.0
21-Nov	-11.8	-11.2	-10.9	-10.8	-10.6	-10.6	-10.3	-10.2	-9.8	-9.4	-9.3	-9.2	-8.8	-8.8	-9.1	-9.2	-9.8	-10.1	-10.4	-10.4	-10.4	-10.5	-10.8	-10.9	-10.1	-8.8
22-Nov	-10.8	-11.0	-11.5	-11.8	-12.6	-13.8	-14.8	-15.6	-16.7	-17.0	-15.1	-13.4	-13.2	-13.3	-13.3	-13.7	-15.0	-14.9	-14.7	-14.4	-14.0	-13.8	-13.3	-12.5	-13.8	-10.8
23-Nov	-12.3	-12.0	-11.5	-11.1	-10.8	-10.4	-10.0	-9.8	-9.5	-9.1	-8.3	-7.6	-7.0	-6.3	-5.9	-6.3	-8.3	-10.0	-11.4	-12.1	-11.1	-10.6	-11.7	-8.3	-9.6	-5.9
24-Nov	-6.1	-3.4	-1.1	-1.7	-2.2	-0.9	-0.7	-0.6	-1.5	-1.6	0.1	1.9	3.2	4.2	4.1	3.2	1.9	1.1	0.1	-0.9	-0.9	-1.4	-2.4	-3.1	-0.4	4.2
25-Nov	-3.5	-4.0	-3.9	-1.4	-0.5	-0.6	-1.2	-1.5	-2.2	-4.0	-4.0	-3.8	-3.9	-3.8	-5.1	-7.0	-9.0	-11.0	-12.6	-14.0	-15.3	-15.8	-17.0	-17.8	-6.8	-0.5
26-Nov	-17.4	-16.0	-15.5	-16.1	-16.3	-15.3	-14.7	-15.3	-16.3	-15.3	-13.3	-12.0	-10.5	-9.8	-9.7	-9.3	-8.8	-8.5	-8.1	-8.1	-7.7	-7.2	-7.7	-9.1	-12.0	-7.2
27-Nov	-10.5	-12.0	-12.7	-11.2	-10.1	-9.5	-9.2	-8.8	-8.5	-7.5	-6.2	-4.7	-3.9	-3.1	-2.3	-1.9	-2.4	-2.0	-0.8	-0.5	-0.2	1.5	2.2	2.0	-5.1	2.2
28-Nov	1.4	1.4	0.8	0.3	0.6	0.1	-0.2	-0.9	-1.2	-0.9	0.7	2.0	3.7	4.2	3.9	3.2	2.5	2.4	3.0	3.2	2.9	1.6	-0.2	-1.5	1.4	4.2
29-Nov	-1.7	-1.7	-1.9	-2.1	-2.9	-3.2	-3.1	-2.8	-3.2	-3.0	-2.3	-1.7	-0.6	0.8	0.9	0.6	0.1	-0.3	-0.5	-1.1	-1.0	-1.4	-1.9	-2.0	-1.5	0.9
30-Nov	-2.5	-3.5	-3.8	-4.7	-5.3	-5.4	-5.7	-5.8	-5.8	-5.6	-5.7	-5.1	-4.9	-5.1	-5.4	-5.7	-5.8	-6.0	-6.2	-6.3	-6.3	-6.9	-8.4	-10.0	-5.7	-2.5
																								Diurnal Average		
																								Diurnal Maximum		



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

**Ambient Temperature (AT) - C**  
**Waskow ohci Pimatisiwin - November 2023**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C  
Waskow ohci Pimatisiwin - November 2023**

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	0	0.00	0.00
-20 - 0	610	84.72	84.72
0 - 10	110	15.28	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



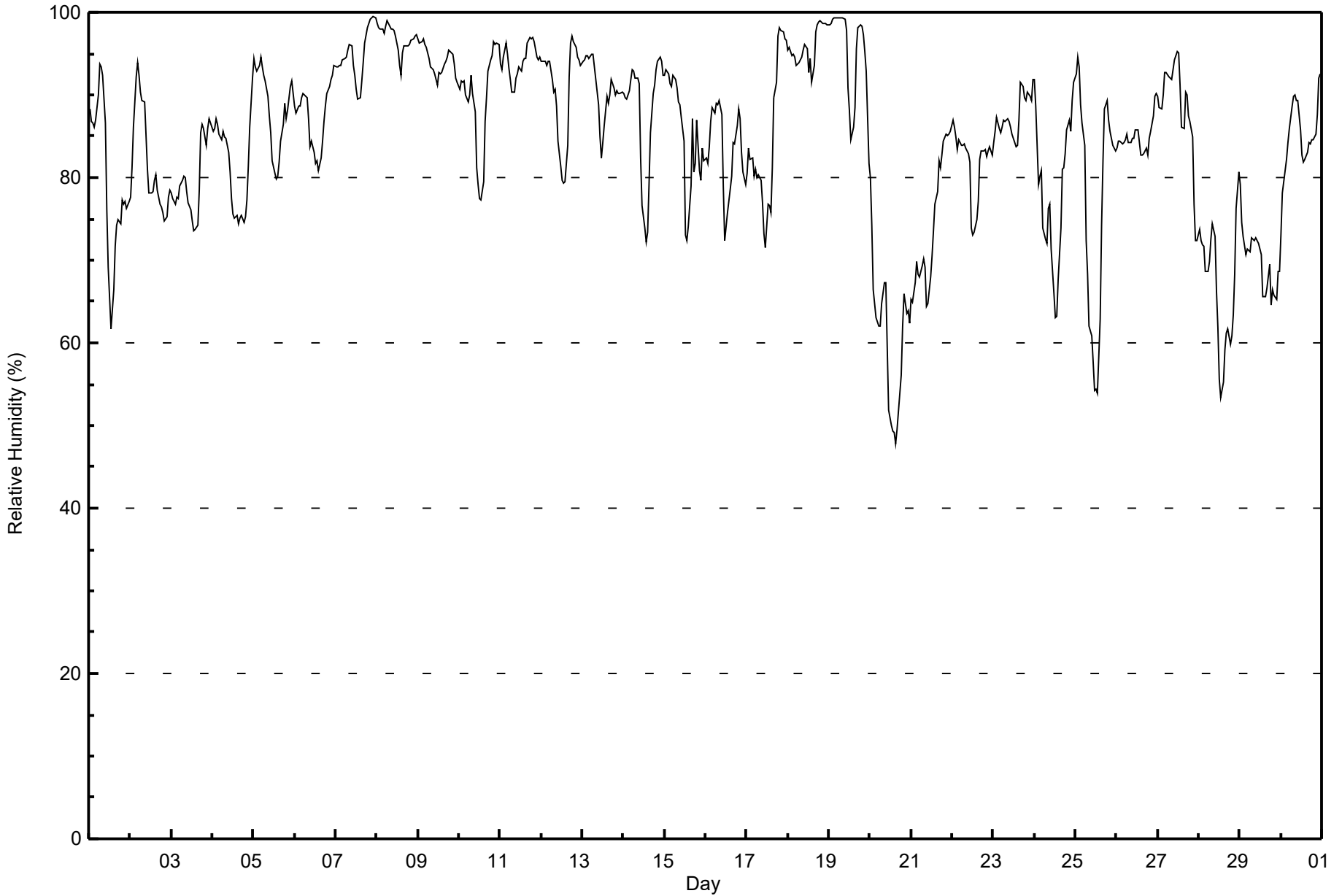
Maximum Value: 99.4 % on Nov 7 23:00																								Maximum Daily Average: 96.9 % on Nov 8																								Hours in Service: 720	
Minimum Value: 47.8 % on Nov 20 16:00																								Minimum Daily Average: 60.6 % on Nov 20																								Hours of Data: 720	
Maximum Diurnal Average: 87.2 % at hour 23																								Minimum Diurnal Average: 77.1 % at hour 14																								Hours of Missing Data: 0	
Monthly Average: 84.48 %																								Percentiles: P <sub>1</sub> = 53.9 P <sub>10</sub> = 69.5 Q <sub>1</sub> = 78.4 Median = 86.2 Q <sub>3</sub> = 92.6 P <sub>90</sub> = 96.0 P <sub>99</sub> = 99.3																								Hours of Calibration: 0	
																																																Percent Operational Time: 100.0	
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Nov	88.3	86.7	86.7	86.1	87.0	90.0	93.8	93.4	92.3	86.7	76.1	69.1	65.5	61.7	66.5	71.7	74.2	74.9	74.4	77.3	76.8	77.2	76.4	77.2	79.6	93.8																							
2-Nov	77.7	81.2	86.1	92.1	93.9	92.4	90.4	89.2	89.2	85.1	81.0	78.1	78.1	78.3	79.6	80.4	78.5	76.8	76.4	75.8	74.8	75.2	77.6	78.5	81.9	93.9																							
3-Nov	78.1	77.5	76.8	77.6	77.5	79.0	79.6	80.2	80.1	78.3	76.9	76.2	74.7	73.5	73.7	74.2	78.4	85.4	86.5	85.9	84.0	86.0	87.1	86.6	79.7	87.1																							
4-Nov	85.6	86.0	87.1	86.4	85.3	84.6	85.6	84.9	84.7	83.1	80.7	77.4	75.5	75.1	75.4	74.5	75.0	75.4	74.5	75.3	77.4	81.4	86.1	92.0	81.2	92.0																							
5-Nov	94.3	93.3	92.9	93.5	94.5	93.4	92.4	91.7	89.9	87.5	85.3	82.0	80.5	79.9	80.2	81.8	84.4	86.5	89.0	87.1	88.2	91.1	91.6	90.1	88.4	94.5																							
6-Nov	88.7	87.8	88.7	88.7	89.7	90.2	89.8	89.7	87.1	83.7	84.5	83.0	81.6	82.1	80.9	82.4	84.3	86.8	88.7	90.3	91.1	91.8	92.4	93.5	87.4	93.5																							
7-Nov	93.4	93.4	93.6	93.5	94.2	94.3	94.6	95.4	96.2	96.0	93.6	92.4	90.7	89.4	89.7	91.7	93.9	96.4	98.2	98.7	99.2	99.4	99.4	99.3	94.8	99.4																							
8-Nov	98.7	98.1	97.9	98.0	97.5	98.3	98.9	98.6	98.0	97.9	97.8	97.1	95.5	93.6	92.3	95.0	95.9	96.0	96.0	96.1	96.6	96.8	97.1	97.2	96.9	98.9																							
9-Nov	96.7	96.3	96.4	96.7	96.2	95.8	94.4	93.5	93.3	93.1	92.6	91.2	92.6	92.6	92.7	93.7	94.0	94.6	95.5	95.3	94.9	93.8	92.0	91.5	94.1	96.7																							
10-Nov	90.8	91.6	91.5	91.7	90.1	89.1	90.0	92.4	90.2	88.0	81.2	79.1	77.5	77.2	79.6	86.7	89.7	92.8	94.2	94.8	96.5	96.0	96.3	96.1	89.3	96.5																							
11-Nov	93.8	93.1	94.6	96.3	94.9	93.3	91.8	90.3	90.3	92.0	92.6	93.4	92.9	94.0	94.4	94.5	96.2	97.0	96.8	96.9	96.4	94.6	94.3	94.6	94.1	97.0																							
12-Nov	94.0	94.2	94.0	93.6	94.0	94.1	91.9	90.4	90.6	88.7	84.4	81.4	79.7	79.3	79.5	83.9	92.2	96.3	97.1	96.4	95.7	94.5	94.3	93.6	90.6	97.1																							
13-Nov	94.0	94.2	94.7	94.7	94.4	94.9	95.0	93.5	91.8	88.8	84.9	82.4	84.3	86.3	89.8	88.9	90.0	91.9	90.8	90.0	90.4	90.1	90.2	90.4	90.7	95.0																							
14-Nov	90.2	89.6	89.5	90.6	91.8	93.0	92.8	92.0	91.4	82.4	76.5	73.9	72.2	73.4	79.2	85.5	90.2	91.3	93.0	94.0	94.5	94.0	92.3	87.7	94.5																								
15-Nov	92.4	93.0	92.6	91.4	91.1	92.3	91.9	90.8	89.1	88.8	87.2	84.5	73.1	72.4	74.1	79.0	87.1	80.7	81.7	86.9	80.8	79.6	83.6	82.1	85.3	93.0																							
16-Nov	82.4	81.7	83.7	86.7	88.5	87.8	88.9	88.8	89.3	87.7	79.0	72.4	74.0	75.8	78.6	80.2	84.3	84.0	86.3	88.3	87.1	83.1	80.7	79.2	83.3	89.3																							
17-Nov	80.5	83.6	82.2	82.3	80.2	81.0	80.0	80.4	79.7	76.9	73.3	71.6	76.9	76.6	75.7	81.2	89.7	91.5	97.2	98.1	97.8	97.6	96.8	96.6	84.5	98.1																							
18-Nov	95.4	95.8	94.8	94.9	94.6	93.5	93.9	94.2	94.6	95.5	96.1	95.6	92.7	94.4	91.6	93.5	97.7	98.5	98.8	98.9	98.7	98.7	98.7	98.4	95.8	98.9																							
19-Nov	98.5	98.7	99.2	99.3	99.3	99.3	99.3	99.3	99.3	99.3	99.2	97.9	90.8	88.1	84.6	86.1	88.5	95.6	98.1	98.5	98.3	97.3	95.3	92.8	81.7	99.3																							
20-Nov	80.1	74.3	66.4	63.1	62.5	62.0	62.1	64.7	67.2	67.2	59.5	51.8	50.0	49.4	49.2	47.8	49.6	53.8	56.1	62.0	65.9	63.5	63.9	62.4	60.6	80.1																							
21-Nov	65.2	65.0	67.3	69.9	68.3	68.0	69.4	70.2	69.1	64.5	64.8	67.9	70.5	73.6	76.7	78.3	82.0	81.2	82.8	84.4	85.2	85.1	85.3	85.7	74.2	85.7																							
22-Nov	86.9	86.1	84.8	83.4	84.6	83.9	84.0	84.1	83.5	82.9	81.9	74.0	73.1	73.4	75.0	77.0	82.3	83.2	83.3	83.4	82.6	83.2	83.7	82.8	81.8	86.9																							
23-Nov	84.3	85.6	87.3	86.0	85.4	86.2	86.9	86.8	87.2	86.8	86.1	85.3	84.2	83.8	84.0	86.9	91.5	91.1	89.6	89.3	90.3	89.8	89.3	91.9	87.3	91.9																							
24-Nov	91.9	88.6	79.2	80.2	80.8	73.9	72.6	72.0	76.3	76.8	71.3	65.9	63.1	63.2	67.6	73.8	81.0	81.2	82.8	85.8	87.0	85.6	89.4	91.5	78.4	91.9																							
25-Nov	92.6	94.6	93.3	88.8	86.6	83.9	72.3	68.3	62.0	60.8	57.7	54.2	54.4	54.0	62.8	74.2	82.0	88.3	89.4	86.9	85.6	84.7	83.9	83.2	76.8	94.6																							
26-Nov	83.5	84.4	84.3	84.1	84.2	84.6	85.2	84.3	84.3	84.7	84.8	85.8	85.8	84.3	82.8	82.7	82.8	83.5	82.7	84.7	85.6	87.4	89.9	90.3	84.9	90.3																							
27-Nov	89.8	88.5	88.2	90.0	92.7	92.7	92.2	92.1	91.9	93.0	94.2	95.2	95.1	91.1	86.2	86.0	90.4	89.9	87.4	86.8	84.9	76.8	72.3	72.3	88.3	95.2																							
28-Nov	73.7	72.4	71.9	71.7	68.7	68.7	69.8	72.5	74.4	72.9	66.3	61.9	55.5	53.4	55.3	59.1	61.3	61.8	59.7	60.9	63.4	68.3	76.2	80.6	66.7	80.6																							
29-Nov	79.1	74.6	72.9	70.6	71.3	71.1	71.0	72.7	72.3	72.8	72.4	72.0	70.7	65.5	65.7	65.6	66.7	69.5	64.6	66.5	65.8	65.3	68.7	68.6	69.8	79.1																							
30-Nov	73.0	78.1	80.9	82.3	84.3	85.9	88.6	89.8	90.0	89.4	89.2	85.7	82.8	81.9	82.2	83.0	84.2	84.1	84.5	84.6	85.2	87.7	92.0	92.6	85.1	92.6																							
																								87.1	86.9	86.6	86.8	86.8	86.6	86.3	86.2	85.9	84.7	81.9	79.1	77.8	77.1	78.0	80.5	84.0	85.4	85.8	86.6	86.6	86.5	87.2	87.1	Diurnal Average	
																								98.7	98.7	99.2	99.3	99.3	99.3	99.3	99.3	99.3	99.3	99.2	97.9	97.1	95.5	94.4	94.4	95.0	97.7	98.5	98.8	98.9	99.2	99.4	99.4	99.3	Diurnal Maximum





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

**Relative Humidity (RH) - %**  
**Waskow ohci Pimatisiwin - November 2023**





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

**Relative Humidity (RH) - %**  
**Waskow ohci Pimatisiwin - November 2023**

<b>Concentration Ranges (%)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	0	0.00	0.00
20 - 40	0	0.00	0.00
40 - 60	18	2.50	2.50
60 - 80	184	25.56	28.06
80 - 100	518	71.94	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720

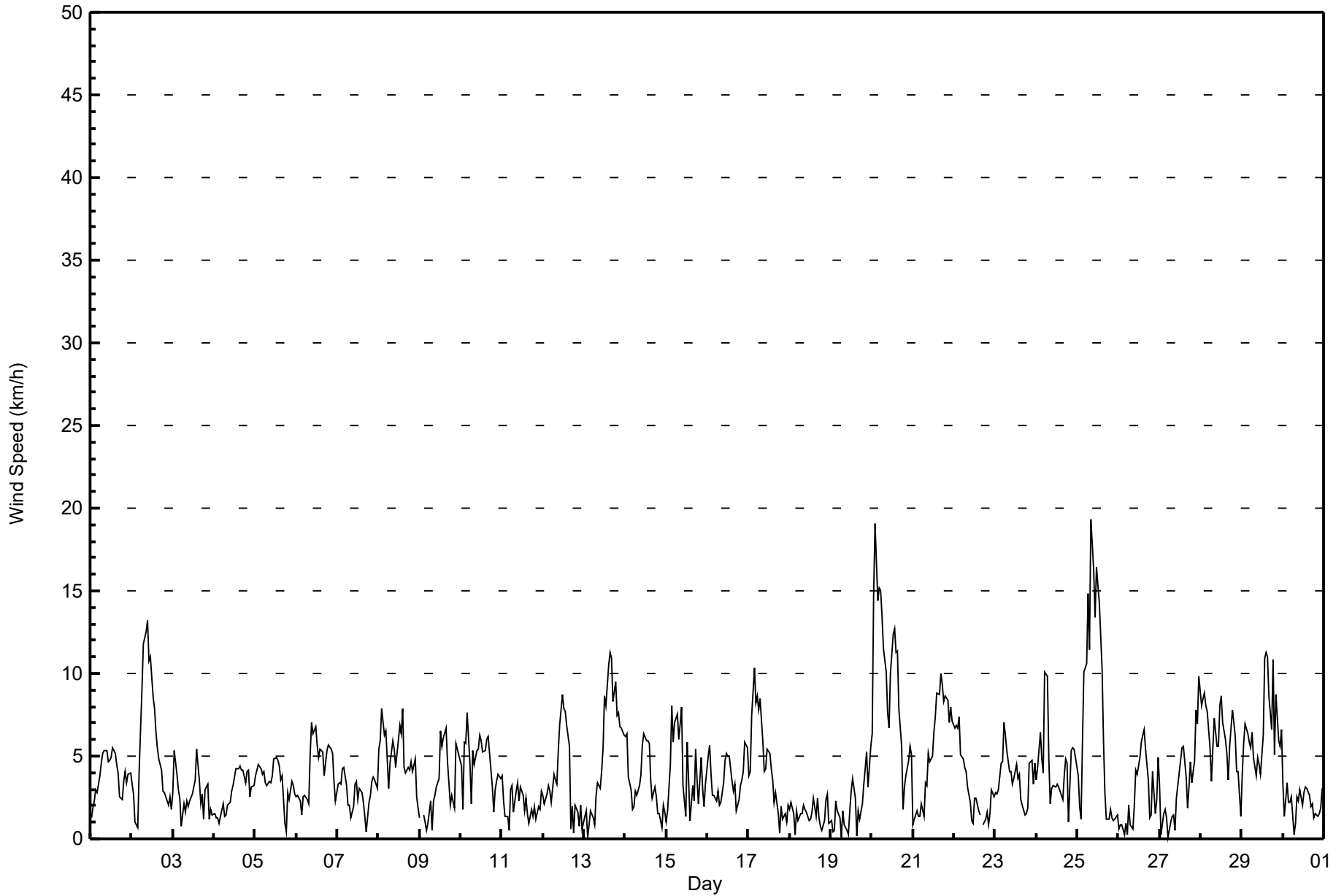


Maximum Speed: 19 km/h on Nov 25 09:00	Maximum Daily Speed Average: 9.5 km/h on Nov 20	Hours in Service: 720
Minimum Speed Value: 0 km/h on Nov 13 03:00	Minimum Daily Speed Average: 0.3 km/h on Nov 30	Hours of Data: 718
Maximum Diurnal Speed Average: 1.8 km/h at hour 3	Minimum Diurnal Speed Average: 0.2 km/h at hour 12	Hours of Missing Data: 2
Monthly Average Velocity: 0.8 km/h 244.9 deg	Percentiles: P <sub>1</sub> = 0 P <sub>10</sub> = 1 Q <sub>1</sub> = 2 Median = 3 Q <sub>3</sub> = 5 P <sub>90</sub> = 8 P <sub>99</sub> = 15	Percent Operational Time: 99.7

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	SSE1	SSE2	S2	SSE3	SSE3	SSE4	SSE5	SSE5	SSE5	SSE5	SE5	SE5	SE5	SE5	SE5	SSE4	SE4	SSE3	SSE2	SSE3	SSE4	SSE3	SSE4	SSE4	SSE3.8	SE5
2-Nov	SSE3	SSE3	ENE1	N1	NNW4	N7	N9	NNW12	NNW13	N13	N11	N11	N9	NNE8	NNE6	NE5	NNE5	NE4	ENE3	ENE3	NE3	NE2	E3	SE2	NNE4.7	N13
3-Nov	S3	SSE5	SE4	ESE3	SSE2	SE1	ESE2	E2	E2	E2	NE2	NNE3	N3	N4	N5	NNW3	NNW2	NNW3	WSW1	W3	NNW3	N1	NE2	NE1	NE0.7	N5
4-Nov	NE1	N1	N1	NNE1	NNE1	NNE2	ENE1	NNW1	NNE2	ENE2	ENE3	E3	E4	E4	E4	E4	E4	E4	E4	E4	ENE3	NNE3	NNE3	ENE2.4	E4	
5-Nov	NNE4	NE4	NNE5	N4	NNE4	NNE4	NE3	NNE3	NNE3	NNE3	NNE4	NNE5	NNE5	NNE5	N4	N4	N4	NNE1	E0	ESE3	ESE2	SE3	ESE3	ESE3	NNE2.8	NNE5
6-Nov	E3	SE3	SE2	SE1	SE3	SE3	SE2	SE2	SSE5	SE7	SE6	SE7	SE6	SE5	SSE5	SSE5	SSE4	SE5	SSE5	SSE6	SSE5	SSE5	SSE3	SE2	SE4.1	SE7
7-Nov	S3	S3	S3	SSE4	S4	SW3	SW2	WSW2	SSW1	SSW2	WSW3	WSW4	WSW2	SW3	W3	NW2	NNW1	SSE0	SSE2	SSE3	SSE3	SSE4	SSE4	SSE3	SSW2.0	S4
8-Nov	SW5	W6	W8	W6	WNW7	WNW5	W3	W5	WNW6	WNW5	WNW4	WNW5	NW7	WNW6	WNW8	WNW4	WNW4	WNW4	WNW4	WNW5	WNW4	NW5	WNW3	W2	WNW4.8	W8
9-Nov	WNW1	UO	S1	SSE1	SSW1	W1	WSW2	SW0	S2	S3	S3	S4	SE7	SSE6	SSE6	SE7	SSE5	SSE3	SSE2	SE3	ESE2	SSE6	SSE5	SSE5	SSE2.9	SE7
10-Nov	SSE4	WSW2	SSE6	SE6	SE8	SSE5	W2	SSE5	SSE4	SSE5	SSE5	SE6	SSE6	SSE5	SSE5	SE6	SSE6	SE5	SE3	SE2	SSE3	S3	SSE4	SSE4	SSE4.4	SE8
11-Nov	SSE4	SW2	SSE1	ESE1	NNW1	NW3	WNW3	WNW2	W3	NW3	NW2	NNW3	NW3	N2	WNW2	NNW2	SW1	W2	S1	SW2	SW1	SSW2	S2	S3	W1.0	SSE4
12-Nov	SSE3	SSE2	S3	S3	SSE3	SW2	WSW4	SSW4	WSW3	WSW5	WSW7	W9	W8	WSW8	WSW7	W6	ESE1	S2	SSW0	W2	WNW2	NE1	NW2	NNW1	WSW2.7	W9
13-Nov	SW1	W2	S0	WSW1	NW2	WNW1	WNW1	ENE3	E3	ENE3	NE4	NNE6	NNE9	NNE8	N11	N11	N11	N8	NNW9	NNW7	NNW8	NW7	NNW7	NW6	N4.5	N11
14-Nov	NW6	NW6	WNW4	W3	W2	SSE2	SSE3	SSE3	S3	SSE4	SSE6	SSE6	SSE6	S6	SSW6	SSW3	SSE2	SSE3	SE3	SE1	SSE2	SSW1	SSE2	SSE2	S2.0	SSE6
15-Nov	SE1	NNW2	NW4	NNW8	N6	N7	NNW8	N6	N7	NNW3	NNW3	NW1	WNW6	WNW4	SSE1	S3	SSW2	W5	NW4	WSW2	W5	W3	SSW2	SSW3	NW2.8	NNW8
16-Nov	SW5	SW6	SW4	SSE3	SSE3	SSE2	SSE3	SSE2	SSE2	SSE3	SE5	SSE5	SE5	SE5	SSE3	W3	W3	WNW2	SSE2	SSE3	SSE4	SSW4	SW6	SW5	S2.6	SW6
17-Nov	SSE4	S4	SW7	WSW10	WSW8	WSW9	WSW8	SW8	SW6	SW4	S4	SE5	SE5	SSE4	S4	SSW2	W3	WNW2	SW0	S2	SSW1	S2	S1	S2	SW3.5	WSW10
18-Nov	SSE2	S2	SSW2	SSW0	SSW2	SSE1	S2	S1	SSE2	S2	SSW2	S1	ESE1	S2	SE2	S1	SSW2	S1	SSW1	S1	SSW1	SSE2	SSE3	SSE1	S1.4	SSE3
19-Nov	S1	SSW0	SE1	SSE2	WSW2	NNW1	E0	SW2	SSW1	WSW0	E0	ESE2	SE3	SSE4	S2	NW0	S2	S1	SSE2	SSE3	SSE4	SSE5	SW3	WSW6	S1.4	WSW6
20-Nov	W6	WNW15	W19	W14	W15	W15	W13	W12	W10	W8	W7	W10	W12	W13	W11	WNW11	W8	W6	W2	WSW3	WSW4	W5	W6	W5	W9.5	WNW19
21-Nov	SSE1	SE1	SSE2	SSE1	ESE1	SE2	NNE1	N3	NNE3	NE5	NE5	NE5	NNE6	NE7	NNE9	N9	N10	N9	N8	N9	N8	N7	N8	N7	NNE4.6	N10
22-Nov	N7	N7	N7	NNW7	N5	NNE5	N4	NW4	WNW3	W2	NNW1	ENE1	ENE2	NE2	N2	N1	UO	SE1	SE1	S2	SW1	S2	SSE3	ESE3	N1.9	NNW7
23-Nov	SE3	SE3	SE3	SE5	SSE5	SSE7	SSE6	SSE5	SSE4	S4	SSE3	SSE4	S5	S4	SSE4	S2	SW2	S1	SSE2	SSE2	SSE5	S5	SSW3	S5	SSE3.6	SSE7
24-Nov	SE4	SSE4	S6	SSE5	S4	WSW10	WSW10	SW5	S2	SSE3	S3	SE3	SE3	SSE3	SW3	SSE2	S4	SSE5	SSE5	S1	SSW5	SSE5	SSE5	SSE5	S3.7	WSW10
25-Nov	SSE4	S2	W1	NNW6	N10	N11	NNW15	NNW11	NNW19	NNW16	NNW13	NNW16	NW15	NW14	NNW10	N6	NNW3	SW1	SW1	WSW2	SW1	WSW1	WSW1	WSW1	NNW6.6	NNW19
26-Nov	W1	SW1	SSE1	WNW0	WSW1	WSW0	SE2	SW1	ESE1	S2	SE4	SSE4	SE5	SSE6	SSE6	SSE7	SSE5	S4	NNE1	SSW1	SSE4	ENE2	WNW2	NW5	SSE1.8	SSE7
27-Nov	WNW3	S0	SSE1	S2	SSE1	SSE0	SE1	S1	SSE1	S1	SSE2	SSE4	SSE5	SSE5	SSE6	S4	SW2	SSE3	S5	SSW3	WSW5	WSW8	SW7	WSW10	SSW2.6	WSW10
28-Nov	WSW8	SW8	SW9	SW8	SW8	S5	SSW4	WSW5	WSW7	WSW6	W6	WSW8	W9	WSW7	W6	W5	SSW4	WSW6	WSW8	WSW7	WSW6	WNW4	W4	SSW1	WSW5.8	SW9
29-Nov	SSW4	WSW6	W7	W6	W6	W5	W6	WSW5	W4	W5	WSW4	SW4	W6	WNW11	WNW11	WNW11	WNW9	WNW7	NW11	WNW5	WNW9	WNW6	WNW6	WNW7	W6.2	WNW11
30-Nov	WNW3	WSW1	W3	W2	N2	NNE3	SSW0	WSW1	SE3	SE2	SE3	ESE2	ENE3	ENE3	E3	ESE3	ESE2	ENE2	NE1	NE2	NNW1	W2	W2	W3	ENE0.3	W3

SSW1.2	SW1.5	WSW1.8	WSW1.3	WSW1.1	W1.1	W1.4	W1.4	W1.1	W0.7	SW0.3	SW0.2	W0.5	WSW0.4	W0.6	WNW0.6	W0.6	WSW0.4	SW0.3	SSW0.7	SW0.9	SSW1.1	SW1.3	SW1.3	Diurnal Average	
WSW8	WNW15	WNW19	W14	W15	W15	NNW15	NNW12	NNW19	NNW16	NNW13	NNW16	NW15	NW14	WNW11	WNW11	N11	N9	NW11	N9	WNW9	WSW8	N8	WSW10	Diurnal Maximum	

UO - Unstable Operation  
 All monthly, daily, and diurnal averages have been calculated using vector methods





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h  
Waskow ohci Pimatisiwin - November 2023**

<b>Wind Speed Ranges (km/h)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	547	76.18	76.18
6 - 11	152	21.17	97.35
12 - 19	19	2.65	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: 718

Total Number of Hours: 720



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

**Wind Speed (WS) - km/h**  
**Waskow ohci Pimatisiwin - November 2023**

<b>Wind Speed</b> <b>Ranges (km/h)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 5	18	25	18	15	20	17	52	133	65	32	29	28	34	32	14	15	547
6 - 11	27	8	0	0	0	0	10	16	2	1	9	24	22	15	6	12	152
12 - 19	1	0	0	0	0	0	0	0	0	0	0	0	7	2	2	7	19
20 - 28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	46	33	18	15	20	17	62	149	67	33	38	52	63	49	22	34	718

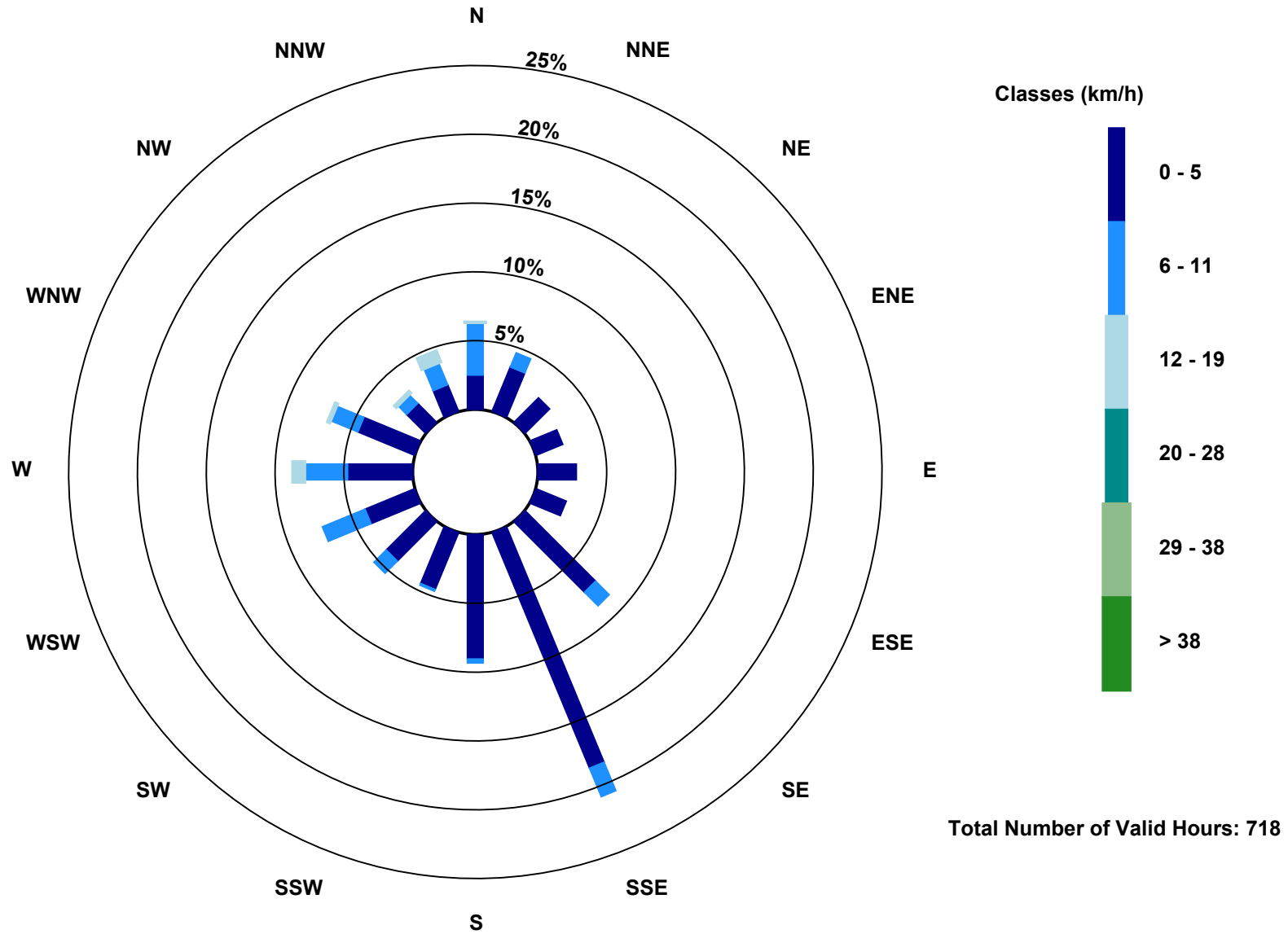
Total Number of Valid Hours: 718

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 2023

Wind Speed (WS) - km/h  
Waskow ohci Pimatisiwin





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

**Wind Speed (WS) - km/h**

**Waskow ohci Pimatisiwin - November 2023**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 8 km/h on Nov 20 03:00	Hours of Data: 718
Minimum Value: 0 km/h on Nov 22 09:00	Hours of Missing Data: 2
Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 1 Q <sub>1</sub> = 1 Median = 1 Q <sub>3</sub> = 2 P <sub>90</sub> = 3 P <sub>99</sub> = 5	Hours of Calibration: 0
	Percent Operational Time: 99.7

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

3	6	8	7	6	5	5	5	5	7	5	4	6	5	5	4	5	4	3	5	3	3	3	3	4	
Diurnal Maximum																									

UO - Unstable Operation





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

**Wind Direction (WD) - deg**  
**Waskow ohci Pimatisiwin - November 2023**

Direction of Maximum Speed: 327 deg on Nov 25 09:00		Hours in Service: 720
Direction of Maximum Daily Speed Average: 274.6 deg on Nov 20		Hours of Data: 718
Direction of Minimum Speed: 186 deg on Nov 13 03:00	Direction of Minimum Daily Speed Average: 0.3 deg on Nov 30	Hours of Missing Data: 2
Monthly Average Direction: 244.9 deg		Percent Operational Time: 99.7

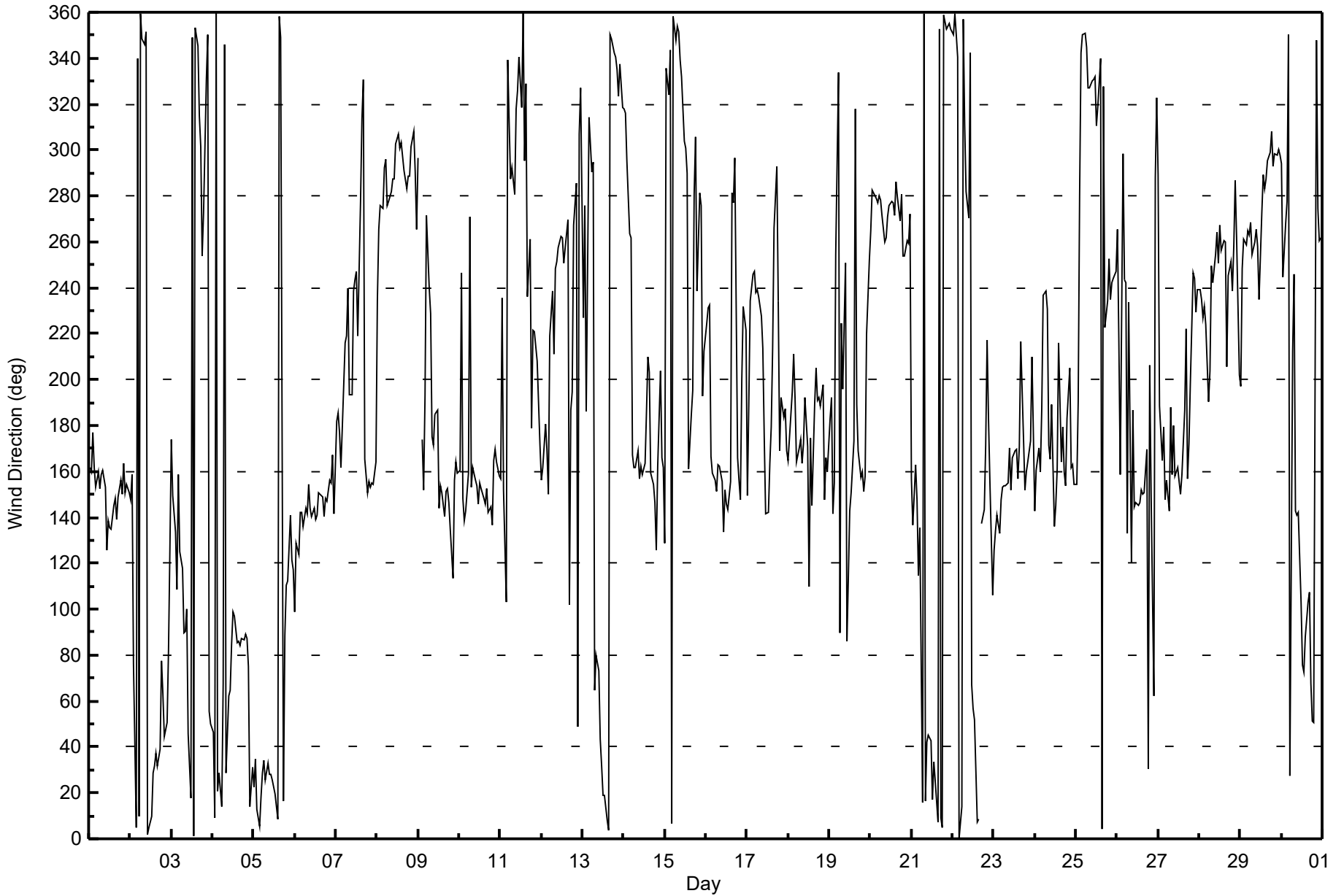
Day	Hourly Period Ending At (MST)																								Daily Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Nov	162	160	177	162	153	160	153	159	160	153	126	139	135	135	145	148	139	149	156	150	164	151	155	151	150.0
2-Nov	148	159	76	5	340	10	359	348	346	352	2	5	10	29	32	37	32	39	77	63	44	51	83	127	13.8
3-Nov	174	150	134	109	159	125	118	90	90	100	46	18	349	1	353	345	315	301	254	272	331	350	56	50	39.9
4-Nov	46	9	360	21	29	14	68	346	29	62	65	85	99	97	85	86	84	87	87	89	87	75	14	31	68.6
5-Nov	23	35	13	5	18	28	34	26	33	28	28	25	20	14	9	358	349	16	88	110	112	141	121	117	31.5
6-Nov	99	128	124	142	142	136	144	142	155	144	140	144	139	141	151	149	149	141	148	147	156	155	167	142	144.7
7-Nov	182	185	177	161	179	216	219	240	194	193	239	244	247	219	278	314	331	165	151	156	153	155	154	164	193.9
8-Nov	235	265	276	275	292	296	276	278	282	287	287	302	307	301	303	297	291	283	289	289	301	308	290	265	287.3
9-Nov	296	UO	174	152	193	272	240	229	175	172	185	187	144	154	151	141	151	152	147	135	114	156	164	159	159.4
10-Nov	160	246	148	138	142	159	271	153	162	156	154	146	155	152	148	146	152	142	144	136	165	169	164	158	153.7
11-Nov	157	236	152	103	339	312	288	292	281	318	326	340	319	360	295	329	236	261	179	222	221	208	190	171	272.0
12-Nov	156	162	180	169	150	219	238	211	249	252	257	262	262	251	257	270	102	187	195	267	286	49	307	327	242.6
13-Nov	227	276	186	249	314	290	295	65	80	73	44	32	19	19	8	3	350	349	342	341	335	323	337	319	355.9
14-Nov	318	316	296	263	262	167	162	162	169	157	162	158	163	186	210	203	159	154	146	125	162	204	166	162	186.3
15-Nov	129	336	324	344	7	358	348	354	352	340	332	304	301	290	161	185	195	281	306	238	281	276	193	212	321.5
16-Nov	225	231	232	167	159	156	151	163	163	155	134	152	146	143	156	281	277	297	166	156	147	200	232	222	184.5
17-Nov	149	190	234	246	247	238	239	236	228	214	175	142	142	163	179	213	266	293	234	169	192	184	187	169	214.1
18-Nov	165	174	195	211	192	164	170	174	164	172	192	171	110	175	145	190	205	191	192	189	198	148	166	160	173.4
19-Nov	183	192	142	155	254	334	89	225	196	251	86	113	143	151	173	318	189	169	157	160	152	158	220	252	177.9
20-Nov	265	282	281	279	277	280	278	272	260	262	271	276	277	277	271	286	279	269	281	254	254	261	259	272	274.6
21-Nov	157	136	163	148	115	136	16	360	16	42	45	43	17	34	25	8	353	9	5	359	353	354	355	353	13.0
22-Nov	350	359	350	341	0	14	357	311	282	271	342	67	57	52	8	9	UO	137	143	171	217	183	156	106	356.6
23-Nov	126	134	141	133	148	153	154	155	170	152	166	169	169	157	171	217	174	152	160	164	173	210	177	160.1	
24-Nov	142	160	170	160	187	237	239	230	172	166	189	136	145	161	216	164	180	160	154	183	205	162	163	154	182.1
25-Nov	154	190	280	343	351	351	345	327	327	330	331	332	310	319	340	4	328	222	235	252	235	242	244	247	328.9
26-Nov	265	217	159	298	243	242	133	234	120	187	145	147	145	147	152	150	151	170	30	206	151	62	288	323	156.5
27-Nov	289	189	165	179	148	156	143	188	159	180	158	162	155	150	159	187	222	157	172	198	247	244	229	239	197.0
28-Nov	239	235	227	232	224	190	204	250	242	254	264	251	267	256	260	260	205	245	251	239	258	287	262	202	243.8
29-Nov	197	248	261	259	265	263	269	254	260	265	258	235	273	289	283	287	295	299	308	293	299	298	300	298	278.9
30-Nov	294	244	268	278	350	27	213	246	143	141	142	103	76	73	88	103	107	68	51	51	348	275	261	262	73.7

204.4 235.6 240.6 246.7 258.6 272.2 275.9 269.3 270.0 268.7 220.5 214.1 269.2 241.6 265.4 293.9 271.3 238.5 227.1 203.7 229.2 208.7 218.0 220.9

Diurnal Average

UO - Unstable Operation

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





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

**Wind Direction (WD) - deg**

**Waskow ohci Pimatisiwin - November 2023**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 100 deg on Nov 26 06:00		Hours in Service: 720 Hours of Data: 718 Hours of Missing Data: 2 Hours of Calibration: 0 Percent Operational Time: 99.7																							
Minimum Value: 10 deg on Nov 13 09:00  Percentiles: P <sub>1</sub> = 15 P <sub>10</sub> = 20 Q <sub>1</sub> = 24 Median = 31 Q <sub>3</sub> = 47 P <sub>90</sub> = 67 P <sub>99</sub> = 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-Nov	65	63	38	25	26	17	29	19	23	28	28	29	27	26	22	18	21	26	40	23	24	31	17	26	65
2-Nov	29	24	88	92	25	21	23	20	20	21	25	24	26	25	28	27	27	34	24	18	29	37	34	55	92
3-Nov	33	21	36	41	68	94	44	29	23	41	28	37	41	41	25	28	33	22	49	14	30	78	38	40	94
4-Nov	47	22	40	47	48	25	46	45	23	18	21	25	27	25	19	20	19	18	20	21	18	20	21	22	48
5-Nov	20	20	22	18	23	24	19	18	19	22	23	29	28	26	20	20	25	17	90	29	22	28	29	33	90
6-Nov	22	35	41	51	26	28	37	40	30	26	23	23	24	27	26	24	26	24	19	21	23	22	29	26	51
7-Nov	33	32	29	23	31	36	46	36	25	54	57	62	62	52	38	39	71	94	17	16	14	19	23	39	94
8-Nov	43	37	29	37	27	29	51	38	30	25	28	23	21	23	22	28	26	31	25	29	24	19	25	35	51
9-Nov	30	UO	38	60	57	72	48	83	45	47	42	47	26	26	26	23	25	25	28	38	64	20	23	32	83
10-Nov	45	59	31	20	23	48	59	27	25	25	26	26	26	28	22	20	22	25	35	30	24	23	30	28	59
11-Nov	51	61	52	67	81	32	54	64	51	41	60	46	74	59	61	60	64	61	55	36	57	28	40	29	81
12-Nov	25	30	31	33	29	65	45	48	39	42	37	29	34	41	36	34	77	59	80	47	51	82	37	96	96
13-Nov	46	55	85	51	36	59	78	24	10	15	19	21	22	25	21	23	21	19	20	26	23	26	18	17	85
14-Nov	15	16	43	30	25	29	35	25	20	25	25	29	41	41	43	39	19	27	59	61	90	39	67	90	
15-Nov	76	58	26	19	34	25	20	19	22	21	34	100	33	55	83	30	36	21	34	38	31	54	51	42	100
16-Nov	35	39	64	30	21	38	45	45	36	24	31	33	25	23	21	34	34	82	52	24	27	64	50	45	82
17-Nov	42	67	43	36	50	38	41	36	41	55	37	25	22	24	33	65	53	80	94	71	66	59	72	34	94
18-Nov	45	24	53	93	22	44	35	59	33	42	43	55	57	45	42	65	26	61	79	88	79	20	36	73	93
19-Nov	80	98	91	46	57	47	76	67	77	93	88	36	27	28	39	77	51	45	44	31	31	21	71	52	98
20-Nov	47	30	28	29	30	26	27	26	28	43	48	34	32	28	33	25	36	33	93	31	17	50	33	43	93
21-Nov	79	57	37	68	35	43	58	29	35	19	20	23	26	25	23	26	20	25	24	24	21	23	21	19	79
22-Nov	20	22	21	17	25	24	27	17	12	12	83	71	33	44	42	25	UO	37	36	30	54	37	20	25	83
23-Nov	25	31	29	23	27	22	22	23	20	28	24	27	27	31	22	25	26	30	24	46	20	34	40	24	46
24-Nov	32	28	29	30	37	35	36	88	72	41	47	33	28	47	58	48	22	28	25	95	31	23	15	25	95
25-Nov	27	66	91	40	20	23	23	19	18	19	20	21	19	20	35	21	22	63	76	34	62	75	76	53	91
26-Nov	96	67	71	82	80	100	87	78	86	66	31	42	24	21	23	20	19	28	50	79	39	86	55	22	100
27-Nov	18	100	42	39	56	95	77	40	29	86	35	26	23	21	22	34	62	37	40	55	59	39	43	34	100
28-Nov	36	32	29	28	32	37	62	26	36	39	43	33	34	36	47	53	54	40	35	43	44	29	25	66	66
29-Nov	47	27	24	39	26	16	24	47	52	25	28	55	46	25	28	24	21	20	19	21	19	17	16	17	55
30-Nov	37	84	24	77	36	32	98	68	32	40	28	49	18	17	25	36	42	24	48	76	67	43	45	18	98
Diurnal Maximum																									
UO - Unstable Operation																									



## WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY  
MONITORING PROGRAM  
MONTHLY REPORT

### **AMS26 CHRISTINA LAKE NOVEMBER 2023**

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

December 22, 2023

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CHRISTINA LAKE (AMS26)  
NOVEMBER 2023

MONTHLY SUMMARY

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2 (ppb) Average	687	32	33	99.86	30.5	0	7.8	0
H2S (ppb) Average	686	32	34	99.72	0.9	0	0.5	0
NO2 (ppb) Average	685	34	35	99.86	19.7	0	7.8	-
NO (ppb) Average	685	34	35	99.86	25.8	-	8.3	-
NOX (ppb) Average	685	34	35	99.86	44.3	-	16.1	-
Temperature 2 m (C) Average	719	0	1	99.86	9.5	-	1.8	-
Relative Humidity (%) Average	719	0	1	99.86	98.3	-	96.5	-
Wind Speed 10 m (km/h) Average	720	0	0	100	36	-	21	-
Wind Direction 10 m (deg) Average	720	0	0	100	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CHRISTINA LAKE (AMS26)  
 NOVEMBER 2023

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile						
					Min	P10	Q1	Median	Q3	P90	Max
SO2 (ppb) Average	687	0.91	2.5	-	0	0.1	0.1	0.3	0.8	1.9	30.5
H2S (ppb) Average	686	0.18	0.2	-	0	0	0.1	0.2	0.2	0.4	0.9
NO2 (ppb) Average	685	3.62	2.7	-	0.2	1.1	1.9	2.9	4.5	6.9	19.7
NO (ppb) Average	685	1.76	3.3	-	0	0	0.1	0.5	1.6	4.6	25.8
NOX (ppb) Average	685	5.38	5.7	-	0.2	1.3	2.1	3.6	6.6	11.8	44.3
Temperature 2 m (C) Average	719	-2.48	3.9	-	-14.7	-8	-4.2	-2.2	-0.2	1.7	9.5
Relative Humidity (%) Average	719	77.88	12.9	-	38.8	59.4	69.2	79.1	88.5	95.1	98.3
Wind Speed 10 m (km/h) Average	720	11.4	6	-	0	4	7	11	14	18	36
Wind Direction 10 m (deg) Average	720	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CHRISTINA LAKE (AMS26)  
 NOVEMBER 2023

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
SO2	07 Nov 2023 12:00	07 Nov 2023 12:00	1	Maintenance - reinitiated daily QA check
H2S	07 Nov 2023 13:00	07 Nov 2023 14:00	2	Maintenance - reinitiated daily QA check
NO2	07 Nov 2023 14:00	07 Nov 2023 14:00	1	Maintenance - reinitiated daily QA check
Relative Humidity, Temperature	29 Nov 2023 16:00	29 Nov 2023 16:00	1	Maintenance - sensor replaced



Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Christina Lake - November 2023

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 30.5 ppb on Nov 20 07:00	Maximum Daily Average: 7.8 ppb on Nov 20		Hours of Data:	687
Minimum Value: 0.0 ppb on Nov 1 03:00	Minimum Daily Average: 0.1 ppb on Nov 4		Hours of Missing Data:	33
Maximum Diurnal Average: 1.6 ppb at hour 10	Minimum Diurnal Average: 0.5 ppb at hour 23		Hours of Calibration:	32
Monthly Average: 0.91 ppb	Percentiles: P <sub>1</sub> = 0.0 P <sub>10</sub> = 0.1 Q <sub>1</sub> = 0.1 Median = 0.3 Q <sub>3</sub> = 0.8 P <sub>90</sub> = 1.9 P <sub>99</sub> = 7.6		Percent Operational Time:	99.9

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Nov	0.0	0.0	0.0	0.0	0.0	Z	0.2	0.0	0.1	0.2	0.1	0.6	1.7	1.7	1.3	0.7	0.1	0.2	0.2	0.8	1.2	1.3	0.2	0.2	0.5	1.7																						
2-Nov	Z	0.2	0.2	0.3	0.4	1.1	1.5	1.2	0.9	1.1	0.8	0.4	0.2	0.1	0.1	0.1	0.1	0.2	0.2	0.1	0.1	0.1	0.1	0.2	0.4	1.5																						
3-Nov	0.2	Z	0.2	0.1	0.2	0.2	0.1	0.1	0.0	0.3	0.9	0.5	0.5	0.3	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.2	0.9																						
4-Nov	0.0	0.1	Z	0.1	0.2	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.1	0.1	0.0	0.1	0.2																						
5-Nov	0.1	0.1	0.1	Z	0.1	0.0	0.1	0.1	0.0	0.1	0.0	0.1	0.1	0.0	0.2	0.3	0.1	0.1	0.0	0.1	0.0	0.1	0.0	0.0	0.1	0.3																						
6-Nov	0.1	0.1	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.2	0.4	0.4	1.3	0.6	0.7	0.6	0.6	0.1	0.1	0.2	0.1	0.1	0.1	0.3	1.3																						
7-Nov	0.1	0.2	0.1	0.3	0.2	0.2	0.2	0.2	0.3	0.3	0.3	M	0.2	0.4	0.4	0.5	0.4	0.3	0.2	0.1	0.1	0.3	0.3	0.2	0.3	0.5																						
8-Nov	0.1	0.1	0.3	0.2	0.6	Z	0.3	0.5	1.0	8.5	2.6	3.5	3.2	2.0	4.7	4.7	1.6	2.7	1.4	2.0	2.1	0.9	0.8	1.0	2.0	8.5																						
9-Nov	Z	0.9	0.7	0.7	0.3	0.3	0.2	0.3	0.4	0.5	0.8	2.1	3.4	3.1	1.2	0.3	0.4	0.3	0.5	0.2	0.2	1.8	2.3	5.5	1.1	5.5																						
10-Nov	5.7	Z	2.7	2.5	2.2	5.1	1.1	2.0	1.0	1.5	0.4	0.5	0.7	1.0	0.6	0.6	0.5	0.3	0.9	0.5	0.3	0.3	0.3	0.3	1.3	5.7																						
11-Nov	1.3	2.3	Z	2.8	0.3	0.2	0.3	0.2	0.4	0.3	0.4	0.3	1.0	1.2	0.7	0.7	0.9	0.6	0.7	1.1	0.3	0.1	0.1	0.1	0.7	2.8																						
12-Nov	0.4	0.6	0.4	Z	0.0	0.0	0.0	0.1	0.0	0.9	0.7	0.0	0.0	0.5	0.5	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.9																						
13-Nov	0.1	0.0	0.0	0.0	Z	0.0	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.2	0.2	0.1	0.2	0.2	0.5	0.3	0.1	0.5																						
14-Nov	0.6	1.9	0.9	0.9	0.6	Z	0.7	0.7	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.2	0.2	0.5	0.4	0.6	0.8	1.0	2.1	0.6	2.1																						
15-Nov	Z	1.4	1.2	0.8	1.5	0.4	0.4	0.3	0.3	0.2	1.0	5.2	3.1	1.0	1.8	1.3	0.4	0.3	0.4	0.3	0.1	0.2	0.3	0.4	1.0	5.2																						
16-Nov	0.9	Z	0.1	0.1	0.1	0.1	0.0	0.2	1.1	1.3	0.7	0.6	0.6	0.4	0.6	1.2	1.1	1.5	0.5	0.3	0.1	0.2	0.2	0.1	0.5	1.5																						
17-Nov	0.1	0.3	Z	0.2	0.1	0.1	0.1	0.2	0.1	0.1	0.6	1.0	0.2	0.2	0.2	0.1	0.3	0.4	0.7	0.5	0.1	0.1	0.0	0.2	0.3	1.0																						
18-Nov	0.2	0.1	0.0	Z	0.0	0.6	0.7	0.6	0.4	0.4	0.2	0.2	0.9	1.1	1.0	0.7	0.9	0.4	0.3	0.2	0.1	0.2	0.2	0.1	0.4	1.1																						
19-Nov	0.1	0.3	0.2	0.1	Z	0.2	0.3	0.2	0.2	0.2	0.3	1.7	3.0	2.4	3.4	2.5	0.8	0.3	0.3	0.3	0.3	1.0	1.3	0.7	0.9	3.4																						
20-Nov	0.7	0.9	0.9	7.3	22.3	Z	30.5	22.4	24.4	26.8	17.5	5.6	2.4	1.6	5.7	4.7	0.6	0.5	1.4	1.3	0.5	0.5	0.7	0.8	7.8	30.5																						
21-Nov	Z	0.4	0.3	0.2	0.3	0.2	0.1	0.2	0.3	0.2	0.2	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.3	0.2	0.2	0.1	0.2	0.4																						
22-Nov	0.1	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.2	0.4	0.4	0.5	0.2	0.2	0.1	0.1	0.2	0.1	0.1	0.2	0.2	0.2	0.5																						
23-Nov	0.6	0.4	Z	2.5	0.9	2.8	0.4	0.4	0.3	0.4	0.5	0.5	0.6	0.7	0.7	0.3	0.4	0.5	0.5	0.3	0.4	0.2	0.1	0.2	0.7	2.8																						
24-Nov	0.5	1.3	1.6	Z	1.8	0.7	0.3	0.2	0.2	0.6	0.5	0.2	0.2	0.8	1.0	0.5	1.6	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.6	1.8																						
25-Nov	0.0	0.0	0.0	0.6	Z	3.4	2.3	1.8	0.9	0.8	1.4	4.0	4.2	2.1	1.4	1.7	0.8	0.5	0.5	0.7	0.3	0.4	0.4	0.0	1.2	4.2																						
26-Nov	0.1	0.1	0.0	0.0	0.0	Z	0.0	0.1	0.4	0.1	4.9	1.8	0.9	1.6	1.4	3.9	2.0	0.7	0.7	0.8	0.6	0.1	0.3	0.1	0.9	4.9																						
27-Nov	Z	0.1	0.6	0.7	0.9	0.5	0.5	0.5	0.5	0.5	0.5	0.1	1.0	0.7	1.4	0.8	0.6	0.4	0.2	0.2	0.9	0.5	0.9	0.7	0.6	1.4																						
28-Nov	0.9	Z	0.2	0.1	0.1	0.1	0.1	0.0	0.1	0.1	0.3	1.0	1.2	1.6	1.3	0.3	0.2	0.3	0.2	0.2	0.7	0.6	1.1	0.8	0.5	1.6																						
29-Nov	2.6	1.2	Z	0.6	0.9	0.7	2.1	4.8	3.8	C	C	C	C	5.2	5.4	4.2	3.0	3.3	4.9	3.5	7.5	4.4	2.0	1.4	3.2	7.5																						
30-Nov	1.3	1.8	2.7	Z	1.9	2.1	1.2	1.1	0.7	0.4	2.6	4.5	1.6	1.1	1.0	0.2	0.1	0.1	0.3	0.1	0.3	0.2	0.4	0.3	1.1	4.5																						
																								0.7	0.6	0.5	0.9	1.3	0.8	1.5	1.3	1.3	1.6	1.3	1.3	1.1	1.1	1.2	1.1	0.6	0.5	0.5	0.5	0.6	0.5	0.5	0.5	Diurnal Average
																								5.7	2.3	2.7	7.3	22.3	5.1	30.5	22.4	24.4	26.8	17.5	5.6	4.2	5.2	5.7	4.7	3.0	3.3	4.9	3.5	7.5	4.4	2.3	5.5	Diurnal Maximum

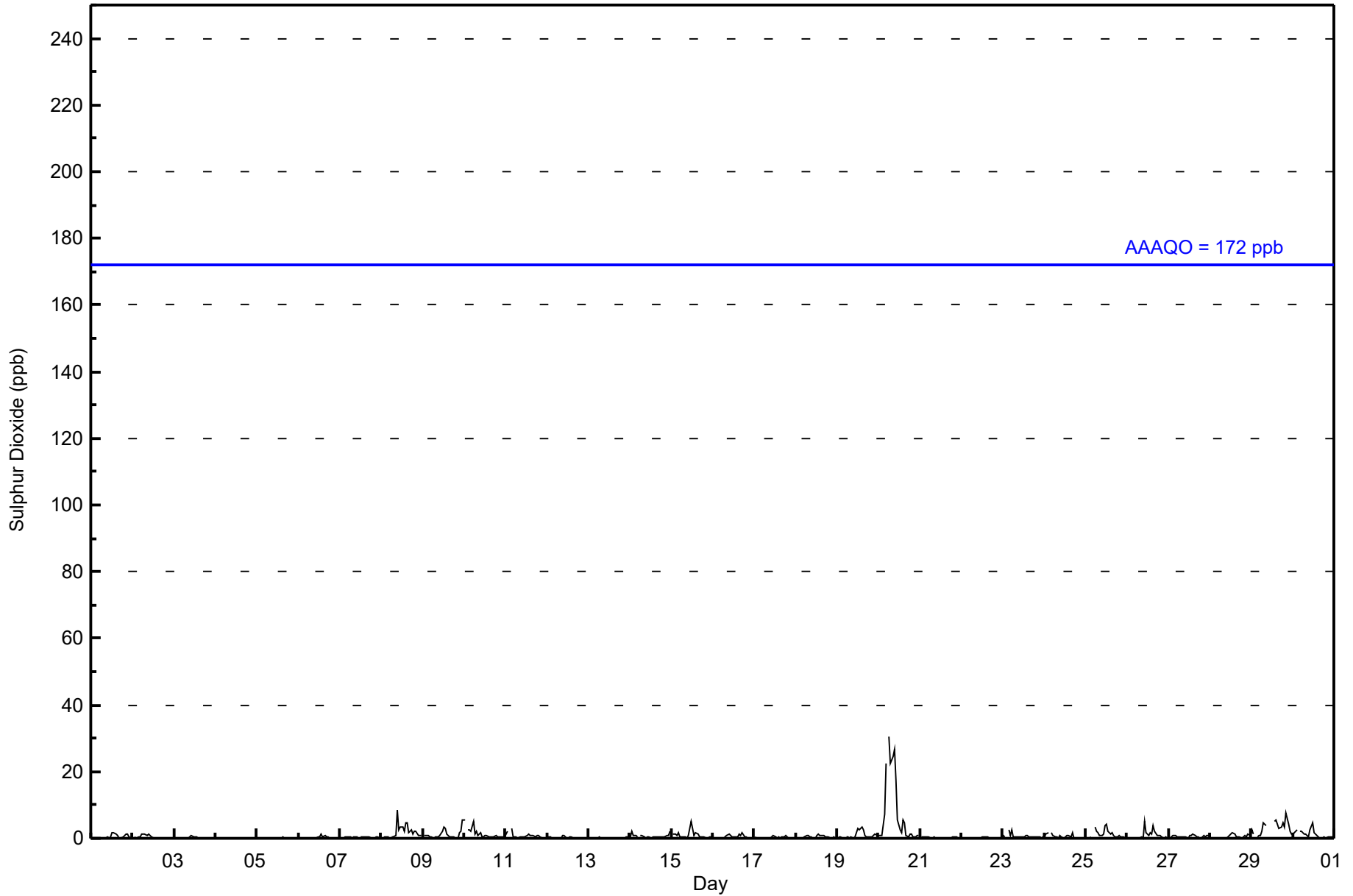
Z - zerospan      C - Calibration      M - Maintenance  
 Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 172 ppb    24-hr 48 ppb





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

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Christina Lake - November 2023**





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

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Christina Lake - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 10	681	99.13	99.13
11 - 20	1	0.15	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: 687

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Christina Lake - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 10	3	17	28	32	41	22	18	36	45	83	86	105	76	33	43	13	681
11 - 20	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	1	4	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
<b>Totals</b>	<b>3</b>	<b>17</b>	<b>28</b>	<b>32</b>	<b>41</b>	<b>22</b>	<b>18</b>	<b>36</b>	<b>45</b>	<b>83</b>	<b>86</b>	<b>105</b>	<b>76</b>	<b>35</b>	<b>47</b>	<b>13</b>	<b>687</b>

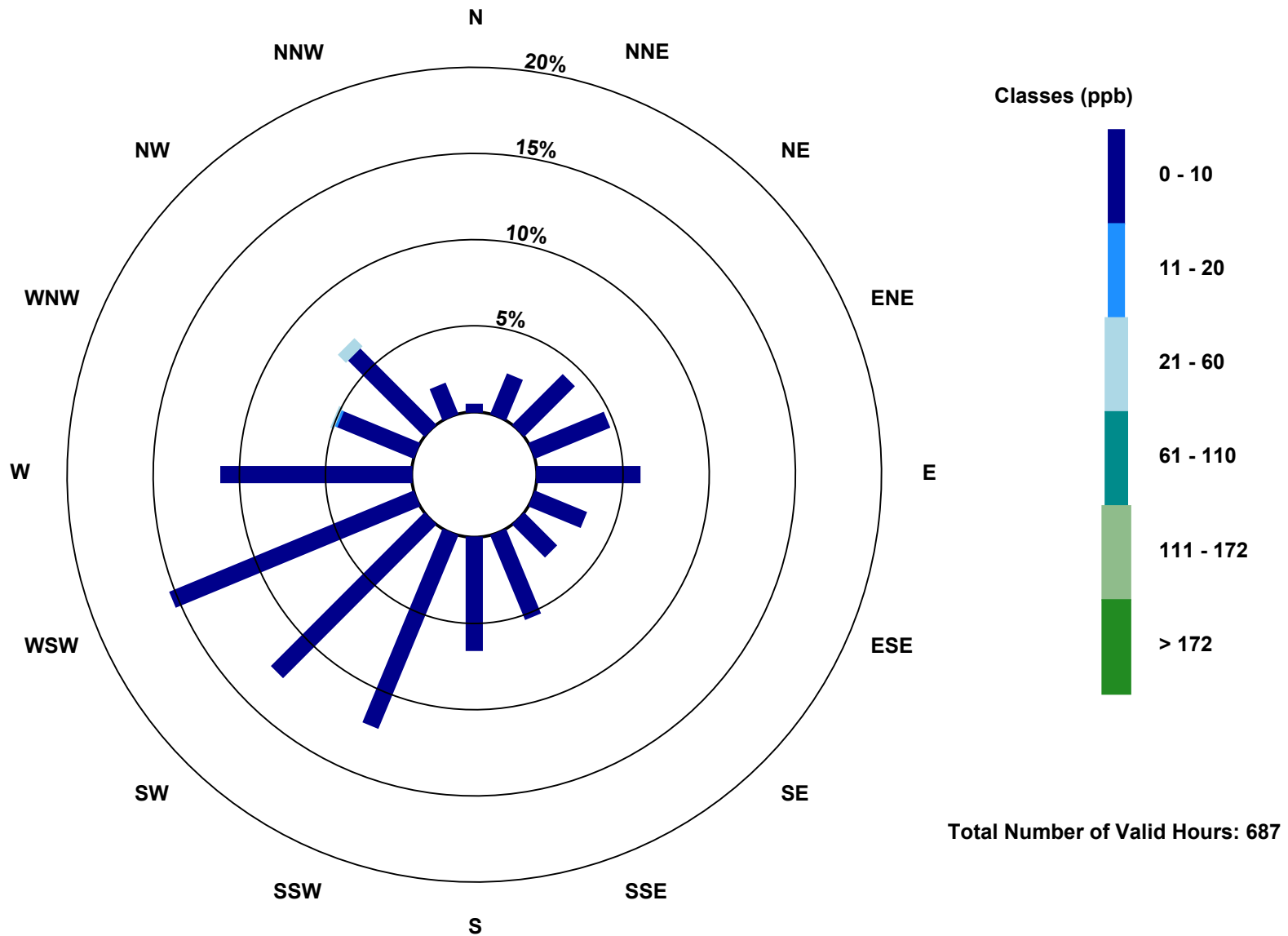
Total Number of Valid Hours: 687

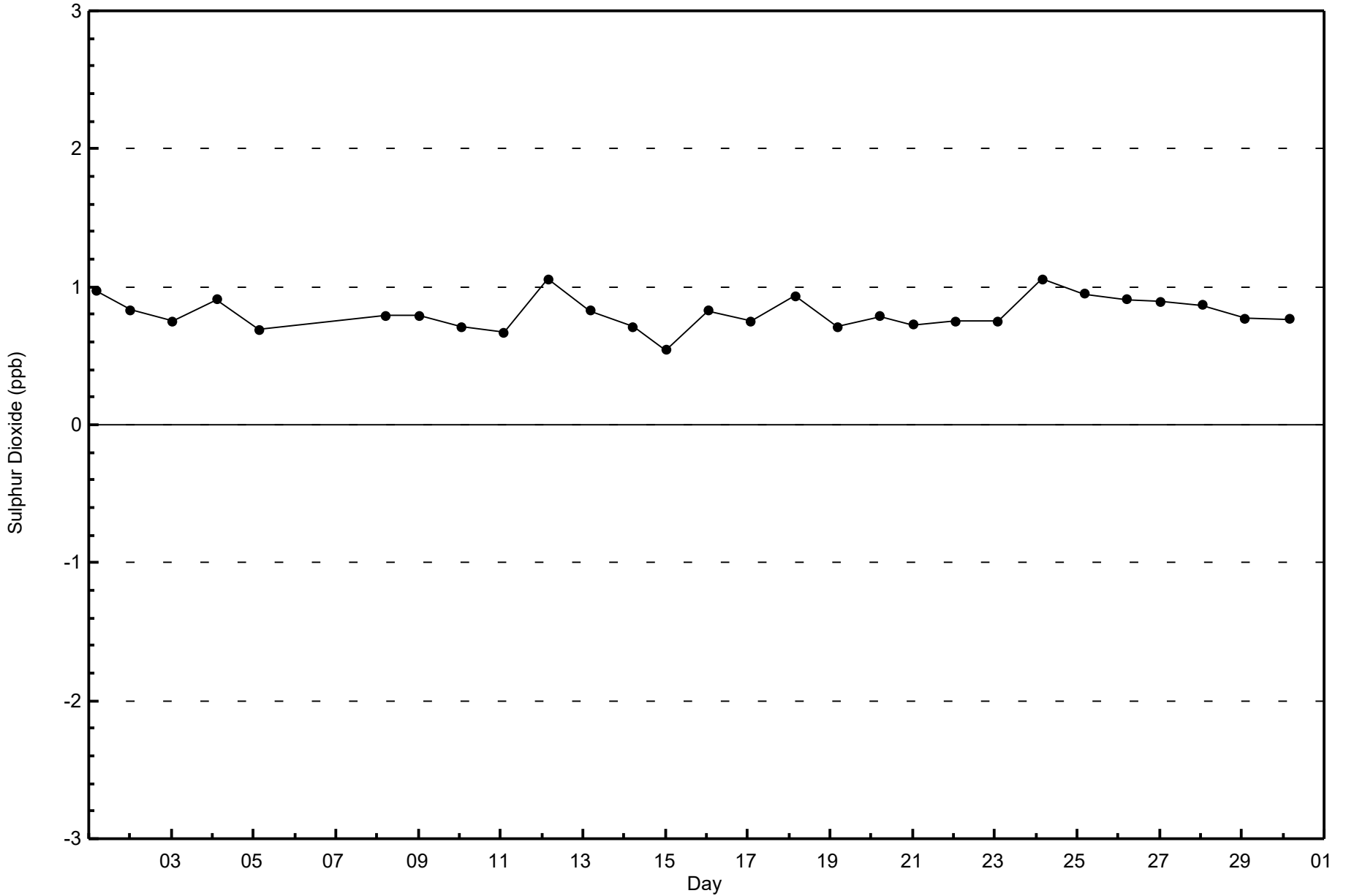
Total Number of Hours: 720

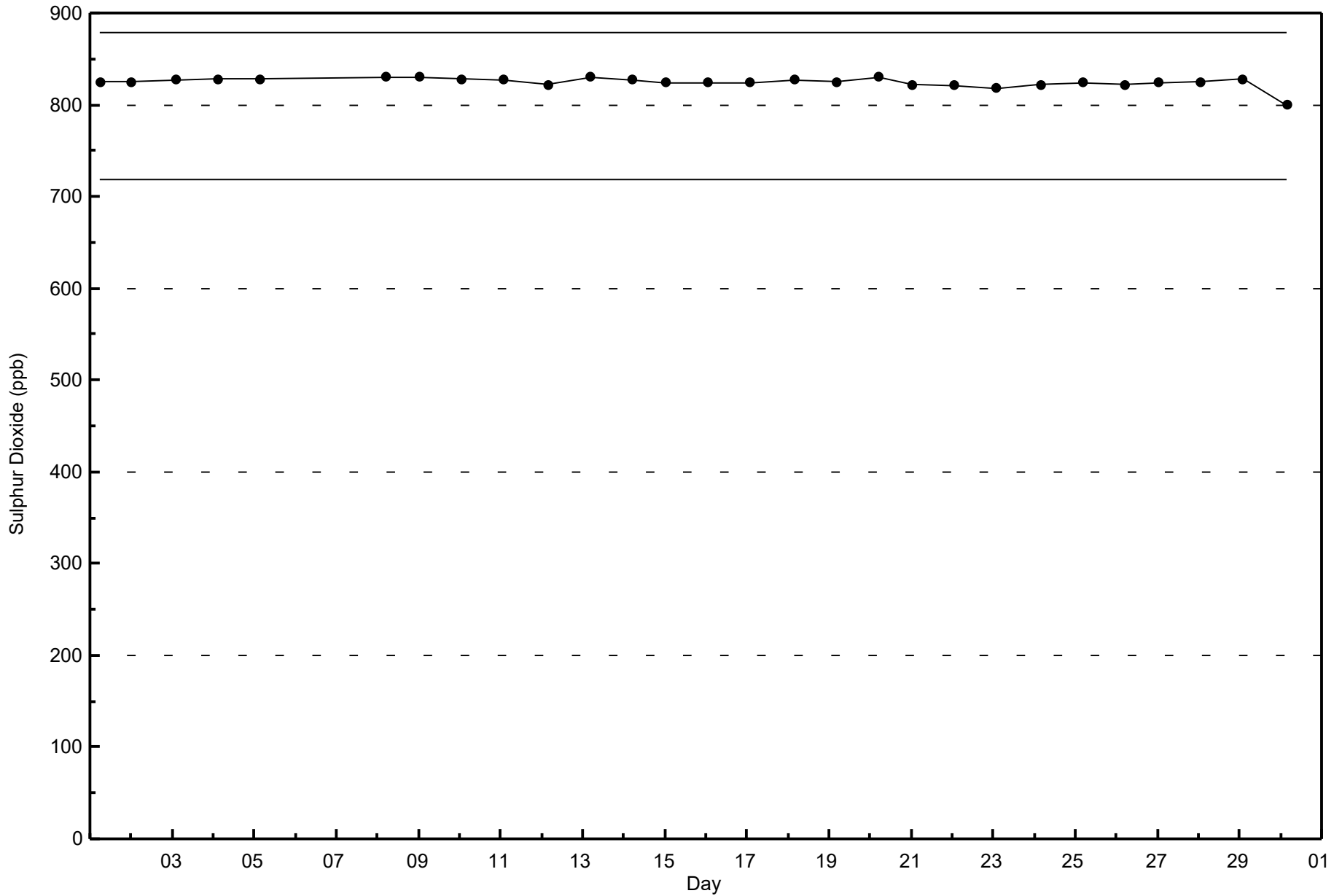


Wood Buffalo Environmental Association  
Wind Rose Nov 2023

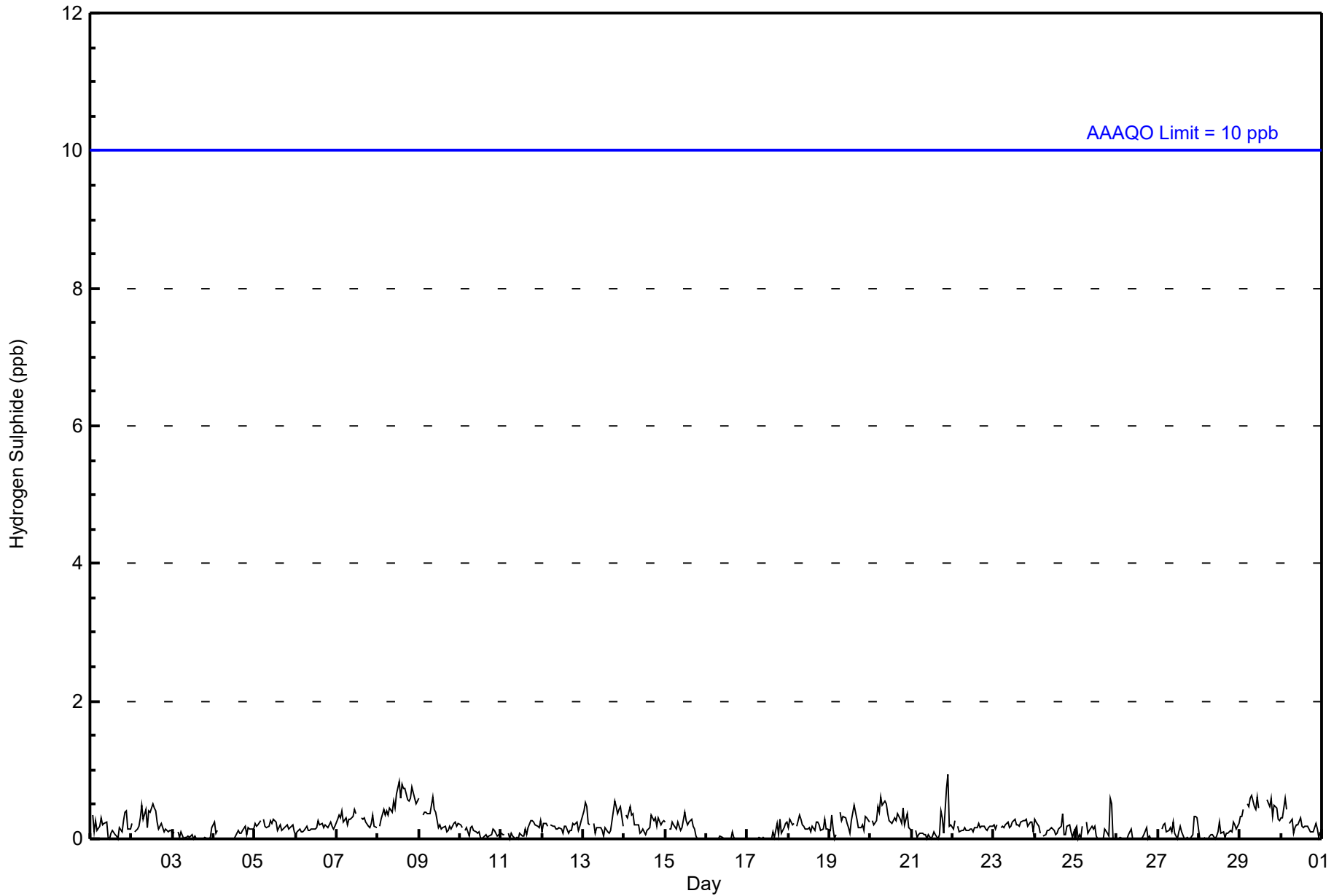
Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Christina Lake















**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Hydrogen Sulphide (H<sub>2</sub>S) - ppb  
Christina Lake - November 2023**

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

Total Number of Valid Hours: 686

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Hydrogen Sulphide (H<sub>2</sub>S) - ppb  
Christina Lake - November 2023**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	3	19	26	33	41	24	17	35	47	80	84	105	76	37	46	13	686
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	3	19	26	33	41	24	17	35	47	80	84	105	76	37	46	13	686

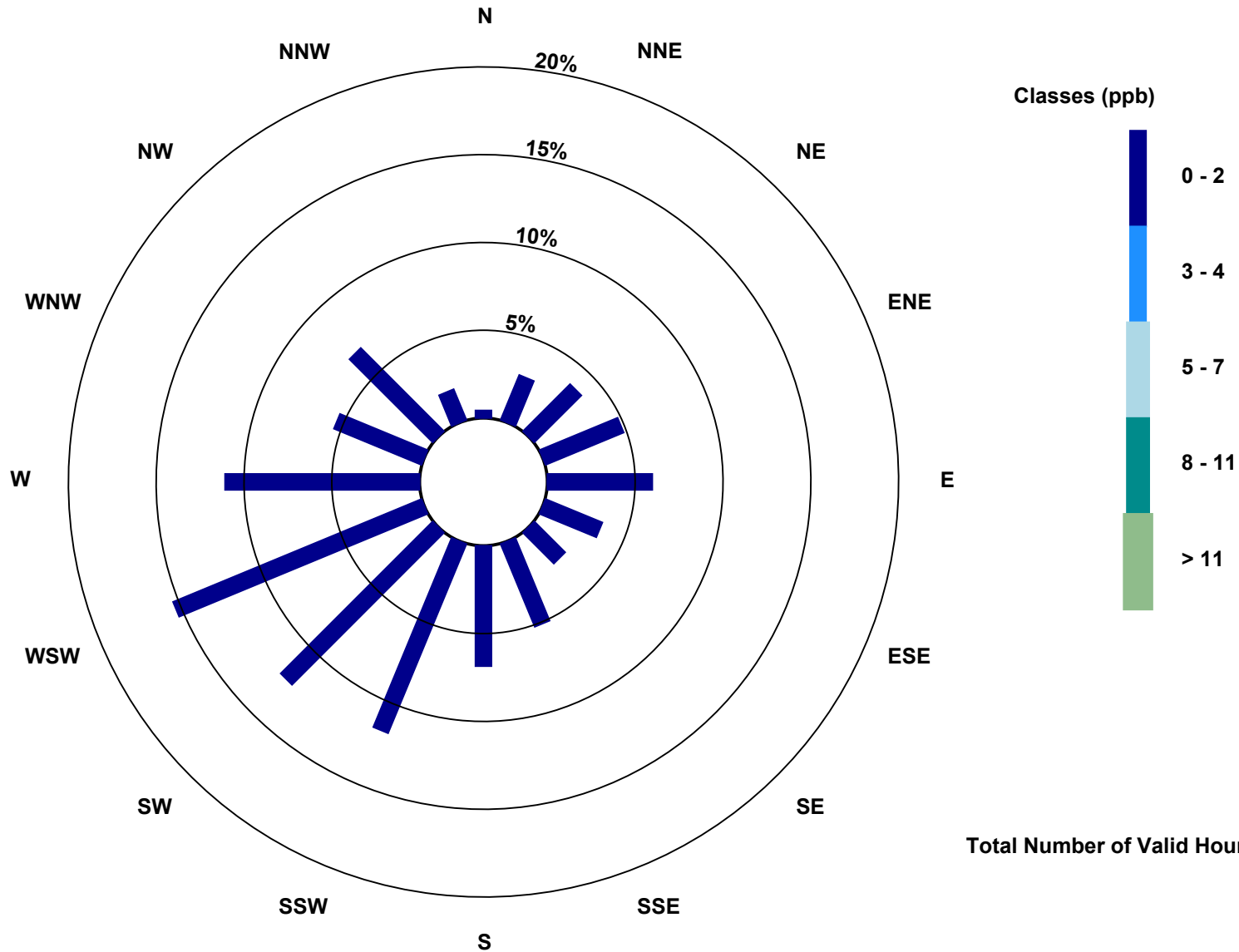
Total Number of Valid Hours: 686

Total Number of Hours: 720

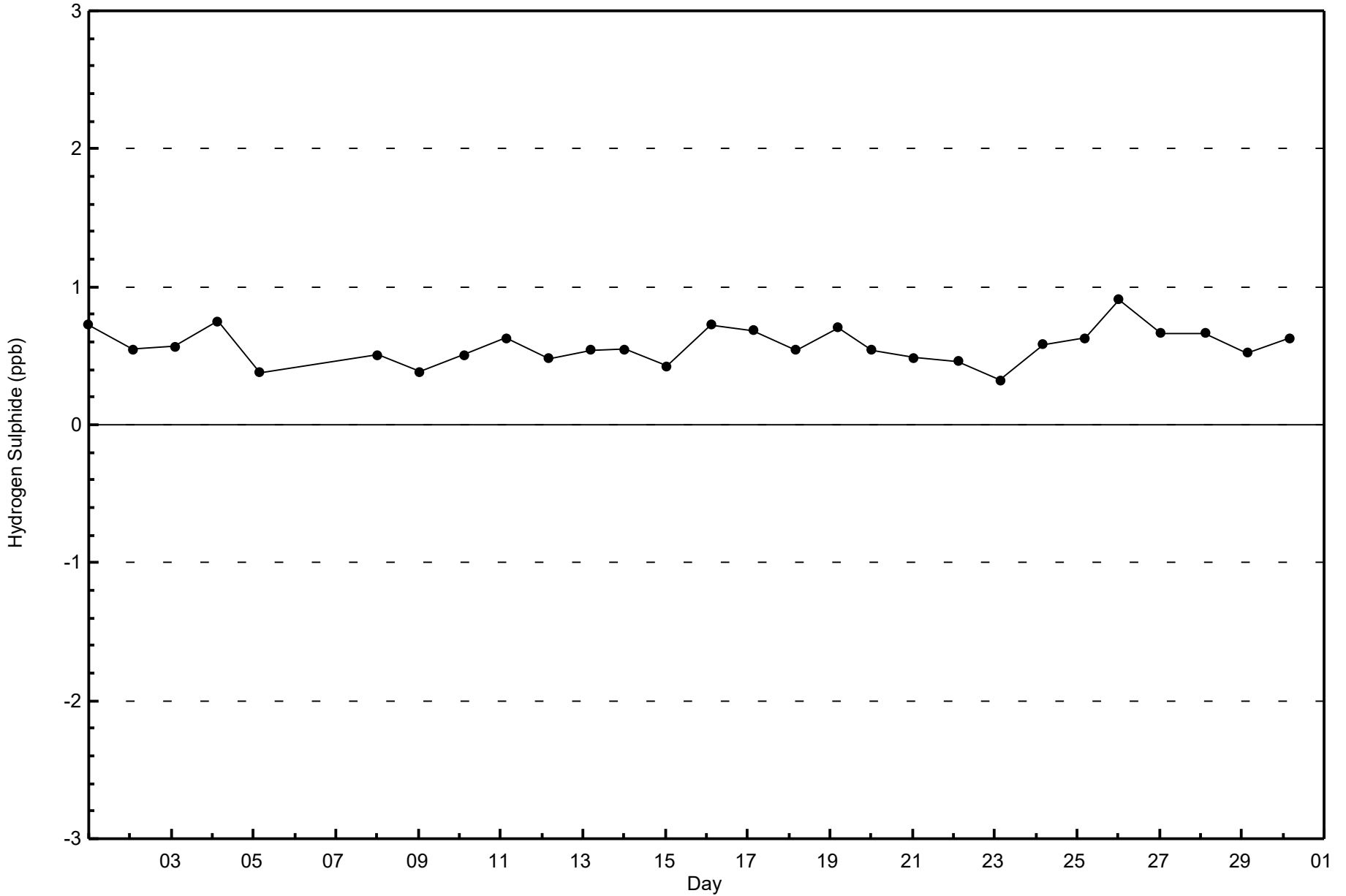


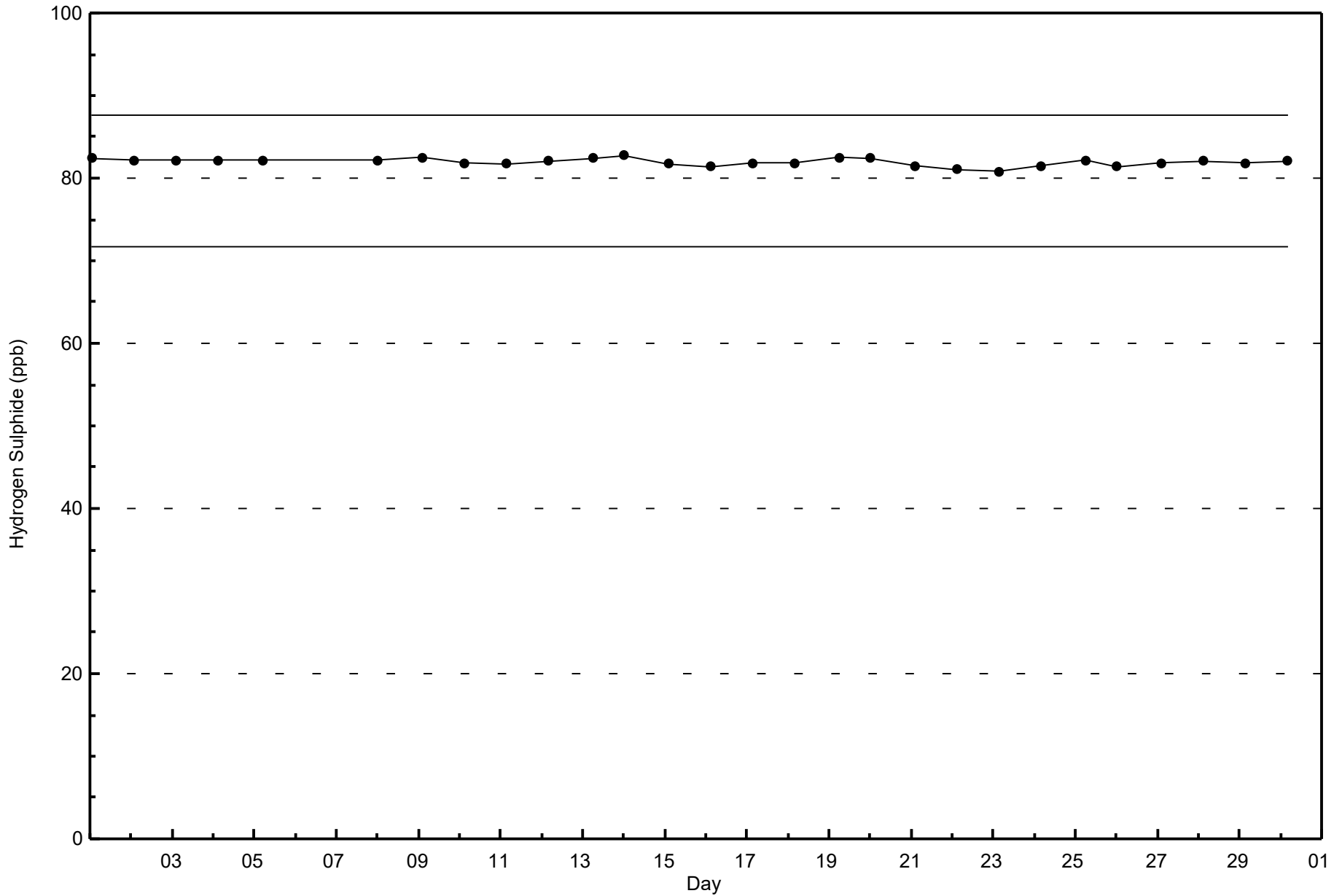
Wood Buffalo Environmental Association  
Wind Rose Nov 2023

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



Total Number of Valid Hours: 686



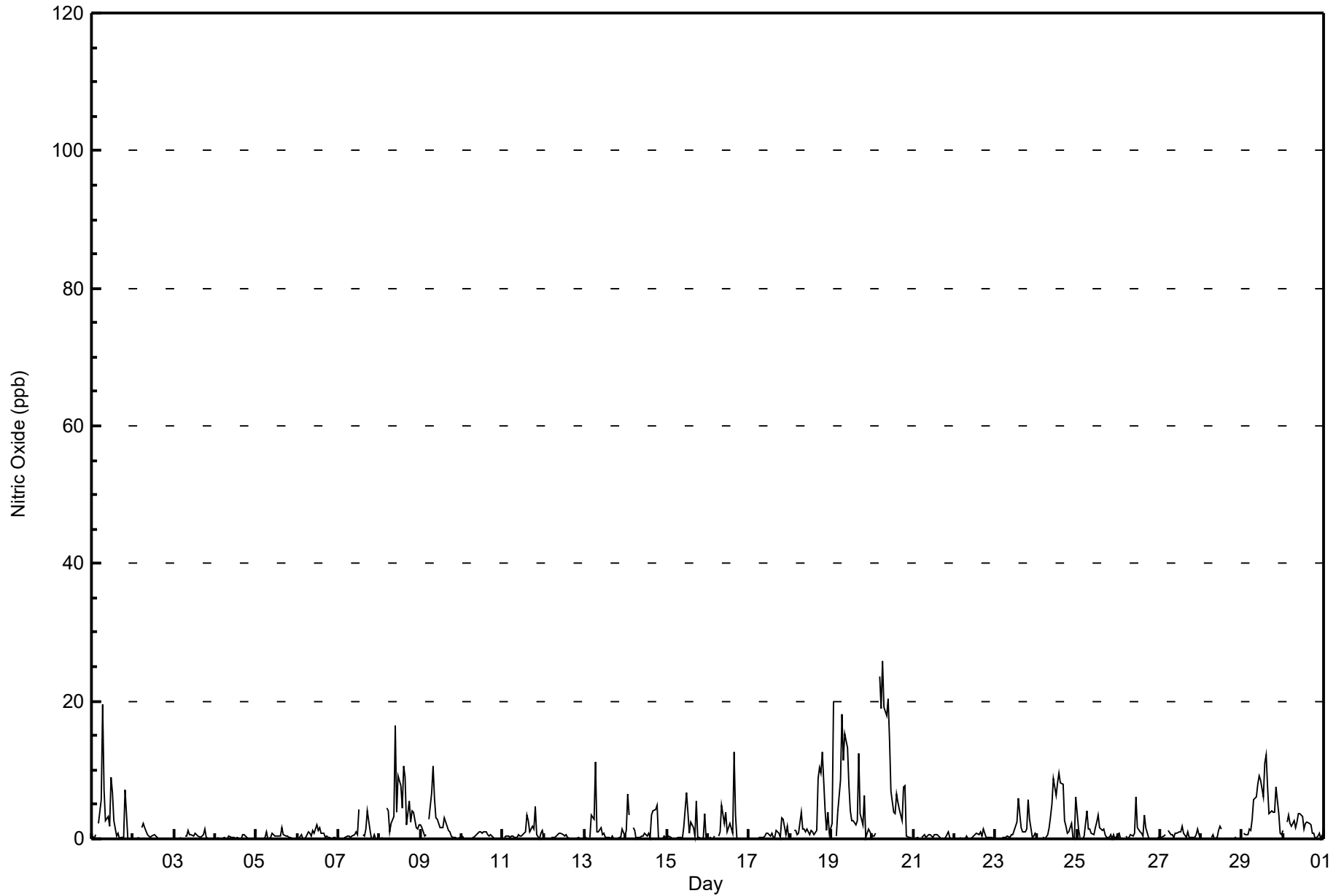






**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Nitric Oxide (NO) - ppb**  
**Christina Lake - November 2023**





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

**Nitric Oxide (NO) - ppb**  
**Christina Lake - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	683	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: 685

Total Number of Hours: 720





**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitric Oxide (NO) - ppb  
Christina Lake - November 2023**

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	18	27	33	41	23	15	36	46	83	83	100	78	38	46	13	683
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	2
41 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	3	18	27	33	41	23	15	36	46	83	83	100	78	39	47	13	685

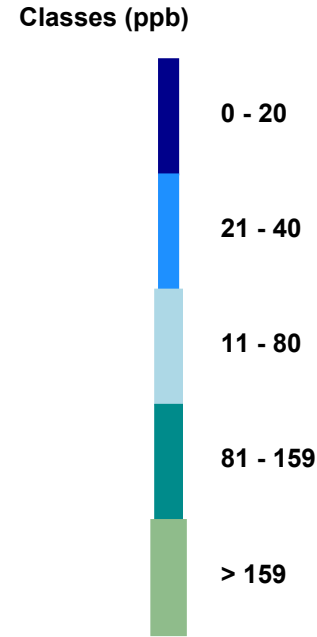
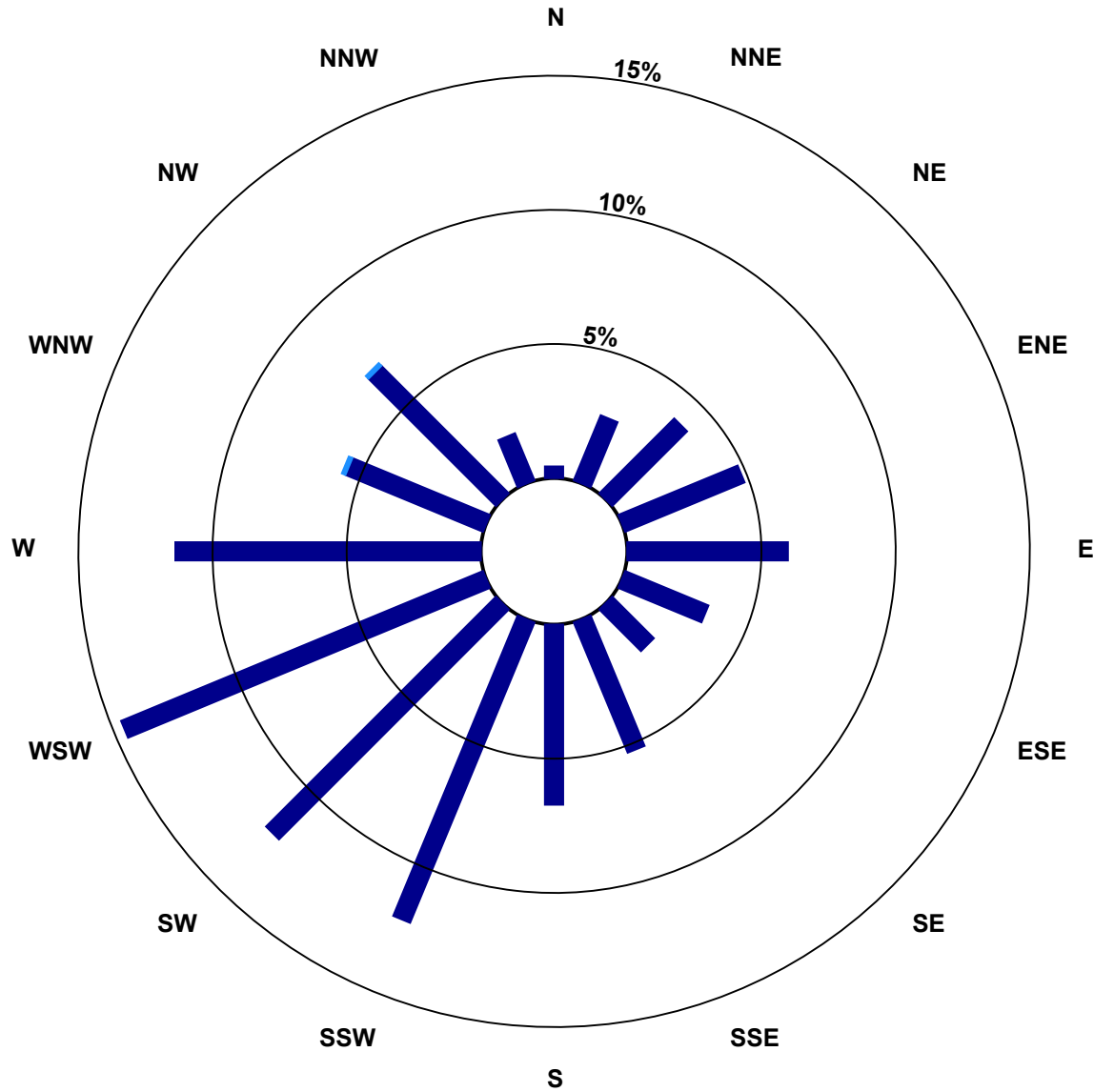
Total Number of Valid Hours: 685

Total Number of Hours: 720

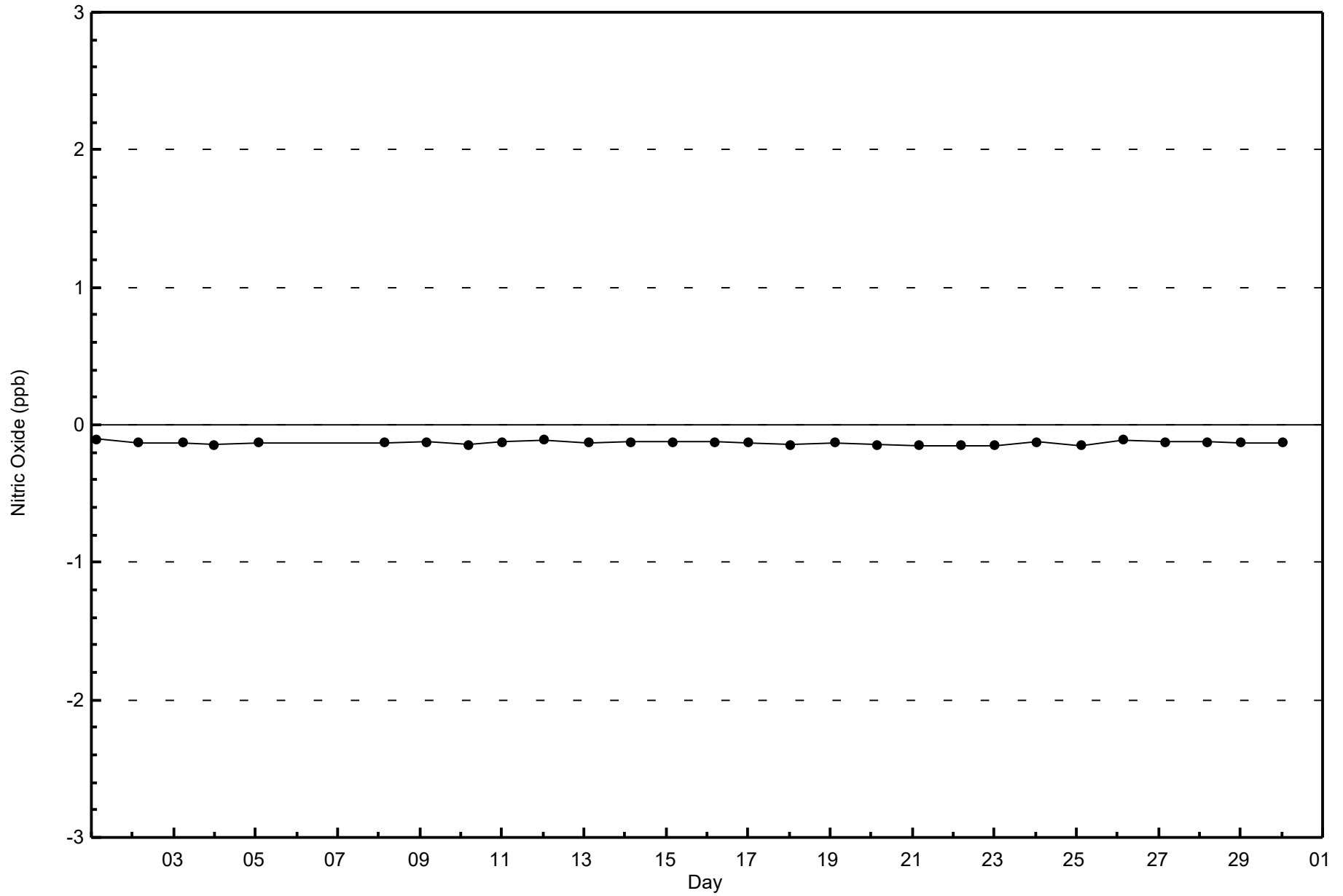


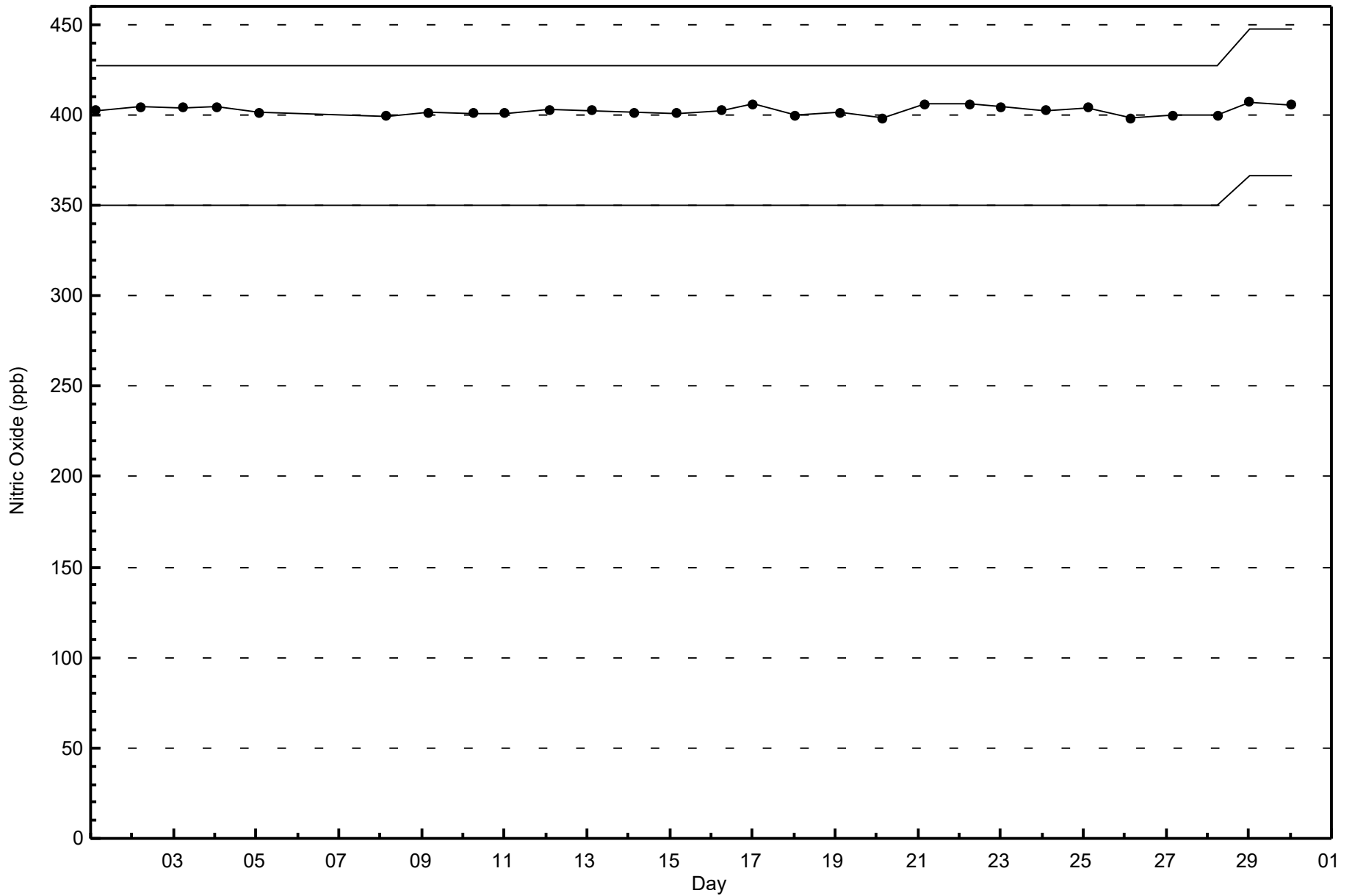
Wood Buffalo Environmental Association  
Wind Rose Nov 2023

Nitric Oxide (NO) - ppb  
Christina Lake



Total Number of Valid Hours: 685







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

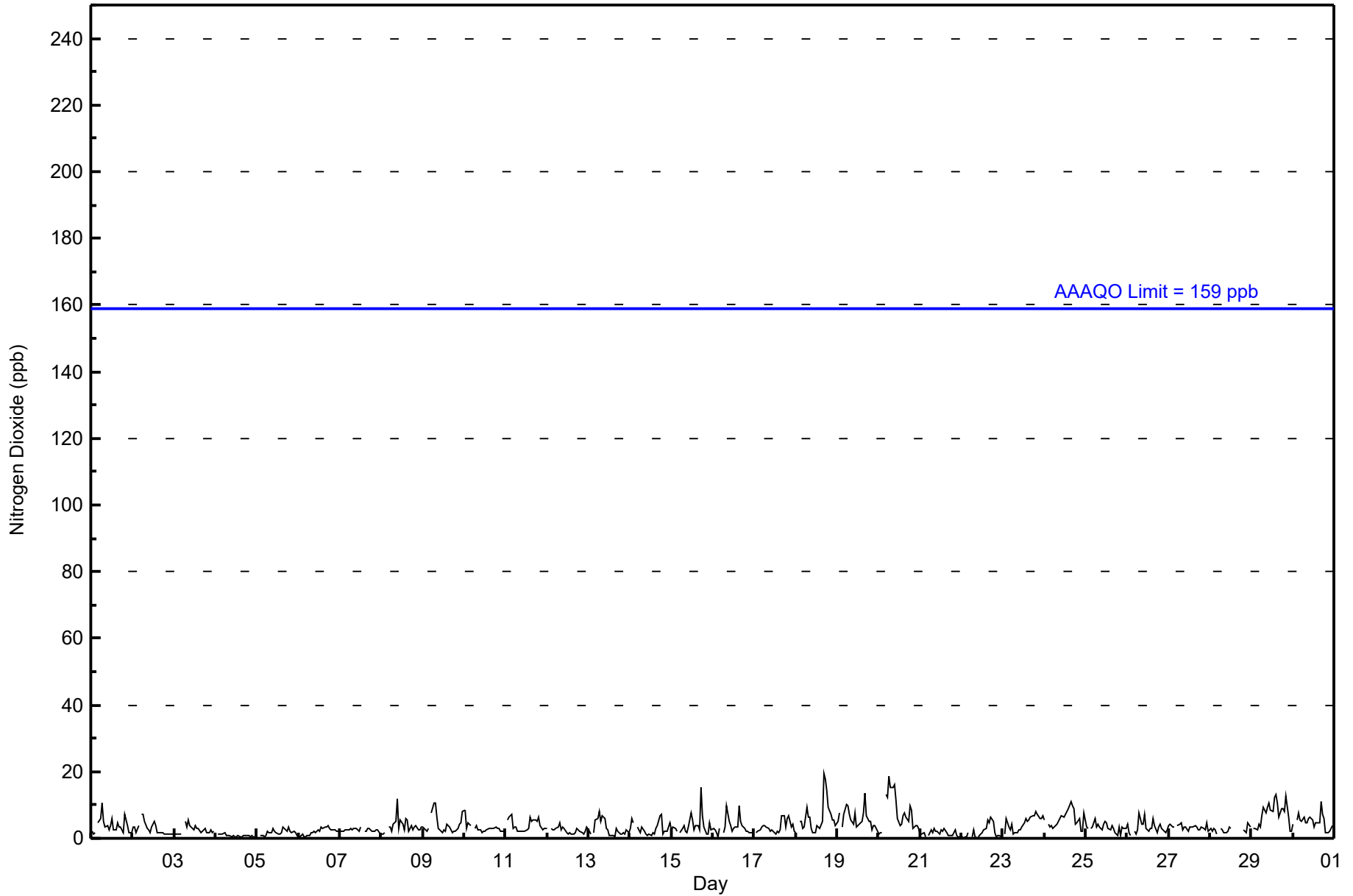
**Nitrogen Dioxide (NO<sub>2</sub>) - ppb**  
**Christina Lake - November 2023**

Number of Exceedences (AAAQO):		1-hr: 0		24-hr: 0		Hours in Service:		720																		
Maximum Value: 19.7 ppb on Nov 18 17:00		Maximum Daily Average: 7.8 ppb on Nov 20				Hours of Data:		685																		
Minimum Value: 0.2 ppb on Nov 22 10:00		Minimum Daily Average: 0.8 ppb on Nov 4				Hours of Missing Data:		35																		
Maximum Diurnal Average: 5.0 ppb at hour 17		Minimum Diurnal Average: 2.5 ppb at hour 2				Hours of Calibration:		34																		
Monthly Average: 3.62 ppb		Percentiles: P <sub>1</sub> = 0.4 P <sub>10</sub> = 1.1 Q <sub>1</sub> = 1.9 Median = 2.9 Q <sub>3</sub> = 4.5 P <sub>90</sub> = 6.9 P <sub>99</sub> = 14.4				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-Nov	2.3	1.3	1.5	Z	4.5	6.0	10.4	5.0	3.6	3.7	2.5	3.7	5.9	2.7	2.6	4.5	3.5	3.4	1.9	7.3	5.7	4.0	1.5	1.5	3.9	10.4
2-Nov	3.5	3.3	1.9	3.8	Z	7.0	7.3	5.1	2.8	2.6	1.7	3.3	5.2	4.0	1.9	1.5	1.7	1.5	1.4	1.3	1.1	1.4	1.1	1.1	2.8	7.3
3-Nov	1.1	1.3	1.2	1.3	1.4	Z	5.0	3.6	5.3	3.7	3.3	2.5	3.7	3.1	2.8	1.6	2.1	2.7	2.9	1.8	1.9	2.4	1.6	2.2	2.5	5.3
4-Nov	Z	1.4	1.4	1.1	1.3	1.6	1.0	0.7	0.8	0.6	0.7	0.6	0.5	0.7	0.6	0.6	0.9	0.9	0.8	0.7	0.6	0.8	0.6	0.6	0.8	1.6
5-Nov	0.5	Z	0.9	0.7	0.5	1.0	2.0	1.6	1.5	2.9	2.3	1.6	1.3	1.3	1.7	3.3	3.1	2.2	3.3	2.3	1.8	2.3	1.5	0.8	1.8	3.3
6-Nov	0.4	0.4	1.1	0.3	0.5	1.0	0.8	1.8	1.5	2.1	1.9	2.4	2.1	3.5	2.9	3.3	3.6	3.8	2.8	2.5	2.5	2.5	2.3	2.0	2.0	3.8
7-Nov	2.2	2.1	2.2	2.6	2.6	2.4	2.8	2.7	2.8	2.9	2.6	2.0	3.2	M	2.0	2.1	2.9	3.0	2.2	2.0	2.1	2.7	2.4	1.3	2.4	3.2
8-Nov	1.3	1.2	1.5	Z	3.2	3.6	2.0	4.4	5.2	11.8	2.9	5.3	4.1	2.5	6.1	5.5	2.1	3.7	2.4	3.3	4.0	2.4	2.4	3.4	3.7	11.8
9-Nov	3.6	3.0	2.0	3.0	Z	7.6	10.5	10.5	6.4	2.8	2.6	1.9	2.4	2.3	4.3	3.3	2.5	1.7	2.2	2.0	3.0	4.2	4.5	8.2	4.1	10.5
10-Nov	8.3	2.9	4.8	4.3	3.9	Z	3.0	3.8	2.5	2.6	1.9	2.1	2.0	2.4	2.9	3.0	3.0	3.0	3.6	2.8	2.9	2.3	2.3	2.2	3.2	8.3
11-Nov	Z	5.3	6.3	7.2	3.0	3.5	3.3	2.0	2.3	2.2	2.0	2.0	2.7	2.8	6.3	5.1	5.6	5.7	5.0	6.5	3.8	2.6	2.9	3.1	4.0	7.2
12-Nov	3.0	Z	3.1	2.5	2.4	2.8	3.4	4.5	2.4	3.4	2.8	1.8	1.3	1.9	1.2	1.2	1.7	3.0	2.6	2.0	1.9	1.3	2.0	3.5	2.4	4.5
13-Nov	2.1	1.4	Z	1.9	5.6	6.1	8.2	5.2	6.7	5.8	3.1	2.6	0.9	0.8	0.8	0.6	3.1	2.0	1.2	1.3	1.8	1.1	2.6	1.5	2.9	8.2
14-Nov	2.8	5.9	4.6	Z	3.2	2.5	1.7	3.2	2.3	1.3	1.0	1.1	1.0	1.6	1.3	3.0	3.8	6.6	7.0	1.4	2.0	2.0	3.5	4.6	2.9	7.0
15-Nov	2.6	3.6	2.8	2.0	Z	1.8	3.0	3.7	2.0	1.5	3.2	7.8	5.6	2.4	3.9	4.0	2.5	15.1	6.8	3.5	1.3	1.4	4.5	2.4	3.8	15.1
16-Nov	3.1	2.7	1.8	0.6	2.8	Z	1.9	3.4	9.7	5.2	3.7	2.3	2.9	3.3	3.4	9.9	5.2	3.9	2.9	2.3	2.1	1.7	1.7	1.6	3.4	9.9
17-Nov	Z	1.8	2.0	2.7	3.6	4.0	3.8	3.6	3.0	2.3	2.6	2.1	1.3	2.1	1.5	2.7	6.6	6.9	3.2	5.8	6.7	3.3	4.2	2.2	3.4	6.9
18-Nov	1.8	Z	5.0	5.1	2.9	3.5	9.5	6.5	6.2	3.1	1.6	1.9	3.7	3.5	2.8	5.1	19.7	18.0	14.3	9.4	7.0	5.5	5.6	4.0	6.3	19.7
19-Nov	4.9	7.5	Z	3.3	7.4	10.1	9.6	7.2	5.7	4.4	7.5	3.5	4.0	4.3	5.2	7.5	13.6	6.7	5.1	5.2	2.5	3.7	3.8	2.0	5.9	13.6
20-Nov	1.4	1.6	1.9	Z	13.0	12.1	18.5	15.3	15.4	16.3	11.4	6.0	4.0	4.4	6.8	7.8	6.3	4.9	9.6	8.5	3.1	4.0	3.9	3.0	7.8	18.5
21-Nov	1.1	1.3	1.7	0.6	Z	0.9	2.5	1.5	2.9	2.0	2.2	1.3	2.7	2.2	3.0	1.9	0.9	0.7	0.7	1.0	2.7	1.0	0.6	0.5	1.6	3.0
22-Nov	0.3	0.2	0.3	0.4	1.5	Z	0.4	2.7	0.3	0.2	0.7	1.3	1.8	2.7	3.1	5.7	4.8	6.2	5.2	1.6	0.6	0.7	0.7	0.4	1.8	6.2
23-Nov	Z	1.3	5.8	3.4	2.6	4.1	1.3	1.5	1.5	2.7	2.5	3.4	4.6	5.8	5.2	5.4	6.3	6.6	6.7	8.1	7.1	6.0	6.1	6.7	4.6	8.1
24-Nov	5.4	Z	4.4	3.3	3.7	2.8	3.8	4.2	5.0	5.9	6.9	6.3	7.2	8.1	8.7	11.0	9.9	8.9	4.3	4.7	5.8	2.1	2.2	7.7	5.8	11.0
25-Nov	3.4	3.0	Z	3.0	3.2	6.1	3.5	4.3	3.5	2.5	4.2	5.0	4.8	2.9	2.7	3.8	3.1	1.5	1.0	3.3	0.9	3.3	3.1	3.0	3.3	6.1
26-Nov	4.4	1.5	0.9	Z	2.1	1.1	2.6	7.8	4.3	4.1	7.2	3.0	2.3	3.0	3.1	6.1	4.0	1.7	3.6	4.4	3.1	2.2	1.5	2.7	3.3	7.8
27-Nov	3.8	4.4	3.6	3.6	Z	3.8	4.1	4.7	2.5	3.2	3.3	2.3	3.5	3.5	3.2	3.7	3.6	2.7	2.6	3.3	2.9	2.4	4.5	2.2	3.4	4.7
28-Nov	2.9	2.0	2.9	2.6	1.3	Z	2.9	2.4	1.5	1.5	2.1	3.2	2.8	C	C	C	C	C	C	2.7	2.3	1.9	4.8	3.4	--	4.8
29-Nov	Z	3.1	3.0	2.4	4.1	3.5	6.8	9.5	7.8	9.4	10.4	8.6	7.9	12.1	13.2	10.7	6.5	8.8	8.7	8.1	12.8	6.5	2.0	2.1	7.3	13.2
30-Nov	4.2	Z	5.7	7.7	5.7	5.0	6.3	4.7	4.5	5.8	6.5	5.4	3.4	4.7	4.6	4.8	11.2	7.0	5.8	1.9	1.6	2.0	3.1	4.0	5.0	11.2
																								Diurnal Average		
																								Diurnal Maximum		
																								2.8 2.5 2.8 2.8 3.4 4.2 4.7 4.6 4.1 4.0 3.6 3.2 3.3 3.4 3.7 4.4 5.0 4.9 4.1 3.7 3.3 2.7 2.8 2.8		
																								8.3 7.5 6.3 7.7 13.0 12.1 18.5 15.3 15.4 16.3 11.4 8.6 7.9 12.1 13.2 11.0 19.7 18.0 14.3 9.4 12.8 6.5 6.1 8.2		
Z - zerospan      C - Calibration      M - Maintenance																										
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 159 ppb																										



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

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb**  
**Christina Lake - November 2023**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Christina Lake - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	685	100.00	100.00
21 - 40	0	0.00	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Christina Lake - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 20	3	18	27	33	41	23	15	36	46	83	83	100	78	39	47	13	685
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	<b>3</b>	<b>18</b>	<b>27</b>	<b>33</b>	<b>41</b>	<b>23</b>	<b>15</b>	<b>36</b>	<b>46</b>	<b>83</b>	<b>83</b>	<b>100</b>	<b>78</b>	<b>39</b>	<b>47</b>	<b>13</b>	<b>685</b>

Total Number of Valid Hours: 685

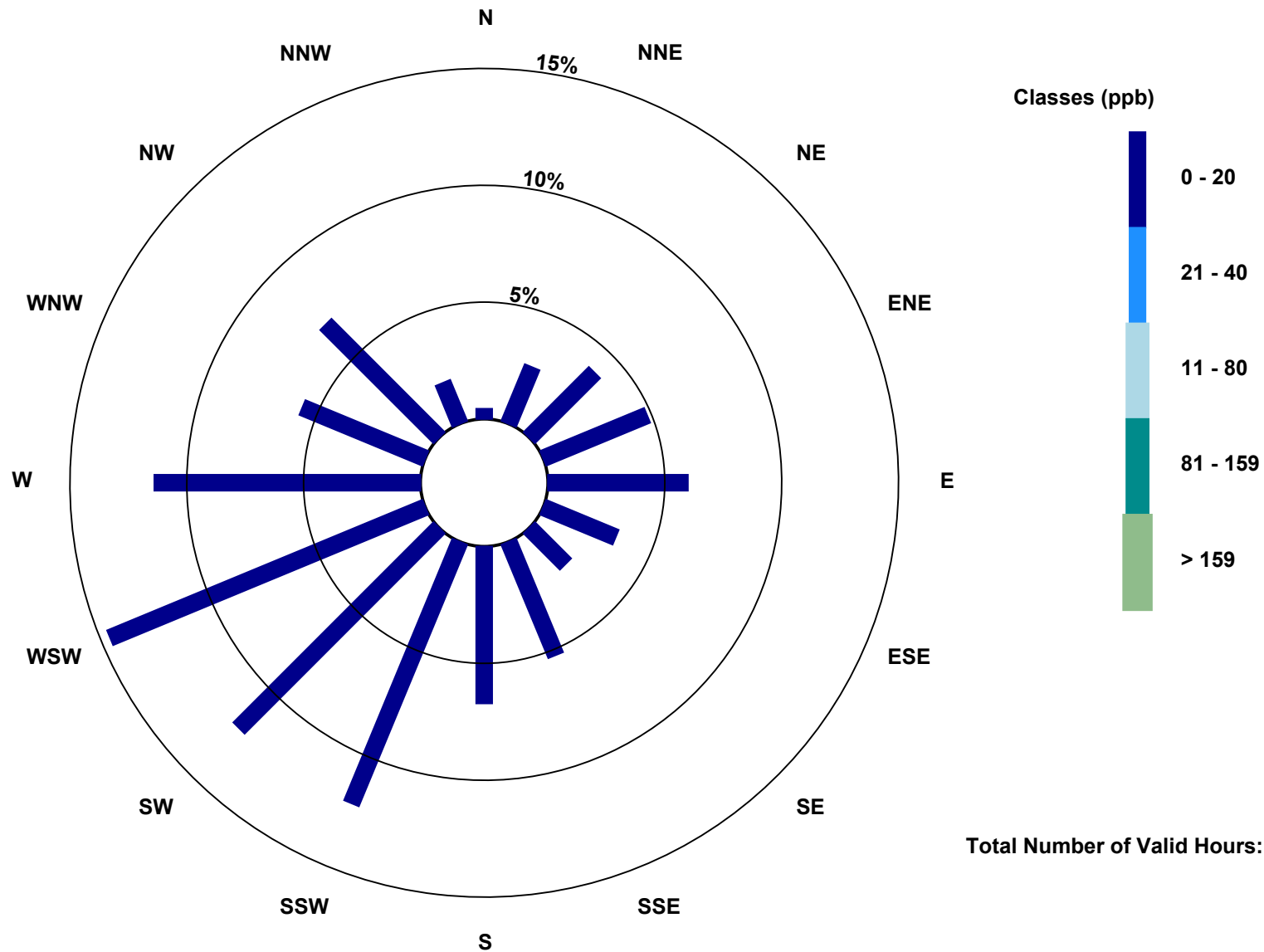
Total Number of Hours: 720

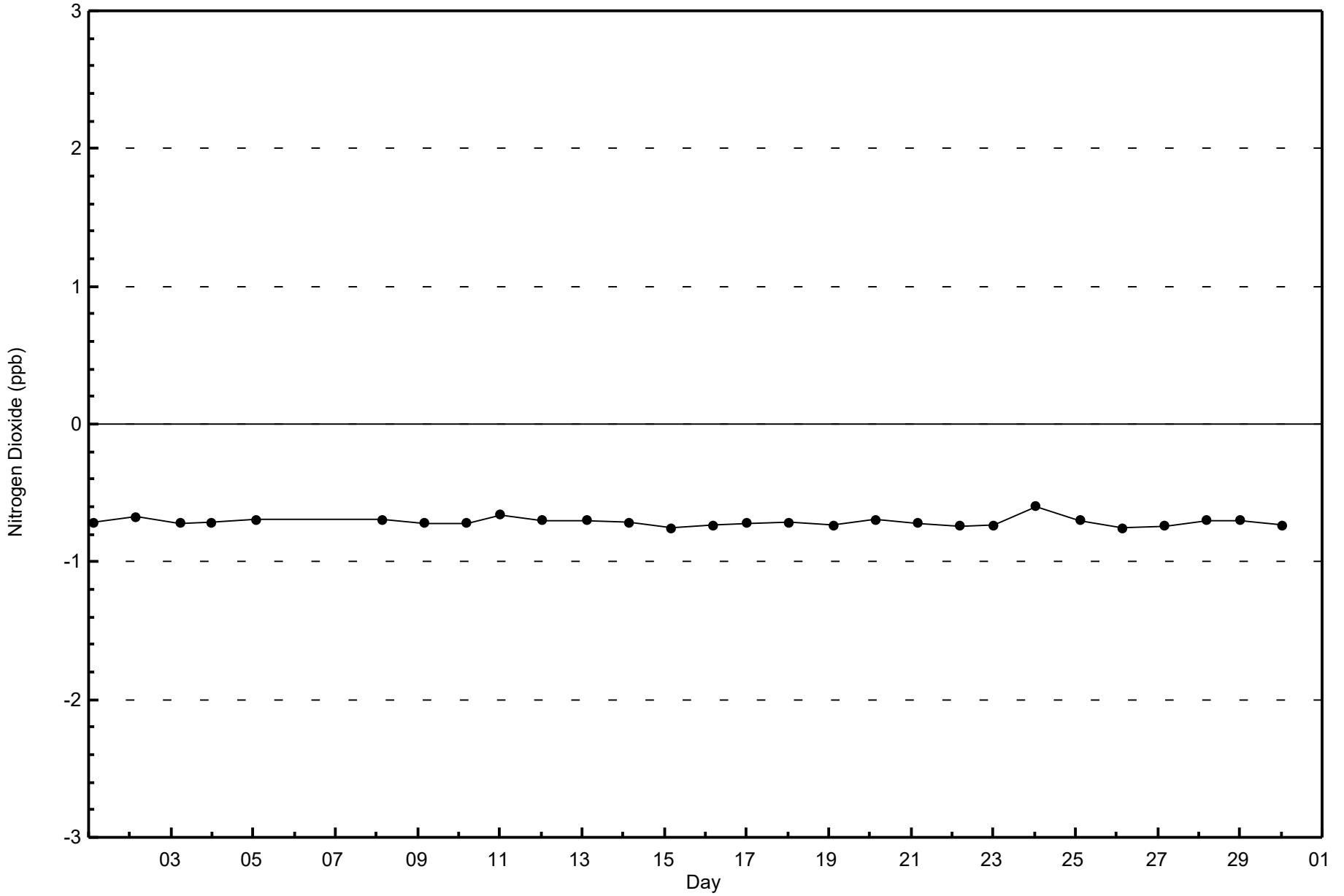


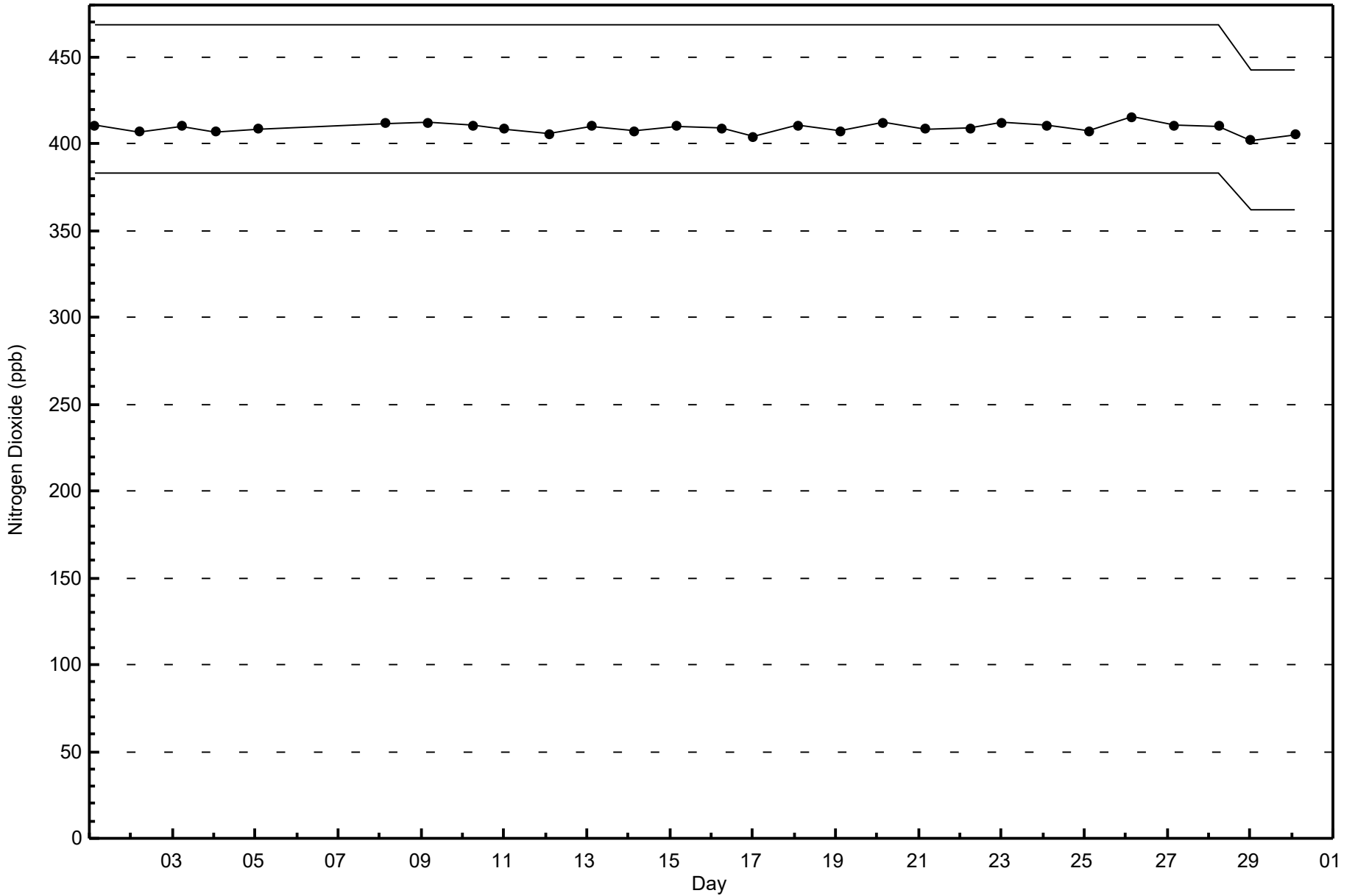


Wood Buffalo Environmental Association  
Wind Rose Nov 2023

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









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

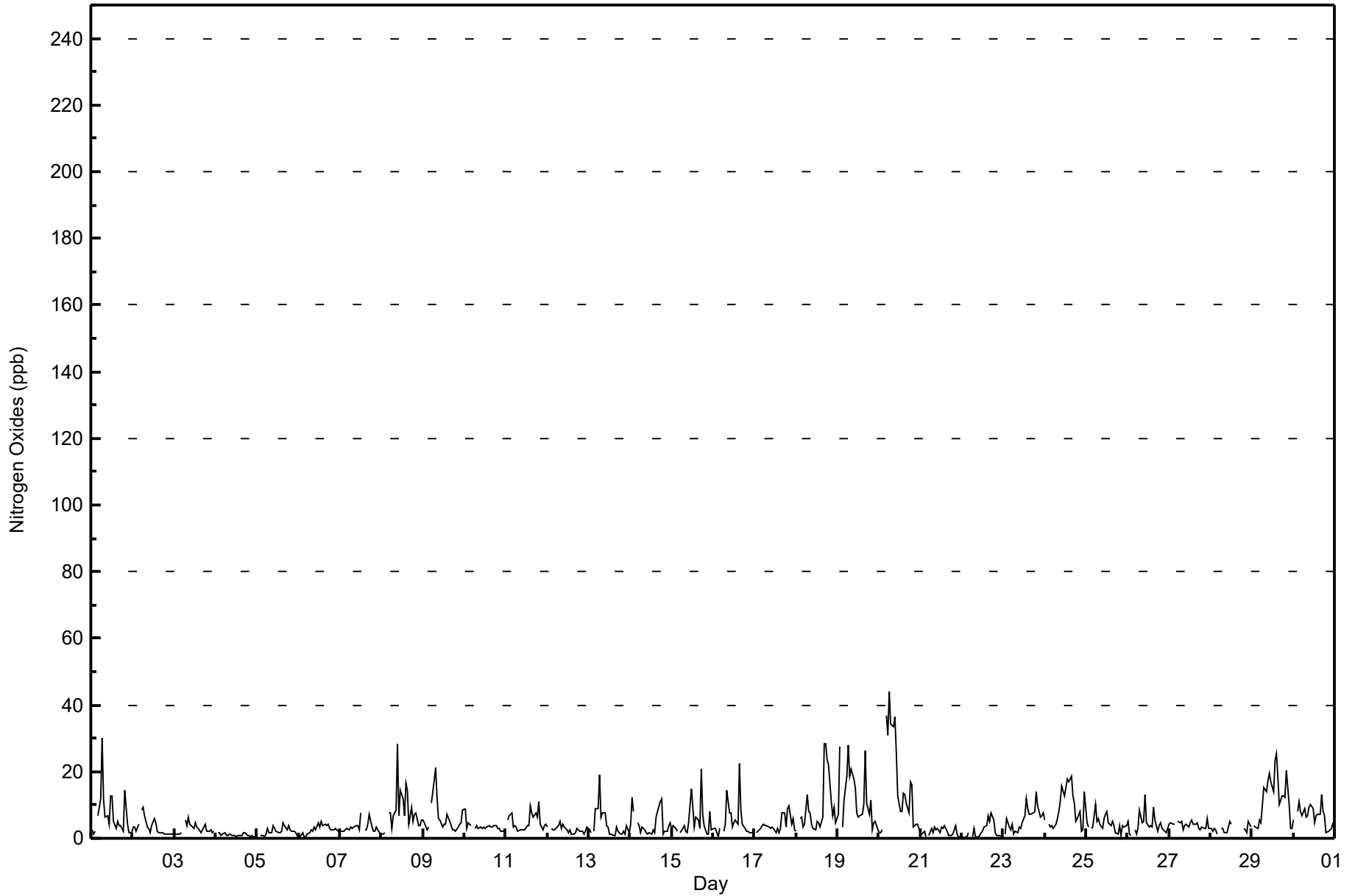
**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Christina Lake - November 2023**

Maximum Value: 44.3 ppb on Nov 20 07:00      Maximum Daily Average: 16.1 ppb on Nov 20																						Hours in Service: 720 Hours of Data: 685																											
Minimum Value: 0.2 ppb on Nov 22 02:00      Minimum Daily Average: 1.0 ppb on Nov 4 Maximum Diurnal Average: 8.1 ppb at hour 7      Minimum Diurnal Average: 3.1 ppb at hour 22 Monthly Average: 5.38 ppb      Percentiles: P <sub>1</sub> = 0.4 P <sub>10</sub> = 1.3 Q <sub>1</sub> = 2.1 Median = 3.6 Q <sub>3</sub> = 6.6 P <sub>90</sub> = 11.8 P <sub>99</sub> = 28.7																						Hours of Missing Data: 35 Hours of Calibration: 34 Percent Operational Time: 99.9																											
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Nov	2.7	1.4	2.0	Z	6.8	11.8	29.9	12.0	6.2	6.9	4.3	12.6	12.7	5.2	3.1	5.3	3.6	3.7	2.1	14.4	9.4	4.1	1.5	1.5	7.1	29.9																							
2-Nov	3.6	3.4	2.0	4.0	Z	8.5	9.5	6.8	3.4	3.0	1.9	3.7	5.9	4.5	2.0	1.6	1.7	1.5	1.4	1.3	1.1	1.4	1.1	1.1	3.2	9.5																							
3-Nov	1.1	1.3	1.2	1.4	1.5	Z	5.4	4.0	6.5	4.3	3.9	2.9	4.5	3.6	3.2	1.8	2.5	3.3	4.3	2.0	2.0	2.5	1.7	2.3	2.9	6.5																							
4-Nov	Z	1.7	1.5	1.1	1.4	1.8	1.0	0.7	1.2	0.8	0.8	0.7	0.6	0.8	0.7	0.7	1.6	1.5	0.9	0.7	0.6	0.9	0.6	0.6	1.0	1.8																							
5-Nov	0.5	Z	1.0	0.8	0.5	1.2	3.0	1.6	1.7	3.8	2.9	2.0	1.7	1.7	2.2	4.9	3.8	2.7	3.7	2.5	2.1	2.3	1.5	0.8	2.1	4.9																							
6-Nov	0.4	0.4	1.7	0.3	0.5	1.2	1.8	2.6	2.0	3.3	2.7	4.5	3.2	5.1	3.8	4.2	3.9	4.2	3.0	2.7	2.5	2.8	2.4	2.0	2.6	5.1																							
7-Nov	2.2	2.1	2.2	2.6	2.9	2.7	3.3	3.0	3.2	3.6	3.6	2.6	7.5	M	2.5	2.5	4.3	7.0	3.5	2.1	2.2	3.3	2.4	1.3	3.2	7.5																							
8-Nov	1.4	1.3	1.7	Z	7.7	7.6	3.0	6.7	8.5	28.2	6.7	14.5	11.9	6.9	16.7	14.5	4.2	9.1	4.9	7.3	7.8	4.0	3.9	5.5	8.0	28.2																							
9-Nov	5.6	4.6	2.4	3.6	Z	10.5	17.2	21.1	12.4	5.8	5.4	3.6	4.1	4.0	7.4	5.2	3.8	2.6	2.6	2.2	3.3	4.3	4.6	8.5	6.3	21.1																							
10-Nov	8.8	2.9	4.9	4.4	4.0	Z	3.2	3.9	2.8	3.4	2.9	3.2	2.9	3.5	4.0	3.5	3.5	3.7	3.7	2.9	3.0	2.3	2.3	2.2	3.6	8.8																							
11-Nov	Z	5.5	6.6	7.7	3.2	3.9	3.6	2.2	2.5	2.7	2.5	2.5	3.6	3.9	9.8	7.6	6.6	7.5	6.5	11.2	4.4	2.6	3.8	4.3	5.0	11.2																							
12-Nov	3.2	Z	3.1	2.6	2.4	2.9	3.6	5.0	3.0	4.3	3.6	2.4	1.7	2.4	1.4	1.3	1.8	3.0	2.6	2.0	2.0	1.3	2.0	3.6	2.7	5.0																							
13-Nov	2.4	1.5	Z	2.1	9.1	9.0	19.3	6.2	7.8	7.4	3.7	3.4	1.2	1.1	1.0	0.7	3.5	2.0	1.2	1.3	2.1	1.3	4.0	1.9	4.1	19.3																							
14-Nov	4.0	12.4	8.1	Z	4.8	3.7	1.8	3.4	2.5	1.6	1.5	1.8	1.5	2.4	1.5	6.4	7.9	11.0	11.8	1.4	2.0	2.1	3.8	4.8	4.4	12.4																							
15-Nov	2.7	3.9	3.1	2.1	Z	1.8	3.1	4.0	2.1	1.6	4.8	14.6	9.4	3.2	6.3	5.7	2.8	20.6	7.0	3.7	1.4	1.5	8.2	2.4	5.0	20.6																							
16-Nov	3.1	2.8	1.8	0.6	3.1	Z	2.3	4.3	14.5	7.4	7.6	3.4	4.5	5.5	4.3	22.6	8.6	4.0	2.9	2.3	2.1	1.7	1.7	1.6	4.9	22.6																							
17-Nov	Z	1.9	2.0	2.8	3.7	4.1	3.9	3.8	3.3	2.8	3.5	2.9	1.7	3.0	1.7	3.0	7.7	7.7	3.4	8.9	9.6	4.0	6.1	2.4	4.1	9.6																							
18-Nov	2.0	Z	6.1	6.4	3.4	4.3	13.3	8.0	7.6	4.1	3.0	2.5	4.9	4.5	3.3	6.4	28.5	28.3	23.9	22.1	11.0	6.8	9.5	4.7	9.3	28.5																							
19-Nov	7.2	27.5	Z	3.6	11.3	18.7	27.8	18.7	20.9	17.7	15.2	7.7	6.6	6.9	7.1	10.1	26.1	10.5	7.1	11.5	2.6	4.5	5.2	2.6	12.0	27.8																							
20-Nov	1.8	1.9	2.7	Z	36.7	31.0	44.3	34.4	33.4	36.5	25.9	12.9	7.9	8.1	13.4	13.1	10.5	7.5	17.0	16.2	3.5	4.3	4.1	3.1	16.1	44.3																							
21-Nov	1.1	1.3	1.9	0.6	Z	1.0	3.0	1.8	3.4	2.6	2.9	1.6	3.4	2.8	3.6	2.1	0.9	0.7	0.7	1.2	3.6	1.2	0.6	0.5	1.9	3.6																							
22-Nov	0.3	0.2	0.4	0.4	1.7	Z	0.4	3.2	0.4	0.3	0.9	1.7	2.3	3.5	3.7	6.7	5.3	7.6	5.4	1.8	0.8	0.9	0.9	0.4	2.1	7.6																							
23-Nov	Z	1.4	5.9	3.5	2.7	4.2	1.5	2.0	1.7	3.3	3.1	4.7	6.9	11.7	8.8	7.0	7.3	7.7	8.1	13.8	9.9	6.2	6.6	7.5	5.9	13.8																							
24-Nov	5.7	Z	4.4	3.3	3.9	2.9	4.4	5.7	8.2	10.9	15.6	12.6	15.3	17.6	16.8	18.8	12.6	10.7	5.2	5.8	8.1	2.2	2.3	13.9	9.0	18.8																							
25-Nov	4.8	3.2	Z	3.1	3.5	10.3	5.0	5.7	4.2	3.1	5.7	7.4	8.2	4.5	4.0	5.1	3.7	1.7	1.1	3.9	1.0	3.9	3.2	3.6	4.3	10.3																							
26-Nov	5.3	1.5	0.9	Z	2.5	1.1	2.9	8.5	4.6	4.9	13.3	4.7	3.3	3.9	3.5	9.5	5.6	2.0	3.7	4.5	3.1	2.2	1.5	2.8	4.2	13.3																							
27-Nov	4.0	4.6	4.1	4.3	Z	5.0	4.8	5.3	2.7	3.9	4.2	3.2	4.5	5.3	4.1	4.0	4.7	2.9	2.7	3.5	3.1	3.1	6.0	2.8	4.0	6.0																							
28-Nov	3.0	2.1	3.0	2.7	1.4	Z	3.1	2.9	1.6	1.7	3.3	5.1	4.2	C	C	C	C	C	C	2.8	2.4	1.9	4.9	3.5	--	5.1																							
29-Nov	Z	3.9	3.6	3.1	5.6	4.6	9.6	15.2	13.8	17.4	19.5	17.1	14.0	23.1	25.3	18.3	10.2	12.9	12.7	12.1	20.3	10.1	2.8	2.8	12.1	25.3																							
30-Nov	5.3	Z	8.2	11.1	7.9	6.8	8.9	6.3	6.9	9.5	10.1	8.7	4.8	6.9	7.1	7.0	13.2	7.9	6.7	1.9	2.0	2.7	3.1	4.6	6.9	13.2																							
																								3.3	3.8	3.2	3.1	5.3	6.4	8.1	7.0	6.4	6.9	6.2	5.7	5.5	5.6	5.9	6.9	6.9	6.7	5.5	5.7	4.3	3.1	3.4	3.3	Diurnal Average	
																								8.8	27.5	8.2	11.1	36.7	31.0	44.3	34.4	33.4	36.5	25.9	17.1	15.3	23.1	25.3	22.6	28.5	28.3	23.9	22.1	20.3	10.1	9.5	13.9	Diurnal Maximum	
Z - zerospan      C - Calibration      M - Maintenance																																																	



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

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Christina Lake - November 2023**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Christina Lake - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	663	96.79	96.79
21 - 40	21	3.07	99.85
41 - 80	1	0.15	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Christina Lake - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 20	3	18	27	33	41	19	15	36	45	80	80	99	78	35	41	13	663
21 - 40	0	0	0	0	0	4	0	0	1	3	3	1	0	4	5	0	21
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	<b>3</b>	<b>18</b>	<b>27</b>	<b>33</b>	<b>41</b>	<b>23</b>	<b>15</b>	<b>36</b>	<b>46</b>	<b>83</b>	<b>83</b>	<b>100</b>	<b>78</b>	<b>39</b>	<b>47</b>	<b>13</b>	<b>685</b>

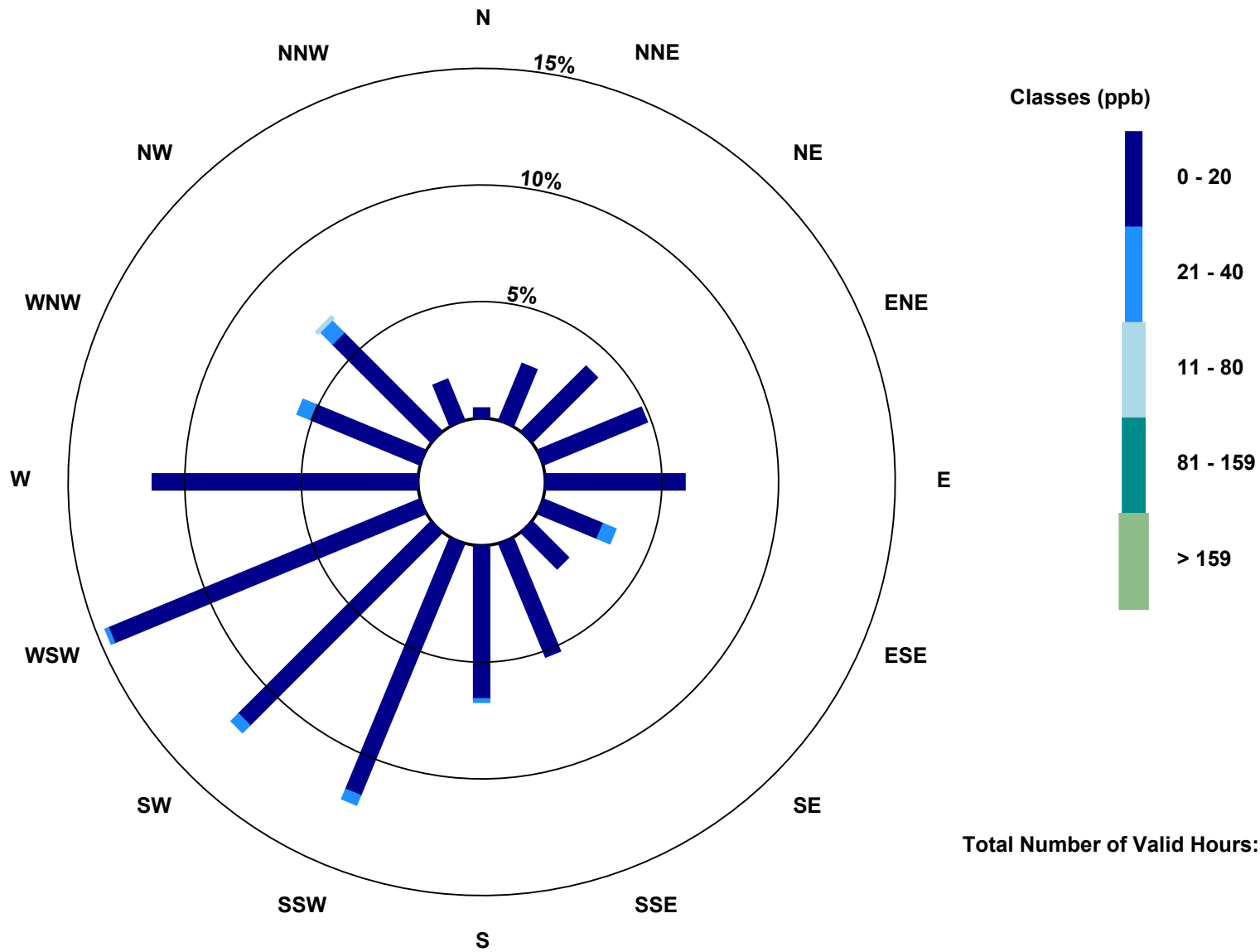
Total Number of Valid Hours: 685

Total Number of Hours: 720

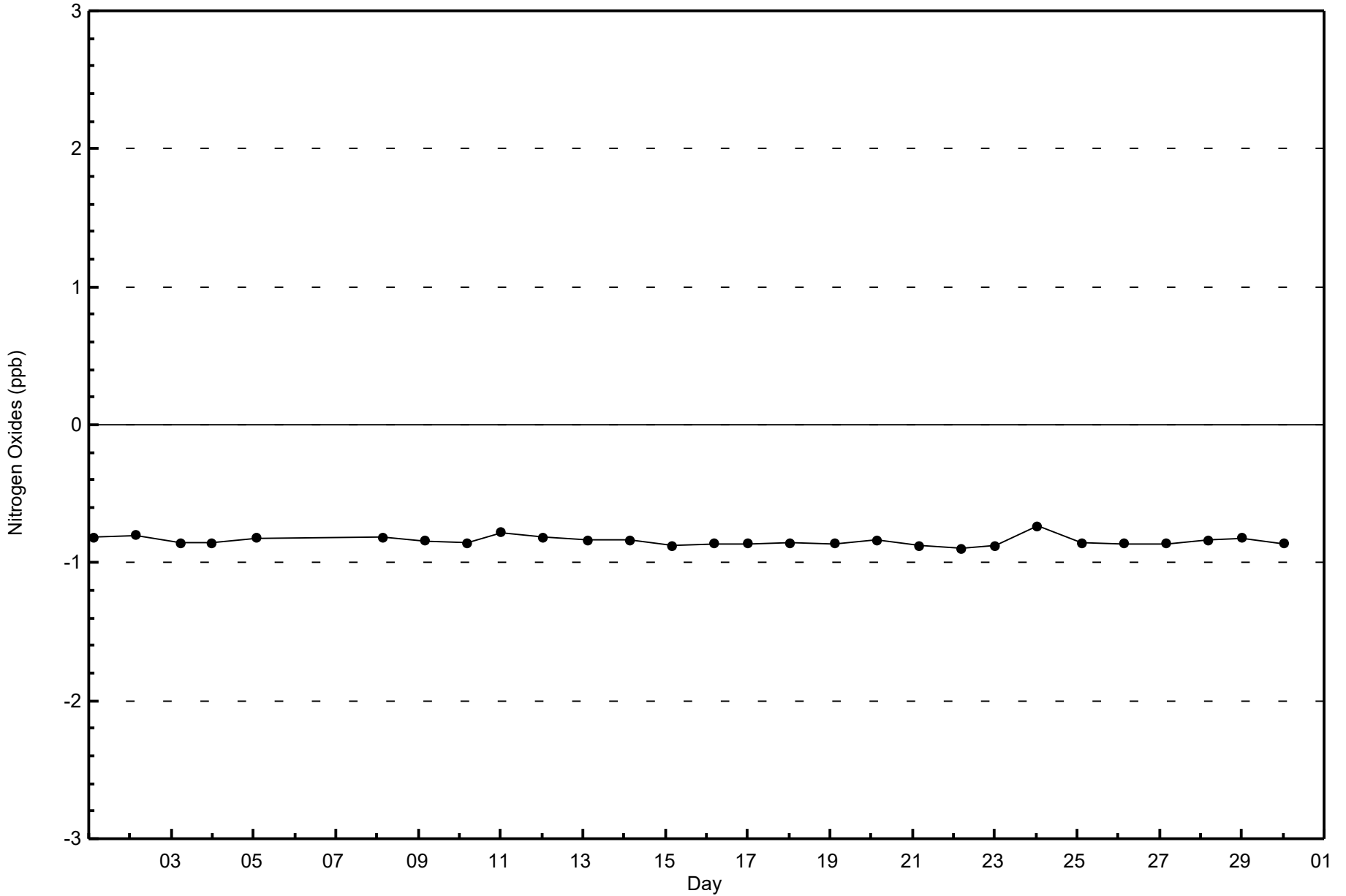


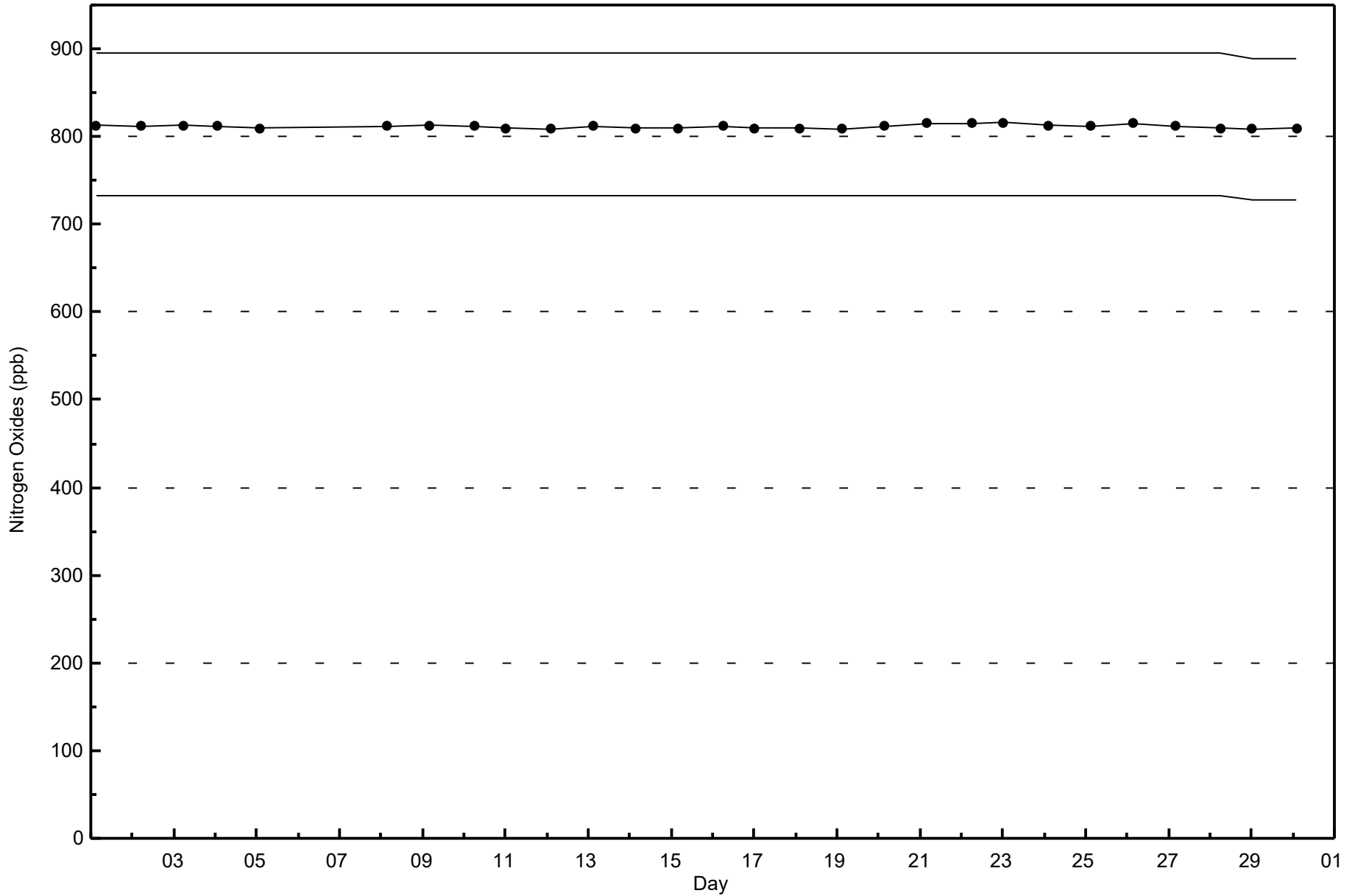
Wood Buffalo Environmental Association  
Wind Rose Nov 2023

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











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

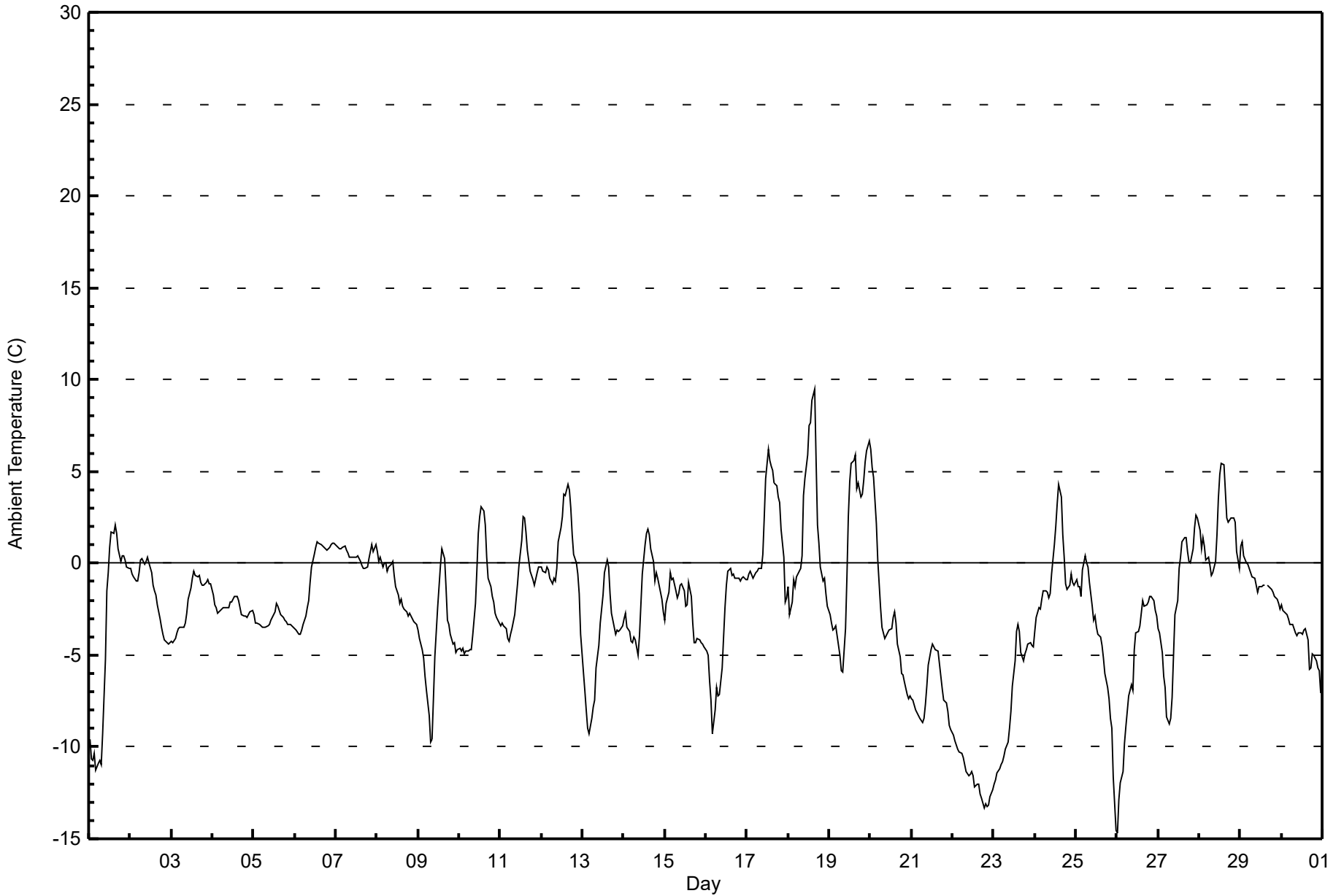
**Ambient Temperature (AT) - C**  
**Christina Lake - November 2023**

Maximum Value: 9.5 C on Nov 18 16:00		Maximum Daily Average: 1.8 C on Nov 28		Hours in Service: 720																							
Minimum Value: -14.7 C on Nov 26 01:00		Minimum Daily Average: -11.6 C on Nov 22		Hours of Data: 719																							
Maximum Diurnal Average: 0.0 C at hour 15		Minimum Diurnal Average: -4.1 C at hour 8		Hours of Missing Data: 1																							
Monthly Average: -2.48 C		Percentiles: P <sub>1</sub> = -12.7 P <sub>10</sub> = -8.0 Q <sub>1</sub> = -4.2 Median = -2.2 Q <sub>3</sub> = -0.2 P <sub>90</sub> = 1.7 P <sub>99</sub> = 6.1		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-Nov	-9.6	-10.7	-10.7	-10.4	-11.3	-10.9	-10.7	-11.0	-9.3	-5.2	-1.5	-0.5	0.9	1.7	1.6	2.1	1.6	0.8	0.1	0.4	0.4	0.2	-0.2	-0.2	-3.8	2.1	
2-Nov	-0.3	-0.6	-0.8	-1.0	-1.0	-0.5	0.2	0.3	-0.1	0.1	0.3	0.1	-0.5	-1.2	-1.5	-1.7	-2.3	-3.0	-3.5	-3.8	-4.1	-4.4	-4.4	-4.3	-1.6	0.3	
3-Nov	-4.2	-4.3	-4.1	-3.8	-3.6	-3.5	-3.5	-3.5	-3.3	-2.7	-1.9	-1.3	-0.8	-0.4	-0.6	-0.7	-0.6	-1.0	-1.2	-1.2	-1.0	-0.9	-1.1	-1.1	-2.1	-0.4	
4-Nov	-1.7	-2.3	-2.4	-2.7	-2.6	-2.5	-2.4	-2.4	-2.4	-2.4	-2.1	-2.1	-2.0	-1.8	-1.8	-2.0	-2.4	-2.8	-2.9	-2.9	-2.9	-2.8	-2.6	-2.6	-2.4	-1.7	
5-Nov	-2.8	-3.3	-3.2	-3.3	-3.4	-3.5	-3.5	-3.5	-3.4	-3.3	-3.1	-2.9	-2.6	-2.2	-2.3	-2.6	-2.8	-2.9	-3.1	-3.2	-3.3	-3.4	-3.4	-3.5	-3.1	-2.2	
6-Nov	-3.6	-3.7	-3.8	-3.8	-3.6	-3.4	-2.9	-2.4	-2.0	-1.1	-0.2	0.5	0.9	1.2	1.1	1.0	0.9	0.9	0.8	0.7	0.8	1.0	1.1	1.1	-0.8	1.2	
7-Nov	1.0	0.9	0.8	0.8	0.9	0.9	0.7	0.5	0.3	0.3	0.3	0.3	0.4	0.1	-0.1	-0.2	-0.3	-0.2	0.2	0.6	1.0	0.7	1.0	0.5	1.0		
8-Nov	0.7	0.1	0.3	-0.2	0.0	0.0	-0.4	-0.2	-0.1	0.1	-0.7	-1.3	-1.7	-2.2	-1.9	-2.3	-2.5	-2.6	-2.8	-2.7	-2.9	-3.2	-3.2	-3.3	-1.4	0.7	
9-Nov	-3.7	-4.1	-4.7	-5.2	-6.2	-6.9	-8.3	-9.8	-9.6	-7.4	-5.1	-2.4	-1.3	-0.1	0.8	0.2	-1.4	-3.1	-3.3	-3.8	-4.4	-4.3	-4.9	-4.7	-4.3	0.8	
10-Nov	-4.6	-4.8	-4.6	-4.9	-4.7	-4.8	-4.7	-4.7	-3.9	-2.2	-0.4	1.6	2.6	3.0	2.8	2.1	0.3	-0.8	-1.3	-1.8	-2.1	-2.7	-2.9	-3.2	-1.9	3.0	
11-Nov	-3.4	-3.2	-3.4	-3.6	-4.1	-4.2	-3.9	-3.5	-2.8	-2.0	-1.1	-0.1	1.3	2.5	2.5	1.7	0.7	-0.4	-0.7	-0.9	-1.2	-0.5	-0.2	-0.2	-1.3	2.5	
12-Nov	-0.2	-0.4	-0.5	-0.2	-0.3	-0.8	-1.1	-0.8	-1.0	-0.3	1.1	1.9	2.5	3.8	3.7	4.3	4.0	3.0	1.6	0.5	0.0	-0.6	-1.7	-3.9	0.6	4.3	
13-Nov	-5.9	-6.9	-8.0	-9.0	-9.3	-8.5	-7.8	-7.4	-5.7	-4.5	-3.2	-2.5	-1.7	-0.5	0.2	-0.2	-1.7	-2.7	-3.5	-3.9	-3.6	-3.7	-3.6	-3.4	-4.5	0.2	
14-Nov	-3.0	-2.7	-3.5	-3.7	-4.2	-4.3	-4.0	-4.2	-5.0	-4.0	-2.2	-0.6	1.0	1.6	1.9	1.5	0.8	0.1	-0.9	-0.5	-0.8	-1.6	-2.0	-2.6	-1.8	1.9	
15-Nov	-3.1	-2.2	-1.6	-0.5	-0.9	-0.8	-1.5	-1.9	-1.6	-1.2	-1.1	-1.5	-2.4	-2.2	-1.1	-1.8	-3.3	-4.3	-4.3	-4.1	-4.2	-4.3	-4.4	-4.6	-2.4	-0.5	
16-Nov	-4.8	-5.0	-6.4	-7.5	-9.3	-8.0	-6.8	-7.2	-7.1	-5.7	-4.0	-2.4	-1.2	-0.5	-0.2	-0.6	-0.6	-0.8	-0.8	-0.9	-1.0	-0.8	-0.7	-0.9	-3.5	-0.2	
17-Nov	-0.9	-0.6	-0.4	-0.8	-0.7	-0.5	-0.4	-0.3	-0.3	0.5	2.5	4.6	6.2	5.6	5.3	5.1	4.4	4.2	3.6	3.3	1.9	0.3	-2.1	-1.9	1.6	6.2	
18-Nov	-1.3	-2.8	-2.1	-0.9	-1.3	-0.8	-0.4	-0.3	0.4	3.7	4.6	5.9	7.5	7.6	8.9	9.5	5.6	2.1	1.1	-0.2	-1.0	-0.8	-1.6	-2.3	1.7	9.5	
19-Nov	-2.8	-3.3	-3.6	-3.6	-3.4	-4.5	-5.0	-5.8	-5.9	-3.6	-0.7	2.6	4.5	5.4	5.6	5.9	4.0	4.4	3.6	3.7	4.6	5.5	6.1	6.6	0.8	6.6	
20-Nov	6.2	5.2	4.7	2.1	0.2	-1.1	-2.4	-3.5	-4.1	-4.0	-3.8	-3.6	-3.5	-2.9	-2.7	-3.2	-4.4	-5.1	-6.0	-6.1	-6.5	-7.2	-7.4	-7.2	-2.8	6.2	
21-Nov	-7.4	-7.5	-8.0	-8.1	-8.3	-8.4	-8.6	-8.5	-7.6	-6.7	-5.6	-4.7	-4.4	-4.6	-4.7	-4.8	-5.5	-6.2	-6.9	-7.5	-7.6	-8.1	-8.8	-9.1	-7.0	-4.4	
22-Nov	-9.4	-9.7	-9.9	-10.1	-10.2	-10.3	-10.6	-10.9	-11.3	-11.6	-11.5	-11.4	-11.6	-12.2	-12.0	-12.0	-12.6	-12.8	-13.4	-13.1	-13.2	-13.1	-12.7	-12.3	-11.6	-9.4	
23-Nov	-12.1	-11.8	-11.4	-11.2	-11.0	-10.8	-10.5	-10.1	-9.7	-9.0	-8.0	-6.7	-5.3	-3.7	-3.4	-3.7	-4.9	-5.3	-4.9	-4.7	-4.4	-4.3	-4.5	-4.5	-7.3	-3.4	
24-Nov	-3.7	-2.9	-2.4	-2.5	-2.0	-1.5	-1.5	-1.6	-1.9	-1.6	-0.6	1.0	2.0	3.2	4.3	3.6	1.6	0.3	-1.1	-1.4	-1.2	-0.6	-1.0	-1.2	-0.5	4.3	
25-Nov	-0.9	-1.3	-1.3	-1.8	-0.4	0.4	0.0	-0.2	-1.0	-2.3	-3.1	-2.9	-3.5	-3.9	-4.0	-4.5	-5.2	-6.0	-6.7	-7.3	-8.4	-8.9	-11.7	-14.6	-4.1	0.4	
26-Nov	-14.7	-12.9	-12.0	-11.3	-9.8	-8.9	-8.0	-7.2	-6.6	-6.9	-4.7	-3.8	-3.7	-3.4	-2.7	-2.0	-2.3	-2.2	-2.1	-1.8	-1.8	-2.1	-2.5	-2.9	-5.7	-1.8	
27-Nov	-3.5	-3.8	-4.8	-6.2	-6.8	-8.3	-8.7	-8.4	-7.3	-5.0	-2.8	-2.1	-0.3	0.3	1.1	1.4	1.4	0.7	0.1	0.0	0.8	1.9	2.6	2.5	-2.3	2.6	
28-Nov	1.8	0.8	1.4	0.9	0.2	0.4	-0.1	-0.6	-0.5	0.1	1.6	3.5	4.8	5.5	5.4	3.9	2.5	2.3	2.4	2.5	2.5	2.2	0.6	-0.3	1.8	5.5	
29-Nov	0.9	1.2	0.4	0.1	-0.1	-0.3	-0.5	-0.7	-0.8	-1.2	-1.6	-1.3	-1.3	-1.2	-1.2	M	-1.2	-1.4	-1.4	-1.6	-1.8	-2.0	-2.2	-2.5	-0.9	1.2	
30-Nov	-2.3	-2.5	-2.7	-2.8	-3.0	-3.4	-3.3	-3.6	-3.8	-3.9	-3.8	-3.8	-3.9	-3.6	-3.6	-4.1	-5.8	-5.7	-5.0	-5.0	-5.3	-5.7	-5.9	-7.1	-4.1	-2.3	
		-3.3	-3.5	-3.6	-3.8	-4.0	-4.0	-4.0	-4.1	-3.9	-3.1	-2.1	-1.2	-0.6	-0.2	0.0	-0.1	-1.1	-1.7	-2.1	-2.2	-2.4	-2.5	-2.8	-3.1	Diurnal Average	
		6.2	5.2	4.7	2.1	0.9	0.9	0.7	0.5	0.4	3.7	4.6	5.9	7.5	7.6	8.9	9.5	5.6	4.4	3.6	3.7	4.6	5.5	6.1	6.6	Diurnal Maximum	
M - Maintenance																											



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

**Ambient Temperature (AT) - C**  
**Christina Lake - November 2023**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C  
Christina Lake - November 2023**

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	0	0.00	0.00
-20 - 0	548	76.22	76.22
0 - 10	171	23.78	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 719

Total Number of Hours: 720



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

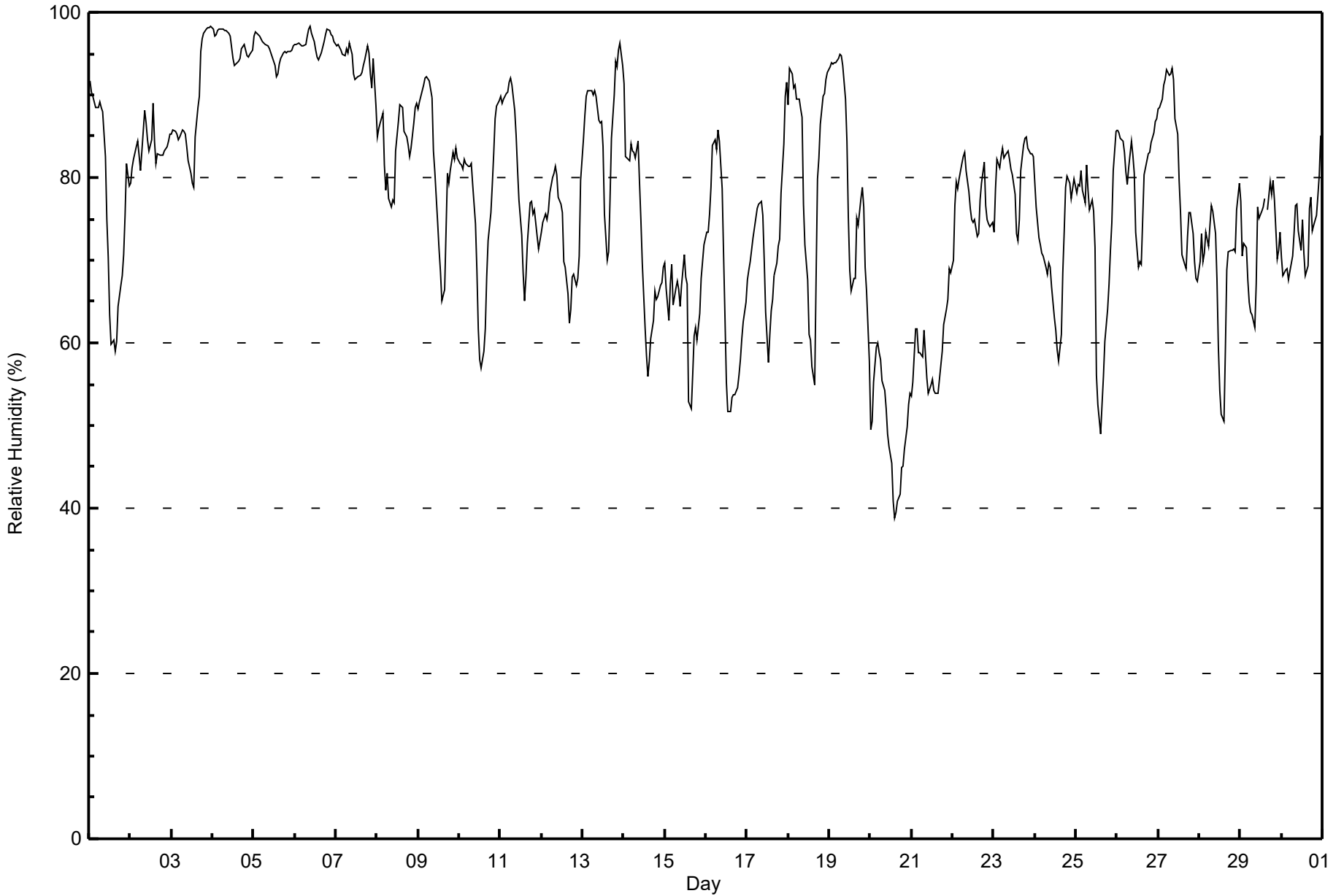
**Relative Humidity (RH) - %**  
**Christina Lake - November 2023**

Maximum Value: 98.3 % on Nov 4 00:00      Maximum Daily Average: 96.5 % on Nov 6																						Hours in Service: 720 Hours of Data: 719				
Minimum Value: 38.8 % on Nov 20 15:00      Minimum Daily Average: 49.6 % on Nov 20 Maximum Diurnal Average: 82.3 % at hour 4      Minimum Diurnal Average: 68.3 % at hour 15 Monthly Average: 77.88 %      Percentiles: P <sub>1</sub> = 45.7 P <sub>10</sub> = 59.4 Q <sub>1</sub> = 69.2 Median = 79.1 Q <sub>3</sub> = 88.5 P <sub>90</sub> = 95.1 P <sub>99</sub> = 97.9																						Hours of Missing Data: 1 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-Nov	91.7	90.3	89.8	89.2	88.5	88.5	89.1	88.5	88.1	82.5	74.9	70.4	63.4	59.8	60.4	59.0	60.2	64.4	66.9	68.1	70.7	75.4	81.6	79.1	76.7	91.7
2-Nov	79.3	81.2	82.2	83.7	84.4	82.7	80.9	83.1	88.1	86.6	84.5	83.2	84.6	88.9	84.4	81.7	82.8	82.7	82.6	82.8	83.2	83.7	84.4	85.2	83.6	88.9
3-Nov	85.3	85.7	85.7	85.2	84.6	84.9	85.8	85.6	85.2	83.8	82.1	80.6	79.3	78.8	84.9	88.5	89.9	95.3	96.7	97.4	97.9	98.2	98.2	98.3	88.2	98.3
4-Nov	98.0	97.1	97.2	97.8	97.9	97.9	97.9	97.8	97.5	97.1	95.7	94.4	93.6	93.9	94.1	94.3	95.5	96.2	95.4	94.8	94.6	94.6	94.9	95.4	96.1	98.0
5-Nov	97.2	97.7	97.5	97.2	96.8	96.5	96.3	96.2	95.9	95.5	95.1	94.6	93.6	92.2	92.5	93.7	94.4	95.1	95.2	95.1	95.3	95.3	95.5	95.9	95.4	97.7
6-Nov	96.1	96.2	96.3	96.2	96.0	95.9	96.1	97.2	98.0	98.3	97.4	96.5	95.4	94.6	94.3	95.1	95.7	96.4	97.3	98.0	97.8	97.4	97.2	96.5	96.5	98.3
7-Nov	96.0	96.1	95.8	95.4	94.8	94.8	95.5	95.1	96.3	94.8	92.5	91.8	92.0	92.3	92.4	92.7	93.6	94.2	95.9	95.0	92.5	90.8	94.4	88.6	93.9	96.3
8-Nov	85.0	86.0	86.5	87.9	81.5	78.5	80.5	77.5	76.5	77.3	76.9	83.2	86.7	88.8	88.6	88.6	85.7	84.9	83.9	82.6	83.5	86.5	88.4	89.0	83.9	89.0
9-Nov	88.3	89.1	90.5	91.3	92.0	92.3	91.7	90.7	89.7	83.2	80.6	74.7	71.4	68.7	65.0	66.5	73.5	80.6	79.2	80.8	83.0	82.3	83.6	82.4	82.1	92.3
10-Nov	81.7	81.5	80.9	82.2	81.7	81.4	81.3	81.8	79.2	74.5	68.9	61.8	57.9	56.9	58.9	61.6	68.0	72.4	75.8	79.1	82.8	87.1	88.6	89.3	75.6	89.3
11-Nov	89.9	89.0	89.4	90.2	90.3	91.5	92.1	91.2	88.2	85.2	81.0	77.2	73.0	68.5	65.2	68.0	72.0	77.0	77.1	75.6	76.1	72.9	71.4	72.4	80.2	92.1
12-Nov	73.3	74.5	75.7	75.0	75.9	78.1	79.9	80.5	81.3	80.4	77.7	76.8	75.8	69.9	69.2	66.0	62.3	64.0	68.0	68.2	66.9	67.7	70.5	79.7	73.2	81.3
13-Nov	84.6	87.5	89.9	90.6	90.5	90.5	90.1	90.5	89.9	87.0	86.6	86.7	83.8	75.7	69.9	71.1	77.4	84.7	90.0	94.1	93.4	95.5	96.3	93.6	87.1	96.3
14-Nov	91.3	82.5	82.4	82.0	84.0	83.2	83.0	82.3	84.5	79.6	74.9	69.7	61.9	58.5	55.9	57.7	60.5	62.7	66.3	65.3	65.6	67.0	67.3	69.1	72.4	91.3
15-Nov	69.6	66.6	62.7	67.1	69.5	64.6	66.6	67.5	66.5	64.5	66.9	70.7	68.0	67.1	52.8	52.0	56.2	60.8	61.8	60.3	63.5	67.9	69.8	71.8	64.8	71.8
16-Nov	73.4	73.3	75.7	78.8	84.0	84.6	83.4	85.8	84.4	78.7	70.7	63.0	55.3	51.8	51.7	53.3	53.7	53.6	54.6	56.2	58.0	60.5	62.5	64.9	67.2	85.8
17-Nov	67.6	68.8	69.7	72.6	73.9	75.0	76.3	76.7	77.2	75.5	70.1	63.7	57.6	61.0	63.9	65.3	68.1	69.6	71.7	72.5	78.1	84.0	89.9	91.5	72.5	91.5
18-Nov	88.8	93.3	92.5	90.8	91.3	89.5	89.5	88.4	87.3	76.8	71.9	67.7	61.0	60.4	57.0	54.9	67.8	79.9	82.3	86.4	89.8	90.1	91.9	92.7	80.9	93.3
19-Nov	93.4	93.8	93.7	93.9	93.9	94.4	94.9	94.7	93.6	89.5	84.4	75.2	68.8	66.2	67.7	67.8	75.0	74.3	77.4	78.9	76.5	69.2	66.2	57.8	80.9	94.9
20-Nov	49.4	50.5	55.3	59.5	59.9	58.7	58.0	55.4	54.3	52.1	48.9	47.5	45.4	40.8	38.8	39.4	40.8	41.7	44.8	45.2	47.1	49.8	52.6	53.8	49.6	59.9
21-Nov	53.6	55.2	61.6	61.8	58.8	58.8	58.3	61.6	58.7	55.8	53.9	54.9	55.6	54.3	53.9	53.9	55.5	57.3	58.9	62.1	64.0	65.3	69.0	68.4	58.8	69.0
22-Nov	70.0	76.5	79.5	78.7	79.9	81.7	82.5	83.0	80.8	78.3	76.3	74.9	74.5	75.0	72.9	73.2	77.4	79.4	81.9	76.5	74.9	74.4	74.1	74.5	77.1	83.0
23-Nov	73.3	78.7	82.2	81.3	82.5	83.5	82.3	82.7	83.2	82.3	81.0	80.3	77.9	73.2	72.4	74.8	80.8	83.9	84.7	85.0	83.6	82.9	82.9	82.5	80.8	85.0
24-Nov	79.4	76.4	72.7	71.8	70.9	70.4	69.2	68.4	69.6	69.2	66.7	63.0	61.5	59.2	57.7	61.0	68.5	73.5	78.8	80.2	79.3	77.5	78.6	79.7	71.0	80.2
25-Nov	78.1	79.2	79.1	80.9	78.5	77.0	81.5	78.4	76.1	77.2	75.9	71.6	56.1	52.5	49.1	52.5	56.0	60.2	64.1	67.1	71.1	74.5	80.9	85.6	71.0	85.6
26-Nov	85.7	85.4	84.8	84.4	83.1	80.7	79.2	81.1	84.3	82.7	80.5	73.4	69.1	69.8	69.4	74.8	80.3	82.0	82.9	83.1	84.2	85.5	86.7	87.2	80.8	87.2
27-Nov	88.3	88.4	89.4	91.2	91.9	93.1	92.4	92.6	93.2	91.9	87.1	85.3	79.7	75.7	70.7	69.4	69.1	73.0	75.7	75.8	73.2	69.8	67.8	67.5	81.3	93.2
28-Nov	69.9	73.2	69.8	70.8	73.4	71.8	74.3	76.7	75.9	73.1	67.7	59.4	54.2	51.4	50.5	59.2	68.9	71.0	71.2	71.2	71.4	71.0	76.0	79.4	68.8	79.4
29-Nov	77.0	70.5	72.0	71.6	67.6	64.8	63.8	63.3	61.9	67.1	76.4	75.1	75.9	76.5	77.5	M	76.1	79.5	77.9	79.7	77.2	70.2	71.2	73.5	72.4	79.7
30-Nov	70.3	68.1	68.9	69.0	67.6	68.6	70.6	73.2	76.7	76.8	73.5	71.1	75.0	70.9	68.1	69.3	76.2	77.7	73.5	74.3	75.5	77.8	80.3	85.0	73.2	85.0
																								Diurnal Average		
																								Diurnal Maximum		
M - Maintenance																										



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

**Relative Humidity (RH) - %**  
**Christina Lake - November 2023**





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

**Relative Humidity (RH) - %**  
**Christina Lake - November 2023**

<b>Concentration Ranges (%)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	0	0.00	0.00
20 - 40	2	0.28	0.28
40 - 60	74	10.29	10.57
60 - 80	306	42.56	53.13
80 - 100	337	46.87	100.00

Total Number of Valid Hours: 719

Total Number of Hours: 720



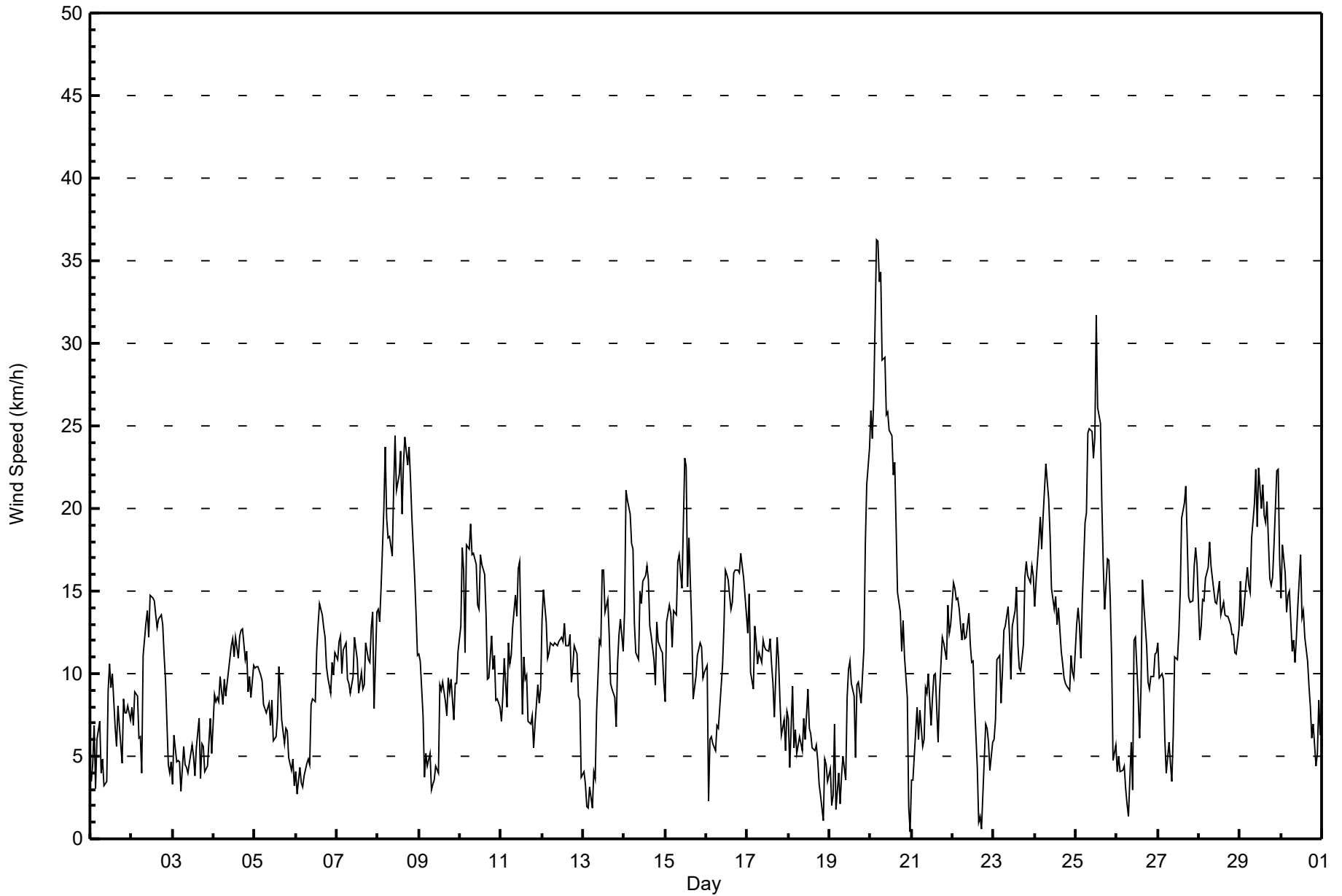


Maximum Speed: 36 km/h on Nov 20 04:00	Maximum Daily Speed Average: 20.8 km/h on Nov 20	Hours in Service: 720
Minimum Speed Value: 0 km/h on Nov 21 00:00	Minimum Daily Speed Average: 3.8 km/h on Nov 3	Hours of Data: 720
Maximum Diurnal Speed Average: 5.8 km/h at hour 15	Minimum Diurnal Speed Average: 4.3 km/h at hour 10	Hours of Missing Data: 0
Monthly Average Velocity: 5.1 km/h 257.0 deg	Percentiles: $P_1 = 2$ $P_{10} = 4$ $Q_1 = 7$ Median = 11 $Q_3 = 14$ $P_{90} = 18$ $P_{99} = 27$	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-Nov	SSW4	SSW5	SSW7	SW3	SSW6	SW7	SSW4	SSW5	S3	SSW3	WSW9	WSW11	SW9	SW10	SW7	SSW6	SW8	SW7	SSW5	SW8	SW8	SW8	SW8	SW7	SW6.3	WSW11		
2-Nov	SW8	SW7	SW9	SW9	SW6	WSW6	WNW4	NW11	NW13	NNW14	NNE12	NNE15	NNE15	NNE14	NNE14	NE13	NE13	NE14	NE13	NE11	NE10	ENE4	SSE4	SE5	NNE5.0	NNE15		
3-Nov	SE3	ESE6	SSE5	S5	SSE5	SE3	SE6	ESE5	ESE4	SSE4	SSE5	S6	SE5	E4	E6	E7	E4	E6	E6	ESE4	E4	NE6	NE7	NE5	ESE3.8	E7		
4-Nov	NNE9	NE8	NNE9	NE8	ENE10	ENE8	ENE10	ENE9	E9	E11	E12	E12	E11	E12	E11	E12	E13	E13	E11	E11	E9	ENE10	ENE9	ENE10	ENE9.6	E13		
5-Nov	E10	ENE10	ENE10	ENE10	ENE10	ENE8	ENE8	ENE8	ENE8	ENE7	ENE8	ENE6	ENE7	NE7	NE10	ENE9	ENE7	E6	ENE7	E7	E5	E4	E5	ESE3	ENE7.3	NE10		
6-Nov	ESE4	E3	E4	ESE3	SE3	E4	SE5	ESE5	ESE4	SSE8	S9	S8	S11	S13	S14	SSW14	S13	SSW12	SSW10	SSW10	SSW9	SSW11	SSW10	SSW11	S7.2	S14		
7-Nov	SSW11	SSW12	SSW12	SSW10	SSW11	SSW12	SSW10	SSW9	SSW9	SSW10	SSW12	SSW12	SSW11	SW9	SW10	SW9	SW9	SW12	WSW11	WSW11	WSW13	W14	WSW8	WSW14	SW10.0	WSW14		
8-Nov	W14	WSW13	W15	W20	NNW24	NNW19	W18	NNW18	NNW17	NW21	NW24	NW21	NW22	NW23	NW20	NW23	NW24	NW23	NW24	NW23	NW24	NW22	NW19	NW16	NW14	NNW11	NW18.1	NW24
9-Nov	WNN11	WNN11	WNN7	W4	SW5	SW4	SW5	SW3	S3	S4	SSE4	SSE4	SSE9	SSE9	SSW10	SSW8	S7	SSE10	SSW9	S10	S7	SSE9	S9	S11	SSW5.2	S11		
10-Nov	S13	S18	S16	S11	SSW18	S18	SSW19	SSW17	SSW17	SSW17	SSW14	SSW14	SSW17	SSW17	SSW16	SSW14	SSW10	SSW10	SSW12	SSW10	SSW11	S8	S8	S8	SSW13.8	SSW19		
11-Nov	S7	S9	S11	SSE8	SSE12	SSE11	SSE11	SSE13	SSE15	SSE13	SSE16	SSE17	SSE8	SSW11	SW10	SSW10	SSW7	SSW7	SW7	SW5	WSW7	WSW9	WSW8	WSW9	S8.5	SSE17		
12-Nov	WSW13	WSW15	WSW13	W11	W11	W12	WSW12	WSW12	WSW12	WSW12	WSW12	W12	W12	W13	W12	W12	W12	WSW10	SW10	SW12	WSW11	WSW9	SW8	SSE4	WSW10.9	WSW15		
13-Nov	S4	S3	SE2	SE2	SE3	SE2	E4	E4	NE8	NE12	ENE12	NE16	ENE16	E14	E15	ENE12	ENE9	NE9	NNE9	NNE7	NNW11	NW12	NW13	WSW11	NE5.1	ENE16		
14-Nov	W14	WNN21	WNN21	WNN20	W18	W18	W13	W11	W11	WSW15	WSW14	WSW16	WSW16	WSW17	WSW16	WSW13	WSW12	WSW11	WSW9	WSW13	SW12	SW11	SW11	SW10	WSW13.3	WNN21		
15-Nov	SSW8	SW13	SW14	SW14	SW12	WSW14	WSW14	WSW17	WSW17	WSW16	W15	NNW23	NNW23	NNW15	NW18	WNN13	W8	SW9	SW10	WSW11	WSW12	WSW12	WSW10	WSW10	W11.1	NNW23		
16-Nov	WSW11	W2	E6	SE6	SSE6	SSW5	S7	S7	SSW8	SW10	SW13	SW16	SW16	SW16	SW14	SW14	SW16	WSW16	WSW16	WSW16	SW17	SW16	WSW16	WSW14	SW10.6	SW17		
17-Nov	WSW12	WSW15	WSW10	WSW9	W13	W12	WSW11	WSW11	WSW11	WSW12	W12	W11	WSW11	WSW12	WSW11	SW9	SW7	SW12	SW11	SW8	WSW6	SW7	SE5	SSW8	WSW9.7	WSW15		
18-Nov	SSW7	S4	SSW9	SSE6	SSW7	SSW5	SSW6	S6	S5	SSW7	SSE6	SSW9	SSW7	SSW6	S6	SSE5	ESE6	ESE5	ESE3	S3	SSW1	SE5	SSE5	ESE3	S4.8	SSW9		
19-Nov	E4	ESE2	E3	E7	E2	SW4	SSW2	S4	SSW5	SW4	WSW9	WSW10	WSW11	W9	W9	WSW5	WSW9	WSW10	WSW8	W10	W12	W18	W21	W24	WSW6.3	W24		
20-Nov	W26	W24	W27	WNN36	WNN36	WNN34	NW34	NW29	NW29	NW26	WNN26	WNN25	WNN24	WNN22	WNN23	WNN19	W15	W14	W11	W13	W11	W9	WSW2	NE0	WNN20.8	WNN36		
21-Nov	ENE4	S4	E7	E8	ESE6	E8	ESE6	ESE6	ESE9	ESE9	ESE10	E7	ENE9	ENE10	NE10	ENE6	NE9	NNE10	NNE12	NNE12	NNE11	NNE14	NNE12	NNE13	ENE7.0	NNE14		
22-Nov	NNE16	NNE15	NE15	NE15	NE14	NE12	NE13	NE12	NE12	NE14	NE12	NE11	ENE11	ENE8	E4	SSE1	SE1	ESE1	ESE5	SE7	SE7	SE6	SSE4	S6	NE7.3	NNE16		
23-Nov	SSE6	SSE7	S11	SSW11	S8	S10	SSW13	SSW13	SSW14	SSW12	SSW10	SW13	SW14	WSW15	SW12	SW10	SW10	SW12	SW16	SW17	SW16	SW15	SW16	SW16	SSW11.7	SW17		
24-Nov	SW14	SW16	SW18	SW19	SW18	WSW20	WSW23	WSW22	WSW21	WSW18	WSW15	W14	W15	W13	W14	W11	WSW11	WSW10	SW9	SW9	WSW9	WSW11	WSW10	WSW10	WSW14.1	WSW23		
25-Nov	W13	W14	WSW13	WSW11	W14	NW19	NW20	N25	N25	N25	NNW23	NNW24	NNW32	NNW26	NNW25	NNW20	NNW17	NW14	NW17	NNW17	NW15	NNW11	SSE5	SSW6	NNW14.9	NNW32		
26-Nov	SSW4	S5	SSE4	SE4	S4	S3	S2	SW1	NW6	SSW3	NW12	NNW12	NNW9	WSW6	WSW9	WNN16	WNN14	W12	WSW9	WSW9	WSW10	WSW10	WSW11	WSW11	W5.5	WNN16		
27-Nov	WSW12	WSW10	SW10	SW10	SSW6	SSE4	S6	S5	S3	SSW6	SSW11	SSW11	SW12	SW15	SW19	WSW20	WSW21	WSW18	W15	W14	W14	W17	W18	W17	WSW10.8	WSW21		
28-Nov	W12	W13	W14	W14	WSW16	W16	W18	W17	W16	W14	W14	W15	W16	W14	W14	WSW14	WSW13	WSW14	WSW13	W12	W12	WSW11	WSW11	WSW13	W13.9	W18		
29-Nov	WNN16	W13	W13	W15	WNN16	W15	WNN15	NW18	WNN20	WNN22	WNN19	WNN22	WNN20	NW21	WNN20	NW19	NW20	NW16	NW15	WNN16	NW18	NW22	NW22	NW17	WNN17.5	WNN22		
30-Nov	WNN15	NW18	NW16	NW14	WNN15	NW15	WNN11	WNN12	WNN11	W12	WNN14	NW17	NW13	WNN14	W12	W11	SW9	SW8	SW6	SSW7	SE4	S5	SW8	SW6	WNN9.3	NW18		

WSW5.5	WSW5.5	WSW5.5	WSW4.9	WSW5.5	WSW5.4	WSW5.0	WSW4.6	W4.4	W4.3	W4.8	W5.3	W5.1	W5.6	W5.8	W5.3	WSW4.9	WSW5.0	WSW4.9	WSW5.2	W5.4	W5.6	WSW5.1	WSW5.6	Diurnal Average
W26	W24	W27	WNN36	WNN36	WNN34	NW34	NW29	NW29	NW26	WNN26	WNN25	NNW32	NNW26	NNW25	NW23	NW24	NW23	NW24	NW22	NW19	NW22	NW22	W24	Diurnal Maximum

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





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h  
Christina Lake - November 2023**

