



**WOOD BUFFALO
ENVIRONMENTAL ASSOCIATION**

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Wood Buffalo Environmental Association

DECEMBER 2023 MONTHLY REPORT

CONTINUOUS MONITORING

January 31, 2023

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





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January 31, 2024

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

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

Enclosed is the December 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	289664-00-00; 241311-00-00
Blackgold	246984-01-00
Canadian Natural	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

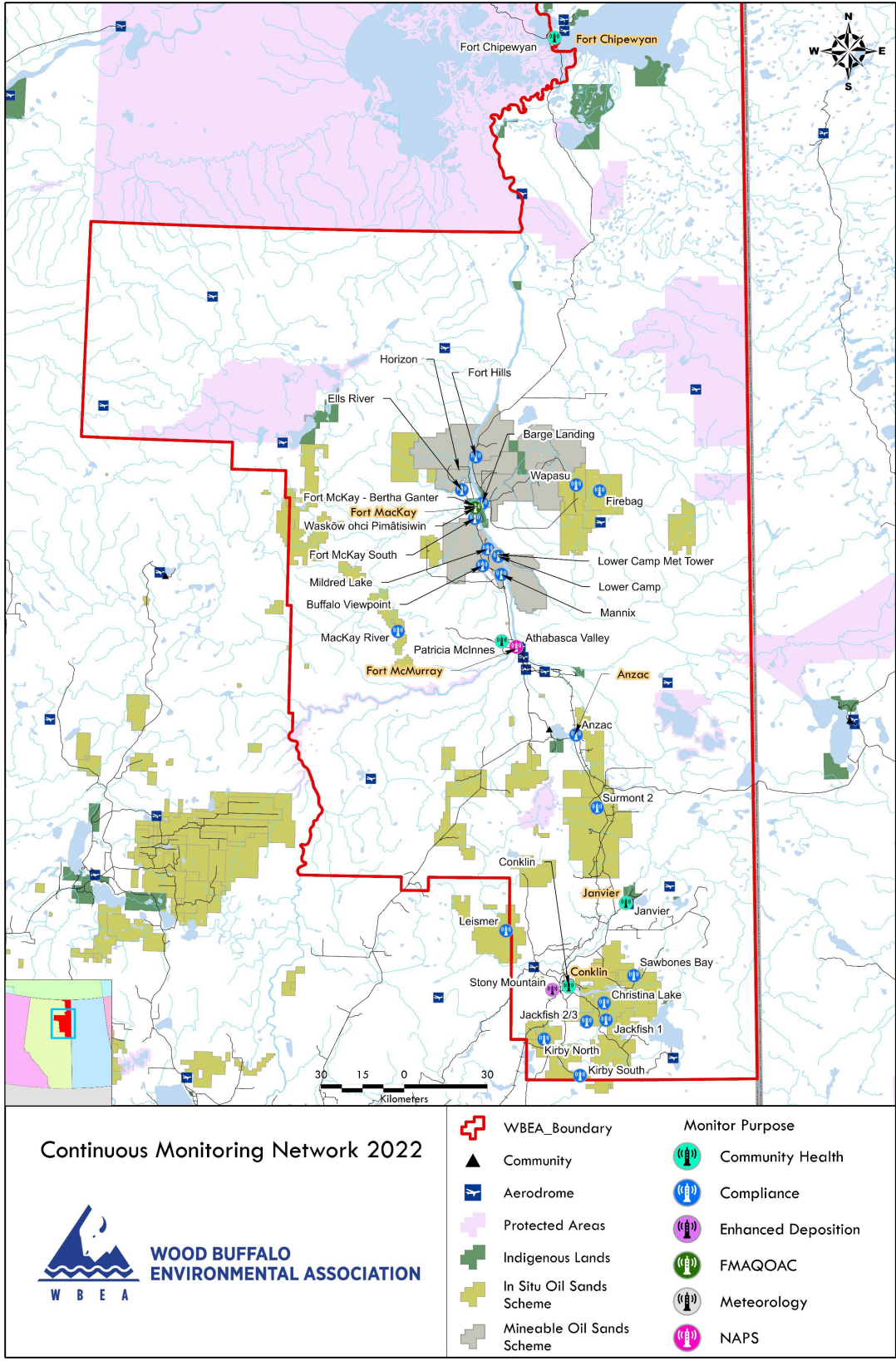


Figure 1: Map of WBEA Continuous Monitoring Network

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 NH₃, NO₂, O₃, PM_{2.5}, TRS, and TSP.

There were fourteen ground-level concentrations in excess of the 1-hour H₂S objective reported to AEPA; following data validation and processing, nine exceedances were confirmed.

There were three ground-level concentrations in excess of the 24-hour H₂S objective reported to AEPA; following data validation and processing, two exceedances were confirmed.

There were two ground-level concentrations in excess of the 1-hour SO₂ objective reported to AEPA; following data validation and processing, the exceedances were confirmed.

Site	Parameter	Date /Time	Reference	Period	Reported	Final	Status*
Mannix	H2S	3Dec23, 17:00	422676	1-hr	13	12.9	exc
Lower Camp	H2S	6Dec23, 17:00	422805	1-hr	28	27.2	exc
Lower Camp	H2S	6Dec23, 18:00	422806	1-hr	36	35.8	exc
Lower Camp	H2S	6Dec23, 24:00	422809	24-hr	5	3.9	exc
Mildred Lake	H2S	12Dec23, 24:00	422983	1-hr	12	11.6	exc
Mildred Lake	H2S	13Dec23, 12:00	423004	1-hr	10	9.7	nae
Lower Camp	H2S	14Dec23, 15:00	423056	1-hr	16	15.1	exc
Lower Camp	H2S	14Dec23, 16:00	423056	1-hr	10	9.8	nae
Lower Camp	H2S	14Dec23, 24:00	423062	24-hr	3	2.4	nae
Lower Camp	H2S	15Dec23, 18:00	423090	1-hr	10	8.8	nae
Mildred Lake	H2S	17Dec23, 19:00	423115	1-hr	11	10.8	exc
Mildred Lake	H2S	17Dec23, 23:00	423118	1-hr	10	9.7	nae
Mildred Lake	H2S	17Dec23, 24:00	423118	1-hr	11	10.5	exc
Mildred Lake	H2S	17Dec23, 24:00	423118	24-hr	3	3.2	exc
Mannix	SO2	19Dec23, 04:00	423163	1-hr	425	424.1	exc
Mannix	SO2	19Dec23, 05:00	423164	1-hr	249	248.5	exc
Lower Camp	H2S	21Dec23, 09:00	423250	1-hr	11	11.4	exc
Mildred Lake	H2S	24Dec23, 15:00	423340	1-hr	10	10.0	nae
Mildred Lake	H2S	24Dec23, 20:00	423340	1-hr	13	13.2	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_{2.5}, 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_{2.5} 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, NO₂ concentrations are re-calculated from baseline-corrected NO_x and NO concentrations. Specifically, the NO concentration is subtracted from the NO_x concentration to determine the NO₂ 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 December 2023, there were three instances that resulted in monitoring instruments operating less than 90% of the time.

1. The THC, NMHC, and CH₄ analyzer at the Mildred Lake AMS operated for less than 90% of December 2023, which is a contravention of the Air Monitoring Directive (AMD) (2016, as amended), Chapter 6, Clause DQ 4-C. This incident was reported to Alberta Environment and Protected Areas (AEPA) on January 5, 2024 (reference number 423561).

There were three issues associated with the operation of the THC/NMHC/CH₄ analyzer, resulting in 82 hours of invalid data:

- On December 21, the CH₄ span was outside of the AMD acceptable criteria, prompting an investigation. A technician replaced the instrument on December 21 and data for the incident period was invalidated resulting in a total of 33 hours.

- Between December 22 through 23, the baseline for the instrument was within the required limits but the data appeared noisy. A technician performed a maintenance calibration and span adjustment on the afternoon of December 23 resulting in 4 hours of downtime.
 - On December 30 and 31, the NMHC span was outside of the AMD acceptable criteria. On January 1, 2024, a technician conducted a calibration and retention time adjustment to fix the problem. Data for the incident period was invalidated resulting in an additional 45 hours of downtime in December.
2. The TRS analyzer at Athabasca Valley air monitoring station operated less than 90% for the month of December 2023, which is a contravention of the Air Monitoring Directive (AMD) (2016, as amended), Chapter 6, Clause DQ 4-C This incident was reported to Alberta Environment and Protected Areas (AEPA) on January 25, 2024 (reference number 424274).

A multi-point calibration of the TRS was carried out on December 19. The technician had to replace the scrubber beads and make significant adjustments to the span when the scrubber check section of the calibration failed. TRS spans were constantly high, outside of AMD criteria, throughout the next few days. The WBEA investigated this and found that the problem was due to not providing the analyzer enough stabilization following the SO₂ scrubber replacement and making a large span adjustment, on December 19. The WBEA conducted a recalibration, verified its performance, and resolved the issue on December 31. During the data validation process, 282 hours of data were invalidated, resulting in 62% operational time for December.

3. The CO₂ analyzer at the Fort Chipewyan AMS operated for less than 90% of December 2023, which is a contravention of the Air Monitoring Directive (AMD) (2016, as amended), Chapter 6, Clause DQ 4-C. This incident was reported to Alberta Environment and Protected Areas (AEPA) on January 24, 2024 (reference number 424206).

On December 26, an onsite CO₂ calibration failed the AMD criteria due to operator error. This resulted in no valid calibration for the month of December. Prior to this incident, all daily quality assurance checks for the month of December were within AMD criteria. Following this incident, the CO₂ daily span was above the AMD limits. The WBEA conducted a remote investigation and maintenance to correct the linearity of the instrument on January 3. On January 18, an onsite multipoint calibration was conducted, the issue was resolved, and the analyzer returned to normal operation. During the data validation process, the WBEA conservatively invalidated data between December 26 and January 18, resulting in 545 hours of invalid data.

3.2 Intermittent Monitoring

The results for time-integrated sampling of precipitation, PAH, VOC, ECOC, PM_{2.5}, and PM₁₀ will be submitted in the 2023 Annual Report.

3.3 General Network Notes

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

Total hydrocarbon (THC), non-methane hydrocarbon (NMHC), and methane (CH₄) measurements are collected at some air monitoring stations in the WBEA network using the Thermo Environmental model 55i direct CH₄/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.

Station 1, Bertha Ganter – Fort McKay

The NH₃ analyzer required additional time to stabilize to levels below ambient concentrations following the automated daily spans and routine monthly multipoint calibrations. Additional time is required for stabilization after exposure to high concentrations of NH₃ gas, and this is an inherent behavior in the NH₃ analyzer operations due to the properties of the NH₃ gas. Data for 1 hour following the daily spans have been reported as invalid for a total of 32 hours this month.

Unstable operations due to excessive baseline drift in the output signal of the NH₃ analyzer on December 1 resulted in 1 hour of invalid data.

Unstable operations due to flatline in the output signal of TRS analyzer on December 6 resulted in 1 hour of invalid data. Subsequent maintenance to reboot the TRS analyzer on December 6 resulted in additional 1 hour of downtime.

Failure to record data of precipitation collector on December 4 and 5 resulted in 32 hours of invalid data.

The surface leaf wetness sensor operated out of range on December 6 resulting in 2 hours of invalid data.

Station 2, Mildred Lake

Unstable operations due to excessive baseline drift in the output signal of the THC/NMHC/CH₄ analyzer on December 20 through 21 resulted in 31 hours of invalid data.

Maintenance to replace the analyzer on December 21 interrupted the normal operation of the THC/NMHC/CH₄ analyzer for 2 hours.

Unstable operations due to excessive baseline drift in the output signal of the THC/NMHC/CH₄ analyzer on December 22 through 23 resulted in 23 hours of invalid data.

Maintenance to adjust the retention time on December 23 interrupted the normal operations of the THC/NMHC/CH₄ analyzer for 4 hours.

Unstable operations due to excessive baseline drift in the output signal of the THC/NMHC/CH₄ analyzer on December 30 through January 1 resulted in 45 hours of invalid data.

Station 3, Lower Camp – Meteorology

A flatline in the output signal of the wind speed, wind direction and vertical wind speed at 45-meter on December 5 resulted in 2 hours of invalid data.

Intermittent flatlines in the output signal of the wind speed, wind direction and vertical wind speed at 163-meter on December 2 and 3 resulted in 13 hours of invalid data.

Station 4, Buffalo Viewpoint

Maintenance to replace the support gas cylinder for THC/NMHC/CH₄ on December 8 resulted in 2 hours of downtime.

Maintenance to replace the PM_{2.5} analyzer with updated firmware on December 21 resulted in 1 hour of downtime.

Automated daily zero-response checks of the NO₂ analyzer did not meet WBEA's QC acceptance criteria for the month of December. Therefore, the calibrator zeros from the November, December and January multi-point calibrations were used to validate the analyzer baseline response.

Station 5, Mannix

Cleaning of the manifold on December 8 interrupted the normal operation of H₂S analyzer for 1 hour.

Failure to record data for all meteorological sensors on December 17 and 18 resulted in 9 hours of invalid data.

Flatline in the output signal of the wind speed, wind direction and vertical wind speed at 45-meter on December 5 resulted in 3 hours of invalid data.

Flatline in the output signal of the wind speed, wind direction and vertical wind speed at 75-meter on December 5 resulted in 2 hours of invalid data.

Station 6, Patricia McInnes

The NH₃ analyzer required additional time to stabilize to levels below ambient concentrations following the automated daily spans and routine monthly multipoint calibrations. NH₃ analyzers require additional time for stabilization after being exposed to high concentrations, this is due to the physical properties of the NH₃ gas. Data for 1 hour following each daily span has been reported as invalid for a total of 31 hours this month.

Unstable operations due to flatline in the output signal of PM_{2.5} analyzer on December 1 resulted in 10 hours of invalid data.

Maintenance to replace the PM_{2.5} analyzer with updated firmware on December 14 resulted in 2 hours of downtime.

Unstable operations of the NH₃ analyzer due to noisy baseline signal on December 17 and 18 resulted in 2 hours of invalid data.

Cleaning of the manifold on December 18 interrupted the normal operations of all gaseous analyzers, except for O₃ analyzer, for 1 hour.

Station 7, Athabasca Valley

Maintenance to reset logger/modem on December 14 interrupted the normal operations of all parameters for 1 hour.

Unstable operation due to TRS analyzer performance within non-compliance of AMD on December 19 to 31 resulted in 281 hours of invalid data.

Maintenance to recalibrate the TRS analyzer on December 31 resulted in 5 hours of downtime.

Unstable operations due to flatline in analyzer output signal of THC/NMHC/CH₄ analyzer on December 18 and 20 resulted in 23 hours of invalid data. Subsequent maintenances to reboot the analyzer on December 18 and 20 resulted in a further 3 hours of downtime.

Automated daily zero-response checks of the O₃ analyzer did not meet WBEA's QC acceptance criteria for the month of December. Therefore, the calibrator zeros from the November, December and January multi-point calibrations were used to validate the analyzer baseline response.

Station 8, Fort Chipewyan

Maintenance to reinitiate the daily QA check on December 5 interrupted the normal operations of CO₂ analyzer for 1 hour.

Maintenance to adjust linearity interrupted the normal operation of CO₂ analyzer on December 26 for 2 hours.

Unstable operation due to CO₂ analyzer performance within non-compliance of AMD on December 26 to January 1 resulted in 122 hours of invalid data.

Flat lines in the sensor output signal of wind sensors on December 2 resulted in 4 hours of invalid data.

Station 9, Barge Landing

No operational issues to report.

Station 11, Lower Camp

Cleaning of the sample manifold on December 19 interrupted the normal operation of H₂S analyzer for 2 hours.

Station 13, Fort McKay South

Unstable operations of the O₃ analyzer due to noisy baseline signal on December 2 through 10 resulted in 28 hours of invalid data.

Maintenance to replace UV lamp and subsequent stabilization of the O₃ analyzer on December 11 and 12 resulted in 22 hours of downtime.

Unstable operations of the O₃ analyzer due to unstable UV lamp signal on December 12 and 13 resulted in 20 hours of invalid data. Subsequent maintenance to adjust the UV lamp voltage on December 13 resulted in additional 2 hours of downtime.

A flatline in the output signal of the wind sensor on December 1 and 2 resulted in 2 hours of invalid data.

Station 14, Anzac

Station power failure on December 4 interrupted the normal operations of all air quality analyzers for 2 hours.

Cleaning of the sample manifold on December 7 interrupted the normal operations NO₂, O₃, and TRS analyzers for 2 hours.

Maintenance to replace the support gas cylinder for THC/NMHC/CH₄ analyzer on December 21 resulted in 2 hours of downtime.

Station 17, Wapasu

Unstable operations due to excessive baseline drift interrupted the normal operation of THC analyzer on December 20 and 21 resulted in 9 hours of invalid data.

Maintenance to recalibrate and replace support gas cylinder for THC analyzer on December 21 resulted in 4 hours of downtime.

Station 18, Stony Mountain

Analyzer failure due to sample pump failure of the PM_{2.5} analyzer on December 18 to 20 resulted in 40 hours of invalid data. Subsequent maintenance to replace the sample pump of PM_{2.5} analyzer on December 20 resulted in additional 1 hour of downtime.

Unstable operations of the CO analyzer due to excessive baseline drift on December 31 and January 1 resulted in 19 hours of invalid data.

Station 19, Firebag

No operational issues to report.

Station 20, MacKay River

Maintenance to replace sample pump of the NO₂ analyzer and a subsequent stabilization on December 1 resulted in 8 hours of downtime.

Station 21, Conklin

Maintenance to reinitiate the daily QA check on December 5 interrupted the normal operations of THC/NMHC/CH₄ analyzer for 2 hours.

Station operator activities on December 5 interrupted the normal operations of the THC/NMHC/CH₄ analyzer for 3 hours.

Unstable operations due to excessive baseline noise in the output signal of the THC/NMHC/CH₄ analyzer on December 8 through 11 resulted in 21 hours of invalid data. Subsequent maintenance to adjust the retention timing on December 8 and 14 and replace the analyzer on December 11 resulted in additional 8 hours of downtime.

Automated daily zero-response checks of the O₃ analyzer did not meet WBEA's QC acceptance criteria for December. Therefore, the calibrator zeros from the November, December, and January multi-point calibrations were used to validate the analyzer baseline response.

Station 22, Janvier

Maintenance to install the new firmware on December 1 interrupted the normal operation of PM_{2.5} analyzer for 1 hour.

Maintenance to replace the support gas cylinder for THC/NMHC/CH₄ analyzer on December 19 resulted in 2 hours of downtime.

Maintenance to reinitiate the daily QA check on December 23 interrupted the normal operations of NO₂, O₃, SO₂, and THC/NMHC/CH₄ analyzers for 1 to 2 hours.

Unstable operations of the THC/NMHC/CH₄ analyzer due to failure of the zero-air generator on December 22 and 23 resulted in 25 hours of invalid data.

A flatline in the output signal of the wind sensor on December 3 resulted in 1 hour of invalid data.

Station 23, Fort Hills

Maintenance to reset the logger and the modem on December 8 interrupted the normal operation of all parameters for 1 hour.

Cleaning of the manifold on December 13 interrupted the normal operations of all gaseous analyzers for 1 hour.

Station 25, Waskōw ohci Pimâtisiwin

Cleaning of the manifold on December 21 interrupted the normal operations of SO₂ and H₂S analyzers for 1 hour.

A flatline in the output signal of the wind sensor on December 2 resulted in 1 hour of invalid data.

Station 26, Christina Lake

Maintenance to replace the calibration gas cylinder on December 19 interrupted the normal operations of the H₂S analyzer for 5 hours.

Station 27, Jackfish 2/3

Failure to record data for all parameters throughout the month resulted in 16 hours of invalid data.

Unstable operations of the H₂S analyzer due to excessive baseline drift on December 25 resulted in 2 hours of invalid data.

Station 29, Surmont 2

Unstable operations of the H₂S analyzer due to excessive baseline drift on December 5 resulted in 1 hour of invalid data.

Station 30, Ells River

Maintenance to replace the support gas cylinder for THC/NMHC/CH₄ analyzer on December 15 resulted in 2 hours of downtime.

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

Station 501, Leismer

A flatline in the output signal of the wind sensor on December 1 resulted in 2 hours of invalid data.

Station 505, Sawbones Bay

Maintenance to reset the logger and the modem on December 13 interrupted the normal operation of all parameters for 1 hour.

The relative humidity sensor operated out of range on December 4 and 15 resulting in 6 hours of invalid data.

Automated daily zero-response checks of the NO₂ analyzer did not meet WBEA's QC acceptance criteria for December. Therefore, the calibrator zeros from the November, December, and January (2024) multi-point calibrations were used to validate the analyzer baseline response.

Station 507, Kirby South

A flatline in the output signal of the SO₂ analyzer on December 23 and 24 resulted in 13 hours of invalid data. Subsequent maintenance to reboot and complete multi-point verification check of the SO₂ analyzer on December 24 resulted in a further 5 hours of downtime.

Station 511, Blackgold

An internal audit on December 5 interrupted the normal operations of all air quality analyzers for 1 to 3 hours.

Cleaning of the sample manifold on December 14 interrupted the normal operations of the H₂S and NO₂ analyzers for 1 hours.

Station power failure on December 27 and 28 interrupted the normal operations of all air quality analyzers for 4 to 5 hours.

A flatline in the output signal of the wind sensor on December 1 resulted in 1 hour 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 Denny Estador 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.



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R00_2312

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION
MONTHLY AIR MONITORING SUMMARY

December 2023

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APPROVAL NUMBERS	REPORT DATE						
	MONTH	YEAR					
289664-00-00	12	2023					
241311-00-00	CONTINUOUS AMBIENT MONITORING						
20809-02-00							
149968-01-00							
237382-00-00				ONE-HOUR AVERAGE		24-HOUR AVERAGE	
48522-01-00	PARAMETER	STN. NO.	% TIME OPERATIONAL	MAXIMUM CONCENTRATION	NO. READINGS > REGULATION	MAXIMUM CONCENTRATION	NO. READINGS > REGULATION
240008-00-00	SO2(ppb)	1	100	15	0	4.1	0
48263-01-00	SO2(ppb)	2	100	52.2	0	9.1	0
224816-00-00	SO2(ppb)	4	100	9.8	0	2.2	0
151469-01-00	SO2(ppb)	5	100	424.1	2	36.3	0
189942-00-00	SO2(ppb)	6	100	21.4	0	3.9	0
206355-00-00	SO2(ppb)	7	100	12.8	0	3.0	0
46586-00-00	SO2(ppb)	8	100	9.1	0	3.6	0
73203-02-00	SO2(ppb)	9	100	7.4	0	3.6	0
216466-01-00	SO2(ppb)	11	100	146.5	0	12.5	0
137467-01-00	SO2(ppb)	13	100	10.0	0	2.5	0
236394-00-00	SO2(ppb)	14	100	15.3	0	4.2	0
254465-00-00	SO2(ppb)	17	100	34.6	0	9.9	0
094-03-00	SO2(ppb)	18	100	8.9	0	2.8	0
80105-01-00	SO2(ppb)	19	100	49.8	0	11.9	0
305529-00-00	SO2(ppb)	20	100	9.6	0	0.6	0
318401-00-00	SO2(ppb)	21	100	6.2	0	1.4	0
026-03-00	SO2(ppb)	22	100	2.5	0	1.0	0
364232-00-00	SO2(ppb)	23	100	15.8	0	3.2	0
228044-00-00	SO2(ppb)	25	100	12.6	0	3.0	0
247548-00-00	SO2(ppb)	26	100	13.2	0	3.1	0
231302-00-00	SO2(ppb)	27	98	15.1	0	2.1	0
153125-01-00	SO2(ppb)	29	100	8.5	0	1.6	0
	SO2(ppb)	30	100	6.3	0	1.9	0
	SO2(ppb)	501	100	29.9	0	8.0	0
	SO2(ppb)	505	100	20.8	0	10.6	0
	SO2(ppb)	507	98	10.5	0	2.2	0
	SO2(ppb)	511	99	17.6	0	6.5	0
	H2S(ppb)	1	100	3.3	0	1.6	0
	H2S(ppb)	2	100	13.2	4	3.2	1
	H2S(ppb)	4	100	2.9	0	1.2	0
	H2S(ppb)	5	100	12.9	1	2.4	0
	H2S(ppb)	11	100	35.8	4	3.9	1
	H2S(ppb)	17	100	0.9	0	0.4	0
	H2S(ppb)	19	100	3.3	0	0.4	0
	H2S(ppb)	20	100	0.9	0	0.3	0
	H2S(ppb)	25	100	3.3	0	1.7	0
	H2S(ppb)	26	99	1.1	0	0.5	0
	H2S(ppb)	27	98	0.8	0	0.4	0
	H2S(ppb)	29	100	0.5	0	0.2	0
	H2S(ppb)	501	100	0.9	0	0.3	0
	H2S(ppb)	505	100	1.9	0	0.9	0
	H2S(ppb)	507	100	2.1	0	0.5	0
	H2S(ppb)	511	99	1.9	0	0.5	0
	TRS(ppb)	1	100	4.7	0	2.4	0
	TRS(ppb)	6	100	1.7	0	0.9	0
	TRS(ppb)	7	62	1.1	0	0.6	0
	TRS(ppb)	8	100	0.5	0	0.3	0
	TRS(ppb)	9	100	3.6	0	1.8	0
	TRS(ppb)	13	100	4.6	0	2.0	0
	TRS(ppb)	14	99	1.6	0	0.5	0
	TRS(ppb)	18	100	0.4	0	0.3	0
	TRS(ppb)	21	100	4.1	0	0.5	0
	TRS(ppb)	22	100	0.4	0	0.3	0
	TRS(ppb)	23	100	2.9	0	0.9	0
	TRS(ppb)	30	100	2.8	0	1.0	0
	THC(ppm)	1	100	3.6	-	2.7	-
	THC(ppm)	2	86	7.1	-	2.6	-
	THC(ppm)	4	100	5.1	-	2.7	-
	THC(ppm)	5	100	4.4	-	3.1	-
	THC(ppm)	6	100	3.1	-	2.5	-
	THC(ppm)	7	96	3.1	-	2.6	-
	THC(ppm)	9	100	3.8	-	2.7	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION
MONTHLY AIR MONITORING SUMMARY

December 2023

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REPORT DATE							
MONTH	YEAR						
12	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	3.1	-	2.5	-
241311-00-00	THC(ppm)	13	100	4.0	-	2.7	-
20809-02-00	THC(ppm)	14	99	3.2	-	2.3	-
149968-01-00	THC(ppm)	17	98	2.9	-	2.5	-
237382-00-00	THC(ppm)	18	100	2.3	-	2.2	-
48522-01-00	THC(ppm)	19	100	2.7	-	2.5	-
240008-00-00	THC(ppm)	20	100	3.2	-	2.6	-
48263-01-00	THC(ppm)	21	96	2.5	-	2.3	-
224816-00-00	THC(ppm)	22	96	2.4	-	2.2	-
151469-01-00	THC(ppm)	23	100	7.9	-	4.0	-
189942-00-00	THC(ppm)	29	100	2.6	-	2.5	-
206355-00-00	THC(ppm)	30	100	4.3	-	2.8	-
46586-00-00	THC(ppm)	507	100	3.3	-	2.6	-
73203-02-00	THC(ppm)	511	99	3.0	-	2.6	-
216466-01-00	O3(ppb)	1	100	39.6	0	29.8	-
137467-01-00	O3(ppb)	4	100	43.8	0	39.0	-
236394-00-00	O3(ppb)	6	100	43.7	0	37.4	-
254465-00-00	O3(ppb)	7	100	46.7	0	34.7	-
094-03-00	O3(ppb)	8	100	41.0	0	39.0	-
80105-01-00	O3(ppb)	13	90	41.8	0	29.9	-
305529-00-00	O3(ppb)	14	99	44.6	0	38.8	-
318401-00-00	O3(ppb)	17	100	42.0	0	36.6	-
026-03-00	O3(ppb)	18	100	38.5	0	35.4	-
364232-00-00	O3(ppb)	21	100	40.9	0	37.5	-
228044-00-00	O3(ppb)	22	100	45.1	0	40.7	-
247548-00-00	NO2(ppb)	1	100	33.1	0	21.4	-
231302-00-00	NO2(ppb)	4	100	39.4	0	19.2	-
153125-01-00	NO2(ppb)	6	100	34.7	0	17.3	-
	NO2(ppb)	7	100	33.2	0	18.8	-
	NO2(ppb)	8	100	19.8	0	8.6	-
	NO2(ppb)	9	100	37.9	0	24.8	-
	NO2(ppb)	13	100	33.8	0	17.5	-
	NO2(ppb)	14	99	28.2	0	11.2	-
	NO2(ppb)	17	100	28.6	0	11.1	-
	NO2(ppb)	18	100	9.6	0	5.5	-
	NO2(ppb)	19	100	29.8	0	12.2	-
	NO2(ppb)	20	99	33.9	0	9.4	-
	NO2(ppb)	21	100	16.0	0	6.7	-
	NO2(ppb)	22	100	9.6	0	6.4	-
	NO2(ppb)	23	100	65.4	0	33.2	-
	NO2(ppb)	26	100	19.7	0	9.3	-
	NO2(ppb)	27	98	10.1	0	4.7	-
	NO2(ppb)	29	100	20.4	0	8.9	-
	NO2(ppb)	30	100	33.0	0	18.6	-
	NO2(ppb)	501	100	19.2	0	8.3	-
	NO2(ppb)	505	100	20.8	0	12.7	-
	NO2(ppb)	507	100	13.0	0	6.3	-
	NO2(ppb)	511	99	37.3	0	10.7	-
	CO(ppm)	1	100	0.4	0	0.3	-
	CO(ppm)	7	100	0.8	0	0.3	-
	CO(ppm)	8	100	0.2	0	0.1	-
	CO(ppm)	18	97	0.2	0	0.2	-
	CO2(ppm)	1	100	469.7	-	454.5	-
	CO2(ppm)	8	83	459.4	-	450.3	-
	CO2(ppm)	18	100	452.6	-	446.8	-
	NH3(ppb)	1	96	0.0	0	0.0	-
	NH3(ppb)	6	95	0.0	0	0.0	-
	PM2.5(ug/m3)	1	100	45.5	0	18.7	0
	PM2.5(ug/m3)	4	100	62.0	0	25.8	0
	PM2.5(ug/m3)	6	98	34.3	0	18.1	0
	PM2.5(ug/m3)	7	100	24.1	0	13.5	0
	PM2.5(ug/m3)	8	100	36.8	0	21.2	0
	PM2.5(ug/m3)	9	100	36.8	0	22.1	0
	PM2.5(ug/m3)	13	100	25.6	0	18.0	0

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION
MONTHLY AIR MONITORING SUMMARY


December 2023

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REPORT DATE	
MONTH	YEAR
12	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	56	0	11.8	0
241311-00-00	PM2.5(ug/m3)	17	100	18	0	9.6	0
20809-02-00	PM2.5(ug/m3)	18	94	16	0	9.7	0
149968-01-00	PM2.5(ug/m3)	21	100	78.8	0	17.3	0
237382-00-00	PM2.5(ug/m3)	22	100	26.1	0	8.6	0
48522-01-00	PM2.5(ug/m3)	23	100	39.7	0	19.3	0
240008-00-00	PM2.5(ug/m3)	29	100	14.3	0	9.3	0
48263-01-00	PM2.5(ug/m3)	30	100	34.9	0	21.2	0
224816-00-00	WS(km/h)	1	100	-	-	-	-
151469-01-00	WS(km/h)	2	99	-	-	-	-
189942-00-00	WS(km/h)	4	100	-	-	-	-
206355-00-00	WS(km/h)	5	99	-	-	-	-
46586-00-00	WS(km/h)	6	100	-	-	-	-
73203-02-00	WS(km/h)	7	100	-	-	-	-
216466-01-00	WS(km/h)	8	99	-	-	-	-
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	100	-	-	-	-
026-03-00	WS(km/h)	19	100	-	-	-	-
364232-00-00	WS(km/h)	20	100	-	-	-	-
228044-00-00	WS(km/h)	21	100	-	-	-	-
247548-00-00	WS(km/h)	22	100	-	-	-	-
231302-00-00	WS(km/h)	23	100	-	-	-	-
153125-01-00	WS(km/h)	25	100	-	-	-	-
	WS(km/h)	26	100	-	-	-	-
	WS(km/h)	27	98	-	-	-	-
	WS(km/h)	29	100	-	-	-	-
	WS(km/h)	30	100	-	-	-	-
	WS(km/h)	501	100	-	-	-	-
	WS(km/h)	505	100	-	-	-	-
	WS(km/h)	507	100	-	-	-	-
	WS(km/h)	511	100	-	-	-	-
				FOR ALBERTA ENVIRONMENT USE ONLY			
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 DECEMBER 2023

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

January 31, 2024

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FORT MCKAY - BERTHA GANTER (AMS01)
DECEMBER 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	709	35	35	100	14.5	0	4.1	0
H2S(ppb) Average	705	39	39	100	3.3	0	1.6	0
TRS(ppb) Average	703	39	41	99.73	4.7	0	2.4	0
THC(ppm) Average	709	35	35	100	3.6	-	2.7	-
NMHC(ppm) Average	709	35	35	100	0.379	-	0.175	-
CH4(ppm) Average	709	35	35	100	3.3	-	2.5	-
O3 (ppb) Average	710	34	34	100	39.6	0	29.8	-
NO2 (ppb) Average	708	36	36	100	33.1	0	21.4	-
NO (ppb) Average	708	36	36	100	101.7	-	38.4	-
NOX (ppb) Average	708	36	36	100	121.3	-	55.4	-
NH3 (ppb) Average	669	42	75	95.56	0	0	0	-
PM2.5 (ug/m3) Average	742	2	2	100	45.5	0	18.7	0
CO(ppm) Average	709	35	35	100	0.4	0	0.3	0
CO2(ppm) Average	709	35	35	100	469.7	0	454.5	0
Temperature 2 m (C) Average	744	0	0	100	5.9	-	0.7	-
Temperature 10 m (C) Average	744	0	0	100	6.4	-	1.9	-
Relative Humidity (%) Average	744	0	0	100	96.6	-	91.6	-
Wind Speed 10 m (km/h) Average	744	0	0	100	20	-	12	-
Wind Direction 10 m (deg) Average	744	0	0	100	-	-	-	-
Precipitation (mm) Total	712	0	32	95.7	0.6	-	2.8	-
Leaf Wetness (% of range) Average	742	0	2	99.73	31.3	-	13.5	-
Global Solar Radiation (W/m2) Average	744	0	0	100	267	-	44.4	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - BERTHA GANTER FORT MCKAY (AMS01)
 DECEMBER 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	709	0.91	1.7	-	0	0	0.1	0.3	1	2.5	14.5
H2S (ppb) Average	705	0.52	0.5	-	0	0.1	0.1	0.3	0.8	1.2	3.3
TRS (ppb) Average	703	0.89	0.7	-	0.3	0.4	0.4	0.6	1.2	1.8	4.7
THC (ppm) Average	709	2.23	0.3	-	1.9	1.9	2	2.2	2.4	2.6	3.6
NMHC(ppm) Average	709	0.057	0.071	-	0	0	0	0	0.1	0.2	0.379
CH4(ppm) Average	709	2.17	0.2	-	1.9	1.9	2	2.1	2.3	2.4	
O3 (ppb) Average	710	12.91	10.6	-	0.1	0.7	3.2	11	20.9	28.4	39.6
NO2 (ppb) Average	708	12.62	7.7	-	0	0.8	6.6	13.4	18.3	22.3	33.1
NO (ppb) Average	708	6.94	13.4	-	0	0	0	1.1	7.2	23.2	101.7
NOX (ppb) Average	708	19.56	18.1	-	0	0.8	7	15.7	26.3	42.5	121.3
NH3 (ppb) Average	669	0	0	-	0	0	0	0	0	0	0
PM2.5 (ug/m3) Average	742	6.59	5.2	-	0.3	1.5	2.9	5.2	8.6	13.3	45.5
CO(ppm) Average	709	0.25	0	-	0.2	0.2	0.2	0.2	0.3	0.3	0.4
CO2(ppm) Average	709	436.19	10	-	421.9	424.4	427.6	435	443.2	450.2	469.7
Temperature 2 m (C) Average	744	-6.93	5.4	-	-18.3	-13.7	-11.1	-7.4	-2.7	0.8	5.9
Temperature 10 m (C) Average	744	-6.38	5.4	-	-17.3	-13.3	-10.5	-6.7	-2.4	1.4	6.4
Relative Humidity (%) Average	744	76.9	11.4	-	41.9	59.2	70.4	80.5	85	89.2	96.6
Wind Speed 10 m (km/h) Average	744	6.1	3	-	0	2	4	5	8	10	20
Wind Direction 10 m (deg) Average	744	-	-	-	-	-	-	-	-	-	-
Precipitation (mm) Total	712	-	-	5.88	-	-	-	-	-	-	-
Leaf Wetness (% of range) Average	742	4.48	3.1	-	1.9	2.4	2.6	3.7	5.5	6.3	31.3
Global Solar Radiation (W/m2) Average	744	26.1	54.8	-	0	0	0	0	11.2	122.4	267

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

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
TRS	06 Dec 2023 14:00	06 Dec 2023 14:00	1	Unstable Operation - flatline in analyzer output signal
TRS	06 Dec 2023 15:00	06 Dec 2023 15:00	1	Maintenance - analyzer rebooted
NH3	01 Dec 2023 04:00	31 Dec 2023 05:00	32	Stabilization after daily QA check
NH3	12 Dec 2023 01:00	12 Dec 2023 01:00	1	Unstable Operation - excessive baseline drift
Precipitation Collector	04 Dec 2023 01:00	05 Dec 2023 08:00	32	DAS Failure - data not recorded
Surface Leaf Wetness	06 Dec 2023 12:00	06 Dec 2023 13:00	2	Sensor operated out of range



Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 14.5 ppb on Dec 20 09:00	Maximum Daily Average: 4.1 ppb on Dec 25		Hours of Data:	709
Minimum Value: 0.0 ppb on Dec 2 05:00	Minimum Daily Average: 0.0 ppb on Dec 19		Hours of Missing Data:	35
Maximum Diurnal Average: 2.0 ppb at hour 15	Minimum Diurnal Average: 0.3 ppb at hour 3		Hours of Calibration:	35
Monthly Average: 0.91 ppb	Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.1 Median = 0.3 Q ₃ = 1.0 P ₉₀ = 2.5 P ₉₉ = 8.3		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-Dec	0.0	0.0	0.1	0.0	0.1	Z	0.3	0.4	0.3	0.3	0.2	0.2	0.4	1.0	0.5	0.2	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.4	0.2	1.0
2-Dec	Z	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.3	0.7	0.6	0.5	0.2	0.1	0.2	0.1	0.1	0.2	0.1	0.2	0.2	0.7
3-Dec	0.2	Z	0.1	0.2	0.3	0.6	0.4	0.3	0.3	0.2	0.3	1.2	2.3	1.9	1.2	1.0	0.9	1.3	0.6	0.5	0.4	0.4	0.4	0.4	0.7	2.3
4-Dec	0.4	0.4	Z	0.7	0.6	0.8	0.6	0.7	0.6	0.9	1.0	0.7	0.7	0.7	0.5	0.2	0.2	0.2	0.4	0.5	1.1	1.0	1.0	0.9	0.6	1.1
5-Dec	1.2	0.9	1.3	2.1	Z	2.6	3.3	2.8	1.6	2.9	2.0	1.9	0.5	0.6	0.8	1.9	1.4	0.4	0.2	0.0	0.0	0.0	0.0	0.0	1.2	3.3
6-Dec	0.0	0.1	0.1	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.2	0.0	0.1	0.1	0.1	0.0	0.0	0.1	0.2
7-Dec	Z	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.1	0.2	0.1	0.1	0.6	1.0	0.3	0.4	0.4	0.4	0.3	0.3	0.2	0.2	0.2	1.0
8-Dec	0.1	Z	0.0	0.0	0.1	0.1	0.1	0.0	0.1	0.0	0.1	0.0	0.1	0.0	0.1	0.8	0.9	0.4	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.9
9-Dec	0.1	0.1	Z	0.0	0.1	0.0	0.0	0.1	0.3	0.2	0.3	0.4	0.7	4.6	3.6	1.4	0.3	0.2	0.3	0.4	0.5	0.6	0.4	0.5	0.7	4.6
10-Dec	0.5	0.4	0.3	Z	0.5	0.7	0.5	0.5	2.6	1.5	2.1	0.5	0.3	0.3	0.3	0.2	0.1	0.1	0.1	0.0	0.1	0.0	0.0	0.0	0.5	2.6
11-Dec	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	2.2	0.7	0.0	0.0	0.0	0.0	0.0	0.1	2.2
12-Dec	0.0	0.0	0.1	0.1	0.5	Z	1.7	1.2	0.9	0.7	0.5	1.2	1.2	2.1	2.3	1.2	0.5	0.3	1.1	2.2	2.1	0.6	0.5	1.7	1.0	2.3
13-Dec	Z	1.0	1.6	1.0	0.5	0.5	0.6	0.6	0.7	1.4	C	C	C	C	9.8	6.3	1.2	0.3	0.3	1.1	1.4	4.8	4.0	3.2	2.1	9.8
14-Dec	1.3	Z	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	0.0	0.0	0.0	0.0	0.0	1.1	0.1	1.3
15-Dec	1.5	1.9	Z	1.0	0.3	0.2	0.4	0.3	0.8	3.3	3.9	4.7	1.3	0.2	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.1	0.1	0.9	4.7
16-Dec	0.1	0.1	0.2	Z	0.1	0.1	0.1	0.1	0.0	0.1	0.0	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.1	0.1	0.1	0.2
17-Dec	0.2	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.1	0.2	1.3	2.7	6.8	6.5	7.7	7.0	6.0	5.0	4.8	6.0	6.8	3.8	1.9	0.7	2.9	7.7
18-Dec	0.5	0.5	0.2	0.1	0.1	Z	0.2	0.1	0.1	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	0.1	0.5
19-Dec	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
20-Dec	0.0	Z	0.0	0.1	3.3	4.7	3.3	6.5	14.5	9.3	11.4	4.7	2.7	1.4	0.8	2.0	0.8	0.5	1.1	1.5	1.6	1.6	0.9	0.8	3.2	14.5
21-Dec	0.3	0.3	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.3	0.2	1.1	4.5	6.0	2.7	3.1	2.2	1.2	1.2	1.0	0.4	0.4	0.3	1.1	6.0
22-Dec	0.2	0.2	0.2	Z	0.3	0.2	0.1	0.2	0.1	0.3	0.5	0.7	0.7	1.3	1.1	0.8	0.6	0.6	0.6	0.5	0.6	0.7	0.4	0.4	0.5	1.3
23-Dec	0.4	0.2	0.2	0.1	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	0.4
24-Dec	0.0	0.0	0.0	0.0	0.0	Z	3.3	3.9	0.9	0.1	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.8	2.3	1.3	0.8	0.6	3.9
25-Dec	Z	0.8	0.6	0.6	0.9	1.6	2.0	2.4	3.2	3.3	4.9	8.2	8.3	10.6	6.9	5.3	10.7	6.3	3.4	2.3	3.4	3.5	2.3	2.6	4.1	10.7
26-Dec	1.2	Z	0.7	0.5	0.6	0.7	1.1	0.7	1.0	1.1	1.3	2.2	2.2	2.2	1.4	1.1	2.4	5.8	5.2	2.7	3.4	2.8	1.1	0.9	1.8	5.8
27-Dec	0.5	0.2	Z	0.2	0.2	0.2	0.7	1.7	1.1	0.5	0.5	0.4	2.0	4.1	9.3	6.1	2.5	1.4	0.9	0.6	0.4	0.3	0.2	0.2	1.5	9.3
28-Dec	0.1	0.4	0.4	Z	0.4	0.5	0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.2	0.5
29-Dec	0.1	0.1	0.1	0.0	Z	0.4	0.6	1.7	1.5	1.5	1.1	0.9	2.1	1.5	2.6	5.4	4.7	4.2	2.1	1.7	1.3	0.3	0.2	0.1	1.5	5.4
30-Dec	0.4	0.5	0.9	1.5	1.3	Z	0.6	0.5	0.4	0.4	1.2	2.7	2.2	1.8	2.0	1.4	1.4	2.1	1.4	1.7	1.0	0.8	0.8	0.8	1.2	2.7
31-Dec	Z	0.2	0.1	0.0	0.0	0.4	0.2	0.1	0.1	0.1	0.6	1.4	3.5	3.8	3.1	1.2	0.5	0.4	0.3	0.2	0.2	0.2	0.2	0.1	0.7	3.8

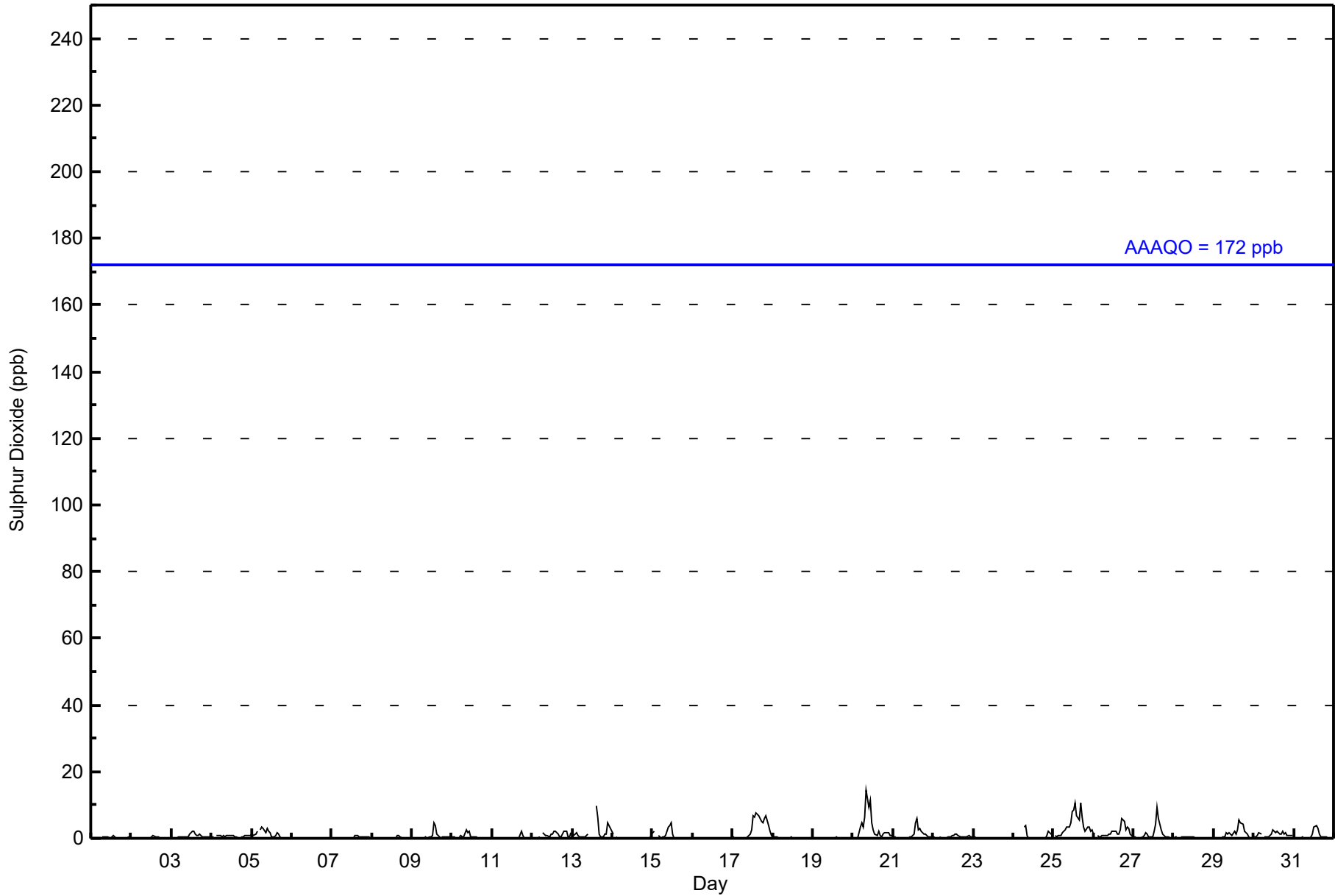
0.4	0.3	0.3	0.3	0.4	0.6	0.7	0.8	1.0	0.9	1.1	1.2	1.3	1.7	2.0	1.5	1.3	1.1	0.8	0.8	0.9	0.8	0.5	0.5	Diurnal Average	
1.5	1.9	1.6	2.1	3.3	4.7	3.3	6.5	14.5	9.3	11.4	8.2	8.3	10.6	9.8	7.0	10.7	6.3	5.2	6.0	6.8	4.8	4.0	3.2	Diurnal Maximum	

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



Wood Buffalo Environmental Association
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Fort McKay - Bertha Ganter - December 2023





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Fort McKay - Bertha Ganter - December 2023

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	705	99.44	99.44
11 - 20	4	0.56	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: 709

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Fort McKay - Bertha Ganter - December 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	20	11	3	2	4	6	24	252	116	80	50	45	29	14	15	705
11 - 20	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	4
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	34	20	11	3	2	4	6	24	256	116	80	50	45	29	14	15	709

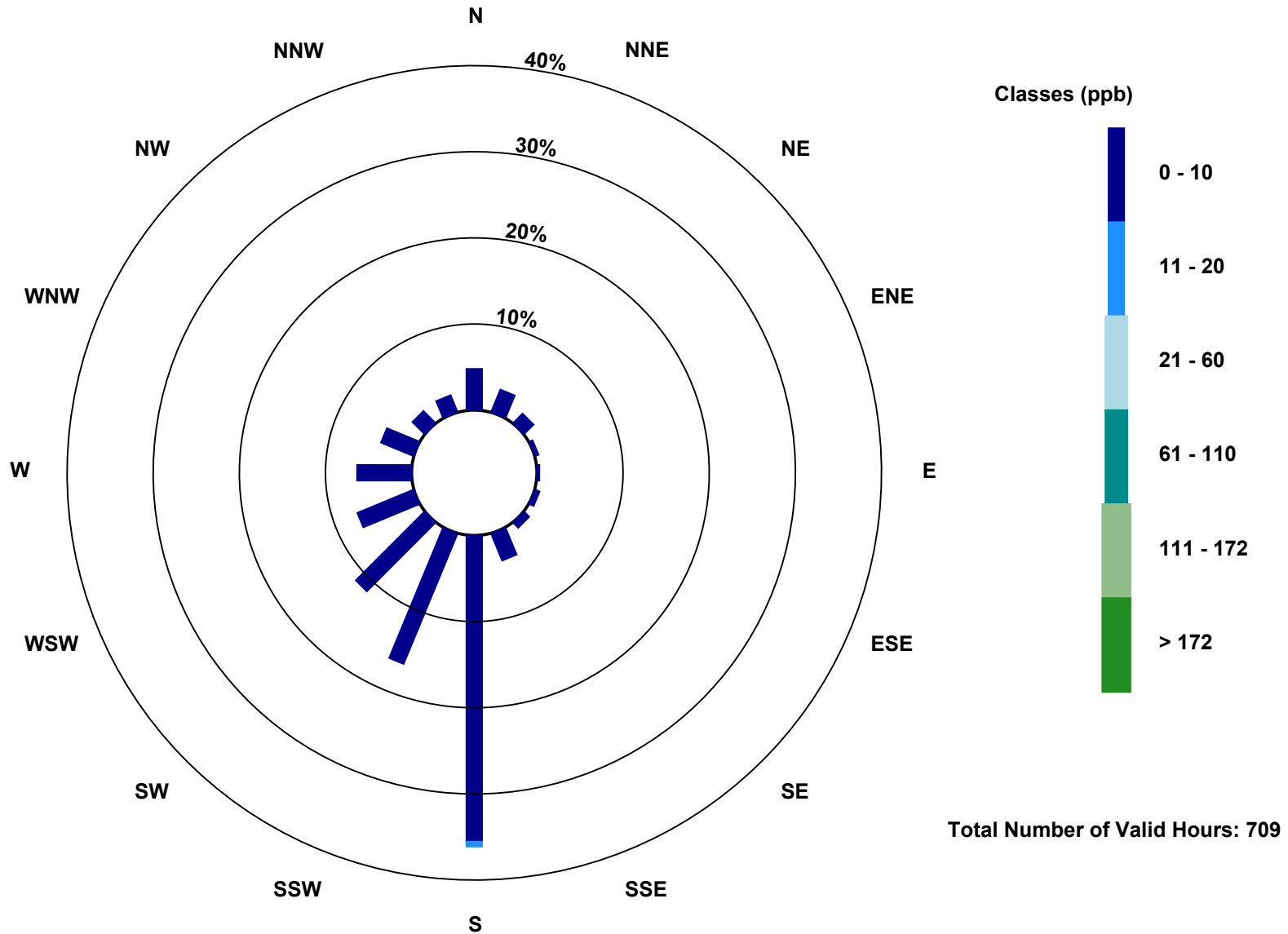
Total Number of Valid Hours: 709

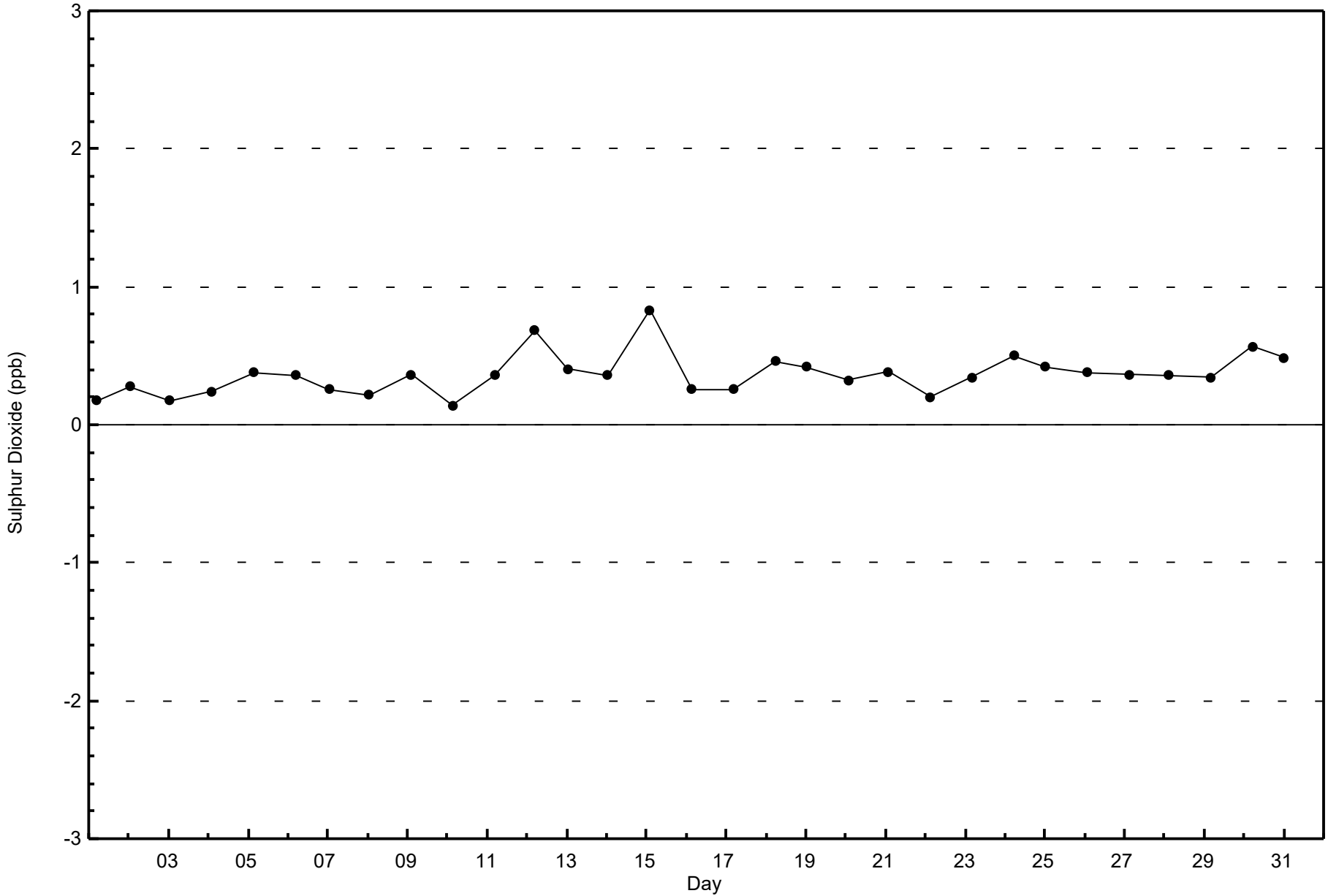
Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Dec 2023

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

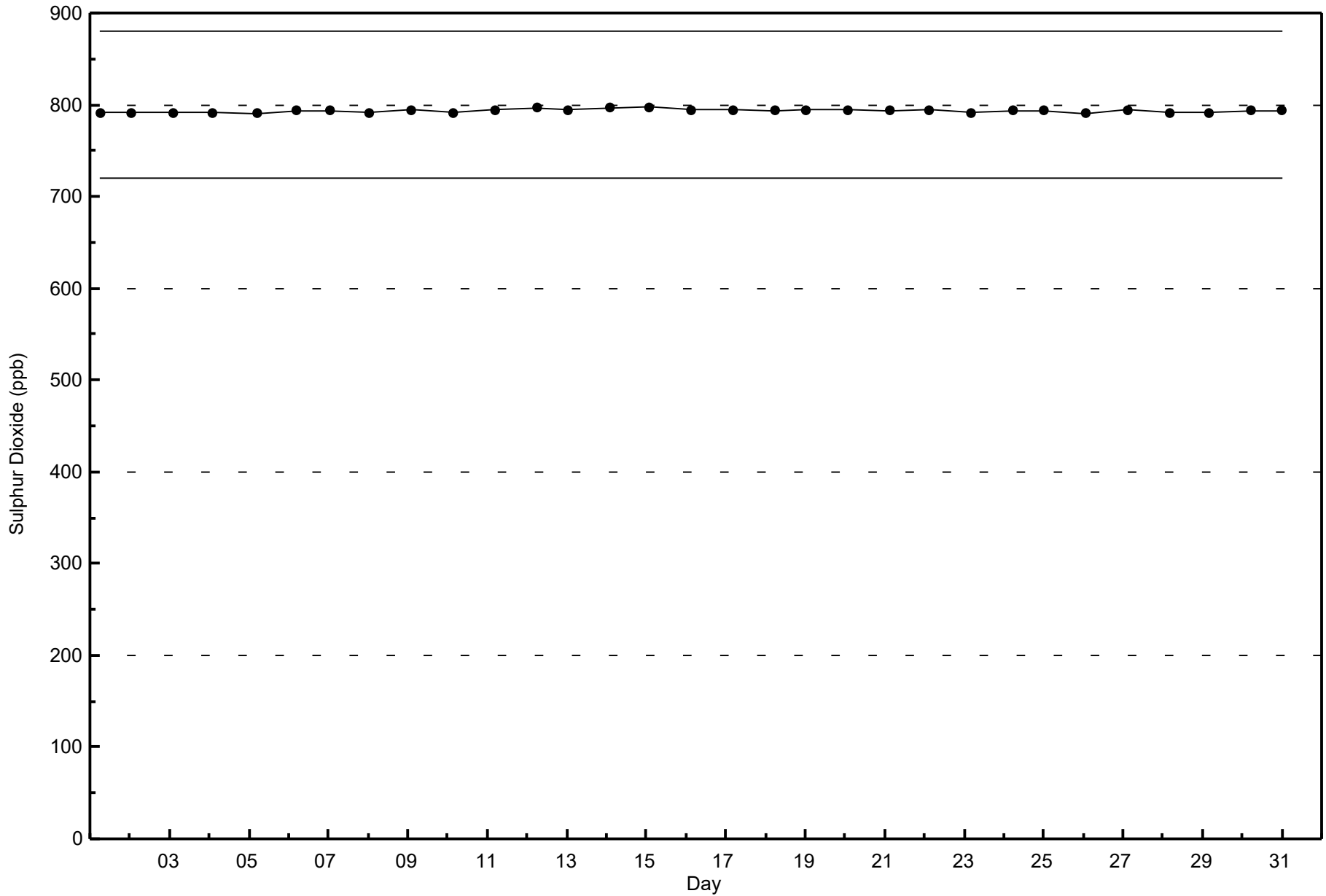






Wood Buffalo Environmental Association
Span Responses

Sulphur Dioxide (SO₂) - ppb
Fort McKay - Bertha Ganter - December 2023

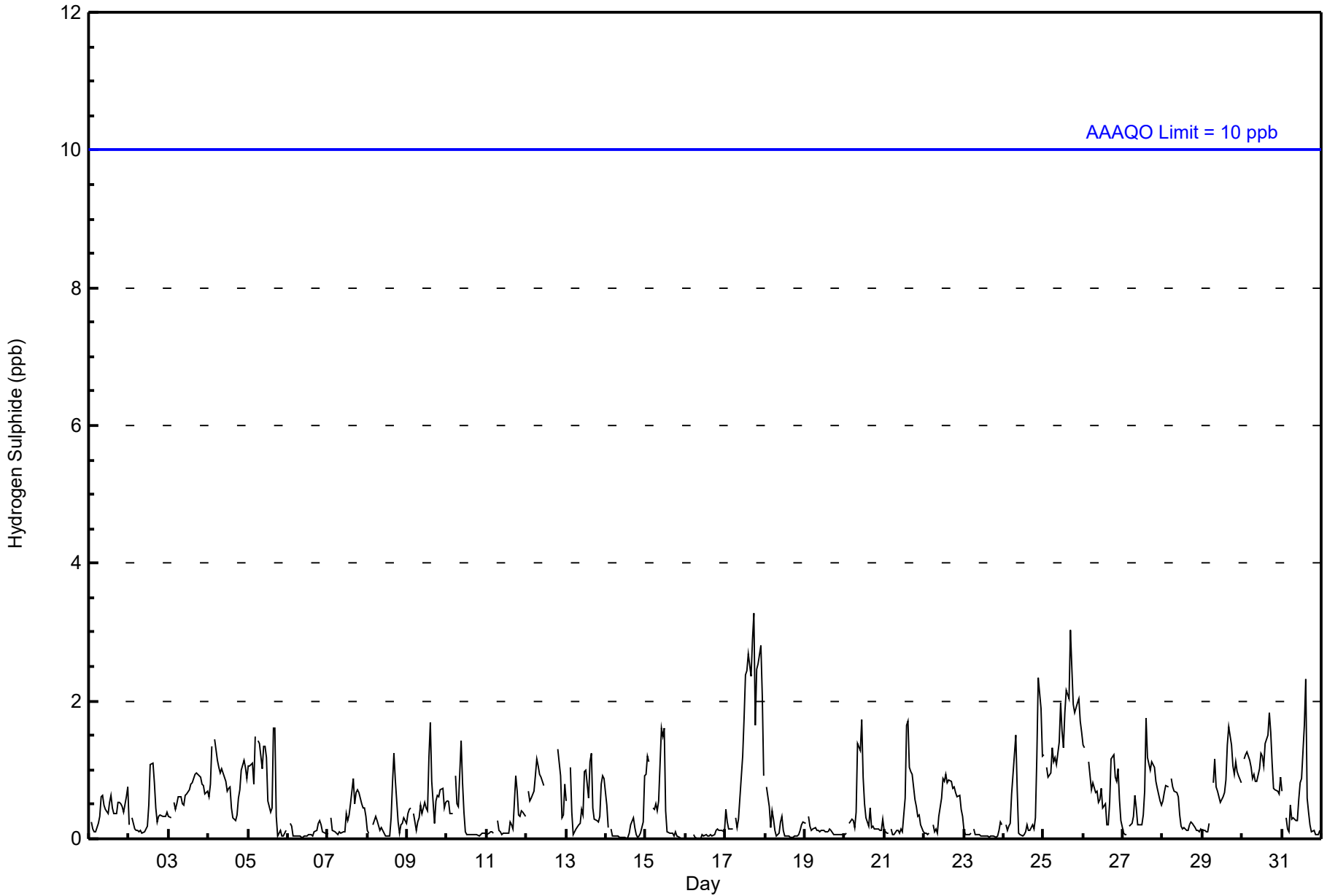




Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 3.3 ppb on Dec 17 18:00	Maximum Daily Average: 1.6 ppb on Dec 25		Hours of Data:	705
Minimum Value: 0.0 ppb on Dec 15 22:00	Minimum Daily Average: 0.1 ppb on Dec 16		Hours of Missing Data:	39
Maximum Diurnal Average: 0.7 ppb at hour 15	Minimum Diurnal Average: 0.3 ppb at hour 4		Hours of Calibration:	39
Monthly Average: 0.52 ppb	Percentiles: P ₁ = 0.0 P ₁₀ = 0.1 Q ₁ = 0.1 Median = 0.3 Q ₃ = 0.8 P ₉₀ = 1.2 P ₉₉ = 2.5		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-Dec	Z	0.2	0.1	0.1	0.1	0.2	0.3	0.6	0.6	0.5	0.4	0.4	0.5	0.6	0.5	0.4	0.4	0.5	0.5	0.5	0.5	0.4	0.6	0.7	0.4	0.7																						
2-Dec	0.2	Z	0.3	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.5	1.1	1.1	0.8	0.4	0.2	0.3	0.4	0.3	0.3	0.3	0.4	0.3	1.1																						
3-Dec	0.3	0.3	Z	0.5	0.4	0.5	0.6	0.6	0.5	0.5	0.6	0.6	0.7	0.8	0.8	0.9	0.9	1.0	0.9	0.9	0.8	0.8	0.6	0.7	0.7	1.0																						
4-Dec	0.6	0.8	1.3	Z	1.5	1.1	1.0	1.0	1.0	0.9	0.8	0.7	0.7	0.7	0.5	0.3	0.3	0.3	0.6	0.7	1.0	1.1	1.0	0.9	0.8	1.5																						
5-Dec	1.1	1.0	1.1	0.8	1.5	Z	1.4	1.4	1.0	1.3	1.3	1.2	0.6	0.4	0.5	1.6	1.6	0.3	0.0	0.1	0.0	0.0	0.1	0.1	0.8	1.6																						
6-Dec	Z	0.2	0.2	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	0.2	0.3	0.2	0.1	0.1	0.1	0.1	0.3																						
7-Dec	0.1	Z	0.3	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.4	0.3	0.3	0.5	0.9	0.5	0.7	0.7	0.7	0.5	0.4	0.5	0.3	0.9																						
8-Dec	0.1	0.1	Z	0.2	0.3	0.3	0.3	0.1	0.2	0.1	0.1	0.0	0.0	0.0	0.3	0.8	1.2	0.9	0.3	0.1	0.2	0.2	0.3	0.2	0.3	1.2																						
9-Dec	0.4	0.4	0.5	Z	0.4	0.1	0.2	0.3	0.5	0.4	0.5	0.5	0.4	1.2	1.7	0.8	0.2	0.5	0.6	0.6	0.7	0.7	0.4	0.5	0.5	1.7																						
10-Dec	0.5	0.5	0.4	0.4	Z	0.9	0.5	0.5	1.4	0.8	0.4	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	0.3	1.4																						
11-Dec	0.1	0.1	0.1	0.1	0.1	Z	0.3	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.9	0.7	0.4	0.3	0.4	0.4	0.3	0.2	0.9																						
12-Dec	Z	0.7	0.5	0.6	0.7	0.9	1.2	1.1	0.9	0.9	0.8	C	C	C	C	C	C	C	C	1.3	0.9	0.3	0.3	0.8	--	1.3																						
13-Dec	0.5	Z	1.0	0.4	0.1	0.1	0.1	0.2	0.2	0.4	0.3	1.0	1.0	0.6	1.1	1.2	0.5	0.3	0.3	0.2	0.3	0.8	0.9	0.9	0.5	1.2																						
14-Dec	0.5	0.2	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	0.2	0.3	0.2	0.1	0.0	0.0	0.1	0.2	0.9	0.1	0.9																						
15-Dec	0.9	1.2	1.1	Z	0.4	0.4	0.5	0.4	0.5	1.6	1.5	1.6	0.4	0.1	0.1	0.1	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.5	1.6																						
16-Dec	0.0	0.0	0.0	0.0	Z	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1																						
17-Dec	0.4	0.2	0.1	0.1	0.1	Z	0.3	0.2	0.3	0.6	1.2	1.7	2.4	2.4	2.7	2.4	2.9	3.3	1.6	2.5	2.5	2.8	2.1	0.9	1.5	3.3																						
18-Dec	Z	0.7	0.5	0.2	0.4	0.3	0.1	0.0	0.1	0.2	0.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.2	0.2	0.7																						
19-Dec	0.2	Z	0.3	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	0.1	0.1	0.1	0.1	0.1	0.3																						
20-Dec	0.1	0.1	Z	0.2	0.3	0.3	0.2	0.4	1.4	1.3	1.7	0.9	0.5	0.3	0.2	0.4	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.3	0.4	1.7																						
21-Dec	0.1	0.1	0.1	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.6	1.7	1.7	1.0	1.0	0.9	0.6	0.5	0.3	0.4	0.2	0.1	0.4	1.7																						
22-Dec	0.1	0.1	0.1	0.1	Z	0.2	0.1	0.1	0.1	0.3	0.6	0.9	0.8	0.9	0.8	0.9	0.8	0.7	0.8	0.7	0.6	0.6	0.4	0.3	0.5	0.9																						
23-Dec	0.1	0.1	0.1	0.1	0.1	Z	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	0.2	0.2	0.1	0.2																						
24-Dec	Z	0.2	0.1	0.2	0.2	0.6	1.2	1.5	0.7	0.1	0.1	0.0	0.1	0.1	0.2	0.1	0.1	0.2	0.1	0.3	1.2	2.3	1.9	1.2	0.6	2.3																						
25-Dec	1.2	Z	1.0	0.9	1.0	1.3	1.1	1.2	1.1	1.4	2.0	1.6	1.3	1.8	2.2	2.0	3.0	2.5	2.0	1.8	2.0	2.0	1.7	1.5	1.6	3.0																						
26-Dec	1.4	1.3	Z	1.1	0.9	0.7	0.8	0.7	0.7	0.5	0.6	0.7	0.5	0.5	0.2	0.2	0.5	1.2	1.2	0.9	0.8	1.0	0.6	0.3	0.8	1.4																						
27-Dec	0.1	0.1	0.1	Z	0.2	0.2	0.3	0.6	0.4	0.2	0.2	0.2	0.4	0.7	1.7	1.2	1.0	1.1	1.1	1.0	0.8	0.7	0.6	0.5	0.6	1.7																						
28-Dec	0.5	0.7	0.8	0.8	Z	0.9	0.7	0.7	0.7	0.6	0.4	0.2	0.1	0.2	0.1	0.1	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.4	0.9																						
29-Dec	0.1	0.1	0.1	0.1	0.2	Z	0.8	1.2	0.7	0.7	0.6	0.5	0.6	0.7	0.9	1.4	1.6	1.4	1.1	0.9	1.1	1.0	0.9	0.8	0.8	1.6																						
30-Dec	Z	1.2	1.2	1.3	1.1	1.0	0.9	0.9	0.8	0.8	1.0	1.2	1.2	1.1	1.4	1.5	1.8	1.6	1.1	0.7	0.7	0.7	0.7	0.9	1.1	1.8																						
31-Dec	0.7	Z	0.3	0.1	0.1	0.5	0.3	0.3	0.3	0.3	0.6	0.8	0.9	1.6	2.3	0.6	0.4	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.5	2.3																						
																								0.4	0.4	0.5	0.3	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.6	0.7	0.7	0.7	0.7	0.5	0.5	0.5	0.6	0.5	0.5	Diurnal Average
																								1.4	1.3	1.3	1.3	1.5	1.3	1.4	1.5	1.4	1.6	2.0	1.7	2.4	2.4	2.7	2.4	3.0	3.3	2.0	2.5	2.5	2.8	2.1	1.5	Diurnal Maximum

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Hydrogen Sulphide (H₂S) - ppb
Fort McKay - Bertha Ganter - December 2023**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	699	99.15	99.15
3 - 4	6	0.85	100.00
5 - 7	0	0.00	100.00
8 - 11	0	0.00	100.00
> 11	0	0.00	100.00

Total Number of Valid Hours: 705

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Hydrogen Sulphide (H₂S) - ppb
Fort McKay - Bertha Ganter - December 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	32	20	11	3	2	3	6	22	251	115	79	53	45	26	17	14	699
3 - 4	0	0	0	0	0	0	0	0	5	1	0	0	0	0	0	0	6
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	32	20	11	3	2	3	6	22	256	116	79	53	45	26	17	14	705

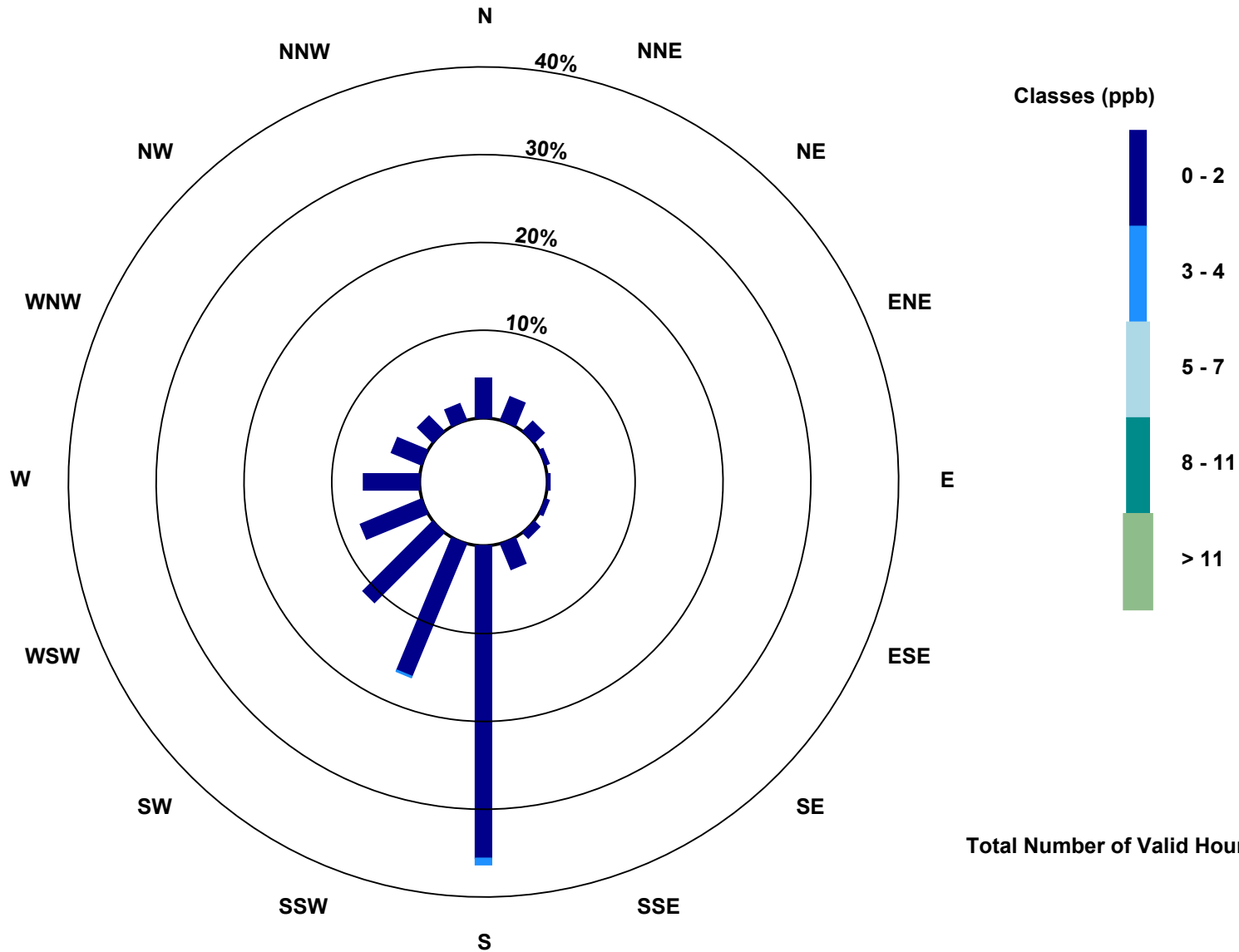
Total Number of Valid Hours: 705

Total Number of Hours: 744

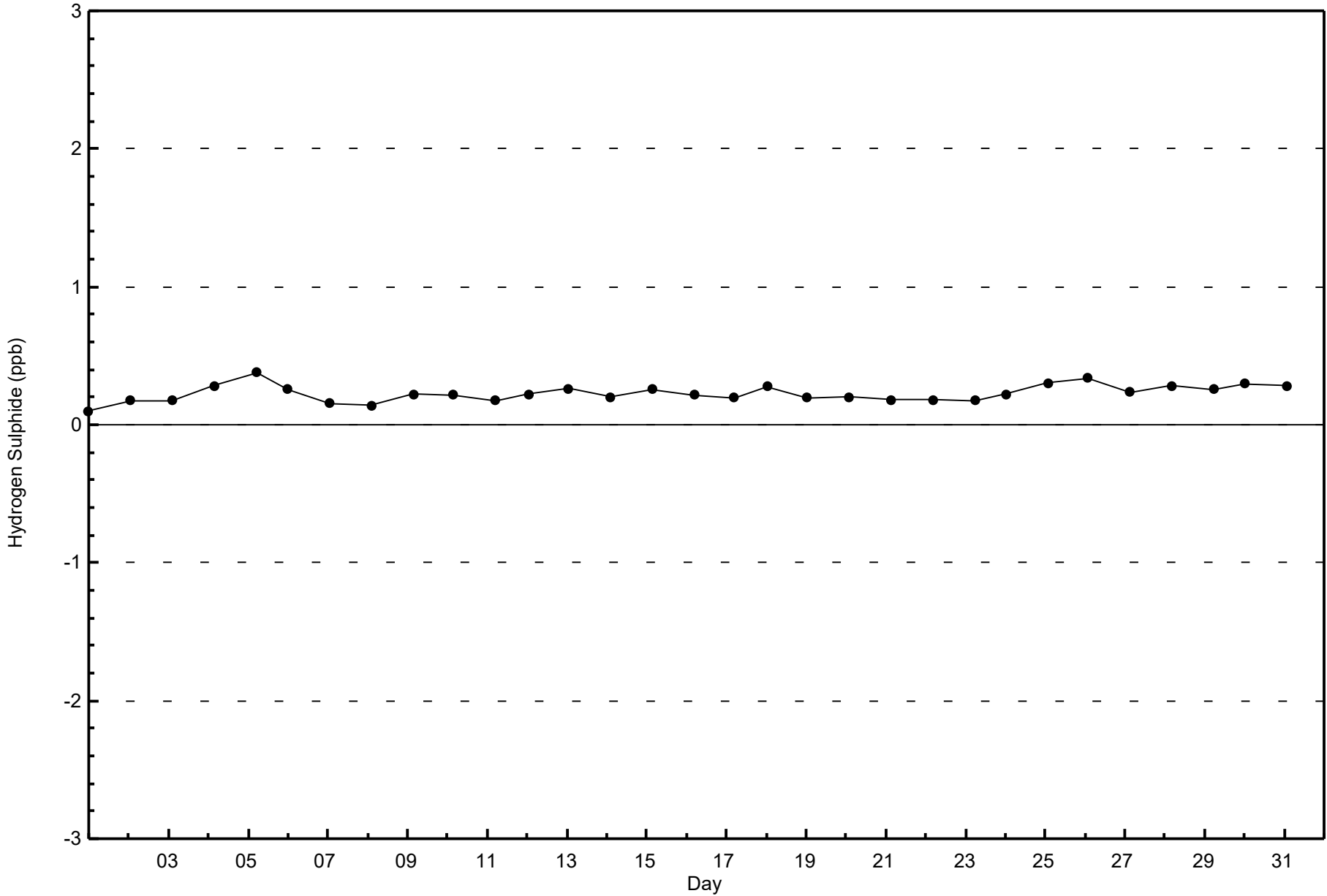


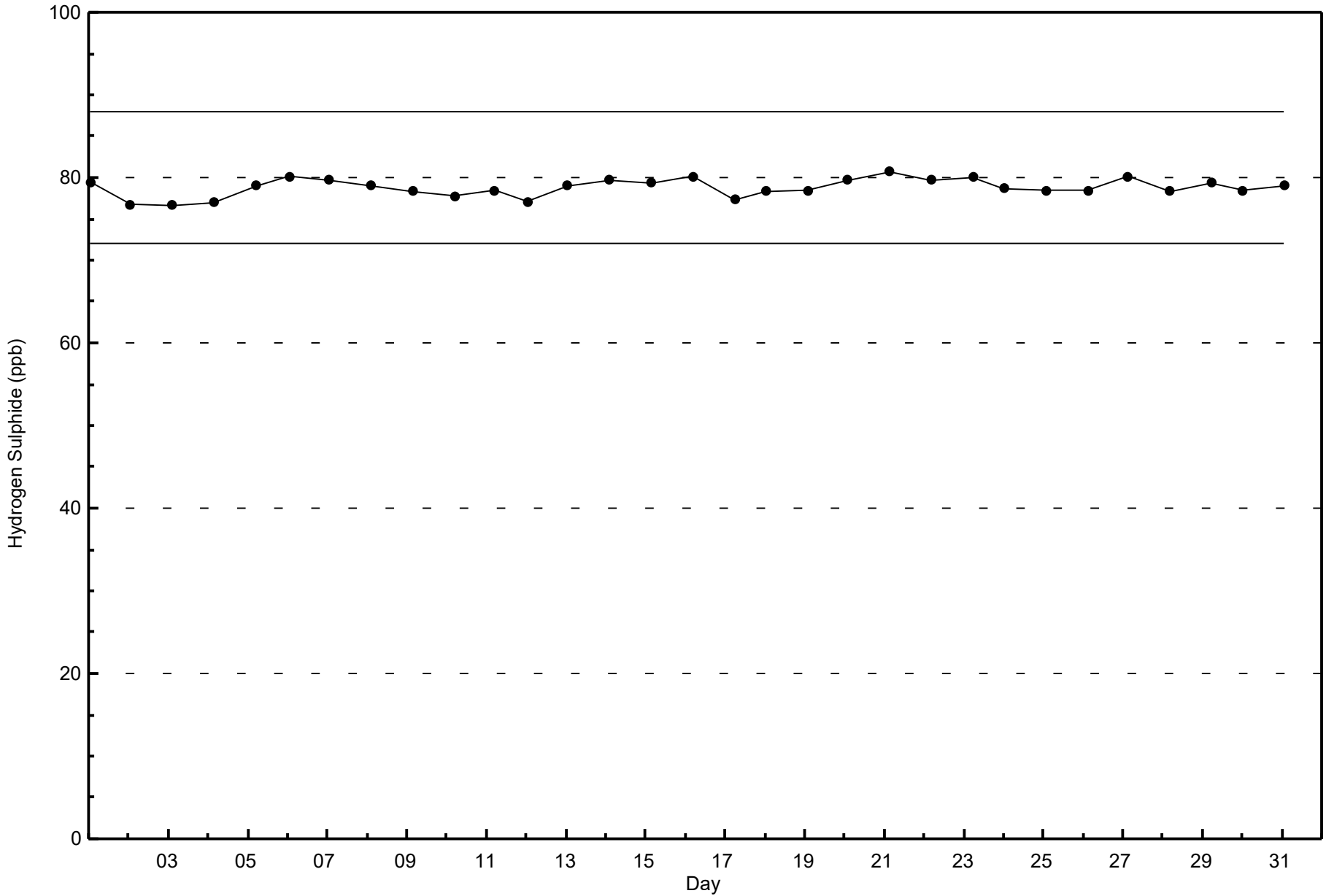
Wood Buffalo Environmental Association
Wind Rose Dec 2023

Hydrogen Sulphide (H₂S) - ppb
Fort McKay - Bertha Ganter



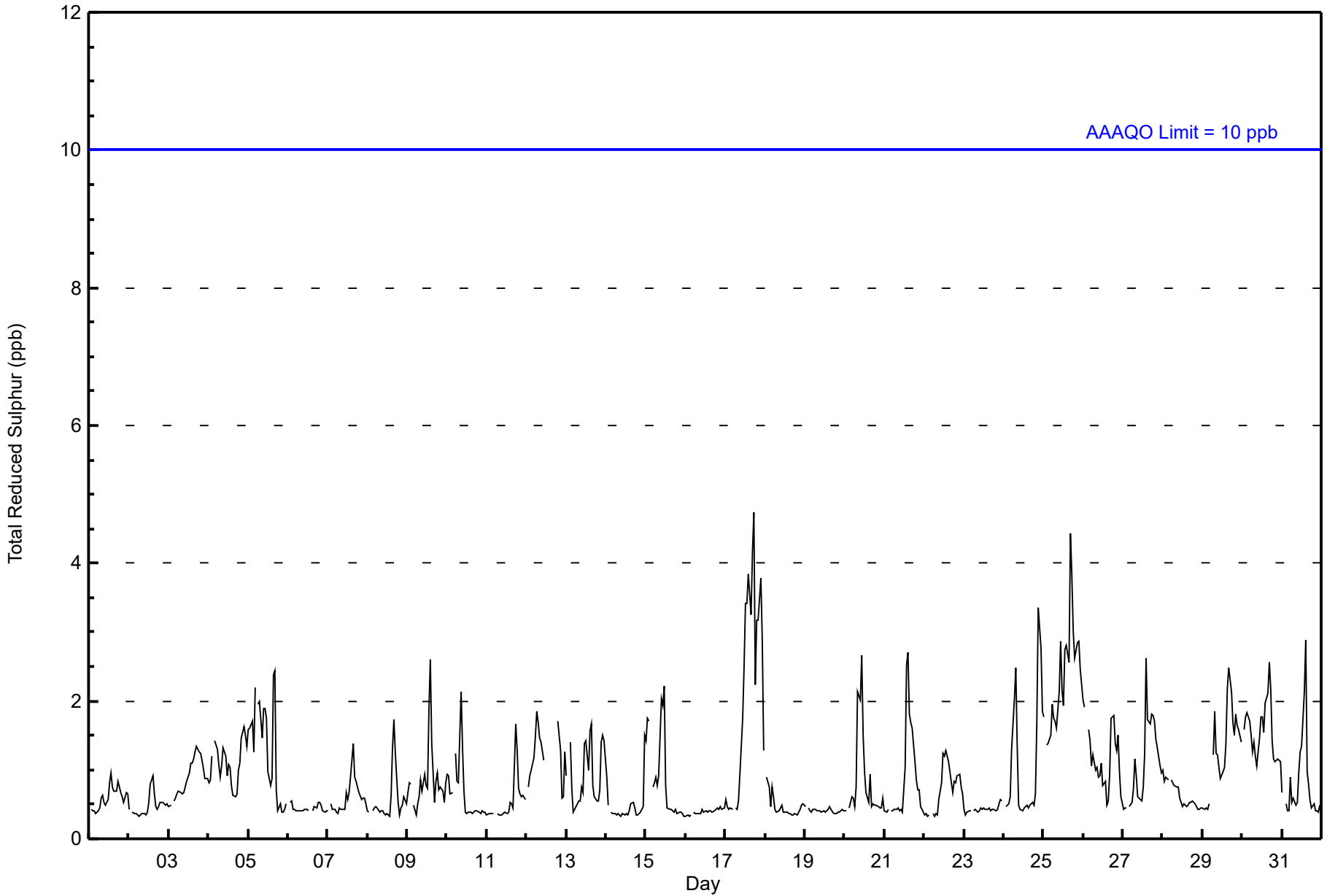
Total Number of Valid Hours: 705







Number of Exceedences (AAAQO):		1-hr: 0	24-hr: 0																		Hours in Service:	744																										
Maximum Value: 4.7 ppb on Dec 17 18:00		Maximum Daily Average: 2.4 ppb on Dec 25																	Hours of Data:	703																												
Minimum Value: 0.3 ppb on Dec 8 14:00		Minimum Daily Average: 0.4 ppb on Dec 16																	Hours of Missing Data:	41																												
Maximum Diurnal Average: 1.2 ppb at hour 15		Minimum Diurnal Average: 0.6 ppb at hour 4																	Hours of Calibration:	39																												
Monthly Average: 0.89 ppb		Percentiles: P ₁ = 0.3 P ₁₀ = 0.4 Q ₁ = 0.4 Median = 0.6 Q ₃ = 1.2 P ₉₀ = 1.8 P ₉₉ = 3.4																	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-Dec	Z	0.4	0.4	0.4	0.4	0.4	0.4	0.6	0.6	0.5	0.5	0.6	0.8	1.0	0.7	0.7	0.7	0.8	0.8	0.7	0.6	0.5	0.7	0.7	0.6	1.0																						
2-Dec	0.4	Z	0.4	0.4	0.4	0.4	0.3	0.3	0.4	0.4	0.4	0.4	0.5	0.8	0.9	0.6	0.5	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.9																						
3-Dec	0.5	0.5	Z	0.5	0.6	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.9	1.1	1.1	1.2	1.3	1.3	1.3	1.2	1.1	1.0	0.9	0.9	1.3																							
4-Dec	0.8	0.8	1.2	Z	1.4	1.3	1.1	0.9	1.1	1.3	1.2	0.9	1.1	1.0	0.8	0.6	0.6	0.7	1.0	1.1	1.5	1.6	1.5	1.4	1.6																							
5-Dec	1.6	1.6	1.7	1.3	2.2	Z	1.9	2.0	1.5	1.9	1.9	1.7	1.0	0.8	0.9	2.4	2.4	0.7	0.4	0.5	0.4	0.4	0.4	0.5	2.4																							
6-Dec	Z	0.5	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	UO	M	0.4	0.5	0.4	0.5	0.5	0.5	0.4	0.4	0.4	0.5																							
7-Dec	0.4	Z	0.5	0.4	0.4	0.4	0.4	0.5	0.4	0.4	0.4	0.7	0.6	0.7	0.9	1.4	0.9	0.8	0.8	0.7	0.6	0.6	0.6	0.5	1.4																							
8-Dec	0.4	0.4	Z	0.4	0.4	0.5	0.5	0.4	0.4	0.4	0.4	0.3	0.4	0.3	0.6	1.3	1.7	1.2	0.5	0.3	0.4	0.5	0.6	0.5	1.7																							
9-Dec	0.7	0.8	0.8	Z	0.5	0.4	0.5	0.6	0.9	0.7	0.9	0.8	0.7	1.9	2.6	1.4	0.5	0.8	1.0	0.7	0.8	0.7	0.5	0.8	2.6																							
10-Dec	0.9	0.9	0.7	0.7	Z	1.2	0.8	0.8	2.1	1.3	0.7	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	2.1																							
11-Dec	0.4	0.4	0.4	0.4	0.4	Z	0.4	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.5	1.7	1.3	0.7	0.7	0.6	0.6	0.6	1.7																							
12-Dec	Z	0.8	0.9	1.0	1.2	1.5	1.8	1.7	1.5	1.4	1.1	C	C	C	C	C	C	C	C	1.7	1.3	0.6	0.6	1.3	1.8																							
13-Dec	0.9	Z	1.4	0.7	0.4	0.4	0.5	0.6	0.6	0.8	0.7	1.4	1.4	1.0	1.6	1.7	0.8	0.6	0.5	0.6	0.7	1.4	1.5	1.4	1.7																							
14-Dec	0.9	0.5	Z	0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.4	0.4	0.4	0.4	0.5	0.5	0.4	0.4	0.3	0.4	0.4	0.5	1.5	1.5	1.5																							
15-Dec	1.4	1.7	1.7	Z	0.8	0.8	0.9	0.8	0.9	2.0	1.9	2.2	0.8	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.3	2.2																							
16-Dec	0.3	0.3	0.3	0.3	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	0.5	0.4	0.4	0.5																							
17-Dec	0.6	0.5	0.4	0.4	0.4	Z	0.4	0.4	0.6	0.9	1.7	2.5	3.4	3.4	3.9	3.3	4.2	4.7	2.2	3.2	3.2	3.8	2.9	1.3	4.7																							
18-Dec	Z	0.9	0.8	0.5	0.7	0.6	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	0.5	0.5	0.9																							
19-Dec	0.5	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	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5																							
20-Dec	0.4	0.4	Z	0.5	0.6	0.6	0.5	0.8	2.1	2.0	2.7	1.5	1.0	0.7	0.5	0.9	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.6	2.7																							
21-Dec	0.4	0.4	0.4	Z	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	1.0	2.5	2.7	1.8	1.7	1.6	1.1	0.9	0.7	0.7	0.5	0.4	2.7																							
22-Dec	0.3	0.4	0.3	0.3	Z	0.4	0.3	0.4	0.3	0.6	0.8	1.2	1.2	1.3	1.2	1.1	0.8	0.7	0.8	0.8	0.9	0.9	0.7	0.7	1.3																							
23-Dec	0.4	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	0.5	0.6	0.6	0.6																							
24-Dec	Z	0.5	0.5	0.5	0.6	1.3	2.0	2.5	1.3	0.5	0.4	0.4	0.5	0.5	0.5	0.4	0.5	0.5	0.5	0.7	1.7	3.3	2.8	1.8	3.3																							
25-Dec	1.8	Z	1.4	1.4	1.5	2.0	1.7	1.7	1.6	2.1	2.9	2.1	1.9	2.7	2.8	2.6	4.4	3.8	3.0	2.6	2.9	2.9	2.5	2.2	4.4																							
26-Dec	2.0	1.9	Z	1.6	1.4	1.1	1.2	1.0	1.0	0.9	0.9	1.1	0.8	0.8	0.5	0.5	0.9	1.8	1.8	1.4	1.3	1.5	1.0	0.6	2.0																							
27-Dec	0.4	0.5	0.4	Z	0.5	0.5	0.7	1.2	0.9	0.6	0.6	0.6	0.8	1.2	2.6	1.7	1.7	1.8	1.8	1.7	1.4	1.3	1.1	0.9	2.6																							
28-Dec	1.0	0.8	0.9	0.9	Z	0.9	0.8	0.8	0.8	0.8	0.6	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	1.0																							
29-Dec	0.4	0.4	0.4	0.4	0.5	Z	1.2	1.9	1.2	1.2	1.0	0.9	1.0	1.0	1.4	2.2	2.5	2.1	1.7	1.5	1.8	1.6	1.6	1.4	2.5																							
30-Dec	Z	1.6	1.8	1.8	1.7	1.5	1.3	1.4	1.2	1.1	1.5	1.8	1.8	1.5	2.0	2.1	2.6	2.2	1.4	1.2	1.1	1.2	1.1	1.1	2.6																							
31-Dec	0.7	Z	0.5	0.4	0.4	0.9	0.5	0.6	0.5	0.5	1.0	1.3	1.3	2.1	2.9	1.0	0.8	0.6	0.4	0.5	0.4	0.4	0.4	0.5	2.9																							
																								0.7	0.7	0.8	0.6	0.7	0.8	0.8	0.8	0.8	0.8	0.9	0.9	0.9	1.0	1.2	1.1	1.1	1.1	0.9	0.9	1.0	0.9	0.8	Diurnal Average	
																								2.0	1.9	1.8	1.8	2.2	2.0	2.0	2.5	2.1	2.1	2.9	2.5	3.4	3.4	3.9	3.3	4.4	4.7	3.0	3.2	3.2	3.8	2.9	2.2	Diurnal Maximum
Z - zerospan																								C - Calibration						M - Maintenance						UO - Unstable Operation												
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 10 ppb 24-hr 3 ppb																																																





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

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

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	674	95.87	95.87
3 - 4	28	3.98	99.86
5 - 7	1	0.14	100.00
8 - 11	0	0.00	100.00
> 11	0	0.00	100.00

Total Number of Valid Hours: 703

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Total Reduced Sulphur (TRS) - ppb
Fort McKay - Bertha Ganter - December 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	32	20	11	3	2	3	6	22	233	112	77	51	45	26	17	14	674
3 - 4	0	0	0	0	0	0	0	0	22	4	2	0	0	0	0	0	28
5 - 7	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	32	20	11	3	2	3	6	22	256	116	79	51	45	26	17	14	703

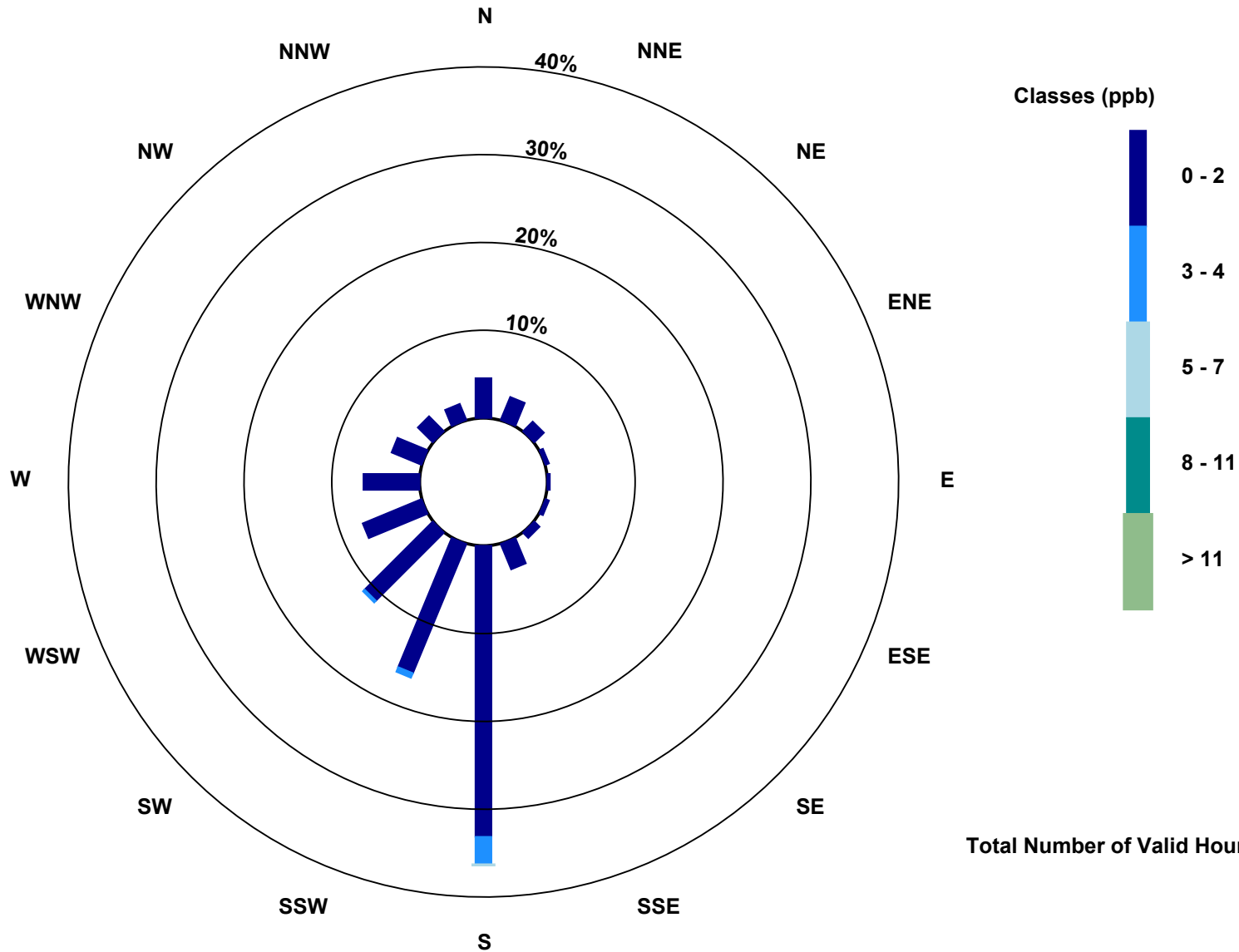
Total Number of Valid Hours: 703

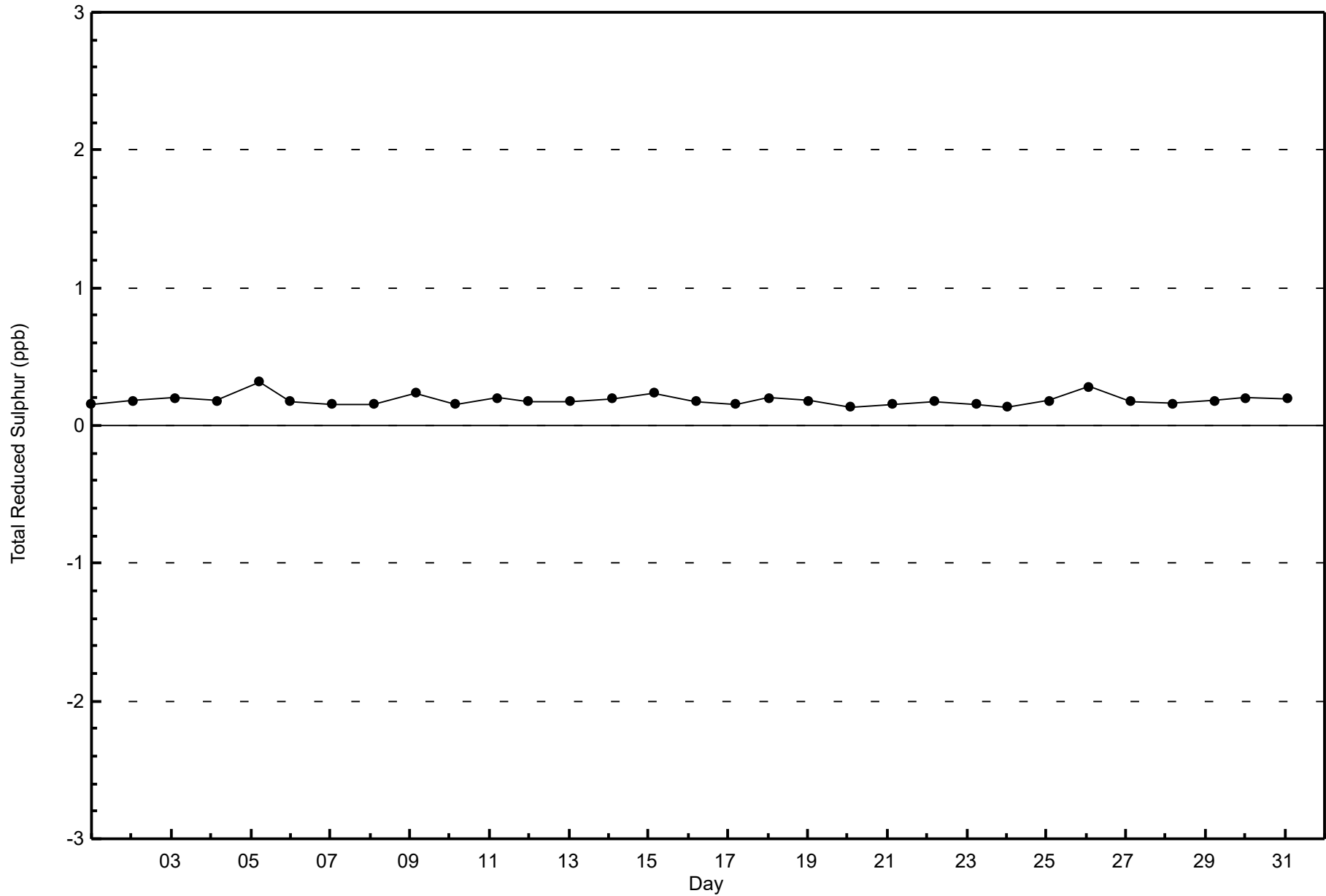
Total Number of Hours: 744

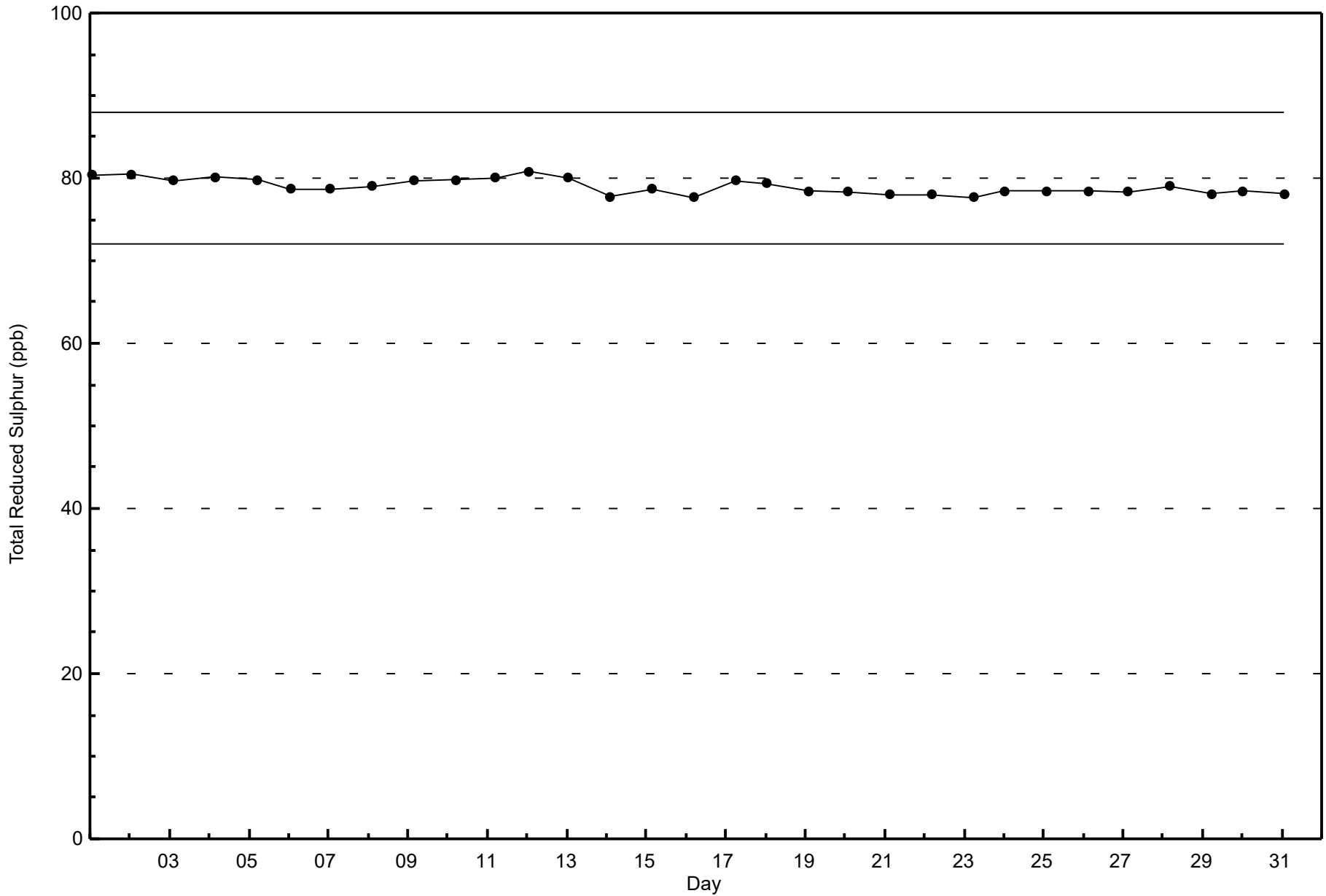


Wood Buffalo Environmental Association
Wind Rose Dec 2023

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









Wood Buffalo Environmental Association
Summary of Hour Averages

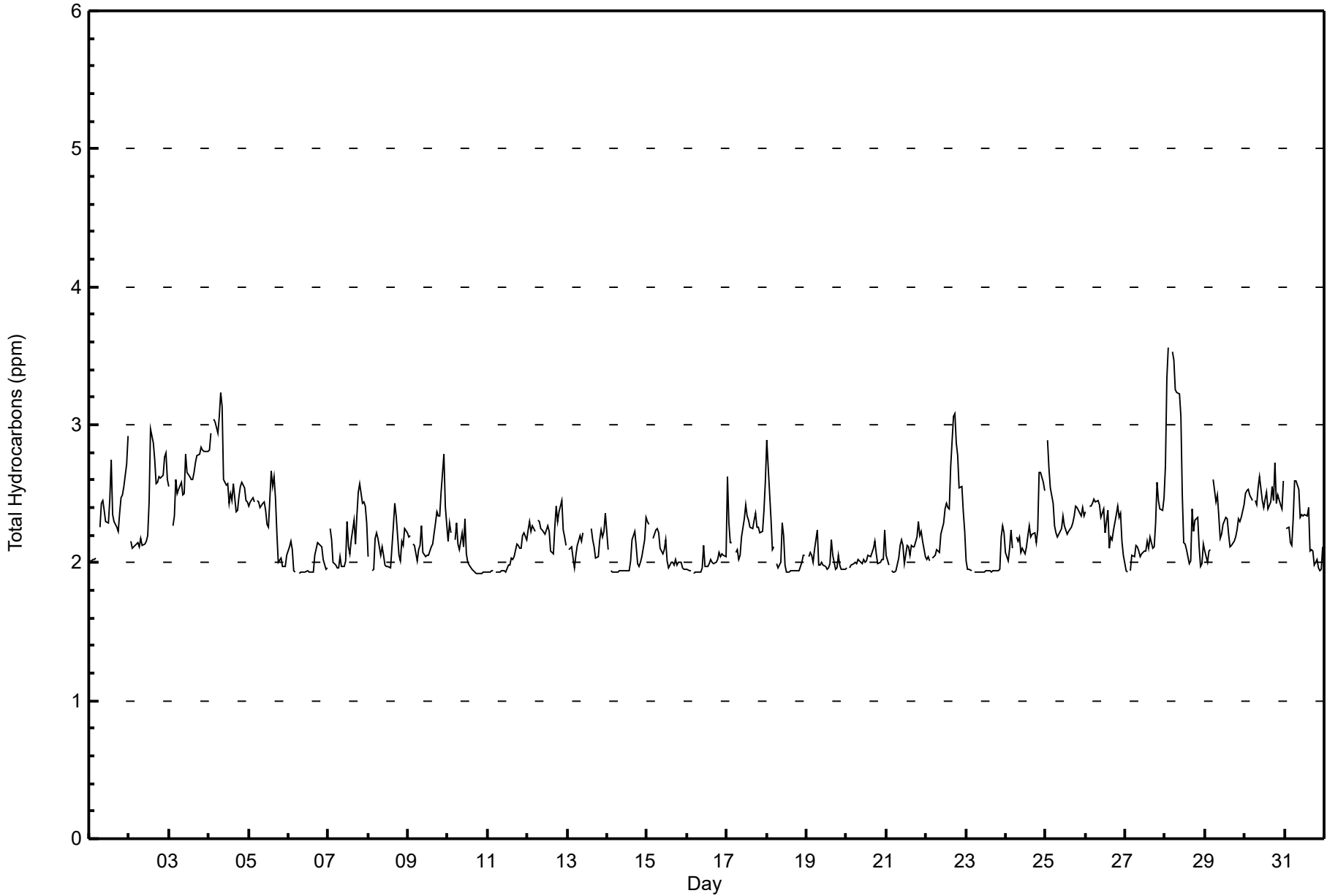
Total Hydrocarbons (THC) - ppm
Fort McKay - Bertha Ganter - December 2023

Maximum Value: 3.6 ppm on Dec 28 03:00		Maximum Daily Average: 2.7 ppm on Dec 4		Hours in Service: 744																																												
Minimum Value: 1.9 ppm on Dec 10 18:00		Minimum Daily Average: 2.0 ppm on Dec 23		Hours of Data: 709																																												
Maximum Diurnal Average: 2.3 ppm at hour 24		Minimum Diurnal Average: 2.2 ppm at hour 4		Hours of Missing Data: 35																																												
Monthly Average: 2.23 ppm		Percentiles: P ₁ = 1.9 P ₁₀ = 1.9 Q ₁ = 2.0 Median = 2.2 Q ₃ = 2.4 P ₉₀ = 2.6 P ₉₉ = 3.2		Hours of Calibration: 35																																												
				Percent Operational Time: 100.0																																												
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Dec	2.0	2.0	2.0	2.0	2.0	Z	2.3	2.4	2.4	2.4	2.3	2.3	2.5	2.7	2.4	2.3	2.3	2.2	2.4	2.5	2.5	2.6	2.7	2.9	2.4	2.9																						
2-Dec	Z	2.2	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.2	2.2	2.4	3.0	2.9	2.7	2.6	2.6	2.6	2.6	2.6	2.8	2.8	2.6	2.4	3.0																						
3-Dec	2.6	Z	2.3	2.3	2.6	2.5	2.5	2.6	2.5	2.5	2.8	2.7	2.6	2.6	2.6	2.7	2.7	2.8	2.8	2.8	2.8	2.8	2.8	2.6	2.8	2.8																						
4-Dec	2.8	2.9	Z	3.0	3.0	2.9	3.1	3.2	3.1	2.6	2.6	2.6	2.4	2.5	2.5	2.6	2.4	2.4	2.5	2.5	2.6	2.5	2.5	2.4	2.7	3.2																						
5-Dec	2.4	2.4	2.5	2.4	Z	2.4	2.4	2.4	2.4	2.4	2.4	2.3	2.3	2.7	2.6	2.6	2.5	2.2	2.0	2.0	2.0	2.0	2.1	2.3	2.7	2.7																						
6-Dec	2.1	2.2	2.1	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.2																						
7-Dec	Z	2.3	2.2	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.3	2.1	2.1	2.2	2.3	2.1	2.3	2.5	2.6	2.4	2.4	2.4	2.3	2.2	2.6																						
8-Dec	2.0	Z	1.9	2.0	2.2	2.2	2.2	2.1	2.1	2.1	2.0	2.0	2.0	2.1	2.3	2.4	2.3	2.1	2.0	2.2	2.1	2.3	2.2	2.1	2.4	2.4																						
9-Dec	2.2	2.2	Z	2.1	2.1	2.0	2.1	2.1	2.3	2.1	2.0	2.1	2.1	2.1	2.1	2.1	2.3	2.4	2.3	2.3	2.5	2.8	2.4	2.3	2.2	2.8																						
10-Dec	2.2	2.3	2.2	Z	2.2	2.3	2.1	2.1	2.2	2.1	2.3	2.1	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.1	2.3																						
11-Dec	1.9	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.0	2.2																						
12-Dec	2.2	2.3	2.2	2.3	2.2	Z	2.3	2.3	2.2	2.2	2.2	2.2	2.3	2.2	2.1	2.1	2.3	2.4	2.3	2.4	2.5	2.2	2.2	2.1	2.3	2.5																						
13-Dec	Z	2.1	2.1	2.0	2.0	2.1	2.1	2.2	2.2	2.2	C	C	C	C	2.2	2.2	2.1	2.0	2.0	2.2	2.2	2.2	2.4	2.1	2.4																							
14-Dec	2.1	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.2	2.2	2.1	2.0	2.0	2.0	2.0	2.2	2.3	2.0	2.3																						
15-Dec	2.3	2.3	Z	2.2	2.2	2.2	2.3	2.2	2.1	2.1	2.1	2.2	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	2.1	2.3	2.3																						
16-Dec	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.1	2.1	2.0	2.0	2.1																						
17-Dec	2.6	2.3	2.1	2.1	Z	2.1	2.1	2.0	2.1	2.2	2.3	2.4	2.3	2.3	2.3	2.2	2.3	2.4	2.3	2.3	2.2	2.2	2.4	2.6	2.3	2.6																						
18-Dec	2.9	2.7	2.3	2.1	2.1	Z	2.0	2.0	2.0	2.3	2.2	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.1	2.1	2.1	2.9																						
19-Dec	Z	2.0	2.1	2.1	2.0	2.1	2.2	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.2	2.1	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.2																						
20-Dec	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	2.0	2.1	2.1	2.2	2.1	2.0	2.0	2.0	2.0	2.2	2.0	2.2	2.2																						
21-Dec	2.1	2.0	Z	1.9	1.9	1.9	1.9	2.0	2.1	2.2	2.1	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.3	2.2	2.2	2.2	2.0	2.1	2.3																						
22-Dec	2.0	2.0	2.0	Z	2.0	2.1	2.1	2.1	2.1	2.2	2.3	2.4	2.4	2.4	2.4	2.7	3.1	3.1	2.9	2.8	2.5	2.6	2.4	2.2	2.4	3.1																						
23-Dec	2.0	2.0	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.2	2.3	2.2	2.0	2.3	2.3																						
24-Dec	2.1	2.0	2.1	2.2	2.1	Z	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.2	2.3	2.2	2.2	2.2	2.1	2.2	2.7	2.7	2.6	2.5	2.2	2.7																						
25-Dec	Z	2.9	2.7	2.5	2.4	2.3	2.2	2.2	2.2	2.2	2.3	2.3	2.2	2.2	2.2	2.2	2.3	2.3	2.4	2.4	2.4	2.3	2.4	2.3	2.4	2.9																						
26-Dec	2.4	Z	2.4	2.4	2.4	2.5	2.4	2.5	2.4	2.3	2.4	2.4	2.2	2.4	2.1	2.2	2.2	2.2	2.3	2.4	2.3	2.4	2.2	2.1	2.3	2.5																						
27-Dec	1.9	1.9	Z	1.9	2.0	2.0	2.1	2.1	2.1	2.0	2.1	2.1	2.1	2.2	2.1	2.2	2.1	2.1	2.3	2.6	2.5	2.4	2.4	2.5	2.2	2.6																						
28-Dec	2.7	3.3	3.6	Z	3.5	3.5	3.3	3.2	3.2	3.1	2.5	2.1	2.1	2.1	2.0	2.0	2.4	2.2	2.3	2.3	2.1	2.0	2.0	2.1	2.6	3.6																						
29-Dec	2.1	2.0	2.1	2.1	Z	2.6	2.4	2.5	2.3	2.2	2.2	2.3	2.3	2.3	2.2	2.1	2.1	2.2	2.2	2.2	2.3	2.3	2.3	2.4	2.3	2.6																						
30-Dec	2.5	2.5	2.5	2.5	2.4	Z	2.4	2.4	2.5	2.6	2.5	2.4	2.5	2.5	2.4	2.4	2.6	2.5	2.7	2.4	2.5	2.4	2.4	2.6	2.5	2.7																						
31-Dec	Z	2.2	2.3	2.1	2.1	2.3	2.6	2.6	2.5	2.3	2.4	2.3	2.3	2.3	2.4	2.1	2.1	2.1	2.0	2.0	2.0	1.9	1.9	2.1	2.2	2.6																						
																								2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.3	Diurnal Average
																								2.9	3.3	3.6	3.0	3.5	3.5	3.3	3.2	3.2	3.1	2.8	2.7	2.6	3.0	2.9	2.7	3.1	3.1	2.9	2.8	2.8	2.8	2.8	2.9	Diurnal Maximum
Z - zerospan C - Calibration																																																



Wood Buffalo Environmental Association
Hourly Averages

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





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

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

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	220	31.03	31.03
2.1 - 3.0	476	67.14	98.17
3.1 - 10.0	13	1.83	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 709

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Total Hydrocarbons (THC) - ppm
Fort McKay - Bertha Ganter - December 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	6	12	8	1	2	1	4	4	42	22	24	30	38	17	5	4	220
2.1 - 3.0	28	8	3	2	0	3	2	20	212	92	52	19	6	11	8	10	476
3.1 - 10.0	0	0	0	0	0	0	0	0	2	2	4	1	1	1	1	1	13
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	34	20	11	3	2	4	6	24	256	116	80	50	45	29	14	15	709

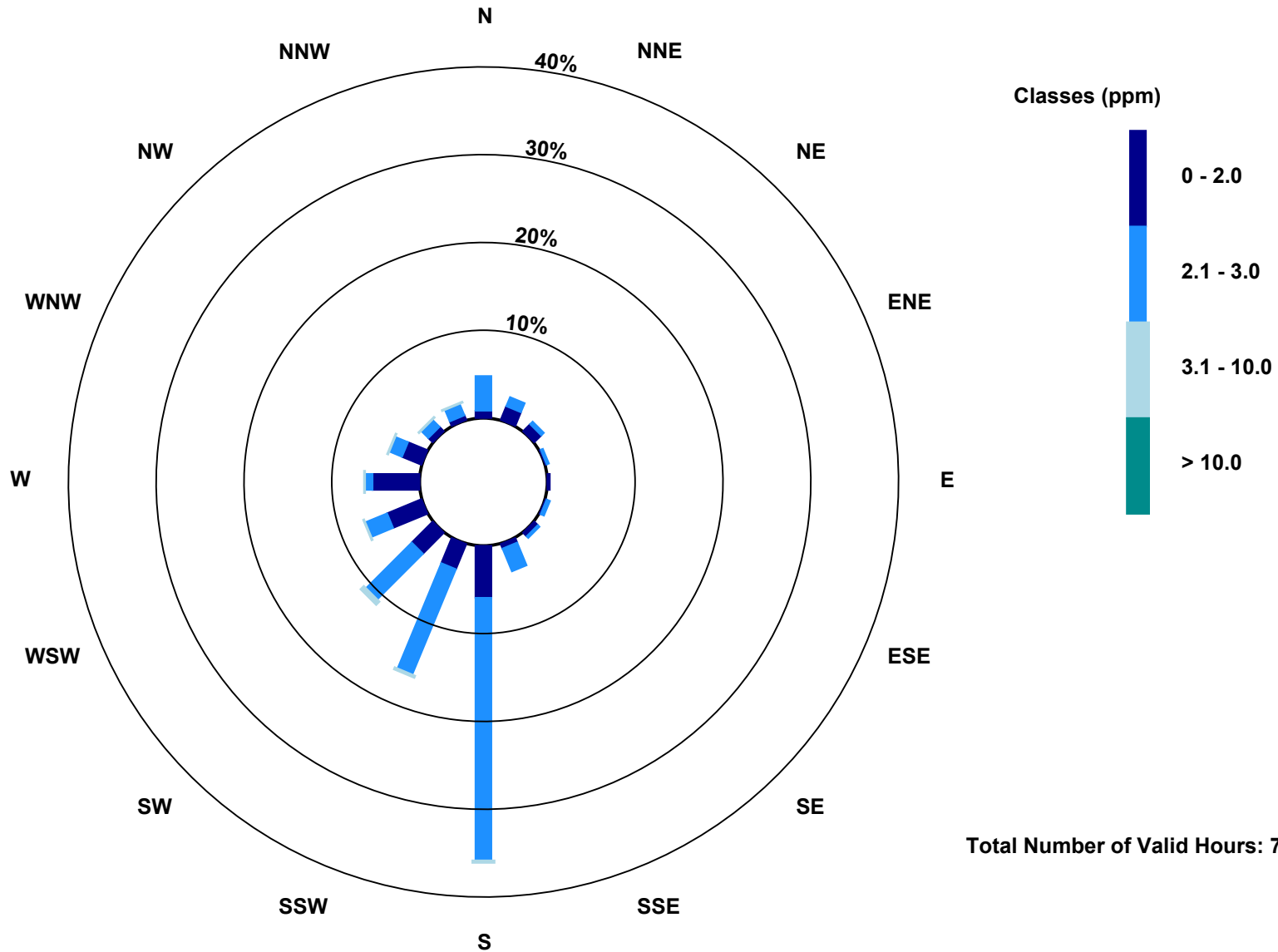
Total Number of Valid Hours: 709

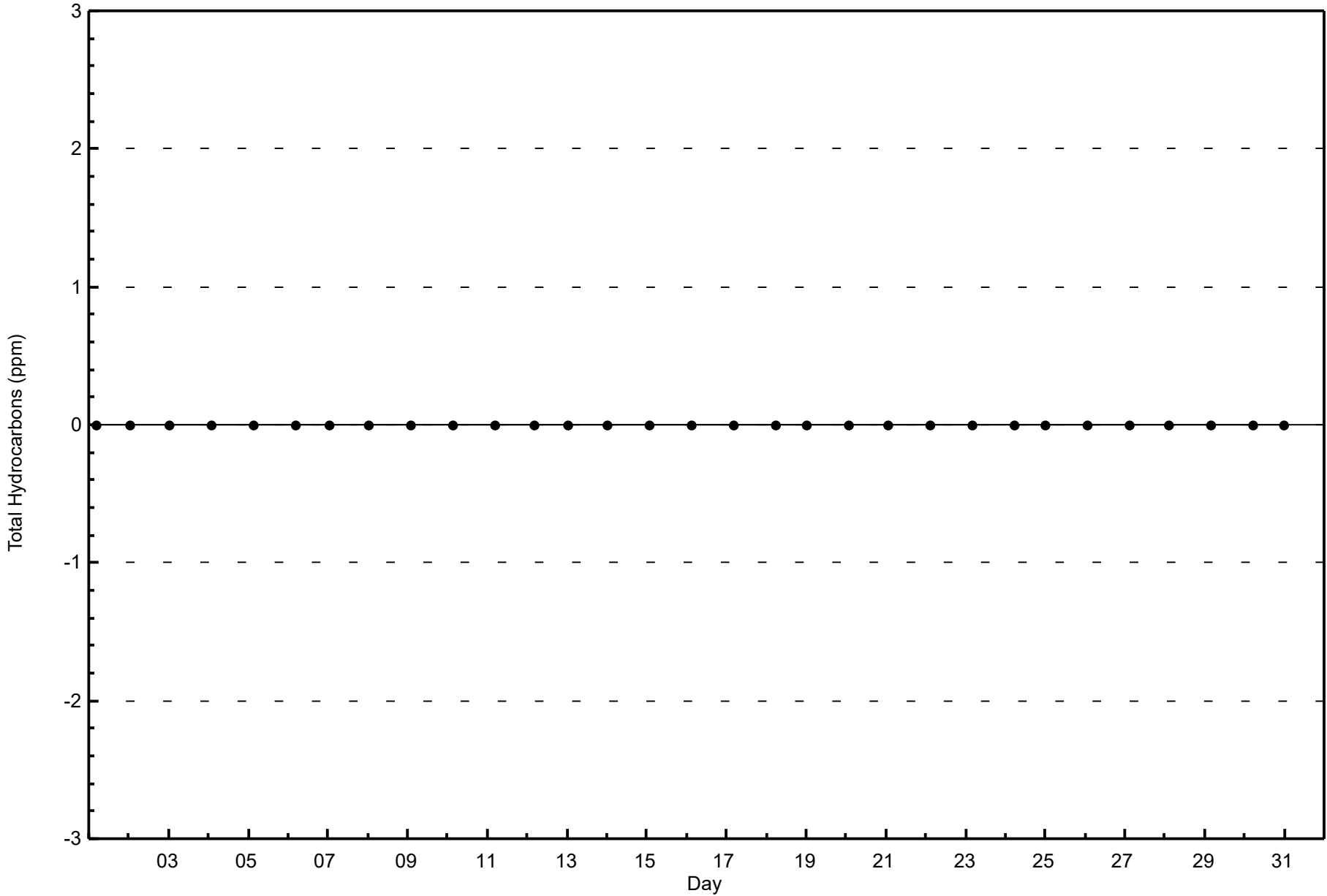
Total Number of Hours: 744

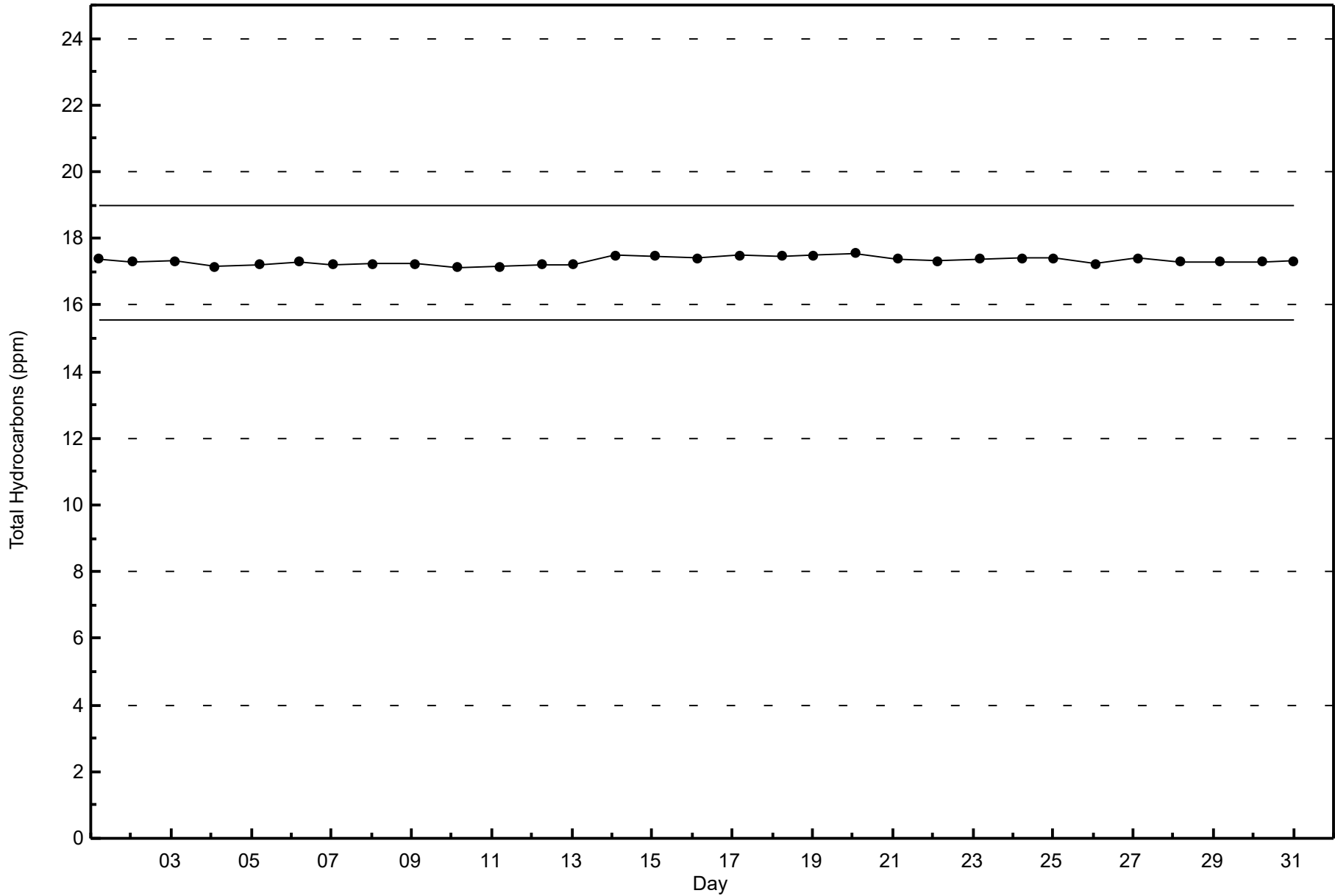


Wood Buffalo Environmental Association
Wind Rose Dec 2023

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









Wood Buffalo Environmental Association

Summary of Hour Averages

Non Methane Hydrocarbons (NMHC) - ppm

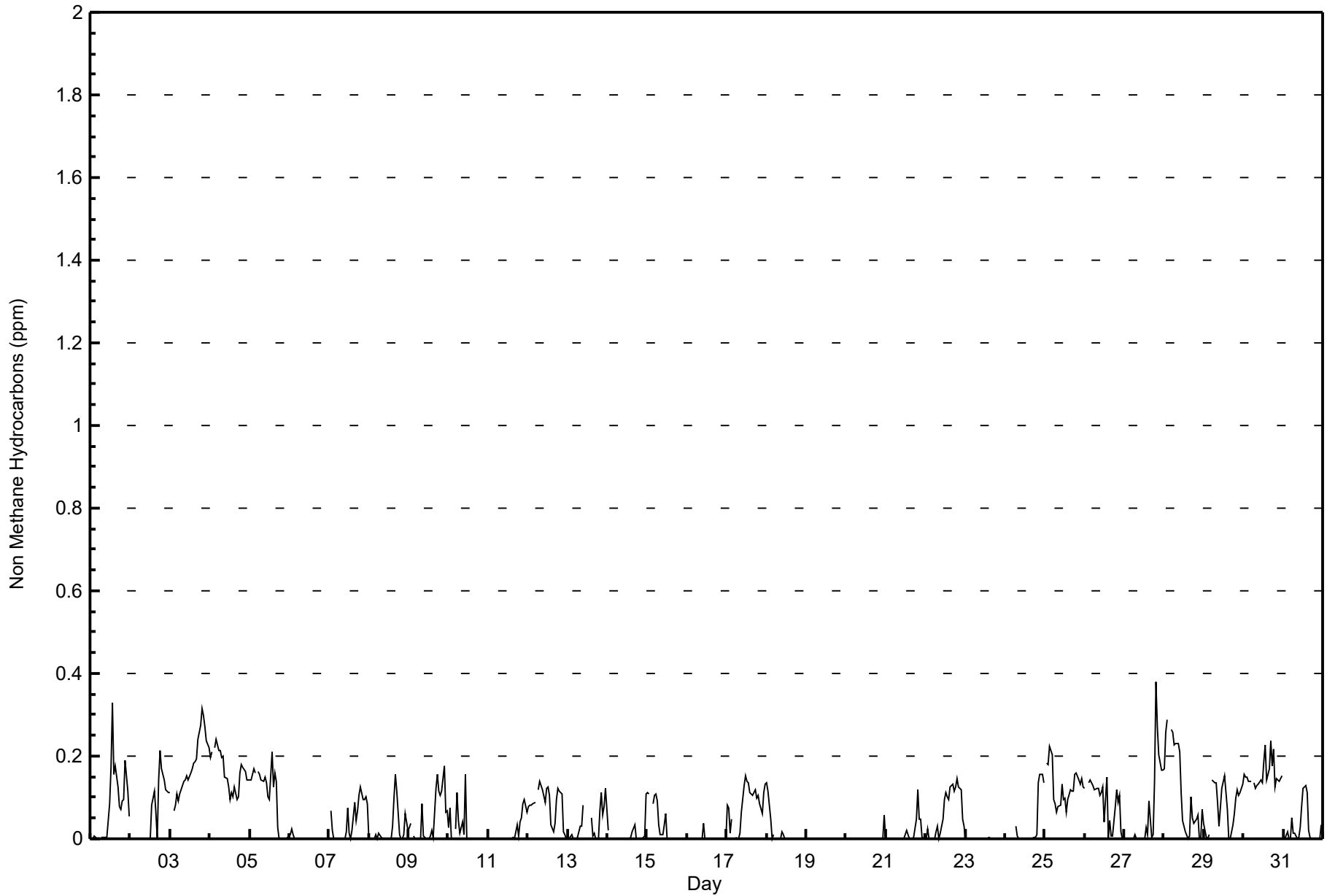
Fort McKay - Bertha Ganter - December 2023

Maximum Value: 0.379 ppm on Dec 27 20:00		Maximum Daily Average: 0.175 ppm on Dec 3		Hours in Service:	744																						
Minimum Value: 0.000 ppm on Dec 1 01:00		Minimum Daily Average: 0.000 ppm on Dec 19		Hours of Data:	709																						
Maximum Diurnal Average: 0.081 ppm at hour 20		Minimum Diurnal Average: 0.043 ppm at hour 10		Hours of Missing Data:	35																						
Monthly Average: 0.057 ppm		Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.0 Median = 0.0 Q ₃ = 0.1 P ₉₀ = 0.2 P ₉₉ = 0.3		Hours of Calibration:	35																						
				Percent Operational Time:	100.0																						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Dec	0.000	0.000	0.007	0.002	0.000	Z	0.003	0.004	0.004	0.004	0.003	0.086	0.172	0.328	0.155	0.175	0.124	0.077	0.070	0.093	0.096	0.191	0.116	0.055	0.077	0.328	
2-Dec	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.082	0.115	0.066	0.000	0.141	0.215	0.170	0.142	0.120	0.115	0.112	0.056	0.215	
3-Dec	0.111	Z	0.067	0.083	0.107	0.092	0.110	0.130	0.141	0.143	0.152	0.141	0.160	0.168	0.182	0.186	0.192	0.241	0.273	0.316	0.297	0.270	0.237	0.221	0.175	0.316	
4-Dec	0.197	0.209	Z	0.219	0.241	0.212	0.214	0.197	0.199	0.150	0.147	0.126	0.095	0.111	0.102	0.125	0.096	0.102	0.158	0.179	0.172	0.161	0.143	0.143	0.161	0.241	
5-Dec	0.143	0.144	0.169	0.158	Z	0.164	0.157	0.143	0.138	0.149	0.136	0.100	0.094	0.210	0.126	0.158	0.139	0.027	0.000	0.000	0.000	0.000	0.000	0.003	0.102	0.210	
6-Dec	0.011	0.025	0.011	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	0.002	0.025	
7-Dec	Z	0.069	0.019	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.017	0.076	0.013	0.000	0.020	0.087	0.046	0.069	0.107	0.125	0.095	0.094	0.101	0.083	0.044	0.125
8-Dec	0.005	Z	0.000	0.000	0.011	0.000	0.012	0.004	0.000	0.001	0.000	0.000	0.000	0.000	0.031	0.098	0.156	0.116	0.010	0.000	0.000	0.009	0.060	0.021	0.023	0.156	
9-Dec	0.029	0.037	Z	0.008	0.000	0.000	0.000	0.001	0.086	0.008	0.000	0.000	0.001	0.008	0.021	0.005	0.121	0.155	0.115	0.104	0.117	0.175	0.063	0.067	0.049	0.175	
10-Dec	0.027	0.076	0.001	Z	0.024	0.112	0.045	0.013	0.042	0.010	0.156	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.022	0.156	
11-Dec	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	0.002	0.000	0.032	0.008	0.041	0.050	0.086	0.093	0.066	0.016	0.093	
12-Dec	0.079	0.082	0.081	0.086	0.088	Z	0.119	0.140	0.131	0.118	0.087	0.122	0.126	0.107	0.035	0.017	0.039	0.094	0.123	0.115	0.108	0.015	0.011	0.001	0.084	0.140	
13-Dec	Z	0.001	0.009	0.001	0.000	0.000	0.005	0.030	0.031	0.082	C	C	C	C	0.052	0.008	0.013	0.000	0.000	0.066	0.111	0.058	0.079	0.123	0.035	0.123	
14-Dec	0.021	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.018	0.034	0.000	0.000	0.000	0.000	0.001	0.007	0.110	0.008	0.110		
15-Dec	0.112	0.108	Z	0.085	0.105	0.109	0.090	0.033	0.010	0.009	0.035	0.060	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.033	0.112	
16-Dec	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.036	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.036	
17-Dec	0.082	0.076	0.015	0.049	Z	0.003	0.000	0.000	0.015	0.064	0.130	0.151	0.139	0.137	0.110	0.104	0.112	0.120	0.097	0.107	0.086	0.060	0.113	0.131	0.083	0.151	
18-Dec	0.135	0.115	0.046	0.000	0.012	Z	0.000	0.000	0.000	0.018	0.009	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.015	0.135	
19-Dec	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	
20-Dec	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	0.059	0.003	0.059	
21-Dec	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.022	0.011	0.000	0.000	0.000	0.002	0.047	0.119	0.046	0.047	0.004	0.000	0.013	0.119	
22-Dec	0.000	0.025	0.000	Z	0.000	0.000	0.017	0.029	0.000	0.013	0.049	0.097	0.111	0.103	0.093	0.125	0.131	0.114	0.124	0.145	0.124	0.117	0.047	0.030	0.065	0.145	
23-Dec	0.001	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	
24-Dec	0.000	0.000	0.000	0.000	0.000	Z	0.031	0.008	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.002	0.009	0.135	0.157	0.155	0.135	0.028	0.157	
25-Dec	Z	0.183	0.181	0.225	0.202	0.095	0.086	0.066	0.077	0.083	0.132	0.096	0.097	0.065	0.094	0.118	0.115	0.116	0.156	0.159	0.143	0.132	0.146	0.125	0.126	0.225	
26-Dec	0.121	Z	0.135	0.143	0.136	0.129	0.120	0.122	0.121	0.104	0.112	0.125	0.041	0.149	0.002	0.044	0.007	0.007	0.079	0.119	0.090	0.105	0.016	0.000	0.088	0.149	
27-Dec	0.000	0.000	Z	0.000	0.000	0.000	0.009	0.000	0.000	0.000	0.000	0.000	0.000	0.027	0.009	0.090	0.003	0.010	0.139	0.379	0.271	0.202	0.167	0.168	0.064	0.379	
28-Dec	0.169	0.257	0.287	Z	0.265	0.259	0.227	0.231	0.230	0.209	0.111	0.043	0.031	0.017	0.000	0.008	0.103	0.053	0.036	0.048	0.058	0.000	0.000	0.070	0.118	0.287	
29-Dec	0.039	0.004	0.001	0.010	Z	0.142	0.135	0.135	0.088	0.032	0.074	0.121	0.151	0.112	0.070	0.001	0.001	0.034	0.060	0.098	0.119	0.104	0.113	0.131	0.077	0.151	
30-Dec	0.155	0.149	0.150	0.138	0.139	Z	0.137	0.123	0.128	0.134	0.142	0.135	0.187	0.226	0.144	0.169	0.237	0.175	0.218	0.125	0.146	0.139	0.145	0.152	0.156	0.237	
31-Dec	Z	0.000	0.016	0.000	0.000	0.050	0.012	0.014	0.001	0.005	0.027	0.079	0.123	0.127	0.111	0.021	0.005	0.001	0.000	0.000	0.000	0.000	0.000	0.036	0.027	0.127	
		0.057	0.060	0.046	0.045	0.051	0.055	0.049	0.046	0.046	0.043	0.052	0.052	0.052	0.066	0.048	0.052	0.054	0.054	0.066	0.081	0.078	0.072	0.062	0.066	Diurnal Average	
		0.197	0.257	0.287	0.225	0.265	0.259	0.227	0.231	0.230	0.209	0.156	0.151	0.187	0.328	0.182	0.186	0.237	0.241	0.273	0.379	0.297	0.270	0.237	0.221	Diurnal Maximum	
Z - zerospan		C - Calibration																									



Wood Buffalo Environmental Association
Hourly Averages

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 0.005	326	45.98	45.98
0.006 - 0.05	101	14.25	60.23
0.06 - 0.1	207	29.20	89.42
> 0.1	75	10.58	100.00

Total Number of Valid Hours: 709

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

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

Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 0.005	9	14	9	2	2	2	5	8	81	48	35	39	41	18	6	7	326
0.006 - 0.05	5	4	1	1	0	0	1	3	49	17	14	2	1	3	0	0	101
0.06 - 0.1	15	1	1	0	0	0	0	10	106	35	19	6	2	5	4	3	207
> 0.1	5	1	0	0	0	2	0	3	20	16	12	3	1	3	4	5	75
Totals	34	20	11	3	2	4	6	24	256	116	80	50	45	29	14	15	709

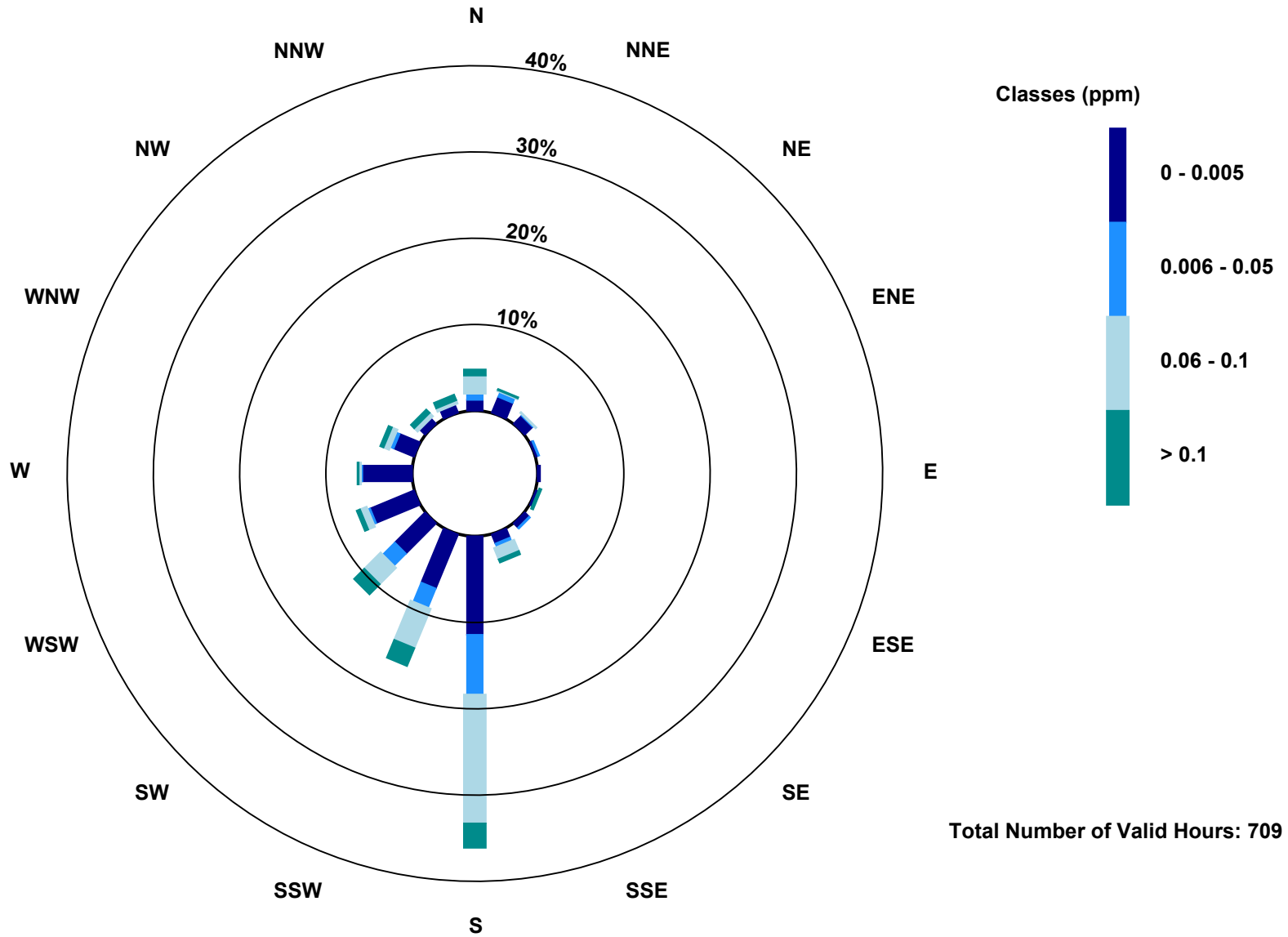
Total Number of Valid Hours: 709

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Dec 2023

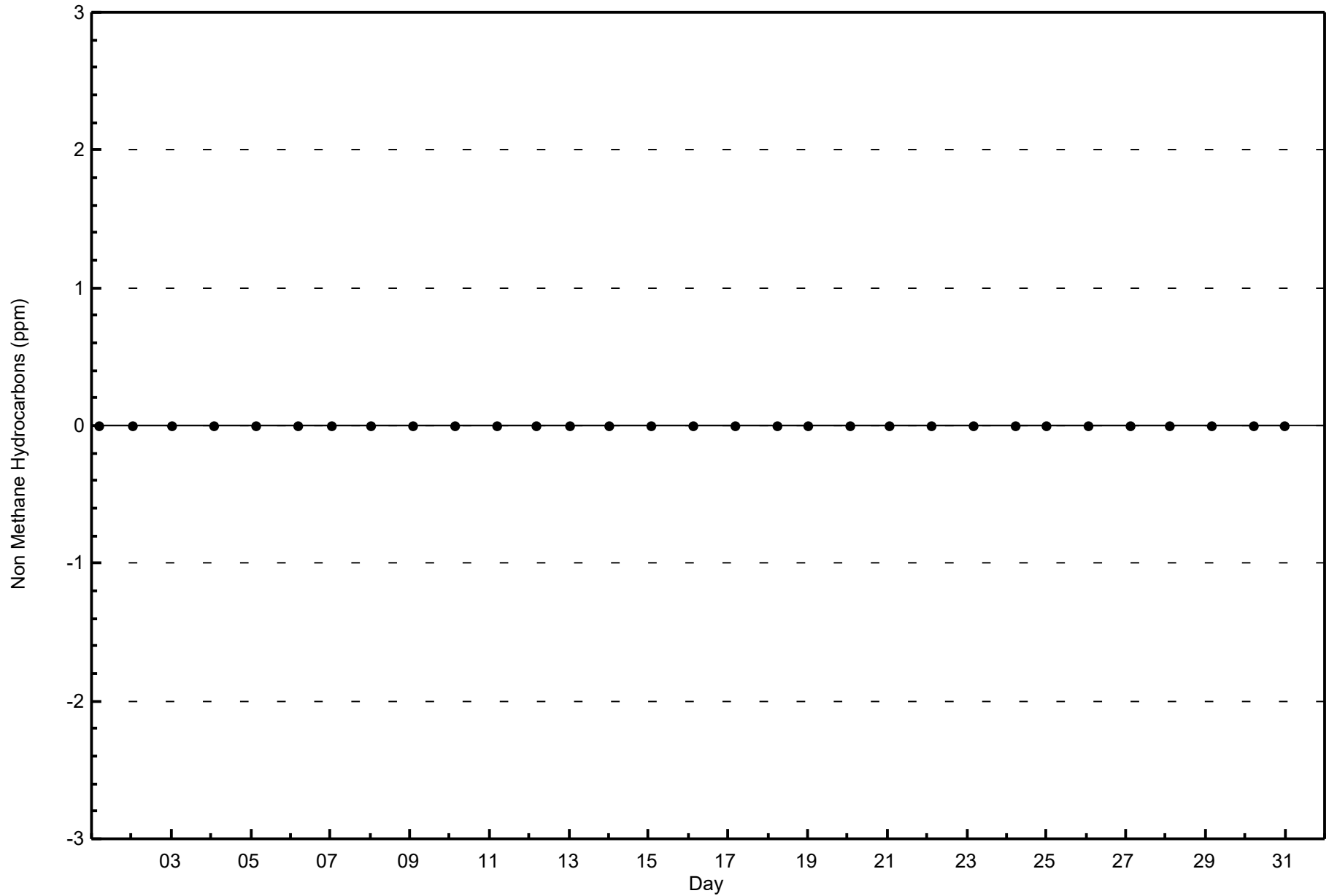
Non Methane Hydrocarbons (NMHC) - ppm
Fort McKay - Bertha Ganter

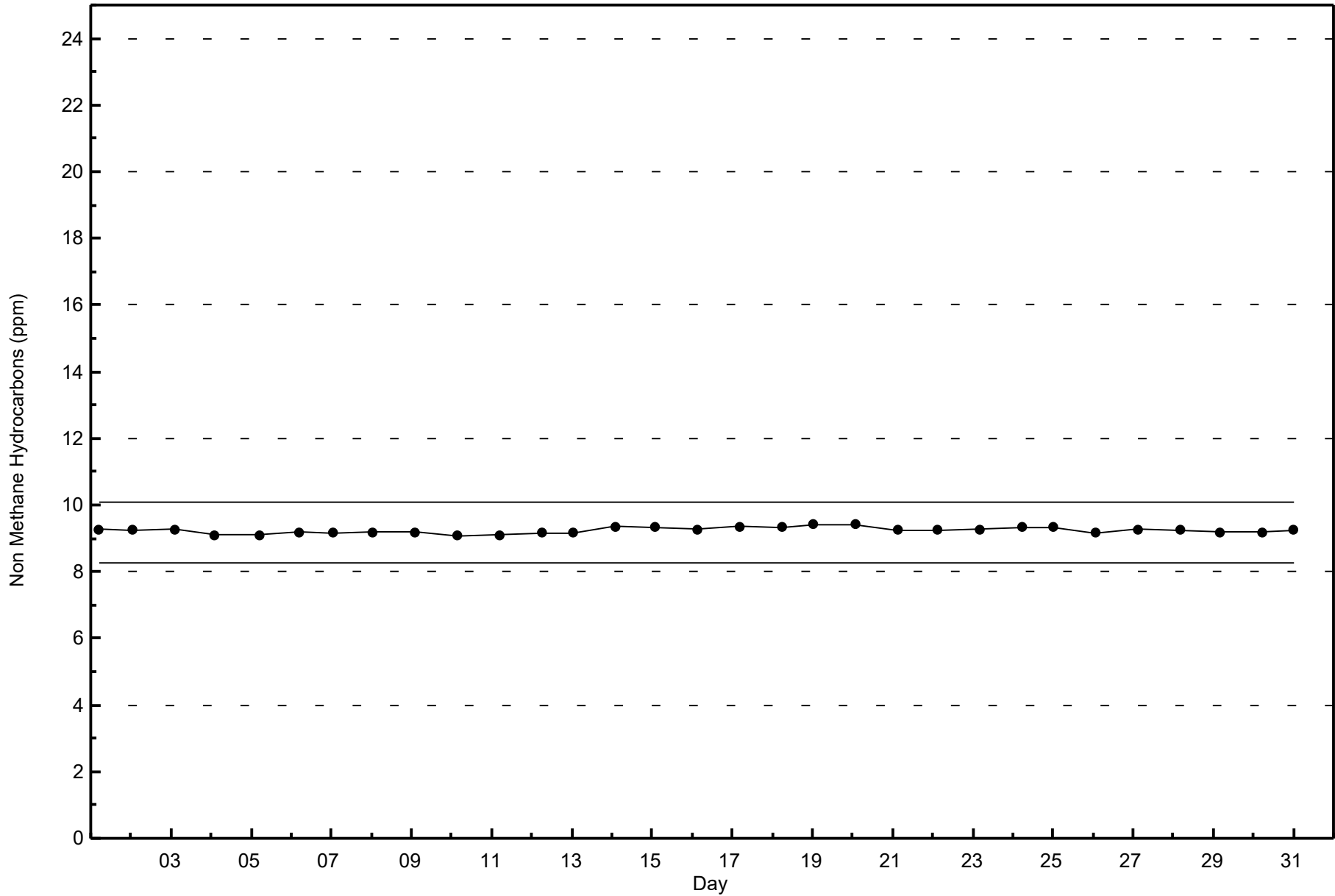




Wood Buffalo Environmental Association
Zero Responses

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







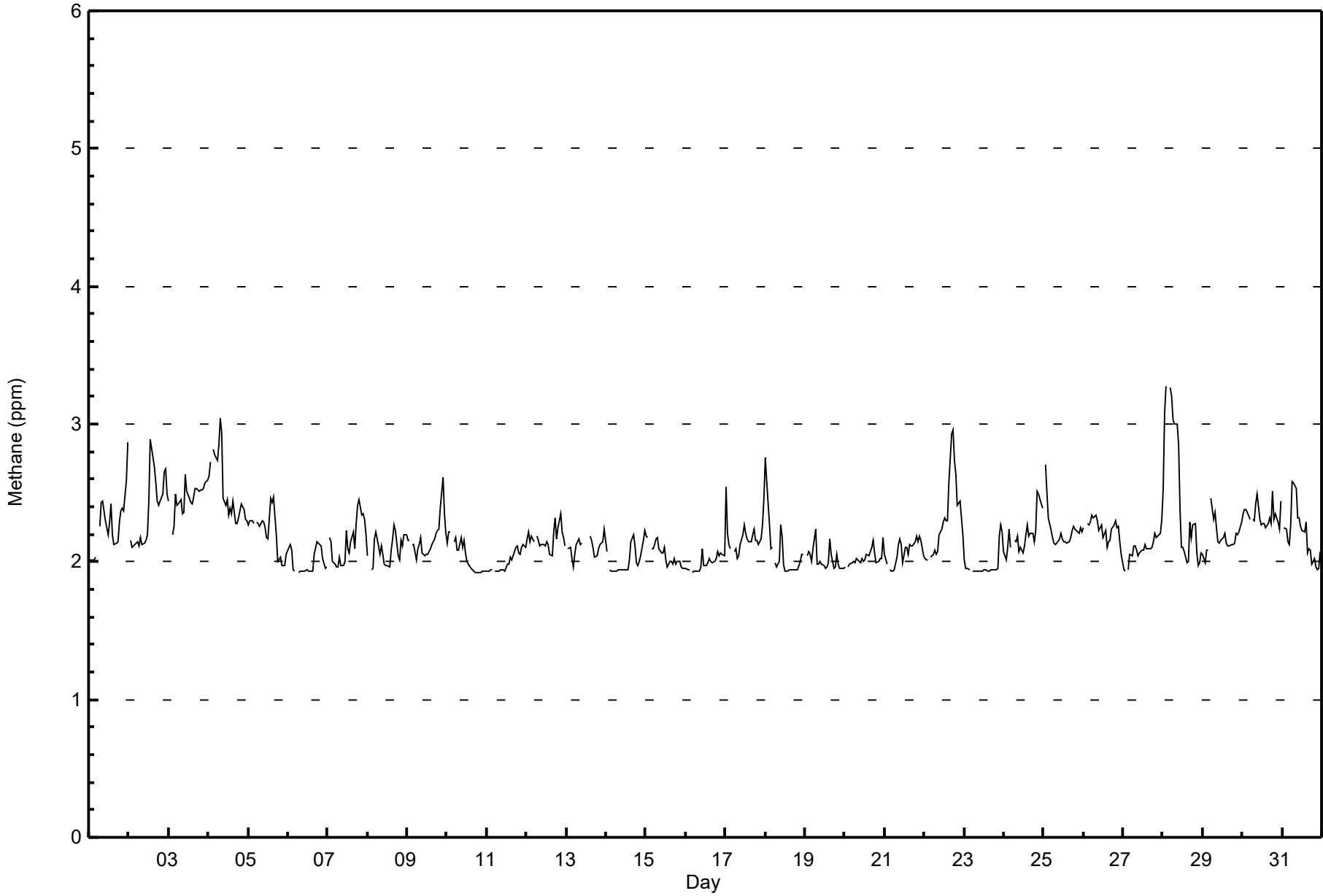
Wood Buffalo Environmental Association

Summary of Hour Averages

Methane (CH₄) - ppm

Fort McKay - Bertha Ganter - December 2023

Number of Exceedences (AAAQO):		1-hr: 0		24-hr: 0		Hours in Service:		744																																									
Maximum Value: 3.3 ppm on Dec 28 03:00		Maximum Daily Average: 2.5 ppm on Dec 4				Hours of Data:		709																																									
Minimum Value: 1.9 ppm on Dec 10 18:00		Minimum Daily Average: 2.0 ppm on Dec 23				Hours of Missing Data:		35																																									
Maximum Diurnal Average: 2.2 ppm at hour 2		Minimum Diurnal Average: 2.1 ppm at hour 4				Hours of Calibration:		35																																									
Monthly Average: 2.17 ppm		Percentiles: P ₁ = 1.9 P ₁₀ = 1.9 Q ₁ = 2.0 Median = 2.1 Q ₃ = 2.3 P ₉₀ = 2.4 P ₉₉ = 3.0				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-Dec	2.0	2.0	2.0	2.0	2.0	Z	2.3	2.4	2.4	2.4	2.3	2.2	2.3	2.4	2.2	2.1	2.1	2.2	2.3	2.4	2.4	2.4	2.6	2.9	2.3	2.9																							
2-Dec	Z	2.2	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.2	2.2	2.4	2.9	2.8	2.7	2.6	2.4	2.4	2.4	2.5	2.7	2.7	2.5	2.4	2.9																							
3-Dec	2.4	Z	2.2	2.3	2.5	2.4	2.4	2.5	2.4	2.4	2.6	2.5	2.5	2.4	2.4	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.6	2.6	2.5	2.6																							
4-Dec	2.6	2.7	Z	2.8	2.8	2.7	2.8	3.0	2.9	2.5	2.4	2.4	2.3	2.4	2.4	2.4	2.3	2.3	2.3	2.4	2.4	2.4	2.3	2.3	2.5	3.0																							
5-Dec	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	2.5	2.4	2.5	2.3	2.2	2.0	2.0	2.0	2.0	2.0	2.0	2.2	2.5																							
6-Dec	2.1	2.1	2.1	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.1																							
7-Dec	Z	2.2	2.2	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.2	2.1	2.1	2.1	2.2	2.1	2.3	2.4	2.4	2.3	2.3	2.3	2.2	2.1	2.4																							
8-Dec	2.0	Z	1.9	2.0	2.2	2.2	2.2	2.0	2.1	2.1	2.0	2.0	2.0	2.0	2.1	2.2	2.3	2.2	2.0	2.0	2.2	2.1	2.2	2.2	2.1	2.3																							
9-Dec	2.2	2.2	Z	2.1	2.1	2.0	2.1	2.1	2.2	2.1	2.0	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.4	2.6	2.4	2.2	2.2	2.6																							
10-Dec	2.1	2.2	2.2	Z	2.1	2.2	2.1	2.1	2.2	2.1	2.2	2.1	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.2																							
11-Dec	1.9	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.1																							
12-Dec	2.2	2.2	2.1	2.2	2.1	Z	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.2	2.3	2.2	2.3	2.3	2.2	2.2	2.1	2.2	2.3																							
13-Dec	Z	2.1	2.1	2.0	2.0	2.1	2.1	2.2	2.1	2.1	C	C	C	C	2.2	2.2	2.1	2.0	2.0	2.1	2.1	2.1	2.1	2.2	2.1	2.2																							
14-Dec	2.1	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.1	2.2	2.1	2.0	2.0	2.0	2.0	2.2	2.2	2.0	2.2																							
15-Dec	2.2	2.2	Z	2.1	2.1	2.1	2.2	2.2	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	2.1	2.2																							
16-Dec	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.1	2.1	2.0	2.0	2.1																							
17-Dec	2.5	2.2	2.1	2.1	Z	2.1	2.1	2.0	2.0	2.1	2.2	2.3	2.2	2.2	2.1	2.1	2.2	2.2	2.2	2.2	2.1	2.2	2.3	2.5	2.2	2.5																							
18-Dec	2.8	2.6	2.3	2.1	2.1	Z	2.0	2.0	2.0	2.3	2.2	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.1	2.1	2.1	2.1	2.8																							
19-Dec	Z	2.0	2.1	2.1	2.0	2.1	2.2	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.2	2.1	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.2																							
20-Dec	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	2.1	2.1	2.2	2.1	2.0	2.0	2.0	2.0	2.2	2.0	2.2																							
21-Dec	2.1	2.0	Z	1.9	1.9	1.9	1.9	2.0	2.1	2.2	2.1	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.2	2.2	2.0	2.1	2.2																							
22-Dec	2.0	2.0	2.0	Z	2.0	2.1	2.1	2.1	2.1	2.2	2.2	2.3	2.3	2.3	2.3	2.6	2.9	3.0	2.7	2.6	2.4	2.4	2.3	2.2	2.3	3.0																							
23-Dec	2.0	2.0	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.2	2.3	2.2	2.0	2.3																								
24-Dec	2.1	2.0	2.1	2.2	2.1	Z	2.2	2.1	2.2	2.1	2.1	2.1	2.1	2.2	2.3	2.2	2.2	2.2	2.1	2.2	2.5	2.5	2.4	2.4	2.2	2.5																							
25-Dec	Z	2.7	2.5	2.3	2.2	2.2	2.1	2.1	2.1	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.7																							
26-Dec	2.2	Z	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.3	2.2	2.2	2.1	2.1	2.2	2.2	2.3	2.3	2.2	2.3	2.1	2.1	2.2	2.3																							
27-Dec	1.9	1.9	Z	1.9	2.0	2.0	2.1	2.1	2.1	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.3	2.1	2.3																							
28-Dec	2.5	3.1	3.3	Z	3.3	3.2	3.0	3.0	3.0	2.8	2.4	2.1	2.1	2.1	2.0	2.0	2.3	2.2	2.3	2.3	2.1	2.0	2.0	2.1	2.5	3.3																							
29-Dec	2.1	2.0	2.1	2.1	Z	2.5	2.3	2.4	2.3	2.1	2.1	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.3	2.2	2.5																							
30-Dec	2.3	2.4	2.4	2.4	2.3	Z	2.3	2.3	2.4	2.5	2.3	2.3	2.3	2.3	2.2	2.3	2.3	2.3	2.5	2.3	2.3	2.3	2.2	2.4	2.3	2.5																							
31-Dec	Z	2.2	2.2	2.1	2.1	2.3	2.6	2.6	2.5	2.3	2.3	2.3	2.2	2.2	2.3	2.1	2.1	2.1	2.0	2.0	2.0	1.9	1.9	2.1	2.2	2.6																							
																								2.2	2.2	2.2	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.2	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	Diurnal Average
																								2.8	3.1	3.3	2.8	3.3	3.2	3.0	3.0	3.0	2.8	2.6	2.5	2.5	2.9	2.8	2.7	2.9	3.0	2.7	2.6	2.5	2.7	2.7	2.9	2.9	Diurnal Maximum
Z - zerospan																								C - Calibration																									





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Methane (CH₄) - ppm
Fort McKay - Bertha Ganter - December 2023

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	225	31.73	31.73
2.1 - 3.0	480	67.70	99.44
3.1 - 10.0	4	0.56	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 709

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Methane (CH₄) - ppm
Fort McKay - Bertha Ganter - December 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	6	12	8	1	2	1	4	4	44	23	26	30	38	17	5	4	225
2.1 - 3.0	28	8	3	2	0	3	2	20	212	91	54	20	7	12	8	10	480
3.1 - 10.0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	1	1	4
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	34	20	11	3	2	4	6	24	256	116	80	50	45	29	14	15	709

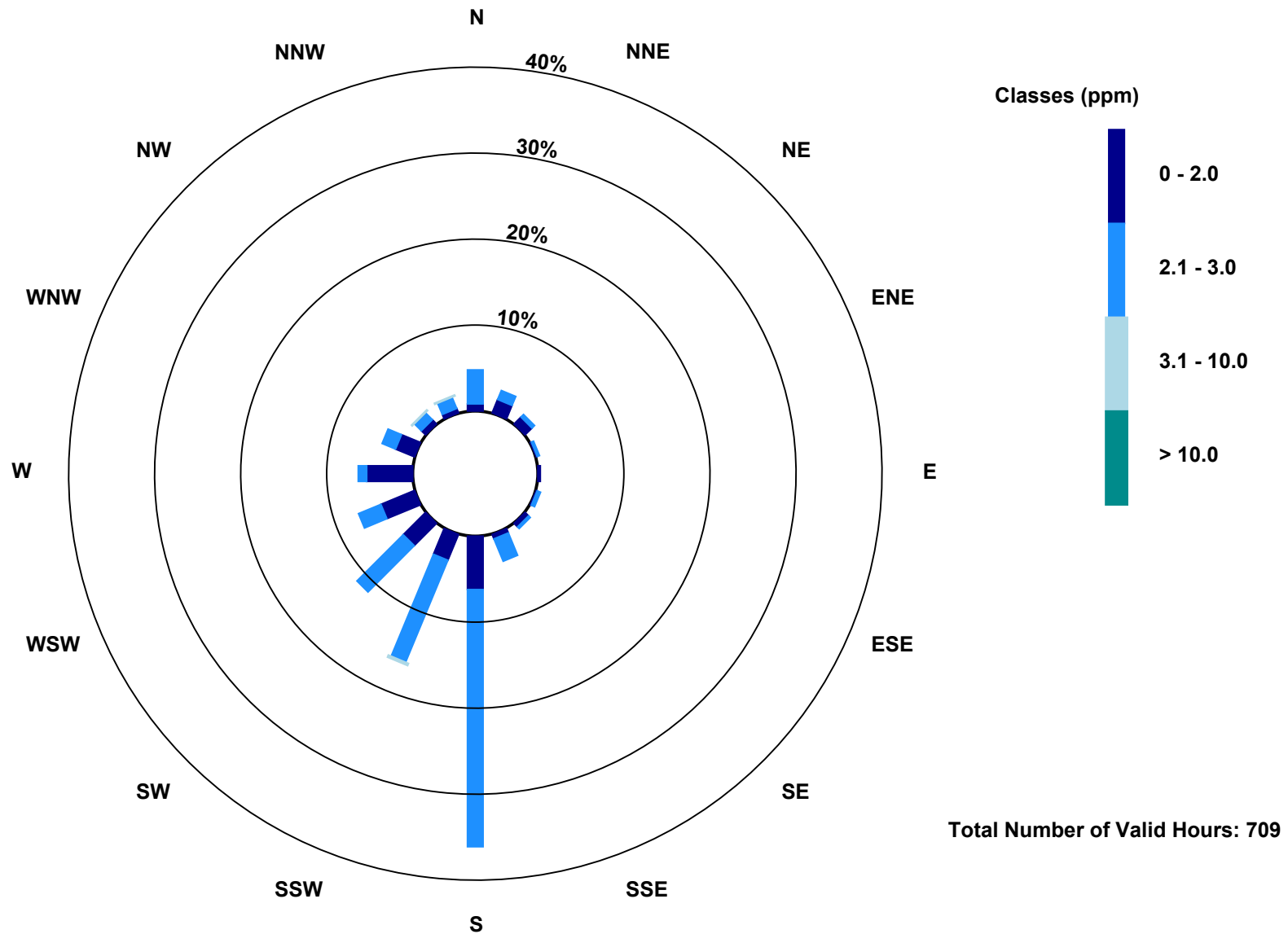
Total Number of Valid Hours: 709

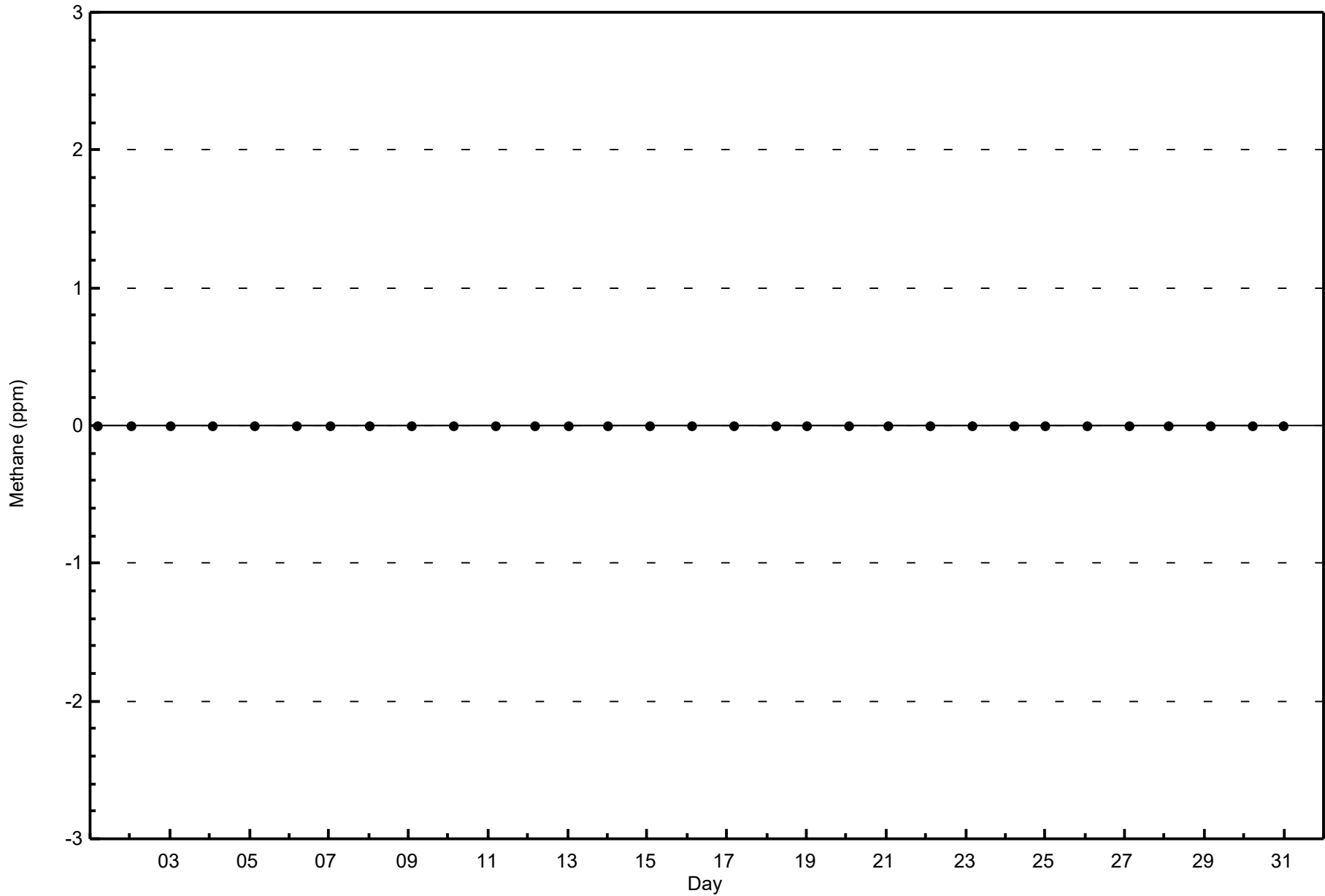
Total Number of Hours: 744

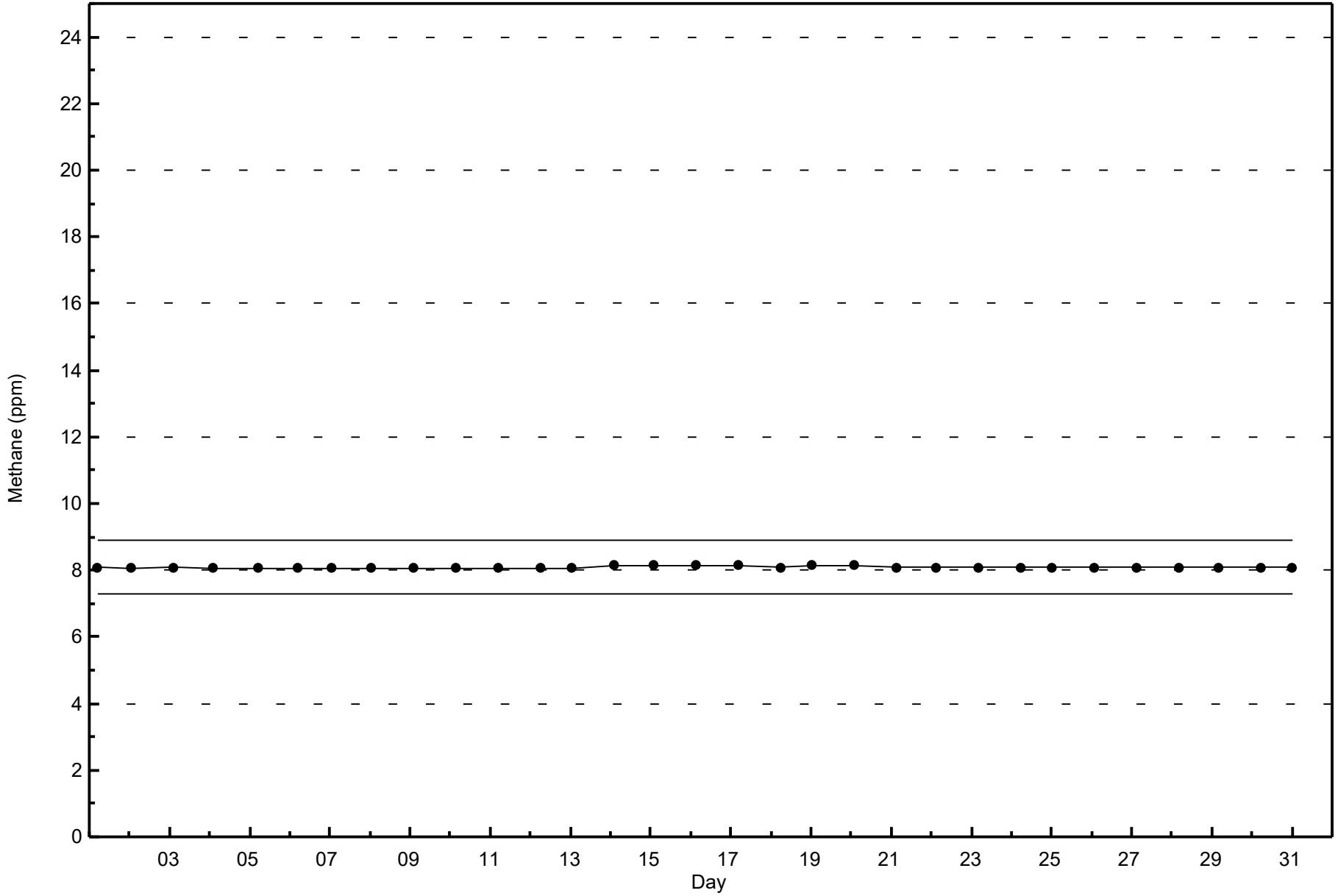


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Methane (CH₄) - ppm
Fort McKay - Bertha Ganter







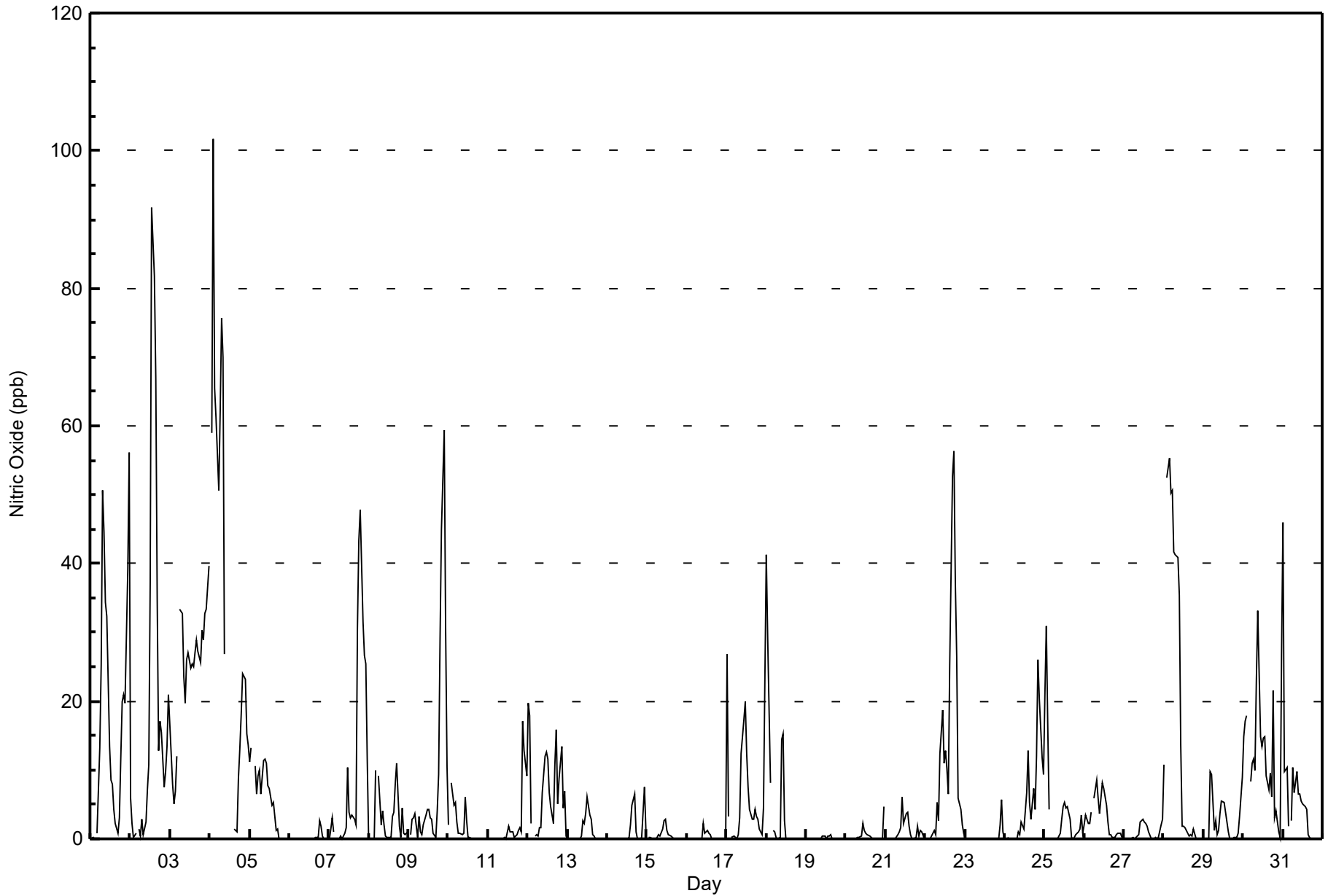


Maximum Value: 101.7 ppb on Dec 4 03:00																					Maximum Daily Average: 38.4 ppb on Dec 4					Hours in Service: 744	
Minimum Value: 0.0 ppb on Dec 5 19:00											Minimum Daily Average: 0.1 ppb on Dec 19					Hours of Data: 708											
Maximum Diurnal Average: 8.9 ppb at hour 3											Minimum Diurnal Average: 5.3 ppb at hour 17					Hours of Missing Data: 36											
Monthly Average: 6.94 ppb											Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.0 Median = 1.1 Q ₃ = 7.2 P ₉₀ = 23.2 P ₉₉ = 62.3					Hours of Calibration: 36											
																Percent Operational Time: 100.0											
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Dec	0.0	0.2	0.2	Z	0.8	13.2	25.2	50.7	44.6	34.4	32.3	13.5	8.5	7.9	4.2	2.3	0.9	3.1	11.8	20.0	20.9	19.7	39.1	56.1	17.8	56.1	
2-Dec	6.0	2.3	0.2	0.8	Z	1.4	0.4	2.9	0.6	2.5	7.1	10.8	37.2	91.7	81.8	66.9	34.9	12.8	17.0	15.4	7.5	9.7	13.4	21.0	19.3	91.7	
3-Dec	16.6	8.0	5.1	6.8	12.0	Z	33.4	32.7	23.6	19.7	26.0	27.1	24.8	25.4	25.1	27.1	28.9	27.2	25.7	30.4	28.9	32.7	33.3	39.6	24.4	39.6	
4-Dec	Z	59.0	101.7	65.6	61.3	50.6	62.3	75.7	70.1	26.8	C	C	C	C	C	1.3	0.9	8.7	13.0	18.1	24.1	23.2	15.2	13.6	38.4	101.7	
5-Dec	11.2	13.2	Z	10.6	6.5	9.3	10.0	6.5	11.5	11.7	11.0	7.7	7.3	4.8	5.3	3.2	1.3	1.3	0.0	0.0	0.0	0.0	0.0	0.0	5.8	13.2	
6-Dec	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	0.2	0.1	2.7	1.9	0.4	0.0	0.0	0.0	0.2	2.7	
7-Dec	0.0	1.5	3.0	1.1	Z	0.0	0.0	0.4	0.1	0.8	1.6	10.4	4.0	3.1	3.5	2.9	2.1	30.5	43.3	47.7	31.5	26.7	25.4	11.5	10.9	47.7	
8-Dec	0.1	0.0	0.0	0.0	9.9	Z	9.1	2.0	4.0	2.0	0.4	0.2	0.2	0.1	3.3	4.0	8.0	11.0	1.9	0.1	4.5	0.9	0.7	1.0	2.7	11.0	
9-Dec	Z	0.5	2.8	3.0	3.6	0.2	3.4	1.1	0.5	2.1	3.4	4.2	4.3	3.1	2.9	0.9	0.3	4.0	9.5	28.9	44.9	59.5	30.3	10.4	9.7	59.5	
10-Dec	2.0	Z	8.2	4.8	5.3	2.4	0.8	0.7	0.5	0.9	6.1	2.6	0.3	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.5	8.2	
11-Dec	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	1.8	1.0	1.0	0.9	0.2	0.7	1.2	1.7	1.0	17.2	12.7	9.2	2.1	17.2	
12-Dec	19.8	17.9	2.1	Z	0.4	0.7	0.4	1.7	1.6	6.6	11.9	12.5	11.5	6.7	4.6	2.3	10.8	15.9	5.2	8.8	13.5	4.4	7.0	0.4	7.2	19.8	
13-Dec	0.0	0.0	0.1	0.0	Z	0.0	0.0	0.1	0.3	2.6	2.2	3.6	6.1	3.5	2.8	0.6	0.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0	1.0	6.1	
14-Dec	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	0.2	1.9	5.0	6.5	1.1	0.0	0.0	0.0	0.2	7.5	1.5	1.0	7.5	
15-Dec	Z	0.2	0.1	0.0	0.0	0.1	0.1	0.6	0.4	1.3	2.5	2.9	1.1	0.7	0.4	0.1	0.0	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.5	2.9	
16-Dec	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	2.3	0.9	1.1	0.8	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	2.3	
17-Dec	26.8	3.2	Z	0.1	0.3	0.3	0.0	0.6	3.0	12.3	17.4	19.9	12.3	7.5	4.3	2.8	2.8	4.4	3.3	2.9	1.3	0.6	4.5	23.2	6.7	26.8	
18-Dec	41.3	29.3	8.1	Z	1.3	1.0	0.1	0.0	0.1	14.4	15.3	2.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.9	41.3	
19-Dec	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.3	0.5	0.0	0.4	0.4	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.7	
20-Dec	0.0	0.0	0.0	0.0	0.0	Z	0.0	0.1	0.2	0.5	2.2	1.3	0.8	0.6	0.3	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	4.7	0.5	4.7	
21-Dec	Z	0.1	0.1	0.0	0.0	0.0	0.0	0.6	0.9	1.7	6.1	2.2	3.7	3.9	1.9	0.5	0.0	0.0	0.2	1.8	0.3	1.2	1.1	0.0	1.1	6.1	
22-Dec	0.0	Z	0.0	0.0	0.5	1.2	0.6	5.2	2.7	12.5	18.7	11.0	12.8	10.1	6.5	25.3	52.7	56.3	37.5	26.5	6.0	4.2	1.9	0.8	12.7	56.3	
23-Dec	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.1	5.7	0.9	0.4	5.7	
24-Dec	0.0	0.0	0.1	Z	0.0	0.0	0.0	0.0	1.0	0.6	2.5	1.5	4.0	6.7	12.9	5.3	2.8	7.4	4.3	12.1	26.0	20.4	11.8	9.3	5.6	26.0	
25-Dec	21.1	31.0	16.6	4.2	Z	0.0	0.0	0.0	0.0	0.8	2.8	4.7	5.3	4.5	4.8	2.9	0.2	0.1	0.2	0.6	1.0	1.5	3.4	0.8	4.6	31.0	
26-Dec	2.1	3.4	2.3	2.2	3.9	Z	5.9	8.6	6.0	3.6	5.8	8.1	7.3	4.9	2.5	0.7	0.6	0.1	0.2	0.7	0.7	0.9	0.8	0.2	3.1	8.6	
27-Dec	Z	0.0	0.0	0.0	0.1	0.2	0.1	0.2	0.4	0.7	2.5	2.8	2.4	2.3	1.9	1.1	0.1	0.0	0.0	0.1	0.0	0.2	2.0	2.9	0.9	2.9	
28-Dec	10.8	Z	52.5	55.3	50.3	50.7	41.7	41.4	40.9	35.5	13.7	1.8	1.9	1.6	0.7	0.5	0.6	0.5	1.3	0.0	0.0	0.0	0.0	0.0	17.5	55.3	
29-Dec	0.0	0.0	Z	0.1	9.9	9.3	1.3	2.6	0.5	1.2	3.6	5.4	5.3	3.8	2.4	1.0	0.0	0.0	0.2	0.2	0.2	0.8	3.2	9.0	2.6	9.9	
30-Dec	14.9	17.1	17.8	Z	8.3	11.0	11.5	9.9	23.0	33.1	14.8	13.5	14.7	14.8	9.2	7.1	9.5	6.1	21.6	3.0	4.1	1.1	0.2	26.9	12.7	33.1	
31-Dec	46.0	9.7	10.3	1.8	Z	2.6	10.3	6.7	9.7	6.5	6.5	5.5	5.0	4.8	4.2	0.6	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.7	46.0	
8.4 7.3 8.9 6.3 7.0 5.9 7.0 8.1 7.9 7.6 7.3 5.9 6.1 7.2 6.3 5.4 5.3 6.2 6.5 7.1 7.0 7.3 7.1 7.8																								Diurnal Average			
46.0 59.0 101.7 65.6 61.3 50.7 62.3 75.7 70.1 35.5 32.3 27.1 37.2 91.7 81.8 66.9 52.7 56.3 43.3 47.7 44.9 59.5 39.1 56.1																								Diurnal Maximum			
Z - zerospan C - Calibration																											



Wood Buffalo Environmental Association
Hourly Averages

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	631	89.12	89.12
21 - 40	48	6.78	95.90
41 - 80	26	3.67	99.58
81 - 159	3	0.42	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 708

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Nitric Oxide (NO) - ppb
Fort McKay - Bertha Ganter - December 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	25	19	11	3	2	4	6	20	240	101	66	42	45	25	10	12	631
21 - 40	7	1	0	0	0	0	0	2	10	9	6	4	0	3	4	2	48
11 - 80	1	0	0	0	0	0	0	0	4	7	6	3	1	2	1	1	26
81 - 159	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	3
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	33	20	11	3	2	4	6	23	255	118	78	49	46	30	15	15	708

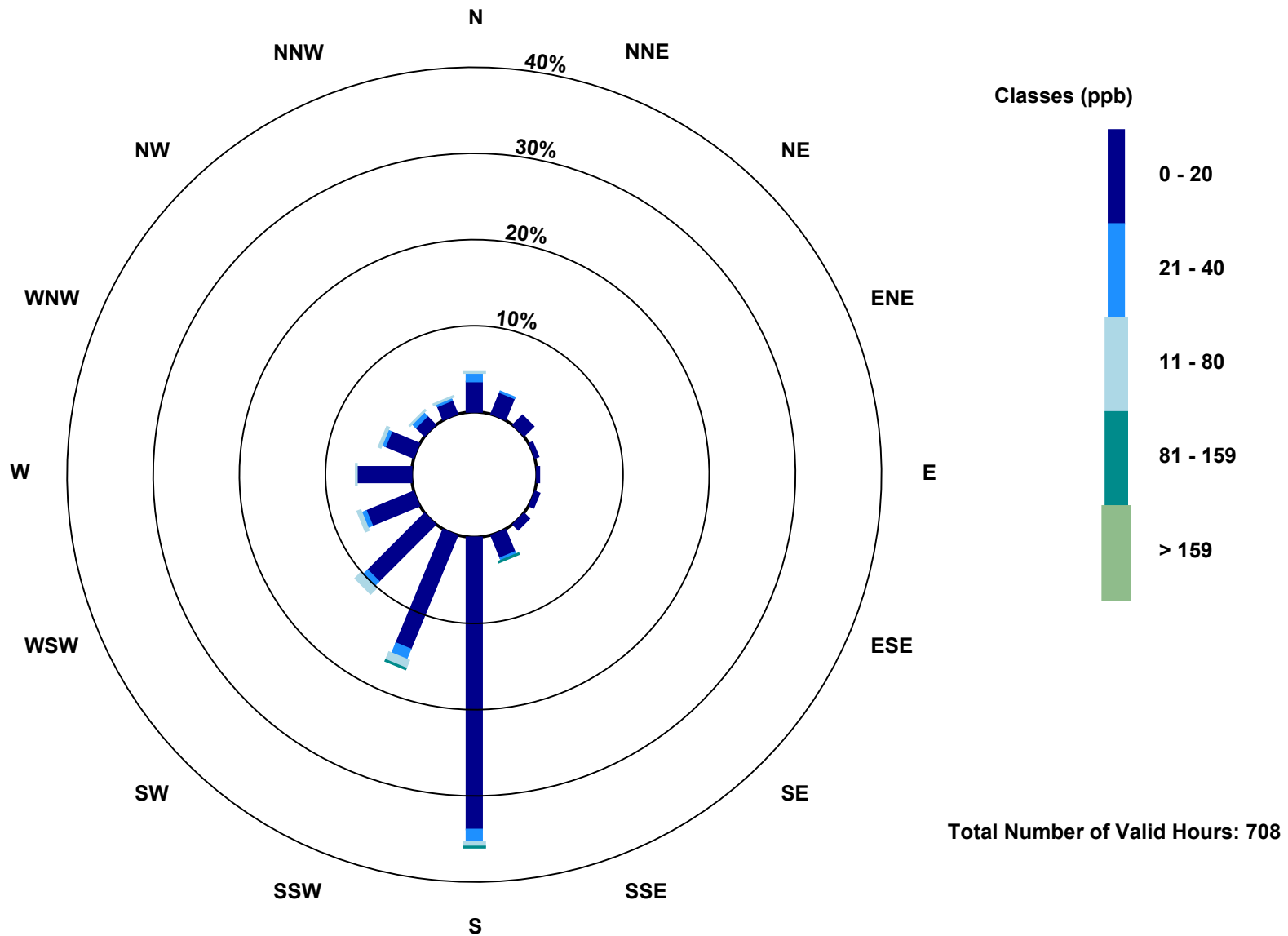
Total Number of Valid Hours: 708

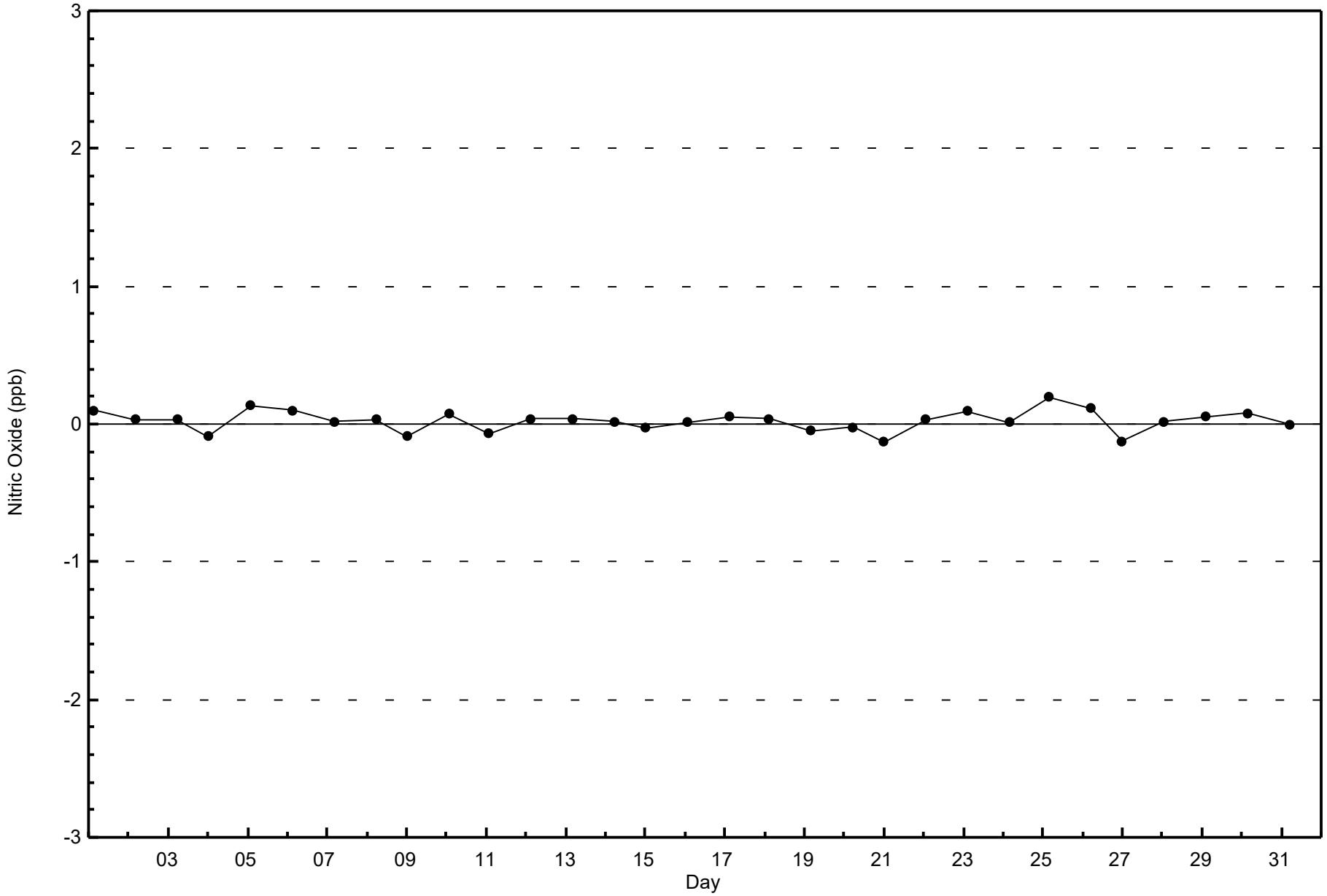
Total Number of Hours: 744

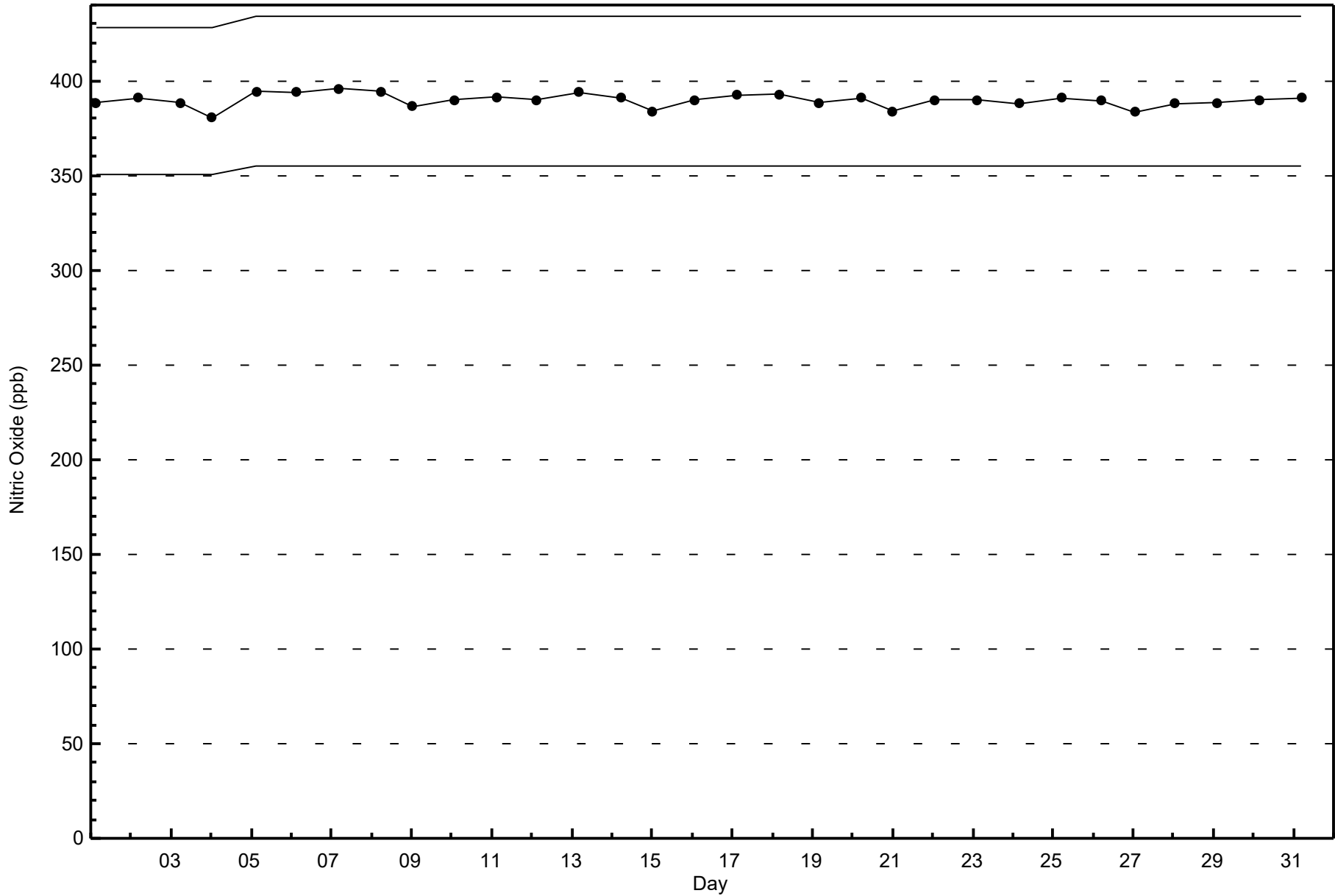


Wood Buffalo Environmental Association
Wind Rose Dec 2023

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









Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO₂) - ppb

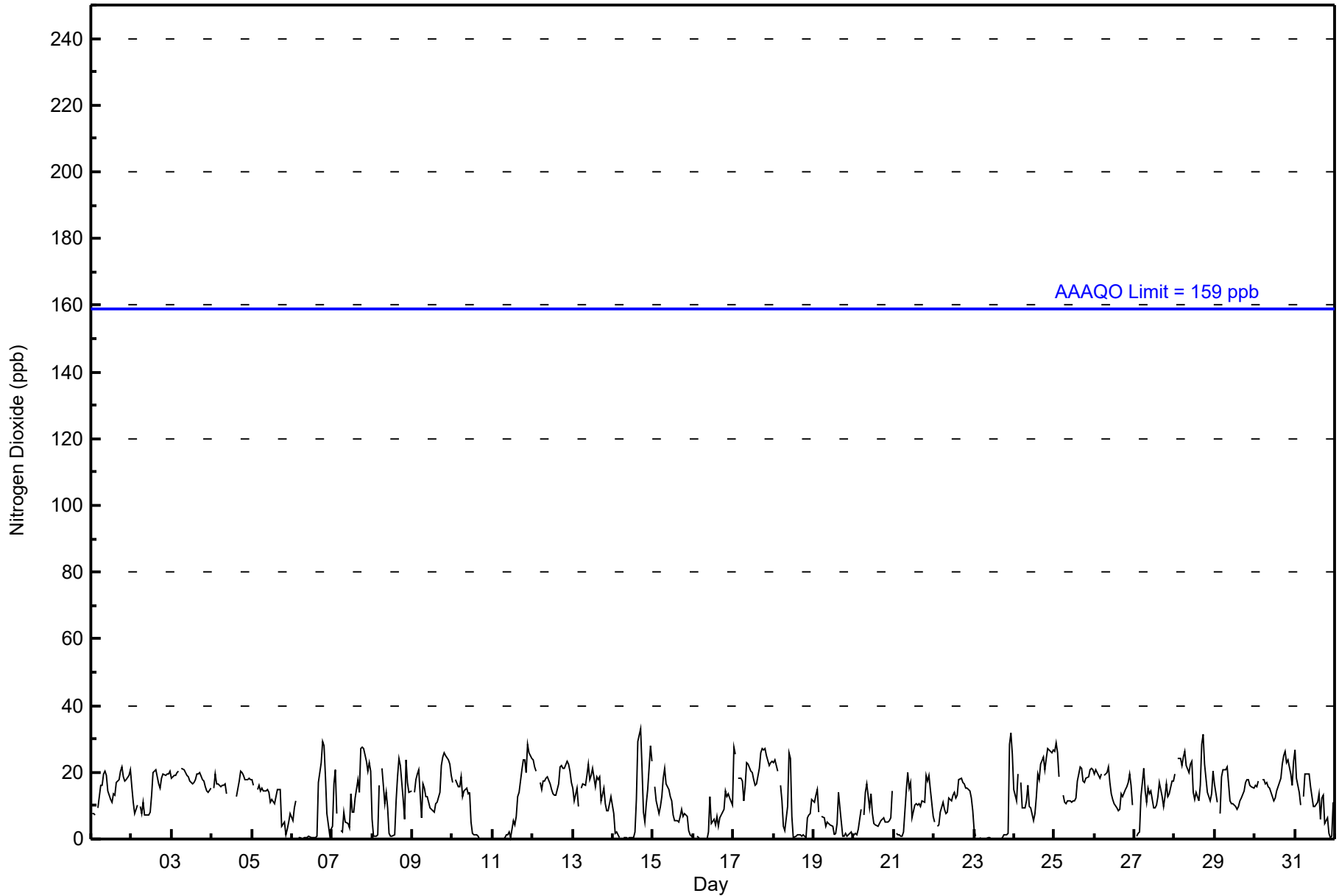
Fort McKay - Bertha Ganter - December 2023

Number of Exceedences (AAAQO):		1-hr: 0		24-hr: 0		Hours in Service:		744																			
Maximum Value: 33.1 ppb on Dec 14 17:00		Maximum Daily Average: 21.4 ppb on Dec 17		Minimum Value: 0.0 ppb on Dec 10 19:00		Minimum Daily Average: 4.2 ppb on Dec 23		Hours of Data: 708																			
Maximum Diurnal Average: 15.8 ppb at hour 18		Minimum Diurnal Average: 8.6 ppb at hour 13		Monthly Average: 12.62 ppb		Percentiles: P ₁ = 0.0 P ₁₀ = 0.8 Q ₁ = 6.6 Median = 13.4 Q ₃ = 18.3 P ₉₀ = 22.3 P ₉₉ = 28.3		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-Dec	7.7	7.7	7.1	Z	9.2	16.1	16.2	19.6	20.5	19.1	14.4	11.8	11.1	13.5	13.1	16.9	17.8	20.5	21.5	18.7	17.4	17.9	19.2	20.7	15.6	21.5	
2-Dec	15.6	10.9	7.5	10.1	Z	9.9	7.7	11.2	7.4	7.2	7.4	8.1	13.1	19.9	20.9	18.7	16.4	15.4	18.3	19.5	19.0	19.5	19.5	20.5	14.1	20.9	
3-Dec	18.2	18.9	19.2	20.0	20.3	Z	21.2	20.8	20.1	19.1	18.6	17.5	16.6	17.0	17.6	19.4	19.7	19.8	17.7	17.4	15.5	14.6	13.9	15.1	18.2	21.2	
4-Dec	Z	15.2	19.6	16.6	16.5	15.6	16.0	16.1	16.7	13.7	C	C	C	C	C	12.6	17.2	20.4	20.0	18.9	17.8	17.6	18.2	17.9	17.0	20.4	
5-Dec	17.6	16.1	Z	14.9	16.1	14.5	15.4	14.5	14.2	14.9	13.8	11.2	12.0	10.5	12.9	15.0	15.0	14.9	3.8	5.0	1.4	2.9	5.2	7.7	11.7	17.6	
6-Dec	5.5	9.4	11.4	Z	0.4	0.4	0.2	0.3	0.3	0.5	0.8	0.5	0.4	0.6	0.6	0.8	16.8	22.8	29.4	28.1	18.8	7.6	1.4	3.1	7.0	29.4	
7-Dec	3.7	16.5	20.8	7.7	Z	2.5	2.1	7.9	5.0	4.6	3.2	13.4	8.0	8.0	12.2	17.9	14.1	27.1	27.7	27.2	23.5	20.5	22.7	20.5	13.8	27.7	
8-Dec	6.0	0.8	0.8	1.2	16.0	Z	21.0	10.4	14.0	9.4	1.8	1.0	1.0	1.1	11.3	18.8	24.1	22.2	12.0	5.9	23.6	16.8	13.8	14.3	10.8	24.1	
9-Dec	Z	13.8	17.9	19.3	20.9	6.2	16.7	15.3	12.7	12.8	9.3	8.7	8.3	7.9	10.6	11.2	13.9	21.9	24.6	25.8	25.1	23.8	22.5	19.2	16.0	25.8	
10-Dec	17.1	Z	17.6	15.8	15.7	18.7	12.9	14.5	15.3	13.5	13.8	5.1	1.6	1.3	1.3	0.9	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	7.2	18.7	
11-Dec	0.0	0.0	Z	0.0	0.0	0.0	0.2	0.3	1.1	1.1	2.3	0.5	5.3	4.3	6.9	12.8	13.9	20.6	23.6	23.9	19.8	28.2	26.0	24.1	9.3	28.2	
12-Dec	23.6	21.6	20.2	Z	17.1	15.0	17.5	17.5	18.4	18.8	16.6	15.0	13.6	13.3	13.0	16.4	21.4	22.1	21.3	21.2	23.4	22.3	20.4	17.0	18.6	23.6	
13-Dec	15.4	11.4	15.3	9.8	Z	15.2	16.7	16.2	18.9	22.6	17.8	19.0	21.1	15.8	18.6	17.7	18.5	11.3	15.3	10.8	8.3	8.3	10.8	12.7	15.1	22.6	
14-Dec	7.7	1.6	2.0	1.1	0.4	Z	0.3	0.6	0.6	0.2	0.3	0.4	0.5	2.0	11.9	29.1	33.1	21.3	7.9	5.2	10.8	14.9	28.0	23.2	8.8	33.1	
15-Dec	Z	15.8	11.4	7.8	9.7	12.9	18.2	21.2	16.6	14.8	12.7	11.3	7.1	5.7	5.7	5.2	6.9	8.8	6.9	7.7	6.8	2.7	1.4	0.7	9.5	21.2	
16-Dec	0.7	Z	0.7	0.6	0.2	0.0	0.0	0.0	0.0	2.2	12.7	4.6	5.9	4.2	6.7	3.7	6.5	8.2	9.1	14.4	12.5	13.6	12.1	10.2	5.6	14.4	
17-Dec	27.5	25.6	Z	18.1	18.4	17.5	11.4	16.2	22.9	22.6	20.5	19.9	17.9	16.3	16.7	21.3	25.8	27.0	26.5	27.1	25.2	22.0	23.0	23.1	21.4	27.5	
18-Dec	22.7	23.7	20.3	Z	16.2	11.4	3.8	2.6	9.6	25.8	24.3	6.9	0.6	1.0	1.2	1.1	1.3	1.0	1.4	0.5	6.5	7.3	7.6	12.0	9.1	25.8	
19-Dec	10.9	13.3	14.7	8.2	Z	6.6	6.2	3.7	5.2	4.5	4.2	3.9	1.2	1.8	4.6	14.1	9.5	0.9	1.0	1.7	0.7	1.4	2.0	0.7	5.3	14.7	
20-Dec	1.4	1.8	1.4	3.1	9.1	Z	7.3	14.0	16.5	9.3	13.5	7.7	4.8	4.3	3.7	4.8	5.7	5.9	6.3	4.9	5.1	5.7	6.2	14.5	6.8	16.5	
21-Dec	Z	1.6	1.2	1.1	0.8	0.7	2.3	14.9	20.0	15.2	17.0	6.5	10.3	10.8	10.3	10.5	9.9	11.4	11.2	18.9	17.5	19.0	15.0	6.7	10.1	20.0	
22-Dec	5.2	Z	4.0	4.2	8.0	11.0	8.9	7.6	8.2	12.4	11.4	13.3	14.0	12.2	13.1	17.6	18.3	16.9	16.6	15.1	15.4	14.5	12.1	8.5	11.7	18.3	
23-Dec	2.6	0.8	Z	0.5	0.2	0.2	0.1	0.2	0.3	0.6	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.5	1.3	1.3	1.9	28.3	31.8	25.4	4.2	31.8	
24-Dec	14.9	11.3	19.7	Z	16.9	9.4	9.4	11.5	15.9	9.6	9.2	5.3	7.7	12.6	19.4	17.8	22.5	24.4	20.9	24.1	27.1	26.5	25.9	26.6	16.9	27.1	
25-Dec	26.2	28.9	26.0	18.6	Z	13.1	11.0	10.7	11.5	11.3	11.2	11.3	11.3	12.4	17.4	21.8	21.1	17.4	16.8	18.1	18.8	20.6	21.3	20.7	17.3	28.9	
26-Dec	19.5	20.7	19.0	18.3	19.4	Z	19.2	19.8	21.7	16.8	13.4	12.0	10.6	9.4	8.4	8.7	13.7	12.6	14.8	15.6	16.9	19.7	15.9	10.2	15.5	21.7	
27-Dec	Z	0.7	1.6	2.0	12.5	21.3	14.5	10.9	15.3	13.6	14.4	9.4	9.2	10.0	12.8	16.8	12.8	9.8	12.7	16.5	12.8	13.4	17.2	17.5	12.1	21.3	
28-Dec	19.6	Z	24.0	24.1	22.2	24.4	26.4	22.0	20.1	22.4	23.2	14.0	11.9	14.0	11.3	16.3	28.6	31.4	22.5	14.0	12.9	11.4	13.6	20.4	19.6	31.4	
29-Dec	16.7	11.2	Z	7.5	18.8	20.8	20.6	21.6	16.4	11.5	10.6	10.7	9.9	9.1	9.6	11.3	12.4	14.6	17.0	17.6	17.6	16.2	15.8	15.2	14.5	21.6	
30-Dec	16.3	15.5	17.2	Z	18.0	17.7	16.4	16.9	15.8	15.4	12.5	11.5	12.1	14.4	15.8	18.3	22.3	25.2	26.1	22.9	23.6	19.6	16.0	23.2	17.9	26.1	
31-Dec	26.5	18.1	13.9	10.1	Z	12.8	19.7	19.6	19.3	15.7	12.9	9.8	9.8	11.1	13.5	5.8	12.1	13.2	4.6	6.4	1.9	0.6	0.7	11.1	11.7	26.5	
		13.4	12.3	12.9	9.6	12.1	11.3	11.6	12.2	12.9	12.3	11.5	9.0	8.6	8.8	10.7	13.0	15.2	15.8	14.8	14.7	14.4	14.8	14.8	14.9	Diurnal Average	
		27.5	28.9	26.0	24.1	22.2	24.4	26.4	22.0	22.9	25.8	24.3	19.9	21.1	19.9	20.9	29.1	33.1	31.4	29.4	28.1	27.1	28.3	31.8	26.6	Diurnal Maximum	
Z - zerospan		C - Calibration																									
Alberta Ambient Air Quality Objectives (AAAQO):		1-hr		159 ppb																							



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Dioxide (NO₂) - ppb
Fort McKay - Bertha Ganter - December 2023





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitrogen Dioxide (NO₂) - ppb
Fort McKay - Bertha Ganter - December 2023

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	596	84.18	84.18
21 - 40	112	15.82	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 708

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Fort McKay - Bertha Ganter - December 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	28	18	11	3	2	4	6	21	213	93	61	39	45	26	12	14	596
21 - 40	5	2	0	0	0	0	0	2	42	25	17	10	1	4	3	1	112
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	33	20	11	3	2	4	6	23	255	118	78	49	46	30	15	15	708

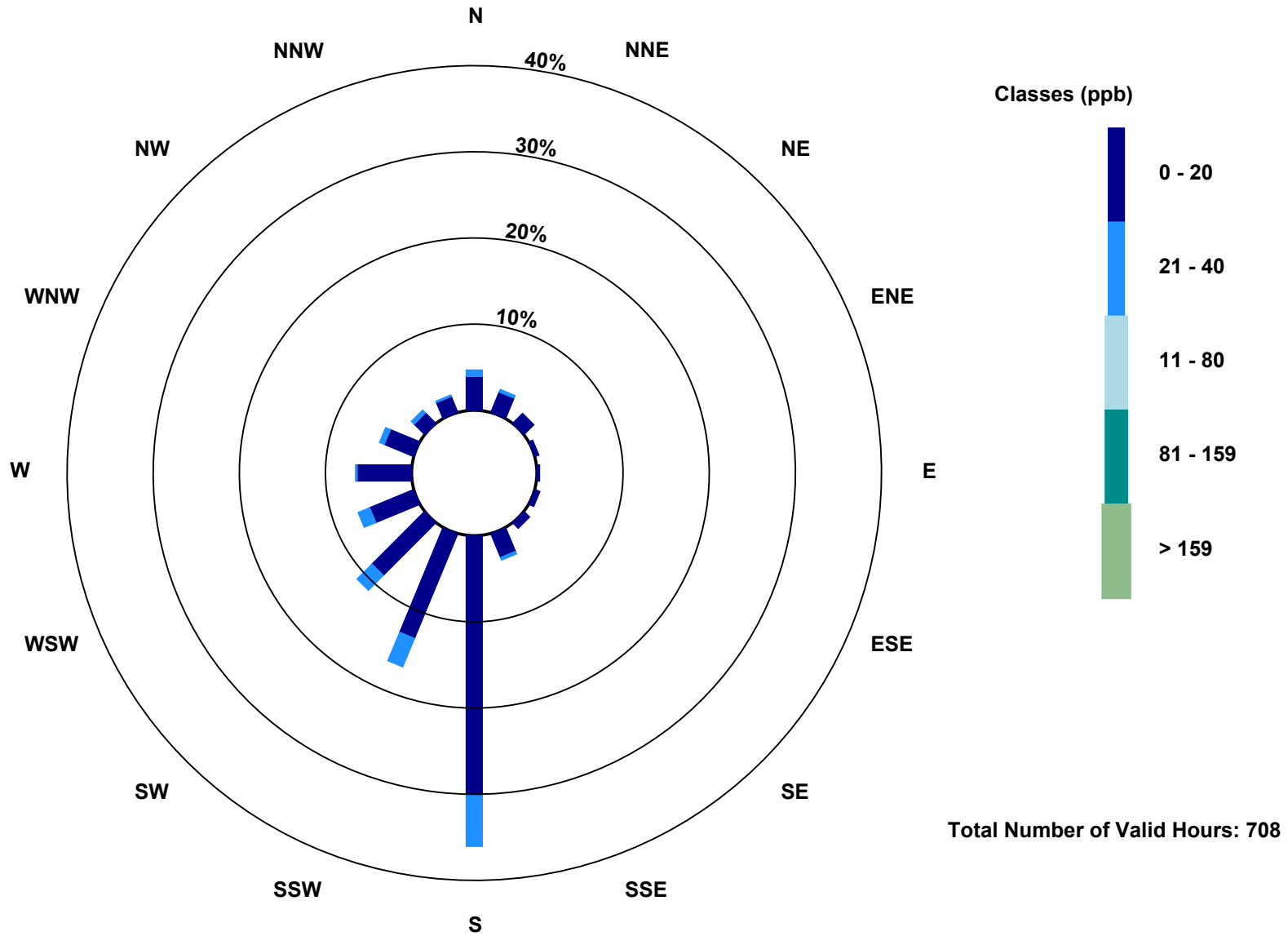
Total Number of Valid Hours: 708

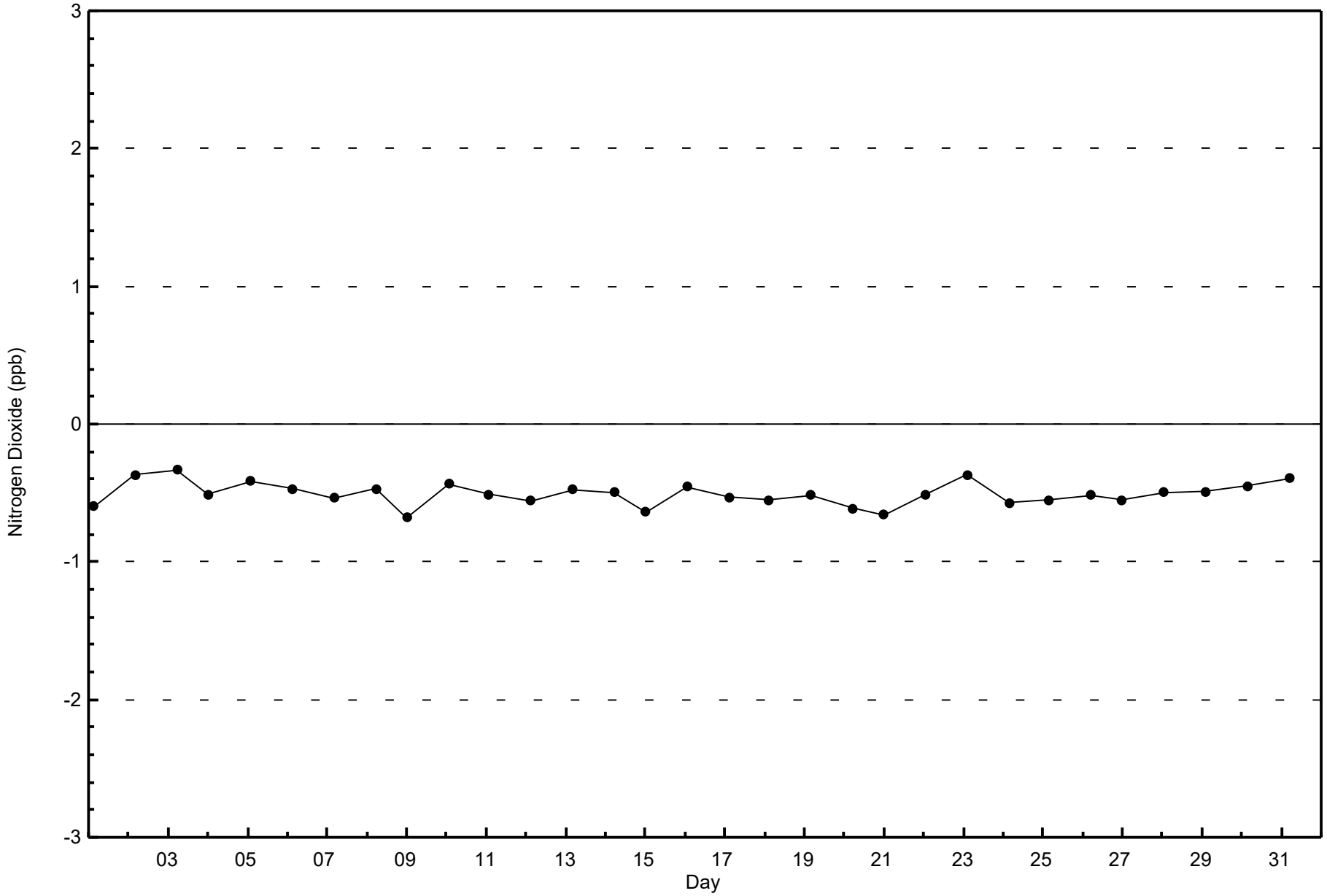
Total Number of Hours: 744

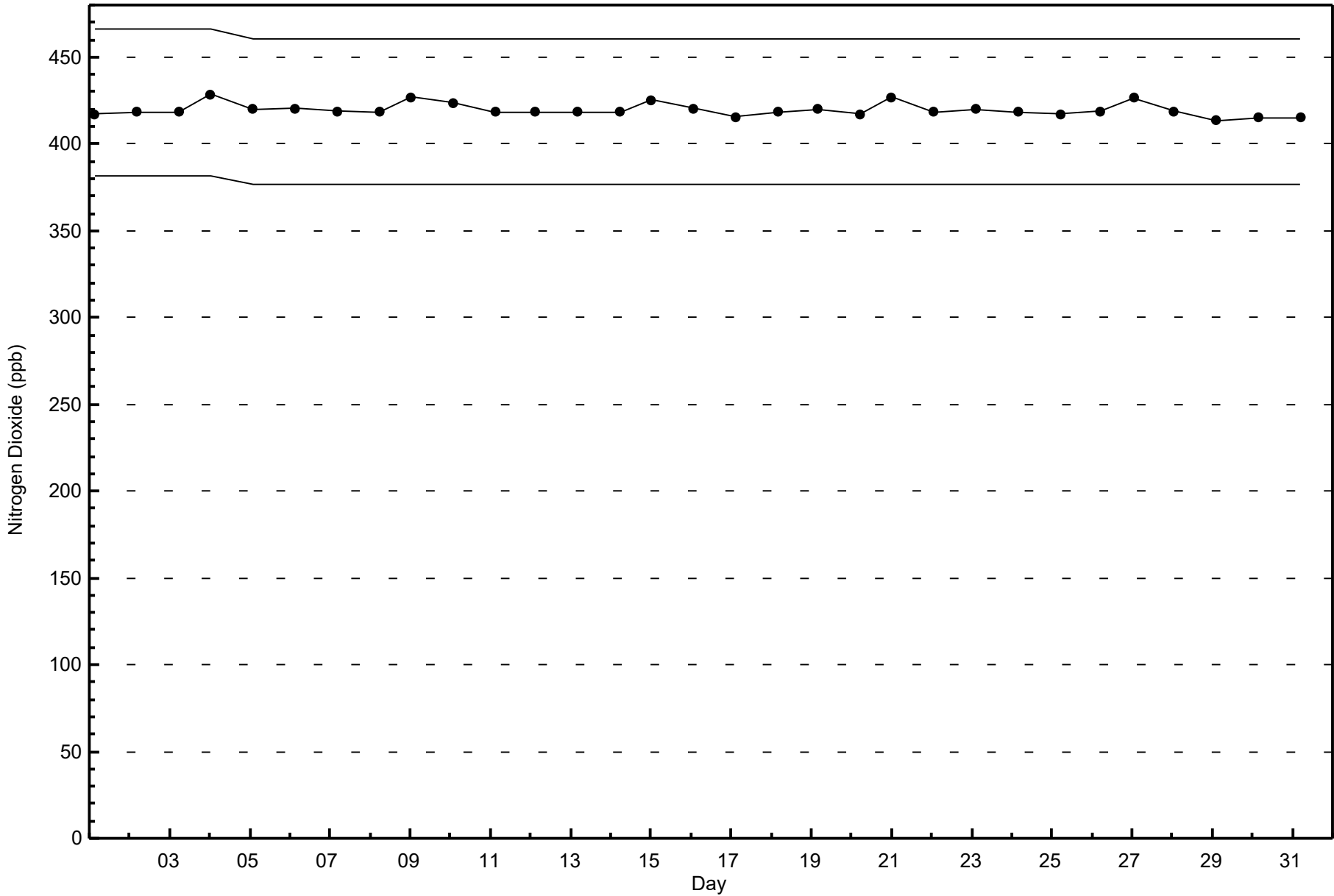


Wood Buffalo Environmental Association
Wind Rose Dec 2023

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









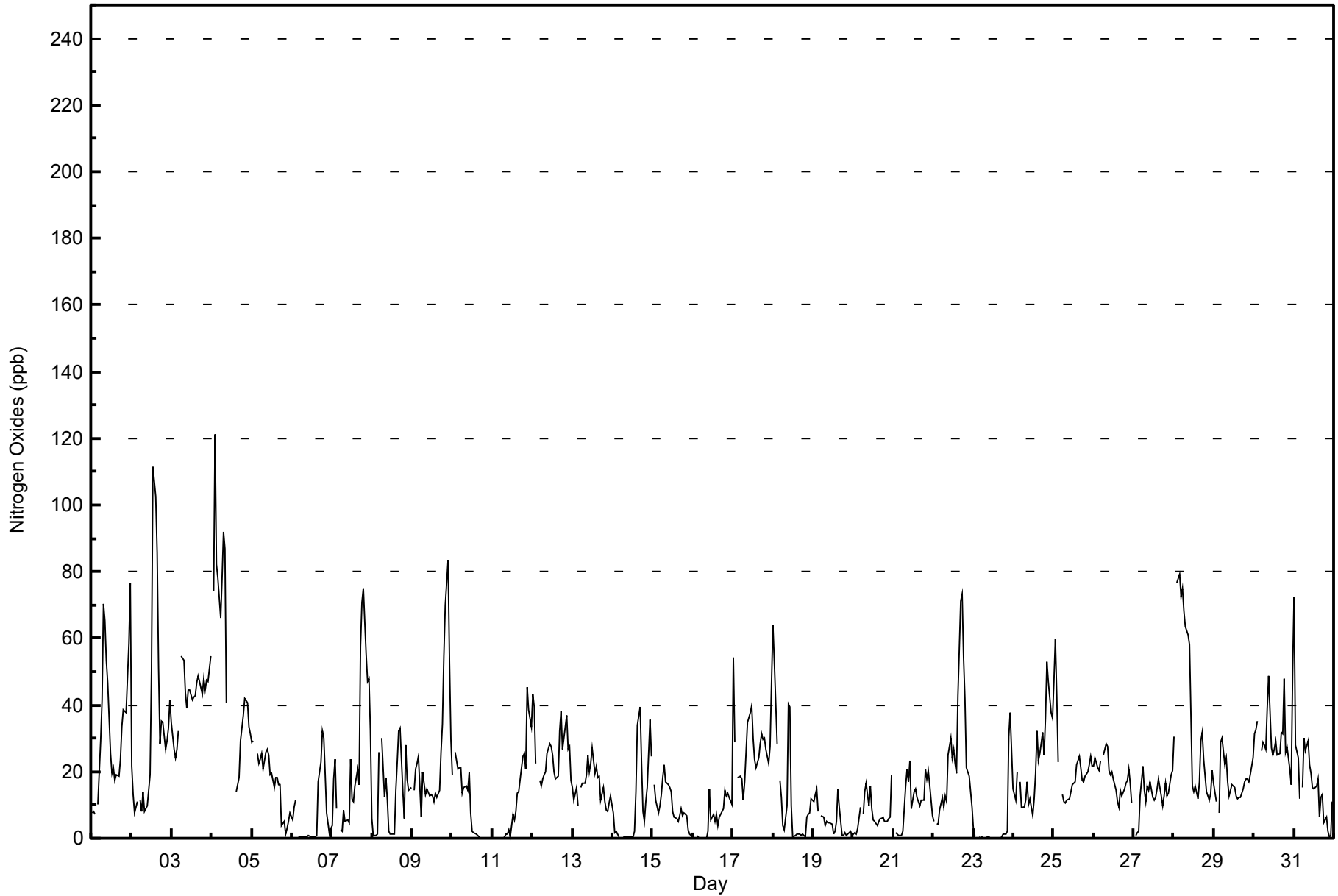
Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Oxides (NO_x) - ppb

Fort McKay - Bertha Ganter - December 2023

Maximum Value: 121.3 ppb on Dec 4 03:00																						Maximum Daily Average: 55.4 ppb on Dec 4																						Hours in Service: 744			
Minimum Value: 0.0 ppb on Dec 10 19:00																						Minimum Daily Average: 4.6 ppb on Dec 23																						Hours of Data: 708			
Maximum Diurnal Average: 22.8 ppb at hour 24																						Minimum Diurnal Average: 14.7 ppb at hour 13																						Hours of Missing Data: 36			
Monthly Average: 19.56 ppb																						Percentiles: P ₁ = 0.0 P ₁₀ = 0.8 Q ₁ = 7.0 Median = 15.7 Q ₃ = 26.3 P ₉₀ = 42.5 P ₉₉ = 82.0																						Hours of Calibration: 36			
																						Percent Operational Time: 100.0																									
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																					
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																							
1-Dec	7.7	7.9	7.3	Z	10.0	29.3	41.4	70.3	65.1	53.5	46.7	25.3	19.6	21.4	17.3	19.2	18.7	23.6	33.3	38.7	38.3	37.6	58.3	76.8	33.4	76.8																					
2-Dec	21.6	13.2	7.7	10.9	Z	11.3	8.1	14.1	8.0	9.7	14.5	18.9	50.3	111.6	102.7	85.6	51.3	28.2	35.3	34.9	26.5	29.2	32.9	41.5	33.4	111.6																					
3-Dec	34.8	26.9	24.3	26.8	32.3	Z	54.6	53.5	43.7	38.8	44.6	44.6	41.4	42.4	42.7	46.5	48.6	47.0	43.4	47.8	44.4	47.3	47.2	54.7	42.5	54.7																					
4-Dec	Z	74.2	121.3	82.2	77.8	66.2	78.3	91.8	86.8	40.5	C	C	C	C	C	13.9	18.1	29.1	33.0	37.0	41.9	40.8	33.4	31.5	55.4	121.3																					
5-Dec	28.8	29.3	Z	25.5	22.6	23.8	25.4	21.0	25.7	26.6	24.8	18.9	19.3	15.3	18.2	18.2	16.3	16.2	3.8	5.0	1.4	2.9	5.2	7.7	17.5	29.3																					
6-Dec	5.5	9.4	11.4	Z	0.4	0.4	0.2	0.3	0.3	0.5	0.8	0.5	0.4	0.6	0.6	0.8	17.0	22.9	32.1	30.0	19.2	7.6	1.4	3.1	7.2	32.1																					
7-Dec	3.7	18.0	23.8	8.8	Z	2.5	2.1	8.3	5.1	5.4	4.8	23.8	12.0	11.1	15.7	20.8	16.2	57.6	71.0	74.9	55.0	47.2	48.1	32.0	24.7	74.9																					
8-Dec	6.1	0.8	0.8	1.2	25.9	Z	30.1	12.4	18.0	11.4	2.2	1.2	1.2	1.2	14.6	22.8	32.1	33.2	13.9	6.0	28.1	17.7	14.5	15.3	13.5	33.2																					
9-Dec	Z	14.3	20.7	22.3	24.5	6.4	20.1	16.4	13.2	14.9	12.7	12.9	12.6	11.0	13.5	12.1	14.2	25.9	34.1	54.7	70.0	83.3	52.8	29.6	25.8	83.3																					
10-Dec	19.1	Z	25.8	20.6	21.0	21.1	13.7	15.2	15.8	14.4	19.9	7.7	1.9	1.5	1.3	0.9	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	8.7	25.8																					
11-Dec	0.0	0.0	Z	0.0	0.0	0.0	0.2	0.3	1.1	1.1	2.5	0.5	7.1	5.3	7.9	13.7	14.1	21.3	24.8	25.6	20.8	45.4	38.7	33.3	11.5	45.4																					
12-Dec	43.4	39.5	22.3	Z	17.5	15.7	17.9	19.2	20.0	25.4	28.5	27.5	25.1	20.0	17.6	18.7	32.2	38.0	26.5	30.0	36.9	26.7	27.4	17.4	25.8	43.4																					
13-Dec	15.4	11.4	15.4	9.8	Z	15.2	16.7	16.3	19.2	25.2	20.0	22.6	27.2	19.3	21.4	18.3	18.8	11.4	15.3	10.8	8.3	8.3	10.8	12.7	16.1	27.2																					
14-Dec	7.7	1.6	2.0	1.1	0.4	Z	0.3	0.6	0.6	0.2	0.3	0.4	0.5	2.2	13.8	34.1	39.6	22.4	7.9	5.2	10.8	15.1	35.5	24.7	9.9	39.6																					
15-Dec	Z	16.0	11.5	7.8	9.7	13.0	18.3	21.8	17.0	16.1	15.2	14.2	8.2	6.4	6.1	5.3	6.9	8.9	7.0	7.8	6.8	2.7	1.4	0.7	9.9	21.8																					
16-Dec	0.7	Z	0.7	0.6	0.2	0.0	0.0	0.0	0.0	2.3	15.0	5.5	7.0	5.0	7.3	3.7	6.5	8.2	9.1	14.4	12.5	13.6	12.1	10.2	5.9	15.0																					
17-Dec	54.3	28.8	Z	18.2	18.7	17.8	11.4	16.8	25.9	34.9	37.9	39.8	30.2	23.8	21.0	24.1	28.6	31.4	29.8	30.0	26.5	22.6	27.5	46.3	28.1	54.3																					
18-Dec	64.0	53.0	28.4	Z	17.5	12.4	3.9	2.6	9.7	40.2	39.6	9.6	0.6	1.0	1.2	1.1	1.3	1.0	1.4	0.5	6.5	7.3	7.6	12.0	14.0	64.0																					
19-Dec	10.9	13.3	14.7	8.2	Z	6.6	6.2	3.7	5.2	4.5	4.5	4.4	1.2	2.2	5.0	14.8	9.5	0.9	1.0	1.7	0.7	1.4	2.0	0.7	5.4	14.8																					
20-Dec	1.4	1.8	1.4	3.1	9.1	Z	7.3	14.1	16.7	9.8	15.7	9.0	5.6	4.9	4.0	5.0	5.8	6.0	6.4	5.0	5.2	5.8	6.3	19.2	7.3	19.2																					
21-Dec	Z	1.7	1.3	1.1	0.8	0.7	2.3	15.5	20.9	16.9	23.1	8.7	14.0	14.7	12.2	11.0	9.9	11.4	11.4	20.7	17.8	20.2	16.1	6.7	11.3	23.1																					
22-Dec	5.2	Z	4.0	4.2	8.5	12.2	9.5	12.8	10.9	24.9	30.1	24.3	26.8	22.3	19.6	42.9	71.0	73.2	54.1	41.6	21.4	18.7	14.0	9.3	24.4	73.2																					
23-Dec	2.6	0.8	Z	0.5	0.2	0.2	0.1	0.2	0.3	0.6	0.0	0.0	0.1	0.0	0.0	0.0	0.5	1.3	1.3	1.9	30.4	37.5	26.3	4.6	37.5																						
24-Dec	14.9	11.3	19.8	Z	16.9	9.4	9.4	11.5	16.9	10.2	11.7	6.8	11.7	19.3	32.3	23.1	25.3	31.8	25.2	36.2	53.1	46.9	37.7	35.9	22.5	53.1																					
25-Dec	47.3	59.9	42.6	22.8	Z	13.1	11.0	10.7	11.5	12.1	14.0	16.0	16.6	16.9	22.2	24.7	21.3	17.5	17.0	18.7	19.8	22.1	24.7	21.5	21.9	59.9																					
26-Dec	21.6	24.1	21.3	20.5	23.3	Z	25.1	28.4	27.7	20.4	19.2	20.1	17.9	14.3	10.9	9.4	14.3	12.7	15.0	16.3	17.6	20.6	16.7	10.4	18.6	28.4																					
27-Dec	Z	0.7	1.6	2.0	12.6	21.5	14.6	11.1	15.7	14.3	16.9	12.2	11.6	12.3	14.7	17.9	12.9	9.8	12.7	16.6	12.8	13.6	19.2	20.4	12.9	21.5																					
28-Dec	30.4	Z	76.5	79.4	72.5	75.1	68.1	63.4	61.0	57.9	36.9	15.8	13.8	15.6	12.0	16.8	29.2	31.9	23.8	14.0	12.9	11.4	13.6	20.4	37.1	79.4																					
29-Dec	16.7	11.2	Z	7.6	28.7	30.1	21.9	24.2	16.9	12.7	14.2	16.1	15.2	12.9	12.0	12.3	12.4	14.6	17.2	17.8	17.8	17.0	19.0	24.2	17.1	30.1																					
30-Dec	31.2	32.6	35.0	Z	26.3	28.7	27.9	26.8	38.8	48.5	27.3	25.0	26.8	29.2	25.0	25.4	31.8	31.3	47.7	25.9	27.7	20.7	16.2	50.1	30.7	50.1																					
31-Dec	72.5	27.8	24.2	11.9	Z	15.4	30.0	26.3	29.0	22.2	19.4	15.3	14.8	15.9	17.7	6.4	12.3	13.2	4.6	6.4	1.9	0.6	0.7	11.1	17.4	72.5																					
																						21.8	19.6	21.8	15.9	19.1	17.2	18.6	20.3	20.9	19.9	18.8	14.9	14.7	16.0	17.0	18.4	20.5	22.0	21.3	21.8	21.4	22.1	21.9	22.8	Diurnal Average	
																						72.5	74.2	121.3	82.2	77.8	75.1	78.3	91.8	86.8	57.9	46.7	44.6	50.3	111.6	102.7	85.6	71.0	73.2	71.0	74.9	70.0	83.3	58.3	76.8	Diurnal Maximum	
Z - zerospan																						C - Calibration																									





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Fort McKay - Bertha Ganter - December 2023**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	451	63.70	63.70
21 - 40	178	25.14	88.84
41 - 80	71	10.03	98.87
81 - 159	8	1.13	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 708

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Fort McKay - Bertha Ganter - December 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	16	17	10	3	2	2	6	12	162	60	45	35	43	23	6	9	451
21 - 40	9	2	1	0	0	2	0	8	77	41	21	6	2	2	4	3	178
11 - 80	7	1	0	0	0	0	0	2	14	15	10	8	1	5	5	3	71
81 - 159	1	0	0	0	0	0	0	1	2	2	2	0	0	0	0	0	8
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	33	20	11	3	2	4	6	23	255	118	78	49	46	30	15	15	708

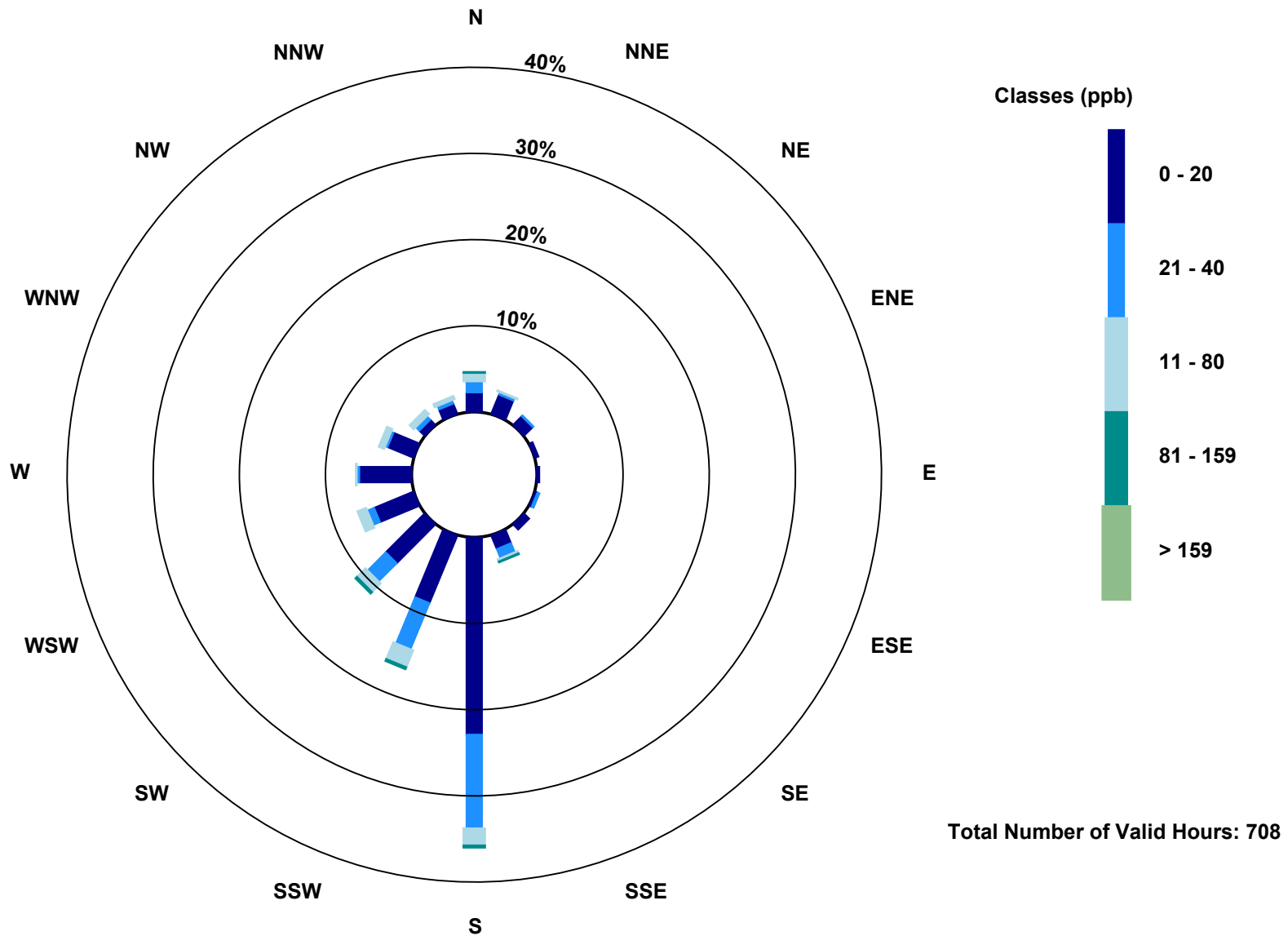
Total Number of Valid Hours: 708

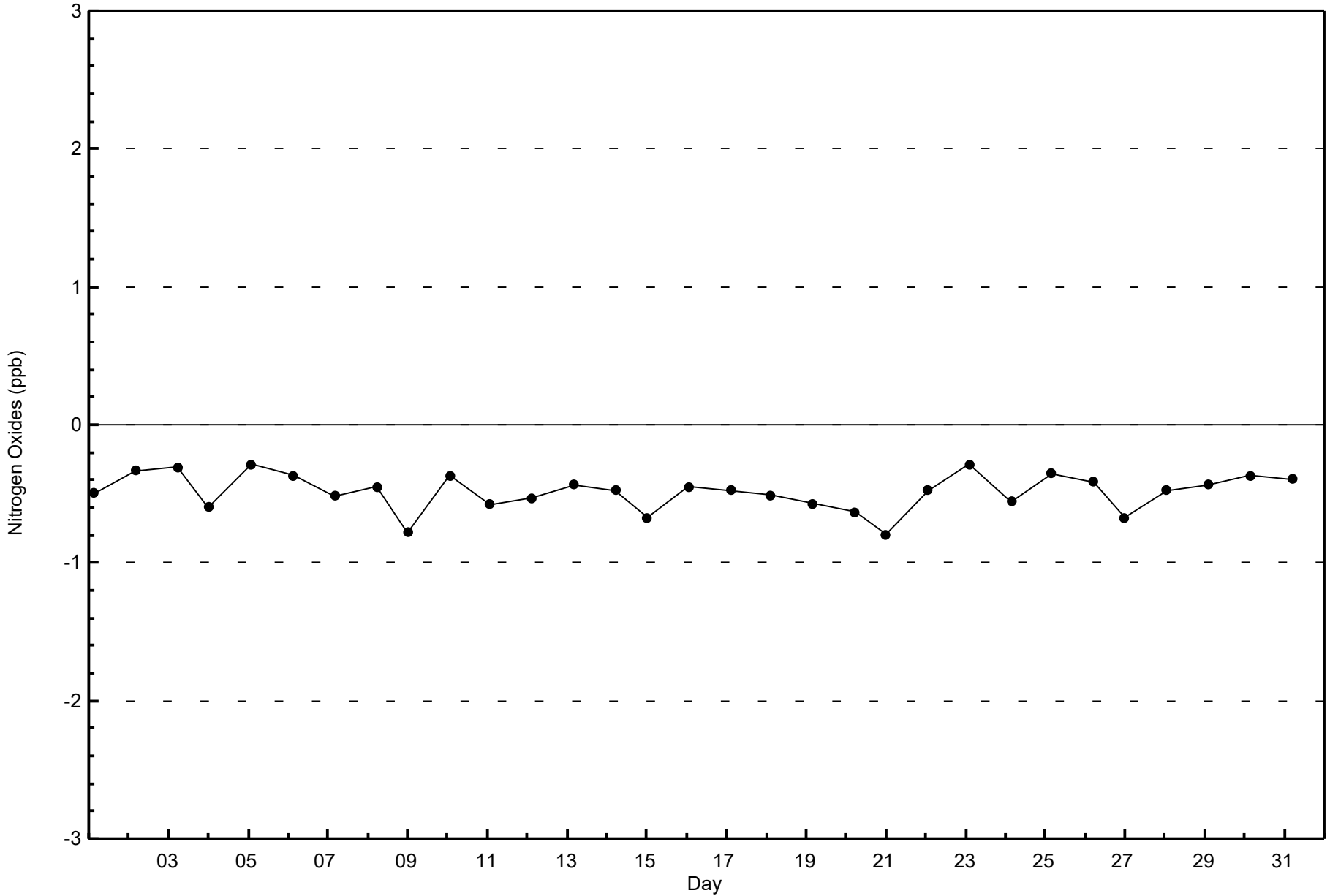
Total Number of Hours: 744

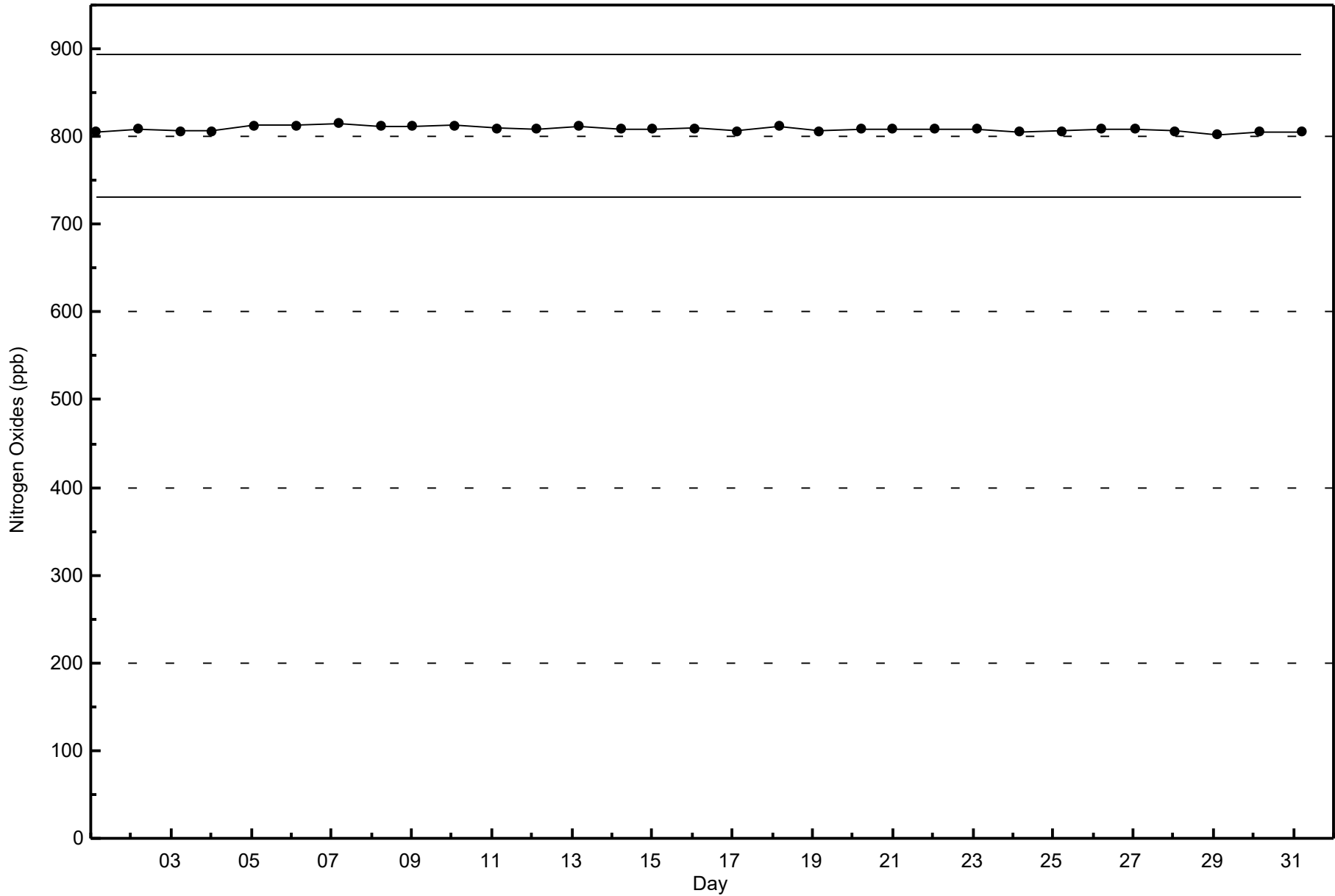


Wood Buffalo Environmental Association
Wind Rose Dec 2023

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









Wood Buffalo Environmental Association

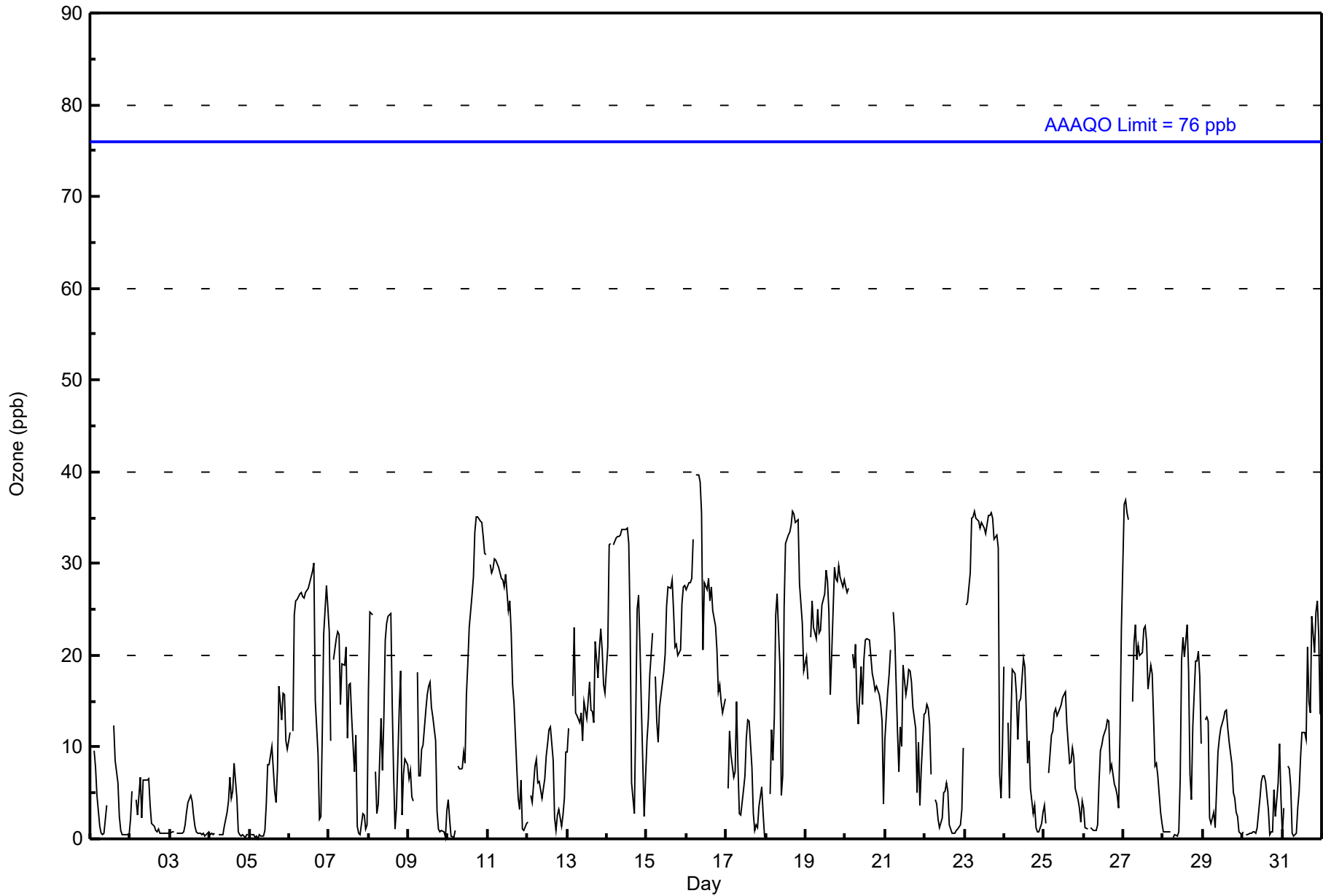
Summary of Hour Averages

Ozone (O₃) - ppb

Fort McKay - Bertha Ganter - December 2023

Number of Exceedences (AAAQO):		1-hr: 0	24-hr: 0	Hours in Service: 744																	Daily Average		Daily Maximum				
Maximum Value: 39.6 ppb on Dec 16 08:00		Maximum Daily Average: 29.8 ppb on Dec 23		Hours of Data: 710																	Hours of Missing Data: 34		Hours of Calibration: 34				
Minimum Value: 0.1 ppb on Dec 5 06:00		Minimum Daily Average: 1.3 ppb on Dec 3		Hours of Missing Data: 34																	Hours of Calibration: 34		Percent Operational Time: 100.0				
Maximum Diurnal Average: 18.1 ppb at hour 14		Minimum Diurnal Average: 9.6 ppb at hour 23		Hours of Calibration: 34																	Hours of Calibration: 34		Percent Operational Time: 100.0				
Monthly Average: 12.91 ppb		Percentiles: P ₁ = 0.3 P ₁₀ = 0.7 Q ₁ = 3.2 Median = 11.0 Q ₃ = 20.9 P ₉₀ = 28.4 P ₉₉ = 35.5																									
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-Dec	8.3	Z	9.6	7.8	4.7	1.3	0.7	0.5	0.6	2.2	3.6	C	C	C	12.4	8.6	6.0	2.4	0.9	0.4	0.4	0.5	0.5	0.5	3.6	12.4	
2-Dec	2.1	5.2	Z	4.3	2.6	4.8	6.7	2.4	6.5	6.4	6.4	6.5	3.7	1.7	1.4	0.9	0.8	1.1	0.6	0.6	0.6	0.6	0.7	0.6	2.9	6.7	
3-Dec	0.6	0.7	0.7	Z	0.7	0.6	0.6	0.6	0.7	1.5	2.9	4.0	4.7	4.1	2.6	1.3	0.7	0.6	0.6	0.5	0.5	0.3	0.5	0.7	1.3	4.7	
4-Dec	0.4	0.7	0.5	0.6	Z	0.5	0.5	0.5	0.5	1.4	2.8	4.2	6.7	4.4	5.1	8.3	4.4	0.7	0.4	0.4	0.5	0.2	0.4	0.4	1.9	8.3	
5-Dec	Z	0.4	0.5	0.2	0.4	0.1	0.4	0.3	0.3	1.0	3.8	8.1	8.1	10.1	7.6	5.1	4.0	7.6	16.6	12.9	15.9	15.6	10.7	9.8	6.1	16.6	
6-Dec	11.6	Z	11.7	24.4	25.9	26.2	26.7	26.8	26.4	26.2	26.8	27.4	28.0	28.6	29.2	30.0	15.1	9.1	2.1	2.4	11.5	22.2	27.5	25.2	21.4	30.0	
7-Dec	22.6	10.6	Z	19.6	21.8	22.5	22.2	14.6	19.0	18.9	20.9	11.0	16.7	17.0	13.3	7.3	11.3	1.4	0.6	0.5	2.8	2.6	1.0	1.6	12.2	22.6	
8-Dec	16.2	24.8	24.4	Z	7.3	2.8	3.9	13.1	7.5	13.2	21.7	23.6	24.2	24.6	14.5	6.8	1.0	3.3	14.2	18.2	2.5	7.0	8.7	8.1	12.7	24.8	
9-Dec	6.6	7.4	4.6	4.1	Z	18.1	6.9	6.8	9.7	10.2	14.1	15.8	16.7	17.0	14.3	13.3	10.7	3.1	1.0	0.7	0.9	0.8	0.2	3.1	8.1	18.1	
10-Dec	4.3	2.1	0.3	0.1	0.9	Z	7.9	7.6	7.7	9.4	8.2	15.7	19.1	23.1	26.5	28.6	33.3	35.0	35.1	34.6	34.5	32.9	31.1	31.0	18.7	35.1	
11-Dec	Z	29.9	29.0	29.5	30.4	30.4	29.6	28.9	28.3	28.2	27.5	28.9	24.9	26.0	22.4	16.8	14.8	7.6	4.4	3.2	6.4	1.1	0.9	1.6	19.6	30.4	
12-Dec	1.9	Z	4.7	3.9	7.9	8.7	6.1	6.2	5.4	4.4	6.6	9.0	10.4	12.0	12.2	8.5	2.3	0.9	2.6	3.2	1.3	2.6	4.4	9.5	5.9	12.2	
13-Dec	9.5	12.0	Z	15.6	23.0	13.8	13.5	12.7	13.8	10.7	14.9	14.1	13.1	17.0	14.1	13.8	12.7	21.5	17.6	20.8	22.9	20.5	16.8	15.8	15.7	23.0	
14-Dec	20.9	32.0	32.2	Z	32.0	32.8	33.0	32.9	33.1	33.7	33.8	33.8	32.2	22.9	6.1	2.7	13.6	25.1	26.5	21.1	14.5	2.4	6.7	24.2	33.8	33.8	
15-Dec	10.7	13.1	17.8	22.4	Z	17.7	12.8	10.5	14.3	16.9	18.2	20.1	25.3	27.5	27.3	28.2	24.9	20.9	21.2	20.0	20.6	25.7	27.5	27.7	20.5	28.2	
16-Dec	27.2	28.0	28.0	28.4	32.7	Z	39.6	39.6	39.0	35.5	20.6	28.0	27.1	28.3	25.9	27.4	24.8	23.2	20.7	16.0	16.8	15.0	13.8	15.3	26.1	39.6	
17-Dec	Z	5.5	11.8	9.1	6.7	7.3	14.9	8.1	2.7	2.6	5.3	6.8	10.9	12.9	12.8	7.8	2.7	0.9	1.5	1.2	3.5	5.6	2.8	0.3	6.2	14.9	
18-Dec	0.4	Z	4.9	12.0	8.5	13.2	24.3	26.7	18.7	4.7	6.9	25.1	32.3	33.2	33.4	34.2	35.7	35.5	34.5	34.8	27.7	25.7	23.5	18.4	22.4	35.7	
19-Dec	19.8	17.4	Z	22.0	25.9	23.1	21.8	25.1	22.3	22.7	25.5	26.6	29.3	28.0	24.8	15.8	20.1	29.5	28.4	28.0	29.7	28.5	27.4	28.3	24.8	29.7	
20-Dec	27.5	26.8	27.3	Z	20.2	18.6	21.2	14.9	12.5	18.7	14.6	19.5	21.7	21.8	21.6	19.8	18.1	17.3	16.2	16.6	15.7	14.6	12.8	3.8	18.3	27.5	
21-Dec	10.9	16.1	17.9	20.7	Z	24.7	22.4	11.8	7.3	12.1	10.0	19.0	15.7	16.8	18.5	18.4	17.1	14.4	12.1	5.0	10.5	3.6	7.6	13.6	14.2	24.7	
22-Dec	13.7	14.6	14.2	12.4	7.0	Z	4.3	3.9	2.1	1.3	2.3	5.0	5.2	6.2	5.2	1.6	0.6	0.7	0.6	0.9	1.0	1.5	3.3	9.9	5.1	14.6	
23-Dec	Z	25.5	25.8	29.1	34.9	35.0	35.8	34.9	34.6	33.9	34.4	34.2	33.8	33.3	35.3	35.3	35.5	34.9	32.7	33.1	31.7	7.0	4.4	10.1	29.8	35.8	
24-Dec	18.7	Z	12.6	4.4	12.7	18.5	18.0	15.7	10.8	15.0	15.2	19.7	18.7	14.0	8.2	10.7	5.5	2.8	3.6	1.2	0.8	0.8	1.6	2.9	10.1	19.7	
25-Dec	3.6	1.7	Z	7.2	11.3	11.7	13.7	14.1	13.4	14.1	14.7	15.3	15.7	16.0	12.5	8.3	8.4	9.9	8.8	5.5	4.3	3.3	1.8	4.1	9.5	16.0	
26-Dec	3.3	1.2	1.1	Z	1.2	1.1	0.9	0.9	1.5	6.2	9.6	10.2	11.1	12.1	13.0	12.8	7.5	8.0	6.0	5.5	4.7	3.3	11.4	23.1	6.8	23.1	
27-Dec	36.5	36.9	35.5	34.8	Z	15.0	21.4	23.3	19.6	21.1	20.0	20.3	22.8	23.1	21.5	16.4	18.9	17.9	13.1	8.0	8.2	6.9	2.9	1.7	19.4	36.9	
28-Dec	0.8	0.8	0.8	0.8	0.8	Z	0.1	0.5	0.4	0.8	6.3	19.5	22.0	19.8	23.3	18.3	7.0	4.3	12.2	19.3	19.4	20.5	17.7	10.4	9.8	23.3	
29-Dec	Z	13.0	13.2	12.9	2.3	1.6	2.9	1.3	5.3	9.4	11.0	12.0	13.1	13.9	14.0	12.0	10.5	8.0	5.0	4.5	2.8	2.5	0.7	0.5	7.5	14.0	
30-Dec	0.7	Z	0.4	0.5	0.5	0.7	0.8	0.7	0.7	1.2	4.3	6.2	6.9	6.9	6.3	3.2	0.5	0.7	0.8	5.3	2.4	6.1	10.3	4.4	3.1	10.3	
31-Dec	0.4	3.4	Z	8.0	7.7	5.7	0.5	0.3	0.7	3.4	5.2	8.9	11.5	11.7	10.8	20.9	14.9	13.7	24.2	20.2	24.7	25.9	22.2	13.6	11.2	25.9	
		10.7	13.2	13.2	12.9	12.7	13.2	13.4	12.5	11.8	12.5	13.5	16.6	17.8	18.1	16.5	14.4	12.0	11.3	11.7	11.3	11.2	10.3	9.6	9.8	Diurnal Average	
		36.5	36.9	35.5	34.8	34.9	35.0	39.6	39.6	39.0	35.5	34.4	34.2	33.8	33.3	35.3	35.3	35.7	35.5	35.1	34.8	34.5	32.9	31.1	31.0	Diurnal Maximum	

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ozone (O₃) - ppb
Fort McKay - Bertha Ganter - December 2023**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	524	73.80	73.80
21 - 50	186	26.20	100.00
51 - 82	0	0.00	100.00
> 83	0	0.00	100.00

Total Number of Valid Hours: 710

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Ozone (O₃) - ppb
Fort McKay - Bertha Ganter - December 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	23	14	2	2	0	2	1	19	232	101	57	27	12	12	10	10	524
21 - 50	7	7	9	1	2	2	4	6	25	15	20	24	36	17	7	4	186
51 - 82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 83	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	30	21	11	3	2	4	5	25	257	116	77	51	48	29	17	14	710

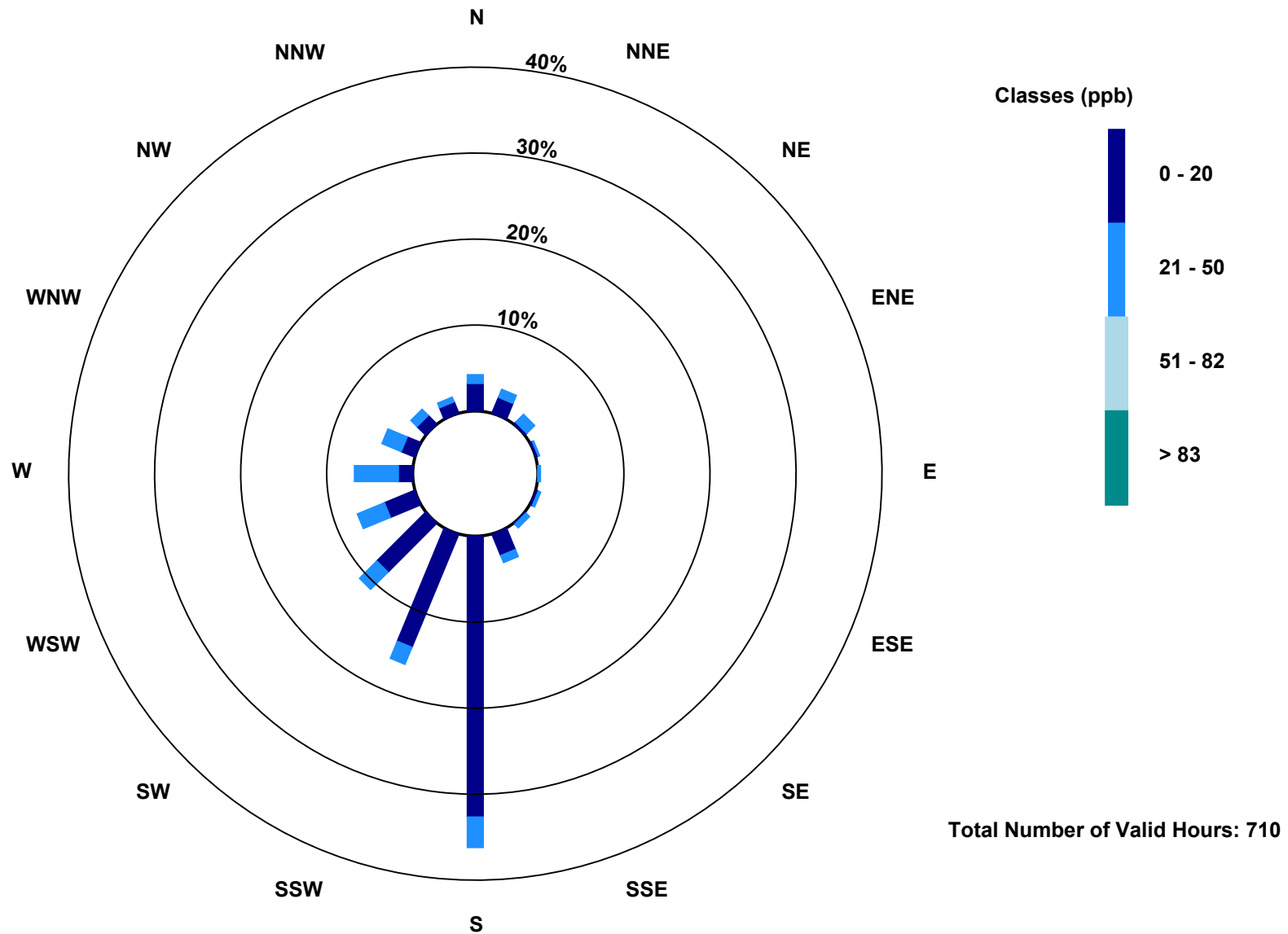
Total Number of Valid Hours: 710

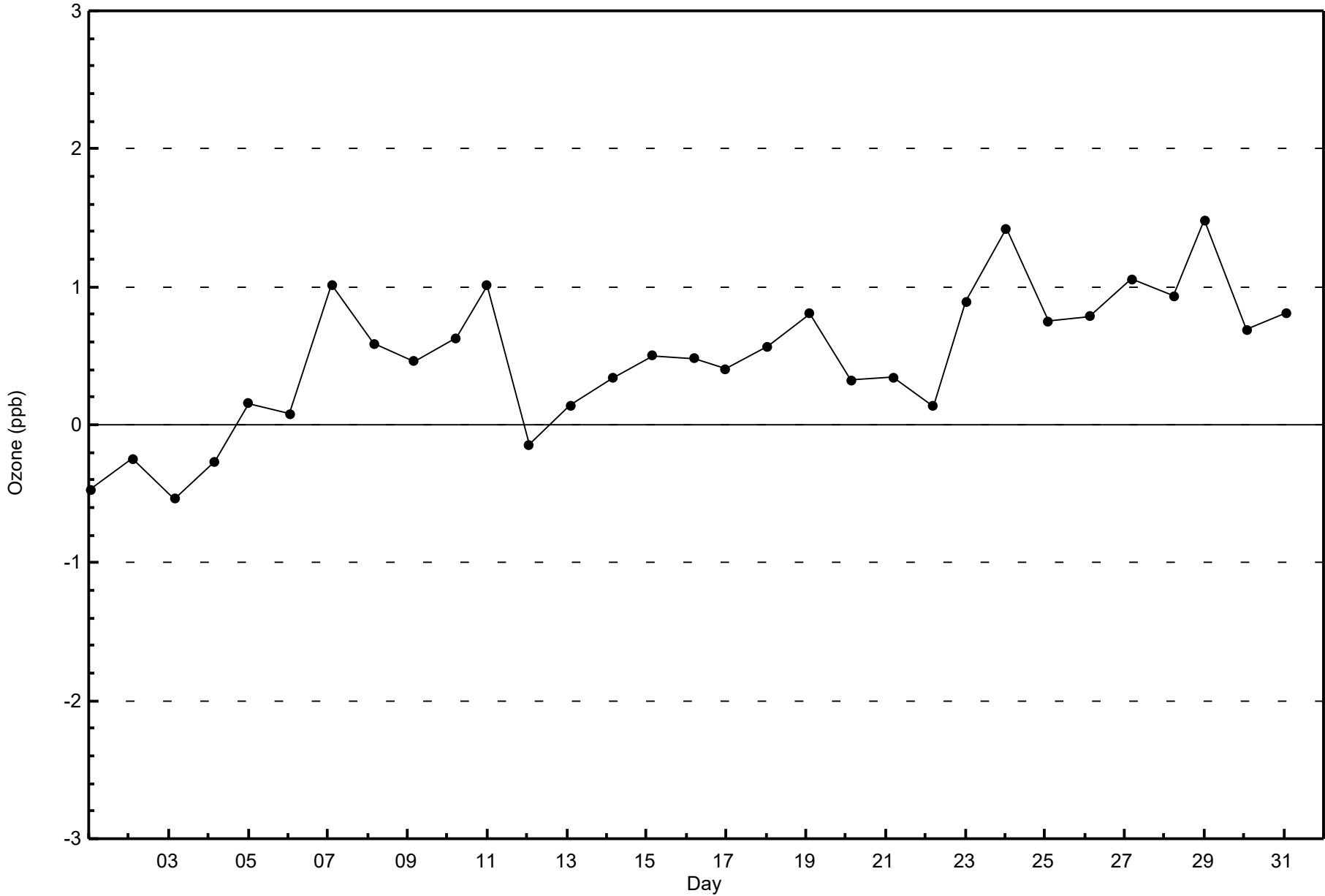
Total Number of Hours: 744

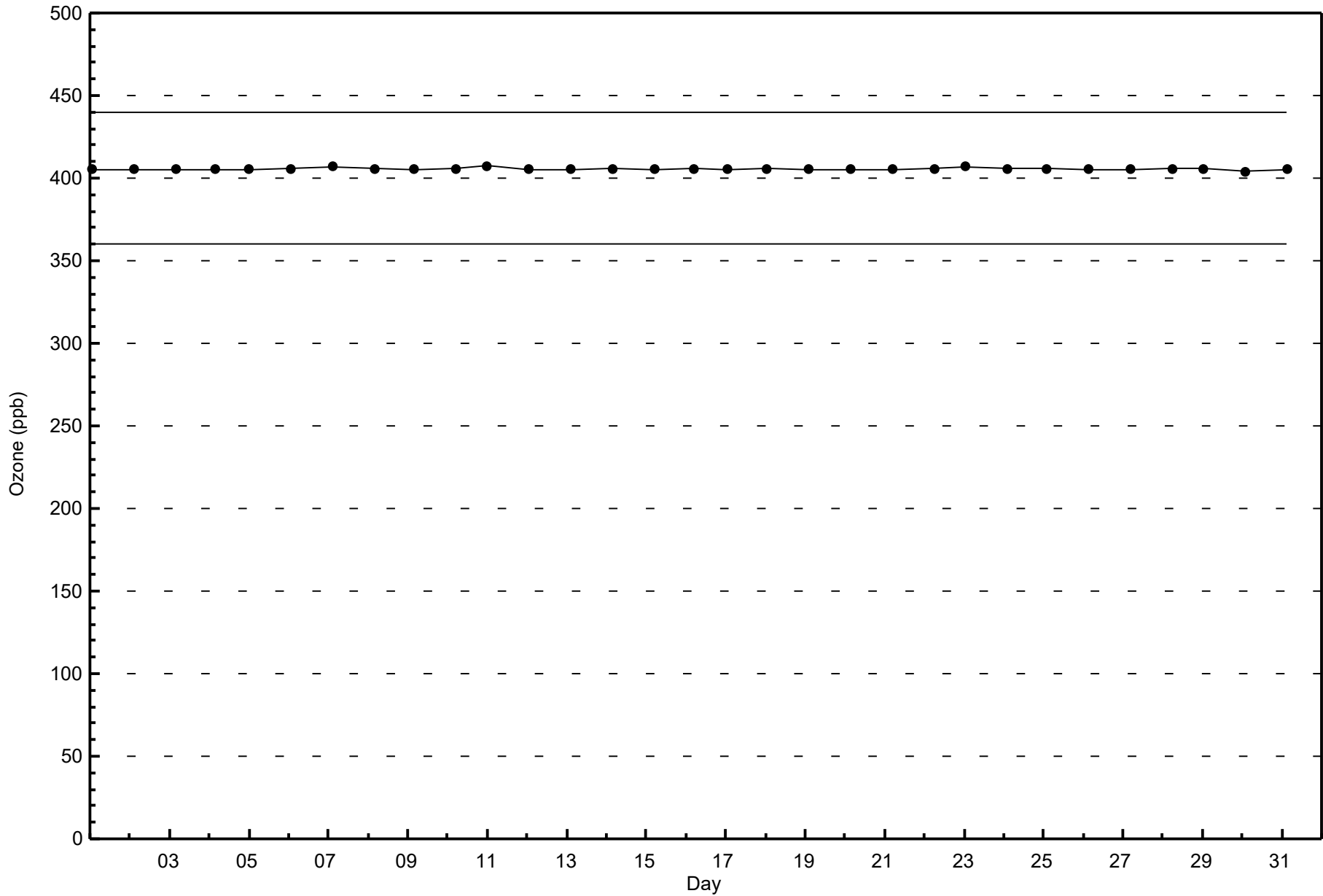


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Ozone (O₃) - ppb
Fort McKay - Bertha Ganter









Wood Buffalo Environmental Association

Summary of Hour Averages

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

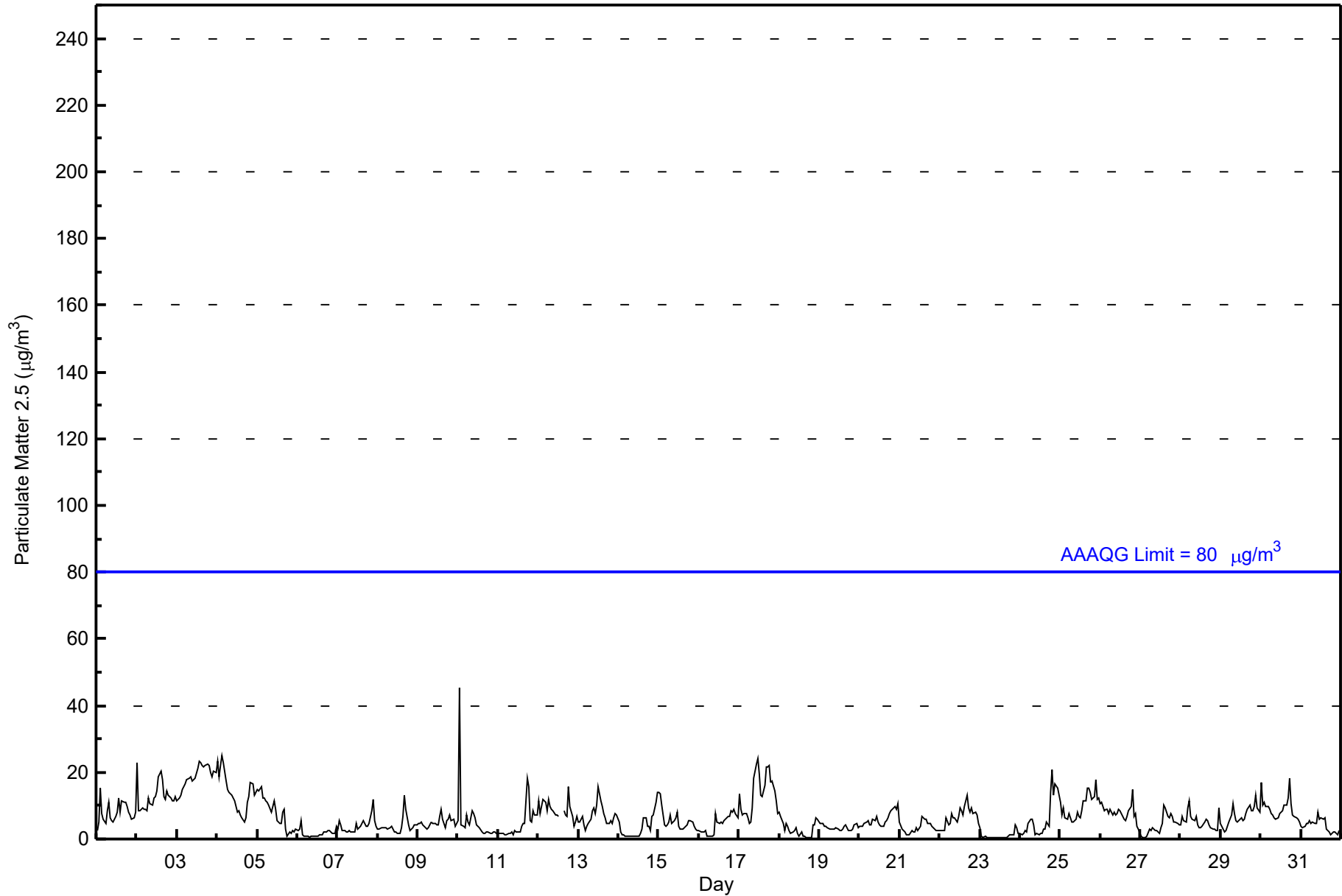
Fort McKay - Bertha Ganter - December 2023

Number of Exceedences (AAAQO):		1-hr: 0		24-hr: 0		Hours in Service:		744																																								
Maximum Value: 45.5 µg/m ³ on Dec 10 02:00		Maximum Daily Average: 18.7 µg/m ³ on Dec 3				Hours of Data:		742																																								
Minimum Value: 0.3 µg/m ³ on Dec 23 12:00		Minimum Daily Average: 1.0 µg/m ³ on Dec 23				Hours of Missing Data:		2																																								
Maximum Diurnal Average: 7.9 µg/m ³ at hour 19		Minimum Diurnal Average: 5.5 µg/m ³ at hour 7				Hours of Calibration:		2																																								
Monthly Average: 6.59 µg/m ³		Percentiles: P ₁ = 0.4 P ₁₀ = 1.5 Q ₁ = 2.9 Median = 5.2 Q ₃ = 8.6 P ₉₀ = 13.3 P ₉₉ = 22.7				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-Dec	2.6	5.1	15.4	7.8	5.8	4.7	8.5	11.0	6.5	5.5	4.9	6.6	8.2	12.2	8.0	11.4	11.0	11.2	9.9	8.0	7.0	6.1	6.2	8.0	8.0	15.4																						
2-Dec	22.8	8.3	8.4	9.2	8.9	8.9	8.6	12.3	10.7	10.2	12.3	12.7	14.3	18.4	20.2	18.0	12.8	11.8	14.3	13.2	12.4	11.6	11.6	12.6	12.7	22.8																						
3-Dec	11.5	12.2	13.1	14.6	15.9	16.7	17.6	18.1	18.5	17.5	17.9	18.2	21.4	23.1	22.8	22.2	21.8	22.2	22.4	22.0	19.8	18.8	20.2	20.0	18.7	23.1																						
4-Dec	23.2	18.6	21.9	25.0	22.8	17.4	15.0	14.1	13.6	13.0	11.4	9.6	8.2	8.3	7.1	6.2	5.1	6.2	11.0	12.6	16.9	16.4	13.2	14.2	13.8	25.0																						
5-Dec	14.7	14.2	15.5	12.3	12.3	11.2	11.0	10.0	7.9	9.6	11.6	9.0	5.6	4.5	4.6	8.1	8.8	3.1	1.1	1.9	1.6	2.5	2.0	2.9	7.7	15.5																						
6-Dec	2.5	3.1	5.4	1.2	0.7	0.7	0.7	0.6	0.7	0.8	0.9	0.9	0.9	1.1	1.4	1.4	1.9	2.1	2.6	2.7	1.9	1.7	1.5	3.8	1.7	5.4																						
7-Dec	2.9	5.4	4.0	2.5	2.4	2.1	2.0	2.7	2.2	2.2	2.2	4.8	2.8	3.2	3.8	5.4	4.6	3.7	3.8	4.8	8.5	12.0	5.4	3.6	4.0	12.0																						
8-Dec	2.9	2.8	3.5	3.4	3.4	3.2	2.8	3.3	3.6	2.8	2.2	1.9	1.8	1.7	3.3	6.7	13.3	8.8	4.3	2.5	2.9	3.3	4.2	4.1	3.9	13.3																						
9-Dec	4.5	4.9	5.0	4.3	3.6	2.9	3.4	4.0	4.9	4.6	4.6	4.4	4.2	6.9	8.7	5.9	3.6	5.7	5.7	7.4	5.3	5.8	3.8	4.5	5.0	8.7																						
10-Dec	5.3	45.5	4.3	3.9	3.4	7.1	5.1	4.4	8.3	7.6	6.3	4.0	3.7	3.2	1.9	1.7	1.7	2.0	2.2	1.8	1.9	1.9	2.0	1.7	5.5	45.5																						
11-Dec	1.7	1.9	1.8	1.7	1.4	1.2	1.5	1.5	2.2	1.2	2.5	1.9	2.3	2.2	3.8	4.7	4.7	18.3	15.8	5.6	4.9	8.4	7.4	7.0	4.4	18.3																						
12-Dec	11.3	7.5	9.9	11.7	11.0	8.4	12.0	9.6	8.9	8.6	7.3	7.0	6.7	C	C	8.3	7.4	7.0	15.8	9.6	6.7	3.8	4.9	6.6	8.6	15.8																						
13-Dec	5.2	5.1	6.8	4.1	2.5	4.0	4.8	5.9	8.4	9.3	7.7	10.2	15.9	11.3	9.8	7.5	6.4	4.6	4.6	5.5	4.8	6.2	7.6	7.0	6.9	15.9																						
14-Dec	4.9	2.0	1.3	1.4	0.9	0.9	0.8	0.9	1.0	1.0	0.9	0.9	1.0	1.6	3.1	6.3	6.3	3.7	4.0	2.3	7.0	7.1	10.9	14.1	3.5	14.1																						
15-Dec	14.2	13.6	10.3	4.1	3.7	4.4	5.1	7.0	4.7	5.7	6.4	7.9	3.7	2.8	3.2	3.2	3.7	4.2	5.4	5.6	4.9	3.7	2.9	2.5	5.6	14.2																						
16-Dec	2.3	2.1	2.0	2.3	2.4	1.0	0.7	0.7	0.8	1.4	7.4	4.9	4.6	5.0	4.8	5.4	6.0	6.7	6.7	8.5	8.0	8.8	7.5	6.4	4.4	8.8																						
17-Dec	13.6	8.9	7.1	7.7	7.7	6.5	4.7	4.9	9.3	18.2	22.3	24.2	19.5	13.1	12.7	16.2	21.5	21.5	22.2	16.8	17.2	14.2	11.6	7.7	13.7	24.2																						
18-Dec	8.1	6.7	4.5	2.3	4.7	3.9	2.4	1.8	2.2	2.7	3.4	1.6	0.9	2.0	0.7	1.0	0.6	0.6	0.6	0.6	4.4	4.2	6.4	5.8	3.0	8.1																						
19-Dec	4.7	4.9	4.6	4.0	3.6	3.4	3.1	2.9	2.9	3.0	3.3	3.1	2.6	2.5	3.0	4.0	4.1	2.5	2.5	2.7	3.0	4.1	4.7	3.6	3.4	4.9																						
20-Dec	3.7	3.7	3.8	4.7	5.2	5.3	4.3	4.1	5.8	5.5	6.6	4.9	4.1	3.9	3.8	5.1	5.4	6.2	7.7	8.6	9.3	9.9	9.0	10.4	5.9	10.4																						
21-Dec	5.3	3.2	2.6	1.9	1.4	1.2	1.5	2.4	1.9	2.3	3.3	2.7	3.8	6.8	6.3	6.1	5.9	4.6	4.6	3.7	3.2	3.1	2.3	2.6	3.5	6.8																						
22-Dec	2.7	2.6	2.4	2.5	6.2	4.3	4.8	7.5	6.3	6.2	5.2	6.9	9.5	8.4	7.4	9.9	13.1	9.5	7.9	9.3	7.8	7.9	7.3	4.9	6.7	13.1																						
23-Dec	3.2	0.9	0.6	0.7	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.4	0.4	0.5	0.5	0.5	0.9	1.4	1.3	1.2	4.4	3.4	1.5	1.0	4.4																						
24-Dec	1.6	1.3	1.7	2.6	2.2	4.7	6.0	6.0	4.3	1.4	1.7	1.3	1.5	1.8	2.8	3.0	5.1	3.8	13.9	20.9	13.2	16.6	15.2	13.3	6.1	20.9																						
25-Dec	10.9	7.2	9.4	6.5	6.0	7.5	6.4	5.0	5.1	5.8	8.2	6.8	6.2	8.6	11.3	11.5	15.4	15.3	14.0	11.8	12.7	18.0	11.8	12.5	9.7	18.0																						
26-Dec	10.4	11.0	8.6	9.1	9.1	7.7	8.8	7.2	8.0	7.3	7.5	9.1	8.3	6.8	6.0	5.5	6.8	8.5	9.9	14.8	6.9	7.5	4.0	3.2	8.0	14.8																						
27-Dec	0.7	0.4	0.4	0.4	0.9	2.8	2.5	3.5	3.2	2.7	2.5	1.8	3.3	4.6	10.0	9.2	6.8	6.2	7.8	6.8	5.1	5.1	4.8	4.0	4.0	10.0																						
28-Dec	4.3	6.8	5.5	5.3	9.2	11.6	6.8	5.9	5.5	6.6	4.2	3.2	3.2	3.9	5.2	6.0	5.7	4.0	3.4	3.0	2.9	2.6	2.4	9.4	5.3	11.6																						
29-Dec	4.7	2.8	2.0	2.7	3.6	4.9	7.4	10.7	7.8	5.5	5.2	5.6	6.2	5.6	6.0	7.7	8.7	10.0	8.5	8.7	9.6	13.2	9.5	8.0	6.9	13.2																						
30-Dec	16.9	10.3	11.1	9.7	9.9	8.7	7.8	7.1	6.2	5.8	6.6	7.7	8.0	8.6	10.0	10.2	12.1	18.3	10.5	7.3	6.9	6.2	5.9	5.0	9.0	18.3																						
31-Dec	3.6	3.2	3.9	4.5	4.6	5.3	4.7	5.0	4.7	4.8	8.2	6.0	6.3	6.0	6.4	3.1	2.6	2.3	1.4	2.3	1.9	1.6	1.2	2.5	4.0	8.2																						
																								7.3	7.3	6.3	5.6	5.7	5.6	5.5	5.8	5.7	5.8	6.3	6.1	6.1	6.3	6.6	7.1	7.5	7.6	7.9	7.5	7.1	7.6	6.8	6.9	Diurnal Average
																								23.2	45.5	21.9	25.0	22.8	17.4	17.6	18.1	18.5	18.2	22.3	24.2	21.4	23.1	22.8	22.2	21.8	22.2	22.4	22.0	19.8	18.8	20.2	20.0	Diurnal Maximum
C - Calibration																																																
Alberta Ambient Air Quality Guideline/Objectives: 1-hr 80 µg/m ³ 24-hr 29 µg/m ³																																																



Wood Buffalo Environmental Association
Hourly Averages

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Fort McKay - Bertha Ganter - December 2023





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Fort McKay - Bertha Ganter - December 2023

Concentration Ranges ($\mu\text{g}/\text{m}^3$)	Number of Hours	%	Cumulative %
0 - 5	390	52.56	52.56
6 - 15	299	40.30	92.86
16 - 25	52	7.01	99.87
26 - 80	1	0.13	100.00
> 81.0	0	0.00	100.00

Total Number of Valid Hours: 742

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Particulate Matter 2.5 (PM_{2.5}) - μg/m³
Fort McKay - Bertha Ganter - December 2023**

Concentration Ranges (μg/m ³)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	13	16	8	1	2	2	4	13	108	54	46	40	43	23	8	9	390
6 - 15	12	4	3	2	0	2	2	12	138	60	31	11	5	7	6	4	299
16 - 25	9	1	0	0	0	0	0	1	19	9	4	2	1	1	3	2	52
26 - 80	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1
> 81.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	34	21	11	3	2	4	6	26	265	123	81	54	49	31	17	15	742

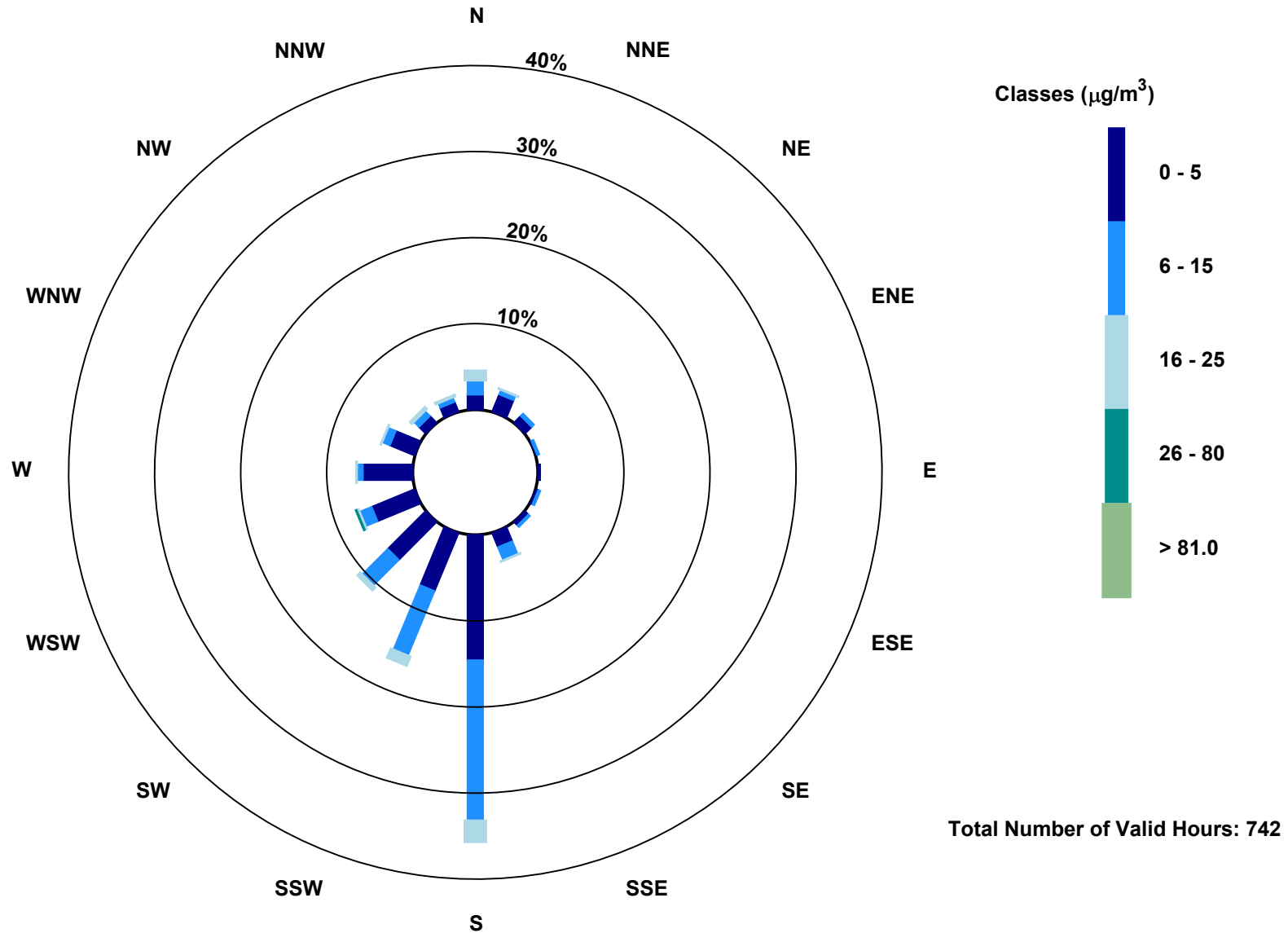
Total Number of Valid Hours: 742

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Dec 2023

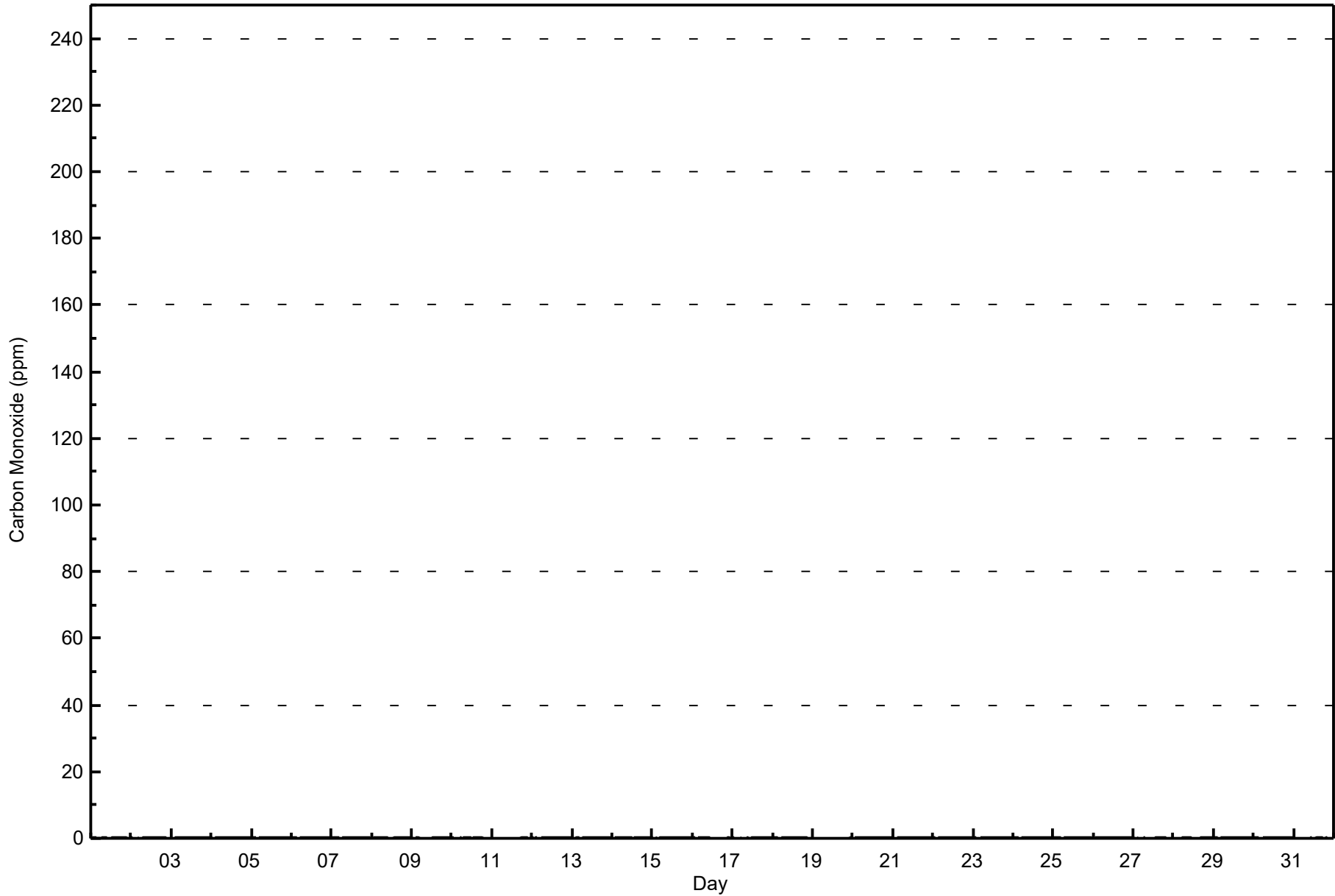
Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Fort McKay - Bertha Garter





Wood Buffalo Environmental Association
Hourly Averages

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





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

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

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 0.3	681	96.05	96.05
0.4 - 0.5	28	3.95	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: 709

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Carbon Monoxide (CO) - ppm
Fort McKay - Bertha Ganter - December 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	34	21	11	3	2	4	5	26	250	105	68	49	45	30	16	12	681
0.4 - 0.5	0	0	0	0	0	0	0	0	9	11	7	1	0	0	0	0	28
0.6 - 0.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.8 - 1.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1.5 - 10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	34	21	11	3	2	4	5	26	259	116	75	50	45	30	16	12	709

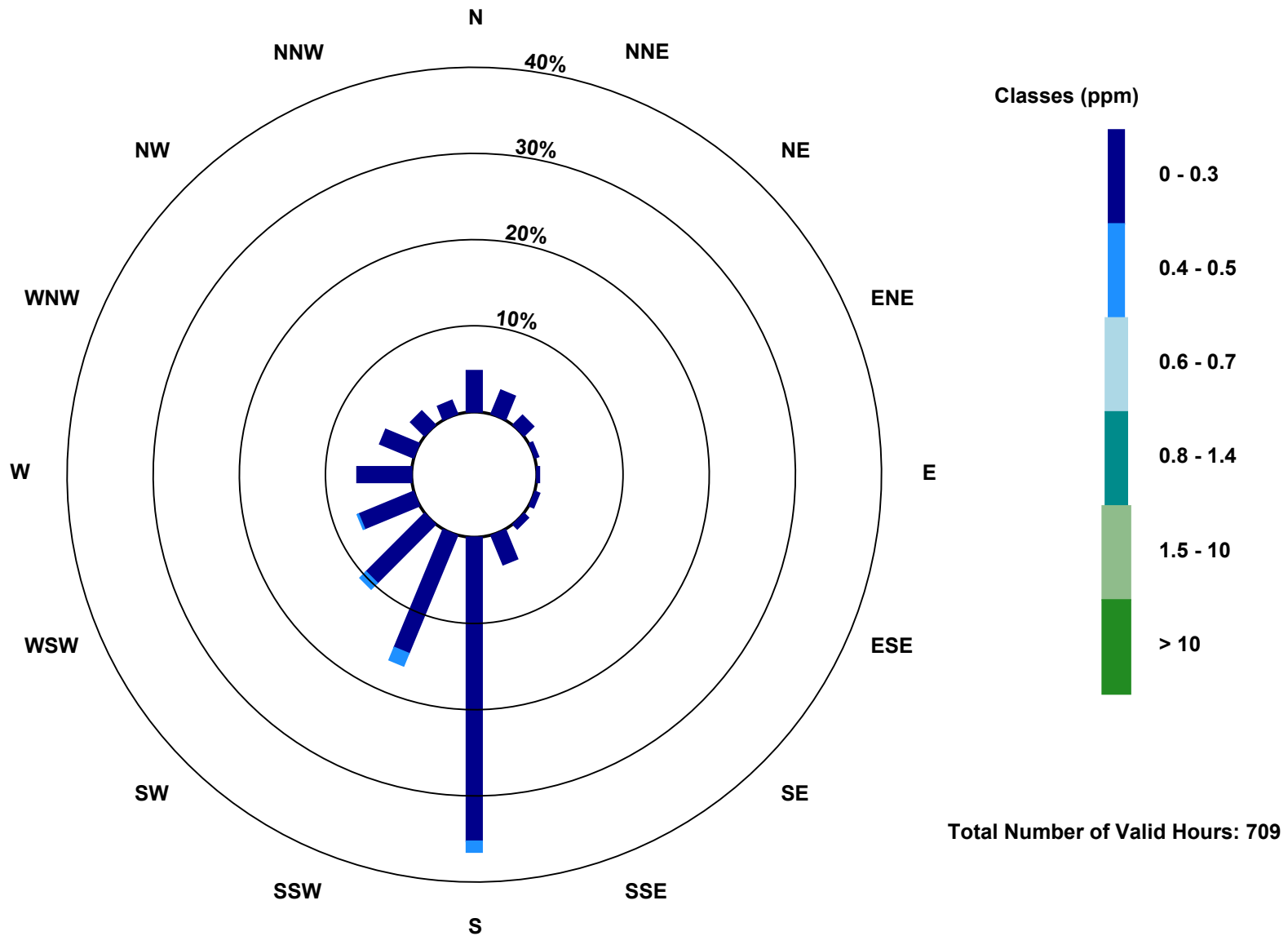
Total Number of Valid Hours: 709

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Dec 2023

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



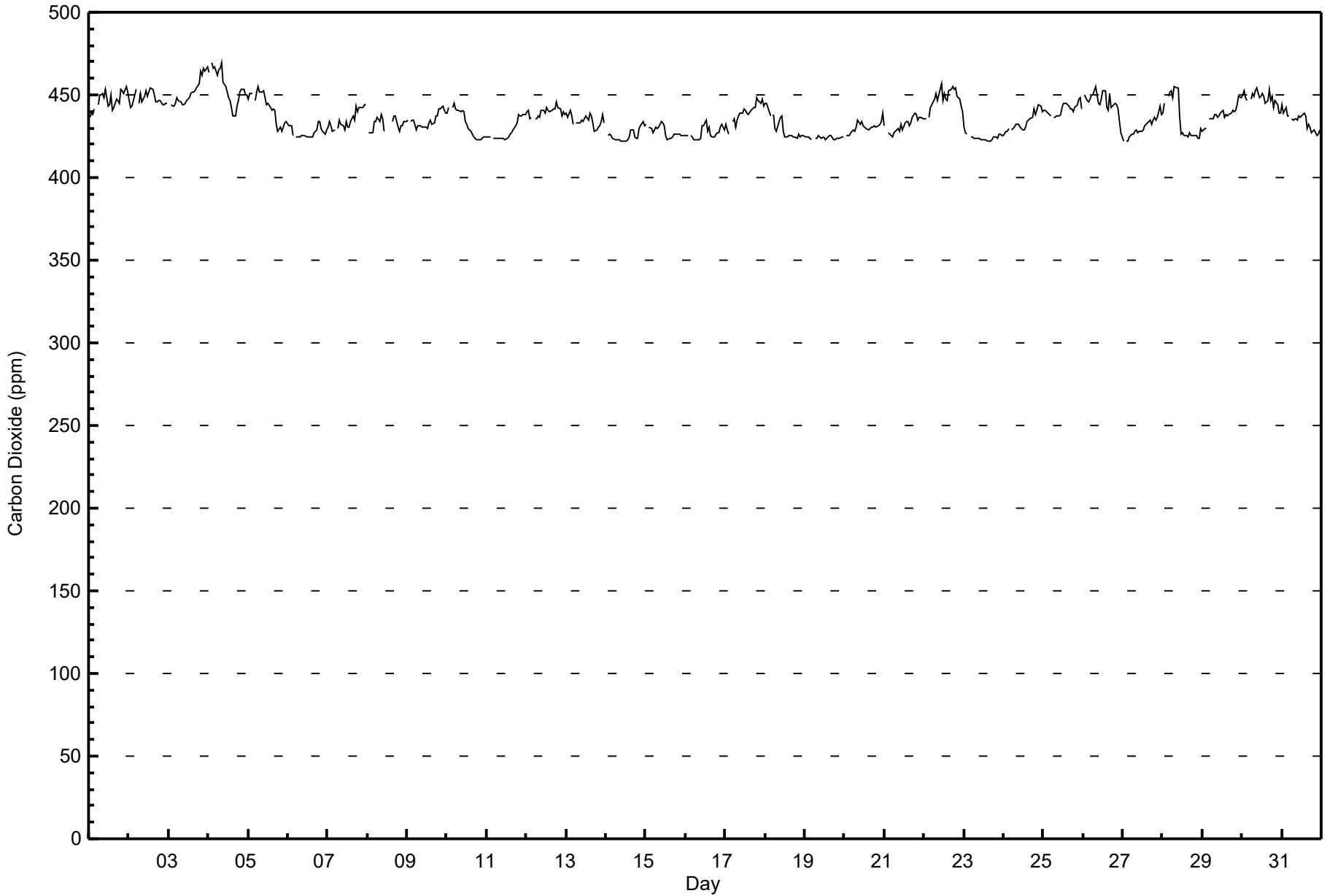


Number of Exceedences (AAAQO):		1-hr: 0	24-hr: 0	Hours in Service:																	744																												
Maximum Value: 469.7 ppm on Dec 4 09:00		Maximum Daily Average: 454.5 ppm on Dec 4																	Hours of Data:		709																												
Minimum Value: 421.9 ppm on Dec 14 12:00		Minimum Daily Average: 424.1 ppm on Dec 19																	Hours of Missing Data:		35																												
Maximum Diurnal Average: 437.7 ppm at hour 23		Minimum Diurnal Average: 434.8 ppm at hour 16																	Hours of Calibration:		35																												
Monthly Average: 436.19 ppm		Percentiles: P ₁ = 422.3 P ₁₀ = 424.4 Q ₁ = 427.6 Median = 435.0 Q ₃ = 443.2 P ₉₀ = 450.2 P ₉₉ = 465.3																	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-Dec	436.6	438.6	437.9	441.9	Z	443.8	449.7	450.2	450.5	448.5	453.2	443.2	443.9	449.7	440.6	442.7	447.5	446.8	445.2	453.0	452.1	451.2	454.9	451.4	446.7	454.9																							
2-Dec	446.3	442.5	443.1	449.7	453.6	Z	444.7	451.2	446.2	449.4	452.2	449.1	451.8	454.4	453.2	449.9	445.8	445.6	447.0	446.7	444.2	444.0	445.2	444.9	447.9	454.4																							
3-Dec	Z	444.0	442.9	443.3	445.2	448.1	446.8	445.5	444.3	444.2	445.2	446.3	448.7	450.4	451.7	451.3	452.6	454.0	456.8	464.4	462.1	466.5	464.7	467.0	451.6	467.0																							
4-Dec	464.0	Z	469.3	466.0	466.6	461.9	465.3	465.9	469.7	458.0	455.1	451.5	448.1	446.3	442.0	437.7	437.4	442.9	446.7	451.3	453.3	453.6	450.4	449.6	454.5	469.7																							
5-Dec	447.7	450.9	450.8	Z	446.8	451.7	455.3	451.4	452.0	452.3	448.4	443.9	445.0	442.7	440.4	441.5	440.9	432.1	427.9	430.2	428.3	430.5	432.8	433.9	442.5	455.3																							
6-Dec	430.9	431.6	431.0	425.6	Z	424.6	424.6	424.7	425.0	425.0	425.0	424.9	424.9	424.7	424.5	424.8	427.2	428.7	433.6	433.6	429.5	427.8	426.3	428.8	427.3	433.6																							
7-Dec	430.2	433.6	431.6	428.3	429.1	Z	429.3	434.8	432.0	431.2	429.1	433.9	430.8	430.5	433.9	437.0	435.1	443.2	440.2	442.3	442.4	442.7	443.7	443.7	435.2	443.7																							
8-Dec	Z	426.7	426.7	427.0	434.0	434.1	436.6	434.2	438.0	435.3	427.9	C	C	C	C	434.2	437.0	437.3	430.3	427.6	431.1	431.3	433.5	433.8	432.4	438.0																							
9-Dec	434.3	Z	433.9	434.7	435.0	428.8	431.3	431.7	431.8	430.9	430.7	430.1	429.8	433.4	434.8	432.5	433.1	436.9	437.3	441.2	441.2	443.3	440.6	439.2	434.6	443.3																							
10-Dec	439.1	442.3	Z	442.5	445.0	441.8	440.6	440.6	439.6	440.9	439.5	433.5	432.6	430.1	427.6	426.3	424.3	423.5	423.2	423.0	423.1	423.9	424.8	424.7	432.7	445.0																							
11-Dec	424.6	425.0	424.9	Z	423.7	423.4	423.8	423.7	423.8	423.5	423.9	423.2	423.8	424.2	426.0	427.0	429.0	431.7	433.4	438.4	437.1	437.4	437.9	438.3	428.2	438.4																							
12-Dec	439.6	440.3	435.8	436.2	Z	435.6	435.6	436.9	436.8	440.6	440.6	439.1	442.2	440.7	439.9	441.0	441.3	441.8	445.5	442.4	441.6	436.9	440.1	437.9	439.5	445.5																							
13-Dec	438.8	436.0	440.8	437.0	432.0	Z	432.7	433.2	433.3	435.1	433.9	435.6	437.3	435.0	439.2	436.9	433.3	428.2	429.0	430.4	431.2	434.2	438.3	433.4	434.6	440.8																							
14-Dec	Z	425.4	426.1	425.5	423.7	422.9	422.7	422.8	422.7	422.3	422.2	421.9	422.0	422.6	424.6	428.6	428.4	424.8	424.0	424.0	430.0	431.6	433.8	431.7	425.4	433.8																							
15-Dec	432.2	Z	430.4	429.5	427.4	429.1	430.2	429.9	430.5	433.5	433.5	431.7	425.3	423.1	423.7	423.8	424.9	426.2	426.7	426.4	426.3	425.6	425.5	425.5	427.9	433.5																							
16-Dec	425.8	425.7	Z	425.6	424.5	422.8	422.7	422.5	423.5	431.5	431.0	434.8	428.4	430.3	425.4	424.6	424.5	426.0	427.3	427.3	430.5	432.0	429.0	426.9	434.8																								
17-Dec	432.1	428.5	426.5	Z	434.2	435.5	430.4	434.3	437.6	439.4	439.3	441.3	440.9	439.1	437.9	440.4	441.7	442.0	442.5	448.0	446.8	444.6	447.2	443.2	438.8	448.0																							
18-Dec	445.1	445.3	439.8	437.6	Z	438.5	430.0	427.8	433.8	436.5	437.2	428.0	424.8	424.6	425.6	425.1	425.1	424.4	424.9	423.9	426.6	424.5	425.8	425.1	430.4	445.3																							
19-Dec	424.4	424.4	424.3	423.5	422.8	Z	423.8	423.8	425.1	424.6	424.1	424.6	423.2	423.4	424.2	425.4	425.5	422.8	423.2	423.8	423.4	424.1	424.5	424.5	424.1	425.5																							
20-Dec	Z	425.3	425.2	425.6	427.9	428.5	427.8	430.2	434.4	432.1	433.9	431.0	430.1	429.5	429.1	429.7	430.2	430.1	431.1	430.7	431.0	432.3	434.0	438.7	430.4	438.7																							
21-Dec	431.1	Z	427.5	426.4	425.1	424.6	426.7	428.7	429.9	428.0	431.9	428.6	432.9	433.5	433.5	431.6	433.2	436.8	439.4	438.0	435.1	436.0	436.8	435.2	431.8	439.4																							
22-Dec	435.2	435.3	Z	436.7	442.3	446.0	447.6	450.5	446.8	450.4	456.4	447.0	450.8	447.6	446.6	452.5	453.3	455.3	453.3	454.3	448.9	447.2	443.4	439.8	447.3	456.4																							
23-Dec	430.8	427.4	426.6	Z	424.3	424.2	423.8	423.7	423.9	423.3	423.1	423.1	423.0	422.4	422.3	422.1	422.9	424.5	424.4	423.7	426.3	426.6	425.3	424.4	424.4	430.8																							
24-Dec	425.5	427.6	427.7	429.7	Z	428.9	430.6	432.0	432.1	432.2	430.7	428.9	428.9	430.2	433.7	434.6	435.6	436.5	441.4	438.5	440.6	443.8	442.9	439.9	433.6	443.8																							
25-Dec	440.9	440.3	440.1	438.8	436.9	Z	436.2	436.6	437.1	437.4	438.4	442.5	445.1	444.8	445.0	443.0	441.6	441.5	439.7	442.3	443.9	447.9	447.9	441.7	441.3	447.9																							
26-Dec	Z	450.2	446.6	445.4	447.8	450.0	449.9	455.2	449.7	445.0	444.1	447.4	452.9	452.9	442.5	441.0	450.7	442.7	444.0	445.1	443.7	441.6	433.5	427.5	445.6	455.2																							
27-Dec	422.3	Z	422.0	422.1	424.8	426.5	426.3	427.8	428.4	427.5	448.0	428.3	429.0	431.2	432.3	432.9	434.4	432.4	434.6	436.4	434.6	436.4	443.0	437.8	430.4	443.0																							
28-Dec	439.0	444.7	Z	449.1	451.5	452.6	448.5	454.7	454.4	454.3	436.2	426.1	426.8	425.3	425.0	424.6	426.8	425.7	425.3	425.1	425.2	423.7	423.6	429.4	435.5	454.7																							
29-Dec	428.1	429.3	429.7	Z	435.3	435.3	435.7	438.3	438.4	436.6	437.4	438.9	440.9	436.7	437.8	437.1	438.5	438.8	440.9	439.5	441.0	444.0	448.7	448.3	438.0	448.7																							
30-Dec	449.7	452.5	448.5	446.9	Z	447.2	450.4	449.5	452.7	454.0	448.1	449.5	450.9	449.3	444.6	446.5	453.5	446.9	448.9	442.0	447.0	444.0	439.2	439.1	447.9	454.0																							
31-Dec	444.3	439.0	442.2	437.4	437.1	Z	435.9	434.6	435.9	435.0	437.7	436.0	437.3	438.7	437.4	430.0	432.1	430.3	426.8	429.0	427.3	425.7	426.2	428.8	434.1	444.3																							
436.1																								435.9	435.3	435.8	435.9	436.3	436.0	437.0	437.4	437.1	436.7	435.3	436.0	435.5	435.0	434.8	435.7	435.4	435.9	436.9	436.8	437.2	437.7	436.7	Diurnal Average		
464.0																								452.5	469.3	466.0	466.6	461.9	465.3	465.9	469.7	458.0	456.4	451.5	452.9	454.4	453.2	452.5	453.5	455.3	456.8	464.4	462.1	466.5	464.7	467.0	Diurnal Maximum		
Z - zerospan																								C - Calibration																									



Wood Buffalo Environmental Association
Hourly Averages

Carbon Dioxide (CO₂) - ppm
Fort McKay - Bertha Ganter - December 2023





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Carbon Dioxide (CO₂) - ppm
Fort McKay - Bertha Ganter - December 2023

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
400 - 420	0	0.00	0.00
420 - 440	472	66.57	66.57
440 - 460	224	31.59	98.17
460 - 480	13	1.83	100.00
480 - 500	0	0.00	100.00
> 500	0	0.00	100.00

Total Number of Valid Hours: 709

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Carbon Dioxide (CO₂) - ppm
Fort McKay - Bertha Ganter - December 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	19	20	10	3	2	2	4	12	174	69	43	38	41	21	6	8	472
440 - 460	15	1	1	0	0	2	1	14	83	43	25	12	4	9	10	4	224
460 - 480	0	0	0	0	0	0	0	0	1	5	5	2	0	0	0	0	13
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
Totals	34	21	11	3	2	4	5	26	258	117	73	52	45	30	16	12	709

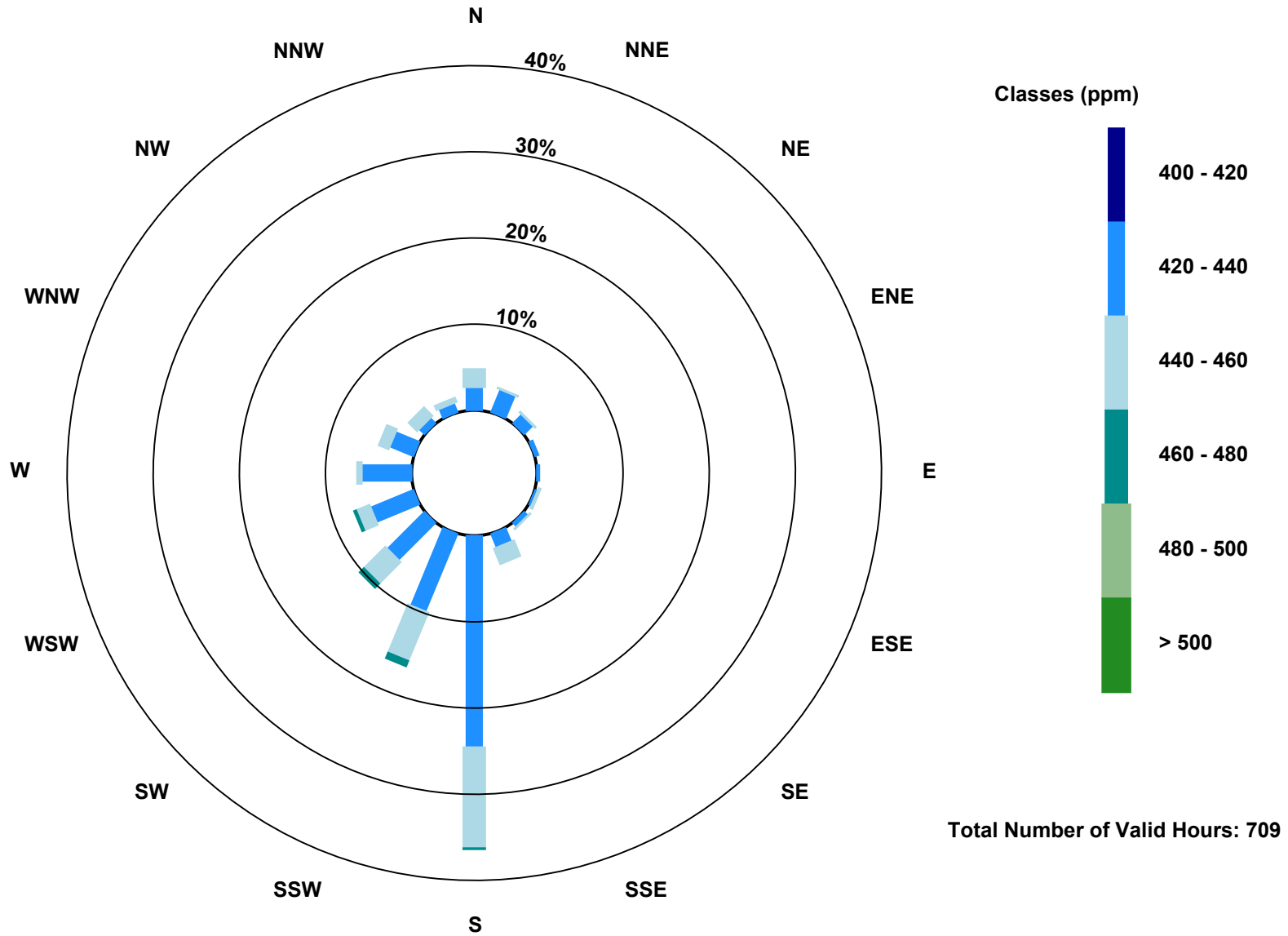
Total Number of Valid Hours: 709

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Dec 2023

Carbon Dioxide (CO₂) - ppm
Fort McKay - Bertha Ganter



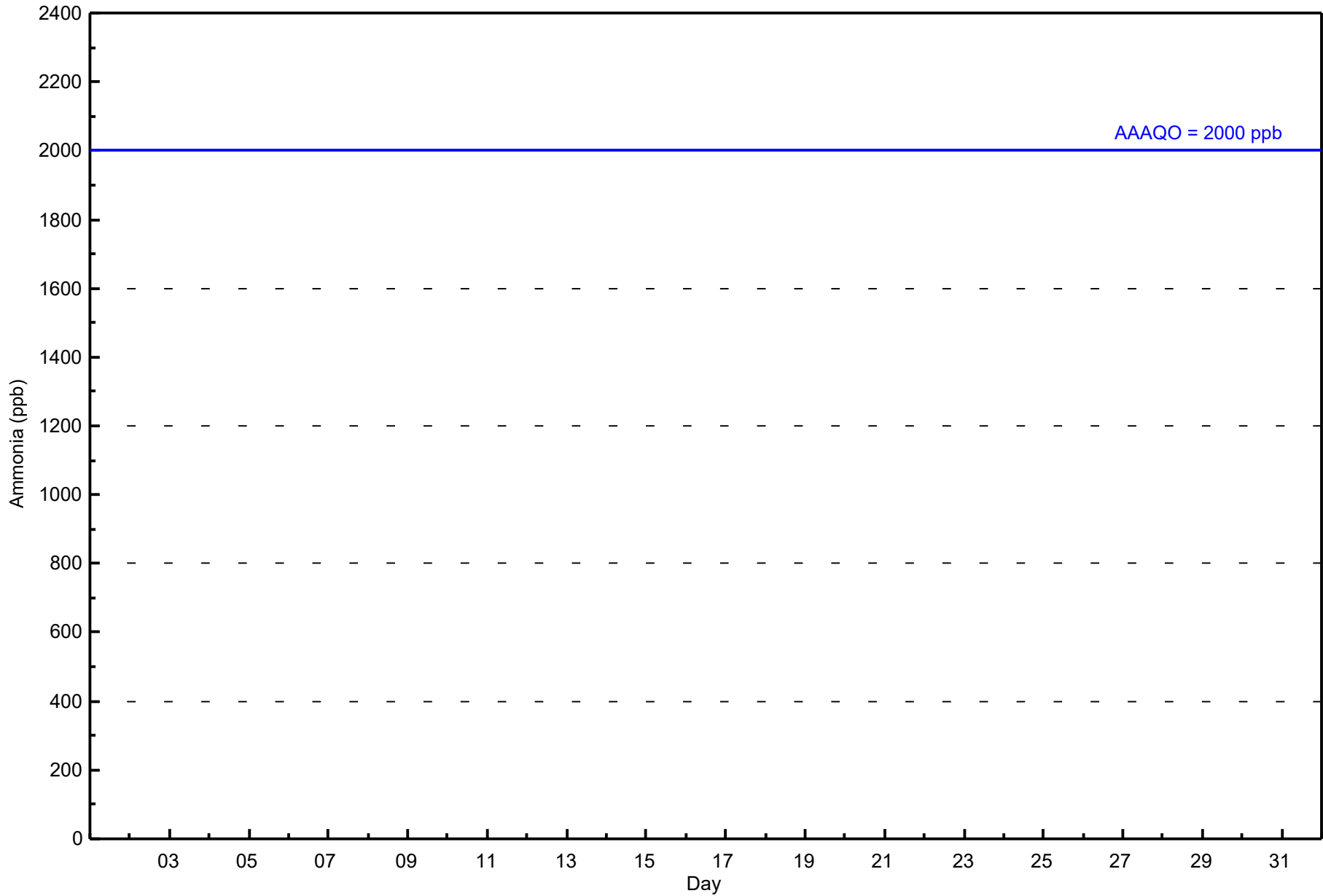


Number of Exceedences (AAAQO): 1-hr: 0		Hours in Service: 744																									
Maximum Value: 0.0 ppb on Dec 1 01:00		Maximum Daily Average: 0.0 ppb on Dec 1																									
Minimum Value: 0.0 ppb on Dec 1 01:00		Hours of Data: 669																									
Maximum Diurnal Average: 0.0 ppb at hour 1		Hours of Missing Data: 75																									
Monthly Average: 0.00 ppb		Hours of Calibration: 42																									
Minimum Daily Average: 0.0 ppb on Dec 1		Percent Operational Time: 95.6																									
Minimum Diurnal Average: 0.0 ppb at hour 1		Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.0 Median = 0.0 Q ₃ = 0.0 P ₉₀ = 0.0 P ₉₉ = 0.0																									
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Dec	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-Dec	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-Dec	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-Dec	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-Dec	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
6-Dec	0.0	0.0	Z	RE	0.0	0.0	0.0	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	0.0	0.0	0.0	0.0	0.0
7-Dec	0.0	0.0	0.0	Z	RE	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	0.0	0.0
8-Dec	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
9-Dec	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
10-Dec	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
11-Dec	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
12-Dec	UO	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
13-Dec	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
14-Dec	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
15-Dec	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
16-Dec	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
17-Dec	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
18-Dec	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
19-Dec	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
20-Dec	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
21-Dec	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
22-Dec	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
23-Dec	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
24-Dec	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
25-Dec	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
26-Dec	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
27-Dec	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
28-Dec	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
29-Dec	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
30-Dec	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
31-Dec	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
																								Diurnal Average			
																								Diurnal Maximum			
Z - zerospan C - Calibration UO - Unstable Operation RE - Recovery																											
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 2000 ppb																											



Wood Buffalo Environmental Association
Hourly Averages

Ammonia (NH₃) - ppb
Fort McKay - Bertha Ganter - December 2023





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Ammonia (NH₃) - ppb
Fort McKay - Bertha Ganter - December 2023

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 5	669	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: 669

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Ammonia (NH₃) - ppb
Fort McKay - Bertha Ganter - December 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	31	20	11	3	2	4	6	24	246	107	71	44	43	29	15	13	669
6 - 10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 - 15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16 - 20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21 - 25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	31	20	11	3	2	4	6	24	246	107	71	44	43	29	15	13	669

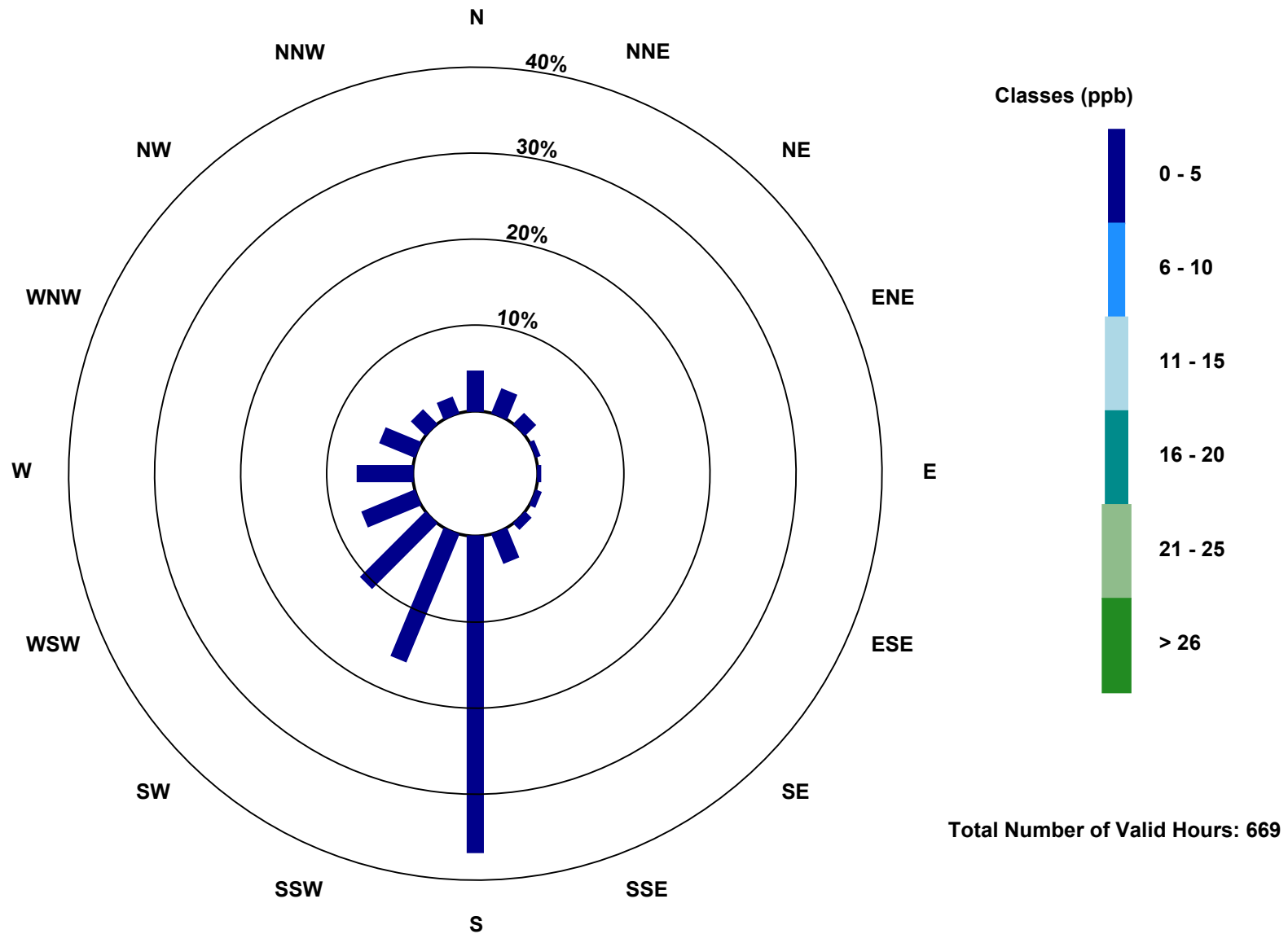
Total Number of Valid Hours: 669

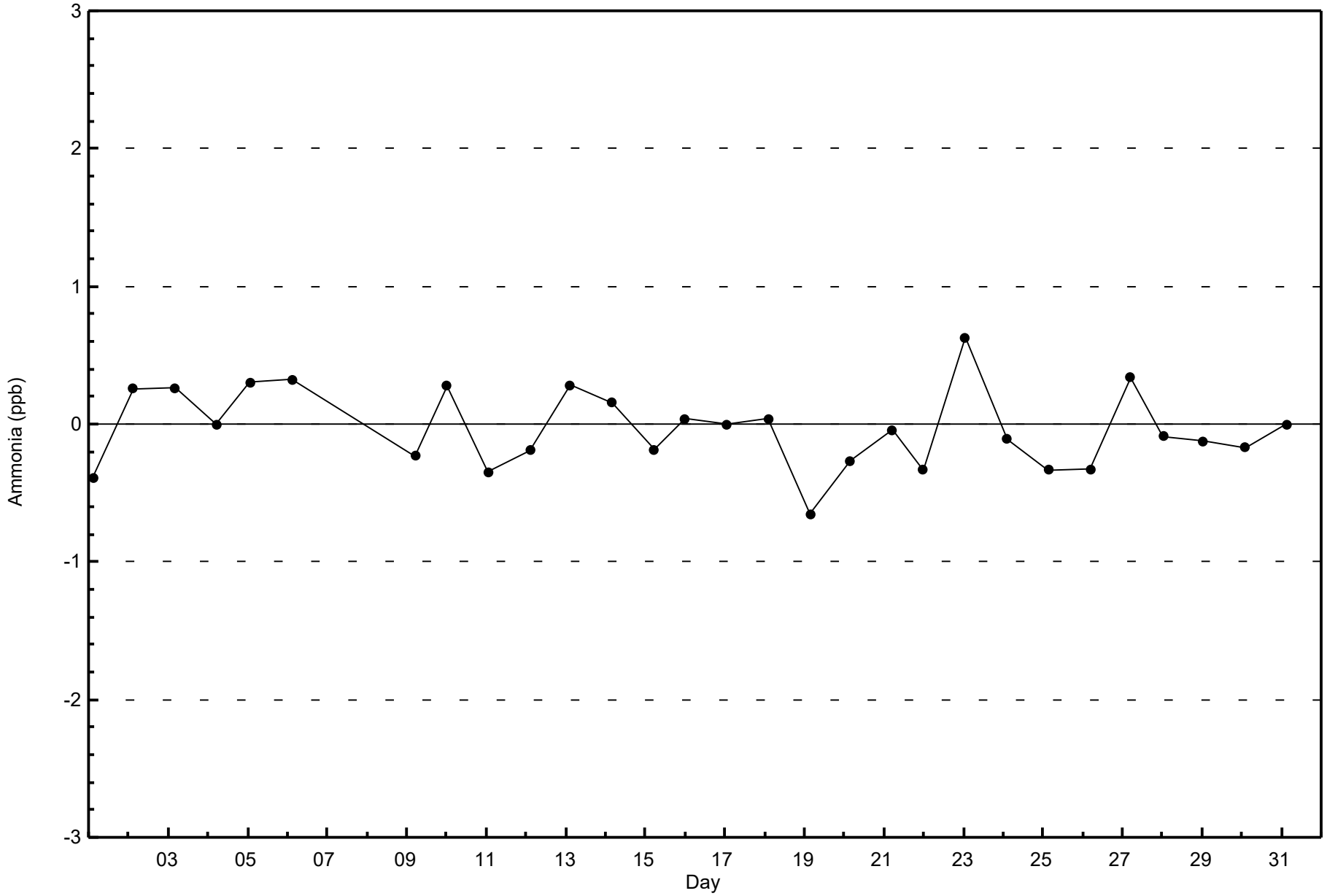
Total Number of Hours: 744

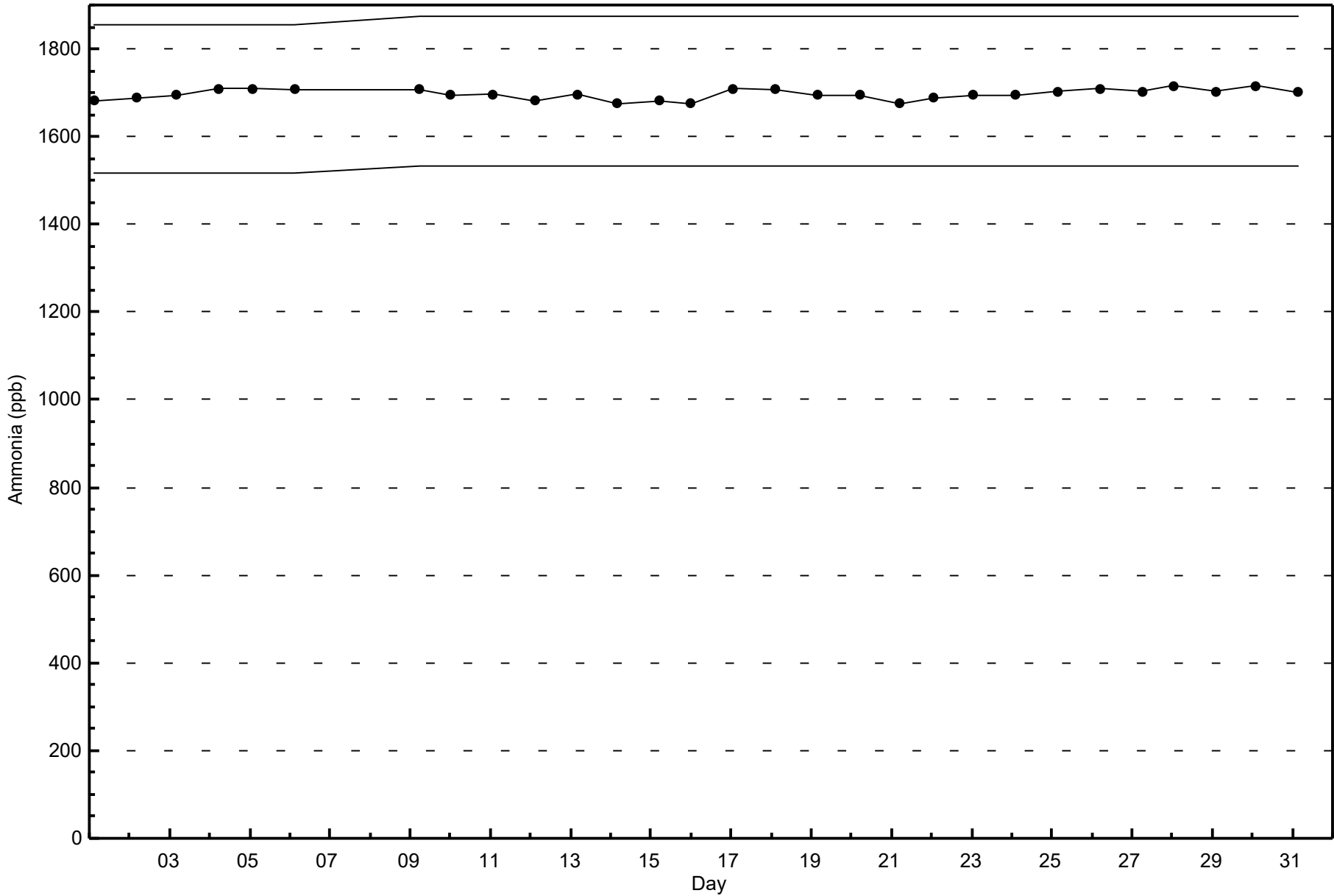


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Ammonia (NH₃) - ppb
Fort McKay - Bertha Ganter









Wood Buffalo Environmental Association

Summary of Hour Averages

Ambient Temperature 10 m (AT 10m) - C

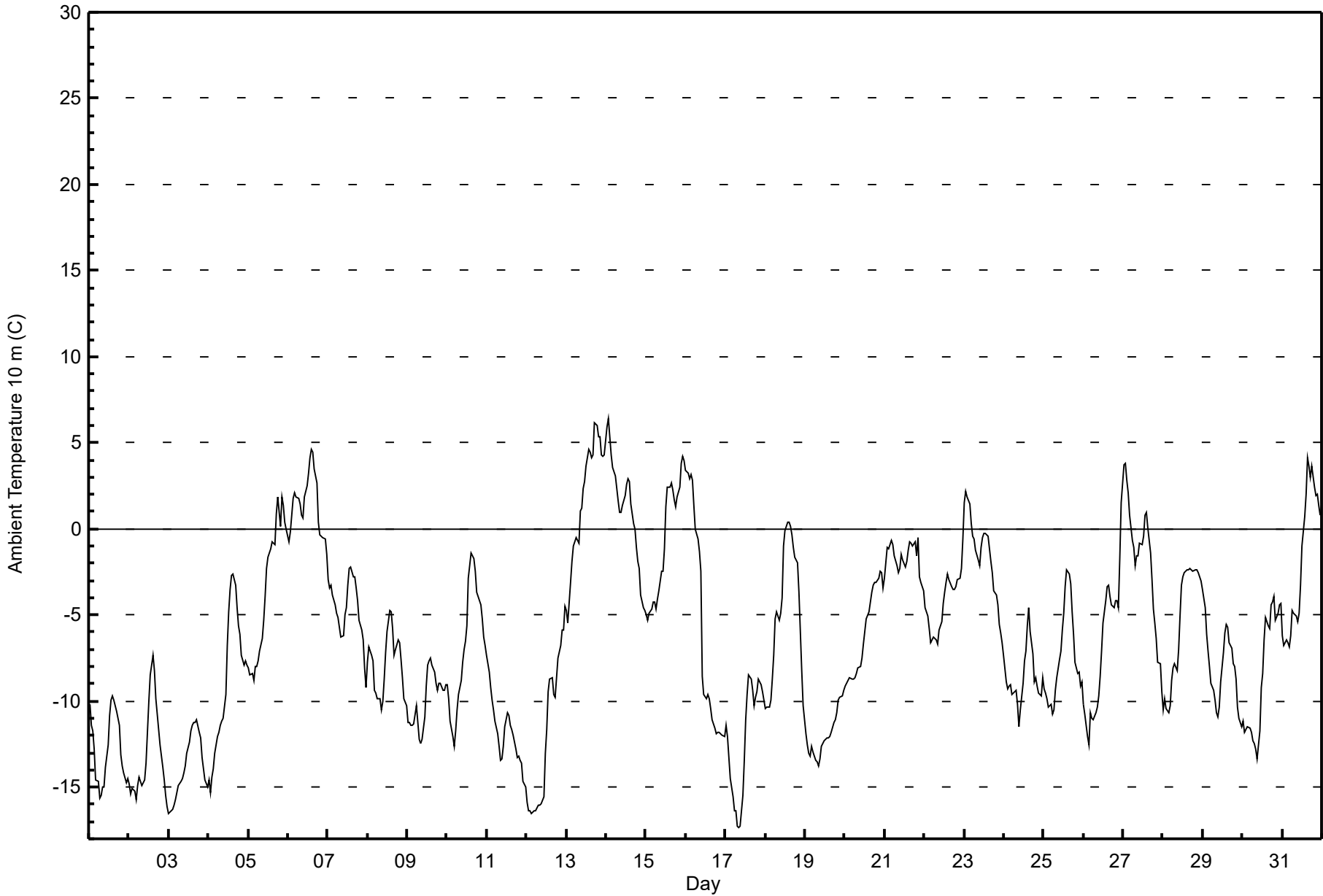
Fort McKay - Bertha Ganter - December 2023

Maximum Value: 6.4 C on Dec 14 02:00 Maximum Daily Average: 1.9 C on Dec 13 Minimum Value: -17.3 C on Dec 17 09:00 Minimum Daily Average: -13.8 C on Dec 3 Maximum Diurnal Average: -3.7 C at hour 15 Minimum Diurnal Average: -8.2 C at hour 9 Monthly Average: -6.38 C Percentiles: P ₁ = -16.4 P ₁₀ = -13.3 Q ₁ = -10.5 Median = -6.7 Q ₃ = -2.4 P ₉₀ = 1.4 P ₉₉ = 4.6																						Hours in Service:	744																								
																						Hours of Data:	744																								
																						Hours of Missing Data:	0																								
																						Hours of Calibration:	0																								
																						Percent Operational Time:	100.0																								
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																					
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																							
1-Dec	-10.2	-11.4	-11.7	-12.8	-14.6	-14.6	-15.6	-15.5	-15.0	-15.0	-13.8	-12.5	-10.9	-10.0	-9.7	-10.0	-10.6	-11.0	-11.4	-13.1	-13.8	-14.2	-14.8	-14.5	-12.8	-9.7																					
2-Dec	-14.8	-15.4	-15.1	-15.3	-15.7	-14.9	-14.5	-14.7	-14.9	-14.5	-13.6	-11.8	-10.0	-8.5	-7.4	-8.2	-9.9	-10.7	-11.7	-12.6	-13.9	-14.6	-15.5	-16.1	-13.1	-7.4																					
3-Dec	-16.5	-16.4	-16.3	-16.0	-15.7	-15.3	-14.9	-14.7	-14.5	-14.2	-13.7	-13.0	-12.4	-11.8	-11.4	-11.2	-11.3	-11.1	-11.8	-12.2	-13.3	-13.9	-14.6	-15.0	-13.8	-11.1																					
4-Dec	-14.6	-15.3	-14.5	-14.0	-13.1	-12.0	-11.8	-11.4	-11.1	-11.0	-9.7	-6.8	-4.8	-3.5	-2.7	-2.6	-3.3	-4.6	-5.7	-6.1	-7.3	-7.9	-7.7	-7.9	-8.7	-2.6																					
5-Dec	-8.1	-8.5	-8.4	-8.8	-8.0	-8.0	-7.7	-7.1	-6.4	-5.3	-4.0	-2.3	-1.7	-1.2	-0.8	-0.9	-0.9	0.9	1.8	0.2	1.8	1.4	0.4	0.0	-3.4	1.8																					
6-Dec	-0.7	-0.2	0.8	1.8	2.1	1.9	1.8	1.5	0.8	0.6	1.8	2.5	3.2	4.2	4.6	4.4	3.5	2.6	0.4	-0.3	-0.4	-0.5	-0.6	-1.5	1.4	4.6																					
7-Dec	-2.9	-3.4	-3.2	-3.8	-4.4	-4.9	-5.1	-5.7	-6.3	-6.2	-5.0	-4.6	-3.3	-2.3	-2.2	-2.8	-2.8	-3.4	-4.2	-5.3	-5.9	-6.5	-8.1	-9.2	-4.6	-2.2																					
8-Dec	-7.7	-6.8	-7.4	-7.7	-9.4	-9.6	-9.9	-9.9	-10.5	-10.0	-8.7	-7.2	-5.9	-4.7	-4.8	-5.8	-7.3	-7.0	-6.5	-6.6	-7.6	-8.6	-9.9	-10.3	-7.9	-4.7																					
9-Dec	-11.3	-11.3	-11.4	-11.4	-11.3	-10.2	-11.3	-12.2	-12.4	-12.2	-10.9	-9.2	-7.9	-7.7	-7.5	-7.9	-8.4	-9.0	-9.3	-9.0	-9.0	-9.4	-9.4	-9.1	-9.9	-7.5																					
10-Dec	-9.0	-9.9	-11.2	-12.1	-12.7	-11.7	-10.6	-9.7	-8.8	-7.7	-7.0	-6.5	-5.6	-2.8	-1.4	-1.6	-1.7	-2.5	-3.7	-4.2	-4.4	-5.2	-6.3	-6.8	-6.8	-1.4																					
11-Dec	-7.3	-8.3	-9.2	-10.0	-10.5	-11.2	-11.9	-12.6	-13.4	-13.3	-12.6	-11.5	-10.7	-10.9	-11.4	-11.7	-12.0	-12.8	-13.3	-13.2	-13.5	-13.6	-14.7	-15.0	-11.9	-7.3																					
12-Dec	-15.9	-16.4	-16.4	-16.5	-16.4	-16.4	-16.2	-16.1	-16.1	-16.0	-15.6	-13.1	-11.7	-9.5	-8.7	-8.7	-9.6	-9.7	-8.6	-7.5	-6.8	-5.8	-5.9	-4.5	-12.0	-4.5																					
13-Dec	-4.7	-5.4	-3.1	-1.9	-1.0	-0.7	-0.5	-0.8	1.0	1.2	2.3	2.7	3.7	4.6	4.4	4.2	4.3	6.1	6.0	5.3	5.4	4.3	4.2	4.3	1.9	6.1																					
14-Dec	5.9	6.4	5.3	4.3	3.6	3.0	2.4	1.6	0.9	1.0	1.4	1.9	2.6	2.9	2.8	1.5	0.3	0.0	-1.1	-1.9	-2.3	-3.8	-4.6	-4.8	1.2	6.4																					
15-Dec	-5.0	-5.3	-4.9	-4.7	-4.3	-4.3	-4.6	-4.1	-3.6	-2.4	-2.4	-1.2	1.3	2.4	2.4	2.7	2.2	1.7	1.3	1.9	2.4	3.8	4.2	4.0	-0.7	4.2																					
16-Dec	3.4	3.2	2.9	3.1	2.9	1.3	0.0	-0.6	-1.3	-2.4	-8.6	-9.6	-9.9	-9.6	-9.9	-10.4	-11.1	-11.6	-11.9	-11.8	-11.8	-11.9	-12.0	-12.1	-5.8	3.4																					
17-Dec	-11.4	-12.0	-13.3	-14.5	-15.5	-16.4	-16.4	-17.3	-17.3	-17.3	-15.5	-13.5	-11.1	-9.6	-8.5	-8.7	-9.4	-10.3	-9.8	-9.5	-8.7	-9.0	-9.5	-10.0	-12.3	-8.5																					
18-Dec	-10.4	-10.3	-10.3	-10.0	-8.7	-7.3	-5.2	-4.8	-5.3	-4.9	-4.0	-1.0	-0.1	0.4	0.4	0.1	-0.3	-1.1	-1.6	-2.0	-3.7	-6.0	-8.2	-10.3	-4.8	0.4																					
19-Dec	-11.9	-12.6	-13.0	-13.2	-12.6	-12.9	-13.4	-13.5	-13.7	-13.4	-12.6	-12.3	-12.2	-12.1	-12.1	-12.0	-11.8	-11.3	-11.1	-10.6	-9.9	-9.8	-9.7	-9.4	-12.0	-9.4																					
20-Dec	-9.1	-8.9	-8.8	-8.7	-8.7	-8.7	-8.7	-8.4	-8.1	-8.0	-7.5	-6.7	-5.9	-5.2	-4.8	-4.2	-3.6	-3.3	-3.1	-3.1	-2.8	-2.5	-2.6	-3.5	-6.0	-2.5																					
21-Dec	-2.8	-1.1	-1.2	-0.9	-0.7	-0.9	-1.6	-2.1	-2.5	-2.3	-1.5	-1.8	-2.2	-1.9	-1.2	-0.7	-0.8	-1.0	-0.8	-1.6	-0.5	-2.8	-3.2	-3.6	-1.7	-0.5																					
22-Dec	-4.6	-4.8	-5.0	-5.8	-6.6	-6.3	-6.3	-6.5	-6.7	-5.8	-5.4	-4.3	-3.7	-3.1	-2.7	-3.0	-3.3	-3.5	-3.5	-3.4	-3.0	-2.9	-2.3	-0.6	-4.3	-0.6																					
23-Dec	1.5	2.2	1.8	1.4	0.3	-0.4	-0.6	-1.3	-1.8	-2.1	-1.0	-0.5	-0.3	-0.2	-0.4	-1.2	-1.9	-2.6	-3.6	-3.8	-4.4	-5.6	-6.0	-6.6	-1.5	2.2																					
24-Dec	-7.4	-8.9	-9.3	-9.2	-9.1	-9.7	-9.4	-9.4	-10.2	-11.5	-10.5	-9.0	-7.7	-7.1	-5.7	-4.6	-5.9	-7.2	-8.9	-8.6	-9.2	-9.5	-9.7	-8.7	-8.6	-4.6																					
25-Dec	-9.3	-9.5	-9.9	-10.4	-10.2	-10.7	-10.5	-9.4	-8.6	-7.6	-7.1	-5.9	-4.9	-3.4	-2.4	-2.6	-3.2	-4.8	-6.1	-7.7	-8.4	-8.3	-9.2	-8.9	-7.5	-2.4																					
26-Dec	-10.2	-10.7	-12.1	-12.5	-10.7	-11.0	-11.1	-10.7	-10.3	-9.7	-8.6	-7.1	-5.5	-4.1	-3.4	-3.3	-3.9	-4.4	-4.6	-4.2	-4.2	-4.6	-1.7	1.5	-6.9	1.5																					
27-Dec	3.8	3.8	2.8	2.1	0.8	-0.7	-1.1	-2.1	-1.6	-1.5	-0.8	-1.0	-0.4	0.8	1.0	0.1	-1.4	-3.0	-4.6	-5.4	-6.3	-7.8	-7.8	-9.5	-1.7	3.8																					
28-Dec	-10.5	-9.9	-10.4	-10.7	-10.3	-8.8	-8.1	-7.9	-8.2	-7.0	-5.1	-3.3	-2.8	-2.5	-2.4	-2.3	-2.3	-2.4	-2.5	-2.4	-2.4	-2.5	-2.8	-3.1	-5.4	-2.3																					
29-Dec	-3.5	-4.5	-6.2	-7.1	-8.0	-9.0	-9.4	-10.0	-10.7	-10.9	-10.3	-8.9	-7.2	-6.1	-5.5	-5.7	-6.6	-7.0	-7.8	-8.0	-8.7	-10.3	-11.0	-11.5	-8.1	-3.5																					
30-Dec	-11.2	-11.8	-11.7	-11.5	-11.6	-11.8	-12.3	-12.5	-12.8	-13.3	-11.7	-9.3	-8.4	-6.5	-5.1	-5.6	-5.8	-4.4	-4.2	-3.9	-5.3	-4.9	-4.4	-4.3	-8.5	-3.9																					
31-Dec	-6.2	-6.8	-6.5	-6.6	-6.9	-6.2	-4.8	-4.9	-5.0	-5.4	-4.9	-3.3	-1.0	0.7	2.0	4.1	3.7	3.0	3.7	2.4	1.9	2.0	1.3	0.8	-1.8	4.1																					
																						-7.2	-7.4	-7.6	-7.8	-8.0	-8.0	-8.0	-8.1	-8.2	-8.0	-7.3	-6.1	-5.1	-4.1	-3.7	-3.8	-4.4	-4.7	-5.1	-5.4	-5.7	-6.2	-6.5	-6.6	Diurnal Average	
																						5.9	6.4	5.3	4.3	3.6	3.0	2.4	1.6	1.0	1.2	2.3	2.7	3.7	4.6	4.6	4.4	4.3	6.1	6.0	5.3	5.4	4.3	4.2	4.3	Diurnal Maximum	



Wood Buffalo Environmental Association
Hourly Averages

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	641	86.16	86.16
0 - 10	103	13.84	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744

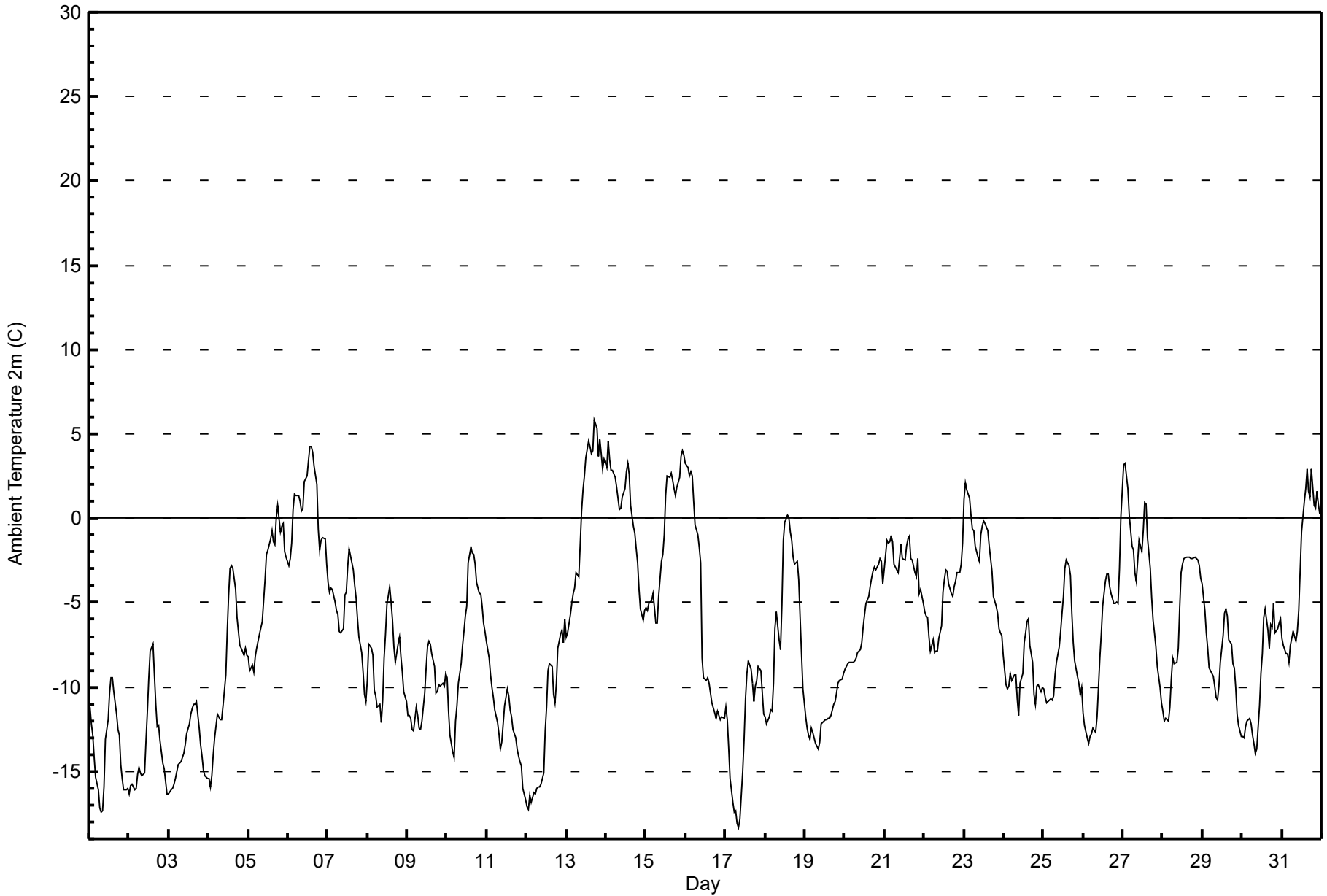


Maximum Value: 5.9 C on Dec 13 18:00																				Maximum Daily Average: 0.7 C on Dec 6					Hours in Service: 744	
Minimum Value: -18.3 C on Dec 17 09:00																				Minimum Daily Average: -13.8 C on Dec 3					Hours of Data: 744	
Maximum Diurnal Average: -3.8 C at hour 15																				Minimum Diurnal Average: -8.9 C at hour 9					Hours of Missing Data: 0	
Monthly Average: -6.93 C																				Percentiles: P ₁ = -17.2 P ₁₀ = -13.7 Q ₁ = -11.1 Median = -7.4 Q ₃ = -2.7 P ₉₀ = 0.8 P ₉₉ = 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-Dec	-11.2	-12.2	-12.9	-14.2	-15.4	-16.1	-17.1	-17.4	-17.3	-16.0	-13.1	-11.9	-10.4	-9.5	-9.5	-10.2	-11.6	-12.5	-12.8	-14.6	-15.4	-16.1	-16.1	-13.7	-9.5	
2-Dec	-16.3	-15.8	-15.8	-16.1	-16.0	-15.2	-14.7	-15.1	-15.3	-15.1	-13.2	-11.4	-9.5	-7.9	-7.4	-9.3	-11.0	-12.3	-12.2	-13.2	-14.5	-14.8	-15.6	-16.3	-13.5	-7.4
3-Dec	-16.4	-16.1	-16.0	-15.8	-15.4	-15.0	-14.6	-14.4	-14.2	-13.9	-13.5	-12.8	-12.2	-11.6	-11.3	-11.0	-11.0	-10.9	-12.4	-13.4	-14.1	-14.9	-15.3	-15.4	-13.8	-10.9
4-Dec	-15.4	-15.9	-15.3	-14.0	-13.0	-11.6	-11.8	-11.9	-11.9	-11.1	-9.3	-6.7	-4.5	-3.0	-2.8	-3.0	-4.2	-5.9	-6.7	-7.5	-7.7	-8.1	-7.7	-8.1	-9.1	-2.8
5-Dec	-8.2	-9.0	-8.7	-9.1	-8.2	-7.7	-7.3	-6.9	-6.1	-4.9	-3.6	-2.2	-1.9	-1.2	-0.7	-1.4	-1.6	0.1	0.7	-0.8	-0.5	-0.3	-1.9	-2.3	-3.9	0.7
6-Dec	-2.8	-2.4	-1.4	0.5	1.4	1.4	1.3	1.0	0.4	0.6	2.2	2.5	3.4	4.3	4.2	3.9	3.1	2.0	-0.6	-1.9	-1.3	-1.1	-1.2	-2.7	0.7	4.3
7-Dec	-3.8	-4.4	-4.1	-4.2	-5.0	-5.5	-5.7	-6.7	-6.8	-6.5	-4.5	-4.4	-2.9	-1.8	-2.3	-3.1	-3.9	-4.7	-6.0	-7.0	-8.0	-9.1	-10.4	-10.9	-5.5	-1.8
8-Dec	-9.6	-7.5	-7.7	-8.1	-10.2	-10.6	-11.2	-11.0	-12.1	-10.8	-8.3	-6.9	-5.1	-4.0	-4.9	-6.0	-7.6	-8.5	-7.4	-7.0	-8.2	-9.1	-10.3	-10.9	-8.5	-4.0
9-Dec	-11.7	-11.7	-11.8	-12.5	-12.6	-11.2	-11.7	-12.5	-12.5	-12.1	-10.4	-8.9	-7.7	-7.3	-7.4	-8.0	-8.8	-10.3	-10.3	-9.9	-10.0	-9.8	-9.9	-9.2	-10.3	-7.3
10-Dec	-9.4	-11.5	-12.9	-13.8	-14.2	-12.0	-11.1	-9.8	-8.6	-7.6	-6.7	-5.8	-5.2	-2.7	-1.7	-2.0	-2.2	-2.7	-3.8	-4.4	-4.5	-5.2	-6.2	-6.7	-7.1	-1.7
11-Dec	-7.3	-8.3	-9.3	-10.1	-10.6	-11.4	-12.1	-12.8	-13.7	-13.3	-12.2	-11.1	-10.1	-10.5	-11.4	-11.8	-12.5	-13.1	-13.7	-14.1	-14.4	-14.7	-16.0	-16.7	-12.1	-7.3
12-Dec	-17.1	-17.3	-16.4	-16.8	-16.3	-16.3	-16.0	-15.9	-15.9	-15.7	-15.1	-12.6	-11.2	-9.0	-8.6	-8.8	-10.4	-11.0	-9.8	-7.7	-6.9	-6.6	-7.3	-6.0	-12.3	-6.0
13-Dec	-7.0	-6.8	-5.7	-5.1	-4.4	-4.1	-3.2	-3.4	-1.5	0.4	1.7	2.5	3.6	4.6	4.3	3.9	4.0	5.9	5.4	3.7	4.7	3.8	2.9	3.5	0.6	5.9
14-Dec	3.0	4.6	3.5	2.9	2.8	2.5	1.8	1.1	0.5	0.6	1.2	1.8	2.7	3.3	2.6	0.8	-0.5	-0.9	-1.8	-2.6	-4.3	-5.4	-6.1	-5.5	0.4	4.6
15-Dec	-5.3	-5.5	-5.1	-4.9	-4.4	-5.3	-6.2	-6.2	-4.6	-2.5	-2.2	-1.0	1.3	2.5	2.4	2.7	2.2	1.7	1.4	1.9	2.4	3.7	4.0	3.8	-1.0	4.0
16-Dec	3.2	3.0	2.5	2.8	2.5	1.0	-0.4	-0.9	-1.7	-2.6	-8.3	-9.4	-9.6	-9.4	-9.8	-10.4	-11.0	-11.5	-11.9	-11.4	-11.7	-11.9	-11.8	-11.8	-5.9	3.2
17-Dec	-11.2	-11.9	-13.6	-15.4	-16.9	-17.4	-17.3	-18.1	-18.3	-17.8	-15.0	-13.1	-10.7	-9.2	-8.5	-8.9	-9.8	-10.9	-9.9	-9.6	-8.8	-9.1	-10.4	-11.6	-12.6	-8.5
18-Dec	-11.7	-12.2	-11.8	-11.4	-11.5	-9.8	-6.5	-5.5	-7.2	-7.8	-5.1	-1.3	-0.2	0.2	0.0	-0.8	-1.3	-2.3	-2.7	-2.6	-3.6	-5.9	-8.0	-10.1	-5.8	0.2
19-Dec	-11.8	-12.4	-12.9	-13.1	-12.5	-12.7	-13.3	-13.5	-13.7	-13.2	-12.2	-12.0	-11.9	-12.0	-11.9	-11.9	-11.7	-11.0	-10.9	-10.4	-9.8	-9.6	-9.5	-9.2	-11.8	-9.2
20-Dec	-8.9	-8.8	-8.7	-8.5	-8.6	-8.6	-8.5	-8.3	-7.9	-7.8	-7.3	-6.5	-5.7	-5.0	-4.6	-4.1	-3.5	-3.1	-2.9	-3.0	-2.7	-2.4	-2.6	-3.9	-5.9	-2.4
21-Dec	-3.1	-1.3	-1.5	-1.4	-1.1	-1.4	-2.7	-3.1	-3.2	-2.4	-1.5	-2.4	-2.5	-1.7	-1.2	-1.1	-2.4	-2.5	-3.2	-3.5	-2.3	-4.4	-4.2	-5.1	-2.5	-1.1
22-Dec	-5.6	-5.8	-5.9	-7.0	-7.9	-7.2	-7.9	-7.8	-7.9	-7.1	-6.4	-4.4	-3.6	-3.1	-3.1	-3.9	-4.5	-4.6	-4.1	-3.7	-3.2	-3.2	-2.7	-1.5	-5.1	-1.5
23-Dec	1.1	2.1	1.7	1.2	0.2	-0.7	-0.8	-1.6	-2.3	-2.6	-1.0	-0.4	-0.2	-0.3	-0.8	-1.6	-2.4	-3.1	-4.6	-5.2	-5.6	-6.5	-6.8	-6.9	-2.0	2.1
24-Dec	-8.1	-9.9	-10.1	-9.9	-9.2	-9.6	-9.2	-9.2	-10.7	-11.7	-9.8	-9.2	-7.4	-6.8	-6.1	-6.0	-7.6	-8.5	-10.5	-11.0	-9.9	-9.9	-10.3	-10.0	-9.2	-6.0
25-Dec	-10.1	-10.6	-11.0	-10.8	-10.7	-10.8	-10.6	-9.3	-8.5	-7.7	-6.7	-5.6	-4.6	-3.0	-2.4	-2.8	-3.4	-5.6	-7.3	-8.4	-9.3	-9.8	-10.4	-10.1	-7.9	-2.4
26-Dec	-11.6	-12.2	-13.0	-13.3	-12.9	-12.8	-12.5	-12.7	-11.8	-10.0	-8.3	-6.9	-5.2	-3.7	-3.3	-3.3	-4.0	-4.5	-5.1	-5.1	-4.9	-5.0	-3.0	0.1	-7.7	0.1
27-Dec	3.1	3.3	2.5	1.8	0.2	-1.6	-1.9	-3.2	-3.7	-2.6	-1.3	-1.9	-0.7	0.9	0.9	-1.1	-3.0	-4.7	-6.0	-6.8	-7.6	-8.8	-10.1	-10.9	-2.6	3.3
28-Dec	-11.5	-12.0	-11.9	-12.0	-11.2	-9.5	-8.3	-8.6	-8.5	-7.7	-5.3	-3.2	-2.7	-2.4	-2.3	-2.3	-2.3	-2.3	-2.4	-2.3	-2.4	-2.5	-2.8	-3.5	-5.8	-2.3
29-Dec	-3.9	-5.4	-6.8	-7.7	-8.8	-9.0	-9.3	-10.0	-10.6	-10.7	-9.9	-8.6	-6.9	-5.6	-5.4	-5.8	-7.2	-7.4	-8.6	-8.9	-10.1	-11.6	-12.3	-13.0	-8.5	-3.9
30-Dec	-12.9	-13.0	-12.3	-12.1	-11.8	-12.2	-12.9	-13.4	-13.9	-13.7	-11.1	-9.2	-8.0	-5.9	-5.4	-6.6	-7.7	-6.3	-6.5	-5.0	-6.8	-6.5	-6.2	-6.0	-9.4	-5.0
31-Dec	-7.1	-7.6	-8.0	-8.1	-8.5	-7.5	-7.1	-6.7	-7.3	-6.7	-5.4	-3.2	-0.8	1.0	1.8	3.0	1.6	1.3	2.9	0.8	0.6	1.6	0.8	0.3	-2.9	3.0
																								Diurnal Average		
																								Diurnal Maximum		



Wood Buffalo Environmental Association
Hourly Averages

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	652	87.63	87.63
0 - 10	92	12.37	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



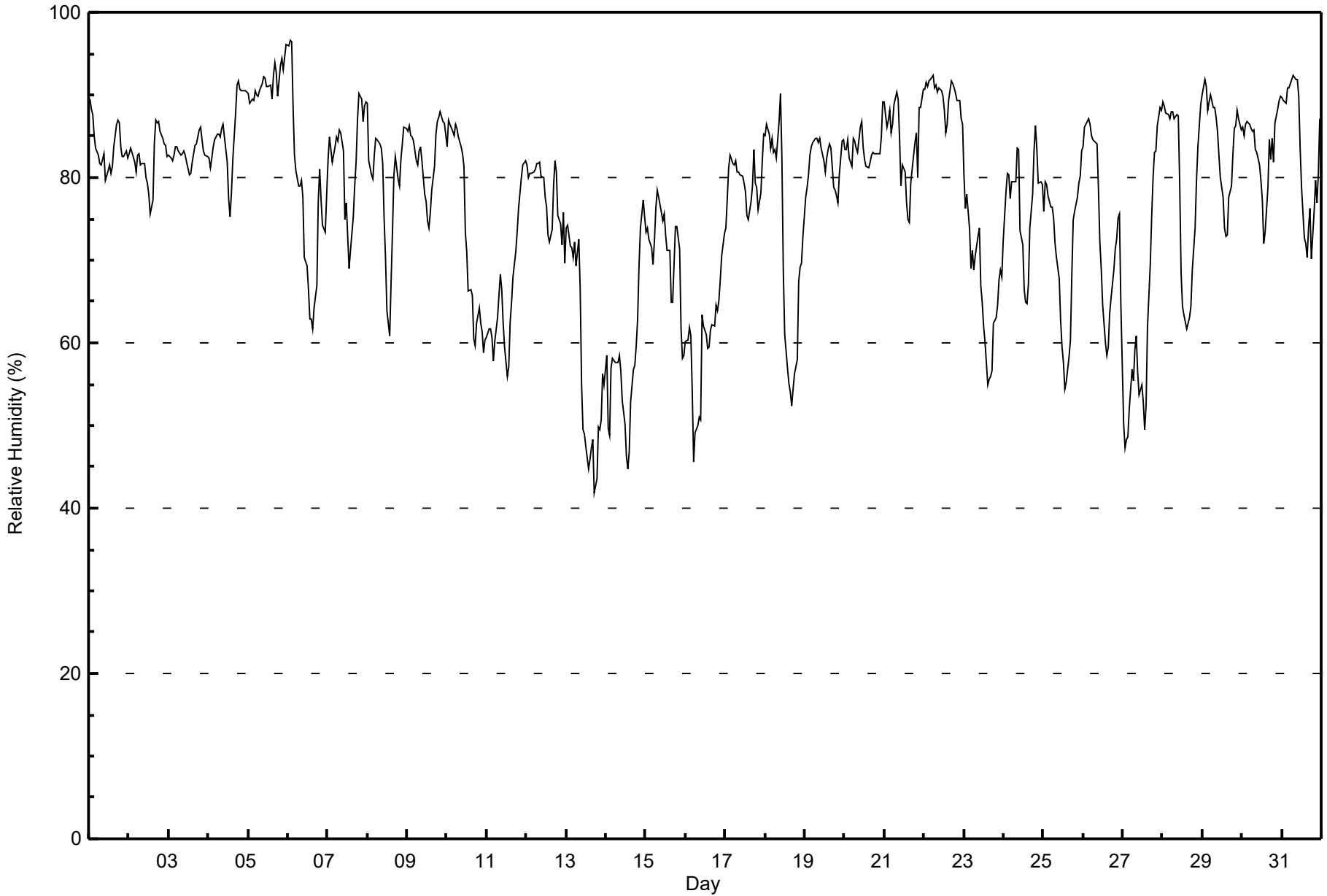
Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

Fort McKay - Bertha Ganter - December 2023

Maximum Value: 96.6 % on Dec 6 02:00 Maximum Daily Average: 91.6 % on Dec 5																						Hours in Service: 744 Hours of Data: 744				
Minimum Value: 41.9 % on Dec 13 18:00 Minimum Daily Average: 57.3 % on Dec 13 Maximum Diurnal Average: 80.3 % at hour 24 Minimum Diurnal Average: 68.2 % at hour 14 Monthly Average: 76.90 % Percentiles: P ₁ = 47.0 P ₁₀ = 59.2 Q ₁ = 70.4 Median = 80.5 Q ₃ = 85.0 P ₉₀ = 89.2 P ₉₉ = 93.3																						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-Dec	89.5	88.4	87.6	85.0	83.6	82.7	81.8	81.5	82.3	82.9	79.6	80.8	81.6	80.5	81.4	83.7	86.4	87.0	86.6	83.7	82.6	82.5	83.2	82.5	83.6	89.5
2-Dec	82.9	83.6	83.1	81.8	80.7	82.8	82.9	81.6	81.6	81.6	80.0	79.3	78.0	75.6	77.2	84.3	87.0	86.6	86.8	85.6	84.8	84.1	84.0	82.6	82.4	87.0
3-Dec	82.8	82.3	82.0	82.8	83.8	83.8	83.2	82.8	82.8	83.2	82.7	81.9	80.3	80.5	81.8	82.8	83.9	84.1	85.8	86.1	84.6	83.3	82.7	82.5	83.0	86.1
4-Dec	82.4	81.2	82.4	83.8	84.6	85.2	85.3	84.9	86.0	86.4	83.3	81.9	77.4	75.2	78.1	82.2	87.8	91.2	91.7	90.7	90.4	90.6	90.4	90.4	85.1	91.7
5-Dec	90.2	89.0	89.5	89.2	90.5	90.0	89.8	90.6	91.4	92.1	92.1	91.0	91.0	91.2	89.4	92.4	93.8	92.7	89.9	93.5	94.3	93.1	94.6	96.0	91.6	96.0
6-Dec	96.0	96.6	96.4	88.6	82.8	80.9	79.0	79.0	79.6	77.7	70.3	69.3	66.4	62.9	62.9	61.7	64.2	66.9	77.2	80.9	77.2	74.2	73.4	77.9	76.8	96.6
7-Dec	82.3	84.9	83.4	81.9	83.7	84.9	84.4	85.7	85.5	83.2	74.8	76.9	72.8	69.0	71.2	75.2	78.9	81.9	86.9	90.1	89.5	86.8	88.7	89.1	82.1	90.1
8-Dec	88.9	82.0	80.3	79.9	82.7	84.7	84.6	84.1	83.6	81.7	75.1	70.4	63.9	60.9	67.5	73.5	80.3	82.6	79.9	79.1	82.2	84.0	86.1	85.9	79.3	88.9
9-Dec	85.6	86.3	85.1	85.0	84.4	82.0	81.5	83.3	83.7	82.1	78.0	77.1	74.8	73.8	75.8	78.5	81.4	85.3	86.8	87.3	88.0	86.8	86.6	85.2	82.7	88.0
10-Dec	83.8	87.0	86.4	85.7	85.2	86.4	85.9	84.9	83.7	82.8	81.4	73.3	71.0	66.2	66.4	65.8	60.5	59.7	62.3	64.3	62.3	61.4	58.8	60.4	73.6	87.0
11-Dec	60.8	61.8	61.8	60.7	57.9	60.2	63.1	65.8	68.4	66.5	62.3	59.5	55.9	57.1	62.6	64.9	68.0	71.0	73.3	76.2	78.1	80.0	81.5	82.1	66.6	82.1
12-Dec	81.5	80.1	80.4	80.5	80.7	81.0	81.7	81.7	81.8	80.2	79.9	77.6	76.4	73.0	72.2	73.7	78.9	82.0	80.6	75.4	74.3	71.9	75.8	69.7	78.0	82.0
13-Dec	74.0	74.2	71.8	71.4	70.3	72.3	69.4	72.6	66.4	54.9	49.6	49.0	47.4	44.8	45.9	47.4	48.3	41.9	43.6	49.8	49.5	50.8	56.2	54.9	57.3	74.2
14-Dec	58.5	49.7	48.8	57.0	58.1	57.6	57.7	57.7	58.4	56.7	53.0	50.3	46.2	44.7	46.8	52.9	56.8	57.2	59.6	62.9	69.2	74.0	77.3	75.2	57.8	77.3
15-Dec	73.4	73.9	72.5	71.5	69.4	72.3	76.3	78.5	77.6	75.8	74.7	75.6	73.0	71.2	71.1	64.9	64.9	69.5	74.1	74.1	71.3	61.6	58.2	58.6	71.0	78.5
16-Dec	60.2	60.3	61.8	60.8	54.0	45.6	49.2	50.0	51.0	50.8	63.3	62.0	61.0	59.4	59.4	61.5	62.3	62.0	64.6	63.8	65.2	67.7	70.4	73.2	60.0	73.2
17-Dec	74.0	77.4	81.1	82.7	81.7	81.6	82.0	80.6	80.6	80.4	80.2	79.4	78.3	75.4	74.9	77.1	78.9	83.4	79.3	78.8	76.0	78.2	82.1	85.3	79.6	85.3
18-Dec	85.0	86.4	85.2	83.6	84.8	83.1	83.5	82.4	86.8	90.1	82.5	68.9	61.0	57.0	55.0	54.1	52.3	54.5	56.3	57.9	67.5	69.2	69.6	72.9	72.1	90.1
19-Dec	77.6	78.8	80.3	82.8	83.8	84.2	84.7	84.8	84.2	84.8	83.5	82.1	80.6	82.4	83.4	84.1	83.5	78.8	78.5	77.8	76.9	80.4	84.4	84.5	81.9	84.8
20-Dec	83.3	83.5	84.6	82.4	81.4	84.8	84.4	83.5	83.1	86.1	86.8	83.8	82.2	81.3	81.3	81.8	82.7	83.1	82.8	82.9	82.8	82.9	84.8	89.2	83.6	89.2
21-Dec	89.1	86.1	87.0	88.2	85.4	86.4	88.8	90.3	89.5	84.7	79.1	81.5	80.7	77.0	74.8	74.6	79.3	81.0	84.2	85.4	80.0	88.5	88.5	90.7	84.2	90.7
22-Dec	90.6	91.6	91.0	91.6	91.8	92.3	90.9	91.2	90.3	90.9	90.5	89.8	88.1	85.4	86.5	89.4	91.7	91.3	90.9	90.2	89.4	89.4	87.1	86.4	89.9	92.3
23-Dec	80.2	76.2	78.0	73.6	69.1	71.2	68.8	70.5	72.9	73.9	67.0	64.9	62.1	60.2	54.9	55.7	56.0	56.6	62.4	63.1	64.6	67.6	68.8	68.0	66.9	80.2
24-Dec	72.3	78.4	80.4	80.3	77.4	79.6	79.4	79.4	83.6	83.4	73.6	71.8	66.4	64.9	64.8	67.2	74.0	78.0	83.3	86.3	83.5	79.4	79.4	79.1	76.9	86.3
25-Dec	75.9	79.5	79.2	77.7	76.4	76.4	75.0	72.0	70.3	67.8	62.8	59.5	57.7	54.4	55.2	58.3	60.4	68.3	75.0	76.0	77.6	79.3	80.2	83.2	70.8	83.2
26-Dec	83.7	86.1	86.8	87.1	86.5	85.0	84.6	84.2	84.1	78.6	72.2	69.0	64.6	60.1	58.4	59.6	63.6	65.5	68.7	71.4	72.5	75.1	75.7	64.6	74.5	87.1
27-Dec	50.1	47.3	48.3	48.7	52.0	56.8	55.3	59.2	60.9	56.4	53.7	55.0	52.8	49.5	52.3	61.8	69.5	75.2	79.9	83.0	83.2	86.3	88.4	88.2	63.1	88.4
28-Dec	89.2	88.6	87.9	87.6	87.1	87.9	87.9	87.1	87.6	87.5	79.3	68.5	64.4	63.3	61.8	62.4	63.0	64.5	68.8	73.8	79.6	83.7	86.3	88.9	78.6	89.2
29-Dec	89.9	91.9	91.0	88.1	89.2	90.0	88.5	88.5	87.2	85.6	82.7	80.0	77.7	74.0	72.9	73.0	77.7	79.1	82.9	85.9	86.3	88.2	87.1	85.8	84.3	91.9
30-Dec	86.2	85.1	86.5	86.7	86.5	86.0	85.6	85.7	83.4	83.0	81.5	79.7	77.2	72.1	73.4	78.8	84.5	82.2	84.7	81.8	86.5	88.3	89.3	89.8	83.5	89.8
31-Dec	89.7	89.4	89.1	90.9	90.8	91.3	91.8	92.3	91.8	91.9	89.8	83.5	78.8	72.7	72.1	70.4	74.0	76.3	70.2	76.0	79.6	77.0	80.5	87.1	83.2	92.3
80.3 80.2 80.3 79.9 79.2 79.6 79.6 79.9 80.0 78.8 75.7 73.3 70.6 68.2 68.8 70.8 73.4 74.8 76.7 77.9 78.4 78.9 80.0 80.3																								Diurnal Average		
96.0 96.6 96.4 91.6 91.8 92.3 91.8 92.3 91.8 92.1 92.1 91.0 91.0 91.2 89.4 92.4 93.8 92.7 91.7 93.5 94.3 93.1 94.6 96.0																								Diurnal Maximum		





Wood Buffalo Environmental Association

Summary of Hour Averages

Precipitation (PC) - mm

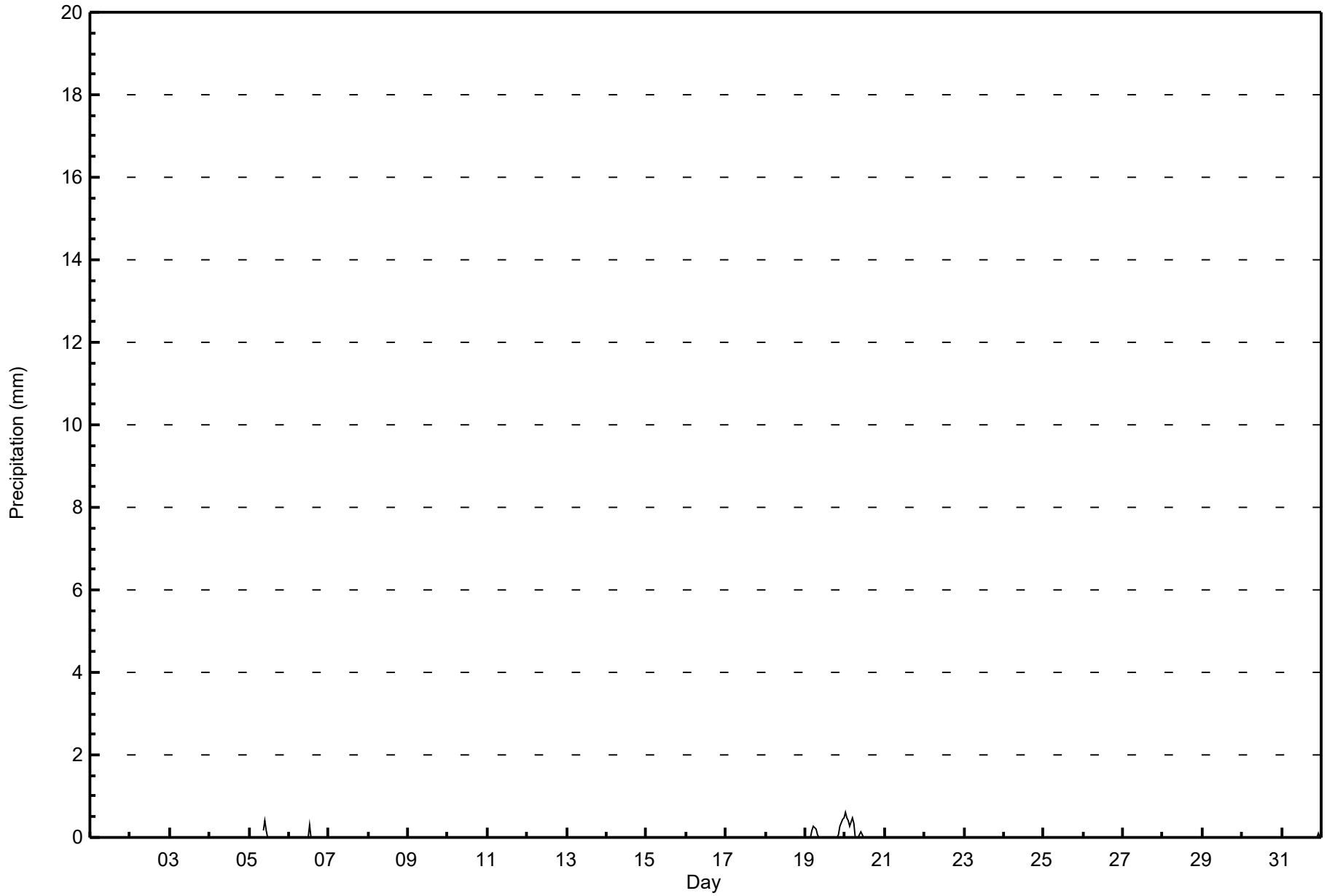
Fort McKay - Bertha Ganter - December 2023

Maximum Value: 0.6 mm on Dec 20 01:00		Maximum Daily Total: 2.8 mm on Dec 20		Hours in Service: 744																													
Minimum Value: 0.0 mm on Dec 1 01:00		Minimum Daily Total: 0.0 mm on Dec 1		Hours of Data: 712																													
Maximum Diurnal Total: 0.7 mm at hour 5		Minimum Diurnal Total: 0.0 mm at hour 12		Hours of Missing Data: 32																													
Monthly Total: 5.88 mm		Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.0 Median = 0.0 Q ₃ = 0.0 P ₉₀ = 0.0 P ₉₉ = 0.3		Hours of Calibration: 0																													
				Percent Operational Time: 95.7																													
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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	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	DF	DF	DF	DF	DF	DF	DF	
5-Dec	DF	DF	DF	DF	DF	DF	DF	DF	DF	0.2	0.4	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	
6-Dec	0.0	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	0.3	0.3
7-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20-Dec	0.6	0.5	0.4	0.3	0.5	0.4	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
21-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
31-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		0.6	0.5	0.4	0.3	0.7	0.6	0.2	0.1	0.2	0.5	0.3	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.3	0.6	0.5			Diurnal Average						
		0.6	0.5	0.4	0.3	0.5	0.4	0.2	0.1	0.2	0.4	0.2	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.3	0.4	0.5			Diurnal Maximum						
DF - DAS Failure																																	



Wood Buffalo Environmental Association
Hourly Averages

Precipitation (PC) - mm
Fort McKay - Bertha Ganter - December 2023





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Precipitation (PC) - mm
Fort McKay - Bertha Ganter - December 2023

Concentration Ranges (mm)	Number of Hours	%	Cumulative %
0 - 0.3	705	99.02	99.02
0.4 - 0.5	6	0.84	99.86
0.6 - 0.7	1	0.14	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: 712

Total Number of Hours: 744



Summary of Hour Averages

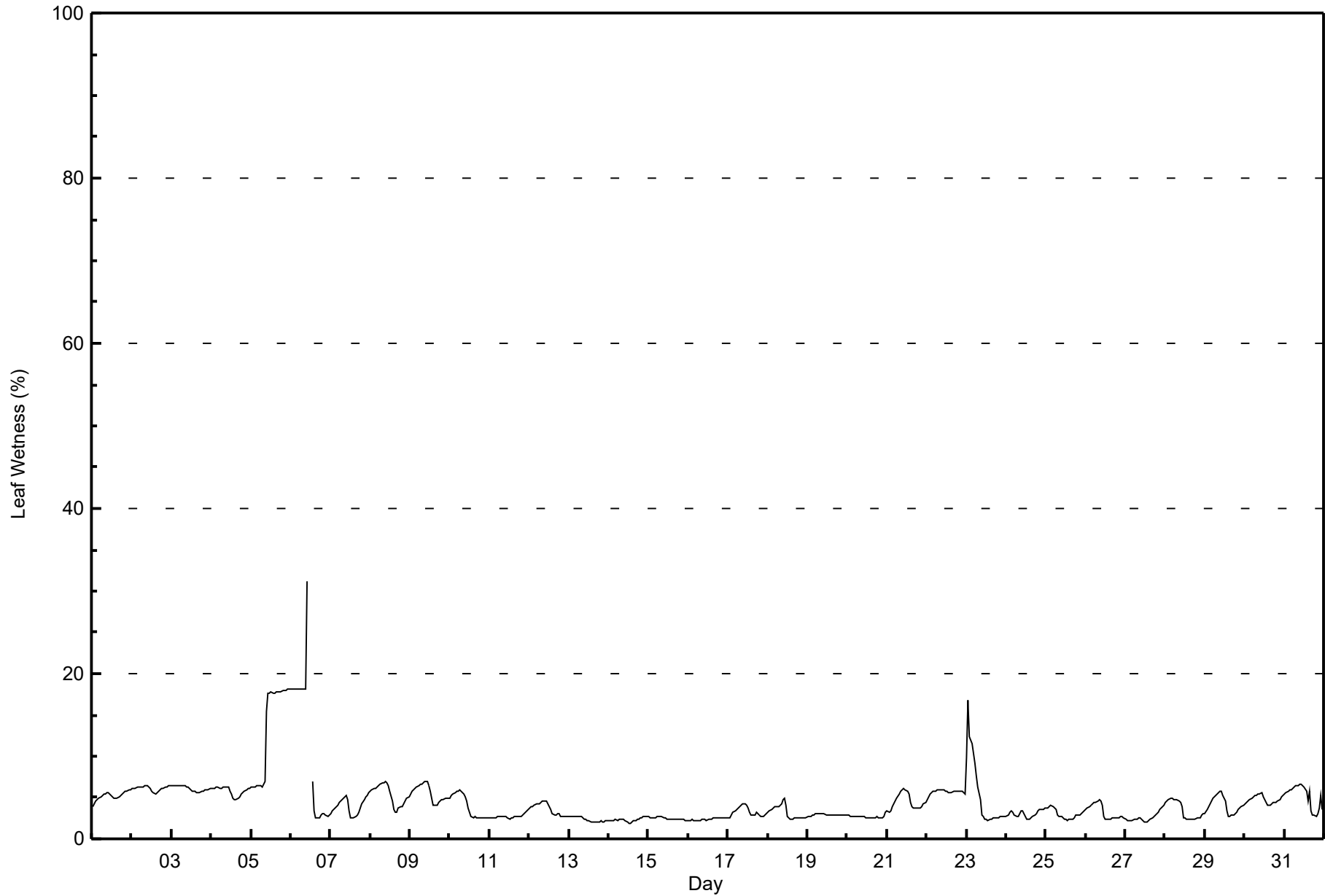
Fort McKay - Bertha Ganter - December 2023

Maximum Value: 31.3 % on Dec 6 11:00																				Maximum Daily Average: 13.5 % on Dec 5					Hours in Service: 744	
Minimum Value: 1.9 % on Dec 14 13:00																				Minimum Daily Average: 2.3 % on Dec 14					Hours of Data: 742	
Maximum Diurnal Average: 5.7 % at hour 11																				Minimum Diurnal Average: 3.7 % at hour 15					Hours of Missing Data: 2	
Monthly Average: 4.48 %																				Percentiles: P ₁ = 2.0 P ₁₀ = 2.4 Q ₁ = 2.6 Median = 3.7 Q ₃ = 5.5 P ₉₀ = 6.3 P ₉₉ = 18.1					Hours of Calibration: 0	
																									Percent Operational Time: 99.7	
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Dec	4.0	4.3	4.6	4.8	5.0	5.1	5.3	5.4	5.5	5.6	5.5	5.3	5.1	4.9	4.8	5.0	5.2	5.3	5.5	5.6	5.7	5.8	5.9	5.9	5.2	5.9
2-Dec	6.0	6.1	6.2	6.2	6.2	6.3	6.3	6.3	6.4	6.4	6.3	6.0	5.8	5.6	5.4	5.6	5.7	5.9	6.0	6.2	6.3	6.3	6.4	6.4	6.1	6.4
3-Dec	6.5	6.5	6.5	6.5	6.5	6.4	6.4	6.4	6.4	6.3	6.2	6.0	5.8	5.7	5.7	5.6	5.6	5.7	5.8	5.9	5.9	6.0	6.1	6.1	6.5	6.5
4-Dec	6.1	6.1	6.2	6.2	6.2	6.2	6.1	6.2	6.2	6.3	6.2	5.8	5.4	5.0	4.7	4.9	4.9	5.2	5.4	5.6	5.8	6.0	6.1	6.2	5.8	6.3
5-Dec	6.3	6.3	6.3	6.4	6.4	6.4	6.4	6.3	7.0	15.4	17.7	17.7	17.7	17.7	17.7	17.7	17.8	17.8	17.8	17.9	18.0	18.0	18.1	18.1	13.5	18.1
6-Dec	18.1	18.2	18.2	18.2	18.1	18.2	18.2	18.1	18.1	18.1	31.3	OR	OR	7.0	3.3	2.6	2.5	2.6	2.8	3.1	3.1	2.9	2.8	2.9	11.3	31.3
7-Dec	3.1	3.4	3.6	3.7	4.0	4.3	4.6	4.7	5.0	5.2	4.8	3.4	2.5	2.5	2.7	2.9	3.2	3.7	4.2	4.7	5.0	5.3	5.6	3.9	5.6	
8-Dec	5.8	5.9	6.0	6.1	6.2	6.4	6.6	6.7	6.8	6.9	6.8	6.4	5.7	4.6	3.6	3.3	3.3	3.7	3.9	3.9	4.2	4.5	4.8	5.2	5.3	6.9
9-Dec	5.4	5.7	6.0	6.2	6.3	6.5	6.6	6.7	6.8	7.0	6.9	6.4	5.7	4.9	4.2	4.0	4.1	4.4	4.6	4.7	4.8	4.9	4.9	4.9	5.5	7.0
10-Dec	5.0	5.2	5.4	5.6	5.7	5.8	5.9	5.8	5.5	5.0	4.6	3.8	3.3	2.8	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.5	2.5	2.5	4.0	5.9
11-Dec	2.6	2.6	2.6	2.6	2.6	2.7	2.7	2.7	2.8	2.8	2.6	2.5	2.4	2.5	2.6	2.7	2.7	2.7	2.8	2.8	2.9	3.1	3.3	3.5	2.7	3.5
12-Dec	3.7	3.8	4.0	4.1	4.2	4.3	4.3	4.4	4.5	4.6	4.6	4.3	3.9	3.5	3.0	2.8	2.9	3.1	3.0	2.7	2.7	2.7	2.7	2.7	3.6	4.6
13-Dec	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.6	2.4	2.3	2.2	2.1	2.0	2.1	2.1	2.1	2.0	2.0	2.1	2.1	2.1	2.2	2.1	2.3	2.7
14-Dec	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.0	1.9	1.9	2.0	2.2	2.3	2.3	2.4	2.5	2.6	2.7	2.7	2.7	2.3	2.7
15-Dec	2.6	2.6	2.6	2.6	2.5	2.6	2.8	2.8	2.7	2.6	2.5	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.3	2.3	2.2	2.5	2.8
16-Dec	2.3	2.3	2.3	2.3	2.3	2.2	2.3	2.3	2.3	2.3	2.4	2.3	2.3	2.3	2.4	2.5	2.5	2.5	2.5	2.5	2.5	2.6	2.6	2.6	2.4	2.6
17-Dec	2.6	2.6	2.9	3.2	3.4	3.6	3.8	4.0	4.1	4.2	4.3	4.0	3.8	3.3	2.9	2.9	2.9	3.2	3.0	2.8	2.7	2.7	2.8	3.0	3.3	4.3
18-Dec	3.2	3.4	3.6	3.8	3.9	4.0	3.8	3.9	4.3	4.7	4.8	4.1	2.6	2.3	2.3	2.4	2.5	2.5	2.5	2.5	2.5	2.5	2.6	3.2	4.8	
19-Dec	2.7	2.7	2.7	2.8	3.0	3.0	3.0	3.0	3.1	3.0	3.0	2.9	2.9	2.9	2.9	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	2.9	3.1	3.1
20-Dec	3.0	3.0	2.8	2.7	2.7	2.7	2.7	2.7	2.6	2.7	2.7	2.6	2.6	2.5	2.5	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.7	3.1	2.7	3.1
21-Dec	3.4	3.2	3.4	3.9	4.2	4.5	5.0	5.4	5.8	6.0	6.1	5.8	5.8	5.5	4.5	3.9	3.8	3.7	3.7	3.8	3.8	4.0	4.2	4.5	4.5	6.1
22-Dec	4.8	5.1	5.3	5.6	5.7	5.8	5.9	6.0	6.0	6.0	5.9	5.8	5.7	5.6	5.5	5.7	5.8	5.8	5.8	5.7	5.7	5.7	5.6	5.4	5.7	6.0
23-Dec	9.8	16.8	12.4	11.5	10.3	9.1	7.7	6.3	4.8	2.9	2.6	2.3	2.3	2.3	2.4	2.5	2.5	2.5	2.6	2.6	2.7	2.7	2.7	5.3	16.8	
24-Dec	2.8	3.0	3.2	3.4	3.1	2.9	2.7	2.7	3.0	3.3	3.4	2.7	2.4	2.4	2.4	2.6	2.7	2.8	3.1	3.4	3.5	3.5	3.6	3.7	3.0	3.7
25-Dec	3.7	3.8	3.9	4.0	3.9	3.8	3.5	2.9	2.7	2.7	2.6	2.4	2.3	2.3	2.3	2.4	2.5	2.6	2.8	2.9	2.9	3.0	3.2	3.4	3.0	4.0
26-Dec	3.5	3.8	4.0	4.1	4.3	4.4	4.5	4.6	4.7	4.7	4.1	2.8	2.4	2.4	2.4	2.4	2.5	2.5	2.6	2.6	2.6	2.7	2.7	2.6	3.3	4.7
27-Dec	2.3	2.2	2.2	2.2	2.3	2.4	2.4	2.4	2.5	2.5	2.4	2.0	2.1	2.0	2.1	2.4	2.6	2.8	2.9	3.1	3.2	3.6	3.9	4.1	2.6	4.1
28-Dec	4.4	4.6	4.8	5.0	4.9	4.8	4.7	4.7	4.6	4.4	3.9	2.6	2.5	2.4	2.4	2.4	2.4	2.4	2.4	2.5	2.5	2.6	2.9	3.0	3.5	5.0
29-Dec	3.1	3.5	3.9	4.3	4.6	4.9	5.2	5.4	5.6	5.8	5.8	5.3	4.5	3.4	2.7	2.7	2.8	2.9	3.0	3.3	3.5	3.8	4.0	4.1	4.1	5.8
30-Dec	4.3	4.4	4.6	4.8	4.9	5.1	5.2	5.3	5.4	5.5	5.5	5.1	4.8	4.4	4.0	4.0	4.2	4.3	4.4	4.4	4.6	4.8	5.0	5.3	4.8	5.5
31-Dec	5.4	5.6	5.7	5.8	6.0	6.1	6.3	6.4	6.5	6.6	6.6	6.4	6.2	5.7	4.6	5.8	3.4	3.0	2.8	2.8	3.0	3.8	5.2	3.6	5.1	6.6
																								Diurnal Average		
																								Diurnal Maximum		
4.6 4.9 4.9 4.9 5.0 5.0 5.0 5.0 5.0 5.3 5.7 4.5 4.2 4.0 3.7 3.7 3.7 3.8 3.9 4.0 4.0 4.1 4.3 4.3																										
18.1 18.2 18.2 18.2 18.1 18.2 18.2 18.1 18.1 18.1 31.3 17.7 17.7 17.7 17.7 17.7 17.8 17.8 17.8 17.9 18.0 18.0 18.1 18.1																										
OR - Out of Range																										



Wood Buffalo Environmental Association
Hourly Averages

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





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

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

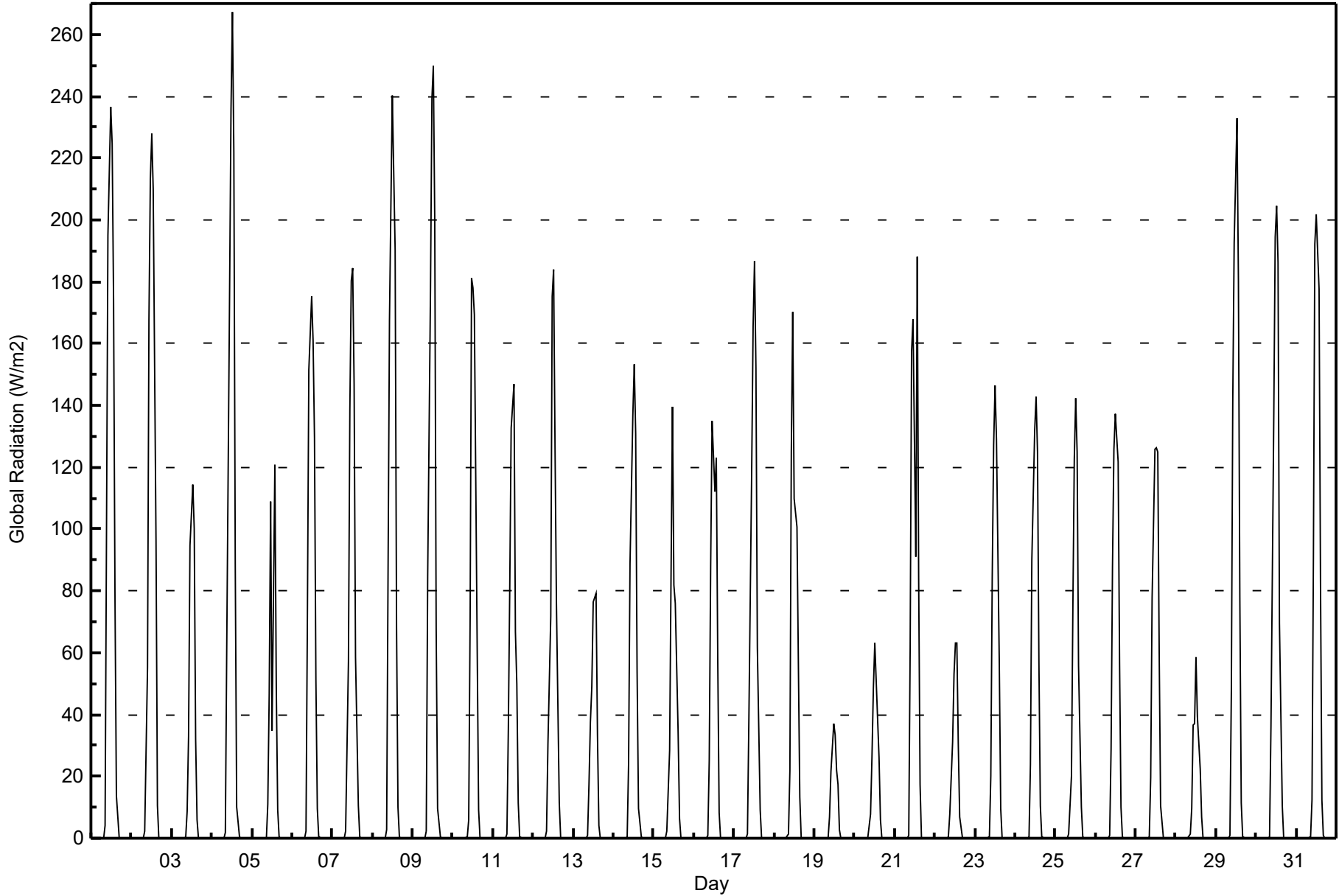
Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 0.3	0	0.00	0.00
0.4 - 0.5	0	0.00	0.00
0.6 - 0.7	0	0.00	0.00
0.8 - 1.4	0	0.00	0.00
1.5 - 10	712	95.96	95.96
> 10	30	4.04	100.00

Total Number of Valid Hours: 742

Total Number of Hours: 744



Maximum Value: 267.0 W/m2 on Dec 4 13:00 Maximum Daily Average: 44.4 W/m2 on Dec 4																							Hours in Service:	744		
Minimum Value: 0.0 W/m2 on Dec 1 01:00 Minimum Daily Average: 5.9 W/m2 on Dec 19																							Hours of Data:	744		
Maximum Diurnal Average: 147.7 W/m2 at hour 13 Minimum Diurnal Average: 0.0 W/m2 at hour 23																							Hours of Missing Data:	0		
Monthly Average: 26.10 W/m2 Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.0 Median = 0.0 Q ₃ = 11.2 P ₉₀ = 122.4 P ₉₉ = 226.5																							Hours of Calibration:	0		
																							Percent Operational Time:	100.0		
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.9	99.0	194.9	236.7	224.7	174.0	77.6	13.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	42.7	236.7
2-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.1	55.6	167.6	213.3	227.9	210.3	96.2	10.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	41.0	227.9
3-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	8.7	33.0	94.7	114.5	100.0	32.2	6.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	16.2	114.5
4-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.7	62.5	176.4	235.6	267.0	222.2	89.0	10.3	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	44.4	267.0
5-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	11.2	46.7	109.0	34.7	121.0	48.4	9.4	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15.9	121.0
6-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.3	72.4	151.7	175.2	160.9	129.7	51.1	9.5	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	31.4	175.2
7-Dec	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	2.3	57.3	138.6	180.1	184.3	147.0	58.7	10.4	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	32.5	184.3
8-Dec	0.0	0.0	0.0	0.0	0.2	0.2	0.1	0.1	2.9	86.6	167.5	204.5	240.4	190.4	68.2	10.0	0.5	0.1	0.0	0.1	0.1	0.1	0.1	0.0	40.5	240.4
9-Dec	0.1	0.0	0.1	0.1	0.1	0.0	0.0	0.0	2.5	84.5	177.8	239.2	249.9	199.7	67.6	9.4	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	43.0	249.9
10-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	5.8	71.4	181.3	177.8	169.5	60.8	9.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	28.2	181.3
11-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.4	35.0	80.7	132.8	147.0	67.0	49.8	11.6	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	21.9	147.0
12-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.5	30.6	72.0	175.3	184.1	126.7	76.0	11.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	28.3	184.1
13-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9	17.3	37.5	48.8	76.4	79.0	33.5	3.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12.4	79.0
14-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	24.2	88.8	136.9	153.2	130.9	54.0	9.8	0.3	0.0	0.0	0.1	0.0	0.0	0.0	0.1	24.9	153.2
15-Dec	0.1	0.0	0.1	0.1	0.0	0.0	0.0	0.0	2.3	28.5	85.2	139.6	81.8	75.9	34.1	6.4	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	18.9	139.6
16-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9	25.3	87.8	134.8	112.1	123.3	58.6	8.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	23.0	134.8
17-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	38.1	118.9	165.9	186.7	152.1	61.6	9.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	30.6	186.7
18-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.4	22.0	125.0	170.2	109.9	100.8	56.3	13.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	25.0	170.2
19-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	6.8	21.5	37.2	33.3	22.1	17.6	2.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.9	37.2
20-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	7.8	25.9	48.7	63.2	50.6	26.1	6.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.5	63.2
21-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9	61.6	157.6	168.1	91.2	187.9	84.7	17.5	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	32.1	187.9
22-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	8.0	31.0	53.1	63.3	63.0	30.7	7.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.7	63.3
23-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	20.3	84.4	127.0	146.6	128.9	56.3	9.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	23.9	146.6
24-Dec	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	23.7	90.0	131.8	142.9	125.2	56.5	10.4	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	24.2	142.9
25-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.2	20.0	74.7	122.8	142.4	125.0	56.0	10.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	23.0	142.4
26-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	28.8	87.7	125.7	137.1	121.5	56.6	10.2	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	23.7	137.1
27-Dec	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.6	19.8	77.7	126.0	126.4	124.8	60.2	10.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	22.8	126.4
28-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.4	9.6	36.6	37.1	58.6	39.6	22.3	7.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.8	58.6
29-Dec	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.8	47.4	140.8	192.8	232.8	180.4	77.8	11.3	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	36.9	232.8
30-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	36.2	136.9	194.4	204.7	186.4	69.4	10.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	35.0	204.7
31-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	12.3	90.4	192.2	201.7	177.6	83.8	12.4	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	32.2	201.7
																							Diurnal Average			
																							Diurnal Maximum			





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

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

Concentration Ranges (W/m2)	Number of Hours	%	Cumulative %
0 - 20	571	76.75	76.75
21 - 100	90	12.10	88.84
101 - 300	83	11.16	100.00
301 - 600	0	0.00	100.00
601 - 900	0	0.00	100.00
> 900	0	0.00	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Maximum Speed: 20 km/h on Dec 10 23:00	Maximum Daily Speed Average: 11.9 km/h on Dec 20	Hours in Service: 744
Minimum Speed Value: 0 km/h on Dec 16 21:00	Minimum Daily Speed Average: 1.7 km/h on Dec 2	Hours of Data: 744
Maximum Diurnal Speed Average: 5.7 km/h at hour 14	Minimum Diurnal Speed Average: 2.3 km/h at hour 23	Hours of Missing Data: 0
Monthly Average Velocity: 3.7 km/h 205.7 deg	Percentiles: P ₁ = 1 P ₁₀ = 2 Q ₁ = 4 Median = 5 Q ₃ = 8 P ₉₀ = 10 P ₉₉ = 17	Percent Operational Time: 100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Dec	WNW2	SW2	SW3	SSW3	S3	SSW2	SSW2	SSW4	SSW3	SW3	S3	S7	SSE7	S7	S6	S3	SW3	SW3	SW1	SSW3	SSW3	SW3	WSW1	WSW2	SSW2.8	SSE7
2-Dec	W4	WNW4	W3	WSW2	SSW2	W3	WSW3	S2	WSW3	SW2	S3	SSE3	SSE3	SSE6	S5	N4	NNW3	NW5	N7	NW6	NW5	NNW5	N4	NW3	WNW1.7	N7
3-Dec	NNW2	NW3	N2	N3	NNW4	N6	NW4	N4	N4	N4	N2	N2	N1	NW2	N3	NNE3	NNW2	NW2	WNW1	WSW2	WSW1	SW2	SSW2	SSW4	NNW1.8	N6
4-Dec	SW2	SSW2	SSW4	SSW6	SW4	SSW5	SW3	SW4	S5	S7	S8	S8	SSE5	SSE6	SSE6	S6	S5	S4	S7	S7	S8	S7	S5	S6	S5.2	S8
5-Dec	SSW6	S3	S4	S5	WSW3	ESE1	SW2	NE2	S1	S4	SSE6	S7	SSW5	SSW6	S7	SSW6	S8	SW7	W2	NNE7	W2	S5	S3	SSW4	SSW3.3	S8
6-Dec	SSE1	S3	SSW4	WSW7	WSW10	WSW10	W10	W10	WSW8	WSW8	SW7	W7	WSW9	WSW9	WSW8	SW8	SSW10	SW4	S6	S4	SSW5	SSW6	SW4	S3	SW6.0	W10
7-Dec	S7	S5	SSW6	SSW4	S4	S4	SSW4	S5	S4	S7	S7	SSE9	S8	S7	S9	S7	SW4	S3	S4	S5	WSW4	S4	SSE4	SSW2	S5.1	SSE9
8-Dec	SW5	W7	SW4	SW5	SSE5	S4	S4	SW5	S5	SSW5	SW6	SW5	SSW6	SW6	S7	S8	SSW6	S6	SW5	SW5	S7	S8	S6	S6	SSW5.1	S8
9-Dec	S7	S7	S7	S7	S5	SSW5	S8	S9	S9	S8	S9	S10	S10	S13	S11	S8	S7	S5	SSW4	SW2	WNW2	SW3	SW4	SSW5	S6.6	S13
10-Dec	SSW3	WSW3	SW2	WNW2	S3	S6	S5	S7	S7	SSW5	SW4	SW7	WSW8	WSW7	SW6	W7	WNW13	WNW13	WNW14	WNW14	NW15	NW17	NW20	NW17	W6.1	NW20
11-Dec	NNW16	NNW17	NW18	NW15	NW15	NNW10	WSW8	WSW8	WSW6	WSW6	WSW6	WSW6	SSW7	SSW6	S9	S7	S6	S7	S5	SSW4	SSW3	WSW2	S4	SW2	W4.4	NW18
12-Dec	SSW5	S6	SSW5	SSW5	SSW5	SSW6	S7	S6	S6	S5	S5	S4	SSE5	S5	S8	S5	WSW4	SW3	SSW6	SW5	SW5	WSW4	S6	SSW4	SSW4.9	S8
13-Dec	SW2	NNW1	SE1	SSW3	SW5	SSW4	S3	SSW2	S7	S8	S8	S10	S11	S11	S7	S9	S11	S13	S6	SSW6	SSE9	S6	S6	S6	S6.2	S13
14-Dec	WNW4	WNW7	W2	WSW5	WSW6	W9	W8	W11	W10	W9	SW2	S8	S8	SSW6	SSW6	WSW6	WSW6	W2	SW0	S4	S5	S5	S6	S6	WSW4.8	W11
15-Dec	S8	S9	S10	S10	S10	SSW5	SW4	SW4	S8	S12	S14	S14	S17	S16	S14	S15	SSW15	SSW15	S20	SSW17	SSW14	SSW11	SW8	SW8	S11.4	S20
16-Dec	SW8	WSW8	W7	W7	WNW14	WNW15	W10	W11	WNW9	NNW11	NE11	NE7	NE8	NE7	NE6	NE3	NE5	ENE2	N4	ENE2	NNE0	SW2	SE1	NNE7	NW3.1	WNW15
17-Dec	N10	N10	WNW2	SW3	S3	S4	S4	S3	S4	S5	S7	S7	S10	S9	S7	S7	S6	S6	S9	S8	S9	SSW5	SW3	WNW3	S4.0	S10
18-Dec	WNW2	SSW4	SSW5	S5	SSW5	S5	WSW6	SSW2	SSW4	SW6	SSE4	WSW5	WSW6	W8	W5	W5	W6	WNW6	W5	WNW8	NNE13	NNE13	N15	NNE12	WNW2.1	N15
19-Dec	NNE10	NNE10	N11	N9	N7	NNW5	NW4	N4	NNW1	N1	E1	NE2	NE2	NNE3	NNE4	NNE4	NE2	ESE4	E2	ESE5	SE10	SSE10	SE8	SE10	NE2.6	N11
20-Dec	SE12	SSE11	SSE15	S17	S19	S15	SSE15	S14	S12	S10	S11	S10	S9	S11	S12	S13	S12	S14	S13	S14	S12	S10	SSW4	SW3	S11.9	S19
21-Dec	WSW8	W9	WSW7	W7	WSW8	SW4	WSW4	SSW4	SSW6	SSW5	S3	NNE1	S5	S9	S10	S5	SSW2	SW3	SW3	SSW7	SSW4	N2	W3	WSW4	SW4.1	S10
22-Dec	WSW3	W3	WSW2	SSE2	SSE3	SSW3	SW2	SSW3	SSW4	SSW3	SSW5	SSW4	SSW4	S5	SW3	SW2	SW3	SW2	S5	S5	S7	SSW8	S6	SSW5	SSW3.5	SSW8
23-Dec	WSW6	W10	W8	W7	W7	W7	W7	W6	W5	WSW4	W8	W10	W9	WNW9	NNW11	NNW10	WNW9	SW4	SW5	SW6	WSW6	WSW9	WSW9	SSW5	W6.8	WNW11
24-Dec	S5	SSW4	SSW5	SSW6	S9	S8	S9	S8	WSW4	SW3	SW2	WSW2	S5	S7	S5	S4	S4	SSW6	S4	S7	S9	S8	SSW6	SSW6	S5.4	S9
25-Dec	SSW6	SSW6	SSW5	S9	S8	S8	S12	S10	S9	S9	S10	S9	S9	S10	S11	S11	S8	S3	SSW4	S6	S6	SSW5	S6	SW4	S7.6	S12
26-Dec	SW1	SSW2	N1	N2	WNW2	S3	S4	S5	S6	S9	S8	S8	S11	S13	S13	S11	S10	S8	SSW6	SSW5	S9	S8	S10	SSW9	S6.4	S13
27-Dec	WSW10	SW10	SSW11	SSW10	S8	S7	S9	SSE5	SSE5	S7	S5	NNE2	S2	S5	S6	S2	SSW1	N4	W1	NNW3	NNW3	N3	WNW2	NNW3	SSW3.3	SSW11
28-Dec	S0	NW4	NNW2	NW2	SSW1	SSW3	W1	WSW1	S1	WNW0	NNE8	NNE10	NNE11	N7	N8	NNE6	N4	NNE7	N7	N5	N7	N6	N4	WNW2	N3.8	NNE11
29-Dec	WNW2	W3	SW3	S5	S6	S9	S9	S8	S9	S8	S7	S9	S10	S10	S10	S8	S4	S7	S4	SSW6	W1	WSW1	SSW1	SSW3	S5.5	S10
30-Dec	SSW4	S5	S5	S5	S5	SSW4	SSW4	SW3	SSW3	S4	SSW5	SE2	SSE3	SSE3	SSW4	ESE1	SW3	SW4	SW2	SSW7	S5	S6	S5	SSW5	SSW3.8	SSW7
31-Dec	WSW4	W4	SW4	SW4	SSW4	SW5	SW5	SW4	SSW3	SSW5	SSW5	SSW6	SSW8	S10	S9	SW7	SSW6	S3	SSW6	SSW3	W6	WNW5	NNE4	ENE2	SSW4.0	S10

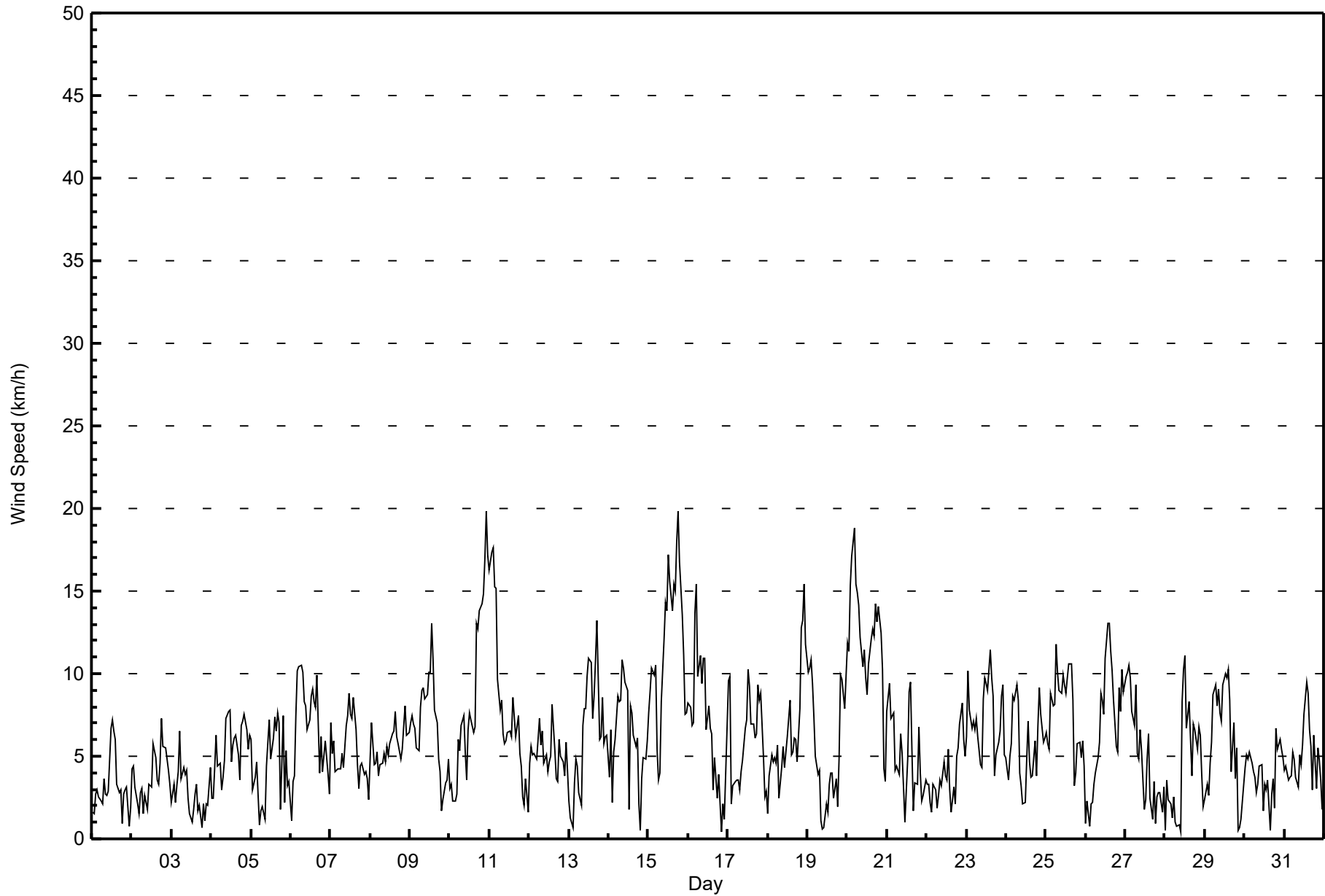
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NNW16	NNW17	NW18	S17	S19	S15	SSE15	S14	S12	S12	S14	S14	S17	S16	S14	S15	SSW15	SSW18	S20	SSW17	WNW15	NW17	NW20	NW17		Diurnal Maximum

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



Wood Buffalo Environmental Association
Hourly Averages

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





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

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

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	378	50.81	50.81
6 - 11	315	42.34	93.15
12 - 19	49	6.59	99.73
20 - 28	2	0.27	100.00
29 - 38	0	0.00	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Wind Speed (WS) - km/h
Fort McKay - Bertha Ganter - December 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	22	8	6	3	2	4	2	15	86	83	67	25	18	15	10	12	378
6 - 11	11	10	5	0	0	0	3	9	156	36	14	29	31	9	1	1	315
12 - 19	1	3	0	0	0	0	1	2	24	4	0	0	0	7	5	2	49
20 - 28	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	2
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	34	21	11	3	2	4	6	26	267	123	81	54	49	31	17	15	744

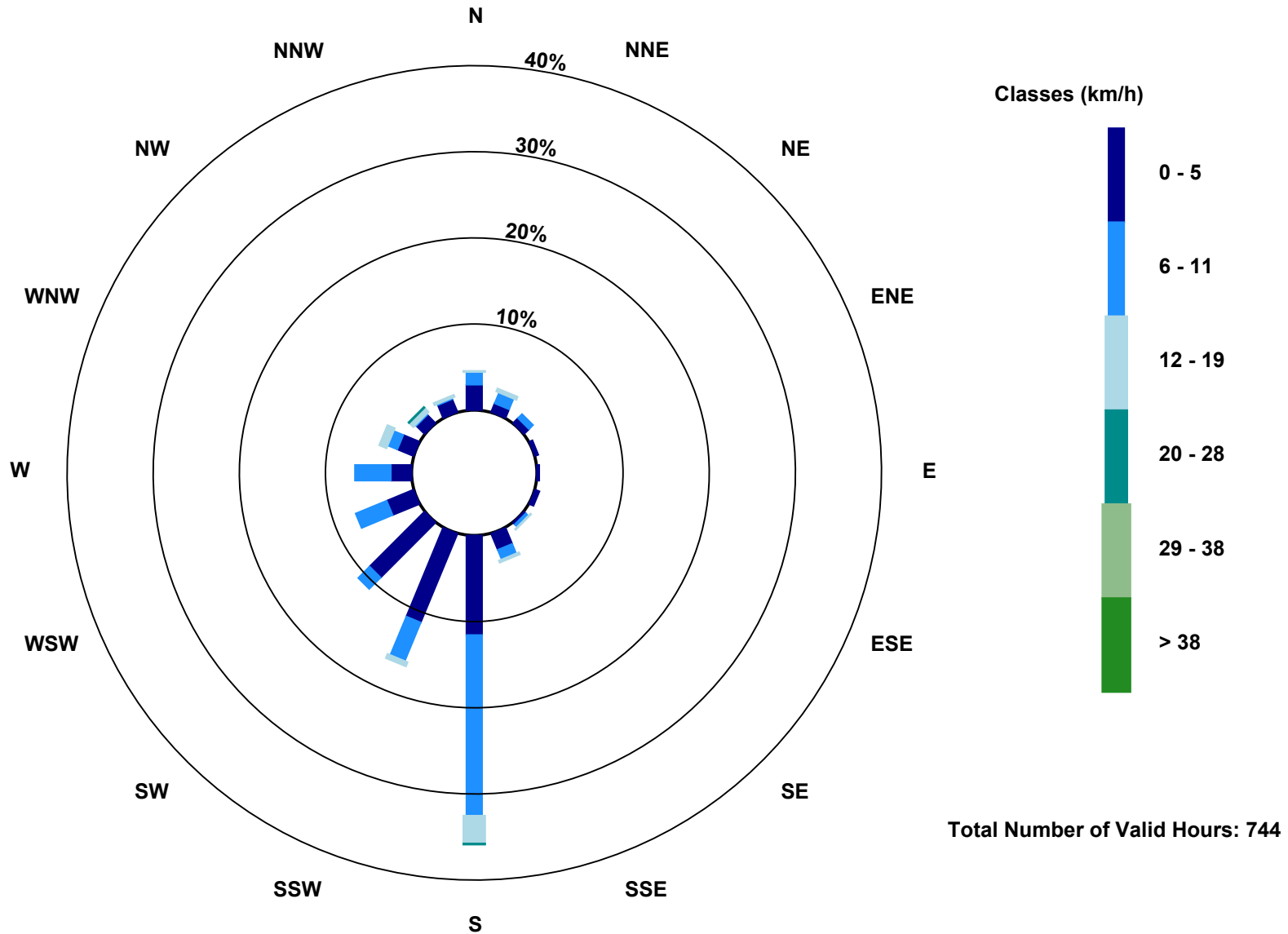
Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Dec 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 - December 2023

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 7 km/h on Dec 16 06:00																	Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0								
Minimum Value: 1 km/h on Dec 1 11:00																									
Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 1 Median = 2 Q ₃ = 2 P ₉₀ = 3 P ₉₉ = 5																									
Day	Hourly Period Ending At (MST)																							Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23		24
1-Dec	2	1	1	1	1	1	2	1	1	2	1	2	1	1	2	1	1	1	1	1	1	1	1	1	2
2-Dec	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	2	1	1	1	1	1	1	1	2
3-Dec	1	2	1	1	1	1	2	1	1	1	1	1	1	2	1	1	1	1	1	1	1	2	2	1	2
4-Dec	1	1	1	1	2	1	1	1	2	1	1	2	1	1	1	1	1	2	1	2	2	1	1	1	2
5-Dec	1	1	1	1	2	1	1	2	1	1	2	2	2	2	2	2	2	2	2	4	1	2	2	2	4
6-Dec	1	1	2	3	4	4	4	4	3	3	3	4	4	4	3	3	3	2	2	2	1	2	2	1	4
7-Dec	3	1	2	2	1	1	1	1	1	2	2	2	2	1	1	1	2	1	1	1	1	1	1	2	3
8-Dec	2	3	2	2	2	1	1	1	1	1	2	3	2	2	1	1	2	2	2	2	1	2	2	3	3
9-Dec	2	1	1	1	1	2	2	2	2	2	2	2	2	3	2	2	1	1	1	1	2	1	1	1	3
10-Dec	1	2	1	2	2	2	2	1	2	2	2	3	3	3	3	3	6	6	5	6	5	5	6	4	6
11-Dec	4	4	5	5	5	3	3	3	2	2	2	2	2	2	2	2	1	1	2	1	2	1	2	1	5
12-Dec	2	2	1	1	1	1	1	1	2	1	1	1	1	1	2	2	1	1	2	2	2	1	1	2	2
13-Dec	2	1	1	2	2	1	1	2	2	2	2	2	3	2	2	2	3	4	6	3	3	2	3	6	
14-Dec	1	3	1	2	2	3	3	3	4	4	4	4	3	2	2	1	2	2	1	1	1	2	2	2	4
15-Dec	2	2	2	2	2	1	1	1	3	2	3	2	4	4	4	4	4	5	5	4	3	4	3	3	5
16-Dec	3	3	3	3	5	7	4	4	4	3	3	2	3	2	2	2	2	2	2	1	1	1	1	2	7
17-Dec	2	3	2	2	2	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	3	1	2	2	3
18-Dec	2	2	2	1	1	1	3	2	2	2	2	2	2	3	2	2	2	2	1	2	3	4	4	3	4
19-Dec	3	3	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	3	2	2	2	2	3
20-Dec	3	3	4	4	4	3	3	3	3	2	2	2	3	3	3	2	3	3	3	3	2	2	2	2	4
21-Dec	4	4	3	3	3	2	2	2	2	1	1	1	3	2	4	1	3	2	1	1	3	2	2	1	4
22-Dec	1	1	1	2	1	1	1	2	1	1	1	1	1	1	2	2	1	1	2	2	2	3	2	2	3
23-Dec	3	5	3	4	3	3	3	3	2	2	3	4	4	4	5	4	3	2	2	2	2	3	2	2	5
24-Dec	1	1	1	2	2	2	2	3	1	1	1	2	1	2	1	2	1	1	1	1	1	1	2	1	3
25-Dec	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	2	1	1	1	2	2
26-Dec	2	2	1	1	2	2	2	1	1	2	1	1	4	3	3	2	2	2	2	2	2	2	2	3	4
27-Dec	4	4	3	3	2	2	2	3	2	1	2	2	2	2	2	2	1	2	2	3	2	2	2	2	4
28-Dec	1	2	2	1	2	2	1	2	2	1	3	3	4	2	2	2	1	1	2	2	1	1	1	1	4
29-Dec	1	1	1	1	1	2	2	2	2	2	1	2	2	2	2	2	2	1	1	1	1	1	1	2	2
30-Dec	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	1	1	1	1	1	2
31-Dec	1	1	1	1	1	2	1	1	2	1	1	2	2	2	2	2	2	2	2	2	3	2	2	2	3
																	Diurnal Maximum								



Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Direction (WD) - deg

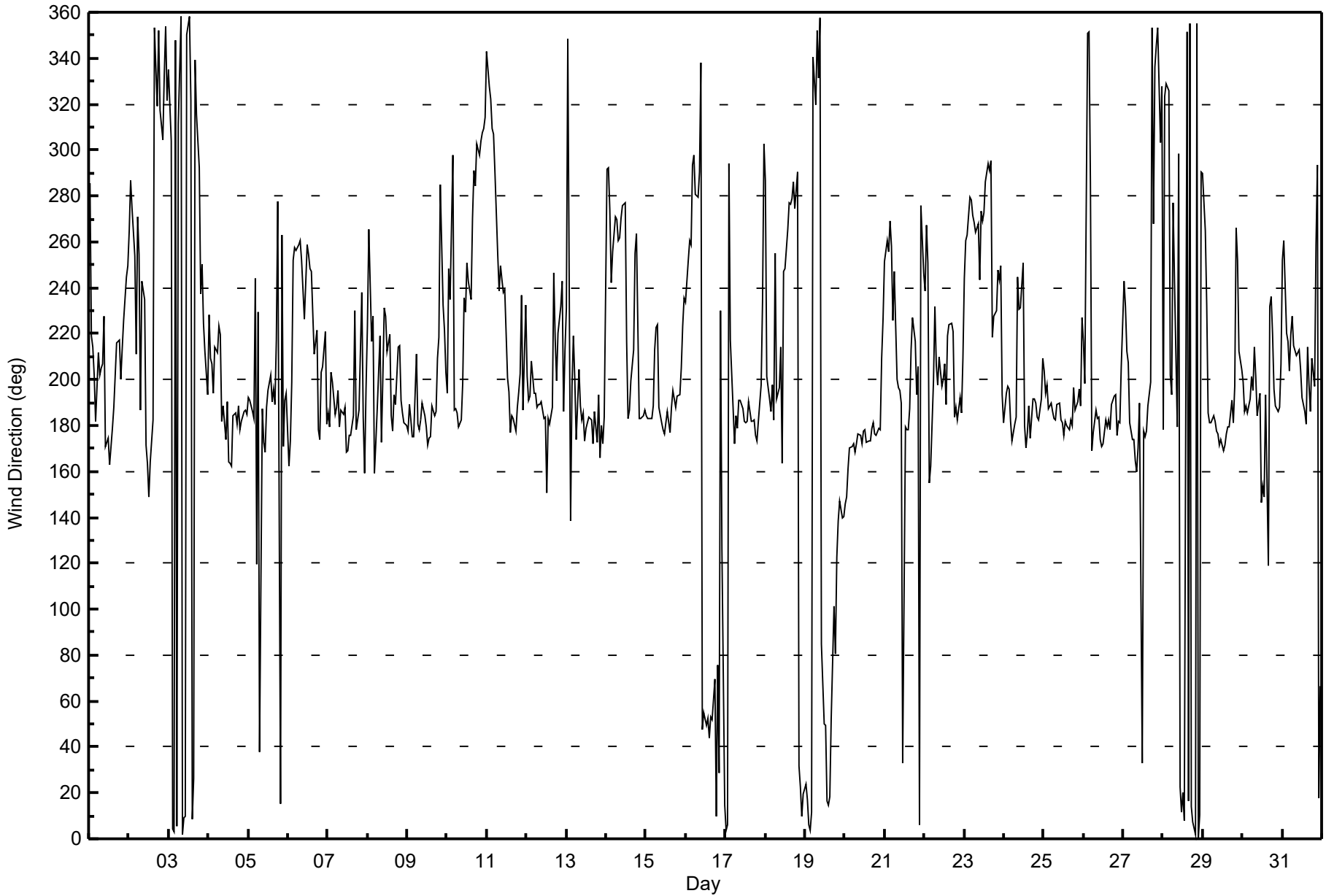
Fort McKay - Bertha Ganter - December 2023

Direction of Maximum Speed: 310 deg on Dec 10 23:00		Hours in Service:	744
Direction of Maximum Daily Speed Average: 172.7 deg on Dec 20		Hours of Data:	744
Direction of Minimum Speed: 28 deg on Dec 16 21:00		Hours of Missing Data:	0
Direction of Minimum Daily Speed Average: 1.7 deg on Dec 2		Percent Operational Time:	100.0
Monthly Average Direction: 205.7 deg			

Day	Hourly Period Ending At (MST)																								Daily Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Dec	286	219	214	202	182	212	202	205	207	227	171	175	163	171	179	188	216	217	217	200	213	226	245	250	196.5
2-Dec	265	287	275	254	211	271	255	187	243	235	172	163	149	164	182	353	335	319	352	317	304	332	354	321	285.4
3-Dec	335	304	4	3	348	5	311	358	2	9	10	350	358	322	8	26	339	315	292	237	250	224	212	193	341.4
4-Dec	228	209	207	194	214	212	223	220	182	189	174	191	164	163	163	185	185	181	189	178	182	186	187	185	187.8
5-Dec	192	191	186	183	244	120	229	38	188	173	168	188	195	202	190	196	189	217	278	15	263	171	191	194	193.3
6-Dec	162	174	199	252	257	256	259	260	252	239	227	259	255	248	247	229	211	222	178	174	203	206	221	181	235.2
7-Dec	186	179	203	199	185	188	196	179	187	185	188	168	169	176	176	184	230	178	182	187	238	184	159	196	185.3
8-Dec	223	266	216	227	159	173	187	219	173	200	231	228	212	220	184	178	193	189	214	215	191	186	181	180	201.0
9-Dec	178	189	183	175	175	211	181	178	182	190	184	180	172	174	175	188	184	186	209	218	285	233	222	203	185.8
10-Dec	194	249	235	298	187	187	186	179	183	199	236	229	250	243	235	270	291	284	302	298	304	307	310	314	274.5
11-Dec	343	328	322	310	307	291	255	239	249	244	238	239	201	195	177	184	183	177	188	194	202	237	186	232	264.3
12-Dec	201	191	193	208	194	194	188	189	189	191	183	184	151	183	180	188	247	218	199	220	232	243	186	213	196.1
13-Dec	231	348	138	197	219	200	174	204	188	183	185	173	179	184	183	183	172	186	173	194	166	180	172	183	183.1
14-Dec	292	292	274	242	256	271	269	261	262	271	276	277	217	183	187	199	213	255	264	223	183	183	184	187	244.5
15-Dec	184	183	183	183	188	213	223	224	188	181	178	176	181	186	177	188	195	192	188	193	193	205	223	236	190.3
16-Dec	234	252	261	259	294	298	281	279	290	338	48	55	49	52	44	53	52	69	10	76	28	230	126	15	322.6
17-Dec	4	6	294	217	187	172	184	179	191	191	188	182	181	182	190	182	182	182	176	173	182	197	234	303	187.3
18-Dec	287	202	192	186	197	182	255	192	197	214	164	247	248	265	277	276	279	286	274	291	32	23	10	20	284.1
19-Dec	23	17	6	4	11	341	320	352	332	358	85	50	50	17	14	18	52	102	80	122	138	147	140	140	47.6
20-Dec	146	149	161	170	171	172	168	172	176	176	172	177	178	173	173	173	179	181	177	175	179	178	209	226	172.7
21-Dec	251	261	256	269	258	226	247	200	197	195	190	33	180	178	178	187	213	227	217	193	206	6	276	247	221.4
22-Dec	238	267	251	155	162	199	232	207	198	210	197	200	207	189	219	224	224	221	184	188	183	192	186	210	201.2
23-Dec	244	260	263	279	278	271	269	264	268	243	273	269	273	286	294	291	295	218	227	230	248	244	250	193	264.6
24-Dec	181	194	197	196	182	173	180	183	244	231	231	251	180	170	177	188	174	192	191	190	183	182	192	209	189.2
25-Dec	204	194	197	188	190	186	183	182	189	189	183	181	176	182	180	178	183	180	197	187	190	196	189	227	186.8
26-Dec	217	199	351	352	286	169	177	186	183	184	174	171	172	182	180	182	178	189	193	193	176	182	181	205	183.3
27-Dec	243	232	212	207	181	174	174	165	160	170	190	33	177	175	178	188	199	353	268	336	345	353	303	328	200.2
28-Dec	178	323	329	326	202	193	277	243	180	298	23	12	20	8	351	16	355	14	7	2	355	0	10	290	2.2
29-Dec	290	265	232	185	181	181	184	182	178	176	171	174	169	171	176	179	179	191	181	197	266	252	213	204	183.6
30-Dec	199	186	188	185	191	201	195	214	201	184	194	146	154	149	193	119	232	236	219	196	188	186	188	207	192.6
31-Dec	252	261	220	217	204	220	227	215	210	212	213	204	192	186	180	214	198	186	209	197	259	294	18	67	212.8

231.2 245.5 224.0 219.4 216.9 216.6 214.0 209.0 204.7 202.6 191.8 196.1 185.8 189.1 188.1 195.0 205.3 206.0 204.4 204.3 203.2 209.1 212.6 219.3
Diurnal Average

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





Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

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

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 101 deg on Dec 28 08:00 Minimum Value: 7 deg on Dec 24 20:00 Percentiles: P ₁ = 9 P ₁₀ = 13 Q ₁ = 15 Median = 23 Q ₃ = 37 P ₉₀ = 56 P ₉₉ = 88																			Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0						
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Dec	68	40	34	31	53	34	74	20	19	60	22	14	13	12	21	19	15	10	66	31	19	23	62	39	74
2-Dec	11	23	32	31	38	17	34	64	33	39	16	15	18	13	15	23	27	22	12	21	17	35	27	19	64
3-Dec	40	30	34	22	25	13	22	24	21	22	28	43	24	53	37	24	36	31	76	20	70	42	56	27	76
4-Dec	21	24	17	14	23	26	33	25	21	16	16	23	32	18	16	11	13	26	11	9	11	15	12	13	33
5-Dec	16	29	20	29	68	56	55	56	81	26	22	27	41	23	15	19	16	25	85	28	68	24	54	36	85
6-Dec	83	22	39	36	32	37	35	33	33	37	45	55	53	40	40	35	20	39	12	40	20	25	56	50	83
7-Dec	27	21	25	62	33	27	39	21	36	16	22	11	13	12	10	10	39	43	13	18	34	42	45	64	64
8-Dec	37	41	48	63	31	32	24	30	22	32	51	68	30	24	16	8	12	26	45	35	7	11	27	14	68
9-Dec	22	13	9	10	13	48	15	12	13	13	14	13	13	12	11	13	10	11	17	70	63	12	24	19	70
10-Dec	61	45	51	33	75	14	22	15	20	28	43	30	44	48	45	39	26	27	24	22	21	16	14	16	75
11-Dec	18	11	12	14	14	23	34	28	35	36	31	38	33	25	12	12	13	12	22	13	52	32	27	56	56
12-Dec	31	15	20	20	16	17	13	16	17	26	23	29	18	17	16	26	30	29	31	39	43	36	18	27	43
13-Dec	64	64	84	25	20	32	61	84	17	11	18	11	13	14	14	12	11	16	71	55	32	49	28	53	84
14-Dec	31	17	23	32	35	36	37	38	34	34	34	35	88	16	15	21	36	33	55	97	24	16	15	14	97
15-Dec	13	13	12	11	14	16	34	32	16	12	12	13	13	16	15	18	19	17	15	18	18	26	51	48	51
16-Dec	38	36	38	34	25	19	32	28	30	32	24	29	30	29	21	36	26	58	24	51	71	31	84	12	84
17-Dec	15	15	52	35	36	43	44	35	20	18	14	16	13	13	15	17	24	13	11	13	14	16	60	34	60
18-Dec	87	27	16	17	26	36	49	64	18	18	27	50	47	37	28	23	21	18	20	17	26	19	16	17	87
19-Dec	17	16	14	14	14	33	15	14	16	56	41	21	27	13	12	13	27	20	21	21	14	12	13	14	56
20-Dec	12	14	14	14	13	14	13	14	14	14	13	16	17	16	13	13	14	15	13	13	15	14	35	33	35
21-Dec	40	43	38	32	37	45	29	61	25	18	33	36	54	16	14	13	97	45	26	14	53	35	27	27	97
22-Dec	40	32	62	70	19	42	56	37	20	20	17	25	22	16	39	73	38	53	23	28	19	17	21	40	73
23-Dec	56	43	41	40	39	37	38	38	43	48	43	37	37	30	22	24	20	56	36	30	26	21	22	52	56
24-Dec	29	31	18	18	12	13	13	15	21	30	70	79	47	11	25	35	53	13	13	7	10	11	15	14	79
25-Dec	18	16	14	12	14	15	14	14	16	13	15	13	13	15	13	12	12	60	15	17	18	23	19	32	60
26-Dec	80	71	81	49	59	59	31	19	10	12	11	11	12	14	14	13	12	16	22	37	12	13	12	33	81
27-Dec	44	32	25	22	16	18	11	43	18	7	29	68	77	48	26	61	77	24	73	66	43	54	67	36	77
28-Dec	86	33	45	60	92	67	99	101	81	100	21	17	18	31	18	20	20	17	17	34	19	18	31	51	101
29-Dec	31	22	55	21	13	12	13	14	14	14	15	13	12	12	12	14	49	13	28	13	86	89	44	22	89
30-Dec	12	12	13	15	15	16	20	20	20	17	16	49	21	19	48	81	47	43	61	11	13	9	9	15	81
31-Dec	18	14	40	22	17	26	13	31	57	18	23	26	24	15	11	33	23	77	19	61	49	48	32	59	77
	87	71	84	70	92	67	99	101	81	100	70	79	88	53	48	81	97	77	85	97	86	89	84	64	
Diurnal Maximum																									



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

AMS02 MILDRED LAKE DECEMBER 2023

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

January 31, 2024

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - MILDRED LAKE (AMS02)
DECEMBER 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	708	36	36	100	52.2	0	9.1	0
H2S (ppb) Average	708	36	36	100	13.2	4	3.2	1
THC (ppm) Average	602	37	142	85.89	7.1	-	2.6	-
NMHC(ppm) Average	602	37	142	85.89	0.88	-	0.14	-
CH4(ppm) Average	602	37	142	85.89	6.2	-	2.5	-
Temperature (C) Average	744	0	0	100	6.8	-	3.9	-
Relative Humidity (%) Average	744	0	0	100	95.4	-	88.8	-
Wind Speed 10 m (km/h) Average	739	0	5	99.33	24	-	16	-
Wind Direction 10 m (deg) Average	739	0	5	99.33	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - MILDRED LAKE (AMS02)
DECEMBER 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	708	2.94	6.4	-	0	0.1	0.3	0.6	1.9	8.4	52.2
H2S (ppb) Average	708	0.8	1.6	-	0.1	0.1	0.2	0.2	0.6	2	13.2
THC (ppm) Average	602	2.26	0.4	-	1.9	2	2	2.2	2.4	2.7	7.1
NMHC(ppm) Average	602	0.034	0.08	-	0	0	0	0	0	0.1	0.88
CH4(ppm) Average	602	2.23	0.3	-	1.9	2	2	2.1	2.3	2.6	6.2
Temperature 2 m (C) Average	744	-5.29	5.3	-	-16.1	-11.8	-9.4	-5.5	-1.6	2.3	6.8
Relative Humidity (%) Average	744	74.97	12.1	-	37.8	57.1	66.8	76.6	85.4	88.7	95.4
Wind Speed 10 m (km/h) Average	739	9	4	-	1	5	6	8	11	15	24
Wind Direction 10 m (deg) Average	739	-	-	-	-	-	-	-	-	-	-

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

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
THC/NMHC/CH4	20 Dec 2023 05:00	21 Dec 2023 11:00	31	Unstable Operation - excessive baseline drift
THC/NMHC/CH4	21 Dec 2023 12:00	21 Dec 2023 13:00	2	Maintenance - Analyzer removal
THC/NMHC/CH4	22 Dec 2023 12:00	23 Dec 2023 12:00	23	Unstable Operation - excessive baseline drift
THC/NMHC/CH4	23 Dec 2023 13:00	23 Dec 2023 16:00	4	Maintenance - Retention time adjustment
THC/NMHC/CH4	30 Dec 2023 04:00	01 Jan 2024 00:00	45	Unstable Operation - excessive baseline drift
WS/WD	01 Dec 2023 05:00	01 Dec 2023 05:00	1	Flat line in sensor output signal
WS/WD	03 Dec 2023 12:00	03 Dec 2023 12:00	1	Flat line in sensor output signal
WS/WD	03 Dec 2023 15:00	03 Dec 2023 15:00	1	Flat line in sensor output signal
WS/WD	03 Dec 2023 20:00	03 Dec 2023 20:00	1	Flat line in sensor output signal
WS/WD	24 Dec 2023 17:00	24 Dec 2023 17:00	1	Flat line in sensor output signal



Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO₂) - ppb

Mildred Lake - December 2023

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 52.2 ppb on Dec 14 10:00	Maximum Daily Average: 9.1 ppb on Dec 14		Hours of Data:	708
Minimum Value: 0.0 ppb on Dec 4 09:00	Minimum Daily Average: 0.2 ppb on Dec 1		Hours of Missing Data:	36
Maximum Diurnal Average: 5.5 ppb at hour 12	Minimum Diurnal Average: 1.0 ppb at hour 5		Hours of Calibration:	36
Monthly Average: 2.94 ppb	Percentiles: P ₁ = 0.0 P ₁₀ = 0.1 Q ₁ = 0.3 Median = 0.6 Q ₃ = 1.9 P ₉₀ = 8.4 P ₉₉ = 33.3		Percent Operational Time:	100.0

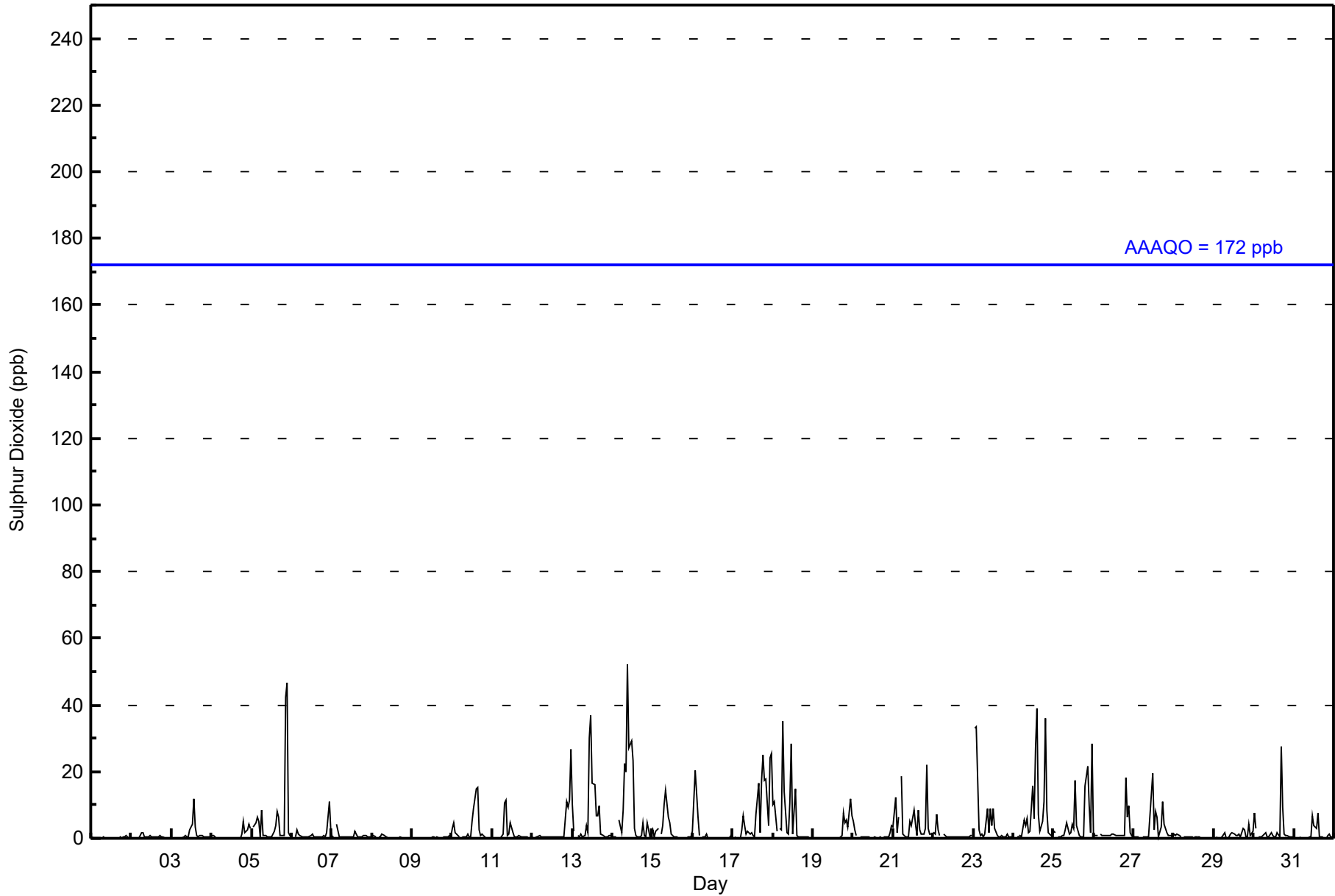
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Dec	0.3	0.2	Z	0.2	0.1	0.1	0.1	0.3	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.1	0.2	0.2	0.2	0.2	0.4	0.7	0.2	0.1	0.2	0.7																							
2-Dec	0.0	0.1	0.1	Z	0.2	1.0	1.5	1.8	0.4	0.3	0.5	0.7	0.4	0.6	0.6	0.4	0.5	0.7	0.3	0.3	0.1	0.1	0.1	0.1	0.5	1.8																							
3-Dec	0.0	0.0	0.1	0.1	Z	0.0	0.1	0.3	0.7	0.3	0.6	2.4	4.4	11.9	3.3	0.9	0.5	0.7	0.7	0.6	0.5	0.5	0.6	1.3	11.9																								
4-Dec	0.8	0.7	0.3	0.1	0.1	Z	0.2	0.1	0.0	0.0	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	1.3	5.0	1.5	2.5	4.3	3.1	0.9	5.0																							
5-Dec	Z	3.4	4.5	6.4	5.1	0.6	8.4	0.9	0.7	0.5	0.5	0.5	0.6	2.3	3.6	8.2	6.5	0.7	0.8	0.9	42.3	46.7	1.8	0.9	6.4	46.7																							
6-Dec	0.7	Z	0.4	2.7	1.5	0.9	0.5	0.4	0.2	0.3	0.4	1.0	1.3	0.5	0.4	0.3	0.3	0.4	0.4	0.7	0.3	1.7	11.1	2.2	1.2	11.1																							
7-Dec	0.5	0.4	Z	4.2	0.5	0.3	0.4	0.4	0.4	0.3	0.5	0.3	0.4	0.4	2.0	0.3	0.3	0.2	0.2	0.8	0.7	0.4	0.4	0.2	0.6	4.2																							
8-Dec	0.6	0.7	0.4	Z	0.2	0.4	1.3	0.6	0.3	0.5	C	C	C	C	C	0.1	0.0	0.3	0.0	0.1	0.1	0.1	0.1	0.0	0.3	1.3																							
9-Dec	0.1	0.1	0.1	0.0	Z	0.1	0.1	0.1	0.1	0.2	0.1	0.2	0.2	0.6	0.2	0.2	0.1	0.2	0.2	0.3	0.4	0.5	0.7	0.4	0.2	0.7																							
10-Dec	3.1	4.7	1.6	0.7	0.4	Z	0.5	0.5	0.6	1.2	0.5	0.5	5.2	8.7	15.0	15.4	2.4	0.7	1.3	0.3	0.2	0.2	0.2	0.0	2.8	15.4																							
11-Dec	Z	0.1	0.0	0.1	0.1	0.0	1.3	10.6	11.6	1.0	1.1	4.7	1.8	0.3	0.3	0.7	0.3	0.2	0.3	0.2	0.3	0.2	0.3	0.3	1.6	11.6																							
12-Dec	0.3	Z	0.2	0.5	1.1	0.3	0.2	0.4	0.4	0.4	0.5	0.5	0.6	0.5	0.6	0.4	0.5	0.4	0.4	0.5	11.2	9.3	11.6	26.5	2.9	26.5																							
13-Dec	10.3	2.1	Z	0.7	0.5	1.1	0.6	0.8	3.7	1.9	30.0	37.0	16.4	16.1	6.7	6.8	9.6	1.1	0.7	0.5	0.5	0.6	0.7	0.8	6.5	37.0																							
14-Dec	0.6	0.3	0.5	Z	5.6	1.8	8.7	22.6	19.9	52.2	27.0	29.1	23.5	3.0	0.8	0.5	0.5	0.8	4.8	0.7	0.5	4.8	0.5	0.9	9.1	52.2																							
15-Dec	2.6	0.4	2.0	Z	2.8	1.1	3.8	10.1	14.6	6.1	4.6	1.1	0.7	0.4	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.3	0.3	0.3	2.3	14.6																							
16-Dec	2.1	20.1	13.4	6.2	1.0	Z	0.3	0.3	1.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.2	1.1	2.0	20.1																							
17-Dec	Z	0.3	0.2	0.2	0.2	2.3	6.9	3.8	1.1	2.3	1.2	1.6	0.7	0.5	7.3	16.4	1.9	17.6	25.2	17.2	17.7	3.6	24.2	25.6	7.7	25.6																							
18-Dec	10.3	11.1	2.0	Z	3.1	2.7	35.2	14.0	1.5	1.4	10.5	28.6	1.4	14.9	0.8	0.4	0.3	0.3	0.3	0.2	0.4	0.2	0.1	0.1	6.1	35.2																							
19-Dec	0.1	0.1	Z	0.2	0.2	0.1	0.1	0.1	0.1	0.2	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.8	7.8	4.8	5.5	3.3	11.9	6.7	1.8	11.9																							
20-Dec	4.9	2.7	1.0	Z	0.4	0.5	0.6	0.5	0.3	0.3	0.2	0.1	0.2	0.2	0.2	0.2	0.2	0.1	0.2	0.3	0.2	0.3	1.6	3.9	0.8	4.9																							
21-Dec	3.5	12.1	1.8	6.2	Z	18.5	1.4	0.6	0.4	0.5	4.9	3.9	8.4	4.3	0.7	8.4	2.7	1.3	1.4	2.9	22.0	3.1	1.1	1.4	4.8	22.0																							
22-Dec	1.7	1.2	7.2	2.7	1.0	Z	1.4	1.0	0.6	0.5	0.5	0.4	0.4	0.5	0.6	0.5	0.5	0.4	0.4	0.5	0.5	0.5	0.7	0.9	1.1	7.2																							
23-Dec	Z	33.0	33.3	2.6	1.0	1.1	0.6	1.2	8.7	1.7	9.1	3.6	8.8	3.0	0.9	0.4	0.3	0.8	0.5	0.3	1.2	0.3	0.3	0.3	4.9	33.3																							
24-Dec	0.3	Z	0.3	0.3	1.0	0.4	5.7	3.9	6.1	1.6	2.1	15.6	6.0	27.3	39.2	7.2	2.0	4.9	11.2	36.2	8.3	1.9	1.0	0.8	8.0	39.2																							
25-Dec	2.2	1.6	Z	0.6	0.5	0.8	0.9	2.5	4.6	1.1	1.6	4.1	2.9	17.3	3.8	0.8	0.6	0.2	0.3	15.9	21.6	9.8	1.8	28.5	5.4	28.5																							
26-Dec	1.6	0.8	0.9	Z	1.1	1.0	0.9	1.0	1.0	1.0	1.0	1.1	1.1	1.0	0.7	0.7	0.7	0.7	1.0	18.4	6.5	9.6	1.7	0.9	2.4	18.4																							
27-Dec	0.6	0.5	0.4	0.3	Z	0.4	0.4	0.4	0.3	0.5	6.7	19.3	2.4	8.2	6.2	0.6	3.4	11.1	4.4	3.0	1.5	1.0	0.7	0.6	3.2	19.3																							
28-Dec	1.1	1.0	1.2	0.9	0.6	Z	0.4	0.2	0.3	0.3	0.3	0.3	0.2	0.2	0.3	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.2	0.2	0.4	1.2																							
29-Dec	Z	0.3	0.1	0.0	0.0	0.2	1.8	0.2	0.2	0.2	1.1	1.6	1.2	1.0	0.8	1.4	0.6	3.1	2.6	0.6	0.4	4.1	1.1	2.2	1.1	4.1																							
30-Dec	7.8	2.8	Z	0.5	0.6	1.0	1.4	1.7	0.5	0.6	1.9	0.7	0.5	0.6	1.5	0.6	27.4	9.4	1.3	0.9	0.7	0.6	0.5	0.4	2.8	27.4																							
31-Dec	0.3	0.1	Z	0.2	0.1	0.1	0.0	0.0	0.0	0.3	0.2	6.7	3.9	2.8	7.6	0.6	0.3	0.3	0.0	0.1	0.6	1.3	0.2	0.2	1.1	7.6																							
																								2.2	3.6	3.0	1.6	1.0	1.4	2.8	2.6	2.6	2.5	3.6	5.5	3.1	4.3	3.5	2.3	2.0	1.9	2.2	3.6	4.7	3.5	2.6	3.6	Diurnal Average	
																								10.3	33.0	33.3	6.4	5.6	18.5	35.2	22.6	19.9	52.2	30.0	37.0	23.5	27.3	39.2	16.4	27.4	17.6	25.2	36.2	42.3	46.7	24.2	28.5	Diurnal Maximum	

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



Wood Buffalo Environmental Association
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Mildred Lake - December 2023





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Mildred Lake - December 2023

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	653	92.23	92.23
11 - 20	31	4.38	96.61
21 - 60	24	3.39	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 708

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Mildred Lake - December 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	38	20	6	3	2	7	68	162	125	53	67	23	29	20	7	18	648
11 - 20	0	0	0	0	1	4	11	1	1	2	0	6	5	0	0	0	31
21 - 60	0	0	0	0	0	3	6	4	0	0	1	4	6	0	0	0	24
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	38	20	6	3	3	14	85	167	126	55	68	33	40	20	7	18	703

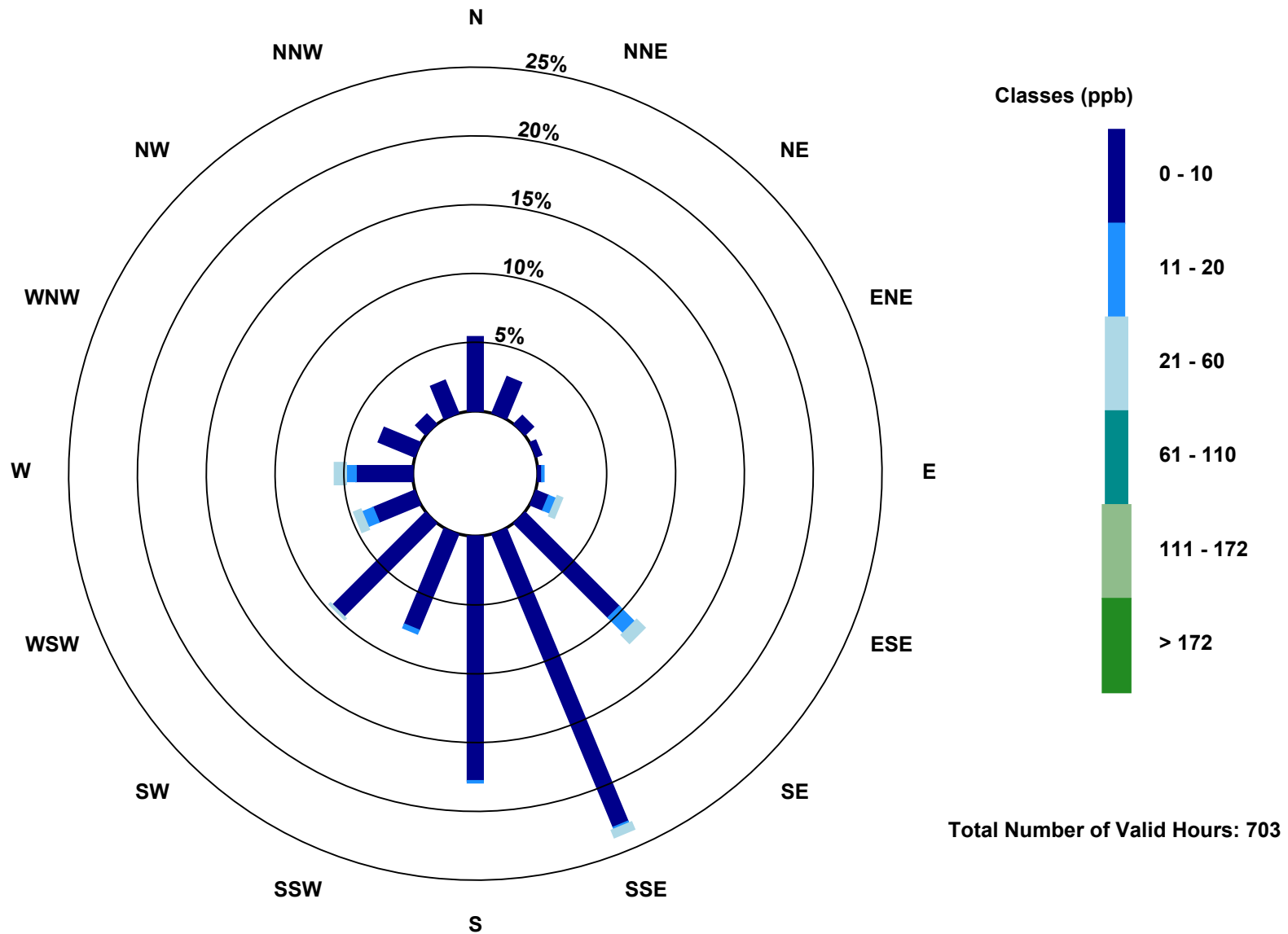
Total Number of Valid Hours: 703

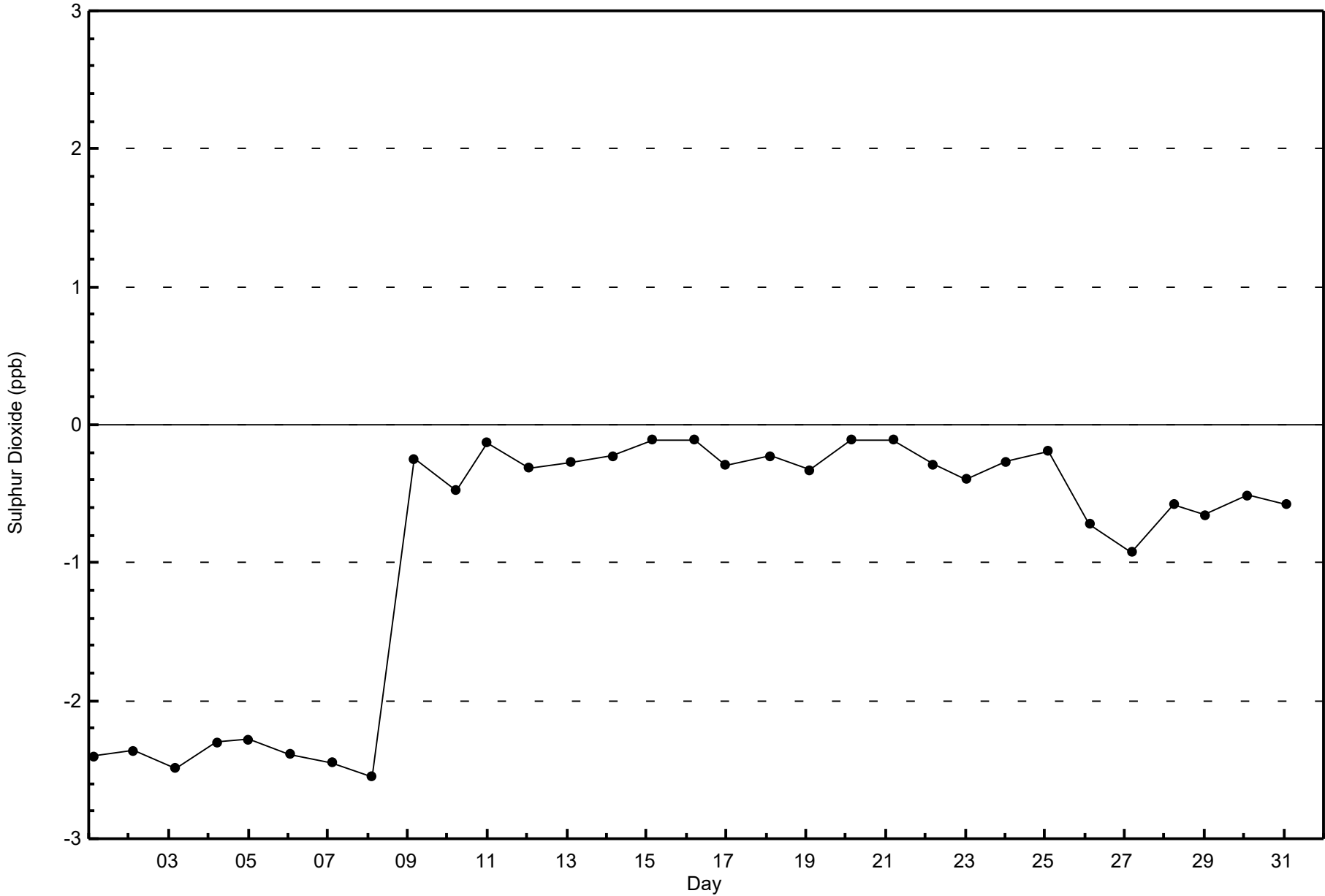
Total Number of Hours: 744

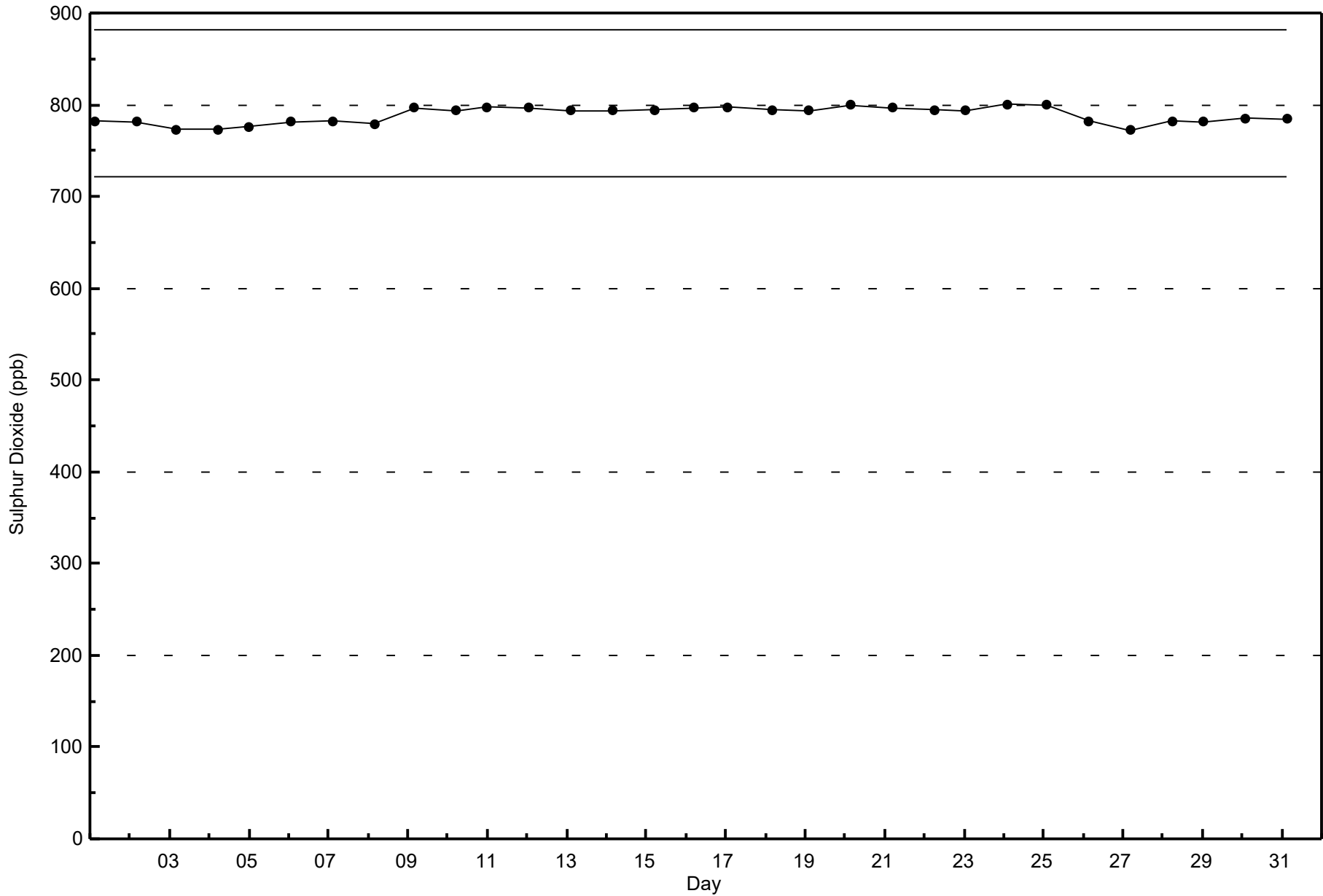


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Sulphur Dioxide (SO₂) - ppb
Mildred Lake









Wood Buffalo Environmental Association

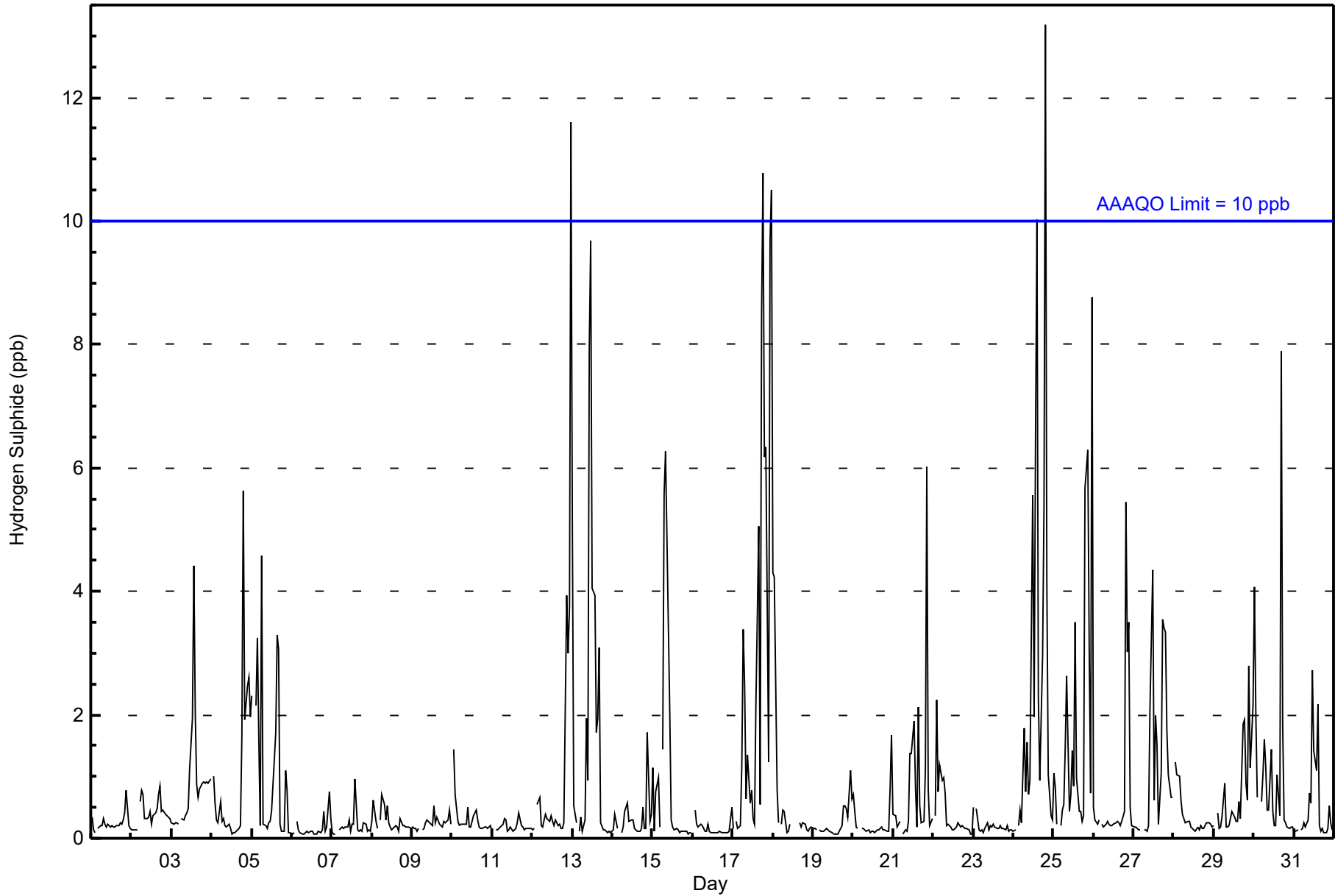
Summary of Hour Averages

Hydrogen Sulphide (H₂S) - ppb

Mildred Lake - December 2023

Number of Exceedences (AAAQO):		1-hr: 4	24-hr: 1	Hours in Service: 744																	744					
Maximum Value: 13.2 ppb on Dec 24 20:00		Maximum Daily Average: 3.2 ppb on Dec 17																	Hours of Data: 708							
Minimum Value: 0.1 ppb on Dec 19 16:00		Minimum Daily Average: 0.2 ppb on Dec 16																	Hours of Missing Data: 36							
Maximum Diurnal Average: 1.5 ppb at hour 20		Minimum Diurnal Average: 0.3 ppb at hour 5																	Hours of Calibration: 36							
Monthly Average: 0.80 ppb		Percentiles: P ₁ = 0.1 P ₁₀ = 0.1 Q ₁ = 0.2 Median = 0.2 Q ₃ = 0.6 P ₉₀ = 2.0 P ₉₉ = 8.7																	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-Dec	0.3	0.1	0.1	Z	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	0.3	0.2	0.3	0.4	0.8	0.2	0.2	0.2	0.8
2-Dec	0.1	0.1	0.1	0.1	Z	0.6	0.8	0.7	0.3	0.3	0.4	0.4	0.2	0.4	0.4	0.5	0.7	0.8	0.4	0.5	0.4	0.4	0.3	0.3	0.4	0.8
3-Dec	0.2	0.2	0.2	0.2	0.2	Z	0.3	0.3	0.4	0.4	0.5	1.1	2.0	4.4	2.0	0.9	0.7	0.8	0.9	0.9	0.9	0.9	0.9	1.0	0.9	4.4
4-Dec	Z	1.0	0.6	0.3	0.2	0.6	0.3	0.3	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.2	0.2	1.7	5.6	1.9	2.5	2.6	2.0	0.9	5.6	
5-Dec	2.3	Z	2.1	3.2	1.6	0.2	4.6	0.2	0.2	0.2	0.2	0.3	0.4	1.3	1.7	3.3	3.1	0.2	0.1	0.1	1.1	0.8	0.1	0.1	1.2	4.6
6-Dec	0.1	0.1	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	0.4	0.1	0.2	0.8	0.3	0.2	0.8
7-Dec	0.1	0.1	0.1	Z	0.1	0.2	0.2	0.2	0.2	0.2	0.3	0.1	0.2	0.2	1.0	0.1	0.1	0.1	0.1	0.3	0.2	0.1	0.1	0.1	0.2	1.0
8-Dec	0.3	0.6	0.3	0.2	Z	0.3	0.7	0.5	0.3	0.5	0.3	0.2	0.1	0.2	0.2	0.2	0.1	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.7
9-Dec	0.2	0.2	0.2	0.1	0.2	Z	0.1	0.2	0.3	0.3	0.2	0.2	0.2	0.5	0.2	0.4	0.2	0.2	0.2	0.3	0.2	0.3	0.5	0.2	0.2	0.5
10-Dec	Z	1.5	0.7	0.3	0.2	0.2	0.2	0.2	0.2	0.5	0.2	0.2	0.3	0.4	0.4	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	1.5
11-Dec	0.1	Z	0.1	0.1	0.2	0.2	0.2	0.3	0.3	0.1	0.1	0.2	0.1	0.1	0.2	0.2	0.4	0.2	0.2	0.1	0.2	0.2	0.2	0.2	0.2	0.4
12-Dec	0.1	0.2	Z	0.5	0.7	0.2	0.2	0.3	0.4	0.3	0.3	0.4	0.3	0.2	0.3	0.2	0.2	0.2	0.2	0.2	3.9	3.0	3.8	11.6	1.2	11.6
13-Dec	5.1	0.5	0.2	Z	0.1	0.3	0.1	0.3	2.0	0.9	7.9	9.7	4.1	3.9	1.7	2.0	3.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	1.9	9.7
14-Dec	0.1	0.4	0.3	0.2	Z	0.1	0.2	0.4	0.5	0.6	0.3	0.3	0.3	0.2	0.1	0.1	0.1	0.2	0.5	0.2	0.2	1.7	0.3	0.4	0.3	1.7
15-Dec	1.1	0.1	0.8	1.0	0.2	Z	1.5	5.6	6.3	3.4	2.0	0.3	0.2	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	1.0	6.3
16-Dec	Z	0.5	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.5
17-Dec	0.2	Z	0.3	0.2	0.2	1.2	3.4	2.5	0.6	1.3	0.6	0.8	0.3	0.2	2.2	5.1	0.5	8.5	10.8	6.2	6.3	1.2	9.7	10.5	3.2	10.8
18-Dec	4.3	4.2	0.8	0.2	Z	0.2	0.5	0.4	0.1	0.1	0.2	C	C	C	C	C	0.3	0.2	0.3	0.2	0.1	0.1	0.2	0.2	0.7	4.3
19-Dec	0.2	0.2	0.1	Z	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	0.5	0.5	0.5	0.3	1.1	0.6	0.2	1.1
20-Dec	0.7	0.4	0.2	0.1	Z	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.1	0.1	0.1	0.1	0.8	1.7	0.3	1.7
21-Dec	0.4	0.4	0.2	0.2	0.3	Z	0.1	0.1	0.1	0.3	1.4	1.4	1.9	0.8	0.2	2.1	0.5	0.3	0.3	1.1	6.0	0.8	0.2	0.3	0.8	6.0
22-Dec	Z	0.4	2.2	0.7	1.2	0.9	1.0	0.7	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	0.1	0.1	0.1	0.4	2.2
23-Dec	0.5	Z	0.5	0.1	0.1	0.1	0.1	0.2	0.2	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.2	0.1	0.1	0.1	0.2	0.5
24-Dec	0.1	0.1	Z	0.2	0.4	0.2	1.8	0.8	1.6	0.7	0.9	5.6	2.0	6.5	10.0	2.3	0.9	3.0	5.4	13.2	4.1	1.0	0.4	0.3	2.7	13.2
25-Dec	1.1	0.8	0.2	Z	0.2	0.5	0.5	1.4	2.6	0.4	0.7	1.4	0.9	3.5	1.0	0.4	0.4	0.3	0.4	5.7	6.3	3.1	0.7	8.8	1.8	8.8
26-Dec	0.5	0.3	0.2	0.3	Z	0.2	0.2	0.2	0.3	0.2	0.2	0.2	0.2	0.3	0.3	0.2	0.2	0.3	0.4	5.4	3.0	3.5	0.5	0.2	0.8	5.4
27-Dec	0.2	0.2	0.2	0.1	0.1	Z	0.1	0.1	0.1	0.2	2.1	4.4	0.6	2.0	1.5	0.2	1.0	3.5	3.4	3.3	1.7	1.0	0.7	0.7	1.2	4.4
28-Dec	Z	1.2	1.0	1.0	0.6	0.4	0.3	0.3	0.3	0.3	0.2	0.1	0.1	0.1	0.2	0.1	0.2	0.2	0.2	0.3	0.2	0.3	0.2	0.2	0.3	1.2
29-Dec	0.2	Z	0.4	0.2	0.2	0.3	0.9	0.2	0.2	0.2	0.3	0.4	0.3	0.3	0.3	0.6	0.3	1.8	1.9	0.9	0.6	2.8	1.1	2.2	0.7	2.8
30-Dec	4.1	2.0	0.7	Z	0.6	1.0	1.6	1.2	0.5	0.5	1.4	0.4	0.2	0.2	1.0	0.4	7.9	1.8	0.3	0.2	0.2	0.2	0.2	0.2	1.2	7.9
31-Dec	0.1	0.1	0.1	Z	0.1	0.2	0.3	0.2	0.3	0.7	0.6	2.7	1.4	1.1	2.2	0.2	0.1	0.2	0.1	0.1	0.2	0.5	0.3	0.1	0.5	2.7
																								Diurnal Average		
																								Diurnal Maximum		
																								1.4		
																								11.6		

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 (H₂S) - ppb
Mildred Lake - December 2023**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	653	92.23	92.23
3 - 4	29	4.10	96.33
5 - 7	15	2.12	98.45
8 - 11	8	1.13	99.58
> 11	3	0.42	100.00

Total Number of Valid Hours: 708

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Hydrogen Sulphide (H₂S) - ppb
Mildred Lake - December 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	36	20	5	3	2	5	60	157	121	53	71	29	40	19	7	20	648
3 - 4	0	1	1	0	1	5	10	4	4	3	0	0	0	0	0	0	29
5 - 7	0	0	0	0	0	2	8	4	1	0	0	0	0	0	0	0	15
8 - 11	0	0	0	0	0	1	4	3	0	0	0	0	0	0	0	0	8
> 11	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	3
Totals	36	21	6	3	3	14	83	169	126	56	71	29	40	19	7	20	703

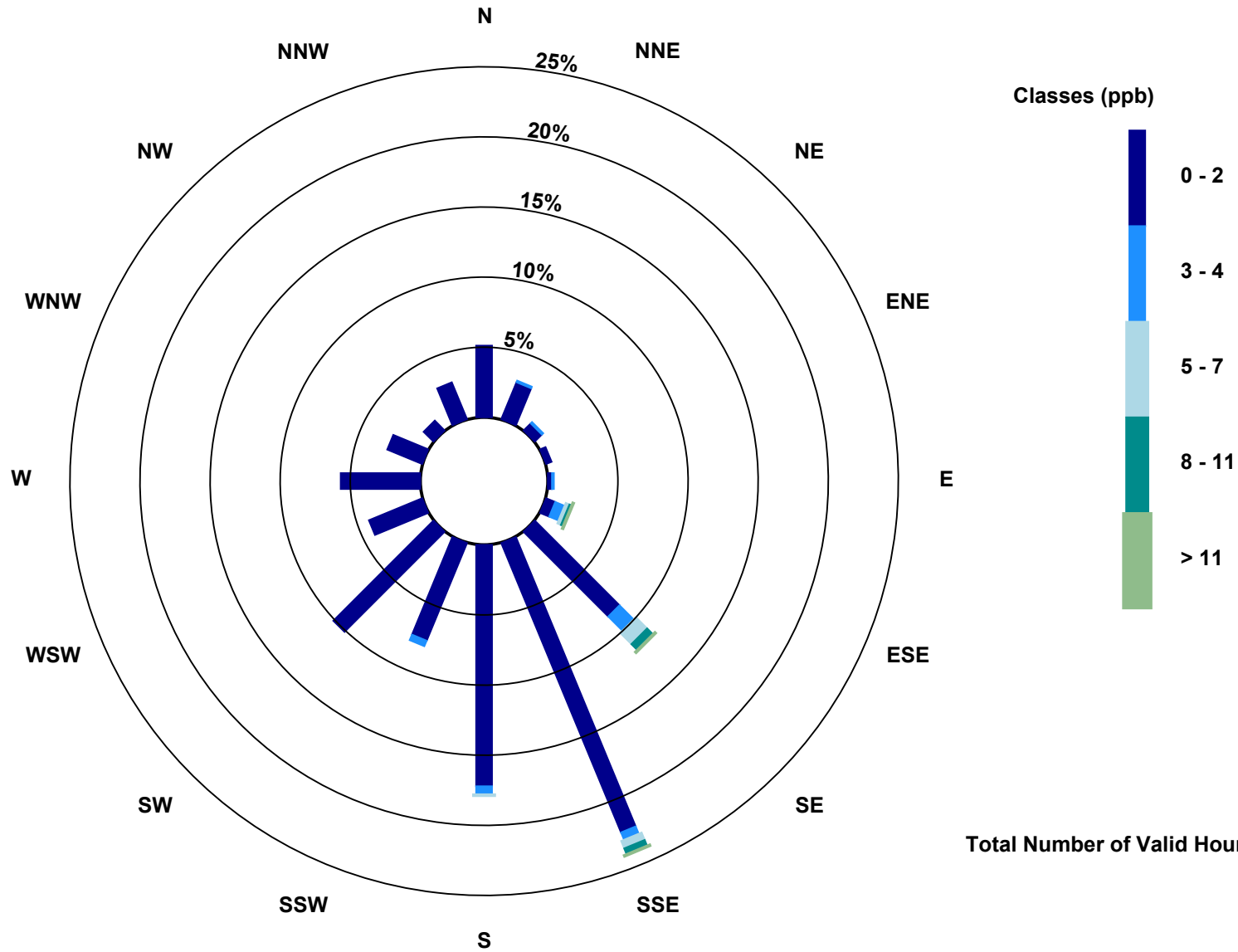
Total Number of Valid Hours: 703

Total Number of Hours: 744

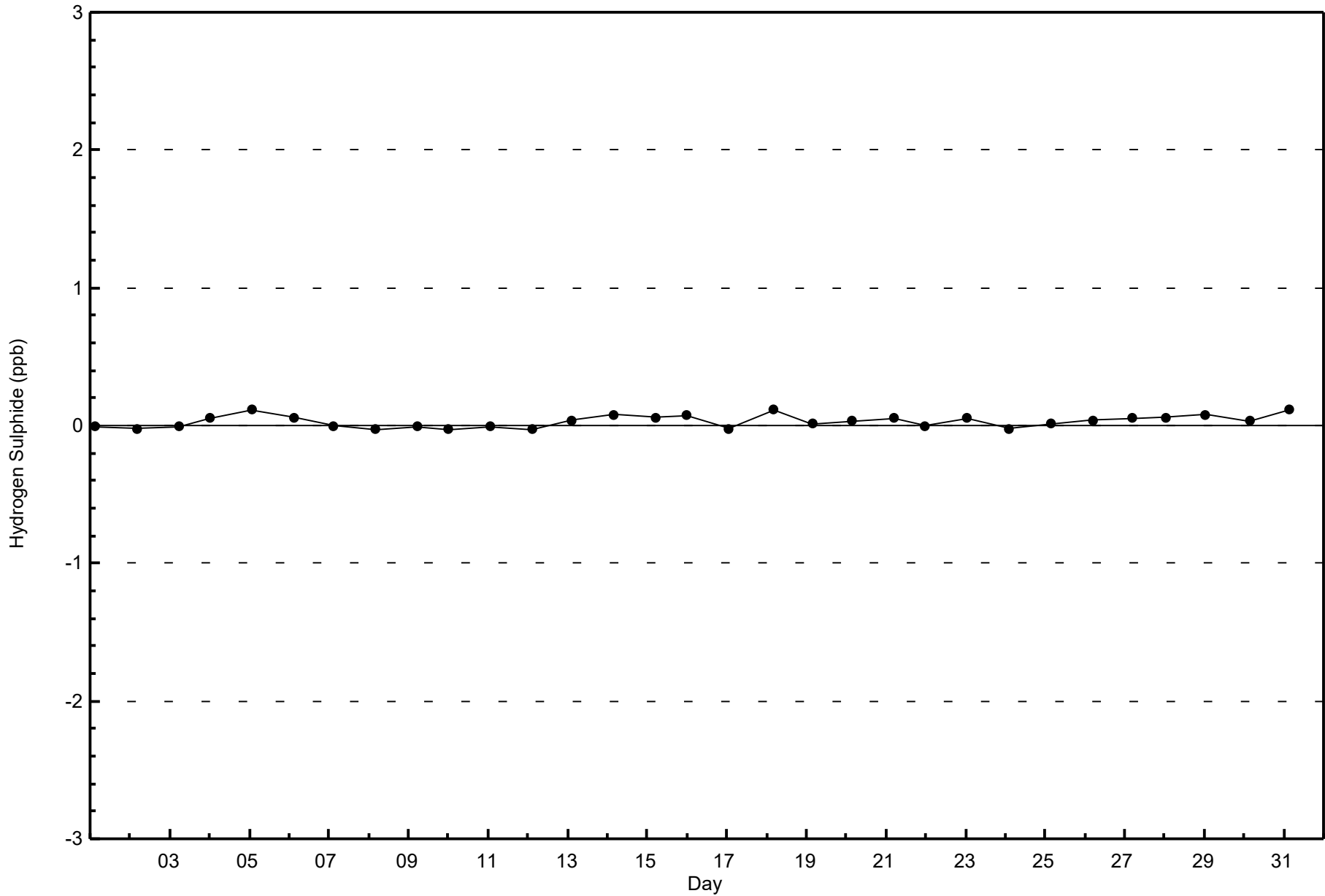


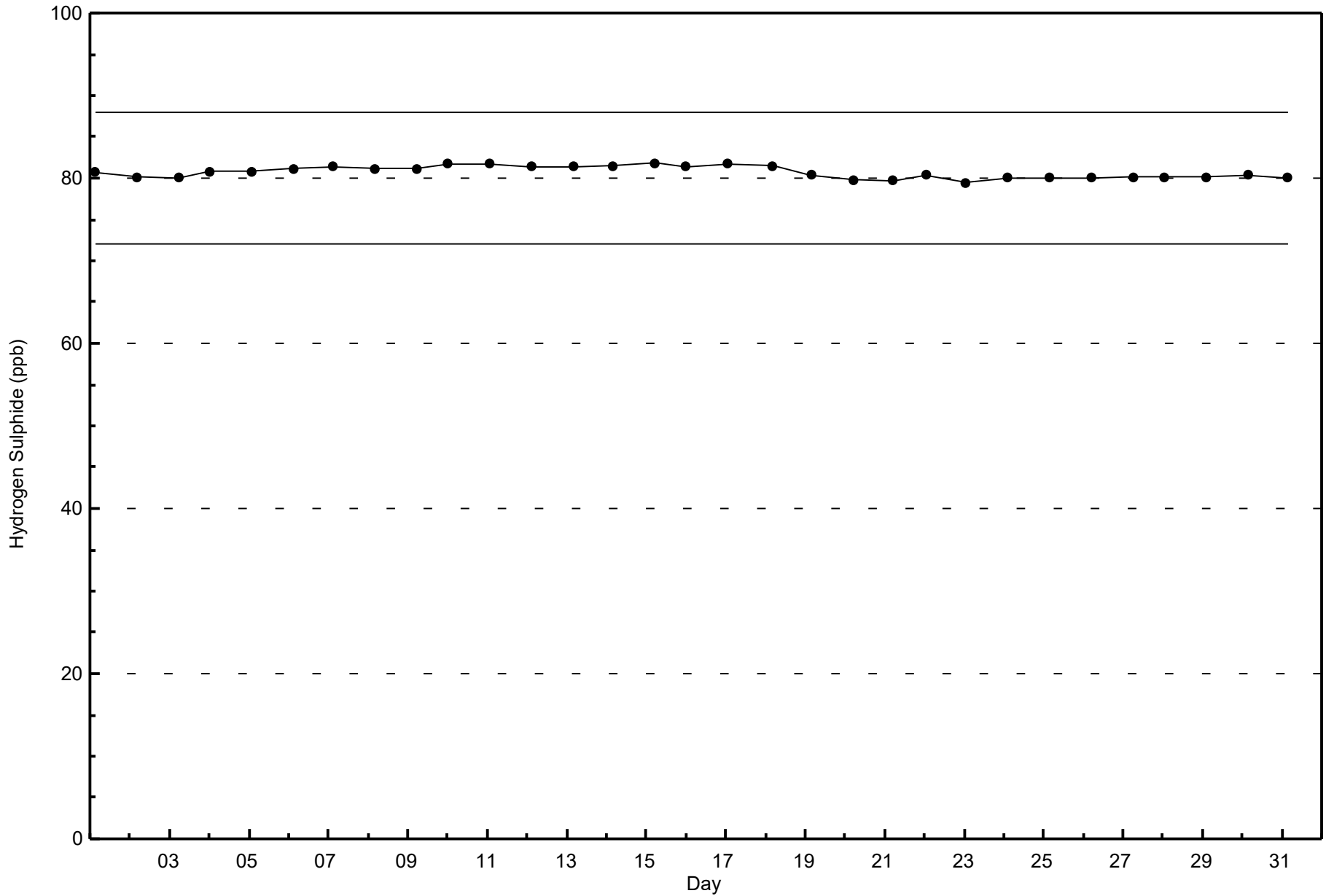
Wood Buffalo Environmental Association
Wind Rose Dec 2023

Hydrogen Sulphide (H₂S) - ppb
Mildred Lake



Total Number of Valid Hours: 703



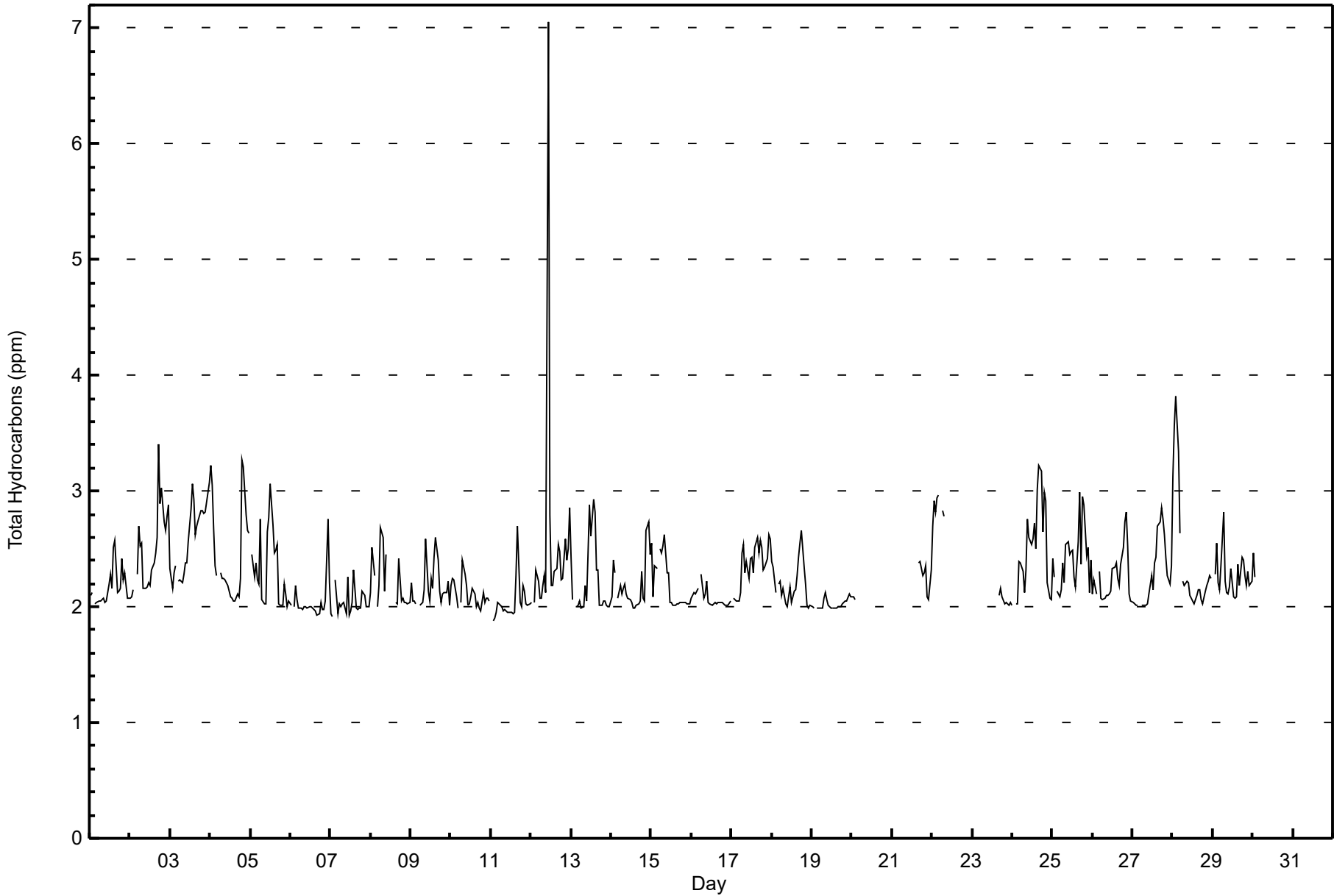




Wood Buffalo Environmental Association
Summary of Hour Averages

Total Hydrocarbons (THC) - ppm
Mildred Lake - December 2023

Maximum Value: 7.1 ppm on Dec 12 11:00		Maximum Daily Average: 2.6 ppm on Dec 3		Hours in Service: 744																																												
Minimum Value: 1.9 ppm on Dec 11 02:00		Minimum Daily Average: 2.0 ppm on Dec 19		Hours of Data: 602																																												
Maximum Diurnal Average: 2.4 ppm at hour 11		Minimum Diurnal Average: 2.2 ppm at hour 6		Hours of Missing Data: 142																																												
Monthly Average: 2.26 ppm		Percentiles: P ₁ = 1.9 P ₁₀ = 2.0 Q ₁ = 2.0 Median = 2.2 Q ₃ = 2.4 P ₉₀ = 2.7 P ₉₉ = 3.2		Hours of Calibration: 37																																												
				Percent Operational Time: 85.9																																												
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-Dec	2.1	2.1	Z	2.0	2.0	2.0	2.1	2.1	2.1	2.0	2.0	2.2	2.3	2.2	2.5	2.6	2.1	2.1	2.2	2.4	2.2	2.3	2.1	2.1	2.2	2.6																						
2-Dec	2.1	2.1	2.1	Z	2.3	2.7	2.5	2.6	2.2	2.2	2.2	2.2	2.3	2.4	2.5	2.6	3.4	2.9	3.0	2.7	2.7	2.8	2.9	2.5	3.4																							
3-Dec	2.3	2.2	2.3	2.4	Z	2.2	2.2	2.2	2.3	2.4	2.4	2.6	2.8	3.1	2.9	2.6	2.7	2.7	2.8	2.8	2.8	2.9	3.1	2.6	3.1																							
4-Dec	3.2	3.0	2.7	2.4	2.3	Z	2.3	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.3	3.3	3.2	2.8	2.7	2.6	3.3																							
5-Dec	Z	2.5	2.3	2.4	2.2	2.2	2.8	2.1	2.0	2.0	2.6	2.8	3.1	2.7	2.5	2.5	2.5	2.0	2.0	2.2	2.1	2.0	2.0	2.3	3.1																							
6-Dec	2.0	Z	2.0	2.2	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	2.0	2.0	2.0	2.0	2.8	2.2	2.0	2.8																							
7-Dec	1.9	1.9	Z	2.2	1.9	2.0	2.0	2.0	2.0	1.9	2.3	1.9	2.0	2.0	2.3	2.0	2.0	2.0	2.1	2.1	2.0	2.0	2.0	2.0	2.3																							
8-Dec	2.1	2.5	2.3	Z	2.0	2.2	2.7	2.6	2.1	2.4	C	C	C	C	C	2.0	2.0	2.4	2.0	2.1	2.0	2.0	2.0	2.2	2.7																							
9-Dec	2.2	2.1	2.1	2.0	Z	2.0	2.0	2.0	2.1	2.6	2.1	2.1	2.2	2.2	2.4	2.6	2.4	2.1	2.0	2.1	2.1	2.1	2.2	2.0	2.6																							
10-Dec	2.2	2.2	2.2	2.1	2.0	Z	2.0	2.4	2.3	2.2	2.0	2.0	2.1	2.2	2.1	2.0	2.0	2.0	2.0	2.1	2.0	2.1	2.1	2.0	2.4																							
11-Dec	Z	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	2.0	2.3	2.7	2.0	2.0	2.2	2.1	2.0	2.0	2.0	2.7																							
12-Dec	2.0	Z	2.0	2.3	2.2	2.1	2.1	2.2	2.3	2.1	7.1	2.8	2.2	2.2	2.3	2.3	2.5	2.5	2.2	2.2	2.6	2.4	2.5	2.8	7.1																							
13-Dec	2.4	2.1	Z	2.0	2.0	2.0	2.0	2.0	2.2	2.0	2.5	2.9	2.6	2.9	2.8	2.3	2.3	2.0	2.0	2.1	2.1	2.0	2.0	2.2	2.9																							
14-Dec	2.1	2.4	2.3	Z	2.1	2.2	2.1	2.2	2.2	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.3	2.1	2.0	2.7	2.7	2.5	2.7																							
15-Dec	2.6	2.1	2.4	2.3	Z	2.5	2.5	2.5	2.6	2.3	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	2.2	2.6																							
16-Dec	2.1	2.1	2.1	2.1	2.2	Z	2.3	2.1	2.1	2.2	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.3																							
17-Dec	Z	2.1	2.1	2.0	2.1	2.1	2.5	2.5	2.3	2.4	2.3	2.4	2.4	2.3	2.5	2.6	2.5	2.6	2.5	2.3	2.3	2.4	2.6	2.6	2.6																							
18-Dec	2.4	2.3	2.1	Z	2.2	2.2	2.1	2.2	2.0	2.0	2.1	2.2	2.0	2.1	2.1	2.3	2.4	2.5	2.7	2.3	2.2	2.0	2.0	2.2	2.7																							
19-Dec	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1																							
20-Dec	2.1	2.1	2.1	Z	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	2.1																							
21-Dec	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	M	M	C	C	C	2.4	2.4	2.3	2.3	2.3	2.1	2.1	2.3	2.4																							
22-Dec	2.7	2.9	2.8	2.9	3.0	Z	2.8	2.8	UO	UO	2.1	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	2.2	UO	3.0																								
23-Dec	Z	2.2	UO	2.1	UO	UO	UO	UO	UO	UO	UO	UO	M	M	M	M	2.1	2.2	2.1	2.0	2.0	2.0	2.0	2.2																								
24-Dec	2.0	Z	2.0	2.0	2.4	2.4	2.3	2.1	2.3	2.8	2.6	2.5	2.6	2.7	2.5	3.0	3.2	3.2	2.6	3.0	2.9	2.2	2.1	2.1	3.2																							
25-Dec	2.4	2.3	Z	2.1	2.1	2.1	2.4	2.2	2.5	2.6	2.5	2.5	2.5	2.3	2.2	2.6	3.0	2.4	2.9	2.9	2.4	2.5	2.1	2.4	3.0																							
26-Dec	2.1	2.2	2.1	Z	2.3	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.3	2.3	2.4	2.2	2.2	2.4	2.5	2.7	2.8	2.5	2.1	2.1	2.8																							
27-Dec	2.0	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.1	2.3	2.2	2.4	2.4	2.7	2.7	2.8	2.8	2.6	2.4	2.3	2.2	2.4	2.8																							
28-Dec	3.1	3.6	3.8	3.3	2.6	Z	2.2	2.2	2.2	2.2	2.1	2.1	2.0	2.0	2.1	2.1	2.2	2.1	2.0	2.1	2.2	2.2	2.3	2.2	3.8																							
29-Dec	Z	2.3	2.5	2.2	2.1	2.4	2.8	2.2	2.1	2.1	2.2	2.3	2.1	2.1	2.1	2.4	2.2	2.4	2.4	2.3	2.2	2.3	2.2	2.2	2.8																							
30-Dec	2.5	2.3	Z	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	2.5																							
31-Dec	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	--																							
																								2.3	2.3	2.3	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.4	2.3	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.3	Diurnal Average	
																								3.2	3.6	3.8	3.3	3.0	2.7	2.8	2.8	2.6	2.8	7.1	2.9	3.1	3.1	2.9	3.0	3.2	3.4	2.9	3.3	3.2	2.8	2.9	3.1	Diurnal Maximum
Z - zerospan																								C - Calibration				M - Maintenance				AF - Analyzer Failure				UO - Unstable Operation												





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Mildred Lake - December 2023

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	180	29.90	29.90
2.1 - 3.0	408	67.77	97.67
3.1 - 10.0	14	2.33	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 602

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Total Hydrocarbons (THC) - ppm
Mildred Lake - December 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	13	3	3	1	2	3	9	34	30	44	12	6	4	5	3	179
2.1 - 3.0	25	7	3	0	1	10	68	116	73	18	17	18	18	14	2	15	405
3.1 - 10.0	5	0	0	0	1	1	1	4	1	0	0	0	0	0	0	0	13
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	37	20	6	3	3	13	72	129	108	48	61	30	24	18	7	18	597

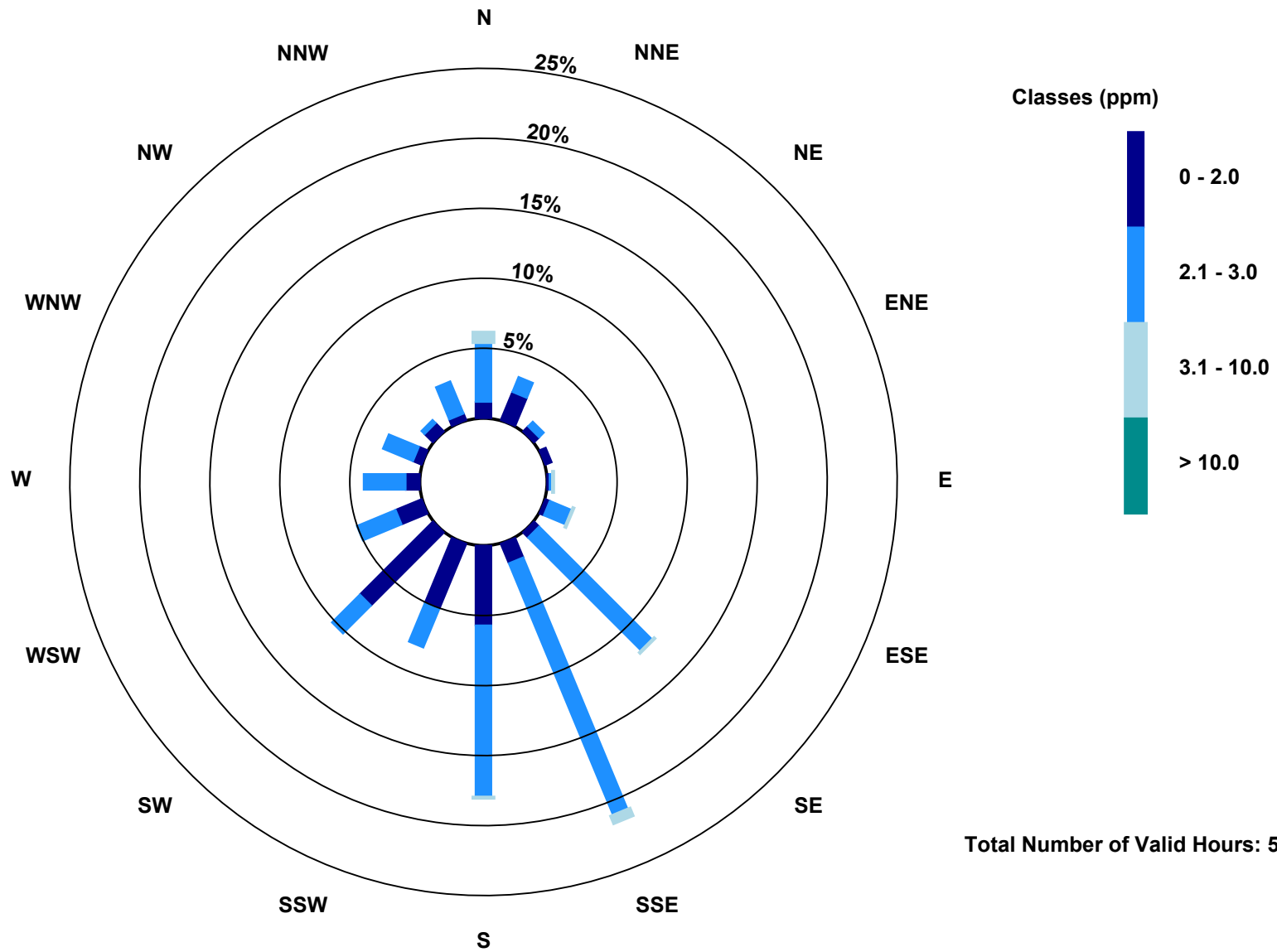
Total Number of Valid Hours: 597

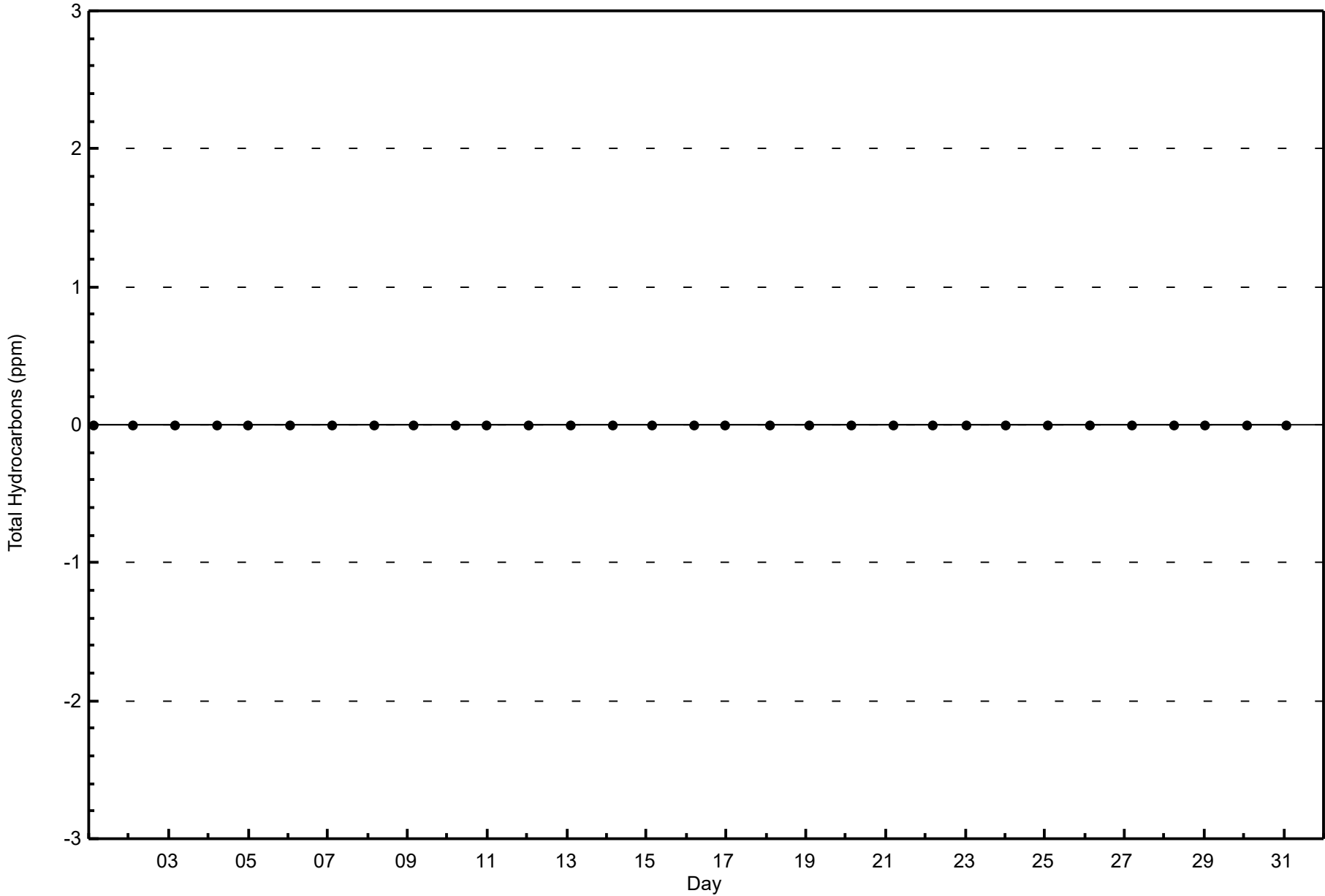
Total Number of Hours: 744

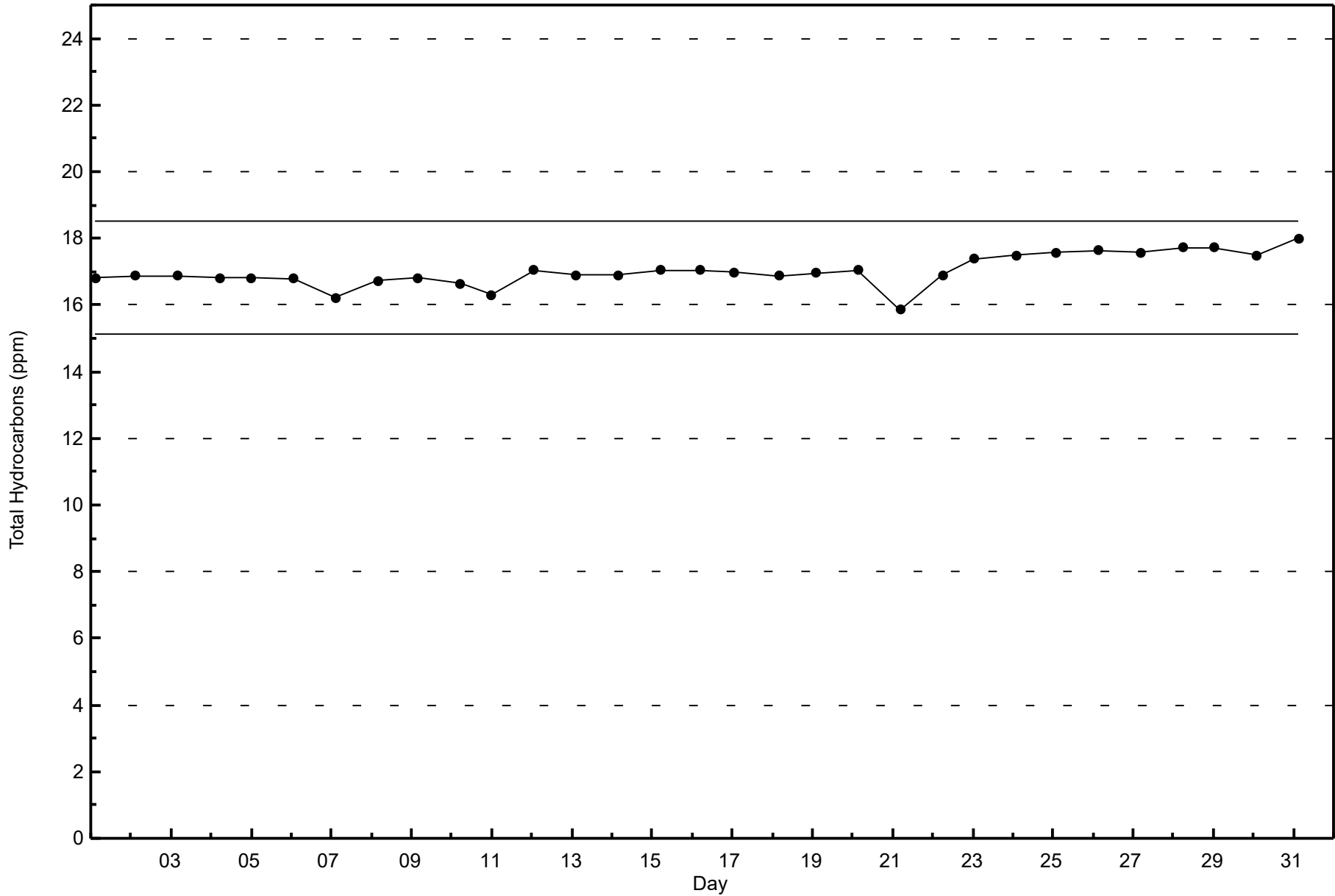


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Total Hydrocarbons (THC) - ppm
Mildred Lake









Summary of Hour Averages

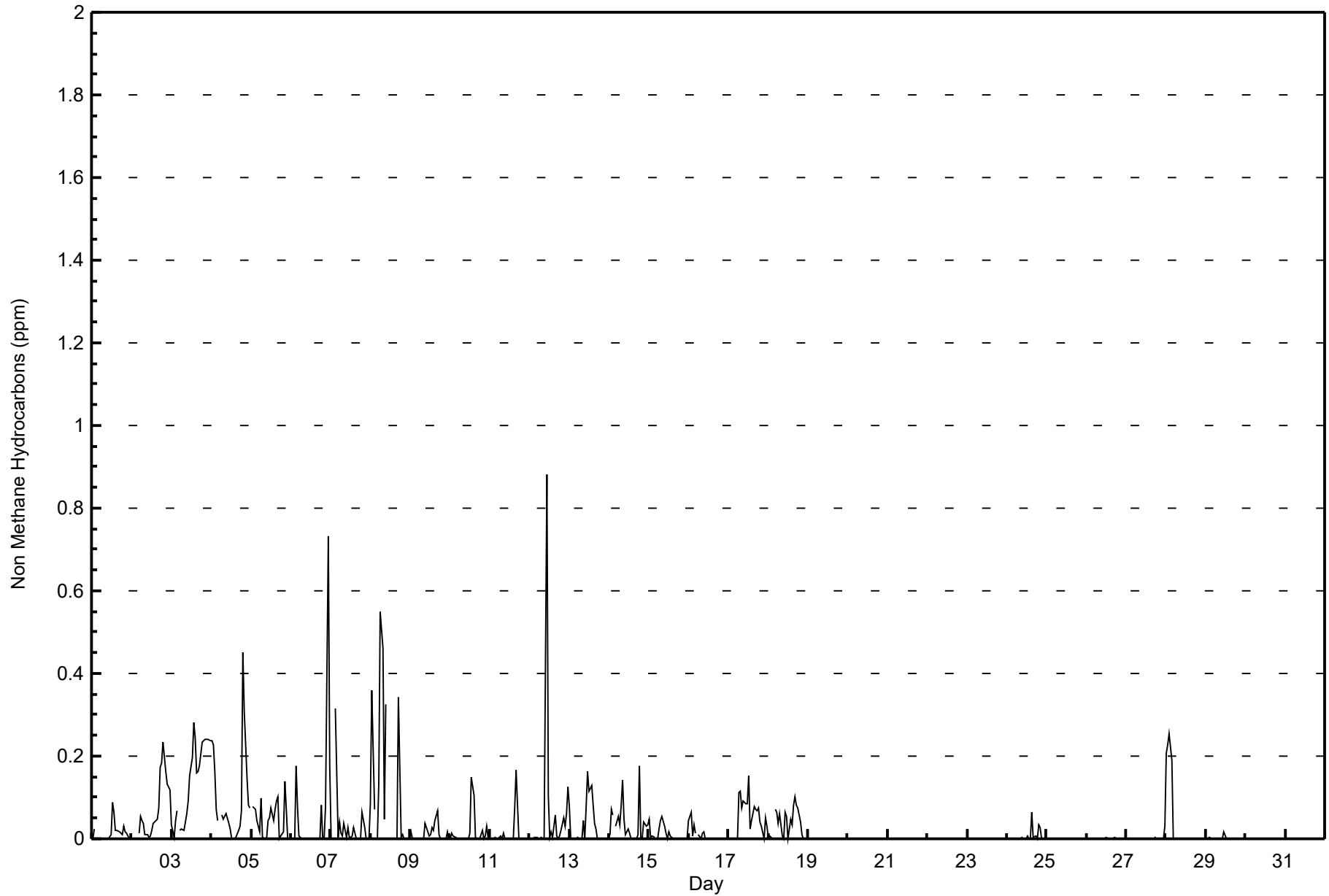
Mildred Lake - December 2023

Maximum Value: 0.880 ppm on Dec 12 11:00		Maximum Daily Average: 0.140 ppm on Dec 3		Hours in Service: 744																											
Minimum Value: 0.000 ppm on Dec 1 04:00		Minimum Daily Average: 0.000 ppm on Dec 25		Hours of Data: 602																											
Maximum Diurnal Average: 0.054 ppm at hour 11		Minimum Diurnal Average: 0.013 ppm at hour 5		Hours of Missing Data: 142																											
Monthly Average: 0.034 ppm		Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.0 Median = 0.0 Q ₃ = 0.0 P ₉₀ = 0.1 P ₉₉ = 0.3		Hours of Calibration: 37																											
				Percent Operational Time: 85.9																											
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-Dec	0.001	0.025	Z	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.011	0.088	0.064	0.020	0.021	0.016	0.013	0.009	0.032	0.015	0.013	0.000	0.000	0.014	0.088					
2-Dec	0.000	0.000	0.000	Z	0.014	0.054	0.043	0.038	0.010	0.011	0.003	0.007	0.021	0.037	0.044	0.047	0.076	0.172	0.183	0.234	0.163	0.132	0.126	0.118	0.067	0.234					
3-Dec	0.035	0.005	0.045	0.067	Z	0.019	0.024	0.020	0.042	0.061	0.093	0.152	0.196	0.281	0.245	0.158	0.162	0.176	0.233	0.239	0.239	0.241	0.241	0.236	0.140	0.281					
4-Dec	0.239	0.226	0.163	0.070	0.045	Z	0.058	0.048	0.053	0.060	0.038	0.025	0.000	0.001	0.001	0.004	0.019	0.029	0.068	0.450	0.309	0.145	0.081	0.075	0.096	0.450					
5-Dec	Z	0.076	0.071	0.044	0.032	0.018	0.100	0.003	0.000	0.002	0.044	0.050	0.074	0.046	0.071	0.092	0.100	0.000	0.008	0.015	0.140	0.071	0.000	0.000	0.046	0.140					
6-Dec	0.000	Z	0.000	0.175	0.076	0.006	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	0.076	0.731	0.176	0.058	0.731					
7-Dec	0.000	0.000	Z	0.314	0.004	0.041	0.014	0.006	0.036	0.003	0.026	0.002	0.002	0.006	0.028	0.000	0.000	0.000	0.000	0.065	0.028	0.000	0.000	0.000	0.025	0.314					
8-Dec	0.085	0.359	0.070	Z	0.000	0.131	0.551	0.460	0.049	0.324	C	C	C	C	C	0.000	0.000	0.344	0.003	0.011	0.000	0.000	0.000	0.000	0.133	0.551					
9-Dec	0.018	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.037	0.018	0.008	0.011	0.028	0.019	0.046	0.067	0.011	0.000	0.000	0.000	0.018	0.000	0.012	0.067					
10-Dec	0.001	0.014	0.007	0.002	0.000	Z	0.000	0.000	0.001	0.000	0.000	0.000	0.014	0.151	0.104	0.002	0.000	0.000	0.000	0.020	0.001	0.008	0.030	0.003	0.016	0.151					
11-Dec	Z	0.000	0.000	0.002	0.000	0.000	0.005	0.000	0.013	0.001	0.000	0.000	0.000	0.000	0.000	0.074	0.167	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.167					
12-Dec	0.000	Z	0.000	0.003	0.002	0.000	0.000	0.002	0.001	0.000	0.880	0.106	0.003	0.016	0.003	0.059	0.008	0.000	0.005	0.020	0.052	0.032	0.060	0.125	0.060	0.880					
13-Dec	0.078	0.000	Z	0.000	0.000	0.002	0.000	0.000	0.046	0.001	0.079	0.162	0.114	0.127	0.082	0.038	0.025	0.000	0.000	0.001	0.000	0.001	0.001	0.000	0.033	0.162					
14-Dec	0.010	0.072	0.056	Z	0.029	0.054	0.033	0.081	0.143	0.048	0.012	0.022	0.013	0.001	0.000	0.000	0.000	0.012	0.176	0.003	0.000	0.041	0.030	0.035	0.038	0.176					
15-Dec	0.047	0.004	0.005	0.004	Z	0.000	0.024	0.043	0.054	0.031	0.013	0.002	0.018	0.008	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.054					
16-Dec	0.043	0.063	0.007	0.035	0.014	Z	0.012	0.000	0.014	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	0.000	0.000	0.009	0.063					
17-Dec	Z	0.000	0.000	0.000	0.000	0.000	0.111	0.117	0.076	0.093	0.086	0.085	0.151	0.025	0.043	0.077	0.070	0.066	0.075	0.040	0.030	0.001	0.050	0.030	0.053	0.151					
18-Dec	0.003	0.008	0.000	Z	0.070	0.064	0.039	0.061	0.008	0.002	0.066	0.055	0.000	0.047	0.034	0.081	0.103	0.083	0.074	0.040	0.010	0.000	0.000	0.000	0.037	0.103					
19-Dec	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	0.000	0.001					
20-Dec	0.000	0.000	0.000	Z	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	--	0.000					
21-Dec	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	M	M	C	C	C	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	--	0.000					
22-Dec	0.000	0.000	0.000	0.000	0.000	Z	0.000	0.000	UO	UO	0.000	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	--	0.000					
23-Dec	Z	0.067	UO	0.000	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	--	0.067					
24-Dec	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.006	0.000	0.000	0.063	0.003	0.006	0.000	0.035	0.027	0.000	0.000	0.000	0.006	0.063					
25-Dec	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					
26-Dec	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.005	0.001	0.000	0.000	0.000	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.005					
27-Dec	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	0.000	0.000	0.000	0.000	0.031	0.001	0.031					
28-Dec	0.206	0.226	0.254	0.191	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	0.038	0.254					
29-Dec	Z	0.002	0.002	0.000	0.000	0.000	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					
30-Dec	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					
31-Dec	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	--	--					
																								Diurnal Average							
																								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
Mildred Lake - December 2023





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 0.005	367	60.96	60.96
0.006 - 0.05	124	20.60	81.56
0.06 - 0.1	70	11.63	93.19
> 0.1	41	6.81	100.00

Total Number of Valid Hours: 602

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

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

Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 0.005	20	18	5	3	1	8	42	73	74	34	46	10	9	6	6	10	365
0.006 - 0.05	4	1	1	0	0	2	14	37	22	9	5	7	12	7	1	2	124
0.06 - 0.1	3	1	0	0	0	3	12	14	9	2	7	8	3	5	0	3	70
> 0.1	10	0	0	0	2	0	4	5	3	3	3	5	0	0	0	3	38
Totals	37	20	6	3	3	13	72	129	108	48	61	30	24	18	7	18	597

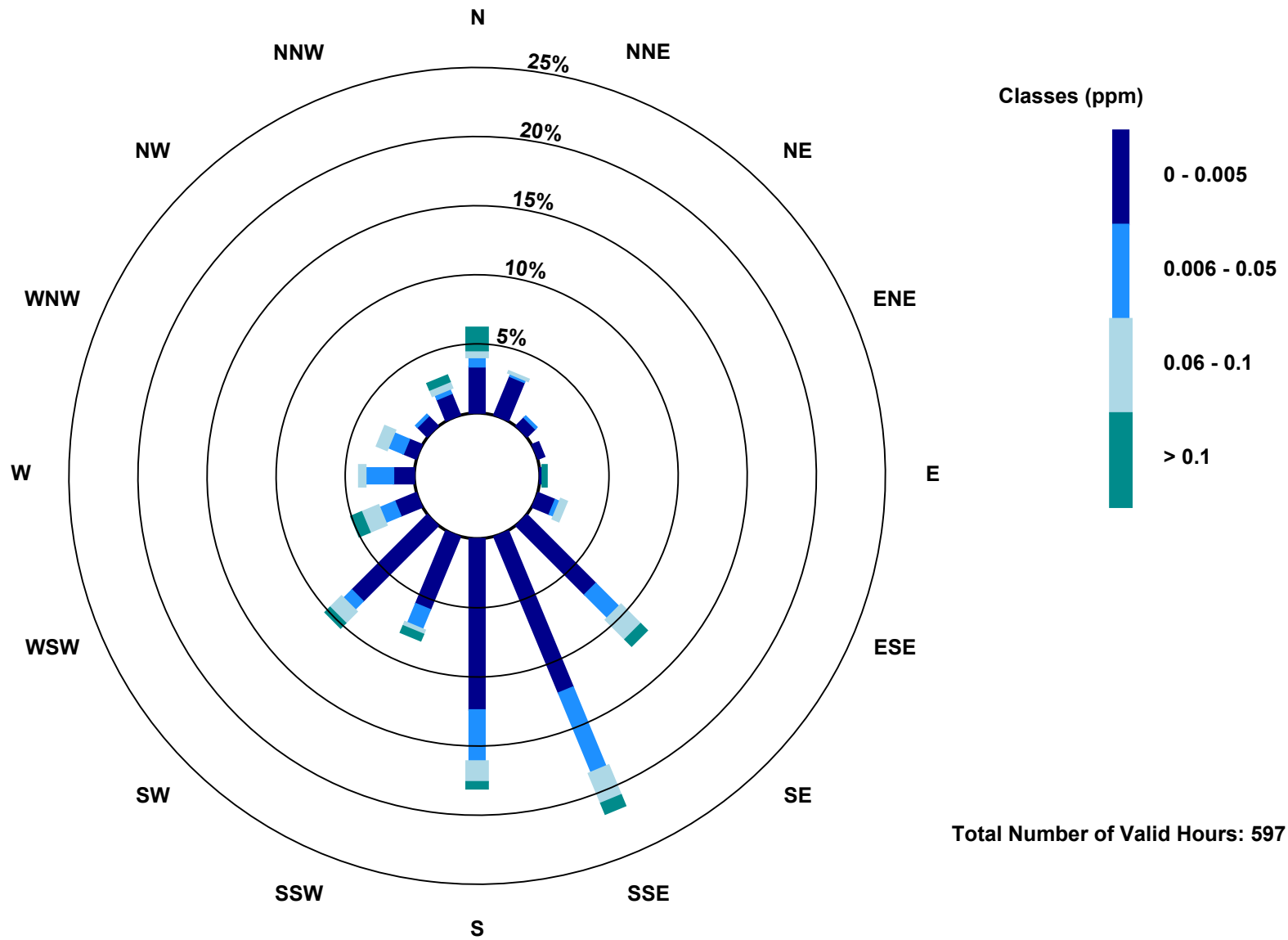
Total Number of Valid Hours: 597

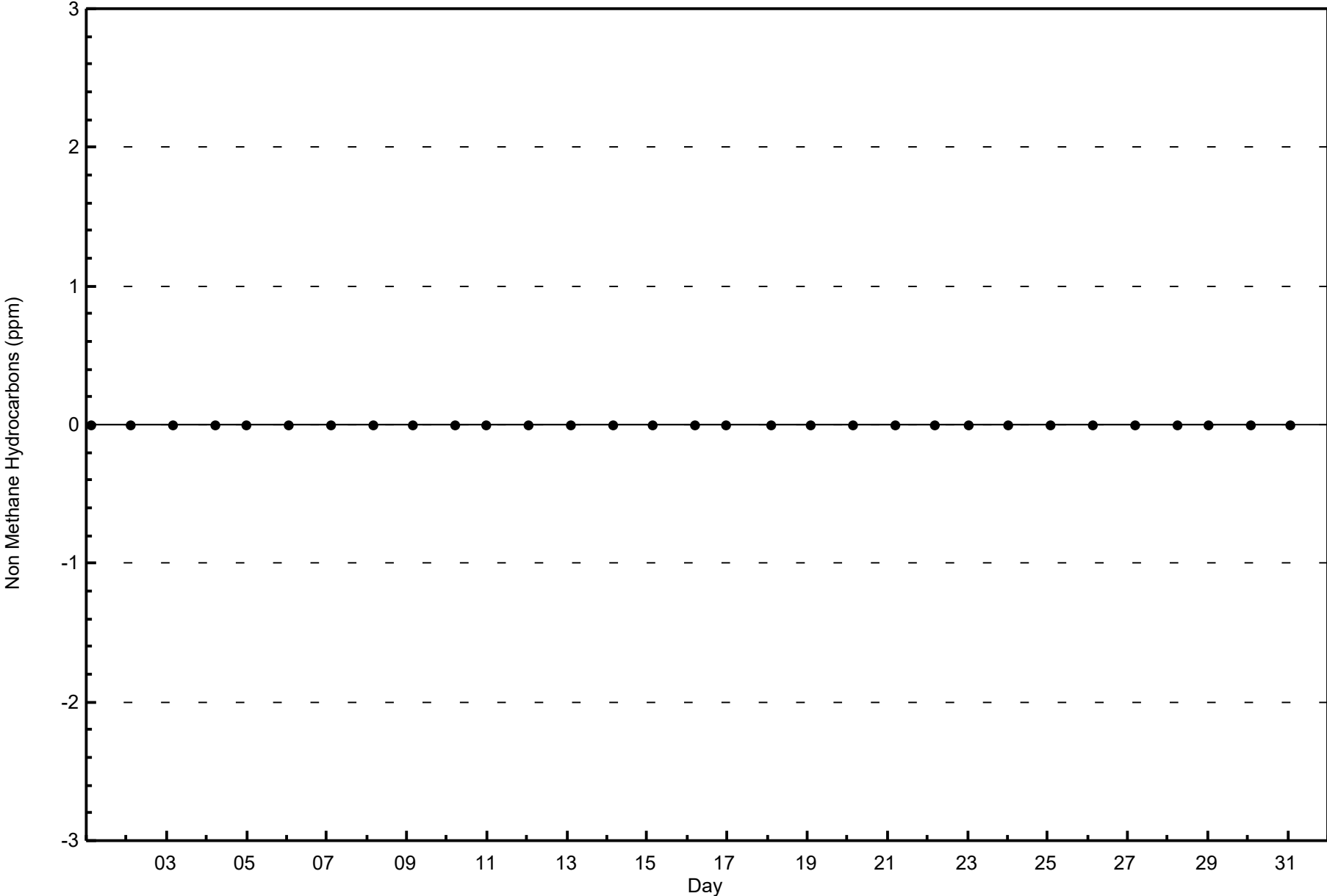
Total Number of Hours: 744

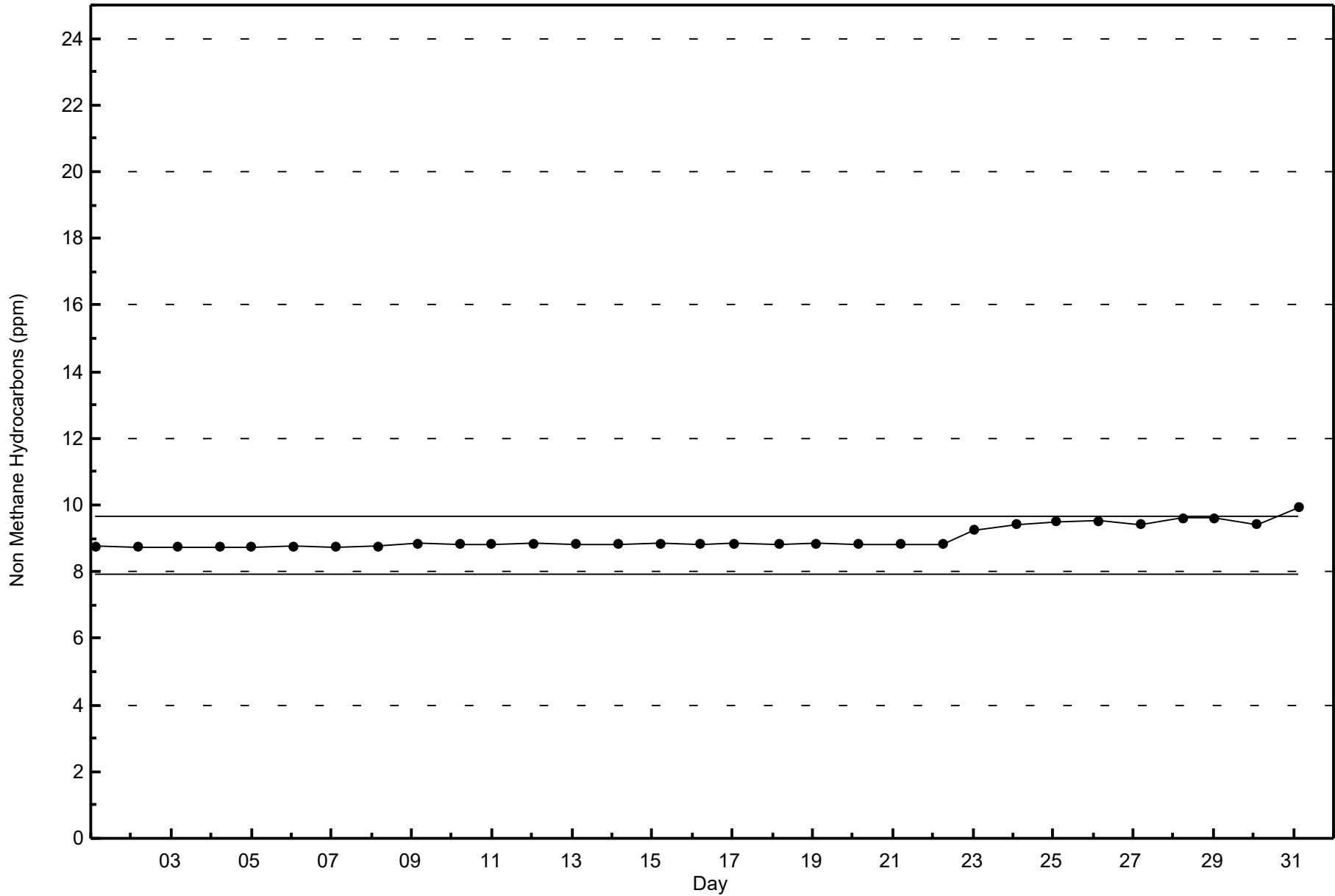


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Non Methane Hydrocarbons (NMHC) - ppm
Mildred Lake









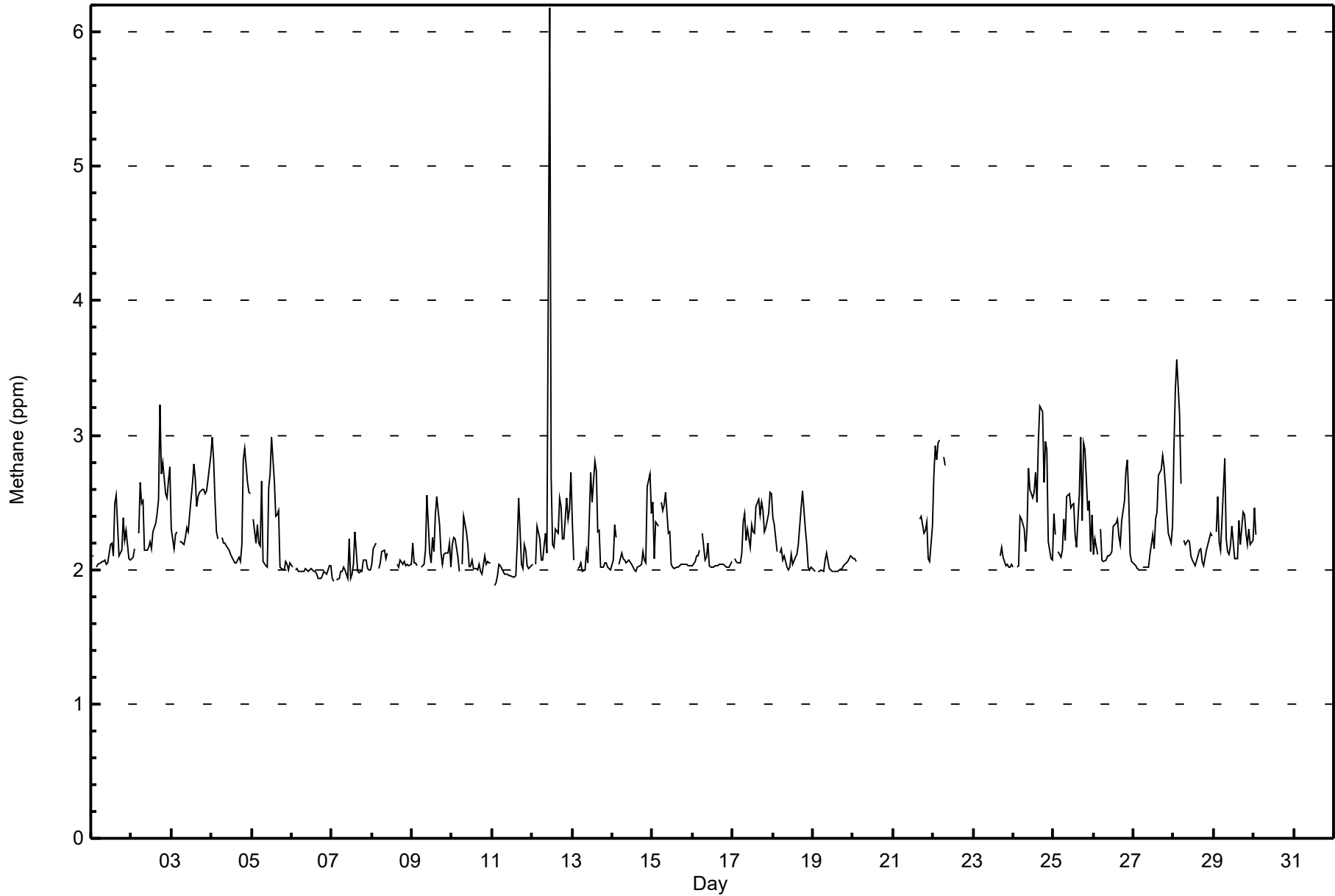
Wood Buffalo Environmental Association

Summary of Hour Averages

Methane (CH₄) - ppm

Mildred Lake - December 2023

Number of Exceedences (AAAQO):		1-hr: 0	24-hr: 0	Hours in Service: 744																	Daily Average		Daily Maximum																										
Maximum Value: 6.2 ppm on Dec 12 11:00		Maximum Daily Average: 2.5 ppm on Dec 24																	Hours of Data: 602		Hours of Missing Data: 142																												
Minimum Value: 1.9 ppm on Dec 11 02:00		Minimum Daily Average: 2.0 ppm on Dec 6																	Hours of Calibration: 37		Percent Operational Time: 85.9																												
Maximum Diurnal Average: 2.3 ppm at hour 11		Minimum Diurnal Average: 2.1 ppm at hour 6																																															
Monthly Average: 2.23 ppm		Percentiles: P ₁ = 1.9 P ₁₀ = 2.0 Q ₁ = 2.0 Median = 2.1 Q ₃ = 2.3 P ₉₀ = 2.6 P ₉₉ = 3.2																																															
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-Dec	2.1	2.1	Z	2.0	2.0	2.0	2.1	2.1	2.1	2.0	2.0	2.2	2.2	2.1	2.5	2.6	2.1	2.1	2.1	2.4	2.2	2.3	2.1	2.1	2.2	2.6	2.4	3.2																					
2-Dec	2.1	2.1	2.1	Z	2.3	2.6	2.5	2.5	2.1	2.1	2.2	2.2	2.2	2.3	2.3	2.4	2.5	3.2	2.7	2.8	2.6	2.5	2.7	2.8	2.5	2.8	2.5	2.8																					
3-Dec	2.3	2.2	2.3	2.3	Z	2.2	2.2	2.2	2.2	2.3	2.3	2.4	2.6	2.8	2.7	2.5	2.5	2.6	2.6	2.6	2.6	2.6	2.7	2.8	2.5	2.8	2.5	2.8																					
4-Dec	3.0	2.8	2.5	2.3	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	2.2	2.8	2.9	2.7	2.6	2.6	2.3	3.0	2.3	3.0																					
5-Dec	Z	2.4	2.2	2.3	2.2	Z	2.2	2.7	2.1	2.0	2.0	2.6	2.7	3.0	2.7	2.4	2.4	2.0	2.0	2.0	2.1	2.0	2.0	2.0	2.3	3.0	2.3	3.0																					
6-Dec	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	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0																				
7-Dec	1.9	1.9	Z	1.9	1.9	2.0	2.0	2.0	2.0	1.9	2.2	1.9	2.0	2.0	2.3	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																				
8-Dec	2.0	2.2	2.2	Z	2.0	2.0	2.1	2.1	2.1	2.1	C	C	C	C	C	2.0	2.0	2.1	2.0	2.1	2.0	2.0	2.0	2.0	2.1	2.2	2.1	2.2																					
9-Dec	2.2	2.1	2.1	2.0	Z	2.0	2.0	2.0	2.1	2.6	2.1	2.0	2.2	2.1	2.4	2.5	2.3	2.1	2.0	2.1	2.1	2.1	2.2	2.0	2.2	2.6	2.2	2.6																					
10-Dec	2.2	2.2	2.2	2.1	2.0	Z	2.0	2.4	2.3	2.2	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.1	2.0	2.0	2.1	2.4	2.1	2.4																					
11-Dec	Z	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	2.0	2.2	2.5	2.0	2.0	2.2	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.5																				
12-Dec	2.0	Z	2.0	2.3	2.2	2.1	2.1	2.2	2.3	2.1	6.2	2.7	2.2	2.2	2.3	2.3	2.5	2.5	2.2	2.2	2.5	2.4	2.4	2.7	2.5	6.2	2.5	6.2																					
13-Dec	2.4	2.1	Z	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.4	2.7	2.5	2.8	2.7	2.3	2.3	2.0	2.0	2.1	2.1	2.0	2.0	2.0	2.2	2.8	2.2	2.8																					
14-Dec	2.1	2.3	2.2	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	2.1	2.1	2.0	2.6	2.7	2.4	2.1	2.7	2.4																					
15-Dec	2.5	2.1	2.4	2.3	Z	2.5	2.4	2.5	2.6	2.3	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	2.2	2.6	2.2	2.6																				
16-Dec	2.0	2.1	2.1	2.1	2.1	Z	2.3	2.1	2.1	2.2	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.3	2.1	2.3	2.3																				
17-Dec	Z	2.1	2.1	2.0	2.1	2.1	2.4	2.4	2.2	2.3	2.2	2.3	2.3	2.3	2.5	2.5	2.4	2.5	2.4	2.3	2.3	2.4	2.6	2.6	2.3	2.6	2.3	2.6	2.6																				
18-Dec	2.4	2.3	2.1	Z	2.1	2.2	2.1	2.1	2.0	2.0	2.0	2.1	2.0	2.1	2.1	2.2	2.3	2.5	2.6	2.3	2.2	2.0	2.0	2.0	2.2	2.6	2.2	2.6	2.6																				
19-Dec	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1																				
20-Dec	2.1	2.1	2.1	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	AF																				
21-Dec	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	M	M	C	C	C	2.4	2.4	2.3	2.3	2.3	2.1	2.1	2.1	2.3	2.4	2.4	2.4	2.4																				
22-Dec	2.7	2.9	2.8	2.9	3.0	Z	2.8	2.8	UO	UO	2.1	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	2.2	UO	2.7	2.9	3.0	3.0																				
23-Dec	Z	2.2	UO	2.1	UO	UO	UO	UO	UO	UO	UO	UO	M	M	M	M	2.1	2.2	2.1	2.0	2.0	2.0	2.0	2.0	2.2	2.2	2.2	2.2	2.2																				
24-Dec	2.0	Z	2.0	2.0	2.4	2.4	2.3	2.1	2.3	2.8	2.6	2.5	2.6	2.7	2.5	3.0	3.2	3.2	2.6	2.9	2.9	2.2	2.1	2.1	2.5	3.2	2.5	3.2	3.2																				
25-Dec	2.4	2.3	Z	2.1	2.1	2.1	2.4	2.2	2.5	2.6	2.5	2.5	2.5	2.3	2.2	2.6	3.0	2.4	2.9	2.9	2.4	2.5	2.1	2.4	2.4	3.0	2.4	3.0	3.0																				
26-Dec	2.1	2.2	2.1	Z	2.3	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.3	2.3	2.4	2.2	2.2	2.4	2.5	2.7	2.8	2.5	2.1	2.1	2.3	2.8	2.3	2.8	2.8																				
27-Dec	2.0	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.1	2.3	2.2	2.4	2.4	2.7	2.7	2.8	2.8	2.6	2.4	2.3	2.2	2.3	2.3	2.8	2.3	2.8	2.8																				
28-Dec	2.9	3.3	3.6	3.2	2.6	Z	2.2	2.2	2.2	2.2	2.1	2.1	2.0	2.0	2.1	2.1	2.2	2.1	2.0	2.1	2.2	2.2	2.3	2.2	2.4	3.6	2.4	3.6	3.6																				
29-Dec	Z	2.3	2.5	2.2	2.1	2.4	2.8	2.2	2.1	2.1	2.2	2.3	2.1	2.1	2.1	2.4	2.2	2.4	2.4	2.3	2.2	2.3	2.2	2.2	2.3	2.8	2.3	2.8	2.8																				
30-Dec	2.5	2.3	Z	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																				
31-Dec	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	UO	UO	UO																				
																								2.2	2.2	2.3	2.2	2.2	2.1	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	2.3	2.3	2.2	2.2	2.2	Diurnal Average	
																								3.0	3.3	3.6	3.2	3.0	2.6	2.8	2.8	2.6	2.8	6.2	2.7	3.0	2.8	2.7	3.0	3.2	3.2	2.9	2.9	2.9	2.7	2.7	2.8	Diurnal Maximum	
Z - zerospan																								C - Calibration				M - Maintenance				AF - Analyzer Failure				UO - Unstable Operation													





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Methane (CH₄) - ppm
Mildred Lake - December 2023

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	198	32.89	32.89
2.1 - 3.0	397	65.95	98.84
3.1 - 10.0	7	1.16	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 602

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Methane (CH₄) - ppm
Mildred Lake - December 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	13	3	3	1	2	4	9	35	31	49	18	9	5	5	3	197
2.1 - 3.0	26	7	3	0	2	10	68	119	73	17	12	12	15	13	2	15	394
3.1 - 10.0	4	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	6
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	37	20	6	3	3	13	72	129	108	48	61	30	24	18	7	18	597

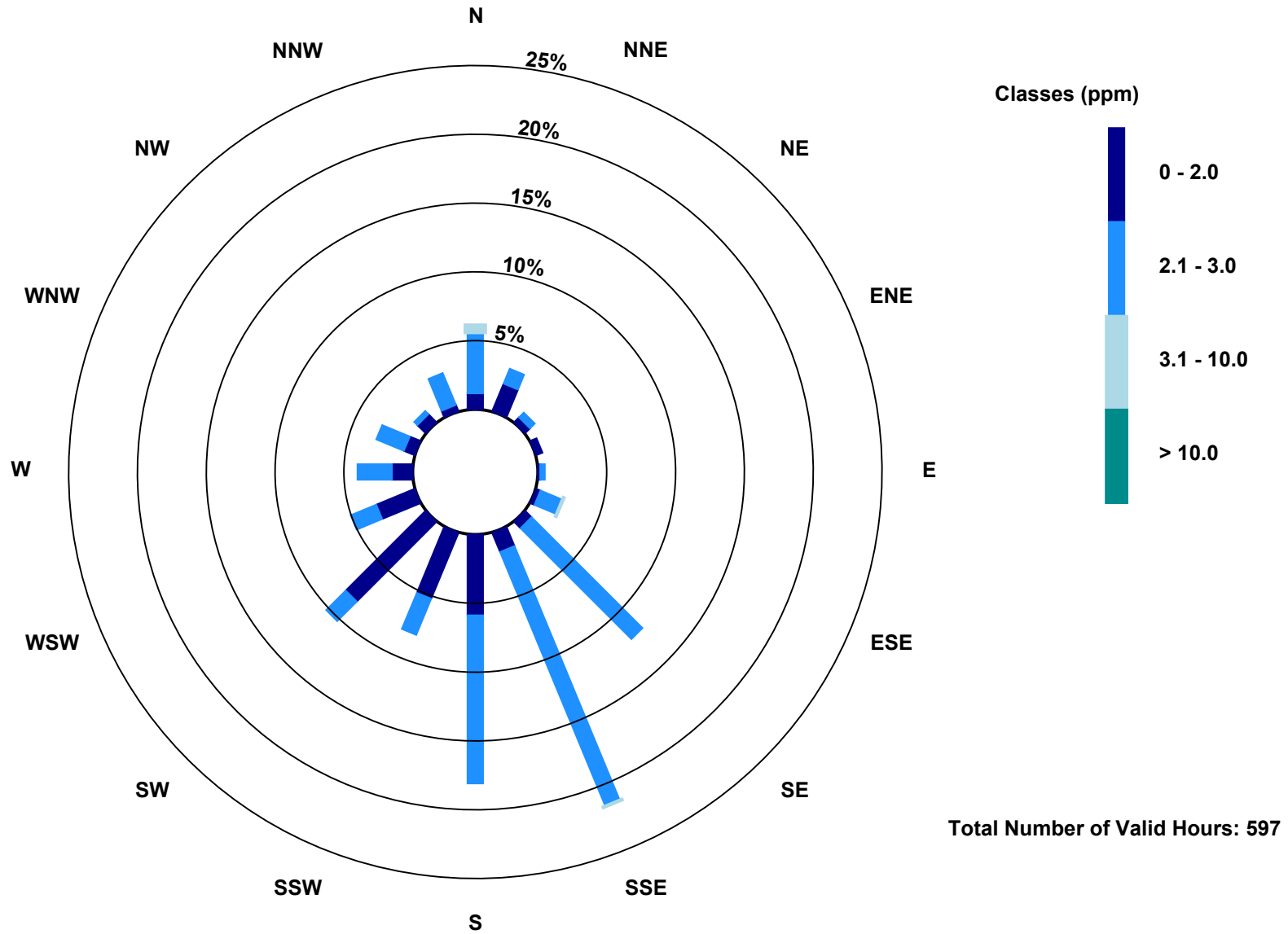
Total Number of Valid Hours: 597

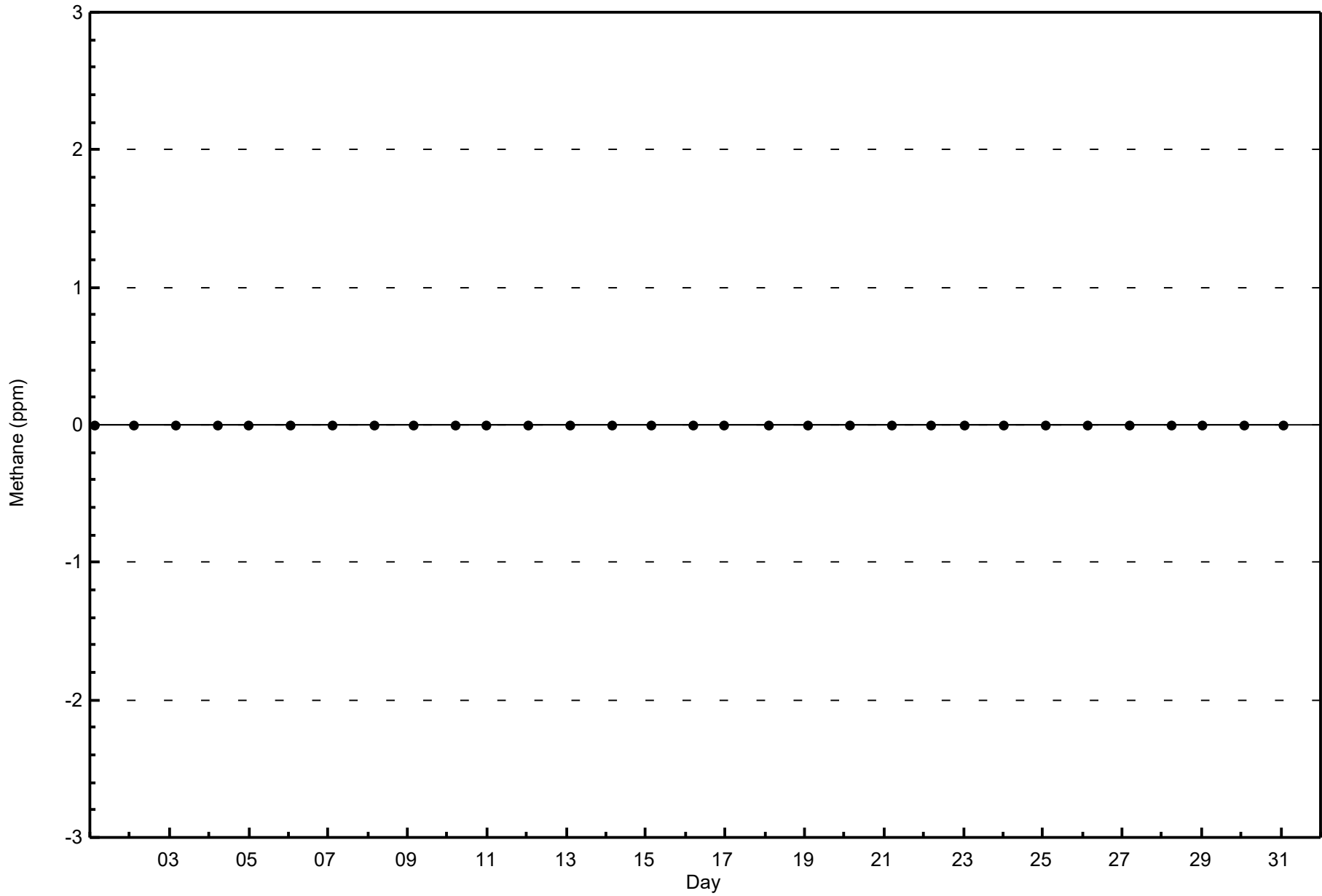
Total Number of Hours: 744

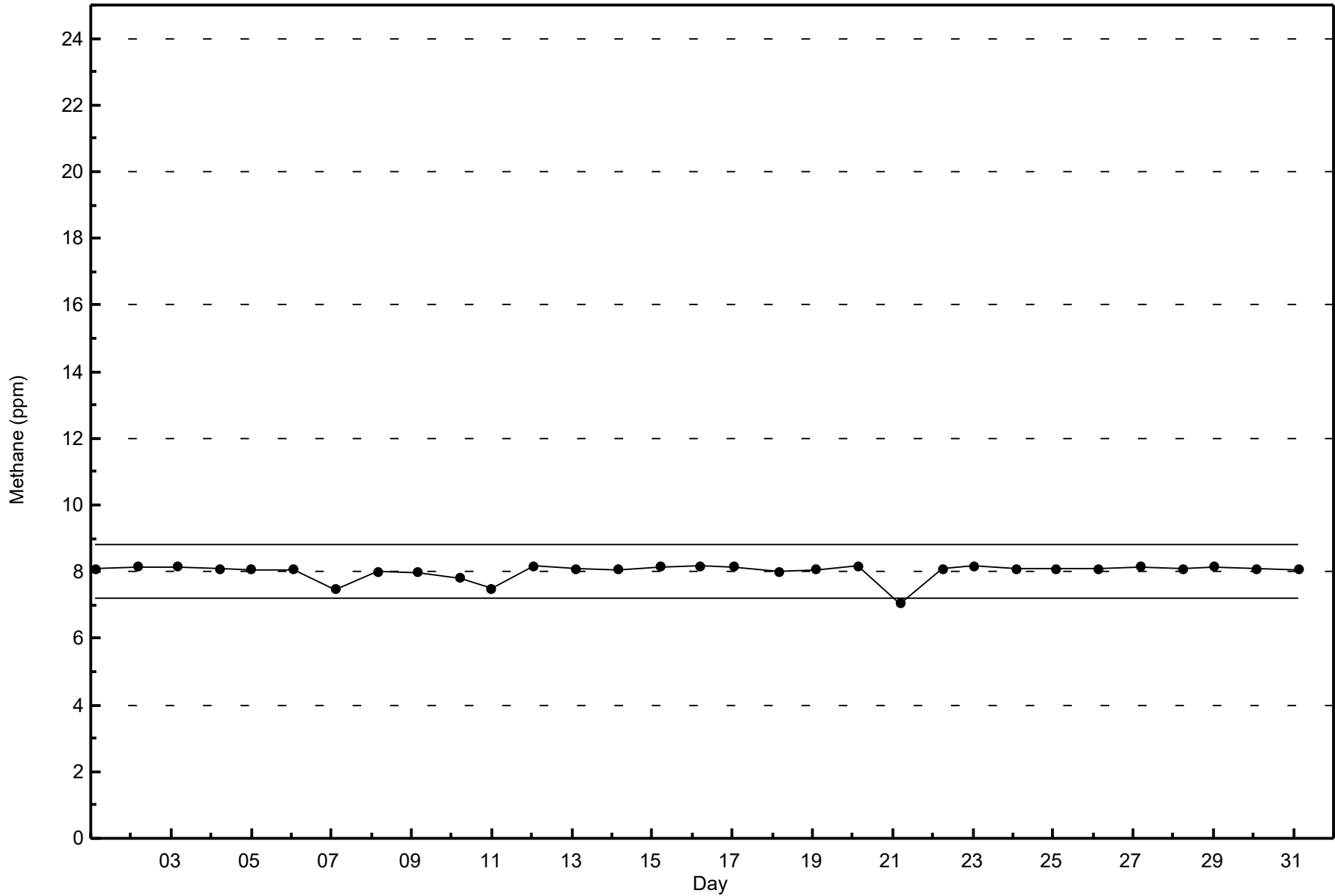


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Methane (CH₄) - ppm
Mildred Lake









Wood Buffalo Environmental Association
Summary of Hour Averages

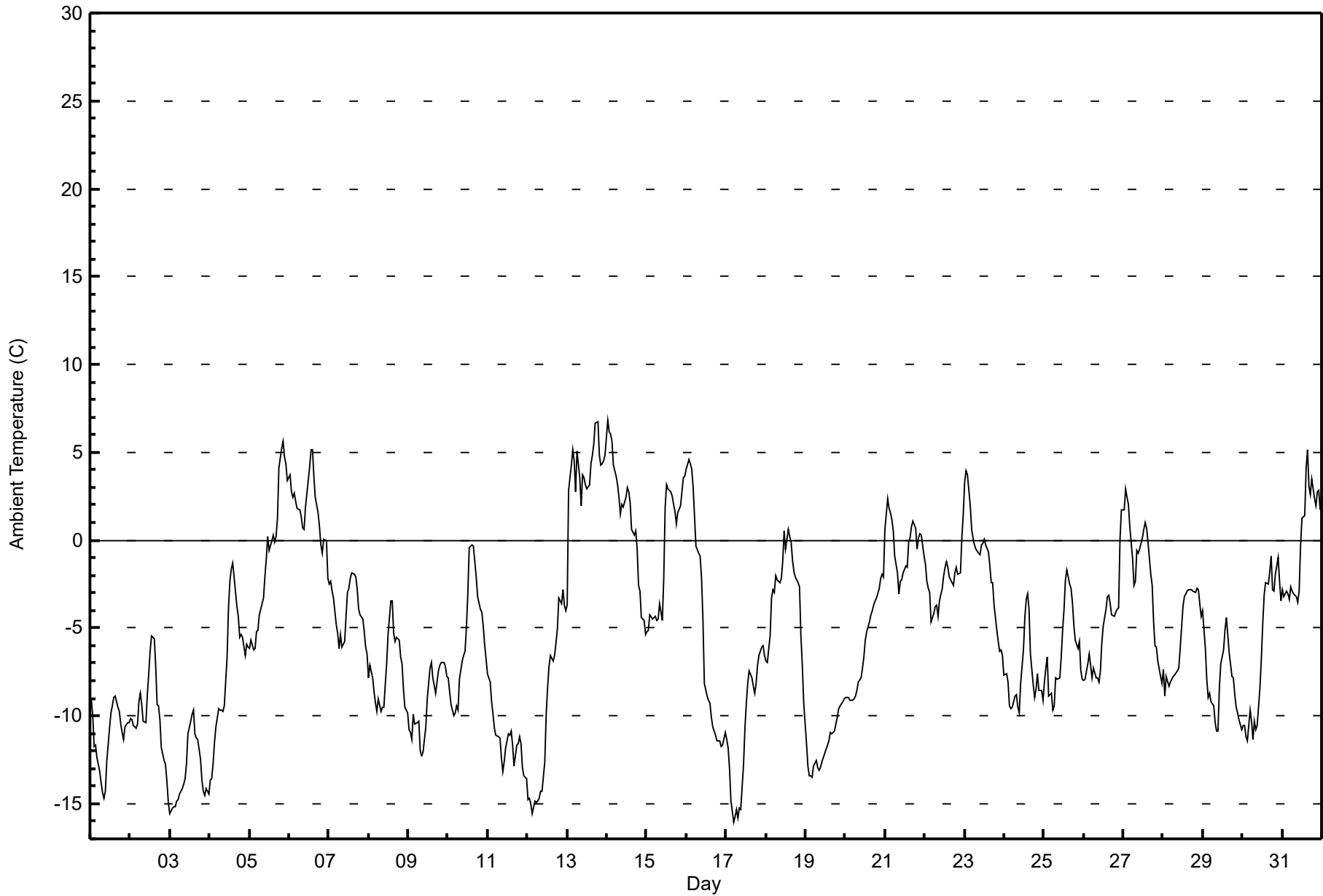
Ambient Temperature (AT) - C
Mildred Lake - December 2023

Maximum Value: 6.8 C on Dec 14 01:00																						Maximum Daily Average: 3.9 C on Dec 13																						Hours in Service: 744	
Minimum Value: -16.1 C on Dec 17 05:00																						Minimum Daily Average: -13.2 C on Dec 3																						Hours of Data: 744	
Maximum Diurnal Average: -2.9 C at hour 15																						Minimum Diurnal Average: -7.1 C at hour 9																						Hours of Missing Data: 0	
Monthly Average: -5.29 C																						Percentiles: P ₁ = -15.2 P ₁₀ = -11.8 Q ₁ = -9.4 Median = -5.5 Q ₃ = -1.6 P ₉₀ = 2.3 P ₉₉ = 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-Dec	-9.2	-10.0	-11.7	-11.7	-12.4	-13.2	-13.8	-14.3	-14.7	-14.3	-12.6	-10.7	-9.8	-9.4	-9.0	-8.9	-9.6	-9.8	-10.5	-10.9	-11.3	-10.6	-10.4	-10.4	-11.2	-8.9																			
2-Dec	-10.2	-10.3	-10.5	-10.7	-10.5	-9.2	-8.7	-9.4	-10.3	-10.4	-8.8	-7.6	-6.3	-5.5	-5.6	-7.2	-9.3	-9.4	-10.3	-11.8	-12.6	-12.8	-13.7	-14.9	-9.8	-5.5																			
3-Dec	-15.6	-15.2	-15.1	-15.2	-14.9	-14.8	-14.4	-14.1	-13.9	-13.6	-12.7	-11.0	-10.3	-9.9	-9.7	-11.0	-11.2	-11.4	-12.4	-13.7	-14.3	-14.6	-14.1	-14.5	-13.2	-9.7																			
4-Dec	-13.6	-13.6	-12.7	-11.5	-10.7	-9.6	-9.7	-9.7	-9.7	-9.5	-6.7	-3.9	-2.3	-1.7	-1.3	-2.1	-3.8	-4.3	-5.5	-5.4	-5.5	-6.6	-6.0	-6.1	-7.1	-1.3																			
5-Dec	-6.1	-5.7	-6.3	-6.1	-5.2	-5.2	-4.3	-3.9	-3.3	-2.1	-1.1	0.2	-0.6	0.0	0.3	-0.1	0.2	1.3	4.1	5.2	5.6	4.7	4.3	3.4	-0.9	5.6																			
6-Dec	3.7	2.7	2.5	2.7	2.2	1.8	1.7	1.4	0.7	0.6	1.9	3.4	4.2	5.1	5.1	3.6	2.4	1.5	0.7	-0.3	-0.7	0.1	-0.1	-2.2	1.9	5.1																			
7-Dec	-2.5	-2.4	-2.9	-3.3	-4.8	-5.3	-6.2	-5.4	-6.1	-5.8	-4.4	-3.0	-2.8	-2.2	-1.9	-1.9	-2.1	-2.8	-4.0	-4.3	-4.5	-5.2	-6.1	-6.5	-4.0	-1.9																			
8-Dec	-7.9	-7.1	-7.8	-8.7	-9.3	-9.8	-9.0	-9.7	-9.5	-9.5	-8.2	-7.1	-5.4	-3.4	-3.4	-5.3	-5.8	-5.6	-5.7	-6.7	-7.0	-8.4	-9.5	-9.9	-7.5	-3.4																			
9-Dec	-10.8	-10.9	-11.4	-9.9	-10.4	-10.4	-10.3	-12.0	-12.3	-12.0	-10.6	-9.1	-8.2	-7.3	-6.9	-7.9	-8.7	-8.0	-7.4	-7.1	-7.0	-6.9	-7.2	-7.8	-9.2	-6.9																			
10-Dec	-7.8	-8.6	-9.4	-10.0	-9.8	-9.4	-9.7	-7.9	-6.9	-6.6	-6.3	-5.0	-3.1	-0.5	-0.3	-0.4	-1.3	-2.1	-3.2	-3.9	-4.1	-4.9	-5.9	-6.7	-5.6	-0.3																			
11-Dec	-7.6	-8.1	-9.2	-9.9	-10.7	-11.1	-11.2	-11.3	-12.4	-13.2	-12.6	-11.9	-11.1	-11.1	-10.9	-11.7	-12.8	-11.7	-11.6	-11.2	-11.6	-12.9	-13.4	-13.6	-11.4	-7.6																			
12-Dec	-14.8	-14.7	-15.0	-15.6	-14.8	-15.0	-14.8	-14.7	-14.3	-14.3	-12.6	-9.9	-8.4	-7.2	-6.6	-6.9	-6.5	-5.9	-5.0	-3.3	-3.6	-2.8	-3.7	-4.0	-9.8	-2.8																			
13-Dec	-3.7	2.8	4.2	5.2	4.5	2.8	5.1	3.6	2.0	3.7	3.5	3.2	2.9	3.2	4.3	4.8	5.5	6.6	6.8	4.8	4.3	4.4	4.5	4.9	3.9	6.8																			
14-Dec	6.8	6.1	6.0	5.6	4.3	3.7	3.1	2.4	1.5	2.0	1.9	2.5	3.0	2.8	2.1	0.6	0.3	0.5	-0.5	-2.6	-2.9	-4.4	-4.6	-5.3	1.5	6.8																			
15-Dec	-5.2	-5.2	-4.3	-4.5	-4.4	-4.3	-4.6	-4.5	-3.6	-4.6	-2.2	1.8	3.2	2.9	2.8	2.5	2.1	1.6	0.9	1.6	1.9	2.8	3.6	3.7	-0.7	3.7																			
16-Dec	4.0	4.6	4.3	4.1	3.0	1.3	-0.3	-0.8	-0.9	-2.2	-4.5	-8.2	-8.9	-9.1	-9.3	-10.1	-10.6	-11.1	-11.4	-11.4	-11.4	-11.8	-11.7	-11.0	-5.1	4.6																			
17-Dec	-11.4	-11.8	-13.0	-14.8	-16.1	-15.7	-15.3	-15.8	-15.2	-15.3	-12.8	-10.7	-9.3	-8.2	-7.4	-7.8	-8.3	-8.8	-8.1	-7.1	-6.5	-6.1	-6.0	-6.6	-10.8	-6.0																			
18-Dec	-6.9	-7.0	-5.4	-3.3	-2.8	-2.9	-2.0	-2.2	-2.4	-2.2	-1.2	0.5	-0.5	0.6	0.2	-0.1	-1.1	-1.8	-2.1	-2.4	-2.7	-5.5	-7.1	-9.3	-2.9	0.6																			
19-Dec	-11.6	-12.8	-13.4	-13.4	-13.5	-12.9	-12.5	-12.9	-13.1	-12.9	-12.7	-12.1	-11.9	-11.6	-11.4	-10.9	-11.0	-10.9	-10.5	-10.0	-9.6	-9.4	-9.2	-9.0	-11.6	-9.0																			
20-Dec	-8.9	-9.0	-8.9	-9.1	-9.1	-9.1	-8.8	-8.6	-8.1	-7.8	-7.3	-6.6	-5.7	-5.2	-4.7	-4.2	-4.0	-3.7	-3.5	-3.3	-2.7	-2.2	-1.9	-2.1	-6.0	-1.9																			
21-Dec	0.6	2.3	1.8	1.6	1.2	0.5	-0.9	-1.9	-3.0	-2.4	-2.3	-1.8	-1.5	-1.5	-0.1	0.2	0.8	1.1	0.7	-0.5	0.1	0.3	0.2	-0.9	-0.2	2.3																			
22-Dec	-1.4	-2.3	-2.8	-3.0	-4.7	-4.2	-3.8	-3.7	-4.3	-3.5	-2.7	-2.0	-1.5	-1.2	-1.5	-2.1	-2.4	-2.6	-1.9	-1.5	-1.9	-1.9	0.1	1.5	-2.3	1.5																			
23-Dec	3.3	4.0	3.7	2.0	0.6	0.1	-0.2	-0.5	-0.7	-0.8	-0.3	-0.2	0.0	-0.3	-0.7	-1.5	-2.4	-2.4	-3.7	-5.1	-5.7	-6.3	-6.3	-6.6	-1.3	4.0																			
24-Dec	-7.7	-7.6	-8.1	-9.4	-9.6	-9.5	-8.9	-8.8	-9.5	-9.8	-8.2	-6.3	-4.4	-3.4	-3.1	-3.9	-6.5	-8.2	-8.9	-8.5	-7.6	-8.6	-8.6	-9.1	-7.7	-3.1																			
25-Dec	-8.1	-7.3	-6.6	-8.8	-8.8	-9.7	-9.4	-7.8	-7.9	-7.8	-6.7	-5.1	-4.0	-2.3	-1.7	-2.5	-2.7	-3.5	-4.8	-5.7	-6.1	-5.8	-7.5	-8.0	-6.2	-1.7																			
26-Dec	-8.0	-7.9	-7.0	-6.5	-7.1	-7.8	-7.3	-7.8	-7.8	-8.1	-7.4	-5.9	-4.9	-3.9	-3.2	-3.1	-3.6	-4.2	-4.4	-4.1	-3.9	-3.8	0.0	1.7	-5.3	1.7																			
27-Dec	1.7	2.9	2.4	2.1	0.8	-1.1	-2.6	-2.4	-0.6	-0.7	-0.5	0.1	0.6	1.0	0.7	-0.1	-2.0	-2.6	-4.6	-6.0	-6.1	-6.8	-7.7	-8.1	-1.6	2.9																			
28-Dec	-7.3	-8.9	-7.7	-8.3	-8.1	-7.9	-7.8	-7.7	-7.4	-7.3	-6.2	-5.0	-3.8	-3.2	-2.9	-2.8	-2.8	-2.8	-2.9	-3.0	-2.7	-2.8	-3.6	-4.3	-5.3	-2.7																			
29-Dec	-4.1	-6.2	-7.9	-8.9	-8.8	-9.2	-9.4	-10.4	-10.9	-10.9	-8.4	-7.0	-6.2	-5.2	-4.4	-5.4	-6.4	-7.7	-7.8	-8.8	-9.5	-9.8	-10.2	-10.8	-8.1	-4.1																			
30-Dec	-10.5	-10.5	-11.2	-11.5	-9.7	-10.3	-11.4	-10.3	-10.8	-10.5	-8.4	-6.7	-4.7	-3.1	-2.4	-2.5	-1.7	-0.9	-2.8	-2.9	-1.9	-1.0	-2.3	-3.5	-6.3	-0.9																			
31-Dec	-2.9	-3.2	-2.9	-3.1	-3.4	-2.7	-2.9	-3.0	-3.2	-3.6	-2.9	-0.4	1.2	1.4	4.1	5.2	3.1	2.6	3.5	2.4	2.0	2.8	2.9	1.7	-0.1	5.2																			
																								Diurnal Average																					
																								Diurnal Maximum																					



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature (AT) - C
Mildred Lake - December 2023





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	605	81.32	81.32
0 - 10	139	18.68	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association
Summary of Hour Averages

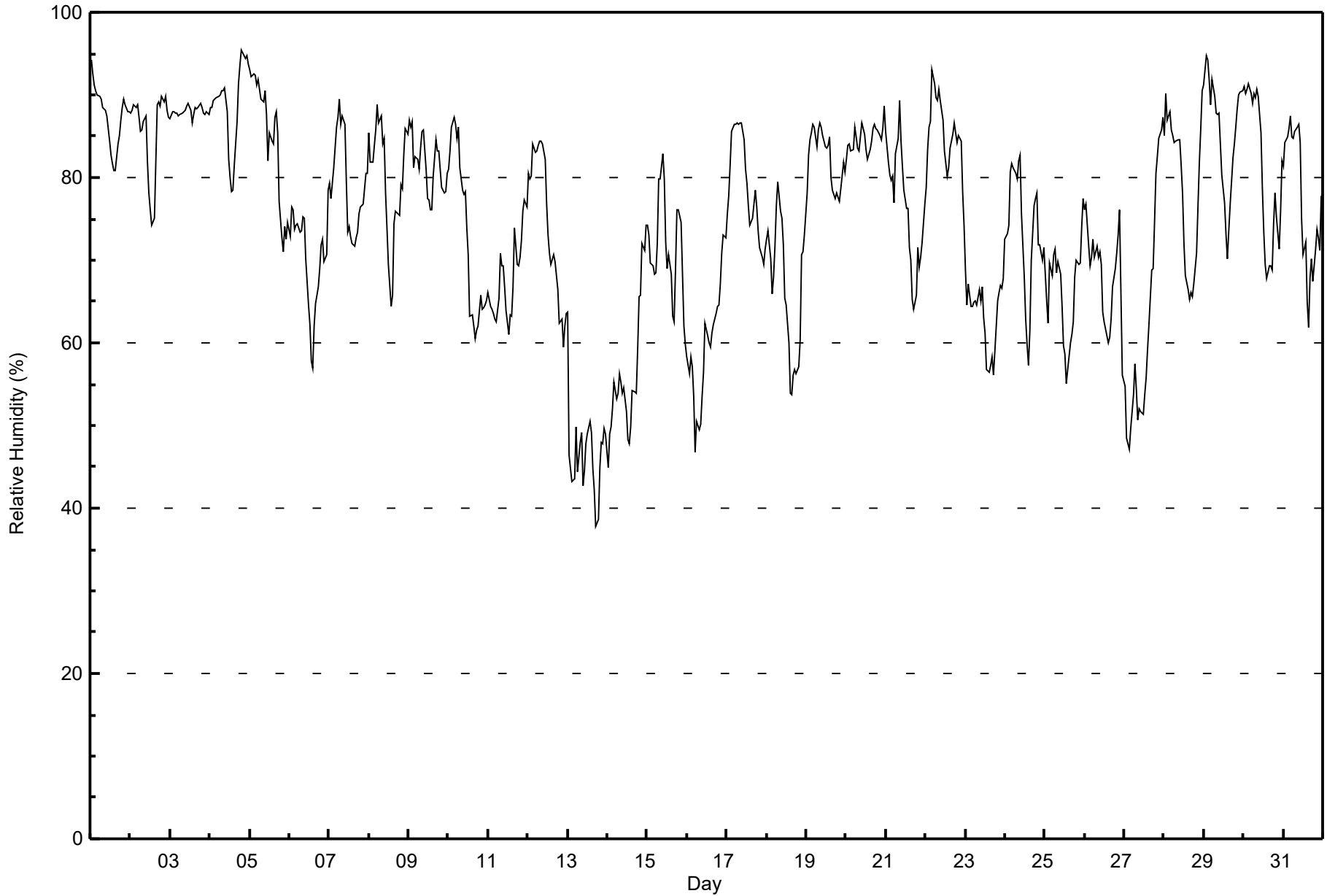
Relative Humidity (RH) - %
Mildred Lake - December 2023

Maximum Value: 95.4 % on Dec 4 20:00 Maximum Daily Average: 88.8 % on Dec 4																						Hours in Service:	744																								
Minimum Value: 37.8 % on Dec 13 18:00 Minimum Daily Average: 46.6 % on Dec 13																						Hours of Data:	744																								
Maximum Diurnal Average: 78.8 % at hour 9 Minimum Diurnal Average: 68.0 % at hour 15																						Hours of Missing Data:	0																								
Monthly Average: 74.97 % Percentiles: P ₁ = 44.5 P ₁₀ = 57.1 Q ₁ = 66.8 Median = 76.6 Q ₃ = 85.4 P ₉₀ = 88.7 P ₉₉ = 93.7																						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-Dec	94.2	92.6	91.1	90.4	90.0	89.9	89.5	88.4	88.4	88.2	87.4	84.5	82.7	81.7	80.8	80.9	84.1	85.0	86.9	88.6	89.4	88.8	88.0	88.0	87.5	94.2																					
2-Dec	87.8	88.1	88.8	88.6	88.8	87.2	85.6	85.8	86.9	87.5	81.8	78.1	76.2	74.2	75.1	82.1	88.9	89.2	88.7	89.8	89.2	89.9	88.2	87.3	85.6	89.9																					
3-Dec	87.0	87.9	87.9	87.8	87.9	87.4	87.6	87.8	87.9	88.2	88.7	89.0	88.1	86.6	87.6	88.4	88.4	88.5	89.1	88.5	87.8	87.7	87.9	87.6	88.0	89.1																					
4-Dec	88.5	88.5	89.3	89.5	89.6	89.9	89.9	90.4	90.4	90.8	88.1	82.2	79.9	78.2	78.4	81.5	86.8	91.4	93.5	95.4	95.1	94.5	94.7	93.8	88.8	95.4																					
5-Dec	93.0	92.3	92.5	92.4	91.3	91.8	90.6	89.6	89.2	90.4	87.6	82.1	85.4	84.4	84.0	87.3	87.9	85.4	77.1	72.7	71.0	74.1	72.5	74.7	85.0	93.0																					
6-Dec	72.9	76.4	76.1	73.8	74.2	74.5	73.4	73.6	75.3	75.1	70.1	64.5	62.2	57.8	56.9	62.0	64.8	66.8	68.9	71.9	72.5	69.8	70.7	78.5	70.1	78.5																					
7-Dec	79.3	77.5	79.4	81.2	86.1	87.3	89.5	86.5	87.5	86.5	79.5	73.4	74.0	72.8	72.1	71.7	72.7	73.3	75.6	76.5	76.8	78.6	80.5	80.4	79.1	89.5																					
8-Dec	85.5	81.9	81.9	83.9	85.7	88.8	86.6	87.5	84.1	84.7	78.1	73.9	69.4	64.4	65.8	74.4	75.9	75.7	75.5	79.2	78.6	82.7	85.9	85.2	79.8	88.8																					
9-Dec	87.0	86.2	86.7	81.2	82.6	82.2	81.1	83.6	85.7	85.7	80.8	77.5	77.3	76.1	76.1	80.2	84.6	83.2	83.2	80.9	78.8	78.1	78.3	80.5	81.6	87.0																					
10-Dec	81.1	83.2	86.1	87.3	86.4	84.8	86.1	81.1	78.5	78.0	78.3	73.9	70.7	63.2	63.5	62.0	60.5	61.6	62.0	65.7	64.1	64.2	64.6	65.1	73.0	87.3																					
11-Dec	66.2	64.4	64.1	63.6	62.8	62.5	65.4	70.8	69.3	69.3	66.8	63.9	61.0	63.4	63.2	66.7	73.9	69.4	69.3	70.4	72.4	75.9	77.3	76.4	67.8	77.3																					
12-Dec	80.4	79.8	80.2	84.1	83.0	83.2	83.8	84.4	84.4	84.0	82.2	76.7	73.1	70.9	69.5	70.6	69.9	68.2	66.4	62.4	62.9	59.6	62.0	63.6	74.4	84.4																					
13-Dec	63.8	46.5	43.3	43.3	43.6	49.8	44.5	48.0	49.2	42.8	44.6	47.8	49.1	50.5	49.1	44.7	42.2	37.8	38.7	44.9	47.9	47.9	49.6	49.0	46.6	63.8																					
14-Dec	44.9	49.0	49.9	52.1	55.2	53.3	53.9	56.2	55.3	53.9	54.5	51.7	48.2	47.8	49.9	54.3	54.1	53.9	59.4	65.7	65.8	72.0	71.1	74.2	56.1	74.2																					
15-Dec	74.3	73.0	69.6	69.4	68.3	68.4	72.1	79.9	79.9	82.8	79.9	72.3	68.9	70.6	68.3	63.1	62.6	68.8	76.1	76.1	74.5	68.3	62.0	59.9	71.2	82.8																					
16-Dec	58.3	56.2	58.3	57.0	53.6	46.7	50.5	49.5	50.2	53.5	56.4	62.5	60.8	60.0	59.4	61.2	62.3	63.6	64.3	64.5	67.2	70.8	73.1	72.7	59.7	73.1																					
17-Dec	75.6	77.7	81.5	85.6	86.5	86.4	86.6	86.5	86.6	86.6	84.5	81.1	79.3	76.7	74.2	75.1	76.8	78.5	76.5	73.6	71.6	70.3	69.6	71.3	79.1	86.6																					
18-Dec	72.5	73.6	70.1	66.0	67.9	71.8	76.6	79.6	76.0	75.1	71.9	65.5	64.6	60.1	53.9	53.7	56.0	56.7	56.2	57.1	60.4	70.6	71.0	73.0	66.7	79.6																					
19-Dec	78.1	82.8	84.5	85.5	86.5	86.2	83.7	85.7	86.6	86.0	85.1	83.7	83.5	84.0	84.9	80.1	78.5	77.4	78.1	77.6	77.1	78.6	81.9	80.6	82.4	86.6																					
20-Dec	82.2	83.8	84.1	83.3	83.4	86.1	85.0	83.5	83.2	86.6	86.0	85.2	83.5	82.3	83.4	84.5	85.9	86.4	86.0	85.8	85.0	84.5	85.9	88.7	84.8	88.7																					
21-Dec	85.6	81.8	80.4	79.7	80.2	77.0	82.9	84.8	89.4	84.3	81.4	78.5	76.2	76.2	71.6	70.0	65.2	64.1	65.8	71.5	69.2	70.4	72.0	76.8	76.5	89.4																					
22-Dec	78.7	83.4	86.1	86.7	93.0	91.4	89.7	89.3	90.7	89.4	86.9	83.2	81.7	80.2	81.2	83.6	85.3	86.6	85.4	84.2	85.1	84.4	78.3	74.2	84.9	93.0																					
23-Dec	68.7	64.6	67.1	64.3	64.5	65.0	65.1	64.6	66.4	65.0	66.7	63.0	61.1	56.9	56.5	57.2	58.2	56.2	59.0	65.1	66.1	66.9	66.6	67.7	63.4	68.7																					
24-Dec	72.5	73.3	74.2	80.6	81.7	81.1	80.5	79.9	82.0	82.7	75.6	67.9	62.8	59.9	57.2	61.6	70.0	76.6	77.4	78.1	71.9	71.9	69.9	71.5	73.4	82.7																					
25-Dec	68.3	65.1	62.3	69.6	68.2	70.7	71.3	68.5	69.9	68.3	64.5	59.6	58.6	55.1	56.8	60.0	61.0	62.5	68.0	69.9	69.4	69.7	74.0	77.4	66.2	77.4																					
26-Dec	76.1	76.7	71.6	69.3	70.3	72.6	70.4	71.6	70.3	71.0	69.5	63.8	62.6	60.8	60.0	60.7	62.9	66.7	69.0	70.8	73.1	76.1	66.2	56.1	68.3	76.7																					
27-Dec	54.8	48.4	47.9	47.1	49.6	53.7	57.4	54.4	50.7	52.1	51.8	51.3	53.7	55.7	59.1	62.1	68.9	66.9	74.6	80.5	82.6	84.8	85.8	87.3	61.8	87.3																					
28-Dec	85.1	90.1	87.0	87.9	85.7	85.1	84.3	84.4	84.6	84.6	81.6	78.1	72.0	68.2	66.5	65.3	66.1	65.5	67.0	70.8	76.4	81.8	86.0	90.6	78.9	90.6																					
29-Dec	91.3	94.7	94.2	91.8	88.9	91.9	89.8	87.8	87.6	87.8	84.1	80.3	76.9	73.3	70.1	73.5	76.9	82.4	84.0	86.0	88.4	90.1	90.3	90.5	85.5	94.7																					
30-Dec	91.1	90.2	90.6	91.3	90.2	88.9	90.2	89.6	90.6	89.9	85.4	78.6	73.4	69.5	67.8	69.4	69.3	68.8	74.4	78.2	75.3	71.4	76.0	82.0	80.9	91.3																					
31-Dec	81.3	84.3	84.9	85.9	87.5	84.8	84.7	85.7	86.2	86.4	84.2	74.9	70.7	72.2	64.9	61.9	67.9	70.1	67.4	71.4	73.8	72.6	71.2	77.8	77.2	87.5																					
																						77.6	77.2	77.2	77.4	77.8	78.1	78.3	78.7	78.8	78.6	76.3	72.5	70.6	68.8	68.0	69.4	71.2	71.9	73.0	74.6	74.8	75.7	75.8	76.9	Diurnal Average	
																						94.2	94.7	94.2	92.4	93.0	91.9	90.6	90.4	90.7	90.8	88.7	89.0	88.1	86.6	87.6	88.4	88.9	91.4	93.5	95.4	95.1	94.5	94.7	93.8	Diurnal Maximum	



Wood Buffalo Environmental Association
Hourly Averages

Relative Humidity (RH) - %
Mildred Lake - December 2023





Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed (WS) - km/h

Mildred Lake - December 2023

Maximum Speed: 24 km/h on Dec 20 05:00	Maximum Daily Speed Average: 15.4 km/h on Dec 20	Hours in Service: 744
Minimum Speed Value: 1 km/h on Dec 16 22:00	Minimum Daily Speed Average: 1.9 km/h on Dec 2	Hours of Data: 739
Maximum Diurnal Speed Average: 6.0 km/h at hour 15	Minimum Diurnal Speed Average: 3.4 km/h at hour 24	Hours of Missing Data: 5
Monthly Average Velocity: 4.6 km/h 193.7 deg	Percentiles: P ₁ = 2 P ₁₀ = 5 Q ₁ = 6 Median = 8 Q ₃ = 11 P ₉₀ = 15 P ₉₉ = 22	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-Dec	SW4	WSW4	S4	SSW5	UO	S7	S7	S5	S5	S6	S5	SSE7	SSE10	SSE9	SSE8	SSE8	SSE6	S6	SSE6	S5	SSE4	SSE5	SSE8	SSE8	S5.8	SSE10
2-Dec	S10	S10	SSE8	S7	SSE8	SSE11	SSE10	SSE7	S7	S6	S6	S6	S5	SSE5	SSE6	SSE2	NNW6	N7	N8	NNW11	NNW11	NNW8	NNW8	N8	SSE1.9	NNW11
3-Dec	N6	NNW5	NNE4	NNE5	NNE3	N5	NNW3	NE4	N4	N5	N3	UO	E3	E3	UO	N7	N7	N6	N4	UO	NNW2	SSE2	SSW3	SSE4	N3.0	N7
4-Dec	S6	S6	S6	S6	S6	S5	S4	S5	S6	S8	S8	SSW8	SW10	SW9	S10	SSW7	S5	S6	SE5	SSE5	SE6	SE6	SE7	SE7	S5.9	S10
5-Dec	SE7	SE7	S7	SE7	S7	SSE6	SSE6	S5	S6	SSE8	SSE10	SSE10	SSE9	SE9	SE8	SE9	S7	SSW7	WSW13	SW18	WSW13	SW10	SW10	SSW7	S6.7	SW18
6-Dec	SW11	SSW12	SW15	SW13	SW10	SW11	SW14	SW12	SW11	SSW10	SSW10	SW8	SW10	SW13	SW13	SW11	SSW9	SW10	SSW6	SSE6	SSW8	SW10	SSW4	SE3	SW9.7	SW15
7-Dec	SW8	WSW11	SW10	WSW5	SW4	SSW5	S3	SSW7	SSW6	S7	S6	SSW9	S10	SE5	SSE6	SSW9	SW9	SW7	WSW7	SW8	SSW9	SW6	SSW9	SW6	SSW6.6	WSW11
8-Dec	SW3	SSW6	SSW7	SW6	WSW6	W5	WSW7	SW5	WSW9	SW6	SW8	WSW10	SW7	SSW4	S5	SSW8	SW8	WSW8	SW10	SSW10	SSW13	S9	S10	S8	SW6.9	SSW13
9-Dec	S5	SSW10	SSW10	SW11	SW9	SW9	SW11	S9	SSE8	SSE9	SSE8	S9	SSE11	SE10	SSE10	SSE9	SSE9	SSE7	SSE9	SSE10	SSE9	SSE8	SSE8	S4	S7.8	SW11
10-Dec	SSE6	S5	S5	SSW6	SSE9	S7	SSE8	SSE14	SSE15	SSE14	S10	S8	SW5	WSW15	WSW13	W19	W20	W23	W23	WNW15	WNW22	WNW20	WNW20	NW18	WSW7.3	W23
11-Dec	NW17	NW13	NW20	NW19	NNW18	NNW17	W17	W15	WSW12	SW11	WSW11	SW12	SW9	SSW8	S8	SSE5	SE7	SSE9	SSE7	SE9	SSE7	S7	SSE7	S7	WSW5.8	NW20
12-Dec	S6	S8	S9	SE4	S9	S8	S7	SSE6	S7	SSE7	SSE11	SSE13	SSE11	SSE11	SSE13	SSE11	SE14	SSE15	SSE11	SSE12	SE9	SE8	ESE5	ESE5	SSE8.9	SSE15
13-Dec	SSE6	WSW8	SW10	SW13	SW11	S5	SW10	SSW7	SSE5	SSW7	SSE6	SE7	ESE6	SE7	S8	SSW7	SSW8	S15	S12	S9	SSE6	SSW5	SSW7	S4	S6.5	S15
14-Dec	W9	WNW9	W14	W15	W14	W18	W17	W14	WSW17	W23	W18	W15	WSW8	S6	SSW10	SSW8	SW9	WSW10	WSW4	SW6	S5	SSE6	SSE8	SE5	WSW9.2	W23
15-Dec	SSE8	SSE8	SSE10	SSE10	SSE10	SE11	SE6	S8	SE7	ESE6	SE8	S12	SSW15	S16	S18	S20	S17	SSW18	S19	SSW19	S12	SSW11	SW14	SW13	S11.0	S20
16-Dec	SW15	WSW18	W16	W18	WNW19	WNW21	WNW16	W19	W21	NW13	NNW13	NNE11	NNE11	NNE9	NNE8	N7	NNE8	NNE5	N8	NE4	NE4	NW1	ENE3	NE3	NW7.3	W21
17-Dec	N10	N10	NNW6	WNW2	SE2	SE5	SE5	S5	S5	SSE4	S7	SSE9	SSE8	SSE8	SE7	SE9	SSE8	SE7	SE9	SE11	SSE12	SE11	SE11	SSE7	SE5.1	SSE12
18-Dec	SSE6	SSW5	SW8	SW11	SW8	SW9	W11	WSW5	SW12	WSW15	WSW14	WSW12	WSW12	W17	WNW14	WNW14	WNW13	WNW13	WNW12	WNW11	NNW11	NNE14	NNE13	NNE12	W7.4	W17
19-Dec	NNE12	N12	N10	N10	NNW6	NNW6	N5	N5	N5	NNE4	ENE5	ENE6	NE5	NNE4	NNE5	E7	ESE11	ESE11	SE13	SE15	SE19	SE21	SE18	SE22	E4.8	SE22
20-Dec	SE21	SE22	SE20	SE21	SE24	SE18	SE18	SE19	SE18	SE15	SSE17	SSE15	SSE13	SSE10	SSE12	SSE13	SSE12	SSE15	SSE14	SSE13	SSE16	SSE14	SE7	S8	SSE15.4	SE24
21-Dec	WSW12	W19	W18	W17	W17	WSW12	SW10	SW8	SW8	SW6	SE5	ESE5	SE9	SE10	SE13	SE9	SE14	SSE10	SE7	ESE5	SE8	SSE9	S7	SE8	SSW5.3	W19
22-Dec	SE7	SSE6	SE5	SSE5	SSE4	SSE6	SSE6	S8	SSW6	S7	S8	S10	S10	S8	S8	S7	S8	S6	S8	S8	SSE8	S8	SW8	SW10	S6.9	SW10
23-Dec	WSW11	WSW17	W16	W17	W19	W20	W19	W19	W15	W18	W18	W23	W19	W19	W16	WNW13	WNW13	WNW13	WNW12	WNW11	NNW11	NNE14	NNE13	NNE12	W14.2	W23
24-Dec	SW4	SW9	SW7	S5	SE8	SE8	SE9	SE11	SE8	SSE7	SE6	SE6	SE7	SE8	ESE5	SSE7	UO	ESE4	ESE5	SSE6	S6	S6	S7	S7	SSE5.8	SE11
25-Dec	SSE6	SSE8	SSE10	S6	S7	SSE7	S9	SSE8	SSE8	SSE9	SSE8	SE9	SE11	SE8	SE10	SE9	SSE10	S7	SSE7	SE6	SE7	S7	SSE7	SSE7	SSE7.8	SE11
26-Dec	S9	S7	SSE11	S8	S11	SSW8	S9	S9	S9	S10	S9	S9	SSE10	SSE10	SSE12	SSE12	SSE9	SSE7	SSE6	SE7	SSE7	SSW6	S13	S13	S8.9	S13
27-Dec	SW13	SW14	SW17	SW15	SW10	S7	SSE6	SSW6	SSW8	S6	SE6	ESE7	SE7	SE8	SSE12	SSE8	SE4	S5	NE2	NNE3	NNW5	N5	NNE5	N6	S4.1	SW17
28-Dec	N7	N8	N8	N8	N6	N5	N6	NNW4	N3	N4	NNE9	NNW9	N9	N7	NNW10	N7	N5	NNE6	N7	N7	N7	N6	NNW4	NW4	N6.3	NNW10
29-Dec	NNW3	SSW2	SSW5	S5	S5	SSE8	SSE9	S7	SSE6	S5	SSE7	SSE9	S11	SSE9	SSE8	SSE9	SSE7	ESE3	SSE6	S4	SE5	SSE5	S4	SSE4	SSE5.6	S11
30-Dec	SE5	S5	SSW4	S5	SSE8	SSE4	SSE5	S7	SSW5	S6	SSE5	S7	S6	SSE7	S8	SSE9	SE13	SSE10	S6	SSE8	SSE11	SSE12	SSE7	SSE7	SSE6.8	SE13
31-Dec	SSE7	SSE6	SSE7	SSE8	SSE9	SSE11	SSE11	SSE9	SSE8	SSE7	SSE7	SE7	SSE12	SSE12	SSW9	SW11	SSW10	SSW9	SW9	SSW8	WSW7	W11	WNW10	N5	S6.3	SSE12

SSW3.6	SW4.6	SW5.1	SW5.0	SW5.0	SSW4.4	SSW4.7	SSW5.4	SSW5.5	SSW5.2	S4.8	S5.3	S5.7	S5.5	S6.0	S5.3	S4.9	S4.7	SSW4.1	S4.8	S4.0	S4.1	S3.9	S3.4	Diurnal Average
SE21	SE22	SE20	SE21	SE24	WNW21	W19	SE19	W21	W23	W18	W23	W19	W19	S18	S20	W20	W23	W23	SSW19	WNW22	SE21	WNW20	SE22	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

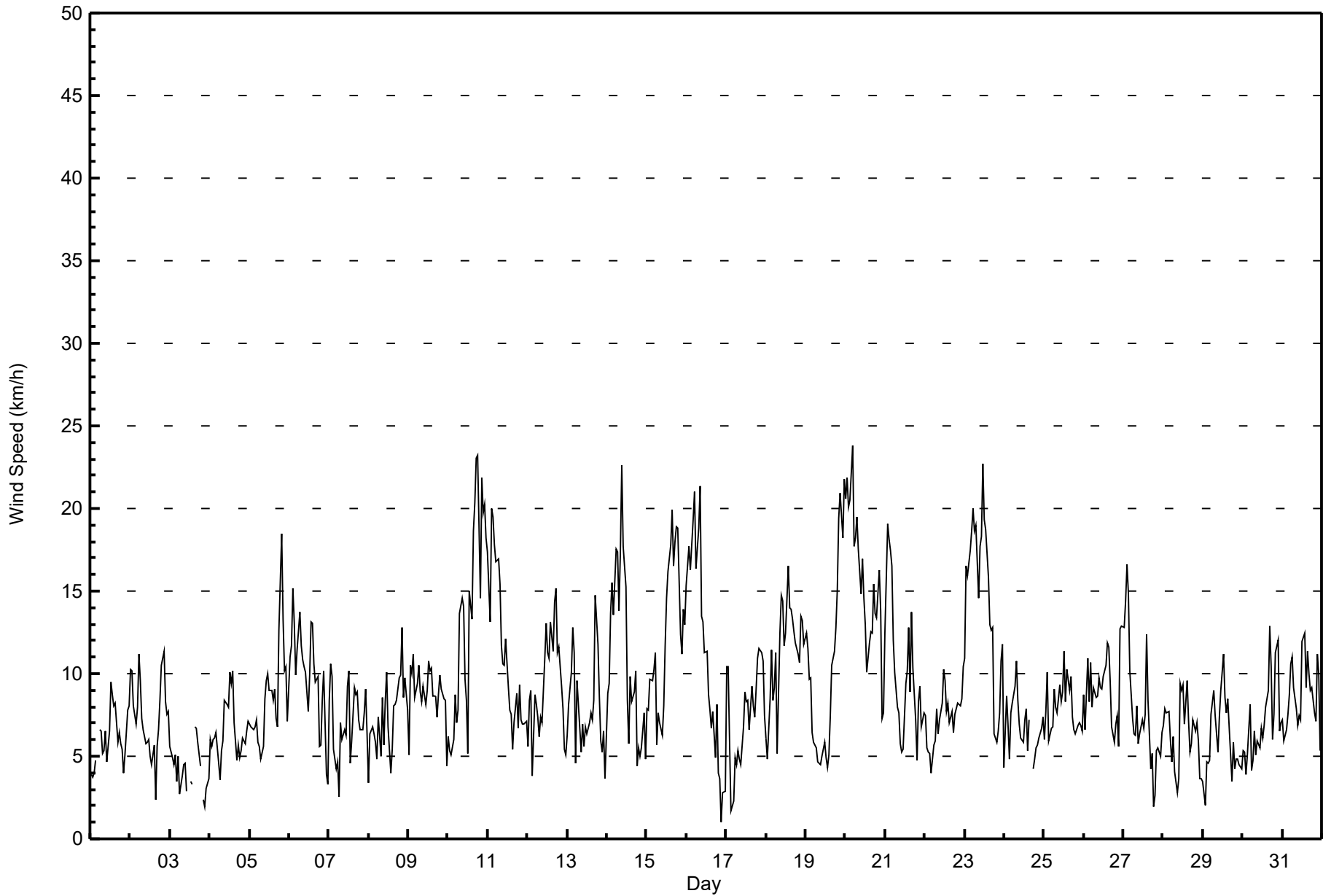
Wind Speed (WS) - km/h
Mildred Lake - December 2023

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 8 km/h on Dec 23 02:00 Minimum Value: 1 km/h on Dec 30 03:00 Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 2 Median = 2 Q ₃ = 3 P ₉₀ = 4 P ₉₉ = 6																	Hours in Service: 744 Hours of Data: 739 Hours of Missing Data: 5 Hours of Calibration: 0 Percent Operational Time: 99.3									
Day	Hourly Period Ending At (MST)																								Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Dec	1	1	1	1	UO	1	1	1	2	1	1	2	2	1	2	2	2	1	1	1	2	2	2	2	2	2
2-Dec	2	3	3	2	2	2	2	2	2	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	1	3
3-Dec	1	1	1	1	1	1	1	1	1	1	1	UO	1	1	UO	1	1	1	1	UO	1	1	1	1	1	1
4-Dec	1	1	2	1	1	2	1	1	1	1	1	2	3	2	2	2	2	1	2	1	2	1	1	1	1	3
5-Dec	2	2	2	2	3	2	2	2	2	2	3	3	2	2	2	2	2	2	5	6	5	4	3	2	6	
6-Dec	3	3	4	4	3	4	4	4	3	3	3	3	4	4	3	3	3	3	2	2	3	4	3	2	4	
7-Dec	3	3	3	2	2	2	2	2	2	4	2	3	2	1	1	2	2	2	2	2	2	2	2	2	4	
8-Dec	1	2	2	1	1	2	2	2	2	2	2	2	2	1	2	3	2	3	4	3	3	3	2	3	4	
9-Dec	2	2	3	4	4	3	3	2	2	2	2	2	3	2	2	2	2	2	2	2	1	2	2	1	4	
10-Dec	3	2	1	1	2	3	3	3	3	4	2	1	5	5	4	6	5	7	7	4	6	5	6	5	7	
11-Dec	4	3	5	5	5	5	5	5	4	3	3	3	3	2	2	1	2	1	2	2	2	1	1	1	5	
12-Dec	1	1	2	2	2	2	1	2	3	2	3	3	2	3	3	4	4	4	3	3	2	2	2	1	4	
13-Dec	2	3	4	4	4	2	3	2	2	2	2	2	2	2	2	2	2	3	3	4	2	2	3	2	4	
14-Dec	3	2	5	5	4	5	5	4	6	7	5	5	5	2	2	2	3	3	2	1	2	2	3	2	7	
15-Dec	2	3	2	3	2	2	2	1	2	1	2	3	4	4	4	4	3	4	4	4	4	4	5	4	5	
16-Dec	5	6	5	5	6	6	4	5	6	3	4	3	3	2	2	2	2	2	2	1	1	1	1	2	6	
17-Dec	2	3	2	1	2	2	2	1	1	2	2	2	1	2	2	3	2	1	2	2	2	3	3	1	3	
18-Dec	1	2	2	4	4	4	5	3	4	4	4	4	3	5	3	4	3	3	3	3	4	4	3	3	5	
19-Dec	3	3	2	2	1	1	2	2	1	1	1	1	1	1	1	2	3	3	4	4	5	5	5	5	5	
20-Dec	5	5	5	5	5	4	4	4	3	3	4	3	3	3	2	2	2	3	3	2	3	3	2	2	5	
21-Dec	4	6	5	5	5	4	3	3	2	3	2	1	2	3	2	2	2	2	2	2	2	1	2	2	6	
22-Dec	1	2	1	2	1	2	1	1	1	2	2	2	2	2	2	1	2	2	2	2	2	3	3	4	4	
23-Dec	6	8	6	6	5	6	6	5	5	5	6	6	6	5	5	4	3	4	3	2	3	3	3	4	8	
24-Dec	2	2	3	1	1	2	2	2	1	1	2	1	1	1	1	2	UO	1	1	1	1	2	1	1	3	
25-Dec	1	2	2	1	2	2	2	1	2	2	2	2	3	2	2	2	2	1	1	1	2	2	2	2	3	
26-Dec	2	2	3	4	2	2	2	2	2	2	2	2	2	2	2	2	2	1	1	2	2	2	4	3	4	
27-Dec	4	4	4	4	3	2	2	2	2	2	2	2	2	2	2	1	1	2	1	2	2	2	2	2	4	
28-Dec	2	3	3	2	2	2	2	2	3	2	3	3	3	2	2	2	1	1	2	1	2	2	1	2	3	
29-Dec	2	1	1	2	1	1	2	2	2	1	2	2	2	1	1	1	3	2	3	1	1	1	1	1	3	
30-Dec	1	1	1	1	2	2	2	2	2	1	2	2	2	2	2	2	2	4	1	2	2	3	1	1	4	
31-Dec	1	1	1	1	2	2	2	2	2	2	2	2	2	3	3	3	2	3	4	3	2	4	3	2	4	
Diurnal Maximum																										
UO - Unstable Operation																										



Wood Buffalo Environmental Association
Hourly Averages

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





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

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

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	134	18.13	18.13
6 - 11	446	60.35	78.48
12 - 19	139	18.81	97.29
20 - 28	20	2.71	100.00
29 - 38	0	0.00	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 739

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Wind Speed (WS) - km/h
Mildred Lake - December 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	14	9	6	2	2	8	13	17	30	12	6	4	1	1	2	7	134
6 - 11	25	8	0	1	1	6	55	129	91	41	54	16	4	3	0	12	446
12 - 19	1	4	0	0	0	0	12	26	10	5	17	15	30	13	5	1	139
20 - 28	0	0	0	0	0	0	7	0	1	0	0	0	7	4	1	0	20
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	40	21	6	3	3	14	87	172	132	58	77	35	42	21	8	20	739

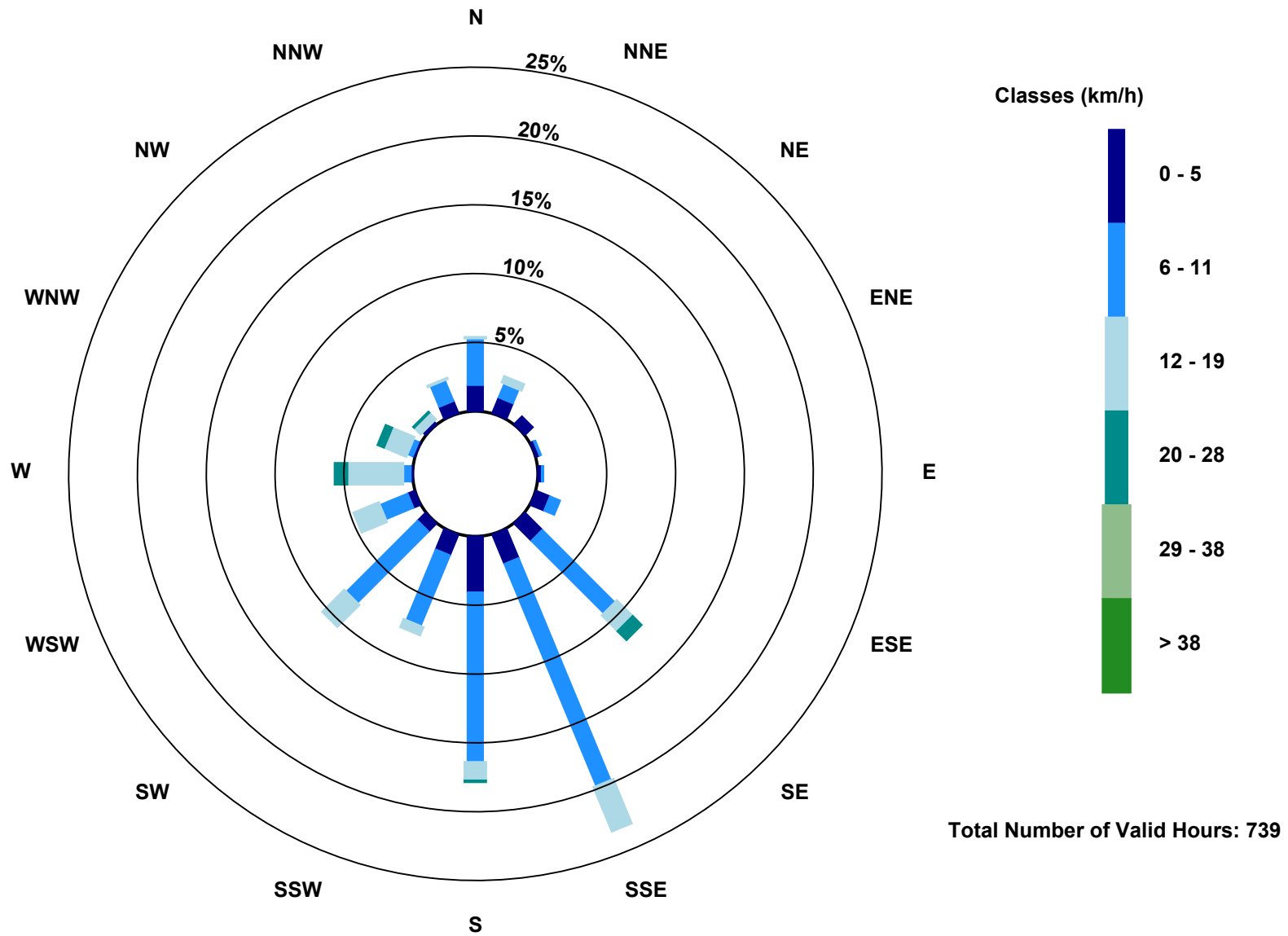
Total Number of Valid Hours: 739

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Dec 2023

Wind Speed (WS) - km/h
Mildred Lake





Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
Mildred Lake - December 2023

Direction of Maximum Speed: 141 deg on Dec 20 05:00	Hours in Service: 744
Direction of Maximum Daily Speed Average: 147.1 deg on Dec 20	Hours of Data: 739
Direction of Minimum Speed: 312 deg on Dec 16 22:00	Hours of Missing Data: 5
Direction of Minimum Daily Speed Average: 1.9 deg on Dec 2	Percent Operational Time: 99.3
Monthly Average Direction: 193.7 deg	

Day	Hourly Period Ending At (MST)																								Daily Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Dec	214	238	184	199	UO	191	174	176	180	187	188	159	155	149	147	157	163	176	157	176	159	157	158	159	169.7
2-Dec	172	172	161	172	158	150	152	165	182	180	173	183	181	164	167	158	346	358	353	344	347	348	343	352	165.2
3-Dec	355	340	15	28	28	5	341	34	7	358	9	UO	88	98	UO	354	354	351	359	UO	336	149	192	157	9.7
4-Dec	179	182	186	180	181	178	190	190	184	175	184	201	229	220	186	193	184	177	130	149	141	127	135	143	179.1
5-Dec	140	139	181	140	169	168	158	191	191	161	153	154	151	144	144	144	182	192	239	234	252	231	218	203	183.6
6-Dec	214	212	222	233	229	226	227	226	221	208	212	225	224	222	220	217	210	214	207	168	200	220	210	134	217.3
7-Dec	215	238	230	240	215	211	181	201	203	186	182	202	172	145	163	209	218	230	233	232	239	232	205	219	211.2
8-Dec	236	213	211	230	246	259	252	226	243	220	234	238	229	212	189	196	222	239	229	210	203	187	191	185	219.4
9-Dec	189	200	213	225	236	215	217	181	165	161	165	169	150	146	149	148	151	159	153	149	155	162	158	188	174.6
10-Dec	159	189	174	199	168	173	153	147	152	153	174	170	215	240	253	274	277	276	277	300	296	302	301	309	251.0
11-Dec	318	324	313	307	296	291	280	272	249	236	237	229	221	198	174	156	143	151	154	145	160	169	164	178	253.8
12-Dec	179	173	176	140	175	176	178	159	172	151	155	152	157	158	147	147	146	149	158	154	132	136	115	104	154.4
13-Dec	149	240	235	232	230	179	218	203	163	197	156	126	106	125	181	201	196	173	176	173	167	200	192	188	188.8
14-Dec	273	283	279	267	268	275	273	260	253	261	270	266	256	174	192	206	234	246	249	220	182	157	164	126	252.5
15-Dec	164	158	150	148	150	146	128	170	133	111	143	189	197	185	178	179	183	195	189	197	179	193	227	232	179.0
16-Dec	234	256	274	276	286	303	283	276	275	311	346	26	29	27	16	11	12	23	360	36	48	312	70	43	307.6
17-Dec	2	357	338	295	127	131	130	174	176	158	173	150	155	156	136	140	154	125	128	138	147	144	139	152	140.6
18-Dec	160	192	215	220	224	216	263	246	227	237	245	258	241	263	283	283	283	293	289	286	336	15	14	28	267.1
19-Dec	12	3	349	351	341	348	10	354	359	27	68	68	53	26	19	82	108	113	133	138	140	141	136	140	89.2
20-Dec	136	141	138	141	141	141	140	143	146	144	147	152	151	160	150	152	154	152	161	155	150	149	145	188	147.1
21-Dec	241	270	277	273	272	252	229	215	230	215	144	111	137	140	143	131	143	149	143	112	133	161	169	143	199.3
22-Dec	142	151	130	148	151	155	154	173	198	179	180	178	187	175	180	182	177	184	171	172	168	185	215	220	175.9
23-Dec	245	256	260	281	280	278	280	278	275	279	275	275	272	280	279	283	284	286	268	226	238	245	248	243	271.2
24-Dec	215	232	223	184	140	144	140	141	144	156	143	129	156	139	116	161	UO	113	114	167	180	184	176	173	158.2
25-Dec	152	155	158	175	182	160	171	161	152	157	148	142	142	142	141	141	150	169	151	137	124	176	163	160	153.8
26-Dec	184	178	156	169	178	204	181	179	182	184	191	180	163	159	159	167	160	158	164	144	159	192	179	182	172.8
27-Dec	223	233	230	226	219	179	168	196	213	171	131	118	145	131	147	151	133	172	50	19	347	350	19	359	189.8
28-Dec	354	350	350	356	359	359	352	338	355	356	13	335	5	357	331	356	355	12	350	352	358	356	338	311	352.5
29-Dec	334	209	208	189	188	157	154	175	162	176	168	156	169	163	161	157	163	113	164	173	135	164	186	147	165.5
30-Dec	145	187	195	183	167	154	154	174	198	172	165	191	176	165	170	158	137	151	183	163	157	150	168	165	164.7
31-Dec	160	156	163	166	158	154	150	158	151	156	151	144	157	150	197	223	204	201	220	198	237	271	300	354	180.6

200.6 221.7 222.9 227.1 215.5 208.3 206.4 199.6 202.1 195.1 186.5 184.8 177.7 175.1 176.0 181.3 183.6 188.1 191.8 181.2 176.9 182.9 186.8 179.4
 Diurnal Average

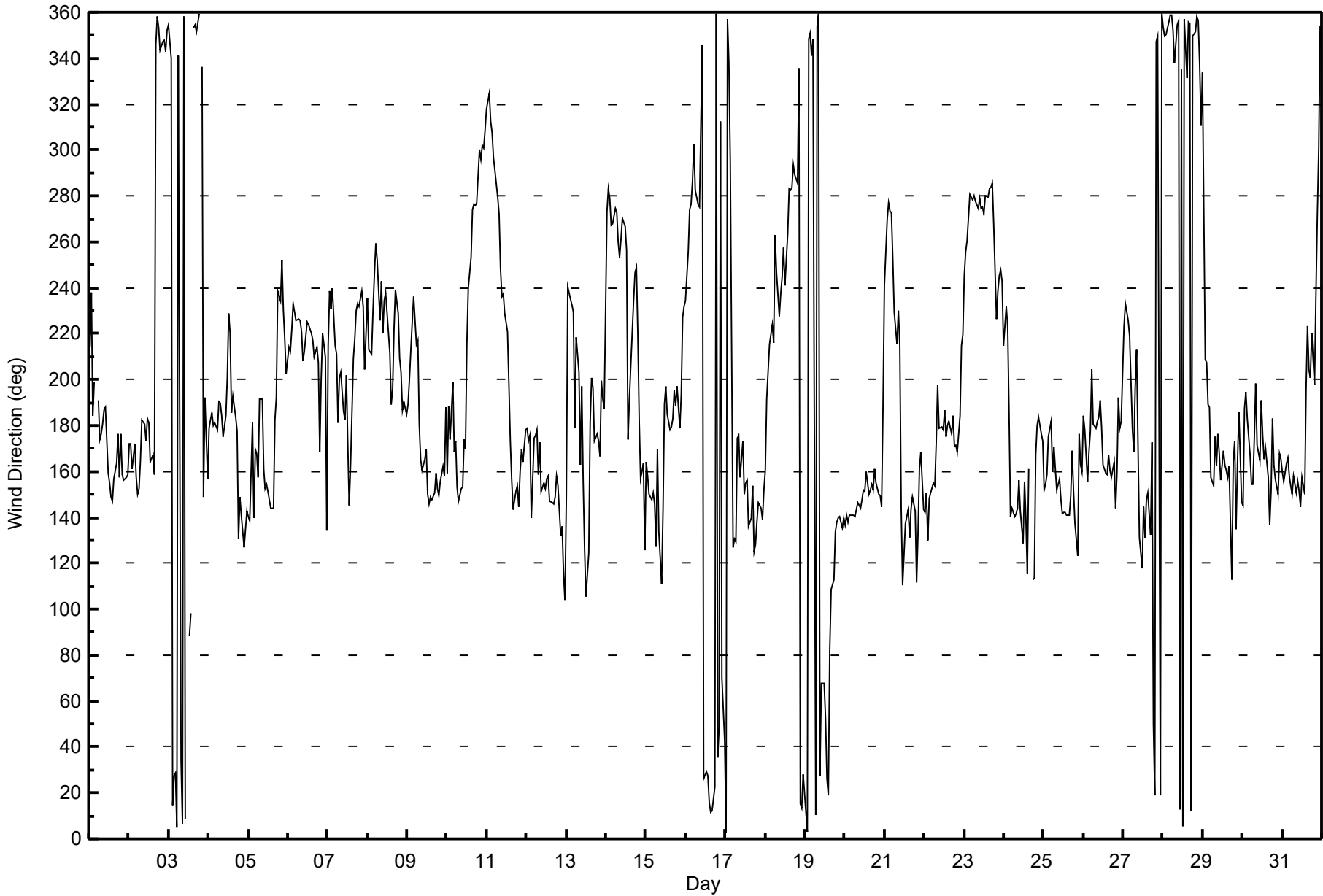
UO - Unstable Operation
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Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Direction (WD) - deg
Mildred Lake - December 2023

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0										Hours in Service: 744																
Maximum Value: 86 deg on Dec 16 22:00										Hours of Data: 739																
Minimum Value: 9 deg on Dec 4 10:00										Hours of Missing Data: 5																
Percentiles: P ₁ = 10 P ₁₀ = 12 Q ₁ = 14 Median = 18 Q ₃ = 24 P ₉₀ = 30 P ₉₉ = 61										Hours of Calibration: 0																
										Percent Operational Time: 99.3																
Day	Hourly Period Ending At (MST)																								Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Dec	18	20	21	20	UO	12	13	15	19	17	17	16	14	13	13	15	19	15	12	13	35	17	11	11	35	
2-Dec	16	16	18	19	13	11	12	27	16	13	15	20	28	21	14	71	17	18	11	11	9	13	12	15	71	
3-Dec	20	24	28	14	26	17	45	26	22	16	29	UO	28	35	UO	15	25	14	17	UO	40	54	39	30	54	
4-Dec	12	12	15	16	11	27	17	14	14	9	17	21	20	24	16	20	26	33	17	15	13	12	12	12	33	
5-Dec	23	20	25	27	27	25	28	38	26	17	17	18	16	16	12	12	28	22	23	22	29	34	21	18	38	
6-Dec	18	17	19	24	28	26	25	27	25	23	25	30	28	22	20	20	17	26	30	30	26	30	73	55	73	
7-Dec	28	20	23	29	29	30	70	19	26	32	24	23	12	24	23	21	21	22	21	26	25	22	16	20	70	
8-Dec	33	22	19	14	20	19	17	19	13	26	17	16	22	38	22	21	21	24	24	18	16	17	13	25	38	
9-Dec	30	13	22	20	27	19	22	21	14	17	17	14	15	13	13	13	9	12	11	10	10	13	16	26	30	
10-Dec	31	23	23	16	14	28	17	12	15	16	12	15	60	23	24	18	17	17	19	16	18	16	16	15	60	
11-Dec	13	15	12	15	16	18	19	20	28	23	22	21	25	26	17	20	12	11	14	12	13	12	10	16	28	
12-Dec	21	10	13	35	13	13	12	18	17	26	16	12	15	15	12	14	14	14	15	13	16	14	26	19	35	
13-Dec	43	27	23	23	23	51	21	23	36	16	29	16	19	18	20	24	25	17	20	31	25	39	46	57	57	
14-Dec	22	15	17	24	22	18	20	22	21	20	19	21	46	41	17	17	21	23	41	19	38	15	15	27	46	
15-Dec	15	16	14	10	10	9	21	13	31	12	22	19	18	15	13	13	15	16	14	17	23	28	27	24	31	
16-Dec	23	24	19	18	17	15	16	17	18	15	34	20	22	23	19	17	17	31	23	31	34	86	26	65	86	
17-Dec	16	18	20	54	64	18	34	15	35	34	17	13	12	13	19	16	13	14	16	13	13	14	15	11	64	
18-Dec	12	36	19	22	31	29	36	69	25	22	21	24	22	22	17	17	17	17	16	16	46	19	19	24	69	
19-Dec	19	16	13	14	14	19	18	18	15	20	17	20	24	22	19	14	16	18	19	17	15	14	16	15	24	
20-Dec	17	15	15	14	13	13	14	12	11	12	11	12	15	17	11	12	11	12	14	12	10	11	16	24	24	
21-Dec	23	21	19	19	19	27	23	20	20	43	22	18	15	14	12	15	12	14	17	27	14	12	21	15	43	
22-Dec	11	10	15	15	11	14	16	11	13	13	19	15	14	16	17	13	15	21	19	17	20	22	23	28	28	
23-Dec	40	26	25	19	18	19	20	19	25	18	20	19	21	19	18	17	16	18	53	25	34	29	22	22	53	
24-Dec	53	24	27	26	10	14	14	12	12	13	14	24	15	13	24	21	16	18	29	24	12	13	11	10	13	53
25-Dec	10	12	14	15	15	28	14	15	17	12	11	14	16	18	16	11	13	10	12	26	20	32	41	33	41	
26-Dec	22	19	22	34	14	18	14	12	15	14	14	14	14	13	13	12	14	17	20	15	17	18	15	15	34	
27-Dec	25	21	21	22	22	28	15	25	19	39	28	28	15	19	12	10	32	28	62	33	12	27	22	20	62	
28-Dec	26	19	18	18	28	45	25	29	54	34	21	19	21	39	16	19	20	22	14	21	19	25	33	40	54	
29-Dec	28	58	16	26	26	15	14	15	21	23	23	17	13	13	13	11	23	24	48	13	21	17	17	34	58	
30-Dec	28	13	13	16	11	34	28	14	13	22	21	18	15	16	14	13	13	20	14	13	10	13	13	14	34	
31-Dec	12	10	13	11	12	13	11	14	15	21	15	17	13	14	36	23	18	24	35	25	23	28	34	23	36	
										Diurnal Maximum																
										53 58 28 54 64 51 70 69 54 43 34 30 60 41 36 71 32 33 62 33 46 86 73 65																
UO - Unstable Operation																										





WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

AMS03 LOWER CAMP METEOROLOGY DECEMBER 2023

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

January 31, 2024

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - LOWER CAMP MET TOWER (AMS03)
DECEMBER 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	744	0	0	100	7.3	-	2.3	-
Temperature 45 m (C) Average	744	0	0	100	8.2	-	3.2	-
Temperature 100 m (C) Average	744	0	0	100	9.3	-	6.1	-
Temperature 163 m (C) Average	744	0	0	100	9.9	-	7.5	-
Relative Humidity 20 m (%) Average	744	0	0	100	92.6	-	86.9	-
Relative Humidity 45 m (%) Average	744	0	0	100	92.3	-	88.5	-
Relative Humidity 100 m (%) Average	744	0	0	100	87.9	-	85.2	-
Relative Humidity 163 m (%) Average	744	0	0	100	91	-	86.6	-
Wind Speed 20 m (km/h) Average	744	0	0	100	29	-	19.0	-
Wind Speed 45 m (km/h) Average	742	0	2	99.73	42	-	27.0	-
Wind Speed 100 m (km/h) Average	744	0	0	100	49	-	32.0	-
Wind Speed 163 m (km/h) Average	731	0	13	98.25	52	-	35.0	-
Wind Direction 20 m (deg) Average	744	0	0	100	-	-	-	-
Wind Direction 45 m (deg) Average	742	0	2	99.73	-	-	-	-
Wind Direction 100 m (deg) Average	744	0	0	100	-	-	-	-
Wind Direction 163 m (deg) Average	731	0	13	98.25	-	-	-	-
Vertical Wind Speed 20 m (km/h) Average	744	0	0	100	0.9	-	0.0	-
Vertical Wind Speed 45 m (km/h) Average	742	0	2	99.73	1.8	-	0.8	-
Vertical Wind Speed 100 m (km/h) Average	744	0	0	100	3.1	-	0.9	-
Vertical Wind Speed 163 m (km/h) Average	731	0	13	98.25	6.1	-	1.8	-

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)
DECEMBER 2023

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
Wind Speed, Wind Direction, Vertical Wind Speed 45m	05 Dec 2023 10:00	05 Dec 2023 11:00	2	Flat line in sensor output signal
Wind Speed, Wind Direction, Vertical Wind Speed 163m	02 Dec 2023 22:00	03 Dec 2023 07:00	10	Flat line in sensor output signal
Wind Speed, Wind Direction, Vertical Wind Speed 163m	03 Dec 2023 10:00	03 Dec 2023 12:00	3	Flat line in sensor output signal



Wood Buffalo Environmental Association
Summary of Hour Averages

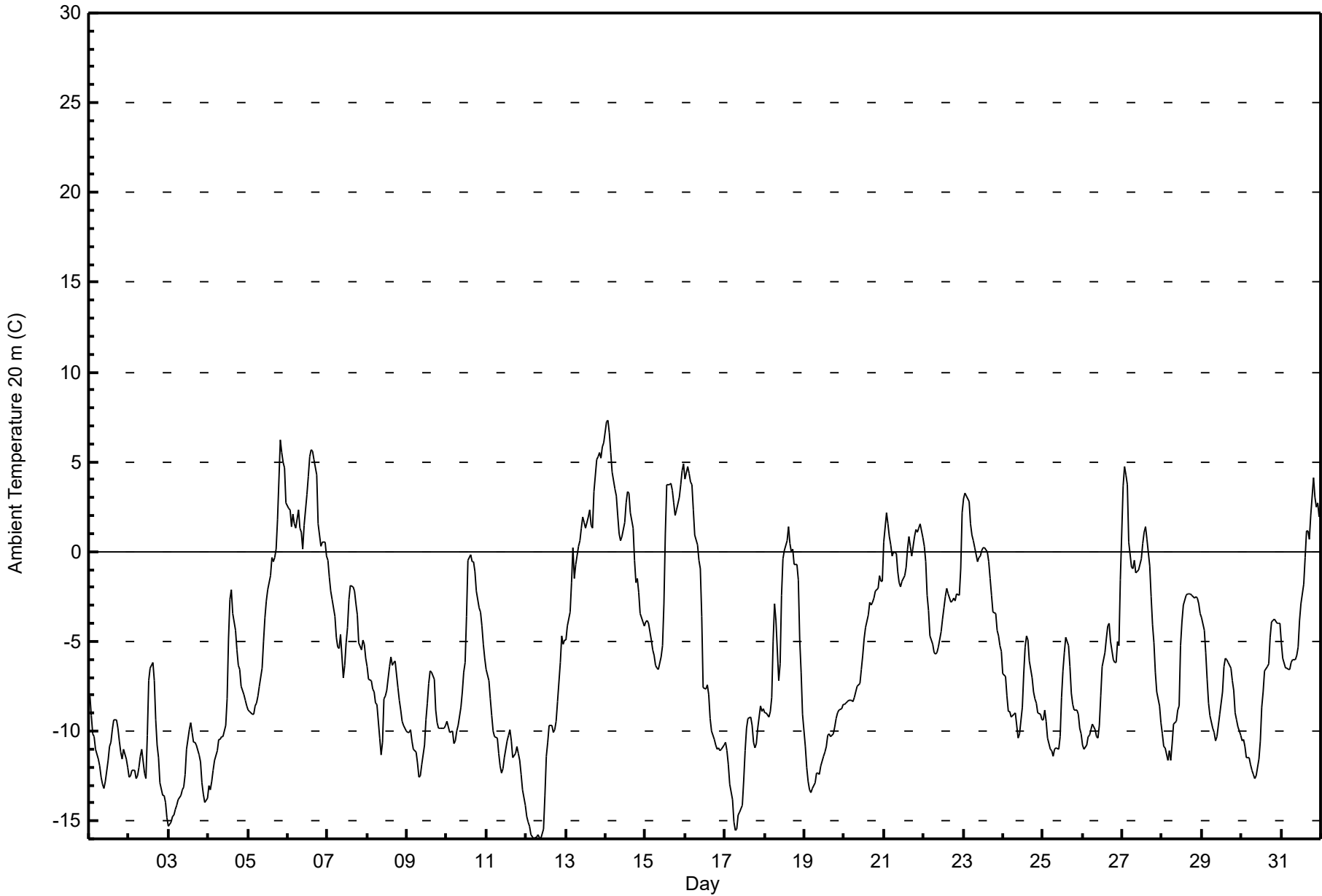
Ambient Temperature 20 m (AT20m) - C
Lower Camp Met Tower - December 2023

Maximum Value: 7.3 C on Dec 14 02:00 Maximum Daily Average: 2.3 C on Dec 6																						Hours in Service: 744 Hours of Data: 744				
Minimum Value: -16.0 C on Dec 12 05:00 Minimum Daily Average: -12.7 C on Dec 3 Maximum Diurnal Average: -3.5 C at hour 15 Minimum Diurnal Average: -7.8 C at hour 9 Monthly Average: -5.89 C Percentiles: P ₁ = -15.5 P ₁₀ = -12.1 Q ₁ = -10.2 Median = -6.6 Q ₃ = -1.7 P ₉₀ = 1.6 P ₉₉ = 5.6																						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-Dec	-8.0	-9.1	-10.1	-10.3	-11.0	-11.6	-12.0	-12.6	-12.9	-13.2	-12.8	-11.6	-10.9	-10.6	-9.9	-9.4	-9.4	-9.8	-10.5	-11.2	-11.5	-11.0	-11.6	-12.0	-11.0	-8.0
2-Dec	-12.5	-12.5	-12.2	-12.2	-12.7	-12.5	-12.0	-11.4	-11.0	-12.3	-12.6	-10.2	-7.2	-6.5	-6.2	-7.2	-9.3	-10.8	-11.5	-12.8	-13.6	-13.6	-14.0	-14.8	-11.3	-6.2
3-Dec	-15.3	-15.0	-14.8	-14.7	-14.4	-14.1	-13.8	-13.6	-13.3	-13.1	-12.4	-11.0	-9.9	-9.6	-10.1	-10.6	-10.6	-10.8	-11.3	-11.7	-12.8	-13.5	-13.9	-13.7	-12.7	-9.6
4-Dec	-13.1	-13.3	-12.8	-12.2	-11.6	-11.1	-10.5	-10.4	-10.3	-10.3	-9.7	-8.2	-4.8	-2.7	-2.1	-3.4	-4.3	-5.5	-6.3	-6.6	-7.5	-8.0	-8.3	-8.6	-8.4	-2.1
5-Dec	-8.8	-8.9	-9.1	-9.1	-8.6	-8.5	-8.0	-7.5	-6.5	-5.0	-3.7	-2.7	-2.1	-1.3	-0.3	-0.6	-0.3	0.2	1.7	6.2	5.5	5.0	4.7	2.7	-2.7	6.2
6-Dec	2.4	2.3	1.4	2.1	1.5	1.3	2.3	1.3	1.0	0.1	1.4	3.2	4.2	5.3	5.7	5.6	5.1	4.2	1.6	1.0	0.3	0.5	0.6	-0.3	2.3	5.7
7-Dec	-0.5	-1.4	-2.2	-2.6	-3.6	-4.8	-5.3	-5.4	-4.6	-7.0	-6.4	-5.1	-4.2	-2.6	-1.9	-2.0	-2.2	-2.9	-3.6	-5.1	-5.5	-4.9	-5.2	-5.9	-4.0	-0.5
8-Dec	-6.4	-7.1	-7.2	-7.6	-7.8	-8.4	-8.5	-10.4	-11.3	-10.6	-8.2	-8.1	-7.8	-6.4	-5.8	-6.3	-6.2	-6.1	-7.6	-8.3	-8.8	-9.4	-9.7	-10.0	-8.1	-5.8
9-Dec	-10.1	-10.1	-9.9	-10.6	-11.0	-11.1	-11.8	-12.5	-12.5	-11.8	-10.8	-9.4	-8.4	-7.4	-6.6	-6.7	-7.1	-8.8	-9.6	-9.8	-9.9	-9.8	-9.9	-9.7	-9.8	-6.6
10-Dec	-9.5	-9.8	-10.0	-10.0	-10.7	-10.5	-10.0	-9.7	-8.6	-7.8	-6.7	-6.2	-3.6	-0.5	-0.2	-0.5	-0.6	-1.1	-2.2	-3.2	-3.4	-4.1	-5.2	-6.0	-5.8	-0.2
11-Dec	-6.6	-7.2	-8.2	-9.2	-10.0	-10.3	-10.4	-11.2	-11.9	-12.4	-12.1	-11.5	-10.6	-10.2	-9.9	-10.6	-11.5	-11.2	-10.8	-11.2	-11.7	-12.5	-13.3	-14.1	-10.8	-6.6
12-Dec	-14.7	-15.1	-15.3	-15.7	-16.0	-15.9	-15.9	-15.7	-15.9	-16.0	-15.5	-13.6	-11.4	-10.6	-9.7	-9.7	-10.1	-9.9	-9.4	-8.3	-6.2	-4.7	-5.1	-4.9	-11.9	-4.7
13-Dec	-4.9	-4.2	-3.4	-1.8	0.2	-1.5	-0.7	0.3	0.6	1.3	1.9	1.6	1.3	1.9	2.3	1.4	1.3	3.3	5.1	5.3	5.5	5.2	5.8	6.1	1.4	6.1
14-Dec	7.2	7.3	6.6	5.5	4.4	3.5	3.1	2.0	1.0	0.6	0.9	1.7	2.7	3.3	3.3	2.2	1.3	-0.5	-1.8	-1.5	-2.3	-3.5	-3.9	-4.1	1.6	7.3
15-Dec	-3.9	-3.9	-4.0	-4.9	-5.5	-5.8	-6.3	-6.5	-6.5	-5.9	-5.2	-2.9	1.0	3.7	3.7	3.8	3.4	2.7	2.0	2.3	3.0	3.7	4.5	4.9	-0.9	4.9
16-Dec	4.0	4.8	4.3	3.9	3.7	2.4	1.0	0.4	-0.5	-0.9	-3.6	-7.6	-7.7	-7.4	-8.0	-9.3	-10.0	-10.5	-10.8	-11.0	-11.0	-11.1	-11.0	-10.8	-4.4	4.8
17-Dec	-10.6	-11.1	-11.9	-13.0	-13.8	-15.0	-15.5	-15.4	-14.7	-14.5	-14.1	-12.8	-11.1	-9.8	-9.3	-9.2	-9.7	-10.6	-10.9	-10.7	-9.8	-8.6	-8.9	-8.7	-11.7	-8.6
18-Dec	-9.0	-9.0	-9.3	-8.9	-8.1	-5.0	-2.9	-3.9	-7.2	-6.2	-2.4	-0.4	0.0	0.6	1.4	0.5	0.0	0.1	-0.7	-0.7	-1.6	-4.9	-6.8	-9.0	-3.9	1.4
19-Dec	-10.9	-12.0	-12.8	-13.3	-13.4	-13.2	-12.9	-12.3	-12.4	-12.4	-11.9	-11.4	-11.2	-10.8	-10.2	-10.2	-10.3	-10.2	-9.8	-9.3	-9.0	-8.8	-8.7	-8.5	-11.1	-8.5
20-Dec	-8.5	-8.5	-8.3	-8.3	-8.2	-8.4	-8.2	-7.8	-7.5	-7.4	-6.6	-5.8	-4.8	-4.2	-3.5	-2.8	-3.0	-2.8	-2.6	-2.2	-2.0	-1.4	-1.7	-1.7	-5.3	-1.4
21-Dec	0.5	2.1	1.5	0.8	0.4	-0.3	0.0	-0.1	-1.1	-1.7	-2.0	-1.7	-1.4	-0.9	0.1	0.9	0.3	-0.2	0.8	1.2	1.1	1.3	1.5	0.8	0.2	2.1
22-Dec	0.3	-0.6	-2.4	-3.3	-4.7	-5.2	-5.6	-5.7	-5.6	-5.3	-4.5	-3.7	-3.1	-2.5	-2.0	-2.3	-2.8	-2.7	-2.6	-2.8	-2.4	-2.4	-0.9	2.2	-3.0	2.2
23-Dec	2.9	3.2	3.1	2.8	1.5	1.0	0.6	0.2	-0.6	-0.3	-0.3	0.1	0.2	0.2	0.0	-0.6	-1.5	-2.4	-3.4	-3.4	-4.4	-4.7	-5.2	-5.6	-0.7	3.2
24-Dec	-6.8	-6.9	-8.0	-8.9	-8.9	-9.3	-9.1	-9.0	-9.7	-10.4	-10.2	-8.7	-6.8	-5.3	-4.7	-4.9	-6.1	-7.1	-7.8	-8.2	-8.5	-9.0	-9.1	-9.4	-8.0	-4.7
25-Dec	-9.4	-8.8	-9.5	-10.4	-11.0	-11.1	-11.4	-11.0	-10.9	-11.0	-10.3	-8.1	-6.6	-5.6	-4.7	-5.3	-6.4	-7.9	-8.5	-8.8	-8.8	-9.1	-9.8	-10.2	-8.9	-4.7
26-Dec	-10.8	-11.0	-10.7	-10.3	-10.2	-9.9	-9.6	-10.0	-10.3	-10.4	-9.7	-8.1	-6.4	-5.6	-4.8	-4.1	-4.0	-5.0	-6.0	-6.1	-6.2	-5.0	-5.3	-1.5	-7.5	-1.5
27-Dec	3.7	4.7	4.2	3.8	0.5	-0.9	-1.0	-0.5	-1.1	-1.1	-1.0	-0.4	0.4	1.1	1.4	0.7	-0.8	-2.5	-4.0	-5.1	-6.7	-7.8	-8.6	-9.5	-1.3	4.7
28-Dec	-10.1	-10.9	-10.9	-11.7	-11.1	-11.6	-10.7	-9.6	-9.5	-8.8	-8.6	-5.3	-3.9	-3.0	-2.4	-2.4	-2.4	-2.4	-2.5	-2.6	-2.5	-2.6	-2.9	-3.4	-6.3	-2.4
29-Dec	-3.6	-4.4	-5.6	-7.1	-8.4	-9.1	-9.9	-10.1	-10.6	-10.3	-9.7	-9.1	-7.8	-6.4	-6.0	-6.0	-6.2	-6.5	-7.2	-7.7	-9.0	-9.4	-9.8	-10.2	-7.9	-3.6
30-Dec	-10.6	-10.4	-10.9	-11.5	-11.5	-11.8	-12.2	-12.4	-12.6	-12.5	-11.6	-10.6	-8.7	-7.8	-6.7	-6.4	-6.3	-4.8	-3.9	-3.8	-3.7	-4.0	-4.0	-4.0	-8.4	-3.7
31-Dec	-5.1	-5.9	-6.5	-6.5	-6.5	-6.6	-6.1	-6.0	-6.1	-5.8	-5.3	-3.9	-2.9	-1.8	-0.3	1.2	1.2	0.7	2.0	4.1	3.1	2.5	2.7	2.0	-2.3	4.1
																								Diurnal Average		
																								Diurnal Maximum		



Wood Buffalo Environmental Association
Hourly Averages

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	608	81.72	81.72
0 - 10	136	18.28	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association