<b>Wind Speed Ranges (km/h)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	108	15.00	15.00
6 - 11	289	40.14	55.14
12 - 19	263	36.53	91.67
20 - 28	53	7.36	99.03
29 - 38	7	0.97	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Wind Speed (WS) - km/h  
Christina Lake - November 2023**

<b>Wind Speed Ranges (km/h)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 5	0	0	2	2	14	16	13	17	17	13	9	2	2	1	0	0	108
6 - 11	0	6	13	28	20	8	5	14	25	48	47	50	14	6	3	2	289
12 - 19	0	13	13	4	8	0	0	6	7	24	33	49	60	18	24	4	263
20 - 28	3	0	0	0	0	0	0	0	0	0	0	6	6	14	18	6	53
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	0	3	3	1	7
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	<b>3</b>	<b>19</b>	<b>28</b>	<b>34</b>	<b>42</b>	<b>24</b>	<b>18</b>	<b>37</b>	<b>49</b>	<b>85</b>	<b>89</b>	<b>107</b>	<b>82</b>	<b>42</b>	<b>48</b>	<b>13</b>	<b>720</b>

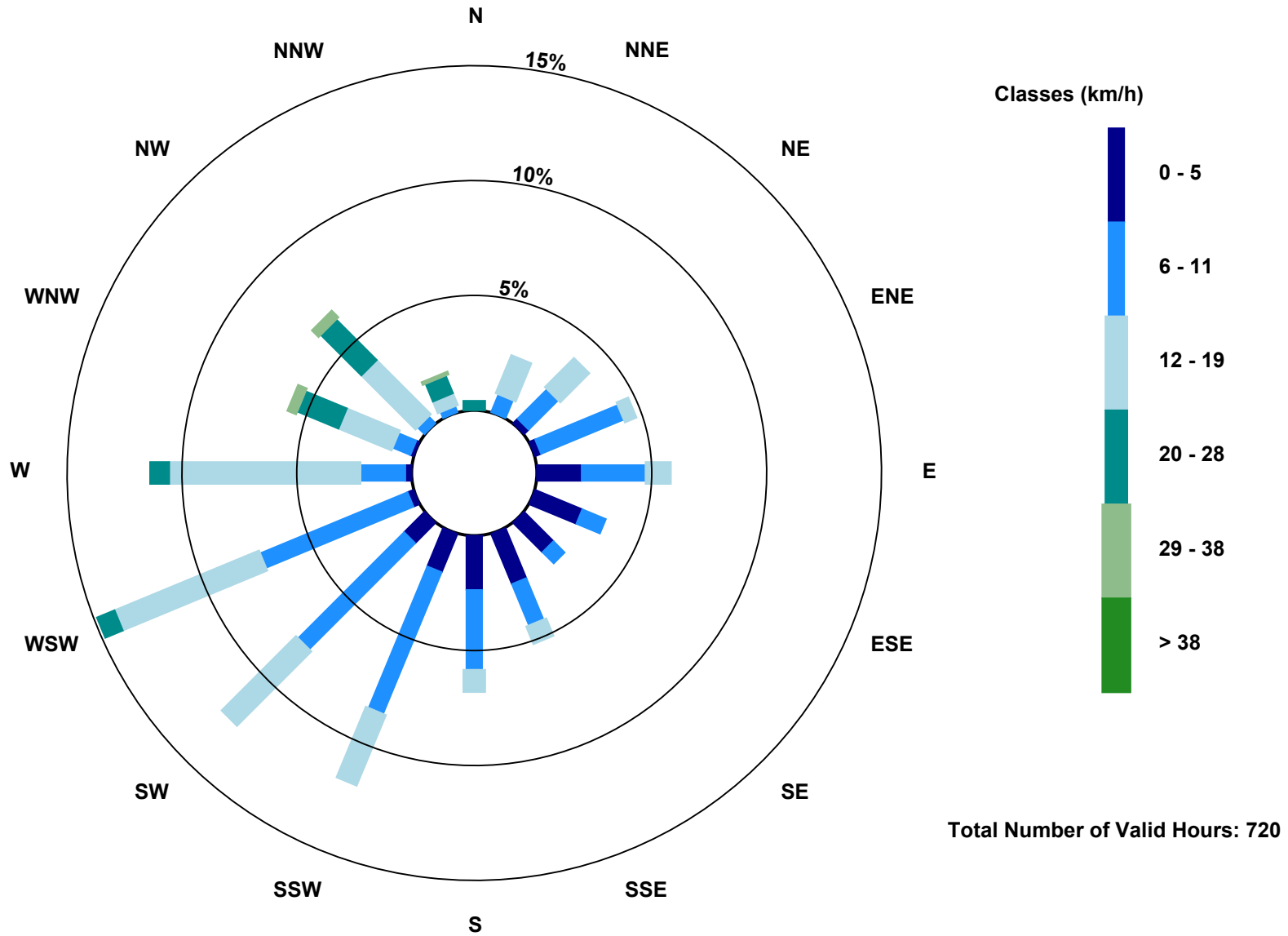
Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 2023

Wind Speed (WS) - km/h  
Christina Lake





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

**Wind Speed (WS) - km/h**  
**Christina Lake - November 2023**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 10 km/h on Nov 20 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 Nov 6 03:00																									
Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 1 Q <sub>1</sub> = 2 Median = 2 Q <sub>3</sub> = 4 P <sub>90</sub> = 5 P <sub>99</sub> = 8																									
Day	Hourly Period Ending At (MST)																							Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23		24
1-Nov	1	3	2	2	1	2	2	1	1	1	3	2	2	2	2	1	1	1	2	2	1	2	1	1	3
2-Nov	2	3	1	2	3	4	3	6	3	3	2	2	3	2	2	2	2	2	2	2	1	2	2	1	6
3-Nov	1	2	1	1	1	2	2	1	1	1	1	2	1	1	1	2	1	1	1	2	1	1	1	1	2
4-Nov	2	2	1	1	2	2	2	1	2	2	3	2	2	2	2	3	3	2	2	2	2	2	1	2	3
5-Nov	2	2	2	2	2	2	1	2	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	2
6-Nov	2	2	1	1	1	1	1	1	1	3	2	2	3	4	3	3	3	3	2	2	2	2	2	4	4
7-Nov	3	3	3	3	3	3	3	3	2	3	3	2	3	2	2	2	3	2	2	2	3	4	2	4	4
8-Nov	4	3	4	6	6	6	5	6	5	5	5	5	6	5	5	5	4	4	4	4	4	4	3	3	6
9-Nov	3	3	3	2	2	2	2	2	2	1	2	2	2	2	2	2	1	2	2	2	2	2	3	3	3
10-Nov	3	4	4	3	4	4	4	3	4	4	4	4	4	4	5	3	2	2	3	3	3	2	2	2	5
11-Nov	2	2	3	2	3	2	3	2	3	3	4	4	6	3	3	2	2	2	2	1	2	2	2	2	6
12-Nov	3	3	4	3	3	3	3	3	2	2	3	3	3	5	4	3	3	2	2	2	2	2	2	2	5
13-Nov	2	2	2	1	1	2	1	2	2	2	3	3	3	3	3	2	2	2	2	2	3	2	3	2	3
14-Nov	6	6	5	5	5	5	3	3	4	3	4	4	4	4	4	3	2	3	2	3	2	2	2	2	6
15-Nov	2	3	3	3	3	3	3	4	3	4	5	6	6	4	5	5	4	1	1	2	2	2	2	2	6
16-Nov	2	3	2	1	2	2	1	1	2	2	4	3	3	3	3	3	3	3	3	3	3	3	4	4	4
17-Nov	3	4	3	3	3	3	2	3	3	3	3	3	3	3	2	2	2	2	2	2	1	1	2	2	4
18-Nov	1	2	2	2	2	1	1	1	1	2	1	2	2	2	2	2	1	1	1	1	1	1	2	1	2
19-Nov	1	2	1	2	2	1	1	1	1	2	1	2	2	2	3	2	3	3	2	3	4	5	6	7	7
20-Nov	8	8	10	10	9	10	8	8	8	6	7	6	6	7	6	6	4	3	3	3	3	3	2	2	10
21-Nov	1	1	2	1	2	2	2	2	3	3	4	3	2	2	2	3	2	2	2	3	2	3	2	3	4
22-Nov	3	3	3	2	2	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1	2	1	1	1	3
23-Nov	1	1	3	4	2	3	3	2	3	3	2	3	3	3	2	2	2	2	3	3	3	3	3	3	4
24-Nov	2	3	4	4	4	5	4	5	5	5	4	4	4	3	4	3	1	1	1	1	1	2	1	2	5
25-Nov	4	4	3	2	4	4	4	6	7	6	5	7	7	7	6	6	5	3	3	4	3	3	2	1	7
26-Nov	2	2	1	2	1	1	1	2	3	2	5	3	3	2	3	5	5	3	2	2	2	2	2	2	5
27-Nov	2	2	1	2	2	1	1	2	2	2	2	2	2	3	5	4	4	5	4	4	4	4	4	4	5
28-Nov	3	3	4	4	4	4	5	5	4	4	4	4	4	4	4	3	3	4	3	3	3	2	2	2	5
29-Nov	5	4	4	4	5	5	5	5	6	6	6	5	5	6	5	5	4	5	4	4	4	5	5	3	6
30-Nov	4	4	4	4	4	4	4	4	3	3	5	4	4	4	4	3	1	1	2	1	1	1	1	2	5
																	Diurnal Maximum								



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

**Wind Direction (WD) - deg**  
**Christina Lake - November 2023**

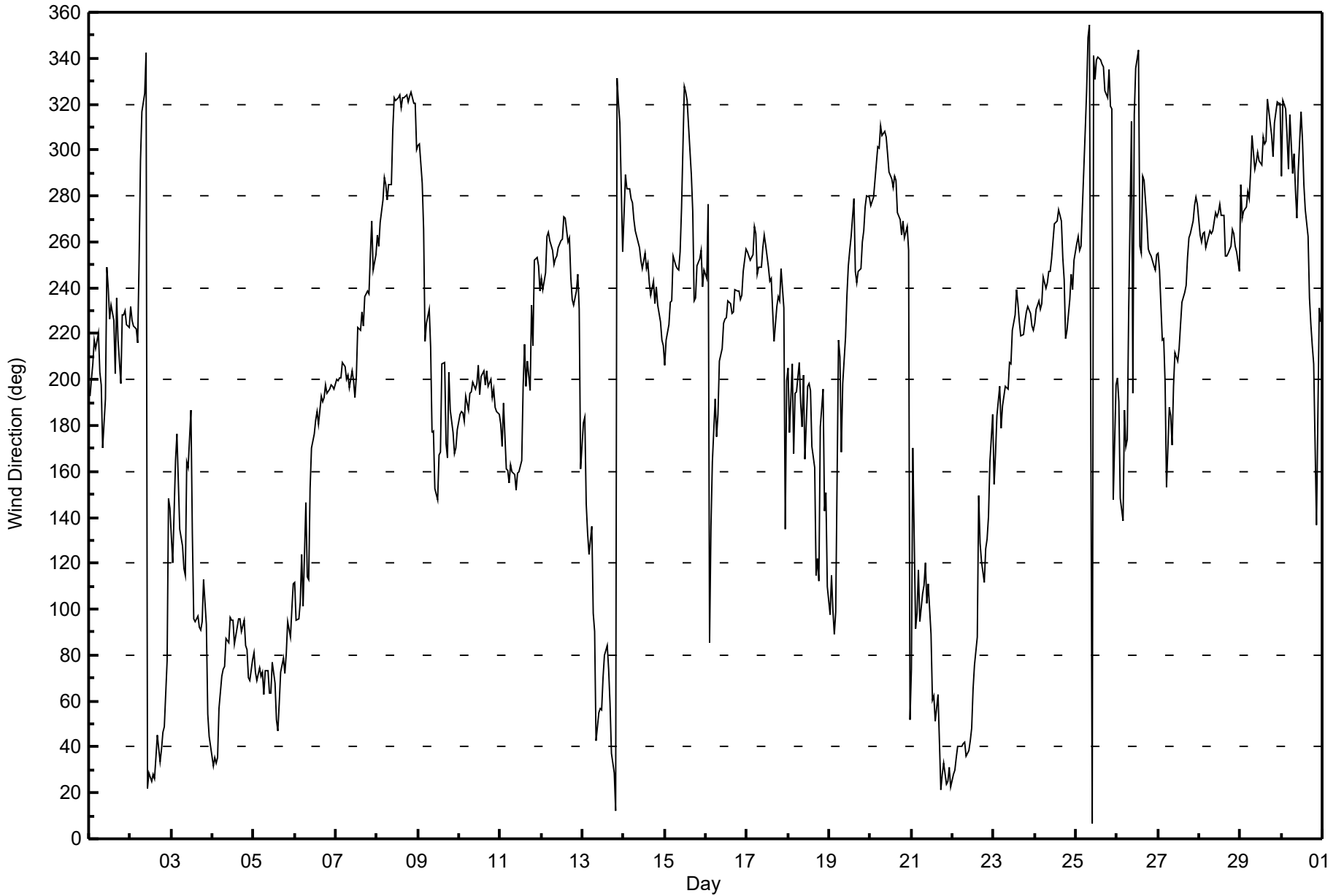
Direction of Maximum Speed: 294 deg on Nov 20 04:00		Hours in Service: 720
Direction of Maximum Daily Speed Average: 290.8 deg on Nov 20		Hours of Data: 720
Direction of Minimum Speed: 52 deg on Nov 21 00:00	Direction of Minimum Daily Speed Average: 3.8 deg on Nov 3	Hours of Missing Data: 0
Monthly Average Direction: 257.0 deg		Percent Operational Time: 100.0

Day	Hourly Period Ending At (MST)																								Daily Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Nov	193	200	207	217	213	220	203	198	171	192	249	240	226	232	226	203	236	217	198	228	228	230	224	222	220.9
2-Nov	232	226	223	222	216	252	295	317	325	342	22	29	25	28	26	35	45	34	39	46	49	78	148	144	15.6
3-Nov	132	120	165	176	155	135	127	118	115	164	162	187	133	96	94	97	92	91	95	113	93	54	45	40	113.7
4-Nov	31	35	33	35	57	71	74	75	87	85	96	95	95	85	92	96	96	90	95	84	83	70	69	78	78.2
5-Nov	81	72	69	74	71	73	63	73	73	63	64	77	68	52	47	59	73	79	72	81	94	88	100	111	71.5
6-Nov	111	95	96	103	124	101	146	114	113	152	170	176	183	186	181	193	191	192	198	194	196	198	197	196	176.7
7-Nov	200	199	201	201	208	206	200	202	196	204	200	192	201	223	221	229	223	236	239	237	254	269	248	254	218.9
8-Nov	263	258	269	278	288	285	279	285	285	308	323	322	322	324	318	323	323	324	321	323	325	320	320	300	306.5
9-Nov	302	303	286	266	217	225	231	214	177	177	153	148	167	168	207	208	172	166	203	187	177	168	171	178	197.8
10-Nov	185	186	185	182	193	187	194	195	199	196	198	206	193	201	204	198	204	197	200	192	196	188	186	185	194.1
11-Nov	181	171	190	161	160	155	163	160	159	152	159	160	165	197	215	197	208	195	232	215	252	253	250	238	183.8
12-Nov	244	239	246	263	264	261	256	250	252	254	258	260	261	271	270	260	262	245	235	232	238	246	231	161	251.7
13-Nov	181	184	146	133	124	136	98	90	43	55	57	56	70	80	84	74	58	37	29	12	332	320	312	256	49.7
14-Nov	272	289	283	283	279	277	270	265	260	257	252	249	255	248	251	242	237	243	233	240	233	225	217	215	256.9
15-Nov	206	217	224	233	234	254	250	248	248	256	275	328	325	321	310	289	273	234	236	250	252	256	240	248	263.5
16-Nov	244	276	86	136	164	192	175	185	208	214	224	226	227	234	233	229	229	239	239	238	235	236	247	257	227.6
17-Nov	256	254	252	254	267	264	246	249	249	258	263	259	249	243	244	230	217	232	236	234	248	231	135	199	245.7
18-Nov	205	177	207	168	194	195	207	190	180	202	166	197	199	195	171	162	115	122	112	180	196	143	151	110	178.7
19-Nov	98	115	100	89	99	217	210	169	198	219	237	250	256	262	279	247	242	247	248	260	265	275	280	279	256.4
20-Nov	276	278	279	294	302	301	310	306	308	306	298	290	287	283	289	287	273	270	263	269	262	267	256	52	290.8
21-Nov	74	170	92	98	117	95	107	111	120	102	111	89	60	62	51	63	42	21	28	33	24	25	31	22	61.7
22-Nov	28	30	35	40	40	40	42	42	36	39	43	48	65	76	88	149	129	121	111	126	131	140	164	185	53.4
23-Nov	154	168	184	197	179	188	193	197	196	208	207	222	228	239	233	225	219	219	225	229	232	229	224	221	213.4
24-Nov	224	231	234	231	233	245	240	242	247	247	252	268	269	269	274	269	253	243	218	221	235	246	239	252	245.0
25-Nov	259	262	256	258	275	308	326	349	354	7	341	331	340	341	339	337	336	326	323	335	319	318	148	198	326.3
26-Nov	201	190	149	138	187	171	174	229	312	194	316	336	344	258	255	289	287	269	257	255	254	250	247	255	266.0
27-Nov	255	248	217	218	199	153	188	184	172	197	212	208	214	224	234	238	241	254	262	264	269	276	280	276	240.7
28-Nov	263	260	264	264	257	263	265	264	265	273	271	273	276	272	272	254	254	255	258	265	264	258	255	247	263.3
29-Nov	285	270	273	275	282	279	290	306	292	295	299	295	293	306	303	304	322	312	306	297	312	321	320	321	299.7
30-Nov	288	321	318	307	292	315	290	298	283	270	291	317	304	285	274	262	235	224	215	207	137	185	231	225	284.2

248.4 247.4 242.8 249.6 249.4 257.0 252.3 258.4 260.2 262.1 267.0 275.1 274.9 268.6 268.6 260.0 257.5 252.5 252.7 251.7 258.9 260.9 250.2 243.9

Diurnal Average

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







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

**Wind Direction (WD) - deg**  
**Christina Lake - November 2023**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 91 deg on Nov 16 02:00 Minimum Value: 5 deg on Nov 18 01:00 Percentiles: P <sub>1</sub> = 7 P <sub>10</sub> = 10 Q <sub>1</sub> = 12 Median = 15 Q <sub>3</sub> = 18 P <sub>90</sub> = 26 P <sub>99</sub> = 60																			Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0							
Day	Hourly Period Ending At (MST)																								Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	32	21	12	60	10	26	51	16	29	30	17	14	20	14	16	13	10	10	23	10	11	12	15	15	60	
2-Nov	13	24	12	13	59	80	75	47	16	17	13	12	14	11	12	13	15	11	10	11	10	27	54	27	80	
3-Nov	26	23	26	14	17	22	13	11	13	20	16	15	23	28	12	12	16	11	11	31	12	17	9	27	31	
4-Nov	12	10	10	10	10	12	10	10	13	11	13	11	12	11	14	12	11	10	10	11	13	12	11	14	14	
5-Nov	11	10	10	10	10	12	15	17	11	15	10	13	11	12	9	14	11	10	9	9	12	15	16	16	17	
6-Nov	24	45	7	11	31	12	14	13	15	22	20	26	17	15	12	16	13	13	12	12	14	12	12	16	45	
7-Nov	15	14	13	12	14	14	13	12	11	17	19	12	15	17	24	17	16	14	13	11	15	18	14	16	24	
8-Nov	17	16	18	15	15	16	17	16	17	17	11	12	12	10	14	11	10	10	11	10	11	14	14	20	20	
9-Nov	20	20	30	52	30	39	32	40	30	25	36	32	15	17	21	17	13	10	15	10	15	14	15	13	52	
10-Nov	13	11	12	13	12	11	10	10	11	12	18	16	17	16	14	13	13	16	13	19	14	16	19	20	20	
11-Nov	21	17	18	15	14	13	12	11	12	15	13	13	44	18	16	12	14	18	24	20	18	14	16	21	44	
12-Nov	13	12	15	17	17	18	16	15	13	13	16	17	18	18	18	18	16	12	10	8	15	11	7	45	45	
13-Nov	25	24	60	25	25	49	13	15	11	11	15	9	12	14	13	10	18	10	11	19	22	14	18	21	60	
14-Nov	19	16	15	16	16	15	17	17	17	17	16	15	17	17	16	12	11	13	11	10	9	12	10	10	19	
15-Nov	11	10	13	14	16	17	17	13	13	16	22	17	15	18	22	24	26	9	10	16	13	16	12	11	26	
16-Nov	11	91	18	25	11	18	22	22	14	16	16	11	11	13	12	10	11	11	10	10	10	10	16	17	91	
17-Nov	16	16	18	20	17	17	18	19	16	17	19	17	17	14	15	12	13	9	8	16	16	8	21	20	21	
18-Nov	5	28	7	13	19	12	13	15	15	12	17	14	22	18	34	28	10	19	21	26	42	29	15	32	42	
19-Nov	14	49	29	11	59	19	48	13	12	29	6	15	16	25	23	40	18	12	13	17	19	17	15	16	59	
20-Nov	16	16	16	15	14	15	13	15	15	16	17	15	15	16	17	17	16	15	17	16	18	26	80	88	88	
21-Nov	58	39	12	9	16	10	21	13	24	34	26	49	19	18	13	33	10	13	13	12	11	14	10	13	58	
22-Nov	13	12	11	10	11	10	9	9	9	8	12	15	20	15	25	44	50	55	18	16	12	16	17	13	55	
23-Nov	20	13	12	13	16	14	12	12	12	15	14	15	11	12	13	11	11	11	11	11	10	11	10	11	20	
24-Nov	11	11	12	12	13	14	11	12	14	15	19	18	17	17	16	18	10	12	7	7	11	11	11	16	19	
25-Nov	17	18	16	15	17	17	15	19	20	19	14	17	16	18	15	15	16	15	13	16	10	31	37	27	37	
26-Nov	25	26	22	32	23	23	36	89	54	70	44	23	35	25	16	20	20	18	15	13	14	12	10	15	89	
27-Nov	14	14	10	10	19	25	16	37	31	19	11	12	15	11	12	11	12	16	19	18	17	15	13	15	37	
28-Nov	17	17	18	18	16	18	18	18	18	17	16	17	17	17	17	15	15	15	17	17	16	14	13	10	18	
29-Nov	21	20	18	15	16	17	19	19	15	16	18	14	15	17	18	16	13	20	18	18	18	12	11	11	21	
30-Nov	18	16	15	18	19	18	25	25	26	18	26	16	22	19	20	18	9	7	46	12	33	38	11	27	46	
	58	91	60	60	59	80	75	89	54	70	44	49	44	28	34	44	50	55	46	31	42	38	80	88		
Diurnal Maximum																										



## WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY  
MONITORING PROGRAM  
MONTHLY REPORT

**AMS27**  
**JACKFISH 2/3**  
**NOVEMBER 2023**

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

December 22, 2023

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - JACKFISH 2/3 (AMS27)  
 NOVEMBER 2023

MONTHLY SUMMARY

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2 (ppb) Average	685	33	35	99.72	28.3	0	7.6	0
H2S (ppb) Average	685	34	35	99.86	3.8	0	0.8	0
NO2 (ppb) Average	647	33	73	94.44	6.6	0	3.1	-
NO (ppb) Average	647	33	73	94.44	1.5	-	0.4	-
NOX (ppb) Average	647	33	73	94.44	6.8	-	3.4	-
Temperature 2 m (C) Average	719	0	1	99.86	8.2	-	3	-
Relative Humidity (%) Average	719	0	1	99.86	99.3	-	98.4	-
Wind Speed 10 m (km/h) Average	666	0	54	92.5	20	-	13	-
Wind Direction 10 m (deg) Average	666	0	54	92.5	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - JACKFISH 2/3 (AMS27)  
 NOVEMBER 2023

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	0.66	2.4	-	0	0	0.1	0.2	0.4	1	28.3
H2S (ppb) Average	685	0.23	0.2	-	0	0.1	0.1	0.2	0.3	0.4	3.8
NO2 (ppb) Average	647	1.05	1	-	0	0	0.3	0.8	1.5	2.2	6.6
NO (ppb) Average	647	0.24	0.3	-	0	0	0	0.2	0.4	0.6	1.5
NOX (ppb) Average	647	1.29	1.1	-	0	0.2	0.5	1	1.8	2.7	6.8
Temperature 2 m (C) Average	719	-3.16	3.8	-	-14.2	-8.1	-5.2	-2.9	-0.8	0.9	8.2
Relative Humidity (%) Average	719	80.28	12.7	-	39.5	61.7	72.4	82	89.4	96.7	99.3
Wind Speed 10 m (km/h) Average	666	8.1	4	-	0	4	6	8	10	13	20
Wind Direction 10 m (deg) Average	666	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - JACKFISH 2/3 (AMS27)  
NOVEMBER 2023

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
SO2	07 Nov 2023 13:00	07 Nov 2023 14:00	2	Maintenance - reinitiated daily QA check
H2S	07 Nov 2023 14:00	07 Nov 2023 14:00	1	Maintenance - reinitiated daily QA check
NO2	07 Nov 2023 15:00	07 Nov 2023 15:00	1	Maintenance - reinitiated daily QA check
NO2	19 Nov 2023 04:00	20 Nov 2023 13:00	34	Analyzer Failure - sample pump failure
NO2	20 Nov 2023 14:00	20 Nov 2023 18:00	5	Maintenance - replaced sample pump
Relative Humidity, Temperature	09 Nov 2023 16:00	09 Nov 2023 16:00	1	Maintenance - sensor replaced
Wind Speed, Wind Direction	07 Nov 2023 08:00	09 Nov 2023 12:00	53	Flat line in sensor output signal - Sensor frozen
Wind Speed, Wind Direction	09 Nov 2023 13:00	09 Nov 2023 13:00	1	Maintenance - tower lowered to de-ice sensor



Wood Buffalo Environmental Association

Summary of Hour Averages

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

Jackfish 2/3 - November 2023

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 28.3 ppb on Nov 20 09:00	Maximum Daily Average: 7.6 ppb on Nov 20		Hours of Data:	685
Minimum Value: 0.0 ppb on Nov 1 02:00	Minimum Daily Average: 0.0 ppb on Nov 3		Hours of Missing Data:	35
Maximum Diurnal Average: 1.5 ppb at hour 10	Minimum Diurnal Average: 0.2 ppb at hour 23		Hours of Calibration:	33
Monthly Average: 0.66 ppb	Percentiles: P <sub>1</sub> = 0.0 P <sub>10</sub> = 0.0 Q <sub>1</sub> = 0.1 Median = 0.2 Q <sub>3</sub> = 0.4 P <sub>90</sub> = 1.0 P <sub>99</sub> = 9.9		Percent Operational Time:	99.7

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	0.1	0.0	0.2	0.1	0.1	Z	0.0	0.0	0.2	0.3	2.4	0.2	0.2	0.1	0.1	0.0	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.2	2.4
2-Nov	Z	0.1	0.0	0.3	0.2	1.3	0.5	0.3	0.2	0.5	1.0	0.7	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.1	0.0	0.1	1.3
3-Nov	0.1	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.1	0.0	0.1	0.1	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.2
4-Nov	0.1	0.1	Z	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.1	0.1	0.1	0.1	0.2	0.1	0.3	0.4	0.5	0.3	0.3	0.3	0.3	0.3	0.5
5-Nov	0.3	0.2	0.2	Z	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.2	0.3	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.3
6-Nov	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.2	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.1	0.1	0.3	0.3	0.3
7-Nov	0.2	0.2	0.1	0.2	0.2	0.1	0.2	0.2	0.2	0.2	0.1	0.2	M	M	0.0	0.1	0.1	0.1	0.1	0.2	0.1	0.3	0.1	0.1	0.1	0.3
8-Nov	0.2	0.2	0.2	0.2	0.5	Z	0.0	1.4	0.7	3.8	0.8	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	3.8	0.8
9-Nov	Z	2.1	1.3	1.3	0.5	0.1	0.0	0.0	0.0	0.0	0.1	0.4	0.2	0.0	0.0	0.0	0.0	0.1	0.4	0.1	0.1	0.2	0.1	0.1	2.1	2.1
10-Nov	0.1	Z	0.0	0.0	0.0	0.0	0.1	0.1	0.1	1.2	0.3	0.1	0.2	0.4	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.0	0.2	1.2
11-Nov	0.2	0.1	Z	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.2	0.3	0.2	0.1	0.0	0.0	0.0	0.3	0.4	0.1	0.6	0.6	0.2	0.6
12-Nov	0.3	0.3	0.6	Z	0.3	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.3	0.0	0.0	0.1	0.0	0.0	0.0	0.4	0.5	0.1	0.2	0.1	0.2	0.6
13-Nov	0.0	0.0	0.0	0.0	Z	0.0	0.2	0.1	0.0	0.0	0.0	0.0	0.1	1.6	0.4	1.7	1.2	0.1	0.1	0.0	0.0	0.0	0.5	0.1	0.3	1.7
14-Nov	0.6	1.4	2.9	1.3	0.4	Z	0.1	0.2	0.1	0.3	0.3	0.2	C	C	C	C	C	0.2	0.6	0.5	0.2	0.2	0.1	0.2	0.5	2.9
15-Nov	Z	0.1	0.0	0.5	0.4	0.6	0.4	0.5	0.5	0.8	1.1	0.5	0.2	2.7	3.2	1.1	1.7	0.2	0.1	2.0	2.7	0.4	0.1	0.1	0.9	3.2
16-Nov	0.1	Z	1.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.1	0.3	0.9	1.0	1.1	1.0	0.6	0.3	1.1
17-Nov	0.7	0.6	Z	0.4	0.1	0.1	0.5	0.5	0.4	0.1	0.1	0.1	0.1	0.4	0.3	0.2	0.4	0.3	0.1	0.2	0.1	0.1	0.1	0.1	0.3	0.7
18-Nov	0.1	0.1	0.1	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.8	0.8	0.6	0.4	0.5	0.4	0.5	1.0	0.9	0.4	0.4	0.6	0.6	0.3	1.0
19-Nov	0.6	0.6	0.6	0.7	Z	0.5	0.5	0.4	0.4	0.4	0.3	0.5	0.4	2.2	3.2	1.2	0.3	0.4	0.5	0.5	0.5	0.4	0.4	0.3	0.7	3.2
20-Nov	0.2	0.3	0.3	7.5	19.4	Z	24.9	20.3	28.3	27.6	10.0	7.8	9.4	1.2	5.0	8.3	2.1	0.3	0.1	0.2	0.4	0.2	0.2	0.6	7.6	28.3
21-Nov	Z	0.5	0.4	0.3	0.5	0.6	0.5	0.4	0.2	0.2	0.1	0.2	0.4	0.5	0.5	0.7	0.4	0.3	0.2	0.3	0.3	0.2	0.2	0.1	0.3	0.7
22-Nov	0.1	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.4	0.2	0.4	0.5	0.1	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.1	0.5
23-Nov	0.1	0.1	Z	0.4	0.4	0.3	0.3	0.5	0.1	0.1	0.1	0.1	0.2	0.3	0.3	0.2	0.1	0.1	0.1	0.2	0.1	0.1	0.2	0.1	0.2	0.5
24-Nov	0.2	0.2	0.2	Z	0.1	0.0	0.1	0.1	0.1	0.1	0.4	0.7	0.2	0.1	0.1	0.1	0.2	0.2	0.2	0.1	0.1	0.1	0.0	0.1	0.2	0.7
25-Nov	0.1	0.3	0.1	0.1	Z	2.6	0.0	0.5	1.2	1.4	0.7	0.2	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.2	0.3	0.2	0.1	0.2	0.4	2.6
26-Nov	0.2	0.1	0.2	0.2	0.2	Z	0.1	0.2	0.3	0.5	0.7	0.4	0.3	1.7	1.4	3.0	3.1	1.5	0.3	0.2	0.2	0.2	0.1	0.2	0.7	3.1
27-Nov	Z	0.3	0.1	0.0	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	0.5	0.4	0.1	0.1	0.1	0.0	0.1	0.5
28-Nov	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.8	0.7	0.6	0.4	0.2	0.2	0.1	0.1	0.1	0.1	0.8
29-Nov	3.4	0.8	Z	0.1	0.0	0.1	0.2	9.4	11.2	5.0	4.7	9.8	4.1	7.2	3.5	8.3	0.5	0.4	4.9	2.2	0.3	0.4	0.2	0.2	3.3	11.2
30-Nov	0.2	0.2	1.8	Z	2.1	0.3	1.4	0.6	0.0	1.7	5.3	3.2	5.4	1.5	2.4	0.7	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	1.2	5.4

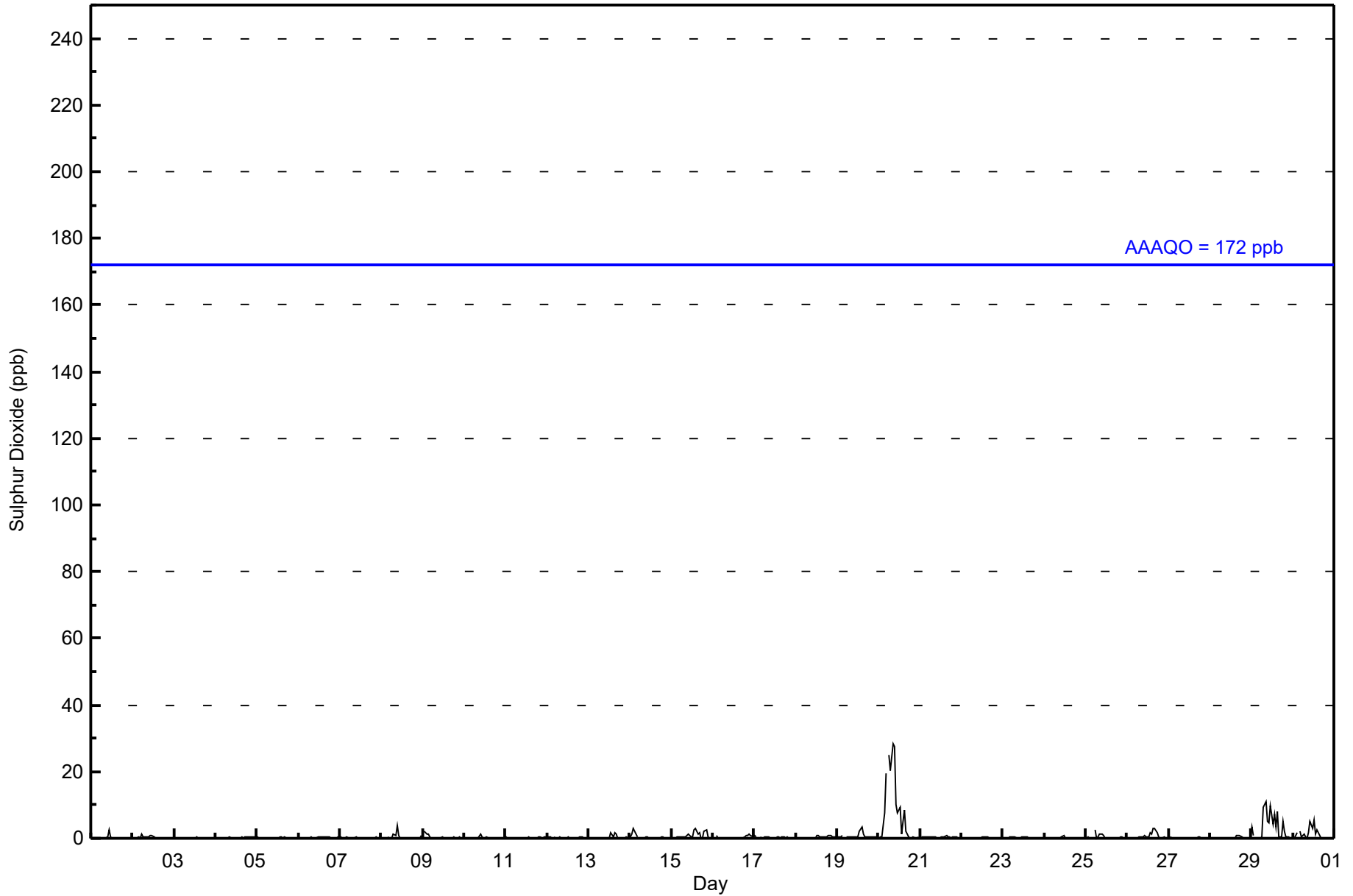
0.3	0.3	0.4	0.6	1.0	0.3	1.0	1.2	1.5	1.5	1.0	0.9	0.9	0.8	0.8	1.0	0.4	0.2	0.4	0.4	0.3	0.2	0.2	0.2	0.2	0.2	Diurnal Average
3.4	2.1	2.9	7.5	19.4	2.6	24.9	20.3	28.3	27.6	10.0	9.8	9.4	7.2	5.0	8.3	3.1	1.5	4.9	2.2	2.7	1.1	1.0	0.8	0.8	0.8	Diurnal Maximum

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



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

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Jackfish 2/3 - November 2023**





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

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Jackfish 2/3 - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 10	679	99.12	99.12
11 - 20	3	0.44	99.56
21 - 60	3	0.44	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720





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

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Jackfish 2/3 - November 2023**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	3	17	28	32	41	22	18	36	45	83	85	100	76	37	43	13	679
11 - 20	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	0	3
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	3
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	3	17	28	32	41	22	18	36	45	83	85	100	76	39	47	13	685

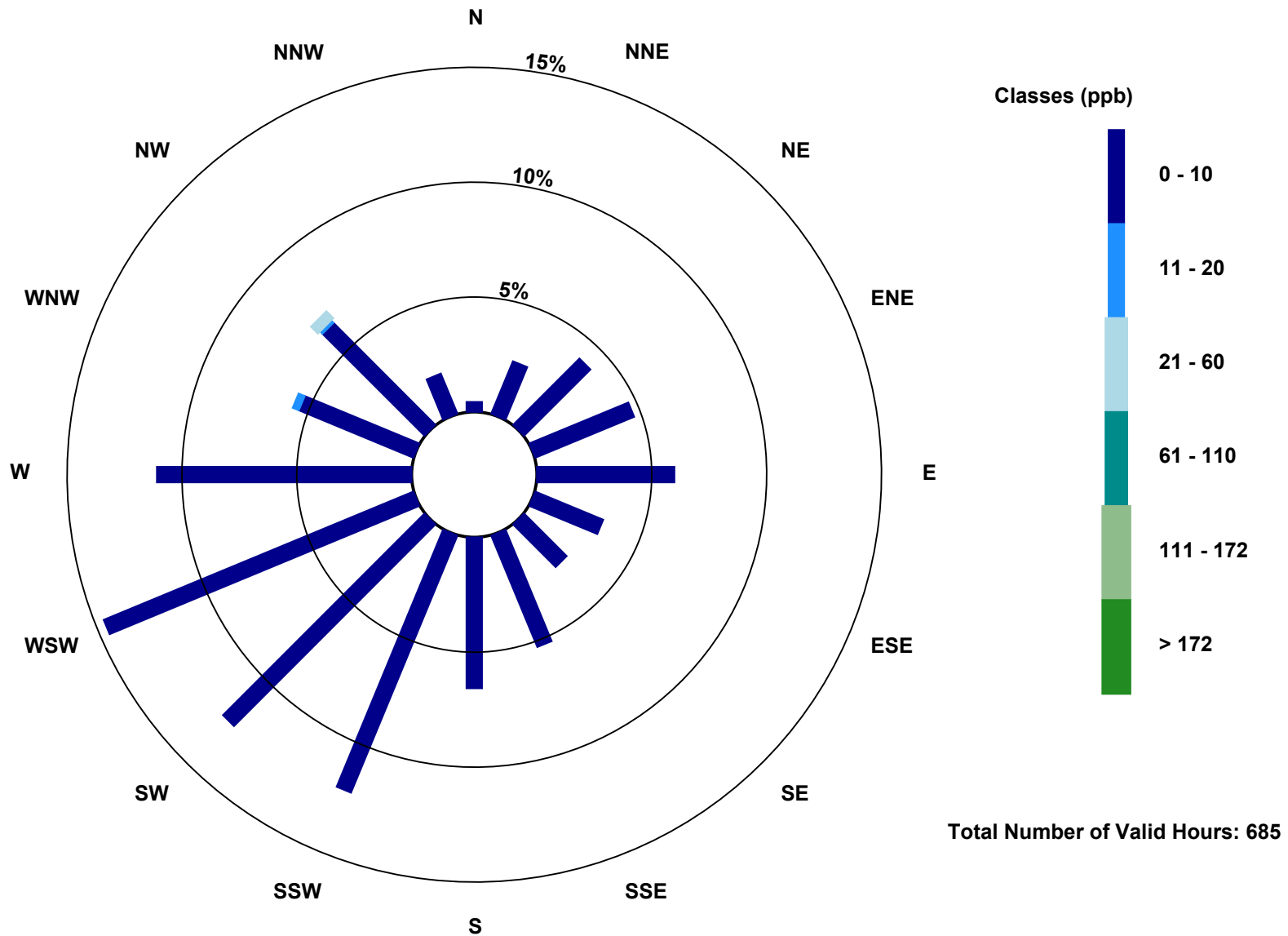
Total Number of Valid Hours: 685

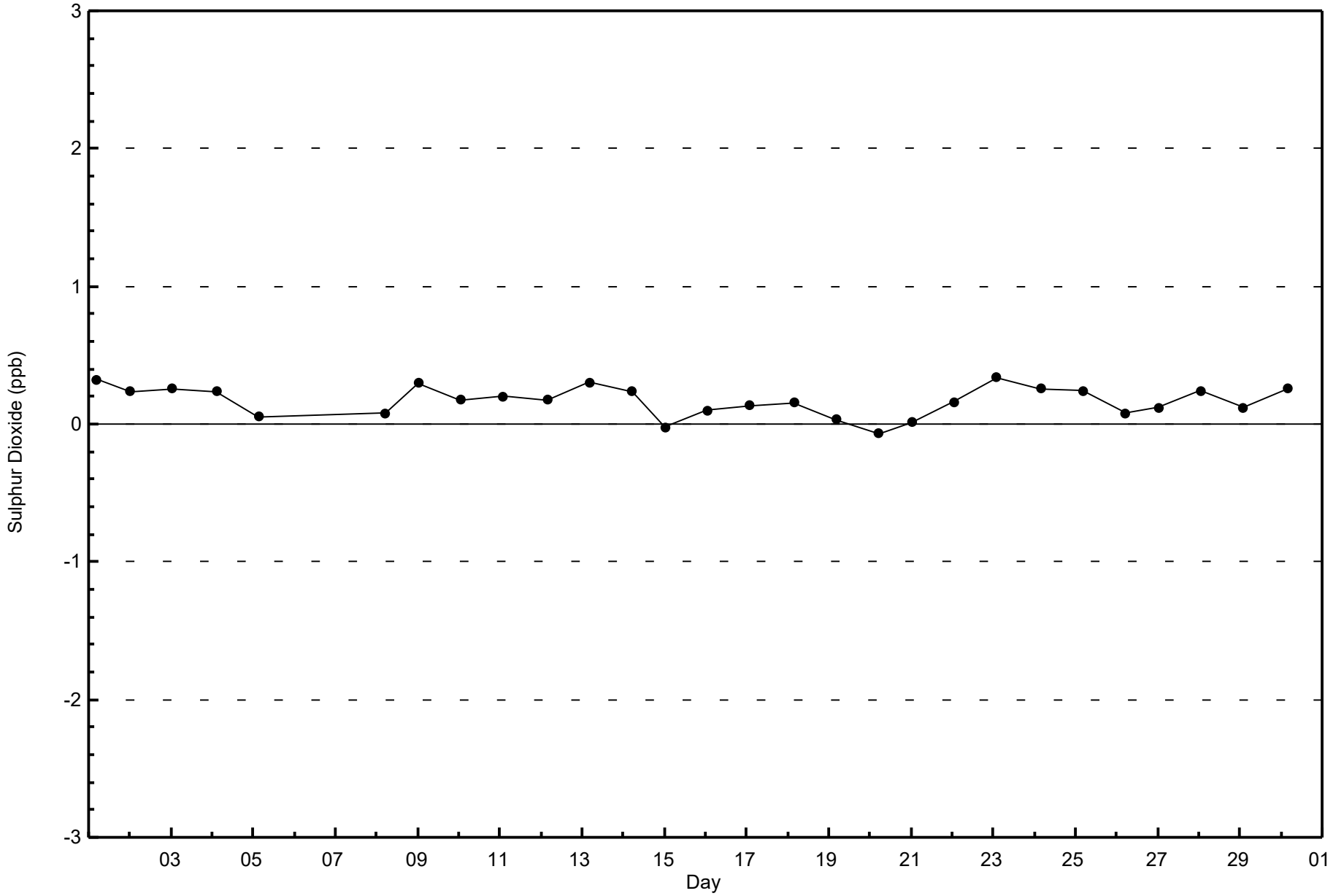
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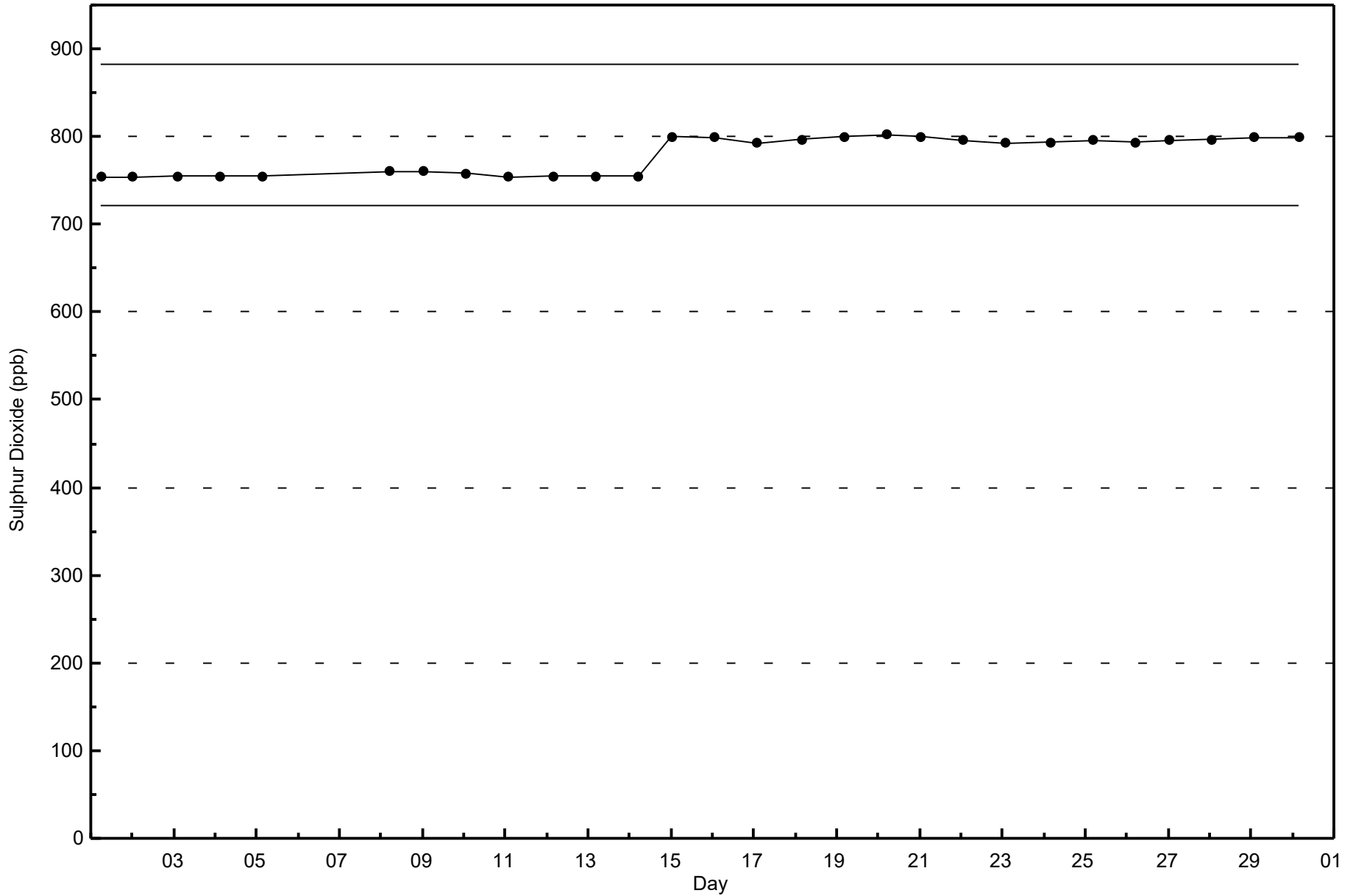


Wood Buffalo Environmental Association  
Wind Rose Nov 2023

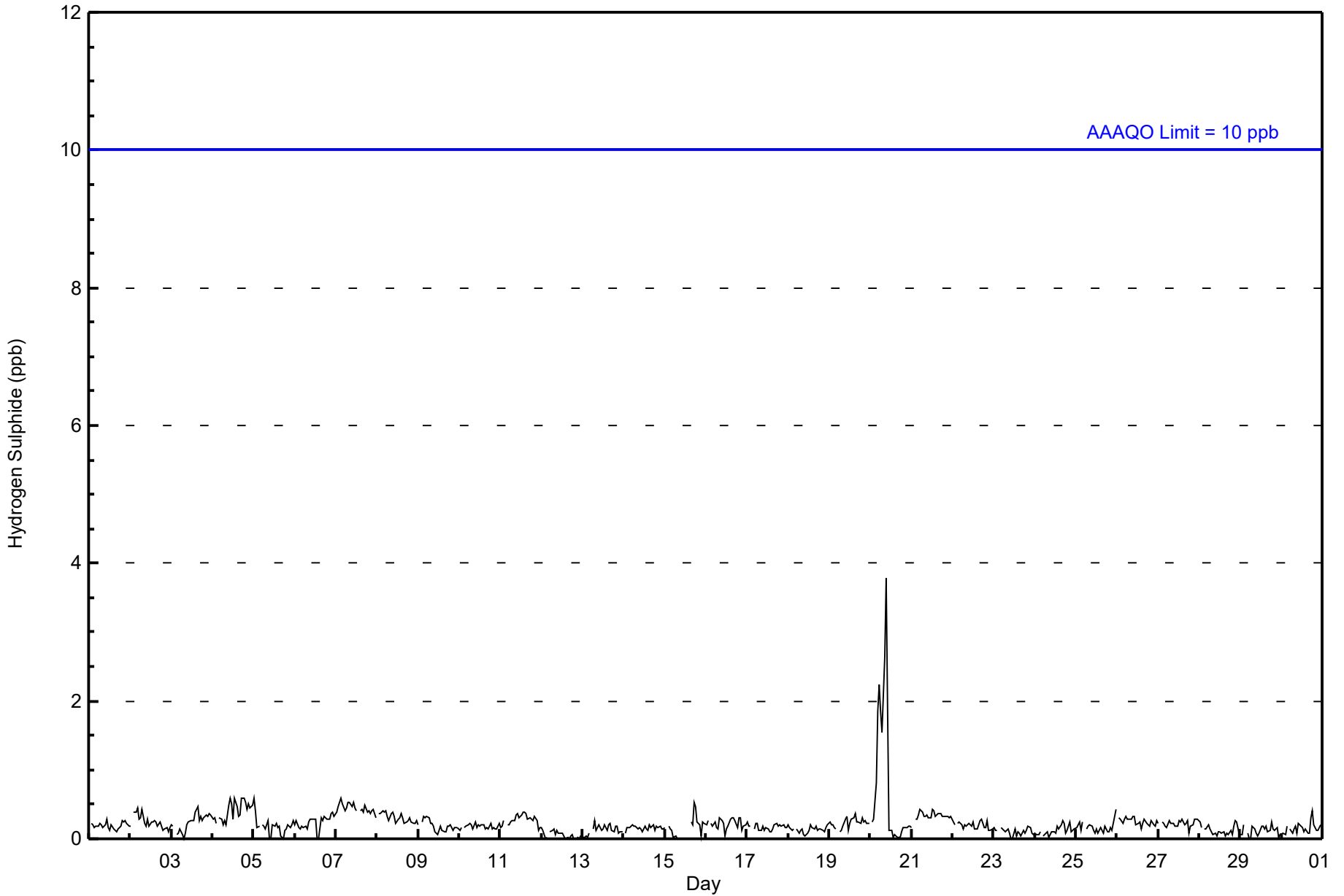
Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Jackfish 2/3













**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Hydrogen Sulphide (H<sub>2</sub>S) - ppb  
Jackfish 2/3 - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2	683	99.71	99.71
3 - 4	2	0.29	100.00
5 - 7	0	0.00	100.00
8 - 11	0	0.00	100.00
> 11	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Hydrogen Sulphide (H<sub>2</sub>S) - ppb  
Jackfish 2/3 - November 2023**

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	23	51	12	22	9	8	16	40	93	83	112	71	45	25	14	632
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	8	23	51	12	22	9	8	16	40	93	83	112	71	47	25	14	634

Total Number of Valid Hours: 634

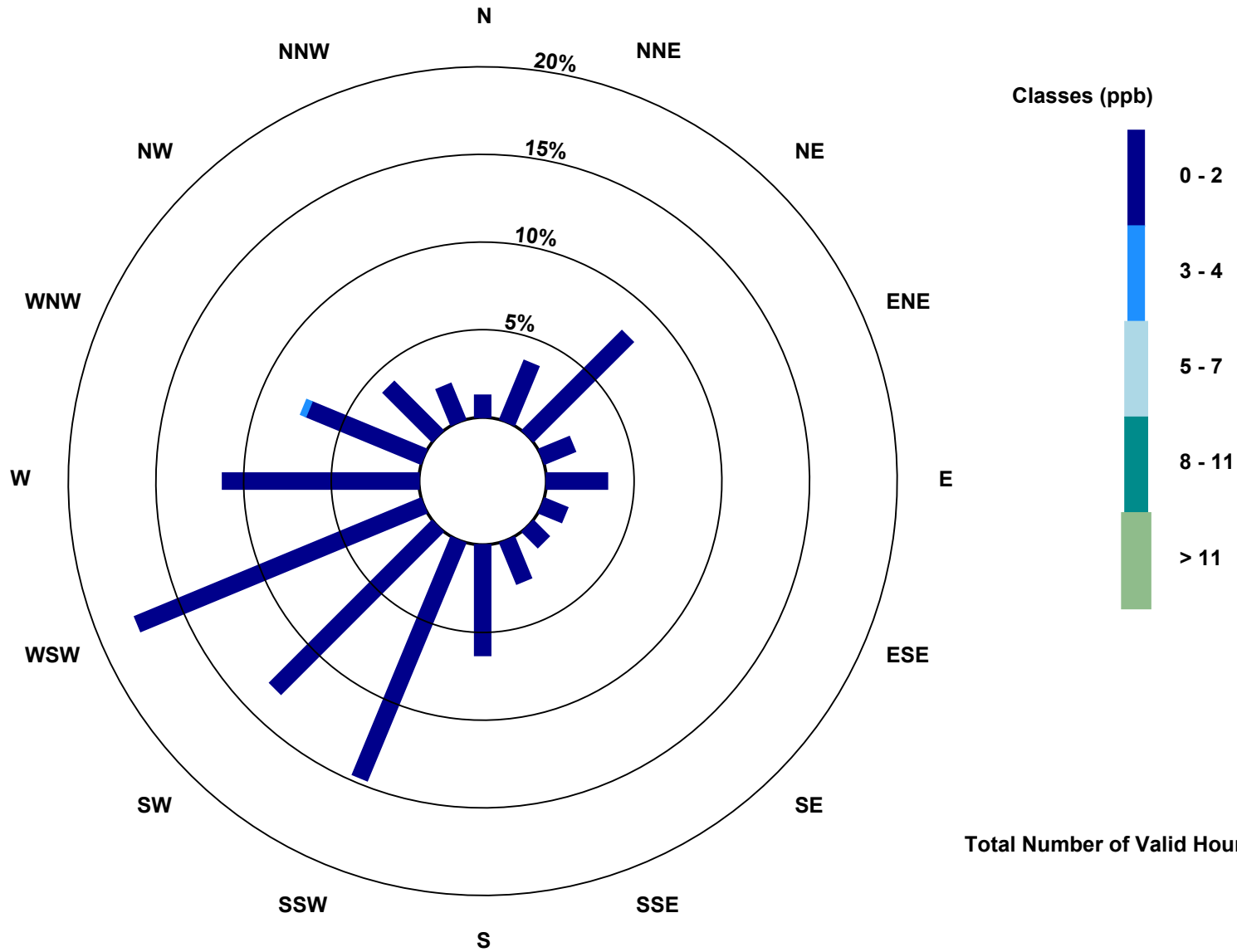
Total Number of Hours: 720



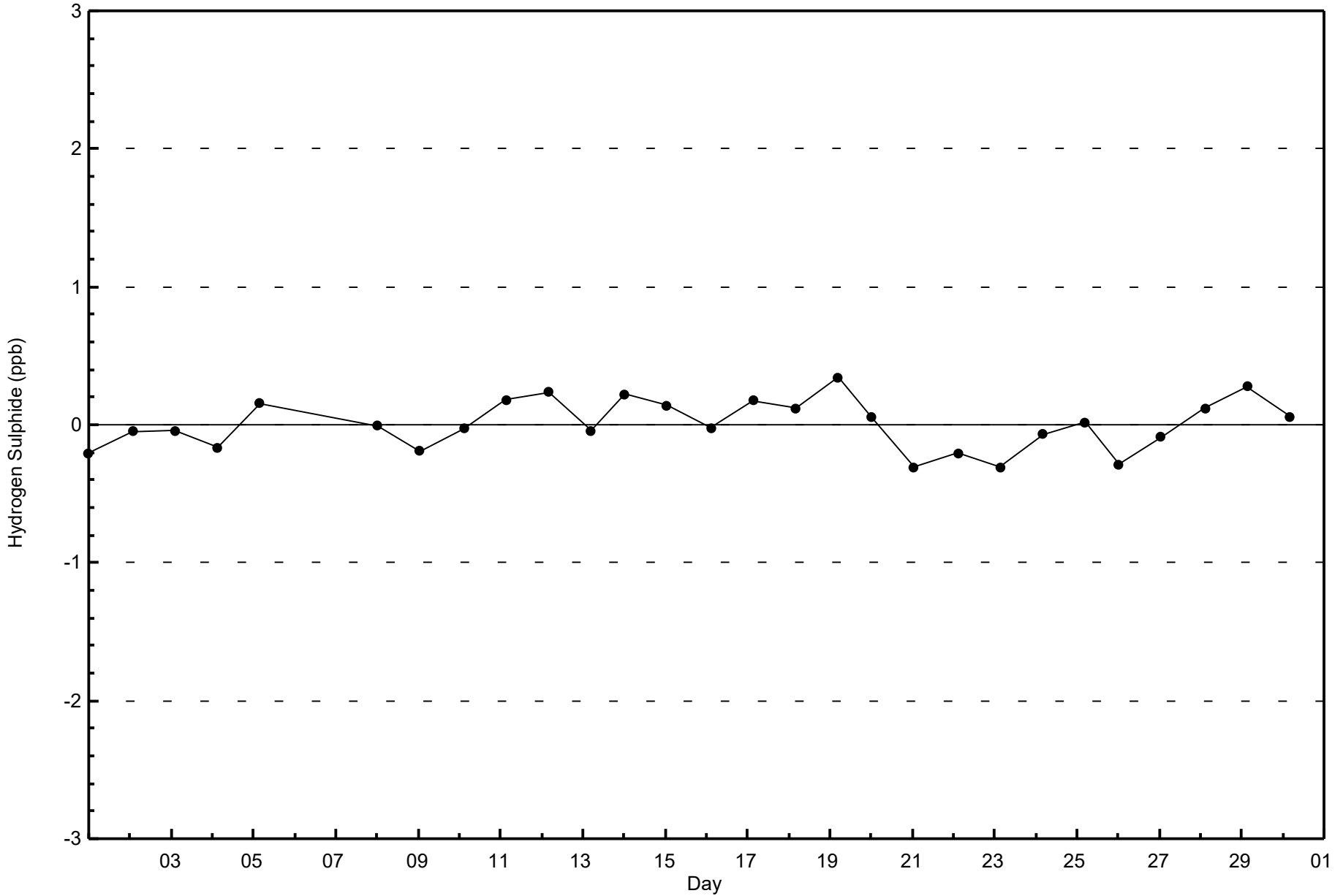


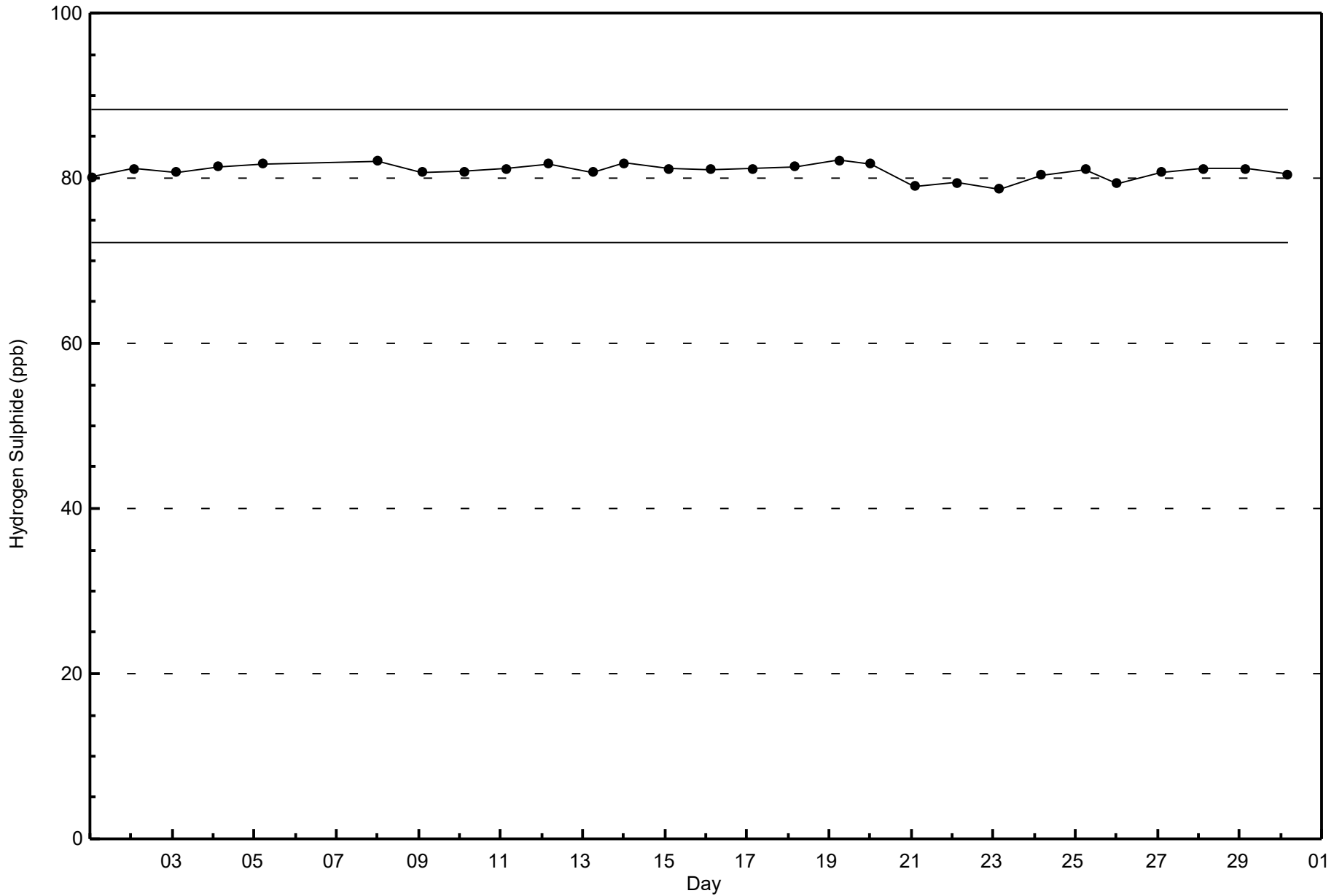
Wood Buffalo Environmental Association  
Wind Rose Nov 2023

Hydrogen Sulphide (H<sub>2</sub>S) - ppb  
Jackfish 2/3



Total Number of Valid Hours: 634





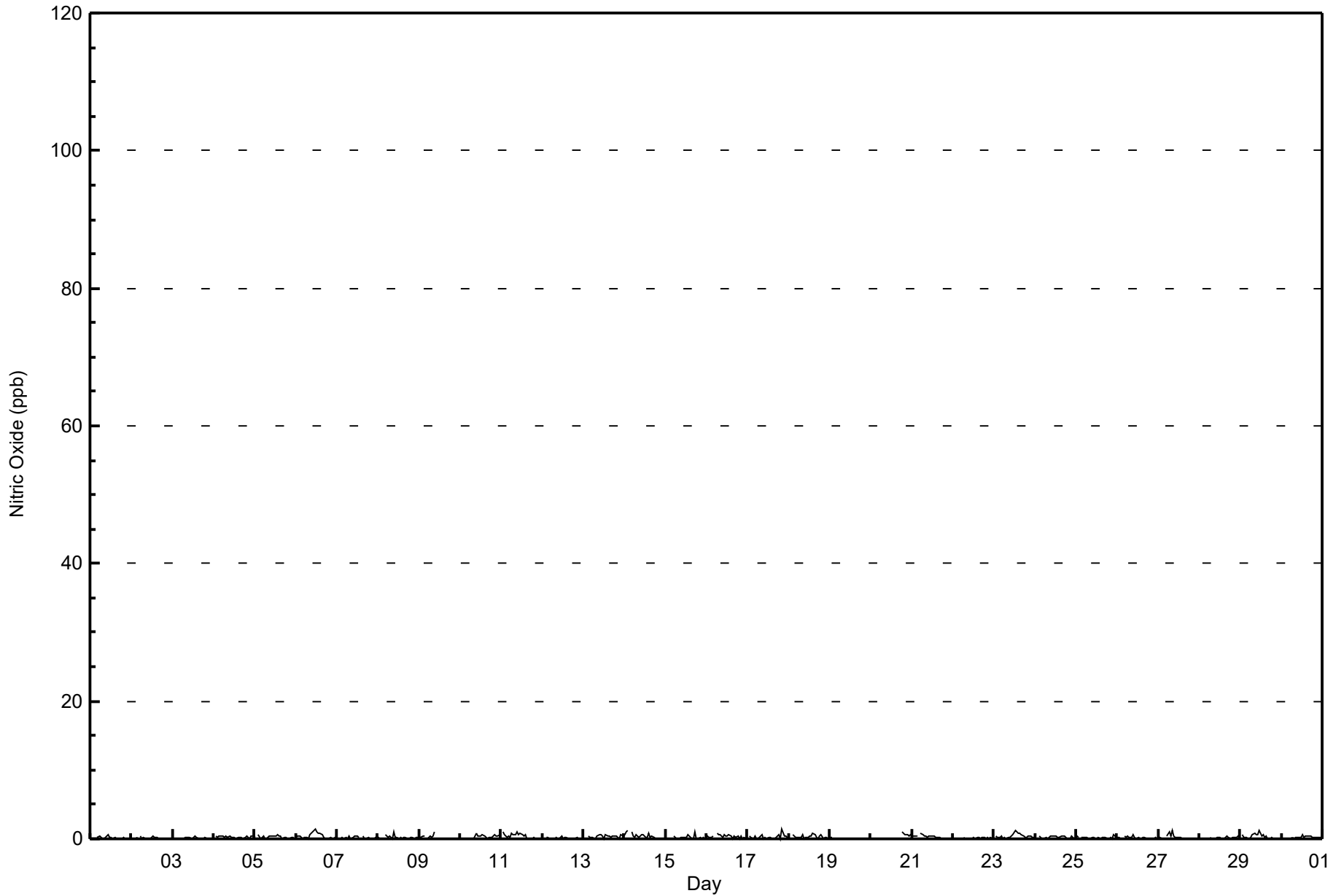


Maximum Value: 1.5 ppb on Nov 6 12:00																				Maximum Daily Average: 0.4 ppb on Nov 6					Hours in Service: 720		
Minimum Value: 0.0 ppb on Nov 1 02:00																				Minimum Daily Average: 0.1 ppb on Nov 12					Hours of Data: 647		
Maximum Diurnal Average: 0.4 ppb at hour 10																				Minimum Diurnal Average: 0.1 ppb at hour 22					Hours of Missing Data: 73		
Monthly Average: 0.24 ppb																				Percentiles: P <sub>1</sub> = 0.0 P <sub>10</sub> = 0.0 Q <sub>1</sub> = 0.0 Median = 0.2 Q <sub>3</sub> = 0.4 P <sub>90</sub> = 0.6 P <sub>99</sub> = 1.1					Hours of Calibration: 33		
																									Percent Operational Time: 94.4		
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Nov	0.0	0.0	0.0	Z	0.1	0.4	0.3	0.1	0.0	0.5	0.6	0.3	0.3	0.0	0.1	0.0	0.0	0.1	0.1	0.2	0.0	0.0	0.0	0.0	0.1	0.6	
2-Nov	0.1	0.1	0.0	0.2	Z	0.5	0.1	0.2	0.0	0.0	0.0	0.0	0.4	0.2	0.1	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.5	
3-Nov	0.0	0.0	0.0	0.0	0.0	Z	0.0	0.2	0.1	0.1	0.2	0.0	0.3	0.3	0.2	0.0	0.0	0.0	0.0	0.2	0.0	0.1	0.1	0.0	0.1	0.3	
4-Nov	Z	0.5	0.1	0.3	0.4	0.3	0.3	0.5	0.3	0.4	0.2	0.3	0.1	0.0	0.2	0.2	0.3	0.1	0.2	0.5	0.2	0.0	0.3	0.4	0.3	0.5	
5-Nov	0.2	Z	0.6	0.1	0.3	0.4	0.0	0.0	0.3	0.3	0.4	0.3	0.4	0.6	0.3	0.4	0.0	0.3	0.2	0.1	0.0	0.2	0.2	0.1	0.3	0.6	
6-Nov	0.2	0.5	0.4	0.3	0.0	0.2	0.2	0.0	0.7	0.9	1.1	1.5	0.9	0.7	0.9	0.6	0.1	0.1	0.0	0.1	0.2	0.0	0.0	0.2	0.4	1.5	
7-Nov	0.0	0.0	0.1	0.2	0.1	0.2	0.1	0.5	0.0	0.2	0.3	0.3	0.4	0.2	M	0.3	0.1	0.0	0.1	0.1	0.0	0.0	0.1	0.4	0.2	0.5	
8-Nov	0.3	0.0	0.0	Z	0.5	0.3	0.1	0.4	0.0	1.1	0.3	0.2	0.1	0.3	0.0	0.1	0.2	0.0	0.0	0.2	0.1	0.0	0.1	0.2	0.2	1.1	
9-Nov	0.2	0.1	0.4	0.4	Z	0.0	0.5	0.2	0.4	1.0	C	C	C	C	C	C	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	--	1.0	
10-Nov	0.0	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.8	0.3	0.3	0.4	0.7	0.4	0.2	0.0	0.3	0.3	0.4	0.6	0.4	0.4	0.7	0.3	0.8	
11-Nov	Z	1.0	0.5	0.3	0.5	0.2	0.8	0.6	0.7	0.9	0.6	0.7	0.6	0.5	0.7	0.0	0.1	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.4	1.0	
12-Nov	0.0	Z	0.1	0.3	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.5	0.0	0.1	0.2	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.5	
13-Nov	0.0	0.0	Z	0.5	0.2	0.1	0.1	0.1	0.3	0.6	0.5	0.5	0.0	0.6	0.4	0.5	0.2	0.4	0.5	0.5	0.2	0.1	0.5	0.4	0.3	0.6	
14-Nov	0.5	0.9	1.2	Z	1.0	0.5	0.2	0.6	0.2	0.4	0.6	0.5	0.2	0.2	0.9	0.3	0.4	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.4	1.2	
15-Nov	0.0	0.0	0.0	0.0	Z	0.4	0.0	0.0	0.0	0.1	0.2	0.2	0.2	0.6	0.5	0.0	0.0	1.1	0.0	0.0	0.1	0.0	0.1	0.1	0.2	1.1	
16-Nov	0.4	0.3	0.2	0.2	0.3	Z	0.9	0.5	0.6	0.3	0.7	0.5	0.4	0.7	0.4	0.1	0.3	0.2	0.4	0.0	0.4	0.1	0.2	0.0	0.4	0.9	
17-Nov	Z	0.5	0.2	0.1	0.3	0.0	0.1	0.1	0.6	0.1	0.3	0.0	0.1	0.2	0.0	0.0	0.1	0.5	0.7	0.0	1.4	0.3	0.3	0.2	0.3	1.4	
18-Nov	0.2	Z	0.5	0.3	0.1	0.1	0.1	0.2	0.5	0.1	0.3	0.1	0.3	0.4	0.8	0.6	0.3	0.0	0.4	0.6	0.0	0.3	0.3	0.0	0.3	0.8	
19-Nov	0.2	0.2	Z	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	0.2	
20-Nov	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	M	M	M	M	M	M	1.1	0.8	0.6	0.5	0.5	0.5	--	1.1
21-Nov	0.5	0.5	0.4	0.5	Z	0.7	0.6	0.4	0.4	0.2	0.4	0.3	0.4	0.3	0.3	0.2	0.1	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.3	0.7	
22-Nov	0.0	0.0	0.0	0.0	0.0	Z	0.2	0.1	0.0	0.0	0.0	0.0	0.2	0.0	0.1	0.2	0.0	0.2	0.1	0.0	0.3	0.1	0.2	0.0	0.1	0.3	
23-Nov	Z	0.4	0.1	0.2	0.4	0.1	0.2	0.1	0.2	0.1	0.3	0.7	1.2	1.0	0.7	0.7	0.3	0.1	0.1	0.5	0.5	0.2	0.2	0.2	0.4	1.2	
24-Nov	0.1	Z	0.5	0.2	0.1	0.0	0.2	0.1	0.2	0.5	0.5	0.3	0.5	0.1	0.1	0.3	0.4	0.5	0.2	0.0	0.1	0.4	0.1	0.0	0.2	0.5	
25-Nov	0.3	0.3	Z	0.3	0.2	0.2	0.1	0.0	0.0	0.1	0.3	0.0	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.0	0.3	0.1	0.6	0.3	0.2	0.6
26-Nov	0.1	0.2	0.1	Z	0.5	0.3	0.5	0.2	0.2	0.7	0.2	0.1	0.2	0.1	0.1	0.2	0.3	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.2	0.7	
27-Nov	0.0	0.1	0.0	0.0	Z	0.5	1.0	0.5	1.3	0.4	0.1	0.3	0.2	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.2	1.3	
28-Nov	0.0	0.0	0.0	0.0	0.0	Z	0.3	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.0	0.1	0.3	0.2	0.1	0.2	0.1	0.1	0.2	0.5	0.1	0.5	
29-Nov	Z	0.5	0.1	0.2	0.1	0.1	0.2	0.7	0.7	0.6	0.6	1.3	0.5	0.7	0.2	0.3	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.3	1.3	
30-Nov	0.0	Z	0.1	0.1	0.0	0.0	0.2	0.0	0.2	0.1	0.3	0.1	0.6	0.2	0.4	0.3	0.4	0.5	0.2	0.3	0.2	0.2	0.2	0.1	0.2	0.6	
																								Diurnal Average			
																								Diurnal Maximum			
Z - zerospan      C - Calibration      M - Maintenance      AF - Analyzer Failure																											



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

**Nitric Oxide (NO) - ppb**  
**Jackfish 2/3 - November 2023**





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

**Nitric Oxide (NO) - ppb**  
**Jackfish 2/3 - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	647	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: 647

Total Number of Hours: 720



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

**Nitric Oxide (NO) - ppb**  
**Jackfish 2/3 - November 2023**

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	22	53	12	21	9	7	15	39	88	79	107	64	32	29	14	599
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	8	22	53	12	21	9	7	15	39	88	79	107	64	32	29	14	599

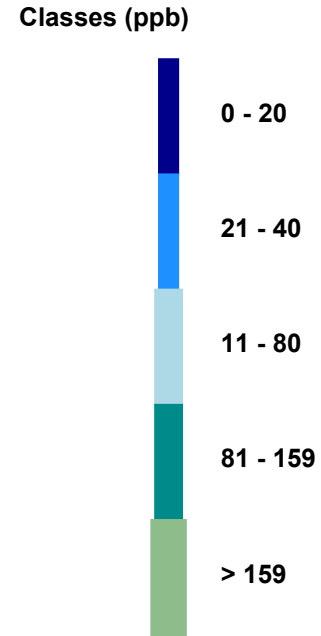
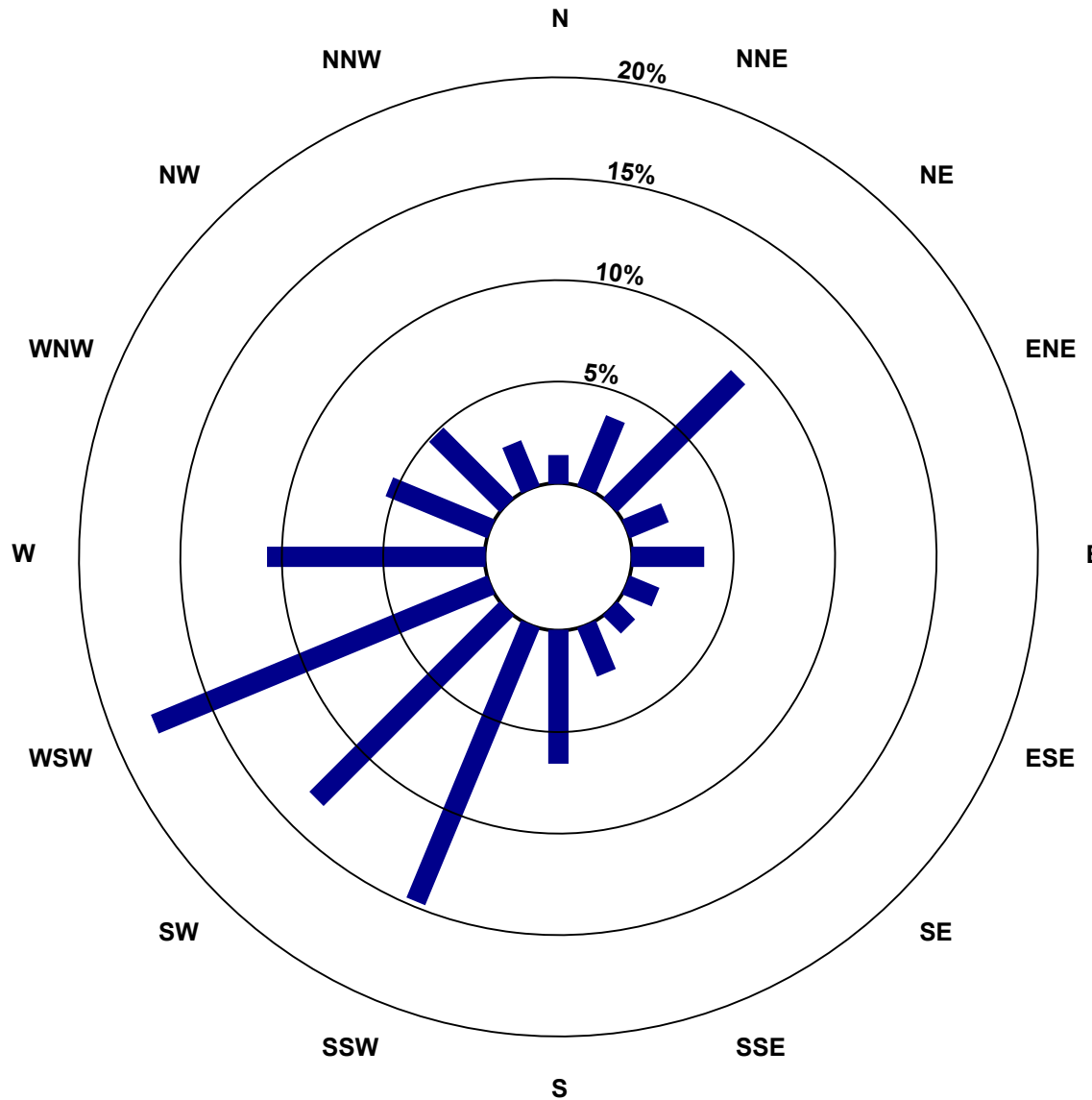
Total Number of Valid Hours: 599

Total Number of Hours: 720



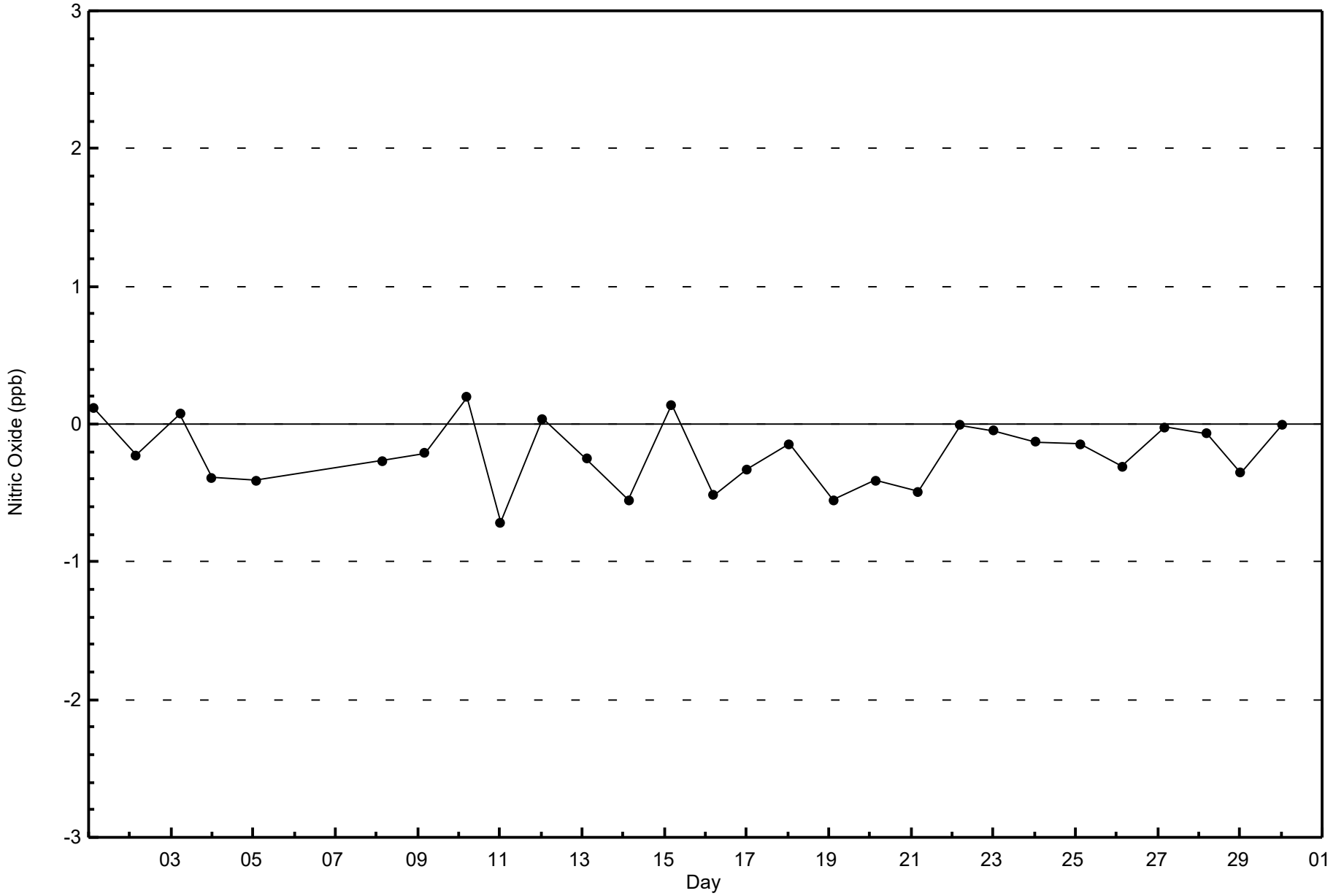
Wood Buffalo Environmental Association  
Wind Rose Nov 2023

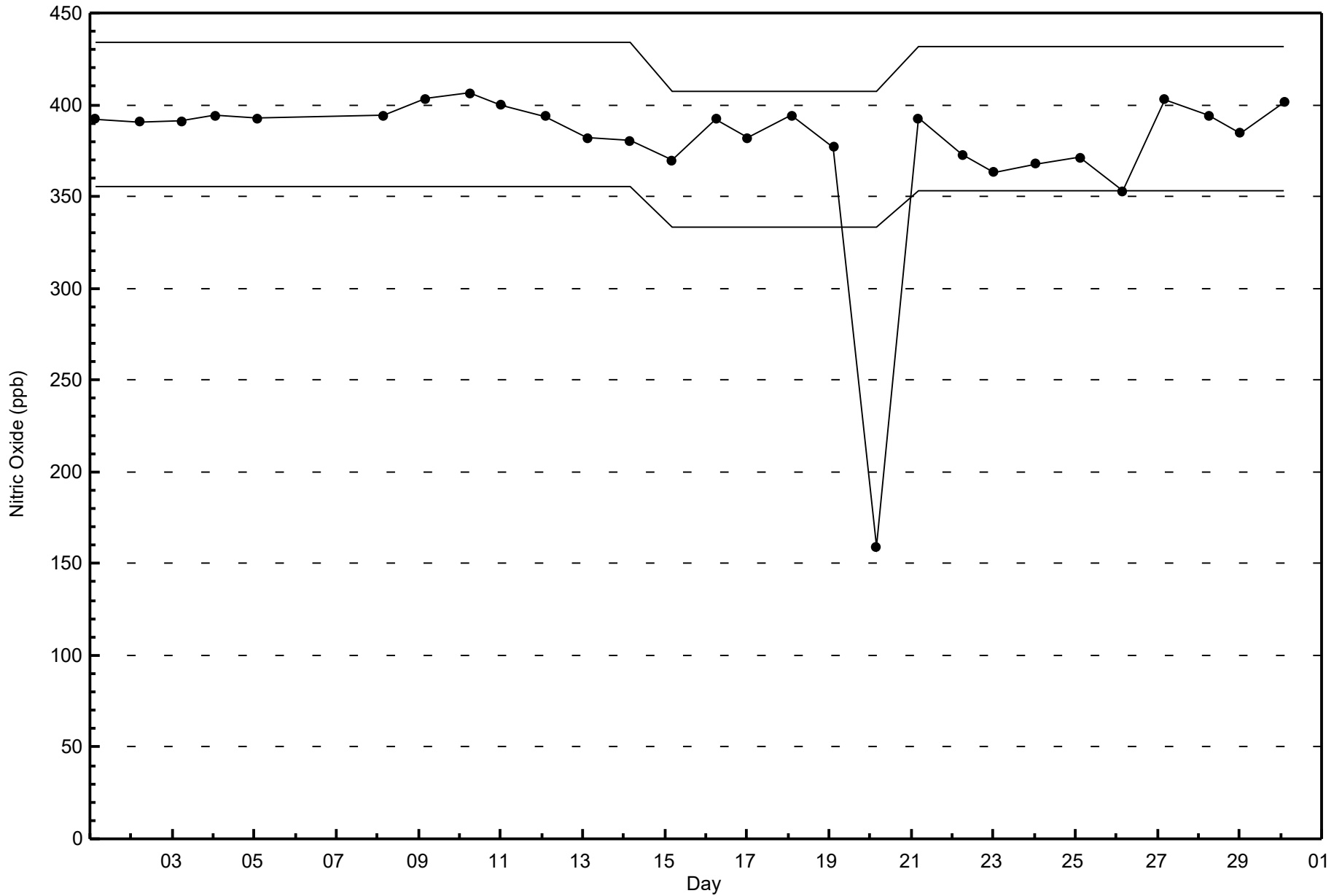
Nitric Oxide (NO) - ppb  
Jackfish 2/3



Total Number of Valid Hours: 599









# Wood Buffalo Environmental Association

## Summary of Hour Averages

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

## Jackfish 2/3 - November 2023

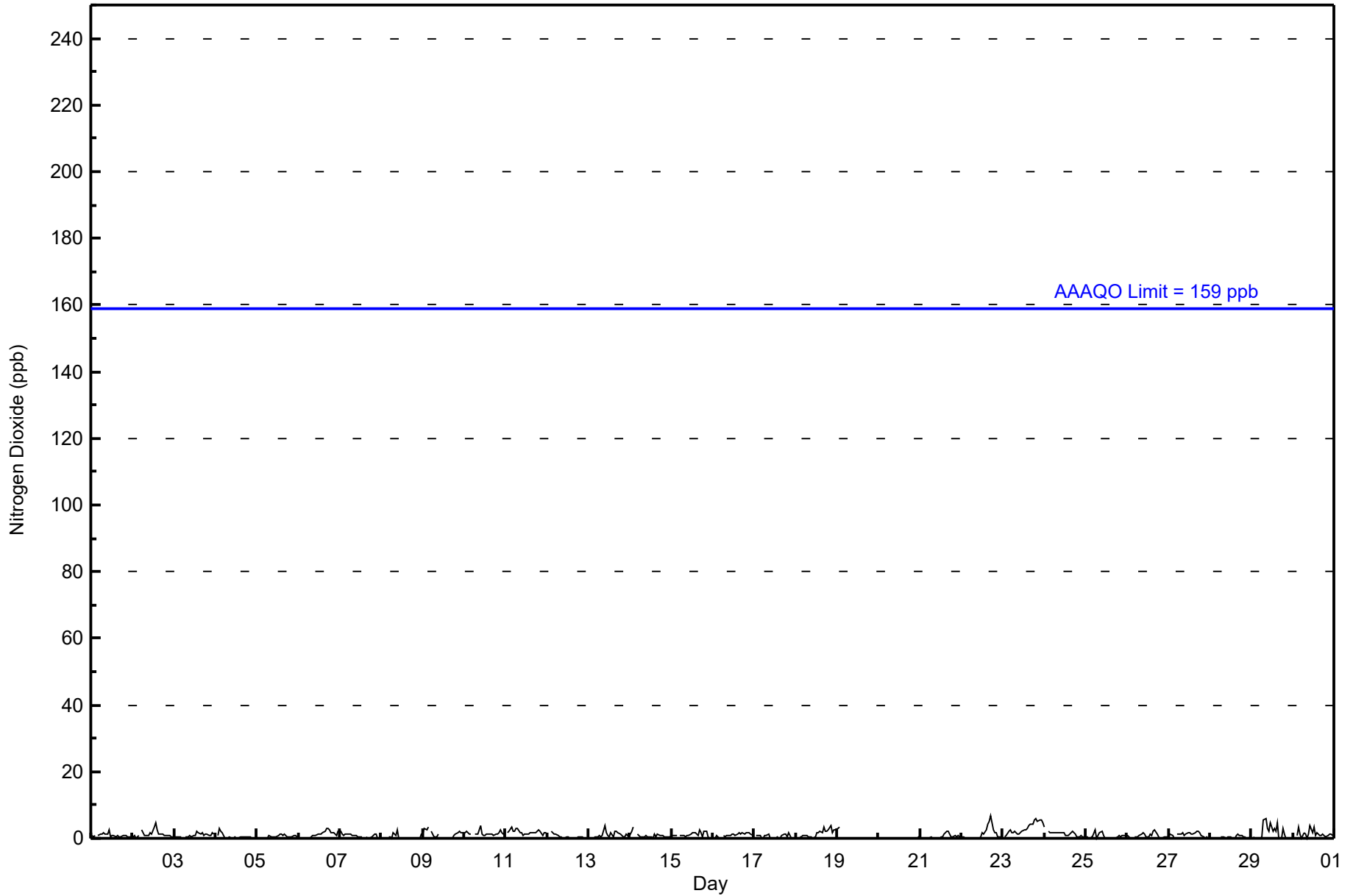
Number of Exceedences (AAAQO):		1-hr: 0	24-hr: 0	Hours in Service: 720																	Daily Average		Daily Maximum				
Maximum Value: 6.6 ppb on Nov 22 18:00		Maximum Daily Average: 3.1 ppb on Nov 23		Hours of Data: 647																	Hours of Missing Data: 73		Hours of Calibration: 33		Percent Operational Time: 94.4		
Minimum Value: 0.0 ppb on Nov 4 07:00		Minimum Daily Average: 0.3 ppb on Nov 28		Hours of Calibration: 33																	Hours of Calibration: 33		Percent Operational Time: 94.4				
Maximum Diurnal Average: 1.5 ppb at hour 17		Minimum Diurnal Average: 0.8 ppb at hour 5		Percentiles: P <sub>1</sub> = 0.0 P <sub>10</sub> = 0.0 Q <sub>1</sub> = 0.3 Median = 0.8 Q <sub>3</sub> = 1.5 P <sub>90</sub> = 2.2 P <sub>99</sub> = 5.3																							
Monthly Average: 1.05 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-Nov	0.8	0.5	0.8	Z	0.8	1.1	1.2	1.6	1.4	1.2	2.4	0.5	0.8	0.8	0.6	0.9	0.3	0.6	1.0	1.0	1.0	0.6	0.3	0.3	0.9	2.4	
2-Nov	0.5	0.7	0.2	0.9	Z	2.6	1.5	0.9	0.9	1.0	1.7	1.4	3.2	4.6	2.5	1.2	1.3	1.2	0.7	0.7	1.0	1.0	0.5	0.6	1.3	4.6	
3-Nov	0.6	0.3	0.5	0.3	0.3	Z	0.6	0.4	0.4	0.7	0.6	0.9	0.7	2.0	1.6	1.3	1.6	1.0	1.3	1.1	0.8	1.0	1.6	1.2	0.9	2.0	
4-Nov	Z	1.0	2.8	2.0	1.6	0.2	0.0	0.0	0.5	0.0	0.0	0.3	0.1	0.0	0.3	0.5	0.3	0.5	0.6	0.5	0.3	0.0	0.2	0.2	0.5	2.8	
5-Nov	0.3	Z	0.1	0.1	0.0	0.1	0.1	0.9	0.3	0.5	0.5	0.5	0.7	1.3	1.3	0.8	1.4	0.6	0.4	0.4	0.3	0.8	0.9	0.6	0.6	1.4	
6-Nov	0.1	0.0	0.0	0.0	0.0	0.0	0.4	0.9	1.0	0.9	1.2	1.2	1.1	1.5	2.0	2.9	2.8	2.5	1.5	1.5	1.2	1.0	2.1	1.1	2.9		
7-Nov	2.2	1.1	0.9	1.1	1.4	1.3	1.1	1.0	0.9	0.9	0.6	0.6	0.5	0.6	M	0.3	0.1	0.2	0.4	0.8	1.2	1.1	0.1	0.2	0.8	2.2	
8-Nov	0.1	0.0	0.0	Z	0.5	0.3	0.0	1.7	0.9	2.7	0.2	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	1.3	0.3	2.7	
9-Nov	1.4	2.9	2.6	3.4	Z	2.3	0.4	0.5	0.4	1.1	C	C	C	C	C	C	0.0	0.2	0.8	1.4	1.9	2.1	1.6	1.5	--	3.4	
10-Nov	1.5	2.3	1.9	1.2	1.2	Z	1.3	1.2	1.2	3.7	1.3	0.8	1.0	1.4	1.1	1.4	1.4	0.9	1.1	1.2	1.5	2.5	1.6	1.0	1.5	3.7	
11-Nov	Z	1.5	2.2	3.6	2.2	2.0	2.9	3.1	1.6	1.7	1.0	1.3	1.2	1.3	1.5	1.5	1.8	1.6	2.2	2.4	2.0	1.0	1.5	1.8	1.9	3.6	
12-Nov	1.3	Z	2.0	1.7	1.3	1.1	0.7	0.5	0.4	0.1	0.1	0.4	0.4	0.0	0.2	0.0	0.0	0.0	0.3	0.3	0.5	0.1	0.2	0.2	0.5	2.0	
13-Nov	0.1	0.1	Z	0.1	0.3	0.4	0.8	0.6	1.0	3.8	1.8	0.7	0.4	1.7	0.5	2.1	2.0	1.6	1.4	0.9	0.3	0.4	1.2	0.5	1.0	3.8	
14-Nov	1.1	2.0	3.6	Z	1.2	0.7	0.6	0.5	0.6	0.8	0.5	0.4	0.4	0.2	1.1	0.4	1.2	0.8	1.0	0.8	0.4	0.5	0.5	0.5	0.9	3.6	
15-Nov	1.0	0.9	0.8	0.9	Z	0.8	0.9	0.8	0.3	0.9	1.0	1.1	1.5	1.7	1.8	1.0	2.4	1.8	0.3	2.1	2.3	0.6	0.0	0.0	1.1	2.4	
16-Nov	0.0	0.0	1.0	0.3	0.0	Z	0.8	0.5	0.8	0.7	1.0	1.2	1.2	0.9	1.1	1.5	1.4	1.6	1.3	1.6	1.7	1.6	1.3	0.9	1.0	1.7	
17-Nov	Z	0.8	0.9	0.8	0.1	0.0	0.8	1.0	1.2	0.1	0.1	0.0	0.1	0.5	0.2	0.1	1.0	1.1	1.3	0.5	1.8	0.0	0.1	0.2	0.6	1.8	
18-Nov	0.4	Z	0.3	0.4	0.7	0.7	0.8	0.4	0.3	0.3	0.2	0.5	1.5	1.8	2.0	1.7	3.4	2.2	2.3	2.6	3.7	1.8	2.6	2.7	1.4	3.7	
19-Nov	2.9	3.3	Z	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	3.3	
20-Nov	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	M	M	M	M	M	0.0	0.0	0.0	0.0	0.0	0.3	--	0.3	
21-Nov	0.2	0.2	0.0	0.0	Z	0.1	0.5	0.2	0.0	0.0	0.2	0.0	0.5	0.6	1.1	2.0	2.1	1.2	0.6	0.5	0.9	0.5	0.8	0.5	0.6	2.1	
22-Nov	0.4	0.3	0.0	0.1	0.1	Z	0.1	0.1	0.1	0.2	0.2	0.5	1.6	1.1	2.6	4.2	5.0	6.6	2.5	1.6	1.7	0.6	0.6	0.3	1.3	6.6	
23-Nov	Z	0.5	0.9	2.2	2.6	1.8	1.6	2.1	1.3	1.2	1.6	2.1	2.6	2.6	2.9	3.7	4.1	4.4	5.4	5.8	5.2	5.6	5.4	4.6	3.1	5.8	
24-Nov	3.6	Z	2.3	1.8	1.7	1.6	1.6	1.5	1.7	1.7	1.6	1.5	0.8	0.8	0.7	1.5	2.2	1.6	1.1	0.5	0.4	0.9	0.6	0.3	1.4	3.6	
25-Nov	0.6	0.5	Z	0.3	0.4	2.4	0.0	0.7	1.8	2.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.7	0.3	0.9	0.8	0.9	0.6	2.4	
26-Nov	0.8	0.3	0.2	Z	0.4	0.4	0.6	0.8	1.3	1.5	1.1	0.5	0.3	1.4	0.9	2.2	2.4	1.2	0.3	0.2	0.1	0.3	0.4	0.3	0.8	2.4	
27-Nov	0.4	1.1	0.7	0.2	Z	1.1	1.2	1.1	1.6	1.0	1.1	1.6	1.5	1.4	1.3	1.6	2.0	2.0	1.6	0.9	0.6	0.2	0.3	0.2	1.1	2.0	
28-Nov	0.0	0.0	0.1	0.0	0.1	Z	0.4	0.4	0.3	0.2	0.4	0.4	0.3	0.1	0.1	0.8	1.2	1.0	0.8	0.3	0.3	0.1	0.0	0.3	0.3	1.2	
29-Nov	Z	0.5	0.1	0.0	0.0	0.0	0.4	5.3	6.0	3.1	2.2	4.7	2.0	3.0	2.1	4.7	0.1	0.0	2.9	1.1	0.0	0.0	0.0	0.0	1.7	6.0	
30-Nov	0.0	Z	1.0	3.5	1.3	0.2	1.7	1.2	0.2	1.3	3.8	1.9	3.5	0.9	1.5	0.7	0.7	1.3	0.7	0.6	0.7	1.1	1.1	0.9	1.3	3.8	
																								Diurnal Average		Diurnal Maximum	
																								0.8		3.6	
																								0.9		3.3	
																								1.0		3.6	
																								1.0		3.6	
																								0.8		2.6	
																								0.9		2.6	
																								0.8		2.9	
																								1.1		5.3	
																								1.0		6.0	
																								1.2		3.8	
																								1.0		3.8	
																								0.9		4.7	
																								1.0		3.5	
																								1.2		4.6	
																								1.2		2.9	
																								1.4		4.7	
																								1.5		5.0	
																								1.4		6.6	
																								1.2		5.4	
																								1.1		5.8	
																								1.1		5.2	
																								0.9		5.6	
																								0.9		5.4	
																								0.8		4.6	

Z - zerospan      C - Calibration      M - Maintenance      AF - Analyzer Failure  
 Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 159 ppb



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

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb**  
**Jackfish 2/3 - November 2023**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Jackfish 2/3 - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	647	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: 647

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Jackfish 2/3 - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 20	8	22	53	12	21	9	7	15	39	88	79	107	64	32	29	14	599
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	<b>8</b>	<b>22</b>	<b>53</b>	<b>12</b>	<b>21</b>	<b>9</b>	<b>7</b>	<b>15</b>	<b>39</b>	<b>88</b>	<b>79</b>	<b>107</b>	<b>64</b>	<b>32</b>	<b>29</b>	<b>14</b>	<b>599</b>

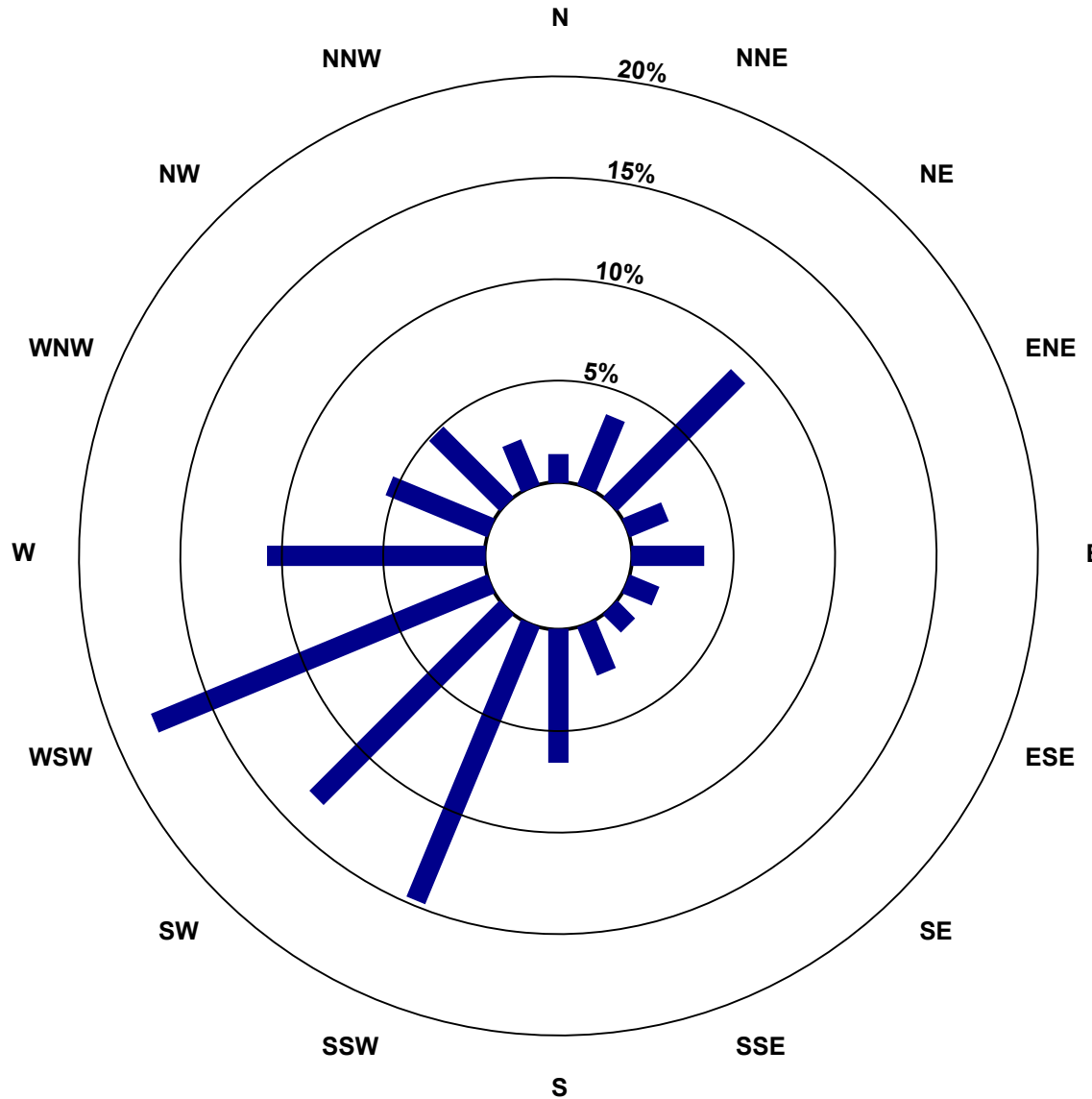
Total Number of Valid Hours: 599

Total Number of Hours: 720

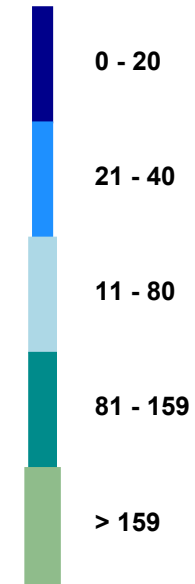


Wood Buffalo Environmental Association  
Wind Rose Nov 2023

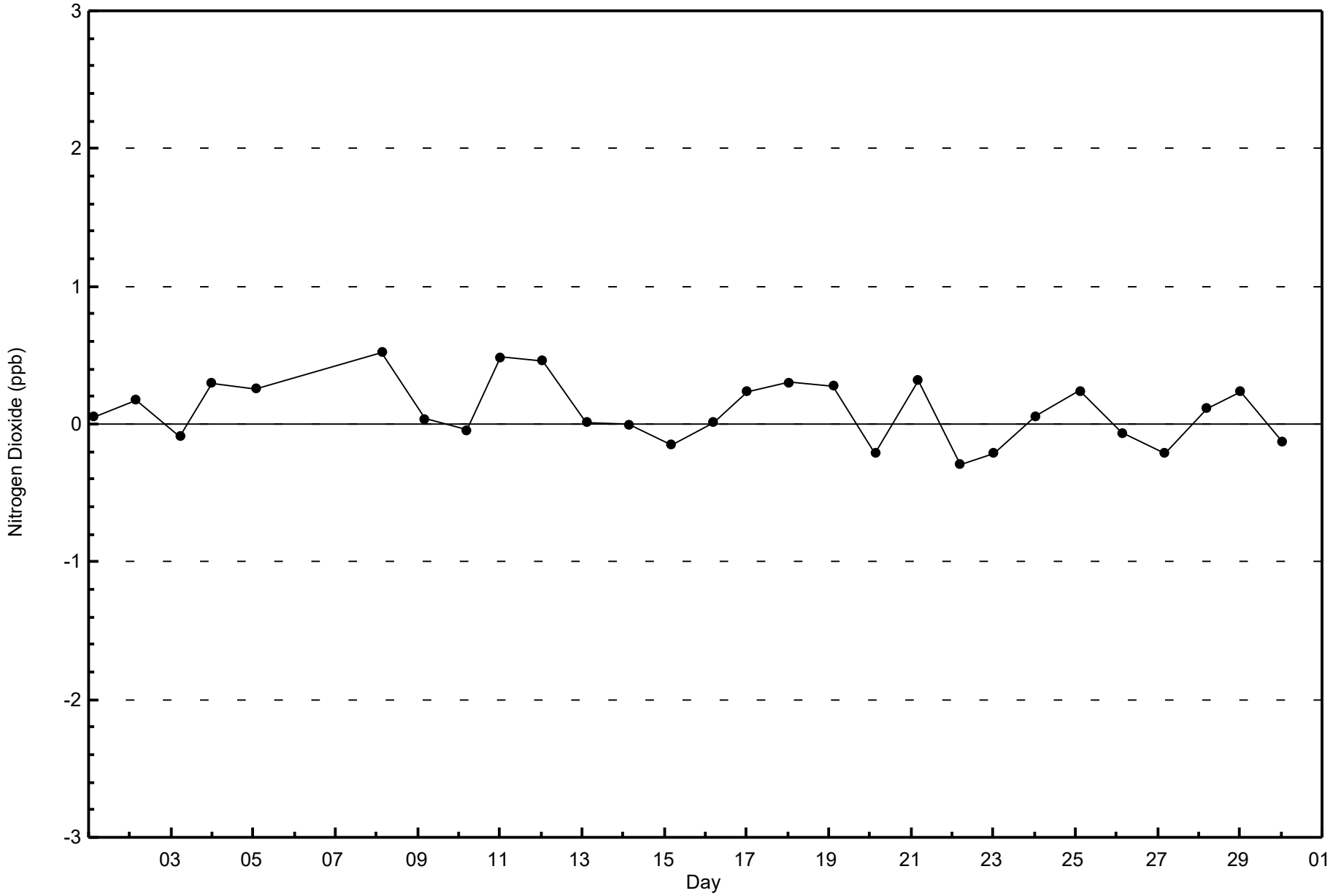
Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Jackfish 2/3



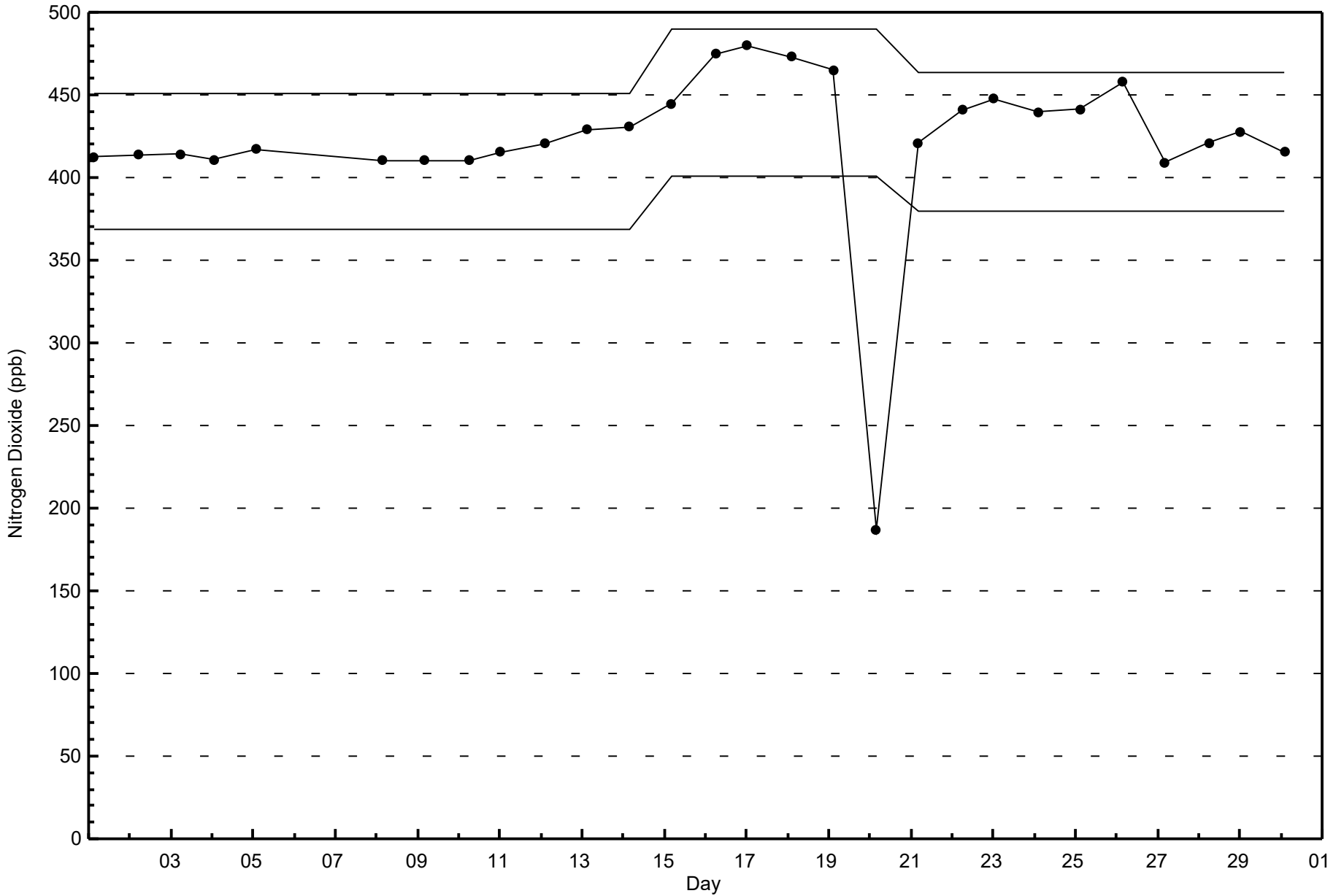
Classes (ppb)



Total Number of Valid Hours: 599









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

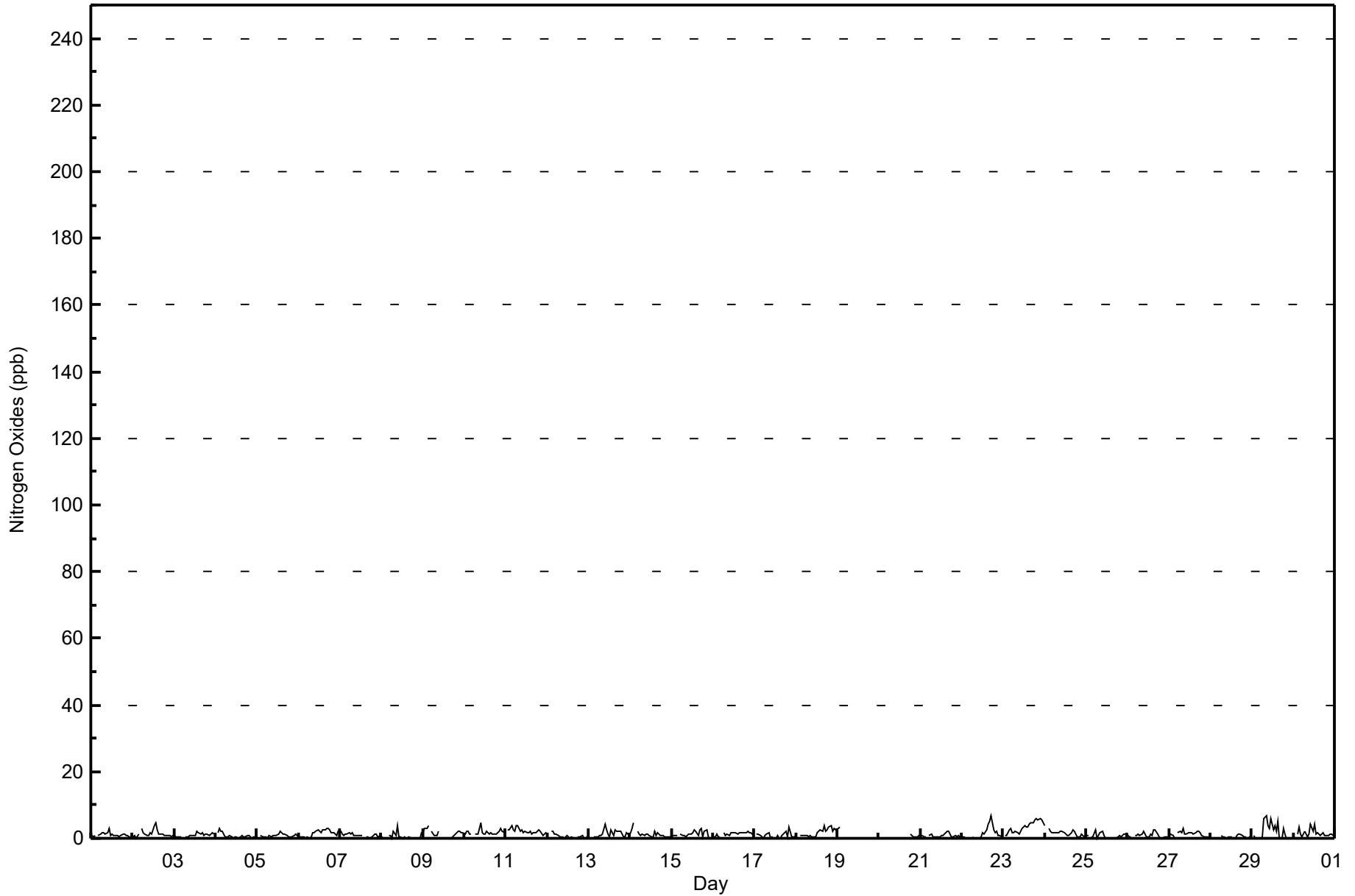
**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Jackfish 2/3 - November 2023**

Maximum Value: 6.8 ppb on Nov 22 18:00		Maximum Daily Average: 3.4 ppb on Nov 23		Hours in Service: 720																																													
Minimum Value: 0.0 ppb on Nov 6 05:00		Minimum Daily Average: 0.4 ppb on Nov 28		Hours of Data: 647																																													
Maximum Diurnal Average: 1.7 ppb at hour 17		Minimum Diurnal Average: 1.0 ppb at hour 1		Hours of Missing Data: 73																																													
Monthly Average: 1.29 ppb		Percentiles: P <sub>1</sub> = 0.0 P <sub>10</sub> = 0.2 Q <sub>1</sub> = 0.5 Median = 1.0 Q <sub>3</sub> = 1.8 P <sub>90</sub> = 2.7 P <sub>99</sub> = 5.7		Hours of Calibration: 33																																													
				Percent Operational Time: 94.4																																													
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Nov	0.8	0.5	0.8	Z	0.9	1.5	1.5	1.7	1.4	1.7	3.0	0.8	1.1	0.8	0.7	0.9	0.3	0.7	1.1	1.2	1.0	0.6	0.3	0.3	1.0	3.0																							
2-Nov	0.6	0.8	0.2	1.1	Z	3.1	1.6	1.1	0.9	1.0	1.7	1.4	3.6	4.8	2.6	1.4	1.3	1.2	0.7	0.7	1.0	1.0	0.5	0.6	1.4	4.8																							
3-Nov	0.6	0.3	0.5	0.3	0.3	Z	0.6	0.6	0.5	0.8	0.8	0.9	1.0	2.3	1.8	1.3	1.6	1.0	1.3	1.3	0.8	1.1	1.7	1.2	1.0	2.3																							
4-Nov	Z	1.5	2.9	2.3	2.0	0.5	0.3	0.5	0.8	0.4	0.2	0.6	0.2	0.0	0.5	0.7	0.6	0.6	0.8	1.0	0.5	0.0	0.5	0.6	0.8	2.9																							
5-Nov	0.5	Z	0.7	0.2	0.3	0.5	0.1	0.9	0.6	0.8	0.9	0.8	1.1	1.9	1.6	1.2	1.4	0.9	0.6	0.5	0.3	1.0	1.1	0.7	0.8	1.9																							
6-Nov	0.3	0.5	0.4	0.3	0.0	0.2	0.2	0.4	1.6	1.9	2.0	2.7	2.1	1.8	2.4	2.6	3.0	2.9	2.5	1.6	1.7	1.2	1.0	2.3	1.5	3.0																							
7-Nov	2.2	1.1	1.0	1.3	1.5	1.5	1.2	1.5	0.9	1.1	0.9	0.9	0.9	0.8	M	0.6	0.2	0.2	0.5	0.9	1.2	1.1	0.2	0.6	1.0	2.2																							
8-Nov	0.4	0.0	0.0	Z	1.0	0.6	0.1	2.1	0.9	3.8	0.5	0.2	0.1	0.3	0.1	0.1	0.2	0.1	0.0	0.2	0.1	0.0	0.1	1.5	0.6	3.8																							
9-Nov	1.6	3.0	3.0	3.8	Z	2.3	0.9	0.7	0.8	2.1	C	C	C	C	C	C	0.1	0.2	0.8	1.4	1.9	2.1	1.6	1.5	--	3.8																							
10-Nov	1.5	2.3	1.9	1.2	1.2	Z	1.3	1.2	1.2	4.5	1.6	1.1	1.4	2.1	1.5	1.6	1.4	1.2	1.4	1.6	2.1	2.9	2.0	1.7	1.7	4.5																							
11-Nov	Z	2.5	2.7	3.9	2.7	2.2	3.7	3.7	2.3	2.6	1.6	2.0	1.8	1.8	2.2	1.5	1.9	1.6	2.3	2.5	2.0	1.0	1.5	1.8	2.3	3.9																							
12-Nov	1.3	Z	2.1	2.0	1.3	1.1	0.7	0.5	0.5	0.2	0.1	0.9	0.4	0.1	0.4	0.0	0.0	0.0	0.3	0.3	0.6	0.1	0.2	0.2	0.6	2.1																							
13-Nov	0.1	0.1	Z	0.6	0.5	0.5	0.9	0.7	1.3	4.4	2.3	1.2	0.4	2.3	0.9	2.6	2.2	2.0	1.9	1.4	0.5	0.5	1.7	0.9	1.3	4.4																							
14-Nov	1.6	2.9	4.8	Z	2.2	1.2	0.8	1.1	0.8	1.2	1.1	0.9	0.6	0.4	2.0	0.7	1.6	1.0	1.0	0.8	0.4	0.5	0.5	0.5	1.2	4.8																							
15-Nov	1.0	0.9	0.8	0.9	Z	1.2	0.9	0.8	0.3	1.0	1.2	1.3	1.7	2.3	2.3	1.0	2.4	2.9	0.3	2.1	2.4	0.6	0.1	0.1	1.2	2.9																							
16-Nov	0.4	0.3	1.2	0.5	0.3	Z	1.7	1.0	1.4	1.0	1.7	1.7	1.6	1.6	1.5	1.6	1.7	1.8	1.7	1.6	2.1	1.7	1.5	0.9	1.3	2.1																							
17-Nov	Z	1.3	1.1	0.9	0.4	0.0	0.9	1.1	1.8	0.2	0.4	0.0	0.2	0.7	0.2	0.1	1.1	1.6	2.0	0.5	3.2	0.3	0.4	0.4	0.8	3.2																							
18-Nov	0.6	Z	0.8	0.7	0.8	0.8	0.9	0.6	0.8	0.4	0.5	0.6	1.8	2.2	2.8	2.3	3.7	2.2	2.7	3.2	3.7	2.1	2.9	2.7	1.7	3.7																							
19-Nov	3.1	3.5	Z	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	3.5																							
20-Nov	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	M	M	M	M	M	1.1	0.8	0.6	0.5	0.5	0.8	--	1.1																							
21-Nov	0.7	0.7	0.4	0.5	Z	0.8	1.1	0.6	0.4	0.2	0.6	0.3	0.9	0.9	1.4	2.2	2.2	1.3	0.6	0.6	0.9	0.5	0.8	0.5	0.8	2.2																							
22-Nov	0.4	0.3	0.0	0.1	0.1	Z	0.3	0.2	0.1	0.2	0.2	0.5	1.8	1.1	2.7	4.4	5.0	6.8	2.6	1.6	2.0	0.7	0.8	0.3	1.4	6.8																							
23-Nov	Z	0.9	1.0	2.4	3.0	1.9	1.8	2.2	1.5	1.3	1.9	2.8	3.8	3.6	3.6	4.4	4.8	4.7	5.5	5.9	5.7	6.1	5.6	4.8	3.4	6.1																							
24-Nov	3.7	Z	2.8	2.0	1.8	1.6	1.8	1.6	1.9	2.2	2.1	1.8	1.3	0.9	0.8	1.8	2.6	2.1	1.3	0.5	0.5	1.3	0.7	0.3	1.6	3.7																							
25-Nov	0.9	0.8	Z	0.6	0.6	2.6	0.1	0.7	1.8	2.1	1.0	0.0	0.1	0.1	0.1	0.1	0.2	0.1	0.6	0.7	0.6	1.0	1.4	1.2	0.8	2.6																							
26-Nov	0.9	0.5	0.3	Z	0.9	0.7	1.1	1.0	1.5	2.2	1.3	0.6	0.5	1.5	1.0	2.4	2.7	1.3	0.3	0.2	0.1	0.3	0.5	0.3	1.0	2.7																							
27-Nov	0.4	1.2	0.7	0.2	Z	1.6	2.2	1.6	2.9	1.4	1.2	1.9	1.7	1.6	1.4	1.6	2.0	2.0	1.6	0.9	0.6	0.2	0.4	0.3	1.3	2.9																							
28-Nov	0.0	0.0	0.1	0.0	0.1	Z	0.7	0.4	0.3	0.2	0.5	0.5	0.4	0.2	0.1	0.9	1.5	1.2	0.9	0.5	0.4	0.2	0.2	0.8	0.4	1.5																							
29-Nov	Z	1.0	0.2	0.2	0.1	0.1	0.6	6.0	6.7	3.7	2.8	6.0	2.5	3.7	2.3	5.0	0.1	0.0	3.1	1.1	0.0	0.0	0.0	0.0	2.0	6.7																							
30-Nov	0.0	Z	1.1	3.6	1.3	0.2	1.9	1.2	0.4	1.4	4.1	2.0	4.1	1.1	1.9	1.0	1.1	1.8	0.9	0.9	0.9	1.3	1.3	1.0	1.5	4.1																							
																								1.0	1.1	1.2	1.2	1.0	1.2	1.1	1.3	1.3	1.6	1.3	1.3	1.4	1.5	1.5	1.6	1.7	1.5	1.4	1.2	1.3	1.0	1.0	1.0	Diurnal Average	
																								3.7	3.5	4.8	3.9	3.0	3.1	3.7	6.0	6.7	4.5	4.1	6.0	4.1	4.8	3.6	5.0	5.0	6.8	5.5	5.9	5.7	6.1	5.6	4.8	Diurnal Maximum	
Z - zerospan																								C - Calibration				M - Maintenance				AF - Analyzer Failure																	



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

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Jackfish 2/3 - November 2023**





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

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Jackfish 2/3 - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	647	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: 647

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Jackfish 2/3 - November 2023**

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	22	53	12	21	9	7	15	39	88	79	107	64	32	29	14	599
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	8	22	53	12	21	9	7	15	39	88	79	107	64	32	29	14	599

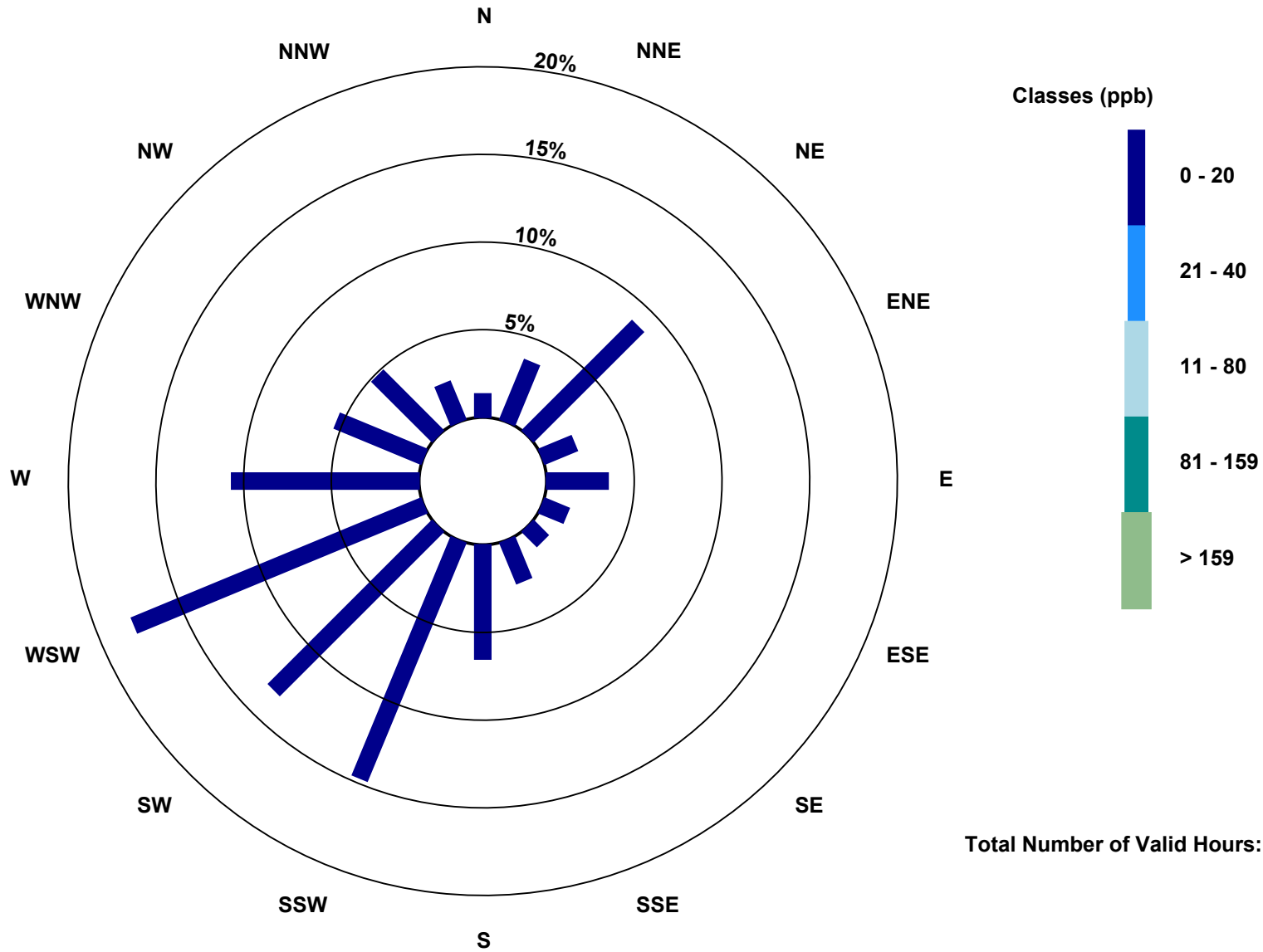
Total Number of Valid Hours: 599

Total Number of Hours: 720

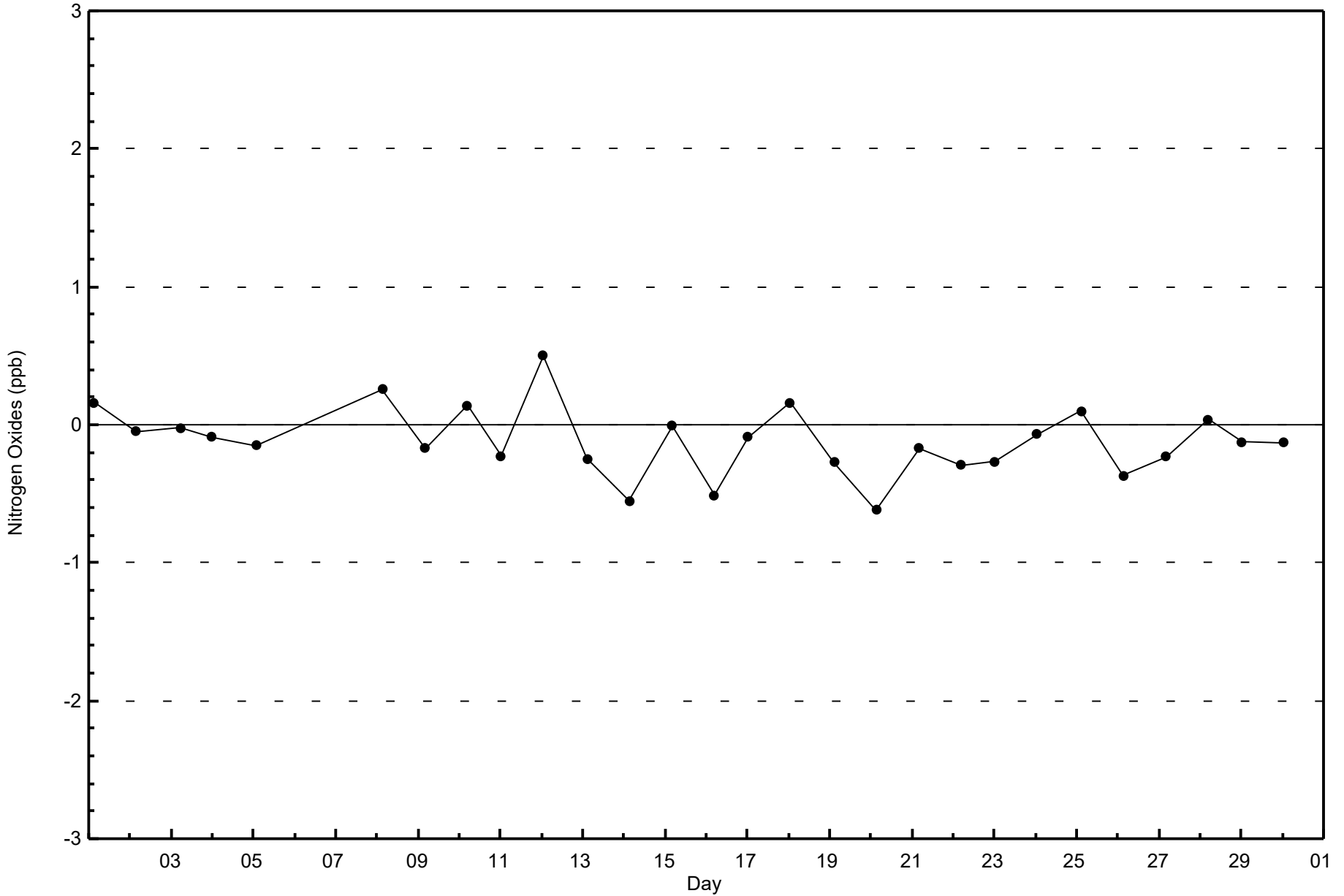


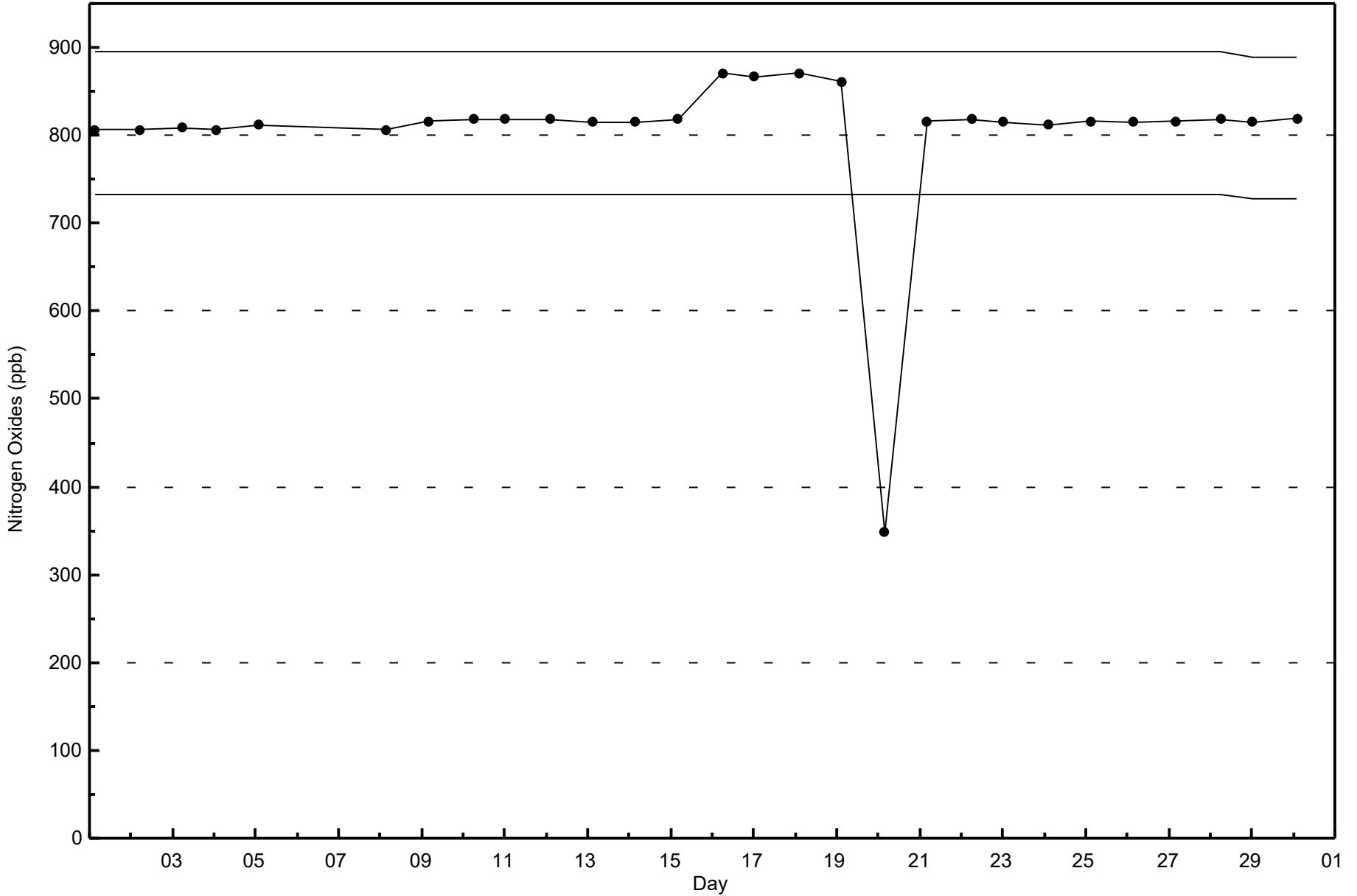
Wood Buffalo Environmental Association  
Wind Rose Nov 2023

Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Jackfish 2/3



Total Number of Valid Hours: 599









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

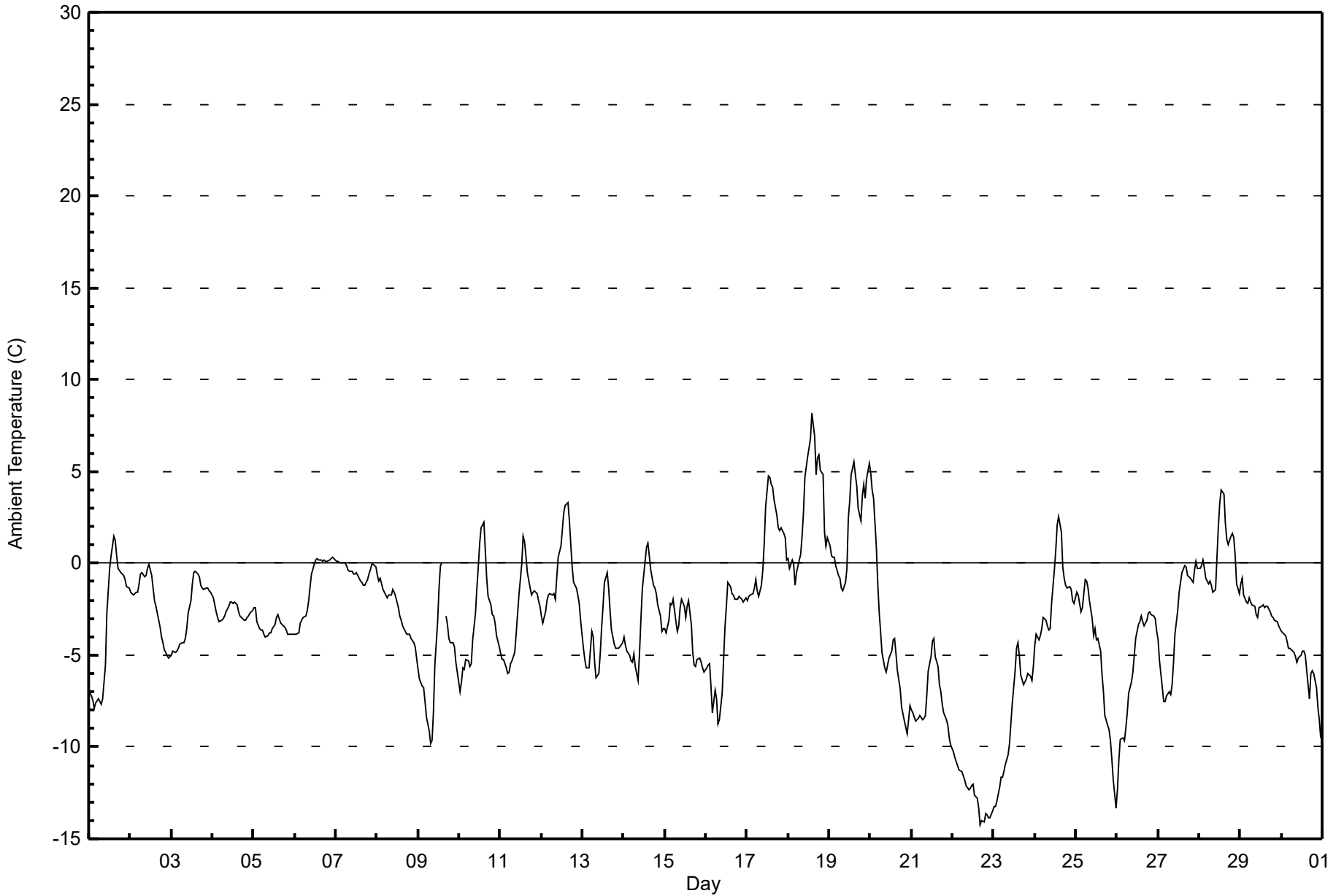
**Ambient Temperature (AT) - C**  
**Jackfish 2/3 - November 2023**

Maximum Value: 8.2 C on Nov 18 15:00		Maximum Daily Average: 3.0 C on Nov 18		Hours in Service: 720																							
Minimum Value: -14.2 C on Nov 22 17:00		Minimum Daily Average: -12.5 C on Nov 22		Hours of Data: 719																							
Maximum Diurnal Average: -0.8 C at hour 15		Minimum Diurnal Average: -4.5 C at hour 8		Hours of Missing Data: 1																							
Monthly Average: -3.16 C		Percentiles: P <sub>1</sub> = -13.5 P <sub>10</sub> = -8.1 Q <sub>1</sub> = -5.2 Median = -2.9 Q <sub>3</sub> = -0.8 P <sub>90</sub> = 0.9 P <sub>99</sub> = 5.5		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-Nov	-7.1	-7.2	-7.5	-7.9	-7.6	-7.4	-7.5	-7.7	-7.4	-5.6	-2.7	-1.5	-0.2	0.4	1.4	1.3	0.4	-0.3	-0.5	-0.6	-0.7	-0.9	-1.2	-1.3	-3.3	1.4	
2-Nov	-1.6	-1.7	-1.7	-1.6	-1.6	-1.1	-0.6	-0.5	-0.8	-0.6	-0.3	0.0	-0.6	-1.4	-2.0	-2.3	-2.7	-3.5	-4.0	-4.3	-4.7	-5.0	-5.2	-5.1	-2.2	0.0	
3-Nov	-5.0	-4.8	-4.8	-4.8	-4.6	-4.4	-4.4	-4.3	-4.1	-3.5	-2.7	-2.1	-1.2	-0.5	-0.5	-0.6	-0.7	-1.2	-1.4	-1.4	-1.4	-1.4	-1.5	-1.5	-2.6	-0.5	
4-Nov	-1.9	-2.3	-2.7	-2.9	-3.2	-3.1	-3.0	-2.9	-2.6	-2.3	-2.1	-2.1	-2.2	-2.1	-2.2	-2.6	-2.9	-2.9	-3.1	-3.1	-3.0	-2.8	-2.7	-2.6	-2.6	-1.9	
5-Nov	-2.4	-2.4	-3.2	-3.6	-3.6	-3.7	-3.8	-4.0	-3.9	-3.8	-3.8	-3.6	-3.3	-3.0	-2.8	-3.0	-3.2	-3.4	-3.5	-3.7	-3.8	-3.9	-3.9	-3.9	-3.5	-2.4	
6-Nov	-3.8	-3.8	-3.8	-3.2	-3.1	-2.9	-2.9	-2.6	-2.0	-1.3	-0.6	-0.1	0.2	0.3	0.2	0.2	0.1	0.2	0.1	0.1	0.2	0.2	0.3	0.2	-1.2	0.3	
7-Nov	0.1	0.1	0.0	0.0	0.0	0.0	-0.1	-0.4	-0.5	-0.4	-0.6	-0.6	-0.5	-0.6	-0.9	-1.0	-1.2	-1.2	-0.9	-0.6	-0.4	-0.1	-0.1	-0.2	-0.4	0.1	
8-Nov	-0.7	-0.9	-0.8	-1.4	-1.6	-1.7	-1.9	-1.8	-1.7	-1.4	-1.6	-1.8	-2.4	-2.9	-3.1	-3.4	-3.6	-3.8	-3.9	-3.8	-4.1	-4.3	-4.5	-5.2	-2.6	-0.7	
9-Nov	-5.8	-6.3	-6.7	-6.7	-7.5	-8.4	-9.2	-9.8	-9.7	-8.1	-5.5	-3.2	-1.4	-0.1	0.0	M	-2.9	-3.3	-4.1	-4.3	-4.3	-4.6	-5.4	-5.9	-5.4	0.0	
10-Nov	-7.0	-6.4	-5.7	-5.8	-5.3	-5.3	-5.6	-5.5	-4.2	-2.7	-1.4	-0.2	1.1	2.0	2.2	0.7	-0.8	-1.8	-2.3	-2.8	-2.9	-3.2	-3.9	-4.6	-3.0	2.2	
11-Nov	-4.9	-5.3	-5.3	-5.7	-6.0	-5.9	-5.5	-5.3	-4.9	-3.9	-2.8	-1.7	-0.1	1.4	1.1	0.4	-0.5	-1.4	-1.7	-1.6	-1.5	-1.7	-2.0	-2.4	-2.8	1.4	
12-Nov	-2.9	-3.2	-2.6	-2.1	-1.7	-1.6	-1.7	-1.6	-2.0	-0.8	0.3	0.9	1.9	2.8	3.2	3.3	2.3	1.0	-0.2	-1.0	-1.4	-1.7	-2.2	-3.1	-0.6	3.3	
13-Nov	-4.6	-5.2	-5.7	-5.7	-5.7	-3.7	-4.0	-5.4	-6.2	-6.0	-4.9	-3.5	-2.3	-1.0	-0.5	-1.3	-2.6	-3.7	-4.4	-4.6	-4.6	-4.6	-4.6	-4.3	-4.1	-0.5	
14-Nov	-4.0	-4.5	-4.8	-5.0	-5.3	-5.4	-4.9	-5.6	-6.4	-4.9	-3.1	-1.4	0.1	0.9	1.1	0.4	-0.4	-1.2	-1.3	-1.6	-2.3	-2.9	-3.7	-3.5	-2.9	1.1	
15-Nov	-3.6	-3.8	-3.1	-2.2	-2.3	-2.0	-3.2	-3.7	-3.4	-2.4	-2.0	-2.3	-2.9	-2.4	-2.1	-3.3	-4.8	-5.6	-5.6	-5.2	-5.2	-5.4	-5.7	-5.9	-3.7	-2.0	
16-Nov	-5.7	-5.5	-5.5	-6.7	-8.1	-6.9	-7.4	-8.7	-8.5	-7.1	-5.3	-3.5	-2.4	-1.0	-1.3	-1.6	-1.7	-1.9	-1.9	-1.8	-1.9	-2.0	-2.1	-1.9	-4.2	-1.0	
17-Nov	-2.0	-1.8	-1.8	-1.6	-1.3	-0.9	-1.5	-1.8	-1.2	-0.4	1.1	3.1	4.8	4.7	4.3	4.1	3.5	2.6	1.9	1.8	1.9	1.7	1.4	0.2	0.9	4.8	
18-Nov	0.2	-0.3	0.1	-0.1	-1.2	-0.5	0.1	0.5	1.5	2.8	4.7	5.8	6.3	6.8	8.2	6.9	4.8	5.7	5.9	5.0	4.8	1.7	1.0	1.4	3.0	8.2	
19-Nov	0.9	0.4	0.4	0.3	-0.1	-0.7	-0.8	-1.4	-1.5	-1.1	-0.3	2.5	3.4	4.8	5.5	4.8	4.2	3.0	2.3	3.7	4.3	3.6	4.6	5.4	2.0	5.5	
20-Nov	4.9	4.0	3.5	0.9	-1.1	-2.6	-3.7	-4.8	-5.7	-5.9	-5.5	-5.2	-4.8	-4.1	-4.1	-4.9	-5.9	-6.9	-7.8	-8.2	-8.6	-9.3	-8.5	-7.8	-4.3	4.9	
21-Nov	-8.0	-8.1	-8.6	-8.5	-8.4	-8.3	-8.5	-8.5	-8.3	-7.2	-5.9	-5.1	-4.3	-4.1	-5.1	-5.6	-6.6	-7.0	-7.7	-8.2	-8.5	-8.8	-9.5	-9.9	-7.4	-4.1	
22-Nov	-10.2	-10.6	-10.8	-11.0	-11.3	-11.3	-11.5	-11.8	-12.1	-12.3	-12.3	-12.1	-12.0	-12.7	-12.8	-13.3	-14.2	-14.0	-14.1	-13.6	-13.7	-13.9	-13.9	-13.5	-12.5	-10.2	
23-Nov	-13.2	-13.3	-13.0	-12.2	-11.6	-11.6	-11.4	-11.0	-10.4	-9.8	-8.7	-7.6	-5.9	-4.6	-4.3	-5.0	-6.1	-6.6	-6.4	-6.3	-6.0	-6.1	-6.4	-5.6	-8.5	-4.3	
24-Nov	-4.5	-3.9	-4.1	-3.9	-3.5	-3.0	-3.1	-3.4	-3.6	-3.5	-2.2	-0.4	0.7	2.1	2.6	1.7	-0.2	-0.8	-1.2	-1.3	-1.3	-1.4	-2.0	-2.2	-1.8	2.6	
25-Nov	-1.6	-1.7	-2.2	-2.6	-2.4	-0.9	-1.0	-1.3	-2.1	-3.0	-3.9	-3.5	-4.1	-4.1	-4.8	-6.0	-7.0	-8.3	-8.8	-9.0	-9.6	-10.7	-11.8	-13.3	-5.2	-0.9	
26-Nov	-12.3	-10.8	-9.6	-9.5	-9.6	-9.0	-8.1	-7.1	-6.4	-5.9	-5.0	-4.1	-3.3	-3.1	-2.9	-3.2	-3.4	-3.1	-2.7	-2.6	-2.8	-2.8	-3.0	-3.7	-5.6	-2.6	
27-Nov	-4.2	-5.3	-6.7	-7.5	-7.5	-7.2	-7.0	-7.1	-6.6	-5.4	-3.9	-2.5	-1.6	-1.1	-0.5	-0.1	-0.2	-0.7	-0.7	-0.8	-1.0	-0.4	0.1	-0.3	-3.3	0.1	
28-Nov	-0.2	-0.1	0.2	-0.3	-0.8	-1.1	-0.9	-1.2	-1.6	-1.4	0.3	2.0	3.3	4.0	3.7	2.2	1.3	1.0	1.5	1.6	1.4	0.4	-1.1	-1.7	0.5	4.0	
29-Nov	-1.2	-0.8	-1.8	-2.1	-2.2	-1.9	-2.1	-2.3	-2.3	-2.8	-2.9	-2.4	-2.4	-2.2	-2.4	-2.3	-2.3	-2.7	-2.9	-3.0	-3.1	-3.2	-3.4	-3.6	-2.4	-0.8	
30-Nov	-3.7	-3.8	-4.0	-4.3	-4.7	-4.7	-4.8	-4.8	-5.1	-5.4	-5.2	-5.0	-4.8	-4.8	-5.0	-6.6	-7.4	-6.0	-5.9	-6.0	-6.8	-7.9	-8.5	-9.5	-5.6	-3.7	
		-3.9	-4.0	-4.1	-4.3	-4.4	-4.2	-4.3	-4.5	-4.5	-3.9	-3.0	-2.0	-1.4	-0.9	-0.8	-1.4	-2.2	-2.6	-2.8	-2.9	-3.0	-3.4	-3.7	-3.8	Diurnal Average	
		4.9	4.0	3.5	0.9	0.0	0.0	0.1	0.5	1.5	2.8	4.7	5.8	6.3	6.8	8.2	6.9	4.8	5.7	5.9	5.0	4.8	3.6	4.6	5.4	Diurnal Maximum	
M - Maintenance																											



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

**Ambient Temperature (AT) - C**  
**Jackfish 2/3 - November 2023**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C  
Jackfish 2/3 - November 2023**

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	0	0.00	0.00
-20 - 0	604	84.01	84.01
0 - 10	115	15.99	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 719

Total Number of Hours: 720



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

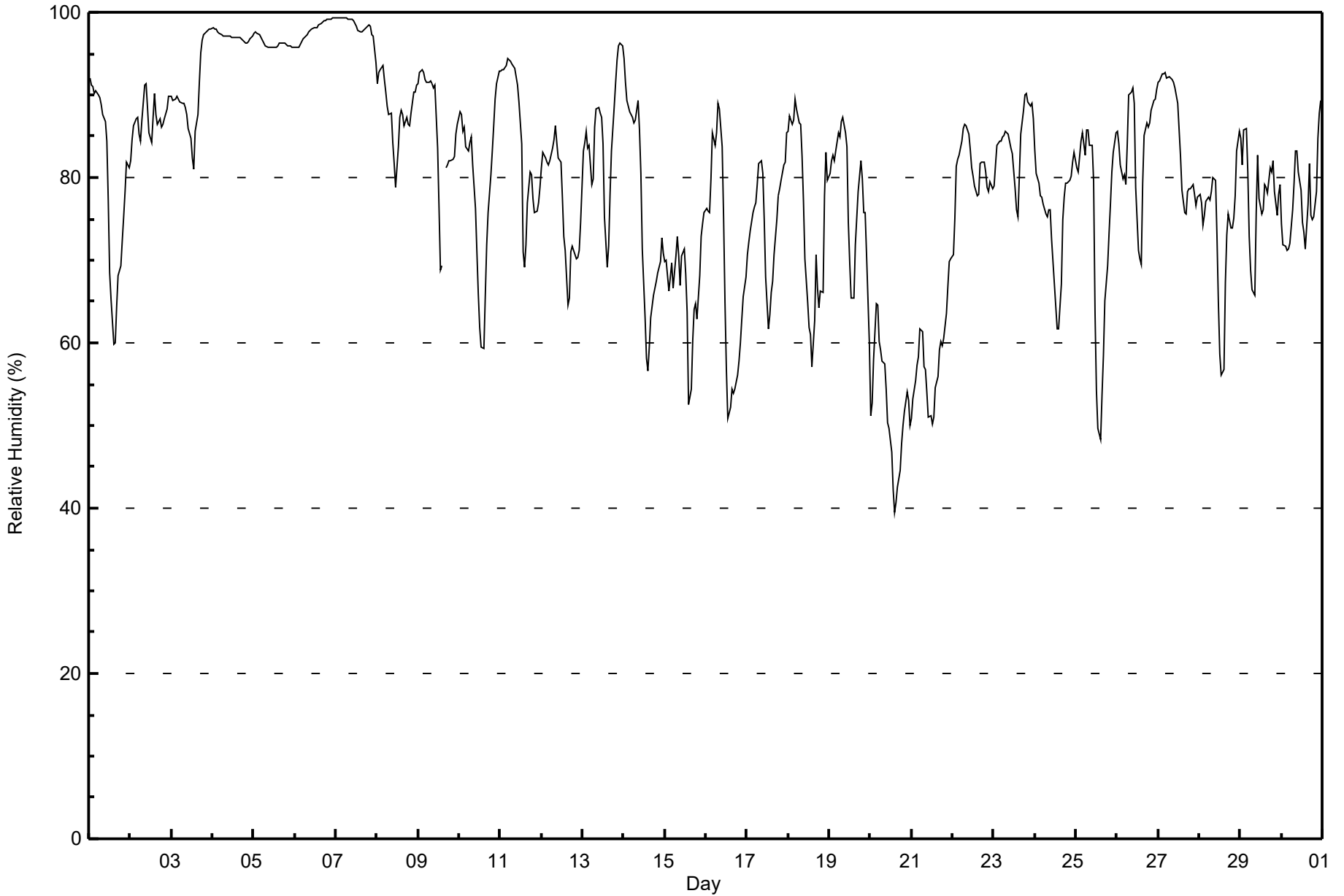
**Relative Humidity (RH) - %**  
**Jackfish 2/3 - November 2023**

Maximum Value: 99.3 % on Nov 7 00:00      Maximum Daily Average: 98.4 % on Nov 7																						Hours in Service:	720																								
Minimum Value: 39.5 % on Nov 20 15:00      Minimum Daily Average: 51.8 % on Nov 20																						Hours of Data:	719																								
Maximum Diurnal Average: 84.7 % at hour 9      Minimum Diurnal Average: 70.5 % at hour 15																						Hours of Missing Data:	1																								
Monthly Average: 80.28 %      Percentiles: P <sub>1</sub> = 48.5 P <sub>10</sub> = 61.7 Q <sub>1</sub> = 72.4 Median = 82.0 Q <sub>3</sub> = 89.4 P <sub>90</sub> = 96.7 P <sub>99</sub> = 99.3																						Hours of Calibration:	0																								
																						Percent Operational Time:	99.9																								
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																					
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																							
1-Nov	92.0	91.3	90.9	90.2	90.5	89.9	89.7	88.8	87.7	86.7	84.4	77.4	68.5	65.3	59.8	60.1	64.4	68.1	69.3	72.3	75.2	78.2	81.9	81.2	79.3	92.0																					
2-Nov	82.1	84.6	86.3	87.1	87.3	85.3	84.4	86.9	91.2	91.3	88.5	85.4	84.3	87.3	90.2	87.7	86.4	87.1	86.1	86.5	87.1	88.3	89.9	89.8	87.1	91.3																					
3-Nov	89.8	89.3	89.5	89.9	89.5	89.2	89.0	88.9	88.5	87.6	85.9	84.7	82.4	81.1	85.6	87.7	91.5	95.1	96.6	97.3	97.6	97.8	97.9	98.0	90.4	98.0																					
4-Nov	98.1	98.0	97.9	97.7	97.5	97.3	97.1	97.1	97.2	97.2	97.1	97.0	96.9	96.9	97.0	97.0	97.0	96.8	96.4	96.3	96.3	96.4	96.7	97.1	97.1	98.1																					
5-Nov	97.5	97.7	97.5	97.2	96.9	96.7	96.3	95.9	95.7	95.7	95.7	95.8	95.7	95.7	96.0	96.3	96.3	96.3	96.2	96.1	95.9	95.9	95.8	95.8	96.3	97.7																					
6-Nov	95.8	95.8	95.8	96.2	96.4	96.8	97.1	97.4	97.6	97.8	97.9	98.1	98.1	98.2	98.5	98.7	98.8	98.9	99.0	99.1	99.1	99.2	99.3	99.3	97.9	99.3																					
7-Nov	99.3	99.3	99.3	99.3	99.3	99.3	99.3	99.2	99.2	99.1	98.9	98.7	98.3	97.9	97.6	97.6	97.9	98.0	98.3	98.5	98.3	97.3	97.1	93.9	98.4	99.3																					
8-Nov	91.4	92.8	93.0	93.6	91.8	90.3	88.7	87.6	87.7	84.3	81.7	78.8	83.7	87.2	88.1	87.7	86.3	87.4	86.5	86.4	87.9	90.3	90.3	91.2	88.1	93.6																					
9-Nov	91.3	92.7	93.1	92.7	91.9	91.5	91.4	91.6	91.3	90.9	91.2	83.6	76.2	68.8	69.4	M	81.2	81.5	82.0	82.1	82.2	82.6	85.2	86.5	85.7	93.1																					
10-Nov	87.9	87.6	85.6	86.1	83.8	83.2	84.2	84.9	81.6	76.3	71.1	66.0	61.9	59.4	59.4	65.7	71.8	75.8	80.3	83.2	86.3	89.6	91.3	92.8	79.0	92.8																					
11-Nov	92.9	93.0	93.0	93.5	94.4	94.2	94.0	93.7	93.3	92.2	91.1	89.2	84.1	71.0	69.1	71.8	77.0	80.7	80.3	77.5	75.8	75.9	76.9	78.9	84.7	94.4																					
12-Nov	81.1	83.1	82.4	81.8	81.6	82.1	83.6	84.6	86.2	84.2	82.4	81.9	77.7	72.9	71.3	64.6	65.5	71.0	71.7	71.2	70.1	70.3	71.3	74.6	77.0	86.2																					
13-Nov	83.2	84.3	85.5	83.5	83.9	79.2	79.8	86.1	88.3	88.5	87.8	87.2	84.0	75.3	69.2	71.7	78.0	83.2	88.6	91.6	94.2	95.9	96.2	95.9	85.0	96.2																					
14-Nov	94.5	91.6	89.3	87.9	87.6	87.2	86.5	86.9	89.3	85.7	80.5	71.4	63.1	58.1	56.7	59.6	63.0	65.8	66.6	67.4	68.4	69.8	72.6	70.9	75.8	94.5																					
15-Nov	69.8	69.9	66.3	68.0	69.6	66.6	70.5	72.9	70.6	66.9	70.6	71.4	68.4	63.7	52.6	54.4	60.3	64.0	64.7	62.8	68.2	72.8	74.4	75.7	67.3	75.7																					
16-Nov	76.3	76.0	75.8	79.9	85.5	83.9	85.5	89.1	88.3	83.7	75.2	65.0	56.7	50.9	52.2	54.4	54.0	54.4	56.0	57.7	59.9	62.9	65.6	68.0	69.0	89.1																					
17-Nov	70.7	72.3	73.5	75.8	76.5	76.9	79.1	81.6	82.0	80.4	75.0	68.0	61.8	63.4	66.1	67.5	70.7	74.9	77.8	78.7	79.7	81.5	81.9	85.4	75.0	85.4																					
18-Nov	85.5	87.4	86.5	86.9	89.5	88.3	86.6	86.4	82.5	77.2	70.2	64.9	61.8	61.0	57.1	62.7	70.7	66.6	64.2	66.2	66.1	77.8	83.1	79.6	75.4	89.5																					
19-Nov	80.5	82.0	82.6	82.0	83.2	85.5	85.0	86.8	87.3	85.4	83.7	74.6	69.7	65.4	65.5	71.9	75.1	78.3	82.1	79.9	75.8	75.7	70.6	60.0	77.9	87.3																					
20-Nov	51.2	52.7	58.0	64.8	64.6	60.2	59.1	57.8	57.5	54.4	50.4	49.6	46.7	42.2	39.5	40.7	42.6	44.6	47.8	50.0	51.8	54.0	53.0	50.0	51.8	64.8																					
21-Nov	50.9	53.2	55.4	57.3	58.2	61.7	61.3	57.2	56.9	54.1	51.1	51.1	50.2	51.0	54.6	56.0	59.2	60.2	59.6	60.6	63.5	66.8	69.8	70.1	57.9	70.1																					
22-Nov	70.7	75.1	81.4	82.2	82.8	84.3	85.9	86.4	86.2	85.2	83.5	81.2	80.1	78.9	77.8	78.0	81.7	81.8	81.9	80.7	78.8	78.3	79.5	78.7	80.9	86.4																					
23-Nov	79.0	81.5	84.0	84.4	84.4	85.0	85.1	85.6	85.3	84.5	83.6	82.8	78.6	76.1	75.3	80.2	85.2	88.1	89.9	90.1	89.2	88.7	88.9	87.0	84.3	90.1																					
24-Nov	83.3	80.5	79.3	77.9	77.7	76.7	75.6	75.3	76.1	76.2	72.5	67.1	64.5	61.6	61.7	67.1	74.8	77.6	79.4	79.4	79.7	80.2	81.9	83.1	75.4	83.3																					
25-Nov	81.2	80.7	82.6	84.4	85.4	82.7	85.8	85.8	83.9	83.9	79.5	63.8	54.2	49.6	48.3	53.7	58.5	65.0	69.3	73.2	76.8	80.7	83.1	85.4	74.1	85.8																					
26-Nov	85.6	84.1	81.6	79.8	80.3	79.2	84.0	89.9	90.3	90.8	89.1	78.8	71.2	70.3	69.6	79.3	85.0	86.5	86.0	86.6	88.2	89.3	89.4	90.7	83.6	90.8																					
27-Nov	91.5	91.8	92.6	92.6	92.6	92.1	92.1	91.8	91.5	90.8	89.0	85.7	82.6	78.4	75.7	75.6	78.4	78.6	78.6	79.2	77.9	76.6	77.6	85.2	85.2	92.6																					
28-Nov	77.9	76.9	74.2	75.4	77.1	77.6	77.2	78.3	79.9	79.7	72.9	64.8	58.7	56.1	56.8	67.4	73.0	75.5	73.8	74.0	75.1	77.8	83.2	85.6	73.7	85.6																					
29-Nov	84.7	81.6	85.7	85.9	80.7	72.9	68.8	66.5	65.7	75.8	82.8	77.5	75.6	76.0	79.2	78.8	78.2	81.2	80.7	82.0	78.3	75.4	77.9	79.2	78.0	85.9																					
30-Nov	74.5	71.9	71.7	71.2	71.3	72.0	76.0	79.3	83.2	83.2	80.6	78.4	74.6	73.3	71.4	76.8	81.8	75.5	74.9	75.3	78.3	84.7	87.8	89.4	77.4	89.4																					
																						83.0	83.3	83.7	84.2	84.4	83.6	84.0	84.7	84.7	83.7	81.5	77.4	73.8	71.2	70.5	72.8	76.0	77.9	78.8	79.4	80.1	81.7	83.0	83.0	Diurnal Average	
																						99.3	99.3	99.3	99.3	99.3	99.3	99.3	99.2	99.2	99.1	98.9	98.7	98.3	98.2	98.5	98.7	98.8	98.9	99.0	99.1	99.1	99.2	99.3	99.3	Diurnal Maximum	
M - Maintenance																																															



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

**Relative Humidity (RH) - %**  
**Jackfish 2/3 - November 2023**





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

**Relative Humidity (RH) - %**  
**Jackfish 2/3 - November 2023**

<b>Concentration Ranges (%)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	0	0.00	0.00
20 - 40	1	0.14	0.14
40 - 60	63	8.76	8.90
60 - 80	248	34.49	43.39
80 - 100	407	56.61	100.00

Total Number of Valid Hours: 719

Total Number of Hours: 720

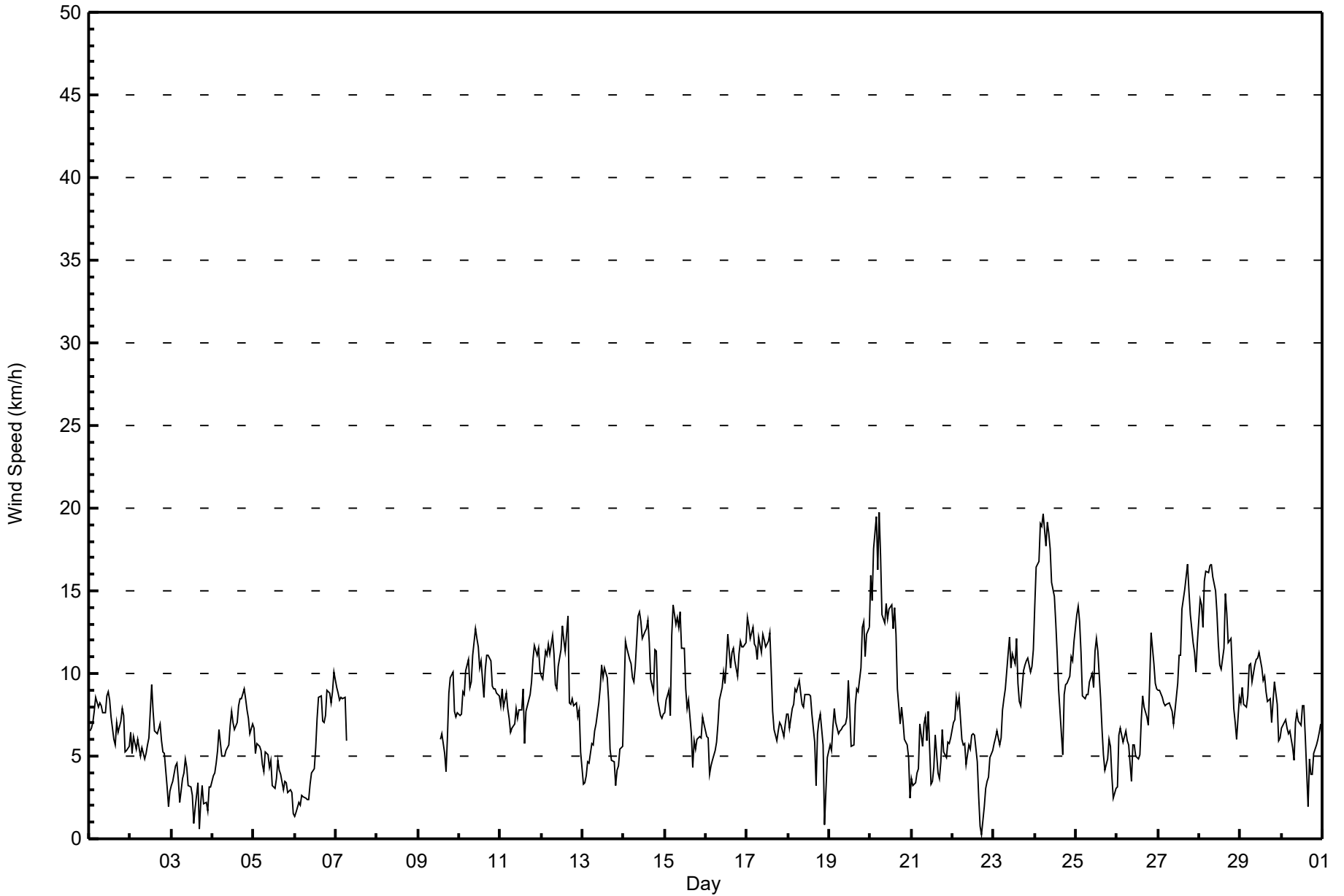


Maximum Speed: 20 km/h on Nov 20 06:00	Maximum Daily Speed Average: 13.3 km/h on Nov 24	Hours in Service: 720
Minimum Speed Value: 0 km/h on Nov 22 18:00	Minimum Daily Speed Average: 1.7 km/h on Nov 3	Hours of Data: 666
Maximum Diurnal Speed Average: 5.3 km/h at hour 2	Minimum Diurnal Speed Average: 4.1 km/h at hour 17	Hours of Missing Data: 54
Monthly Average Velocity: 4.7 km/h 246.0 deg	Percentiles: P <sub>1</sub> = 2 P <sub>10</sub> = 4 Q <sub>1</sub> = 6 Median = 8 Q <sub>3</sub> = 10 P <sub>90</sub> = 13 P <sub>99</sub> = 18	Percent Operational Time: 92.5

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Nov	WSW7	WSW7	SW7	WSW8	WSW9	SW8	WSW8	SW8	SW8	WSW9	SW9	SW8	SW7	SW6	SW6	WSW7	SW6	SW7	SW8	SW7	SW5	SW5	SW6	SW7.2	SW9		
2-Nov	SW6	WSW5	WSW6	W5	W6	WNW6	NW5	NW6	NNW5	N5	N6	N6	NE9	NE8	NNE6	NE6	NE6	NNE7	NNE6	NE5	NE5	NE3	ENE2	SSE3	N2.9	NE9	
3-Nov	SE3	SE3	S4	S5	SSE4	SE2	SSE4	S4	S5	SSW4	SSW3	SSW3	SSE3	ENE1	ENE2	ESE3	S1	ENE2	NE3	ENE2	NE2	NNE2	NE3	NNE3	SE1.7	S5	
4-Nov	NNE4	NNE4	NE5	NE5	NE7	NE5	NE5	NE5	ENE5	E6	E7	E8	E7	E7	E7	ESE8	ESE9	E8	E9	E8	E8	E7	E6	E7	E6.0	E9	
5-Nov	E7	E5	NE6	NE6	NE5	NE4	NE4	NE5	NE5	NE4	NE5	NE3	NNE3	NE4	NE5	NE4	NE4	NE3	NE3	NE3	NE3	NE3	NE2	NE4.0	E7		
6-Nov	E1	ESE2	E2	SE2	SSE3	SSE3	SSE2	SSE2	S2	S3	SSW4	SSW4	SSW6	SSW7	SSW9	SSW9	SSW7	SSW7	SSW7	SSW9	SSW9	SW8	SSW9	SSW10	SSW4.9	SSW10	
7-Nov	SSW9	SSW9	SSW8	SSW9	SSW8	SSW9	SSW6	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	---	SSW9	
8-Nov	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	---	---	
9-Nov	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	SSW6	SSW6	SSW5	S4	SSW6	SSW9	SSW10	SSW10	SSW8	SSW7	S8	---	SSW10	
10-Nov	S7	S8	SSW9	SSW9	SSW10	SSW11	SSW9	SSW10	SSW11	SSW13	SSW12	SSW12	S10	SSW11	SW9	SSW10	SSW11	SSW11	SSW11	SSW11	SSW9	SSW9	SSW9	S9	SSW9.8	SSW13	
11-Nov	S8	S9	S8	S9	S8	S7	S6	S7	S7	SSE8	SSE7	SSE8	S8	SSW9	SW6	SSW8	SW8	SW9	SW10	SW11	WSW12	WSW11	SW12	SW10	SSW7.5	WSW12	
12-Nov	SW10	SW10	WSW11	WSW11	WSW12	WSW11	WSW12	WSW11	W9	W9	W10	WSW11	WSW13	W12	W11	W13	W8	WSW8	WSW8	SW8	WSW8	SW7	SW8	WSW5	WSW9.8	W13	
13-Nov	SSW3	S3	SSE4	S5	SE5	ESE6	ENE6	NE7	NE7	NE8	NE9	NE11	ENE10	ENE10	E10	ENE8	NE5	NE5	NNE5	NNE3	NW4	NW4	WNW5	W6	ENE3.7	NE11	
14-Nov	WNW9	WNW12	WNW11	WNW11	W10	W10	WSW10	WSW14	WSW14	WSW13	WSW12	WSW13	WSW13	WSW12	WSW10	WSW9	WSW11	WSW11	SW8	SW7	SSW7	SSW8	WSW10.0	WSW14			
15-Nov	SSW8	SSW8	SW9	SW7	WSW12	WSW14	WSW13	WSW13	WSW14	W12	NW12	NW9	NW8	WNW8	WNW6	WNW4	WSW6	WSW6	W5	W6	WNW6	W6	WSW7	W7	W7.7	WSW14	
16-Nov	W6	W6	NW4	SW4	SSW5	SSW5	SSW6	SSW7	SSW8	SW9	SW10	SW9	SW11	WSW12	WSW10	WSW11	SW12	WSW11	WSW10	WSW11	WSW12	WSW12	WSW12	WSW12	SW8.4	WSW12	
17-Nov	WSW13	WSW13	WSW12	WSW13	W12	WSW12	WSW11	WSW12	WSW11	WSW12	W12	W12	WSW12	WSW12	WSW10	WSW8	WSW7	SW6	SSW7	SW7	WSW7	WSW6	SW7	SSW8	WSW9.7	WSW13	
18-Nov	SW8	SSW7	SSW8	SSW8	SSW9	SSW9	SSW10	SSW9	SSW8	SW8	SW9	SSW9	SW9	SW9	SSW8	SSW6	S3	S6	S7	S8	SSW6	SE1	S3	S5	SSW6.8	SSW10	
19-Nov	S6	S5	S7	S8	SSW7	SSW6	SW6	SW7	SSW7	SW7	WSW7	WSW10	W8	W6	W6	WSW8	WSW9	WSW9	WSW10	WSW13	W13	W11	WNW12	W13	WSW7.1	W13	
20-Nov	W16	W14	W18	WNW19	WNW16	WNW20	WNW17	NW14	WNW13	WNW14	WNW13	WNW14	WNW14	WNW13	WNW14	WNW12	WNW9	W7	W8	W7	W6	WSW6	W5	NNW2	WNW11.9	WNW20	
21-Nov	NE4	S3	E3	E4	ESE4	ESE7	ESE6	SSE7	SSE7	ESE6	SE8	SE3	E3	NE4	NNE6	NE4	NNE4	NNE5	NNE7	NNE5	N5	N6	NNE6	N6	ENE3.0	SE8	
22-Nov	NNE7	NNE7	NNE9	NE8	NE9	NE6	NNE6	NNE6	NNE4	NNE6	NE5	NE6	NE6	ENE6	NE5	ENE3	SSE1	SSW0	E2	ESE3	SE3	S4	SSW5	S5	NE3.6	NNE9	
23-Nov	S6	S6	S7	SSW6	SSW6	S8	S8	SSW9	SSW11	SSW12	SW10	SW11	SW11	WSW12	SW9	SW8	SSW8	SW10	SW11	SW11	SW11	SW10	SW10	SW11	SW8.9	SSW12	
24-Nov	WSW14	WSW16	SW17	SW19	WSW19	WSW20	WSW18	WSW19	WSW19	WSW18	WSW16	WSW15	W13	W11	W9	W6	W5	WSW9	WSW9	WSW9	WSW10	WSW11	WSW11	WSW12	WSW13.3	WSW20	
25-Nov	WSW14	WSW14	WSW13	W11	WNW9	NW8	NNW9	NNW9	N10	N10	NNW9	NNW11	NNW12	NNW11	NNW8	NNW7	NNW5	NNW4	NW5	NW6	NW6	NW4	WSW2	SW3	NW6.7	WSW14	
26-Nov	WSW3	WSW6	SW7	SSW6	SSW6	SSW7	SW6	WSW6	WNW3	W6	NW6	NNW5	NNW5	WNW5	W7	WNW9	WNW8	WNW7	W7	W9	WSW12	WSW11	W9	WSW9	W5.8	WSW12	
27-Nov	WSW9	SW9	SW9	SW8	SW8	SW8	SW8	SSW8	SSW8	SSW7	SSW8	SW9	SW11	SW11	SW14	WSW15	WSW16	WSW17	WSW15	W14	W12	W11	W10	WSW12	WSW10.0	WSW17	
28-Nov	WSW14	W14	W13	WSW16	WSW16	W16	W17	W17	W16	W15	W14	W12	W11	W10	W12	WSW15	WSW14	WSW12	WSW12	W10	W8	W7	W6	W9	W12.5	W17	
29-Nov	WNW8	W9	W8	W8	W9	WNW11	WNW11	WNW11	WNW11	WNW11	WNW11	WNW11	WNW11	NW10	WNW10	NW10	WNW9	NW8	NW9	NW7	NW8	NW9	NW8	NW6	NW6	WNW8.7	WNW11
30-Nov	NW7	NW7	NW7	NW7	NW6	NW7	W6	WNW5	W7	WNW8	WNW7	WNW7	WNW8	WNW8	WNW6	W2	SW5	W4	SW4	SW5	SSW6	SSW6	SW6	SW7	W4.9	WNW8	

WSW4.9	WSW5.3	WSW5.1	WSW5.1	WSW5.1	WSW5.0	WSW4.9	WSW4.8	WSW4.8	WSW4.8	WSW4.7	WSW4.4	WSW4.4	WSW4.1	WSW4.3	WSW4.6	WSW5.0	WSW5.0	WSW4.6	WSW4.9	Diurnal Average							
W16	WSW16	WNW18	WNW19	WSW19	WNW20	WSW18	WSW19	WSW19	WSW18	WSW16	WSW15	WNW14	WNW13	WNW14	WSW15	WSW16	WSW17	WSW15	W14	W13	WSW12	WNW12	W13	Diurnal Maximum			

UO - Unstable Operation  
 All monthly, daily, and diurnal averages have been calculated using vector methods







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

**Wind Speed (WS) - km/h**  
**Jackfish 2/3 - November 2023**

<b>Wind Speed Ranges (km/h)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	148	22.22	22.22
6 - 11	408	61.26	83.48
12 - 19	108	16.22	99.70
20 - 28	2	0.30	100.00
29 - 38	0	0.00	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 666

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Wind Speed (WS) - km/h  
Jackfish 2/3 - November 2023**

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	11	37	7	7	4	7	11	17	11	7	4	6	5	6	6	148
6 - 11	6	13	16	5	15	6	1	5	26	83	72	54	47	29	23	7	408
12 - 19	0	0	0	0	0	0	0	0	0	4	5	60	22	14	2	1	108
20 - 28	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	2
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	8	24	53	12	22	10	8	16	43	98	84	119	75	49	31	14	666

Total Number of Valid Hours: 666

Total Number of Hours: 720





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

**Wind Speed (WS) - km/h**  
**Jackfish 2/3 - November 2023**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 9 km/h on Nov 20 04:00 Minimum Value: 0 km/h on Nov 13 02:00 Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 1 Q <sub>1</sub> = 2 Median = 2 Q <sub>3</sub> = 3 P <sub>90</sub> = 4 P <sub>99</sub> = 6																		Hours in Service: 720 Hours of Data: 666 Hours of Missing Data: 54 Hours of Calibration: 0 Percent Operational Time: 92.5							
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Nov	1	1	2	2	2	1	2	2	1	1	2	2	2	2	2	2	2	1	2	2	2	1	1	1	2
2-Nov	1	2	1	1	2	2	2	2	2	2	2	3	3	3	3	2	2	3	2	2	1	1	1	1	3
3-Nov	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2
4-Nov	1	1	1	2	2	2	1	1	2	2	2	3	2	2	2	3	3	3	3	2	3	2	2	2	3
5-Nov	2	2	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1	2
6-Nov	1	1	1	1	1	1	1	1	1	1	2	1	2	3	3	3	3	3	3	3	3	3	3	3	4
7-Nov	3	3	3	3	3	3	4	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	4
8-Nov	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	--
9-Nov	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	3	2	2	2	2	2	3	3	3	2	3
10-Nov	2	2	3	3	4	4	3	3	4	4	4	4	4	4	3	3	3	3	3	3	2	2	2	2	4
11-Nov	2	3	2	3	3	3	2	2	3	3	3	3	3	3	2	3	2	2	2	3	2	2	2	2	3
12-Nov	2	2	2	2	2	3	3	3	2	3	3	3	4	4	3	4	3	2	2	2	2	1	2	2	4
13-Nov	0	0	1	2	1	1	2	2	2	2	2	3	3	3	3	3	1	1	1	1	2	2	2	2	3
14-Nov	4	5	5	4	5	4	4	3	3	3	4	3	4	4	4	3	3	2	3	3	2	2	2	2	5
15-Nov	1	2	2	2	4	4	3	3	3	4	5	5	4	4	4	3	2	1	1	2	2	2	1	2	5
16-Nov	2	2	2	1	1	1	1	2	2	3	3	3	3	4	3	3	3	3	3	3	3	3	3	3	4
17-Nov	3	3	3	3	3	3	3	3	3	3	4	3	3	3	3	2	2	1	2	2	2	2	1	2	4
18-Nov	2	2	1	2	2	2	2	2	2	2	2	3	2	2	2	2	1	2	2	2	2	1	1	1	3
19-Nov	2	1	2	2	2	1	1	1	1	2	1	2	2	2	1	2	2	2	2	3	4	3	5	5	5
20-Nov	7	6	7	9	7	8	8	6	5	6	5	6	6	5	6	5	3	2	2	2	2	2	2	1	9
21-Nov	1	1	1	1	2	2	2	3	4	3	3	3	1	2	2	1	1	2	2	2	2	2	2	2	4
22-Nov	3	3	3	3	3	2	2	2	1	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	3
23-Nov	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3	2	2	2	3	3	3	3	3	3	3
24-Nov	4	5	5	5	5	5	4	5	4	5	4	4	4	4	3	2	1	2	2	2	2	2	2	2	5
25-Nov	3	3	3	4	3	4	4	4	4	4	5	4	5	5	4	4	2	1	2	2	2	1	1	1	5
26-Nov	1	2	2	2	1	1	2	2	2	2	2	2	2	2	3	4	3	3	2	2	3	3	3	2	4
27-Nov	2	2	2	2	2	1	2	1	1	1	2	3	3	3	4	4	4	5	4	4	3	4	3	2	5
28-Nov	3	3	3	4	4	4	5	4	4	4	5	4	4	3	4	4	3	3	3	3	2	2	2	2	5
29-Nov	3	3	3	3	3	4	4	4	4	5	4	5	5	4	4	4	3	4	3	4	4	4	2	3	5
30-Nov	3	3	4	3	3	3	2	2	3	3	3	3	3	3	3	2	1	1	2	1	1	1	1	1	4
Diurnal Maximum																									
UO - Unstable Operation																									



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

**Wind Direction (WD) - deg**  
**Jackfish 2/3 - November 2023**

Direction of Maximum Speed: 300 deg on Nov 20 06:00	Hours in Service: 720
Direction of Maximum Daily Speed Average: 243.9 deg on Nov 24	Hours of Data: 666
Direction of Minimum Speed: 198 deg on Nov 22 18:00	Hours of Missing Data: 54
Direction of Minimum Daily Speed Average: 1.7 deg on Nov 3	Percent Operational Time: 92.5
Monthly Average Direction: 246.0 deg	

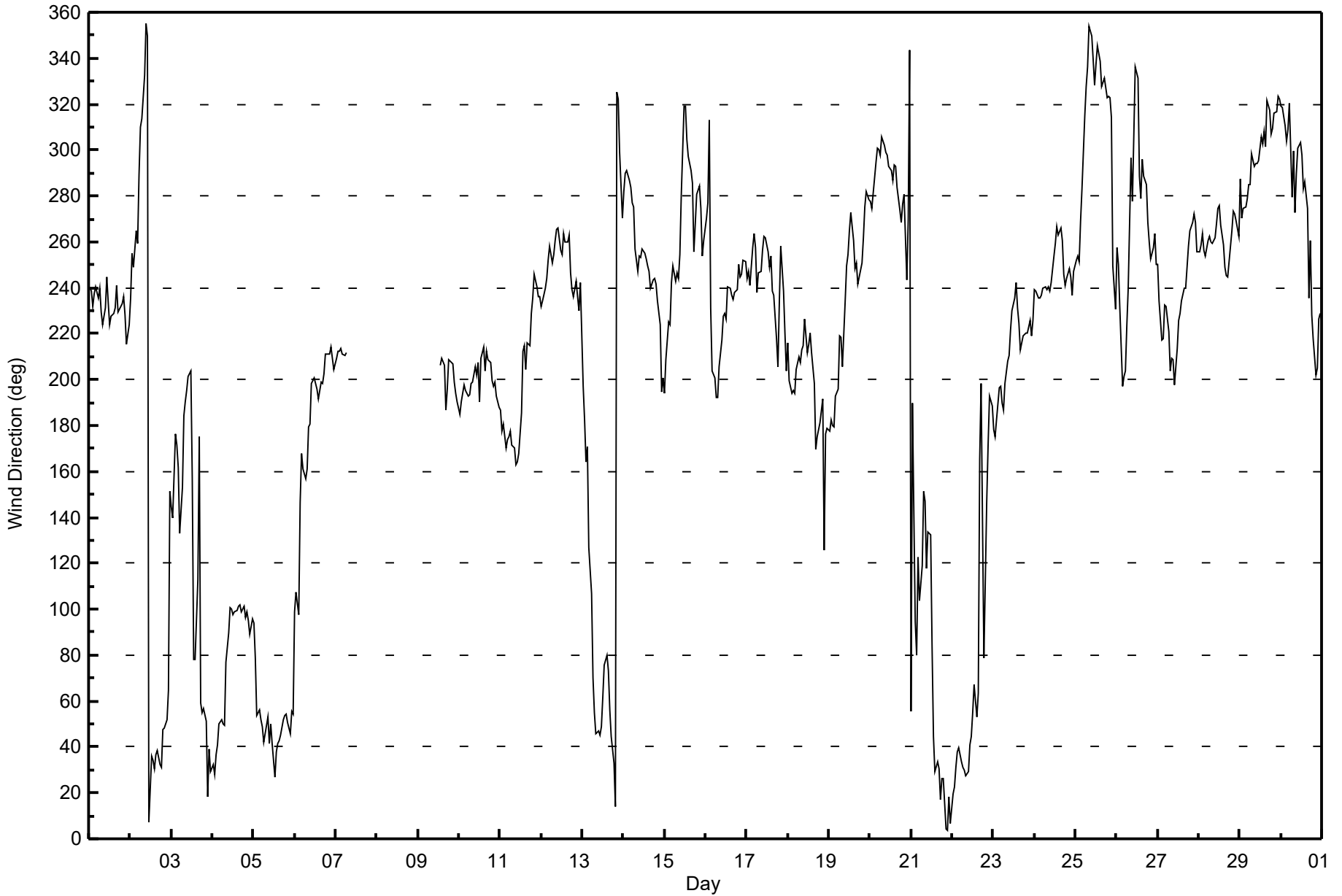
Day	Hourly Period Ending At (MST)																								Daily Average	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	240	238	232	237	241	235	240	229	224	232	245	234	224	228	229	231	241	229	232	233	236	228	215	224	232.9	
2-Nov	235	255	249	265	260	289	310	314	332	355	349	8	36	34	31	37	38	32	31	48	48	52	64	151	358.0	
3-Nov	144	140	176	172	162	133	153	184	191	196	201	204	157	78	78	113	175	59	55	57	51	18	39	30	144.1	
4-Nov	33	28	36	41	50	52	50	50	77	90	100	100	98	99	100	102	102	99	101	97	99	95	89	96	84.4	
5-Nov	94	79	53	56	52	49	42	46	53	41	50	42	27	38	41	43	45	52	54	54	50	46	56	54	52.2	
6-Nov	99	107	98	146	168	161	157	161	179	180	198	201	199	196	192	199	198	203	211	211	211	214	209	204	196.3	
7-Nov	209	213	212	213	211	210	212	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	--	
8-Nov	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	--	
9-Nov	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	206	209	206	186	196	209	208	207	199	194	190	--
10-Nov	185	190	194	198	195	193	194	199	199	206	202	207	190	209	214	204	212	209	207	200	197	199	193	188	199.8	
11-Nov	187	177	180	170	174	175	178	172	170	163	164	168	186	213	215	204	216	215	229	236	246	240	236	236	201.5	
12-Nov	232	234	240	244	252	258	251	254	261	265	266	257	255	263	260	260	263	246	239	236	243	236	230	242	250.5	
13-Nov	197	183	164	171	127	107	70	55	46	47	45	49	62	76	80	73	56	44	33	14	325	322	299	270	60.2	
14-Nov	282	290	291	287	284	277	275	257	247	254	254	257	255	253	250	247	240	243	244	242	234	224	195	201	255.5	
15-Nov	194	208	225	224	242	250	243	246	244	254	280	319	319	305	297	291	286	256	268	280	284	274	254	261	260.6	
16-Nov	270	277	313	231	204	201	192	192	206	217	228	229	226	240	240	237	235	238	239	250	245	246	252	252	236.1	
17-Nov	244	247	241	257	264	258	238	247	247	256	262	262	256	249	254	239	237	218	205	234	258	239	220	204	246.2	
18-Nov	216	200	194	196	194	204	210	208	213	214	226	212	215	220	212	198	169	175	178	181	192	126	176	179	201.8	
19-Nov	177	182	180	179	193	196	219	218	205	234	249	254	265	272	261	248	251	242	248	251	262	275	282	278	241.6	
20-Nov	278	275	281	295	301	300	298	305	302	299	298	293	291	287	294	293	284	274	268	276	281	244	270	343	290.1	
21-Nov	56	190	94	80	123	104	119	151	147	117	134	133	84	44	29	34	31	17	26	26	4	3	18	7	71.8	
22-Nov	20	22	31	38	40	34	31	30	27	29	41	45	55	67	53	64	165	198	79	112	146	171	193	189	48.2	
23-Nov	178	175	182	197	197	190	187	198	208	211	221	230	236	242	231	225	213	219	220	220	220	226	219	226	214.6	
24-Nov	239	238	236	235	237	240	241	239	240	239	242	254	259	267	263	266	261	246	241	244	248	244	237	247	243.9	
25-Nov	252	254	251	269	283	315	328	336	354	349	340	328	337	345	339	327	329	332	323	324	322	314	250	231	311.0	
26-Nov	257	250	231	197	201	204	223	240	297	278	306	336	332	289	279	296	289	285	268	260	253	258	264	250	262.6	
27-Nov	250	234	217	218	233	232	221	204	210	208	198	214	226	229	234	240	240	249	258	265	269	272	269	256	238.6	
28-Nov	255	259	264	256	254	260	263	260	259	262	268	275	276	267	259	249	245	245	258	265	274	272	269	262	260.4	
29-Nov	287	270	274	275	279	285	285	298	293	294	294	296	306	303	308	301	322	317	307	309	316	317	323	322	298.4	
30-Nov	319	319	311	304	309	320	279	299	273	290	301	303	298	283	286	275	236	261	228	218	202	205	226	229	279.3	

240.0 240.1 238.8 239.2 240.1 244.7 243.6 243.8 242.1 249.7 255.8 261.9 262.0 258.4 258.6 248.6 245.2 241.0 241.3 243.7 248.1 246.9 239.6 236.0

Diurnal Average

UO - Unstable Operation

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**  
**Jackfish 2/3 - November 2023**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 97 deg on Nov 22 18:00	Hours of Data: 666
Minimum Value: 4 deg on Nov 13 02:00	Hours of Missing Data: 54
Percentiles: P <sub>1</sub> = 13 P <sub>10</sub> = 16 Q <sub>1</sub> = 19 Median = 25 Q <sub>3</sub> = 34 P <sub>90</sub> = 42 P <sub>99</sub> = 64	Hours of Calibration: 0
	Percent Operational Time: 92.5

Day	Hourly Period Ending At (MST)																								Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	14	15	14	15	13	15	15	18	16	16	18	20	25	25	25	20	16	17	18	17	18	18	16	18	25	
2-Nov	17	18	15	20	17	33	36	39	43	46	48	44	33	34	40	34	30	42	37	31	29	40	59	37	59	
3-Nov	47	37	25	27	47	70	39	39	21	23	32	28	50	68	29	33	70	26	20	30	25	43	29	29	70	
4-Nov	33	31	29	25	22	22	19	18	25	28	31	26	30	29	28	30	29	28	27	25	27	28	28	28	33	
5-Nov	28	31	21	23	18	22	23	20	23	26	24	36	41	33	29	31	29	31	21	24	21	25	22	30	41	
6-Nov	54	62	35	46	34	41	49	63	64	53	43	38	40	37	32	31	37	30	32	25	28	27	29	28	64	
7-Nov	30	29	27	27	28	29	29	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	30	
8-Nov	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	--	
9-Nov	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	36	29	23	27	24	23	24	25	30	28	26	36
10-Nov	26	27	28	30	33	32	35	30	28	27	30	28	35	31	28	25	21	20	20	21	22	18	18	18	35	
11-Nov	18	23	23	30	28	32	40	38	41	40	42	38	33	29	35	29	20	18	18	14	14	15	16	15	42	
12-Nov	15	17	14	14	13	17	15	19	19	25	27	20	22	26	26	24	25	16	17	19	19	18	15	22	27	
13-Nov	14	4	18	26	25	20	22	24	23	23	17	20	26	27	29	25	23	21	27	47	49	41	40	32	49	
14-Nov	36	38	33	36	33	33	32	26	16	17	20	23	25	24	20	18	18	18	17	17	18	20	16	18	38	
15-Nov	15	19	22	24	21	17	17	17	18	19	36	41	48	43	40	38	31	10	21	29	35	33	13	19	48	
16-Nov	31	32	54	21	20	20	18	19	20	22	22	25	25	23	22	21	20	21	18	18	18	18	22	16	54	
17-Nov	16	17	17	15	21	16	18	16	17	18	25	27	21	18	18	21	17	19	23	19	17	21	23	16	27	
18-Nov	19	20	14	13	14	16	17	15	18	21	21	23	24	21	20	18	48	22	22	25	30	56	37	23	56	
19-Nov	22	18	14	16	22	14	17	17	13	17	15	20	31	31	27	13	12	14	13	15	24	31	34	38	38	
20-Nov	34	33	34	38	38	36	35	36	35	34	36	38	39	37	37	35	33	26	22	28	28	22	33	56	56	
21-Nov	33	36	27	29	40	27	32	41	53	54	48	90	46	43	32	32	25	39	34	37	43	48	41	39	90	
22-Nov	40	40	34	31	26	34	34	38	38	41	36	29	33	29	25	23	72	97	47	19	43	36	22	22	97	
23-Nov	25	25	23	29	24	25	24	24	20	19	22	21	20	21	21	20	18	17	18	19	19	20	20	21	29	
24-Nov	19	19	20	20	19	18	19	17	16	17	17	20	23	27	27	27	13	13	14	14	12	14	17	15	27	
25-Nov	16	17	15	25	28	45	47	44	46	48	46	46	49	48	48	48	45	43	32	32	32	35	48	27	49	
26-Nov	25	14	19	19	15	19	27	50	56	31	41	47	44	42	33	37	37	36	29	19	16	21	22	15	56	
27-Nov	14	17	17	18	15	14	16	14	16	17	19	22	22	21	20	18	18	17	19	23	25	29	24	15	29	
28-Nov	15	15	23	16	15	19	20	19	17	21	29	31	31	29	22	16	16	16	18	25	31	25	23	17	31	
29-Nov	35	25	30	29	31	32	34	36	38	35	36	36	36	40	37	38	43	41	36	41	41	42	43	48	48	
30-Nov	42	47	43	40	37	39	35	47	33	33	39	42	40	37	36	64	23	32	33	19	18	17	16	16	64	

54	62	54	46	47	70	49	63	64	54	48	90	50	68	48	64	72	97	47	47	49	56	59	56	
Diurnal Maximum																								

UO - Unstable Operation



## WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY  
MONITORING PROGRAM  
MONTHLY REPORT

**AMS29  
SURMONT 2  
NOVEMBER 2023**

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

December 22, 2023



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - SURMONT2 (AMS29)  
 NOVEMBER 2023

MONTHLY SUMMARY

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2 (ppb) Average	685	34	35	99.86	3.8	0	1	0
H2S (ppb) Average	686	33	34	99.86	0.3	0	0.1	0
THC(ppm) Average	686	33	34	99.86	2.6	-	2.4	-
NO2 (ppb) Average	687	33	33	100	8.6	0	2.7	-
NO (ppb) Average	687	33	33	100	2.2	-	0.5	-
NOX (ppb) Average	687	33	33	100	10	-	3.1	-
PM2.5 (ug/m3) Average	718	2	2	100	19.1	0	11.6	0
Temperature 2 m (C) Average	720	0	0	100	7.9	-	2	-
Relative Humidity (%) Average	720	0	0	100	99.6	-	96.3	-
Wind Speed 10 m (km/h) Average	717	0	3	99.58	22	-	12	-
Wind Direction 10 m (deg) Average	717	0	3	99.58	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - SURMONT 2 (AMS29)  
 NOVEMBER 2023

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	0.27	0.4	-	0	0	0.1	0.2	0.3	0.5	3.8
H2S (ppb) Average	686	0.08	0	-	0	0	0	0.1	0.1	0.1	0.3
THC (ppm) Average	686	2.27	0	-	2.2	2.2	2.2	2.3	2.3	2.3	2.6
NO2 (ppb) Average	687	1.27	1	-	0.2	0.4	0.6	1	1.6	2.5	8.6
NO (ppb) Average	687	0.11	0.2	-	0	0	0	0	0.1	0.3	2.2
NOX (ppb) Average	687	1.37	1.2	-	0.2	0.4	0.6	1	1.8	2.6	10
PM2.5 (ug/m3) Average	718	4.24	2.7	-	0.5	1.9	2.6	3.4	5.1	7.4	19.1
Temperature 2 m (C) Average	720	-3.72	4.3	-	-15.3	-9.8	-6.1	-3.6	-0.5	1.1	7.9
Relative Humidity (%) Average	720	82.29	12.1	-	35.7	64.5	74.6	85.3	92	94.9	99.6
Wind Speed 10 m (km/h) Average	717	5.8	4	-	0	2	3	5	8	11	22
Wind Direction 10 m (deg) Average	717	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - SURMONT 2 (AMS29)  
NOVEMBER 2023