Summary of Hour Averages

Ambient Temperature 45 m (AT45m) - C

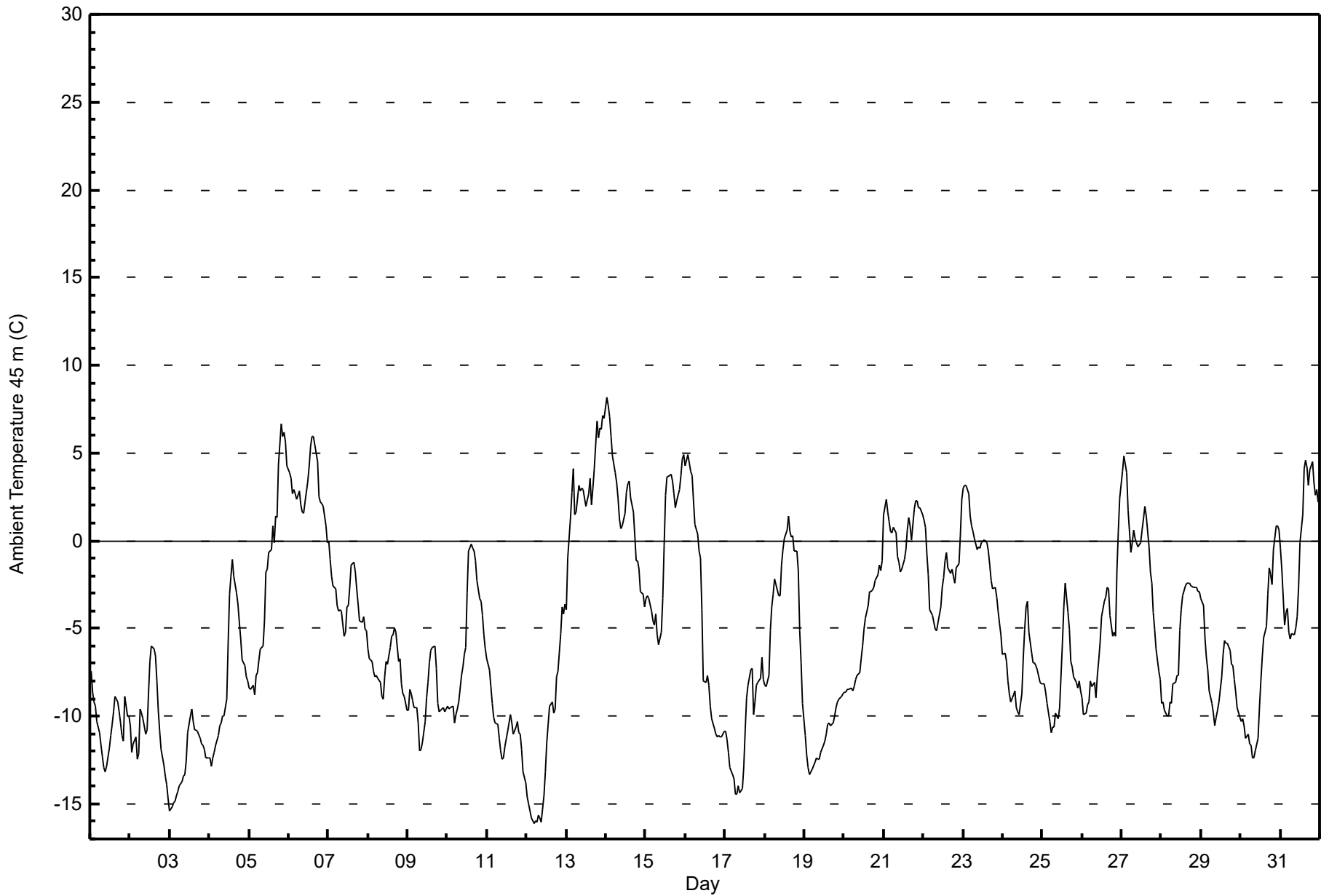
Lower Camp Met Tower - December 2023

Maximum Value: 8.2 C on Dec 14 01:00																				Maximum Daily Average: 3.2 C on Dec 13					Hours in Service: 744																								
Minimum Value: -16.1 C on Dec 12 05:00																				Minimum Daily Average: -12.5 C on Dec 3					Hours of Data: 744																								
Maximum Diurnal Average: -2.9 C at hour 15																				Minimum Diurnal Average: -7.2 C at hour 9					Hours of Missing Data: 0																								
Monthly Average: -5.20 C																				Percentiles: P ₁ = -15.4 P ₁₀ = -11.7 Q ₁ = -9.6 Median = -5.9 Q ₃ = -0.7 P ₉₀ = 2.6 P ₉₉ = 6.4					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-Dec	-7.4	-8.6	-9.2	-9.4	-10.3	-11.0	-11.7	-12.3	-12.9	-13.1	-12.8	-11.8	-11.1	-10.5	-9.8	-8.8	-9.2	-9.7	-10.4	-11.1	-11.5	-8.9	-10.0	-10.0	-10.5	-7.4																							
2-Dec	-10.5	-12.1	-11.6	-11.2	-12.4	-12.1	-9.6	-9.8	-10.2	-11.0	-10.8	-8.7	-6.9	-6.0	-6.2	-6.6	-8.0	-9.7	-10.9	-11.9	-12.8	-13.4	-13.9	-14.7	-10.5	-6.0																							
3-Dec	-15.4	-15.2	-14.9	-14.9	-14.5	-14.3	-14.0	-13.8	-13.4	-13.3	-12.5	-10.9	-10.0	-9.6	-10.3	-10.8	-10.8	-10.9	-11.2	-11.6	-11.7	-11.9	-12.4	-12.4	-12.5	-9.6																							
4-Dec	-12.4	-12.9	-12.4	-12.0	-11.7	-11.1	-10.5	-10.4	-10.0	-10.0	-9.0	-5.8	-3.1	-2.0	-1.0	-2.0	-3.0	-3.6	-4.7	-5.6	-6.8	-7.2	-7.7	-8.0	-7.6	-1.0																							
5-Dec	-8.4	-8.5	-8.2	-8.8	-7.7	-7.5	-6.8	-6.2	-6.0	-4.6	-1.8	-1.6	-0.7	-0.5	0.9	-0.1	1.4	1.3	4.3	6.7	5.9	6.2	5.7	4.3	-1.7	6.7																							
6-Dec	3.9	3.5	2.7	2.9	2.6	2.4	2.8	2.0	1.7	1.6	2.2	3.4	4.2	5.4	6.0	5.9	5.5	4.5	2.6	2.2	2.1	1.9	0.8	-0.1	3.0	6.0																							
7-Dec	0.0	-1.0	-2.0	-2.6	-2.7	-3.7	-4.0	-3.9	-4.0	-5.4	-5.2	-3.7	-3.7	-2.7	-1.4	-1.2	-1.8	-2.7	-3.6	-4.6	-4.7	-4.4	-5.0	-5.1	-3.3	0.0																							
8-Dec	-6.2	-6.8	-6.9	-7.4	-7.8	-7.7	-7.8	-8.1	-8.8	-9.0	-7.8	-6.9	-7.1	-6.1	-5.5	-5.3	-5.0	-5.2	-6.9	-6.7	-8.2	-8.7	-8.9	-9.7	-7.3	-5.0																							
9-Dec	-9.7	-8.4	-8.7	-9.1	-9.5	-9.5	-10.4	-12.0	-11.9	-11.5	-10.3	-8.9	-8.1	-7.0	-6.3	-6.1	-6.0	-7.3	-9.3	-9.7	-9.7	-9.5	-9.7	-9.6	-9.1	-6.0																							
10-Dec	-9.5	-9.6	-9.5	-9.4	-10.4	-9.9	-9.6	-9.2	-7.7	-7.2	-6.5	-6.1	-2.9	-0.6	-0.2	-0.4	-0.6	-1.2	-2.3	-3.3	-3.5	-4.3	-5.4	-6.1	-5.6	-0.2																							
11-Dec	-6.7	-7.3	-8.3	-9.3	-10.1	-10.4	-10.5	-11.3	-12.0	-12.5	-12.4	-11.8	-10.9	-10.4	-9.9	-10.4	-11.0	-10.6	-10.3	-11.0	-11.0	-11.9	-13.2	-13.8	-10.7	-6.7																							
12-Dec	-14.6	-15.0	-15.4	-15.8	-16.1	-16.0	-16.0	-15.6	-15.8	-16.1	-14.5	-13.2	-11.5	-10.5	-9.5	-9.2	-9.8	-9.6	-7.8	-7.4	-5.3	-3.8	-4.2	-3.6	-11.5	-3.6																							
13-Dec	-4.0	-1.0	1.4	2.8	4.1	1.5	1.7	3.1	2.9	3.0	2.9	2.4	1.9	2.7	3.6	2.0	3.0	4.1	6.8	5.9	6.4	6.3	7.1	7.0	3.2	7.1																							
14-Dec	8.2	7.7	7.0	5.9	4.9	3.8	3.3	2.5	1.3	0.7	0.9	1.6	2.8	3.2	3.4	2.4	1.6	0.3	-1.1	-1.2	-1.6	-2.9	-3.0	-3.8	2.0	8.2																							
15-Dec	-3.3	-3.2	-3.3	-4.0	-4.5	-4.8	-4.2	-5.4	-5.9	-5.2	-3.3	-0.3	2.6	3.7	3.7	3.8	3.4	2.6	1.9	2.2	3.0	3.7	4.6	4.9	-0.3	4.9																							
16-Dec	4.2	4.9	4.4	4.0	3.7	2.3	1.0	0.3	-0.6	-1.0	-4.0	-8.0	-8.0	-7.7	-8.3	-9.4	-10.2	-10.7	-11.0	-11.2	-11.1	-11.2	-11.2	-10.9	-4.6	4.9																							
17-Dec	-10.9	-11.3	-12.0	-12.9	-13.4	-13.6	-14.5	-14.4	-14.0	-14.4	-14.1	-12.8	-10.8	-8.9	-8.3	-7.4	-7.3	-9.9	-9.2	-8.2	-8.1	-7.8	-6.7	-7.9	-10.8	-6.7																							
18-Dec	-8.2	-8.3	-7.7	-5.2	-3.8	-3.0	-2.2	-2.5	-3.2	-3.2	-1.4	-0.5	0.1	0.6	1.4	0.5	0.2	0.3	-0.6	-0.6	-1.7	-5.1	-7.0	-9.3	-2.9	1.4																							
19-Dec	-11.1	-12.2	-12.9	-13.3	-13.2	-13.0	-12.6	-12.4	-12.5	-12.5	-12.1	-11.7	-11.4	-11.0	-10.5	-10.4	-10.6	-10.4	-10.0	-9.5	-9.2	-9.0	-8.9	-8.7	-11.2	-8.7																							
20-Dec	-8.6	-8.6	-8.5	-8.5	-8.4	-8.5	-8.3	-7.9	-7.7	-7.5	-6.7	-6.0	-5.1	-4.4	-3.7	-2.9	-2.9	-2.8	-2.7	-2.3	-2.0	-1.4	-1.7	-1.1	-5.3	-1.1																							
21-Dec	1.5	2.3	1.6	1.1	0.6	0.4	0.8	0.4	-0.9	-1.3	-1.8	-1.6	-1.1	-0.5	0.6	1.3	0.8	0.1	1.8	2.3	2.3	1.9	1.9	1.5	0.7	2.3																							
22-Dec	1.2	0.8	-0.8	-1.9	-3.9	-4.3	-4.7	-5.0	-5.1	-4.6	-3.8	-2.7	-2.1	-1.1	-0.6	-1.5	-1.9	-1.6	-2.0	-2.4	-1.5	-1.3	0.4	2.4	-2.0	2.4																							
23-Dec	3.0	3.2	3.1	2.7	1.4	0.8	0.5	0.2	-0.5	-0.4	-0.4	-0.1	0.0	0.0	-0.1	-0.6	-1.4	-2.3	-2.8	-2.6	-3.2	-4.0	-4.7	-5.4	-0.6	3.2																							
24-Dec	-6.5	-6.4	-6.9	-8.0	-8.7	-9.2	-8.8	-8.6	-9.5	-9.7	-9.9	-8.7	-6.6	-5.0	-3.8	-3.4	-5.2	-6.4	-7.0	-6.9	-7.2	-7.3	-8.1	-8.1	-7.3	-3.4																							
25-Dec	-8.1	-8.2	-8.6	-9.3	-10.3	-10.9	-10.7	-10.6	-9.8	-10.2	-9.5	-7.7	-5.8	-3.7	-2.5	-4.1	-5.1	-6.8	-7.2	-7.8	-8.1	-8.4	-8.0	-8.5	-7.9	-2.5																							
26-Dec	-9.0	-9.9	-9.8	-9.4	-9.2	-8.0	-8.3	-8.1	-9.0	-7.7	-6.8	-5.7	-4.4	-3.4	-3.2	-2.6	-2.7	-4.3	-5.5	-5.2	-5.5	-1.7	0.6	2.4	-5.7	2.4																							
27-Dec	4.0	4.9	4.3	3.9	1.8	-0.7	-0.2	0.6	0.2	-0.1	-0.4	-0.1	0.6	1.2	1.9	1.4	-0.3	-1.8	-2.4	-4.1	-5.1	-6.2	-7.4	-7.9	-0.5	4.9																							
28-Dec	-9.2	-9.2	-9.6	-10.0	-10.0	-9.2	-9.2	-8.2	-8.1	-7.7	-7.7	-5.2	-4.0	-3.1	-2.6	-2.4	-2.4	-2.4	-2.4	-2.6	-2.7	-2.6	-2.7	-2.9	-2.9	-5.7	-2.4																						
29-Dec	-3.3	-3.7	-5.5	-6.6	-7.4	-8.6	-9.3	-9.9	-10.6	-10.1	-9.7	-9.2	-7.7	-6.5	-5.7	-5.8	-5.9	-6.3	-7.0	-7.1	-7.9	-8.6	-9.5	-10.1	-7.6	-3.3																							
30-Dec	-10.3	-10.2	-10.5	-11.3	-11.0	-11.6	-11.7	-12.4	-12.4	-12.0	-11.3	-9.5	-8.0	-6.6	-5.5	-4.9	-3.0	-1.6	-1.9	-2.5	-0.5	0.8	0.9	0.6	-6.9	0.9																							
31-Dec	-0.4	-1.6	-4.8	-4.1	-3.9	-5.2	-5.6	-5.3	-5.4	-5.0	-4.3	-2.7	-0.1	1.5	4.1	4.6	4.2	3.1	4.1	4.5	3.3	2.6	2.9	2.2	-0.5	4.6																							
																								-5.4	-5.5	-5.9	-6.2	-6.5	-6.9	-6.8	-6.9	-7.2	-7.1	-6.6	-5.6	-4.5	-3.5	-2.9	-3.0	-3.4	-3.9	-4.2	-4.3	-4.4	-4.5	-4.7	-4.9	Diurnal Average	
																								8.2	7.7	7.0	5.9	4.9	3.8	3.3	3.1	2.9	3.0	2.9	3.4	4.2	5.4	6.0	5.9	5.5	4.5	6.8	6.7	6.4	6.3	7.1	7.0	Diurnal Maximum	



Wood Buffalo Environmental Association
Hourly Averages

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	588	79.03	79.03
0 - 10	156	20.97	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744

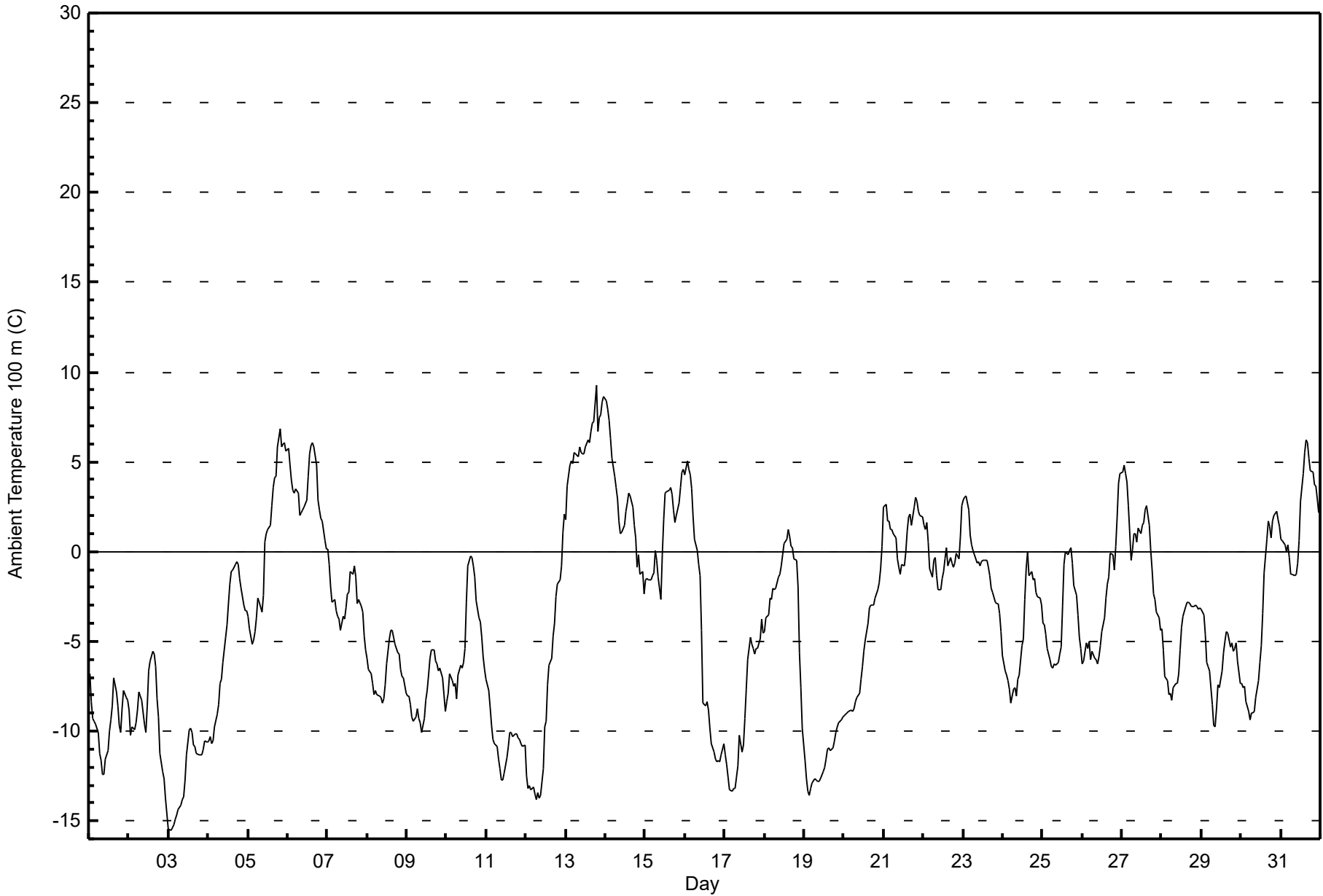


Maximum Value: 9.3 C on Dec 13 19:00		Maximum Daily Average: 6.1 C on Dec 13		Hours in Service: 744																																												
Minimum Value: -15.5 C on Dec 3 02:00		Minimum Daily Average: -12.5 C on Dec 3		Hours of Data: 744																																												
Maximum Diurnal Average: -1.8 C at hour 16		Minimum Diurnal Average: -5.6 C at hour 9		Hours of Missing Data: 0																																												
Monthly Average: -3.86 C		Percentiles: P ₁ = -14.2 P ₁₀ = -11.1 Q ₁ = -8.2 Median = -3.7 Q ₃ = 0.2 P ₉₀ = 3.4 P ₉₉ = 7.3		Hours of Calibration: 0																																												
				Percent Operational Time: 100.0																																												
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Dec	-6.8	-8.4	-9.3	-9.5	-9.6	-10.1	-11.3	-11.7	-12.4	-12.4	-11.5	-11.1	-10.0	-9.4	-8.6	-7.1	-7.8	-8.6	-9.7	-10.1	-8.7	-7.7	-8.2	-8.3	-9.5	-6.8																						
2-Dec	-8.8	-10.3	-9.8	-9.9	-9.6	-8.9	-7.8	-8.1	-8.3	-9.6	-10.1	-8.6	-6.6	-6.1	-5.6	-5.7	-6.4	-8.2	-9.2	-11.3	-12.3	-12.6	-13.8	-14.6	-9.3	-5.6																						
3-Dec	-15.4	-15.5	-15.4	-15.2	-14.9	-14.7	-14.3	-14.1	-13.8	-13.6	-12.7	-11.3	-9.9	-9.8	-10.1	-10.8	-10.8	-11.2	-11.3	-11.3	-11.3	-11.0	-10.6	-10.7	-12.5	-9.8																						
4-Dec	-10.5	-10.3	-10.7	-10.5	-9.8	-9.1	-8.5	-7.4	-7.1	-6.2	-4.8	-4.1	-2.9	-1.8	-1.1	-1.1	-0.7	-0.5	-0.7	-1.5	-2.1	-3.0	-3.3	-3.3	-5.0	-0.5																						
5-Dec	-3.6	-4.3	-5.2	-5.0	-4.4	-3.7	-2.6	-2.9	-3.3	-2.4	0.5	1.0	1.2	1.5	2.5	3.5	4.1	4.2	5.9	6.9	5.8	6.0	6.0	5.6	0.7	6.9																						
6-Dec	5.7	4.8	3.9	3.4	3.3	3.5	3.2	2.0	2.2	2.3	2.5	2.8	4.2	5.4	5.9	6.0	5.8	4.8	2.9	2.3	1.9	1.7	0.6	0.1	3.4	6.0																						
7-Dec	0.2	-0.7	-1.9	-2.8	-2.7	-3.3	-3.6	-3.8	-4.4	-3.6	-3.7	-3.2	-2.3	-2.3	-1.1	-1.3	-0.8	-1.4	-2.9	-2.7	-3.1	-3.4	-4.7	-5.4	-2.7	0.2																						
8-Dec	-5.9	-6.5	-6.8	-7.3	-8.0	-7.8	-7.9	-8.0	-8.1	-8.5	-8.2	-7.4	-6.3	-4.8	-4.4	-4.3	-4.8	-5.2	-5.7	-5.7	-6.6	-7.0	-7.0	-7.9	-6.7	-4.3																						
9-Dec	-8.0	-8.1	-8.5	-9.2	-9.4	-9.2	-8.7	-9.3	-9.5	-10.1	-9.3	-8.3	-7.8	-6.9	-6.0	-5.5	-5.5	-6.1	-6.2	-6.7	-6.5	-7.0	-8.0	-8.9	-7.9	-5.5																						
10-Dec	-8.3	-7.9	-6.8	-7.2	-7.5	-7.4	-8.2	-6.9	-6.4	-6.5	-6.2	-5.4	-2.8	-0.8	-0.3	-0.3	-0.8	-1.5	-2.7	-3.7	-4.0	-4.8	-5.8	-6.6	-4.9	-0.3																						
11-Dec	-7.1	-7.8	-8.7	-9.7	-10.5	-10.7	-10.9	-11.6	-12.1	-12.7	-12.7	-12.3	-11.5	-10.9	-10.1	-10.1	-10.3	-10.2	-10.1	-10.4	-10.5	-10.7	-10.8	-10.8	-10.5	-7.1																						
12-Dec	-12.5	-13.2	-13.0	-13.3	-13.1	-13.5	-13.8	-13.4	-13.7	-13.6	-12.1	-9.8	-9.4	-7.4	-6.4	-6.0	-4.7	-4.0	-2.5	-1.8	-1.6	-0.8	1.1	2.1	-8.2	2.1																						
13-Dec	1.8	3.6	4.9	5.0	4.9	5.6	5.4	5.3	5.8	5.5	5.4	5.5	5.8	6.3	6.1	6.7	7.2	7.3	9.3	6.7	7.5	7.7	8.3	8.7	6.1	9.3																						
14-Dec	8.4	7.9	7.3	6.3	5.2	4.2	3.5	2.9	1.7	1.0	1.1	1.5	2.3	2.7	3.3	3.1	2.5	1.5	0.8	-0.9	-0.2	-1.3	-1.1	-2.4	2.6	8.4																						
15-Dec	-1.6	-1.5	-1.6	-1.6	-1.4	-1.1	0.0	-0.5	-1.4	-2.7	-0.2	1.8	3.3	3.3	3.4	3.5	3.2	2.3	1.6	2.0	2.7	3.6	4.4	4.6	1.1	4.6																						
16-Dec	4.2	5.1	4.6	4.2	3.5	2.0	0.7	0.1	-0.8	-1.4	-4.4	-8.5	-8.6	-8.3	-8.8	-9.9	-10.7	-11.2	-11.5	-11.7	-11.6	-11.7	-11.3	-10.7	-4.9	5.1																						
17-Dec	-11.3	-11.9	-12.5	-13.3	-13.3	-13.2	-13.2	-12.6	-11.9	-10.2	-11.2	-10.8	-9.3	-7.7	-6.0	-4.8	-5.2	-5.4	-5.7	-5.4	-5.4	-4.8	-3.8	-4.5	-8.9	-3.8																						
18-Dec	-4.4	-3.7	-3.5	-2.6	-2.7	-2.1	-2.1	-2.0	-1.4	-1.3	-0.8	-0.1	0.5	0.7	1.2	0.8	0.3	0.2	-0.4	-0.5	-2.0	-5.6	-7.5	-9.9	-2.0	1.2																						
19-Dec	-11.7	-12.7	-13.3	-13.6	-13.2	-12.9	-12.6	-12.7	-12.8	-12.8	-12.7	-12.3	-12.0	-11.5	-11.0	-10.9	-11.1	-10.9	-10.5	-10.1	-9.7	-9.5	-9.4	-9.2	-11.6	-9.2																						
20-Dec	-9.1	-9.1	-9.0	-8.9	-8.8	-8.9	-8.8	-8.4	-8.1	-7.9	-7.1	-6.4	-5.5	-4.9	-4.0	-3.1	-3.0	-3.0	-3.0	-2.6	-2.2	-1.7	-0.9	0.3	-5.6	0.3																						
21-Dec	2.5	2.6	1.7	1.7	1.2	1.3	1.0	0.7	-0.4	-0.8	-1.2	-0.7	-0.8	0.0	1.1	1.9	2.1	1.4	2.5	3.0	2.8	2.3	2.0	1.9	1.2	3.0																						
22-Dec	1.4	1.2	1.6	0.5	-0.9	-1.4	-0.5	-0.3	-1.3	-2.2	-2.1	-1.5	-1.1	-0.4	0.2	-0.8	-0.3	-0.6	-0.9	-0.6	-0.1	-0.4	0.8	2.6	-0.3	2.6																						
23-Dec	2.9	3.0	3.1	2.4	1.0	0.4	0.1	-0.2	-0.6	-0.6	-0.8	-0.6	-0.5	-0.5	-0.5	-0.8	-1.3	-2.0	-2.3	-2.8	-2.9	-2.9	-3.5	-4.5	-0.6	3.1																						
24-Dec	-5.8	-6.6	-6.8	-7.2	-7.6	-8.4	-7.7	-7.6	-8.1	-7.1	-6.9	-5.2	-4.9	-2.6	-0.9	0.0	-1.3	-1.1	-1.6	-1.5	-2.2	-2.5	-2.6	-3.0	-4.6	0.0																						
25-Dec	-4.0	-4.0	-4.6	-5.4	-6.0	-6.4	-6.5	-6.3	-6.3	-6.2	-5.7	-5.3	-3.0	-0.7	-0.1	-0.1	0.1	0.2	-0.6	-1.9	-2.4	-3.5	-4.8	-5.4	-3.7	0.2																						
26-Dec	-6.2	-6.1	-5.1	-5.4	-5.0	-6.1	-5.6	-5.9	-6.0	-6.3	-5.9	-5.2	-4.5	-3.6	-2.6	-1.8	-1.4	-0.1	-0.2	-1.1	0.3	2.0	3.8	4.3	-3.1	4.3																						
27-Dec	4.4	4.8	4.3	3.9	2.6	-0.5	0.1	1.0	1.0	0.5	1.3	1.0	1.5	1.6	2.3	2.5	1.5	0.1	-1.1	-2.4	-2.7	-3.4	-3.7	-4.4	0.7	4.8																						
28-Dec	-4.3	-5.5	-6.9	-7.2	-8.0	-7.9	-8.3	-7.5	-7.3	-7.3	-6.8	-5.5	-4.2	-3.6	-3.0	-2.8	-2.9	-2.9	-3.1	-3.1	-3.0	-3.1	-3.2	-3.1	-5.0	-2.8																						
29-Dec	-3.2	-3.5	-4.6	-6.2	-6.4	-6.7	-8.5	-9.7	-9.7	-8.7	-7.4	-7.6	-6.6	-5.6	-5.0	-4.5	-4.6	-5.3	-5.1	-5.5	-5.4	-5.1	-6.1	-7.3	-6.2	-3.2																						
30-Dec	-7.3	-7.6	-7.5	-8.4	-8.9	-9.4	-9.0	-9.0	-8.9	-8.2	-7.2	-6.2	-5.2	-3.5	-1.2	0.7	1.7	1.4	0.8	1.7	2.0	2.3	1.8	1.4	-3.9	2.3																						
31-Dec	0.7	0.6	0.4	-0.1	0.4	-0.3	-1.3	-1.3	-1.3	-1.3	-0.7	0.6	2.8	4.4	5.5	6.2	6.1	5.2	4.5	4.4	3.8	3.7	2.9	2.2	2.0	6.2																						
																								-4.0	-4.2	-4.5	-4.9	-5.2	-5.4	-5.4	-5.5	-5.6	-5.6	-5.2	-4.6	-3.7	-2.8	-2.1	-1.8	-1.9	-2.3	-2.5	-2.8	-2.9	-3.0	-3.2	-3.5	Diurnal Average
																								8.4	7.9	7.3	6.3	5.2	5.6	5.4	5.3	5.8	5.5	5.4	5.5	5.8	6.3	6.1	6.7	7.2	7.3	9.3	6.9	7.5	7.7	8.3	8.7	Diurnal Maximum



Wood Buffalo Environmental Association
Hourly Averages

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	550	73.92	73.92
0 - 10	194	26.08	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744

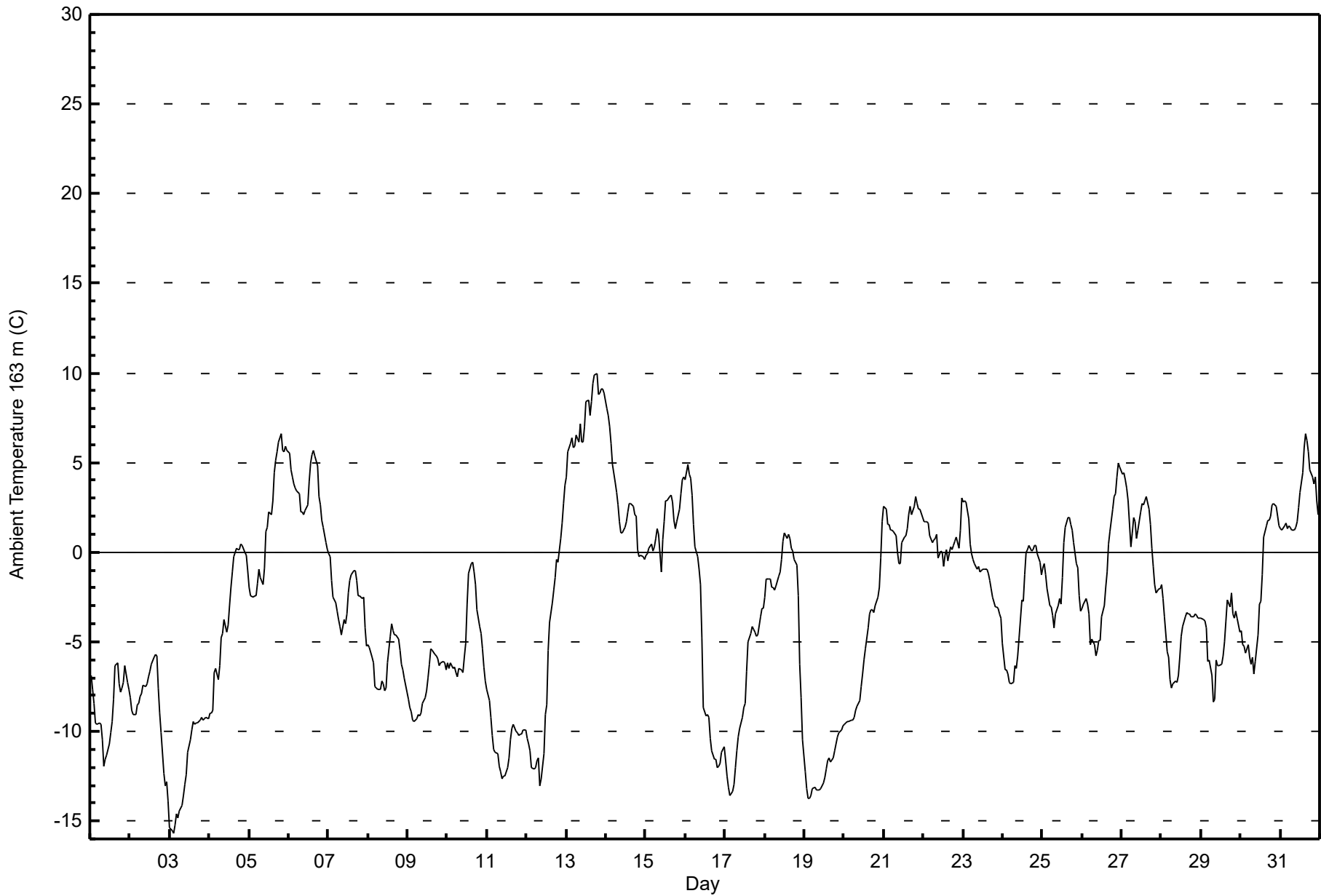


Maximum Value: 9.9 C on Dec 13 19:00																				Maximum Daily Average: 7.5 C on Dec 13					Hours in Service: 744	
Minimum Value: -15.7 C on Dec 3 03:00																				Minimum Daily Average: -12.1 C on Dec 19					Hours of Data: 744	
Maximum Diurnal Average: -1.3 C at hour 17																				Minimum Diurnal Average: -4.8 C at hour 9					Hours of Missing Data: 0	
Monthly Average: -3.18 C																				Percentiles: P ₁ = -14.0 P ₁₀ = -10.7 Q ₁ = -7.3 Median = -3.0 Q ₃ = 1.2 P ₉₀ = 3.3 P ₉₉ = 8.6					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-Dec	-6.9	-7.7	-8.5	-9.5	-9.6	-9.5	-9.6	-10.4	-11.9	-11.6	-11.3	-10.7	-10.1	-9.5	-8.2	-6.4	-6.2	-7.4	-7.8	-7.6	-7.3	-6.3	-7.3	-7.7	-8.7	-6.2
2-Dec	-8.1	-8.9	-9.1	-9.1	-8.5	-8.4	-8.0	-7.9	-7.5	-7.5	-7.3	-6.9	-6.7	-6.2	-5.8	-5.7	-5.8	-7.6	-9.0	-10.0	-12.3	-13.0	-12.8	-13.9	-8.6	-5.7
3-Dec	-15.4	-15.5	-15.7	-15.2	-14.6	-14.9	-14.4	-14.1	-13.6	-13.0	-12.4	-11.1	-10.5	-10.0	-9.4	-9.6	-9.5	-9.5	-9.4	-9.2	-9.3	-9.3	-9.2	-9.3	-11.8	-9.2
4-Dec	-9.0	-9.0	-8.8	-6.8	-6.5	-7.1	-6.3	-4.8	-4.6	-3.8	-4.5	-4.1	-3.0	-2.0	-1.1	-0.3	0.3	0.2	0.5	0.4	0.0	-0.2	-1.1	-3.4	0.5	
5-Dec	-2.0	-2.4	-2.5	-2.4	-2.4	-1.8	-0.9	-1.5	-1.8	-0.9	1.2	1.4	2.3	2.1	2.9	4.4	5.1	5.6	6.1	6.6	5.7	5.6	5.9	5.7	1.8	6.6
6-Dec	5.5	4.6	4.2	3.8	3.6	3.4	3.2	2.3	2.3	2.1	2.3	2.6	4.0	5.0	5.5	5.7	5.4	4.8	3.1	2.6	1.8	1.4	0.5	0.1	3.3	5.7
7-Dec	-0.1	-0.3	-1.6	-2.5	-2.8	-3.3	-3.8	-4.1	-4.7	-3.8	-4.0	-3.5	-2.3	-1.6	-1.3	-1.0	-1.0	-1.5	-2.5	-2.4	-2.6	-2.5	-4.3	-5.2	-2.6	-0.1
8-Dec	-5.2	-5.4	-5.9	-6.1	-7.5	-7.6	-7.7	-7.7	-7.2	-7.3	-7.7	-7.6	-6.2	-4.7	-4.0	-4.4	-4.6	-4.6	-4.8	-5.5	-6.3	-6.6	-7.0	-7.8	-6.2	-4.0
9-Dec	-8.2	-8.7	-8.9	-9.4	-9.4	-9.3	-9.0	-9.1	-9.0	-8.4	-8.1	-7.7	-7.0	-6.3	-5.4	-5.4	-5.7	-5.8	-5.9	-6.3	-6.2	-6.1	-6.2	-6.6	-7.4	-5.4
10-Dec	-6.1	-6.5	-6.2	-6.5	-6.4	-6.8	-6.9	-6.5	-6.6	-6.7	-5.9	-5.1	-2.9	-1.1	-0.6	-0.6	-1.1	-1.8	-3.2	-4.1	-4.5	-5.4	-6.4	-7.2	-4.8	-0.6
11-Dec	-7.6	-8.3	-9.2	-10.2	-11.0	-11.2	-11.3	-11.9	-12.3	-12.6	-12.5	-12.5	-12.1	-11.4	-10.5	-9.9	-9.6	-10.0	-10.1	-10.2	-10.1	-10.1	-9.9	-10.0	-10.6	-7.6
12-Dec	-10.4	-10.7	-11.1	-12.0	-12.1	-12.1	-11.6	-11.5	-13.0	-12.6	-11.3	-9.1	-8.5	-5.5	-3.9	-2.9	-2.1	-1.5	-0.4	-0.6	0.8	1.6	2.7	3.7	-6.4	3.7
13-Dec	4.2	5.6	6.1	6.4	5.8	5.9	6.5	6.2	7.2	6.2	6.1	7.0	8.4	8.5	7.6	8.4	9.4	9.9	9.9	8.8	8.9	9.1	9.1	8.8	7.5	9.9
14-Dec	8.0	7.6	7.0	6.1	4.9	3.9	3.3	2.6	1.7	1.1	1.1	1.4	1.7	2.2	2.7	2.7	2.5	2.1	2.0	0.1	-0.2	-0.2	-0.3	-0.4	2.7	8.0
15-Dec	-0.2	-0.1	0.2	0.4	0.1	0.3	0.8	1.3	1.0	-1.1	0.7	1.7	2.8	2.9	3.1	3.2	2.8	1.8	1.3	1.7	2.4	3.3	4.1	4.2	1.6	4.2
16-Dec	4.0	4.9	4.4	4.1	3.2	1.5	0.3	-0.3	-0.9	-1.8	-4.7	-8.7	-9.2	-9.0	-9.2	-10.4	-11.1	-11.5	-11.6	-12.0	-11.9	-11.8	-11.2	-10.8	-5.2	4.9
17-Dec	-11.6	-12.5	-13.1	-13.6	-13.3	-13.0	-12.1	-11.1	-10.3	-9.8	-9.2	-8.7	-8.4	-6.7	-5.0	-4.6	-4.2	-4.3	-4.4	-4.7	-4.6	-3.6	-3.1	-3.1	-8.1	-3.1
18-Dec	-2.5	-1.5	-1.5	-1.5	-2.0	-2.0	-2.1	-1.9	-1.4	-1.1	-0.4	0.6	1.1	0.7	1.0	0.8	0.2	0.1	-0.4	-0.7	-2.5	-6.2	-8.1	-10.5	-1.7	1.1
19-Dec	-12.2	-13.2	-13.8	-13.8	-13.6	-13.2	-13.1	-13.3	-13.3	-13.3	-13.2	-12.9	-12.5	-12.1	-11.6	-11.5	-11.7	-11.5	-11.1	-10.7	-10.3	-10.1	-9.9	-9.7	-12.1	-9.7
20-Dec	-9.6	-9.6	-9.5	-9.5	-9.3	-9.3	-9.2	-8.8	-8.6	-8.3	-7.5	-6.8	-6.0	-5.4	-4.2	-3.5	-3.2	-3.2	-3.4	-3.0	-2.5	-1.9	-0.3	1.7	-5.9	1.7
21-Dec	2.6	2.4	1.6	1.5	1.3	1.2	1.1	0.9	0.0	-0.7	-0.7	0.5	0.9	0.9	1.3	2.1	2.5	2.1	2.6	3.1	2.7	2.4	2.4	2.0	1.5	3.1
22-Dec	1.7	1.7	1.7	1.6	0.9	0.5	0.7	0.8	1.0	-0.4	0.1	0.0	-0.8	-0.2	0.1	-0.5	0.3	0.2	0.4	0.6	0.9	0.2	1.2	3.0	0.7	3.0
23-Dec	2.8	2.9	2.8	1.9	0.5	-0.1	-0.4	-0.6	-0.9	-0.8	-1.1	-1.0	-1.0	-0.9	-0.9	-1.2	-1.6	-2.0	-2.5	-3.1	-3.1	-3.1	-3.4	-3.7	-0.9	2.9
24-Dec	-5.1	-6.5	-6.5	-6.8	-7.3	-7.3	-7.2	-6.3	-6.5	-5.8	-4.8	-2.7	-2.7	-1.3	0.0	0.2	0.3	0.0	0.2	0.4	0.4	-0.1	-0.6	-1.2	-3.2	0.4
25-Dec	-0.9	-0.6	-1.3	-2.1	-3.0	-3.1	-3.6	-4.3	-3.5	-3.0	-2.6	-2.9	-1.4	0.5	1.4	1.9	1.9	1.5	1.2	0.5	-0.7	-0.9	-2.4	-3.3	-1.3	1.9
26-Dec	-3.2	-2.9	-2.6	-2.9	-3.4	-5.1	-4.9	-5.1	-5.8	-5.5	-4.9	-5.0	-3.6	-3.0	-2.0	-1.1	0.4	1.2	2.4	3.1	3.2	4.2	5.0	4.8	-1.5	5.0
27-Dec	4.3	4.5	4.1	3.6	2.9	0.3	1.1	1.9	1.7	0.8	1.3	2.2	2.7	2.6	2.9	3.1	2.4	1.5	0.3	-0.8	-1.8	-2.3	-2.0	-2.1	1.5	4.5
28-Dec	-1.8	-2.6	-3.6	-5.5	-5.9	-7.1	-7.6	-7.4	-7.2	-7.3	-6.8	-5.9	-4.7	-4.2	-3.6	-3.3	-3.4	-3.5	-3.6	-3.6	-3.5	-3.5	-3.7	-3.7	-4.7	-1.8
29-Dec	-3.6	-3.8	-3.8	-4.2	-6.1	-6.1	-6.9	-8.3	-8.2	-6.1	-6.3	-6.3	-6.3	-5.8	-5.0	-3.8	-2.7	-3.0	-2.3	-3.4	-3.7	-3.3	-3.7	-4.4	-4.9	-2.3
30-Dec	-4.4	-5.1	-5.2	-5.6	-5.2	-5.9	-6.2	-5.9	-6.8	-6.1	-4.6	-2.9	-2.7	-1.3	0.8	1.5	1.8	1.7	2.0	2.7	2.7	2.6	2.0	1.5	-2.0	2.7
31-Dec	1.3	1.2	1.5	1.6	1.3	1.5	1.4	1.2	1.2	1.4	1.7	2.5	3.3	4.4	5.9	6.6	6.2	5.6	4.6	4.2	3.8	4.2	2.9	2.1	3.0	6.6
																								Diurnal Average		
																								Diurnal Maximum		



Wood Buffalo Environmental Association
Hourly Averages

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	497	66.80	66.80
0 - 10	247	33.20	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 744

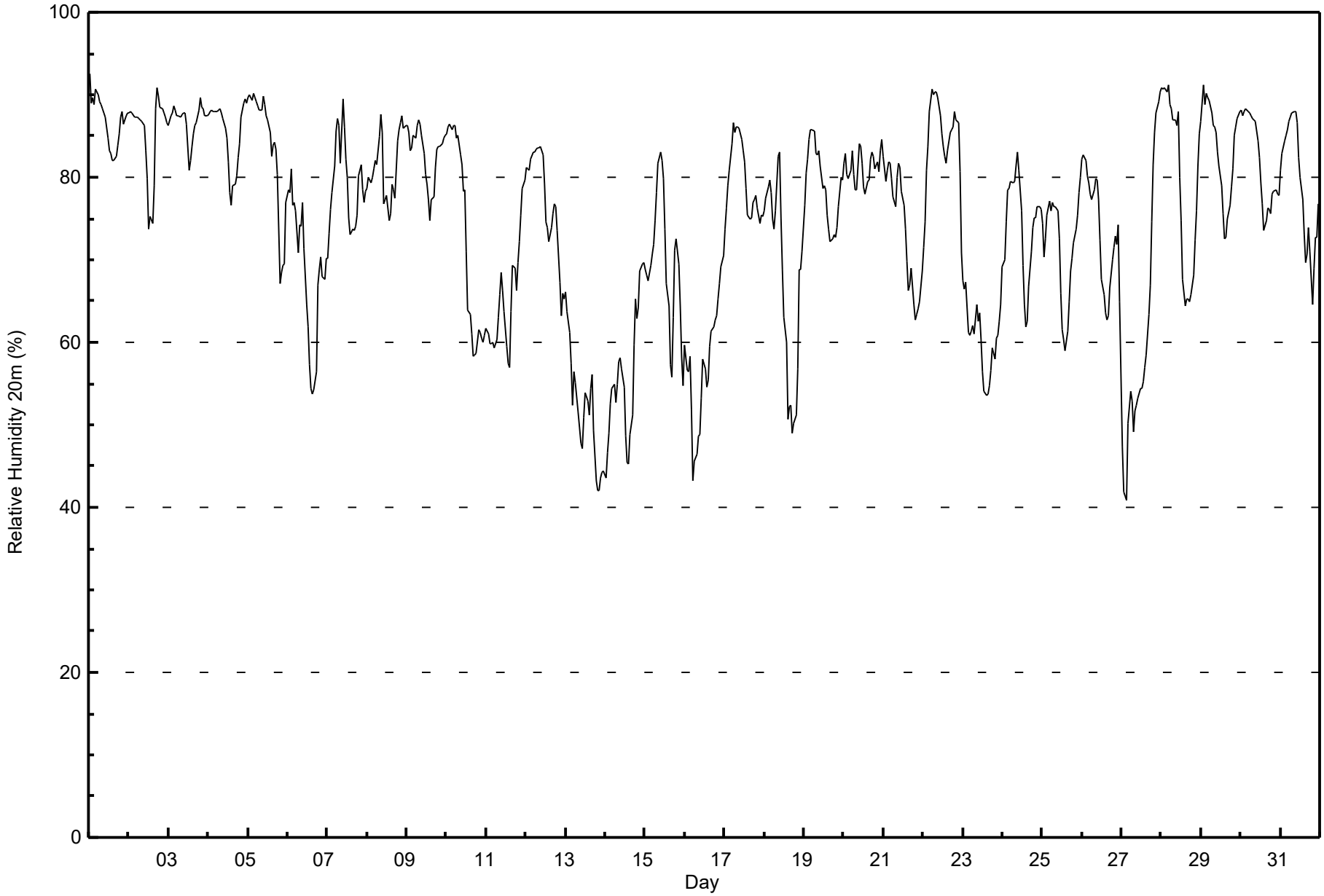
Total Number of Hours: 744



Wood Buffalo Environmental Association
Summary of Hour Averages

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

Maximum Value: 92.6 % on Dec 1 01:00 Maximum Daily Average: 86.9 % on Dec 1																						Hours in Service: 744 Hours of Data: 744																											
Minimum Value: 40.9 % on Dec 27 04:00 Minimum Daily Average: 51.5 % on Dec 13 Maximum Diurnal Average: 79.2 % at hour 10 Minimum Diurnal Average: 67.6 % at hour 15 Monthly Average: 74.79 % Percentiles: P ₁ = 43.6 P ₁₀ = 56.5 Q ₁ = 66.9 Median = 77.9 Q ₃ = 84.7 P ₉₀ = 87.9 P ₉₉ = 90.6																						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-Dec	92.6	89.0	89.6	88.9	90.6	90.0	89.1	88.7	88.3	87.8	87.3	84.7	83.2	82.8	82.0	82.0	82.5	83.9	85.3	87.2	87.9	86.4	87.4	87.8	86.9	92.6																							
2-Dec	87.8	88.0	87.8	87.3	87.3	87.2	87.2	87.0	86.8	86.3	83.2	79.8	73.8	75.3	74.3	79.0	88.3	90.9	89.8	88.4	88.4	87.9	87.2	86.6	85.2	90.9																							
3-Dec	86.3	87.5	87.8	88.7	88.2	87.5	87.4	87.3	87.7	87.8	87.8	86.4	80.8	82.0	83.8	85.3	86.2	86.6	88.2	89.6	88.4	88.3	87.4	87.4	86.9	89.6																							
4-Dec	87.6	88.0	88.2	87.9	88.1	87.9	88.1	88.3	87.9	87.2	86.0	84.7	81.9	78.1	76.6	78.9	79.2	80.1	82.4	84.0	87.3	89.0	89.6	88.9	85.2	89.6																							
5-Dec	89.7	90.0	89.3	90.2	89.7	89.2	88.6	88.1	88.1	89.9	88.8	87.5	87.0	85.4	82.5	83.9	84.2	83.5	80.4	67.2	68.5	69.3	69.6	76.9	83.6	90.2																							
6-Dec	78.4	78.1	81.0	76.6	76.9	76.0	70.8	74.3	74.0	77.0	71.4	64.5	61.8	57.3	54.5	53.7	54.3	56.5	67.0	68.8	70.3	67.9	67.6	70.1	68.7	81.0																							
7-Dec	70.2	73.2	76.1	78.2	81.3	85.6	87.1	86.3	81.7	89.4	86.1	82.3	79.9	75.0	73.1	73.7	73.6	74.0	75.4	80.2	81.5	78.6	76.9	78.4	79.1	89.4																							
8-Dec	78.6	80.0	79.3	80.1	81.0	82.1	81.5	84.9	87.6	85.5	76.8	77.3	77.7	74.8	75.5	79.2	78.4	77.5	84.4	85.8	86.6	87.5	86.0	86.3	81.4	87.6																							
9-Dec	86.2	85.4	83.2	83.6	85.0	84.8	86.3	86.9	86.5	85.1	82.8	80.4	79.2	77.3	74.7	77.4	77.7	81.2	83.5	83.7	83.8	84.1	84.7	85.1	82.8	86.9																							
10-Dec	85.3	86.1	86.4	85.8	86.3	86.3	84.7	85.1	82.7	81.5	78.3	78.5	71.1	63.8	63.4	61.0	58.2	58.4	58.6	61.5	61.2	60.5	59.9	60.8	72.7	86.4																							
11-Dec	61.7	61.1	59.8	59.8	59.9	59.4	60.4	63.0	65.8	68.5	66.3	63.7	59.5	57.4	57.0	63.6	69.3	69.0	66.3	69.6	72.2	75.5	78.7	79.7	65.3	79.7																							
12-Dec	81.2	81.1	80.9	82.2	83.1	83.1	83.4	83.5	83.6	83.8	82.7	79.2	74.5	74.0	72.3	73.9	75.6	76.8	76.5	73.6	67.3	63.3	66.0	65.2	76.9	83.8																							
13-Dec	66.1	63.8	61.2	57.5	52.3	56.4	55.2	51.5	49.7	47.8	47.1	50.8	53.9	52.8	51.1	54.3	56.0	49.4	43.2	42.0	42.0	43.6	44.2	44.4	51.5	66.1																							
14-Dec	43.6	46.5	49.1	52.6	54.4	54.8	52.7	54.8	57.7	58.2	56.8	54.5	48.6	45.5	45.3	48.9	51.2	59.6	65.3	62.9	64.3	68.7	69.5	69.7	55.6	69.7																							
15-Dec	68.8	68.2	67.4	69.4	70.8	71.8	74.8	78.2	81.8	83.0	82.0	79.8	73.8	67.2	64.3	57.3	55.8	63.1	71.2	72.5	69.5	64.4	58.2	54.7	69.5	83.0																							
16-Dec	59.7	56.5	56.4	58.2	51.8	43.2	45.6	46.4	48.7	48.9	53.3	58.0	56.9	54.5	55.5	59.6	61.3	61.9	62.8	63.3	65.2	67.2	69.2	70.5	57.3	70.5																							
17-Dec	73.7	76.3	79.0	80.9	84.0	86.6	85.5	86.1	86.1	86.0	84.6	83.2	81.8	78.6	75.4	74.8	75.1	76.9	77.2	77.9	76.3	74.5	75.3	75.2	79.6	86.6																							
18-Dec	76.0	77.4	78.8	79.6	78.1	74.9	73.7	75.9	82.6	83.0	75.1	68.8	63.0	60.0	50.7	52.1	52.3	49.0	50.2	51.3	56.8	68.9	68.8	71.0	67.4	83.0																							
19-Dec	76.6	80.5	82.3	84.6	85.8	85.7	85.6	83.0	82.7	83.2	81.4	78.6	79.0	78.5	75.4	73.7	72.2	72.5	73.1	72.8	73.9	76.4	80.1	79.7	79.0	85.8																							
20-Dec	81.8	82.9	80.4	79.8	80.8	83.3	80.3	78.5	78.5	84.1	83.8	81.8	78.7	78.0	79.5	79.7	82.2	83.0	82.5	81.0	81.9	80.6	83.3	84.5	81.3	84.5																							
21-Dec	82.5	79.5	80.8	81.8	81.7	79.8	77.6	76.5	79.9	81.7	81.2	78.3	76.6	73.6	69.8	66.3	66.9	69.0	64.5	62.7	63.4	64.0	64.9	68.7	73.8	82.5																							
22-Dec	71.6	74.6	80.8	83.7	88.0	90.8	89.9	90.4	90.4	89.7	87.5	85.2	83.7	82.6	81.7	83.2	85.4	85.8	86.0	87.9	86.9	86.6	80.7	70.9	84.3	90.8																							
23-Dec	67.5	66.4	67.3	61.2	60.8	61.4	62.0	61.1	64.7	62.5	63.5	60.3	56.5	54.0	53.6	53.7	54.8	56.6	59.3	57.9	60.5	60.9	62.6	64.5	60.6	67.5																							
24-Dec	69.1	70.0	74.6	78.4	78.6	79.5	79.3	79.5	81.3	83.1	80.8	75.9	69.3	64.6	61.9	62.5	66.8	71.1	73.9	75.0	75.1	76.5	76.4	76.2	74.1	83.1																							
25-Dec	74.4	70.4	72.6	75.4	77.2	75.9	76.9	76.5	76.4	76.0	72.6	66.0	61.5	60.3	59.1	61.4	65.0	68.6	70.1	72.0	73.7	75.4	78.1	80.1	71.5	80.1																							
26-Dec	82.3	82.7	82.0	80.2	79.4	77.9	77.2	78.5	79.9	79.7	77.3	72.3	67.6	65.8	63.6	62.8	63.2	66.6	69.9	71.6	72.9	71.9	74.2	65.0	73.5	82.7																							
27-Dec	47.2	41.9	41.3	40.9	50.2	54.1	52.8	49.2	51.7	52.4	53.2	54.5	54.4	55.2	56.9	58.5	63.4	66.9	74.6	81.5	85.4	87.8	89.1	90.3	60.6	90.3																							
28-Dec	90.9	90.6	90.9	90.3	91.2	88.8	88.4	86.9	86.9	86.3	87.9	80.1	74.8	67.6	64.5	65.2	65.2	64.9	65.8	68.1	72.3	75.9	81.3	85.2	79.6	91.2																							
29-Dec	86.8	91.1	88.8	90.2	89.7	89.3	87.9	86.3	86.2	85.4	83.0	81.4	79.0	75.5	72.5	72.7	75.0	76.6	78.8	81.0	85.0	86.2	87.2	88.0	83.5	91.1																							
30-Dec	88.1	87.5	87.9	88.3	87.9	87.8	87.4	87.1	87.0	86.8	84.4	82.4	79.3	76.7	73.6	74.7	76.2	76.1	75.5	77.9	78.3	78.5	78.0	77.9	81.9	88.3																							
31-Dec	80.9	82.9	84.5	85.0	85.8	86.8	87.2	87.7	87.9	88.0	86.6	82.4	80.1	77.3	73.0	69.7	70.7	73.9	71.1	64.6	69.0	72.8	72.7	76.8	79.1	88.0																							
																								76.6	76.7	77.3	77.6	78.3	78.3	77.9	78.0	78.7	79.2	77.4	74.9	71.9	69.4	67.6	68.5	69.9	71.3	72.7	73.0	74.1	74.8	75.3	75.7	Diurnal Average	
																								92.6	91.1	90.9	90.3	91.2	90.8	89.9	90.4	90.4	89.9	88.8	87.5	87.0	85.4	83.8	85.3	88.3	90.9	89.8	89.6	88.4	89.0	89.6	90.3	Diurnal Maximum	





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

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

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	0	0.00	0.00
40 - 60	108	14.52	14.52
60 - 80	326	43.82	58.33
80 - 100	310	41.67	100.00

Total Number of Valid Hours: 744

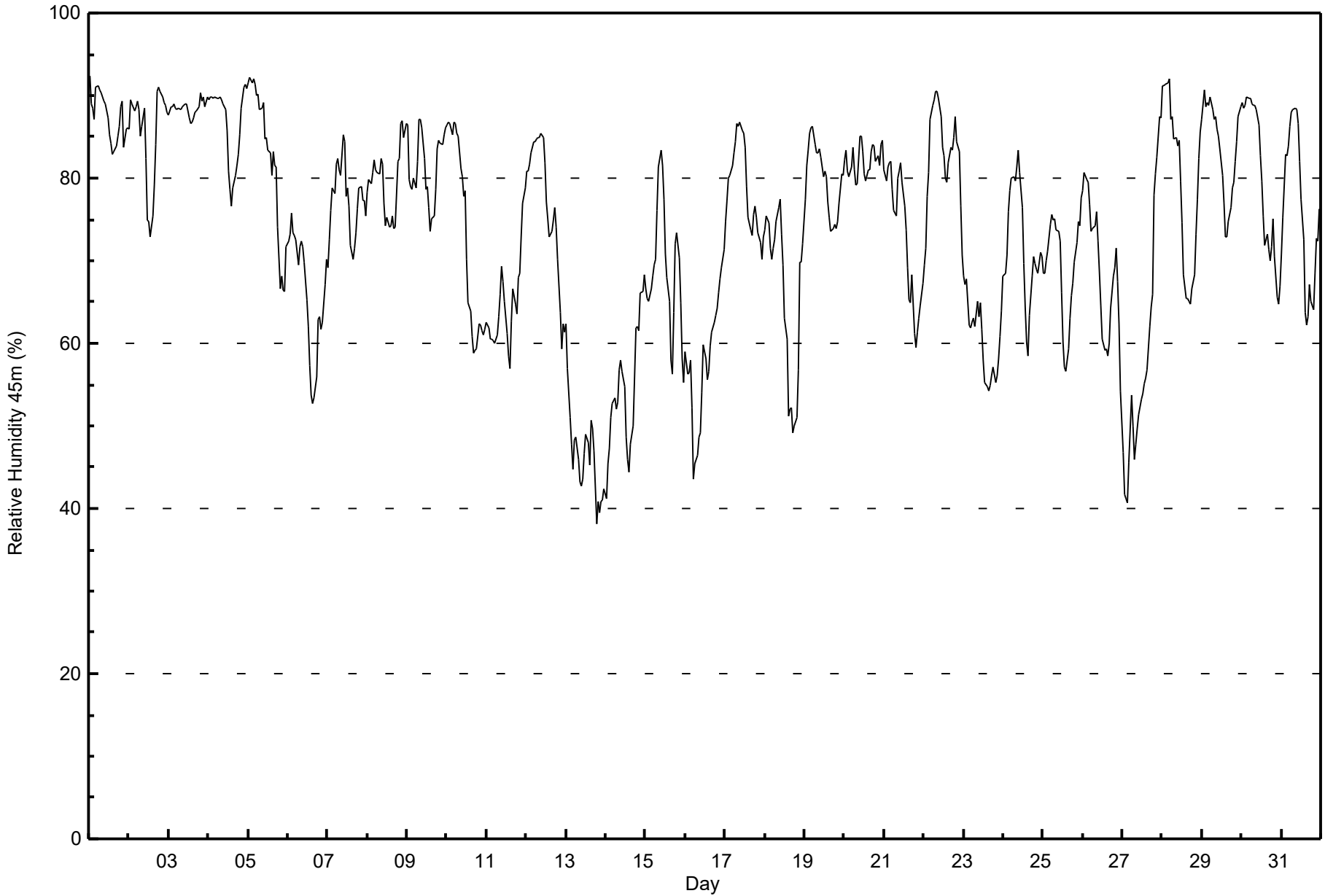
Total Number of Hours: 744



Wood Buffalo Environmental Association
Summary of Hour Averages

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

Maximum Value: 92.3 % on Dec 1 01:00																						Maximum Daily Average: 88.5 % on Dec 3																						Hours in Service: 744			
Minimum Value: 38.1 % on Dec 13 19:00																						Minimum Daily Average: 46.4 % on Dec 13																						Hours of Data: 744			
Maximum Diurnal Average: 78.4 % at hour 10																						Minimum Diurnal Average: 66.9 % at hour 15																						Hours of Missing Data: 0			
Monthly Average: 73.77 %																						Percentiles: P ₁ = 41.4 P ₁₀ = 55.8 Q ₁ = 64.9 Median = 75.7 Q ₃ = 84.1 P ₉₀ = 88.6 P ₉₉ = 91.4																						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-Dec	92.3	89.0	88.5	87.1	91.0	91.2	90.6	90.3	89.8	89.4	88.9	87.2	85.2	84.3	82.8	83.2	83.9	85.1	86.3	88.6	89.3	83.8	85.9	86.2	87.5	92.3																					
2-Dec	85.9	89.5	88.9	88.1	88.7	89.4	88.3	85.0	86.3	88.5	82.4	74.9	74.7	72.9	75.5	79.2	84.0	90.6	91.1	90.5	89.8	89.2	88.7	88.0	85.4	91.1																					
3-Dec	87.6	88.7	88.6	89.0	88.6	88.3	88.4	88.3	88.6	88.8	89.0	87.3	86.6	86.8	87.3	88.1	88.1	88.7	90.3	89.4	89.9	88.6	89.8	88.5	88.5	90.3																					
4-Dec	89.5	89.8	89.9	89.7	89.8	89.7	89.6	89.8	89.5	88.9	88.3	85.7	80.9	78.7	76.6	78.7	80.3	81.5	82.9	85.2	88.5	90.9	91.4	90.9	86.5	91.4																					
5-Dec	91.5	92.1	91.5	92.1	91.3	90.1	90.1	88.4	88.5	89.1	84.8	84.9	83.3	83.1	80.4	83.2	81.5	81.4	74.1	66.6	68.2	66.4	66.2	71.7	82.5	92.1																					
6-Dec	72.4	73.1	75.7	73.3	73.0	72.5	69.5	71.8	72.4	71.7	69.8	65.3	62.1	57.3	53.7	52.7	53.4	56.0	62.9	63.2	61.7	62.6	67.2	70.2	66.0	75.7																					
7-Dec	69.2	72.5	76.1	78.8	78.2	81.7	82.3	81.0	80.3	85.2	84.3	77.9	78.8	76.7	71.8	70.1	71.5	73.4	76.3	78.8	79.0	77.3	77.2	75.5	77.2	85.2																					
8-Dec	78.3	79.9	79.4	80.6	82.3	81.1	80.7	80.6	82.3	81.7	76.9	74.2	75.3	74.1	74.2	75.5	73.9	74.1	82.1	82.4	86.6	86.9	84.9	86.6	79.8	86.9																					
9-Dec	86.4	79.8	79.0	78.7	79.9	78.7	82.0	87.1	87.2	86.2	82.4	78.6	78.9	76.5	73.6	75.0	75.4	78.6	83.6	84.5	84.3	84.1	85.3	86.1	81.3	87.2																					
10-Dec	86.4	86.7	86.7	85.3	86.8	86.6	85.4	85.0	81.1	80.2	77.7	78.5	70.2	64.9	64.0	60.8	58.9	59.1	59.4	62.4	62.2	61.5	60.9	61.7	73.0	86.8																					
11-Dec	62.5	61.8	60.5	60.5	60.4	59.9	61.1	63.2	65.9	69.3	67.4	65.0	61.2	58.4	57.0	62.8	66.6	64.7	63.5	67.9	68.6	72.9	77.0	78.7	64.9	78.7																					
12-Dec	80.8	80.9	81.7	83.0	84.5	84.5	84.8	85.0	84.9	85.5	84.9	81.9	77.1	75.1	72.9	73.5	74.9	76.5	74.0	70.1	63.7	59.4	62.4	61.3	76.8	85.5																					
13-Dec	62.3	57.0	51.0	47.7	44.8	48.3	48.6	46.0	43.2	42.7	43.5	46.7	49.0	47.9	45.3	50.6	49.6	47.0	38.1	40.8	39.5	40.9	41.1	42.3	46.4	62.3																					
14-Dec	41.1	45.4	47.2	51.0	52.8	53.4	52.1	52.8	56.8	58.0	56.7	54.7	48.6	45.9	44.5	47.8	50.0	55.9	61.9	62.1	61.5	66.1	66.3	68.3	54.2	68.3																					
15-Dec	66.6	65.4	65.1	66.6	68.1	69.4	70.2	76.1	81.3	83.3	81.5	77.4	78.6	67.9	65.0	57.9	56.3	63.8	72.1	73.4	70.4	64.9	58.1	55.2	68.6	83.3																					
16-Dec	59.1	56.3	56.4	57.9	52.3	43.5	45.4	46.4	48.7	49.1	54.0	59.8	58.1	55.6	56.5	59.6	61.4	62.6	63.4	64.2	66.0	67.7	69.1	71.4	57.7	71.4																					
17-Dec	74.7	77.3	80.1	80.3	81.5	83.0	84.3	86.6	86.3	86.8	85.8	85.3	83.7	79.0	75.2	73.7	73.1	75.6	76.6	75.2	73.4	72.2	70.1	72.8	78.9	86.8																					
18-Dec	73.6	75.5	74.6	71.5	70.2	71.6	72.6	74.8	76.5	77.5	73.3	69.5	63.0	60.5	51.1	52.0	52.2	49.1	50.0	51.0	56.8	69.8	69.8	72.1	65.8	77.5																					
19-Dec	77.5	81.5	83.4	85.5	86.0	86.3	84.1	83.1	83.1	83.6	82.6	80.2	80.8	80.1	77.0	75.2	73.6	74.0	74.5	74.0	74.7	77.0	80.6	80.3	79.9	86.3																					
20-Dec	82.2	83.4	80.9	80.2	81.4	83.7	81.0	79.1	79.3	85.1	85.1	83.2	80.5	79.7	81.0	81.0	83.2	84.1	83.9	82.1	82.7	81.5	84.0	84.5	82.2	85.1																					
21-Dec	80.9	79.7	81.4	81.8	82.0	78.6	76.1	75.5	80.0	80.8	81.9	79.5	76.6	73.7	69.2	65.3	65.0	68.3	61.2	59.5	61.3	63.1	64.6	67.2	73.1	82.0																					
22-Dec	69.5	71.5	77.9	80.6	87.1	88.8	89.4	90.5	90.6	89.7	87.5	83.7	82.6	80.0	79.4	81.8	83.8	83.5	84.9	87.4	84.3	83.2	76.6	70.7	82.7	90.6																					
23-Dec	68.2	67.2	67.8	62.2	61.8	62.5	63.1	62.1	65.1	63.3	64.9	61.8	58.0	55.3	54.7	54.3	55.0	56.1	57.1	55.2	56.0	58.2	60.9	64.0	60.6	68.2																					
24-Dec	68.2	68.5	70.7	75.9	78.5	80.1	80.2	79.7	81.3	83.5	80.7	76.4	69.7	64.4	60.3	58.5	63.4	68.1	70.4	69.7	69.0	68.5	71.1	70.5	72.0	83.5																					
25-Dec	68.4	68.5	69.9	71.2	74.5	75.6	74.9	75.0	73.8	73.5	72.4	66.1	60.2	57.1	56.6	59.2	63.1	65.8	67.2	69.8	72.1	74.7	74.2	77.6	69.2	77.6																					
26-Dec	78.4	80.7	79.8	79.5	76.9	73.5	73.9	74.2	76.0	72.3	68.7	64.5	60.5	59.2	59.3	58.5	60.0	64.3	68.1	69.1	71.5	67.4	62.4	54.3	68.9	80.7																					
27-Dec	46.8	41.8	41.1	40.7	45.6	53.7	50.0	46.0	47.8	49.6	51.4	53.2	54.0	55.0	55.7	56.8	62.0	64.4	65.9	77.9	80.6	82.6	87.4	87.3	58.2	87.4																					
28-Dec	91.2	91.2	91.4	91.6	92.1	87.2	87.5	84.7	84.9	84.0	84.7	79.7	74.6	68.4	65.5	65.5	65.0	64.8	66.6	68.3	73.2	77.5	82.4	85.5	79.5	92.1																					
29-Dec	87.2	90.6	88.7	89.2	88.8	89.9	88.3	87.1	87.5	86.0	85.1	83.6	80.3	76.9	72.8	72.8	74.7	76.4	78.8	79.5	82.1	84.4	87.5	88.6	83.6	90.6																					
30-Dec	89.1	88.5	88.8	89.8	89.6	89.7	89.0	88.9	88.8	88.3	86.5	82.7	79.7	75.5	71.8	73.1	71.4	70.1	71.7	75.1	70.6	65.6	64.8	66.9	79.8	89.8																					
31-Dec	70.9	75.3	82.9	82.7	83.9	86.3	88.1	88.4	88.5	88.3	86.7	82.0	77.5	72.6	63.7	62.2	63.2	67.1	65.1	64.0	68.6	72.6	72.3	76.3	76.2	88.5																					
																						75.4	75.8	76.3	76.5	77.2	77.4	77.2	77.2	77.9	78.4	77.1	74.6	71.7	69.1	66.9	67.4	68.3	70.0	71.0	71.9	72.4	73.0	73.5	74.3	Diurnal Average	
																						92.3	92.1	91.5	92.1	92.1	91.2	90.6	90.5	90.6	89.7	89.0	89.0	87.3	86.6	86.8	87.3	88.1	90.6	91.1	90.5	89.8	90.9	91.4	90.9	Diurnal Maximum	





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	2	0.27	0.27
40 - 60	114	15.32	15.59
60 - 80	333	44.76	60.35
80 - 100	295	39.65	100.00

Total Number of Valid Hours: 744

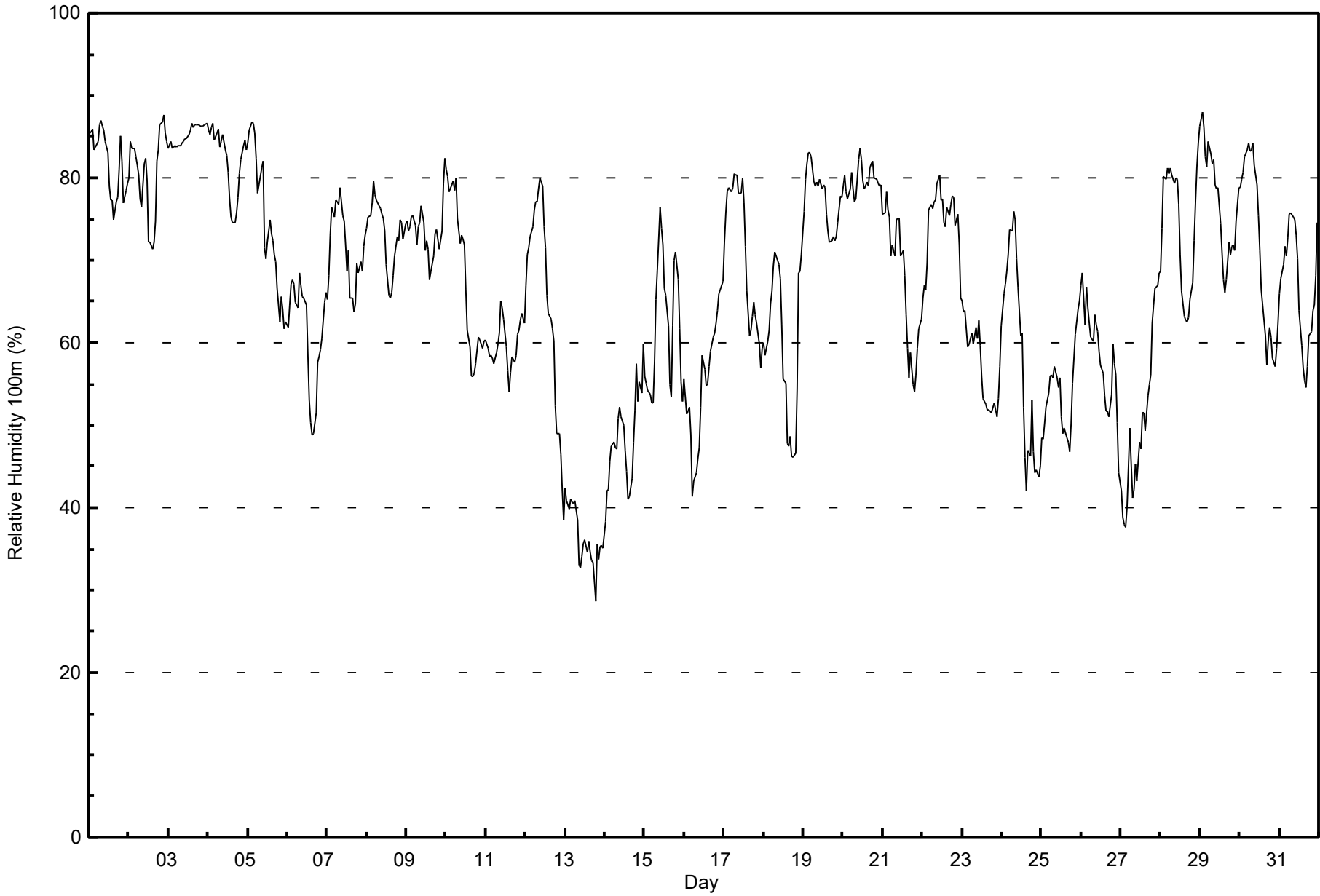
Total Number of Hours: 744



Wood Buffalo Environmental Association
Summary of Hour Averages

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

Maximum Value: 87.9 % on Dec 29 02:00		Maximum Daily Average: 85.2 % on Dec 3		Hours in Service: 744																						
Minimum Value: 28.6 % on Dec 13 19:00		Minimum Daily Average: 36.3 % on Dec 13		Hours of Data: 744																						
Maximum Diurnal Average: 71.4 % at hour 10		Minimum Diurnal Average: 60.6 % at hour 16		Hours of Missing Data: 0																						
Monthly Average: 66.96 %		Percentiles: P ₁ = 34.5 P ₁₀ = 48.1 Q ₁ = 57.7 Median = 68.6 Q ₃ = 77.7 P ₉₀ = 83.2 P ₉₉ = 86.6		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-Dec	85.4	85.6	86.0	83.4	83.7	84.5	86.5	86.9	86.2	85.7	84.4	83.0	79.0	77.3	77.3	74.9	77.1	77.6	81.0	85.1	82.1	77.0	78.5	79.4	82.0	86.9
2-Dec	80.0	84.3	83.6	83.5	82.6	81.4	80.4	77.5	76.4	81.7	82.4	79.7	72.2	72.2	71.4	72.2	74.8	82.1	83.5	86.4	86.7	87.7	85.5	84.5	80.5	87.7
3-Dec	83.6	84.4	83.6	83.7	83.9	83.8	84.0	83.9	84.3	84.4	84.8	84.7	85.3	85.7	86.6	86.2	86.4	86.5	86.5	86.3	86.3	86.3	86.4	86.6	85.2	86.6
4-Dec	85.8	85.2	86.2	86.6	84.6	85.3	85.9	83.7	84.5	85.3	83.4	82.7	80.6	77.5	75.2	74.5	74.5	75.7	77.6	80.5	82.3	83.9	84.6	83.4	82.1	86.6
5-Dec	84.3	85.8	86.7	86.7	85.4	82.4	85.9	79.2	81.2	82.1	71.5	70.2	72.3	74.9	73.1	72.3	70.6	69.9	66.7	62.5	65.6	64.1	61.7	62.5	74.6	86.7
6-Dec	61.8	64.6	67.1	67.6	67.1	64.9	64.3	68.5	67.0	65.7	65.4	64.5	58.7	53.1	50.4	48.8	48.9	51.5	57.6	58.2	59.2	60.5	64.9	66.1	61.1	68.5
7-Dec	65.3	68.1	73.1	76.5	75.2	77.3	77.1	76.8	78.9	75.5	74.8	71.8	68.6	71.2	65.5	65.4	63.8	64.8	69.7	68.5	69.8	68.7	71.7	73.1	71.3	78.9
8-Dec	74.0	75.2	75.4	76.9	79.7	78.0	77.4	76.5	76.3	75.6	75.1	73.6	69.4	65.7	65.3	66.1	68.1	70.5	72.8	72.4	74.9	74.5	72.5	74.5	73.4	79.7
9-Dec	74.8	73.6	74.0	75.3	75.4	74.3	71.9	74.0	74.5	76.6	74.5	71.3	72.3	71.4	67.6	68.7	70.5	73.2	73.7	72.6	71.3	73.6	79.4	82.4	73.6	82.4
10-Dec	81.0	80.1	78.4	79.1	79.7	78.5	80.0	75.0	72.0	73.0	72.5	71.8	66.4	61.5	59.5	55.9	55.9	56.3	57.5	60.7	60.3	59.9	59.4	60.3	68.1	81.0
11-Dec	60.4	59.4	58.3	58.5	58.2	57.5	58.8	59.8	61.3	65.1	64.2	62.8	59.6	56.6	54.0	56.5	58.3	57.7	58.5	61.0	61.5	62.8	63.6	62.5	59.9	65.1
12-Dec	66.9	70.7	71.5	72.9	74.1	76.0	77.1	77.2	78.6	79.9	79.1	74.0	71.5	65.8	63.5	62.8	61.6	60.1	52.4	49.0	49.0	46.4	41.9	38.5	65.0	79.9
13-Dec	42.3	40.8	39.8	40.9	40.7	40.5	40.9	38.5	33.0	32.7	34.0	35.7	36.1	34.6	35.9	34.5	33.5	33.3	28.6	35.6	33.7	35.2	35.3	35.1	36.3	42.3
14-Dec	38.3	42.0	42.2	45.7	47.4	48.0	47.3	47.1	50.9	52.2	51.1	50.1	47.0	44.4	41.0	41.4	43.6	47.9	51.9	57.4	53.0	55.3	53.9	59.8	48.3	59.8
15-Dec	55.9	55.2	54.2	53.7	52.8	52.8	57.7	65.2	68.8	76.4	73.8	71.8	66.7	65.8	62.0	55.0	53.5	62.1	70.1	71.0	67.7	61.7	55.3	52.9	61.7	76.4
16-Dec	55.5	51.3	51.7	52.1	48.8	41.3	43.2	44.3	46.0	47.4	52.2	58.5	56.7	54.7	55.2	57.2	59.1	60.6	61.2	62.3	63.8	66.0	66.5	67.4	55.1	67.4
17-Dec	72.2	75.7	78.4	78.9	78.3	78.9	80.5	80.3	80.3	78.2	78.1	79.9	76.9	71.7	66.3	60.9	61.6	63.2	65.0	63.3	62.4	59.9	57.0	59.4	71.1	80.5
18-Dec	59.9	58.4	60.1	61.5	64.8	66.3	69.3	70.9	70.0	69.5	67.8	62.2	55.5	55.0	47.8	47.4	48.6	46.3	46.2	46.7	54.4	68.6	68.6	70.8	59.9	70.9
19-Dec	75.9	79.9	81.7	83.0	83.1	82.5	79.4	79.0	79.4	79.0	79.8	78.6	79.1	78.8	75.6	73.6	72.1	72.4	72.8	72.4	72.8	74.6	77.8	77.6	77.5	83.1
20-Dec	79.0	80.3	78.2	77.5	78.7	80.7	78.7	77.1	77.5	82.1	83.5	82.2	79.6	78.7	79.5	79.1	81.1	81.7	82.0	80.0	79.8	79.3	79.0	79.1	79.8	83.5
21-Dec	75.5	75.7	78.2	76.1	75.3	70.4	71.9	70.5	74.9	75.0	75.1	70.5	71.2	68.1	63.4	59.3	55.8	58.8	55.0	54.0	56.2	59.3	61.6	62.9	67.3	78.2
22-Dec	65.4	66.9	66.4	69.7	76.0	76.8	76.3	77.1	77.4	79.3	80.3	77.3	77.4	74.7	74.1	76.5	75.4	76.8	77.9	77.7	74.2	75.6	71.9	65.4	74.4	80.3
23-Dec	65.0	63.8	63.9	59.6	59.8	60.5	61.1	59.9	61.9	60.6	62.7	59.6	56.0	53.3	52.5	51.9	51.9	51.7	51.4	52.7	51.9	51.0	53.1	57.2	57.2	65.0
24-Dec	62.1	66.0	67.1	68.6	70.6	73.7	73.6	76.0	74.9	70.2	66.8	60.8	61.2	52.2	46.2	42.1	46.9	46.3	53.1	46.7	44.2	44.5	43.7	45.0	58.4	76.0
25-Dec	48.5	48.4	50.2	52.3	53.9	56.0	56.1	55.8	57.2	55.8	54.6	55.7	51.1	48.9	49.7	48.4	47.9	46.8	50.2	55.2	60.9	62.5	64.1	65.1	54.0	65.1
26-Dec	66.9	68.4	62.2	66.7	64.2	62.3	60.7	60.1	63.4	62.2	61.4	59.0	57.3	56.3	53.5	51.7	51.7	51.1	53.7	59.8	57.5	56.1	50.4	44.3	58.4	68.4
27-Dec	42.0	38.8	38.0	37.6	40.0	49.7	45.3	41.2	42.1	45.2	43.3	48.0	47.0	51.6	51.5	49.3	53.6	54.8	56.0	62.3	64.5	66.6	67.0	68.5	50.2	68.5
28-Dec	68.7	74.0	80.2	79.8	81.2	80.5	81.2	80.4	79.3	80.0	79.8	76.8	70.6	66.3	63.1	62.7	62.6	63.0	65.2	67.3	72.4	77.0	81.4	84.3	74.1	84.3
29-Dec	86.3	87.9	86.1	82.6	81.4	84.5	82.9	81.7	82.1	79.1	78.7	78.8	74.3	70.8	67.6	66.1	67.6	72.3	70.6	71.7	71.9	71.2	74.8	78.9	77.1	87.9
30-Dec	78.8	79.9	80.7	82.5	83.4	84.3	83.3	83.4	84.2	81.6	79.2	75.5	71.2	66.4	64.6	60.9	57.2	60.2	61.8	60.6	58.1	57.1	59.4	62.4	71.5	84.3
31-Dec	65.9	67.7	69.5	71.6	70.6	72.7	75.5	75.8	75.3	74.8	73.0	70.3	63.9	59.7	56.9	55.4	54.6	57.2	60.8	61.3	63.9	64.6	68.1	74.7	66.8	75.8
		68.0	69.0	69.4	70.0	70.3	70.5	70.4	71.0	71.4	70.5	69.1	66.3	64.0	61.8	60.6	60.9	62.3	63.6	64.6	64.9	65.5	65.8	66.6	Diurnal Average	
		86.3	87.9	86.7	86.7	85.4	85.3	86.5	86.9	86.2	85.7	84.8	84.7	85.3	85.7	86.6	86.2	86.4	86.5	86.5	86.4	86.7	86.4	86.6	Diurnal Maximum	





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	23	3.09	3.09
40 - 60	198	26.61	29.70
60 - 80	399	53.63	83.33
80 - 100	124	16.67	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association
Summary of Hour Averages

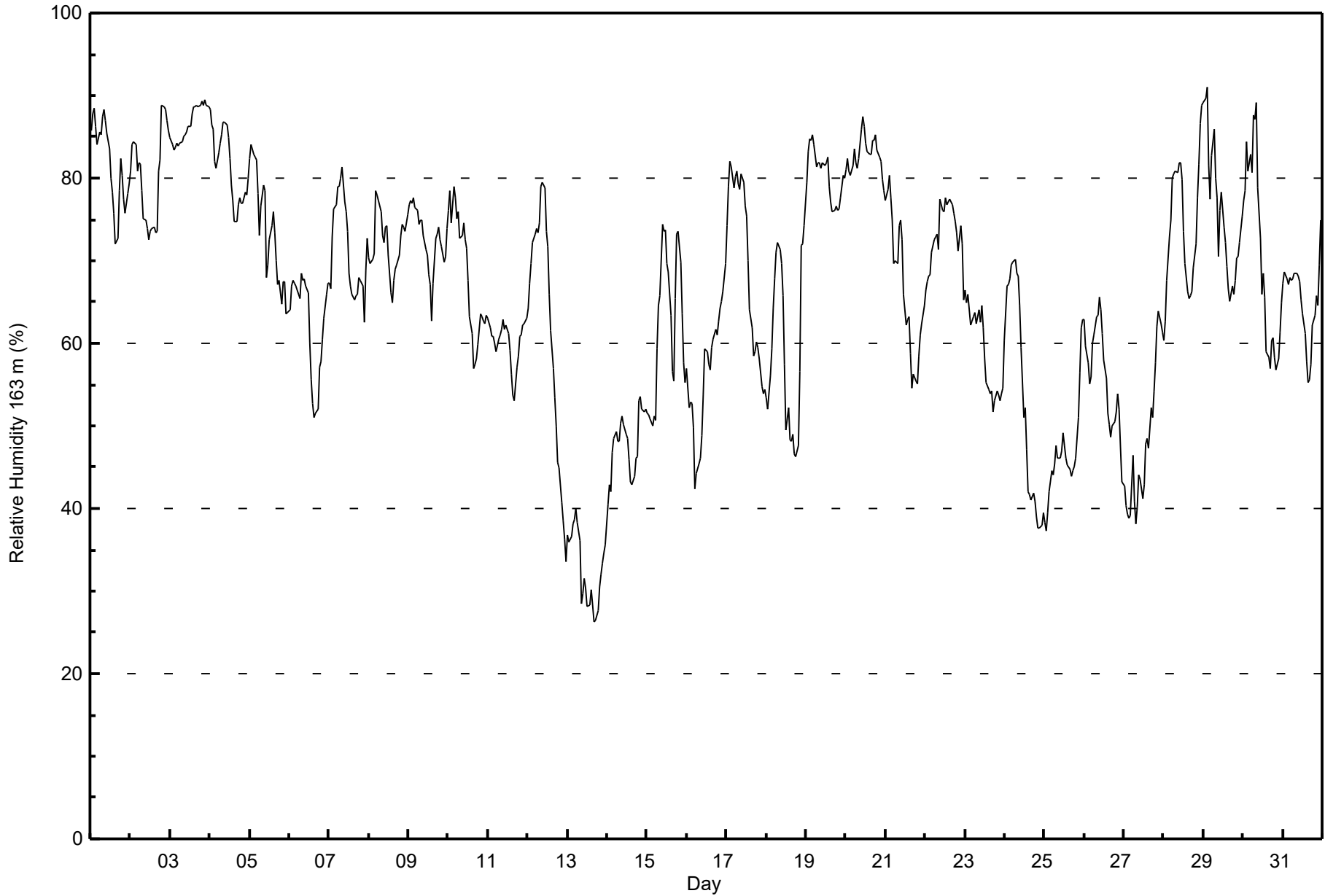
Relative Humidity 163 m (RH163m) - %
Lower Camp Met Tower - December 2023

Maximum Value: 91.0 % on Dec 29 03:00		Maximum Daily Average: 86.6 % on Dec 3		Hours in Service: 744																							
Minimum Value: 26.3 % on Dec 13 17:00		Minimum Daily Average: 32.6 % on Dec 13		Hours of Data: 744																							
Maximum Diurnal Average: 70.2 % at hour 10		Minimum Diurnal Average: 60.4 % at hour 17		Hours of Missing Data: 0																							
Monthly Average: 66.19 %		Percentiles: P ₁ = 29.9 P ₁₀ = 46.0 Q ₁ = 56.9 Median = 67.7 Q ₃ = 77.3 P ₉₀ = 83.5 P ₉₉ = 88.8		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-Dec	85.7	87.8	88.4	86.2	84.0	85.6	85.2	87.5	88.3	87.0	85.4	83.6	80.0	78.2	75.8	72.1	72.7	78.4	82.4	80.4	77.5	75.7	78.1	79.3	81.9	88.4	
2-Dec	80.9	84.1	84.3	84.0	80.9	81.8	81.7	78.4	75.0	75.0	73.9	72.6	73.5	73.9	74.1	73.5	73.6	80.9	82.2	88.9	88.7	88.3	86.9	85.7	80.1	88.9	
3-Dec	84.9	84.1	83.4	83.7	84.3	83.9	84.3	84.5	85.1	85.3	85.6	86.2	86.3	87.7	88.6	88.6	88.8	88.7	88.8	89.3	88.8	89.5	88.8	88.6	86.6	89.5	
4-Dec	88.4	86.5	86.0	82.1	81.1	83.1	84.2	85.3	86.8	86.8	86.4	84.8	82.4	79.2	77.3	74.7	74.7	76.9	77.6	76.9	77.0	78.2	78.0	80.0	81.4	88.4	
5-Dec	82.4	84.1	82.9	82.6	82.2	78.1	73.0	76.6	79.1	78.5	67.9	69.4	72.5	74.2	76.0	73.3	70.0	67.1	67.6	64.7	67.5	67.4	63.6	63.7	73.5	84.1	
6-Dec	64.1	66.9	67.6	67.3	67.0	66.4	65.5	68.5	67.7	67.8	66.9	66.0	60.1	55.6	52.7	51.1	51.5	52.0	57.1	57.8	60.5	63.0	66.0	67.3	62.4	68.5	
7-Dec	67.3	66.7	72.9	76.2	76.8	79.0	79.0	80.0	81.4	77.1	75.9	73.5	68.5	66.9	65.9	65.3	65.7	66.0	68.0	67.6	66.9	62.5	68.9	72.8	71.3	81.4	
8-Dec	70.4	69.7	70.2	70.8	78.4	78.0	77.2	75.9	73.1	72.2	74.1	74.2	70.6	66.2	65.0	67.7	68.9	69.5	70.7	73.1	74.5	74.0	73.5	75.6	72.2	78.4	
9-Dec	76.7	77.2	76.9	77.7	76.5	76.0	74.4	75.0	75.0	73.0	71.4	70.6	68.4	67.2	62.7	67.3	72.7	73.1	74.0	72.6	71.7	69.8	70.5	73.9	72.7	77.7	
10-Dec	76.1	78.4	74.6	79.0	77.5	75.1	75.9	72.7	73.1	74.6	72.6	71.6	67.7	63.2	61.2	57.0	57.4	58.1	59.9	63.5	63.1	62.7	62.4	63.3	68.4	79.0	
11-Dec	63.0	61.9	60.9	60.8	60.1	59.1	60.5	61.0	61.8	62.9	61.7	62.2	61.2	59.1	56.2	53.7	53.1	57.1	58.5	60.8	61.1	62.2	62.4	63.1	60.2	63.1	
12-Dec	64.2	67.2	69.6	72.2	73.3	73.9	73.4	74.6	78.9	79.4	78.8	73.6	71.7	65.9	61.5	56.9	53.3	49.9	45.7	45.0	40.7	38.5	36.3	33.5	61.6	79.4	
13-Dec	36.8	35.9	36.5	38.1	38.6	40.0	38.3	36.1	28.5	29.6	31.5	30.3	28.2	28.4	30.2	28.2	26.3	26.4	27.6	30.5	32.0	33.5	34.5	35.6	32.6	40.0	
14-Dec	40.5	42.9	42.1	46.7	48.5	49.3	48.2	48.2	50.3	51.2	50.1	49.0	48.6	46.0	43.2	42.9	43.9	46.2	46.2	53.0	53.6	52.1	51.7	52.0	47.8	53.6	
15-Dec	51.5	51.4	50.8	50.0	51.1	50.7	59.3	64.5	65.8	74.4	73.6	73.7	69.7	68.6	63.5	56.6	55.5	65.4	73.1	73.6	69.8	63.5	57.6	55.3	62.0	74.4	
16-Dec	57.0	52.2	52.8	52.8	49.8	42.4	44.2	45.4	46.1	48.8	53.7	59.4	59.0	57.5	56.8	59.4	60.4	61.6	61.1	62.7	64.3	65.1	66.2	69.7	56.2	69.7	
17-Dec	74.2	79.0	82.1	81.3	78.7	80.2	80.8	79.3	78.6	80.4	79.5	76.6	75.4	70.0	64.0	61.9	58.5	59.0	60.2	59.4	58.2	54.7	54.0	54.5	70.0	82.1	
18-Dec	53.4	52.1	56.2	59.3	64.2	67.8	71.1	72.2	71.4	69.7	65.8	57.5	49.6	52.2	48.3	48.2	49.0	46.6	46.3	47.6	56.7	71.9	72.0	74.2	59.3	74.2	
19-Dec	79.4	83.3	84.7	84.6	85.3	84.1	81.4	81.8	81.8	81.2	81.8	81.6	81.8	82.6	79.0	77.1	75.9	76.2	76.6	76.1	76.4	77.6	80.3	80.0	80.4	85.3	
20-Dec	81.0	82.4	80.9	80.3	81.6	83.5	81.9	81.3	82.3	86.0	87.5	86.3	84.3	83.3	82.9	82.9	84.7	84.6	85.3	83.3	82.6	82.1	79.8	78.5	82.9	87.5	
21-Dec	77.3	78.7	80.3	77.7	74.8	69.7	70.0	69.7	74.3	74.9	72.5	65.9	62.3	63.0	63.2	58.9	54.5	56.3	55.5	55.1	58.5	61.0	62.3	64.6	66.7	80.3	
22-Dec	66.5	67.4	68.1	68.2	71.0	72.5	72.9	73.2	71.4	77.5	76.0	75.9	77.6	76.7	77.1	77.5	76.8	75.7	74.8	73.3	71.1	74.3	72.0	65.3	73.0	77.6	
23-Dec	66.4	64.9	65.9	62.2	62.6	63.2	63.8	62.4	64.1	62.5	64.6	61.8	58.1	55.3	54.4	53.8	54.2	51.7	53.1	54.2	53.7	53.1	53.9	54.6	58.9	66.4	
24-Dec	60.4	66.9	67.2	67.7	69.4	69.9	70.2	68.5	68.2	64.7	59.5	51.1	52.2	47.2	42.0	41.7	41.0	41.8	40.8	38.9	37.7	37.6	38.0	39.5	53.4	70.2	
25-Dec	38.4	37.2	39.5	42.0	44.5	44.1	45.4	47.6	46.0	46.1	47.0	49.2	47.6	46.1	45.2	44.7	43.9	44.6	45.1	46.1	51.0	56.4	61.9	62.9	46.8	62.9	
26-Dec	62.9	59.6	57.6	55.0	55.9	60.1	61.0	63.2	63.5	65.6	64.1	61.2	57.9	55.8	51.5	50.1	48.7	49.9	50.6	51.6	54.0	52.0	47.4	43.1	55.9	65.6	
27-Dec	42.7	40.3	39.3	38.8	39.2	46.4	40.8	38.1	40.1	44.1	43.6	41.2	42.9	47.8	48.4	47.3	52.2	51.0	54.3	57.6	62.1	64.0	62.4	61.4	47.7	64.0	
28-Dec	60.4	62.8	67.7	72.9	74.9	79.9	80.5	80.9	80.6	81.8	81.9	79.8	73.5	69.7	66.2	65.4	65.8	66.3	69.1	72.1	77.6	81.8	86.6	88.8	74.5	88.8	
29-Dec	89.2	89.6	91.0	81.4	77.4	82.7	85.9	80.0	77.6	70.6	76.2	78.3	74.1	72.2	69.3	66.7	65.1	67.0	66.0	67.6	70.4	70.6	72.3	75.5	75.7	91.0	
30-Dec	77.3	78.4	84.3	80.8	82.9	80.7	87.6	87.2	89.2	78.8	72.7	66.0	68.4	65.7	58.9	58.3	56.9	60.4	60.7	58.4	56.8	58.1	61.3	65.0	70.6	89.2	
31-Dec	67.4	68.7	67.8	67.1	68.0	67.6	67.8	68.4	68.5	68.2	67.5	65.3	63.6	61.2	57.8	55.2	55.6	57.5	62.2	63.5	65.8	64.7	69.4	74.8	65.2	74.8	
		67.3	68.0	68.8	68.7	69.1	69.5	69.8	69.9	70.1	70.2	69.3	67.7	65.7	64.1	61.9	60.6	60.4	61.5	62.6	63.4	64.2	64.7	65.1	65.9	Diurnal Average	
		89.2	89.6	91.0	86.2	85.3	85.6	87.6	87.5	89.2	87.0	87.5	86.3	86.3	87.7	88.6	88.6	88.8	88.7	88.8	89.3	88.8	89.5	88.8	88.8	Diurnal Maximum	



Wood Buffalo Environmental Association
Hourly Averages

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	38	5.11	5.11
40 - 60	185	24.87	29.97
60 - 80	384	51.61	81.59
80 - 100	137	18.41	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



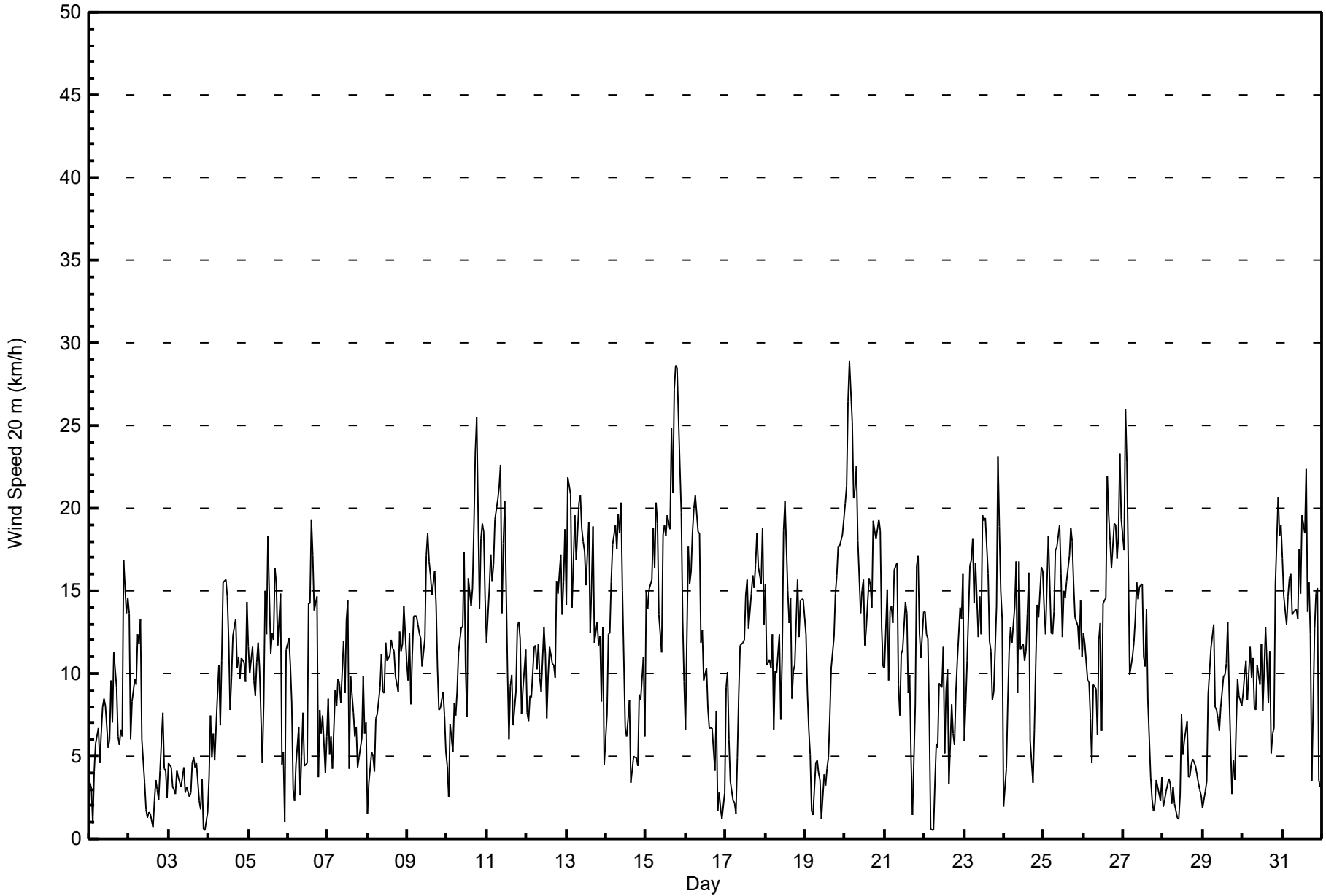
Maximum Speed: 29 km/h on Dec 20 04:00		Maximum Daily Speed Average: 17.9 km/h on Dec 20		Hours in Service: 744																							
Minimum Speed Value: 1 km/h on Dec 3 23:00		Minimum Daily Speed Average: 2.3 km/h on Dec 2		Hours of Data: 744																							
Maximum Diurnal Speed Average: 7.7 km/h at hour 15		Minimum Diurnal Speed Average: 4.3 km/h at hour 2		Hours of Missing Data: 0																							
Monthly Average Velocity: 6.4 km/h 150.1 deg		Percentiles: P ₁ = 1 P ₁₀ = 3 Q ₁ = 7 Median = 11 Q ₃ = 15 P ₉₀ = 19 P ₉₉ = 25		Percent Operational Time: 100.0																							
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Dec	WNW3	WSW3	S1	SE4	SE6	SE7	SE5	SE6	SE8	SE8	SE8	SE5	ESE6	SE10	SE7	SE11	SE9	SE6	ESE6	SE7	SE6	SE17	SE14	SE15	SE6.9	SE17	
2-Dec	SE14	ESE6	ESE8	SE10	SE9	SE12	SE12	SE13	SE6	N3	NW2	WNW1	NW2	NW2	WNW1	NNW2	NNW4	NNW3	NW2	N4	N8	N4	NW4	NNW2	ESE2.3	SE14	
3-Dec	NNW5	NNW4	NNW3	NNE3	N3	NNW4	NW4	N3	NNW4	NNW4	NNW3	N3	N3	NNW3	NNW5	NNW5	NNW4	NW5	NW2	W2	NNW4	S1	NNE1	S2	NNW2.9	NNW5	
4-Dec	SE4	SE7	SE5	SE6	SE5	SE9	SE11	SE7	SE11	SE16	SE16	SE15	SE12	SE12	SE8	SE10	SE12	SE13	SE10	SE11	SE10	SE11	SE9	SE14	SE10.0	SE16	
5-Dec	SE12	SE10	SE12	SE10	SE9	SE11	SE12	SE10	SE7	SE5	SE8	SE15	SE12	SE18	SE11	SE12	SE12	SE16	ESE15	SE12	SW15	SE4	S5	SE1	SE11	SE10.0	SE18
6-Dec	SE12	SE11	SE8	ESE3	SSW2	WSW4	WSW7	SE3	S5	SE8	SSE4	SE5	SW14	WSW14	WSW19	SW17	SSW14	SSW15	SSE4	SE8	SE6	SE7	SSW4	SSE6	S5.9	WSW19	
7-Dec	SW8	SSW5	SSE6	SE4	SE9	SE8	SE10	SE9	SSE8	SE12	SE9	SE13	SE14	SE4	SE10	SE8	SSE6	S7	SSE4	S5	S6	SW10	SSE6	SE7	SSE7.0	SE14	
8-Dec	N1	SSE3	SSE5	SSE5	SE4	SE7	SE8	SE9	SE11	SE9	SSE9	SE12	SE11	SE11	SE12	SE12	SE11	SE10	SE9	SE13	SE11	SE12	SE14	SE11	SE9.0	SE14	
9-Dec	SE10	SE12	SE8	SE11	SE13	SE13	SE13	SE12	SE12	SE10	SE12	SE17	SE18	SE17	SE16	SE15	SE16	SE14	ESE10	ESE8	SE8	SE9	SE7	SE5	SE12.0	SE18	
10-Dec	SE4	SE3	SE7	SSE5	SSE8	SE7	SSE9	SE11	SE13	SE13	SE17	SE11	SSE7	WSW16	WSW14	W15	W19	W23	WNW26	NW14	NW18	NW19	NW19	NW14	WSW4.2	WNW26	
11-Dec	NNW12	NW15	NW17	NW16	NNW17	NNW19	W20	W21	WSW23	WSW14	WSW18	WSW20	WSW10	SSW6	SSE9	SE10	SE7	SE9	SE13	SE13	SE12	SE8	SE9	SE11	WSW5.6	WSW23	
12-Dec	SE8	SE7	SE9	SE9	SE12	SE12	SE10	SE12	SE10	ESE9	SE13	SE11	ESE7	SE10	SE12	SE11	SE11	SE10	SE16	SE15	SE17	SE14	SE16	SE19	SE11.4	SE19	
13-Dec	SE14	SE22	SE21	ESE14	ESE17	SE20	SE17	SE20	SE21	SE19	SE18	SE17	SE15	SE19	SE12	SE15	SE19	ESE12	SE13	SE12	SE12	SE8	SE13	ESE4	SE15.6	SE22	
14-Dec	WSW8	W12	W12	WSW16	WSW18	WSW19	W18	WSW20	WSW18	WSW20	WSW15	WSW7	SSE6	S7	SSW8	S3	SW5	WSW5	SSW5	SSE4	SE9	SE8	SE11	SE6	SW8.1	WSW20	
15-Dec	SE15	SE14	SE15	SE16	SE19	SE16	SE20	SE19	SE14	SE11	SE18	SE19	SSE18	S20	S19	S25	S21	S27	S29	S28	S23	SSE20	S13	SW9	SSE16.9	S29	
16-Dec	SW7	WSW18	W15	W16	NNW19	NW20	NNW21	W19	W19	NW12	NNW13	NNE10	N10	N8	N7	N7	N7	NNW4	N8	N2	NNW3	NNW2	ENE1	N3	NW7.8	WNW21	
17-Dec	N9	N10	NNW6	NW3	SE2	SE2	SE2	SE5	SE9	SE12	SE12	SE12	SE15	SE16	SE13	SE15	SE16	SE15	SE17	SE19	SE16	SE15	SE19	SE13	SE9.1	SE19	
18-Dec	SE15	SE10	SE11	SE10	SE12	S7	WSW10	SSE10	SE12	SSE7	WSW11	WSW19	WSW20	W15	WNW13	W15	W9	NNW10	NNW11	W16	NNW12	N14	NNE14	NNE14	WSW3.7	WSW20	
19-Dec	N12	NNW9	NNW7	NNW5	NW2	NW1	N5	NNE5	NE4	NE4	E1	ENE4	NNE3	NW4	E5	E7	ESE10	ESE12	SE15	SE16	SE18	SE18	SE18	SE19	ESE4.6	SE19	
20-Dec	SE20	SE21	SE26	SE29	SE25	SE21	SE21	SE23	SE18	SE14	SE15	SE16	SE12	SSE13	SSE16	SSE15	SE14	SSE19	SSE19	SSE18	SE19	SE19	SE13	SE10	SE17.9	SE29	
21-Dec	WSW10	WSW15	WSW10	WSW14	W14	WSW13	WSW16	SW17	SW9	SE7	SE11	SE11	SE14	SE14	SE9	SE10	ESE5	ESE1	ESE8	SE16	SE17	SE12	SE11	SE14	S6.4	SE17	
22-Dec	SE14	SE12	SE12	SE7	NW1	N1	SE3	ESE6	SE5	SE9	SE9	SE12	SE5	SE9	SE10	SE3	SE8	SE6	SE6	SE9	SE11	SE14	SE13	WSW16	SE7.5	WSW16	
23-Dec	SSW6	WSW8	WSW11	W17	W17	W18	W14	W17	W12	W15	W12	W20	W19	W19	W16	W12	W11	W8	WSW9	WSW14	WSW23	WSW19	WSW15	WSW13	W13.9	WSW23	
24-Dec	WNW2	ESE4	SE8	SE11	SE13	SE12	SE14	SE17	SE9	SE17	SE11	SE12	SE11	SE11	SE14	SE16	SE6	SE3	SSE7	SE11	SE14	SE13	SE16	SE16	SE11.0	SE17	
25-Dec	SE14	SE12	SE15	SE18	SE12	SE12	SE14	SE17	SE18	SE19	SE16	SE12	SE15	SE15	SE16	SE17	SE19	SE18	SE15	SE13	SE13	SE11	SE14	SE11	SE14.9	SE19	
26-Dec	SE12	SE12	SE10	SE10	SE7	SSE5	SE9	SE9	SE6	SE12	SE13	SE6	SE14	SE15	SE22	SE20	SE18	SE16	SE19	SE19	SE17	SE18	SE23	SSE19	SE13.8	SE23	
27-Dec	SW17	SW26	SW23	SW17	SE10	ESE11	SE12	SE13	SE16	SE15	SE15	SE15	SE11	SE10	SE14	SE8	SE4	SSE2	NNW2	NW2	NW4	NNW3	NW2	NW4	SSE6.3	WSW26	
28-Dec	NW2	NW2	NW3	NW4	W3	NW2	NNW3	NW2	WSW1	NNW1	W3	NW8	NNW5	N6	NNW7	NNW4	NW4	N4	NNW5	NW4	NNW4	NNW3	NW3	NNW3	NW3.3	NW8	
29-Dec	WSW2	WSW3	SSW3	SE9	SE10	SE12	SE13	SE8	SE8	SE7	SE6	SE8	SE10	SE10	SE11	SE13	SE9	SSE3	SSE5	S4	SE7	SE10	SE9	SE8	SE7.3	SE13	
30-Dec	SE9	SE10	SE11	SE8	SE12	SE10	SE11	SE8	SE8	SE11	SE9	SE12	SSE8	SE10	SE13	SE8	SE11	SSE5	SSE6	SSE7	SE15	SE21	SE18	SE19	SE10.7	SE21	
31-Dec	SE17	SE15	SE13	SE15	SE16	SE16	SE14	SE14	SE14	SE13	SE18	SE15	SE20	SE18	SE22	SE14	SE16	SE12	ESE4	WSW13	WSW15	WSW15	NW4	NW3	SE10.7	SE22	
SSE4.9 SSE4.3 SSE5.2 SSE5.2 SSE5.5 SSE5.2 SSE5.6 SSE7.0 SSE6.7 SE7.1 SSE7.6 SE7.4 SSE7.4 SSE6.9 SSE7.7 SSE7.5 SSE7.1 SSE5.9 SSE6.0 SSE6.6 SSE6.6 SE6.9 SE7.2 SE6.3																								Diurnal Average			
SE20 WSW26 SE26 SE29 SE25 SE21 SE21 SE23 WSW23 WSW20 SE18 WSW20 WSW20 S20 SE22 S25 S21 S27 S29 S28 WSW23 SE21 SE23 SE19																								Diurnal Maximum			
All monthly, daily, and diurnal averages have been calculated using vector methods																											



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

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

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	154	20.70	20.70
6 - 11	242	32.53	53.23
12 - 19	305	40.99	94.22
20 - 28	41	5.51	99.73
29 - 38	2	0.27	100.00
> 38	0	0.00	100.00

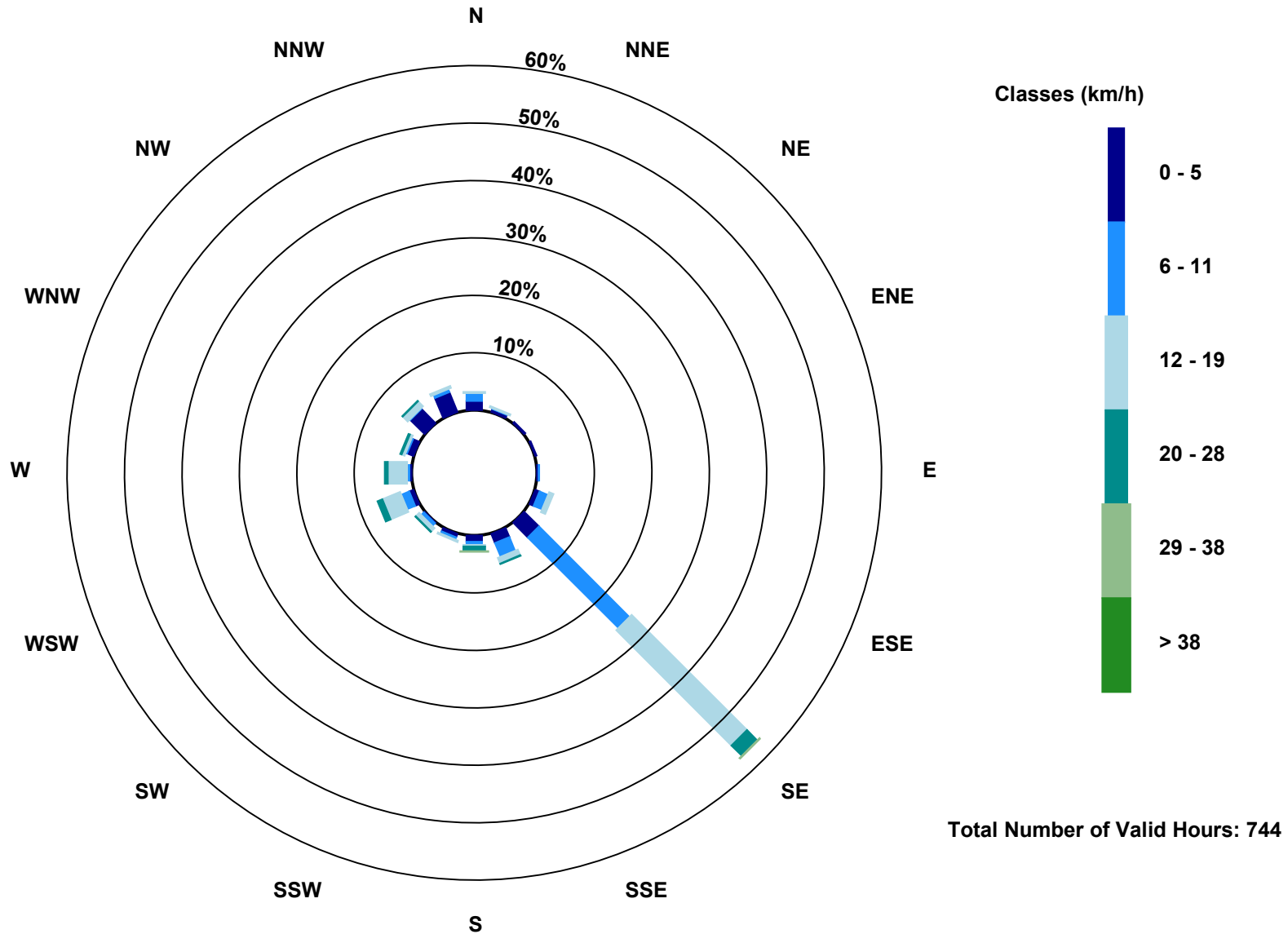
Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Dec 2023

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





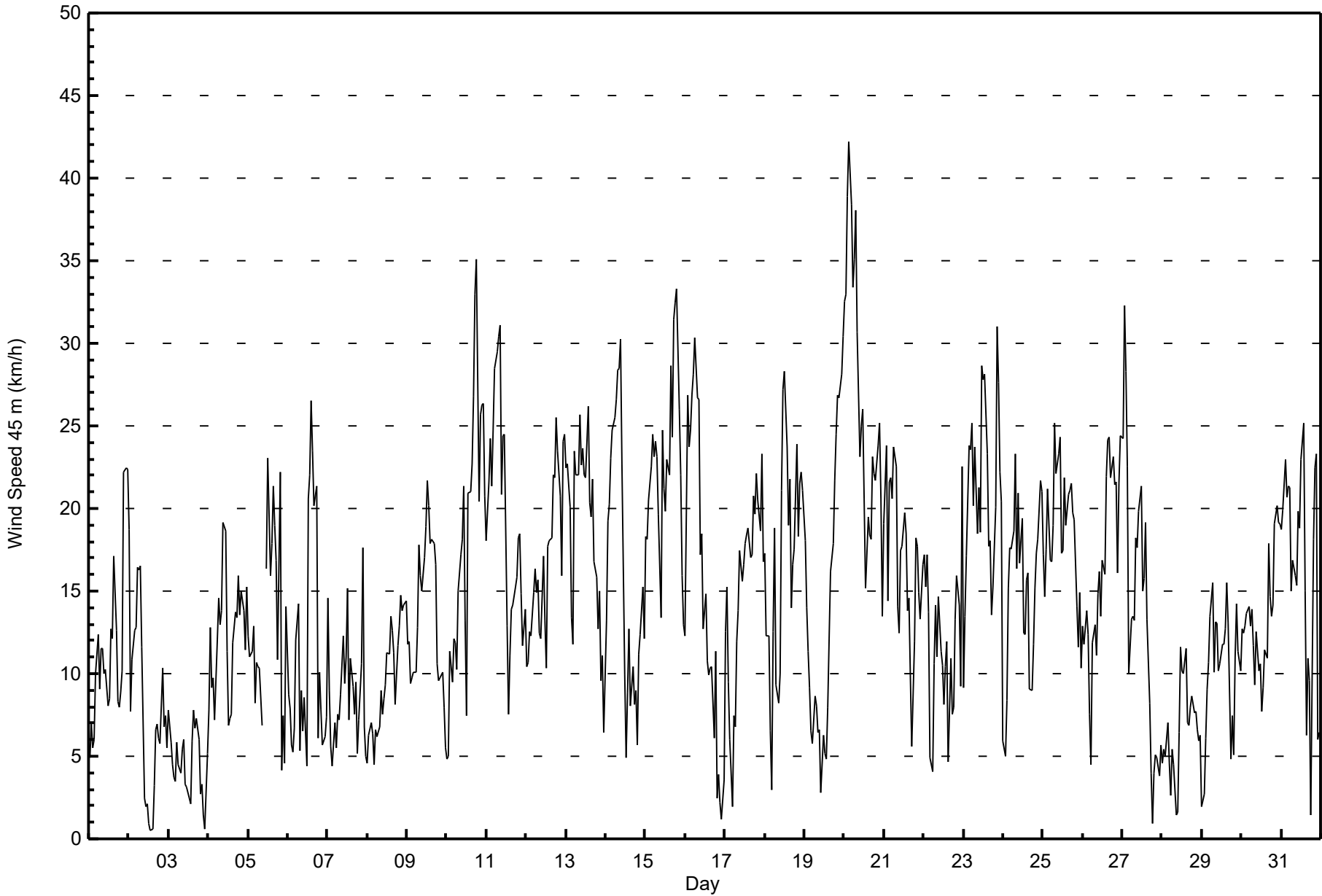
Maximum Speed: 42 km/h on Dec 20 04:00		Maximum Daily Speed Average: 26.3 km/h on Dec 20		Hours in Service: 744																						
Minimum Speed Value: 1 km/h on Dec 2 14:00		Minimum Daily Speed Average: 3.3 km/h on Dec 2		Hours of Data: 742																						
Maximum Diurnal Speed Average: 9.3 km/h at hour 16		Minimum Diurnal Speed Average: 5.0 km/h at hour 2		Hours of Missing Data: 2																						
Monthly Average Velocity: 7.6 km/h 154.8 deg		Percentiles: P ₁ = 1 P ₁₀ = 6 Q ₁ = 9 Median = 14 Q ₃ = 20 P ₉₀ = 24 P ₉₉ = 33		Percent Operational Time: 99.7																						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Dec	W5	WSW7	SW5	S6	SE10	SE12	SE9	SE12	SE12	SE10	SE10	SE8	ESE8	SE13	SE12	SE17	SE13	SE8	SE8	SE9	SE10	SE22	SE22	SSE22	SE10.3	SE22
2-Dec	SE19	ESE8	SE11	SE13	SE13	SE16	SE16	SE16	SE12	ENE2	NNW2	SSE2	ESE1	S1	E1	ESE3	NNW7	NNW7	NNW6	NW6	NNW10	N7	NNW7	NNW6	ESE3.3	SE19
3-Dec	NNW8	NNW6	N4	NNE4	N3	NNW6	NW5	N4	NNW5	NNW6	NNW3	NNW2	NNW2	NNW6	NNW8	NNW7	NW7	NNW6	NW3	NW3	SW1	SE1	SE5	NNW3.9	NNW8	
4-Dec	SE8	SE13	SE9	SE10	SE7	SE12	SE15	SE13	SE14	SE19	SE19	SE11	S7	S7	SSE8	SE12	SE14	SE13	SE16	SE14	SE15	SE14	SE11	SE15	SE12.0	SE19
5-Dec	ESE12	SE11	SE11	ESE13	SE8	ESE11	SE10	SE10	SE7	UO	UO	SE16	SE23	SE16	SE18	SE21	SE19	SE17	S11	SW22	S4	SSW7	SSW5	SE14	SE11.4	SE23
6-Dec	SSE9	S8	SSW6	SW5	WSW7	WSW12	WSW14	SSW5	SW9	SSW7	WSW9	SSW4	WSW21	WSW22	WSW26	SW23	SSW20	SSW21	SSE6	SE10	SE8	SSE6	SW6	SSW7	SW9.9	WSW26
7-Dec	SW15	SW9	S6	S4	S7	SSE6	SSE8	S7	S9	SE12	SE9	SSE11	SE15	ESE7	SE11	SE9	S8	SW9	S5	WSW7	WSW11	WSW18	SSW7	SSE5	S6.9	WSW18
8-Dec	WSW5	SW6	SSW7	SSW6	S5	S7	SSW6	SSE7	SSE9	SSE8	S9	SSE9	SE11	SE11	SE13	SSE13	SSE11	SSE8	SE12	SE13	SE15	SE14	SE14	SE14	SSE8.6	SE15
9-Dec	SE12	SSE12	S9	SSE10	SSE10	SSE10	SE13	SE18	SE16	SE15	SE17	SSE19	SE22	SE20	SSE18	SSE18	SE18	SE17	ESE11	ESE10	ESE10	SE10	SE8	SE5	SE13.2	SE22
10-Dec	ESE5	SE5	SE11	SE10	SE12	SE12	SSE10	SE15	SE17	SE18	SE21	SE13	SSW7	WSW21	WSW21	W23	W27	W33	W35	NW20	NW26	NW26	NW26	NW21	WSW6.4	WNNW35
11-Dec	NW18	NW22	NW24	NW21	WNNW25	WNNW29	W30	WSW30	WSW31	WSW21	WSW24	WSW25	WSW13	SSW8	SSE11	SE14	SE14	SE15	SE16	SE18	SE18	SE15	SE12	SE14	WSW7.9	WSW31
12-Dec	ESE10	SE11	SE13	SE12	SE15	SE16	SE15	SE16	SE12	ESE12	SE17	SE13	ESE10	SE18	SE18	SE18	SE22	SE22	SE25	SE23	SE21	SE16	SE24	SE24	SE16.9	SE25
13-Dec	SE22	SE23	SE20	SE13	SE12	SE23	SE22	SE22	SE26	SE23	SE24	SE22	SE22	SE26	SE20	SE19	SE22	SE17	SSE16	SE13	SSE15	SSE10	SSE11	S6	SE18.4	SE26
14-Dec	WSW13	W19	W20	WSW23	WSW25	WSW25	W27	WSW28	WSW28	WSW30	WSW23	WSW10	S5	SSW9	SSW13	SSW8	SW10	SW8	SW9	S6	SE11	SE12	SE15	SE12	WSW12.5	WSW30
15-Dec	SE18	SE18	SE23	SE24	SE23	SE24	SE23	SE23	SE20	ESE13	SE25	SE21	S20	S23	S22	S29	S24	S31	S32	S33	S26	S22	SSW16	SW13	SSE20.1	S33
16-Dec	WSW12	WSW27	W24	W25	WNNW27	NW28	WNNW30	W27	W27	NW17	N18	NNE13	N15	N11	N10	N10	N10	N6	N11	N2	NNW4	NW2	ENE1	N4	WNNW11.2	WNNW30
17-Dec	N13	N15	NNW9	NNW6	SSE2	ESE7	ESE7	SE12	SE14	SE17	SE16	SE17	SE18	SE18	SE19	SE17	SE17	SE21	SE20	SE22	SE21	SE19	SE23	SE17	SE12.0	SE23
18-Dec	SE17	SE12	SE12	SE7	SE3	WSW13	WSW19	SSW9	SSE8	WSW10	WSW21	WSW27	WSW28	W24	WNNW19	W22	W14	WNNW17	WNNW18	WNNW24	NNW18	N22	NNE22	NNE21	W8.4	WSW28
19-Dec	N18	NNW14	NNW11	NNW9	NNW6	NNW6	N9	NNE8	NE6	ENE7	E3	ENE6	NE5	NNW5	E8	E12	ESE16	ESE18	SE22	SE24	SE27	SE27	SE28	SE30	E7.4	SE30
20-Dec	SE33	SE33	SE39	SE42	SE38	SE33	SE35	SE38	SE31	SE23	SE25	SE26	SE21	SSE15	SE19	SSE18	SE18	SE23	SSE22	SSE22	SE24	SE25	SE21	SE13	SE26.3	SE42
21-Dec	WSW19	WSW24	WSW14	WSW22	W22	WSW21	WSW24	SW23	SW14	SE12	SE17	SE18	SE20	SE18	SE14	SE15	SE10	ESE6	SE12	SE18	SE18	SE15	SE13	SE17	S9.5	WSW24
22-Dec	SE17	SE15	SE17	SE14	SE5	SE4	SE11	SE14	SE11	SE15	SE11	SE10	SE8	SE10	SSE12	SSE5	SE11	SSE8	SE8	SE13	SE16	SE14	S9	WSW23	SE10.5	WSW23
23-Dec	SW9	WSW13	WSW17	W24	W24	W25	W20	W24	W18	W21	W19	W29	W28	W28	W23	W18	W18	W14	WSW15	SW20	WSW31	WSW28	SW22	SW20	W20.5	WSW31
24-Dec	WSW6	SE5	SE8	SE15	SE18	SE18	SE19	SE23	SE16	SE21	SE17	SE19	SE12	SE12	SE16	SE16	SE9	SE9	SE12	SE15	SE17	SE18	SE22	SE21	SE14.8	SE23
25-Dec	SE17	ESE15	SE18	SE21	SE17	SE17	SE19	SE25	SE22	SE23	SE24	SE17	SE17	SE22	SE19	SE21	SE21	SE22	SE20	SE19	SE14	ESE12	ESE15	SE10	SE18.6	SE25
26-Dec	SE13	SE12	SE14	SE12	ESE8	SE4	SE12	SE13	SE11	SSE15	SSE16	SSE13	SSE17	SSE16	SSE22	SE24	SE24	SE22	SE23	SE21	SE22	SE16	SSE21	S24	SE16.0	S24
27-Dec	SW24	SW32	SW28	SW23	SSE10	ESE13	SE13	SE13	SE18	SE18	SE20	SE21	SE15	SE16	SE19	SE13	SE8	ESE4	NE1	NNW4	NW5	NNW5	NNW4	NNW6	SSE8.1	SW32
28-Dec	NNW5	NNW5	NNW5	NNW7	NW5	NW3	NW5	NNW4	NW1	NW2	NNW6	NW12	N10	N10	NNW12	NNW7	NNW7	N8	NNW9	NW8	NNW8	NNW7	NNW6	WNNW6	NNW6.3	NW12
29-Dec	NW2	WSW3	SW6	SE9	SE11	SE13	SE16	SE10	SE13	SE13	SE10	SE11	SE12	SE12	SE13	SE16	SE13	SE5	SE7	SE5	SE11	SE14	SE11	SE10	SE9.6	SE16
30-Dec	SE13	SE12	SE13	SE14	SE14	SE13	SE14	SE12	SE9	SE13	SE10	SE11	SE8	ESE9	SE11	SE11	SE18	SE15	SE13	SE14	SE19	SSE20	SSE19	SSE19	SE13.3	SSE20
31-Dec	SSE19	SE20	SE23	SE21	SE21	SE21	ESE15	ESE17	ESE16	ESE15	SE20	SE19	SE23	SE25	SE15	SSE6	SSE11	SSE10	SW1	WSW18	WSW22	WSW23	NW6	NNW6	SSE11.7	SE25
SSE5.8 S5.0 SSE6.1 SSE6.5 SSE5.8 SSE6.2 SSE6.9 SSE9.0 SSE8.8 SSE8.6 SSE9.1 SSE8.9 SSE8.6 SSE8.6 SSE9.0 SSE9.3 SSE8.8 SSE7.7 SSE7.2 SSE8.0 SSE7.8 SSE7.8 SE7.9 SSE7.5																								Diurnal Average		
SE33 SE33 SE39 SE42 SE38 SE33 SE35 SE38 WSW31 WSW30 SE25 W29 WSW28 W28 WSW26 S29 W27 W33 WNNW35 S33 WSW31 WSW28 SE28 SE30																								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 45 m (WS45m) - km/h
Lower Camp Met Tower - December 2023

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	73	9.84	9.84
6 - 11	204	27.49	37.33
12 - 19	269	36.25	73.59
20 - 28	171	23.05	96.63
29 - 38	23	3.10	99.73
> 38	2	0.27	100.00

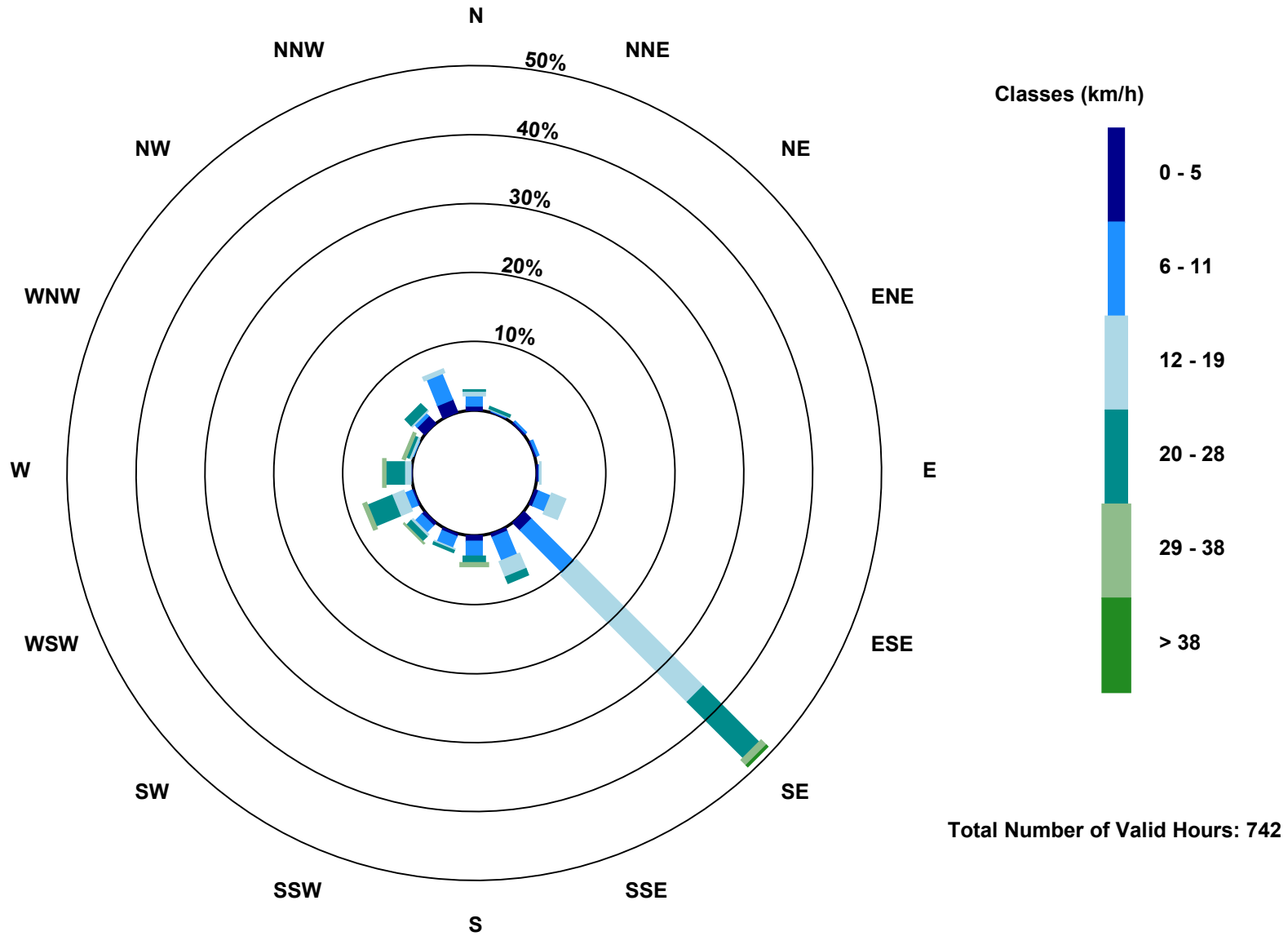
Total Number of Valid Hours: 742

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Dec 2023

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





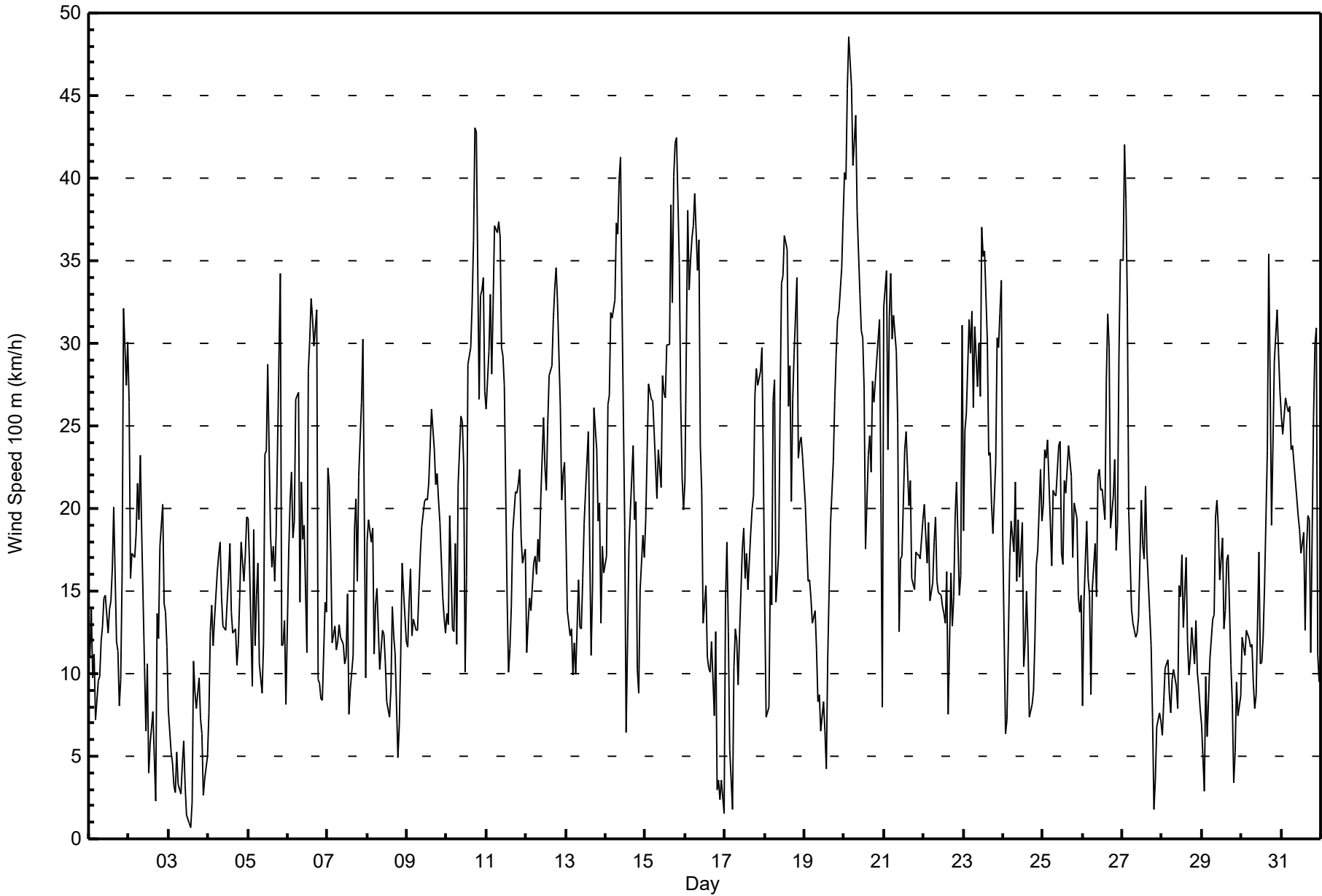
Maximum Speed: 49 km/h on Dec 20 04:00		Maximum Daily Speed Average: 31.5 km/h on Dec 20		Hours in Service: 744																						
Minimum Speed Value: 1 km/h on Dec 3 14:00		Minimum Daily Speed Average: 4.0 km/h on Dec 3		Hours of Data: 744																						
Maximum Diurnal Speed Average: 12.3 km/h at hour 16		Minimum Diurnal Speed Average: 9.5 km/h at hour 1		Hours of Missing Data: 0																						
Monthly Average Velocity: 10.7 km/h 191.5 deg		Percentiles: P ₁ = 2 P ₁₀ = 8 Q ₁ = 12 Median = 17 Q ₃ = 24 P ₉₀ = 32 P ₉₉ = 42		Percent Operational Time: 100.0																						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Dec	WSW11	WSW14	SW10	SW11	S7	S10	SSE10	SSE12	SSE13	SSE15	SSE15	SSE12	SSE14	SSE14	SSE16	SSE20	SSE12	S11	S8	S10	SSE16	SSE32	SSE27	S30	S13.2	SSE32
2-Dec	S26	SSE16	SSE17	S17	SSE18	SSE22	SSE19	SSE23	SSE19	SSE10	SE7	SSE11	SSE4	SSE6	SSE8	SSE5	WNW2	NNW14	NNW12	NNW18	NNW20	NNW14	NNW14	NNW12	SSE5.0	S26
3-Dec	NNW8	NW5	NNW5	N3	N3	N5	NW3	N3	N5	NNW6	NNW3	NW1	ESE1	ESE1	NNW2	N11	N9	NNW8	NNW10	NNW7	NNW6	N3	SSW4	SSE5	NNW4.0	NNW11
4-Dec	S8	SSE13	SSE14	SSE12	SSE13	SSE16	SSE17	SSE18	S15	S13	SSW13	SW14	SW16	SW18	SW14	SSW12	SSW13	SSW11	SSE12	SSE15	SSE18	SSE16	SSE17	SSE20	S12.9	SSE20
5-Dec	SSE19	SE17	SSE9	SSE19	SSE12	SSE15	SE17	SSE11	S9	S12	SSE23	SW24	SSE29	SSE18	SSE16	SSE18	S16	SSW18	SW24	SW34	WSW12	SW12	SW13	S8	S14.2	SW34
6-Dec	SW17	SW21	SW22	WSW18	WSW19	WSW27	WSW27	SW14	WSW22	SW18	WSW19	SW11	WSW28	WSW30	WSW33	SW32	SW30	SW32	SSW10	SSW9	S9	SW8	WSW14	SW14	SW19.7	WSW33
7-Dec	SW22	WSW21	SW17	WSW12	SW13	SW11	SW12	SW13	SW12	S12	SSW11	SSW11	S15	SE8	S9	SW11	SW19	WSW21	WSW16	WSW22	WSW26	WSW30	SW20	SW10	SW14.3	WSW30
8-Dec	WSW18	WSW19	SW18	WSW19	WSW11	WSW14	WSW15	SW10	SW11	WSW13	SW12	SSW11	SSW8	SSW7	S9	SSW14	SW12	SW11	SW5	SSW7	S11	SSE17	SSW15	S12	SW11.4	WSW19
9-Dec	S12	SSW14	SSW16	SSW12	SW13	SW13	SSW13	S15	SSE17	SSE19	SSE20	SSE21	SSE21	SSE21	SSE24	SSE26	SSE24	SSE21	SSE22	SSE21	SSE19	SSE15	SSE13	SE12	S16.6	SSE26
10-Dec	SE14	SSE13	SE20	SSE13	SSE13	SSE18	SSE12	SSE21	SSE26	SSE25	SSE23	SSE10	SW16	WSW29	WSW30	W32	W36	W43	W43	NW27	WNW33	NW33	NW34	NW27	WSW11.4	W43
11-Dec	NW26	NW29	NW33	NW28	NNW32	NNW37	W37	W37	WSW36	WSW30	WSW29	WSW27	SW15	SSW10	S12	SSE14	SSE19	SSE21	SSE21	SSE22	SSE22	SSE18	SSE17	SSE18	WSW12.9	W37
12-Dec	SSE11	SSE13	S15	SSE14	S17	SSE17	SSE16	SSE18	SSE17	SSE21	SSE26	SSE23	SSE21	SSE25	SSE28	SSE29	SSE31	SSE33	SSE35	SSE32	SSE26	SSE21	SSE22	S23	SSE22.0	SSE35
13-Dec	S18	S14	SSW12	SW13	SSW10	SSE12	S10	SSE16	S13	SSE13	SSE16	SSE19	SSE21	SSE25	S18	S11	S15	S26	SSW24	S19	SSW20	SW13	SSW18	SW16	S15.3	S26
14-Dec	W17	WNW26	W27	W32	WSW31	WSW33	W37	WSW37	WSW40	WSW41	W33	W19	WSW6	SSW12	SW18	SW20	SW24	WSW19	WSW20	SW10	SSE9	SSE15	SSE18	SSE17	WSW20.2	WSW41
15-Dec	S19	S23	SSE28	SSE27	SSE25	S23	SSE18	SSE24	SE21	SSE28	S27	SSW27	S30	S30	S38	S32	SSW40	S42	SSW42	SSW35	S26	SSW22	SW20	S26.8	SSW42	
16-Dec	WSW22	WSW38	W33	W35	WNW36	NW37	WNW39	W34	W36	NW24	NNW21	NNE13	N15	N11	NNE10	N10	N12	N7	N13	NE3	N4	NNW2	SSW4	WNW1	WNW14.1	WNW39
17-Dec	N14	N18	NNW13	NNW5	SE2	SE10	SE13	SSE12	S9	S12	SSE18	SSE19	SSE16	SSE17	SSE15	SSE19	SSE20	SSE21	SSE27	SSE28	SSE27	SSE28	SSE30	SSE23	SSE13.1	SSE30
18-Dec	S14	SSW7	SW8	WSW16	WSW14	WSW26	WSW28	WSW14	WSW17	WSW26	WSW34	WSW34	WSW37	W36	WNW26	W29	WNW20	WNW27	WNW29	WNW34	NNW23	N24	NNE24	NNE23	W17.8	WSW37
19-Dec	N20	N18	NNW16	NNW16	NNW15	N13	N14	NNE11	NE8	E9	ESE7	E8	ENE7	N4	E11	ESE15	ESE19	ESE23	SE27	SE29	SE31	SE32	SE35	SE38	E9.7	SE38
20-Dec	SE40	SE40	SE45	SE49	SE46	SE41	SE42	SE44	SE38	SE33	SE31	SE30	SE27	SSE18	SSE23	SSE24	SSE22	SSE28	SSE26	SSE28	SSE30	SSE31	SSE21	SSW8	SE31.5	SE49
21-Dec	WSW32	WSW34	W24	WSW32	W34	WSW30	WSW32	SW29	SW25	SSE13	SSE17	SSE17	SSE24	SSE25	SSE22	SSE20	SSE22	SSE16	SSE15	S17	SSE17	SSE17	S17	SSE19	SSW15.8	WSW34
22-Dec	SSE20	S18	SSE17	SSE19	SSE14	SSE15	SSE18	SE19	SSE16	S15	S15	S14	S14	SSE13	SSE16	SSE8	SSE16	S13	S15	SSE19	S22	S15	SW16	WSW31	S15.0	WSW31
23-Dec	WSW19	WSW25	WSW26	W31	W29	W32	W26	W31	W27	W30	W27	W37	W35	W36	W30	W23	W23	W20	W18	WSW23	W30	WSW30	WSW32	WSW34	W27.6	W37
24-Dec	WSW18	SSW6	SSW7	S12	SSE17	SSE19	SSE17	SE22	SSE16	SSE19	SSE16	SSE19	SSE10	SSE12	SSE15	S12	S7	SSE8	SSE9	SSE12	SSE17	S17	SSE22	SSE19	SSE13.7	SSE22
25-Dec	SSE20	SSE24	SSE23	SSE24	SSE19	SSE17	S21	SSE21	SSE21	SSE24	SSE24	SSE17	SSE17	SSE22	SSE21	SSE24	SSE23	SSE22	SSE17	SSE20	SSE19	SSE15	SSE14	SE15	SSE19.9	SSE24
26-Dec	S8	SSE14	SSE19	SSE16	SSE15	S9	SSE15	SSE18	SSE15	SSE22	SSE22	SSE21	SSE21	SSE19	SSE28	SSE32	SSE30	S19	SSE21	SSE23	S17	SSW19	SSW29	SSW35	SSE19.6	SSW35
27-Dec	SW35	SW42	SW39	SW32	SW20	SSE14	S13	SSW13	S12	SSE12	SSE13	SE21	SSE18	SE17	SSE21	SSE17	SE14	SE12	SE7	E2	NNW4	N7	NE8	NNE7	S11.1	SW42
28-Dec	NNE6	NNW8	NNW10	NNW11	N9	NNW8	NNW10	NNW10	N9	NNW8	N15	NNW15	N17	N13	NNW17	N12	NNW10	NNE11	N13	NNW11	NNW13	N10	NNW9	NNW8	N10.7	N17
29-Dec	NNW7	NW3	WSW10	SSW6	SSW9	SSE11	SSE13	SSE14	SSE19	SSE21	SSE19	SSE16	SSE18	SSE13	SSE14	SSE17	SSE17	SE11	SSE8	S3	SSE5	S9	S7	S9	SSE10.3	SSE21
30-Dec	S12	S12	SSE11	SSE13	S12	S12	S12	S9	S8	S9	SE17	SSE11	S11	SSE12	SSE15	SE23	SE35	SSE28	SSE19	SSE24	SSE29	SSE32	SSE29	SSE27	SSE17.2	SE35
31-Dec	SSE26	SSE25	SSE27	SSE26	SSE26	SSE26	SSE24	SSE24	SSE22	SSE21	SSE20	SSE19	SSE17	SSE19	SSW13	SW18	SSW20	SW19	WSW11	WSW26	WSW30	W31	NNW11	NNW9	S15.4	W31
SSW9.5 SW10.6 SSW10.6 SSW9.7 SSW9.8 SW10.6 SW11.6 SW12.0 S11.4 S11.9 S11.4 S11.2 S11.3 S11.6 S12.3 S12.2 S11.7 S10.1 S11.0 S10.3 S10.3 S10.1 S9.7																								Diurnal Average		
SE40 SW42 SE45 SE49 SE46 SE41 SE42 SE44 WSW40 WSW41 WSW34 W37 WSW37 W36 WSW33 S38 W36 W43 W43 SSW42 SSW35 NW33 SE35 SE38																								Diurnal Maximum		
All monthly, daily, and diurnal averages have been calculated using vector methods																										



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

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

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	33	4.44	4.44
6 - 11	123	16.53	20.97
12 - 19	294	39.52	60.48
20 - 28	175	23.52	84.01
29 - 38	101	13.58	97.58
> 38	18	2.42	100.00

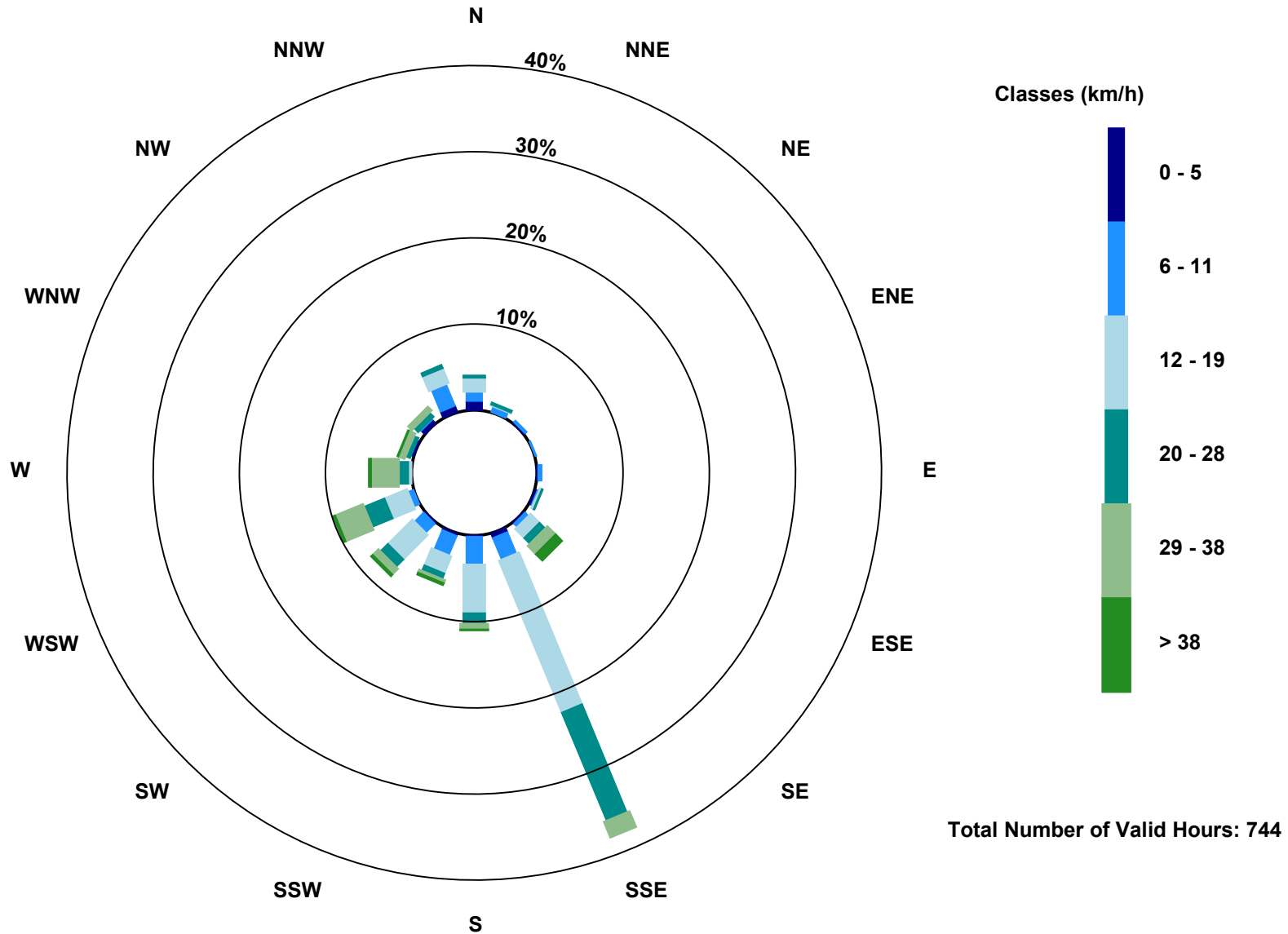
Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Dec 2023

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





Maximum Speed: 52 km/h on Dec 20 04:00	Maximum Daily Speed Average: 33.7 km/h on Dec 20	Hours in Service: 744
Minimum Speed Value: 1 km/h on Dec 3 08:00	Minimum Daily Speed Average: 12.6 km/h on Dec 19	Hours of Data: 731
Maximum Diurnal Speed Average: 16.4 km/h at hour 18	Minimum Diurnal Speed Average: 13.4 km/h at hour 13	Hours of Missing Data: 13
Monthly Average Velocity: 14.6 km/h 209.7 deg	Percentiles: P ₁ = 3 P ₁₀ = 12 Q ₁ = 17 Median = 23 Q ₃ = 30 P ₉₀ = 38 P ₉₉ = 48	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-Dec	W14	W11	WSW6	SW12	SW13	SSW11	S10	SSE10	S18	S22	SSE20	SSE19	S19	SSE19	SSE22	SSE27	SSE23	SSE18	SSE16	SSE25	SSE32	S34	S30	S34	\$17.4	S34
2-Dec	S35	S29	S29	S29	S28	SSE28	SSE24	SSE29	S26	SSE24	SSE22	SSE21	S13	S9	S11	S10	SSW8	NNW12	N14	N12	N18	UO	UO	UO	\$14.9	S35
3-Dec	UO	UO	UO	UO	UO	UO	UO	ESE1	ENE3	UO	UO	UO	E3	SE7	SE5	NNE3	NNE2	NNE2	WNW2	SSW1	S4	SE5	SSE9	SSE12	---	SSE12
4-Dec	SSE14	SSE18	SSE23	SSE27	S25	SSE21	SSE26	S25	SSW19	SW17	SW20	WSW24	WSW25	WSW22	SW22	SW21	SW23	SW18	SSW15	SSW18	SSW18	S18	S20	S25	SSW17.9	SSE27
5-Dec	SSE30	SSE26	SSE21	SE29	SE20	SE22	SE25	SE19	SSE18	SSE21	S30	S30	S22	S17	S13	SSW15	SW23	SW31	SW36	WSW43	WSW23	WSW17	SW21	SW12	\$18.5	WSW43
6-Dec	WSW24	WSW28	WSW34	WSW33	WSW31	WSW36	WSW38	WSW29	WSW33	WSW28	WSW27	WSW22	WSW34	WSW35	WSW38	SW36	SW33	SW39	SW18	SW17	SW16	WSW19	WSW27	WSW18	WSW28.5	SW39
7-Dec	WSW26	WSW29	WSW31	WSW26	WSW24	WSW20	SW18	SW20	WSW21	SSW14	SW14	SW17	SSW15	S10	SW13	SW21	WSW24	WSW28	WSW26	WSW31	WSW35	W32	WSW26	WSW22	WSW21.9	WSW35
8-Dec	W22	W23	WSW26	WSW29	WSW24	WSW25	WSW25	WSW21	WSW25	WSW21	WSW22	WSW22	WSW18	WSW18	WSW15	SW17	WSW23	WSW21	WSW18	SW17	SW13	SSW16	SW16	SW12	WSW19.9	WSW29
9-Dec	SSW11	SW16	SW20	SW21	WSW25	WSW22	SW18	SW16	SSW15	S14	S17	SSW17	S17	SSE18	S17	S23	S25	S27	S30	SSE29	SSE28	SSE25	SSE26	SSE23	\$18.4	S30
10-Dec	SSE22	SSE19	SE24	SE18	SE20	SSE24	SSE23	SSE31	SSE31	SSE30	S23	SSW14	WSW23	WSW34	W34	W40	W44	W50	W50	NW32	NNW39	NNW39	NNW38	NNW31	WSW14.6	NNW50
11-Dec	NW30	NW33	NW38	NW35	NNW39	NNW44	NNW42	W41	W37	W32	W26	WSW28	WSW18	SW12	S13	S15	S21	S26	S22	S23	S23	S17	S18	S20	WSW16.8	NNW44
12-Dec	S18	SSW14	SW14	SW13	SSW13	SSW13	S16	S15	SSE24	S28	SSE34	SSE33	SSE30	S37	S38	S42	S42	S44	S40	S34	S32	SSW31	SSW25	SSW28	\$26.5	S44
13-Dec	SW24	SW26	SW24	SW30	SW24	SW14	SW18	SW21	SW21	SSW18	SSW19	SSW25	SSW25	SSW27	SSW25	SW20	SW27	SSW39	SSW29	SW24	SW20	W19	SW20	WSW18	WSW22.6	SSW39
14-Dec	W19	NNW30	W30	W38	W37	W38	W45	W43	W49	W48	W42	W30	W13	SW14	SW19	SW24	WSW32	WSW33	WSW32	WSW23	SSW9	S10	SSW13	SSW18	WSW26.7	W49
15-Dec	SSW22	SSW22	SSW26	SSW24	SSW26	SSW26	SSW29	SW28	S28	S27	S35	S35	SSW32	SSW35	S38	S46	SSW38	SSW44	SSW47	SSW48	SSW39	SSW30	SSW28	WSW26	SSW31.8	SSW48
16-Dec	WSW31	WSW45	W41	W41	NNW45	NNW46	NNW45	NNW42	W45	NNW31	NNW23	NNE13	NNE16	NNE11	NNE10	NNE9	NNE14	NE9	NE11	ENE7	ENE4	SSE2	SSW9	WSW5	NNW16.0	NW46
17-Dec	N17	N19	N13	N4	S3	SSE9	S10	SSW10	WSW14	SW13	S18	S18	S17	SSW17	SSW14	S16	SSW19	S21	S28	S31	S33	S33	S33	S31	\$13.4	S33
18-Dec	SW24	SW21	WSW24	WSW31	WSW30	WSW35	W37	WSW25	WSW30	WSW38	WSW45	W35	W36	W43	NNW33	NNW31	NNW29	NNW37	NNW38	NNW36	NNW25	NNE25	NNE26	NNE24	W25.0	WSW45
19-Dec	NNE21	N22	N19	N20	N17	N16	NNE14	NE12	ENE7	E9	ESE11	E10	E7	NE5	E13	ESE17	ESE22	SE26	SE30	SE32	SE34	SE36	SE39	SE42	E12.6	SE42
20-Dec	SE45	SE44	SE49	SE52	SE49	SE43	SE46	SE45	SE38	SE36	SE30	SSE29	SE27	SSE19	SSE26	SSE30	SSE28	SSE32	SSE31	SSE33	SSE37	SSE35	SSW22	WSW22	SSE33.7	SE52
21-Dec	WSW42	W41	W32	W38	W41	W36	WSW37	WSW34	SW32	SSW14	S18	SSW21	S25	S27	SSE30	SSE29	SSE33	SSE28	S23	SSW24	SSW22	SSW23	SSW27	S25	SW22.2	WSW42
22-Dec	S25	SSW23	SSW18	S18	SSE20	SSE26	SSE26	SSE24	SSE22	SSE16	SSE19	SSE18	SSE19	SSE18	SE19	SSE17	SSE20	SSE24	SSE24	S26	SSW20	SW20	WSW28	WSW36	\$18.8	WSW36
23-Dec	WSW26	WSW34	W31	W37	W35	W39	W33	W38	W33	W38	W36	W44	W42	W41	W35	NNW28	NNW26	W28	NNW20	WSW24	W29	W26	W27	W31	W32.3	W44
24-Dec	WSW27	WSW20	SW18	SSW15	S18	SSW22	S17	S18	SSW17	SSW19	SSW21	SSW22	SSW14	SSW11	SSW15	SSW10	SW11	SW8	SSW7	SSW13	SSW19	SSW21	SSW19	SSW20	SSW15.9	WSW27
25-Dec	S20	S21	S18	S19	S24	SSW20	SSW25	SSW23	SSW20	SSW23	SSW24	S18	S14	S16	S20	S25	S22	S21	S16	S22	SSE29	SSE24	SSE20	SE23	\$20.0	SSE29
26-Dec	SSE21	SE28	SSE29	SE32	SE23	SSE21	SSE20	SSE18	SSE16	SSE19	SSE21	SSE24	SSE23	SSE25	SSE36	S40	S29	SSW19	SSW20	SSW20	SW21	SW35	SW41	SW41	\$22.3	SW41
27-Dec	WSW44	WSW49	SW47	SW40	SW31	SSW27	SSW25	SW25	SW21	SSW18	SSW14	S17	SSW17	S14	SSE18	S20	SE15	SE22	SE17	ESE15	SE6	NW4	NE11	ENE8	SSW16.2	WSW49
28-Dec	ENE8	ENE6	N10	NNE16	NE21	NNE11	N11	N17	NNE18	N14	NNE24	N17	N22	N16	NNW19	N15	N12	NNE15	N15	N13	N15	N14	N12	NNW8	N13.7	NNE24
29-Dec	N6	NNW2	WSW7	WSW12	SW14	SSW10	SSE18	SSE23	SSE24	S26	SSE25	SSE25	SSE26	S17	S20	S21	S19	S17	SSE17	SSE12	SSE12	S10	SSE15	SSE18	\$14.8	S26
30-Dec	SSE18	SSE13	SSE13	SSE19	SSE22	SSE16	SE15	SE16	SSE14	SSE22	SE26	SE24	SE21	SE19	SE27	SE32	SE41	SSE36	SSE29	SSE34	S38	S38	S34	S30	SSE24.2	SE41
31-Dec	S31	S29	S24	S23	SSW22	S19	S20	S18	S18	SSW16	SSW17	SSW14	SSW15	SSW15	SW22	WSW29	SW29	WSW28	WSW23	WSW34	W31	NNW32	NNW16	NNW12	SW17.7	WSW34

SW14.0	SW14.1	SW14.4	SW15.3	SW14.6	SW13.9	SW14.6	SW14.8	SW15.9	SW15.5	SW15.2	SW14.8	SW13.8	SW13.6	SW14.3	SW16.6	SW16.6	SW16.6	SW14.6	SW15.3	SW14.6	SW14.6	SW14.0	SW14.0	Diurnal Average
SE45	WSW49	SE49	SE52	SE49	NW46	SE46	SE45	W49	W48	WSW45	W44	W42	W43	S38	S46	W44	W50	NNW50	SSW48	SSW39	NNW39	SW41	SE42	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

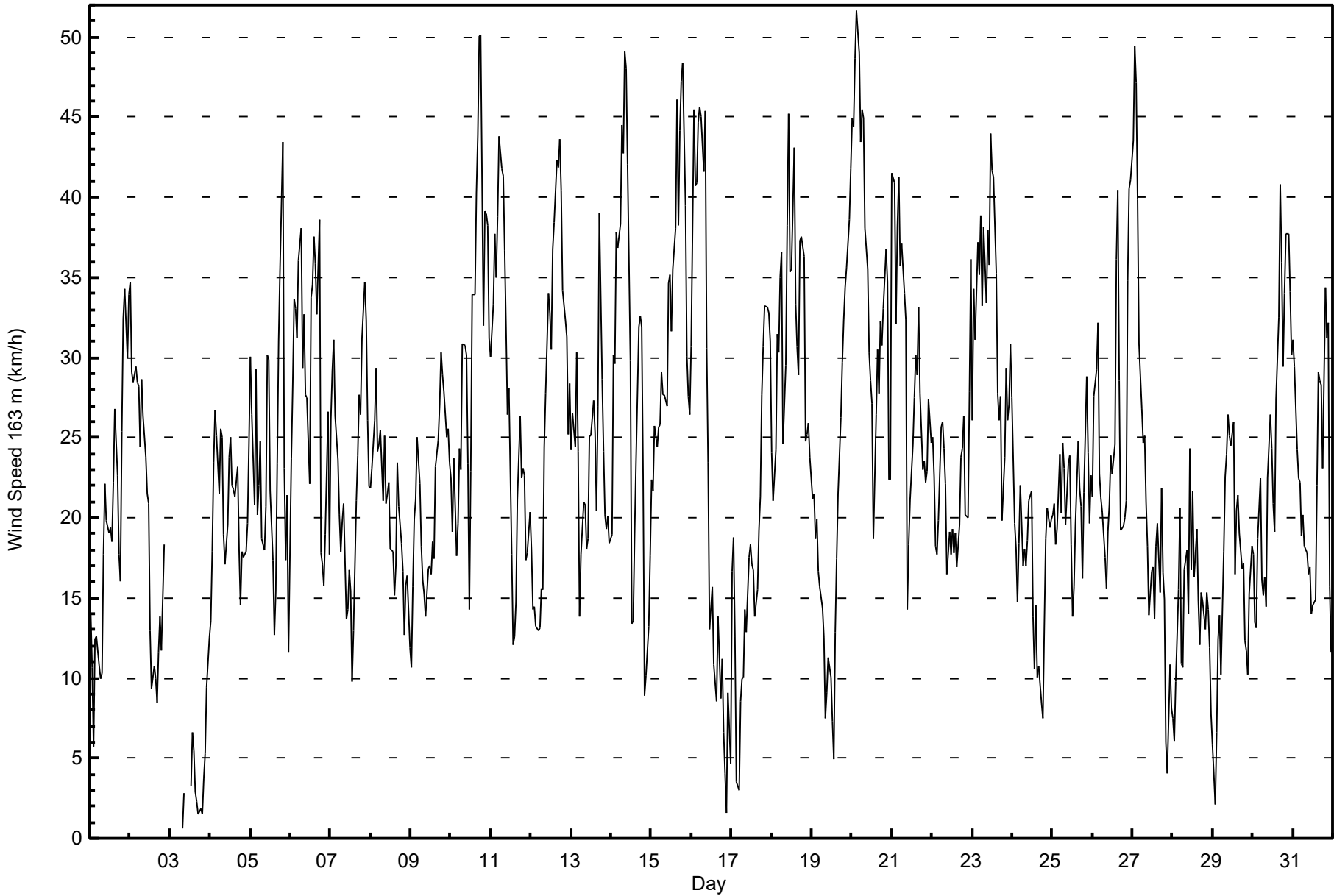
Wind Speed 163 m (WS163m) - km/h
Lower Camp Met Tower - December 2023

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 11 km/h on Dec 16 01:00 Minimum Value: 1 km/h on Dec 3 20:00 Percentiles: P ₁ = 1 P ₁₀ = 2 Q ₁ = 2 Median = 3 Q ₃ = 4 P ₉₀ = 5 P ₉₉ = 7																		Hours in Service: 744 Hours of Data: 731 Hours of Missing Data: 13 Hours of Calibration: 0 Percent Operational Time: 98.3							
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Dec	3	3	2	3	2	2	2	4	3	3	2	2	2	3	4	1	2	2	3	3	4	2	2	1	4
2-Dec	2	3	3	2	2	2	2	4	2	3	2	2	3	2	1	2	2	3	2	2	3	UO	UO	UO	4
3-Dec	UO	UO	UO	UO	UO	UO	UO	1	1	UO	UO	UO	2	4	3	2	2	1	1	1	2	2	3	3	4
4-Dec	2	4	2	2	3	1	2	2	2	2	3	3	1	1	1	4	2	2	2	2	2	2	2	4	4
5-Dec	2	4	3	4	4	5	1	2	3	3	3	3	5	4	2	2	5	3	5	5	7	6	6	4	7
6-Dec	4	2	4	5	2	3	5	3	2	3	3	2	4	5	2	3	4	5	7	3	5	7	5	6	7
7-Dec	6	2	3	4	2	2	3	3	2	3	3	3	2	4	4	2	2	2	1	3	2	1	3	2	6
8-Dec	2	4	3	2	4	2	2	2	2	5	2	3	2	2	2	3	4	4	2	3	2	1	2	4	5
9-Dec	3	3	2	2	3	4	2	2	1	2	2	2	2	3	3	3	1	2	2	2	1	2	2	2	4
10-Dec	3	3	5	2	2	3	4	3	3	4	4	3	3	5	4	5	4	7	10	7	11	6	8	6	11
11-Dec	4	4	6	5	5	5	6	3	2	4	2	2	3	2	2	2	3	1	2	2	1	3	2	1	6
12-Dec	3	1	1	2	2	2	2	2	3	3	3	2	3	2	2	2	2	2	3	3	2	4	3	2	4
13-Dec	3	3	4	4	6	4	5	6	7	3	2	3	3	2	4	2	4	3	6	4	3	3	3	3	7
14-Dec	6	4	6	3	2	4	2	2	3	3	4	5	5	2	3	2	4	4	1	6	4	2	2	2	6
15-Dec	4	2	2	3	3	2	3	3	4	4	3	4	4	4	6	5	5	3	3	4	7	5	5	7	7
16-Dec	11	3	3	3	7	8	5	7	7	5	9	2	3	3	2	1	2	3	4	3	1	1	2	3	11
17-Dec	4	3	2	3	2	1	1	2	2	2	4	2	2	1	2	3	2	2	3	1	2	1	1	3	4
18-Dec	2	2	5	3	2	6	4	5	6	4	3	5	3	3	5	4	7	4	1	1	5	5	4	4	7
19-Dec	3	3	2	2	1	2	2	3	2	3	3	4	4	2	4	3	3	4	4	5	3	4	3	4	5
20-Dec	4	4	5	5	5	5	3	3	4	3	4	4	5	3	4	4	4	5	5	4	5	4	7	6	7
21-Dec	5	3	4	4	2	3	2	3	4	5	2	2	2	3	2	5	4	2	3	3	3	3	2	2	5
22-Dec	2	2	2	2	2	2	3	2	2	1	3	2	2	2	2	3	4	3	2	3	3	3	5	6	6
23-Dec	4	3	3	7	6	5	5	6	3	4	4	4	4	3	5	4	4	5	4	2	3	2	2	2	7
24-Dec	2	4	2	1	2	3	1	2	2	3	2	1	4	5	5	2	2	2	2	3	2	2	2	2	5
25-Dec	2	3	2	3	3	3	3	2	2	2	2	4	2	3	3	2	3	4	4	3	2	3	5	6	6
26-Dec	4	3	4	4	2	2	2	1	2	1	2	1	1	3	4	3	6	3	3	3	5	3	5	5	6
27-Dec	4	4	4	5	5	4	4	3	3	4	3	2	2	4	3	1	2	4	4	2	5	1	2	1	5
28-Dec	2	4	2	3	4	3	3	2	3	4	3	2	5	3	3	3	2	2	2	2	1	3	2	1	5
29-Dec	1	1	3	2	1	2	2	3	3	5	2	2	4	3	3	3	3	2	1	3	3	2	2	2	5
30-Dec	2	1	2	3	2	3	2	3	4	2	2	2	2	3	4	3	3	7	3	3	1	1	2	1	7
31-Dec	1	2	2	2	2	2	2	2	2	2	3	4	4	3	4	2	3	3	7	5	4	3	6	3	7
Diurnal Maximum																									
UO - Unstable Operation																									



Wood Buffalo Environmental Association
Hourly Averages

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





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

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

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	19	2.60	2.60
6 - 11	48	6.57	9.17
12 - 19	201	27.50	36.66
20 - 28	246	33.65	70.31
29 - 38	155	21.20	91.52
> 38	62	8.48	100.00

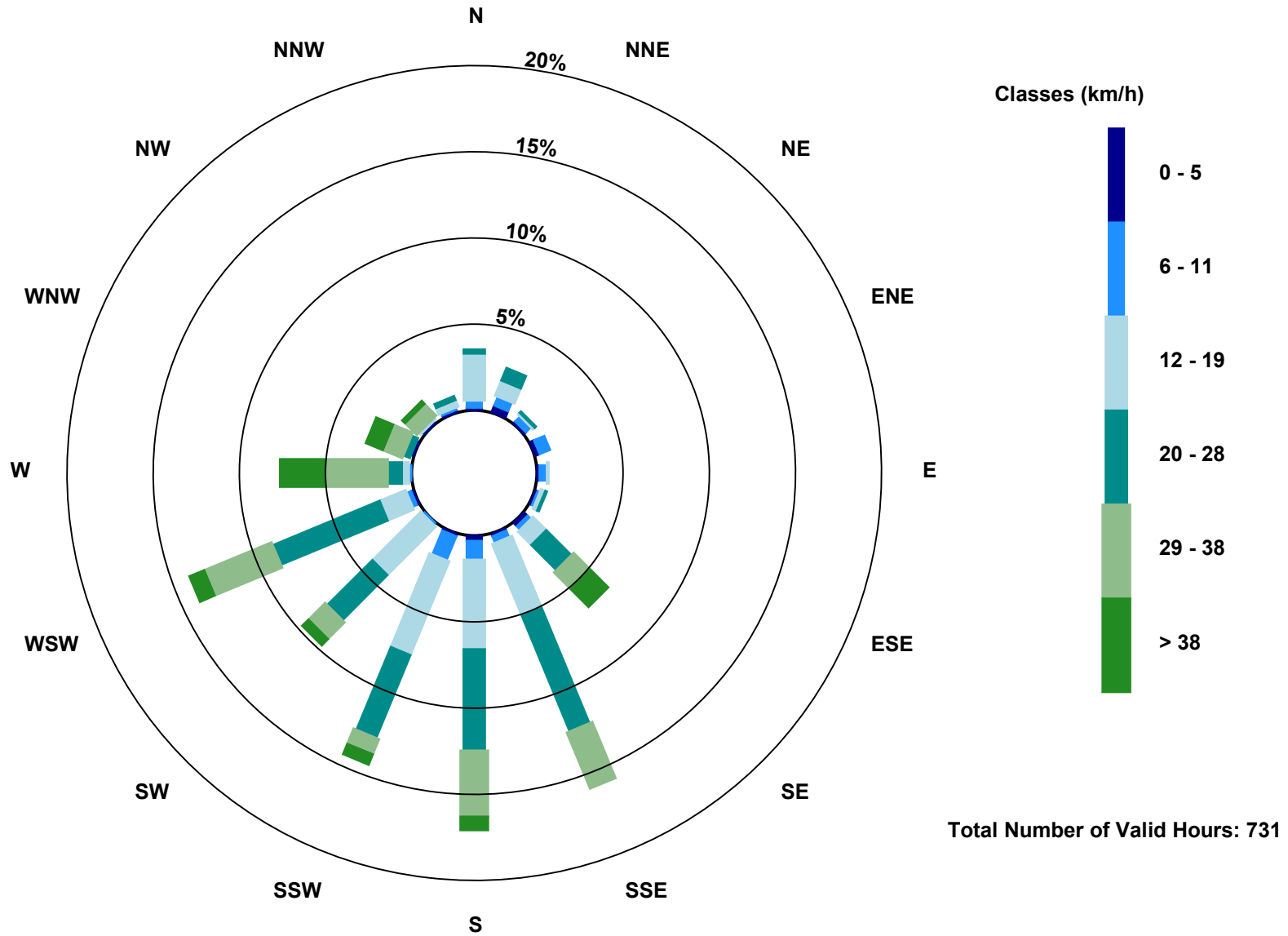
Total Number of Valid Hours: 731

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Dec 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 - December 2023

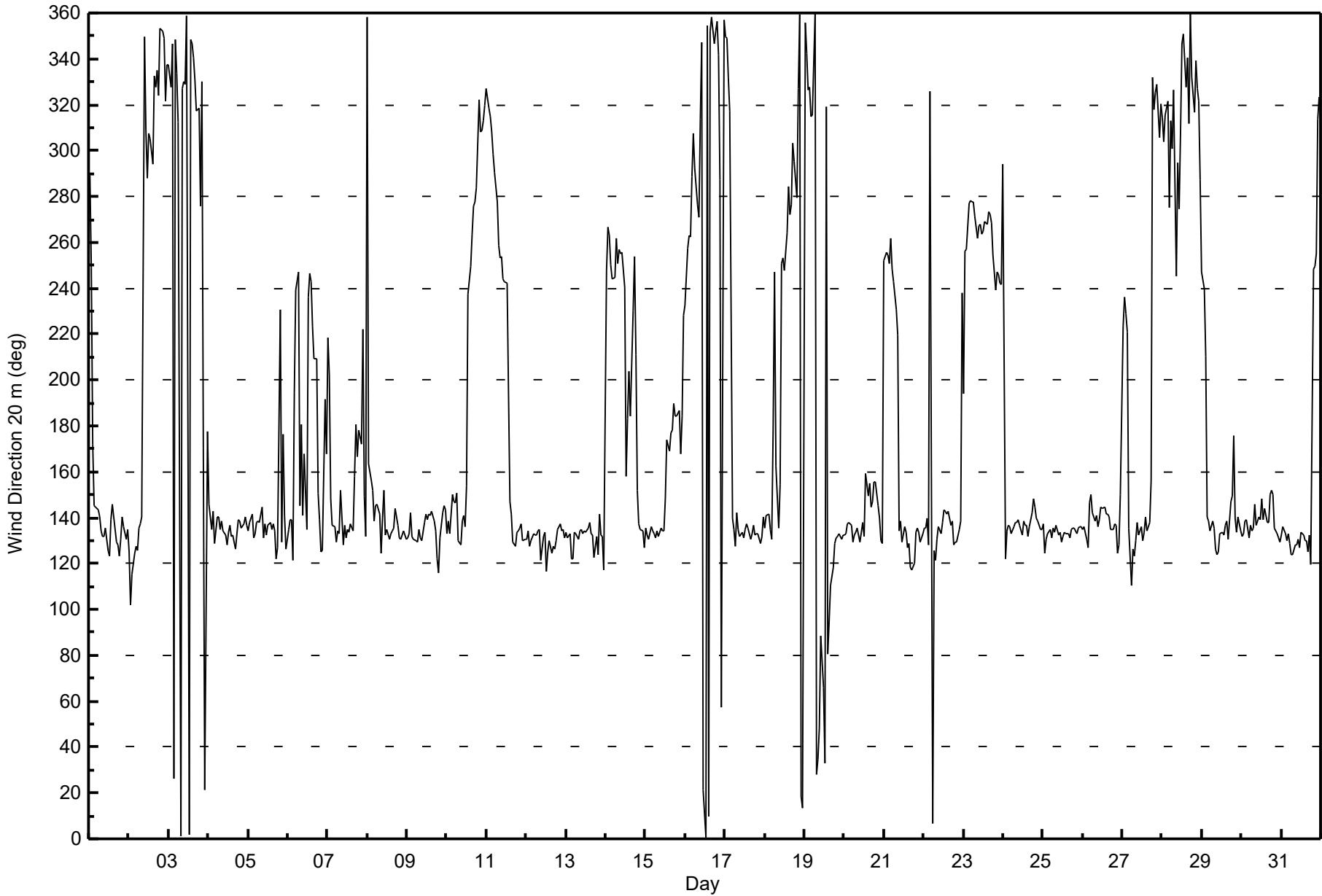
Direction of Maximum Speed: 138 deg on Dec 20 04:00																						Hours in Service: 744			
Direction of Maximum Daily Speed Average: 139.4 deg on Dec 20																						Hours of Data: 744			
Direction of Minimum Speed: 21 deg on Dec 3 23:00											Direction of Minimum Daily Speed Average: 2.3 deg on Dec 2											Hours of Missing Data: 0			
Monthly Average Direction: 150.1 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-Dec	289	249	172	145	145	143	140	134	132	132	136	126	123	139	146	140	129	128	123	131	140	136	131	135	136.5
2-Dec	125	102	116	125	128	126	135	137	140	350	309	288	308	305	294	332	327	335	324	353	352	349	321	338	106.5
3-Dec	337	328	346	26	349	334	312	1	327	330	329	359	2	348	346	340	330	317	318	276	330	170	21	177	336.3
4-Dec	146	141	135	143	128	140	140	135	139	134	132	128	133	137	132	132	126	133	139	139	135	138	140	137	135.3
5-Dec	134	138	142	131	133	138	138	138	144	131	137	132	137	138	135	137	134	122	127	231	129	177	141	127	138.6
6-Dec	135	139	139	121	194	239	247	145	180	141	168	135	236	247	243	223	209	209	150	139	125	126	192	168	190.6
7-Dec	218	202	148	136	136	129	134	133	152	128	137	131	135	134	138	134	158	181	167	178	172	222	150	132	149.3
8-Dec	358	163	156	152	139	145	146	142	125	140	152	132	135	130	133	134	136	144	137	131	130	133	134	131	136.6
9-Dec	131	133	142	132	130	130	129	135	131	130	138	142	139	141	141	143	138	134	122	116	131	142	145	144	135.5
10-Dec	133	139	133	150	147	146	151	130	128	138	141	136	154	238	249	264	276	277	284	322	308	309	313	320	250.4
11-Dec	327	318	315	308	298	290	277	259	253	254	244	243	242	194	147	142	129	127	133	134	136	137	130	130	246.9
12-Dec	130	134	128	130	133	133	132	134	135	121	132	134	117	125	130	124	127	127	130	135	137	134	135	131	131.0
13-Dec	133	131	133	122	122	134	133	131	134	135	133	134	134	136	138	133	132	123	132	124	141	133	132	117	131.8
14-Dec	248	266	263	250	244	245	262	251	257	255	256	240	158	183	204	184	230	254	211	152	138	135	134	127	234.8
15-Dec	135	132	131	136	134	133	131	134	132	136	134	134	148	174	169	177	178	189	184	184	187	168	184	228	159.1
16-Dec	233	258	263	262	288	308	293	277	271	314	347	22	1	354	10	352	358	346	352	356	342	288	58	357	303.8
17-Dec	350	349	332	317	140	135	128	142	135	132	134	131	135	137	135	131	133	137	133	133	133	129	132	140	130.3
18-Dec	136	141	142	135	131	178	247	163	136	155	251	253	248	264	284	272	276	303	295	279	327	359	18	14	252.1
19-Dec	356	342	327	328	315	315	360	28	35	48	88	66	33	319	81	94	110	118	129	131	132	133	131	132	101.8
20-Dec	133	133	137	138	136	130	133	134	135	129	134	138	132	159	149	155	145	147	155	156	145	140	130	128	139.4
21-Dec	252	256	254	251	262	248	243	231	220	134	138	129	136	134	127	129	119	117	120	133	135	134	129	133	174.8
22-Dec	135	136	140	128	326	7	126	122	131	136	133	138	143	143	142	142	136	139	128	129	129	135	138	238	140.0
23-Dec	194	256	257	277	278	277	278	271	262	267	268	263	265	269	268	273	272	269	254	239	247	246	242	242	261.8
24-Dec	294	122	134	137	136	133	136	138	138	139	136	132	138	137	136	132	136	142	148	144	140	138	135	135	136.9
25-Dec	137	125	130	133	135	131	135	134	137	132	134	129	132	134	133	133	131	135	135	135	133	136	136	136	133.4
26-Dec	135	136	131	127	146	150	142	138	141	136	139	144	144	145	142	141	141	135	135	137	137	124	128	150	137.9
27-Dec	223	236	229	221	135	111	127	124	130	138	132	136	130	134	140	134	138	156	332	318	325	329	306	320	163.1
28-Dec	314	304	316	322	275	313	301	326	246	295	274	308	347	351	328	341	312	360	332	316	339	327	322	288	321.2
29-Dec	247	240	211	141	139	134	138	135	126	124	125	133	133	132	137	138	131	147	150	176	140	134	140	134	138.6
30-Dec	132	133	139	139	131	137	135	135	146	137	140	139	148	139	144	138	138	150	152	150	135	133	131	130	137.3
31-Dec	132	136	133	130	133	129	124	124	128	128	130	127	134	132	130	130	125	132	119	248	250	255	314	324	137.8
148.0	163.5	158.3	156.9	152.1	153.3	159.0	152.8	153.2	142.9	146.4	144.8	147.9	155.8	151.2	149.5	146.4	153.1	149.2	156.7	149.1	145.7	137.0	141.5		
Diurnal Average																									
All monthly, daily, and diurnal averages have been calculated using vector methods																									



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

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

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





Wood Buffalo Environmental Association
Summary of Hour Averages

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

Direction of Maximum Speed: 136 deg on Dec 20 04:00		Hours in Service: 744
Direction of Maximum Daily Speed Average: 136.7 deg on Dec 20		Hours of Data: 742
Direction of Minimum Speed: 181 deg on Dec 2 14:00	Direction of Minimum Daily Speed Average: 3.3 deg on Dec 2	Hours of Missing Data: 2
Monthly Average Direction: 154.8 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-Dec	260	250	217	182	135	134	137	135	133	130	129	124	122	131	136	138	131	133	129	132	136	145	140	148	140.5
2-Dec	143	118	126	139	128	128	146	146	145	69	348	162	112	181	101	117	335	340	333	319	334	350	332	341	121.0
3-Dec	339	327	349	19	352	339	312	358	337	334	338	342	339	329	345	343	334	326	338	312	312	224	146	142	337.4
4-Dec	138	132	126	130	124	131	132	129	134	132	132	146	174	176	160	132	129	129	129	126	126	124	124	126	132.7
5-Dec	121	127	134	123	130	122	137	130	130	UO	UO	134	139	133	137	134	137	133	182	232	188	206	213	129	142.5
6-Dec	167	187	195	215	238	244	240	211	234	211	237	196	237	243	239	222	211	211	152	144	140	148	227	198	216.5
7-Dec	222	224	189	190	174	152	147	176	188	134	146	147	134	122	138	145	180	214	189	240	240	241	202	155	179.5
8-Dec	248	215	203	201	178	184	195	163	150	166	182	161	128	125	130	149	156	164	129	138	133	138	141	129	152.5
9-Dec	137	165	176	158	160	155	138	131	132	134	141	148	140	143	148	151	146	138	112	112	121	125	129	128	140.9
10-Dec	123	132	133	139	136	141	147	130	138	141	141	134	199	237	248	260	273	276	281	318	305	308	311	318	250.9
11-Dec	326	319	313	308	298	290	276	258	252	249	242	240	237	197	147	137	135	135	142	135	139	135	126	130	244.2
12-Dec	122	128	127	127	131	129	128	129	129	123	139	130	120	126	127	126	127	127	131	129	128	124	131	128	128.1
13-Dec	129	129	131	129	129	126	129	132	132	131	131	128	128	132	133	128	130	139	160	146	162	148	162	177	134.4
14-Dec	249	274	265	251	244	247	260	250	253	253	257	256	176	195	211	209	226	234	233	174	126	129	137	131	237.8
15-Dec	139	139	130	133	131	130	130	127	127	123	132	145	172	178	173	179	181	190	186	186	189	174	195	229	160.2
16-Dec	239	255	260	260	287	306	292	277	269	312	349	21	5	358	11	356	2	352	354	6	343	317	74	2	302.3
17-Dec	353	352	339	329	149	121	118	135	132	128	127	127	132	138	131	139	140	129	132	132	129	124	129	126	125.6
18-Dec	126	126	134	142	132	239	255	201	162	243	256	251	245	261	285	272	280	299	294	283	330	2	17	13	273.5
19-Dec	359	346	332	333	331	333	0	23	39	60	99	71	51	328	84	98	112	118	128	129	131	131	130	131	97.4
20-Dec	131	131	135	136	134	131	132	133	131	128	132	134	131	152	144	155	143	146	151	154	146	141	129	126	136.7
21-Dec	249	253	256	249	261	247	238	224	215	135	134	129	133	133	127	126	129	116	128	136	138	138	141	139	179.4
22-Dec	140	145	138	137	124	124	129	130	134	126	130	146	138	145	149	151	138	155	129	126	138	145	171	239	143.5
23-Dec	219	250	252	276	277	277	278	271	261	267	265	263	264	267	272	272	272	264	248	236	247	242	236	236	259.9
24-Dec	251	140	137	137	134	134	138	137	134	136	128	129	128	125	130	134	125	137	134	133	133	133	128	128	133.4
25-Dec	125	120	125	128	126	127	129	130	135	129	134	127	125	132	135	128	132	128	133	128	124	123	123	131	128.7
26-Dec	127	130	126	126	119	129	134	135	131	147	160	162	160	156	149	144	139	130	128	127	129	137	152	174	141.3
27-Dec	224	234	228	222	166	119	126	132	131	132	129	134	130	131	143	137	138	120	37	338	315	340	337	337	163.4
28-Dec	339	330	329	339	319	311	323	332	315	312	340	317	353	353	330	348	331	3	337	326	345	338	332	299	334.7
29-Dec	320	248	218	137	140	133	135	132	128	136	126	129	127	127	136	132	129	129	132	135	130	130	129	125	133.4
30-Dec	127	124	128	129	128	129	131	128	131	127	130	132	129	122	128	129	125	133	130	138	145	152	155	150	134.0
31-Dec	148	144	131	134	135	127	121	123	121	123	130	127	138	137	144	160	163	166	214	246	248	249	323	333	147.1

157.6 177.1 166.6 166.4 161.6 158.5 164.2 155.7 156.1 146.7 149.4 149.7 151.2 157.1 154.8 152.6 151.2 155.6 152.6 157.4 152.6 151.2 143.4 146.3
 Diurnal Average

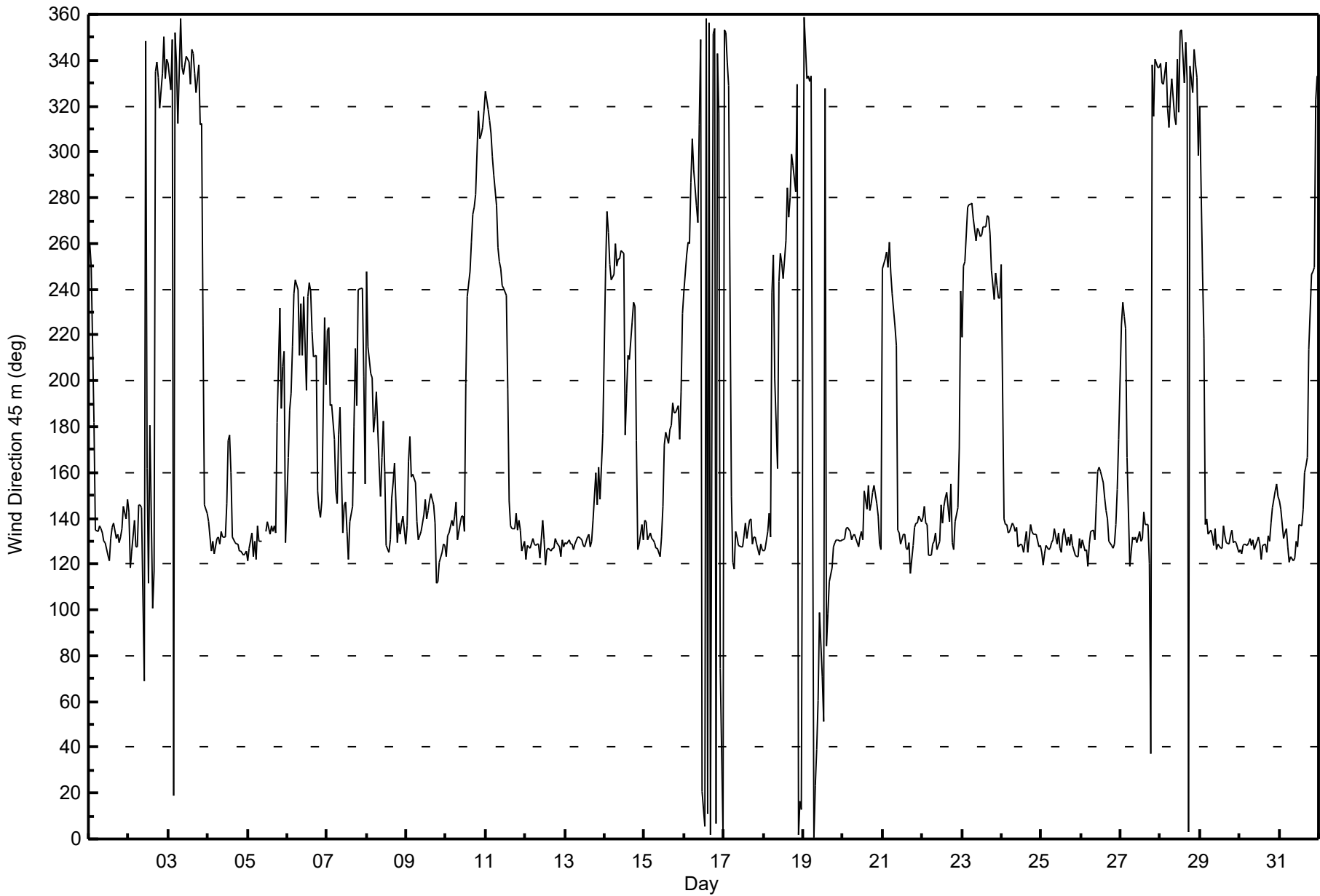
UO - Unstable Operation
 All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

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

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 102 deg on Dec 31 19:00 Minimum Value: 2 deg on Dec 17 18:00 Percentiles: P ₁ = 3 P ₁₀ = 5 Q ₁ = 6 Median = 10 Q ₃ = 17 P ₉₀ = 31 P ₉₉ = 79																	Hours in Service: 744 Hours of Data: 742 Hours of Missing Data: 2 Hours of Calibration: 0 Percent Operational Time: 99.7								
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Dec	24	10	15	29	8	5	8	5	8	10	10	11	10	7	6	4	5	8	8	8	6	6	6	8	29
2-Dec	26	19	13	9	7	8	7	11	41	66	91	30	79	81	92	21	30	12	11	15	10	21	16	19	92
3-Dec	12	19	25	19	25	15	28	23	13	14	19	25	26	46	27	15	25	11	12	22	25	60	95	17	95
4-Dec	8	7	7	8	9	8	4	5	6	3	6	15	22	29	23	8	7	6	3	3	3	5	5	4	29
5-Dec	6	9	10	9	27	11	13	8	18	UO	UO	11	8	10	6	6	10	19	29	10	66	44	64	7	66
6-Dec	21	27	39	52	31	11	27	53	15	26	11	41	18	7	5	7	6	13	48	16	22	59	48	33	59
7-Dec	22	49	31	74	21	35	25	21	20	13	19	14	6	14	8	11	21	20	31	28	26	18	44	44	74
8-Dec	63	47	50	43	45	31	28	24	19	27	15	13	9	4	4	12	12	26	6	6	6	9	8	7	63
9-Dec	7	15	13	15	18	13	13	3	5	8	9	8	4	4	9	8	6	8	8	14	10	7	6	11	18
10-Dec	17	43	9	8	4	12	11	8	11	12	7	8	37	8	9	13	12	13	17	14	15	11	14	11	43
11-Dec	11	10	11	11	10	10	12	7	6	10	6	5	10	16	14	7	7	7	8	6	7	5	5	8	16
12-Dec	5	5	5	5	4	3	5	5	6	12	15	11	14	6	6	9	7	8	6	5	5	5	5	4	15
13-Dec	5	4	5	16	21	7	5	9	5	3	3	4	4	4	5	3	3	20	23	22	14	23	22	35	35
14-Dec	16	10	10	12	5	7	8	5	6	7	8	33	62	21	13	35	17	21	21	38	6	4	9	14	62
15-Dec	6	7	7	4	3	4	5	5	9	8	7	21	14	12	9	8	9	7	7	11	11	23	21	23	
16-Dec	24	11	9	10	19	11	10	12	13	13	31	12	11	13	15	10	10	20	14	52	26	54	49	85	85
17-Dec	11	12	11	48	57	12	12	3	6	3	5	6	4	5	5	7	8	2	5	6	5	7	5	5	57
18-Dec	4	10	8	26	64	24	11	33	28	34	12	9	6	13	13	10	15	14	11	8	41	12	11	12	64
19-Dec	10	11	10	10	10	10	11	20	15	13	78	23	33	18	31	13	11	11	10	9	8	8	8	8	78
20-Dec	7	7	6	6	7	7	6	5	8	11	10	10	10	16	10	10	9	9	11	11	10	10	7	9	16
21-Dec	30	9	13	8	9	10	4	10	13	26	6	5	6	5	8	10	18	23	9	8	5	6	8	7	30
22-Dec	7	7	10	13	37	56	10	10	13	5	14	15	13	7	10	19	15	25	25	6	12	18	23	10	56
23-Dec	35	16	11	16	14	13	15	13	16	12	15	11	11	10	11	12	9	17	18	6	3	5	5	7	35
24-Dec	76	61	14	7	4	7	6	3	5	4	5	5	5	4	6	5	6	9	8	5	4	3	3	3	76
25-Dec	3	5	5	4	7	6	5	4	9	4	4	7	7	4	8	5	5	3	7	5	6	6	4	14	14
26-Dec	5	13	5	9	10	19	5	7	6	11	15	19	6	6	7	6	5	4	4	5	3	11	12	17	19
27-Dec	13	6	7	9	43	11	8	12	6	7	4	6	8	5	6	9	12	78	83	17	25	61	17	40	83
28-Dec	24	37	19	16	25	72	53	35	68	50	23	15	11	32	13	15	12	16	11	20	18	18	25	28	72
29-Dec	55	79	36	20	13	8	4	28	9	25	13	10	8	8	9	5	14	12	8	18	7	6	3	5	79
30-Dec	5	6	3	4	4	5	4	5	6	5	10	15	8	6	9	14	5	8	5	8	6	5	4	6	15
31-Dec	6	9	3	10	8	5	6	6	6	6	6	8	8	5	14	35	23	21	102	9	6	23	40	10	102
Diurnal Maximum																									
UO - Unstable Operation																									





Wood Buffalo Environmental Association
Summary of Hour Averages

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

Direction of Maximum Speed: 139 deg on Dec 20 04:00		Hours in Service:	744
Direction of Maximum Daily Speed Average: 141.8 deg on Dec 20		Hours of Data:	744
Direction of Minimum Speed: 113 deg on Dec 3 14:00		Hours of Missing Data:	0
Direction of Minimum Daily Speed Average: 4.0 deg on Dec 3		Percent Operational Time:	100.0
Monthly Average Direction: 191.5 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-Dec	250	247	229	214	189	175	154	149	162	165	157	157	166	159	155	152	159	170	169	171	155	164	162	170	169.9
2-Dec	171	165	165	171	167	158	155	158	158	156	132	148	165	153	167	153	286	346	348	335	338	342	336	342	162.2
3-Dec	346	325	345	6	2	352	321	8	356	347	346	313	111	113	337	349	352	344	342	344	335	6	213	155	345.6
4-Dec	172	167	161	157	160	148	154	159	169	178	197	221	230	224	217	194	205	205	163	164	162	158	155	154	176.5
5-Dec	153	142	165	148	161	149	139	168	185	170	157	157	157	151	150	159	186	201	263	234	240	226	230	176	175.1
6-Dec	230	230	236	239	243	241	239	234	237	231	237	236	242	242	240	224	219	221	195	196	191	221	249	231	232.2
7-Dec	230	239	234	237	226	226	218	221	216	180	204	201	169	146	188	214	228	243	248	250	248	245	236	229	227.1
8-Dec	243	240	234	240	238	237	238	233	227	239	226	210	192	205	184	193	216	233	222	207	179	167	194	172	218.0
9-Dec	177	196	212	210	217	215	207	176	164	156	164	166	150	150	165	165	168	166	161	157	159	154	148	140	169.4
10-Dec	138	154	145	152	156	150	160	156	157	153	158	168	234	242	252	263	274	276	280	310	303	305	308	314	245.9
11-Dec	324	321	314	309	299	290	277	260	256	249	244	242	232	203	170	155	159	162	163	156	157	160	165	166	246.6
12-Dec	168	165	169	165	169	168	164	160	161	157	158	158	150	155	153	152	150	149	156	153	154	161	165	176	158.3
13-Dec	171	191	194	221	208	154	179	168	172	166	164	157	157	158	175	185	188	184	203	184	193	215	205	224	182.8
14-Dec	263	283	271	259	255	257	262	257	253	256	263	264	249	212	218	221	232	239	244	228	163	163	165	151	246.1
15-Dec	171	171	156	159	160	161	176	167	153	143	162	182	193	185	180	182	187	193	190	192	195	189	210	232	179.7
16-Dec	240	253	261	263	286	305	290	278	268	306	345	21	10	10	14	7	11	8	0	40	3	345	205	289	295.8
17-Dec	359	355	348	345	133	134	139	165	190	178	160	155	156	162	153	159	164	153	154	152	153	153	150	155	152.9
18-Dec	175	210	224	242	250	247	257	242	237	248	252	256	249	259	287	278	290	293	294	289	327	6	15	14	272.9
19-Dec	3	355	346	343	340	351	10	27	55	83	104	83	63	350	93	105	117	123	130	131	133	133	131	133	95.5
20-Dec	133	135	138	139	138	135	135	136	136	134	138	139	137	149	147	155	153	152	152	156	153	148	150	193	141.8
21-Dec	249	258	261	258	263	255	243	230	221	164	151	152	149	153	151	148	156	159	163	173	168	168	177	163	203.2
22-Dec	163	171	163	165	153	154	149	145	159	170	173	174	179	165	150	164	163	174	172	167	172	181	233	244	171.6
23-Dec	242	250	254	275	277	276	277	273	264	267	264	263	267	268	275	278	266	262	242	259	253	247	243	263.1	
24-Dec	240	207	200	173	157	154	148	144	151	160	159	152	159	153	159	171	176	159	151	157	162	170	163	161	163.0
25-Dec	161	165	159	163	167	165	169	163	158	159	160	151	153	148	149	156	157	166	154	149	149	158	151	135	157.4
26-Dec	172	167	165	155	157	182	164	164	162	165	165	165	160	160	157	157	157	169	157	151	170	204	196	200	167.8
27-Dec	232	235	230	227	215	165	171	193	181	162	158	146	156	142	149	162	129	142	126	84	338	357	40	23	188.2
28-Dec	21	348	340	346	4	345	346	337	358	348	6	332	359	358	334	353	346	12	349	341	347	353	342	327	349.2
29-Dec	339	322	239	203	196	167	155	155	151	161	160	157	160	163	163	164	157	141	163	188	165	172	177	173	165.3
30-Dec	172	173	168	166	176	171	170	182	188	179	138	158	169	168	150	145	140	148	159	152	160	159	167	166	159.7
31-Dec	167	163	160	162	163	164	163	163	158	159	157	153	160	159	202	236	213	218	237	245	253	262	320	348	186.3

203.0 215.0 209.6 209.3 208.8 202.8 201.9 192.0 193.0 186.2 180.8 180.6 181.7 183.7 180.9 182.2 183.9 190.7 190.5 188.3 186.3 185.5 186.6 186.2
 Diurnal Average

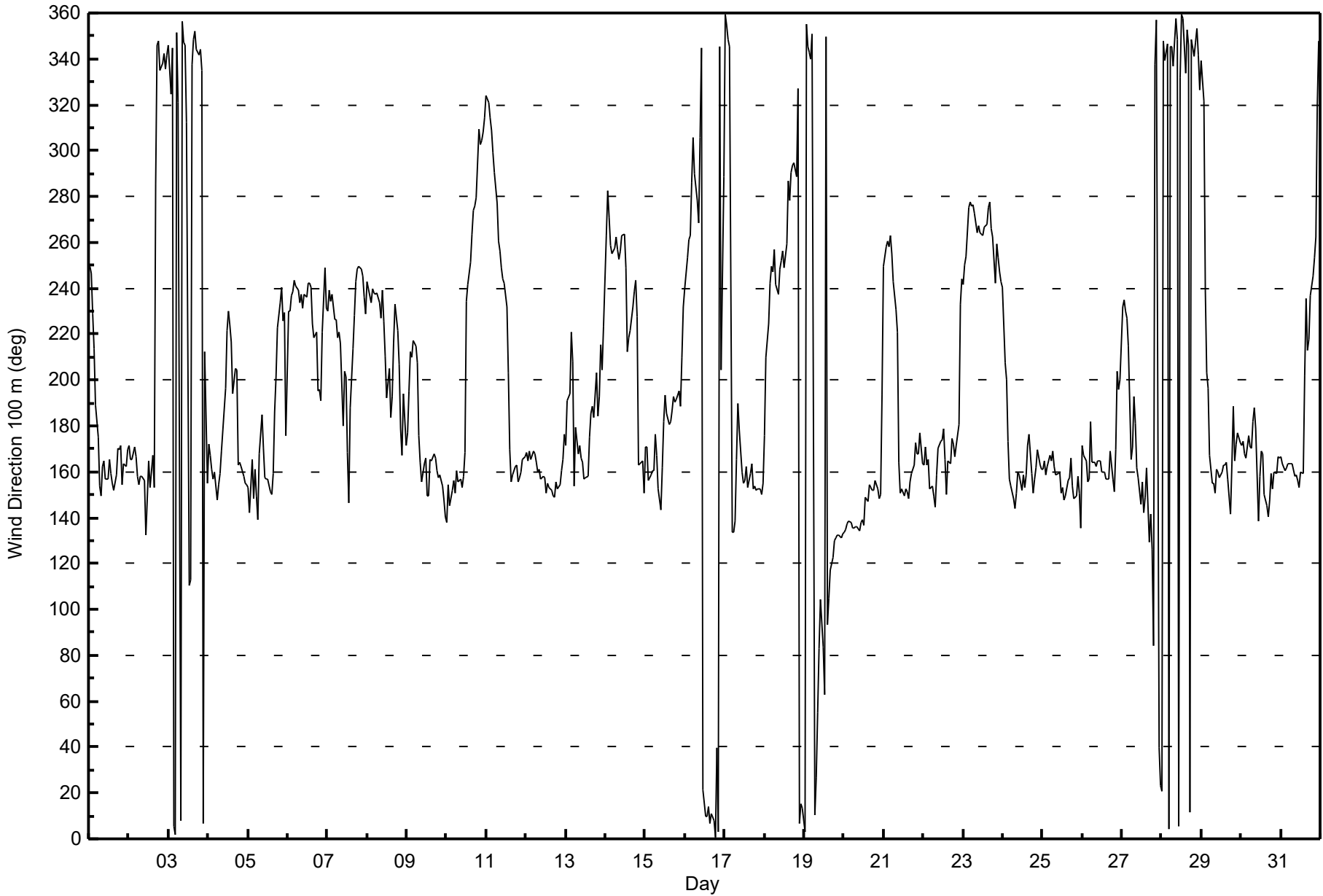
All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

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

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 89 deg on Dec 3 14:00																	Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0								
Minimum Value: 2 deg on Dec 7 22:00																									
Percentiles: P ₁ = 3 P ₁₀ = 4 Q ₁ = 6 Median = 8 Q ₃ = 12 P ₉₀ = 20 P ₉₉ = 55																									
Day	Hourly Period Ending At (MST)																							Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23		24
1-Dec	8	5	7	13	21	17	8	6	7	7	8	10	7	9	5	5	7	10	16	17	5	4	3	4	21
2-Dec	8	9	8	7	6	3	5	4	5	21	10	9	21	11	10	20	56	9	11	4	4	6	4	7	56
3-Dec	11	21	13	23	25	11	25	23	21	8	14	36	61	89	59	10	19	9	6	6	10	52	31	16	89
4-Dec	11	7	8	12	7	8	7	4	9	8	8	9	5	9	12	11	9	11	6	3	3	4	4	4	12
5-Dec	7	11	31	11	13	10	7	15	18	12	5	6	4	8	8	9	15	10	10	6	36	38	41	20	41
6-Dec	9	4	5	20	11	4	7	17	5	7	4	15	6	3	3	5	3	3	30	15	26	47	24	19	47
7-Dec	13	9	10	27	10	12	12	10	14	12	9	12	5	15	23	12	7	3	7	4	4	2	12	35	35
8-Dec	8	10	24	13	18	12	9	15	15	10	13	14	15	13	13	13	19	20	25	19	8	6	10	12	25
9-Dec	14	10	8	11	13	11	16	10	5	7	6	7	7	6	6	7	5	4	4	5	4	6	7	8	16
10-Dec	7	9	7	7	8	8	9	7	6	8	6	11	12	6	6	8	8	8	14	11	13	8	11	8	14
11-Dec	7	6	6	9	7	8	9	4	6	3	4	4	9	13	13	9	10	5	6	5	5	4	3	3	13
12-Dec	9	5	6	7	5	4	3	6	6	8	10	4	9	5	4	7	3	3	3	4	8	6	12	6	12
13-Dec	12	15	17	21	30	18	17	22	21	12	8	11	12	6	10	9	10	11	14	15	14	17	15	22	30
14-Dec	13	7	9	8	5	5	4	3	3	3	5	14	54	15	9	5	7	4	3	32	18	5	6	6	54
15-Dec	10	4	6	5	5	8	10	10	9	7	8	14	7	8	7	6	8	5	4	5	7	10	17	12	17
16-Dec	11	7	5	5	15	8	7	10	10	11	30	8	9	11	8	7	9	18	15	45	26	81	30	78	81
17-Dec	8	7	6	13	53	4	6	8	9	12	6	6	6	4	11	6	7	6	3	4	6	5	4	8	53
18-Dec	8	18	31	11	12	5	6	18	14	5	5	4	4	10	10	8	11	9	5	4	42	10	8	10	42
19-Dec	8	7	6	4	4	6	8	14	13	11	25	16	24	36	19	10	8	8	7	6	5	5	5	5	36
20-Dec	4	5	4	4	5	4	3	3	4	5	6	6	5	11	8	7	9	8	8	8	8	7	14	36	36
21-Dec	5	4	8	3	3	8	4	9	5	25	9	11	6	5	9	11	10	10	7	14	9	6	8	7	25
22-Dec	7	5	5	5	4	6	6	4	8	6	14	16	10	10	13	18	7	10	11	5	7	24	15	5	24
23-Dec	13	8	6	12	11	11	13	12	12	9	10	7	7	6	7	8	6	9	16	5	6	5	3	4	16
24-Dec	14	42	21	15	6	5	7	4	6	8	5	7	8	6	8	8	8	8	10	9	3	5	3	3	42
25-Dec	4	4	3	3	7	8	6	9	6	4	6	7	5	6	4	5	6	5	4	5	7	9	17	25	25
26-Dec	26	9	12	12	9	23	12	5	9	4	4	5	5	5	5	5	5	10	8	7	10	8	7	9	26
27-Dec	8	5	5	6	28	14	12	20	16	20	12	9	11	15	6	7	10	14	17	58	84	20	18	21	84
28-Dec	24	47	18	16	22	31	19	9	17	11	10	12	7	26	9	9	8	11	7	13	7	11	9	16	47
29-Dec	11	47	13	31	16	16	5	13	7	9	6	8	13	11	8	6	9	9	11	19	11	6	6	9	47
30-Dec	6	4	4	8	7	6	8	16	8	14	13	12	4	5	8	6	2	11	6	5	3	3	4	5	16
31-Dec	3	3	2	2	3	2	3	3	3	5	6	14	13	10	22	11	8	7	42	7	5	6	35	15	42
																	Diurnal Maximum								





Wood Buffalo Environmental Association
Summary of Hour Averages

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

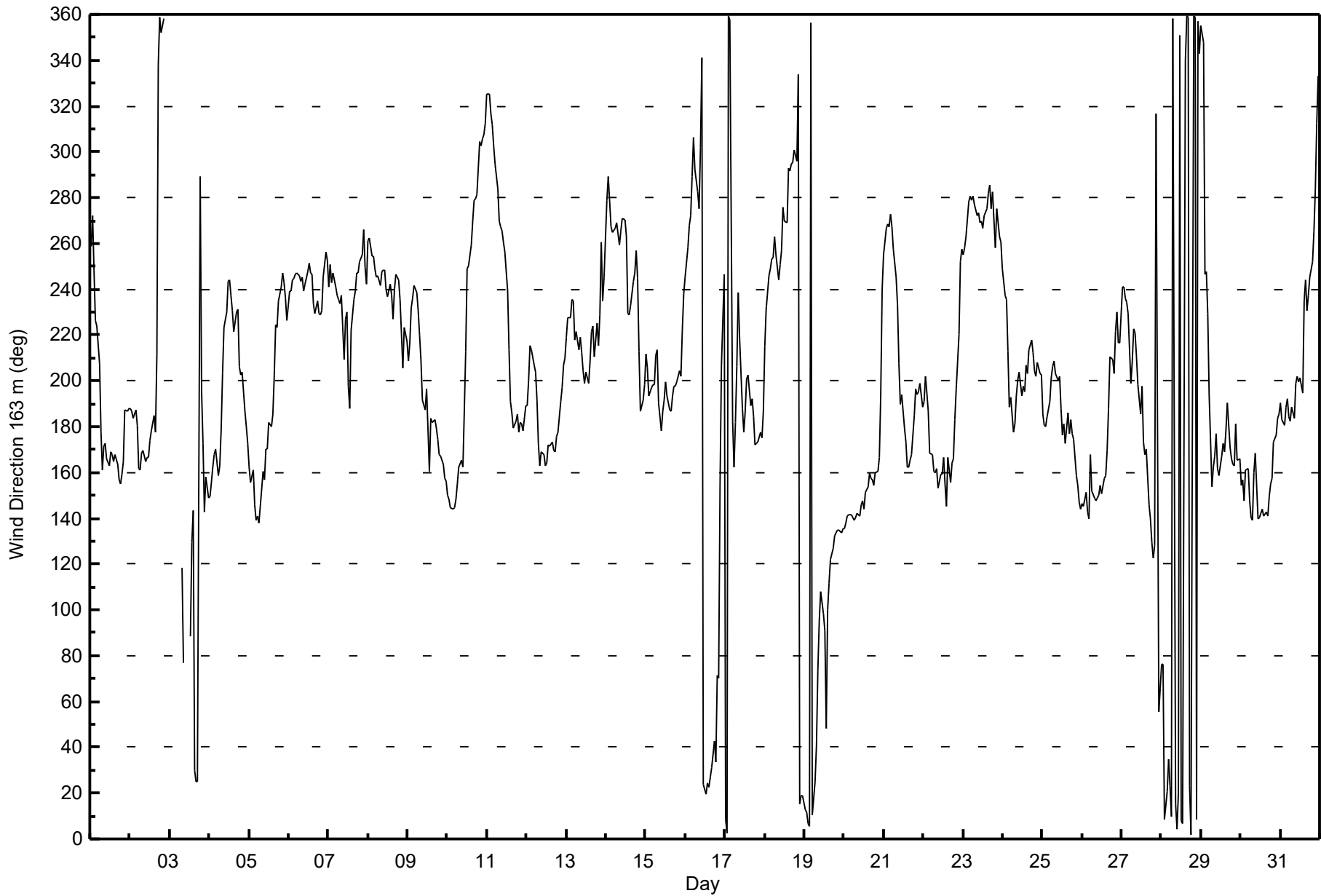
Direction of Maximum Speed: 142 deg on Dec 20 04:00																				Hours in Service: 744							
Direction of Maximum Daily Speed Average: 149.6 deg on Dec 20																				Hours of Data: 731							
Direction of Minimum Speed: 119 deg on Dec 3 08:00										Direction of Minimum Daily Speed Average: 12.6 deg on Dec 19										Hours of Missing Data: 13							
Monthly Average Direction: 209.7 deg																								Percent Operational Time: 98.3			
Day	Hourly Period Ending At (MST)																								Daily Average		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Dec	259	272	248	226	224	208	178	161	172	173	166	163	169	168	165	168	164	157	155	159	165	187	187	188	178.4		
2-Dec	188	187	184	188	181	162	161	168	169	165	167	166	174	178	185	178	212	338	359	352	358	UO	UO	UO	176.5		
3-Dec	UO	UO	UO	UO	UO	UO	UO	119	77	UO	UO	UO	89	129	143	30	25	25	289	196	173	143	158	149	--		
4-Dec	150	156	162	168	170	158	163	179	203	224	230	244	244	237	230	221	230	231	206	203	204	186	180	173	197.8		
5-Dec	162	156	161	146	139	141	138	145	160	157	170	170	182	180	186	202	225	223	235	241	247	243	236	226	186.9		
6-Dec	239	239	244	245	247	247	246	244	246	239	242	248	252	247	246	234	229	235	230	229	231	245	257	253	242.6		
7-Dec	241	250	243	247	241	237	236	234	237	209	227	230	198	188	222	236	239	247	247	252	255	266	249	242	241.1		
8-Dec	261	262	254	254	249	246	246	242	248	248	248	240	237	242	238	227	240	247	244	235	221	205	223	217	242.9		
9-Dec	209	217	232	236	241	238	231	220	209	191	187	196	179	160	184	182	183	180	175	168	167	163	158	156	191.1		
10-Dec	150	148	145	144	145	148	155	162	165	163	187	213	249	250	259	270	279	280	281	304	303	305	308	312	245.5		
11-Dec	325	325	317	312	303	295	284	270	267	265	260	256	239	214	191	186	180	182	186	177	182	181	178	189	258.5		
12-Dec	189	200	216	214	207	204	191	173	163	169	168	163	164	172	172	173	169	169	176	178	191	197	207	210	180.3		
13-Dec	219	227	228	235	235	218	221	214	219	212	205	199	204	199	209	222	224	211	225	215	229	260	235	246	220.6		
14-Dec	279	289	278	267	265	267	269	264	259	265	271	270	263	230	229	233	243	247	257	245	213	187	192	198	257.7		
15-Dec	211	206	194	197	198	198	211	214	190	178	187	191	200	194	188	187	193	198	198	200	204	202	222	238	198.9		
16-Dec	245	258	268	272	289	307	292	283	275	302	341	24	19	24	22	27	31	43	34	72	70	154	207	246	294.7		
17-Dec	9	2	359	357	182	162	182	206	239	218	188	177	187	201	202	189	192	184	172	173	173	178	175	187	185.5		
18-Dec	215	231	246	249	253	254	263	255	244	251	257	276	270	269	293	292	295	295	301	296	334	15	19	19	276.1		
19-Dec	13	11	6	6	356	10	25	41	74	95	108	98	91	48	100	112	122	127	133	133	135	135	133	135	99.5		
20-Dec	136	138	141	142	142	140	139	140	142	141	146	148	144	151	154	160	157	157	155	160	161	166	194	240	149.6		
21-Dec	255	266	268	267	273	268	258	245	233	207	190	194	179	173	163	162	165	168	185	196	194	196	199	189	218.7		
22-Dec	191	202	194	187	168	168	160	160	162	153	160	159	166	155	145	167	156	164	166	183	197	221	252	258	180.1		
23-Dec	255	258	263	278	281	279	281	277	272	274	269	270	267	272	275	282	285	275	282	258	275	269	263	260	271.8		
24-Dec	249	237	235	213	189	193	177	181	193	200	204	194	197	195	207	203	214	218	213	204	202	208	203	203	205.8		
25-Dec	185	181	180	184	191	201	206	209	203	200	202	188	176	182	173	186	177	183	177	174	159	154	147	144	182.0		
26-Dec	147	145	151	143	140	168	152	149	148	149	150	155	151	157	158	170	188	210	209	203	222	230	216	216	173.8		
27-Dec	241	241	236	234	229	199	209	223	221	211	198	186	198	173	168	170	146	140	129	123	128	317	56	66	206.5		
28-Dec	76	76	8	21	35	23	10	358	15	4	20	351	8	7	340	359	359	23	2	359	359	8	357	343	9.1		
29-Dec	355	348	246	248	229	194	154	162	167	177	162	159	167	173	169	178	190	171	166	164	163	181	165	166	173.9		
30-Dec	154	157	148	161	162	148	141	139	160	168	140	140	142	144	141	143	141	150	155	157	173	176	184	185	156.0		
31-Dec	190	183	180	188	192	184	182	188	184	199	202	200	201	195	235	244	231	238	245	252	266	284	312	333	219.4		
215.8	224.4	224.1	224.5	224.0	219.7	216.2	212.6	212.6	207.0	202.7	201.4	202.0	201.7	198.7	199.1	202.9	206.1	207.2	203.9	204.6	208.3	208.6	208.4				
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 163 m (WD163m) - deg
Lower Camp Met Tower - December 2023

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 92 deg on Dec 3 08:00 Minimum Value: 2 deg on Dec 30 15:00 Percentiles: P ₁ = 2 P ₁₀ = 4 Q ₁ = 5 Median = 6 Q ₃ = 9 P ₉₀ = 13 P ₉₉ = 49																	Hours in Service: 744 Hours of Data: 731 Hours of Missing Data: 13 Hours of Calibration: 0 Percent Operational Time: 98.3									
Day	Hourly Period Ending At (MST)																								Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Dec	7	6	13	11	9	18	10	7	4	4	4	4	5	3	2	4	5	6	4	5	4	4	3	18		
2-Dec	4	4	4	6	8	4	4	7	5	4	3	2	6	7	6	5	23	20	7	8	8	UO	UO	UO	23	
3-Dec	UO	UO	UO	UO	UO	UO	UO	92	28	UO	UO	UO	23	32	47	45	48	64	38	44	64	16	10	13	92	
4-Dec	8	8	3	4	3	4	5	6	13	8	8	4	3	6	4	4	5	12	7	7	10	5	4	13		
5-Dec	4	9	5	7	5	3	2	10	13	8	7	5	8	11	10	9	9	4	6	5	11	19	12	16	19	
6-Dec	6	3	3	4	4	3	4	5	3	5	4	5	3	3	5	3	3	12	8	14	21	10	18	21		
7-Dec	13	7	3	5	3	4	5	8	6	11	8	8	6	17	14	4	4	3	2	4	5	4	7	5	17	
8-Dec	9	7	9	6	5	3	2	4	4	3	3	6	5	4	7	6	7	8	6	8	7	7	6	11	11	
9-Dec	16	11	7	6	4	6	9	9	8	9	7	8	12	9	5	6	5	3	2	3	3	5	4	4	16	
10-Dec	6	5	4	6	5	5	6	5	6	8	7	15	8	5	6	5	5	6	10	10	11	7	9	8	15	
11-Dec	7	6	5	7	6	7	7	4	5	5	5	5	8	11	11	9	5	5	6	6	5	6	5	3	11	
12-Dec	6	8	7	10	9	9	5	16	4	5	5	4	4	3	3	5	3	4	7	6	5	7	3	16		
13-Dec	9	6	6	5	8	19	10	13	13	8	6	6	6	5	7	5	7	8	12	14	12	20	15	21	21	
14-Dec	13	5	9	7	4	4	3	3	3	2	3	5	23	15	8	4	4	2	7	9	22	11	7	9	23	
15-Dec	7	7	6	8	7	10	5	5	13	7	5	10	6	7	5	5	7	4	4	4	7	10	14	9	14	
16-Dec	8	6	4	4	11	6	6	7	7	9	28	9	8	11	8	8	6	26	24	19	19	64	13	61	64	
17-Dec	5	6	6	36	57	10	8	9	8	16	12	12	7	7	5	8	12	8	5	4	6	6	4	11	57	
18-Dec	9	10	6	3	4	5	5	15	6	3	4	6	6	8	7	7	8	5	3	2	44	10	6	8	44	
19-Dec	7	6	6	4	3	9	8	12	12	10	10	13	20	29	11	7	7	6	5	5	5	5	4	4	29	
20-Dec	3	4	4	4	5	4	3	4	4	4	6	6	5	8	6	6	7	7	7	7	7	9	17	8	17	
21-Dec	4	4	5	4	2	7	6	10	3	19	8	5	7	6	4	6	5	5	10	11	6	5	4	5	19	
22-Dec	5	4	5	8	3	3	4	3	3	4	5	9	8	9	8	6	7	4	4	8	9	19	7	7	19	
23-Dec	6	5	5	9	8	7	11	9	10	6	6	4	5	4	5	7	6	7	14	8	5	6	5	5	14	
24-Dec	7	7	6	11	11	6	8	8	8	6	6	6	6	9	8	7	7	8	9	19	10	4	6	6	7	19
25-Dec	9	5	5	4	6	10	8	7	13	7	7	8	9	12	9	11	7	6	8	10	5	4	7	7	13	
26-Dec	4	3	5	5	5	5	10	5	9	4	3	4	4	3	3	7	8	12	15	12	10	6	7	8	15	
27-Dec	5	4	4	5	11	6	7	9	6	13	11	11	6	23	12	5	13	6	7	4	60	46	13	7	60	
28-Dec	14	49	26	11	10	25	27	10	8	7	7	14	6	22	9	11	6	8	8	10	6	7	8	12	49	
29-Dec	15	46	11	10	7	31	7	4	5	8	4	3	3	5	5	9	8	4	5	4	13	14	4	6	46	
30-Dec	4	6	7	4	3	7	3	4	13	10	3	2	3	4	2	3	2	8	4	5	5	3	4	4	13	
31-Dec	3	2	5	5	6	6	5	7	7	11	13	26	21	13	12	5	5	5	14	5	11	6	24	10	26	
Diurnal Maximum																										
UO - Unstable Operation																										





Maximum Value: 0.9 km/h on Dec 13 04:00																				Maximum Daily Average: 0.0 km/h on Dec 3					Hours in Service: 744	
Minimum Value: -1.9 km/h on Dec 15 20:00																				Minimum Daily Average: -0.9 km/h on Dec 15					Hours of Data: 744	
Maximum Diurnal Average: -0.2 km/h at hour 24																				Minimum Diurnal Average: -0.4 km/h at hour 14					Hours of Missing Data: 0	
Monthly Average: -0.33 km/h																				Percentiles: P ₁ = -1.2 P ₁₀ = -0.9 Q ₁ = -0.6 Median = -0.3 Q ₃ = 0.0 P ₉₀ = 0.0 P ₉₉ = 0.3					Hours of Calibration: 0	
																									Percent Operational Time: 100.0	
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Dec	-0.2	0.0	0.0	0.1	0.1	0.0	0.0	0.0	-0.3	-0.5	-0.3	-0.3	-0.1	-0.2	-0.1	-0.4	-0.4	-0.2	0.0	-0.3	-0.4	-0.3	-0.3	-0.2	-0.2	0.1
2-Dec	-0.2	-0.2	-0.3	-0.1	-0.2	-0.5	0.2	-0.1	0.0	0.0	0.0	-0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	-0.1	0.0	-0.1	-0.2	-0.1	-0.1	0.2
3-Dec	-0.1	-0.1	0.0	-0.1	0.0	-0.2	-0.2	0.1	0.0	-0.1	0.0	0.0	0.3	0.0	0.0	0.0	-0.1	-0.2	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.3
4-Dec	0.0	-0.1	0.0	-0.1	0.0	-0.3	-0.5	-0.1	-0.4	-0.6	-0.3	0.1	-0.1	0.2	-0.1	0.0	0.3	-0.2	-0.2	-0.4	-0.4	-0.3	-0.3	-0.2	-0.2	0.3
5-Dec	-0.5	-0.4	-0.5	-0.5	-0.2	-0.3	-0.5	-0.1	-0.2	-0.4	-0.9	-0.4	-0.7	-0.4	-0.5	-0.7	-0.4	0.0	0.0	-0.2	0.1	-0.1	0.1	0.3	-0.3	0.3
6-Dec	0.1	-0.2	-0.1	0.0	0.0	-0.2	-0.2	0.0	-0.2	0.1	-0.1	-0.1	-0.6	-0.6	-0.9	-0.6	-0.4	-0.5	0.1	0.0	0.1	0.4	-0.2	-0.3	-0.2	0.4
7-Dec	-0.2	0.0	0.0	-0.1	0.0	-0.1	0.0	-0.1	-0.2	0.0	0.1	-0.1	-0.5	-0.1	-0.1	0.1	-0.2	-0.5	-0.2	-0.1	0.1	0.3	0.1	0.1	-0.1	0.3
8-Dec	0.1	0.1	0.1	-0.1	-0.1	-0.1	-0.1	-0.1	0.4	0.0	-0.2	-0.3	-0.2	-0.2	-0.4	-0.2	0.1	-0.1	0.1	0.3	-0.2	-0.3	-0.2	-0.2	-0.1	0.4
9-Dec	-0.1	0.2	0.1	0.4	-0.1	0.0	0.1	-0.3	-0.2	-0.3	-0.5	-0.9	-1.1	-0.9	-0.6	-0.3	-0.3	-0.6	-0.6	-0.4	-0.4	-0.4	-0.4	-0.3	-0.3	0.4
10-Dec	-0.1	-0.1	-0.1	-0.3	-0.5	-0.2	-0.5	-0.5	-0.7	-0.5	-0.9	-0.4	-0.2	-0.5	-0.6	-0.8	-1.1	-1.0	-1.0	-0.2	-0.4	-0.7	-0.3	-0.3	-0.5	-0.1
11-Dec	-0.1	-0.4	-0.4	-0.6	-0.5	-0.7	-0.9	-1.2	-1.2	-0.6	-0.6	-0.9	-0.6	-0.3	-0.3	-0.3	-0.1	-0.4	-0.3	-0.5	-0.5	-0.4	-0.4	-0.3	-0.5	-0.1
12-Dec	-0.4	-0.2	-0.1	-0.3	-0.5	-0.4	-0.4	-0.5	-0.5	-0.5	-0.3	-0.5	-0.6	-0.7	-0.5	-0.7	-0.5	-0.6	-0.6	-0.7	-0.9	-0.5	-0.3	-0.1	-0.5	-0.1
13-Dec	-0.3	-0.5	-0.3	0.9	0.7	-0.7	-0.3	-0.8	-0.9	-0.5	-0.6	-0.7	-0.2	-0.8	-0.4	-0.4	-0.5	-0.5	-0.2	-0.7	-0.3	0.0	-0.2	0.0	-0.3	0.9
14-Dec	-0.3	-0.6	-0.5	-0.7	-0.9	-0.9	-0.9	-1.1	-1.0	-1.2	-0.7	-0.4	-0.1	-0.4	-0.2	-0.1	-0.1	-0.2	-0.4	0.0	0.0	0.0	-0.2	0.0	-0.5	0.0
15-Dec	-0.4	-0.7	-0.7	-0.7	-0.9	-0.8	-0.6	-0.5	-1.0	-0.9	-0.8	-0.5	-0.4	-1.1	-1.0	-1.6	-1.4	-1.7	-1.9	-1.9	-1.5	-1.0	-0.5	-0.3	-0.9	-0.3
16-Dec	-0.3	-0.9	-0.7	-0.8	-0.8	-0.7	-0.8	-0.6	-0.9	-0.3	0.1	0.0	0.0	-0.2	0.1	0.0	0.0	0.1	-0.1	0.0	0.0	-0.1	-0.1	0.0	-0.3	0.1
17-Dec	-0.1	-0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	-0.3	-0.7	-0.6	-0.9	-0.6	-0.6	-0.4	-0.9	-0.9	-0.9	-0.8	-0.8	-1.0	-0.6	-0.4	0.0
18-Dec	-0.5	-0.2	-0.2	-0.2	-0.1	-0.2	-0.2	-0.4	0.1	0.1	-0.5	-1.0	-1.1	-0.4	-0.5	-0.7	-0.3	-0.2	-0.4	-0.7	-0.1	-0.1	0.1	0.1	-0.3	0.1
19-Dec	-0.1	-0.1	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	-0.3	-0.3	-0.7	-0.7	-0.6	-0.8	-1.0	-0.8	-0.2	0.1
20-Dec	-0.7	-0.9	-1.2	-1.3	-1.1	-0.8	-0.9	-0.7	-0.7	-0.4	-0.5	-0.5	0.1	-0.6	-0.9	-0.4	-0.8	-1.2	-0.8	-0.9	-1.0	-0.9	-0.6	-0.2	-0.7	0.1
21-Dec	-0.5	-0.8	-0.6	-0.7	-0.8	-0.6	-0.7	-0.5	-0.2	-0.1	-0.7	-0.6	-0.7	-0.6	-0.2	-0.3	0.0	0.1	0.0	-0.3	-0.6	-0.4	-0.3	-0.5	-0.4	0.1
22-Dec	-0.2	0.1	-0.3	0.0	0.0	0.0	0.1	0.1	0.0	-0.4	-0.2	-0.1	0.1	0.0	-0.1	0.0	0.0	-0.2	-0.1	-0.3	-0.3	-0.4	-0.2	-0.5	-0.1	0.1
23-Dec	-0.3	-0.3	-0.6	-0.8	-0.9	-0.9	-0.6	-0.8	-0.6	-0.9	-0.6	-0.9	-0.9	-0.8	-0.8	-0.7	-0.4	-0.4	-0.3	-0.6	-1.2	-1.0	-0.6	-0.5	-0.7	-0.3
24-Dec	0.0	0.1	0.1	0.0	-0.5	-0.3	-0.6	-0.7	-0.3	-0.9	-0.5	-0.3	-0.4	-0.4	-0.5	-0.6	0.1	0.0	-0.1	-0.1	-0.5	-0.9	-0.6	-0.5	-0.4	0.1
25-Dec	-0.4	-0.5	-0.6	-0.7	-0.7	-0.4	-0.3	-0.4	-0.7	-0.6	-0.4	-0.6	-0.9	-0.9	-1.1	-1.0	-1.0	-0.8	-0.5	0.0	-0.7	-0.5	-0.6	-0.4	-0.6	0.0
26-Dec	-0.2	-0.4	-0.6	-0.3	-0.2	0.1	0.0	0.1	0.1	0.3	0.3	0.3	-0.2	-0.1	-1.1	-1.0	-0.9	-0.6	-1.0	-0.9	-0.4	0.1	-0.4	-0.4	-0.3	0.3
27-Dec	-0.8	-1.0	-1.1	-0.6	0.0	-0.4	-0.2	0.1	-0.2	-0.5	-0.5	-0.8	-0.5	-0.3	-0.5	-0.2	0.0	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	-0.3	0.1
28-Dec	0.0	-0.1	-0.1	-0.1	-0.1	0.0	-0.1	0.0	0.0	0.0	-0.1	-0.3	0.0	-0.1	-0.1	0.0	0.0	0.0	0.0	-0.1	0.0	0.0	0.0	-0.1	0.0	0.0
29-Dec	0.0	-0.1	-0.1	0.0	-0.1	-0.2	-0.4	-0.1	-0.2	-0.2	-0.3	-0.4	-0.6	-0.5	-0.4	-0.4	-0.1	0.0	-0.2	0.0	0.0	0.3	0.0	0.0	-0.2	0.3
30-Dec	-0.3	-0.1	-0.3	-0.3	-0.2	-0.1	0.0	0.0	-0.2	-0.1	-0.2	-0.4	-0.4	-0.4	-0.7	-0.2	-0.4	-0.1	-0.1	0.0	0.1	-0.3	-0.1	-0.3	-0.2	0.1
31-Dec	0.0	0.1	-0.3	-0.5	-0.7	-0.8	-0.6	-0.6	-0.6	-0.5	-1.0	-0.8	-0.8	-0.8	-0.4	0.0	0.0	0.2	0.0	-0.5	-0.8	-0.6	-0.1	-0.1	-0.4	0.2
																								Diurnal Average		
																								Diurnal Maximum		



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

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

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0																				Hours in Service: 744					
Maximum Value: 4.8 km/h on Dec 10 19:00																				Hours of Data: 744					
Minimum Value: 0.1 km/h on Dec 3 22:00																				Hours of Missing Data: 0					
Percentiles: P ₁ = 0.2 P ₁₀ = 0.6 Q ₁ = 0.8 Median = 1.2 Q ₃ = 1.7 P ₉₀ = 2.5 P ₉₉ = 4.0																				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-Dec	0.5	0.4	0.4	0.6	0.4	0.6	0.5	0.6	0.9	1.0	1.0	1.1	1.4	1.4	1.1	1.3	0.7	0.7	0.5	0.7	0.7	1.5	2.1	2.1	2.1
2-Dec	2.3	0.8	0.9	0.8	1.0	1.7	1.7	1.5	1.3	0.7	0.4	0.3	0.3	0.3	0.2	0.3	0.5	0.3	0.6	0.9	0.7	0.5	0.4	2.3	
3-Dec	0.8	0.8	0.8	0.7	0.7	0.9	0.7	0.7	0.8	1.0	0.8	0.8	0.8	0.6	0.8	1.0	0.9	0.6	0.3	0.1	0.2	0.1	0.2	0.2	1.0
4-Dec	0.3	0.8	0.6	0.7	0.7	1.4	1.3	1.3	1.0	1.3	1.5	1.3	1.4	1.4	1.3	0.7	0.7	0.7	0.8	0.9	1.3	1.2	1.1	1.2	1.5
5-Dec	1.1	1.0	1.0	1.4	0.9	1.2	1.1	0.9	0.7	0.9	1.5	1.5	1.9	1.4	1.3	2.1	1.4	0.9	1.7	2.3	1.5	1.1	1.0	0.8	2.3
6-Dec	1.2	1.4	1.1	1.2	0.9	0.8	1.5	1.2	0.9	0.9	0.8	1.0	1.9	2.0	1.9	1.5	1.4	1.8	0.6	0.4	0.8	1.4	1.3	1.2	2.0
7-Dec	0.9	1.1	1.1	1.3	1.0	0.7	0.8	0.9	1.0	0.6	0.8	0.9	1.2	0.6	0.7	0.8	0.8	1.2	1.0	0.9	1.5	1.9	1.3	1.0	1.9
8-Dec	0.9	1.4	1.5	1.4	1.2	1.3	1.1	0.9	0.9	0.7	0.9	1.2	1.0	0.7	0.7	0.8	0.8	1.1	0.4	0.5	0.5	1.0	0.9	0.9	1.5
9-Dec	0.7	0.9	0.9	1.2	1.0	0.9	0.7	1.2	1.0	1.2	1.7	1.4	1.8	1.5	1.2	1.0	0.8	1.1	1.3	1.3	1.2	1.0	0.8	0.7	1.8
10-Dec	0.6	0.8	1.3	0.8	0.8	1.0	0.8	1.3	1.2	1.6	1.7	1.4	1.1	2.0	2.1	2.6	3.4	4.4	4.8	2.5	3.6	3.2	3.6	2.7	4.8
11-Dec	2.2	2.5	3.0	2.6	2.9	3.7	3.5	3.2	3.0	2.3	2.4	2.1	1.6	0.7	0.7	1.0	1.2	1.3	0.9	1.3	1.5	1.5	0.8	1.2	3.7
12-Dec	1.0	0.9	1.1	1.2	1.4	1.4	1.7	1.3	1.3	1.5	1.9	1.4	1.5	2.3	2.3	2.2	2.7	2.9	2.8	2.4	1.6	1.1	2.1	1.7	2.9
13-Dec	1.9	1.7	1.6	1.8	1.5	1.7	1.2	1.2	1.6	1.3	1.5	1.4	1.7	2.0	1.9	1.0	1.2	1.5	1.5	1.6	1.4	1.2	1.5	1.0	2.0
14-Dec	1.0	1.7	1.8	2.0	1.5	1.7	2.8	2.1	2.7	3.0	2.5	1.4	1.5	0.9	0.8	0.9	0.8	0.9	0.9	0.5	0.6	1.1	1.1	1.1	3.0
15-Dec	1.0	1.1	1.4	1.5	1.3	1.6	1.7	1.6	2.0	1.6	2.1	1.9	1.9	2.1	1.8	2.3	1.9	2.7	2.6	2.6	2.3	1.9	2.0	1.8	2.7
16-Dec	1.5	2.8	2.7	2.6	3.6	3.5	3.5	3.3	3.5	2.0	2.5	1.7	2.0	1.4	1.3	1.0	1.1	0.9	1.3	0.6	0.6	0.4	0.2	0.8	3.6
17-Dec	1.4	1.8	1.1	0.4	0.2	0.2	0.2	0.3	0.6	1.4	1.5	1.9	1.5	1.7	1.7	1.4	1.3	1.6	1.4	1.6	1.3	1.3	2.0	1.5	2.0
18-Dec	1.3	0.9	0.8	1.1	1.3	1.3	2.0	1.2	1.6	1.5	2.6	2.8	2.5	3.0	2.5	2.5	1.6	2.0	2.0	2.4	3.0	2.5	2.8	2.6	3.0
19-Dec	2.0	1.7	1.2	0.9	0.3	0.3	0.5	0.8	0.6	0.7	0.9	1.1	1.1	0.8	1.3	1.6	2.2	2.4	2.8	3.1	3.3	3.1	3.5	3.7	3.7
20-Dec	4.0	3.9	4.1	4.5	4.4	4.0	3.9	4.2	3.8	3.2	3.1	3.1	2.9	1.5	2.0	1.8	1.6	2.2	2.1	2.0	2.2	2.7	2.2	0.9	4.5
21-Dec	1.8	2.5	1.7	1.8	2.4	1.4	1.2	1.4	1.2	0.9	1.5	1.6	1.5	1.2	1.0	1.0	1.0	0.5	0.6	1.0	0.8	0.7	0.8	0.8	2.5
22-Dec	0.8	0.8	1.9	1.4	0.3	0.4	0.7	1.3	1.2	1.6	1.2	0.8	0.6	0.7	0.8	0.4	0.7	0.8	0.6	1.3	1.4	1.0	1.5	1.8	1.9
23-Dec	1.6	1.9	1.9	3.0	3.2	3.4	2.9	3.3	2.2	2.7	2.8	3.7	3.5	3.4	3.0	2.3	2.0	1.5	1.2	0.9	1.8	2.0	1.6	1.8	3.7
24-Dec	1.1	0.7	0.8	0.9	1.3	1.7	1.7	1.9	1.4	1.5	1.6	2.1	1.3	1.0	1.0	0.7	0.6	0.4	0.6	0.8	0.9	1.2	1.6	1.4	2.1
25-Dec	1.2	1.0	1.4	1.4	1.5	1.3	1.5	2.4	1.8	1.7	2.2	1.8	1.8	2.3	2.0	1.8	1.2	1.5	1.7	1.5	1.1	0.8	1.2	1.3	2.4
26-Dec	0.9	1.0	1.3	1.5	0.7	0.3	0.6	0.9	0.9	1.5	1.5	1.5	1.6	1.7	1.6	1.9	2.0	1.6	1.6	1.7	1.5	1.1	1.9	2.0	2.0
27-Dec	2.1	2.6	2.3	2.0	1.6	1.1	0.7	0.7	0.8	1.0	1.2	1.8	1.2	1.5	1.5	0.9	0.6	0.5	0.2	0.3	0.3	0.2	0.2	0.3	2.6
28-Dec	0.3	0.2	0.2	0.3	0.2	0.5	0.3	0.2	0.3	0.3	0.6	1.0	1.1	1.3	1.4	0.7	0.6	0.7	1.0	0.6	0.7	0.6	0.4	0.4	1.4
29-Dec	0.2	0.4	0.8	0.7	0.8	0.7	1.0	0.9	1.5	1.4	1.3	1.1	1.4	1.3	1.1	0.8	0.9	0.2	0.4	0.2	0.4	0.6	0.6	0.6	1.5
30-Dec	0.7	0.5	0.7	1.2	0.8	0.8	1.0	1.1	0.7	1.1	1.2	1.2	0.8	1.0	1.1	0.8	1.1	0.7	0.7	0.8	1.2	1.0	0.9	0.7	1.2
31-Dec	1.3	2.0	2.2	1.9	1.9	1.7	1.1	1.2	1.4	1.1	1.6	1.7	1.9	2.3	1.8	1.5	1.2	1.4	1.4	1.5	1.9	2.5	1.1	0.5	2.5
4.0 3.9 4.1 4.5 4.4 4.0 3.9 4.2 3.8 3.2 3.1 3.7 3.5 3.4 3.0 2.6 3.4 4.4 4.8 3.1 3.6 3.2 3.6 3.7																									
Diurnal Maximum																									



Maximum Value: 1.8 km/h on Dec 7 22:00		Maximum Daily Average: 0.8 km/h on Dec 20		Hours in Service: 744																						
Minimum Value: -1.3 km/h on Dec 10 19:00		Minimum Daily Average: -0.3 km/h on Dec 23		Hours of Data: 742																						
Maximum Diurnal Average: 0.3 km/h at hour 24		Minimum Diurnal Average: 0.1 km/h at hour 6		Hours of Missing Data: 2																						
Monthly Average: 0.24 km/h		Percentiles: P ₁ = -1.0 P ₁₀ = -0.2 Q ₁ = 0.0 Median = 0.2 Q ₃ = 0.5 P ₉₀ = 0.8 P ₉₉ = 1.3		Hours of Calibration: 0																						
				Percent Operational Time: 99.7																						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Dec	-0.3	0.1	0.2	0.3	0.7	0.8	0.5	0.6	0.1	-0.2	0.2	0.1	0.3	0.6	0.8	0.9	-0.2	-0.1	0.2	0.0	0.0	0.8	1.1	1.5	0.4	1.5
2-Dec	1.0	-0.1	-0.1	0.2	0.3	0.0	1.7	1.0	1.2	0.2	0.1	0.0	0.1	0.0	0.1	0.1	0.0	0.0	-0.1	-0.1	0.0	0.1	-0.2	-0.1	0.2	1.7
3-Dec	-0.2	-0.2	0.2	0.0	0.0	-0.1	-0.2	0.2	0.0	-0.1	0.2	0.0	0.1	-0.1	0.0	-0.1	-0.1	-0.2	-0.1	0.0	0.0	0.0	0.1	0.2	0.0	0.2
4-Dec	0.4	0.5	0.5	0.5	0.4	0.5	0.3	0.8	0.3	0.1	0.7	0.6	0.1	0.2	0.3	0.6	0.6	1.2	0.7	0.4	0.2	0.4	0.4	0.2	0.5	1.2
5-Dec	0.2	0.1	0.2	0.1	0.1	0.2	0.3	0.6	0.1	UO	UO	0.4	0.6	0.4	0.6	0.6	0.7	0.4	0.3	0.6	0.2	0.2	0.2	1.0	0.4	1.0
6-Dec	0.3	0.3	0.2	0.2	0.0	-0.2	0.3	-0.1	-0.1	0.2	0.0	-0.2	0.2	0.2	0.1	0.3	0.4	0.6	0.5	0.4	0.6	0.4	-0.1	0.1	0.2	0.6
7-Dec	0.3	0.6	0.2	-0.1	0.1	0.1	0.2	0.0	-0.2	0.4	0.4	0.3	0.3	0.2	0.6	0.8	0.2	0.0	0.0	0.5	1.3	1.8	0.9	0.3	0.4	1.8
8-Dec	0.3	0.6	1.2	0.7	0.1	-0.2	-0.1	0.1	0.7	0.3	0.0	0.0	0.3	0.3	0.3	0.5	0.6	0.4	0.9	1.0	0.3	0.6	0.9	0.5	0.4	1.2
9-Dec	0.5	0.2	0.0	0.5	0.1	0.3	0.8	0.7	0.7	0.5	0.7	0.4	0.6	0.7	0.6	0.7	0.5	0.3	0.0	-0.1	0.1	0.1	0.1	0.1	0.4	0.8
10-Dec	0.2	0.2	0.6	0.1	0.3	0.7	0.0	0.1	-0.3	0.4	0.4	0.3	0.2	0.3	-0.2	-0.4	-0.9	-1.1	-1.3	-0.8	-0.7	-1.2	-1.2	-1.0	-0.2	0.7
11-Dec	-0.7	-0.9	-0.9	-0.9	-1.0	-0.9	-0.8	-0.5	-0.3	0.7	0.6	0.1	0.3	0.2	0.3	0.7	0.8	0.5	0.5	0.3	0.6	0.5	0.0	0.5	0.0	0.8
12-Dec	0.2	0.3	0.4	0.2	0.2	0.3	0.3	-0.1	0.0	0.1	0.7	-0.1	-0.5	0.0	0.3	0.3	0.1	0.3	0.4	0.0	-0.2	0.2	1.0	0.9	0.2	1.0
13-Dec	1.2	0.7	0.9	1.6	1.0	0.4	0.8	0.2	0.2	0.4	0.1	0.1	0.8	0.5	1.3	0.4	0.5	-0.3	0.6	-0.6	0.2	0.5	0.2	0.3	0.5	1.6
14-Dec	0.0	-0.4	-0.3	-0.2	-0.1	-0.2	-0.6	-0.5	-0.6	-0.4	-0.3	0.1	0.0	0.1	0.5	0.4	0.6	0.1	0.4	0.2	0.6	0.6	0.9	0.7	0.1	0.9
15-Dec	0.8	0.1	0.0	0.3	-0.1	-0.2	0.5	0.5	-0.2	-0.1	0.2	0.6	0.3	0.0	-0.1	-0.3	0.0	-0.1	-0.1	-0.2	-0.2	-0.1	0.3	0.1	0.1	0.8
16-Dec	0.0	-0.4	-0.4	-0.6	-1.0	-1.1	-1.2	-0.7	-0.7	-0.7	-0.3	-0.1	0.0	-0.1	0.2	0.1	0.0	0.1	-0.2	0.0	0.0	0.0	0.0	0.1	-0.3	0.2
17-Dec	-0.1	-0.2	-0.1	-0.1	0.1	0.4	0.3	0.7	0.8	0.5	0.3	-0.3	0.2	0.4	0.4	0.6	0.7	-0.3	-0.3	-0.1	-0.2	-0.2	-0.1	0.1	0.1	0.8
18-Dec	0.4	0.7	0.8	0.3	0.1	0.0	0.3	0.1	0.3	0.3	-0.2	-0.4	0.0	-0.5	-0.4	-0.8	-0.2	-0.4	-0.4	-0.6	-0.2	-0.1	0.1	0.1	0.0	0.8
19-Dec	0.2	-0.1	0.0	-0.2	-0.1	-0.1	-0.1	0.1	0.0	0.1	0.1	0.4	0.2	0.0	0.4	0.3	0.3	0.3	0.4	0.5	0.6	0.6	0.5	0.6	0.2	0.6
20-Dec	0.7	0.6	0.8	1.0	1.0	0.8	0.8	1.3	1.2	0.8	1.3	1.5	1.0	0.5	1.0	0.8	0.3	0.6	0.8	0.4	0.4	0.4	0.3	0.2	0.8	1.5
21-Dec	-0.2	-0.3	-0.4	-0.2	-0.4	-0.1	0.1	0.6	0.8	0.8	0.2	0.0	0.4	0.4	0.4	0.2	0.6	0.3	0.3	0.5	0.4	0.2	0.3	0.2	0.2	0.8
22-Dec	0.7	1.0	1.3	1.0	0.2	0.2	0.6	0.6	0.7	0.3	0.7	0.4	0.8	0.7	0.5	0.1	0.6	0.2	0.1	0.4	0.5	0.3	0.3	0.3	0.5	1.3
23-Dec	0.3	0.1	-0.3	-0.7	-0.8	-0.9	-0.4	-0.7	-0.2	-0.7	-0.5	-0.6	-0.7	-0.8	-0.8	-0.7	-0.2	-0.2	-0.1	0.0	-0.2	0.0	0.4	0.7	-0.3	0.7
24-Dec	0.4	0.4	0.5	1.1	0.3	0.4	0.6	1.0	0.7	0.2	0.2	0.4	-0.1	0.1	0.2	0.3	0.6	0.5	0.7	0.9	0.5	0.1	0.5	0.5	0.5	1.1
25-Dec	0.5	0.2	0.1	0.0	0.0	0.2	0.7	0.8	0.4	0.3	1.3	0.1	-0.4	0.4	0.2	0.1	0.4	0.3	0.6	0.8	-0.2	0.0	0.2	0.3	0.3	1.3
26-Dec	0.6	0.1	0.0	0.3	0.3	0.1	0.8	1.2	1.1	1.3	1.0	1.2	0.5	0.9	0.4	0.5	0.7	0.4	-0.2	-0.2	0.6	0.9	0.8	0.9	0.6	1.3
27-Dec	0.3	0.2	0.1	0.2	0.5	-0.2	0.2	0.4	0.6	0.3	0.2	0.3	0.2	0.4	1.0	0.8	0.5	0.3	0.2	0.0	0.0	0.0	0.0	0.0	0.3	1.0
28-Dec	0.0	-0.1	-0.1	-0.1	-0.1	0.0	-0.1	0.0	0.1	0.0	-0.1	-0.5	0.0	0.0	-0.2	-0.1	-0.1	0.1	0.0	-0.2	-0.1	0.0	-0.1	-0.1	-0.1	0.1
29-Dec	0.0	0.0	0.1	0.5	0.5	0.4	0.3	0.4	0.4	0.5	0.1	0.1	-0.2	0.0	0.2	0.4	0.5	0.2	0.2	0.3	0.6	1.2	0.7	0.6	0.3	1.2
30-Dec	0.2	0.4	0.2	0.7	0.2	0.6	0.8	0.7	0.7	0.6	0.3	0.2	0.1	0.2	0.1	0.5	0.3	0.6	0.5	1.2	1.4	0.7	0.6	0.7	0.5	1.4
31-Dec	1.1	1.5	1.4	1.1	0.9	0.7	0.0	0.1	0.1	0.1	0.1	-0.1	0.8	0.9	0.5	0.2	0.2	0.4	-0.1	-0.2	-0.1	0.6	0.1	0.0	0.4	1.5
																								Diurnal Average		
																								Diurnal Maximum		
UO - Unstable Operation																										



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

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

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 5.1 km/h on Dec 10 19:00 Minimum Value: 0.1 km/h on Dec 3 22:00 Percentiles: P ₁ = 0.2 P ₁₀ = 0.5 Q ₁ = 0.7 Median = 1.0 Q ₃ = 1.5 P ₉₀ = 2.4 P ₉₉ = 3.6																						Hours in Service: 744 Hours of Data: 742 Hours of Missing Data: 2 Hours of Calibration: 0 Percent Operational Time: 99.7			
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Dec	0.7	0.6	0.6	0.9	0.7	0.6	0.5	0.6	1.0	1.0	0.9	1.0	1.1	0.9	0.8	0.9	0.8	0.8	0.7	0.7	0.6	1.2	1.1	1.2	1.2
2-Dec	1.7	1.2	1.1	1.2	1.0	1.3	1.0	1.1	1.4	0.9	0.5	0.3	0.4	0.4	0.3	0.3	0.4	0.4	0.5	0.8	0.7	0.7	0.5	0.5	1.7
3-Dec	0.7	0.7	0.9	0.6	0.6	0.8	0.6	0.7	0.7	0.8	0.8	0.7	0.6	0.5	0.6	0.9	0.8	0.5	0.3	0.2	0.2	0.1	0.2	0.3	0.9
4-Dec	0.4	0.8	0.5	0.7	0.8	1.0	0.9	0.9	0.9	0.8	0.9	1.1	1.4	1.7	1.6	0.9	1.0	0.6	0.5	0.6	0.7	0.7	0.6	0.7	1.7
5-Dec	0.7	1.0	0.7	1.0	0.7	0.6	0.9	0.7	0.6	UO	UO	1.1	1.0	1.0	0.6	1.3	1.2	1.4	1.8	2.8	1.7	1.6	1.2	0.9	2.8
6-Dec	1.4	1.3	1.5	1.7	1.4	1.1	1.7	1.9	1.2	1.0	0.8	1.3	1.7	1.6	1.4	1.6	1.6	2.1	0.9	0.7	1.3	1.7	1.9	1.5	2.1
7-Dec	1.2	1.4	1.5	1.7	1.3	1.1	1.3	1.2	1.3	0.7	0.7	0.8	0.6	0.5	0.7	1.1	1.1	1.2	1.3	1.2	2.1	1.9	2.0	1.3	2.1
8-Dec	1.6	2.0	2.0	2.0	1.5	1.6	1.4	1.1	1.3	0.9	1.1	1.2	0.7	0.5	0.5	0.8	1.1	1.5	0.7	0.7	0.6	0.7	0.8	0.9	2.0
9-Dec	0.7	0.9	1.2	1.3	1.6	1.2	0.9	0.7	0.8	1.0	1.2	1.0	0.9	0.8	1.1	0.8	0.7	0.9	1.0	1.2	0.9	0.6	0.5	0.6	1.6
10-Dec	0.7	0.7	1.1	0.9	0.6	0.9	1.0	1.1	1.5	1.6	1.3	0.9	1.1	1.8	2.0	2.7	3.9	4.9	5.1	2.5	3.9	3.5	3.5	2.9	5.1
11-Dec	2.5	2.6	3.1	3.0	2.9	3.3	3.3	2.6	2.0	2.2	1.7	1.5	1.4	0.9	0.7	0.7	0.9	0.9	0.9	0.9	0.9	0.9	0.5	0.9	3.3
12-Dec	0.6	0.7	0.9	1.0	0.9	0.8	1.1	1.0	0.8	1.2	1.4	1.2	1.5	1.5	1.3	1.3	1.6	2.3	1.5	1.5	1.0	0.7	1.4	0.9	2.3
13-Dec	1.0	1.2	1.3	1.8	1.8	1.2	1.0	1.2	1.5	0.9	1.2	1.0	1.1	1.1	1.2	0.6	0.8	2.0	2.0	1.9	2.2	1.5	1.8	1.6	2.2
14-Dec	1.2	1.5	1.4	1.7	1.2	1.5	2.3	1.7	2.2	2.7	2.3	1.8	1.8	1.2	1.1	1.1	1.2	0.6	1.0	1.3	0.7	0.5	1.0	1.1	2.7
15-Dec	0.9	1.1	1.0	1.0	1.1	1.3	1.1	1.0	1.0	1.0	1.1	1.7	2.1	2.5	2.2	2.5	2.4	3.0	3.0	3.0	2.7	2.4	2.4	2.1	3.0
16-Dec	1.7	2.8	2.6	2.5	3.8	3.6	3.3	3.4	3.9	2.1	2.3	1.6	1.7	1.3	1.1	0.8	1.0	0.9	1.0	0.7	0.7	0.4	0.2	0.6	3.9
17-Dec	1.1	1.5	1.0	0.4	0.3	0.3	0.4	0.4	0.6	0.8	0.9	1.3	0.9	0.8	0.8	0.6	0.8	0.6	0.8	1.0	1.0	1.1	1.3	0.9	1.5
18-Dec	0.7	0.6	0.6	1.1	1.0	1.7	2.2	1.1	1.7	1.6	2.6	2.2	1.9	3.1	2.6	2.2	1.8	2.4	1.9	2.1	2.7	2.3	2.2	2.2	3.1
19-Dec	1.8	1.5	1.3	0.9	0.4	0.4	0.5	0.7	0.6	0.7	1.0	1.3	1.0	0.8	1.3	1.5	1.9	2.3	2.3	2.5	2.6	2.5	2.7	2.8	2.8
20-Dec	3.0	2.8	2.5	3.0	3.2	2.9	2.6	2.6	2.9	2.8	2.5	2.5	2.5	1.6	1.9	2.1	1.7	2.2	2.3	2.3	2.5	2.5	1.7	1.0	3.2
21-Dec	1.6	2.2	1.9	1.6	2.3	1.1	0.9	1.4	1.5	1.0	0.9	1.1	1.1	0.9	1.2	1.2	1.4	0.8	0.8	1.0	0.9	0.9	1.1	1.0	2.3
22-Dec	1.0	0.8	0.8	1.2	0.4	0.6	0.9	1.4	1.3	1.0	0.9	0.8	0.7	0.6	0.7	0.6	0.8	1.0	0.7	0.9	1.1	1.0	1.8	1.6	1.8
23-Dec	1.9	2.2	2.0	3.4	3.5	3.8	3.3	3.5	2.3	3.0	3.1	3.7	3.5	3.4	3.0	2.4	1.9	1.7	1.3	0.6	0.8	1.2	1.2	1.5	3.8
24-Dec	1.4	1.1	1.0	0.7	0.9	1.4	0.8	0.9	1.0	0.9	0.9	1.3	0.7	0.6	0.7	0.6	0.4	0.6	0.8	0.9	0.7	0.6	0.6	0.8	1.4
25-Dec	0.7	0.9	1.0	0.8	0.8	1.0	0.8	1.2	1.0	1.1	1.2	1.3	0.8	1.0	0.9	1.2	0.7	0.6	1.1	1.2	0.8	0.7	0.8	1.0	1.3
26-Dec	0.7	0.8	0.7	1.1	0.5	0.4	0.6	0.5	0.6	0.8	1.4	1.3	1.0	0.9	1.0	1.6	1.4	1.0	1.1	1.2	0.9	1.4	1.3	2.0	2.0
27-Dec	2.2	2.4	2.8	2.3	1.9	1.3	1.0	1.3	1.1	1.1	0.9	1.0	0.9	1.0	1.1	1.0	0.7	0.7	0.3	0.3	0.3	0.3	0.2	0.2	2.8
28-Dec	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.3	0.4	0.2	0.6	0.9	1.1	1.2	1.4	0.6	0.7	0.6	1.0	0.6	0.6	0.6	0.4	0.3	1.4
29-Dec	0.2	0.5	1.2	0.9	0.7	0.6	0.7	1.0	1.5	1.2	1.1	0.9	1.0	0.9	1.0	0.8	0.9	0.4	0.4	0.3	0.4	0.8	0.4	0.5	1.5
30-Dec	0.6	0.7	0.5	1.0	0.7	0.6	0.6	0.8	0.4	1.0	0.9	0.8	0.5	0.4	0.7	0.8	1.1	1.2	0.6	0.9	1.1	1.0	0.7	0.8	1.2
31-Dec	0.7	0.8	0.8	0.9	0.9	0.8	1.0	1.2	1.0	0.9	1.2	1.7	1.4	1.0	1.6	1.4	1.4	1.1	1.9	1.5	1.5	2.4	1.3	0.4	2.4
3.0 2.8 3.1 3.4 3.8 3.8 3.3 3.5 3.9 3.0 3.1 3.7 3.5 3.4 3.0 2.7 3.9 4.9 5.1 3.0 3.9 3.5 3.5 2.9																									
Diurnal Maximum																									
UO - Unstable Operation																									



Maximum Value: 3.1 km/h on Dec 7 22:00		Maximum Daily Average: 0.9 km/h on Dec 20		Hours in Service: 744																																												
Minimum Value: -1.6 km/h on Dec 16 06:00		Minimum Daily Average: -0.5 km/h on Dec 23		Hours of Data: 744																																												
Maximum Diurnal Average: 0.3 km/h at hour 11		Minimum Diurnal Average: -0.3 km/h at hour 5		Hours of Missing Data: 0																																												
Monthly Average: 0.04 km/h		Percentiles: P ₁ = -1.3 P ₁₀ = -0.7 Q ₁ = -0.4 Median = 0.0 Q ₃ = 0.4 P ₉₀ = 0.8 P ₉₉ = 2.4		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-Dec	-0.9	-0.2	0.0	0.3	-0.1	-0.1	0.1	0.2	-0.7	-1.0	-0.1	-0.1	0.5	1.0	1.3	0.8	-0.3	-0.4	-0.1	-0.3	-0.4	-0.3	0.5	0.5	0.0	1.3																						
2-Dec	0.7	-0.9	-1.4	-0.8	-0.4	0.6	1.6	0.9	1.5	0.2	0.2	0.3	0.0	0.1	-0.1	0.0	0.0	0.1	0.0	0.0	-0.1	0.1	0.0	0.1	0.1	1.6																						
3-Dec	0.0	-0.1	0.5	0.2	0.3	0.7	0.0	0.3	0.5	0.7	0.5	0.0	0.0	0.0	0.2	0.2	0.0	0.0	0.1	0.1	0.1	-0.1	0.0	0.2	0.7																							
4-Dec	-0.2	-0.2	0.1	0.4	0.3	0.7	0.6	1.2	-0.3	-0.4	-0.3	-0.2	-0.3	-0.1	-0.2	0.0	-0.5	-0.3	-0.1	-0.3	-0.5	0.3	0.5	0.2	0.0	1.2																						
5-Dec	-0.1	-0.1	-0.1	0.2	0.0	0.4	0.6	0.0	-0.2	-0.4	0.6	0.5	0.9	0.4	0.8	0.1	-0.2	-0.5	0.1	0.1	0.0	-0.2	0.0	-0.1	0.1	0.9																						
6-Dec	-0.1	0.3	0.2	0.4	-0.7	-0.6	0.1	-0.8	-0.6	0.0	-0.5	-0.8	-0.5	-0.4	-0.7	-0.3	-0.2	0.0	0.1	-0.3	-0.1	-0.7	-1.2	-0.1	-0.3	0.4																						
7-Dec	0.0	1.1	0.5	-0.3	-0.6	-0.5	-0.6	-0.7	-0.8	-0.3	-0.3	-0.3	0.0	0.2	-0.1	0.6	1.0	0.8	0.8	1.5	2.5	3.1	3.0	0.5	0.5	3.1																						
8-Dec	1.0	2.0	2.7	2.4	0.2	-0.7	-0.7	-0.5	-0.4	-0.5	-0.5	-0.2	0.0	0.0	-0.2	-0.1	0.3	0.4	0.1	0.0	-0.5	-0.1	0.0	-0.1	0.2	2.7																						
9-Dec	-0.2	-0.3	-0.6	-0.4	-0.8	-0.6	-0.2	-0.1	0.4	0.6	0.8	-0.1	0.0	0.7	0.3	0.3	-0.8	-0.5	-0.2	0.0	-0.5	0.1	0.4	0.4	-0.1	0.8																						
10-Dec	0.5	0.1	0.9	0.2	0.1	0.7	0.3	0.1	-0.9	0.1	-0.1	-0.2	-0.3	-0.2	-0.5	-0.7	-1.3	-1.3	-1.3	-1.1	-0.8	-1.5	-1.2	-0.9	-0.4	0.9																						
11-Dec	-0.8	-0.8	-1.2	-1.2	-1.1	-1.2	-0.8	-0.7	-0.7	0.9	0.6	-0.3	0.5	0.0	-0.1	0.3	0.5	0.6	-0.3	0.1	0.6	0.4	-0.3	-0.2	-0.2	0.9																						
12-Dec	0.1	0.0	-0.1	-0.1	-0.6	0.0	0.3	-0.3	-0.5	0.0	1.2	-0.7	-1.1	1.0	1.4	1.3	2.0	2.9	1.9	0.6	-1.0	-0.5	0.3	-0.5	0.3	2.9																						
13-Dec	0.1	-0.5	-0.3	-0.1	-0.2	0.1	-0.2	-0.1	-0.2	-0.4	-0.5	-0.5	0.3	0.2	-0.3	-0.4	-0.4	-0.7	0.0	-1.5	-0.6	-0.1	-0.4	0.2	-0.3	0.3																						
14-Dec	-0.2	-0.8	-0.7	-0.7	-0.7	-0.7	-1.2	-0.9	-1.0	-0.8	-0.4	0.5	-0.3	0.2	0.5	1.1	1.1	0.6	0.8	0.6	0.2	0.0	0.3	1.3	0.0	1.3																						
15-Dec	-0.1	-0.9	-0.6	-0.1	-0.9	-0.7	-0.8	-0.5	0.1	-0.4	0.2	0.2	0.2	-0.6	-0.8	-1.2	-0.9	-0.9	-0.7	-0.7	-0.9	-0.4	0.2	0.1	-0.5	0.2																						
16-Dec	-0.3	-0.9	-0.7	-0.8	-1.3	-1.6	-1.5	-0.7	-1.1	-0.9	0.3	0.4	0.5	0.5	0.8	0.5	0.5	0.2	0.2	0.1	0.1	0.0	-0.1	0.1	-0.2	0.8																						
17-Dec	0.1	0.1	0.1	0.0	0.1	0.3	0.6	-0.1	-0.3	-0.4	0.5	0.2	0.7	0.7	0.3	0.3	0.0	0.5	0.1	0.3	-0.1	-0.2	0.4	-0.1	0.2	0.7																						
18-Dec	-0.4	-0.2	-0.2	-0.2	-0.6	-0.4	0.3	-0.3	-0.2	-0.5	-0.6	-0.7	-0.9	-1.0	-0.7	-0.7	-0.3	-0.5	-0.5	-0.7	0.4	0.4	0.7	0.5	-0.3	0.7																						
19-Dec	0.8	0.0	0.1	-0.1	-0.1	0.0	0.2	0.5	0.1	0.4	0.9	0.7	0.7	0.2	1.0	0.7	0.6	0.4	0.2	0.4	0.5	0.4	0.1	0.3	0.4	1.0																						
20-Dec	0.4	-0.2	0.1	0.5	0.5	0.4	0.0	0.9	2.4	1.8	2.6	2.7	1.8	1.5	1.9	0.5	0.8	0.6	1.4	0.2	0.2	0.2	0.1	-0.2	0.9	2.7																						
21-Dec	-0.8	-0.5	-0.5	-0.4	-0.9	-0.6	-0.8	0.2	1.2	0.4	-0.1	-0.4	1.1	0.7	0.4	0.1	1.1	0.2	-0.4	-0.5	-1.0	-1.2	-0.9	-0.8	-0.2	1.2																						
22-Dec	-0.3	-0.2	0.6	0.6	0.5	0.4	0.8	1.0	0.7	0.0	0.2	-0.1	0.0	0.2	0.5	0.1	0.1	0.0	-0.2	0.0	0.0	-0.3	0.4	-0.4	0.2	1.0																						
23-Dec	-0.2	-0.1	-0.5	-0.8	-0.9	-0.7	-0.4	-0.9	-0.7	-0.9	-0.7	-0.9	-1.0	-1.3	-0.8	-0.7	-0.3	-0.1	-0.3	-0.6	-0.8	-0.3	0.1	0.8	-0.5	0.8																						
24-Dec	0.8	0.0	-0.2	-0.1	-0.1	0.4	0.3	0.7	0.9	-0.1	0.4	1.1	-0.1	0.2	0.4	-0.4	-0.1	0.1	0.2	0.3	-0.4	-1.1	0.1	0.2	0.1	1.1																						
25-Dec	0.2	0.0	0.1	-0.2	-0.4	-0.2	-0.1	0.2	0.3	1.1	1.5	0.9	0.8	1.4	1.5	1.1	0.3	-0.5	0.4	0.9	-0.1	-0.4	-0.1	0.0	0.4	1.5																						
26-Dec	-0.2	-0.6	-0.1	0.4	0.2	-0.4	-0.1	-0.1	0.2	0.6	0.6	1.5	0.7	1.1	0.7	0.6	1.0	-0.1	0.0	0.7	-0.3	-0.6	0.0	0.5	0.3	1.5																						
27-Dec	-0.5	-0.6	-0.6	-0.4	0.3	-0.6	-0.4	-0.5	-0.2	-0.2	-0.3	-0.1	-0.1	0.3	1.0	0.4	0.6	0.3	0.3	0.1	0.1	0.2	0.2	0.3	0.0	1.0																						
28-Dec	0.2	0.0	0.0	0.0	0.2	0.1	0.0	0.0	0.2	0.1	0.3	-0.3	0.2	0.2	-0.3	0.1	0.1	0.4	0.1	0.0	0.0	0.1	0.0	0.0	0.1	0.4																						
29-Dec	0.0	0.1	0.3	0.0	-0.2	-0.1	0.2	0.8	1.0	0.8	0.3	-0.5	0.1	0.0	0.0	0.1	0.7	0.2	-0.1	0.0	0.0	-0.1	-0.1	-0.2	0.1	1.0																						
30-Dec	-0.3	-0.5	-0.5	0.0	-0.4	0.0	-0.1	0.0	-0.2	-0.4	0.0	0.2	-0.2	-0.4	0.4	0.8	0.8	0.6	0.3	1.2	0.4	0.3	-0.6	-0.5	0.0	1.2																						
31-Dec	-0.4	0.2	0.8	0.7	0.4	0.7	0.2	0.7	0.6	0.4	1.0	-0.2	0.2	-0.1	-0.4	-0.7	-0.7	-0.4	-0.6	-0.9	-0.2	1.6	0.3	0.2	0.1	1.6																						
																								0.0	-0.1	0.0	0.0	-0.3	-0.1	-0.1	0.0	0.0	0.0	0.3	0.1	0.1	0.2	0.3	0.1	0.2	0.1	0.1	0.0	-0.1	0.0	0.1	0.1	Diurnal Average
																								1.0	2.0	2.7	2.4	0.5	0.7	1.6	1.2	2.4	1.8	2.6	2.7	1.8	1.5	1.9	1.3	2.0	2.9	1.9	1.5	2.5	3.1	3.0	1.3	Diurnal Maximum



Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

Vertical Wind Speed 100 m (VW100m) - km/h

Lower Camp Met Tower - December 2023

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 5.2 km/h on Dec 10 19:00																					Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0				
Minimum Value: 0.1 km/h on Dec 3 20:00																									
Percentiles: P ₁ = 0.3 P ₁₀ = 0.5 Q ₁ = 0.8 Median = 1.1 Q ₃ = 1.6 P ₉₀ = 2.4 P ₉₉ = 3.5																									
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-Dec	0.9	0.6	0.5	0.9	0.7	0.6	0.6	0.7	1.1	1.3	0.9	0.9	1.1	1.1	0.9	1.2	0.6	0.9	0.7	0.7	1.2	1.2	1.3	1.2	1.3
2-Dec	1.3	1.3	1.2	1.3	0.9	1.1	1.4	1.3	1.1	1.0	0.5	0.4	0.5	0.3	0.4	0.3	0.6	0.4	0.4	0.5	0.6	0.6	0.4	0.4	1.4
3-Dec	0.4	0.4	0.7	0.4	0.4	0.5	0.4	0.5	0.4	0.4	0.4	0.3	0.3	0.2	0.4	0.5	0.5	0.3	0.2	0.1	0.2	0.2	0.3	0.3	0.7
4-Dec	0.4	0.6	0.7	0.7	0.7	1.0	1.0	0.8	0.8	0.8	0.9	0.7	0.9	1.6	1.0	1.1	0.7	0.5	0.6	0.7	0.8	0.7	0.8	0.8	1.6
5-Dec	0.8	0.7	0.8	1.2	0.9	0.7	0.6	0.7	0.7	1.0	1.0	1.3	1.2	1.3	1.0	1.3	1.4	1.4	2.0	2.4	2.2	2.2	1.8	1.3	2.4
6-Dec	1.2	0.9	1.3	2.1	2.1	0.9	1.6	2.5	1.1	1.4	1.0	1.7	1.2	1.0	1.2	1.3	0.9	1.2	1.3	1.0	1.8	2.8	2.4	1.6	2.8
7-Dec	1.1	1.6	1.9	2.2	1.6	1.4	1.3	1.4	1.8	0.7	0.7	0.8	0.5	0.6	0.8	1.3	0.9	0.7	1.0	0.7	1.0	0.9	2.2	1.9	2.2
8-Dec	1.7	2.0	2.3	2.4	2.1	1.5	1.4	1.3	1.5	1.1	1.2	1.6	1.0	0.8	0.8	1.1	1.2	1.9	0.9	0.8	0.6	0.8	0.9	0.9	2.4
9-Dec	1.0	1.3	1.3	1.5	1.8	1.6	1.0	0.9	0.8	1.2	1.1	0.9	1.0	1.1	0.8	0.7	0.6	0.8	0.9	1.1	0.9	0.9	0.9	0.9	1.8
10-Dec	1.2	1.0	1.2	0.9	0.9	1.2	1.3	1.7	1.9	2.2	1.5	0.9	0.9	1.2	1.2	2.5	3.5	4.4	5.2	2.6	4.1	3.4	3.4	2.8	5.2
11-Dec	2.2	2.0	2.5	3.1	2.8	3.0	2.9	1.8	1.4	1.8	1.1	1.2	1.5	0.9	0.9	0.9	1.0	1.1	1.1	1.2	1.2	0.9	0.5	0.5	3.1
12-Dec	0.7	0.6	0.7	1.1	0.9	0.5	0.6	0.7	1.1	1.9	1.8	1.2	1.9	1.2	1.2	1.3	1.3	1.3	1.4	2.0	1.5	1.1	1.8	1.0	2.0
13-Dec	1.2	1.6	1.6	2.3	1.9	1.6	1.2	1.3	1.8	1.1	1.2	1.6	1.7	1.3	1.1	0.7	0.9	2.5	2.4	2.6	2.4	1.8	2.3	2.3	2.6
14-Dec	1.5	1.4	1.1	1.6	1.1	1.3	1.6	0.9	1.1	1.1	1.8	2.2	2.2	1.3	1.0	1.2	0.9	0.5	0.8	1.6	1.1	0.7	0.8	1.4	2.2
15-Dec	1.1	0.9	1.5	1.8	1.5	1.6	1.4	1.4	1.6	1.2	1.3	2.0	2.3	2.4	2.2	2.4	2.7	2.5	2.5	2.6	2.8	2.7	3.1	2.5	3.1
16-Dec	1.7	2.0	2.0	1.8	3.6	3.5	2.7	3.5	3.6	2.6	2.5	1.7	1.7	1.3	1.2	0.8	1.1	1.1	0.8	0.7	0.6	0.3	0.4	0.6	3.6
17-Dec	1.0	1.4	0.8	0.4	0.2	0.5	0.5	0.4	0.6	0.6	0.9	0.8	0.8	1.0	0.8	0.7	0.8	0.8	0.9	1.2	1.5	1.4	1.5	1.5	1.5
18-Dec	0.8	0.8	0.7	1.0	1.6	1.3	1.9	1.4	1.5	1.4	1.9	1.1	1.0	2.2	2.9	1.9	2.2	2.4	1.6	1.3	2.5	2.6	2.4	2.5	2.9
19-Dec	2.0	1.2	0.9	0.7	0.3	0.5	0.8	0.9	0.6	0.6	1.3	1.2	1.0	1.2	1.3	1.7	2.0	2.4	2.4	2.6	2.5	2.5	2.5	2.5	2.6
20-Dec	2.5	2.5	2.7	3.1	3.5	2.7	2.2	2.5	2.2	2.3	2.4	2.2	1.9	1.9	2.3	2.4	2.3	2.8	3.0	2.8	3.4	2.8	2.0	1.4	3.5
21-Dec	1.0	1.4	1.8	0.9	1.4	0.8	1.0	1.1	1.0	1.2	1.1	1.5	1.4	1.6	2.0	1.9	2.0	1.6	1.0	1.4	1.4	1.0	1.2	1.2	2.0
22-Dec	1.2	0.9	0.8	1.0	0.6	0.7	0.9	1.1	1.1	0.7	0.8	1.0	1.0	1.1	1.1	1.0	0.9	1.1	1.0	0.9	1.1	1.2	1.9	1.3	1.9
23-Dec	1.7	2.1	1.4	3.4	3.7	4.0	3.5	3.5	2.2	2.9	3.1	3.1	3.2	2.8	2.7	2.2	1.6	1.9	1.3	0.7	1.0	0.9	0.9	1.5	4.0
24-Dec	1.3	1.8	1.4	0.8	0.9	1.3	1.0	1.1	0.8	1.0	0.9	1.1	0.5	0.5	0.8	0.6	0.3	0.6	1.0	1.1	0.5	0.7	0.8	0.9	1.8
25-Dec	0.9	1.0	0.9	0.7	0.9	0.6	0.9	1.4	1.0	1.1	1.8	1.7	0.8	1.3	0.8	1.0	0.6	0.5	0.8	1.2	0.7	0.8	0.6	0.9	1.8
26-Dec	0.7	1.0	1.0	1.3	0.7	1.1	1.0	0.7	0.8	0.7	0.9	1.3	1.2	1.1	1.4	2.0	1.8	1.3	1.6	1.8	1.3	1.4	1.9	2.5	2.5
27-Dec	1.8	2.2	2.4	2.3	2.0	1.7	1.4	1.8	1.6	1.8	1.3	1.0	1.0	1.0	1.9	1.1	0.6	1.2	0.6	0.4	0.3	0.3	0.3	0.4	2.4
28-Dec	0.4	0.6	0.4	0.4	0.7	0.4	0.5	0.3	0.7	0.3	1.0	1.1	1.2	1.3	1.0	0.6	0.6	0.8	0.8	0.7	0.4	0.6	0.3	0.3	1.3
29-Dec	0.3	0.4	1.4	1.2	0.6	0.6	0.8	1.5	1.6	1.2	1.2	1.0	1.3	1.0	1.2	0.9	1.1	0.5	0.5	0.3	0.3	0.4	0.3	0.5	1.6
30-Dec	0.7	0.4	0.4	0.7	0.6	0.5	0.4	0.4	0.6	0.9	0.7	0.8	0.4	0.5	0.9	1.2	1.0	1.8	1.1	1.5	1.2	1.0	0.9	0.9	1.8
31-Dec	0.8	0.9	0.9	0.9	1.0	0.7	0.7	0.9	0.8	1.0	1.7	2.5	2.4	1.8	1.5	1.6	1.4	1.4	2.6	1.9	0.8	2.6	1.5	0.3	2.6
2.5 2.5 2.7 3.4 3.7 4.0 3.5 3.5 3.6 2.9 3.1 3.1 3.2 2.8 2.9 2.5 3.5 4.4 5.2 2.8 4.1 3.4 3.4 2.8																									
Diurnal Maximum																									



Maximum Value: 6.1 km/h on Dec 8 04:00																				Maximum Daily Average: 1.8 km/h on Dec 7					Hours in Service: 744								
Minimum Value: -1.9 km/h on Dec 2 03:00																				Minimum Daily Average: -0.1 km/h on Dec 17					Hours of Data: 731								
Maximum Diurnal Average: 0.7 km/h at hour 4																				Minimum Diurnal Average: 0.2 km/h at hour 21					Hours of Missing Data: 13								
Monthly Average: 0.50 km/h																				Percentiles: P ₁ = -1.3 P ₁₀ = -0.3 Q ₁ = 0.0 Median = 0.3 Q ₃ = 0.8 P ₉₀ = 1.4 P ₉₉ = 3.6					Hours of Calibration: 0								
																				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-Dec	-0.5	0.3	0.3	1.0	0.5	0.0	-0.1	0.0	-1.3	-1.6	-0.2	0.0	0.8	1.3	1.5	0.4	-0.5	-0.1	0.3	-0.2	-1.2	-0.2	0.2	0.8	0.1	1.5							
2-Dec	1.5	-1.4	-1.9	-1.0	-0.3	0.7	1.2	0.7	1.5	0.4	0.3	0.3	-0.1	-0.3	-0.2	-0.1	0.0	0.4	0.4	0.4	0.3	UO	UO	UO	0.1	1.5							
3-Dec	UO	UO	UO	UO	UO	UO	UO	-0.1	0.3	UO	UO	UO	0.4	0.0	-0.1	0.3	0.2	0.2	0.1	-0.1	-0.2	-0.1	-0.4	-0.3	--	0.4							
4-Dec	0.0	0.2	0.3	0.6	0.4	0.5	0.6	0.8	-0.1	0.2	0.3	0.4	0.6	0.7	0.9	0.6	0.5	0.0	-0.1	-0.2	-0.1	-0.4	-0.6	0.3	0.9								
5-Dec	0.0	-0.1	0.0	1.1	0.5	0.6	0.5	0.6	0.3	0.2	0.2	0.3	0.2	-0.3	0.1	0.1	0.8	0.7	1.6	2.2	1.3	0.4	1.0	0.4	0.5	2.2							
6-Dec	0.6	1.4	1.8	2.1	0.6	0.9	1.8	0.4	0.5	1.0	0.3	-0.6	1.1	1.1	0.6	1.0	1.0	1.6	0.8	0.4	-0.1	-0.6	-0.6	1.2	0.8	2.1							
7-Dec	1.3	3.8	2.9	0.6	0.0	0.4	0.1	-0.2	-0.7	0.1	0.1	0.1	0.3	0.0	0.3	2.0	2.3	2.7	2.9	3.8	5.2	6.1	5.7	2.9	1.8	6.1							
8-Dec	3.0	4.3	5.7	6.1	2.0	0.4	0.2	-0.1	0.2	0.2	0.1	0.8	1.1	0.7	0.5	0.8	2.0	2.1	0.9	0.8	0.2	0.3	0.4	0.2	1.4	6.1							
9-Dec	0.2	0.1	0.0	0.3	-0.3	-0.1	0.3	0.4	0.3	0.0	0.5	0.1	-0.3	0.7	0.4	0.2	-0.7	-0.7	-0.6	0.0	-1.2	0.0	0.5	0.5	0.0	0.7							
10-Dec	1.0	0.5	0.8	0.8	0.6	0.9	0.8	-0.1	-1.3	0.0	-0.6	0.0	0.5	1.6	1.3	1.1	0.7	0.6	1.1	-0.2	0.3	-0.3	0.1	0.2	0.4	1.6							
11-Dec	0.0	0.1	-0.1	-0.5	0.4	0.7	0.9	1.0	1.1	3.0	2.5	1.3	1.8	0.5	0.0	0.0	0.1	0.6	-0.5	-0.4	-0.2	-0.1	-0.4	-0.2	0.5	3.0							
12-Dec	0.1	0.2	0.3	0.3	0.1	0.1	0.2	-0.4	-0.1	0.3	2.0	-1.0	-1.3	1.3	1.1	1.1	1.5	2.6	0.3	-0.7	-1.8	-0.7	0.4	0.1	0.2	2.6							
13-Dec	0.8	0.6	0.8	1.3	0.8	0.3	0.6	0.8	0.7	0.1	-0.1	-0.8	0.2	0.0	0.4	0.4	0.6	0.3	0.9	-0.9	0.3	0.5	0.4	0.6	0.4	1.3							
14-Dec	0.8	0.4	0.7	1.0	0.9	0.9	0.7	0.6	1.3	1.2	1.4	2.4	0.0	1.0	1.4	2.3	3.0	2.5	3.2	2.7	0.3	0.0	0.1	0.6	1.2	3.2							
15-Dec	0.2	-0.5	-1.4	-0.9	-1.1	-0.9	-0.1	0.1	-0.4	-1.3	0.1	0.8	1.0	-0.1	-0.4	-0.7	-0.4	-0.3	0.0	0.1	-0.1	0.0	1.3	1.8	-0.1	1.8							
16-Dec	1.0	1.5	1.0	1.0	0.4	-0.4	0.0	0.9	1.1	0.1	0.5	0.2	0.2	0.5	0.6	0.5	0.5	0.0	0.1	-0.1	0.0	0.1	0.1	0.1	0.4	1.5							
17-Dec	-0.1	0.2	0.3	0.1	0.1	0.1	0.0	0.1	0.1	-0.1	0.1	0.1	0.5	0.7	0.2	-0.1	-0.1	-0.1	-0.7	-0.7	-0.8	-1.3	-0.7	-1.0	-0.1	0.7							
18-Dec	0.4	0.6	0.5	1.2	0.9	1.5	2.5	0.8	0.9	1.1	1.6	0.6	1.0	1.1	0.8	1.1	1.0	0.9	1.1	0.8	1.6	0.4	0.5	0.3	1.0	2.5							
19-Dec	0.5	0.1	0.2	0.0	0.2	0.3	0.4	0.2	0.0	0.2	0.9	0.9	0.8	0.2	0.8	0.3	0.1	0.1	-0.1	0.1	0.4	0.0	-0.2	0.1	0.3	0.9							
20-Dec	0.0	-0.4	-0.4	-0.1	-0.3	-0.1	-0.5	0.7	2.9	2.5	3.1	3.2	2.1	1.8	1.6	-0.1	0.9	0.5	0.9	0.0	0.0	0.0	-0.2	0.5	0.8	3.2							
21-Dec	1.4	1.2	1.2	1.3	1.2	1.1	1.1	1.8	3.0	0.6	-0.4	-0.9	0.7	0.3	0.7	0.2	1.6	0.5	-0.7	-0.1	-1.2	-1.3	-0.9	-1.0	0.5	3.0							
22-Dec	-0.5	0.1	0.3	0.2	0.3	0.4	0.4	0.8	0.7	1.0	1.0	0.3	0.3	0.8	1.2	0.4	0.7	0.9	0.1	-0.1	0.3	0.2	1.5	1.6	0.5	1.6							
23-Dec	1.3	1.9	1.2	0.9	0.8	1.0	1.2	0.7	0.9	0.8	1.1	1.1	0.7	0.6	0.7	1.0	1.0	1.1	0.7	0.6	0.3	1.2	2.0	3.1	1.1	3.1							
24-Dec	3.0	1.1	0.5	0.2	-0.3	0.1	-0.3	0.1	0.4	0.2	0.0	1.0	-0.3	0.0	0.3	0.0	0.2	0.2	0.2	0.2	-0.3	-0.5	-0.1	0.0	0.2	3.0							
25-Dec	0.0	0.0	-0.2	-0.2	-0.3	0.0	0.2	0.4	0.1	0.7	1.8	0.2	0.2	0.1	0.7	0.7	-0.2	-0.5	-0.3	0.3	-0.1	-0.1	0.6	0.4	0.2	1.8							
26-Dec	0.5	0.4	1.0	1.2	0.7	-0.2	0.4	0.7	0.5	1.2	1.3	2.7	1.8	2.4	1.0	0.8	0.2	0.3	-0.1	0.1	0.3	0.7	1.3	1.5	0.9	2.7							
27-Dec	1.3	1.4	1.3	1.3	1.8	-0.3	0.2	0.3	0.6	0.2	-0.4	-0.4	-0.2	0.3	0.6	0.3	0.5	0.8	0.4	0.1	0.2	0.1	-0.1	-0.1	0.4	1.8							
28-Dec	-0.1	0.2	0.3	0.6	0.4	0.2	0.3	0.4	0.5	0.2	0.5	0.2	0.2	0.3	0.3	0.3	0.1	0.6	0.3	0.2	0.3	0.2	0.2	0.2	0.3	0.6							
29-Dec	0.1	0.1	0.6	0.6	0.3	0.3	0.2	1.5	1.5	0.9	0.3	0.0	0.8	0.1	0.2	-0.2	0.3	-0.3	-0.1	0.1	0.0	0.0	0.1	-0.1	0.3	1.5							
30-Dec	0.4	0.1	0.2	0.8	0.6	1.5	0.5	0.8	0.0	-0.6	0.5	1.1	0.8	0.3	0.5	0.6	0.9	0.9	1.3	1.2	0.0	-0.6	-0.7	-0.7	0.4	1.5							
31-Dec	-0.4	-0.1	0.0	0.1	0.1	0.2	0.0	0.3	0.1	0.1	0.4	-0.1	0.1	-0.1	0.4	0.5	0.5	0.5	-0.6	0.8	1.7	3.0	1.0	0.4	0.4	3.0							
																								Diurnal Average									
																								Diurnal Maximum									
UO - Unstable Operation																																	



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

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

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 4.5 km/h on Dec 10 19:00 Minimum Value: 0.2 km/h on Dec 17 05:00 Percentiles: P ₁ = 0.3 P ₁₀ = 0.6 Q ₁ = 0.8 Median = 1.1 Q ₃ = 1.6 P ₉₀ = 2.3 P ₉₉ = 3.5																					Hours in Service: 744 Hours of Data: 731 Hours of Missing Data: 13 Hours of Calibration: 0 Percent Operational Time: 98.3				
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Dec	0.7	0.6	0.6	0.8	0.7	0.8	0.8	0.7	1.2	1.2	1.0	1.1	1.1	1.2	1.1	1.0	0.7	0.7	0.9	1.4	1.3	0.6	0.9	0.6	1.4
2-Dec	1.1	1.2	1.3	1.4	1.0	1.1	1.5	1.5	1.1	1.0	0.6	0.5	0.7	0.4	0.4	0.3	0.8	0.6	0.4	0.3	0.5	UO	UO	UO	1.5
3-Dec	UO	UO	UO	UO	UO	UO	UO	0.8	0.6	UO	UO	UO	0.4	0.5	0.6	0.7	0.4	0.3	0.3	0.3	0.7	0.5	0.6	0.6	0.8
4-Dec	0.4	0.6	0.7	1.0	1.0	0.9	1.1	1.0	1.2	1.4	1.1	0.8	0.6	1.0	1.0	0.9	0.7	0.6	0.7	0.9	0.9	0.9	0.8	0.8	1.4
5-Dec	0.8	0.9	0.7	1.2	0.8	0.7	0.6	0.9	1.0	1.7	1.3	1.4	1.2	1.5	1.2	1.5	1.6	1.6	2.1	2.6	2.5	2.8	2.3	1.8	2.8
6-Dec	1.7	1.1	1.1	1.7	1.4	1.2	1.3	1.7	1.0	1.5	1.2	1.3	1.1	1.3	1.3	1.5	1.0	0.9	1.5	1.2	2.2	3.5	2.3	1.8	3.5
7-Dec	1.3	1.4	1.2	2.2	1.1	1.0	1.0	1.3	1.4	0.8	0.7	0.8	0.7	0.8	1.0	1.2	0.8	0.7	0.7	0.9	0.9	0.9	1.6	1.1	2.2
8-Dec	1.3	2.0	1.4	1.4	2.5	0.9	0.7	0.9	1.3	1.1	0.8	1.2	1.1	0.8	0.6	1.1	1.2	1.7	1.0	1.1	0.9	0.9	0.9	1.0	2.5
9-Dec	1.6	1.4	1.2	1.0	1.5	1.6	1.1	0.9	1.0	1.1	0.8	1.2	1.1	1.2	0.5	0.3	0.4	0.5	0.9	1.0	0.9	1.0	1.2	1.2	1.6
10-Dec	1.3	1.1	1.2	1.4	1.4	1.8	1.8	1.9	2.0	2.3	1.3	1.1	1.1	1.2	1.5	1.9	2.5	3.7	4.5	3.0	4.0	3.3	3.5	3.1	4.5
11-Dec	2.1	2.1	2.4	3.1	2.9	2.5	2.3	1.9	1.4	1.6	0.9	1.1	1.3	1.1	1.1	1.0	0.6	0.8	0.9	0.8	0.8	0.9	0.7	0.5	3.1
12-Dec	0.8	0.8	0.9	1.0	1.0	0.8	0.5	0.7	1.2	2.1	2.2	1.3	2.4	1.5	1.2	1.0	1.0	1.6	1.5	1.9	1.3	1.2	1.2	1.1	2.4
13-Dec	1.2	1.7	1.9	1.9	1.9	2.1	1.7	1.6	1.6	1.2	0.8	1.4	1.5	1.3	0.8	0.9	1.2	2.4	2.7	2.8	1.9	1.9	2.1	2.5	2.8
14-Dec	2.0	1.3	1.3	1.8	1.6	1.6	1.4	1.2	1.3	1.1	1.6	1.9	2.6	1.3	1.2	1.1	0.9	0.7	0.9	1.4	1.5	0.9	0.8	1.5	2.6
15-Dec	1.1	1.0	1.3	1.3	1.6	1.5	1.3	1.2	1.3	1.2	1.0	2.0	2.3	2.3	2.0	2.2	2.6	2.2	2.1	2.5	3.0	3.2	3.5	2.8	3.5
16-Dec	1.7	2.1	1.8	1.5	3.3	3.0	2.2	3.3	2.3	2.8	2.2	1.5	1.6	1.4	1.2	0.7	0.9	1.2	0.6	0.9	0.6	0.3	0.5	0.5	3.3
17-Dec	1.1	1.3	0.7	0.4	0.2	0.6	0.5	0.5	0.7	0.7	0.9	1.0	1.0	1.0	0.7	0.6	0.7	0.7	1.0	0.7	1.2	0.8	0.8	1.4	1.4
18-Dec	1.1	0.7	1.1	1.0	1.1	1.2	2.2	1.6	1.7	1.6	1.6	1.1	1.5	1.5	3.0	2.2	2.8	2.1	0.9	0.6	2.3	2.6	2.3	2.4	3.0
19-Dec	2.2	1.5	1.2	0.5	0.3	0.7	1.0	1.1	0.8	0.7	1.3	1.1	0.9	1.6	1.3	1.5	1.8	2.3	2.1	2.4	2.5	2.4	2.3	2.2	2.5
20-Dec	2.3	2.5	2.9	3.3	4.0	3.2	2.5	3.3	2.7	2.4	2.5	2.2	2.2	1.8	2.4	2.2	2.6	3.2	3.6	2.7	2.9	2.2	1.7	1.1	4.0
21-Dec	1.4	1.4	1.6	1.2	1.2	1.1	1.2	1.3	0.8	1.4	1.0	1.0	1.2	1.4	1.2	1.6	1.8	1.5	1.2	1.7	1.6	1.2	1.1	0.9	1.8
22-Dec	0.8	0.7	0.5	0.8	0.6	0.6	0.9	1.2	0.8	0.8	0.9	0.9	0.8	1.0	0.9	1.2	0.9	0.9	0.9	0.8	1.3	1.6	1.8	1.4	1.8
23-Dec	1.6	1.6	1.8	3.1	3.3	3.6	3.6	3.3	2.2	2.3	2.5	2.6	2.5	2.2	2.2	2.0	1.9	1.9	1.8	1.0	1.3	1.4	1.6	1.7	3.6
24-Dec	1.2	1.8	1.2	0.7	0.8	1.2	0.8	1.0	1.0	1.0	0.7	1.2	0.7	0.6	0.8	0.7	0.6	0.7	1.3	1.2	0.6	0.9	1.0	1.0	1.8
25-Dec	0.8	0.8	0.7	0.5	1.2	0.9	1.0	1.1	1.0	1.0	1.7	1.5	1.1	1.7	1.2	0.8	0.7	0.5	0.7	1.2	0.9	1.0	0.8	0.9	1.7
26-Dec	0.9	1.1	1.1	1.3	0.6	0.9	0.9	0.7	0.6	0.7	0.8	0.9	1.1	1.1	1.3	1.5	2.2	1.9	2.5	2.4	1.9	1.0	2.0	2.9	2.9
27-Dec	2.2	2.2	2.4	2.3	1.9	1.9	1.8	1.6	1.2	1.5	1.3	0.8	0.6	1.1	2.1	1.0	0.7	1.4	0.9	0.5	0.5	0.3	0.4	0.3	2.4
28-Dec	0.5	0.8	0.4	0.5	0.9	0.6	0.7	0.4	0.9	0.5	1.4	1.3	1.6	1.5	0.8	0.7	0.8	1.1	1.0	0.8	0.5	0.6	0.4	0.3	1.6
29-Dec	0.4	0.3	0.7	0.8	0.5	0.6	1.0	1.8	1.7	1.4	1.0	0.8	1.2	1.1	1.1	0.9	1.1	0.5	0.8	0.4	0.4	0.6	0.6	0.8	1.8
30-Dec	0.7	0.4	0.5	0.7	0.7	0.8	0.4	0.6	0.8	0.8	0.6	0.6	0.7	0.6	0.9	1.4	1.1	2.2	1.6	1.7	1.0	0.7	0.9	0.7	2.2
31-Dec	0.4	0.4	0.9	0.8	1.2	0.9	0.9	1.0	1.0	1.1	2.0	3.2	2.9	1.9	1.5	1.5	1.3	1.5	3.1	2.0	1.1	2.5	1.9	0.5	3.2
2.3 2.5 2.9 3.3 4.0 3.6 3.6 3.3 2.7 2.8 2.5 3.2 2.9 2.3 3.0 2.2 2.8 3.7 4.5 3.0 4.0 3.5 3.5 3.1																									
Diurnal Maximum																									
UO - Unstable Operation																									



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

AMS04 BUFFALO VIEWPOINT DECEMBER 2023

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

January 31, 2024

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - BUFFALO VIEWPOINT (AMS04)
DECEMBER 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	709	35	35	100	9.8	0	2.2	0
H2S (ppb) Average	709	35	35	100	2.9	0	1.2	0
THC (ppm) Average	707	35	37	99.73	5.1	-	2.7	-
NMHC(ppm) Average	707	35	37	99.73	0.656	-	0.222	-
CH4(ppm) Average	707	35	37	99.73	4.5	-	2.5	-
O3(ppb) Average	709	35	35	100	43.8	0	39	-
NO2(ppb) Average	707	37	37	100	39.4	0	19.2	-
NO(ppb) Average	707	37	37	100	151.1	-	27.2	-
NOX(ppb) Average	707	37	37	100	190.5	-	45.3	-
PM2.5(ug/m3) Average	742	1	2	99.87	62	0	25.8	0
Temperature (C) Average	744	0	0	100	7.2	-	5.4	-
Relative Humidity (%) Average	744	0	0	100	93.8	-	87	-
Wind Speed 10 m (km/h) Average	744	0	0	100	28	-	16	-
Wind Direction 10 m (deg) Average	744	0	0	100	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - BUFFALO VIEWPOINT (AMS04)
 DECEMBER 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	709	0.29	0.7	-	0	0	0	0.1	0.3	0.5	9.8
H2S (ppb) Average	709	0.19	0.3	-	0	0.1	0.1	0.1	0.2	0.3	2.9
THC (ppm) Average	707	2.08	0.2	-	1.9	2	2	2	2.1	2.2	5.1
NMHC(ppm) Average	707	0.018	0.066	-	0	0	0	0	0	0	0.656
CH4(ppm) Average	707	2.06	0.2	-	1.9	2	2	2	2.1	2.2	4.5
O3(ppb) Average	709	25.29	10.1	-	1.4	10.3	18.1	25.8	33.4	37.9	43.8
NO2(ppb) Average	707	5.56	6	-	0	0.5	1.1	3.7	7.3	13.7	39.4
NO(ppb) Average	707	2.43	11.4	-	0	0	0	0	0.4	2.5	151.1
NOX(ppb) Average	707	7.99	15.6	-	0	0.5	1.2	3.9	8	15.8	190.5
PM2.5(ug/m3) Average	742	5.33	6.7	-	0.3	1.1	2.2	3.5	4.8	11.4	62
Temperature 2 m (C) Average	744	-5.19	5.7	-	-17	-12.1	-9.8	-5.1	-1.1	2.9	7.2
Relative Humidity (%) Average	744	72.88	13.4	-	29.2	54.6	64.2	74.9	84.8	88	93.8
Wind Speed 10 m (km/h) Average	744	9.1	5	-	1	4	6	8	11	17	28
Wind Direction 10 m (deg) Average	744	-	-	-	-	-	-	-	-	-	-

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

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
THC/NMHC/CH4	08 Dec 2023 08:00	08 Dec 2023 09:00	2	Maintenance - replaced support gas cylinder
PM2.5	21 Dec 2023 11:00	21 Dec 2023 11:00	1	Maintenance - replaced analyser



Number of Exceedences (AAAQO):		1-hr: 0		24-hr: 0		Hours in Service: 744																Daily Average		Daily Maximum			
Maximum Value: 9.8 ppb on Dec 16 21:00		Maximum Daily Average: 2.2 ppb on Dec 3		Hours of Data: 709																Hours of Missing Data: 35		Hours of Calibration: 35					
Minimum Value: 0.0 ppb on Dec 1 01:00		Minimum Daily Average: 0.0 ppb on Dec 11		Hours of Calibration: 35																Percent Operational Time: 100.0							
Maximum Diurnal Average: 0.5 ppb at hour 21		Minimum Diurnal Average: 0.1 ppb at hour 2		Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.0 Median = 0.1 Q ₃ = 0.3 P ₉₀ = 0.5 P ₉₉ = 3.8																							
Monthly Average: 0.29 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-Dec	0.0	0.0	0.0	0.0	0.1	Z	0.0	0.1	0.3	0.1	0.2	0.2	0.5	0.6	0.3	0.4	0.4	0.4	0.5	0.3	0.5	0.4	0.5	0.3	0.3	0.6	
2-Dec	Z	0.2	0.6	0.7	0.2	0.2	0.1	0.2	0.1	0.2	0.3	0.1	0.1	0.1	0.2	0.1	0.2	0.4	0.4	0.3	0.5	0.2	0.2	0.2	0.3	0.7	
3-Dec	0.2	Z	0.3	0.0	1.3	3.9	2.7	3.4	2.6	5.5	4.0	3.3	3.8	3.2	2.8	4.6	1.8	1.0	0.9	1.1	1.5	1.0	0.9	1.0	2.2	5.5	
4-Dec	0.8	0.8	Z	0.5	0.4	0.3	0.3	0.3	0.1	0.3	0.5	0.4	0.3	0.2	0.1	0.3	0.2	0.1	0.3	0.0	0.1	0.0	0.0	0.1	0.3	0.8	
5-Dec	0.1	0.0	0.0	Z	0.1	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	0.0	0.1	
6-Dec	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	0.1	0.2	0.3	0.3	0.2	0.0	0.0	0.0	0.3	
7-Dec	0.0	0.1	0.5	0.1	0.1	Z	0.1	0.1	0.5	0.5	0.3	0.2	0.3	0.3	0.2	0.1	0.1	0.3	0.4	0.4	0.2	0.2	0.1	0.2	0.2	0.5	
8-Dec	Z	0.2	0.3	0.2	0.3	0.3	0.3	0.0	0.1	0.4	0.5	0.1	0.4	0.3	0.4	0.3	0.5	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.2	0.5	
9-Dec	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	0.0	0.1	0.1	0.0	0.1	0.1	0.1	0.2	0.0	0.2	
10-Dec	0.1	0.1	Z	0.0	0.0	0.2	0.3	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	0.0	0.0	0.0	0.0	0.1	0.3	
11-Dec	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	
12-Dec	0.0	0.0	0.2	0.0	Z	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.3	0.3	0.3	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.3	
13-Dec	0.1	0.1	0.2	0.2	0.2	Z	0.4	0.3	0.3	0.3	0.2	0.2	0.5	0.6	0.5	0.4	0.3	0.4	0.5	0.5	0.4	0.4	0.3	0.1	0.3	0.6	
14-Dec	Z	0.2	0.3	0.2	0.1	0.1	0.1	C	C	C	C	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	0.1	0.3	
15-Dec	0.0	Z	0.0	0.1	0.2	0.2	0.2	0.1	0.0	0.0	0.1	0.2	0.0	0.0	0.1	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.2	
16-Dec	0.1	0.1	Z	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.3	9.8	7.9	6.0	1.5	1.1	9.8	
17-Dec	0.8	0.1	0.2	Z	0.0	0.1	0.5	0.1	0.5	0.9	1.2	0.6	0.3	0.2	0.1	0.1	0.0	0.0	0.1	0.0	0.1	0.1	0.2	0.1	0.3	1.2	
18-Dec	0.1	0.1	0.1	0.2	Z	0.1	0.0	0.2	0.3	0.2	0.2	0.2	0.0	0.0	0.1	0.1	0.2	0.1	0.2	0.3	0.2	0.1	0.2	0.0	0.1	0.3	
19-Dec	0.0	0.0	0.1	0.0	0.0	Z	0.0	0.0	0.0	2.1	1.5	0.1	0.0	0.4	0.4	0.1	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.2	2.1	
20-Dec	Z	0.2	0.2	0.3	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.4	0.5	0.4	0.5	0.5	0.4	0.4	0.5	0.7	0.6	0.6	0.5	0.5	0.4	0.7	
21-Dec	0.4	Z	0.4	0.3	0.4	0.4	0.4	0.5	0.4	0.3	0.3	0.4	0.4	0.3	0.4	0.4	0.4	0.4	0.4	0.5	0.6	0.5	0.4	0.5	0.4	0.6	
22-Dec	0.3	0.3	Z	0.2	0.2	0.2	0.2	0.3	0.3	0.2	0.2	0.5	0.4	0.5	0.5	0.3	0.4	0.5	0.3	0.4	0.4	0.3	0.2	0.1	0.3	0.5	
23-Dec	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	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	
24-Dec	0.0	0.0	0.1	0.0	Z	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	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.3	
25-Dec	0.0	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.2	0.0	0.0	0.0	0.0	0.2	
26-Dec	Z	0.0	0.0	0.3	0.2	0.3	0.1	0.1	0.3	0.3	0.6	0.6	0.5	0.3	0.3	0.4	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.6	
27-Dec	0.0	Z	0.0	0.0	0.0	0.0	0.0	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	1.2	0.7	0.5	0.1	1.2	
28-Dec	0.1	0.5	Z	0.8	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.3	1.5	0.7	0.2	0.2	0.1	0.0	0.2	0.2	0.0	0.0	0.2	1.5	
29-Dec	0.0	0.0	0.0	Z	0.0	0.1	0.2	0.1	0.1	0.1	0.7	1.1	1.1	1.0	0.9	0.7	0.6	0.5	0.4	0.5	0.3	0.2	0.2	0.1	0.4	1.1	
30-Dec	0.0	0.2	0.2	0.1	Z	0.2	0.3	0.4	0.3	0.1	0.2	0.4	0.4	0.4	0.3	0.6	0.7	0.9	1.1	1.0	0.9	0.7	0.7	0.5	0.5	1.1	
31-Dec	0.8	0.8	0.7	0.4	0.2	Z	0.0	0.1	0.5	0.7	0.7	0.6	0.1	0.1	0.2	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.3	0.8	
																								Diurnal Average		Diurnal Maximum	
																								0.2		0.8	
																								0.1		0.8	
																								0.2		0.7	
																								0.2		0.8	
																								0.2		1.3	
																								0.3		3.9	
																								0.2		2.7	
																								0.2		3.4	
																								0.3		2.6	
																								0.4		5.5	
																								0.4		4.0	
																								0.4		3.3	
																								0.3		3.8	
																								0.3		3.2	
																								0.3		2.8	
																								0.3		4.6	
																								0.2		1.8	
																								0.2		1.0	
																								0.2		1.1	
																								0.2		1.1	
																								0.5		9.8	
																								0.5		7.9	
																								0.4		6.0	
																								0.2		1.5	

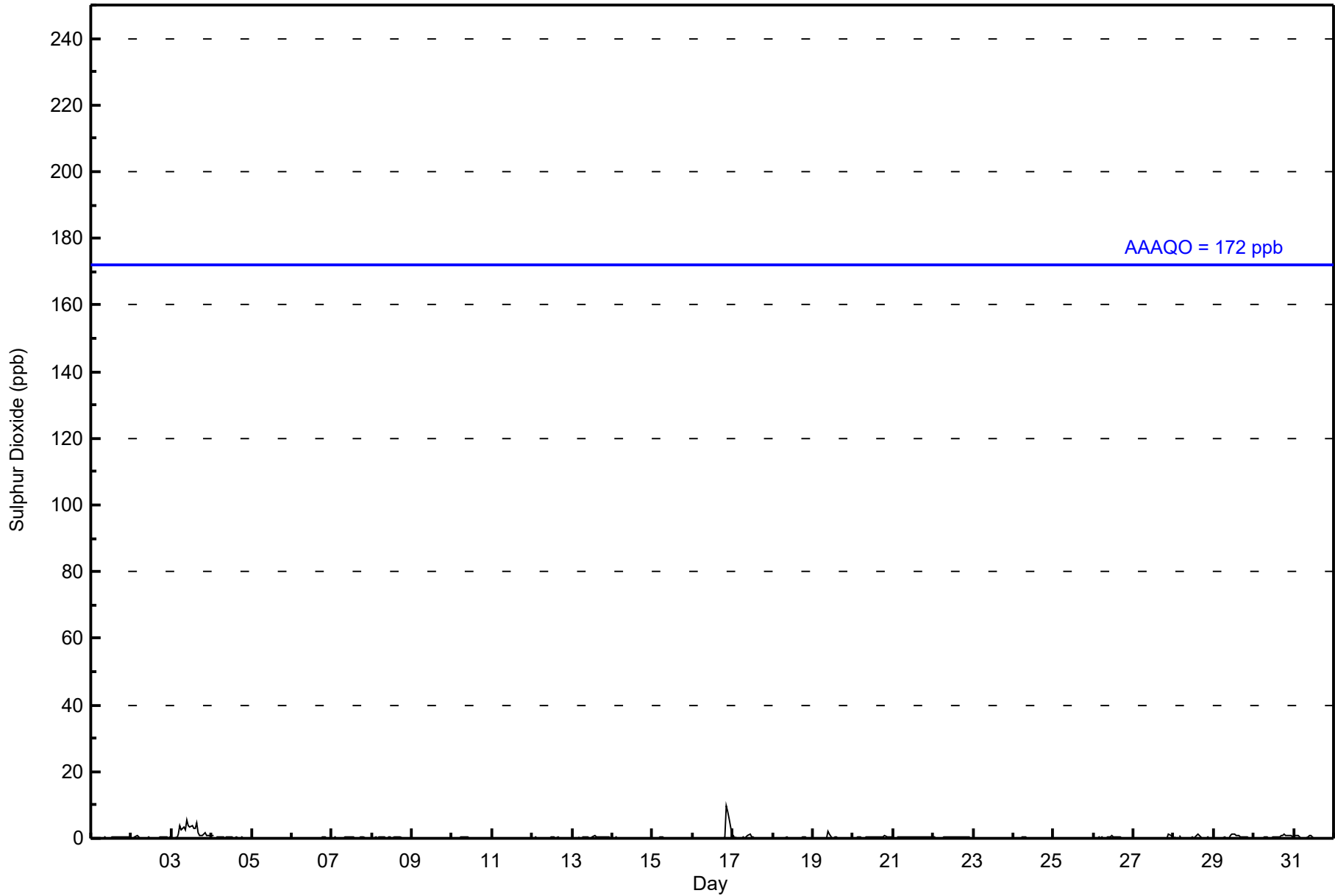
Z - zerospan C - Calibration

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



Wood Buffalo Environmental Association
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Buffalo Viewpoint - December 2023





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Buffalo Viewpoint - December 2023

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	709	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: 709

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Buffalo Viewpoint - December 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	28	25	9	3	1	10	95	219	92	29	43	73	48	11	8	15	709
11 - 20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	28	25	9	3	1	10	95	219	92	29	43	73	48	11	8	15	709

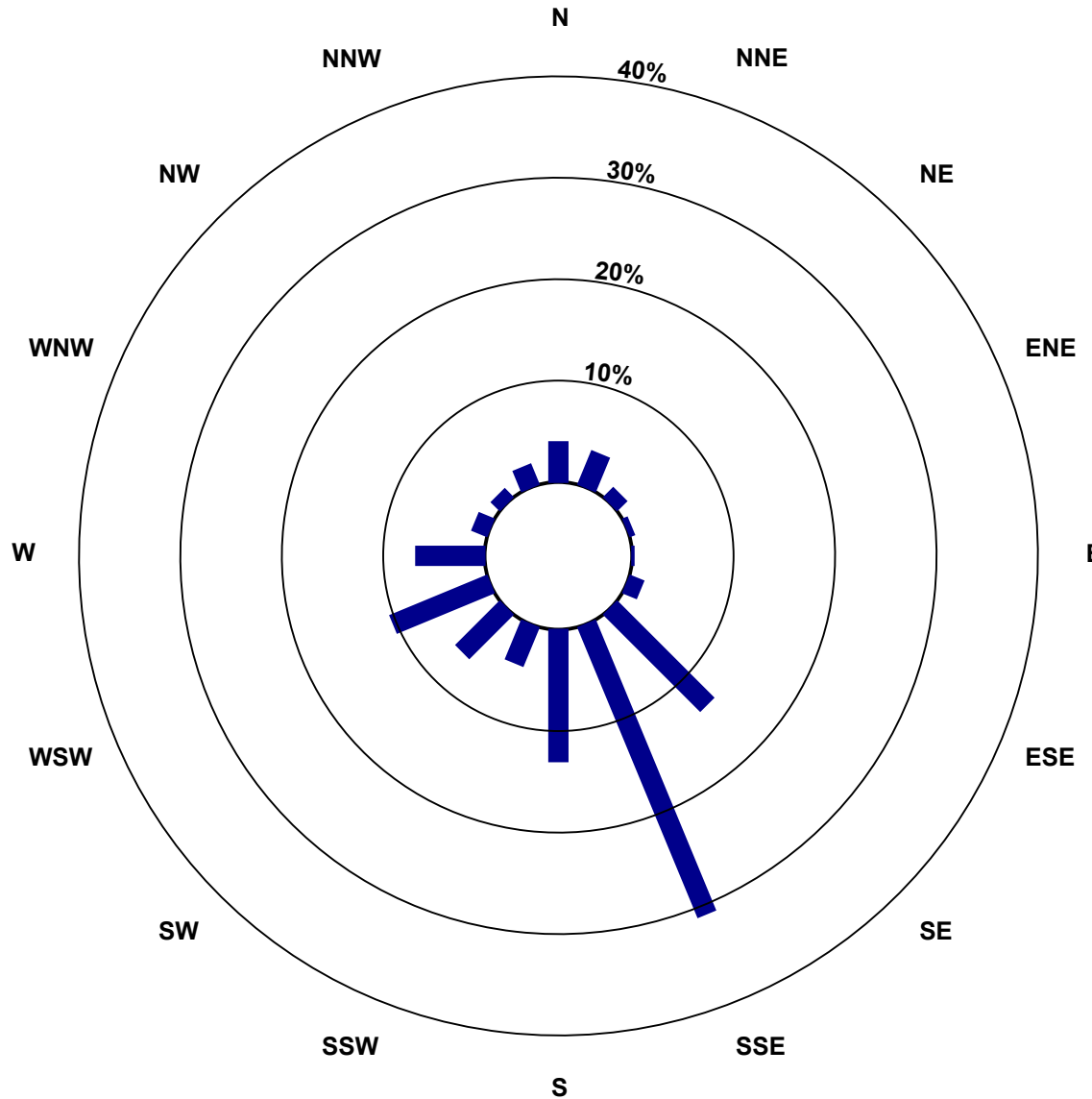
Total Number of Valid Hours: 709

Total Number of Hours: 744

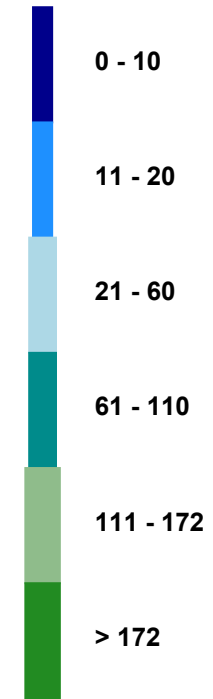


Wood Buffalo Environmental Association
Wind Rose Dec 2023

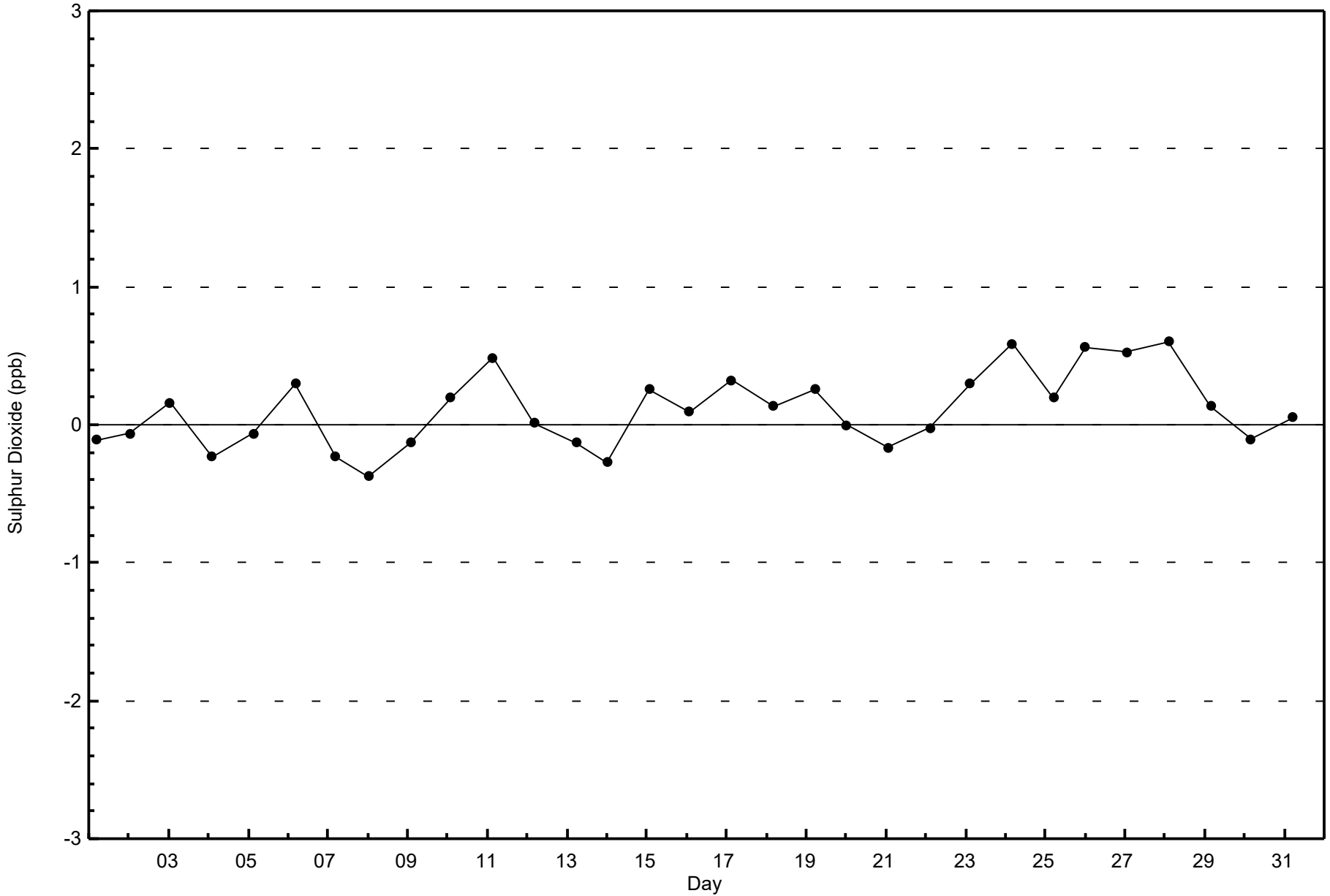
Sulphur Dioxide (SO₂) - ppb
Buffalo Viewpoint

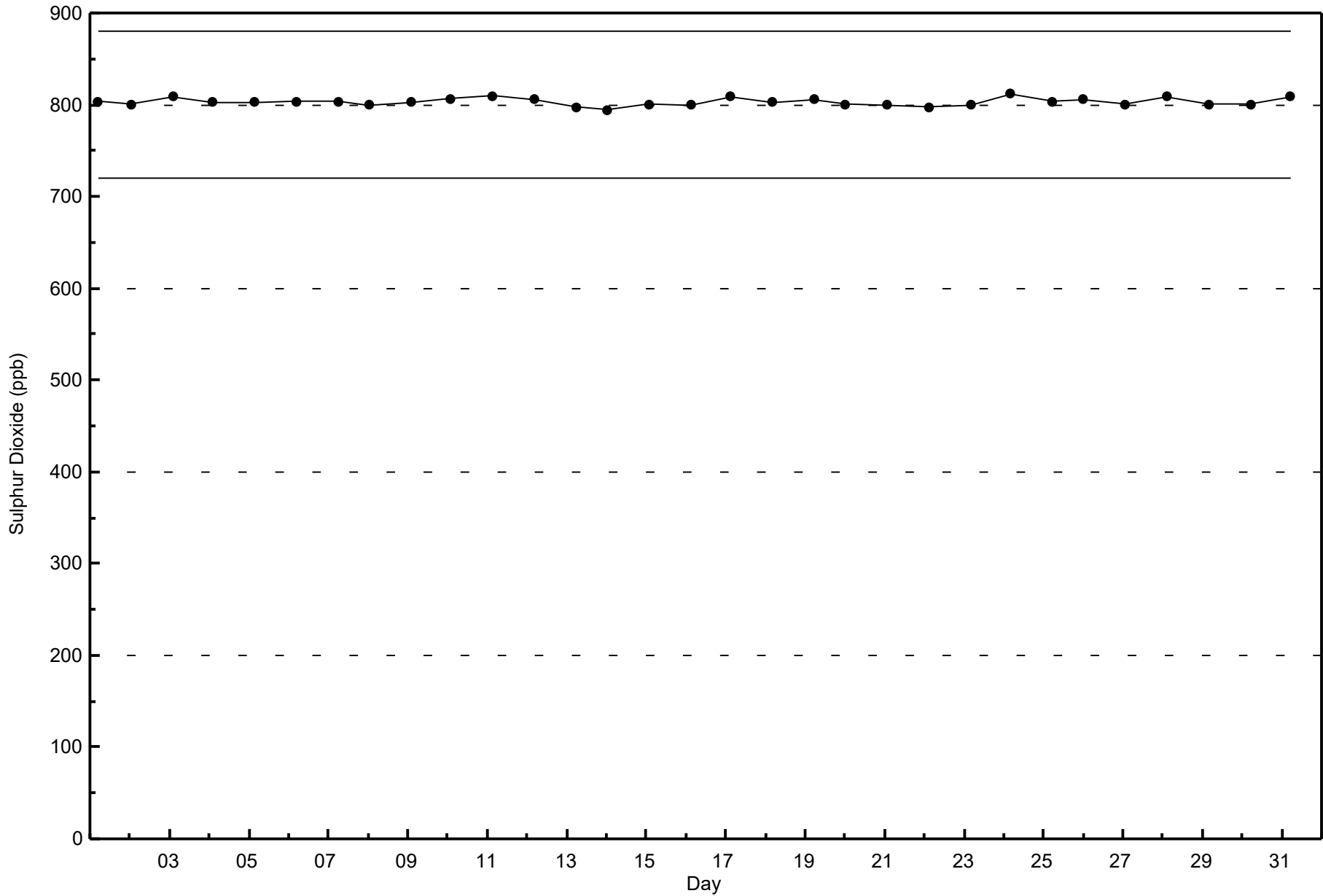


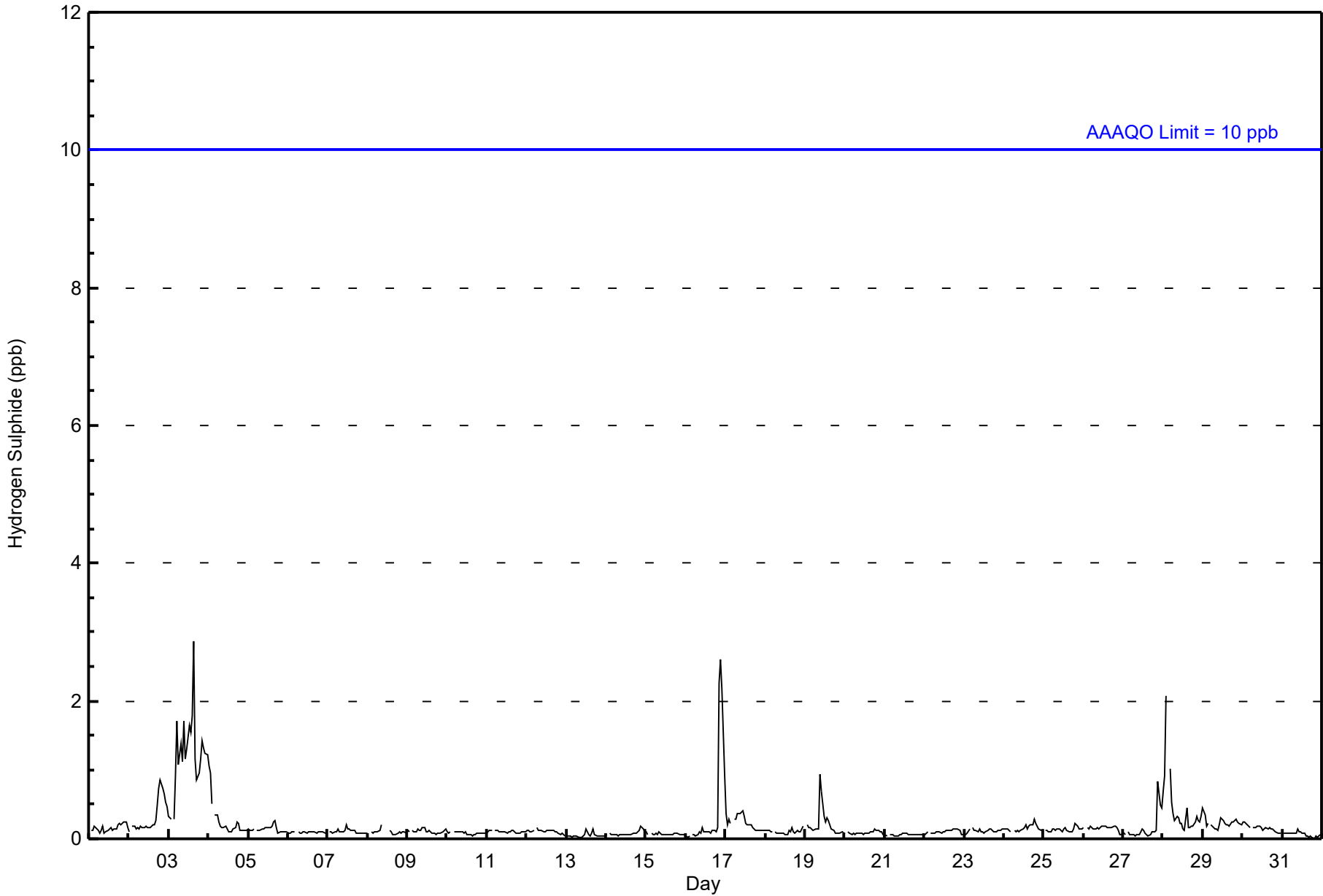
Classes (ppb)



Total Number of Valid Hours: 709









**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Hydrogen Sulphide (H₂S) - ppb
Buffalo Viewpoint - December 2023**

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

Total Number of Valid Hours: 709

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Hydrogen Sulphide (H₂S) - ppb
Buffalo Viewpoint - December 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	30	24	8	3	1	10	99	214	93	29	41	75	46	11	9	14	707
3 - 4	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	2
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	30	25	8	3	1	10	99	214	93	29	41	75	47	11	9	14	709

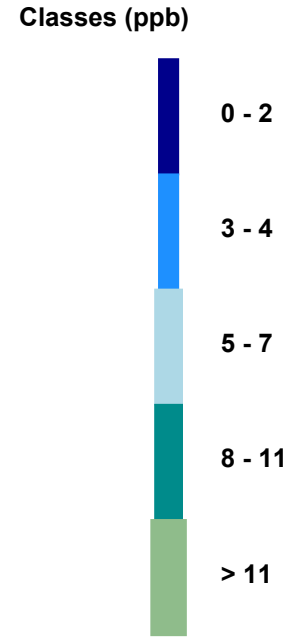
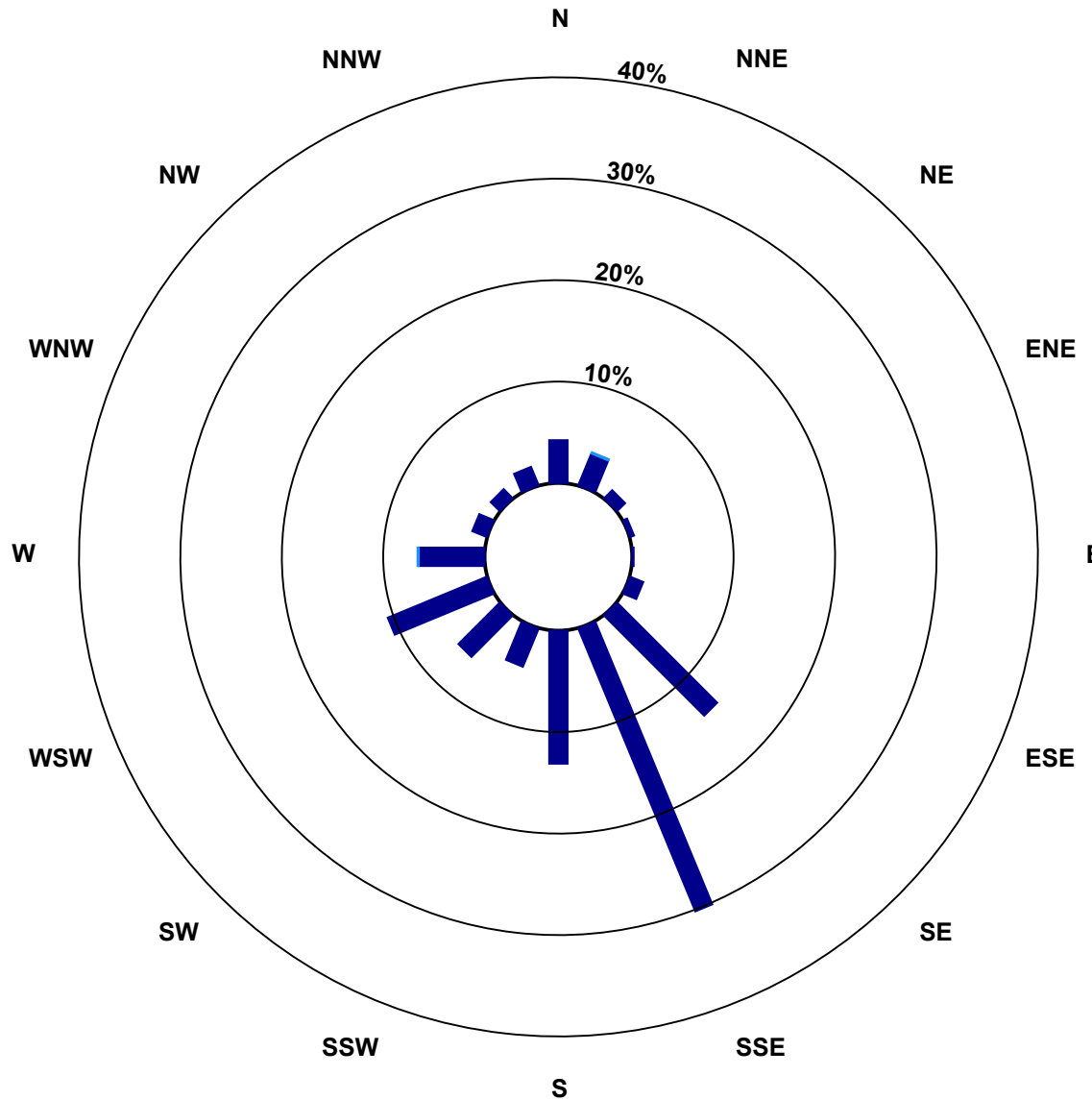
Total Number of Valid Hours: 709

Total Number of Hours: 744

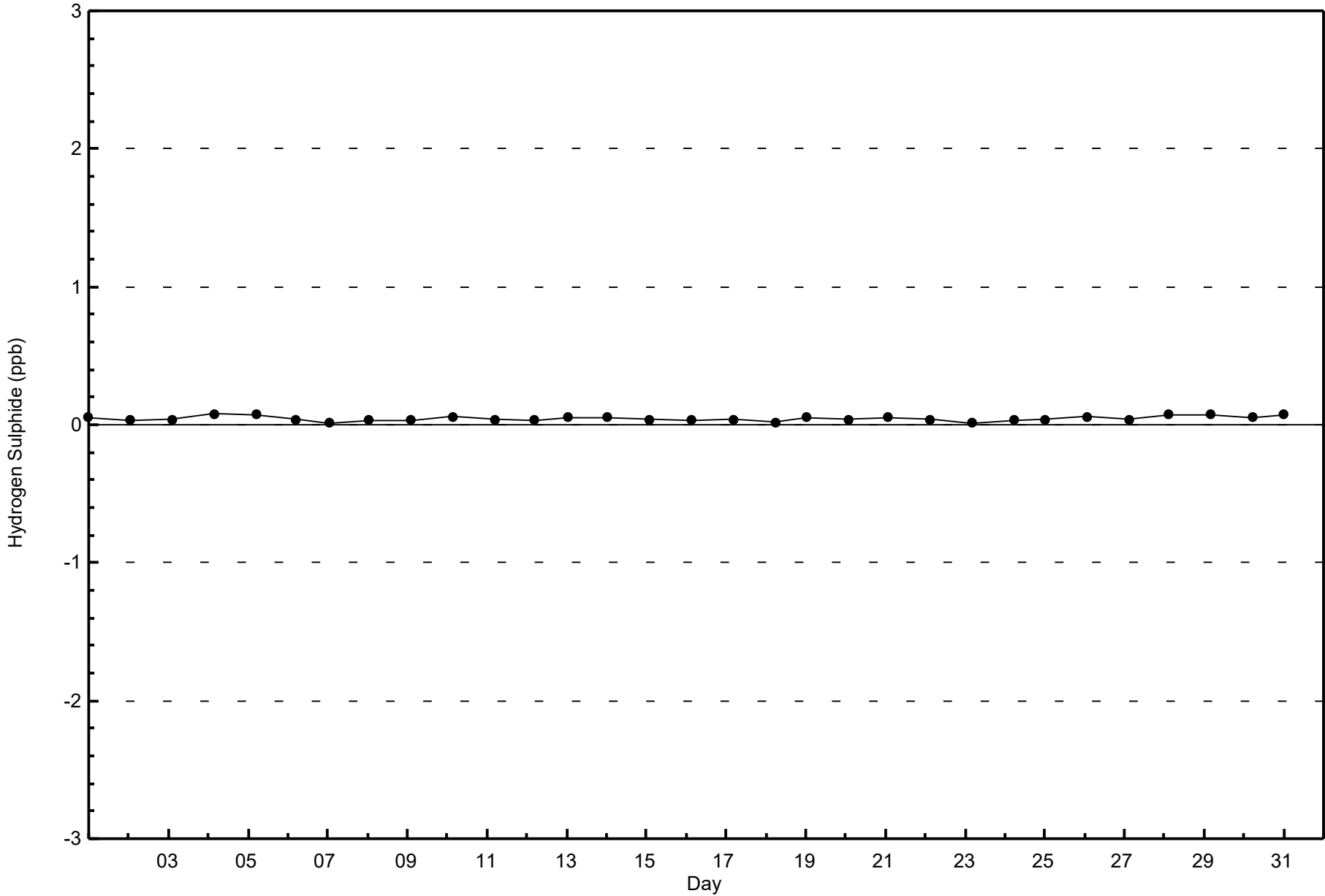


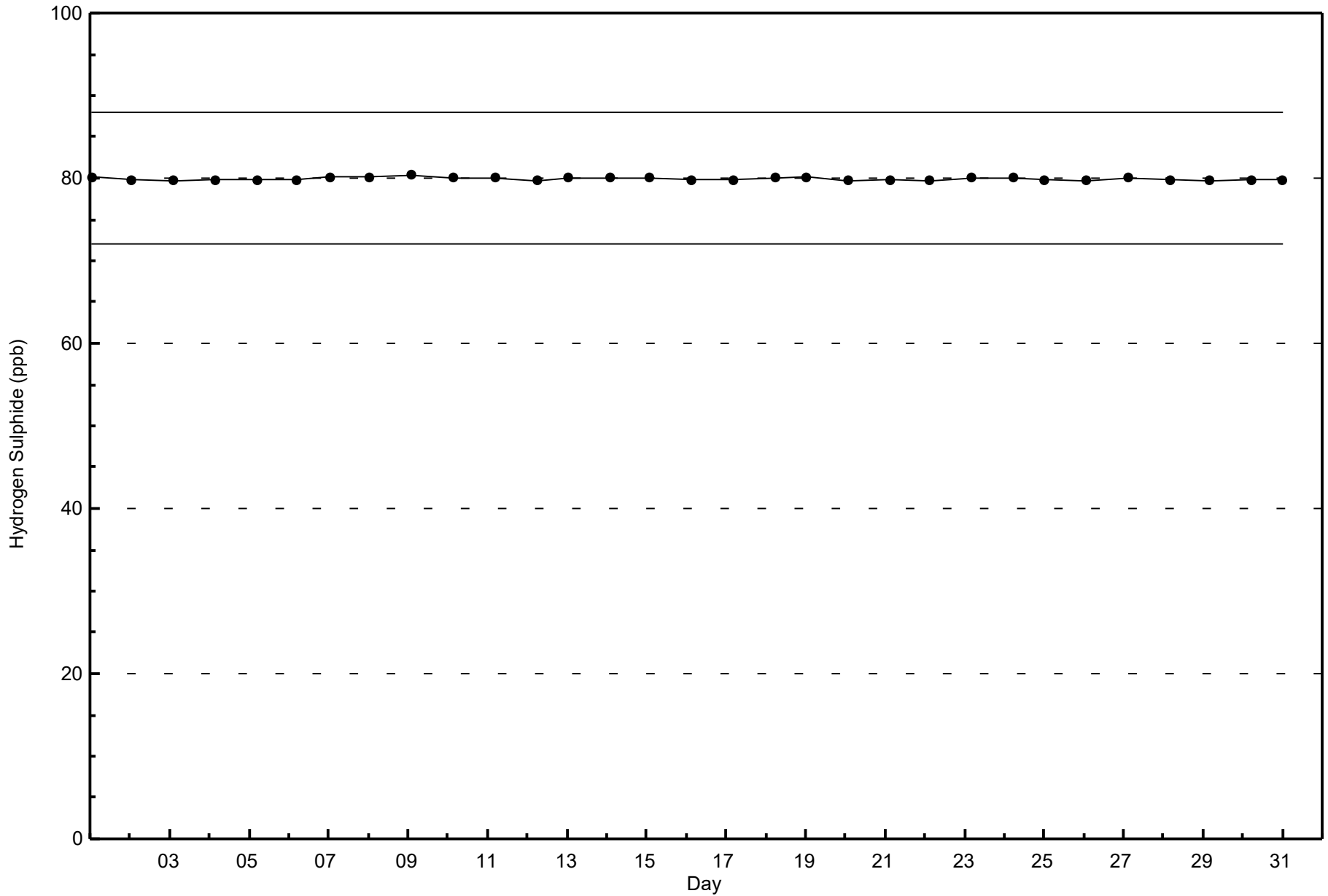
Wood Buffalo Environmental Association
Wind Rose Dec 2023

Hydrogen Sulphide (H₂S) - ppb
Buffalo Viewpoint



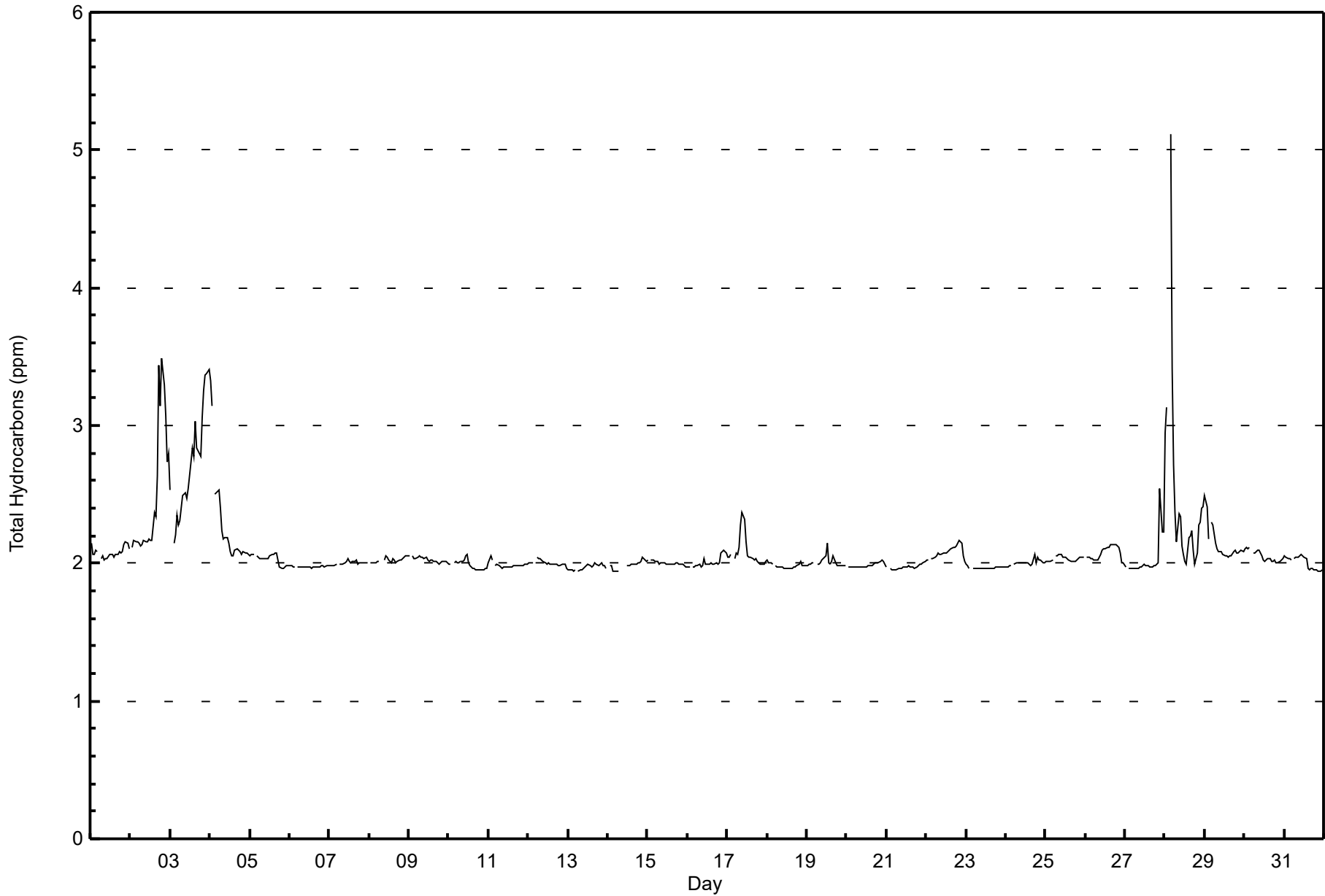
Total Number of Valid Hours: 709







Maximum Value: 5.1 ppm on Dec 28 04:00																					Maximum Daily Average: 2.7 ppm on Dec 3				Hours in Service: 744				
Minimum Value: 1.9 ppm on Dec 14 05:00																					Minimum Daily Average: 2.0 ppm on Dec 23				Hours of Data: 707				
Maximum Diurnal Average: 2.2 ppm at hour 4																					Minimum Diurnal Average: 2.0 ppm at hour 3				Hours of Missing Data: 37				
Monthly Average: 2.08 ppm																					Percentiles: P ₁ = 1.9 P ₁₀ = 2.0 Q ₁ = 2.0 Median = 2.0 Q ₃ = 2.1 P ₉₀ = 2.2 P ₉₉ = 3.3				Hours of Calibration: 35				
																									Percent Operational Time: 99.7				
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24					
1-Dec	2.1	2.1	2.1	2.1	2.1	Z	2.0	2.1	2.0	2.0	2.0	2.1	2.1	2.1	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.5	3.5	
2-Dec	Z	2.1	2.2	2.2	2.2	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.4	2.3	2.6	3.4	3.1	3.5	3.3	3.1	2.7	2.8	2.7	3.4	2.3	3.3	
3-Dec	2.5	Z	2.1	2.2	2.4	2.3	2.3	2.5	2.5	2.5	2.5	2.5	2.7	2.8	2.8	3.0	2.8	2.8	2.8	3.1	3.3	3.4	3.4	3.4	2.7	3.4	2.7	3.4	
4-Dec	3.3	3.1	Z	2.5	2.5	2.5	2.4	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.3	3.3	2.3	
5-Dec	2.1	2.1	2.1	Z	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	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1
6-Dec	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
7-Dec	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
8-Dec	Z	2.0	2.0	2.0	2.0	2.0	2.0	M	M	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.0	2.1	2.0	2.1	2.1
9-Dec	2.1	Z	2.1	2.0	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	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-Dec	2.0	2.0	Z	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	2.0	2.0	2.0	2.0
11-Dec	2.0	2.1	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
12-Dec	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
13-Dec	2.0	2.0	1.9	1.9	2.0	Z	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
14-Dec	Z	2.0	2.0	1.9	1.9	1.9	1.9	C	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
15-Dec	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
16-Dec	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	2.1	2.1	2.0	2.1	2.0	2.1
17-Dec	2.0	2.0	2.1	Z	2.0	2.1	2.1	2.1	2.3	2.4	2.3	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
18-Dec	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
19-Dec	2.0	2.0	2.0	2.0	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	2.0
20-Dec	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
21-Dec	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
22-Dec	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.0	2.1	2.1	2.1	2.2
23-Dec	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
24-Dec	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	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
25-Dec	2.0	2.0	2.0	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	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
26-Dec	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	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.1	2.1	2.1
27-Dec	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	2.5	2.2	2.2	2.0	2.5
28-Dec	2.9	3.1	Z	5.1	3.4	2.7	2.4	2.2	2.4	2.3	2.1	2.1	2.0	2.0	2.2	2.2	2.2	2.2	2.1	2.0	2.1	2.3	2.3	2.4	2.4	2.5	5.1	2.5	5.1
29-Dec	2.5	2.4	2.2	Z	2.3	2.3	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
30-Dec	2.1	2.1	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
31-Dec	2.1	2.0	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.1
2.1 2.1 2.0 2.2 2.1 2.1 2.0 2.0 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																								Diurnal Average					
3.3 3.1 2.2 5.1 3.4 2.7 2.4 2.5 2.5 2.5 2.5 2.5 2.7 2.8 2.8 3.0 2.8 3.4 3.1 3.5 3.3 3.4 3.4 3.4																								Diurnal Maximum					
Z - zerospan C - Calibration M - Maintenance																													





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	494	69.87	69.87
2.1 - 3.0	198	28.01	97.88
3.1 - 10.0	15	2.12	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Total Hydrocarbons (THC) - ppm
Buffalo Viewpoint - December 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	12	12	4	0	1	7	71	140	51	27	39	70	43	11	5	1	494
2.1 - 3.0	14	12	5	3	0	3	24	78	37	2	3	3	4	0	2	8	198
3.1 - 10.0	2	1	0	0	0	0	0	1	4	0	0	0	0	0	1	6	15
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	28	25	9	3	1	10	95	219	92	29	42	73	47	11	8	15	707

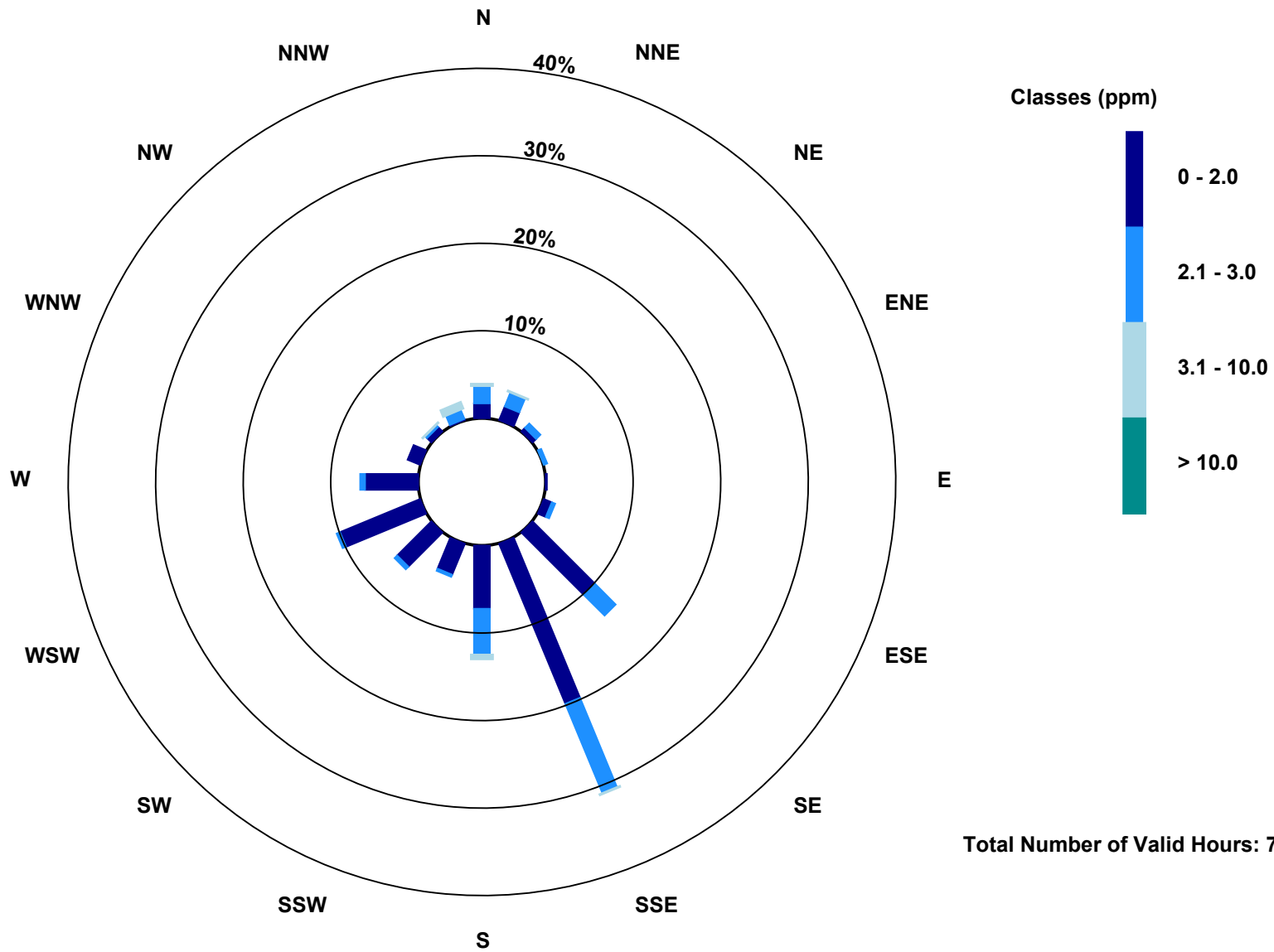
Total Number of Valid Hours: 707

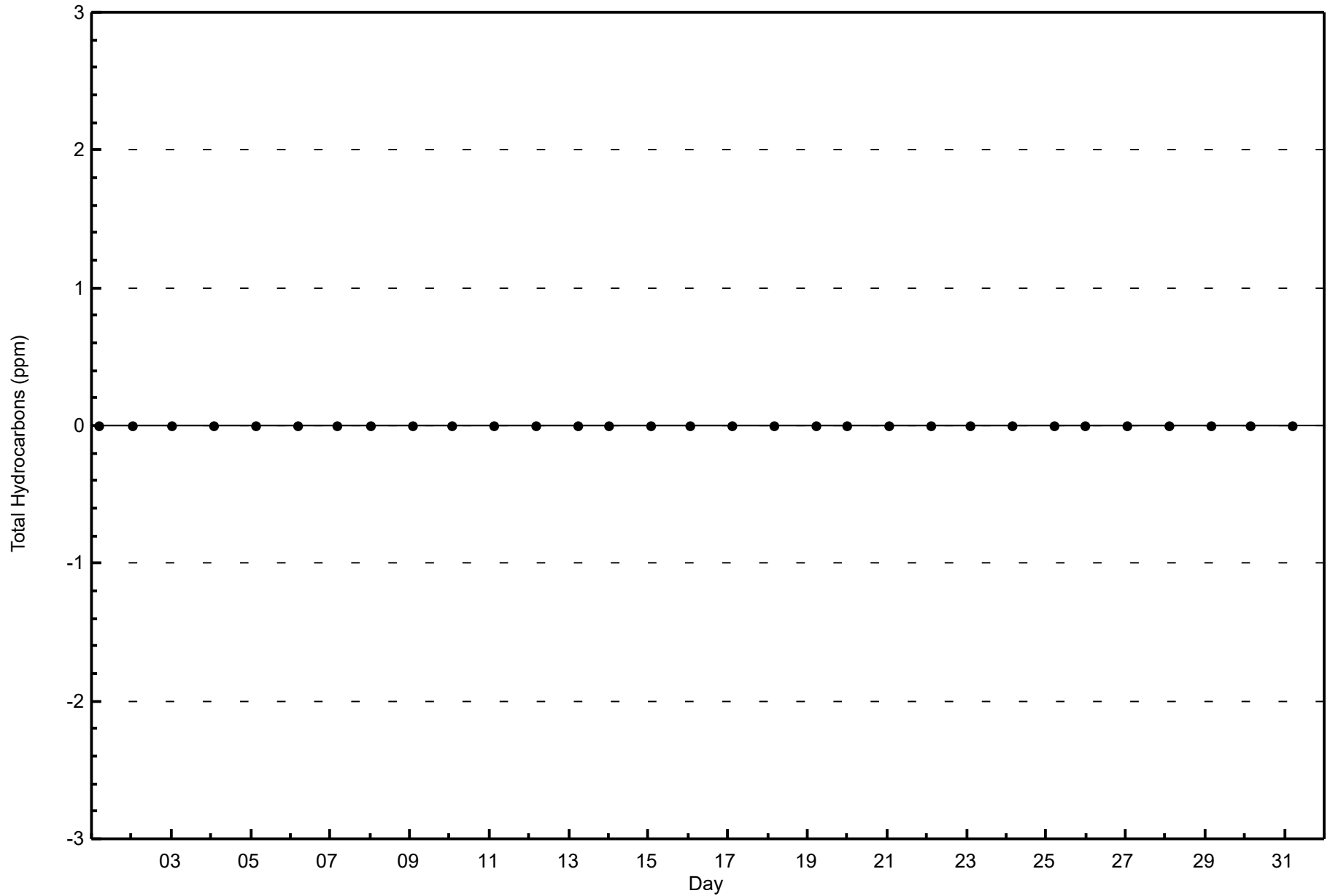
Total Number of Hours: 744

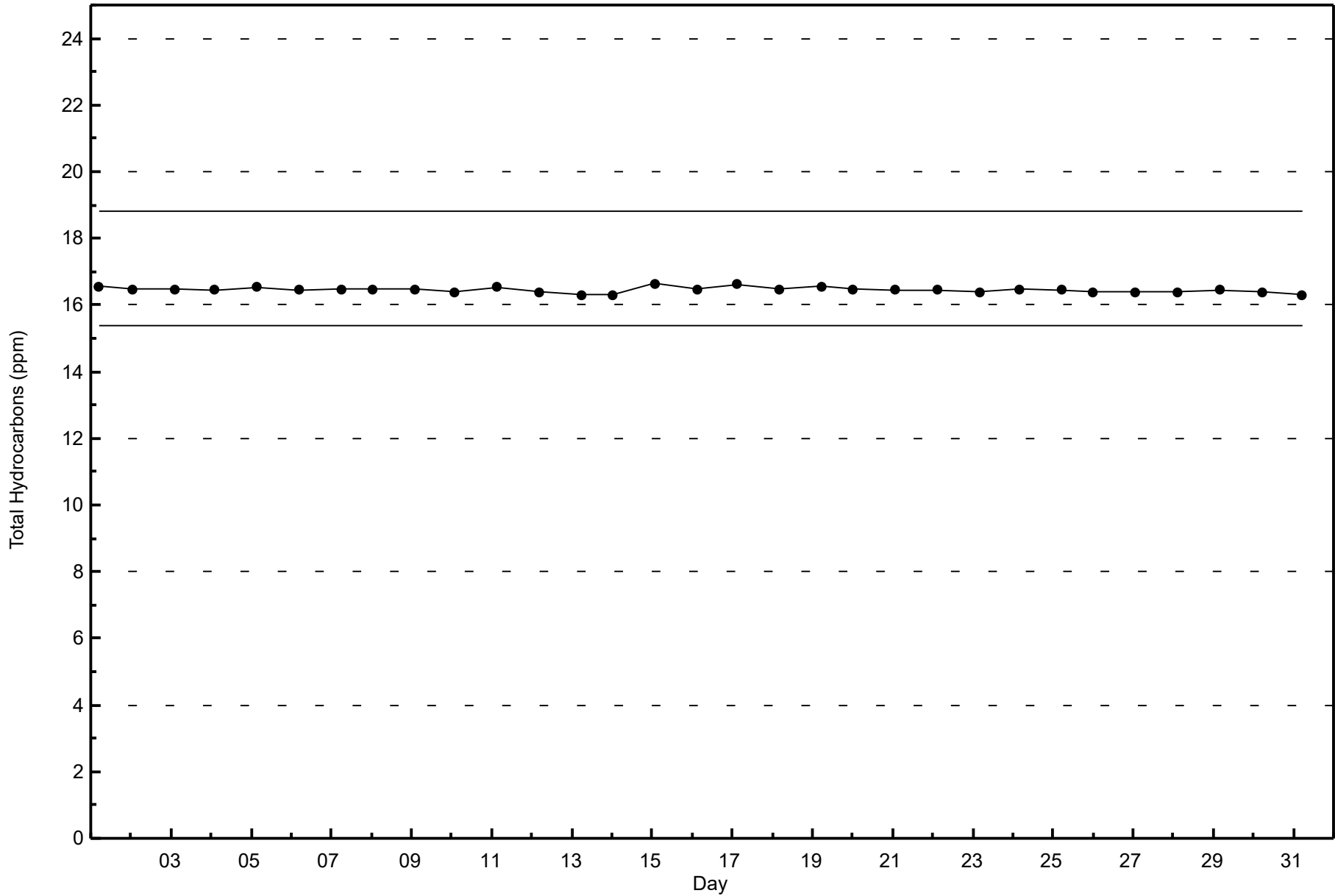


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Total Hydrocarbons (THC) - ppm
Buffalo Viewpoint

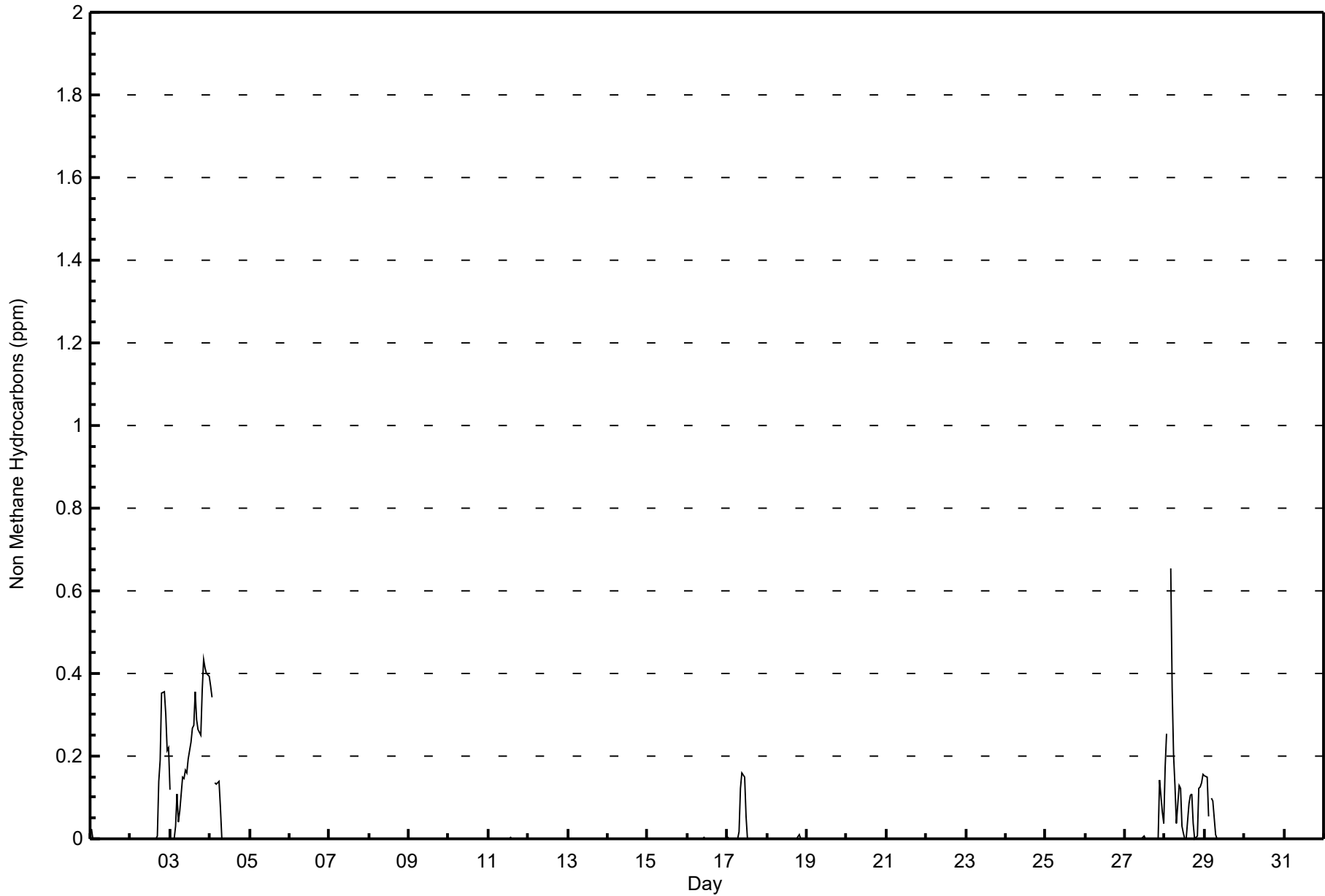








Maximum Value: 0.656 ppm on Dec 28 04:00		Maximum Daily Average: 0.222 ppm on Dec 3		Hours in Service: 744																							
Minimum Value: 0.000 ppm on Dec 1 02:00		Minimum Daily Average: 0.000 ppm on Dec 5		Hours of Data: 707																							
Maximum Diurnal Average: 0.032 ppm at hour 1		Minimum Diurnal Average: 0.002 ppm at hour 3		Hours of Missing Data: 37																							
Monthly Average: 0.018 ppm		Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.0 Median = 0.0 Q ₃ = 0.0 P ₉₀ = 0.0 P ₉₉ = 0.4		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-Dec	0.024	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	0.001	0.024	
2-Dec	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	0.006	0.139	0.190	0.352	0.358	0.301	0.212	0.220	0.077	0.358	
3-Dec	0.117	Z	0.000	0.031	0.110	0.041	0.067	0.148	0.146	0.165	0.160	0.192	0.234	0.268	0.275	0.356	0.289	0.264	0.252	0.358	0.433	0.414	0.400	0.395	0.222	0.433	
4-Dec	0.370	0.344	Z	0.137	0.131	0.139	0.073	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	0.052	0.370	
5-Dec	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-Dec	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-Dec	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-Dec	Z	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	0.000	0.000	0.000	0.000	0.000	
9-Dec	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-Dec	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-Dec	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	
12-Dec	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	
13-Dec	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-Dec	Z	0.000	0.001	0.000	0.000	0.000	0.000	C	C	C	C	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	
15-Dec	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	
16-Dec	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004	
17-Dec	0.003	0.000	0.000	Z	0.000	0.000	0.000	0.017	0.123	0.159	0.150	0.055	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.022	0.159	
18-Dec	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	0.011	
19-Dec	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-Dec	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-Dec	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-Dec	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	
23-Dec	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-Dec	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-Dec	0.000	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
26-Dec	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	
27-Dec	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.008	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.143	0.066	0.038	0.011	
28-Dec	0.173	0.255	Z	0.656	0.362	0.205	0.130	0.036	0.128	0.123	0.030	0.014	0.000	0.000	0.086	0.106	0.110	0.039	0.000	0.006	0.121	0.126	0.134	0.155	0.130	0.656	
29-Dec	0.153	0.149	0.053	Z	0.097	0.092	0.009	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.024	0.153	
30-Dec	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	
31-Dec	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	
		0.032	0.029	0.002	0.032	0.027	0.019	0.009	0.007	0.014	0.015	0.011	0.009	0.008	0.009	0.012	0.015	0.013	0.014	0.014	0.023	0.029	0.032	0.026	0.026	Diurnal Average	
		0.370	0.344	0.053	0.656	0.362	0.205	0.130	0.148	0.146	0.165	0.160	0.192	0.234	0.268	0.275	0.356	0.289	0.264	0.252	0.358	0.433	0.414	0.400	0.395	Diurnal Maximum	
Z - zerospan		C - Calibration				M - Maintenance																					





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 0.005	634	89.67	89.67
0.006 - 0.05	16	2.26	91.94
0.06 - 0.1	25	3.54	95.47
> 0.1	32	4.53	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

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

Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 0.005	12	13	5	0	1	10	92	209	87	29	41	71	45	11	5	3	634
0.006 - 0.05	3	1	2	0	0	0	1	3	0	0	0	2	2	0	0	2	16
0.06 - 0.1	5	2	2	3	0	0	2	4	1	0	1	0	0	0	0	5	25
> 0.1	8	9	0	0	0	0	0	3	4	0	0	0	0	0	3	5	32
Totals	28	25	9	3	1	10	95	219	92	29	42	73	47	11	8	15	707

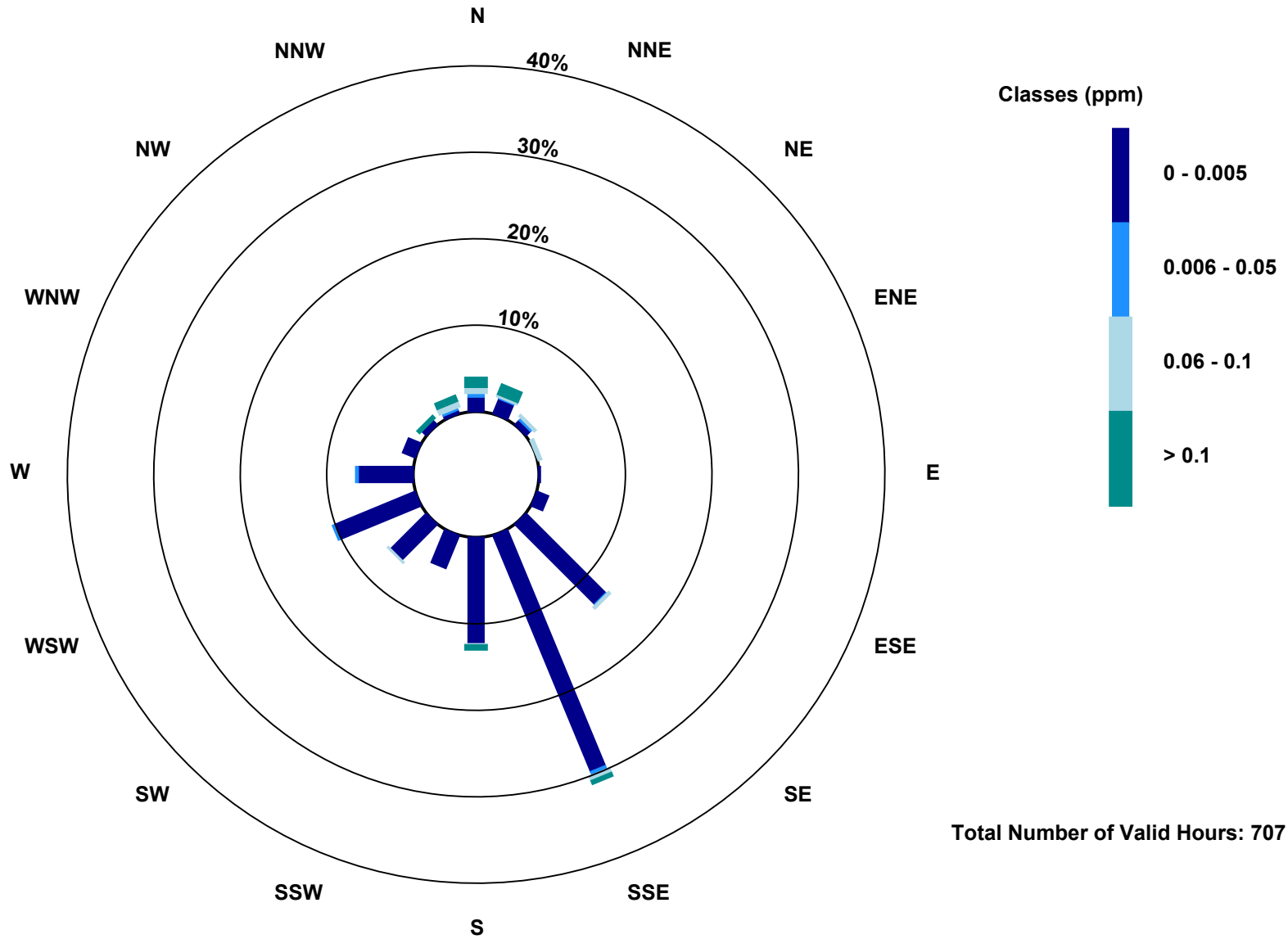
Total Number of Valid Hours: 707

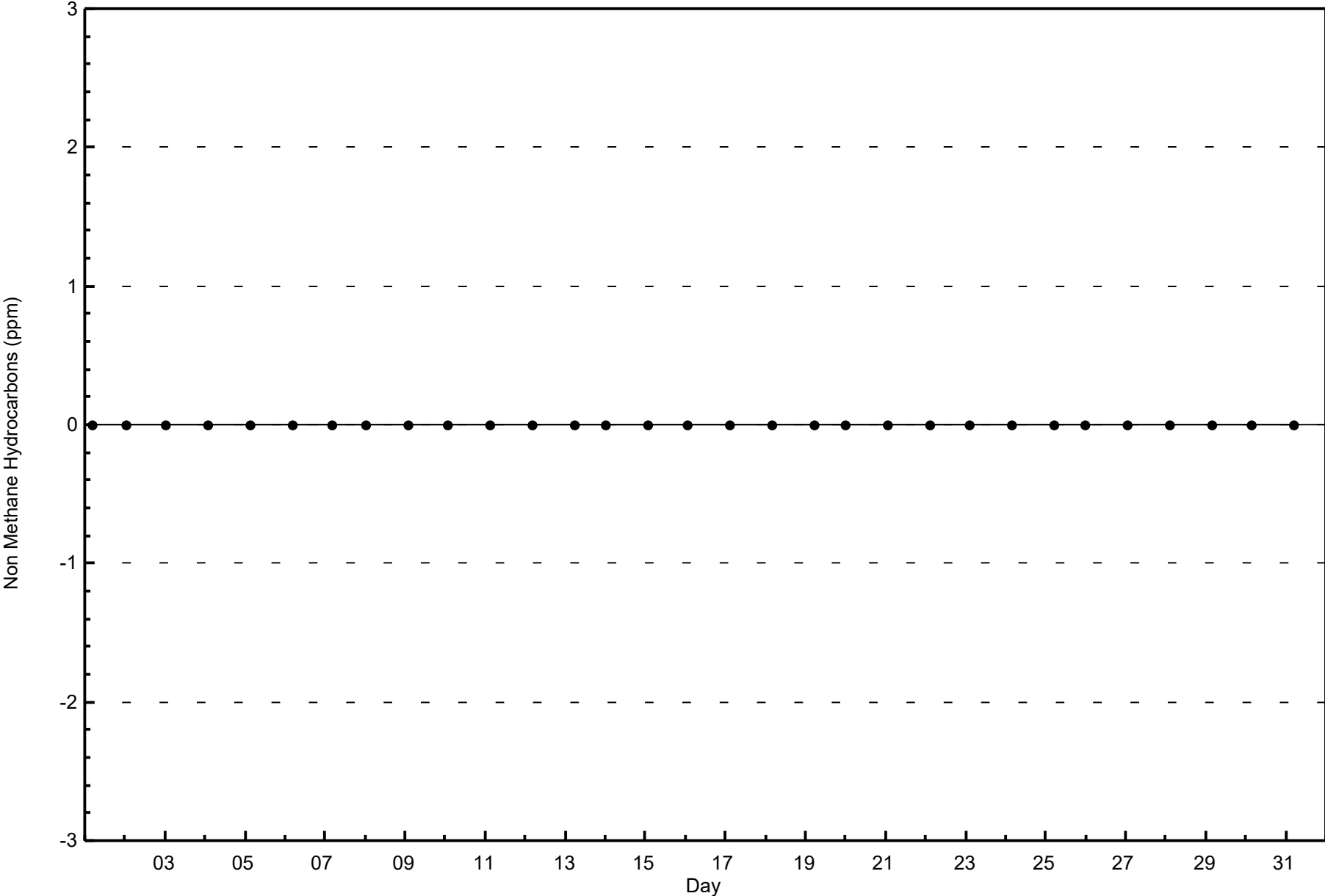
Total Number of Hours: 744

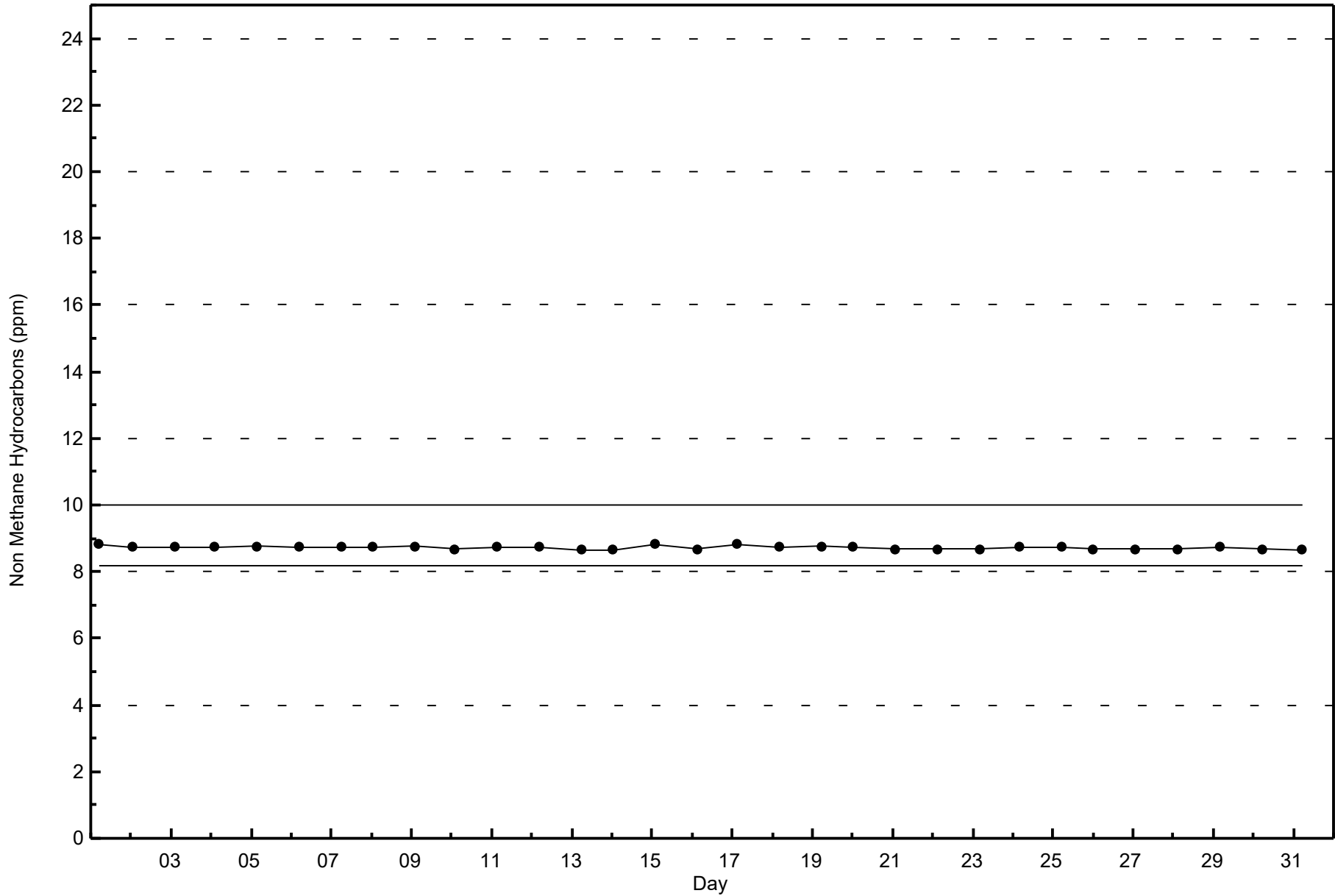


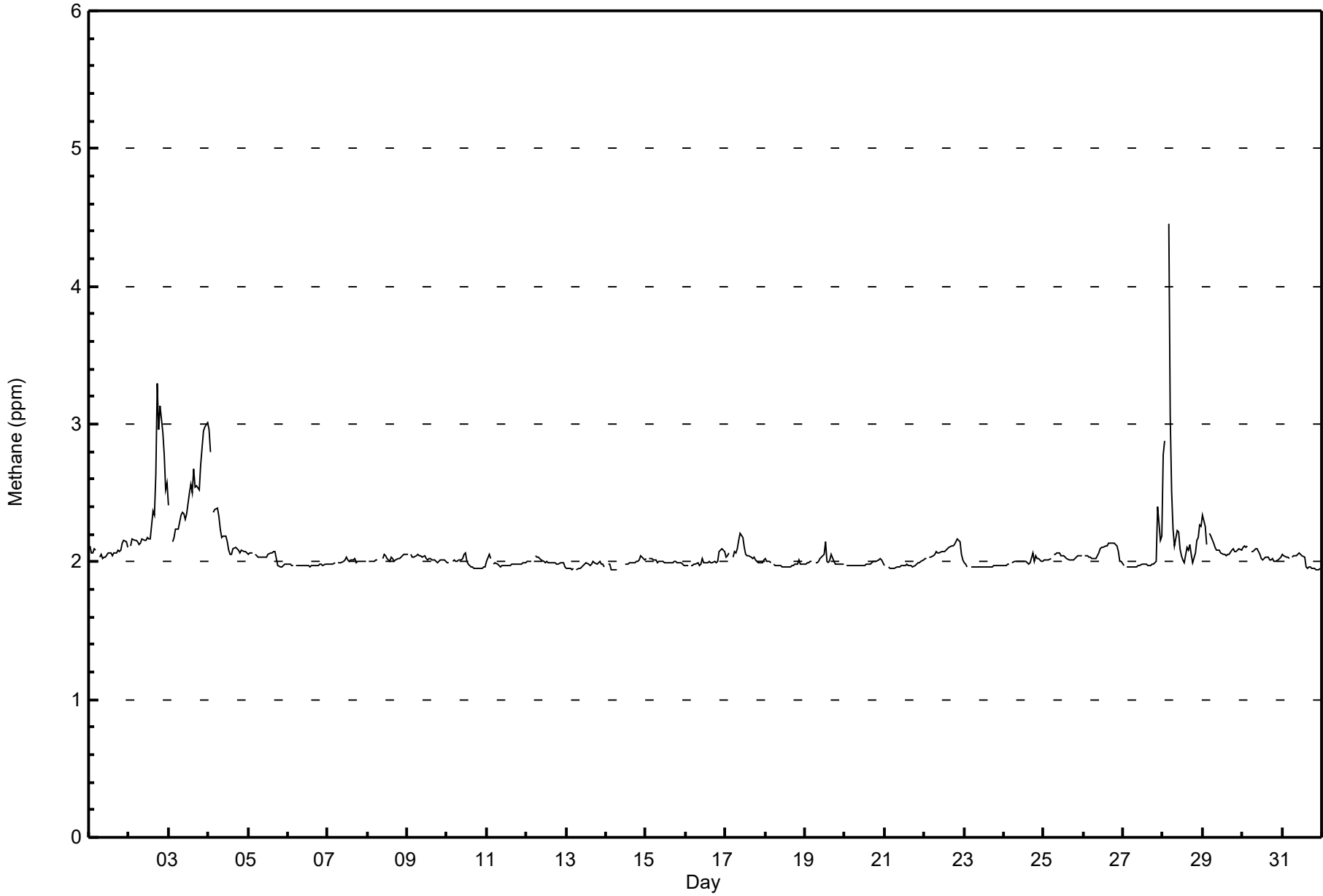
Wood Buffalo Environmental Association
Wind Rose Dec 2023

Non Methane Hydrocarbons (NMHC) - ppm
Buffalo Viewpoint











Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Methane (CH₄) - ppm
Buffalo Viewpoint - December 2023

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	495	70.01	70.01
2.1 - 3.0	208	29.42	99.43
3.1 - 10.0	4	0.57	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Methane (CH₄) - ppm
Buffalo Viewpoint - December 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	12	12	4	0	1	7	71	140	51	27	39	70	43	11	5	2	495
2.1 - 3.0	15	13	5	3	0	3	24	79	41	2	3	3	4	0	2	11	208
3.1 - 10.0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	4
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	28	25	9	3	1	10	95	219	92	29	42	73	47	11	8	15	707

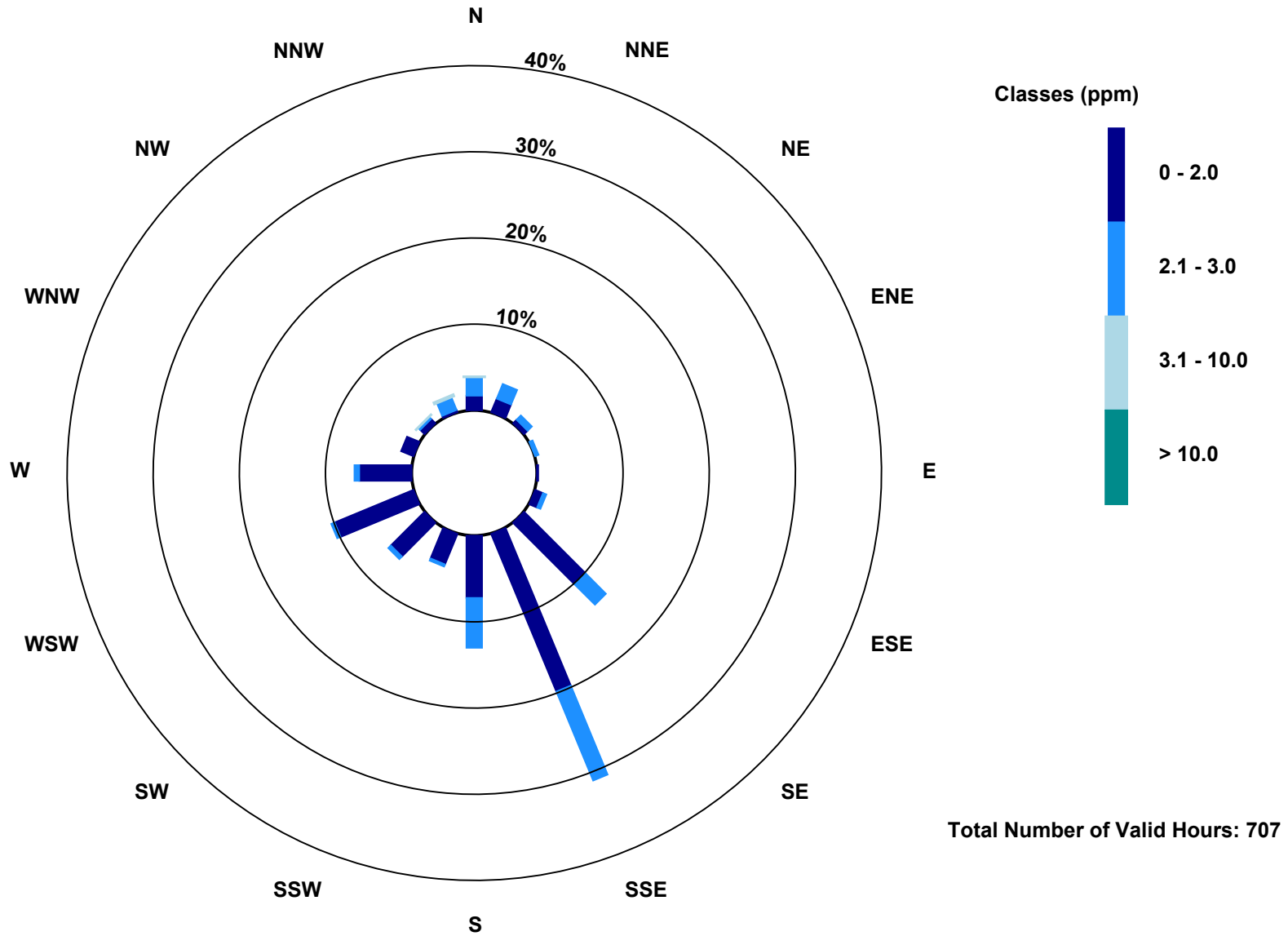
Total Number of Valid Hours: 707

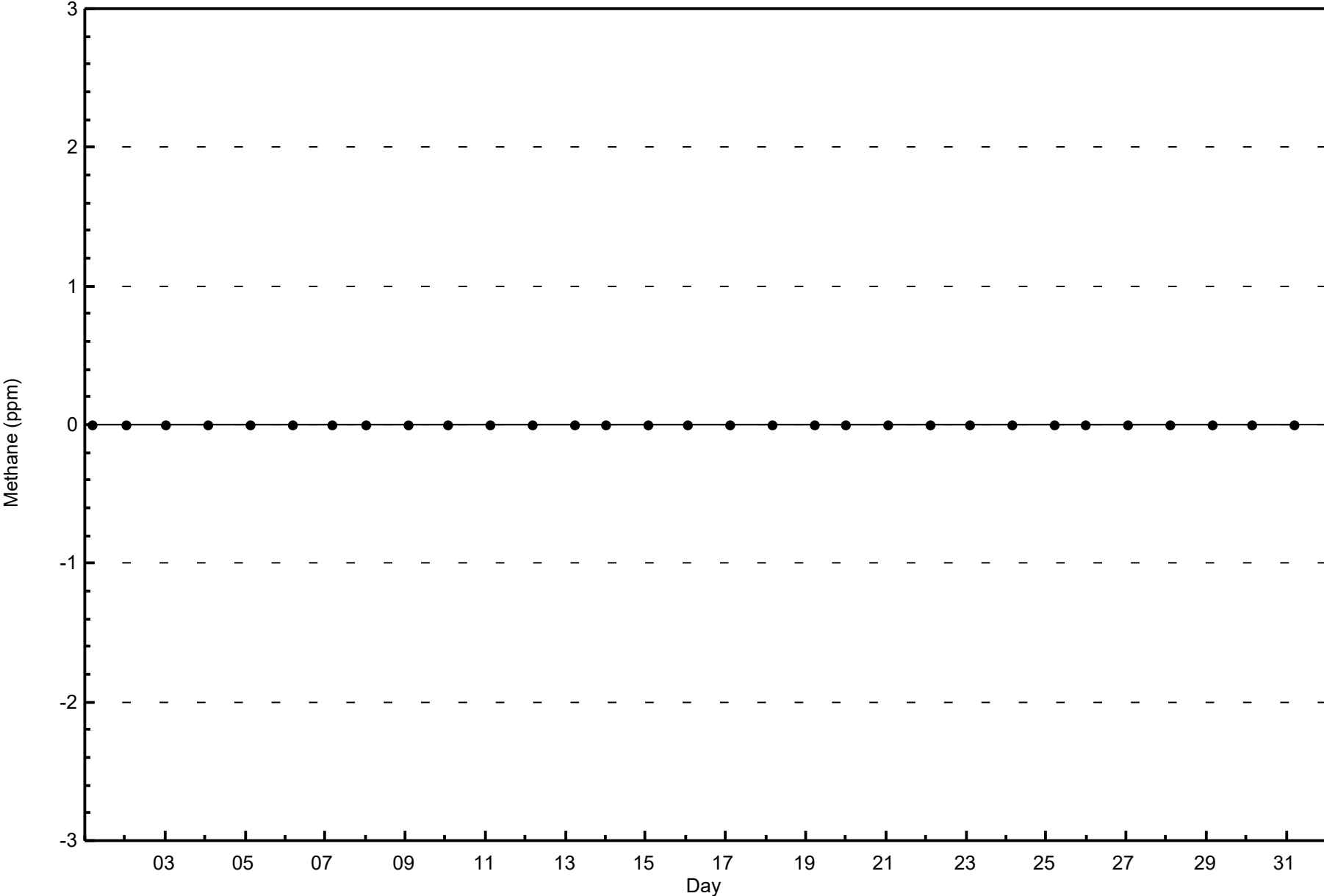
Total Number of Hours: 744

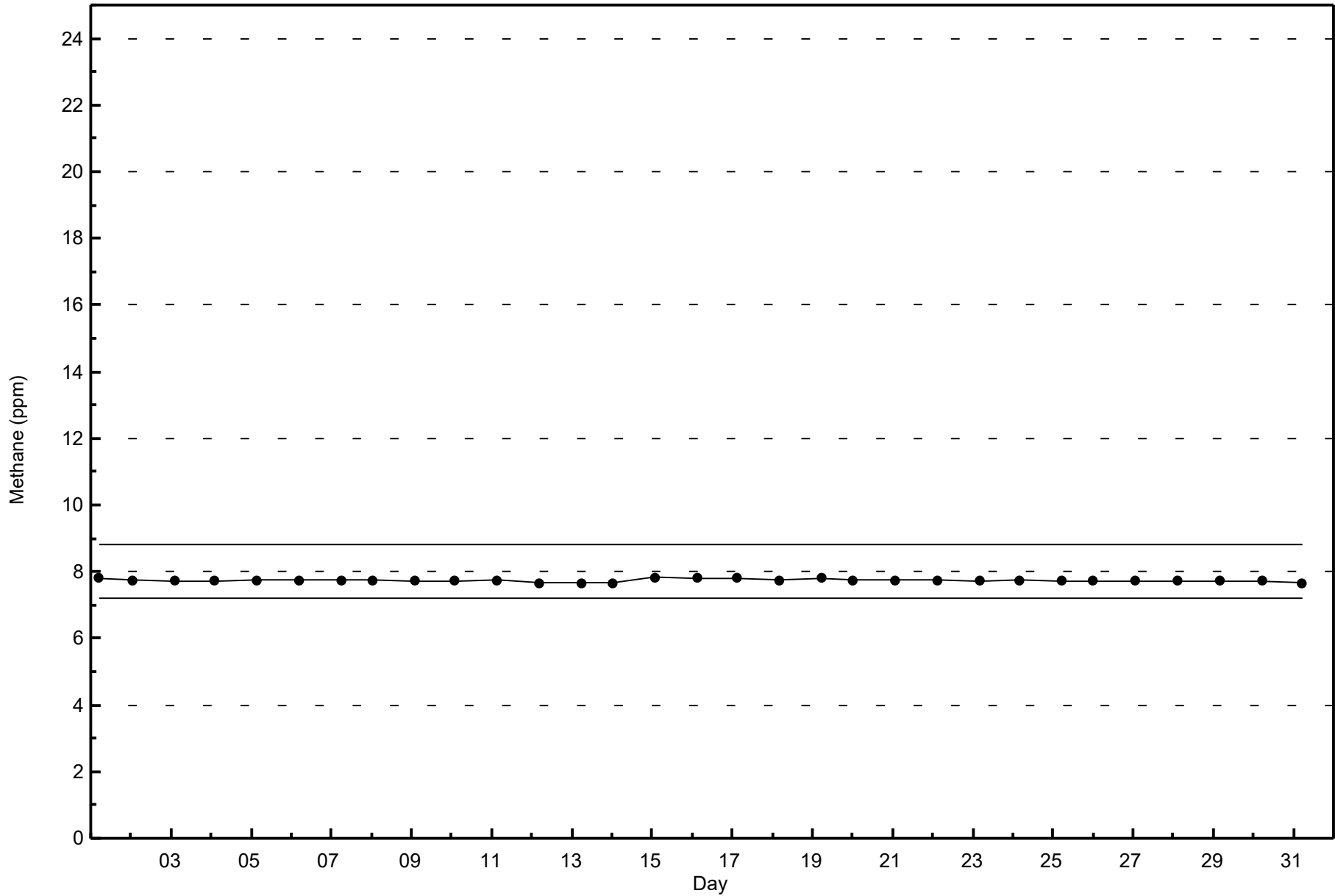


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Methane (CH₄) - ppm
Buffalo Viewpoint

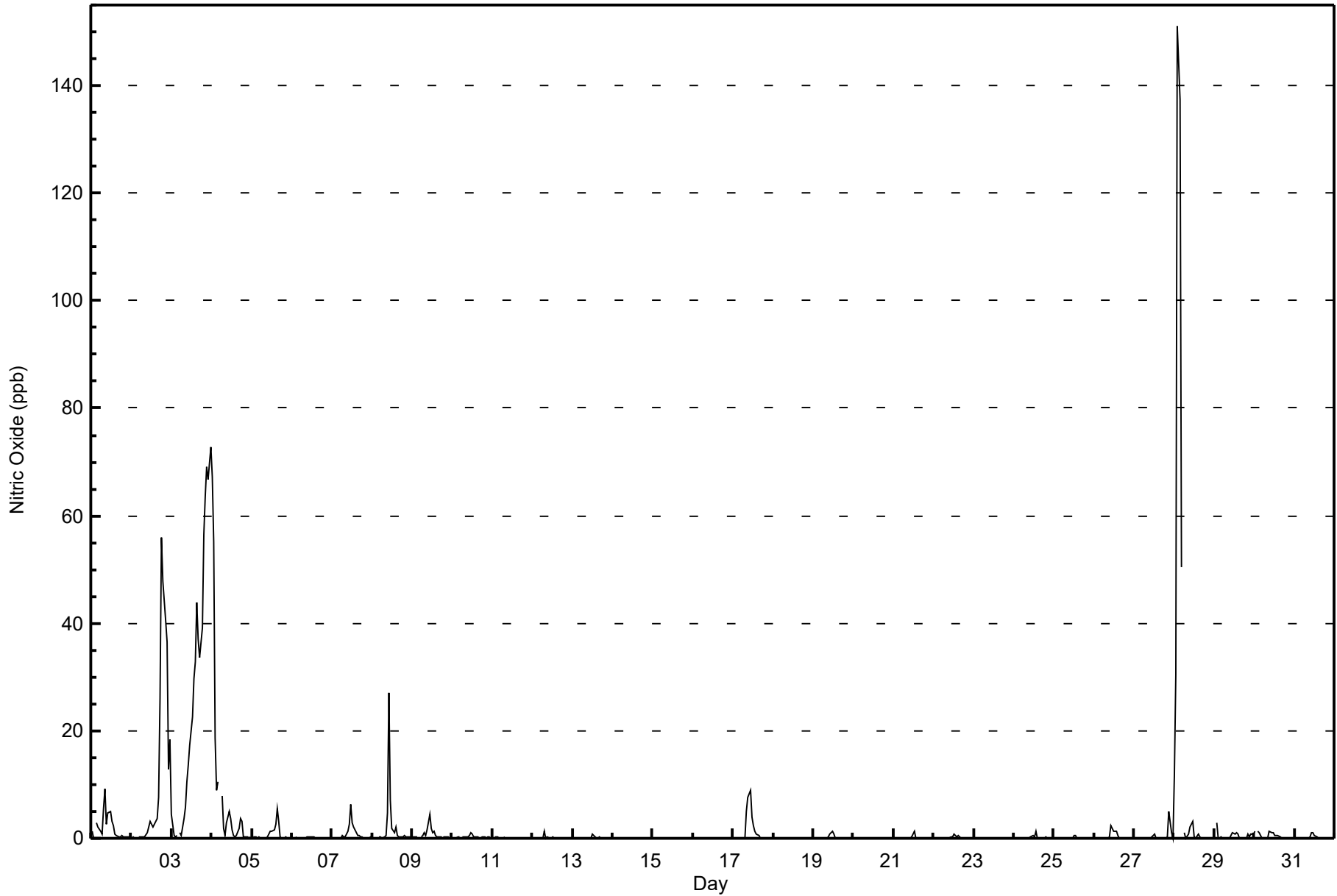








Maximum Value: 151.1 ppb on Dec 28 03:00																				Maximum Daily Average: 27.2 ppb on Dec 3					Hours in Service: 744	
Minimum Value: 0.0 ppb on Dec 1 02:00																				Minimum Daily Average: 0.0 ppb on Dec 14					Hours of Data: 707	
Maximum Diurnal Average: 6.9 ppb at hour 3																				Minimum Diurnal Average: 0.1 ppb at hour 6					Hours of Missing Data: 37	
Monthly Average: 2.43 ppb																				Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.0 Median = 0.0 Q ₃ = 0.4 P ₉₀ = 2.5 P ₉₉ = 56.4					Hours of Calibration: 37	
																									Percent Operational Time: 100.0	
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Dec	1.3	0.0	Z	3.0	2.1	1.4	0.7	5.6	9.3	2.7	4.7	4.9	3.2	2.2	0.9	0.5	0.2	0.2	0.4	0.3	0.4	0.2	0.2	0.2	1.9	9.3
2-Dec	0.1	0.2	0.1	Z	0.4	0.2	0.1	0.1	0.3	1.1	2.0	3.3	2.7	2.1	3.1	3.7	7.6	26.1	56.0	47.9	40.5	36.5	12.7	18.4	11.5	56.0
3-Dec	4.6	0.4	0.3	0.6	Z	1.0	0.5	3.7	5.9	10.6	13.7	17.3	22.6	29.6	32.9	43.9	37.0	33.7	39.1	56.4	63.6	69.2	66.8	72.8	27.2	72.8
4-Dec	67.2	55.2	18.7	9.0	10.4	Z	7.9	1.7	0.5	2.8	5.1	3.6	1.5	0.6	0.3	0.6	1.7	3.7	3.2	0.2	0.4	0.2	0.1	0.2	8.5	67.2
5-Dec	Z	0.3	0.3	0.1	0.2	0.0	0.1	0.1	0.0	0.2	0.8	1.4	1.3	1.7	2.6	5.6	3.2	0.3	0.1	0.0	0.2	0.0	0.0	0.0	0.8	5.6
6-Dec	0.0	Z	0.2	0.0	0.1	0.0	0.1	0.0	0.0	0.2	0.3	0.2	0.2	0.2	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.0	0.0	0.1	0.1	0.3
7-Dec	0.0	0.1	Z	0.0	0.1	0.1	0.5	0.2	0.2	1.4	2.8	6.3	2.8	2.2	1.7	0.4	0.5	0.2	0.2	0.0	0.1	0.1	0.0	0.1	0.9	6.3
8-Dec	0.2	0.0	0.0	Z	0.2	0.1	0.1	0.2	0.6	4.8	27.0	7.1	1.7	1.1	2.1	0.6	0.2	0.2	0.4	0.6	0.2	0.2	0.2	0.3	2.1	27.0
9-Dec	0.2	0.2	0.3	0.2	Z	0.3	0.6	1.1	0.5	1.7	4.6	1.9	1.1	1.2	0.6	0.2	0.2	0.2	0.1	0.3	0.4	0.3	0.1	0.2	0.7	4.6
10-Dec	0.1	0.1	0.1	0.2	0.2	Z	0.4	0.2	0.2	0.3	0.6	1.1	0.7	0.4	0.1	0.2	0.0	0.1	0.2	0.2	0.0	0.2	0.3	0.1	0.3	1.1
11-Dec	Z	0.4	0.2	0.3	0.1	0.1	0.1	0.1	C	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	--	0.4
12-Dec	0.0	Z	0.0	0.0	0.0	0.0	0.0	1.3	0.0	0.4	0.0	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	0.1	1.3
13-Dec	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.7	0.2	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.7
14-Dec	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
15-Dec	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
16-Dec	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
17-Dec	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.1	4.9	7.5	9.0	4.0	2.5	1.4	0.9	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	9.0
18-Dec	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.7	1.4	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	1.4
20-Dec	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
21-Dec	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.1	0.2	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	1.2
22-Dec	0.0	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.1	0.2	0.8	0.6	0.3	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.8
23-Dec	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.6	0.3	1.4	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.1	1.4
25-Dec	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.6	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.6
26-Dec	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.4	2.4	1.8	1.2	1.3	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	2.4
27-Dec	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.7	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.3	4.9	1.0	0.0	0.3	4.9
28-Dec	12.1	30.4	151.1	137.3	50.4	Z	1.0	0.0	0.7	2.0	2.6	3.2	0.2	0.0	0.8	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	17.0	151.1
29-Dec	Z	2.9	0.1	0.1	0.2	0.0	0.0	0.0	0.0	0.0	0.5	1.1	0.9	1.1	0.7	0.0	0.0	0.0	0.0	0.0	0.8	0.3	0.9	0.9	0.5	2.9
30-Dec	1.4	Z	1.2	1.1	0.0	0.0	0.0	0.0	0.0	1.4	1.1	0.9	0.4	0.6	0.5	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	1.4
31-Dec	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.2	1.0	1.1	0.6	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	1.1
																								Diurnal Average		
																								Diurnal Maximum		
3.4 3.5 6.9 5.8 2.5 0.1 0.4 0.5 0.8 1.3 2.6 2.1 1.6 1.6 1.6 1.8 1.6 2.1 3.2 3.4 3.4 3.6 2.7 3.0																										
67.2 55.2 151.1 137.3 50.4 1.4 7.9 5.6 9.3 10.6 27.0 17.3 22.6 29.6 32.9 43.9 37.0 33.7 56.0 56.4 63.6 69.2 66.8 72.8																										
Z - zerospan C - Calibration																										





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	683	96.61	96.61
21 - 40	11	1.56	98.16
41 - 80	11	1.56	99.72
81 - 159	2	0.28	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitric Oxide (NO) - ppb
Buffalo Viewpoint - December 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	17	9	2	1	10	100	218	86	27	41	73	48	10	6	9	683
21 - 40	1	5	0	0	0	0	0	0	1	0	0	0	0	0	0	4	11
11 - 80	2	2	0	0	0	0	0	1	4	0	0	0	0	0	1	1	11
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	29	24	9	2	1	10	100	219	91	27	41	73	48	10	8	15	707

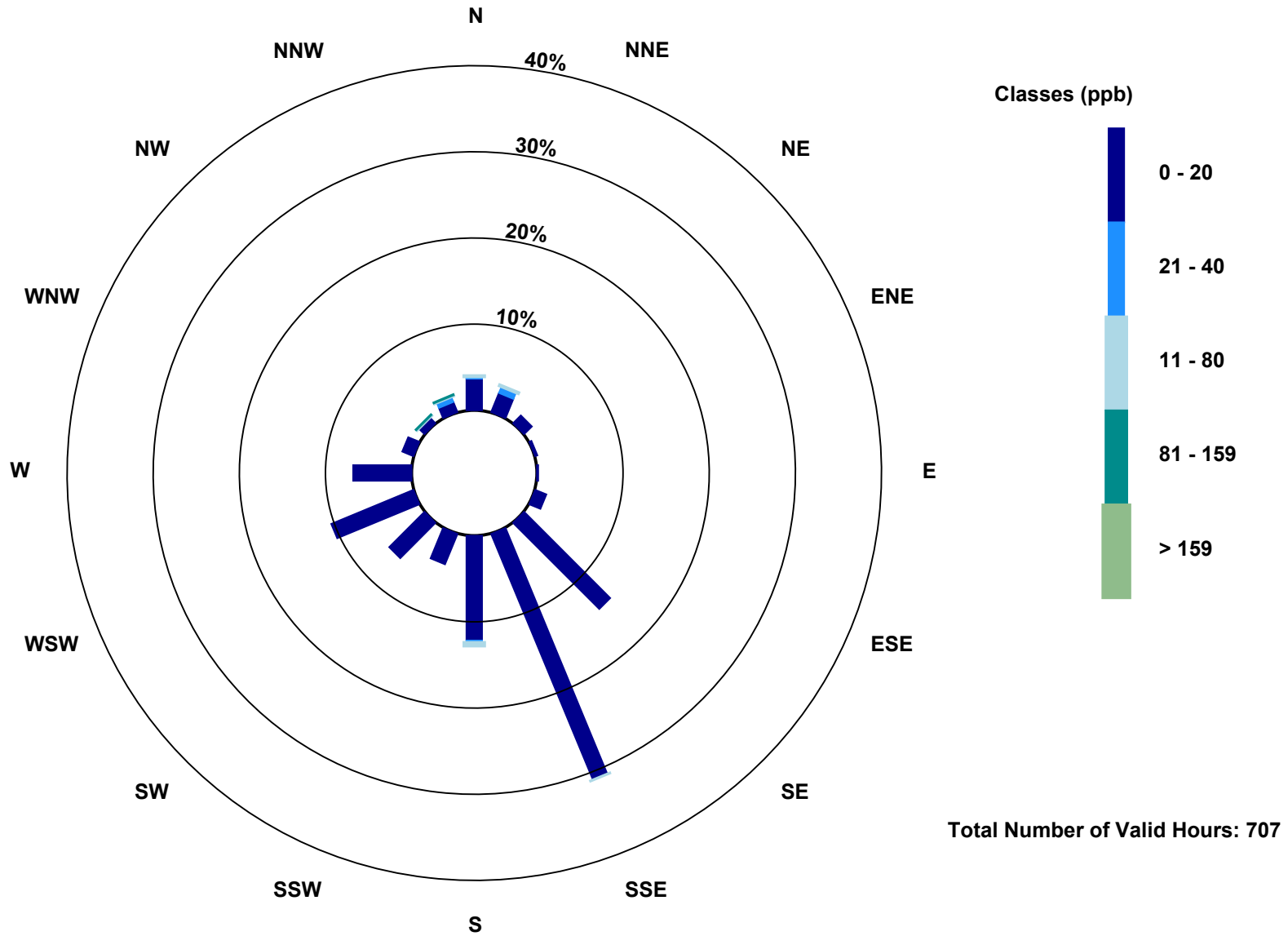
Total Number of Valid Hours: 707

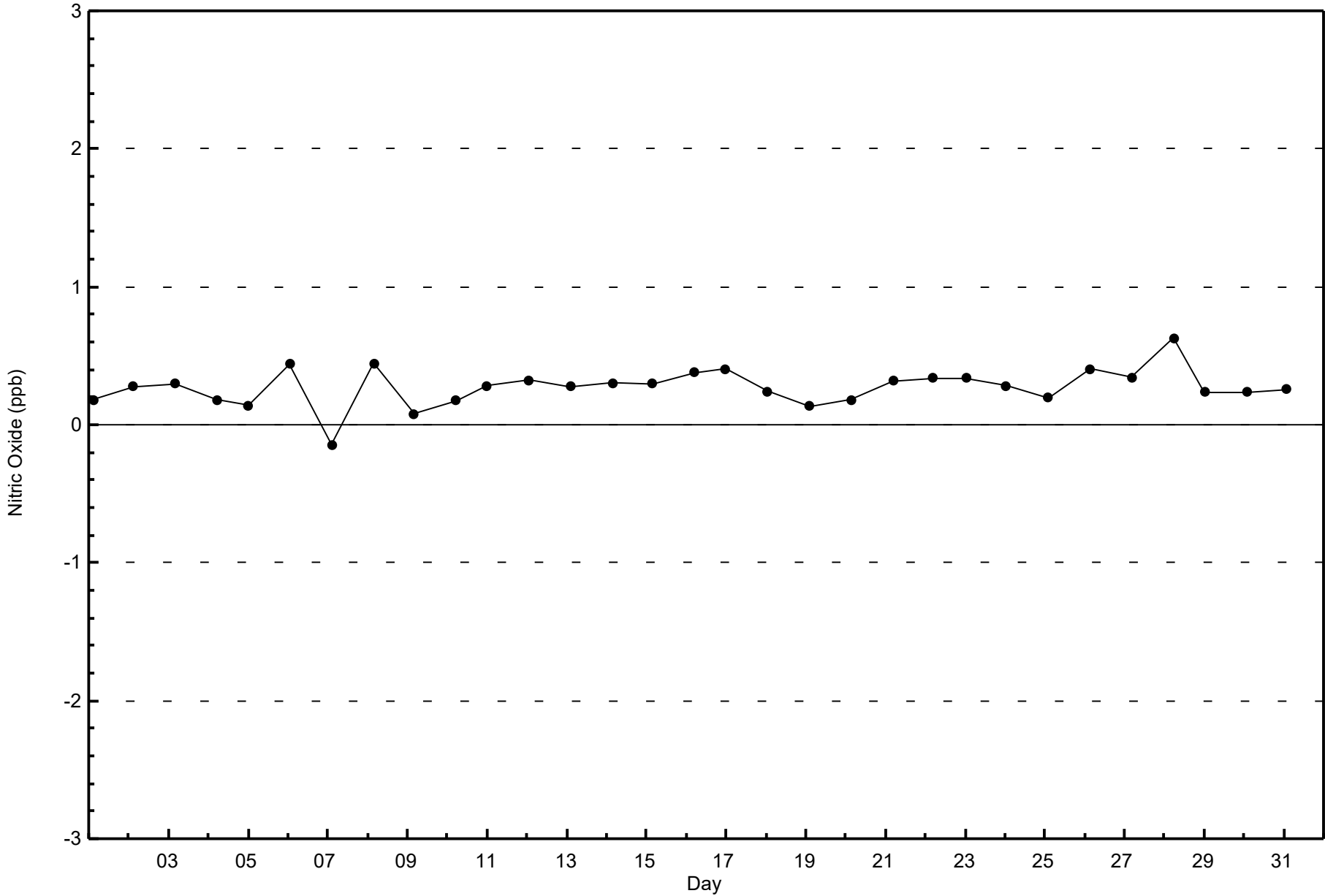
Total Number of Hours: 744

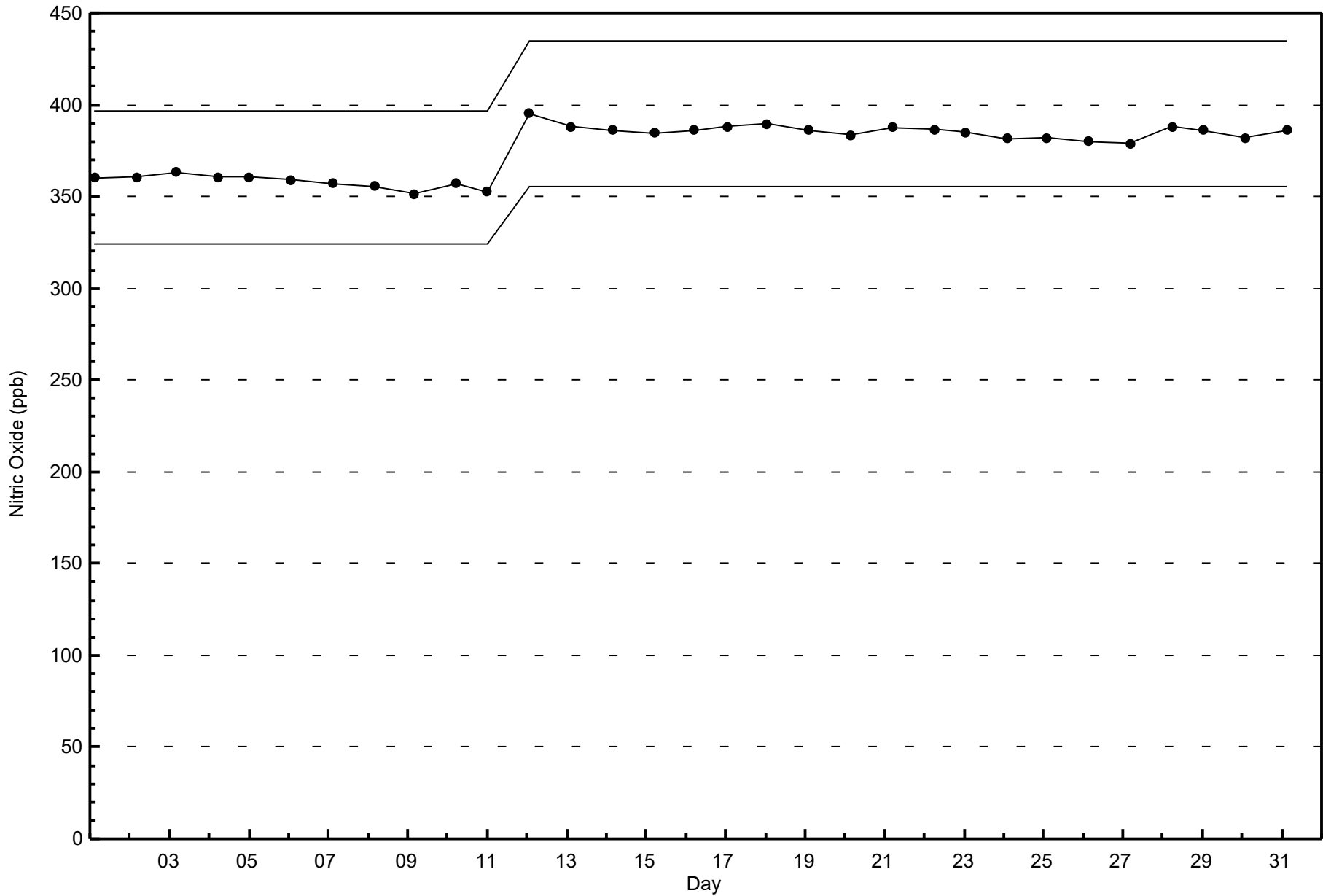


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Nitric Oxide (NO) - ppb
Buffalo Viewpoint









Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO₂) - ppb

Buffalo Viewpoint - December 2023

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 39.4 ppb on Dec 28 03:00	Maximum Daily Average: 19.2 ppb on Dec 28		Hours of Data:	707
Minimum Value: 0.0 ppb on Dec 10 19:00	Minimum Daily Average: 0.4 ppb on Dec 23		Hours of Missing Data:	37
Maximum Diurnal Average: 6.9 ppb at hour 17	Minimum Diurnal Average: 3.7 ppb at hour 6		Hours of Calibration:	37
Monthly Average: 5.56 ppb	Percentiles: P ₁ = 0.1 P ₁₀ = 0.5 Q ₁ = 1.1 Median = 3.7 Q ₃ = 7.3 P ₉₀ = 13.7 P ₉₉ = 24.7		Percent Operational Time:	100.0

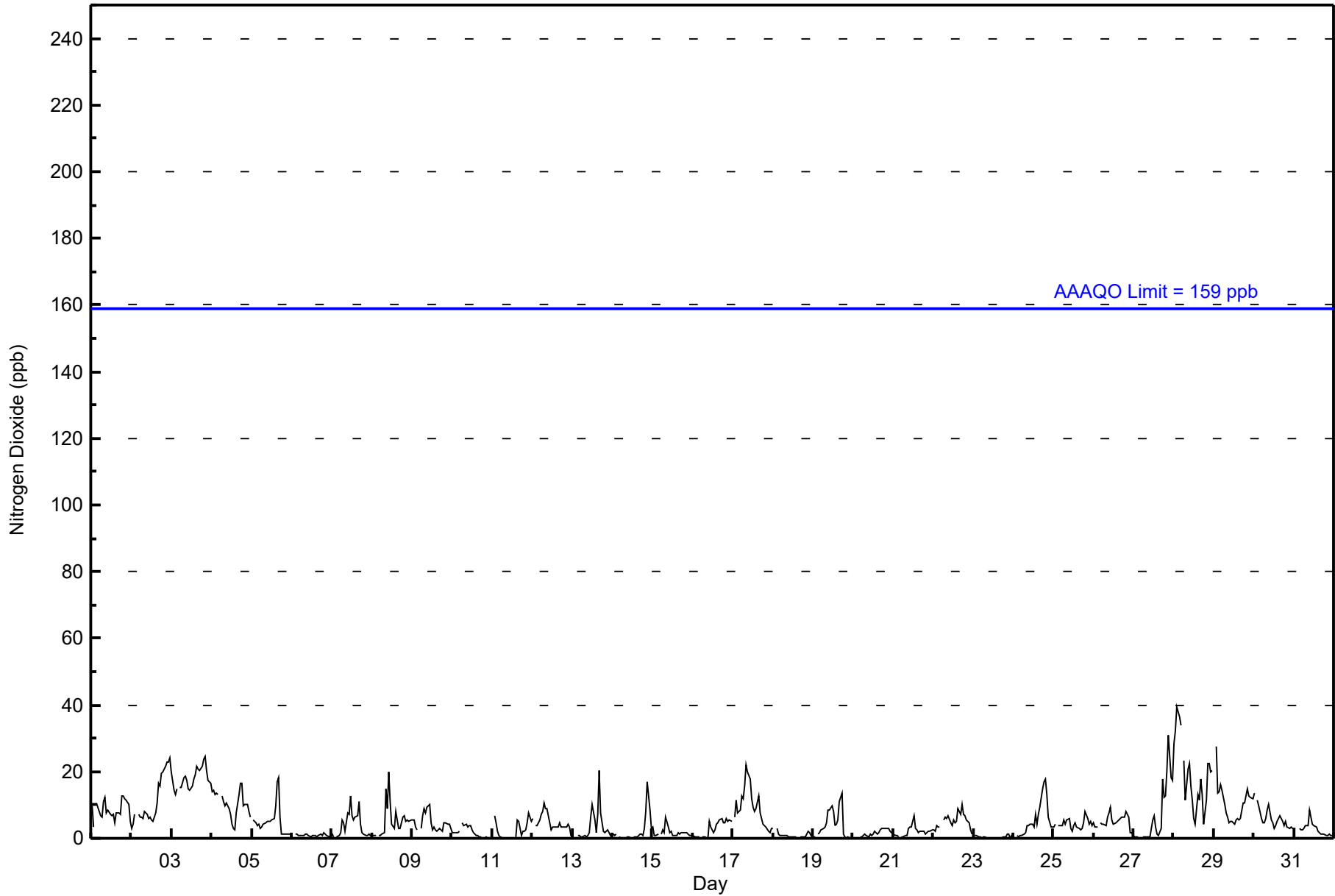
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Dec	9.6	3.2	Z	10.6	9.4	6.9	6.2	10.9	12.3	7.6	8.6	7.3	6.7	7.2	4.6	7.8	7.8	7.4	12.6	12.9	12.0	11.5	10.2	4.9	8.6	12.9																							
2-Dec	3.0	4.2	7.3	Z	7.3	6.4	6.2	6.0	8.2	7.1	6.1	6.2	5.5	5.1	7.8	10.7	16.5	15.5	19.4	19.8	21.7	23.0	22.7	24.0	11.3	24.0																							
3-Dec	20.1	14.5	13.0	14.7	Z	15.3	15.1	18.4	18.7	17.4	14.7	14.4	15.6	17.9	19.2	21.6	20.8	20.5	21.5	23.9	24.7	20.3	17.3	16.6	18.1	24.7																							
4-Dec	13.8	14.6	13.1	13.6	13.0	Z	12.5	11.1	9.7	10.4	9.1	7.2	4.4	2.9	2.5	7.6	13.0	16.6	16.4	9.9	10.3	10.0	7.9	6.2	10.3	16.6																							
5-Dec	Z	5.5	4.5	4.0	4.1	3.0	3.2	4.2	4.8	5.0	5.1	5.0	5.6	5.8	9.8	17.1	18.4	6.5	1.3	1.4	1.2	1.2	1.3	1.3	5.2	18.4																							
6-Dec	1.2	Z	1.2	1.1	0.9	1.0	1.0	0.9	1.1	1.1	0.7	0.6	0.7	0.7	0.9	0.6	0.9	1.3	1.0	1.6	1.4	0.7	0.6	0.7	1.0	1.6																							
7-Dec	1.1	0.6	Z	0.6	0.7	1.8	5.3	4.6	2.2	7.8	7.2	12.5	6.9	5.7	6.3	6.6	11.0	4.2	1.6	1.1	0.7	0.8	1.1	0.9	4.0	12.5																							
8-Dec	0.7	0.7	0.8	Z	0.8	1.0	1.1	1.9	14.7	8.9	19.8	11.2	4.1	3.0	8.2	5.4	2.9	3.0	6.4	6.6	5.1	5.5	5.2	5.3	5.3	19.8																							
9-Dec	5.7	5.4	3.5	2.4	Z	2.9	6.8	8.8	7.7	9.4	10.1	4.7	2.5	3.6	2.7	2.0	2.9	2.4	2.3	4.5	4.5	4.3	4.3	3.1	4.6	10.1																							
10-Dec	1.8	1.9	1.8	1.9	2.1	Z	4.5	4.0	4.1	3.6	4.0	3.9	2.6	1.6	1.0	0.7	0.4	0.4	0.0	0.2	0.6	0.1	0.1	0.1	1.8	4.5																							
11-Dec	Z	6.7	4.5	2.2	0.8	0.5	0.1	0.1	C	C	C	C	C	C	0.3	5.7	5.1	1.0	2.0	2.1	2.5	4.8	7.6	5.1	--	7.6																							
12-Dec	6.0	Z	3.9	3.9	5.3	7.2	8.1	10.6	9.1	8.8	4.7	2.7	3.2	3.3	3.3	3.5	4.5	3.4	3.5	3.6	3.5	4.3	3.6	0.9	4.8	10.6																							
13-Dec	0.6	0.6	Z	0.7	0.7	0.5	0.5	0.9	0.6	0.9	1.6	6.4	10.1	5.6	1.6	7.3	20.4	7.7	2.1	1.5	2.0	2.4	1.6	0.9	3.4	20.4																							
14-Dec	1.2	0.9	1.2	Z	0.4	0.1	0.1	0.1	0.2	0.3	0.3	0.1	0.1	0.5	0.3	0.6	1.4	1.4	0.7	3.0	7.9	17.1	8.5	2.8	2.1	17.1																							
15-Dec	3.3	1.0	0.7	1.1	Z	1.3	2.6	1.9	6.4	3.3	1.9	2.2	0.9	0.8	0.9	1.5	1.4	1.7	1.7	1.7	1.7	1.4	1.0	1.0	1.8	6.4																							
16-Dec	0.9	0.6	0.6	0.6	0.5	Z	0.4	0.5	0.0	0.1	5.2	3.4	1.7	2.5	4.1	4.8	5.4	6.0	4.8	4.6	5.8	5.1	5.6	5.0	3.0	6.0																							
17-Dec	Z	6.5	11.6	7.6	8.5	12.6	12.0	15.5	21.9	19.9	18.0	12.0	9.3	7.9	9.0	12.8	7.6	6.1	4.1	3.7	3.4	2.3	1.9	2.8	9.4	21.9																							
18-Dec	3.1	Z	3.1	1.4	0.9	0.9	0.8	0.7	1.0	0.6	0.4	0.5	0.4	0.4	0.2	0.1	0.2	0.4	0.4	0.5	1.1	2.3	1.7	0.7	0.9	3.1																							
19-Dec	0.6	0.3	Z	1.1	1.8	2.6	3.1	3.3	4.7	8.6	8.4	9.7	8.2	3.9	4.4	5.6	11.0	13.4	1.4	0.4	0.2	0.3	0.2	0.3	4.1	13.4																							
20-Dec	0.2	0.1	0.2	Z	0.4	0.3	0.7	1.1	0.7	0.6	1.2	0.7	1.2	2.0	1.1	1.8	2.5	2.9	2.8	2.9	2.8	2.8	2.2	1.9	1.4	2.9																							
21-Dec	1.2	0.9	0.8	0.6	Z	0.6	0.4	1.0	0.9	2.8	3.6	3.6	6.9	3.1	2.6	1.6	2.1	2.1	2.3	1.4	1.7	2.0	2.2	2.7	2.0	6.9																							
22-Dec	2.4	2.1	3.7	3.3	3.5	Z	5.3	6.4	5.8	6.7	4.6	3.7	5.3	4.8	5.0	8.7	7.4	10.0	7.2	6.8	5.3	4.8	2.4	1.4	5.1	10.0																							
23-Dec	Z	1.0	0.7	0.3	0.3	0.1	0.3	0.3	0.2	0.2	0.2	0.2	0.1	0.2	0.2	0.1	0.1	0.1	0.4	0.5	1.3	1.1	0.1	0.8	0.4	1.3																							
24-Dec	0.6	Z	1.0	0.6	1.0	0.8	1.4	1.8	3.7	3.7	4.3	4.3	3.5	7.4	4.4	7.4	9.2	15.0	17.1	18.0	13.1	6.4	3.2	3.3	5.7	18.0																							
25-Dec	3.4	4.4	Z	3.8	3.9	3.7	5.4	4.1	5.7	6.1	2.9	2.2	3.8	4.5	3.2	2.8	2.6	2.8	4.6	8.0	5.9	4.4	5.0	3.9	4.2	8.0																							
26-Dec	4.5	3.2	3.3	Z	4.5	4.2	4.3	3.8	6.2	7.6	9.3	5.7	4.4	4.7	5.0	5.5	6.0	6.3	6.5	8.1	7.1	6.2	1.6	1.5	5.2	9.3																							
27-Dec	0.6	0.4	0.3	0.2	Z	0.6	0.4	0.4	0.4	0.3	0.4	5.3	6.6	3.6	1.2	1.0	2.9	17.6	12.2	12.6	20.2	30.8	18.3	17.4	6.7	30.8																							
28-Dec	28.4	32.1	39.4	36.6	34.1	Z	23.4	11.6	20.8	22.5	15.8	11.3	5.9	4.2	13.2	11.4	17.6	13.0	4.2	11.5	22.6	22.3	20.0	20.3	19.2	39.4																							
29-Dec	Z	27.4	13.5	14.1	16.1	14.4	10.0	7.8	6.4	4.5	5.1	5.2	4.4	5.4	6.1	5.6	5.9	10.4	10.4	12.9	14.8	12.7	12.4	11.7	10.3	27.4																							
30-Dec	13.4	Z	11.4	9.8	6.0	4.5	4.7	6.0	8.3	10.1	5.6	4.5	2.9	3.7	5.0	6.9	6.1	5.2	4.0	5.0	3.5	2.9	3.3	2.8	5.9	13.4																							
31-Dec	3.0	2.9	Z	3.0	2.4	2.5	2.9	4.0	4.0	8.5	6.4	4.4	3.8	3.6	2.0	1.5	1.2	1.3	1.1	1.0	0.8	1.1	0.9	1.0	2.8	8.5																							
																								5.0	5.5	5.8	5.4	5.0	3.7	4.8	4.9	6.4	6.5	6.2	5.4	4.6	4.2	4.4	5.7	6.9	6.6	5.7	6.2	6.8	6.9	5.6	4.9	Diurnal Average	
																								28.4	32.1	39.4	36.6	34.1	15.3	23.4	18.4	21.9	22.5	19.8	14.4	15.6	17.9	19.2	21.6	20.8	20.5	21.5	23.9	24.7	30.8	22.7	24.0	Diurnal Maximum	

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



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Dioxide (NO₂) - ppb
Buffalo Viewpoint - December 2023





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Buffalo Viewpoint - December 2023**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	684	96.75	96.75
21 - 40	23	3.25	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Buffalo Viewpoint - December 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	22	18	9	1	1	10	99	219	91	27	40	73	48	10	7	9	684
21 - 40	7	6	0	1	0	0	1	0	0	0	1	0	0	0	1	6	23
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	29	24	9	2	1	10	100	219	91	27	41	73	48	10	8	15	707