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
H2S, SO2, THC	11 Nov 2023 11:00	11 Nov 2023 11:00	1	Maintenance - reinitiated daily QA check
Wind Speed, Wind Direction	19 Nov 2023 08:00	19 Nov 2023 09:00	2	Flat line in sensor output signal - Sensor frozen
Wind Speed, Wind Direction	27 Nov 2023 06:00	27 Nov 2023 06:00	1	Flat line in sensor output signal - Sensor frozen



Wood Buffalo Environmental Association

Summary of Hour Averages

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

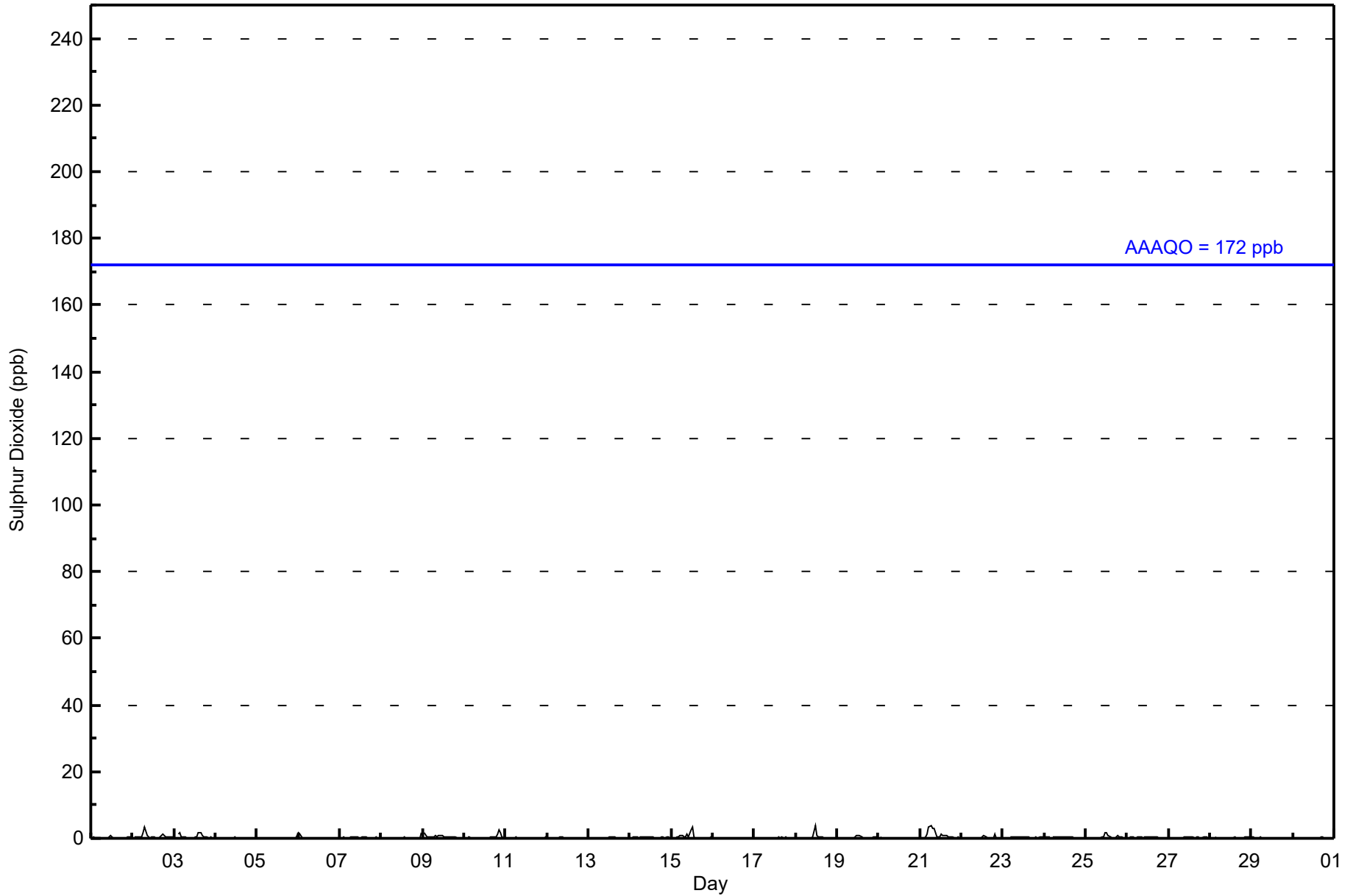
Surmont 2 - November 2023

Number of Exceedences (AAAQO):		1-hr: 0	24-hr: 0																		Hours in Service:	720				
Maximum Value: 3.8 ppb on Nov 18 12:00		Maximum Daily Average: 1.0 ppb on Nov 21																	Hours of Data:	685						
Minimum Value: 0.0 ppb on Nov 1 05:00		Minimum Daily Average: 0.1 ppb on Nov 30																	Hours of Missing Data:	35						
Maximum Diurnal Average: 0.5 ppb at hour 12		Minimum Diurnal Average: 0.2 ppb at hour 23																	Hours of Calibration:	34						
Monthly Average: 0.27 ppb		Percentiles: P <sub>1</sub> = 0.0 P <sub>10</sub> = 0.0 Q <sub>1</sub> = 0.1 Median = 0.2 Q <sub>3</sub> = 0.3 P <sub>90</sub> = 0.5 P <sub>99</sub> = 2.6																	Percent Operational Time:	99.9						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	0.0	0.2	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.1	0.4	0.6	0.4	0.2	0.2	0.1	0.1	0.1	0.1	0.2	0.1	0.3	0.2	0.4	0.2	0.6
2-Nov	Z	0.5	0.3	0.3	0.4	0.3	1.8	3.5	0.8	0.3	0.1	0.2	0.3	0.2	0.1	0.1	0.6	1.3	1.0	0.6	0.5	0.6	0.5	0.4	0.6	3.5
3-Nov	0.4	Z	1.3	1.8	0.5	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.5	1.6	1.5	0.9	0.4	0.3	0.3	0.2	0.2	0.2	0.2	0.5	1.8
4-Nov	0.2	0.1	Z	0.2	0.2	0.1	0.2	0.1	0.2	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	0.2
5-Nov	0.1	0.1	0.1	Z	0.1	0.1	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.0	0.0	0.1	0.1	0.0	0.1	0.7	0.1	0.7
6-Nov	1.5	1.4	0.2	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.2	1.5
7-Nov	0.2	0.2	0.3	0.2	0.1	0.1	0.5	0.5	0.4	0.2	0.3	0.1	0.2	0.2	0.5	0.2	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.2	0.5
8-Nov	0.1	0.1	0.1	0.1	0.1	Z	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.3	0.2	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.2	1.6	0.2	1.6
9-Nov	Z	1.9	0.6	0.2	0.4	0.4	0.6	0.7	0.4	0.7	0.8	0.8	0.6	0.6	0.3	0.3	0.4	0.6	0.3	0.3	0.2	0.2	0.1	0.1	0.5	1.9
10-Nov	0.1	Z	0.3	0.3	0.2	0.1	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.3	0.6	1.1	2.5	1.5	0.4	0.1	0.4	2.5
11-Nov	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1	M	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.1	0.2
12-Nov	0.2	0.2	0.2	0.2	Z	0.2	0.2	0.3	0.4	0.3	0.2	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.4
13-Nov	0.0	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.1	0.1	0.1	0.1	0.4	0.4	0.5	0.3	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.5
14-Nov	Z	0.1	0.3	0.5	0.4	0.2	0.3	0.3	0.2	0.3	0.4	0.3	0.3	0.3	0.1	0.0	0.0	0.1	0.2	0.3	0.2	0.2	0.4	0.1	0.2	0.5
15-Nov	0.0	Z	0.0	0.2	0.3	0.8	0.7	0.5	0.3	1.3	0.4	2.6	3.5	0.5	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.1	0.2	0.5	3.5
16-Nov	0.0	0.1	Z	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	C	C	C	C	C	C	C	0.1	0.0	0.0	0.0	0.0	0.0	--	0.1
17-Nov	0.0	0.1	0.1	Z	0.1	0.2	0.2	0.1	0.2	0.2	0.1	0.2	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.3	0.1	0.1	0.1	0.1	0.1	0.3
18-Nov	0.1	0.1	0.1	0.1	Z	0.1	0.1	0.1	0.1	0.1	0.4	3.8	0.8	0.4	0.5	0.3	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.4	3.8
19-Nov	0.1	0.1	0.1	0.0	0.0	Z	0.1	0.1	0.1	0.1	0.2	0.8	0.7	0.6	0.4	0.2	0.2	0.1	0.1	0.2	0.2	0.3	0.3	0.3	0.2	0.8
20-Nov	Z	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.2	0.2	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.1	0.1	0.2	0.2	0.1	0.2
21-Nov	0.2	Z	0.2	0.4	1.2	3.4	3.7	3.0	2.9	1.7	0.5	0.5	1.3	0.9	0.8	0.7	0.4	0.4	0.3	0.2	0.2	0.2	0.2	0.2	1.0	3.7
22-Nov	0.2	0.2	Z	0.1	0.1	0.1	0.2	0.2	0.1	0.1	0.1	0.2	0.6	0.8	0.4	0.1	0.2	0.1	0.1	1.2	0.2	0.1	0.1	0.2	0.2	1.2
23-Nov	0.1	0.2	0.2	Z	0.3	0.3	0.3	0.3	0.2	0.2	0.4	0.6	0.3	0.2	0.2	0.3	0.2	0.1	0.2	0.2	0.2	0.2	0.5	0.4	0.3	0.6
24-Nov	0.3	0.2	0.4	0.2	Z	0.2	0.3	0.3	0.3	0.3	0.2	0.3	0.6	0.3	0.3	0.3	0.3	0.2	0.1	0.1	0.1	0.2	0.1	0.1	0.2	0.6
25-Nov	0.1	0.1	0.1	0.2	0.1	Z	0.2	0.1	0.1	0.4	0.6	1.7	1.6	0.8	0.6	0.1	0.1	0.1	0.7	0.3	0.3	0.2	0.1	0.1	0.4	1.7
26-Nov	Z	0.2	0.2	0.3	0.1	0.1	0.3	0.3	0.2	0.2	0.3	0.5	0.5	0.4	0.3	0.3	0.4	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.3	0.5
27-Nov	0.1	Z	0.1	0.1	0.0	0.1	0.1	0.0	0.2	0.2	0.4	0.3	0.4	0.2	0.3	0.2	0.3	0.4	0.2	0.1	0.3	0.4	0.2	0.2	0.2	0.4
28-Nov	0.1	0.1	Z	0.3	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.4	0.1	0.1	0.0	0.1	0.2	0.3	0.4	0.6	0.5	0.2	0.6
29-Nov	0.4	0.3	0.1	Z	0.1	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.4
30-Nov	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.3	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.3
																								Diurnal Average		
																								Diurnal Maximum		
																								1.5 1.9 1.3 1.8 1.2 3.4 3.7 3.5 2.9 1.7 0.8 3.8 3.5 0.9 1.6 1.5 0.9 1.3 1.0 1.2 2.5 1.5 0.6 1.6		
Z - zerospan      C - Calibration      M - Maintenance																										
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 172 ppb      24-hr 48 ppb																										



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

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Surmont 2 - November 2023**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Surmont 2 - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 10	685	100.00	100.00
11 - 20	0	0.00	100.00
21 - 60	0	0.00	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



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

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Surmont 2 - November 2023**

<b>Concentration</b> <b>Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 10	22	7	10	17	25	57	76	28	27	27	61	87	117	83	19	19	682
11 - 20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	22	7	10	17	25	57	76	28	27	27	61	87	117	83	19	19	682

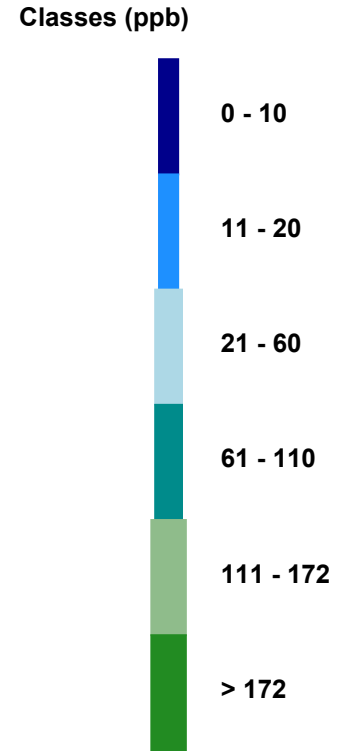
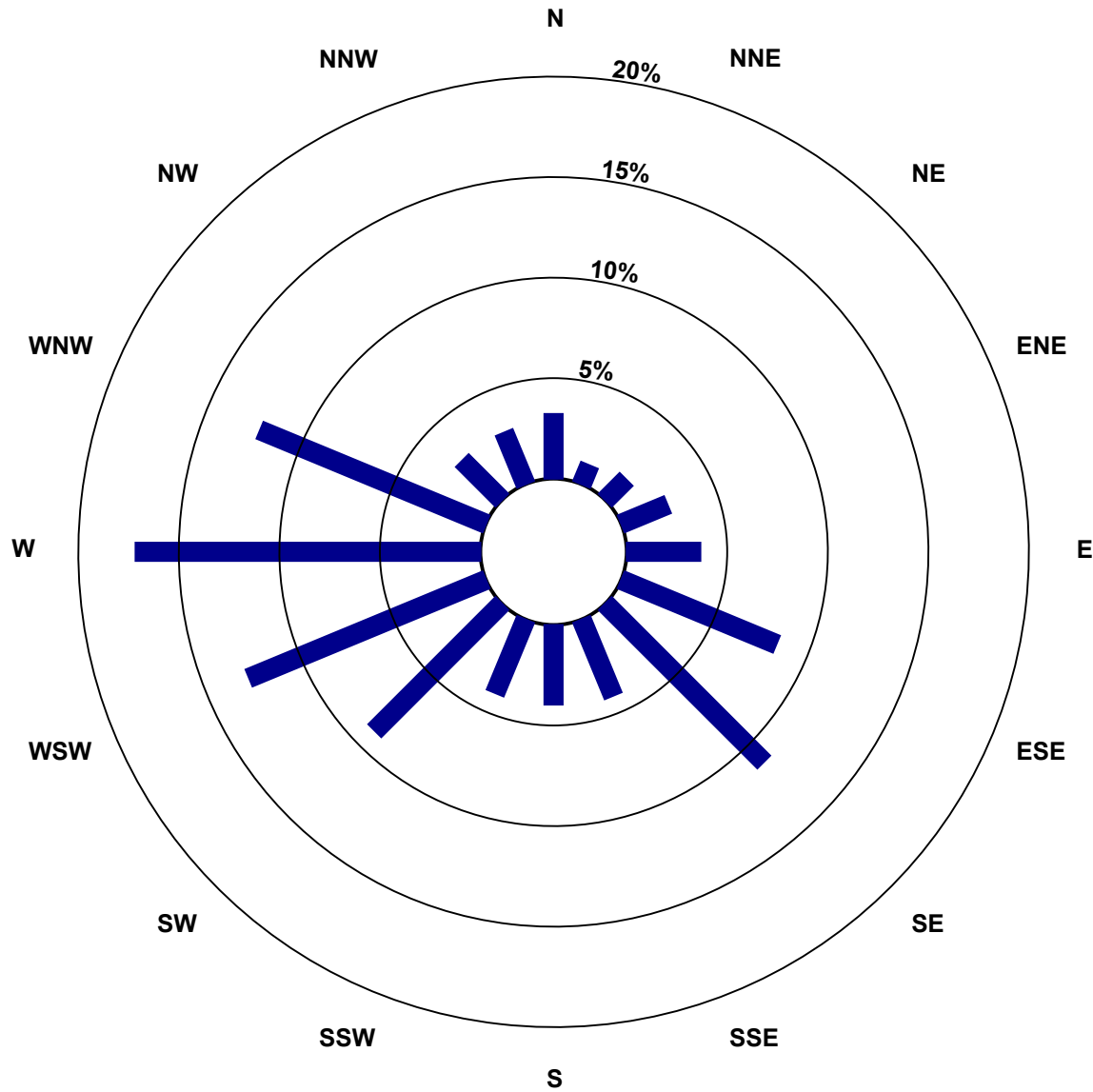
Total Number of Valid Hours: 682

Total Number of Hours: 720



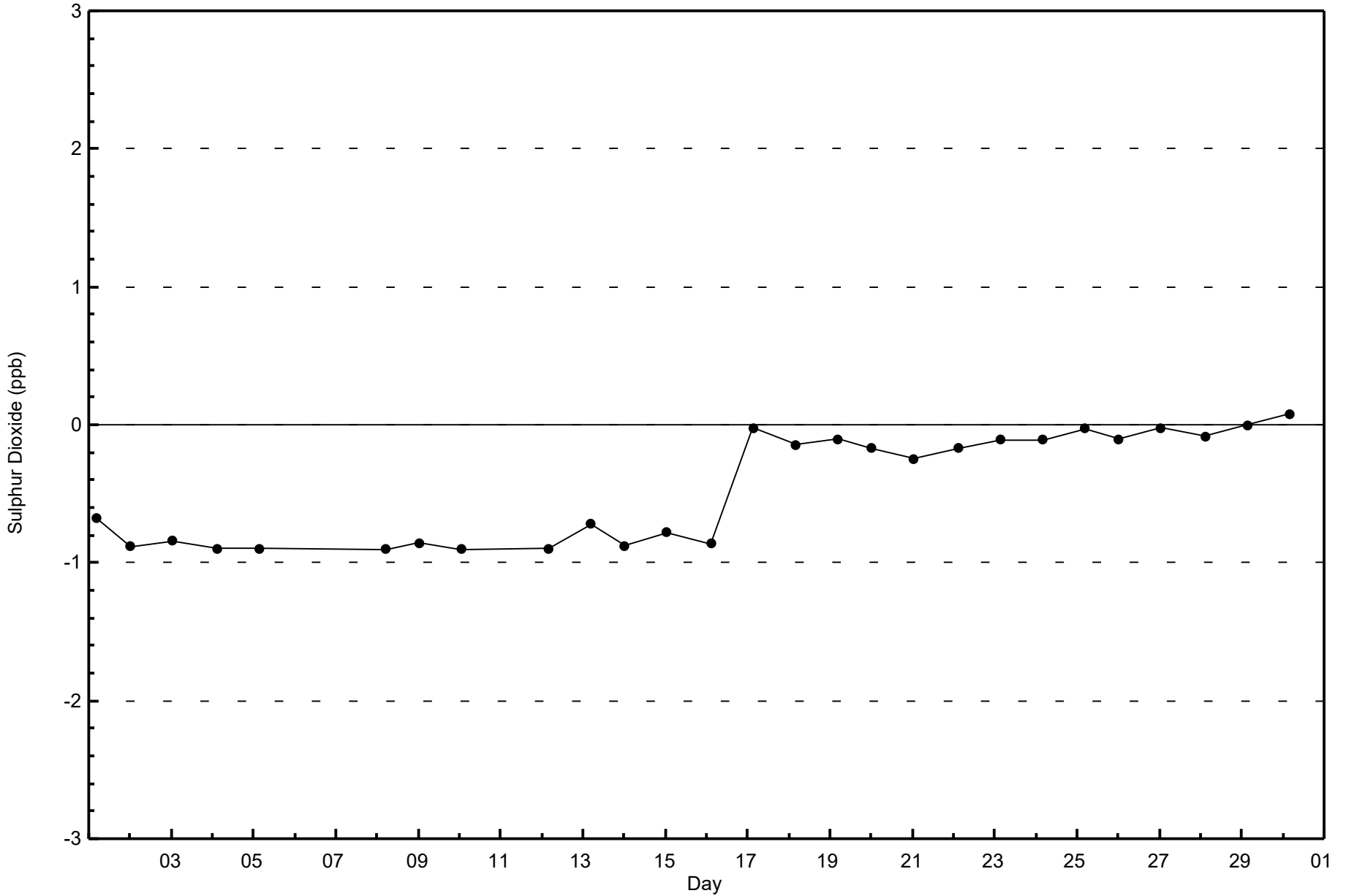
Wood Buffalo Environmental Association  
Wind Rose Nov 2023

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



Total Number of Valid Hours: 682

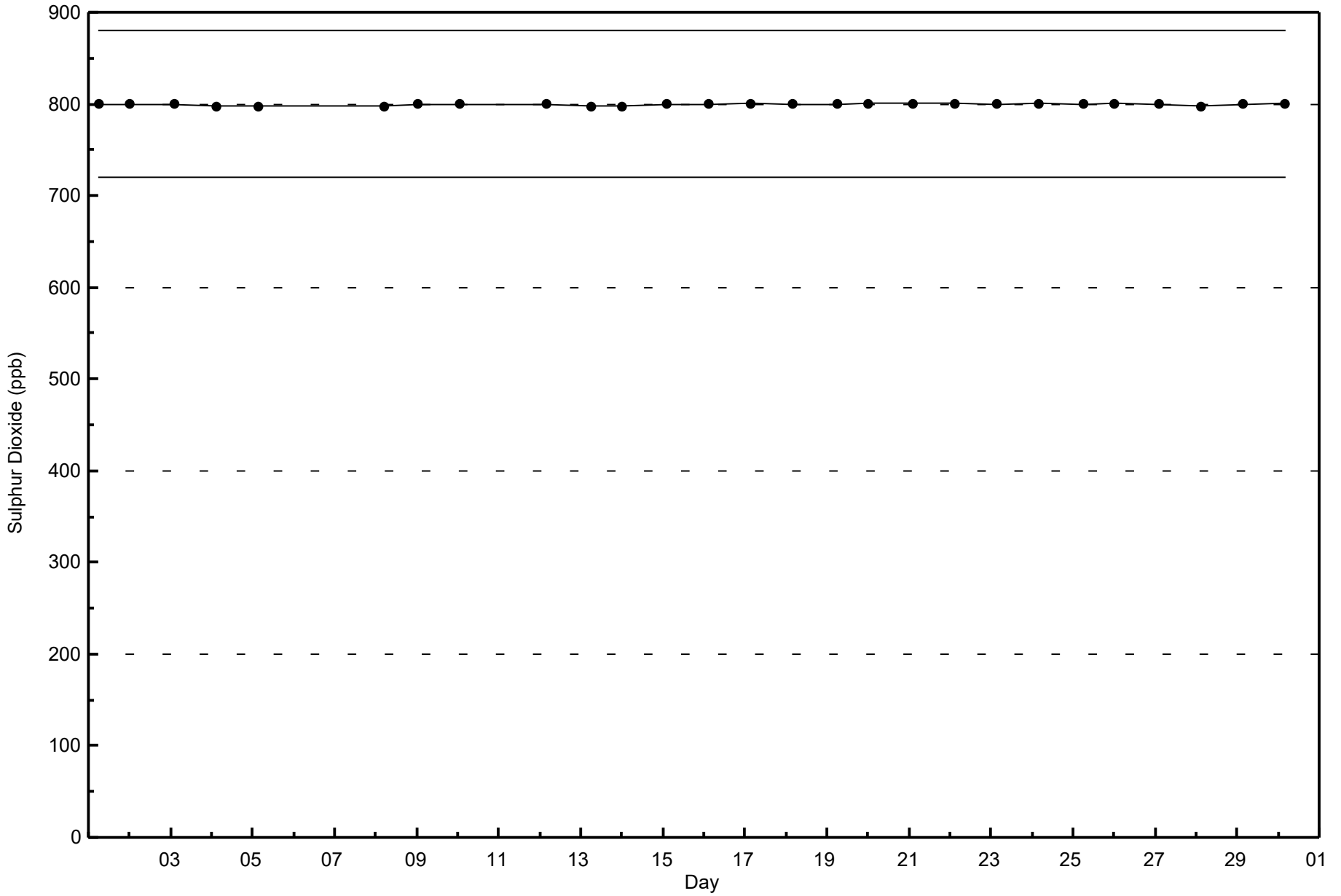






Wood Buffalo Environmental Association  
Span Responses

Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Surmont 2 - November 2023





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

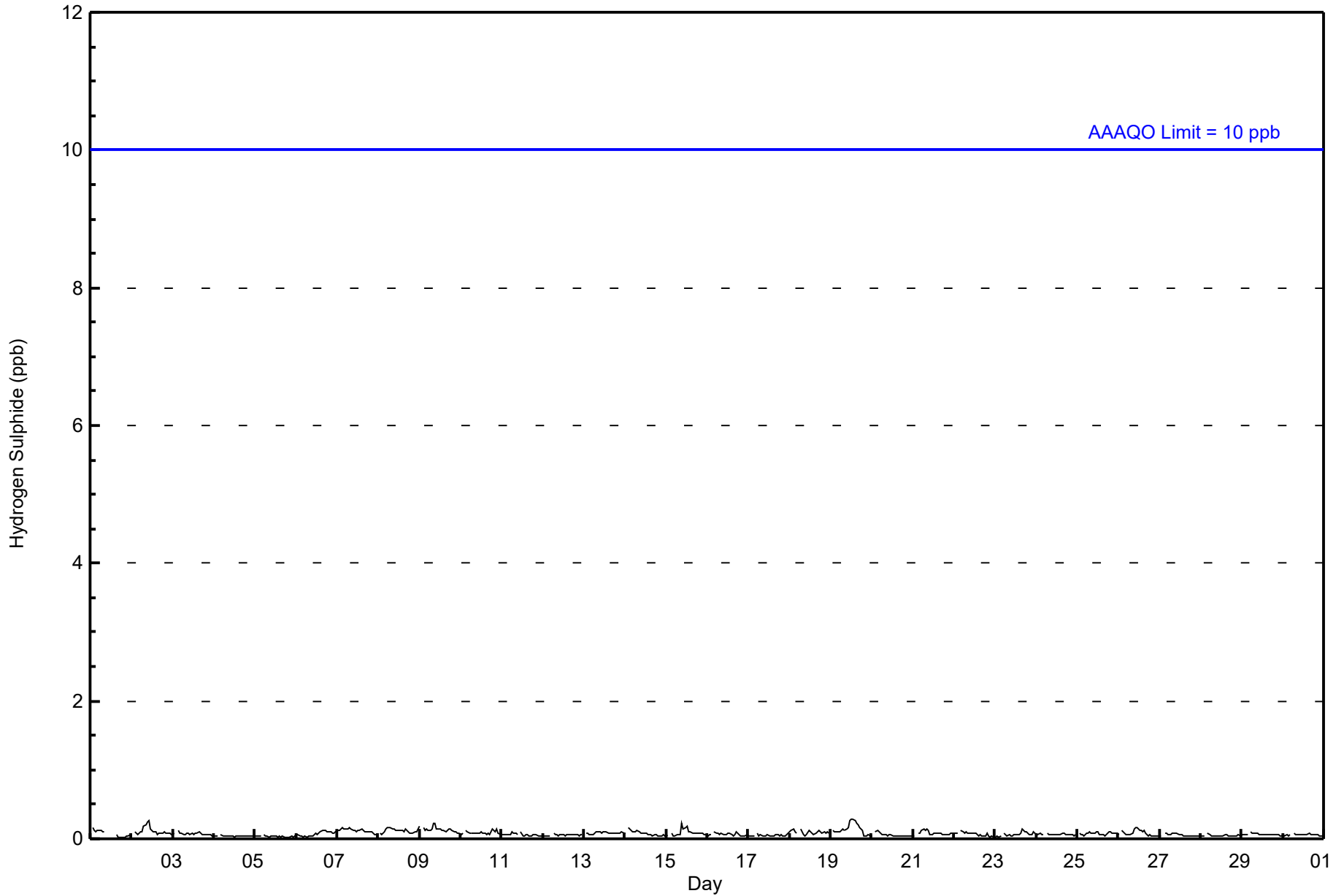
**Hydrogen Sulphide (H<sub>2</sub>S) - ppb**  
**Surmont 2 - November 2023**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 0.3 ppb on Nov 19 13:00      Maximum Daily Average: 0.1 ppb on Nov 19		Hours in Service: 720 Hours of Data: 686 Hours of Missing Data: 34 Hours of Calibration: 33 Percent Operational Time: 99.9																									
Minimum Value: 0.0 ppb on Nov 5 18:00 Maximum Diurnal Average: 0.1 ppb at hour 10 Monthly Average: 0.08 ppb		Minimum Daily Average: 0.0 ppb on Nov 5 Minimum Diurnal Average: 0.1 ppb at hour 22 Percentiles: P <sub>1</sub> = 0.0 P <sub>10</sub> = 0.0 Q <sub>1</sub> = 0.0 Median = 0.1 Q <sub>3</sub> = 0.1 P <sub>90</sub> = 0.1 P <sub>99</sub> = 0.2																									
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Nov	Z	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	C	C	C	C	C	C	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	--	0.2	
2-Nov	0.1	Z	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.3	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.3
3-Nov	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
4-Nov	0.0	0.0	0.0	Z	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
5-Nov	0.0	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	0.0	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-Nov	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	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
7-Nov	0.1	0.1	0.1	0.2	0.2	0.1	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2
8-Nov	Z	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	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2
9-Nov	0.2	Z	0.2	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2
10-Nov	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
11-Nov	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	M	0.1	0.0	0.0	0.1	0.1	0.0	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.1	0.1	0.1
12-Nov	0.1	0.0	0.0	0.0	0.0	Z	0.1	0.1	0.1	0.0	0.1	0.1	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.1	0.1	0.1	0.1
13-Nov	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
14-Nov	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	0.0	0.0	0.0	0.1	0.0	0.0	0.2
15-Nov	0.1	0.0	Z	0.1	0.0	0.0	0.1	0.1	0.1	0.2	0.1	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2
16-Nov	0.0	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	0.0	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.1	0.1	0.1
17-Nov	0.0	0.0	0.0	0.0	Z	0.1	0.0	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.1	0.0	0.0	0.0	0.1	0.1	0.1	0.1
18-Nov	0.1	0.1	0.1	0.1	0.1	Z	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
19-Nov	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.3
20-Nov	0.0	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
21-Nov	0.0	0.0	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
22-Nov	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	0.0	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1
23-Nov	0.0	0.0	0.0	0.0	Z	0.1	0.1	0.0	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
24-Nov	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	0.0	0.1	0.1	0.1
25-Nov	Z	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	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
26-Nov	0.1	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
27-Nov	0.0	0.0	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
28-Nov	0.0	0.0	0.0	Z	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.1
29-Nov	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	0.0	0.0	0.0	0.1
30-Nov	0.1	0.0	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	0.0	0.0	0.0	0.0	0.1
																								Diurnal Average			
																								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**  
**Hourly Averages**

**Hydrogen Sulphide (H<sub>2</sub>S) - ppb**  
**Surmont 2 - November 2023**





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

**Hydrogen Sulphide (H<sub>2</sub>S) - ppb**  
**Surmont 2 - November 2023**

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

Total Number of Valid Hours: 686

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Hydrogen Sulphide (H<sub>2</sub>S) - ppb  
Surmont 2 - November 2023**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	22	7	10	18	27	55	75	30	28	25	58	89	118	81	21	19	683
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	22	7	10	18	27	55	75	30	28	25	58	89	118	81	21	19	683

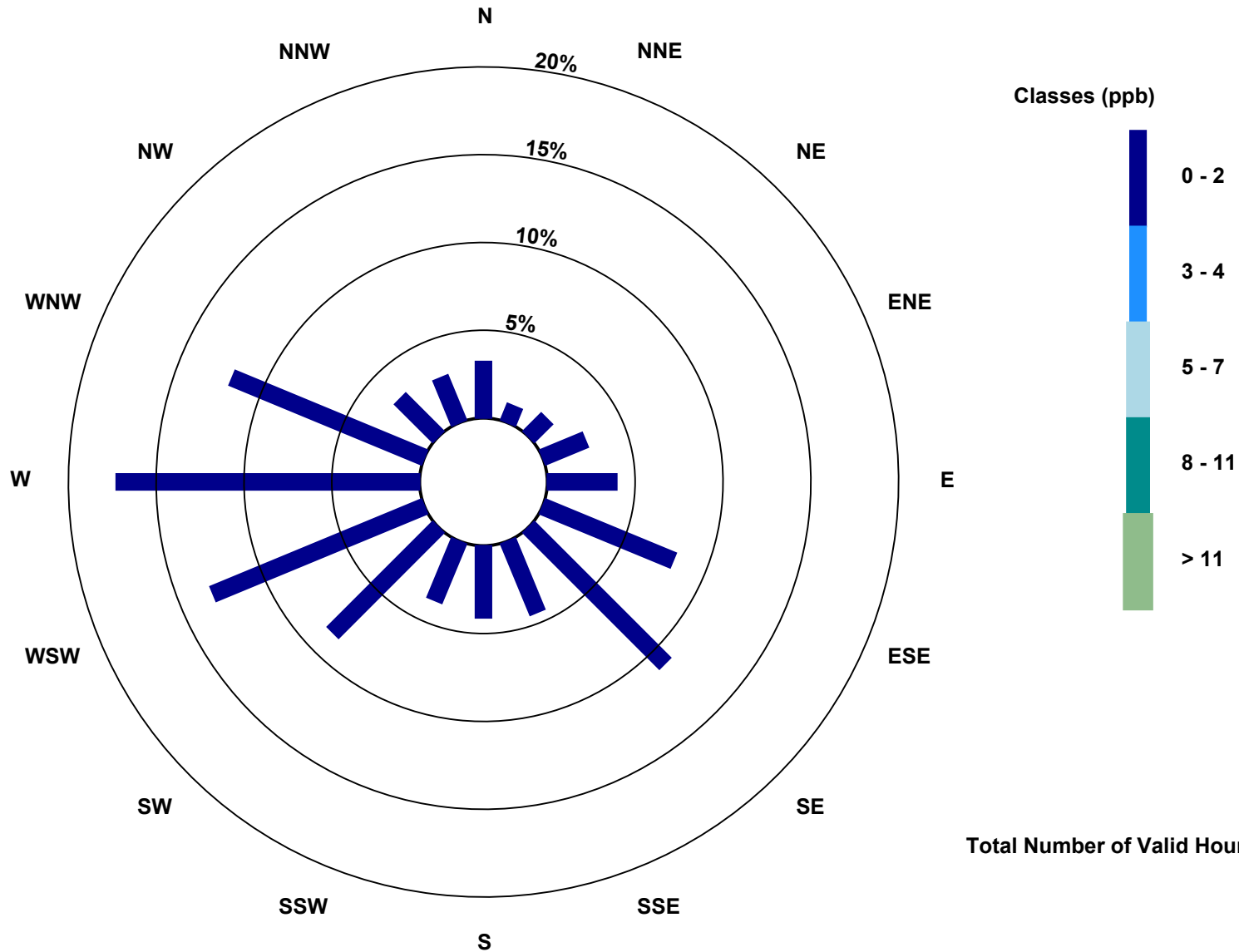
Total Number of Valid Hours: 683

Total Number of Hours: 720

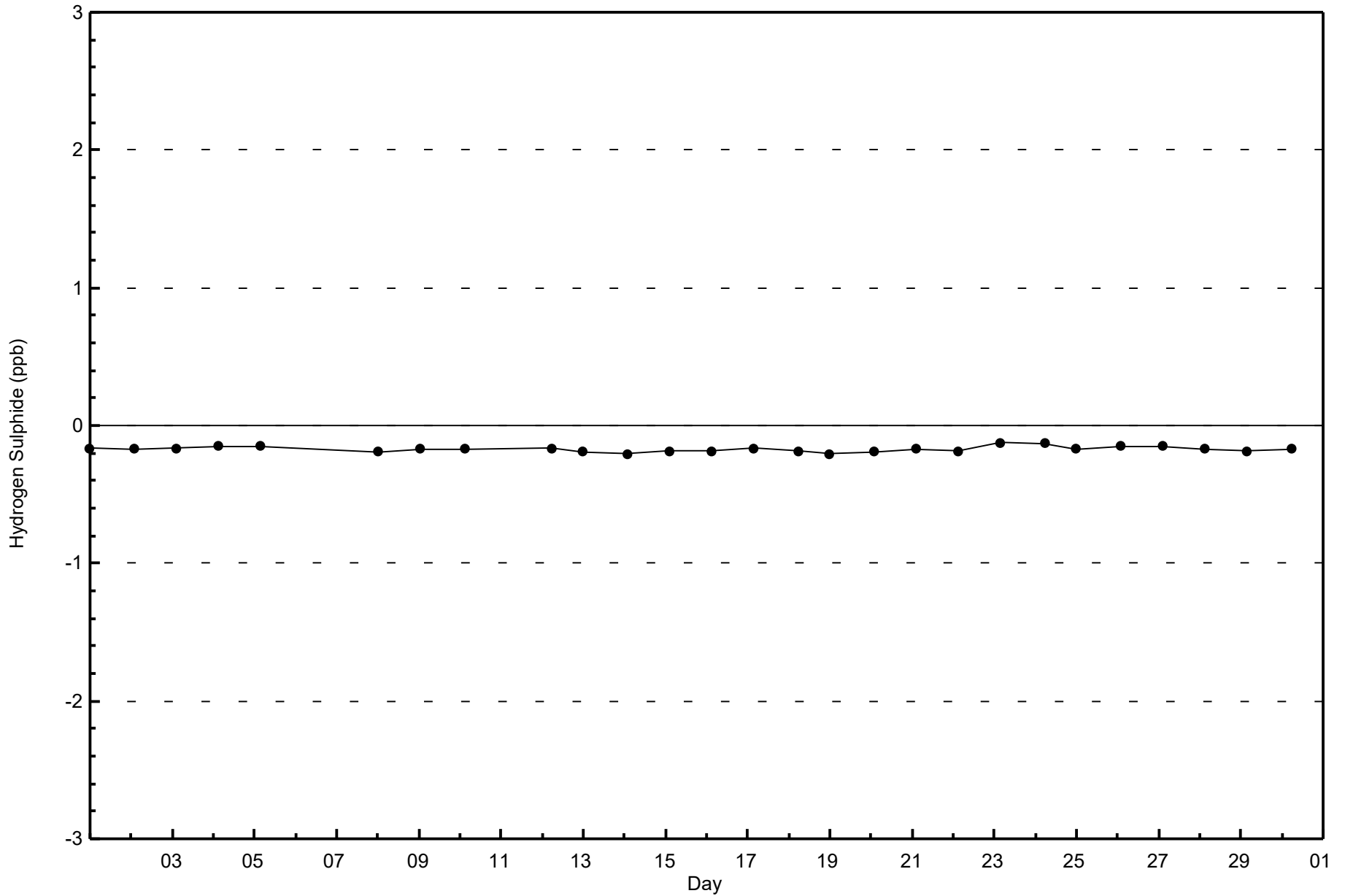


Wood Buffalo Environmental Association  
Wind Rose Nov 2023

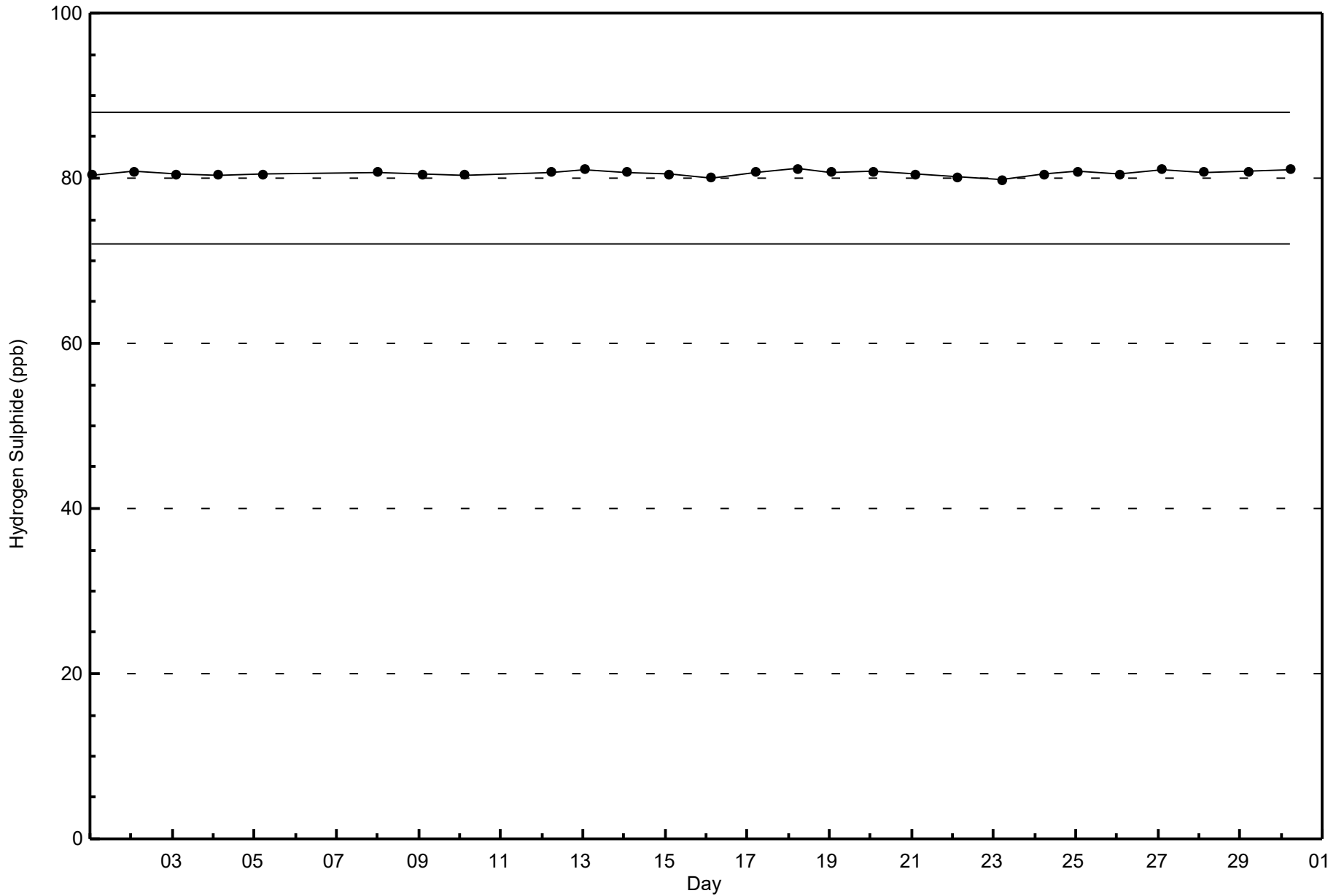
Hydrogen Sulphide (H<sub>2</sub>S) - ppb  
Surmont 2



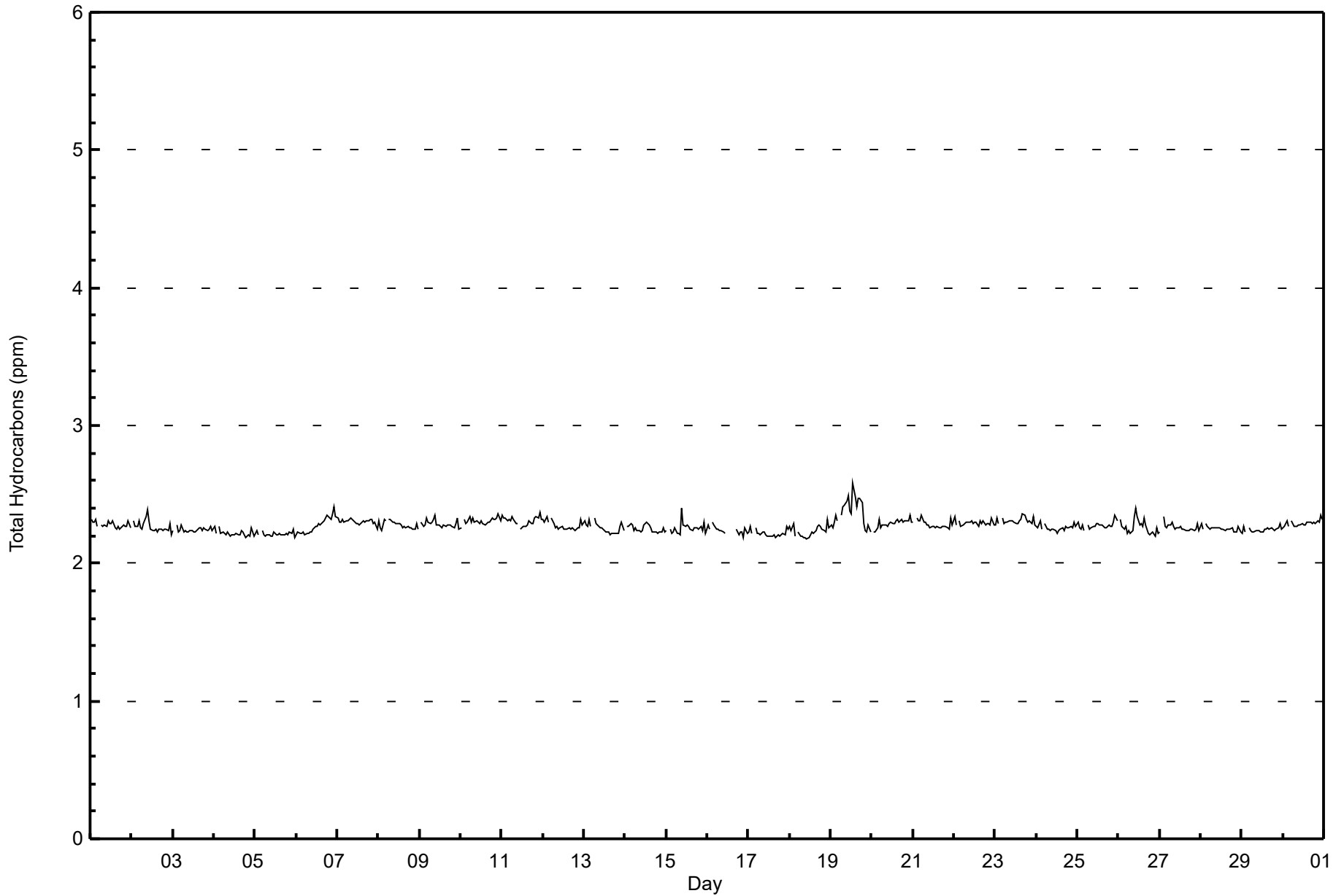
Total Number of Valid Hours: 683













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

**Total Hydrocarbons (THC) - ppm**  
**Surmont 2 - November 2023**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2.0	0	0.00	0.00
2.1 - 3.0	686	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: 686

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Total Hydrocarbons (THC) - ppm  
Surmont 2 - November 2023**

<b>Concentration Ranges (ppm)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2.1 - 3.0	22	7	10	17	25	57	76	28	27	28	61	87	117	83	19	19	683
3.1 - 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	22	7	10	17	25	57	76	28	27	28	61	87	117	83	19	19	683

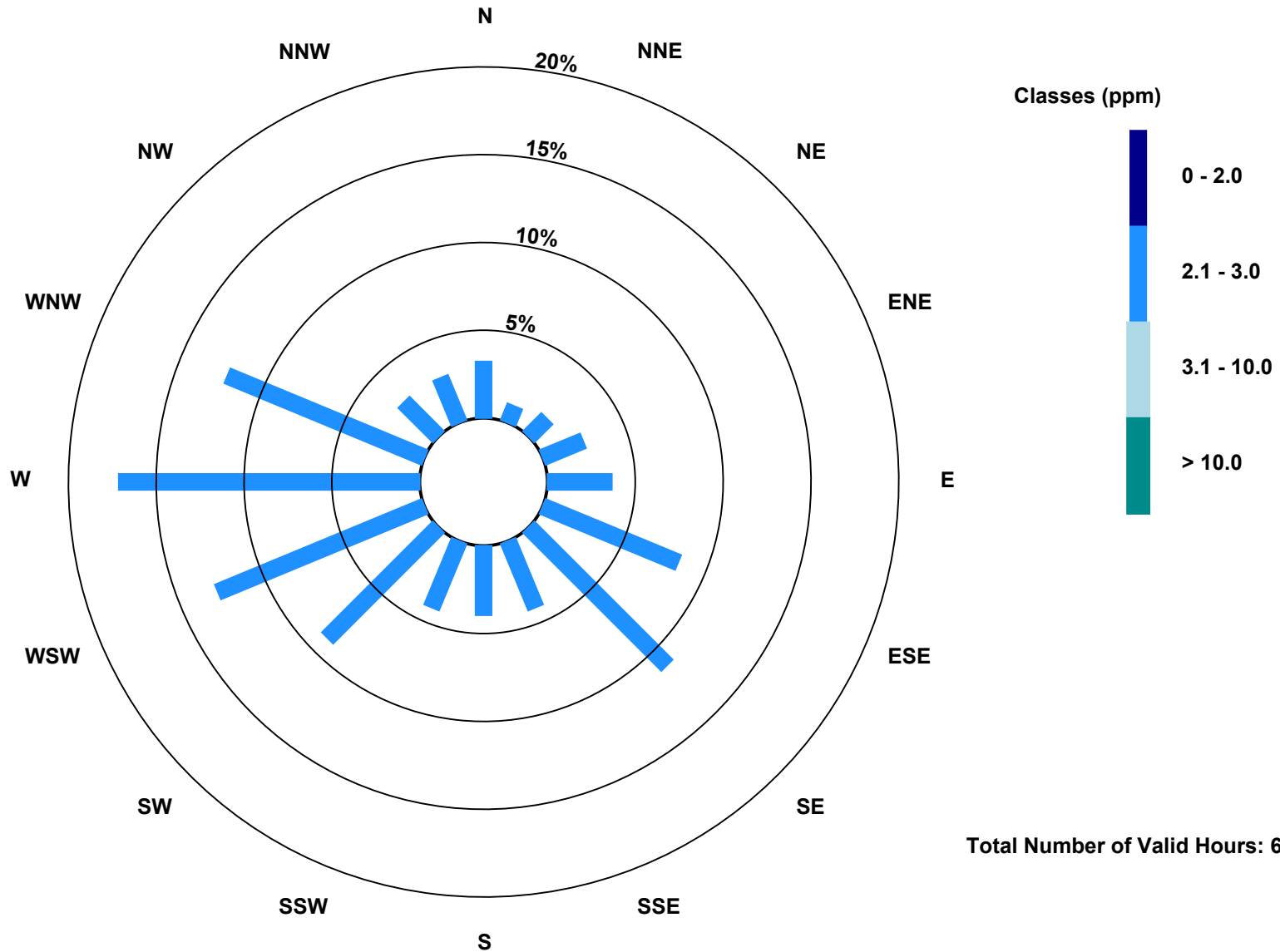
Total Number of Valid Hours: 683

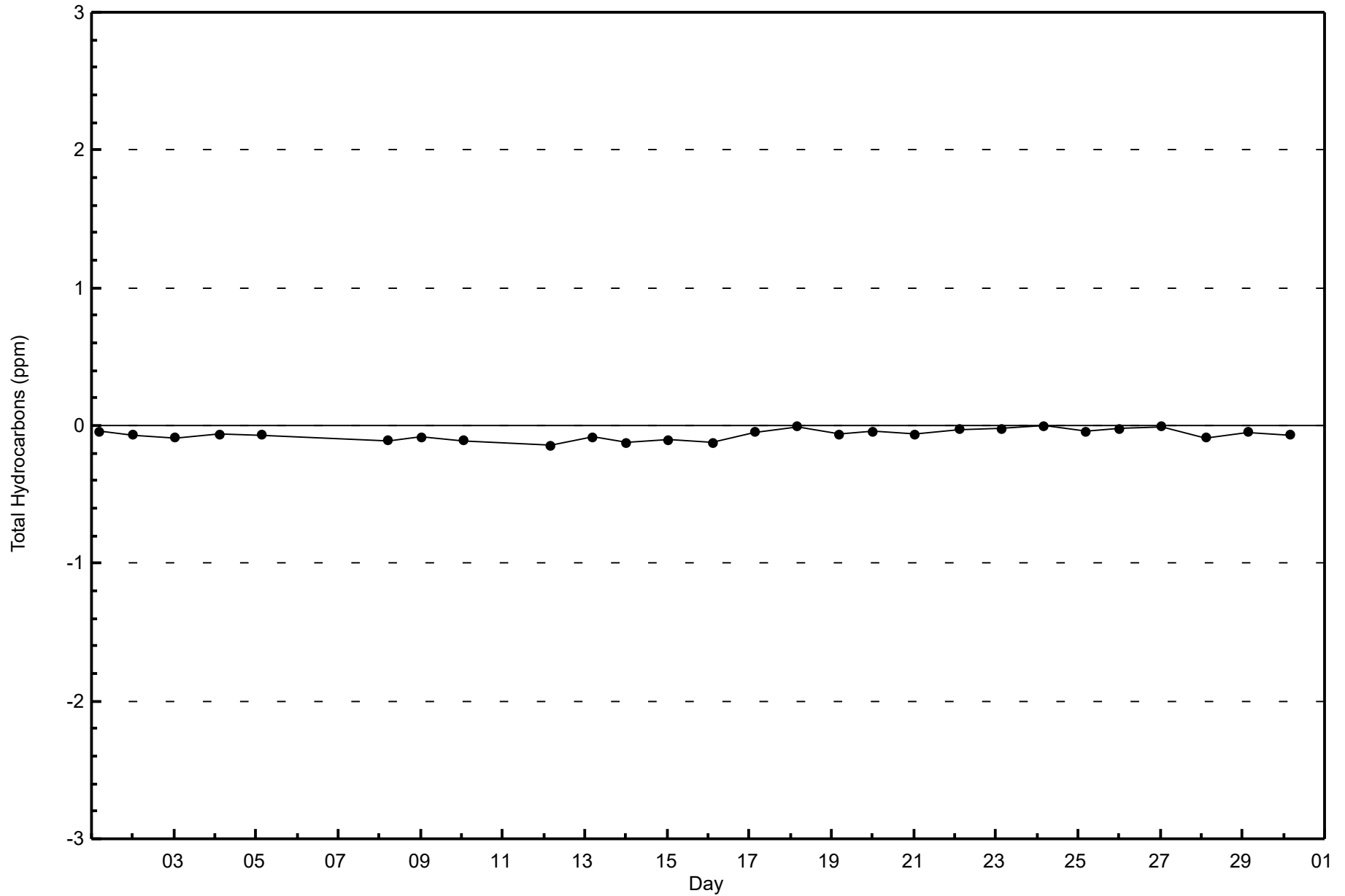
Total Number of Hours: 720

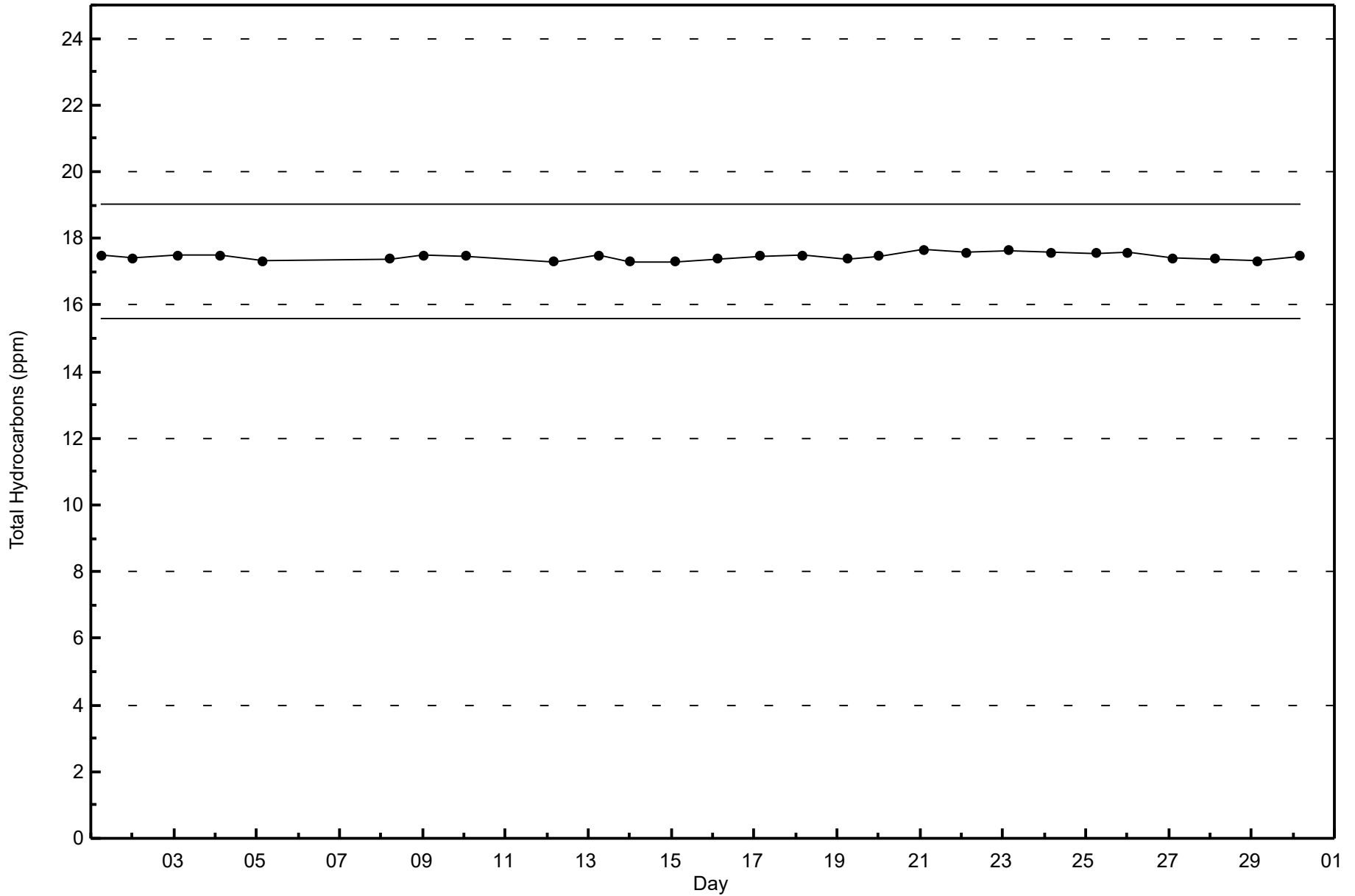


Wood Buffalo Environmental Association  
Wind Rose Nov 2023

Total Hydrocarbons (THC) - ppm  
Surmont 2











Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 2.2 ppb on Nov 19 12:00	Maximum Daily Average: 0.5 ppb on Nov 19		Hours of Data:	687
Minimum Value: 0.0 ppb on Nov 2 19:00	Minimum Daily Average: 0.0 ppb on Nov 5		Hours of Missing Data:	33
Maximum Diurnal Average: 0.4 ppb at hour 12	Minimum Diurnal Average: 0.0 ppb at hour 4		Hours of Calibration:	33
Monthly Average: 0.11 ppb	Percentiles: P <sub>1</sub> = 0.0 P <sub>10</sub> = 0.0 Q <sub>1</sub> = 0.0 Median = 0.0 Q <sub>3</sub> = 0.1 P <sub>90</sub> = 0.3 P <sub>99</sub> = 1.3		Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	0.1	0.1	0.1	Z	0.2	0.4	0.1	0.2	0.6	0.4	1.3	0.5	0.3	0.4	0.3	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	1.3
2-Nov	0.0	0.0	0.0	0.0	Z	0.1	0.1	0.1	0.3	0.6	0.3	0.2	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.6
3-Nov	0.0	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.1	0.2	0.3	0.4	0.5	0.2	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.5	0.0
4-Nov	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5-Nov	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	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	0.1
6-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.5	0.6	0.7	0.7	0.6	0.3	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.7
7-Nov	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.1	0.3	0.2	0.2	0.1	0.1	0.1	0.1	0.0	0.1	0.0	0.0	0.0	0.1	0.3
8-Nov	0.1	0.0	0.0	Z	0.0	0.1	0.0	0.1	0.1	0.2	0.1	0.1	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.2
9-Nov	0.1	0.0	0.0	0.0	Z	0.0	0.1	0.1	1.4	1.7	0.6	0.7	0.5	0.5	0.4	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.3	1.7	
10-Nov	0.0	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.1	0.3	0.4	0.5	0.7	0.4	0.3	0.2	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.2	0.7	
11-Nov	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	
12-Nov	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.0	0.1	
13-Nov	0.0	0.0	0.0	Z	0.1	0.1	0.1	0.0	0.1	0.1	0.2	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	0.2	
14-Nov	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.1	0.1	0.2	0.4	C	C	C	C	C	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.1	0.4	
15-Nov	0.0	0.0	0.0	0.0	0.0	Z	0.1	0.0	0.0	1.4	0.5	0.9	0.8	0.3	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.2	1.4	
16-Nov	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.3	0.4	0.4	0.5	0.2	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.5	
17-Nov	0.0	Z	0.1	0.1	0.1	0.1	0.1	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	0.1	0.0	0.1	0.2	
18-Nov	0.0	0.0	Z	0.1	0.0	0.0	0.0	0.0	0.1	0.1	0.2	1.0	0.3	0.4	0.3	0.1	0.1	0.1	0.0	0.1	0.0	0.1	0.0	0.1	1.0	
19-Nov	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.1	0.4	0.6	1.4	2.2	1.8	1.3	1.3	0.5	0.2	0.1	0.1	0.0	0.0	0.1	0.0	0.5	2.2	
20-Nov	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	
21-Nov	0.0	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.1	0.2	0.2	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	
22-Nov	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.2	0.3	0.3	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.3	
23-Nov	0.0	Z	0.1	0.0	0.1	0.0	0.0	0.1	0.1	0.2	0.3	0.3	0.4	0.3	0.3	0.2	0.1	0.0	0.1	0.1	0.0	0.0	0.0	0.1	0.4	
24-Nov	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.0	0.0	0.1	0.2	
25-Nov	0.0	0.1	0.0	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.3	0.3	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.3	
26-Nov	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.3	0.6	0.8	0.6	0.5	0.2	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.2	0.8	
27-Nov	0.0	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.1	0.1	0.2	0.2	0.3	0.2	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.3	
28-Nov	Z	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	
29-Nov	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.1	
30-Nov	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	

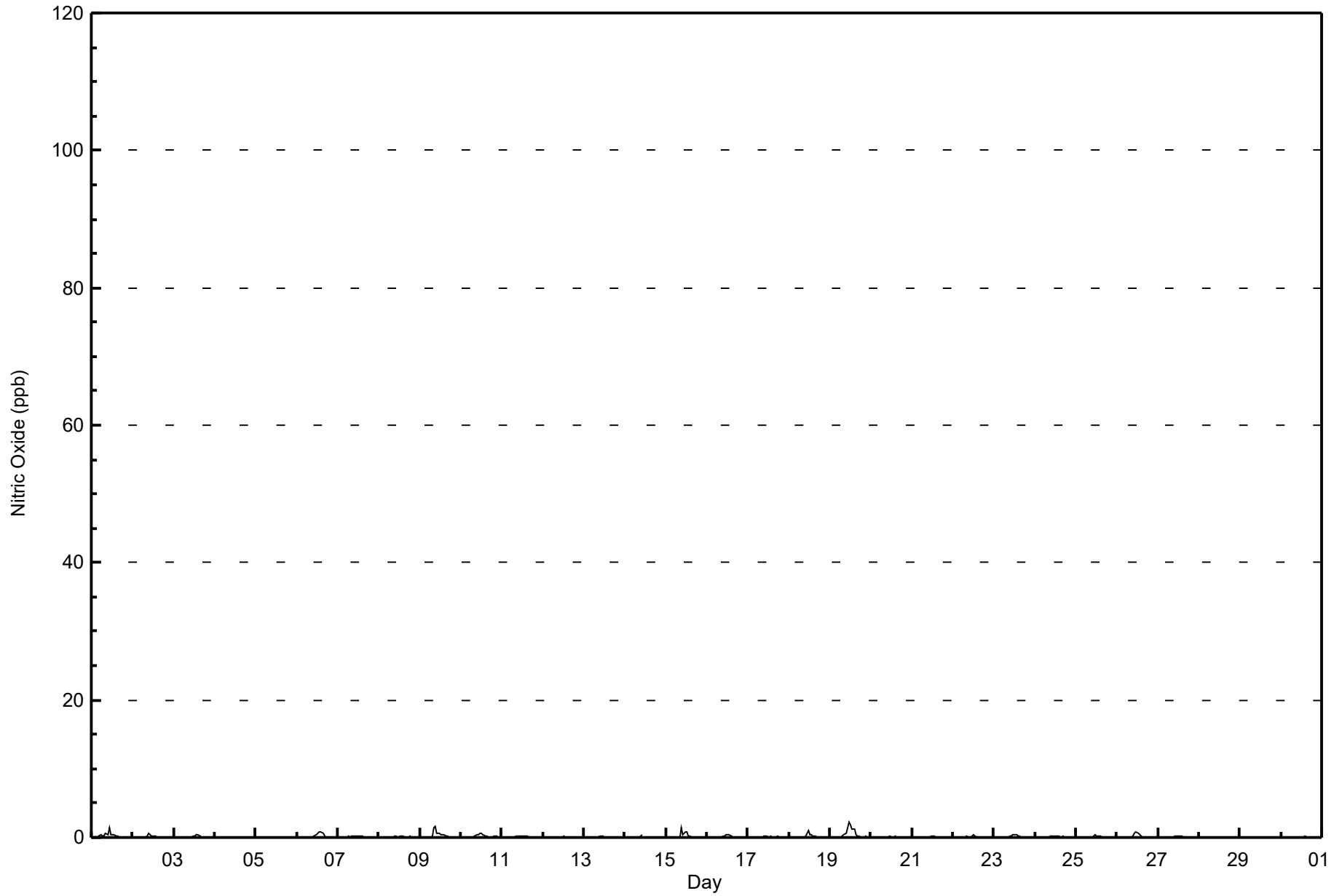
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.3	0.4	0.3	0.3	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Diurnal Average
0.1	0.1	0.1	0.1	0.2	0.4	0.1	0.2	1.4	1.7	1.4	2.2	1.8	1.3	1.3	0.6	0.3	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	Diurnal Maximum

Z - zerospan      C - Calibration



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

**Nitric Oxide (NO) - ppb**  
**Surmont 2 - November 2023**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Nitric Oxide (NO) - ppb  
Surmont 2 - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	687	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: 687

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitric Oxide (NO) - ppb  
Surmont 2 - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 20	22	6	10	18	26	56	78	30	29	29	58	82	118	82	22	19	685
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	22	6	10	18	26	56	78	30	29	29	58	82	118	82	22	19	685

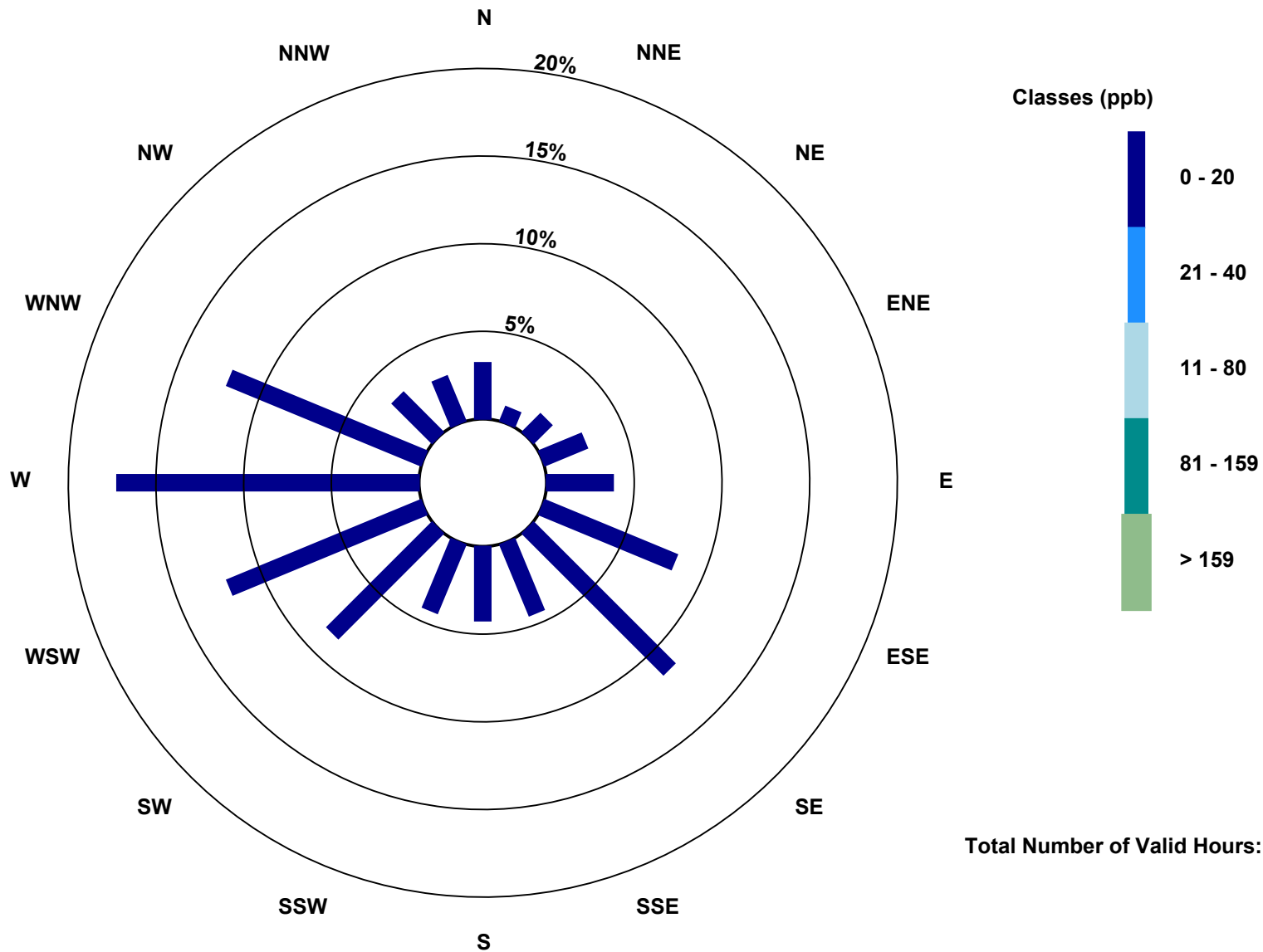
Total Number of Valid Hours: 685

Total Number of Hours: 720

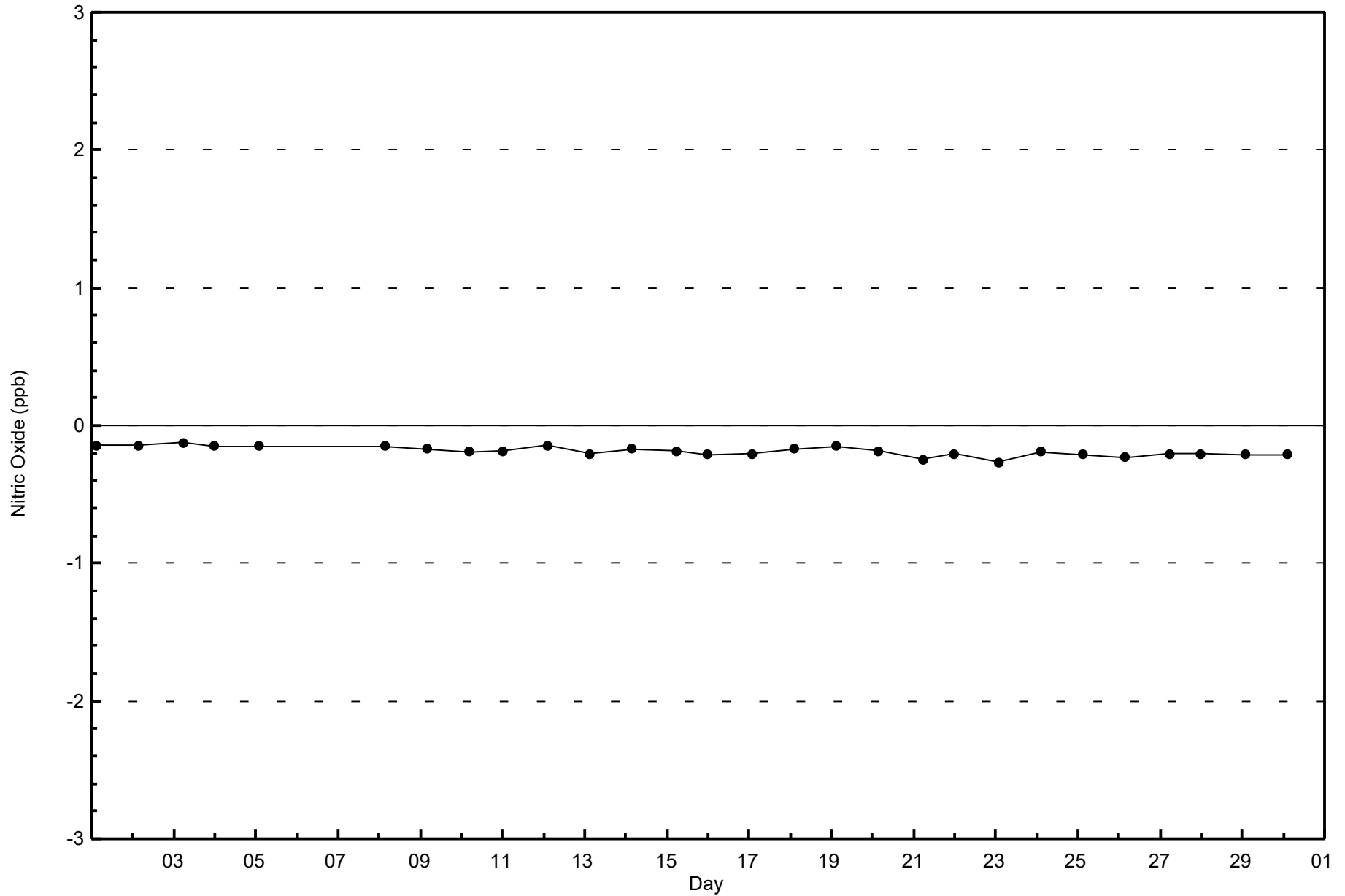


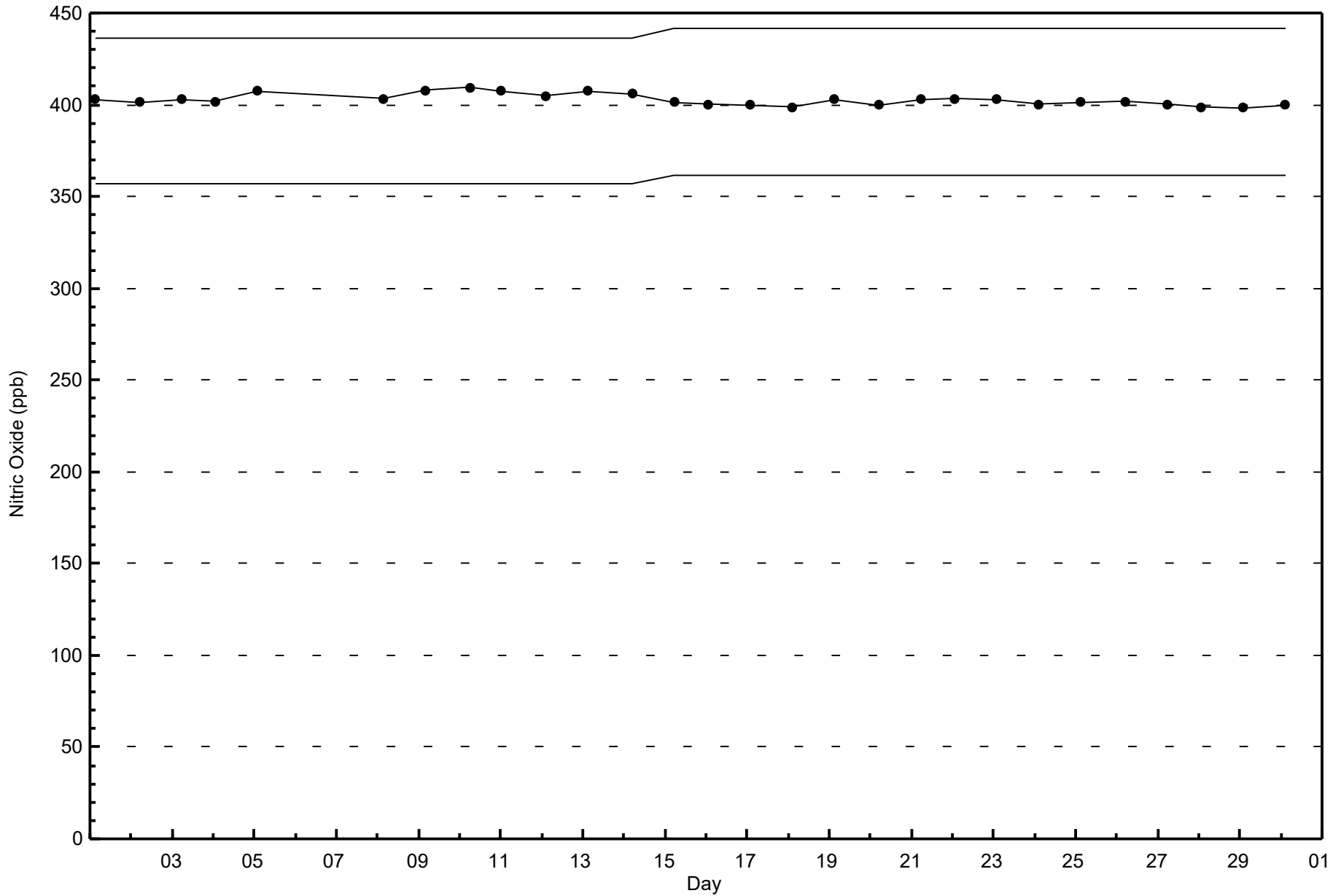
Wood Buffalo Environmental Association  
Wind Rose Nov 2023

Nitric Oxide (NO) - ppb  
Surmont 2



Total Number of Valid Hours: 685







# Wood Buffalo Environmental Association

## Summary of Hour Averages

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

## Surmont 2 - November 2023

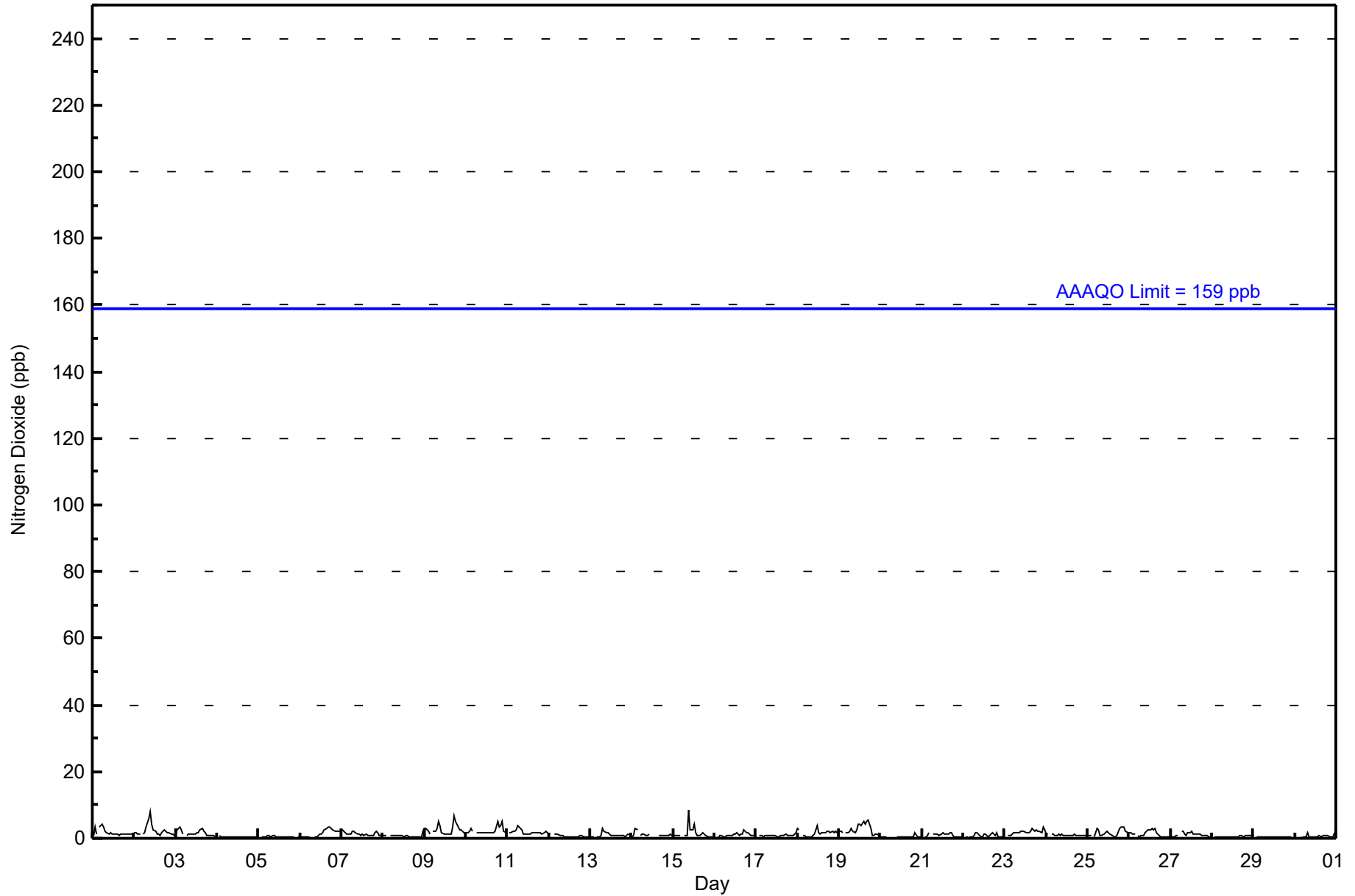
Number of Exceedences (AAAQO):		1-hr: 0		24-hr: 0		Hours in Service:		720																																									
Maximum Value: 8.6 ppb on Nov 15 10:00		Maximum Daily Average: 2.7 ppb on Nov 9		Minimum Value: 0.2 ppb on Nov 20 09:00		Minimum Daily Average: 0.4 ppb on Nov 29		Hours of Data: 687																																									
Maximum Diurnal Average: 1.6 ppb at hour 18		Minimum Diurnal Average: 1.0 ppb at hour 5		Hours of Missing Data: 33		Hours of Calibration: 33		Percent Operational Time: 100.0																																									
Monthly Average: 1.27 ppb		Percentiles: P <sub>1</sub> = 0.2 P <sub>10</sub> = 0.4 Q <sub>1</sub> = 0.6 Median = 1.0 Q <sub>3</sub> = 1.6 P <sub>90</sub> = 2.5 P <sub>99</sub> = 5.0																																															
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Nov	1.0	3.4	1.1	Z	3.2	4.4	3.4	2.3	1.5	1.1	1.5	1.4	1.2	1.3	1.2	1.0	1.1	1.2	1.3	1.2	1.1	1.3	1.2	1.4	1.7	4.4																							
2-Nov	1.5	1.5	1.3	1.4	Z	1.4	1.6	3.5	6.0	8.0	4.3	2.4	2.3	1.4	1.2	1.0	1.6	2.6	2.1	1.7	1.5	1.4	1.1	1.0	2.3	8.0																							
3-Nov	1.0	2.4	3.3	2.5	1.3	Z	1.0	1.1	1.3	1.2	1.4	1.4	1.5	1.8	2.4	3.1	2.2	1.6	1.0	1.0	0.9	0.9	0.7	0.6	1.5	3.3																							
4-Nov	Z	0.9	0.6	0.4	0.4	0.5	0.6	0.4	0.5	0.5	0.5	0.4	0.4	0.5	0.6	0.6	0.5	0.6	0.6	0.4	0.4	0.4	0.6	0.6	0.5	0.9																							
5-Nov	0.5	Z	0.5	0.5	0.6	0.7	0.9	0.6	0.7	0.7	0.6	0.5	0.6	0.5	0.6	0.5	0.6	0.5	0.5	0.5	0.3	0.2	0.2	0.3	0.5	0.9																							
6-Nov	0.4	0.4	0.3	0.3	0.3	0.5	0.2	0.2	0.2	0.3	0.6	1.2	1.3	1.8	2.5	3.1	3.4	3.5	3.0	2.4	2.1	2.3	2.2	2.1	1.4	3.5																							
7-Nov	2.5	2.2	1.9	1.4	1.4	1.4	2.0	2.1	1.8	1.3	1.1	0.9	1.3	0.9	1.4	1.0	0.9	0.8	1.0	1.9	2.0	1.5	1.0	1.0	1.4	2.5																							
8-Nov	1.0	0.7	0.8	Z	1.0	0.9	1.0	0.9	0.8	0.8	0.7	0.7	0.6	0.9	0.7	0.6	0.5	0.4	0.6	0.6	0.4	0.5	0.6	2.2	0.8	2.2																							
9-Nov	3.1	3.1	2.0	1.3	Z	2.0	2.1	2.8	4.9	3.8	1.5	1.4	1.1	1.1	1.1	1.1	3.6	6.9	5.2	4.2	2.7	2.4	2.0	1.7	2.7	6.9																							
10-Nov	1.5	1.8	2.0	2.8	2.3	Z	1.9	1.8	1.7	1.6	1.6	1.7	1.7	1.5	1.5	1.7	1.8	2.0	5.0	3.3	3.9	5.1	2.2	1.7	2.3	5.1																							
11-Nov	Z	1.9	1.9	2.0	2.1	2.7	4.0	3.4	2.5	1.4	1.4	1.2	1.3	1.3	1.6	1.6	1.6	1.6	1.6	1.7	1.3	1.8	2.1	1.6	1.9	4.0																							
12-Nov	1.4	1.2	Z	1.2	1.1	1.2	1.0	0.8	0.8	0.6	0.6	0.5	0.6	0.4	0.6	0.5	0.6	0.6	0.9	0.9	0.5	0.6	0.3	0.4	0.8	1.4																							
13-Nov	0.4	0.4	0.4	Z	0.5	0.5	0.9	2.9	2.2	1.8	1.5	1.1	0.9	0.8	0.9	0.9	1.0	1.0	1.0	0.8	0.5	0.7	1.2	0.8	1.0	2.9																							
14-Nov	0.5	1.0	2.9	2.7	Z	1.0	1.3	1.3	0.8	0.9	1.2	C	C	C	C	C	1.0	0.8	0.7	1.0	0.7	0.7	1.1	1.0	1.1	2.9																							
15-Nov	0.8	0.8	0.9	0.9	0.9	Z	0.8	0.7	0.7	8.6	2.5	2.5	4.2	1.8	0.8	0.7	1.2	1.6	1.2	1.0	0.6	0.4	0.4	0.3	1.5	8.6																							
16-Nov	Z	0.3	0.2	0.7	0.7	0.5	0.6	0.9	0.8	0.9	1.0	1.3	1.4	1.7	1.0	1.1	1.3	2.6	1.5	1.5	1.4	0.9	0.7	0.7	1.0	2.6																							
17-Nov	0.7	Z	0.7	0.7	0.6	0.9	1.0	0.9	0.9	0.9	0.7	0.7	0.4	0.6	0.7	0.7	0.8	1.4	0.8	0.8	0.8	0.7	1.2	1.7	0.8	1.7																							
18-Nov	3.1	2.6	Z	0.9	0.7	0.5	0.6	0.4	0.5	0.9	1.3	3.9	1.6	1.4	1.6	1.7	1.8	2.2	2.1	1.8	2.1	1.7	2.0	1.9	1.6	3.9																							
19-Nov	2.1	2.1	1.9	Z	1.6	1.7	2.2	3.1	2.1	1.6	2.5	4.1	4.1	3.9	5.0	4.4	5.0	5.5	3.1	0.9	0.9	1.2	1.1	0.8	2.6	5.5																							
20-Nov	0.6	0.4	0.4	0.3	Z	0.2	0.2	0.2	0.2	0.2	0.3	0.4	0.3	0.3	0.4	0.4	0.6	0.5	0.3	0.3	1.8	0.3	0.3	0.3	0.4	1.8																							
21-Nov	0.2	0.2	0.3	0.8	1.7	Z	1.2	1.1	1.3	1.1	0.8	1.4	1.6	1.3	1.3	1.4	1.5	1.5	0.9	0.6	0.3	0.3	0.4	0.3	0.9	1.7																							
22-Nov	Z	0.3	0.3	0.2	0.3	0.3	0.8	1.5	1.7	0.8	0.6	0.6	1.2	1.1	0.5	0.9	1.2	1.7	1.0	1.5	0.4	0.4	0.3	0.3	0.8	1.7																							
23-Nov	0.5	Z	0.8	1.0	1.1	1.6	1.7	1.8	1.9	2.3	2.2	2.3	1.8	1.7	1.6	2.3	2.8	2.0	2.5	2.0	2.1	1.9	3.3	2.4	1.9	3.3																							
24-Nov	1.3	1.2	Z	1.2	1.1	1.0	1.0	1.1	1.0	1.2	0.9	0.8	0.9	0.9	0.9	1.0	1.3	0.9	0.7	0.8	0.7	0.7	0.8	0.8	1.0	1.3																							
25-Nov	0.9	0.7	0.8	Z	0.6	3.0	2.6	0.8	0.7	1.3	1.6	2.1	1.7	1.2	0.9	0.3	0.4	1.0	3.0	3.3	3.3	3.2	2.2	1.8	1.6	3.3																							
26-Nov	1.7	1.5	1.4	1.4	Z	0.7	0.6	0.7	0.9	1.9	2.0	2.5	2.6	3.0	2.6	2.8	1.5	0.7	0.6	0.6	0.4	0.4	0.4	0.4	1.4	3.0																							
27-Nov	0.4	0.3	0.5	0.8	0.9	Z	2.0	2.0	1.4	1.0	1.6	1.6	2.0	1.4	1.4	1.2	1.4	1.3	1.0	0.7	0.7	0.7	0.6	0.5	1.1	2.0																							
28-Nov	Z	0.5	0.6	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.4	0.5	0.5	0.5	0.5	0.6	0.7	0.7	0.6	0.7	0.8	0.8	0.8	0.8	0.6	0.8																							
29-Nov	0.7	Z	0.5	0.5	0.5	0.5	0.5	0.3	0.4	0.3	0.3	0.4	0.3	0.3	0.3	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.4	0.7																							
30-Nov	0.2	0.2	Z	0.3	0.2	0.3	0.3	1.6	0.5	0.5	0.3	0.4	0.3	0.3	0.8	0.6	1.0	0.7	0.8	0.7	0.5	0.5	0.6	1.7	0.6	1.7																							
																								1.1	1.2	1.1	1.1	1.0	1.2	1.3	1.4	1.4	1.6	1.3	1.4	1.4	1.2	1.3	1.3	1.4	1.6	1.5	1.3	1.2	1.1	1.1	1.0	Diurnal Average	
																								3.1	3.4	3.3	2.8	3.2	4.4	4.0	3.5	6.0	8.6	4.3	4.1	4.2	3.9	5.0	4.4	5.0	6.9	5.2	4.2	3.9	5.1	3.3	2.4	Diurnal Maximum	
Z - zerospan C - Calibration																																																	
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 159 ppb																																																	





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

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb**  
**Surmont 2 - November 2023**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Surmont 2 - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	687	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: 687

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Surmont 2 - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 20	22	6	10	18	26	56	78	30	29	29	58	82	118	82	22	19	685
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	22	6	10	18	26	56	78	30	29	29	58	82	118	82	22	19	685

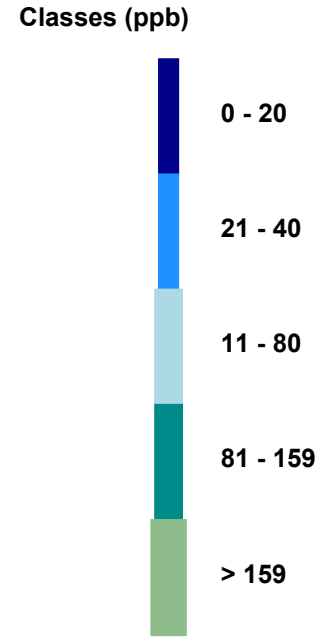
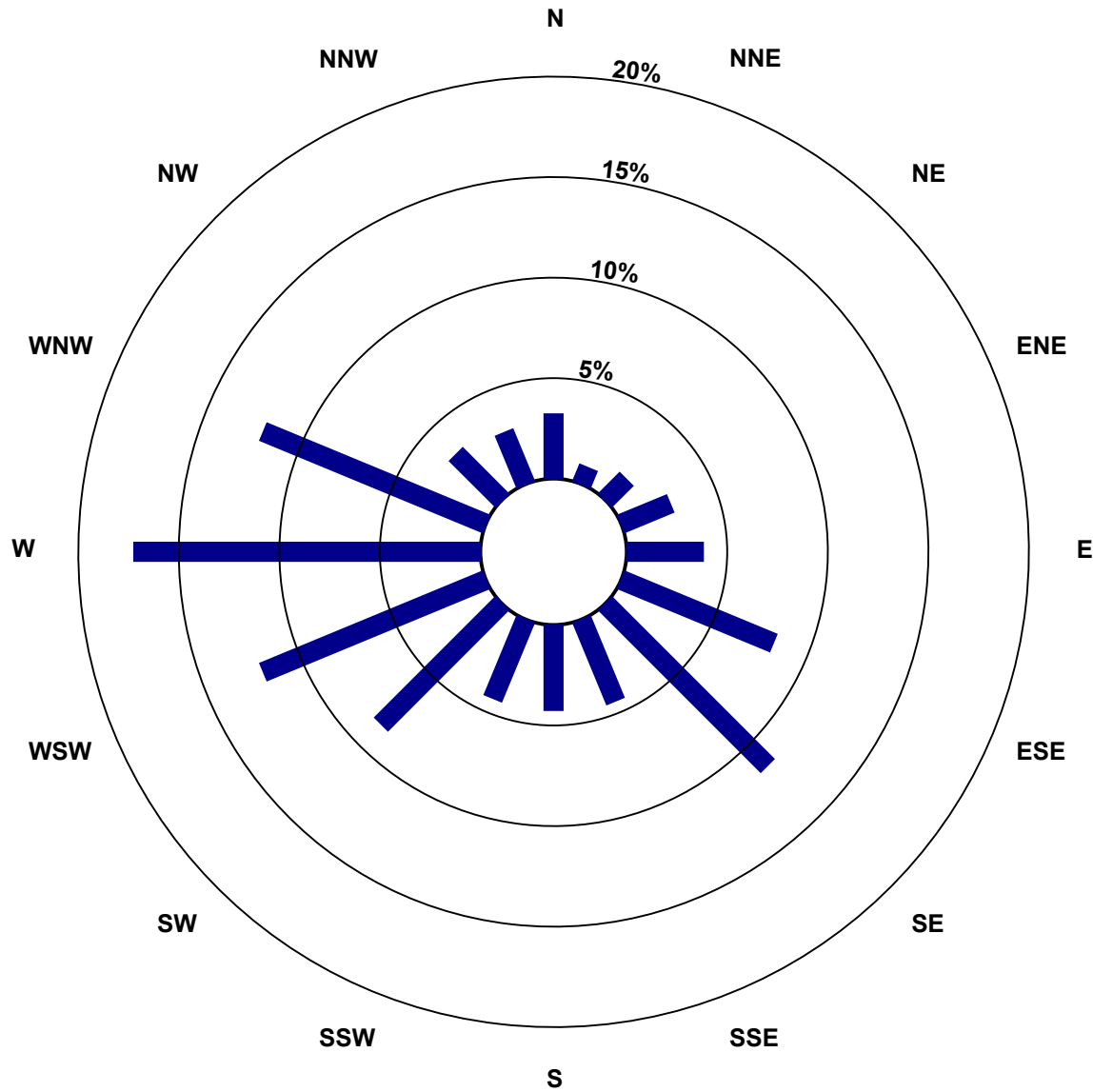
Total Number of Valid Hours: 685

Total Number of Hours: 720

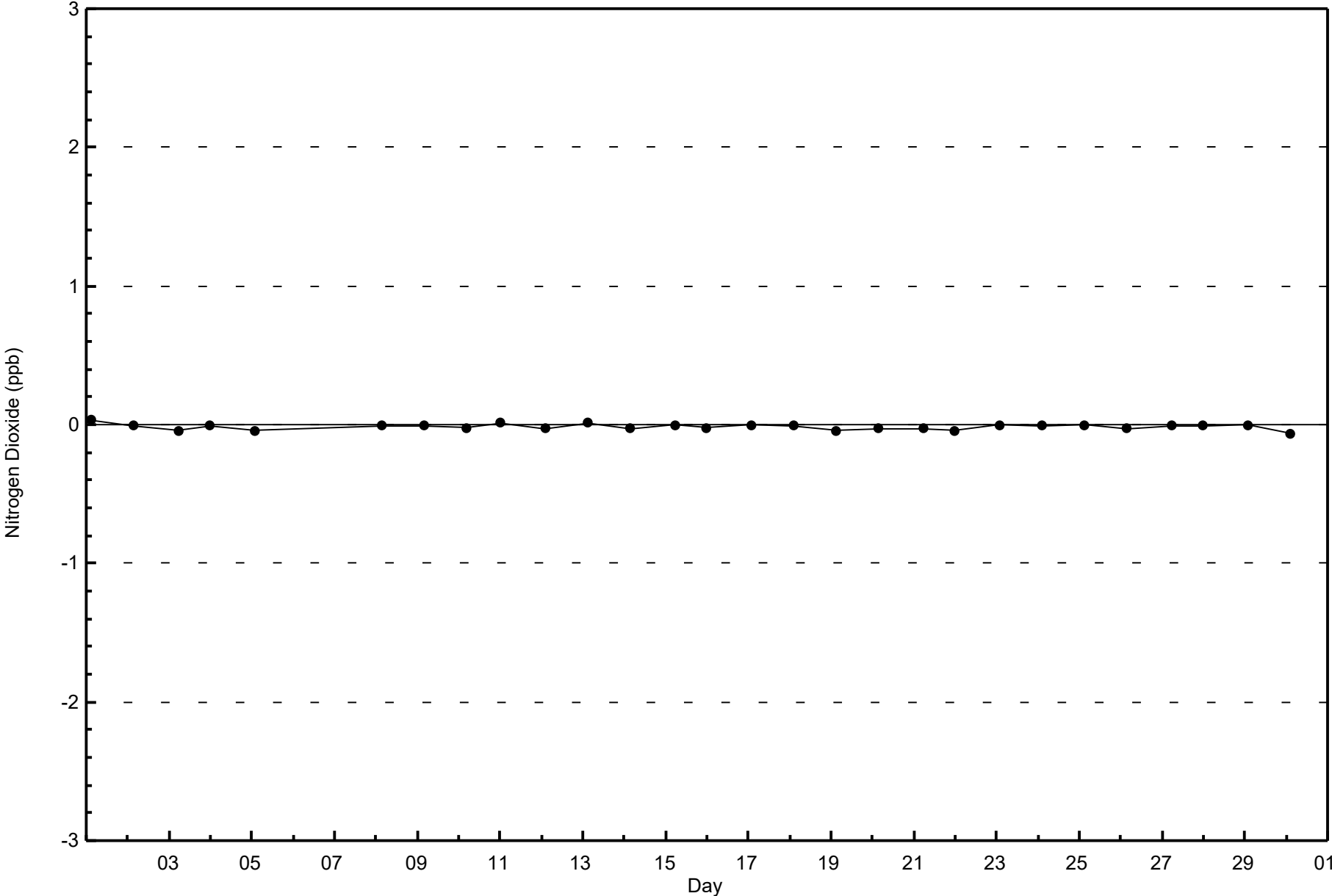


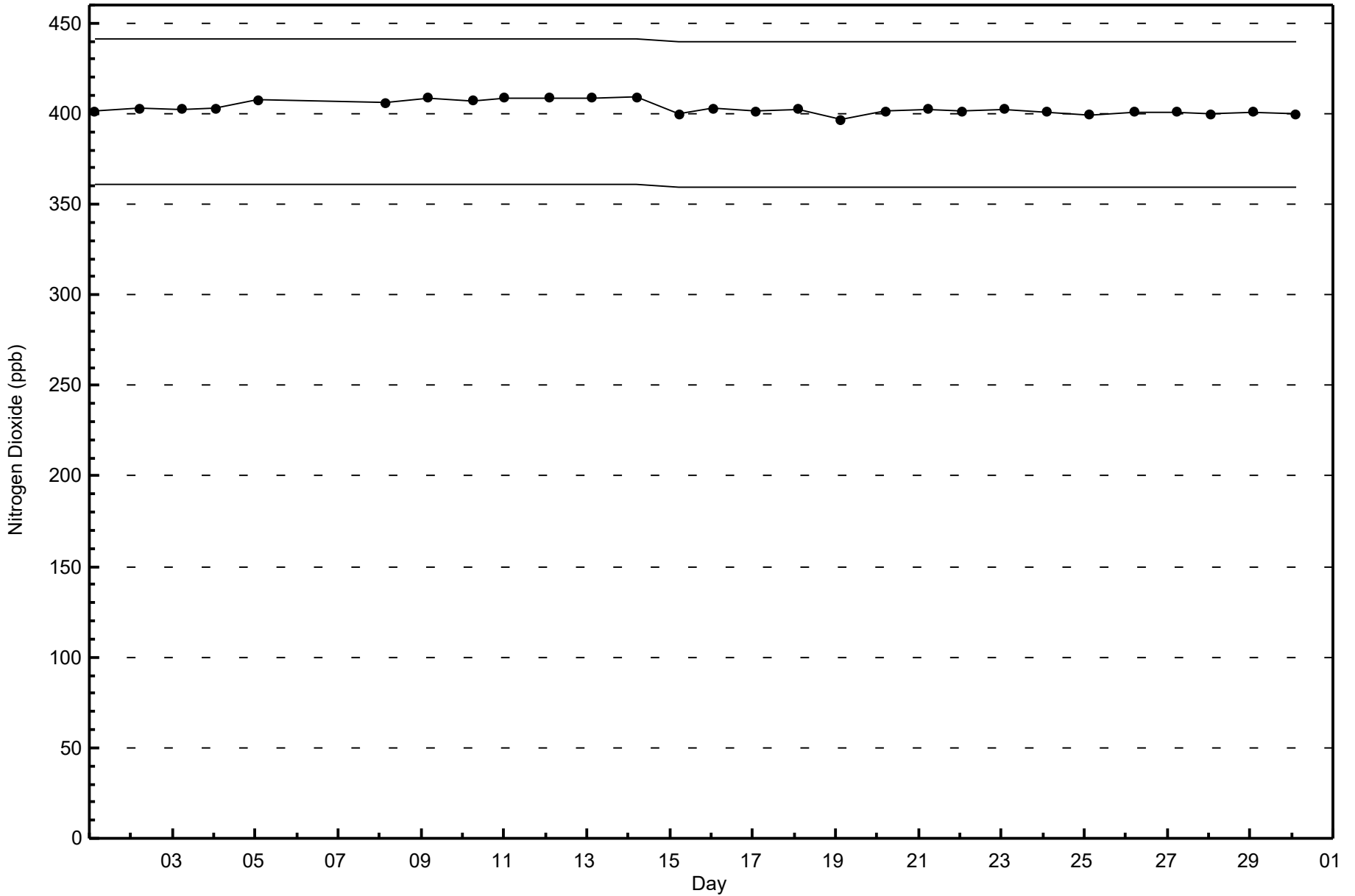
Wood Buffalo Environmental Association  
Wind Rose Nov 2023

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



Total Number of Valid Hours: 685







Wood Buffalo Environmental Association

Summary of Hour Averages

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

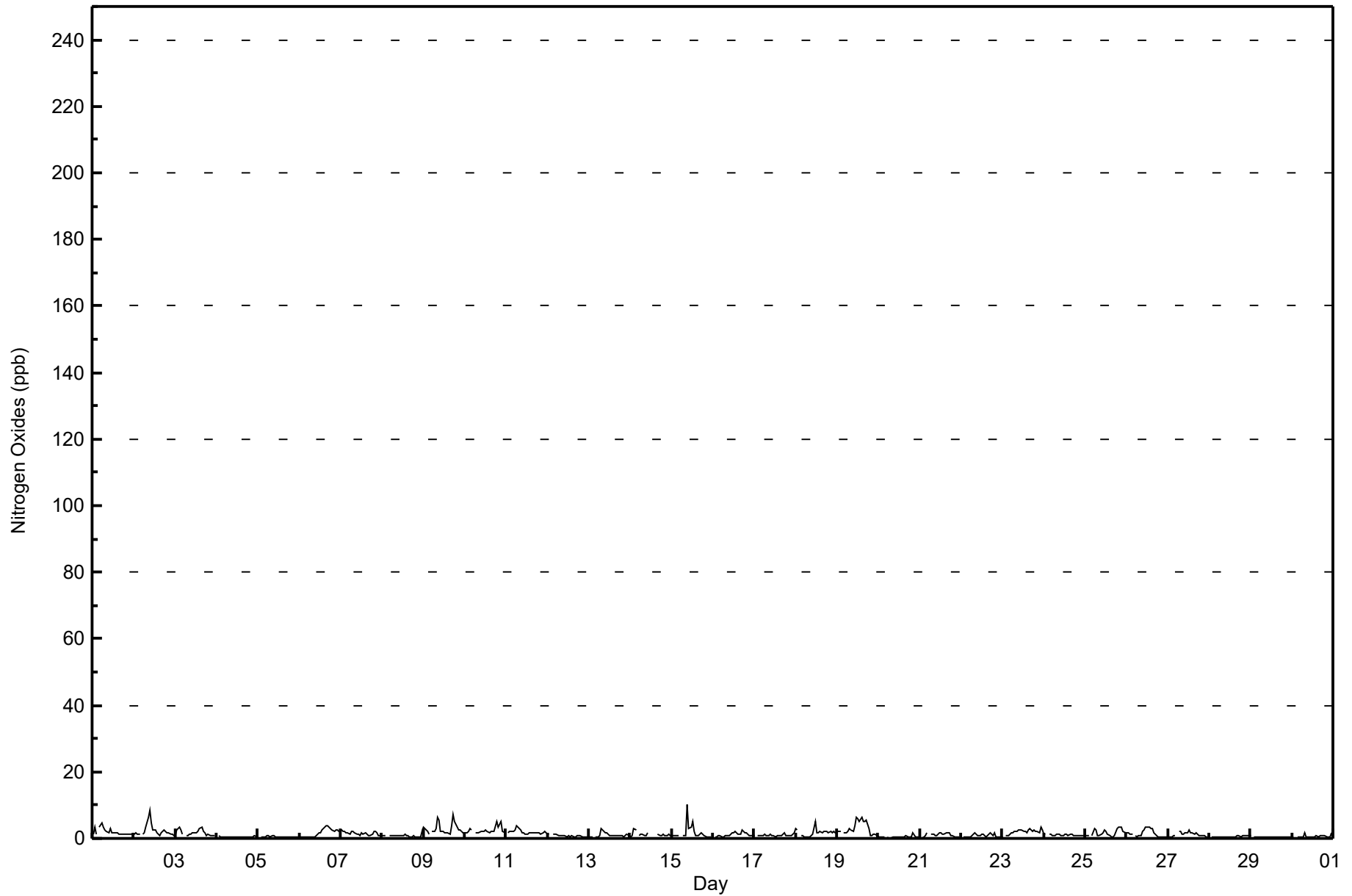
Surmont 2 - November 2023

Number of Exceedences (AAAQO):		1-hr: 0		24-hr: 0		Hours in Service: 720																																											
Maximum Value: 10.0 ppb on Nov 15 10:00		Maximum Daily Average: 3.1 ppb on Nov 19		Hours of Data: 687																																													
Minimum Value: 0.2 ppb on Nov 21 02:00		Minimum Daily Average: 0.4 ppb on Nov 29		Hours of Missing Data: 33																																													
Maximum Diurnal Average: 1.8 ppb at hour 10		Minimum Diurnal Average: 1.0 ppb at hour 24		Hours of Calibration: 33																																													
Monthly Average: 1.37 ppb		Percentiles: P <sub>1</sub> = 0.2 P <sub>10</sub> = 0.4 Q <sub>1</sub> = 0.6 Median = 1.0 Q <sub>3</sub> = 1.8 P <sub>90</sub> = 2.6 P <sub>99</sub> = 6.0		Percent Operational Time: 100.0																																													
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Nov	1.1	3.5	1.2	Z	3.4	4.8	3.5	2.5	2.1	1.5	2.8	1.9	1.5	1.7	1.5	1.1	1.2	1.2	1.3	1.2	1.1	1.3	1.2	1.4	1.9	4.8																							
2-Nov	1.5	1.5	1.3	1.4	Z	1.5	1.7	3.6	6.3	8.6	4.6	2.6	2.5	1.5	1.3	1.0	1.6	2.6	2.1	1.7	1.5	1.4	1.1	1.0	2.3	8.6																							
3-Nov	1.0	2.4	3.3	2.5	1.3	Z	1.0	1.1	1.3	1.2	1.5	1.6	1.8	2.2	2.9	3.3	2.3	1.6	1.0	1.1	0.9	0.9	0.7	0.6	1.6	3.3																							
4-Nov	Z	0.9	0.6	0.4	0.4	0.5	0.6	0.4	0.5	0.5	0.5	0.4	0.4	0.5	0.6	0.6	0.5	0.6	0.6	0.4	0.4	0.4	0.6	0.6	0.5	0.9																							
5-Nov	0.5	Z	0.5	0.5	0.6	0.7	0.9	0.6	0.7	0.8	0.6	0.6	0.6	0.5	0.6	0.5	0.6	0.5	0.5	0.5	0.3	0.2	0.2	0.3	0.5	0.9																							
6-Nov	0.4	0.4	0.3	0.3	0.3	0.5	0.2	0.2	0.2	0.3	0.7	1.7	1.9	2.5	3.2	3.7	3.7	3.6	3.1	2.5	2.2	2.4	2.3	2.2	1.6	3.7																							
7-Nov	2.6	2.3	2.0	1.5	1.5	1.5	2.1	2.2	1.9	1.5	1.3	1.0	1.6	1.1	1.6	1.1	1.0	0.9	1.1	1.9	2.1	1.5	1.0	1.0	1.5	2.6																							
8-Nov	1.1	0.7	0.8	Z	1.0	1.0	1.0	1.0	0.9	1.0	0.8	0.8	0.8	1.1	0.9	0.7	0.6	0.5	0.7	0.6	0.4	0.5	0.6	2.2	0.9	2.2																							
9-Nov	3.2	3.1	2.0	1.3	Z	2.0	2.2	2.9	6.3	5.5	2.1	2.1	1.6	1.6	1.5	1.3	3.7	7.0	5.2	4.2	2.7	2.4	2.0	1.7	2.9	7.0																							
10-Nov	1.5	1.8	2.0	2.8	2.3	Z	1.9	1.8	1.8	1.9	2.0	2.2	2.4	1.9	1.8	1.9	1.9	2.1	5.1	3.4	4.1	5.2	2.3	1.7	2.4	5.2																							
11-Nov	Z	1.9	1.9	2.0	2.1	2.7	4.0	3.4	2.6	1.6	1.6	1.4	1.5	1.5	1.8	1.7	1.6	1.6	1.6	1.7	1.3	1.8	2.1	1.6	2.0	4.0																							
12-Nov	1.4	1.2	Z	1.2	1.1	1.2	1.0	0.8	0.9	0.7	0.7	0.6	0.7	0.5	0.7	0.5	0.6	0.6	1.0	0.9	0.5	0.6	0.4	0.4	0.8	1.4																							
13-Nov	0.4	0.4	0.4	Z	0.6	0.6	1.0	2.9	2.3	1.9	1.7	1.2	1.0	0.9	1.0	0.9	1.0	1.0	1.0	0.8	0.5	0.7	1.2	0.8	1.0	2.9																							
14-Nov	0.5	1.0	2.9	2.7	Z	1.0	1.3	1.4	0.9	1.1	1.6	C	C	C	C	C	1.1	0.9	0.8	1.1	0.7	0.7	1.1	1.0	1.2	2.9																							
15-Nov	0.8	0.8	0.9	0.9	0.9	Z	0.9	0.7	0.7	10.0	3.0	3.4	5.0	2.1	0.9	0.8	1.3	1.6	1.2	1.0	0.6	0.4	0.4	0.3	1.7	10.0																							
16-Nov	Z	0.3	0.2	0.7	0.7	0.5	0.6	0.9	0.9	1.0	1.3	1.7	1.8	2.2	1.2	1.2	1.4	2.7	1.5	1.5	1.4	0.9	0.7	0.7	1.1	2.7																							
17-Nov	0.7	Z	0.8	0.8	0.7	1.0	1.1	0.9	1.0	1.1	0.9	0.9	0.5	0.7	0.8	0.8	0.9	1.5	0.9	0.9	0.9	0.7	1.2	1.7	0.9	1.7																							
18-Nov	3.1	2.6	Z	1.0	0.7	0.5	0.6	0.4	0.6	1.0	1.5	4.9	1.9	1.8	1.9	1.8	1.9	2.3	2.1	1.9	2.1	1.8	2.0	1.9	1.8	4.9																							
19-Nov	2.1	2.1	1.9	Z	1.6	1.7	2.2	3.2	2.5	2.2	3.9	6.3	5.9	5.2	6.3	4.9	5.2	5.6	3.2	0.9	0.9	1.3	1.1	0.8	3.1	6.3																							
20-Nov	0.6	0.4	0.4	0.3	Z	0.2	0.2	0.2	0.3	0.2	0.3	0.5	0.3	0.3	0.5	0.5	0.7	0.5	0.3	0.3	1.8	0.3	0.3	0.3	0.4	1.8																							
21-Nov	0.2	0.2	0.3	0.8	1.7	Z	1.2	1.1	1.3	1.1	0.9	1.6	1.8	1.5	1.4	1.5	1.5	1.5	0.9	0.6	0.3	0.3	0.4	0.3	1.0	1.8																							
22-Nov	Z	0.3	0.3	0.2	0.3	0.3	0.8	1.5	1.8	0.9	0.7	0.8	1.5	1.4	0.6	1.0	1.2	1.7	1.0	1.5	0.4	0.4	0.3	0.3	0.8	1.8																							
23-Nov	0.5	Z	0.9	1.0	1.2	1.6	1.7	1.9	2.0	2.5	2.5	2.6	2.2	2.0	1.9	2.5	2.9	2.0	2.6	2.1	2.1	1.9	3.3	2.4	2.0	3.3																							
24-Nov	1.3	1.2	Z	1.2	1.1	1.0	1.0	1.2	1.1	1.3	1.0	1.0	1.1	1.1	1.0	1.1	1.4	1.0	0.8	0.8	0.8	0.7	0.7	0.8	1.0	1.4																							
25-Nov	0.9	0.8	0.8	Z	0.7	3.1	2.7	0.9	0.8	1.4	1.8	2.4	2.0	1.4	1.0	0.3	0.4	1.0	3.0	3.3	3.3	3.2	2.2	1.8	1.7	3.3																							
26-Nov	1.7	1.5	1.4	1.4	Z	0.7	0.6	0.7	0.9	2.2	2.6	3.3	3.2	3.5	2.8	2.9	1.6	0.8	0.6	0.6	0.4	0.4	0.4	0.4	1.5	3.5																							
27-Nov	0.4	0.3	0.5	0.8	0.9	Z	2.0	2.0	1.5	1.1	1.8	1.8	2.3	1.6	1.5	1.3	1.5	1.3	1.0	0.7	0.7	0.7	0.6	0.5	1.2	2.3																							
28-Nov	Z	0.5	0.6	0.5	0.6	0.5	0.5	0.5	0.5	0.5	0.5	0.6	0.6	0.6	0.6	0.6	0.7	0.7	0.6	0.7	0.8	0.8	0.8	0.8	0.6	0.8																							
29-Nov	0.7	Z	0.5	0.5	0.5	0.5	0.5	0.3	0.4	0.3	0.3	0.4	0.4	0.4	0.3	0.4	0.4	0.3	0.4	0.3	0.3	0.3	0.2	0.2	0.4	0.7																							
30-Nov	0.2	0.2	Z	0.3	0.2	0.3	0.3	1.7	0.5	0.5	0.3	0.4	0.3	0.3	0.9	0.6	1.1	0.7	0.8	0.7	0.5	0.5	0.6	1.7	0.6	1.7																							
																								1.1	1.2	1.1	1.1	1.0	1.2	1.3	1.4	1.5	1.8	1.5	1.8	1.7	1.5	1.5	1.4	1.5	1.7	1.5	1.3	1.2	1.2	1.1	1.0	Diurnal Average	
																								3.2	3.5	3.3	2.8	3.4	4.8	4.0	3.6	6.3	10.0	4.6	6.3	5.9	5.2	6.3	4.9	5.2	7.0	5.2	4.2	4.1	5.2	3.3	2.4	Diurnal Maximum	
Z - zerospan C - Calibration																																																	



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

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Surmont 2 - November 2023**







**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Surmont 2 - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	687	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: 687

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Surmont 2 - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	22	6	10	18	26	56	78	30	29	29	58	82	118	82	22	19	685
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	22	6	10	18	26	56	78	30	29	29	58	82	118	82	22	19	685

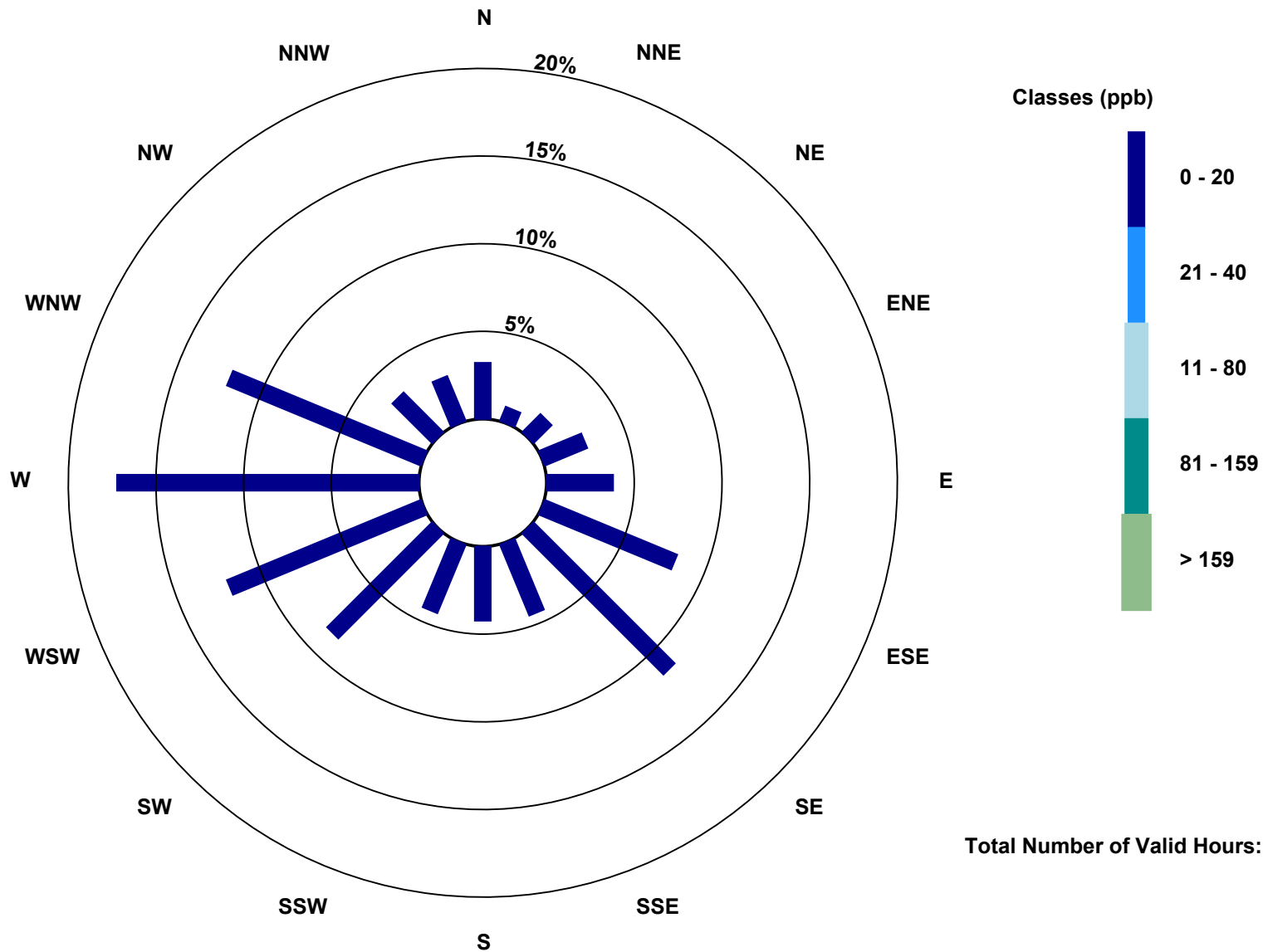
Total Number of Valid Hours: 685

Total Number of Hours: 720

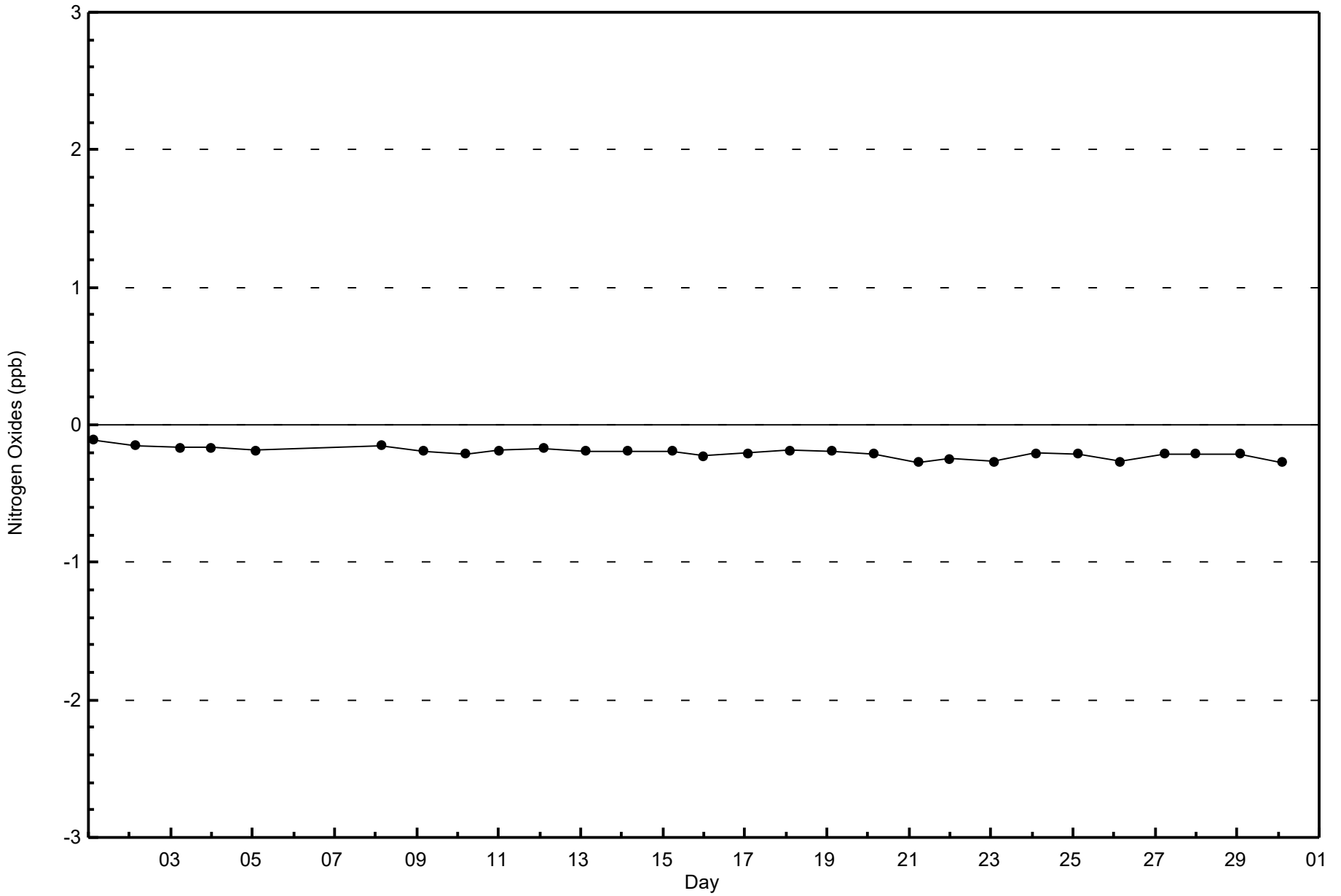


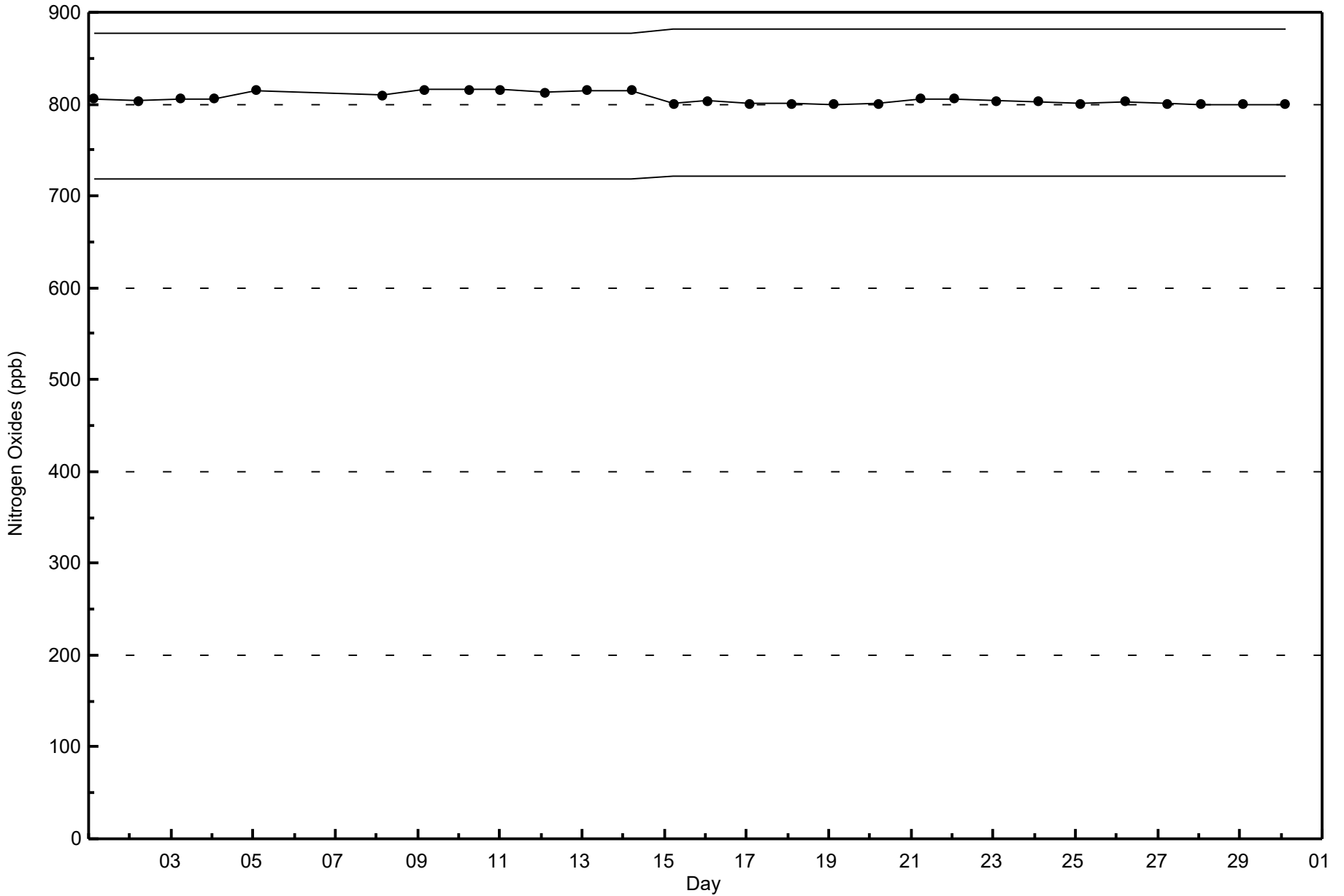
Wood Buffalo Environmental Association  
Wind Rose Nov 2023

Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Surmont 2



Total Number of Valid Hours: 685







Summary of Hour Averages

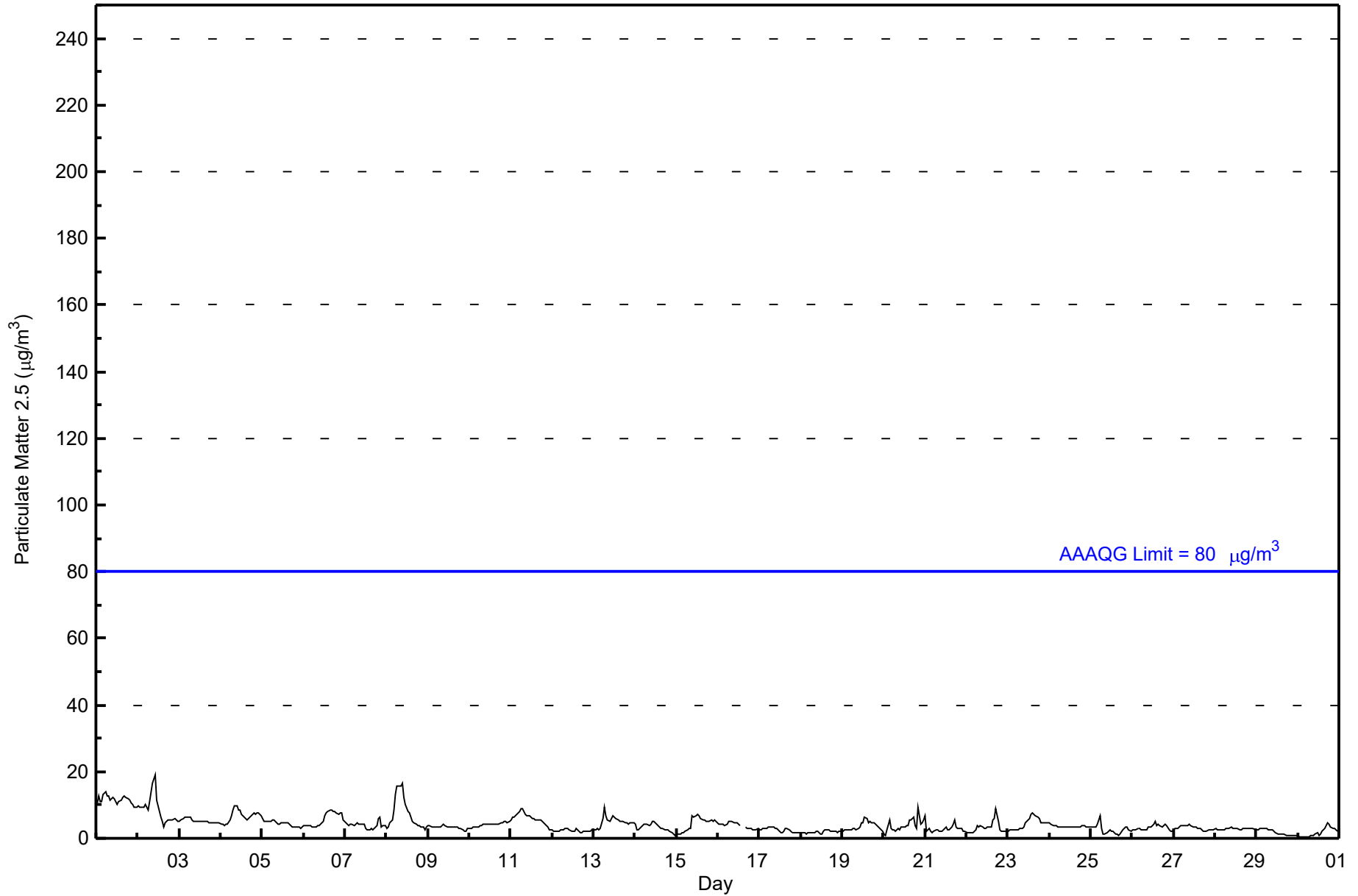
Surmont 2 - November 2023

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 19.1 µg/m <sup>3</sup> on Nov 2 11:00	Maximum Daily Average: 11.6 µg/m <sup>3</sup> on Nov 1		Hours of Data:	718
Minimum Value: 0.5 µg/m <sup>3</sup> on Nov 30 03:00	Minimum Daily Average: 1.8 µg/m <sup>3</sup> on Nov 30		Hours of Missing Data:	2
Maximum Diurnal Average: 5.1 µg/m <sup>3</sup> at hour 10	Minimum Diurnal Average: 3.5 µg/m <sup>3</sup> at hour 24		Hours of Calibration:	2
Monthly Average: 4.24 µg/m <sup>3</sup>	Percentiles: P <sub>1</sub> = 0.7 P <sub>10</sub> = 1.9 Q <sub>1</sub> = 2.6 Median = 3.4 Q <sub>3</sub> = 5.1 P <sub>90</sub> = 7.4 P <sub>99</sub> = 14.0		Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Nov	10.6	12.9	11.0	10.9	13.0	14.2	12.8	12.8	11.4	12.3	12.1	10.8	10.2	11.2	11.3	12.3	12.5	12.1	12.0	11.5	10.5	10.2	9.3	9.5	11.6	14.2																							
2-Nov	9.6	9.4	9.1	9.4	10.2	9.3	8.3	10.9	16.4	17.9	19.1	11.6	8.1	6.5	5.0	3.3	4.5	5.3	5.4	5.4	5.6	5.9	5.7	5.0	8.6	19.1																							
3-Nov	4.9	5.5	6.1	6.4	6.3	6.5	6.2	5.7	5.3	5.2	5.1	5.1	5.1	5.0	5.1	5.1	5.0	4.8	4.9	4.7	4.7	4.6	4.7	4.6	5.3	6.5																							
4-Nov	4.3	4.1	4.0	4.1	4.4	5.6	6.8	8.5	9.8	9.8	8.6	8.3	7.3	6.9	5.9	5.5	6.1	6.5	7.4	7.7	7.3	7.6	7.5	6.9	6.7	9.8																							
5-Nov	5.8	5.1	5.1	5.3	5.0	5.3	5.6	5.4	4.6	4.2	4.4	4.7	4.6	4.7	4.9	4.8	4.2	3.4	3.3	3.3	3.2	3.3	3.2	3.4	4.5	5.8																							
6-Nov	3.7	3.6	3.7	3.7	3.7	3.6	3.4	3.4	3.6	3.9	4.4	5.2	6.6	7.6	8.2	8.3	8.3	8.2	8.1	7.8	7.3	7.5	7.7	5.7	5.7	8.3																							
7-Nov	4.8	4.3	4.0	4.0	4.1	4.0	4.3	4.5	4.2	4.2	4.3	4.0	3.0	2.6	2.4	2.9	2.4	3.1	3.9	5.8	6.2	3.3	3.8	3.8	3.9	6.2																							
8-Nov	3.1	3.4	4.5	5.5	8.5	13.0	15.6	15.9	15.8	16.3	12.5	10.0	8.1	7.5	6.4	5.2	4.7	4.3	3.9	3.9	3.5	3.2	2.7	3.4	7.5	16.3																							
9-Nov	3.8	3.8	3.3	3.2	3.2	3.2	3.4	3.5	3.8	4.4	3.7	3.5	3.3	3.4	3.4	3.4	3.4	3.3	3.0	2.9	2.4	2.3	2.3	2.8	3.3	4.4																							
10-Nov	3.0	3.1	3.2	3.3	3.4	3.5	3.7	3.8	4.1	4.4	4.3	4.4	4.2	4.1	4.2	4.2	4.3	4.3	4.5	4.7	5.1	5.2	4.8	5.1	4.1	5.2																							
11-Nov	5.6	6.5	6.5	7.1	7.6	8.2	9.0	8.8	7.3	6.8	6.9	6.6	6.1	5.8	5.7	5.4	5.5	5.4	5.0	4.6	4.1	3.3	2.7	2.3	5.9	9.0																							
12-Nov	2.3	2.2	2.2	2.1	2.3	2.5	2.4	3.0	3.1	2.9	2.6	2.1	2.1	2.2	2.8	2.1	1.9	1.9	2.3	2.2	2.2	2.1	2.2	2.5	2.3	3.1																							
13-Nov	2.5	2.5	2.8	2.7	2.9	6.1	9.4	6.8	5.4	5.2	5.9	6.8	6.2	5.8	5.6	5.0	5.0	5.1	4.5	4.5	4.2	4.5	4.5	4.6	4.9	9.4																							
14-Nov	4.3	2.4	2.5	3.2	3.8	4.2	4.3	4.2	3.9	4.3	5.2	5.0	4.4	3.8	3.4	3.1	2.9	2.7	2.4	2.4	2.0	1.5	1.1	1.0	3.3	5.2																							
15-Nov	1.2	1.3	1.4	1.5	1.6	1.9	2.4	2.8	2.9	6.9	6.4	6.8	7.4	6.6	6.0	5.7	5.3	5.0	5.0	5.1	5.4	4.9	5.5	5.1	4.3	7.4																							
16-Nov	4.3	4.2	4.3	4.2	3.9	4.2	5.1	5.2	5.1	4.8	4.8	4.8	4.3	3.8	C	C	3.3	2.9	2.9	2.9	2.8	2.6	2.7	2.9	3.9	5.2																							
17-Nov	2.5	2.3	2.8	2.8	3.1	3.2	3.5	3.6	3.2	2.8	2.9	2.6	1.9	1.9	2.3	3.1	3.0	2.7	1.9	1.8	1.7	1.7	1.7	1.7	2.5	3.6																							
18-Nov	1.8	1.6	1.5	1.4	1.5	1.6	1.6	1.6	1.8	2.2	2.0	1.4	1.4	2.1	2.3	2.5	2.4	2.0	2.2	1.9	2.0	1.8	2.1	2.2	1.9	2.5																							
19-Nov	2.3	2.5	2.4	2.6	2.4	2.6	2.8	3.1	2.7	3.0	3.2	4.5	4.6	6.6	6.1	4.8	4.9	4.7	4.6	4.1	4.0	3.3	3.0	1.9	3.6	6.6																							
20-Nov	1.4	0.9	2.8	5.6	2.8	2.5	2.4	2.0	2.8	2.6	3.6	3.2	3.3	3.8	3.9	5.7	5.3	6.4	3.9	3.1	9.2	4.1	4.5	5.3	3.8	9.2																							
21-Nov	6.9	2.3	2.8	2.0	1.9	2.3	2.4	2.4	2.3	2.3	2.3	3.1	3.4	2.7	2.6	3.3	4.3	5.7	3.2	3.1	2.8	3.0	2.3	2.0	3.0	6.9																							
22-Nov	1.9	1.5	1.6	1.7	1.8	2.6	3.8	3.4	3.7	3.3	2.9	3.1	3.3	3.4	3.2	5.7	6.1	8.9	4.9	2.4	2.0	2.0	2.1	2.1	3.2	8.9																							
23-Nov	2.2	2.4	2.5	2.5	2.5	2.5	2.5	2.8	3.1	3.4	4.5	5.2	6.0	7.3	7.5	7.1	6.9	6.2	5.8	4.6	4.7	4.7	4.8	4.8	4.4	7.5																							
24-Nov	4.5	4.3	4.0	3.7	3.7	3.5	3.3	3.4	3.3	3.3	3.2	3.3	3.3	3.4	3.4	3.4	3.3	3.3	3.3	3.6	3.7	3.5	3.3	3.3	3.5	4.5																							
25-Nov	3.5	3.5	3.4	3.6	4.3	6.9	3.1	1.2	1.2	1.6	2.2	2.5	2.1	2.0	1.3	1.1	1.0	1.2	2.4	2.9	3.4	3.2	2.5	2.3	2.6	6.9																							
26-Nov	2.3	2.4	2.6	2.9	2.8	2.7	2.4	2.4	2.4	3.2	3.4	3.4	4.2	5.1	3.7	4.3	3.9	3.3	3.7	4.0	3.8	2.7	2.3	2.2	3.2	5.1																							
27-Nov	2.6	2.9	2.8	3.3	3.6	3.9	3.9	3.9	3.8	4.0	3.7	3.3	3.2	3.2	3.1	2.8	2.4	2.2	2.1	2.3	2.5	2.6	2.6	2.7	3.1	4.0																							
28-Nov	2.9	2.6	2.4	2.3	2.5	2.7	3.0	3.0	3.0	3.2	3.1	2.8	3.0	2.8	2.4	2.6	3.0	3.1	3.1	3.1	2.9	2.9	3.0	2.6	2.8	3.2																							
29-Nov	2.6	2.7	3.1	3.1	3.0	3.0	2.8	2.6	2.6	2.5	2.2	1.7	1.4	1.2	1.1	1.2	1.2	1.0	1.0	0.9	0.7	0.8	0.8	0.7	1.8	3.1																							
30-Nov	0.7	0.6	0.5	0.6	0.6	0.5	0.6	0.6	0.9	1.1	1.2	1.7	0.8	1.4	2.0	2.9	3.8	4.5	4.3	3.5	3.1	2.9	2.7	2.1	1.8	4.5																							
																								3.7	3.6	3.6	3.8	4.0	4.5	4.7	4.7	4.8	5.1	5.0	4.7	4.4	4.5	4.3	4.4	4.4	4.4	4.2	4.0	4.1	3.7	3.6	3.5	Diurnal Average	
																								10.6	12.9	11.0	10.9	13.0	14.2	15.6	15.9	16.4	17.9	19.1	11.6	10.2	11.2	11.3	12.3	12.5	12.1	12.0	11.5	10.5	10.2	9.3	9.5	Diurnal Maximum	

C - Calibration

Alberta Ambient Air Quality Guideline/Objectives: 1-hr 80 µg/m<sup>3</sup> 24-hr 29 µg/m<sup>3</sup>





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

**Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$**   
**Surmont 2 - November 2023**

<b>Concentration Ranges (<math>\mu\text{g}/\text{m}^3</math>)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	576	80.22	80.22
6 - 15	135	18.80	99.03
16 - 25	7	0.97	100.00
26 - 80	0	0.00	100.00
> 81.0	0	0.00	100.00

Total Number of Valid Hours: 718

Total Number of Hours: 720





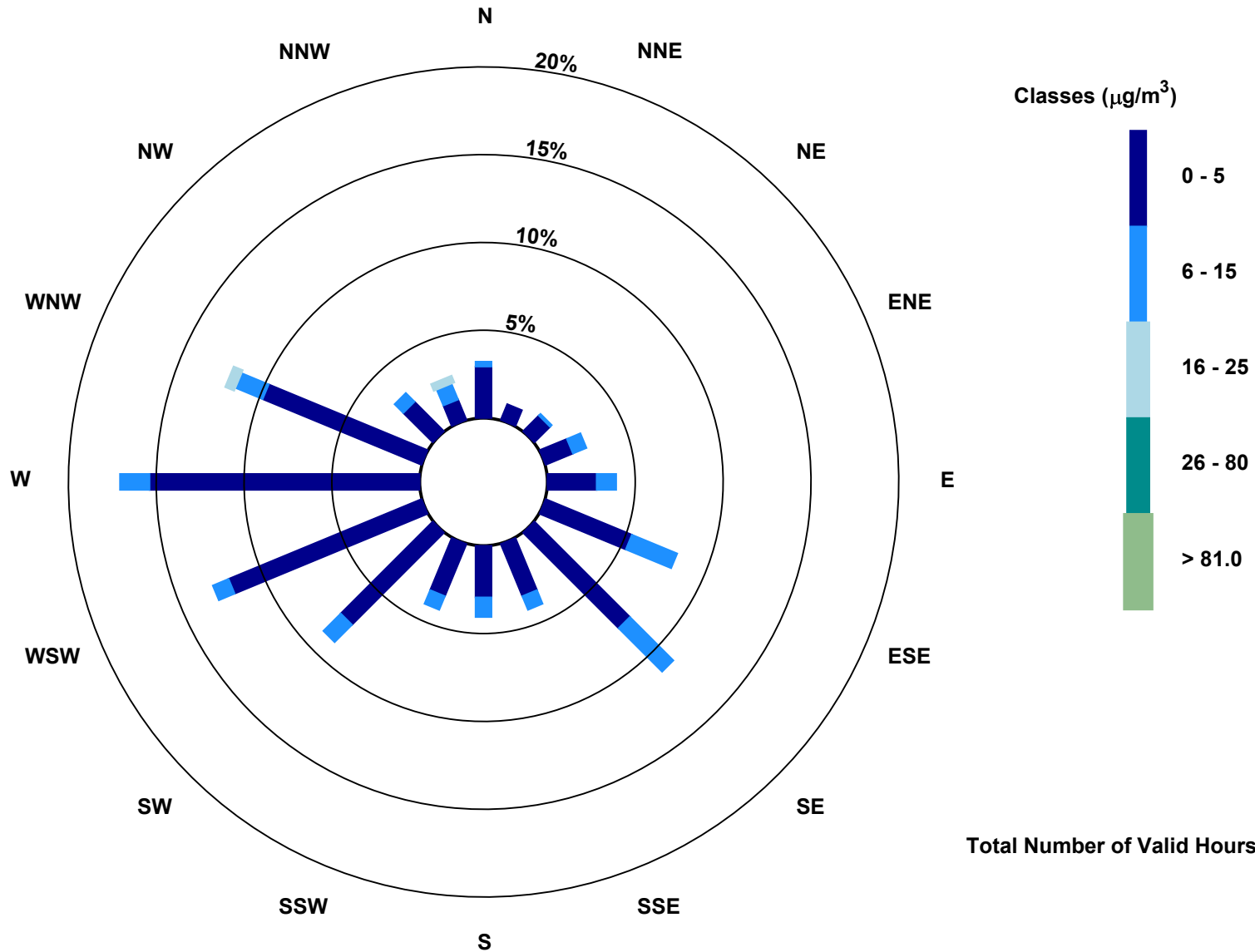
**Wood Buffalo Environmental Association**  
**Frequency Distribution**

**Particulate Matter 2.5 (PM<sub>2.5</sub>) - μg/m<sup>3</sup>**  
**Surmont 2 - November 2023**

Concentration Ranges (μg/m <sup>3</sup> )	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	21	7	9	12	20	38	55	23	21	23	53	85	110	70	17	9	573
6 - 15	2	0	1	6	8	20	25	6	8	6	10	7	12	12	5	7	135
16 - 25	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	3	7
26 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 81.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	23	7	10	18	28	58	80	29	29	29	63	92	122	86	22	19	715

Total Number of Valid Hours: 715

Total Number of Hours: 720



Total Number of Valid Hours: 715



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

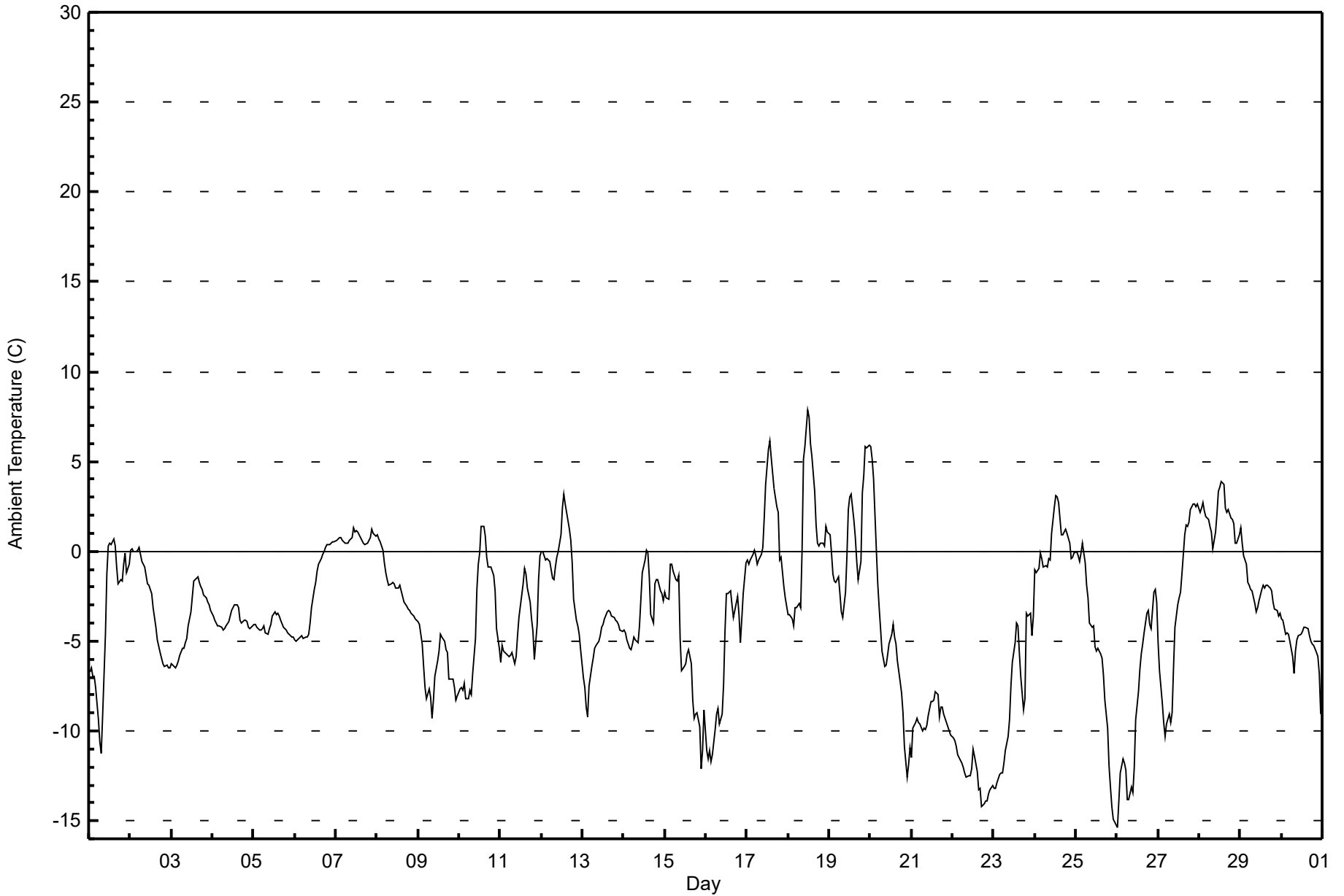
**Ambient Temperature (AT) - C**  
**Surmont 2 - November 2023**

Maximum Value: 7.9 C on Nov 18 12:00																				Maximum Daily Average: 2.0 C on Nov 28					Hours in Service: 720				
Minimum Value: -15.3 C on Nov 26 01:00																				Minimum Daily Average: -12.4 C on Nov 22					Hours of Data: 720				
Maximum Diurnal Average: -1.7 C at hour 14																				Minimum Diurnal Average: -5.2 C at hour 8					Hours of Missing Data: 0				
Monthly Average: -3.72 C																				Percentiles: P <sub>1</sub> = -13.9 P <sub>10</sub> = -9.8 Q <sub>1</sub> = -6.1 Median = -3.6 Q <sub>3</sub> = -0.5 P <sub>90</sub> = 1.1 P <sub>99</sub> = 5.8					Hours of Calibration: 0				
																				Percent Operational Time: 100.0									
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24					
1-Nov	-6.7	-6.5	-6.9	-6.9	-7.6	-9.4	-10.6	-11.2	-9.1	-4.6	-1.3	0.3	0.4	0.7	0.3	-0.9	-1.8	-1.6	-1.7	-0.7	-0.1	-1.2	-0.7	-3.6	0.7				
2-Nov	0.0	0.1	0.0	0.0	0.1	0.2	-0.2	-0.6	-0.8	-1.3	-1.8	-1.9	-2.4	-3.2	-3.7	-4.2	-4.9	-5.6	-5.9	-6.2	-6.4	-6.4	-6.5	-6.5	-2.8	0.2			
3-Nov	-6.3	-6.3	-6.5	-6.3	-6.1	-5.8	-5.4	-5.4	-5.1	-4.9	-4.1	-3.4	-2.5	-1.6	-1.6	-1.4	-1.7	-1.9	-2.1	-2.4	-2.6	-2.8	-3.0	-3.3	-3.9	-1.4			
4-Nov	-3.6	-3.9	-4.0	-4.1	-4.2	-4.3	-4.3	-4.3	-4.2	-3.9	-3.6	-3.3	-3.2	-2.9	-3.0	-3.2	-3.8	-4.0	-3.9	-3.8	-3.9	-4.3	-4.3	-4.2	-3.8	-2.9			
5-Nov	-4.1	-4.1	-4.2	-4.4	-4.4	-4.3	-4.2	-4.5	-4.6	-4.3	-4.1	-3.6	-3.4	-3.5	-3.5	-3.6	-3.9	-4.2	-4.3	-4.4	-4.6	-4.7	-4.8	-4.8	-4.2	-3.4			
6-Nov	-4.9	-5.0	-4.9	-4.8	-4.7	-4.8	-4.8	-4.7	-4.6	-4.0	-3.1	-2.1	-1.7	-1.1	-0.7	-0.4	-0.2	0.0	0.2	0.4	0.4	0.4	0.5	0.5	-2.3	0.5			
7-Nov	0.6	0.7	0.7	0.7	0.6	0.4	0.5	0.5	0.6	0.7	1.3	1.1	1.2	1.1	0.8	0.6	0.4	0.3	0.5	0.6	0.8	1.2	1.0	0.8	0.7	1.3			
8-Nov	0.9	0.7	0.6	0.1	-0.6	-1.1	-1.6	-1.9	-1.8	-1.8	-1.8	-2.1	-2.1	-1.9	-2.2	-2.5	-2.8	-3.1	-3.2	-3.3	-3.4	-3.6	-3.7	-3.8	-1.9	0.9			
9-Nov	-3.9	-4.1	-5.2	-6.4	-7.6	-8.2	-7.6	-8.1	-9.3	-8.3	-7.0	-6.1	-5.5	-4.6	-4.8	-5.0	-5.4	-5.6	-7.1	-7.1	-7.1	-7.6	-8.3	-8.1	-6.6	-3.9			
10-Nov	-7.6	-7.6	-7.7	-7.3	-8.2	-8.2	-7.8	-7.9	-6.8	-4.9	-2.1	-0.7	-0.1	1.4	1.4	0.8	-0.3	-0.9	-0.8	-1.1	-1.4	-2.2	-4.3	-5.4	-3.7	1.4			
11-Nov	-6.2	-5.2	-5.6	-5.7	-5.8	-5.8	-5.8	-5.6	-6.3	-5.8	-4.7	-3.7	-2.5	-1.8	-1.0	-1.2	-2.1	-2.8	-3.8	-4.5	-6.0	-4.1	-1.6	-0.3	-4.1	-0.3			
12-Nov	0.0	0.0	-0.5	-0.4	-0.5	-0.6	-1.5	-1.5	-0.9	-0.3	0.0	0.9	2.4	3.2	2.6	1.7	1.2	0.6	-0.6	-2.7	-3.8	-4.1	-4.6	-5.5	-0.6	3.2			
13-Nov	-7.0	-7.6	-8.7	-9.2	-7.5	-6.4	-5.9	-5.4	-5.2	-5.0	-4.7	-4.3	-4.1	-3.8	-3.4	-3.3	-3.4	-3.6	-3.7	-3.9	-3.9	-4.0	-4.4	-4.4	-5.1	-3.3			
14-Nov	-4.4	-4.6	-4.9	-5.4	-5.5	-5.2	-4.8	-5.0	-5.0	-4.2	-2.7	-1.2	-0.5	0.1	-0.1	-1.4	-3.5	-4.0	-1.8	-1.6	-2.2	-2.4	-2.7	-2.7	-3.1	0.1			
15-Nov	-2.3	-2.6	-2.7	-0.7	-0.7	-1.1	-1.6	-1.7	-1.3	-4.9	-6.7	-6.4	-6.3	-5.7	-5.5	-6.2	-8.3	-9.3	-9.1	-8.9	-9.7	-12.1	-11.1	-8.9	-5.6	-0.7			
16-Nov	-11.1	-11.6	-11.1	-11.7	-11.3	-9.9	-9.1	-8.7	-9.6	-9.0	-7.4	-4.5	-2.4	-2.4	-2.2	-3.0	-3.7	-3.3	-2.5	-3.5	-5.1	-3.8	-2.4	-0.6	-6.2	-0.6			
17-Nov	-0.5	-0.7	-0.5	-0.2	0.1	-0.2	-0.7	-0.5	-0.2	0.2	1.9	3.7	5.7	6.1	5.2	4.3	3.5	2.4	2.2	-0.5	-0.3	-1.9	-2.6	-3.1	1.0	6.1			
18-Nov	-3.5	-3.6	-3.8	-4.1	-3.1	-3.2	-2.9	-3.2	0.0	5.1	5.8	7.9	7.5	6.0	5.3	3.4	1.4	0.5	0.3	0.5	0.5	0.3	1.4	1.1	0.8	7.9			
19-Nov	0.9	-0.1	-1.3	-1.7	-1.7	-1.4	-2.3	-3.3	-3.7	-2.2	-0.2	2.3	3.0	3.2	1.7	0.8	-0.6	-1.6	-0.6	3.3	4.2	5.9	5.8	5.9	0.7	5.9			
20-Nov	5.8	5.1	4.0	0.1	-1.8	-3.2	-4.3	-5.6	-6.4	-6.4	-5.8	-5.2	-4.6	-4.1	-4.7	-5.1	-6.1	-7.2	-7.9	-9.0	-10.9	-12.6	-11.9	-11.0	-4.9	5.8			
21-Nov	-11.4	-9.9	-9.5	-9.3	-9.5	-9.6	-10.0	-9.8	-9.9	-9.7	-9.1	-8.4	-8.4	-8.3	-7.8	-8.0	-9.2	-8.7	-8.7	-9.1	-9.5	-9.8	-10.0	-10.2	-9.3	-7.8			
22-Nov	-10.4	-10.5	-10.9	-11.3	-11.5	-11.8	-12.0	-12.4	-12.5	-12.5	-12.5	-12.1	-11.0	-11.4	-12.3	-13.2	-13.2	-14.2	-14.0	-13.9	-13.9	-13.5	-13.3	-13.0	-12.4	-10.4			
23-Nov	-13.2	-13.2	-12.9	-12.4	-12.4	-12.3	-11.8	-11.1	-10.3	-9.3	-7.5	-6.2	-5.0	-4.0	-4.2	-5.6	-6.9	-8.8	-8.2	-3.5	-3.6	-3.5	-4.7	-3.6	-8.1	-3.5			
24-Nov	-1.0	-1.2	-1.0	-0.1	-0.4	-0.9	-0.8	-0.9	-0.4	-0.5	1.0	2.5	3.1	3.1	2.7	0.9	0.9	1.1	1.3	1.0	0.5	-0.4	-0.4	-0.1	0.4	3.1			
25-Nov	0.0	-0.3	-0.6	-0.1	0.4	-0.7	-1.8	-2.6	-4.0	-4.2	-4.2	-5.3	-5.6	-5.4	-5.7	-6.0	-6.9	-8.3	-9.8	-11.9	-13.1	-14.2	-14.9	-15.2	-5.8	0.4			
26-Nov	-15.3	-13.9	-12.3	-11.6	-11.8	-12.1	-13.8	-13.8	-13.1	-13.4	-12.0	-9.4	-7.8	-6.5	-5.7	-5.2	-4.5	-3.5	-3.3	-4.0	-4.3	-2.3	-2.2	-2.8	-8.5	-2.2			
27-Nov	-5.1	-6.7	-8.4	-9.5	-10.3	-9.6	-9.0	-9.5	-9.0	-6.5	-4.2	-3.0	-2.6	-2.3	-1.3	0.9	1.5	1.4	1.6	2.3	2.7	2.6	2.5	2.6	-3.3	2.7			
28-Nov	2.2	2.4	2.7	2.3	2.0	1.8	1.4	1.1	0.1	1.1	2.1	3.3	3.6	3.8	3.7	2.4	2.2	2.3	1.9	1.8	1.6	0.5	0.4	0.9	2.0	3.8			
29-Nov	1.3	0.5	-0.3	-0.7	-1.7	-1.9	-2.1	-2.2	-2.9	-3.4	-3.1	-2.7	-2.1	-1.9	-2.0	-1.9	-1.9	-2.0	-2.2	-2.9	-3.2	-3.3	-3.6	-3.5	-2.1	1.3			
30-Nov	-3.7	-3.8	-4.6	-4.5	-4.6	-5.0	-5.8	-6.8	-5.5	-5.0	-4.7	-4.6	-4.4	-4.2	-4.2	-4.3	-4.7	-5.0	-5.2	-5.2	-5.6	-5.9	-6.8	-9.1	-5.2	-3.7			
																								Diurnal Average					
																								Diurnal Maximum					



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

**Ambient Temperature (AT) - C**  
**Surmont 2 - November 2023**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C  
Surmont 2 - November 2023**

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	0	0.00	0.00
-20 - 0	575	79.86	79.86
0 - 10	145	20.14	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 720

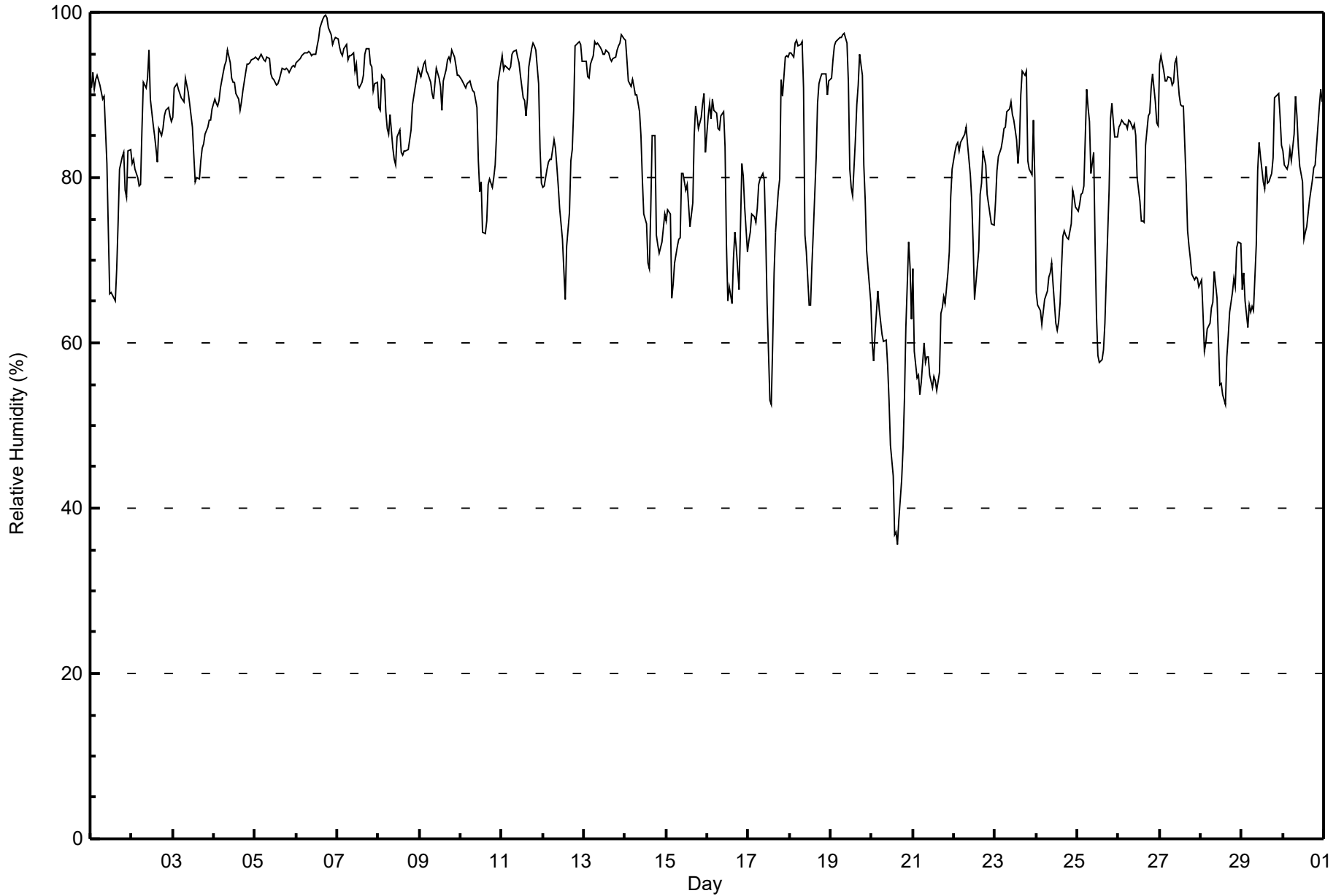
Total Number of Hours: 720



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

**Relative Humidity (RH) - %**  
**Surmont 2 - November 2023**

Maximum Value: 99.6 % on Nov 6 18:00      Maximum Daily Average: 96.3 % on Nov 6																						Hours in Service: 720 Hours of Data: 720				
Minimum Value: 35.7 % on Nov 20 16:00      Minimum Daily Average: 54.7 % on Nov 20 Maximum Diurnal Average: 85.3 % at hour 8      Minimum Diurnal Average: 74.6 % at hour 14 Monthly Average: 82.29 %      Percentiles: P <sub>1</sub> = 48.6 P <sub>10</sub> = 64.5 Q <sub>1</sub> = 74.6 Median = 85.3 Q <sub>3</sub> = 92.0 P <sub>90</sub> = 94.9 P <sub>99</sub> = 97.3																						Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0				
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	90.9	92.6	90.6	91.9	92.3	91.1	90.3	89.4	89.8	81.7	73.7	65.9	66.1	65.7	65.1	68.9	74.6	81.1	82.5	83.1	78.6	77.6	83.3	83.4	81.3	92.6
2-Nov	81.7	82.2	81.0	80.0	79.0	79.1	85.7	91.5	90.8	92.0	95.4	89.6	86.4	85.1	83.5	81.9	86.0	85.2	85.9	87.4	88.2	88.5	87.5	86.8	85.8	95.4
3-Nov	87.3	90.8	91.3	90.8	90.1	89.7	89.2	92.1	91.2	90.4	88.9	86.1	82.8	79.5	80.0	79.8	82.0	83.5	84.1	85.3	86.1	87.0	86.9	88.3	86.8	92.1
4-Nov	89.5	88.9	88.6	89.4	90.9	92.7	93.6	94.1	95.5	94.0	92.1	91.5	91.5	90.1	89.5	88.2	89.2	90.6	92.7	93.7	93.8	93.8	94.2	94.5	91.8	95.5
5-Nov	94.5	94.4	94.3	94.9	94.5	94.2	94.0	94.6	94.4	92.6	92.0	91.9	91.2	91.4	91.8	92.6	93.3	93.1	93.2	93.1	92.8	93.5	93.6	93.4	93.3	94.9
6-Nov	93.9	94.0	94.5	94.7	94.9	95.1	95.1	95.3	95.1	94.8	95.0	95.0	95.9	96.8	98.2	99.2	99.5	99.6	99.3	98.2	97.3	96.2	96.6	96.9	96.3	99.6
7-Nov	96.7	95.8	95.2	94.8	95.6	96.2	94.3	94.7	94.7	95.1	93.0	93.7	91.3	90.8	91.5	92.4	94.9	95.6	95.6	93.8	93.4	90.5	91.4	91.5	93.8	96.7
8-Nov	88.5	88.2	92.3	91.8	88.0	85.9	85.2	87.7	83.6	82.3	81.5	84.9	85.7	83.1	82.7	83.2	83.2	83.4	84.6	85.8	88.7	91.0	92.1	93.3	86.5	93.3
9-Nov	92.7	92.2	93.8	94.1	93.0	92.5	91.6	90.1	89.4	91.3	93.3	92.1	91.1	88.1	91.8	93.1	94.3	94.5	94.1	95.4	94.5	93.6	92.4	92.4	92.6	95.4
10-Nov	91.8	91.5	91.1	90.9	91.3	91.8	91.0	90.6	90.4	88.5	82.1	78.3	79.5	73.4	73.3	74.8	79.2	79.8	78.8	80.0	81.5	85.3	91.6	93.7	85.0	93.7
11-Nov	94.8	93.0	93.5	93.3	93.1	93.4	94.9	95.2	95.4	94.6	93.9	92.3	89.7	89.3	87.4	89.5	93.4	95.7	96.3	96.0	95.4	91.3	83.6	79.3	92.3	96.3
12-Nov	78.8	79.0	80.9	81.9	82.2	82.2	84.6	83.6	81.4	78.9	76.2	72.6	68.8	65.3	71.6	75.7	82.0	83.3	88.2	96.0	96.3	96.5	96.2	94.2	82.4	96.5
13-Nov	94.1	94.0	92.2	92.0	93.7	94.7	96.4	96.2	96.2	95.7	95.4	95.0	95.0	95.5	95.0	94.4	94.1	94.3	94.5	95.4	95.9	96.4	97.3	96.8	95.0	97.3
14-Nov	96.6	94.2	91.7	91.1	91.9	91.0	90.1	90.0	87.9	85.0	79.8	75.6	74.3	69.6	69.0	76.1	85.0	85.1	73.0	71.9	70.9	72.2	74.0	75.7	81.7	96.6
15-Nov	74.8	76.1	75.6	65.4	67.1	69.7	71.7	72.5	72.6	80.6	80.5	78.4	79.1	76.6	74.1	77.0	85.1	88.6	87.5	86.0	87.2	88.9	90.2	83.0	78.7	90.2
16-Nov	87.5	89.0	87.1	89.5	88.1	87.9	85.9	85.7	87.5	87.9	83.7	71.9	65.2	66.8	64.8	70.2	73.3	71.6	66.5	73.9	81.7	80.2	76.4	71.0	78.9	89.5
17-Nov	72.4	73.4	75.5	75.2	74.6	76.3	79.2	79.9	80.5	79.7	73.3	64.8	53.1	52.5	60.0	68.6	73.3	78.3	79.8	91.8	89.9	94.5	94.8	94.6	76.5	94.8
18-Nov	95.1	95.1	94.6	96.3	96.7	95.9	96.2	96.4	90.9	73.0	71.0	64.6	64.5	69.5	73.6	82.4	88.9	91.3	92.0	92.6	92.6	92.5	89.9	91.6	87.0	96.7
19-Nov	92.0	94.3	95.9	96.4	96.6	97.0	96.9	97.2	97.5	96.4	91.5	81.0	78.8	77.8	84.5	88.9	91.2	94.9	92.4	81.5	77.4	71.2	68.9	64.9	87.7	97.5
20-Nov	60.0	57.8	61.0	66.3	64.1	62.6	61.1	60.1	60.4	57.2	53.0	47.6	43.8	36.8	37.0	35.7	38.7	43.3	47.3	53.2	61.8	72.2	69.2	62.9	54.7	72.2
21-Nov	69.0	59.1	55.8	56.1	53.8	55.3	60.0	57.6	58.2	58.3	56.1	54.6	55.9	55.5	54.2	56.4	63.5	64.3	65.5	64.7	68.4	71.0	77.6	81.1	61.3	81.1
22-Nov	83.1	83.9	84.2	83.3	84.3	85.0	85.2	86.2	84.1	80.3	77.2	72.0	65.3	67.3	71.1	78.0	79.4	83.2	81.5	77.9	76.8	75.6	74.3	74.2	78.9	86.2
23-Nov	77.0	80.9	82.5	83.6	84.6	86.0	86.1	87.9	88.4	89.1	87.6	87.0	84.6	81.7	84.1	90.1	92.9	92.4	92.9	82.1	81.1	80.3	87.0	80.0	85.4	92.9
24-Nov	66.1	64.5	64.0	62.2	63.7	65.3	66.3	67.9	68.5	69.7	67.1	62.3	61.5	62.6	64.7	72.9	73.5	73.1	72.6	72.5	74.4	78.5	77.7	76.4	68.7	78.5
25-Nov	75.9	76.9	78.0	78.1	79.0	90.7	88.5	86.8	80.4	83.0	72.1	63.2	58.5	57.6	57.9	59.2	62.4	68.0	78.5	87.2	89.0	86.7	85.0	84.8	76.1	90.7
26-Nov	86.1	86.5	87.0	86.4	86.5	86.0	86.9	86.8	86.0	86.5	85.2	80.0	77.1	74.7	74.7	74.6	84.0	87.4	87.9	90.9	92.5	89.1	86.6	86.3	84.8	92.5
27-Nov	93.8	94.8	93.0	91.6	91.6	92.2	92.0	91.2	91.5	93.8	94.3	89.9	88.8	88.6	88.6	79.3	73.5	71.7	70.2	68.4	67.6	67.9	67.8	66.7	83.7	94.8
28-Nov	67.7	63.5	58.9	60.0	61.6	62.4	64.2	64.9	68.7	65.4	60.3	54.8	55.1	53.7	52.5	58.3	60.8	63.8	66.1	67.8	66.8	71.6	72.2	72.0	63.0	72.2
29-Nov	66.5	68.4	65.1	61.9	64.5	63.8	64.4	63.9	71.8	80.9	84.2	82.5	79.5	78.7	81.3	79.2	79.5	80.5	82.3	89.6	89.9	90.2	87.3	84.0	76.7	90.2
30-Nov	83.3	81.6	81.1	81.7	83.4	82.0	85.3	89.9	87.5	83.8	81.4	79.5	72.6	73.4	74.0	77.3	78.4	79.6	81.2	81.5	86.3	88.7	90.8	89.1	82.2	90.8
84.1 83.9 83.7 83.5 83.7 84.3 84.9 85.3 85.0 84.1 81.7 78.0 75.8 74.6 75.6 77.9 81.0 82.6 82.9 83.9 84.6 85.1 85.2 84.1																								Diurnal Average		
96.7 95.8 95.9 96.4 96.7 97.0 96.9 97.2 97.5 96.4 95.4 95.0 95.9 96.8 98.2 99.2 99.5 99.6 99.3 98.2 97.3 96.5 97.3 96.9																								Diurnal Maximum		





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

**Relative Humidity (RH) - %**  
**Surmont 2 - November 2023**

<b>Concentration Ranges (%)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	0	0.00	0.00
20 - 40	4	0.56	0.56
40 - 60	38	5.28	5.83
60 - 80	214	29.72	35.56
80 - 100	464	64.44	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720





Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed (WS) - km/h

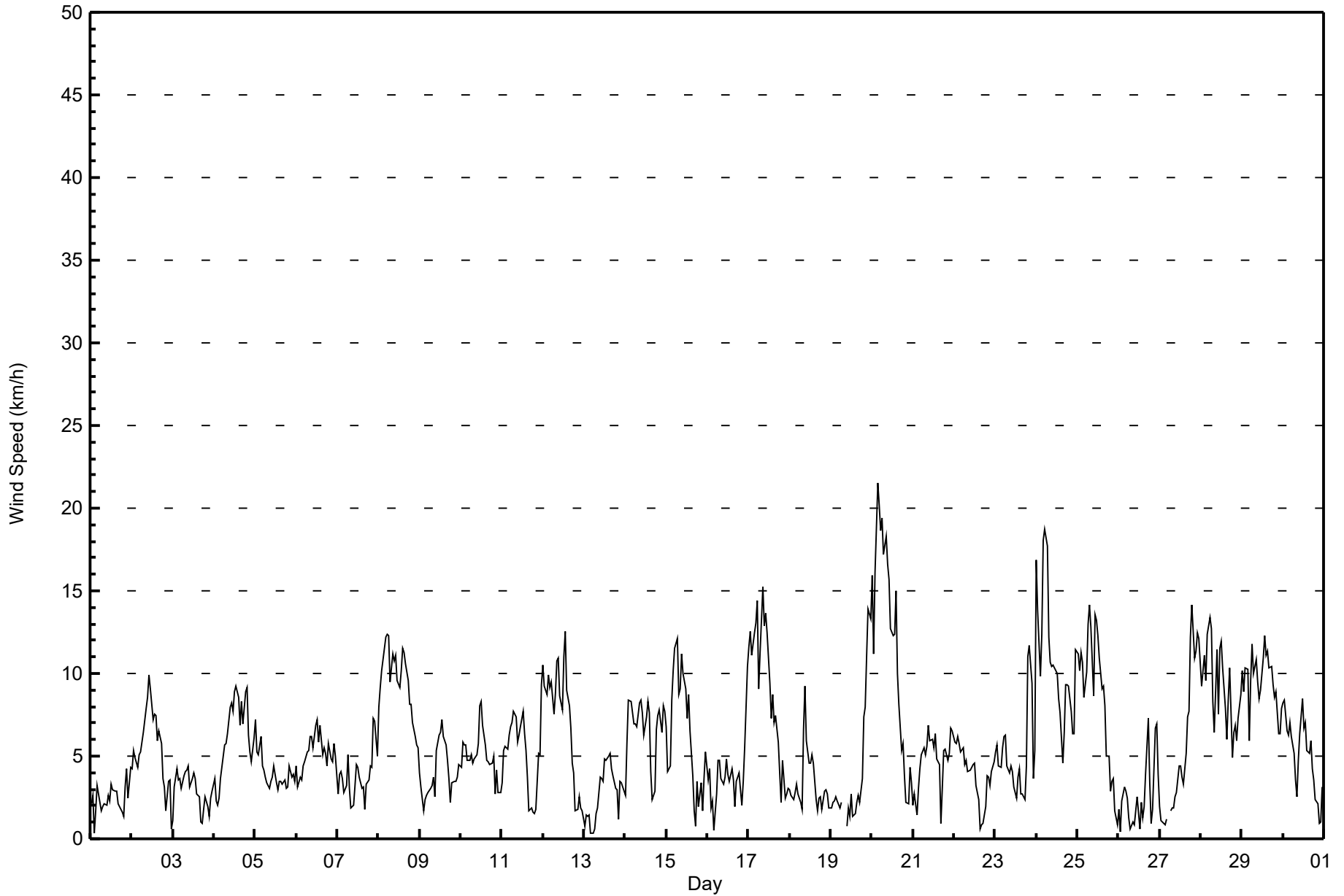
Surmont 2 - November 2023

Maximum Speed: 22 km/h on Nov 20 04:00	Maximum Daily Speed Average: 11.8 km/h on Nov 20	Hours in Service: 720
Minimum Speed Value: 0 km/h on Nov 13 06:00	Minimum Daily Speed Average: 1.2 km/h on Nov 26	Hours of Data: 717
Maximum Diurnal Speed Average: 3.6 km/h at hour 6	Minimum Diurnal Speed Average: 1.3 km/h at hour 13	Hours of Missing Data: 3
Monthly Average Velocity: 2.5 km/h 261.8 deg	Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 2 Q <sub>1</sub> = 3 Median = 5 Q <sub>3</sub> = 8 P <sub>90</sub> = 11 P <sub>99</sub> = 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-Nov	SW2	WSW3	SSW0	SW2	SW3	SW2	SW2	WSW2	SW2	SSW2	SE3	SSW2	SE3	SE3	SE3	SE3	S2	S2	S2	SW1	WSW3	WSW4	WSW2	W4	SSW1.6	W4		
2-Nov	W4	WNW5	W5	W4	W5	WNW5	NW6	NW6	NNW8	NNW9	NNW10	N9	NNW7	NNW8	N7	NW6	N6	N6	N4	NNE3	NNW2	NNW3	W4	W1	NW4.8	NNW10		
3-Nov	SE1	E3	ESE4	SE4	SE4	SE3	ESE4	ESE4	ESE4	ESE4	ESE3	ESE4	E4	ESE4	SSE3	SE3	SSE1	E1	N2	N3	NNE2	NE1	ENE2	NNE3	ESE2.3	ESE4		
4-Nov	NNE4	NE2	ENE2	E2	ESE4	ESE5	ESE6	ESE6	ESE6	ESE8	ESE8	ESE8	ESE9	ESE9	ESE9	E7	E8	ESE7	ESE9	ESE9	E6	E5	E5	ESE6	ESE6.0	ESE9		
5-Nov	ESE7	E5	E5	E6	ESE4	ESE4	E4	ENE3	ENE3	ENE4	E4	E4	E3	ENE3	ENE3	E3	E3	E4	ESE3	ESE3	ESE4	ESE4	ESE4	SE3	E3.8	ESE7		
6-Nov	ESE4	SE3	SE4	SE4	SE4	SSE5	SE5	ESE5	ESE6	SE6	SE6	SE7	SE7	SSE6	SE7	SE5	SE5	SE5	SSE4	SE6	S5	SSE5	S6	SSE5	SE5.0	SE7		
7-Nov	SSE3	S4	SW4	SSW4	S3	WSW3	WSW5	SW3	SW2	SSE2	SSE3	S5	S4	S4	SSW3	SW3	SSW2	SW3	SW4	WSW4	W4	W7	WNW7	W5	SW2.9	W7		
8-Nov	W8	W9	W10	W12	W12	W12	WNW12	WNW10	WNW11	WNW11	WNW11	NW10	WNW9	WNW10	WNW12	WNW11	WNW11	WNW10	WNW8	WNW8	WNW7	NW6	WNW6	WNW5	WNW9.4	W12		
9-Nov	WNW4	WNW3	WSW2	WSW2	WSW3	WSW3	WSW3	WSW3	WSW4	SSE3	SE5	SE6	SE6	SE7	ESE6	SE6	SE5	SE4	SE2	SSE3	SE3	SE3	SE4	ESE4	SSE2.4	SE7		
10-Nov	SE4	ESE6	ESE6	ESE6	E5	E5	E5	ESE5	ESE5	ESE5	SE6	SE8	SE8	SE7	S6	SSE5	S5	S4	SSE5	SSE5	S3	S4	ESE3	SE3	SE4.5	SE8		
11-Nov	SE3	SSE5	SSE6	SE5	SE6	SE7	SE7	ESE8	SE7	SE6	SE6	SE7	SE8	SE6	ESE5	ESE4	SW2	SSW2	SSW2	SW2	SW2	WSW5	W5	WSW9	SSE3.8	WSW9		
12-Nov	WSW11	WSW9	WSW9	WSW10	W9	W10	W8	W9	W11	W11	W9	W8	W11	W13	W9	W8	W7	W5	WNW4	WSW2	SSW2	SW3	WSW2	WSW2	W7.2	W13		
13-Nov	SW1	SW1	WSW1	SW1	S0	E0	E1	ENE2	NE2	E4	ENE4	ENE3	ENE5	ENE5	ENE5	E5	ENE4	ENE4	ENE3	N3	NW1	NW3	NW3	NW3	NE1.6	E5		
14-Nov	NW3	WNW6	WNW8	W8	WNW8	WNW7	WNW7	W7	W8	W8	W8	WSW6	WSW7	WSW8	WSW8	WSW4	SW2	WSW3	W7	W7	WSW8	WSW6	WSW8	WSW8	W6.3	WNW8		
15-Nov	SW7	WSW4	WSW4	WSW8	WSW10	W12	W12	WNW9	W9	NNW11	NNW10	NNW9	NW7	WNW9	WNW7	W4	SW2	WSW1	WSW4	SW2	SW3	SSW2	W4	WNW5	W5.3	W12		
16-Nov	WSW4	SW4	WSW2	SW2	SSW0	SSE3	SE5	SE5	SE4	SE3	SE4	SE5	SE4	SSE4	SSE4	SE4	S2	SSW3	SW4	SW3	S2	W3	W6	W10	S2.1	W10		
17-Nov	WSW12	WSW13	WSW11	WSW12	WSW13	WSW14	WSW9	WSW11	WSW15	WSW13	WSW14	WSW12	WSW9	WSW7	WSW9	WSW7	W7	W6	W4	WSW2	WSW5	WSW2	SW3	SW3	WSW8.9	WSW15		
18-Nov	SW3	SW3	SW2	SSW3	S3	S3	SSW2	S2	WSW7	WSW9	WSW6	SW5	SE5	ESE5	SSE5	SSW2	SW2	SW2	SW3	SW2	SW3	SW3	SW3	SW2	SSW2.8	WSW9		
19-Nov	SSW2	WSW2	SW2	SW3	SSW2	SSW2	WSW2	UO	UO	N1	SE2	W1	NW3	NE1	WNW2	SW2	SW3	SW2	WSW4	W7	WNW8	W11	W14	W13	W3.4	W14		
20-Nov	W16	W11	W16	W22	WNW20	WNW19	WNW19	WNW17	WNW18	WNW17	WNW16	WNW13	W12	WNW12	WNW15	WNW10	WNW8	WNW5	WNW6	WNW4	W2	SW2	WSW4	WSW3	WNW11.8	W22		
21-Nov	WSW2	NW3	SW1	ESE3	ESE4	ESE5	ESE6	ESE5	ESE6	ESE7	ESE6	E6	ENE6	E6	ESE5	NE4	NNW1	N3	NE5	NE5	N5	N5	N7	N6	ENE2.8	ESE7		
22-Nov	N6	N6	N6	N6	N5	N5	N5	NNW5	N4	NNE4	NNE4	NNE5	NE5	N3	NE2	WNW1	S1	SSW1	SSE2	SE4	SE4	SSE3	SSE4	SE5	NNE2.2	N6		
23-Nov	SE5	SE6	SE4	SE4	SE6	SE6	SE6	SE4	SE4	SSE4	SE4	SE3	S2	SW4	SW4	SSW3	S3	SSW2	SW4	WSW11	WSW12	WSW9	S4	SSW5	S3.4	WSW12		
24-Nov	WSW17	WSW14	SW10	WSW12	WSW18	WSW19	WSW18	W12	W11	W10	W11	W10	W11	W10	WNW10	W8	W8	WSW5	W6	WSW9	W9	W9	W8	W6	WNW6	W11	WSW10.5	WSW19
25-Nov	W11	W10	W11	W11	WNW9	NW10	NNW13	NNW14	NNW13	NW9	NNW14	NNW13	NNW12	NW11	NNW9	NW9	NW8	NNW5	NNW5	W3	W3	WSW4	SW2	SW1	NW7.7	NNW14		
26-Nov	SW2	SSW0	SSE2	SE3	ESE3	SE2	SW1	SW1	SSE1	WNW1	NE2	WNW3	S1	SSE2	ESE1	ENE2	W4	W7	W3	SSW1	SW2	W7	W7	WNW4	WSW1.2	W7		
27-Nov	WSW2	WSW1	SW1	SSW1	S1	UO	SW2	SSW2	S2	S3	SSE3	SE4	SSE4	SE4	SSW3	WSW5	W7	W8	W12	W14	W11	W11	W12	W12	WSW4.1	W14		
28-Nov	W9	W10	W11	WNW10	W12	W13	W13	WNW8	W6	W11	NW8	W12	W12	W10	W8	W6	W8	W10	WNW5	W6	W7	W6	W7	W9	W9.0	W13		
29-Nov	W10	WNW9	W10	WNW10	NW6	WNW10	W12	WNW10	WNW11	WNW10	WNW8	WNW9	WNW11	WNW12	WNW11	WNW11	WNW10	WNW10	WNW9	NW9	WNW9	WNW6	WNW6	WNW8	WNW9.4	WNW12		
30-Nov	WNW8	WNW8	WNW7	WNW6	WNW7	WNW6	W5	W4	W3	W5	W6	W9	WNW7	WNW7	W5	W5	W6	WSW4	WSW4	WSW2	SW2	SSW1	SW1	SW3	W4.8	W9		

WSW3.5	WSW3.3	WSW3.2	WSW3.5	WSW3.3	WSW3.6	W3.1	W2.5	W2.8	W2.4	W1.7	W1.5	W1.3	W1.6	WSW1.8	W1.6	W2.1	W2.3	W2.3	WSW2.2	WSW2.6	W3.0	W3.0	W3.3	Diurnal Average
WSW17	WSW14	W16	W22	WNW20	WSW19	WNW19	WNW17	WNW18	WNW17	WNW16	NNW13	W12	W13	WNW15	WNW11	WNW11	WNW10	W12	W14	WSW12	W11	W14	W13	Diurnal Maximum

UO - Unstable Operation  
 All monthly, daily, and diurnal averages have been calculated using vector methods





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h  
Surmont 2 - November 2023**

<b>Wind Speed Ranges (km/h)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	403	56.21	56.21
6 - 11	256	35.70	91.91
12 - 19	56	7.81	99.72
20 - 28	2	0.28	100.00
29 - 38	0	0.00	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 717

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Wind Speed (WS) - km/h  
Surmont 2 - November 2023**

<b>Wind Speed Ranges (km/h)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	13	7	10	17	22	34	54	28	27	29	61	46	27	16	8	4	403
6 - 11	10	0	0	1	6	24	27	2	2	0	2	29	73	57	14	9	256
12 - 19	0	0	0	0	0	0	0	0	0	0	0	17	21	12	0	6	56
20 - 28	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	2
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	23	7	10	18	28	58	81	30	29	29	63	92	122	86	22	19	717

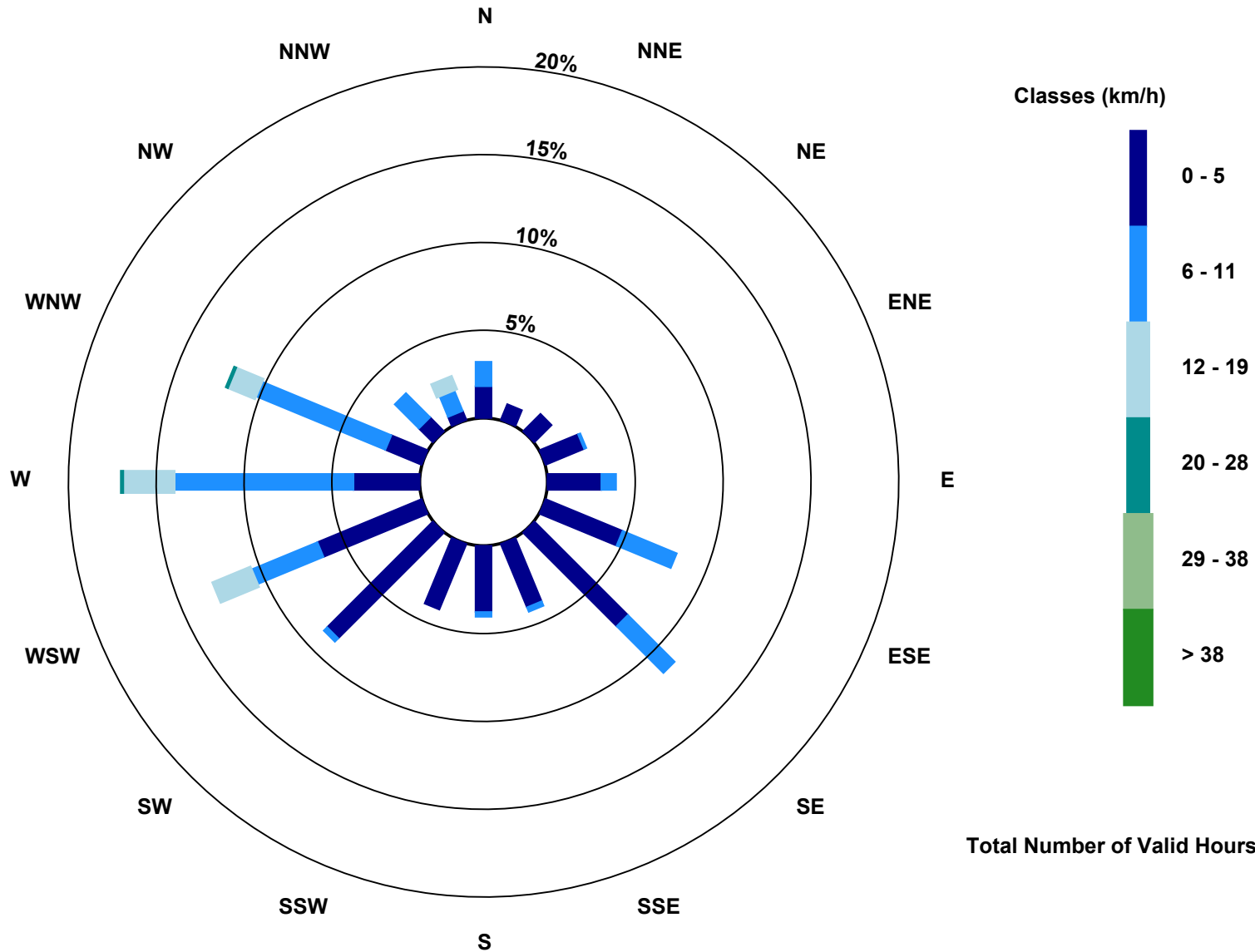
Total Number of Valid Hours: 717

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 2023

Wind Speed (WS) - km/h  
Surmont 2





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

**Wind Speed (WS) - km/h**  
**Surmont 2 - November 2023**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 8 km/h on Nov 20 04:00	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 Nov 1 17:00	
Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 1 Q <sub>1</sub> = 1 Median = 2 Q <sub>3</sub> = 3 P <sub>90</sub> = 4 P <sub>99</sub> = 6	

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

UO - Unstable Operation



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

**Wind Direction (WD) - deg**  
**Surmont 2 - November 2023**

Direction of Maximum Speed: 279 deg on Nov 20 04:00	Hours in Service: 720
Direction of Maximum Daily Speed Average: 283.0 deg on Nov 20	Hours of Data: 717
Direction of Minimum Speed: 96 deg on Nov 13 06:00	Hours of Missing Data: 3
Direction of Minimum Daily Speed Average: 1.2 deg on Nov 26	Percent Operational Time: 99.6
Monthly Average Direction: 261.8 deg	

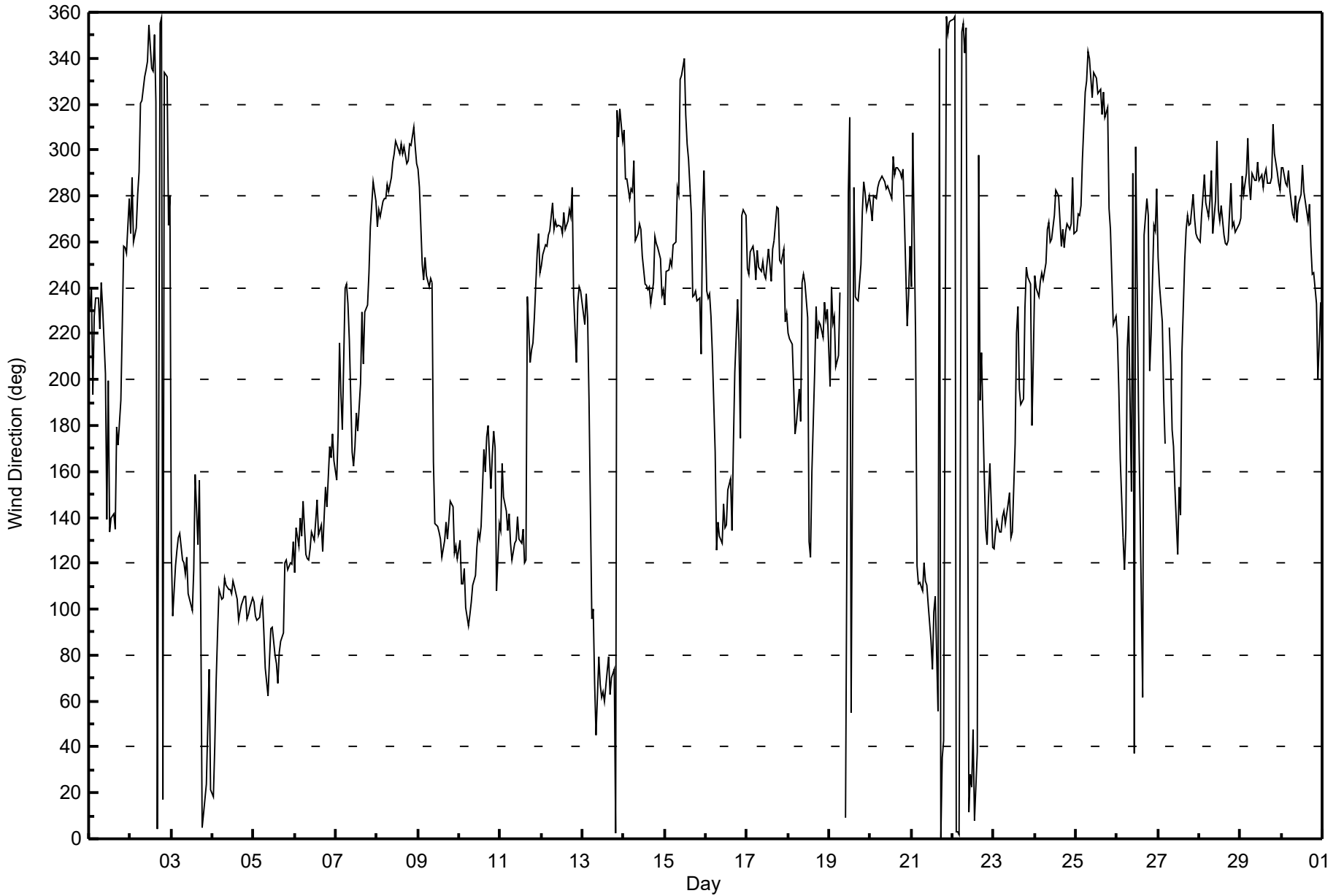
Day	Hourly Period Ending At (MST)																								Daily Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Nov	231	241	194	228	235	235	222	242	232	202	139	200	133	140	142	135	180	172	191	223	258	258	255	279	211.5
2-Nov	264	288	260	266	280	291	320	322	332	335	339	354	336	335	350	321	4	355	357	17	334	332	267	280	325.4
3-Nov	125	97	119	126	131	133	121	120	115	123	107	102	100	117	158	128	156	99	5	11	24	49	74	21	107.3
4-Nov	18	40	69	90	109	104	105	114	110	108	109	107	112	110	104	95	99	102	105	106	96	97	100	105	102.1
5-Nov	103	97	95	96	102	104	90	74	62	78	91	92	80	76	68	81	86	90	120	121	117	120	120	130	96.4
6-Nov	116	135	127	140	132	147	124	122	122	126	134	130	138	148	132	137	125	140	153	144	171	166	176	164	139.1
7-Nov	156	177	216	193	178	240	242	233	217	168	162	171	186	178	198	230	207	229	233	246	267	276	286	278	223.4
8-Nov	267	274	271	278	279	279	285	282	288	295	299	304	300	299	303	298	302	294	295	302	302	310	301	294	290.9
9-Nov	292	284	250	243	253	245	241	244	242	164	137	136	134	130	122	130	138	131	138	147	144	124	128	122	154.6
10-Nov	130	111	111	118	101	93	98	103	111	115	127	133	130	136	170	160	175	180	152	167	177	171	108	137	132.4
11-Nov	134	163	149	143	134	142	129	121	129	130	141	130	129	135	120	121	236	207	213	216	227	255	264	246	150.3
12-Nov	249	255	258	258	263	265	277	265	269	267	267	266	264	273	266	269	274	271	284	237	207	234	241	238	263.7
13-Nov	229	224	237	227	191	96	100	68	45	79	67	61	64	60	73	79	63	70	74	2	317	306	318	304	52.9
14-Nov	309	287	288	279	283	282	296	260	264	268	266	254	241	241	239	240	233	242	263	259	257	252	237	239	261.7
15-Nov	232	247	248	252	249	259	260	284	281	330	332	340	316	303	296	272	236	237	238	234	236	211	270	291	279.1
16-Nov	238	236	238	227	211	168	126	138	132	129	146	135	137	152	157	134	171	203	235	216	175	271	274	271	189.4
17-Nov	248	246	256	258	253	243	256	249	247	252	246	244	257	250	243	257	261	275	275	252	251	257	225	229	251.0
18-Nov	220	218	215	197	177	181	196	182	242	246	242	227	129	122	160	204	232	218	225	224	219	234	226	231	211.0
19-Nov	197	240	225	227	206	211	238	UO	UO	9	133	281	315	55	284	236	235	234	250	273	286	281	274	280	265.7
20-Nov	275	269	280	279	284	286	287	289	286	283	284	283	279	297	289	293	292	291	288	292	270	224	237	258	283.0
21-Nov	240	308	218	119	111	112	108	120	112	110	102	86	74	99	105	56	344	1	35	43	358	351	356	356	71.0
22-Nov	357	358	3	3	2	351	355	342	353	12	28	23	48	8	38	298	191	211	157	135	128	148	164	127	20.6
23-Nov	127	134	138	133	134	140	143	138	146	150	131	134	172	220	232	196	189	192	231	249	245	242	180	210	182.4
24-Nov	245	240	236	243	247	243	251	265	269	260	261	272	283	281	280	258	265	257	264	268	265	268	288	264	258.4
25-Nov	265	272	271	276	296	325	330	343	340	323	334	332	331	325	327	316	325	314	319	274	265	245	224	228	312.6
26-Nov	218	195	166	131	117	135	214	227	151	290	37	301	188	149	106	61	263	279	272	204	220	267	265	283	245.3
27-Nov	253	241	225	192	172	UO	223	206	178	171	152	124	153	141	211	252	265	271	267	268	281	270	263	262	251.6
28-Nov	260	272	280	289	277	271	278	291	264	278	304	274	269	276	263	259	259	261	285	267	269	264	265	268	272.9
29-Nov	270	288	281	290	305	285	279	290	287	286	295	287	289	284	289	291	286	285	288	311	299	290	286	282	287.9
30-Nov	292	292	286	284	291	283	272	270	280	268	277	280	293	282	278	269	277	258	246	247	233	200	216	234	276.7

252.9 256.8 256.7 256.3 257.1 257.2 267.0 273.3 269.9 271.0 279.1 274.0 264.5 264.0 258.2 263.0 266.1 261.6 262.5 258.4 258.2 260.5 259.0 260.0

Diurnal Average

UO - Unstable Operation

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







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

**Wind Direction (WD) - deg**  
**Surmont 2 - November 2023**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 100 deg on Nov 19 10:00	Hours of Data: 717
Minimum Value: 11 deg on Nov 16 02:00	Hours of Missing Data: 3
Percentiles: P <sub>1</sub> = 14 P <sub>10</sub> = 23 Q <sub>1</sub> = 29 Median = 37 Q <sub>3</sub> = 45 P <sub>90</sub> = 57 P <sub>99</sub> = 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-Nov	58	19	86	18	19	36	44	49	53	53	35	57	36	37	32	33	29	35	29	44	40	23	60	60	86
2-Nov	42	34	26	27	29	34	38	38	35	37	36	44	46	42	44	45	43	50	59	63	83	50	56	88	88
3-Nov	84	42	26	39	46	46	48	32	38	33	70	43	42	46	53	40	49	83	67	67	64	97	51	59	97
4-Nov	43	60	75	65	37	24	25	20	20	21	23	24	21	24	24	25	22	26	20	21	26	22	24	20	75
5-Nov	22	32	26	26	28	35	37	41	47	48	41	36	48	44	39	49	36	52	38	44	22	27	23	45	52
6-Nov	30	50	38	45	37	43	32	34	35	41	48	41	47	53	39	50	45	54	54	49	53	58	55	65	65
7-Nov	91	63	47	53	43	41	34	41	54	47	47	52	50	50	46	40	40	27	41	32	32	32	36	38	91
8-Nov	26	31	28	31	29	29	30	30	34	33	38	38	42	38	39	36	38	35	38	36	38	38	42	37	42
9-Nov	45	35	25	14	18	20	22	20	13	46	37	38	43	38	37	41	50	49	51	51	44	44	28	34	51
10-Nov	43	33	32	39	24	33	34	36	34	39	45	42	38	55	51	61	52	53	69	63	91	53	58	56	91
11-Nov	45	42	43	44	45	42	39	34	42	35	41	38	34	45	36	43	47	37	43	44	44	29	34	19	47
12-Nov	20	24	26	24	25	27	34	24	25	25	27	26	28	28	29	33	33	56	50	41	37	19	52	82	82
13-Nov	94	60	34	41	78	73	74	53	40	37	39	52	40	42	38	31	31	34	44	46	70	41	50	43	94
14-Nov	50	38	37	29	33	30	36	31	23	30	37	43	26	28	29	34	17	29	27	28	29	21	21	25	50
15-Nov	20	22	41	29	28	28	32	40	30	43	39	37	48	44	36	31	17	37	18	12	14	26	43	38	48
16-Nov	15	11	51	22	66	45	42	49	33	39	34	33	44	51	41	34	63	55	40	37	66	51	44	34	66
17-Nov	23	24	26	26	24	25	38	27	21	24	22	21	26	25	26	28	30	31	77	43	29	42	20	24	77
18-Nov	21	28	25	20	23	19	20	35	29	25	31	51	54	35	30	50	30	17	48	45	21	21	31	43	54
19-Nov	29	25	14	26	29	44	22	UO	UO	100	68	88	41	84	56	18	12	12	55	27	34	35	32	38	100
20-Nov	30	38	35	31	32	32	32	34	32	31	30	33	34	40	33	35	34	37	37	46	23	35	16	28	46
21-Nov	35	47	75	32	20	26	21	44	27	57	60	41	39	23	36	45	88	64	46	43	48	35	39	43	88
22-Nov	44	43	52	47	49	47	43	43	42	54	54	54	57	78	72	86	37	57	44	42	43	44	44	34	86
23-Nov	37	42	44	38	42	40	46	45	51	48	49	35	45	53	40	53	40	27	36	25	24	28	62	77	77
24-Nov	27	29	46	43	27	23	25	29	33	25	25	30	33	34	32	27	29	22	24	26	23	30	40	24	46
25-Nov	25	27	26	29	42	44	40	39	42	43	43	46	43	41	42	42	41	39	40	18	16	15	43	74	74
26-Nov	65	83	36	36	24	49	78	80	58	94	64	57	90	35	80	63	64	32	43	65	25	25	26	70	94
27-Nov	58	50	54	63	40	UO	52	19	39	29	41	32	31	39	58	44	27	27	24	27	33	27	25	25	63
28-Nov	26	29	32	34	30	30	35	60	77	33	53	33	30	31	30	27	26	28	51	28	27	25	26	28	77
29-Nov	30	35	34	36	43	34	31	35	32	32	34	32	32	32	32	32	32	34	35	43	40	44	36	31	44
30-Nov	36	34	38	34	34	31	26	26	55	27	28	30	39	30	32	27	27	27	19	30	13	53	56	14	56
	94	83	86	65	78	73	78	80	77	100	70	88	90	84	80	86	88	83	77	67	91	97	62	88	

Diurnal Maximum

UO - Unstable Operation



## WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY  
MONITORING PROGRAM  
MONTHLY REPORT

### **AMS30 ELLS RIVER NOVEMBER 2023**

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

December 22, 2023

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - ELLS RIVER (AMS30)  
NOVEMBER 2023

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	32	35	99.58	17.6	0	3.5	0
TRS (ppb) Average	685	34	35	99.86	1.8	0	1	0
THC (ppm) Average	584	30	136	85.28	5	-	2.6	-
NMHC (ppm) Average	584	30	136	85.28	0.28	-	0.044	-
CH4 (ppm) Average	584	30	136	85.28	4.7	-	2.6	-
NO2 (ppb) Average	684	33	36	99.58	30.1	0	16.6	-
NO (ppb) Average	684	33	36	99.58	136.4	-	52	-
NOX (ppb) Average	684	33	36	99.58	160.4	-	67.1	-
PM2.5 (ug/m3) Average	718	2	2	100	23	0	13.6	0
Temperature 2 m (C) Average	720	0	0	100	6.3	-	1.4	-
Relative Humidity (%) Average	720	0	0	100	96.3	-	94.2	-
Wind Speed 10 m (km/h) Average	708	0	12	98.33	30	-	16	-
Wind Direction 10 m (deg) Average	708	0	12	98.33	-	-	-	-
Global Solar Radiation (W/m2) Average	720	0	0	100	338.3	-	65.9	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - ELLS RIVER (AMS30)  
NOVEMBER 2023

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	0.53	1.7	-	0	0	0	0.1	0.2	0.8	17.6
TRS (ppb) Average	685	0.49	0.2	-	0.3	0.3	0.4	0.4	0.5	0.7	1.8
THC (ppm) Average	584	2.17	0.3	-	1.9	2	2	2.1	2.2	2.5	5
NMHC(ppm) Average	584	0.007	0.031	-	0	0	0	0	0	0	0.28
CH4(ppm) Average	584	2.16	0.3	-	1.9	2	2	2.1	2.2	2.5	4.7
NO2 (ppb) Average	684	6.9	6.9	-	0.1	0.4	0.8	4.5	11.4	17.8	30.1
NO (ppb) Average	684	6.68	17	-	0	0	0	0.1	3.2	24.1	136.4
NOX (ppb) Average	684	13.57	21.6	-	0.2	0.4	0.8	5.1	15.3	40.7	160.4
PM2.5 (ug/m3) Average	718	6.4	3.8	-	0.6	2.8	3.9	5.3	8	11.9	23
Temperature 2 m (C) Average	720	-4.52	4.6	-	-18.7	-11	-7	-4.1	-1.1	0.9	6.3
Relative Humidity (%) Average	720	81.54	10.3	-	43.5	66.5	76.9	83.5	89	93	96.3
Wind Speed 10 m (km/h) Average	708	8.2	5	-	0	3	5	7	10	15	30
Wind Direction 10 m (deg) Average	708	234.4	-	-	-	-	-	-	-	-	-
Global Solar Radiation (W/m2) Average	720	26.47	54.7	-	0	0	0	0.1	29.3	95.7	338.3

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - ELLS RIVER (AMS30)  
NOVEMBER 2023

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
SO2	07 Nov 2023 14:00	07 Nov 2023 14:00	1	Maintenance - reinitiated daily QA check
SO2, THC/NMHC/CH4, NO2	30 Nov 2023 14:00	30 Nov 2023 15:00	2	Maintenance - sample manifold cleaned
TRS	07 Nov 2023 14:00	07 Nov 2023 14:00	1	Maintenance - reinitiated daily QA check
THC/NMHC/CH4	04 Nov 2023 04:00	07 Nov 2023 13:00	82	Unstable Operation - depleted support gas
THC/NMHC/CH4	07 Nov 2023 14:00	07 Nov 2023 14:00	1	Maintenance - reinitiated daily QA check
THC/NMHC/CH4	07 Nov 2023 15:00	08 Nov 2023 11:00	21	Unstable Operation - depleted support gas
NO2	07 Nov 2023 14:00	07 Nov 2023 14:00	1	Maintenance - reinitiated daily QA check
Wind Speed, Wind Direction	08 Nov 2023 05:00	08 Nov 2023 14:00	10	Flat line in sensor output signal
Wind Speed, Wind Direction	09 Nov 2023 05:00	09 Nov 2023 05:00	1	Flat line in sensor output signal
Wind Speed, Wind Direction	26 Nov 2023 00:00	26 Nov 2023 00:00	1	Flat line in sensor output signal



Wood Buffalo Environmental Association

Summary of Hour Averages

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

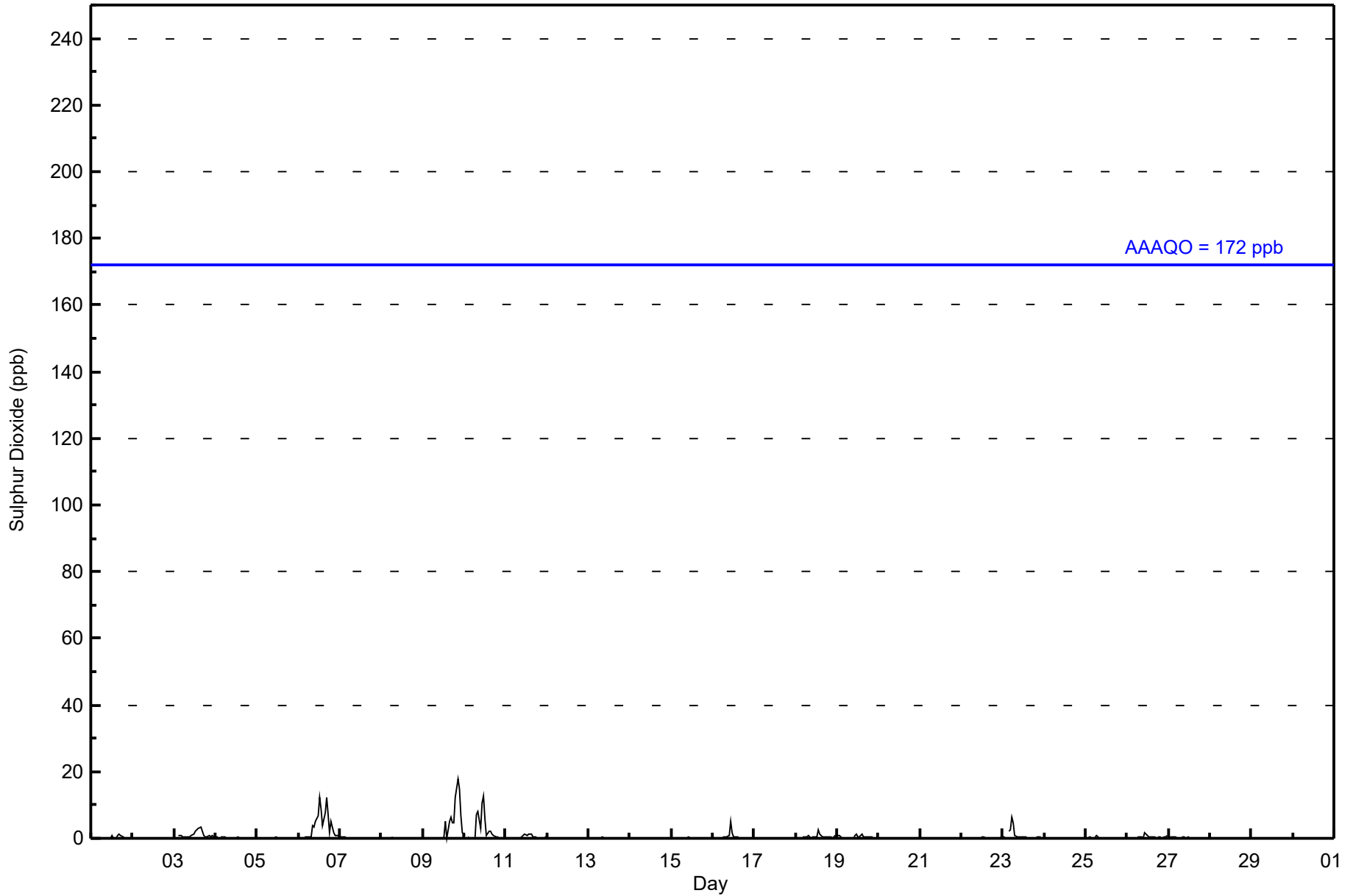
Ells River - November 2023

Number of Exceedences (AAAQO):		1-hr: 0		24-hr: 0		Hours in Service: 720														720																												
Maximum Value: 17.6 ppb on Nov 9 21:00				Maximum Daily Average: 3.5 ppb on Nov 6		Hours of Data: 685														685																												
Minimum Value: 0.0 ppb on Nov 2 00:00				Minimum Daily Average: 0.0 ppb on Nov 20		Hours of Missing Data: 35														35																												
Maximum Diurnal Average: 1.0 ppb at hour 12				Minimum Diurnal Average: 0.2 ppb at hour 3		Hours of Calibration: 32														32																												
Monthly Average: 0.53 ppb				Percentiles: P <sub>1</sub> = 0.0 P <sub>10</sub> = 0.0 Q <sub>1</sub> = 0.0 Median = 0.1 Q <sub>3</sub> = 0.2 P <sub>90</sub> = 0.8 P <sub>99</sub> = 9.0		Percent Operational Time: 99.6														99.6																												
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Nov	0.1	0.1	0.2	0.1	0.0	Z	0.0	0.0	0.1	0.0	0.1	0.1	0.7	0.1	0.1	0.8	1.3	0.9	0.4	0.1	0.1	0.0	0.0	0.0	0.2	1.3																						
2-Nov	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.1	0.0	0.1																						
3-Nov	0.0	Z	1.0	0.9	0.8	0.5	0.4	0.3	0.3	0.4	0.8	1.4	2.1	2.5	2.9	3.6	2.1	0.9	0.5	0.5	0.8	0.6	0.7	0.6	1.1	3.6																						
4-Nov	0.5	0.6	Z	0.5	0.4	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.6																						
5-Nov	0.1	0.1	0.0	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.0	0.1	0.2																						
6-Nov	0.1	0.1	0.1	0.1	0.2	0.2	0.3	0.3	3.8	3.4	5.3	6.6	12.4	8.8	4.0	7.5	12.4	7.3	1.6	5.1	1.6	0.8	0.8	0.7	3.5	12.4																						
7-Nov	0.6	0.4	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.2	0.2	M	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.6																						
8-Nov	0.1	0.1	0.1	0.1	0.1	Z	0.2	0.1	0.0	0.0	0.0	C	C	C	C	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2																						
9-Nov	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	5.1	0.1	4.9	6.5	4.5	4.5	12.1	17.6	14.8	6.7	1.5	3.4	17.6																						
10-Nov	0.8	Z	0.3	0.2	0.1	0.0	0.1	7.1	7.9	2.8	10.4	12.5	5.8	0.8	1.9	2.0	1.2	0.7	0.3	0.2	0.1	0.1	0.1	0.1	2.4	12.5																						
11-Nov	0.1	0.1	Z	0.2	0.1	0.0	0.2	0.2	0.1	0.4	1.0	1.1	0.9	1.2	1.2	1.2	0.6	0.3	0.2	0.1	0.1	0.1	0.1	0.2	0.4	1.2																						
12-Nov	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	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2																						
13-Nov	0.1	0.1	0.1	0.1	Z	0.1	0.1	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.1	0.2																						
14-Nov	0.0	0.0	0.0	0.0	0.0	Z	0.0	0.1	0.0	0.0	0.1	0.0	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																						
15-Nov	Z	0.2	0.2	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	0.2	0.1	0.1	0.2	0.2	0.2	0.1	0.1	0.2	0.2																						
16-Nov	0.1	Z	0.1	0.1	0.1	0.1	0.3	0.3	0.6	0.6	5.0	1.8	0.4	0.3	0.3	0.1	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.5	5.0																						
17-Nov	0.0	0.0	Z	0.0	0.1	0.0	0.0	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.1	0.0	0.1	0.1	0.1	0.2	0.1	0.2																						
18-Nov	0.2	0.1	0.1	Z	0.3	0.6	0.6	0.8	0.5	0.2	0.2	0.3	0.5	2.5	1.1	0.5	0.4	0.4	0.4	0.3	0.3	0.2	0.3	0.7	0.5	2.5																						
19-Nov	0.7	0.7	0.3	0.1	Z	0.1	0.1	0.0	0.0	0.2	1.1	1.5	0.3	0.4	1.2	0.5	0.3	0.4	0.3	0.4	0.3	0.1	0.0	0.0	0.4	1.5																						
20-Nov	0.0	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0																						
21-Nov	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0																						
22-Nov	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.3	0.1	0.3																						
23-Nov	0.3	0.5	Z	1.9	2.6	6.2	4.5	0.7	0.5	0.3	0.4	0.4	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.2	0.3	0.2	0.0	0.1	0.9	6.2																						
24-Nov	0.1	0.1	0.1	Z	0.1	0.1	0.0	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																						
25-Nov	0.1	0.1	0.3	0.6	Z	0.4	0.7	0.2	0.2	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	0.2	0.7																						
26-Nov	0.1	0.1	0.1	0.1	0.1	Z	0.3	0.3	0.3	0.2	1.5	1.2	0.4	0.2	0.2	0.3	0.3	0.1	0.3	0.4	0.1	0.3	0.4	0.7	0.4	1.5																						
27-Nov	Z	0.6	0.5	0.3	0.3	0.2	0.2	0.2	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.6																						
28-Nov	0.1	Z	0.2	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	0.1	0.1	0.2	0.2	0.2	0.2	0.1	0.2	0.1	0.2																						
29-Nov	0.2	0.2	0.2	Z	0.2	0.1	0.1	0.1	0.2	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.0	0.1	0.0	0.2																						
30-Nov	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	M	M	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1																						
																								0.2	0.2	0.2	0.2	0.2	0.4	0.3	0.4	0.5	0.3	0.9	1.0	0.9	0.9	0.5	0.8	0.9	0.6	0.3	0.7	0.8	0.6	0.4	0.2	Diurnal Average
																								0.8	0.7	1.0	1.9	2.6	6.2	4.5	7.1	7.9	3.4	10.4	12.5	12.4	8.8	4.0	7.5	12.4	7.3	4.5	12.1	17.6	14.8	6.7	1.5	Diurnal Maximum
Z - zerospan      C - Calibration      M - Maintenance																																																
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 172 ppb      24-hr 48 ppb																																																



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

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Ells River - November 2023**





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

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Ells River - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 10	679	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: 685

Total Number of Hours: 720





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

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Ells River - November 2023**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	47	45	24	13	9	7	29	75	114	93	76	40	30	40	17	12	671
11 - 20	0	0	0	0	0	0	0	2	4	0	0	0	0	0	0	0	6
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	47	45	24	13	9	7	29	77	118	93	76	40	30	40	17	12	677

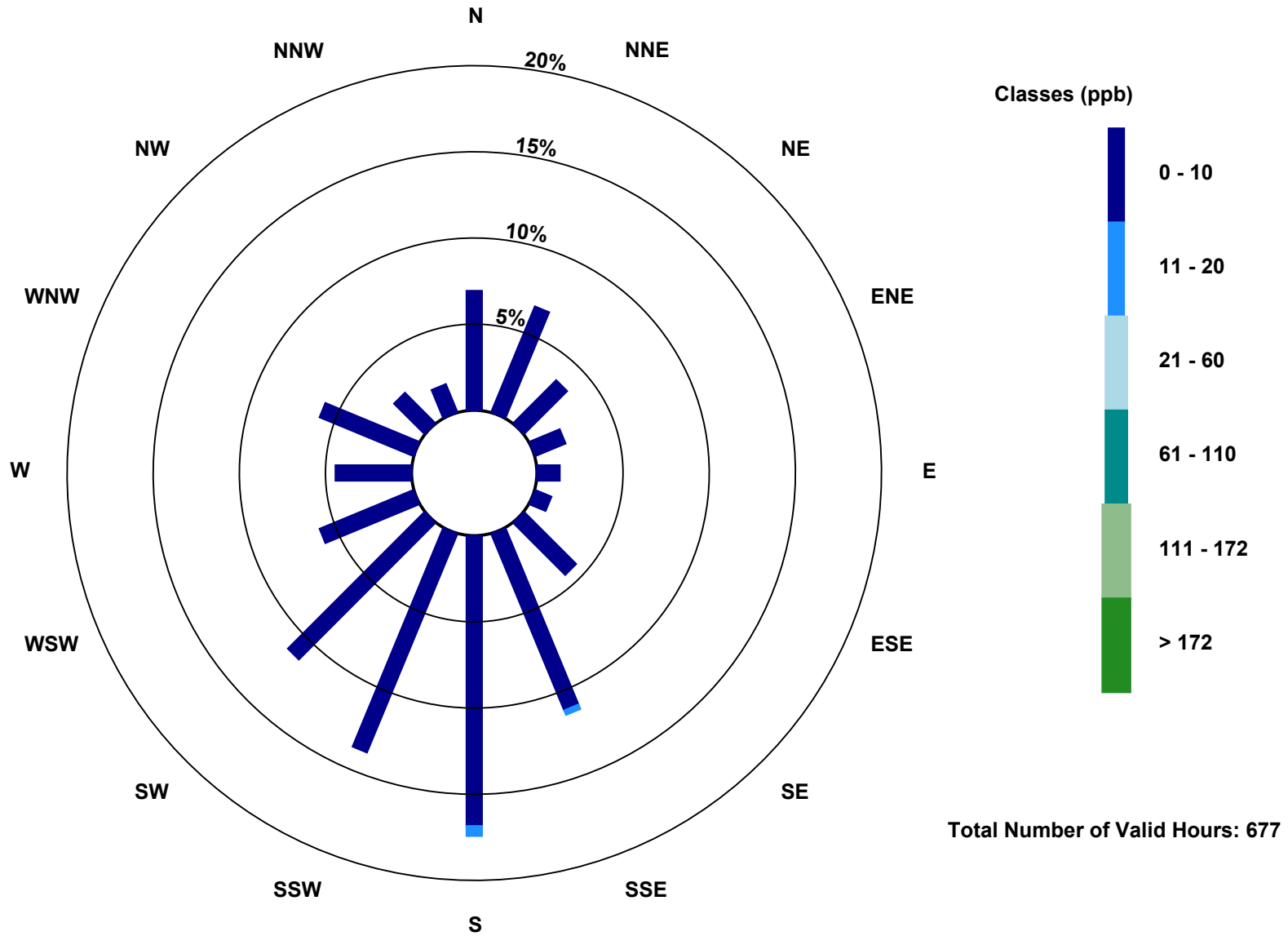
Total Number of Valid Hours: 677

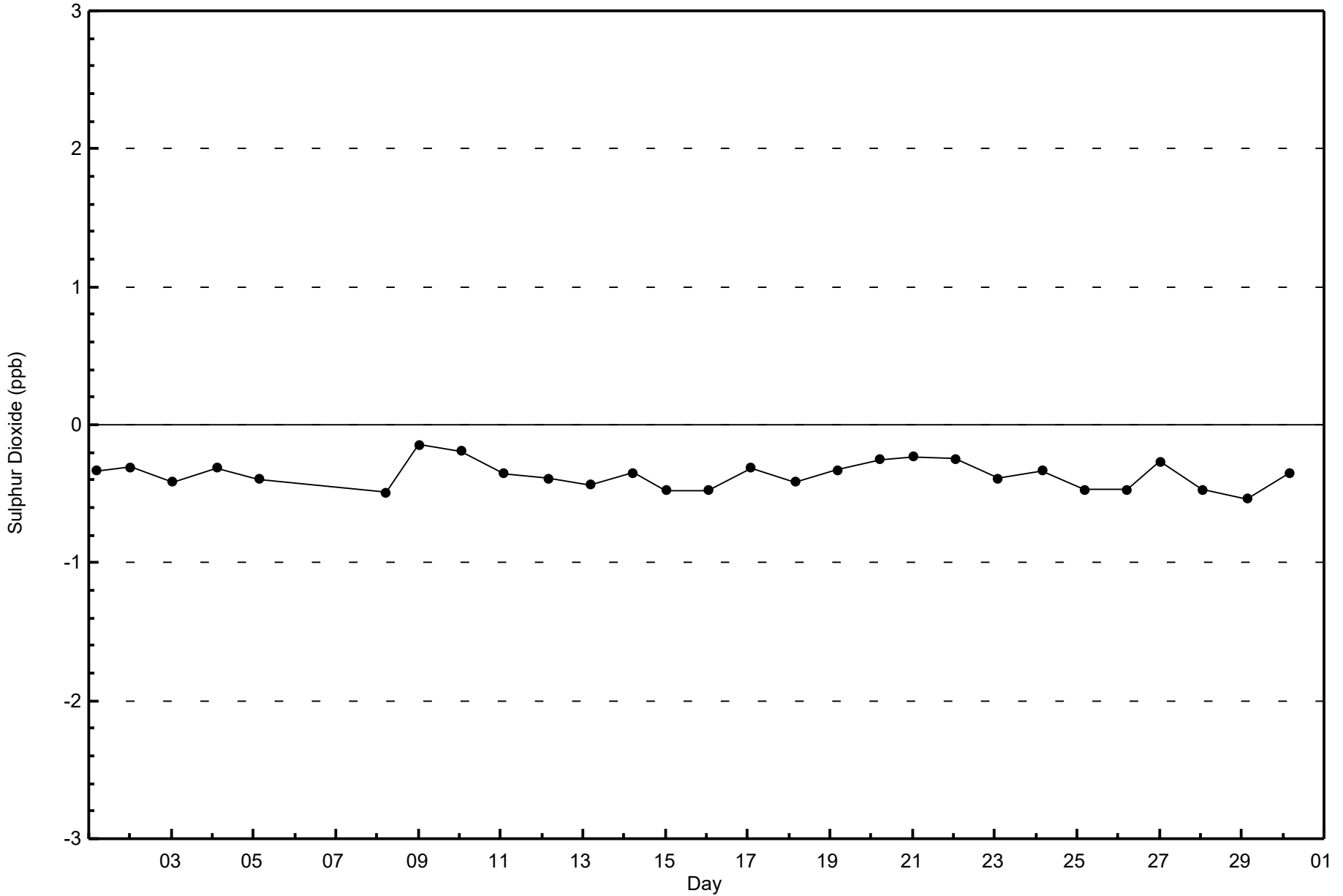
Total Number of Hours: 720

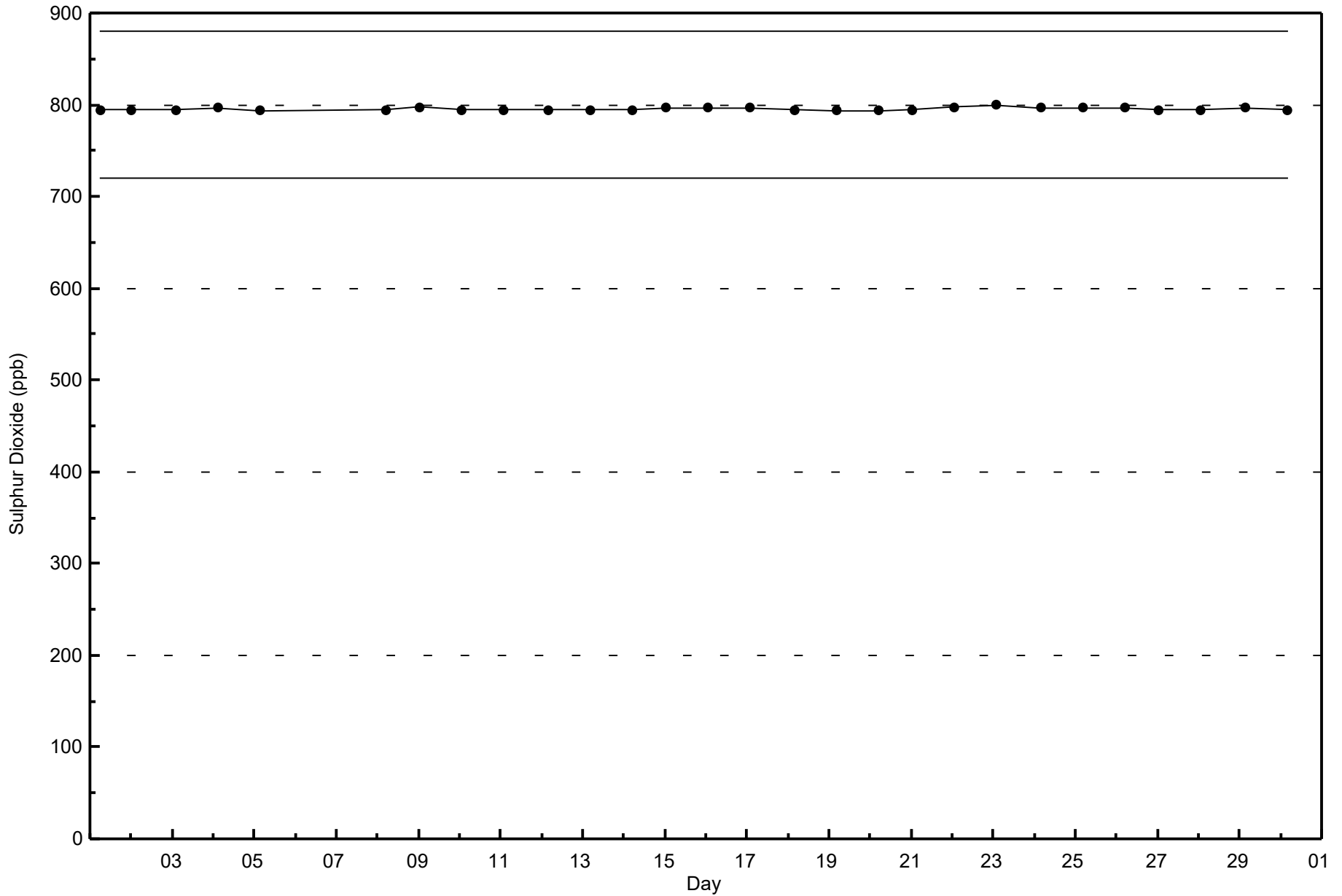


Wood Buffalo Environmental Association  
Wind Rose Nov 2023

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

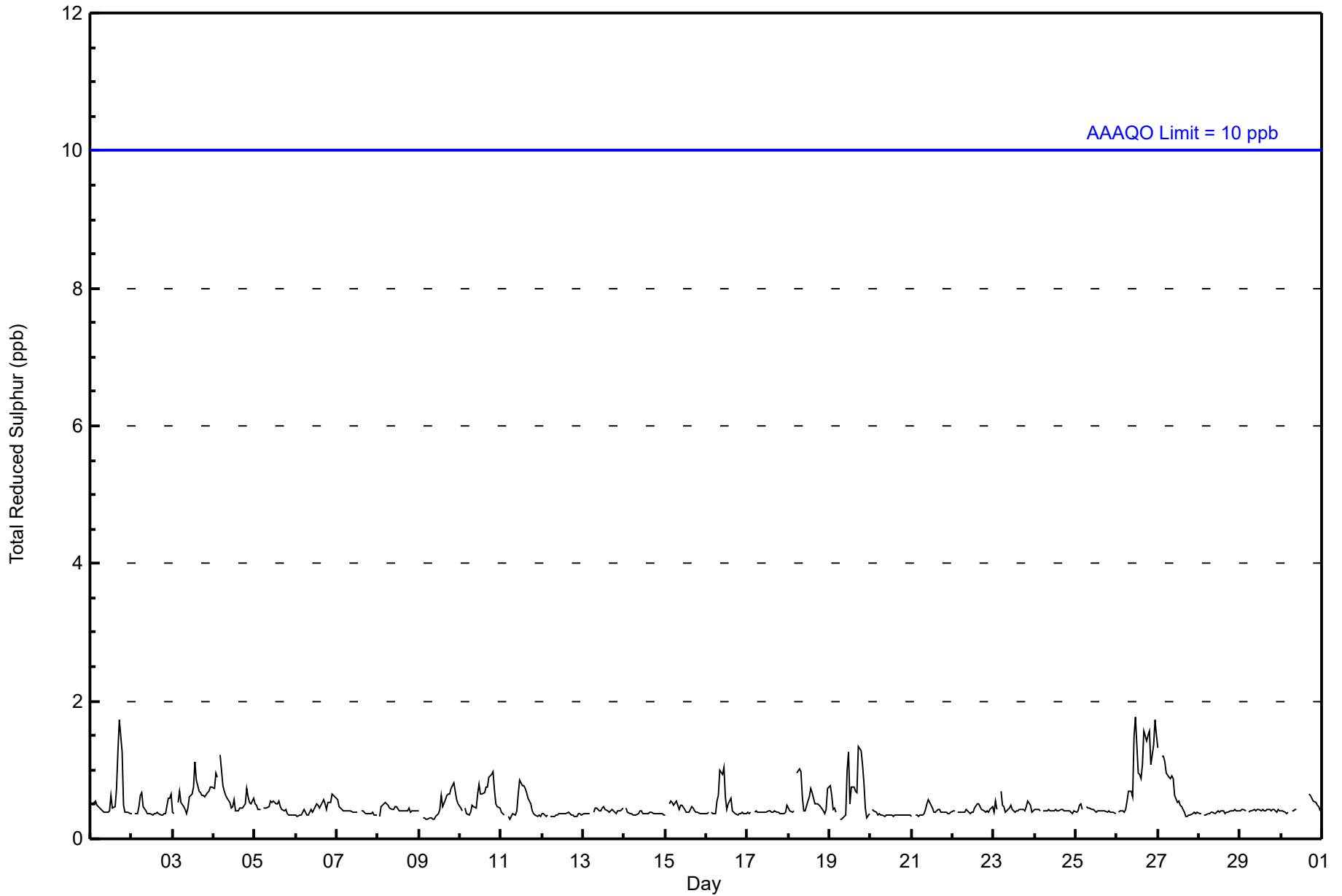








Number of Exceedences (AAAQO):		1-hr: 0	24-hr: 0																		Hours in Service:	720							
Maximum Value: 1.8 ppb on Nov 26 12:00		Maximum Daily Average: 1.0 ppb on Nov 26																	Hours of Data:	685									
Minimum Value: 0.3 ppb on Nov 9 06:00		Minimum Daily Average: 0.4 ppb on Nov 20																	Hours of Missing Data:	35									
Maximum Diurnal Average: 0.6 ppb at hour 18		Minimum Diurnal Average: 0.4 ppb at hour 2																	Hours of Calibration:	34									
Monthly Average: 0.49 ppb		Percentiles: P <sub>1</sub> = 0.3 P <sub>10</sub> = 0.3 Q <sub>1</sub> = 0.4 Median = 0.4 Q <sub>3</sub> = 0.5 P <sub>90</sub> = 0.7 P <sub>99</sub> = 1.5																	Percent Operational Time:	99.9									
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24					
1-Nov	Z	0.5	0.5	0.5	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.6	0.4	0.5	0.7	1.3	1.7	1.3	0.5	0.4	0.4	0.4	0.4	0.6	0.6	0.7	0.4	0.7
2-Nov	0.4	Z	0.4	0.4	0.5	0.6	0.7	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.6	0.6	0.7	0.6	0.7	0.6	1.1	
3-Nov	0.4	0.4	Z	0.5	0.7	0.5	0.5	0.4	0.4	0.5	0.6	0.6	0.7	1.1	0.8	0.7	0.7	0.6	0.6	0.6	0.7	0.7	0.8	0.7	0.6	0.6	0.6	1.2	
4-Nov	0.7	0.9	0.9	Z	1.2	0.8	0.7	0.6	0.6	0.5	0.4	0.5	0.6	0.4	0.4	0.5	0.5	0.5	0.5	0.7	0.6	0.5	0.5	0.6	0.5	0.6	0.4	0.5	
5-Nov	0.5	0.5	0.4	0.4	Z	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.4	0.4	0.4	0.4	0.3	0.3	0.4	0.3	0.4	0.4	0.5		
6-Nov	0.3	0.3	0.3	0.3	0.4	0.4	0.3	0.3	0.4	0.4	0.4	0.5	0.5	0.5	0.4	0.5	0.6	0.5	0.4	0.5	0.5	0.6	0.6	0.6	0.5	0.6	0.5	0.6	
7-Nov	0.6	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	M	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.4	0.4	0.6		
8-Nov	Z	0.3	0.5	0.5	0.5	0.5	0.5	0.5	0.4	0.4	0.5	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5	
9-Nov	0.4	Z	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.6	0.5	0.6	0.6	0.7	0.6	0.7	0.8	0.7	0.6	0.5	0.5	0.5	0.8		
10-Nov	0.4	0.4	Z	0.4	0.4	0.3	0.4	0.5	0.5	0.5	0.6	0.8	0.7	0.6	0.7	0.8	0.7	0.9	0.9	1.0	0.7	0.5	0.5	0.5	0.6	0.6	1.0		
11-Nov	0.4	0.4	0.3	Z	0.3	0.3	0.3	0.4	0.3	0.4	0.6	0.9	0.8	0.8	0.7	0.7	0.6	0.5	0.4	0.4	0.3	0.3	0.3	0.3	0.5	0.5	0.9		
12-Nov	0.4	0.4	0.3	0.3	Z	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.4		
13-Nov	0.4	0.4	0.4	0.4	0.4	Z	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.4	0.5	0.4		
14-Nov	Z	0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4		
15-Nov	0.3	Z	0.5	0.6	0.5	0.5	0.5	0.5	0.4	0.5	0.5	0.4	0.4	0.4	0.4	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.6		
16-Nov	0.4	0.4	Z	0.4	0.4	0.4	0.6	0.6	1.0	0.9	1.0	0.6	0.4	0.5	0.6	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.5	1.0		
17-Nov	0.4	0.4	0.4	Z	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.4	0.5	0.5		
18-Nov	0.5	0.4	0.4	0.4	Z	1.0	1.0	1.0	0.6	0.4	0.4	0.5	0.6	0.7	0.7	0.5	0.5	0.5	0.5	0.5	0.4	0.4	0.4	0.7	0.6	1.0			
19-Nov	0.8	0.6	0.4	0.4	0.4	Z	0.3	0.3	0.3	0.4	1.0	1.3	0.5	0.8	0.8	0.7	0.7	1.3	1.3	1.1	0.8	0.4	0.3	0.4	0.7	1.3			
20-Nov	Z	0.4	0.4	0.4	0.3	0.4	0.3	0.3	0.3	0.3	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.4			
21-Nov	0.3	Z	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.5	0.6	0.5	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.6			
22-Nov	0.4	0.4	Z	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.4	0.5			
23-Nov	0.4	0.5	0.4	Z	0.7	0.5	0.5	0.4	0.4	0.5	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.4	0.4	0.5	0.7			
24-Nov	0.4	0.4	0.4	0.4	Z	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4			
25-Nov	0.4	0.4	0.5	0.5	0.4	Z	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5			
26-Nov	Z	0.4	0.4	0.4	0.4	0.4	0.6	0.7	0.7	0.6	1.5	1.8	1.0	0.9	0.9	1.1	1.6	1.4	1.5	1.6	1.1	1.4	1.7	1.5	1.0	1.8			
27-Nov	1.3	Z	1.2	1.2	1.1	0.9	0.9	0.9	0.9	0.9	0.6	0.5	0.5	0.5	0.5	0.4	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.7	1.3			
28-Nov	0.4	0.4	Z	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4			
29-Nov	0.4	0.4	0.4	0.4	Z	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4			
30-Nov	0.4	0.4	0.4	0.4	0.4	Z	0.4	0.4	0.4	0.4	C	C	C	C	C	C	0.7	0.6	0.6	0.6	0.5	0.5	0.5	0.4	--	0.7			
																								Diurnal Average					
																								Diurnal Maximum					
																								Diurnal Average					
																								Diurnal Maximum					
Z - zerospan      C - Calibration      M - Maintenance																													
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 10 ppb    24-hr 3 ppb																													





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

**Total Reduced Sulphur (TRS) - ppb**  
**Ells River - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2	685	100.00	100.00
3 - 4	0	0.00	100.00
5 - 7	0	0.00	100.00
8 - 11	0	0.00	100.00
> 11	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



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

**Total Reduced Sulphur (TRS) - ppb**  
**Ells River - November 2023**

<b>Concentration</b> <b>Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	47	45	23	13	9	5	24	80	121	92	75	38	30	44	15	12	673
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	47	45	23	13	9	5	24	80	121	92	75	38	30	44	15	12	673

Total Number of Valid Hours: 673

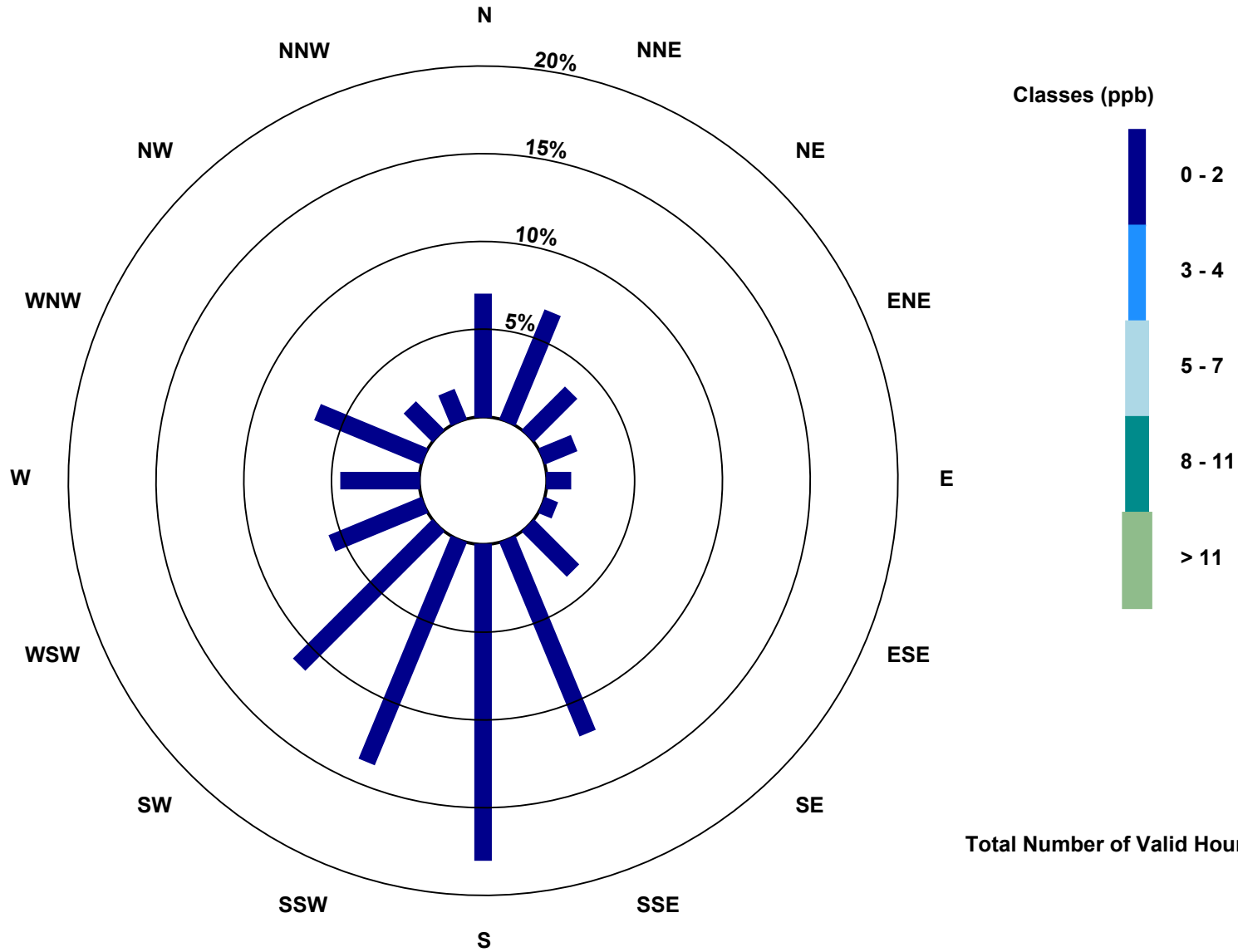
Total Number of Hours: 720



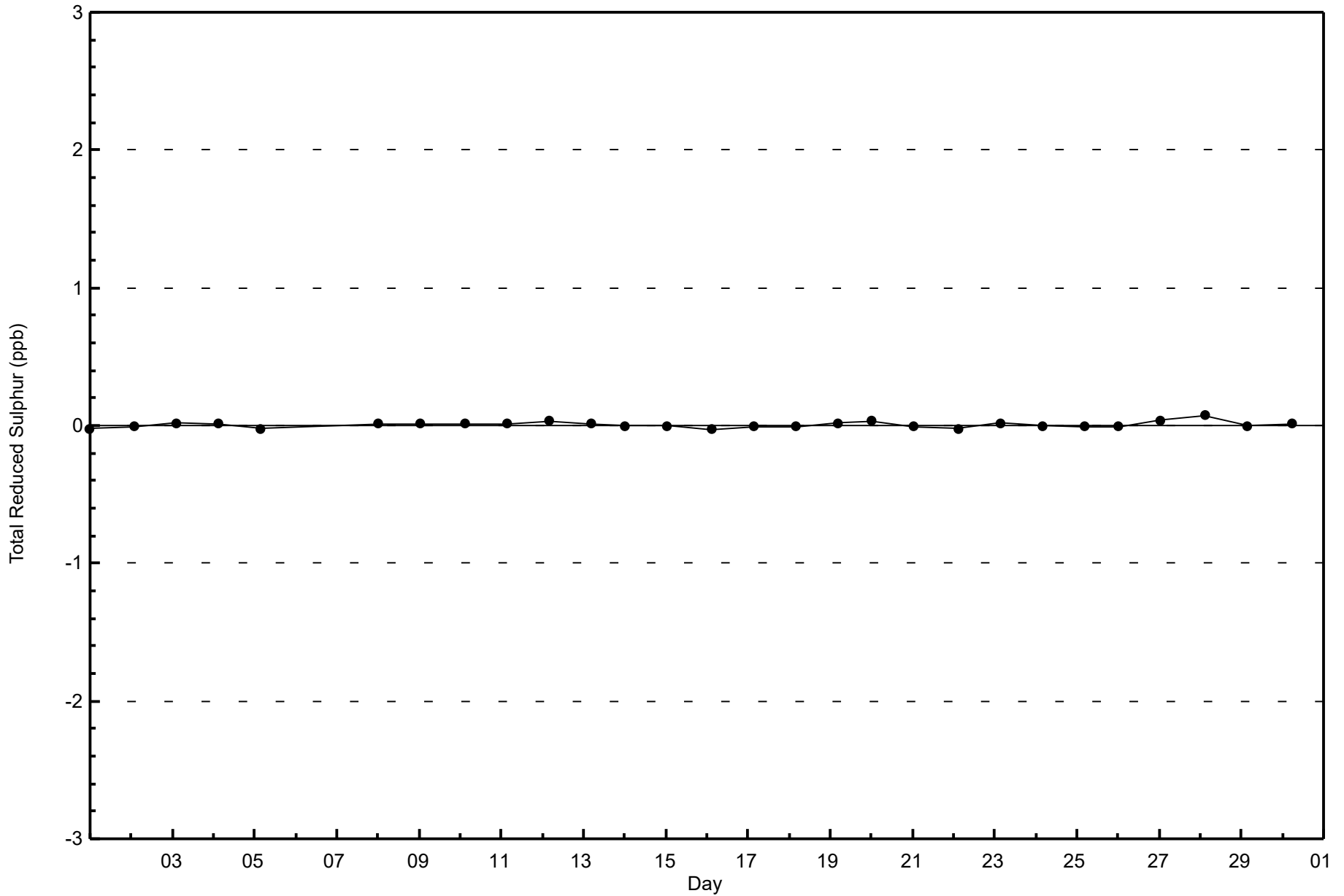


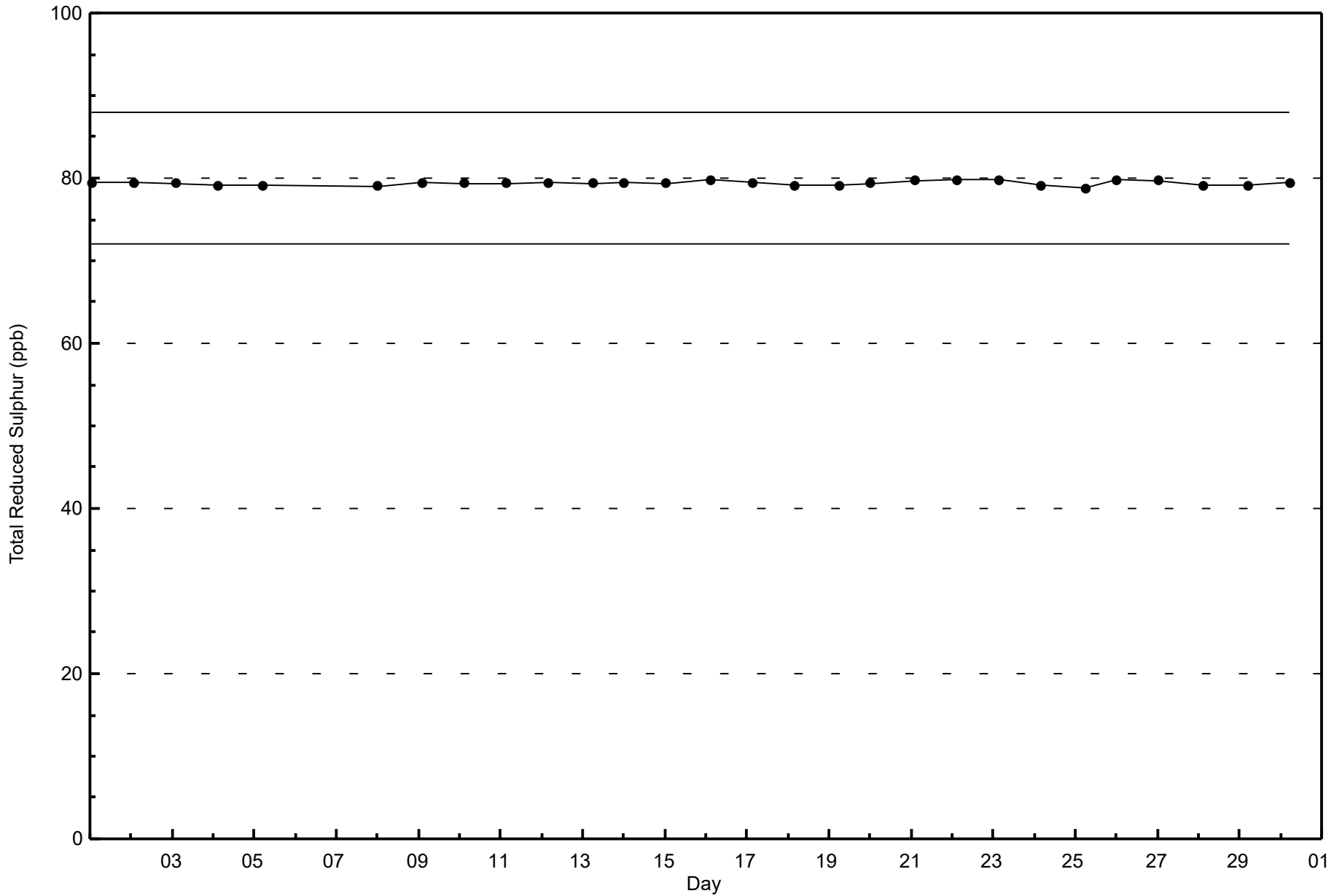
Wood Buffalo Environmental Association  
Wind Rose Nov 2023

Total Reduced Sulphur (TRS) - ppb  
Ells River



Total Number of Valid Hours: 673





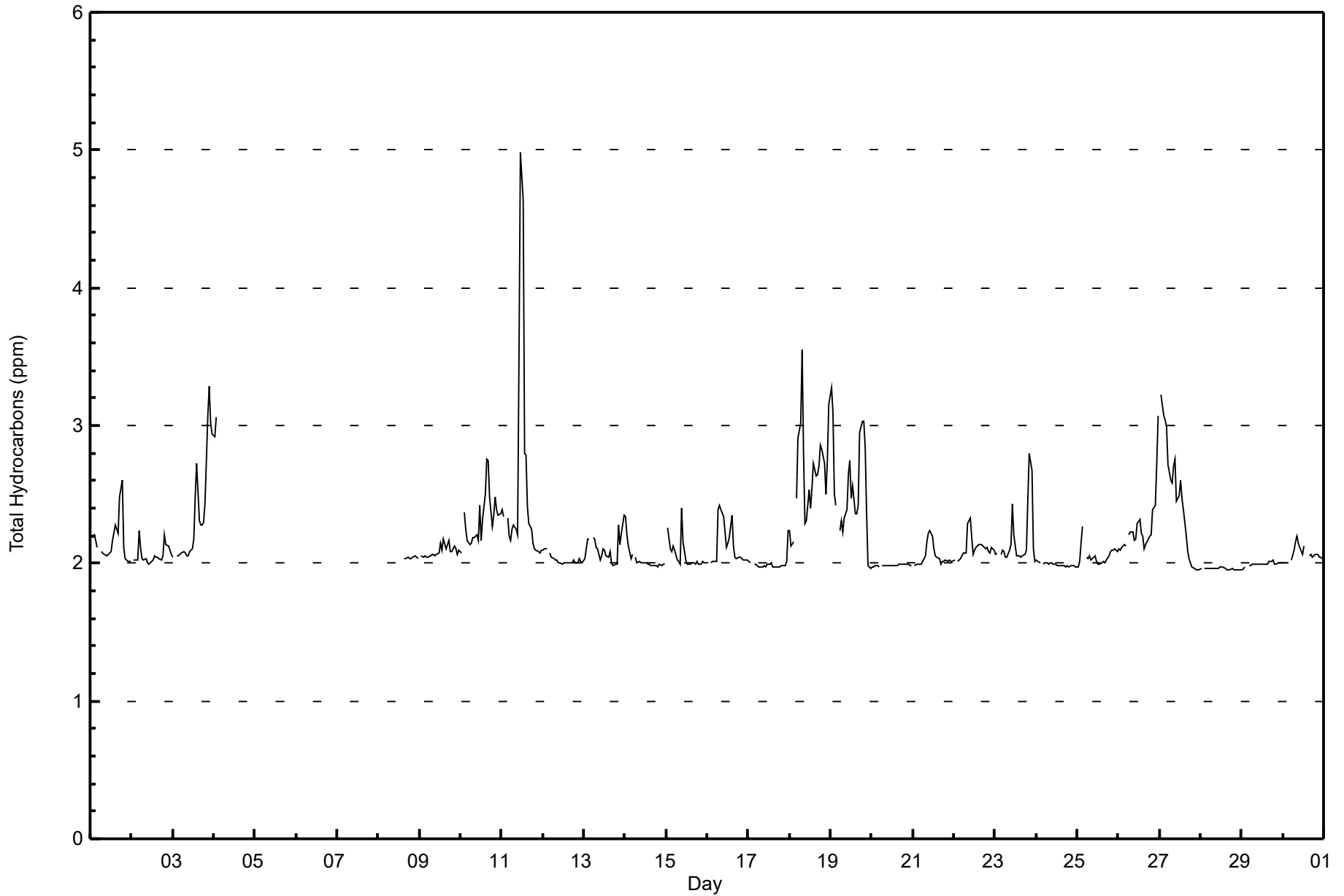


Maximum Value: 5.0 ppm on Nov 11 12:00																				Maximum Daily Average: 2.6 ppm on Nov 18					Hours in Service:	720
Minimum Value: 1.9 ppm on Nov 28 22:00																				Minimum Daily Average: 2.0 ppm on Nov 28					Hours of Data:	584
Maximum Diurnal Average: 2.3 ppm at hour 12																				Minimum Diurnal Average: 2.1 ppm at hour 17					Hours of Missing Data:	136
Monthly Average: 2.17 ppm																				Percentiles: P <sub>1</sub> = 2.0 P <sub>10</sub> = 2.0 Q <sub>1</sub> = 2.0 Median = 2.1 Q <sub>3</sub> = 2.2 P <sub>90</sub> = 2.5 P <sub>99</sub> = 3.2					Hours of Calibration:	30
																									Percent Operational Time:	85.3
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	2.2	2.2	2.2	2.2	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.3	2.2	2.2	2.5	2.6	2.1	2.0	2.0	2.0	2.0	2.2	2.6
2-Nov	Z	2.0	2.0	2.0	2.2	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.2
3-Nov	2.0	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.5	2.7	2.3	2.3	2.3	2.3	2.4	3.1	3.3	3.0	2.9	2.4	3.3
4-Nov	2.9	3.1	Z	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	--	3.1
5-Nov	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	--	--
6-Nov	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	--	--
7-Nov	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	--	--
8-Nov	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	--	2.1
9-Nov	Z	2.1	2.0	2.1	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2
10-Nov	2.1	Z	2.4	2.2	2.2	2.1	2.1	2.2	2.2	2.2	2.2	2.4	2.2	2.3	2.5	2.8	2.7	2.5	2.3	2.3	2.5	2.4	2.3	2.4	2.3	2.8
11-Nov	2.4	2.3	Z	2.3	2.2	2.2	2.2	2.3	2.2	2.2	3.5	5.0	4.6	2.8	2.8	2.4	2.3	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.6	5.0
12-Nov	2.1	2.1	2.1	Z	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1
13-Nov	2.0	2.1	2.2	2.2	Z	2.2	2.2	2.1	2.1	2.0	2.1	2.1	2.1	2.1	2.0	2.1	2.0	2.0	2.0	2.0	2.3	2.1	2.2	2.3	2.1	2.3
14-Nov	2.3	2.2	2.1	2.0	2.1	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.3
15-Nov	Z	2.3	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.4	2.2	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.4
16-Nov	2.0	Z	2.0	2.0	2.0	2.0	2.4	2.4	2.4	2.3	2.2	2.1	2.1	2.2	2.4	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.4
17-Nov	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.2	2.0	2.0	2.2
18-Nov	2.2	2.1	2.2	Z	2.5	2.9	3.0	3.5	2.8	2.3	2.3	2.5	2.4	2.5	2.7	2.6	2.6	2.7	2.9	2.8	2.7	2.5	2.7	3.2	2.6	3.5
19-Nov	3.3	3.1	2.5	2.4	Z	2.2	2.3	2.2	2.3	2.4	2.6	2.7	2.5	2.6	2.4	2.4	2.4	2.9	3.0	3.0	2.8	2.4	2.0	2.0	2.5	3.3
20-Nov	2.0	2.0	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
21-Nov	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.2	2.2	2.2	2.2	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.2
22-Nov	2.0	Z	2.0	2.0	2.0	2.1	2.1	2.1	2.3	2.3	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.3
23-Nov	2.1	2.1	Z	2.1	2.1	2.1	2.0	2.0	2.1	2.1	2.4	2.2	2.1	2.1	2.1	2.0	2.1	2.1	2.1	2.5	2.8	2.7	2.1	2.0	2.2	2.8
24-Nov	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
25-Nov	2.0	2.0	2.2	2.3	Z	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.3
26-Nov	2.1	2.1	2.1	2.1	2.1	Z	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.2	2.2	2.1	2.1	2.2	2.2	2.2	2.4	2.4	2.7	3.1	2.3	3.1
27-Nov	Z	3.2	3.1	3.0	3.0	2.7	2.6	2.6	2.7	2.8	2.5	2.5	2.6	2.5	2.4	2.2	2.1	2.0	2.0	2.0	2.0	2.0	1.9	1.9	2.4	3.2
28-Nov	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	2.0	1.9	2.0	2.0
29-Nov	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
30-Nov	2.0	2.0	2.0	2.0	Z	2.0	2.1	2.2	2.2	2.1	2.1	2.1	2.1	M	M	2.1	2.1	2.0	2.1	2.1	2.1	2.0	2.0	2.0	2.1	2.2
																								Diurnal Average		
																								Diurnal Maximum		
Z - zerospan                      C - Calibration                      M - Maintenance                      UO - Unstable Operation																										



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

**Total Hydrocarbons (THC) - ppm**  
**Ells River - November 2023**





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

**Total Hydrocarbons (THC) - ppm**  
**Ells River - November 2023**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2.0	273	46.75	46.75
2.1 - 3.0	298	51.03	97.77
3.1 - 10.0	13	2.23	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 584

Total Number of Hours: 720



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

**Total Hydrocarbons (THC) - ppm**  
**Ells River - November 2023**

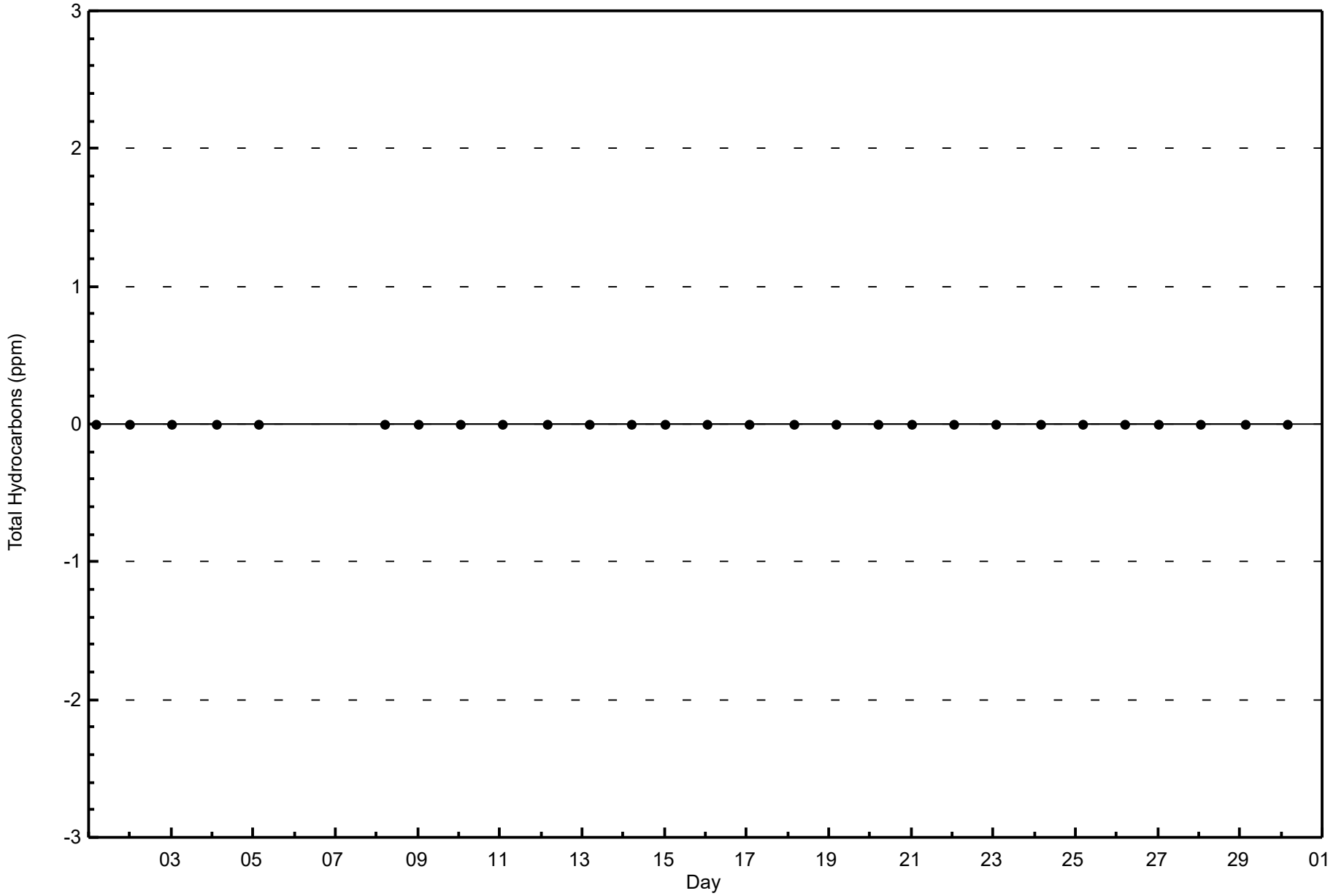
<b>Concentration</b> <b>Ranges (ppm)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	20	15	4	2	0	0	0	15	22	44	53	29	20	33	11	4	272
2.1 - 3.0	18	15	13	4	5	6	21	46	78	39	19	8	9	5	3	8	297
3.1 - 10.0	2	0	1	0	0	0	0	1	4	1	0	0	0	1	3	0	13
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	40	30	18	6	5	6	21	62	104	84	72	37	29	39	17	12	582

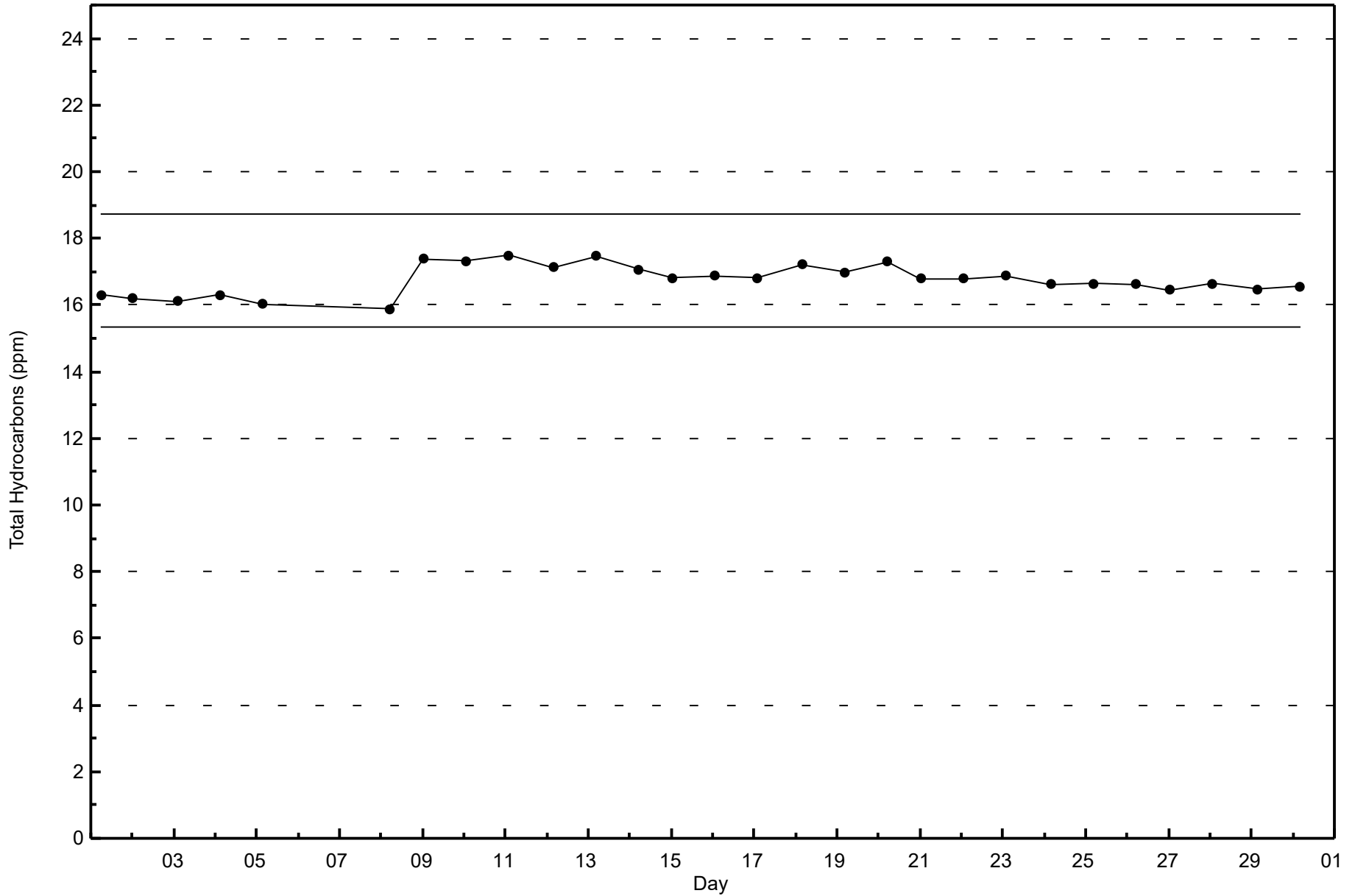
Total Number of Valid Hours: 582

Total Number of Hours: 720



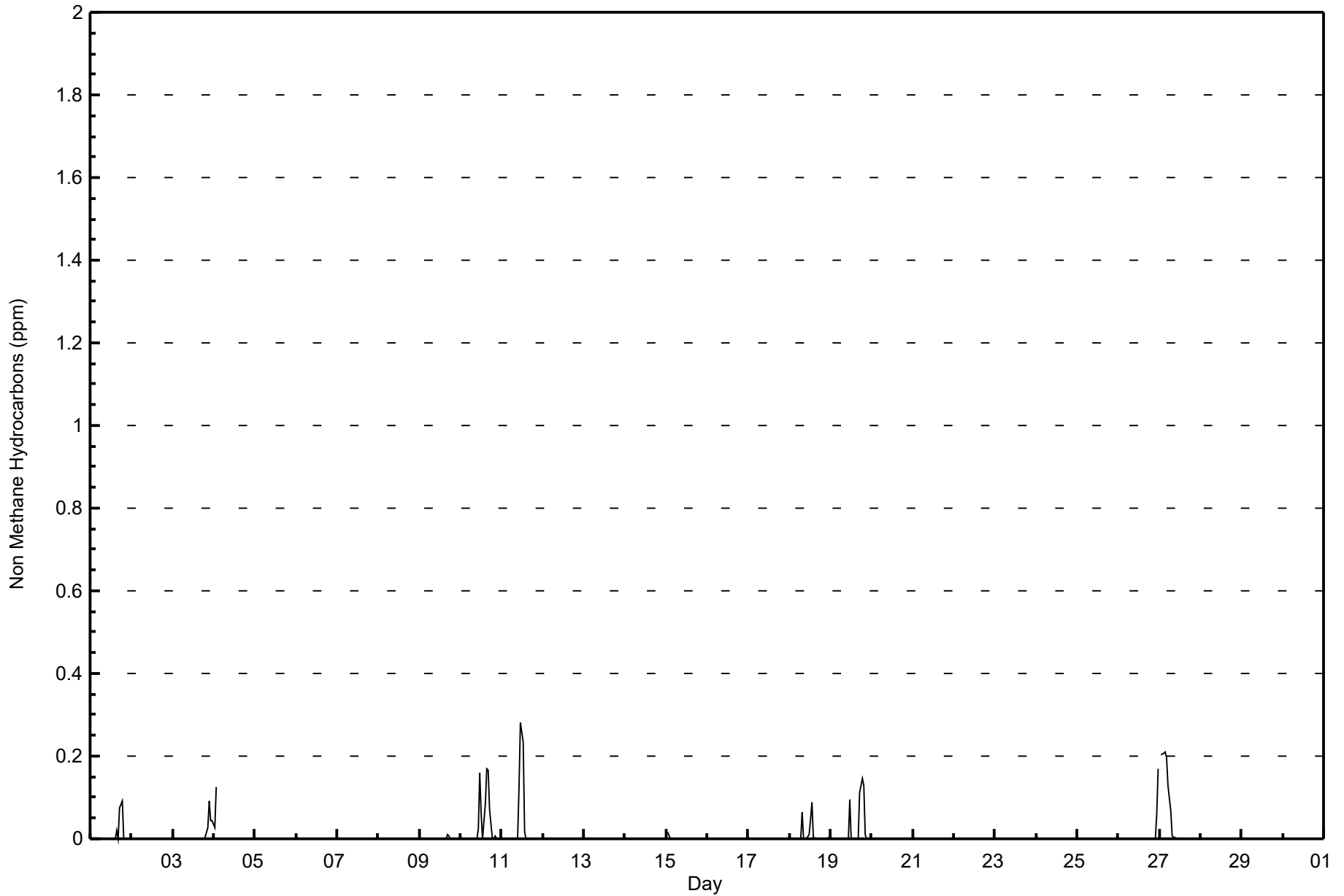








Maximum Value: 0.280 ppm on Nov 11 12:00		Maximum Daily Average: 0.044 ppm on Nov 27		Hours in Service: 720																							
Minimum Value: 0.000 ppm on Nov 1 01:00		Minimum Daily Average: 0.000 ppm on Nov 2		Hours of Data: 584																							
Maximum Diurnal Average: 0.022 ppm at hour 12		Minimum Diurnal Average: 0.000 ppm at hour 9		Hours of Missing Data: 136																							
Monthly Average: 0.007 ppm		Percentiles: P <sub>1</sub> = 0.0 P <sub>10</sub> = 0.0 Q <sub>1</sub> = 0.0 Median = 0.0 Q <sub>3</sub> = 0.0 P <sub>90</sub> = 0.0 P <sub>99</sub> = 0.2		Hours of Calibration: 30																							
				Percent Operational Time: 85.3																							
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Nov	0.000	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.021	0.000	0.075	0.092	0.000	0.000	0.000	0.000	0.000	0.008	0.092	
2-Nov	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
3-Nov	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.026	0.091	0.043	0.046	0.009	0.091
4-Nov	0.029	0.126	Z	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	--	0.126
5-Nov	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	--	--
6-Nov	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	--	--
7-Nov	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	M	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	--	--
8-Nov	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	C	C	C	C	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	--	0.000
9-Nov	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.009	0.007	0.001	0.000	0.002	0.000	0.000	0.000	0.001	0.009	
10-Nov	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.025	0.161	0.062	0.000	0.086	0.168	0.166	0.072	0.000	0.000	0.008	0.000	0.000	0.000	0.032	0.168	
11-Nov	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.121	0.280	0.233	0.017	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.028	0.280	
12-Nov	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
13-Nov	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
14-Nov	0.000	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
15-Nov	Z	0.017	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.017	
16-Nov	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
17-Nov	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
18-Nov	0.000	0.000	0.000	Z	0.000	0.000	0.001	0.066	0.000	0.000	0.000	0.011	0.046	0.087	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.009	0.087	
19-Nov	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.001	0.096	0.000	0.000	0.000	0.000	0.000	0.112	0.145	0.128	0.010	0.000	0.000	0.000	0.021	0.145	
20-Nov	0.000	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
21-Nov	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
22-Nov	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
23-Nov	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
24-Nov	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
25-Nov	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	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-Nov	0.000	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.060	0.170	0.010	0.170	
27-Nov	Z	0.203	0.208	0.209	0.196	0.128	0.068	0.006	0.002	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	0.044	0.209	
28-Nov	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
29-Nov	0.000	0.000	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
30-Nov	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	M	M	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
		0.001	0.016	0.009	0.010	0.009	0.006	0.003	0.003	0.000	0.000	0.006	0.022	0.014	0.004	0.004	0.007	0.007	0.010	0.009	0.005	0.002	0.004	0.004	0.008	Diurnal Average	
		0.029	0.203	0.208	0.209	0.196	0.128	0.068	0.066	0.002	0.003	0.121	0.280	0.233	0.087	0.086	0.168	0.166	0.112	0.145	0.128	0.026	0.091	0.060	0.170	Diurnal Maximum	
Z - zerospan		C - Calibration				M - Maintenance				UO - Unstable Operation																	





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Non Methane Hydrocarbons (NMHC) - ppm  
Ells River - November 2023**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 0.005	542	92.81	92.81
0.006 - 0.05	15	2.57	95.38
0.06 - 0.1	17	2.91	98.29
> 0.1	10	1.71	100.00

Total Number of Valid Hours: 584

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Non Methane Hydrocarbons (NMHC) - ppm  
Ells River - November 2023**

<b>Concentration Ranges (ppm)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 0.005	37	29	16	6	5	6	20	52	89	81	72	36	29	38	13	11	540
0.006 - 0.05	1	1	1	0	0	0	1	6	2	0	0	1	0	0	2	0	15
0.06 - 0.1	1	0	1	0	0	0	0	2	9	2	0	0	0	0	1	1	17
> 0.1	1	0	0	0	0	0	0	2	4	1	0	0	0	1	1	0	10
<b>Totals</b>	<b>40</b>	<b>30</b>	<b>18</b>	<b>6</b>	<b>5</b>	<b>6</b>	<b>21</b>	<b>62</b>	<b>104</b>	<b>84</b>	<b>72</b>	<b>37</b>	<b>29</b>	<b>39</b>	<b>17</b>	<b>12</b>	<b>582</b>

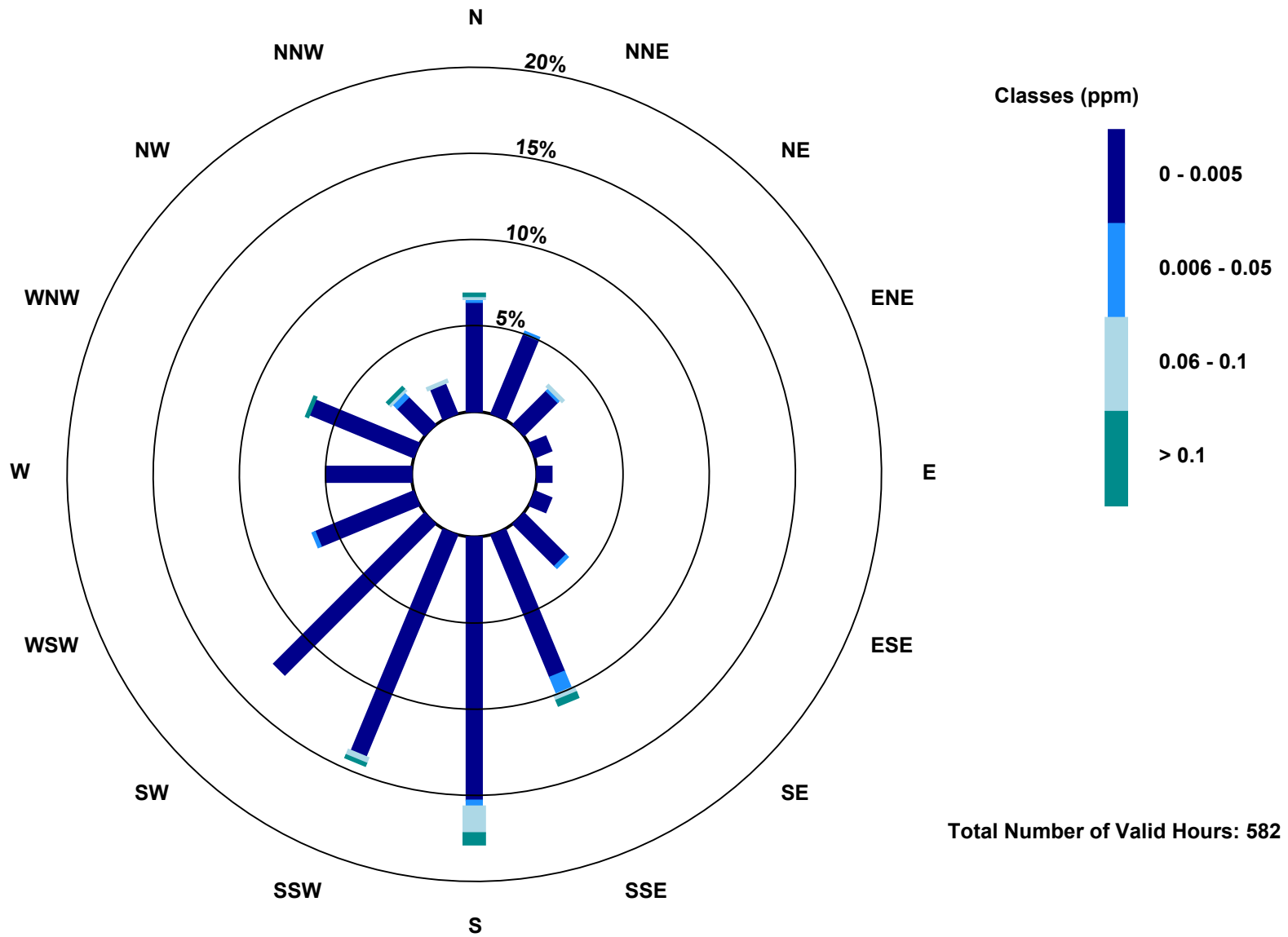
Total Number of Valid Hours: 582

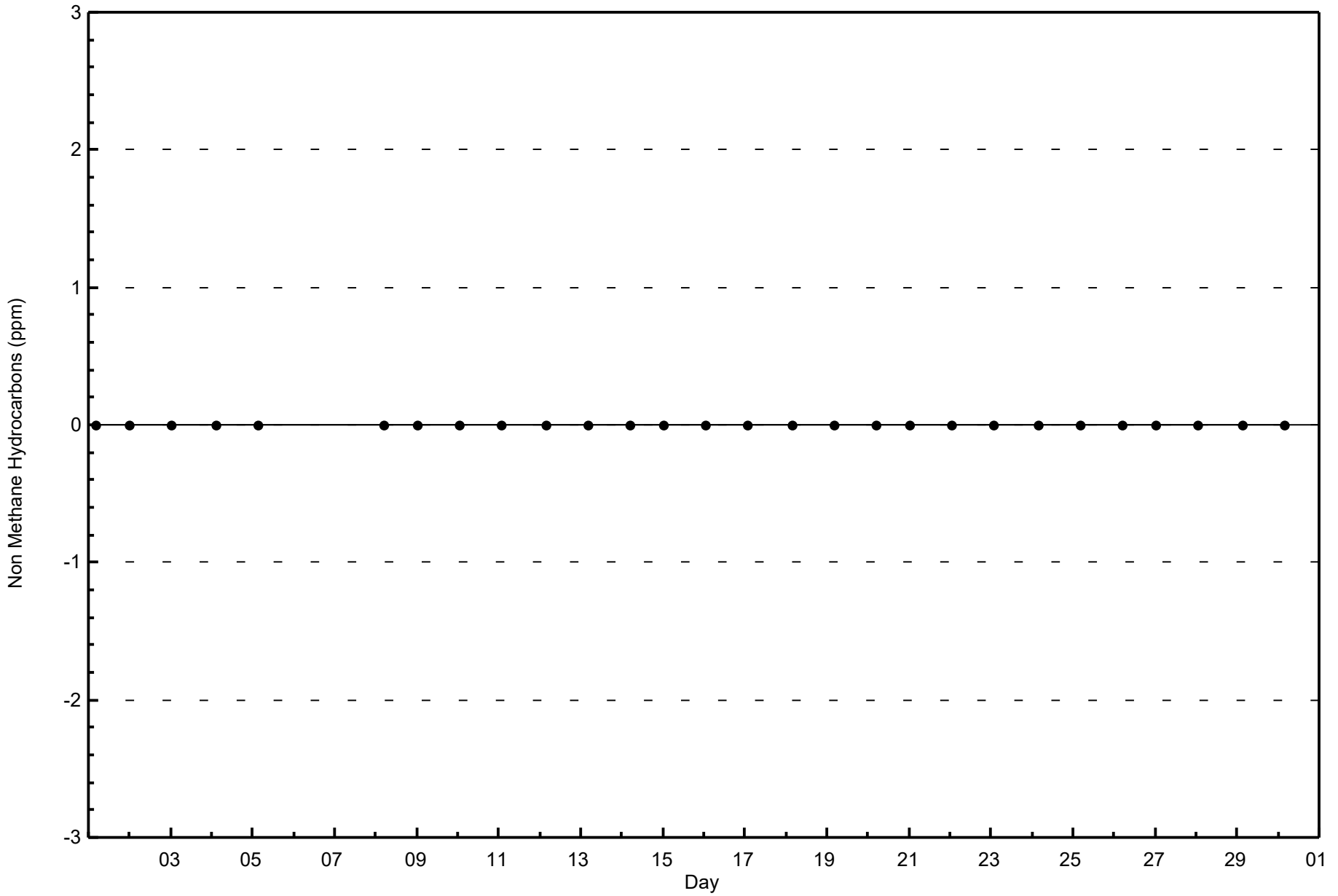
Total Number of Hours: 720



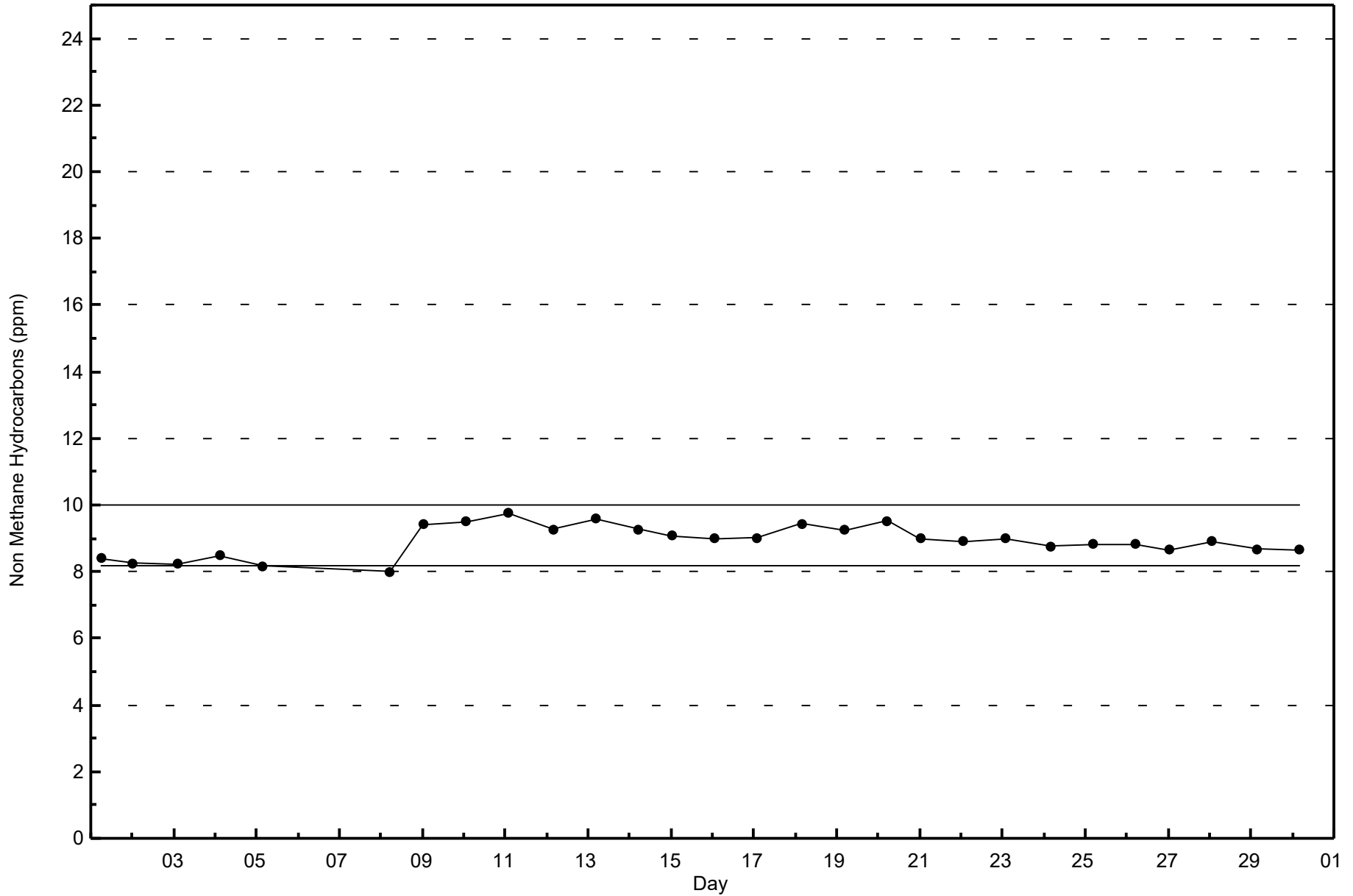
Wood Buffalo Environmental Association  
Wind Rose Nov 2023

Non Methane Hydrocarbons (NMHC) - ppm  
Ells River

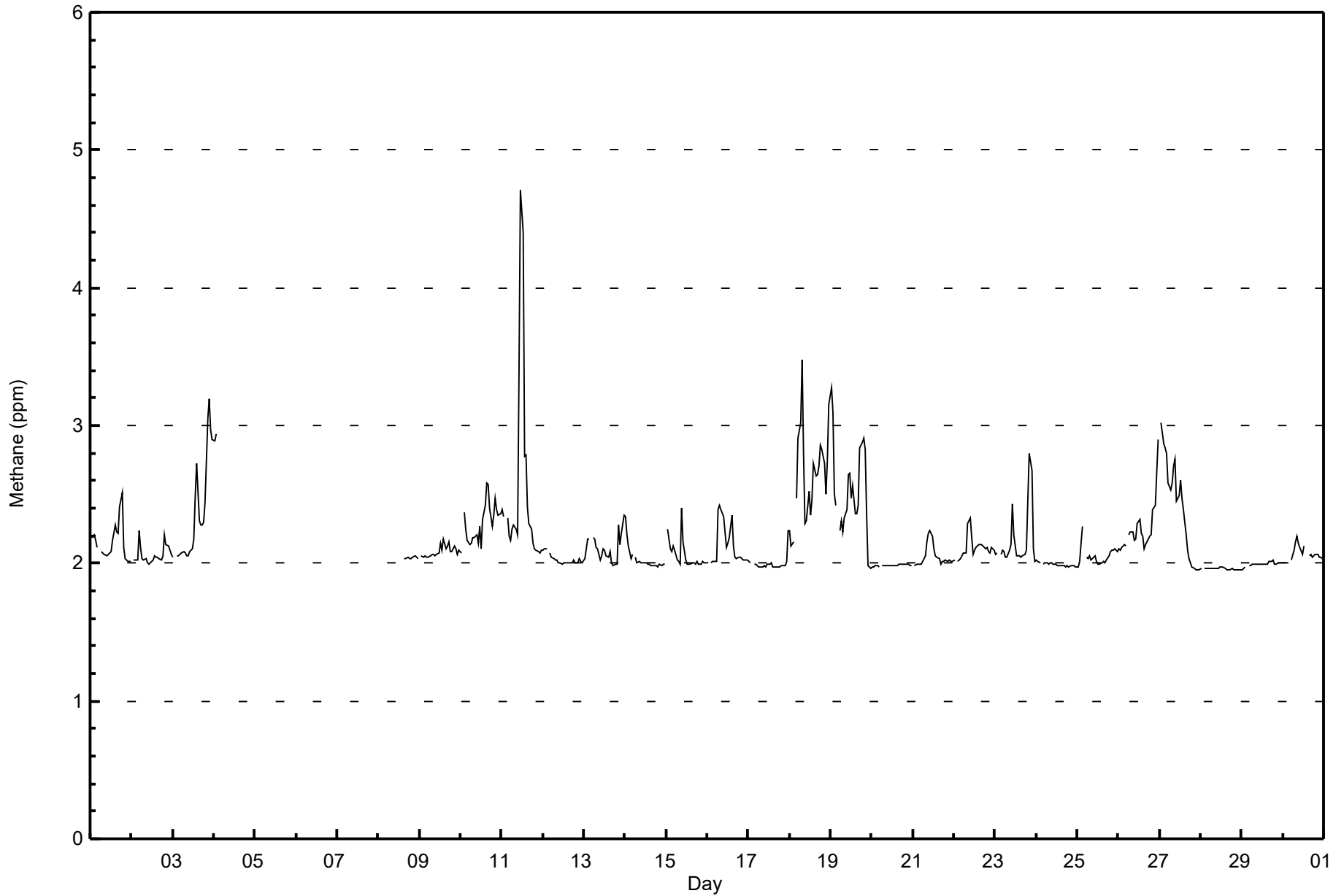














**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Methane (CH<sub>4</sub>) - ppm  
Ells River - November 2023**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2.0	273	46.75	46.75
2.1 - 3.0	303	51.88	98.63
3.1 - 10.0	8	1.37	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 584

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Methane (CH<sub>4</sub>) - ppm  
Ells River - November 2023**

<b>Concentration Ranges (ppm)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	20	15	4	2	0	0	0	15	22	44	53	29	20	33	11	4	272
2.1 - 3.0	19	15	14	4	5	6	21	46	79	40	19	8	9	5	4	8	302
3.1 - 10.0	1	0	0	0	0	0	0	1	3	0	0	0	0	1	2	0	8
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	40	30	18	6	5	6	21	62	104	84	72	37	29	39	17	12	582

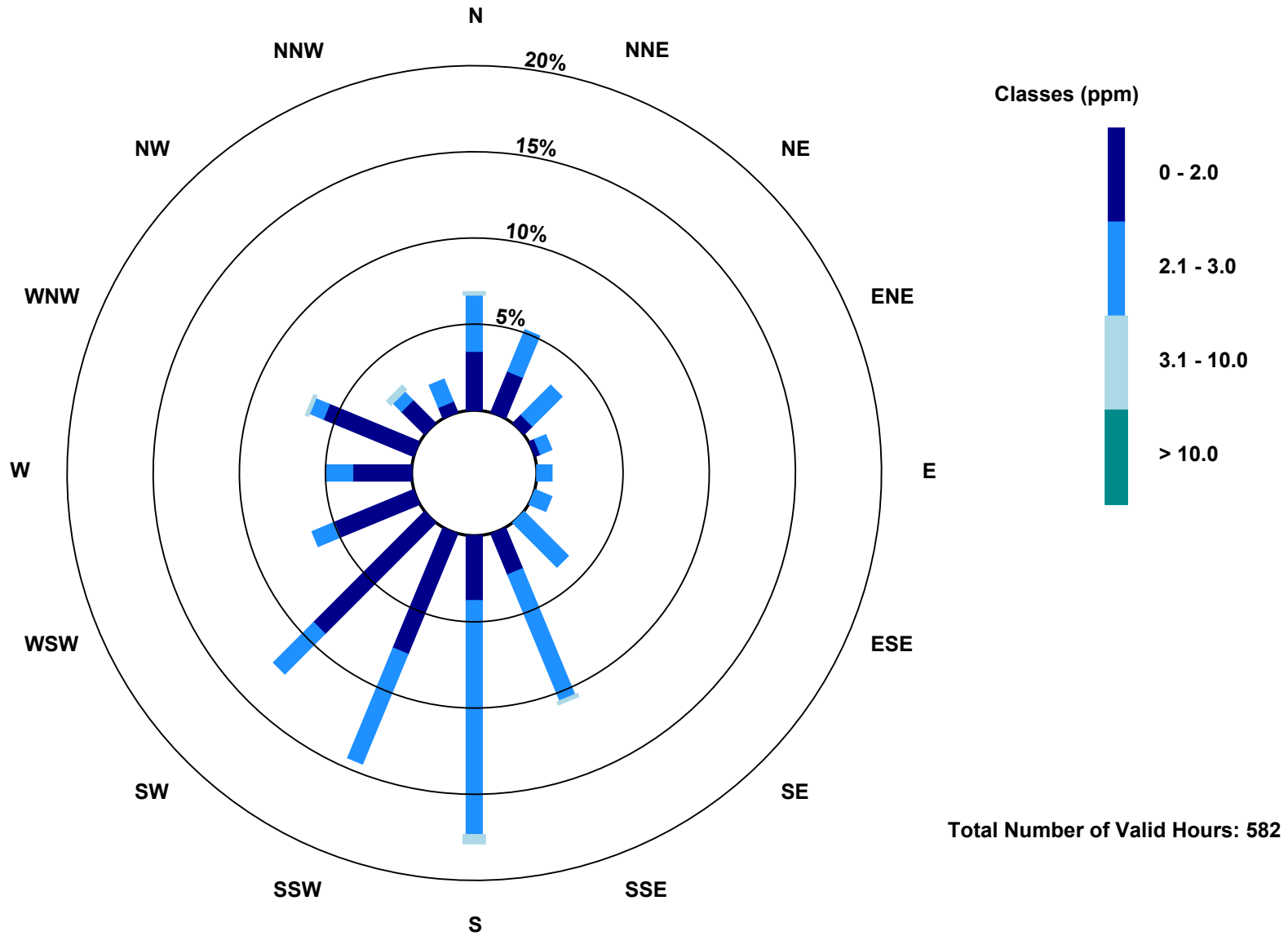
Total Number of Valid Hours: 582

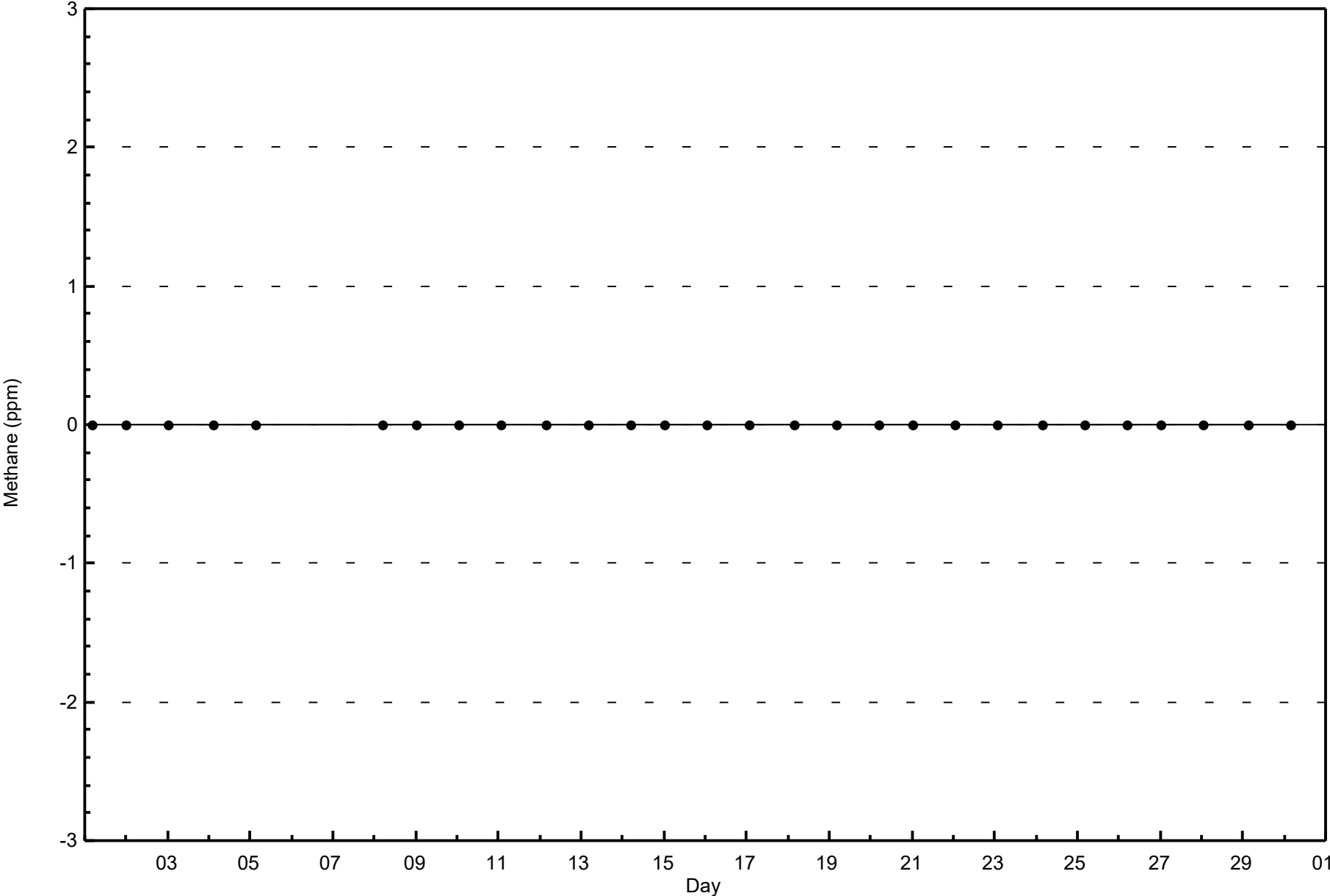
Total Number of Hours: 720

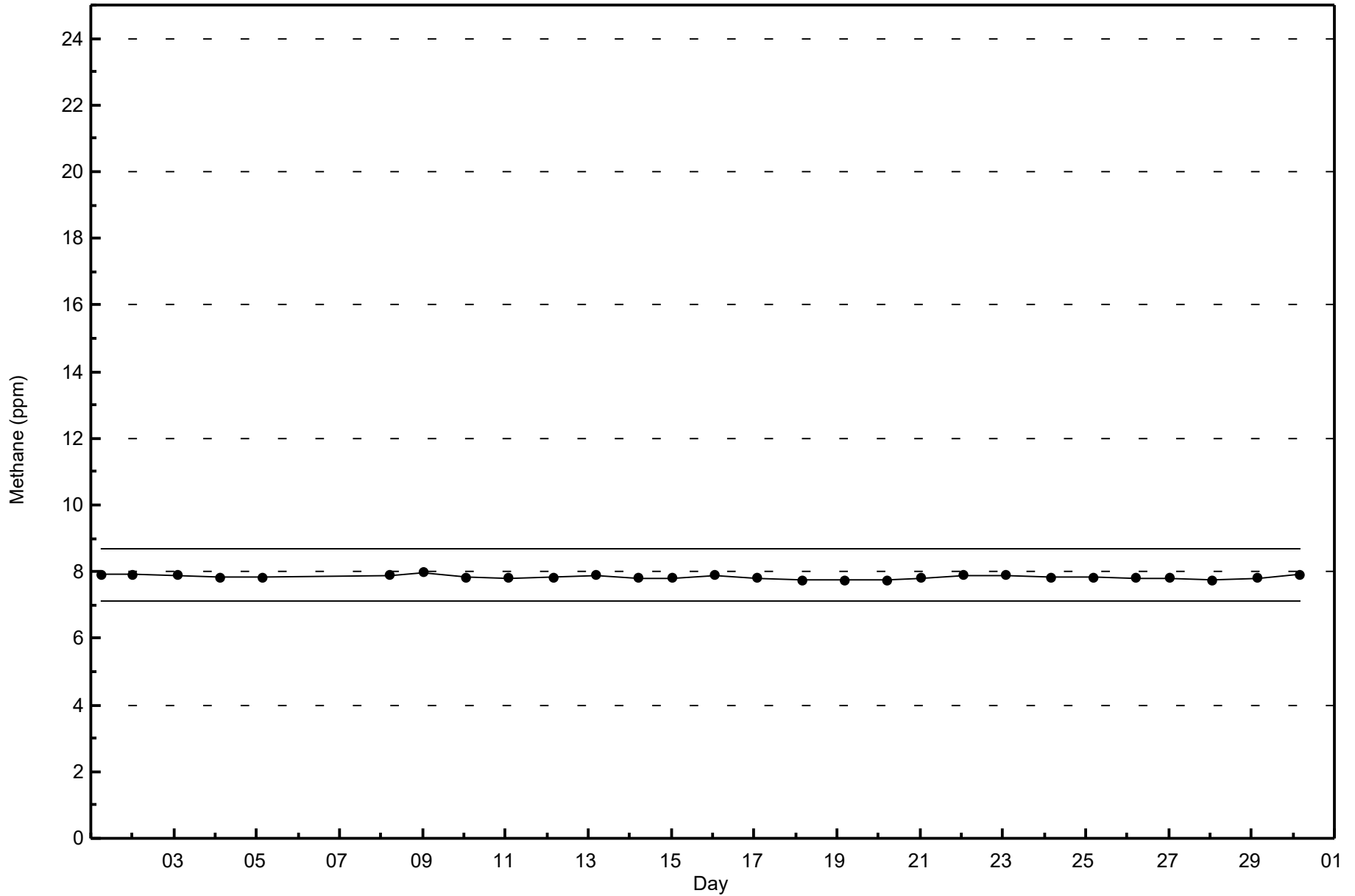


Wood Buffalo Environmental Association  
Wind Rose Nov 2023

Methane (CH<sub>4</sub>) - ppm  
Ells River











Wood Buffalo Environmental Association

Summary of Hour Averages

Nitric Oxide (NO) - ppb

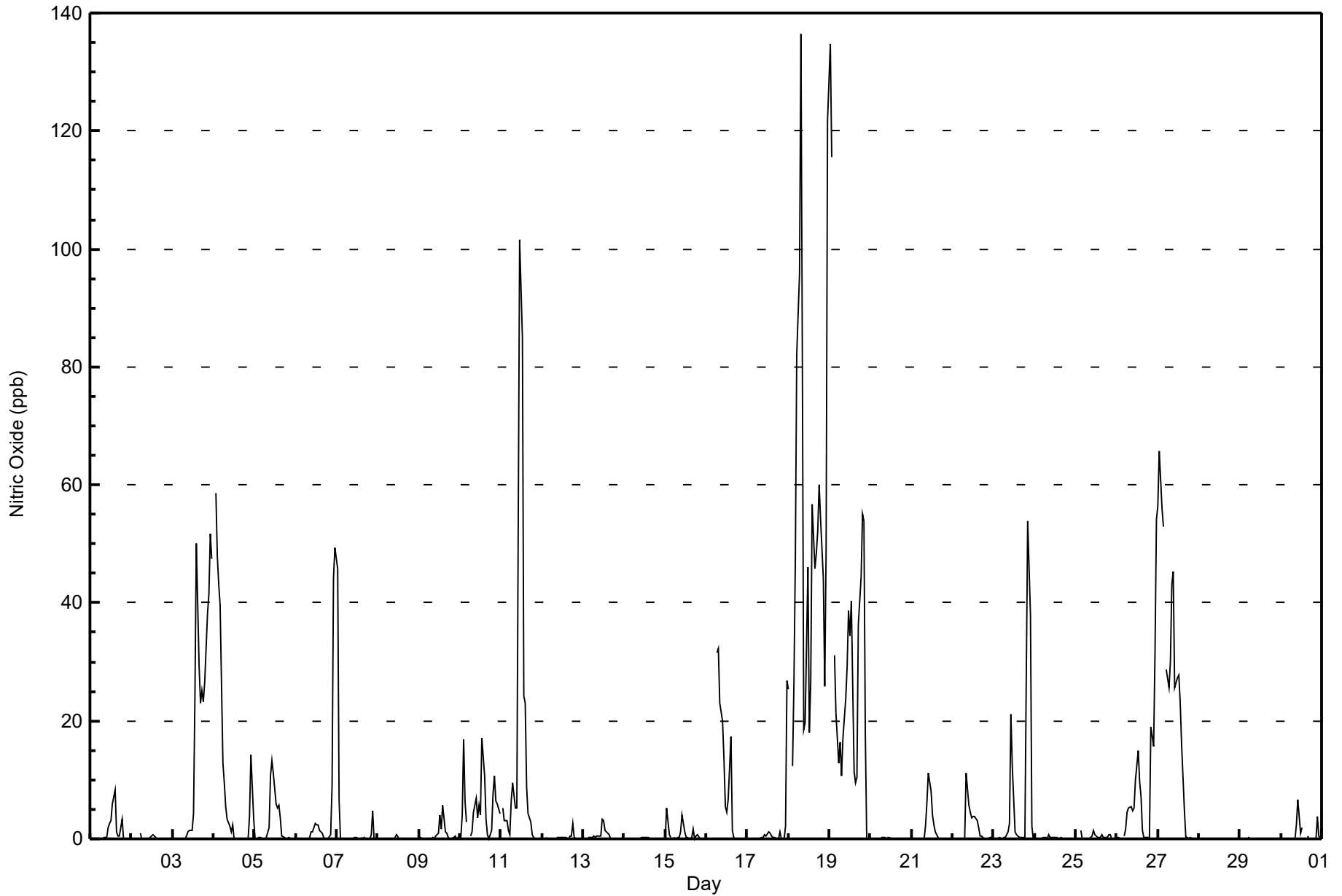
Ells River - November 2023

Maximum Value: 136.4 ppb on Nov 18 08:00																						Maximum Daily Average: 52.0 ppb on Nov 18																						Hours in Service: 720				
Minimum Value: 0.0 ppb on Nov 1 06:00																						Minimum Daily Average: 0.0 ppb on Nov 28																						Hours of Data: 684				
Maximum Diurnal Average: 10.5 ppb at hour 2																						Minimum Diurnal Average: 3.1 ppb at hour 17																						Hours of Missing Data: 36				
Monthly Average: 6.68 ppb																						Percentiles: P <sub>1</sub> = 0.0 P <sub>10</sub> = 0.0 Q <sub>1</sub> = 0.0 Median = 0.1 Q <sub>3</sub> = 3.2 P <sub>90</sub> = 24.1 P <sub>99</sub> = 82.6																						Hours of Calibration: 33				
																						Percent Operational Time: 99.6																										
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Nov	0.1	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.2	0.2	1.8	2.7	3.1	6.0	8.2	1.2	0.4	0.4	3.4	0.0	0.0	0.0	0.0	0.0	1.2	8.2																						
2-Nov	0.0	0.0	0.0	0.0	Z	1.0	0.0	0.0	0.0	0.0	0.0	0.2	0.8	0.5	0.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	1.0																						
3-Nov	0.0	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.4	1.1	1.5	1.5	4.3	23.9	50.0	29.1	23.0	25.3	23.3	26.7	38.2	41.4	51.7	47.4	16.9	51.7																						
4-Nov	Z	58.6	47.8	43.3	39.6	12.7	9.5	5.4	3.3	2.2	1.2	2.4	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.9	14.2	3.3	10.8	58.6																						
5-Nov	0.1	Z	0.2	0.1	0.0	0.1	0.1	0.2	1.9	10.6	13.4	11.2	6.0	5.3	5.7	3.6	0.4	0.1	0.0	0.1	0.2	0.0	0.1	0.0	2.6	13.4																						
6-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	1.3	1.2	2.6	2.5	2.3	1.5	0.9	0.2	0.0	0.0	0.0	0.7	9.0	44.0	49.4	4.8	49.4																						
7-Nov	45.9	6.7	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.1	0.2	M	0.1	0.1	0.3	0.1	0.0	0.0	0.8	4.8	0.0	0.0	2.6	45.9																						
8-Nov	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.1	0.3	0.8	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.8																						
9-Nov	0.0	0.1	0.1	0.0	Z	0.1	0.1	0.0	0.1	0.1	0.4	0.9	4.0	1.6	5.6	1.1	0.9	0.3	0.1	0.1	0.2	0.6	0.1	0.1	0.7	5.6																						
10-Nov	0.2	4.1	16.8	6.4	2.8	Z	0.4	1.3	4.6	6.9	3.6	5.6	4.1	17.0	10.7	3.3	0.6	0.1	1.5	7.7	10.6	6.4	6.0	4.2	5.4	17.0																						
11-Nov	Z	5.3	3.0	3.1	1.5	0.6	6.3	9.5	5.1	5.1	52.7	101.6	84.9	24.1	23.0	8.8	4.4	2.9	0.7	0.2	0.0	0.0	0.0	0.0	14.9	101.6																						
12-Nov	0.0	Z	0.3	0.0	0.1	0.0	0.0	0.0	0.1	0.2	0.1	0.2	0.1	0.1	0.1	0.1	0.5	0.4	2.6	0.3	0.1	0.1	0.1	0.1	0.3	2.6																						
13-Nov	0.1	0.1	Z	0.2	0.1	0.3	0.5	0.2	0.4	0.6	0.6	3.2	3.1	1.5	1.1	0.8	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	3.2																						
14-Nov	0.0	0.1	0.0	Z	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	0.0	0.0	0.1	0.1	0.0	0.0	0.1	0.1																						
15-Nov	0.0	5.3	0.7	0.2	Z	0.1	0.1	0.3	0.1	1.2	4.0	1.1	0.1	0.1	0.1	0.2	1.8	0.0	0.4	0.7	0.0	0.1	0.1	0.0	0.7	5.3																						
16-Nov	0.0	0.1	0.0	0.0	0.0	Z	31.6	32.2	23.1	19.9	13.5	5.4	4.5	6.6	17.3	1.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.8	32.2																						
17-Nov	Z	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.1	0.7	0.6	1.1	0.9	0.4	0.1	0.1	0.1	0.1	1.2	0.1	0.1	2.2	26.9	1.5	26.9																						
18-Nov	25.5	Z	12.4	26.6	47.3	82.1	95.8	136.4	82.0	18.4	19.8	46.1	17.9	26.5	56.7	45.8	48.5	52.1	59.9	54.3	44.0	26.0	49.3	121.8	52.0	136.4																						
19-Nov	134.9	115.6	Z	31.0	21.3	12.8	16.4	10.7	17.1	23.8	29.1	38.8	34.5	40.3	11.4	9.5	10.5	36.3	44.4	55.1	53.9	17.9	0.0	0.0	33.3	134.9																						
20-Nov	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.2	0.1	0.1	0.1	0.2	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.1	0.2																						
21-Nov	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	2.1	6.1	11.2	8.0	4.0	2.4	1.1	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.5	11.2																						
22-Nov	0.0	0.0	0.0	0.0	0.0	Z	0.1	0.1	11.1	5.6	4.4	3.6	3.8	3.8	3.0	2.0	0.6	0.5	0.0	0.0	0.1	0.1	0.1	0.2	1.7	11.1																						
23-Nov	Z	0.0	0.0	0.1	0.0	0.0	0.3	0.3	1.3	2.5	21.2	12.3	1.3	0.7	0.5	0.4	0.2	0.2	0.1	27.3	54.0	37.9	2.1	0.0	7.1	54.0																						
24-Nov	0.0	Z	0.0	0.0	0.1	0.1	0.2	0.1	0.7	0.2	0.3	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.1	0.7																						
25-Nov	0.0	0.0	Z	1.4	0.1	0.1	0.0	0.0	0.0	0.5	1.4	0.8	0.5	0.3	0.3	0.6	0.1	0.2	0.2	0.6	0.6	0.1	0.1	0.0	0.3	1.4																						
26-Nov	0.1	0.1	0.1	Z	0.4	1.7	4.6	5.3	5.5	4.8	5.2	10.0	15.0	9.7	7.2	1.5	0.2	0.2	0.2	0.3	19.1	15.6	31.8	54.0	8.4	54.0																						
27-Nov	56.4	65.8	56.1	52.8	Z	28.7	25.6	30.2	43.1	45.3	25.7	27.3	27.8	23.1	16.0	4.8	0.2	0.3	0.1	0.2	0.0	0.0	0.0	0.0	23.0	65.8																						
28-Nov	0.0	0.0	0.0	0.0	0.0	Z	0.1	0.0	0.0	0.1	C	C	C	C	C	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1																						
29-Nov	0.0	Z	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2																						
30-Nov	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.1	2.5	6.7	1.0	2.0	M	M	0.6	0.1	0.1	0.0	0.1	0.1	3.9	0.5	0.1	0.8	6.7																						
																								10.1	10.5	5.3	6.6	4.5	5.6	6.4	7.8	6.8	5.3	7.6	9.9	7.8	7.3	7.9	3.9	3.1	4.0	4.6	5.8	7.4	5.6	6.8	10.3	Diurnal Average
																								134.9	115.6	56.1	52.8	47.3	82.1	95.8	136.4	82.0	45.3	52.7	101.6	84.9	40.3	56.7	45.8	48.5	52.1	59.9	55.1	54.0	41.4	51.7	121.8	Diurnal Maximum
Z - zerospan      C - Calibration      M - Maintenance																																																



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

**Nitric Oxide (NO) - ppb**  
**Ells River - November 2023**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Nitric Oxide (NO) - ppb  
Ells River - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	606	88.60	88.60
21 - 40	37	5.41	94.01
41 - 80	32	4.68	98.68
81 - 159	9	1.32	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**

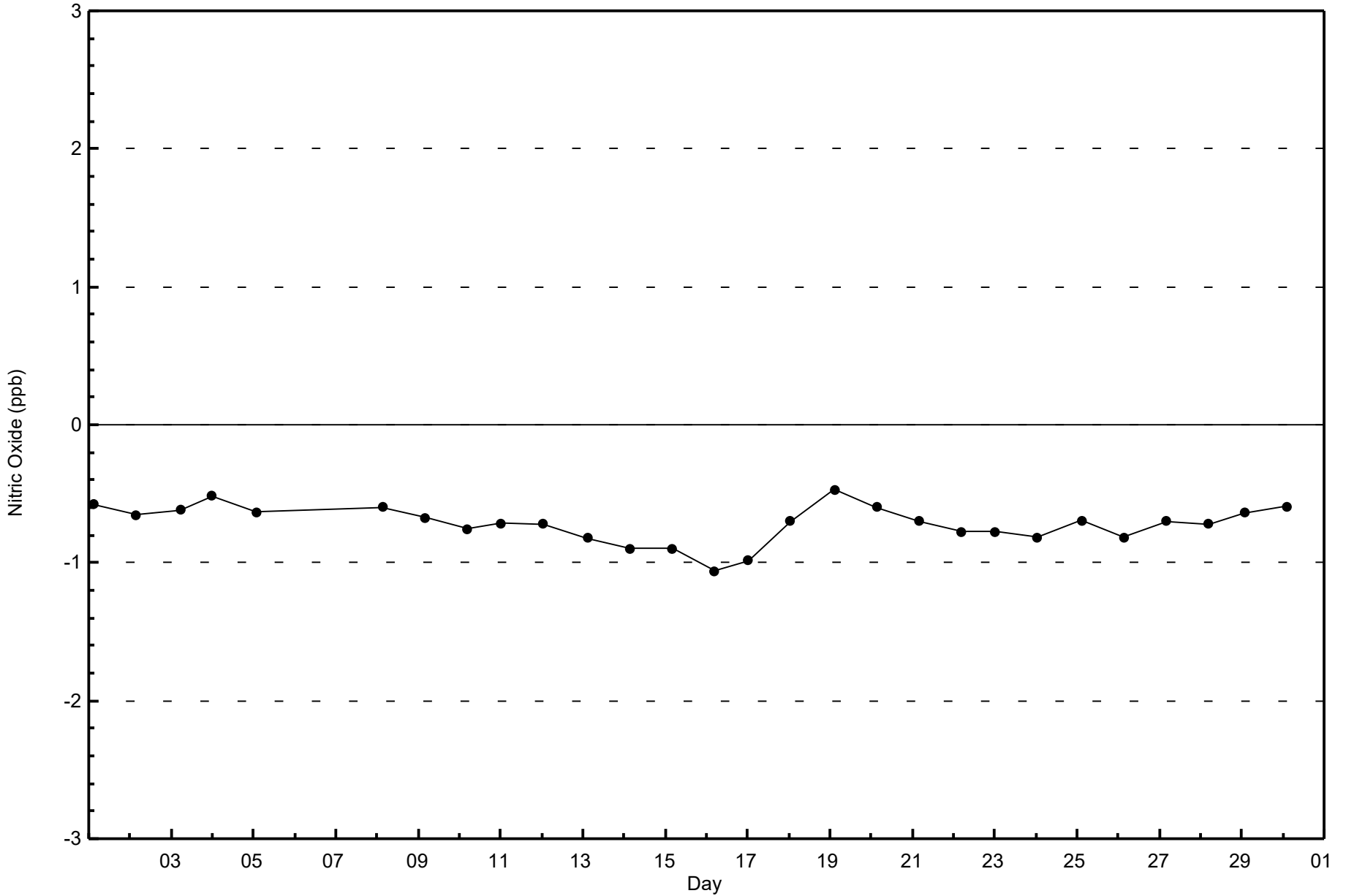
**Nitric Oxide (NO) - ppb**  
**Ells River - November 2023**

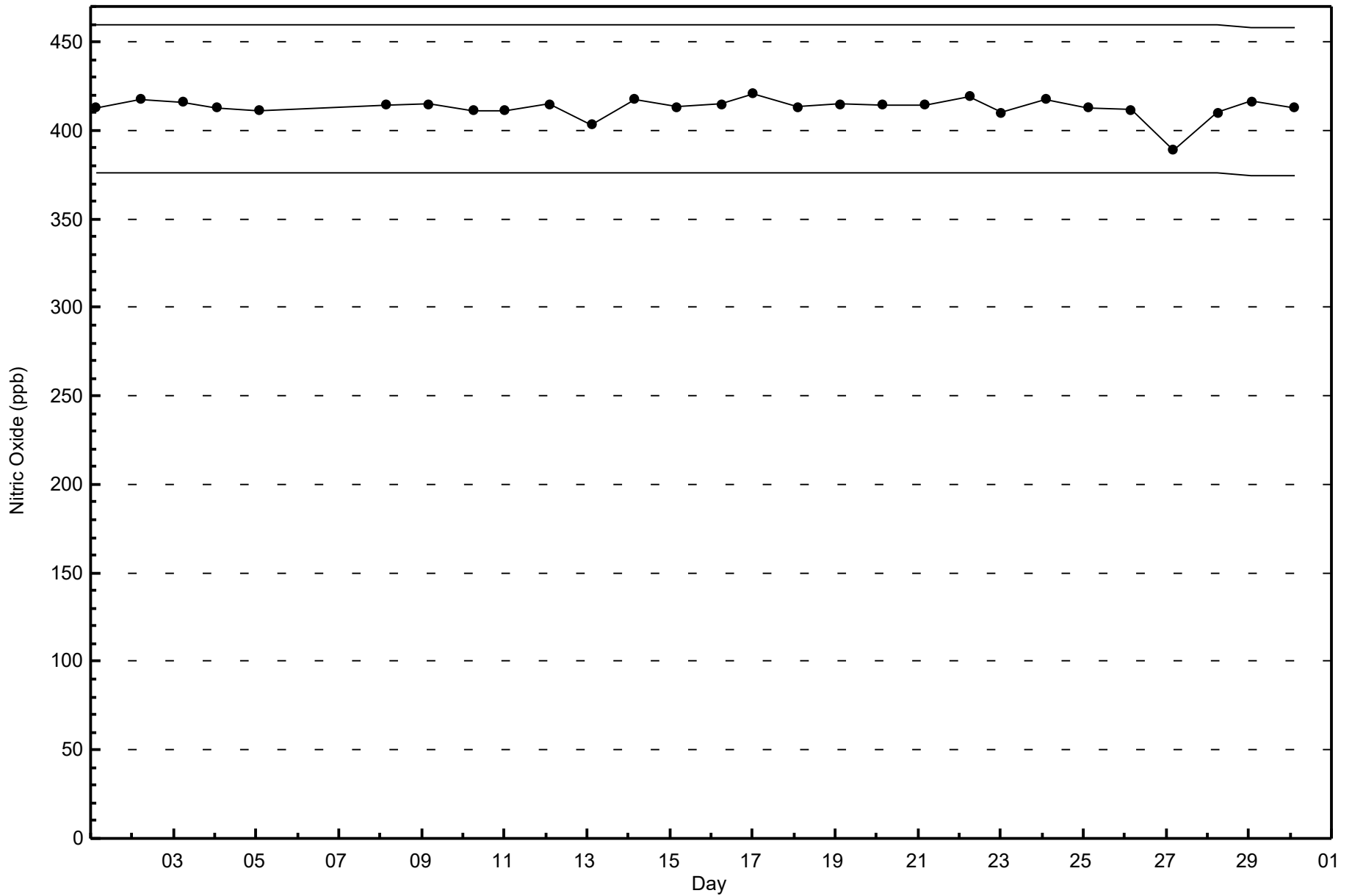
<b>Concentration</b> <b>Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	41	40	22	13	9	7	24	65	90	82	75	34	27	41	13	12	595
21 - 40	3	1	0	0	0	0	3	4	11	6	2	1	3	1	1	1	37
11 - 80	3	3	2	0	0	0	0	7	13	2	0	0	1	0	1	0	32
81 - 159	0	0	0	0	0	0	0	1	5	1	0	0	0	1	1	0	9
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	47	44	24	13	9	7	27	77	119	91	77	35	31	43	16	13	673

Total Number of Valid Hours: 673

Total Number of Hours: 720









Wood Buffalo Environmental Association

Summary of Hour Averages

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

Ells River - November 2023

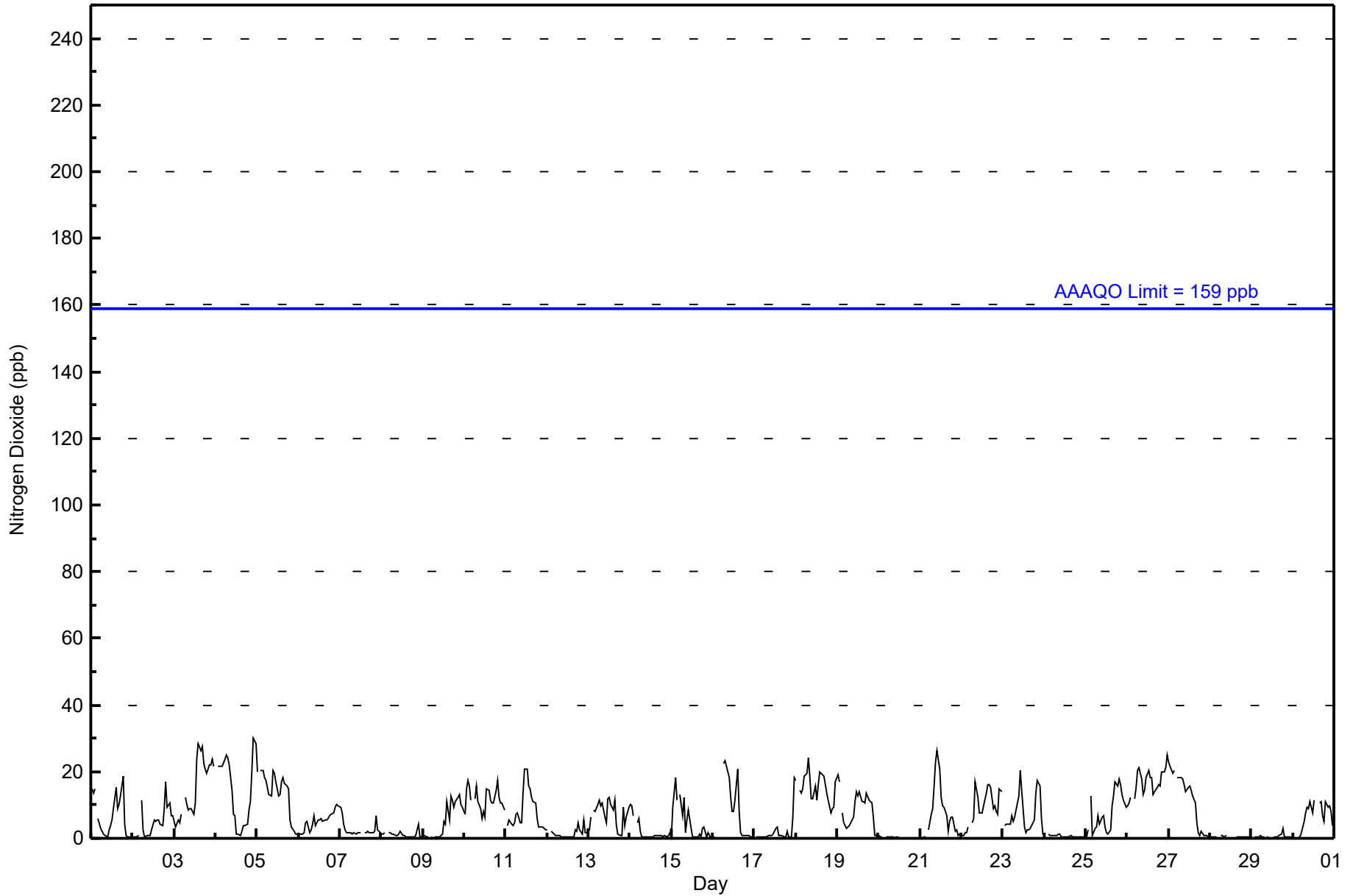
Number of Exceedences (AAAQO):		1-hr: 0		24-hr: 0		Hours in Service:																720																											
Maximum Value: 30.1 ppb on Nov 4 23:00		Maximum Daily Average: 16.6 ppb on Nov 26																Hours of Data:		684																													
Minimum Value: 0.1 ppb on Nov 20 13:00		Minimum Daily Average: 0.3 ppb on Nov 20																Hours of Missing Data:		36																													
Maximum Diurnal Average: 8.5 ppb at hour 15		Minimum Diurnal Average: 5.3 ppb at hour 5																Hours of Calibration:		33																													
Monthly Average: 6.90 ppb		Percentiles: P <sub>1</sub> = 0.2 P <sub>10</sub> = 0.4 Q <sub>1</sub> = 0.8 Median = 4.5 Q <sub>3</sub> = 11.4 P <sub>90</sub> = 17.8 P <sub>99</sub> = 25.1																Percent Operational Time:		99.6																													
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Nov	14.8	13.4	14.8	Z	5.9	3.0	2.1	1.4	1.0	0.6	2.5	3.9	5.3	8.7	15.1	8.7	10.1	12.9	18.6	4.2	0.7	0.5	0.4	0.6	6.5	18.6																							
2-Nov	0.6	0.5	0.6	0.9	Z	11.4	2.7	0.5	0.9	0.8	0.7	2.7	5.5	5.0	5.7	5.3	4.2	3.7	9.1	17.0	9.3	10.6	6.7	6.9	4.8	17.0																							
3-Nov	5.2	3.6	5.4	4.7	7.0	Z	12.2	10.3	8.4	8.7	9.1	7.2	10.5	23.6	28.4	26.4	27.7	22.6	20.7	19.6	22.0	21.9	23.6	21.8	15.2	28.4																							
4-Nov	Z	21.4	21.7	21.4	21.6	23.7	25.2	24.3	22.0	14.2	7.2	6.6	1.4	1.1	0.8	2.2	3.9	3.7	4.2	8.4	11.2	20.1	30.1	28.4	14.1	30.1																							
5-Nov	19.9	Z	20.4	20.5	18.2	17.2	15.4	13.1	12.8	20.4	19.7	17.0	12.7	13.3	16.8	18.1	16.4	15.8	14.7	5.3	3.6	2.1	1.4	1.1	13.7	20.5																							
6-Nov	1.2	1.2	1.1	1.6	4.5	4.9	1.9	2.6	4.4	6.9	3.7	5.3	5.6	5.9	5.2	5.5	5.3	5.8	6.7	7.0	7.5	9.2	10.0	9.9	5.1	10.0																							
7-Nov	9.3	7.5	4.3	2.6	1.9	1.7	1.6	1.4	1.5	1.3	1.7	1.5	1.5	M	1.6	1.6	2.2	1.7	1.6	1.5	2.3	6.8	2.4	1.7	2.7	9.3																							
8-Nov	1.4	1.4	1.8	Z	1.9	1.6	1.4	1.2	0.9	0.8	1.2	2.1	0.8	0.9	0.5	0.4	0.5	0.5	0.4	0.4	0.8	4.1	0.5	0.4	1.1	4.1																							
9-Nov	0.3	0.8	0.3	0.3	Z	0.3	0.2	0.3	0.3	0.3	0.6	1.3	5.2	4.4	11.2	5.6	12.9	11.5	9.4	11.1	12.1	13.2	10.2	9.4	5.3	13.2																							
10-Nov	7.1	14.9	17.5	15.8	11.3	Z	11.9	15.6	11.0	8.7	6.0	8.0	6.3	15.0	14.6	11.6	10.7	10.4	14.4	17.5	12.1	10.7	10.7	8.3	11.7	17.5																							
11-Nov	Z	3.9	5.5	4.4	3.8	4.5	7.3	7.5	4.5	4.8	13.4	20.8	20.6	15.8	15.0	12.1	11.2	10.7	5.9	3.5	3.4	3.4	2.9	2.5	8.1	20.8																							
12-Nov	2.6	Z	2.3	1.7	1.1	0.9	0.7	0.7	0.5	0.5	0.5	0.4	0.5	0.5	0.5	0.5	2.7	2.0	4.7	2.5	1.3	5.6	1.6	1.6	1.6	5.6																							
13-Nov	2.4	6.3	Z	8.6	8.2	10.2	11.6	9.6	10.6	6.2	4.6	11.8	12.1	10.2	8.4	11.3	4.1	1.1	0.8	1.0	9.2	3.7	6.4	9.4	7.3	12.1																							
14-Nov	10.2	9.6	6.8	Z	4.6	6.0	2.3	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.7	0.7	0.7	0.7	0.6	0.7	0.5	0.7	1.5	2.2	10.2																							
15-Nov	0.5	9.3	18.2	11.3	Z	13.3	6.9	12.4	1.5	5.7	8.5	2.8	0.3	0.3	0.3	0.4	1.4	0.3	3.0	3.5	0.3	1.8	0.7	0.2	4.5	18.2																							
16-Nov	0.3	0.2	0.2	0.2	0.2	Z	22.3	23.2	21.4	18.2	12.2	7.9	7.9	11.3	20.9	8.1	1.7	1.0	0.8	0.8	0.8	0.7	0.6	0.6	7.0	23.2																							
17-Nov	Z	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.7	0.8	1.1	2.9	3.6	0.9	0.7	0.7	0.6	0.6	2.2	0.6	0.5	6.5	18.2	2.0	18.2																							
18-Nov	17.3	Z	14.3	13.5	14.8	18.5	19.5	24.0	18.7	11.8	11.7	15.5	11.3	16.1	20.0	19.1	18.6	15.9	13.4	11.3	7.6	9.1	9.2	16.9	15.1	24.0																							
19-Nov	19.1	17.0	Z	7.5	4.8	2.9	3.5	3.8	4.8	6.3	10.9	14.0	12.8	13.8	11.1	11.1	10.8	13.6	11.6	11.2	10.4	6.2	0.7	0.9	9.1	19.1																							
20-Nov	1.0	0.5	0.3	Z	0.4	0.3	0.3	0.3	0.3	0.2	0.4	0.3	0.1	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.3	1.0																						
21-Nov	0.2	0.2	0.4	0.6	Z	2.5	7.1	8.7	15.5	22.8	26.4	20.9	12.3	9.6	9.5	6.7	2.2	4.9	6.3	6.5	2.2	2.4	0.9	1.1	7.4	26.4																							
22-Nov	0.9	1.0	1.5	1.9	3.4	Z	4.8	5.9	17.1	12.2	7.5	7.8	7.6	9.7	13.4	16.1	16.2	15.1	9.1	9.7	8.0	7.0	14.7	14.1	8.9	17.1																							
23-Nov	Z	3.7	4.1	4.4	4.2	6.7	5.1	6.3	10.8	12.8	20.4	14.5	3.5	1.9	2.4	2.7	3.0	4.5	5.6	13.7	17.2	15.7	5.8	1.2	7.4	20.4																							
24-Nov	1.2	Z	1.2	1.0	0.9	0.9	0.9	0.9	1.2	1.1	0.6	0.5	0.5	0.6	0.6	0.7	0.4	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.7	1.2																							
25-Nov	0.4	2.6	Z	12.6	1.0	2.8	3.3	6.9	4.4	6.3	6.6	3.3	1.9	1.3	2.6	9.8	12.5	16.9	15.7	17.6	16.2	13.2	11.5	9.2	7.8	17.6																							
26-Nov	9.8	10.4	12.4	Z	11.9	15.1	20.4	21.1	17.8	13.1	14.5	18.3	20.5	18.1	18.3	13.2	13.9	15.1	16.2	15.5	20.1	20.1	21.2	25.1	16.6	25.1																							
27-Nov	22.7	21.6	19.7	20.2	Z	18.2	18.1	18.3	17.8	16.3	14.1	15.1	15.7	14.2	12.8	10.6	4.7	1.6	1.0	2.1	0.8	0.7	0.7	0.6	11.6	22.7																							
28-Nov	0.6	0.5	0.5	0.5	0.4	Z	0.7	0.7	0.5	0.8	C	C	C	C	C	0.5	0.3	0.3	0.4	0.3	0.3	0.6	0.4	0.4	0.5	0.8																							
29-Nov	0.4	Z	0.5	0.5	0.6	0.7	0.3	0.3	0.2	0.3	0.2	0.2	0.2	0.3	0.3	0.3	0.9	1.1	2.8	0.3	0.3	0.3	0.3	0.3	0.5	2.8																							
30-Nov	0.2	0.3	Z	0.5	0.3	1.5	5.1	7.7	9.3	9.1	11.2	7.6	11.4	M	M	10.8	11.2	6.8	5.2	11.2	9.3	9.8	8.1	4.0	6.7	11.4																							
																								5.8	6.1	6.8	6.3	5.3	6.8	7.2	7.7	7.4	7.1	7.5	7.6	6.8	7.6	8.5	7.4	7.0	6.7	6.8	6.9	6.4	6.7	6.3	6.6	Diurnal Average	
																								22.7	21.6	21.7	21.4	21.6	23.7	25.2	24.3	22.0	22.8	26.4	20.9	20.6	23.6	28.4	26.4	27.7	22.6	20.7	19.6	22.0	21.9	30.1	28.4	Diurnal Maximum	
Z - zerospan      C - Calibration      M - Maintenance																																																	
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 159 ppb																																																	





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

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb**  
**Ells River - November 2023**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Ells River - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	647	94.59	94.59
21 - 40	37	5.41	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 684

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Ells River - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	41	35	17	13	9	7	27	76	115	89	76	34	29	42	14	12	636
21 - 40	6	9	7	0	0	0	0	1	4	2	1	1	2	1	2	1	37
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	47	44	24	13	9	7	27	77	119	91	77	35	31	43	16	13	673

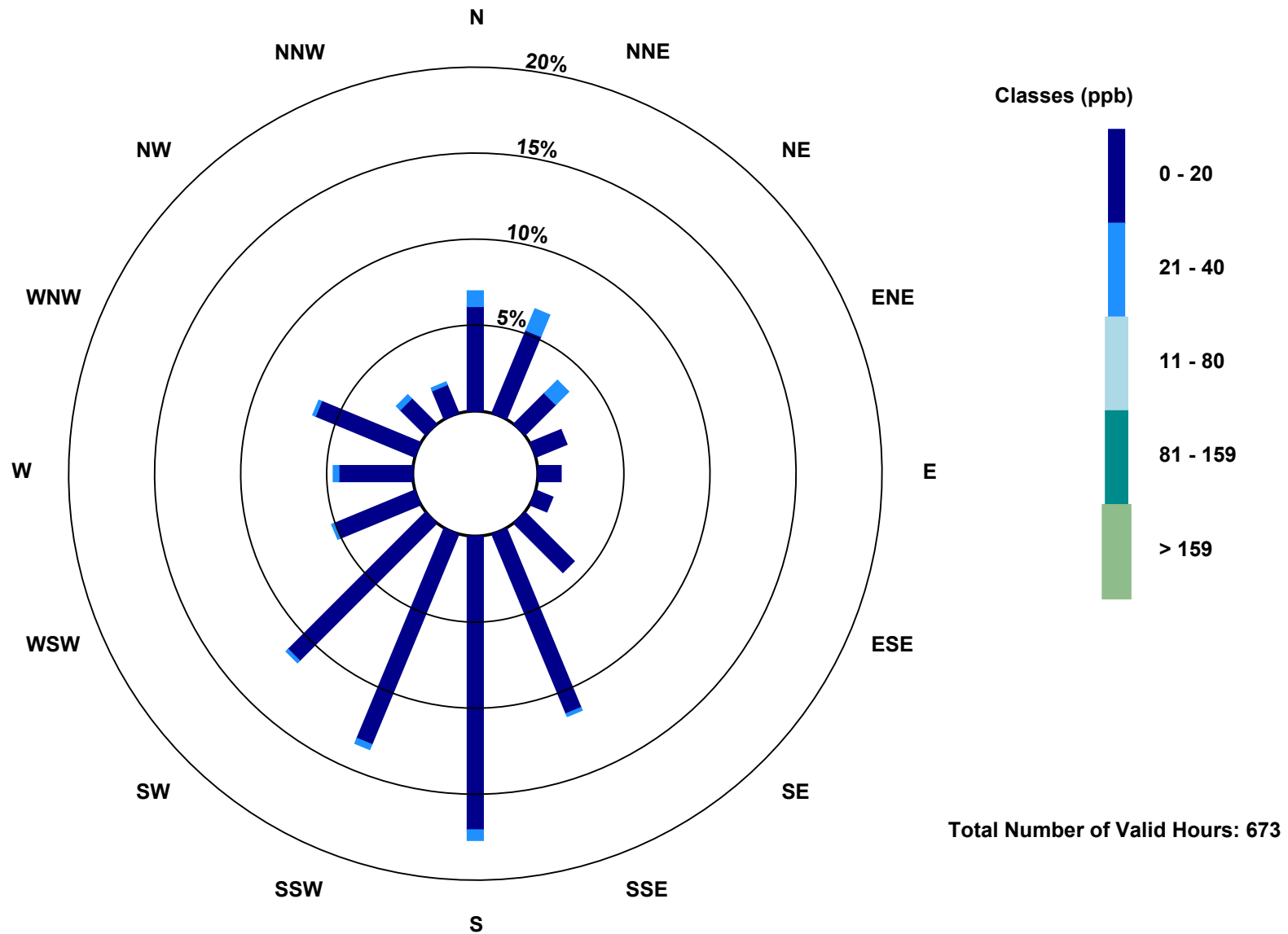
Total Number of Valid Hours: 673

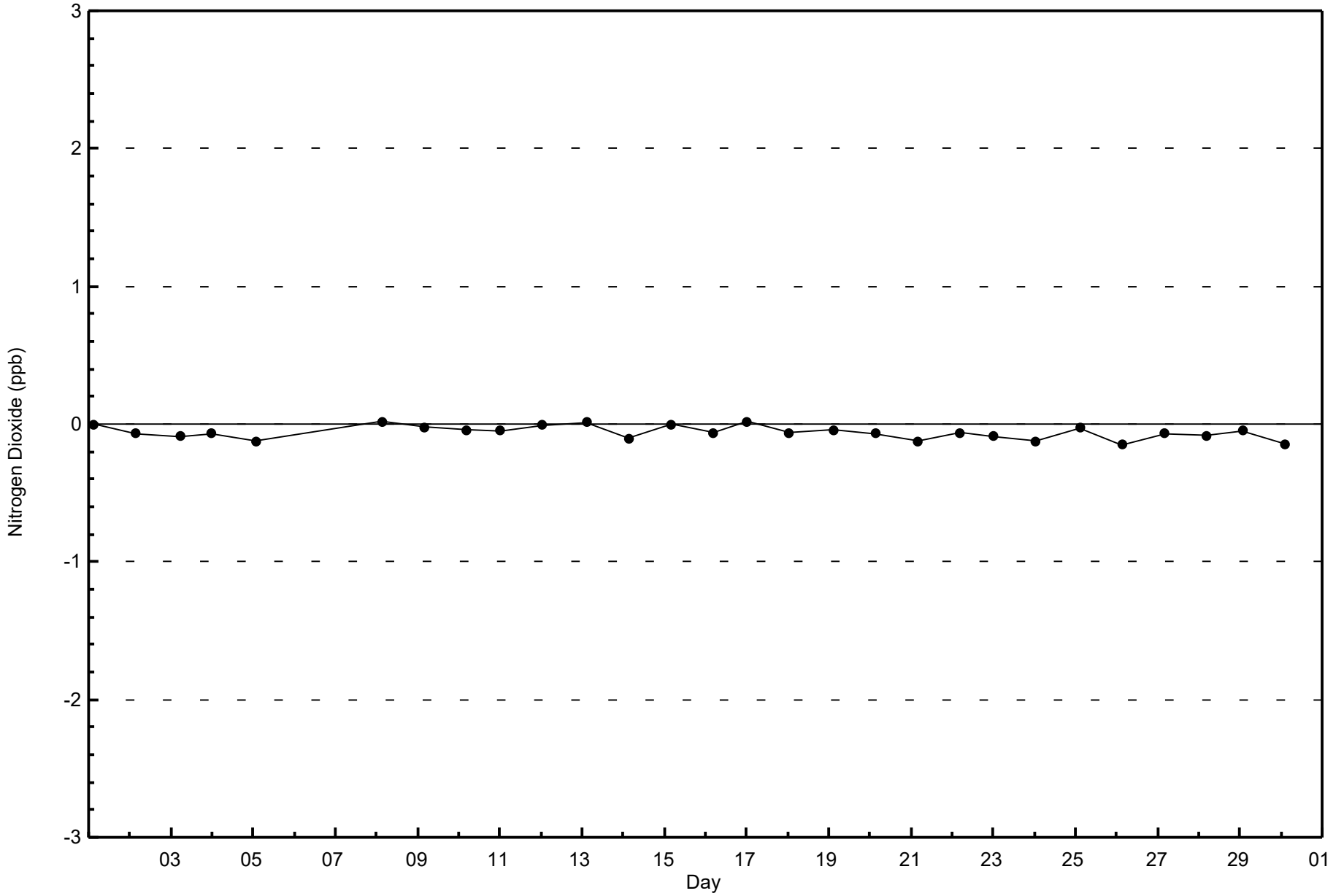
Total Number of Hours: 720

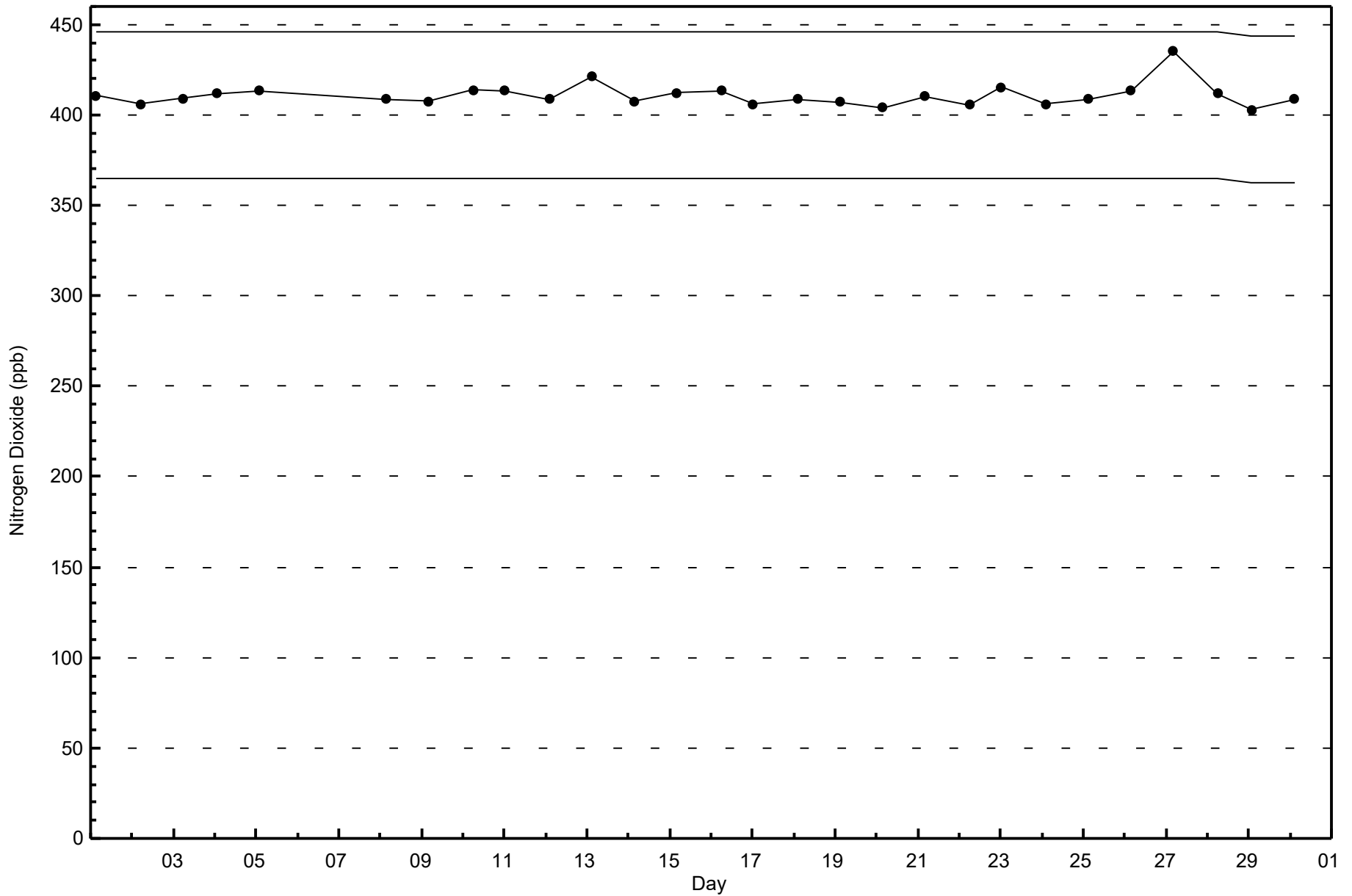


Wood Buffalo Environmental Association  
Wind Rose Nov 2023

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









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

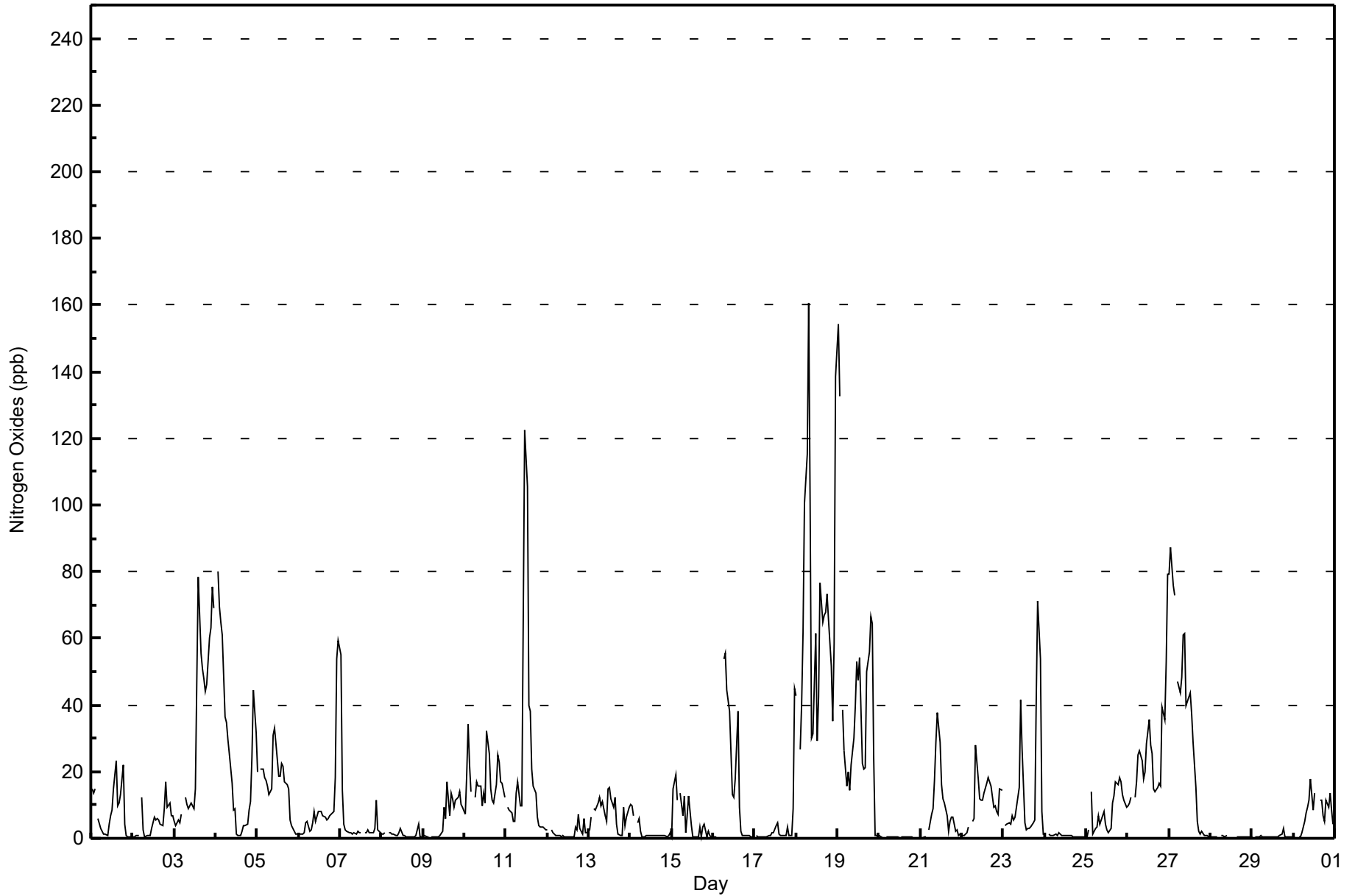
**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Ells River - November 2023**

Maximum Value: 160.4 ppb on Nov 18 08:00		Maximum Daily Average: 67.1 ppb on Nov 18		Hours in Service: 720																																													
Minimum Value: 0.2 ppb on Nov 16 04:00		Minimum Daily Average: 0.3 ppb on Nov 20		Hours of Data: 684																																													
Maximum Diurnal Average: 17.5 ppb at hour 12		Minimum Diurnal Average: 9.9 ppb at hour 5		Hours of Missing Data: 36																																													
Monthly Average: 13.57 ppb		Percentiles: P <sub>1</sub> = 0.2 P <sub>10</sub> = 0.4 Q <sub>1</sub> = 0.8 Median = 5.1 Q <sub>3</sub> = 15.3 P <sub>90</sub> = 40.7 P <sub>99</sub> = 101.5		Hours of Calibration: 33																																													
				Percent Operational Time: 99.6																																													
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Nov	14.9	13.4	14.8	Z	5.9	3.0	2.1	1.4	1.2	0.8	4.3	6.6	8.4	14.7	23.3	9.9	10.5	13.3	22.0	4.2	0.7	0.5	0.4	0.6	7.7	23.3																							
2-Nov	0.6	0.5	0.6	0.9	Z	12.4	2.7	0.5	0.9	0.8	0.7	2.9	6.3	5.5	6.0	5.4	4.2	3.7	9.1	17.0	9.3	10.6	6.7	6.9	5.0	17.0																							
3-Nov	5.2	3.6	5.4	4.7	7.0	Z	12.2	10.3	8.8	9.8	10.6	8.7	14.8	47.5	78.4	55.5	50.7	47.9	44.0	46.3	60.2	63.3	75.3	69.2	32.1	78.4																							
4-Nov	Z	80.0	69.5	64.7	61.2	36.4	34.7	29.7	25.3	16.4	8.4	9.0	1.5	1.1	0.8	2.2	3.9	3.7	4.2	8.4	11.2	24.0	44.3	31.7	24.9	80.0																							
5-Nov	20.0	Z	20.6	20.6	18.2	17.3	15.5	13.3	14.7	31.0	33.1	28.2	18.7	18.6	22.5	21.7	16.8	15.9	14.7	5.4	3.8	2.1	1.5	1.1	16.3	33.1																							
6-Nov	1.2	1.2	1.1	1.6	4.5	4.9	1.9	2.6	4.6	8.2	4.9	7.9	8.1	8.2	6.7	6.4	5.5	5.8	6.7	7.0	8.2	18.2	54.0	59.3	10.0	59.3																							
7-Nov	55.2	14.2	4.4	2.6	1.9	1.7	1.6	1.4	1.6	1.4	1.9	1.6	1.7	M	1.7	1.7	2.5	1.8	1.6	1.5	3.1	11.6	2.4	1.7	5.3	55.2																							
8-Nov	1.4	1.4	1.8	Z	1.9	1.6	1.4	1.2	0.9	0.9	1.5	2.9	0.9	0.9	0.5	0.4	0.5	0.5	0.4	0.4	0.8	4.2	0.5	0.4	1.2	4.2																							
9-Nov	0.3	0.9	0.4	0.3	Z	0.4	0.3	0.3	0.4	0.4	1.0	2.2	9.2	6.0	16.8	6.7	13.8	11.8	9.5	11.2	12.3	13.8	10.3	9.5	6.0	16.8																							
10-Nov	7.3	19.0	34.3	22.2	14.1	Z	12.3	16.9	15.6	15.6	9.6	13.6	10.4	32.0	25.3	14.9	11.3	10.5	15.9	25.2	22.7	17.1	16.7	12.5	17.2	34.3																							
11-Nov	Z	9.2	8.5	7.5	5.3	5.1	13.6	17.0	9.6	9.9	66.1	122.4	105.5	39.9	38.0	20.9	15.6	13.6	6.6	3.7	3.4	3.4	2.9	2.5	23.1	122.4																							
12-Nov	2.6	Z	2.6	1.7	1.2	0.9	0.7	0.7	0.6	0.7	0.6	0.6	0.6	0.6	0.6	3.2	2.4	7.3	2.8	1.4	5.7	1.7	1.7	1.8	7.3																								
13-Nov	2.5	6.4	Z	8.8	8.3	10.5	12.1	9.8	11.0	6.8	5.2	15.0	15.2	11.7	9.5	12.1	4.2	1.1	0.8	1.0	9.2	3.7	6.4	9.4	7.9	15.2																							
14-Nov	10.2	9.7	6.8	Z	4.6	6.0	2.3	0.6	0.6	0.6	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.7	0.7	0.7	0.8	0.5	0.7	1.5	2.3	10.2																							
15-Nov	0.5	14.6	18.9	11.5	Z	13.4	7.0	12.7	1.6	6.9	12.5	3.9	0.4	0.4	0.4	0.6	3.2	0.3	3.4	4.2	0.3	1.9	0.8	0.2	5.2	18.9																							
16-Nov	0.3	0.3	0.2	0.2	0.2	Z	53.9	55.4	44.5	38.1	25.7	13.3	12.4	17.9	38.2	9.4	2.0	1.0	0.8	0.8	0.8	0.7	0.6	0.6	13.8	55.4																							
17-Nov	Z	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.9	0.8	1.5	1.7	4.0	4.5	1.3	0.8	0.8	0.7	0.7	3.4	0.7	0.6	8.7	45.1	3.5	45.1																							
18-Nov	42.8	Z	26.7	40.1	62.1	100.6	115.3	160.4	100.7	30.2	31.5	61.6	29.2	42.6	76.7	64.9	67.1	68.0	73.3	65.6	51.6	35.1	58.5	138.7	67.1	160.4																							
19-Nov	154.0	132.6	Z	38.5	26.1	15.7	19.9	14.5	21.9	30.1	40.0	52.8	47.3	54.1	22.5	20.6	21.3	49.9	56.0	66.3	64.3	24.1	0.7	0.9	42.4	154.0																							
20-Nov	1.0	0.5	0.3	Z	0.4	0.3	0.3	0.5	0.4	0.3	0.5	0.5	0.2	0.2	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	1.0																							
21-Nov	0.2	0.2	0.4	0.6	Z	2.5	7.1	8.7	17.6	28.9	37.6	28.9	16.3	12.0	10.6	7.0	2.2	4.9	6.3	6.5	2.2	2.4	0.9	1.1	8.9	37.6																							
22-Nov	0.9	1.0	1.5	1.9	3.4	Z	4.9	6.0	28.2	17.8	11.9	11.4	11.4	13.5	16.4	18.1	16.8	15.6	9.1	9.7	8.1	7.1	14.8	14.3	10.6	28.2																							
23-Nov	Z	3.7	4.1	4.5	4.2	6.7	5.4	6.6	12.1	15.3	41.6	26.8	4.8	2.6	2.9	3.1	3.2	4.7	5.7	41.0	71.2	53.6	7.9	1.2	14.5	71.2																							
24-Nov	1.2	Z	1.2	1.0	1.0	1.0	1.1	1.0	1.9	1.3	0.9	0.7	0.7	0.7	0.7	0.8	0.5	0.6	0.5	0.5	0.5	0.5	0.4	0.4	0.8	1.9																							
25-Nov	0.4	2.6	Z	14.0	1.1	2.9	3.3	6.9	4.4	6.8	8.0	4.1	2.4	1.6	2.9	10.4	12.6	17.1	15.9	18.2	16.8	13.3	11.6	9.2	8.1	18.2																							
26-Nov	9.9	10.5	12.5	Z	12.3	16.8	25.0	26.4	23.3	17.9	19.7	28.3	35.5	27.8	25.5	14.7	14.1	15.3	16.4	15.8	39.2	35.7	53.0	79.1	25.0	79.1																							
27-Nov	79.1	87.4	75.8	73.0	Z	46.9	43.7	48.5	60.9	61.6	39.8	42.4	43.5	37.3	28.8	15.4	4.9	1.9	1.1	2.3	0.8	0.7	0.7	0.6	34.7	87.4																							
28-Nov	0.6	0.5	0.5	0.5	0.4	Z	0.8	0.7	0.5	0.9	C	C	C	C	C	0.5	0.3	0.3	0.4	0.3	0.3	0.6	0.4	0.4	0.5	0.9																							
29-Nov	0.4	Z	0.5	0.5	0.6	0.9	0.3	0.3	0.2	0.3	0.2	0.2	0.2	0.3	0.4	0.3	0.9	1.1	2.8	0.3	0.3	0.3	0.3	0.3	0.5	2.8																							
30-Nov	0.2	0.3	Z	0.5	0.3	1.5	5.1	7.7	9.4	11.6	17.9	8.6	13.4	M	M	11.4	11.3	6.9	5.2	11.3	9.4	13.7	8.6	4.1	7.5	17.9																							
																								15.9	16.6	12.1	12.9	9.9	12.4	13.6	15.4	14.1	12.4	15.1	17.5	14.6	14.9	16.4	11.2	10.2	10.7	11.4	12.7	13.8	12.3	13.1	16.8	Diurnal Average	
																								154.0	132.6	75.8	73.0	62.1	100.6	115.3	160.4	100.7	61.6	66.1	122.4	105.5	54.1	78.4	64.9	67.1	68.0	73.3	66.3	71.2	63.3	75.3	138.7	Diurnal Maximum	
Z - zerspan		C - Calibration				M - Maintenance																																											



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

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Ells River - November 2023**







**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Ells River - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	556	81.29	81.29
21 - 40	59	8.63	89.91
41 - 80	59	8.63	98.54
81 - 159	9	1.32	99.85
> 159	1	0.15	100.00

Total Number of Valid Hours: 684

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Ells River - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	39	31	16	13	8	7	22	55	79	78	73	33	26	41	13	11	545
21 - 40	2	8	6	0	1	0	3	11	13	6	4	1	2	1	0	1	59
11 - 80	6	5	2	0	0	0	2	10	22	5	0	1	3	0	2	1	59
81 - 159	0	0	0	0	0	0	0	1	4	2	0	0	0	1	1	0	9
> 159	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1
<b>Totals</b>	47	44	24	13	9	7	27	77	119	91	77	35	31	43	16	13	673

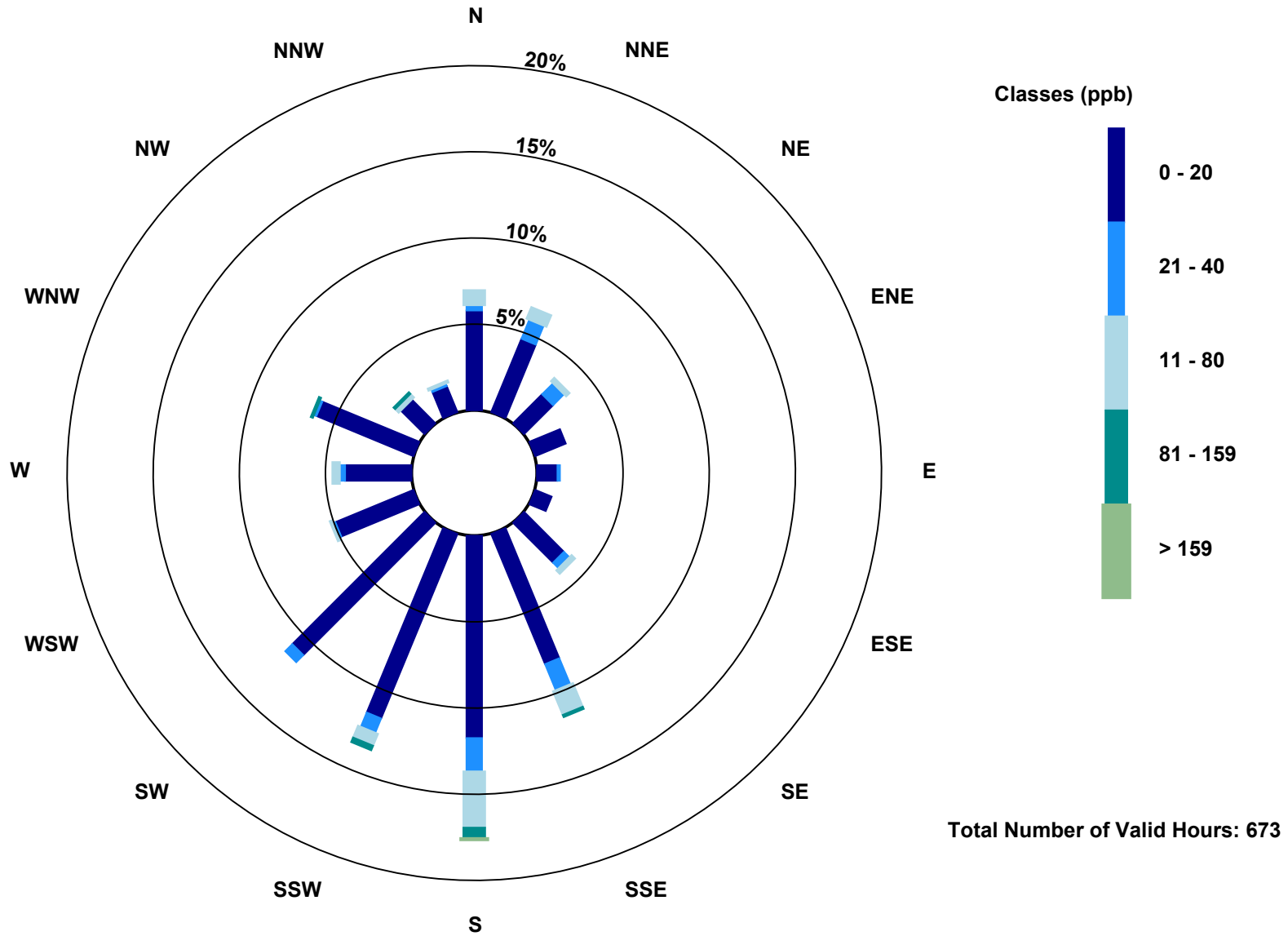
Total Number of Valid Hours: 673

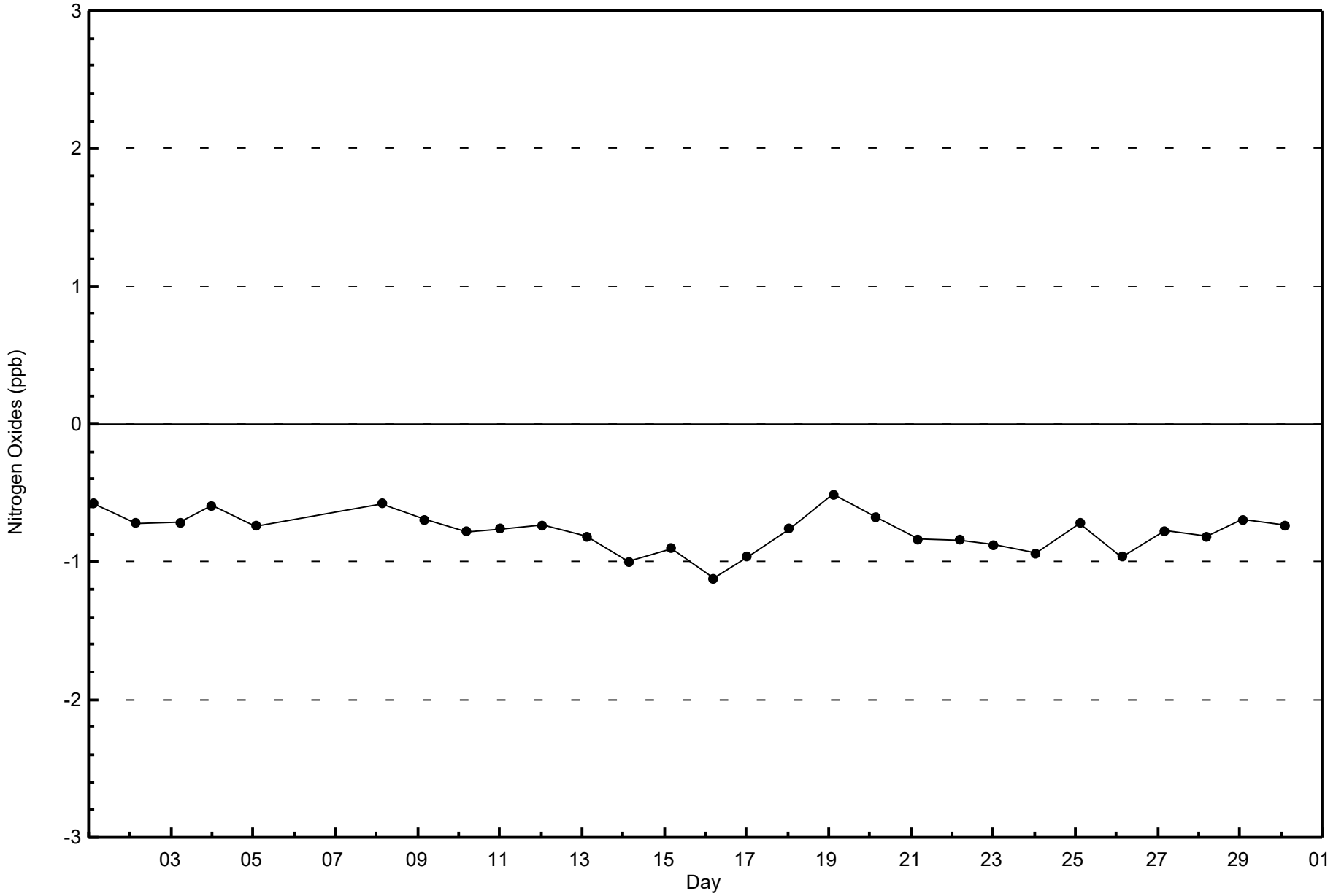
Total Number of Hours: 720

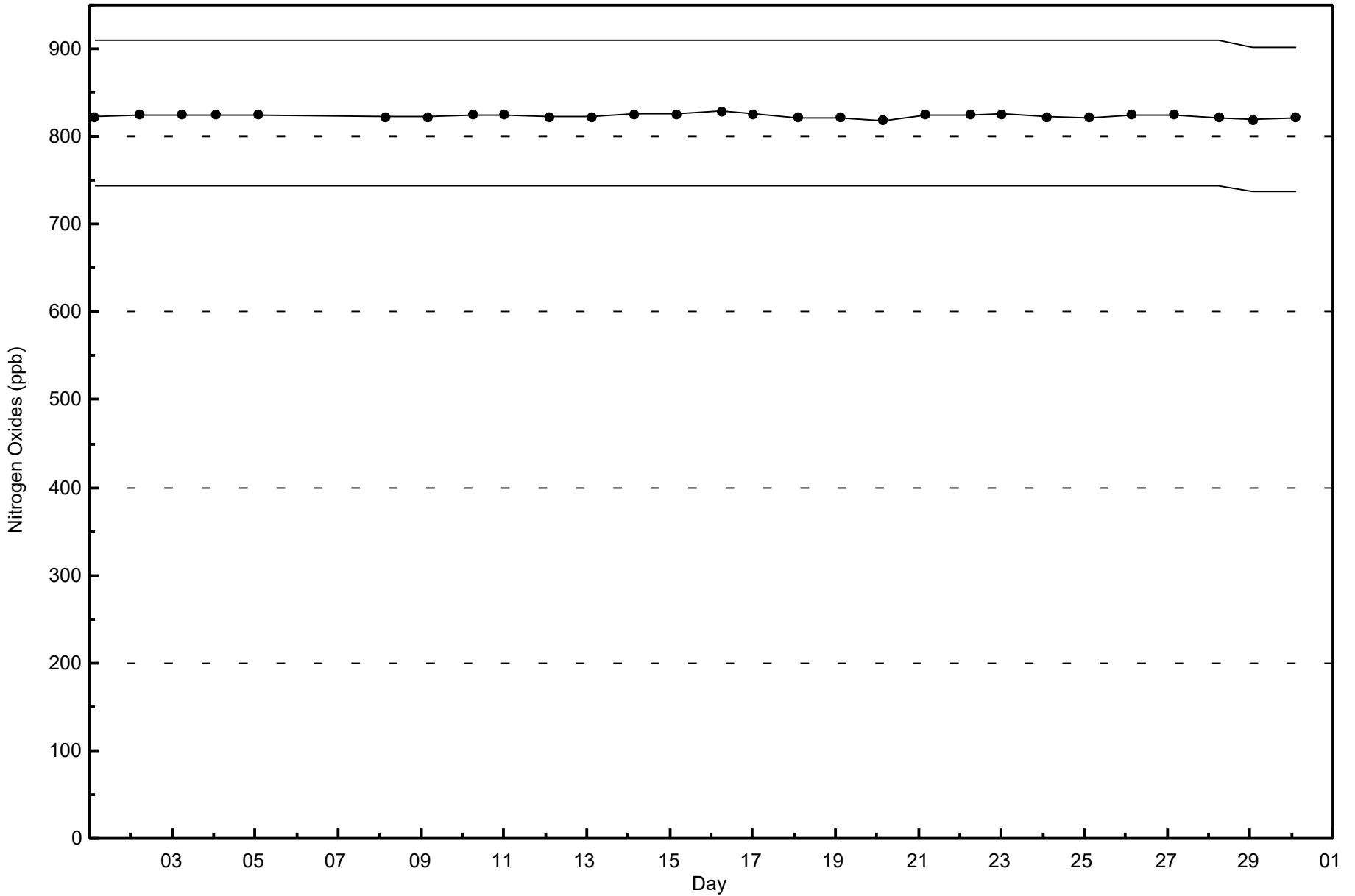


Wood Buffalo Environmental Association  
Wind Rose Nov 2023

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





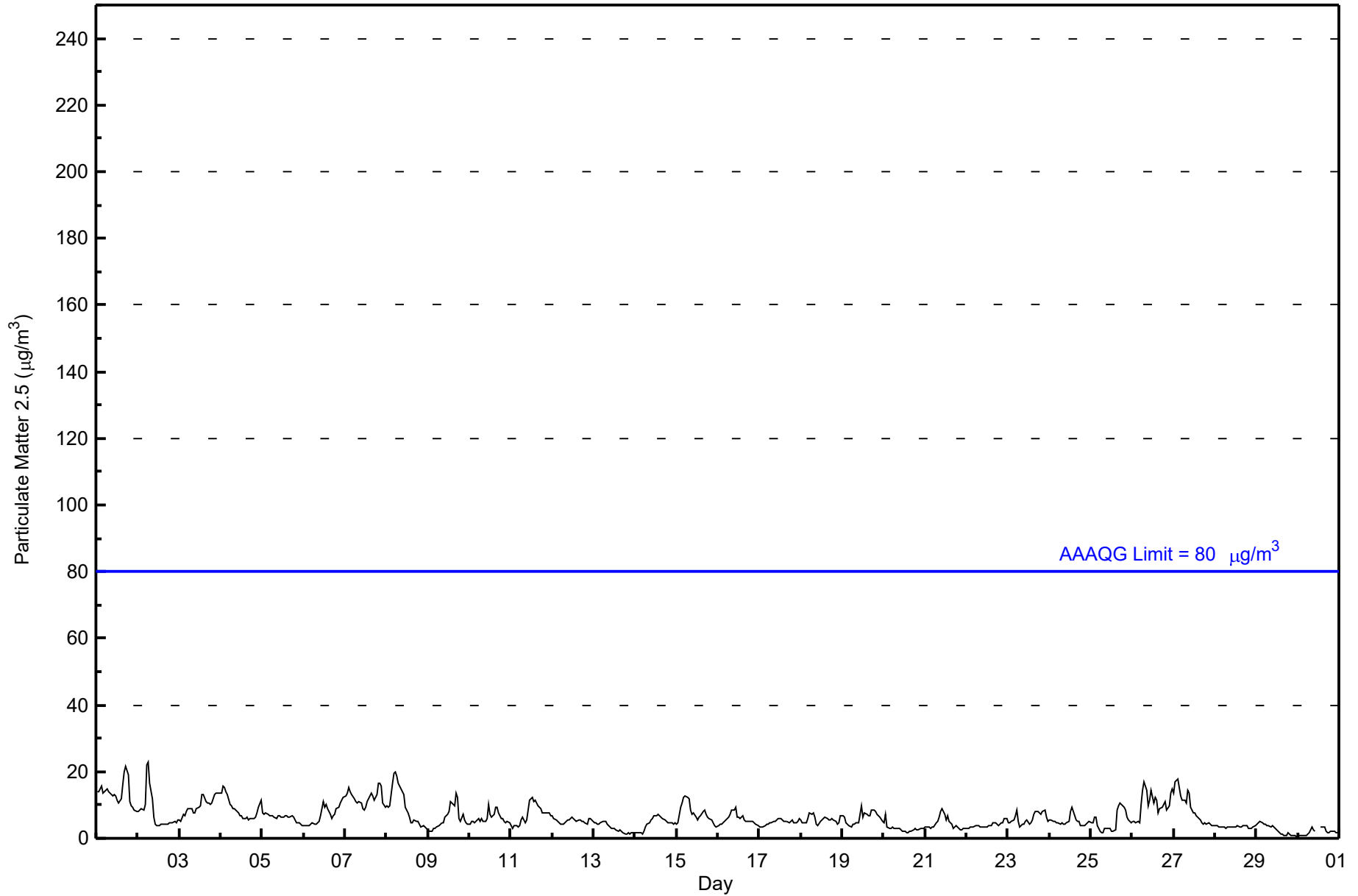




Summary of Hour Averages

Ells River - November 2023

Number of Exceedences (AAAQO):		1-hr: 0	24-hr: 0																		Hours in Service:	720				
Maximum Value: 23.0 µg/m <sup>3</sup> on Nov 2 07:00		Maximum Daily Average: 13.6 µg/m <sup>3</sup> on Nov 1																	Hours of Data:	718						
Minimum Value: 0.6 µg/m <sup>3</sup> on Nov 30 00:00		Minimum Daily Average: 1.9 µg/m <sup>3</sup> on Nov 30																	Hours of Missing Data:	2						
Maximum Diurnal Average: 7.2 µg/m <sup>3</sup> at hour 7		Minimum Diurnal Average: 5.7 µg/m <sup>3</sup> at hour 23																	Hours of Calibration:	2						
Monthly Average: 6.40 µg/m <sup>3</sup>		Percentiles: P <sub>1</sub> = 0.8 P <sub>10</sub> = 2.8 Q <sub>1</sub> = 3.9 Median = 5.3 Q <sub>3</sub> = 8.0 P <sub>90</sub> = 11.9 P <sub>99</sub> = 18.7																	Percent Operational Time:	100.0						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	14.2	14.0	14.9	15.7	13.5	14.3	14.7	14.2	13.5	12.8	13.2	12.6	11.5	10.7	11.8	16.3	20.0	21.8	19.0	11.2	9.9	9.3	8.4	8.0	13.6	21.8
2-Nov	8.2	8.5	8.7	8.6	10.3	22.1	23.0	16.5	11.7	6.2	4.0	3.6	4.0	4.2	4.1	4.4	4.0	4.2	4.7	4.6	4.6	4.9	4.5	5.6	7.7	23.0
3-Nov	5.6	5.0	7.3	6.7	8.2	8.9	9.1	8.8	7.5	7.4	8.9	9.4	9.9	13.0	13.1	10.9	10.5	10.8	10.1	10.7	13.1	13.7	13.7	13.7	9.8	13.7
4-Nov	13.4	15.9	15.1	14.0	13.3	10.3	9.9	9.0	8.9	8.0	7.6	6.9	6.6	5.8	5.8	6.2	5.6	5.9	6.0	5.9	6.3	7.8	9.2	11.3	8.9	15.9
5-Nov	7.5	7.4	7.5	7.2	6.6	6.8	6.6	6.4	5.9	6.6	6.6	6.3	6.2	6.6	6.7	6.5	6.3	6.6	6.6	5.4	4.6	4.5	4.0	3.8	6.2	7.5
6-Nov	3.7	3.7	3.7	4.0	4.4	4.7	4.4	4.2	4.8	5.2	6.6	11.1	9.5	10.2	8.8	7.1	6.0	6.7	7.0	9.0	9.1	10.5	11.5	12.3	7.0	12.3
7-Nov	12.5	13.5	15.1	14.2	13.0	11.9	11.0	10.7	11.1	10.8	8.9	8.5	9.2	11.2	12.8	13.5	12.7	11.5	13.0	16.4	16.7	15.5	10.4	9.3	12.2	16.7
8-Nov	9.8	9.4	9.8	16.6	19.5	19.9	18.8	16.5	14.9	14.1	13.1	9.5	7.7	6.2	4.8	4.8	5.4	5.1	4.9	4.2	3.5	3.7	3.3	3.0	9.5	19.9
9-Nov	2.3	2.1	2.2	2.8	3.1	3.4	3.8	4.4	4.8	4.8	6.2	7.2	8.1	10.9	10.7	9.7	13.7	12.4	5.9	5.1	7.1	5.3	4.5	4.3	6.0	13.7
10-Nov	4.2	5.0	5.1	4.6	5.0	5.8	5.3	5.7	5.0	5.2	5.8	10.3	7.2	6.5	7.1	9.5	9.4	7.6	6.1	5.9	4.9	4.8	5.0	4.7	6.1	10.3
11-Nov	3.7	3.1	3.7	3.8	3.3	4.0	5.4	6.4	4.7	5.6	8.3	11.4	12.2	11.2	11.3	10.8	9.9	8.9	7.4	7.4	7.6	7.8	7.7	6.8	7.2	12.2
12-Nov	6.7	6.1	5.6	4.9	4.6	4.2	4.3	4.7	5.2	5.5	5.7	6.3	6.0	5.4	5.3	5.4	5.3	5.1	4.9	4.5	4.3	5.9	6.1	5.6	5.3	6.7
13-Nov	4.8	4.6	4.4	4.4	4.5	5.0	5.2	4.9	4.3	3.3	3.0	2.8	3.1	2.4	2.0	2.6	2.0	1.6	1.2	1.2	1.5	1.2	1.5	1.6	3.1	5.2
14-Nov	1.6	1.7	1.7	1.5	1.5	1.9	3.4	4.2	4.5	5.5	6.1	6.7	6.9	7.0	6.6	6.5	6.0	5.6	4.9	4.6	4.5	4.5	4.4	4.6	4.4	7.0
15-Nov	4.2	4.9	9.2	10.6	12.4	12.7	12.3	12.0	8.5	7.3	7.6	6.2	5.5	6.5	6.8	7.9	8.6	7.1	6.2	5.8	5.4	4.5	4.0	3.5	7.5	12.7
16-Nov	3.8	4.0	4.3	4.7	5.1	6.0	6.4	7.1	8.3	8.5	9.3	6.4	6.2	6.0	6.7	5.5	5.0	5.3	5.2	5.1	5.0	4.7	4.4	3.9	5.7	9.3
17-Nov	3.5	3.4	3.6	3.7	4.0	4.1	4.5	4.8	5.2	5.2	5.7	5.9	5.3	5.1	5.2	5.1	4.7	4.9	5.3	4.8	4.9	4.9	5.8	4.8	5.9	
18-Nov	5.5	4.7	4.7	4.8	5.8	7.5	7.2	7.8	6.4	4.1	3.9	4.9	5.7	5.9	6.2	5.7	5.6	5.7	6.0	5.6	5.0	4.2	4.8	6.6	5.6	7.8
19-Nov	7.0	6.6	4.8	4.4	4.0	3.5	4.3	4.4	4.6	4.8	7.0	9.9	6.5	7.5	7.1	6.9	6.9	8.4	8.4	8.1	7.3	6.7	6.2	5.2	6.3	9.9
20-Nov	4.8	7.2	3.5	2.9	3.0	3.2	3.0	3.1	2.9	2.8	2.6	2.0	2.1	1.8	1.9	1.9	2.1	2.5	3.0	2.7	2.6	2.8	3.0	3.0	2.9	7.2
21-Nov	3.3	3.6	3.2	3.2	3.3	3.5	4.6	5.1	6.3	8.1	9.1	7.2	5.7	7.0	4.9	4.4	3.1	3.5	3.8	3.4	2.6	2.4	2.8	3.1	4.5	9.1
22-Nov	3.1	3.1	3.3	3.3	3.4	3.7	3.7	3.9	3.2	3.3	3.3	3.3	3.6	3.8	4.0	4.5	4.6	4.8	3.9	4.3	4.5	4.5	6.1	6.0	4.0	6.1
23-Nov	4.5	4.7	5.2	5.5	6.6	8.3	5.1	3.4	4.1	4.4	5.1	5.3	4.2	4.5	5.5	7.2	8.0	7.9	7.5	7.2	8.1	8.7	6.2	5.2	5.9	8.7
24-Nov	5.3	5.4	5.2	5.0	4.8	4.5	4.3	4.5	4.2	4.4	4.8	5.1	8.2	9.2	8.0	5.4	5.3	5.1	3.9	3.9	4.0	4.2	4.7	5.0	5.2	9.2
25-Nov	4.8	4.8	6.2	6.5	3.8	2.1	1.6	1.7	2.9	2.9	3.2	3.0	2.0	2.0	2.4	8.4	9.8	10.7	9.9	9.3	8.5	6.3	5.3	4.8	5.1	10.7
26-Nov	4.9	5.0	4.5	4.9	4.8	10.2	14.4	16.8	14.6	9.8	11.4	14.3	10.5	12.2	11.4	7.7	8.9	9.4	10.2	11.1	8.6	9.8	13.4	14.7	10.1	16.8
27-Nov	13.4	17.1	17.9	15.5	12.6	11.3	11.3	10.8	14.6	13.7	9.4	7.5	7.5	6.6	6.2	5.4	4.5	4.3	4.5	4.4	4.6	4.3	3.9	3.9	9.0	17.9
28-Nov	3.7	3.8	3.6	3.5	3.5	3.3	3.1	3.3	3.3	3.3	3.5	3.6	3.6	3.6	3.4	3.4	3.7	3.9	3.7	3.1	2.8	3.1	3.5	3.8	3.5	3.9
29-Nov	4.2	4.6	5.0	4.8	4.1	4.1	3.9	3.8	3.5	3.6	3.5	3.2	2.0	1.5	1.4	1.2	1.0	1.0	1.6	1.1	0.9	0.7	0.8	0.6	2.6	5.0
30-Nov	0.7	0.7	0.7	0.7	0.7	0.9	1.7	2.5	3.3	2.4	2.2	C	C	3.3	3.2	3.4	2.3	1.6	1.5	1.9	2.1	2.3	1.8	1.5	1.9	3.4
																								Diurnal Average		
																								Diurnal Maximum		
C - Calibration																										
Alberta Ambient Air Quality Guideline/Objectives: 1-hr 80 µg/m <sup>3</sup> 24-hr 29 µg/m <sup>3</sup>																										





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

**Particulate Matter 2.5 (PM<sub>2.5</sub>) -  $\mu\text{g}/\text{m}^3$**   
**Ells River - November 2023**

<b>Concentration Ranges (<math>\mu\text{g}/\text{m}^3</math>)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	378	52.65	52.65
6 - 15	321	44.71	97.35
16 - 25	19	2.65	100.00
26 - 80	0	0.00	100.00
> 81.0	0	0.00	100.00

Total Number of Valid Hours: 718

Total Number of Hours: 720





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

**Particulate Matter 2.5 (PM<sub>2.5</sub>) - μg/m<sup>3</sup>**  
**Ells River - November 2023**

Concentration Ranges (μg/m <sup>3</sup> )	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	24	17	12	5	5	4	15	26	50	50	58	29	22	36	12	11	376
6 - 15	24	28	11	8	6	1	14	52	66	44	25	11	9	9	5	2	315
16 - 25	1	2	1	0	0	0	0	3	5	2	0	0	1	0	0	0	15
26 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 81.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	49	47	24	13	11	5	29	81	121	96	83	40	32	45	17	13	706

Total Number of Valid Hours: 706

Total Number of Hours: 720





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

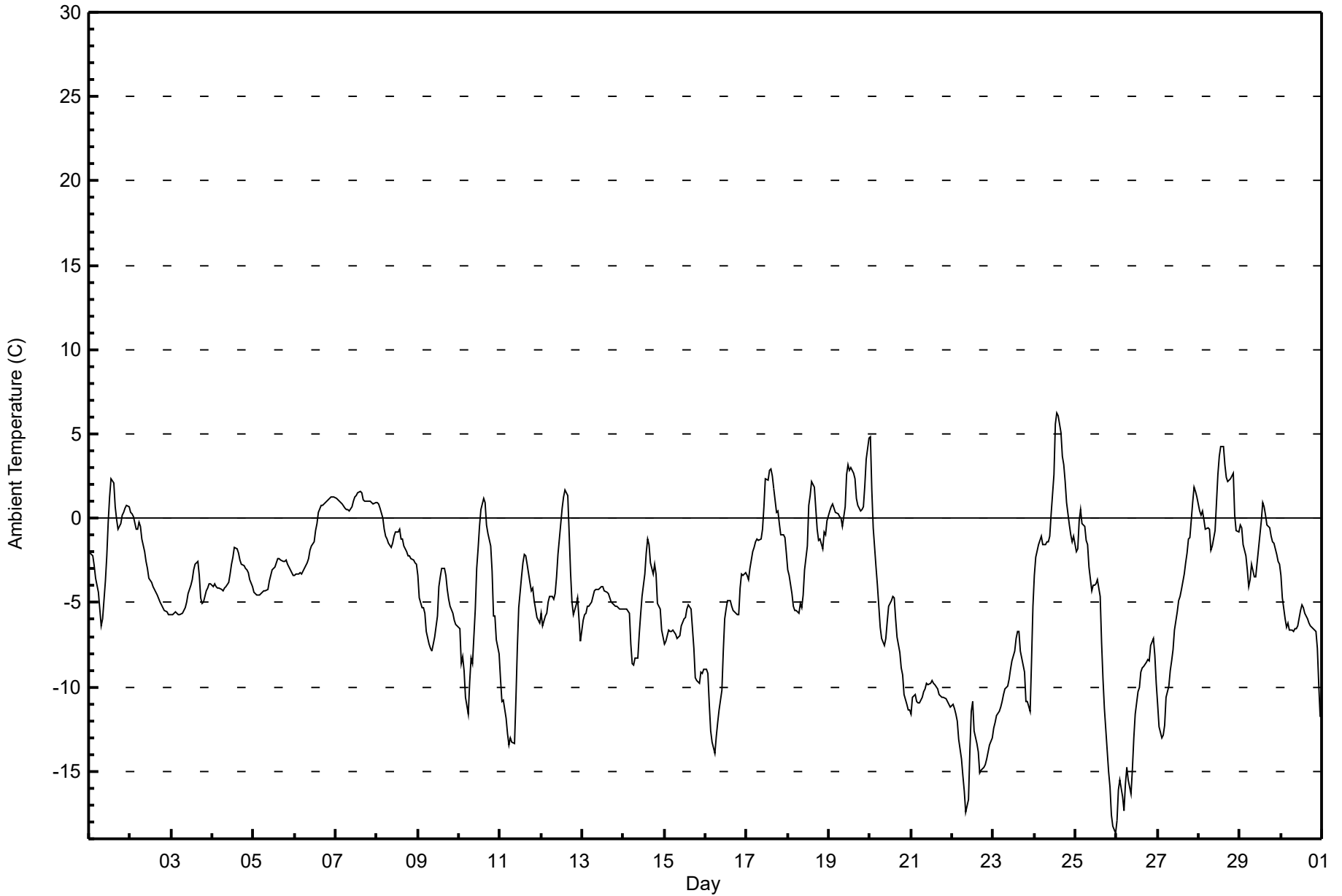
**Ambient Temperature (AT) - C**  
**Ells River - November 2023**

Maximum Value: 6.3 C on Nov 24 14:00		Maximum Daily Average: 1.4 C on Nov 19		Hours in Service: 720																																												
Minimum Value: -18.7 C on Nov 26 00:00		Minimum Daily Average: -13.7 C on Nov 22		Hours of Data: 720																																												
Maximum Diurnal Average: -2.2 C at hour 15		Minimum Diurnal Average: -6.1 C at hour 9		Hours of Missing Data: 0																																												
Monthly Average: -4.52 C		Percentiles: P <sub>1</sub> = -16.5 P <sub>10</sub> = -11.0 Q <sub>1</sub> = -7.0 Median = -4.1 Q <sub>3</sub> = -1.1 P <sub>90</sub> = 0.9 P <sub>99</sub> = 4.2		Hours of Calibration: 0																																												
				Percent Operational Time: 100.0																																												
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Nov	-2.1	-2.1	-2.2	-2.8	-3.6	-4.4	-5.4	-6.3	-6.0	-3.7	-2.2	-0.3	1.2	2.3	2.1	0.7	-0.1	-0.7	-0.3	0.2	0.4	0.6	0.8	0.7	-1.4	2.3																						
2-Nov	0.3	0.3	0.1	-0.7	-0.7	-0.2	-0.5	-1.2	-1.9	-2.5	-3.0	-3.6	-3.8	-4.1	-4.2	-4.3	-4.6	-4.9	-5.2	-5.3	-5.4	-5.6	-5.7	-5.7	-3.0	0.3																						
3-Nov	-5.8	-5.7	-5.5	-5.6	-5.7	-5.7	-5.7	-5.5	-5.3	-5.0	-4.5	-4.0	-3.6	-3.0	-2.7	-2.6	-3.4	-4.8	-5.0	-5.0	-4.3	-4.2	-3.9	-3.9	-4.6	-2.6																						
4-Nov	-4.0	-3.9	-4.0	-4.1	-4.1	-4.2	-4.3	-4.1	-4.0	-3.8	-3.3	-2.8	-2.3	-1.7	-1.8	-2.0	-2.5	-2.7	-2.8	-2.9	-3.0	-3.2	-3.6	-4.1	-3.3	-1.7																						
5-Nov	-4.4	-4.4	-4.5	-4.5	-4.5	-4.4	-4.3	-4.3	-4.2	-3.7	-3.4	-3.0	-2.9	-2.6	-2.4	-2.4	-2.5	-2.5	-2.6	-2.5	-2.7	-3.0	-3.3	-3.4	-3.4	-2.4																						
6-Nov	-3.4	-3.3	-3.3	-3.3	-3.3	-3.1	-2.8	-2.6	-2.4	-1.9	-1.6	-1.4	-0.7	-0.3	0.3	0.8	0.8	0.8	0.9	1.0	1.2	1.3	1.3	1.3	-1.0	1.3																						
7-Nov	1.2	1.1	1.0	0.9	0.8	0.6	0.5	0.5	0.5	0.7	1.0	1.2	1.4	1.5	1.6	1.5	1.1	1.0	1.0	1.0	1.0	1.0	0.8	0.9	1.0	1.6																						
8-Nov	1.0	0.8	0.6	0.1	-0.6	-1.1	-1.2	-1.5	-1.7	-1.5	-1.1	-0.8	-0.8	-0.7	-1.2	-1.2	-1.6	-2.0	-2.2	-2.3	-2.4	-2.5	-2.6	-2.7	-1.2	1.0																						
9-Nov	-3.4	-4.7	-5.3	-5.3	-5.6	-6.7	-7.5	-7.7	-7.8	-7.4	-7.0	-5.8	-4.1	-3.5	-3.0	-3.0	-3.4	-4.2	-4.8	-5.2	-5.6	-6.1	-6.3	-6.4	-5.4	-3.0																						
10-Nov	-6.6	-8.6	-8.2	-9.0	-10.6	-11.6	-9.7	-8.3	-8.6	-5.4	-3.0	-1.8	-0.5	0.5	1.2	0.9	-0.4	-0.9	-1.6	-3.1	-5.8	-5.8	-7.2	-8.0	-5.1	1.2																						
11-Nov	-9.6	-10.9	-10.8	-11.9	-12.8	-13.4	-13.0	-13.3	-13.3	-10.7	-7.7	-5.3	-3.5	-2.7	-2.2	-2.2	-2.7	-3.8	-4.3	-4.1	-4.9	-5.8	-6.0	-6.2	-7.5	-2.2																						
12-Nov	-5.7	-6.4	-5.8	-5.6	-5.0	-4.7	-4.6	-4.8	-4.4	-3.5	-2.1	-0.3	0.6	1.3	1.7	1.4	-0.9	-3.2	-5.0	-5.7	-5.1	-4.7	-5.9	-7.3	-3.6	1.7																						
13-Nov	-6.1	-5.7	-5.6	-5.2	-5.2	-5.0	-4.7	-4.3	-4.2	-4.2	-4.1	-4.0	-4.0	-4.3	-4.4	-4.5	-4.7	-4.9	-5.1	-5.2	-5.2	-5.3	-5.4	-5.4	-4.9	-4.0																						
14-Nov	-5.4	-5.4	-5.4	-5.7	-7.5	-8.6	-8.7	-8.2	-8.3	-6.9	-5.7	-4.7	-3.3	-2.1	-1.2	-1.6	-2.6	-3.3	-2.7	-3.3	-5.1	-5.4	-6.6	-7.0	-5.2	-1.2																						
15-Nov	-7.5	-7.3	-6.7	-6.7	-6.7	-6.6	-6.9	-7.1	-7.0	-7.0	-6.4	-5.9	-5.8	-5.4	-5.1	-5.4	-6.5	-7.7	-9.5	-9.6	-9.8	-9.1	-9.2	-9.0	-7.2	-5.1																						
16-Nov	-9.0	-9.2	-11.1	-12.6	-13.3	-13.9	-12.9	-12.1	-11.4	-10.2	-7.9	-6.0	-5.4	-4.9	-4.9	-5.2	-5.5	-5.5	-5.7	-5.7	-4.2	-3.3	-3.4	-3.2	-7.8	-3.2																						
17-Nov	-3.4	-3.6	-2.9	-2.0	-1.7	-1.4	-1.3	-1.3	-1.2	-0.7	0.7	2.4	2.2	2.8	2.9	2.5	1.8	0.3	0.5	-0.3	-1.0	-1.0	-1.1	-2.1	-0.4	2.9																						
18-Nov	-3.0	-3.4	-4.5	-5.2	-5.5	-5.5	-5.6	-5.1	-5.3	-4.6	-3.0	-1.6	0.7	1.3	2.2	1.8	0.6	-0.7	-1.3	-1.2	-1.8	-0.8	-1.0	-0.2	-2.2	2.2																						
19-Nov	0.4	0.6	0.8	0.6	0.4	0.3	0.1	0.0	-0.5	0.7	2.6	3.2	2.9	3.0	2.7	2.3	1.2	0.8	0.5	0.5	0.7	2.0	3.5	4.8	1.4	4.8																						
20-Nov	4.8	1.7	-0.6	-2.9	-4.0	-5.2	-6.5	-7.2	-7.6	-7.1	-6.1	-5.2	-4.9	-4.6	-4.7	-6.0	-7.0	-7.9	-8.8	-9.3	-10.4	-11.0	-11.4	-11.4	-6.0	4.8																						
21-Nov	-11.6	-10.6	-10.5	-10.9	-10.9	-10.9	-10.6	-10.3	-10.1	-9.8	-9.8	-9.8	-9.6	-9.7	-9.9	-10.1	-10.4	-10.5	-10.6	-10.6	-10.7	-10.8	-11.0	-11.2	-10.5	-9.6																						
22-Nov	-11.0	-11.3	-11.6	-12.0	-13.1	-14.3	-15.2	-16.2	-17.4	-16.7	-13.8	-11.5	-10.9	-12.6	-13.3	-13.8	-15.1	-14.9	-14.8	-14.6	-14.2	-13.9	-13.4	-13.0	-13.7	-10.9																						
23-Nov	-12.4	-12.1	-11.7	-11.4	-11.2	-10.9	-10.4	-10.2	-10.0	-9.6	-8.9	-8.4	-7.9	-7.1	-6.7	-6.7	-7.9	-8.7	-9.1	-10.9	-10.8	-11.4	-8.5	-5.2	-9.5	-5.2																						
24-Nov	-3.4	-2.3	-1.6	-1.3	-1.1	-1.5	-1.4	-1.4	-1.1	0.3	2.6	5.6	6.3	6.1	5.1	3.7	3.2	2.2	0.9	-0.4	-1.0	-1.4	-1.0	0.6	6.3																							
25-Nov	-2.0	-1.8	-0.2	0.6	-0.3	-0.5	-1.3	-1.6	-2.9	-4.3	-4.0	-3.9	-3.9	-3.7	-4.7	-7.4	-9.5	-11.3	-13.8	-15.0	-15.9	-17.6	-18.3	-18.7	-6.7	0.6																						
26-Nov	-17.9	-16.1	-15.5	-16.5	-17.3	-15.7	-14.7	-15.5	-16.3	-14.9	-13.0	-11.6	-10.3	-10.0	-9.1	-8.8	-8.8	-8.5	-8.4	-8.4	-7.5	-7.2	-8.2	-9.8	-12.1	-7.2																						
27-Nov	-11.0	-12.3	-13.0	-12.9	-12.3	-10.6	-10.0	-9.0	-8.4	-7.8	-6.7	-5.5	-4.9	-4.6	-4.2	-3.3	-2.7	-2.1	-1.2	-1.1	0.9	1.8	1.6	1.3	-5.7	1.8																						
28-Nov	0.4	0.2	0.4	-0.1	-0.7	-0.6	-0.7	-1.9	-1.6	-0.7	0.9	2.6	3.6	4.3	4.3	3.2	2.4	2.2	2.3	2.5	2.7	0.2	-0.7	-0.8	1.0	4.3																						
29-Nov	-0.4	-0.6	-1.6	-2.3	-3.1	-4.0	-3.6	-2.7	-3.5	-3.5	-2.6	-1.8	-0.2	1.0	0.7	0.2	-0.4	-0.6	-1.0	-1.4	-1.5	-2.1	-2.6	-2.7	-1.7	1.0																						
30-Nov	-3.4	-4.7	-6.0	-6.5	-6.2	-6.6	-6.7	-6.7	-6.5	-6.5	-6.4	-5.5	-5.1	-5.3	-5.7	-6.0	-6.2	-6.4	-6.4	-6.6	-6.7	-7.7	-9.9	-11.8	-6.5	-3.4																						
																								-4.8	-5.1	-5.2	-5.5	-5.8	-6.0	-6.0	-6.0	-6.1	-5.4	-4.4	-3.4	-2.7	-2.3	-2.2	-2.5	-3.3	-3.8	-4.2	-4.4	-4.6	-4.7	-4.9	-5.0	Diurnal Average
																								4.8	1.7	1.0	0.9	0.8	0.6	0.5	0.5	0.5	0.7	2.6	3.2	5.6	6.3	6.1	5.1	3.7	3.2	2.3	2.5	2.7	2.0	3.5	4.8	Diurnal Maximum