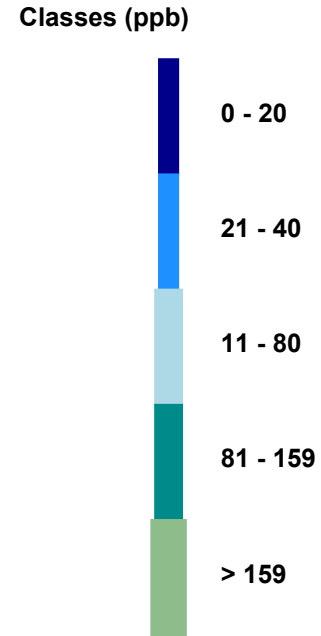
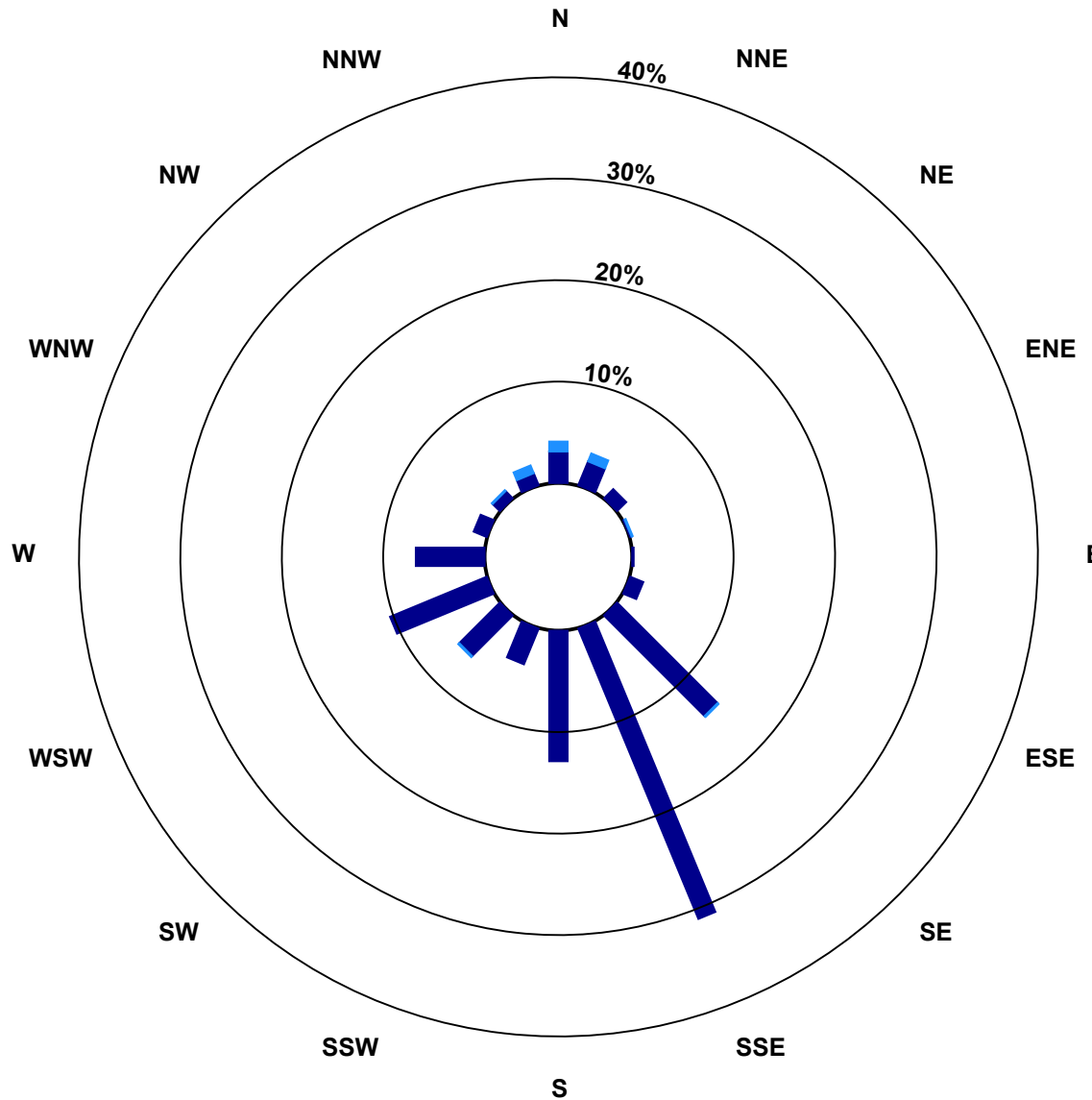
Total Number of Valid Hours: 707

Total Number of Hours: 744

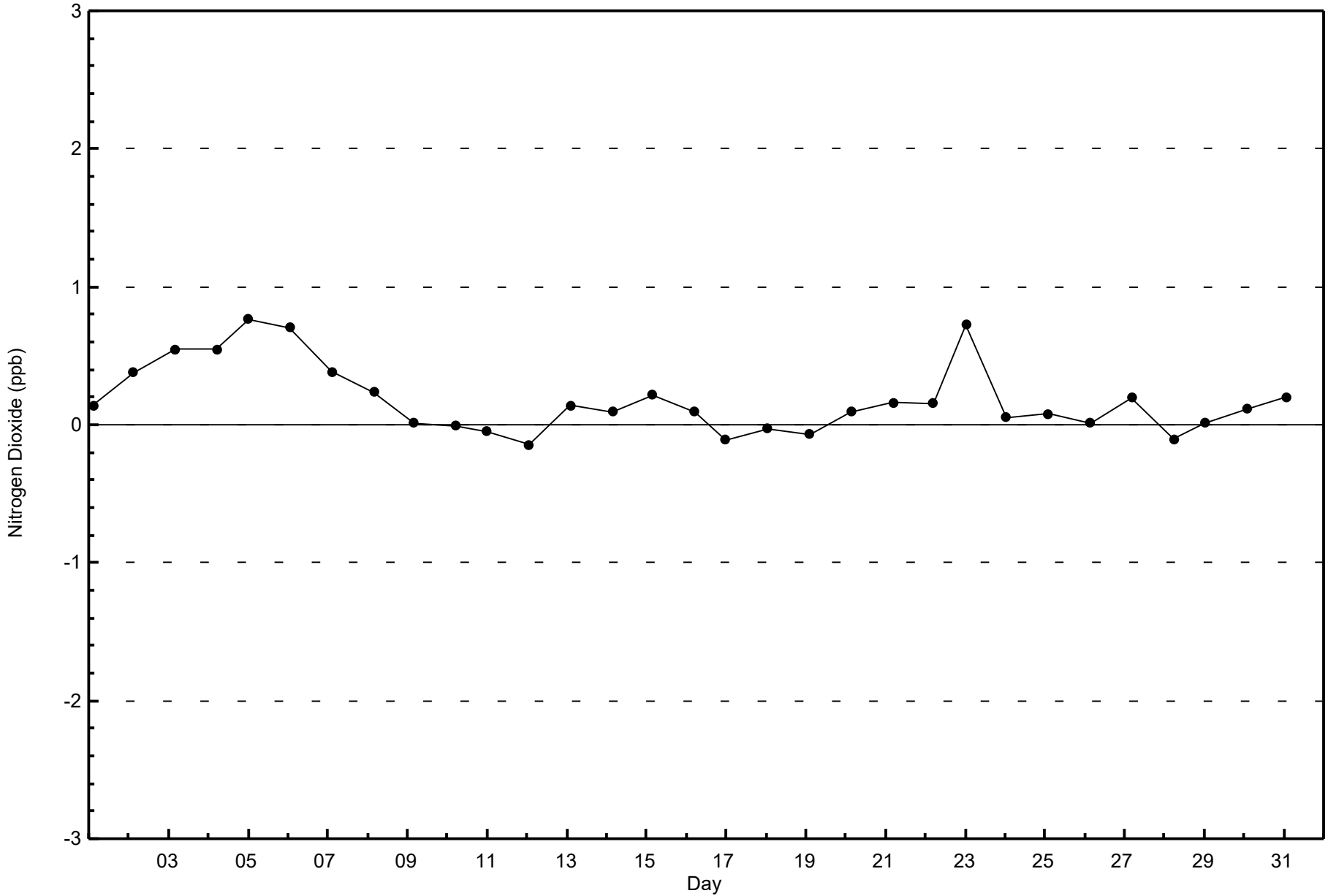


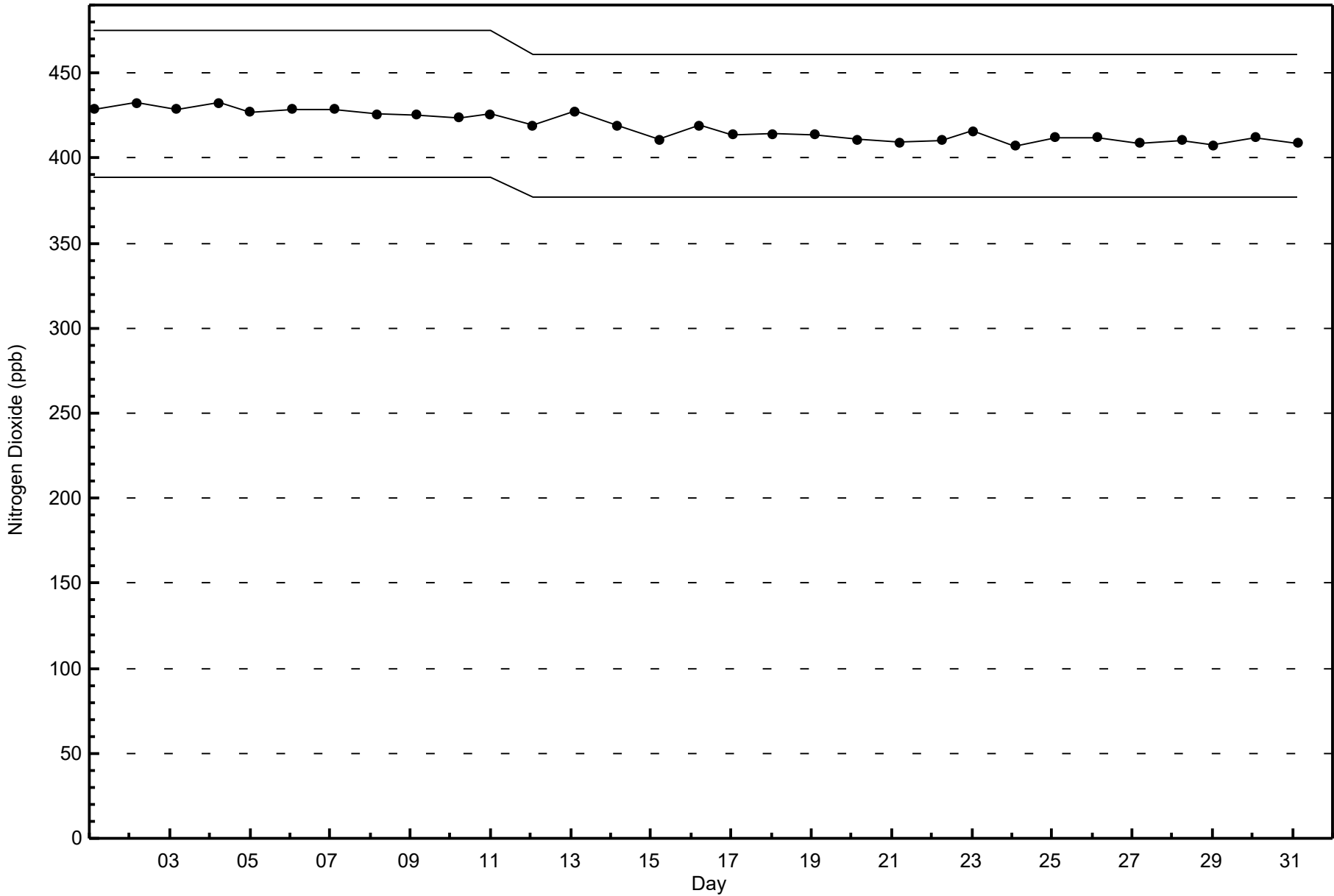
Wood Buffalo Environmental Association
Wind Rose Dec 2023

Nitrogen Dioxide (NO₂) - ppb
Buffalo Viewpoint



Total Number of Valid Hours: 707



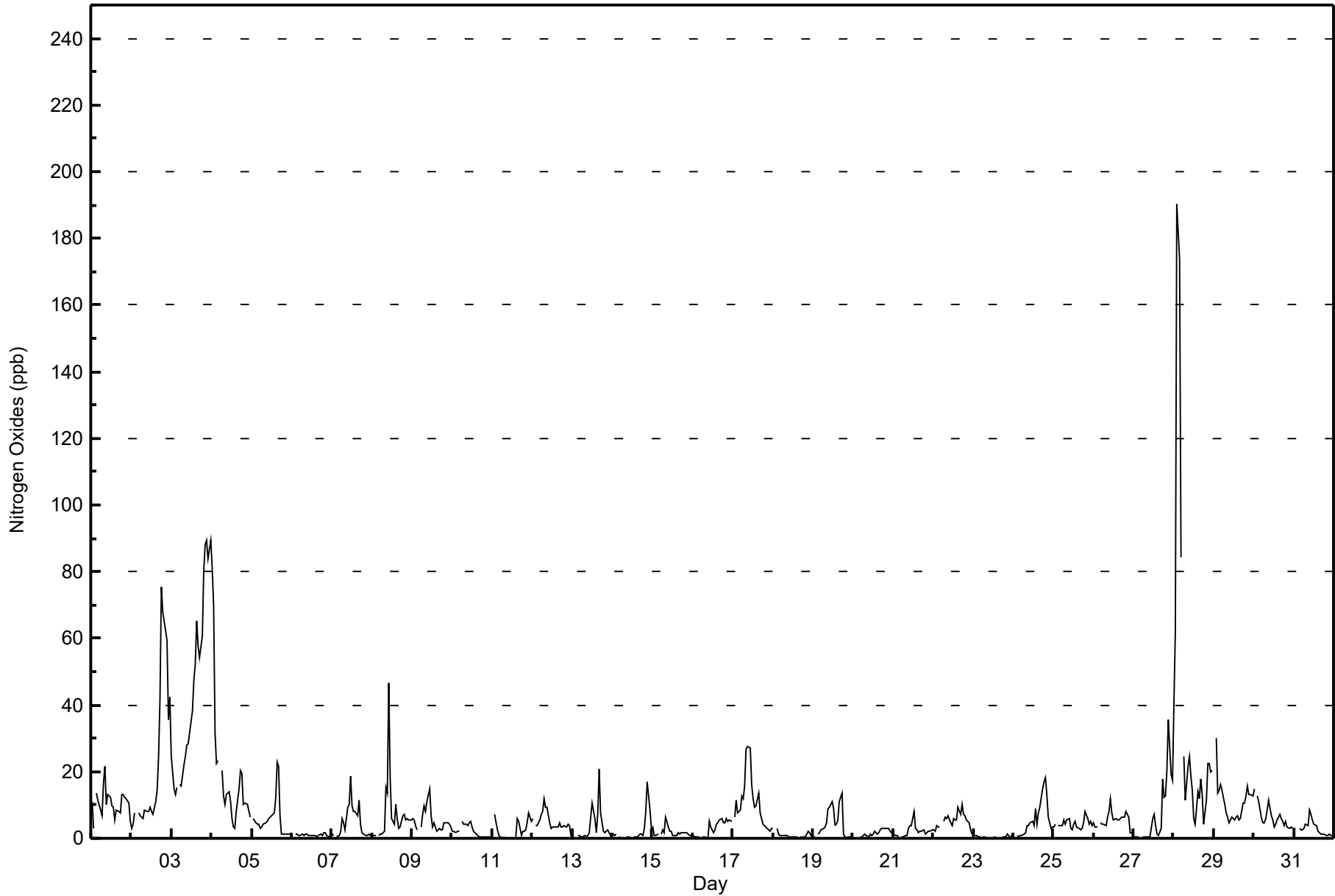




Wood Buffalo Environmental Association
Summary of Hour Averages

Nitrogen Oxides (NO_x) - ppb
Buffalo Viewpoint - December 2023

Number of Exceedences (AAAQO):		1-hr: 0		24-hr: 0		Hours in Service:		744																																									
Maximum Value: 190.5 ppb on Dec 28 03:00		Maximum Daily Average: 45.3 ppb on Dec 3		Minimum Value: 0.0 ppb on Dec 16 09:00		Minimum Daily Average: 0.4 ppb on Dec 23		Hours of Data: 707																																									
Maximum Diurnal Average: 12.7 ppb at hour 3		Minimum Diurnal Average: 3.8 ppb at hour 6		Hours of Missing Data: 37		Hours of Calibration: 37		Percent Operational Time: 100.0																																									
Monthly Average: 7.99 ppb		Percentiles: P ₁ = 0.1 P ₁₀ = 0.5 Q ₁ = 1.2 Median = 3.9 Q ₃ = 8.0 P ₉₀ = 15.8 P ₉₉ = 81.0																																															
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Dec	10.9	3.2	Z	13.6	11.5	8.3	6.9	16.5	21.6	10.3	13.3	12.2	9.9	9.4	5.5	8.3	8.0	7.6	13.0	13.2	12.4	11.7	10.4	5.1	10.5	21.6																							
2-Dec	3.1	4.4	7.4	Z	7.7	6.6	6.3	6.1	8.5	8.2	8.1	9.5	8.2	7.2	10.9	14.4	24.1	41.6	75.4	67.7	62.2	59.5	35.4	42.4	22.8	75.4																							
3-Dec	24.7	14.9	13.3	15.3	Z	16.3	15.6	22.1	24.6	28.0	28.4	31.7	38.2	47.5	52.1	65.5	57.8	54.2	60.6	80.3	88.3	89.5	84.1	89.4	45.3	89.5																							
4-Dec	81.0	69.8	31.8	22.6	23.4	Z	20.4	12.8	10.2	13.2	14.2	10.8	5.9	3.5	2.8	8.2	14.7	20.3	19.6	10.1	10.7	10.2	8.0	6.4	18.7	81.0																							
5-Dec	Z	5.8	4.8	4.1	4.3	3.0	3.3	4.3	4.8	5.2	5.9	6.4	6.9	7.5	12.4	22.7	21.6	6.8	1.4	1.4	1.4	1.2	1.3	1.3	6.0	22.7																							
6-Dec	1.2	Z	1.4	1.1	1.0	1.0	1.1	0.9	1.1	1.3	1.0	0.8	0.9	0.9	0.9	0.6	0.9	1.4	1.1	1.7	1.5	0.7	0.6	0.8	1.0	1.7																							
7-Dec	1.1	0.7	Z	0.6	0.8	1.9	5.8	4.8	2.4	9.2	10.0	18.8	9.7	7.9	8.0	7.0	11.5	4.4	1.8	1.1	0.8	0.9	1.1	1.0	4.9	18.8																							
8-Dec	0.9	0.7	0.8	Z	1.0	1.1	1.2	2.1	15.3	13.7	46.8	18.3	5.8	4.1	10.3	6.0	3.1	3.2	6.8	7.2	5.3	5.7	5.4	5.6	7.4	46.8																							
9-Dec	5.9	5.6	3.8	2.6	Z	3.2	7.4	9.9	8.2	11.1	14.7	6.6	3.6	4.8	3.3	2.2	3.1	2.6	2.4	4.8	4.9	4.6	4.4	3.3	5.3	14.7																							
10-Dec	1.9	2.0	1.9	2.1	2.3	Z	4.9	4.2	4.3	3.9	4.6	5.0	3.3	2.0	1.1	0.9	0.4	0.5	0.2	0.4	0.6	0.3	0.4	0.2	2.1	5.0																							
11-Dec	Z	7.1	4.7	2.5	0.9	0.6	0.2	0.2	C	C	C	C	C	C	0.3	5.7	5.1	1.0	2.0	2.1	2.5	4.8	7.6	5.1	--	7.6																							
12-Dec	6.0	Z	3.9	3.9	5.3	7.2	8.1	11.9	9.1	9.2	4.7	2.8	3.4	3.3	3.3	3.5	4.5	3.4	3.5	3.6	3.5	4.3	3.6	0.9	4.9	11.9																							
13-Dec	0.6	0.6	Z	0.7	0.7	0.5	0.5	0.9	0.6	0.9	1.6	6.5	10.8	5.8	1.6	7.3	20.8	7.7	2.1	1.5	2.0	2.4	1.6	0.9	3.4	20.8																							
14-Dec	1.2	0.9	1.2	Z	0.4	0.1	0.1	0.1	0.2	0.3	0.3	0.1	0.1	0.5	0.3	0.6	1.4	1.4	0.7	3.0	7.9	17.1	8.5	2.8	2.1	17.1																							
15-Dec	3.3	1.0	0.7	1.1	Z	1.3	2.6	1.9	6.4	3.3	1.9	2.2	0.9	0.8	0.9	1.5	1.4	1.7	1.7	1.7	1.7	1.4	1.0	1.0	1.8	6.4																							
16-Dec	0.9	0.6	0.6	0.6	0.5	Z	0.4	0.5	0.0	0.1	5.2	3.4	1.7	2.5	4.1	4.8	5.4	6.0	4.8	4.6	5.8	5.1	5.6	5.0	3.0	6.0																							
17-Dec	Z	6.5	11.6	7.6	8.5	12.6	12.0	15.6	26.8	27.4	27.0	16.0	11.8	9.3	9.9	13.4	7.6	6.1	4.1	3.7	3.4	2.3	1.9	2.8	10.8	27.4																							
18-Dec	3.1	Z	3.1	1.4	0.9	0.9	0.8	0.7	1.0	0.6	0.4	0.5	0.4	0.4	0.2	0.1	0.2	0.4	0.4	0.5	1.1	2.3	1.7	0.7	1.0	3.1																							
19-Dec	0.6	0.3	Z	1.1	1.8	2.6	3.1	3.3	4.7	8.8	9.1	11.1	9.1	3.9	4.4	5.6	11.0	13.4	1.4	0.4	0.2	0.3	0.2	0.3	4.2	13.4																							
20-Dec	0.2	0.1	0.2	Z	0.4	0.3	0.7	1.1	0.7	0.6	1.2	0.7	1.2	2.0	1.1	1.8	2.5	2.9	2.8	2.9	2.8	2.8	2.2	1.9	1.4	2.9																							
21-Dec	1.2	0.9	0.8	0.6	Z	0.6	0.4	1.0	0.9	2.8	3.7	3.8	8.1	3.1	2.6	1.6	2.1	2.1	2.3	1.4	1.7	2.0	2.2	2.7	2.1	8.1																							
22-Dec	2.4	2.1	3.7	3.3	3.5	Z	5.3	6.4	5.8	6.7	4.7	3.9	6.1	5.4	5.3	9.1	7.4	10.0	7.2	6.8	5.3	4.8	2.4	1.4	5.2	10.0																							
23-Dec	Z	1.0	0.7	0.3	0.3	0.1	0.3	0.3	0.2	0.2	0.2	0.2	0.1	0.2	0.2	0.1	0.1	0.1	0.4	0.5	1.3	1.1	0.1	0.8	0.4	1.3																							
24-Dec	0.6	Z	1.0	0.6	1.0	0.8	1.4	1.8	3.7	3.7	4.5	4.9	3.8	8.8	4.4	7.4	9.2	15.0	17.1	18.2	13.1	6.4	3.2	3.3	5.8	18.2																							
25-Dec	3.4	4.4	Z	3.8	3.9	3.7	5.4	4.1	5.7	6.1	2.9	2.3	4.4	4.9	3.2	2.8	2.6	2.8	4.6	8.0	5.9	4.4	5.0	3.9	4.3	8.0																							
26-Dec	4.5	3.2	3.3	Z	4.5	4.2	4.3	3.8	6.2	8.0	11.7	7.5	5.6	6.0	5.6	5.5	6.0	6.3	6.5	8.1	7.1	6.2	1.6	1.5	5.5	11.7																							
27-Dec	0.6	0.4	0.3	0.2	Z	0.6	0.4	0.4	0.4	0.3	0.4	6.0	7.3	3.7	1.2	1.0	2.9	17.6	12.2	12.6	20.5	35.7	19.3	17.4	7.0	35.7																							
28-Dec	40.5	62.5	190.5	173.9	84.5	Z	24.4	11.6	21.5	24.5	18.4	14.5	6.1	4.2	14.0	11.7	17.6	13.0	4.2	11.5	22.6	22.4	20.0	20.3	36.3	190.5																							
29-Dec	Z	30.3	13.6	14.2	16.3	14.4	10.0	7.8	6.4	4.5	5.6	6.3	5.3	6.5	6.8	5.6	5.9	10.4	10.4	12.9	15.6	13.0	13.3	12.6	10.8	30.3																							
30-Dec	14.8	Z	12.6	10.9	6.0	4.5	4.7	6.0	8.3	11.5	6.7	5.4	3.3	4.3	5.5	7.1	6.1	5.2	4.0	5.0	3.5	2.9	3.3	2.8	6.3	14.8																							
31-Dec	3.0	2.9	Z	3.0	2.4	2.5	2.9	4.0	4.0	8.7	7.4	5.5	4.4	3.9	2.0	1.5	1.2	1.3	1.1	1.0	0.8	1.1	0.9	1.0	2.9	8.7																							
																								8.4	8.9	12.7	11.2	7.5	3.8	5.2	5.4	7.1	7.7	8.8	7.5	6.2	5.8	7.5	8.6	8.7	8.9	9.6	10.2	10.5	8.3	7.9	Diurnal Average		
																								81.0	69.8	190.5	173.9	84.5	16.3	24.4	22.1	26.8	28.0	46.8	31.7	38.2	47.5	52.1	65.5	57.8	54.2	75.4	80.3	88.3	89.5	84.1	89.4	Diurnal Maximum	
Z - zerospan																								C - Calibration																									





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Buffalo Viewpoint - December 2023**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	656	92.79	92.79
21 - 40	26	3.68	96.46
41 - 80	17	2.40	98.87
81 - 159	5	0.71	99.58
> 159	2	0.28	99.86

Total Number of Valid Hours: 707

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Buffalo Viewpoint - December 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	19	13	8	0	1	10	96	212	86	27	40	73	47	10	6	8	656
21 - 40	5	5	1	2	0	0	4	6	0	0	1	0	1	0	0	1	26
11 - 80	4	6	0	0	0	0	0	0	2	0	0	0	0	0	1	4	17
81 - 159	1	0	0	0	0	0	0	1	2	0	0	0	0	0	0	1	5
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2
Totals	29	24	9	2	1	10	100	219	90	27	41	73	48	10	8	15	706

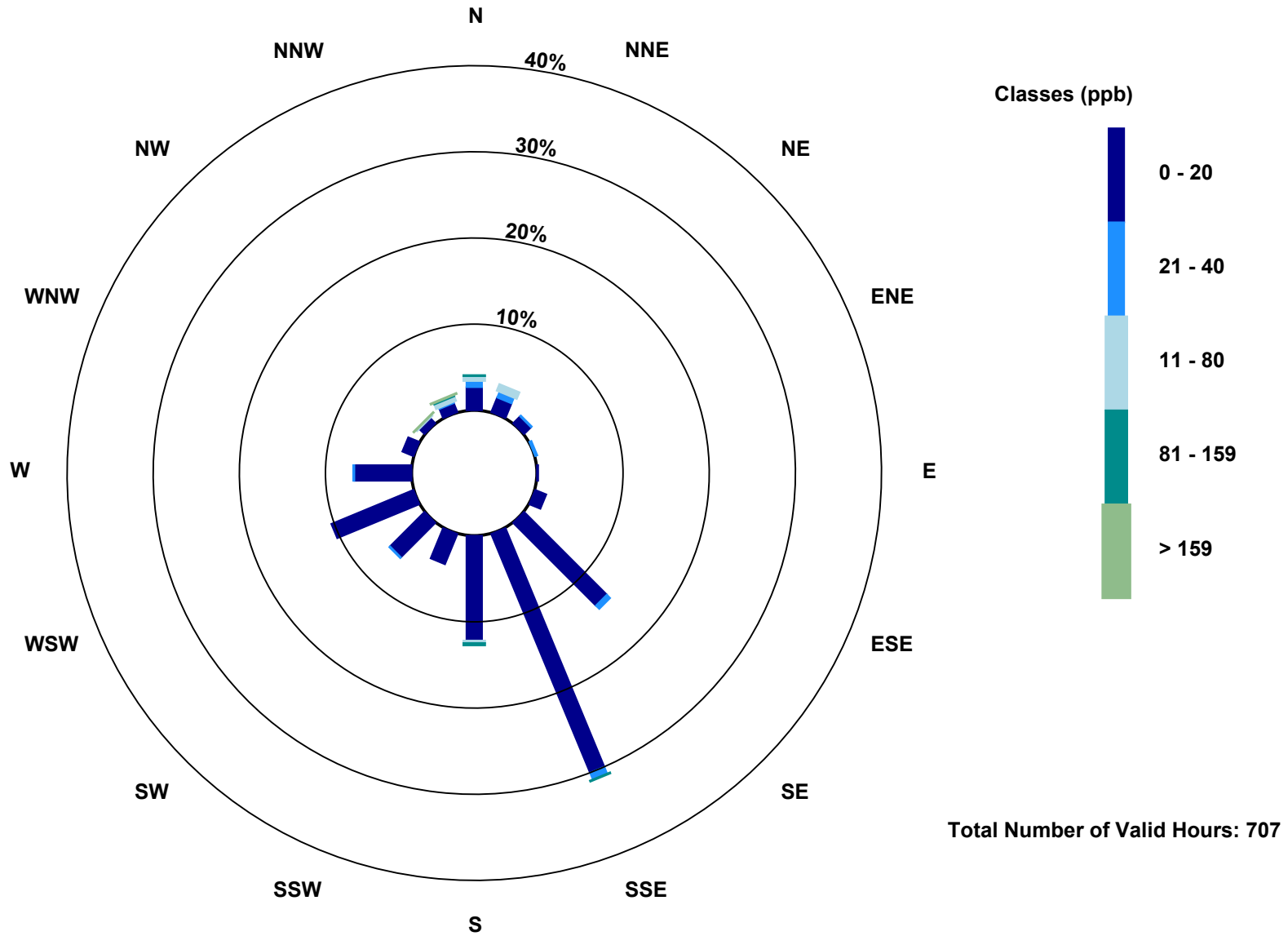
Total Number of Valid Hours: 707

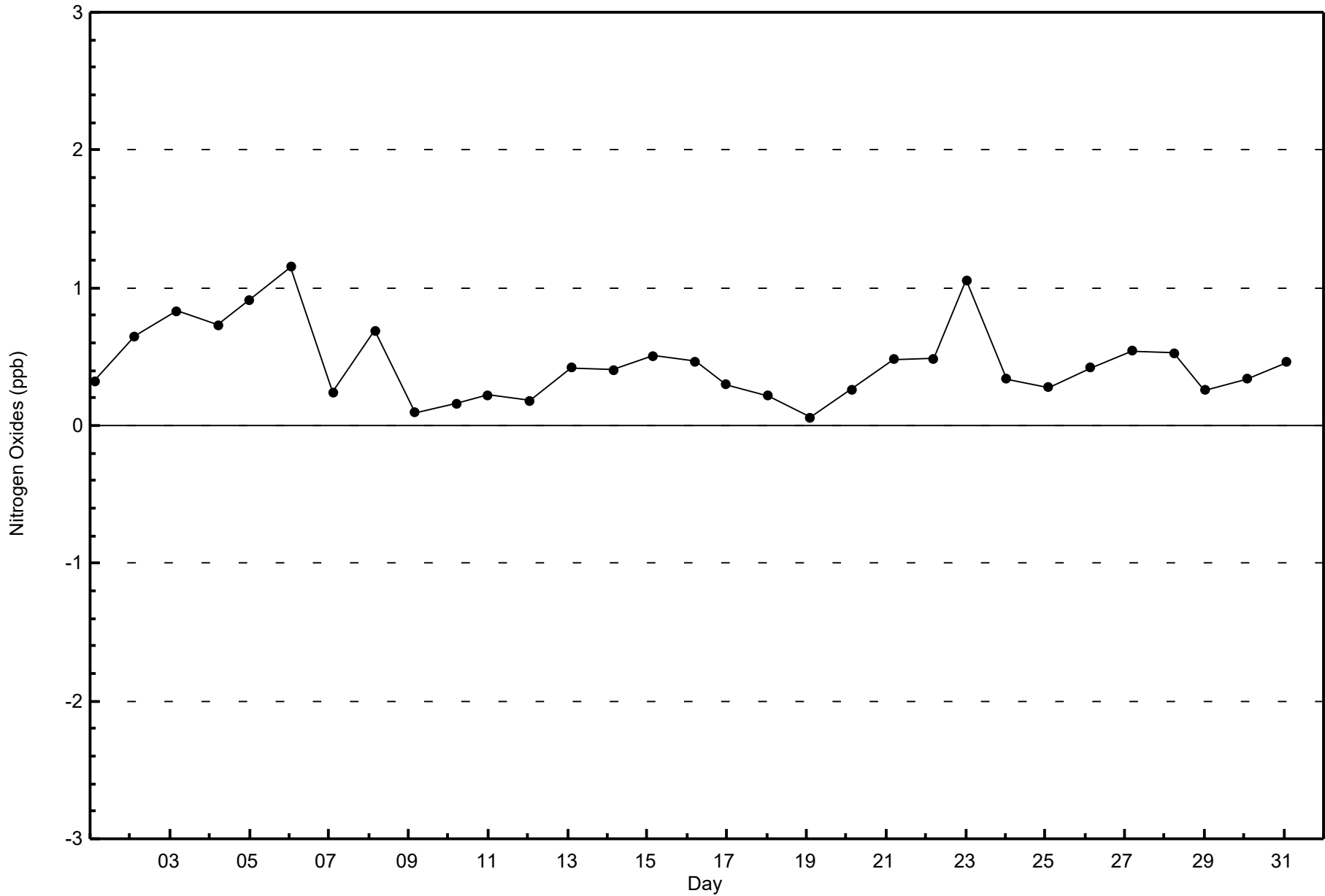
Total Number of Hours: 744

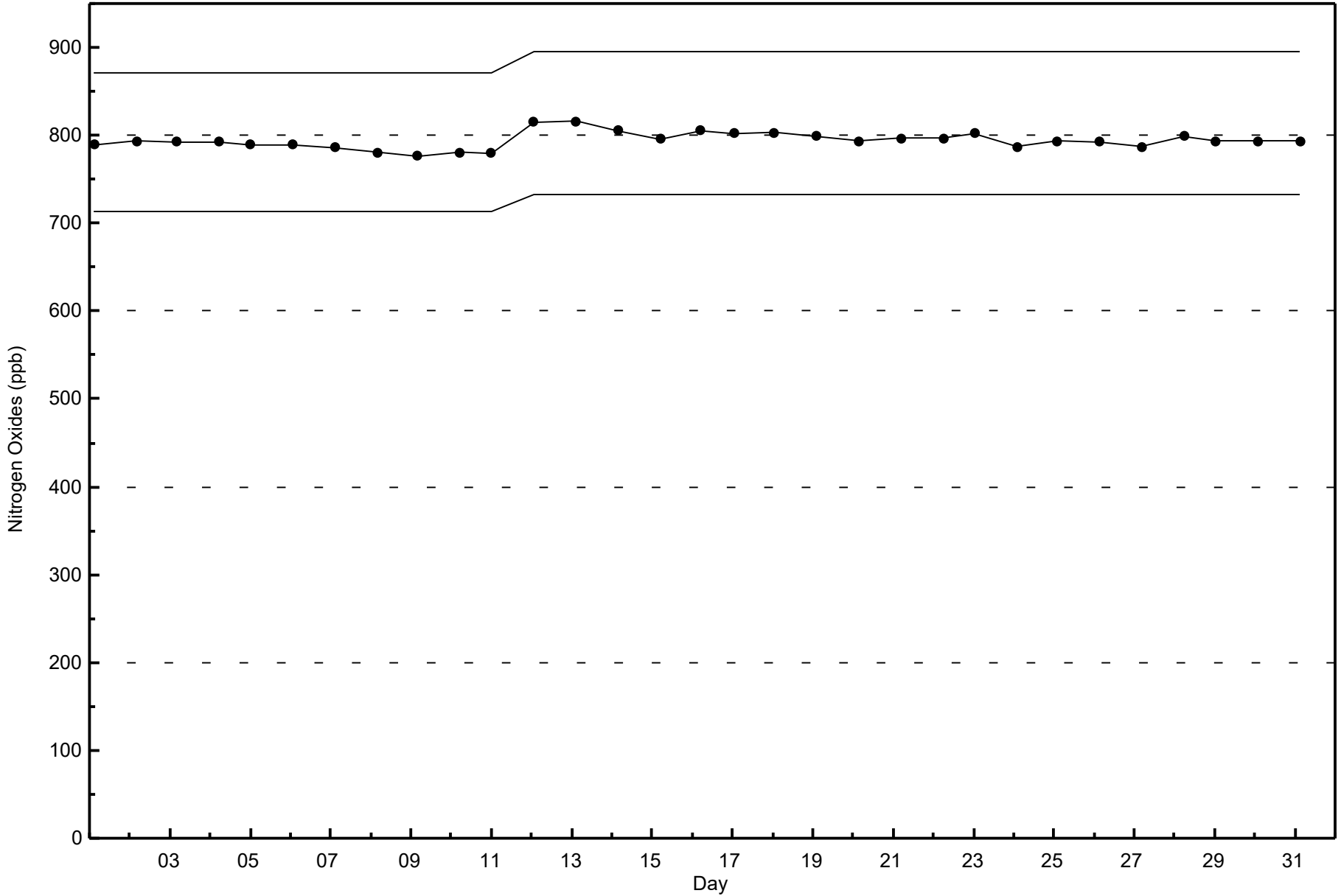


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Nitrogen Oxides (NO_x) - ppb
Buffalo Viewpoint









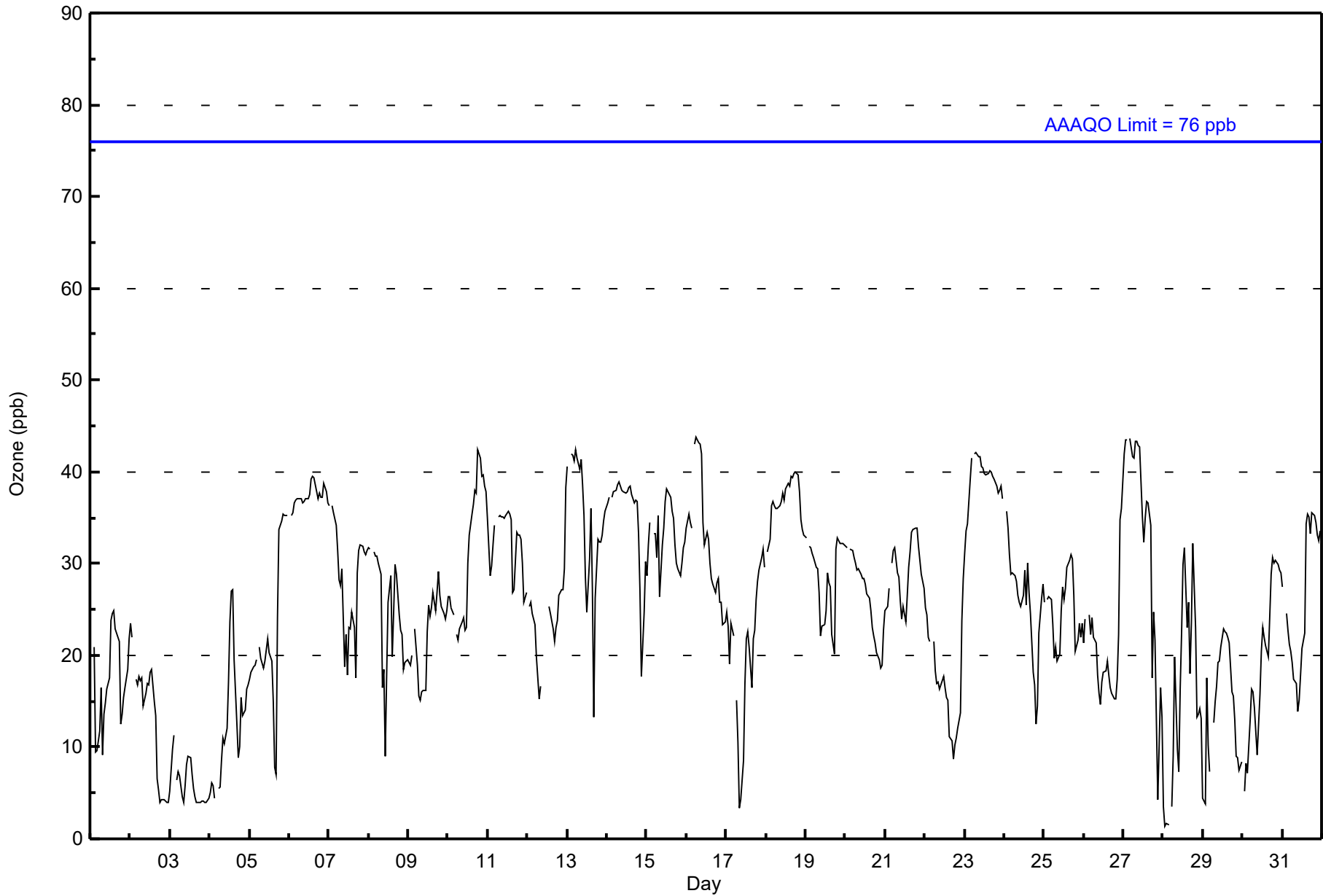
Wood Buffalo Environmental Association

Summary of Hour Averages

Ozone (O₃) - ppb

Buffalo Viewpoint - December 2023

Number of Exceedences (AAAQO):		1-hr: 0	24-hr: 0	Hours in Service:																	744						
Maximum Value: 43.8 ppb on Dec 16 07:00		Maximum Daily Average: 39.0 ppb on Dec 23																	Hours of Data:	709							
Minimum Value: 1.4 ppb on Dec 28 02:00		Minimum Daily Average: 6.0 ppb on Dec 3																	Hours of Missing Data:	35							
Maximum Diurnal Average: 27.4 ppb at hour 15		Minimum Diurnal Average: 23.2 ppb at hour 10																	Hours of Calibration:	35							
Monthly Average: 25.29 ppb		Percentiles: P ₁ = 3.9 P ₁₀ = 10.3 Q ₁ = 18.1 Median = 25.8 Q ₃ = 33.4 P ₉₀ = 37.9 P ₉₉ = 43.0																	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-Dec	20.6	Z	20.9	9.5	9.6	11.8	16.5	9.1	13.6	14.8	16.4	17.6	23.8	24.6	24.9	22.9	21.9	21.5	12.6	13.6	15.4	16.5	18.4	21.9	17.3	24.9	
2-Dec	23.5	22.0	Z	17.4	16.8	17.7	17.2	17.6	14.4	15.8	16.9	16.8	18.2	18.5	14.9	13.4	6.6	5.4	4.0	4.2	4.3	4.1	3.9	4.0	12.9	23.5	
3-Dec	5.3	9.8	11.2	Z	6.5	7.2	6.9	4.5	4.0	5.8	8.1	9.0	8.8	7.0	5.6	4.6	4.0	4.0	4.0	4.2	4.1	3.9	4.0	4.4	6.0	11.2	
4-Dec	5.1	6.2	5.9	4.4	Z	5.4	5.7	8.6	11.0	10.3	12.1	17.0	23.6	26.9	27.2	19.5	12.5	8.9	10.0	15.3	13.4	14.1	16.4	16.8	12.9	27.2	
5-Dec	17.4	18.1	18.7	18.9	19.6	Z	20.9	19.7	18.7	19.4	20.6	21.8	20.3	19.3	15.0	7.8	6.9	24.1	33.6	34.7	35.4	35.2	35.2	35.3	22.5	35.4	
6-Dec	Z	35.2	35.6	36.6	37.0	37.0	37.1	37.1	36.6	36.7	37.1	37.0	37.6	39.2	39.5	39.4	38.6	37.1	37.6	37.2	37.3	38.7	37.9	36.7	37.4	39.5	
7-Dec	36.3	Z	36.4	35.5	34.2	31.4	28.2	27.7	29.4	18.7	22.3	17.8	23.0	22.9	24.7	23.0	17.6	28.9	31.4	32.1	31.8	31.3	31.0	31.4	28.1	36.4	
8-Dec	31.7	31.5	Z	31.3	30.8	30.8	30.1	28.8	16.4	18.5	9.0	17.8	25.8	28.7	19.8	24.8	29.9	28.9	24.4	22.7	22.3	18.4	19.2	19.6	24.4	31.7	
9-Dec	19.3	18.9	20.0	Z	22.9	18.9	15.6	15.2	16.0	16.2	16.2	22.6	25.4	24.2	25.1	26.8	24.8	26.8	29.1	26.5	25.3	24.6	23.9	24.8	22.1	29.1	
10-Dec	26.3	26.3	25.2	24.4	Z	22.3	21.7	22.9	23.6	24.1	22.8	23.1	30.1	33.1	35.4	36.5	38.0	37.7	42.4	41.4	39.5	39.7	38.4	37.8	31.0	42.4	
11-Dec	34.9	28.7	29.7	32.0	34.1	Z	35.1	35.2	35.1	35.0	34.9	35.3	35.7	35.4	34.8	26.8	27.1	33.4	33.1	33.1	32.6	30.1	25.8	26.8	32.4	35.7	
12-Dec	Z	25.4	25.8	24.6	23.4	19.8	17.5	15.2	16.6	Z	Z	Z	Z	25.3	24.5	22.9	21.5	23.0	23.8	26.6	27.2	27.2	29.4	38.3	24.1	38.3	
13-Dec	40.6	Z	42.0	41.8	41.3	42.4	41.6	40.3	41.4	38.7	35.3	28.5	24.7	30.5	36.0	27.3	13.3	26.3	32.7	32.4	32.4	33.0	34.6	35.7	34.5	42.4	
14-Dec	36.5	37.2	Z	37.2	37.9	38.0	38.6	38.9	38.5	38.0	37.9	37.7	37.8	38.4	38.5	37.5	36.6	36.9	36.7	33.3	27.0	17.6	24.7	30.1	35.3	38.9	
15-Dec	28.7	32.0	34.5	Z	33.2	33.2	30.6	35.2	26.3	32.1	33.9	36.8	38.2	37.8	37.3	35.7	35.0	32.0	30.0	29.4	28.7	30.0	31.7	32.4	32.8	38.2	
16-Dec	33.9	35.4	34.4	33.9	Z	43.0	43.8	43.2	43.0	42.0	34.4	32.0	33.4	32.7	30.0	28.3	27.8	26.8	28.0	28.4	25.7	25.7	23.4	23.6	32.7	43.8	
17-Dec	24.8	23.2	19.0	23.5	22.1	Z	15.1	10.6	3.4	4.2	8.6	17.0	21.7	22.5	20.8	16.5	21.7	22.7	26.0	28.1	29.3	30.7	31.6	29.6	20.6	31.6	
18-Dec	Z	31.3	32.7	36.2	36.7	36.3	36.0	36.1	36.4	36.8	37.6	36.9	38.2	38.7	38.5	39.5	39.4	39.9	40.0	39.7	37.8	34.8	33.8	33.1	36.8	40.0	
19-Dec	32.8	Z	31.9	31.8	31.1	30.6	29.7	29.4	26.9	22.1	23.1	23.3	24.9	29.0	27.9	27.4	22.2	20.2	31.6	32.8	32.5	32.2	32.1	32.1	28.6	32.8	
20-Dec	31.9	31.7	Z	31.6	31.4	30.6	30.0	29.2	29.4	28.8	28.3	28.4	27.8	26.6	26.2	24.8	23.0	22.2	21.3	20.2	19.5	18.6	18.9	22.8	26.2	31.9	
21-Dec	24.8	25.3	27.3	Z	30.1	31.4	31.7	28.9	28.6	26.0	23.9	25.3	23.6	26.5	29.6	31.3	33.4	33.7	33.8	33.9	31.9	30.4	28.8	27.3	29.0	33.9	
22-Dec	25.2	24.4	22.0	21.5	Z	21.5	18.2	16.9	17.1	16.3	17.3	17.6	16.4	15.5	15.1	11.1	10.7	8.7	10.2	10.9	12.1	13.7	23.8	28.3	17.2	28.3	
23-Dec	31.1	33.5	34.3	39.2	41.6	Z	41.9	42.2	41.7	41.7	40.5	40.4	39.9	39.6	39.9	40.1	40.0	39.5	39.3	38.4	37.7	38.0	38.5	37.1	39.0	42.2	
24-Dec	Z	35.8	33.9	30.9	28.9	29.0	28.7	28.1	26.5	25.8	25.3	26.5	29.3	25.4	30.1	26.8	24.6	18.1	16.7	12.5	14.5	22.5	26.2	27.8	25.8	35.8	
25-Dec	25.8	Z	26.1	26.4	26.1	23.4	19.7	20.9	19.4	20.1	24.9	27.4	26.1	27.3	29.6	30.4	30.9	30.5	26.6	20.5	21.6	23.5	22.0	23.5	24.9	30.9	
26-Dec	21.4	24.0	Z	24.4	22.3	24.1	22.0	21.4	17.9	15.9	14.7	17.0	18.2	18.3	19.4	17.9	16.5	15.8	15.3	15.3	17.3	22.2	34.7	36.0	20.5	36.0	
27-Dec	41.9	43.5	43.5	Z	43.7	41.7	41.4	43.3	43.3	42.9	42.6	35.1	32.3	34.9	36.8	36.6	34.2	17.5	24.7	21.6	12.9	4.2	16.4	13.3	32.5	43.7	
28-Dec	3.5	1.4	1.7	1.6	Z	3.4	9.1	19.9	9.7	7.3	16.2	22.5	29.9	31.8	23.0	25.8	18.0	23.6	32.1	23.0	13.3	13.6	14.2	13.1	15.5	32.1	
29-Dec	4.5	3.8	17.5	10.2	7.3	Z	12.7	14.9	16.6	19.1	19.4	21.0	22.9	22.5	22.4	21.9	21.3	16.0	15.6	12.9	9.1	8.9	7.5	8.3	14.6	22.9	
30-Dec	Z	5.1	8.2	7.2	12.9	16.4	16.0	14.3	11.8	9.2	15.8	20.4	23.1	22.0	21.1	19.9	24.3	28.8	30.7	30.0	30.4	30.0	29.3	29.0	19.8	30.7	
31-Dec	27.5	Z	24.6	22.7	21.2	20.5	19.2	17.4	17.0	13.9	15.0	17.9	20.8	22.4	34.3	35.3	35.1	33.3	35.6	35.2	34.4	33.1	32.5	33.6	26.2	35.6	
		25.2	24.4	25.5	25.2	27.0	25.7	25.1	24.9	23.6	23.2	23.7	24.9	26.7	27.3	27.4	25.9	24.4	24.9	26.2	25.5	24.4	24.1	25.4	26.3	Diurnal Average	
		41.9	43.5	43.5	41.8	43.7	43.0	43.8	43.3	43.3	42.9	42.6	40.4	39.9	39.6	39.9	40.1	40.0	39.9	42.4	41.4	39.5	39.7	38.5	38.3	Diurnal Maximum	
Z - zerospan		C - Calibration																									
Alberta Ambient Air Quality Objectives (AAAQO):		1-hr 76 ppb																									





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Ozone (O₃) - ppb
Buffalo Viewpoint - December 2023

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	223	31.45	31.45
21 - 50	486	68.55	100.00
51 - 82	0	0.00	100.00
> 83	0	0.00	100.00

Total Number of Valid Hours: 709

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Ozone (O₃) - ppb
Buffalo Viewpoint - December 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	12	4	3	0	3	30	92	45	0	3	2	1	0	4	10	223
21 - 50	15	13	4	0	1	7	67	121	49	28	38	77	46	9	6	5	486
51 - 82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 83	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	29	25	8	3	1	10	97	213	94	28	41	79	47	9	10	15	709

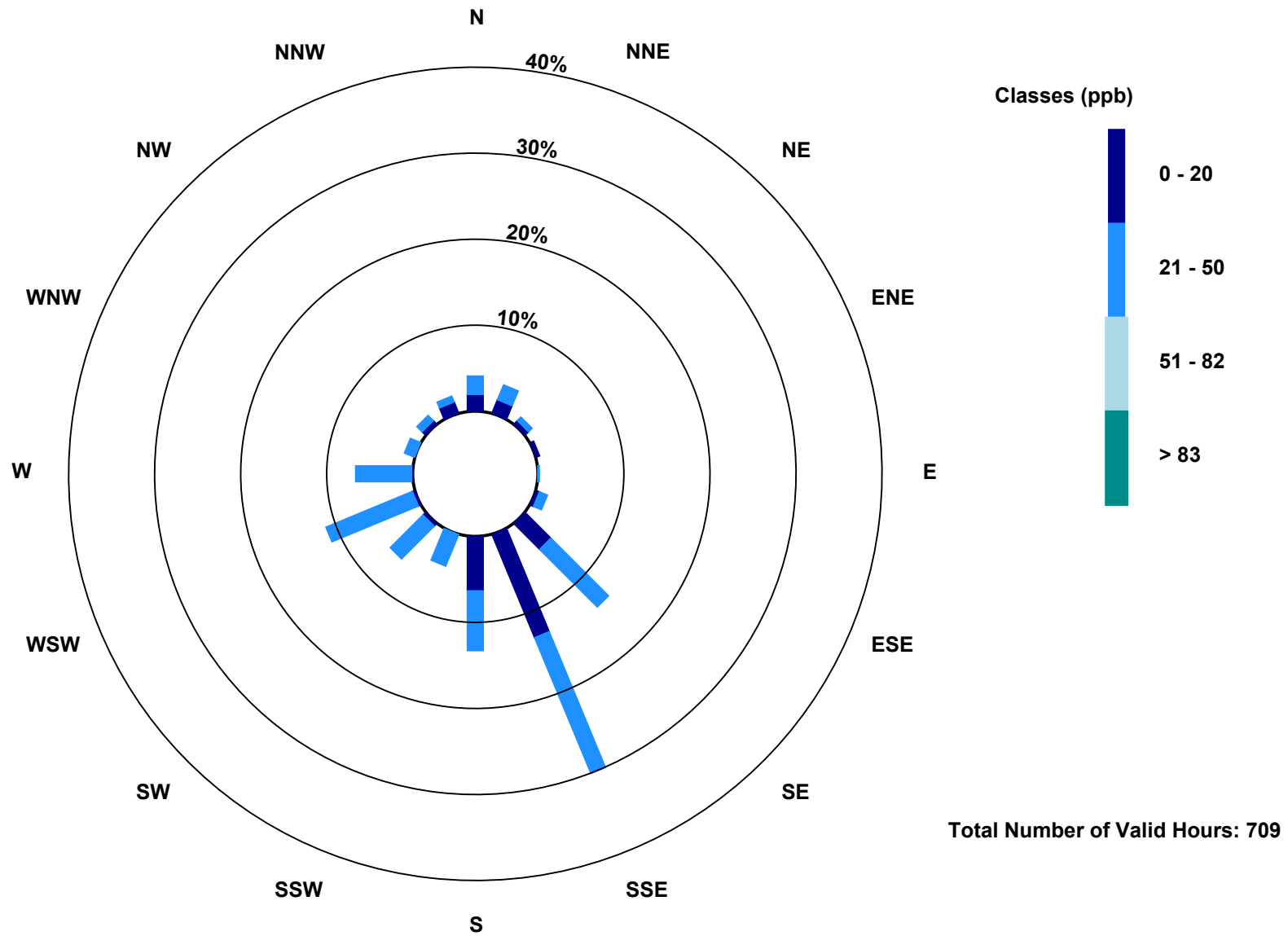
Total Number of Valid Hours: 709

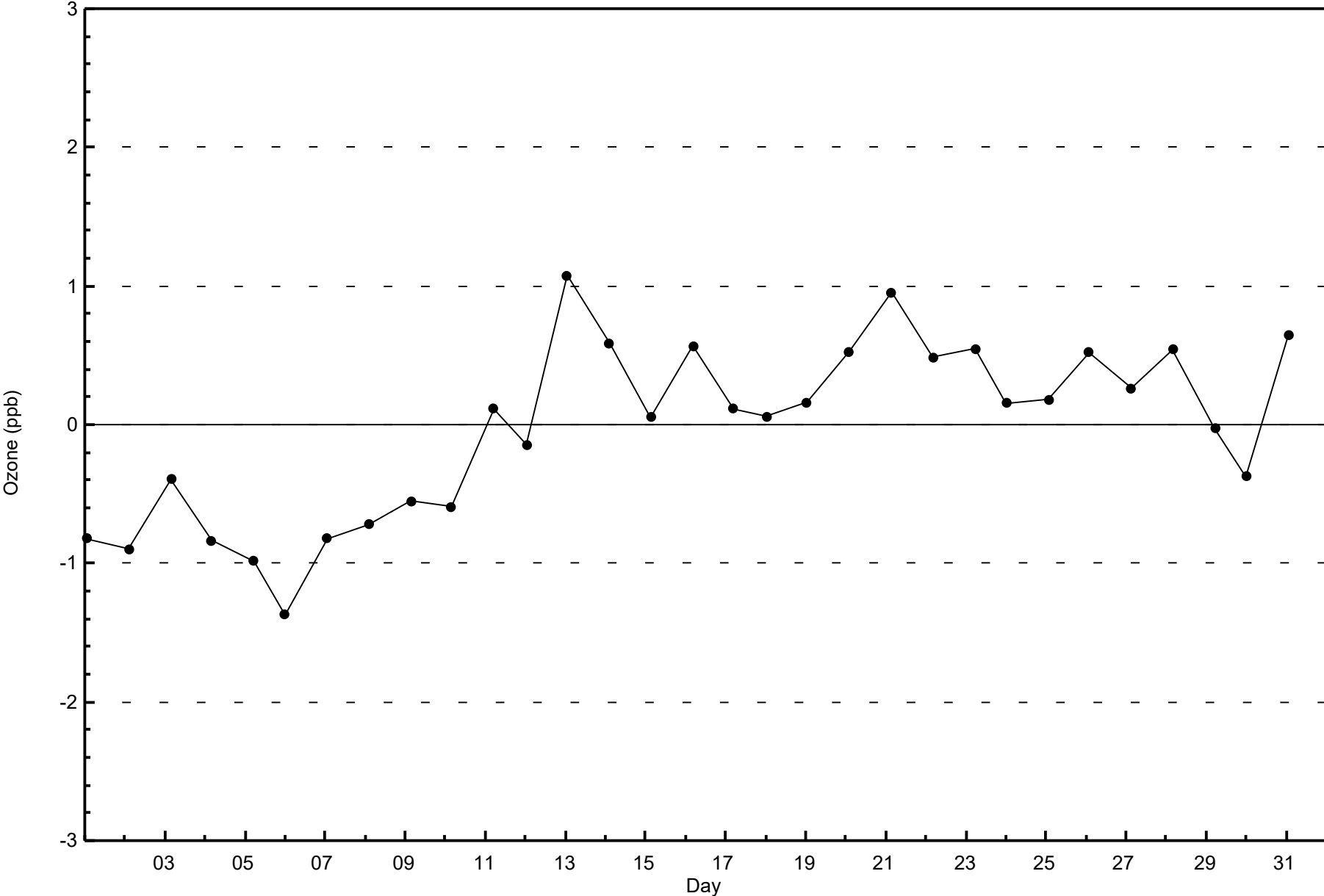
Total Number of Hours: 744

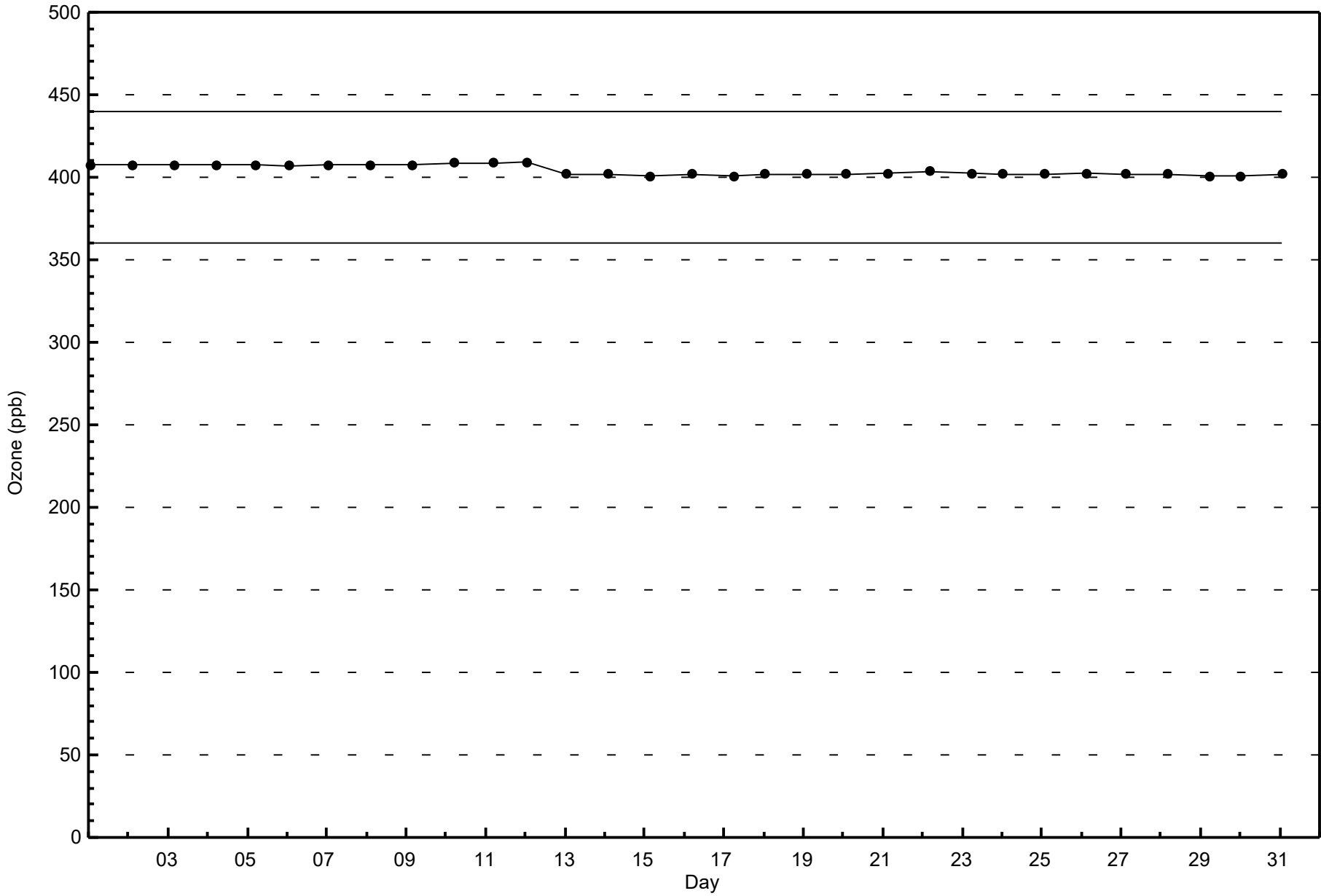


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Ozone (O₃) - ppb
Buffalo Viewpoint

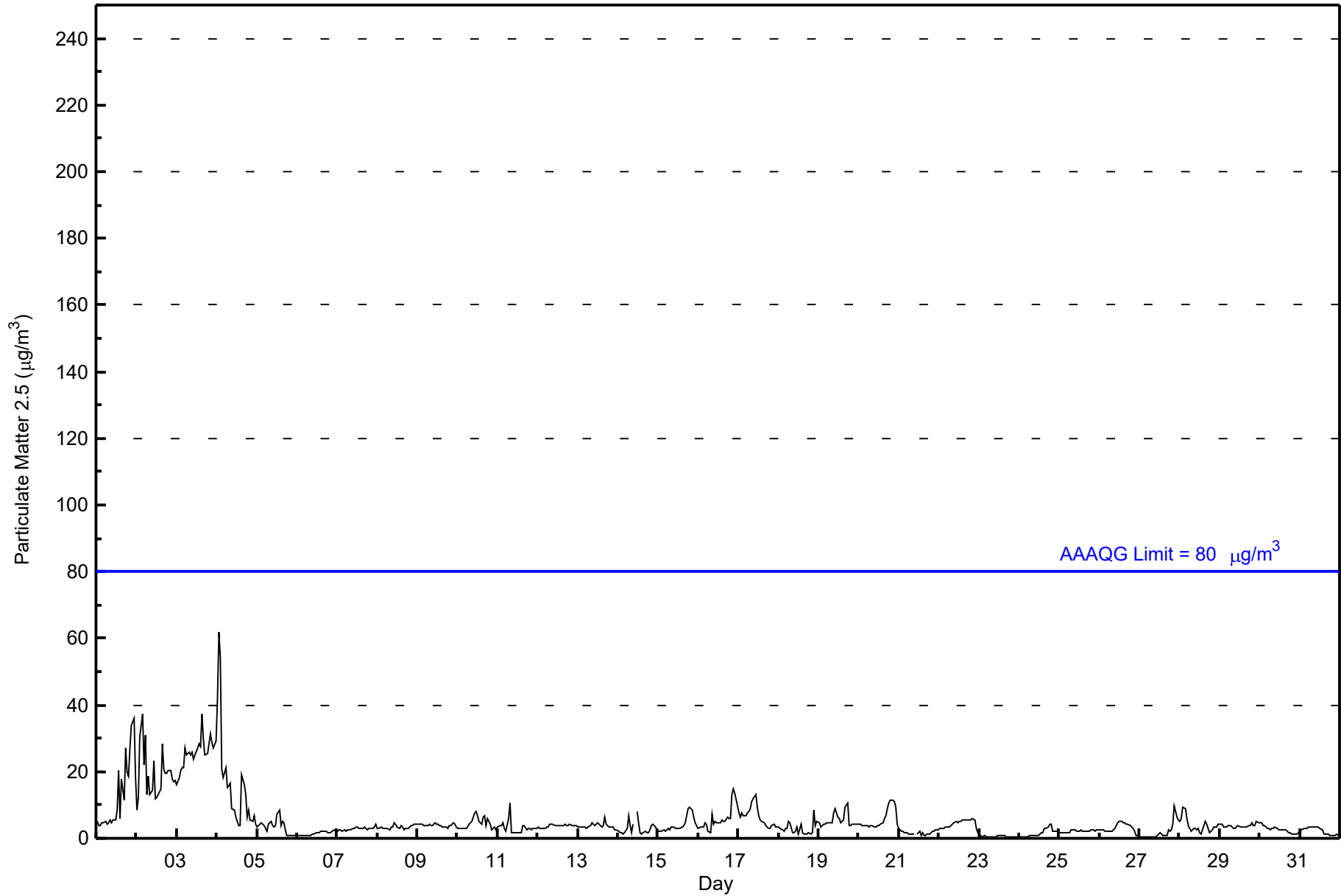








Number of Exceedences (AAAQO):		1-hr: 0		24-hr: 0		Hours in Service:																744																											
Maximum Value: 62.0 µg/m ³ on Dec 4 02:00		Maximum Daily Average: 25.8 µg/m ³ on Dec 3		Hours of Data:																742																													
Minimum Value: 0.3 µg/m ³ on Dec 27 04:00		Minimum Daily Average: 0.6 µg/m ³ on Dec 23		Hours of Missing Data:																2																													
Maximum Diurnal Average: 6.5 µg/m ³ at hour 22		Minimum Diurnal Average: 4.4 µg/m ³ at hour 15		Hours of Calibration:																1																													
Monthly Average: 5.33 µg/m ³		Percentiles: P ₁ = 0.3 P ₁₀ = 1.1 Q ₁ = 2.2 Median = 3.5 Q ₃ = 4.8 P ₉₀ = 11.4 P ₉₉ = 31.2		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-Dec	5.2	3.9	4.0	4.8	4.7	5.1	4.4	4.6	5.4	4.9	5.6	5.6	8.7	20.4	6.1	17.9	11.4	27.2	19.8	18.6	26.8	33.9	35.8	18.2	12.6	35.8																							
2-Dec	8.5	12.3	30.4	37.3	22.0	31.1	13.0	18.6	13.1	14.6	23.3	11.7	12.3	13.3	14.8	28.2	20.8	19.7	19.6	20.5	20.3	17.8	17.1	17.4	19.1	37.3																							
3-Dec	16.1	18.1	20.2	21.0	21.3	27.3	25.0	25.8	25.1	25.7	23.7	25.2	27.0	28.3	27.4	37.3	29.8	25.1	25.4	28.6	31.3	28.7	27.1	29.3	25.8	37.3																							
4-Dec	42.2	62.0	54.1	20.6	18.3	21.1	15.1	15.8	16.4	9.0	8.3	6.5	5.1	3.8	3.6	19.0	16.3	13.2	6.4	8.7	5.5	5.3	6.6	4.0	16.1	62.0																							
5-Dec	3.4	4.0	4.8	4.2	3.9	3.1	2.2	4.1	5.0	3.9	3.5	3.7	7.1	8.5	3.8	5.2	4.5	2.6	1.0	0.9	1.0	1.0	0.9	3.5	8.5																								
6-Dec	1.0	1.0	1.0	0.8	0.8	0.9	0.9	1.0	1.0	1.2	1.4	1.6	1.6	1.9	2.0	2.3	2.3	2.2	1.9	1.9	1.9	2.1	2.4	2.3	1.6	2.4																							
7-Dec	2.2	2.5	2.4	2.3	2.4	2.3	2.5	2.5	2.5	2.9	3.1	3.5	3.4	2.8	3.1	3.1	3.5	2.9	2.6	2.9	2.8	3.0	3.4	4.1	2.9	4.1																							
8-Dec	3.0	3.1	3.5	3.0	2.9	3.0	2.8	2.7	3.4	3.3	4.7	4.3	3.4	2.9	3.6	3.2	2.6	2.8	3.1	3.3	3.6	3.9	4.2	4.2	3.4	4.7																							
9-Dec	4.2	4.3	4.2	4.2	3.9	3.9	3.8	4.3	3.7	4.0	4.9	4.1	4.1	3.9	3.6	3.4	3.4	3.4	3.1	3.7	3.9	4.6	4.2	3.2	3.9	4.9																							
10-Dec	3.1	3.0	3.1	3.1	3.1	3.1	3.4	4.1	5.0	6.4	7.6	8.1	6.8	5.0	4.2	6.3	6.7	3.6	5.9	4.2	2.6	3.1	3.5	2.5	4.5	8.1																							
11-Dec	3.2	3.8	3.7	4.6	2.8	1.9	5.8	10.7	1.7	1.8	1.6	1.6	1.6	1.8	1.9	3.6	3.7	2.5	2.9	3.0	2.6	2.9	3.1	3.1	3.2	10.7																							
12-Dec	3.2	3.0	3.0	2.9	3.1	3.2	3.5	4.4	4.2	4.0	3.8	3.8	3.9	3.8	3.9	3.8	4.3	3.8	4.0	4.1	3.7	3.9	3.8	3.6	3.7	4.4																							
13-Dec	3.3	3.2	3.2	3.2	3.4	2.9	3.2	3.7	4.7	4.4	3.7	4.2	4.5	3.6	3.3	3.7	6.3	4.1	3.6	3.6	3.5	3.2	2.7	2.4	3.7	6.3																							
14-Dec	2.1	1.6	1.8	1.2	1.8	2.9	7.0	3.7	1.8	4.1	C	8.2	4.8	1.8	1.4	1.8	2.0	1.7	1.8	2.5	3.7	4.1	3.5	2.6	2.9	8.2																							
15-Dec	2.3	2.0	2.2	2.7	2.3	2.6	3.0	2.6	3.4	3.4	3.1	3.1	2.9	3.2	3.4	4.0	4.7	6.9	9.0	9.1	8.6	6.3	4.8	3.9	4.1	9.1																							
16-Dec	3.1	3.3	3.6	3.3	4.5	4.0	1.9	1.7	7.0	4.3	5.1	4.7	4.8	4.8	5.4	5.0	5.0	6.2	5.9	5.9	13.1	14.8	13.5	9.7	5.9	14.8																							
17-Dec	7.6	6.3	7.8	6.6	6.6	7.6	8.2	9.0	11.2	12.1	13.1	9.2	6.7	5.4	5.0	4.7	3.7	3.3	2.9	3.1	3.7	4.1	3.5	3.4	6.4	13.1																							
18-Dec	3.5	3.1	2.5	2.1	3.0	2.9	5.1	4.8	1.7	1.6	1.9	3.6	1.3	4.2	1.7	1.1	1.3	1.5	1.5	1.4	1.6	8.3	3.8	5.2	2.9	8.3																							
19-Dec	4.8	3.6	3.7	4.3	4.3	4.8	4.7	4.6	4.5	7.6	8.9	6.5	6.0	4.8	5.0	5.3	9.3	10.6	3.8	3.6	4.2	4.4	4.4	4.4	5.3	10.6																							
20-Dec	4.4	4.1	4.0	3.9	3.8	3.8	3.5	3.6	3.6	3.5	3.5	3.6	4.0	4.2	4.7	6.0	7.0	8.7	10.6	11.3	11.5	11.1	9.2	4.2	5.8	11.5																							
21-Dec	3.0	2.3	2.1	1.8	1.6	1.5	1.3	1.1	1.1	1.1	M	1.1	2.2	1.0	1.5	0.9	1.0	1.1	1.2	1.9	2.0	2.2	2.6	2.7	1.7	3.0																							
22-Dec	2.8	2.9	3.0	3.2	3.4	3.4	3.5	3.6	4.4	4.7	4.9	4.8	5.0	5.0	5.4	5.6	5.4	5.7	5.4	5.4	5.7	5.6	3.0	1.8	4.3	5.7																							
23-Dec	1.3	0.7	0.5	0.6	0.5	0.5	0.4	0.4	0.5	0.4	0.3	0.7	0.8	0.8	0.7	0.8	0.6	0.5	0.5	0.5	0.6	0.6	0.5	0.4	0.6	1.3																							
24-Dec	0.4	0.4	0.4	0.4	0.5	0.5	0.6	0.7	0.8	0.8	0.9	1.0	1.1	1.9	1.5	2.8	2.8	3.2	4.2	4.0	2.2	2.2	2.2	2.0	1.6	4.2																							
25-Dec	1.8	1.8	1.7	1.7	1.7	1.7	1.9	2.4	2.5	2.4	2.2	2.1	2.3	2.7	2.3	2.2	2.1	2.2	2.2	2.2	2.6	2.6	2.1	2.5	2.4	2.2	2.7																						
26-Dec	2.6	2.4	2.4	2.3	2.1	2.1	2.0	2.1	2.5	2.8	3.6	4.5	5.0	5.0	4.6	4.6	4.4	4.4	3.7	3.3	2.8	2.1	0.9	0.7	3.0	5.0																							
27-Dec	0.5	0.3	0.3	0.3	0.3	0.3	0.4	0.3	0.3	0.3	0.4	1.1	1.8	1.3	0.8	1.0	1.0	2.4	1.9	2.7	4.4	9.8	6.3	5.3	1.8	9.8																							
28-Dec	5.2	5.7	9.5	8.7	5.8	3.9	3.1	2.2	3.2	3.2	2.6	2.9	1.9	1.4	3.8	5.1	4.0	3.0	1.5	2.6	3.5	3.3	3.2	4.3	3.9	9.5																							
29-Dec	4.4	4.0	3.4	3.4	3.5	3.8	4.0	3.3	3.1	3.0	3.5	4.0	3.5	3.6	3.5	3.5	3.5	3.7	3.8	4.7	4.0	3.9	5.1	4.7	3.8	5.1																							
30-Dec	4.8	4.5	3.9	3.9	3.2	2.9	2.8	2.9	3.1	3.3	2.9	2.6	2.5	2.5	2.6	2.5	2.1	1.7	1.5	1.2	1.2	1.2	1.4	1.8	2.6	4.8																							
31-Dec	2.5	2.7	2.8	2.9	3.0	3.2	3.3	3.5	3.6	3.6	3.4	3.3	2.9	2.5	1.4	1.2	1.1	1.1	0.9	0.9	0.9	1.0	1.1	1.0	2.2	3.6																							
																								5.0	5.7	6.2	5.3	4.7	5.2	4.6	5.0	4.8	4.8	5.4	4.9	4.8	5.0	4.4	6.3	5.7	5.8	5.2	5.5	6.0	6.5	6.0	5.0	Diurnal Average	
																								42.2	62.0	54.1	37.3	22.0	31.1	25.0	25.8	25.1	25.7	23.7	25.2	27.0	28.3	27.4	37.3	29.8	27.2	25.4	28.6	31.3	33.9	35.8	29.3	Diurnal Maximum	
C - Calibration																								M - Maintenance																									
Alberta Ambient Air Quality Guideline/Objectives: 1-hr 80 µg/m ³																								24-hr 29 µg/m ³																									





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Buffalo Viewpoint - December 2023**

Concentration Ranges ($\mu\text{g}/\text{m}^3$)	Number of Hours	%	Cumulative %
0 - 5	597	80.46	80.46
6 - 15	87	11.73	92.18
16 - 25	34	4.58	96.77
26 - 80	24	3.23	100.00
> 81.0	0	0.00	100.00

Total Number of Valid Hours: 742

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - μg/m³
Buffalo Viewpoint - December 2023

Concentration Ranges (μg/m ³)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	22	10	2	0	1	5	90	177	74	27	45	80	38	11	8	7	597
6 - 15	3	5	3	1	0	5	9	29	14	2	1	1	10	0	1	3	87
16 - 25	5	4	3	1	0	0	0	13	2	0	0	0	1	0	1	4	34
26 - 80	1	6	1	1	0	0	2	7	5	0	0	0	0	0	0	1	24
> 81.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	31	25	9	3	1	10	101	226	95	29	46	81	49	11	10	15	742

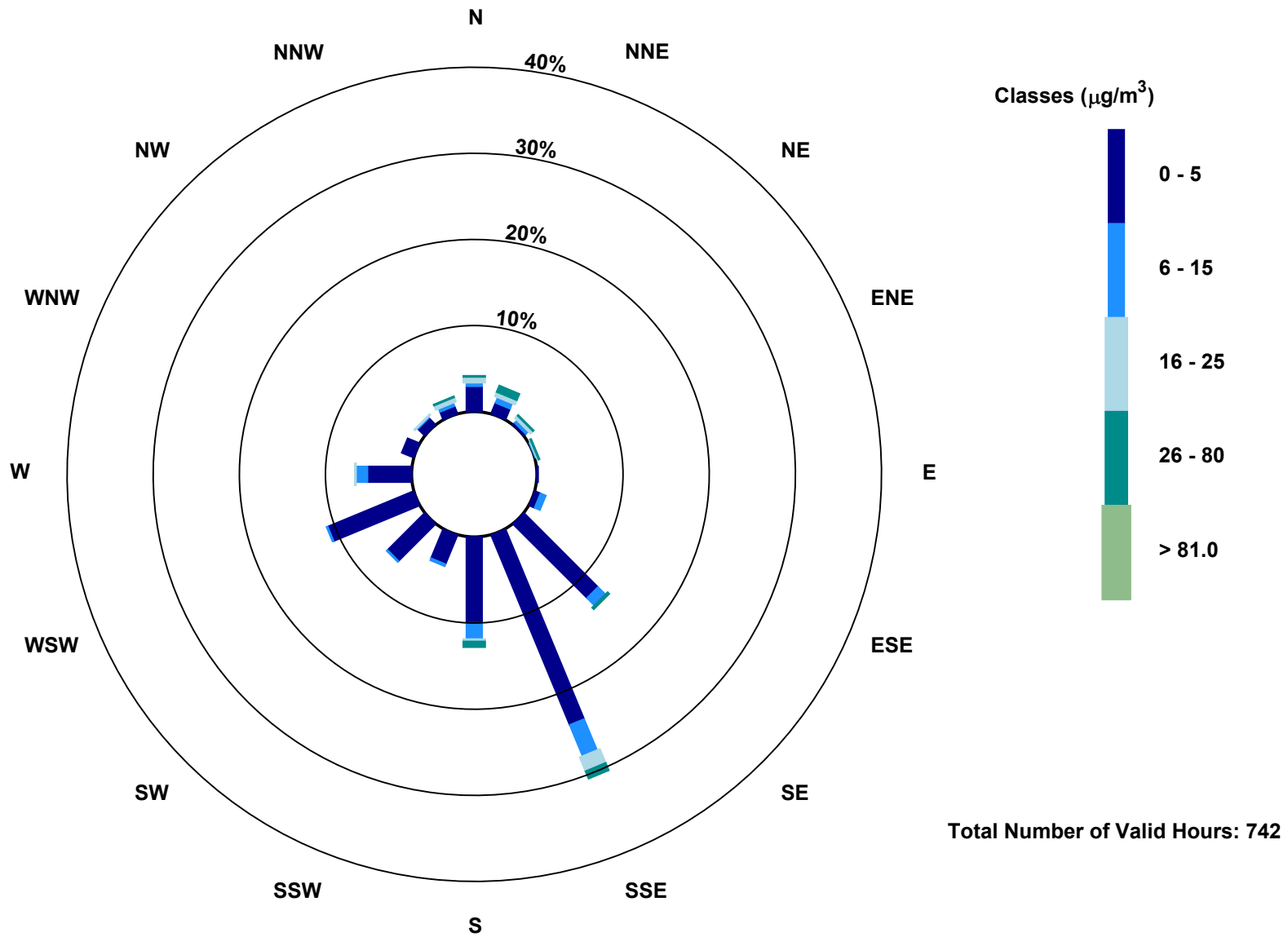
Total Number of Valid Hours: 742

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Dec 2023

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Buffalo Viewpoint





Wood Buffalo Environmental Association
Summary of Hour Averages

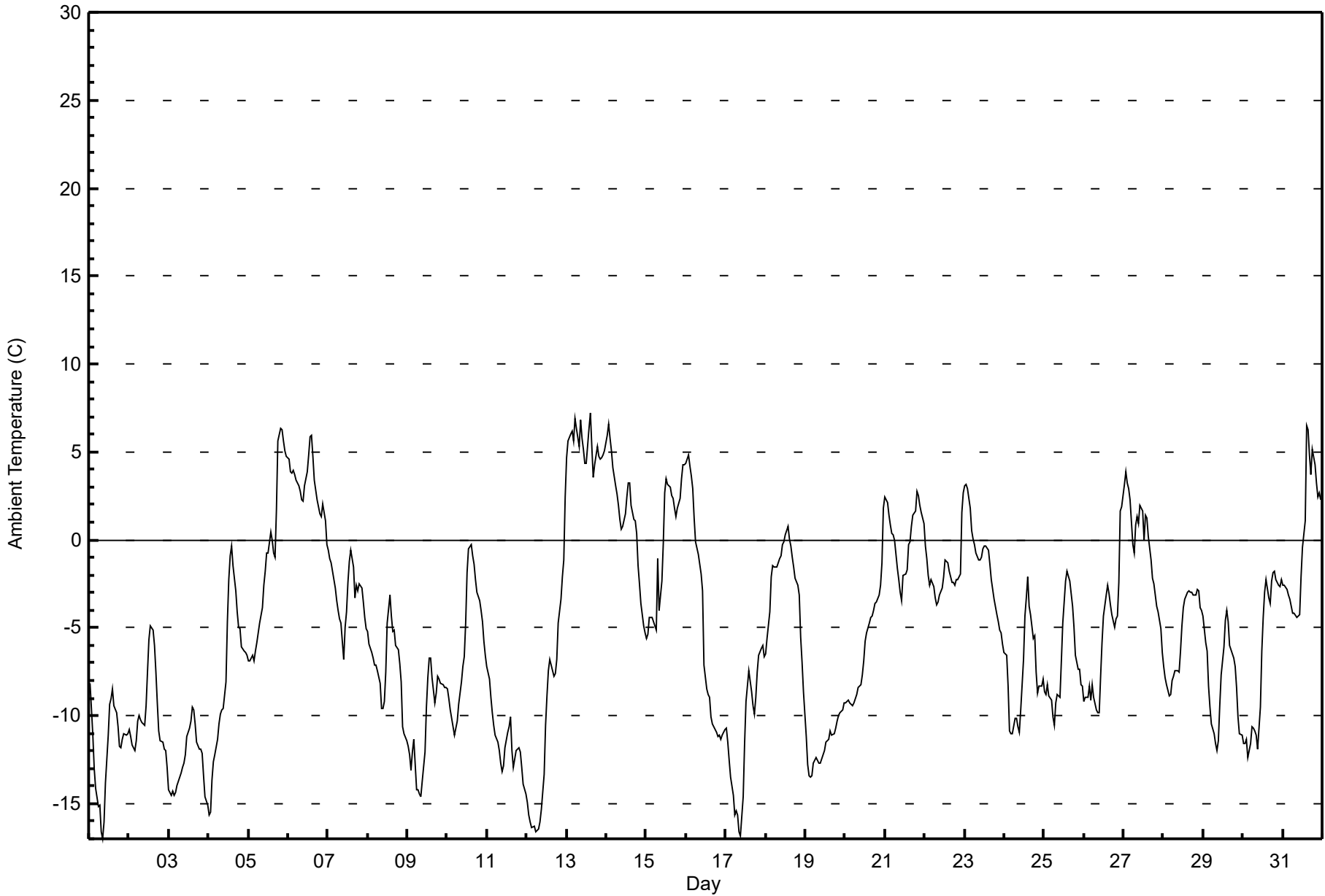
Ambient Temperature (AT) - C
Buffalo Viewpoint - December 2023

Maximum Value: 7.2 C on Dec 13 15:00 Maximum Daily Average: 5.4 C on Dec 13																						Hours in Service: 744 Hours of Data: 744				
Minimum Value: -17.0 C on Dec 1 09:00 Minimum Daily Average: -12.6 C on Dec 3 Maximum Diurnal Average: -2.4 C at hour 15 Minimum Diurnal Average: -7.2 C at hour 9 Monthly Average: -5.19 C Percentiles: P ₁ = -16.3 P ₁₀ = -12.1 Q ₁ = -9.8 Median = -5.1 Q ₃ = -1.1 P ₉₀ = 2.9 P ₉₉ = 6.3																						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-Dec	-8.2	-9.6	-11.1	-13.1	-14.1	-15.2	-15.1	-16.6	-17.0	-16.0	-13.8	-11.1	-9.4	-9.1	-8.5	-9.4	-9.8	-10.6	-11.7	-11.8	-11.3	-11.0	-11.1	-11.0	-11.9	-8.2
2-Dec	-10.8	-11.1	-11.7	-12.0	-11.4	-10.3	-10.0	-10.3	-10.4	-10.6	-9.4	-7.5	-5.7	-4.9	-5.1	-6.0	-7.5	-9.3	-10.8	-11.4	-11.5	-11.9	-12.0	-12.9	-9.8	-4.9
3-Dec	-14.2	-14.5	-14.3	-14.5	-14.3	-14.0	-13.7	-13.3	-12.9	-12.7	-12.2	-11.2	-10.7	-10.3	-9.5	-9.6	-10.5	-11.5	-11.9	-11.9	-12.1	-13.4	-14.6	-15.1	-12.6	-9.5
4-Dec	-15.7	-15.5	-13.7	-12.6	-12.2	-11.3	-10.5	-9.9	-9.7	-9.6	-8.1	-4.7	-2.3	-0.9	0.4	-1.4	-2.9	-4.1	-5.0	-5.1	-6.1	-6.3	-6.4	-6.6	-7.5	-0.4
5-Dec	-6.9	-6.9	-6.6	-6.9	-6.3	-5.9	-5.3	-4.8	-3.9	-2.6	-1.8	-0.8	-0.7	0.4	0.0	-0.8	-1.0	1.7	5.6	6.4	6.3	5.6	5.0	4.8	-1.0	6.4
6-Dec	4.6	3.9	3.8	3.9	3.7	3.4	3.1	2.7	2.3	2.2	3.1	3.8	4.8	5.9	5.9	4.7	3.4	2.2	1.9	1.5	1.3	2.0	1.1	-0.2	3.1	5.9
7-Dec	-0.6	-1.1	-1.3	-1.8	-2.7	-3.5	-4.0	-4.5	-4.8	-6.8	-5.0	-4.1	-2.4	-1.2	-0.6	-1.5	-3.3	-2.6	-2.9	-2.5	-2.7	-3.5	-4.4	-5.0	-3.0	-0.6
8-Dec	-5.2	-5.9	-6.4	-6.8	-7.2	-7.1	-7.4	-8.1	-9.6	-9.6	-9.2	-7.5	-4.7	-3.1	-4.3	-5.2	-5.1	-6.0	-6.2	-7.1	-8.1	-10.6	-11.0	-11.4	-7.2	-3.1
9-Dec	-11.7	-12.2	-13.1	-12.0	-11.3	-14.2	-14.2	-14.5	-14.6	-13.8	-12.0	-9.5	-7.8	-6.7	-6.7	-7.9	-9.3	-8.7	-7.8	-7.9	-8.2	-8.2	-8.4	-8.4	-10.4	-6.7
10-Dec	-8.5	-9.0	-9.7	-10.6	-11.1	-10.7	-10.3	-9.4	-8.1	-7.2	-6.7	-4.7	-1.9	-0.5	-0.2	-0.9	-1.4	-2.3	-3.0	-3.5	-4.0	-4.7	-5.8	-6.5	-5.9	-0.2
11-Dec	-7.2	-7.9	-9.0	-9.9	-10.6	-11.1	-11.5	-11.9	-12.7	-13.2	-12.8	-11.8	-10.9	-10.7	-10.1	-12.0	-12.9	-12.0	-11.9	-11.8	-12.1	-12.9	-13.9	-14.4	-11.5	-7.2
12-Dec	-14.9	-15.7	-16.1	-16.4	-16.3	-16.6	-16.5	-16.4	-16.0	-15.3	-13.3	-10.5	-8.9	-7.5	-6.8	-7.4	-7.7	-7.6	-6.8	-4.7	-3.4	-2.1	-1.2	2.5	-10.2	2.5
13-Dec	4.7	5.6	6.0	6.2	5.6	6.9	6.4	5.3	6.8	5.8	5.1	4.4	4.4	6.3	7.2	5.3	3.6	4.3	5.3	4.7	4.6	4.7	4.8	5.1	5.4	7.2
14-Dec	5.9	6.6	5.8	5.1	4.1	3.1	2.6	2.0	1.2	0.6	0.8	1.5	2.4	3.2	3.2	1.9	1.2	1.1	0.4	-1.4	-2.5	-3.6	-4.9	-5.3	1.5	6.6
15-Dec	-5.6	-5.3	-4.4	-4.4	-4.6	-4.9	-5.1	-1.1	-4.0	-2.3	-0.2	2.7	3.5	3.2	3.0	2.5	2.4	1.8	1.3	1.8	2.4	3.4	4.2	4.3	-0.2	4.3
16-Dec	4.4	4.8	4.2	3.7	2.9	1.3	-0.1	-0.9	-1.4	-1.9	-2.9	-7.1	-8.5	-8.8	-8.9	-10.1	-10.5	-10.8	-10.9	-11.2	-11.1	-11.4	-11.1	-10.8	-4.9	4.8
17-Dec	-10.7	-11.5	-12.6	-13.5	-14.6	-15.6	-15.4	-15.7	-16.6	-16.8	-14.6	-11.6	-9.2	-8.4	-7.4	-8.7	-9.4	-9.9	-9.0	-7.5	-6.6	-6.2	-6.0	-6.6	-11.0	-6.0
18-Dec	-6.5	-5.6	-4.1	-2.1	-1.5	-1.5	-1.6	-1.6	-1.1	-0.9	-0.3	-0.1	0.3	0.8	0.1	-0.4	-1.0	-1.5	-2.2	-2.6	-3.1	-5.5	-7.0	-8.6	-2.4	0.8
19-Dec	-11.2	-12.8	-13.4	-13.5	-13.4	-12.7	-12.4	-12.5	-12.7	-12.7	-12.4	-12.0	-11.5	-11.4	-11.3	-10.9	-11.1	-11.0	-10.7	-10.3	-10.0	-9.8	-9.6	-9.3	-11.6	-9.3
20-Dec	-9.2	-9.2	-9.1	-9.3	-9.4	-9.3	-9.0	-8.8	-8.4	-8.2	-7.7	-6.9	-5.8	-5.3	-4.7	-4.4	-4.4	-4.0	-3.6	-3.5	-3.2	-2.6	-1.3	1.8	-6.1	1.8
21-Dec	2.4	2.1	1.4	0.8	0.4	0.3	0.0	-1.6	-2.2	-2.9	-3.4	-2.0	-1.9	-1.7	-0.3	-0.1	0.8	1.4	1.6	2.8	2.5	2.0	1.6	0.9	0.2	2.8
22-Dec	-0.4	-1.1	-2.0	-2.6	-2.3	-2.6	-3.3	-3.7	-3.5	-3.1	-2.8	-2.1	-1.2	-1.2	-1.3	-1.8	-2.4	-2.4	-2.6	-2.3	-2.3	-1.9	1.6	2.6	-1.9	2.6
23-Dec	3.1	3.2	2.9	1.8	0.6	0.0	-0.2	-0.7	-1.1	-1.2	-1.0	-0.5	-0.4	-0.3	-0.6	-1.4	-2.2	-2.8	-3.4	-4.2	-4.7	-5.1	-5.3	-6.0	-1.2	3.2
24-Dec	-6.4	-6.6	-8.3	-10.8	-11.0	-11.0	-10.1	-10.1	-10.6	-11.0	-9.7	-6.8	-4.4	-3.3	-2.1	-3.8	-4.2	-5.6	-5.4	-7.5	-8.8	-8.3	-8.3	-7.9	-7.6	-2.1
25-Dec	-8.6	-8.8	-8.2	-8.8	-9.1	-10.1	-10.6	-9.2	-8.8	-8.9	-6.9	-4.7	-3.5	-2.3	-1.8	-2.3	-3.1	-3.8	-4.9	-6.6	-7.3	-7.4	-8.2	-8.3	-6.8	-1.8
26-Dec	-9.2	-8.9	-8.9	-8.3	-9.1	-8.3	-9.0	-9.6	-9.8	-9.8	-7.8	-5.8	-4.3	-3.1	-2.6	-3.1	-3.7	-4.3	-5.0	-4.5	-4.4	-2.4	1.6	1.9	-5.8	1.9
27-Dec	3.2	3.9	3.3	2.9	2.2	-0.3	-0.8	0.9	1.3	0.9	1.9	1.7	-0.1	1.4	1.3	0.2	-1.2	-2.2	-2.5	-3.1	-3.8	-4.1	-5.0	-6.4	-0.2	3.9
28-Dec	-7.2	-7.8	-8.2	-8.9	-8.8	-8.0	-7.7	-7.4	-7.4	-7.5	-6.4	-4.9	-3.8	-3.4	-3.0	-2.9	-3.0	-3.0	-3.1	-3.1	-2.8	-2.9	-3.9	-4.0	-5.4	-2.8
29-Dec	-4.3	-5.8	-6.4	-8.3	-9.5	-10.5	-11.0	-11.6	-12.0	-11.4	-9.4	-7.6	-6.1	-4.6	-4.0	-4.7	-6.0	-6.4	-6.7	-7.2	-8.4	-10.0	-11.0	-11.1	-8.1	-4.0
30-Dec	-11.6	-11.6	-11.4	-12.4	-11.6	-10.7	-10.7	-10.9	-11.1	-11.9	-9.5	-6.4	-4.4	-2.9	-2.3	-3.3	-3.6	-2.3	-1.8	-1.8	-2.3	-2.6	-2.6	-2.3	-6.7	-1.8
31-Dec	-2.5	-2.5	-2.8	-3.1	-3.4	-3.7	-4.2	-4.2	-4.4	-4.3	-4.2	-2.1	-0.4	1.1	6.5	6.3	4.8	3.7	5.1	4.2	3.2	2.5	2.7	2.3	0.0	6.5
																								Diurnal Average		
																								Diurnal Maximum		



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature (AT) - C
Buffalo Viewpoint - December 2023





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	598	80.38	80.38
0 - 10	146	19.62	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744

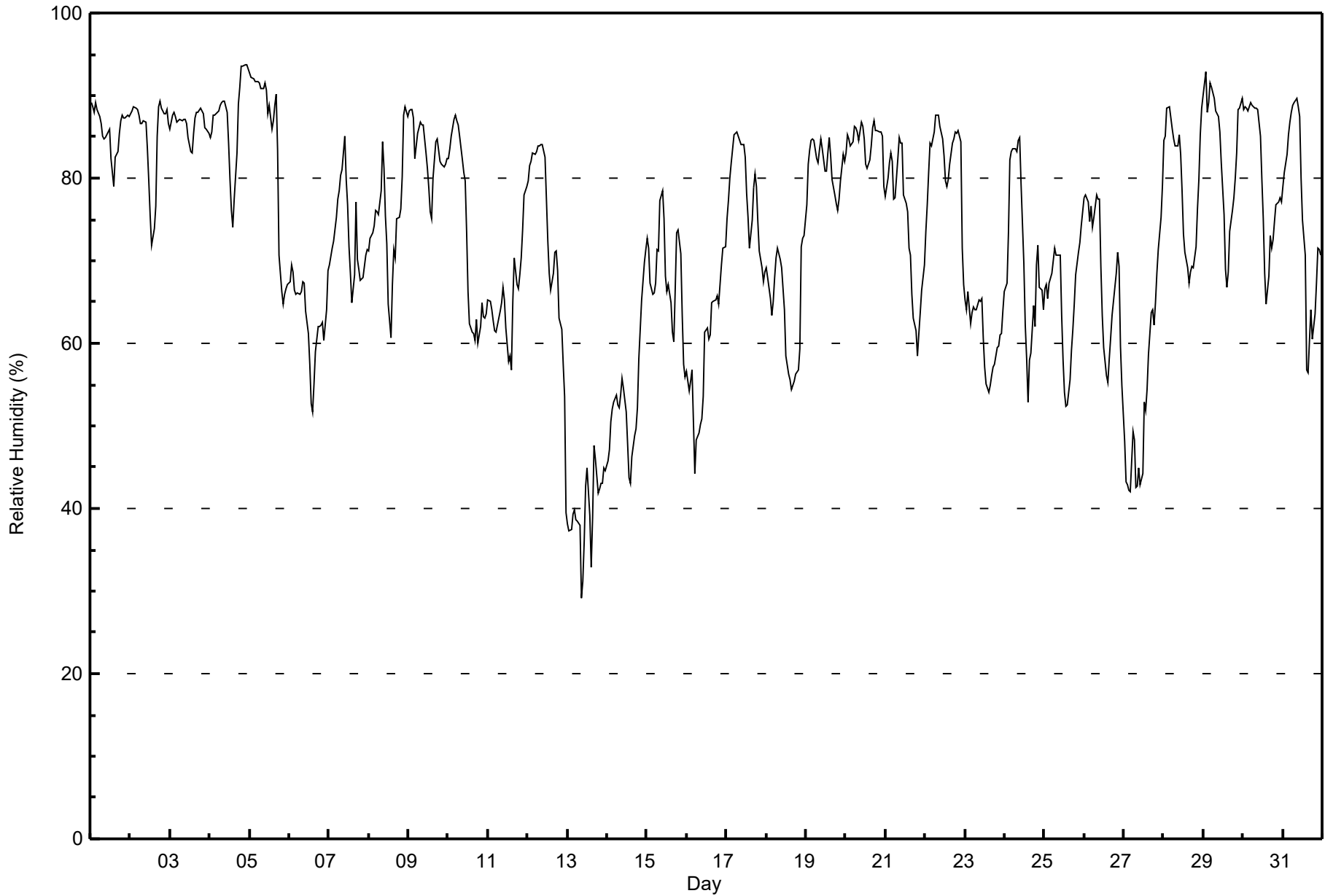


Maximum Value: 93.8 % on Dec 4 23:00 Maximum Daily Average: 87.0 % on Dec 4																						Hours in Service:	744			
Minimum Value: 29.2 % on Dec 13 09:00 Minimum Daily Average: 39.8 % on Dec 13																						Hours of Data:	744			
Maximum Diurnal Average: 77.3 % at hour 10 Minimum Diurnal Average: 65.1 % at hour 15																						Hours of Missing Data:	0			
Monthly Average: 72.88 % Percentiles: P ₁ = 38.3 P ₁₀ = 54.6 Q ₁ = 64.2 Median = 74.9 Q ₃ = 84.8 P ₉₀ = 88.0 P ₉₉ = 92.1																						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-Dec	89.2	88.7	87.9	89.2	88.4	87.5	86.6	85.1	84.8	85.0	85.3	85.9	82.4	80.7	79.1	82.5	83.2	85.4	86.9	87.7	87.3	87.2	87.7	87.4	85.9	89.2
2-Dec	87.7	88.1	88.7	88.4	88.2	87.6	86.6	86.5	86.9	86.7	83.6	79.7	75.4	71.9	73.9	76.7	85.1	88.6	89.3	88.5	87.8	87.8	88.4	86.6	84.9	89.3
3-Dec	85.9	87.6	87.9	87.4	86.8	87.0	87.1	87.0	87.1	87.2	86.7	85.0	83.2	83.0	85.5	87.2	88.0	88.0	88.5	88.2	87.9	86.2	86.0	85.4	86.6	88.5
4-Dec	84.9	85.7	87.6	87.6	87.8	88.1	88.7	89.1	89.4	89.4	88.0	84.2	79.9	76.1	74.0	77.5	83.1	89.0	91.0	93.6	93.6	93.7	93.8	93.2	87.0	93.8
5-Dec	92.7	92.3	92.0	91.7	91.7	91.7	91.5	90.9	90.8	91.6	90.6	87.8	88.8	85.9	86.9	88.8	90.2	83.4	70.7	66.2	64.8	66.0	66.6	67.0	84.2	92.7
6-Dec	67.4	69.4	68.7	66.5	65.9	66.1	65.9	66.2	67.4	67.4	64.0	61.2	57.4	52.8	51.6	55.1	58.9	62.1	62.0	62.3	62.6	60.4	64.1	68.8	63.1	69.4
7-Dec	69.4	70.6	71.5	72.4	75.3	77.5	78.5	80.3	81.0	85.1	79.9	76.8	71.7	68.4	64.8	68.4	77.1	70.2	69.0	67.6	68.0	69.3	70.6	71.3	73.1	85.1
8-Dec	71.2	72.7	73.4	74.3	76.0	76.0	75.6	78.4	84.4	81.2	75.5	72.1	64.8	60.8	67.1	71.4	70.3	75.1	75.2	76.3	80.2	87.6	88.6	87.4	75.6	88.6
9-Dec	88.2	88.4	88.3	87.3	82.4	85.4	86.1	86.7	86.4	86.4	83.1	81.1	78.7	76.0	75.0	79.9	84.3	84.8	83.3	82.1	81.7	81.4	81.8	82.3	83.4	88.4
10-Dec	82.4	83.6	85.1	87.1	87.7	87.0	86.4	85.1	82.3	80.6	79.7	73.5	66.2	62.4	61.4	61.3	60.3	62.8	60.0	62.0	64.9	63.2	63.1	63.6	73.0	87.7
11-Dec	65.2	65.1	64.0	62.8	61.6	61.4	63.0	63.9	64.9	66.7	65.3	61.9	57.8	58.6	56.8	65.1	70.4	67.1	66.7	68.3	70.3	73.7	78.0	79.0	65.7	79.0
12-Dec	79.6	81.5	82.1	83.1	82.9	83.2	83.9	83.8	84.1	84.2	82.6	77.4	72.4	68.6	66.5	68.5	71.0	71.1	68.8	63.0	61.7	57.4	53.5	39.4	72.9	84.2
13-Dec	38.1	37.2	37.5	39.2	39.8	38.6	38.4	37.9	29.2	31.1	36.2	42.8	44.9	39.2	32.9	39.1	47.7	45.9	41.8	42.4	43.0	43.1	45.0	44.6	39.8	47.7
14-Dec	45.8	47.2	50.5	52.1	52.9	53.7	52.6	52.3	53.8	55.8	54.5	51.7	47.8	43.8	43.0	46.3	48.8	49.6	52.2	58.2	61.7	65.3	69.9	71.3	53.4	71.3
15-Dec	72.7	71.6	67.3	65.9	66.2	67.2	71.4	71.2	77.3	78.5	75.1	68.2	66.3	67.1	65.0	61.3	60.2	66.7	73.4	73.6	70.9	63.5	57.4	55.9	68.1	78.5
16-Dec	56.7	54.2	55.5	56.7	50.5	44.2	48.3	49.1	50.2	50.8	53.5	61.3	61.8	60.5	61.1	64.8	65.2	65.2	65.7	64.7	67.2	69.5	71.5	71.7	59.2	71.7
17-Dec	75.0	77.4	79.9	81.8	85.3	85.5	85.6	85.0	84.7	84.1	84.1	82.5	78.2	75.3	71.5	75.0	78.8	80.4	79.0	74.8	71.2	69.1	67.5	68.6	78.4	85.6
18-Dec	69.2	68.0	65.5	63.4	65.0	67.9	70.4	71.4	70.1	69.1	66.6	64.1	58.5	56.2	55.7	54.4	54.9	55.4	56.3	56.8	59.4	71.7	72.7	73.1	64.0	73.1
19-Dec	76.8	81.7	83.5	84.5	84.7	84.5	82.4	81.8	83.3	84.8	83.5	80.8	80.9	83.1	85.0	82.7	79.8	77.9	76.9	76.1	77.5	79.7	83.0	82.0	81.5	85.0
20-Dec	83.0	85.2	84.7	84.0	84.3	86.2	86.1	85.6	84.5	86.8	86.3	84.8	81.7	81.2	82.2	83.9	86.1	86.9	85.8	85.8	85.6	85.5	85.2	79.0	84.6	86.9
21-Dec	77.8	80.1	81.9	83.1	82.1	77.4	77.6	82.4	84.9	84.3	84.2	77.9	77.0	76.0	71.5	70.8	65.9	63.1	61.6	58.5	61.2	63.7	66.4	69.6	74.1	84.9
22-Dec	73.6	76.8	80.6	84.2	84.0	85.6	87.7	87.6	87.6	86.2	84.8	82.7	79.7	79.0	79.9	81.8	84.2	84.7	85.7	85.4	85.8	84.4	71.5	67.1	82.1	87.7
23-Dec	65.3	64.2	66.2	62.4	63.7	64.4	64.1	64.0	65.3	65.1	65.4	60.7	57.2	55.1	54.1	55.0	56.1	57.2	57.4	59.5	59.7	60.9	61.2	63.9	61.2	66.2
24-Dec	66.3	67.2	73.3	82.2	83.2	83.6	83.5	83.2	84.5	85.0	79.4	69.7	62.2	58.2	52.8	58.0	58.8	64.5	62.1	69.5	71.9	66.8	66.4	64.1	70.7	85.0
25-Dec	66.6	67.1	65.4	67.3	68.4	70.0	71.6	70.7	70.6	70.7	63.4	58.0	54.0	52.4	52.5	55.6	59.1	61.6	64.8	68.4	71.0	72.2	74.3	75.9	65.5	75.9
26-Dec	77.6	78.0	77.1	74.7	76.6	74.1	75.3	78.0	77.5	77.4	69.3	63.4	59.5	56.1	55.2	58.2	60.8	63.4	66.8	68.5	71.0	69.3	59.6	54.9	68.4	78.0
27-Dec	48.2	43.3	42.9	42.2	42.1	49.3	48.3	42.5	42.6	44.9	42.9	44.3	52.9	51.9	54.5	58.7	63.8	64.1	62.1	64.9	68.5	71.4	75.3	79.1	54.2	79.1
28-Dec	84.5	85.1	88.5	88.6	87.2	86.0	84.8	83.9	83.9	85.3	82.9	78.5	73.3	71.0	69.1	67.4	68.6	69.3	69.2	71.6	76.3	79.9	85.3	88.5	79.5	88.6
29-Dec	90.0	92.9	88.0	89.1	91.5	91.1	89.6	88.1	87.8	87.4	85.5	81.9	75.7	69.0	66.7	68.6	73.6	76.2	77.7	80.0	83.0	88.3	88.5	89.7	83.3	92.9
30-Dec	88.3	88.6	88.4	88.1	89.1	88.8	88.6	88.5	88.5	88.3	85.2	79.8	75.1	68.5	64.8	68.2	73.1	71.5	72.6	74.8	76.7	77.2	77.5	77.1	80.3	89.1
31-Dec	78.9	80.7	82.9	85.2	86.7	88.0	88.7	89.1	89.7	88.6	87.4	80.0	74.9	70.7	56.8	56.4	60.3	64.0	60.5	63.5	67.3	71.5	71.3	70.7	75.6	89.7
74.1 74.8 75.4 75.9 76.1 76.3 76.6 76.6 77.0 77.3 75.3 72.3 69.0 66.4 65.1 67.4 69.9 70.8 70.4 71.1 72.2 73.1 73.3 72.9																						Diurnal Average				
92.7 92.9 92.0 91.7 91.7 91.7 91.5 90.9 90.8 91.6 90.6 87.8 88.8 85.9 86.9 88.8 90.2 89.0 91.0 93.6 93.6 93.7 93.8 93.2																						Diurnal Maximum				



Wood Buffalo Environmental Association
Hourly Averages

Relative Humidity (RH) - %
Buffalo Viewpoint - December 2023





Maximum Speed: 28 km/h on Dec 10 19:00	Maximum Daily Speed Average: 16.0 km/h on Dec 23	Hours in Service: 744
Minimum Speed Value: 1 km/h on Dec 3 07:00	Minimum Daily Speed Average: 2.1 km/h on Dec 2	Hours of Data: 744
Maximum Diurnal Speed Average: 5.5 km/h at hour 9	Minimum Diurnal Speed Average: 3.8 km/h at hour 14	Hours of Missing Data: 0
Monthly Average Velocity: 4.5 km/h 202.6 deg	Percentiles: P ₁ = 1 P ₁₀ = 4 Q ₁ = 6 Median = 8 Q ₃ = 11 P ₉₀ = 17 P ₉₉ = 23	Percent Operational Time: 100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Dec	WSW6	SW5	SSW4	S5	SSE5	S4	SSE3	S4	SSE4	S2	S2	S2	SE3	SSE5	SSE4	SSE6	SSE6	SSE5	SSE5	SSE6	SSE7	S7	SSE8	SSE8	S4.5	SSE8
2-Dec	SSE7	SE8	SE8	SSE7	SSE6	SSE8	SSE7	SSE6	SSE5	S4	SSE5	S5	S5	SSE2	SE1	SE3	W1	NNW5	N6	NW6	NNW6	NNW6	N4	N5	SSE2.1	SE8
3-Dec	NNE6	N3	NE3	NE4	ENE2	NE4	NNW1	ENE2	NE3	NNE4	NNE3	N3	NNE5	NNE4	N1	NNE5	NNE6	NNE6	NNE6	NNE4	N4	S2	S3	SSE4	NNE2.8	NNE6
4-Dec	S5	S6	SSE6	SSE6	SSE5	S5	SSE7	SSE7	SSE6	SE7	SE7	S5	SW8	SW7	SSW7	S7	SSE8	SE9	SSE8	SSE8	SSE8	SSE7	SSE8	SSE8	SSE6.4	SE9
5-Dec	SE9	SSE7	SSE5	SE7	SSE6	SSE6	SSE5	S7	S5	SSE7	SSE7	SSE7	SE7	SE5	SE8	SE9	SE11	SSW11	SW18	WSW20	WSW19	WSW6	SSW8	SSW8	S6.5	WSW20
6-Dec	SW10	SW10	WSW12	WSW17	WSW14	WSW15	WSW16	WSW17	WSW15	SW14	WSW14	WSW15	WSW13	WSW13	WSW13	SW12	SSW7	SSW9	SSW7	SSW10	SW13	WSW18	W19	WSW7	WSW12.4	W19
7-Dec	SW9	WSW8	WSW13	WSW14	SSW4	S4	WSW5	S5	SW6	SSE5	SSW3	SSE5	S6	E1	SW4	S5	SSE5	WSW7	WSW9	WSW14	WSW17	WSW17	WSW10	W9	SW6.4	WSW17
8-Dec	W17	W13	W10	W7	WSW3	WSW6	SW4	W2	SW1	WSW1	S3	SW6	SW5	WSW5	SSE5	S5	WSW5	W2	WSW6	SSW5	SSW7	SSE6	SSE7	S6	SW4.5	WSW17
9-Dec	SE7	S8	SSE6	SSW5	SW5	SSE6	S7	SSE9	SSE6	SE7	S5	S6	SE6	SE5	SE6	SSE5	SSE7	SSE8	SSE8	SSE8	SSE7	SSE8	SSE7	SSE8	SSE6.4	SSE9
10-Dec	SSE7	SSE8	SSE6	SSE4	SSE5	S6	SSE6	SSE10	SSE10	SSE10	S5	S4	WSW12	WSW15	W17	W20	W22	W21	W28	WNW22	WNW18	WNW24	WNW25	NW23	W8.6	W28
11-Dec	NW21	NNW16	NW19	NW24	NW22	NNW17	W23	W22	WSW17	WSW18	WSW14	WSW12	WSW8	SW6	SSE4	SE6	SSE4	SSE7	SSE7	SSE6	SSE5	S5	S4	S5	W7.5	NW24
12-Dec	SSE6	SSE7	SSE7	SSE7	SSE5	SSE5	S5	SSE5	S6	SSE5	SSE8	SSE10	SSE11	SSE9	SSE11	SSE11	SSE9	S9	S8	S9	SSE8	SE9	SE10	SSW12	SSE7.8	SSW12
13-Dec	SW14	SW15	SW14	SW14	SW12	SW12	SSW10	SSE8	SSW9	SSW8	SSE8	SE10	SE10	SSE8	S8	SSE8	SE11	SE11	SSE9	SSE9	SSE9	SE9	S9	SSE8	S8.2	SW15
14-Dec	SW5	W10	W12	WSW12	WSW15	WSW15	W21	WSW19	WSW22	WSW24	W22	W14	W11	WSW8	SSW8	S7	SW9	SW11	WSW9	S2	SE7	SE8	SSE8	SE9	WSW9.8	WSW24
15-Dec	SE9	SSE8	SSE11	S10	SSE9	SSE9	SE12	S10	SE10	SSE9	SSE9	S12	SSW13	S15	S14	S13	SSW14	SSW14	S14	S16	SSW13	SW18	SW22	SW16	S11.2	SSW22
16-Dec	WSW17	WSW21	WSW20	W18	WNW22	WNW20	NNW18	NNW17	W21	W16	NNW14	NNE12	NNE11	NNE9	N6	N6	NNE6	NNE5	NNE6	NE3	NNE2	W1	SSE3	ESE2	WNW7.7	WNW22
17-Dec	NNE13	N12	NNW7	N3	SSE3	SSE6	SSE8	SSE8	SE9	SSE7	SSE6	SSE6	SE6	SE7	SE7	SE9	SSE6	SE6	SE8	SSE7	SSE10	SE10	SSE9	SSE8	SE4.8	NNE13
18-Dec	SSE9	S7	SW8	WSW14	WSW22	WSW21	WSW25	WSW16	WSW13	WSW17	WSW20	WSW20	WSW17	W21	W17	W19	W17	W15	WNW10	W12	NW11	NNE16	NNE12	NNE15	W11.7	WSW25
19-Dec	N14	N8	N10	N11	N9	N8	N7	NNE7	NE5	NE4	ESE3	ESE1	W1	NNE4	NE5	ESE7	ESE10	ESE9	SE8	SE11	SE11	SE10	SE11	SE13	ENE3.6	N14
20-Dec	SE15	SE13	SE14	SE16	SE16	SSE12	SSE12	SSE12	SSE12	SSE10	SSE11	SSE11	SSE10	SSE7	SSE8	SSE9	SSE9	SSE11	SSE11	SSE12	SSE12	SSE11	SSE5	WSW10	SSE10.7	SE16
21-Dec	WSW17	WSW20	WSW18	WSW16	W19	WSW14	SW11	S8	SSE7	SE8	SE8	SE9	SE8	SE7	SSE9	SE7	SSE10	SSE8	S6	S8	SSW10	S9	S9	S10	SSW6.8	WSW20
22-Dec	SSE8	SSE7	SE7	SE5	SE5	SSE4	S4	S6	S7	S7	SSE8	SSE8	SSE6	SSE5	S6	S4	SSE5	S4	S5	SSE7	S6	S6	W19	WSW20	S5.4	WSW20
23-Dec	W19	WSW21	WSW18	W20	W19	W20	W21	W20	W19	W18	W20	W21	W25	W22	W18	W13	W13	W14	SW8	SSW6	WSW8	SW9	SW10	SW11	W16.0	W25
24-Dec	SW11	SW10	SSE6	SE8	SE9	SE7	SE5	SSE5	SE6	SSE8	SE9	SE6	SE5	SE6	SE5	SE7	SE8	ESE3	SE7	SSE7	SSE9	SSE10	SSE9	SSE9	SSE6.4	SW11
25-Dec	SSE8	SSE6	S7	SSE7	SSE8	SE8	SSE8	SE8	SE9	SSE9	SSE8	SE8	SE8	SE9	SE9	SSE7	SSE6	SSE5	SSE6	SE9	SSE7	SSE6	SE8	SSE6	SSE7.4	SE9
26-Dec	SE6	SSE7	SE8	SSE6	SSE5	S5	SSE4	SE5	SSE5	S5	S5	SSE6	SSE7	SSE7	SSE10	S11	S8	S9	SSE8	SSE10	SE12	S11	S13	S11	SSE7.4	S13
27-Dec	SW16	SW18	SW17	SW16	SW14	S11	S10	SSW12	SW14	SW16	SW14	SE7	ESE9	SE7	SE7	SSE5	SSE5	SSE6	SE5	SE4	ESE1	ENE5	NE8	NNE5	SSW6.6	SW18
28-Dec	N3	NNW4	NW4	NNW7	N6	N6	NNW7	N6	NNE4	N6	N10	NNW11	N11	N7	NNW10	N9	N7	N7	N9	NNW7	N8	N7	NNW5	NW4	N6.8	NNW11
29-Dec	NW4	SW3	WSW5	SSE5	SSE6	SE8	SSE8	S8	SSE7	SSE6	SSE7	SSE8	S8	S8	S9	SSE7	SSE7	SE5	S5	S5	SE7	SSE9	S7	SSE7	SSE6.0	S9
30-Dec	SSE8	SSE8	SSE6	SSE6	SSE7	SSE7	SSE7	SSE6	S5	SE6	SSE6	SSE7	SSE6	SE5	SSE5	SE6	SE7	S7	S8	S6	SSE7	S7	S7	SSE8	SSE6.5	SSE8
31-Dec	S7	SSE7	SSE6	SSE6	SSE8	SE6	SE7	SSE5	SE7	SE9	SE7	SSE6	SE10	SE9	WSW14	SW12	SW11	SSW10	WSW17	WSW17	W13	WSW17	W16	WNW10	SSW6.4	WSW17

SW4.3 SW5.0 SW4.9 SW5.0 SW4.7 SW4.6 SW4.9SSW5.2SSW5.5SSW5.1SSW4.4	S4.0	S3.9SSW3.8SSW4.3	S4.5	S4.4	S4.4SSW4.5SSW5.1SSW4.5SSW4.2SSW4.6SSW4.3	Diurnal Average
NW21 WSW21 WSW20 NW24 WNW22 WSW21 WSW25	W22 WSW22 WSW24	W22	W21	W25	W22 W18 W20 W22 W21 W28 WNW22 WSW19 WNW24 WNW25 NW23	Diurnal Maximum

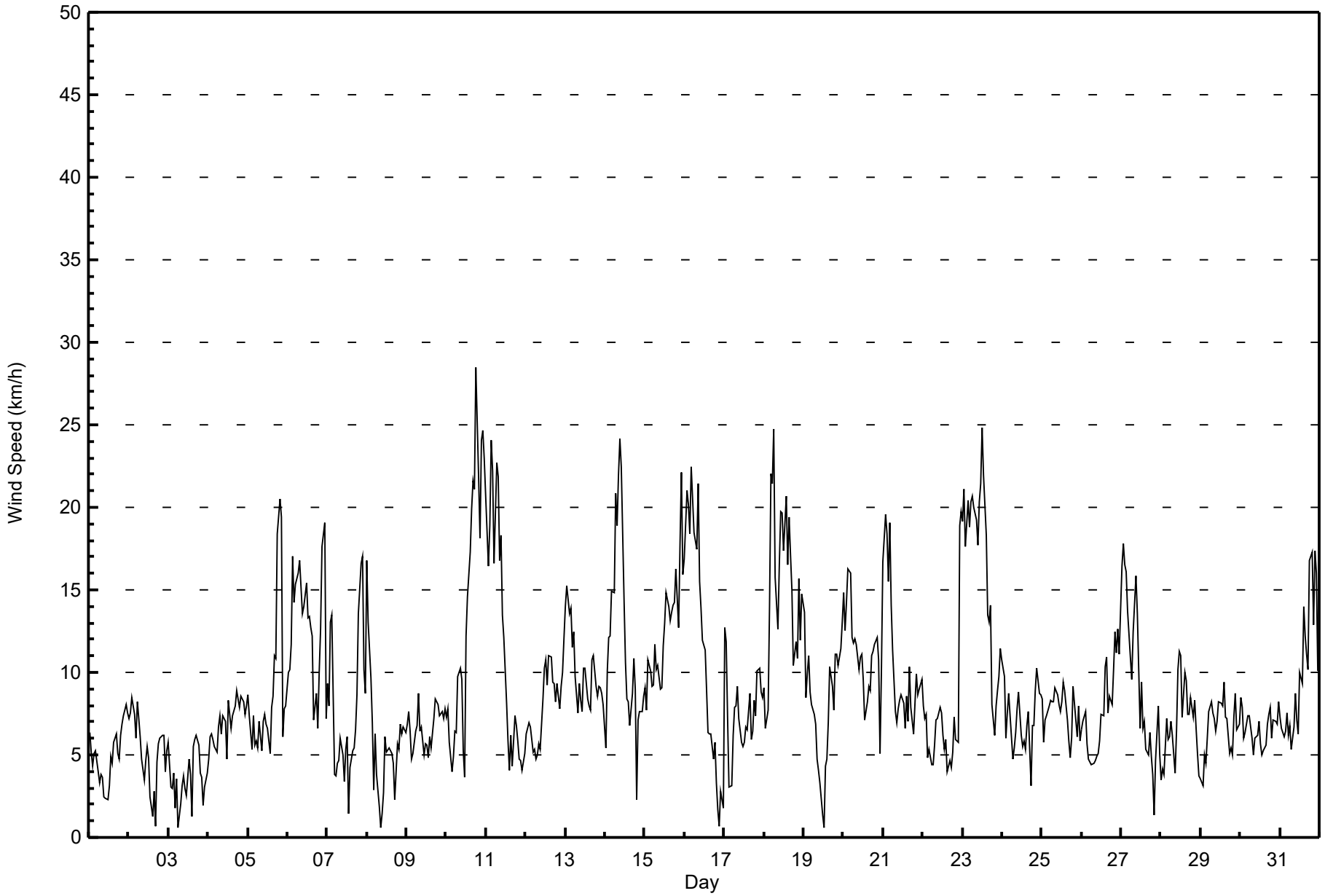
All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

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

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 8 km/h on Dec 10 19:00 Minimum Value: 0 km/h on Dec 1 08:00 Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 2 Median = 2 Q ₃ = 3 P ₉₀ = 4 P ₉₉ = 6																	Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0								
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Dec	1	2	1	1	1	1	1	0	1	1	1	1	1	1	1	2	2	1	1	2	2	2	2	2	2
2-Dec	2	2	2	2	2	2	2	2	2	1	1	2	2	1	1	1	1	1	1	1	2	2	2	2	2
3-Dec	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	2	2	1	1	1	1	1	1	1	1
4-Dec	1	1	1	1	1	1	2	1	1	1	2	1	3	2	1	1	1	1	1	2	1	2	1	1	1
5-Dec	2	2	1	2	2	2	2	2	1	2	2	2	2	2	1	2	2	4	5	6	6	4	2	3	6
6-Dec	2	3	4	5	4	4	4	4	4	4	4	3	4	4	4	3	2	3	2	2	3	4	4	4	5
7-Dec	2	2	5	7	2	1	2	2	2	2	1	1	2	2	2	1	1	2	3	5	4	4	4	2	7
8-Dec	4	3	3	3	2	3	3	1	1	1	1	1	2	2	1	2	2	2	2	2	2	2	1	2	4
9-Dec	1	1	1	2	1	1	2	1	2	2	1	2	2	2	2	1	2	2	2	2	2	2	2	2	2
10-Dec	2	2	2	1	2	2	2	3	3	4	2	2	3	4	4	5	5	5	8	6	5	7	7	6	8
11-Dec	6	5	5	7	7	5	6	5	4	3	4	4	2	2	2	1	2	2	2	2	1	1	1	1	7
12-Dec	1	1	1	1	1	1	1	1	1	2	3	3	4	3	3	3	3	3	2	3	2	2	2	3	4
13-Dec	3	4	4	4	3	4	4	2	2	2	2	2	2	2	1	2	3	4	2	1	3	3	2	2	4
14-Dec	3	3	4	3	3	4	4	4	5	5	6	5	3	3	2	1	3	3	4	1	1	1	2	2	6
15-Dec	2	2	3	2	2	2	2	3	2	2	3	4	4	5	5	5	4	4	4	5	4	6	6	5	6
16-Dec	5	5	4	4	7	6	5	5	5	5	4	3	3	3	2	2	2	2	3	2	1	1	1	2	7
17-Dec	4	3	3	2	1	2	1	1	2	2	2	2	2	2	2	2	2	2	3	3	3	3	3	2	4
18-Dec	2	1	3	4	4	5	5	5	4	5	5	4	4	5	4	4	4	4	3	4	4	5	3	4	5
19-Dec	5	3	2	3	2	2	2	2	2	1	2	1	1	2	2	2	3	3	3	4	4	4	4	5	5
20-Dec	5	4	5	6	6	5	4	4	4	3	4	4	4	3	3	3	3	4	4	4	4	3	2	4	6
21-Dec	4	4	4	3	3	4	3	2	1	2	2	2	2	2	2	3	3	2	3	3	3	2	2	2	4
22-Dec	2	2	2	2	1	1	1	2	2	2	3	2	2	2	2	1	1	1	1	2	2	2	4	5	5
23-Dec	6	5	4	6	5	5	6	5	4	4	4	5	5	5	4	4	4	4	2	2	4	3	2	3	6
24-Dec	3	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	2	2	1	1	1	1	1	3
25-Dec	1	2	1	1	1	2	2	2	3	2	2	2	2	2	2	2	1	1	1	2	2	3	2	3	3
26-Dec	2	2	3	2	2	1	1	1	1	1	1	2	2	2	3	4	2	3	2	3	2	2	3	4	4
27-Dec	5	5	4	4	3	2	3	3	3	3	4	2	2	2	2	2	1	1	2	1	1	2	1	2	5
28-Dec	2	2	2	2	2	2	1	3	3	3	2	4	4	2	3	2	2	2	2	2	2	1	1	1	4
29-Dec	1	1	1	2	1	2	2	2	1	2	2	2	3	2	3	2	2	1	1	1	1	1	1	1	3
30-Dec	1	1	1	1	2	2	1	1	1	1	2	2	2	1	1	2	2	2	2	2	2	2	2	2	2
31-Dec	2	2	1	2	2	2	1	1	2	2	2	2	3	2	4	3	3	3	4	4	4	4	4	4	4
Diurnal Maximum																									





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	164	22.04	22.04
6 - 11	408	54.84	76.88
12 - 19	131	17.61	94.49
20 - 28	41	5.51	100.00
29 - 38	0	0.00	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed (WS) - km/h
Buffalo Viewpoint - December 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	7	11	8	3	1	6	14	44	38	5	8	6	5	0	3	5	164
6 - 11	22	9	1	0	0	4	81	175	50	18	16	16	4	2	2	8	408
12 - 19	2	5	0	0	0	0	7	7	7	6	21	46	23	4	1	2	131
20 - 28	0	0	0	0	0	0	0	0	0	0	1	13	18	5	4	0	41
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	31	25	9	3	1	10	102	226	95	29	46	81	50	11	10	15	744

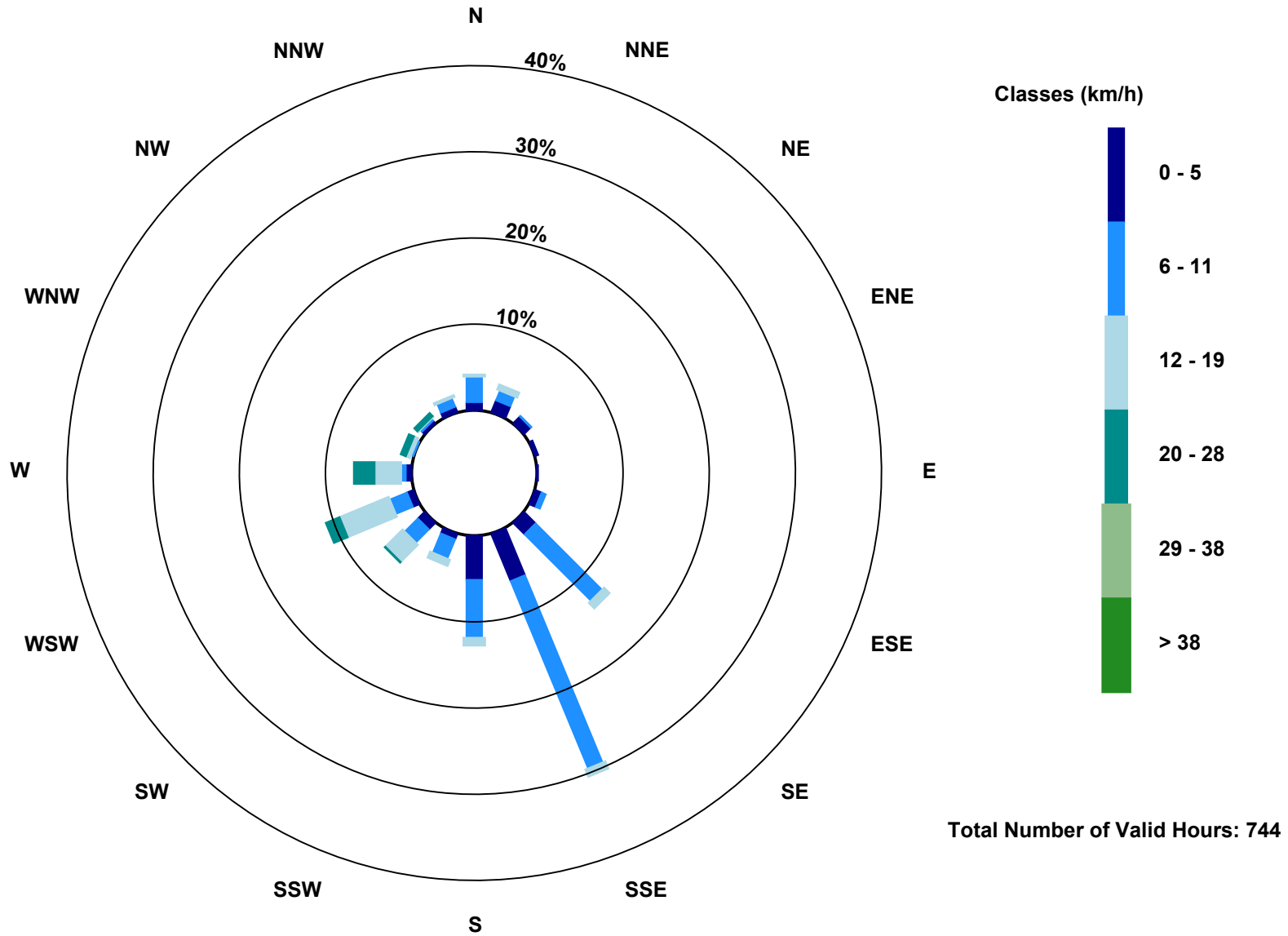
Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Dec 2023

Wind Speed (WS) - km/h
Buffalo Viewpoint





Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
Buffalo Viewpoint - December 2023

Direction of Maximum Speed: 278 deg on Dec 10 19:00		Hours in Service: 744
Direction of Maximum Daily Speed Average: 262.0 deg on Dec 23		Hours of Data: 744
Direction of Minimum Speed: 342 deg on Dec 3 07:00	Direction of Minimum Daily Speed Average: 2.1 deg on Dec 2	Hours of Missing Data: 0
Monthly Average Direction: 202.6 deg		Percent Operational Time: 100.0

Day	Hourly Period Ending At (MST)																								Daily Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Dec	251	222	212	183	162	180	166	170	164	170	191	172	142	157	152	156	168	163	150	162	163	171	162	159	171.4
2-Dec	162	146	146	150	149	153	156	165	162	171	165	171	182	163	140	140	267	345	359	319	337	347	3	10	150.7
3-Dec	16	359	44	52	61	44	342	70	39	23	26	10	26	21	11	33	21	12	17	29	349	172	170	162	29.2
4-Dec	173	179	163	154	165	179	165	163	162	146	139	179	236	228	206	174	156	139	150	149	152	157	159	152	165.8
5-Dec	144	148	166	146	157	147	159	170	182	163	158	166	162	140	137	130	137	193	234	241	251	244	204	204	184.1
6-Dec	222	226	238	240	239	242	240	243	241	236	248	257	253	250	237	214	193	194	200	209	232	253	261	245	237.9
7-Dec	234	245	250	253	198	190	239	189	214	157	202	148	169	87	214	187	163	240	240	249	251	256	242	260	231.3
8-Dec	259	268	263	259	247	255	229	261	214	257	173	231	232	239	163	185	244	262	238	196	196	154	164	169	229.1
9-Dec	135	176	156	194	231	153	169	153	152	142	169	170	146	141	137	164	148	156	157	154	160	159	164	168	159.0
10-Dec	158	166	157	167	161	175	153	153	155	157	169	185	254	245	259	262	270	269	278	292	300	302	301	304	261.1
11-Dec	319	330	322	312	305	295	275	261	251	258	250	252	246	214	167	132	155	155	159	161	168	175	171	180	271.3
12-Dec	152	150	152	147	166	162	169	160	171	156	158	160	155	160	158	158	162	171	174	169	153	140	143	204	160.8
13-Dec	222	225	223	225	222	219	204	157	198	195	150	130	131	148	181	157	141	143	152	156	164	135	188	149	180.2
14-Dec	235	275	261	246	251	253	259	252	250	255	263	267	277	240	211	178	214	236	251	189	132	129	159	146	243.8
15-Dec	145	157	163	169	152	149	139	188	140	150	157	181	193	190	182	175	192	194	186	190	193	216	228	235	183.2
16-Dec	247	254	258	259	288	300	298	282	268	280	337	30	25	16	3	10	12	13	12	36	28	263	149	114	296.6
17-Dec	12	357	347	353	151	155	154	149	142	164	167	151	145	136	126	131	153	146	140	149	151	144	147	167	138.9
18-Dec	151	171	231	248	258	254	255	250	237	245	252	258	251	263	274	264	273	279	291	267	309	19	16	15	264.6
19-Dec	8	352	350	349	349	349	6	22	50	55	123	120	263	17	37	104	112	119	131	129	135	135	134	138	70.8
20-Dec	140	143	141	145	146	147	148	151	157	155	156	157	155	163	155	151	154	157	166	159	153	153	156	247	153.7
21-Dec	251	258	257	257	263	245	223	181	162	134	126	124	130	136	150	141	152	157	172	186	192	181	175	173	200.9
22-Dec	160	152	126	129	131	157	169	174	177	170	164	164	165	150	170	174	165	179	169	166	178	181	259	257	179.5
23-Dec	261	254	254	276	275	272	273	267	262	266	264	266	260	266	271	276	276	260	228	207	251	234	232	233	262.0
24-Dec	225	227	155	140	143	141	143	155	143	160	136	140	124	124	128	139	128	120	128	150	156	157	159	153	150.9
25-Dec	149	160	171	163	154	143	161	144	139	157	150	134	134	134	135	148	153	155	151	136	150	166	134	159	148.1
26-Dec	140	147	144	157	158	181	149	146	161	169	174	158	152	156	162	169	170	170	153	155	138	184	191	184	162.4
27-Dec	229	231	225	224	215	189	175	211	216	219	217	137	122	142	143	156	149	149	144	141	106	57	44	14	196.4
28-Dec	353	347	315	347	9	356	345	353	13	0	6	343	3	350	338	354	0	4	350	345	353	350	341	315	351.6
29-Dec	304	225	239	165	159	145	151	171	156	156	158	162	169	175	174	160	150	137	169	176	145	151	171	151	163.5
30-Dec	148	148	155	158	149	153	147	161	174	143	156	161	156	145	160	132	146	179	179	176	168	172	173	167	158.9
31-Dec	169	165	160	166	153	143	140	153	139	138	143	151	140	143	240	232	215	209	245	246	262	256	268	284	206.9

215.3 223.0 221.4 224.9 222.9 214.9 214.5 205.0 199.8 199.9 197.5 191.1 190.6 193.6 193.3 179.7 178.8 190.0 200.3 195.3 195.3 193.8 204.7 204.5
 Diurnal Average

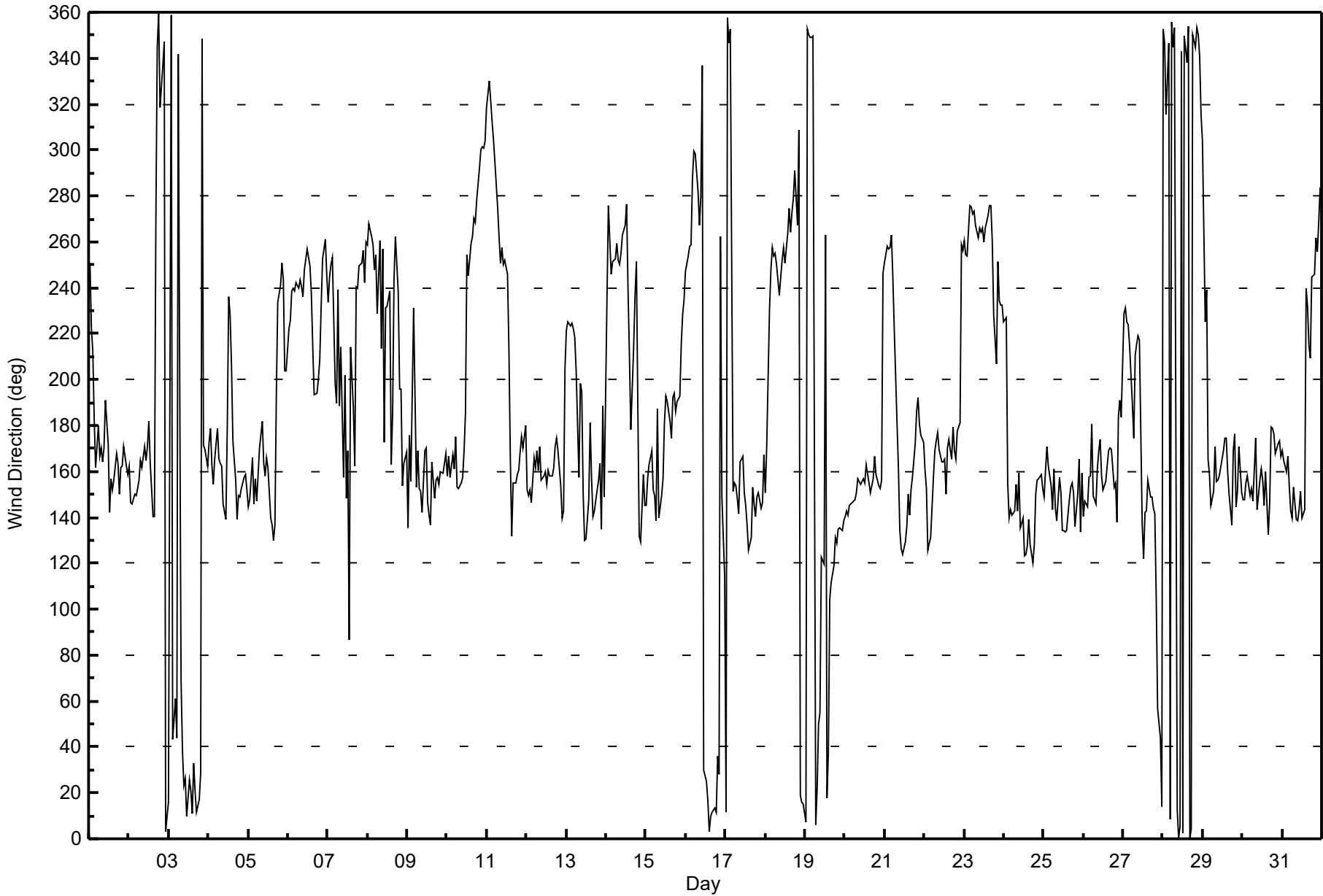
All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Direction (WD) - deg
Buffalo Viewpoint - December 2023

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 87 deg on Dec 3 15:00 Minimum Value: 6 deg on Dec 1 08:00 Percentiles: P ₁ = 9 P ₁₀ = 13 Q ₁ = 16 Median = 20 Q ₃ = 26 P ₉₀ = 31 P ₉₉ = 70																	Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0								
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Dec	13	26	39	16	9	9	11	6	11	14	15	21	24	21	24	25	22	20	21	20	29	22	22	23	39
2-Dec	25	22	20	16	22	24	26	27	28	31	21	22	28	64	86	30	77	31	17	15	21	24	16	19	86
3-Dec	18	35	18	19	33	25	74	27	18	16	19	15	11	20	87	25	27	12	6	7	22	54	29	21	87
4-Dec	17	17	15	17	14	19	17	12	17	13	14	32	21	18	18	16	19	8	14	13	13	16	14	13	32
5-Dec	16	21	23	27	31	24	32	28	26	27	27	35	26	39	14	12	11	39	19	18	19	56	25	21	56
6-Dec	13	14	18	17	17	17	17	16	17	16	16	13	14	18	18	13	18	15	14	16	16	14	14	55	55
7-Dec	16	19	20	51	48	35	44	30	27	54	55	20	22	79	48	25	24	17	22	17	14	14	23	20	79
8-Dec	15	16	19	31	79	32	63	59	83	53	36	19	31	27	30	30	25	64	21	38	24	18	16	21	83
9-Dec	19	12	12	38	31	22	16	17	19	21	20	24	28	27	21	20	19	18	23	24	22	23	22	25	38
10-Dec	25	23	32	24	23	25	23	26	25	31	26	42	17	17	14	13	15	14	19	22	21	21	20	21	42
11-Dec	19	19	18	20	21	21	18	13	15	12	17	17	19	21	32	17	22	24	24	30	20	19	13	13	32
12-Dec	10	14	11	14	11	14	15	15	17	26	22	23	25	26	26	26	29	29	28	28	23	20	25	16	29
13-Dec	17	16	17	17	18	20	25	20	16	16	24	14	11	21	21	16	13	19	39	27	20	18	28	22	39
14-Dec	46	30	13	17	15	15	12	14	15	13	13	20	23	34	22	19	31	18	32	61	22	12	18	12	61
15-Dec	13	18	22	21	24	19	11	29	18	20	26	30	23	23	26	26	24	24	25	25	26	20	18	19	30
16-Dec	17	15	11	11	23	21	21	19	13	22	26	19	18	20	20	16	18	28	28	43	36	65	24	64	65
17-Dec	20	16	20	17	28	21	12	15	15	13	22	23	20	15	13	11	23	19	21	30	25	23	25	20	30
18-Dec	15	30	20	18	12	13	13	18	17	17	15	12	14	12	16	11	16	18	21	14	35	20	20	20	35
19-Dec	21	20	16	16	16	17	20	20	17	16	27	52	82	22	18	23	19	23	27	24	26	28	27	29	82
20-Dec	28	28	29	30	30	31	31	29	28	29	28	29	30	27	28	26	26	27	26	26	26	26	54	19	54
21-Dec	13	11	11	11	10	19	16	18	21	16	14	12	20	26	25	27	25	28	33	29	22	21	18	19	33
22-Dec	19	19	17	55	9	16	34	23	26	28	26	24	23	20	22	25	27	29	27	19	25	38	11	13	55
23-Dec	17	13	15	18	18	16	17	16	15	14	12	14	11	13	16	19	17	14	21	33	17	16	15	17	33
24-Dec	22	17	26	15	15	16	23	21	14	14	13	19	22	21	20	14	13	33	9	19	8	6	9	11	33
25-Dec	15	13	13	11	11	17	16	13	15	14	15	14	19	22	18	19	22	20	14	12	16	28	25	27	28
26-Dec	20	24	24	32	38	20	20	20	17	21	22	27	26	27	27	25	24	30	20	40	11	24	19	25	40
27-Dec	17	17	15	16	17	17	16	20	14	14	16	39	13	25	26	23	18	21	25	21	56	30	15	22	56
28-Dec	33	31	26	22	33	32	20	15	30	16	18	21	19	36	17	16	19	23	16	18	16	16	26	29	36
29-Dec	31	47	14	38	10	15	13	15	14	21	20	18	21	21	20	16	15	16	10	9	10	9	11	14	47
30-Dec	10	10	15	16	15	16	18	18	15	18	28	30	23	21	32	21	28	27	21	21	22	27	23	23	32
31-Dec	21	21	19	20	17	22	17	22	17	13	28	35	23	29	18	17	12	25	16	16	15	11	13	20	35
46 47 39 55 79 35 74 59 83 54 55 52 82 79 87 30 77 64 39 61 56 65 54 64																									
Diurnal Maximum																									





WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

**AMS05
MANNIX
DECEMBER 2023**

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

January 31, 2024

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - MANNIX (AMS05)
 DECEMBER 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	709	35	35	100	424.1	2	36.3	0
H2S (ppb) Average	706	37	38	99.87	13	1	2.4	0
THC (ppm) Average	709	35	35	100	4.4	-	3.1	-
NMHC(ppm) Average	709	35	35	100	0.999	-	0.37	-
CH4(ppm) Average	709	35	35	100	4	-	2.8	-
Temperature 2 m (C) Average	735	0	9	98.79	5.2	-	2	-
Temperature 20 m (C) Average	735	0	9	98.79	7.7	-	4.1	-
Temperature 45 m (C) Average	735	0	9	98.79	8.1	-	5.7	-
Temperature 75 m (C) Average	735	0	9	98.79	8.9	-	6.9	-
Temperature 90 m (C) Average	735	0	9	98.79	9.1	-	7.2	-
Relative Humidity 2 m (%) Average	735	0	9	98.79	94	-	88	-
Relative Humidity 20 m (%) Average	735	0	9	98.79	93	-	86	-
Relative Humidity 45 m (%) Average	735	0	9	98.79	91	-	87	-
Relative Humidity 75 m (%) Average	735	0	9	98.79	96	-	89	-
Relative Humidity 90 m (%) Average	735	0	9	98.79	93	-	86	-
Wind Speed 20 m (km/h) Average	735	0	9	98.79	45	-	22	-
Wind Speed 45 m (km/h) Average	732	0	12	98.39	52	-	28	-
Wind Speed 75 m (km/h) Average	733	0	11	98.52	55	-	31	-
Wind Speed 90 m (km/h) Average	735	0	9	98.79	57	-	33	-
Wind Direction 20 m (deg) Average	735	0	9	98.79	-	-	-	-
Wind Direction 45 m (deg) Average	732	0	12	98.39	-	-	-	-
Wind Direction 75 m (deg) Average	733	0	11	98.52	-	-	-	-
Wind Direction 90 m (deg) Average	735	0	9	98.79	-	-	-	-
Vertical Wind Speed 20 m (km/h) Average	735	0	9	98.79	1.5	-	0.8	-
Vertical Wind Speed 45 m (km/h) Average	732	0	12	98.39	2.4	-	0.6	-
Vertical Wind Speed 75 m (km/h) Average	733	0	11	98.52	2.8	-	0.4	-
Vertical Wind Speed 90 m (km/h) Average	735	0	9	98.79	3	-	0.4	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - MANNIX (AMS05)
DECEMBER 2023

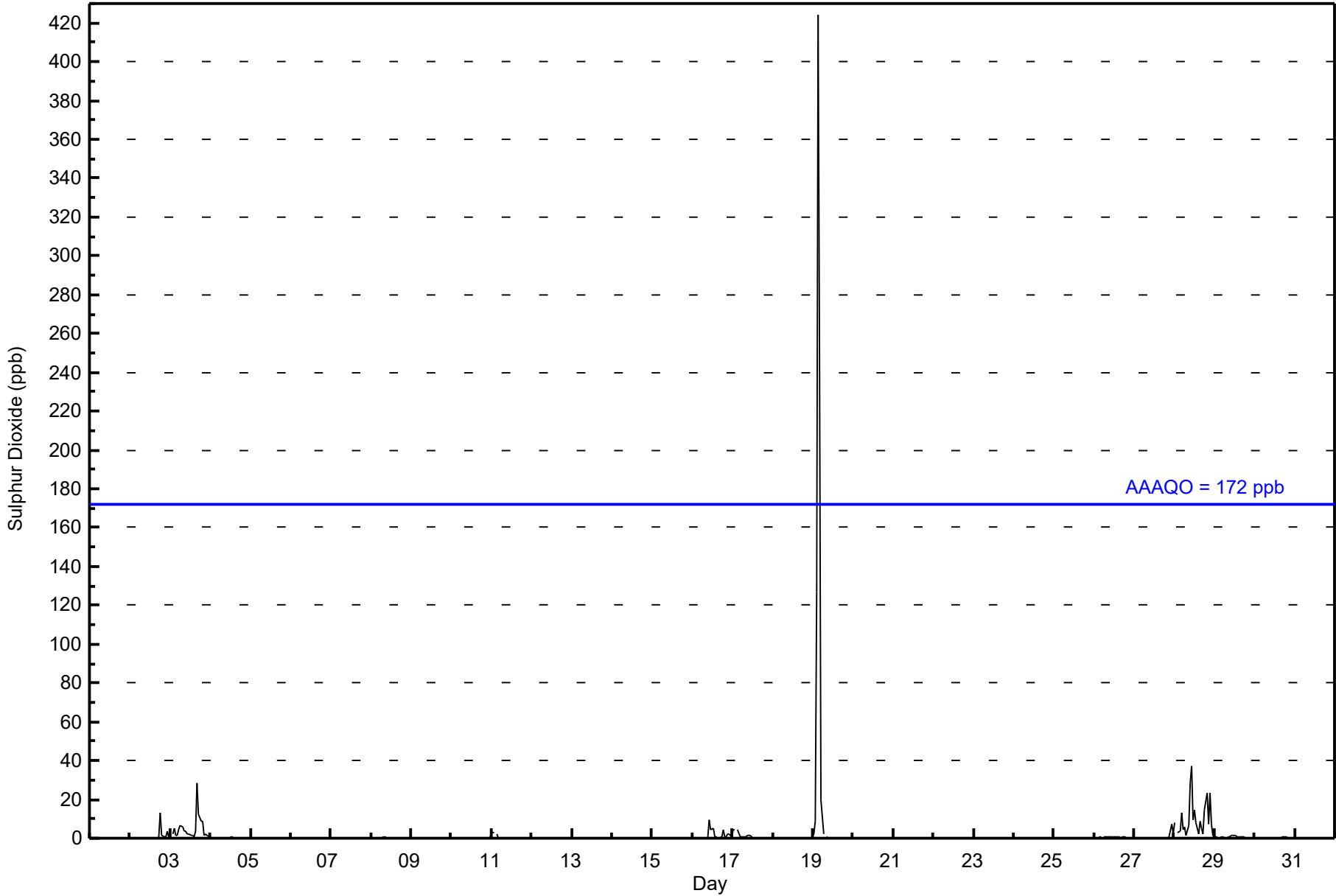
MONTHLY SUMMARY FOR AIR QUALITY/ METEOROLOGICAL MONITORING MEASUREMENTS

Parameter	Number	Mean	StnDev	Total	Percentile						
					Min	P10	Q1	Median	Q3	P90	Max
SO2 (ppb) Average	709	1.93	19.2	-	0	0	0.1	0.1	0.3	1.2	424.1
H2S (ppb) Average	706	0.39	0.8	-	0	0.1	0.1	0.2	0.3	0.6	12.9
THC (ppm) Average	709	2.15	0.3	-	2	2	2	2.1	2.1	2.3	4.4
NMHC(ppm) Average	709	0.031	0.102	-	0	0	0	0	0	0.1	0.999
CH4(ppm) Average	709	2.12	0.2	-	2	2	2	2.1	2.1	2.2	4
Temperature 2 m (C) Average	735	-6.02	5	-	-16.4	-12.4	-10.1	-6.4	-2.3	1.1	5.2
Temperature 20 m (C) Average	735	-4.73	5.3	-	-15.1	-11.5	-9.3	-4.7	-0.7	2.7	7.7
Temperature 45 m (C) Average	735	-4.05	5.4	-	-14.9	-11.2	-8.6	-3.8	0.1	3.1	8.1
Temperature 75 m (C) Average	735	-3.43	5.3	-	-15	-10.9	-7.6	-3.3	0.6	3.3	8.9
Temperature 90 m (C) Average	735	-3.13	5.3	-	-14.7	-10.7	-7.2	-2.9	0.8	3.4	9.1
Relative Humidity 2 m (%) Average	735	76.2	11	-	47	59	67	80	86	88	94
Relative Humidity 20 m (%) Average	735	71.1	13	-	38	52	62	73	82	87	93
Relative Humidity 45 m (%) Average	735	69.1	14	-	29	50	60	70	81	86	91
Relative Humidity 75 m (%) Average	735	67.8	15	-	26	48	58	69	78	87	96
Relative Humidity 90 m (%) Average	735	66.4	14	-	25	46	57	68	77	85	93
Wind Speed 20 m (km/h) Average	735	12.6	6	-	1	6	9	12	15	20	45
Wind Speed 45 m (km/h) Average	732	18.9	7	-	0	9	14	20	23	28	52
Wind Speed 75 m (km/h) Average	733	22.1	9	-	0	10	16	23	28	33	55
Wind Speed 90 m (km/h) Average	735	22.6	9	-	1	10	16	23	28	34	57
Wind Direction 20 m (deg) Average	735	-	-	-	-	-	-	-	-	-	-
Wind Direction 45 m (deg) Average	732	-	-	-	-	-	-	-	-	-	-
Wind Direction 75 m (deg) Average	733	-	-	-	-	-	-	-	-	-	-
Wind Direction 90 m (deg) Average	735	-	-	-	-	-	-	-	-	-	-
Vertical Wind Speed 20 m (km/h) Average	735	0.27	0.4	-	-0.9	-0.3	-0.1	0.3	0.6	0.8	1.5
Vertical Wind Speed 45 m (km/h) Average	732	0.08	0.5	-	-1.2	-0.7	-0.3	0.1	0.5	0.7	2.4
Vertical Wind Speed 75 m (km/h) Average	733	0.18	0.3	-	-0.9	-0.2	0	0.2	0.4	0.6	2.8
Vertical Wind Speed 90 m (km/h) Average	735	-0.21	0.5	-	-1.5	-0.8	-0.5	-0.2	0.1	0.4	3

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - MANNIX (AMS05)
DECEMBER 2023

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
H2S	08 Dec 2023 14:00	08 Dec 2023 14:00	1	Maintenance - sample manifold cleaned
ALL METEOROLOGICAL SENSORS	17 Dec 2023 18:00	18 Dec 2023 02:00	9	DAS Failure - data not recorded
Wind Speed, Wind Direction, Vertical Wind Speed 45m	05 Dec 2023 10:00	05 Dec 2023 12:00	3	Flat line in sensor output signal
Wind Speed, Wind Direction, Vertical Wind Speed 75m	05 Dec 2023 10:00	05 Dec 2023 11:00	2	Flat line in sensor output signal





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Mannix - December 2023

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	695	98.03	98.03
11 - 20	6	0.85	98.87
21 - 60	5	0.71	99.58
61 - 110	0	0.00	99.58
111 - 172	1	0.14	99.72
> 172	2	0.28	100.00

Total Number of Valid Hours: 709

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Mannix - December 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	10	16	1	1	3	7	32	339	64	37	32	53	48	16	13	14	686
11 - 20	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	6
21 - 60	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	2	5
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
> 172	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2
Totals	18	17	1	1	3	7	32	339	64	37	32	53	48	16	13	19	700

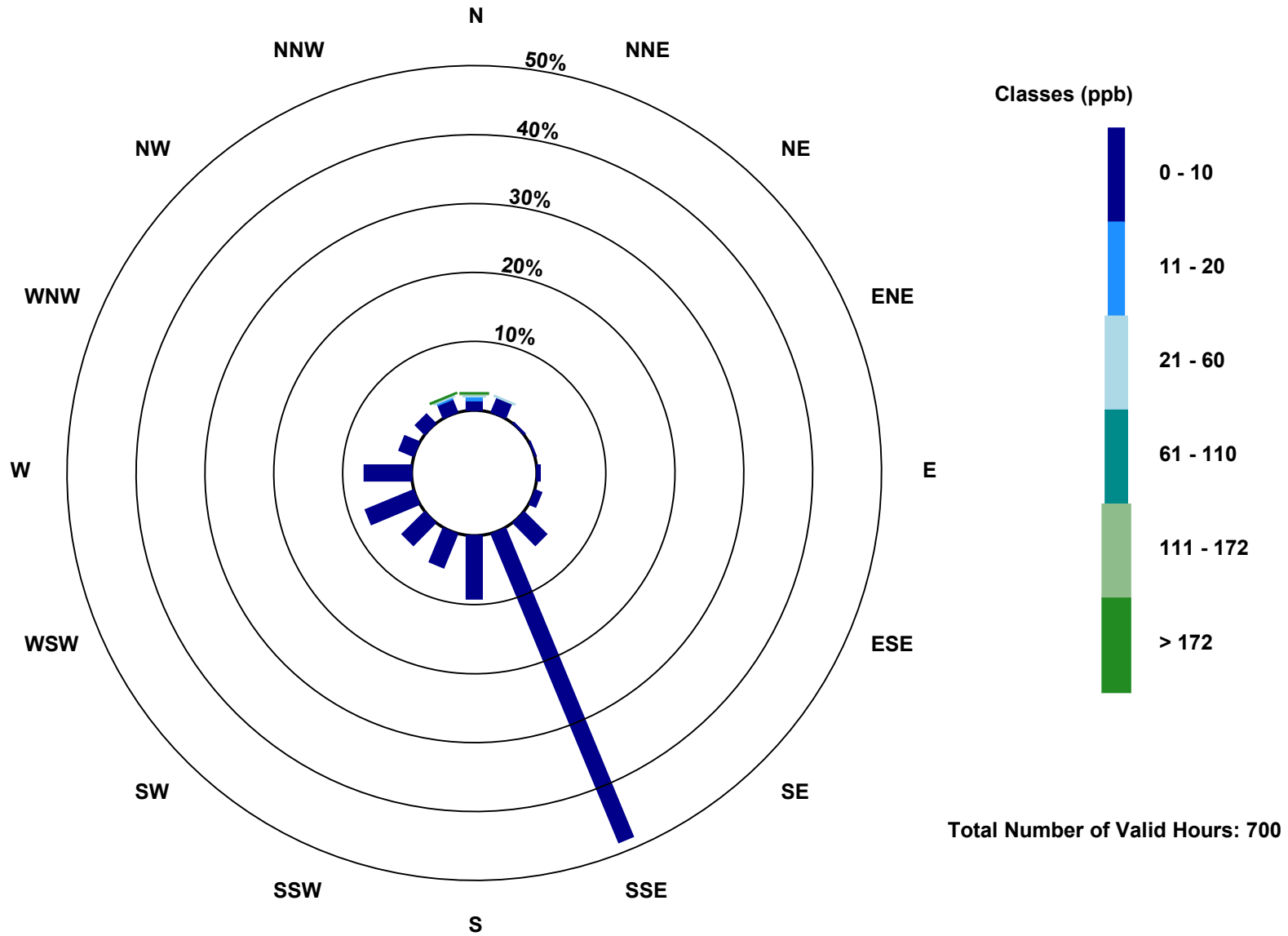
Total Number of Valid Hours: 700

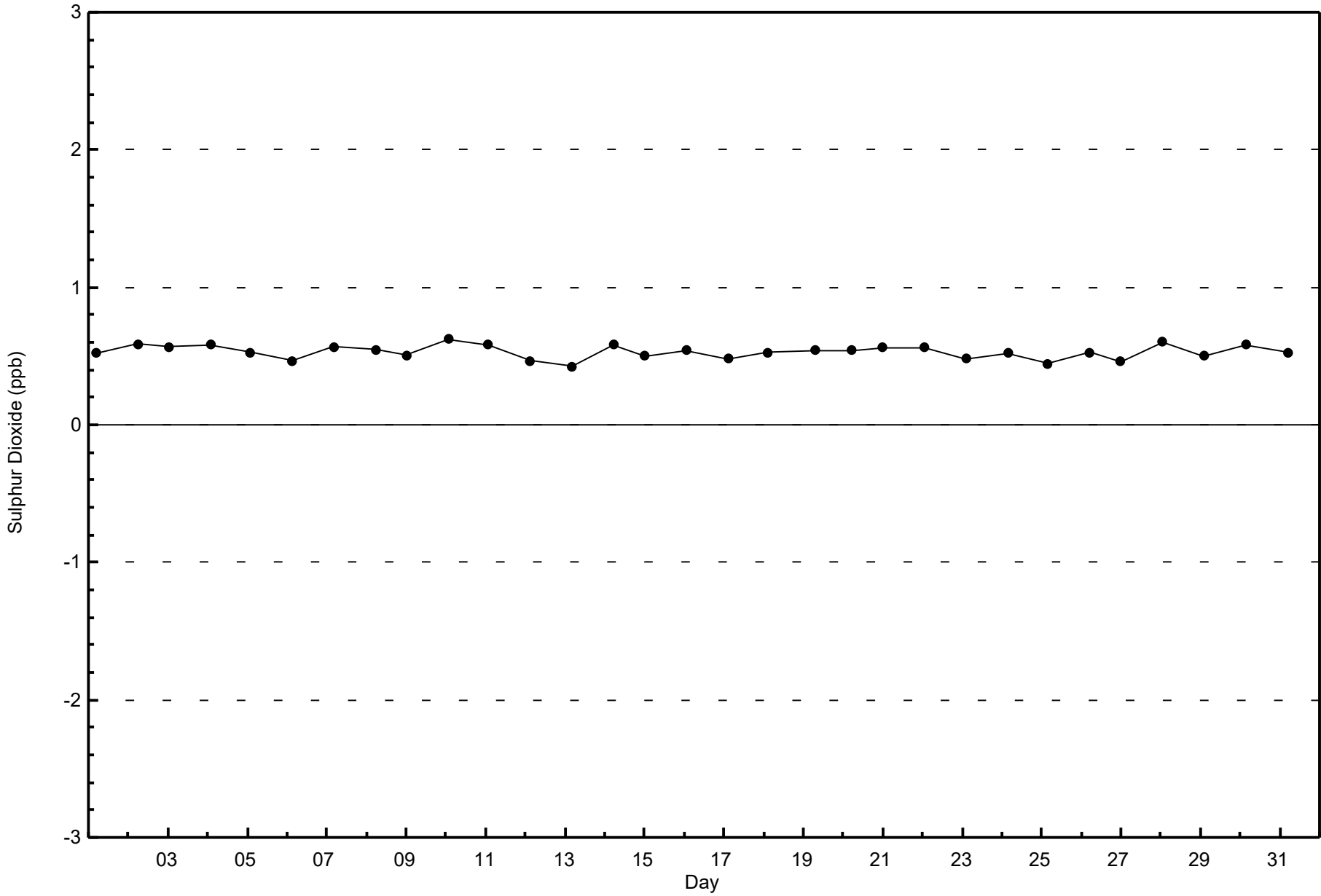
Total Number of Hours: 744

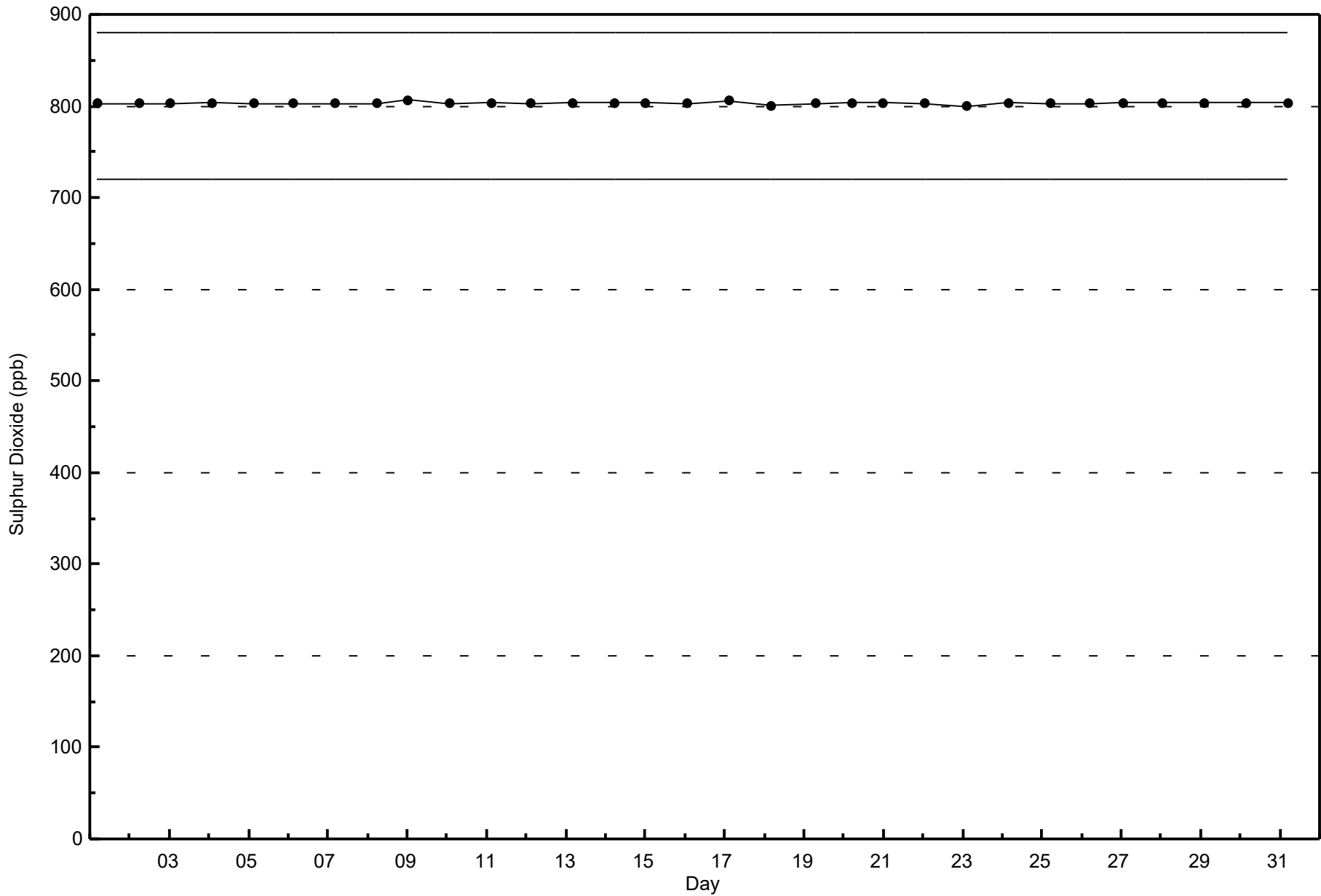


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Sulphur Dioxide (SO₂) - ppb
Mannix

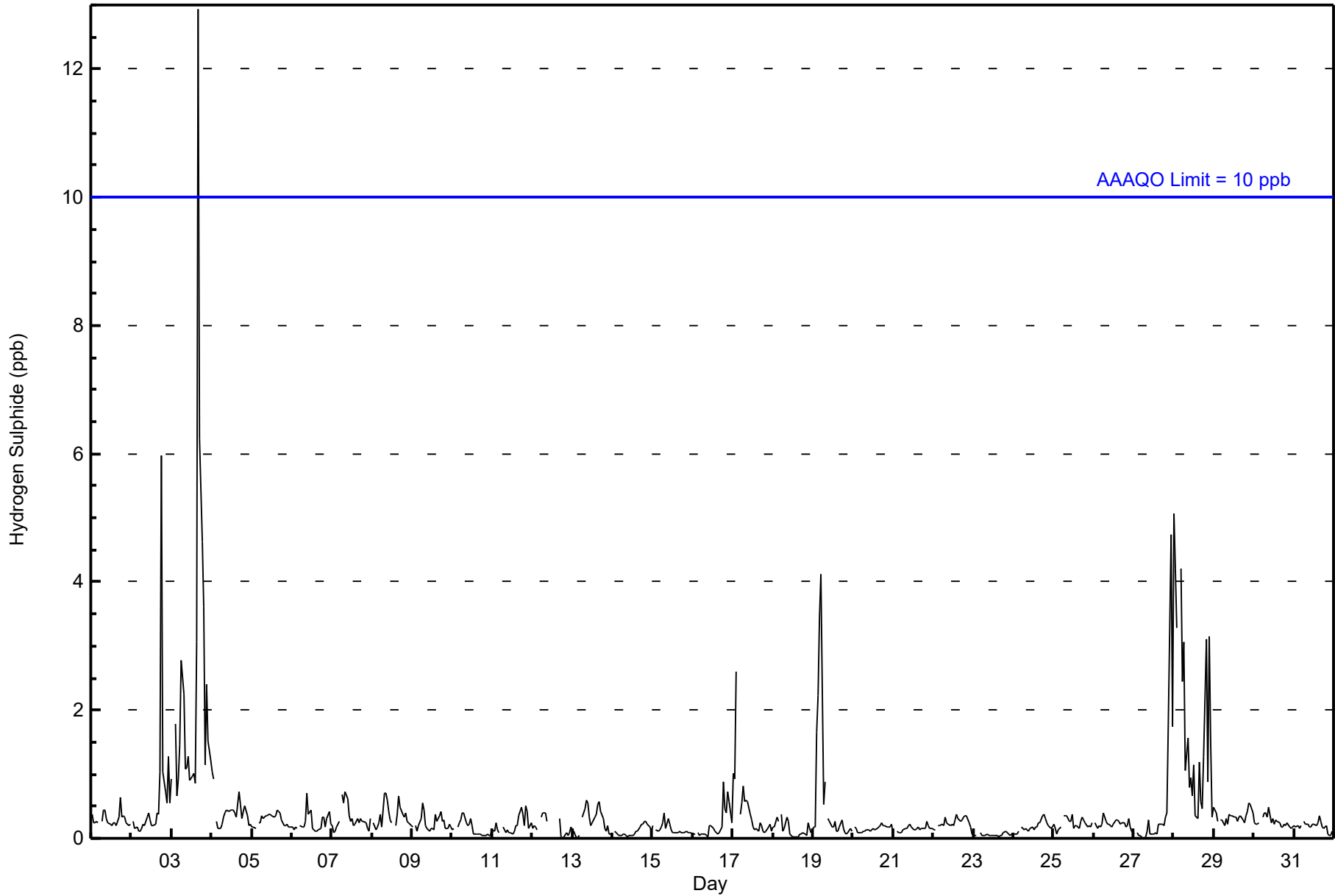








Number of Exceedences (AAAQO):		1-hr: 1 24-hr: 0		Hours in Service:		744																																											
Maximum Value: 12.9 ppb on Dec 3 17:00		Maximum Daily Average: 2.4 ppb on Dec 3		Hours of Data:		706																																											
Minimum Value: 0.0 ppb on Dec 12 19:00		Minimum Daily Average: 0.1 ppb on Dec 23		Hours of Missing Data:		38																																											
Maximum Diurnal Average: 0.7 ppb at hour 17		Minimum Diurnal Average: 0.2 ppb at hour 14		Hours of Calibration:		37																																											
Monthly Average: 0.39 ppb		Percentiles: P ₁ = 0.0 P ₁₀ = 0.1 Q ₁ = 0.1 Median = 0.2 Q ₃ = 0.3 P ₉₀ = 0.6 P ₉₉ = 4.2		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-Dec	0.4	0.2	0.3	0.3	0.3	Z	0.3	0.4	0.4	0.3	0.2	0.2	0.2	0.2	0.3	0.2	0.3	0.6	0.3	0.4	0.3	0.2	0.2	0.2	0.3	0.6	0.6																						
2-Dec	Z	0.3	0.1	0.2	0.1	0.1	0.1	0.2	0.2	0.3	0.4	0.3	0.2	0.2	0.2	0.4	0.4	1.0	6.0	1.0	0.7	0.5	1.3	0.5	0.6	6.0	6.0																						
3-Dec	0.9	Z	1.8	0.7	0.9	1.5	2.8	2.3	1.1	1.1	1.3	0.9	1.0	1.0	0.9	3.1	12.9	6.2	4.6	3.6	1.1	2.4	1.5	1.2	2.4	12.9	12.9																						
4-Dec	1.0	0.9	Z	0.3	0.2	0.2	0.2	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.7	0.7	0.5	0.3	0.4	0.5	0.4	0.2	0.2	0.4	1.0	1.0																						
5-Dec	0.2	0.2	0.2	Z	0.3	0.2	0.3	0.3	0.4	0.3	0.4	0.4	0.4	0.3	0.4	0.4	0.4	0.4	0.3	0.2	0.2	0.2	0.2	0.2	0.3	0.4	0.4																						
6-Dec	0.2	0.1	0.2	0.2	Z	0.2	0.2	0.2	0.3	0.7	0.4	0.4	0.2	0.1	0.1	0.1	0.1	0.2	0.3	0.3	0.2	0.3	0.4	0.2	0.2	0.7	0.7																						
7-Dec	0.2	0.1	0.1	0.2	0.3	Z	0.7	0.6	0.7	0.6	0.3	0.3	0.3	0.2	0.2	0.3	0.2	0.3	0.3	0.3	0.2	0.2	0.1	0.3	0.3	0.7	0.7																						
8-Dec	Z	0.2	0.1	0.2	0.2	0.4	0.2	0.7	0.7	0.6	0.4	0.3	0.2	M	0.2	0.4	0.7	0.5	0.4	0.3	0.4	0.3	0.2	0.2	0.4	0.7	0.7																						
9-Dec	0.2	Z	0.2	0.1	0.2	0.3	0.5	0.4	0.2	0.2	0.1	0.2	0.2	0.1	0.4	0.3	0.4	0.4	0.3	0.3	0.2	0.1	0.2	0.2	0.2	0.5	0.5																						
10-Dec	0.1	0.2	Z	0.2	0.2	0.3	0.4	0.4	0.2	0.2	0.2	0.3	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.1	0.0	0.1	0.2	0.4	0.4																						
11-Dec	0.1	0.1	0.2	0.1	0.1	Z	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.4	0.5	0.4	0.2	0.5	0.4	0.2	0.2	0.2	0.5	0.5																						
12-Dec	0.1	0.2	0.2	0.1	Z	0.3	0.4	0.4	0.4	0.3	C	C	C	C	C	C	0.3	0.0	0.0	0.0	0.1	0.0	0.1	0.2	--	0.4	0.4																						
13-Dec	0.1	0.1	0.0	0.0	0.0	Z	0.3	0.5	0.6	0.6	0.3	0.2	0.2	0.3	0.4	0.5	0.6	0.4	0.3	0.1	0.1	0.2	0.1	0.1	0.3	0.6	0.6																						
14-Dec	Z	0.1	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	0.1	0.2	0.2	0.2	0.3	0.3	0.2	0.2	0.1	0.1	0.3	0.3																						
15-Dec	0.2	Z	0.1	0.1	0.1	0.2	0.3	0.4	0.1	0.3	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	0.4																						
16-Dec	0.1	0.1	Z	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.2	0.9	0.5	0.4	0.7	0.6	0.2	0.2	0.9	0.9																						
17-Dec	1.0	0.9	2.6	Z	0.4	0.6	0.8	0.6	0.6	0.6	0.4	0.3	0.2	0.1	0.1	0.1	0.3	0.2	0.1	0.1	0.1	0.2	0.2	0.1	0.5	2.6	2.6																						
18-Dec	0.2	0.2	0.3	0.3	Z	0.4	0.1	0.1	0.3	0.3	0.1	0.1	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.0	0.2	0.2	0.1	0.1	0.4	0.4																						
19-Dec	0.2	0.2	1.6	2.2	3.4	4.1	0.5	0.9	Z	0.3	0.3	0.2	0.2	0.3	0.1	0.1	0.2	0.3	0.2	0.1	0.1	0.1	0.2	0.1	0.7	4.1	4.1																						
20-Dec	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	0.2	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2																						
21-Dec	0.1	Z	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	0.2	0.1	0.2	0.2	0.2	0.3	0.2	0.2	0.2	0.1	0.3	0.3																						
22-Dec	0.1	0.1	Z	0.2	0.2	0.2	0.2	0.3	0.2	0.2	0.2	0.2	0.2	0.3	0.4	0.3	0.3	0.3	0.3	0.4	0.4	0.2	0.2	0.1	0.2	0.4	0.4																						
23-Dec	0.0	0.0	0.0	Z	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	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1																						
24-Dec	0.1	0.1	0.1	0.1	Z	0.2	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.2	0.2	0.2	0.2	0.4	0.4	0.3	0.2	0.2	0.1	0.2	0.2	0.4	0.4																						
25-Dec	0.2	0.2	0.1	0.1	0.2	Z	0.4	0.4	0.3	0.3	0.3	0.4	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.4																						
26-Dec	Z	0.2	0.2	0.2	0.2	0.2	0.4	0.3	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.3	0.2	0.1	0.2	0.4	0.4																						
27-Dec	0.1	Z	0.1	0.0	0.1	0.0	0.0	0.0	0.1	0.3	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.3	0.4	1.8	4.7	1.8	0.5	4.7	4.7																						
28-Dec	5.1	4.2	3.3	Z	4.2	2.4	3.1	1.1	1.6	0.8	0.9	0.7	1.2	0.4	0.3	1.2	0.6	0.5	1.3	3.1	0.9	3.1	1.5	0.3	1.8	5.1	5.1																						
29-Dec	0.5	0.4	0.3	Z	0.3	0.3	0.2	0.3	0.2	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.4	0.3	0.3	0.4	0.4	0.6	0.5	0.4	0.3	0.6	0.6																						
30-Dec	0.2	0.2	0.2	0.2	Z	0.3	0.4	0.4	0.3	0.5	0.2	0.3	0.2	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.5	0.5																						
31-Dec	0.2	0.2	0.2	0.2	0.2	Z	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.4	0.3	0.2	0.2	0.2	0.1	0.0	0.1	0.1	0.2	0.4	0.4																						
																								0.5	0.4	0.5	0.2	0.5	0.5	0.4	0.4	0.4	0.3	0.3	0.3	0.2	0.2	0.3	0.7	0.5	0.6	0.5	0.3	0.5	0.5	0.3	Diurnal Average		
																								5.1	4.2	3.3	2.2	4.2	4.1	3.1	2.3	1.6	1.1	1.3	0.9	1.2	1.0	0.9	3.1	12.9	6.2	6.0	3.6	1.1	3.1	4.7	1.8	Diurnal Maximum	
Z - zerspan C - Calibration M - Maintenance																																																	
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 10 ppb 24-hr 3 ppb																																																	





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Hydrogen Sulphide (H₂S) - ppb
Mannix - December 2023**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	688	97.45	97.45
3 - 4	12	1.70	99.15
5 - 7	5	0.71	99.86
8 - 11	0	0.00	99.86
> 11	1	0.14	100.00

Total Number of Valid Hours: 706

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Hydrogen Sulphide (H₂S) - ppb
Mannix - December 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	13	14	2	0	3	7	32	335	65	35	35	53	45	15	11	14	679
3 - 4	4	1	0	1	0	0	0	0	0	0	0	1	1	1	1	2	12
5 - 7	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	1	5
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Totals	20	17	2	1	3	7	32	335	65	35	35	54	46	16	12	17	697

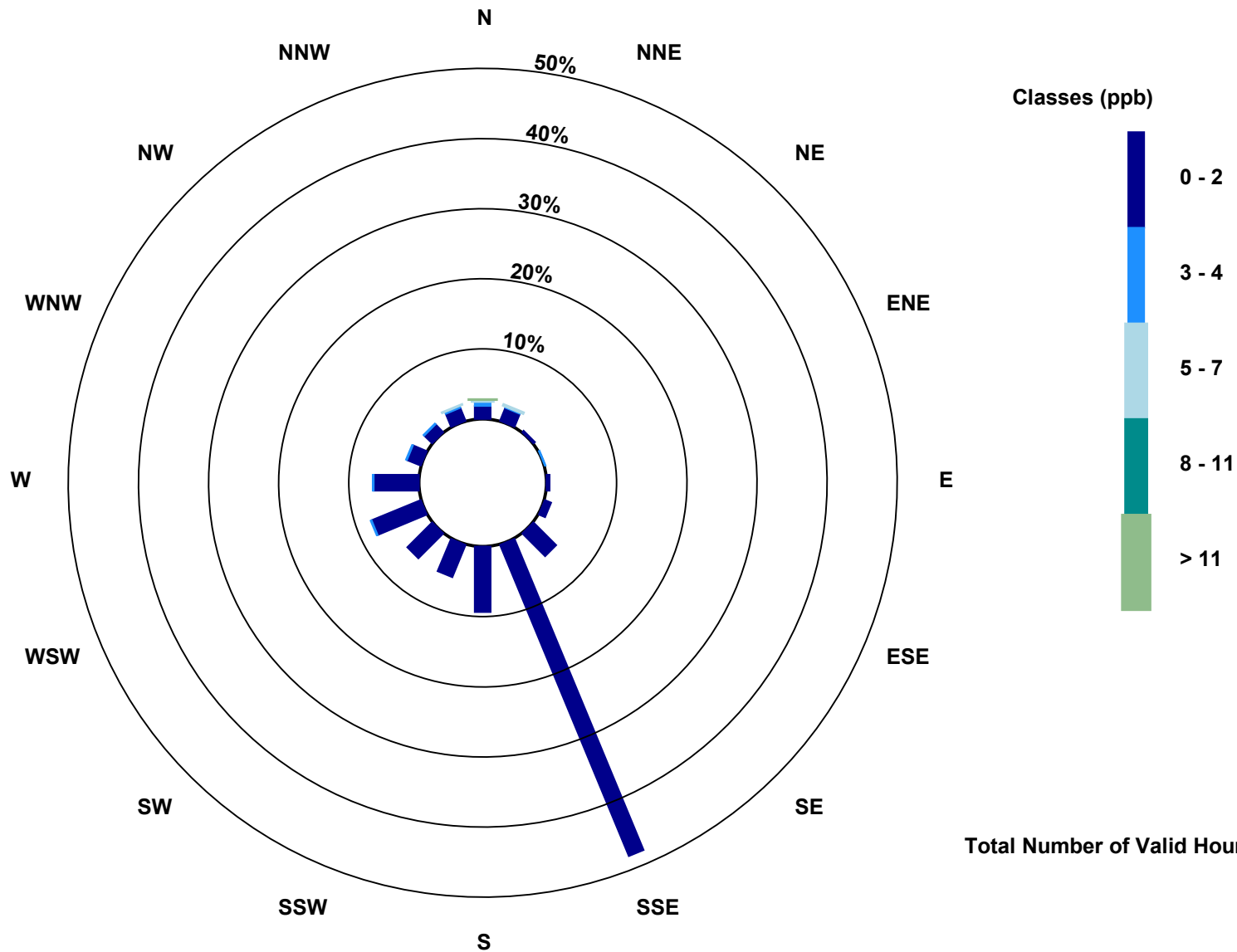
Total Number of Valid Hours: 697

Total Number of Hours: 744

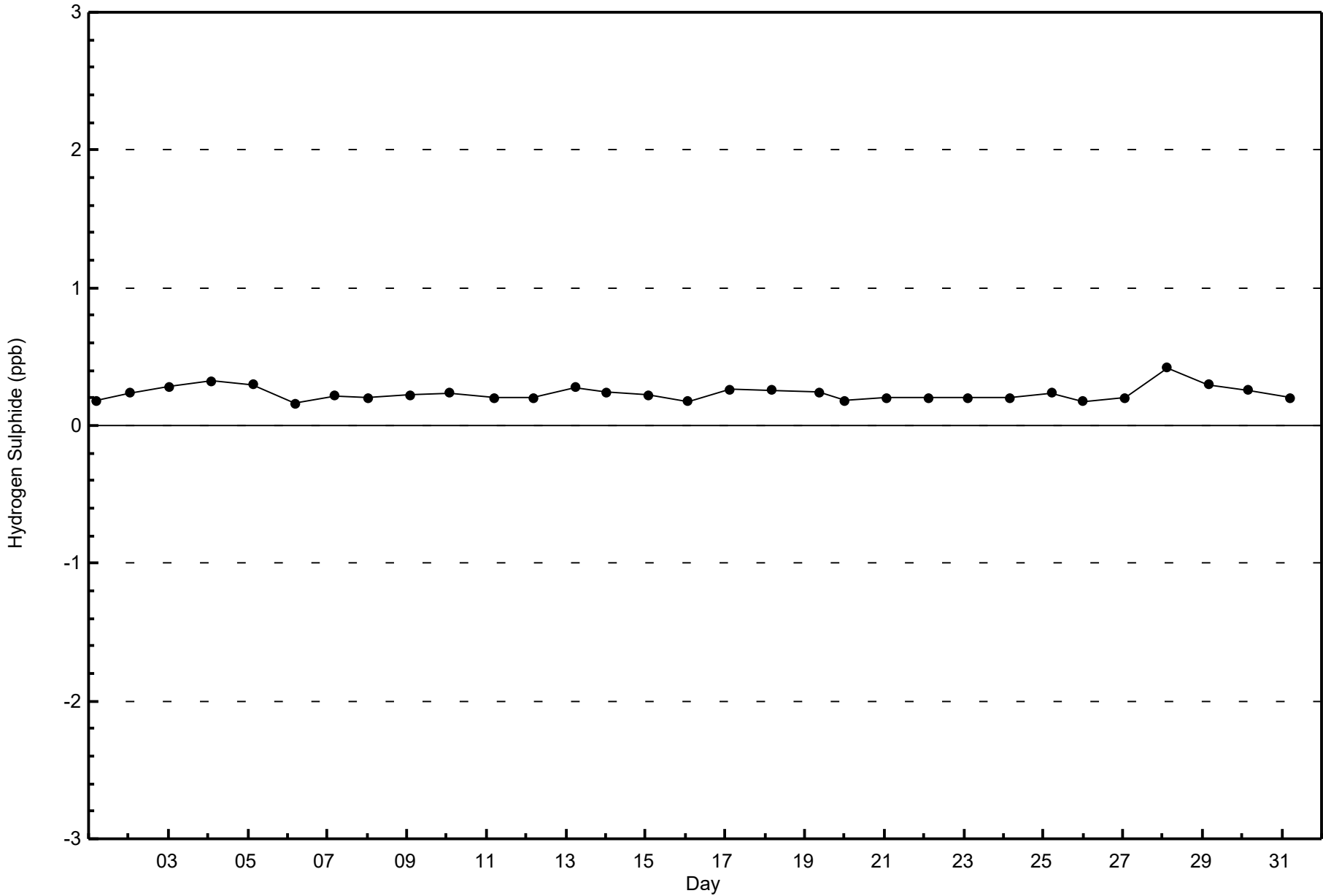


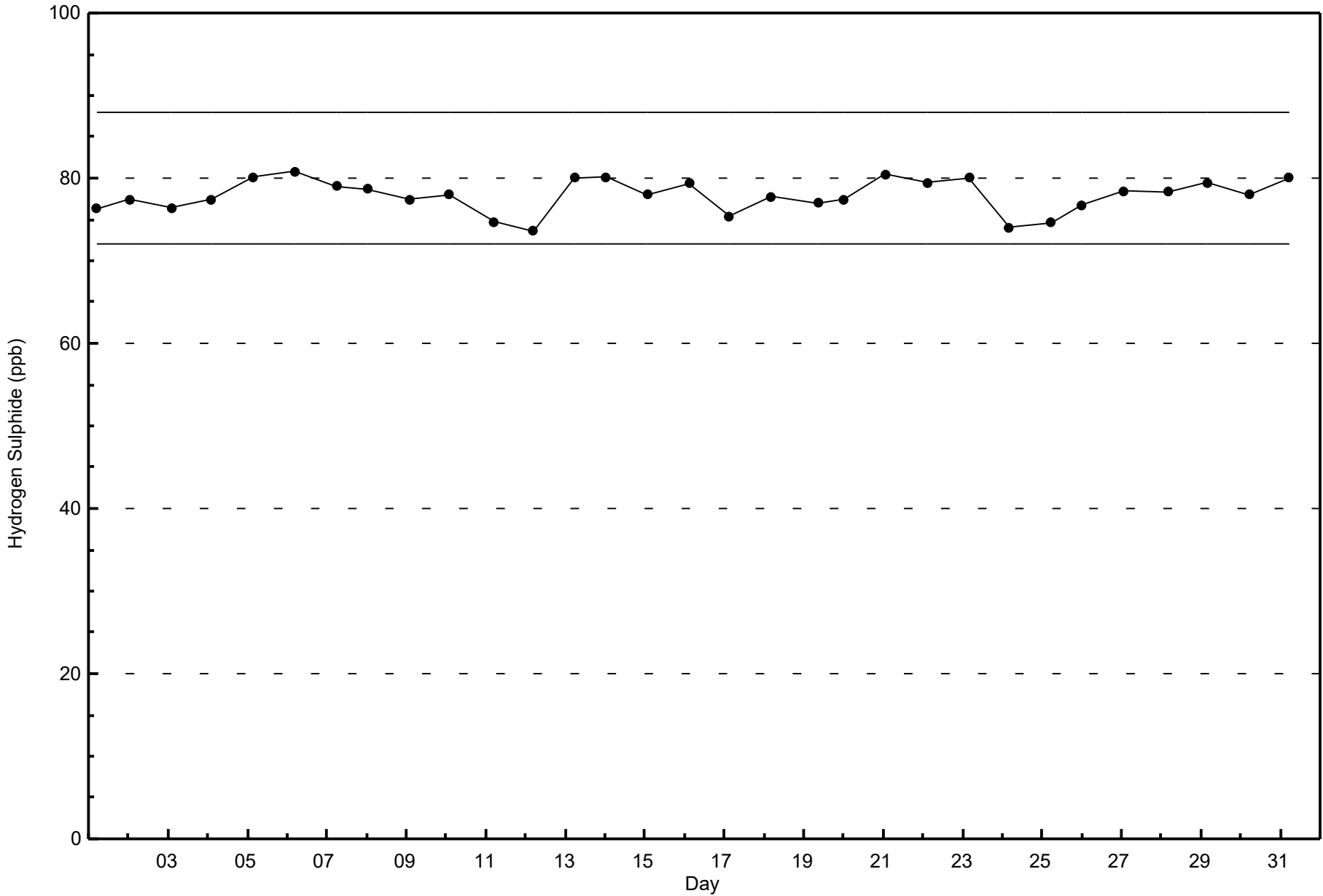
Wood Buffalo Environmental Association
Wind Rose Dec 2023

Hydrogen Sulphide (H₂S) - ppb
Mannix



Total Number of Valid Hours: 697

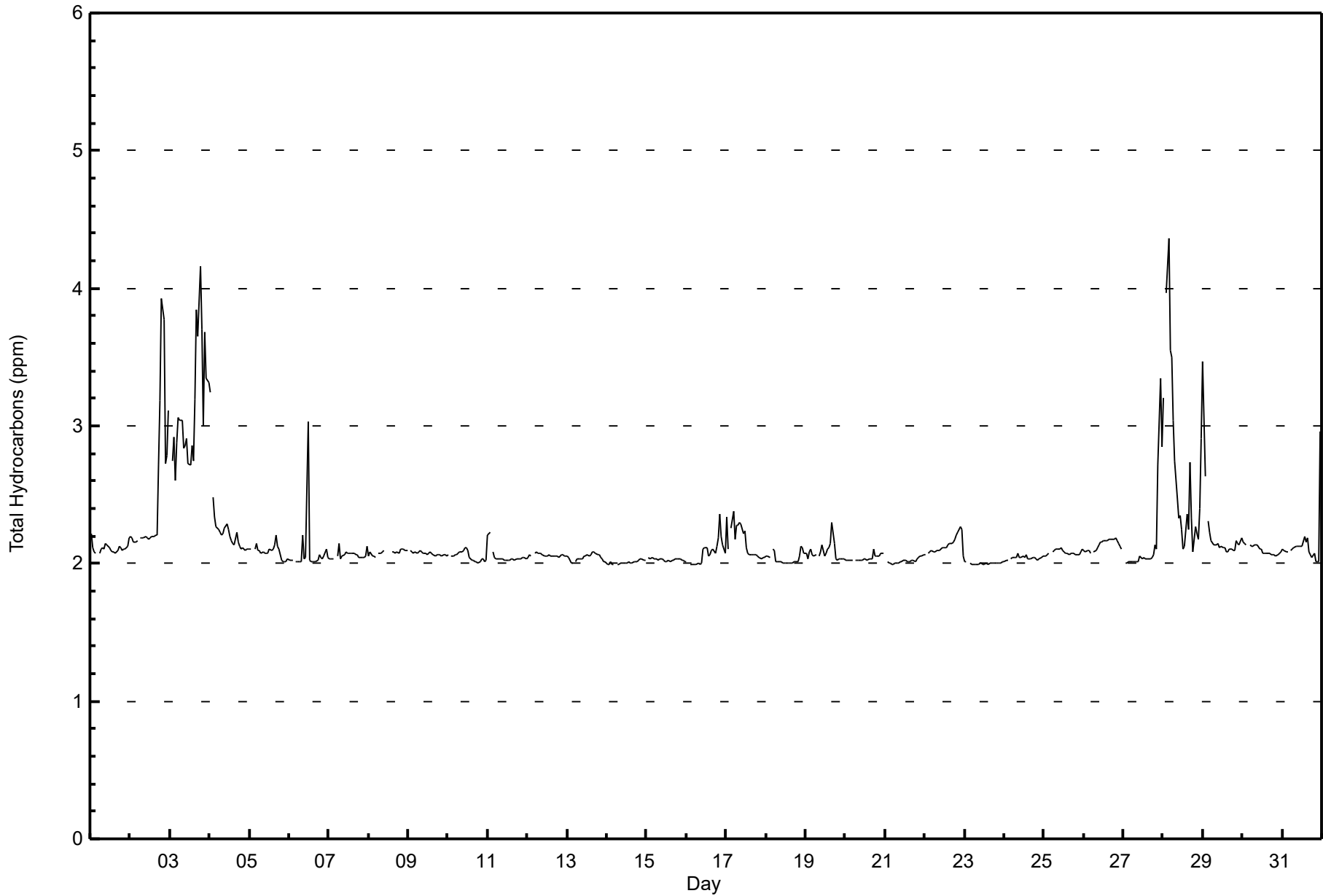






Maximum Value: 4.4 ppm on Dec 28 04:00		Maximum Daily Average: 3.1 ppm on Dec 3		Hours in Service: 744																						
Minimum Value: 2.0 ppm on Dec 14 04:00		Minimum Daily Average: 2.0 ppm on Dec 23		Hours of Data: 709																						
Maximum Diurnal Average: 2.2 ppm at hour 1		Minimum Diurnal Average: 2.1 ppm at hour 13		Hours of Missing Data: 35																						
Monthly Average: 2.15 ppm		Percentiles: P ₁ = 2.0 P ₁₀ = 2.0 Q ₁ = 2.0 Median = 2.1 Q ₃ = 2.1 P ₉₀ = 2.3 P ₉₉ = 3.7		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-Dec	2.2	2.1	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.2	
2-Dec	2.2	2.2	2.2	2.2	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.7	3.2	3.9	3.8	2.7	2.8	3.1	2.5	3.9
3-Dec	Z	2.7	2.9	2.6	2.9	3.1	3.0	3.0	2.8	2.9	2.9	2.7	2.7	2.9	2.8	3.2	3.8	3.7	4.2	3.7	3.0	3.7	3.4	3.3	3.1	4.2
4-Dec	3.2	Z	2.5	2.3	2.3	2.3	2.2	2.2	2.2	2.3	2.3	2.2	2.2	2.1	2.1	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	3.2
5-Dec	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	2.2	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.2
6-Dec	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.2	2.0	2.0	3.0	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.0	2.1	2.1	2.0	2.1	2.1	3.0
7-Dec	2.0	2.0	2.0	2.0	Z	2.1	2.1	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1
8-Dec	2.1	2.1	2.1	2.1	2.0	Z	2.1	2.1	2.1	2.1	C	C	C	C	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
9-Dec	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
10-Dec	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	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1
11-Dec	2.2	2.2	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	2.2
12-Dec	2.0	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.1	2.1	2.0	2.1	2.1	2.1	2.0	2.1	2.1	2.1	2.1	2.1	2.1
13-Dec	2.1	2.0	2.0	2.0	Z	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	2.0	2.0	2.0	2.0	2.0	2.1
14-Dec	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
15-Dec	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-Dec	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	2.2	2.4	2.2	2.1	2.1	2.1	2.1	2.4
17-Dec	2.3	2.1	Z	2.3	2.4	2.2	2.3	2.3	2.3	2.3	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.2	2.4
18-Dec	2.1	2.1	2.0	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	2.1	2.1	2.1	2.1	2.0	2.1
19-Dec	2.1	2.0	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	2.3	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.3
20-Dec	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	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.1
21-Dec	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.0	2.1
22-Dec	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.1	2.1	2.3
23-Dec	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
24-Dec	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	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.0	2.1
25-Dec	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
26-Dec	2.1	2.1	2.1	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.2
27-Dec	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	2.1	2.1	2.1	2.7	3.3	2.8	2.2	3.3
28-Dec	3.2	Z	4.0	4.4	3.6	3.5	3.0	2.8	2.5	2.3	2.3	2.3	2.1	2.1	2.4	2.3	2.7	2.3	2.1	2.3	2.2	2.2	2.4	2.9	2.7	4.4
29-Dec	3.5	2.6	Z	2.3	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.2	2.2	3.5
30-Dec	2.2	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2
31-Dec	2.1	2.1	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.1	2.1	2.0	2.1	2.0	2.0	2.0	3.0	2.1	3.0
																								Diurnal Average		
																								Diurnal Maximum		
																								Diurnal Average		
																								Diurnal Maximum		

Z - zerospan C - Calibration





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Mannix - December 2023

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	261	36.81	36.81
2.1 - 3.0	427	60.23	97.04
3.1 - 10.0	21	2.96	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 709

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Total Hydrocarbons (THC) - ppm
Mannix - December 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	1	0	0	0	0	0	22	67	24	25	22	41	44	10	1	0	257
2.1 - 3.0	13	14	1	1	3	6	10	272	40	10	9	12	3	5	9	14	422
3.1 - 10.0	4	3	0	0	0	1	0	0	0	2	1	0	1	1	3	5	21
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	18	17	1	1	3	7	32	339	64	37	32	53	48	16	13	19	700

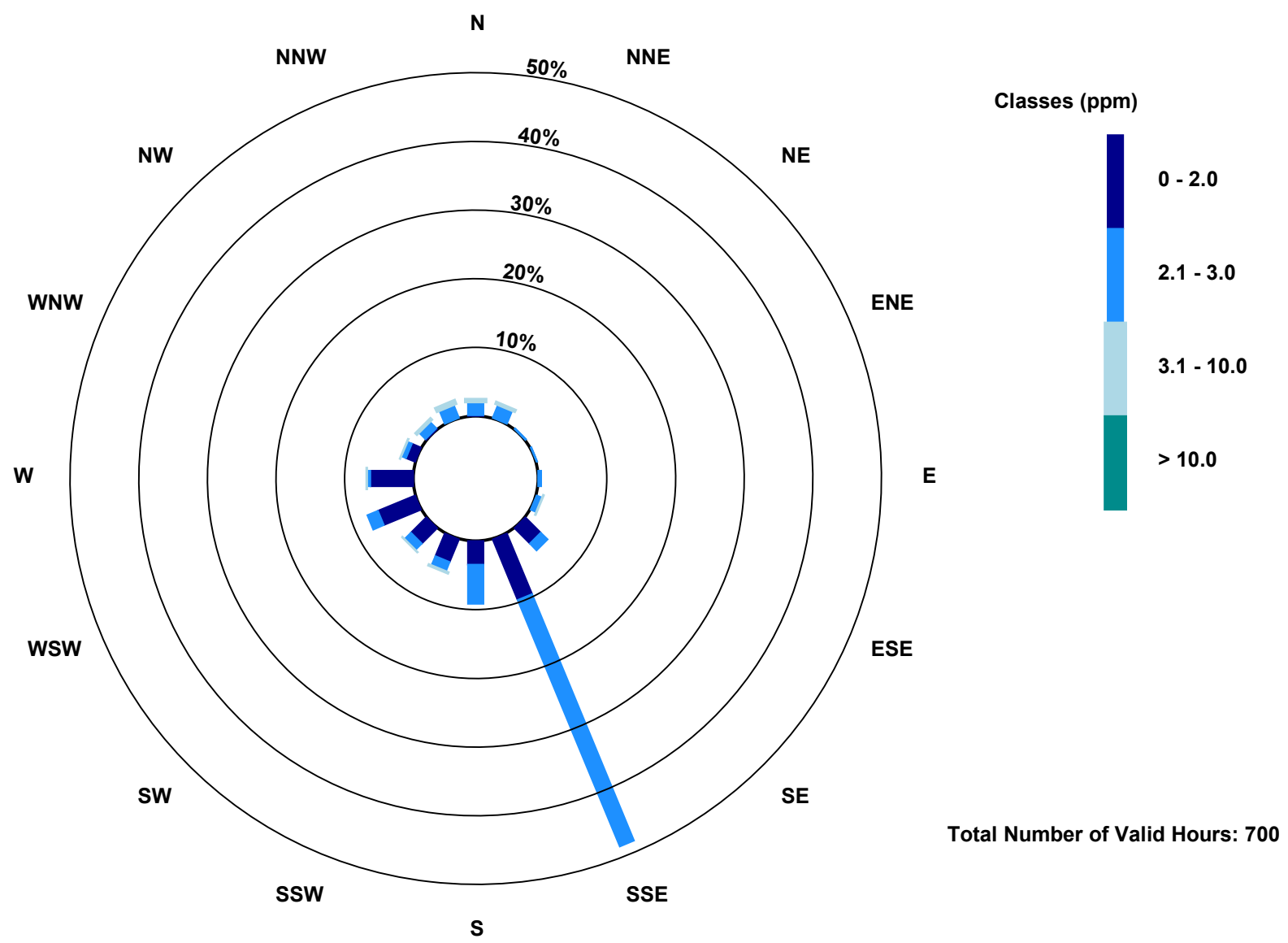
Total Number of Valid Hours: 700

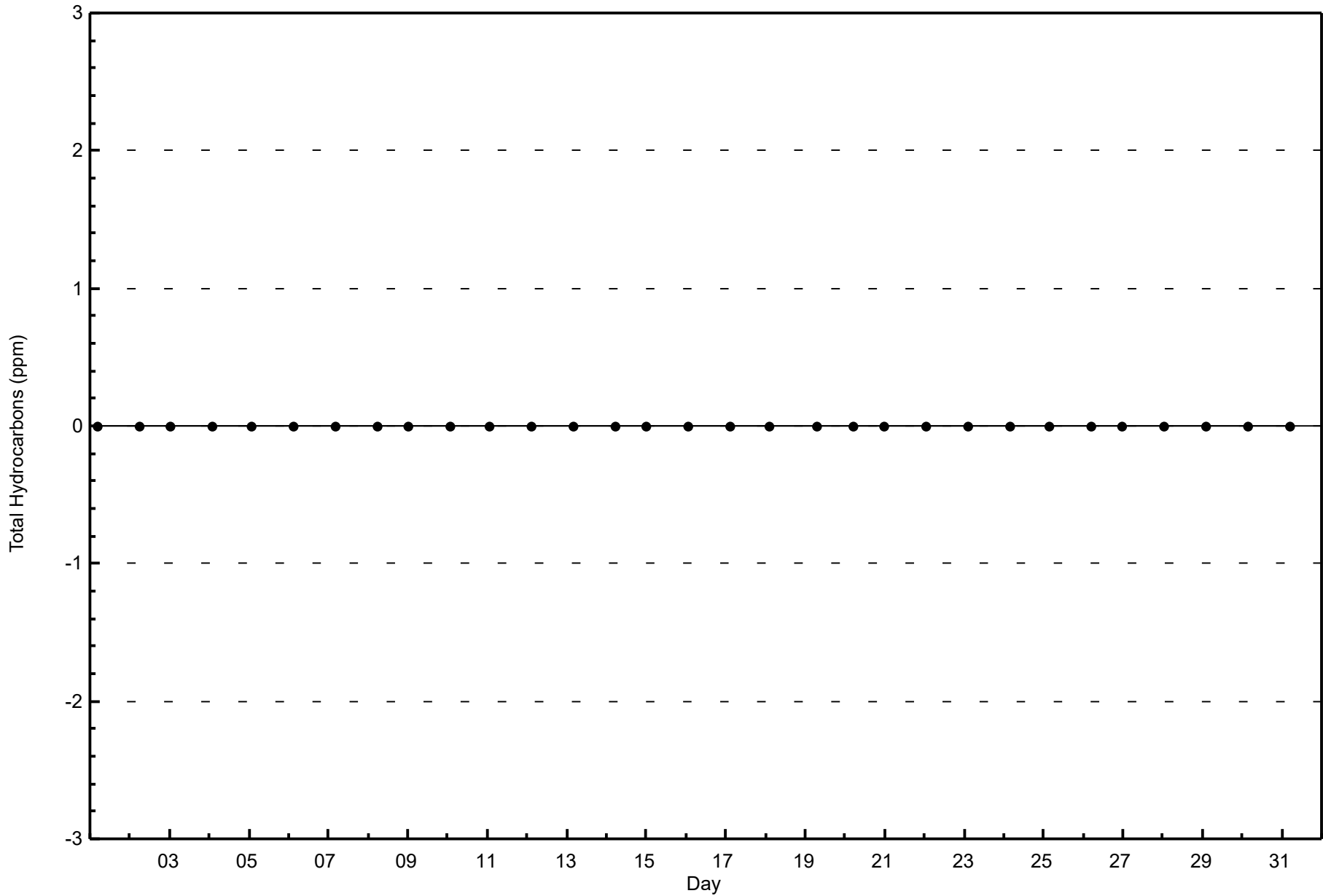
Total Number of Hours: 744

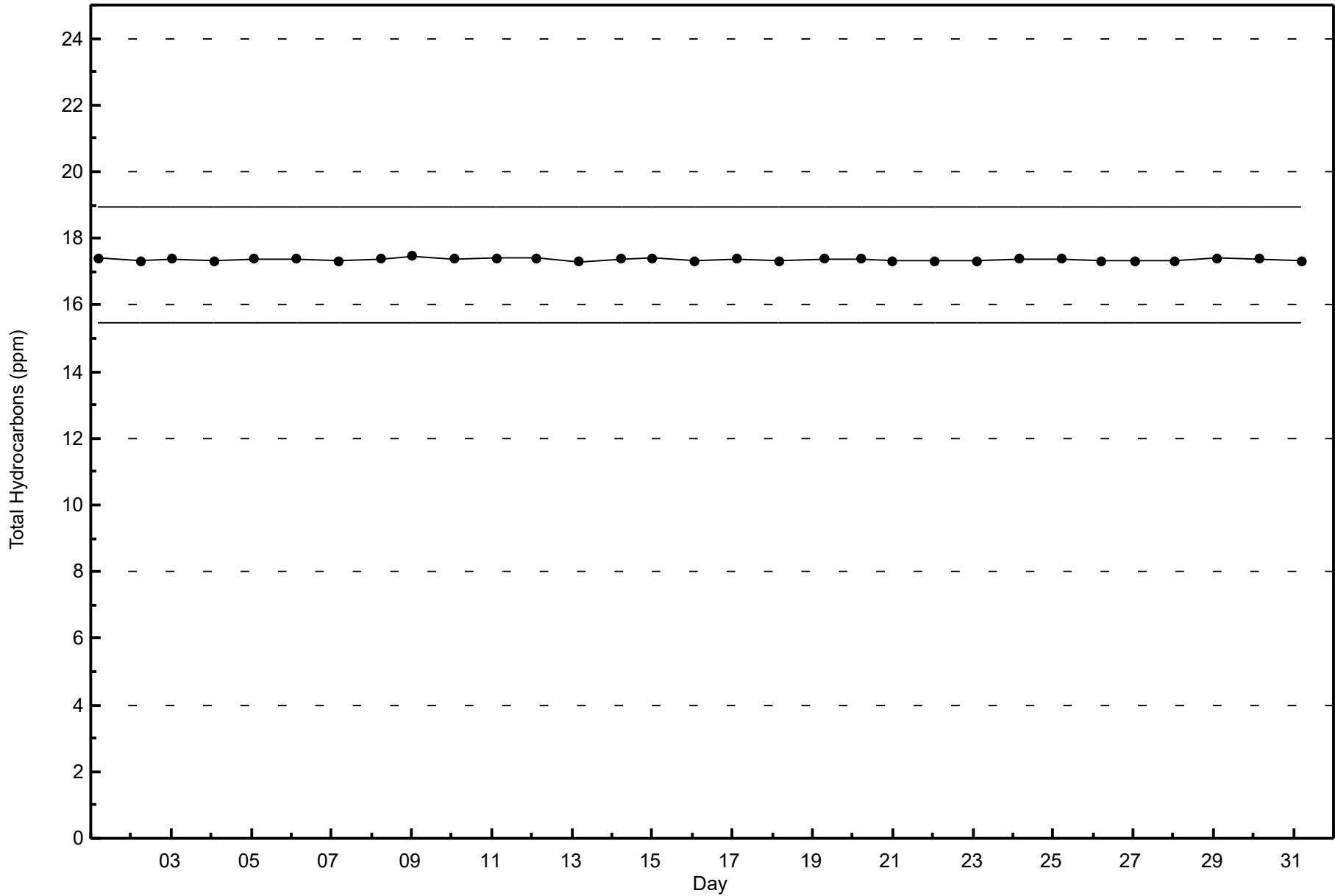


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Total Hydrocarbons (THC) - ppm
Mannix

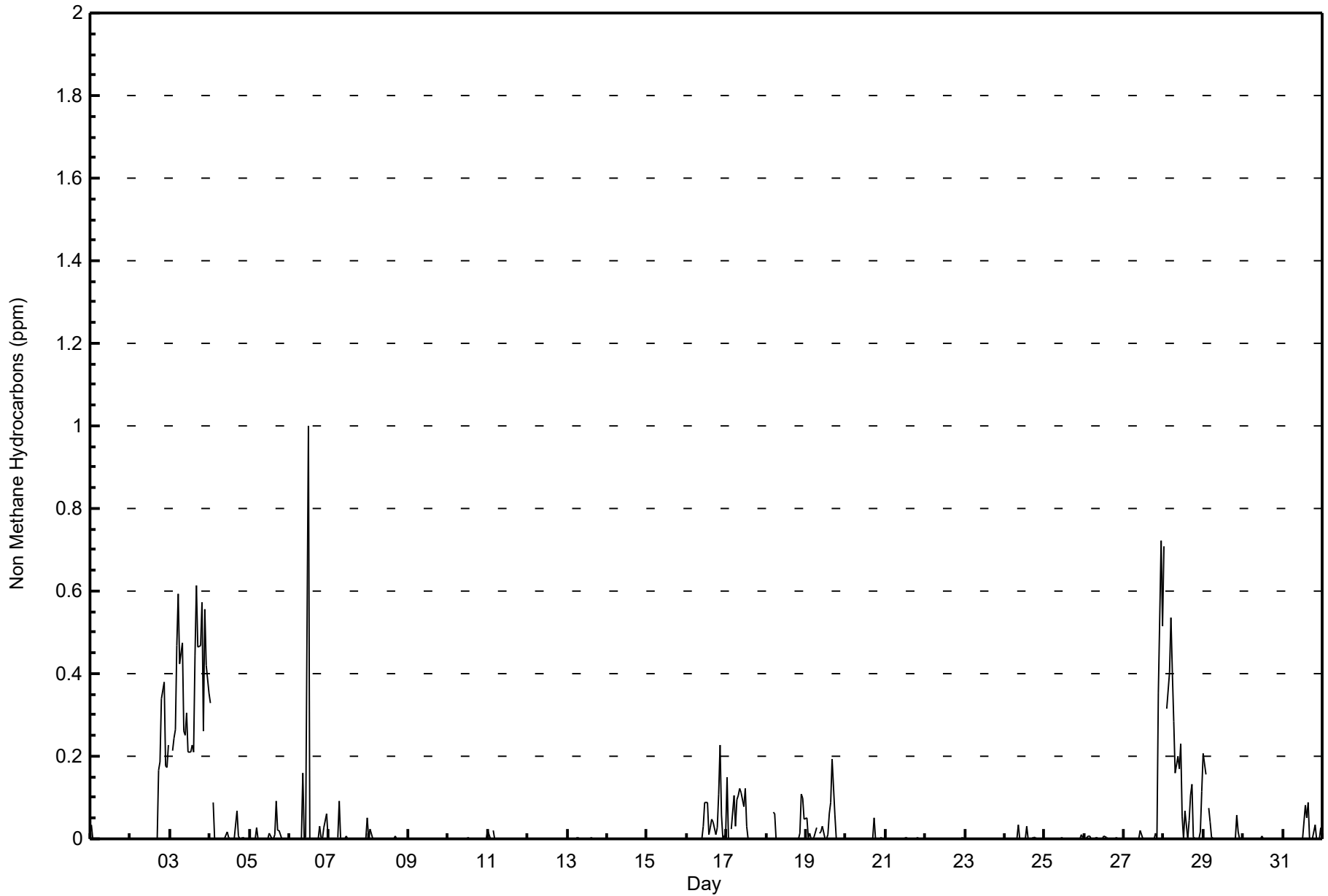








Maximum Value: 0.999 ppm on Dec 6 12:00		Maximum Daily Average: 0.370 ppm on Dec 3		Hours in Service: 744																							
Minimum Value: 0.000 ppm on Dec 1 02:00		Minimum Daily Average: 0.000 ppm on Dec 9		Hours of Data: 709																							
Maximum Diurnal Average: 0.058 ppm at hour 1		Minimum Diurnal Average: 0.011 ppm at hour 15		Hours of Missing Data: 35																							
Monthly Average: 0.031 ppm		Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.0 Median = 0.0 Q ₃ = 0.0 P ₉₀ = 0.1 P ₉₉ = 0.5		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-Dec	0.035	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	0.002	0.035	
2-Dec	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	0.165	0.187	0.337	0.378	0.177	0.174	0.228	0.072	0.378	
3-Dec	Z	0.215	0.245	0.266	0.467	0.595	0.425	0.474	0.262	0.251	0.306	0.209	0.209	0.226	0.212	0.443	0.613	0.465	0.466	0.574	0.260	0.558	0.422	0.351	0.370	0.613	
4-Dec	0.329	Z	0.089	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.015	0.004	0.000	0.000	0.000	0.000	0.067	0.008	0.000	0.000	0.002	0.000	0.000	0.000	0.022	0.329	
5-Dec	0.000	0.000	Z	0.000	0.028	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.015	0.000	0.010	0.090	0.019	0.022	0.000	0.000	0.000	0.000	0.000	0.000	0.008	0.090	
6-Dec	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.161	0.000	0.004	0.999	0.000	0.000	0.000	0.000	0.000	0.000	0.031	0.004	0.000	0.026	0.062	0.005	0.056	0.999	
7-Dec	0.000	0.000	0.000	0.000	Z	0.004	0.092	0.000	0.000	0.000	0.008	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.050	0.007	0.092	
8-Dec	0.000	0.024	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	C	C	C	C	0.000	0.000	0.006	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.024	
9-Dec	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	
10-Dec	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	
11-Dec	0.020	0.002	Z	0.021	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.021	
12-Dec	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
13-Dec	0.000	0.000	0.000	0.000	Z	0.000	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.005	
14-Dec	0.000	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
15-Dec	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	
16-Dec	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.029	0.088	0.089	0.010	0.026	0.048	0.042	0.009	0.028	0.107	0.227	0.058	0.000	0.015	0.034	0.227	
17-Dec	0.148	0.000	Z	0.024	0.105	0.029	0.093	0.105	0.121	0.112	0.077	0.122	0.031	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.042	0.148	
18-Dec	0.000	0.000	0.000	Z	0.066	0.061	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.015	0.108	0.099	0.049	0.017	0.108	
19-Dec	0.050	0.003	0.013	0.000	0.002	0.004	0.029	Z	0.014	0.017	0.031	0.000	0.000	0.011	0.062	0.089	0.193	0.058	0.000	0.000	0.000	0.000	0.000	0.000	0.025	0.193	
20-Dec	0.001	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	0.051	0.000	0.000	0.000	0.004	0.000	0.000	0.002	0.051	
21-Dec	Z	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	0.005	0.000	0.000	0.000	0.000	0.000	0.005	
22-Dec	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	
23-Dec	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-Dec	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.033	0.000	0.000	0.000	0.000	0.029	0.000	0.000	0.000	0.003	0.002	0.000	0.000	0.000	0.000	0.000	0.003	0.033	
25-Dec	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.001	0.000	0.005	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.009	0.004	0.001	0.001	0.009	
26-Dec	0.000	0.000	0.008	0.007	0.000	Z	0.000	0.003	0.000	0.000	0.000	0.007	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.001	0.008	
27-Dec	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.022	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.015	0.000	0.353	0.721	0.517	0.071	0.721	
28-Dec	0.708	Z	0.314	0.405	0.537	0.404	0.285	0.159	0.199	0.171	0.229	0.054	0.000	0.067	0.001	0.043	0.104	0.132	0.002	0.000	0.000	0.000	0.018	0.115	0.172	0.708	
29-Dec	0.206	0.156	Z	0.075	0.040	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	0.057	0.016	0.000	0.004	0.024	0.206		
30-Dec	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.007	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.007	
31-Dec	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	0.081	0.052	0.088	0.001	0.000	0.000	0.035	0.000	0.000	0.000	0.029	0.012	0.088	
		0.058	0.015	0.026	0.031	0.048	0.042	0.030	0.025	0.026	0.018	0.024	0.049	0.012	0.014	0.011	0.023	0.036	0.029	0.024	0.035	0.030	0.042	0.049	0.044	Diurnal Average	
		0.708	0.215	0.314	0.405	0.537	0.595	0.425	0.474	0.262	0.251	0.306	0.999	0.209	0.226	0.212	0.443	0.613	0.465	0.466	0.574	0.378	0.558	0.721	0.517	Diurnal Maximum	
Z - zerospan		C - Calibration																									