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

**Ambient Temperature (AT) - C**  
**Ells River - November 2023**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C  
Ells River - November 2023**

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	0	0.00	0.00
-20 - 0	592	82.22	82.22
0 - 10	128	17.78	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



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

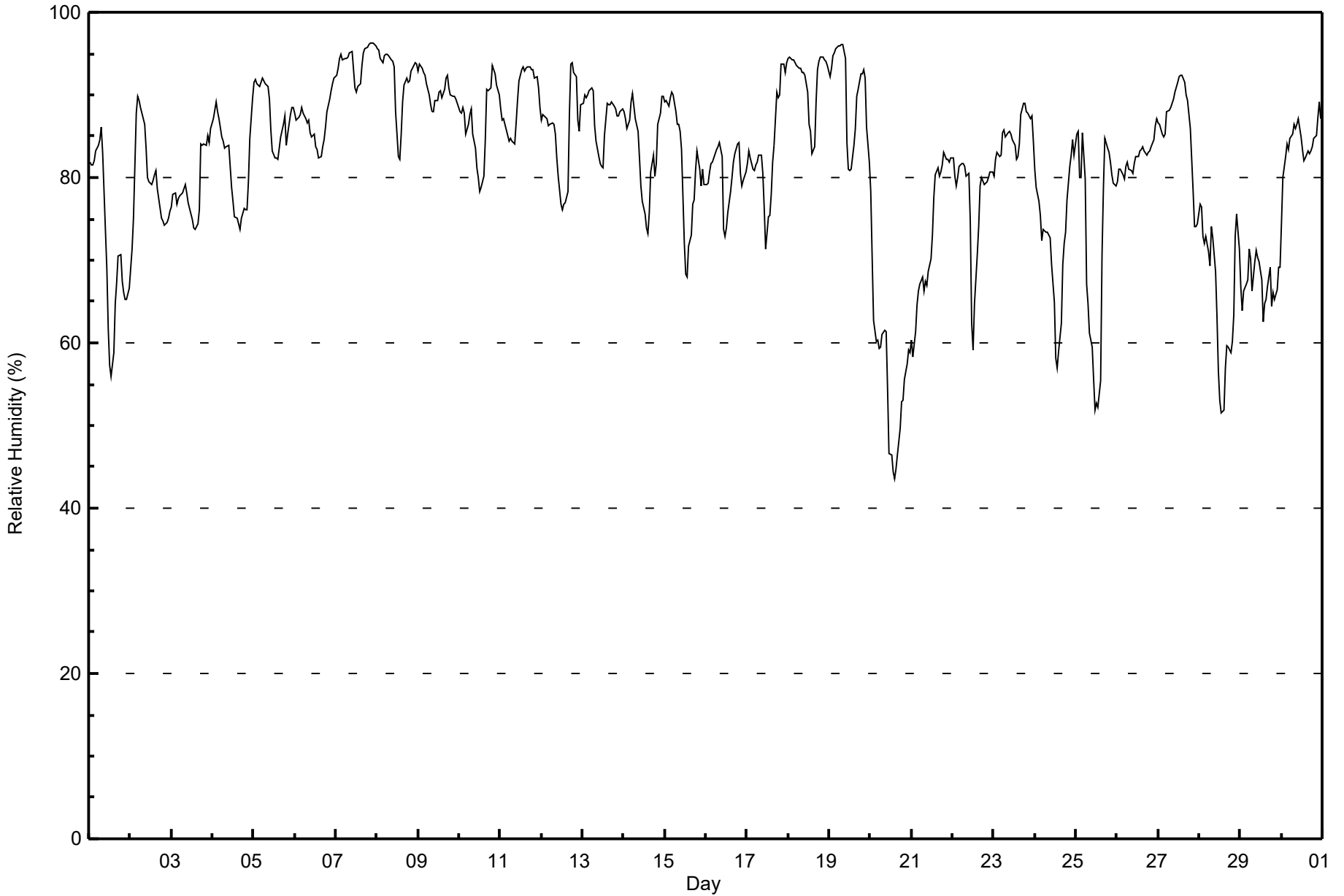
**Relative Humidity (RH) - %**  
**Ells River - November 2023**

Maximum Value: 96.3 % on Nov 7 22:00      Maximum Daily Average: 94.2 % on Nov 7																						Hours in Service: 720 Hours of Data: 720																											
Minimum Value: 43.5 % on Nov 20 15:00      Minimum Daily Average: 56.2 % on Nov 20 Maximum Diurnal Average: 84.1 % at hour 6      Minimum Diurnal Average: 75.3 % at hour 14 Monthly Average: 81.54 %      Percentiles: P <sub>1</sub> = 51.6 P <sub>10</sub> = 66.5 Q <sub>1</sub> = 76.9 Median = 83.5 Q <sub>3</sub> = 89.0 P <sub>90</sub> = 93.0 P <sub>99</sub> = 95.9																						Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0																											
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Nov	81.8	81.5	81.5	82.1	83.2	83.9	84.6	86.0	83.0	73.5	69.0	61.6	57.3	56.0	58.7	64.8	67.2	70.5	70.6	67.5	66.2	65.2	65.2	66.6	72.0	86.0																							
2-Nov	68.9	71.4	75.1	87.8	89.8	89.3	88.4	87.7	86.5	83.6	79.9	79.5	79.2	79.7	80.3	80.9	78.7	76.3	75.0	74.8	74.2	74.5	75.1	75.9	79.7	89.8																							
3-Nov	76.5	78.0	78.1	76.9	77.4	77.8	78.2	78.7	79.2	78.2	76.9	75.5	74.9	73.9	73.7	74.5	76.1	84.0	83.9	84.1	83.9	85.0	84.3	85.9	79.0	85.9																							
4-Nov	87.1	88.2	89.1	87.9	87.1	84.9	84.5	83.5	83.7	83.8	81.4	78.8	77.1	75.3	75.1	74.3	73.7	75.0	76.2	76.1	76.1	79.5	84.7	89.7	81.4	89.7																							
5-Nov	91.5	91.9	91.4	91.1	91.6	92.0	91.7	91.4	91.1	89.4	85.7	83.2	82.4	82.5	82.3	83.6	84.9	86.4	87.4	83.9	85.2	87.6	88.4	88.5	87.7	92.0																							
6-Nov	87.7	86.9	87.2	87.6	88.4	87.8	87.1	86.6	87.0	85.4	85.0	85.3	83.7	83.4	82.3	82.5	83.8	84.6	86.1	88.0	89.5	90.5	91.4	92.0	86.7	92.0																							
7-Nov	92.4	93.2	94.4	94.9	94.3	94.4	94.4	94.6	95.1	95.3	93.1	90.8	90.3	91.0	91.3	93.6	95.1	95.7	95.8	96.0	96.2	96.3	96.3	95.9	94.2	96.3																							
8-Nov	95.6	95.4	94.4	93.9	94.8	94.8	95.0	94.8	94.3	94.1	93.3	87.9	82.5	82.2	85.2	89.2	91.2	92.1	91.5	91.7	92.9	93.6	93.9	93.7	92.0	95.6																							
9-Nov	92.9	93.8	93.2	92.7	92.3	91.3	90.0	88.8	88.0	88.0	89.3	89.4	90.4	90.5	89.7	90.7	92.0	92.3	90.8	90.0	89.9	89.8	89.5	89.1	90.6	93.8																							
10-Nov	88.0	87.8	88.5	87.8	85.2	86.4	87.7	88.3	85.3	83.5	81.1	80.0	78.3	78.9	80.1	84.6	90.7	90.5	90.8	93.5	93.1	92.6	91.1	89.9	86.8	93.5																							
11-Nov	88.3	87.0	87.1	85.7	85.0	84.4	84.7	84.4	84.1	86.6	89.3	91.7	93.1	93.4	92.9	93.2	93.5	93.4	93.1	93.0	92.1	92.2	90.8	88.4	89.5	93.5																							
12-Nov	87.0	87.7	87.3	87.1	86.3	86.4	86.6	86.4	85.2	82.3	80.2	76.8	76.1	76.7	76.9	78.4	87.6	93.7	94.0	92.6	92.2	87.0	85.6	88.8	85.4	94.0																							
13-Nov	89.0	90.0	89.6	90.0	90.5	90.9	90.6	86.3	84.5	82.5	81.6	81.3	81.2	85.1	89.0	88.9	88.7	89.2	88.7	88.3	87.5	87.5	88.0	88.3	87.4	90.9																							
14-Nov	88.0	87.1	86.0	86.9	89.1	90.1	88.7	87.1	85.7	82.4	79.0	77.1	75.5	73.9	73.2	75.7	80.8	82.7	80.2	81.7	86.4	87.8	89.9	89.8	83.5	90.1																							
15-Nov	89.1	89.3	88.7	89.7	90.4	89.9	87.9	86.5	86.4	85.5	83.4	72.0	68.2	68.0	71.7	73.0	76.8	77.3	80.9	83.2	81.0	79.1	81.0	79.2	81.6	90.4																							
16-Nov	79.1	79.3	80.7	81.7	81.8	82.9	83.4	83.8	84.3	82.5	73.7	72.9	73.9	75.8	78.3	79.9	81.8	82.9	84.1	84.3	80.5	78.9	79.7	80.7	80.3	84.3																							
17-Nov	81.7	83.2	82.4	81.0	80.8	81.5	81.8	82.8	82.8	80.4	76.3	71.3	75.2	75.5	78.0	81.9	84.0	90.4	89.6	90.0	93.7	93.7	92.7	93.9	83.5	93.9																							
18-Nov	94.4	94.6	94.3	94.2	93.9	93.5	93.2	93.3	92.8	92.7	92.3	90.4	86.4	85.6	82.9	83.7	89.1	93.1	94.1	94.5	94.6	94.3	94.0	93.5	91.9	94.6																							
19-Nov	92.3	93.2	94.7	95.1	95.7	95.9	96.0	96.1	96.1	94.4	84.2	81.0	80.8	81.0	84.0	85.9	89.8	90.8	92.5	92.6	93.0	92.0	86.2	81.9	90.2	96.1																							
20-Nov	78.3	70.3	62.7	60.2	60.3	59.3	59.4	61.0	61.6	61.3	54.5	46.7	46.4	44.4	43.5	44.7	46.5	49.7	52.8	53.0	55.6	57.5	59.1	58.8	56.2	78.3																							
21-Nov	60.3	58.4	61.4	64.6	66.2	67.1	67.9	66.4	67.5	67.0	68.6	70.1	73.1	77.7	80.4	81.2	80.2	80.7	81.6	83.0	82.2	82.2	81.8	82.4	73.0	83.0																							
22-Nov	82.4	80.2	79.0	80.0	81.4	81.6	81.7	81.4	80.2	80.4	74.8	62.4	59.1	64.8	70.7	74.1	78.9	80.0	79.1	79.3	79.5	80.1	80.7	80.6	77.2	82.4																							
23-Nov	80.2	82.2	83.0	82.5	82.7	85.4	85.7	84.9	85.4	85.7	85.2	84.6	83.9	82.2	82.6	84.1	87.6	89.0	88.9	87.9	87.8	87.2	87.5	84.5	85.0	89.0																							
24-Nov	81.1	78.9	77.2	75.4	72.4	73.7	73.3	73.1	72.7	69.5	65.0	58.1	57.0	58.9	62.4	69.5	72.0	73.5	77.3	81.3	82.8	84.6	82.7	72.7	84.6	86.6																							
25-Nov	85.3	85.6	80.0	80.0	85.4	79.9	67.1	64.8	61.2	59.5	55.7	51.9	52.7	52.3	55.4	70.7	78.8	84.8	83.6	83.0	81.9	80.3	79.3	79.0	72.4	85.6																							
26-Nov	79.4	81.0	81.0	80.4	79.8	81.3	81.9	81.1	80.9	80.5	81.7	82.6	82.5	83.2	83.5	83.7	83.2	82.8	83.1	83.2	83.7	84.6	86.3	87.1	82.4	87.1																							
27-Nov	86.6	86.4	85.3	85.0	85.3	88.0	88.1	88.5	89.0	89.5	90.4	91.5	92.2	92.5	92.5	91.5	90.0	89.4	87.6	86.0	78.3	74.0	74.0	74.4	86.5	92.5																							
28-Nov	76.9	76.4	72.9	72.0	72.9	71.1	69.3	74.1	72.7	68.6	63.3	56.7	53.1	51.5	51.9	56.9	59.6	59.4	58.8	60.2	63.3	72.9	75.5	71.3	65.9	76.9																							
29-Nov	66.7	64.0	66.3	67.0	67.6	71.3	70.2	66.2	69.8	71.2	70.3	69.8	67.6	62.6	64.7	65.2	66.8	69.1	64.5	66.2	65.2	66.5	69.1	69.2	67.4	71.3																							
30-Nov	74.4	79.9	82.6	84.1	83.4	84.7	85.2	86.4	85.9	86.5	87.0	84.8	83.4	82.0	82.4	83.2	82.8	83.3	83.8	84.7	85.1	87.2	89.1	87.2	84.1	89.1																							
																								83.4	83.4	83.2	83.5	83.8	84.1	83.5	83.2	82.7	81.6	79.2	76.4	75.3	75.3	76.4	78.6	81.0	82.7	82.8	83.0	83.1	83.4	83.8	83.6	Diurnal Average	
																								95.6	95.4	94.7	95.1	95.7	95.9	96.0	96.1	96.1	95.3	93.3	91.7	93.1	93.4	92.9	93.6	95.1	95.7	95.8	96.0	96.2	96.3	96.3	95.9	84.1	Diurnal Maximum



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

**Relative Humidity (RH) - %**  
**Ells River - November 2023**





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

**Relative Humidity (RH) - %**  
**Ells River - November 2023**

<b>Concentration Ranges (%)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	0	0.00	0.00
20 - 40	0	0.00	0.00
40 - 60	38	5.28	5.28
60 - 80	199	27.64	32.92
80 - 100	483	67.08	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720





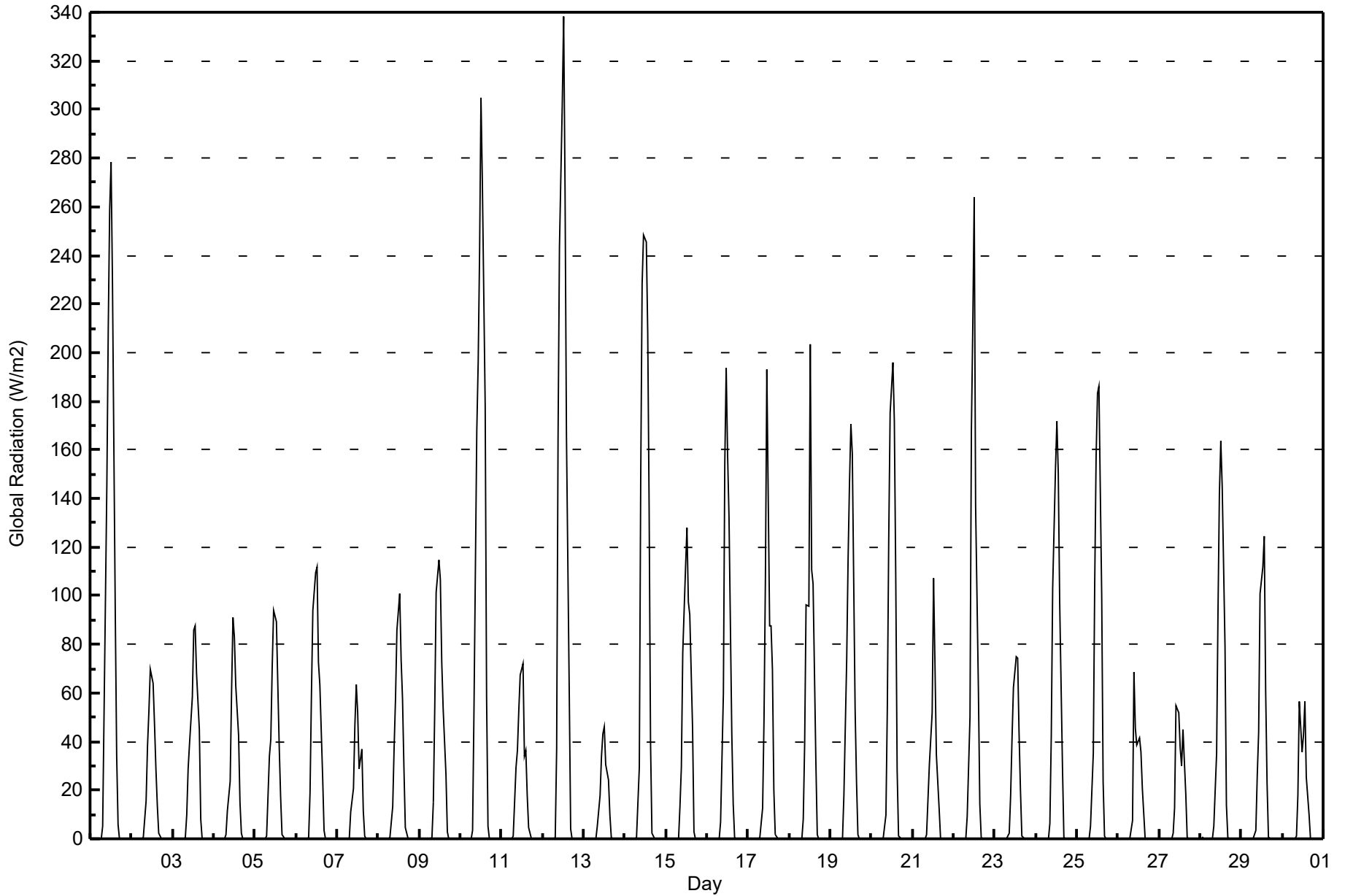
**Wood Buffalo Environmental Association**

**Summary of Hour Averages**

**Global Radiation (GR) - W/m2**

**Ells River - November 2023**

Maximum Value: 338.3 W/m2 on Nov 12 13:00      Maximum Daily Average: 65.9 W/m2 on Nov 12																						Hours in Service: 720 Hours of Data: 720					
Minimum Value: 0.0 W/m2 on Nov 1 01:00      Minimum Daily Average: 8.8 W/m2 on Nov 13 Maximum Diurnal Average: 137.3 W/m2 at hour 13      Minimum Diurnal Average: 0.0 W/m2 at hour 7 Monthly Average: 26.47 W/m2      Percentiles: P <sub>1</sub> = 0.0 P <sub>10</sub> = 0.0 Q <sub>1</sub> = 0.0 Median = 0.1 Q <sub>3</sub> = 29.3 P <sub>90</sub> = 95.7 P <sub>99</sub> = 256.7																						Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0					
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Nov	0.0	0.0	0.0	0.0	0.2	0.2	0.2	5.0	51.9	146.2	210.1	258.8	278.2	228.6	92.9	33.8	5.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	54.7	278.2
2-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	15.4	37.8	52.5	69.6	63.9	47.2	28.6	13.6	2.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	13.8	69.6
3-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	9.7	29.0	39.4	58.2	85.8	87.7	67.8	45.2	7.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	18.0	87.7
4-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.6	11.7	23.5	60.6	91.0	83.2	62.7	42.4	15.1	2.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	16.4	91.0
5-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.4	33.9	40.9	70.6	94.2	89.3	63.1	38.2	17.3	1.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	18.8	94.2
6-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	19.2	59.4	93.7	109.5	112.0	72.4	63.4	25.3	3.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	23.3	112.0
7-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	11.2	20.6	46.9	63.2	51.6	29.0	37.1	11.4	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11.3	63.2
8-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	13.2	37.7	57.6	85.8	100.9	73.6	57.7	29.6	4.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	19.2	100.9
9-Nov	0.2	0.2	0.2	0.0	0.2	0.2	0.2	0.7	15.0	53.8	101.4	114.4	106.4	72.3	53.4	26.3	3.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	22.9	114.4
10-Nov	0.2	0.2	0.2	0.2	0.2	0.1	0.2	3.5	53.1	167.9	195.9	240.6	305.1	269.0	178.2	58.0	5.0	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.1	61.6	305.1
11-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	29.4	36.0	52.8	67.2	72.0	33.8	36.5	17.9	4.5	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	14.6	72.0
12-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	36.7	165.1	243.0	302.0	338.3	266.4	166.0	59.8	4.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	65.9	338.3
13-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.3	18.0	34.1	43.3	46.2	30.6	24.0	9.7	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.8	46.2
14-Nov	0.0	0.0	0.0	0.0	0.2	0.1	0.0	0.5	29.6	148.4	228.0	248.1	245.5	208.0	135.9	39.5	2.5	0.0	0.1	0.1	0.0	0.0	0.0	0.1	0.1	53.6	248.1
15-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	13.5	29.5	76.5	111.8	128.1	97.5	92.3	45.6	2.7	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	24.9	128.1
16-Nov	0.0	0.0	0.2	0.2	0.2	0.0	0.0	0.0	6.7	59.9	154.2	193.8	158.1	132.6	43.2	14.7	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	31.9	193.8
17-Nov	0.2	0.0	0.0	0.0	0.0	0.0	0.1	0.4	12.4	49.5	107.6	192.8	87.3	87.4	69.6	20.0	1.6	0.0	0.0	0.0	0.2	0.1	0.1	0.2	0.2	26.2	192.8
18-Nov	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	8.0	39.0	96.0	95.6	203.5	110.8	104.9	31.7	1.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	28.8	203.5
19-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	17.6	73.6	115.1	146.2	170.8	158.7	53.4	23.4	1.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	31.7	170.8
20-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	9.6	54.2	123.2	175.2	196.0	171.5	108.2	28.2	1.2	0.0	0.1	0.1	0.2	0.2	0.0	0.0	0.0	36.2	196.0
21-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.9	16.0	30.7	52.1	107.1	71.5	34.5	12.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	13.6	107.1
22-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.5	50.2	168.3	211.3	263.7	137.2	61.2	14.5	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	38.2	263.7
23-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.4	17.6	41.3	62.0	74.9	74.2	43.7	20.4	1.3	0.2	0.2	0.2	0.2	0.1	0.0	0.0	0.0	14.1	74.9
24-Nov	0.0	0.0	0.0	0.2	0.2	0.1	0.0	0.0	6.6	42.0	103.1	151.9	171.8	150.3	97.5	29.2	0.8	0.0	0.1	0.1	0.2	0.2	0.2	0.2	0.1	31.4	171.8
25-Nov	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.4	35.3	104.8	157.2	183.1	186.2	100.0	23.9	1.0	0.1	0.2	0.2	0.2	0.2	0.2	0.0	0.0	33.3	186.2
26-Nov	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.2	7.6	68.8	45.3	38.9	41.4	35.7	20.9	10.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11.2	68.8
27-Nov	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	2.2	12.4	54.7	51.8	37.6	29.7	44.8	18.4	0.4	0.0	0.1	0.1	0.2	0.2	0.2	0.2	0.2	10.5	54.7
28-Nov	0.2	0.3	0.3	0.2	0.2	0.2	0.2	0.1	5.2	35.2	93.7	142.3	163.5	144.5	78.8	14.1	0.4	0.0	0.0	0.0	0.0	0.2	0.2	0.0	0.0	28.3	163.5
29-Nov	0.0	0.0	0.1	0.2	0.0	0.0	0.0	0.0	3.4	26.2	44.1	101.1	111.6	124.7	61.0	23.3	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.7	124.7
30-Nov	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.9	17.9	56.4	35.9	42.4	56.2	25.6	10.0	0.1	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.0	10.3	56.4
																								Diurnal Average			
																								Diurnal Maximum			





Maximum Speed: 30 km/h on Nov 25 07:00	Maximum Daily Speed Average: 15.3 km/h on Nov 20	Hours in Service: 720
Minimum Speed Value: 0 km/h on Nov 22 12:00	Minimum Daily Speed Average: 0.8 km/h on Nov 3	Hours of Data: 708
Maximum Diurnal Speed Average: 3.8 km/h at hour 24	Minimum Diurnal Speed Average: 0.7 km/h at hour 17	Hours of Missing Data: 12
Monthly Average Velocity: 2.1 km/h 224.1 deg	Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 3 Q <sub>1</sub> = 5 Median = 7 Q <sub>3</sub> = 10 P <sub>90</sub> = 15 P <sub>99</sub> = 25	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-Nov	SW6	SW7	SW7	SSW5	SSW7	SSW10	S8	S10	S9	SSW6	SE6	SE5	SSE7	SSE8	S9	SSE8	SSE6	SSE7	S9	SSW8	SSW8	SW6	SW6	S4	S6.4	S10
2-Nov	S5	SW6	WSW3	NNW1	N8	NNE17	NNE20	N23	N24	NNE22	NNE22	NNE22	NNE19	NNE18	NE14	NE14	NE13	NNE11	NE7	NE6	ENE5	ESE5	E6	SE1	NNE10.3	N24
3-Nov	SW3	SSE4	SE6	SE7	SSE5	SE5	SSE3	SSE3	E3	ENE2	ESE2	NE3	N5	N4	N5	N5	W1	N2	W2	W3	NW1	N3	NNE2	NE2	E0.8	SE7
4-Nov	N2	NE2	NNE4	NNE2	NNE3	NE5	NE4	NE3	NE5	NE6	ENE7	ENE8	E8	E9	E11	E11	ENE11	ENE9	ENE7	ENE7	ENE6	NE5	NNE8	NNE9	ENE5.7	ENE11
5-Nov	NNE11	NNE11	N12	NNE11	NNE10	N10	N8	N8	N9	NNE8	NNE9	NNE10	NNE10	NNE9	NNE8	N9	NNE5	NNE2	SE6	SE7	SE7	SE9	SE6	NNE6.5	N12	
6-Nov	ESE5	SE5	SE5	SSE3	SE4	SSE6	SSE8	SSE9	S7	SSE11	SSE12	SSE12	SSE11	SSE10	SSE10	SSE7	SSE7	SSE7	SSE8	SSE7	S8	S8	S7	S6	SSE7.4	SSE12
7-Nov	S6	S6	S6	S7	SSW7	SSW7	SSW5	SSW4	S5	SSW5	SSW7	WSW6	SW5	SW5	SW5	WSW3	SSW1	SSW4	S6	S5	S5	S7	SSW7	SW8	SSW5.1	SW8
8-Nov	SW8	WSW9	NNW11	W9	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	NNW11	WNW6	WNW6	W5	WNW6	W6	WNW7	WNW5	W3	SW4	---	WNW11
9-Nov	SW4	SSW2	SSW4	SSW4	UO	SSW4	SW5	SSW6	SSW7	SW6	SW7	SSW7	SSE12	SSW11	S11	SSE12	S6	SSE7	S11	S13	S10	S9	S8	S8	S7.0	S13
10-Nov	SSW7	SW7	SSW7	SSW8	SW6	WSW6	SSW8	S8	SW5	S9	SSE11	S10	S11	S10	S9	SSE8	S6	S9	S7	SSE4	WSW2	S5	SSE3	SSW5	S6.6	SSE11
11-Nov	SSW2	WSW3	SSE4	WSW1	WNW4	W4	WSW3	SSW1	WNW3	WNW3	NW4	NW3	WNW3	SE1	W2	SW3	S5	WSW4	SW6	SW7	SSW5	S8	S9	SSW8	SW2.8	S9
12-Nov	SSW8	SSW8	SW10	SW10	SW11	SW11	SW12	SW10	SW9	SW11	WSW11	WSW12	WSW11	WSW11	WSW10	WSW6	S3	S4	S1	WNW3	WNW7	W8	WNW4	WNW4	SW7.4	WSW12
13-Nov	WNW5	NW3	S4	WSW1	NNW2	NE1	ENE3	NE8	ENE7	ENE9	NE10	NE12	NNE17	NNE16	NNE20	NNE24	N21	N18	N17	N13	N14	NNW10	N9	NNW8	NNE9.0	NNE24
14-Nov	NNW8	N8	N4	WNW4	SSW3	S6	S10	S11	S9	SSW11	SSW12	SSW14	SSW13	SSW11	SW10	SW8	SSW6	SSW7	SW10	SW7	SSE7	S8	SSE7	S8	SSW6.3	SSW14
15-Nov	W5	NW5	N11	N16	NNE9	N12	N15	NNE14	N13	N11	NNW5	NW9	NNW10	W6	SW5	SSW6	SW6	WNW6	W1	S3	WNW6	W4	S8	SSW8	NNW4.4	N16
16-Nov	SW9	SW9	SW9	SW8	SSW7	SSE5	S6	S3	SSW2	W1	SSE4	S12	S11	S8	SW5	W6	SW4	SSW5	S6	S8	SSW8	SW13	SW13	SSW14	SSW6.6	SSW14
17-Nov	SSW9	SW13	SW14	SW17	SW16	SW17	SSW12	SSW14	S13	SSE10	SSE12	SSE11	SSE10	S11	S9	SSW10	WSW5	WNW6	WSW8	SW5	SSW8	SSW7	SSW8	S10	SSW9.5	SW17
18-Nov	S8	S10	S6	SSE7	SSE8	S8	SSW6	S9	S7	S7	S11	SSE10	SSE11	SSE11	S9	SSE7	S7	S5	SSE6	SSE5	S5	S7	SSE7	S6	S7.5	SSE11
19-Nov	S6	SSE5	SW4	SW1	WNW3	W2	SE4	W3	S4	SW1	S6	SSW5	SE8	SE8	SSE6	SSE3	SSE7	SSW6	S5	S7	SSE9	S10	SW10	WSW12	S4.5	WSW12
20-Nov	W16	WNW28	W28	WNW25	WNW22	WNW25	WNW23	WNW17	W12	W12	W13	W19	W21	WNW22	WNW18	WNW19	WNW14	W11	W6	WSW6	S8	SW9	WSW9	W7	W15.3	WNW28
21-Nov	WNW7	WNW5	SSE4	SSE4	SSE2	SSE4	NNE1	NNE5	NNE8	NE10	NNE13	NNE15	NNE15	NNE17	NNE15	N17	N22	NNE19	NNE16	N16	N18	N16	N17	N18	NNE10.1	N22
22-Nov	N18	N19	N18	N16	NNE14	NNE9	NNE10	NNW8	NNW3	N3	S1	NE0	NE1	E3	SE3	ESE4	ESE4	SE6	SSE6	S5	S3	SSW4	SSE4	SE6	NNE3.7	N19
23-Nov	SSE9	SSE6	S6	SE11	SSE10	SSE7	SSE7	S7	SSW3	S4	S6	SSW9	S9	SSW10	SSW10	SSW8	S7	S9	S9	SSE9	S10	SSE9	SSW11	SSW14	S7.8	SSW14
24-Nov	SSW15	SW17	SSW18	SSW16	SW13	SW14	SW15	SW8	SSW9	SSW7	SW9	SW8	WSW6	SSW6	SSW6	SSW6	SW9	WSW11	SW12	SW6	SSW14	S9	SSW9	SSW12	SW10.3	SSW18
25-Nov	SSE8	SSE1	NW5	N16	N17	N25	N30	NNW22	NNW27	NNW26	NNW18	NW21	NW19	NW16	NNW17	NNE9	NNE5	NE3	SSW2	S3	SSE1	SW2	SW1	UO	NNW10.7	N30
26-Nov	SE1	S4	S4	SE3	S2	SSE3	SSE5	S3	SE4	S6	SSE6	SSE4	SSE6	SE7	SSE7	SE8	SSE7	SSE2	NE4	S5	S8	E5	NNW8	N6	SSE3.2	S8
27-Nov	W6	SSW3	S6	S6	SSE5	S5	S5	S5	S4	SSW2	SSW4	S7	SSW6	SSW6	SSW6	S9	S9	S9	SSW9	SSW6	WSW13	SW14	SW13	SW13	SSW6.4	SW14
28-Nov	SSW10	SSW13	SSW12	SSW12	SSW14	SSW14	S9	SSE10	SSW8	S7	SW7	SW8	WSW13	WSW15	WSW14	WSW9	SW9	WSW11	SW12	SW10	WSW7	NW3	SW5	W8	SW8.9	WSW15
29-Nov	WSW13	WSW10	SW11	SW8	WSW4	SW9	WSW8	WSW7	SW10	WSW7	SW7	SW7	WNW14	WNW17	WNW18	WNW13	NW13	NW13	NW15	WNW8	WNW11	WNW6	WNW10	WNW7	W8.7	WNW18
30-Nov	NW4	WSW2	SW3	W4	WNW4	NW6	W2	S2	S2	SSE2	SE5	ESE6	ESE7	E8	E7	SE7	E5	ENE5	NE2	N3	SSW1	W2	NW2	W3	ESE0.8	E8

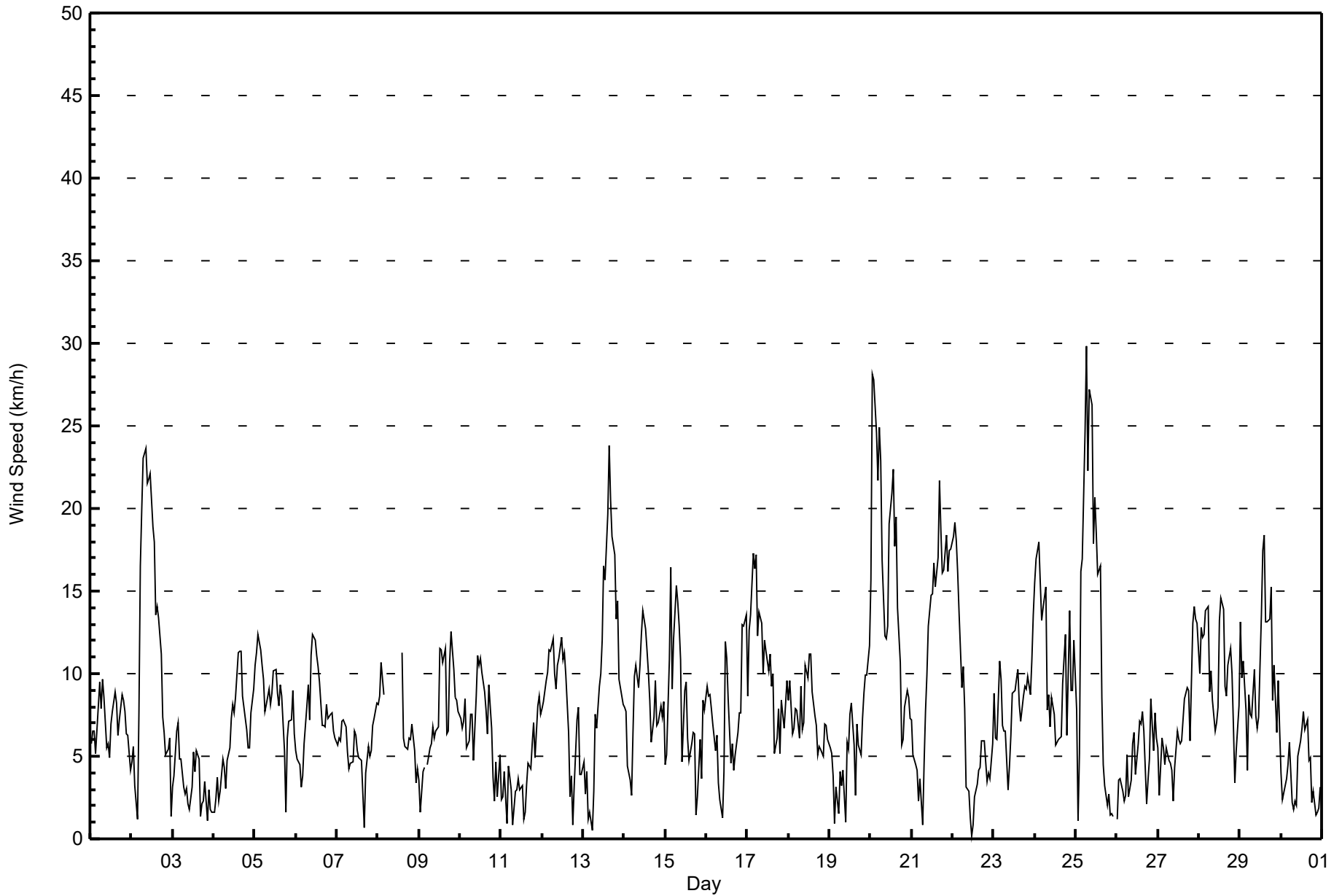
SW3.6	WSW3.6	SW3.4	WSW2.7	WSW2.4	WSW2.2	WSW1.6	WSW1.7	WSW1.5	SW0.9	S1.9	SW1.6	SW1.6	SW1.9	WSW1.9	SW0.8	SW0.7	SW1.2	SW2.1	SSW2.6	SSW2.9	SSW3.2	SSW3.3	SW3.8	Diurnal Average	
N18	WNW28	W28	WNW25	WNW22	WNW25	N30	N23	NNW27	NNW26	NNE22	NNE22	W21	WNW22	NNE20	NNE24	N22	NNE19	N17	N16	N18	N16	N17	N18	Diurnal Maximum	

UO - Unstable Operation  
 All monthly, daily, and diurnal averages have been calculated using vector methods



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

**Wind Speed (WS) - km/h**  
**Ells River - November 2023**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h  
Ells River - November 2023**

<b>Wind Speed Ranges (km/h)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	217	30.65	30.65
6 - 11	359	50.71	81.36
12 - 19	108	15.25	96.61
20 - 28	23	3.25	99.86
29 - 38	1	0.14	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 708

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Wind Speed (WS) - km/h  
Ells River - November 2023**

<b>Wind Speed Ranges (km/h)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	10	9	14	4	4	5	13	26	33	25	20	12	16	14	9	3	217
6 - 11	12	18	6	9	7	2	16	50	85	54	46	21	9	17	2	5	359
12 - 19	21	14	4	0	0	0	0	5	3	17	17	7	5	8	5	2	108
20 - 28	5	6	0	0	0	0	0	0	0	0	0	0	2	6	1	3	23
29 - 38	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	49	47	24	13	11	7	29	81	121	96	83	40	32	45	17	13	708

Total Number of Valid Hours: 708

Total Number of Hours: 720





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

**Wind Speed (WS) - km/h**  
**Ells River - November 2023**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 10 km/h on Nov 20 03:00	Hours of Data: 708
Minimum Value: 0 km/h on Nov 7 21:00	Hours of Missing Data: 12
Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 1 Q <sub>1</sub> = 1 Median = 2 Q <sub>3</sub> = 2 P <sub>90</sub> = 3 P <sub>99</sub> = 6	Hours of Calibration: 0
	Percent Operational Time: 98.3

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

Diurnal Maximum

UO - Unstable Operation





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

**Wind Direction (WD) - deg**  
**Ells River - November 2023**

Direction of Maximum Speed: 351 deg on Nov 25 07:00	Hours in Service: 720
Direction of Maximum Daily Speed Average: 277.4 deg on Nov 20	Hours of Data: 708
Direction of Minimum Speed: 48 deg on Nov 22 12:00	Hours of Missing Data: 12
Direction of Minimum Daily Speed Average: 0.8 deg on Nov 3	Percent Operational Time: 98.3
Monthly Average Direction: 224.1 deg	

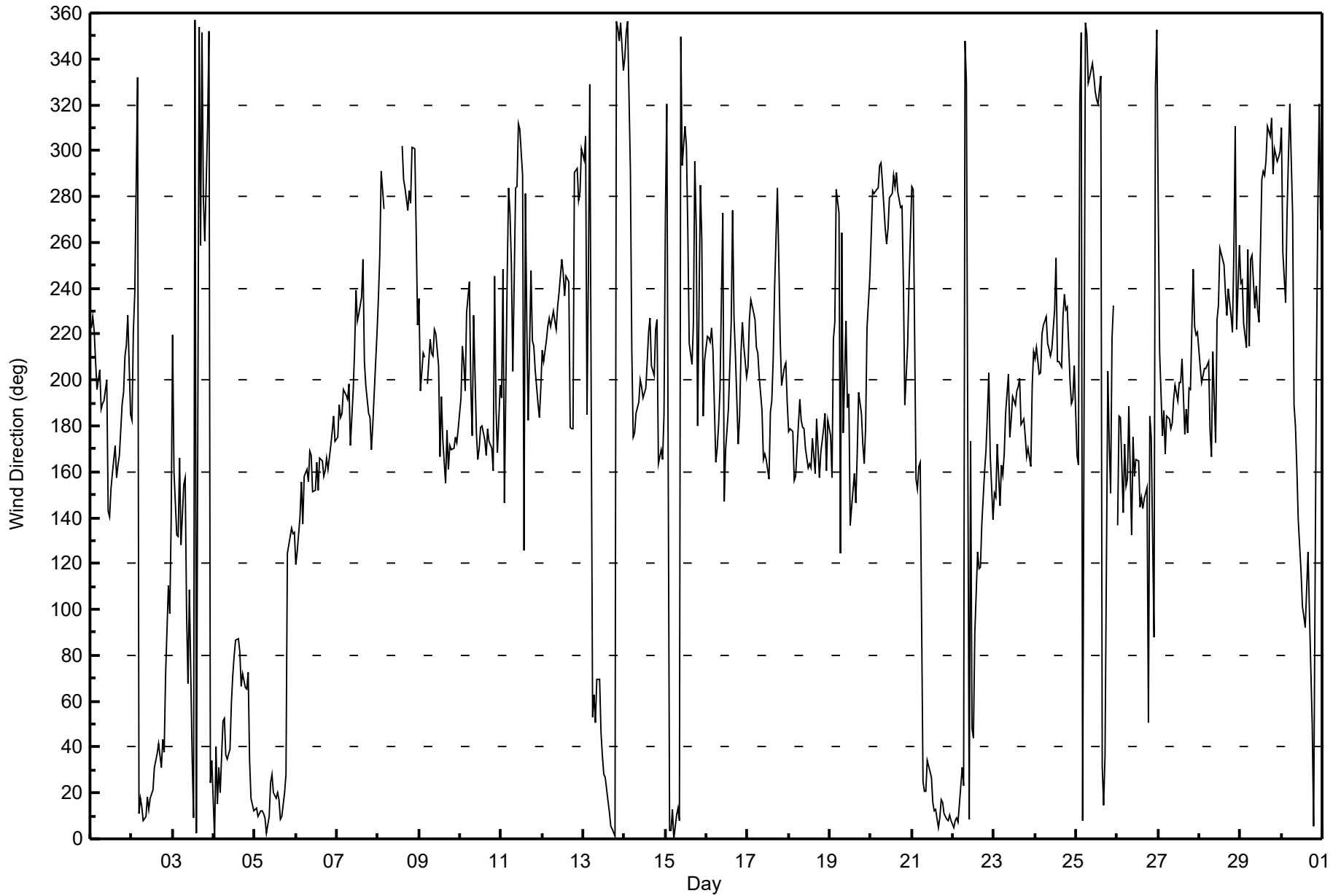
Day	Hourly Period Ending At (MST)																								Daily Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Nov	223	228	221	208	196	204	187	190	191	200	143	140	153	160	171	157	163	167	190	195	210	215	228	185	188.6
2-Nov	182	221	238	332	11	18	14	8	10	19	13	18	21	31	34	37	41	31	43	38	71	110	98	139	24.4
3-Nov	219	160	132	132	166	128	155	158	98	68	108	35	9	357	2	354	259	351	279	260	311	352	25	34	84.5
4-Nov	1	41	15	31	20	51	52	36	35	39	59	72	80	87	87	82	67	72	66	65	72	34	17	12	57.7
5-Nov	13	14	10	12	12	11	9	3	10	25	28	20	18	20	17	9	10	20	28	125	128	136	133	133	26.1
6-Nov	119	125	141	156	137	158	161	155	169	167	151	152	164	152	166	165	158	161	166	161	171	178	184	173	159.5
7-Nov	175	189	184	185	196	194	192	198	171	196	213	239	226	229	236	252	208	198	185	184	170	180	194	220	198.8
8-Nov	235	255	291	275	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	302	287	284	274	283	277	302	301	264	224	--
9-Nov	235	196	212	210	UO	198	218	212	210	222	220	206	167	193	174	155	178	161	172	170	170	175	173	179	185.1
10-Nov	192	215	207	196	229	243	198	176	228	177	165	170	179	180	174	167	179	173	170	160	245	188	168	198	186.4
11-Nov	192	248	147	245	284	273	250	204	284	285	312	310	289	125	281	224	182	248	217	215	205	189	183	197	224.0
12-Nov	213	208	217	223	227	223	230	225	222	232	238	252	246	237	245	243	179	179	179	290	292	278	282	301	236.0
13-Nov	296	307	185	246	329	53	63	51	70	69	47	36	28	27	16	12	6	4	1	356	353	348	356	335	13.3
14-Nov	341	351	356	291	213	175	177	185	190	200	197	192	196	208	221	227	206	202	222	226	164	169	165	185	201.0
15-Nov	272	320	4	3	13	0	10	13	8	350	293	311	302	266	216	207	224	295	267	180	285	261	185	209	328.7
16-Nov	219	219	217	222	212	164	170	180	196	273	147	169	178	187	225	274	227	211	172	184	212	225	215	202	202.6
17-Nov	206	227	235	230	226	214	212	201	187	165	168	166	157	186	191	209	240	284	252	217	198	205	207	190	205.8
18-Nov	178	179	178	156	158	169	192	182	179	179	170	161	164	162	174	159	183	170	157	168	179	185	161	182	171.5
19-Nov	176	157	218	225	283	273	125	264	177	226	188	194	137	144	159	147	168	195	185	172	163	180	222	244	184.5
20-Nov	263	282	281	283	284	294	294	286	266	259	266	279	281	289	284	290	282	275	276	242	189	215	242	264	277.4
21-Nov	284	283	157	152	163	164	25	21	21	34	32	27	16	12	13	5	9	17	16	11	8	8	10	8	13.4
22-Nov	5	8	9	7	15	31	23	348	329	9	173	48	44	90	125	118	119	137	161	169	185	203	167	139	27.9
23-Nov	150	149	172	145	163	159	168	185	203	175	183	193	189	195	197	201	181	183	176	166	170	163	198	212	178.9
24-Nov	209	214	202	203	221	224	228	216	213	210	214	231	253	208	208	206	228	237	230	232	199	190	192	206	214.7
25-Nov	167	163	321	351	8	356	351	329	332	338	333	326	322	320	332	32	15	37	204	173	151	218	232	UO	339.7
26-Nov	136	184	184	142	172	154	157	189	132	175	158	165	165	145	149	144	148	153	50	184	175	88	327	352	154.3
27-Nov	276	213	176	187	168	184	183	178	181	192	197	191	199	199	209	176	187	177	197	196	248	223	220	221	202.8
28-Nov	206	199	202	205	205	208	178	167	213	173	226	232	258	255	250	238	228	240	228	221	255	311	222	259	221.9
29-Nov	242	243	225	214	257	215	253	254	232	241	231	225	287	291	289	296	310	306	314	290	301	295	297	299	273.1
30-Nov	310	256	234	272	297	321	272	189	180	162	139	117	102	97	92	125	99	74	49	6	208	275	321	265	111.0

227.9 236.8 231.1 236.8 243.0 240.0 244.2 237.2 245.2 229.6 191.2 213.9 229.7 221.1 243.2 226.5 222.8 230.2 214.1 199.1 208.0 204.8 209.5 219.9

Diurnal Average

UO - Unstable Operation

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**  
**Ells River - November 2023**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 90 deg on Nov 30 08:00	Hours of Data: 708
Minimum Value: 6 deg on Nov 23 17:00	Hours of Missing Data: 12
Percentiles: P <sub>1</sub> = 7 P <sub>10</sub> = 9 Q <sub>1</sub> = 12 Median = 17 Q <sub>3</sub> = 25 P <sub>90</sub> = 45 P <sub>99</sub> = 83	Hours of Calibration: 0
	Percent Operational Time: 98.3

Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Nov	14	17	19	19	12	14	21	8	12	27	19	28	21	25	14	10	8	7	9	12	21	26	27	47	
2-Nov	17	19	58	83	10	8	10	8	10	9	10	9	12	10	11	10	8	11	17	10	22	25	20	76	
3-Nov	26	21	16	21	25	20	15	33	32	48	89	28	22	23	13	18	48	30	56	40	43	26	71	35	
4-Nov	36	26	18	38	31	23	26	38	9	10	13	22	19	16	15	12	12	13	11	14	19	24	10	8	
5-Nov	7	8	8	7	9	9	8	10	6	11	8	8	10	9	10	8	7	23	43	11	7	10	8	13	
6-Nov	10	14	23	17	11	10	11	9	15	14	10	15	14	13	12	12	10	10	11	10	11	12	12	10	
7-Nov	10	11	11	11	12	14	18	11	13	17	20	23	20	31	20	24	86	16	12	12	7	11	14	20	
8-Nov	22	18	18	18	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	11	15	13	16	13	16	13	13	20	10	
9-Nov	13	67	16	33	UO	15	19	18	16	21	19	26	12	16	16	9	36	19	8	9	8	9	11	11	
10-Nov	18	21	9	11	30	23	10	11	39	15	10	11	13	13	11	16	23	11	12	41	51	16	80	21	
11-Nov	57	32	31	79	15	34	44	77	55	32	35	48	64	64	85	34	31	23	22	16	13	10	12	22	
12-Nov	17	13	13	15	15	16	17	17	18	20	19	18	19	20	18	25	42	22	85	35	20	20	28	35	
13-Nov	19	44	29	69	83	73	46	9	13	12	9	11	9	10	7	7	11	9	12	16	15	26	13	11	
14-Nov	11	15	30	20	30	11	11	12	13	15	14	14	16	18	19	19	24	23	19	20	20	9	13	20	
15-Nov	42	40	11	11	18	15	11	9	10	14	18	17	19	25	26	24	21	21	76	38	18	48	24	13	
16-Nov	15	17	17	15	14	28	28	30	33	58	53	12	14	17	28	15	30	32	11	25	28	22	19	14	
17-Nov	21	20	19	19	19	16	18	15	14	11	10	12	10	14	16	14	60	27	14	45	8	17	14	12	
18-Nov	10	9	15	15	17	19	11	11	7	12	9	9	9	8	15	18	12	39	14	43	63	14	16	34	
19-Nov	42	33	53	69	61	65	51	32	40	60	20	37	9	9	20	60	22	24	18	16	15	16	20	20	
20-Nov	26	17	17	17	16	12	13	15	18	19	22	16	18	18	17	17	16	27	32	30	14	16	16	22	
21-Nov	18	63	28	27	44	39	80	41	11	12	8	9	10	8	8	11	9	9	8	9	9	10	8	8	
22-Nov	11	9	9	10	8	9	10	12	24	24	54	80	69	81	24	21	17	11	11	13	22	15	25	12	
23-Nov	10	17	23	11	14	13	19	19	24	19	15	13	15	14	13	15	6	7	7	7	6	14	13	21	
24-Nov	16	18	14	13	20	17	20	63	44	37	16	23	41	20	22	25	17	18	18	50	11	23	18	16	
25-Nov	22	83	46	17	6	14	16	10	12	11	13	14	12	14	20	15	17	43	52	46	61	49	74	UO	
26-Nov	37	32	18	27	48	36	65	78	45	43	18	34	23	10	10	10	20	68	24	34	16	66	27	17	
27-Nov	19	42	17	25	21	16	15	12	16	26	20	14	17	17	16	13	12	11	16	41	21	18	18	17	
28-Nov	19	13	19	11	10	13	34	20	39	45	27	28	20	20	17	23	24	20	20	21	33	50	28	19	
29-Nov	17	19	13	35	63	34	19	23	15	12	20	23	15	14	14	12	13	11	12	15	11	14	18	25	
30-Nov	43	54	45	43	28	24	54	90	60	73	17	15	14	17	20	20	23	25	55	61	86	62	40	17	

57	83	58	83	83	73	80	90	60	73	89	80	69	81	85	60	86	68	85	61	86	66	80	76	
Diurnal Maximum																								

UO - Unstable Operation



## WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY  
MONITORING PROGRAM  
MONTHLY REPORT

**AMS501  
LEISMER  
NOVEMBER 2023**

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

December 22, 2023

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - LEISMER (AMS501)  
 NOVEMBER 2023

MONTHLY SUMMARY

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	32	35	99.58	25.2	0	8.2	0
H2S (ppb) Average	685	33	35	99.72	2.7	0	0.7	0
NO2 (ppb) Average	685	33	35	99.72	13.1	0	4.2	-
NO (ppb) Average	685	33	35	99.72	18.1	-	4.5	-
NOX (ppb) Average	685	33	35	99.72	24.4	-	7.7	-
Temperature 2 m (C) Average	720	0	0	100	7.2	-	2	-
Relative Humidity (%) Average	720	0	0	100	98.8	-	98.5	-
Wind Speed 10 m (km/h) Average	693	0	27	96.25	47	-	26	-
Wind Direction 10 m (deg) Average	693	0	27	96.25	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - LEISMER (AMS501)  
 NOVEMBER 2023

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile						
					Min	P10	Q1	Median	Q3	P90	Max
SO2 (ppb) Average	685	1.17	3.6	-	0	0	0	0.1	0.2	2.5	25.2
H2S (ppb) Average	685	0.13	0.2	-	0	0	0.1	0.1	0.1	0.2	2.7
NO2 (ppb) Average	685	1.57	1.7	-	0.1	0.4	0.6	1	1.9	3.4	13.1
NO (ppb) Average	685	0.73	2	-	0	0	0	0	0.3	1.9	18.1
NOX (ppb) Average	685	2.3	3.5	-	0.1	0.4	0.7	1.1	2.2	5	24.4
Temperature 2 m (C) Average	720	-3.65	3.8	-	-13.4	-9.2	-5.6	-3.6	-0.9	0.7	7.2
Relative Humidity (%) Average	720	82.56	12	-	44.3	63.4	75.7	85.5	91.7	95.8	98.8
Wind Speed 10 m (km/h) Average	693	10	7	-	0	4	5	8	12	21	47
Wind Direction 10 m (deg) Average	693	225.5	0	-	0	-	-	-	-	-	0

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - LEISMER (AMS501)  
NOVEMBER 2023

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
SO2	07 Nov 2023 09:00	07 Nov 2023 10:00	2	Maintenance - reinitiated daily QA check
H2S	07 Nov 2023 10:00	07 Nov 2023 11:00	2	Maintenance - reinitiated daily QA check
NO2	07 Nov 2023 10:00	07 Nov 2023 10:00	1	Maintenance - reinitiated daily QA check
NO2, SO2	29 Nov 2023 10:00	29 Nov 2023 10:00	1	Maintenance - sample manifold cleaned
Wind Speed, Wind Direction	07 Nov 2023 11:00	08 Nov 2023 11:00	25	Flat line in sensor output signal - Sensor frozen
Wind Speed, Wind Direction	09 Nov 2023 10:00	09 Nov 2023 11:00	2	Flat line in sensor output signal - Sensor frozen

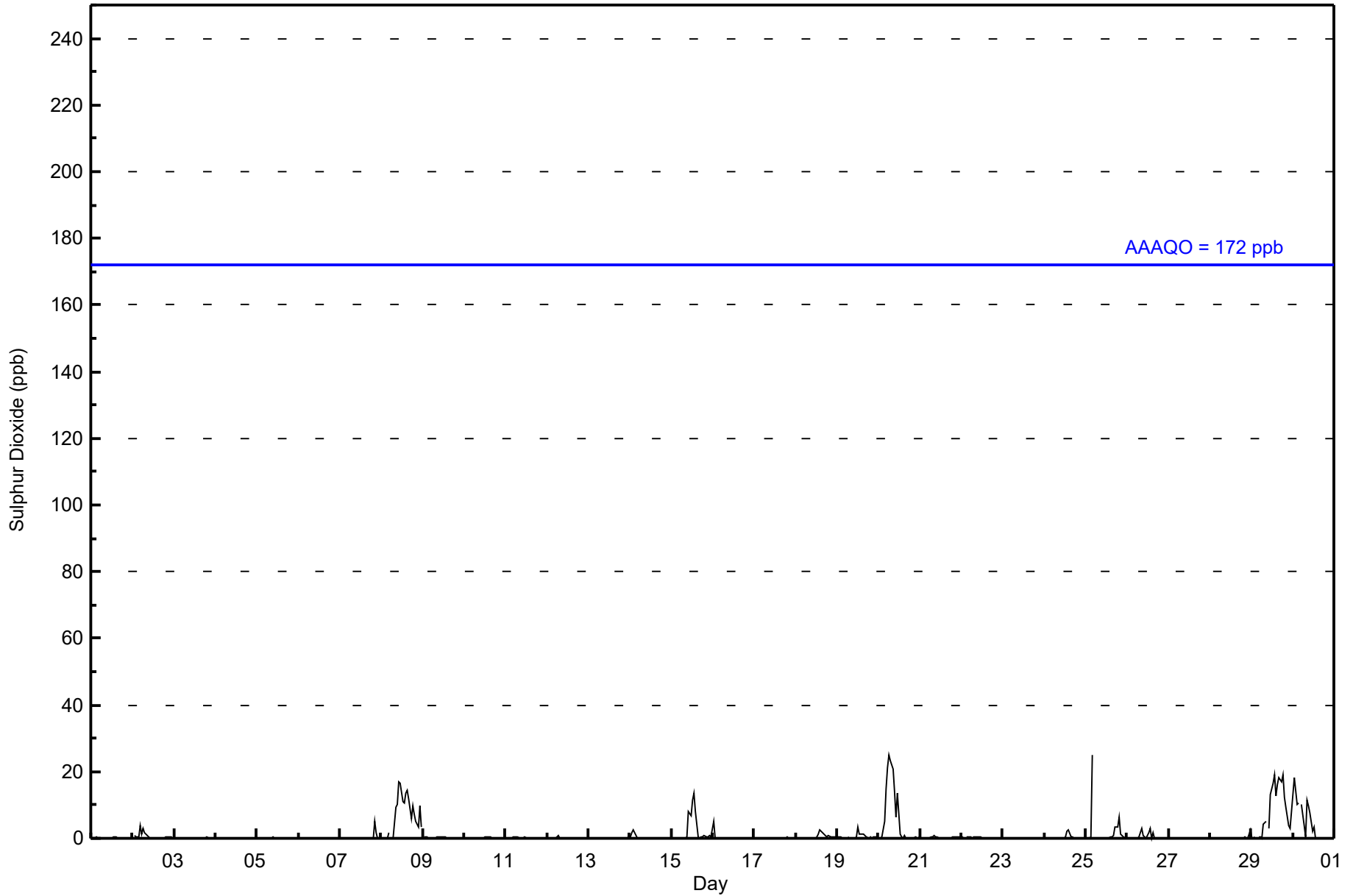






**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Leismer - November 2023**





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

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Leismer - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 10	655	95.62	95.62
11 - 20	25	3.65	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: 685

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Leismer - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 10	14	11	9	12	40	71	35	31	43	66	22	17	89	97	43	30	630
11 - 20	0	0	0	0	0	0	0	0	0	0	0	0	0	7	17	0	24
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	1	4	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
<b>Totals</b>	<b>14</b>	<b>11</b>	<b>9</b>	<b>12</b>	<b>40</b>	<b>71</b>	<b>35</b>	<b>31</b>	<b>43</b>	<b>66</b>	<b>22</b>	<b>17</b>	<b>89</b>	<b>105</b>	<b>64</b>	<b>30</b>	<b>659</b>

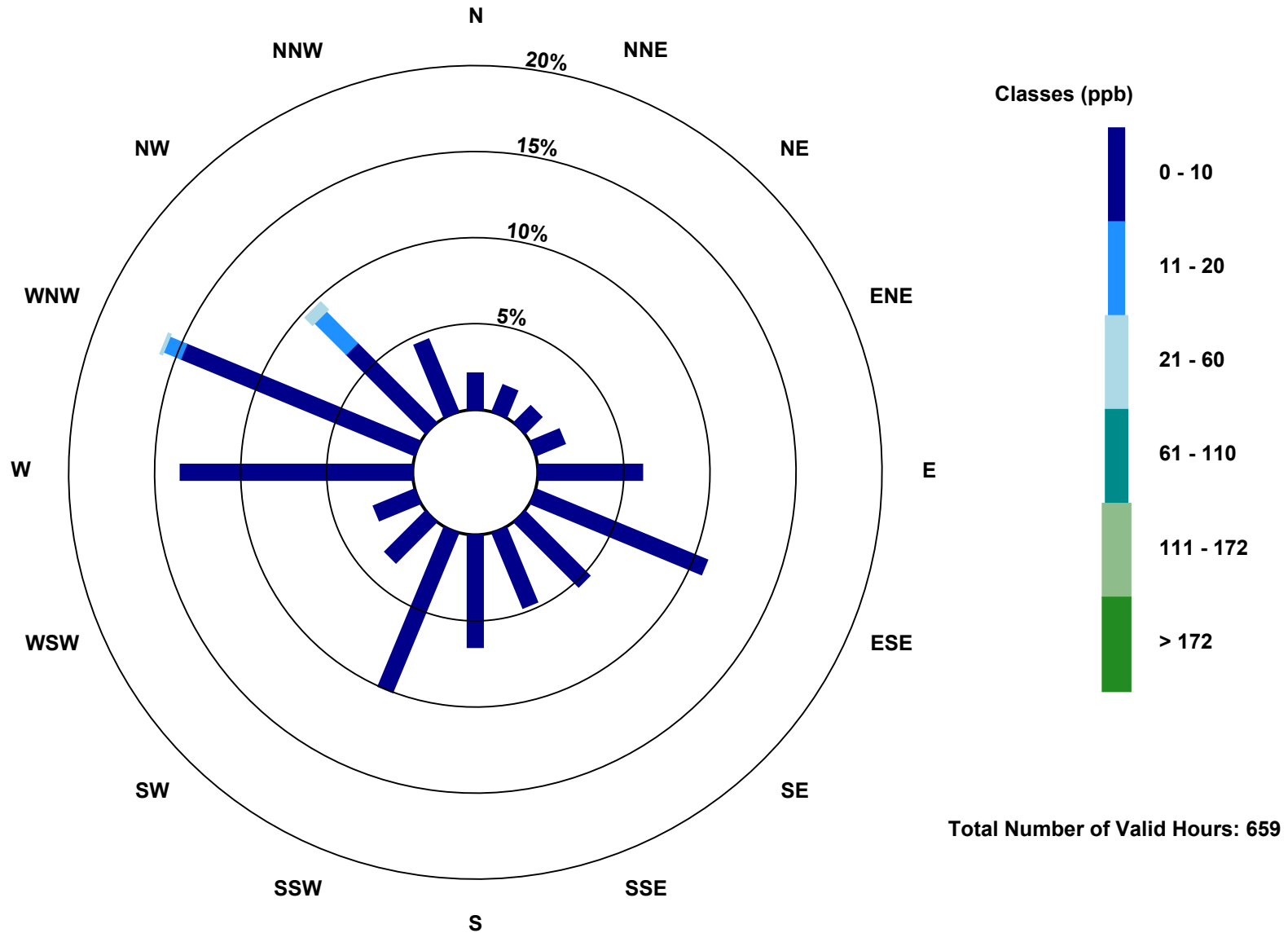
Total Number of Valid Hours: 659

Total Number of Hours: 720

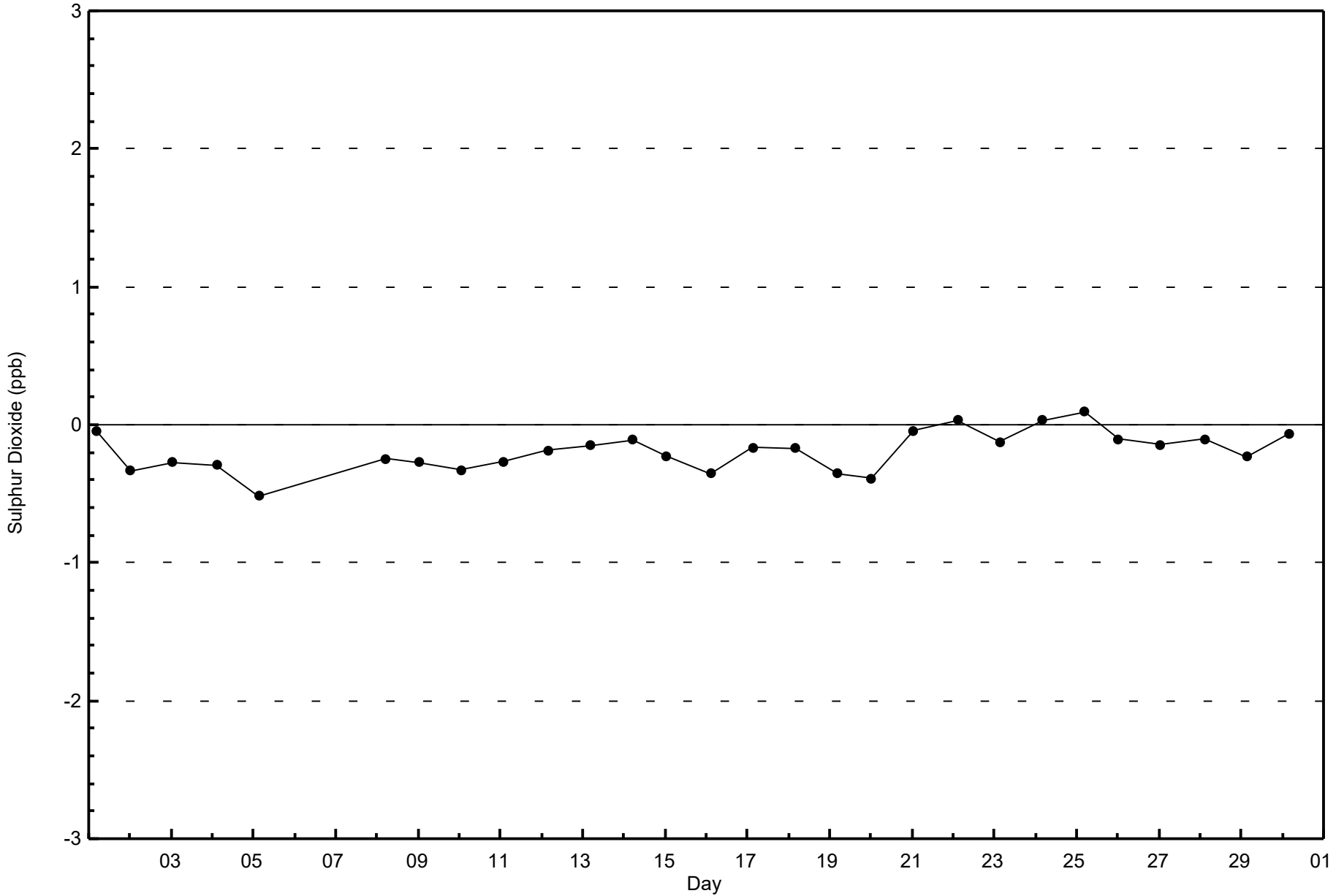


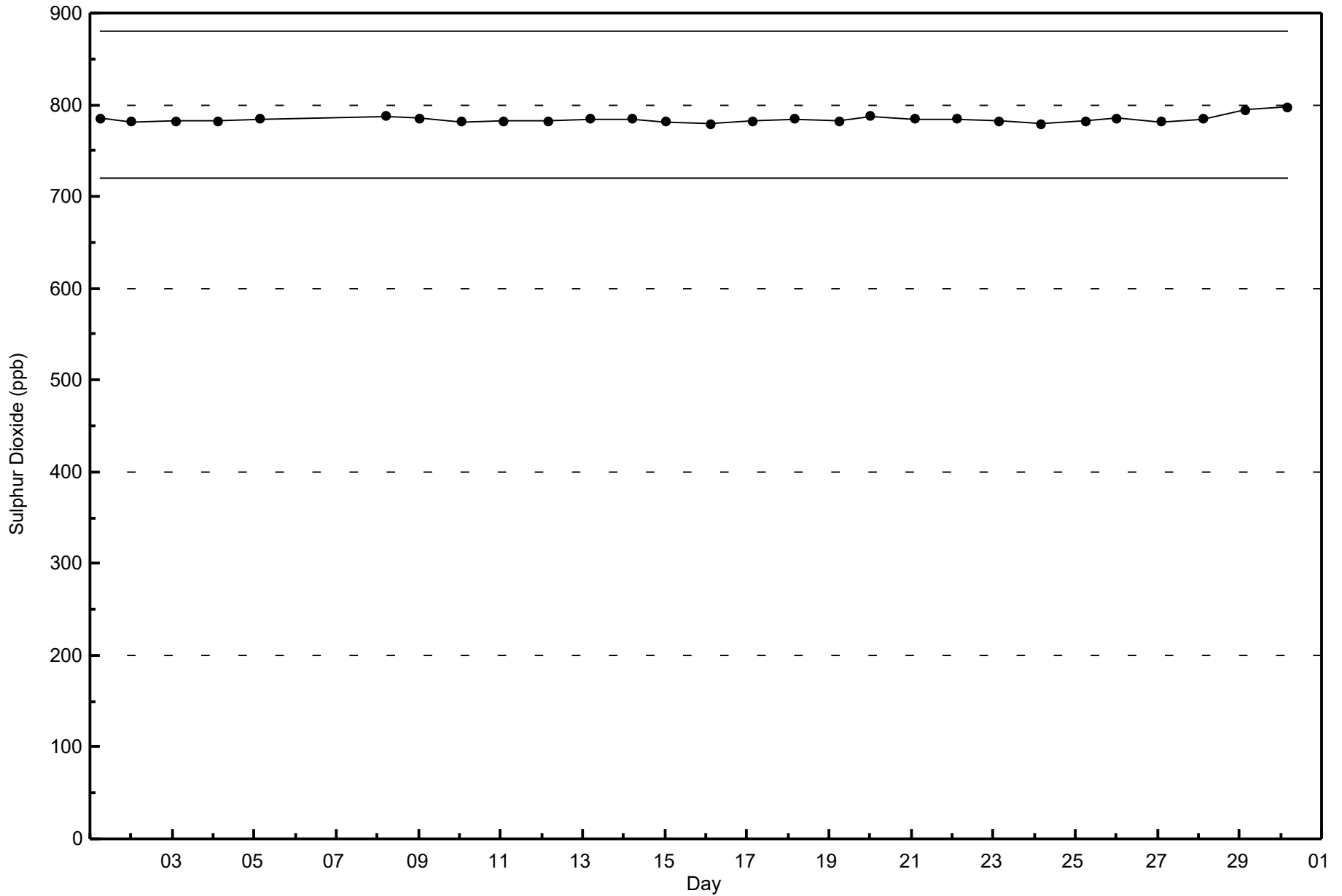
Wood Buffalo Environmental Association  
Wind Rose Nov 2023

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

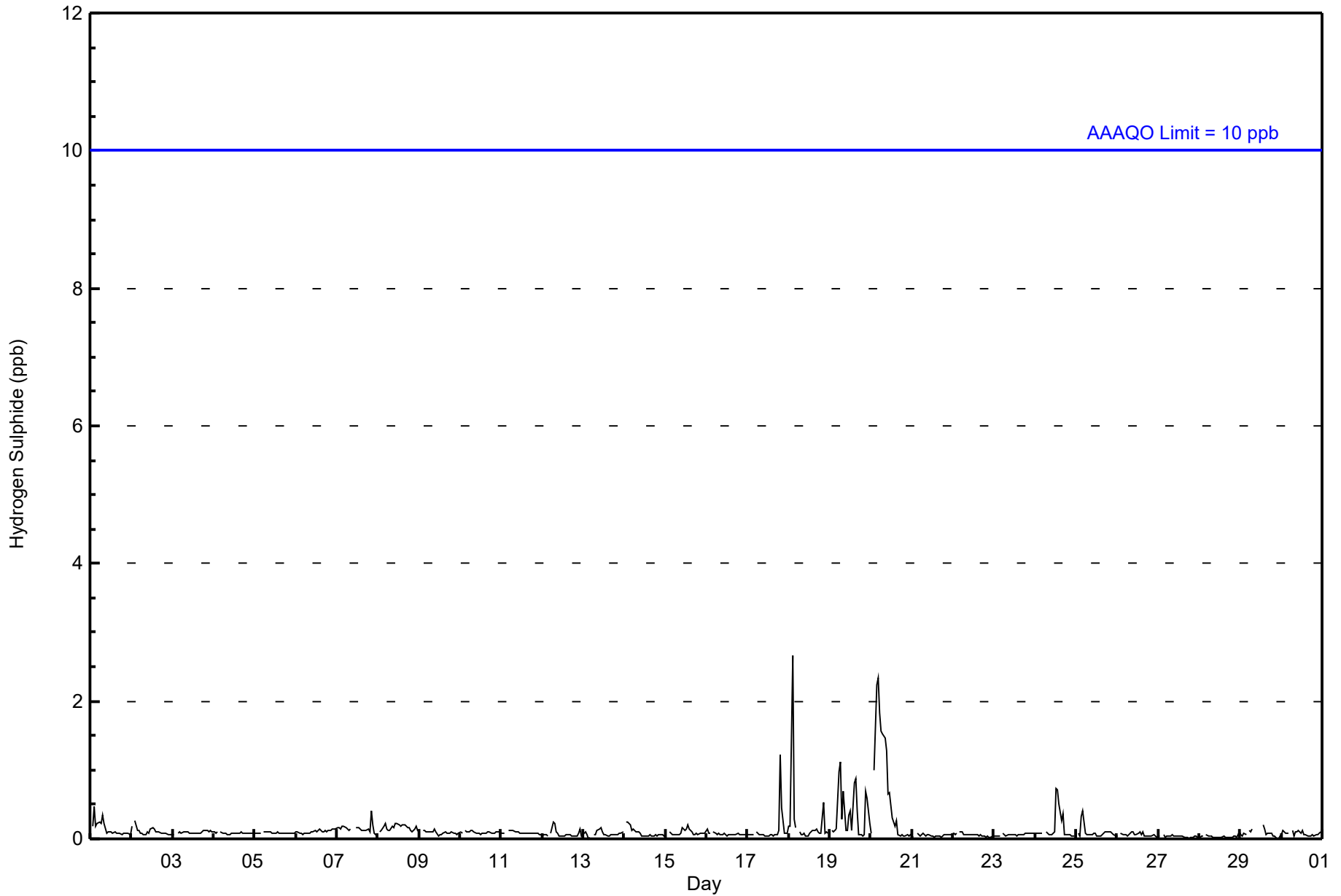


Total Number of Valid Hours: 659













**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Hydrogen Sulphide (H<sub>2</sub>S) - ppb  
Leismer - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2	684	99.85	99.85
3 - 4	1	0.15	100.00
5 - 7	0	0.00	100.00
8 - 11	0	0.00	100.00
> 11	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Hydrogen Sulphide (H<sub>2</sub>S) - ppb  
Leismer - November 2023**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	14	11	9	12	38	71	34	32	43	68	22	18	92	100	66	29	659
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	14	11	9	12	38	71	34	32	43	68	22	18	92	101	66	29	660

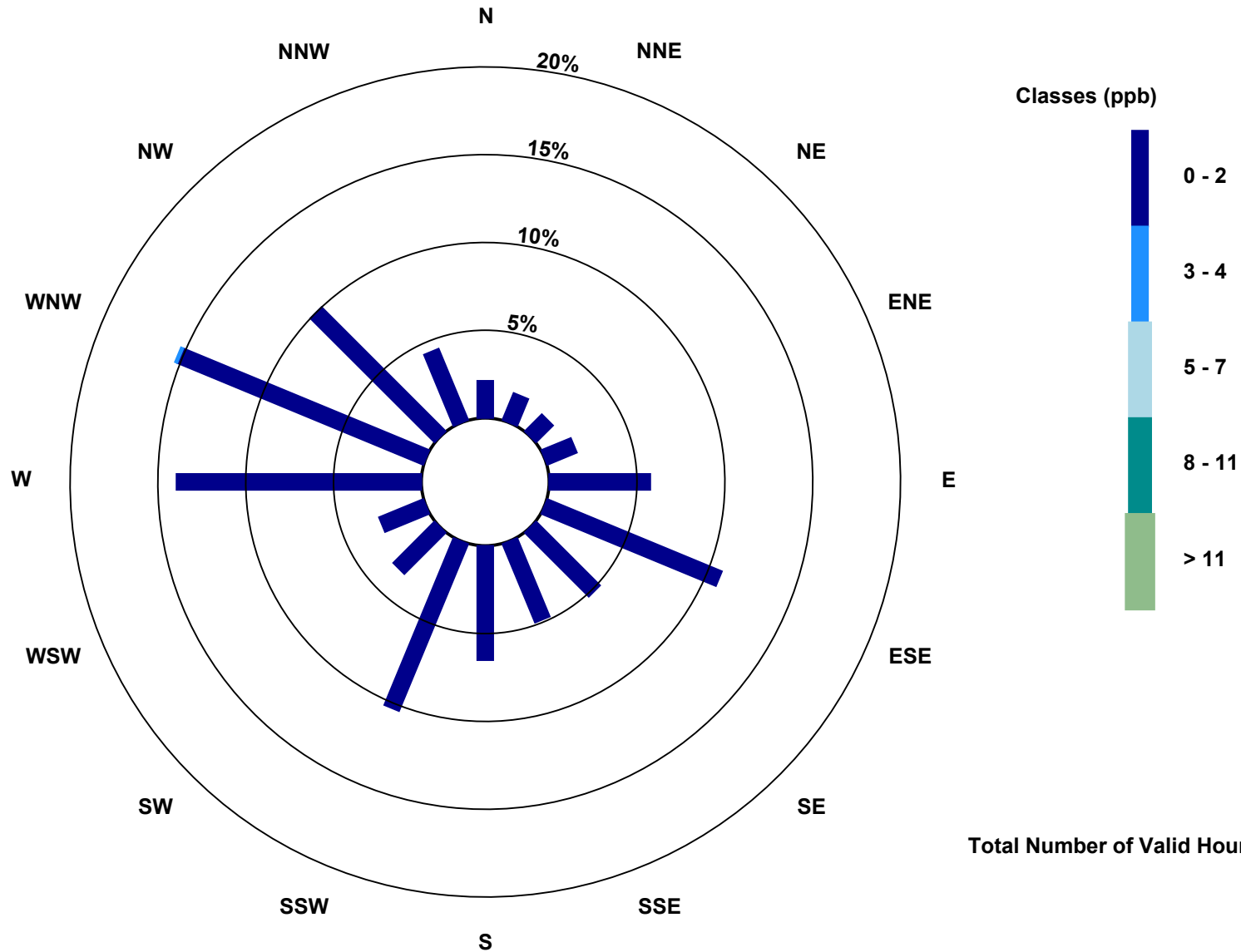
Total Number of Valid Hours: 660

Total Number of Hours: 720

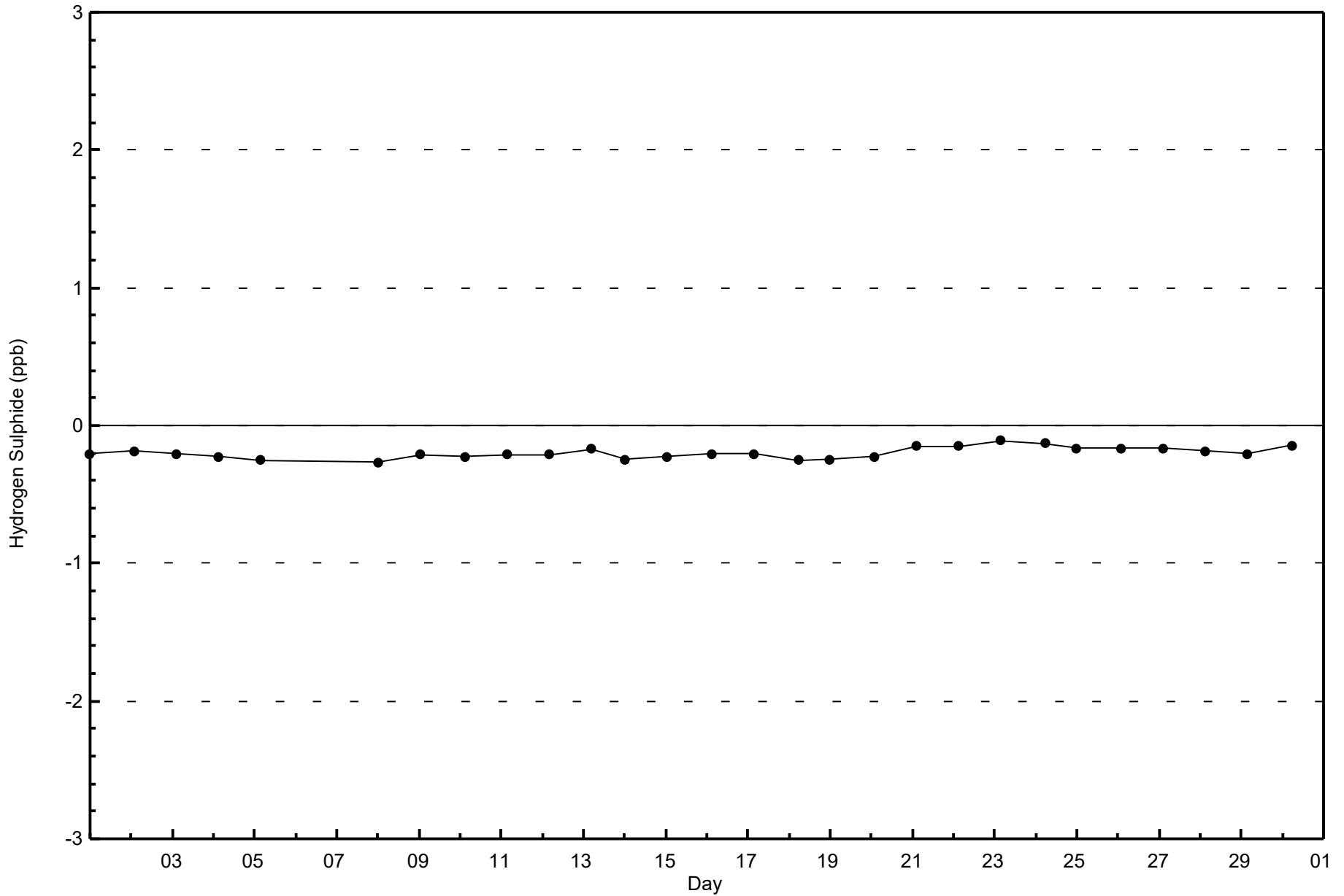


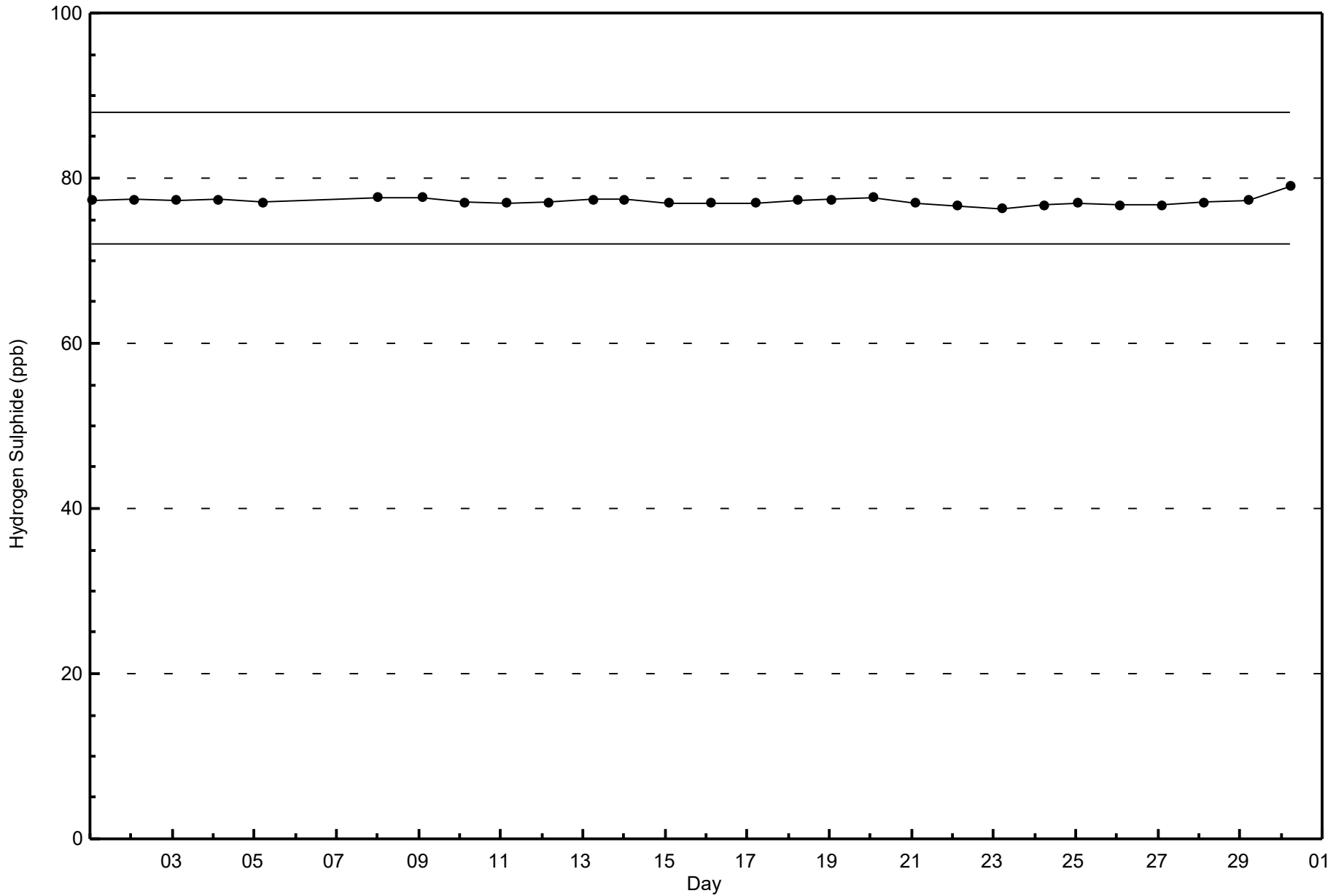
Wood Buffalo Environmental Association  
Wind Rose Nov 2023

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



Total Number of Valid Hours: 660







Wood Buffalo Environmental Association

Summary of Hour Averages

Nitric Oxide (NO) - ppb

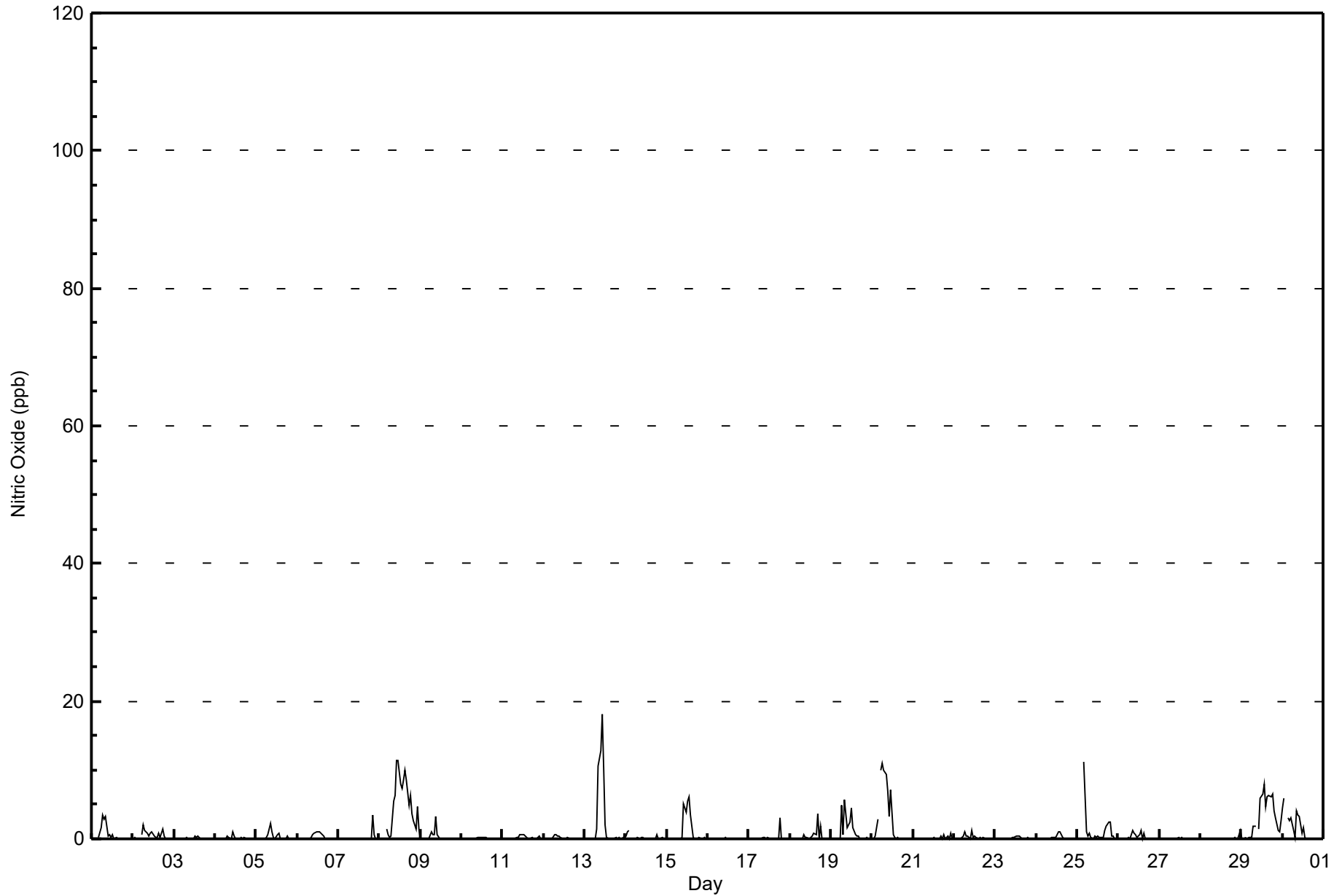
Leismer - November 2023

Maximum Value: 18.1 ppb on Nov 13 11:00																				Maximum Daily Average: 4.5 ppb on Nov 8					Hours in Service: 720		
Minimum Value: 0.0 ppb on Nov 1 16:00																				Minimum Daily Average: 0.0 ppb on Nov 16					Hours of Data: 685		
Maximum Diurnal Average: 1.8 ppb at hour 11																				Minimum Diurnal Average: 0.1 ppb at hour 3					Hours of Missing Data: 35		
Monthly Average: 0.73 ppb																				Percentiles: P <sub>1</sub> = 0.0 P <sub>10</sub> = 0.0 Q <sub>1</sub> = 0.0 Median = 0.0 Q <sub>3</sub> = 0.3 P <sub>90</sub> = 1.9 P <sub>99</sub> = 10.5					Hours of Calibration: 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-Nov	0.1	0.1	0.1	Z	0.2	1.6	3.5	2.9	3.3	0.4	0.6	0.2	0.6	0.1	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	3.5	
2-Nov	0.0	0.1	0.1	0.1	Z	0.6	2.0	1.3	0.9	0.4	0.7	0.9	0.5	0.2	0.2	0.8	0.3	1.5	0.4	0.0	0.0	0.0	0.0	0.0	0.5	2.0	
3-Nov	0.0	0.0	0.0	0.0	0.0	Z	0.0	0.3	0.1	0.1	0.1	0.1	0.4	0.1	0.4	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.4	
4-Nov	Z	0.0	0.0	0.0	0.0	0.1	0.0	0.4	0.2	0.1	0.9	0.3	0.1	0.0	0.0	0.2	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.9	
5-Nov	0.0	Z	0.0	0.0	0.0	0.1	0.2	0.6	2.2	1.0	0.3	0.0	0.5	0.7	0.0	0.0	0.1	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.3	2.2	
6-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.6	0.7	1.0	1.0	1.0	0.8	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	1.0	
7-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	M	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.4	0.7	0.0	0.0	0.2	3.4	
8-Nov	0.0	0.0	0.0	Z	1.5	0.6	0.2	0.4	5.5	6.2	11.3	11.4	8.0	7.3	8.5	9.9	8.5	4.9	6.3	3.6	2.6	1.4	4.7	1.4	4.5	11.4	
9-Nov	0.1	0.0	0.0	0.0	Z	0.0	0.9	0.7	0.5	3.2	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	3.2	
10-Nov	0.0	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.1	0.2	0.3	0.2	0.2	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.3	
11-Nov	Z	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.3	0.6	0.6	0.5	0.4	0.2	0.1	0.0	0.1	0.0	0.0	0.0	0.3	0.0	0.0	0.1	0.6	
12-Nov	0.1	Z	0.0	0.0	0.0	0.0	0.6	0.5	0.4	0.4	0.2	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	0.1	0.6	
13-Nov	0.0	0.0	Z	0.0	0.0	0.0	0.0	1.3	10.6	12.9	18.1	10.5	2.0	0.1	0.1	0.1	0.0	0.0	0.2	0.0	0.1	0.0	0.0	0.3	2.4	18.1	
14-Nov	0.5	0.9	1.3	Z	0.0	0.0	0.0	0.2	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.3	0.0	0.0	0.2	1.3	
15-Nov	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.2	5.1	3.8	5.6	6.1	3.4	0.2	0.0	0.0	0.1	0.2	0.0	0.0	0.2	0.1	1.1	6.1	
16-Nov	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.0	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-Nov	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.0	0.0	0.0	0.0	0.0	0.2	3.0	
18-Nov	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.6	0.2	0.2	0.1	0.2	0.4	0.9	0.6	3.6	0.1	1.8	0.0	0.0	0.0	0.0	0.0	0.4	3.6	
19-Nov	0.0	0.0	0.0	Z	0.0	0.0	4.9	0.6	5.8	1.6	2.1	2.5	4.4	1.6	0.7	0.4	0.4	0.0	0.1	0.0	0.0	0.1	0.1	0.0	1.1	5.8	
20-Nov	0.0	0.0	0.3	2.8	Z	9.9	11.0	10.1	9.5	7.0	3.3	7.1	0.7	0.1	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	2.7	11.0	
21-Nov	0.0	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.1	0.3	0.1	0.0	0.1	0.4	0.0	0.6	0.0	0.4	0.0	0.8	0.0	0.1	0.8	
22-Nov	Z	0.0	0.0	0.0	0.0	0.4	1.0	0.4	0.5	0.1	1.2	0.1	0.5	0.1	0.1	0.1	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.2	1.2	
23-Nov	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.3	0.4	0.5	0.3	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.5	
24-Nov	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.2	0.6	1.0	1.0	0.2	0.1	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.2	1.0	
25-Nov	0.0	0.0	0.0	Z	11.3	1.1	0.5	0.8	0.2	0.1	0.4	0.1	0.4	0.2	0.3	0.2	1.2	1.9	2.5	2.4	0.5	0.4	0.0	0.0	1.1	11.3	
26-Nov	0.0	0.0	0.0	0.0	Z	0.0	0.1	0.1	1.2	0.8	0.7	0.2	0.7	1.2	0.1	0.7	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	1.2	
27-Nov	0.0	0.0	0.0	0.0	0.0	Z	0.1	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1
28-Nov	Z	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	C	C	C	C	C	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	1.2	0.1	1.2	
29-Nov	0.1	Z	0.2	0.1	0.2	0.2	0.1	1.9	1.9	M	1.5	5.9	6.5	7.8	4.7	6.1	6.3	6.1	6.4	4.2	3.0	1.1	1.0	2.6	3.1	7.8	
30-Nov	4.5	5.9	Z	3.0	2.6	3.0	1.2	0.2	4.0	3.5	3.2	0.9	1.7	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	1.5	5.9	
																								Diurnal Average			
																								Diurnal Maximum			
Z - zerospan      C - Calibration      M - Maintenance																											



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

**Nitric Oxide (NO) - ppb**  
**Leismer - November 2023**





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

**Nitric Oxide (NO) - ppb**  
**Leismer - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	685	100.00	100.00
21 - 40	0	0.00	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720





**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitric Oxide (NO) - ppb  
Leismer - November 2023**

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	10	8	12	42	69	35	30	45	67	23	17	89	103	65	30	659
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	14	10	8	12	42	69	35	30	45	67	23	17	89	103	65	30	659

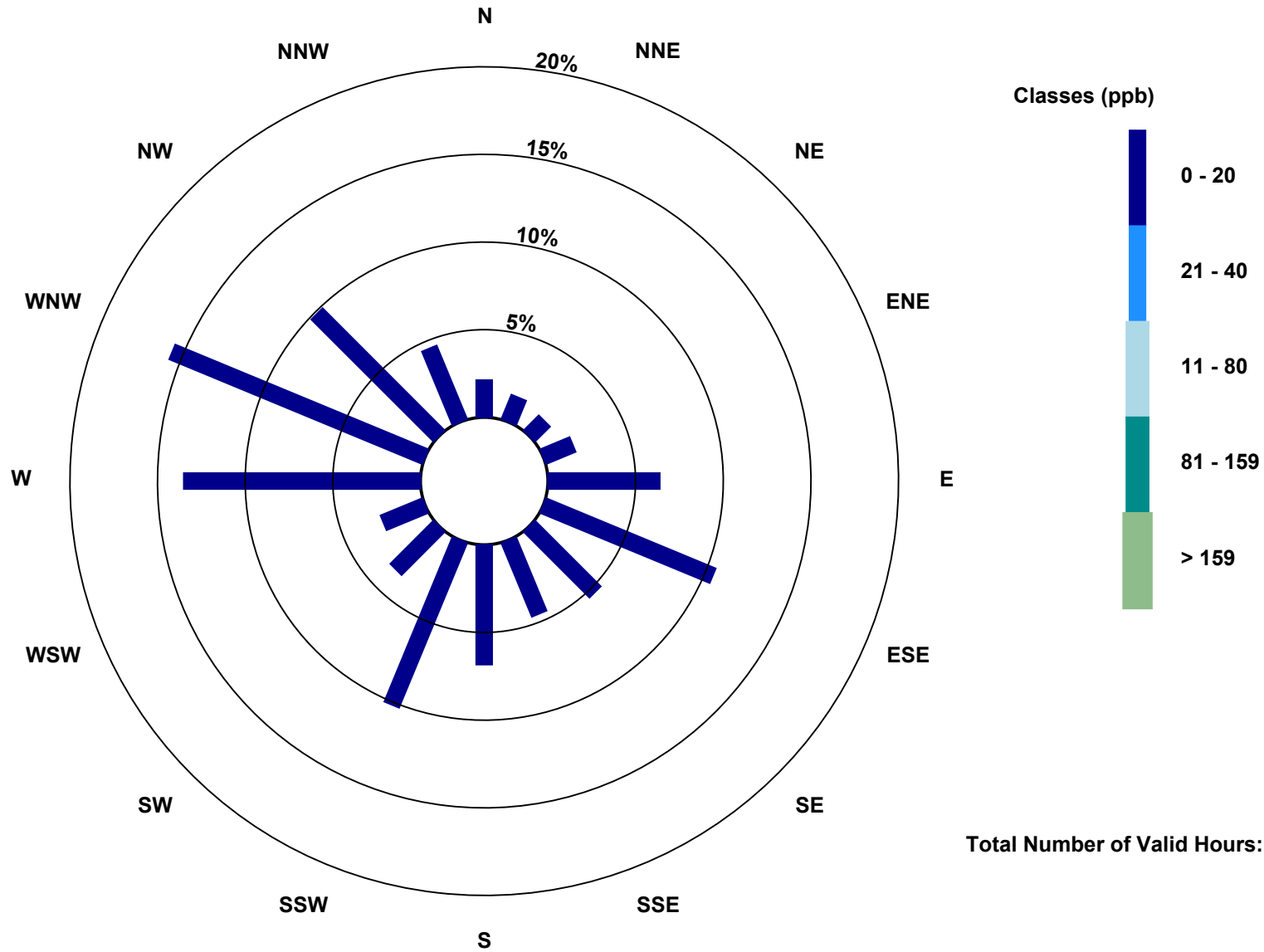
Total Number of Valid Hours: 659

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 2023

Nitric Oxide (NO) - ppb  
Leismer

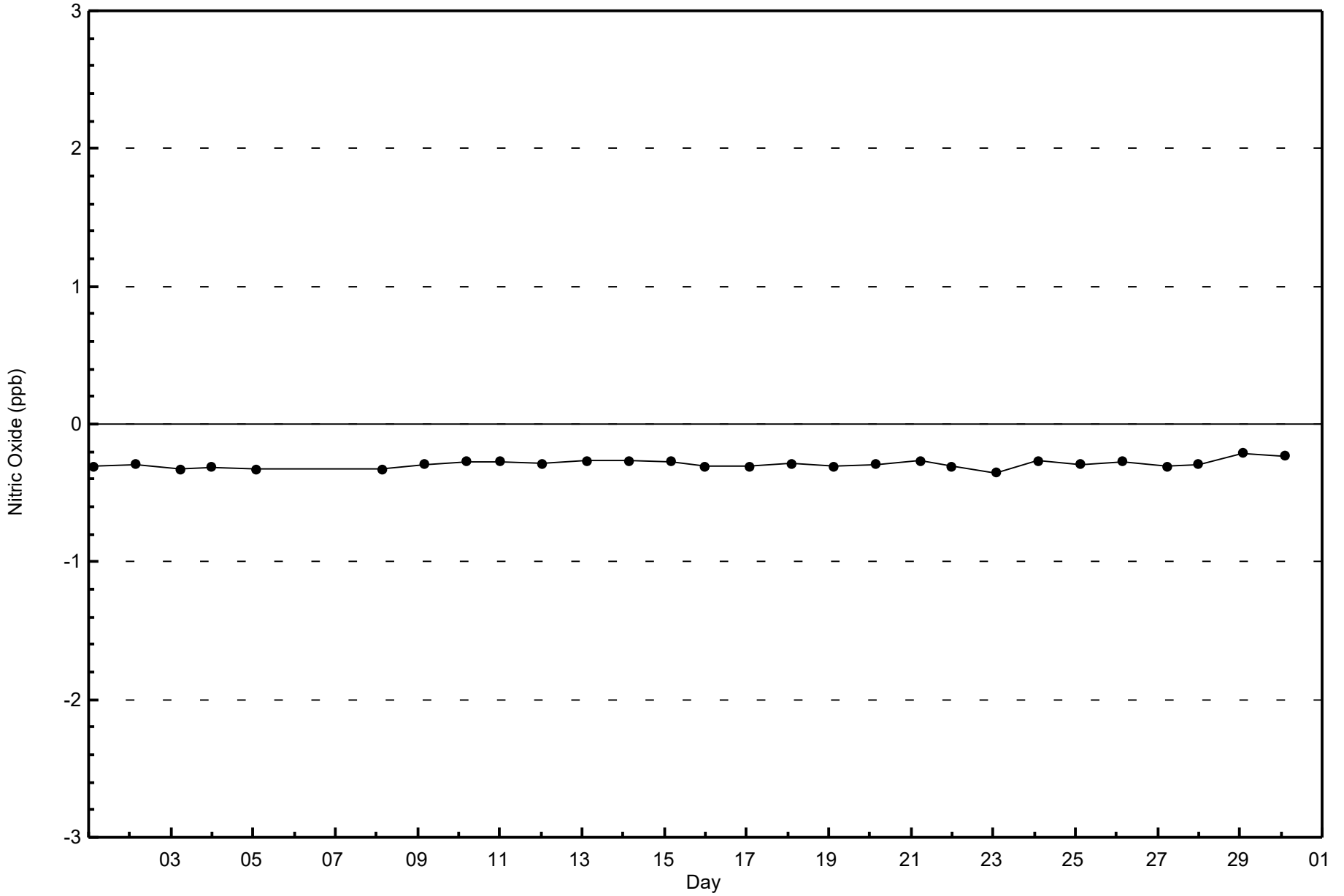


Total Number of Valid Hours: 659



**Wood Buffalo Environmental Association**  
**Zero Responses**

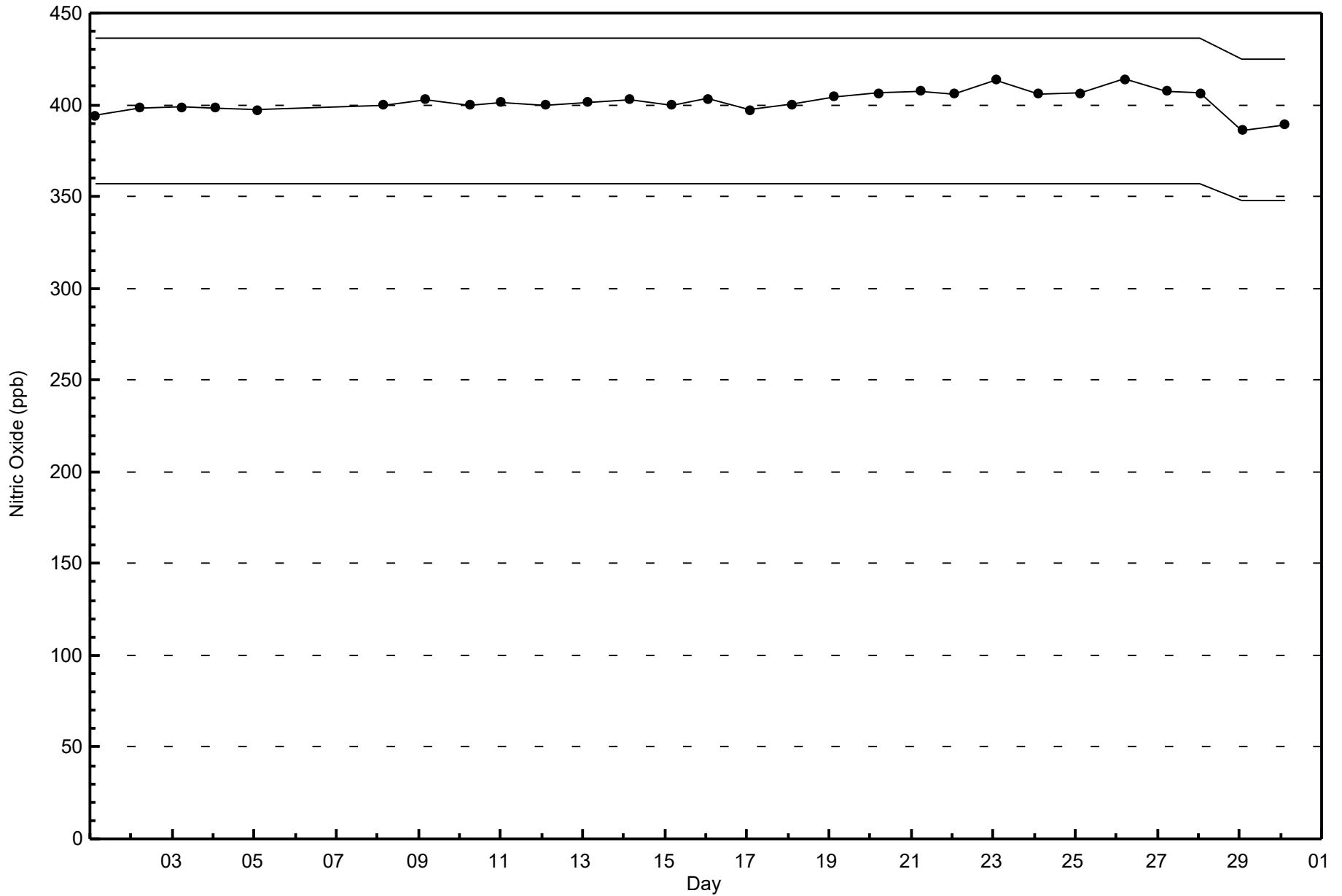
**Nitric Oxide (NO) - ppb**  
**Leismer - November 2023**





Wood Buffalo Environmental Association  
Span Responses

Nitric Oxide (NO) - ppb  
Leismer - November 2023





Wood Buffalo Environmental Association

Summary of Hour Averages

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

Leismer - November 2023

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 13.1 ppb on Nov 25 05:00	Maximum Daily Average: 4.2 ppb on Nov 29		Hours of Data:	685
Minimum Value: 0.1 ppb on Nov 9 14:00	Minimum Daily Average: 0.5 ppb on Nov 4		Hours of Missing Data:	35
Maximum Diurnal Average: 2.6 ppb at hour 9	Minimum Diurnal Average: 1.0 ppb at hour 3		Hours of Calibration:	33
Monthly Average: 1.57 ppb	Percentiles: P <sub>1</sub> = 0.2 P <sub>10</sub> = 0.4 Q <sub>1</sub> = 0.6 Median = 1.0 Q <sub>3</sub> = 1.9 P <sub>90</sub> = 3.4 P <sub>99</sub> = 8.8		Percent Operational Time:	99.7

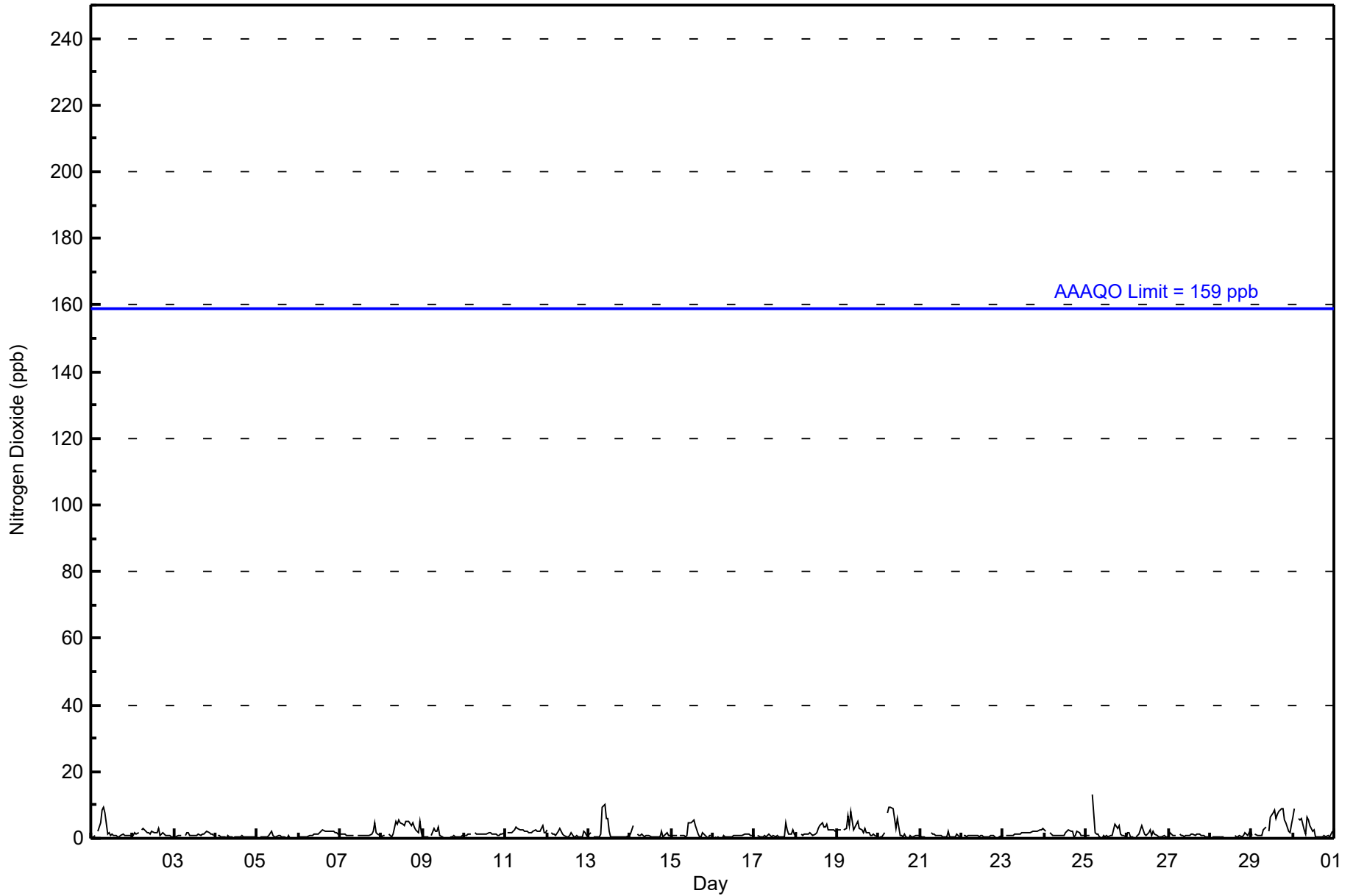
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Nov	0.4	0.4	0.8	Z	2.0	4.6	8.4	9.2	7.5	1.2	1.9	0.9	1.2	0.7	0.9	0.4	0.5	1.0	1.1	0.7	0.8	0.9	1.0	0.8	2.1	9.2																							
2-Nov	0.9	1.7	1.4	1.5	Z	2.4	2.9	2.6	1.7	1.8	1.4	2.2	1.8	1.6	1.6	3.1	1.0	1.6	1.3	1.0	0.8	0.7	0.6	0.6	1.6	3.1																							
3-Nov	0.6	0.6	0.7	0.8	0.9	Z	1.0	1.6	1.6	0.8	0.7	0.7	1.0	1.0	1.3	1.0	1.1	1.1	1.7	2.2	1.7	1.1	1.2	1.0	1.1	2.2																							
4-Nov	Z	0.9	0.7	0.5	0.4	0.4	0.2	0.7	0.3	0.3	0.2	0.6	0.5	0.5	0.8	0.4	0.6	0.4	0.3	0.3	0.3	0.4	0.4	0.4	0.5	0.9																							
5-Nov	0.4	Z	0.5	0.3	0.3	0.4	0.3	0.7	2.0	0.9	0.3	0.4	0.9	0.7	0.4	0.4	0.5	0.2	0.9	0.2	0.2	0.2	0.2	0.2	0.5	2.0																							
6-Nov	0.3	0.4	0.3	0.3	0.3	0.4	0.9	0.8	0.8	1.1	1.2	1.3	1.7	2.0	2.4	2.2	2.0	2.0	2.1	2.2	2.2	1.9	1.7	1.4	1.3	2.4																							
7-Nov	1.2	1.2	1.2	1.1	1.0	1.0	0.9	0.9	0.8	M	0.9	0.7	0.7	0.7	0.8	0.8	0.8	0.9	1.4	2.0	4.7	1.9	1.1	1.0	1.2	4.7																							
8-Nov	0.6	0.7	0.8	Z	1.4	0.9	0.6	1.4	4.9	4.3	5.7	4.8	4.3	3.7	5.0	5.0	5.1	3.7	4.8	3.2	2.5	1.9	4.9	1.9	3.1	5.7																							
9-Nov	0.6	0.5	0.5	0.4	Z	0.8	2.9	2.1	2.0	3.3	1.0	0.3	0.2	0.1	0.1	0.2	0.3	0.4	0.8	0.3	0.3	0.4	0.5	0.8	0.8	3.3																							
10-Nov	0.8	1.0	1.2	1.4	1.4	Z	1.5	1.4	1.3	1.2	1.1	1.2	1.3	1.4	1.5	1.5	1.4	1.3	1.1	1.0	1.0	1.1	1.2	1.5	1.3	1.5																							
11-Nov	Z	1.9	1.7	1.6	2.0	2.6	3.4	3.1	2.5	2.7	2.4	2.2	2.1	1.8	1.7	1.9	2.0	2.7	2.2	2.1	2.1	3.7	1.9	1.8	2.3	3.7																							
12-Nov	2.7	Z	1.5	1.4	1.2	0.9	2.0	3.0	2.0	1.3	0.8	0.5	0.4	0.7	1.6	0.6	0.5	0.9	0.3	0.4	0.5	2.2	1.5	0.8	1.2	3.0																							
13-Nov	1.4	1.7	Z	0.5	0.4	0.5	0.5	1.2	9.3	10.3	5.8	5.8	2.0	0.5	0.5	0.6	0.6	0.5	0.5	0.3	0.5	0.5	0.6	1.0	2.0	10.3																							
14-Nov	1.1	2.4	3.7	Z	1.4	1.0	0.8	1.3	0.6	0.7	0.8	0.7	0.6	0.4	0.5	0.5	0.4	0.5	2.3	0.6	0.7	1.7	1.0	0.7	1.1	3.7																							
15-Nov	0.6	0.9	1.0	0.9	Z	0.8	0.7	0.7	0.6	0.9	4.7	4.5	4.9	5.5	3.7	1.2	0.4	0.3	1.8	1.2	0.5	0.2	1.0	0.7	1.6	5.5																							
16-Nov	Z	0.4	0.2	0.3	0.2	0.2	0.8	0.3	0.4	0.5	0.6	0.6	0.7	0.9	0.7	0.7	0.8	1.0	1.1	1.1	1.2	1.2	0.9	0.9	0.7	1.2																							
17-Nov	0.9	Z	0.8	0.6	0.6	0.5	0.7	0.6	1.1	1.0	0.6	0.8	0.5	0.7	0.5	0.6	0.6	0.6	4.8	2.4	1.2	1.1	2.4	1.3	1.1	4.8																							
18-Nov	1.9	1.9	Z	1.2	1.0	1.2	1.3	1.1	1.8	1.2	0.9	1.1	1.9	2.8	4.0	4.8	3.6	3.5	4.4	2.7	2.4	2.7	2.5	2.3	2.3	4.8																							
19-Nov	2.7	2.7	2.5	Z	2.4	2.8	6.7	3.9	7.9	2.7	3.2	4.3	5.0	3.1	2.6	1.9	3.1	1.8	1.7	1.0	1.0	1.4	1.0	0.5	2.9	7.9																							
20-Nov	0.2	0.3	0.5	1.8	Z	7.6	9.2	9.2	8.7	6.0	3.1	5.8	1.0	0.7	0.6	1.1	0.5	0.2	0.7	0.6	0.3	0.7	0.7	0.7	2.6	9.2																							
21-Nov	0.7	0.4	0.3	0.2	0.2	Z	1.6	1.2	1.4	1.0	1.0	0.9	0.8	0.4	0.5	0.5	2.1	0.4	0.6	0.6	0.6	1.1	0.7	0.6	0.8	2.1																							
22-Nov	Z	1.0	0.9	0.6	0.8	0.9	1.0	1.0	0.9	0.9	0.5	0.7	0.8	0.6	0.3	0.6	0.4	0.7	1.0	0.3	0.2	0.2	0.3	0.8	0.7	1.0																							
23-Nov	0.9	Z	0.8	0.7	0.7	0.8	0.9	1.1	1.2	1.2	1.3	1.5	1.8	1.7	1.7	1.8	1.9	2.1	2.2	2.3	2.3	2.5	2.7	2.9	1.6	2.9																							
24-Nov	2.7	2.1	Z	1.5	1.2	0.9	0.7	0.8	0.8	0.9	1.0	1.0	1.5	2.0	2.5	2.3	2.1	0.6	0.7	2.1	1.7	0.8	1.0	0.9	1.4	2.7																							
25-Nov	1.0	0.8	0.7	Z	13.1	1.7	1.2	1.3	0.6	0.2	0.7	0.4	0.8	0.6	0.8	0.7	2.6	4.4	3.0	4.0	1.1	0.8	0.7	0.3	1.8	13.1																							
26-Nov	1.8	1.5	0.4	0.3	Z	0.5	0.7	1.3	3.8	2.4	1.3	0.7	1.8	2.5	0.8	2.0	1.1	0.7	0.3	0.3	0.4	0.9	0.4	0.5	1.1	3.8																							
27-Nov	0.6	1.5	0.8	0.9	0.9	Z	1.1	0.7	0.7	0.6	0.7	0.8	1.0	1.2	1.1	1.0	1.1	1.4	1.2	0.9	0.7	0.5	0.4	0.4	0.9	1.5																							
28-Nov	Z	0.5	0.4	0.5	0.6	0.4	0.4	0.5	0.4	C	C	C	C	C	0.7	0.4	0.5	0.7	0.6	1.0	1.5	1.1	0.9	2.4	0.8	2.4																							
29-Nov	1.0	Z	1.2	0.8	0.8	0.9	0.7	2.7	3.2	M	2.3	6.3	7.5	8.3	6.1	7.1	8.2	8.7	9.1	5.6	4.6	2.2	1.7	4.2	4.2	9.1																							
30-Nov	6.2	8.8	Z	6.1	5.4	5.8	2.7	1.3	6.2	5.4	3.9	2.0	2.5	0.6	0.5	0.6	0.4	0.3	0.8	0.4	0.7	0.3	1.4	2.2	2.8	8.8																							
																								1.3	1.4	1.0	1.0	1.6	1.6	1.9	1.9	2.6	2.0	1.7	1.9	1.8	1.6	1.5	1.5	1.5	1.5	1.8	1.4	1.3	1.2	1.2	1.2	Diurnal Average	
																								6.2	8.8	3.7	6.1	13.1	7.6	9.2	9.2	9.3	10.3	5.8	6.3	7.5	8.3	6.1	7.1	8.2	8.7	9.1	5.6	4.7	3.7	4.9	4.2	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 (NO<sub>2</sub>) - ppb**  
**Leismer - November 2023**





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

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb**  
**Leismer - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	685	100.00	100.00
21 - 40	0	0.00	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Leismer - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 20	14	10	8	12	42	69	35	30	45	67	23	17	89	103	65	30	659
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	14	10	8	12	42	69	35	30	45	67	23	17	89	103	65	30	659

Total Number of Valid Hours: 659

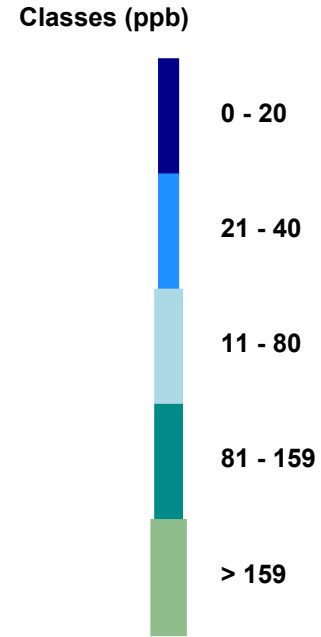
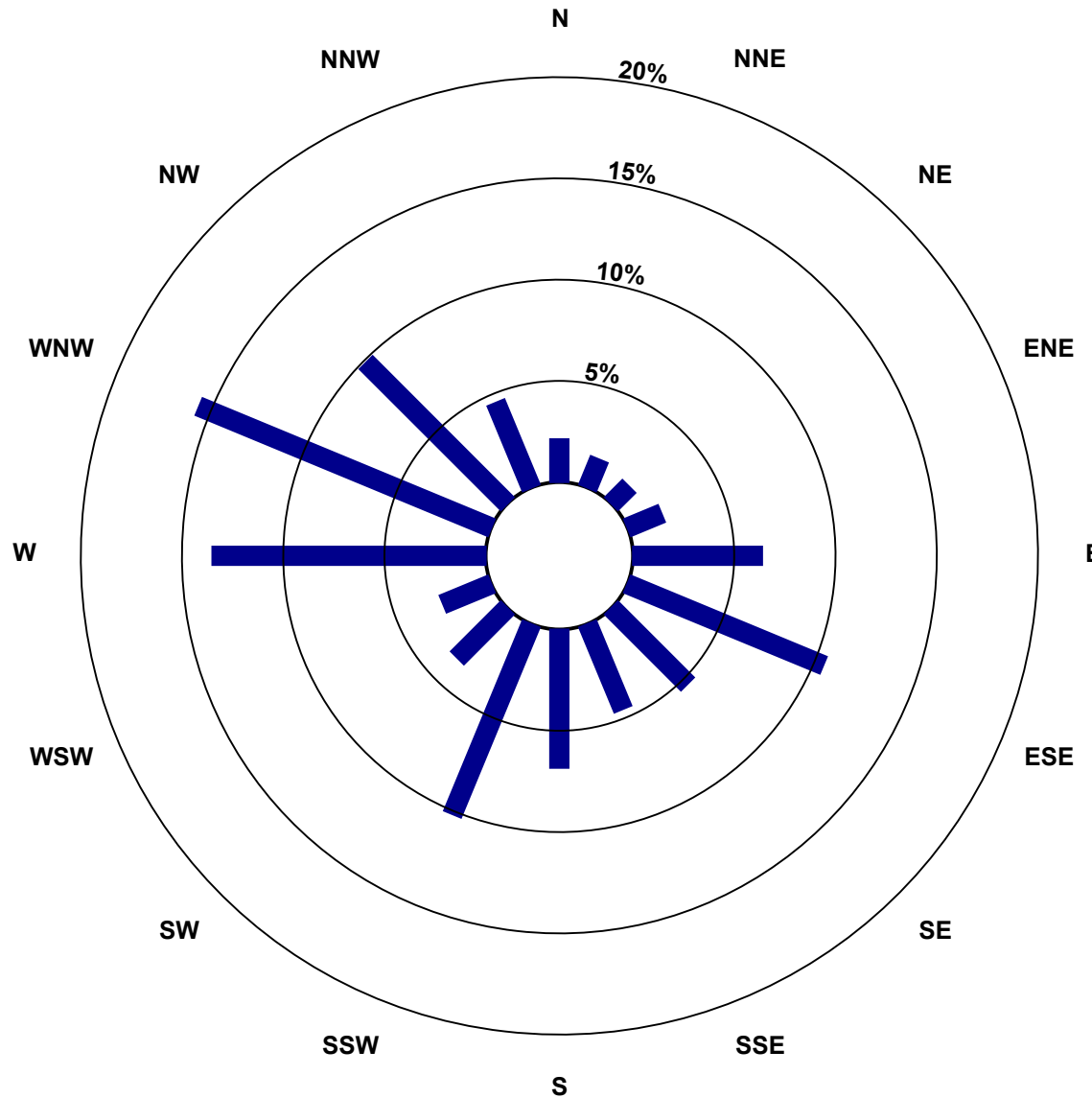
Total Number of Hours: 720



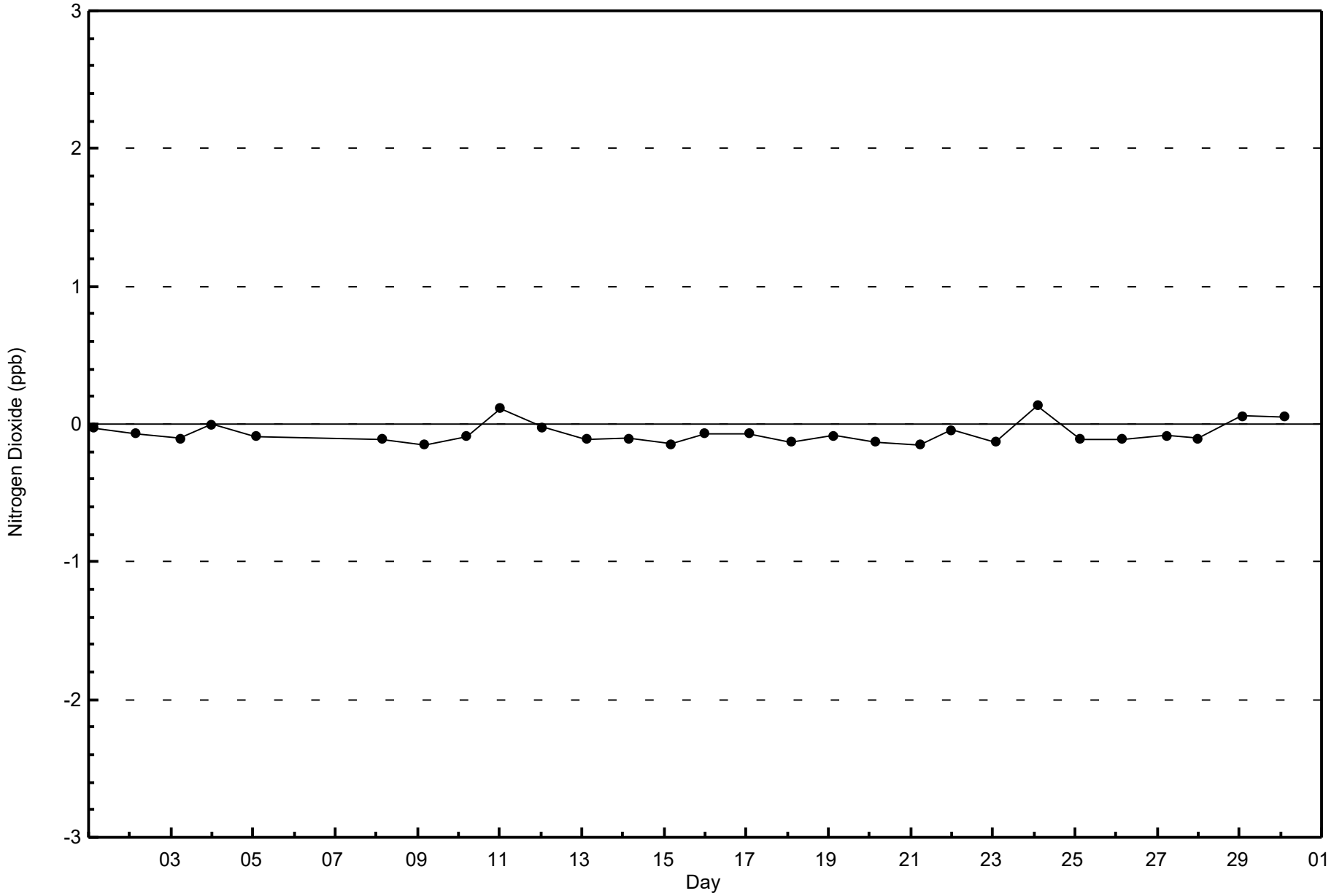


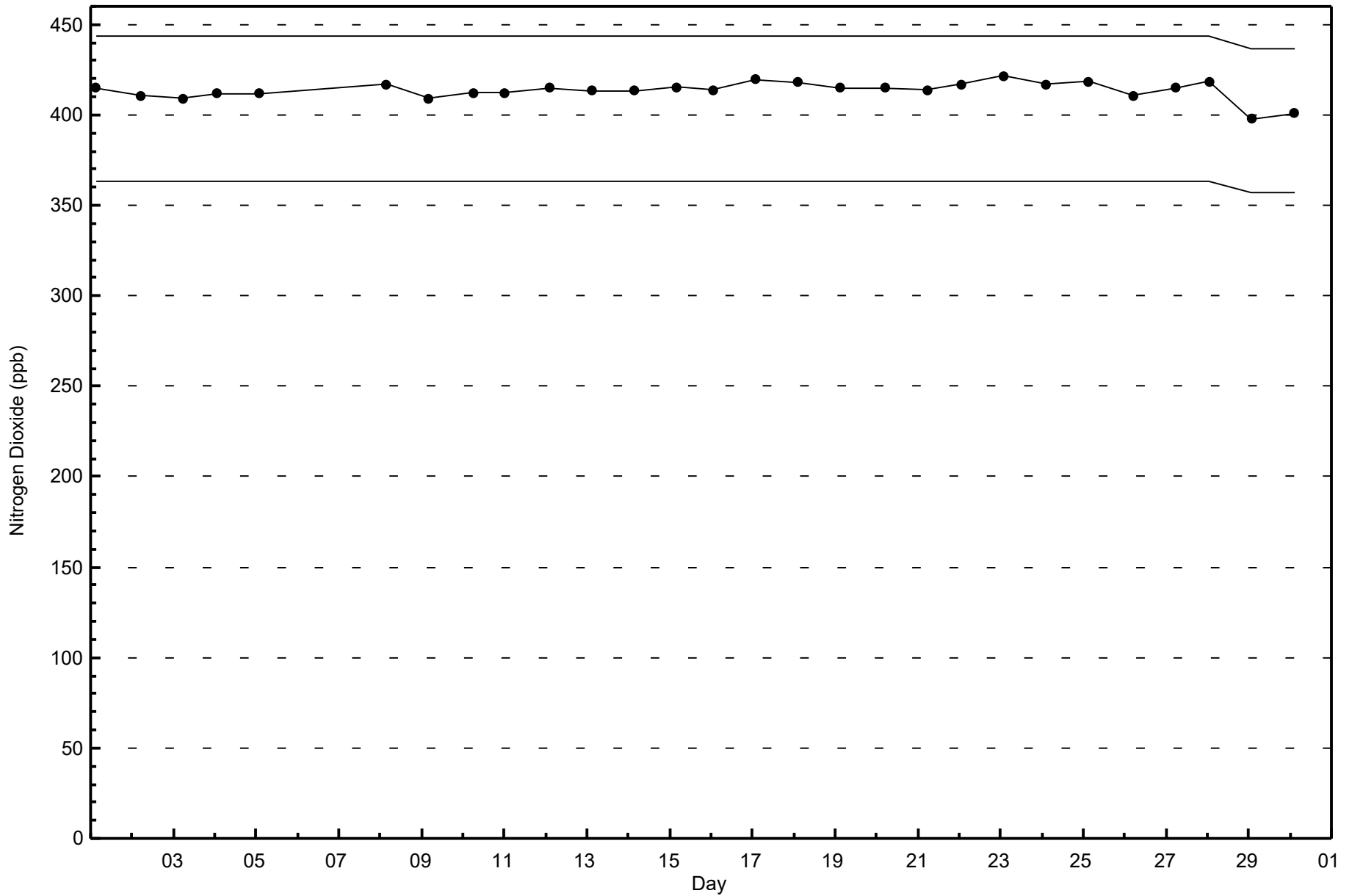
Wood Buffalo Environmental Association  
Wind Rose Nov 2023

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



Total Number of Valid Hours: 659







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

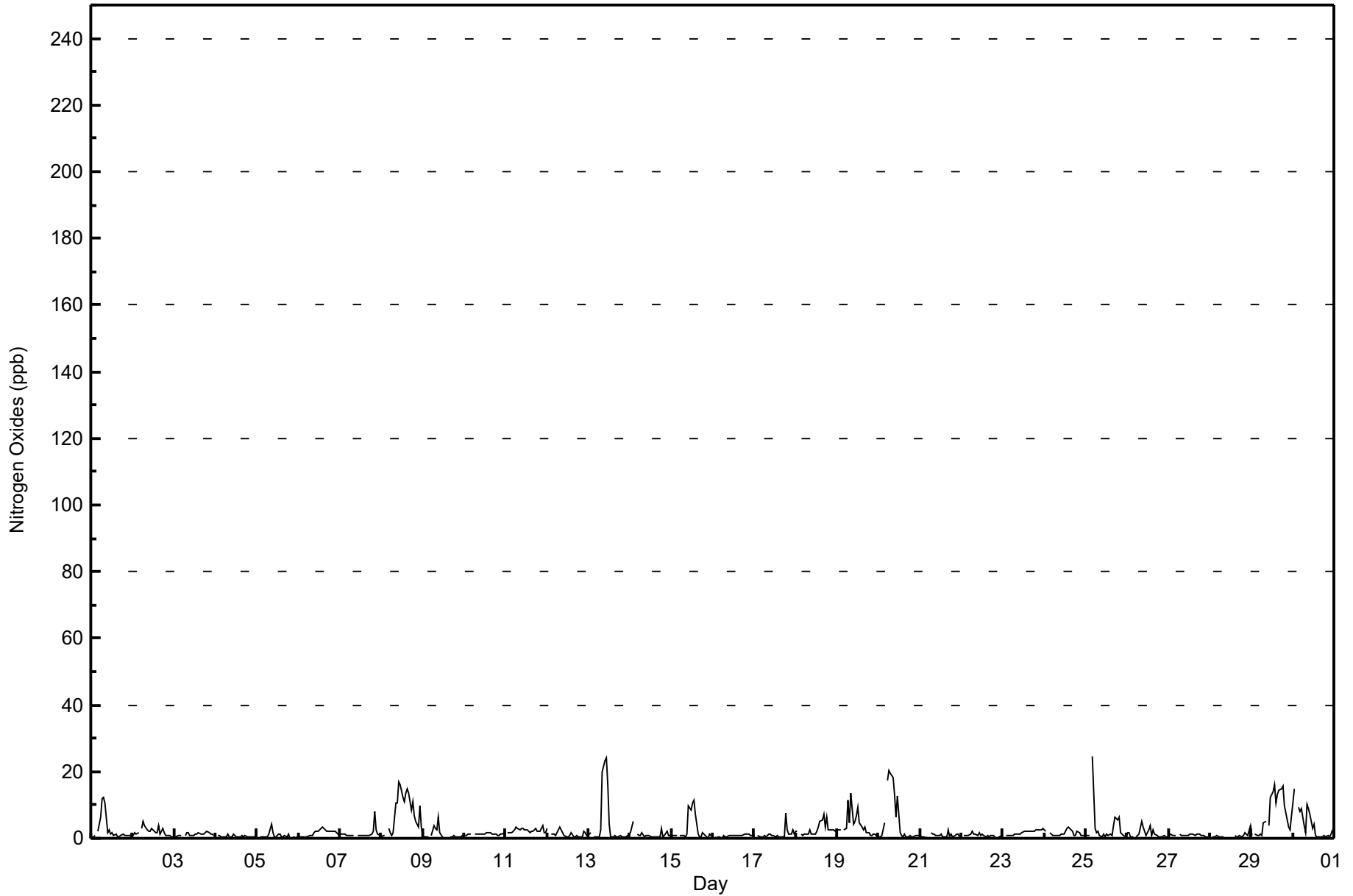
**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Leismer - November 2023**

Maximum Value: 24.4 ppb on Nov 25 05:00																						Maximum Daily Average: 7.7 ppb on Nov 8																						Hours in Service: 720					
Minimum Value: 0.1 ppb on Nov 9 14:00																						Minimum Daily Average: 0.6 ppb on Nov 4																						Hours of Data: 685					
Maximum Diurnal Average: 4.2 ppb at hour 9																						Minimum Diurnal Average: 1.1 ppb at hour 3																						Hours of Missing Data: 35					
Monthly Average: 2.30 ppb																						Percentiles: P <sub>1</sub> = 0.2 P <sub>10</sub> = 0.4 Q <sub>1</sub> = 0.7 Median = 1.1 Q <sub>3</sub> = 2.2 P <sub>90</sub> = 5.0 P <sub>99</sub> = 17.6																						Hours of Calibration: 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-Nov	0.5	0.5	0.9	Z	2.2	6.2	11.9	12.1	10.8	1.6	2.5	1.1	1.8	0.8	1.1	0.4	0.5	1.0	1.1	0.7	0.8	0.9	1.0	0.8	2.7	12.1																							
2-Nov	0.9	1.8	1.5	1.6	Z	3.0	4.9	3.9	2.6	2.2	2.1	3.1	2.3	1.8	1.8	3.9	1.3	3.1	1.7	1.0	0.8	0.7	0.6	0.6	2.1	4.9																							
3-Nov	0.6	0.6	0.7	0.8	0.9	Z	1.0	1.9	1.7	0.9	0.8	0.8	1.4	1.1	1.7	1.1	1.1	1.2	1.7	2.2	1.7	1.1	1.2	1.0	1.2	2.2																							
4-Nov	Z	0.9	0.7	0.5	0.4	0.5	0.2	1.1	0.5	0.4	1.1	0.9	0.6	0.5	0.5	1.0	0.4	0.7	0.4	0.3	0.3	0.3	0.4	0.4	0.6	1.1																							
5-Nov	0.4	Z	0.5	0.3	0.3	0.5	0.5	1.3	4.2	1.9	0.6	0.4	1.4	1.4	0.4	0.4	0.6	0.2	1.3	0.2	0.2	0.2	0.2	0.2	0.8	4.2																							
6-Nov	0.3	0.4	0.3	0.3	0.3	0.4	1.0	0.9	0.9	1.7	1.9	2.3	2.7	3.0	3.2	2.5	2.0	2.0	2.1	2.2	2.2	1.9	1.7	1.4	1.6	3.2																							
7-Nov	1.2	1.2	1.2	1.1	1.0	1.0	0.9	0.9	0.8	M	1.0	0.8	0.8	0.7	0.8	0.8	0.8	0.9	1.4	2.0	8.1	2.6	1.1	1.0	1.4	8.1																							
8-Nov	0.6	0.7	0.8	Z	2.9	1.5	0.8	1.8	10.4	10.5	17.0	16.2	12.3	11.0	13.5	14.9	13.6	8.6	11.1	6.8	5.1	3.3	9.6	3.3	7.7	17.0																							
9-Nov	0.7	0.5	0.5	0.4	Z	0.8	3.8	2.8	2.5	6.5	1.6	0.3	0.2	0.1	0.1	0.2	0.3	0.4	0.8	0.3	0.3	0.4	0.5	0.8	1.1	6.5																							
10-Nov	0.8	1.0	1.2	1.4	1.4	Z	1.5	1.4	1.4	1.4	1.4	1.4	1.4	1.5	1.6	1.6	1.5	1.4	1.3	1.1	1.0	1.0	1.1	1.2	1.5	1.3	1.6																						
11-Nov	Z	1.9	1.7	1.6	2.0	2.6	3.5	3.1	2.6	3.0	3.0	2.8	2.6	2.2	1.9	2.0	2.0	2.8	2.2	2.1	2.1	4.0	1.9	1.8	2.4	4.0																							
12-Nov	2.8	Z	1.5	1.4	1.2	0.9	2.6	3.5	2.4	1.7	1.0	0.5	0.4	0.7	1.9	0.6	0.5	0.9	0.3	0.4	0.5	2.2	1.5	0.8	1.3	3.5																							
13-Nov	1.4	1.7	Z	0.5	0.4	0.5	0.5	2.5	19.9	23.2	23.9	16.3	4.0	0.6	0.6	0.7	0.6	0.5	0.7	0.3	0.6	0.5	0.6	1.3	4.4	23.9																							
14-Nov	1.6	3.3	5.0	Z	1.4	1.0	0.8	1.5	0.6	0.8	0.9	0.7	0.6	0.4	0.5	0.5	0.4	0.5	3.0	0.6	0.7	2.0	1.0	0.7	1.2	5.0																							
15-Nov	0.6	0.9	1.0	0.9	Z	0.8	0.7	0.7	0.6	1.1	9.8	8.3	10.5	11.6	7.1	1.4	0.4	0.3	1.9	1.4	0.5	0.2	1.2	0.8	2.7	11.6																							
16-Nov	Z	0.4	0.2	0.3	0.2	0.2	0.8	0.3	0.4	0.6	0.7	0.7	0.8	1.0	0.7	0.7	0.8	1.0	1.1	1.1	1.2	1.2	0.9	0.9	0.7	1.2																							
17-Nov	0.9	Z	0.8	0.6	0.6	0.5	0.7	0.6	1.4	1.2	0.7	0.9	0.5	0.7	0.5	0.6	0.6	0.6	7.8	2.4	1.2	1.1	2.4	1.3	1.2	7.8																							
18-Nov	1.9	1.9	Z	1.2	1.0	1.2	1.3	1.1	2.4	1.4	1.1	1.2	2.1	3.2	4.9	5.4	7.2	3.6	6.2	2.7	2.4	2.7	2.5	2.3	2.7	7.2																							
19-Nov	2.7	2.7	2.5	Z	2.4	2.8	11.6	4.5	13.7	4.3	5.3	6.8	9.4	4.7	3.3	2.3	3.5	1.8	1.8	1.0	1.0	1.5	1.1	0.5	4.0	13.7																							
20-Nov	0.2	0.3	0.8	4.6	Z	17.5	20.2	19.3	18.2	13.0	6.4	12.9	1.7	0.8	0.6	1.4	0.5	0.2	0.7	0.6	0.3	0.8	0.8	0.7	5.3	20.2																							
21-Nov	0.7	0.4	0.3	0.2	0.2	Z	1.6	1.2	1.4	1.0	1.0	1.0	1.1	0.5	0.5	0.6	2.5	0.4	1.2	0.6	1.0	1.1	1.5	0.6	0.9	2.5																							
22-Nov	Z	1.0	0.9	0.6	0.8	1.3	2.0	1.4	1.4	1.0	1.7	0.8	1.3	0.7	0.4	0.7	0.4	0.9	1.0	0.3	0.2	0.2	0.3	0.8	0.9	2.0																							
23-Nov	0.9	Z	0.8	0.7	0.7	0.8	0.9	1.1	1.2	1.3	1.5	1.8	2.2	2.2	2.0	1.9	1.9	2.1	2.2	2.4	2.3	2.5	2.7	2.9	1.7	2.9																							
24-Nov	2.7	2.1	Z	1.5	1.2	0.9	0.7	0.8	0.8	1.0	1.2	1.2	2.1	3.0	3.5	2.5	2.2	0.6	0.7	2.2	1.8	0.8	1.0	0.9	1.5	3.5																							
25-Nov	1.0	0.8	0.7	Z	24.4	2.8	1.7	2.1	0.8	0.3	1.1	0.5	1.2	0.8	1.1	0.9	3.8	6.3	5.5	6.4	1.6	1.2	0.7	0.3	2.9	24.4																							
26-Nov	1.8	1.5	0.4	0.3	Z	0.5	0.8	1.4	5.0	3.2	2.0	0.9	2.5	3.7	0.9	2.7	1.2	0.7	0.3	0.3	0.4	0.9	0.4	0.5	1.4	5.0																							
27-Nov	0.6	1.5	0.8	0.9	0.9	Z	1.2	0.7	0.7	0.7	0.8	0.9	1.1	1.3	1.1	1.0	1.1	1.4	1.2	0.9	0.7	0.5	0.4	0.4	0.9	1.5																							
28-Nov	Z	0.5	0.4	0.5	0.7	0.4	0.4	0.5	0.4	C	C	C	C	C	0.7	0.4	0.5	0.7	0.6	1.0	1.7	1.1	0.9	3.6	0.8	3.6																							
29-Nov	1.1	Z	1.4	0.9	1.0	1.1	0.8	4.6	5.1	M	3.8	12.2	14.0	16.1	10.8	13.2	14.5	14.8	15.5	9.8	7.6	3.3	2.7	6.8	7.3	16.1																							
30-Nov	10.7	14.7	Z	9.1	8.0	8.8	3.9	1.5	10.2	8.9	7.1	2.9	4.2	0.8	0.5	0.6	0.4	0.3	0.8	0.4	0.7	0.3	1.4	2.3	4.3	14.7																							
																								1.5	1.7	1.1	1.3	2.3	2.3	2.8	2.7	4.2	3.5	3.5	3.5	3.0	2.7	2.3	2.2	2.2	2.0	2.6	1.8	1.6	1.4	1.4	1.4	Diurnal Average	
																								10.7	14.7	5.0	9.1	24.4	17.5	20.2	19.3	19.9	23.2	23.9	16.3	14.0	16.1	13.5	14.9	14.5	14.8	15.5	9.8	8.1	4.0	9.6	6.8	Diurnal Maximum	
Z - zerospan      C - Calibration      M - Maintenance																																																	



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

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Leismer - November 2023**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Leismer - November 2023**

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

Total Number of Valid Hours: 685

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Leismer - November 2023**

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	10	8	10	42	69	35	30	45	67	23	17	89	103	64	30	656
21 - 40	0	0	0	2	0	0	0	0	0	0	0	0	0	0	1	0	3
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	14	10	8	12	42	69	35	30	45	67	23	17	89	103	65	30	659

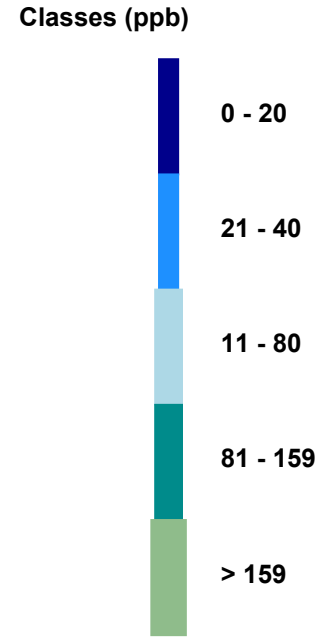
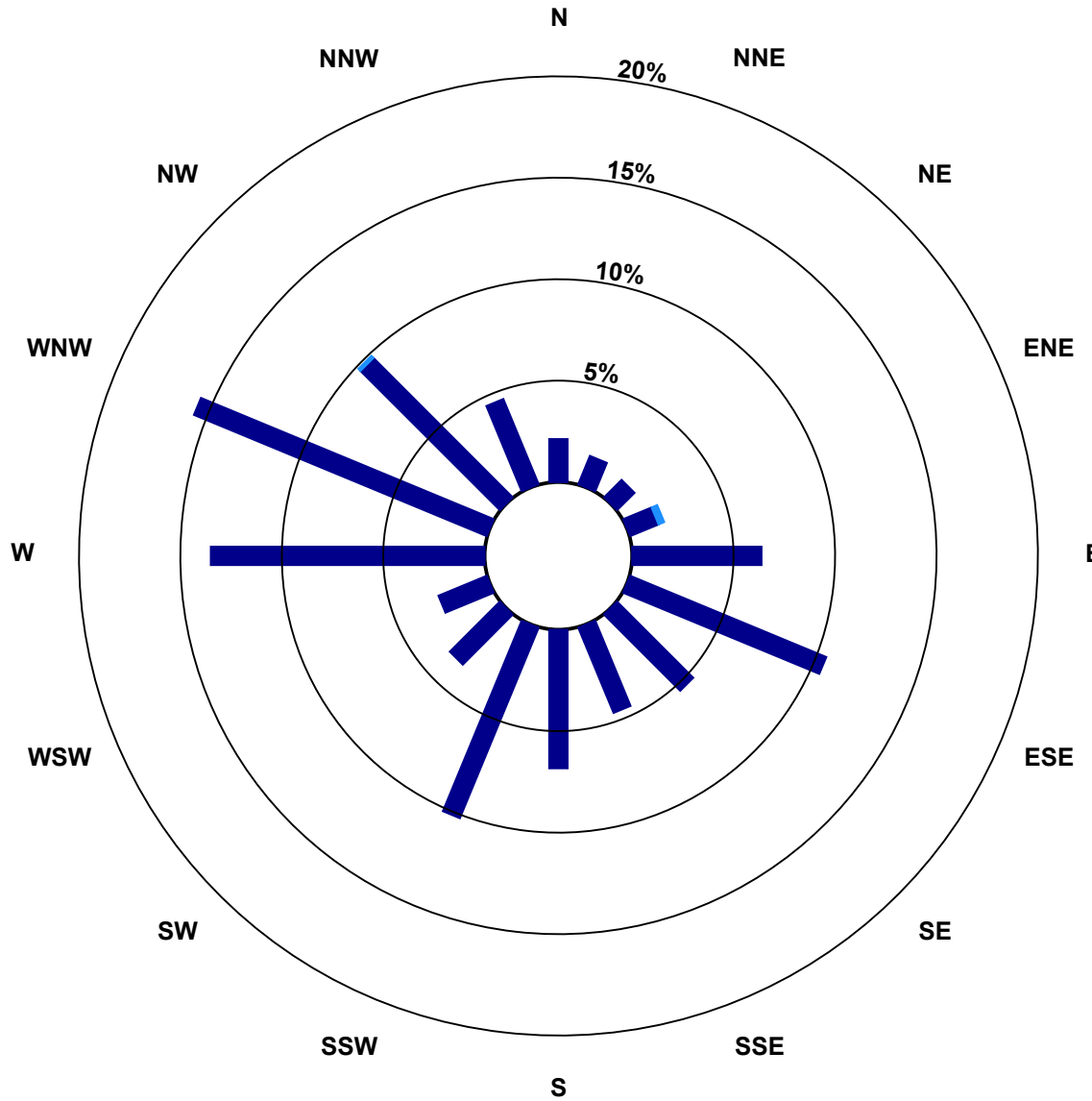
Total Number of Valid Hours: 659

Total Number of Hours: 720



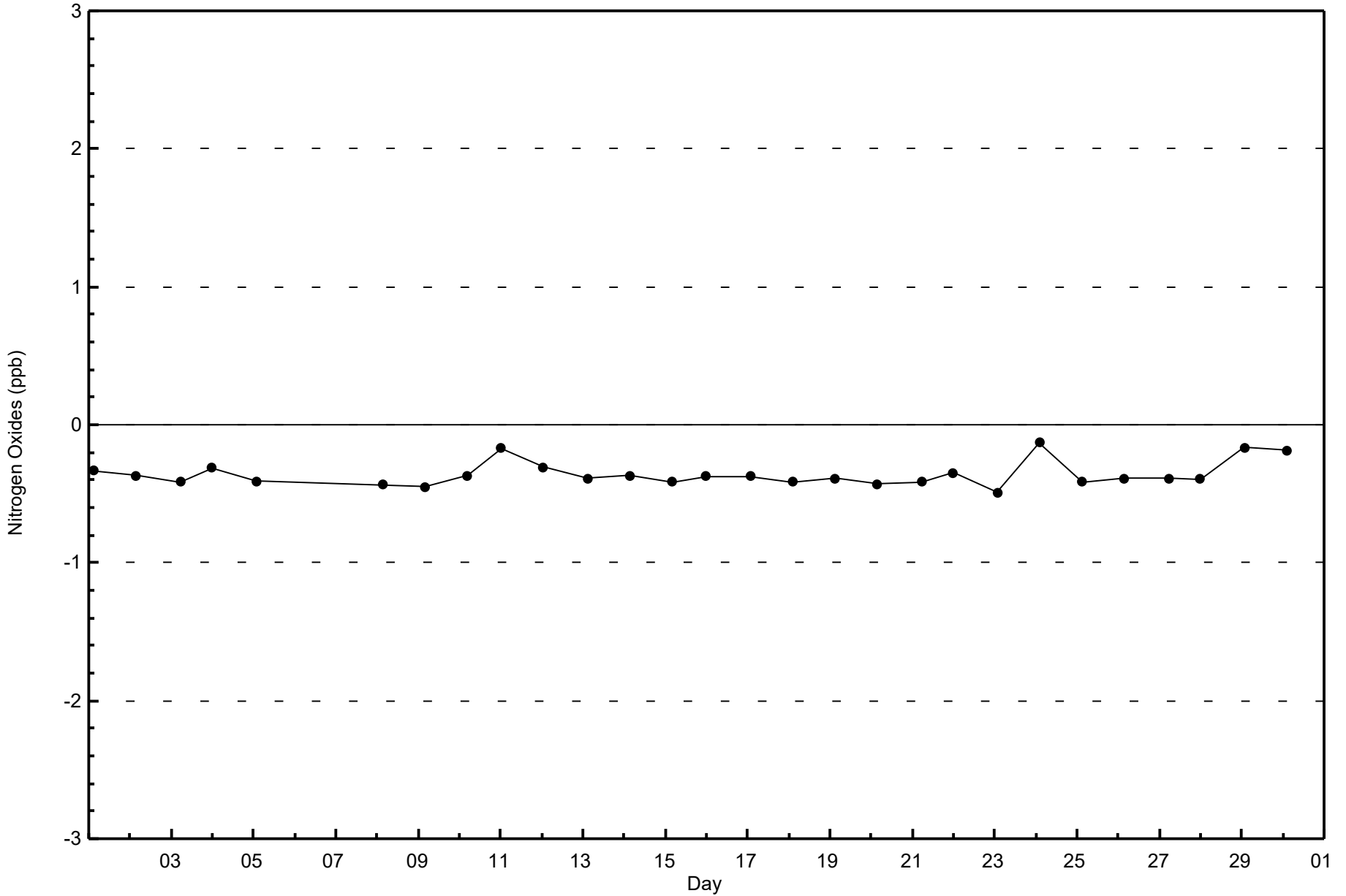
Wood Buffalo Environmental Association  
Wind Rose Nov 2023

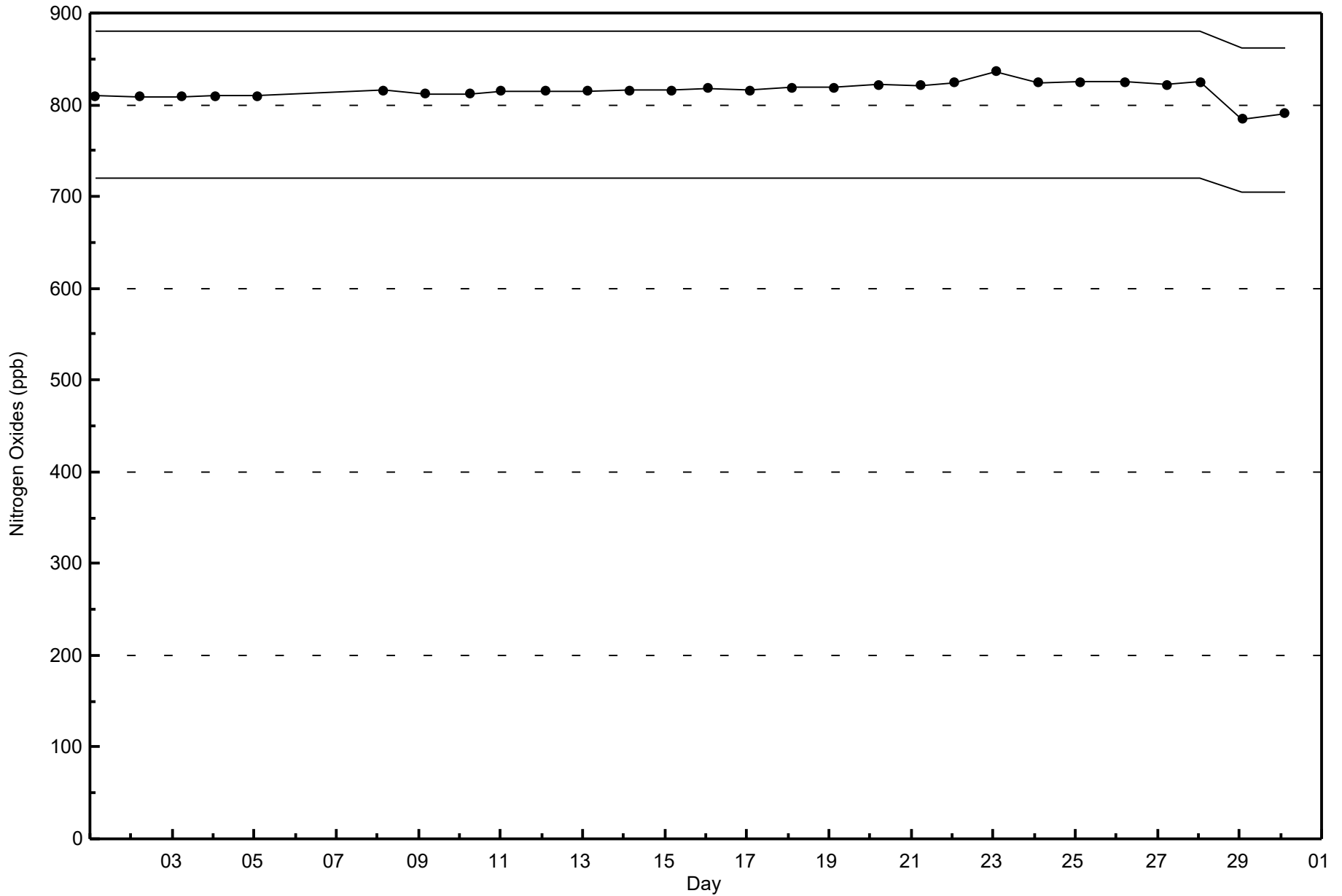
Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Leismer



Total Number of Valid Hours: 659







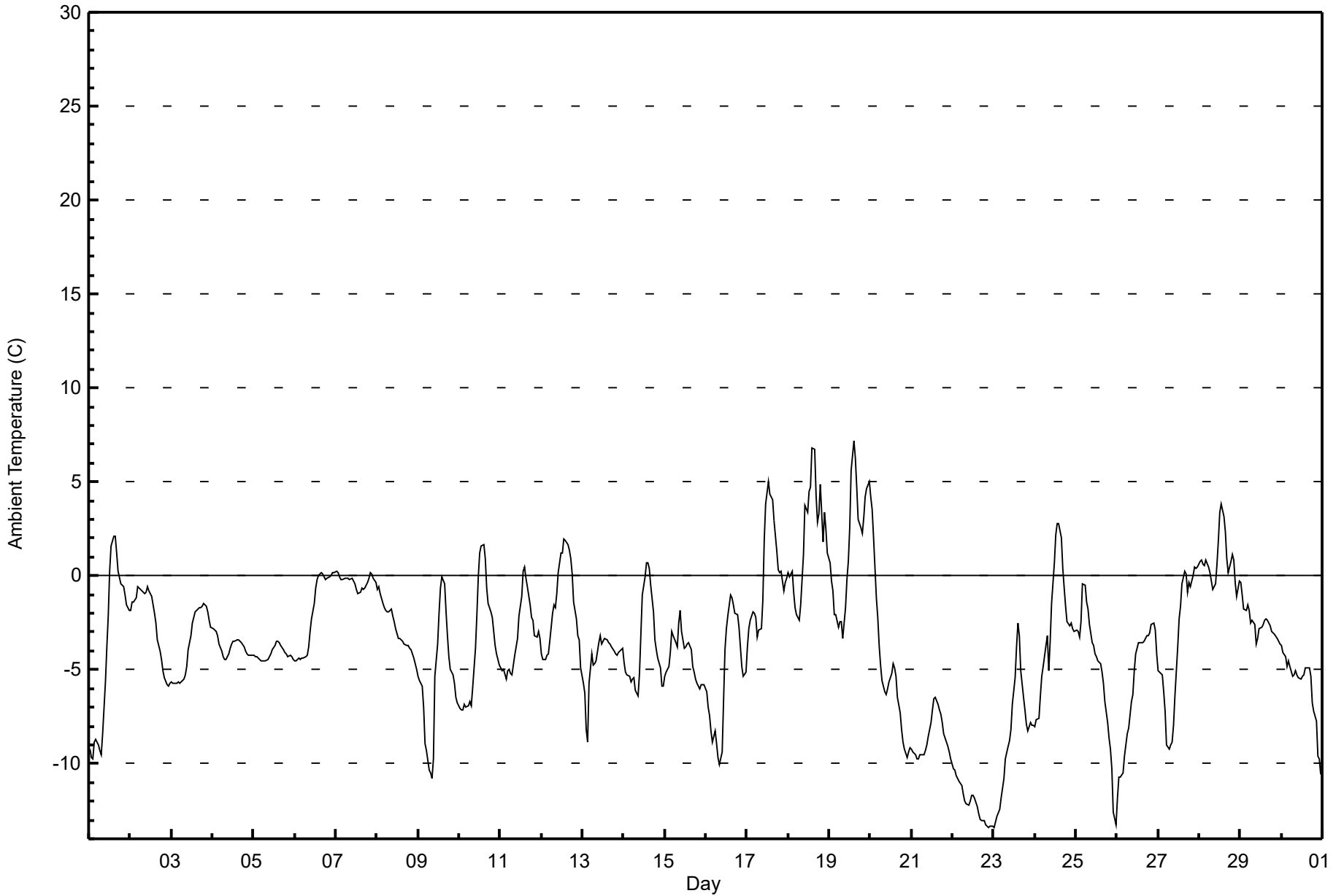


Maximum Value: 7.2 C on Nov 19 15:00      Maximum Daily Average: 2.0 C on Nov 18																				Hours in Service: 720 Hours of Data: 720						
Minimum Value: -13.4 C on Nov 23 01:00      Minimum Daily Average: -12.1 C on Nov 22 Maximum Diurnal Average: -1.1 C at hour 15      Minimum Diurnal Average: -5.1 C at hour 8 Monthly Average: -3.65 C      Percentiles: P <sub>1</sub> = -13.1 P <sub>10</sub> = -9.2 Q <sub>1</sub> = -5.6 Median = -3.6 Q <sub>3</sub> = -0.9 P <sub>90</sub> = 0.7 P <sub>99</sub> = 4.8																				Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	-9.2	-9.7	-9.8	-8.9	-8.7	-9.0	-9.3	-9.6	-8.4	-5.7	-3.8	-2.1	0.2	1.6	2.1	2.1	1.2	0.2	-0.5	-0.5	-0.6	-1.0	-1.6	-1.8	-3.9	2.1
2-Nov	-1.8	-1.4	-1.4	-1.2	-0.6	-0.6	-0.7	-0.8	-0.9	-0.9	-0.6	-0.8	-1.1	-1.6	-2.0	-2.5	-3.4	-4.0	-4.5	-5.0	-5.4	-5.8	-5.9	-5.7	-2.4	-0.6
3-Nov	-5.6	-5.7	-5.7	-5.7	-5.7	-5.7	-5.6	-5.5	-5.3	-4.8	-4.0	-3.2	-2.5	-2.2	-1.9	-1.8	-1.7	-1.7	-1.6	-1.5	-1.6	-1.9	-2.4	-2.7	-3.6	-1.5
4-Nov	-2.8	-2.9	-3.0	-3.1	-3.6	-4.0	-4.3	-4.5	-4.4	-4.2	-3.9	-3.6	-3.5	-3.4	-3.4	-3.5	-3.6	-3.8	-4.0	-4.1	-4.1	-4.2	-4.2	-4.2	-3.7	-2.8
5-Nov	-4.2	-4.3	-4.3	-4.5	-4.5	-4.5	-4.5	-4.5	-4.5	-4.3	-4.1	-3.9	-3.7	-3.5	-3.5	-3.6	-3.7	-3.9	-4.1	-4.1	-4.3	-4.3	-4.3	-4.4	-4.1	-3.5
6-Nov	-4.5	-4.5	-4.4	-4.5	-4.4	-4.4	-4.3	-4.2	-3.8	-3.0	-2.3	-1.5	-0.7	-0.2	0.0	0.1	0.1	-0.1	-0.2	-0.2	0.0	0.0	0.1	0.2	-1.9	0.2
7-Nov	0.2	0.2	-0.1	-0.2	-0.2	-0.1	-0.1	-0.1	-0.2	-0.1	-0.3	-0.4	-0.7	-0.9	-0.9	-0.7	-0.7	-0.6	-0.3	-0.1	0.2	0.1	-0.1	-0.4	-0.3	0.2
8-Nov	-0.7	-0.6	-0.9	-1.5	-1.7	-1.8	-1.9	-1.9	-1.7	-2.2	-2.4	-2.8	-3.3	-3.4	-3.4	-3.5	-3.6	-3.7	-3.7	-3.8	-4.0	-4.3	-4.7	-5.0	-2.8	-0.6
9-Nov	-5.4	-5.5	-5.9	-7.0	-8.9	-9.3	-10.3	-10.5	-10.8	-9.7	-5.3	-3.6	-2.0	-0.6	-0.1	-0.4	-1.9	-3.2	-4.3	-5.0	-5.3	-5.8	-6.5	-6.8	-5.6	-0.1
10-Nov	-7.1	-7.1	-7.1	-6.9	-7.0	-6.9	-6.7	-6.9	-5.9	-3.8	-2.0	-0.1	1.2	1.6	1.6	0.9	-0.6	-1.5	-2.0	-2.2	-2.9	-3.7	-4.2	-4.8	-3.5	1.6
11-Nov	-4.9	-5.1	-5.0	-5.5	-5.1	-5.0	-5.2	-5.2	-4.2	-3.8	-3.3	-2.1	-1.1	0.3	0.4	-0.1	-0.6	-1.5	-2.2	-2.4	-3.2	-3.3	-2.9	-3.3	-3.1	0.4
12-Nov	-4.2	-4.5	-4.4	-4.2	-4.1	-3.5	-2.0	-1.5	-1.7	-0.9	0.2	1.2	1.2	1.9	1.9	1.7	1.4	0.9	0.1	-1.4	-2.3	-3.2	-3.4	-4.9	-1.5	1.9
13-Nov	-5.7	-6.2	-8.2	-8.8	-5.7	-4.1	-4.8	-4.7	-4.5	-3.5	-3.2	-3.7	-3.4	-3.4	-3.4	-3.5	-3.6	-3.8	-4.0	-4.2	-4.2	-4.1	-4.0	-3.8	-4.5	-3.2
14-Nov	-4.6	-5.1	-5.3	-5.4	-5.6	-5.5	-5.4	-6.1	-6.4	-5.2	-3.1	-1.0	-0.1	0.7	0.4	-0.5	-1.9	-3.4	-4.0	-4.4	-4.4	-4.9	-5.9	-5.9	-3.7	0.7
15-Nov	-5.4	-5.1	-4.8	-4.1	-3.0	-3.2	-3.5	-3.8	-2.5	-1.8	-3.0	-3.8	-3.8	-3.6	-3.7	-4.0	-4.8	-5.1	-5.5	-5.7	-6.0	-5.8	-5.8	-5.8	-4.3	-1.8
16-Nov	-6.1	-7.0	-7.4	-8.2	-8.9	-8.3	-9.0	-9.7	-10.0	-9.3	-6.6	-3.9	-2.8	-2.2	-1.0	-1.2	-1.5	-2.0	-2.1	-2.7	-3.8	-4.8	-5.3	-5.1	-5.4	-1.0
17-Nov	-3.8	-2.8	-2.4	-1.9	-2.0	-2.2	-3.3	-2.9	-2.8	-1.3	1.9	3.8	5.0	4.3	4.2	4.1	2.9	1.3	0.3	0.2	0.3	-0.8	-0.4	-0.2	0.1	5.0
18-Nov	0.1	0.0	0.2	-0.9	-1.7	-2.0	-2.4	-1.6	-0.2	1.1	3.7	3.4	4.5	4.7	6.8	6.8	4.3	2.8	3.3	4.8	1.8	3.4	2.5	1.2	2.0	6.8
19-Nov	0.7	-0.3	-0.8	-2.1	-2.1	-2.7	-2.4	-2.5	-3.3	-1.7	-0.2	0.8	2.6	5.6	7.2	6.3	4.7	3.0	2.5	2.3	3.1	4.2	4.7	5.0	1.4	7.2
20-Nov	4.2	3.6	2.0	-1.2	-2.2	-3.7	-4.7	-5.6	-6.2	-6.3	-6.0	-5.6	-5.2	-4.7	-4.9	-5.4	-6.4	-7.3	-8.2	-8.9	-9.2	-9.7	-9.4	-9.2	-5.0	4.2
21-Nov	-9.2	-9.4	-9.5	-9.7	-9.8	-9.5	-9.5	-9.5	-9.3	-9.0	-8.5	-7.8	-7.1	-6.6	-6.4	-6.9	-7.1	-7.3	-7.8	-8.4	-8.9	-9.0	-9.4	-9.8	-8.6	-6.4
22-Nov	-10.3	-10.4	-10.7	-10.8	-10.9	-11.2	-11.6	-12.0	-12.1	-12.2	-12.0	-11.7	-11.7	-11.8	-12.3	-12.6	-12.9	-13.1	-13.1	-13.2	-13.4	-13.4	-13.3	-13.3	-12.1	-10.3
23-Nov	-13.4	-13.1	-12.8	-12.4	-11.9	-11.3	-10.8	-9.7	-9.1	-8.7	-8.2	-6.8	-5.4	-3.8	-2.5	-3.2	-5.0	-6.4	-7.2	-7.9	-8.2	-7.8	-8.0	-7.9	-8.4	-2.5
24-Nov	-8.0	-7.7	-7.6	-6.4	-5.3	-4.8	-3.7	-3.2	-5.0	-3.5	-1.5	0.7	2.2	2.7	2.8	2.1	0.4	-0.7	-1.6	-2.5	-2.6	-2.5	-2.8	-3.0	-2.6	2.8
25-Nov	-2.9	-3.0	-3.3	-2.4	-0.4	-0.5	-1.4	-1.8	-2.6	-3.6	-3.7	-4.1	-4.3	-4.5	-4.7	-5.1	-5.7	-6.7	-7.8	-8.6	-9.2	-10.3	-12.6	-13.2	-5.1	-0.4
26-Nov	-11.8	-10.7	-10.8	-10.5	-9.6	-9.0	-8.4	-8.1	-6.7	-6.4	-5.0	-4.2	-3.6	-3.6	-3.6	-3.5	-3.5	-3.2	-3.2	-3.0	-2.6	-2.5	-2.9	-4.1	-5.9	-2.5
27-Nov	-5.0	-5.1	-5.3	-6.2	-7.2	-9.0	-9.2	-9.0	-8.9	-7.9	-6.4	-3.8	-2.3	-1.7	-0.4	0.3	0.1	-0.9	-0.4	-0.6	0.1	0.5	0.4	0.5	-3.7	0.5
28-Nov	0.8	0.8	0.6	0.6	0.8	0.5	0.2	-0.2	-0.7	-0.5	0.6	1.9	3.3	3.8	3.2	2.3	0.9	0.2	0.8	1.2	0.8	-0.3	-1.1	-0.2	0.8	3.8
29-Nov	-0.4	-1.0	-1.7	-1.9	-1.6	-1.9	-2.5	-2.4	-2.6	-3.6	-3.4	-2.9	-2.8	-2.6	-2.4	-2.3	-2.3	-2.7	-2.9	-3.1	-3.1	-3.3	-3.5	-3.6	-2.5	-0.4
30-Nov	-3.7	-4.1	-4.3	-4.9	-4.6	-4.8	-5.3	-5.3	-5.0	-5.3	-5.4	-5.5	-5.4	-5.3	-4.9	-4.9	-4.9	-5.4	-6.8	-7.2	-7.8	-9.6	-9.7	-10.5	-5.9	-3.7
																								Diurnal Average		
																								Diurnal Maximum		



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

**Ambient Temperature (AT) - C**  
**Leismer - November 2023**





**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C**  
**Leismer - November 2023**

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	0	0.00	0.00
-20 - 0	611	84.86	84.86
0 - 10	109	15.14	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



**Wood Buffalo Environmental Association**  
**Summary of Hour Averages**

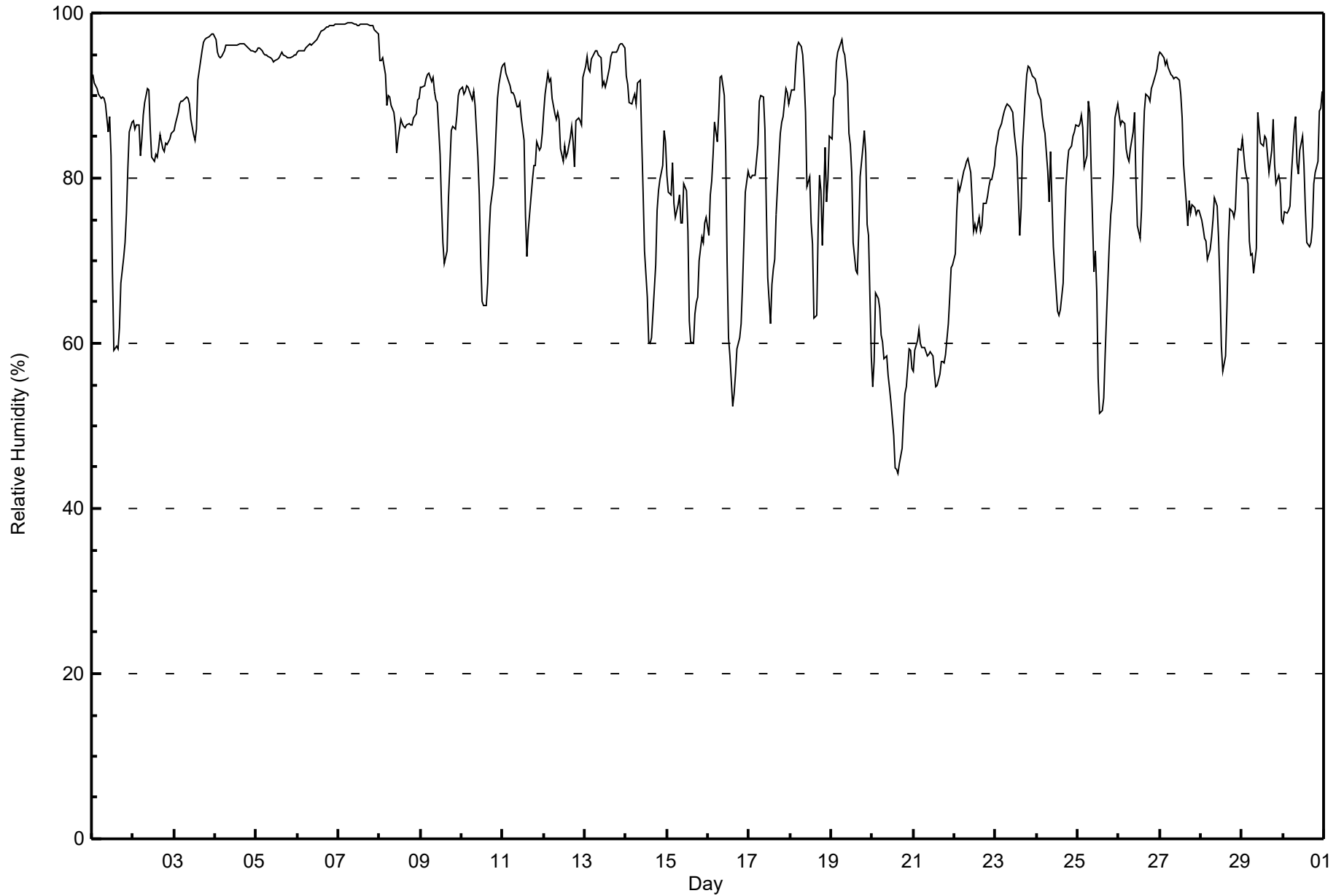
**Relative Humidity (RH) - %**  
**Leismer - November 2023**

<b>Maximum Value: 98.8 % on Nov 7 08:00</b> <b>Maximum Daily Average: 98.5 % on Nov 7</b>																						<b>Hours in Service: 720</b> <b>Hours of Data: 720</b>				
<b>Minimum Value: 44.3 % on Nov 20 16:00</b> <b>Minimum Daily Average: 55.0 % on Nov 20</b> <b>Maximum Diurnal Average: 86.7 % at hour 8</b> <b>Minimum Diurnal Average: 73.6 % at hour 15</b> <b>Monthly Average: 82.56 %</b> <b>Percentiles: P<sub>1</sub> = 51.6 P<sub>10</sub> = 63.4 Q<sub>1</sub> = 75.7 Median = 85.5 Q<sub>3</sub> = 91.7 P<sub>90</sub> = 95.8 P<sub>99</sub> = 98.7</b>																						<b>Hours of Missing Data: 0</b> <b>Hours of Calibration: 0</b> <b>Percent Operational Time: 100.0</b>				
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	92.5	91.6	91.1	90.9	90.2	89.6	89.8	89.7	89.0	85.6	87.4	82.7	68.6	59.2	59.7	59.4	61.9	67.3	70.4	72.1	75.7	81.1	85.5	86.8	79.9	92.5
2-Nov	87.0	86.0	86.5	86.4	82.7	84.7	87.6	89.2	90.8	90.7	86.0	82.5	82.1	82.9	82.6	83.8	85.2	83.6	83.2	84.3	84.1	84.8	85.5	85.6	85.3	90.8
3-Nov	85.7	86.5	88.0	88.9	89.2	89.3	89.6	89.9	89.7	89.0	87.1	85.3	84.6	86.0	91.9	94.2	95.5	96.4	96.8	97.0	97.2	97.3	97.4	97.4	91.3	97.4
4-Nov	96.7	95.3	94.7	94.5	94.7	95.4	96.1	96.1	96.1	96.1	96.0	96.1	96.2	96.2	96.3	96.3	96.3	96.3	96.0	95.7	95.5	95.4	95.3	95.3	95.8	96.7
5-Nov	95.5	95.8	95.8	95.4	95.1	95.0	94.9	94.8	94.6	94.3	94.2	94.2	94.4	94.6	95.0	95.2	94.9	94.7	94.6	94.6	94.5	94.8	94.8	95.0	94.9	95.8
6-Nov	95.2	95.5	95.5	95.4	95.5	95.8	96.1	96.2	96.1	96.3	96.5	96.7	97.1	97.5	97.8	98.0	98.2	98.3	98.4	98.4	98.5	98.5	98.6	98.6	97.0	98.6
7-Nov	98.6	98.7	98.7	98.7	98.7	98.8	98.8	98.8	98.8	98.7	98.6	98.5	98.5	98.6	98.7	98.7	98.6	98.6	98.5	98.5	98.5	98.0	97.8	97.4	98.5	98.8
8-Nov	94.3	94.2	94.5	92.5	88.8	90.0	89.9	88.8	88.0	86.5	83.1	84.7	87.2	86.6	86.3	86.1	86.5	86.6	86.5	86.5	87.2	87.8	89.5	89.7	88.4	94.5
9-Nov	91.0	91.1	91.3	92.1	92.5	92.8	91.8	92.2	90.6	89.5	89.2	82.8	76.9	72.2	69.7	71.2	77.7	81.5	85.7	86.3	86.0	87.6	90.0	90.6	85.9	92.8
10-Nov	91.0	90.2	90.5	91.2	91.1	90.1	89.6	90.5	88.8	82.6	78.0	70.4	65.1	64.6	64.5	67.3	73.0	76.7	79.2	81.7	85.7	89.6	91.4	93.4	82.3	93.4
11-Nov	93.7	93.9	92.8	91.7	91.2	90.3	90.3	90.1	88.7	88.7	89.2	87.4	84.6	75.5	70.5	73.7	75.7	79.8	81.5	81.6	84.4	83.5	83.8	85.4	85.3	93.9
12-Nov	88.1	90.1	92.7	91.7	92.1	89.7	87.7	87.1	88.0	87.1	83.6	82.1	83.9	82.5	83.1	84.9	86.2	84.5	81.4	86.9	87.3	87.0	86.5	92.2	86.9	92.7
13-Nov	93.6	94.8	93.2	92.9	94.4	95.0	95.5	95.3	94.9	94.6	91.2	91.6	91.0	91.7	93.4	94.7	95.3	95.2	95.3	95.7	96.1	96.2	96.3	95.8	94.3	96.3
14-Nov	92.3	91.3	89.2	89.0	89.6	90.2	88.9	91.5	91.9	84.8	78.2	71.2	65.7	60.2	60.0	60.6	63.5	69.5	76.2	78.4	79.8	81.5	85.8	84.5	79.7	92.3
15-Nov	80.3	78.3	78.0	81.8	76.9	75.3	76.8	78.0	74.6	74.6	79.2	78.4	73.5	62.6	60.2	60.0	63.6	64.9	65.6	70.1	72.9	72.2	74.5	75.2	72.8	81.8
16-Nov	73.0	77.9	79.7	82.8	86.8	84.3	87.8	92.2	92.4	90.0	83.2	69.8	60.7	58.5	52.3	53.9	56.3	59.3	60.7	62.4	67.0	72.4	78.3	80.8	73.4	92.4
17-Nov	80.1	80.0	80.3	80.4	82.3	84.1	89.3	90.0	89.8	85.9	76.5	68.0	62.4	67.1	68.9	70.2	75.5	82.3	85.5	86.9	87.4	90.8	90.3	89.0	81.0	90.8
18-Nov	89.9	90.8	90.6	93.8	95.9	96.5	95.9	95.0	92.0	88.0	78.9	80.1	74.6	72.1	63.0	63.4	73.7	80.3	78.4	71.9	83.8	77.2	79.8	85.0	82.9	96.5
19-Nov	84.8	89.6	90.1	94.0	95.3	96.3	96.7	95.5	94.8	91.5	85.4	84.0	80.7	72.3	68.7	68.5	73.4	80.1	83.8	85.7	83.0	74.4	73.1	58.3	83.3	96.7
20-Nov	54.8	57.9	66.1	65.4	64.2	61.0	60.2	58.2	58.4	56.1	54.5	52.8	48.8	44.9	44.8	44.3	45.4	47.3	51.0	53.8	54.7	59.2	59.2	57.0	55.0	66.1
21-Nov	56.7	59.1	60.4	61.7	60.1	59.5	59.4	58.9	58.5	58.6	59.0	58.4	56.5	54.8	54.9	56.2	57.8	57.8	57.7	58.6	62.4	65.7	69.2	69.4	59.6	69.4
22-Nov	70.8	75.9	79.3	78.4	79.1	80.8	81.4	82.1	82.4	80.6	77.3	73.6	74.5	73.5	75.2	73.6	74.2	76.9	77.0	77.8	79.0	79.9	79.8	81.5	77.7	82.4
23-Nov	83.8	84.6	85.8	86.6	87.4	88.1	88.7	88.9	88.6	88.3	88.0	85.6	82.6	77.8	73.1	76.5	83.7	89.9	92.6	93.5	93.3	92.3	92.3	92.0	86.8	93.5
24-Nov	91.4	90.3	89.6	87.6	86.2	85.5	80.9	77.1	83.2	77.4	71.7	66.5	63.9	63.5	64.1	67.3	73.8	79.0	81.6	83.5	84.0	85.1	85.7	86.4	79.4	91.4
25-Nov	86.2	86.6	87.6	86.1	81.4	82.7	89.3	87.9	81.1	68.7	71.2	66.2	55.8	51.5	51.8	53.3	58.6	63.5	72.3	75.5	77.2	80.7	87.4	89.0	74.6	89.3
26-Nov	87.7	86.4	86.9	86.6	83.6	82.5	82.1	83.6	85.6	88.0	79.7	74.2	72.7	76.3	83.2	88.1	90.2	89.8	89.4	90.9	91.3	92.6	93.3	94.8	85.8	94.8
27-Nov	95.3	95.1	94.6	93.8	94.2	93.3	92.6	92.3	92.0	92.3	92.3	91.8	90.1	87.3	81.7	76.9	74.2	77.3	75.7	76.9	76.4	75.6	76.1	76.1	86.0	95.3
28-Nov	74.9	73.8	72.8	72.5	70.2	71.3	72.8	74.9	77.6	76.7	72.7	66.9	59.6	56.6	58.5	64.4	72.2	76.2	75.9	75.3	76.3	80.5	83.5	83.4	72.5	83.5
29-Nov	84.7	82.9	81.0	79.3	72.3	70.7	70.8	68.5	71.6	87.9	85.9	84.2	84.0	85.0	84.7	82.8	80.7	83.4	87.2	81.8	79.4	80.3	79.4	74.9	80.1	87.9
30-Nov	74.6	76.0	75.8	76.0	76.7	80.3	85.9	87.5	81.9	80.5	83.3	85.1	81.6	76.3	72.1	71.8	72.1	74.1	79.3	80.7	82.1	88.1	88.5	90.5	80.0	90.5
																								Diurnal Average		
																								Diurnal Maximum		



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Relative Humidity (RH) - %**  
**Leismer - November 2023**





**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Relative Humidity (RH) - %**  
**Leismer - November 2023**

<b>Concentration Ranges (%)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	0	0.00	0.00
20 - 40	0	0.00	0.00
40 - 60	53	7.36	7.36
60 - 80	192	26.67	34.03
80 - 100	475	65.97	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720





# Wood Buffalo Environmental Association

## Summary of Hour Averages

# Wind Speed (WS) - km/h

## Leismer - November 2023

Maximum Speed: 47 km/h on Nov 20 04:00	Maximum Daily Speed Average: 25.5 km/h on Nov 20	Hours in Service: 720
Minimum Speed Value: 0 km/h on Nov 26 07:00	Minimum Daily Speed Average: 2.1 km/h on Nov 1	Hours of Data: 693
Maximum Diurnal Speed Average: 6.2 km/h at hour 14	Minimum Diurnal Speed Average: 2.6 km/h at hour 18	Hours of Missing Data: 27
Monthly Average Velocity: 4.1 km/h 286.5 deg	Percentiles: P <sub>1</sub> = 2 P <sub>10</sub> = 4 Q <sub>1</sub> = 5 Median = 8 Q <sub>3</sub> = 12 P <sub>90</sub> = 21 P <sub>99</sub> = 34	Percent Operational Time: 96.3

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	NW3	NNW2	NW4	NW5	WNW5	NW5	NW4	NW4	W2	W2	SSW2	SSW4	WSW3	W4	SSE2	S4	SSW4	S3	SSW3	SSW3	SW2	SSW4	SSW3	SSW2	WSW2.1	NW5
2-Nov	NW5	NW6	NW6	NW8	NW12	NW13	NW14	NNW12	N9	N11	N11	N14	N12	N10	N9	N10	NNE12	NNE11	NE9	ENE9	E7	ESE5	SSE5	SE3	N7.1	N14
3-Nov	ESE5	ESE7	SE5	ESE6	E5	ESE6	SE6	SE4	SE5	SSE6	SSE5	SE3	ESE4	SE4	ESE3	SE4	SSE4	SE5	ESE5	ESE5	E6	E4	E7	E5	ESE4.6	E7
4-Nov	ENE5	E5	ENE5	E5	E8	E9	ESE7	E8	E11	ESE11	E11	ESE11	ESE11	E12	E12	ESE13	ESE14	ESE13	ESE13	E14	ESE15	ESE13	ESE13	E13	E10.4	ESE15
5-Nov	ESE11	ESE10	E9	E8	E7	E6	E6	E6	E6	E6	E6	ESE5	ESE4	ENE4	E5	ESE5	ESE5	ESE4	ESE4	ESE5	ESE5	ESE6	ESE6	E6.0	ESE11	
6-Nov	SE5	ESE6	ESE5	ESE5	ESE5	SE6	ESE6	ESE6	ESE6	ESE7	ESE5	SE6	SSE8	SSE8	SSE8	S8	S9	S9	SSW5	SSW5	SSW9	S9	S9	SSW10	SSE5.8	SSW10
7-Nov	SSW9	SSW11	SSW9	SSW6	SSW7	SSW8	SSW6	SSW7	SSW5	S8	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	---	SSW11
8-Nov	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	NW28	NW25	NW23	NW24	NW25	NW23	NW21	NW22	NW19	NW16	NW12	NW13	NW14	---	NW28
9-Nov	NW15	NNW12	NNW10	N6	W2	NNW4	NNW3	N4	N3	UO	UO	SSE6	S8	S8	S8	S7	S8	S7	S6	SSW8	S8	SSE9	SE9	SSE10	SSW2.2	NW15
10-Nov	SSE9	SSE11	SSE11	SSE10	SSE10	SSE10	SSE11	SSE9	S10	S8	S10	SSW12	SSW14	SSW11	SSW10	SSW9	S9	S8	S9	SSW8	SSW6	S6	S6	SSE6	S8.8	SSW14
11-Nov	SSE7	SSE7	SSE7	SE8	ESE10	SE9	SE8	SE9	SE11	ESE11	ESE11	SE9	SE9	S8	SSW8	SSW5	S5	SSW5	SSW4	W4	WNW6	WNW10	W4	WSW3	SSE4.9	SE11
12-Nov	WNW4	WSW3	W3	W5	W5	WNW10	WNW18	WNW18	WNW15	WNW18	WNW15	W16	W14	WNW17	WNW13	W7	W8	W9	W8	W5	W5	WNW6	NW5	SSW3	WNW9.4	WNW18
13-Nov	SW1	NNE2	NE5	ENE3	E6	E9	E11	E10	ENE10	ENE12	ENE12	E16	E16	E18	E15	E11	E8	E7	E6	N6	NNW4	NW6	WNW9	WNW17	ENE6.1	E18
14-Nov	WNW24	WNW26	WNW27	WNW22	WNW23	WNW20	WNW17	WNW12	W9	WSW6	W9	W11	W17	W16	W11	W11	W8	W5	SSW2	SW2	W2	WSW2	S4	S5	W11.3	WNW27
15-Nov	S5	S4	SSW6	SSW3	W6	W7	W10	W9	W16	WNW24	NW30	NW22	NW24	WNW23	WNW18	WNW13	W9	W6	WNW10	W10	WNW12	W12	WNW11	WNW11	WNW11.1	NW30
16-Nov	NW11	NNW6	SW0	ENE1	SE5	SE6	SE5	SSE6	SSE6	S5	SSW7	SSW8	SW9	SSW9	SW8	SW7	SW8	SW7	WSW6	W5	W4	SW3	SSW3	WSW3	SW3.8	NW11
17-Nov	W7	W10	WNW14	W11	W7	W6	SSW2	WSW4	W4	W7	W7	W10	W10	W12	W6	W5	WSW3	SSW4	S0	NNW3	SW3	W3	W6	W6	W6.0	WNW14
18-Nov	W5	WNW2	WNW2	SW1	S4	S4	S4	S4	S4	S5	S6	SSW6	S6	SSW5	SW4	S2	ESE5	ESE6	ESE6	ESE8	ESE4	SE6	ESE5	ESE6	SSE3.0	ESE8
19-Nov	ESE6	ESE5	ENE4	NE3	ESE2	W1	NNW2	NNW4	NNW5	NNW9	NNW7	WNW11	NW9	WNW10	WNW10	WNW12	WNW12	W6	WNW9	WNW8	WNW18	WNW27	WNW26	WNW30	WNW7.9	WNW30
20-Nov	W32	WNW34	WNW44	WNW47	WNW42	NW45	NW37	NW36	WNW33	WNW34	WNW32	WNW32	WNW26	WNW30	WNW28	WNW23	WNW18	W11	W9	W7	W8	NNW6	NW6	NNW6	WNW25.5	WNW47
21-Nov	N4	SE2	E4	ESE7	ESE8	ESE10	ESE11	ESE12	ESE10	ESE12	ESE13	E10	E9	ESE9	ESE7	ESE5	E3	NE7	NE8	ENE8	NNE7	NNE8	NNE8	N11	E6.3	ESE13
22-Nov	NNE10	NNE8	NE10	NE7	NE6	NNE7	NNE6	NNE5	NE4	NE5	ENE5	E5	ESE7	ESE7	ESE7	ESE5	SE5	SE4	SE5	SE6	SSE6	SSE5	SE5	SE5	E4.0	NNE10
23-Nov	SE5	SE8	SSE7	SSE3	SE7	SE8	SSE8	S8	SSW9	SSW8	SSW9	SW9	SW6	SW6	WSW6	SW5	SSW6	SSW5	SSW4	SSW6	SSW6	SSW7	SSW6	SSW7	SSW5.7	SSW9
24-Nov	SSW6	SSW8	SSW6	SSW8	SSW8	SW6	SW7	WSW6	S5	WSW5	W14	WNW16	WNW22	WNW19	WNW16	WNW14	WNW6	WSW4	W5	WNW7	WNW11	W7	W10	W9	W7.8	WNW22
25-Nov	WNW12	WNW15	W16	WNW20	NW25	NW26	NNW25	NNW25	NNW29	NNW31	NNW29	NNW32	NNW31	NNW26	NNW25	NNW21	NW16	NW13	NW15	NW14	NW13	NNW9	SSW2	W3	NW18.8	NNW32
26-Nov	WNW5	W2	SSE4	SE3	SSE2	SE3	ENE0	NW3	NW8	NW12	NNW13	NNW12	NW13	WNW15	WNW16	WNW18	WNW14	WNW12	WSW5	W8	W12	WNW11	W8	W6	WNW7.2	WNW18
27-Nov	W6	W7	W4	WSW4	SSW3	SSE5	S4	S5	SSW4	S4	SSW5	SSW6	SW7	SSW7	SW7	SW8	WSW7	W9	W16	WNW14	WNW13	W12	W16	W18	WSW6.3	W18
28-Nov	W21	W22	W20	WNW26	WNW28	W21	W19	WNW18	W15	W12	W20	WNW18	W14	WNW14	WNW14	W7	WSW4	W6	WNW13	WNW14	WNW14	W9	W10	WNW19	WNW15.8	WNW28
29-Nov	WNW13	W10	WNW16	WNW19	WNW21	WNW22	WNW22	WNW23	WNW22	WNW22	WNW20	WNW23	WNW23	NW23	WNW24	NW25	NW21	NW19	NW21	NW25	NW21	NW18	NW18	NW19	WNW19.9	NW25
30-Nov	NW18	NW19	NW17	NW15	NW15	NW15	NW12	WNW14	NW17	NW17	NW16	WNW16	WNW16	WNW17	W10	W7	W6	WSW4	SSW3	W3	W4	SW2	NNW4	WNW2	WNW10.6	NW19