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 0.005	574	80.96	80.96
0.006 - 0.05	53	7.48	88.43
0.06 - 0.1	32	4.51	92.95
> 0.1	50	7.05	100.00

Total Number of Valid Hours: 709

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Non Methane Hydrocarbons (NMHC) - ppm
Mannix - December 2023

Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 0.005	4	0	0	0	1	1	27	311	51	32	28	47	44	10	3	6	565
0.006 - 0.05	5	5	0	1	1	2	1	16	7	1	1	3	1	1	6	2	53
0.06 - 0.1	2	6	0	0	0	2	3	8	3	2	2	1	1	1	0	1	32
> 0.1	7	6	1	0	1	2	1	4	3	2	1	2	2	4	4	10	50
Totals	18	17	1	1	3	7	32	339	64	37	32	53	48	16	13	19	700

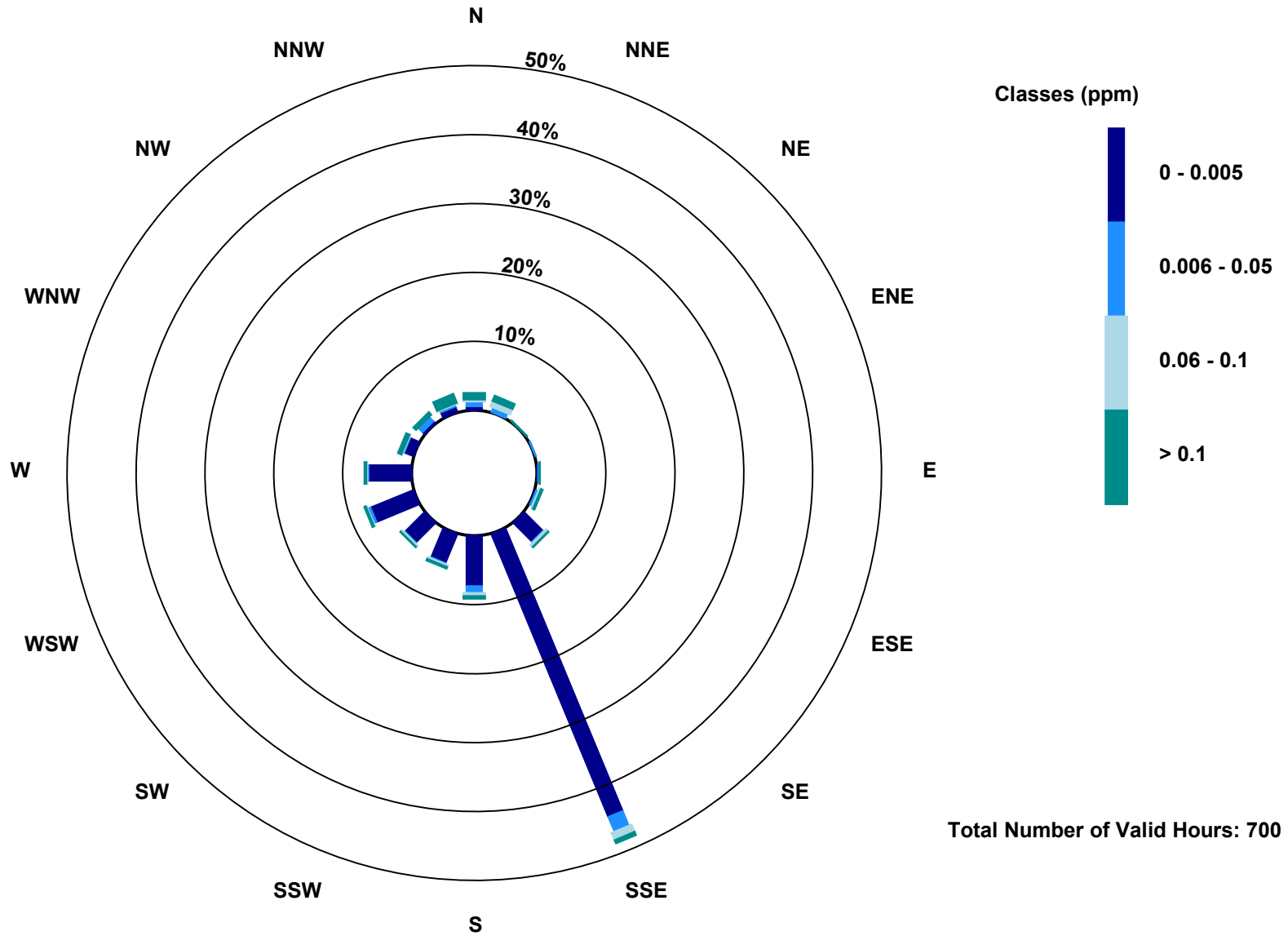
Total Number of Valid Hours: 700

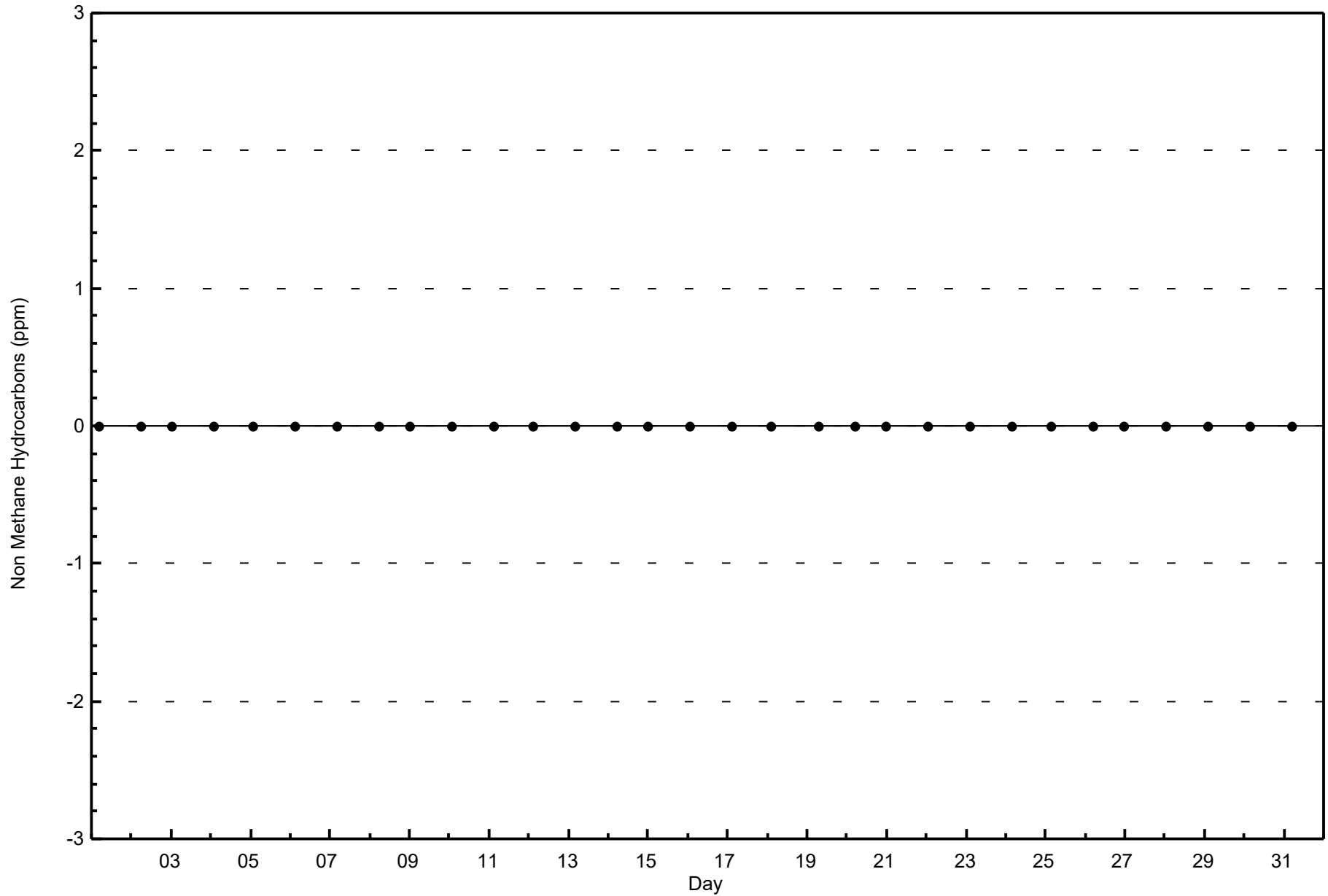
Total Number of Hours: 744

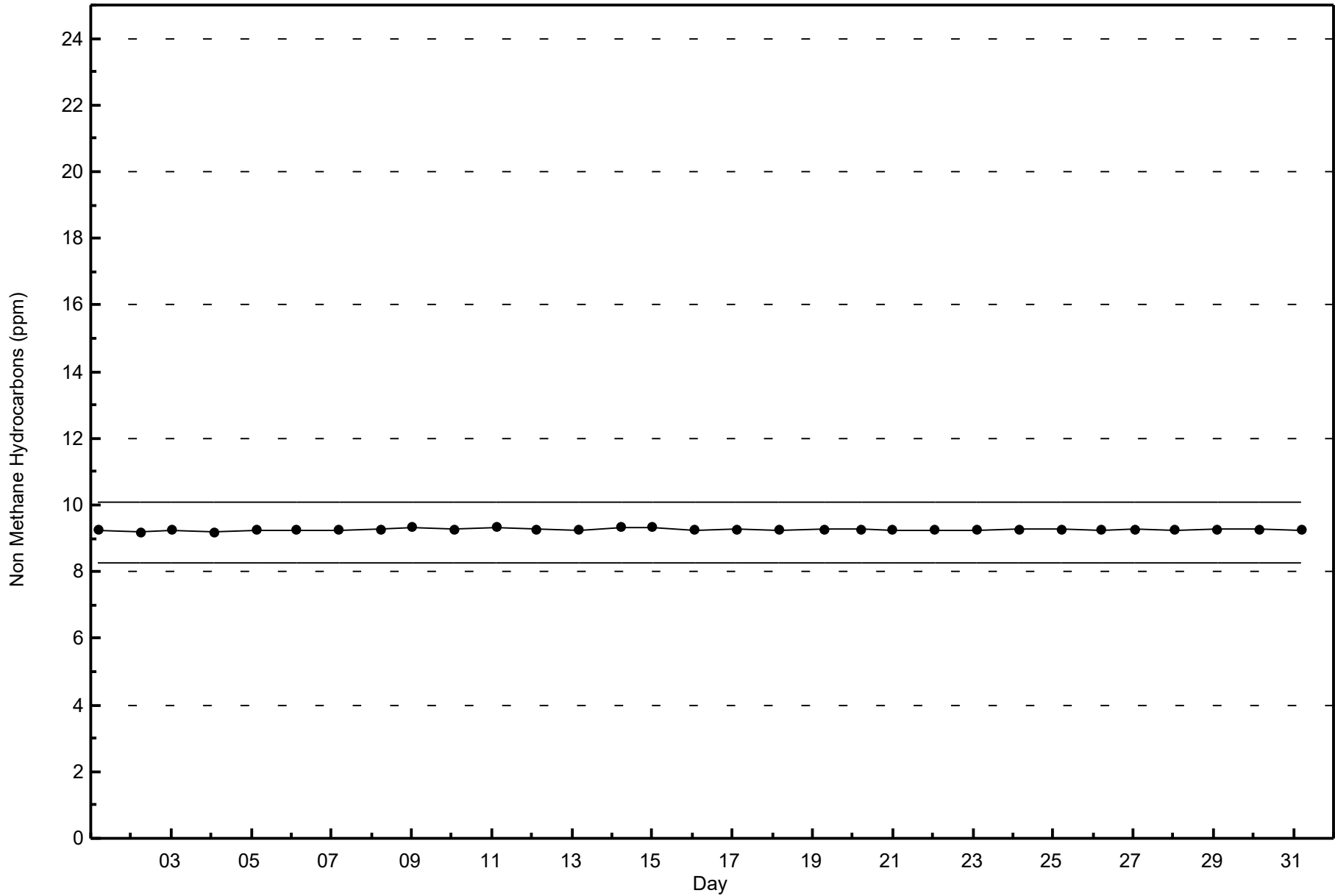


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Non Methane Hydrocarbons (NMHC) - ppm
Mannix

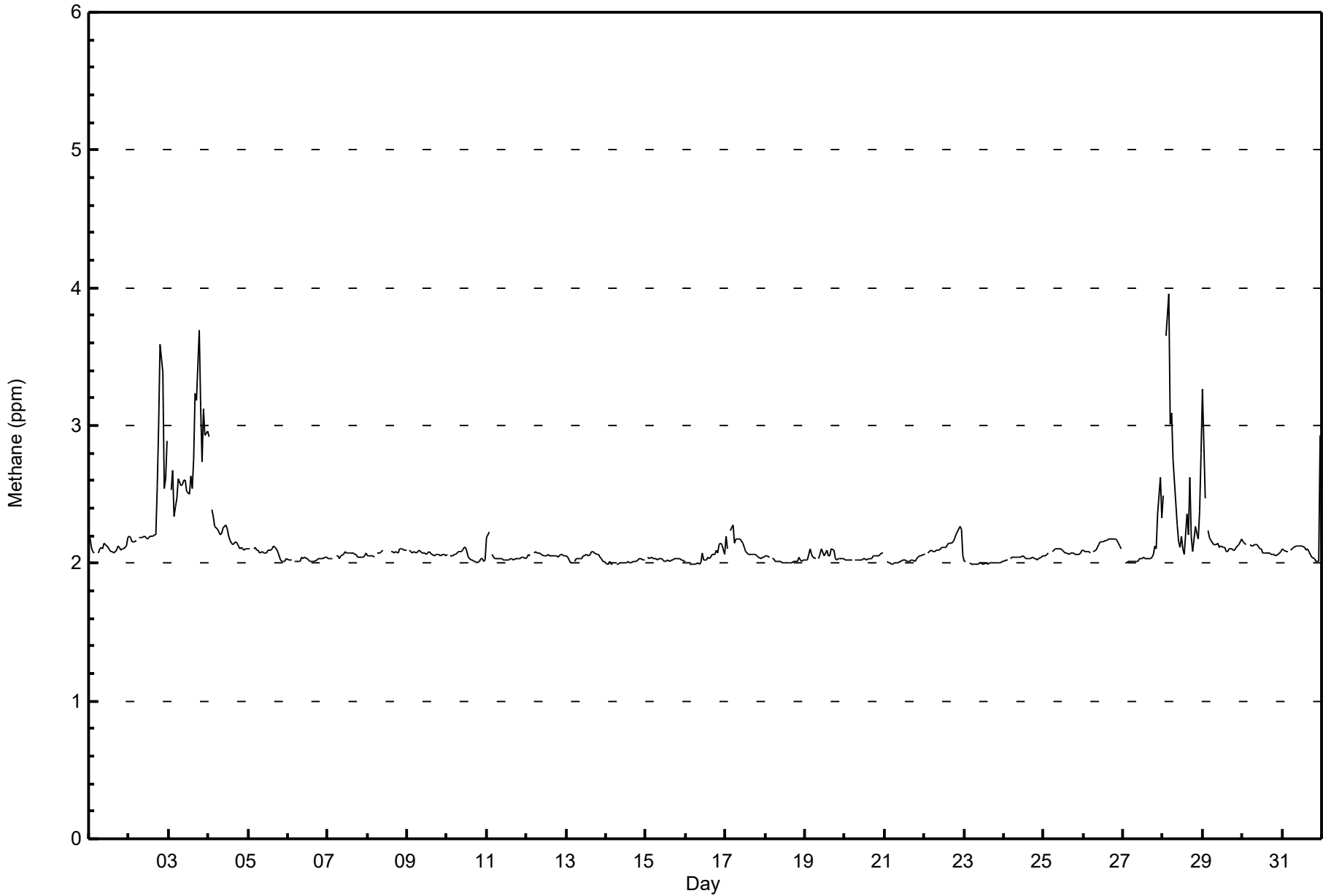








Number of Exceedences (AAAQO):		1-hr: 0		24-hr: 0		Hours in Service:														744						
Maximum Value: 4.0 ppm on Dec 28 04:00		Maximum Daily Average: 2.8 ppm on Dec 3		Hours of Data:														709								
Minimum Value: 2.0 ppm on Dec 14 04:00		Minimum Daily Average: 2.0 ppm on Dec 23		Hours of Missing Data:														35								
Maximum Diurnal Average: 2.2 ppm at hour 24		Minimum Diurnal Average: 2.1 ppm at hour 13		Hours of Calibration:														35								
Monthly Average: 2.12 ppm		Percentiles: P ₁ = 2.0 P ₁₀ = 2.0 Q ₁ = 2.0 Median = 2.1 Q ₃ = 2.1 P ₉₀ = 2.2 P ₉₉ = 3.2		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-Dec	2.2	2.1	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.2
2-Dec	2.2	2.2	2.2	2.2	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.5	3.0	3.6	3.4	2.5	2.6	2.9	2.4	3.6
3-Dec	Z	2.5	2.7	2.3	2.4	2.5	2.6	2.6	2.6	2.6	2.6	2.5	2.5	2.6	2.5	2.8	3.2	3.2	3.7	3.1	2.7	3.1	2.9	3.0	2.8	3.7
4-Dec	2.9	Z	2.4	2.3	2.3	2.3	2.2	2.2	2.2	2.3	2.3	2.2	2.2	2.2	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.9
5-Dec	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	2.0	2.0	2.0	2.0	2.1	2.1	
6-Dec	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
7-Dec	2.0	2.0	2.0	2.0	Z	2.0	2.1	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1
8-Dec	2.1	2.1	2.1	2.1	2.0	Z	2.1	2.1	2.1	2.1	C	C	C	C	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
9-Dec	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
10-Dec	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	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1
11-Dec	2.2	2.2	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	2.2
12-Dec	2.0	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.1	2.1	2.0	2.1	2.1	2.1	2.0	2.1	2.1	2.1	2.1	2.1	2.1
13-Dec	2.1	2.0	2.0	2.0	Z	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	2.0	2.0	2.0	2.0	2.0	2.1
14-Dec	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
15-Dec	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-Dec	2.0	Z	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	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.1
17-Dec	2.2	2.1	Z	2.2	2.3	2.1	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.1	2.3
18-Dec	2.1	2.1	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1
19-Dec	2.0	2.0	2.1	2.1	2.1	2.0	2.0	Z	2.0	2.1	2.1	2.1	2.1	2.1	2.0	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1
20-Dec	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	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.1
21-Dec	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.0	2.1
22-Dec	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.1	2.1	2.3
23-Dec	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
24-Dec	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	2.1	2.0	2.1
25-Dec	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
26-Dec	2.1	2.1	2.1	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.2
27-Dec	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	2.1	2.4	2.6	2.3	2.1	2.6
28-Dec	2.5	Z	3.7	4.0	3.0	3.1	2.8	2.6	2.3	2.2	2.1	2.2	2.1	2.1	2.4	2.2	2.6	2.2	2.1	2.3	2.2	2.2	2.4	2.8	2.5	4.0
29-Dec	3.3	2.5	Z	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	3.3
30-Dec	2.2	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2
31-Dec	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	2.0	2.0	2.0	2.0	2.0	2.9	2.1	2.9
																								Diurnal Average		
																								Diurnal Maximum		
Z - zerospan C - Calibration																										





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Methane (CH₄) - ppm
Mannix - December 2023**

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	287	40.48	40.48
2.1 - 3.0	411	57.97	98.45
3.1 - 10.0	11	1.55	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 709

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Methane (CH₄) - ppm
Mannix - December 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	3	9	0	1	0	1	22	71	25	27	24	44	44	10	2	0	283
2.1 - 3.0	13	8	1	0	3	5	10	268	39	10	8	9	3	5	8	16	406
3.1 - 10.0	2	0	0	0	0	1	0	0	0	0	0	0	1	1	3	3	11
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	18	17	1	1	3	7	32	339	64	37	32	53	48	16	13	19	700

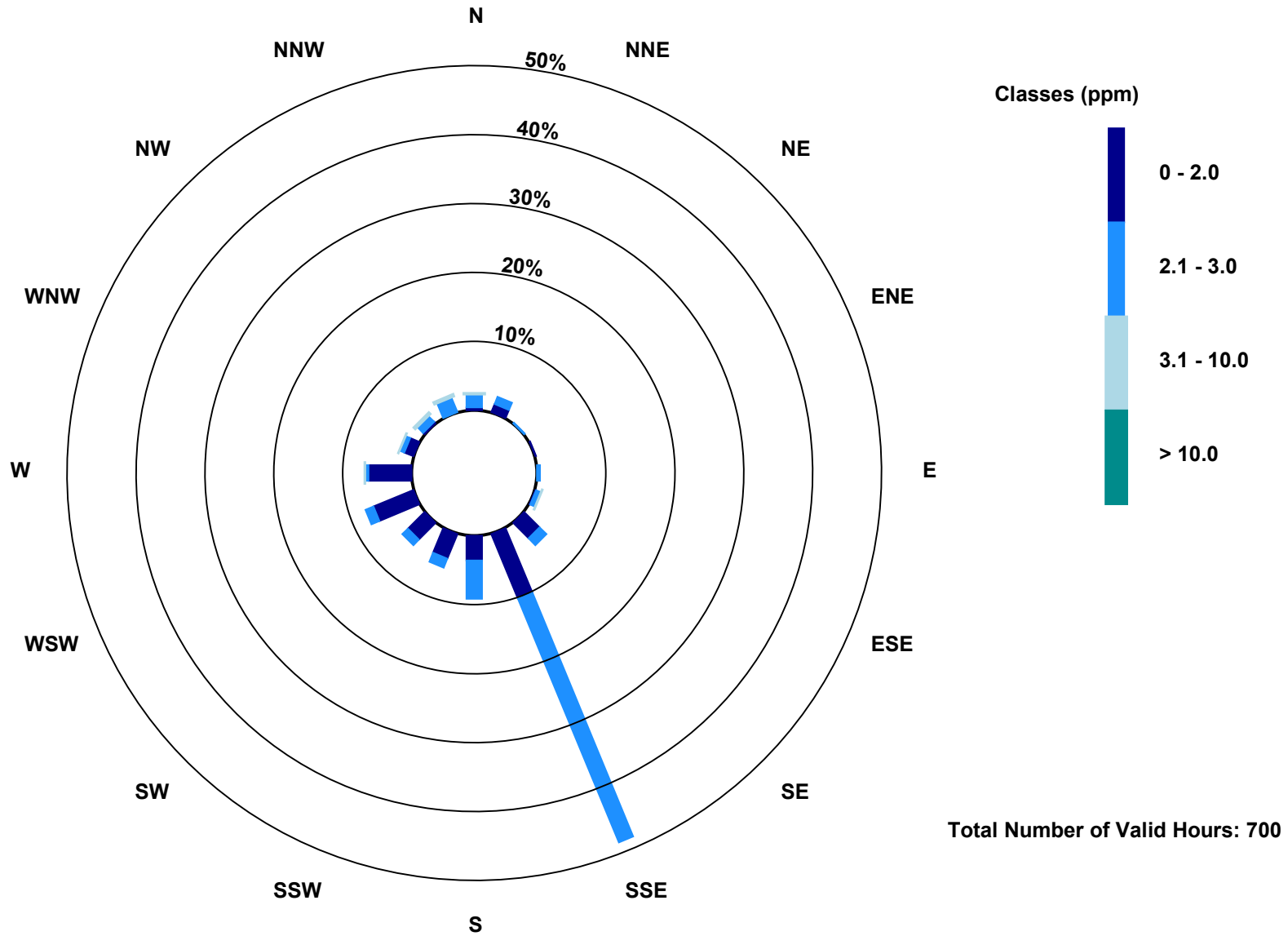
Total Number of Valid Hours: 700

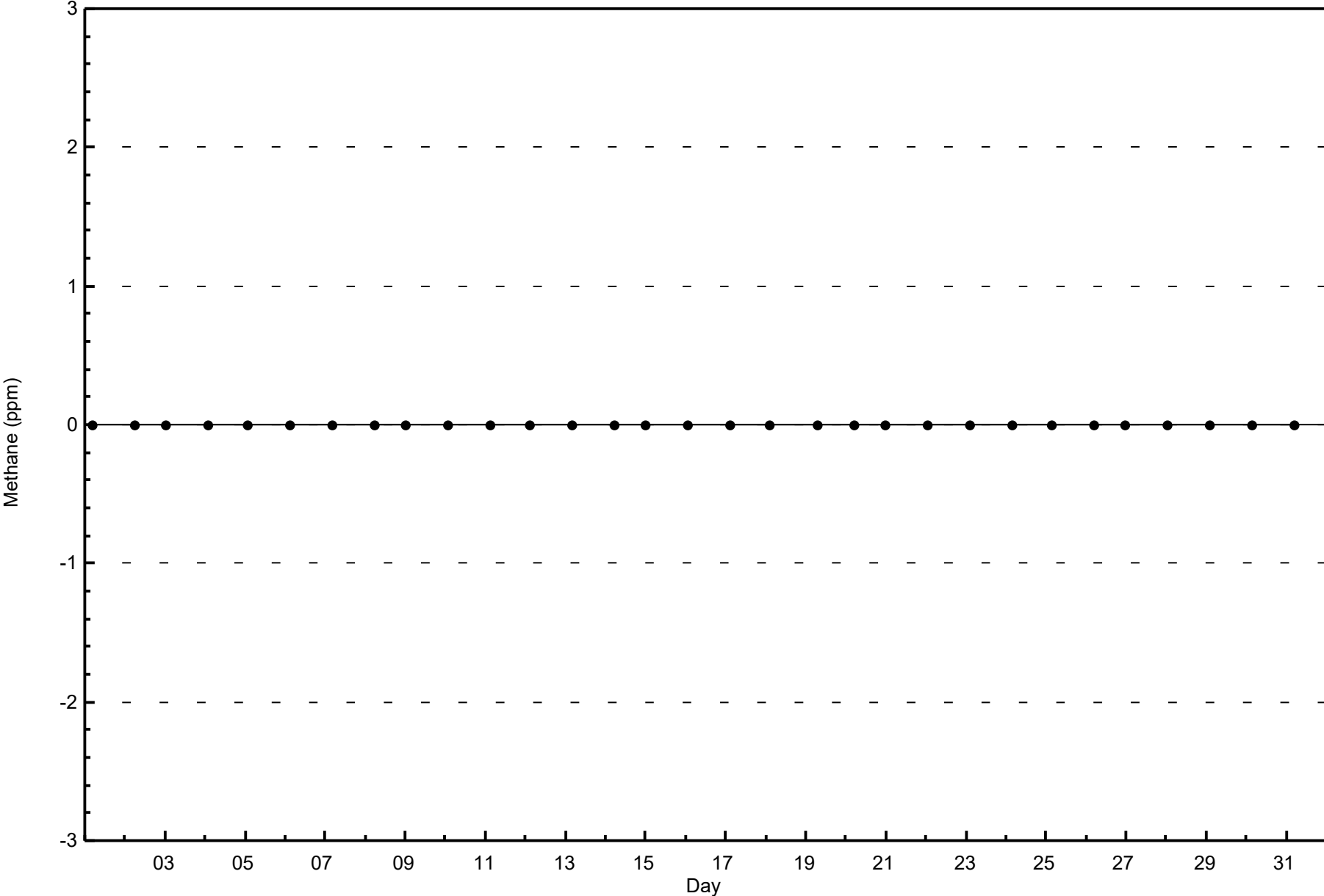
Total Number of Hours: 744

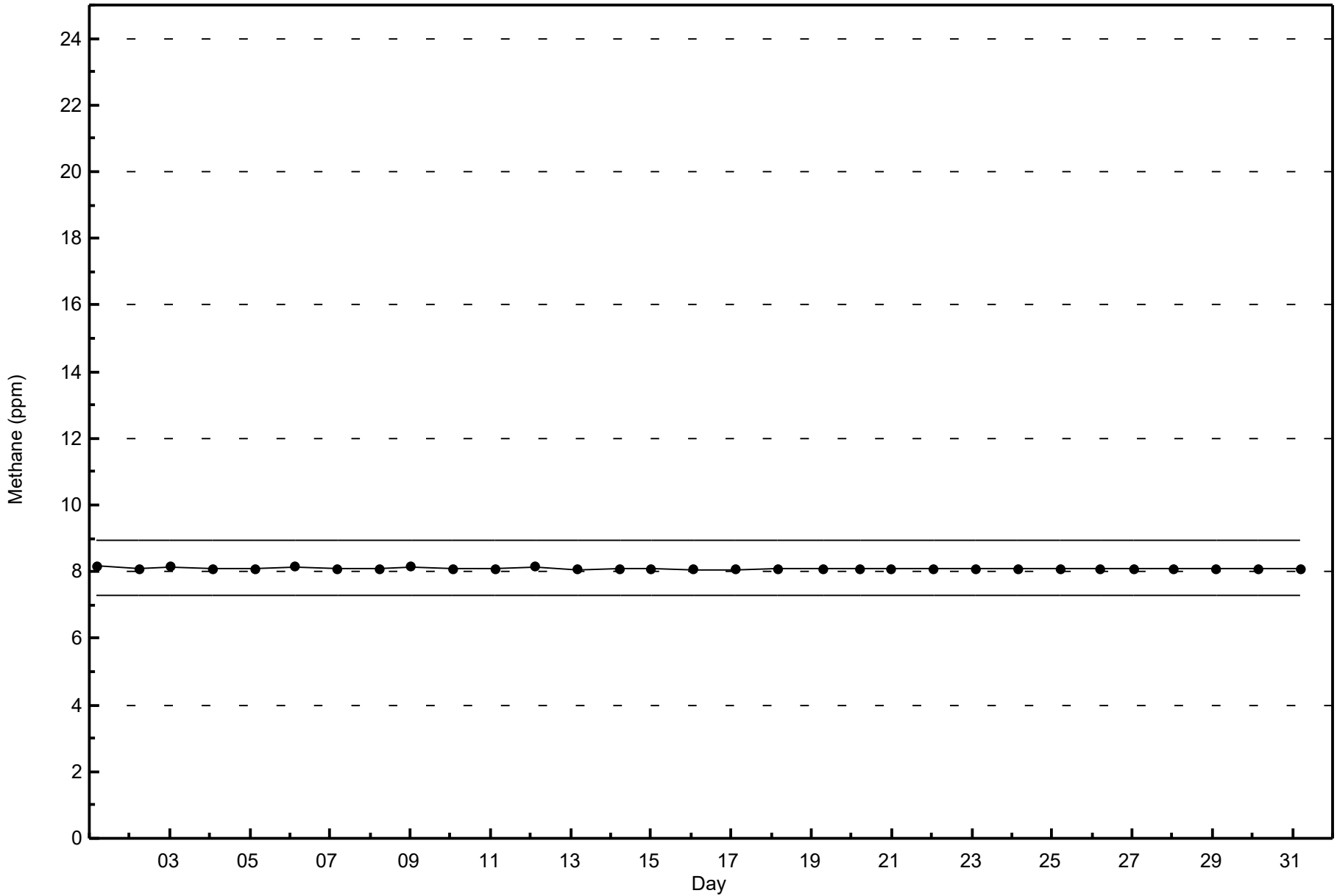


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Methane (CH₄) - ppm
Mannix







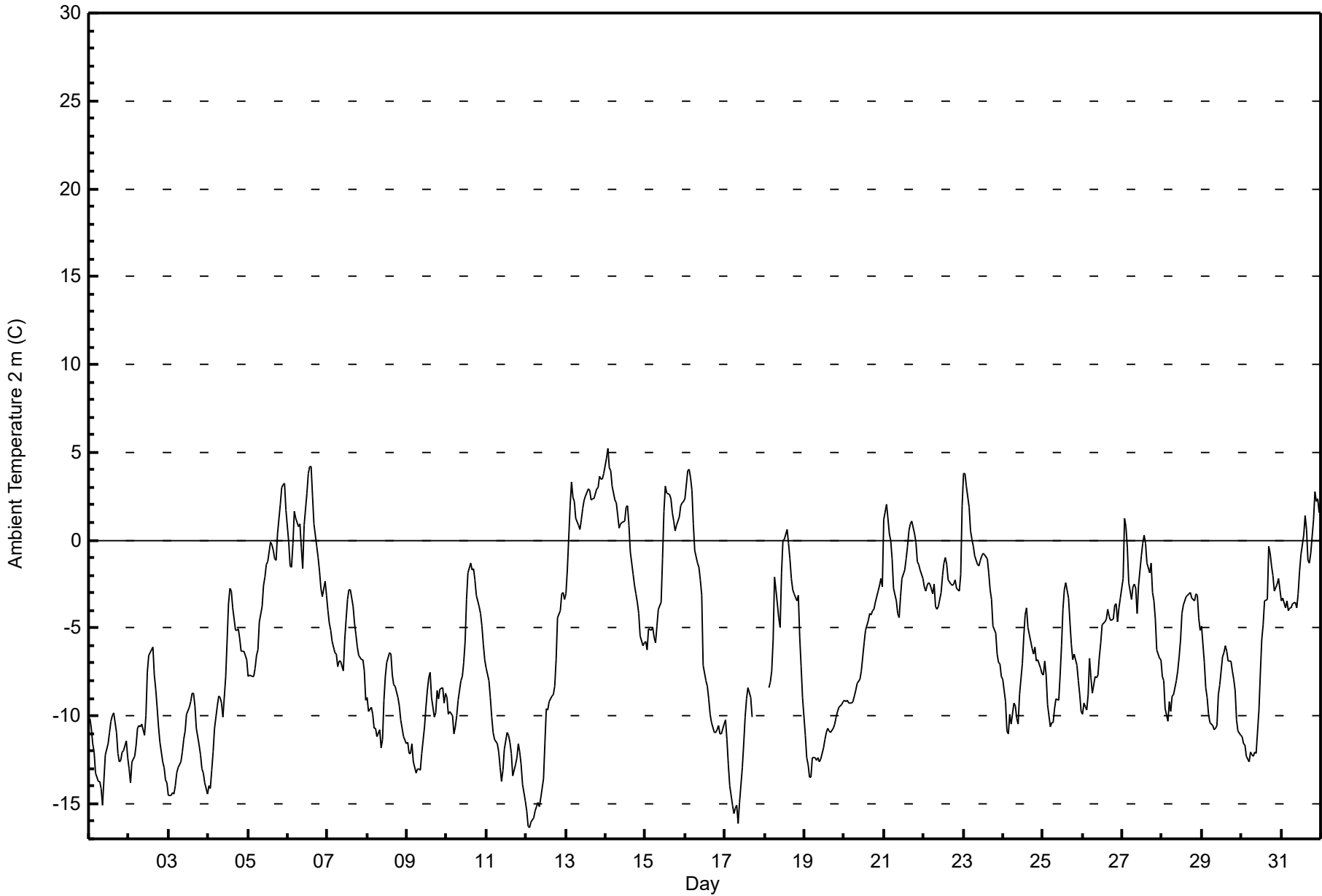


Maximum Value: 5.2 C on Dec 14 02:00																				Maximum Daily Average: 2.0 C on Dec 13					Hours in Service: 744	
Minimum Value: -16.4 C on Dec 12 03:00																				Minimum Daily Average: -12.1 C on Dec 3					Hours of Data: 735	
Maximum Diurnal Average: -3.7 C at hour 15																				Minimum Diurnal Average: -7.7 C at hour 9					Hours of Missing Data: 9	
Monthly Average: -6.02 C																				Percentiles: P ₁ = -15.3 P ₁₀ = -12.4 Q ₁ = -10.1 Median = -6.4 Q ₃ = -2.3 P ₉₀ = 1.1 P ₉₉ = 3.9					Hours of Calibration: 0	
																									Percent Operational Time: 98.8	
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Dec	-10.1	-10.7	-11.5	-12.1	-13.2	-13.8	-13.7	-14.2	-15.1	-13.6	-12.2	-11.6	-10.9	-10.3	-10.0	-9.8	-11.0	-12.2	-12.6	-12.5	-12.0	-12.0	-11.4	-12.3	-12.0	-9.8
2-Dec	-13.1	-13.8	-12.6	-12.3	-11.7	-10.7	-10.6	-10.7	-10.5	-11.1	-10.0	-7.5	-6.6	-6.4	-6.1	-7.7	-8.5	-9.5	-10.7	-11.5	-12.6	-12.9	-13.7	-13.8	-10.6	-6.1
3-Dec	-14.6	-14.6	-14.4	-14.4	-14.0	-13.3	-12.9	-12.6	-12.1	-11.4	-10.9	-9.9	-9.5	-9.2	-8.7	-8.7	-9.4	-10.7	-11.6	-12.2	-13.0	-13.2	-13.8	-14.5	-12.1	-8.7
4-Dec	-14.0	-14.1	-13.1	-12.0	-10.7	-9.4	-8.8	-9.0	-9.3	-10.1	-7.8	-5.7	-3.6	-2.8	-2.9	-3.8	-5.1	-5.1	-5.0	-5.6	-6.3	-6.4	-6.6	-6.8	-7.7	-2.8
5-Dec	-7.7	-7.7	-7.7	-7.8	-7.3	-6.6	-6.2	-4.7	-3.8	-2.6	-2.1	-1.4	-1.3	-0.1	-0.3	-0.6	-1.1	-1.1	0.4	2.1	3.0	3.1	3.2	1.8	-2.4	3.2
6-Dec	-0.1	-1.5	-1.6	-0.2	1.7	1.3	0.8	0.9	-0.5	-1.6	0.9	2.6	3.8	4.2	4.2	2.5	0.9	-0.3	-1.0	-1.8	-2.8	-3.2	-2.3	-3.2	0.2	4.2
7-Dec	-4.0	-4.8	-5.1	-5.8	-6.4	-6.5	-7.2	-6.8	-6.9	-7.5	-5.7	-4.5	-3.4	-2.8	-2.8	-3.8	-4.8	-5.4	-6.1	-6.5	-6.8	-6.8	-7.5	-9.1	-5.7	-2.8
8-Dec	-9.0	-9.8	-9.5	-9.9	-10.7	-10.7	-11.2	-10.8	-11.8	-11.3	-9.1	-7.8	-6.9	-6.4	-6.5	-7.7	-8.2	-8.3	-8.9	-9.5	-10.2	-10.7	-11.2	-11.6	-9.5	-6.4
9-Dec	-11.5	-12.1	-12.1	-11.6	-12.6	-13.2	-13.0	-13.0	-13.1	-12.1	-10.6	-9.5	-8.6	-7.8	-7.5	-8.9	-10.0	-9.8	-8.6	-9.1	-8.5	-8.4	-9.3	-8.7	-10.4	-7.5
10-Dec	-8.9	-9.9	-9.7	-10.0	-11.0	-10.6	-10.0	-9.1	-8.0	-7.7	-7.0	-5.8	-3.4	-1.9	-1.3	-1.7	-1.6	-2.3	-3.1	-3.8	-4.2	-4.9	-6.0	-6.8	-6.2	-1.3
11-Dec	-7.3	-8.0	-8.9	-10.0	-10.9	-11.3	-11.6	-12.1	-12.9	-13.8	-13.1	-11.9	-11.0	-11.1	-11.5	-12.1	-13.5	-12.8	-12.4	-11.6	-12.1	-12.8	-13.9	-14.9	-11.7	-7.3
12-Dec	-15.4	-16.3	-16.4	-16.1	-15.8	-15.4	-15.2	-14.9	-15.2	-14.7	-13.6	-11.5	-9.6	-9.7	-9.2	-8.9	-8.8	-8.3	-6.8	-4.4	-4.0	-3.1	-3.0	-3.4	-10.8	-3.0
13-Dec	-3.0	-1.7	1.9	3.3	2.4	2.2	1.2	0.9	0.6	1.2	1.8	2.2	2.5	2.9	2.8	2.2	2.3	2.3	2.9	3.0	3.7	3.4	3.5	3.8	2.0	3.8
14-Dec	4.6	5.2	4.1	3.9	3.1	2.3	2.1	1.4	0.7	0.9	1.0	1.1	1.9	1.9	0.9	-0.7	-1.9	-2.6	-3.0	-3.6	-4.2	-5.5	-6.0	-5.8	0.1	5.2
15-Dec	-5.8	-6.2	-5.0	-5.2	-5.0	-5.5	-5.9	-4.9	-4.0	-3.5	-1.1	1.6	3.1	2.7	2.6	2.4	1.6	1.1	0.6	0.8	1.3	1.9	2.1	2.2	-1.2	3.1
16-Dec	2.4	4.0	4.0	3.6	2.9	0.9	-0.6	-1.3	-1.6	-2.3	-3.1	-7.1	-8.0	-8.3	-9.0	-9.9	-10.4	-10.9	-10.9	-10.8	-10.5	-11.0	-11.0	-10.5	-5.0	4.0
17-Dec	-10.2	-11.3	-12.8	-14.0	-15.1	-15.6	-15.2	-15.1	-16.1	-14.9	-13.0	-11.6	-10.1	-9.1	-8.4	-9.0	-10.1	DF	DF	DF	DF	DF	DF	DF	--	-8.4
18-Dec	DF	DF	-8.4	-8.1	-7.4	-5.7	-2.1	-2.8	-4.4	-5.0	-1.9	0.0	0.1	0.6	-0.2	-1.0	-2.2	-2.8	-3.1	-3.5	-3.1	-5.5	-7.2	-9.0	-3.8	0.6
19-Dec	-11.1	-12.4	-12.8	-13.5	-13.5	-12.4	-12.3	-12.5	-12.4	-12.6	-12.5	-11.9	-11.3	-11.0	-10.7	-10.8	-11.0	-10.7	-10.4	-10.0	-9.7	-9.5	-9.3	-9.2	-11.4	-9.2
20-Dec	-9.1	-9.2	-9.1	-9.3	-9.3	-9.2	-8.9	-8.6	-8.2	-7.9	-7.4	-6.6	-5.8	-5.1	-4.6	-4.2	-4.3	-4.0	-3.9	-3.5	-2.9	-2.6	-2.2	-2.7	-6.2	-2.2
21-Dec	1.2	2.0	1.3	0.3	0.0	-1.0	-2.7	-3.4	-4.2	-4.4	-3.2	-2.2	-1.7	-1.0	-0.3	0.5	0.9	1.1	0.4	-0.1	-1.2	-1.4	-1.7	-2.2	-1.0	2.0
22-Dec	-2.7	-2.9	-2.6	-2.4	-2.5	-3.0	-2.5	-3.8	-3.9	-3.8	-3.0	-2.0	-1.3	-1.0	-1.4	-2.3	-2.5	-2.6	-2.5	-2.2	-2.7	-2.9	-1.9	1.9	-2.4	1.9
23-Dec	3.8	3.8	3.1	1.9	0.6	0.0	-0.3	-0.9	-1.4	-1.5	-1.2	-0.9	-0.7	-0.8	-1.0	-1.8	-2.8	-3.4	-4.9	-5.3	-6.5	-7.0	-7.1	-7.7	-1.8	3.8
24-Dec	-7.9	-9.2	-10.9	-11.0	-9.9	-10.5	-9.3	-9.5	-10.1	-10.5	-8.8	-7.1	-5.6	-4.3	-3.8	-5.0	-5.3	-6.2	-6.5	-6.1	-6.9	-6.8	-7.2	-7.6	-7.7	-3.8
25-Dec	-7.6	-6.9	-7.7	-9.3	-10.7	-10.4	-10.4	-9.6	-9.0	-9.2	-7.7	-6.0	-4.0	-2.8	-2.5	-3.3	-4.7	-5.9	-6.8	-6.5	-7.1	-8.0	-8.8	-9.7	-7.3	-2.5
26-Dec	-9.9	-9.3	-9.7	-8.8	-6.8	-7.8	-8.7	-7.8	-7.8	-7.7	-6.6	-5.8	-4.8	-4.6	-4.5	-3.9	-4.3	-4.5	-4.5	-3.7	-3.6	-4.7	-3.8	-3.3	-6.1	-3.3
27-Dec	-2.2	1.2	0.7	-0.4	-2.4	-3.4	-2.7	-2.5	-2.8	-4.2	-2.5	-0.9	-0.2	0.3	-0.2	-1.3	-1.9	-1.3	-3.0	-3.5	-4.5	-6.2	-6.7	-6.8	-2.4	1.2
28-Dec	-7.7	-8.0	-9.6	-10.3	-9.2	-9.8	-8.9	-8.8	-8.0	-7.5	-6.6	-5.7	-4.2	-3.7	-3.2	-3.1	-3.1	-2.9	-3.3	-3.4	-3.0	-3.2	-4.4	-5.2	-5.9	-2.9
29-Dec	-4.9	-6.9	-8.4	-9.0	-9.9	-10.4	-10.6	-10.8	-10.7	-10.5	-8.8	-8.2	-6.6	-6.4	-6.0	-6.3	-6.9	-6.9	-7.5	-7.9	-8.6	-10.2	-10.9	-11.1	-8.5	-4.9
30-Dec	-11.2	-11.6	-11.7	-12.3	-12.6	-12.0	-12.2	-12.3	-12.0	-12.2	-9.7	-7.6	-5.7	-4.8	-3.5	-3.4	-0.4	-0.8	-1.4	-2.1	-2.9	-2.5	-2.1	-2.8	-7.1	-0.4
31-Dec	-3.5	-3.3	-3.8	-3.5	-4.1	-3.9	-3.9	-3.6	-3.5	-3.8	-3.1	-1.8	-0.8	0.3	1.4	0.6	-1.2	-1.3	-0.7	1.2	2.8	2.2	2.4	1.5	-1.4	2.8
																								Diurnal Average		
																								Diurnal Maximum		
DF - DAS Failure																										



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature 2 m (AT2m) - C
Mannix - December 2023





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Ambient Temperature 2 m (AT2m) - C
Mannix - December 2023

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	633	86.12	86.12
0 - 10	102	13.88	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 735

Total Number of Hours: 744

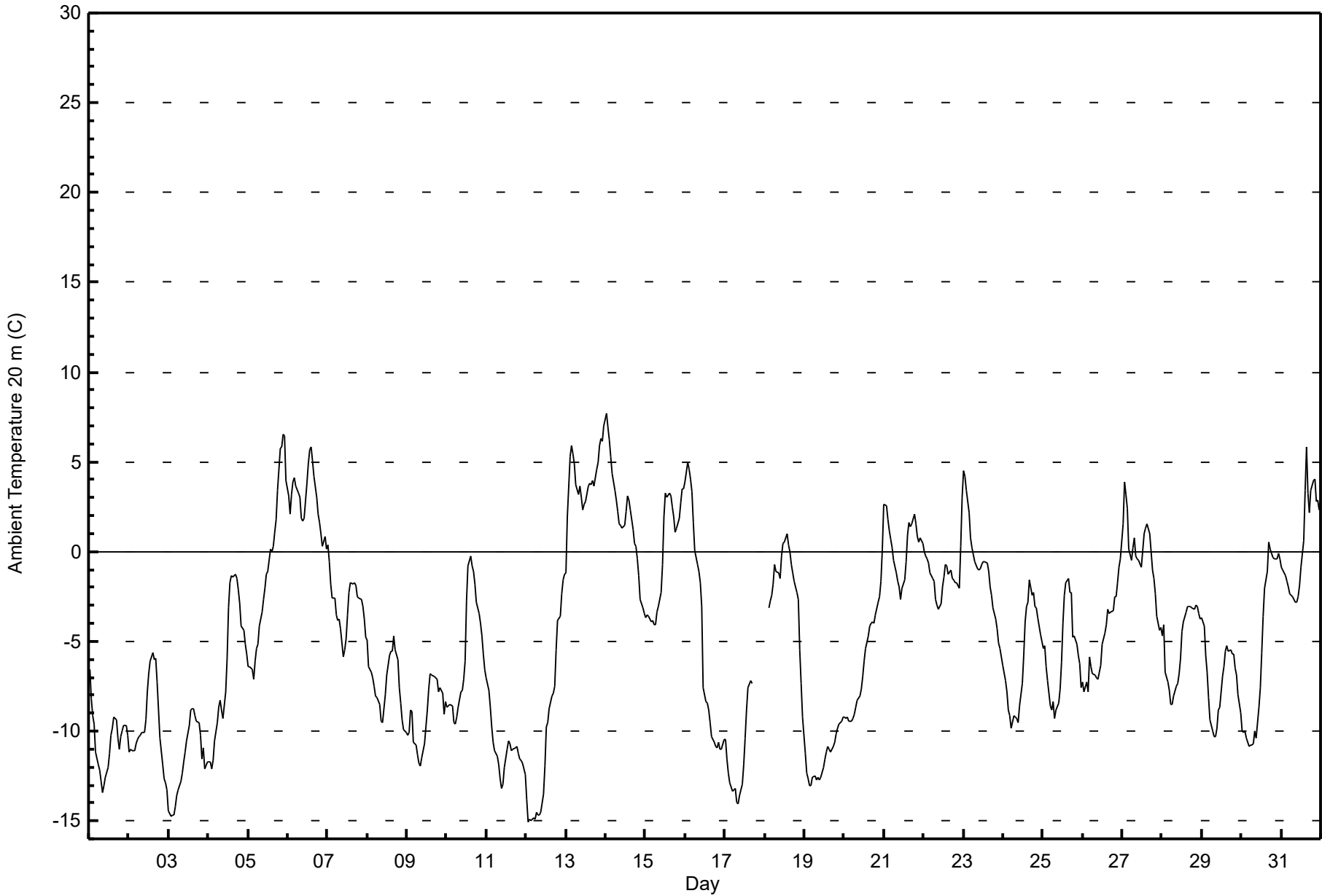


Summary of Hour Averages

Mannix - December 2023

Maximum Value: 7.7 C on Dec 14 01:00		Maximum Daily Average: 4.1 C on Dec 13		Hours in Service: 744																						
Minimum Value: -15.1 C on Dec 12 02:00		Minimum Daily Average: -11.6 C on Dec 3		Hours of Data: 735																						
Maximum Diurnal Average: -2.8 C at hour 16		Minimum Diurnal Average: -6.6 C at hour 10		Hours of Missing Data: 9																						
Monthly Average: -4.73 C		Percentiles: P ₁ = -14.7 P ₁₀ = -11.5 Q ₁ = -9.3 Median = -4.7 Q ₃ = -0.7 P ₉₀ = 2.7 P ₉₉ = 6.1		Hours of Calibration: 0																						
				Percent Operational Time: 98.8																						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Dec	-6.6	-8.2	-9.1	-9.6	-11.1	-11.9	-12.2	-12.8	-13.4	-13.0	-12.5	-12.0	-11.2	-10.2	-9.8	-9.2	-9.4	-10.4	-11.0	-10.3	-10.0	-9.7	-9.7	-10.2	-10.6	-6.6
2-Dec	-11.2	-11.0	-11.1	-11.1	-10.7	-10.5	-10.3	-10.3	-10.1	-10.0	-9.4	-7.8	-6.8	-6.1	-5.6	-6.0	-5.9	-7.3	-8.9	-10.4	-11.8	-12.6	-12.9	-13.2	-9.6	-5.6
3-Dec	-14.5	-14.8	-14.7	-14.7	-14.2	-13.6	-13.3	-12.8	-12.3	-11.7	-11.2	-10.5	-9.7	-8.9	-8.8	-8.8	-9.1	-9.4	-9.5	-10.3	-11.5	-10.9	-12.1	-11.7	-11.6	-8.8
4-Dec	-11.7	-11.7	-12.1	-11.6	-10.6	-9.5	-8.6	-8.3	-8.8	-9.3	-7.8	-5.9	-3.2	-1.7	-1.4	-1.4	-1.2	-1.5	-2.1	-2.9	-4.2	-4.4	-5.1	-5.7	-6.3	-1.2
5-Dec	-6.4	-6.4	-6.6	-7.1	-6.1	-5.4	-5.2	-4.2	-3.4	-2.7	-2.0	-1.3	-1.1	0.1	0.0	0.3	1.1	1.8	3.4	5.8	5.9	6.5	6.5	3.9	-0.9	6.5
6-Dec	3.1	2.1	3.2	3.8	4.1	3.6	3.2	3.0	1.8	1.7	1.8	3.8	4.9	5.7	5.8	5.0	4.2	3.1	2.1	1.6	1.0	0.3	0.9	0.1	2.9	5.8
7-Dec	0.3	-0.6	-1.8	-2.6	-2.6	-3.6	-3.8	-3.7	-4.3	-5.8	-5.5	-4.8	-3.5	-2.3	-1.7	-1.8	-1.7	-1.9	-2.5	-2.6	-2.6	-3.0	-3.7	-4.7	-3.0	0.3
8-Dec	-4.9	-6.4	-6.7	-7.0	-7.5	-8.1	-8.2	-8.5	-9.5	-9.5	-8.8	-7.9	-6.9	-5.8	-5.5	-5.6	-4.7	-5.4	-6.1	-7.6	-8.4	-9.4	-9.9	-10.1	-7.4	-4.7
9-Dec	-10.2	-10.1	-8.8	-8.9	-10.6	-10.8	-11.4	-11.8	-12.0	-11.5	-10.7	-9.8	-8.8	-7.6	-6.8	-6.9	-6.9	-7.0	-7.1	-7.8	-7.6	-7.9	-9.0	-8.4	-9.1	-6.8
10-Dec	-8.7	-8.6	-8.5	-8.6	-9.6	-9.6	-9.3	-8.7	-7.8	-7.7	-7.1	-6.1	-2.8	-0.8	-0.3	-0.8	-1.1	-1.8	-2.8	-3.4	-4.0	-4.7	-5.7	-6.6	-5.6	-0.3
11-Dec	-7.1	-7.7	-8.6	-9.7	-10.6	-11.1	-11.4	-11.9	-12.7	-13.2	-13.0	-12.0	-11.0	-10.5	-10.7	-11.1	-11.0	-10.9	-10.9	-11.2	-11.6	-11.7	-11.8	-12.4	-11.0	-7.1
12-Dec	-13.8	-15.1	-14.9	-15.0	-14.8	-14.9	-14.5	-14.7	-14.7	-14.5	-13.5	-11.9	-9.8	-9.5	-8.8	-8.0	-7.9	-7.5	-5.5	-3.9	-3.6	-2.4	-1.5	-1.2	-10.1	-1.2
13-Dec	-1.2	2.0	5.3	5.9	5.5	4.9	3.7	3.1	3.6	3.0	2.4	2.7	2.8	3.6	3.8	3.7	4.0	3.7	4.6	4.9	5.9	6.3	6.2	7.0	4.1	7.0
14-Dec	7.7	6.9	6.2	5.3	4.4	3.4	2.9	2.2	1.5	1.4	1.3	1.4	2.3	3.1	2.9	2.3	1.2	0.4	0.3	-0.4	-1.3	-2.7	-3.2	-3.5	1.9	7.7
15-Dec	-3.7	-3.5	-3.6	-3.9	-3.8	-4.1	-4.1	-3.4	-3.0	-2.3	-0.7	1.9	3.3	3.0	3.2	3.1	2.5	1.9	1.1	1.3	1.9	2.7	3.5	3.5	-0.1	3.5
16-Dec	3.9	5.0	4.6	4.1	3.3	1.6	0.0	-0.7	-1.1	-1.7	-3.0	-7.6	-8.4	-8.4	-8.8	-9.5	-10.3	-10.6	-10.9	-11.0	-10.6	-11.0	-11.0	-10.5	-4.7	5.0
17-Dec	-10.5	-11.5	-12.3	-12.9	-13.4	-13.3	-13.2	-14.0	-14.0	-13.6	-13.0	-11.8	-10.4	-8.8	-7.5	-7.2	-7.3	DF	DF	DF	DF	DF	DF	DF	--	-7.2
18-Dec	DF	DF	-3.1	-2.7	-2.5	-1.8	-0.7	-1.1	-1.2	-1.5	-0.3	0.4	0.5	1.0	0.4	0.0	-0.7	-1.2	-1.7	-2.3	-2.6	-5.4	-7.3	-9.2	-2.0	1.0
19-Dec	-11.3	-12.3	-12.6	-13.1	-13.0	-12.5	-12.5	-12.7	-12.6	-12.7	-12.6	-12.1	-11.6	-11.2	-10.9	-11.0	-11.1	-10.9	-10.6	-10.2	-9.9	-9.6	-9.5	-9.3	-11.5	-9.3
20-Dec	-9.2	-9.3	-9.2	-9.5	-9.5	-9.3	-9.1	-8.7	-8.3	-8.1	-7.6	-7.0	-6.1	-5.4	-4.7	-4.2	-4.0	-4.0	-4.0	-3.5	-2.9	-2.5	-1.6	0.1	-6.1	0.1
21-Dec	2.6	2.6	1.8	1.2	0.7	0.2	-0.4	-1.2	-1.6	-2.0	-2.6	-2.1	-1.6	-0.5	0.9	1.6	1.4	1.6	2.1	1.5	0.9	0.6	0.8	0.4	0.4	2.6
22-Dec	0.0	-0.3	-0.4	-0.7	-1.2	-1.5	-1.6	-2.7	-2.9	-3.2	-2.9	-2.0	-1.4	-0.7	-0.8	-1.2	-1.0	-1.5	-1.6	-1.7	-1.8	-2.0	0.3	3.0	-1.2	3.0
23-Dec	4.5	4.2	3.4	2.2	0.8	0.3	-0.2	-0.6	-0.9	-1.0	-0.9	-0.7	-0.6	-0.6	-0.7	-1.1	-1.9	-2.4	-3.2	-3.7	-4.3	-5.1	-5.4	-5.9	-1.0	4.5
24-Dec	-6.4	-7.2	-7.8	-8.8	-9.1	-9.9	-9.2	-9.2	-9.3	-9.5	-8.6	-7.4	-5.8	-3.9	-3.1	-2.8	-1.6	-2.4	-2.3	-3.1	-3.1	-3.6	-4.6	-5.0	-6.0	-1.6
25-Dec	-5.4	-5.2	-6.4	-7.2	-8.6	-8.9	-8.3	-9.3	-8.8	-8.4	-7.7	-6.2	-4.0	-2.4	-1.8	-1.5	-2.3	-2.3	-4.8	-4.7	-5.2	-5.8	-6.2	-7.6	-5.8	-1.5
26-Dec	-7.2	-7.8	-7.3	-7.8	-5.9	-6.4	-6.8	-6.9	-7.0	-7.1	-6.8	-6.3	-5.2	-4.6	-4.1	-3.2	-3.4	-3.4	-3.3	-2.5	-2.5	-1.7	-0.8	-0.4	-4.9	-0.4
27-Dec	1.5	3.9	3.2	2.4	0.1	-0.5	0.2	0.8	-0.3	-0.4	-0.4	-0.9	0.1	1.0	1.3	1.5	1.0	0.0	-1.0	-1.5	-2.4	-3.6	-4.4	-4.2	-0.1	3.9
28-Dec	-4.7	-4.1	-6.8	-7.2	-7.7	-8.5	-8.5	-8.0	-7.5	-7.4	-6.8	-5.9	-4.5	-3.9	-3.4	-3.0	-3.1	-3.0	-3.2	-3.2	-3.0	-3.1	-3.4	-3.7	-5.1	-3.0
29-Dec	-3.6	-4.1	-5.8	-6.7	-8.1	-9.4	-10.0	-10.3	-10.3	-9.8	-8.8	-8.6	-7.0	-6.4	-5.5	-5.2	-5.6	-5.5	-5.7	-5.7	-6.5	-6.9	-8.0	-9.0	-7.2	-3.6
30-Dec	-10.0	-10.1	-10.0	-10.4	-10.9	-10.8	-10.8	-10.7	-10.0	-10.4	-8.6	-7.6	-5.6	-3.6	-2.0	-1.1	0.6	0.2	-0.1	-0.3	-0.4	-0.4	-0.1	-0.4	-5.6	0.6
31-Dec	-0.9	-1.1	-1.4	-1.7	-2.0	-2.3	-2.4	-2.5	-2.8	-2.9	-2.5	-1.9	-0.9	0.6	3.4	5.8	3.3	2.2	3.4	4.0	4.0	2.8	2.9	2.3	0.4	5.8
																								Diurnal Average		
																								Diurnal Maximum		
																								-4.8 -5.0 -5.2 -5.6 -6.0 -6.3 -6.3 -6.5 -6.6 -6.6 -6.1 -5.4 -4.3 -3.4 -2.9 -2.8 -3.0 -3.2 -3.4 -3.5 -3.7 -4.0 -4.2 -4.4		
																								7.7 6.9 6.2 5.9 5.5 4.9 3.7 3.1 3.6 3.0 2.4 3.8 4.9 5.7 5.8 5.8 4.2 3.7 4.6 5.8 5.9 6.5 6.5 7.0		

DF - DAS Failure





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

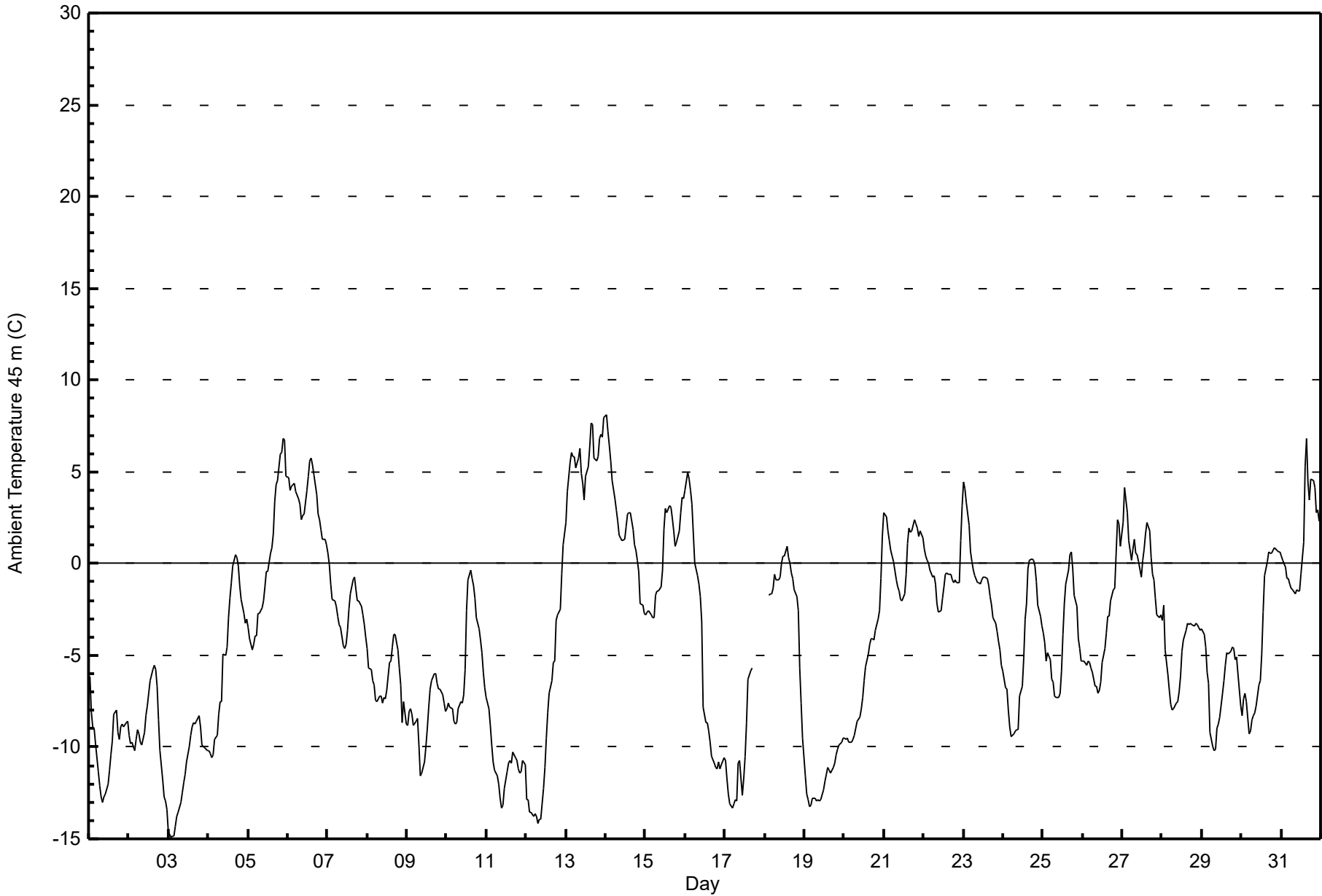
Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	583	79.32	79.32
0 - 10	152	20.68	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 735

Total Number of Hours: 744



Maximum Value: 8.1 C on Dec 14 01:00		Maximum Daily Average: 5.7 C on Dec 13		Hours in Service: 744																						
Minimum Value: -14.9 C on Dec 3 02:00		Minimum Daily Average: -11.7 C on Dec 19		Hours of Data: 735																						
Maximum Diurnal Average: -2.1 C at hour 16		Minimum Diurnal Average: -5.9 C at hour 9		Hours of Missing Data: 9																						
Monthly Average: -4.05 C		Percentiles: P ₁ = -13.9 P ₁₀ = -11.2 Q ₁ = -8.6 Median = -3.8 Q ₃ = 0.1 P ₉₀ = 3.1 P ₉₉ = 6.8		Hours of Calibration: 0																						
				Percent Operational Time: 98.8																						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Dec	-6.2	-8.0	-8.9	-9.0	-9.8	-11.3	-12.1	-12.7	-13.0	-12.7	-12.6	-12.1	-11.2	-10.4	-9.6	-8.2	-8.0	-9.2	-9.6	-8.9	-8.7	-8.9	-8.7	-8.6	-9.9	-6.2
2-Dec	-9.4	-9.8	-9.8	-10.2	-9.6	-9.1	-9.3	-9.7	-9.9	-9.2	-8.3	-7.7	-7.1	-6.4	-5.8	-5.5	-5.7	-6.7	-8.5	-10.2	-11.8	-12.7	-12.9	-13.4	-9.1	-5.5
3-Dec	-14.6	-14.9	-14.9	-14.8	-14.3	-13.8	-13.5	-13.0	-12.5	-12.0	-11.5	-10.8	-9.9	-9.4	-8.9	-8.7	-8.8	-8.6	-8.3	-8.9	-9.9	-10.0	-10.1	-10.2	-11.3	-8.3
4-Dec	-10.2	-10.4	-10.5	-10.4	-9.6	-9.3	-8.2	-7.5	-7.5	-4.9	-5.0	-4.6	-2.9	-1.9	-1.1	-0.2	0.5	0.4	-0.1	-1.2	-1.9	-2.7	-3.3	-3.0	-4.8	0.5
5-Dec	-3.5	-4.1	-4.7	-4.4	-4.0	-4.0	-2.7	-2.7	-2.4	-2.0	-1.2	-0.4	-0.4	0.6	0.9	1.7	3.4	4.3	4.5	6.0	6.0	6.8	6.8	4.7	0.4	6.8
6-Dec	4.6	4.0	4.2	4.3	4.4	3.9	3.5	3.2	2.4	2.7	2.7	4.0	4.8	5.6	5.8	5.3	4.8	3.7	2.7	2.4	1.8	1.3	1.3	1.0	3.5	5.8
7-Dec	0.6	-0.1	-1.1	-1.9	-2.0	-2.4	-2.9	-3.3	-3.5	-4.5	-4.6	-4.4	-3.6	-2.5	-1.7	-0.9	-0.7	-1.4	-2.0	-2.0	-2.3	-2.8	-3.4	-4.1	-2.4	0.6
8-Dec	-4.6	-5.7	-5.8	-6.4	-6.6	-7.5	-7.5	-7.2	-7.3	-7.6	-7.3	-7.4	-6.9	-5.4	-5.3	-4.5	-3.8	-3.9	-4.7	-5.7	-6.6	-8.6	-7.5	-8.7	-6.4	-3.8
9-Dec	-8.8	-8.0	-7.9	-8.2	-8.8	-8.6	-8.5	-9.9	-11.6	-11.4	-10.8	-10.0	-9.0	-7.9	-6.8	-6.4	-6.0	-6.0	-6.5	-6.9	-6.8	-7.2	-7.6	-8.0	-8.2	-6.0
10-Dec	-7.9	-7.6	-7.9	-7.9	-8.6	-8.8	-8.7	-7.9	-7.5	-7.6	-7.2	-5.8	-2.6	-0.9	-0.4	-0.8	-1.2	-1.9	-2.9	-3.6	-4.2	-4.9	-5.9	-6.8	-5.4	-0.4
11-Dec	-7.3	-7.9	-8.8	-9.9	-10.8	-11.2	-11.6	-12.0	-12.8	-13.4	-13.2	-12.3	-11.3	-10.9	-10.7	-10.9	-10.3	-10.6	-10.7	-11.2	-11.4	-11.3	-10.7	-11.0	-10.9	-7.3
12-Dec	-12.9	-12.8	-13.5	-13.6	-13.7	-13.6	-13.7	-14.2	-14.0	-14.0	-12.3	-11.1	-9.5	-8.2	-7.1	-6.3	-5.4	-5.3	-3.1	-2.8	-2.5	-0.6	1.0	1.6	-8.6	1.6
13-Dec	2.3	3.9	5.5	6.1	5.8	5.8	5.2	5.8	6.3	4.9	4.4	3.5	4.8	5.3	6.3	7.7	7.6	5.8	5.6	5.8	6.8	7.0	6.9	7.9	5.7	7.9
14-Dec	8.1	7.2	6.5	5.6	4.5	3.5	2.9	2.3	1.5	1.4	1.2	1.3	2.0	2.7	2.7	1.8	1.0	0.7	0.2	-0.5	-2.2	-2.2	-2.7	2.2	8.1	
15-Dec	-2.8	-2.6	-2.6	-2.8	-3.0	-2.9	-1.8	-1.5	-1.5	-1.3	-0.3	1.8	3.0	2.8	3.2	3.1	2.5	1.8	0.9	1.2	1.8	2.7	3.6	3.5	0.4	3.6
16-Dec	4.0	5.0	4.6	4.0	3.2	1.6	0.1	-0.7	-1.1	-1.8	-3.2	-7.8	-8.6	-8.7	-9.1	-9.8	-10.5	-10.9	-11.1	-11.2	-10.8	-11.2	-11.0	-10.6	-4.8	5.0
17-Dec	-10.7	-11.7	-12.6	-13.1	-13.3	-13.1	-12.9	-12.9	-10.9	-10.7	-12.6	-11.7	-10.5	-8.7	-6.3	-5.8	-5.7	DF	DF	DF	DF	DF	DF	DF	--	-5.7
18-Dec	DF	DF	-1.7	-1.7	-1.7	-1.4	-0.6	-0.9	-0.9	-0.7	0.0	0.4	0.4	1.0	0.4	0.1	-0.5	-0.8	-1.4	-1.8	-2.6	-5.7	-7.6	-9.5	-1.7	1.0
19-Dec	-11.5	-12.5	-12.8	-13.2	-13.2	-12.8	-12.8	-13.0	-12.9	-13.0	-12.9	-12.4	-11.9	-11.5	-11.1	-11.3	-11.4	-11.1	-10.9	-10.5	-10.1	-9.9	-9.7	-9.5	-11.7	-9.5
20-Dec	-9.5	-9.6	-9.5	-9.8	-9.7	-9.6	-9.4	-9.0	-8.6	-8.4	-7.9	-7.3	-6.4	-5.7	-4.9	-4.4	-4.1	-4.1	-4.2	-3.7	-3.0	-2.6	-0.8	1.5	-6.3	1.5
21-Dec	2.8	2.6	1.7	1.3	0.7	0.4	0.1	-0.9	-1.3	-1.5	-1.9	-2.0	-1.7	-0.6	1.1	1.9	1.7	1.8	2.4	2.1	2.0	1.5	1.8	1.4	0.7	2.8
22-Dec	0.8	0.4	0.2	0.1	-0.3	-0.8	-0.6	-1.1	-2.2	-2.6	-2.6	-1.9	-1.2	-0.6	-0.5	-0.6	-0.5	-0.9	-1.1	-0.9	-1.1	-1.1	1.3	3.2	-0.6	3.2
23-Dec	4.4	4.1	3.3	2.1	0.6	0.1	-0.3	-0.7	-1.0	-1.1	-1.1	-0.9	-0.7	-0.8	-1.2	-1.8	-2.3	-2.9	-3.3	-3.7	-4.3	-4.7	-5.5	-0.9	4.4	
24-Dec	-5.9	-6.8	-6.8	-8.0	-8.9	-9.5	-9.3	-9.2	-9.1	-9.1	-7.2	-6.7	-5.1	-3.0	-2.2	-0.3	0.2	0.2	0.2	-0.1	-1.0	-2.3	-2.9	-3.4	-4.8	0.2
25-Dec	-3.8	-4.3	-5.3	-4.8	-5.2	-6.3	-6.4	-7.2	-7.3	-7.3	-7.1	-5.8	-3.9	-2.2	-1.1	-0.4	0.5	0.6	-0.3	-1.7	-2.3	-4.1	-4.6	-5.3	-4.0	0.6
26-Dec	-5.3	-5.3	-5.5	-5.3	-5.4	-5.7	-6.0	-6.7	-6.7	-7.0	-6.9	-6.5	-5.4	-4.6	-3.8	-2.9	-2.9	-2.1	-1.4	-1.4	0.6	2.4	2.2	1.0	-3.8	2.4
27-Dec	2.3	4.1	3.5	2.8	1.2	0.2	0.8	1.3	0.6	0.5	0.1	-0.7	0.1	0.8	1.6	2.2	1.8	0.4	-0.6	-0.9	-1.9	-2.8	-3.0	-2.8	0.5	4.1
28-Dec	-3.1	-2.3	-4.7	-6.1	-6.9	-7.7	-8.0	-7.9	-7.6	-7.5	-7.0	-6.1	-4.8	-4.2	-3.7	-3.3	-3.3	-3.3	-3.4	-3.4	-3.2	-3.3	-3.5	-3.6	-4.9	-2.3
29-Dec	-3.5	-3.8	-4.5	-5.9	-6.5	-9.2	-10.0	-10.2	-10.1	-9.0	-8.7	-8.3	-7.0	-6.4	-5.5	-4.9	-4.9	-4.8	-4.5	-4.7	-5.2	-5.1	-6.0	-7.7	-6.5	-3.5
30-Dec	-8.3	-7.4	-7.1	-7.6	-9.3	-9.2	-8.5	-8.3	-8.1	-7.7	-6.6	-6.4	-4.9	-2.6	-0.6	0.1	0.7	0.5	0.5	0.7	0.9	0.7	0.7	0.6	-4.0	0.9
31-Dec	0.4	0.2	-0.2	-0.8	-0.8	-1.1	-1.3	-1.4	-1.7	-1.4	-1.5	-1.5	-0.6	1.1	5.3	6.8	4.4	3.4	4.6	4.5	4.1	2.8	2.9	2.3	1.3	6.8
																								Diurnal Average		
																								Diurnal Maximum		
DF - DAS Failure																										





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Ambient Temperature 45 m (AT45m) - C
Mannix - December 2023

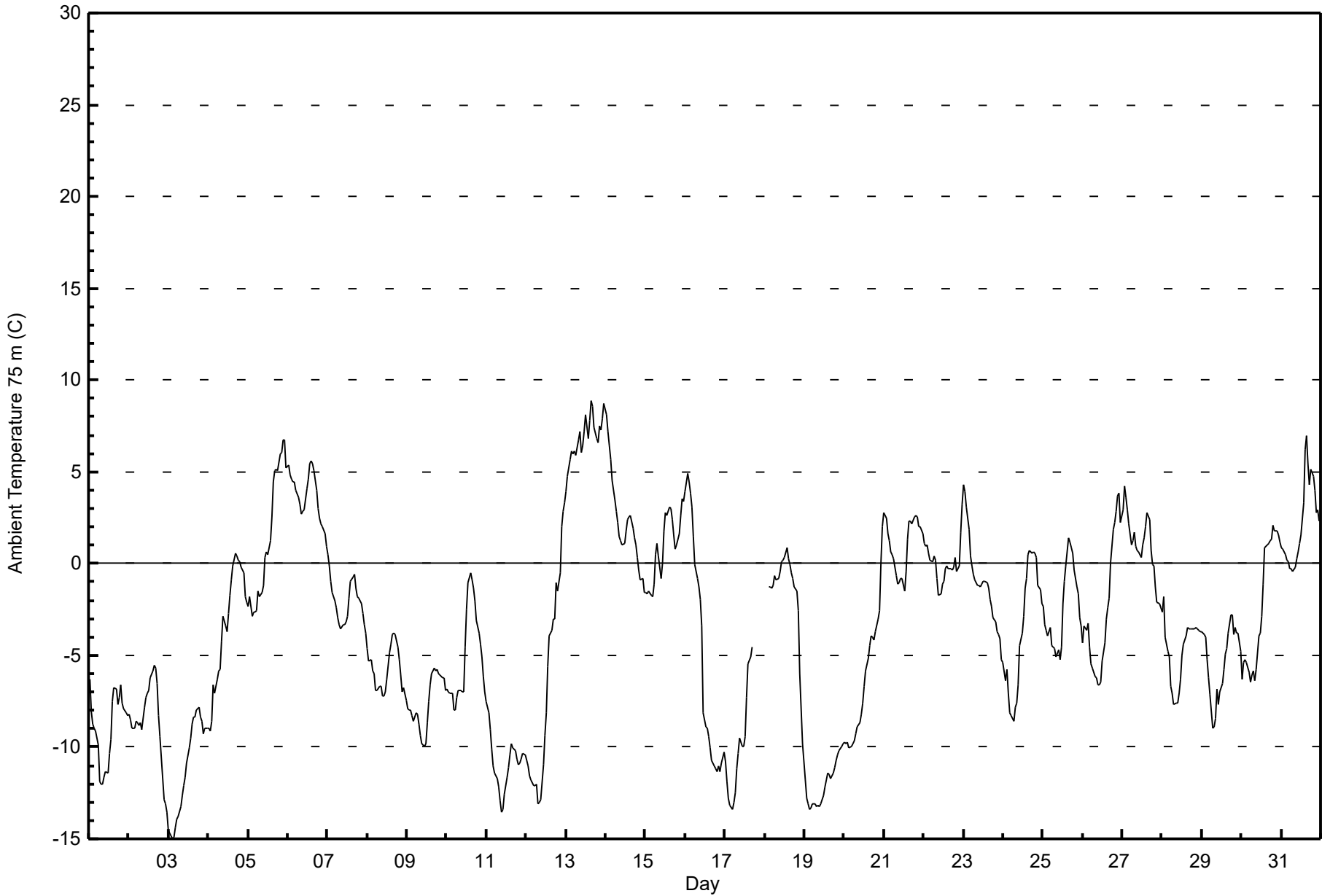
Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	547	74.42	74.42
0 - 10	188	25.58	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 735

Total Number of Hours: 744



Maximum Value: 8.9 C on Dec 13 16:00																				Maximum Daily Average: 6.9 C on Dec 13					Hours in Service: 744	
Minimum Value: -15.0 C on Dec 3 03:00																				Minimum Daily Average: -12.0 C on Dec 19					Hours of Data: 735	
Maximum Diurnal Average: -1.6 C at hour 16																				Minimum Diurnal Average: -5.1 C at hour 9					Hours of Missing Data: 9	
Monthly Average: -3.43 C																				Percentiles: P ₁ = -13.5 P ₁₀ = -10.9 Q ₁ = -7.6 Median = -3.3 Q ₃ = 0.6 P ₉₀ = 3.3 P ₉₉ = 7.5					Hours of Calibration: 0	
																									Percent Operational Time: 98.8	
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Dec	-6.3	-8.1	-8.7	-9.0	-9.1	-9.9	-11.8	-12.0	-12.0	-11.6	-11.4	-11.4	-10.4	-9.6	-7.5	-6.8	-6.8	-7.7	-7.3	-6.6	-7.6	-7.9	-8.2	-8.3	-9.0	-6.3
2-Dec	-8.2	-8.5	-9.0	-9.0	-8.6	-8.7	-8.8	-8.7	-9.0	-7.8	-7.3	-7.0	-6.9	-6.3	-5.9	-5.6	-5.7	-6.6	-8.3	-9.4	-11.7	-12.9	-13.1	-13.5	-8.6	-5.6
3-Dec	-14.6	-14.9	-15.0	-14.9	-14.4	-13.9	-13.8	-13.2	-12.6	-12.1	-11.7	-10.9	-10.0	-9.5	-8.8	-8.4	-8.3	-8.0	-7.9	-8.3	-8.6	-9.3	-9.0	-9.0	-11.1	-7.9
4-Dec	-9.0	-9.1	-8.6	-6.6	-7.0	-6.3	-5.8	-5.7	-4.3	-2.9	-3.4	-3.7	-2.7	-1.8	-0.9	-0.1	0.5	0.4	0.1	-0.2	-0.5	-1.8	-2.1	-3.4	0.5	
5-Dec	-2.3	-1.8	-2.8	-2.7	-2.7	-2.5	-1.5	-1.8	-1.6	-1.2	0.3	0.6	0.5	1.2	2.6	4.4	5.1	5.2	5.1	6.0	6.1	6.8	6.8	5.2	1.5	6.8
6-Dec	5.4	4.8	4.6	4.5	4.4	4.0	3.6	3.2	2.7	2.8	2.9	4.1	4.6	5.4	5.6	5.4	5.1	4.0	3.0	2.5	2.1	2.0	1.6	0.9	3.7	5.6
7-Dec	0.5	-0.1	-1.0	-1.6	-2.0	-2.4	-3.0	-3.3	-3.6	-3.4	-3.3	-3.2	-2.9	-1.9	-1.0	-0.7	-0.6	-1.4	-1.8	-1.9	-2.2	-2.7	-3.4	-3.8	-2.1	0.5
8-Dec	-4.6	-5.3	-5.3	-5.9	-6.0	-6.9	-6.9	-6.7	-6.7	-7.2	-7.2	-7.0	-6.3	-4.8	-4.4	-3.9	-3.8	-3.8	-4.6	-5.2	-6.1	-7.0	-6.8	-7.4	-5.8	-3.8
9-Dec	-7.9	-8.0	-8.0	-8.3	-8.6	-8.1	-8.2	-8.8	-9.4	-9.8	-10.0	-9.8	-8.7	-7.5	-6.6	-6.0	-5.7	-5.8	-5.8	-6.0	-6.1	-6.2	-6.2	-6.9	-7.6	-5.7
10-Dec	-6.9	-7.0	-7.1	-7.0	-8.0	-8.0	-7.3	-6.9	-6.9	-7.0	-7.0	-4.5	-2.5	-1.0	-0.5	-0.9	-1.3	-2.0	-3.1	-3.8	-4.4	-5.1	-6.2	-7.0	-5.1	-0.5
11-Dec	-7.5	-8.1	-9.0	-10.1	-11.0	-11.4	-11.7	-12.2	-13.0	-13.5	-13.4	-12.6	-11.6	-11.1	-10.4	-9.8	-10.0	-10.2	-10.6	-10.9	-10.9	-10.6	-10.3	-10.4	-10.9	-7.5
12-Dec	-10.7	-11.1	-11.5	-11.8	-12.1	-12.1	-12.0	-13.1	-13.0	-12.9	-10.9	-9.3	-8.1	-5.6	-3.9	-3.7	-3.0	-3.0	-1.0	-1.5	-0.5	2.0	2.9	3.3	-6.8	3.3
13-Dec	3.9	4.8	5.7	6.1	6.0	6.1	5.9	6.7	7.2	6.0	6.5	7.2	8.1	6.8	7.8	8.9	8.6	7.4	6.8	6.6	7.5	7.3	7.9	8.7	6.9	8.9
14-Dec	8.1	7.2	6.5	5.6	4.5	3.5	2.8	2.2	1.5	1.3	1.1	1.8	2.4	2.5	2.6	1.9	1.4	1.0	0.3	-0.4	-0.9	-0.8	-1.6	2.3	8.1	
15-Dec	-1.6	-1.6	-1.5	-1.7	-1.8	-1.1	0.5	1.1	0.4	-0.8	0.0	1.8	2.8	2.6	3.1	3.0	2.4	1.5	0.8	1.0	1.6	2.7	3.6	3.4	0.9	3.6
16-Dec	3.9	4.9	4.4	3.9	3.1	1.5	-0.1	-0.8	-1.3	-2.0	-3.4	-8.1	-8.9	-9.0	-9.4	-10.0	-10.7	-11.1	-11.2	-11.3	-11.1	-11.3	-10.8	-10.3	-5.0	4.9
17-Dec	-10.8	-11.9	-12.8	-13.2	-13.4	-13.0	-12.5	-11.2	-10.4	-9.5	-10.0	-10.0	-9.4	-7.3	-5.4	-5.1	-4.6	DF	DF	DF	DF	DF	DF	DF	--	-4.6
18-Dec	DF	DF	-1.3	-1.3	-1.4	-1.2	-0.6	-0.9	-0.8	-0.4	0.1	0.2	0.3	0.8	0.3	0.0	-0.5	-0.8	-1.2	-1.5	-2.5	-6.0	-7.9	-9.8	-1.7	0.8
19-Dec	-11.8	-12.8	-13.1	-13.4	-13.4	-13.1	-13.1	-13.3	-13.2	-13.2	-13.1	-12.6	-12.2	-11.8	-11.4	-11.5	-11.7	-11.4	-11.1	-10.7	-10.4	-10.2	-10.0	-9.8	-12.0	-9.8
20-Dec	-9.8	-9.8	-9.8	-10.0	-10.0	-9.8	-9.6	-9.3	-8.9	-8.6	-8.2	-7.6	-6.7	-5.9	-5.1	-4.5	-4.0	-4.0	-4.2	-3.7	-3.0	-2.5	0.0	2.0	-6.4	2.0
21-Dec	2.8	2.4	1.7	1.2	0.7	0.5	0.3	-0.6	-1.1	-1.1	-0.8	-0.8	-1.5	-0.5	1.3	2.3	2.3	2.2	2.5	2.6	2.5	2.0	2.0	1.6	1.0	2.8
22-Dec	1.1	1.0	1.0	0.5	0.1	0.1	0.4	0.2	-0.8	-1.7	-1.6	-1.1	-0.9	-0.3	-0.1	-0.3	-0.2	-0.4	-0.2	0.3	-0.5	-0.1	1.7	3.2	0.1	3.2
23-Dec	4.3	3.9	3.1	1.8	0.4	-0.1	-0.6	-0.9	-1.2	-1.2	-1.3	-1.1	-1.0	-1.0	-1.3	-1.9	-2.3	-2.9	-3.2	-3.7	-3.8	-4.1	-5.2	-1.0	4.3	
24-Dec	-5.4	-6.4	-5.8	-7.0	-8.1	-8.3	-8.6	-7.8	-7.6	-6.6	-4.5	-3.8	-2.9	-1.3	-0.8	0.5	0.7	0.5	0.7	0.6	0.3	-1.2	-1.4	-2.2	-3.6	0.7
25-Dec	-2.3	-3.3	-3.7	-3.9	-3.5	-4.5	-4.6	-4.6	-5.1	-4.7	-5.2	-4.5	-2.2	-0.9	-0.2	1.4	1.2	0.9	0.6	-0.3	-1.3	-1.7	-2.9	-3.4	-2.4	1.4
26-Dec	-4.3	-3.4	-3.6	-3.3	-4.6	-5.5	-5.7	-6.1	-6.2	-6.6	-6.6	-6.4	-5.3	-4.3	-3.0	-2.4	-1.9	0.1	1.9	2.3	2.8	3.7	3.9	2.2	-2.6	3.9
27-Dec	2.9	4.2	3.6	3.0	2.1	1.0	1.3	1.7	1.0	0.7	0.6	0.4	1.0	1.4	2.0	2.8	2.4	0.7	0.0	-0.1	-1.3	-2.1	-2.2	-2.4	1.0	4.2
28-Dec	-2.6	-1.8	-4.0	-4.8	-5.1	-6.7	-7.1	-7.7	-7.6	-7.6	-7.1	-6.3	-5.0	-4.4	-3.9	-3.5	-3.5	-3.5	-3.6	-3.6	-3.5	-3.5	-3.6	-3.7	-4.7	-1.8
29-Dec	-3.7	-3.8	-4.0	-5.2	-6.2	-7.1	-9.0	-8.9	-8.5	-6.8	-7.7	-7.0	-6.5	-5.7	-4.9	-4.7	-3.8	-2.8	-2.8	-3.8	-3.5	-3.8	-3.8	-4.8	-5.4	-2.8
30-Dec	-6.3	-5.4	-5.2	-5.4	-5.9	-6.5	-6.1	-5.9	-6.4	-5.7	-3.9	-3.8	-2.9	-1.1	0.9	1.0	1.1	1.2	1.3	2.1	1.8	1.7	1.5	1.1	-2.4	2.1
31-Dec	0.9	0.8	0.5	0.2	0.1	-0.3	-0.3	-0.5	-0.2	0.2	0.7	1.1	1.6	3.3	6.2	7.0	5.4	4.3	5.1	4.8	4.0	2.8	2.9	2.3	2.2	7.0
																								Diurnal Average		
																								Diurnal Maximum		
DF - DAS Failure																										





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

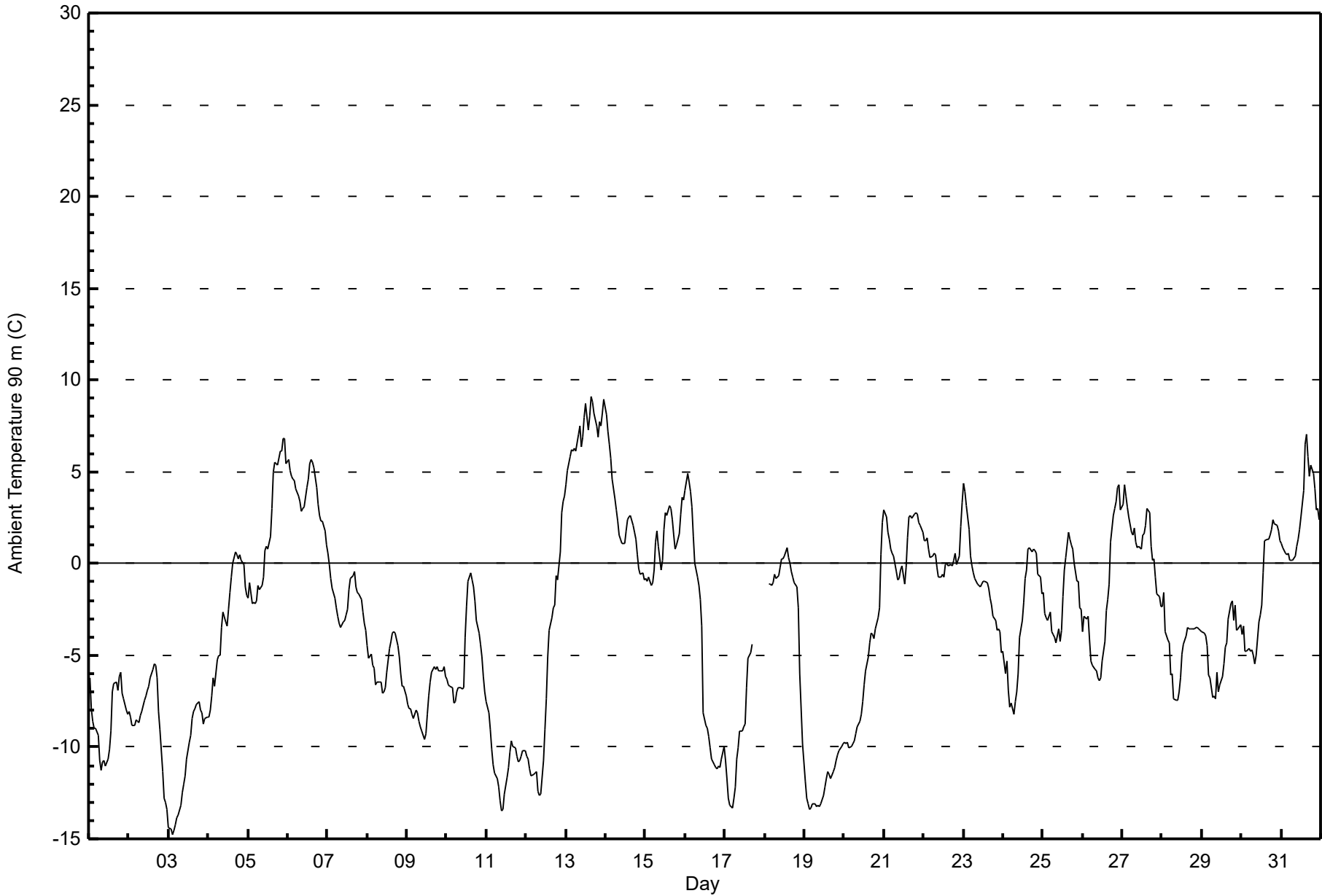
Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	518	70.48	70.48
0 - 10	217	29.52	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 735

Total Number of Hours: 744



Maximum Value: 9.1 C on Dec 13 16:00																				Maximum Daily Average: 7.2 C on Dec 13					Hours in Service: 744	
Minimum Value: -14.7 C on Dec 3 03:00																				Minimum Daily Average: -12.0 C on Dec 19					Hours of Data: 735	
Maximum Diurnal Average: -1.4 C at hour 16																				Minimum Diurnal Average: -4.7 C at hour 9					Hours of Missing Data: 9	
Monthly Average: -3.13 C																				Percentiles: P ₁ = -13.5 P ₁₀ = -10.7 Q ₁ = -7.2 Median = -2.9 Q ₃ = 0.8 P ₉₀ = 3.4 P ₉₉ = 8.0					Hours of Calibration: 0	
																									Percent Operational Time: 98.8	
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Dec	-6.3	-7.9	-8.6	-8.9	-9.0	-9.4	-10.8	-11.3	-10.8	-10.7	-11.1	-10.6	-10.1	-9.1	-7.0	-6.6	-6.5	-6.9	-6.2	-5.9	-7.1	-7.4	-8.0	-8.2	-8.5	-5.9
2-Dec	-8.1	-8.4	-8.8	-8.8	-8.5	-8.6	-8.6	-8.3	-8.1	-7.4	-7.2	-6.9	-6.7	-6.2	-5.8	-5.5	-5.6	-6.3	-8.0	-9.1	-11.3	-12.8	-13.0	-13.4	-8.4	-5.5
3-Dec	-14.4	-14.5	-14.7	-14.6	-14.2	-13.9	-13.7	-13.2	-12.5	-12.0	-11.6	-10.7	-9.8	-9.4	-8.5	-8.1	-7.9	-7.7	-7.5	-8.0	-8.1	-8.7	-8.4	-8.4	-10.8	-7.5
4-Dec	-8.4	-8.0	-7.2	-6.2	-6.7	-5.3	-5.0	-5.0	-3.5	-2.7	-3.2	-3.4	-2.5	-1.6	-0.7	0.0	0.6	0.5	0.3	0.5	0.2	-0.1	-1.3	-1.8	-2.9	0.6
5-Dec	-1.9	-1.1	-2.2	-2.1	-2.2	-2.1	-1.2	-1.4	-1.2	-0.8	0.7	0.9	0.8	1.5	3.0	5.0	5.5	5.4	5.4	6.1	6.2	6.8	6.8	5.4	1.8	6.8
6-Dec	5.6	5.1	4.8	4.6	4.5	4.1	3.7	3.3	2.8	3.0	3.1	4.1	4.6	5.5	5.6	5.6	5.2	4.2	3.2	2.6	2.3	2.3	1.8	1.0	3.9	5.6
7-Dec	0.5	-0.1	-0.8	-1.4	-1.9	-2.4	-2.9	-3.3	-3.5	-3.2	-3.1	-2.8	-2.5	-1.5	-0.8	-0.6	-0.5	-1.2	-1.6	-1.7	-2.0	-2.6	-3.3	-3.7	-1.9	0.5
8-Dec	-4.5	-5.1	-4.9	-5.6	-5.7	-6.6	-6.5	-6.4	-6.5	-7.0	-7.0	-6.8	-5.9	-4.6	-4.2	-3.8	-3.7	-3.8	-4.5	-5.1	-6.0	-6.7	-6.7	-7.2	-5.6	-3.7
9-Dec	-7.7	-7.9	-7.9	-8.2	-8.4	-8.0	-8.1	-8.6	-8.9	-9.1	-9.6	-9.3	-8.2	-7.2	-6.5	-5.9	-5.6	-5.8	-5.6	-5.8	-5.9	-5.8	-5.6	-6.1	-7.3	-5.6
10-Dec	-6.3	-6.6	-6.7	-6.7	-7.6	-7.5	-7.0	-6.8	-6.8	-6.9	-6.7	-4.1	-2.4	-1.0	-0.5	-0.9	-1.3	-2.0	-3.1	-3.8	-4.4	-5.1	-6.2	-7.0	-4.9	-0.5
11-Dec	-7.5	-8.1	-9.0	-10.1	-11.0	-11.4	-11.7	-12.2	-12.9	-13.5	-13.4	-12.5	-11.6	-11.1	-10.3	-9.6	-9.9	-10.1	-10.5	-10.8	-10.7	-10.5	-10.2	-10.2	-10.8	-7.5
12-Dec	-10.5	-10.6	-11.2	-11.6	-11.5	-11.4	-11.4	-12.4	-12.7	-12.6	-10.7	-9.0	-7.3	-5.1	-3.7	-3.0	-2.4	-2.3	-0.7	-0.9	0.6	2.7	3.4	3.7	-6.3	3.7
13-Dec	4.3	5.0	5.8	6.2	6.1	6.3	6.1	7.1	7.5	6.4	6.9	8.0	8.7	7.2	8.1	9.1	8.8	8.2	7.5	6.9	7.7	7.5	8.2	8.9	7.2	9.1
14-Dec	8.1	7.2	6.5	5.7	4.6	3.5	2.9	2.3	1.6	1.3	1.1	1.1	1.8	2.4	2.6	2.6	2.1	1.7	1.3	0.5	-0.3	-0.6	-0.5	-0.9	2.5	8.1
15-Dec	-0.8	-1.0	-0.8	-1.2	-1.1	-0.4	1.2	1.8	1.0	-0.4	0.2	1.9	2.8	2.6	3.1	3.0	2.4	1.6	0.8	1.0	1.7	2.7	3.6	3.4	1.2	3.6
16-Dec	4.0	4.9	4.5	3.9	3.1	1.5	0.0	-0.7	-1.2	-1.9	-3.4	-8.1	-8.8	-9.0	-9.4	-10.0	-10.7	-11.0	-11.1	-11.2	-11.0	-11.1	-10.7	-9.9	-4.9	4.9
17-Dec	-10.7	-11.7	-12.8	-13.1	-13.3	-12.8	-12.2	-10.7	-10.1	-9.2	-9.1	-8.9	-8.8	-6.8	-5.2	-4.9	-4.4	DF	DF	DF	DF	DF	DF	DF	--	-4.4
18-Dec	DF	DF	-1.2	-1.1	-1.2	-1.0	-0.6	-0.8	-0.7	-0.2	0.2	0.3	0.4	0.9	0.3	0.0	-0.4	-0.7	-1.1	-1.3	-2.4	-6.0	-7.9	-9.8	-1.6	0.9
19-Dec	-11.8	-12.8	-13.1	-13.4	-13.3	-13.1	-13.1	-13.3	-13.2	-13.2	-13.1	-12.6	-12.2	-11.7	-11.4	-11.5	-11.7	-11.4	-11.1	-10.7	-10.4	-10.2	-10.0	-9.8	-12.0	-9.8
20-Dec	-9.8	-9.8	-9.8	-10.0	-10.0	-9.8	-9.6	-9.3	-8.9	-8.6	-8.2	-7.6	-6.6	-5.8	-5.1	-4.3	-3.8	-3.9	-4.1	-3.5	-2.9	-2.4	0.5	2.2	-6.3	2.2
21-Dec	2.9	2.5	1.7	1.3	0.8	0.6	0.4	-0.4	-0.9	-0.8	-0.4	-0.1	-1.1	-0.2	1.4	2.5	2.6	2.5	2.7	2.8	2.7	2.2	2.1	1.7	1.2	2.9
22-Dec	1.2	1.3	1.4	0.8	0.3	0.4	0.6	0.5	-0.2	-0.8	-0.7	-0.6	-0.7	-0.1	0.0	-0.1	0.0	-0.1	0.1	0.6	-0.1	0.4	2.0	3.3	0.4	3.3
23-Dec	4.4	3.9	3.1	1.8	0.4	-0.1	-0.5	-0.9	-1.1	-1.2	-1.3	-1.1	-1.0	-1.0	-1.3	-1.9	-2.3	-2.9	-3.1	-3.6	-3.6	-3.7	-4.8	-1.0	4.4	
24-Dec	-4.8	-6.0	-5.3	-6.9	-7.8	-7.6	-8.2	-7.5	-7.0	-6.0	-4.0	-3.1	-2.1	-0.8	-0.4	0.8	0.9	0.7	0.8	0.7	0.5	-0.6	-0.8	-1.6	-3.2	0.9
25-Dec	-1.5	-2.7	-3.0	-3.1	-2.6	-3.7	-3.9	-4.0	-4.4	-3.6	-4.2	-3.6	-1.8	-0.4	0.3	1.7	1.3	1.0	0.8	0.0	-0.9	-0.9	-2.4	-2.5	-1.8	1.7
26-Dec	-3.7	-2.9	-3.0	-2.9	-4.2	-5.3	-5.5	-5.8	-5.8	-6.3	-6.4	-6.2	-5.3	-4.2	-2.5	-2.0	-1.1	1.1	2.6	3.0	3.3	4.1	4.3	2.9	-2.2	4.3
27-Dec	3.2	4.3	3.7	3.1	2.5	1.7	1.6	2.0	1.1	0.9	1.0	0.8	1.6	1.6	2.1	3.0	2.7	1.0	0.2	0.2	-0.7	-1.7	-1.8	-2.3	1.3	4.3
28-Dec	-2.3	-1.6	-3.7	-4.1	-4.4	-6.1	-6.0	-7.3	-7.5	-7.5	-7.0	-6.2	-5.0	-4.4	-3.9	-3.5	-3.5	-3.5	-3.6	-3.5	-3.4	-3.5	-3.6	-3.6	-4.5	-1.6
29-Dec	-3.7	-3.8	-3.9	-4.4	-6.1	-6.2	-7.3	-7.2	-7.4	-5.9	-7.0	-6.6	-6.1	-5.5	-4.6	-4.3	-3.0	-2.2	-2.0	-3.1	-2.2	-3.6	-3.6	-3.4	-4.7	-2.0
30-Dec	-3.9	-3.4	-4.8	-4.8	-4.6	-4.7	-4.7	-5.0	-5.5	-5.0	-3.2	-2.8	-2.3	-0.5	1.2	1.3	1.4	1.5	1.8	2.4	2.2	2.1	1.8	1.2	-1.6	2.4
31-Dec	1.1	0.9	0.6	0.5	0.6	0.1	0.1	0.2	0.4	0.9	1.3	1.9	2.5	4.0	6.5	7.1	5.8	4.8	5.4	4.9	4.0	2.9	3.0	2.4	2.6	7.1
																								Diurnal Average		
																								Diurnal Maximum		
-3.1 -3.3 -3.6 -3.9 -4.3 -4.5 -4.6 -4.7 -4.7 -4.6 -4.4 -4.0 -3.4 -2.6 -1.8 -1.4 -1.4 -1.6 -1.7 -1.8 -2.1 -2.3 -2.3 -2.6 8.1 7.2 6.5 6.2 6.1 6.3 6.1 7.1 7.5 6.4 6.9 8.0 8.7 7.2 8.1 9.1 8.8 8.2 7.5 6.9 7.7 7.5 8.2 8.9																										
DF - DAS Failure																										





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	501	68.16	68.16
0 - 10	234	31.84	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 735

Total Number of Hours: 744



Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

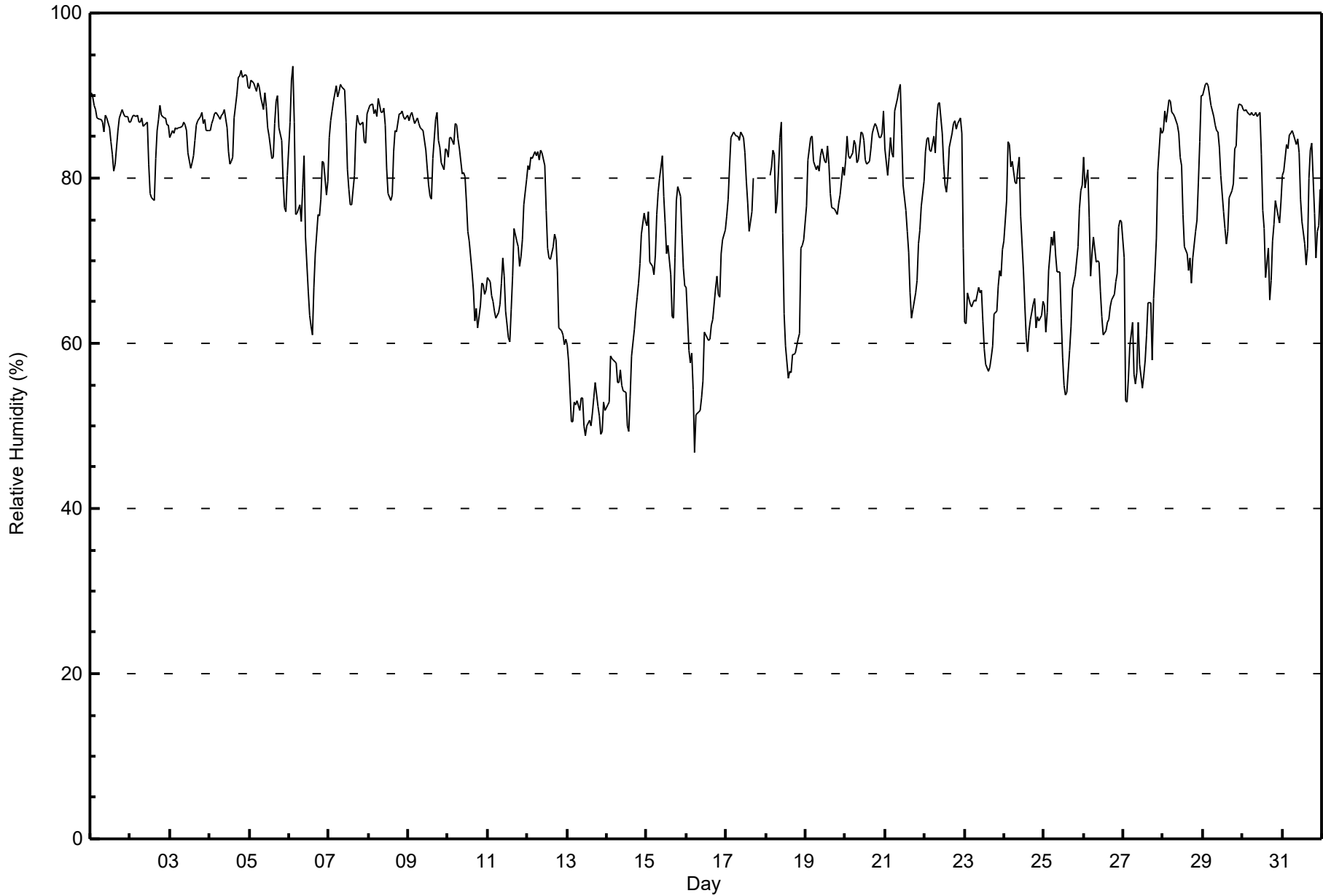
Mannix - December 2023

Maximum Value: 94 % on Dec 6 03:00 Maximum Daily Average: 88.0 % on Dec 4																		Hours in Service: 744 Hours of Data: 735 Hours of Missing Data: 9 Hours of Calibration: 0 Percent Operational Time: 98.8								
Minimum Value: 47 % on Dec 16 06:00 Minimum Daily Average: 52.2 % on Dec 13 Maximum Diurnal Average: 80.0 % at hour 10 Minimum Diurnal Average: 69.4 % at hour 15 Monthly Average: 76.2 % Percentiles: P ₁ = 50 P ₁₀ = 59 Q ₁ = 67 Median = 80 Q ₃ = 86 P ₉₀ = 88 P ₉₉ = 92																										
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Dec	90	90	89	88	87	87	87	87	86	88	87	86	84	83	81	82	86	87	88	88	88	87	88	87	86.7	90
2-Dec	87	87	88	88	88	87	87	87	86	87	87	82	78	78	77	82	86	87	89	88	87	87	86	87	85.5	89
3-Dec	85	86	85	86	86	86	86	86	86	86	86	83	81	82	83	85	86	87	87	88	87	87	86	86	85.5	88
4-Dec	86	87	87	88	88	88	87	88	88	88	86	83	82	82	83	87	90	92	92	93	92	93	92	91	88.0	93
5-Dec	91	92	92	91	90	92	91	90	88	90	89	86	85	82	82	87	89	90	86	85	80	76	76	80	86.7	92
6-Dec	87	92	94	87	76	76	77	75	79	83	73	66	63	62	61	67	71	76	75	78	82	82	78	80	76.5	94
7-Dec	85	87	88	89	91	90	90	91	91	91	87	81	79	77	77	80	86	88	87	86	87	84	84	88	86.0	91
8-Dec	88	89	89	88	88	87	90	88	88	88	87	81	78	77	78	83	86	86	88	88	88	88	87	88	86.1	90
9-Dec	87	88	88	87	87	87	87	86	86	86	83	81	79	78	77	82	87	88	85	84	82	81	84	83	84.3	88
10-Dec	83	85	85	84	87	86	85	84	81	81	80	77	73	72	69	66	63	64	62	64	67	67	66	66	74.9	87
11-Dec	68	67	66	65	64	63	64	65	67	70	68	64	61	60	64	68	74	72	72	69	70	73	77	80	68.0	80
12-Dec	82	81	83	82	83	83	83	82	83	83	81	76	72	70	70	72	73	72	69	62	62	61	60	61	74.4	83
13-Dec	60	58	50	50	53	52	53	52	53	53	50	49	50	51	50	52	53	55	52	51	49	49	53	52	52.2	60
14-Dec	52	53	58	58	58	58	55	55	57	55	54	54	50	49	53	58	62	64	66	67	70	73	76	75	59.6	76
15-Dec	74	76	70	69	68	71	76	78	80	83	78	75	71	72	68	63	63	70	77	79	78	73	69	67	72.8	83
16-Dec	67	59	58	59	54	47	51	52	52	53	55	61	61	60	60	62	63	67	68	66	66	71	73	74	60.8	74
17-Dec	75	77	81	85	86	85	85	85	85	86	85	83	80	77	74	76	80	DF	DF	DF	DF	DF	DF	DF	--	86
18-Dec	DF	DF	80	81	83	83	76	77	85	87	73	64	60	56	57	56	59	59	59	60	61	72	72	73	69.6	87
19-Dec	77	82	84	85	85	82	81	82	81	83	84	82	82	84	82	78	77	76	76	76	77	78	81	80	80.5	85
20-Dec	82	85	83	82	83	85	84	82	82	86	85	85	82	82	82	84	86	86	87	86	85	85	85	88	84.2	88
21-Dec	83	80	83	85	83	82	88	90	91	91	85	79	76	74	71	66	63	64	66	68	72	74	77	80	78.0	91
22-Dec	83	85	85	83	83	85	83	87	89	89	85	82	79	78	80	84	85	87	87	86	87	87	85	71	84.0	89
23-Dec	62	62	66	65	64	65	65	65	67	66	66	63	59	57	57	58	60	64	64	64	67	69	68	71	63.7	71
24-Dec	72	77	84	84	81	82	80	79	81	83	75	69	65	61	59	61	63	65	65	62	63	63	63	65	71.0	84
25-Dec	65	61	64	69	73	72	74	71	69	69	63	58	55	54	54	59	62	67	68	68	72	76	78	79	66.6	79
26-Dec	83	79	81	75	68	71	73	70	70	70	66	63	61	61	63	63	64	65	66	67	69	74	75	75	69.7	83
27-Dec	70	53	53	56	60	63	56	55	56	62	57	55	56	58	61	65	65	58	65	69	73	81	86	85	63.3	86
28-Dec	86	88	87	89	89	88	88	87	86	85	83	81	76	72	71	69	70	67	70	73	75	79	84	90	80.6	90
29-Dec	90	91	92	91	90	89	87	86	86	86	84	80	76	74	72	74	78	78	79	84	84	88	89	89	84.0	92
30-Dec	88	88	88	88	88	88	88	88	88	88	88	83	76	74	68	71	65	68	72	74	77	75	75	77	80.1	88
31-Dec	80	81	84	84	85	85	86	85	84	85	83	77	75	72	69	72	80	83	84	76	70	74	74	79	79.5	86
																								Diurnal Average		
																								Diurnal Maximum		
79.0 78.9 79.5 79.4 79.0 78.8 78.8 78.5 79.1 80.0 77.3 73.9 71.1 70.0 69.4 71.4 73.3 74.3 75.1 75.0 75.5 76.9 77.6 78.2 91 92 94 91 91 92 91 91 91 91 89 86 85 84 83 87 90 92 92 92 93 92 93 92 91																										
DF - DAS Failure																										



Wood Buffalo Environmental Association
Hourly Averages

Relative Humidity (RH) - %
Mannix - December 2023





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

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

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	0	0.00	0.00
40 - 60	82	11.16	11.16
60 - 80	290	39.46	50.61
80 - 100	363	49.39	100.00

Total Number of Valid Hours: 735

Total Number of Hours: 744



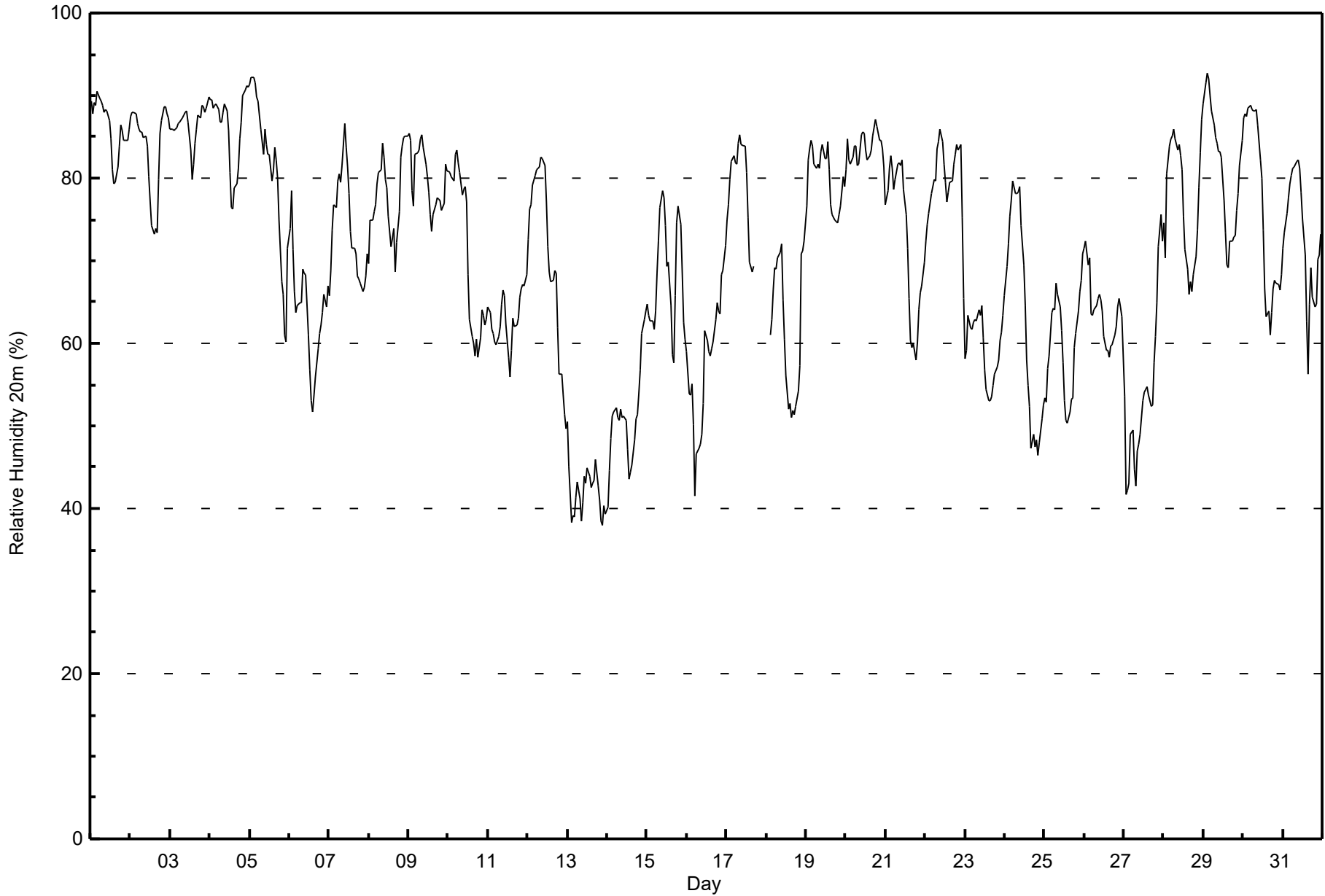
Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity 20m (RH20m) - %

Mannix - December 2023

Maximum Value: 93 % on Dec 29 03:00																		Maximum Daily Average: 86.4 % on Dec 3																		Hours in Service: 744	
Minimum Value: 38 % on Dec 13 22:00																		Minimum Daily Average: 42.0 % on Dec 13																		Hours of Data: 735	
Maximum Diurnal Average: 75.9 % at hour 10																		Minimum Diurnal Average: 65.0 % at hour 16																		Hours of Missing Data: 9	
Monthly Average: 71.1 %																		Percentiles: P ₁ = 40 P ₁₀ = 52 Q ₁ = 62 Median = 73 Q ₃ = 82 P ₉₀ = 87 P ₉₉ = 91																		Hours of Calibration: 0	
																																				Percent Operational Time: 98.8	
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum											
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24													
1-Dec	89	88	89	89	90	90	89	89	88	88	88	87	85	81	79	80	81	84	86	86	85	85	85	86	86.1	90											
2-Dec	87	88	88	88	87	86	86	86	85	85	84	80	77	74	73	74	73	80	85	87	89	89	88	87	83.6	89											
3-Dec	86	86	86	86	86	87	87	87	88	88	88	87	83	80	82	84	86	88	87	89	89	88	88	90	86.4	90											
4-Dec	90	89	88	89	89	88	87	87	88	88	88	86	81	76	76	79	79	81	85	87	90	91	91	91	86.0	91											
5-Dec	91	92	92	91	90	89	88	86	83	86	84	83	83	80	81	84	82	80	75	68	66	61	60	72	81.1	92											
6-Dec	74	78	71	66	64	65	65	65	69	68	68	61	57	53	52	54	56	59	61	62	64	66	64	67	63.7	78											
7-Dec	66	69	74	77	77	80	81	80	81	87	84	81	78	74	72	72	71	68	68	67	66	67	68	71	74.0	87											
8-Dec	70	75	75	76	77	79	81	81	84	83	80	79	75	72	73	74	69	72	76	82	84	85	85	85	77.9	85											
9-Dec	85	85	79	77	83	83	83	85	85	84	82	80	78	76	74	76	77	78	77	77	76	77	82	81	79.9	85											
10-Dec	81	81	80	80	83	83	82	81	78	79	79	77	68	63	61	60	59	60	58	61	64	63	62	63	71.1	83											
11-Dec	64	64	62	61	60	60	61	62	65	66	66	62	58	56	59	63	62	62	63	66	67	67	67	68	63.0	68											
12-Dec	73	76	77	79	80	81	81	81	83	82	82	77	72	69	67	68	69	68	62	56	56	54	51	50	70.6	83											
13-Dec	51	45	38	39	39	41	43	41	39	41	44	43	45	44	43	43	43	46	43	41	39	38	40	39	42.0	51											
14-Dec	40	45	48	51	52	52	51	51	52	51	51	47	44	44	45	48	51	51	54	57	61	63	64	64	51.0	64											
15-Dec	65	63	63	63	62	64	69	72	76	79	78	74	69	70	65	59	58	66	75	77	74	69	63	61	67.9	79											
16-Dec	59	54	54	55	50	42	47	47	48	49	53	62	60	59	58	59	60	63	65	64	64	68	69	72	57.5	72											
17-Dec	75	77	80	82	83	82	82	84	85	84	84	84	81	75	70	69	69	DF	DF	DF	DF	DF	DF	DF	--	85											
18-Dec	DF	DF	61	63	66	69	69	70	71	72	65	60	56	52	53	51	52	51	52	54	57	71	71	72	61.9	72											
19-Dec	77	82	84	85	84	82	81	82	81	83	84	82	82	84	81	77	76	75	75	75	76	77	80	79	80.1	85											
20-Dec	81	85	82	82	83	84	84	81	82	85	86	85	83	82	83	83	85	86	87	86	85	85	84	81	83.7	87											
21-Dec	77	79	81	83	81	79	80	82	82	82	82	79	76	72	65	60	60	60	58	60	64	66	67	70	72.6	83											
22-Dec	72	74	76	77	78	80	80	83	84	86	84	82	80	77	78	80	80	82	83	84	83	84	75	65	79.5	86											
23-Dec	58	59	63	62	62	62	63	63	64	63	65	61	57	54	53	53	54	55	56	57	58	60	61	63	59.5	65											
24-Dec	66	69	72	75	77	80	78	78	79	74	70	65	58	55	52	47	49	47	48	46	48	51	53	63.2	80												
25-Dec	53	53	57	59	64	64	64	67	66	64	62	58	53	51	50	52	53	53	59	61	64	66	68	71	59.7	71											
26-Dec	71	72	70	70	64	63	64	65	65	66	65	64	61	59	59	58	60	60	61	62	64	65	64	63	64.1	72											
27-Dec	54	42	42	43	49	49	45	43	47	48	49	53	54	54	55	54	52	53	58	61	65	72	76	72	53.7	76											
28-Dec	75	70	80	84	85	85	86	85	83	84	83	81	75	71	69	66	67	66	68	71	74	79	83	87	77.4	87											
29-Dec	89	92	93	92	90	88	86	85	84	83	83	83	77	73	69	69	72	72	73	73	76	78	82	85	81.2	93											
30-Dec	87	88	87	89	89	88	88	88	88	86	82	80	74	67	63	64	61	64	67	68	67	67	66	68	76.5	89											
31-Dec	71	73	76	78	79	80	81	81	82	82	81	78	75	71	63	56	65	69	66	64	65	70	71	73	73.0	82											
																		72.6 73.1 73.2 73.8 74.2 74.4 74.5 74.8 75.3 75.9 75.0 73.2 69.9 66.8 65.3 65.0 65.4 66.7 67.6 68.2 69.1 70.5 70.8 71.6																		Diurnal Average	
																		91 92 93 92 90 90 89 89 88 89 88 87 85 84 83 84 86 88 87 89 90 91 91 91																		Diurnal Maximum	
DF - DAS Failure																																					





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Relative Humidity 20m (RH20m) - %
Mannix - December 2023

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	7	0.95	0.95
40 - 60	142	19.32	20.27
60 - 80	336	45.71	65.99
80 - 100	250	34.01	100.00

Total Number of Valid Hours: 735

Total Number of Hours: 744



Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity 45m (RH45m) - %

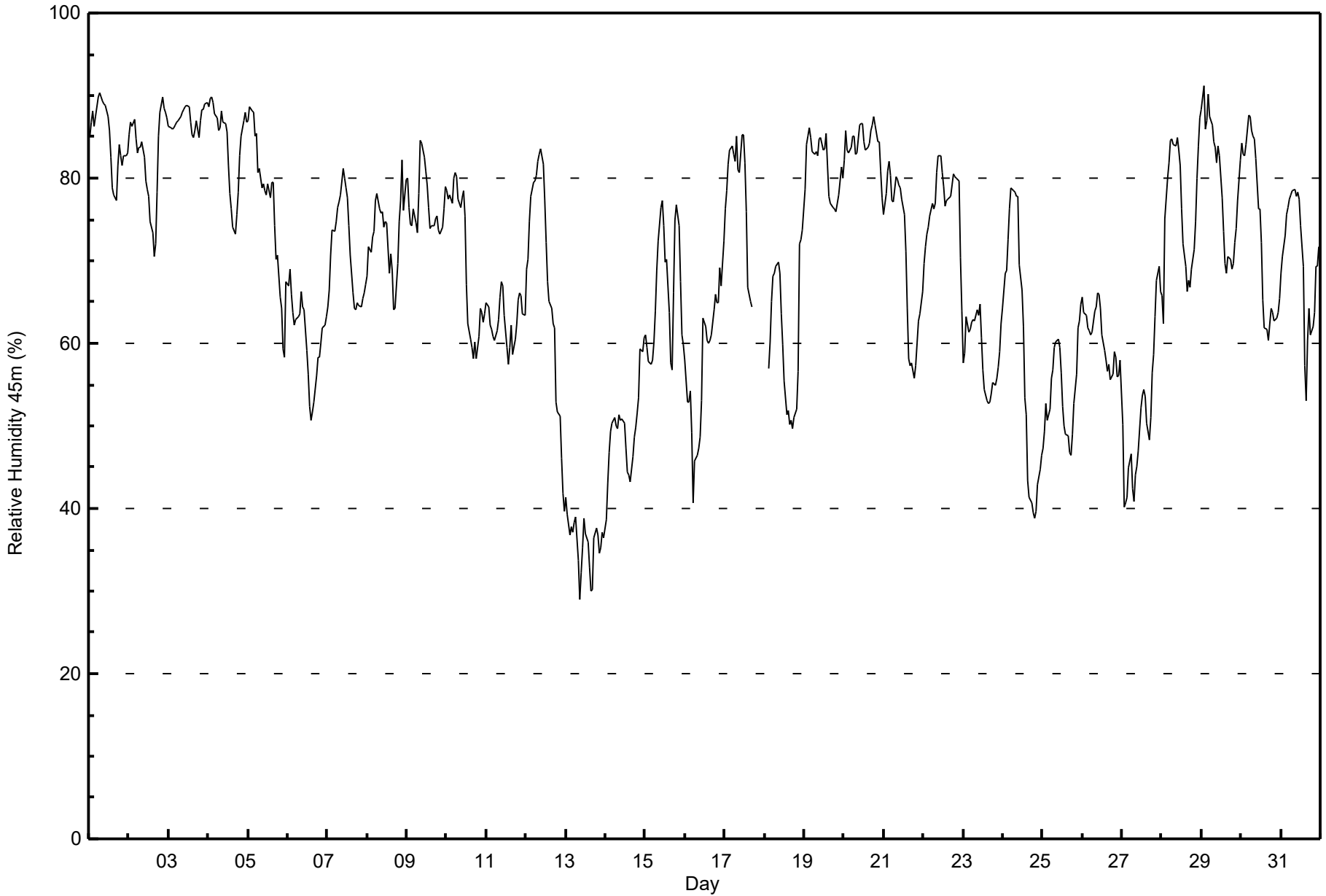
Mannix - December 2023

Maximum Value: 91 % on Dec 29 02:00														Maximum Daily Average: 87.1 % on Dec 3														Hours in Service: 744	
Minimum Value: 29 % on Dec 13 09:00														Minimum Daily Average: 35.8 % on Dec 13														Hours of Data: 735	
Maximum Diurnal Average: 73.9 % at hour 10														Minimum Diurnal Average: 62.3 % at hour 17														Hours of Missing Data: 9	
Monthly Average: 69.1 %														Percentiles: P ₁ = 35 P ₁₀ = 50 Q ₁ = 60 Median = 70 Q ₃ = 81 P ₉₀ = 86 P ₉₉ = 89														Hours of Calibration: 0	
																												Percent Operational Time: 98.8	
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24					
1-Dec	85	87	88	86	87	90	90	90	89	89	89	87	86	83	79	78	77	82	84	83	81	83	83	83	85.0	90			
2-Dec	85	87	86	87	85	83	84	84	84	83	80	79	78	75	73	70	72	78	85	88	90	88	88	87	82.5	90			
3-Dec	86	86	86	86	86	87	87	87	88	88	89	89	89	87	85	85	86	87	85	87	88	88	89	89	87.1	89			
4-Dec	89	90	90	89	88	87	86	86	88	88	87	86	82	78	76	74	73	76	78	83	85	87	88	87	84.1	90			
5-Dec	87	89	88	88	85	85	81	81	79	79	78	78	79	78	79	80	74	70	71	66	64	59	58	67	76.8	89			
6-Dec	67	69	66	64	62	63	63	64	66	64	64	59	56	52	51	52	53	56	58	58	60	62	62	63	60.6	69			
7-Dec	64	66	71	74	74	75	76	77	78	81	80	79	78	74	71	66	64	64	65	65	64	65	66	67	71.0	81			
8-Dec	68	72	71	73	74	77	78	76	76	76	74	75	75	68	71	69	64	64	70	75	77	82	76	80	73.4	82			
9-Dec	80	76	74	74	76	75	73	78	85	84	83	81	79	76	74	74	74	75	75	74	73	74	76	79	76.8	85			
10-Dec	79	77	78	77	80	81	80	77	76	78	78	75	67	62	61	60	58	60	58	61	64	64	63	64	69.9	81			
11-Dec	65	64	62	62	61	60	61	63	66	67	67	63	59	57	59	62	59	61	62	65	66	66	64	63	62.8	67			
12-Dec	69	70	75	78	79	80	80	82	83	84	82	77	72	67	65	64	62	62	53	52	51	46	42	40	67.3	84			
13-Dec	41	39	37	38	37	38	39	34	29	32	35	39	37	36	33	30	30	36	38	37	35	35	37	37	35.8	41			
14-Dec	39	43	47	49	50	51	50	50	51	51	50	47	44	44	43	46	49	50	52	53	59	59	61	61	49.6	61			
15-Dec	61	59	58	57	58	60	64	69	72	76	77	74	70	70	64	58	57	66	75	77	74	67	61	60	66.1	77			
16-Dec	58	53	53	54	49	41	46	46	47	49	53	63	62	60	60	60	61	64	66	65	65	69	67	72	57.7	72			
17-Dec	76	78	82	83	84	83	82	85	81	81	85	85	82	76	67	65	64	DF	DF	DF	DF	DF	DF	DF	--	85			
18-Dec	DF	DF	57	60	65	68	69	69	70	68	64	60	55	51	52	50	51	50	51	52	57	72	73	74	60.8	74			
19-Dec	79	84	85	86	85	83	83	83	83	85	85	83	84	85	82	78	77	76	76	76	77	78	81	80	81.4	86			
20-Dec	82	86	83	83	84	85	85	83	83	86	87	87	84	83	84	84	86	86	88	86	84	84	81	78	84.3	88			
21-Dec	76	78	81	82	80	77	77	80	80	79	79	78	76	71	64	58	57	58	56	57	60	63	64	66	70.7	82			
22-Dec	70	72	73	74	75	77	76	77	81	83	83	81	79	77	77	77	78	79	80	80	80	80	70	64	76.8	83			
23-Dec	58	59	63	61	62	63	63	63	64	63	65	61	57	54	53	53	53	54	55	55	56	57	59	62	58.8	65			
24-Dec	64	68	69	73	76	79	78	78	78	69	66	62	53	51	43	41	41	39	39	40	43	45	46	46	59.2	79			
25-Dec	47	49	53	51	52	56	57	60	60	61	60	56	52	50	49	49	47	46	49	53	56	62	63	65	54.2	65			
26-Dec	66	64	63	62	62	61	61	64	64	66	66	64	61	59	58	57	57	56	56	59	58	56	56	58	60.6	66			
27-Dec	50	40	41	41	45	47	42	41	44	45	47	52	54	54	54	50	48	51	56	59	63	68	69	66	51.2	69			
28-Dec	66	62	75	80	82	85	85	84	84	85	83	81	76	72	69	66	68	67	69	71	75	80	84	87	76.5	87			
29-Dec	88	91	86	87	90	88	86	84	84	82	84	83	78	74	70	68	71	70	69	70	72	74	77	82	79.5	91			
30-Dec	84	83	83	84	88	87	86	85	85	82	76	76	72	65	62	62	60	62	64	64	63	63	64	65	73.6	88			
31-Dec	68	70	73	76	76	78	78	78	79	78	78	77	74	69	57	53	60	64	61	62	64	69	69	72	70.2	79			
														69.9 70.4 70.9 71.6 72.2 72.5 72.5 72.9 73.4 73.9 73.4 72.4 69.7 66.6 64.3 62.6 62.3 63.7 64.8 65.6 66.6 68.1 67.8 68.8														Diurnal Average	
														89 91 90 89 90 90 90 90 89 89 89 89 89 87 85 85 86 87 88 88 90 88 89 89														Diurnal Maximum	
DF - DAS Failure																													



Wood Buffalo Environmental Association
Hourly Averages

Relative Humidity 45m (RH45m) - %
Mannix - December 2023





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Relative Humidity 45m (RH45m) - %
Mannix - December 2023

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	28	3.81	3.81
40 - 60	154	20.95	24.76
60 - 80	357	48.57	73.33
80 - 100	196	26.67	100.00

Total Number of Valid Hours: 735

Total Number of Hours: 744



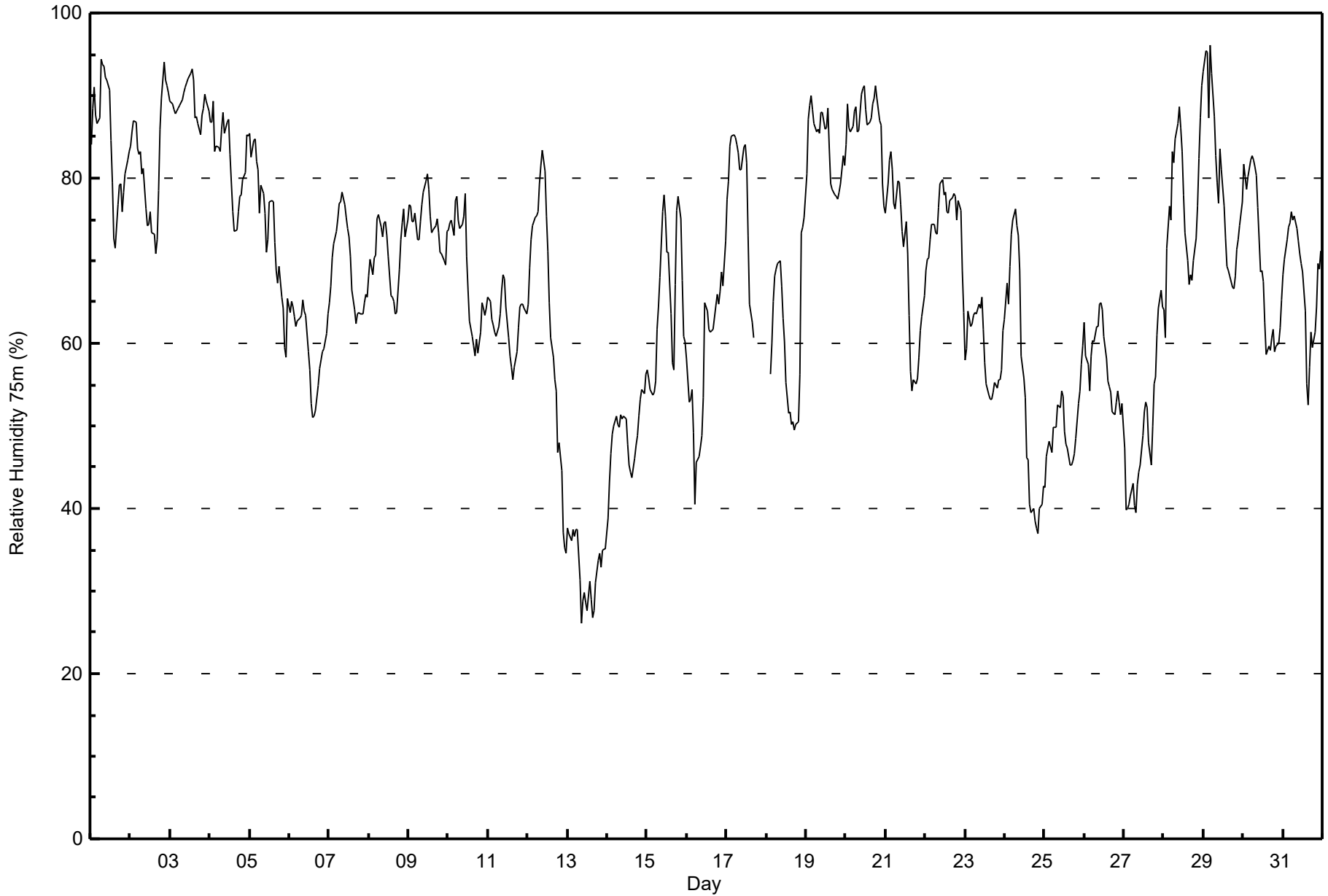
Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity 75m (RH75m) - %

Mannix - December 2023

Maximum Value: 96 % on Dec 29 05:00																		Maximum Daily Average: 89.3 % on Dec 3																		Hours in Service: 744																																																																																									
Minimum Value: 26 % on Dec 13 09:00																		Minimum Daily Average: 32.7 % on Dec 13																		Hours of Data: 735																																																																																									
Maximum Diurnal Average: 72.1 % at hour 10																		Minimum Diurnal Average: 61.1 % at hour 17																		Hours of Missing Data: 9																																																																																									
Monthly Average: 67.8 %																		Percentiles: P ₁ = 30 P ₁₀ = 48 Q ₁ = 58 Median = 69 Q ₃ = 78 P ₉₀ = 87 P ₉₉ = 93																		Hours of Calibration: 0																																																																																									
																																				Percent Operational Time: 98.8																																																																																									
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																																																																																																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																																																																																																					
1-Dec	84	89	91	88	87	87	94	94	94	92	92	91	85	79	73	72	77	79	79	76	78	80	82	83	84.4	94																																																																																																			
2-Dec	84	86	87	87	83	83	83	80	81	76	74	74	76	73	73	71	73	79	86	90	94	92	91	90	82.0	94																																																																																																			
3-Dec	89	89	88	88	88	89	89	89	90	91	91	92	93	93	92	87	88	87	85	88	88	90	89	88	89.3	93																																																																																																			
4-Dec	87	87	89	83	84	84	83	86	88	85	87	87	83	79	76	74	74	76	78	78	80	81	85	85	82.4	89																																																																																																			
5-Dec	85	83	85	85	82	81	76	79	78	76	71	73	77	77	77	72	69	67	69	66	64	59	58	65	74.0	85																																																																																																			
6-Dec	64	65	64	63	62	63	63	63	65	64	63	59	57	53	51	51	52	55	57	58	59	59	61	64	59.8	65																																																																																																			
7-Dec	65	67	70	72	73	75	77	77	78	77	75	74	73	70	66	64	62	64	64	64	64	65	66	66	69.5	78																																																																																																			
8-Dec	68	70	68	70	71	75	76	74	73	75	75	73	71	66	66	65	64	64	69	73	75	76	73	75	70.9	76																																																																																																			
9-Dec	77	77	75	75	76	73	73	75	77	78	80	81	79	75	73	74	74	75	73	71	71	70	69	74	74.7	81																																																																																																			
10-Dec	74	75	75	73	77	78	75	74	74	75	78	71	66	63	61	60	58	60	59	61	65	64	63	64	68.5	78																																																																																																			
11-Dec	66	65	63	62	61	61	62	64	66	68	68	64	61	58	57	56	57	59	62	64	65	65	64	64	62.6	68																																																																																																			
12-Dec	65	69	73	74	75	75	76	79	82	83	81	75	71	65	61	58	56	54	47	48	45	37	35	35	63.3	83																																																																																																			
13-Dec	38	37	36	37	37	37	37	31	26	29	30	29	28	31	29	27	28	31	34	35	33	35	35	35	32.7	38																																																																																																			
14-Dec	39	43	47	49	50	51	50	51	51	51	51	51	48	45	44	44	46	48	49	51	53	54	54	56	49.0	56																																																																																																			
15-Dec	57	56	54	54	54	55	62	64	68	76	78	75	71	71	64	58	57	67	76	78	75	68	61	60	64.9	78																																																																																																			
16-Dec	58	53	53	54	49	41	46	46	48	49	53	65	64	62	61	62	62	65	66	65	66	69	67	72	58.1	72																																																																																																			
17-Dec	77	80	84	85	85	85	84	83	81	81	84	84	82	73	65	63	61	DF	DF	DF	DF	DF	DF	DF	--	85																																																																																																			
18-Dec	DF	DF	56	60	65	68	69	70	70	67	63	60	55	51	52	50	50	49	50	50	56	73	74	75	60.7	75																																																																																																			
19-Dec	81	87	89	90	88	87	86	86	85	88	88	86	86	88	84	79	79	78	78	77	78	79	83	82	83.8	90																																																																																																			
20-Dec	84	89	86	86	86	88	89	86	86	90	91	91	88	86	87	87	89	90	91	90	87	86	79	77	87.0	91																																																																																																			
21-Dec	76	79	82	83	81	77	76	80	79	77	74	72	75	71	63	57	54	56	55	56	58	62	63	66	69.6	83																																																																																																			
22-Dec	69	70	70	73	74	74	73	73	76	79	80	78	78	76	76	77	78	78	78	75	77	76	69	64	74.7	80																																																																																																			
23-Dec	58	59	64	62	62	63	64	64	65	64	66	62	58	55	54	53	54	55	55	55	56	56	57	61	59.1	66																																																																																																			
24-Dec	63	67	65	69	73	75	76	74	73	69	58	56	53	46	46	40	39	40	38	38	37	40	40	43	55.0	76																																																																																																			
25-Dec	43	46	47	48	47	50	50	50	53	52	54	54	49	48	47	45	45	46	47	48	53	54	57	60	49.7	60																																																																																																			
26-Dec	63	58	57	54	58	60	60	62	62	65	65	64	61	58	55	55	54	52	51	53	54	53	51	53	57.5	65																																																																																																			
27-Dec	47	40	40	41	42	43	40	39	43	44	45	49	52	53	52	48	45	50	55	56	61	64	66	64	49.2	66																																																																																																			
28-Dec	64	61	72	77	75	83	82	85	87	89	86	83	78	73	70	67	68	68	70	73	77	82	87	91	77.0	91																																																																																																			
29-Dec	93	95	95	87	96	93	87	83	80	77	84	81	77	73	69	69	68	67	67	68	71	72	74	77	79.3	96																																																																																																			
30-Dec	82	80	79	80	82	83	82	81	80	76	69	69	67	62	59	60	59	61	62	59	60	60	62	65	69.9	83																																																																																																			
31-Dec	68	70	72	74	75	76	75	75	74	72	71	70	69	64	55	53	57	61	59	61	64	70	69	71	67.8	76																																																																																																			
																		68.8				69.7				70.2				70.4				71.0				71.4				71.5				71.5				72.0				72.1				71.8				70.7				68.7				65.8				63.2				61.2				61.1				62.6				63.6				64.1				65.5				66.4				66.3				67.5				Diurnal Average				Diurnal Maximum							
																		93				95				95				90				96				93				94				94				94				94				92				92				92				93				93				92				87				89				90				91				90				94				92				91				91											
DF - DAS Failure																																																																																																																													





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Relative Humidity 75m (RH75m) - %
Mannix - December 2023

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	36	4.90	4.90
40 - 60	173	23.54	28.44
60 - 80	364	49.52	77.96
80 - 100	162	22.04	100.00

Total Number of Valid Hours: 735

Total Number of Hours: 744



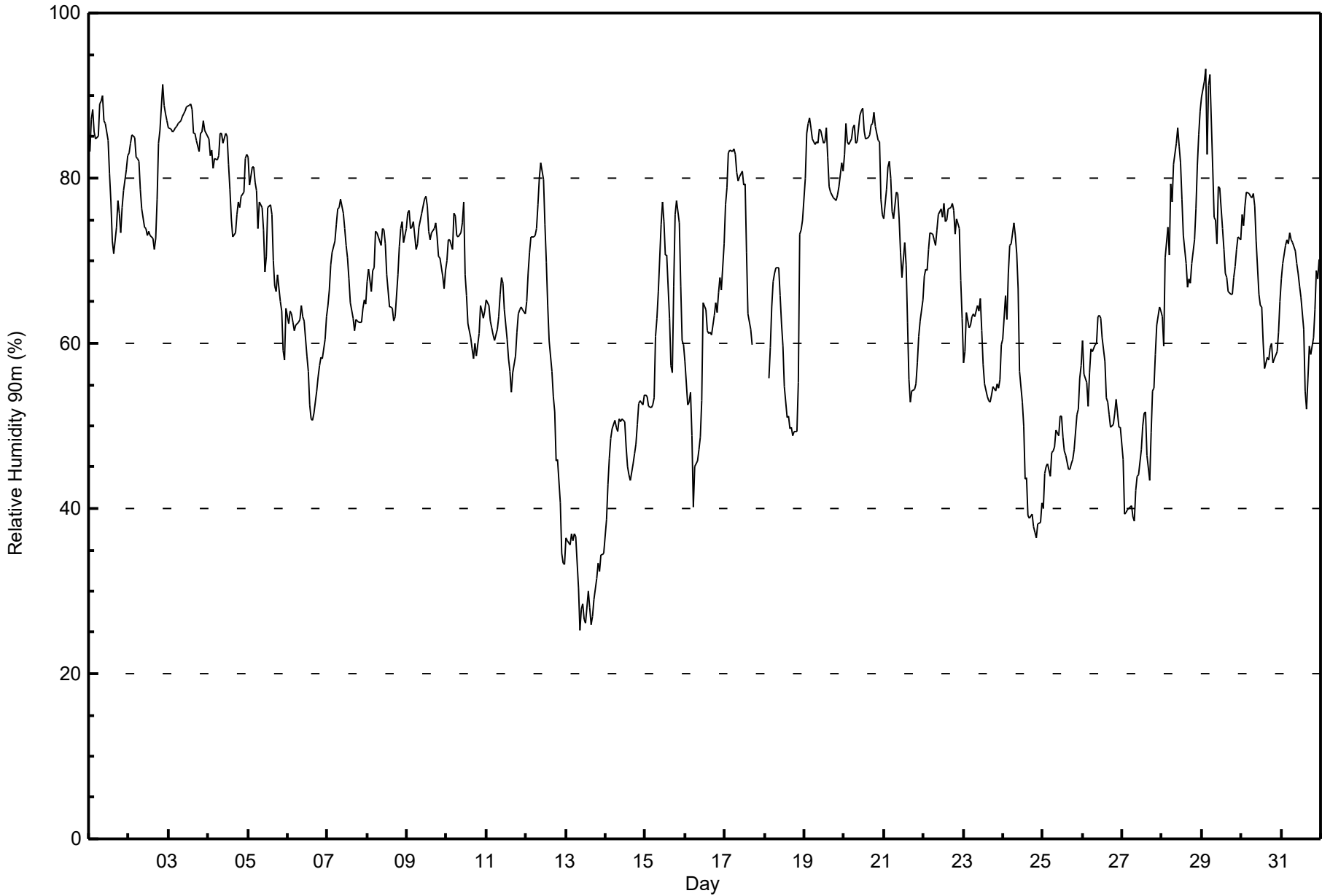
Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity 90m (RH90m) - %

Mannix - December 2023

Maximum Value: 93 % on Dec 29 03:00																		Maximum Daily Average: 86.5 % on Dec 3						Hours in Service: 744																									
Minimum Value: 25 % on Dec 13 09:00																		Minimum Daily Average: 31.7 % on Dec 13						Hours of Data: 735																									
Maximum Diurnal Average: 70.2 % at hour 10																		Minimum Diurnal Average: 60.1 % at hour 17						Hours of Missing Data: 9																									
Monthly Average: 66.4 %																		Percentiles: P ₁ = 29 P ₁₀ = 46 Q ₁ = 57 Median = 68 Q ₃ = 77 P ₉₀ = 85 P ₉₉ = 89						Hours of Calibration: 0																									
																								Percent Operational Time: 98.8																									
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Dec	83	87	88	86	85	85	89	89	90	87	87	85	80	77	72	71	74	77	76	73	76	79	81	83	81.7	90																							
2-Dec	83	84	85	85	83	82	82	79	76	74	74	73	73	73	73	71	73	77	84	86	91	89	88	87	80.3	91																							
3-Dec	86	86	86	86	86	86	87	87	88	88	88	89	89	88	85	85	85	83	85	86	87	86	85	85	86.5	89																							
4-Dec	85	83	83	81	82	82	83	85	85	84	85	85	82	79	75	73	73	76	77	76	78	78	82	83	80.7	85																							
5-Dec	83	79	81	81	80	79	74	77	76	74	69	71	76	77	76	70	67	66	68	65	64	59	58	64	72.2	83																							
6-Dec	62	64	63	63	61	62	63	63	65	63	63	58	57	53	51	51	51	54	56	57	58	58	61	63	59.2	65																							
7-Dec	65	66	69	71	72	74	76	76	78	76	74	72	70	68	65	63	61	63	63	63	63	64	65	65	68.4	78																							
8-Dec	67	69	66	69	69	74	73	72	72	74	74	72	68	64	64	64	63	63	68	72	74	75	72	74	69.7	75																							
9-Dec	76	76	74	74	75	71	72	74	75	76	77	78	77	74	73	73	74	75	73	70	70	68	67	69	73.3	78																							
10-Dec	70	72	72	71	76	75	73	73	73	75	77	68	66	62	61	59	58	60	58	61	65	64	63	64	67.4	77																							
11-Dec	65	65	63	62	61	60	62	63	66	68	67	64	60	58	57	54	56	58	61	64	64	64	64	64	62.1	68																							
12-Dec	65	68	71	73	73	73	74	77	80	82	80	74	70	65	60	57	54	52	46	46	41	34	33	33	61.7	82																							
13-Dec	37	36	36	37	36	37	37	30	25	28	29	27	26	30	28	26	27	29	32	33	32	34	34	35	31.7	37																							
14-Dec	39	43	46	48	50	51	50	49	51	50	51	51	48	45	44	43	45	47	48	50	53	53	53	54	48.4	54																							
15-Dec	54	53	52	52	52	53	61	63	66	74	77	75	71	71	63	57	56	67	76	77	75	67	60	60	63.9	77																							
16-Dec	58	53	53	54	49	40	45	46	47	49	53	65	64	62	61	61	61	63	65	64	66	68	66	72	57.7	72																							
17-Dec	77	79	83	83	83	84	83	81	80	80	81	79	79	71	64	62	60	DF	DF	DF	DF	DF	DF	DF	--	84																							
18-Dec	DF	DF	56	59	64	67	68	69	69	66	62	60	55	51	51	50	50	49	49	49	55	73	74	75	60.1	75																							
19-Dec	80	86	87	87	86	85	84	84	84	86	86	84	84	86	83	79	78	78	78	77	78	79	82	81	82.6	87																							
20-Dec	83	87	84	84	85	86	87	84	84	88	88	88	86	85	85	85	86	87	88	86	84	84	77	76	84.9	88																							
21-Dec	75	79	81	82	80	76	75	78	78	75	71	68	72	70	63	56	53	54	54	55	58	61	63	65	68.4	82																							
22-Dec	68	69	69	71	73	73	73	72	74	76	76	75	77	75	75	76	76	77	76	73	75	74	68	63	73.1	77																							
23-Dec	58	59	64	62	62	63	63	63	64	64	65	62	57	55	54	53	53	54	55	54	55	55	56	60	58.7	65																							
24-Dec	60	66	63	68	72	72	75	73	71	67	57	53	50	44	44	39	39	39	38	37	36	38	38	41	53.3	75																							
25-Dec	40	44	45	45	44	47	47	47	50	49	51	51	49	47	46	45	45	45	46	47	51	52	56	57	47.8	57																							
26-Dec	60	56	55	52	56	59	59	60	60	63	63	63	61	58	53	53	51	50	50	52	53	52	50	50	55.9	63																							
27-Dec	46	39	39	40	40	40	39	38	42	44	44	47	50	52	52	46	43	49	54	55	59	62	64	64	47.9	64																							
28-Dec	63	60	70	74	71	79	77	82	84	86	84	82	78	73	70	67	68	67	70	73	76	82	85	88	75.3	88																							
29-Dec	90	92	93	83	91	92	81	75	75	72	79	79	74	71	68	68	66	66	66	68	69	71	73	73	76.5	93																							
30-Dec	76	74	77	78	78	78	78	78	77	72	66	65	64	60	57	58	58	59	60	58	58	59	61	65	67.3	78																							
31-Dec	68	70	72	73	72	73	73	72	71	70	68	67	66	62	54	52	56	60	59	61	64	69	68	70	66.1	73																							
																								67.4	68.1	68.6	68.9	69.3	69.7	69.7	69.8	70.2	70.2	69.9	68.7	67.1	64.6	62.2	60.3	60.1	61.5	62.5	62.9	64.3	65.1	64.9	66.0	Diurnal Average	
																								90	92	93	87	91	92	89	89	90	88	88	89	89	89	88	85	86	87	88	86	91	89	88	88	Diurnal Maximum	
DF - DAS Failure																																																	





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Relative Humidity 90m (RH90m) - %
Mannix - December 2023

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	43	5.85	5.85
40 - 60	179	24.35	30.20
60 - 80	379	51.56	81.77
80 - 100	134	18.23	100.00

Total Number of Valid Hours: 735

Total Number of Hours: 744



Maximum Speed: 45 km/h on Dec 10 19:00	Maximum Daily Speed Average: 21.8 km/h on Dec 23	Hours in Service: 744
Minimum Speed Value: 1 km/h on Dec 3 05:00	Minimum Daily Speed Average: 0.2 km/h on Dec 3	Hours of Data: 735
Maximum Diurnal Speed Average: 8.7 km/h at hour 10	Minimum Diurnal Speed Average: 6.0 km/h at hour 24	Hours of Missing Data: 9
Monthly Average Velocity: 7.4 km/h 184.5 deg	Percentiles: $P_1 = 2$ $P_{10} = 6$ $Q_1 = 9$ Median = 12 $Q_3 = 15$ $P_{90} = 20$ $P_{99} = 30$	Percent Operational Time: 98.8

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Dec	W10	WSW9	SW3	S7	SSE10	SSE10	SSE8	SSE8	SSE8	SSE13	SSE13	SSE13	SSE11	SSE12	SSE14	SSE14	SSE11	SSE9	SSE8	S12	SSE14	SSE12	SSE14	SSE15	SSE9.6	SSE15	
2-Dec	S11	SSE13	SSE13	SSE14	SSE12	SSE14	SSE10	S11	SSE11	SSE12	SSE10	SSE11	SSE10	SSE8	SSE8	SSE8	SW6	WNW2	N9	WNW8	NW7	NNW6	NNW5	NNW6	S5.9	SSE14	
3-Dec	N6	NNW5	N5	NNE4	NW1	NNW1	WSW5	E2	SSE3	S2	SSE3	S4	SE4	SSE3	S4	NNE4	N3	NNW3	N4	W1	WNW3	ESE3	SW5	SSW5	NNW0.2	N6	
4-Dec	SSW7	S10	SSE11	SSE13	SSE13	SSE13	SSE14	SSE12	SSE14	SSE10	SSE8	S5	SSW5	S6	S9	S8	S8	SSE12	SSE11	SSE14	SSE13	SSE12	SSE12	SSE12	SSE10.2	SSE14	
5-Dec	SSE13	SSE12	S9	SSE14	S11	SSE8	SSE12	SSE15	S13	SSE10	SSE14	SSE13	SSE13	SSE11	SE9	SSE11	SSE13	SSE11	SE7	SW14	SSW10	SSW10	SW16	SSE10	SSE10.7	SW16	
6-Dec	S9	SSW11	SW13	SW14	WSW14	WSW14	SW13	WSW12	SSE6	S8	SSE6	WSW9	WSW16	WSW18	WSW19	SW15	SSW11	SSW13	SW7	S9	SSW11	SSW6	SW2	S7	SW10.1	WSW19	
7-Dec	WSW10	SW13	SW8	S6	S8	S8	SSE6	SSW6	SSE7	SSE11	SSE8	SSE11	SSE12	SSE8	SSE8	S8	SSW7	SW10	WSW9	WSW8	WSW9	WSW10	WSW9	WSW2	SSW6.7	SW13	
8-Dec	WSW9	WSW5	WSW8	SW4	SW6	S6	SE4	SSE9	SSE7	SSE7	S6	S7	SSE6	SSE6	SSE8	SSE9	S7	SSE9	S9	SSE12	SSE12	SSE15	SSE13	SSE12	S7.2	SSE15	
9-Dec	SSE13	S12	SW13	SSW10	SSE10	SSE9	SSE12	SSE12	SSE12	SSE15	SSE16	SSE15	SSE12	SSE14	SSE11	SSE13	SSE11	SSE14	SSE11	SSE11	SSE11	SSE11	SSE12	SSE11	SSE11.7	SSE16	
10-Dec	SSE13	SSE12	SSE15	SSE15	SSE13	SSE14	SSE13	SSE13	SSE13	SSE16	SSE13	SSE10	WSW10	WSW18	WSW17	WSW20	W32	W35	W45	WNW30	WNW23	WNW26	WNW31	NW27	WSW10.7	W45	
11-Dec	NW22	NW23	WNW26	WNW29	WNW26	WNW24	W27	W22	W19	WSW13	WSW14	WSW14	SW9	SSW5	SSE9	SSE11	SSE13	SSE12	SSE12	SSE12	SSE12	SSE12	SSE13	SSE11	WSW8.6	WNW29	
12-Dec	SSE8	SSE10	SSE10	SSE12	SSE11	SSE13	SSE12	SSE13	SSE13	SSE14	SSE16	SSE14	SSE14	SSE14	SSE14	SSE15	SSE16	SSE16	SSE16	SSE21	SSE18	SSE18	SSE16	SSE16	SSE14.1	SSE21	
13-Dec	SSE15	S11	SSW12	SW16	SW17	SSW13	SSE9	SSE14	S10	S11	SSE10	SSE15	SSE12	SSE14	SSE10	SSE11	SSE11	SSE17	SSE13	S14	S13	S10	SSW14	SW11	S11.6	SSE17	
14-Dec	WSW11	W13	W14	WSW16	WSW16	WSW17	W23	W19	WSW22	W28	W28	W20	WSW9	SW6	SSW9	SSW12	SW11	WSW10	WSW10	SSW8	SSE11	SSE12	SSE13	SSE13	WSW11.9	W28	
15-Dec	SSE12	SSE13	SSE18	SSE20	SSE19	SSE14	W24	SSE14	SSE17	SSE27	SSE17	SSE16	S18	SSW16	S14	S19	S18	S16	SSW21	S21	S20	S18	S15	SSW14	SSW9	S15.8	SSW21
16-Dec	SW12	WSW22	W25	W24	W30	WNW23	WNW23	W26	W27	WNW22	NW15	NNE13	NNE14	N9	NNE7	NNE8	N10	NNW5	N7	NNE6	NNW2	W6	SSW4	S3	WNW9.9	W30	
17-Dec	N12	NNW13	N9	NW5	S1	SSE8	SSE8	SE6	SSE8	SSE11	SSE13	SSE14	SSE12	SSE12	SSE11	SE11	SSE12	DF	DF	DF	DF	DF	DF	DF	---	SSE14	
18-Dec	DF	DF	SSW8	SW8	SSW5	WSW7	W15	SW8	SW8	WSW12	WSW16	W20	WSW18	W22	W19	W13	W12	W11	WNW16	W20	NW14	NNE17	NNE18	NNE18	W9.5	W22	
19-Dec	NNE16	N15	N16	NNW10	N9	N11	NNE10	NE9	ENE8	ESE4	ESE5	E7	ESE5	E6	ESE11	ESE13	ESE12	SE14	SE19	SE20	SE20	SE22	SE22	SE22	E7.8	SE22	
20-Dec	SE25	SE23	SE24	SE26	SE27	SE24	SE23	SE22	SE17	SE16	SE18	SE13	SE12	SSE11	SE12	SSE13	SSE14	SSE17	SSE16	SSE17	SSE20	SSE18	S14	SSW9	SE17.5	SE27	
21-Dec	WSW22	W25	WSW22	WSW16	W20	WSW13	SW13	SW13	SW13	SSE10	SSE14	SE11	SE15	SSE17	SSE15	SSE16	SSE17	SSE18	S11	SSE9	SSE9	SSE11	SSE14	SSE15	SSW10.3	WSW25	
22-Dec	SSE13	SSE12	SSE13	SSE16	SSE13	SSE12	SSE12	SSE12	S9	S9	S9	SSE13	S9	SSE10	SSE10	SSW6	SSE10	S7	S9	SSE12	SSE13	SSE13	SW8	WSW16	S10.2	WSW16	
23-Dec	WSW24	WSW26	WSW24	W28	W28	W30	W26	W25	W21	W20	W25	W30	W29	W30	W28	W17	W18	W15	W12	WSW14	WSW15	WSW16	WSW13	WSW15	W21.8	W30	
24-Dec	WSW17	SW7	SSW10	SSE12	SSE12	SSE12	SSE13	SSE14	SSE12	SSE12	SSE10	SSE12	SSE12	SSE12	SSE10	SSE13	SSE9	SSE10	SSE9	SSE13	S15	SSE14	SSE15	SSE14	SSE11.0	WSW17	
25-Dec	SSE19	SSE18	SSE16	SSE15	SSE15	SSE12	S14	SSE14	SSE15	SSE14	SSE13	SSE14	SSE16	SSE14	SSE14	SSE16	SSE12	SSE13	SSE13	SSE14	SSE11	SSE11	S9	SSE10	SSE13.7	SSE19	
26-Dec	S11	SSE14	S9	SSE14	SSE15	SSE11	SSE13	SSE14	SSE14	SSE15	SSE16	SSE11	SSE11	SSE15	SSE17	SSE20	SSE15	SSE14	SSE15	SSE12	SSE13	SSE15	S16	SSE13.9	SSE20		
27-Dec	SW17	SW22	SW20	SW17	S15	SSW15	SSW11	SSW11	S8	S10	SSE5	SE10	SSE9	SSE9	SSE11	SSE11	SSE13	SSE15	SSE10	SE4	SE3	NE4	NNE7	NNE7	S7.9	SW22	
28-Dec	NNE7	ENE8	NW5	NNW5	N8	NNW2	WNW5	NNW5	N6	N8	NNE16	NW10	N10	N9	NW11	N8	NNW6	NNE11	N7	NNW8	NNW5	NNW6	NNW6	WNW6	N6.5	NNE16	
29-Dec	NW5	W4	WSW9	S5	SSE10	SSE8	SSE12	SSE17	SSE17	SSE16	SSE14	SSE12	SSE13	SSE14	SSE14	SSE10	SSE14	SSE12	SSE11	SSW5	SSW3	S6	SSE8	SSE6	SSE9.2	SSE17	
30-Dec	SSE9	SSE8	SSE8	SSE11	SSE10	SSE13	SSE12	S10	S7	SSE9	SSE11	S9	SSE12	S10	SSE14	SSE12	SE22	SSE17	SSE16	SSE14	SSE15	SSE14	SSE17	SSE14	SSE12.0	SE22	
31-Dec	SSE15	SSE16	SSE16	SSE16	SSE15	SSE17	SSE17	SSE16	SSE16	SSE14	SSE16	SSE16	SE14	SE12	SSE8	SW7	S11	S10	SSW10	WSW10	W16	WSW19	W16	NW7	S10.2	WSW19	

SSW6.1	SSW6.7	SSW7.2	SSW7.6	SSW7.4	S7.3	SSW7.5	S8.3	S8.4	S8.7	S7.9	S7.9	S7.4	S7.5	S7.8	S8.1	S8.0	S8.4	S6.9	S7.5	S7.6	S6.9	S6.7	S6.0	Diurnal Average
SE25	WSW26	WNW26	WNW29	W30	W30	W27	W26	W27	W28	W28	W30	W29	W30	W28	WSW20	W32	W35	W45	WNW30	WNW23	WNW26	WNW31	NW27	Diurnal Maximum

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



Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

Wind Speed 20 m (WS20m) - km/h

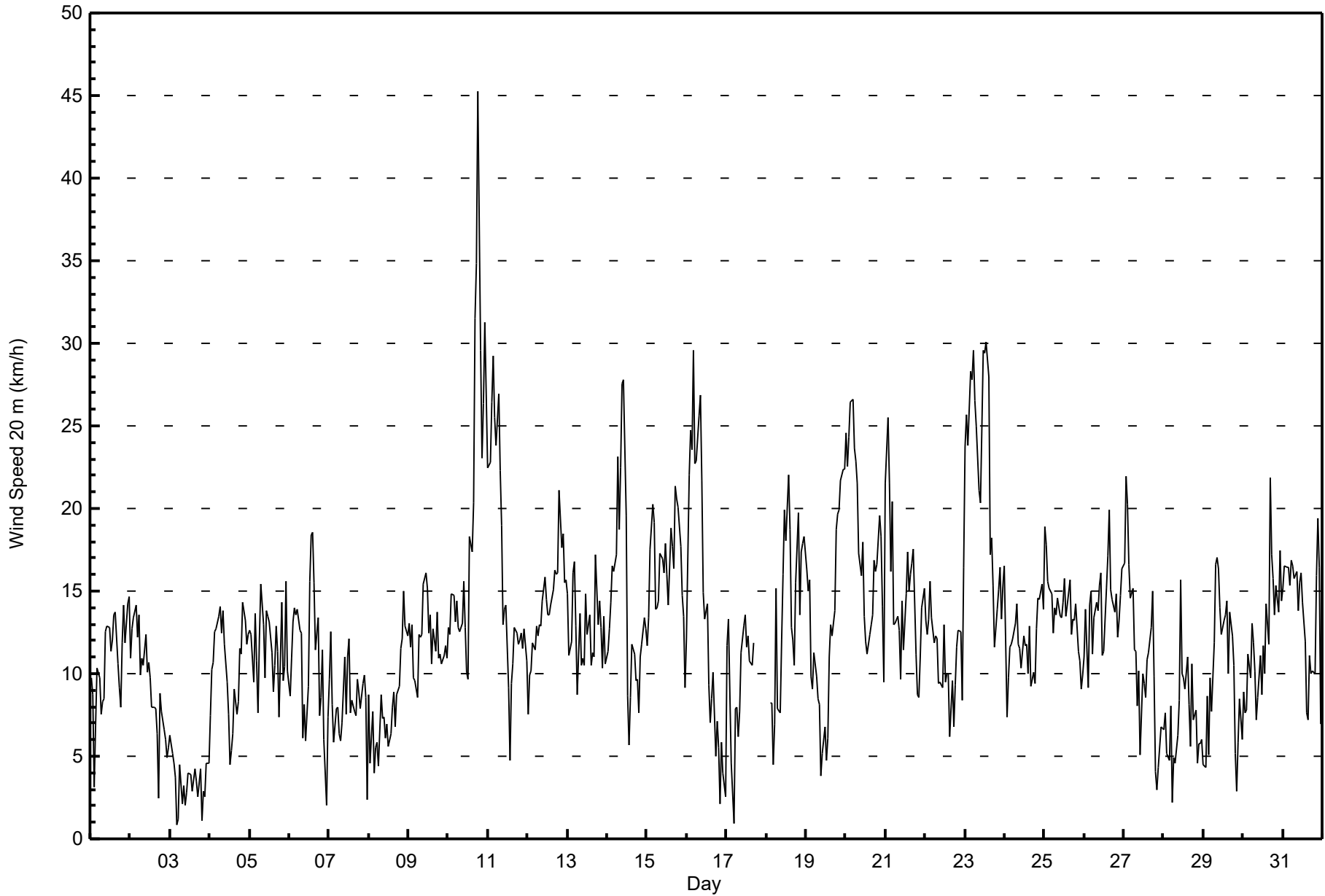
Mannix - December 2023

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 9 km/h on Dec 10 20:00 Minimum Value: 1 km/h on Dec 9 05:00 Percentiles: P ₁ = 1 P ₁₀ = 2 Q ₁ = 2 Median = 3 Q ₃ = 3 P ₉₀ = 5 P ₉₉ = 7																	Hours in Service: 744 Hours of Data: 735 Hours of Missing Data: 9 Hours of Calibration: 0 Percent Operational Time: 98.8									
Day	Hourly Period Ending At (MST)																								Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Dec	1	1	2	2	2	2	2	2	2	4	3	3	3	3	3	2	2	1	1	2	2	3	2	1	4	
2-Dec	2	2	2	2	2	2	2	4	3	2	2	2	2	2	2	2	1	2	2	2	2	3	2	2	4	
3-Dec	2	1	1	2	1	1	3	1	2	1	1	2	2	2	2	2	1	1	2	2	2	1	1	1	3	
4-Dec	1	2	3	3	2	3	2	3	2	3	2	2	1	2	2	2	2	1	2	2	3	2	2	2	3	
5-Dec	2	2	2	3	5	2	2	2	4	4	4	4	3	4	3	2	3	4	4	4	4	6	5	3	6	
6-Dec	3	2	2	3	3	3	3	3	3	2	2	6	3	4	4	3	3	3	3	2	2	2	3	3	6	
7-Dec	2	2	3	1	2	1	3	2	2	2	2	2	2	4	2	2	1	1	1	1	2	2	3	3	4	
8-Dec	2	2	2	2	2	1	2	1	1	2	2	2	2	1	2	2	1	1	2	1	1	2	2	3	3	
9-Dec	2	2	3	3	1	2	2	2	2	2	3	3	3	3	3	2	1	2	3	2	2	2	2	2	3	
10-Dec	3	2	2	2	1	2	2	2	3	3	3	4	6	4	4	6	5	6	8	9	6	7	9	6	9	
11-Dec	5	6	7	6	6	5	5	4	3	2	2	3	3	1	2	2	2	2	2	2	2	2	1	1	7	
12-Dec	3	2	2	2	2	3	2	3	3	3	3	3	2	2	2	2	2	2	2	4	4	3	3	2	4	
13-Dec	2	3	4	4	4	3	2	2	3	3	2	3	2	4	2	1	2	3	5	3	4	3	3	2	5	
14-Dec	3	3	2	3	3	4	4	4	7	5	6	5	4	2	2	3	2	1	2	2	2	1	3	3	7	
15-Dec	3	2	3	3	4	2	2	2	3	3	3	6	6	5	6	5	5	8	6	7	6	5	5	4	8	
16-Dec	6	5	5	4	7	5	5	5	5	6	5	3	4	2	3	2	3	2	3	2	2	1	2	2	7	
17-Dec	4	4	2	1	2	1	2	3	3	2	3	3	3	2	2	2	2	DF	DF	DF	DF	DF	DF	DF	4	
18-Dec	DF	DF	1	2	3	4	4	3	2	4	3	4	4	6	5	3	3	4	3	2	4	4	5	5	6	
19-Dec	5	4	4	4	3	2	3	3	2	2	2	3	2	3	4	5	5	5	6	5	6	6	6	6	6	
20-Dec	7	6	6	7	7	6	5	6	5	4	4	4	3	2	3	3	3	4	4	4	4	4	3	4	7	
21-Dec	5	5	4	3	4	4	2	2	2	2	2	3	3	4	2	3	4	4	3	3	2	2	2	2	5	
22-Dec	2	3	3	3	2	2	3	2	2	3	3	3	2	2	2	2	2	2	2	2	3	3	4	4	4	
23-Dec	7	6	5	6	5	5	6	5	5	4	5	5	5	5	4	4	3	3	3	3	2	4	2	2	7	
24-Dec	3	3	3	2	2	3	3	3	2	2	2	2	2	2	2	2	2	4	2	1	2	2	3	2	4	
25-Dec	4	4	2	2	2	3	2	3	3	2	3	4	4	3	3	3	2	2	2	3	2	3	2	5	5	
26-Dec	3	2	2	4	3	3	1	3	3	3	3	2	3	3	3	4	2	3	2	2	2	1	2	3	4	
27-Dec	4	5	4	4	4	4	3	3	2	2	3	3	3	2	2	2	3	4	3	2	2	2	2	2	5	
28-Dec	3	2	3	3	2	3	3	2	3	2	6	4	3	3	3	3	2	3	3	2	2	2	2	1	6	
29-Dec	1	3	2	2	2	2	3	3	3	3	3	2	3	4	3	2	4	2	2	2	2	1	1	2	4	
30-Dec	2	1	2	2	1	2	2	2	2	2	3	3	4	3	2	4	5	5	2	2	2	2	3	2	5	
31-Dec	2	2	2	2	2	3	3	2	3	3	3	3	4	3	3	3	3	2	3	7	3	4	4	2	7	
	7	6	7	7	7	6	6	6	7	6	6	6	6	6	6	6	5	8	8	9	6	7	9	6		
Diurnal Maximum																										
DF - DAS Failure																										



Wood Buffalo Environmental Association
Hourly Averages

Wind Speed 20 m (WS20m) - km/h
Mannix - December 2023





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Wind Speed 20 m (WS20m) - km/h
Mannix - December 2023

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	59	8.03	8.03
6 - 11	260	35.37	43.40
12 - 19	340	46.26	89.66
20 - 28	65	8.84	98.50
29 - 38	10	1.36	99.86
> 38	1	0.14	100.00

Total Number of Valid Hours: 735

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Wind Speed 20 m (WS20m) - km/h
Mannix - December 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	1	0	1	4	3	5	7	7	4	3	2	3	4	10	59
6 - 11	14	8	1	2	2	1	5	112	45	21	14	18	3	2	4	8	260
12 - 19	3	7	0	0	0	2	11	232	16	8	16	28	13	1	2	1	340
20 - 28	0	0	0	0	0	0	14	4	2	1	2	9	22	8	3	0	65
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	7	3	0	0	10
> 38	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
Totals	20	17	2	2	3	7	33	353	70	37	36	58	48	17	13	19	735

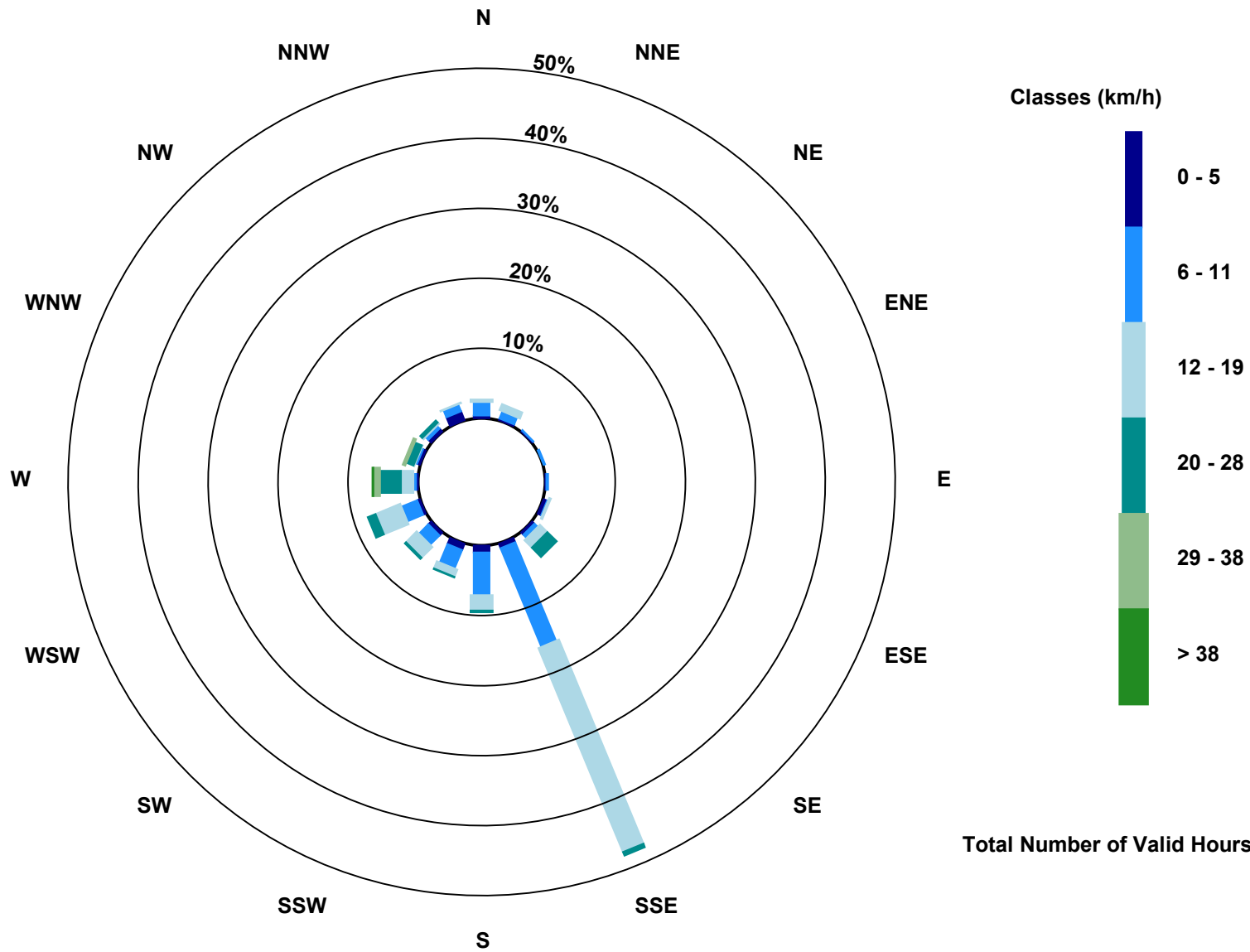
Total Number of Valid Hours: 735

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Dec 2023

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





Maximum Speed: 52 km/h on Dec 10 19:00	Maximum Daily Speed Average: 27.4 km/h on Dec 23	Hours in Service: 744
Minimum Speed Value: 0 km/h on Dec 3 05:00	Minimum Daily Speed Average: 2.0 km/h on Dec 3	Hours of Data: 732
Maximum Diurnal Speed Average: 13.8 km/h at hour 10	Minimum Diurnal Speed Average: 9.7 km/h at hour 1	Hours of Missing Data: 12
Monthly Average Velocity: 11.6 km/h 181.7 deg	Percentiles: P ₁ = 2 P ₁₀ = 9 Q ₁ = 14 Median = 20 Q ₃ = 23 P ₉₀ = 28 P ₉₉ = 35	Percent Operational Time: 98.4

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Dec	WSW13	WSW13	SW6	S7	SSE14	SSE16	SE12	SSE14	SSE16	SSE20	SSE19	SE17	SSE16	SSE18	SSE20	SE21	SSE19	SSE15	SSE18	SSE23	SSE23	SSE22	SSE24	S25	SSE15.6	S25
2-Dec	SSE22	SSE22	SSE23	SSE24	SSE22	SE24	SE18	SSE19	SSE17	SSE20	SSE17	SSE15	SSE11	SSE11	S10	SSE15	S10	W2	N13	NW11	NW11	NNW10	NW8	NNW8	SSE9.8	SE24
3-Dec	N8	NNW6	NNW5	NNE4	NNE0	NNW1	WSW5	E2	SE4	SSE2	SSE3	SSE5	SE5	SSE4	SSE6	NNE2	NNE3	NE3	ESE4	SE5	SSE4	SE7	SSE10	SSE12	SE2.0	SSE12
4-Dec	SSE15	SSE20	SSE20	SSE23	SSE23	SSE22	SSE23	SSE24	SSE23	S23	S19	S9	SW8	SW8	SSW11	SSW16	SSW17	SSW14	SSE17	SSE21	SSE25	SSE24	SSE23	SE23	SSE17.6	SSE25
5-Dec	SE22	SE20	SSE17	SE25	SE20	SE17	SE23	SSE24	SSE23	UO	UO	UO	SSE22	SSE18	SSE16	SSE20	S20	S17	S11	SW21	SSW14	SSW14	SW22	SSE15	SSE17.1	SE25
6-Dec	SSW17	SSW20	SW21	SW22	WSW20	SW21	SW20	WSW20	SSW9	SSW13	SSW8	WSW16	WSW21	WSW24	SW25	SW24	SSW21	SSW24	SW16	SSW15	SW21	SW16	WSW9	SSW9	SW17.4	SW25
7-Dec	WSW14	SW17	SW17	SW9	SSW11	SSW10	SSW7	SW9	SSW8	SSE16	SSE11	SSE14	SSE14	SSE11	SSE11	S10	SW11	WSW16	WSW14	WSW14	WSW15	WSW16	WSW14	WSW9	SW9.8	SW17
8-Dec	WSW15	WSW13	WSW17	WSW11	WSW11	SW8	SSW5	SSW9	SW11	S7	SSW7	S8	SSE6	SSE8	SSE12	S13	SW10	SSW11	SSW9	S14	S15	SSE21	S17	SSE16	SSW9.4	SSE21
9-Dec	SSE18	S14	SW16	SW16	SSW10	SSW11	S12	SSE17	SSE19	SSE22	SSE22	SSE20	SE17	SSE18	SSE16	SSE20	SSE20	SSE23	SSE20	SSE22	SSE20	SSE19	SE21	SSE18	SSE17.0	SSE23
10-Dec	SE19	SSE20	SE23	SE23	SE22	SE22	SSE20	SSE21	SE21	SSE24	SSE19	S13	WSW15	WSW25	WSW23	WSW27	W37	W41	W52	WNW38	WNW30	WNW35	WNW41	WNW35	SW12.8	W52
11-Dec	NW30	NW30	WNW35	WNW39	WNW35	W31	W32	W26	WSW24	WSW17	WSW18	WSW18	SW10	SSW7	SE13	SSE16	S22	SSE20	SSE19	SSE19	SSE20	SSE20	SSE22	SSE19	WSW11.3	WNW39
12-Dec	SSE14	SSE20	SSE18	SSE20	SSE19	SSE20	SSE20	SSE22	SSE24	SSE23	SSE26	SSE20	SSE21	SSE24	SSE26	SSE26	SE28	SE26	SSE30	SSE32	SSE26	SSE27	S21	S26	SSE23.2	SSE32
13-Dec	S22	SSW21	SSW21	SW24	SW26	SSW21	SSW14	S18	SSW20	S18	SSE16	SSE22	SSE21	SSE22	S16	S15	S18	S27	S24	S25	S25	S16	SSW23	SW18	S19.2	S27
14-Dec	WSW17	WSW19	WSW20	WSW25	WSW24	WSW24	W29	WSW25	WSW30	WSW33	W32	W24	WSW12	SSW8	SSW14	SSW21	SW19	WSW17	WSW15	SW11	SSE13	SSE18	SSE21	SSE20	WSW16.9	WSW33
15-Dec	SSE18	SSE23	SSE27	SSE26	SSE23	SSE23	SSE22	SSE27	SSE26	SSE25	S29	SSW24	S23	S30	S27	S25	S33	S32	S32	S28	S22	SSW21	SSW14	S24.8	S33	
16-Dec	SW17	WSW29	WSW31	WSW30	W37	WNW30	W30	W31	WSW33	W28	NW21	N16	N17	N11	NNE8	NNE10	N13	N7	N9	NNE7	NNE2	WSW6	SSW6	S5	WNW12.5	W37
17-Dec	N15	NNW19	NNW12	NW6	ESE1	SSE9	SSE12	SSE9	S12	SSE15	SSE20	SSE20	SSE17	SSE18	SSE15	SE19	SSE21	DF	DF	DF	DF	DF	DF	DF	---	SSE21
18-Dec	DF	DF	SW17	WSW17	SW10	WSW14	WSW20	SW13	SW13	WSW21	WSW24	W24	WSW25	WSW28	W25	W18	W17	W17	W22	W27	WNW19	NNE23	NNE23	N25	W14.9	WSW28
19-Dec	N22	N19	N21	N14	N13	N14	NNE12	NE11	ENE9	ESE5	E6	E8	E6	E7	E13	ESE15	ESE14	ESE16	SE23	SE24	SE25	SE27	SE27	SE28	E9.7	SE28
20-Dec	SE31	SE28	SE30	SE33	SE34	SE30	SE29	SE27	SE22	SE21	SE23	SE17	SE16	SE14	SE17	SE18	SE20	SE24	SSE22	SSE23	SSE27	SSE25	S20	SW16	SE22.5	SE34
21-Dec	WSW30	WSW32	WSW28	WSW23	W27	WSW20	SW20	SW21	SW19	S15	SSE19	SE17	SE21	SSE24	SSE22	SSE25	SSE26	SSE26	S18	S15	S17	SSE17	S19	S23	SSW15.9	WSW32
22-Dec	SSE20	SSE20	SSE20	SSE23	SSE22	SSE21	SE21	SE18	SSE16	SSE17	SSE16	SSE20	SSE15	SSE14	SE16	SSE13	SSE17	SSE13	SSE17	SSE21	S22	S17	WSW15	WSW23	SSE16.4	WSW23
23-Dec	WSW30	WSW32	WSW30	W33	W32	W34	W31	W30	W26	W25	W29	W34	WSW34	W34	W32	W22	W23	WSW22	W17	WSW23	WSW22	WSW27	WSW22	WSW23	WSW27.4	WSW34
24-Dec	WSW25	SW14	SW17	SSE16	SSE18	SSE19	SSE19	SSE21	SSE18	SSE19	SSE18	SSE19	SSE17	SSE17	SSE15	S17	S14	SSE12	SSE14	S18	S26	S22	SSE25	SSE23	SSE16.8	S26
25-Dec	SSE30	SSE28	SSE27	SSE26	SSE26	SSE21	S26	SSE22	SSE23	SSE23	SSE22	SSE22	SSE23	SE22	SE22	SSE24	SSE24	SSE21	SSE24	SSE28	SE23	SE20	SE17	SE20	SSE23.2	SSE30
26-Dec	SSE18	SSE25	SSE20	SE27	SE24	SSE19	SE19	SE22	SSE21	SSE21	SSE22	SE15	SE15	SSE21	SSE24	SSE29	SSE23	SSE25	SSE24	SSE24	SSE18	SSW18	S22	S28	SSE21.2	SSE29
27-Dec	SW27	SW30	SW30	SW27	SSW26	SSW28	SSW23	SSW22	SSW14	SSW18	S10	SE15	SE16	SSE13	SSE18	SSE17	SE19	SE22	SE15	ESE8	SE8	ENE4	NNE11	NNE8	S13.0	SW30
28-Dec	NE11	ENE14	NNW9	N10	N15	N6	NW8	NNW10	N10	N12	N22	NW14	NNW13	N13	NW15	N11	NNW8	NNE14	N11	NNW11	NNW7	N9	NNW8	NW9	N10.2	N22
29-Dec	NNW5	WNW3	WSW11	SW4	S10	SSE15	SSE20	SSE25	SSE25	SSE27	SSE21	SE18	SSE18	SSE18	SSE22	SSE15	SSE23	SSE21	SE20	SSE11	SE7	SSE11	SSE16	SSE14	SSE14.5	SSE27
30-Dec	SSE17	SSE19	SSE17	SSE21	SSE20	SSE21	SSE20	SSE18	SSE17	SSE21	SE21	SSE17	SSE19	SSE18	SE23	SE22	SE31	SE26	SSE23	SE23	SSE24	SSE25	SSE27	SSE24	SSE20.9	SE31
31-Dec	SSE25	SSE25	SSE27	SSE26	SSE26	SSE27	SSE28	SSE26	SSE26	SSE24	SSE24	SSE25	SE23	SE20	SSW13	SW16	S20	SSW19	SW20	WSW18	WSW22	WSW27	W21	NW11	S16.9	SSE28

SSW9	SSW10	SSW11	SSW11.5	S11.2	S11.4	S11.4	S12.7	S13.3	S13.8	S11.9	S11.2	S10.8	S11.3	S11.9	S13.0	S13.3	S13.2	S11.6	S12.5	S12.2	S11.1	S10.9	S10.2	Diurnal Average
SE31	WSW32	WNW35	WNW39	W37	W34	W32	W31	WSW33	WSW33	W32	W34	WSW34	W34	W32	SSE29	W37	W41	W52	WNW38	WNW30	WNW35	WNW41	WNW35	Diurnal Maximum

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



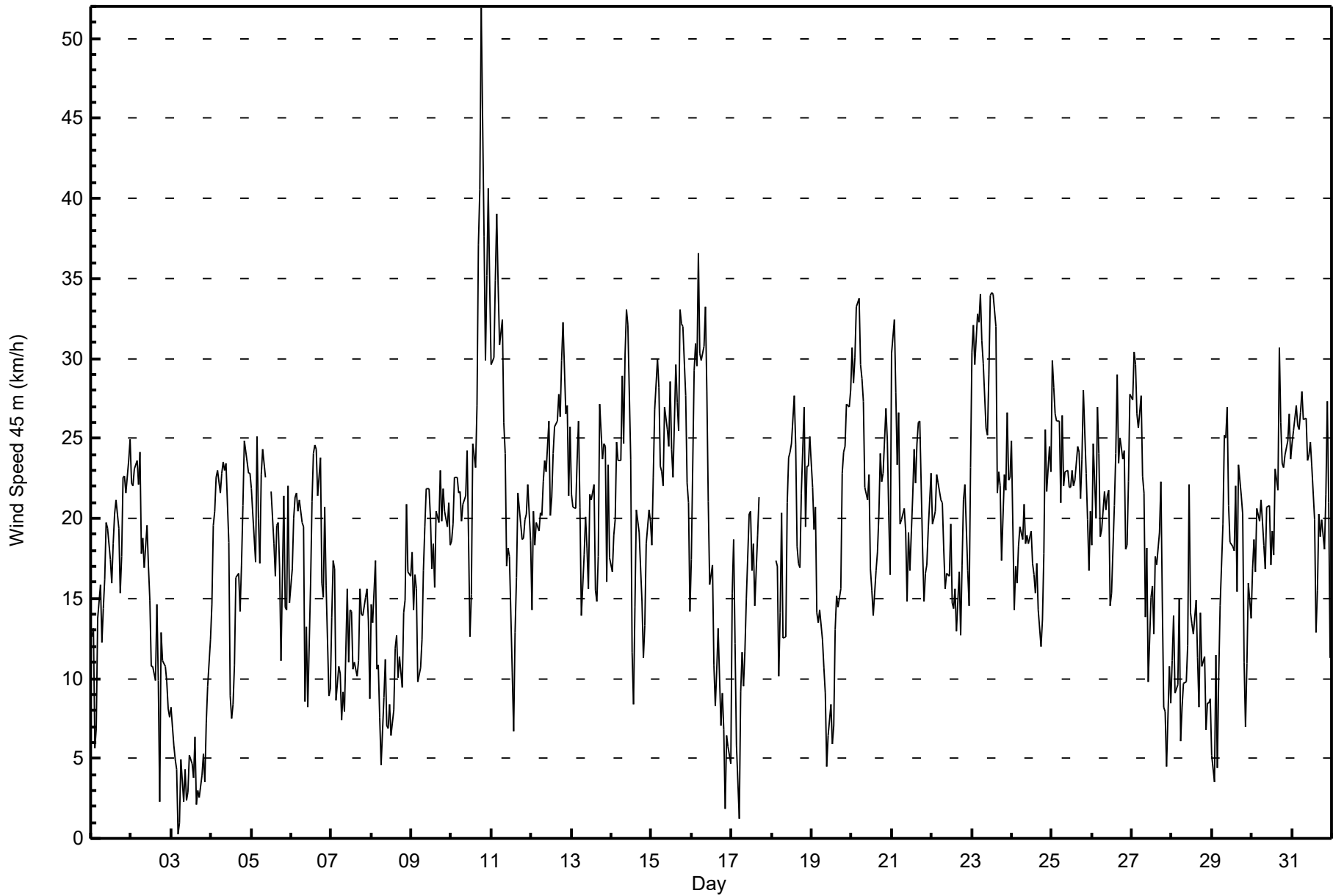
Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

Wind Speed 45 m (WS45m) - km/h

Mannix - December 2023

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 9 km/h on Dec 10 23:00 Minimum Value: 1 km/h on Dec 30 07:00 Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 2 Median = 3 Q ₃ = 4 P ₉₀ = 5 P ₉₉ = 7																	Hours in Service: 744 Hours of Data: 732 Hours of Missing Data: 12 Hours of Calibration: 0 Percent Operational Time: 98.4								
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Dec	2	1	2	2	1	2	2	2	1	4	3	3	3	3	2	1	3	2	3	2	2	3	2	1	4
2-Dec	3	2	2	1	3	2	3	4	4	2	1	2	2	2	1	2	1	2	2	2	2	3	2	2	4
3-Dec	1	1	1	2	1	1	3	1	2	1	1	2	3	2	4	1	2	1	2	3	3	3	2	1	4
4-Dec	1	3	3	2	2	3	2	2	2	2	4	1	1	1	2	2	1	2	4	2	3	2	1	2	4
5-Dec	2	3	1	4	3	3	3	2	4	UO	UO	UO	4	6	4	3	2	4	5	4	6	7	5	3	7
6-Dec	3	2	2	3	3	3	3	3	4	2	3	6	3	4	4	3	3	4	4	2	2	4	5	3	6
7-Dec	3	2	3	3	1	1	2	1	2	3	2	1	2	5	2	2	2	1	2	2	2	2	3	4	5
8-Dec	1	3	2	3	1	1	2	2	1	1	1	2	2	1	2	2	2	1	2	3	2	2	2	3	3
9-Dec	2	1	2	3	1	3	3	2	2	2	3	3	2	2	2	1	1	3	3	2	2	2	1	1	3
10-Dec	2	2	2	2	1	2	2	3	4	4	2	4	6	4	5	6	5	6	7	8	6	7	9	6	9
11-Dec	5	5	6	5	6	4	4	4	3	2	2	3	2	2	4	2	2	2	2	2	2	2	1	2	6
12-Dec	4	2	2	1	2	1	2	3	2	3	3	2	2	3	2	3	2	3	2	3	3	2	2	2	4
13-Dec	2	4	4	5	4	5	3	3	3	2	3	2	2	3	2	1	2	2	6	3	5	4	4	3	6
14-Dec	3	3	3	3	4	3	4	4	7	5	6	5	4	2	2	2	1	2	2	3	3	2	2	3	7
15-Dec	4	2	2	2	3	2	1	2	2	2	2	4	5	4	5	5	4	7	5	5	4	5	5	5	7
16-Dec	7	5	5	4	8	5	5	4	4	5	6	3	4	2	3	2	3	2	4	2	2	1	1	3	8
17-Dec	5	4	2	2	2	2	1	2	3	3	3	3	2	2	1	2	2	DF	DF	DF	DF	DF	DF	DF	5
18-Dec	DF	DF	1	2	4	5	4	4	2	3	3	3	4	5	4	4	3	5	2	2	3	5	5	4	5
19-Dec	5	4	4	4	3	2	3	3	1	2	3	3	3	3	3	3	5	6	5	5	5	6	6	6	6
20-Dec	7	6	7	6	7	6	5	5	5	4	4	4	3	2	3	3	4	3	4	4	4	4	3	5	7
21-Dec	5	4	5	3	3	4	2	3	2	3	2	4	3	3	2	3	4	4	3	4	3	2	2	2	5
22-Dec	2	3	4	3	2	3	3	2	1	2	3	2	2	2	2	2	3	2	2	2	3	5	5	4	5
23-Dec	8	6	5	6	5	5	6	5	4	4	5	6	5	4	4	4	3	3	4	2	1	3	3	2	8
24-Dec	3	4	3	2	2	2	2	3	2	2	2	2	2	2	2	2	1	1	2	3	2	2	1	2	4
25-Dec	3	3	2	2	2	4	3	3	3	2	3	3	3	3	2	2	1	3	4	2	2	4	1	5	5
26-Dec	2	1	2	2	3	3	2	2	2	3	2	2	2	3	2	4	2	3	2	2	2	2	4	4	4
27-Dec	3	5	4	3	4	3	3	3	4	3	5	3	3	3	2	2	3	5	4	3	3	2	3	2	5
28-Dec	2	3	2	2	4	3	2	3	4	2	6	4	3	4	2	3	2	3	4	3	2	2	2	1	6
29-Dec	1	2	1	2	4	2	2	3	2	2	2	2	2	3	3	2	5	3	2	4	2	1	2	2	5
30-Dec	2	1	1	1	2	1	1	1	3	2	4	3	3	2	2	6	4	5	2	2	2	3	2	2	6
31-Dec	2	1	1	2	2	2	2	1	2	2	2	3	3	4	3	4	3	3	3	7	3	3	4	2	7
																	Diurnal Maximum 8 6 7 6 8 6 6 5 7 5 6 6 6 6 5 6 5 7 7 8 6 7 9 6								
DF - DAS Failure UO - Unstable Operation																									





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Wind Speed 45 m (WS45m) - km/h
Mannix - December 2023

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	28	3.83	3.83
6 - 11	100	13.66	17.49
12 - 19	233	31.83	49.32
20 - 28	310	42.35	91.67
29 - 38	57	7.79	99.45
> 38	4	0.55	100.00

Total Number of Valid Hours: 732

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Wind Speed 45 m (WS45m) - km/h
Mannix - December 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	5	1	1	1	3	3	5	1	1	1	1	1	1	0	3	28
6 - 11	10	5	2	1	4	1	3	13	10	17	12	6	0	0	7	9	100
12 - 19	11	3	0	1	1	3	24	96	25	16	17	26	4	1	2	3	233
20 - 28	4	2	0	0	0	0	47	156	25	15	16	32	12	0	1	0	310
29 - 38	0	0	0	0	0	0	7	5	5	0	2	12	17	7	2	0	57
> 38	0	0	0	0	0	0	0	0	0	0	0	0	2	2	0	0	4
Totals	25	15	3	3	6	7	84	275	66	49	48	77	36	11	12	15	732

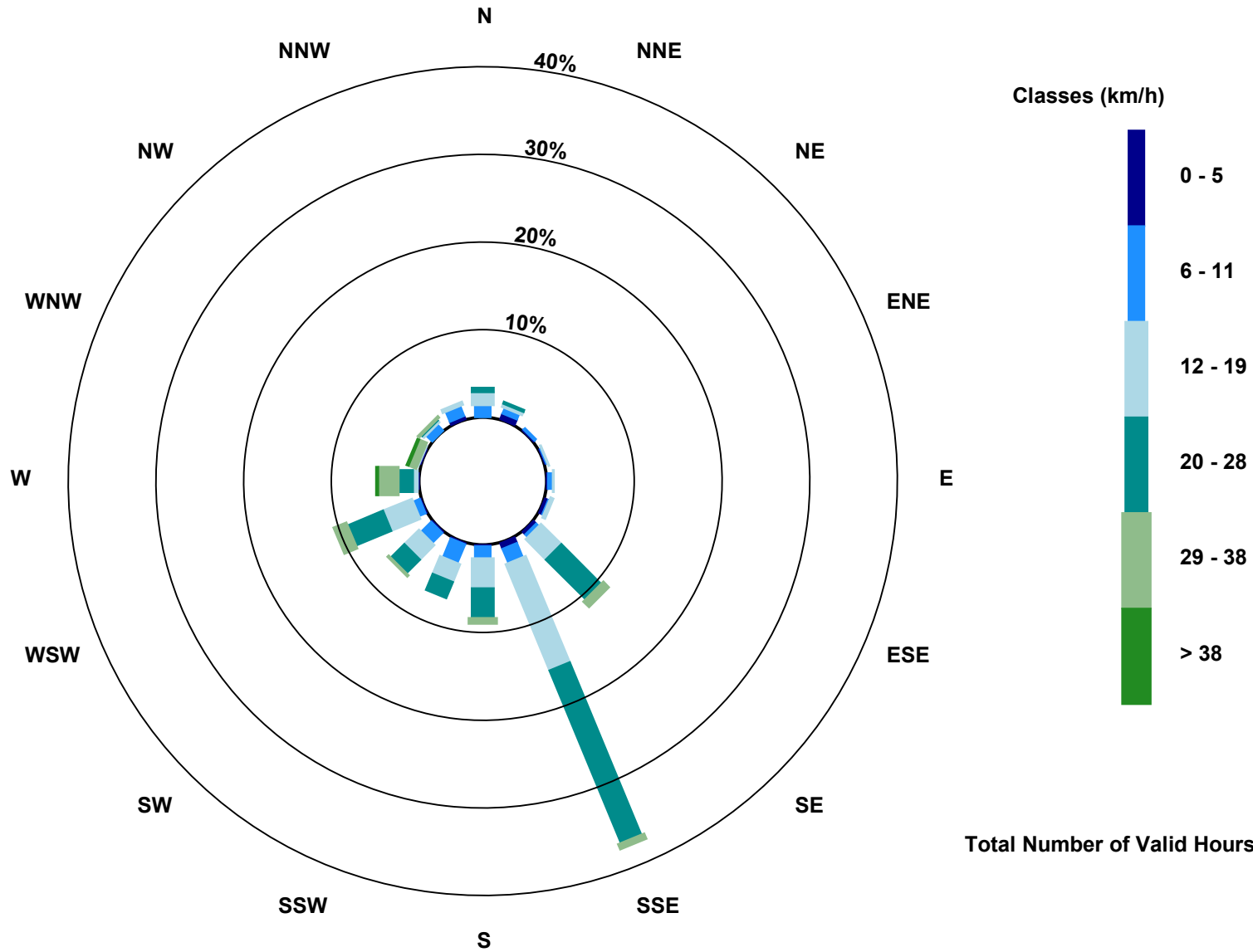
Total Number of Valid Hours: 732

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Dec 2023

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





Maximum Speed: 55 km/h on Dec 10 19:00	Maximum Daily Speed Average: 31.1 km/h on Dec 23	Hours in Service: 744
Minimum Speed Value: 0 km/h on Dec 17 05:00	Minimum Daily Speed Average: 4.8 km/h on Dec 3	Hours of Data: 733
Maximum Diurnal Speed Average: 15.7 km/h at hour 18	Minimum Diurnal Speed Average: 12.1 km/h at hour 1	Hours of Missing Data: 11
Monthly Average Velocity: 13.7 km/h 191.9 deg	Percentiles: P ₁ = 2 P ₁₀ = 10 Q ₁ = 16 Median = 23 Q ₃ = 28 P ₉₀ = 33 P ₉₉ = 39	Percent Operational Time: 98.5

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Dec	WSW14	W17	SW8	SSW7	SSE8	SSE12	SSE18	SSE20	SSE26	SSE27	SSE26	SSE24	SSE23	SSE27	SSE27	SSE25	SSE22	SSE23	SSE30	SSE33	SSE32	SSE31	S30	S28	SSE20.5	SSE33
2-Dec	S30	SSE30	S28	S28	S27	SSE27	SE21	SSE25	SSE23	SSE23	SSE20	SSE19	SSE14	SSE14	S13	SSE17	S11	W3	N15	NNW12	NNW13	NNW11	NNW10	NNW9	SSE12.2	S30
3-Dec	NNE8	NNW4	NNW4	NE4	ESE2	NNE1	WSW5	SE2	SE5	SE2	SSE3	SSE6	SE5	SE5	SSE8	SE2	E2	SE4	SE9	SE12	SE12	SE14	SSE18	SE20	SE4.8	SE20
4-Dec	SE18	SSE21	SSE26	SSE29	SSE27	SSE27	SSE30	S32	SE23	SSW15	SSW14	WSW12	WSW13	WSW13	SW11	SSW17	SW19	SSW16	S14	S19	S20	S23	SSE26	SSE27	S18.3	S32
5-Dec	SSE29	SSE27	SE22	SE27	SE25	SE20	SE23	SE25	S23	UO	UO	SSE28	SSE28	SSE21	S18	S22	SSW21	SSW21	SSW17	SW27	SW18	SW16	SW25	S15	S19.3	SSE29
6-Dec	SW23	SW25	SW27	WSW27	WSW26	WSW26	SW25	WSW25	SW15	SW18	SW12	WSW21	WSW24	WSW27	WSW28	SW30	SSW27	SW30	SW23	SSW19	SW27	WSW24	WSW15	SW11	SW22.7	SW30
7-Dec	WSW17	WSW20	WSW23	WSW13	SW12	SW12	SW8	WSW10	SW9	S14	SSW7	S9	SSE17	SSE14	SSE7	SSW8	SW14	WSW20	WSW19	WSW20	WSW21	WSW20	WSW17	WSW14	SW12.5	WSW23
8-Dec	WSW18	WSW20	WSW24	WSW18	WSW17	WSW10	WSW9	WSW10	WSW14	SW6	SW6	SW9	SSW8	SSW5	S10	SSW12	SW14	SW13	SW10	SSW11	SSW13	S17	SW16	SSW15	SW11.4	WSW24
9-Dec	S12	SSW12	SW18	SW18	SW11	SW13	SSW11	SSW14	S19	SSE22	SSE25	SSE23	SSE21	SSE22	S20	S24	S25	S27	SSE28	SSE29	SSE27	SSE26	SSE29	SSE24	S19.1	SSE29
10-Dec	SE21	SE24	SE27	SE28	SE27	SE26	SE27	SSE28	SSE29	SSE32	S23	SSW17	WSW20	WSW29	WSW27	WSW32	W41	W44	W55	NNW41	NNW33	NNW39	NNW44	NNW38	SW14.3	W55
11-Dec	NW33	NW33	NNW38	NNW43	NNW38	NNW35	W36	W29	WSW28	WSW20	WSW21	WSW20	SW11	SSW8	SSE12	S17	S24	S25	S24	SSE24	SSE24	SSE22	SSE23	S21	WSW14.3	NNW43
12-Dec	S20	S18	S15	S14	S15	S15	S16	SSE24	SSE30	SSE32	SSE34	SSE28	SSE31	SSE33	SSE34	SSE35	SSE36	SSE35	SSE40	S39	S31	S32	SSW27	SSW28	SSE26.8	SSE40
13-Dec	SSW27	SW29	SW27	SW29	SW32	SW26	SW20	SSW22	SW27	SSW23	SSW18	S23	S25	S27	SSW18	SW19	SSW21	S34	S31	S31	SSW29	SSW16	SSW27	SW20	SSW24.3	S34
14-Dec	WSW19	W22	W24	WSW30	WSW28	WSW28	W33	WSW29	WSW36	WSW38	W35	W27	WSW14	SW9	SSW17	SW23	SW24	WSW24	WSW20	WSW15	S9	SSE17	S15	S17	WSW20.6	WSW38
15-Dec	S21	S29	S32	S31	S27	SSW25	S24	S31	S28	S32	S35	SSW28	S27	S36	S33	S31	S38	S37	S38	S33	S26	SSW26	SSW18	S29.6	S38	
16-Dec	SW22	WSW34	WSW35	WSW34	W41	NNW34	NNW34	W35	W37	W31	NW24	NNE16	NNE18	NNE11	NNE9	NNE11	NNE14	N8	N10	NE8	NE2	WSW5	S7	SSW8	NNW13.8	W41
17-Dec	N17	N23	N14	NNW6	SSE0	SSE6	SSE12	SSW10	SW11	S9	S24	SSE24	SSE19	S17	S15	SSE18	S23	DF	DF	DF	DF	DF	DF	DF	---	S24
18-Dec	DF	DF	WSW23	WSW24	WSW16	WSW21	W25	WSW17	WSW18	WSW27	WSW29	W27	WSW30	W32	W29	W22	W22	W22	NNW27	NNW33	NNW24	NNE27	NNE26	NNE28	W18.9	NNW33
19-Dec	NNE26	N22	N23	N17	N16	NNE15	NNE14	NE12	ENE9	ESE4	E6	E8	ESE5	E7	E11	ESE11	ESE12	ESE12	SE20	SE21	SE22	SE26	SE23	SE27	E9.1	SE27
20-Dec	SE29	SE28	SE31	SE35	SE35	SE32	SE31	SE30	SE25	SE25	SE26	SE19	SE19	SE17	SE22	SE23	SSE27	SSE31	SSE28	SSE28	SSE33	SSE30	SSW25	SW24	SSE25.6	SE35
21-Dec	WSW37	WSW38	WSW33	WSW28	W31	WSW25	WSW25	SW26	SW25	S18	S19	SSE20	SSE26	SSE30	SSE29	SSE32	SSE35	SSE33	S25	S21	S24	S22	S23	S27	SSW21.0	WSW38
22-Dec	S25	S24	S20	S27	SSE26	SSE28	SSE25	SE21	SE18	SE21	SSE23	SSE26	SSE20	SE17	SE20	SSE19	SE22	SSE18	SSE21	S27	S29	SSW17	WSW21	WSW29	SSE19.7	S29
23-Dec	WSW36	WSW37	WSW34	W35	W34	W36	W34	W33	W29	W29	W32	W37	W37	W36	W34	W24	W26	W26	W22	WSW27	WSW25	WSW32	WSW30	WSW29	W31.1	W37
24-Dec	WSW30	SW21	SW21	S13	S20	S23	SSE21	SSE23	S21	S18	SSW20	S23	S18	S17	S13	SSW15	SSW13	SSW9	SSW13	SSW17	SSW20	S24	S25	S21	SSW17.7	WSW30
25-Dec	S30	SSE30	S27	S29	S32	S24	SSW28	SSW22	S21	S28	S29	SSE25	SSE24	SSE27	SSE29	S27	SSE27	S22	SSE21	SSE27	SSE28	SE28	SE21	SE26	SSE25.3	S32
26-Dec	SE21	SE26	SSE26	SE31	SE30	SSE23	SE23	SE25	SE25	SE26	SE25	SE18	SSE18	SSE24	SSE32	SSE35	SSE33	SSE24	S20	S21	SSW19	SW26	SSW31	SSW37	SSE23.6	SSW37
27-Dec	SW35	SW36	SW36	SW33	SSW31	SSW37	SSW32	SW30	SSW20	SSW24	SSW16	SSE17	SSE18	SSE15	SSE21	SSE19	SE18	SE24	SE12	ESE8	SE9	ESE5	NE9	NE7	SSW16.3	SSW37
28-Dec	NE10	NE13	N7	N11	NNE14	NNE10	N9	NNW14	N14	N15	NNE28	NNW17	N16	N15	NW17	N14	NNW10	NNE18	N14	N13	N9	N11	N10	NNW9	N12.3	NNE28
29-Dec	NNW5	NW3	WSW9	WSW9	SSW6	SSE14	SSE25	SSE31	SSE29	SSE30	SSE28	SE25	SSE25	SSE22	SSE28	SSE22	SSE27	SSE25	SSE22	SSE17	S13	SE13	SSE17	SSE22	SSE17.9	SSE31
30-Dec	SSE22	SE16	SE17	SSE19	SSE24	SE17	SE7	SE9	SSE21	SSE22	SE16	SE23	SE24	SE24	SE26	SE29	SE36	SE33	SSE31	SSE31	SSE33	SSE34	SSE33	S29	SSE23.6	SE36
31-Dec	S31	S31	SSE31	S32	SSE28	SSE30	SSE29	S27	S27	S21	S21	SSE24	SSE27	SSE21	SW20	SW20	SSW23	SW24	WSW26	WSW24	WSW25	WSW32	W25	NNW14	SSW19.7	WSW32

SSW12.6	SSW12.6	SSW13.6	SSW13.6	SSW12.6	SSW13.6	SSW12.6	SSW14.5	S15.5	S15.2	S13.6	S13.5	S13.4	S13.7	S14.0	S15.2	S15.7	S15.7	SSW14.1	S15.6	SSW14.6	SSW13.6	SSW13.6	SSW12.4	Diurnal Average
WSW37	WSW38	NNW38	NNW43	W41	SSW37	W36	W35	W37	WSW38	W35	W37	W37	W36	S36	SSE35	W41	W44	W55	NNW41	SSE33	NNW39	NNW44	NNW38	Diurnal Maximum