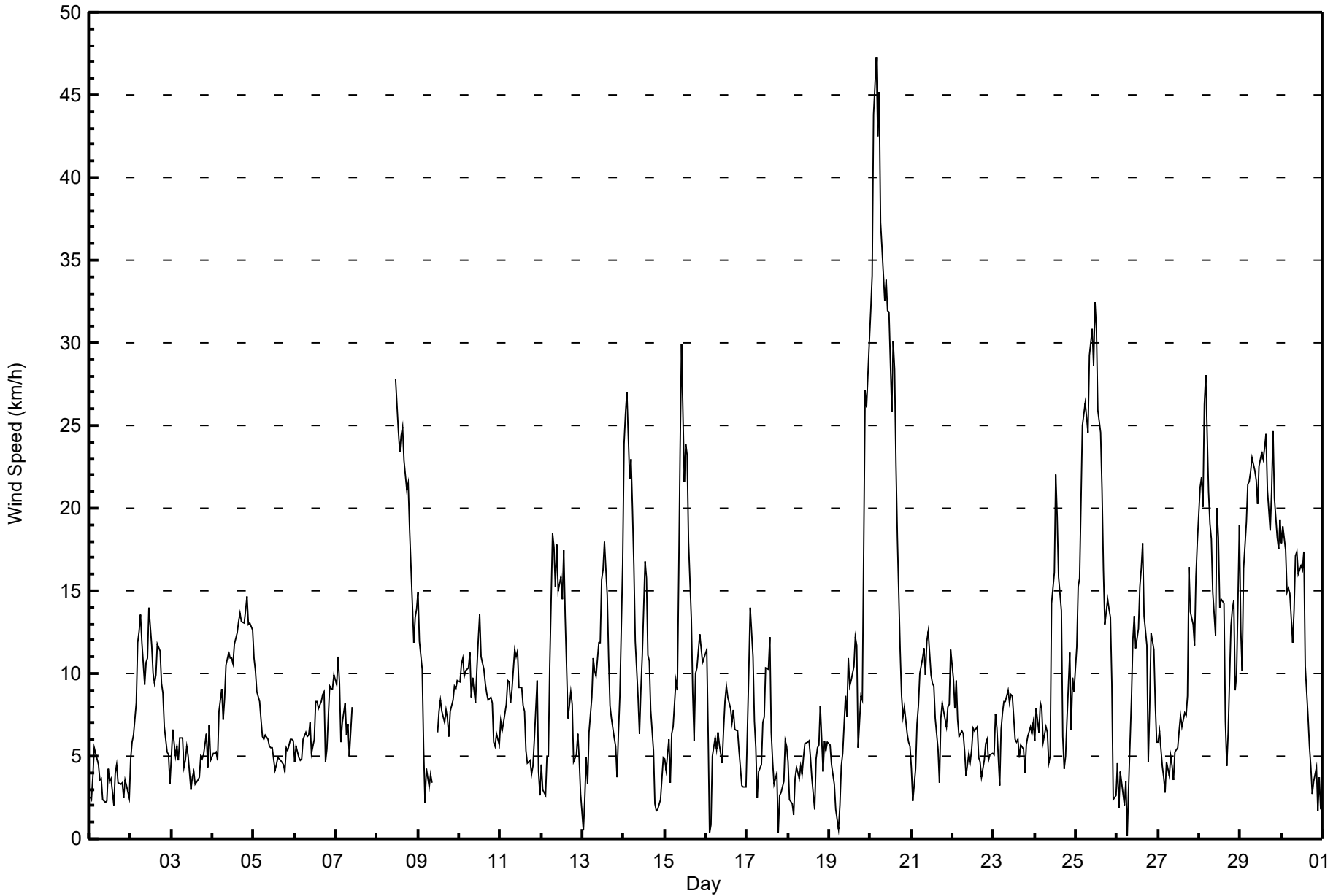
WNW4.4	W4.0	WNW4.3	WNW4.3	WNW4.1	WNW3.8	WNW3.4	WNW3.5	WNW3.5	WNW4.1	WNW5.0	WNW5.8	WNW6.0	WNW6.2	WNW5.7	WNW4.7	W3.5	W2.8	WNW2.7	WNW3.0	WNW3.8	WNW3.4	W3.1	W3.8	Diurnal Average	
W32	WNW34	WNW44	WNW47	WNW42	NW45	NW37	NW36	WNW33	WNW34	WNW32	NNW32	NNW31	WNW30	WNW28	NW25	NW23	NW21	NW22	NW25	NW21	WNW27	WNW26	WNW30	Diurnal Maximum	

UO - Unstable Operation  
 All monthly, daily, and diurnal averages have been calculated using vector methods



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Wind Speed (WS) - km/h**  
**Leismer - November 2023**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h  
Leismer - November 2023**

<b>Wind Speed Ranges (km/h)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	201	29.00	29.00
6 - 11	294	42.42	71.43
12 - 19	123	17.75	89.18
20 - 28	55	7.94	97.11
29 - 38	16	2.31	99.42
> 38	4	0.58	100.00

Total Number of Valid Hours: 693

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Wind Speed (WS) - km/h  
Leismer - November 2023**

Wind Speed Ranges (km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	3	2	4	8	8	26	20	9	20	28	10	13	26	6	9	9	201
6 - 11	9	8	6	3	27	35	16	25	26	38	13	5	47	21	8	7	294
12 - 19	2	1	0	2	7	11	0	0	0	2	0	0	17	47	30	4	123
20 - 28	0	0	0	0	0	0	0	0	0	0	0	0	5	27	18	5	55
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	1	7	3	5	16
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	3	1	0	4
<b>Totals</b>	14	11	10	13	42	72	36	34	46	68	23	18	96	111	69	30	693

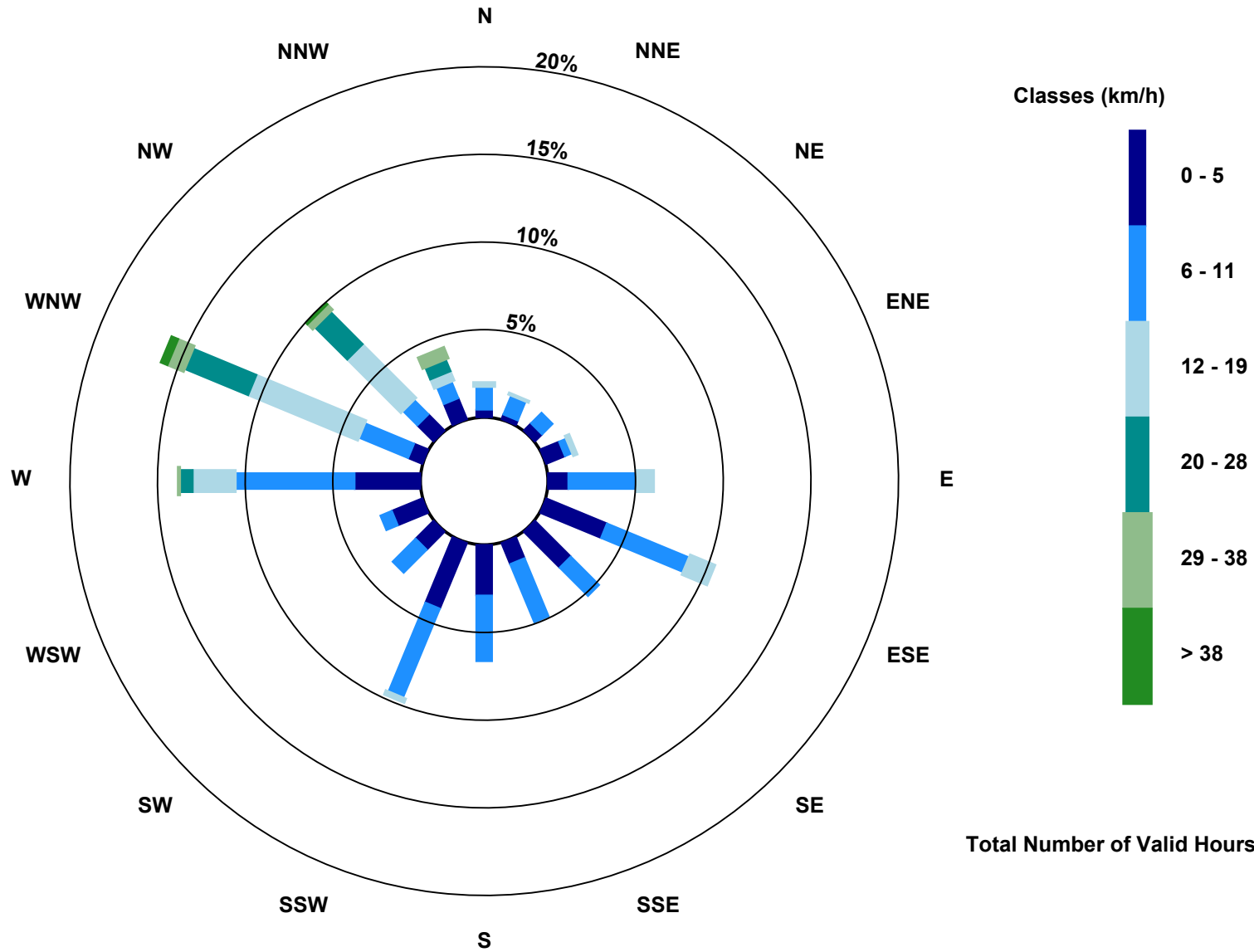
Total Number of Valid Hours: 693

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 2023

Wind Speed (WS) - km/h  
Leismer



Total Number of Valid Hours: 693



**Wood Buffalo Environmental Association**  
**Summary of Hour Standard Deviations**

**Wind Speed (WS) - km/h**  
**Leismer - November 2023**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 10 km/h on Nov 20 03:00	Hours of Data: 693
Minimum Value: 1 km/h on Nov 27 07:00	Hours of Missing Data: 27
Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 1 Q <sub>1</sub> = 1 Median = 2 Q <sub>3</sub> = 3 P <sub>90</sub> = 4 P <sub>99</sub> = 8	Hours of Calibration: 0
	Percent Operational Time: 96.3

Day	Hourly Period Ending At (MST)																								Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	2	1	1	1	2	1	1	1	1	2	1	1	1	2	2	1	1	1	1	1	1	1	1	2	2	
2-Nov	2	1	1	3	2	2	2	2	2	3	3	3	3	3	2	2	2	3	2	2	2	1	1	1	3	
3-Nov	1	2	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	2	2	2	
4-Nov	2	2	1	2	2	2	2	2	2	3	3	3	3	3	3	4	3	3	3	4	4	3	3	3	4	
5-Nov	3	3	2	2	2	2	2	2	2	2	1	2	1	1	1	1	1	1	1	2	1	1	1	1	3	
6-Nov	2	2	1	1	1	1	1	1	2	2	1	1	2	2	1	2	3	5	3	3	3	2	2	3	5	
7-Nov	3	4	5	4	3	3	3	2	2	2	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	5	
8-Nov	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	5	5	5	4	4	4	4	4	3	3	3	2	2	5
9-Nov	3	2	2	2	2	2	2	2	2	1	UO	UO	2	2	2	2	2	1	1	1	1	2	1	1	1	3
10-Nov	1	1	1	1	2	2	2	1	2	2	3	4	4	3	3	2	2	2	2	2	2	2	1	2	1	4
11-Nov	1	1	1	2	2	2	2	2	2	2	3	2	2	2	2	1	2	1	1	1	1	1	1	2	2	3
12-Nov	2	2	2	2	3	2	4	2	3	3	3	4	4	4	3	2	2	2	2	2	2	3	2	1	4	
13-Nov	1	2	1	1	2	2	3	2	3	3	4	4	4	5	4	3	3	2	2	2	2	2	2	6	6	
14-Nov	5	5	5	5	5	4	4	2	2	2	3	4	5	5	4	5	3	2	1	1	1	1	1	1	5	
15-Nov	1	1	1	2	3	2	3	3	4	7	6	4	6	5	4	3	2	2	2	3	3	2	2	2	7	
16-Nov	3	1	2	1	1	1	1	1	1	1	2	2	3	3	3	2	2	2	2	2	2	1	1	1	3	
17-Nov	2	3	3	3	2	3	1	2	2	2	2	3	3	4	3	2	2	1	1	1	1	1	2	2	4	
18-Nov	1	1	1	1	1	1	1	1	1	1	1	2	1	1	2	1	1	1	2	2	2	1	1	1	2	
19-Nov	2	1	1	2	1	1	2	1	1	1	2	3	2	2	3	2	3	2	1	3	6	4	5	7	7	
20-Nov	9	7	10	9	10	9	8	8	7	6	6	7	5	6	6	5	3	3	3	2	2	2	2	1	10	
21-Nov	1	1	1	3	2	2	2	3	4	4	4	3	2	2	2	1	1	2	2	3	2	3	2	3	4	
22-Nov	3	3	3	2	2	2	2	1	1	1	2	2	2	1	1	1	1	1	1	1	1	1	1	1	3	
23-Nov	1	2	3	2	1	1	1	2	3	2	2	3	2	2	2	1	1	1	1	1	1	1	1	1	3	
24-Nov	2	2	1	2	3	2	2	2	1	2	4	4	4	4	3	3	2	1	2	1	2	2	3	3	4	
25-Nov	3	3	3	4	6	5	4	5	7	8	6	6	6	6	6	6	4	3	3	3	2	3	1	2	8	
26-Nov	1	2	1	1	1	1	1	2	2	3	3	2	3	4	4	3	3	2	3	3	3	2	1	2	4	
27-Nov	2	1	1	1	1	1	1	1	1	1	1	1	2	2	2	3	3	3	4	4	3	4	4	4	4	
28-Nov	4	5	4	6	5	4	4	4	4	3	4	4	3	5	6	3	2	3	2	2	2	3	2	3	6	
29-Nov	3	3	3	3	4	3	5	4	4	3	3	4	5	4	5	5	4	4	4	5	4	3	4	3	5	
30-Nov	3	4	3	3	3	3	3	3	4	4	4	3	3	3	2	2	2	2	1	1	1	2	1	1	4	

9	7	10	9	10	9	8	8	7	8	6	7	6	6	6	6	6	4	5	4	5	6	4	5	7	
Diurnal Maximum																									

UO - Unstable Operation



**Wood Buffalo Environmental Association**  
**Summary of Hour Averages**

**Wind Direction (WD) - deg**  
**Leismer - November 2023**

Direction of Maximum Speed: 297 deg on Nov 20 04:00	Hours in Service: 720
Direction of Maximum Daily Speed Average: 294.7 deg on Nov 20	Hours of Data: 693
Direction of Minimum Speed: 61 deg on Nov 26 07:00	Hours of Missing Data: 27
Direction of Minimum Daily Speed Average: 2.1 deg on Nov 1	Percent Operational Time: 96.3
Monthly Average Direction: 286.5 deg	

Day	Hourly Period Ending At (MST)																								Daily Average	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	325	344	320	305	301	312	305	310	262	269	208	204	252	278	167	187	205	191	195	204	234	207	192	207	251.4	
2-Nov	314	310	305	323	325	323	320	329	356	8	353	4	8	10	10	6	15	15	39	58	92	103	147	135	358.5	
3-Nov	102	105	127	111	101	115	138	133	137	153	165	145	107	139	104	126	151	134	110	116	101	100	97	91	120.1	
4-Nov	67	88	77	94	97	101	103	101	101	102	97	104	103	101	101	102	107	108	106	101	108	105	103	100	101.1	
5-Nov	102	102	96	101	89	92	91	87	86	89	88	112	107	77	88	106	116	114	105	113	113	111	114	122	100.6	
6-Nov	127	116	105	118	118	125	119	117	115	115	123	127	151	159	162	170	177	188	194	196	195	191	189	195	155.2	
7-Nov	200	199	198	203	202	207	203	202	194	189	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	--	
8-Nov	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	316	318	317	316	317	319	320	318	320	321	319	317	322	--
9-Nov	325	328	339	350	268	328	335	356	5	UO	UO	164	171	180	189	186	173	179	179	193	176	165	146	152	194.2	
10-Nov	153	157	158	153	163	157	154	158	177	183	183	192	206	200	201	195	187	187	188	196	195	187	170	162	177.7	
11-Nov	154	157	150	130	119	125	125	125	131	120	116	127	143	173	195	195	188	193	209	261	286	290	265	244	152.2	
12-Nov	288	258	271	277	269	282	294	294	291	290	286	279	280	283	285	280	280	281	276	263	276	295	321	192	284.2	
13-Nov	235	14	49	58	91	98	89	90	77	73	78	84	95	99	93	94	85	80	94	9	339	319	297	288	76.6	
14-Nov	290	293	294	289	288	285	284	283	281	254	260	267	278	274	263	268	271	267	200	232	260	258	188	171	279.0	
15-Nov	187	181	195	211	267	273	274	272	279	288	317	324	312	301	295	286	277	270	282	280	282	280	288	284	289.0	
16-Nov	312	345	215	71	131	139	142	154	160	190	197	205	219	210	229	222	223	229	248	261	263	227	211	246	216.4	
17-Nov	275	281	284	280	274	264	211	249	266	272	264	272	269	276	267	262	243	201	180	334	233	260	277	277	270.0	
18-Nov	273	287	285	231	176	182	178	179	179	183	188	192	191	199	223	188	102	112	106	115	111	138	116	110	161.3	
19-Nov	118	121	71	53	112	261	331	341	331	344	338	288	310	288	291	287	286	274	282	282	284	289	287	282	294.1	
20-Nov	281	282	289	297	301	305	307	305	303	299	294	299	290	288	287	289	284	276	272	270	269	345	307	346	294.7	
21-Nov	6	143	83	116	118	112	117	120	105	103	106	100	101	106	117	107	84	34	53	69	31	21	12	7	86.6	
22-Nov	15	18	36	50	41	30	28	31	49	40	73	98	102	115	117	116	139	131	132	136	148	147	131	142	79.5	
23-Nov	140	138	161	147	146	144	155	187	207	201	204	222	218	226	242	226	205	203	208	202	203	209	208	206	192.9	
24-Nov	204	206	198	202	213	214	227	241	184	247	280	284	292	291	291	289	284	247	263	286	289	278	280	276	266.4	
25-Nov	283	283	281	294	314	321	328	331	333	332	332	327	330	336	327	328	325	315	325	323	323	331	195	263	321.7	
26-Nov	299	279	165	136	162	139	61	319	305	305	330	330	315	300	287	291	285	282	253	271	281	287	276	275	293.0	
27-Nov	281	281	265	238	208	154	181	179	193	183	198	207	215	212	219	228	252	265	280	282	282	277	279	279	253.3	
28-Nov	280	280	281	285	287	279	280	282	277	276	280	285	280	285	283	267	255	274	283	286	291	281	280	292	282.1	
29-Nov	282	276	289	288	291	292	290	294	296	293	293	300	303	305	301	316	316	315	315	319	320	321	322	319	303.2	
30-Nov	318	315	305	311	307	309	311	287	316	318	311	293	295	288	281	278	262	242	194	268	263	233	342	287	301.0	

286.4 280.6 283.4 288.3 287.3 289.6 292.0 290.8 296.0 298.4 298.7 295.5 291.6 285.5 282.9 282.9 275.0 269.5 281.7 286.6 282.2 282.6 275.2 276.8

Diurnal Average

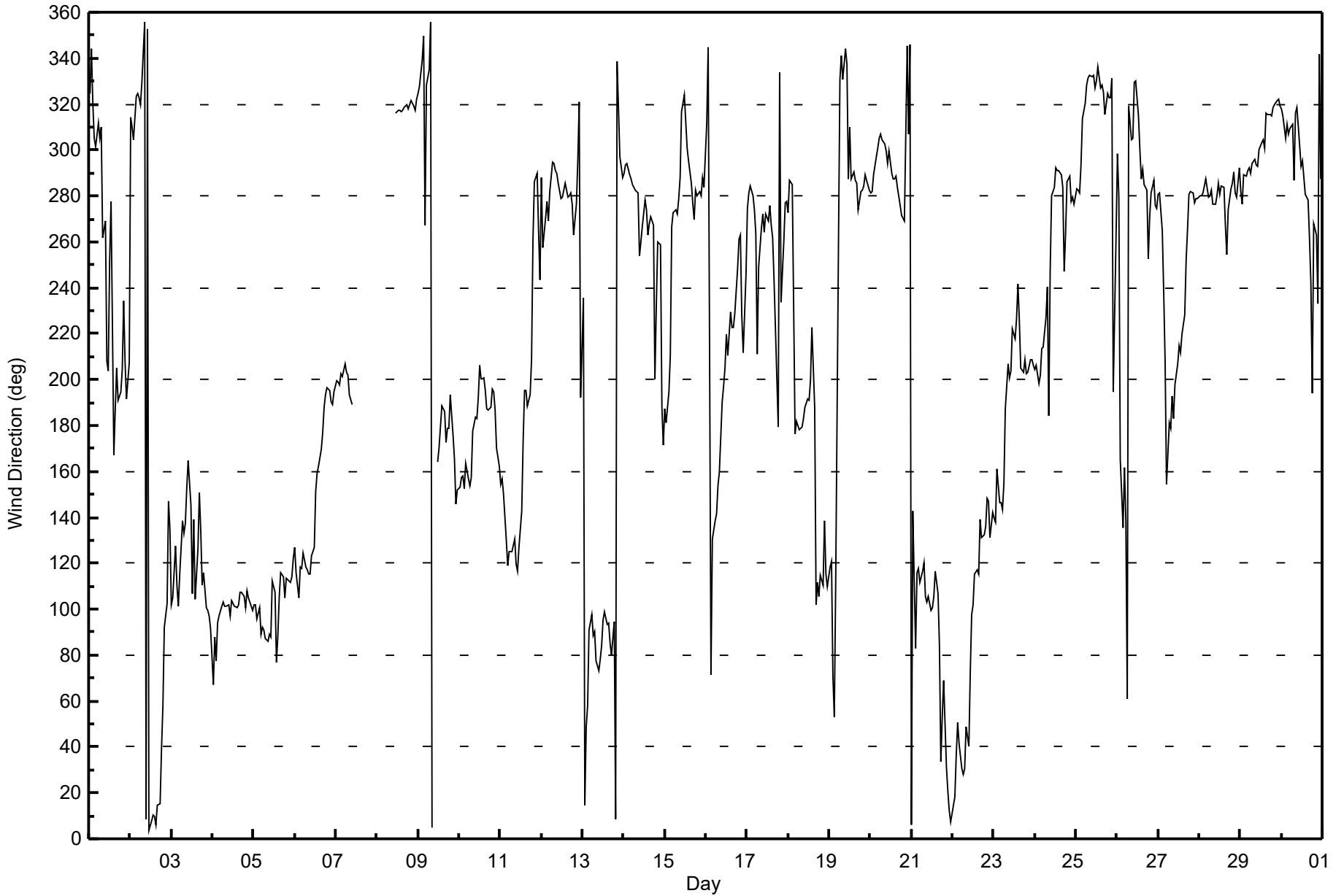
UO - Unstable Operation

All monthly, daily, and diurnal averages have been calculated using vector methods



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Wind Direction (WD) - deg**  
**Leismer - November 2023**







**Wood Buffalo Environmental Association**  
**Summary of Hour Standard Deviations**

**Wind Direction (WD) - deg**  
**Leismer - November 2023**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 99 deg on Nov 17 19:00	Hours of Data: 693
Minimum Value: 6 deg on Nov 24 21:00	Hours of Missing Data: 27
Percentiles: P <sub>1</sub> = 8 P <sub>10</sub> = 10 Q <sub>1</sub> = 13 Median = 17 Q <sub>3</sub> = 23 P <sub>90</sub> = 34 P <sub>99</sub> = 72	Hours of Calibration: 0
	Percent Operational Time: 96.3

Day	Hourly Period Ending At (MST)																								Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	45	35	30	21	19	25	31	20	44	48	33	22	45	51	78	33	13	12	11	16	33	17	32	34	78	
2-Nov	30	22	18	21	12	9	9	12	18	18	18	18	17	19	16	16	16	19	18	22	24	23	19	29	30	
3-Nov	24	25	27	18	26	21	14	18	18	15	19	23	16	22	16	21	12	19	15	15	18	26	20	24	27	
4-Nov	24	25	20	30	19	16	20	19	16	17	19	18	19	17	17	18	17	16	18	19	17	16	17	18	30	
5-Nov	17	18	20	19	23	22	26	21	23	21	24	20	24	25	25	25	19	16	19	19	17	16	13	20	26	
6-Nov	21	18	21	21	16	15	13	16	17	15	18	18	13	12	14	16	17	16	17	17	17	18	17	17	21	
7-Nov	20	17	19	19	16	21	18	19	16	19	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	21	
8-Nov	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	11	11	11	10	10	10	10	10	11	10	12	11	11	12
9-Nov	11	10	9	29	62	29	38	29	65	UO	UO	18	19	22	21	16	10	12	10	11	13	11	8	8	65	
10-Nov	8	10	7	8	9	11	8	8	16	18	22	22	21	23	19	17	16	16	17	17	16	16	15	16	23	
11-Nov	12	16	17	17	13	15	15	14	16	16	15	20	16	21	17	13	18	15	32	22	14	8	45	49	49	
12-Nov	36	55	60	28	42	10	10	7	9	9	11	14	14	12	11	13	11	13	13	34	36	19	27	46	60	
13-Nov	79	45	14	21	20	16	17	18	22	21	23	20	19	18	20	23	26	26	25	25	64	30	26	12	79	
14-Nov	11	10	10	10	11	11	12	11	15	31	28	28	17	20	28	27	20	32	43	48	48	46	23	14	48	
15-Nov	18	19	15	32	34	21	17	27	15	13	14	13	16	13	13	12	13	19	12	15	11	11	17	15	34	
16-Nov	17	15	92	90	13	11	9	9	13	15	18	22	24	27	33	26	24	27	36	31	38	48	46	49	92	
17-Nov	29	13	10	16	27	44	63	47	40	19	26	21	26	20	27	28	41	22	99	39	38	33	14	16	99	
18-Nov	21	26	42	52	16	22	25	20	20	17	17	17	17	17	41	64	9	15	27	11	47	10	13	11	64	
19-Nov	13	12	30	26	56	79	31	20	13	10	19	12	23	19	15	14	14	23	10	19	10	8	10	12	79	
20-Nov	13	12	11	11	11	12	12	12	12	11	11	12	11	12	10	10	10	15	18	20	19	26	35	29	35	
21-Nov	25	65	30	17	15	14	17	18	32	29	24	22	25	20	21	27	46	18	20	26	22	20	17	17	65	
22-Nov	19	19	22	24	27	19	15	19	30	26	35	32	25	23	17	23	13	21	16	16	13	12	16	19	35	
23-Nov	14	16	38	27	13	13	11	17	21	20	20	27	30	35	32	27	10	9	19	9	10	15	14	13	38	
24-Nov	14	14	13	15	21	24	26	34	22	45	16	12	9	11	14	11	31	18	22	9	6	16	13	18	45	
25-Nov	12	9	10	9	11	10	11	12	12	13	14	13	15	14	13	11	10	15	9	11	10	15	55	72	72	
26-Nov	25	65	26	24	36	20	97	41	18	18	16	13	19	18	10	12	10	10	29	22	14	9	11	13	97	
27-Nov	13	10	18	25	34	9	16	11	10	15	16	22	25	22	24	28	36	27	13	12	13	16	12	12	36	
28-Nov	11	12	11	11	10	12	12	11	14	17	12	11	15	14	19	25	28	44	9	8	14	11	10	10	44	
29-Nov	12	15	11	9	9	9	9	10	12	10	10	12	13	13	12	11	13	13	12	10	12	12	13	10	15	
30-Nov	12	12	16	15	16	14	21	13	14	13	16	12	15	10	13	16	20	33	44	21	26	65	28	51	65	
	79	65	92	90	62	79	97	47	65	48	35	32	45	51	78	64	46	44	99	48	64	65	55	72		

Diurnal Maximum

UO - Unstable Operation



## WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY  
MONITORING PROGRAM  
MONTHLY REPORT

### **AMS505 SAWBONES BAY NOVEMBER 2023**

Operations, Data Collection,  
QA/QC, Data Validation and Reporting by:  
Wood Buffalo Environmental Association  
Fort McMurray, Alberta

December 22, 2023

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - SAWBONES BAY (AMS505)  
 NOVEMBER 2023

MONTHLY SUMMARY for  
 AMD SECTION III.B.1(c)

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2 (ppb) Average	686	31	34	99.58	15.9	0	6.1	0
H2S (ppb) Average	686	33	34	99.86	2	0	0.8	0
NO2 (ppb) Average	685	32	35	99.58	16.4	0	8.6	-
NO (ppb) Average	685	32	35	99.58	27.4	-	4.7	-
NOX (ppb) Average	685	32	35	99.58	39.7	-	12.9	-
Temperature 2 m (C) Average	720	0	0	100	7.3	-	1.8	-
Relative Humidity (%) Average	581	0	139	80.69	99.9	-	95.9	-
Wind Speed 10 m (km/h) Average	720	0	0	100	39	-	22	-
Wind Direction 10 m (deg) Average	720	0	0	100	-	-	-	-

Note : Operational time includes periods of data collection and instrument calibration

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - SAWBONES BAY (AMS505)  
 NOVEMBER 2023

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile						
					Min	P10	Q1	Median	Q3	P90	Max
SO2 (ppb) Average	686	1.3	2.4	-	0	0	0.1	0.3	1	4.7	15.9
H2S (ppb) Average	686	0.21	0.3	-	0	0	0.1	0.1	0.2	0.6	2
NO2 (ppb) Average	685	3.18	3.4	-	0	0	0.5	2.3	4.5	7.9	16.4
NO (ppb) Average	685	1.03	2.3	-	0	0	0	0	0.9	3.3	27.4
NOX (ppb) Average	685	4.21	5.4	-	0	0	0.5	2.5	5.2	10.9	39.7
Temperature 2 m (C) Average	720	-3.11	4.1	-	-16.1	-8.8	-5.1	-2.9	-0.4	1.6	7.3
Relative Humidity (%) Average	581	78.52	12.5	-	39.9	59.9	71.1	79.5	88.4	94.1	99.9
Wind Speed 10 m (km/h) Average	720	11.2	6	-	1	4	7	10	15	19	39
Wind Direction 10 m (deg) Average	720	226.2	0	-	0	-	-	-	-	-	0

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - SAWBONES BAY (AMS505)  
NOVEMBER 2023

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
SO2	07 Nov 2023 11:00	07 Nov 2023 11:00	1	Maintenance - reinitiated daily QA check
H2S, NO2	07 Nov 2023 12:00	07 Nov 2023 12:00	1	Maintenance - reinitiated daily QA check
NO2, SO2	09 Nov 2023 09:00	09 Nov 2023 10:00	2	Maintenance - sample manifold cleaned
Relative Humidity	01 Nov 2023 04:00	27 Nov 2023 03:00	139	Sensor operated out of range

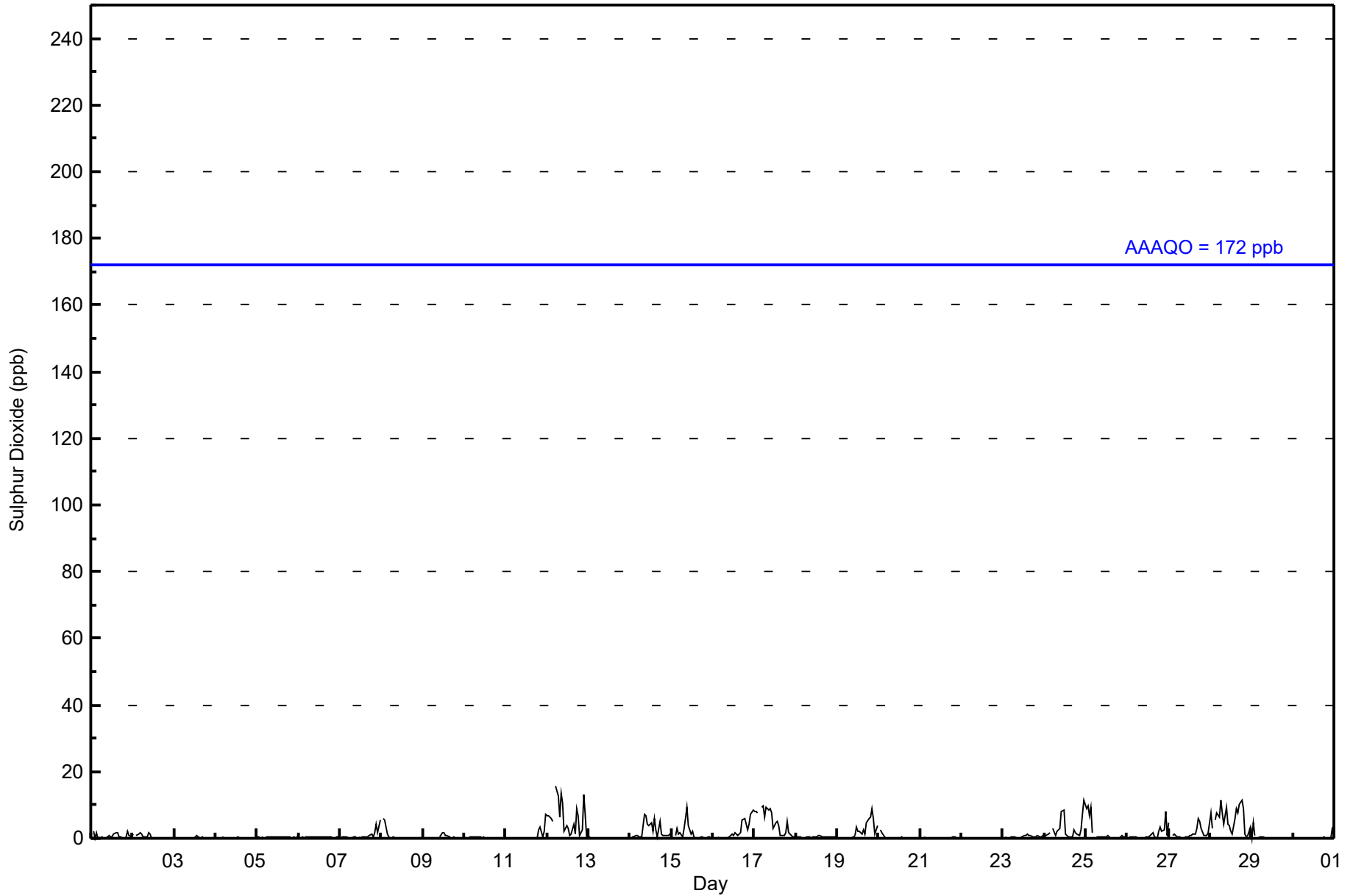


Number of Exceedences (AAAQO):		1-hr: 0	24-hr: 0	Hours in Service: 720																	Daily Average		Daily Maximum																																														
Maximum Value: 15.9 ppb on Nov 12 06:00		Maximum Daily Average: 6.1 ppb on Nov 12																	Hours of Data: 686		Hours of Missing Data: 34																																																
Minimum Value: 0.0 ppb on Nov 2 22:00		Minimum Daily Average: 0.0 ppb on Nov 22																	Hours of Calibration: 31		Percent Operational Time: 99.6																																																
Maximum Diurnal Average: 1.8 ppb at hour 2		Minimum Diurnal Average: 0.7 ppb at hour 17																																																																			
Monthly Average: 1.30 ppb		Percentiles: P <sub>1</sub> = 0.0 P <sub>10</sub> = 0.0 Q <sub>1</sub> = 0.1 Median = 0.3 Q <sub>3</sub> = 1.0 P <sub>90</sub> = 4.7 P <sub>99</sub> = 10.9																																																																			
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																																											
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																																													
1-Nov	Z	2.0	0.2	1.5	0.2	0.1	0.2	0.1	0.1	0.3	0.9	0.4	0.6	1.2	1.8	1.5	0.5	0.2	0.2	0.1	0.6	2.2	0.9	0.5	0.7	2.2																																											
2-Nov	1.3	Z	1.0	1.4	1.7	1.2	0.3	0.2	0.3	1.6	1.1	0.2	0.1	0.1	0.1	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.5	1.7																																											
3-Nov	0.0	0.0	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.7	0.4	0.2	0.2	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.7																																											
4-Nov	0.1	0.1	0.0	Z	0.2	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.2	0.1	0.1	0.2	0.1	0.2																																											
5-Nov	0.2	0.2	0.2	0.3	Z	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.3	0.3	0.2	0.3	0.2	0.2	0.2	0.2	0.3	0.3	0.3																																											
6-Nov	0.3	0.2	0.3	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.5	0.5	0.4	0.4	0.4	0.3	0.3	0.3	0.2	0.2	0.2	0.3	0.2	0.5																																											
7-Nov	0.2	0.3	0.3	0.2	0.2	0.2	0.2	0.1	0.3	0.3	M	0.2	0.1	0.3	0.4	0.5	0.6	0.8	1.1	0.3	1.8	4.3	1.5	5.7	0.9	5.7																																											
8-Nov	Z	6.0	5.4	1.1	0.4	0.2	0.1	0.2	0.2	0.2	0.2	0.2	0.1	0.0	C	C	C	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	6.0																																											
9-Nov	0.1	Z	0.2	0.1	0.1	0.1	0.1	0.1	M	M	0.4	1.7	1.5	0.8	0.7	0.5	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.4	1.7																																										
10-Nov	0.2	0.1	Z	0.2	0.3	0.2	0.3	0.3	0.2	0.3	0.2	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.3																																											
11-Nov	0.0	0.0	0.1	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.2	0.1	0.1	0.1	0.1	2.7	3.3	0.5	1.9	7.3	0.7	7.3																																											
12-Nov	6.6	6.9	5.8	4.9	Z	15.9	12.5	6.4	13.7	10.8	2.1	3.9	3.0	0.7	1.3	4.4	1.4	8.9	6.6	1.0	2.7	13.2	7.1	0.5	6.1	15.9																																											
13-Nov	0.3	0.2	0.1	0.1	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.3																																											
14-Nov	Z	0.2	0.3	0.8	0.8	0.5	0.5	0.5	7.2	6.9	4.0	3.7	4.6	2.3	5.8	2.5	0.6	5.2	1.5	0.7	0.9	0.8	0.9	1.1	2.3	7.2																																											
15-Nov	1.0	Z	0.8	3.1	1.3	1.6	0.3	2.8	6.0	9.2	4.0	1.1	1.9	0.2	0.1	0.1	0.1	0.3	0.4	0.1	0.0	0.3	0.2	0.1	1.5	9.2																																											
16-Nov	0.1	0.1	Z	0.3	0.2	0.1	0.1	0.1	0.1	0.3	1.0	1.1	0.9	1.6	0.6	1.2	1.8	5.4	6.0	4.1	2.6	4.3	7.0	8.5	2.1	8.5																																											
17-Nov	7.9	8.1	7.4	Z	9.2	9.8	6.2	9.5	8.3	8.7	7.6	3.1	4.6	4.9	3.8	0.8	0.8	0.6	1.8	5.0	1.6	0.9	0.5	0.3	4.9	9.8																																											
18-Nov	0.4	0.3	0.3	0.3	Z	0.2	0.3	0.3	0.5	0.2	0.5	0.3	0.5	0.9	0.8	0.5	0.5	0.4	0.5	0.5	0.5	0.4	0.3	0.3	0.4	0.9																																											
19-Nov	0.2	0.2	0.2	0.1	0.0	Z	0.1	0.1	0.0	0.3	1.0	3.4	2.0	2.3	1.3	2.4	1.4	4.9	6.1	6.2	8.8	6.0	1.2	4.0	2.3	8.8																																											
20-Nov	Z	2.4	1.6	0.4	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.0	0.1	0.3	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.1	0.1	0.3	2.4																																											
21-Nov	0.2	Z	0.4	0.1	0.1	0.1	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.2	0.3	0.3	0.1	0.0	0.0	0.1	0.4																																											
22-Nov	0.0	0.1	Z	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.1																																											
23-Nov	0.0	0.0	0.3	Z	0.5	0.5	0.4	0.3	0.2	0.0	0.2	0.6	1.0	0.8	1.1	0.9	0.7	0.5	0.4	0.5	0.7	0.5	0.4	0.8	0.5	1.1																																											
24-Nov	0.5	0.8	1.3	1.6	Z	2.9	1.0	2.2	2.4	2.9	7.9	8.5	1.4	0.7	0.4	0.3	0.3	2.6	1.5	1.2	0.9	2.7	7.4	11.5	2.7	11.5																																											
25-Nov	8.9	9.6	6.6	9.4	1.7	Z	0.4	0.3	0.3	0.2	0.3	0.3	0.5	0.7	0.1	0.1	0.1	0.1	0.0	0.0	0.2	0.7	0.4	0.3	1.8	9.6																																											
26-Nov	Z	0.4	0.2	0.2	0.2	0.3	0.2	0.1	0.1	0.1	0.1	0.2	0.5	0.7	1.1	1.7	0.2	0.0	2.0	3.3	1.9	2.4	8.0	0.8	1.1	8.0																																											
27-Nov	4.7	Z	1.0	1.3	0.7	0.6	0.5	0.1	0.1	0.2	0.5	0.3	0.7	0.9	1.2	1.4	3.0	6.0	5.3	2.9	0.7	0.8	1.1	1.8	1.5	6.0																																											
28-Nov	7.6	2.9	Z	5.6	7.7	6.2	11.6	7.8	4.3	9.3	4.2	3.9	2.1	1.1	6.0	9.0	7.7	10.3	11.3	9.0	1.4	0.4	1.0	3.5	5.8	11.6																																											
29-Nov	0.2	4.8	0.9	Z	0.5	0.5	0.3	0.2	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	4.8																																											
30-Nov	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.4	0.1	0.2	0.2	0.3	3.2	0.2	3.2																																											
																								Diurnal Average		Diurnal Maximum																																											
																								1.6 8.9		1.8 9.6		1.4 7.4		1.3 9.4		1.1 9.2		1.6 15.9		1.2 12.5		1.1 9.5		1.6 13.7		1.8 10.8		1.3 7.9		1.2 8.5		0.9 4.6		1.0 4.9		1.0 6.0		0.7 9.0		1.6 10.3		1.6 11.3		1.3 9.0		1.0 8.8		1.4 13.2		1.4 8.0		1.7 11.5	
Z - zerospan C - Calibration M - Maintenance																																																																					
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 172 ppb 24-hr 48 ppb																																																																					



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Sawbones Bay - November 2023**





**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Sawbones Bay - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 10	678	98.83	98.83
11 - 20	8	1.17	100.00
21 - 60	0	0.00	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 686

Total Number of Hours: 720





**Wood Buffalo Environmental Association**  
**Frequency Distribution**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Sawbones Bay - November 2023**

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	35	20	18	44	27	28	51	77	57	56	42	58	94	38	13	678
11 - 20	0	0	0	0	0	0	0	0	0	0	0	2	6	0	0	0	8
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	20	35	20	18	44	27	28	51	77	57	56	44	64	94	38	13	686

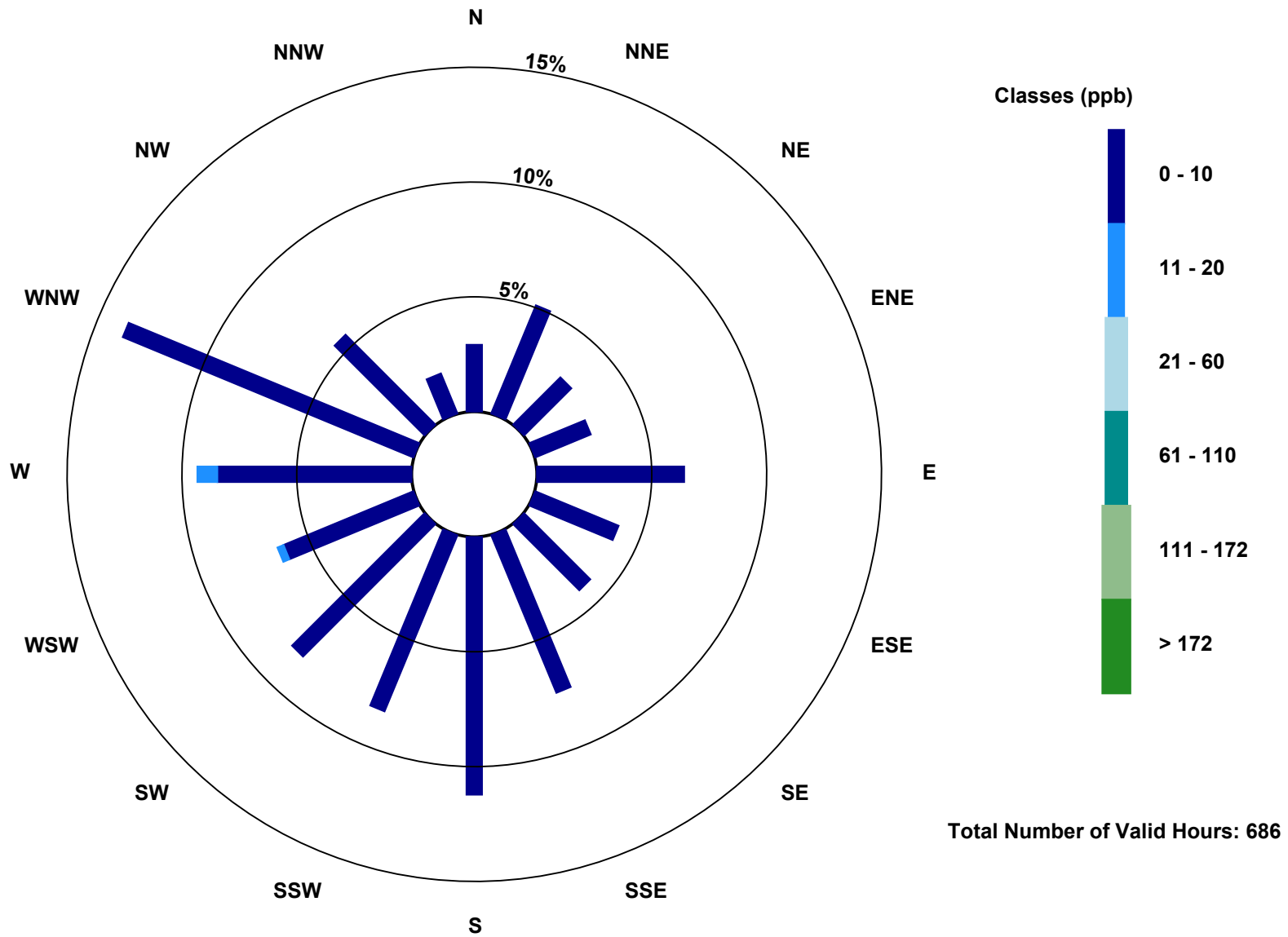
Total Number of Valid Hours: 686

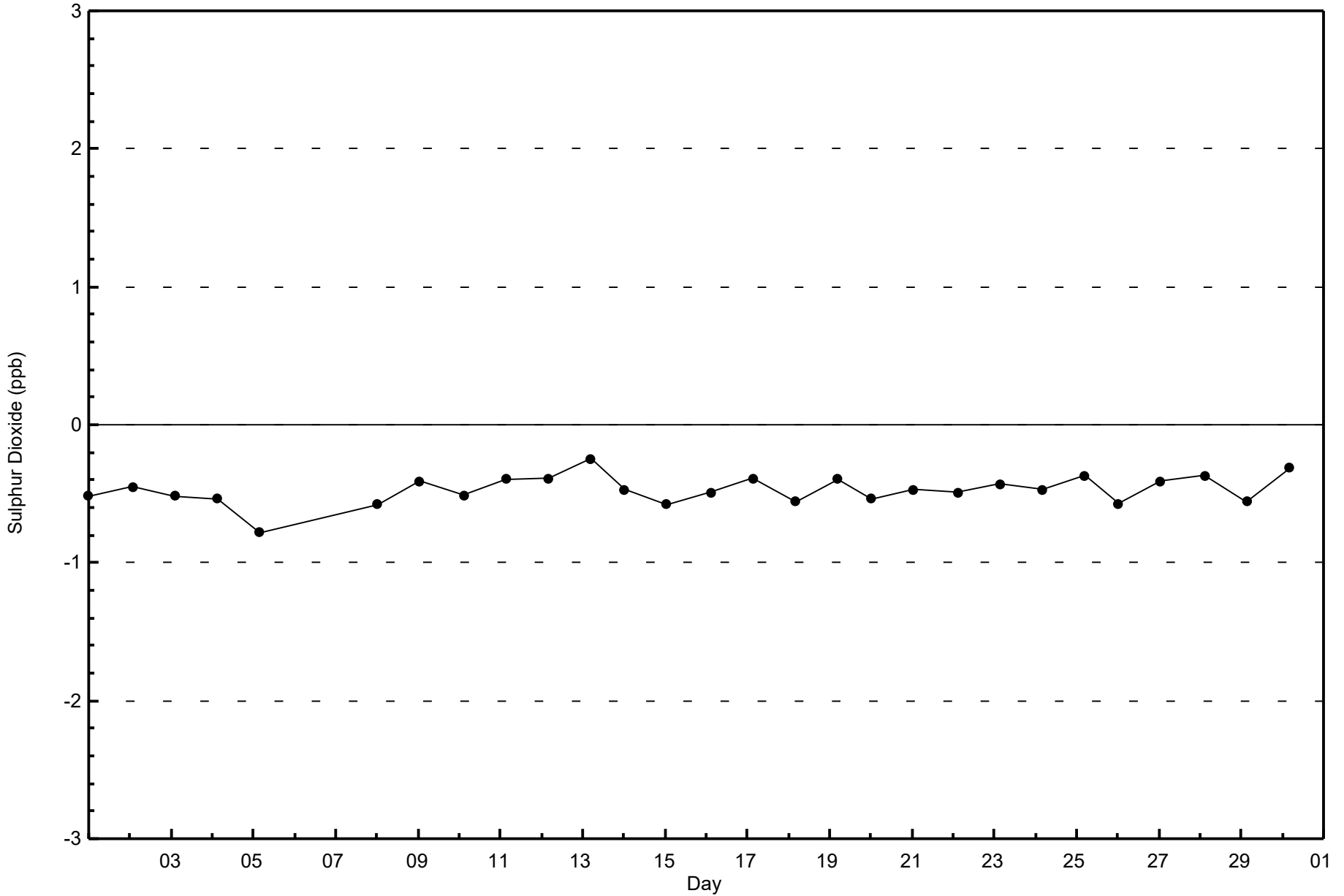
Total Number of Hours: 720

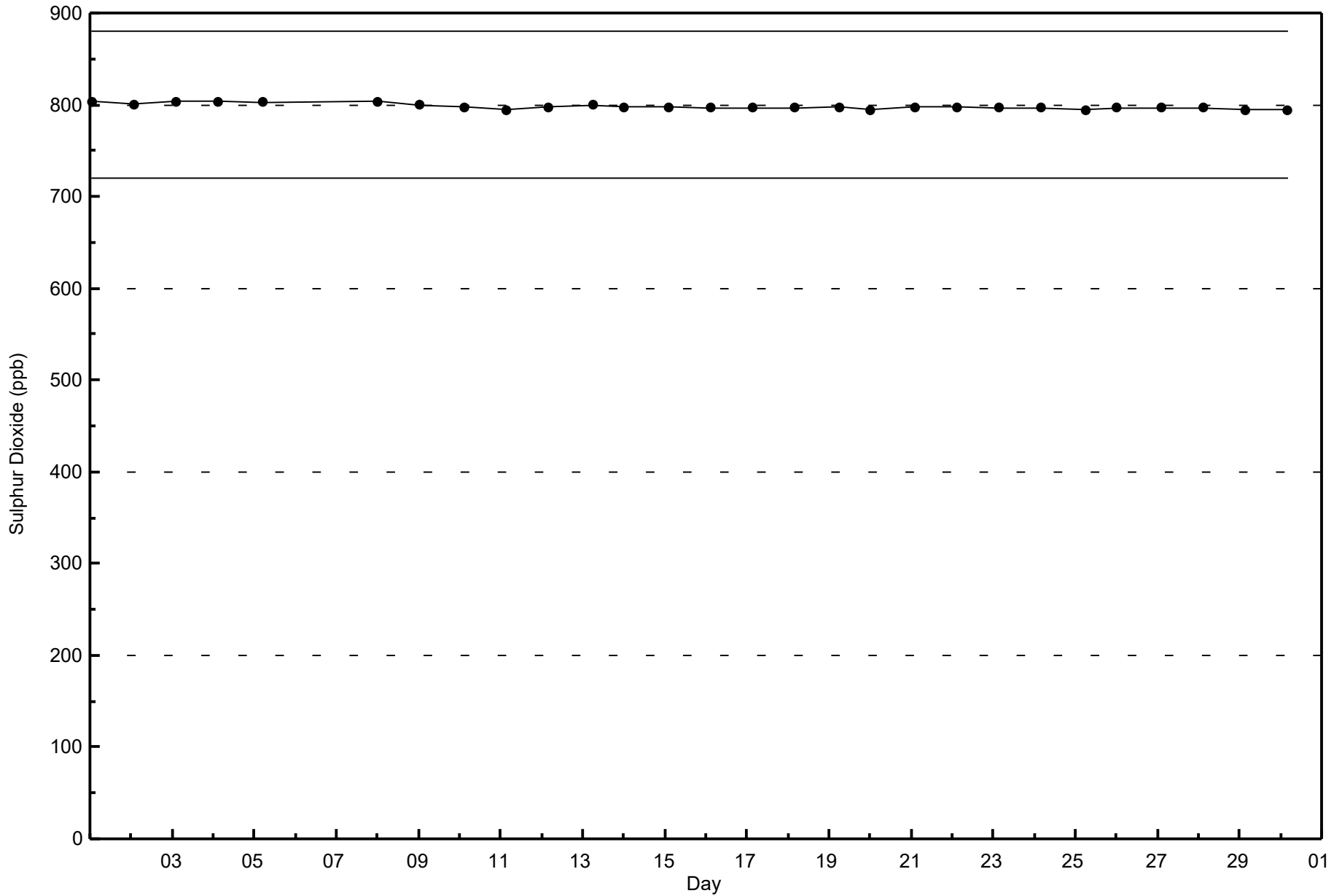


Wood Buffalo Environmental Association  
Wind Rose Nov 2023

Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Sawbones Bay









**Wood Buffalo Environmental Association**  
**Summary of Hour Averages**

**Hydrogen Sulphide (H2S) - ppb**  
**Sawbones Bay - November 2023**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 2.0 ppb on Nov 12 05:00	Maximum Daily Average: 0.8 ppb on Nov 12
Minimum Value: 0.0 ppb on Nov 9 23:00	Hours of Data: 686
Maximum Diurnal Average: 0.3 ppb at hour 3	Hours of Missing Data: 34
Monthly Average: 0.21 ppb	Hours of Calibration: 33
Minimum Daily Average: 0.0 ppb on Nov 22	Percent Operational Time: 99.9
Minimum Diurnal Average: 0.1 ppb at hour 17	
Percentiles: P <sub>1</sub> = 0.0 P <sub>10</sub> = 0.0 Q <sub>1</sub> = 0.1 Median = 0.1 Q <sub>3</sub> = 0.2 P <sub>90</sub> = 0.6 P <sub>99</sub> = 1.4	

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	0.2	Z	0.3	0.8	0.3	0.2	0.3	0.3	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	0.2	0.8
2-Nov	0.3	0.2	Z	0.5	0.6	0.6	0.2	0.1	0.1	0.1	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.6
3-Nov	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	0.2
4-Nov	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
5-Nov	0.1	0.0	0.0	0.0	0.0	Z	0.1	0.1	0.1	0.1	0.0	0.0	0.1	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.1
6-Nov	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2
7-Nov	0.2	0.2	0.3	0.3	0.2	0.1	0.1	0.2	0.2	0.2	0.1	M	0.2	0.2	0.1	0.2	0.2	0.2	0.1	0.1	0.2	0.9	0.2	0.6	0.2	0.9
8-Nov	0.6	Z	0.8	0.8	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	0.2	0.8
9-Nov	0.1	0.1	Z	0.1	0.1	0.1	0.3	0.3	C	C	C	C	C	0.1	0.1	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.1	0.3
10-Nov	0.0	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
11-Nov	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	0.2	0.1	0.1	0.1	0.1	0.2	0.3	0.1	0.3	1.2	1.2
12-Nov	0.9	0.8	1.4	1.6	2.0	Z	0.7	0.8	1.2	0.6	0.9	0.7	0.7	0.4	0.3	0.4	0.3	0.8	0.5	0.1	0.2	1.6	0.9	0.3	0.8	2.0
13-Nov	Z	0.3	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.3
14-Nov	0.3	Z	0.1	0.1	0.1	0.2	0.2	0.2	0.6	0.4	0.2	0.2	0.5	0.1	0.3	0.1	0.1	0.5	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.6
15-Nov	0.1	0.1	Z	0.2	0.2	0.3	0.1	0.2	0.5	0.8	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	0.8
16-Nov	0.1	0.1	0.1	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.2	0.2	0.5	0.5	0.4	0.3	0.5	0.8	1.2	0.3	1.2
17-Nov	1.4	1.2	1.1	0.2	Z	1.6	1.7	1.4	1.6	1.5	0.7	0.7	0.5	1.0	0.5	0.2	0.2	0.1	0.3	1.1	0.6	0.2	0.1	0.1	0.8	1.7
18-Nov	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
19-Nov	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.4	0.3	0.7	0.4	0.3	0.1	0.2	0.1	1.0	0.8	0.7	0.5	1.3	0.5	0.9	0.4	1.3
20-Nov	1.0	Z	1.1	0.4	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	0.2	0.2	0.1	0.1	0.1	0.1	0.2	1.1
21-Nov	0.1	0.1	Z	0.1	0.1	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.1
22-Nov	0.0	0.0	0.0	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
23-Nov	0.0	0.0	0.0	0.0	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	0.1	0.2	0.1	0.2
24-Nov	0.2	0.2	0.1	0.1	0.1	Z	0.1	0.2	0.1	0.2	0.6	0.7	0.6	0.4	0.2	0.1	0.3	0.2	0.1	0.1	0.1	0.2	1.2	0.9	0.3	1.2
25-Nov	Z	0.8	0.7	0.9	0.9	0.1	0.0	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	0.1	0.1	0.2	0.9
26-Nov	0.1	Z	0.1	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.2	0.2	0.0	0.0	0.2	0.3	0.3	0.3	0.4	0.1	0.1	0.4
27-Nov	0.6	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	0.1	0.1	0.2	0.4	1.1	0.6	0.8	1.0	0.9	0.3	1.1
28-Nov	0.5	0.5	0.8	Z	0.9	0.8	0.6	0.9	0.7	0.5	0.7	0.5	0.3	0.6	0.6	0.6	0.2	0.6	0.7	0.5	0.5	0.1	0.6	0.2	0.6	0.9
29-Nov	0.0	0.3	0.5	0.4	Z	0.2	0.1	0.1	0.1	0.0	0.0	0.1	0.1	0.1	0.0	0.0	0.1	0.1	0.1	0.1	0.0	0.0	0.1	0.0	0.1	0.5
30-Nov	0.0	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	0.1	0.1	0.2	0.1	0.7	0.1	0.7

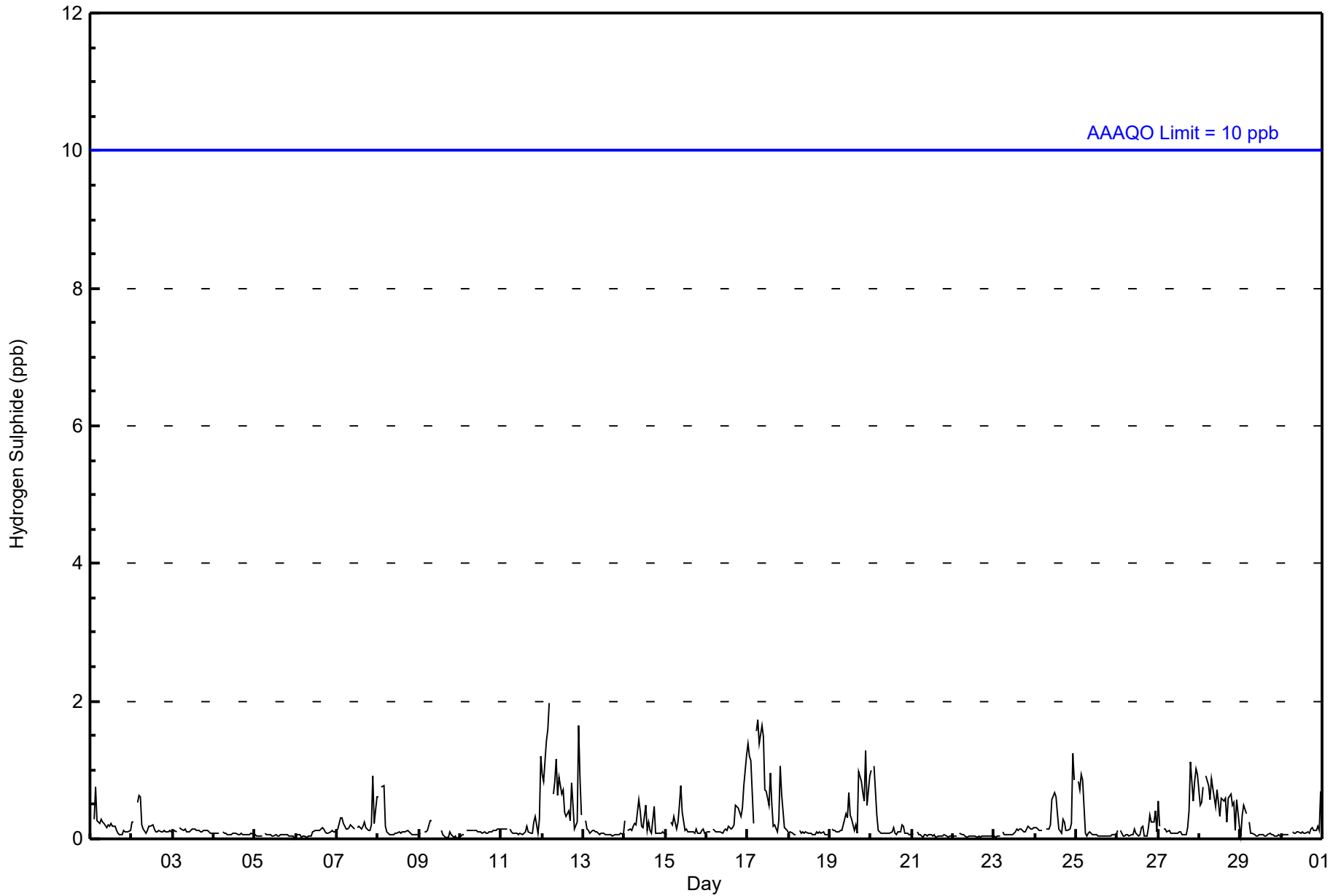
0.3	0.2	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.3	0.3	0.3	Diurnal Average	
1.4	1.2	1.4	1.6	2.0	1.6	1.7	1.4	1.6	1.5	0.9	0.7	0.7	1.0	0.6	0.6	0.3	1.0	0.8	1.1	0.6	1.6	1.2	1.2	Diurnal Maximum		

Z - zerospan      C - Calibration      M - Maintenance  
 Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 10 ppb    24-hr 3 ppb



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Hydrogen Sulphide (H<sub>2</sub>S) - ppb**  
**Sawbones Bay - November 2023**





**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Hydrogen Sulphide (H<sub>2</sub>S) - ppb**  
**Sawbones Bay - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2	686	100.00	100.00
3 - 4	0	0.00	100.00
5 - 7	0	0.00	100.00
8 - 11	0	0.00	100.00
> 11	0	0.00	100.00

Total Number of Valid Hours: 686

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Hydrogen Sulphide (H<sub>2</sub>S) - ppb  
Sawbones Bay - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 2	21	35	20	18	42	28	27	51	74	57	56	44	66	94	40	13	686
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	21	35	20	18	42	28	27	51	74	57	56	44	66	94	40	13	686

Total Number of Valid Hours: 686

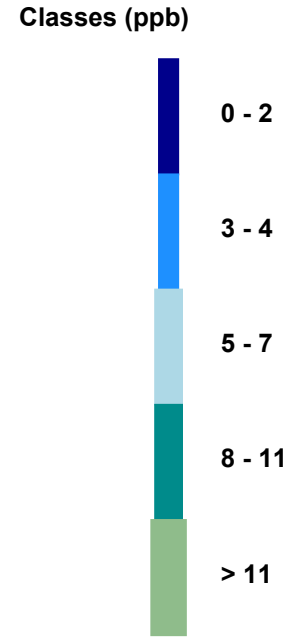
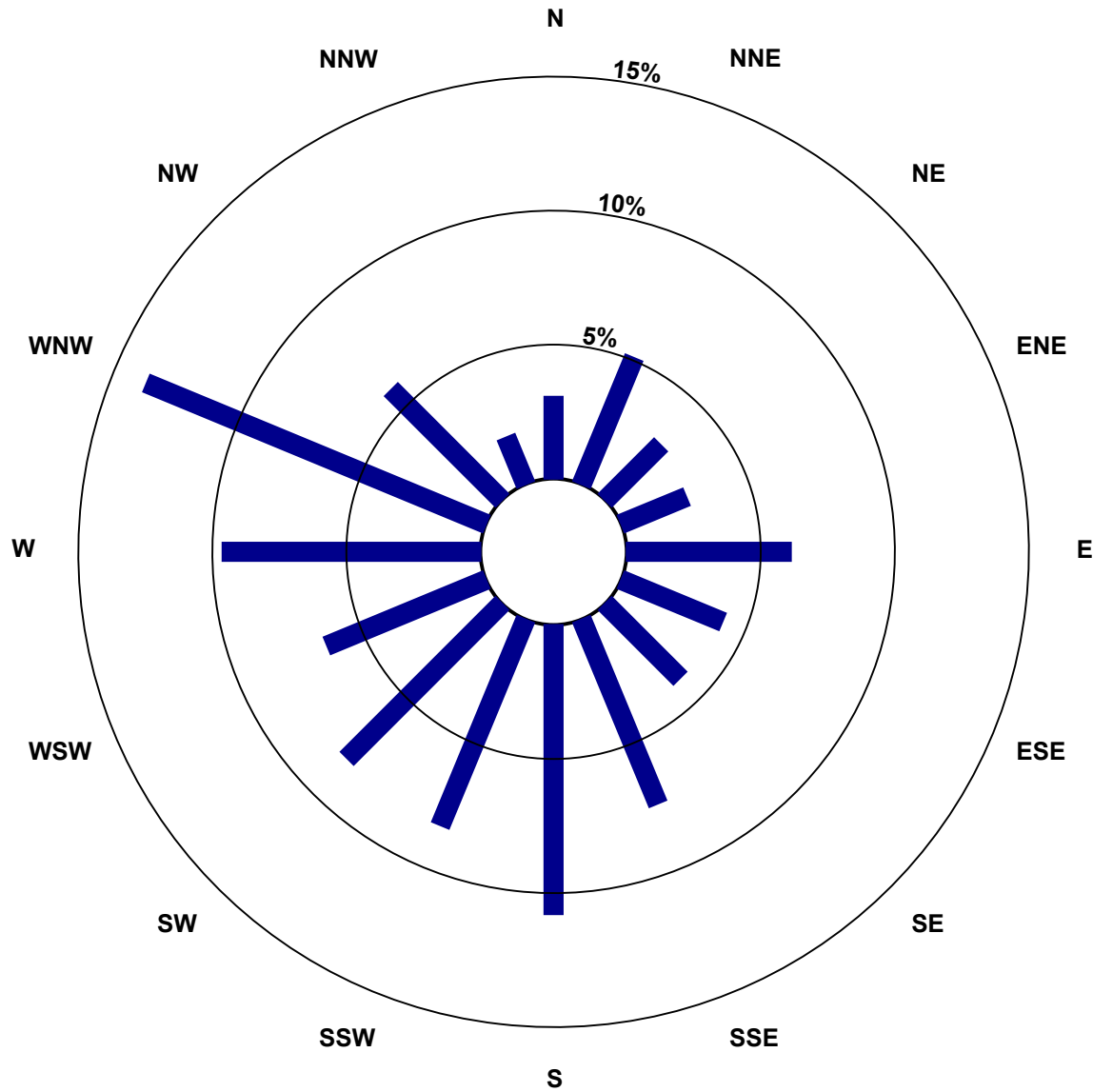
Total Number of Hours: 720



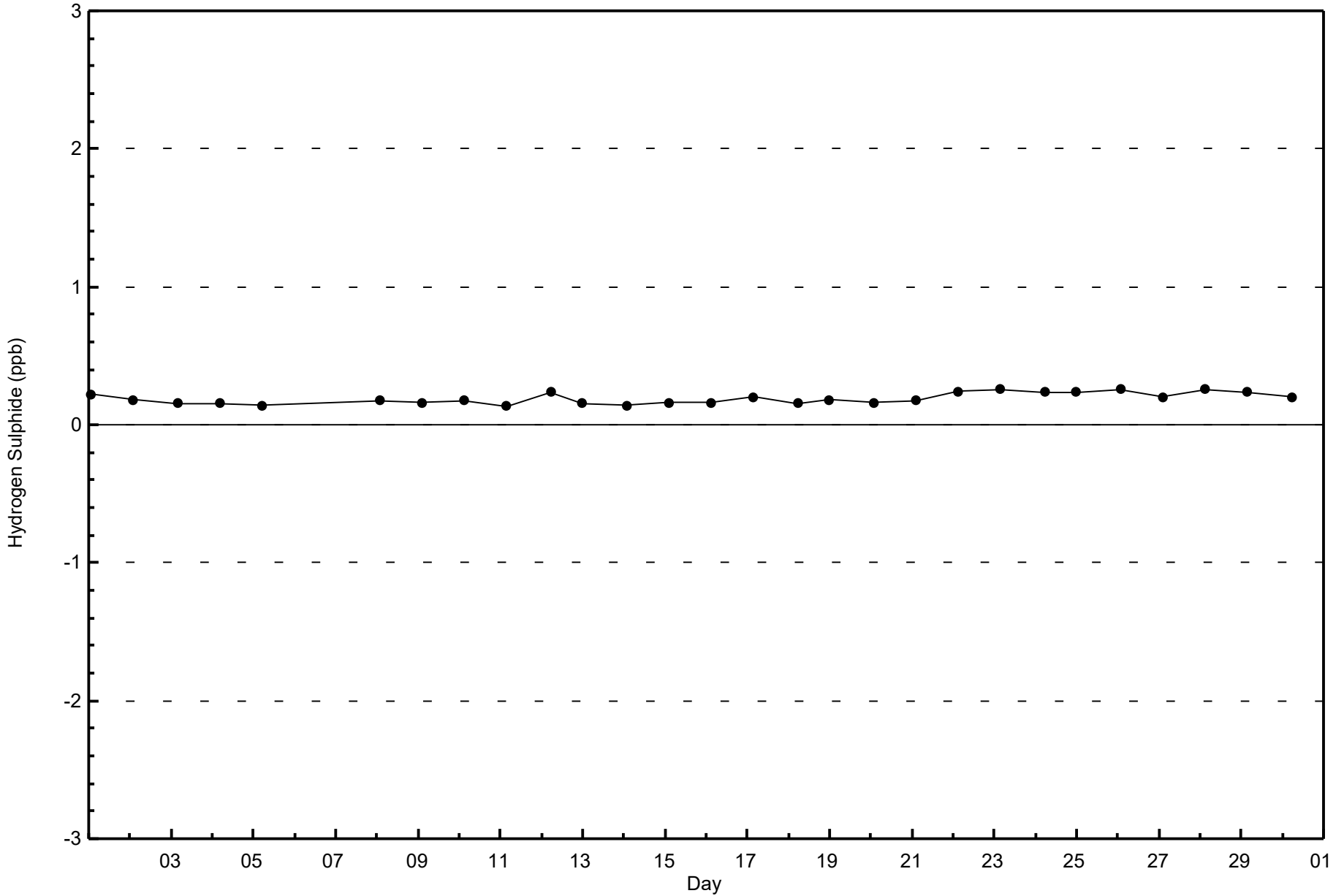


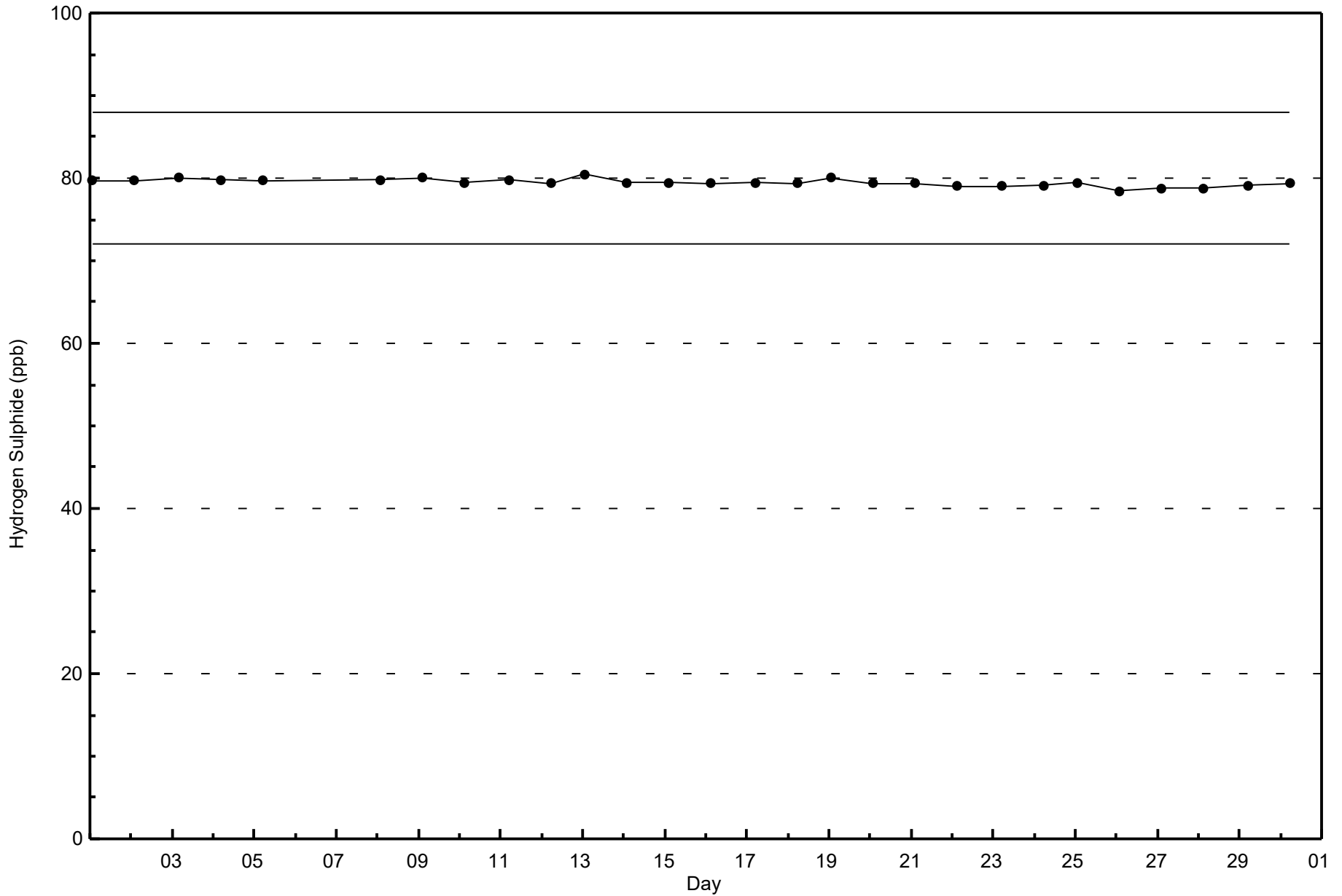
Wood Buffalo Environmental Association  
Wind Rose Nov 2023

Hydrogen Sulphide (H<sub>2</sub>S) - ppb  
Sawbones Bay



Total Number of Valid Hours: 686





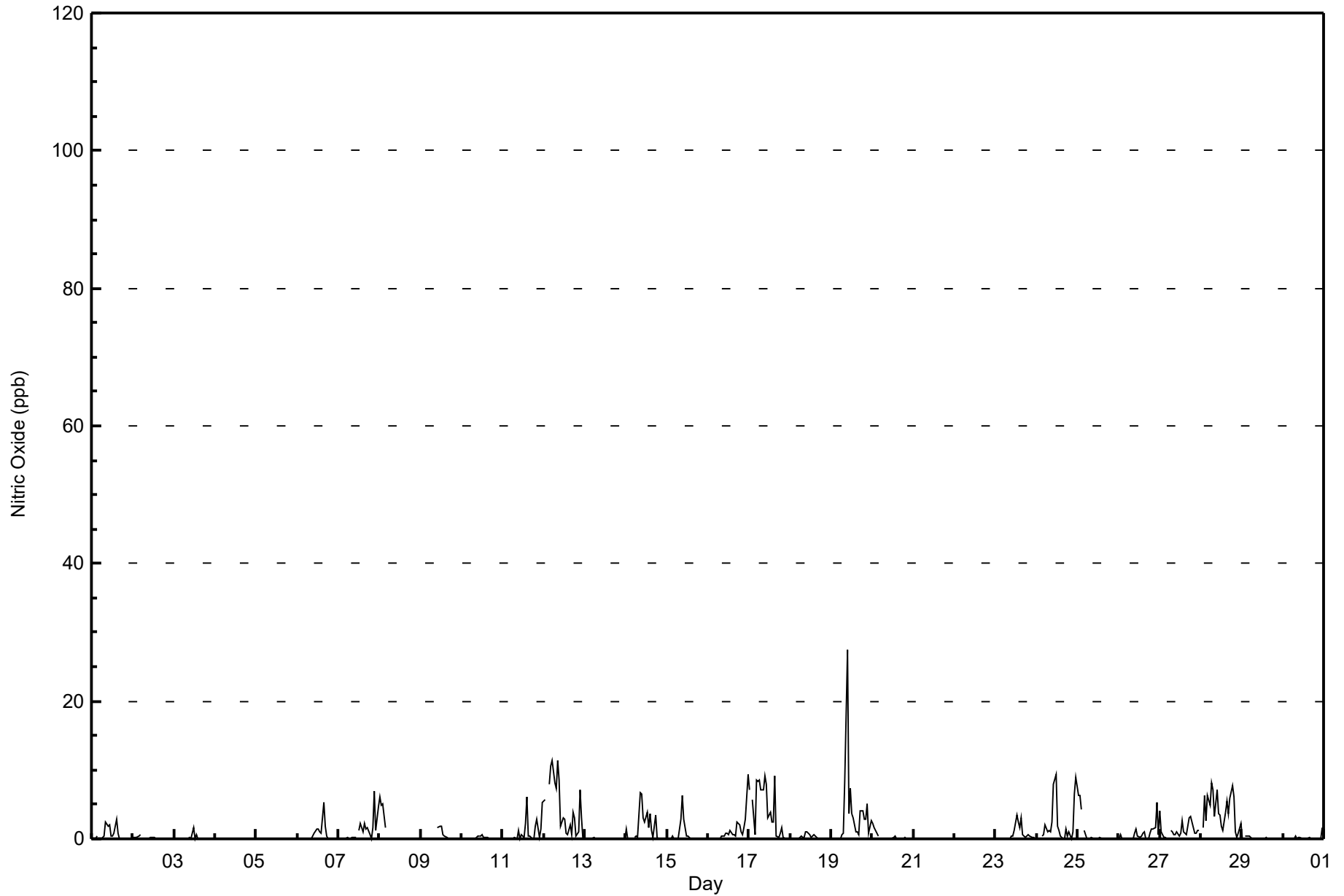


Maximum Value: 27.4 ppb on Nov 19 10:00																				Maximum Daily Average: 4.7 ppb on Nov 12					Hours in Service:	720	
Minimum Value: 0.0 ppb on Nov 1 03:00																				Minimum Daily Average: 0.0 ppb on Nov 5					Hours of Data:	685	
Maximum Diurnal Average: 2.6 ppb at hour 10																				Minimum Diurnal Average: 0.4 ppb at hour 17					Hours of Missing Data:	35	
Monthly Average: 1.03 ppb																				Percentiles: P <sub>1</sub> = 0.0 P <sub>10</sub> = 0.0 Q <sub>1</sub> = 0.0 Median = 0.0 Q <sub>3</sub> = 0.9 P <sub>90</sub> = 3.3 P <sub>99</sub> = 9.2					Hours of Calibration:	32	
																									Percent Operational Time:	99.6	
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Nov	0.0	0.1	0.0	0.3	Z	0.0	0.2	0.4	2.4	1.8	2.0	0.5	0.5	0.8	2.9	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	2.9	
2-Nov	0.1	0.2	0.2	0.5	0.6	Z	0.0	0.0	0.0	0.0	0.1	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.6	
3-Nov	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	1.7	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	1.7	
4-Nov	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
5-Nov	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
6-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.9	1.4	1.4	1.1	0.8	5.3	1.9	0.4	0.0	0.1	0.0	0.0	0.0	0.0	0.6	5.3	
7-Nov	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.2	0.1	0.3	M	1.3	2.2	1.1	2.3	1.4	1.7	0.6	0.0	1.7	7.0	1.2	4.7	1.1	7.0	
8-Nov	6.1	4.9	5.0	1.6	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	0.0	0.0	0.0	0.0	0.0	0.9	6.1	
9-Nov	0.0	0.0	0.0	0.0	0.1	Z	0.0	0.0	M	M	1.6	1.8	1.8	0.7	0.5	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.3	1.8	
10-Nov	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.4	0.4	0.3	0.6	0.2	0.3	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.6	
11-Nov	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.2	0.0	1.1	0.1	0.5	0.1	2.3	6.1	0.4	0.4	0.0	0.1	1.9	2.8	0.2	1.5	5.3	1.0	6.1	
12-Nov	5.4	5.7	Z	8.0	10.7	11.3	8.1	7.4	11.4	8.6	1.8	3.0	2.9	0.9	0.7	2.1	0.6	3.8	3.1	0.5	1.1	7.2	3.0	0.0	4.7	11.4	
13-Nov	0.0	0.0	0.0	Z	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	
14-Nov	1.3	0.0	0.0	0.0	Z	0.3	0.4	0.2	6.7	6.5	3.1	2.4	3.9	1.5	3.7	1.2	0.3	3.4	0.1	0.0	0.0	0.0	0.0	0.0	1.5	6.7	
15-Nov	0.0	0.0	0.0	0.4	0.0	Z	0.0	1.5	2.8	6.4	2.8	0.3	0.5	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	6.4	
16-Nov	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.5	0.9	0.9	0.7	1.2	0.6	0.5	0.3	2.4	2.1	1.1	0.7	1.7	2.8	9.5	1.1	9.5	
17-Nov	7.2	Z	5.8	0.6	8.5	8.3	8.5	7.1	7.1	9.2	8.0	3.0	3.8	2.5	2.3	9.2	0.5	0.2	0.7	1.6	0.2	0.0	0.0	0.0	4.1	9.2	
18-Nov	0.0	0.0	Z	0.0	0.0	0.0	0.4	0.3	0.3	1.0	1.0	0.7	0.2	0.4	0.5	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	1.0	
19-Nov	0.0	0.0	0.0	Z	0.0	0.0	0.7	0.8	8.4	27.4	3.6	7.4	3.7	3.0	1.0	1.1	0.7	4.1	4.1	2.9	2.9	5.1	0.8	2.5	3.5	27.4	
20-Nov	2.2	1.7	1.2	0.4	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.4	0.0	0.1	0.1	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.3	2.2	
21-Nov	0.0	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1
22-Nov	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23-Nov	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.4	0.4	1.2	3.6	2.5	1.6	3.2	0.5	0.2	0.4	0.6	0.5	0.1	0.2	0.1	0.7	3.6	
24-Nov	0.1	0.0	Z	0.4	0.6	1.9	1.1	1.3	1.1	2.4	8.0	9.3	1.9	1.2	0.4	0.1	0.1	1.5	0.4	0.9	0.0	0.9	6.5	8.9	2.1	9.3	
25-Nov	6.3	6.3	4.2	Z	1.2	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	6.3	
26-Nov	0.1	0.6	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.8	1.4	0.3	0.2	0.3	0.8	1.1	0.0	0.0	0.9	1.5	1.3	1.7	5.3	0.7	0.7	5.3	
27-Nov	4.1	0.9	0.3	0.2	0.0	Z	1.1	1.0	0.6	0.5	1.0	0.5	0.7	2.6	1.0	0.6	1.8	3.1	3.3	2.4	0.9	0.8	1.3	1.2	1.3	4.1	
28-Nov	Z	1.7	6.2	2.6	6.3	4.9	8.1	7.1	3.2	7.0	3.6	3.4	1.8	1.3	3.9	5.6	3.7	5.9	7.7	6.0	0.9	0.2	0.7	2.2	4.1	8.1	
29-Nov	0.0	Z	0.5	0.4	0.4	0.2	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.5	
30-Nov	0.1	0.0	Z	0.0	0.0	0.0	0.0	0.4	0.0	0.2	0.1	0.0	0.1	0.0	0.1	0.2	0.0	0.1	0.1	0.0	0.0	0.1	0.1	1.5	0.1	1.5	
																								Diurnal Average			
																								Diurnal Maximum			
Z - zerspan      C - Calibration      M - Maintenance																											



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Nitric Oxide (NO) - ppb**  
**Sawbones Bay - November 2023**





**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Nitric Oxide (NO) - ppb**  
**Sawbones Bay - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	684	99.85	99.85
21 - 40	1	0.15	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitric Oxide (NO) - ppb  
Sawbones Bay - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 20	20	36	20	18	44	26	27	52	76	57	57	44	67	91	37	12	684
21 - 40	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	20	36	20	18	44	26	27	52	77	57	57	44	67	91	37	12	685

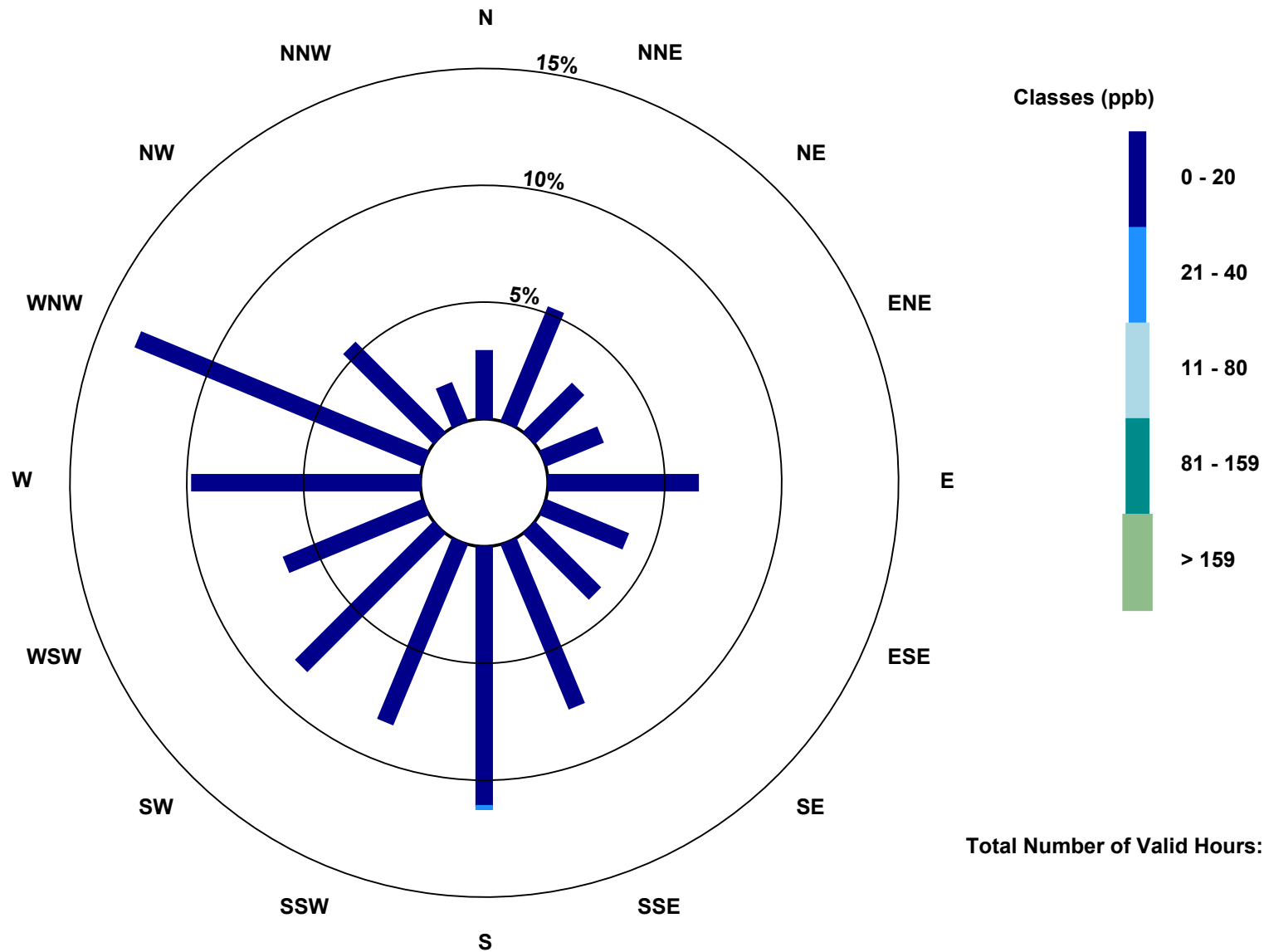
Total Number of Valid Hours: 685

Total Number of Hours: 720

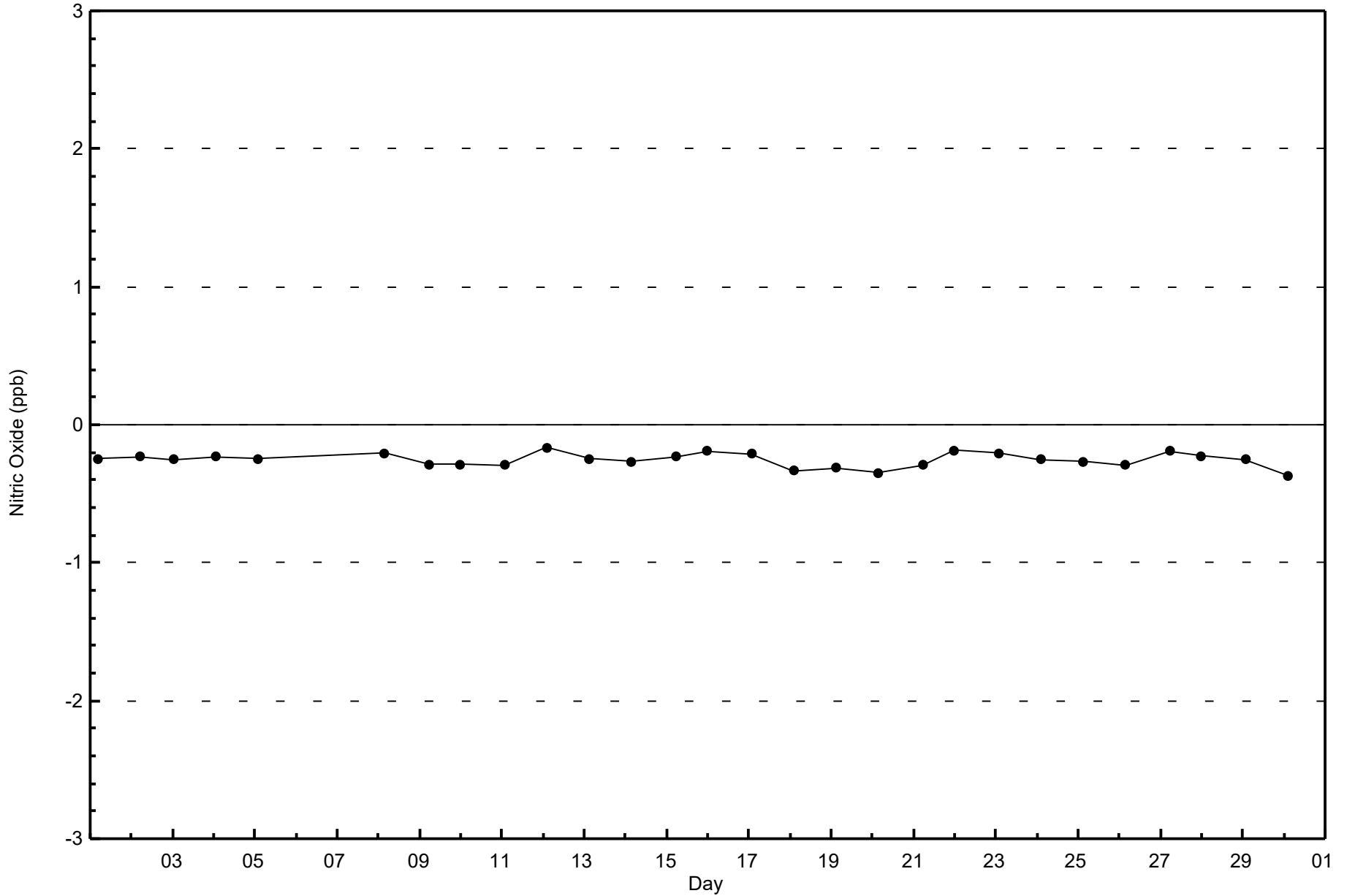


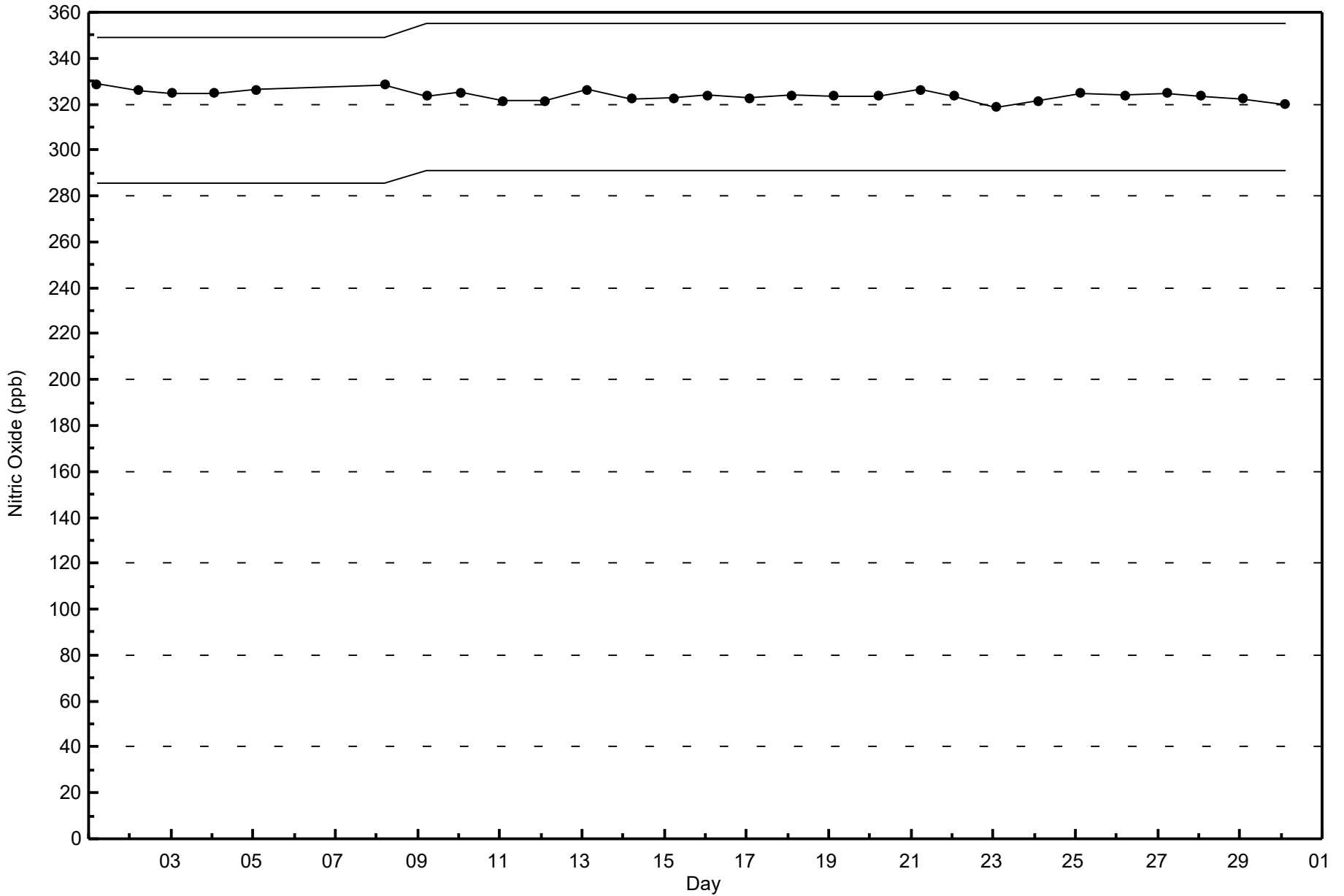
Wood Buffalo Environmental Association  
Wind Rose Nov 2023

Nitric Oxide (NO) - ppb  
Sawbones Bay











# Wood Buffalo Environmental Association

## Summary of Hour Averages

## Nitrogen Dioxide (NO<sub>2</sub>) - ppb Sawbones Bay - November 2023

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 16.4 ppb on Nov 17 05:00	Maximum Daily Average: 8.6 ppb on Nov 17		Hours of Data:	685
Minimum Value: 0.0 ppb on Nov 5 10:00	Minimum Daily Average: 0.1 ppb on Nov 5		Hours of Missing Data:	35
Maximum Diurnal Average: 4.3 ppb at hour 1	Minimum Diurnal Average: 2.1 ppb at hour 13		Hours of Calibration:	32
Monthly Average: 3.18 ppb	Percentiles: P <sub>1</sub> = 0.0 P <sub>10</sub> = 0.0 Q <sub>1</sub> = 0.5 Median = 2.3 Q <sub>3</sub> = 4.5 P <sub>90</sub> = 7.9 P <sub>99</sub> = 14.6		Percent Operational Time:	99.6

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	4.9	5.1	2.4	5.3	Z	3.4	6.0	4.6	6.5	3.5	3.1	1.6	1.7	2.7	5.9	4.2	3.9	3.2	4.8	2.3	2.1	4.0	2.4	2.1	3.7	6.5
2-Nov	3.8	4.0	2.9	4.3	4.0	Z	1.8	2.3	0.9	2.3	3.2	3.8	3.9	1.6	0.7	0.7	0.8	0.8	0.9	0.8	0.6	0.5	0.7	0.5	2.0	4.3
3-Nov	Z	3.0	2.6	4.3	2.3	1.0	2.8	6.5	3.4	3.0	1.8	2.4	1.7	3.5	2.7	3.0	3.3	2.4	3.2	3.0	1.5	1.1	0.8	0.7	2.6	6.5
4-Nov	0.6	Z	0.4	0.2	0.1	0.2	0.2	0.1	0.1	0.2	0.7	1.0	0.6	0.8	0.2	0.3	1.1	0.8	0.2	0.1	0.2	0.5	0.1	0.1	0.4	1.1
5-Nov	0.1	0.2	Z	0.4	0.2	0.2	0.1	0.1	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.4
6-Nov	0.5	1.5	0.8	1.2	1.1	1.4	1.6	0.9	0.9	1.1	2.0	2.5	2.3	3.1	3.1	5.7	6.4	4.4	2.8	2.7	2.0	1.9	1.9	1.8	2.2	6.4
7-Nov	1.9	1.9	1.8	2.0	1.9	2.1	1.6	1.5	2.2	1.9	1.5	M	3.0	4.1	3.2	3.8	4.4	3.5	2.2	1.4	3.1	7.0	3.6	10.2	3.0	10.2
8-Nov	9.1	7.5	6.7	2.2	Z	0.6	0.2	0.5	0.5	0.2	C	C	C	C	0.4	0.2	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	1.5	9.1
9-Nov	0.0	0.1	0.2	0.1	1.4	Z	1.5	1.9	M	M	2.7	3.0	3.2	1.4	1.3	1.3	0.9	2.8	5.2	6.0	4.8	2.5	3.7	2.1	2.2	6.0
10-Nov	Z	3.2	2.7	1.8	2.4	4.0	2.5	3.1	2.8	2.1	1.6	1.4	1.6	1.3	1.7	2.1	3.1	2.9	2.5	2.5	2.8	2.3	2.7	2.7	2.4	4.0
11-Nov	3.7	Z	4.0	4.4	3.4	2.1	1.1	1.3	1.0	2.0	1.1	1.8	1.4	3.3	5.5	4.1	3.6	4.3	4.6	7.1	7.9	3.6	5.6	11.6	3.8	11.6
12-Nov	10.5	9.9	Z	11.0	12.6	14.6	12.3	11.7	14.6	10.0	3.1	4.5	4.2	2.1	2.3	5.4	3.2	10.9	7.7	4.1	6.0	15.9	9.6	2.2	8.2	15.9
13-Nov	7.6	10.1	7.3	Z	2.9	6.7	0.6	0.4	0.3	0.2	0.2	0.1	0.2	0.2	0.2	0.1	0.1	0.1	0.0	0.0	0.0	0.1	0.9	0.3	1.7	10.1
14-Nov	2.7	0.7	1.4	2.6	Z	2.0	1.5	1.4	8.3	8.3	4.2	3.2	5.1	2.9	6.0	3.1	2.3	8.2	1.8	1.1	1.2	2.4	3.3	3.8	3.4	8.3
15-Nov	4.7	3.5	2.5	4.2	3.0	Z	1.2	4.5	6.4	13.3	6.8	1.6	2.1	1.2	0.5	0.0	0.2	0.2	1.1	0.4	0.0	0.5	0.4	0.0	2.5	13.3
16-Nov	Z	0.0	0.0	0.1	0.6	0.5	0.8	4.6	4.9	2.9	2.6	2.6	2.5	4.2	3.0	5.6	6.8	8.0	7.1	5.7	4.6	7.2	8.1	15.3	4.2	15.3
17-Nov	13.3	Z	12.9	3.3	16.4	15.5	14.5	13.1	13.6	13.8	10.6	5.0	6.2	7.2	7.6	8.1	2.3	2.1	5.0	8.1	6.4	3.5	2.9	6.6	8.6	16.4
18-Nov	3.8	6.7	Z	3.3	3.2	5.9	8.1	7.5	4.3	5.8	3.0	2.7	1.0	2.6	3.7	3.3	5.1	5.0	5.0	5.2	4.6	3.6	3.2	1.9	4.3	8.1
19-Nov	2.5	2.1	1.7	Z	3.3	4.5	9.7	8.5	10.9	12.3	4.8	6.2	3.7	4.3	3.1	5.4	5.9	9.4	7.6	9.7	8.0	8.1	3.0	6.1	6.1	12.3
20-Nov	4.7	4.2	3.7	0.7	Z	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.2	0.6	0.1	0.2	0.5	0.3	0.6	1.1	0.1	0.2	1.5	0.5	0.8	4.7
21-Nov	0.0	0.0	0.6	0.5	1.7	Z	2.2	0.5	0.9	0.8	0.5	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.4	2.2
22-Nov	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9	1.3	0.3	0.0	0.1	1.0	0.2	1.3
23-Nov	0.0	Z	1.4	1.6	2.9	2.1	3.1	2.9	1.7	1.5	1.6	2.9	5.4	5.4	4.7	7.0	5.8	5.6	6.5	7.0	7.7	6.8	7.0	6.7	4.2	7.7
24-Nov	6.0	5.8	Z	4.1	3.5	5.0	3.6	4.6	5.2	5.8	10.0	10.9	3.3	2.8	1.4	1.1	2.2	7.5	4.8	6.1	3.9	5.0	12.9	15.6	5.7	15.6
25-Nov	13.3	14.0	10.5	Z	4.0	0.5	0.4	1.0	1.0	0.2	0.1	0.2	0.2	0.5	0.0	0.0	0.2	0.0	0.1	1.4	0.1	1.1	1.9	3.3	2.3	14.0
26-Nov	5.3	11.9	7.3	1.4	Z	5.8	4.9	2.6	3.9	3.4	3.1	0.7	0.7	1.4	2.8	3.3	0.2	0.0	4.4	8.5	3.1	3.5	11.6	3.7	4.1	11.9
27-Nov	7.3	3.3	2.2	3.3	2.6	Z	7.4	8.5	4.4	3.9	4.5	2.1	3.2	4.8	3.6	3.2	5.4	7.8	7.9	5.9	3.1	3.0	3.8	3.3	4.5	8.5
28-Nov	Z	4.2	14.7	9.5	12.8	9.4	14.4	11.6	6.3	10.8	5.5	5.4	2.9	2.5	7.9	12.0	9.3	12.9	14.4	10.9	3.2	1.0	2.7	3.8	8.2	14.7
29-Nov	0.2	Z	2.2	1.6	1.2	0.8	0.1	0.5	0.3	0.1	0.0	0.0	0.0	0.1	0.2	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.3	2.2
30-Nov	0.0	0.0	Z	0.1	0.0	0.0	0.0	3.0	0.8	1.3	0.4	0.0	0.0	0.0	0.0	0.8	0.8	2.4	1.8	0.9	1.8	3.6	2.3	7.2	1.2	7.2

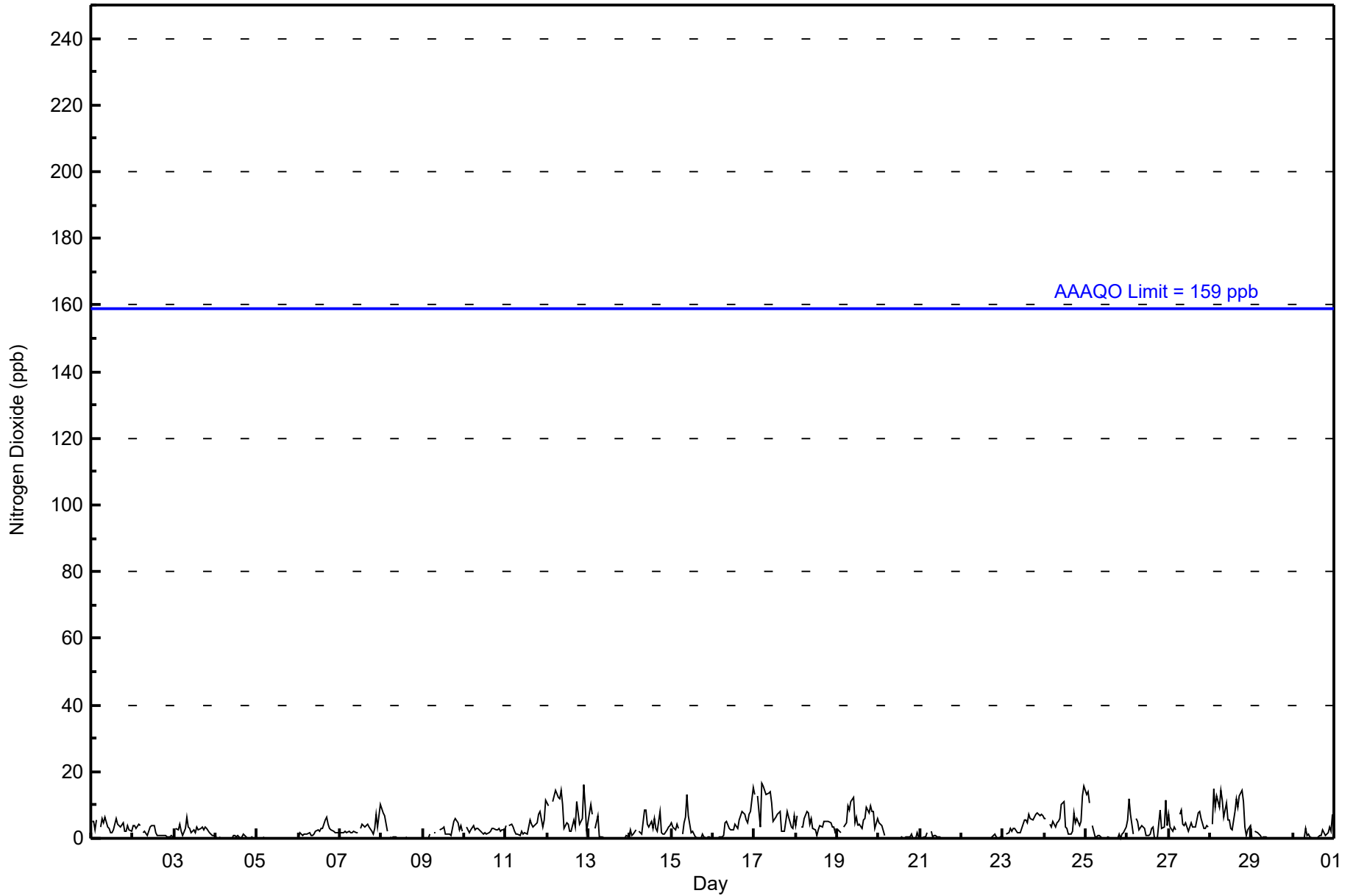
4.3	4.1	3.7	2.7	3.5	3.5	3.5	3.7	3.7	3.8	2.7	2.4	2.1	2.2	2.4	2.8	2.6	3.5	3.4	3.4	2.6	3.0	3.2	3.8	Diurnal Average	
13.3	14.0	14.7	11.0	16.4	15.5	14.5	13.1	14.6	13.8	10.6	10.9	6.2	7.2	7.9	12.0	9.3	12.9	14.4	10.9	8.0	15.9	12.9	15.6	Diurnal Maximum	

Z - zerspan      C - Calibration      M - Maintenance  
 Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 159 ppb



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb**  
**Sawbones Bay - November 2023**





**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb**  
**Sawbones Bay - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	685	100.00	100.00
21 - 40	0	0.00	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Sawbones Bay - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 20	20	36	20	18	44	26	27	52	77	57	57	44	67	91	37	12	685
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	20	36	20	18	44	26	27	52	77	57	57	44	67	91	37	12	685

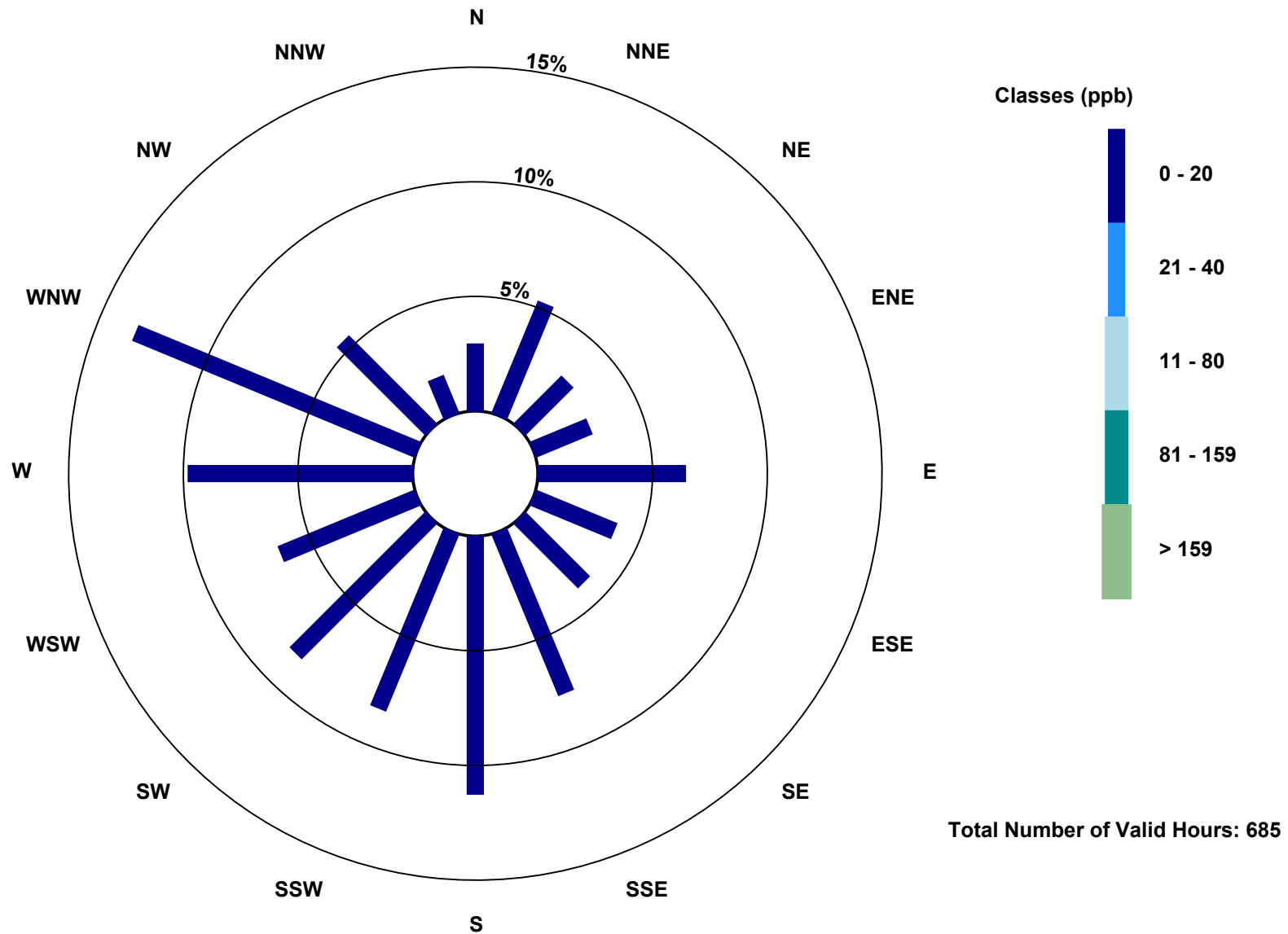
Total Number of Valid Hours: 685

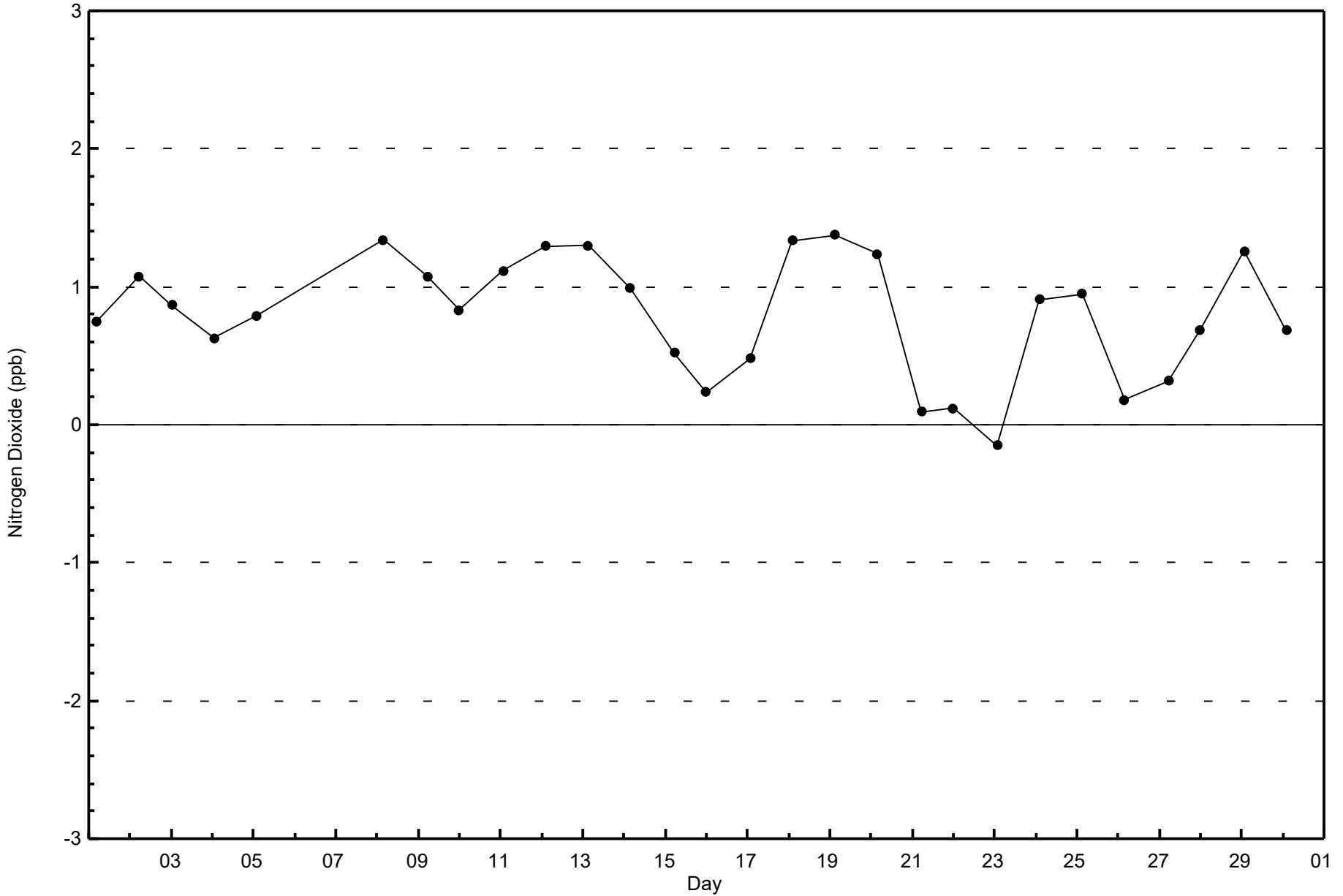
Total Number of Hours: 720



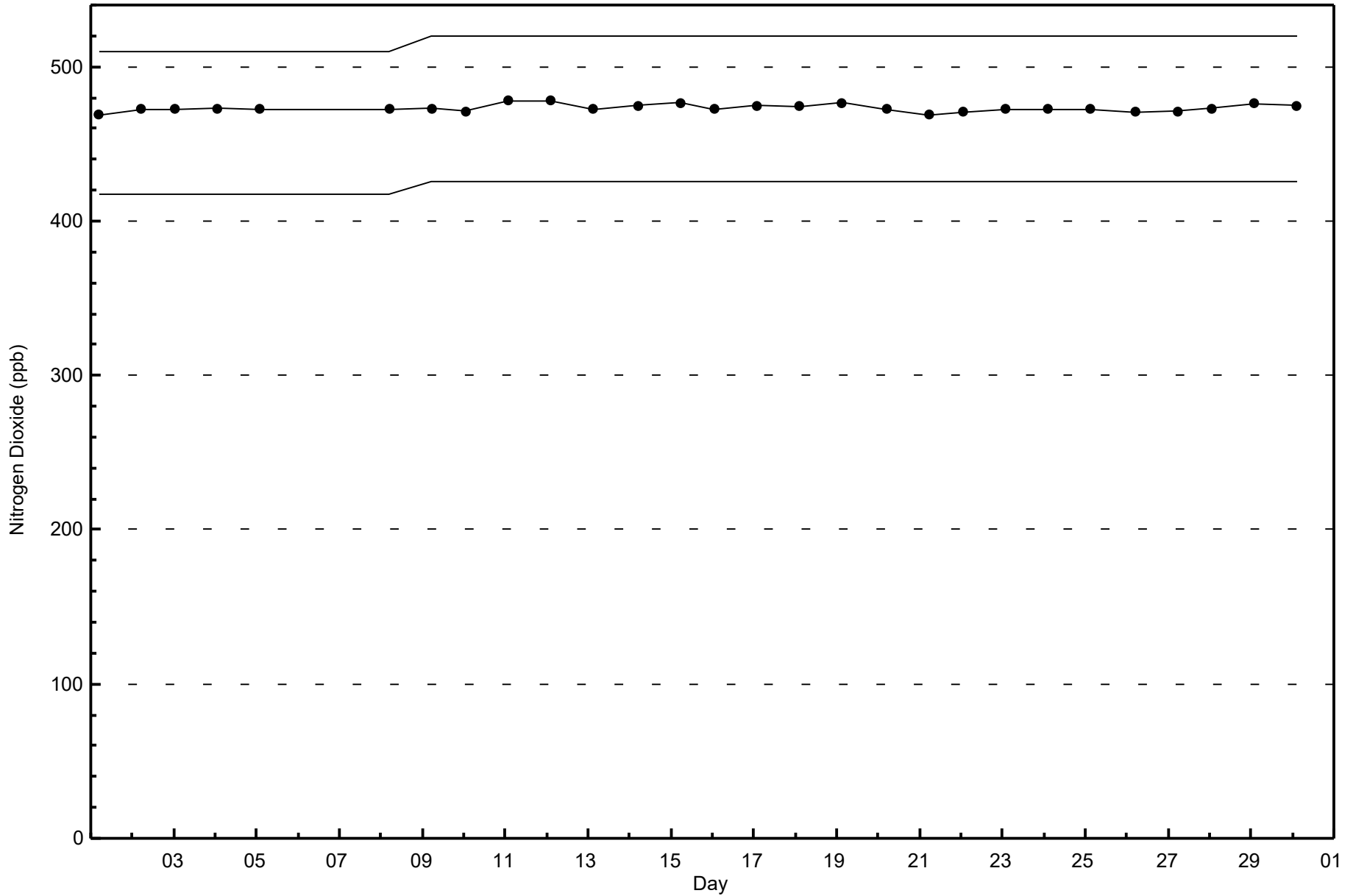
Wood Buffalo Environmental Association  
Wind Rose Nov 2023

Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Sawbones Bay







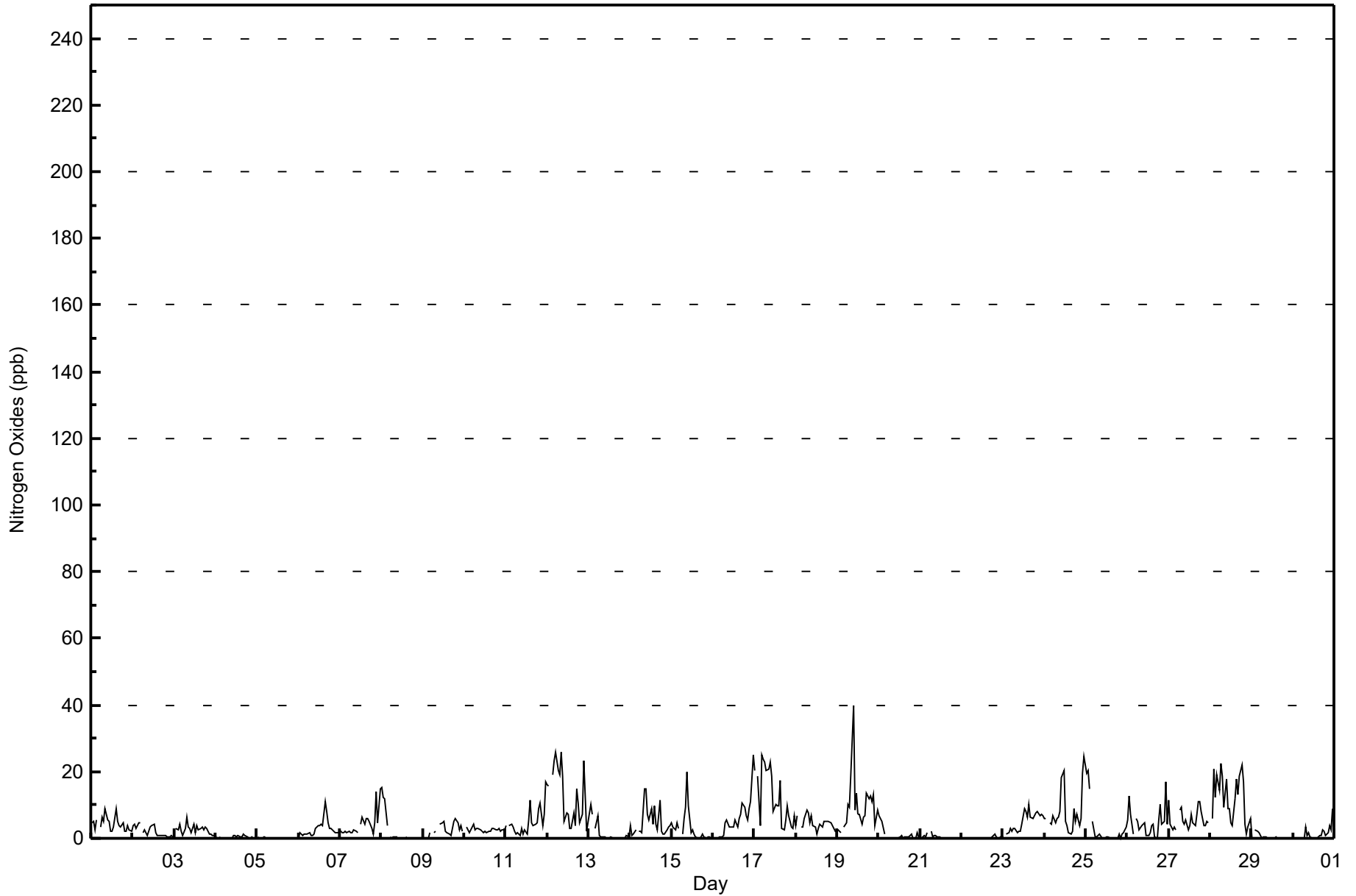






**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Sawbones Bay - November 2023**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Sawbones Bay - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	669	97.66	97.66
21 - 40	16	2.34	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Sawbones Bay - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	20	36	20	18	44	26	27	52	76	57	57	33	63	91	37	12	669
21 - 40	0	0	0	0	0	0	0	0	1	0	0	11	4	0	0	0	16
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	20	36	20	18	44	26	27	52	77	57	57	44	67	91	37	12	685

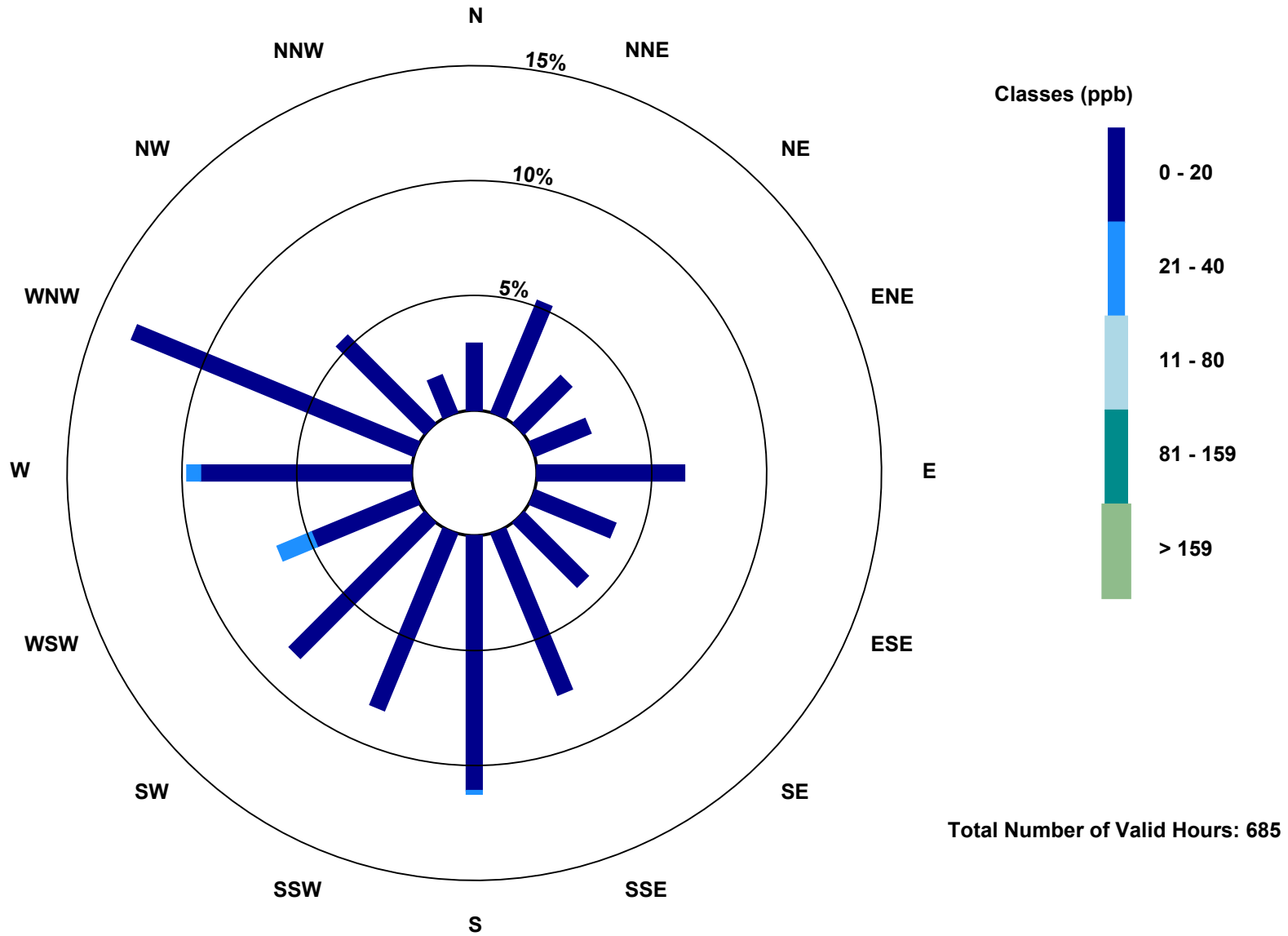
Total Number of Valid Hours: 685

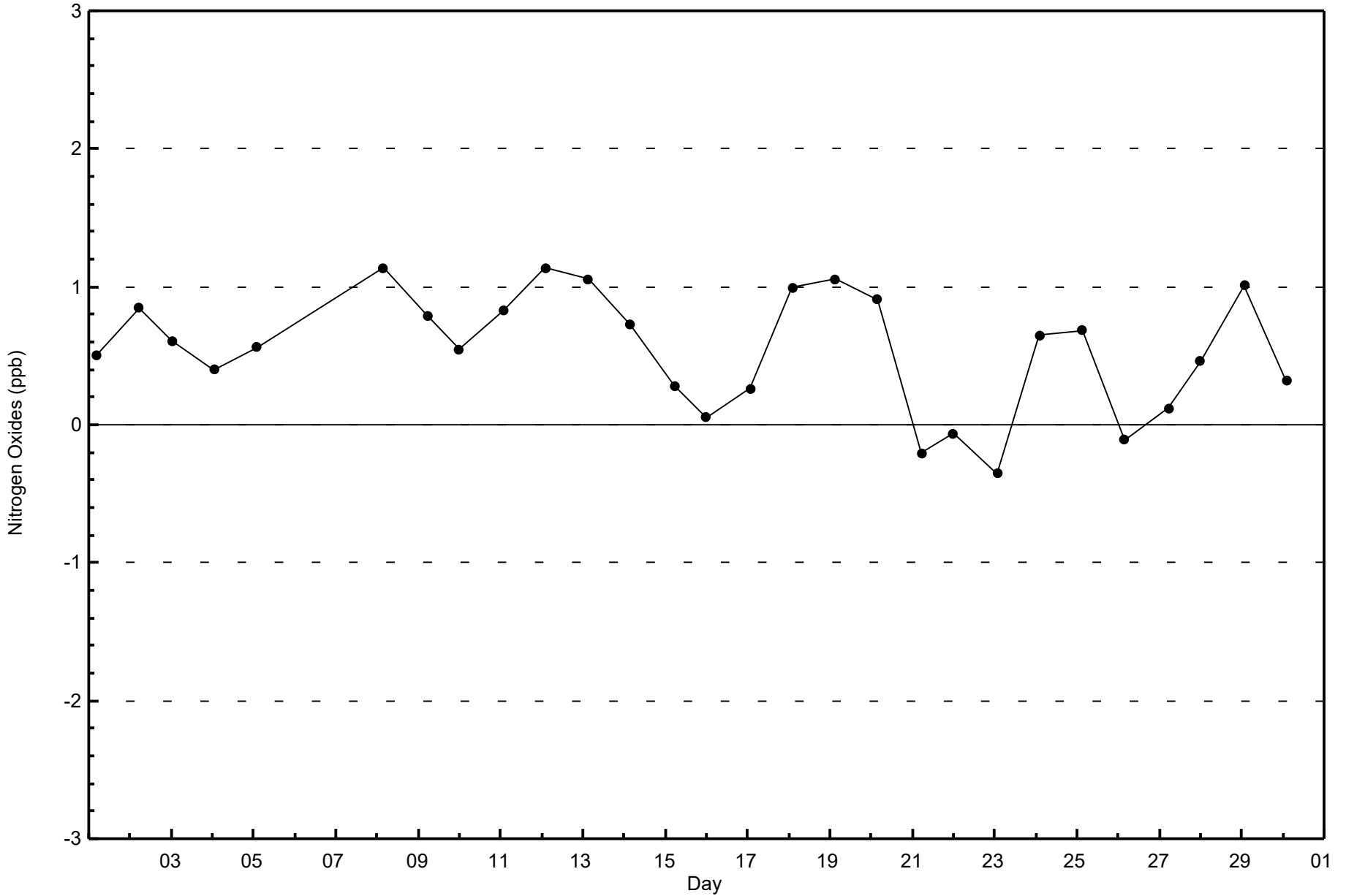
Total Number of Hours: 720

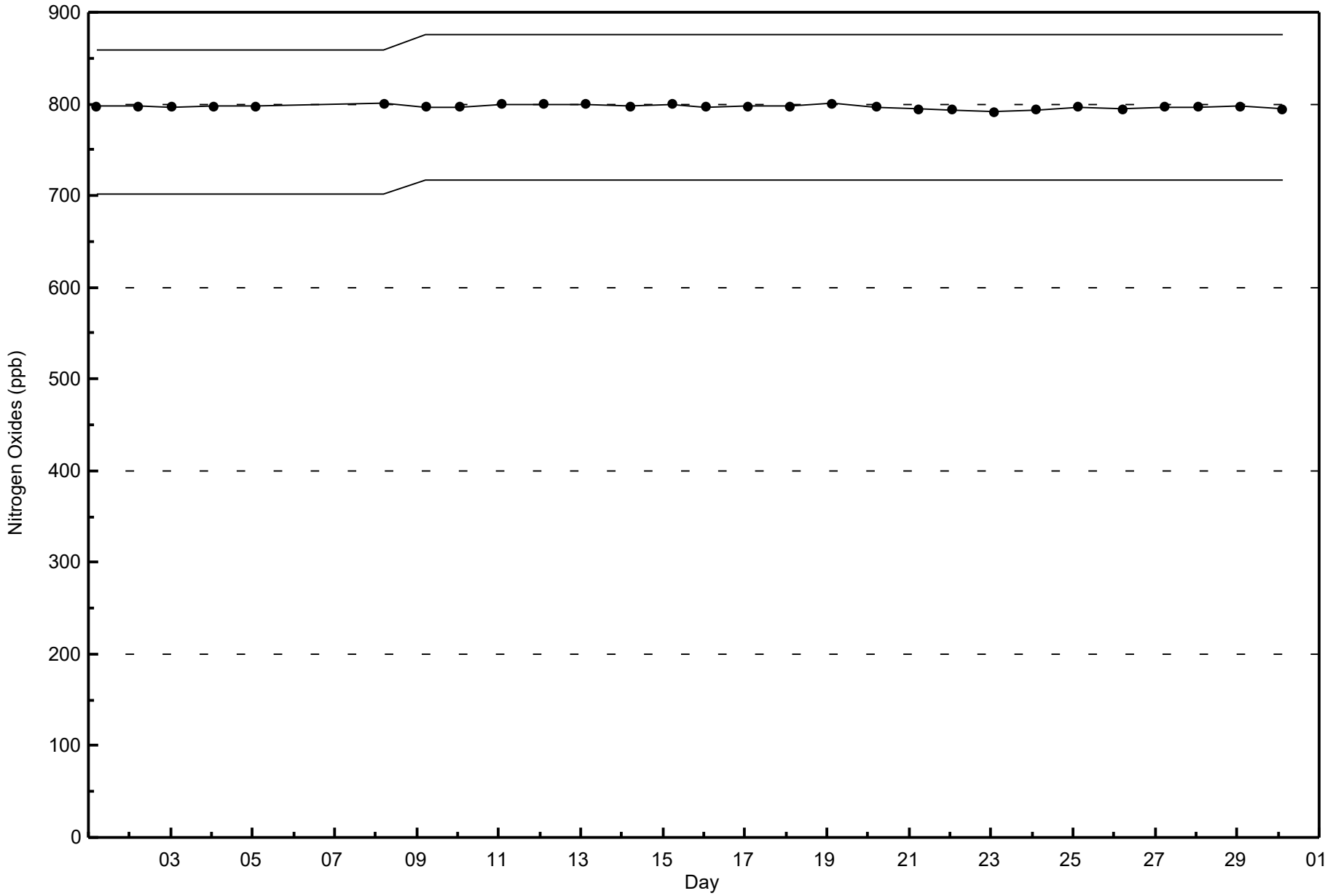


Wood Buffalo Environmental Association  
Wind Rose Nov 2023

Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Sawbones Bay











**Wood Buffalo Environmental Association**  
**Summary of Hour Averages**

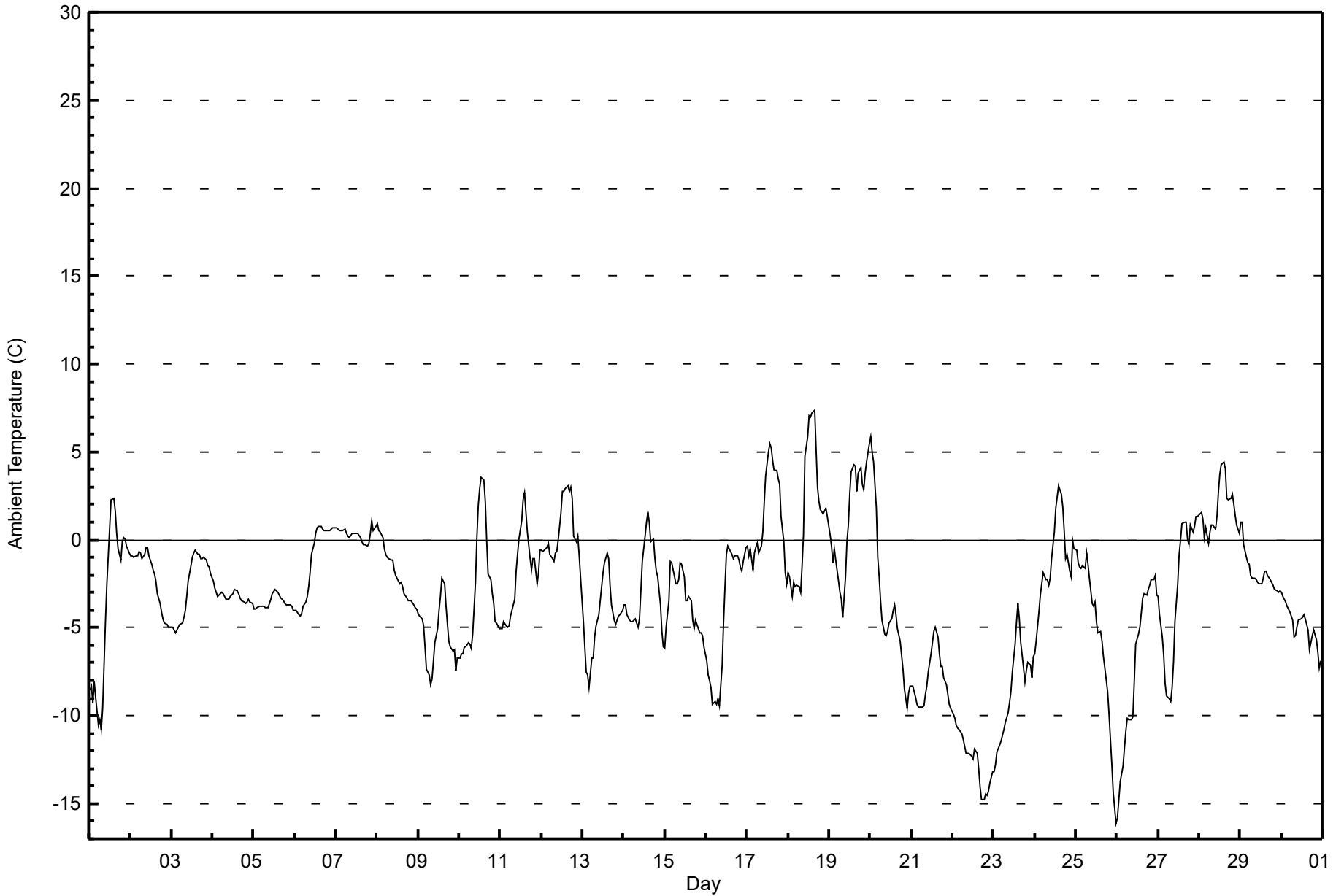
**Ambient Temperature (AT) - C**  
**Sawbones Bay - November 2023**

Maximum Value: 7.3 C on Nov 18 16:00		Maximum Daily Average: 1.8 C on Nov 28		Hours in Service: 720																																												
Minimum Value: -16.1 C on Nov 26 00:00		Minimum Daily Average: -12.4 C on Nov 22		Hours of Data: 720																																												
Maximum Diurnal Average: -0.6 C at hour 15		Minimum Diurnal Average: -4.7 C at hour 8		Hours of Missing Data: 0																																												
Monthly Average: -3.11 C		Percentiles: P <sub>1</sub> = -14.4 P <sub>10</sub> = -8.8 Q <sub>1</sub> = -5.1 Median = -2.9 Q <sub>3</sub> = -0.4 P <sub>90</sub> = 1.6 P <sub>99</sub> = 5.4		Hours of Calibration: 0																																												
				Percent Operational Time: 100.0																																												
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Nov	-8.5	-8.3	-9.3	-8.1	-8.9	-10.6	-10.3	-10.8	-9.6	-4.6	-2.5	-0.9	0.6	2.3	2.3	1.6	0.3	-0.5	-1.1	-0.1	0.1	0.0	-0.3	-0.7	-3.7	2.3																						
2-Nov	-0.9	-0.9	-1.0	-0.9	-0.9	-0.7	-0.7	-1.0	-0.8	-0.5	-0.5	-0.9	-1.4	-1.7	-2.0	-2.4	-3.0	-3.6	-4.1	-4.5	-4.7	-4.8	-4.9	-5.0	-2.2	-0.5																						
3-Nov	-5.0	-5.0	-5.3	-5.1	-4.9	-4.8	-4.7	-4.4	-4.0	-3.2	-2.4	-1.5	-1.0	-0.7	-0.6	-0.8	-0.8	-1.1	-1.1	-1.0	-1.1	-1.5	-1.6	-1.9	-2.6	-0.6																						
4-Nov	-2.4	-2.7	-3.0	-3.2	-3.1	-3.0	-3.0	-3.2	-3.4	-3.4	-3.2	-3.2	-3.0	-2.9	-2.9	-3.1	-3.3	-3.4	-3.6	-3.6	-3.6	-3.4	-3.5	-3.7	-3.2	-2.4																						
5-Nov	-3.9	-3.9	-3.9	-3.8	-3.8	-3.8	-3.8	-3.8	-3.9	-3.8	-3.6	-3.4	-3.1	-2.8	-2.9	-3.0	-3.1	-3.3	-3.5	-3.6	-3.7	-3.7	-3.8	-4.0	-3.6	-2.8																						
6-Nov	-4.0	-4.0	-4.2	-4.3	-4.2	-3.8	-3.6	-3.2	-2.7	-1.9	-0.8	-0.2	0.3	0.7	0.8	0.8	0.6	0.5	0.6	0.5	0.5	0.6	0.7	0.7	-1.2	0.8																						
7-Nov	0.7	0.6	0.5	0.5	0.5	0.6	0.4	0.2	0.1	0.3	0.4	0.4	0.4	0.4	0.2	-0.1	-0.3	-0.3	-0.4	-0.2	0.4	1.1	0.5	0.7	0.3	1.1																						
8-Nov	1.0	0.5	0.5	0.1	-0.5	-0.8	-1.0	-1.0	-1.1	-1.2	-1.7	-2.1	-2.3	-2.5	-2.5	-2.6	-3.0	-3.3	-3.5	-3.5	-3.5	-3.7	-3.8	-3.9	-1.9	1.0																						
9-Nov	-4.2	-4.4	-4.5	-4.9	-6.1	-7.4	-7.7	-8.3	-7.9	-6.9	-5.9	-5.0	-4.0	-3.3	-2.2	-2.5	-3.7	-4.8	-5.8	-6.1	-6.3	-6.3	-7.5	-6.7	-5.5	-2.2																						
10-Nov	-6.7	-6.5	-6.4	-6.1	-6.1	-5.9	-5.9	-6.1	-5.4	-2.4	0.1	2.0	2.9	3.5	3.4	2.2	0.0	-1.9	-2.2	-3.0	-3.6	-4.7	-4.7	-5.0	-2.9	3.5																						
11-Nov	-5.0	-5.0	-4.7	-4.9	-5.0	-4.9	-4.3	-4.0	-3.4	-1.8	-0.8	0.0	1.1	2.3	2.6	1.6	0.5	-1.0	-1.7	-1.1	-1.1	-2.5	-1.9	-0.6	-1.9	2.6																						
12-Nov	-0.6	-0.7	-0.5	-0.4	-0.2	-0.8	-1.0	-1.2	-0.8	-0.7	0.0	1.6	2.7	2.8	2.9	3.1	2.8	3.0	2.4	0.2	-0.1	0.2	-0.9	-2.1	0.5	3.1																						
13-Nov	-4.7	-6.1	-7.5	-7.7	-8.4	-6.7	-6.7	-5.6	-4.9	-4.2	-3.4	-2.7	-1.8	-1.3	-0.8	-1.1	-2.6	-3.7	-4.6	-4.8	-4.6	-4.3	-4.2	-4.0	-4.4	-0.8																						
14-Nov	-3.7	-3.7	-4.2	-4.5	-4.7	-4.7	-4.6	-4.5	-4.9	-4.5	-2.9	-1.3	0.2	1.0	1.6	1.0	-0.1	0.0	-1.1	-1.8	-2.1	-3.7	-5.2	-6.1	-2.7	1.6																						
15-Nov	-6.2	-5.0	-3.5	-1.2	-1.3	-1.7	-2.5	-2.5	-2.2	-1.3	-1.4	-2.1	-3.4	-3.5	-3.2	-3.4	-4.6	-5.0	-4.6	-4.8	-5.3	-5.3	-5.5	-6.1	-3.6	-1.2																						
16-Nov	-6.9	-7.7	-8.0	-8.4	-9.3	-9.2	-9.4	-9.0	-9.5	-7.1	-4.7	-2.7	-0.9	-0.4	-0.6	-0.8	-1.1	-0.9	-0.9	-1.1	-1.5	-1.8	-1.2	-0.4	-4.3	-0.4																						
17-Nov	-0.4	-0.9	-0.5	-1.7	-0.8	-0.4	-0.2	-0.8	-0.4	0.5	2.1	3.6	5.0	5.4	5.2	4.5	4.0	3.9	3.5	3.2	1.3	-0.1	-1.8	-2.5	1.3	5.4																						
18-Nov	-1.9	-2.1	-3.2	-2.5	-2.7	-2.6	-2.7	-3.0	-1.5	0.3	4.7	5.8	7.1	7.0	7.2	7.3	5.2	3.0	2.2	1.7	1.5	1.7	1.8	1.3	1.5	7.3																						
19-Nov	0.3	-0.3	-1.3	-0.5	-1.1	-2.4	-3.0	-3.4	-4.4	-2.1	-0.1	0.9	2.6	3.9	4.3	4.2	2.8	3.8	4.1	3.2	2.8	3.8	4.4	5.4	1.2	5.4																						
20-Nov	5.9	5.0	4.5	1.8	-1.0	-2.1	-3.5	-4.6	-5.3	-5.4	-5.2	-4.7	-4.5	-4.0	-3.7	-4.3	-5.0	-5.8	-6.5	-7.4	-8.5	-9.6	-8.7	-8.3	-3.8	5.9																						
21-Nov	-8.3	-8.3	-9.0	-9.4	-9.5	-9.5	-9.5	-9.4	-8.8	-8.3	-7.5	-6.5	-5.8	-5.2	-4.9	-5.5	-6.5	-7.2	-7.2	-7.8	-8.2	-8.8	-9.4	-9.6	-7.9	-4.9																						
22-Nov	-9.9	-10.2	-10.5	-10.7	-10.8	-11.0	-11.3	-11.7	-12.1	-12.2	-12.2	-12.3	-12.5	-11.9	-12.1	-13.0	-14.1	-14.8	-14.7	-14.5	-14.6	-14.3	-13.8	-13.2	-12.4	-9.9																						
23-Nov	-13.1	-12.8	-12.1	-11.7	-11.4	-11.1	-10.8	-10.4	-9.8	-9.3	-8.6	-7.6	-5.9	-4.6	-3.6	-4.5	-5.8	-7.2	-8.1	-7.5	-6.9	-7.1	-7.8	-6.6	-8.5	-3.6																						
24-Nov	-6.5	-5.8	-4.1	-3.2	-2.5	-1.9	-2.3	-2.2	-2.6	-2.2	-1.1	0.5	1.8	2.4	3.1	2.6	1.8	0.5	-1.1	-0.8	-1.8	-2.1	0.0	-0.5	-1.2	3.1																						
25-Nov	-0.6	-1.3	-1.6	-1.6	-1.5	-1.6	-0.8	-1.4	-2.2	-3.6	-3.8	-3.6	-4.6	-5.3	-5.2	-5.7	-6.6	-7.3	-8.7	-9.9	-11.3	-12.8	-14.4	-16.1	-5.5	-0.6																						
26-Nov	-15.8	-14.7	-13.8	-12.9	-11.8	-10.8	-10.2	-10.2	-10.2	-10.1	-8.1	-5.9	-5.4	-5.0	-4.1	-3.3	-3.1	-3.1	-2.9	-2.6	-2.3	-2.2	-2.0	-3.2	-7.2	-2.0																						
27-Nov	-3.2	-4.2	-5.5	-6.6	-8.1	-8.9	-9.1	-9.2	-8.4	-6.9	-4.7	-2.5	-0.8	0.0	0.9	1.0	1.0	0.1	-0.3	0.8	0.4	0.8	1.3	1.3	-2.9	1.3																						
28-Nov	1.5	1.5	1.2	0.1	0.7	-0.2	0.4	0.9	0.8	0.6	1.4	2.7	3.7	4.2	4.4	4.0	2.4	2.3	2.3	2.6	2.0	1.4	0.8	0.4	1.8	4.4																						
29-Nov	1.0	1.0	-0.2	-1.0	-1.3	-1.4	-2.1	-2.2	-2.2	-2.3	-2.5	-2.5	-2.5	-2.2	-1.8	-1.8	-2.1	-2.3	-2.4	-2.6	-2.8	-2.9	-3.0	-2.9	-1.9	1.0																						
30-Nov	-3.0	-3.2	-3.5	-3.7	-3.9	-4.1	-4.6	-5.5	-5.4	-5.0	-4.6	-4.5	-4.4	-4.2	-4.5	-5.1	-6.2	-5.8	-5.4	-5.1	-5.7	-6.4	-7.3	-6.9	-4.9	-3.0																						
																								-3.8	-4.0	-4.2	-4.2	-4.4	-4.5	-4.6	-4.7	-4.6	-3.8	-2.8	-1.9	-1.3	-0.8	-0.6	-1.0	-1.8	-2.3	-2.7	-2.8	-3.1	-3.4	-3.6	-3.7	Diurnal Average
																								5.9	5.0	4.5	1.8	0.7	0.6	0.4	0.9	0.8	0.6	4.7	5.8	7.1	7.0	7.2	7.3	5.2	3.9	4.1	3.2	2.8	3.8	4.4	5.4	Diurnal Maximum



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Ambient Temperature (AT) - C**  
**Sawbones Bay - November 2023**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C  
Sawbones Bay - November 2023**

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	0	0.00	0.00
-20 - 0	565	78.47	78.47
0 - 10	155	21.53	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



Maximum Value: 99.9 % on Nov 27 11:00	Maximum Daily Average: 95.9 % on Nov 9	Hours in Service: 720
Minimum Value: 39.9 % on Nov 20 15:00	Minimum Daily Average: 52.8 % on Nov 20	Hours of Data: 581
Maximum Diurnal Average: 84.5 % at hour 9	Minimum Diurnal Average: 67.6 % at hour 15	Hours of Missing Data: 139
Monthly Average: 78.52 %	Percentiles: P <sub>1</sub> = 47.6 P <sub>10</sub> = 59.9 Q <sub>1</sub> = 71.1 Median = 79.5 Q <sub>3</sub> = 88.4 P <sub>90</sub> = 94.1 P <sub>99</sub> = 99.2	Hours of Calibration: 0
		Percent Operational Time: 80.7

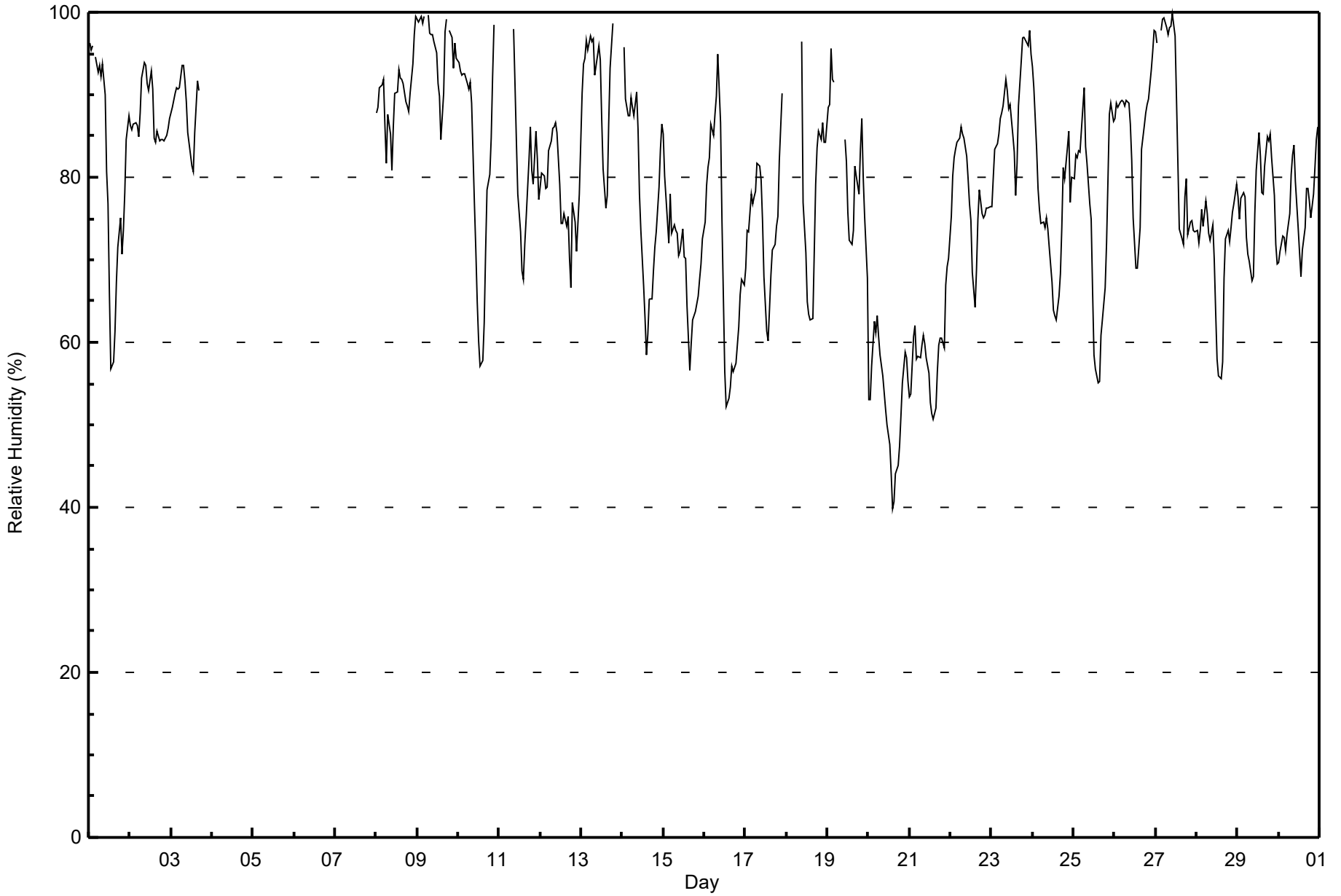
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	96.2	95.4	95.9	OR	94.6	92.7	93.6	92.2	93.7	90.1	80.6	76.7	66.0	56.8	57.6	61.3	67.3	71.6	75.0	70.6	73.6	78.1	84.6	87.4	80.5	96.2
2-Nov	86.3	85.8	86.4	86.6	86.3	84.9	87.9	92.1	93.9	93.5	91.3	90.6	92.9	90.7	84.8	84.2	85.7	84.4	84.7	84.6	84.4	85.1	86.0	87.2	87.5	93.9
3-Nov	87.8	88.5	90.2	90.8	90.7	90.9	93.6	93.5	91.8	89.2	85.4	82.7	81.4	80.7	85.4	91.7	90.6	OR	OR	OR	OR	OR	OR	OR	--	93.6
4-Nov	OR	OR	OR	OR	OR	OR	OR	OR	OR	OR	OR	OR	OR	OR	OR	OR	OR	OR	OR	OR	OR	OR	OR	OR	--	--
5-Nov	OR	OR	OR	OR	OR	OR	OR	OR	OR	OR	OR	OR	OR	OR	OR	OR	OR	OR	OR	OR	OR	OR	OR	OR	--	--
6-Nov	OR	OR	OR	OR	OR	OR	OR	OR	OR	OR	OR	OR	OR	OR	OR	OR	OR	OR	OR	OR	OR	OR	OR	OR	--	--
7-Nov	OR	OR	OR	OR	OR	OR	OR	OR	OR	OR	OR	OR	OR	OR	OR	OR	OR	OR	OR	OR	OR	OR	OR	OR	--	--
8-Nov	87.8	88.5	90.9	91.2	91.8	86.2	81.7	87.7	85.2	80.9	86.1	90.2	90.3	93.0	92.1	91.9	91.4	89.2	88.6	88.0	90.2	93.8	97.3	99.4	89.7	99.4
9-Nov	99.1	98.8	99.5	98.6	99.5	OR	99.6	97.5	97.3	97.3	96.5	95.1	91.3	89.8	84.5	90.1	97.6	99.2	OR	97.8	96.9	93.2	96.3	94.4	95.9	99.6
10-Nov	93.8	93.0	92.4	92.5	92.5	91.3	90.7	91.6	89.0	76.7	71.1	64.8	60.2	57.2	57.9	62.3	71.0	78.5	80.3	84.7	92.2	98.6	OR	OR	81.0	98.6
11-Nov	OR	OR	OR	OR	OR	OR	OR	OR	98.0	91.4	84.5	77.9	73.3	68.6	67.7	71.9	75.1	82.0	86.2	80.9	79.1	85.6	82.2	77.2	--	98.0
12-Nov	78.8	80.4	80.1	78.7	78.8	83.2	84.4	86.0	86.2	86.7	85.4	79.1	74.4	74.3	75.6	74.1	75.3	70.1	66.7	77.0	74.6	71.0	74.4	78.0	78.1	86.7
13-Nov	90.3	93.7	94.5	96.6	95.4	97.1	96.5	96.8	92.4	94.8	96.0	94.2	87.1	81.0	76.2	77.8	86.4	93.3	98.6	OR	OR	OR	OR	OR	91.5	98.6
14-Nov	OR	95.8	89.5	87.4	87.5	89.6	88.5	87.5	90.3	85.7	78.0	73.6	66.7	62.8	58.4	61.0	65.2	65.3	68.6	71.5	73.4	78.9	83.3	86.5	78.0	95.8
15-Nov	85.2	80.1	74.8	72.0	77.9	73.2	74.3	73.5	73.3	70.5	71.1	73.8	70.4	70.2	64.5	56.6	59.9	62.7	63.3	63.7	65.6	67.6	69.4	72.6	70.3	85.2
16-Nov	74.6	79.0	81.2	82.4	86.4	85.1	87.6	89.8	94.9	86.6	74.8	65.6	56.5	52.2	53.2	54.6	57.1	56.5	57.4	59.7	61.9	65.8	67.7	66.9	70.7	94.9
17-Nov	69.1	73.6	73.3	78.0	76.7	77.7	78.3	81.6	81.3	79.6	74.7	68.0	61.3	60.2	64.0	68.2	71.1	71.8	74.1	75.2	82.0	90.2	OR	OR	74.1	90.2
18-Nov	OR	OR	OR	OR	OR	OR	OR	OR	OR	96.5	77.0	70.9	64.9	63.4	62.8	62.9	71.0	79.2	83.6	85.6	84.6	86.6	84.2	84.2	--	96.5
19-Nov	88.4	88.9	95.6	91.9	91.6	OR	OR	OR	OR	OR	84.5	81.8	75.7	72.4	71.8	73.6	81.3	80.3	77.9	83.4	87.1	80.1	75.3	67.8	81.5	95.6
20-Nov	53.0	53.1	57.1	62.5	61.2	63.1	60.7	58.6	55.9	53.9	51.9	50.0	47.7	44.0	39.9	40.6	44.0	45.0	47.5	51.2	55.1	58.9	58.2	55.3	52.8	63.1
21-Nov	53.4	53.7	60.7	62.0	57.9	58.3	58.1	59.6	60.8	59.8	58.2	56.3	52.8	51.4	50.7	52.0	56.5	59.7	60.5	60.4	59.4	66.9	69.2	70.1	58.7	70.1
22-Nov	75.3	80.2	82.3	83.4	84.2	84.7	86.1	85.3	84.7	82.6	79.8	76.8	74.7	68.6	64.3	68.7	74.8	78.4	75.5	75.1	75.4	76.2	76.4	76.5	77.9	86.1
23-Nov	76.4	80.0	83.4	84.1	85.3	87.1	87.8	88.6	91.8	90.6	88.4	88.8	85.1	83.0	77.9	81.7	88.6	94.1	96.9	96.9	96.6	96.0	97.9	94.9	88.4	97.9
24-Nov	93.4	90.9	83.4	78.7	76.0	74.4	74.6	73.9	75.1	73.8	71.4	67.2	63.8	63.3	62.7	65.7	68.3	73.9	81.2	79.8	83.5	85.6	77.0	80.0	75.7	93.4
25-Nov	79.9	82.7	82.3	83.3	83.0	88.3	90.9	83.8	81.7	76.8	75.0	66.2	58.4	56.8	55.1	55.3	60.9	62.8	66.6	72.1	79.7	87.6	88.9	86.8	75.2	90.9
26-Nov	87.1	89.1	88.4	89.2	89.4	89.2	88.6	89.3	88.9	86.5	82.0	75.1	69.0	69.1	71.3	74.0	83.3	86.3	87.8	88.9	89.4	93.0	95.3	97.8	85.3	97.8
27-Nov	97.6	96.2	OR	97.8	99.1	99.3	98.2	97.2	98.2	98.4	99.9	97.1	89.5	81.7	73.7	72.5	71.9	77.7	79.9	73.0	74.5	74.7	73.5	73.4	86.7	99.9
28-Nov	73.6	72.0	73.5	76.1	74.1	77.1	75.5	73.3	72.4	74.2	70.0	63.7	58.0	56.0	55.7	57.7	67.8	72.6	73.5	72.2	73.9	75.7	76.9	79.2	70.6	79.2
29-Nov	77.6	74.9	77.5	78.2	77.6	72.6	70.7	69.8	67.5	67.9	75.6	80.9	85.4	82.5	78.2	78.0	81.4	85.0	84.4	85.2	82.3	77.7	71.9	69.6	77.2	85.4
30-Nov	69.6	71.1	72.9	72.7	71.1	73.0	75.6	80.3	82.7	83.9	79.5	73.9	70.8	67.9	71.2	73.9	78.6	78.6	77.2	75.1	77.9	81.3	84.6	86.1	76.2	86.1
	81.5	82.7	82.9	83.2	83.7	82.7	83.6	83.9	84.5	82.7	79.6	76.2	71.8	69.1	67.6	69.3	73.9	75.9	76.5	77.2	78.9	81.2	80.5	80.5		Diurnal Average
	99.1	98.8	99.5	98.6	99.5	99.3	99.6	97.5	98.2	98.4	99.9	97.1	92.9	93.0	92.1	91.9	97.6	99.2	98.6	97.8	96.9	98.6	97.9	99.4		Diurnal Maximum

OR - Out of Range



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Relative Humidity (RH) - %**  
**Sawbones Bay - November 2023**





**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Relative Humidity (RH) - %**  
**Sawbones Bay - November 2023**

<b>Concentration Ranges (%)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	0	0.00	0.00
20 - 40	1	0.17	0.17
40 - 60	58	9.98	10.15
60 - 80	238	40.96	51.12
80 - 100	284	48.88	100.00

Total Number of Valid Hours: 581

Total Number of Hours: 720

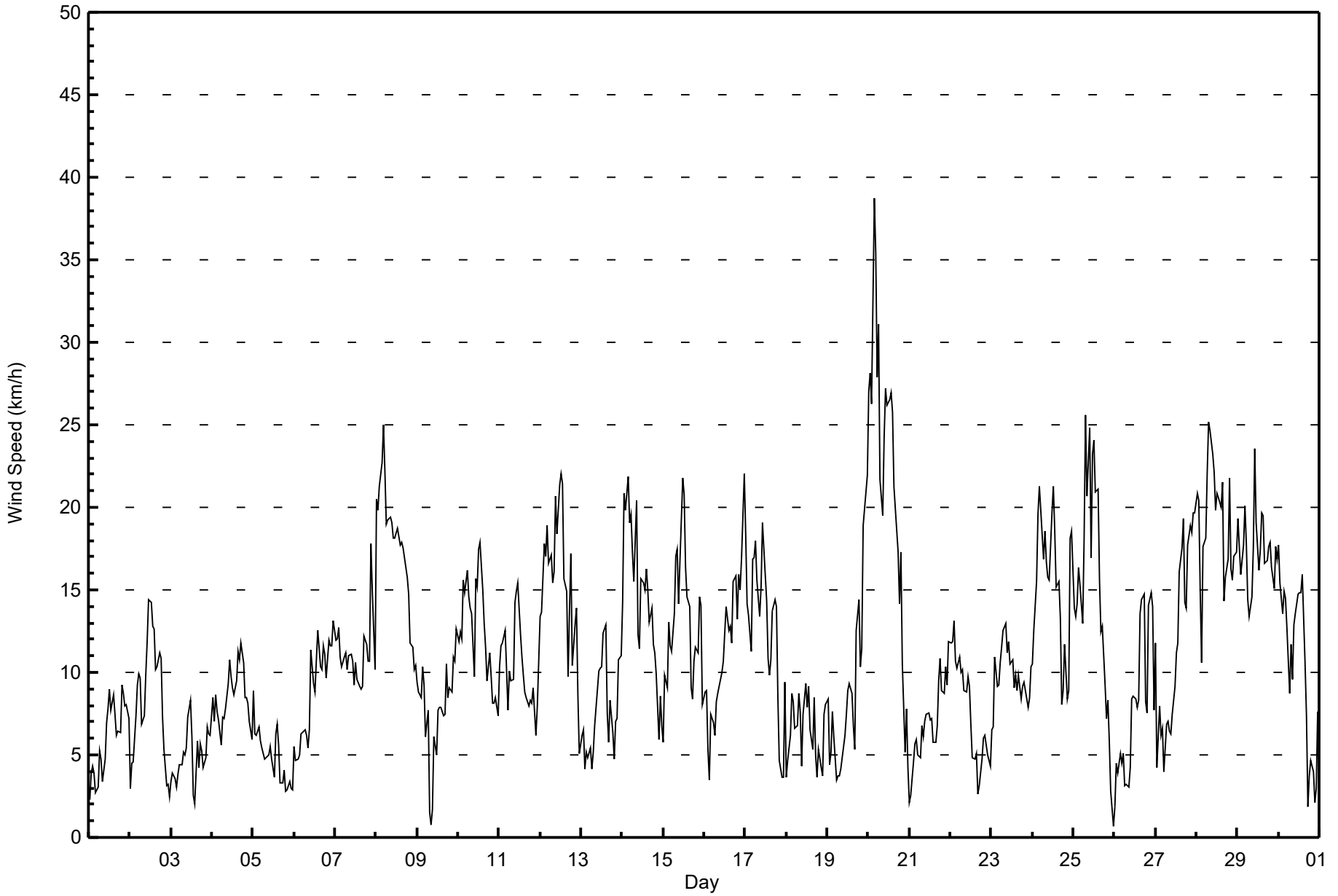


Maximum Speed: 39 km/h on Nov 20 04:00	Maximum Daily Speed Average: 21.8 km/h on Nov 20	Hours in Service: 720
Minimum Speed Value: 1 km/h on Nov 26 00:00	Minimum Daily Speed Average: 3.4 km/h on Nov 3	Hours of Data: 720
Maximum Diurnal Speed Average: 5.8 km/h at hour 13	Minimum Diurnal Speed Average: 3.9 km/h at hour 10	Hours of Missing Data: 0
Monthly Average Velocity: 4.9 km/h 254.3 deg	Percentiles: P <sub>1</sub> = 2 P <sub>10</sub> = 4 Q <sub>1</sub> = 7 Median = 10 Q <sub>3</sub> = 15 P <sub>90</sub> = 19 P <sub>99</sub> = 27	Percent Operational Time: 100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	SW2	SSW4	S4	SW4	SSW3	S3	S5	S5	S3	SSW5	SW7	SW8	SSW9	SSW8	SSW9	SSW7	S6	S6	S6	SSW9	SSW9	SSW8	SSW8	SSW7	SSW5.9	SSW9
2-Nov	SSW3	W4	SW5	W7	W9WNW10	WNW10	WNW7	NNW7	N10	N12	N14	N14	N13	N13	N10	N10	N11	N11	NNE7	NNE5	N3	NNW3	NE2	NNW6.4	N14	
3-Nov	ESE3	E4	ESE4	E3	ENE4	E4	E4	ESE5	ESE5	SE5	SSE7	S8	SSE6	SE3	ESE2	ESE6	E4	ESE6	E5	E4	NNE5	NNE7	NNE6	NNE6	E3.4	S8
4-Nov	NNE8	NNE7	NNE9	NNE8	NE7	ENE6	E7	E7	E8	E9	E11	E10	E9	E10	E11	E11	E12	E11	E8	E9	E8	E7	E6	E7.7	E12	
5-Nov	E9	E6	ENE6	ENE7	ENE6	ENE5	NE5	ENE5	NE5	NE5	NE5	ENE5	NE4	NNE6	NNE7	NE6	NE3	NE3	NNE4	NE3	NE3	ENE3	E3	ENE4.6	E9	
6-Nov	ESE6	E5	E5	E5	ESE6	ESE6	ESE7	ESE6	ESE5	ESE7	SSE11	SSE9	SSE9	SSE11	SSE13	S10	S10	S12	S11	S10	S12	S12	S12	S13	SSE7.4	S13
7-Nov	S12	SSW12	SSW13	SSW11	S10	SSW11	SSW11	S10	S11	SSW11	SSW11	S9	SSW11	S10	SSW9	SSW9	SSW9	SW12	SW12	SSW11	SW11	W18	W15WSW10	SSW9.9	W18	
8-Nov	W20	W20	W21	W23WNW25	WNW22	WNW19	WNW19	WNW19	NW19	NW18	NW18	NW18	NW19WNW18	NW18	NW18	NW16	NW16	NW16	NW15	NW12WNW12	WNW10	WNW10	WNW17.0	WNW25		
9-Nov	NW9	WNW9	WNW8	WNW10	WNW9	WNW6	W8	NW2	S1	ESE2	S6	SSE5	SSE8	SE8	SE8	SE7	SE7	SSE11	S8	SSE9	SSE9	SSE11	SSE11	SSE13	S3.6	SSE13
10-Nov	SSE12	SSE12	SSE12	S16	SSE15	S16	S15	SSE14	S14	S10	S16	S15	S17	S18	SSW15	S13	S12	S10	S11	S10	SSE8	S8	SSE8	SSE7	S12.4	S18
11-Nov	SSE10	SSE12	S12	SSE13	SE10	SE8	SSE10	SE10	SE10	SSE14	SSE15	SSE15	SSE12	S11	S10	S9	SSW8	S8	SSW8	SW8	SW9	SSW6	SW8WSW11	S9.0	SSE15	
12-Nov	WSW13	WSW14	WSW18	WSW17	WSW19	W17	W17	WSW15	WSW16	W21	W18	W21	W22WNW21	W16	W15	W10	W14	W17	SW10	SW13	WSW14	W9	W5	W15.1	W22	
13-Nov	S6	SSE7	ESE4	ESE5	E5	E5	ENE4	ENE5	ENE7	NE9	ENE10	ENE10	ENE10	E12	E13	E8	NNE6	NNE8	NNE6	N5	NW7	NW7WNW11	WNW11	NE4.1	E13	
14-Nov	W14WNW21	WNW20	WNW22	WNW19	WNW20	WNW17	WNW15	W20WSW12	SW11	SW16	WSW15	SW15	SW16	SW15	SSW13	SW14	SW12	SSW11	SSW10	SSW6	S9	S7	WSW12.2	WNW22		
15-Nov	SSE6	S10	S9	SW13	SSW12	SW11	SSW14	SW17	WSW14	SW17	ENE2	NW21	NW16	NW15	WNW14	NW9	NW8	WNW11	WNW11	WNW11	WNW15	WNW14	NW8	W9.4	NW22	
16-Nov	NNW9	NNW9	N5	E4	SE7	ESE7	SE6	SSE8	S9	S10	SSW10	SSW11	SSW12	SW14	SW13	SW13	SW12	SW15	SW16	SW13	SW16	SW15	SW17WSW22	SW8.0	WSW22	
17-Nov	WSW18	WSW14	WSW13	SW11	WSW17	WSW17	WSW18	WSW16	WSW13	WSW15	W19	W17	W14	WSW11	WSW10	SSW11	SW14	SW14	SW14	WSW9	S5	SE4	SE4	SSE9	WSW11.6	W19
18-Nov	S4	SSE5	S6	SSE9	SSE8	SSE7	SSE7	S9	S8	SE4	SSE7	SSE9	S8	S9	S7	ESE5	ESE8	E5	E4	ESE5	SE4	SE4	ESE7	SE8	SSE5.9	SSE9
19-Nov	ESE8	SE4	ESE5	ESE8	ESE6	S3	S4	SSW4	S4	S5	SW6	WSW7	WNW9	W9	WNW9	W7	S5	WSW13	W14	WSW10	SW11	W19	WNW20	W22	WSW5.5	W22
20-Nov	W27	W28	W26	WNW39	WNW35	WNW28	WNW31	WNW22	NW20	WNW24	WNW27	WNW26	WNW27	WNW27	WNW26	WNW21	WNW20	WNW17	WNW14	WNW17	WNW10	NW5	WNW8	NW4	WNW21.8	WNW39
21-Nov	ENE2	ESE3	E5	E6	E6	E5	E5	ESE7	E6	E7	ENE7	NE8	NE7	NE7	NE6	NE6	NNE7	NNE10	NNE11	NE9	NNE9	N10	N9	N12	NE5.7	N12
22-Nov	N12	NNE12	NNE13	NNE11	NNE10	NNE11	NNE10	NNE10	N9	NNE9	NNE10	NNE9	NNE7	NNE5	NNE5	N5	NNE3	NE3	ESE5	ESE6	SE6	SE6	SE5	SE4	NNE6.0	NNE13
23-Nov	SE7	SE7	SSE11	SSE9	SSE11	S12	S13	S13	SSW11	S12	SSW10	SSW11	SSW9	SSW10	SSW9	SSW10	S8	S9	SSW9	SSW9	SSW8	S8	SSW10	S9.3	S13	
24-Nov	SSW10	SSW13	SW16	SW20	SW21	SW20	SW17	SW19	SW17	SW16	WSW16	W20	W21	WNW19	WNW15	WNW13	SW8	SSW9	SW12	SSW8	SW9	WSW18	W19	WSW13.6	SW21	
25-Nov	WSW14	WSW13	WSW14	WSW16	W15	WNW13	NNW18	NNW26	N21	NNW25	NNW17	NNW23	NNW24	NNW21	NW21	NW16	NW12	NW13	NW9	NNW7	N8	NNE6	SSE3	NW1	NW12.2	NNW26
26-Nov	S2	S4	SE4	SE5	SSE4	SSE5	SSE3	ENE3	NE3	SE4	NW8	NNW9	NW8	NW8	WNW8	W14	WNW14	WNW15	W8	WSW8	W14	W15	WSW14	SW8	W4.8	W15
27-Nov	WSW12	WSW4	SW8	S6	SSE7	S4	SSE7	S7	S6	SSE6	S7	S9	SSW11	SSW12	SW16	SW18	SW19	SW14	WSW14	W18	WNW19	W18	W20	W20	SW9.2	W20
28-Nov	W21	W20	WSW15	WSW11	WSW18	WSW18	W22	W25	W25	W23	W22	W20	W21	W21	W20	W21	SW14	WSW16	W17	W22	W16	WNW16	W17	WNW17	W18.7	W25
29-Nov	WNW19	W18	W16	W18	WNW20	WNW18	WNW14	WNW13	WNW15	WNW18	WNW24	WNW19	WNW16	WNW17	WNW20	WNW19	NW17	WNW17	WNW18	WNW18	WNW16	NW15	WNW18	WNW17	WNW17.2	WNW24
30-Nov	WNW18	NW15	WNW14	WNW15	WNW15	WNW13	NW9	WNW12	WNW10	WNW13	WNW14	NW15	NW15	WNW15	WNW16	WNW11	NW7	SW2	SW4	WNW5	SSE4	SE2	SW3	W8	WNW9.6	WNW18

WSW5.0	WSW5.1	WSW5.0	WSW5.4	WSW5.3	WSW4.8	WSW4.7	WSW4.2	WSW4.0	WSW3.9	WSW5.3	W5.4	W5.8	W5.5	W5.8	W5.3	WSW4.2	WSW4.7	WSW5.1	WSW5.0	WSW4.5	W4.6	WSW5.5	WSW5.5	Diurnal Average
W27	W28	W26	WNW39	WNW35	WNW28	WNW31	NNW26	W25	NNW25	WNW27	WNW26	WNW27	WNW27	WNW26	W21	WNW20	WNW17	WNW18	W22	WNW19	W19	WNW20	WSW22	Diurnal Maximum

All monthly, daily, and diurnal averages have been calculated using vector methods







**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h  
Sawbones Bay - November 2023**

<b>Wind Speed Ranges (km/h)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	122	16.94	16.94
6 - 11	304	42.22	59.17
12 - 19	228	31.67	90.83
20 - 28	63	8.75	99.58
29 - 38	2	0.28	99.86
> 38	1	0.14	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Wind Speed (WS) - km/h  
Sawbones Bay - November 2023**

<b>Wind Speed Ranges (km/h)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 5	4	6	13	9	19	14	14	7	16	5	6	1	2	1	4	1	122
6 - 11	9	29	7	10	23	16	14	35	44	44	15	10	9	22	12	5	304
12 - 19	7	2	0	0	3	0	0	13	21	9	35	35	29	51	21	2	228
20 - 28	1	0	0	0	0	0	0	0	0	0	3	1	29	21	3	5	63
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
<b>Totals</b>	<b>21</b>	<b>37</b>	<b>20</b>	<b>19</b>	<b>45</b>	<b>30</b>	<b>28</b>	<b>55</b>	<b>81</b>	<b>58</b>	<b>59</b>	<b>47</b>	<b>69</b>	<b>98</b>	<b>40</b>	<b>13</b>	<b>720</b>

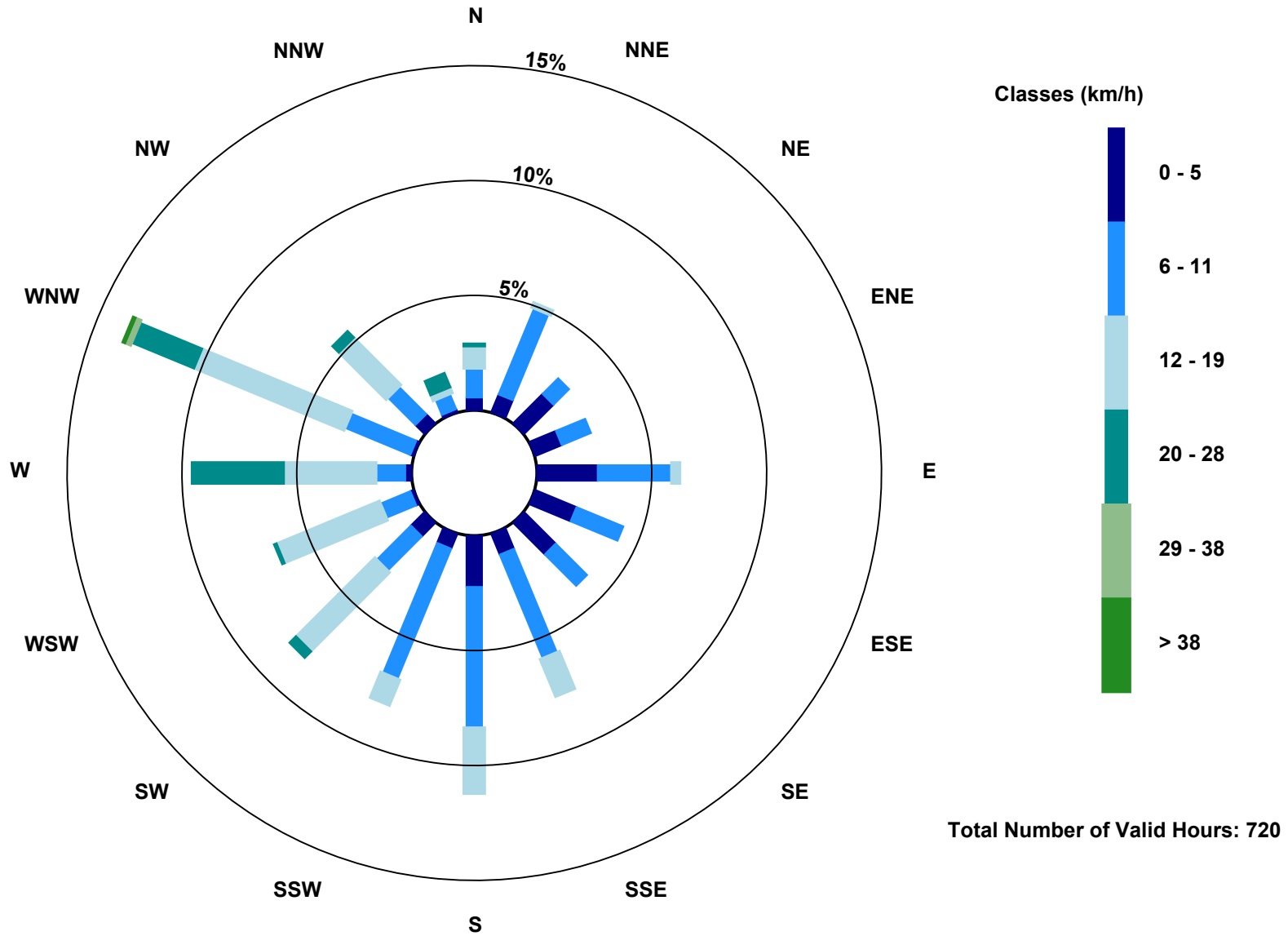
Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 2023

Wind Speed (WS) - km/h  
Sawbones Bay





**Wood Buffalo Environmental Association**  
**Summary of Hour Standard Deviations**

**Wind Speed (WS) - km/h**  
**Sawbones Bay - November 2023**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 9 km/h on Nov 20 04:00 Minimum Value: 1 km/h on Nov 18 22:00 Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 1 Q <sub>1</sub> = 2 Median = 3 Q <sub>3</sub> = 4 P <sub>90</sub> = 5 P <sub>99</sub> = 7																	Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0								
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Nov	1	2	2	1	2	2	1	2	1	1	2	3	2	3	2	2	1	1	1	2	2	2	2	3	3
2-Nov	2	3	3	3	2	2	2	2	1	3	3	3	3	3	3	3	2	2	2	2	1	2	2	1	3
3-Nov	2	1	1	1	1	1	1	1	1	1	2	2	3	1	1	1	1	1	2	2	2	1	1	2	3
4-Nov	2	1	2	2	1	2	2	2	2	3	3	2	2	3	3	3	3	3	3	3	2	3	2	2	3
5-Nov	3	2	2	2	2	2	2	1	1	2	2	2	1	2	2	2	1	1	1	1	1	1	1	1	3
6-Nov	1	1	1	1	1	1	1	1	1	1	3	3	2	2	3	3	2	3	3	3	3	2	3	3	3
7-Nov	3	4	3	3	3	3	3	2	2	3	3	2	3	2	2	2	2	4	4	2	3	4	4	3	4
8-Nov	5	4	4	5	5	5	4	4	4	4	4	4	4	4	4	4	4	3	3	3	3	2	2	2	5
9-Nov	2	1	2	2	1	2	2	2	1	2	1	2	2	2	2	1	1	2	1	1	1	2	1	2	2
10-Nov	2	2	2	3	3	3	2	3	2	3	4	4	5	5	4	3	3	2	2	2	2	2	2	2	5
11-Nov	2	2	2	2	2	2	2	2	2	4	3	4	3	3	3	2	2	1	2	3	3	2	2	3	4
12-Nov	4	3	5	6	5	3	3	5	4	4	4	4	5	5	4	4	4	4	4	2	3	4	3	4	6
13-Nov	1	1	1	1	1	2	1	2	2	3	4	4	4	4	4	3	2	1	1	2	2	1	2	2	4
14-Nov	4	5	4	4	4	4	4	3	4	5	3	4	4	5	4	2	4	3	2	2	2	1	1	1	5
15-Nov	2	2	2	3	3	4	3	4	4	4	4	5	5	5	5	4	1	1	1	2	3	3	3	2	5
16-Nov	2	2	2	1	2	1	1	1	1	2	2	3	4	4	3	3	3	4	4	3	4	4	4	5	5
17-Nov	6	3	5	3	4	4	5	4	3	4	4	4	3	3	3	2	3	3	4	3	2	1	1	2	6
18-Nov	2	2	2	1	2	1	1	1	2	1	1	2	2	2	2	1	1	3	2	3	1	1	1	1	3
19-Nov	1	3	3	1	4	1	2	1	2	1	3	2	2	2	1	3	2	6	6	3	3	5	5	6	6
20-Nov	6	7	7	9	9	7	7	6	6	7	6	6	6	6	6	5	4	3	3	4	3	2	2	2	9
21-Nov	1	1	1	2	2	2	2	2	2	4	4	3	2	2	2	2	1	2	2	3	2	2	2	3	4
22-Nov	3	4	3	3	3	2	2	2	2	2	2	2	3	2	2	1	1	1	1	2	1	1	1	1	4
23-Nov	1	1	3	2	3	2	2	2	3	3	3	3	2	2	2	2	1	2	2	1	1	1	1	2	3
24-Nov	2	3	4	4	5	5	4	4	4	5	4	4	5	4	3	3	3	3	2	2	2	4	5	4	5
25-Nov	4	4	5	5	4	3	4	7	5	7	4	6	6	5	5	5	2	3	1	1	1	1	2	1	7
26-Nov	1	1	1	1	1	1	2	1	1	1	2	2	2	2	3	5	3	4	3	3	3	4	4	2	5
27-Nov	5	3	2	1	1	1	3	1	1	1	1	2	3	3	5	4	5	4	4	4	4	5	4	4	5
28-Nov	5	4	4	3	5	5	4	5	5	5	5	4	5	4	4	4	4	4	4	4	4	3	4	4	5
29-Nov	4	4	4	4	4	3	4	3	3	5	5	4	3	4	5	4	4	4	3	3	3	4	4	3	5
30-Nov	3	3	3	3	3	3	2	3	2	3	3	4	4	3	3	3	2	3	3	2	3	2	2	2	4
																	Diurnal Maximum								



**Wood Buffalo Environmental Association**  
**Summary of Hour Averages**

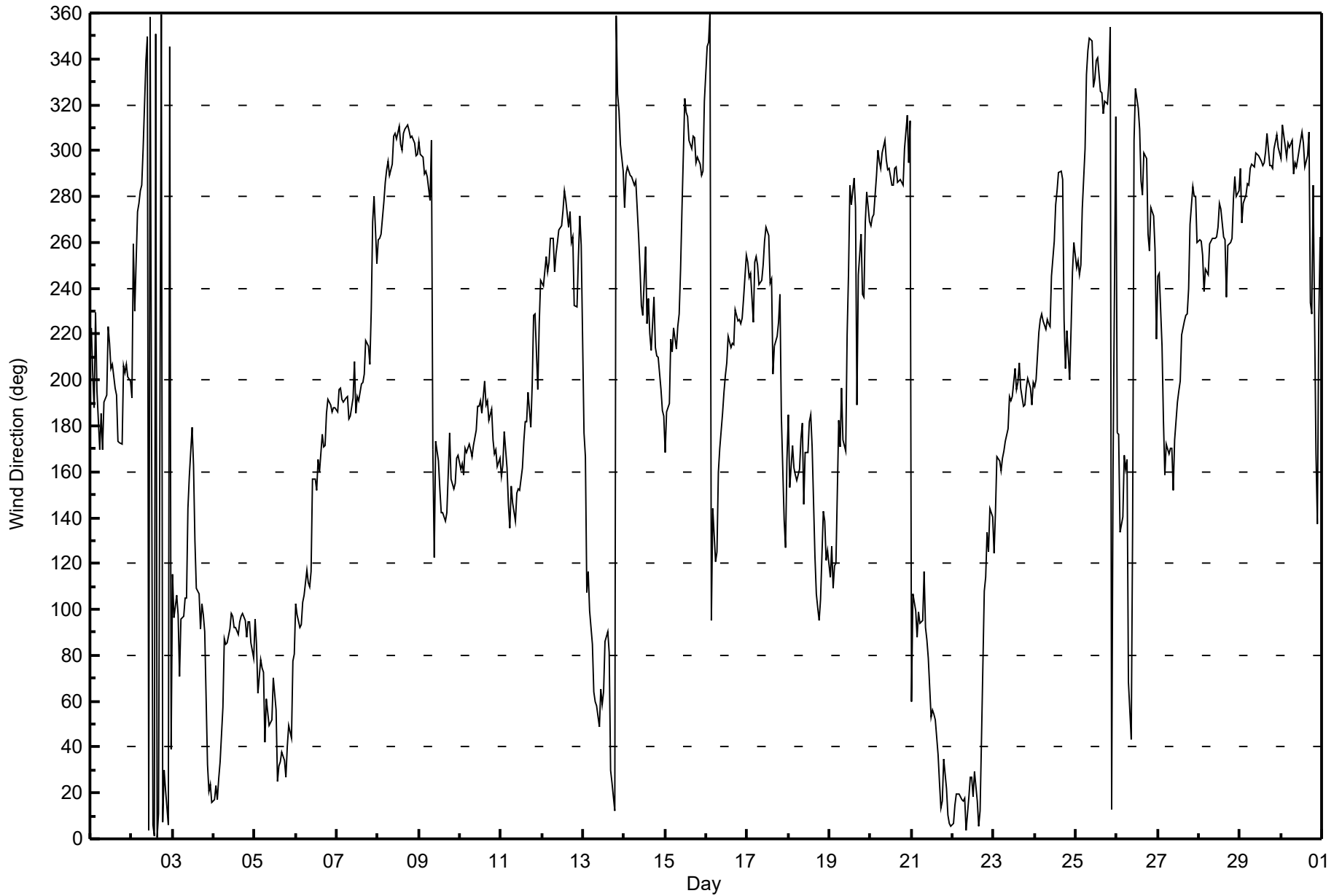
**Wind Direction (WD) - deg**  
**Sawbones Bay - November 2023**

Direction of Maximum Speed: 289 deg on Nov 20 04:00	Hours in Service: 720
Direction of Maximum Daily Speed Average: 289.3 deg on Nov 20	Hours of Data: 720
Direction of Minimum Speed: 315 deg on Nov 26 00:00	Hours of Missing Data: 0
Direction of Minimum Daily Speed Average: 3.4 deg on Nov 3	Percent Operational Time: 100.0
Monthly Average Direction: 254.3 deg	

Day	Hourly Period Ending At (MST)																								Daily Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Nov	223	202	188	230	195	170	185	170	191	194	223	216	205	207	196	194	173	173	172	206	203	207	201	200	197.8
2-Nov	192	259	230	273	277	282	285	301	339	350	4	358	6	1	351	1	11	359	7	30	21	6	346	39	343.3
3-Nov	115	96	106	98	71	96	97	105	105	144	158	180	163	130	109	107	91	103	97	90	33	21	24	16	100.5
4-Nov	17	23	17	26	34	57	87	85	86	91	98	97	92	92	89	94	97	98	95	88	95	94	85	79	79.8
5-Nov	96	85	63	78	74	73	42	61	50	51	52	70	56	25	31	34	38	34	27	40	49	44	77	81	57.3
6-Nov	102	98	92	93	103	106	117	112	110	116	157	157	152	165	160	176	171	172	186	191	189	186	188	188	157.5
7-Nov	186	196	196	192	190	192	193	183	184	192	208	186	193	191	198	199	203	217	215	207	231	269	280	251	207.4
8-Nov	261	262	263	277	286	291	295	289	294	306	308	305	311	303	300	307	309	311	309	306	307	303	298	298	294.5
9-Nov	304	298	297	290	291	288	279	304	169	123	173	165	152	142	142	138	142	159	177	157	152	155	166	167	185.2
10-Nov	161	164	159	170	168	172	169	166	171	178	188	188	191	185	200	189	191	183	187	174	168	169	162	166	176.9
11-Nov	158	163	178	162	146	136	154	146	138	151	152	152	162	173	182	182	195	179	198	228	229	196	225	244	172.0
12-Nov	242	241	254	247	252	262	262	247	255	260	265	268	274	282	278	266	273	260	263	232	232	254	272	259	259.4
13-Nov	177	167	107	116	99	85	64	60	58	49	65	59	64	86	90	81	30	24	12	359	325	317	303	291	54.3
14-Nov	275	290	293	289	289	287	285	287	263	249	233	228	258	224	235	220	213	236	214	210	210	196	187	184	253.6
15-Nov	168	186	189	218	213	223	213	223	229	248	274	323	317	315	305	301	306	306	295	297	294	289	291	321	272.1
16-Nov	345	347	360	95	144	121	125	160	170	185	194	202	207	219	214	216	215	230	226	226	224	227	236	255	216.3
17-Nov	251	245	247	225	251	254	250	242	243	250	260	266	263	242	244	203	215	219	225	237	184	139	127	166	239.5
18-Nov	185	153	171	161	158	156	161	175	181	146	168	168	182	185	171	123	107	101	95	104	143	139	122	126	152.8
19-Nov	114	128	109	119	120	182	171	197	174	169	219	247	285	276	288	275	189	246	264	237	236	269	282	269	244.8
20-Nov	267	271	272	289	300	295	292	299	304	296	291	292	285	285	292	293	286	287	286	285	301	316	295	313	289.3
21-Nov	60	107	100	88	99	94	95	116	92	87	78	53	56	55	52	37	25	14	16	35	22	10	7	5	48.8
22-Nov	6	15	19	20	19	17	16	18	4	18	27	27	19	29	17	5	12	43	108	114	134	125	144	140	29.4
23-Nov	125	143	166	165	161	166	169	173	179	193	191	193	205	196	199	207	197	188	189	197	201	196	189	199	184.0
24-Nov	197	200	221	226	229	226	222	226	224	223	245	261	277	283	291	291	288	227	205	222	200	222	247	260	240.8
25-Nov	249	252	246	250	275	301	333	343	349	348	327	332	340	340	326	325	316	321	320	329	354	13	161	315	320.2
26-Nov	177	176	134	140	167	161	165	69	44	138	304	327	319	309	287	280	299	297	264	256	275	271	257	218	273.3
27-Nov	245	247	215	183	159	172	168	170	170	152	174	190	195	199	220	225	228	229	240	268	285	280	280	260	230.6
28-Nov	261	260	254	239	248	246	259	261	261	262	262	266	277	275	263	261	236	258	260	262	279	288	280	282	263.1
29-Nov	292	268	277	281	285	285	293	294	293	299	298	298	296	294	295	299	308	293	294	292	301	307	302	299	293.4
30-Nov	297	311	302	297	303	301	305	290	295	293	296	305	308	303	293	298	308	234	229	285	168	138	227	263	295.9

249.0 246.4 244.1 244.9 252.3 252.5 251.6 246.9 248.7 255.3 254.9 267.0 272.3 265.9 264.6 260.0 252.8 251.3 247.1 246.5 249.0 260.6 258.1 252.1  
 Diurnal Average

All monthly, daily, and diurnal averages have been calculated using vector methods





**Wood Buffalo Environmental Association**  
**Summary of Hour Standard Deviations**

**Wind Direction (WD) - deg**  
**Sawbones Bay - November 2023**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 88 deg on Nov 9 08:00 Minimum Value: 6 deg on Nov 18 00:00 Percentiles: P <sub>1</sub> = 8 P <sub>10</sub> = 11 Q <sub>1</sub> = 13 Median = 15 Q <sub>3</sub> = 20 P <sub>90</sub> = 31 P <sub>99</sub> = 68																	Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0								
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Nov	65	31	31	19	68	47	17	13	19	21	20	22	17	24	17	24	13	9	12	14	16	19	17	24	68
2-Nov	54	56	42	33	13	12	8	14	14	16	17	17	16	16	19	17	16	15	17	17	17	53	67	33	67
3-Nov	41	43	39	31	26	23	25	20	16	21	18	14	44	68	57	17	19	17	18	22	24	14	13	14	68
4-Nov	12	13	13	14	15	35	27	29	28	25	20	21	22	22	25	22	19	20	21	27	24	26	28	33	35
5-Nov	21	32	32	31	31	32	27	32	28	30	28	31	32	16	18	21	23	21	15	19	25	24	28	22	32
6-Nov	16	20	19	17	13	12	12	10	14	16	17	18	21	14	15	16	14	15	14	15	15	13	13	14	21
7-Nov	14	15	15	15	15	15	14	14	14	14	17	16	20	19	18	18	17	17	14	17	16	21	18	14	21
8-Nov	12	11	12	14	11	12	12	11	13	13	13	13	13	13	13	13	12	12	13	13	13	13	12	11	14
9-Nov	11	10	12	8	7	10	11	88	85	80	23	27	22	21	18	15	12	14	11	10	10	12	7	9	88
10-Nov	9	10	13	12	12	11	10	10	11	16	15	15	15	16	16	14	14	14	14	16	14	10	16	21	21
11-Nov	11	9	12	9	12	15	12	13	17	14	15	15	17	16	17	15	14	11	20	22	18	24	21	18	24
12-Nov	15	14	14	15	13	10	11	17	13	11	14	14	15	12	16	15	16	16	13	12	14	15	27	70	70
13-Nov	11	7	17	12	14	28	33	40	35	33	36	35	35	27	27	33	25	12	14	37	12	19	13	11	40
14-Nov	15	11	11	10	11	11	13	12	11	23	19	17	19	18	20	15	13	24	16	15	16	20	9	11	24
15-Nov	18	13	18	16	14	18	14	15	16	20	21	18	16	17	15	12	9	7	9	12	12	11	11	16	21
16-Nov	16	13	27	50	15	14	18	10	10	12	16	16	18	17	15	16	16	17	16	17	15	16	18	14	50
17-Nov	14	16	17	18	15	14	14	16	14	16	13	14	16	19	23	14	14	13	14	29	47	33	29	6	47
18-Nov	43	26	10	8	10	10	9	9	14	24	11	12	13	14	18	23	10	30	25	20	15	19	11	14	43
19-Nov	11	61	20	10	38	27	50	32	17	8	25	30	12	14	11	35	22	23	15	18	16	17	13	14	61
20-Nov	15	14	15	15	14	14	12	15	15	14	12	14	12	12	13	13	9	9	12	11	11	31	12	33	33
21-Nov	39	25	27	26	22	22	27	16	35	47	41	50	30	31	31	36	14	12	13	21	19	15	14	16	50
22-Nov	15	15	13	15	14	12	14	14	14	15	14	20	21	33	12	12	22	21	27	22	17	15	24	23	33
23-Nov	15	16	12	14	14	12	13	13	13	16	14	15	16	15	15	14	14	11	12	13	12	12	10	13	16
24-Nov	12	14	16	14	14	15	14	14	14	15	19	13	15	15	11	9	11	33	24	12	14	24	16	11	33
25-Nov	19	18	17	17	14	19	14	15	19	18	15	16	19	16	15	13	9	11	10	24	10	11	37	82	82
26-Nov	64	18	32	21	27	17	61	32	30	26	31	28	26	21	19	16	13	13	32	30	15	16	18	17	64
27-Nov	21	64	21	29	12	23	16	12	11	12	12	13	14	15	16	15	14	17	20	13	11	13	13	12	64
28-Nov	13	11	15	20	18	17	11	12	11	12	13	15	16	16	13	11	18	14	12	11	15	11	13	16	20
29-Nov	11	17	16	16	10	12	14	12	12	13	12	13	12	12	13	13	14	11	10	10	12	14	13	12	17
30-Nov	11	14	14	12	13	13	11	10	12	12	14	14	17	13	11	13	13	81	57	46	57	77	60	22	81
Diurnal Maximum																									
65 64 42 50 68 47 61 88 85 80 41 50 44 68 57 36 25 81 57 46 57 77 67 82																									



## WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY  
MONITORING PROGRAM  
MONTHLY REPORT

**AMS507**  
**KIRBY SOUTH**  
**NOVEMBER 2023**

Operations, Data Collection,  
QA/QC, Data Validation and Reporting by:  
Wood Buffalo Environmental Association  
Fort McMurray, Alberta

December 22, 2023



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - KIRBY SOUTH (AMS 507)  
NOVEMBER 2023

MONTHLY SUMMARY

Parameter	Hours of Data	Hours of Calibration	Hours without Data	Operational Time	Maximum 1-Hour Value	1-Hour Exceedances	Maximum 24-Hour Value	24-Hour Exceedances
SO2 (ppb) Average	687	33	33	100	8.5	0	2	0
H2S (ppb) Average	685	35	35	100	1.5	0	0.3	0
THC (ppm) Average	687	33	33	100	2.9	-	2.5	-
NO2 (ppb) Average	685	35	35	100	8.7	0	3.5	-
NO (ppb) Average	685	35	35	100	6.7	-	1.5	-
NOX (ppb) Average	685	35	35	100	14.4	-	4.1	-
Temperature 2 m (C) Average	720	0	0	100	8.8	-	3.9	-
Relative Humidity (%) Average	720	0	0	100	99.8	-	99.3	-
Wind Speed 10 m (km/h) Average	676	0	44	93.89	34	-	21	-
Wind Direction 10 m (deg) Average	676	0	44	93.89	-	-	-	-

Note : Operational time includes periods of data collection and instrument calibration

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - KIRBY SOUTH(AMS507)  
 NOVEMBER 2023

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile						
					Min	P10	Q1	Median	Q3	P90	Max
SO2 (ppb) Average	687	0.51	1	-	0	0	0	0.2	0.5	1.2	8.5
H2S (ppb) Average	685	0.14	0.1	-	0	0	0.1	0.1	0.1	0.3	1.5
THC (ppm) Average	687	2.37	0.1	-	2.1	2.2	2.3	2.4	2.4	2.5	2.9
NO2 (ppb) Average	685	1.67	1.4	-	0.1	0.4	0.7	1.3	2.2	3.7	8.7
NO (ppb) Average	685	0.26	0.8	-	0	0	0	0	0.1	0.6	6.7
NOX (ppb) Average	685	1.93	2	-	0.1	0.4	0.7	1.3	2.4	4.2	14.4
Temperature 2 m (C) Average	720	-3.23	3.7	-	-13.7	-8	-5.4	-2.9	-1.1	0.9	8.8
Relative Humidity (%) Average	720	80.77	13.1	-	39.5	61.6	72.7	82.6	90.9	97.2	99.8
Wind Speed 10 m (km/h) Average	676	12.7	5	-	1	7	9	12	16	20	34
Wind Direction 10 m (deg) Average	676	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - KIRBY SOUTH (AMS507)  
NOVEMBER 2023

OPERATIONAL NOTES

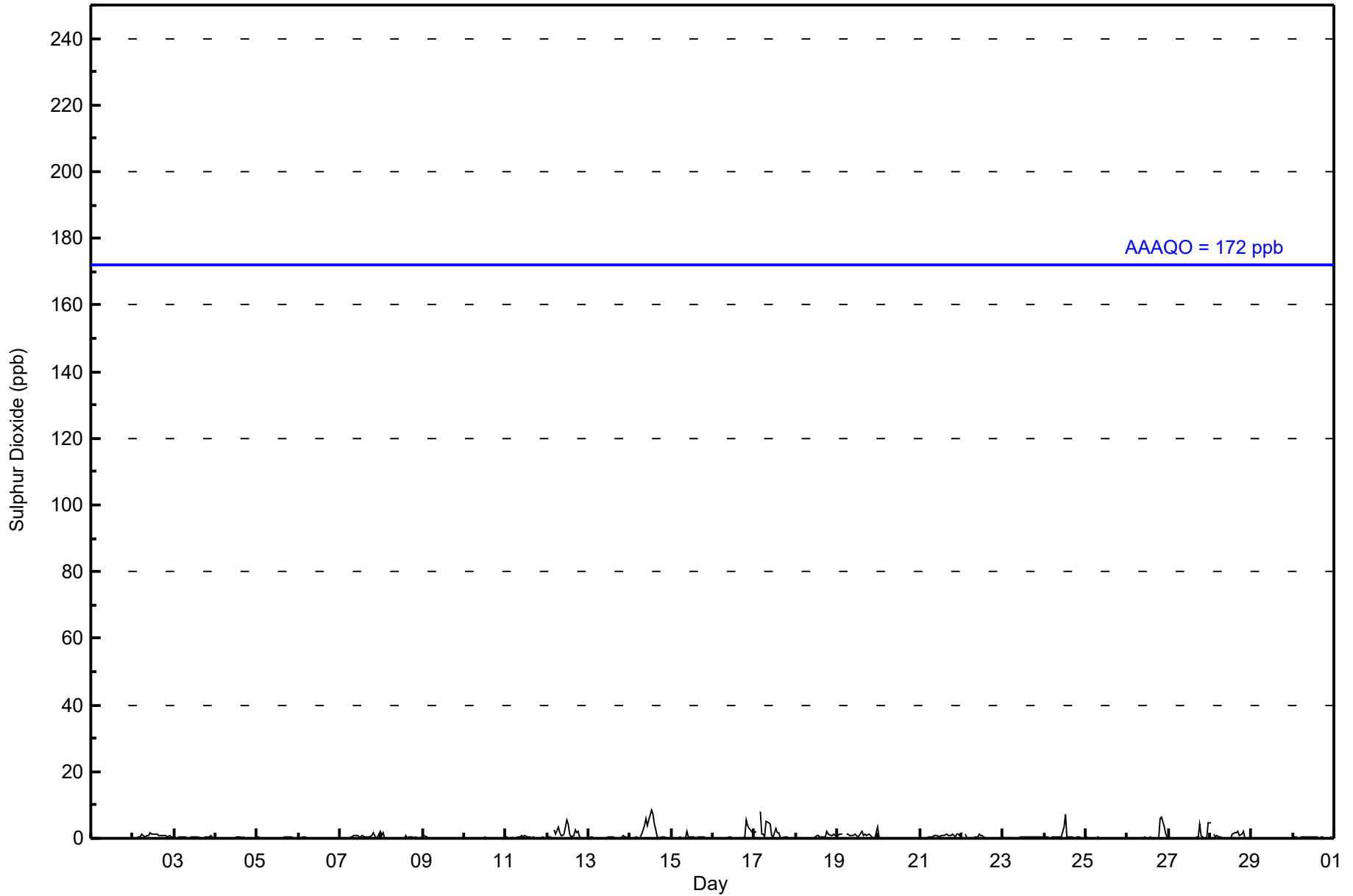
Parameter	Period Start	Period End	Duration (Hours)	Notes
Wind Speed, Wind Direction	05 Nov 2023 06:00	06 Nov 2023 15:00	34	Flat line in sensor output signal - Sensor frozen
Wind Speed, Wind Direction	06 Nov 2023 16:00	06 Nov 2023 16:00	1	Maintenance - tower lowered to de-ice sensor
Wind Speed, Wind Direction	07 Nov 2023 01:00	07 Nov 2023 08:00	8	Flat line in sensor output signal - Sensor frozen
Wind Speed, Wind Direction	07 Nov 2023 09:00	07 Nov 2023 09:00	1	Maintenance - tower lowered to de-ice sensor





Wood Buffalo Environmental Association  
Hourly Averages

Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Kirby South - November 2023





**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Kirby South - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 10	687	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: 687

Total Number of Hours: 720



**Wood Buffalo Environmental Association**  
**Frequency Distribution**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Kirby South - November 2023**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 10	5	9	30	10	18	28	9	4	24	63	91	83	100	89	53	31	647
11 - 20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	5	9	30	10	18	28	9	4	24	63	91	83	100	89	53	31	647

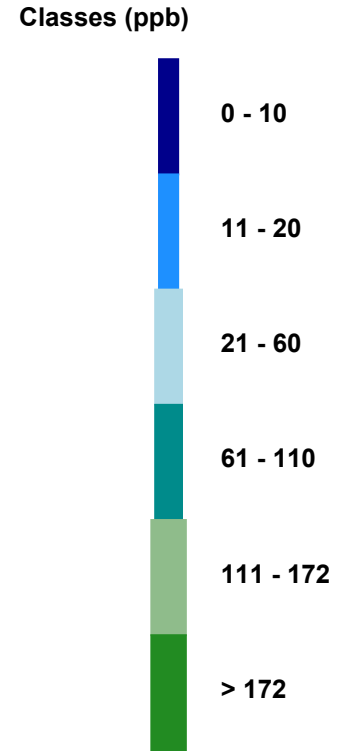
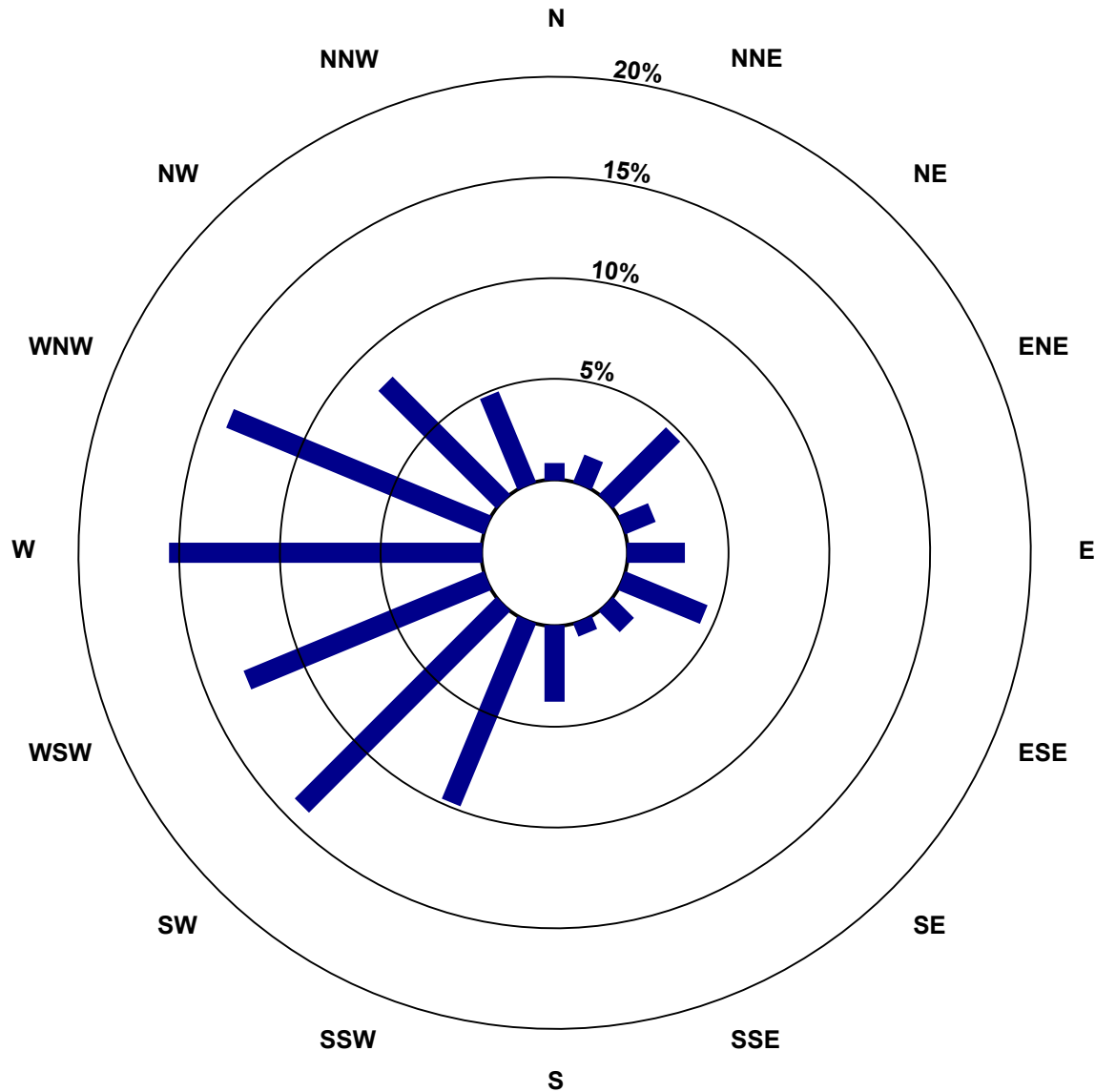
Total Number of Valid Hours: 647

Total Number of Hours: 720



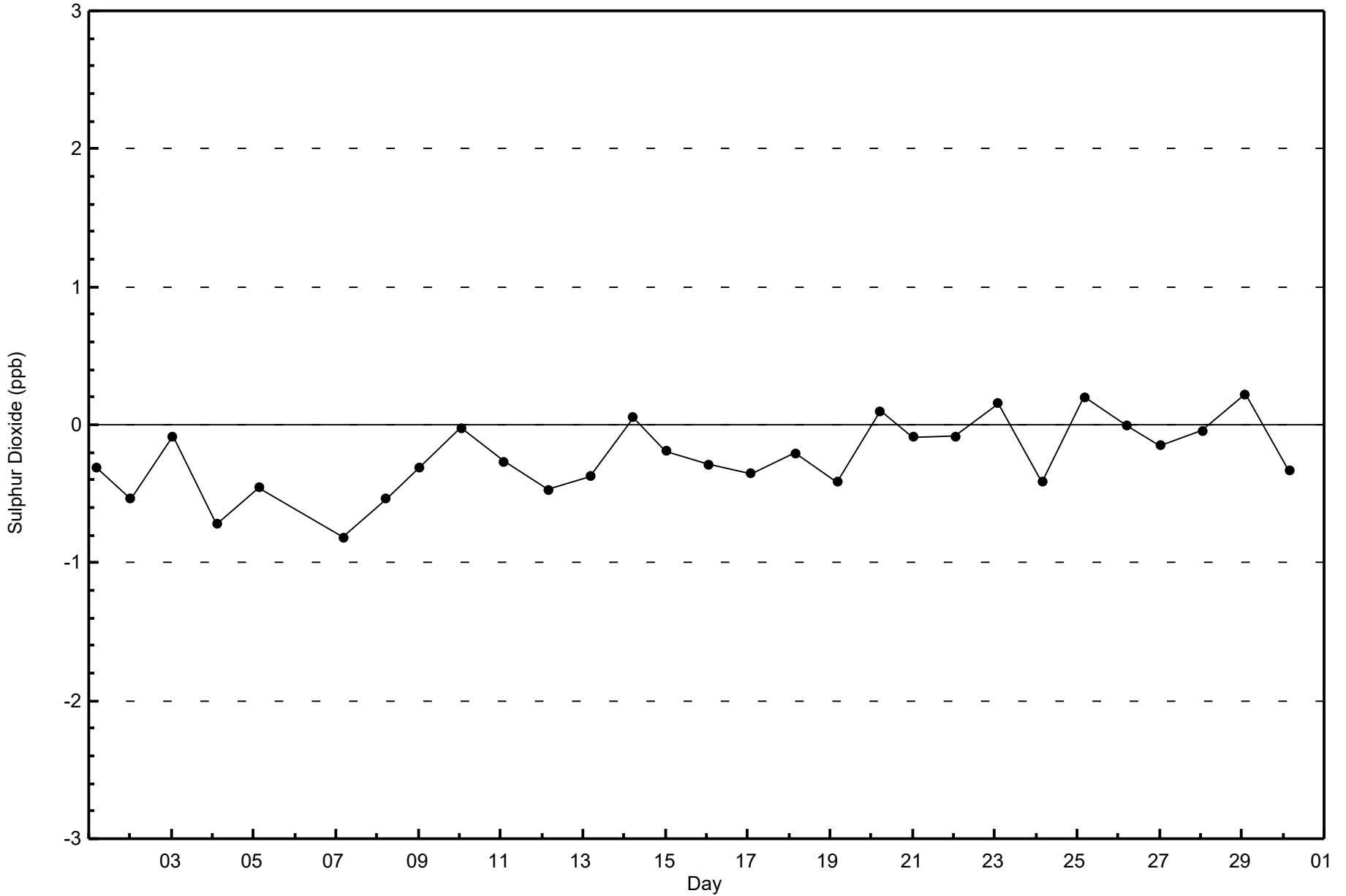
Wood Buffalo Environmental Association  
Wind Rose Nov 2023

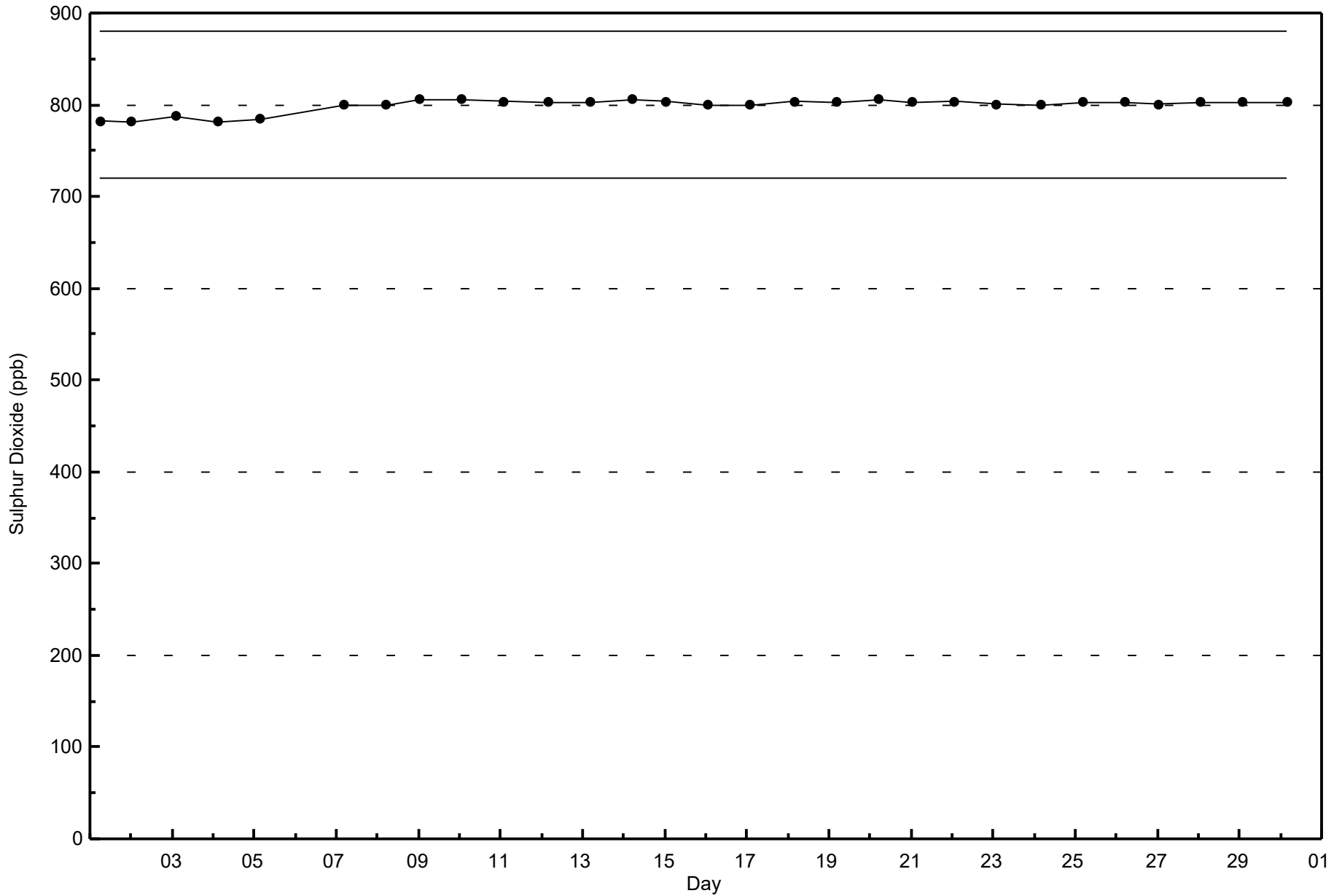
Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Kirby South



Total Number of Valid Hours: 647









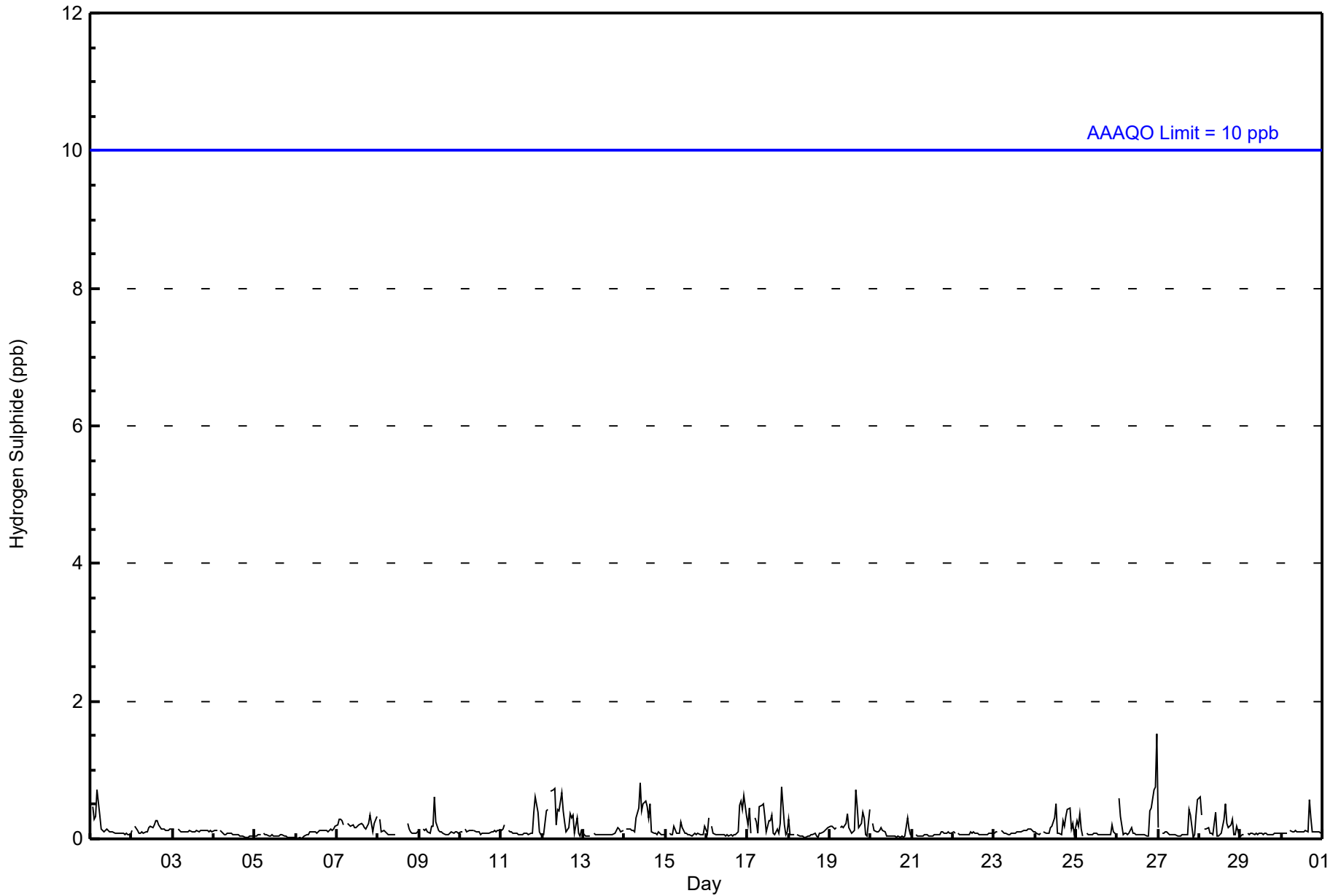
# Wood Buffalo Environmental Association

## Summary of Hour Averages

# Hydrogen Sulphide (H<sub>2</sub>S) - ppb

## Kirby South - November 2023

Number of Exceedences (AAAQO):		1-hr: 0		24-hr: 0		Hours in Service:														720						
Maximum Value: 1.5 ppb on Nov 27 00:00		Maximum Daily Average: 0.3 ppb on Nov 12														Hours of Data:		685								
Minimum Value: 0.0 ppb on Nov 6 01:00		Minimum Daily Average: 0.0 ppb on Nov 5														Hours of Missing Data:		35								
Maximum Diurnal Average: 0.2 ppb at hour 24		Minimum Diurnal Average: 0.1 ppb at hour 14														Hours of Calibration:		35								
Monthly Average: 0.14 ppb		Percentiles: P <sub>1</sub> = 0.0 P <sub>10</sub> = 0.0 Q <sub>1</sub> = 0.1 Median = 0.1 Q <sub>3</sub> = 0.1 P <sub>90</sub> = 0.3 P <sub>99</sub> = 0.7														Percent Operational Time:		100.0								
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	Z	0.5	0.3	0.3	0.7	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	0.1	0.2	0.7
2-Nov	0.1	Z	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.3	0.3	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.3
3-Nov	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
4-Nov	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
5-Nov	0.0	0.0	0.1	0.1	Z	0.1	0.1	0.1	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.1
6-Nov	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	0.1	0.1	0.1	0.2	0.2
7-Nov	0.2	0.3	0.3	0.3	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	0.1	0.2	0.4	0.2	0.1	0.2	0.3	0.2	0.4
8-Nov	Z	0.3	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	C	C	C	C	C	C	0.2	0.1	0.1	0.1	0.1	0.1	0.1	--	0.3
9-Nov	0.1	Z	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.6	0.3	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.6
10-Nov	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
11-Nov	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	0.1	0.1	0.1	0.4	0.6	0.4	0.1	0.1	0.1	0.6
12-Nov	0.1	0.1	0.4	0.4	Z	0.7	0.7	0.7	0.2	0.4	0.4	0.7	0.4	0.2	0.1	0.2	0.4	0.3	0.3	0.1	0.3	0.1	0.0	0.1	0.3	0.7
13-Nov	0.1	0.0	0.0	0.0	0.0	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	0.2
14-Nov	Z	0.1	0.2	0.1	0.1	0.1	0.1	0.3	0.4	0.8	0.4	0.5	0.5	0.3	0.5	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.8
15-Nov	0.1	Z	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.2	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	0.2	0.2
16-Nov	0.1	0.3	Z	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.5	0.6	0.4	0.6	0.3	0.2	0.6
17-Nov	0.2	0.5	0.1	Z	0.3	0.3	0.1	0.5	0.5	0.5	0.3	0.1	0.3	0.3	0.3	0.1	0.1	0.1	0.1	0.2	0.8	0.2	0.1	0.1	0.3	0.8
18-Nov	0.3	0.1	0.1	0.1	Z	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.3
19-Nov	0.2	0.2	0.2	0.1	0.2	Z	0.2	0.2	0.2	0.2	0.4	0.2	0.1	0.1	0.1	0.7	0.5	0.2	0.2	0.4	0.3	0.1	0.0	0.4	0.2	0.7
20-Nov	Z	0.2	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.3	0.1	0.1	0.1	0.3
21-Nov	0.1	Z	0.1	0.0	0.0	0.0	0.0	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	0.1
22-Nov	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
23-Nov	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
24-Nov	0.1	0.1	0.1	0.1	Z	0.1	0.1	0.1	0.1	0.1	0.2	0.3	0.5	0.1	0.1	0.1	0.3	0.2	0.3	0.4	0.4	0.1	0.2	0.1	0.1	0.5
25-Nov	0.3	0.2	0.4	0.1	0.0	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	0.1	0.1	0.1	0.4
26-Nov	Z	0.6	0.3	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	0.0	0.1	0.4	0.5	0.7	0.7	1.5	0.3	1.5
27-Nov	0.2	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	0.4	0.3	0.0	0.1	0.4	0.6	0.1	0.6
28-Nov	0.6	0.3	Z	0.1	0.1	0.2	0.1	0.1	0.1	0.4	0.0	0.0	0.1	0.1	0.3	0.5	0.2	0.2	0.2	0.3	0.1	0.1	0.2	0.0	0.2	0.6
29-Nov	0.0	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
30-Nov	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	0.6	0.3	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.6
																								Diurnal Average		
																								Diurnal Maximum		
																								0.1 0.2 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.2 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.2 0.2 0.1 0.2 0.2		
																								0.6 0.6 0.4 0.4 0.7 0.7 0.7 0.7 0.5 0.8 0.4 0.7 0.5 0.5 0.3 0.7 0.6 0.3 0.4 0.5 0.8 0.7 0.7 1.5		
Z - zerospan C - Calibration																										
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 10 ppb 24-hr 3 ppb																										





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Hydrogen Sulphide (H<sub>2</sub>S) - ppb  
Kirby South - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2	685	100.00	100.00
3 - 4	0	0.00	100.00
5 - 7	0	0.00	100.00
8 - 11	0	0.00	100.00
> 11	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Hydrogen Sulphide (H<sub>2</sub>S) - ppb  
Kirby South - November 2023**

Concentration Ranges (ppb)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2	5	9	30	10	17	30	9	4	22	66	91	83	99	89	50	28	642
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	5	9	30	10	17	30	9	4	22	66	91	83	99	89	50	28	642

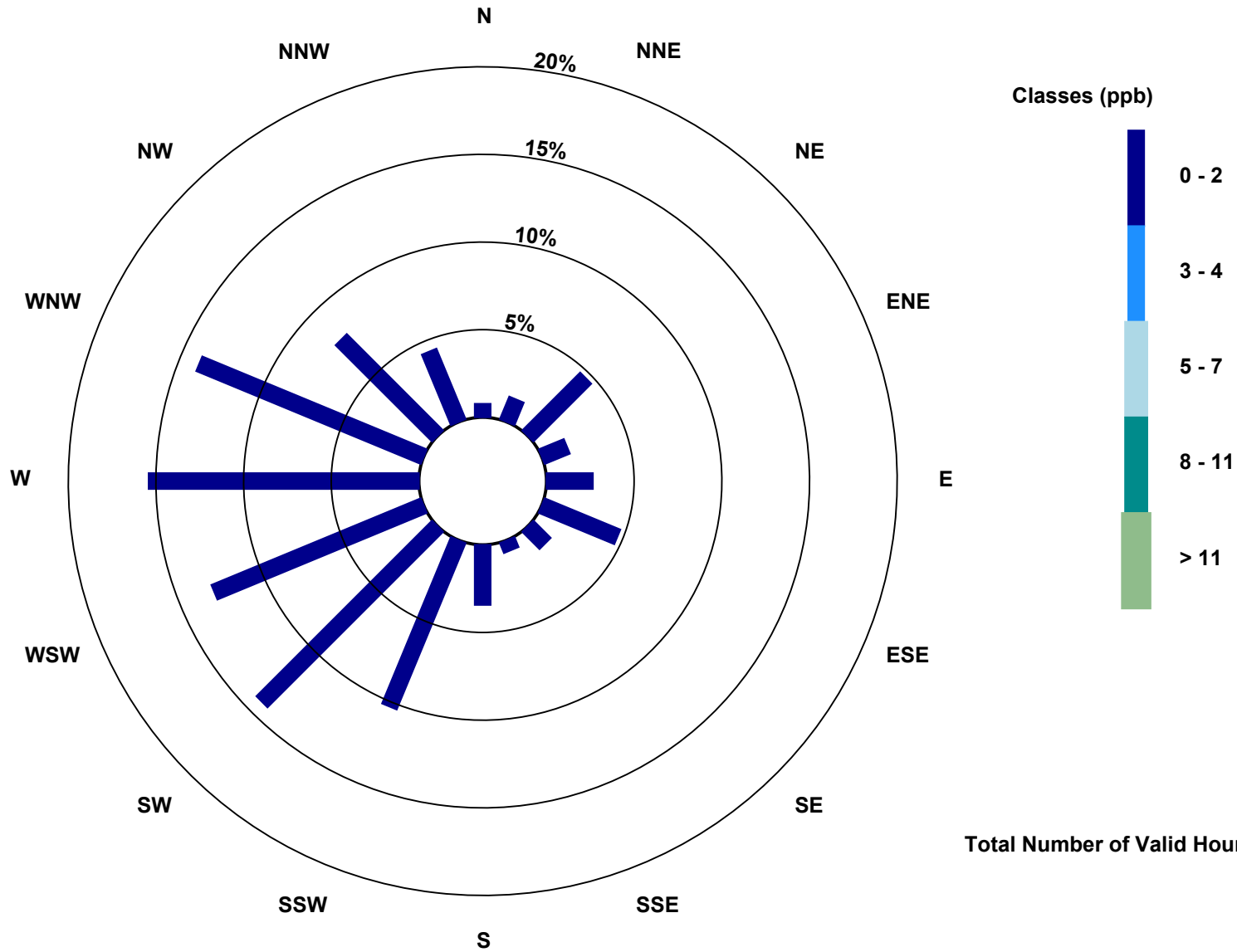
Total Number of Valid Hours: 642

Total Number of Hours: 720

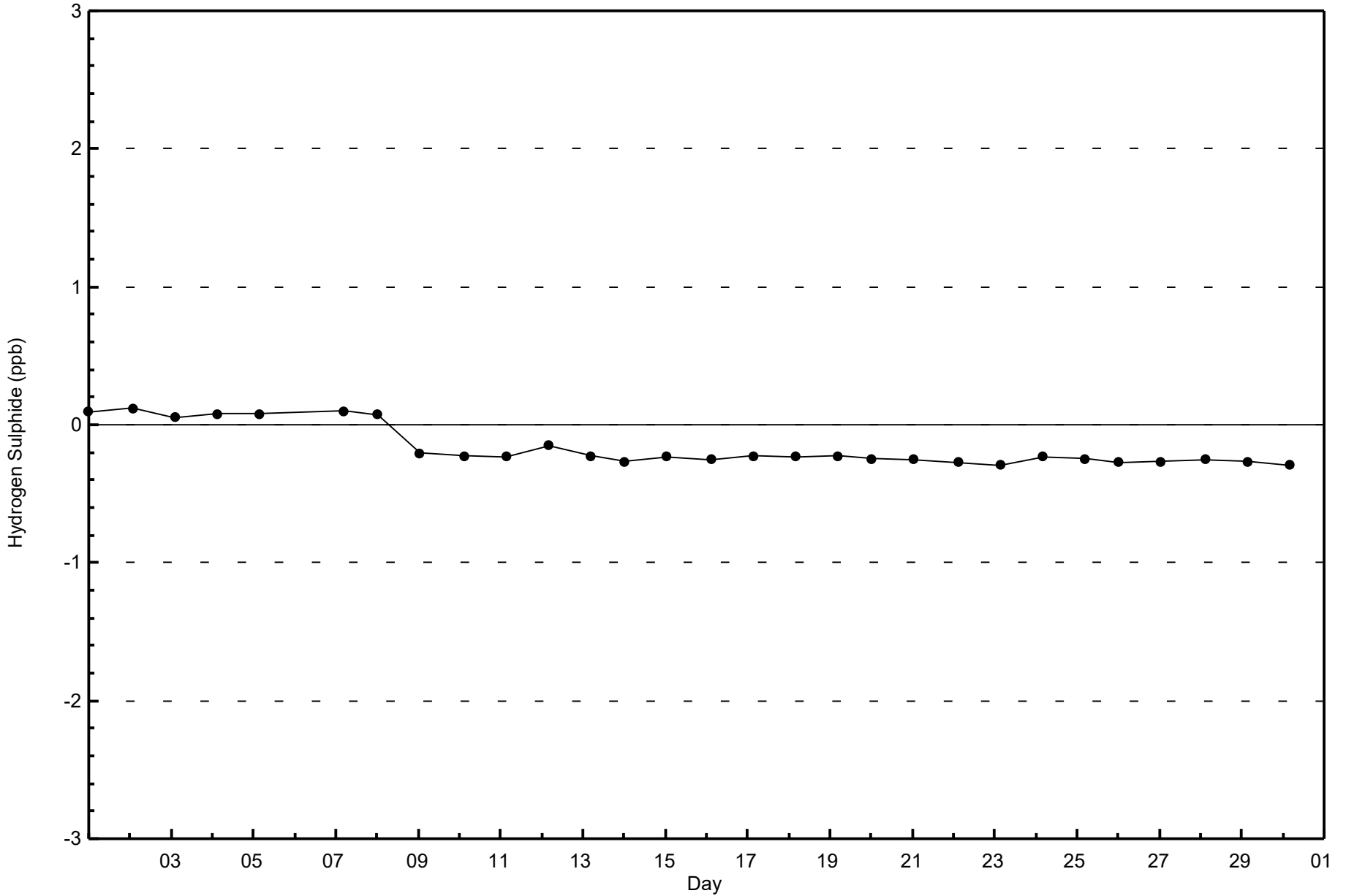


Wood Buffalo Environmental Association  
Wind Rose Nov 2023

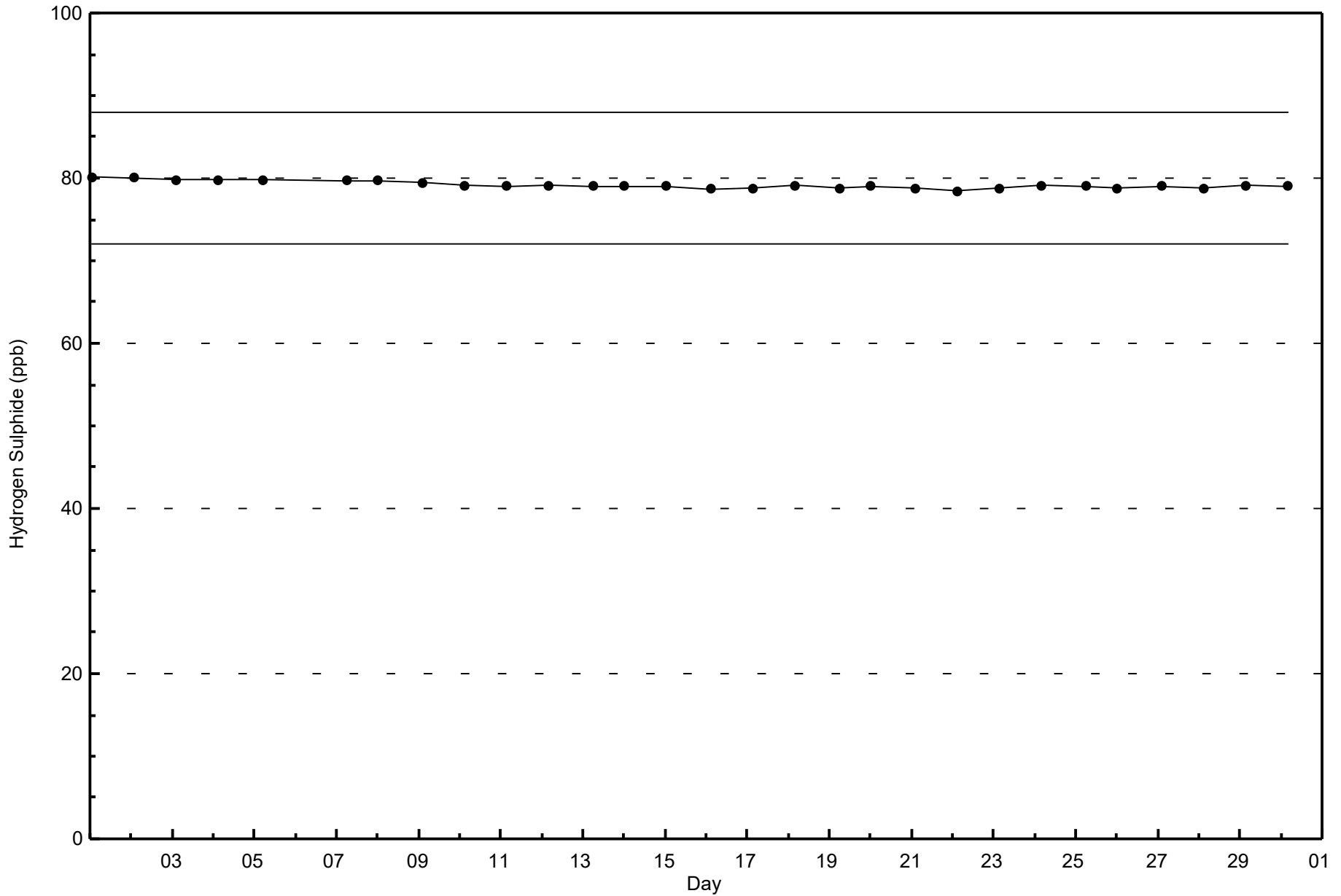
Hydrogen Sulphide (H<sub>2</sub>S) - ppb  
Kirby South



Total Number of Valid Hours: 642









# Wood Buffalo Environmental Association

## Summary of Hour Averages

# Total Hydrocarbons (THC) - ppm

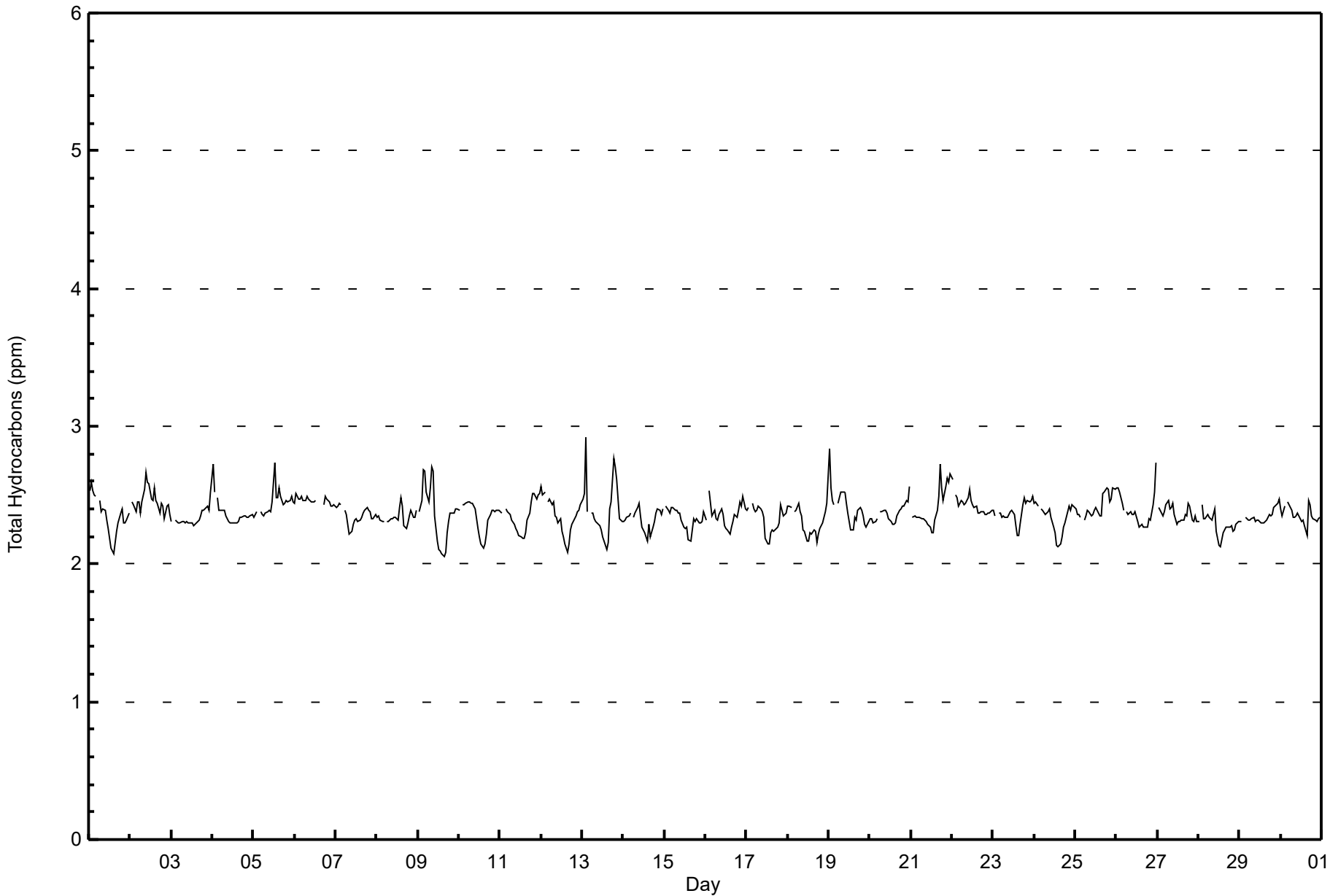
## Kirby South - November 2023

Maximum Value: 2.9 ppm on Nov 13 03:00		Maximum Daily Average: 2.5 ppm on Nov 6		Hours in Service: 720																						
Minimum Value: 2.1 ppm on Nov 9 16:00		Minimum Daily Average: 2.3 ppm on Nov 28		Hours of Data: 687																						
Maximum Diurnal Average: 2.4 ppm at hour 3		Minimum Diurnal Average: 2.3 ppm at hour 15		Hours of Missing Data: 33																						
Monthly Average: 2.37 ppm		Percentiles: P <sub>1</sub> = 2.1 P <sub>10</sub> = 2.2 Q <sub>1</sub> = 2.3 Median = 2.4 Q <sub>3</sub> = 2.4 P <sub>90</sub> = 2.5 P <sub>99</sub> = 2.7		Hours of Calibration: 33																						
				Percent Operational Time: 100.0																						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	2.5	2.6	2.5	2.5	2.5	Z	2.5	2.4	2.4	2.4	2.3	2.3	2.2	2.1	2.1	2.2	2.2	2.3	2.4	2.4	2.3	2.3	2.3	2.4	2.3	2.6
2-Nov	Z	2.4	2.4	2.4	2.5	2.4	2.4	2.4	2.5	2.7	2.6	2.6	2.5	2.5	2.5	2.4	2.4	2.4	2.4	2.3	2.4	2.4	2.4	2.4	2.5	2.7
3-Nov	2.3	Z	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.4	2.4	2.4	2.4	2.4	2.4	2.5	2.5	
4-Nov	2.7	2.5	Z	2.5	2.4	2.4	2.4	2.4	2.4	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.4	2.4	2.3	2.3	2.4	2.4	2.7	
5-Nov	2.3	2.4	2.4	Z	2.4	2.4	2.3	2.4	2.4	2.4	2.4	2.7	2.5	2.5	2.6	2.5	2.4	2.4	2.5	2.5	2.5	2.5	2.5	2.5	2.7	
6-Nov	2.4	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	C	C	C	C	2.4	2.5	2.5	2.4	2.4	2.4	2.4	2.5	
7-Nov	2.4	2.4	2.4	2.4	Z	2.4	2.4	2.3	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.4	2.4	2.4	2.4	2.4	2.3	2.3	2.4	2.4	
8-Nov	2.3	2.4	2.3	2.3	2.3	Z	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.4	2.5	2.4	2.3	2.3	2.3	2.3	2.4	2.3	2.3	2.4	2.5	
9-Nov	Z	2.4	2.5	2.7	2.7	2.5	2.5	2.5	2.7	2.7	2.3	2.2	2.1	2.1	2.1	2.1	2.1	2.2	2.3	2.4	2.4	2.4	2.4	2.4	2.7	
10-Nov	2.4	Z	2.4	2.4	2.4	2.4	2.5	2.4	2.4	2.4	2.4	2.3	2.3	2.2	2.1	2.1	2.1	2.2	2.3	2.4	2.4	2.4	2.4	2.4	2.5	
11-Nov	2.4	2.4	Z	2.4	2.4	2.4	2.4	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.4	2.5	2.5	2.5	2.5	2.5	2.5	2.5	
12-Nov	2.6	2.5	2.5	Z	2.5	2.5	2.4	2.4	2.4	2.3	2.3	2.3	2.2	2.2	2.1	2.1	2.1	2.2	2.3	2.3	2.3	2.4	2.4	2.4	2.6	
13-Nov	2.5	2.5	2.9	2.4	Z	2.4	2.4	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.1	2.2	2.4	2.5	2.8	2.7	2.6	2.5	2.3	2.3	2.9	
14-Nov	2.3	2.3	2.3	2.4	2.4	Z	2.3	2.4	2.4	2.4	2.4	2.3	2.3	2.2	2.2	2.2	2.3	2.3	2.3	2.4	2.4	2.4	2.4	2.4	2.4	
15-Nov	Z	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.4	
16-Nov	2.3	Z	2.5	2.4	2.3	2.4	2.3	2.3	2.4	2.4	2.4	2.3	2.3	2.2	2.2	2.3	2.3	2.4	2.3	2.4	2.4	2.4	2.4	2.5	2.5	
17-Nov	2.4	2.4	Z	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.3	2.2	2.1	2.1	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.4	2.3	2.4	2.4	
18-Nov	2.4	2.4	2.4	Z	2.4	2.4	2.4	2.4	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.4	2.4	2.4	
19-Nov	2.8	2.6	2.5	2.4	Z	2.4	2.5	2.5	2.5	2.5	2.4	2.4	2.3	2.2	2.2	2.3	2.3	2.4	2.4	2.4	2.3	2.3	2.3	2.3	2.8	
20-Nov	2.3	2.3	2.3	2.3	2.3	Z	2.4	2.4	2.4	2.4	2.4	2.3	2.3	2.3	2.3	2.3	2.3	2.4	2.4	2.4	2.4	2.5	2.4	2.6	2.6	
21-Nov	Z	2.3	2.4	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.3	2.4	2.5	2.7	2.6	2.5	2.6	2.6	2.6	2.6	2.7	2.7	
22-Nov	2.6	Z	2.5	2.5	2.4	2.5	2.4	2.4	2.4	2.5	2.5	2.5	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.6	
23-Nov	2.4	2.3	Z	2.4	2.4	2.3	2.3	2.3	2.4	2.4	2.4	2.4	2.3	2.2	2.1	2.1	2.1	2.2	2.3	2.4	2.5	2.4	2.5	2.5	2.5	
24-Nov	2.4	2.5	2.4	Z	2.4	2.4	2.4	2.4	2.4	2.4	2.3	2.3	2.2	2.1	2.1	2.1	2.2	2.3	2.3	2.3	2.4	2.4	2.4	2.4	2.5	
25-Nov	2.4	2.4	2.4	2.3	Z	2.3	2.3	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.3	2.3	2.5	2.5	2.6	2.5	2.5	2.5	2.6	2.5	2.6	
26-Nov	2.5	2.6	2.5	2.4	2.4	Z	2.4	2.4	2.4	2.4	2.4	2.4	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.4	2.5	2.7	2.7	
27-Nov	Z	2.4	2.4	2.4	2.4	2.4	2.5	2.4	2.4	2.4	2.4	2.3	2.3	2.3	2.3	2.3	2.4	2.4	2.4	2.4	2.3	2.3	2.4	2.3	2.5	
28-Nov	2.3	Z	2.4	2.3	2.3	2.4	2.3	2.3	2.3	2.4	2.2	2.2	2.1	2.1	2.2	2.2	2.3	2.3	2.3	2.3	2.2	2.2	2.3	2.3	2.4	
29-Nov	2.3	2.3	Z	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.4	2.3	2.4	2.4	2.4	2.4	2.5	2.5	
30-Nov	2.4	2.3	2.4	Z	2.4	2.4	2.4	2.3	2.3	2.4	2.4	2.3	2.3	2.3	2.2	2.5	2.4	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.5	
																								Diurnal Average		
																								Diurnal Maximum		
Z - zerospan C - Calibration																										



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Total Hydrocarbons (THC) - ppm**  
**Kirby South - November 2023**





**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Total Hydrocarbons (THC) - ppm**  
**Kirby South - November 2023**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2.0	0	0.00	0.00
2.1 - 3.0	687	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: 687

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Total Hydrocarbons (THC) - ppm  
Kirby South - November 2023**

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	5	9	30	10	18	28	9	4	24	63	91	83	100	89	53	31	647
3.1 - 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	5	9	30	10	18	28	9	4	24	63	91	83	100	89	53	31	647

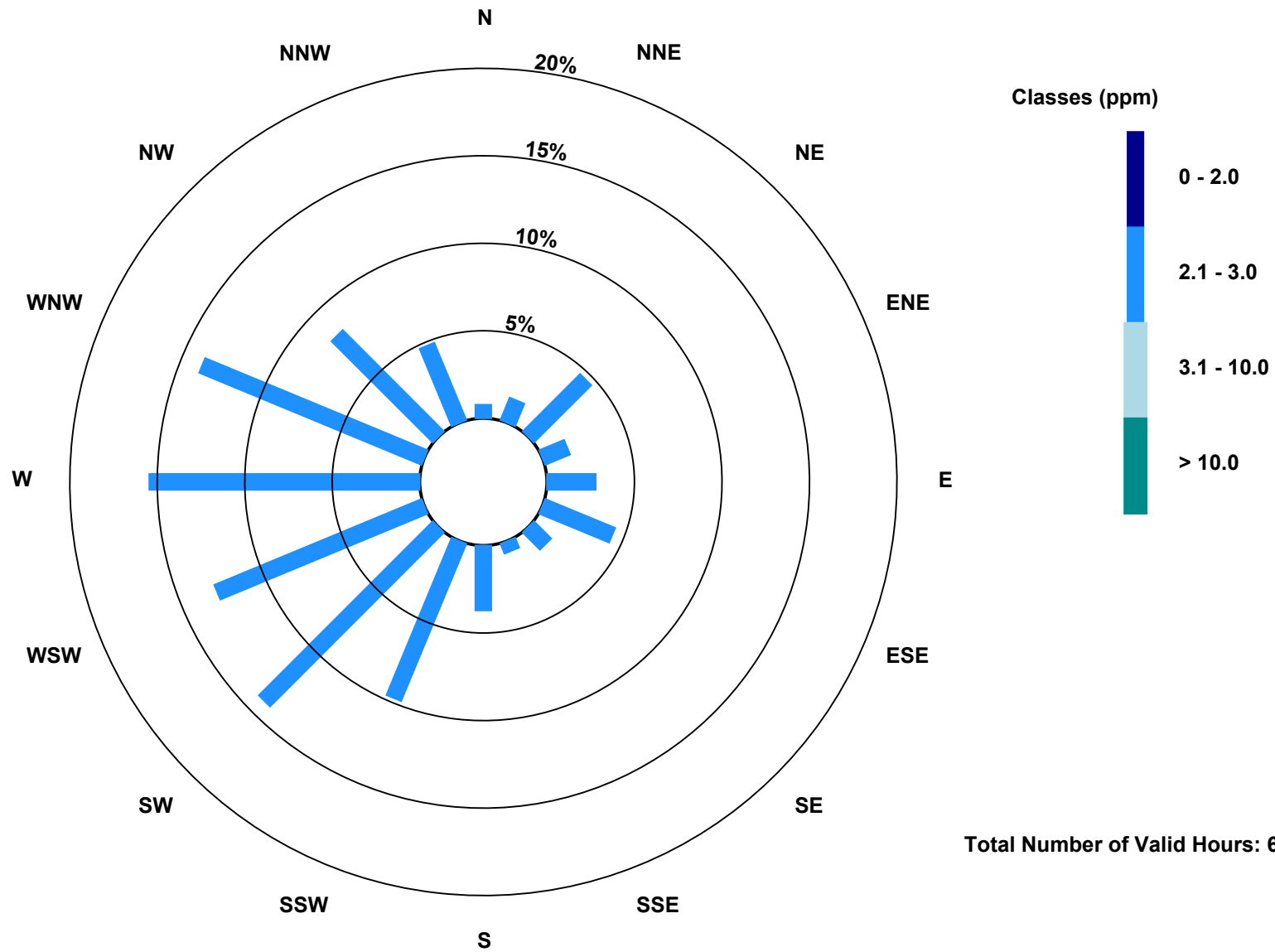
Total Number of Valid Hours: 647

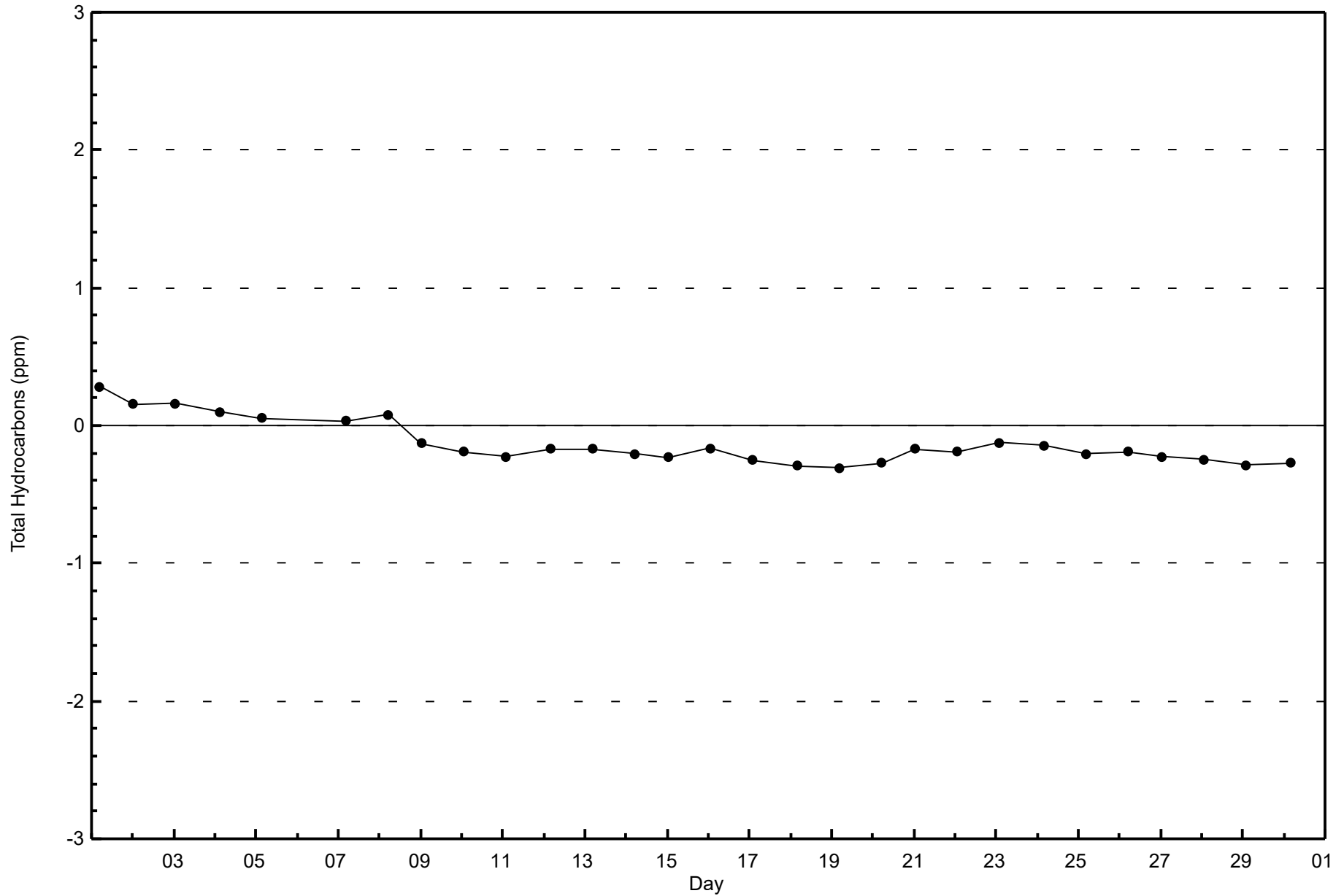
Total Number of Hours: 720

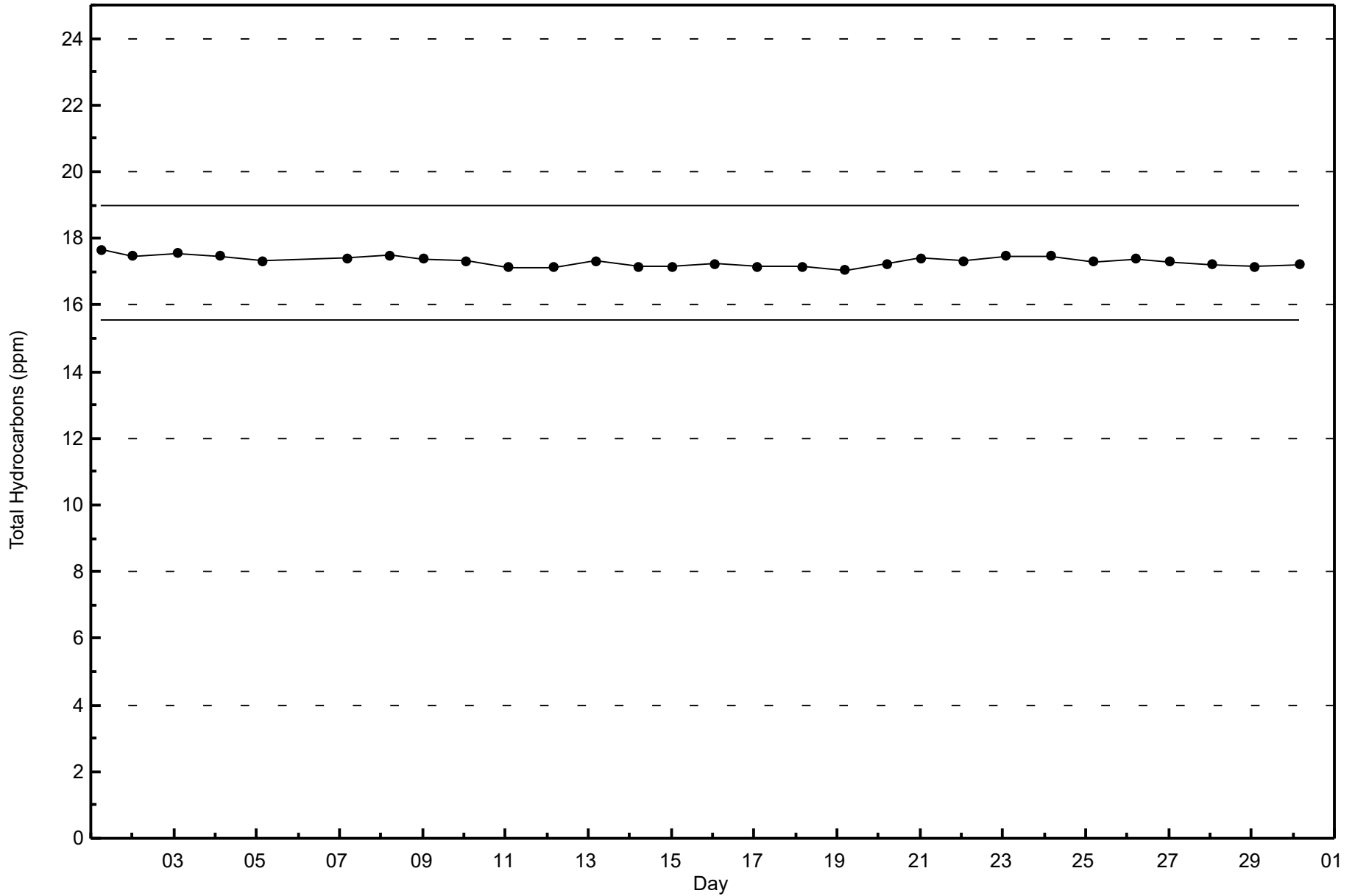


Wood Buffalo Environmental Association  
Wind Rose Nov 2023

Total Hydrocarbons (THC) - ppm  
Kirby South











Wood Buffalo Environmental Association

Summary of Hour Averages

Nitric Oxide (NO) - ppb

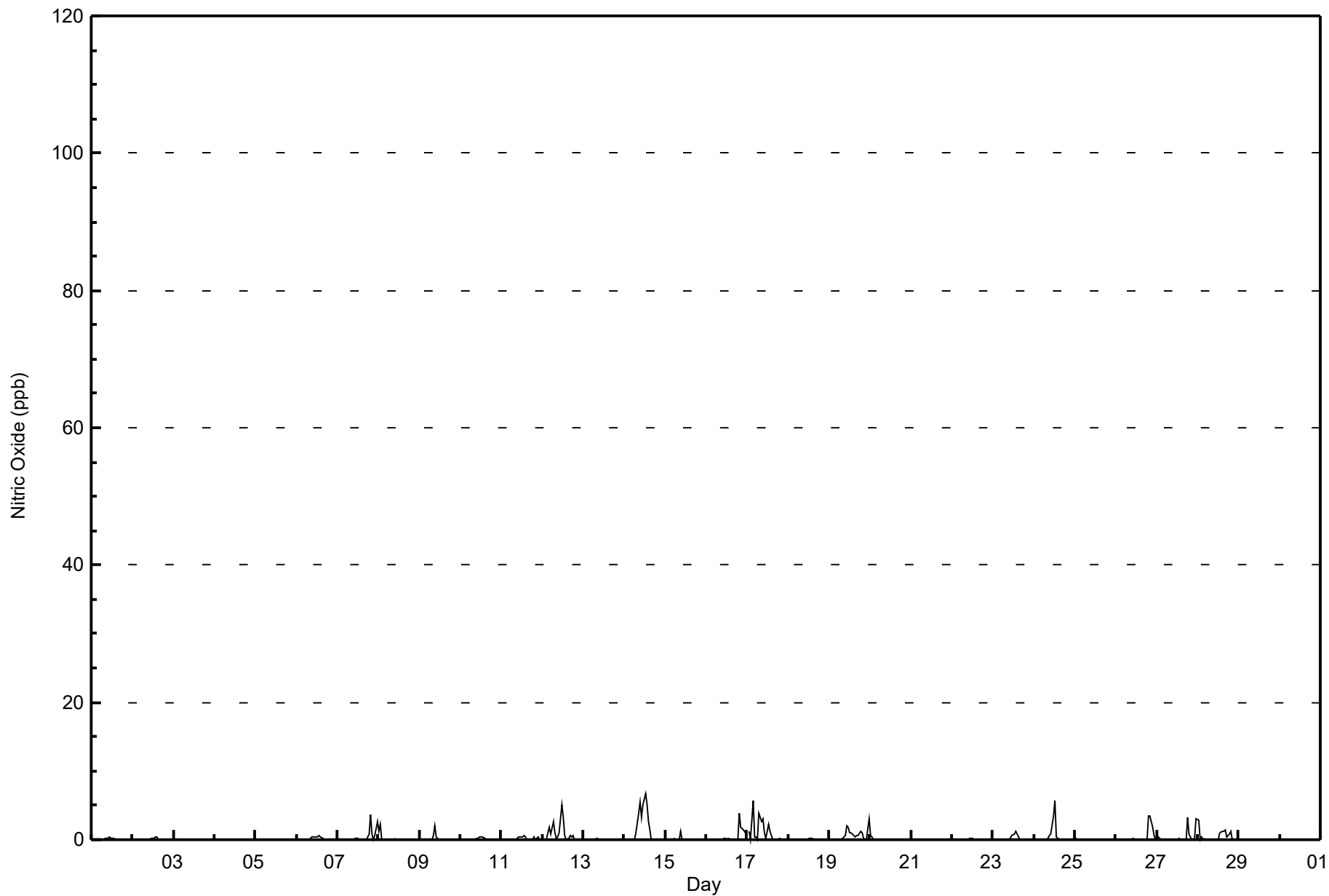
Kirby South - November 2023

Maximum Value: 6.7 ppb on Nov 14 13:00																				Maximum Daily Average: 1.5 ppb on Nov 14					Hours in Service: 720	
Minimum Value: 0.0 ppb on Nov 1 02:00																				Minimum Daily Average: 0.0 ppb on Nov 4					Hours of Data: 685	
Maximum Diurnal Average: 0.8 ppb at hour 13																				Minimum Diurnal Average: 0.0 ppb at hour 3					Hours of Missing Data: 35	
Monthly Average: 0.26 ppb																				Percentiles: P <sub>1</sub> = 0.0 P <sub>10</sub> = 0.0 Q <sub>1</sub> = 0.0 Median = 0.0 Q <sub>3</sub> = 0.1 P <sub>90</sub> = 0.6 P <sub>99</sub> = 4.1					Hours of Calibration: 35	
																									Percent Operational Time: 100.0	
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.3	0.3	0.3	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.3
2-Nov	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.4	0.4	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.4
3-Nov	0.0	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4-Nov	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5-Nov	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.4	0.3	0.4	0.4	0.5	0.5	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.5
7-Nov	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.9	3.7	0.8	0.0	0.6	2.7	0.4	3.7
8-Nov	1.2	2.3	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.2	C	C	C	C	C	C	0.0	0.0	0.0	0.0	0.0	0.0	0.0	--	2.3
9-Nov	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.7	2.1	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	0.1	2.1
10-Nov	0.0	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.2	0.3	0.4	0.4	0.4	0.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.4
11-Nov	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.3	0.3	0.4	0.5	0.3	0.1	0.0	0.0	0.0	0.4	0.0	0.5	0.0	0.0	0.1	0.5
12-Nov	0.0	Z	0.2	1.1	1.8	0.7	2.6	1.0	0.2	0.4	1.0	5.0	3.3	0.7	0.0	0.3	0.7	0.4	0.5	0.0	0.0	0.0	0.0	0.0	0.9	5.0
13-Nov	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
14-Nov	0.0	0.0	0.0	Z	0.0	0.0	0.0	1.1	3.9	5.6	3.2	5.1	6.7	5.1	2.7	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.5	6.7
15-Nov	0.0	0.0	0.0	0.0	Z	0.1	0.0	0.0	0.0	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	1.3
16-Nov	0.0	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.1	3.8	1.8	1.6	1.5	0.8	0.4	3.8
17-Nov	Z	1.2	0.0	5.7	0.4	0.5	0.0	3.8	2.7	3.0	1.0	0.2	2.2	1.1	0.6	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	1.0	5.7
18-Nov	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.3	0.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3
19-Nov	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.2	0.6	1.9	1.8	1.0	1.0	0.5	0.4	0.6	0.6	1.1	1.0	0.3	0.0	0.0	3.0	0.6	3.0
20-Nov	0.5	0.4	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5
21-Nov	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
22-Nov	0.0	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
23-Nov	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.5	0.9	1.2	0.9	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	1.2
24-Nov	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.7	0.9	3.4	5.8	0.4	0.2	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.5	5.8
25-Nov	0.2	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
26-Nov	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.5	3.5	1.9	0.5	0.0	0.4	3.5
27-Nov	0.2	0.3	0.1	0.1	Z	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.1	0.0	0.0	0.1	3.2	0.8	0.0	0.0	0.1	3.1	0.4	3.2	
28-Nov	2.8	0.1	0.4	0.0	0.3	Z	0.0	0.0	0.0	0.1	0.0	0.0	1.0	1.3	1.2	1.3	0.5	0.7	1.2	0.0	0.0	0.0	0.0	0.5	2.8	
29-Nov	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30-Nov	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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		
0.2 0.2 0.0 0.3 0.1 0.1 0.1 0.2 0.3 0.5 0.4 0.6 0.8 0.5 0.3 0.2 0.1 0.1 0.2 0.5 0.2 0.1 0.1 0.3																										
2.8 2.3 0.4 5.7 1.8 0.7 2.6 3.8 3.9 5.6 3.2 5.1 6.7 5.1 2.7 1.4 1.3 0.6 3.2 3.8 3.5 1.9 1.5 3.1																										
Z - zerospan C - Calibration																										



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Nitric Oxide (NO) - ppb**  
**Kirby South - November 2023**





**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Nitric Oxide (NO) - ppb**  
**Kirby South - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	685	100.00	100.00
21 - 40	0	0.00	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitric Oxide (NO) - ppb  
Kirby South - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	5	9	30	10	17	30	9	3	23	65	91	83	100	89	50	28	642
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	5	9	30	10	17	30	9	3	23	65	91	83	100	89	50	28	642

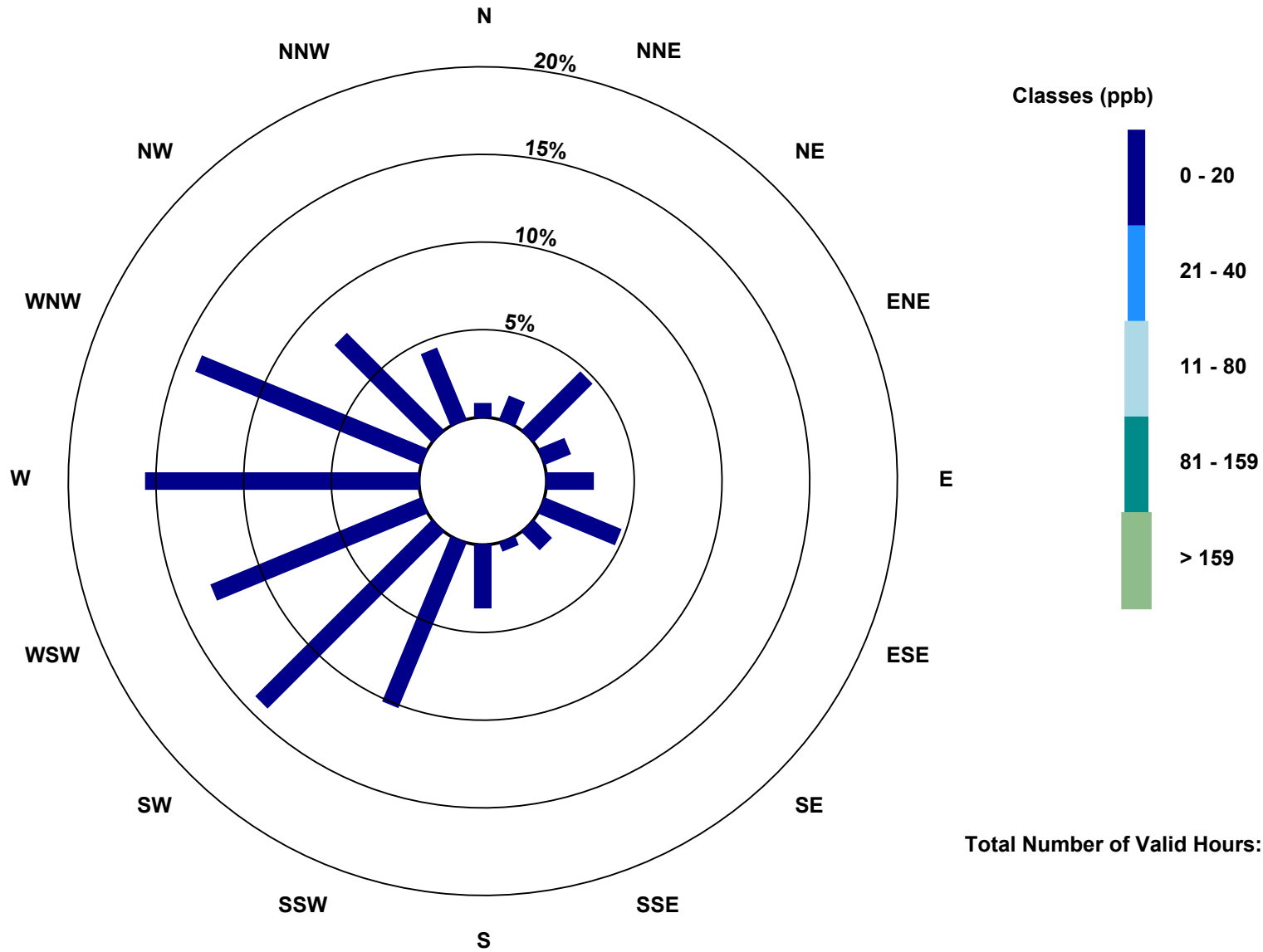
Total Number of Valid Hours: 642

Total Number of Hours: 720

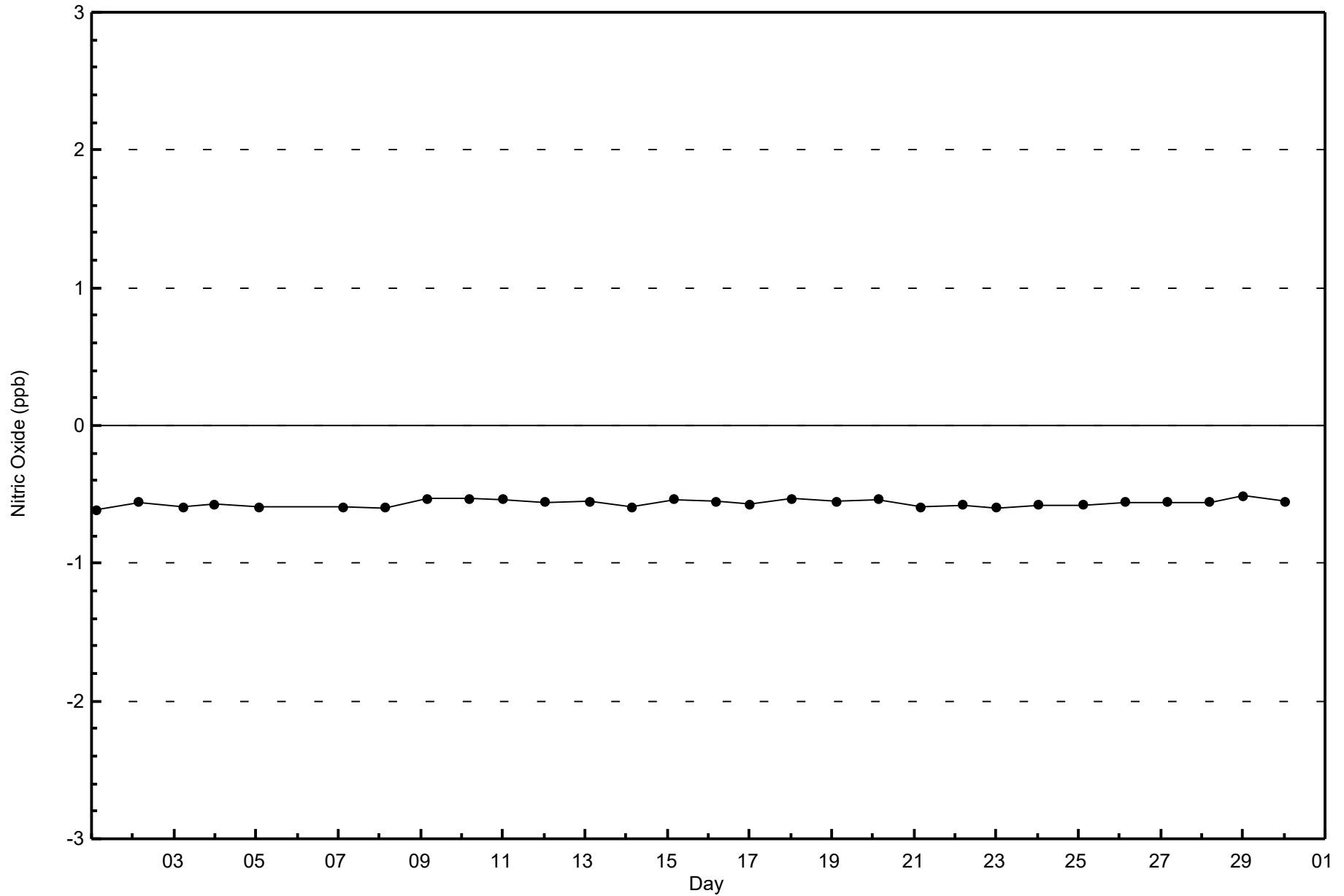


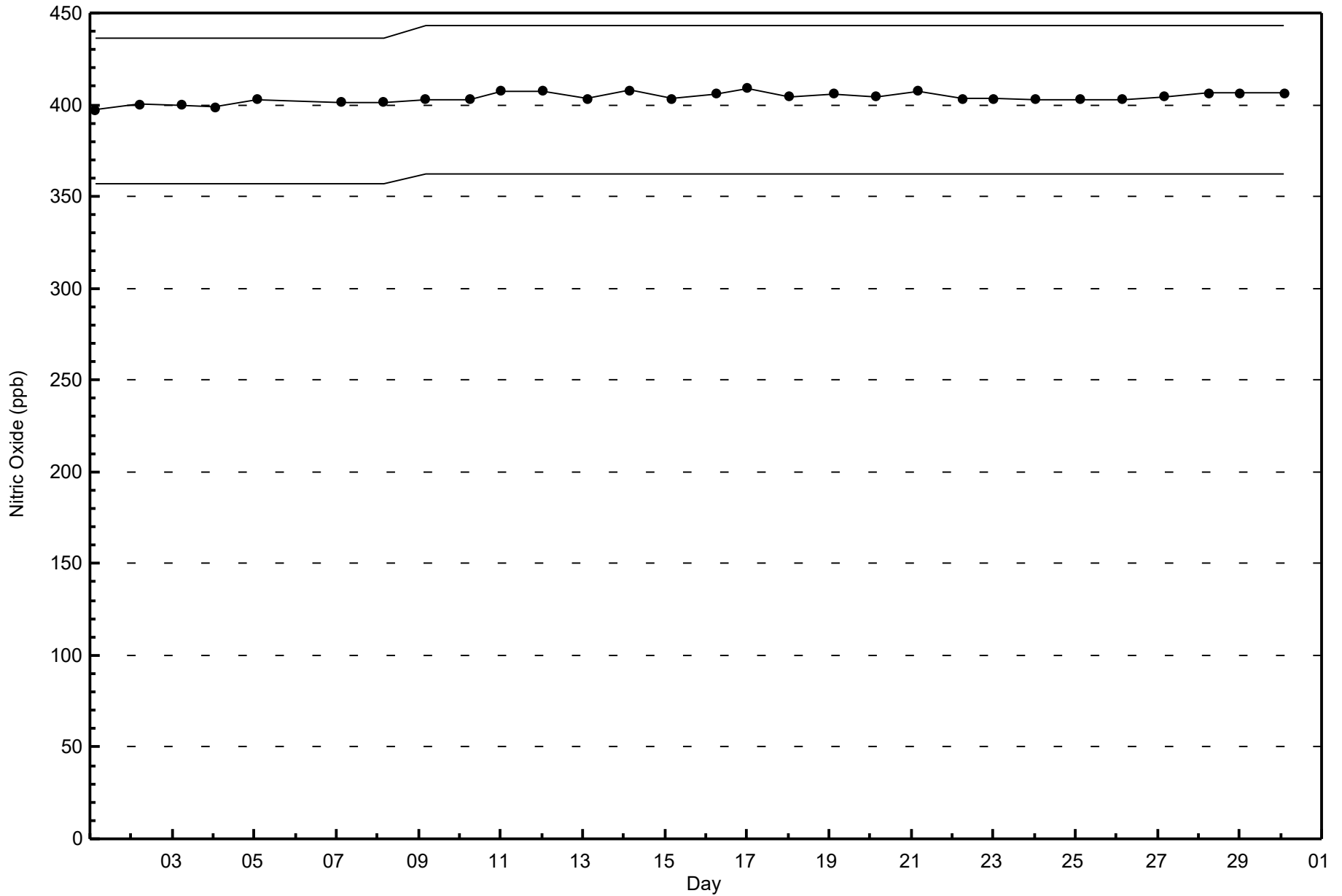
Wood Buffalo Environmental Association  
Wind Rose Nov 2023

Nitric Oxide (NO) - ppb  
Kirby South



Total Number of Valid Hours: 642







# Wood Buffalo Environmental Association

## Summary of Hour Averages

# Nitrogen Dioxide (NO<sub>2</sub>) - ppb

## Kirby South - November 2023

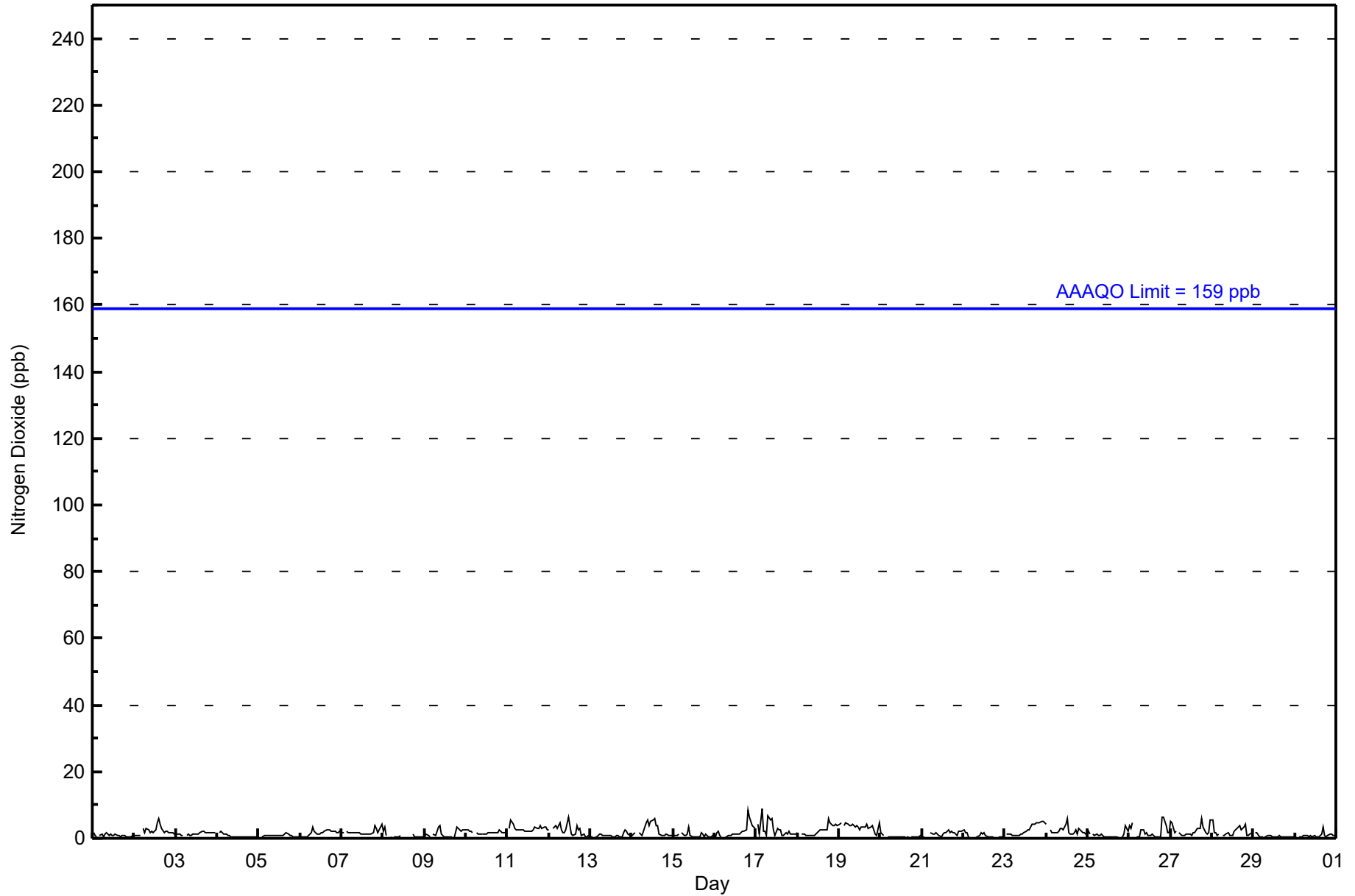
Number of Exceedences (AAAQO):		1-hr: 0	24-hr: 0	Hours in Service: 720																	Daily Average		Daily Maximum				
Maximum Value: 8.7 ppb on Nov 17 04:00		Maximum Daily Average: 3.5 ppb on Nov 19																	Hours of Data: 685		Hours of Missing Data: 35						
Minimum Value: 0.1 ppb on Nov 22 20:00		Minimum Daily Average: 0.5 ppb on Nov 20																	Hours of Calibration: 35		Percent Operational Time: 100.0						
Maximum Diurnal Average: 2.3 ppb at hour 20		Minimum Diurnal Average: 1.2 ppb at hour 7																									
Monthly Average: 1.67 ppb		Percentiles: P <sub>1</sub> = 0.2 P <sub>10</sub> = 0.4 Q <sub>1</sub> = 0.7 Median = 1.3 Q <sub>3</sub> = 2.2 P <sub>90</sub> = 3.7 P <sub>99</sub> = 6.0																									
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Nov	1.9	0.9	0.4	Z	1.0	1.1	0.6	1.3	1.7	1.0	1.1	0.9	0.9	1.1	1.0	0.7	0.6	0.7	0.7	0.6	0.5	0.5	0.6	0.7	0.9	1.9	
2-Nov	0.8	0.9	1.0	0.9	Z	3.1	1.8	2.9	2.4	1.5	2.1	1.9	2.4	4.5	6.0	4.2	2.8	1.8	2.3	2.1	1.6	1.6	1.5	1.4	2.2	6.0	
3-Nov	1.3	1.1	1.2	1.0	0.8	Z	0.8	1.1	1.0	1.0	1.3	1.1	1.3	1.3	1.5	2.0	2.0	1.8	1.7	1.5	1.5	1.6	1.5	1.5	1.3	2.0	
4-Nov	Z	1.9	2.0	1.7	1.4	1.1	0.8	0.7	0.6	0.6	0.6	0.6	0.5	0.6	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.4	0.5	0.4	0.8	2.0	
5-Nov	0.5	Z	0.6	0.7	0.7	0.8	0.8	0.9	0.8	0.8	0.8	0.7	0.8	0.8	0.8	1.2	1.8	1.3	0.8	0.7	0.5	0.4	0.4	0.4	0.8	1.8	
6-Nov	0.3	0.4	0.4	0.4	0.6	0.9	1.8	3.2	2.1	1.5	1.3	1.3	1.5	1.8	2.2	2.5	2.6	2.5	2.3	2.2	2.0	1.8	1.8	2.0	1.6	3.2	
7-Nov	1.9	1.7	Z	2.0	1.8	1.5	1.5	1.5	1.5	1.5	1.5	1.4	1.3	1.3	1.2	1.2	1.1	1.2	1.8	4.0	2.8	1.5	2.6	4.3	1.8	4.3	
8-Nov	2.3	3.6	0.7	Z	0.3	0.2	0.2	0.3	0.4	0.6	0.9	C	C	C	C	C	C	1.1	0.6	0.4	0.4	0.4	0.6	0.6	--	3.6	
9-Nov	0.5	1.4	0.9	0.6	Z	1.4	1.0	2.3	3.5	4.0	1.2	0.5	0.5	0.4	0.3	0.3	0.2	0.2	1.9	3.2	2.5	2.1	2.4	2.5	1.5	4.0	
10-Nov	2.6	2.5	2.2	2.0	1.8	Z	1.6	1.4	1.4	1.3	1.2	1.3	1.4	1.6	1.7	1.8	1.8	1.7	1.9	2.4	2.1	1.8	1.7	1.9	1.8	2.6	
11-Nov	Z	3.1	5.7	4.3	2.8	2.5	2.7	2.7	2.5	2.4	2.1	2.2	2.1	2.2	2.3	2.4	3.2	2.8	2.8	3.7	2.9	3.3	3.4	2.4	2.9	5.7	
12-Nov	2.4	Z	2.9	3.4	4.0	3.0	4.8	2.7	1.9	1.6	2.6	6.2	3.8	1.4	0.8	1.1	3.7	2.6	2.8	0.9	1.4	0.6	0.6	1.0	2.4	6.2	
13-Nov	0.6	0.4	Z	0.4	0.4	1.4	1.2	0.7	0.7	0.7	0.7	0.7	0.7	0.6	0.6	0.7	0.7	0.5	0.5	1.6	2.4	2.2	1.4	0.7	0.9	2.4	
14-Nov	0.9	1.1	1.5	Z	1.6	1.3	0.9	2.1	4.5	5.4	3.9	4.9	5.6	5.9	3.8	3.7	1.3	1.0	0.8	0.7	1.3	1.0	1.0	1.0	2.4	5.9	
15-Nov	1.0	0.9	1.0	1.1	Z	1.9	1.0	0.7	1.3	3.3	0.9	0.6	0.4	0.4	0.5	0.6	1.8	1.2	0.6	1.4	0.6	0.5	0.4	0.8	1.0	3.3	
16-Nov	0.4	1.6	2.2	0.7	0.4	Z	0.5	0.6	0.7	0.9	1.1	1.4	1.1	1.2	1.4	1.5	2.0	2.1	2.4	8.3	6.4	5.1	3.9	2.8	2.1	8.3	
17-Nov	Z	4.1	1.3	8.7	2.0	2.0	1.0	6.6	5.7	5.8	2.5	0.9	3.0	2.4	2.4	1.0	0.9	1.9	1.1	2.1	1.3	1.2	1.1	1.2	2.6	8.7	
18-Nov	1.5	Z	1.2	1.2	1.1	1.0	0.9	0.8	0.8	0.7	0.9	1.6	2.1	2.4	2.4	2.6	2.5	2.4	5.9	4.6	3.8	3.8	4.1	4.0	2.3	5.9	
19-Nov	4.2	4.6	Z	4.0	4.6	4.2	3.8	3.8	4.2	3.3	3.7	3.4	2.7	3.2	3.4	3.2	4.3	3.0	3.6	3.9	2.4	1.3	0.9	4.7	3.5	4.7	
20-Nov	1.6	1.3	0.7	Z	0.3	0.3	0.4	0.3	0.3	0.3	0.3	0.4	0.3	0.4	0.3	0.2	0.3	0.2	0.3	0.3	0.3	0.4	0.3	0.9	0.5	1.6	
21-Nov	0.6	0.3	0.2	0.2	Z	1.5	1.4	1.3	1.5	1.4	0.9	0.6	1.3	1.6	1.8	2.4	1.6	2.1	1.9	1.9	1.0	2.1	2.2	2.0	1.4	2.4	
22-Nov	2.7	1.6	1.6	0.5	0.2	Z	0.2	0.2	0.3	0.9	1.8	1.4	1.6	0.7	0.5	0.4	0.5	0.3	0.2	0.1	0.2	0.4	0.3	0.6	0.7	2.7	
23-Nov	Z	1.3	1.2	1.3	1.0	0.8	0.8	0.9	1.0	1.2	1.3	1.7	2.0	2.4	2.7	3.4	4.1	4.4	4.8	4.8	4.7	5.0	5.1	4.6	2.6	5.1	
24-Nov	4.1	Z	2.5	1.9	1.9	1.7	1.8	2.0	3.0	2.9	2.4	4.1	5.8	1.6	1.4	1.4	1.8	2.6	1.4	2.9	2.3	1.9	1.6	1.3	2.4	5.8	
25-Nov	2.0	1.1	Z	1.2	0.9	1.2	0.9	1.0	1.1	0.6	0.4	0.4	0.4	0.3	0.4	0.4	0.4	0.4	0.2	0.2	0.3	1.3	3.9	2.3	0.9	3.9	
26-Nov	3.7	3.1	4.6	Z	0.3	0.4	0.6	2.4	2.4	1.3	1.7	0.9	1.0	1.3	0.9	0.5	0.5	0.4	0.4	6.4	6.2	4.0	1.8	1.7	2.0	6.4	
27-Nov	5.1	4.7	1.9	2.0	Z	1.8	0.8	0.9	1.0	1.2	1.4	1.2	1.0	1.5	1.9	3.1	2.9	2.9	5.8	3.2	1.6	1.3	1.5	5.5	2.4	5.8	
28-Nov	5.6	1.6	1.9	0.9	1.4	Z	0.8	0.9	1.1	1.5	0.8	0.8	0.8	2.0	3.1	3.6	3.7	2.5	3.2	4.2	1.0	0.8	1.2	1.7	2.0	5.6	
29-Nov	Z	1.5	1.5	0.6	0.5	0.3	0.2	0.3	0.8	0.8	0.7	0.5	0.4	0.3	0.3	0.7	0.4	0.3	0.4	0.4	0.4	0.3	0.3	0.3	0.5	1.5	
30-Nov	0.3	Z	0.6	0.3	0.3	0.9	0.9	0.7	0.6	0.7	0.5	0.7	0.5	0.4	0.6	1.3	3.6	1.0	0.4	0.9	1.1	1.2	0.9	0.8	0.8	3.6	
		2.0	1.9	1.6	1.7	1.3	1.5	1.2	1.6	1.7	1.7	1.4	1.5	1.6	1.6	1.7	1.8	1.6	1.8	2.3	1.9	1.7	1.7	1.9	Diurnal Average		
		5.6	4.7	5.7	8.7	4.6	4.2	4.8	6.6	5.7	5.8	3.9	6.2	5.8	5.9	6.0	4.2	4.3	4.4	5.9	8.3	6.4	5.1	5.1	5.5	Diurnal Maximum	
Z - zerospan		C - Calibration																									
Alberta Ambient Air Quality Objectives (AAAQO):		1-hr 159 ppb																									





**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb**  
**Kirby South - November 2023**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Kirby South - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	685	100.00	100.00
21 - 40	0	0.00	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Kirby South - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 20	5	9	30	10	17	30	9	3	23	65	91	83	100	89	50	28	642
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	<b>5</b>	<b>9</b>	<b>30</b>	<b>10</b>	<b>17</b>	<b>30</b>	<b>9</b>	<b>3</b>	<b>23</b>	<b>65</b>	<b>91</b>	<b>83</b>	<b>100</b>	<b>89</b>	<b>50</b>	<b>28</b>	<b>642</b>

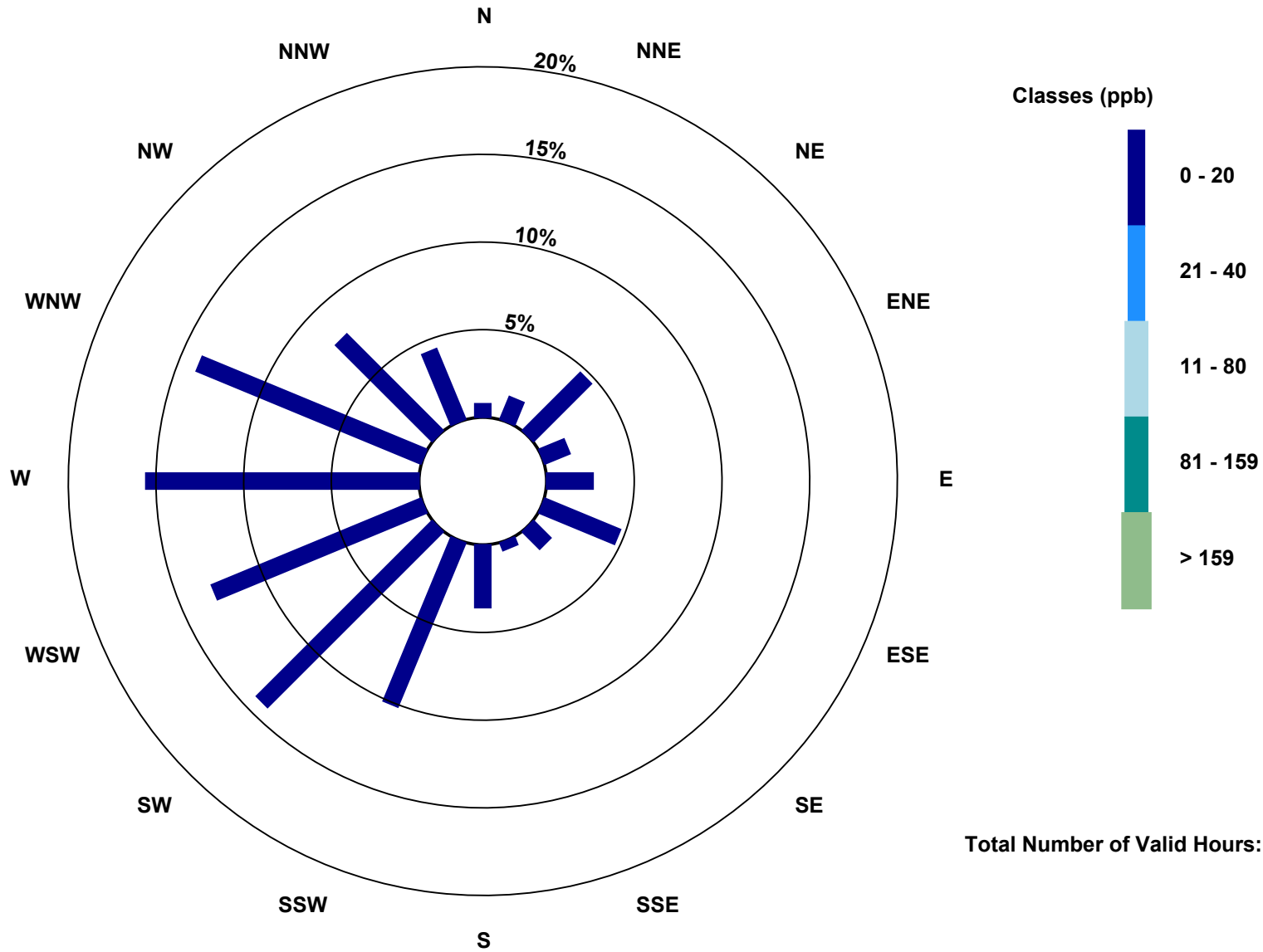
Total Number of Valid Hours: 642

Total Number of Hours: 720

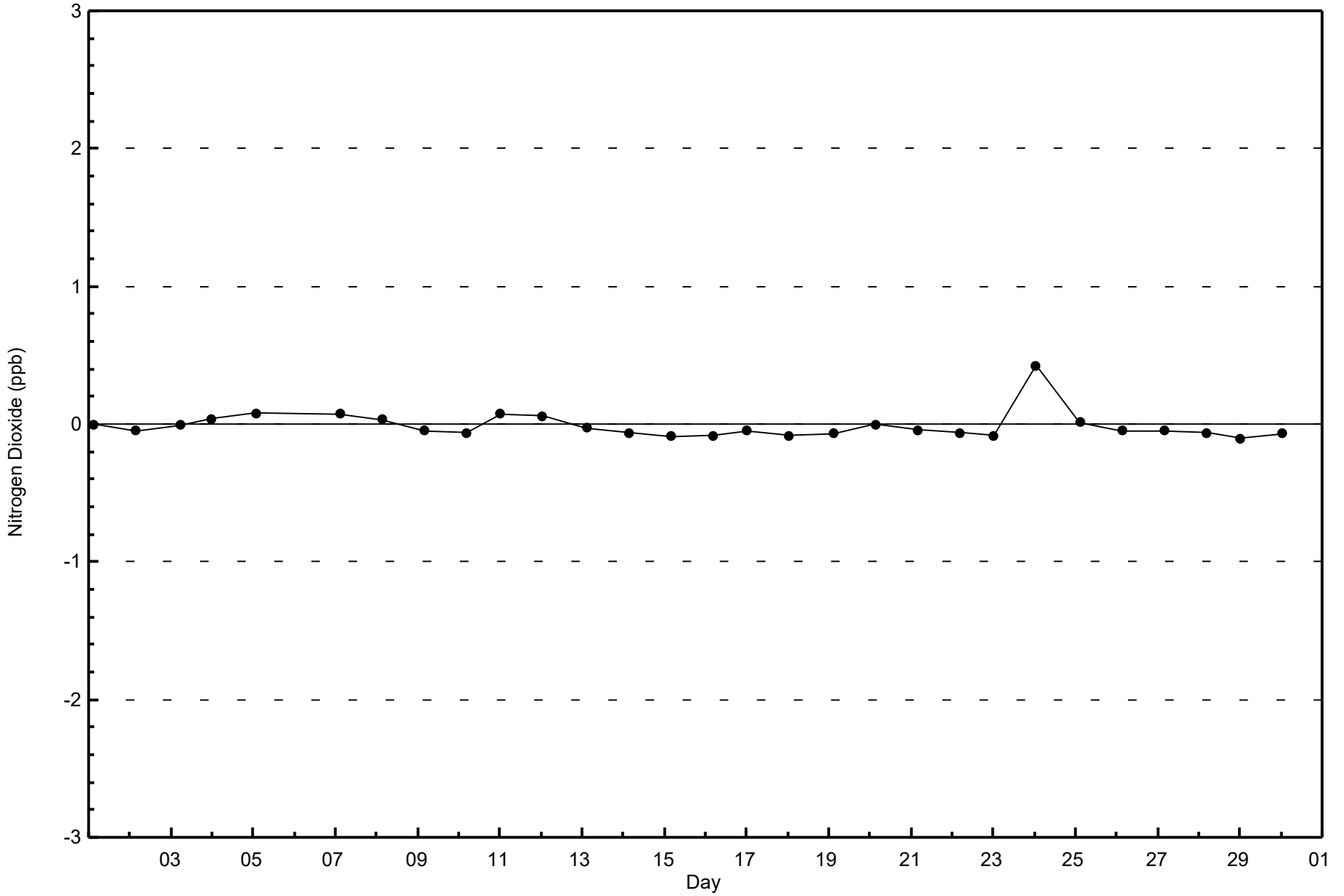


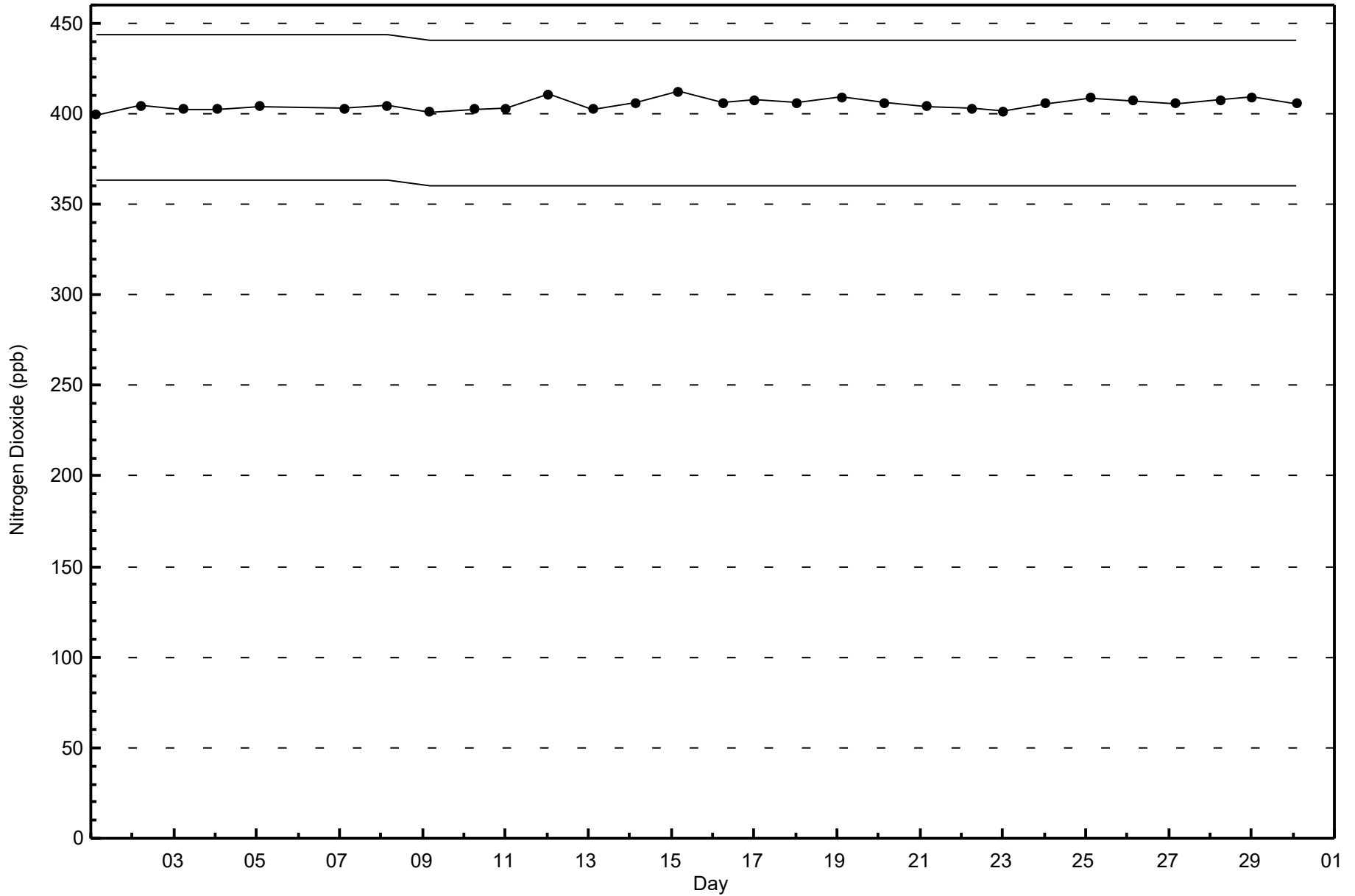
Wood Buffalo Environmental Association  
Wind Rose Nov 2023

Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Kirby South



Total Number of Valid Hours: 642







**Wood Buffalo Environmental Association**  
**Summary of Hour Averages**

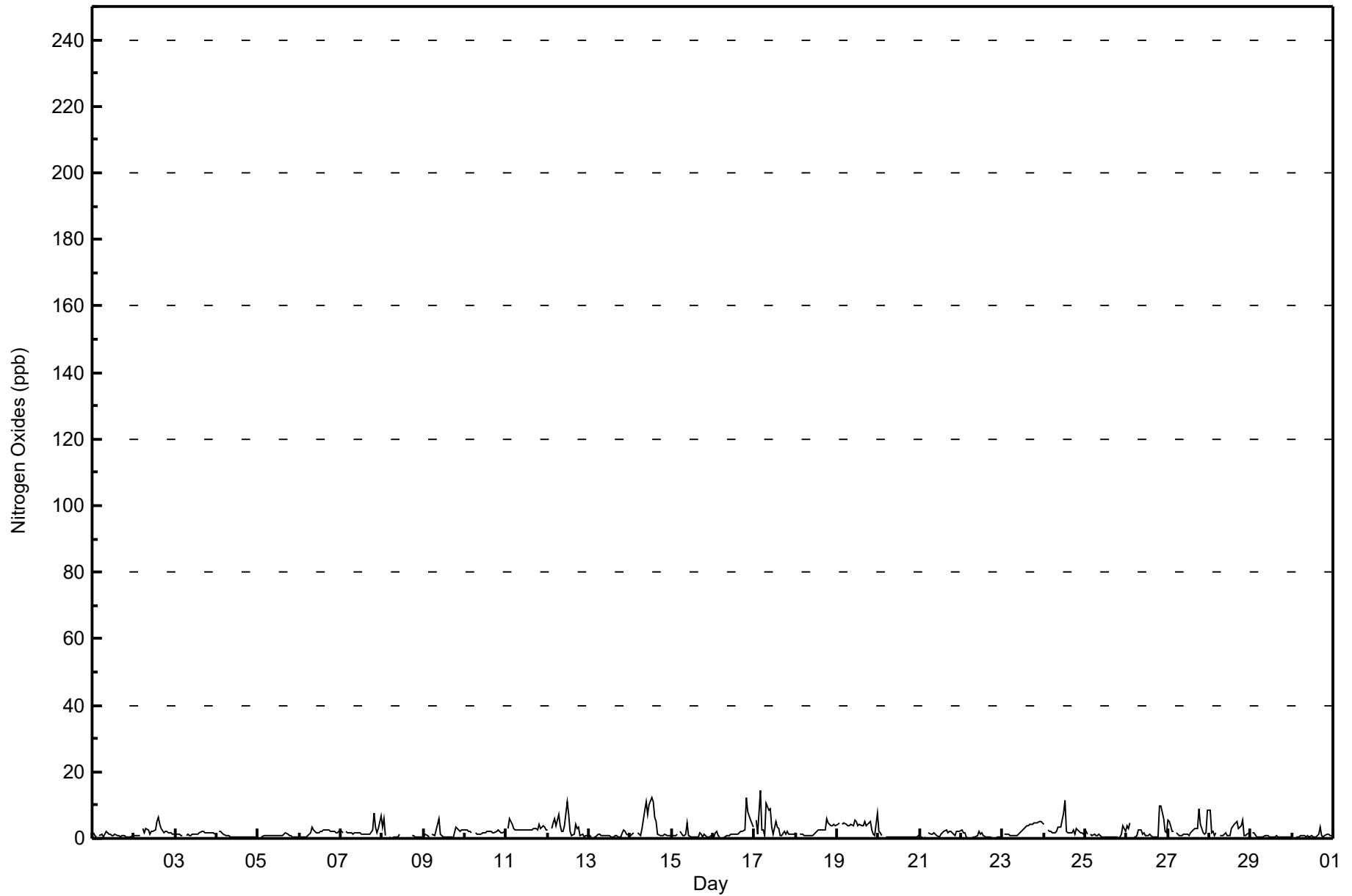
**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Kirby South - November 2023**

Maximum Value: 14.4 ppb on Nov 17 04:00      Maximum Daily Average: 4.1 ppb on Nov 19																				Hours in Service: 720 Hours of Data: 685 Hours of Missing Data: 35 Hours of Calibration: 35 Percent Operational Time: 100.0						
Minimum Value: 0.1 ppb on Nov 22 20:00      Minimum Daily Average: 0.5 ppb on Nov 20 Maximum Diurnal Average: 2.8 ppb at hour 20      Minimum Diurnal Average: 1.3 ppb at hour 7 Monthly Average: 1.93 ppb      Percentiles: P <sub>1</sub> = 0.2 P <sub>10</sub> = 0.4 Q <sub>1</sub> = 0.7 Median = 1.3 Q <sub>3</sub> = 2.4 P <sub>90</sub> = 4.2 P <sub>99</sub> = 10.5																										
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	1.9	0.9	0.4	Z	1.0	1.1	0.6	1.3	2.0	1.3	1.4	1.0	1.0	1.2	1.0	0.7	0.6	0.7	0.7	0.6	0.5	0.5	0.6	0.7	0.9	2.0
2-Nov	0.8	0.9	1.0	0.9	Z	3.1	1.8	2.9	2.4	1.5	2.2	2.0	2.5	4.9	6.4	4.3	2.8	1.8	2.3	2.1	1.6	1.6	1.5	1.4	2.3	6.4
3-Nov	1.3	1.1	1.2	1.0	0.8	Z	0.8	1.1	1.0	1.0	1.3	1.1	1.3	1.3	1.5	2.0	2.0	1.8	1.7	1.5	1.5	1.6	1.5	1.5	1.3	2.0
4-Nov	Z	1.9	2.0	1.7	1.4	1.1	0.8	0.7	0.6	0.6	0.6	0.6	0.5	0.6	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.4	0.5	0.4	0.8	2.0
5-Nov	0.5	Z	0.6	0.7	0.7	0.8	0.8	0.9	0.8	0.8	0.8	0.7	0.8	0.8	0.8	1.2	1.8	1.3	0.8	0.7	0.5	0.4	0.4	0.4	0.8	1.8
6-Nov	0.3	0.4	0.4	0.4	0.6	0.9	1.8	3.2	2.4	1.9	1.6	1.7	1.9	2.3	2.7	2.7	2.6	2.5	2.3	2.2	2.0	1.8	1.8	2.0	1.8	3.2
7-Nov	1.9	1.7	Z	2.0	1.8	1.5	1.5	1.5	1.5	1.6	1.6	1.5	1.4	1.4	1.3	1.3	1.1	1.2	2.7	7.7	3.6	1.5	3.2	7.0	2.2	7.7
8-Nov	3.5	5.9	0.7	Z	0.3	0.2	0.2	0.3	0.4	0.6	1.1	C	C	C	C	C	C	1.1	0.6	0.4	0.4	0.4	0.6	0.6	--	5.9
9-Nov	0.5	1.4	0.9	0.6	Z	1.4	1.0	2.3	4.2	6.1	1.5	0.5	0.5	0.4	0.3	0.3	0.2	0.2	1.9	3.2	2.5	2.1	2.4	2.5	1.6	6.1
10-Nov	2.6	2.5	2.2	2.0	1.8	Z	1.6	1.4	1.4	1.5	1.5	1.7	1.8	2.0	2.0	1.9	1.8	1.7	1.9	2.4	2.1	1.8	1.7	1.9	1.9	2.6
11-Nov	Z	3.1	5.7	4.3	2.8	2.5	2.7	2.7	2.5	2.6	2.4	2.5	2.5	2.7	2.6	2.5	3.2	2.8	2.8	4.1	2.9	3.8	3.4	2.4	3.0	5.7
12-Nov	2.4	Z	3.1	4.5	5.8	3.7	7.4	3.7	2.1	2.0	3.6	11.2	7.1	2.1	0.8	1.4	4.4	3.0	3.3	0.9	1.4	0.6	0.6	1.0	3.3	11.2
13-Nov	0.6	0.4	Z	0.4	0.4	1.4	1.2	0.7	0.9	0.7	0.7	0.7	0.7	0.6	0.6	0.7	0.7	0.5	0.5	1.6	2.4	2.2	1.4	0.7	0.9	2.4
14-Nov	0.9	1.1	1.5	Z	1.6	1.3	0.9	3.2	8.4	11.0	7.1	10.0	12.3	11.0	6.5	5.1	1.3	1.0	0.8	0.7	1.3	1.0	1.0	1.0	3.9	12.3
15-Nov	1.0	0.9	1.0	1.1	Z	2.0	1.0	0.7	1.3	4.6	0.9	0.6	0.4	0.4	0.5	0.6	1.8	1.2	0.6	1.4	0.6	0.5	0.4	0.8	1.1	4.6
16-Nov	0.4	1.6	2.2	0.7	0.4	Z	0.5	0.6	0.7	0.9	1.2	1.5	1.2	1.3	1.4	1.5	2.0	2.1	2.5	12.1	8.2	6.7	5.4	3.6	2.6	12.1
17-Nov	Z	5.3	1.3	14.4	2.4	2.5	1.0	10.4	8.4	8.8	3.5	1.1	5.2	3.5	3.0	1.0	0.9	1.9	1.1	2.2	1.3	1.2	1.1	1.2	3.6	14.4
18-Nov	1.5	Z	1.2	1.2	1.1	1.0	0.9	0.8	0.8	0.7	0.9	1.6	2.3	2.7	2.7	2.7	2.5	2.4	5.9	4.6	3.8	3.8	4.1	4.0	2.3	5.9
19-Nov	4.2	4.6	Z	4.0	4.6	4.2	3.8	3.8	4.4	3.9	5.6	5.2	3.7	4.2	3.9	3.6	4.9	3.6	4.7	4.9	2.7	1.3	0.9	7.7	4.1	7.7
20-Nov	2.1	1.7	0.7	Z	0.3	0.3	0.4	0.3	0.3	0.3	0.3	0.4	0.3	0.4	0.3	0.2	0.3	0.2	0.3	0.3	0.3	0.4	0.3	0.9	0.5	2.1
21-Nov	0.6	0.3	0.2	0.2	Z	1.5	1.4	1.3	1.5	1.4	0.9	0.6	1.3	1.7	1.9	2.4	1.6	2.1	1.9	1.9	1.0	2.1	2.2	2.0	1.4	2.4
22-Nov	2.7	1.6	1.6	0.5	0.2	Z	0.2	0.2	0.3	0.9	1.9	1.5	1.8	0.7	0.5	0.4	0.5	0.3	0.2	0.1	0.2	0.4	0.3	0.6	0.8	2.7
23-Nov	Z	1.3	1.2	1.3	1.0	0.8	0.8	0.9	1.0	1.2	1.5	2.2	2.9	3.6	3.6	3.8	4.1	4.4	4.8	4.8	4.7	5.0	5.1	4.6	2.8	5.1
24-Nov	4.1	Z	2.5	1.9	1.9	1.7	1.8	2.0	3.2	3.6	3.3	7.5	11.6	2.0	1.6	1.5	1.8	2.6	1.4	3.0	2.3	1.9	1.6	1.3	2.9	11.6
25-Nov	2.2	1.1	Z	1.2	0.9	1.2	0.9	1.0	1.1	0.6	0.4	0.4	0.4	0.3	0.4	0.4	0.4	0.4	0.2	0.2	0.3	1.3	3.9	2.3	0.9	3.9
26-Nov	3.7	3.1	4.6	Z	0.3	0.4	0.6	2.4	2.4	1.3	1.8	0.9	1.0	1.3	0.9	0.5	0.5	0.4	0.4	9.9	9.7	5.9	2.3	1.7	2.4	9.9
27-Nov	5.3	5.0	2.0	2.1	Z	1.9	0.8	0.9	1.0	1.2	1.4	1.2	1.0	1.7	2.0	3.1	2.9	3.0	9.0	4.0	1.6	1.3	1.6	8.6	2.7	9.0
28-Nov	8.4	1.7	2.3	0.9	1.7	Z	0.8	0.9	1.1	1.6	0.8	0.8	0.8	3.0	4.4	4.8	5.0	3.0	3.9	5.4	1.0	0.8	1.2	1.7	2.4	8.4
29-Nov	Z	1.5	1.5	0.6	0.5	0.3	0.2	0.3	0.8	0.8	0.7	0.5	0.4	0.3	0.3	0.7	0.4	0.3	0.4	0.4	0.4	0.3	0.3	0.3	0.5	1.5
30-Nov	0.3	Z	0.6	0.3	0.3	0.9	0.9	0.7	0.6	0.7	0.5	0.7	0.5	0.4	0.6	1.3	3.6	1.0	0.4	0.9	1.1	1.2	0.9	0.8	0.8	3.6
																								Diurnal Average		
																								Diurnal Maximum		
																								2.2   2.0   1.6   2.0   1.4   1.5   1.3   1.8   2.0   2.2   1.8   2.1   2.4   2.0   1.9   1.8   1.9   1.6   2.0   2.8   2.1   1.8   1.7   2.2		
																								8.4   5.9   5.7   14.4   5.8   4.2   7.4   10.4   8.4   11.0   7.1   11.2   12.3   11.0   6.5   5.1   5.0   4.4   9.0   12.1   9.7   6.7   5.4   8.6		
Z - zerospan      C - Calibration																										



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Kirby South - November 2023**







**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Kirby South - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	685	100.00	100.00
21 - 40	0	0.00	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Kirby South - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 20	5	9	30	10	17	30	9	3	23	65	91	83	100	89	50	28	642
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	5	9	30	10	17	30	9	3	23	65	91	83	100	89	50	28	642

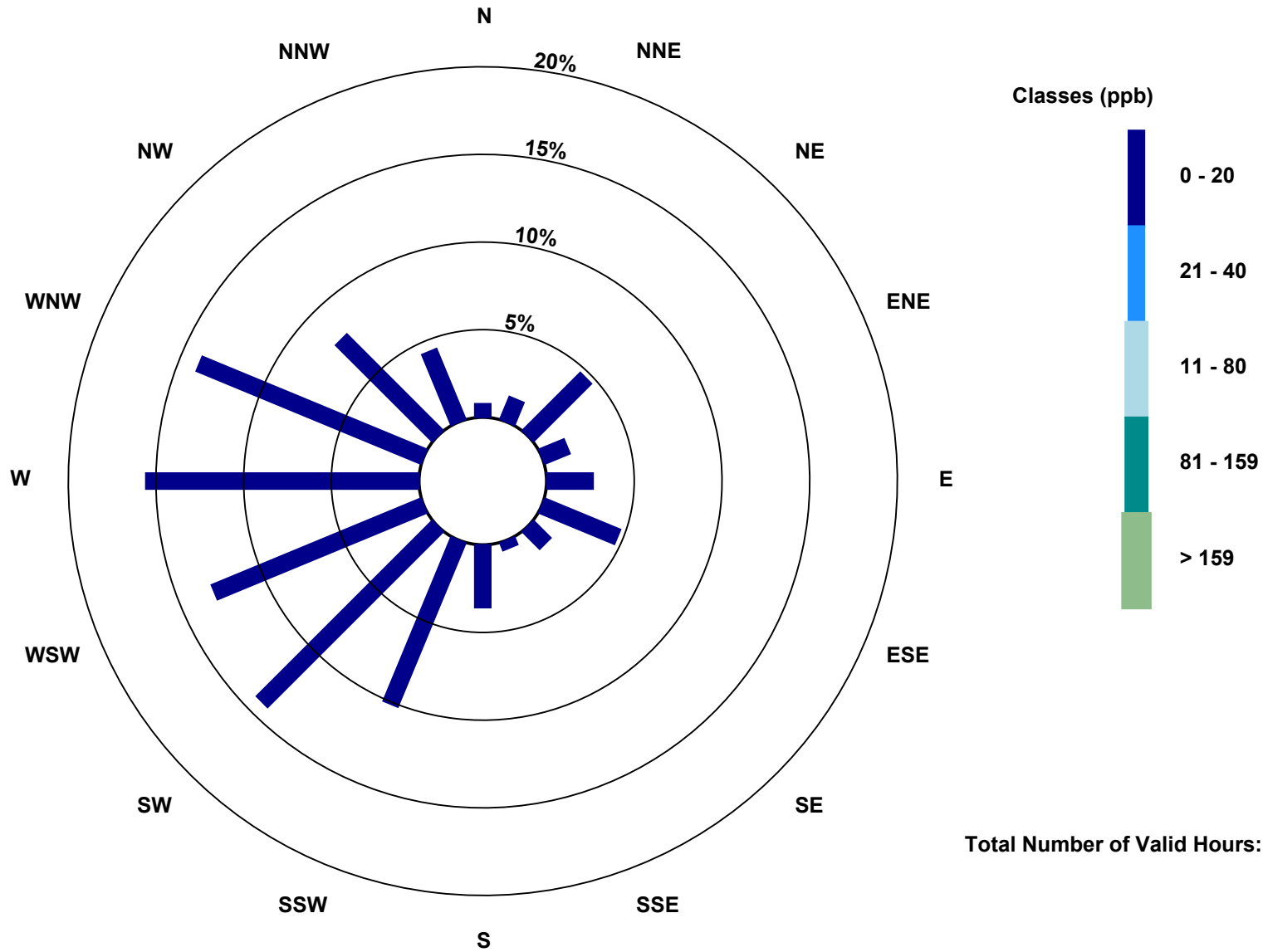
Total Number of Valid Hours: 642

Total Number of Hours: 720

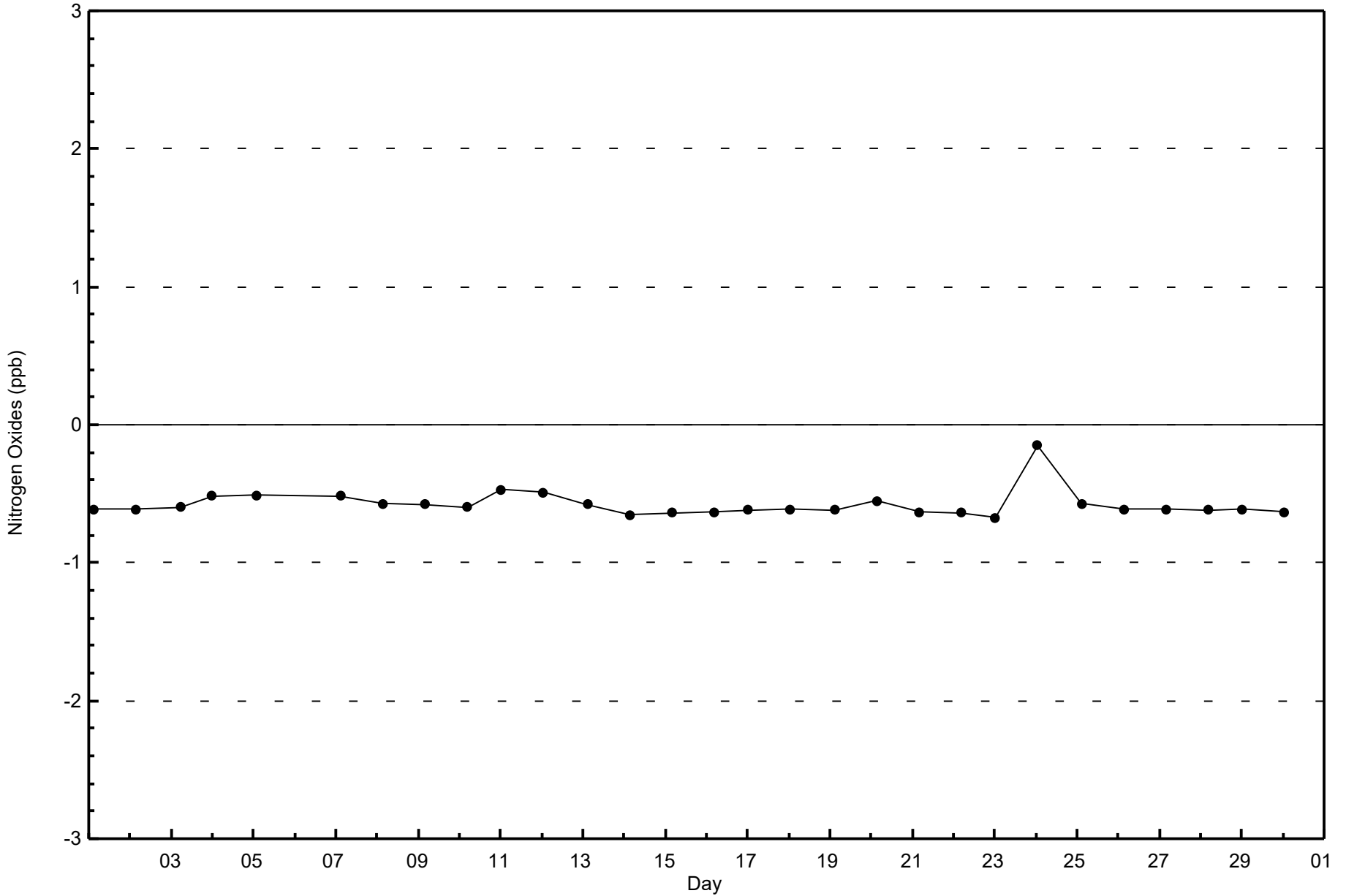


Wood Buffalo Environmental Association  
Wind Rose Nov 2023

Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Kirby South



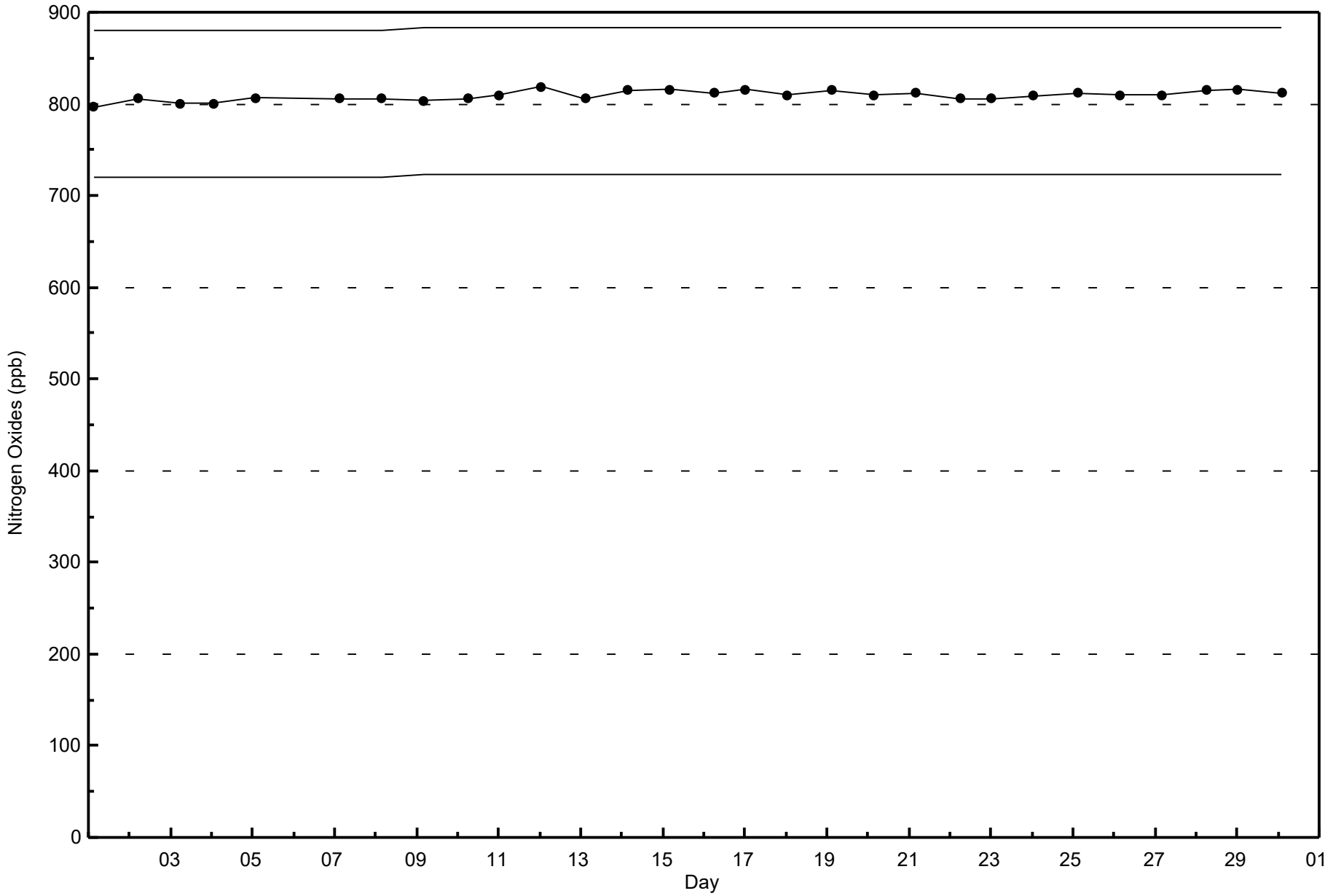
Total Number of Valid Hours: 642





Wood Buffalo Environmental Association  
Span Responses

Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Kirby South - November 2023





**Wood Buffalo Environmental Association**  
**Summary of Hour Averages**

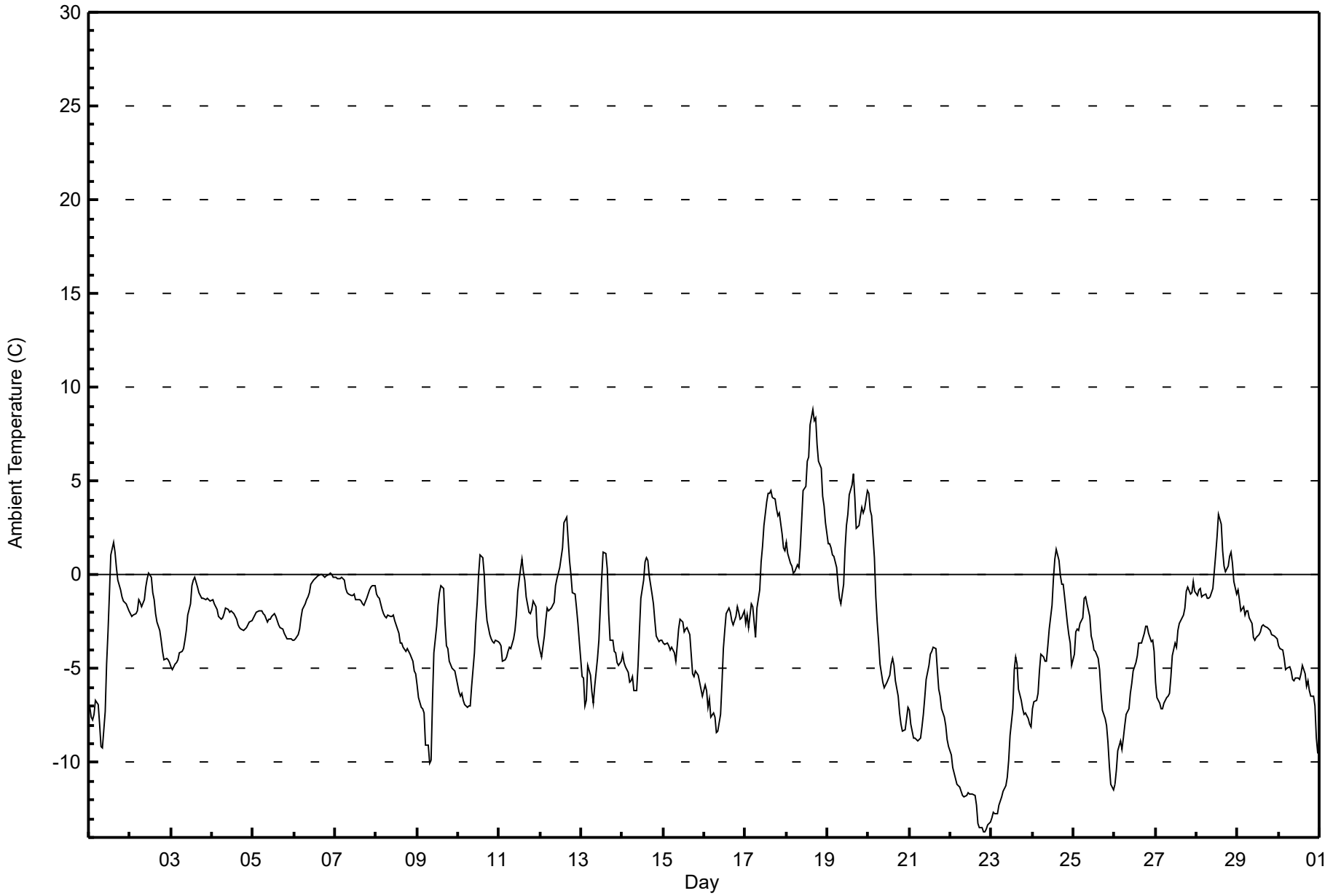
**Ambient Temperature (AT) - C**  
**Kirby South - November 2023**

Maximum Value: 8.8 C on Nov 18 16:00		Maximum Daily Average: 3.9 C on Nov 18		Hours in Service: 720																																												
Minimum Value: -13.7 C on Nov 22 20:00		Minimum Daily Average: -12.0 C on Nov 22		Hours of Data: 720																																												
Maximum Diurnal Average: -1.0 C at hour 15		Minimum Diurnal Average: -4.6 C at hour 8		Hours of Missing Data: 0																																												
Monthly Average: -3.23 C		Percentiles: P <sub>1</sub> = -13.1 P <sub>10</sub> = -8.0 Q <sub>1</sub> = -5.4 Median = -2.9 Q <sub>3</sub> = -1.1 P <sub>90</sub> = 0.9 P <sub>99</sub> = 6.0		Hours of Calibration: 0																																												
				Percent Operational Time: 100.0																																												
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Nov	-7.0	-7.6	-7.7	-7.4	-6.7	-6.9	-8.0	-9.2	-9.2	-7.3	-4.8	-3.0	-1.1	1.0	1.7	1.2	0.4	-0.3	-0.8	-1.2	-1.4	-1.5	-1.6	-1.9	-3.8	1.7																						
2-Nov	-2.1	-2.2	-2.2	-2.0	-1.9	-1.3	-1.4	-1.7	-1.4	-0.7	-0.2	0.1	-0.1	-0.9	-1.4	-2.0	-2.5	-3.0	-3.5	-4.1	-4.5	-4.5	-4.6	-4.7	-2.2	0.1																						
3-Nov	-4.9	-5.0	-4.8	-4.7	-4.5	-4.2	-4.1	-3.9	-3.5	-3.0	-2.1	-1.6	-0.6	-0.3	-0.2	-0.7	-0.9	-1.1	-1.2	-1.2	-1.3	-1.3	-1.4	-1.4	-2.4	-0.2																						
4-Nov	-1.3	-1.6	-1.7	-1.9	-2.2	-2.4	-2.3	-2.1	-1.8	-1.9	-2.0	-1.9	-2.0	-2.0	-2.4	-2.7	-2.8	-2.9	-3.0	-2.9	-2.8	-2.7	-2.5	-2.4	-2.3	-1.3																						
5-Nov	-2.3	-2.2	-2.0	-2.0	-1.9	-2.0	-2.1	-2.2	-2.5	-2.3	-2.4	-2.2	-2.0	-2.2	-2.5	-2.7	-2.8	-2.9	-3.1	-3.3	-3.4	-3.4	-3.4	-3.5	-2.6	-1.9																						
6-Nov	-3.5	-3.4	-3.2	-2.9	-2.3	-1.8	-1.6	-1.3	-1.2	-1.0	-0.5	-0.3	-0.2	-0.1	-0.1	0.0	0.0	-0.1	-0.1	-0.1	0.0	0.1	0.0	-0.1	-1.0	0.1																						
7-Nov	-0.2	-0.2	-0.2	-0.2	-0.1	-0.3	-0.7	-0.9	-1.0	-1.1	-1.1	-1.0	-1.3	-1.3	-1.4	-1.4	-1.6	-1.6	-1.2	-1.0	-0.8	-0.6	-0.6	-0.6	-0.9	-0.1																						
8-Nov	-1.1	-1.2	-1.3	-1.9	-2.1	-2.2	-2.3	-2.1	-2.2	-2.2	-2.1	-2.4	-2.9	-3.1	-3.6	-3.7	-3.8	-4.1	-3.9	-4.1	-4.2	-4.6	-5.1	-5.3	-3.0	-1.1																						
9-Nov	-5.9	-6.5	-7.1	-7.2	-7.4	-9.1	-9.1	-10.1	-9.9	-6.8	-4.2	-2.8	-1.6	-0.9	-0.5	-0.7	-2.6	-3.8	-4.0	-4.6	-5.0	-5.1	-5.1	-5.5	-5.2	-0.5																						
10-Nov	-6.3	-6.5	-6.3	-6.7	-6.9	-7.0	-7.0	-7.0	-5.9	-4.2	-2.6	-1.5	0.0	1.0	0.9	0.0	-1.5	-2.4	-3.2	-3.4	-3.6	-3.6	-3.5	-3.6	-3.8	1.0																						
11-Nov	-3.6	-3.8	-4.6	-4.5	-4.4	-4.1	-3.9	-4.0	-3.4	-3.0	-2.2	-0.9	0.3	0.8	0.2	-0.3	-1.2	-2.0	-2.1	-1.8	-1.4	-1.7	-3.2	-3.7	-2.4	0.8																						
12-Nov	-4.1	-4.4	-3.3	-2.4	-1.8	-1.9	-1.8	-1.6	-1.5	-0.6	-0.2	0.4	0.9	1.4	2.8	3.1	1.9	0.8	0.0	-0.9	-1.0	-1.8	-2.6	-3.6	-0.9	3.1																						
13-Nov	-5.4	-5.5	-7.0	-6.7	-4.8	-5.4	-6.3	-6.8	-5.9	-4.4	-3.5	-1.8	-0.2	1.2	1.2	0.3	-2.1	-3.5	-3.5	-4.1	-4.1	-4.7	-4.8	-4.6	-3.8	1.2																						
14-Nov	-4.3	-4.7	-4.9	-5.2	-5.7	-5.7	-5.4	-6.2	-6.2	-4.8	-3.0	-1.2	-0.3	0.7	0.9	0.8	-0.1	-1.0	-1.5	-2.4	-3.2	-3.5	-3.5	-3.5	-3.1	0.9																						
15-Nov	-3.7	-3.7	-3.6	-3.8	-4.0	-3.8	-4.2	-4.6	-3.8	-2.9	-2.4	-2.5	-3.1	-2.9	-2.8	-3.2	-4.2	-5.2	-5.4	-5.1	-5.4	-5.7	-6.1	-6.5	-4.1	-2.4																						
16-Nov	-5.9	-6.2	-7.1	-6.6	-7.6	-7.3	-7.6	-8.4	-8.4	-7.4	-5.8	-3.9	-2.9	-2.0	-1.7	-2.0	-2.5	-2.7	-2.2	-1.7	-2.0	-2.3	-2.3	-1.9	-4.5	-1.7																						
17-Nov	-2.6	-2.1	-2.8	-1.6	-1.7	-2.5	-3.4	-1.8	-0.8	0.7	1.5	2.6	3.9	4.4	4.4	4.5	4.2	4.1	3.5	3.1	3.3	2.2	1.4	1.3	1.1	4.5																						
18-Nov	1.7	1.1	0.6	0.5	0.1	0.1	0.6	0.4	1.5	2.9	4.5	4.7	6.1	6.3	8.0	8.8	8.2	8.3	7.0	6.1	5.7	4.2	3.7	2.7	3.9	8.8																						
19-Nov	1.7	1.7	1.5	1.0	1.0	0.4	-0.5	-1.2	-1.5	-0.5	1.3	2.6	3.2	4.3	4.8	5.4	4.1	2.5	2.6	3.2	3.6	3.3	3.6	4.5	2.2	5.4																						
20-Nov	4.3	3.5	3.1	0.9	-1.2	-2.5	-3.5	-4.8	-5.7	-6.0	-5.9	-5.7	-5.4	-4.8	-4.4	-4.9	-5.6	-6.5	-7.4	-8.0	-8.3	-8.2	-7.7	-7.0	-4.2	4.3																						
21-Nov	-7.2	-8.0	-8.7	-8.7	-8.8	-8.9	-8.7	-8.1	-7.4	-6.5	-5.6	-4.8	-4.3	-4.1	-3.8	-3.9	-5.0	-6.1	-6.5	-7.2	-7.6	-8.1	-8.7	-9.2	-6.9	-3.8																						
22-Nov	-9.6	-10.2	-10.5	-10.8	-11.2	-11.3	-11.6	-11.8	-11.8	-11.8	-11.6	-11.7	-11.7	-11.7	-11.8	-12.3	-13.2	-13.5	-13.5	-13.7	-13.7	-13.5	-13.3	-13.1	-12.0	-9.6																						
23-Nov	-13.0	-12.6	-12.7	-12.7	-12.3	-12.0	-11.8	-11.6	-11.3	-10.8	-9.9	-8.6	-7.2	-5.1	-4.4	-4.8	-6.1	-6.7	-7.2	-7.4	-7.4	-7.7	-8.0	-8.1	-9.1	-4.4																						
24-Nov	-7.2	-6.7	-6.7	-6.3	-5.2	-4.2	-4.4	-4.6	-4.6	-3.8	-2.9	-1.7	-0.2	0.9	1.4	0.8	-0.1	-0.5	-0.5	-1.2	-2.6	-3.2	-3.7	-4.8	-3.0	1.4																						
25-Nov	-4.2	-3.0	-2.9	-2.9	-2.6	-2.3	-1.2	-1.2	-1.5	-2.2	-3.3	-3.6	-4.0	-4.1	-4.5	-5.0	-6.3	-7.2	-7.6	-8.1	-9.0	-10.2	-11.1	-11.5	-5.0	-1.2																						
26-Nov	-11.2	-10.4	-9.4	-8.9	-9.3	-8.7	-8.1	-7.5	-7.2	-6.3	-5.8	-5.1	-4.6	-4.3	-3.6	-3.6	-3.6	-3.1	-2.8	-2.7	-3.1	-3.6	-3.5	-4.1	-5.9	-2.7																						
27-Nov	-5.7	-6.5	-6.8	-7.1	-7.1	-6.8	-6.5	-6.4	-6.3	-5.4	-4.3	-3.6	-3.8	-3.0	-2.6	-2.3	-2.1	-1.8	-0.9	-0.7	-1.0	-0.9	-0.3	-0.9	-3.9	-0.3																						
28-Nov	-1.1	-0.8	-0.8	-1.2	-1.1	-1.0	-1.3	-1.3	-1.2	-0.7	0.2	1.1	2.0	3.2	2.7	1.3	0.4	0.2	0.5	1.0	1.2	0.6	-0.3	-1.1	0.1	3.2																						
29-Nov	-0.8	-1.3	-1.9	-1.7	-2.1	-1.9	-1.9	-2.3	-2.6	-3.4	-3.5	-3.3	-3.2	-3.0	-2.8	-2.7	-2.7	-2.8	-2.9	-3.0	-3.2	-3.3	-3.3	-3.4	-2.6	-0.8																						
30-Nov	-3.7	-4.0	-4.0	-4.4	-5.1	-5.0	-4.9	-5.1	-5.6	-5.6	-5.5	-5.5	-5.5	-5.3	-4.9	-5.3	-6.0	-5.7	-6.2	-6.4	-6.4	-7.0	-8.7	-9.6	-5.6	-3.7																						
																								-4.0	-4.1	-4.3	-4.3	-4.4	-4.4	-4.5	-4.6	-4.5	-3.8	-3.0	-2.3	-1.7	-1.2	-1.0	-1.3	-2.0	-2.5	-2.7	-2.9	-3.1	-3.4	-3.7	-3.9	Diurnal Average
																								4.3	3.5	3.1	1.0	1.0	0.4	0.6	0.4	1.5	2.9	4.5	4.7	6.1	6.3	8.0	8.8	8.2	8.3	7.0	6.1	5.7	4.2	3.7	4.5	Diurnal Maximum



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Ambient Temperature (AT) - C**  
**Kirby South - November 2023**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C  
Kirby South - November 2023**

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	0	0.00	0.00
-20 - 0	614	85.28	85.28
0 - 10	106	14.72	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720





**Wood Buffalo Environmental Association**  
**Summary of Hour Averages**

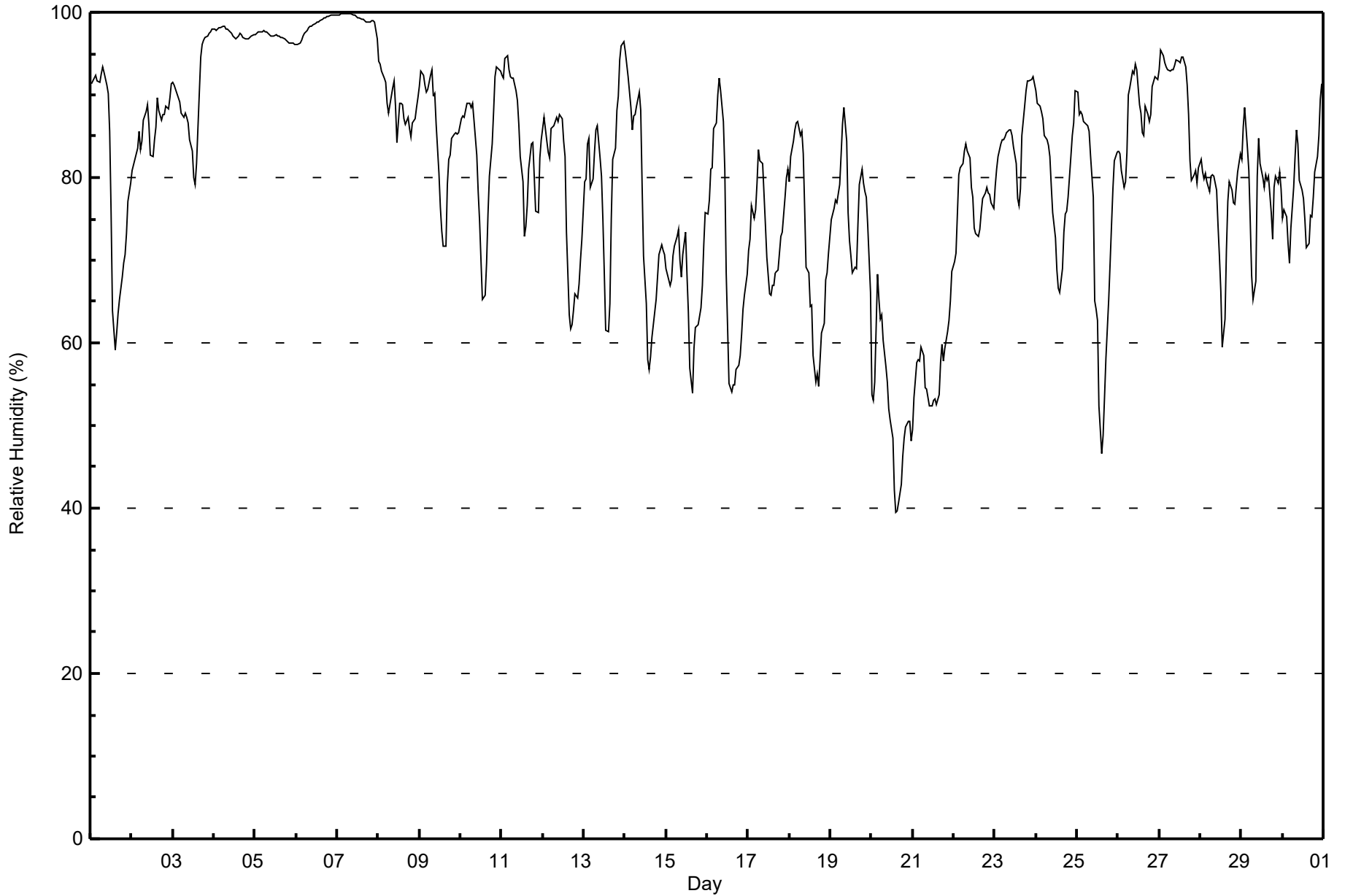
**Relative Humidity (RH) - %**  
**Kirby South - November 2023**

<b>Maximum Value: 99.8 % on Nov 7 06:00</b> <b>Maximum Daily Average: 99.3 % on Nov 7</b>																						<b>Hours in Service: 720</b> <b>Hours of Data: 720</b>																											
<b>Minimum Value: 39.5 % on Nov 20 15:00</b> <b>Minimum Daily Average: 51.8 % on Nov 20</b> <b>Maximum Diurnal Average: 85.7 % at hour 8</b> <b>Minimum Diurnal Average: 72.2 % at hour 15</b> <b>Monthly Average: 80.77 %</b> <b>Percentiles: P<sub>1</sub> = 48.1 P<sub>10</sub> = 61.6 Q<sub>1</sub> = 72.7 Median = 82.6 Q<sub>3</sub> = 90.9 P<sub>90</sub> = 97.2 P<sub>99</sub> = 99.7</b>																						<b>Hours of Missing Data: 0</b> <b>Hours of Calibration: 0</b> <b>Percent Operational Time: 100.0</b>																											
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Nov	91.3	91.7	92.0	92.4	91.7	91.5	92.5	93.4	92.7	91.2	90.2	85.5	75.9	63.8	59.1	61.3	63.5	65.3	67.9	69.7	70.6	73.3	77.2	79.3	80.1	93.4																							
2-Nov	80.8	81.6	82.1	83.5	85.6	83.4	84.4	86.9	88.0	88.9	86.5	82.7	82.6	84.5	86.0	89.7	88.2	87.0	87.6	87.7	88.6	88.3	89.6	91.4	86.1	91.4																							
3-Nov	91.6	91.3	90.2	89.6	89.2	87.7	87.4	87.8	87.3	86.6	84.6	83.3	80.0	79.1	81.7	90.4	94.6	96.1	96.6	96.9	97.2	97.5	97.7	97.9	90.1	97.9																							
4-Nov	98.0	97.8	98.0	98.1	98.2	98.3	98.3	97.9	97.9	97.7	97.4	97.2	97.0	96.8	97.1	97.5	97.2	97.0	96.8	96.8	96.8	96.9	97.1	97.2	97.5	98.3																							
5-Nov	97.4	97.5	97.6	97.7	97.7	97.7	97.7	97.6	97.3	97.2	97.2	97.2	97.0	97.2	97.1	97.0	96.9	96.8	96.6	96.4	96.3	96.2	96.2	96.1	97.1	97.7																							
6-Nov	96.1	96.2	96.3	96.6	97.0	97.5	97.8	98.1	98.3	98.4	98.5	98.7	98.8	98.9	99.0	99.2	99.3	99.4	99.5	99.5	99.6	99.7	99.7	99.7	98.4	99.7																							
7-Nov	99.7	99.7	99.8	99.8	99.8	99.8	99.8	99.8	99.8	99.7	99.6	99.5	99.4	99.3	99.2	99.1	99.0	98.8	98.8	98.9	98.9	99.0	98.8	96.8	99.3	99.8																							
8-Nov	94.2	93.7	92.9	92.0	91.4	89.0	87.9	88.8	90.9	91.7	88.6	84.2	89.0	88.9	88.8	87.1	86.5	87.4	86.0	84.9	86.7	87.1	88.5	89.7	89.0	94.2																							
9-Nov	91.1	92.9	92.4	91.2	90.3	90.7	92.4	93.1	89.8	90.1	86.5	80.4	76.4	73.5	71.6	71.6	79.1	82.3	82.7	84.7	85.3	85.5	85.2	85.5	85.2	93.1																							
10-Nov	87.1	87.4	87.3	88.1	89.1	89.0	88.4	89.0	87.0	82.6	78.3	74.7	70.0	65.3	65.8	69.6	75.7	80.2	84.0	88.0	92.2	93.4	93.2	92.9	83.3	93.4																							
11-Nov	92.5	92.1	94.3	94.8	93.1	92.2	92.0	92.1	90.6	89.4	86.5	82.5	79.5	73.0	74.0	76.6	81.0	84.1	84.2	80.1	76.0	75.8	82.4	84.7	85.1	94.8																							
12-Nov	85.9	87.3	84.4	83.1	82.5	86.0	86.3	86.7	87.2	86.8	87.7	87.1	84.5	82.5	73.4	63.5	61.7	62.1	63.9	65.9	65.4	67.2	70.0	72.6	77.6	87.7																							
13-Nov	79.6	79.8	84.1	84.7	78.8	79.9	83.1	85.8	86.2	82.4	80.1	75.0	68.5	61.5	61.3	64.7	75.2	82.3	83.6	88.1	89.9	94.3	96.0	96.5	80.9	96.5																							
14-Nov	95.3	93.7	92.3	88.5	85.8	87.4	87.6	88.6	90.4	88.2	79.0	70.6	64.8	57.9	56.7	58.3	60.7	63.8	65.2	68.0	70.7	71.9	71.2	70.6	76.1	95.3																							
15-Nov	69.0	68.3	66.9	67.6	70.4	71.7	72.8	73.8	69.9	68.0	70.7	73.5	68.3	63.7	56.9	53.9	59.4	61.9	62.1	62.2	64.2	67.0	71.9	75.8	67.1	75.8																							
16-Nov	75.6	77.2	81.1	81.2	85.9	86.7	90.1	92.1	90.5	86.8	81.1	68.4	61.9	55.1	54.1	55.0	54.9	56.8	57.4	58.6	61.0	64.2	65.7	68.3	71.2	92.1																							
17-Nov	71.3	72.5	76.6	75.0	76.1	79.4	83.4	82.1	81.6	78.0	74.3	70.4	65.9	65.8	66.9	67.0	68.5	68.9	70.8	72.9	73.5	77.6	80.0	80.9	74.1	83.4																							
18-Nov	79.6	82.5	84.4	85.7	86.6	86.8	85.1	85.7	82.8	76.3	69.1	68.4	64.3	64.5	58.5	55.2	56.3	54.8	58.0	61.2	62.3	67.6	68.5	70.9	71.5	86.8																							
19-Nov	74.9	75.7	76.3	77.3	76.9	79.2	82.8	86.4	88.4	84.4	75.8	72.4	70.5	68.5	69.2	68.9	74.3	79.1	81.0	79.3	78.3	77.6	74.2	66.2	76.6	88.4																							
20-Nov	53.8	53.0	55.3	68.3	65.2	62.8	63.5	60.4	57.1	55.2	52.1	50.7	48.4	42.2	39.5	39.6	40.7	42.9	46.2	48.4	49.9	50.5	50.5	48.1	51.8	68.3																							
21-Nov	49.5	53.4	57.7	58.0	57.7	59.5	58.5	54.6	54.4	53.5	52.3	52.3	53.1	53.2	52.5	53.7	57.6	59.8	57.8	59.3	61.3	62.8	65.0	68.6	56.9	68.6																							
22-Nov	69.9	70.8	75.5	80.4	81.3	81.8	83.1	84.1	83.2	82.4	78.8	77.6	74.0	73.1	72.9	73.7	75.8	77.4	78.1	78.8	78.2	77.9	76.9	76.3	77.6	84.1																							
23-Nov	79.0	81.0	82.5	84.0	84.5	84.6	85.0	85.4	85.8	85.7	85.0	83.7	81.7	77.5	76.6	78.6	85.1	88.6	90.6	91.7	91.7	91.8	92.2	91.3	85.2	92.2																							
24-Nov	90.5	89.0	88.7	87.9	87.2	85.1	84.7	83.8	82.6	79.0	75.8	72.7	68.8	66.6	66.2	68.9	73.3	75.6	76.0	77.7	82.6	85.0	86.6	90.5	80.2	90.5																							
25-Nov	90.3	87.6	87.9	87.7	86.9	86.4	86.3	85.6	82.6	77.7	65.0	64.1	62.7	52.3	46.6	48.8	53.4	58.2	65.2	69.7	74.2	78.7	82.0	83.0	73.5	90.3																							
26-Nov	83.3	82.8	80.9	78.9	79.5	83.1	90.1	90.9	92.9	92.6	93.7	93.0	88.9	87.8	85.4	85.0	88.7	87.7	86.8	87.7	91.1	92.1	92.1	91.9	87.8	93.7																							
27-Nov	93.1	95.4	94.8	93.9	93.3	93.0	93.0	93.0	93.0	93.6	94.2	94.1	93.8	94.6	94.5	93.4	91.2	87.6	82.1	79.6	80.4	80.9	79.4	81.2	90.1	95.4																							
28-Nov	82.2	80.7	79.8	80.6	79.5	78.2	80.2	80.3	80.1	78.4	74.2	70.5	66.2	59.5	62.9	71.2	77.2	79.6	78.5	77.0	76.8	78.8	80.7	82.9	76.5	82.9																							
29-Nov	82.2	86.1	88.5	83.5	80.9	74.7	68.2	65.2	67.4	80.2	84.8	81.7	80.0	78.8	80.3	79.7	80.2	75.8	72.6	78.7	80.1	79.3	80.6	78.7	78.7	88.5																							
30-Nov	75.2	76.1	75.2	72.1	69.7	73.9	78.8	82.6	85.8	84.0	79.7	78.4	77.4	74.9	71.6	72.0	75.5	75.2	77.6	80.7	82.5	85.2	89.5	91.4	78.5	91.4																							
																								83.3	83.8	84.5	84.7	84.4	84.6	85.4	85.7	85.4	84.2	81.6	79.0	76.3	73.3	72.2	73.0	75.7	77.1	77.8	79.0	80.1	81.4	82.6	83.2	Diurnal Average	
																								99.7	99.7	99.8	99.8	99.8	99.8	99.8	99.8	99.8	99.7	99.6	99.5	99.4	99.3	99.2	99.2	99.3	99.4	99.5	99.5	99.6	99.7	99.7	99.7	99.7	Diurnal Maximum



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Relative Humidity (RH) - %**  
**Kirby South - November 2023**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Relative Humidity (RH) - %  
Kirby South - November 2023**

<b>Concentration Ranges (%)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	0	0.00	0.00
20 - 40	2	0.28	0.28
40 - 60	62	8.61	8.89
60 - 80	235	32.64	41.53
80 - 100	421	58.47	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



Maximum Speed: 34 km/h on Nov 20 04:00	Maximum Daily Speed Average: 20.6 km/h on Nov 20	Hours in Service: 720
Minimum Speed Value: 1 km/h on Nov 3 22:00	Minimum Daily Speed Average: 4.4 km/h on Nov 21	Hours of Data: 676
Maximum Diurnal Speed Average: 8.1 km/h at hour 8	Minimum Diurnal Speed Average: 6.6 km/h at hour 18	Hours of Missing Data: 44
Monthly Average Velocity: 7.4 km/h 266.1 deg	Percentiles: P <sub>1</sub> = 3 P <sub>10</sub> = 7 Q <sub>1</sub> = 9 Median = 12 Q <sub>3</sub> = 16 P <sub>90</sub> = 20 P <sub>99</sub> = 26	Percent Operational Time: 93.9

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Nov	WSW6	W6	WSW8	W8	W10	W9	WSW9	SW10	SW9	WSW8	WSW8	SW8	SW10	SW10	SW8	SW9	SW9	SW9	SW9	SW7	SW7	SW7	SSW7	SW7	SW7.9	W10	
2-Nov	WSW7	WSW9	W7	WNW8	WNW9	NW8	NW8	WNW8	NW8	N10	NNE12	NNE10	NNE13	NE11	NE9	NE12	NE10	NE10	NE10	NE9	E5	NE4	E2	ENE5	N4.7	NNE13	
3-Nov	ESE6	ESE6	SSE7	SE5	SE4	SSE7	S5	SSW8	SSW9	SSW11	SSW11	SSW9	SSW10	SSW9	SSW7	SSW7	SSW4	SE3	ESE2	E3	E3	SE1	E3	NE2	S4.6	SSW11	
4-Nov	NE5	NE6	NE6	NE6	ENE8	ENE6	ENE5	ENE5	ESE7	ESE10	ESE10	ESE11	ESE9	ESE10	ESE11	ESE11	ESE12	ESE12	ESE14	ESE12	ESE11	ESE11	ESE10	ESE10	E8.5	ESE14	
5-Nov	ESE9	E7	E5	E6	E5	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	---	ESE9	
6-Nov	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	M	SSW12	SSW14	SSW12	SSW13	SSW14	SSW14	SSW14	SSW14	---	SSW14	
7-Nov	UO	UO	UO	UO	UO	UO	UO	UO	UO	M	SSW11	SSW11	SW11	SW12	SW11	SW11	WSW10	SW10	WSW14	WSW14	W15	WNW19	WNW14	W11	W18	---	WNW19
8-Nov	W19	W20	WNW22	WNW21	WNW21	WNW20	WNW20	WNW19	WNW17	WNW16	NW18	NW19	NW18	NNW20	NNW19	NW20	NNW19	NW17	NNW17	NNW15	NNW13	NNW12	NW12	NW13	NW16.9	WNW22	
9-Nov	NW10	NW11	NNW8	NNW7	NNW5	WNW6	WNW7	W5	WSW4	W4	SW3	SSW7	SSW8	SSW9	SSW9	SW8	SSW8	SSW9	SSW16	SW16	SW16	SSW13	SSW15	SSW16	SW6.5	SW16	
10-Nov	SSW15	SSW15	SSW16	SSW19	SSW19	SSW20	SSW20	SSW19	SSW22	SSW21	SSW21	SSW21	SSW19	SW19	SW16	SSW15	SW13	SW15	SW15	SW15	SSW16	SW15	SSW15	SSW14	SSW17.2	SSW22	
11-Nov	SSW14	S13	SSW14	S13	S12	S15	S15	S14	S16	S18	S16	S18	SSW16	SW19	SW13	SW12	SW10	SW13	WSW13	W14	W16	W15	WSW12	WSW13	SSW12.0	SW19	
12-Nov	WSW14	WSW13	W14	W16	W17	W16	W18	W20	WNW16	W15	W16	W17	W19	WNW19	WNW15	WNW14	W11	W11	W10	WSW11	W11	WSW9	WSW8	SW5	W13.6	W20	
13-Nov	SW6	SSW5	SSE4	ESE7	ESE8	ESE8	E9	E9	E10	E13	E12	E14	E4	ESE13	E10	ENE9	NE7	NE7	NE9	NE6	NNW8	NNW9	NW10	WNW9	ENE5.3	E14	
14-Nov	WNW17	WNW20	WNW21	WNW22	WNW21	WNW19	WNW16	W18	W20	W18	W15	W20	W21	W19	W19	W16	WSW16	WSW15	WSW15	WSW12	WSW10	SW11	SW11	SW8	W15.5	WNW22	
15-Nov	SW10	SW10	WSW11	WSW9	WSW11	WSW12	WSW13	WSW14	WSW17	W19	WNW21	NW23	NW23	NW17	NW15	NW11	WNW8	WNW8	WNW9	WNW9	WNW8	WNW8	WNW9	W10	W10.8	NW23	
16-Nov	WNW11	W9	W8	W7	SW8	SW8	SW10	SW12	SW12	SW12	SW13	SW14	SW14	SW14	WSW14	SW14	WSW15	WSW15	WSW16	W15	W13	W14	W18	W16	WSW11.8	W18	
17-Nov	W16	W15	WSW15	W20	W17	WSW14	WSW11	W17	W15	W19	W18	WNW17	W16	W16	W13	WSW11	SW12	WSW10	WSW11	W13	W15	W10	WSW12	WSW11	W13.9	W20	
18-Nov	W9	SW8	SW9	SW10	SW11	SW11	SW12	SW11	SW10	SW11	SW13	SW12	SW12	SW11	SW10	SSW9	SSW12	S14	S13	S15	SSW17	SSW12	S6	S6	SW10.2	SSW17	
19-Nov	S4	SSW4	S6	SSW8	SSW11	SW10	SW9	WSW7	WSW8	WSW9	W13	WNW15	WNW13	WNW11	WNW10	W13	W11	WSW10	W14	W18	W17	WNW20	WNW19	W21	W10.1	W21	
20-Nov	WNW27	WNW27	WNW26	WNW34	NW33	NW29	NW23	NW26	NW24	NW24	NW24	NW23	NW26	WNW24	WNW24	WNW22	WNW17	WNW12	WNW12	WNW12	WNW9	W9	WNW10	NW5	WNW20.6	WNW34	
21-Nov	SSE3	S5	ESE6	SE6	ESE7	ESE7	ESE8	SE11	SE15	SE14	SSE13	S10	S9	S6	ESE1	WSW2	NNE3	NNE7	NE11	NE11	NE8	NNE12	NE12	NNE10	ESE4.4	SE15	
22-Nov	NNE12	NE13	NE14	NE13	NE14	NE12	NE9	NE9	NE9	NE9	NE9	NE10	NE10	ENE9	ENE6	ENE7	ENE5	E3	E4	ESE5	SE4	S4	S5	SSW8	ENE6.9	NE14	
23-Nov	SSW9	S9	SSW11	SSW12	SSW9	SSW11	SSW11	SSW13	SW15	SW16	SW17	SW16	SW12	WSW16	WSW13	WSW10	WSW13	SW13	SW11	SW12	SW13	SW12	SW13	SW15	SW12.1	SW17	
24-Nov	WSW17	SW14	WSW15	WSW17	WSW18	WSW21	WSW20	WSW18	WSW21	WSW22	WSW21	W18	W19	WNW18	WNW17	WNW13	W14	W12	W12	W11	W11	WSW13	WSW12	WSW11	WSW15.4	WSW22	
25-Nov	W14	W18	W18	WNW18	WNW18	NW17	NNW18	N19	NNW18	NNW23	NNW23	NNW22	N23	N22	N19	NNW16	NNW10	NNW9	NNW12	NNW13	NW10	WNW7	WNW8	WNW9	NNW13.9	NNW23	
26-Nov	W8	W7	WSW5	WSW8	SW7	SW10	WSW6	WSW8	W7	WNW9	WNW10	NW10	NW10	NW9	WNW11	NW15	WNW13	WNW13	WNW11	W15	W16	W16	W14	W11	W9.4	W16	
27-Nov	WSW11	WSW12	WSW11	SW11	WSW10	SW9	SW8	WSW9	WSW9	SW8	SW10	SW11	SW11	WSW12	WSW13	WSW13	WSW13	WSW17	W20	WNW21	WNW21	WNW19	W18	W17	WSW12.3	WNW21	
28-Nov	W19	W18	W19	W18	W22	W23	W23	WNW23	WNW21	W20	WNW21	WNW19	WNW20	WNW17	W15	W14	WSW15	WSW15	W14	W16	WNW12	WNW13	WNW13	WNW11	W17.3	W23	
29-Nov	NW15	NW12	WNW14	WNW19	WNW18	WNW20	WNW19	WNW19	NW17	NW17	NW19	NW22	NW20	NW21	NW20	NW19	NW18	NNW20	NW15	NW17	NNW17	NNW15	NNW14	NNW12	NW16.9	NW22	
30-Nov	NNW14	NW14	NNW15	NNW16	NNW14	NW9	NW10	WNW11	WNW12	NW14	NW14	NW13	NW16	NW14	NW9	WNW8	W9	WSW7	WSW7	WSW6	SW8	SW6	SW9	SW8	WNW9.1	NNW16	

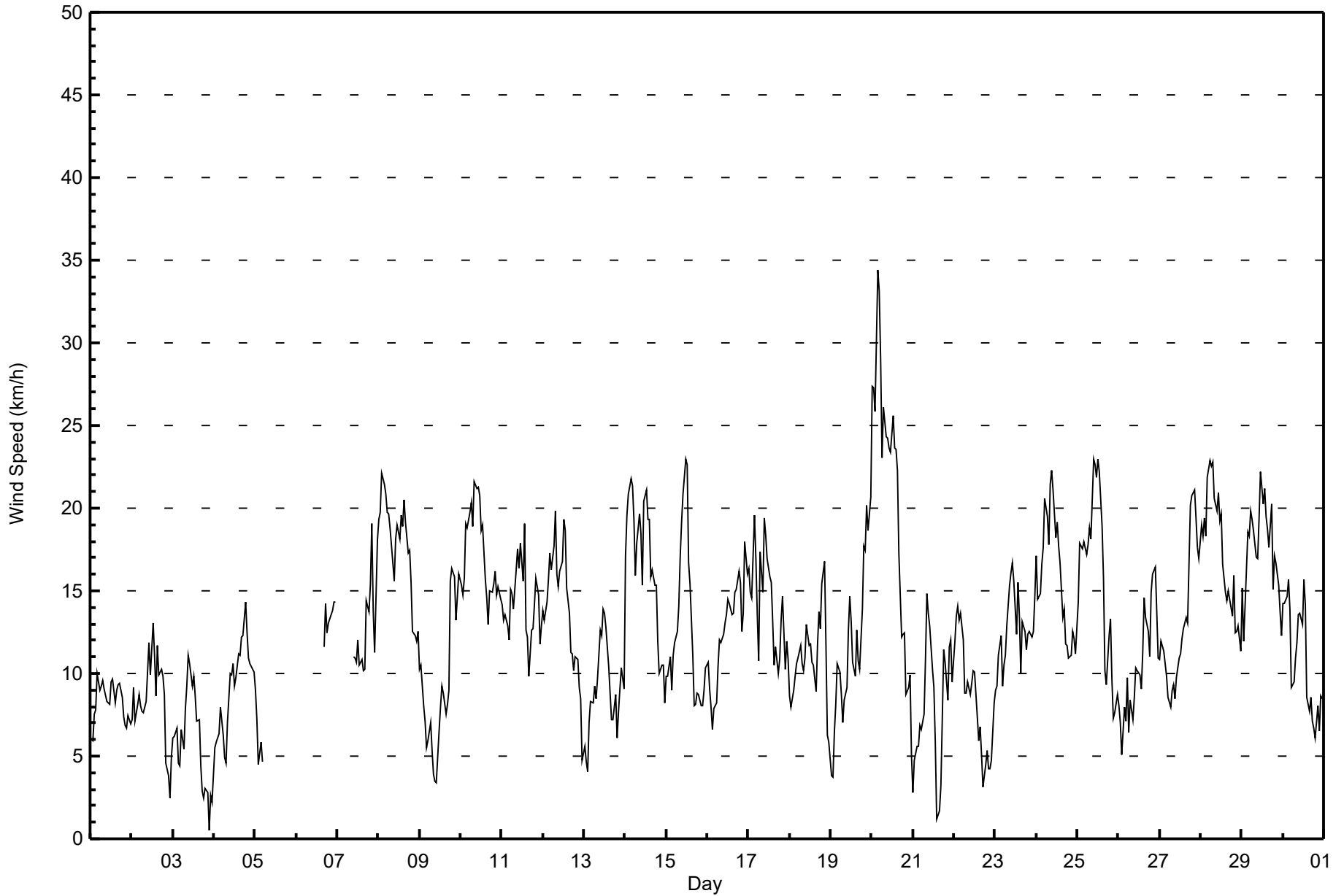
W7.6	W7.4	W7.4	W7.6	W7.5	W7.8	W7.5	W8.1	W7.8	W7.7	W7.8	W8.0	W8.1	W7.9	W7.4	W7.0	W6.6	W6.6	W6.7	W7.3	W7.5	W7.3	W7.0	WSW7.0	Diurnal Average
WNW27	WNW27	WNW26	WNW34	NW33	NW29	NW23	NW26	NW24	NW24	NW24	NW23	NW26	WNW24	WNW24	WNW22	NNW19	NNW20	W20	WNW21	WNW21	WNW20	WNW19	W21	Diurnal Maximum

M - Maintenance UO - Unstable Operation  
 All monthly, daily, and diurnal averages have been calculated using vector methods



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Wind Speed (WS) - km/h**  
**Kirby South - November 2023**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h  
Kirby South - November 2023**

<b>Wind Speed Ranges (km/h)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	44	6.51	6.51
6 - 11	264	39.05	45.56
12 - 19	297	43.93	89.50
20 - 28	68	10.06	99.56
29 - 38	3	0.44	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 676

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Wind Speed (WS) - km/h  
Kirby South - November 2023**

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	3	4	9	3	5	2	5	3	2	3	2	0	1	1	44
6 - 11	1	3	23	6	5	23	2	2	6	28	53	39	25	27	15	6	264
12 - 19	2	5	6	0	4	5	2	1	13	31	39	40	65	41	23	20	297
20 - 28	2	0	0	0	0	0	0	0	0	6	0	5	12	24	14	5	68
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	3
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	5	9	32	10	18	31	9	5	24	68	94	87	104	93	55	32	676

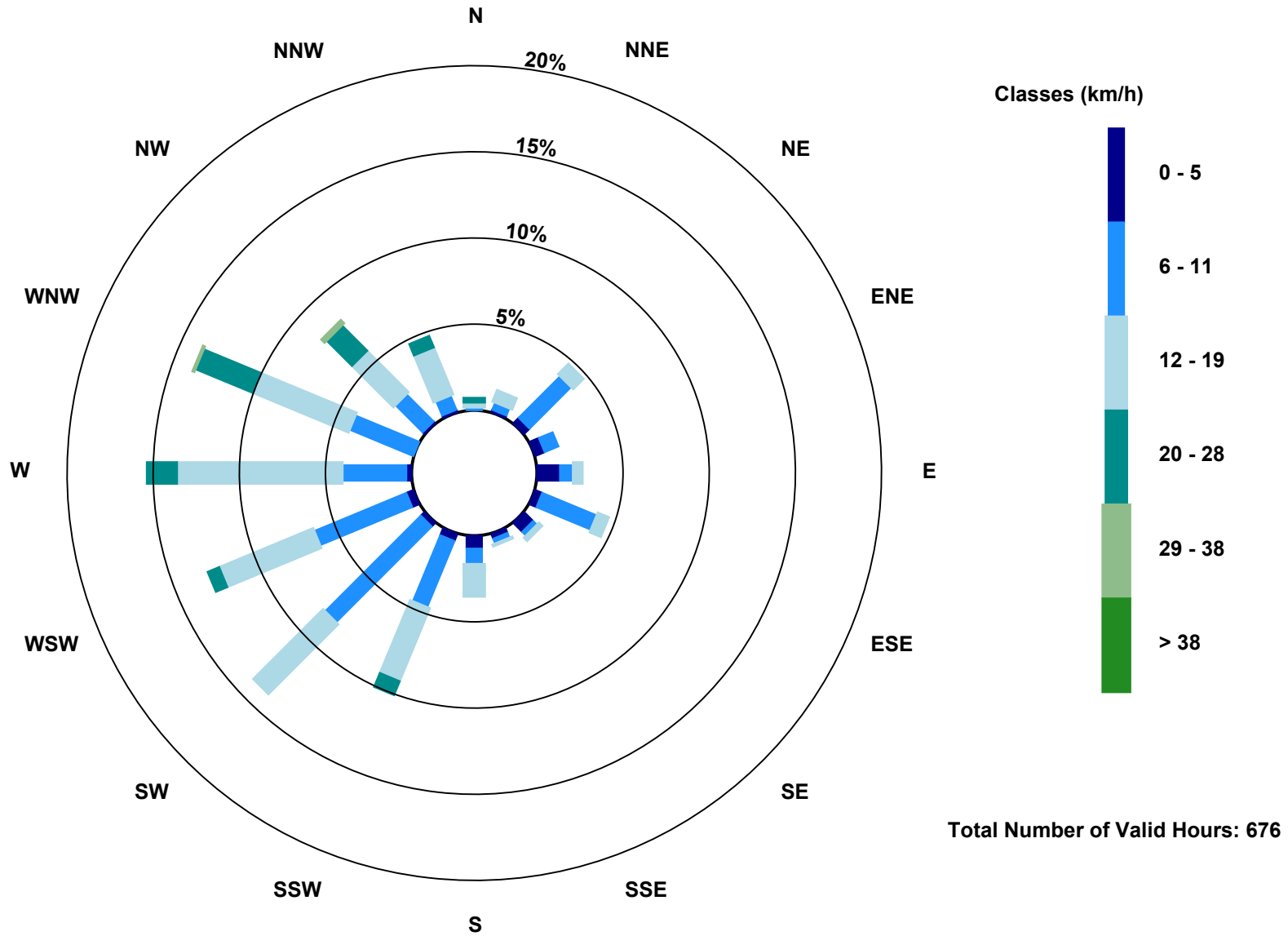
Total Number of Valid Hours: 676

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 2023

Wind Speed (WS) - km/h  
Kirby South







**Wood Buffalo Environmental Association**  
**Summary of Hour Standard Deviations**

**Wind Speed (WS) - km/h**  
**Kirby South - November 2023**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 10 km/h on Nov 20 06:00	Hours of Data: 676
Minimum Value: 1 km/h on Nov 2 23:00	Hours of Missing Data: 44
Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 1 Q <sub>1</sub> = 2 Median = 3 Q <sub>3</sub> = 4 P <sub>90</sub> = 4 P <sub>99</sub> = 7	Hours of Calibration: 0
	Percent Operational Time: 93.9

Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Nov	1	1	1	2	2	2	3	1	1	2	2	2	2	2	2	2	2	2	1	1	1	1	1	2	3
2-Nov	2	2	2	1	1	2	1	1	2	3	3	3	4	3	2	3	2	2	2	2	1	1	1	2	4
3-Nov	1	1	1	1	1	2	2	2	2	3	3	2	3	3	3	2	2	1	1	1	1	1	1	3	
4-Nov	2	1	1	1	2	2	1	1	2	3	3	3	2	2	3	3	3	3	4	3	3	3	3	4	
5-Nov	2	2	3	2	2	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	3	
6-Nov	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	M	3	4	4	3	4	4	4	4	
7-Nov	UO	UO	UO	UO	UO	UO	UO	UO	UO	M	3	3	3	3	3	3	3	4	3	4	4	3	3	4	
8-Nov	4	4	5	5	4	4	4	4	4	3	4	5	5	4	5	5	5	4	4	4	3	2	2	5	
9-Nov	3	2	1	2	1	1	2	2	1	1	1	1	2	2	2	2	2	2	4	4	3	3	3	4	
10-Nov	4	4	4	4	4	4	4	4	4	5	5	5	4	5	4	3	3	3	3	3	3	3	3	5	
11-Nov	3	3	3	3	3	3	3	3	4	4	4	5	4	5	3	3	2	2	2	4	3	4	2	5	
12-Nov	2	2	3	4	4	3	4	3	4	3	3	3	4	5	3	3	3	3	2	2	2	2	2	5	
13-Nov	1	1	1	1	1	1	1	1	3	3	3	3	3	3	3	2	2	2	2	2	2	2	2	3	
14-Nov	5	5	5	5	5	4	3	4	4	4	5	5	4	5	4	3	3	3	2	2	2	2	2	5	
15-Nov	2	2	2	2	2	3	2	3	3	5	4	5	5	5	4	3	2	1	2	1	1	1	2	5	
16-Nov	3	1	2	2	2	1	2	2	2	3	3	3	3	4	3	3	3	3	4	4	3	3	3	4	
17-Nov	3	4	3	4	4	3	2	4	3	4	3	3	3	4	3	2	2	2	2	3	2	3	2	4	
18-Nov	2	2	2	2	2	2	2	2	2	2	3	3	3	2	2	2	2	3	3	4	4	3	2	4	
19-Nov	2	1	1	2	2	2	1	2	1	2	2	3	3	2	2	3	2	3	4	3	3	4	3	7	
20-Nov	6	6	6	8	9	10	6	7	6	5	6	6	5	5	6	5	4	3	2	2	3	2	3	10	
21-Nov	1	1	1	1	1	1	2	4	4	5	4	4	3	2	2	2	2	2	3	2	2	3	2	5	
22-Nov	4	3	3	3	3	3	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	4	
23-Nov	2	2	3	3	2	2	3	3	4	3	4	4	3	4	4	2	2	2	2	2	2	3	2	4	
24-Nov	3	3	3	3	3	4	4	3	4	4	5	4	4	3	3	3	3	2	2	2	2	2	2	5	
25-Nov	4	3	3	3	3	4	4	6	5	7	7	7	7	6	7	6	2	2	3	3	3	1	1	7	
26-Nov	3	2	2	2	2	3	2	2	2	2	3	2	2	2	4	4	3	3	2	3	3	3	3	4	
27-Nov	2	2	2	2	1	1	1	1	1	2	2	2	2	2	3	2	2	3	4	4	4	4	3	4	
28-Nov	4	3	3	3	4	4	4	4	4	3	4	3	4	3	3	3	3	3	2	3	2	2	2	4	
29-Nov	3	3	3	4	3	4	4	4	4	3	5	5	5	5	5	5	4	5	4	4	4	4	3	5	
30-Nov	4	3	4	4	4	2	2	2	2	4	3	4	3	4	2	2	1	2	2	1	2	2	1	4	

Diurnal Maximum

M - Maintenance UO - Unstable Operation



**Wood Buffalo Environmental Association**  
**Summary of Hour Averages**

**Wind Direction (WD) - deg**  
**Kirby South - November 2023**

Direction of Maximum Speed: 300 deg on Nov 20 04:00	Hours in Service: 720
Direction of Maximum Daily Speed Average: 300.0 deg on Nov 20	Hours of Data: 676
Direction of Minimum Speed: 128 deg on Nov 3 22:00	Direction of Minimum Daily Speed Average: 4.4 deg on Nov 21
Direction of Minimum Speed: 128 deg on Nov 3 22:00	Hours of Missing Data: 44
Monthly Average Direction: 266.1 deg	Percent Operational Time: 93.9

Day	Hourly Period Ending At (MST)																								Daily Average	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	256	265	243	260	271	263	238	234	235	240	245	233	231	234	219	214	227	232	230	227	218	215	212	224	236.2	
2-Nov	246	237	271	284	299	311	311	292	324	6	21	12	33	45	38	42	45	54	47	54	91	53	92	74	9.5	
3-Nov	102	122	154	134	140	157	175	195	201	204	208	206	211	196	200	194	193	145	108	91	99	128	85	41	176.7	
4-Nov	37	52	54	55	61	65	67	73	104	115	118	115	118	110	110	109	104	105	107	112	108	107	106	107	99.2	
5-Nov	106	98	90	101	87	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	--	
6-Nov	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	M	198	199	207	208	210	207	204	199	--	
7-Nov	UO	UO	UO	UO	UO	UO	UO	UO	UO	M	204	204	224	232	215	226	242	236	248	258	281	286	290	281	280	--
8-Nov	281	280	291	295	292	294	294	294	295	303	311	321	321	327	328	324	329	326	330	332	335	327	325	325	310.2	
9-Nov	319	311	327	336	333	299	286	267	258	260	226	209	201	212	212	218	197	202	209	217	217	208	198	202	231.4	
10-Nov	202	197	200	201	202	200	202	207	203	210	211	212	204	217	215	210	217	222	219	216	207	214	209	208	208.2	
11-Nov	201	191	202	178	176	173	177	178	175	173	175	181	199	215	223	217	232	235	242	266	276	265	248	239	207.2	
12-Nov	243	244	265	265	270	275	273	275	283	278	278	275	279	282	287	285	266	263	264	248	266	248	237	235	269.2	
13-Nov	234	204	164	114	118	107	90	89	81	85	82	79	87	104	91	58	42	52	35	35	340	335	305	292	74.0	
14-Nov	300	303	295	295	293	291	291	278	278	268	279	278	276	265	259	252	250	252	240	240	240	230	222	218	273.3	
15-Nov	220	231	238	241	241	253	249	246	252	268	287	317	325	318	308	313	301	301	290	294	284	284	291	281	280.2	
16-Nov	285	278	265	259	220	225	219	223	225	234	234	234	233	236	237	236	243	244	254	268	266	266	278	280	248.3	
17-Nov	259	264	251	271	277	257	248	267	266	276	281	286	275	261	267	246	235	255	255	261	276	261	245	251	263.9	
18-Nov	269	234	229	226	230	232	234	229	227	219	225	220	220	227	228	210	198	188	179	187	194	202	191	189	214.7	
19-Nov	176	197	180	196	205	223	232	252	243	252	275	287	291	301	293	277	259	255	264	271	279	286	289	277	265.0	
20-Nov	282	282	286	300	307	309	312	312	311	313	311	307	305	303	300	299	297	289	282	284	288	275	288	322	300.0	
21-Nov	165	184	114	128	116	113	118	132	143	139	150	169	179	172	104	254	15	24	37	47	35	26	34	29	104.6	
22-Nov	32	39	47	46	51	50	54	53	52	48	41	55	54	59	60	65	70	97	92	111	144	172	181	198	58.7	
23-Nov	199	190	199	209	198	195	200	209	217	220	226	230	234	242	243	237	239	234	230	226	227	224	226	233	222.0	
24-Nov	239	236	238	238	239	244	245	246	255	254	263	277	284	282	285	277	279	277	279	277	262	261	253	253	239	256.7
25-Nov	263	279	275	282	292	312	335	352	347	343	347	347	352	357	360	346	344	330	336	336	320	285	292	297	327.0	
26-Nov	279	269	254	238	229	235	246	244	263	296	311	326	317	306	297	314	294	295	292	272	272	269	276	273	280.8	
27-Nov	244	241	238	236	239	235	231	237	238	230	225	229	230	237	238	240	239	253	267	282	286	283	279	264	252.0	
28-Nov	266	277	273	281	278	278	281	282	283	280	288	283	283	283	263	266	257	258	263	280	286	284	282	285	277.2	
29-Nov	311	305	283	290	292	294	295	298	311	307	312	314	319	318	317	305	319	330	319	323	331	335	334	332	311.9	
30-Nov	328	316	328	334	329	315	306	291	296	315	322	312	304	310	319	294	279	249	245	248	229	235	226	223	300.4	

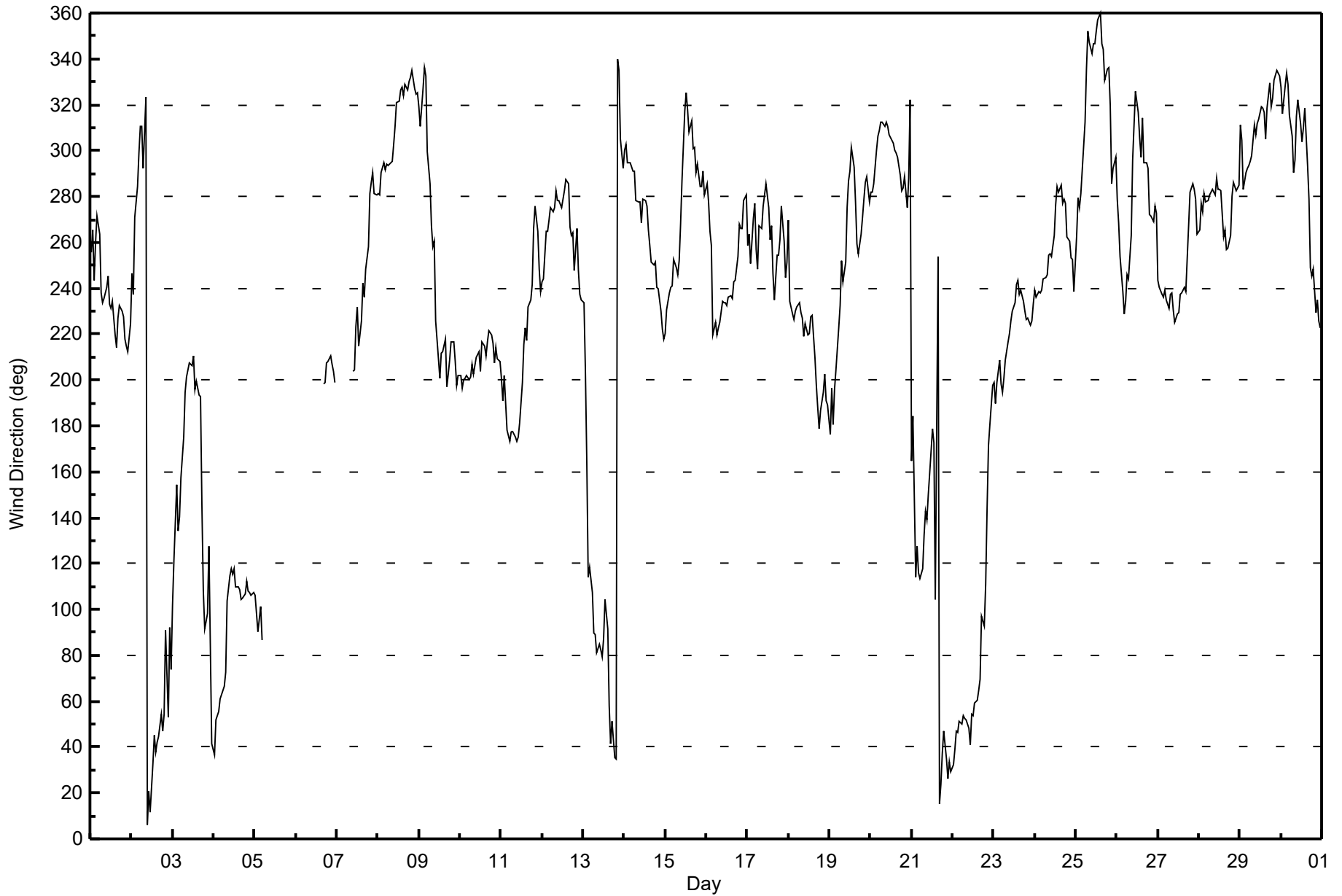
264.2 262.5 261.3 267.4 268.1 264.6 263.2 262.7 261.4 264.5 270.5 275.8 277.7 275.4 274.9 273.5 262.0 259.6 262.9 265.7 265.5 263.8 259.9 256.7

Diurnal Average

M - Maintenance

UO - Unstable Operation

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**  
**Kirby South - November 2023**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 73 deg on Nov 4 00:00	Hours of Data: 676
Minimum Value: 7 deg on Nov 12 01:00	Hours of Missing Data: 44
Percentiles: P <sub>1</sub> = 8 P <sub>10</sub> = 10 Q <sub>1</sub> = 12 Median = 14 Q <sub>3</sub> = 16 P <sub>90</sub> = 19 P <sub>99</sub> = 42	Hours of Calibration: 0
	Percent Operational Time: 93.9

Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Nov	14	17	11	17	10	17	8	9	9	13	15	16	17	23	19	15	14	12	12	12	11	10	15	24	24
2-Nov	14	11	21	10	13	14	12	10	22	24	19	21	17	19	19	15	13	14	17	20	19	21	50	26	50
3-Nov	18	22	16	21	19	17	21	15	16	16	16	17	18	18	18	15	22	26	35	29	20	36	27	73	73
4-Nov	17	14	12	14	12	13	12	13	19	18	18	17	19	17	17	16	17	17	17	17	18	17	17	17	19
5-Nov	16	17	15	17	15	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	17
6-Nov	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	M	15	16	16	17	17	16	17	17	17
7-Nov	UO	UO	UO	UO	UO	UO	UO	UO	M	20	18	19	19	21	23	19	17	14	12	12	14	13	11	23	23
8-Nov	11	11	11	12	11	11	11	12	12	13	15	14	14	15	15	14	14	14	14	14	16	15	12	14	16
9-Nov	16	14	13	21	18	15	14	17	23	20	28	23	19	21	16	15	11	10	15	14	14	15	15	15	28
10-Nov	14	15	15	15	15	15	14	14	14	15	15	14	15	15	17	15	15	14	13	15	13	14	13	13	17
11-Nov	14	15	15	14	15	14	13	14	14	14	15	16	17	15	17	15	15	13	13	16	10	14	10	8	17
12-Nov	7	10	12	13	11	10	11	9	10	11	10	11	14	12	13	11	15	14	12	13	16	12	9	17	17
13-Nov	8	14	16	15	9	11	12	12	12	15	16	15	17	19	23	13	11	16	14	20	20	15	16	12	23
14-Nov	15	13	12	12	12	11	11	11	10	11	17	12	13	15	17	14	12	11	12	12	19	11	15	15	19
15-Nov	11	15	15	14	14	16	12	11	11	17	12	16	15	18	15	13	10	10	11	13	9	8	11	9	18
16-Nov	11	10	18	20	12	11	12	11	12	13	14	15	16	16	14	14	13	14	13	15	13	14	9	12	20
17-Nov	11	13	12	11	10	17	12	13	14	11	11	12	15	13	15	15	11	16	11	14	8	14	8	11	17
18-Nov	17	10	11	13	12	10	11	11	11	13	14	15	14	13	13	16	13	13	15	15	15	15	17	15	17
19-Nov	41	27	9	15	12	12	10	17	8	16	10	13	13	14	14	10	13	12	13	11	9	10	11	13	41
20-Nov	12	11	12	14	15	15	14	15	15	14	15	14	14	14	15	13	13	11	9	10	13	9	16	46	46
21-Nov	49	32	15	14	18	17	18	18	16	27	19	40	23	23	67	59	68	19	15	14	19	16	15	17	68
22-Nov	15	14	14	13	13	13	15	13	13	17	18	17	17	19	24	14	14	19	17	15	23	20	19	14	24
23-Nov	14	14	14	16	17	16	16	15	15	15	14	15	15	14	15	14	10	13	13	12	13	13	13	12	17
24-Nov	11	12	12	12	13	12	12	12	10	11	12	15	12	11	10	9	9	8	8	15	12	14	13	11	15
25-Nov	15	10	9	10	10	16	18	21	19	18	21	20	21	24	22	21	18	18	15	17	16	12	12	9	24
26-Nov	17	17	19	14	16	13	18	16	20	14	16	19	15	17	17	16	12	13	15	11	11	11	10	11	20
27-Nov	13	11	10	11	11	12	12	12	11	13	13	15	15	14	13	12	12	12	14	10	9	10	11	12	15
28-Nov	11	10	9	10	10	10	10	9	10	10	11	11	11	11	14	13	14	12	11	10	11	10	10	11	14
29-Nov	15	16	10	10	10	11	11	13	13	14	14	15	15	14	14	13	14	17	16	14	15	16	17	15	17
30-Nov	15	14	15	18	16	18	16	11	13	18	17	14	15	17	20	14	7	25	20	17	18	17	16	10	25
	49	32	21	21	19	18	21	21	23	27	28	40	23	24	67	59	68	26	35	29	23	36	50	73	

Diurnal Maximum

M - Maintenance

UO - Unstable Operation



## WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY  
MONITORING PROGRAM  
MONTHLY REPORT

### **AMS511 BLACKGOLD NOVEMBER 2023**

Operations, Data Collection,  
QA/QC, Data Validation and Reporting by:  
Wood Buffalo Environmental Association  
Fort McMurray, Alberta

December 22, 2023

## WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - BLACKGOLD (AMS511)

NOVEMBER 2023

## MONTHLY SUMMARY

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	688	32	32	100	19	0	6	0
H2S (ppb) Average	685	35	35	100	1.8	0	0.5	0
THC (ppm) Average	688	32	32	100	2.8	-	2.6	-
NO2 (ppb) Average	685	35	35	100	17.1	0	4.1	-
NO (ppb) Average	685	35	35	100	10.8	-	2.1	-
NOX (ppb) Average	685	35	35	100	21.8	-	5.9	-
Temperature 2 m (C) Average	720	0	0	100	8.9	-	1.9	-
Relative Humidity (%) Average	713	0	7	99.03	100	-	98.5	-
Wind Speed 10 m (km/h) Average	720	0	0	100	32	-	16	-
Wind Direction 10 m (deg) Average	720	0	0	100	-	-	-	-

Note : Operational time includes periods of data collection and instrument calibration

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - BLACKGOLD (AMS511)  
 NOVEMBER 2023

MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile						
					Min	P10	Q1	Median	Q3	P90	Max
SO2 (ppb) Average	688	1.34	2.9	-	0	0	0	0.2	0.9	4.3	19
H2S (ppb) Average	685	0.19	0.2	-	0	0	0.1	0.1	0.2	0.5	1.8
THC (ppm) Average	688	2.37	0.1	-	2.1	2.2	2.3	2.4	2.4	2.5	2.8
NO2 (ppb) Average	685	2.06	2	-	0	0.3	0.7	1.5	2.8	4.8	17.1
NO (ppb) Average	685	0.58	1.2	-	0	0	0	0.2	0.6	1.5	10.8
NOX (ppb) Average	685	2.64	2.9	-	0	0.4	0.8	1.7	3.5	6	21.8
Temperature 2 m (C) Average	720	-2.88	3.9	-	-15.9	-8.4	-4.6	-2.5	-0.6	1.2	8.9
Relative Humidity (%) Average	713	78.76	13.1	-	38.4	59.3	70.7	79.9	87.9	97.1	100
Wind Speed 10 m (km/h) Average	720	8.1	4	-	0	3	5	8	10	14	32
Wind Direction 10 m (deg) Average	720	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - BLACKGOLD (AMS511)  
NOVEMBER 2023

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
Relative Humidity	04 Nov 2023 00:00	04 Nov 2023 01:00	2	Sensor operated out of range
Relative Humidity	06 Nov 2023 11:00	06 Nov 2023 12:00	2	Sensor operated out of range
Relative Humidity	06 Nov 2023 20:00	06 Nov 2023 22:00	3	Sensor operated out of range





Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO<sub>2</sub>) - ppb

Blackgold - November 2023

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	720
Maximum Value: 19.0 ppb on Nov 27 18:00	Maximum Daily Average: 6.0 ppb on Nov 28		Hours of Data:	688
Minimum Value: 0.0 ppb on Nov 1 02:00	Minimum Daily Average: 0.0 ppb on Nov 22		Hours of Missing Data:	32
Maximum Diurnal Average: 1.9 ppb at hour 10	Minimum Diurnal Average: 0.8 ppb at hour 12		Hours of Calibration:	32
Monthly Average: 1.34 ppb	Percentiles: P <sub>1</sub> = 0.0 P <sub>10</sub> = 0.0 Q <sub>1</sub> = 0.0 Median = 0.2 Q <sub>3</sub> = 0.9 P <sub>90</sub> = 4.3 P <sub>99</sub> = 14.0		Percent Operational Time:	100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	Z	0.0	0.1	0.0	0.1	0.2	0.2	0.3	0.4	1.4	6.4	1.1	1.2	1.4	0.6	0.5	1.5	0.7	0.2	0.7	1.1	0.3	0.2	1.6	0.9	6.4
2-Nov	1.8	Z	1.2	0.1	0.2	0.2	0.2	0.2	0.2	0.6	0.5	0.3	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.1	0.3	1.8
3-Nov	0.1	0.1	Z	0.1	0.2	0.0	0.2	0.1	0.2	0.2	0.1	0.2	0.2	0.3	0.3	0.1	0.1	0.0	0.1	0.1	0.1	0.1	0.0	0.0	0.1	0.3
4-Nov	0.0	0.1	0.1	Z	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.2	0.2	0.2	0.1	0.0	0.0	0.0	0.1	0.2
5-Nov	0.1	0.0	0.0	0.1	Z	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
6-Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.1	0.2	0.4	0.0	0.0	0.4	0.5	0.1	0.5
7-Nov	0.7	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	C	C	C	C	0.0	0.6	0.1	1.9	2.3	4.2	3.9	0.2	2.6	6.9	1.2	6.9
8-Nov	Z	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8
9-Nov	0.0	Z	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.5	0.7	1.8	0.9	0.1	0.1	0.1	0.1	1.6	3.1	3.3	0.2	0.5	0.5	0.6	3.3
10-Nov	0.3	0.5	Z	0.8	0.8	0.3	0.2	0.2	0.4	1.3	1.7	0.4	2.1	0.8	0.2	0.4	0.9	0.9	0.2	0.9	1.0	1.8	2.4	2.3	0.9	2.4
11-Nov	0.5	0.5	0.3	Z	1.5	0.2	1.0	0.3	0.3	0.3	0.3	0.3	0.5	1.2	0.4	0.4	1.0	0.1	1.0	4.8	4.5	4.5	8.8	3.8	1.6	8.8
12-Nov	0.9	2.1	8.6	7.4	Z	2.0	3.5	4.6	0.4	0.1	0.1	0.5	5.0	0.0	0.7	1.9	3.4	2.4	1.0	2.1	1.7	1.2	0.1	0.0	2.2	8.6
13-Nov	0.0	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.2	0.3	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.1	0.2	0.1	0.3
14-Nov	Z	0.1	0.3	0.5	0.3	0.3	1.2	3.4	15.3	14.1	10.7	3.4	6.1	7.3	9.9	4.7	3.3	2.2	4.1	5.0	0.4	0.9	0.6	0.6	4.1	15.3
15-Nov	0.3	Z	1.0	4.0	7.6	14.0	7.0	10.3	9.5	14.9	2.6	0.4	0.3	0.2	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.2	0.1	0.1	3.2	14.9
16-Nov	0.0	0.1	Z	0.1	0.0	0.1	0.1	0.1	0.1	0.2	0.4	0.7	0.4	1.9	0.9	0.8	0.3	0.8	1.3	4.5	4.1	3.3	10.7	12.3	1.9	12.3
17-Nov	9.0	13.9	11.3	Z	2.6	5.0	10.5	12.4	9.5	2.7	0.4	0.4	4.0	4.8	5.3	4.6	3.0	0.8	0.4	2.4	0.4	0.4	0.3	0.2	4.5	13.9
18-Nov	0.3	0.2	0.2	0.2	Z	0.2	0.3	0.5	0.3	0.4	0.2	0.4	1.2	1.1	0.9	0.6	0.6	0.5	0.4	0.4	0.4	0.3	0.3	0.4	0.5	1.2
19-Nov	0.3	0.3	0.3	0.3	0.4	Z	0.4	0.3	0.3	0.5	0.5	0.7	1.5	1.7	2.8	2.3	3.7	3.7	4.7	11.7	10.3	0.7	0.6	0.4	2.1	11.7
20-Nov	Z	0.2	0.1	0.1	0.2	0.1	0.1	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.1	0.0	0.3	0.1	0.1	0.1	0.3
21-Nov	0.1	Z	0.1	0.2	0.3	0.2	0.2	0.3	0.9	0.8	0.2	0.2	0.1	0.3	0.4	0.3	0.1	0.0	0.2	0.1	0.2	0.2	0.1	0.1	0.2	0.9
22-Nov	0.1	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
23-Nov	0.4	0.6	0.4	Z	0.4	0.4	0.6	0.9	0.4	0.2	0.2	0.2	1.0	0.5	0.6	0.8	0.2	0.3	0.7	0.4	0.4	0.2	0.3	0.4	0.5	1.0
24-Nov	1.2	1.0	1.4	1.0	Z	4.1	4.7	6.7	6.0	12.1	13.3	4.0	3.7	0.5	0.2	0.1	0.2	2.4	7.1	6.1	7.4	6.4	3.1	7.2	4.3	13.3
25-Nov	12.1	11.9	8.2	0.4	0.2	Z	0.1	0.8	1.0	1.0	0.6	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	1.6	12.1
26-Nov	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.3	0.2	0.3	0.3	0.2	0.1	0.1	0.1	0.3	0.6	4.0	6.0	2.6	0.7	6.0
27-Nov	2.2	Z	1.4	0.8	2.6	2.9	0.7	1.0	0.7	1.0	0.4	0.2	0.2	0.8	1.9	2.6	6.4	19.0	10.4	2.2	0.3	0.2	0.3	0.2	2.5	19.0
28-Nov	2.5	10.8	Z	11.7	10.9	15.3	8.0	13.9	6.7	2.2	5.8	0.2	0.1	0.1	0.2	14.5	16.9	4.7	11.3	1.1	0.2	0.1	0.0	0.0	6.0	16.9
29-Nov	0.1	0.2	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
30-Nov	0.0	0.1	0.0	0.0	Z	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	0.2	0.1	0.0	0.0	0.1	1.3	0.1	1.3

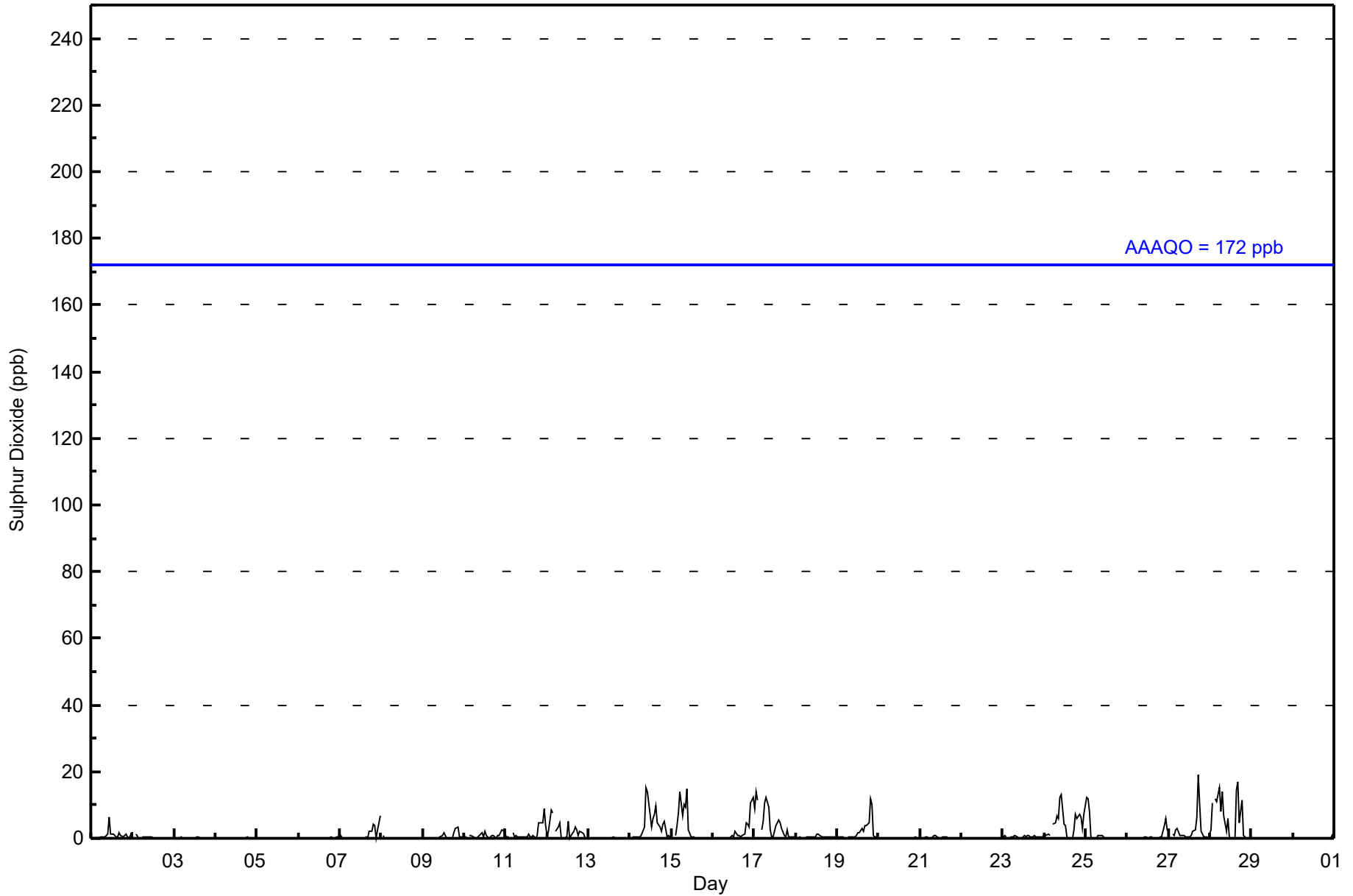
1.3	1.7	1.4	1.1	1.1	1.7	1.3	1.8	1.4	1.9	1.7	0.8	1.0	0.8	0.8	1.4	1.5	1.4	1.5	1.7	1.5	0.8	1.3	1.4	Diurnal Average	
12.1	13.9	11.3	11.7	10.9	15.3	10.5	13.9	9.5	15.3	14.1	10.7	5.0	6.1	7.3	14.5	16.9	19.0	11.3	11.7	10.3	6.4	10.7	12.3	Diurnal Maximum	

Z - zerospan      C - Calibration  
 Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 172 ppb      24-hr 48 ppb



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Blackgold - November 2023**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Blackgold - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 10	664	96.51	96.51
11 - 20	24	3.49	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: 688

Total Number of Hours: 720



**Wood Buffalo Environmental Association**  
**Frequency Distribution**

**Sulphur Dioxide (SO<sub>2</sub>) - ppb**  
**Blackgold - November 2023**

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	29	36	33	22	11	9	23	37	72	94	56	65	108	44	13	664
11 - 20	0	0	0	0	0	0	0	0	0	0	1	22	1	0	0	0	24
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	12	29	36	33	22	11	9	23	37	72	95	78	66	108	44	13	688

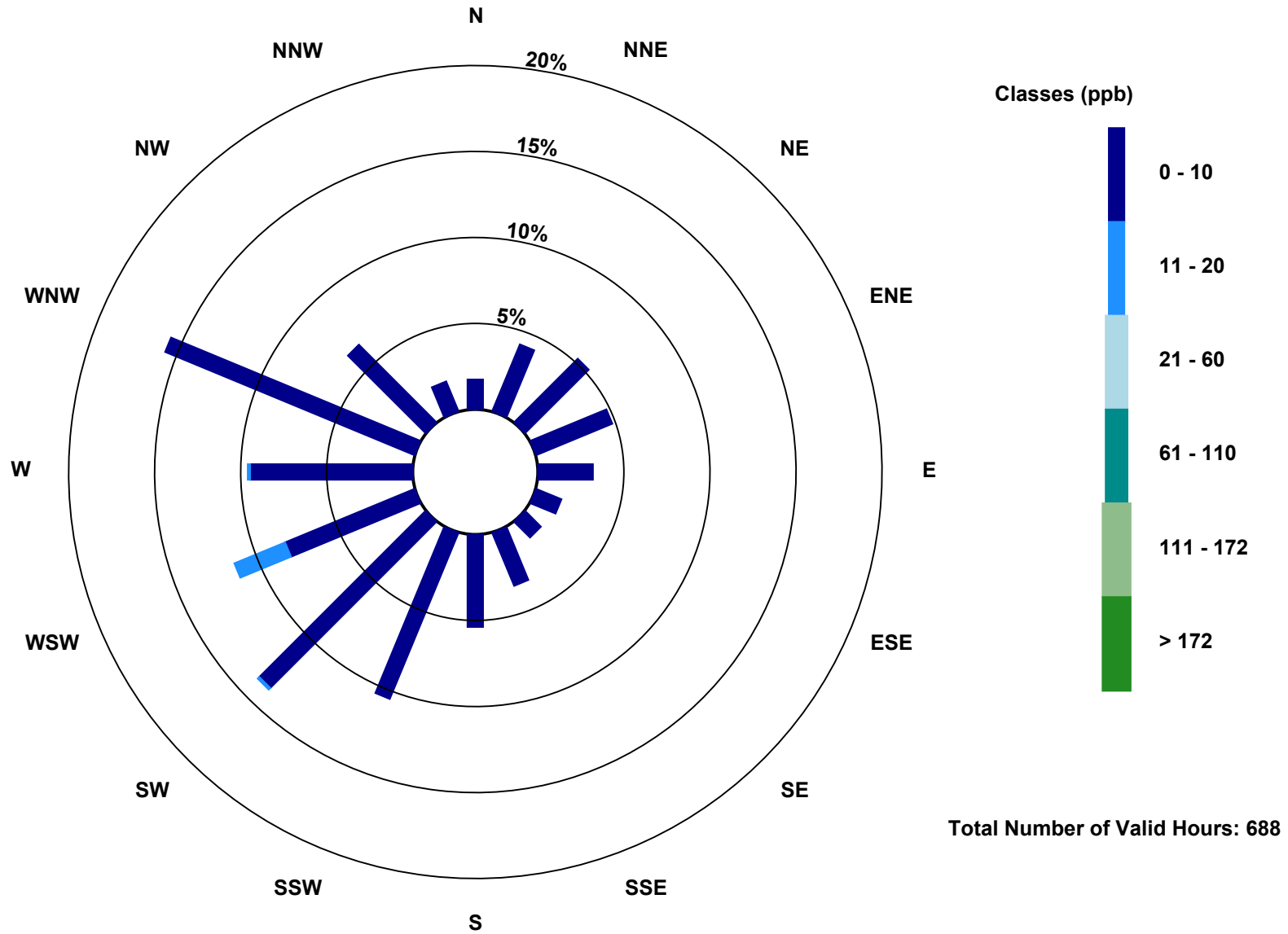
Total Number of Valid Hours: 688

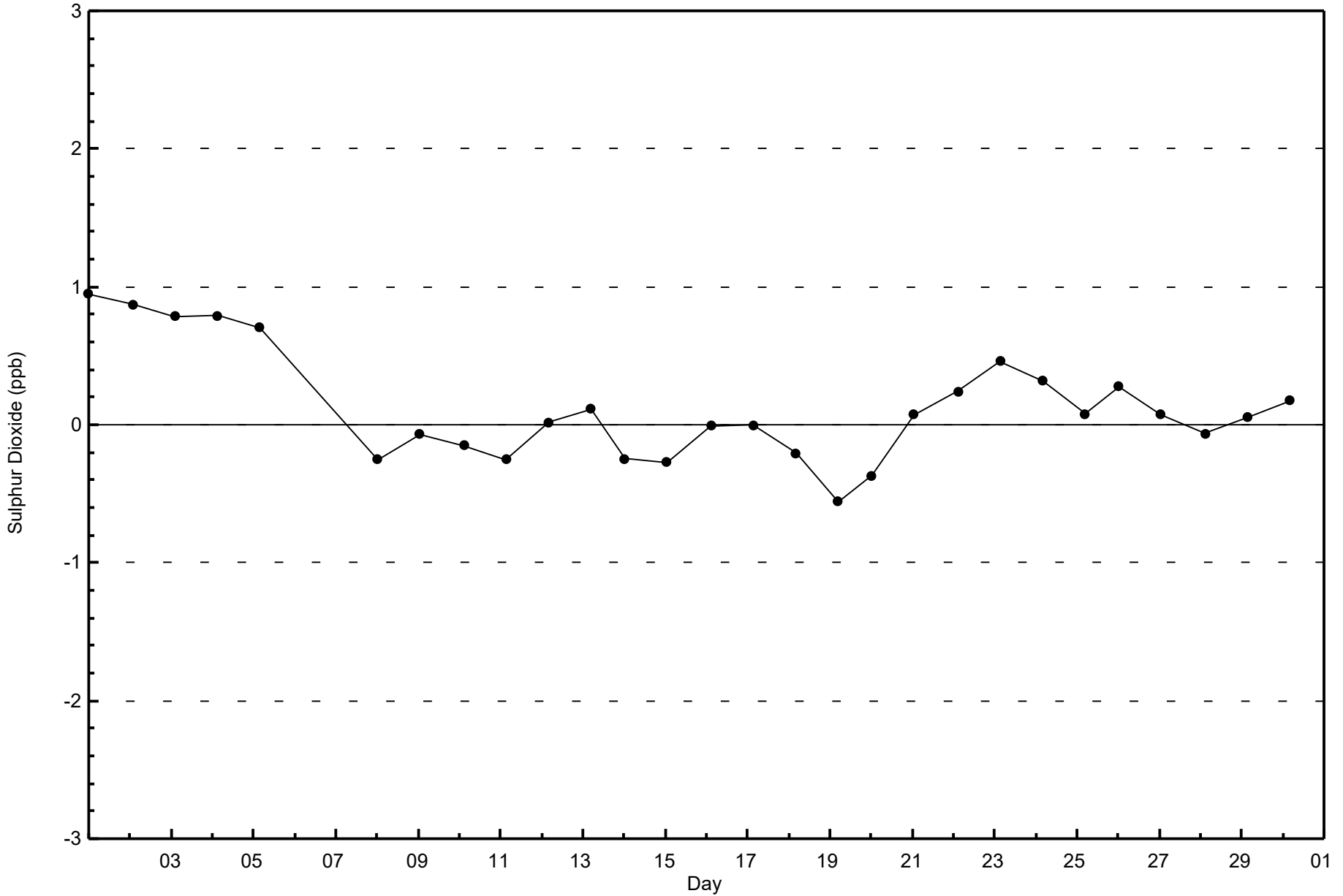
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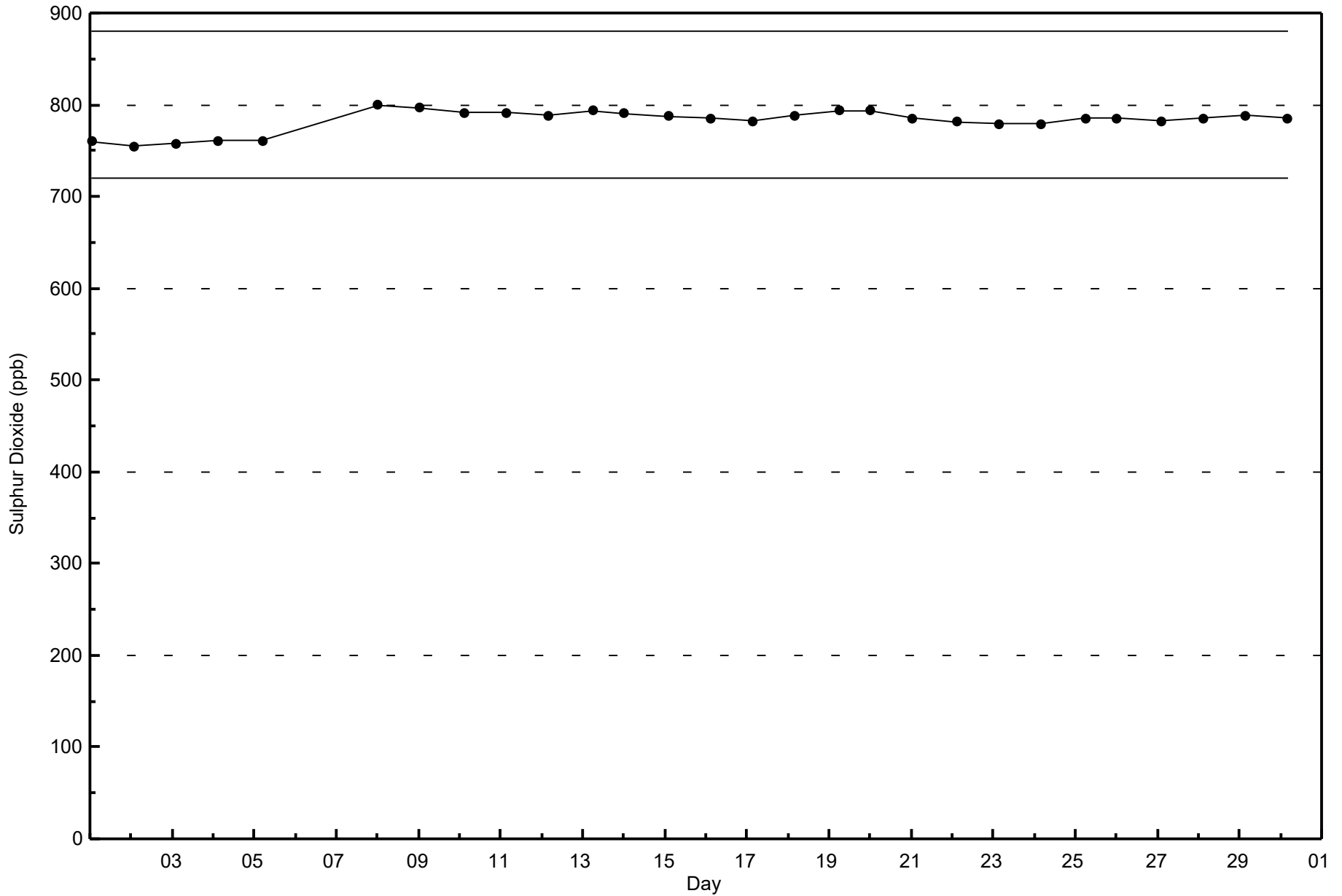


Wood Buffalo Environmental Association  
Wind Rose Nov 2023

Sulphur Dioxide (SO<sub>2</sub>) - ppb  
Blackgold

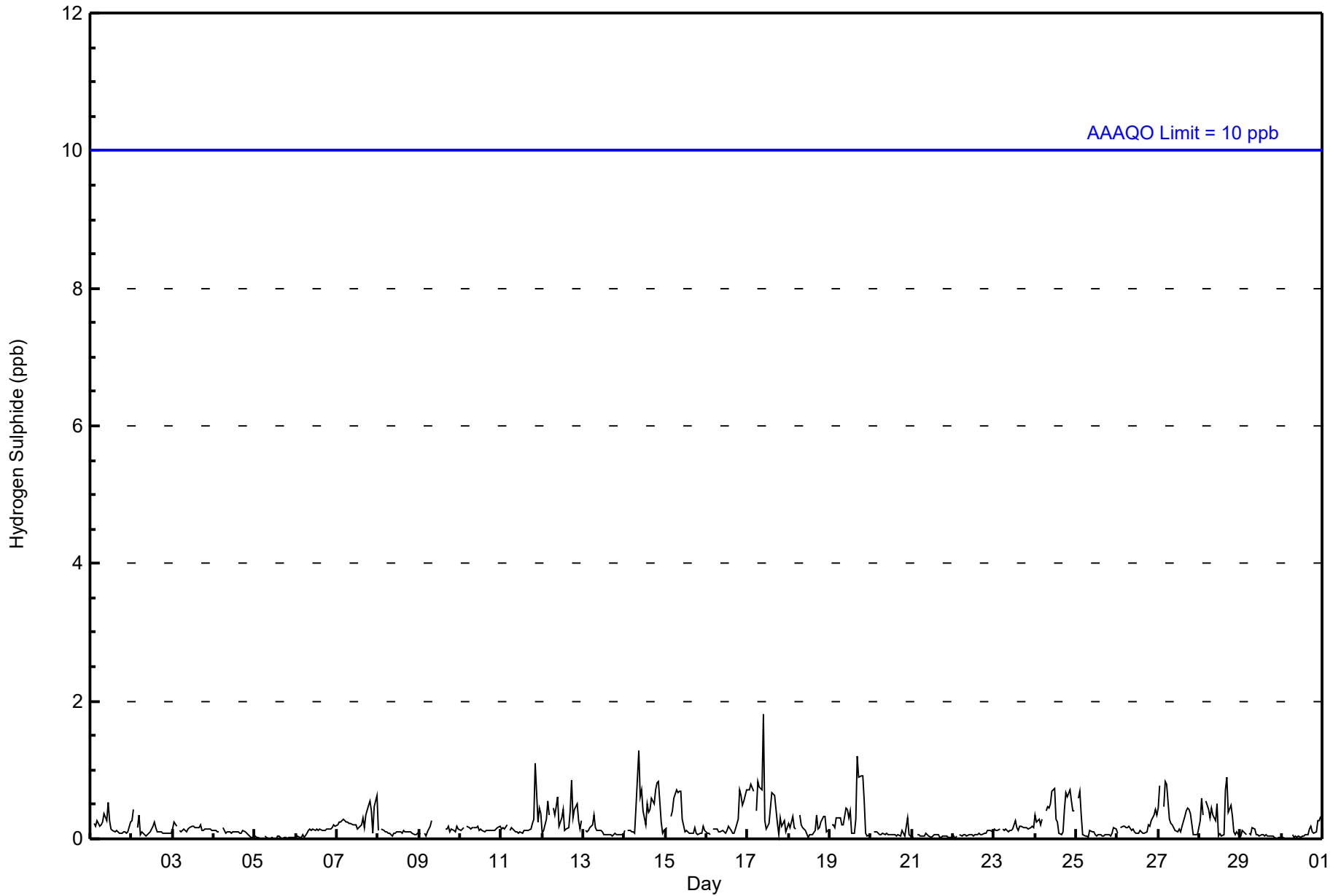














**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Hydrogen Sulphide (H<sub>2</sub>S) - ppb  
Blackgold - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2	685	100.00	100.00
3 - 4	0	0.00	100.00
5 - 7	0	0.00	100.00
8 - 11	0	0.00	100.00
> 11	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Hydrogen Sulphide (H<sub>2</sub>S) - ppb  
Blackgold - November 2023**

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	30	37	32	22	11	7	20	38	74	94	75	67	110	43	13	685
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	12	30	37	32	22	11	7	20	38	74	94	75	67	110	43	13	685

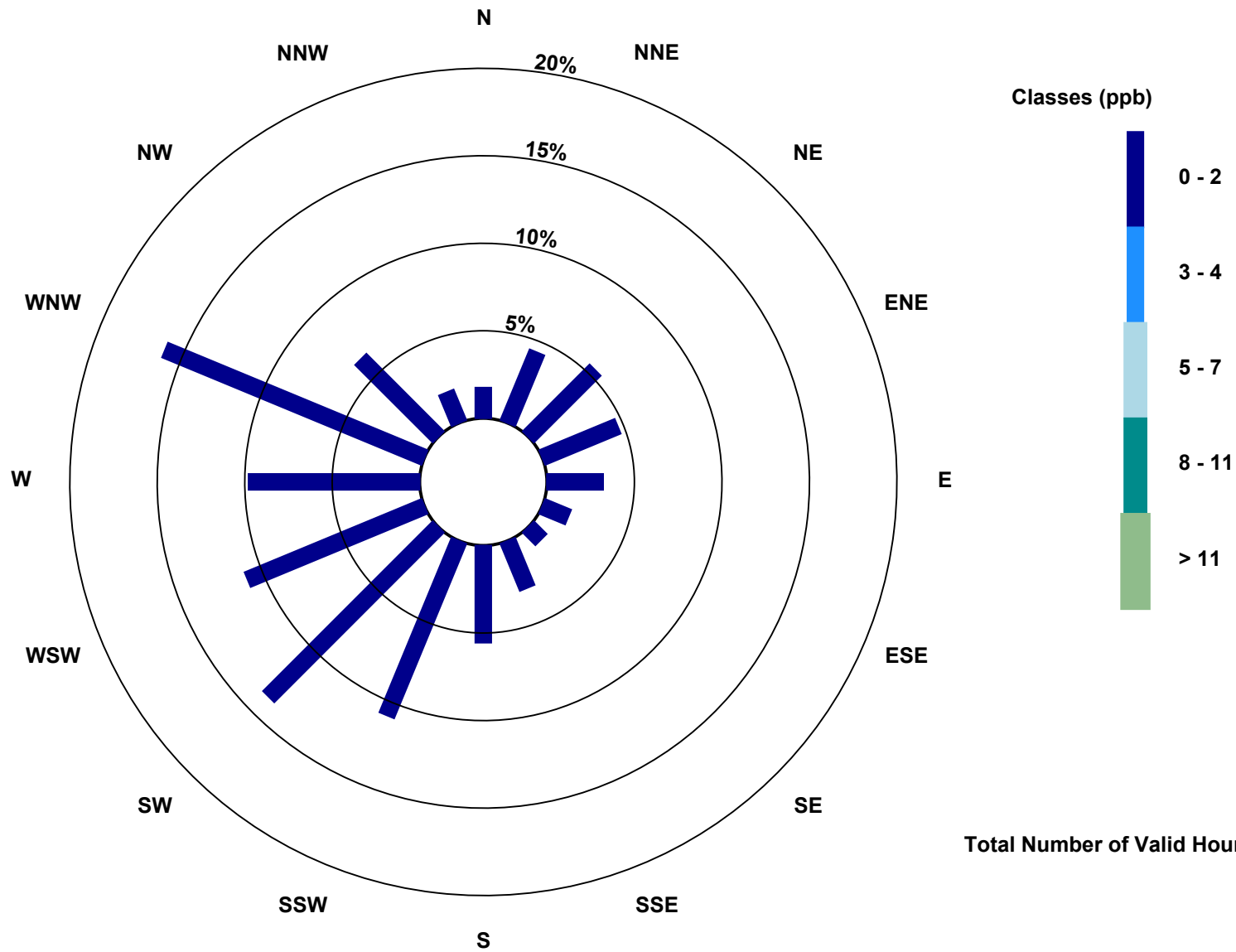
Total Number of Valid Hours: 685

Total Number of Hours: 720

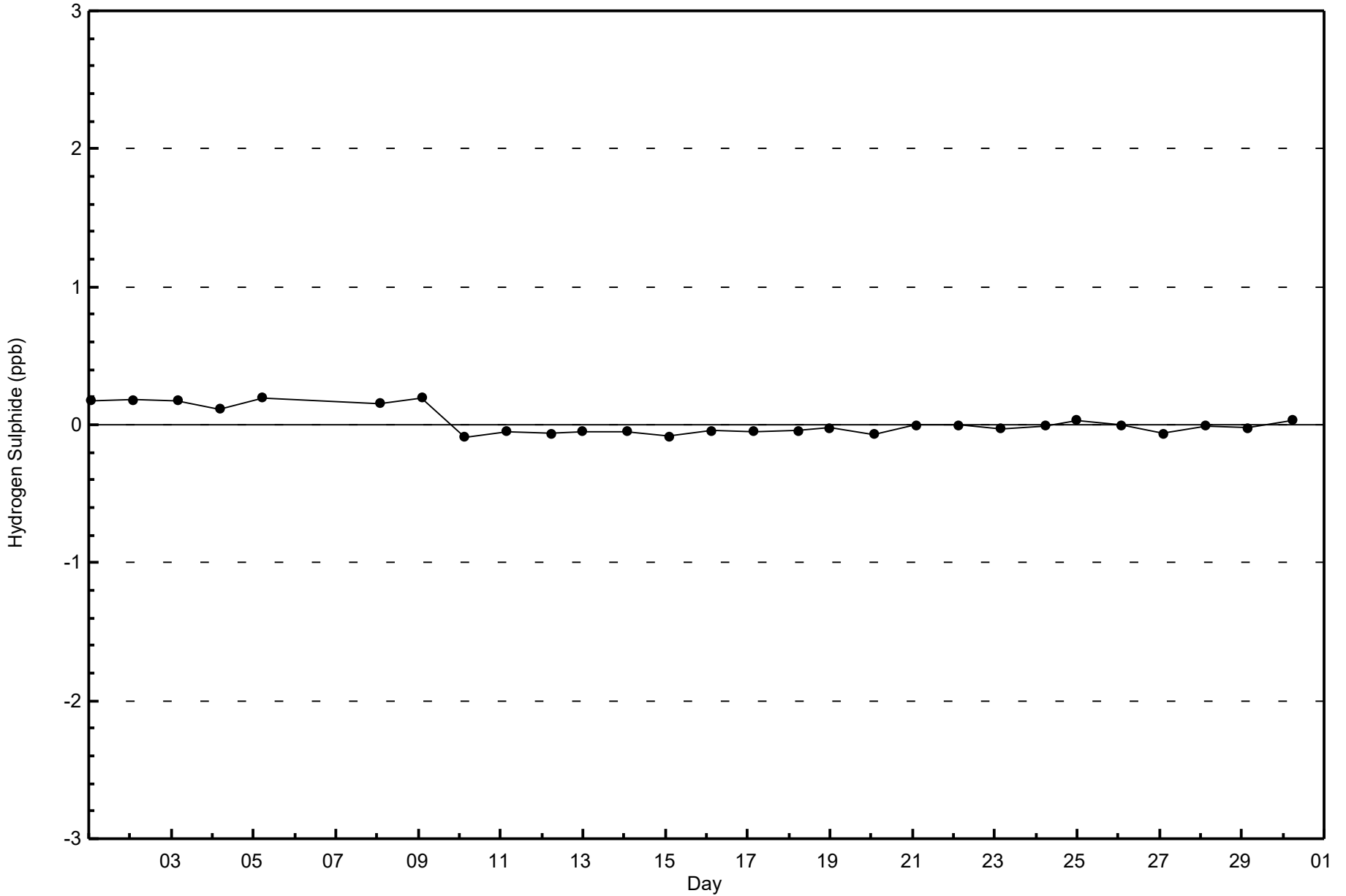


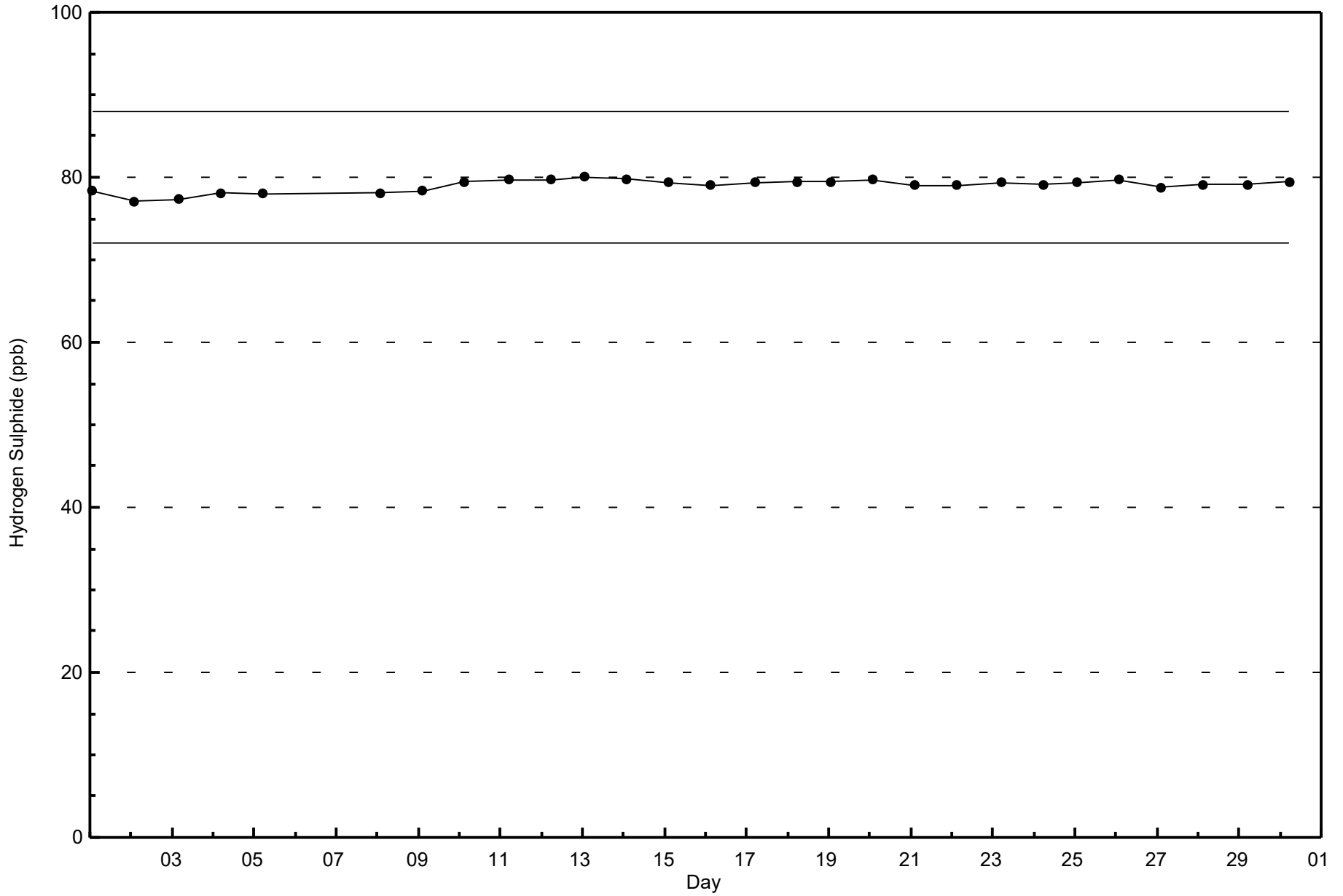
Wood Buffalo Environmental Association  
Wind Rose Nov 2023

Hydrogen Sulphide (H<sub>2</sub>S) - ppb  
Blackgold



Total Number of Valid Hours: 685



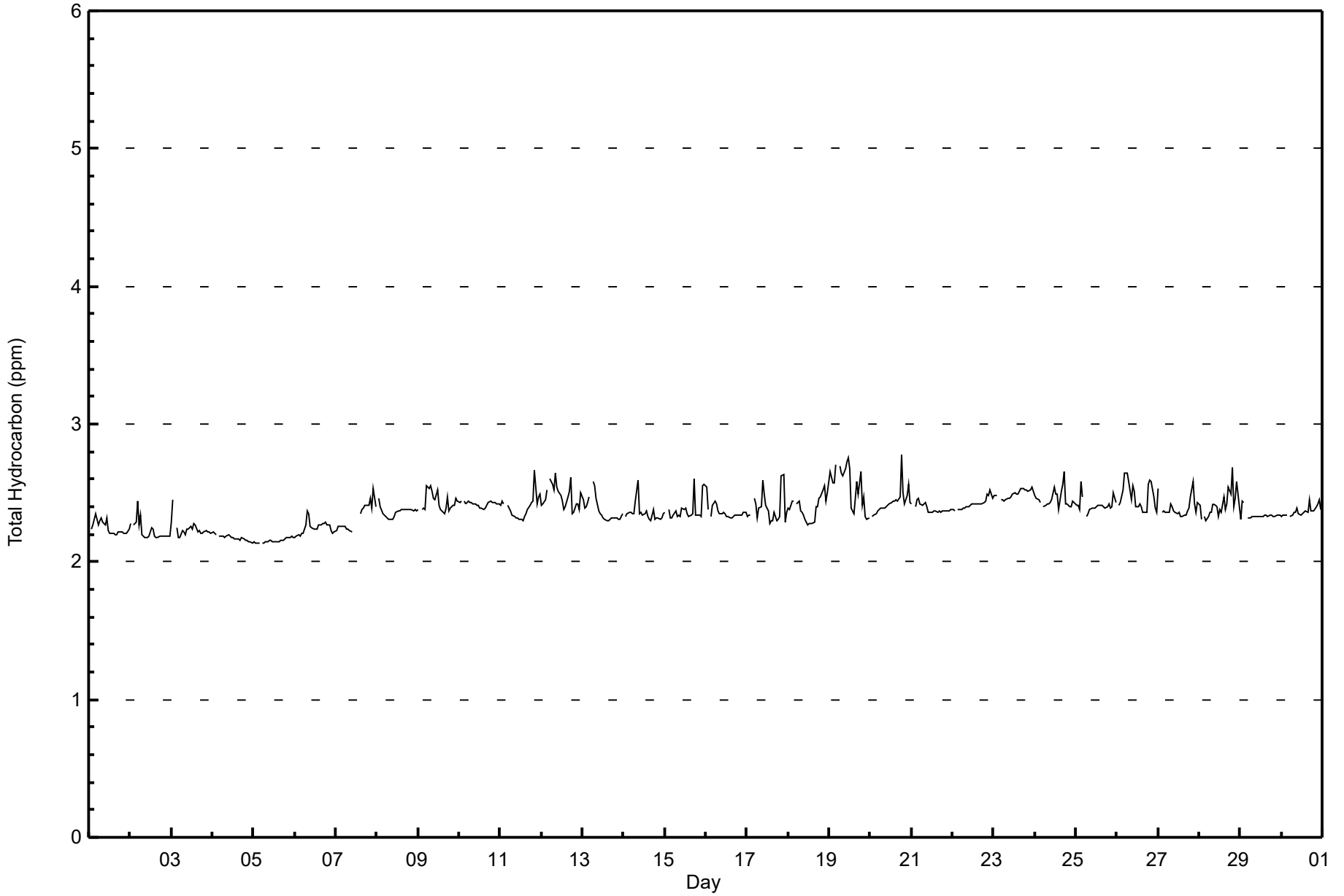




**Wood Buffalo Environmental Association**  
**Summary of Hour Averages**

**Total Hydrocarbon (THC) - ppm**  
**Blackgold - November 2023**

Maximum Value: 2.8 ppm on Nov 20 19:00		Maximum Daily Average: 2.6 ppm on Nov 19		Hours in Service: 720																								
Minimum Value: 2.1 ppm on Nov 5 04:00		Minimum Daily Average: 2.2 ppm on Nov 5		Hours of Data: 688																								
Maximum Diurnal Average: 2.4 ppm at hour 21		Minimum Diurnal Average: 2.3 ppm at hour 15		Hours of Missing Data: 32																								
Monthly Average: 2.37 ppm		Percentiles: P <sub>1</sub> = 2.1 P <sub>10</sub> = 2.2 Q <sub>1</sub> = 2.3 Median = 2.4 Q <sub>3</sub> = 2.4 P <sub>90</sub> = 2.5 P <sub>99</sub> = 2.7		Hours of Calibration: 32																								
				Percent Operational Time: 100.0																								
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24				
1-Nov	Z	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	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3
2-Nov	2.3	Z	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	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.4
3-Nov	2.3	2.5	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.2	2.5
4-Nov	2.2	2.2	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.2	2.2
5-Nov	2.1	2.1	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
6-Nov	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.4	2.3	2.3	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.4
7-Nov	2.2	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	C	C	C	C	2.4	2.4	2.4	2.4	2.4	2.4	2.5	2.4	2.5	2.4	2.3	2.3	2.5	2.5
8-Nov	Z	2.5	2.4	2.4	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.5
9-Nov	2.4	Z	2.4	2.4	2.4	2.5	2.5	2.6	2.5	2.5	2.5	2.5	2.4	2.4	2.4	2.3	2.4	2.5	2.4	2.4	2.4	2.4	2.5	2.4	2.4	2.4	2.6	2.6
10-Nov	2.4	2.4	Z	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4
11-Nov	2.4	2.4	2.4	Z	2.4	2.4	2.4	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.4	2.4	2.4	2.4	2.4	2.7	2.4	2.5	2.5	2.4	2.4	2.7	2.7
12-Nov	2.4	2.4	2.5	2.5	Z	2.6	2.6	2.5	2.6	2.5	2.5	2.5	2.4	2.4	2.4	2.5	2.5	2.6	2.4	2.4	2.4	2.4	2.4	2.4	2.5	2.5	2.5	2.6
13-Nov	2.4	2.4	2.4	2.4	2.5	Z	2.6	2.6	2.5	2.4	2.4	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.4	2.4	2.6
14-Nov	Z	2.3	2.4	2.4	2.4	2.4	2.3	2.4	2.6	2.4	2.4	2.3	2.4	2.4	2.3	2.3	2.3	2.4	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.4	2.4	2.6
15-Nov	2.4	Z	2.4	2.3	2.3	2.3	2.4	2.3	2.3	2.3	2.4	2.4	2.4	2.4	2.3	2.3	2.3	2.6	2.3	2.3	2.3	2.3	2.6	2.6	2.4	2.4	2.4	2.6
16-Nov	2.5	2.4	Z	2.3	2.4	2.4	2.4	2.4	2.3	2.4	2.4	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.4	2.4	2.4	2.4	2.4	2.5
17-Nov	2.3	2.3	2.3	Z	2.5	2.4	2.3	2.4	2.4	2.6	2.5	2.4	2.4	2.3	2.3	2.3	2.4	2.3	2.3	2.3	2.6	2.6	2.3	2.4	2.4	2.4	2.4	2.6
18-Nov	2.4	2.4	2.4	2.4	Z	2.4	2.4	2.4	2.4	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.4	2.4	2.5	2.5	2.5	2.5	2.4	2.5	2.4	2.4	2.5	2.5
19-Nov	2.7	2.6	2.6	2.6	2.7	Z	2.7	2.6	2.6	2.7	2.7	2.8	2.7	2.4	2.3	2.5	2.6	2.5	2.7	2.4	2.5	2.3	2.3	2.3	2.3	2.3	2.3	2.8
20-Nov	Z	2.3	2.3	2.3	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.5	2.8	2.5	2.4	2.5	2.6	2.4	2.4	2.4	2.4	2.8
21-Nov	2.4	Z	2.4	2.5	2.5	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.5
22-Nov	2.4	2.4	Z	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.5	2.5	2.5	2.5	2.4	2.4	2.4	2.5
23-Nov	2.5	2.5	2.5	Z	2.5	2.4	2.4	2.4	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
24-Nov	2.5	2.5	2.4	2.4	Z	2.4	2.4	2.4	2.4	2.4	2.5	2.5	2.5	2.5	2.4	2.5	2.6	2.7	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.7
25-Nov	2.4	2.4	2.4	2.6	2.5	Z	2.3	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.5	2.4	2.4	2.4	2.4	2.6
26-Nov	Z	2.4	2.4	2.5	2.6	2.6	2.6	2.4	2.5	2.5	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.6	2.6	2.6	2.5	2.4	2.4	2.4	2.4	2.4	2.6
27-Nov	2.5	Z	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.3	2.4	2.3	2.3	2.3	2.3	2.4	2.4	2.5	2.6	2.4	2.4	2.4	2.4	2.4	2.4	2.6
28-Nov	2.4	2.3	Z	2.3	2.3	2.3	2.4	2.4	2.4	2.4	2.4	2.3	2.4	2.4	2.5	2.4	2.4	2.5	2.5	2.7	2.4	2.5	2.6	2.4	2.4	2.4	2.4	2.7
29-Nov	2.3	2.4	2.4	Z	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.4
30-Nov	2.3	2.3	2.3	2.3	Z	2.3	2.3	2.4	2.4	2.4	2.3	2.3	2.4	2.4	2.4	2.4	2.5	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.5
																								Diurnal Average				
																								Diurnal Maximum				
Z - zerospan C - Calibration																												







**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Total Hydrocarbon (THC) - ppm**  
**Blackgold - November 2023**

<b>Concentration Ranges (ppm)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 2.0	0	0.00	0.00
2.1 - 3.0	688	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: 688

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Total Hydrocarbon (THC) - ppm  
Blackgold - November 2023**

<b>Concentration Ranges (ppm)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 2.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2.1 - 3.0	12	29	36	33	22	11	9	23	37	72	95	78	66	108	44	13	688
3.1 - 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	12	29	36	33	22	11	9	23	37	72	95	78	66	108	44	13	688

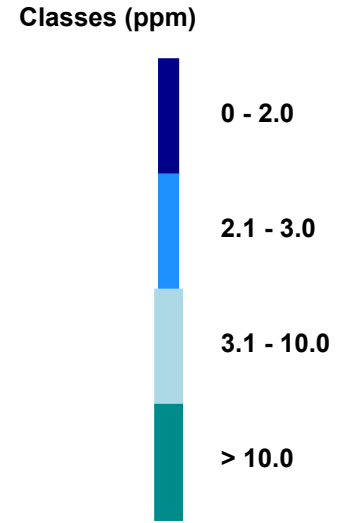
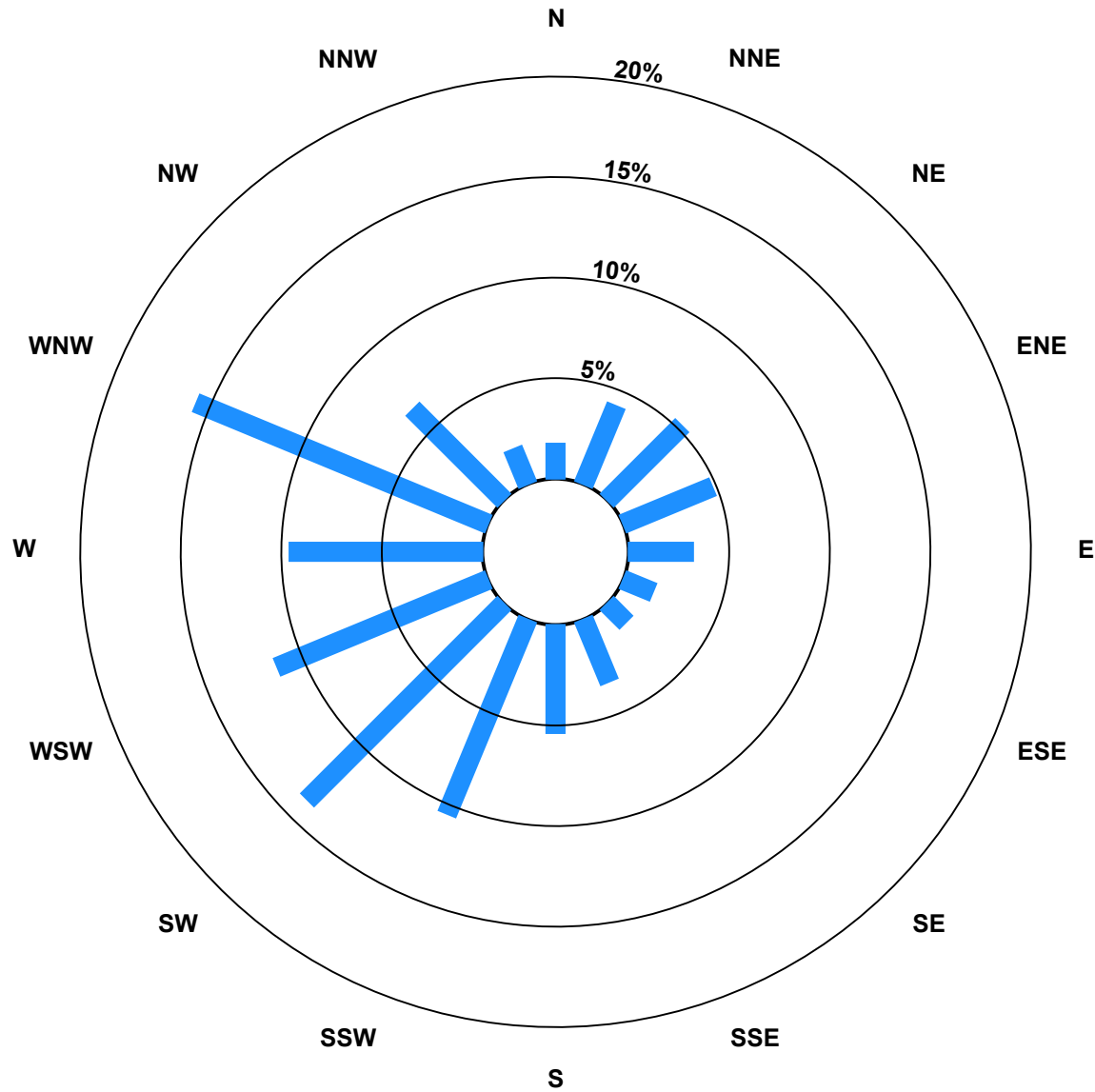
Total Number of Valid Hours: 688

Total Number of Hours: 720

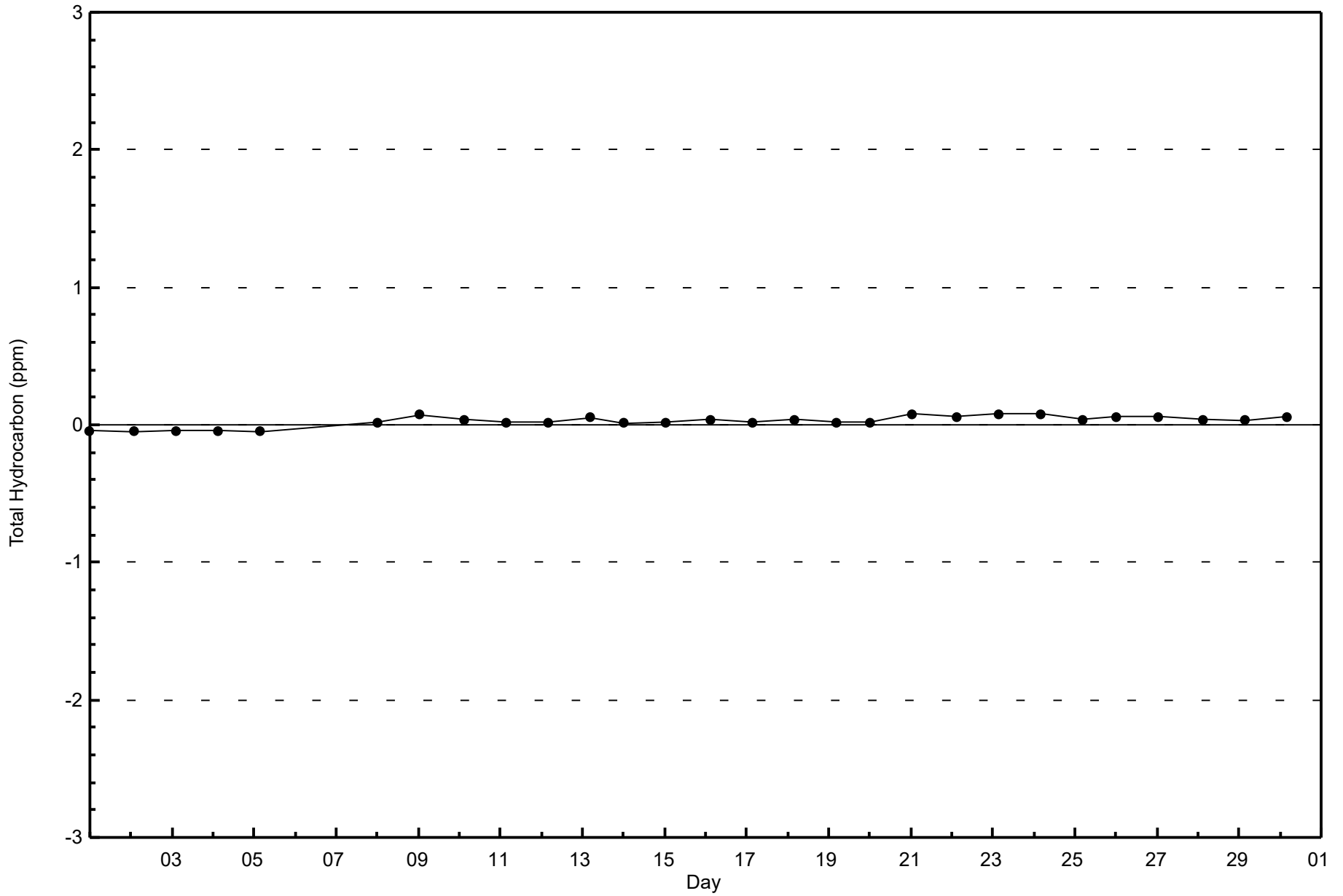


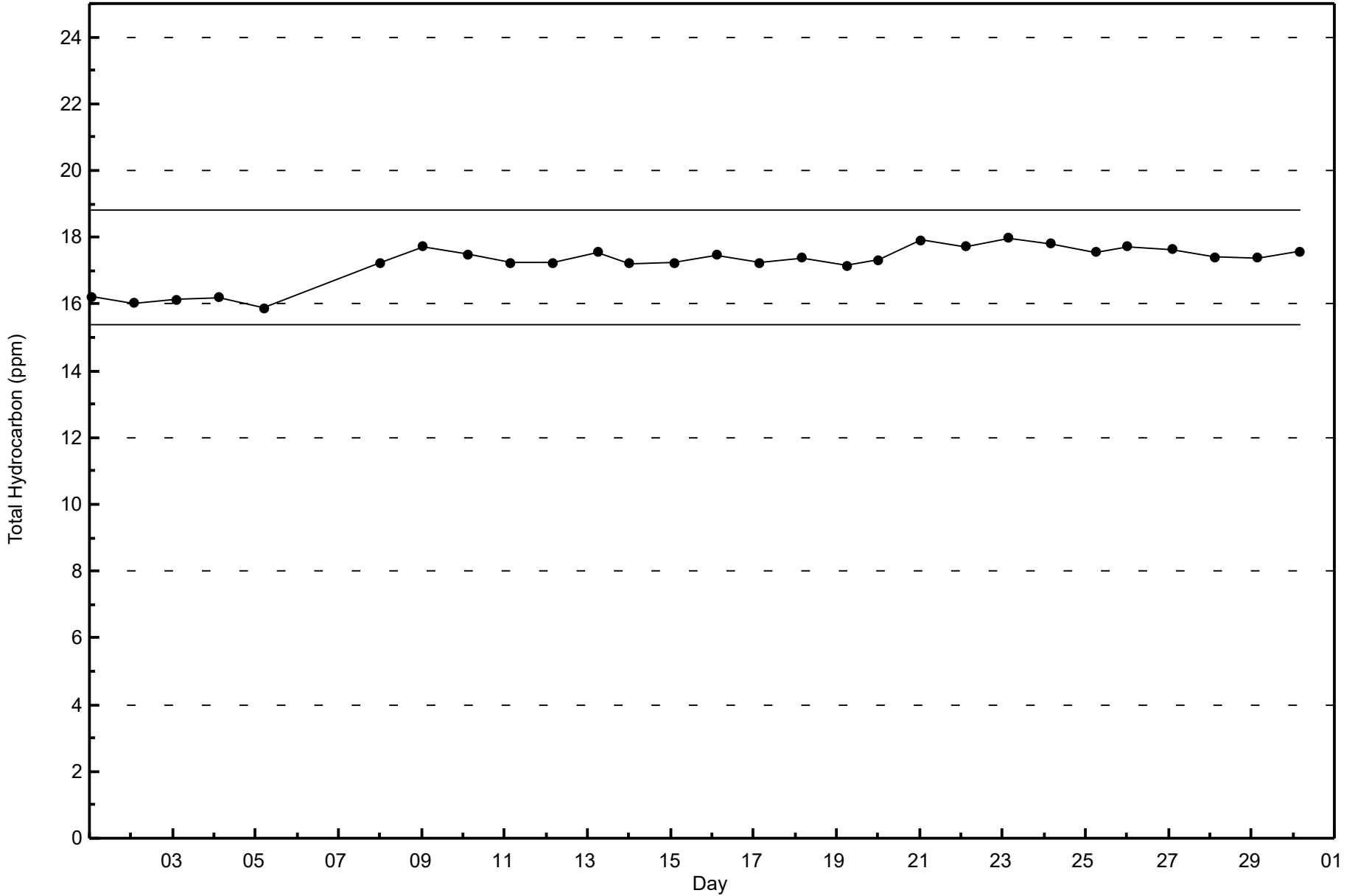
Wood Buffalo Environmental Association  
Wind Rose Nov 2023

Total Hydrocarbon (THC) - ppm  
Blackgold



Total Number of Valid Hours: 688







**Wood Buffalo Environmental Association**  
**Summary of Hour Averages**

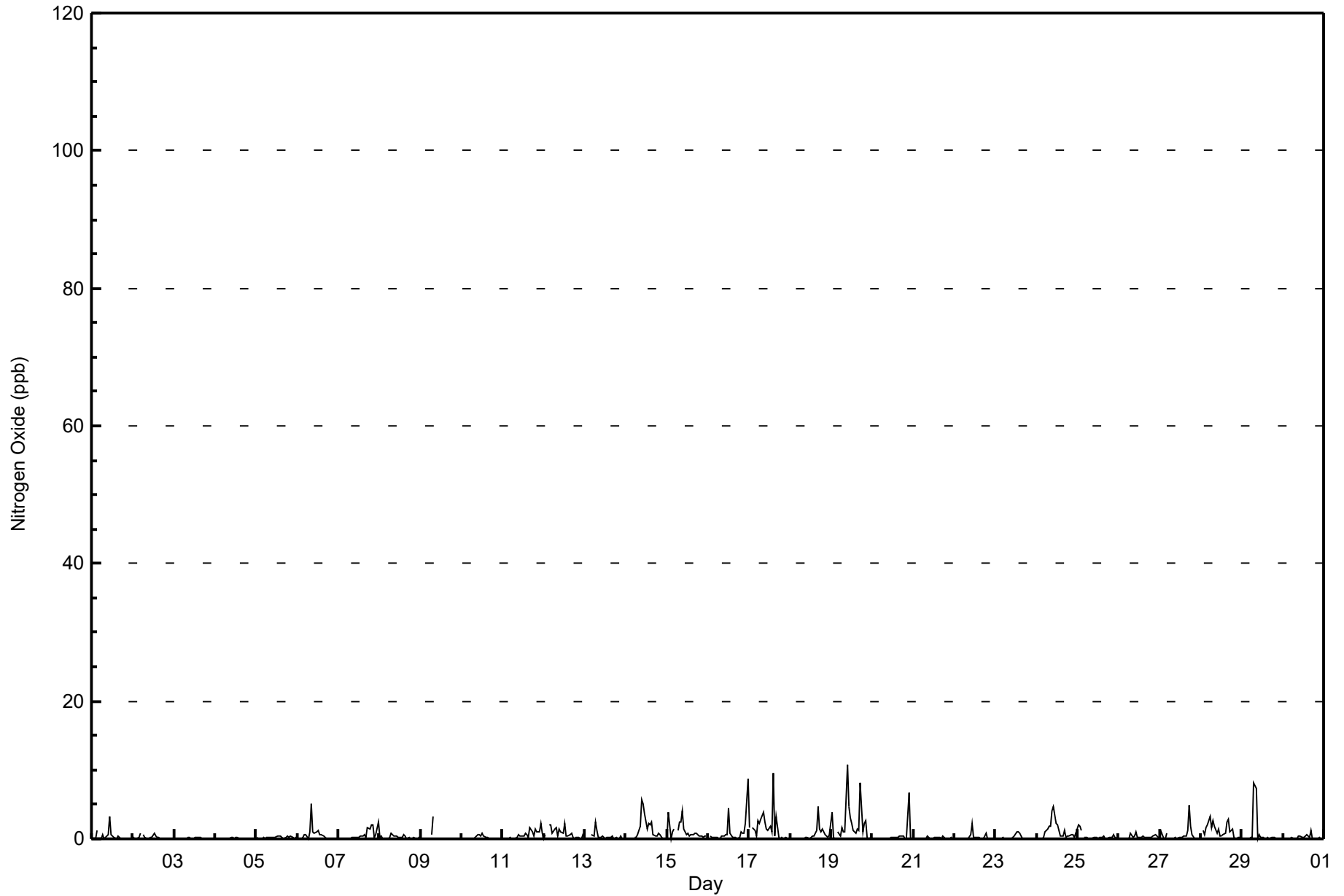
**Nitrogen Oxide (NO) - ppb**  
**Blackgold - November 2023**

Maximum Value: 10.8 ppb on Nov 19 10:00		Maximum Daily Average: 2.1 ppb on Nov 19		Hours in Service: 720																							
Minimum Value: 0.0 ppb on Nov 1 01:00		Minimum Daily Average: 0.1 ppb on Nov 4		Hours of Data: 685																							
Maximum Diurnal Average: 1.3 ppb at hour 10		Minimum Diurnal Average: 0.2 ppb at hour 3		Hours of Missing Data: 35																							
Monthly Average: 0.58 ppb		Percentiles: P <sub>1</sub> = 0.0 P <sub>10</sub> = 0.0 Q <sub>1</sub> = 0.0 Median = 0.2 Q <sub>3</sub> = 0.6 P <sub>90</sub> = 1.5 P <sub>99</sub> = 5.9		Hours of Calibration: 35																							
				Percent Operational Time: 100.0																							
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Nov	0.0	0.0	0.0	1.2	Z	0.0	0.5	0.0	0.2	0.7	3.3	0.5	0.3	0.0	0.5	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	3.3	
2-Nov	0.1	0.0	0.0	0.2	0.9	Z	0.5	0.2	0.0	0.1	0.2	0.2	0.7	0.4	0.1	0.1	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.2	0.9	
3-Nov	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.1	0.0	0.1	0.2	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	
4-Nov	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.2	0.1	0.1	0.2	0.2	0.1	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.1	0.1	0.2	
5-Nov	0.0	0.1	Z	0.1	0.2	0.1	0.2	0.1	0.2	0.2	0.2	0.3	0.4	0.3	0.2	0.1	0.2	0.4	0.2	0.3	0.1	0.1	0.1	0.1	0.2	0.4	
6-Nov	0.1	0.0	0.1	0.2	0.5	0.7	0.1	0.9	5.1	1.0	0.8	0.9	1.2	0.6	0.7	0.4	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.6	5.1	
7-Nov	0.1	0.0	0.0	0.1	0.1	0.1	0.0	0.0	0.1	0.2	0.2	0.2	0.2	0.3	0.3	0.7	0.1	1.7	1.4	2.1	2.0	0.2	0.6	2.3	0.5	2.3	
8-Nov	0.2	0.4	0.1	0.0	Z	0.1	0.2	0.8	0.4	0.5	0.3	0.1	0.1	0.2	0.6	0.4	0.0	0.1	0.0	0.0	0.3	0.1	0.0	0.2	0.2	0.8	
9-Nov	0.0	0.0	0.0	0.0	0.0	Z	0.6	3.2	C	C	C	C	C	C	C	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	--	3.2	
10-Nov	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.5	0.6	0.4	0.8	0.4	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.8	
11-Nov	0.0	Z	0.0	0.0	0.1	0.0	0.1	0.0	0.2	0.5	0.5	0.4	0.5	0.7	0.6	0.3	1.5	0.9	0.4	1.5	1.0	0.9	2.2	0.9	0.6	2.2	
12-Nov	0.0	0.6	Z	2.1	2.0	0.9	1.5	1.6	0.5	1.4	1.0	0.8	2.2	0.5	0.3	0.6	0.8	0.2	0.0	0.1	0.3	0.1	0.0	0.7	0.8	2.2	
13-Nov	0.0	0.0	0.0	Z	0.7	0.5	2.4	1.2	0.2	0.2	0.3	0.2	0.1	0.2	0.2	0.1	0.4	0.0	0.2	0.0	0.0	0.3	0.0	0.0	0.3	2.4	
14-Nov	0.0	0.0	0.0	0.0	Z	0.2	0.2	0.7	1.7	5.7	5.1	3.6	1.4	2.3	2.1	2.4	0.7	0.3	0.3	0.7	0.7	0.0	0.0	0.0	1.2	5.7	
15-Nov	0.0	3.9	0.0	1.0	1.4	Z	1.3	2.4	2.4	4.1	1.5	0.5	0.7	0.4	0.7	0.6	0.9	0.7	0.7	0.4	0.4	0.2	0.3	0.4	1.1	4.1	
16-Nov	Z	0.3	0.1	0.1	0.1	0.2	0.1	0.1	0.3	0.4	0.5	0.6	4.6	0.8	0.3	0.1	0.2	0.1	0.2	1.0	0.9	0.7	2.2	8.8	1.0	8.8	
17-Nov	1.5	Z	1.6	1.2	0.4	2.7	2.2	2.9	3.9	2.3	1.4	1.3	1.8	1.1	9.5	0.5	3.3	0.1	0.0	0.2	0.0	0.2	0.0	0.0	1.7	9.5	
18-Nov	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.1	0.3	0.4	0.5	1.2	4.7	1.3	1.1	1.3	0.6	0.5	0.3	0.6	0.6	4.7	
19-Nov	3.8	0.2	0.0	Z	0.9	0.3	1.7	1.0	1.0	10.8	4.6	3.1	2.2	1.1	0.9	1.5	1.2	8.2	0.9	2.3	2.6	0.1	0.0	0.1	2.1	10.8	
20-Nov	0.0	0.0	0.0	0.0	Z	0.0	0.1	0.0	0.1	0.0	0.1	0.2	0.1	0.2	0.1	0.2	0.5	0.4	0.4	0.1	0.0	6.8	0.0	0.0	0.4	6.8	
21-Nov	0.0	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.3	0.2	0.1	0.0	0.2	0.2	0.2	0.2	0.0	0.4	0.1	0.0	0.0	0.0	0.1	0.0	0.1	0.4	
22-Nov	Z	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.7	2.2	0.1	0.2	0.1	0.2	0.0	0.0	0.0	0.8	0.0	0.0	0.0	0.0	0.0	0.2	2.2	
23-Nov	0.0	Z	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.1	0.2	0.4	1.1	1.0	0.8	0.4	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	1.1	
24-Nov	0.2	0.1	Z	0.0	0.3	1.0	1.4	1.9	1.7	4.1	4.7	2.3	1.9	1.3	0.4	0.3	1.2	0.2	0.3	0.4	0.6	0.6	0.2	0.8	1.1	4.7	
25-Nov	2.1	1.8	1.2	Z	0.2	0.1	0.0	0.0	0.0	0.1	0.2	0.2	0.0	0.2	0.2	0.5	0.1	0.1	0.3	0.2	0.1	0.6	0.2	0.1	0.4	2.1	
26-Nov	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.8	0.1	0.5	1.1	0.3	0.1	0.3	0.5	0.1	0.2	0.1	0.2	0.1	0.4	0.6	0.4	0.2	0.3	1.1	
27-Nov	0.3	1.1	0.1	0.0	0.7	Z	0.0	0.0	0.0	0.1	0.0	0.1	0.2	0.2	0.4	0.5	1.3	4.8	1.9	0.6	0.0	0.1	0.1	0.1	0.5	4.8	
28-Nov	Z	1.3	0.6	1.7	2.1	3.2	1.6	2.6	1.8	0.9	1.5	0.4	0.5	0.6	0.7	2.4	2.9	1.1	1.4	0.2	0.0	0.1	0.3	0.2	1.2	3.2	
29-Nov	0.0	Z	0.1	0.0	0.0	0.3	0.2	8.2	7.4	0.1	0.5	0.2	0.2	0.1	0.1	0.2	0.1	0.2	0.2	0.1	0.1	0.0	0.0	0.0	0.8	8.2	
30-Nov	0.0	0.0	Z	0.0	0.1	0.2	0.1	0.1	0.0	0.4	0.5	0.3	0.3	0.4	0.6	0.2	1.2	0.1	0.0	0.0	0.0	0.2	0.0	0.1	0.2	1.2	
		0.3	0.4	0.2	0.3	0.4	0.4	0.5	1.0	1.0	1.3	1.1	0.6	0.8	0.5	0.7	0.5	0.7	0.7	0.4	0.4	0.4	0.4	0.2	0.5	Diurnal Average	
		3.8	3.9	1.6	2.1	2.1	3.2	2.4	8.2	7.4	10.8	5.1	3.6	4.6	2.3	9.5	2.4	4.7	8.2	1.9	2.3	2.6	6.8	2.2	8.8	Diurnal Maximum	
Z - zerospan		C - Calibration																									



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Nitrogen Oxide (NO) - ppb**  
**Blackgold - November 2023**





**Wood Buffalo Environmental Association**  
**Cumulative Frequency Distribution**

**Nitrogen Oxide (NO) - ppb**  
**Blackgold - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	685	100.00	100.00
21 - 40	0	0.00	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720





**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitrogen Oxide (NO) - ppb  
Blackgold - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 20	11	29	38	33	20	11	7	22	37	73	96	75	69	107	44	13	685
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	11	29	38	33	20	11	7	22	37	73	96	75	69	107	44	13	685

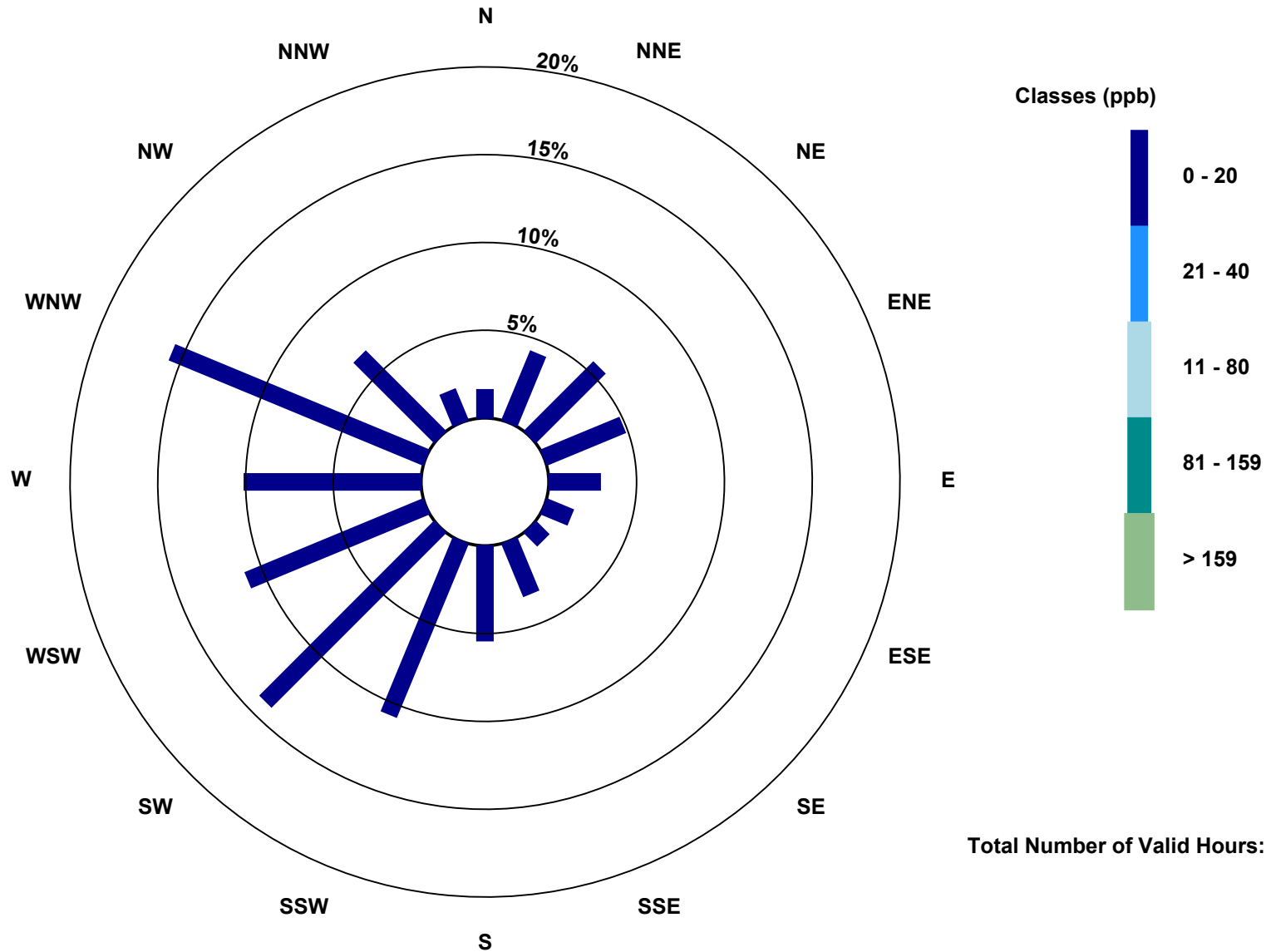
Total Number of Valid Hours: 685

Total Number of Hours: 720

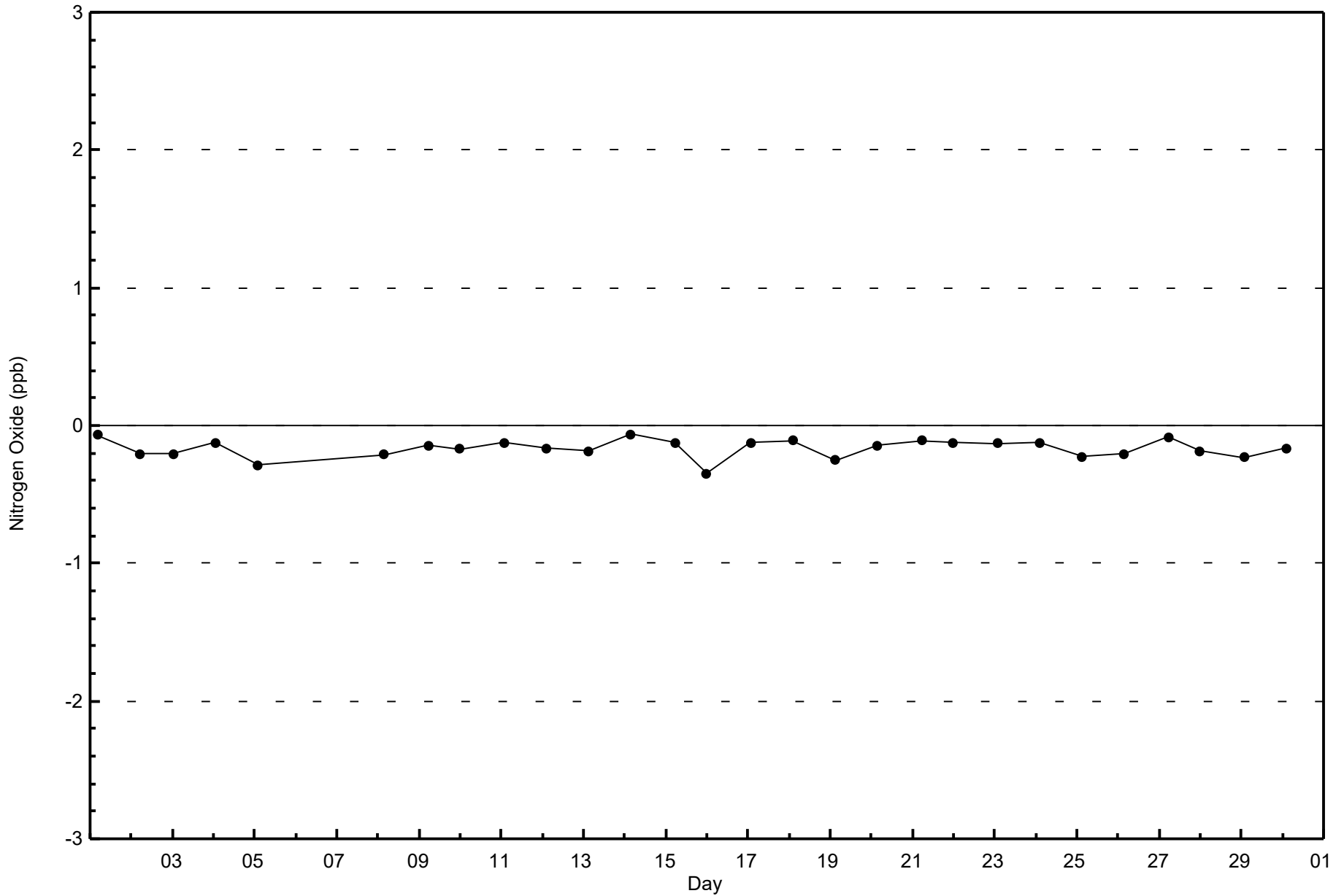


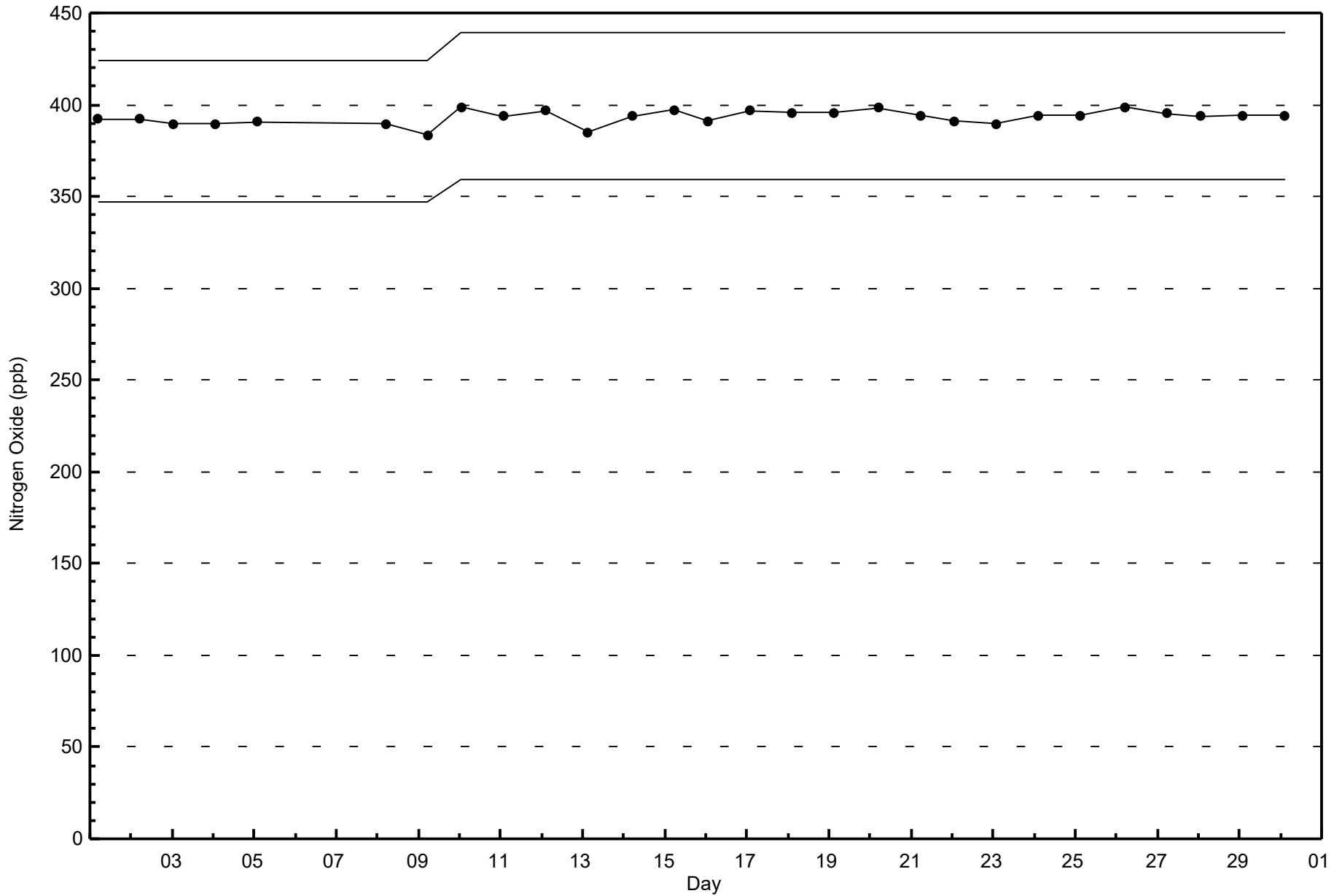
Wood Buffalo Environmental Association  
Wind Rose Nov 2023

Nitrogen Oxide (NO) - ppb  
Blackgold



Total Number of Valid Hours: 685







# Wood Buffalo Environmental Association

## Summary of Hour Averages

# Nitrogen Dioxide (NO<sub>2</sub>) - ppb

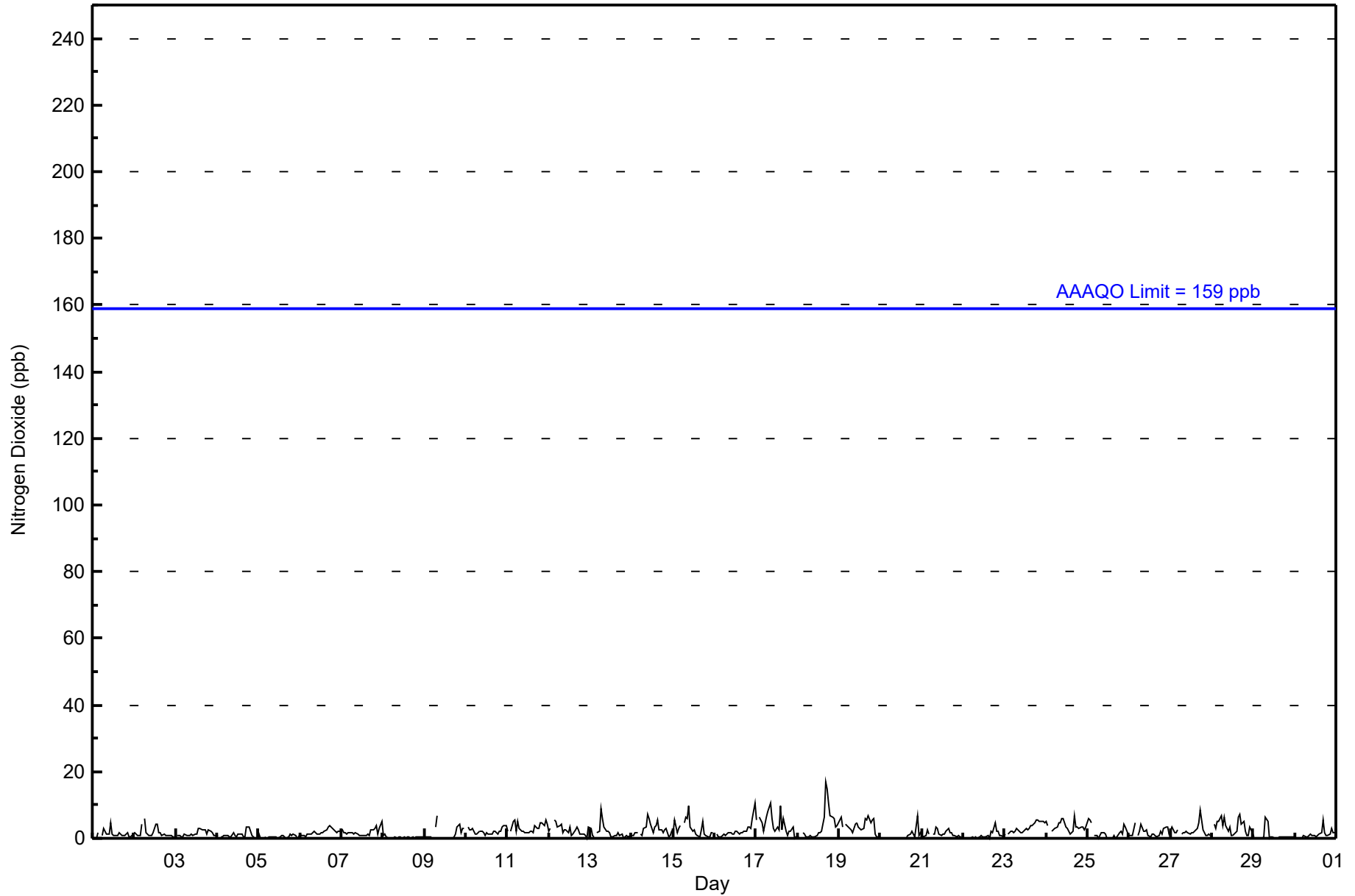
## Blackgold - November 2023

Number of Exceedences (AAAQO):		1-hr: 0		24-hr: 0		Hours in Service: 720																																											
Maximum Value: 17.1 ppb on Nov 18 17:00		Maximum Daily Average: 4.1 ppb on Nov 17		Hours of Data: 685																																													
Minimum Value: 0.0 ppb on Nov 1 02:00		Minimum Daily Average: 0.3 ppb on Nov 8		Hours of Missing Data: 35																																													
Maximum Diurnal Average: 3.0 ppb at hour 17		Minimum Diurnal Average: 1.3 ppb at hour 12		Hours of Calibration: 35																																													
Monthly Average: 2.06 ppb		Percentiles: P <sub>1</sub> = 0.0 P <sub>10</sub> = 0.3 Q <sub>1</sub> = 0.7 Median = 1.5 Q <sub>3</sub> = 2.8 P <sub>90</sub> = 4.8 P <sub>99</sub> = 9.0		Percent Operational Time: 100.0																																													
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Nov	0.2	0.0	0.1	1.8	Z	0.7	2.8	2.3	1.2	1.1	4.5	1.2	1.0	1.0	0.7	1.6	1.4	0.9	0.8	1.2	1.5	0.6	0.6	1.3	1.2	4.5																							
2-Nov	1.8	1.3	0.8	0.7	4.2	Z	6.0	1.6	0.7	0.8	0.7	1.7	4.3	4.1	1.8	1.5	1.0	1.1	0.8	1.0	0.9	0.7	0.5	0.4	1.7	6.0																							
3-Nov	Z	0.9	0.8	0.6	0.6	1.4	0.9	0.8	1.0	1.2	0.9	1.3	1.3	2.8	3.1	2.7	2.7	2.4	1.3	2.7	2.0	1.8	1.0	0.8	1.5	3.1																							
4-Nov	0.8	Z	0.5	0.5	0.9	0.7	0.7	0.4	0.5	1.7	1.0	0.6	1.2	1.2	1.1	0.3	0.6	3.6	3.3	2.1	0.9	0.5	0.1	0.1	1.0	3.6																							
5-Nov	1.2	0.2	Z	0.3	0.2	0.1	0.4	0.4	0.3	0.3	0.5	0.2	0.4	0.9	0.9	0.3	0.2	0.4	1.1	0.7	1.2	0.7	0.2	0.3	0.5	1.2																							
6-Nov	1.1	0.9	0.9	0.5	1.3	1.2	1.2	1.7	2.2	1.5	1.4	1.3	1.8	1.5	2.0	2.6	3.6	3.9	3.4	2.9	2.0	1.9	2.2	2.3	1.9	3.9																							
7-Nov	2.4	1.9	1.7	1.4	1.5	1.6	1.5	1.3	1.8	1.2	0.9	0.8	0.7	0.7	0.8	1.1	0.7	2.4	2.4	3.0	3.7	1.3	3.0	5.0	1.8	5.0																							
8-Nov	0.9	1.3	0.3	0.0	Z	0.0	0.0	0.5	0.2	0.3	0.3	0.2	0.3	0.2	0.5	0.5	0.2	0.4	0.1	0.3	0.3	0.3	0.4	0.4	0.3	1.3																							
9-Nov	0.4	0.5	0.3	0.3	0.5	Z	3.2	6.7	C	C	C	C	C	C	C	0.1	0.2	0.4	1.3	3.5	4.1	1.6	3.0	2.8	--	6.7																							
10-Nov	Z	3.3	2.4	2.7	2.9	1.4	1.3	1.6	2.3	2.0	1.6	1.0	1.7	1.3	1.1	1.4	2.0	2.0	1.4	2.1	2.3	3.3	3.9	4.0	2.1	4.0																							
11-Nov	2.2	Z	2.1	5.1	5.3	2.3	5.0	3.1	2.0	2.2	1.6	1.7	1.7	2.0	2.0	1.9	4.0	3.1	3.1	4.8	4.6	4.0	5.7	4.3	3.2	5.7																							
12-Nov	2.1	3.0	Z	5.7	5.2	3.3	4.0	4.1	1.6	2.7	2.6	1.6	3.2	0.8	1.1	2.5	3.6	2.6	1.2	1.3	1.1	1.0	0.1	3.5	2.5	5.7																							
13-Nov	3.0	0.7	0.5	Z	1.7	2.1	8.9	6.0	3.2	2.0	2.1	1.5	0.6	0.5	0.9	0.8	1.8	1.0	1.2	0.2	0.5	1.0	0.4	0.8	1.8	8.9																							
14-Nov	0.7	0.7	1.5	1.9	Z	1.1	1.0	3.0	3.6	7.1	5.8	4.3	1.9	3.3	3.9	5.5	2.7	2.6	1.6	2.7	3.1	0.4	0.9	2.1	2.7	7.1																							
15-Nov	1.5	5.6	1.5	2.8	3.8	Z	4.7	6.3	6.0	9.8	3.6	2.3	2.6	1.1	0.7	0.6	2.6	5.2	1.4	0.8	0.6	0.5	1.9	1.5	2.9	9.8																							
16-Nov	Z	1.2	0.3	0.4	0.5	1.2	0.9	1.1	1.8	1.5	1.3	1.4	2.0	2.0	1.4	1.8	1.7	2.0	2.1	3.6	3.4	3.0	6.1	10.7	2.2	10.7																							
17-Nov	5.6	Z	6.4	4.8	2.3	4.1	6.4	8.0	10.8	6.0	2.9	2.3	3.2	2.7	9.7	2.4	6.1	2.1	0.8	2.1	2.0	3.2	0.2	0.5	4.1	10.8																							
18-Nov	0.4	0.4	Z	1.9	1.4	0.5	0.6	0.9	0.5	0.6	0.6	0.7	1.7	1.9	2.0	6.3	17.1	14.7	10.5	6.6	6.4	5.9	3.5	3.7	3.9	17.1																							
19-Nov	5.5	6.4	3.5	Z	4.4	3.5	3.1	2.7	1.5	4.4	4.7	3.6	2.8	2.4	3.0	5.8	5.3	6.8	4.6	5.6	5.8	1.2	0.4	0.5	3.8	6.8																							
20-Nov	0.1	0.0	0.0	0.0	Z	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.2	0.2	0.7	1.3	2.2	1.4	0.3	6.8	0.9	1.8	0.7	6.8																							
21-Nov	1.0	0.6	0.9	2.7	1.3	Z	1.2	1.4	3.2	2.9	1.2	0.8	1.1	1.4	2.0	2.8	1.7	1.8	0.9	0.7	0.5	0.7	0.6	0.5	1.4	3.2																							
22-Nov	Z	0.0	0.0	0.0	0.2	0.4	0.1	0.5	0.2	0.6	0.8	0.4	0.3	0.5	0.8	0.2	2.1	1.9	4.6	2.2	2.2	0.9	0.8	0.4	0.9	4.6																							
23-Nov	1.4	Z	1.3	2.2	2.2	1.6	2.0	2.8	2.0	1.6	1.6	2.2	2.9	2.5	2.8	3.7	4.0	4.5	5.3	5.4	5.1	5.1	4.9	4.6	3.1	5.4																							
24-Nov	4.9	3.9	Z	2.3	2.5	3.0	3.5	4.6	4.5	6.0	6.1	3.3	2.9	2.3	1.2	2.3	6.9	3.5	3.2	2.8	3.3	3.3	2.4	3.6	3.6	6.9																							
25-Nov	5.9	5.3	4.6	Z	0.9	0.7	0.1	1.0	1.5	1.8	1.3	0.2	0.0	0.1	0.1	1.0	0.1	0.3	1.5	2.0	1.1	4.2	3.3	1.4	1.7	5.9																							
26-Nov	0.8	0.9	1.0	4.6	Z	1.0	2.2	4.1	2.3	2.0	2.6	0.8	0.4	1.1	1.2	0.9	0.5	0.9	2.1	1.3	2.8	3.3	3.2	1.1	1.8	4.6																							
27-Nov	2.3	3.2	1.5	1.7	2.5	Z	1.3	1.9	1.5	2.0	1.5	1.1	1.5	1.5	2.3	3.0	4.7	8.5	5.3	2.7	1.0	0.7	1.2	0.8	2.3	8.5																							
28-Nov	Z	4.4	2.8	5.1	4.9	6.6	3.7	6.3	4.0	2.3	3.3	0.8	0.8	1.2	2.3	6.2	7.3	4.3	4.9	2.2	0.8	0.9	3.3	1.7	3.5	7.3																							
29-Nov	0.3	Z	0.2	0.1	0.1	0.2	0.3	6.4	5.1	0.2	0.5	0.3	0.2	0.2	0.2	0.3	0.3	0.5	0.4	0.4	0.3	0.3	0.4	0.5	0.8	6.4																							
30-Nov	0.2	0.2	Z	0.1	0.1	0.7	0.6	0.4	0.7	1.1	0.8	0.9	0.6	0.7	1.4	1.9	5.4	1.7	0.8	0.8	1.1	2.8	1.5	1.8	1.1	5.4																							
																								1.9	1.9	1.4	1.9	2.1	1.6	2.3	2.7	2.3	2.3	2.0	1.3	1.5	1.5	1.8	2.1	3.0	2.9	2.5	2.3	2.2	2.1	1.9	2.1	Diurnal Average	
																								5.9	6.4	6.4	5.7	5.3	6.6	8.9	8.0	10.8	9.8	6.1	4.3	4.3	4.1	9.7	6.3	17.1	14.7	10.5	6.6	6.4	6.8	6.1	10.7	Diurnal Maximum	
Z - zerospan C - Calibration																																																	
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 159 ppb																																																	



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb**  
**Blackgold - November 2023**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Blackgold - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	685	100.00	100.00
21 - 40	0	0.00	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Blackgold - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 20	11	29	38	33	20	11	7	22	37	73	96	75	69	107	44	13	685
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	11	29	38	33	20	11	7	22	37	73	96	75	69	107	44	13	685

Total Number of Valid Hours: 685

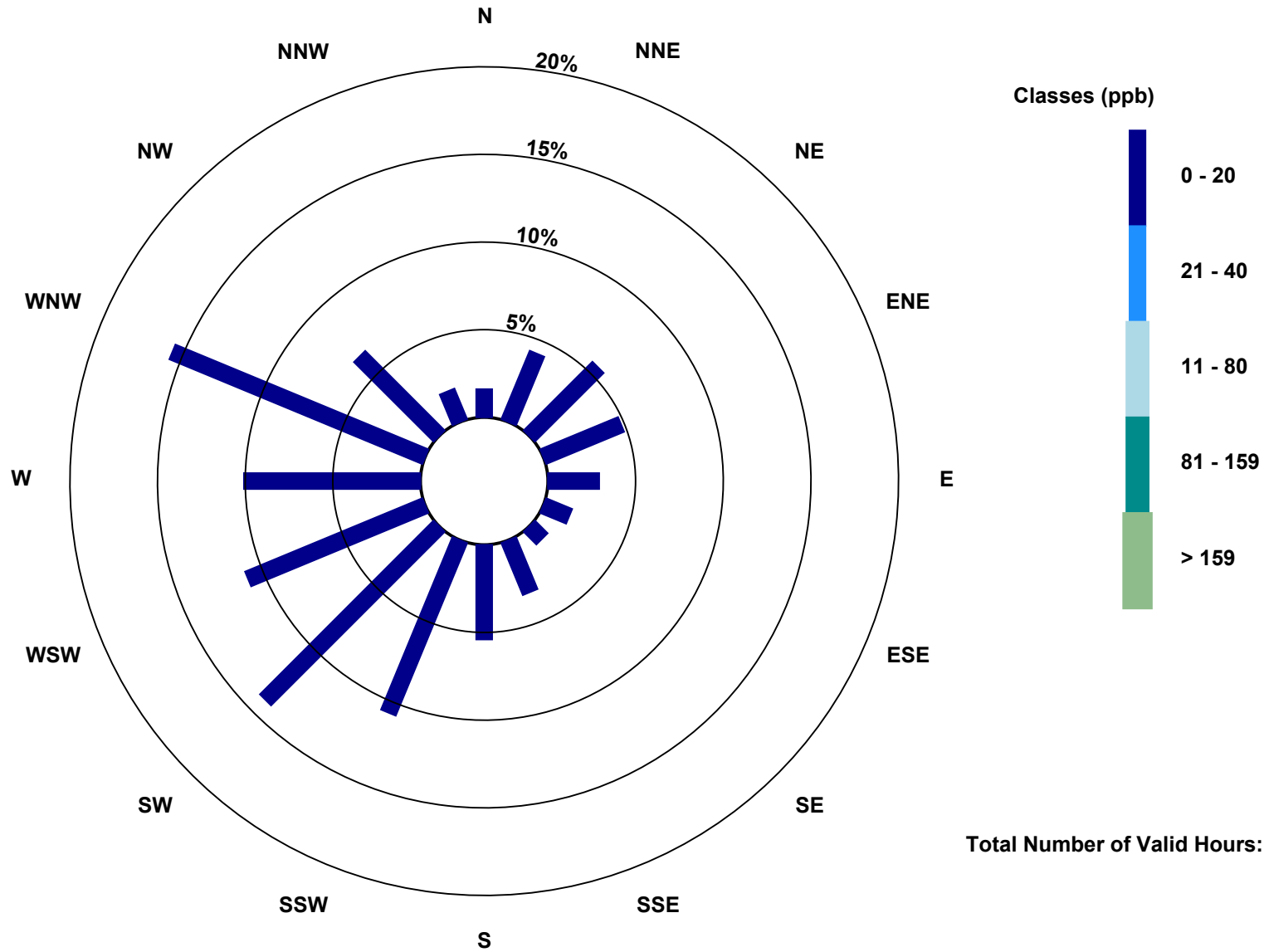
Total Number of Hours: 720

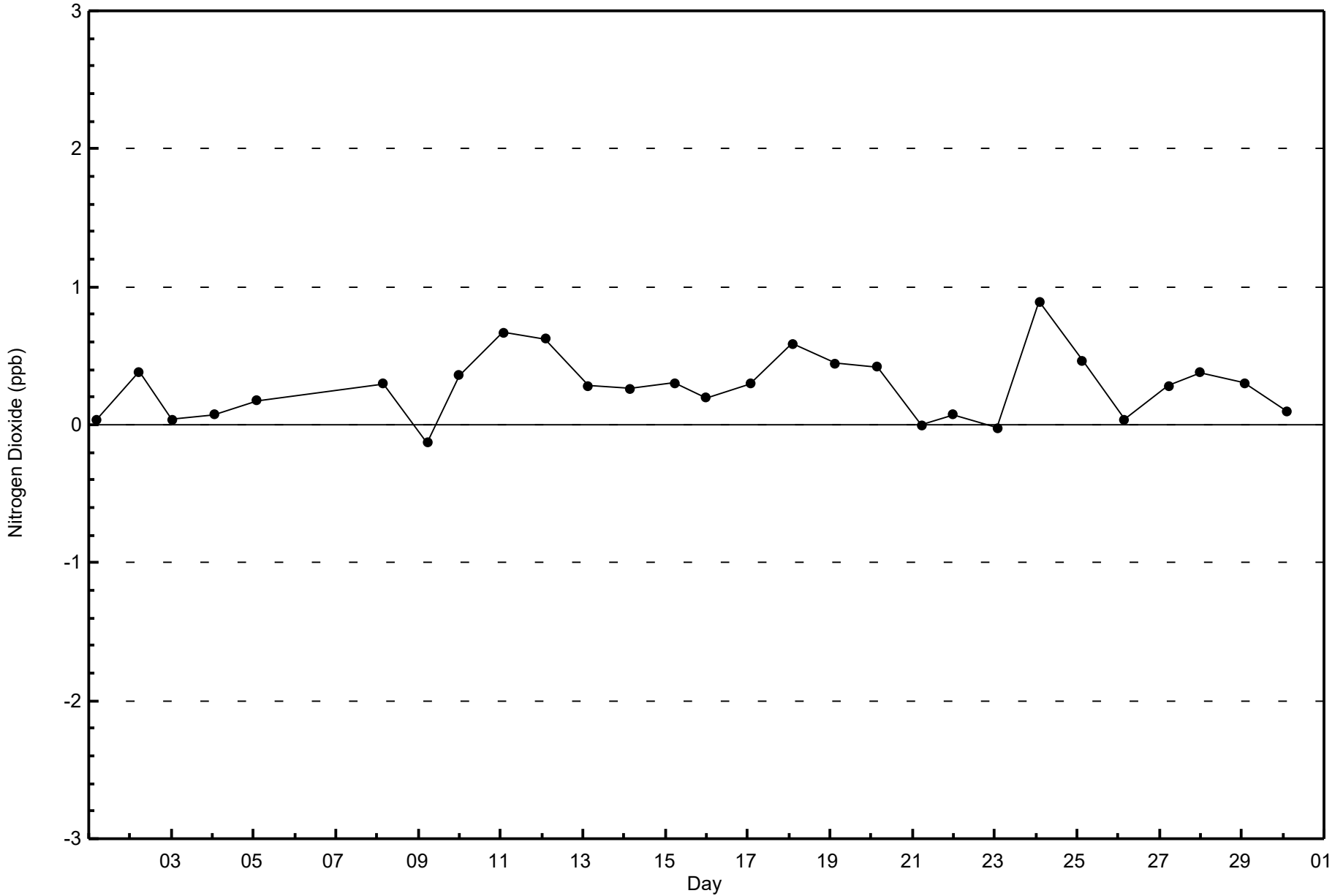




Wood Buffalo Environmental Association  
Wind Rose Nov 2023

Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Blackgold

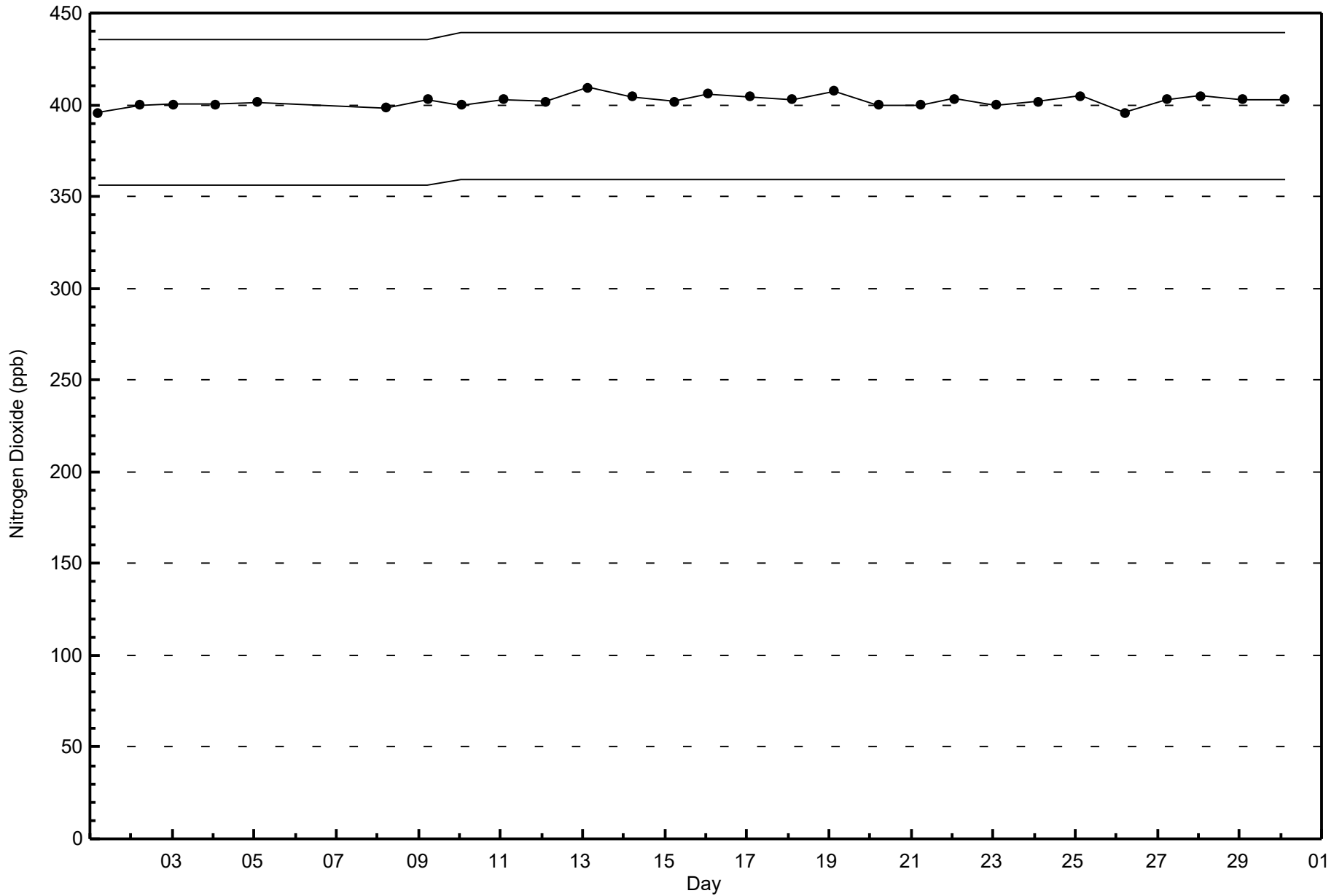






Wood Buffalo Environmental Association  
Span Responses

Nitrogen Dioxide (NO<sub>2</sub>) - ppb  
Blackgold - November 2023





**Wood Buffalo Environmental Association**  
**Summary of Hour Averages**

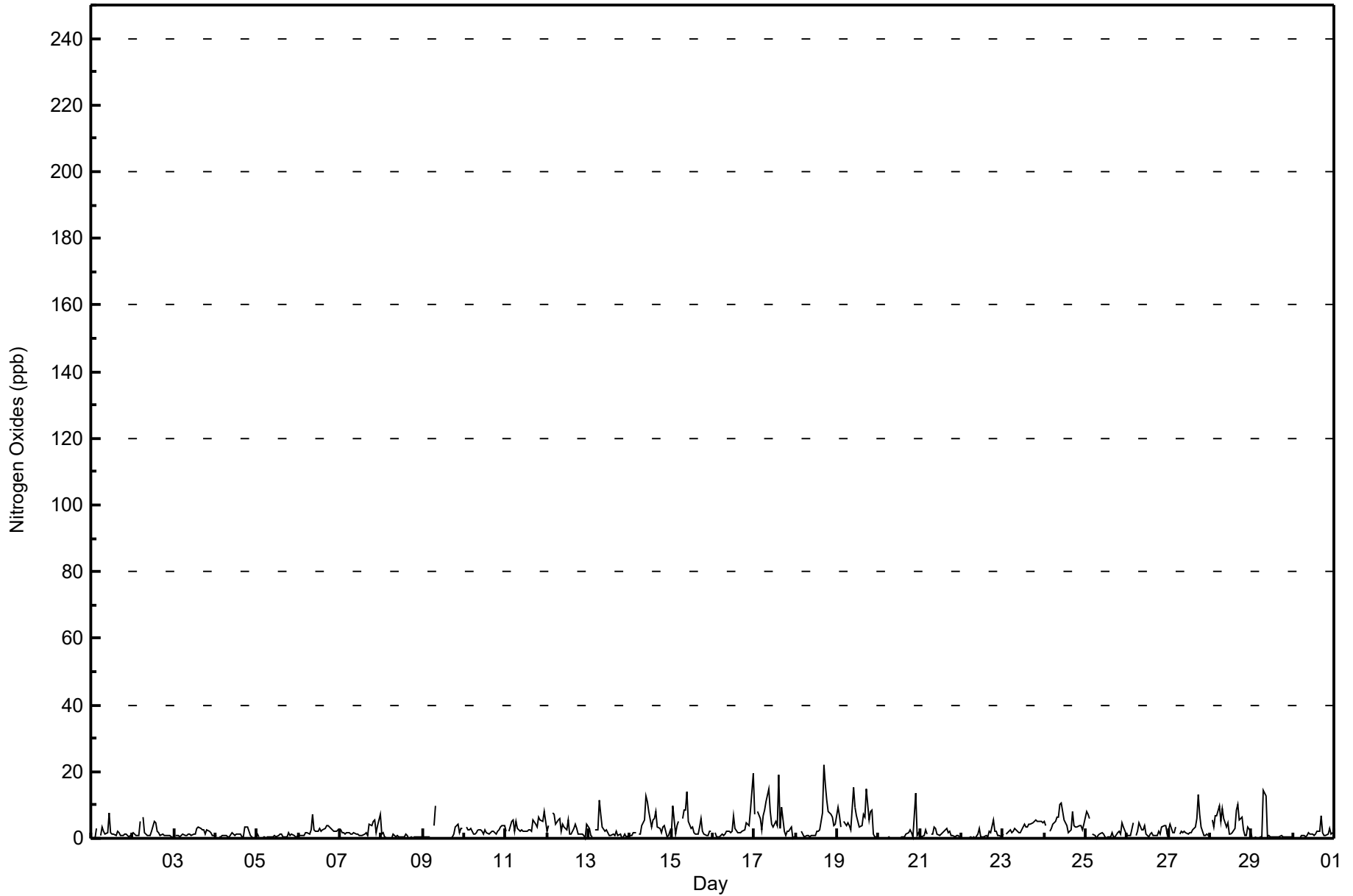
**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Blackgold - November 2023**

Maximum Value: 21.8 ppb on Nov 18 17:00      Maximum Daily Average: 5.9 ppb on Nov 19																				Hours in Service: 720 Hours of Data: 685 Hours of Missing Data: 35 Hours of Calibration: 35 Percent Operational Time: 100.0						
Minimum Value: 0.0 ppb on Nov 8 04:00      Minimum Daily Average: 0.6 ppb on Nov 8 Maximum Diurnal Average: 3.8 ppb at hour 17      Minimum Diurnal Average: 1.6 ppb at hour 3 Monthly Average: 2.64 ppb      Percentiles: P <sub>1</sub> = 0.0 P <sub>10</sub> = 0.4 Q <sub>1</sub> = 0.8 Median = 1.7 Q <sub>3</sub> = 3.5 P <sub>90</sub> = 6.0 P <sub>99</sub> = 14.6																										
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	0.2	0.0	0.1	3.0	Z	0.7	3.3	2.3	1.4	1.8	7.8	1.7	1.3	1.3	0.7	2.1	1.7	0.9	0.8	1.2	1.5	0.6	0.6	1.3	1.6	7.8
2-Nov	1.9	1.3	0.8	0.9	5.1	Z	6.5	1.8	0.7	0.9	0.9	1.9	5.0	4.5	1.9	1.6	1.0	1.2	0.9	1.0	0.9	0.7	0.5	0.4	1.8	6.5
3-Nov	Z	0.9	0.8	0.6	0.6	1.4	0.9	0.8	1.1	1.4	1.0	1.3	1.4	3.0	3.3	2.9	2.7	2.4	1.3	2.7	2.0	1.8	1.0	0.8	1.6	3.3
4-Nov	0.8	Z	0.5	0.5	0.9	0.7	0.7	0.5	0.5	1.9	1.1	0.7	1.4	1.4	1.2	0.3	0.6	3.6	3.3	2.2	1.0	0.5	0.1	0.2	1.1	3.6
5-Nov	1.2	0.3	Z	0.4	0.4	0.2	0.6	0.5	0.5	0.5	0.7	0.4	0.7	1.3	1.2	0.5	0.3	0.6	1.5	0.9	1.5	0.8	0.3	0.4	0.7	1.5
6-Nov	1.2	0.9	1.0	0.7	1.8	1.9	1.3	2.6	7.3	2.5	2.2	2.2	3.0	2.1	2.7	3.0	3.8	4.0	3.5	2.9	2.0	1.9	2.2	2.3	2.5	7.3
7-Nov	2.5	1.9	1.7	1.5	1.6	1.7	1.5	1.3	1.9	1.4	1.1	1.0	0.9	1.0	1.1	1.8	0.8	4.1	3.8	5.1	5.7	1.5	3.6	7.3	2.3	7.3
8-Nov	1.1	1.7	0.4	0.0	Z	0.1	0.2	1.3	0.6	0.8	0.6	0.3	0.4	0.4	1.1	0.9	0.2	0.5	0.1	0.3	0.6	0.4	0.4	0.6	0.6	1.7
9-Nov	0.4	0.5	0.3	0.3	0.5	Z	3.8	9.9	C	C	C	C	C	C	C	0.1	0.2	0.4	1.3	3.5	4.1	1.6	3.0	2.8	--	9.9
10-Nov	Z	3.3	2.4	2.7	2.9	1.4	1.3	1.6	2.4	2.5	2.2	1.4	2.5	1.7	1.3	1.6	2.0	2.0	1.4	2.1	2.3	3.3	3.9	4.0	2.3	4.0
11-Nov	2.2	Z	2.1	5.1	5.4	2.3	5.1	3.1	2.2	2.7	2.1	2.1	2.2	2.7	2.6	2.2	5.5	4.0	3.5	6.3	5.6	4.9	7.9	5.2	3.8	7.9
12-Nov	2.1	3.6	Z	7.8	7.2	4.2	5.5	5.7	2.1	4.1	3.6	2.4	5.4	1.3	1.4	3.1	4.4	2.8	1.2	1.4	1.4	1.1	0.1	4.2	3.3	7.8
13-Nov	3.0	0.7	0.5	Z	2.4	2.6	11.3	7.2	3.4	2.2	2.4	1.7	0.7	0.7	1.1	0.9	2.2	1.0	1.4	0.2	0.5	1.3	0.4	0.8	2.1	11.3
14-Nov	0.7	0.7	1.5	1.9	Z	1.3	1.2	3.7	5.3	12.8	10.9	7.9	3.3	5.6	6.0	7.9	3.4	2.9	1.9	3.4	3.8	0.4	0.9	2.1	3.9	12.8
15-Nov	1.5	9.5	1.5	3.8	5.2	Z	6.0	8.7	8.4	13.9	5.1	2.8	3.3	1.5	1.4	1.2	3.5	5.9	2.1	1.2	1.0	0.7	2.2	1.9	4.0	13.9
16-Nov	Z	1.5	0.4	0.5	0.6	1.4	1.0	1.2	2.1	1.9	1.8	2.0	6.6	2.8	1.7	1.9	1.9	2.1	2.3	4.6	4.3	3.7	8.3	19.5	3.2	19.5
17-Nov	7.1	Z	8.0	6.0	2.7	6.8	8.6	10.9	14.7	8.3	4.3	3.6	5.0	3.8	19.2	2.9	9.4	2.2	0.8	2.3	2.0	3.4	0.2	0.5	5.8	19.2
18-Nov	0.4	0.4	Z	1.9	1.4	0.5	0.6	0.9	0.5	0.7	0.8	0.8	2.0	2.3	2.5	7.5	21.8	16.0	11.6	7.9	7.0	6.4	3.8	4.3	4.4	21.8
19-Nov	9.3	6.6	3.5	Z	5.3	3.8	4.8	3.7	2.5	15.2	9.3	6.7	5.0	3.5	3.9	7.3	6.5	15.0	5.5	7.9	8.4	1.3	0.4	0.6	5.9	15.2
20-Nov	0.1	0.0	0.0	0.0	Z	0.0	0.3	0.0	0.1	0.0	0.1	0.2	0.2	0.4	0.3	0.4	1.2	1.7	2.6	1.5	0.3	13.6	0.9	1.8	1.1	13.6
21-Nov	1.0	0.6	0.9	2.7	1.3	Z	1.2	1.4	3.5	3.1	1.3	0.8	1.3	1.6	2.2	3.0	1.7	2.2	1.0	0.7	0.5	0.7	0.7	0.5	1.5	3.5
22-Nov	Z	0.0	0.0	0.0	0.2	0.5	0.1	0.5	0.2	1.3	3.0	0.5	0.5	0.6	1.0	0.2	2.1	1.9	5.4	2.2	2.2	0.9	0.8	0.4	1.1	5.4
23-Nov	1.4	Z	1.3	2.2	2.4	1.6	2.0	2.8	2.0	1.7	1.8	2.6	4.0	3.5	3.6	4.1	4.1	4.5	5.3	5.4	5.1	5.1	4.9	4.6	3.3	5.4
24-Nov	5.1	4.0	Z	2.3	2.8	4.0	4.9	6.5	6.2	10.1	10.8	5.6	4.8	3.6	1.6	2.6	8.1	3.7	3.5	3.2	3.9	3.9	2.6	4.4	4.7	10.8
25-Nov	8.0	7.1	5.8	Z	1.1	0.8	0.1	1.0	1.5	1.9	1.5	0.4	0.0	0.3	0.3	1.5	0.2	0.4	1.8	2.2	1.2	4.8	3.5	1.5	2.0	8.0
26-Nov	0.8	0.9	1.0	4.6	Z	1.0	2.2	4.9	2.4	2.5	3.7	1.1	0.5	1.4	1.7	1.0	0.7	1.0	2.3	1.4	3.2	3.9	3.6	1.3	2.0	4.9
27-Nov	2.6	4.3	1.6	1.7	3.2	Z	1.3	1.9	1.5	2.1	1.5	1.2	1.7	1.7	2.7	3.5	6.0	13.3	7.2	3.3	1.0	0.8	1.3	0.9	2.9	13.3
28-Nov	Z	5.7	3.4	6.8	7.0	9.8	5.3	8.9	5.8	3.2	4.8	1.2	1.3	1.8	3.0	8.6	10.2	5.4	6.3	2.4	0.8	1.0	3.6	1.9	4.7	10.2
29-Nov	0.3	Z	0.3	0.1	0.1	0.5	0.5	14.6	12.5	0.3	1.0	0.5	0.4	0.3	0.3	0.5	0.4	0.7	0.6	0.5	0.4	0.3	0.4	0.5	1.6	14.6
30-Nov	0.2	0.2	Z	0.1	0.2	0.9	0.7	0.5	0.7	1.5	1.3	1.2	0.9	1.1	2.0	2.1	6.6	1.8	0.8	0.8	1.1	3.0	1.5	1.9	1.4	6.6
																								Diurnal Average		
																								Diurnal Maximum		
2.2 2.3 1.6 2.2 2.5 2.0 2.8 3.7 3.2 3.6 3.1 1.9 2.3 2.0 2.5 2.6 3.8 3.6 2.8 2.7 2.5 2.5 2.1 2.6																										
9.3 9.5 8.0 7.8 7.2 9.8 11.3 14.6 14.7 15.2 10.9 7.9 6.6 5.6 19.2 8.6 21.8 16.0 11.6 7.9 8.4 13.6 8.3 19.5																										
Z - zerospan      C - Calibration																										



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb**  
**Blackgold - November 2023**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Blackgold - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	684	99.85	99.85
21 - 40	1	0.15	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 685

Total Number of Hours: 720



**Wood Buffalo Environmental Association  
Frequency Distribution**

**Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Blackgold - November 2023**

<b>Concentration Ranges (ppb)</b>	<b>Wind Direction</b>																<b>Totals</b>
	<b>N</b>	<b>NNE</b>	<b>NE</b>	<b>ENE</b>	<b>E</b>	<b>ESE</b>	<b>SE</b>	<b>SSE</b>	<b>S</b>	<b>SSW</b>	<b>SW</b>	<b>WSW</b>	<b>W</b>	<b>WNW</b>	<b>NW</b>	<b>NNW</b>	
0 - 20	11	29	38	33	19	11	7	22	37	73	96	75	69	107	44	13	684
21 - 40	0	0	0	0	1	0	0	0	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
<b>Totals</b>	11	29	38	33	20	11	7	22	37	73	96	75	69	107	44	13	685

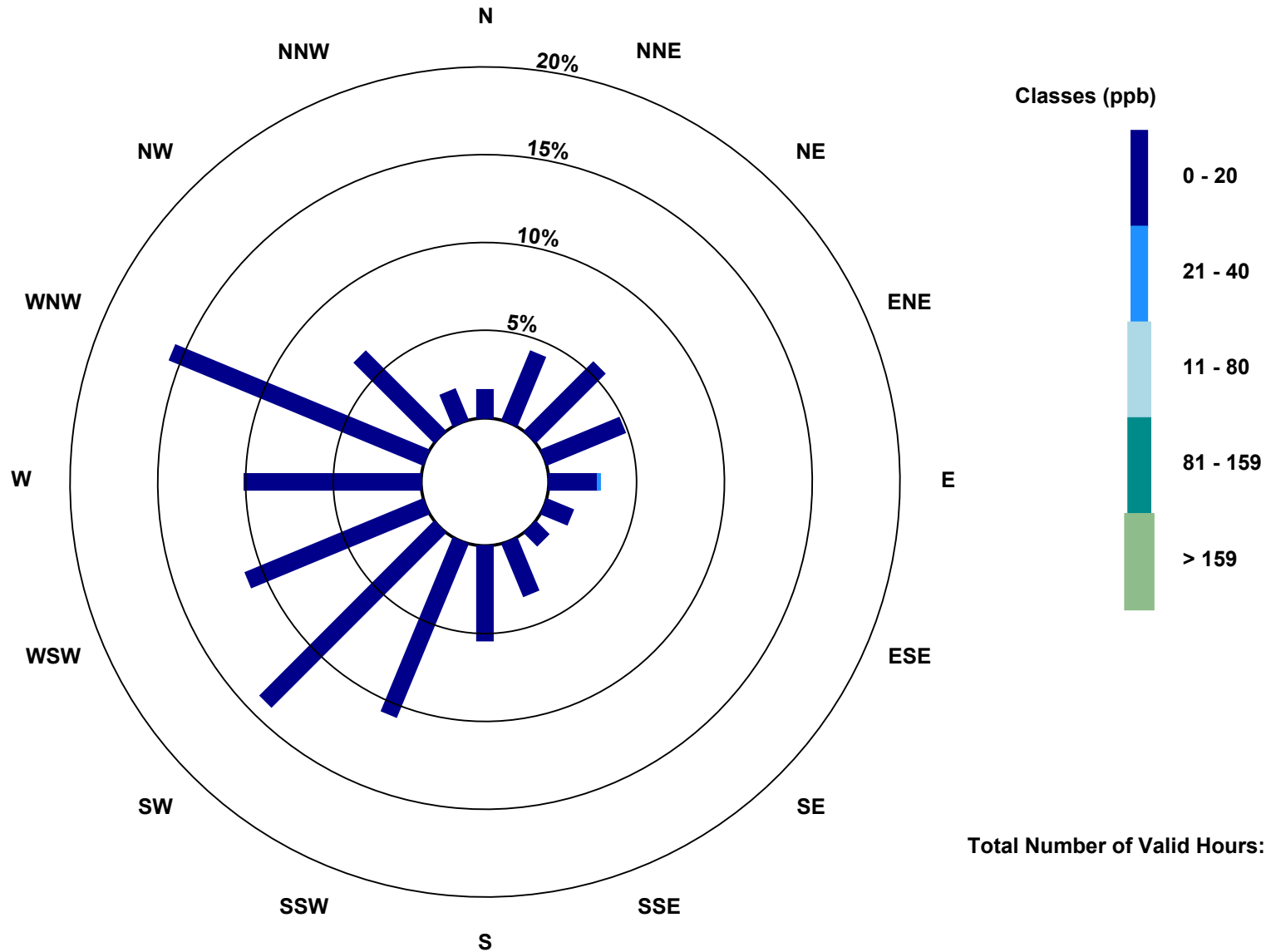
Total Number of Valid Hours: 685

Total Number of Hours: 720



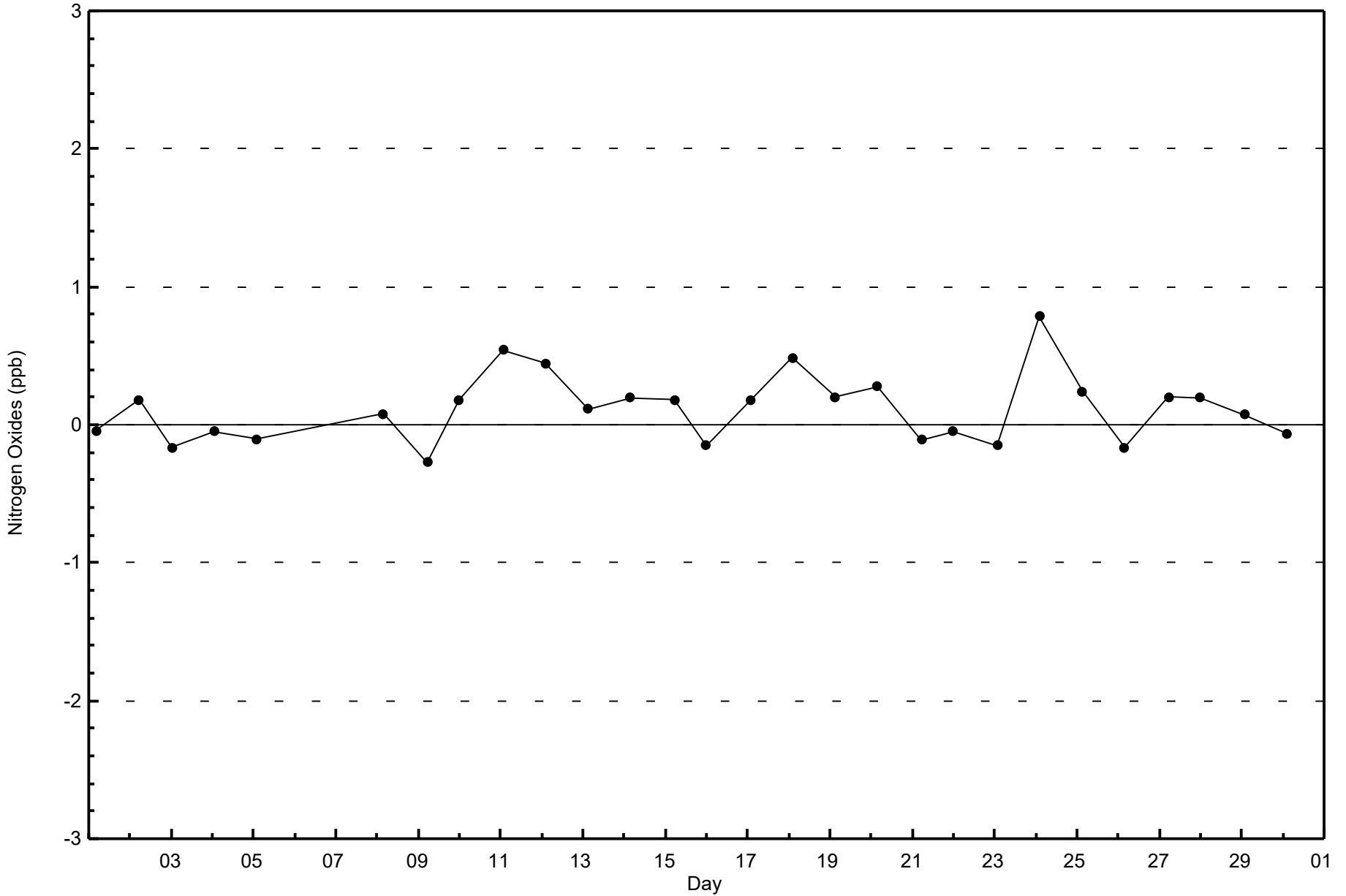
Wood Buffalo Environmental Association  
Wind Rose Nov 2023

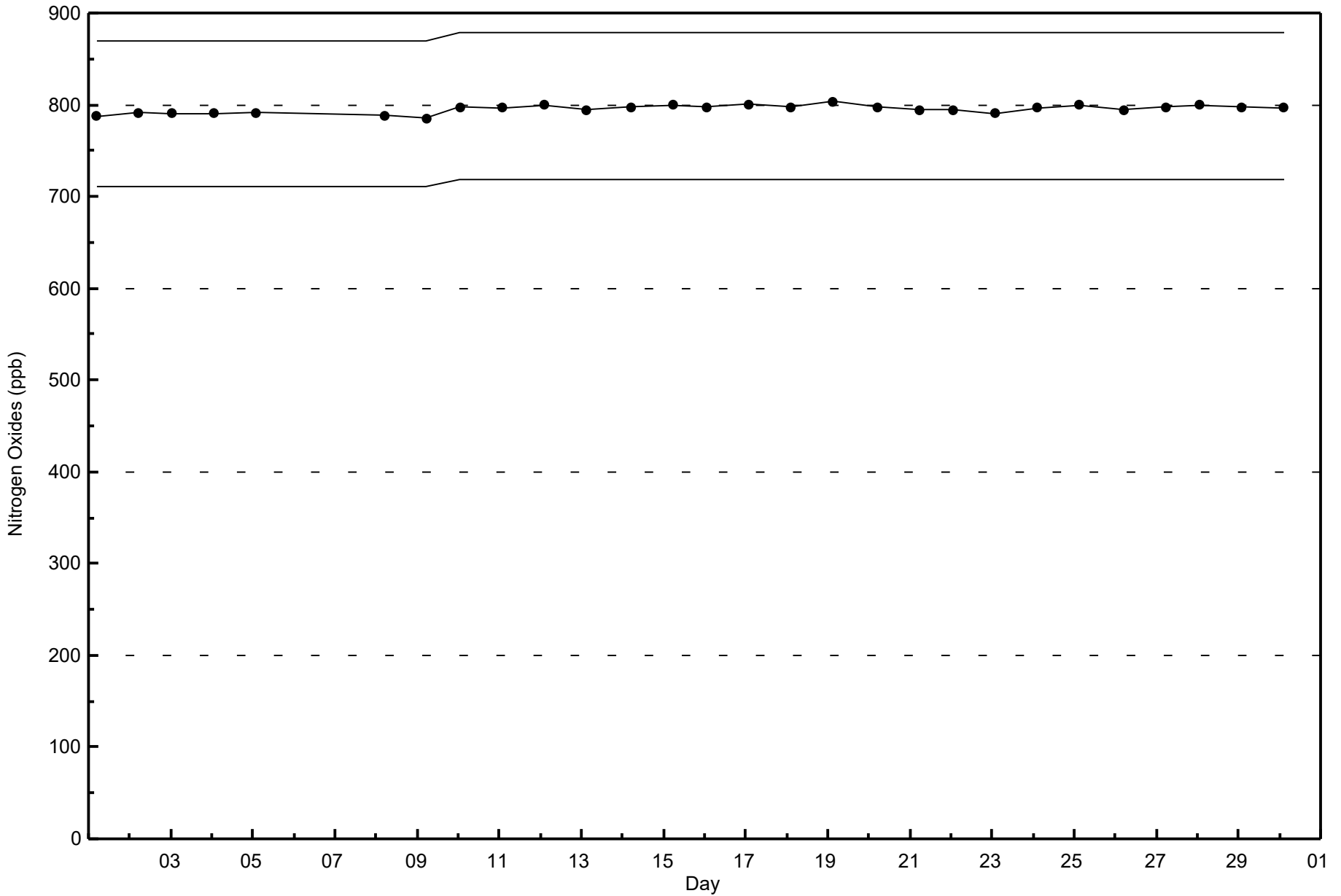
Nitrogen Oxides (NO<sub>x</sub>) - ppb  
Blackgold



Total Number of Valid Hours: 685









**Wood Buffalo Environmental Association**  
**Summary of Hour Averages**

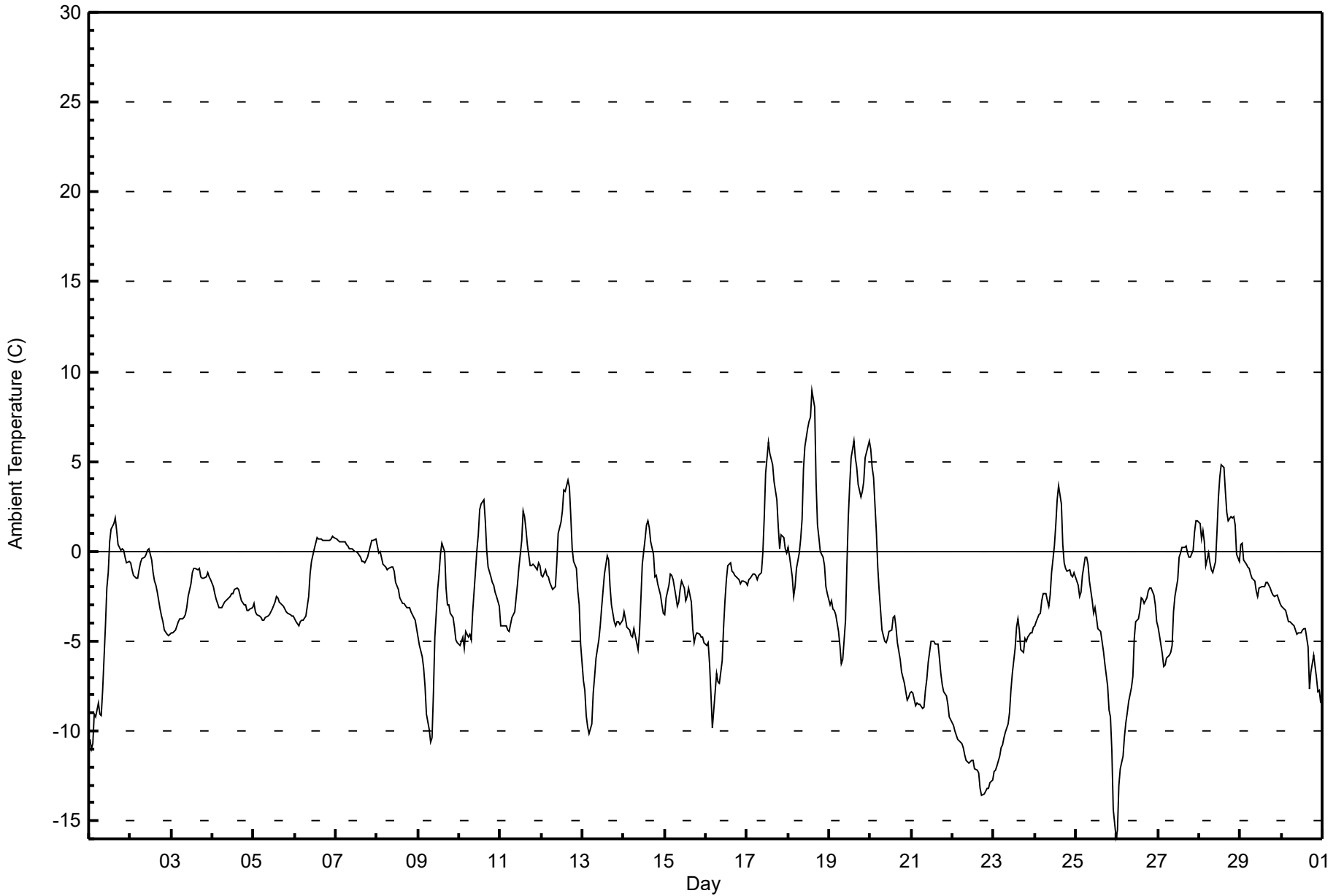
**Ambient Temperature (AT) - C**  
**Blackgold - November 2023**

Maximum Value: 8.9 C on Nov 18 15:00		Maximum Daily Average: 1.9 C on Nov 18		Hours in Service: 720																						
Minimum Value: -15.9 C on Nov 26 00:00		Minimum Daily Average: -11.9 C on Nov 22		Hours of Data: 720																						
Maximum Diurnal Average: -0.3 C at hour 15		Minimum Diurnal Average: -4.4 C at hour 5		Hours of Missing Data: 0																						
Monthly Average: -2.88 C		Percentiles: P <sub>1</sub> = -13.2 P <sub>10</sub> = -8.4 Q <sub>1</sub> = -4.6 Median = -2.5 Q <sub>3</sub> = -0.6 P <sub>90</sub> = 1.2 P <sub>99</sub> = 6.0		Hours of Calibration: 0																						
				Percent Operational Time: 100.0																						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	-10.5	-11.0	-10.7	-9.1	-9.2	-8.5	-9.1	-9.2	-7.8	-4.2	-2.0	-1.2	0.5	1.2	1.5	1.9	1.2	0.4	0.0	0.1	0.1	-0.3	-0.7	-0.5	-3.6	1.9
2-Nov	-0.6	-1.0	-1.3	-1.5	-1.5	-1.0	-0.6	-0.4	-0.3	-0.2	0.1	0.1	-0.5	-1.2	-1.7	-1.9	-2.3	-3.2	-3.6	-3.9	-4.4	-4.6	-4.7	-4.6	-1.9	0.1
3-Nov	-4.6	-4.5	-4.4	-4.1	-3.9	-3.8	-3.7	-3.7	-3.5	-3.1	-2.5	-1.8	-1.2	-0.9	-1.0	-1.0	-1.0	-1.4	-1.5	-1.5	-1.4	-1.2	-1.4	-1.6	-2.4	-0.9
4-Nov	-1.9	-2.4	-2.7	-2.9	-3.1	-3.1	-3.0	-2.8	-2.7	-2.6	-2.5	-2.3	-2.3	-2.1	-2.0	-2.1	-2.4	-2.8	-3.0	-3.0	-3.3	-3.3	-3.2	-3.1	-2.7	-1.9
5-Nov	-2.9	-3.4	-3.5	-3.6	-3.7	-3.8	-3.8	-3.7	-3.6	-3.5	-3.3	-3.2	-2.9	-2.5	-2.6	-2.8	-2.9	-3.1	-3.2	-3.4	-3.4	-3.5	-3.6	-3.6	-3.3	-2.5
6-Nov	-3.7	-3.9	-4.2	-3.9	-3.8	-3.8	-3.6	-3.1	-2.5	-1.3	-0.5	0.1	0.5	0.7	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.8	0.8	-1.1	0.8
7-Nov	0.7	0.6	0.5	0.5	0.5	0.5	0.4	0.3	0.1	0.1	0.1	0.0	0.0	-0.1	-0.3	-0.5	-0.6	-0.6	-0.3	0.0	0.3	0.6	0.6	0.7	0.2	0.7
8-Nov	0.3	-0.1	0.0	-0.7	-0.8	-0.8	-1.1	-1.0	-0.9	-0.9	-1.1	-1.7	-2.1	-2.6	-2.7	-2.9	-2.9	-3.1	-3.1	-3.1	-3.4	-3.7	-3.8	-4.3	-1.9	0.3
9-Nov	-4.8	-5.3	-5.9	-6.5	-7.5	-9.0	-9.9	-10.6	-10.4	-7.9	-4.8	-2.2	-1.3	-0.1	0.4	0.0	-2.1	-3.0	-3.0	-3.5	-3.7	-4.2	-4.9	-5.1	-4.8	0.4
10-Nov	-5.3	-5.0	-4.8	-5.4	-4.4	-4.8	-4.6	-4.9	-3.4	-1.1	0.0	0.9	2.3	2.6	2.8	1.7	0.1	-0.9	-1.4	-1.7	-1.9	-2.3	-2.5	-3.1	-2.0	2.8
11-Nov	-4.2	-4.2	-4.2	-4.2	-4.4	-4.4	-4.1	-3.7	-3.4	-2.6	-1.8	-0.8	0.6	2.2	1.9	1.3	0.4	-0.8	-0.8	-0.7	-0.8	-1.1	-0.6	-0.8	-1.7	2.2
12-Nov	-1.3	-1.4	-1.1	-1.3	-1.4	-1.7	-2.1	-2.1	-2.0	-0.6	1.0	1.6	2.2	3.4	3.3	4.0	3.6	1.9	0.1	-0.6	-1.0	-2.2	-3.0	-5.1	-0.2	4.0
13-Nov	-7.2	-7.7	-9.1	-9.8	-10.2	-9.6	-7.9	-7.0	-5.9	-4.9	-4.2	-3.2	-2.2	-1.2	-0.2	-0.5	-2.0	-2.9	-3.9	-4.1	-4.0	-3.9	-4.0	-3.8	-5.0	-0.2
14-Nov	-3.4	-3.8	-4.2	-4.4	-4.7	-4.7	-4.3	-4.7	-5.5	-4.5	-2.6	-0.7	0.7	1.5	1.7	1.3	0.5	-0.2	-1.4	-1.3	-1.8	-2.4	-3.0	-3.4	-2.3	1.7
15-Nov	-3.5	-2.6	-1.9	-1.2	-1.3	-1.6	-2.5	-3.0	-2.9	-2.2	-1.7	-2.0	-2.8	-2.5	-1.1	-2.8	-4.3	-5.1	-4.7	-4.5	-4.6	-4.8	-4.7	-5.1	-3.1	-1.2
16-Nov	-5.3	-5.1	-6.3	-7.9	-9.8	-7.8	-6.8	-7.3	-7.4	-6.1	-4.3	-2.7	-1.6	-0.8	-0.7	-1.1	-1.2	-1.4	-1.5	-1.5	-1.8	-1.7	-1.6	-1.8	-3.9	-0.7
17-Nov	-1.9	-1.6	-1.5	-1.3	-1.3	-1.3	-1.5	-1.4	-1.1	-0.1	1.8	4.4	6.1	5.4	5.2	4.8	3.9	2.9	1.4	0.1	1.0	0.8	0.1	-0.1	1.0	6.1
18-Nov	0.2	-0.3	-1.4	-2.5	-2.0	-1.0	-0.1	0.7	1.8	4.6	5.8	6.9	7.3	7.4	8.9	8.0	3.8	1.5	0.8	0.0	-0.3	-0.8	-1.9	-2.4	1.9	8.9
19-Nov	-3.0	-2.8	-3.2	-3.3	-3.5	-4.5	-5.3	-6.3	-6.0	-3.8	-0.7	1.9	3.7	5.2	6.1	5.2	4.7	3.7	3.0	3.3	3.9	5.2	5.5	6.1	0.6	6.1
20-Nov	5.6	4.7	4.1	1.1	-0.9	-2.2	-3.3	-4.4	-5.0	-5.1	-4.8	-4.5	-4.4	-3.7	-3.6	-4.2	-5.1	-6.0	-6.7	-7.0	-7.4	-8.3	-8.1	-7.9	-3.6	5.6
21-Nov	-7.8	-7.9	-8.6	-8.5	-8.5	-8.5	-8.7	-8.7	-7.8	-7.1	-6.2	-5.0	-5.0	-5.0	-5.1	-5.1	-6.0	-6.8	-7.4	-7.8	-8.0	-8.5	-9.2	-9.4	-7.4	-5.0
22-Nov	-9.7	-10.0	-10.3	-10.4	-10.6	-10.7	-10.9	-11.3	-11.7	-11.8	-11.7	-11.6	-11.6	-12.1	-12.2	-12.4	-13.2	-13.6	-13.5	-13.3	-13.2	-13.2	-12.9	-12.7	-11.9	-9.7
23-Nov	-12.2	-12.2	-12.0	-11.4	-10.9	-10.8	-10.4	-10.1	-9.6	-9.0	-7.7	-6.8	-5.4	-4.2	-3.7	-4.3	-5.5	-5.6	-4.9	-5.0	-4.8	-4.5	-4.5	-4.2	-7.5	-3.7
24-Nov	-4.2	-3.9	-3.5	-3.4	-2.8	-2.3	-2.4	-2.7	-3.1	-2.5	-1.2	0.3	1.5	2.9	3.6	2.6	0.4	-0.6	-0.9	-1.1	-1.0	-1.3	-1.4	-1.2	-1.2	3.6
25-Nov	-1.6	-1.9	-2.5	-2.3	-1.4	-0.3	-0.4	-0.7	-1.6	-2.7	-3.5	-3.2	-3.7	-4.3	-4.5	-5.0	-5.5	-6.3	-7.5	-8.8	-9.2	-11.1	-14.4	-15.9	-4.9	-0.3
26-Nov	-15.5	-13.0	-12.1	-11.4	-10.3	-9.5	-8.9	-8.4	-7.6	-6.9	-4.8	-3.9	-3.8	-3.3	-2.6	-2.7	-2.9	-2.6	-2.2	-2.1	-2.1	-2.4	-2.9	-3.9	-6.1	-2.1
27-Nov	-4.2	-4.7	-5.7	-6.4	-6.4	-6.0	-5.8	-5.6	-5.2	-3.4	-2.5	-1.5	-0.3	-0.1	0.2	0.2	0.3	-0.1	-0.3	-0.3	0.1	1.1	1.7	1.7	-2.2	1.7
28-Nov	1.6	0.7	1.2	0.5	-0.8	-0.1	-0.7	-1.0	-1.2	-0.6	1.1	3.0	4.1	4.8	4.7	3.3	2.1	1.7	1.9	1.9	1.9	1.5	-0.1	-0.5	1.3	4.8
29-Nov	0.3	0.5	-0.5	-0.7	-0.8	-0.9	-1.2	-1.5	-1.7	-2.2	-2.5	-2.1	-1.9	-1.9	-2.0	-1.7	-1.8	-2.1	-2.3	-2.4	-2.5	-2.4	-2.7	-2.9	-1.7	0.5
30-Nov	-3.0	-3.1	-3.3	-3.6	-3.9	-3.9	-4.1	-4.2	-4.4	-4.6	-4.6	-4.5	-4.4	-4.3	-4.3	-5.3	-7.6	-6.7	-6.3	-5.8	-7.0	-7.8	-7.7	-8.4	-5.1	-3.0
																								Diurnal Average		
																								Diurnal Maximum		



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Ambient Temperature (AT) - C**  
**Blackgold - November 2023**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C  
Blackgold - November 2023**

<b>Concentration Ranges (C)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
-50 - -20	0	0.00	0.00
-20 - 0	577	80.14	80.14
0 - 10	143	19.86	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 720

Total Number of Hours: 720



**Wood Buffalo Environmental Association**  
**Summary of Hour Averages**

**Relative Humidity (RH) - %**  
**Blackgold - November 2023**

Maximum Value: 100.0 % on Nov 3 22:00	Maximum Daily Average: 98.5 % on Nov 6	Hours in Service: 720
Minimum Value: 38.4 % on Nov 20 15:00	Minimum Daily Average: 49.7 % on Nov 20	Hours of Data: 713
Maximum Diurnal Average: 83.7 % at hour 5	Minimum Diurnal Average: 68.8 % at hour 5	Hours of Missing Data: 7
Monthly Average: 78.76 %	Percentiles: P <sub>1</sub> = 47.2 P <sub>10</sub> = 59.3 Q <sub>1</sub> = 70.7 Median = 79.9 Q <sub>3</sub> = 87.9 P <sub>90</sub> = 97.1 P <sub>99</sub> = 100.0	Hours of Calibration: 0
		Percent Operational Time: 99.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	89.6	89.1	89.7	90.5	90.5	91.1	90.1	90.4	88.4	81.8	76.7	73.1	64.5	62.4	61.0	58.1	60.8	64.8	67.1	69.8	73.0	77.7	82.6	80.9	77.6	91.1
2-Nov	80.1	81.8	83.5	84.6	85.2	83.7	83.0	84.3	88.4	87.8	85.7	82.2	82.2	86.5	86.3	83.2	82.5	82.9	82.1	82.4	83.1	84.7	85.5	85.8	84.1	88.4
3-Nov	85.9	86.1	86.3	85.9	85.2	85.2	85.6	85.3	85.0	84.6	83.7	81.9	80.3	79.9	84.3	87.3	89.0	95.6	98.2	99.3	99.8	100.0	100.0	OR	88.4	100.0
4-Nov	OR	100.0	99.6	99.7	99.3	99.2	99.4	99.8	99.8	100.0	100.0	100.0	98.5	97.0	96.3	96.4	96.1	96.7	97.2	95.7	95.9	96.5	97.2	97.8	98.2	100.0
5-Nov	99.3	99.1	98.7	98.4	98.2	98.0	98.0	98.2	98.1	98.1	98.0	97.5	96.7	95.6	95.1	95.6	96.6	97.1	97.5	97.7	97.7	97.7	97.8	97.7	97.6	99.3
6-Nov	97.6	97.4	97.4	97.5	97.4	97.4	97.6	98.6	99.3	100.0	OR	OR	99.4	97.9	97.7	98.2	98.5	99.8	100.0	OR	OR	OR	100.0	100.0	98.5	100.0
7-Nov	100.0	99.6	98.8	97.7	97.3	97.7	97.7	98.1	99.3	98.1	96.3	94.7	94.9	94.1	94.5	95.9	96.4	96.4	98.5	98.1	94.9	92.6	93.9	89.3	96.4	100.0
8-Nov	85.2	86.4	87.0	89.5	83.7	81.8	82.1	79.5	79.4	77.1	75.7	77.7	82.1	87.5	86.8	84.7	81.9	82.9	81.2	81.8	83.9	87.6	88.6	88.8	83.5	89.5
9-Nov	88.8	90.4	91.5	92.4	92.8	92.0	90.8	89.8	89.0	87.1	81.1	74.5	71.3	68.3	65.2	65.9	75.3	79.3	77.6	78.4	79.6	81.1	83.3	83.3	82.0	92.8
10-Nov	83.3	82.3	82.2	83.8	80.4	81.1	80.6	81.9	77.0	70.3	65.4	61.6	57.4	57.9	57.8	61.6	69.0	72.4	76.0	79.1	81.3	85.1	86.6	87.9	75.1	87.9
11-Nov	90.4	91.3	90.5	90.9	91.5	91.1	91.8	90.3	88.7	86.4	83.2	79.6	76.0	66.8	65.2	68.8	73.1	77.7	75.7	72.9	72.9	73.4	71.8	73.4	80.6	91.8
12-Nov	75.9	77.3	76.3	77.3	78.7	80.1	82.7	83.9	83.8	81.4	78.6	77.9	77.1	69.9	69.8	64.5	62.1	66.8	73.5	73.0	70.9	74.3	76.1	84.3	75.7	84.3
13-Nov	88.9	90.2	89.7	90.2	90.0	89.8	91.3	93.7	93.4	90.8	90.3	89.6	85.8	78.6	71.1	70.8	77.6	84.9	90.8	94.5	95.6	96.9	97.9	97.4	88.7	97.9
14-Nov	93.1	86.0	84.3	83.7	84.0	83.9	83.4	83.3	85.3	81.4	76.8	69.5	61.9	57.8	55.8	58.1	61.1	62.6	68.2	68.5	69.7	69.6	69.9	71.3	73.7	93.1
15-Nov	70.5	66.8	63.5	70.2	70.4	67.4	70.0	72.2	71.0	68.0	68.7	71.8	69.0	64.9	52.8	52.5	58.5	62.8	61.1	60.1	66.7	69.6	70.7	72.8	66.3	72.8
16-Nov	74.5	74.5	75.4	78.8	85.1	83.8	83.5	86.8	85.0	79.6	69.8	62.4	55.0	52.4	52.1	54.8	54.8	54.3	55.9	58.4	60.6	62.6	64.4	67.3	68.0	86.8
17-Nov	70.5	71.7	73.0	73.7	75.1	76.8	79.8	79.4	78.9	76.6	71.6	63.6	56.8	61.4	64.0	66.0	69.4	73.1	78.0	83.4	82.2	83.3	86.3	86.4	74.2	86.4
18-Nov	85.1	87.2	90.2	94.2	95.6	92.1	88.2	85.7	82.2	71.2	65.9	61.1	59.0	59.2	55.5	58.9	73.4	81.7	84.3	86.4	89.1	89.6	91.8	92.8	80.0	95.6
19-Nov	94.1	95.0	94.7	94.9	95.0	95.1	95.2	94.5	94.1	90.5	85.9	76.9	71.2	66.1	66.1	71.3	73.3	75.8	78.5	80.0	78.0	69.0	67.0	57.0	81.6	95.2
20-Nov	49.2	50.7	56.7	59.9	58.8	58.8	58.1	52.3	52.3	50.3	47.7	47.7	45.2	40.7	38.4	39.3	41.0	43.2	46.0	47.1	48.2	52.7	53.5	55.8	49.7	59.9
21-Nov	55.5	55.8	60.1	59.3	61.2	59.2	58.4	60.5	58.3	56.4	53.8	51.9	54.8	54.2	53.4	53.3	56.0	58.1	57.4	59.7	63.1	66.9	67.8	67.4	58.4	67.8
22-Nov	69.5	76.2	80.0	78.7	80.1	82.5	83.2	84.8	84.3	82.5	78.5	78.5	75.2	75.8	74.5	71.7	77.8	80.8	82.6	79.7	76.1	75.8	76.8	76.1	78.4	84.8
23-Nov	75.9	79.7	82.0	82.3	83.3	83.4	83.0	83.6	83.2	82.1	81.0	80.1	77.8	73.6	72.7	76.9	82.4	85.8	85.8	86.4	85.6	84.2	83.3	81.9	81.5	86.4
24-Nov	80.5	79.6	76.5	75.4	73.9	73.7	72.9	73.9	74.8	72.4	68.4	64.6	62.6	59.6	59.1	63.6	71.6	76.5	78.4	78.8	78.9	80.0	79.2	79.2	73.1	80.5
25-Nov	80.3	80.7	83.7	82.4	81.6	79.3	82.6	81.7	79.9	79.6	76.3	64.6	57.2	50.2	47.6	51.9	55.2	59.7	65.7	71.7	75.2	80.4	84.0	85.3	72.4	85.3
26-Nov	85.5	85.2	85.3	85.6	84.6	83.5	83.0	84.7	85.2	83.4	82.2	74.3	70.1	70.0	68.2	77.1	82.1	83.3	83.1	83.6	84.8	86.3	87.6	90.1	82.0	90.1
27-Nov	89.5	90.3	92.5	93.9	95.0	94.8	93.3	91.6	90.8	88.7	85.1	82.4	77.3	75.2	74.1	74.5	74.4	77.1	77.3	76.4	75.0	72.3	70.0	69.6	82.6	95.0
28-Nov	69.8	73.2	69.7	71.8	77.7	73.5	75.9	77.9	77.7	75.3	69.0	60.5	55.7	52.2	51.8	62.1	70.7	72.8	73.0	73.1	72.6	72.9	78.2	80.0	70.3	80.0
29-Nov	78.6	72.8	75.5	75.0	69.1	66.5	64.6	63.2	62.7	71.1	78.3	74.3	74.4	75.4	77.8	75.6	76.4	79.4	78.4	80.6	76.0	69.6	74.2	75.0	73.5	80.6
30-Nov	71.4	69.5	69.4	69.4	69.6	69.3	72.7	76.0	79.5	78.9	76.5	75.6	74.9	71.4	70.1	72.7	81.4	80.7	78.8	75.7	79.7	84.6	84.6	88.4	75.9	88.4

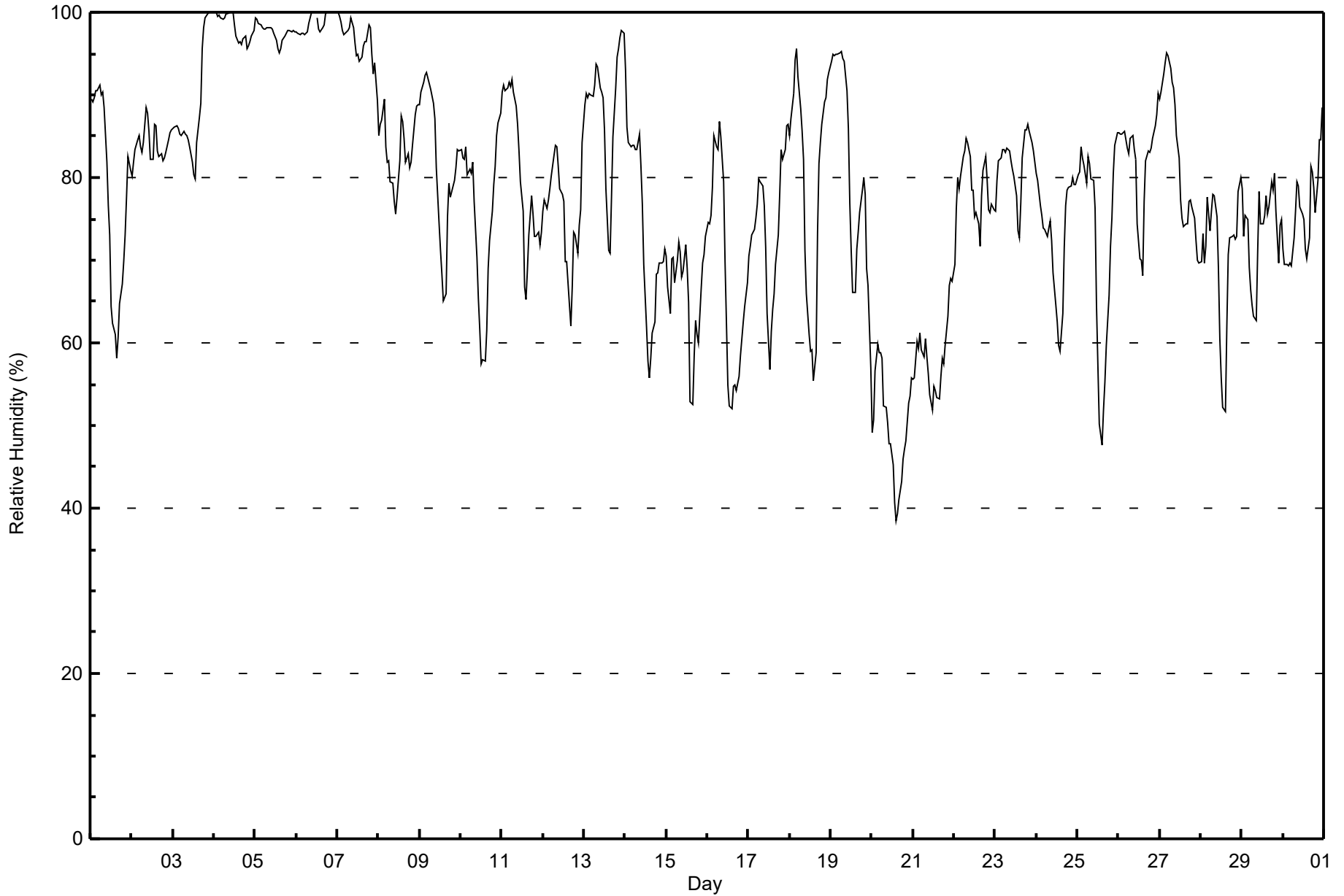
81.3	82.2	82.8	83.6	83.7	83.1	83.3	83.5	83.2	81.0	77.6	74.1	72.1	70.1	68.8	70.4	73.9	76.8	78.3	78.4	79.0	79.9	81.7	81.5	Diurnal Average	
100.0	100.0	99.6	99.7	99.3	99.2	99.4	99.8	99.8	100.0	100.0	100.0	99.4	97.9	97.7	98.2	98.5	99.8	100.0	99.3	99.8	100.0	100.0	100.0	Diurnal Maximum	

OR - Out of Range



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Relative Humidity (RH) - %**  
**Blackgold - November 2023**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Relative Humidity (RH) - %  
Blackgold - November 2023**

<b>Concentration Ranges (%)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 20	0	0.00	0.00
20 - 40	2	0.28	0.28
40 - 60	74	10.38	10.66
60 - 80	283	39.69	50.35
80 - 100	344	48.25	98.60

Total Number of Valid Hours: 713

Total Number of Hours: 720





Maximum Speed: 32 km/h on Nov 20 04:00	Maximum Daily Speed Average: 15.5 km/h on Nov 20	Hours in Service: 720
Minimum Speed Value: 0 km/h on Nov 19 01:00	Minimum Daily Speed Average: 2.2 km/h on Nov 3	Hours of Data: 720
Maximum Diurnal Speed Average: 4.5 km/h at hour 4	Minimum Diurnal Speed Average: 3.5 km/h at hour 18	Hours of Missing Data: 0
Monthly Average Velocity: 3.9 km/h 258.3 deg	Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 3 Q <sub>1</sub> = 5 Median = 8 Q <sub>3</sub> = 10 P <sub>90</sub> = 14 P <sub>99</sub> = 20	Percent Operational Time: 100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Nov	W3	W3	WSW4	W4	WSW4	SW5	WSW3	SW4	SW3	SW7	WSW7	SW9	SW8	SSW8	S5	SSW6	SW7	SSW6	SW6	SW8	SW8	SW6	SSW5	SW4	SW5.2	SW9
2-Nov	WSW5	W3	WSW4	W5	W4	WNW6	W5	NW7	NW8	NNW7	N7	NNE9	NE11	NNE8	NNE8	NE7	NNE8	NNE9	NNE7	NE6	ENE6	ENE4	SE4	SSE3	N3.6	NE11
3-Nov	E3	ESE4	SSE3	SSE3	SSE4	ESE2	SE4	SSE4	SE3	SSE3	SE3	S3	ESE4	NE3	ENE4	ENE5	E2	NE4	ENE4	ENE2	NE3	NNE3	NE5	NNE3	E2.2	NE5
4-Nov	N5	NE4	NNE6	NE5	NE6	NE5	NE4	ENE6	ENE6	E7	E8	E9	E9	E9	ESE11	E10	E10	E10	E9	ENE7	ENE7	ENE7	ENE7	ENE7	ENE6.7	ESE11
5-Nov	ENE6	ENE7	ENE7	ENE7	ENE7	ENE6	NE6	ENE4	ENE6	ENE6	NNE4	NE4	ENE4	NNE4	NNE4	NE5	NE5	NE4	NE3	NE3	NE2	NE3	ENE3	ENE2	NE4.5	ENE7
6-Nov	ENE2	NNE2	NE2	NNE1	E1	ENE2	ESE2	E2	E2	SE6	SSE6	SSE7	S11	S12	S13	S10	S10	SSW10	SSW10	SSW12	SSW10	SSW10	SSW12	SSW11	S5.8	S13
7-Nov	SSW12	SSW12	SSW11	SSW10	SSW10	SSW9	SSW9	SSW7	S8	SSW9	SSW8	SSW8	SSW9	SW8	SSW8	SW7	SSW8	SW10	SW8	WSW8	WSW8	WNW9	W6	WSW9	SW8.0	SSW12
8-Nov	W10	W9	W13WNW17	WNW17	WNW14	WNW14	WNW14	WNW14	WNW13	WNW15	NW16	NW16	NW15	NW15	NW15	NW17	NW16	NW14	NW14	NW12	NW12	NW9	WNW9	WNW8	WNW13.3	WNW17
9-Nov	WNW7	WNW9	WNW6	WNW5	WNW4	WSW3	WSW4	W4	WSW3	SW2	SE4	SE4	SSE7	S9	SSW9	SSW7	S5	S9	SSW9	SSW10	SSW9	S8	S8	S10	SSW4.6	SSW10
10-Nov	S11	S14	S15	S12	S13	S11	S12	SSE10	SSE10	S13	SSW15	SSW16	S17	SSW14	SSW14	SSW12	SSW11	SSW11	SSW13	SSW12	SSW10	SSW11	SSW9	SSW7	S12.0	S17
11-Nov	S4	S9	S8	S8	SSE11	SSE12	SSE11	SSE12	SSE14	SSE15	SSE16	SSE14	S10	SSW10	SSW8	S9	SSW7	SSW6	SW7	SW6	WSW5	SW6	WSW7	WSW6	S8.1	SSE16
12-Nov	SW7	SW8	WSW8	WSW7	W8	W7	WSW7	WSW8	W8	W8	W9	W9	W8WNW12	WNW9	W9	W8	WSW4	SW5	SW6	WSW5	SW4	SW4	W3	WSW6.8	WNW12	
13-Nov	WSW4	WSW2	WSW2	WNW2	NW2	NE2	NE4	NE4	NNE5	NE8	NE8	NE10	ENE12	ENE12	ENE11	ENE9	NE5	NNE6	N5	NNW4	NW6	NW6	WNW9	WNW6	NNE3.6	ENE12
14-Nov	WNW11	WNW16	WNW15	WNW15	WNW15	WNW12	WNW11	W8	W8WSW10	WSW9	WSW10	WSW11	WSW11	WSW12	WSW10	SW9	WSW6	SW7	SW8	SW7	SW7	SSW6	SW6	SW6	W8.9	WNW16
15-Nov	SSW6	SW7	SW8	SW9	SW9	WSW8	WSW9	WSW10	WSW11	WSW10	WNW12	NW16	NW12	WNW11	WNW13	NW10	WNW6	WNW6	WNW7	WNW7	WNW8	WNW8	W6	W7	W7.3	NW16
16-Nov	WNW7	WNW6	NE4	SSE2	SSW4	SSW5	S6	SSW8	SSW7	SSW9	SW11	SW11	SW12	SW11	SW11	SW10	SW12	SW11	SW10	SW9	SW10	SW10	WSW10	WSW7	SW7.5	SW12
17-Nov	WSW8	WSW9	WSW7	WSW9	W8	W8	WSW8	WSW9	WSW8	W8	W10	W10	W9	SW9	SW6	SW5	SW3	SSW5	SSW5	SW4	W6	W5	SW4	SW5	WSW6.6	W10
18-Nov	SW5	SW5	SSW4	SW3	SW4	SW6	SW7	SW7	SW7	SW7	SSW8	SSW10	SSW9	SSW9	SSW6	S2	E0	WNW1	NNW2	W1	NW2	W2	W2	WNW2	SW4.1	SSW10
19-Nov	NW0	WSW1	E0	N2	WNW3	W2	W3	WSW2	W2	W2	W5	W7	W7	WNW8	NW5	W3	WSW5	WSW5	WSW5	WSW8	W9	WNW16	WNW16	WNW18	W5.3	WNW18
20-Nov	WNW20	W20	WNW23	WNW32	WNW27	WNW23	NW16	NW22	WNW20	WNW21	WNW19	WNW17	WNW19	WNW17	WNW17	WNW14	WNW11	WNW8	W9	WNW9	WNW7	W4	WNW4	SE2	WNW15.5	WNW32
21-Nov	ENE3	S2	ENE4	ENE5	ESE5	E7	ESE6	ESE5	ESE6	E6	E8	E6	NE7	NE8	NE7	NNE4	N4	N7	NNE7	NNE7	N7	N8	NNE7	NNE8	NE4.5	N8
22-Nov	NNE10	NNE9	NNE10	NE11	NE9	NNE7	NE7	NNE6	N6	NNE6	NNE7	NNE7	NE7	ENE6	NE4	ENE1	WNW1	NW1	E1	ESE4	SE5	ESE3	S3	S5	NE4.4	NE11
23-Nov	SSE5	SSE6	S8	S7	S6	S8	S10	S11	SSW13	SSW11	SSW9	SSW12	SW11	SW11	SSW9	SW8	SSW7	SW9	SW11	SW11	SW10	SW12	SW10	SW11	SSW9.0	SSW13
24-Nov	SW12	SW12	SW15	SW16	SW15	SW15	SW16	SW16	SW15	WSW13	WSW12	W10	W11	W10	WNW10	WNW8	WNW5	W4	WSW5	WSW5	WSW6	WSW6	WSW6	WSW8	WSW9.9	SW16
25-Nov	WSW9	WSW9	WSW8	W10	WNW9	WN11	NNW14	NNW13	N13	N15	NNW12	NNW18	NNW17	NNW18	NNW16	NNW10	NNW10	NNW7	NW6	NW6	NW7	WNW4	W1	WSW3	NW8.8	NNW18
26-Nov	WSW2	SW3	SSE1	SSE1	S3	S3	NNE1	NW1	NW3	WNW2	NW9	NW7	N5	WNW4	WNW8	WNW12	WNW10	WNW7	W7	W6	WNW7	W6	WSW4	SW6	WNW3.9	WNW12
27-Nov	W5	WSW7	SW7	SW6	SW7	SW7	SW7	SW6	SW6	SW7	SSW9	SSW8	SSW11	SW11	SW13	SW14	SW14	WSW13	WSW10	W10	W10	W11	WNW10	W10	WSW8.3	SW14
28-Nov	W9	WSW9	W10	WSW11	SW10	WSW13	WSW13	WSW11	W12	W9	W9	WNW13	WNW12	WNW12	W11	WSW9	WSW9	W9	W8	W8	WNW8	WNW7	WNW7	WNW8	W9.5	WSW13
29-Nov	NW12	W9	WNW10	WNW11	WNW11	WNW13	WNW14	WNW13	WNW15	WNW16	WNW14	WNW16	WNW15	NW17	WNW14	WNW14	NW13	WNW12	WNW11	WNW13	NW14	NW16	NW9	NW10	WNW12.8	NW17
30-Nov	WNW10	NW10	NW11	NW10	WNW9	NW9	WNW6	NW8	WNW7	WNW9	WNW11	WNW10	WNW10	WNW11	WNW9	WNW4	WSW2	SW3	SSW3	SSW5	SSW1	WSW2	SW6	SW6	WNW6.3	WNW11

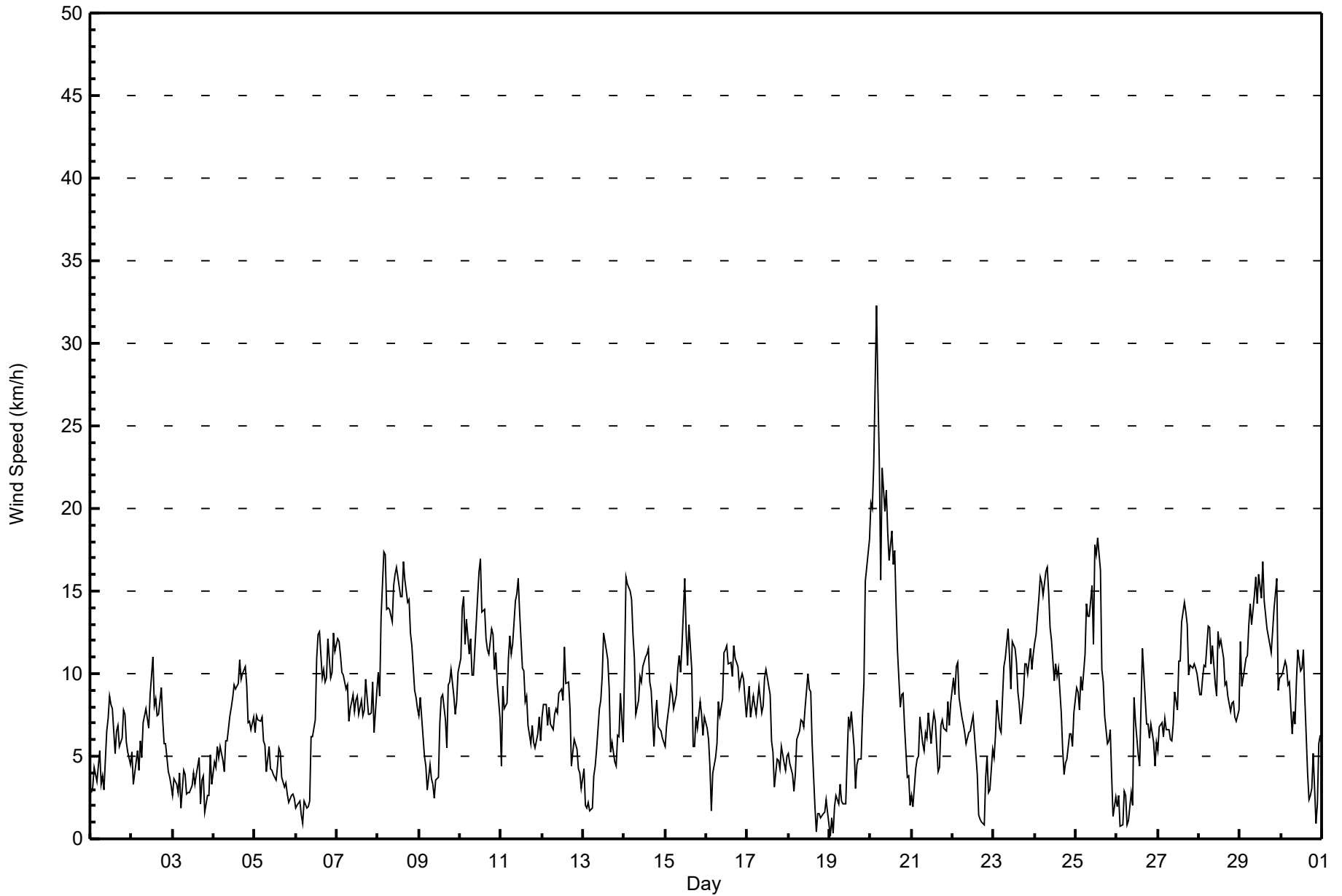
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WNW20	W20WNW23WNW32WNW27WNW23	SW16	NW22	WNW20	WNW21	WNW19	NNW18	WNW19	NNW18	WNW17	NW17	NW16	NW14	NW14	WNW13	NW14	NW16	WNW16	WNW18															Diurnal Maximum

All monthly, daily, and diurnal averages have been calculated using vector methods



**Wood Buffalo Environmental Association**  
**Hourly Averages**

**Wind Speed (WS) - km/h**  
**Blackgold - November 2023**





**Wood Buffalo Environmental Association  
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h  
Blackgold - November 2023**

<b>Wind Speed Ranges (km/h)</b>	<b>Number of Hours</b>	<b>%</b>	<b>Cumulative %</b>
0 - 5	197	27.36	27.36
6 - 11	393	54.58	81.94
12 - 19	121	16.81	98.75
20 - 28	8	1.11	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  
Blackgold - November 2023**

Wind Speed Ranges (km/h)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	5	10	24	15	8	8	8	10	10	10	17	27	23	13	7	2	197
6 - 11	5	20	15	17	14	3	1	8	22	53	66	48	46	53	18	4	393
12 - 19	2	0	0	2	0	0	0	6	9	12	16	6	2	40	19	7	121
20 - 28	0	0	0	0	0	0	0	0	0	0	0	0	1	6	1	0	8
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Totals</b>	12	30	39	34	22	11	9	24	41	75	99	81	72	113	45	13	720

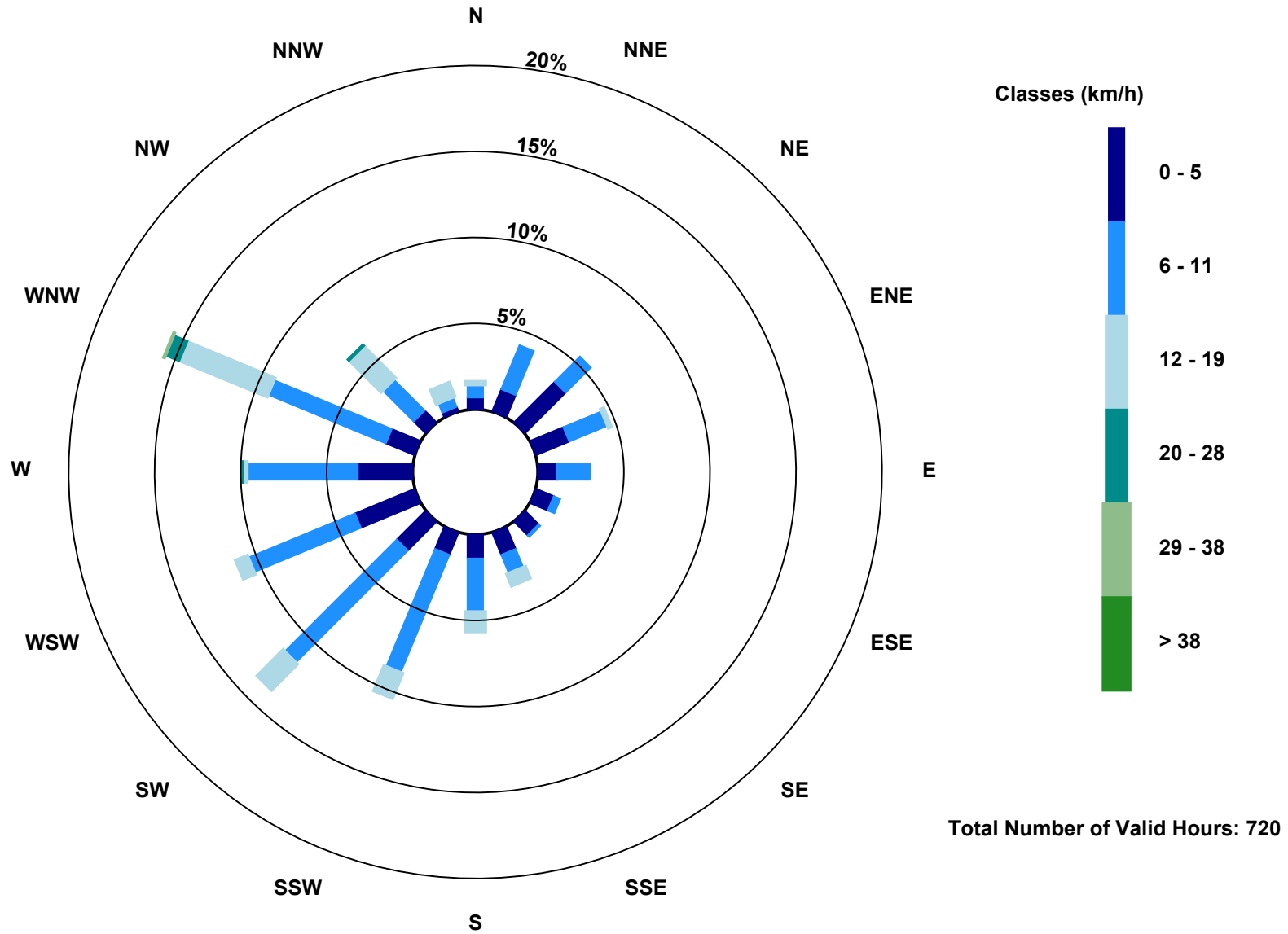
Total Number of Valid Hours: 720

Total Number of Hours: 720



Wood Buffalo Environmental Association  
Wind Rose Nov 2023

Wind Speed (WS) - km/h  
Blackgold





**Wood Buffalo Environmental Association**  
**Summary of Hour Standard Deviations**

**Wind Speed (WS) - km/h**  
**Blackgold - November 2023**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 10 km/h on Nov 20 04:00 Minimum Value: 0 km/h on Nov 18 19:00 Percentiles: P <sub>1</sub> = 1 P <sub>10</sub> = 1 Q <sub>1</sub> = 2 Median = 2 Q <sub>3</sub> = 3 P <sub>90</sub> = 4 P <sub>99</sub> = 7																	Hours in Service: 720 Hours of Data: 720 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0								
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Nov	1	1	2	1	1	1	1	1	2	3	3	3	3	2	2	2	2	1	1	2	2	2	1	2	3
2-Nov	2	2	2	2	1	1	1	2	3	2	2	3	4	3	3	2	2	3	2	2	1	1	1	1	4
3-Nov	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	2
4-Nov	1	1	2	1	2	1	1	1	2	2	2	2	2	2	3	2	3	3	3	3	2	2	2	2	3
5-Nov	2	2	2	2	2	2	2	1	2	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1	2
6-Nov	1	1	1	1	1	0	0	1	1	2	2	2	3	3	3	3	3	3	3	3	3	3	3	3	3
7-Nov	3	3	4	3	3	2	3	2	2	2	2	3	2	2	2	2	2	3	3	3	3	3	3	4	4
8-Nov	3	3	4	5	5	4	4	4	4	5	5	5	5	4	4	5	5	4	4	4	3	3	2	2	5
9-Nov	2	2	2	1	1	1	1	1	1	1	2	1	2	2	2	2	1	2	2	2	3	2	2	2	3
10-Nov	2	3	3	3	3	3	3	2	4	4	5	5	5	5	4	3	3	3	3	3	2	3	3	2	5
11-Nov	1	3	2	2	4	3	3	3	3	4	4	3	3	4	3	2	3	1	2	3	2	2	3	3	4
12-Nov	2	3	3	3	3	3	2	3	3	3	3	3	3	4	4	4	4	2	2	2	2	2	2	1	4
13-Nov	1	1	1	1	1	1	1	1	1	2	2	3	4	3	3	3	2	2	1	2	2	2	2	2	4
14-Nov	4	5	5	4	4	3	3	3	3	4	4	4	4	4	4	3	3	3	2	3	2	2	2	1	5
15-Nov	1	2	3	3	3	3	3	4	4	4	5	6	4	5	4	4	2	2	2	1	2	2	2	2	6
16-Nov	2	2	1	1	1	2	2	2	2	2	3	3	4	3	3	3	3	3	3	3	3	3	3	3	4
17-Nov	3	3	3	4	3	3	3	4	3	3	3	3	4	3	2	2	1	2	1	2	2	2	1	2	4
18-Nov	1	1	1	1	1	2	2	2	1	2	2	3	3	2	2	1	1	1	0	1	0	1	1	1	3
19-Nov	1	0	1	2	2	1	1	1	1	1	2	2	2	3	2	2	2	2	2	3	4	5	5	6	6
20-Nov	6	7	8	10	9	7	5	8	7	7	6	5	6	5	5	4	3	2	3	2	2	2	2	1	10
21-Nov	1	2	1	1	1	2	2	2	4	2	3	4	2	2	2	2	1	2	2	2	2	3	2	3	4
22-Nov	3	3	3	3	3	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	3
23-Nov	1	2	2	2	2	2	2	3	3	3	3	4	4	3	2	2	1	3	3	3	3	3	3	4	4
24-Nov	3	4	5	5	5	5	5	5	5	5	4	4	4	4	3	3	2	1	2	2	2	2	2	3	5
25-Nov	4	3	3	3	3	4	4	4	5	5	6	6	6	7	5	4	3	3	2	2	2	1	1	1	7
26-Nov	1	1	1	1	1	1	1	1	1	2	3	3	2	2	3	3	3	2	2	2	3	2	2	2	3
27-Nov	2	2	2	2	2	2	2	2	2	2	2	2	3	3	4	5	5	5	4	4	3	3	3	3	5
28-Nov	3	3	4	4	4	5	5	4	4	4	3	3	4	3	4	4	4	3	3	3	2	2	2	3	5
29-Nov	4	3	3	3	3	4	4	4	5	5	4	5	4	5	4	4	4	4	3	4	4	5	3	3	5
30-Nov	3	3	3	3	3	3	2	2	2	3	3	3	3	3	3	2	1	1	1	2	1	2	2	2	3
Diurnal Maximum																									



**Wood Buffalo Environmental Association**  
**Summary of Hour Averages**

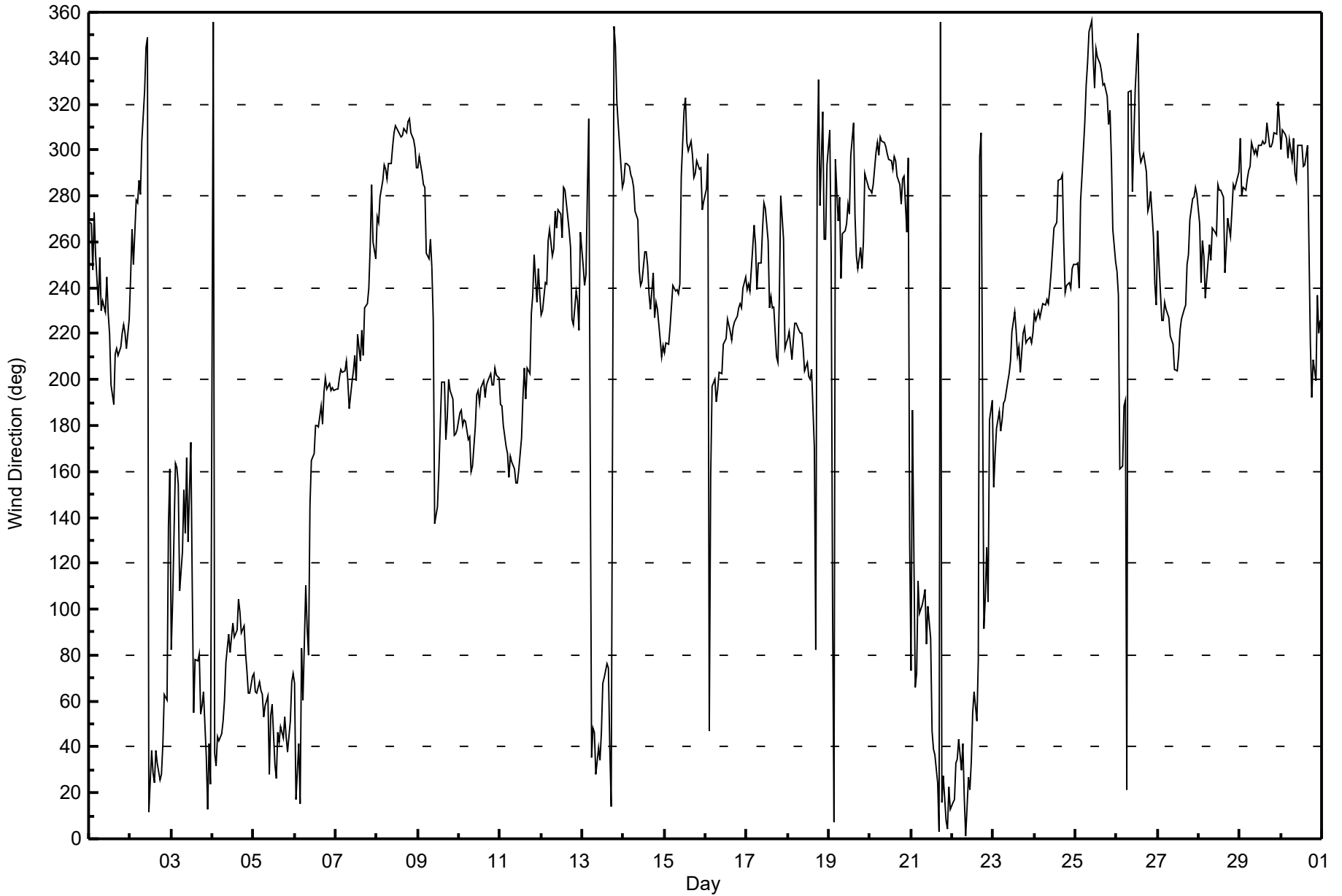
**Wind Direction (WD) - deg**  
**Blackgold - November 2023**

Direction of Maximum Speed: 299 deg on Nov 20 04:00		Hours in Service: 720
Direction of Maximum Daily Speed Average: 294.6 deg on Nov 20		Hours of Data: 720
Direction of Minimum Speed: 308 deg on Nov 19 01:00	Direction of Minimum Daily Speed Average: 2.2 deg on Nov 3	Hours of Missing Data: 0
Monthly Average Direction: 258.3 deg		Percent Operational Time: 100.0

Day	Hourly Period Ending At (MST)																								Daily Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Nov	269	268	248	273	255	232	253	230	234	230	245	229	220	197	189	211	214	210	214	220	224	221	213	226	225.9
2-Nov	245	265	250	278	277	287	281	304	326	345	349	12	38	29	24	38	33	26	28	41	63	61	136	161	2.0
3-Nov	83	104	163	162	155	108	125	152	133	166	129	172	110	55	78	78	80	54	58	64	36	13	41	24	97.3
4-Nov	355	37	32	44	43	46	51	60	77	89	81	88	94	88	91	104	99	90	93	81	73	63	64	71	76.0
5-Nov	72	64	64	68	65	63	53	58	62	28	54	58	32	26	46	42	49	44	53	45	38	51	69	72	55.1
6-Nov	68	17	41	15	83	60	111	92	80	145	165	168	180	180	179	189	180	195	201	196	198	195	197	195	181.3
7-Nov	196	196	201	204	203	204	208	200	187	199	204	211	200	220	208	222	210	232	233	240	258	285	260	253	215.7
8-Nov	271	268	280	287	294	292	288	294	294	301	308	311	308	307	305	306	309	308	312	313	308	304	301	293	299.4
9-Nov	292	297	290	285	284	255	252	261	249	226	137	144	160	180	199	199	174	184	200	195	192	176	176	178	206.7
10-Nov	186	187	180	182	182	174	175	160	162	179	194	195	190	196	200	192	198	200	203	198	198	205	202	201	189.2
11-Nov	189	189	180	171	168	158	166	164	161	155	155	161	175	193	205	191	205	202	229	236	255	234	248	237	182.8
12-Nov	228	230	242	242	260	265	254	257	273	266	274	272	262	283	283	271	265	258	227	224	239	235	221	264	257.1
13-Nov	249	241	246	282	314	35	48	47	28	39	34	46	68	70	76	75	40	14	354	346	322	311	302	284	26.8
14-Nov	286	294	294	293	289	287	284	273	269	248	241	243	256	255	249	237	231	246	227	234	231	217	210	215	261.3
15-Nov	212	216	215	222	232	241	238	239	237	242	289	317	323	303	300	304	298	288	290	295	292	293	274	278	272.0
16-Nov	283	298	47	158	197	200	190	196	203	203	216	217	218	226	221	217	222	225	228	231	233	231	240	245	223.1
17-Nov	239	241	239	258	267	259	239	251	251	266	277	275	261	231	236	232	232	210	207	236	280	261	214	216	248.5
18-Nov	218	221	209	217	224	224	222	220	220	214	204	207	202	200	204	170	82	291	331	276	317	261	261	294	217.2
19-Nov	308	254	100	7	296	269	280	244	264	265	268	276	272	298	312	272	254	249	258	248	260	290	288	283	277.2
20-Nov	282	281	285	299	303	298	306	304	303	302	299	296	296	292	297	296	288	285	277	288	289	264	296	131	294.6
21-Nov	73	187	66	72	112	98	102	105	108	85	101	87	47	39	37	24	3	356	16	27	8	5	22	13	51.9
22-Nov	16	17	33	35	43	30	42	18	1	27	21	33	55	64	52	77	297	308	92	105	127	103	182	191	39.6
23-Nov	153	167	179	186	178	182	190	191	199	202	208	221	229	221	210	214	203	221	223	216	217	218	216	220	206.0
24-Nov	229	226	230	227	230	233	233	235	233	239	247	266	267	269	287	288	289	259	238	241	242	240	249	250	243.5
25-Nov	250	251	240	278	288	312	328	338	351	356	340	327	344	341	337	334	328	329	323	311	317	296	266	252	322.3
26-Nov	247	236	161	162	189	191	21	325	326	282	305	326	351	300	295	296	298	290	273	276	282	263	242	232	285.3
27-Nov	265	250	225	226	234	231	227	219	217	215	204	204	210	222	226	231	232	250	254	270	279	279	284	281	240.2
28-Nov	268	242	260	254	235	251	258	252	266	264	263	285	282	283	280	247	257	270	262	273	285	283	285	290	266.1
29-Nov	305	280	284	282	288	291	293	303	299	300	298	302	302	304	303	303	312	301	301	303	308	307	321	312	300.4
30-Nov	300	309	307	305	296	304	296	305	290	287	302	302	302	293	294	302	258	216	192	209	200	237	220	226	289.8

258.9 251.8 251.4 263.8 257.3 257.7 253.1 256.8 258.0 256.0 261.5 269.7 264.0 266.0 267.5 257.9 256.4 257.8 251.6 250.9 264.1 263.6 251.8 249.1  
 Diurnal Average

All monthly, daily, and diurnal averages have been calculated using vector methods







**Wood Buffalo Environmental Association**  
**Summary of Hour Standard Deviations**

**Wind Direction (WD) - deg**  
**Blackgold - November 2023**

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 720
Maximum Value: 100 deg on Nov 19 01:00	Hours of Data: 720
Minimum Value: 9 deg on Nov 9 18:00	Hours of Missing Data: 0
Percentiles: P <sub>1</sub> = 12 P <sub>10</sub> = 16 Q <sub>1</sub> = 19 Median = 22 Q <sub>3</sub> = 30 P <sub>90</sub> = 37 P <sub>99</sub> = 82	Hours of Calibration: 0
	Percent Operational Time: 100.0

Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Nov	16	25	20	14	23	13	25	20	37	51	33	23	28	20	24	19	19	17	19	23	21	22	22	39	51
2-Nov	36	57	37	21	38	15	16	20	22	21	26	27	22	27	26	25	21	22	24	23	22	26	38	36	57
3-Nov	44	32	29	51	22	58	20	16	33	28	30	39	29	27	22	16	32	21	21	35	24	34	20	33	58
4-Nov	23	24	23	26	23	21	21	19	20	19	17	17	16	17	16	18	16	16	18	18	20	17	18	26	26
5-Nov	21	21	21	20	18	20	21	21	19	23	24	27	26	24	23	21	22	22	18	22	24	22	19	21	27
6-Nov	65	43	27	30	68	28	24	27	24	15	27	21	16	16	17	17	15	17	15	15	17	17	16	15	68
7-Nov	16	17	18	17	17	17	18	16	15	17	21	21	26	28	25	29	21	25	29	29	34	22	37	33	37
8-Nov	28	30	24	18	17	19	20	18	17	20	20	19	20	19	19	20	18	21	21	19	19	15	15	30	30
9-Nov	13	14	13	14	19	30	15	21	31	47	44	33	23	24	21	14	11	9	16	14	17	18	14	14	47
10-Nov	12	13	12	12	14	14	15	15	19	19	21	17	17	22	18	17	16	16	17	17	14	13	18	21	22
11-Nov	30	13	11	18	16	13	15	14	15	13	13	16	22	22	24	17	20	18	28	38	37	34	37	46	46
12-Nov	27	33	34	34	35	39	35	35	30	32	27	26	33	22	26	30	34	44	26	28	38	38	20	14	44
13-Nov	18	29	30	22	35	22	18	26	21	22	21	22	20	19	20	18	25	24	24	31	23	25	20	22	35
14-Nov	22	17	19	18	18	20	21	36	32	32	34	30	34	33	30	28	28	43	26	29	28	26	20	15	43
15-Nov	16	20	24	26	30	32	32	31	28	30	27	22	25	23	20	18	16	17	14	13	15	14	30	23	32
16-Nov	21	32	25	57	17	16	12	12	15	16	20	21	21	26	22	20	20	23	24	25	27	28	33	33	57
17-Nov	29	29	36	35	36	35	29	37	38	36	25	25	30	27	31	34	44	16	17	33	32	41	19	17	44
18-Nov	14	18	18	36	22	16	20	17	15	17	15	17	17	14	21	74	96	41	41	56	44	52	22	55	96
19-Nov	100	68	93	51	18	46	15	48	35	33	26	22	26	25	21	44	36	36	46	36	34	19	21	22	100
20-Nov	23	23	21	19	19	18	21	20	18	19	20	20	19	20	18	17	18	21	24	20	18	40	40	82	82
21-Nov	51	73	15	20	18	14	17	20	43	47	39	59	26	23	25	32	24	24	25	24	26	24	25	26	73
22-Nov	27	26	22	23	22	24	22	24	25	24	25	23	24	24	35	62	43	60	87	19	18	22	25	11	87
23-Nov	17	19	14	17	16	14	14	14	15	18	18	21	24	20	19	19	14	21	23	20	22	20	19	23	24
24-Nov	24	24	25	23	24	27	24	25	25	32	31	34	29	27	19	18	23	33	40	33	31	31	40	38	40
25-Nov	35	33	35	24	24	23	22	25	27	27	24	22	25	24	23	22	21	22	20	16	17	22	71	43	71
26-Nov	54	48	80	77	29	24	92	86	61	66	23	36	32	50	25	19	22	21	25	33	28	34	33	27	92
27-Nov	40	32	23	26	25	23	28	22	27	23	16	18	19	23	24	25	27	31	31	32	23	24	21	24	40
28-Nov	31	34	35	32	30	32	31	34	33	36	33	20	23	24	22	32	34	31	34	28	21	21	16	20	36
29-Nov	20	25	23	22	20	19	21	19	19	19	19	18	20	21	19	21	21	19	18	18	19	19	22	23	25
30-Nov	17	19	19	19	17	17	15	21	21	21	22	19	21	20	20	24	31	39	32	18	93	72	20	18	93

100	73	93	77	68	58	92	86	61	66	44	59	34	50	35	74	96	60	87	56	93	72	71	82	
Diurnal Maximum																								

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**ELECTRONIC TRANSFER SYSTEM  
AIRDATA  
SUBMISSION REPORT**

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December 22, 2023  
9:00:50 AM  
Request # 4626102

**Submitted by:** EN6138  
**Submission Date:** Dec 22, 2023 9:00:31 AM

File Type

Ambient Data

File Name

AMB-WBEA-202311-V00.xml

**Total Number of Files: 1**

\*\*\* End of Report \*\*\*

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**ELECTRONIC TRANSFER SYSTEM  
AIRDATA  
SUBMISSION REPORT**

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December 22, 2023  
9:01:26 AM  
Request # 4626103

**Submitted by:** EN6138  
**Submission Date:** Dec 22, 2023 9:01:18 AM

File Type  
Airshed Monitoring Report

File Name  
WBEA-202311.pdf

**Total Number of Files: 1**

\*\*\* End of Report \*\*\*

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**ELECTRONIC TRANSFER SYSTEM  
AIRDATA  
SUBMISSION REPORT**

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December 22, 2023  
9:02:11 AM  
Request # 4626104

**Submitted by:** EN6138  
**Submission Date:** Dec 22, 2023 9:01:56 AM

File Type

Calibration Report

File Name

CAL-WBEA-202311.pdf

**Total Number of Files: 1**

\*\*\* End of Report \*\*\*



End of Report