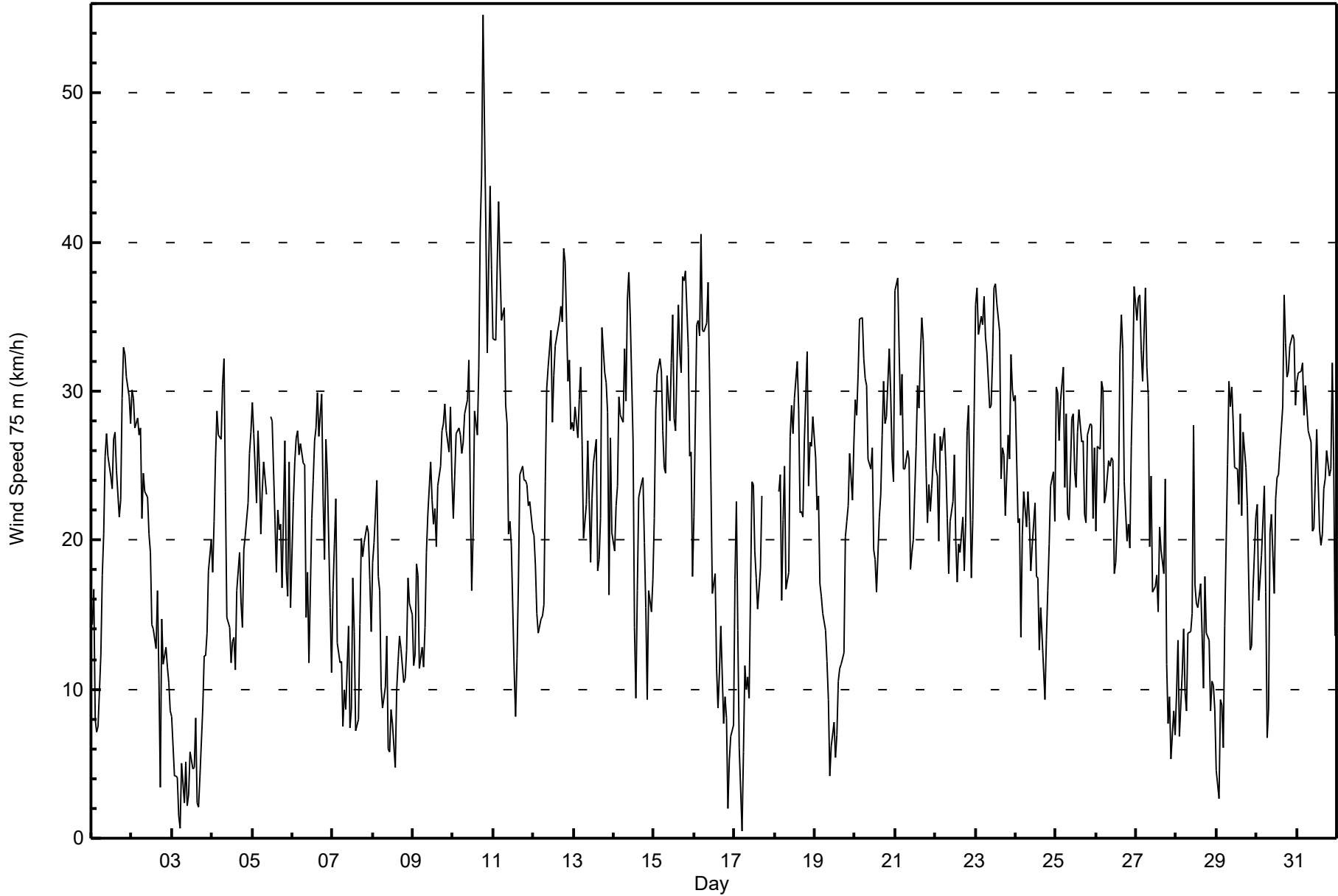
DF - DAS Failure UO - Unstable Operation
 All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Speed 75 m (WS75m) - km/h
Mannix - December 2023

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 10 km/h on Dec 20 01:00 Minimum Value: 1 km/h on Dec 11 23:00 Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 2 Median = 3 Q ₃ = 4 P ₉₀ = 5 P ₉₉ = 8																	Hours in Service: 744 Hours of Data: 733 Hours of Missing Data: 11 Hours of Calibration: 0 Percent Operational Time: 98.5																							
Day	Hourly Period Ending At (MST)																								Daily Maximum															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																
1-Dec	2	1	2	1	1	6	1	2	1	3	2	2	3	2	1	1	1	1	4	2	2	2	2	1	6															
2-Dec	1	1	1	1	1	2	3	5	3	1	1	2	2	1	2	2	2	2	2	1	2	3	1	2	5															
3-Dec	1	2	1	1	1	1	3	2	2	1	1	2	3	3	4	2	3	2	4	4	5	5	2	5																
4-Dec	2	1	2	1	2	2	2	4	2	2	2	2	2	2	1	3	1	2	2	2	2	3	1	4																
5-Dec	1	3	2	5	3	4	6	2	2	UO	UO	3	4	5	3	2	2	5	6	5	6	8	5	8																
6-Dec	3	2	3	4	4	3	3	4	4	3	3	5	4	4	4	4	3	5	4	2	2	4	5	5																
7-Dec	4	1	2	4	2	2	2	1	2	2	2	3	2	5	2	2	2	2	2	2	2	2	3	5																
8-Dec	1	2	2	2	3	2	2	2	1	2	1	2	1	1	3	3	2	2	3	3	2	3	1	3																
9-Dec	2	2	3	3	1	3	3	2	3	3	2	2	1	1	2	1	1	3	2	1	1	1	2	3																
10-Dec	4	3	4	2	1	2	2	2	2	3	3	3	5	4	4	6	5	6	7	9	6	8	8	9																
11-Dec	5	5	6	5	5	4	4	4	3	3	2	4	2	2	2	2	1	1	2	1	2	1	1	6																
12-Dec	1	2	2	2	2	2	3	2	2	2	3	2	2	2	2	3	2	3	1	2	2	2	3	3																
13-Dec	3	4	4	6	4	5	3	4	4	2	2	3	1	3	2	2	2	3	6	4	3	4	3	6																
14-Dec	3	3	4	3	4	3	4	4	7	5	6	5	2	2	2	1	1	2	3	2	2	3	2	7																
15-Dec	3	1	2	2	2	3	2	3	2	2	3	4	5	5	5	5	4	7	5	5	5	5	5	7																
16-Dec	8	5	5	4	8	5	5	5	4	5	7	3	3	2	3	3	2	2	4	2	2	1	1	8																
17-Dec	6	3	2	2	1	2	2	3	3	2	5	2	1	2	2	3	1	DF	DF	DF	DF	DF	DF	6																
18-Dec	DF	DF	2	2	4	6	4	4	3	3	3	4	3	5	4	4	3	5	3	3	4	4	5	6																
19-Dec	5	4	4	5	3	2	3	3	2	2	3	3	3	3	3	4	4	5	7	7	8	8	9	9																
20-Dec	10	9	8	8	8	7	6	5	5	4	4	4	4	3	3	3	3	3	4	4	3	4	4	10																
21-Dec	4	4	5	3	3	4	3	3	2	5	2	4	2	2	2	3	3	3	4	3	3	3	2	5																
22-Dec	1	3	5	1	2	2	4	2	2	3	2	2	3	2	3	2	3	2	3	2	2	6	5	6																
23-Dec	8	6	5	6	5	5	6	5	4	4	5	6	5	4	4	4	3	3	4	2	2	2	2	8																
24-Dec	2	4	3	2	4	3	1	2	3	2	1	2	3	2	5	3	2	2	1	2	2	2	2	5																
25-Dec	3	3	2	1	3	6	3	2	4	2	2	1	2	2	1	1	2	5	5	2	2	3	3	6																
26-Dec	4	3	3	3	5	3	4	2	3	2	2	2	3	2	3	3	2	4	2	2	3	3	4	5																
27-Dec	3	5	4	3	6	3	3	3	5	3	5	2	2	3	1	2	5	6	5	4	3	2	3	6																
28-Dec	2	3	2	3	4	3	3	2	4	2	6	5	4	4	2	3	2	4	4	3	3	2	2	6																
29-Dec	1	2	1	4	1	3	3	1	1	3	1	1	2	3	2	2	3	1	2	3	1	1	2	4																
30-Dec	2	2	1	2	1	4	2	3	2	2	7	5	2	3	4	5	4	5	2	2	2	2	2	7																
31-Dec	1	1	1	1	1	2	1	2	1	4	3	2	2	6	4	4	5	2	4	6	3	3	4	6																
																	Diurnal Maximum																							
																	10	9	8	8	8	7	6	5	7	5	7	6	5	6	5	6	5	7	7	9	8	8	9	9
DF - DAS Failure UO - Unstable Operation																																								





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Wind Speed 75 m (WS75m) - km/h
Mannix - December 2023

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	25	3.41	3.41
6 - 11	75	10.23	13.64
12 - 19	160	21.83	35.47
20 - 28	304	41.47	76.94
29 - 38	159	21.69	98.64
> 38	10	1.36	100.00

Total Number of Valid Hours: 733

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed 75 m (WS75m) - km/h
Mannix - December 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	2	0	1	6	5	2	0	1	0	2	1	0	1	3	25
6 - 11	7	6	4	1	4	2	4	5	6	11	13	6	0	0	0	6	75
12 - 19	12	7	2	0	0	2	17	25	28	24	16	20	1	1	1	4	160
20 - 28	3	5	0	0	0	0	45	90	59	21	24	42	12	2	1	0	304
29 - 38	0	0	0	0	0	0	12	45	31	6	10	24	21	8	2	0	159
> 38	0	0	0	0	0	0	0	1	1	0	0	0	4	4	0	0	10
Totals	22	19	8	1	5	10	83	168	125	63	63	94	39	15	5	13	733

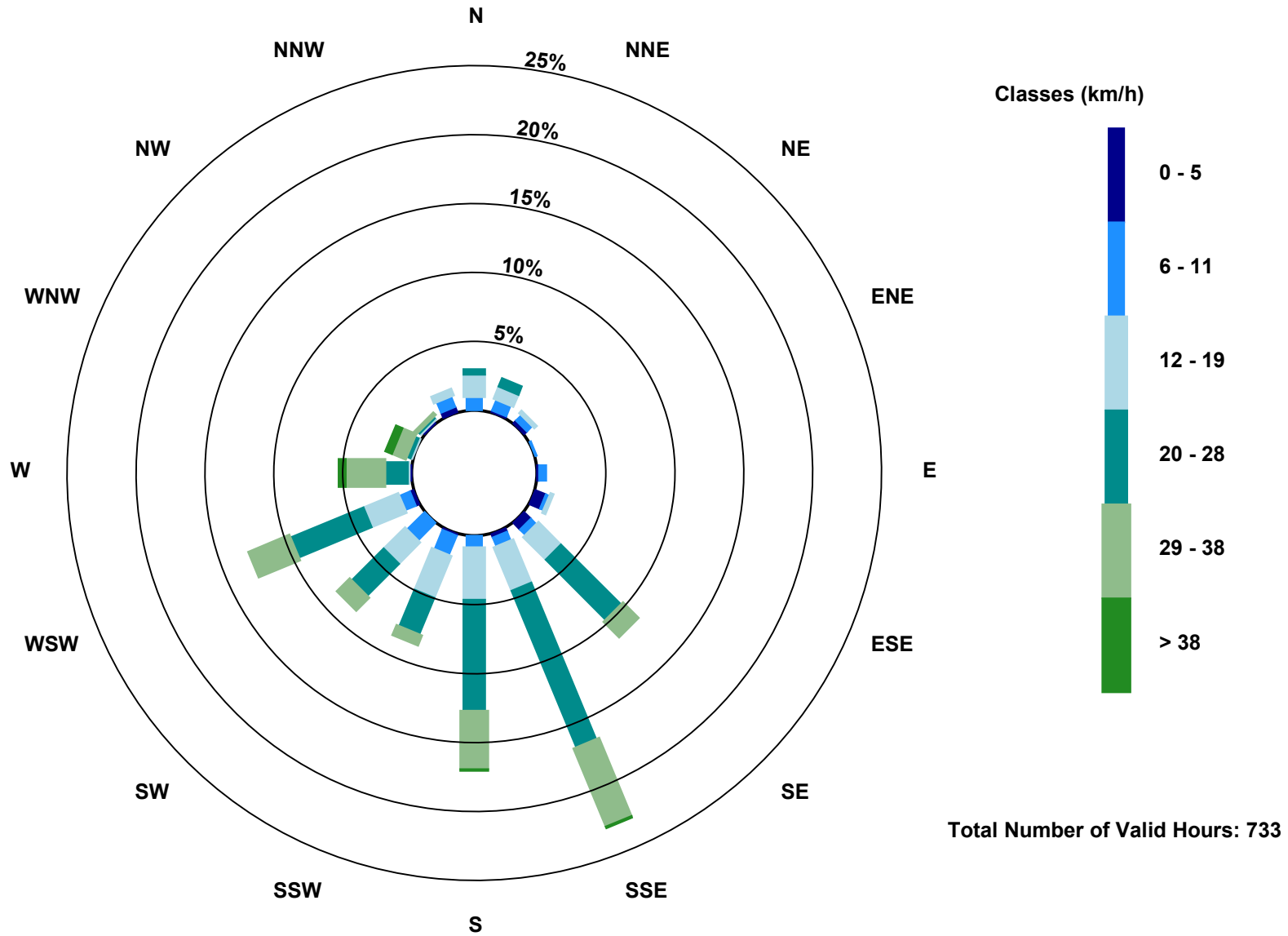
Total Number of Valid Hours: 733

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Dec 2023

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





Maximum Speed: 57 km/h on Dec 10 19:00	Maximum Daily Speed Average: 32.2 km/h on Dec 23	Hours in Service: 744
Minimum Speed Value: 1 km/h on Dec 17 05:00	Minimum Daily Speed Average: 5.9 km/h on Dec 3	Hours of Data: 735
Maximum Diurnal Speed Average: 15.9 km/h at hour 17	Minimum Diurnal Speed Average: 12.4 km/h at hour 1	Hours of Missing Data: 9
Monthly Average Velocity: 13.8 km/h 197.9 deg	Percentiles: P ₁ = 3 P ₁₀ = 10 Q ₁ = 16 Median = 23 Q ₃ = 28 P ₉₀ = 34 P ₉₉ = 40	Percent Operational Time: 98.8

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Dec	WSW15	W19	SW9	SW8	S5	SSE8	SSE14	SSE18	S24	S27	SSE25	SSE25	SSE25	SSE27	SSE28	SSE24	SSE22	SE25	SSE32	SSE36	SSE35	S33	S30	S27	SSE20.4	SSE36
2-Dec	S30	S28	S27	S28	S26	SSE27	SE22	SSE26	SSE26	SSE24	SSE20	SSE20	SSE17	SSE14	S12	SSE15	S9	W5	N15	NNW12	NNW14	NNW12	NNW11	NNW9	SSE12.1	S30
3-Dec	NNE8	NNW3	NNW4	NNE3	ESE2	NE1	SW5	SE3	SE5	ESE2	SE3	SE6	SE5	SE6	SE9	ESE4	ESE4	ESE7	SE12	SE15	SE16	SE16	SE20	SE20	SE5.9	SE20
4-Dec	SE17	SE21	SSE26	SSE27	SSE23	S23	S26	S29	SSW21	SSW13	SW14	WSW15	WSW16	WSW16	SW13	SW17	SW20	SW17	S13	S17	S16	S19	S24	SSE25	S16.7	S29
5-Dec	SSE30	SSE28	SE24	SE30	SE27	SE24	SE26	SE26	SE24	SSE24	SSE28	SSE29	S28	S21	S17	SSW21	SW22	SW23	SW20	SW28	SW19	SW17	SW26	SSW16	S19.8	SSE30
6-Dec	SW24	SW27	WSW29	WSW30	WSW28	WSW29	WSW27	WSW27	SW17	SW20	SW14	WSW23	WSW25	WSW28	WSW29	SW32	SW28	SW31	SW26	SW20	SW29	WSW28	WSW18	SW12	SW24.7	SW32
7-Dec	WSW18	WSW21	WSW25	WSW15	WSW12	SW12	SW8	WSW11	SW10	SSW14	SW6	S6	S15	S12	S5	SW8	SW16	WSW22	WSW21	WSW22	WSW24	WSW22	WSW19	WSW15	WSW13.6	WSW25
8-Dec	WSW20	W22	WSW27	WSW21	WSW19	WSW11	WSW11	WSW12	WSW14	WSW7	WSW7	WSW10	SW9	WSW5	SSW8	SW12	WSW16	SW14	SW12	SW11	SW13	SSW16	SW16	SSW15	WSW12.7	WSW27
9-Dec	SSW10	SSW12	SW20	SW19	WSW12	WSW14	SW12	SSW14	S16	S18	S23	S21	SSE21	SSE22	S20	S24	S25	S27	S28	SSE28	SSE27	SSE28	SSE31	SSE28	S18.7	SSE31
10-Dec	SE26	SE25	SE28	SE28	SE27	SE27	SE29	SSE30	SSE31	SSE33	S23	SW18	WSW22	WSW30	WSW28	WSW33	W42	W46	W57	WNW42	WNW34	WNW40	WNW45	WNW40	SW15.2	W57
11-Dec	NW35	NW35	NNW40	NNW44	NNW40	NNW36	W37	W30	WSW29	WSW22	WSW22	WSW20	WSW12	SSW9	SSE11	S16	S23	S26	S24	S24	S23	S20	S21	S20	WSW15.6	WNW44
12-Dec	S18	S14	SSW12	S11	S11	S11	S12	SSE20	SSE29	SSE32	SSE34	SSE30	SSE34	SSE34	SSE33	SSE36	SSE36	SSE37	S39	S38	S30	SSW34	SSW29	SSW28	S25.7	S39
13-Dec	SW30	SW32	SW29	SW32	SW33	SW28	SW23	SW25	SW28	SW26	SSW22	SSW24	SSW25	S26	SSW20	SW21	SW23	SSW36	SSW32	SSW31	SSW28	SW16	SSW26	WSW20	SSW25.9	SSW36
14-Dec	WSW20	W23	W25	WSW31	WSW30	WSW29	W34	WSW31	WSW38	WSW39	W36	W28	WSW15	SW9	SW17	SW23	SW26	WSW27	WSW22	WSW17	S8	S13	S13	SSW15	WSW22.0	WSW39
15-Dec	SSW20	S28	S29	S30	S28	S27	SSW27	SSW24	S29	S29	S34	S36	SSW29	S28	S37	S34	S32	SSW38	S38	S39	SSW34	SSW26	SSW27	SW19	S29.8	S39
16-Dec	SW23	WSW36	W36	W35	W42	WNW36	NNW36	W36	W39	W33	NW25	N16	N18	NNE11	NNE9	NNE11	NNE15	N8	NNE9	NE9	ENE2	SW4	S6	SW9	WNW14.6	W42
17-Dec	N18	N24	N15	NNW6	SW1	S4	S10	SW10	WSW12	SSW9	S20	S19	S17	S16	SSW16	SSE16	S22	DF	DF	DF	DF	DF	DF	DF	---	N24
18-Dec	DF	DF	WSW25	WSW27	WSW19	WSW24	W27	WSW18	WSW20	WSW29	WSW31	W28	WSW31	W33	W31	W23	W24	W23	WNW29	WNW35	WNW26	NNE27	NNE27	N29	W20.9	WNW35
19-Dec	N27	N23	N24	N18	N17	NNE15	NNE14	NE12	ENE9	E5	E7	E9	ESE6	E8	E14	ESE17	ESE15	ESE14	SE22	SE24	SE25	SE28	SE26	SE29	E10.5	SE29
20-Dec	SE32	SE31	SE33	SE36	SE36	SE33	SE32	SE31	SE26	SE26	SE27	SE20	SE20	SE17	SE23	SE25	SSE29	SSE32	SSE29	SSE30	SSE34	S31	SSW27	WSW27	SE26.5	SE36
21-Dec	WSW39	WSW39	WSW34	WSW30	W33	WSW27	WSW27	SW28	SW28	SSW19	SSW19	S19	SSE26	SSE31	SSE30	SSE34	SSE37	SSE35	S27	S23	SSW25	S24	S25	S28	SSW22.5	WSW39
22-Dec	S25	S24	S18	S26	SSE24	SSE27	SSE25	SE22	SE19	SE23	SE23	SE28	SE22	SE17	SE21	SE21	SE22	SSE19	SSE22	S27	S28	SSW17	WSW24	WSW30	SSE19.4	WSW30
23-Dec	WSW37	WSW38	WSW35	W36	W35	W37	W34	W34	W30	W30	W33	W38	W38	W36	W35	W25	W28	W27	W23	WSW28	WSW26	WSW33	WSW32	WSW32	W32.2	WSW38
24-Dec	WSW31	WSW25	WSW23	SSW14	S19	S21	SSE18	S22	S19	SSW17	SSW20	S20	SSW17	SSW18	S11	SSW16	SW14	SW10	SSW14	SSW17	SSW19	SSW20	SSW21	SSW20	SSW17.4	WSW31
25-Dec	S25	S27	S23	S26	S28	SSW22	SSW27	SSW21	S20	SSW26	S27	S23	SSE21	SSE23	SSE27	S24	S25	S20	SSE18	S25	SSE28	SE28	SE22	SE29	S22.9	SE29
26-Dec	SE21	SE29	SSE26	SE32	SE32	SE24	SE26	SE26	SE25	SE25	SE17	SSE19	SSE23	SSE35	SSE37	S34	S19	SSW18	S19	SW21	SW30	SSW33	SSW39	SSE23.2	SSW39	
27-Dec	SW37	SW38	SW39	SW35	SSW32	SSW40	SSW35	SW33	SW22	SSW26	SSW19	S16	S15	SSE15	SSE20	SSE18	SE19	SE25	ESE14	ESE11	SE11	ESE8	NE8	NE6	SSW16.9	SSW40
28-Dec	NNE8	NE12	NNE6	N9	NNE12	NNE11	N10	NNW15	N16	N17	N30	NNW18	N17	N17	NW18	N15	NNW11	NNE19	N15	N14	N10	N12	N11	NNW9	N13.1	N30
29-Dec	N5	NW2	WSW8	WSW11	SSW6	SSE10	SSE21	S26	S24	S28	SSE28	SSE26	SSE27	S23	S28	S24	S26	S21	SSE18	SSE17	S8	SSE14	SSE18	S22	S16.9	SSE28
30-Dec	SSE20	SE16	SE16	SE19	SE24	SE17	SE13	SE12	SE21	SE22	SE26	SE26	SE27	SE28	SE29	SE32	SE40	SE35	SSE32	SSE33	SSE35	SSE35	S34	S29	SE25.0	SE40
31-Dec	S31	S31	S30	S31	S25	S28	S26	S23	S23	S16	S15	SSE19	SSE22	S18	WSW23	SW22	SW24	SW26	WSW29	WSW26	WSW26	W33	W27	WNW14	SSW19.1	W33

SSW12.4	SW12.6	SW13.8	SSW13.8	SW12.6	SSW12.8	SSW14.3	SSW15.2	SSW15.0	S13.8	S13.3	S13.3	S13.5	S14.1	S15.3	S15.8	SSW15.8	SSW14.8	SSW15.4	SSW14.8	SSW13.5	SSW13.8	SSW12.7	Diurnal Average	
WSW39	WSW39	WNW40	WNW44	W42	SSW40	W37	W36	W39	WSW39	W36	W38	W38	W36	S37	SSE37	W42	W46	W57	WNW42	SSE35	WNW40	WNW45	WNW40	Diurnal Maximum

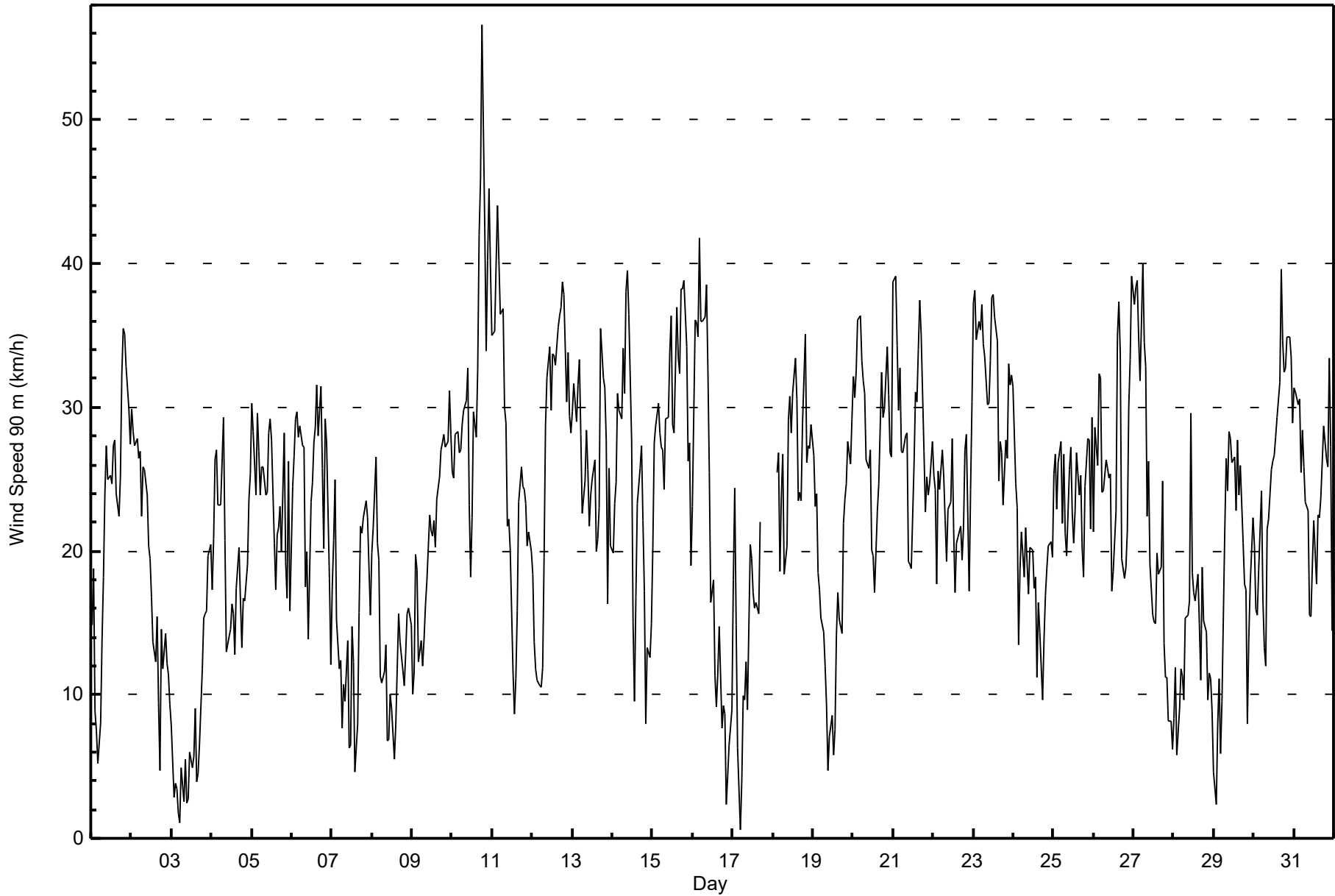
DF - DAS Failure
 All monthly, daily, and diurnal averages have been calculated using vector methods



Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 9 km/h on Dec 10 20:00			Hours of Data:	735
Minimum Value: 1 km/h on Dec 30 03:00			Hours of Missing Data:	9
			Hours of Calibration:	0
			Percent Operational Time:	98.8
Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 2 Median = 3 Q ₃ = 4 P ₉₀ = 5 P ₉₉ = 7				

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

DF - DAS Failure





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Wind Speed 90 m (WS90m) - km/h
Mannix - December 2023

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	24	3.27	3.27
6 - 11	71	9.66	12.93
12 - 19	166	22.59	35.51
20 - 28	291	39.59	75.10
29 - 38	162	22.04	97.14
> 38	21	2.86	100.00

Total Number of Valid Hours: 735

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed 90 m (WS90m) - km/h
Mannix - December 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	1	1	1	1	1	4	4	0	3	0	3	1	1	0	1	2	24
6 - 11	5	8	3	1	3	4	4	3	10	5	12	8	0	0	0	5	71
12 - 19	15	5	2	0	1	4	16	18	29	23	23	22	1	1	1	5	166
20 - 28	4	2	0	0	0	0	54	47	72	25	30	41	14	1	1	0	291
29 - 38	2	0	0	0	0	0	17	36	24	11	13	27	24	6	2	0	162
> 38	0	0	0	0	0	0	1	0	2	2	1	3	5	7	0	0	21
Totals	27	16	6	2	5	12	96	104	140	66	82	102	45	15	5	12	735

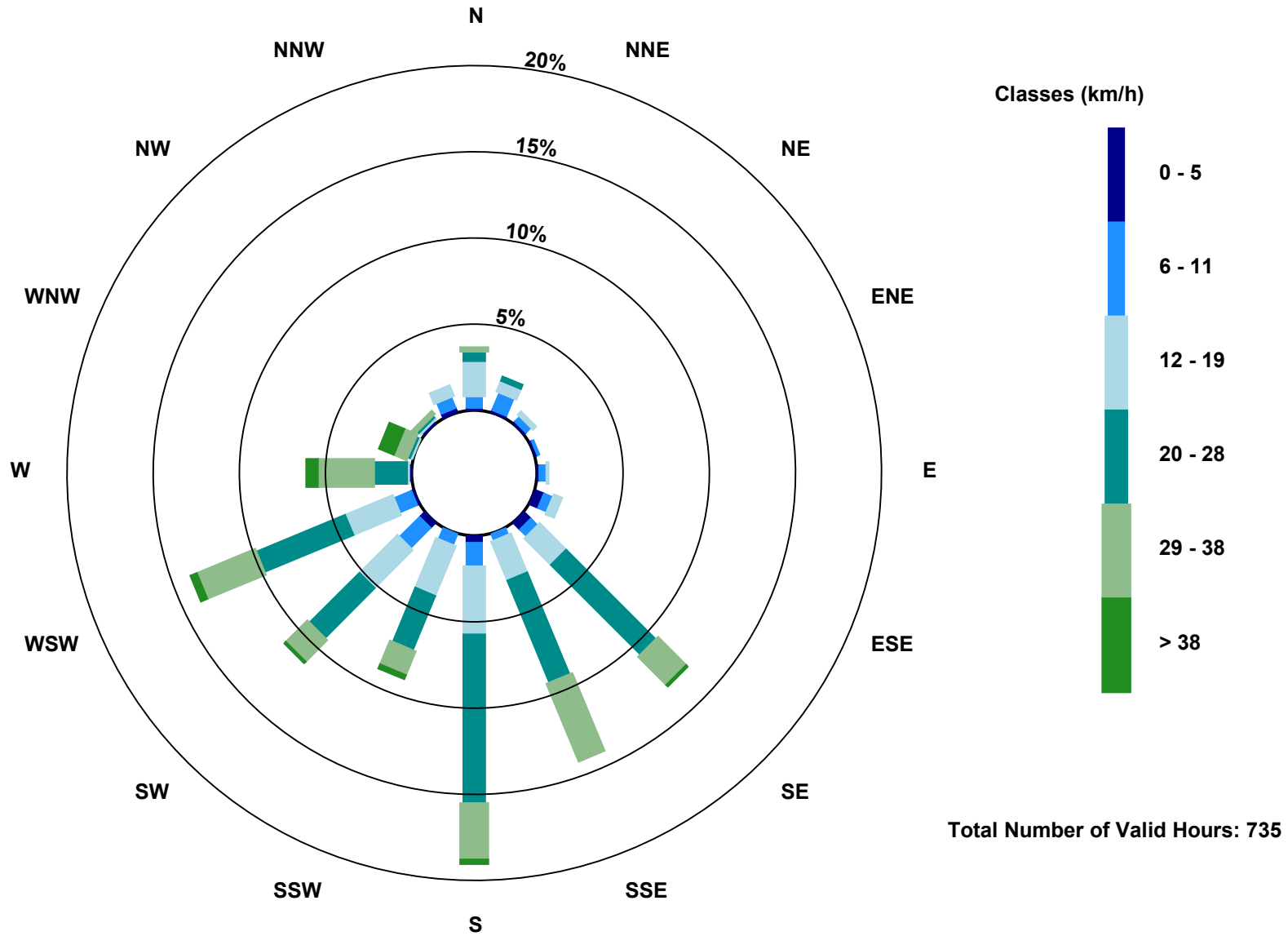
Total Number of Valid Hours: 735

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Dec 2023

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





Direction of Maximum Speed: 275 deg on Dec 10 19:00	Hours in Service: 744
Direction of Maximum Daily Speed Average: 263.5 deg on Dec 23	Hours of Data: 735
Direction of Minimum Speed: 315 deg on Dec 3 05:00	Direction of Minimum Daily Speed Average: 0.2 deg on Dec 3
	Hours of Missing Data: 9
Monthly Average Direction: 184.5 deg	Percent Operational Time: 98.8

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-Dec	265	258	215	180	161	165	149	151	164	157	151	152	154	156	150	157	167	164	155	170	163	167	155	165	164.5
2-Dec	169	166	165	167	157	150	156	173	158	166	161	164	163	161	166	168	222	303	354	301	311	344	329	329	169.8
3-Dec	6	331	357	24	315	342	255	88	147	188	150	169	145	164	172	13	6	339	9	265	293	111	228	192	347.3
4-Dec	203	175	161	153	151	150	153	159	159	156	157	166	185	199	182	188	184	169	156	157	163	157	151	151	162.5
5-Dec	153	152	180	150	169	163	161	163	171	163	162	154	149	149	146	148	159	158	152	215	207	207	227	159	167.3
6-Dec	188	192	219	233	242	238	231	239	166	188	155	251	245	240	239	221	207	212	219	179	204	212	235	181	220.0
7-Dec	242	230	222	179	188	175	166	207	166	158	155	161	162	154	163	175	197	235	238	242	252	254	243	257	200.0
8-Dec	251	240	250	230	214	169	146	161	161	152	174	170	155	159	161	165	185	168	170	162	163	162	165	156	173.0
9-Dec	155	169	215	207	161	164	165	154	154	155	156	160	149	153	151	160	160	164	164	158	159	157	158	158	161.8
10-Dec	152	166	153	155	157	160	160	157	153	157	159	160	253	246	251	256	269	267	275	289	292	297	297	305	245.7
11-Dec	312	313	303	296	294	283	277	264	260	246	248	256	234	195	151	152	167	163	164	150	150	150	154	163	253.4
12-Dec	160	161	158	155	157	158	160	155	152	153	154	162	161	159	158	159	153	152	154	157	156	162	160	164	157.5
13-Dec	161	185	210	227	217	193	166	161	180	171	152	154	151	153	155	158	160	165	166	174	183	181	199	214	176.8
14-Dec	244	259	259	250	252	255	264	259	253	261	271	262	246	214	205	213	219	239	240	200	151	156	161	155	240.7
15-Dec	158	159	162	164	163	157	154	158	155	159	163	189	199	189	182	178	182	194	190	188	190	182	197	198	175.8
16-Dec	225	250	262	260	275	289	282	272	262	285	323	16	12	11	15	17	9	348	1	21	340	259	204	180	289.2
17-Dec	9	347	351	314	176	155	155	144	165	154	158	152	153	157	149	146	156	DF	DF	DF	DF	DF	DF	DF	--
18-Dec	DF	DF	210	225	198	238	261	219	217	239	247	265	256	261	279	263	266	263	282	277	305	24	17	14	271.5
19-Dec	14	9	7	347	355	9	31	42	69	115	106	93	103	88	103	108	116	131	135	134	133	134	133	133	95.5
20-Dec	133	135	136	135	137	137	137	139	142	141	143	144	142	151	143	148	148	150	152	160	161	159	169	206	145.0
21-Dec	248	259	258	253	263	250	233	227	228	167	162	141	146	154	163	156	152	160	170	155	159	148	161	165	195.4
22-Dec	160	163	153	159	150	151	147	163	184	174	177	166	171	167	161	192	167	188	169	163	168	161	218	257	169.8
23-Dec	250	254	258	273	275	271	272	266	264	263	265	265	263	269	271	273	272	259	265	248	249	250	254	241	263.5
24-Dec	246	220	207	158	152	157	150	152	152	154	153	154	154	152	150	164	155	151	149	162	172	161	162	156	162.8
25-Dec	162	158	157	157	162	151	171	157	147	157	155	153	154	149	147	159	151	154	152	149	151	163	170	165	156.1
26-Dec	177	158	171	147	149	167	160	150	164	159	156	157	149	159	158	160	157	151	152	154	152	159	155	179	158.0
27-Dec	220	235	226	216	190	196	202	209	171	184	148	139	148	151	153	159	147	149	150	134	162	37	23	24	183.0
28-Dec	19	62	323	343	4	327	297	337	4	4	17	317	350	5	316	356	340	21	349	342	332	348	330	300	350.4
29-Dec	311	260	242	182	168	156	155	163	159	162	155	158	165	160	163	157	159	154	151	193	193	186	167	151	165.5
30-Dec	153	168	161	166	164	166	168	182	184	168	155	175	168	169	157	153	137	149	161	156	164	154	168	161	161.0
31-Dec	162	159	159	159	157	157	158	158	155	156	153	149	144	144	168	215	184	183	213	245	259	257	276	314	176.3

199.1 205.4 210.4 199.0 195.0 189.7 191.7 185.5 181.3 178.4 172.6 176.9 176.6 177.9 176.2 174.1 175.8 179.1 184.6 184.2 184.0 176.9 185.0 180.7

Diurnal Average

DF - DAS Failure

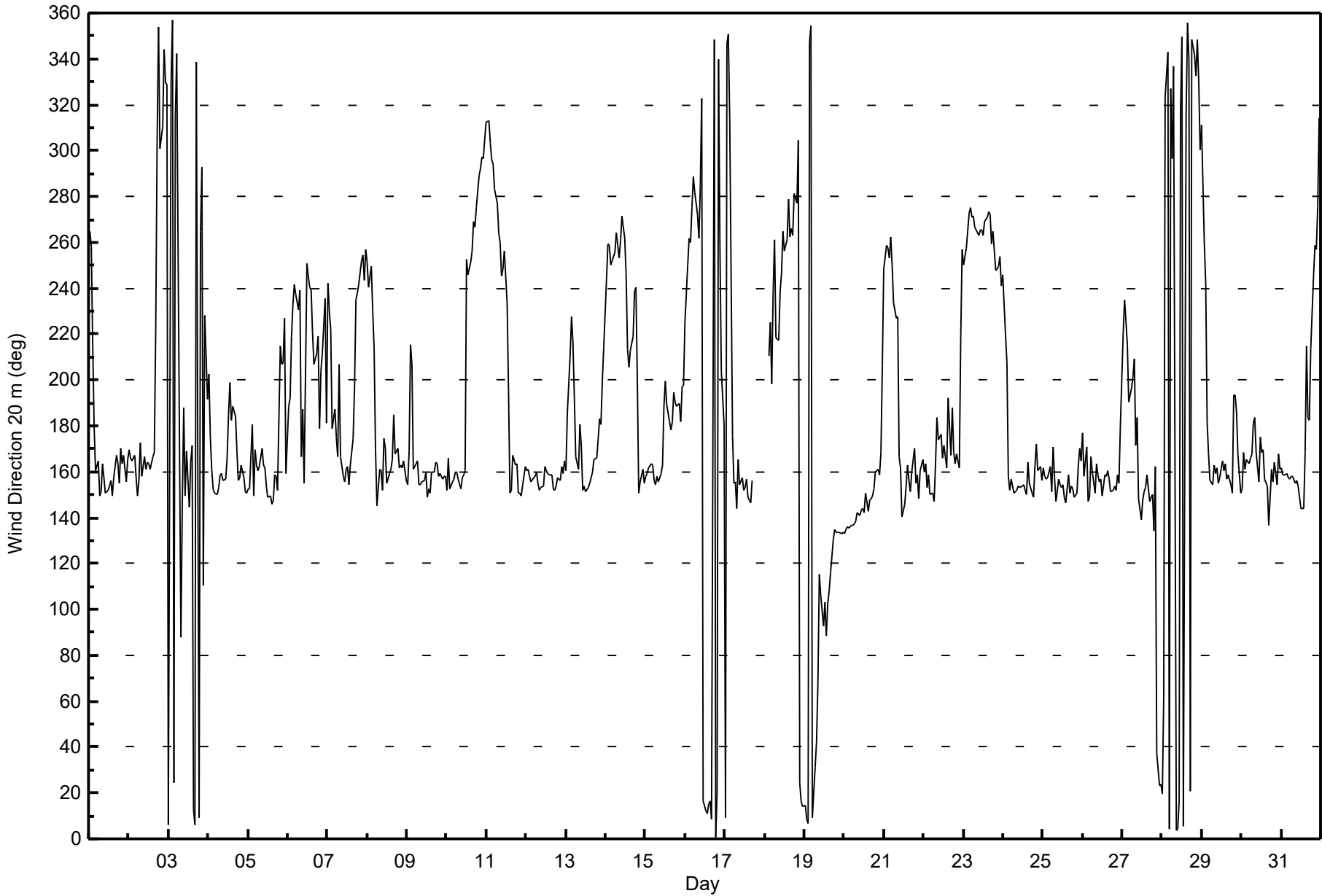
All monthly, daily, and diurnal averages have been calculated using vector methods



Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0	Hours in Service: 744
Maximum Value: 96 deg on Dec 3 20:00	Hours of Data: 735
Minimum Value: 4 deg on Dec 31 02:00	Hours of Missing Data: 9
Percentiles: P ₁ = 5 P ₁₀ = 6 Q ₁ = 8 Median = 9 Q ₃ = 15 P ₉₀ = 26 P ₉₉ = 71	Hours of Calibration: 0
	Percent Operational Time: 98.8

Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Dec	8	7	43	25	6	8	11	11	10	11	9	9	8	9	7	6	5	5	10	8	5	8	6	8	43
2-Dec	5	5	7	7	10	7	10	14	14	6	5	7	9	10	9	13	16	73	10	11	27	27	20	31	73
3-Dec	19	28	22	33	79	61	55	44	33	43	25	22	32	43	67	31	49	40	39	96	61	36	18	25	96
4-Dec	19	10	11	8	8	9	7	9	7	8	9	10	18	14	12	11	11	10	8	9	6	7	8	7	19
5-Dec	9	10	14	9	22	22	17	9	17	17	9	12	11	18	11	11	7	15	37	13	27	39	15	21	39
6-Dec	17	10	8	11	10	9	10	11	34	17	17	61	10	9	9	10	10	9	29	8	10	29	95	35	95
7-Dec	8	7	18	28	19	13	22	14	9	8	17	7	6	16	9	12	13	7	4	5	8	7	16	79	79
8-Dec	10	40	10	24	20	20	16	6	7	10	12	11	13	8	7	15	10	15	17	5	4	5	5	11	40
9-Dec	9	9	18	19	7	14	8	8	8	7	7	8	9	8	8	8	5	7	7	7	9	9	6	7	19
10-Dec	7	13	7	7	5	11	6	9	12	14	9	9	33	12	12	11	8	7	8	13	14	12	11	10	33
11-Dec	10	11	9	8	9	10	8	7	8	10	8	9	15	24	8	7	8	6	7	9	9	8	5	11	24
12-Dec	16	8	7	5	7	8	6	10	8	9	8	7	8	8	8	11	8	6	6	8	7	5	5	5	16
13-Dec	6	31	14	11	11	23	20	9	16	8	9	6	8	8	6	6	11	8	15	11	11	10	12	23	31
14-Dec	11	19	13	8	10	10	8	11	11	9	9	10	22	20	15	9	9	7	9	25	7	5	5	8	25
15-Dec	12	7	5	5	6	6	6	6	6	6	8	17	14	15	13	12	16	14	14	15	15	17	26	25	26
16-Dec	29	11	9	9	13	9	9	8	9	11	31	12	9	13	14	13	10	17	23	22	72	16	26	69	72
17-Dec	14	14	13	23	72	12	10	15	21	10	9	9	9	8	7	9	9	DF	DF	DF	DF	DF	DF	DF	72
18-Dec	DF	DF	13	16	40	29	11	30	15	13	9	9	10	9	13	11	18	7	6	41	13	11	12	41	
19-Dec	13	10	12	18	18	9	13	15	16	25	26	15	28	22	13	10	15	12	8	9	9	9	8	28	
20-Dec	8	9	9	8	8	8	8	8	9	10	9	9	10	9	10	11	8	8	10	9	8	7	10	30	30
21-Dec	10	8	9	9	9	14	7	9	7	27	7	9	9	8	6	7	8	8	13	20	18	7	5	5	27
22-Dec	5	6	8	6	6	7	8	4	12	14	13	9	12	9	14	19	17	16	14	9	8	8	34	11	34
23-Dec	12	11	9	9	9	8	10	10	11	9	9	8	9	8	7	9	6	9	12	8	7	9	9	8	12
24-Dec	6	23	22	6	8	8	8	8	7	8	7	7	7	7	9	4	7	12	7	6	5	6	5	5	23
25-Dec	5	6	6	5	6	12	9	10	9	10	8	8	8	8	7	6	7	6	8	7	6	26	22	32	32
26-Dec	15	10	20	9	9	20	5	10	11	8	8	9	9	9	7	7	6	8	6	7	8	7	8	14	20
27-Dec	16	9	9	10	14	11	12	12	29	10	38	9	12	15	8	8	8	11	10	32	62	19	20	11	62
28-Dec	23	11	41	36	37	70	61	24	27	13	16	35	16	37	15	19	25	15	19	22	28	19	27	25	70
29-Dec	24	43	4	37	9	20	9	7	7	11	8	10	8	7	8	8	7	7	11	21	54	8	11	14	54
30-Dec	11	6	12	8	8	5	7	13	13	19	9	28	11	12	9	28	7	13	8	8	5	8	6	7	28
31-Dec	5	4	5	5	5	6	6	6	7	7	6	8	9	9	23	35	10	12	14	71	11	9	9	23	71
Diurnal Maximum																									
29 43 43 37 79 70 61 44 34 43 38 61 33 43 67 35 49 73 39 96 72 39 95 79																									

DF - DAS Failure





Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Direction 45 m (WD45m) - deg

Mannix - December 2023

Direction of Maximum Speed: 270 deg on Dec 10 19:00	Hours in Service: 744
Direction of Maximum Daily Speed Average: 258.4 deg on Dec 23	Hours of Data: 732
Direction of Minimum Speed: 31 deg on Dec 3 05:00	Hours of Missing Data: 12
Direction of Minimum Daily Speed Average: 2.0 deg on Dec 3	Percent Operational Time: 98.4
Monthly Average Direction: 181.7 deg	

Day	Hourly Period Ending At (MST)																								Daily Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Dec	258	257	226	190	155	157	144	150	159	154	147	146	149	154	147	146	160	163	156	155	153	164	162	169	160.2
2-Dec	168	159	158	162	159	144	136	165	156	156	147	151	156	159	169	164	191	270	353	312	319	338	326	328	160.1
3-Dec	2	327	347	30	31	333	245	92	144	162	149	162	138	156	164	17	17	48	109	128	149	131	161	153	131.2
4-Dec	163	167	160	148	150	150	152	159	164	171	173	191	224	227	193	194	202	193	159	158	159	156	150	141	164.7
5-Dec	137	142	160	144	143	139	134	149	157	UO	UO	UO	152	151	150	155	171	182	184	216	213	208	224	168	162.7
6-Dec	207	210	228	233	238	236	232	238	209	211	194	244	242	237	236	218	206	211	220	197	216	230	251	204	224.2
7-Dec	241	235	235	227	213	210	199	227	198	160	156	155	152	150	159	177	217	240	244	250	253	253	245	258	214.3
8-Dec	252	253	253	252	243	217	200	203	217	178	195	185	154	157	156	173	219	201	193	169	176	159	185	163	197.3
9-Dec	152	175	220	217	197	206	180	164	151	151	153	155	146	150	154	158	165	166	159	154	153	151	145	153	162.1
10-Dec	139	149	141	140	140	145	148	147	146	152	159	170	250	242	248	254	265	262	270	283	288	291	291	299	233.4
11-Dec	308	310	298	291	289	279	272	260	255	246	244	250	231	194	145	152	169	162	164	151	151	149	154	156	241.4
12-Dec	153	156	159	156	159	160	158	153	151	150	148	152	162	163	157	155	144	142	153	158	158	166	175	174	156.6
13-Dec	185	205	212	225	217	204	201	185	202	185	165	155	164	162	171	188	184	173	171	178	186	187	196	218	188.3
14-Dec	247	257	258	249	250	253	260	254	249	255	265	259	245	211	206	211	221	238	245	225	154	152	160	155	236.5
15-Dec	168	164	162	161	159	159	163	162	159	163	168	185	194	185	178	173	178	189	185	184	186	181	198	202	175.0
16-Dec	227	247	257	256	271	285	278	269	258	279	316	11	10	9	14	15	9	351	2	26	15	256	202	188	284.1
17-Dec	3	343	347	319	111	147	152	161	189	156	155	151	151	154	157	144	160	DF	DF	DF	DF	DF	DF	DF	--
18-Dec	DF	DF	230	240	234	248	257	230	231	237	243	260	252	257	273	261	266	267	279	276	300	18	12	9	268.3
19-Dec	9	5	3	351	356	8	26	37	62	107	97	88	100	83	98	102	110	122	129	127	127	128	126	128	86.7
20-Dec	127	129	131	131	131	132	132	134	137	137	139	139	137	143	138	142	143	145	147	155	156	158	177	228	141.5
21-Dec	245	255	254	251	259	248	233	219	221	172	161	141	144	150	159	153	149	157	174	170	178	164	173	169	193.7
22-Dec	166	167	155	159	150	148	138	142	162	161	164	158	159	150	142	158	151	167	167	163	169	169	243	253	162.9
23-Dec	248	250	253	268	270	266	267	262	259	259	260	260	258	264	266	268	268	257	259	242	251	249	247	238	258.4
24-Dec	241	229	216	161	153	159	147	150	152	152	161	154	153	157	150	171	175	164	168	176	178	170	168	161	168.4
25-Dec	159	154	157	160	168	162	175	167	151	162	158	152	151	144	144	159	156	164	152	150	138	143	142	140	154.9
26-Dec	156	149	163	140	139	154	146	141	148	148	147	146	145	153	155	157	154	152	154	152	166	199	179	184	155.0
27-Dec	220	231	224	216	194	194	201	212	193	198	171	140	145	148	147	152	133	136	133	123	143	69	27	33	181.5
28-Dec	39	63	345	359	8	350	321	334	358	0	11	320	347	359	314	350	337	15	350	341	339	350	338	310	352.6
29-Dec	331	295	254	220	170	150	150	156	155	158	150	146	163	160	162	161	156	153	144	156	144	158	159	162	158.5
30-Dec	156	161	157	167	162	158	153	154	168	168	132	151	154	155	135	135	130	142	154	146	152	150	161	161	151.9
31-Dec	165	162	157	157	156	155	155	156	155	157	155	148	140	143	210	226	190	197	225	242	255	254	272	305	177.8

194.0 199.0 205.6 195.5 190.1 186.1 184.5 181.4 180.1 177.4 170.4 171.9 172.2 172.9 172.5 172.4 175.3 179.6 181.6 180.5 180.3 178.6 186.1 181.4

Diurnal Average

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



Summary of Hour Standard Deviations

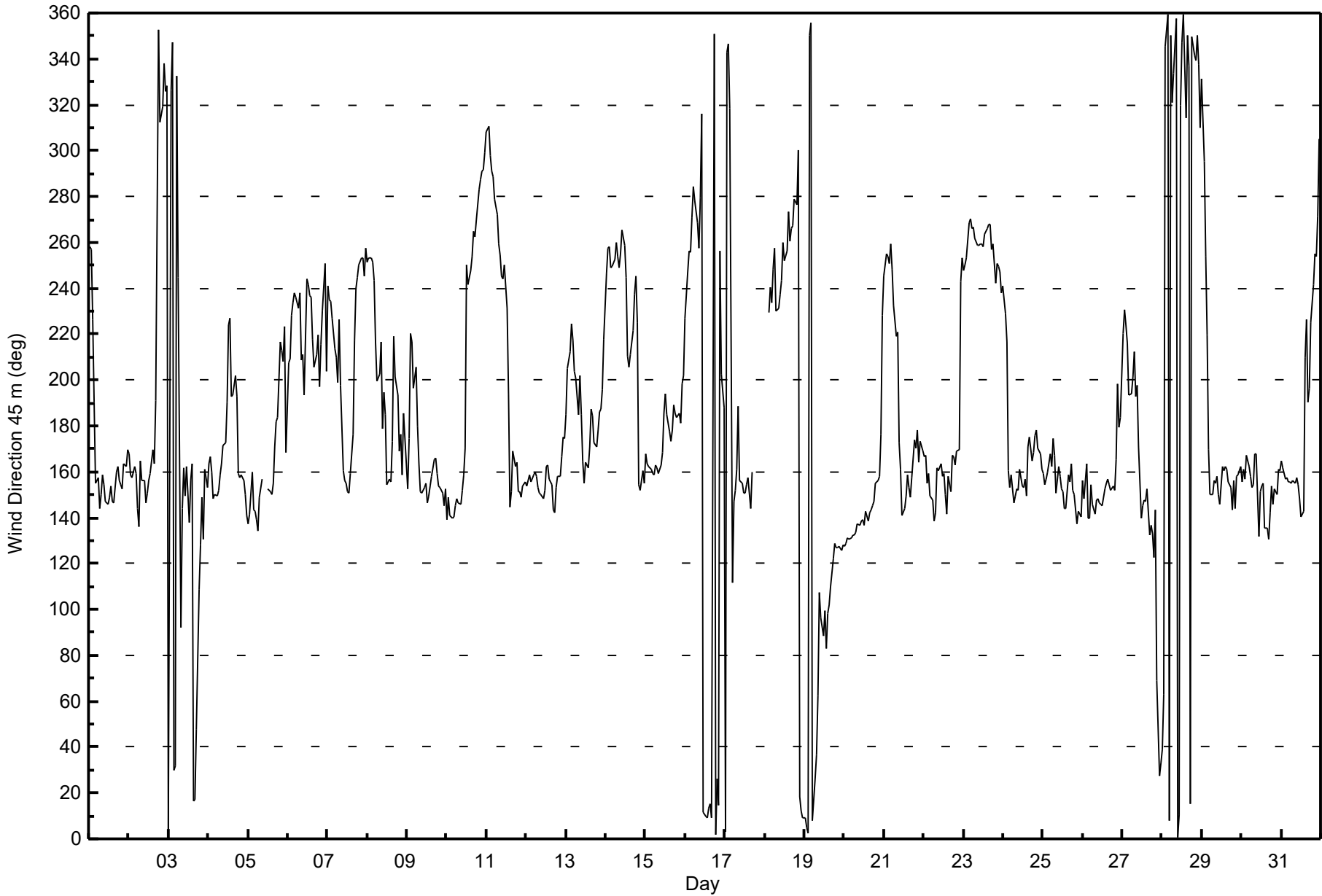
Mannix - December 2023

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 97 deg on Dec 3 05:00 Minimum Value: 2 deg on Dec 31 08:00 Percentiles: P ₁ = 2 P ₁₀ = 4 Q ₁ = 5 Median = 7 Q ₃ = 11 P ₉₀ = 18 P ₉₉ = 56																	Hours in Service: 744 Hours of Data: 732 Hours of Missing Data: 12 Hours of Calibration: 0 Percent Operational Time: 98.4								
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Dec	7	5	21	27	4	4	8	8	5	6	6	6	6	6	5	4	2	2	4	4	4	4	3	4	27
2-Dec	3	4	2	5	6	5	6	10	8	4	4	5	7	8	8	6	9	78	7	10	13	17	11	29	78
3-Dec	17	29	19	18	97	69	38	45	24	37	23	19	27	33	57	53	54	51	33	20	72	23	12	8	97
4-Dec	8	5	5	4	3	5	4	6	3	5	7	15	11	10	13	8	6	9	5	5	3	3	5	4	15
5-Dec	8	12	12	11	7	9	7	7	11	UO	UO	UO	8	12	10	7	12	17	29	10	19	32	12	25	32
6-Dec	9	6	5	7	7	6	6	7	24	12	23	16	8	6	6	7	6	4	7	8	6	11	35	27	35
7-Dec	7	5	7	15	10	9	10	8	13	13	18	4	4	13	6	16	10	4	3	6	5	4	7	15	18
8-Dec	5	8	4	5	8	15	23	15	12	9	14	17	16	5	4	28	7	15	20	7	9	4	10	13	28
9-Dec	8	9	15	7	8	16	9	11	4	4	5	6	7	5	5	8	2	3	6	4	4	5	4	4	16
10-Dec	11	7	7	4	2	9	4	5	9	10	6	13	13	10	9	8	6	6	7	12	12	9	8	7	13
11-Dec	8	8	6	6	7	8	7	6	6	8	5	7	15	20	8	5	6	3	5	7	4	4	2	3	20
12-Dec	7	3	3	2	4	3	3	5	4	6	4	7	4	4	5	7	5	5	4	5	4	4	7	6	7
13-Dec	9	14	9	8	6	14	14	14	11	12	13	4	5	7	7	12	14	5	11	7	6	11	10	21	21
14-Dec	8	13	12	6	7	7	6	9	8	7	8	8	18	15	10	3	8	5	6	19	9	3	4	4	19
15-Dec	11	6	3	3	5	6	7	8	3	3	6	10	8	9	7	8	10	8	7	8	9	13	18	19	19
16-Dec	20	9	7	6	12	7	7	7	7	9	29	8	7	10	11	9	7	12	25	22	91	16	19	66	91
17-Dec	11	9	9	18	88	10	6	19	14	8	5	5	5	4	6	5	6	DF	DF	DF	DF	DF	DF	DF	88
18-Dec	DF	DF	5	7	20	13	8	17	9	6	7	7	6	8	7	10	8	11	5	5	40	9	9	7	40
19-Dec	9	7	9	14	13	6	9	10	13	25	23	14	26	20	10	8	13	11	7	7	6	6	6	6	26
20-Dec	7	7	7	6	6	7	6	7	8	8	7	8	8	7	7	7	5	6	8	7	6	6	14	13	14
21-Dec	7	6	7	6	7	11	5	7	5	27	8	7	5	5	5	5	5	6	8	13	11	7	6	3	27
22-Dec	4	4	4	4	4	3	3	3	10	6	7	7	6	6	8	10	9	10	9	6	4	16	17	7	17
23-Dec	9	9	8	7	7	7	8	8	9	8	7	7	7	6	6	7	5	6	8	4	4	3	6	5	9
24-Dec	2	9	12	7	5	5	5	4	4	4	5	4	3	8	5	10	5	6	10	7	2	4	3	3	12
25-Dec	2	3	5	2	3	9	6	5	8	9	6	6	5	5	4	5	4	4	3	7	3	11	10	16	16
26-Dec	6	5	11	4	6	11	5	6	8	5	5	7	6	6	5	4	4	3	3	3	10	10	11	8	11
27-Dec	14	7	6	6	11	6	6	6	19	7	30	7	8	15	6	6	5	7	8	14	22	30	19	9	30
28-Dec	13	8	29	18	14	39	47	14	20	9	9	31	13	31	12	17	20	12	14	17	21	15	20	21	47
29-Dec	17	42	4	52	14	10	6	4	3	10	5	7	5	5	4	6	3	4	7	5	10	5	4	9	52
30-Dec	8	3	4	5	3	3	4	7	11	13	4	14	5	11	6	10	5	11	7	5	3	4	4	5	14
31-Dec	4	3	3	3	2	2	3	2	2	4	3	5	6	10	24	16	5	11	7	16	8	6	7	17	24
																	Diurnal Maximum								
																	20 42 29 52 97 69 47 45 24 37 30 31 27 33 57 53 54 78 33 22 91 32 35 66								
DF - DAS Failure																	UO - Unstable Operation								



Wood Buffalo Environmental Association
Hourly Averages

Wind Direction 45 m (WD45m) - deg
Mannix - December 2023





Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Direction 75 m (WD75m) - deg

Mannix - December 2023

Direction of Maximum Speed: 272 deg on Dec 10 19:00		Hours in Service: 744
Direction of Maximum Daily Speed Average: 260.3 deg on Dec 23		Hours of Data: 733
Direction of Minimum Speed: 160 deg on Dec 17 05:00		Hours of Missing Data: 11
Direction of Minimum Daily Speed Average: 4.8 deg on Dec 3		Percent Operational Time: 98.5
Monthly Average Direction: 191.9 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-Dec	255	259	219	209	167	160	153	159	167	166	157	149	153	160	160	151	148	151	152	153	158	168	172	174	163.8
2-Dec	174	168	170	175	171	154	140	157	153	150	152	149	158	162	172	164	181	270	355	334	333	345	334	340	162.8
3-Dec	13	340	341	40	106	30	239	124	141	137	149	152	133	143	149	130	99	124	133	138	140	141	149	141	135.3
4-Dec	142	149	152	158	162	165	164	170	187	193	203	239	250	250	222	210	214	209	178	176	174	171	166	157	177.8
5-Dec	151	148	145	140	135	134	133	141	146	UO	UO	159	164	164	175	187	203	207	212	223	223	217	227	191	170.3
6-Dec	222	225	236	238	241	239	236	241	231	226	225	247	243	238	238	221	212	218	223	211	226	241	255	224	231.6
7-Dec	244	242	242	248	232	226	223	243	221	190	194	173	164	161	168	204	232	245	251	254	255	255	248	257	231.3
8-Dec	255	258	255	254	254	245	245	240	239	231	231	228	209	202	177	204	235	223	226	202	209	182	214	199	229.2
9-Dec	176	192	230	228	230	232	211	196	172	161	163	163	157	160	170	170	176	174	166	161	157	153	149	148	172.4
10-Dec	137	140	137	136	137	140	144	150	151	155	169	205	252	243	251	256	267	265	272	284	289	293	294	301	230.3
11-Dec	312	314	301	295	292	282	274	262	256	250	247	251	234	199	154	171	177	173	172	163	166	165	168	170	244.1
12-Dec	171	176	183	172	174	177	173	164	159	158	156	152	159	163	156	159	155	152	165	169	176	190	199	195	167.3
13-Dec	210	217	218	228	223	214	217	209	215	212	206	191	191	179	203	217	207	189	185	190	200	207	206	233	206.3
14-Dec	254	262	263	253	252	255	261	255	250	256	266	261	248	217	211	216	228	241	253	241	173	163	175	176	243.5
15-Dec	188	177	175	173	171	178	195	191	179	177	180	189	196	188	181	176	182	190	188	187	189	190	204	212	184.9
16-Dec	234	249	258	258	273	287	282	272	260	281	317	12	12	14	18	18	17	2	11	45	53	248	189	210	284.7
17-Dec	4	349	351	332	160	162	162	202	222	191	169	166	165	172	189	160	179	DF	DF	DF	DF	DF	DF	DF	--
18-Dec	DF	DF	237	246	248	252	259	238	239	243	247	262	254	259	275	264	271	273	285	283	303	20	16	13	271.0
19-Dec	12	9	6	0	4	13	30	41	65	104	98	91	104	87	100	105	113	122	131	131	131	132	129	132	81.5
20-Dec	132	133	135	135	135	136	136	138	140	139	140	140	138	144	141	144	147	149	149	157	159	166	193	235	146.4
21-Dec	248	257	256	253	262	252	239	220	221	191	183	159	152	155	162	159	155	163	180	185	190	185	186	180	200.3
22-Dec	179	182	172	170	159	157	149	141	141	146	148	148	148	141	137	148	146	158	160	174	177	196	254	256	164.8
23-Dec	250	252	255	270	272	268	269	264	261	261	261	261	259	265	269	270	270	260	261	246	255	253	250	242	260.3
24-Dec	244	236	230	190	171	178	158	168	174	179	196	177	184	187	171	199	204	198	198	198	197	189	186	182	191.5
25-Dec	173	167	169	172	181	184	193	195	171	185	175	167	161	151	151	174	168	174	162	164	148	140	138	137	166.8
26-Dec	142	137	153	136	137	147	139	137	141	142	143	146	151	153	158	158	163	168	179	175	205	221	200	195	159.2
27-Dec	227	233	227	222	206	200	209	218	211	209	195	160	160	157	150	157	132	135	128	122	134	114	37	48	192.5
28-Dec	38	55	6	8	22	15	352	340	2	4	12	331	353	4	321	355	344	18	358	351	352	359	351	328	360.0
29-Dec	347	316	254	244	192	156	156	165	167	165	153	145	163	168	167	167	168	167	157	160	172	144	155	163	164.4
30-Dec	155	142	144	148	148	135	125	130	149	152	128	136	138	139	133	135	135	143	151	148	158	156	167	171	146.3
31-Dec	175	171	168	169	168	167	166	170	170	176	169	157	150	161	231	232	210	217	238	245	257	258	275	301	193.3

203.9 207.5 211.7 205.7 199.9 197.3 196.1 193.1 190.0 189.0 184.1 180.3 179.9 179.3 181.2 182.1 185.2 188.8 191.9 190.6 191.6 191.8 199.4 195.1

Diurnal Average

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



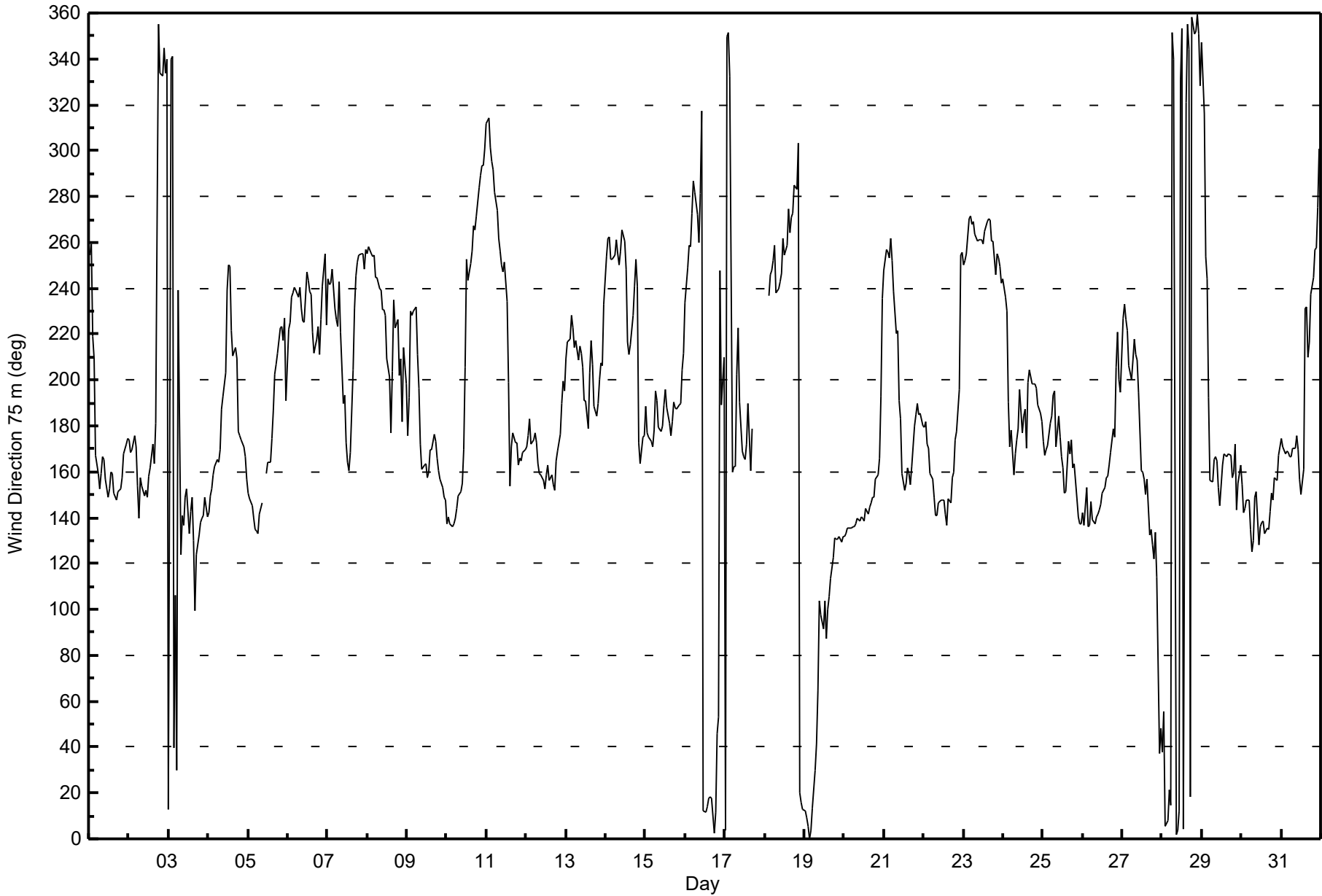
Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

Wind Direction 75 m (WD75m) - deg

Mannix - December 2023

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 92 deg on Dec 17 05:00																		Hours in Service: 744 Hours of Data: 733 Hours of Missing Data: 11 Hours of Calibration: 0 Percent Operational Time: 98.5							
Minimum Value: 2 deg on Dec 31 08:00																									
Percentiles: P ₁ = 2 P ₁₀ = 3 Q ₁ = 5 Median = 6 Q ₃ = 10 P ₉₀ = 15 P ₉₉ = 48																									
Day	Hourly Period Ending At (MST)																							Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23		24
1-Dec	5	4	21	18	11	10	5	6	2	4	5	4	3	3	4	3	2	3	3	2	3	5	3	3	21
2-Dec	3	3	4	4	7	6	4	6	7	6	5	4	6	5	6	5	12	67	4	9	12	15	8	25	67
3-Dec	18	33	22	27	53	90	38	35	16	25	24	18	21	29	24	43	89	22	13	7	11	9	6	5	90
4-Dec	6	7	4	3	2	4	3	5	10	8	12	12	7	7	12	6	5	8	10	5	3	3	5	3	12
5-Dec	5	8	7	7	3	5	4	6	10	UO	UO	11	5	8	13	8	11	12	21	8	17	30	11	24	30
6-Dec	7	5	4	7	6	6	6	6	11	8	12	11	7	5	6	6	4	3	4	5	6	6	13	21	21
7-Dec	7	4	5	8	8	7	14	7	15	12	27	9	3	9	20	22	7	3	3	4	4	4	6	8	27
8-Dec	5	4	3	3	3	8	8	11	4	12	13	15	11	19	8	21	5	12	15	13	9	12	8	13	21
9-Dec	12	10	12	5	5	10	9	13	6	5	3	5	5	4	5	7	3	3	4	3	3	6	2	3	13
10-Dec	5	4	3	2	2	5	3	4	5	8	5	19	8	8	8	7	7	6	7	12	11	8	7	7	19
11-Dec	7	8	6	5	6	6	6	5	5	7	4	6	15	18	7	7	4	3	3	4	3	3	3	4	18
12-Dec	4	4	6	9	7	5	5	4	2	4	3	6	3	7	6	4	4	4	4	6	4	6	6	6	9
13-Dec	7	7	7	7	5	8	9	11	7	8	10	8	7	4	8	6	9	4	12	9	4	16	11	16	16
14-Dec	8	11	12	5	6	6	6	8	7	7	8	7	15	14	8	3	7	4	5	8	21	4	9	5	21
15-Dec	10	9	3	4	6	13	7	11	3	3	4	8	8	7	6	7	8	7	6	7	8	12	15	15	15
16-Dec	15	8	6	6	12	6	7	7	6	9	26	7	7	8	10	7	6	16	26	18	77	25	15	71	77
17-Dec	15	6	7	15	92	19	9	23	9	17	6	4	3	10	7	8	4	DF	DF	DF	DF	DF	DF	DF	92
18-Dec	DF	DF	4	5	11	8	8	13	7	5	5	7	5	8	6	8	7	8	5	5	39	7	7	4	39
19-Dec	6	6	7	11	9	6	7	9	13	23	19	12	24	21	13	12	15	13	8	8	8	7	8	7	24
20-Dec	7	7	6	5	5	5	5	5	6	6	5	6	5	6	5	5	4	4	6	5	5	6	15	7	15
21-Dec	6	6	6	5	7	10	4	7	4	23	18	11	4	3	5	3	4	5	8	7	6	7	5	4	23
22-Dec	4	5	5	4	4	3	4	5	7	5	4	5	4	5	5	5	6	6	6	8	4	26	8	6	26
23-Dec	9	8	7	7	7	7	8	8	10	8	7	7	6	6	7	5	5	8	4	3	2	5	4	10	10
24-Dec	2	5	12	9	8	5	4	3	6	9	6	5	9	14	9	10	6	10	11	6	5	5	4	6	14
25-Dec	5	2	3	2	8	10	8	6	11	9	7	6	4	4	5	5	3	4	5	7	4	3	4	6	11
26-Dec	5	4	7	3	4	6	5	3	6	3	3	5	4	5	5	2	5	5	9	8	10	6	9	6	10
27-Dec	12	6	4	5	9	5	4	4	10	5	16	15	10	24	5	6	6	5	10	14	12	21	23	13	24
28-Dec	13	14	31	15	10	19	48	10	13	7	6	26	10	28	11	15	18	9	10	13	18	11	14	21	48
29-Dec	18	48	5	27	23	7	2	3	2	9	3	4	5	3	3	3	2	3	7	5	8	4	7	2	48
30-Dec	6	4	2	4	4	5	11	10	8	11	8	5	4	5	3	3	2	7	5	4	2	3	4	3	11
31-Dec	4	2	2	2	3	2	2	2	2	6	5	4	4	20	12	8	4	9	5	10	8	5	7	14	20
																		18 48 31 27 92 90 48 35 16 25 27 26 24 29 24 43 89 67 26 18 77 30 23 71							
Diurnal Maximum																									
DF - DAS Failure UO - Unstable Operation																									

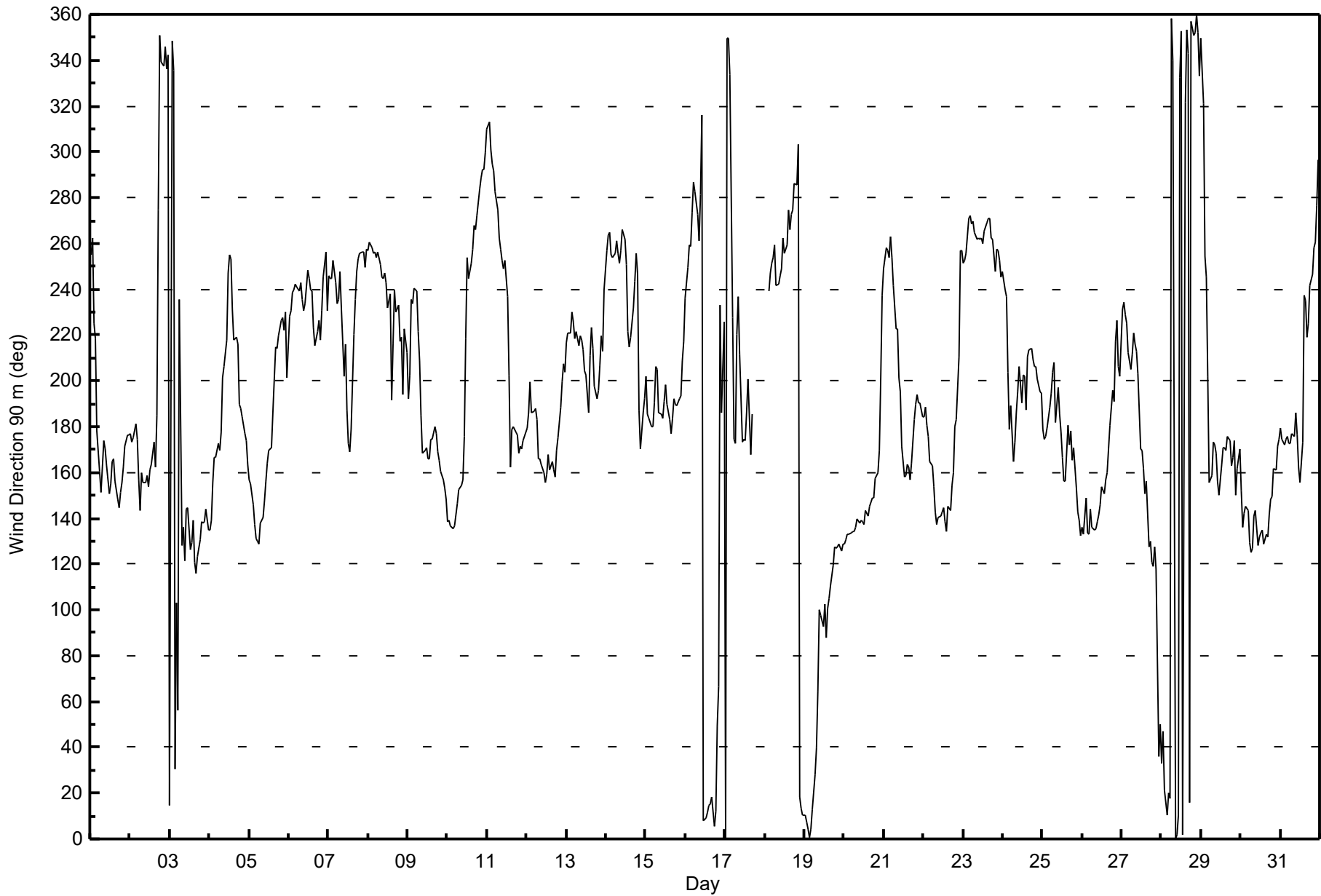




Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Direction 90 m (WD90m) - deg
Mannix - December 2023

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 103 deg on Dec 17 05:00 Minimum Value: 1 deg on Dec 1 18:00 Percentiles: P ₁ = 2 P ₁₀ = 3 Q ₁ = 4 Median = 6 Q ₃ = 9 P ₉₀ = 15 P ₉₉ = 38																	Hours in Service: 744 Hours of Data: 735 Hours of Missing Data: 9 Hours of Calibration: 0 Percent Operational Time: 98.8								
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Dec	3	4	20	13	17	23	5	6	3	3	6	4	3	4	4	3	6	1	5	2	3	7	3	3	23
2-Dec	3	3	4	4	7	6	4	5	6	6	5	4	5	4	6	4	17	55	5	7	12	14	6	22	55
3-Dec	19	37	20	33	29	57	37	38	13	23	26	17	22	26	19	27	60	15	9	5	6	7	5	5	60
4-Dec	5	5	7	2	3	5	2	7	10	8	12	8	6	6	10	5	8	11	6	5	5	5	3	3	12
5-Dec	5	7	4	7	3	2	4	4	10	4	6	10	6	8	15	8	8	10	16	8	15	27	10	23	27
6-Dec	7	5	4	6	6	5	6	6	9	7	10	10	7	5	6	6	4	3	4	5	5	6	10	18	18
7-Dec	6	4	4	5	7	6	14	7	15	11	27	10	4	13	36	24	6	3	3	4	4	4	6	7	36
8-Dec	5	4	4	3	2	4	5	6	4	11	12	10	7	17	14	19	4	11	12	13	8	13	8	8	19
9-Dec	12	10	10	5	4	8	9	11	8	9	3	6	5	4	4	6	3	3	4	2	3	6	3	2	12
10-Dec	5	3	4	2	2	3	3	5	5	8	6	16	7	7	9	7	6	6	6	11	10	7	6	6	16
11-Dec	7	7	5	5	5	6	6	5	5	6	4	6	15	17	9	6	3	3	4	3	3	3	4	4	17
12-Dec	3	6	8	13	10	10	9	7	2	5	3	5	2	7	6	4	4	4	3	8	5	5	4	5	13
13-Dec	7	6	7	6	5	7	8	9	6	6	7	7	6	5	8	6	7	4	13	9	4	18	12	15	18
14-Dec	9	10	11	5	6	6	6	7	6	7	7	7	14	14	8	4	7	4	5	6	26	7	11	8	26
15-Dec	6	9	3	6	9	15	5	10	3	4	4	7	7	7	6	7	8	7	6	6	7	12	14	14	15
16-Dec	13	8	6	6	12	6	6	7	6	9	25	6	6	7	10	6	5	19	28	15	66	30	16	32	66
17-Dec	18	5	7	15	103	30	12	21	6	20	9	6	4	10	7	10	5	DF	DF	DF	DF	DF	DF	DF	103
18-Dec	DF	DF	4	4	9	7	7	11	6	4	5	6	5	7	6	8	7	8	5	5	37	6	6	3	37
19-Dec	5	6	6	10	8	6	7	9	13	22	16	11	23	19	9	8	12	11	8	7	6	6	7	6	23
20-Dec	6	6	6	5	5	5	5	5	6	5	5	5	5	5	4	4	3	4	5	5	5	6	14	6	14
21-Dec	5	5	5	5	6	9	4	8	4	19	19	14	5	3	5	3	4	5	8	7	6	6	5	4	19
22-Dec	4	7	8	5	5	4	4	6	3	4	4	4	3	5	5	3	6	6	6	7	4	25	7	6	25
23-Dec	8	7	7	7	7	7	8	8	9	8	7	7	7	6	6	7	5	5	7	4	3	3	5	3	9
24-Dec	3	4	11	8	11	5	5	3	11	9	6	6	9	13	13	8	6	9	9	5	5	5	4	8	13
25-Dec	7	3	4	4	10	10	7	4	14	10	10	9	5	4	6	6	3	4	8	7	5	2	4	4	14
26-Dec	3	4	6	2	3	4	4	3	6	2	2	4	4	5	4	2	5	7	11	9	8	6	9	6	11
27-Dec	10	6	4	5	9	5	4	4	8	5	11	18	12	30	6	9	6	5	7	8	9	13	20	17	30
28-Dec	14	16	31	17	7	13	42	8	10	6	5	24	10	25	11	14	17	7	9	12	16	10	12	19	42
29-Dec	17	51	9	17	26	11	3	5	4	10	3	4	3	3	2	3	5	4	6	7	9	4	7	2	51
30-Dec	10	4	3	3	3	5	4	6	6	10	4	3	3	4	2	2	2	6	3	4	3	3	4	4	10
31-Dec	4	2	3	3	5	3	2	2	3	10	8	7	6	23	8	7	5	8	5	9	8	5	6	11	23
19 51 31 33 103 57 42 38 15 23 27 24 23 30 36 27 60 55 28 15 66 30 20 32																									
Diurnal Maximum																									
DF - DAS Failure																									





Maximum Value: 1.5 km/h on Dec 19 18:00 Maximum Daily Average: 0.8 km/h on Dec 20																						Hours in Service: 744 Hours of Data: 735				
Minimum Value: -0.9 km/h on Dec 11 00:00 Minimum Daily Average: -0.3 km/h on Dec 16 Maximum Diurnal Average: 0.4 km/h at hour 12 Minimum Diurnal Average: 0.1 km/h at hour 3 Monthly Average: 0.27 km/h Percentiles: P ₁ = -0.7 P ₁₀ = -0.3 Q ₁ = -0.1 Median = 0.3 Q ₃ = 0.6 P ₉₀ = 0.8 P ₉₉ = 1.0																						Hours of Missing Data: 9 Hours of Calibration: 0 Percent Operational Time: 98.8				
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Dec	0.1	0.0	0.1	0.1	0.5	0.5	0.3	0.4	0.3	0.6	0.6	0.7	0.6	0.7	0.8	0.6	0.4	0.4	0.4	0.4	0.8	0.6	0.9	0.7	0.5	0.9
2-Dec	0.5	0.7	0.7	0.7	0.7	0.6	0.4	0.3	0.5	0.5	0.4	0.5	0.4	0.3	0.3	-0.2	-0.2	-0.4	0.0	0.1	0.0	-0.1	-0.1	0.3	0.7	
3-Dec	-0.2	-0.1	-0.1	0.0	0.0	0.0	0.0	0.3	0.2	0.1	0.4	0.3	0.3	0.2	0.1	-0.1	0.0	-0.1	-0.1	0.0	-0.1	0.1	-0.1	0.1	0.4	
4-Dec	-0.1	0.3	0.5	0.5	0.5	0.6	0.7	0.7	0.7	0.4	0.2	0.1	0.2	0.1	0.2	0.0	0.1	0.1	0.5	0.5	0.7	0.7	0.5	0.4	0.4	
5-Dec	0.6	0.5	0.1	0.5	0.3	0.4	0.5	0.6	0.3	-0.3	-0.4	0.4	0.8	0.7	0.5	0.4	0.5	0.3	0.2	-0.2	-0.1	0.1	0.0	0.3	0.3	
6-Dec	0.2	0.0	-0.2	-0.1	0.0	-0.1	-0.1	0.0	0.1	0.0	0.1	0.1	0.0	-0.1	0.0	-0.1	-0.1	0.0	0.1	0.2	0.0	0.1	0.2	0.1	0.0	
7-Dec	-0.1	-0.1	0.0	0.1	0.1	0.0	0.1	0.0	0.1	0.5	0.2	0.4	0.5	0.5	0.3	0.2	-0.1	-0.1	0.0	-0.1	-0.1	-0.1	-0.1	0.0	0.1	
8-Dec	-0.1	-0.1	-0.2	0.0	0.0	0.1	0.1	0.2	0.2	0.2	0.0	0.1	0.3	0.2	0.3	0.2	0.0	0.1	0.1	0.4	0.4	0.7	0.3	0.5	0.2	
9-Dec	0.7	0.3	-0.1	-0.1	0.2	0.2	0.2	0.5	0.7	0.8	0.9	0.9	0.8	0.6	0.7	0.7	0.6	0.7	0.4	0.6	0.5	0.5	0.5	0.6	0.5	
10-Dec	0.6	0.5	0.6	0.6	0.6	0.6	0.5	0.6	0.7	0.7	0.6	0.4	0.0	-0.1	-0.2	-0.2	-0.4	-0.4	-0.5	-0.6	-0.4	-0.5	-0.9	-0.9	0.1	
11-Dec	-0.8	-0.7	-0.7	-0.8	-0.4	-0.2	-0.4	-0.2	-0.2	-0.1	-0.2	-0.1	0.0	0.1	0.6	0.6	0.6	0.6	0.6	0.8	0.9	0.8	0.7	0.5	0.1	
12-Dec	0.3	0.4	0.4	0.7	0.6	0.7	0.6	0.8	0.8	0.8	0.8	0.6	0.6	0.7	0.6	0.6	0.7	0.7	0.9	1.2	1.0	0.9	0.6	0.7	0.7	
13-Dec	0.4	0.2	0.1	0.0	0.0	0.2	0.2	0.4	0.3	0.3	0.3	0.8	0.5	0.8	0.3	0.2	0.3	0.8	0.6	0.4	0.2	0.1	0.1	-0.1	0.3	
14-Dec	-0.1	-0.2	-0.1	-0.3	-0.4	-0.3	-0.2	-0.1	-0.3	-0.3	-0.2	-0.2	0.0	0.0	0.1	0.1	-0.1	-0.1	-0.1	0.0	0.7	0.7	0.7	0.7	0.0	
15-Dec	0.6	0.9	1.1	1.0	1.0	0.8	0.7	0.5	1.1	1.0	0.8	0.4	0.2	0.2	0.2	0.4	0.3	0.1	0.1	0.1	0.1	0.3	0.3	0.1	0.5	
16-Dec	0.0	-0.3	-0.2	-0.2	-0.6	-0.6	-0.4	-0.3	-0.4	-0.3	-0.5	-0.4	-0.7	-0.4	-0.2	-0.1	-0.4	-0.2	-0.2	-0.1	0.0	0.1	0.0	0.0	-0.3	
17-Dec	-0.4	-0.4	-0.5	-0.1	0.0	0.4	0.4	0.3	0.2	0.4	0.7	0.8	0.7	0.7	0.4	0.5	0.6	DF	DF	DF	DF	DF	DF	DF	--	
18-Dec	DF	DF	0.0	0.0	0.1	0.1	-0.1	-0.1	-0.1	-0.1	-0.2	-0.3	-0.3	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.3	-0.3	-0.5	-0.3	-0.8	-0.7	
19-Dec	-0.5	-0.6	-0.6	-0.3	-0.4	-0.5	0.0	0.0	0.1	0.3	0.5	0.5	0.4	0.5	0.7	0.7	1.1	1.5	0.6	0.6	0.8	0.8	0.6	0.9	0.3	
20-Dec	0.9	0.8	1.0	1.1	1.1	0.9	0.9	0.8	0.9	0.7	0.7	0.7	0.7	0.6	0.8	0.6	0.6	0.9	0.8	0.7	0.9	0.9	0.6	0.0	0.8	
21-Dec	-0.4	-0.4	-0.4	-0.3	-0.2	-0.2	-0.2	-0.2	-0.1	0.3	0.7	0.8	1.0	1.0	0.7	0.9	0.9	1.0	0.4	0.4	0.3	0.5	0.7	0.8	0.3	
22-Dec	0.8	0.6	0.7	0.9	0.6	0.6	0.5	0.4	0.0	0.2	0.2	0.4	0.2	0.2	0.3	-0.1	0.2	0.0	0.3	0.5	0.5	0.4	-0.1	-0.2	0.3	
23-Dec	-0.4	-0.2	-0.2	-0.3	-0.3	-0.4	-0.2	-0.3	-0.3	-0.1	-0.2	-0.3	-0.3	-0.4	-0.2	-0.1	0.0	-0.1	-0.1	-0.2	-0.3	-0.3	-0.4	-0.2	-0.2	
24-Dec	-0.3	-0.1	0.1	0.6	0.7	0.7	0.7	0.6	0.5	0.4	0.6	0.5	0.5	0.4	0.4	0.3	0.4	0.3	0.4	0.4	0.4	0.7	0.9	0.7	0.5	
25-Dec	0.9	1.0	0.8	0.8	0.8	0.5	0.4	0.5	0.9	0.7	0.8	0.9	0.9	0.7	0.7	0.9	0.6	0.7	0.5	0.6	0.6	0.4	0.3	0.3	0.7	
26-Dec	0.2	0.7	0.3	0.9	0.7	0.3	0.6	0.6	0.4	0.7	0.9	0.5	0.6	0.7	0.8	1.0	0.8	0.9	0.5	0.8	0.3	0.3	0.5	0.3	0.6	
27-Dec	-0.1	0.1	0.0	-0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.4	0.7	0.7	0.6	0.5	0.5	0.6	0.6	0.5	0.0	0.1	0.0	-0.2	-0.1	0.2	
28-Dec	-0.2	0.0	-0.2	-0.2	-0.3	0.0	-0.1	-0.1	-0.4	-0.4	-0.7	-0.3	-0.4	-0.3	-0.3	-0.2	-0.1	-0.2	-0.2	-0.3	-0.1	-0.3	-0.2	-0.1	-0.2	
29-Dec	-0.1	0.0	-0.1	0.1	0.3	0.3	0.8	0.9	1.0	0.8	0.7	0.3	0.5	0.7	0.8	0.5	0.7	0.7	0.4	0.1	-0.1	0.1	0.3	0.2	0.4	
30-Dec	0.5	0.4	0.3	0.4	0.5	0.6	0.6	0.3	0.2	0.3	0.6	0.3	0.5	0.4	0.5	0.3	0.9	0.7	0.7	0.5	0.7	0.7	0.6	0.7	0.5	
31-Dec	0.8	0.9	0.8	0.8	0.7	1.0	1.0	0.8	0.9	0.7	0.9	0.9	0.8	0.8	0.1	0.2	0.2	0.2	0.1	0.0	-0.1	-0.3	-0.1	-0.2	0.5	
																								Diurnal Average		
																								Diurnal Maximum		
DF - DAS Failure																										



Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 3.3 km/h on Dec 10 23:00		Hours in Service: 744 Hours of Data: 735 Hours of Missing Data: 9 Hours of Calibration: 0 Percent Operational Time: 98.8																							
Minimum Value: 0.2 km/h on Dec 7 09:00																									
Percentiles: P ₁ = 0.3 P ₁₀ = 0.5 Q ₁ = 0.7 Median = 1.0 Q ₃ = 1.4 P ₉₀ = 2.1 P ₉₉ = 2.9																									
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-Dec	0.3	0.5	0.3	0.4	0.5	0.7	0.8	0.9	0.7	1.2	1.4	1.4	1.1	1.3	1.4	0.9	0.6	0.4	0.6	1.0	0.8	0.8	0.9	0.7	1.4
2-Dec	0.5	0.6	0.8	0.9	0.9	1.2	0.8	1.1	0.9	0.7	0.6	0.8	0.8	0.8	0.7	0.6	0.3	0.5	0.7	0.6	0.8	1.1	0.6	0.6	1.2
3-Dec	0.8	0.7	0.5	0.6	0.4	0.4	0.7	0.6	0.6	0.6	1.0	0.8	0.8	0.8	0.5	0.4	0.3	0.5	0.4	0.4	0.3	0.3	0.3	1.0	
4-Dec	0.5	0.8	0.8	1.3	1.2	1.5	1.3	1.2	1.1	0.8	0.8	0.7	0.7	0.8	0.8	0.7	0.7	0.5	0.6	0.7	0.7	0.8	0.9	0.9	1.5
5-Dec	1.0	0.9	0.8	1.2	0.9	0.8	0.8	1.1	1.2	1.5	1.8	1.4	1.3	1.2	1.1	1.0	0.7	0.8	1.2	2.0	1.6	1.6	1.8	1.1	2.0
6-Dec	1.1	0.8	1.0	1.4	1.6	1.5	1.4	1.5	0.9	0.7	0.5	1.6	1.9	1.8	1.8	1.5	1.2	1.3	0.9	0.6	1.1	0.8	1.1	0.7	1.9
7-Dec	0.4	0.4	0.8	0.4	0.4	0.4	0.3	0.4	0.2	0.6	0.9	0.8	0.9	0.9	0.6	0.6	0.4	0.3	0.3	0.3	0.6	0.8	0.7	0.5	0.9
8-Dec	0.6	0.7	0.8	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.7	0.8	0.7	0.5	0.5	0.6	0.4	0.4	0.5	0.6	0.5	0.9	0.6	0.8	0.9
9-Dec	1.0	0.7	0.7	0.7	0.3	0.4	0.5	0.8	1.0	1.2	1.3	1.4	1.4	1.3	0.9	0.8	0.5	0.8	0.7	0.8	1.0	0.9	0.8	1.0	1.4
10-Dec	1.0	0.8	1.1	1.0	0.7	0.9	0.7	1.0	1.4	1.6	1.2	1.0	1.4	2.0	2.1	2.2	2.3	2.5	3.2	2.9	2.4	2.8	3.3	2.7	3.3
11-Dec	2.6	2.5	2.5	2.9	2.7	2.3	2.1	1.7	1.9	1.2	1.4	1.5	1.0	0.6	0.8	0.8	0.8	0.7	0.9	1.2	1.3	1.1	0.7	0.4	2.9
12-Dec	0.5	0.8	0.7	0.8	0.8	0.9	0.8	1.2	1.3	1.2	1.4	1.1	1.2	0.9	1.0	1.0	1.1	1.0	1.1	1.6	1.4	1.2	1.0	0.9	1.6
13-Dec	0.8	1.6	1.7	1.9	1.9	1.7	0.9	0.6	0.9	0.7	0.8	1.1	1.0	1.0	0.6	0.5	0.7	1.1	1.4	1.4	1.5	0.9	1.5	1.0	1.9
14-Dec	1.1	1.2	1.0	1.7	1.8	1.8	2.0	1.9	2.9	2.7	2.3	1.8	1.4	1.0	1.2	0.8	0.5	0.4	0.4	0.6	0.6	0.6	0.5	0.7	2.9
15-Dec	0.6	0.8	1.0	1.2	1.1	0.8	0.8	0.8	1.2	1.0	1.2	2.6	2.4	2.2	2.8	2.4	2.3	3.2	3.1	3.1	2.6	2.2	2.3	1.7	3.2
16-Dec	1.8	2.4	2.3	2.3	2.9	2.2	2.2	1.7	2.4	2.0	2.1	1.7	1.6	1.2	1.0	0.9	1.1	0.7	0.9	0.8	0.5	0.4	0.5	0.6	2.9
17-Dec	1.6	2.0	1.2	0.5	0.3	0.4	0.4	0.6	0.4	0.8	1.2	1.3	1.2	1.2	1.0	0.8	0.6	DF	DF	DF	DF	DF	DF	DF	2.0
18-Dec	DF	DF	0.4	0.5	0.5	1.5	1.4	1.0	0.7	0.9	1.6	1.7	2.1	2.1	1.7	1.3	1.2	1.2	0.9	1.0	1.6	2.4	2.3	2.5	2.5
19-Dec	2.5	1.8	2.0	1.6	1.3	1.3	1.4	1.2	1.0	0.7	0.9	1.1	0.9	1.0	1.5	1.7	1.9	2.0	2.1	2.3	2.3	2.5	2.7	2.6	2.7
20-Dec	2.9	2.7	2.6	2.9	3.0	2.6	2.5	2.4	2.1	2.1	2.2	1.7	1.7	1.2	1.5	1.6	1.5	1.8	1.7	1.7	1.8	1.7	1.2	1.0	3.0
21-Dec	2.5	2.5	2.4	1.9	1.8	1.3	0.8	0.9	0.8	1.0	1.0	1.4	1.8	1.7	1.1	1.3	1.7	1.7	1.4	1.1	1.0	0.9	0.8	0.9	2.5
22-Dec	0.8	0.8	1.0	1.0	1.0	0.9	1.1	0.5	0.8	0.8	1.0	1.1	1.0	0.7	0.7	0.5	0.7	0.6	0.8	1.0	1.0	1.0	1.2	2.0	2.0
23-Dec	3.1	3.1	2.6	2.2	2.2	2.2	2.3	2.1	2.0	1.9	2.3	2.4	2.6	2.1	1.8	1.5	1.1	1.5	0.9	1.2	0.9	1.3	1.1	1.1	3.1
24-Dec	1.3	0.8	0.9	0.6	1.1	1.0	1.3	1.4	1.0	1.0	0.9	1.1	1.0	1.0	0.6	0.4	0.5	0.5	0.4	0.8	0.6	0.8	0.8	0.8	1.4
25-Dec	1.0	1.2	1.1	0.6	0.8	0.9	1.0	1.0	1.5	1.1	1.4	1.5	1.4	1.4	1.3	0.9	0.8	0.6	0.9	1.2	0.9	0.9	0.8	1.0	1.5
26-Dec	0.6	0.8	0.8	1.4	1.5	1.0	0.5	1.5	1.1	1.3	1.5	1.2	1.2	1.2	1.4	1.5	1.0	1.3	1.1	1.2	1.0	0.6	0.9	1.7	1.7
27-Dec	1.9	2.2	2.3	1.9	1.7	1.8	1.5	1.6	1.0	1.0	0.9	1.2	1.1	1.1	0.8	0.6	1.0	1.4	0.8	0.9	0.7	0.4	0.3	0.3	2.3
28-Dec	0.6	0.4	0.5	0.3	0.7	0.4	0.7	0.7	1.0	1.0	2.2	1.4	1.5	1.5	1.3	1.2	0.8	1.7	1.2	1.1	0.9	0.9	0.6	0.3	2.2
29-Dec	0.3	0.3	0.3	0.4	0.5	0.9	1.4	1.3	1.3	1.3	1.2	1.1	1.2	1.1	1.3	0.8	1.1	1.1	0.8	0.5	0.3	0.3	0.3	0.5	1.4
30-Dec	0.7	0.5	0.5	0.5	0.6	0.6	0.6	0.8	0.7	0.7	0.9	1.0	1.1	0.8	0.9	1.3	2.2	1.8	1.0	1.0	0.7	1.1	1.2	0.8	2.2
31-Dec	0.8	0.8	1.0	1.0	0.9	0.9	1.2	1.1	1.3	1.0	1.2	1.6	1.6	1.4	1.0	1.1	0.8	0.8	1.2	1.8	1.6	2.1	1.2	0.8	2.1
	3.1	3.1	2.6	2.9	3.0	2.6	2.5	2.4	2.9	2.7	2.3	2.6	2.6	2.2	2.8	2.4	2.3	3.2	3.2	3.1	2.6	2.8	3.3	2.7	
	Diurnal Maximum																								
DF - DAS Failure																									



Summary of Hour Averages

Mannix - December 2023

Maximum Value: 2.4 km/h on Dec 19 18:00 Maximum Daily Average: 0.6 km/h on Dec 25																								Hours in Service: 744 Hours of Data: 732		
Minimum Value: -1.2 km/h on Dec 11 04:00 Minimum Daily Average: -0.7 km/h on Dec 23																								Hours of Missing Data: 12 Hours of Calibration: 0		
Maximum Diurnal Average: 0.2 km/h at hour 14 Minimum Diurnal Average: -0.1 km/h at hour 3																								Percent Operational Time: 98.4		
Monthly Average: 0.08 km/h Percentiles: P ₁ = -1.0 P ₁₀ = -0.7 Q ₁ = -0.3 Median = 0.1 Q ₃ = 0.5 P ₉₀ = 0.7 P ₉₉ = 1.0																										
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Dec	-0.2	-0.4	-0.1	-0.1	0.2	0.5	0.2	0.4	0.2	0.6	0.7	0.6	0.4	0.7	0.8	0.5	0.3	0.2	0.3	0.6	0.7	0.4	0.6	0.2	0.4	0.8
2-Dec	0.2	0.6	0.6	0.6	0.5	0.7	0.3	0.3	0.2	0.4	0.4	0.5	0.2	0.1	0.0	0.2	-0.1	0.0	-0.3	0.0	0.2	0.4	-0.3	0.0	0.2	0.7
3-Dec	-0.2	-0.2	-0.2	0.1	0.0	-0.1	0.0	0.2	0.1	0.0	0.4	0.0	0.4	0.2	0.1	0.1	0.0	0.0	0.1	0.2	0.1	0.1	0.2	0.4	0.1	0.4
4-Dec	0.2	0.2	0.6	0.6	0.7	0.8	0.8	0.6	0.4	0.1	-0.1	-0.3	-0.3	-0.4	-0.1	-0.3	-0.3	0.3	0.5	0.6	0.7	0.7	0.7	0.7	0.3	0.8
5-Dec	0.8	0.7	0.2	0.8	0.8	0.7	0.8	0.7	0.3	UO	UO	UO	0.8	0.6	0.5	0.4	0.1	-0.1	-0.1	-0.7	-0.3	-0.3	-0.7	0.2	0.3	0.8
6-Dec	-0.2	-0.7	-0.8	-0.7	-0.6	-0.7	-0.5	-0.6	-0.3	-0.4	-0.3	-0.1	-0.7	-0.8	-0.9	-0.7	-0.6	-0.7	-0.4	-0.4	-0.6	-0.2	-0.2	-0.1	-0.5	-0.1
7-Dec	-0.6	-0.6	-0.5	-0.3	-0.3	-0.3	-0.2	-0.2	-0.1	0.2	0.1	0.3	0.4	0.4	0.2	0.0	-0.4	-0.6	-0.5	-0.4	-0.5	-0.6	-0.6	-0.2	-0.2	0.4
8-Dec	-0.4	-0.6	-0.6	-0.4	-0.3	-0.2	-0.1	-0.2	-0.3	0.0	-0.3	-0.2	0.1	0.1	0.1	0.0	-0.3	-0.3	-0.2	0.0	-0.1	0.4	-0.2	0.1	-0.2	0.4
9-Dec	0.6	0.0	-0.7	-0.5	-0.3	-0.3	-0.1	0.1	0.5	0.7	0.7	0.7	0.7	0.6	0.6	0.5	0.3	0.4	0.2	0.6	0.7	0.5	0.7	0.6	0.3	0.7
10-Dec	0.6	0.6	0.6	0.5	0.4	0.4	0.3	0.6	0.8	0.8	0.5	0.0	-0.3	-0.8	-0.8	-0.9	-1.0	-1.1	-0.9	-0.9	-0.8	-0.8	-0.9	-0.9	-0.2	0.8
11-Dec	-0.9	-0.8	-0.6	-1.2	-0.9	-0.8	-0.7	-0.9	-0.9	-0.8	-0.8	-0.6	-0.5	-0.1	0.4	0.4	0.2	0.4	0.4	0.7	0.9	0.8	0.7	0.4	-0.2	0.9
12-Dec	0.3	0.6	0.3	0.5	0.5	0.5	0.4	0.7	1.0	0.7	0.8	0.5	0.4	0.3	0.5	0.6	0.6	0.6	0.9	1.1	0.9	0.4	0.0	0.2	0.6	1.1
13-Dec	-0.2	-0.4	-0.5	-0.6	-0.7	-0.3	-0.2	-0.1	-0.3	-0.1	0.0	0.5	0.2	0.5	0.0	-0.3	-0.2	0.4	0.6	0.1	-0.2	-0.2	-0.5	-0.6	-0.1	0.6
14-Dec	-0.7	-0.6	-0.6	-0.9	-0.8	-0.8	-0.8	-0.7	-1.0	-0.9	-0.6	-0.7	-0.3	-0.3	-0.3	-0.5	-0.6	-0.7	-0.5	-0.5	0.4	0.5	0.4	0.6	-0.5	0.6
15-Dec	0.2	0.7	0.8	0.9	0.9	0.7	0.4	0.2	0.8	0.6	0.5	0.0	-0.2	0.2	0.1	0.4	-0.1	-0.3	-0.2	0.0	-0.1	0.2	0.0	-0.2	0.3	0.9
16-Dec	-0.5	-0.8	-0.9	-0.8	-0.9	-0.7	-0.7	-0.6	-1.0	-0.8	-0.6	-0.1	-0.4	0.1	0.1	-0.1	-0.3	-0.2	-0.2	-0.1	-0.1	-0.1	-0.2	-0.1	-0.4	0.1
17-Dec	-0.3	-0.3	-0.7	-0.2	0.0	0.2	0.2	0.0	-0.1	0.2	0.5	0.7	0.6	0.7	0.2	0.6	0.5	DF	DF	DF	DF	DF	DF	DF	--	0.7
18-Dec	DF	DF	-0.5	-0.6	-0.3	-0.3	-0.6	-0.4	-0.6	-0.7	-0.9	-0.8	-0.9	-0.6	-0.4	-0.6	-0.4	-0.3	-0.7	-0.9	-0.7	0.0	-0.1	-0.3	-0.5	0.0
19-Dec	-0.3	-0.4	-0.4	-0.3	-0.5	-0.4	0.2	0.0	-0.1	0.8	1.0	0.7	0.6	0.6	0.4	0.6	1.6	2.4	0.1	-0.1	0.3	0.1	0.0	0.5	0.3	2.4
20-Dec	0.4	0.3	0.7	0.7	0.6	0.6	0.5	0.4	0.8	0.4	0.5	0.6	0.6	0.5	0.6	0.6	0.7	0.8	0.6	0.9	0.8	0.8	0.1	-0.4	0.6	0.9
21-Dec	-1.1	-1.0	-0.7	-0.8	-0.8	-0.7	-0.7	-0.8	-0.7	0.1	0.5	0.8	1.1	1.2	0.6	0.9	1.0	0.9	0.2	0.3	0.2	0.4	0.3	0.5	0.1	1.2
22-Dec	0.5	0.3	0.7	0.7	0.6	0.6	0.6	0.3	0.0	0.1	0.1	0.2	0.1	0.2	0.3	0.0	0.2	0.1	0.1	0.5	0.3	0.2	-0.6	-0.7	0.2	0.7
23-Dec	-0.7	-1.0	-0.8	-0.7	-0.6	-0.8	-0.4	-0.9	-0.9	-0.7	-0.6	-0.8	-0.9	-0.7	-0.5	-0.5	-0.4	-0.6	-0.5	-0.9	-0.8	-0.8	-0.9	-0.9	-0.7	-0.4
24-Dec	-1.0	-0.5	-0.4	0.3	0.6	0.5	0.7	0.7	0.5	0.4	0.1	0.4	0.1	0.2	0.3	0.0	-0.1	0.1	0.1	0.0	0.3	0.1	0.3	0.5	0.2	0.7
25-Dec	0.8	0.8	0.7	0.6	0.4	0.3	0.1	0.1	0.7	0.4	0.8	1.0	0.9	0.9	0.7	0.6	0.6	0.3	0.6	0.8	0.7	0.6	0.5	0.6	0.6	1.0
26-Dec	0.2	0.7	0.4	1.1	0.6	0.3	0.4	0.6	0.4	0.5	0.5	0.4	0.5	0.5	0.6	0.8	0.6	1.1	0.4	0.8	-0.1	-0.4	0.0	-0.1	0.5	1.1
27-Dec	-0.9	-0.6	-0.7	-0.8	-0.5	-0.4	-0.4	-0.6	-0.1	-0.3	0.2	0.5	0.7	0.7	0.5	0.4	0.5	0.6	0.5	0.2	0.2	0.1	-0.2	0.0	0.0	0.7
28-Dec	0.1	0.1	-0.2	-0.2	-0.2	-0.1	-0.2	-0.4	-0.3	-0.4	-0.2	-0.4	-0.2	-0.3	-0.4	-0.3	-0.1	0.1	-0.2	-0.4	-0.1	-0.3	-0.2	-0.3	-0.2	0.1
29-Dec	-0.1	-0.1	-0.2	0.0	0.0	0.4	0.9	0.8	0.8	0.6	0.5	0.5	0.4	0.5	0.6	0.3	0.6	0.6	0.7	0.2	0.1	0.2	0.2	0.2	0.4	0.9
30-Dec	0.5	0.7	0.6	0.3	0.4	0.5	0.8	0.8	0.2	0.4	0.9	0.5	0.7	0.4	0.5	0.5	0.9	0.6	0.5	0.5	0.6	0.8	0.4	0.5	0.5	0.9
31-Dec	0.4	0.6	0.8	0.6	0.7	0.8	0.8	0.7	1.0	0.5	0.8	1.0	1.1	1.0	-0.2	-0.2	-0.3	-0.4	-0.6	-0.5	-0.7	-0.9	-0.3	-0.4	0.3	1.1
																								Diurnal Average		
																								Diurnal Maximum		
DF - DAS Failure UO - Unstable Operation																										



Summary of Hour Standard Deviations

Mannix - December 2023

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 4.0 km/h on Dec 10 19:00		Hours in Service: 744 Hours of Data: 732 Hours of Missing Data: 12 Hours of Calibration: 0 Percent Operational Time: 98.4																							
Minimum Value: 0.1 km/h on Dec 29 03:00																									
Percentiles: P ₁ = 0.3 P ₁₀ = 0.4 Q ₁ = 0.6 Median = 0.9 Q ₃ = 1.4 P ₉₀ = 2.3 P ₉₉ = 3.1																									
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Dec	0.3	0.4	0.4	0.4	0.5	0.5	0.8	0.7	0.5	1.1	1.3	1.3	1.1	1.3	1.1	0.6	0.3	0.3	0.6	0.5	0.9	0.8	0.7	0.4	1.3
2-Dec	0.6	0.6	0.5	0.5	0.7	0.8	0.7	0.9	0.9	0.5	0.5	0.8	0.7	0.6	0.6	0.3	0.3	0.5	0.5	0.5	1.0	1.2	0.8	0.7	1.2
3-Dec	0.6	0.5	0.4	0.6	0.4	0.4	0.7	0.6	0.6	0.5	0.7	1.0	0.9	1.0	0.7	0.4	0.5	0.4	0.8	0.7	0.5	0.6	0.3	0.5	1.0
4-Dec	0.6	0.5	0.5	0.8	0.9	1.3	1.0	1.1	0.8	0.5	0.6	0.5	0.7	0.8	0.5	0.4	0.4	0.7	0.6	0.5	0.6	0.4	0.4	0.5	1.3
5-Dec	0.6	0.5	0.4	0.7	0.8	0.9	0.8	0.5	0.7	UO	UO	UO	1.0	1.0	0.9	0.9	0.8	1.1	1.9	2.4	2.3	2.3	2.2	1.2	2.4
6-Dec	1.3	0.8	1.1	1.7	1.9	1.7	1.8	1.8	1.3	1.0	0.8	2.2	1.9	1.9	1.9	1.2	0.7	0.7	0.9	0.7	0.8	0.9	1.6	1.1	2.2
7-Dec	0.8	0.4	0.7	0.4	0.3	0.5	0.4	0.3	0.3	0.5	0.8	0.5	0.6	0.8	0.7	0.9	0.4	0.4	0.3	0.5	0.8	0.8	0.9	0.7	0.9
8-Dec	0.6	0.9	0.5	0.4	0.4	0.3	0.4	0.2	0.3	0.3	0.3	0.8	0.5	0.4	0.5	0.8	0.5	0.5	0.6	1.0	0.8	0.6	0.6	0.6	1.0
9-Dec	0.8	0.7	0.9	0.7	0.4	0.4	0.6	0.9	0.7	0.9	1.1	1.2	1.3	1.1	0.8	0.6	0.5	0.7	0.8	0.8	0.7	0.5	0.4	0.5	1.3
10-Dec	0.6	0.4	0.9	0.9	0.5	0.7	0.7	1.0	1.5	1.6	1.0	0.7	1.7	2.0	2.3	2.4	2.9	2.9	4.0	3.4	2.6	2.9	3.5	2.9	4.0
11-Dec	2.6	2.7	2.6	2.7	2.9	2.3	2.2	1.9	1.9	1.4	1.3	1.5	1.2	0.5	0.8	0.6	0.5	0.6	0.9	1.1	1.0	0.9	0.4	0.3	2.9
12-Dec	0.4	0.5	0.5	0.6	0.5	0.4	0.6	0.9	0.9	1.1	1.1	0.8	1.2	0.7	0.7	0.7	0.9	0.8	1.1	1.3	0.9	0.8	1.0	1.1	1.3
13-Dec	1.1	1.8	2.0	2.2	1.7	1.5	1.4	1.0	0.9	0.7	0.6	0.8	0.6	0.8	0.3	0.6	0.5	0.9	1.4	1.1	1.0	0.8	1.1	1.1	2.2
14-Dec	1.3	1.2	0.9	1.5	1.9	1.9	2.3	2.1	3.1	3.3	2.9	2.1	1.7	1.0	0.6	0.5	0.5	0.7	0.5	0.6	0.5	0.5	0.5	0.5	3.3
15-Dec	0.4	0.8	0.7	0.8	1.1	1.1	0.8	0.9	0.7	0.8	1.4	2.6	2.5	2.2	2.6	2.5	2.3	3.0	2.7	3.1	2.7	2.6	2.7	2.1	3.1
16-Dec	2.1	2.8	2.6	2.2	3.0	2.5	2.5	2.1	2.7	2.2	2.2	1.6	1.5	1.4	1.3	1.1	1.0	0.5	0.8	0.9	0.5	0.3	0.3	0.6	3.0
17-Dec	1.5	2.0	1.2	0.7	0.3	0.3	0.4	0.7	0.4	0.7	1.0	1.1	1.1	1.1	0.7	0.7	0.5	DF	DF	DF	DF	DF	DF	DF	2.0
18-Dec	DF	DF	0.4	0.8	0.9	1.9	1.9	1.3	1.0	0.8	1.7	1.9	2.1	2.3	1.8	1.4	1.4	1.5	1.0	0.9	1.5	2.5	2.3	2.1	2.5
19-Dec	2.4	1.8	2.0	1.8	1.4	1.1	1.5	1.2	1.3	0.9	1.0	1.1	1.0	1.2	1.7	2.0	2.2	2.6	2.3	2.5	2.5	2.5	2.7	2.8	2.8
20-Dec	3.2	2.9	3.1	3.0	3.1	2.8	2.7	2.8	2.6	2.5	2.4	2.0	1.9	1.3	1.8	1.7	1.6	1.8	1.7	1.7	1.8	1.5	1.4	1.3	3.2
21-Dec	2.5	2.6	2.5	1.8	1.9	1.2	0.8	0.9	1.0	1.1	0.9	1.4	1.8	1.6	1.0	1.5	1.8	1.6	1.6	1.4	1.4	1.2	1.0	0.9	2.6
22-Dec	0.8	0.8	0.6	0.7	0.6	0.8	0.8	0.3	0.4	0.4	0.6	0.8	0.6	0.6	0.7	0.7	0.6	0.4	0.5	0.7	0.8	1.1	1.5	2.0	2.0
23-Dec	3.9	3.6	3.0	2.7	2.8	2.8	2.8	2.6	2.3	2.3	2.6	3.0	3.1	2.6	2.4	1.9	1.5	1.4	0.9	0.7	0.5	0.7	1.0	1.1	3.9
24-Dec	0.7	0.7	0.6	0.6	0.8	0.7	1.2	1.1	0.9	0.8	0.6	0.9	0.8	0.9	0.9	0.7	0.4	0.6	0.6	0.6	0.5	0.4	0.6	0.5	1.2
25-Dec	0.7	1.0	0.8	0.5	0.4	0.7	0.7	0.6	1.2	0.8	1.2	1.3	1.3	1.5	0.9	0.8	0.4	0.5	0.8	0.8	0.5	0.7	0.7	1.0	1.5
26-Dec	0.5	0.6	0.6	1.1	1.6	0.8	0.7	1.5	1.0	1.0	1.5	1.2	1.2	1.0	1.2	1.1	1.2	1.0	1.0	1.1	0.9	1.0	1.1	1.6	1.6
27-Dec	1.9	2.4	2.2	1.7	1.1	1.3	1.4	1.4	1.2	1.1	1.0	1.2	1.1	1.1	0.6	0.4	0.9	1.3	1.1	1.2	0.9	0.6	0.3	0.2	2.4
28-Dec	0.4	0.4	0.6	0.3	0.6	0.4	0.5	0.7	1.1	0.9	2.3	1.6	1.6	1.6	1.4	1.4	1.0	1.7	1.4	1.0	1.0	1.0	0.6	0.3	2.3
29-Dec	0.2	0.1	0.1	0.3	0.4	0.8	1.1	1.1	0.9	1.0	1.1	1.0	1.0	0.7	1.2	0.6	0.8	0.9	0.6	0.3	0.2	0.2	0.3	0.4	1.2
30-Dec	0.5	0.3	0.3	0.5	0.5	0.3	0.3	0.4	0.5	0.7	1.0	0.9	0.7	0.7	1.0	1.2	2.1	1.5	1.1	0.8	0.9	0.9	0.8	0.7	2.1
31-Dec	0.7	0.6	0.8	0.9	0.6	0.8	0.9	0.6	0.7	0.7	0.7	1.4	1.5	1.5	1.5	1.3	0.7	0.7	1.2	2.2	1.6	1.8	1.4	0.8	2.2
	3.9	3.6	3.1	3.0	3.1	2.8	2.8	2.8	3.1	3.3	2.9	3.0	3.1	2.6	2.6	2.5	2.9	3.0	4.0	3.4	2.7	2.9	3.5	2.9	
	Diurnal Maximum																								
DF - DAS Failure		UO - Unstable Operation																							



Maximum Value: 2.8 km/h on Dec 19 18:00		Maximum Daily Average: 0.4 km/h on Dec 12		Hours in Service: 744																						
Minimum Value: -0.9 km/h on Dec 19 20:00		Minimum Daily Average: -0.1 km/h on Dec 20		Hours of Data: 733																						
Maximum Diurnal Average: 0.3 km/h at hour 14		Minimum Diurnal Average: 0.1 km/h at hour 1		Hours of Missing Data: 11																						
Monthly Average: 0.18 km/h		Percentiles: P ₁ = -0.7 P ₁₀ = -0.2 Q ₁ = 0.0 Median = 0.2 Q ₃ = 0.4 P ₉₀ = 0.6 P ₉₉ = 1.0		Hours of Calibration: 0																						
				Percent Operational Time: 98.5																						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Dec	0.2	0.1	0.1	0.0	0.2	0.6	0.4	0.7	0.2	0.4	0.7	0.4	0.6	0.9	0.8	0.2	0.0	0.4	0.4	0.4	0.6	0.6	0.3	0.3	0.4	0.9
2-Dec	0.4	0.5	0.3	0.5	0.4	0.4	-0.3	0.4	0.2	0.2	0.3	0.3	0.4	0.4	0.1	0.4	0.2	0.3	0.0	0.3	0.7	1.0	0.1	0.3	0.3	1.0
3-Dec	0.1	0.1	0.1	0.2	0.1	0.2	0.2	0.2	0.1	0.2	0.6	0.0	0.5	0.2	0.3	0.2	0.2	0.2	0.1	0.0	0.0	0.0	0.3	0.1	0.2	0.6
4-Dec	0.1	0.3	0.6	0.8	0.8	0.7	0.6	0.6	0.3	0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.2	0.0	-0.2	0.2	0.4	0.3	0.4	0.5	0.7	0.3	0.8
5-Dec	0.5	0.3	0.1	0.0	0.0	0.1	-0.1	0.0	0.1	UO	UO	0.4	0.6	0.4	0.4	0.3	0.0	-0.2	0.1	-0.3	0.0	-0.1	-0.2	0.2	0.1	0.6
6-Dec	0.2	-0.2	-0.3	-0.1	0.2	-0.1	0.1	0.1	0.2	0.0	0.0	0.8	-0.1	0.0	-0.2	-0.3	-0.4	-0.5	0.0	-0.2	-0.2	0.4	0.4	0.3	0.0	0.8
7-Dec	-0.2	-0.3	0.1	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.1	0.4	0.4	0.2	0.1	0.0	-0.1	0.1	0.1	0.0	-0.1	-0.1	0.2	0.1	0.4
8-Dec	0.1	0.3	0.1	0.1	0.2	0.2	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	-0.1	-0.1	0.2	-0.1	0.0	0.1	0.3
9-Dec	0.2	0.0	-0.5	-0.1	0.0	0.0	-0.1	-0.1	0.2	0.5	0.5	0.6	0.6	0.5	0.4	0.5	0.5	0.3	0.4	0.7	0.9	0.4	0.2	0.3	0.3	0.9
10-Dec	0.0	-0.1	-0.3	-0.4	-0.3	-0.3	-0.4	0.2	0.5	0.5	0.4	-0.1	0.4	-0.1	-0.1	-0.1	0.1	0.0	0.6	0.7	0.6	0.7	0.8	0.7	0.2	0.8
11-Dec	0.1	0.5	0.7	0.7	0.6	0.3	0.3	-0.2	0.0	-0.3	-0.4	-0.1	-0.2	0.1	0.3	0.3	0.4	0.3	0.3	0.6	0.6	0.5	0.3	0.2	0.3	0.7
12-Dec	0.3	0.4	0.2	0.3	0.3	0.3	0.3	0.6	1.1	0.7	0.7	0.3	0.6	0.4	0.5	0.7	0.5	0.4	0.7	0.8	0.5	0.1	-0.1	0.0	0.4	1.1
13-Dec	-0.2	0.0	-0.1	0.1	-0.3	0.0	0.1	0.0	0.1	-0.1	-0.1	0.0	0.1	0.6	-0.1	-0.2	-0.2	0.1	0.5	0.0	-0.3	-0.1	-0.4	-0.3	0.0	0.6
14-Dec	0.0	0.2	0.0	0.0	-0.2	-0.1	0.1	-0.1	-0.2	0.3	0.4	0.1	0.2	-0.1	0.0	-0.1	-0.2	-0.3	0.1	-0.1	0.3	0.4	0.2	0.3	0.0	0.4
15-Dec	0.0	0.6	0.6	0.6	0.7	0.5	0.1	0.1	0.6	0.4	0.3	0.0	-0.1	0.3	0.2	0.4	0.1	-0.1	0.0	0.1	0.1	0.2	0.3	-0.1	0.2	0.7
16-Dec	-0.2	0.0	0.0	0.1	0.3	0.4	0.3	0.4	-0.1	0.3	0.4	0.0	-0.3	0.5	0.3	0.1	0.0	0.1	0.1	0.0	0.1	0.1	0.0	0.0	0.1	0.5
17-Dec	0.0	0.5	-0.3	0.0	0.1	0.2	0.2	0.1	0.0	0.1	0.4	0.5	0.4	0.4	0.1	0.6	0.6	DF	DF	DF	DF	DF	DF	DF	--	0.6
18-Dec	DF	DF	0.0	0.0	0.2	0.4	-0.1	0.1	-0.2	-0.1	0.0	-0.1	-0.1	0.4	0.4	0.2	0.2	0.3	0.0	0.1	0.2	0.1	0.1	0.2	0.1	0.4
19-Dec	0.0	-0.3	-0.2	0.2	-0.2	-0.2	0.4	-0.2	-0.1	1.2	1.3	0.8	1.0	0.7	0.6	0.7	2.2	2.8	-0.9	-0.9	-0.6	-0.8	-0.7	-0.6	0.3	2.8
20-Dec	-0.6	-0.7	-0.7	-0.7	-0.8	-0.7	-0.5	-0.5	-0.2	-0.4	-0.4	0.1	-0.2	0.1	-0.1	0.1	0.1	0.3	0.1	0.8	0.7	0.6	0.0	0.2	-0.1	0.8
21-Dec	-0.2	0.0	0.1	-0.1	-0.1	-0.1	-0.3	-0.5	-0.6	0.2	0.3	0.6	0.7	1.0	0.6	0.7	0.7	0.7	0.4	0.4	0.4	0.3	0.2	0.7	0.2	1.0
22-Dec	0.6	0.4	0.3	0.4	0.6	0.6	0.2	-0.3	-0.1	0.0	0.0	-0.1	0.0	-0.2	-0.2	0.1	0.0	0.4	0.5	0.6	0.5	0.2	0.2	0.0	0.2	0.6
23-Dec	0.1	0.1	0.0	0.4	0.6	0.5	0.5	0.1	0.2	0.1	0.5	0.2	0.2	0.4	0.4	0.4	0.1	0.1	-0.2	-0.2	0.1	-0.2	-0.4	0.2	0.6	
24-Dec	-0.4	-0.1	0.0	0.2	0.4	0.4	0.6	0.4	0.3	0.1	-0.1	0.3	-0.2	-0.1	0.2	-0.1	-0.1	0.1	0.1	-0.1	0.1	0.0	0.3	0.2	0.1	0.6
25-Dec	0.3	0.2	0.3	0.2	0.5	0.1	0.0	-0.1	0.3	0.2	0.5	0.7	0.7	0.5	0.5	0.4	0.4	0.3	0.6	0.5	0.3	0.0	-0.2	-0.2	0.3	0.7
26-Dec	-0.1	0.1	0.5	0.2	-0.2	0.1	-0.2	-0.2	-0.2	-0.2	-0.2	0.1	0.3	0.4	0.5	0.8	0.4	0.6	0.1	0.4	-0.3	-0.2	-0.2	-0.1	0.1	0.8
27-Dec	-0.2	-0.1	-0.2	-0.2	-0.4	-0.5	-0.2	-0.2	0.1	-0.2	0.2	0.4	0.6	0.5	0.4	0.4	-0.2	-0.2	0.1	0.3	0.3	0.2	0.0	0.2	0.0	0.6
28-Dec	0.2	0.2	0.2	0.1	0.1	0.1	0.2	0.0	0.0	-0.1	0.0	0.1	0.2	0.0	0.0	0.2	0.1	0.4	0.3	0.0	0.3	0.3	0.2	0.1	0.1	0.4
29-Dec	0.1	0.2	0.2	0.2	0.1	0.6	1.0	0.6	0.4	0.5	0.3	0.0	0.5	0.6	0.6	0.3	0.3	0.3	0.8	0.5	0.3	0.1	0.4	0.5	0.4	1.0
30-Dec	0.6	0.3	0.2	0.2	0.2	0.1	-0.1	0.0	0.3	0.4	0.0	-0.1	0.0	-0.1	-0.2	-0.4	-0.3	-0.2	0.2	0.0	0.5	0.8	0.4	0.3	0.1	0.8
31-Dec	0.4	0.2	0.4	0.3	0.3	0.4	0.3	0.1	0.3	0.2	0.4	0.7	0.7	0.7	0.2	0.4	-0.3	-0.2	0.1	0.1	0.0	0.1	0.4	0.5	0.3	0.7
																								Diurnal Average		
																								Diurnal Maximum		
DF - DAS Failure UO - Unstable Operation																										



Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 4.2 km/h on Dec 10 19:00		Hours in Service: 744 Hours of Data: 733 Hours of Missing Data: 11 Hours of Calibration: 0 Percent Operational Time: 98.5																								
Minimum Value: 0.2 km/h on Dec 29 03:00																										
Percentiles: P ₁ = 0.3 P ₁₀ = 0.4 Q ₁ = 0.6 Median = 0.8 Q ₃ = 1.4 P ₉₀ = 2.4 P ₉₉ = 3.3																										
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-Dec	0.3	0.4	0.6	0.5	0.5	0.6	0.6	0.5	0.4	0.7	0.6	0.9	0.6	0.7	0.5	0.5	0.3	0.4	0.5	0.6	0.8	0.6	0.5	0.5	0.9	
2-Dec	0.6	0.7	0.6	0.5	0.6	0.6	0.6	0.8	0.8	0.6	0.5	0.6	0.6	0.5	0.5	0.3	0.3	0.7	0.5	0.5	1.3	1.3	0.7	0.7	1.3	
3-Dec	0.6	0.4	0.3	0.5	0.3	0.3	0.5	0.5	0.5	0.6	0.6	0.8	1.0	1.0	0.8	0.6	1.0	0.9	1.1	0.9	0.7	0.7	0.4	0.5	1.1	
4-Dec	0.7	0.6	0.7	0.5	0.6	0.6	0.6	0.5	0.7	0.7	0.9	0.6	0.9	0.8	0.5	0.3	0.4	0.8	0.9	0.5	0.5	0.4	0.4	0.5	0.9	
5-Dec	0.5	0.6	0.5	0.9	1.1	1.0	1.2	0.6	0.7	UO	UO	0.8	0.9	0.6	0.6	0.9	1.2	1.4	2.5	2.7	2.8	2.9	2.6	1.4	2.9	
6-Dec	1.7	1.0	1.5	2.1	2.1	2.0	2.1	2.0	1.6	1.2	1.2	2.4	1.8	1.9	2.0	1.2	0.6	0.6	1.0	0.7	0.8	1.0	2.0	1.4	2.4	
7-Dec	1.0	0.5	0.8	0.5	0.3	0.5	0.5	0.4	0.4	0.7	0.7	0.4	0.5	0.9	0.9	1.0	0.5	0.4	0.4	0.7	1.0	1.1	1.1	1.1	1.1	
8-Dec	0.6	0.5	0.4	0.4	0.5	0.3	0.3	0.4	0.3	0.3	0.3	0.7	0.3	0.4	0.7	0.8	0.6	0.7	0.9	1.2	1.0	0.8	0.7	0.7	1.2	
9-Dec	0.9	1.0	1.0	0.9	0.4	0.4	0.7	1.2	0.5	0.6	0.7	0.9	0.8	0.6	0.5	0.3	0.5	0.5	0.4	0.4	0.4	0.5	0.5	0.4	1.2	
10-Dec	0.8	0.5	0.6	0.7	0.6	0.8	0.7	0.9	1.0	0.9	0.8	0.9	1.9	2.0	2.4	2.4	3.2	3.0	4.2	3.6	2.7	3.0	3.5	3.2	4.2	
11-Dec	2.6	2.8	2.7	2.6	2.8	2.3	2.3	2.0	1.8	1.3	1.1	1.2	1.1	0.5	0.5	0.4	0.4	0.6	0.8	0.7	0.7	0.6	0.4	0.4	2.8	
12-Dec	0.4	0.8	0.7	0.9	0.5	0.4	0.5	0.5	0.5	0.7	0.7	0.8	0.8	1.0	0.9	0.8	0.9	0.9	0.8	1.1	0.7	1.0	1.2	1.4	1.4	
13-Dec	1.5	2.0	2.1	2.4	1.7	1.7	1.7	1.2	1.1	1.0	0.7	0.9	0.7	0.5	0.4	0.7	0.5	0.9	1.3	1.1	0.6	1.1	1.2	1.3	2.4	
14-Dec	1.4	1.3	0.8	1.5	1.9	2.1	2.5	2.4	3.0	3.6	3.3	2.6	1.7	1.2	0.6	0.5	0.6	0.6	0.6	0.7	0.6	0.6	0.4	0.5	3.6	
15-Dec	0.4	0.6	0.4	0.6	1.1	1.1	1.0	1.0	0.5	0.7	1.3	2.4	2.4	2.4	2.6	2.6	2.2	3.0	2.6	3.1	2.9	2.8	3.1	2.6	3.1	
16-Dec	2.3	2.9	2.8	2.3	3.1	2.6	2.3	2.4	2.7	2.3	2.1	1.5	1.3	1.5	1.3	1.0	0.9	0.4	0.7	0.8	0.5	0.2	0.4	0.8	3.1	
17-Dec	1.1	1.8	1.2	0.7	0.4	0.4	0.6	0.4	0.4	0.7	0.8	0.7	0.6	1.1	0.8	0.6	0.4	DF	DF	DF	DF	DF	DF	DF	1.8	
18-Dec	DF	DF	0.6	0.9	1.3	1.9	2.3	1.5	1.3	0.9	1.6	2.1	1.9	2.4	2.1	1.7	1.7	1.8	1.1	0.9	1.4	2.2	2.1	1.6	2.4	
19-Dec	2.0	1.8	2.1	2.0	1.4	1.1	1.3	1.1	1.5	1.1	1.3	1.4	1.4	1.3	2.6	3.0	2.7	3.1	2.3	2.3	2.4	2.4	2.6	2.8	3.1	
20-Dec	2.8	2.7	2.8	3.0	3.0	2.7	2.4	2.3	2.3	2.2	2.2	1.7	1.6	1.0	1.4	1.2	1.0	1.4	1.3	1.6	1.4	1.5	1.5	1.7	3.0	
21-Dec	2.5	2.5	2.4	1.8	2.1	1.2	1.0	0.9	1.1	1.2	1.0	0.8	1.0	1.1	0.9	1.1	1.3	1.3	1.9	1.7	1.5	1.5	1.2	1.0	2.5	
22-Dec	0.8	0.5	0.4	0.5	0.5	0.5	0.6	0.4	0.5	0.6	0.6	0.8	0.7	0.6	0.7	0.6	0.5	0.3	0.4	0.5	0.6	1.2	1.8	2.3	2.3	
23-Dec	4.0	3.7	3.0	3.0	3.1	3.0	3.0	3.0	2.6	2.5	2.9	3.4	3.3	3.0	2.5	2.0	1.7	1.4	1.0	0.6	0.5	0.6	0.7	1.1	4.0	
24-Dec	0.6	0.9	0.4	0.9	0.7	0.5	0.6	0.6	0.7	0.7	0.6	0.8	0.9	1.1	0.8	0.9	0.6	0.8	0.9	0.7	0.6	0.4	0.5	0.6	1.1	
25-Dec	0.4	0.6	0.4	0.4	0.6	0.7	0.6	0.5	0.6	0.6	1.0	0.9	0.9	0.9	0.5	0.5	0.4	0.6	0.8	0.7	0.4	0.4	0.6	1.0	1.0	
26-Dec	0.6	0.8	0.4	0.8	1.1	0.9	0.8	0.8	1.0	0.6	0.9	0.9	0.6	0.5	0.9	0.8	1.0	1.0	1.3	1.4	1.2	1.2	1.3	1.6	1.6	
27-Dec	2.0	2.7	2.2	1.8	1.1	0.9	1.1	1.3	1.5	1.2	1.1	0.6	0.5	0.9	0.4	0.4	1.2	1.2	1.5	1.5	0.9	1.1	0.3	0.3	2.7	
28-Dec	0.5	0.3	0.8	0.3	0.4	0.4	0.6	0.7	1.0	0.7	1.8	1.7	1.8	1.5	1.3	1.5	1.0	1.6	1.5	1.1	1.2	1.2	0.6	0.3	1.8	
29-Dec	0.2	0.2	0.2	0.3	0.3	0.5	0.6	0.6	0.6	0.4	0.7	0.5	0.7	0.5	0.8	0.6	0.5	0.7	0.4	0.3	0.3	0.3	0.4	0.3	0.8	
30-Dec	0.4	0.3	0.2	0.3	0.4	0.7	1.0	1.0	0.5	0.6	1.4	1.0	0.7	1.0	1.2	1.0	1.4	1.1	0.9	0.7	0.8	0.6	0.8	0.8	1.4	
31-Dec	0.6	0.6	0.5	0.4	0.5	0.5	0.5	0.3	0.4	0.8	0.7	0.8	1.1	1.6	1.8	1.6	0.7	0.6	1.6	2.4	1.8	1.4	1.5	1.0	2.4	
		4.0	3.7	3.0	3.0	3.1	3.0	3.0	3.0	3.6	3.3	3.4	3.3	3.0	2.6	3.0	3.2	3.1	4.2	3.6	2.9	3.0	3.5	3.2		
		Diurnal Maximum																								
DF - DAS Failure		UO - Unstable Operation																								



Summary of Hour Averages

Mannix - December 2023

Maximum Value: 3.0 km/h on Dec 19 18:00		Maximum Daily Average: 0.4 km/h on Dec 19		Hours in Service: 744																						
Minimum Value: -1.5 km/h on Dec 27 06:00		Minimum Daily Average: -0.7 km/h on Dec 13		Hours of Data: 735																						
Maximum Diurnal Average: -0.1 km/h at hour 14		Minimum Diurnal Average: -0.3 km/h at hour 23		Hours of Missing Data: 9																						
Monthly Average: -0.21 km/h		Percentiles: P ₁ = -1.2 P ₁₀ = -0.8 Q ₁ = -0.5 Median = -0.2 Q ₃ = 0.1 P ₉₀ = 0.4 P ₉₉ = 1.0		Hours of Calibration: 0																						
				Percent Operational Time: 98.8																						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Dec	-0.2	-0.3	-0.2	-0.3	-0.1	0.1	0.2	0.2	-0.3	-0.3	0.0	0.5	0.3	0.2	0.0	-0.1	0.0	0.2	0.3	0.1	0.0	0.0	-0.3	-0.3	0.0	0.5
2-Dec	-0.1	-0.2	-0.3	-0.1	-0.3	0.0	0.1	-0.1	-0.2	0.0	0.1	0.1	0.0	-0.1	-0.2	-0.1	-0.2	0.1	0.2	0.4	0.9	1.3	0.2	0.3	0.1	1.3
3-Dec	0.2	0.0	0.0	0.2	0.0	0.1	0.0	0.0	0.1	0.0	0.4	-0.2	0.3	0.1	0.1	0.1	0.1	0.1	0.4	0.3	0.2	0.4	0.4	0.2	0.4	
4-Dec	0.5	0.5	0.3	0.0	-0.1	0.0	-0.3	-0.3	-0.5	-0.4	-0.5	-0.4	-0.5	-0.4	-0.6	-0.5	-0.6	-0.3	-0.2	-0.3	0.0	-0.1	-0.1	-0.2	0.5	
5-Dec	0.3	0.3	0.4	0.3	0.3	0.3	-0.3	0.6	0.3	0.3	0.1	-0.1	-0.2	-0.1	-0.2	-0.5	-0.7	-0.8	-0.6	-1.2	-0.6	-0.6	-1.1	-0.3	0.6	
6-Dec	-0.4	-0.8	-1.1	-0.9	-0.6	-0.9	-0.7	-0.6	-0.3	-0.6	-0.5	0.2	-0.7	-0.9	-1.0	-1.1	-1.1	-1.2	-0.6	-0.7	-0.9	-0.2	0.1	-0.1	0.2	
7-Dec	-0.8	-0.8	-0.6	-0.3	-0.3	-0.4	-0.2	-0.2	-0.3	-0.5	-0.1	-0.2	-0.2	-0.1	-0.1	-0.2	-0.4	-0.7	-0.4	-0.4	-0.6	-0.6	-0.6	-0.2	-0.4	
8-Dec	-0.3	-0.2	-0.4	-0.3	-0.2	0.0	-0.1	-0.1	-0.2	-0.1	-0.2	-0.3	-0.1	-0.1	-0.2	-0.4	-0.5	-0.5	-0.4	-0.4	-0.5	-0.3	-0.6	-0.4	0.0	
9-Dec	-0.2	-0.5	-1.1	-0.7	-0.3	-0.3	-0.5	-0.6	-0.3	-0.2	-0.3	0.0	-0.1	-0.2	-0.1	-0.2	-0.1	-0.2	-0.3	-0.1	0.3	0.1	0.2	0.4	0.4	
10-Dec	0.7	0.9	0.6	0.5	0.6	0.4	0.0	0.2	0.3	0.2	-0.2	-0.6	-0.2	-0.9	-0.9	-0.9	-0.7	-1.0	-0.7	0.0	0.0	0.3	0.0	0.1	0.9	
11-Dec	0.0	0.5	0.2	0.0	-0.1	-0.4	-0.5	-0.9	-0.7	-0.9	-1.0	-0.6	-0.7	-0.2	0.0	-0.2	-0.2	-0.2	-0.2	-0.2	-0.1	-0.2	-0.2	-0.2	0.5	
12-Dec	0.0	-0.2	-0.3	-0.2	-0.2	-0.2	-0.2	0.0	0.3	0.0	0.1	0.1	0.0	-0.4	0.0	-0.2	-0.1	0.1	-0.3	-0.3	-0.5	-1.0	-1.0	-0.9	0.3	
13-Dec	-0.9	-0.7	-0.8	-0.8	-1.1	-0.7	-0.5	-0.7	-0.5	-0.7	-0.7	-0.8	-0.7	-0.3	-0.6	-0.6	-0.8	-1.0	-0.4	-0.9	-1.1	-0.6	-1.1	-0.9	-0.7	
14-Dec	-0.5	-0.4	-0.5	-0.7	-0.9	-0.8	-0.6	-0.9	-1.2	-0.7	-0.6	-0.5	-0.1	-0.5	-0.5	-0.7	-0.8	-1.0	-0.4	-0.5	-0.1	-0.1	-0.3	-0.3	-0.1	
15-Dec	-0.7	-0.1	-0.3	-0.2	-0.1	-0.3	-0.8	-0.6	-0.5	-0.6	-0.8	-0.9	-0.8	-0.6	-0.9	-0.4	-0.7	-1.1	-1.0	-1.0	-0.9	-0.6	-0.5	-0.7	-0.1	
16-Dec	-0.9	-1.0	-0.9	-0.7	-0.6	-0.2	-0.3	-0.4	-0.8	-0.3	0.4	0.3	0.0	0.7	0.5	0.3	0.3	0.2	0.2	0.1	0.1	-0.1	-0.2	-0.3	0.7	
17-Dec	0.5	1.0	-0.2	-0.1	-0.1	-0.1	-0.1	-0.2	-0.4	-0.3	-0.2	-0.2	-0.3	-0.2	-0.6	0.0	-0.3	DF	DF	DF	DF	DF	DF	DF	1.0	
18-Dec	DF	DF	-0.8	-0.6	-0.3	-0.1	-0.7	-0.4	-0.8	-0.8	-0.9	-0.6	-0.8	-0.4	-0.3	-0.3	-0.2	-0.1	-0.5	-0.5	0.1	0.9	1.0	1.2	1.2	
19-Dec	0.8	0.3	0.3	0.8	0.1	0.1	0.7	0.1	0.1	1.3	1.6	0.9	1.2	0.7	0.3	0.2	2.1	3.0	-0.9	-1.1	-0.7	-0.9	-1.1	-0.5	3.0	
20-Dec	-0.7	-0.5	-0.1	-0.1	-0.1	-0.1	0.1	0.2	0.2	0.0	0.2	0.4	0.1	0.3	0.3	0.4	0.3	0.4	0.2	0.4	0.1	-0.2	-0.8	-0.5	0.4	
21-Dec	-1.3	-0.9	-0.8	-0.8	-0.8	-0.7	-1.0	-1.3	-1.5	-0.5	-0.4	0.0	0.4	0.5	-0.1	0.0	0.2	0.0	-0.3	-0.3	-0.4	-0.3	-0.5	-0.1	0.5	
22-Dec	-0.1	-0.4	-0.2	-0.2	-0.1	-0.2	0.0	0.0	0.4	0.3	0.4	0.1	0.1	0.1	0.3	0.1	0.3	0.0	-0.1	-0.1	-0.2	-0.4	-0.4	-0.7	0.4	
23-Dec	-0.8	-0.9	-0.9	-0.5	-0.1	-0.2	-0.1	-0.7	-0.5	-0.7	-0.3	-0.6	-0.7	-0.8	-0.4	-0.2	-0.2	-0.3	-0.4	-0.9	-0.9	-0.7	-1.0	-1.3	-0.1	
24-Dec	-1.2	-0.8	-0.7	-0.4	-0.2	-0.3	-0.1	-0.2	-0.3	-0.5	-0.7	-0.4	-0.7	-0.7	-0.3	-0.5	-0.5	-0.3	-0.4	-0.6	-0.6	-0.7	-0.4	-0.5	-0.1	
25-Dec	-0.3	-0.7	-0.3	-0.3	-0.4	-0.6	-0.9	-0.8	-0.4	-0.6	-0.2	0.0	-0.1	0.3	0.4	-0.3	-0.3	-0.2	0.0	-0.2	0.3	0.7	0.4	0.2	0.7	
26-Dec	0.4	0.6	0.3	0.9	0.4	0.2	0.3	0.4	0.1	0.7	0.3	0.2	0.0	0.2	-0.1	0.1	-0.3	0.0	-0.6	-0.4	-0.8	-0.8	-1.2	-1.3	0.9	
27-Dec	-1.2	-1.2	-1.3	-1.1	-1.2	-1.5	-1.0	-0.9	-0.5	-0.9	-0.3	0.0	0.0	0.5	0.2	0.0	-0.4	-0.1	-0.3	0.2	0.2	0.0	0.2	0.2	0.5	
28-Dec	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.1	0.4	0.3	0.9	0.2	0.5	0.3	0.0	0.5	0.1	1.0	0.6	0.1	0.4	0.6	0.4	0.0	1.0	
29-Dec	0.0	0.1	0.0	-0.1	-0.1	0.2	0.5	-0.2	-0.3	-0.2	-0.1	0.2	-0.1	0.0	-0.1	-0.4	-0.3	-0.3	0.3	0.0	0.1	0.1	0.1	-0.2	0.5	
30-Dec	0.3	0.6	0.5	0.3	0.6	-0.2	-0.5	-0.2	0.4	0.3	-0.1	0.3	0.6	0.5	-0.3	0.3	0.3	0.4	0.2	0.2	-0.3	0.1	-0.4	-0.3	0.6	
31-Dec	-0.3	-0.4	-0.4	-0.3	-0.3	-0.4	-0.6	-0.3	-0.2	-0.3	-0.2	0.0	0.4	0.3	-0.5	-0.3	-0.8	-0.8	-0.7	-0.5	-0.5	-0.5	-0.1	0.3	0.4	
																								Diurnal Average		
																								Diurnal Maximum		
DF - DAS Failure																										



Summary of Hour Standard Deviations

Mannix - December 2023

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0		Hours in Service: 744																								
Maximum Value: 4.3 km/h on Dec 10 19:00		Hours of Data: 735																								
Minimum Value: 0.1 km/h on Dec 29 03:00		Hours of Missing Data: 9																								
Percentiles: P ₁ = 0.2 P ₁₀ = 0.4 Q ₁ = 0.5 Median = 0.8 Q ₃ = 1.5 P ₉₀ = 2.4 P ₉₉ = 3.3		Hours of Calibration: 0																								
		Percent Operational Time: 98.8																								
Day	Hourly Period Ending At (MST)																								Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Dec	0.3	0.4	0.6	0.5	0.5	0.6	0.7	0.4	0.3	0.5	0.5	0.6	0.5	0.5	0.4	0.5	0.3	0.2	0.5	0.4	0.6	0.5	0.6	0.6	0.7	
2-Dec	0.7	0.8	0.7	0.6	0.6	0.6	0.6	0.8	0.9	0.7	0.5	0.5	0.5	0.3	0.4	0.2	0.3	0.7	0.5	0.4	1.4	1.3	0.7	0.8	1.4	
3-Dec	0.5	0.3	0.3	0.3	0.2	0.3	0.4	0.5	0.5	0.5	0.6	0.8	1.0	1.1	0.9	0.7	1.0	0.9	1.0	0.9	0.7	0.8	0.5	0.6	1.1	
4-Dec	0.9	0.7	0.8	0.5	0.5	0.5	0.4	0.5	0.5	0.8	1.1	0.7	0.8	0.7	0.5	0.3	0.5	1.0	0.9	0.6	0.7	0.4	0.3	0.4	1.1	
5-Dec	0.4	0.5	0.4	1.1	0.8	0.6	1.0	0.6	0.5	0.6	1.0	0.7	0.8	0.5	0.8	1.0	1.2	1.5	2.6	2.8	3.1	3.3	2.7	1.6	3.3	
6-Dec	1.8	1.1	1.6	2.2	2.2	1.9	2.2	2.1	1.7	1.3	1.4	2.5	1.9	1.9	2.1	1.1	0.7	0.6	0.9	0.7	0.8	1.0	2.2	1.5	2.5	
7-Dec	1.1	0.6	0.7	0.6	0.3	0.5	0.5	0.4	0.5	0.7	0.7	0.3	0.4	0.8	0.9	1.1	0.6	0.5	0.4	0.7	1.0	1.1	1.2	1.1	1.2	
8-Dec	0.7	0.5	0.4	0.5	0.5	0.4	0.4	0.5	0.4	0.3	0.4	0.6	0.4	0.5	0.8	0.8	0.7	0.8	1.1	1.4	1.0	0.9	0.8	0.7	1.4	
9-Dec	0.9	1.0	1.0	1.0	0.3	0.4	0.8	1.2	0.6	0.6	0.5	0.7	0.6	0.4	0.5	0.3	0.6	0.6	0.4	0.3	0.3	0.5	0.4	0.4	1.2	
10-Dec	0.7	0.7	0.6	0.5	0.6	1.1	0.9	1.0	0.9	0.9	0.8	1.0	1.9	2.0	2.5	2.4	3.1	2.9	4.3	3.6	2.8	3.1	3.5	3.2	4.3	
11-Dec	2.6	2.8	2.7	2.5	2.8	2.2	2.1	1.9	1.7	1.4	1.1	1.2	1.0	0.6	0.4	0.4	0.4	0.7	0.8	0.6	0.6	0.5	0.4	0.4	2.8	
12-Dec	0.4	0.8	0.7	1.0	0.6	0.4	0.5	0.4	0.5	0.7	0.7	0.8	0.7	1.1	1.0	0.8	1.0	1.0	0.8	1.1	0.8	1.1	1.3	1.5	1.5	
13-Dec	1.8	2.2	2.3	2.6	1.8	1.7	1.8	1.3	1.2	1.2	0.8	0.9	0.8	0.6	0.5	0.9	0.5	0.9	1.4	1.0	0.5	1.2	1.3	1.5	2.6	
14-Dec	1.5	1.2	0.9	1.5	2.0	2.2	2.5	2.3	3.0	3.6	3.3	2.6	1.7	1.2	0.6	0.5	0.6	0.5	0.6	0.7	0.7	0.6	0.3	0.6	3.6	
15-Dec	0.4	0.7	0.5	0.6	1.2	1.2	0.9	1.1	0.6	0.8	1.2	2.3	2.4	2.2	2.5	2.7	2.1	3.1	2.7	3.1	2.8	3.2	3.3	2.8	3.3	
16-Dec	2.4	3.0	2.7	2.3	3.1	2.5	2.3	2.3	2.6	2.3	2.2	1.4	1.2	1.7	1.3	0.9	0.9	0.4	0.6	0.7	0.5	0.2	0.5	1.0	3.1	
17-Dec	1.2	1.6	1.2	0.7	0.4	0.4	0.7	0.4	0.4	0.8	0.9	0.6	0.5	1.2	0.8	0.7	0.5	DF	DF	DF	DF	DF	DF	DF	1.6	
18-Dec	DF	DF	0.7	1.0	1.5	1.8	2.2	1.7	1.5	1.0	1.7	2.1	1.9	2.4	2.0	1.7	1.8	1.8	1.1	0.8	1.5	2.1	2.2	1.5	2.4	
19-Dec	1.9	1.9	2.2	2.1	1.4	1.1	1.3	1.2	1.6	1.1	1.3	1.3	1.3	1.2	2.2	2.5	2.7	3.4	2.4	2.4	2.3	2.3	2.5	2.7	3.4	
20-Dec	2.7	2.6	2.8	2.8	2.8	2.5	2.3	2.1	2.3	2.0	2.1	1.6	1.5	0.9	1.2	1.0	0.8	1.2	1.3	1.7	1.3	1.6	1.5	1.8	2.8	
21-Dec	2.4	2.4	2.3	1.8	2.0	1.2	1.1	0.9	1.2	1.3	1.1	0.9	0.8	0.9	0.8	1.1	1.3	1.1	1.9	1.8	1.6	1.5	1.2	1.1	2.4	
22-Dec	0.9	0.5	0.4	0.4	0.5	0.5	0.7	0.3	0.4	0.8	0.7	0.9	0.6	0.6	0.6	0.6	0.5	0.3	0.4	0.5	0.7	1.2	1.9	2.4	2.4	
23-Dec	4.2	3.7	3.1	2.9	3.1	3.0	3.0	3.0	2.7	2.5	2.8	3.3	3.3	2.9	2.4	2.1	1.7	1.4	1.0	0.6	0.5	0.6	0.6	0.9	4.2	
24-Dec	0.6	0.9	0.4	1.0	0.7	0.4	0.4	0.5	0.7	0.8	0.5	0.9	0.9	1.1	0.9	0.9	0.7	0.9	0.9	0.8	0.6	0.3	0.5	0.6	1.1	
25-Dec	0.4	0.6	0.4	0.4	0.5	0.8	0.5	0.4	0.5	0.5	1.0	1.0	0.9	0.8	0.5	0.6	0.4	0.7	0.8	0.6	0.4	0.5	0.5	1.0	1.0	
26-Dec	0.6	0.6	0.3	0.6	0.9	1.1	0.7	0.7	0.8	0.7	0.8	0.7	0.4	0.4	0.7	0.7	0.8	1.1	1.4	1.5	1.4	1.3	1.4	1.7	1.7	
27-Dec	2.1	2.8	2.2	1.8	1.1	0.8	1.1	1.3	1.6	1.4	1.1	0.6	0.4	0.8	0.4	0.4	1.0	1.1	1.5	1.4	1.0	1.1	0.4	0.3	2.8	
28-Dec	0.6	0.4	0.8	0.4	0.4	0.5	0.7	0.7	1.0	0.7	1.7	1.7	2.0	1.6	1.3	1.4	1.0	1.6	1.4	1.1	1.3	1.3	0.7	0.4	2.0	
29-Dec	0.3	0.1	0.1	0.3	0.3	0.3	0.4	0.5	0.6	0.3	0.5	0.4	0.4	0.3	0.6	0.5	0.6	0.7	0.5	0.2	0.2	0.3	0.2	0.2	0.7	
30-Dec	0.4	0.4	0.3	0.4	0.6	0.9	0.7	0.7	0.6	0.6	1.0	0.8	0.6	0.8	0.8	0.6	0.9	1.0	0.9	0.8	0.7	0.6	0.8	0.9	1.0	
31-Dec	0.7	0.6	0.5	0.4	0.5	0.4	0.4	0.3	0.4	1.0	0.9	0.9	1.3	2.0	1.9	1.7	0.8	0.7	1.7	2.6	1.8	1.3	1.5	1.0	2.6	
		4.2	3.7	3.1	2.9	3.1	3.0	3.0	3.0	3.6	3.3	3.3	3.3	2.9	2.5	2.7	3.1	3.4	4.3	3.6	3.1	3.3	3.5	3.2		
		Diurnal Maximum																								
DF - DAS Failure																										



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

AMS06
PATRICIA MCINNES
DECEMBER 2023

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

January 31, 2024

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - PATRICIA McINNES (AMS06)
DECEMBER 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	708	35	36	99.87	21.4	0	3.9	0
TRS (ppb) Average	708	35	36	99.87	1.7	0	0.9	0
THC (ppm) Average	708	35	36	99.87	3.1	-	2.5	-
NMHC(ppm) Average	708	35	36	99.87	0.483	-	0.081	-
CH4(ppm) Average	708	35	36	99.87	3.1	-	2.5	-
O3 (ppb) Average	708	36	36	100	43.7	0	37.4	-
NO2 (ppb) Average	707	36	37	99.87	34.7	0	17.3	-
NO (ppb) Average	707	36	37	99.87	73.9	-	19.7	-
NOX (ppb) Average	707	36	37	99.87	107.6	-	35.7	-
NH3 (ppb) Average	670	40	74	95.43	0	0	0	-
PM2.5 (ug/m3) Average	731	1	13	98.39	34.3	0	18.1	0
Temperature 2 m (C) Average	744	0	0	100	7.3	-	4.7	-
Relative Humidity (%) Average	744	0	0	100	92.3	-	86.6	-
Wind Speed 10 m (km/h) Average	744	0	0	100	33	-	17	-
Wind Direction 10 m (deg) Average	744	0	0	100	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - PATRICIA McINNES (AMS06)
 DECEMBER 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	708	0.64	1.8	-	0	0	0.1	0.2	0.4	1	21.4
TRS (ppb) Average	708	0.42	0.2	-	0.2	0.3	0.3	0.4	0.4	0.5	1.7
THC (ppm) Average	708	2.15	0.1	-	2	2	2.1	2.1	2.2	2.3	3.1
NMHC(ppm) Average	708	0.035	0.034	-	0	0	0	0	0	0.1	0.483
CH4(ppm) Average	708	2.12	0.1	-	2	2	2	2.1	2.2	2.3	3.1
O3 (ppb) Average	708	21.78	11.1	-	1.2	5.1	13	23.3	30.6	36	43.7
NO2 (ppb) Average	707	8.15	7.6	-	0	0.6	2.1	5.8	12.8	19.5	34.7
NO (ppb) Average	707	3.94	7.7	-	0	0.1	0.3	1.2	3.5	12.2	73.9
NOX (ppb) Average	707	12.09	14.2	-	0	0.8	2.5	7.3	15.9	29.7	107.6
NH3 (ppb) Average	670	0	0	-	0	0	0	0	0	0	0
PM2.5 (ug/m3) Average	731	5.53	5.1	-	0.2	1	2.3	3.9	6.9	12.4	34.3
Temperature 2 m (C) Average	744	-5.39	5.5	-	-18.2	-12.3	-9.9	-5.7	-1.1	2	7.3
Relative Humidity (%) Average	744	73.56	13	-	34.9	55	65.1	75.9	84.3	87.9	92.3
Wind Speed 10 m (km/h) Average	744	10.2	5	-	1	4	6	9	13	18	33
Wind Direction 10 m (deg) Average	744	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - PATRICIA McINNES (AMS06)
DECEMBER 2023

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
ALL GASEOUS ANALYZERS (except O3)	18 Dec 2023 15:00	18 Dec 2023 15:00	1	Maintenance - sample manifold cleaned
PM2.5	01 Dec 2023 01:00	01 Dec 2023 10:00	10	Unstable Operation - excessive baseline drift
PM2.5	14 Dec 2023 12:00	14 Dec 2023 13:00	2	Maintenance - analyzer replaced
NH3	17 Dec 2023 10:00	17 Dec 2023 10:00	1	Unstable Operation - excessive baseline noise
NH3	18 Dec 2023 19:00	18 Dec 2023 19:00	1	Unstable Operation - excessive baseline noise
NH3	01 Dec 2023 04:00	31 Dec 2023 04:00	31	Stabilization after daily span



Wood Buffalo Environmental Association

Summary of Hour Averages

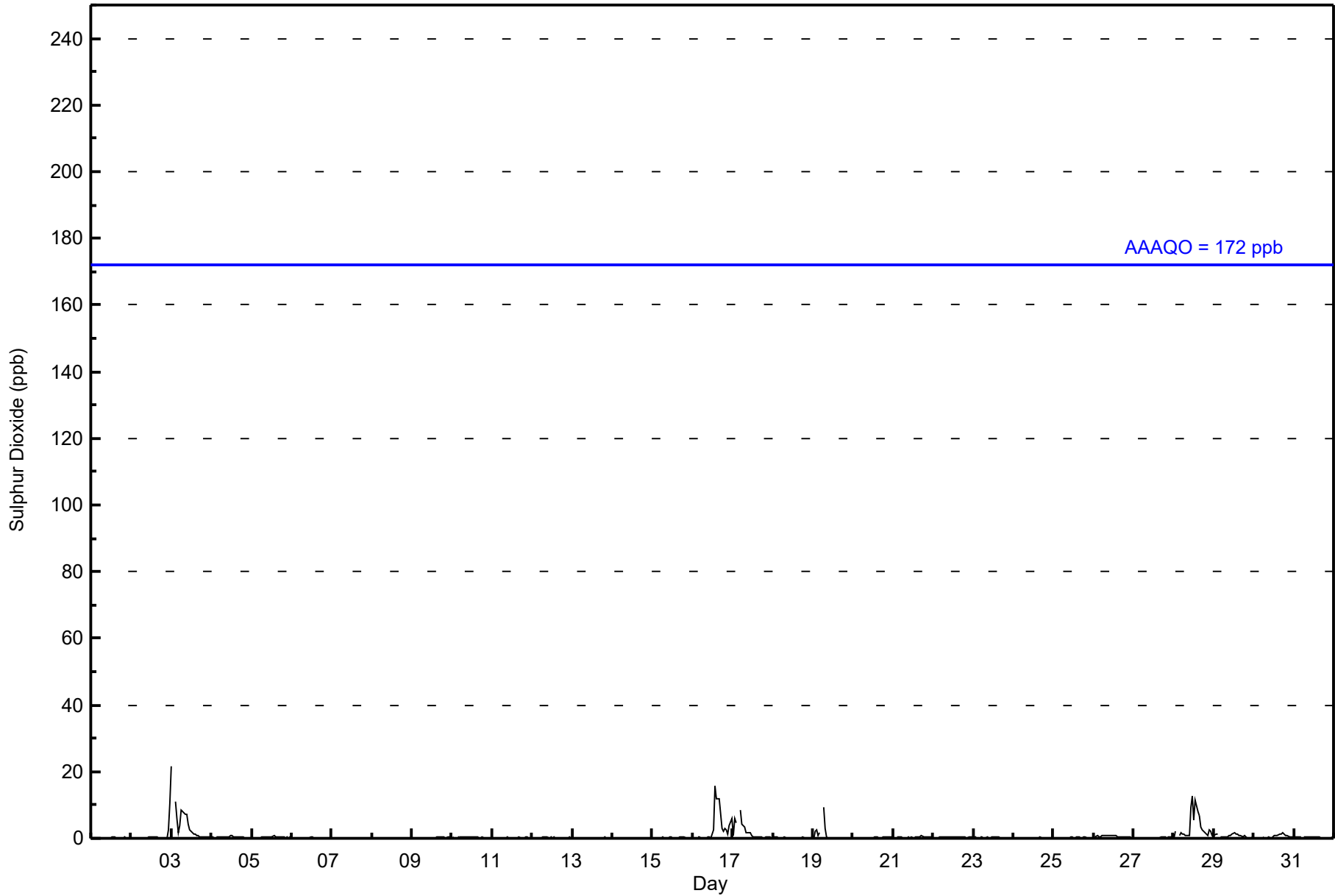
Sulphur Dioxide (SO₂) - ppb

Patricia McInnes - December 2023

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 21.4 ppb on Dec 3 01:00	Maximum Daily Average: 3.9 ppb on Dec 3		Hours of Data:	708
Minimum Value: 0.0 ppb on Dec 2 02:00	Minimum Daily Average: 0.0 ppb on Dec 24		Hours of Missing Data:	36
Maximum Diurnal Average: 1.2 ppb at hour 14	Minimum Diurnal Average: 0.3 ppb at hour 21		Hours of Calibration:	35
Monthly Average: 0.64 ppb	Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.1 Median = 0.2 Q ₃ = 0.4 P ₉₀ = 1.0 P ₉₉ = 11.1		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-Dec	0.0	0.0	0.0	0.0	0.0	Z	0.0	0.1	0.0	0.1	0.1	0.1	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.0	0.1	0.0	0.1	0.2	0.7	10.5																				
2-Dec	Z	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.2	0.2	0.2	0.3	0.3	0.4	0.3	0.3	0.1	0.1	0.0	0.1	0.1	0.2	2.4	10.5	0.7	10.5																						
3-Dec	21.4	Z	11.1	5.9	1.7	4.0	8.6	7.8	7.2	7.0	4.3	2.7	1.9	1.4	1.1	0.8	0.7	0.4	0.3	0.3	0.3	0.4	0.4	0.4	3.9	21.4																						
4-Dec	0.5	0.4	Z	0.4	0.3	0.4	0.4	0.4	0.4	0.3	0.4	0.7	0.7	0.5	0.4	0.4	0.3	0.3	0.4	0.2	0.1	0.1	0.1	0.1	0.4	0.7																						
5-Dec	0.0	0.1	0.1	Z	0.2	0.1	0.3	0.4	0.5	0.5	0.5	0.5	0.6	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.3	0.6																						
6-Dec	0.2	0.1	0.1	0.2	Z	0.2	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.0	0.1	0.0	0.1	0.0	0.1	0.0	0.1	0.2																						
7-Dec	0.0	0.0	0.1	0.0	0.0	Z	0.1	0.1	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.1																					
8-Dec	Z	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.2	0.1	0.0	0.2	0.2																					
9-Dec	0.1	Z	0.1	0.0	0.1	0.0	0.1	0.0	0.0	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.1	0.2	0.2	0.2	0.1	0.3	0.3																					
10-Dec	0.1	0.2	Z	0.4	0.3	0.4	0.3	0.5	0.4	0.5	0.5	0.4	0.3	0.3	0.3	0.3	0.1	0.2	0.2	0.2	0.2	0.1	0.2	0.1	0.3	0.5	0.5																					
11-Dec	0.1	0.1	0.1	Z	0.1	0.1	0.2	0.2	0.1	0.2	0.1	0.2	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.1	0.4	0.3	0.2	0.2	0.2	0.4	0.4																					
12-Dec	0.1	0.2	0.1	0.1	Z	0.2	0.2	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.2	0.2	0.2	0.2	0.2	0.1	0.2	0.3	0.3																					
13-Dec	0.1	0.0	0.1	0.0	0.0	Z	0.1	0.1	0.1	0.1	C	C	C	C	0.2	0.1	0.1	0.2	0.1	0.2	0.2	0.1	0.1	0.1	0.1	0.2	0.2																					
14-Dec	Z	0.1	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.1	0.1	0.2	0.2	0.2																					
15-Dec	0.1	Z	0.2	0.1	0.1	0.1	0.2	0.2	0.1	0.2	0.3	0.3	0.2	0.1	0.1	0.1	0.3	0.4	0.5	0.3	0.1	0.1	0.1	0.1	0.2	0.5	0.5																					
16-Dec	0.1	0.1	Z	0.3	0.3	0.0	0.0	0.0	0.1	0.4	0.3	0.0	2.4	15.5	11.9	11.9	11.9	3.0	2.3	3.0	2.5	1.4	3.8	5.8	3.3	15.5																						
17-Dec	0.8	5.8	4.6	Z	8.3	4.2	3.7	3.4	1.6	1.5	1.7	0.8	0.3	0.3	0.2	0.2	0.3	0.4	0.2	0.2	0.3	0.3	0.2	0.1	1.7	8.3																						
18-Dec	0.1	0.2	0.2	0.2	Z	0.1	0.1	0.3	0.2	0.1	0.0	0.1	0.1	0.1	M	0.0	0.0	0.1	0.4	0.0	0.0	0.0	0.0	0.0	0.1	0.4	0.4																					
19-Dec	0.0	2.0	2.7	0.7	1.8	Z	9.5	3.0	0.6	0.2	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9	9.5																						
20-Dec	Z	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.1	0.1	0.2	0.2	0.2	0.3	0.2	0.2	0.2	0.0	0.3	0.4	0.4	0.4	0.3	0.4	0.2	0.4	0.4																					
21-Dec	0.3	Z	0.4	0.3	0.4	0.3	0.2	0.2	0.2	0.2	0.2	0.3	0.2	0.3	0.5	0.2	0.4	0.7	0.5	0.4	0.5	0.5	0.4	0.2	0.3	0.7	0.7																					
22-Dec	0.2	0.1	Z	0.1	0.3	0.3	0.2	0.2	0.3	0.3	0.3	0.3	0.5	0.6	0.6	0.5	0.4	0.4	0.3	0.3	0.2	0.2	0.3	0.3	0.3	0.6	0.6																					
23-Dec	0.2	0.3	0.3	Z	0.3	0.3	0.2	0.2	0.3	0.1	0.1	0.2	0.3	0.2	0.2	0.3	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.3	0.3																					
24-Dec	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	0.2	0.1	0.0	0.1	0.0	0.0	0.0	0.1	0.0	0.2	0.2																					
25-Dec	0.1	0.0	0.1	0.0	0.0	Z	0.1	0.1	0.1	0.2	0.2	0.3	0.2	0.2	0.2	0.3	0.2	0.2	0.3	0.2	0.1	0.1	0.1	0.1	0.1	0.3	0.3																					
26-Dec	Z	0.6	0.7	0.6	0.5	1.0	1.1	0.9	0.9	1.0	0.9	0.8	0.8	0.7	0.6	0.5	0.5	0.5	0.4	0.3	0.3	0.2	0.2	0.1	0.6	1.1																						
27-Dec	0.1	Z	0.1	0.1	0.0	0.1	0.1	0.0	0.0	0.1	0.1	0.0	0.0	0.1	0.1	0.2	0.3	0.2	0.4	0.4	0.2	0.3	0.2	0.2	0.1	0.4	0.4																					
28-Dec	0.1	2.0	Z	1.0	1.5	1.4	1.2	0.9	0.8	0.9	9.4	12.6	5.4	11.3	7.9	6.7	3.3	2.4	2.1	1.5	0.8	2.4	2.1	1.0	3.4	12.6																						
29-Dec	0.9	1.3	1.2	Z	0.4	0.3	0.2	0.3	0.5	0.7	0.8	1.3	1.5	1.3	1.2	0.9	0.8	0.6	0.7	0.5	0.1	0.1	0.1	0.3	0.7	1.5																						
30-Dec	0.2	0.2	0.1	0.2	Z	0.3	0.1	0.1	0.1	0.2	0.1	0.4	0.6	0.8	1.0	1.2	1.2	1.7	1.4	1.0	0.7	0.6	0.5	0.4	0.6	1.7	1.7																					
31-Dec	0.3	0.2	0.3	0.3	0.4	Z	0.3	0.3	0.2	0.2	0.3	0.4	0.5	0.5	0.4	0.3	0.2	0.1	0.2	0.2	0.1	0.1	0.2	0.3	0.3	0.5	0.5																					
1.0																								0.5	0.9	0.4	0.7	0.6	0.9	0.7	0.5	0.5	0.7	0.8	0.6	1.2	1.0	0.9	0.7	0.4	0.4	0.4	0.3	0.3	0.4	0.7	Diurnal Average	
21.4																								5.8	11.1	5.9	8.3	4.2	9.5	7.8	7.2	7.0	9.4	12.6	5.4	15.5	11.9	11.9	11.9	3.0	2.3	3.0	2.5	2.4	3.8	10.5	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
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Patricia McInnes - December 2023

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	699	98.73	98.73
11 - 20	8	1.13	99.86
21 - 60	1	0.14	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 708

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Patricia McInnes - December 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	9	2	3	2	6	22	98	108	77	94	115	65	42	22	17	17	699
11 - 20	4	0	0	0	0	0	0	0	0	0	0	0	0	1	2	1	8
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	13	2	3	2	6	22	98	108	77	94	115	65	43	23	19	18	708

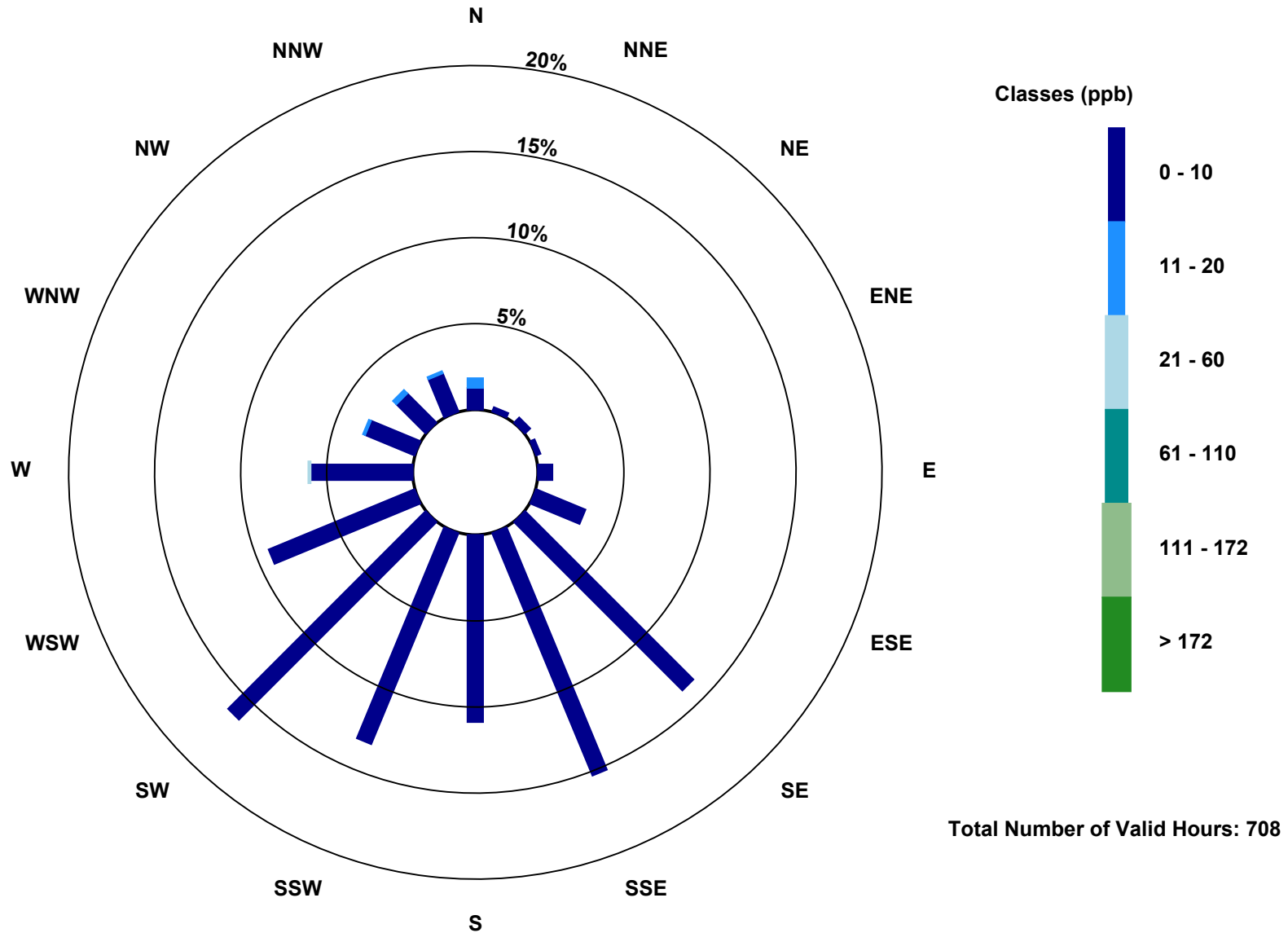
Total Number of Valid Hours: 708

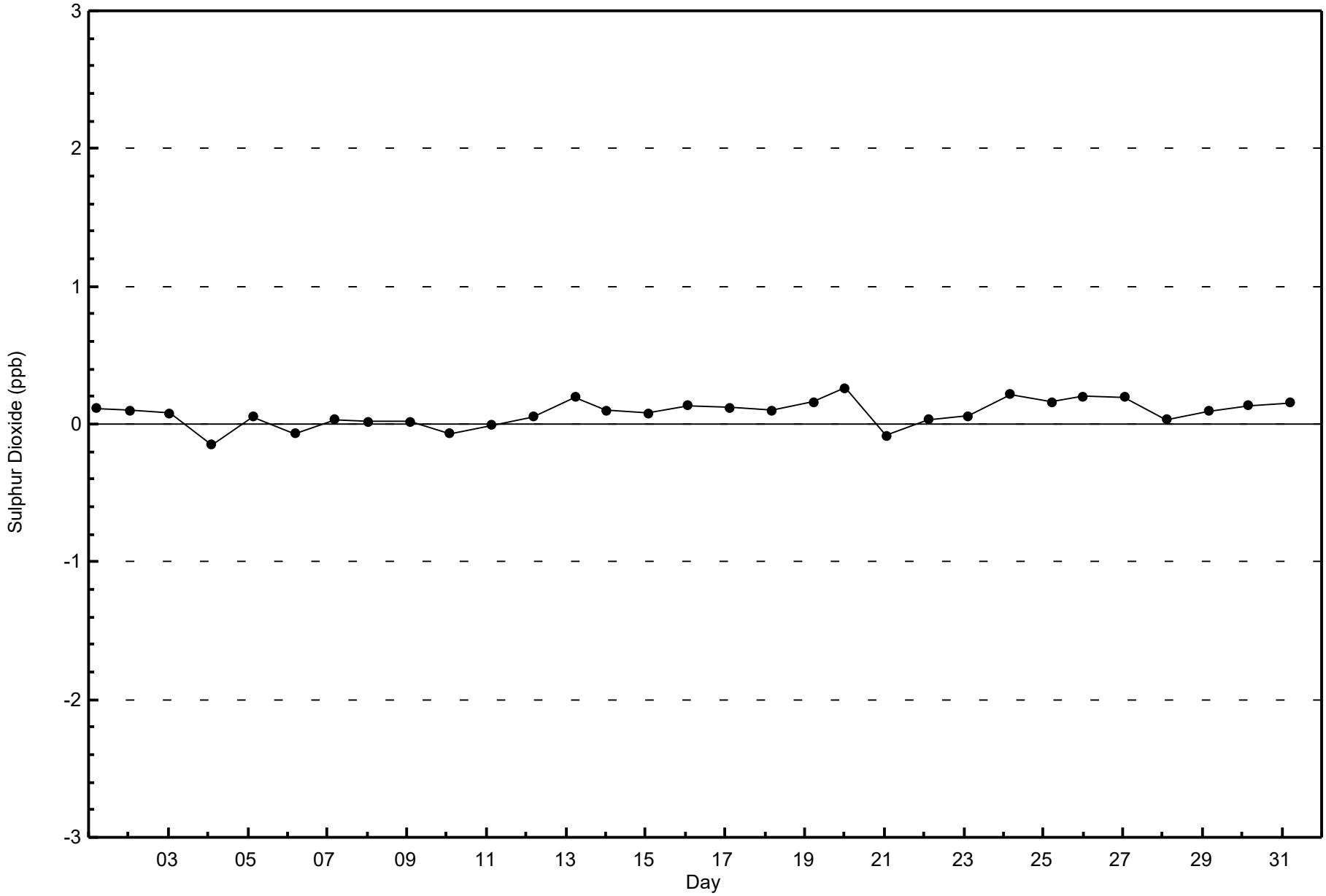
Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Dec 2023

Sulphur Dioxide (SO₂) - ppb
Patricia McInnes

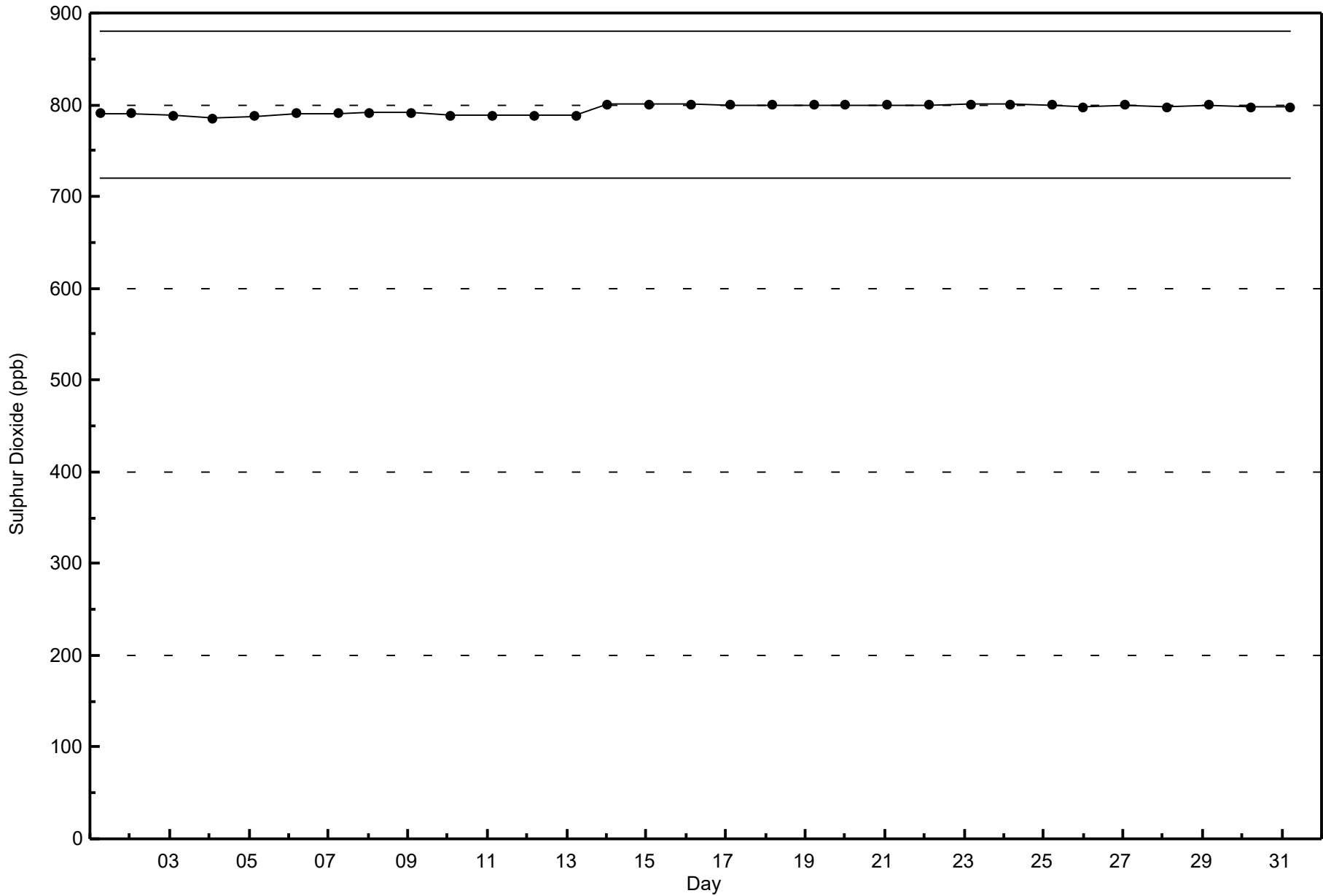






Wood Buffalo Environmental Association
Span Responses

Sulphur Dioxide (SO₂) - ppb
Patricia McInnes - December 2023





Wood Buffalo Environmental Association

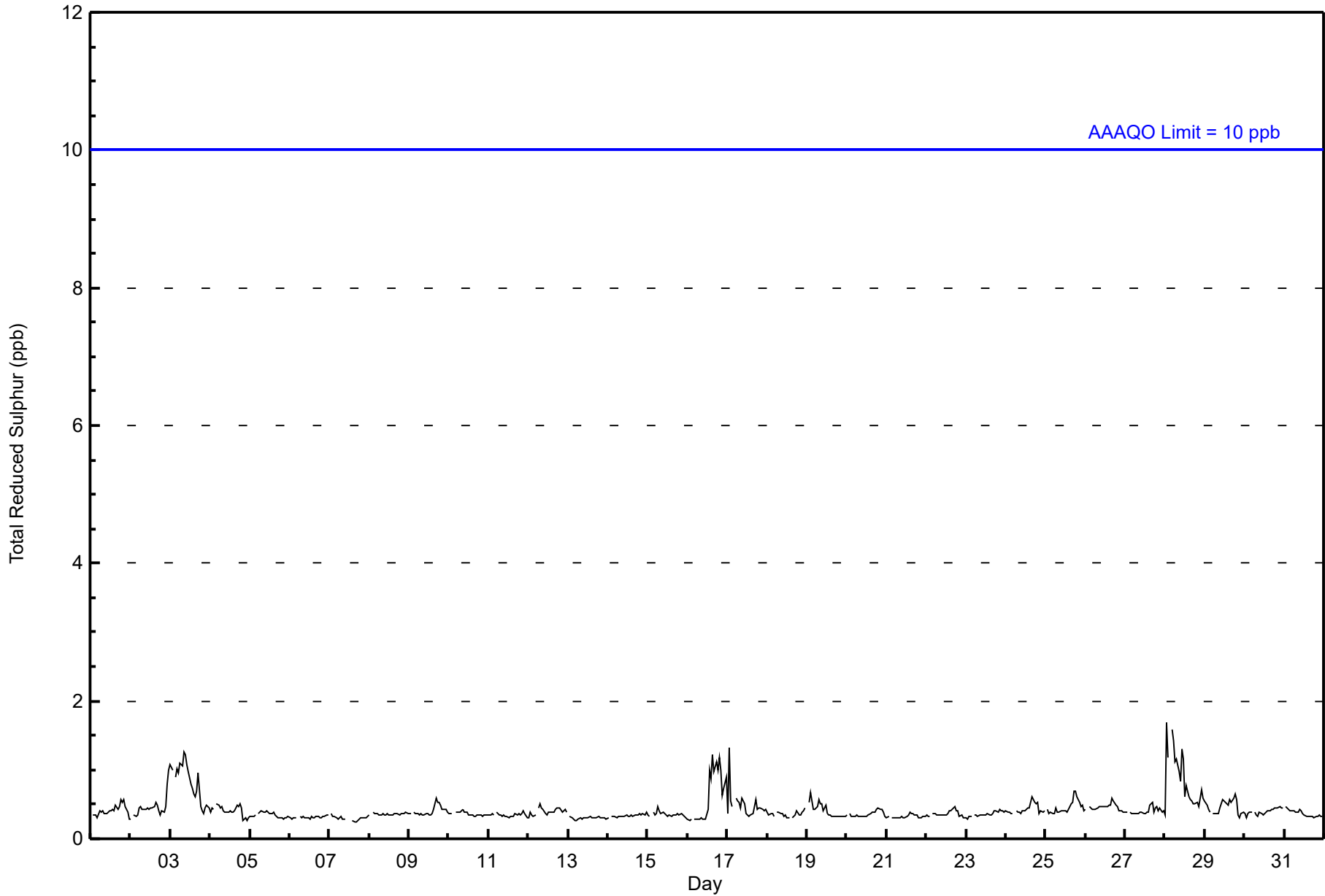
Summary of Hour Averages

Total Reduced Sulphur (TRS) - ppb

Patricia McInnes - December 2023

Number of Exceedences (AAAQO):		1-hr: 0		24-hr: 0		Hours in Service:		744																						
Maximum Value: 1.7 ppb on Dec 28 02:00		Maximum Daily Average: 0.9 ppb on Dec 28		Minimum Value: 0.2 ppb on Dec 7 17:00		Minimum Daily Average: 0.3 ppb on Dec 7		Hours of Data: 708																						
Maximum Diurnal Average: 0.5 ppb at hour 2		Minimum Diurnal Average: 0.4 ppb at hour 1		Hours of Missing Data: 36		Hours of Calibration: 35		Percent Operational Time: 99.9																						
Monthly Average: 0.42 ppb		Percentiles: P ₁ = 0.3 P ₁₀ = 0.3 Q ₁ = 0.3 Median = 0.4 Q ₃ = 0.4 P ₉₀ = 0.5 P ₉₉ = 1.2																												
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24						
1-Dec	Z	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	0.5	0.4	0.5	0.6	0.5	0.6	0.5	0.4	0.3	0.4	0.4	0.5	0.8	1.0	0.5	1.0
2-Dec	0.3	Z	0.3	0.3	0.4	0.5	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.4	0.3	0.4	0.4	0.5	0.8	1.0	0.5	1.0	0.5	1.0	0.5	1.0	
3-Dec	1.1	1.0	Z	0.9	1.0	0.9	1.1	1.1	1.3	1.2	1.1	1.0	0.8	0.7	0.6	0.6	0.7	1.0	0.5	0.4	0.4	0.5	0.5	0.4	0.8	1.3	0.8	1.3		
4-Dec	0.4	0.4	0.4	Z	0.5	0.5	0.4	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.4	0.3	0.3	0.3	0.3	0.3	0.4	0.5	0.4	0.5	0.4	
5-Dec	0.3	0.3	0.3	0.3	Z	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	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	
6-Dec	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	0.3	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	
7-Dec	Z	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	C	C	C	C	0.3	0.2	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	
8-Dec	0.3	Z	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.4	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	
9-Dec	0.4	0.4	Z	0.4	0.4	0.4	0.3	0.4	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.6	0.5	0.5	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.6	
10-Dec	0.4	0.4	0.4	Z	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.3	0.4	0.3	0.3	0.4	0.4	0.4	0.4	0.4	
11-Dec	0.4	0.3	0.4	0.3	Z	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.3	0.4	0.4	0.4	0.4	0.3	0.4	0.4	0.4	0.3	0.3	
12-Dec	0.3	0.4	0.3	0.3	0.3	Z	0.5	0.5	0.5	0.4	0.4	0.3	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	
13-Dec	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	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	
14-Dec	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	0.3	0.4	0.3	0.4	0.3	0.4	0.3	0.4	
15-Dec	0.3	0.3	Z	0.4	0.3	0.4	0.5	0.4	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.4	0.3	0.4	0.3	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4	
16-Dec	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	1.0	0.9	1.2	1.0	1.1	1.0	1.2	1.0	0.6	0.7	0.9	0.6	1.2	0.6	1.2		
17-Dec	0.4	1.3	0.5	0.5	Z	0.6	0.6	0.5	0.4	0.6	0.5	0.4	0.3	0.3	0.3	0.4	0.5	0.6	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5	
18-Dec	0.4	0.4	0.4	0.4	0.3	Z	0.4	0.4	0.4	0.4	0.3	0.3	0.3	0.3	M	0.3	0.3	0.3	0.4	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	
19-Dec	Z	0.5	0.7	0.6	0.4	0.4	0.5	0.6	0.5	0.5	0.4	0.5	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4	
20-Dec	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	0.4	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	
21-Dec	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	0.4	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	
22-Dec	0.3	0.3	0.3	Z	0.4	0.4	0.4	0.3	0.4	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.4	0.4	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.4	
23-Dec	0.3	0.3	0.3	0.3	Z	0.4	0.3	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	
24-Dec	0.4	0.4	0.4	0.4	0.4	Z	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.4	0.5	0.6	0.5	0.5	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	
25-Dec	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	0.5	0.5	0.7	0.7	0.6	0.5	0.5	0.5	0.4	0.4	0.4	0.4	0.4	0.5	
26-Dec	0.4	Z	0.5	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.6	0.5	0.5	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5	
27-Dec	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	0.5	0.5	0.4	0.4	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	
28-Dec	0.3	1.7	1.2	Z	1.6	1.4	1.1	1.2	1.0	0.8	1.3	1.2	0.6	0.8	0.6	0.6	0.5	0.5	0.5	0.5	0.5	0.6	0.7	0.6	0.9	1.7	0.9	1.7		
29-Dec	0.6	0.5	0.4	0.4	Z	0.4	0.4	0.4	0.4	0.4	0.5	0.6	0.5	0.5	0.5	0.6	0.5	0.6	0.7	0.6	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.5	
30-Dec	0.4	0.3	0.4	0.4	0.4	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	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	
31-Dec	Z	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	0.3	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	
																								Diurnal Average						
																								Diurnal Maximum						
																								0.4						
																								1.1						

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





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Reduced Sulphur (TRS) - ppb
Patricia McInnes - December 2023

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	708	100.00	100.00
3 - 4	0	0.00	100.00
5 - 7	0	0.00	100.00
8 - 11	0	0.00	100.00
> 11	0	0.00	100.00

Total Number of Valid Hours: 708

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Total Reduced Sulphur (TRS) - ppb
Patricia McInnes - December 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	13	0	3	2	6	23	96	107	79	96	110	70	42	22	19	20	708
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	13	0	3	2	6	23	96	107	79	96	110	70	42	22	19	20	708

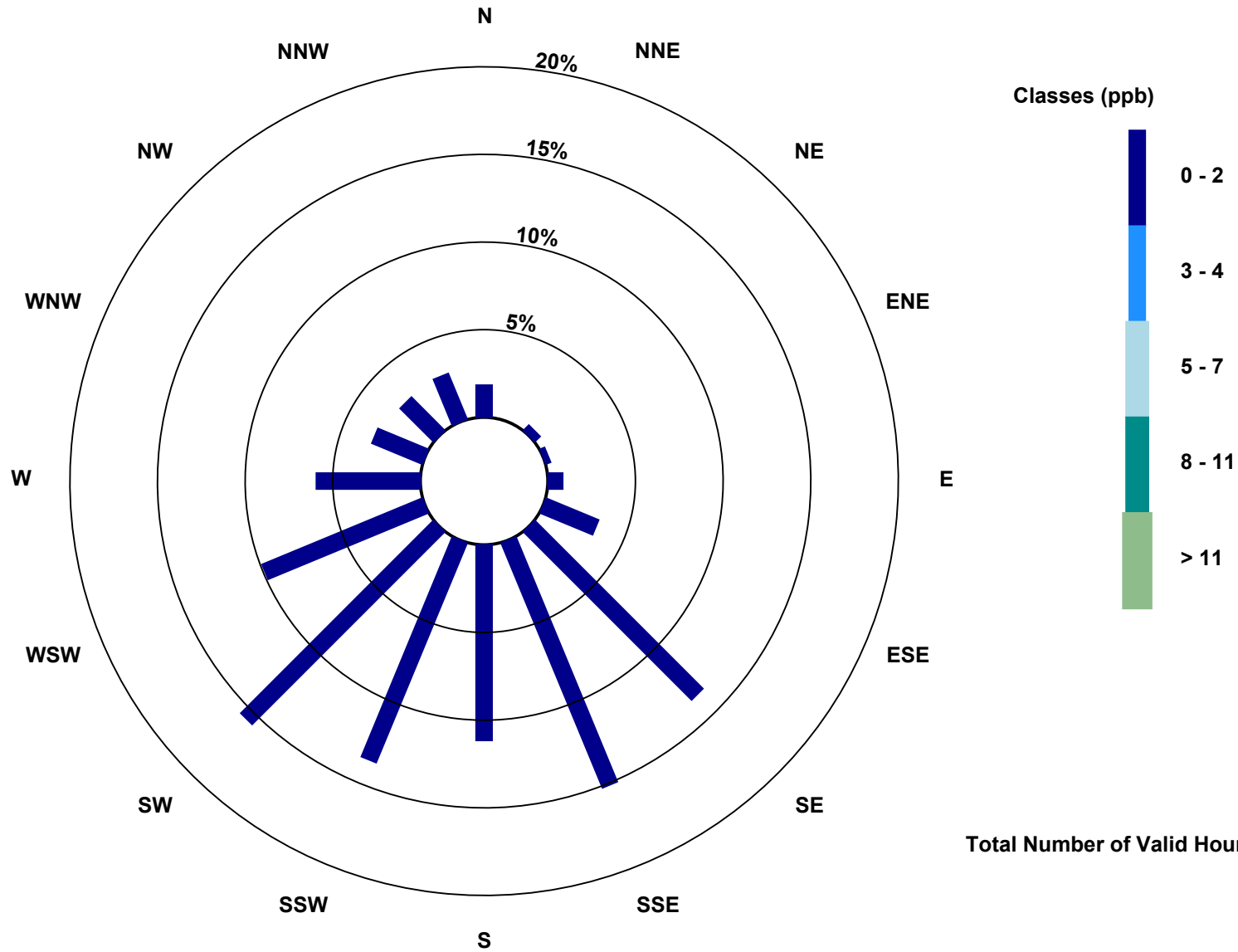
Total Number of Valid Hours: 708

Total Number of Hours: 744

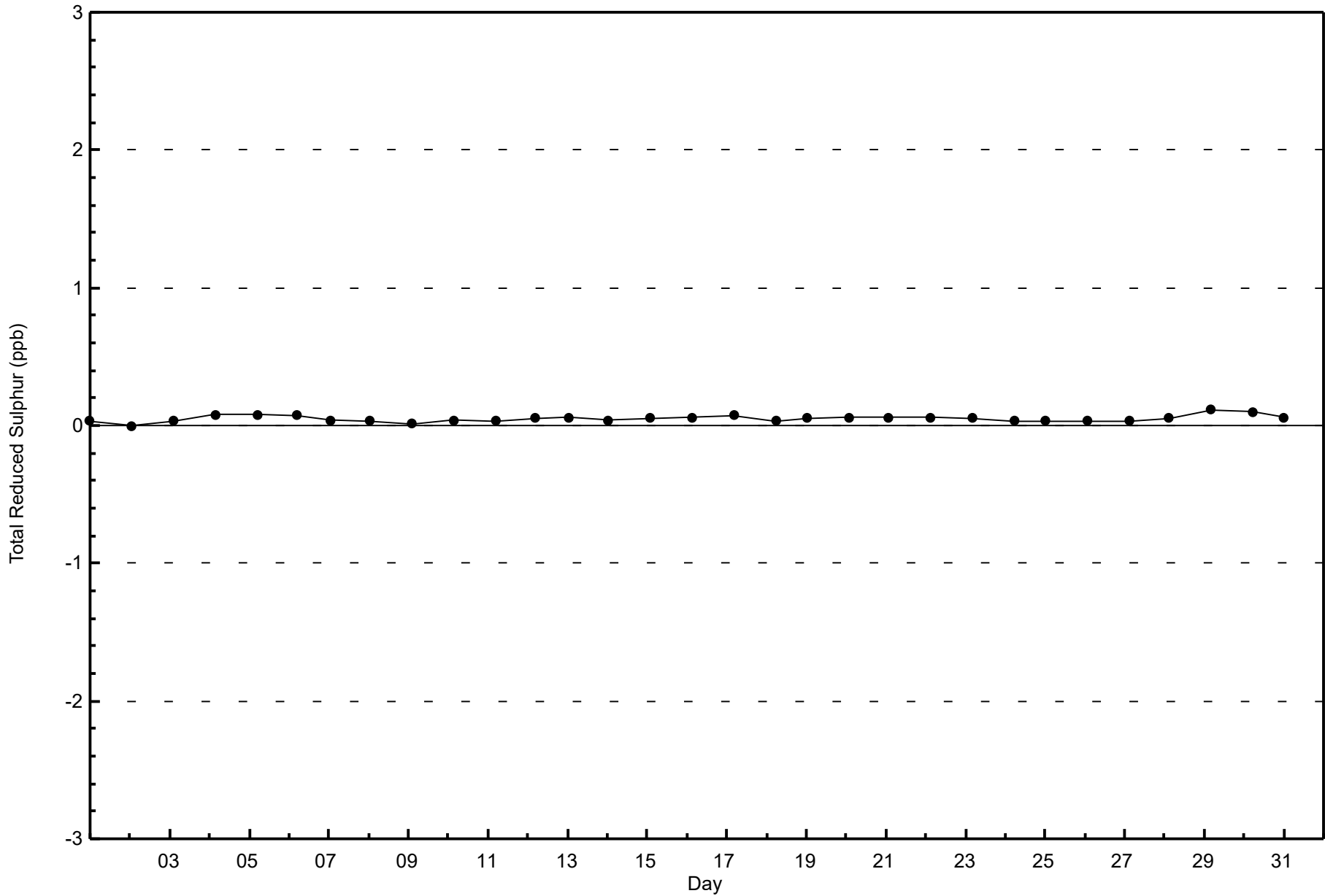


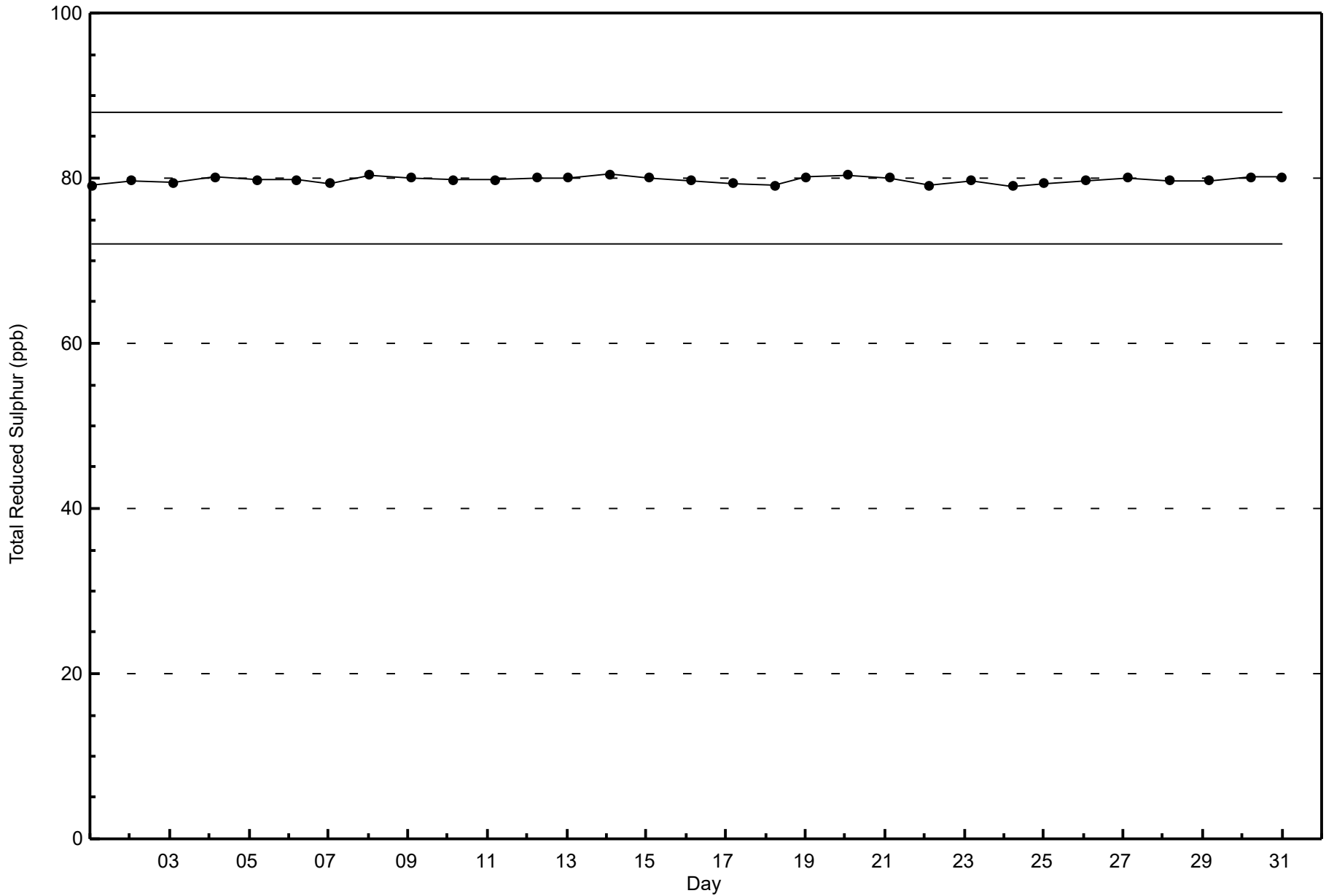
Wood Buffalo Environmental Association
Wind Rose Dec 2023

Total Reduced Sulphur (TRS) - ppb
Patricia McInnes



Total Number of Valid Hours: 708







Wood Buffalo Environmental Association
Summary of Hour Averages

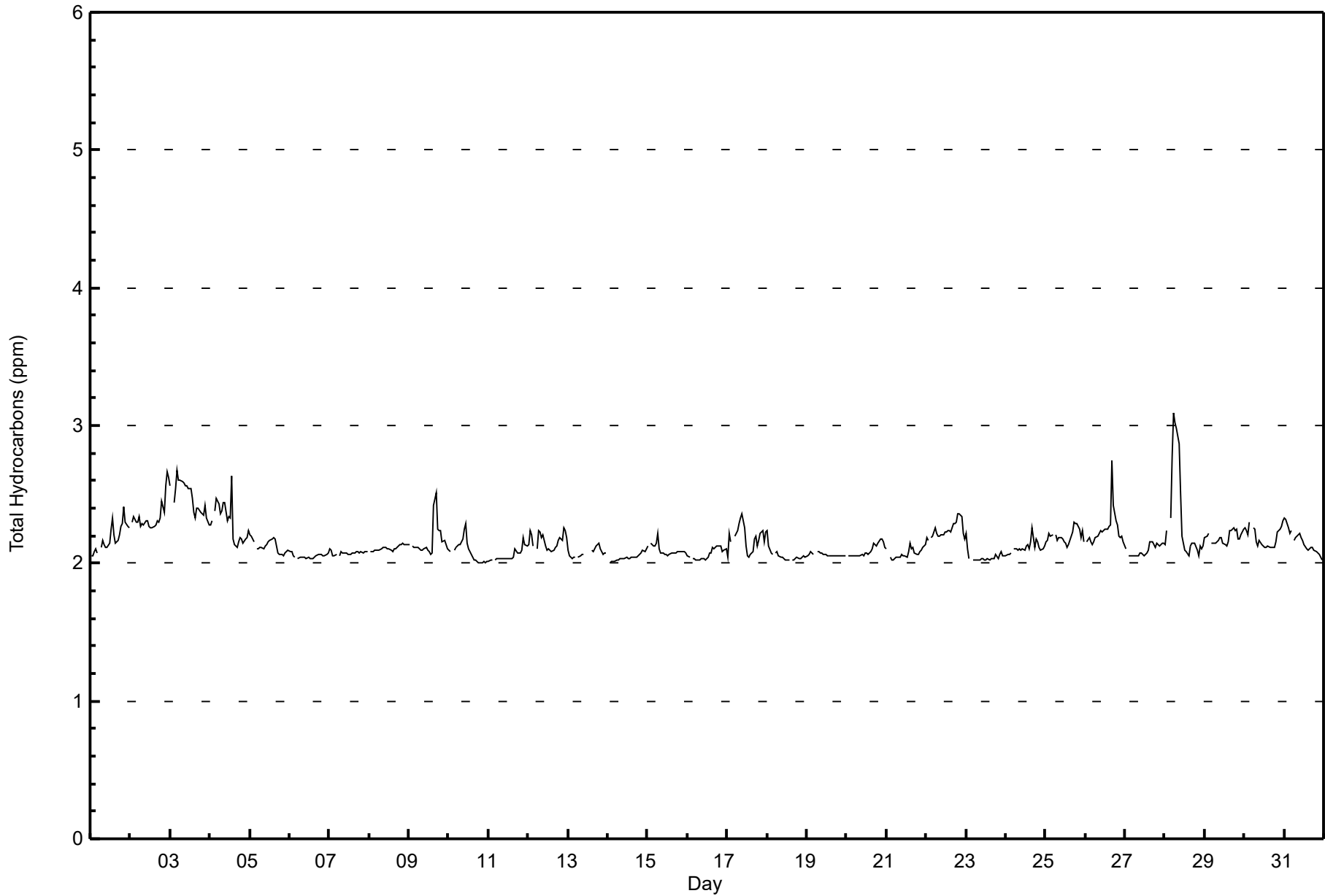
Total Hydrocarbons (THC) - ppm
Patricia McInnes - December 2023

Maximum Value: 3.1 ppm on Dec 28 06:00		Maximum Daily Average: 2.5 ppm on Dec 3		Hours in Service: 744																																													
Minimum Value: 2.0 ppm on Dec 10 20:00		Minimum Daily Average: 2.0 ppm on Dec 14		Hours of Data: 708																																													
Maximum Diurnal Average: 2.2 ppm at hour 6		Minimum Diurnal Average: 2.1 ppm at hour 15		Hours of Missing Data: 36																																													
Monthly Average: 2.15 ppm		Percentiles: P ₁ = 2.0 P ₁₀ = 2.0 Q ₁ = 2.1 Median = 2.1 Q ₃ = 2.2 P ₉₀ = 2.3 P ₉₉ = 2.7		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-Dec	2.0	2.1	2.1	2.1	2.1	Z	2.1	2.2	2.1	2.1	2.1	2.1	2.2	2.3	2.2	2.1	2.2	2.2	2.3	2.3	2.4	2.3	2.3	2.3	2.2	2.4																							
2-Dec	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	2.5	2.4	2.6	2.7	2.6	2.3	2.7																							
3-Dec	2.6	Z	2.4	2.5	2.7	2.6	2.6	2.6	2.6	2.6	2.6	2.5	2.5	2.5	2.4	2.3	2.4	2.4	2.4	2.4	2.3	2.4	2.3	2.3	2.5	2.7																							
4-Dec	2.3	2.3	Z	2.4	2.5	2.4	2.4	2.4	2.4	2.4	2.3	2.3	2.3	2.6	2.2	2.1	2.1	2.2	2.2	2.2	2.1	2.2	2.2	2.2	2.3	2.6																							
5-Dec	2.2	2.2	2.2	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2																							
6-Dec	2.1	2.1	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.0	2.1	2.1	2.1	2.1	2.1																							
7-Dec	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																							
8-Dec	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																							
9-Dec	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	2.4	2.5	2.3	2.2	2.2	2.2	2.2	2.1	2.1	2.2	2.5																							
10-Dec	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.2	2.3	2.3	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.3																							
11-Dec	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	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.1	2.2																							
12-Dec	2.1	2.2	2.2	2.1	Z	2.1	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.3																							
13-Dec	2.1	2.1	2.0	2.0	2.0	Z	2.0	2.1	2.1	2.1	C	C	C	C	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1																							
14-Dec	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	2.1	2.1	2.1	2.1	2.1	2.1																							
15-Dec	2.1	Z	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2																							
16-Dec	2.1	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1																							
17-Dec	2.0	2.2	2.2	Z	2.2	2.2	2.2	2.3	2.3	2.4	2.3	2.1	2.1	2.0	2.1	2.1	2.2	2.2	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.4																							
18-Dec	2.2	2.1	2.1	2.1	Z	2.1	2.1	2.1	2.0	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	2.1	2.0	2.1	2.2																							
19-Dec	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																							
20-Dec	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	2.2	2.2	2.2	2.1	2.1	2.2																							
21-Dec	2.1	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.0	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2																							
22-Dec	2.2	2.2	Z	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	2.4	2.4	2.3	2.2	2.2	2.2	2.4																							
23-Dec	2.2	2.1	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.1	2.1	2.1	2.1	2.1	2.2																							
24-Dec	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	2.2	2.3	2.1	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.3																							
25-Dec	2.2	2.2	2.2	2.2	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.2	2.2	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.3																							
26-Dec	Z	2.2	2.2	2.2	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.7	2.4	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.7																							
27-Dec	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2																							
28-Dec	2.1	2.2	Z	2.3	2.8	3.1	3.0	3.0	2.9	2.5	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	3.1																							
29-Dec	2.2	2.2	2.2	Z	2.2	2.1	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.2	2.2	2.2	2.3	2.2	2.3	2.2	2.2	2.2	2.3	2.2	2.3																							
30-Dec	2.3	2.2	2.2	2.3	Z	2.3	2.2	2.2	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.3	2.3	2.3																							
31-Dec	2.3	2.3	2.3	2.2	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.3																							
																								2.2	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.1	2.2	2.1	2.2	2.2	2.2	2.2	Diurnal Average
																								2.6	2.3	2.4	2.5	2.8	3.1	3.0	3.0	2.9	2.6	2.6	2.5	2.5	2.6	2.4	2.4	2.7	2.4	2.4	2.5	2.4	2.6	2.7	2.6	2.6	Diurnal Maximum
Z - zerospan C - Calibration M - Maintenance																																																	



Wood Buffalo Environmental Association
Hourly Averages

Total Hydrocarbons (THC) - ppm
Patricia McInnes - December 2023





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Total Hydrocarbons (THC) - ppm
Patricia McInnes - December 2023**

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	116	16.38	16.38
2.1 - 3.0	591	83.47	99.86
3.1 - 10.0	1	0.14	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 708

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Total Hydrocarbons (THC) - ppm
Patricia McInnes - December 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	1	0	0	0	0	1	0	0	1	3	23	23	40	18	5	1	116
2.1 - 3.0	12	2	3	2	6	21	98	108	76	91	92	42	3	5	14	16	591
3.1 - 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	13	2	3	2	6	22	98	108	77	94	115	65	43	23	19	18	708

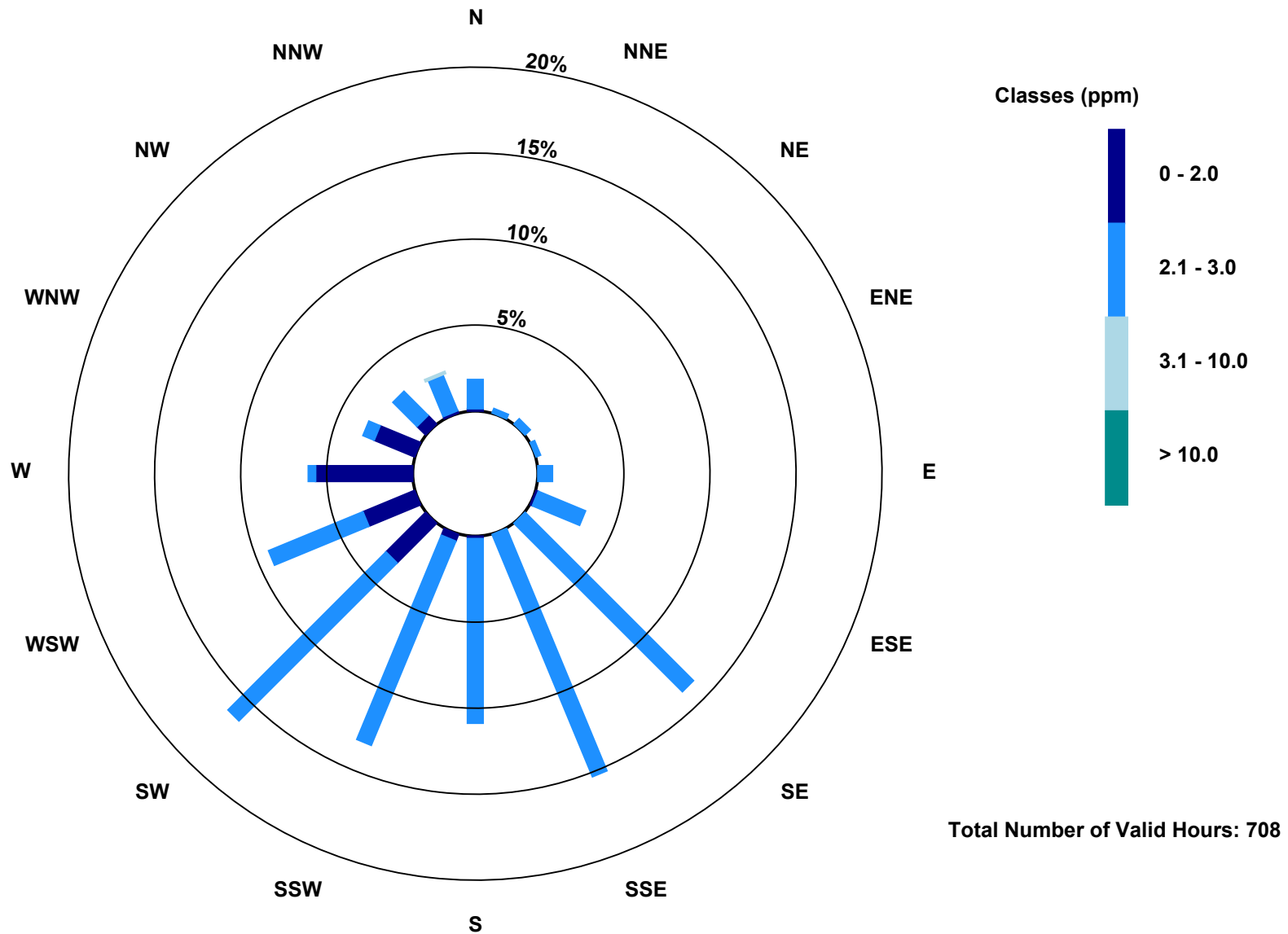
Total Number of Valid Hours: 708

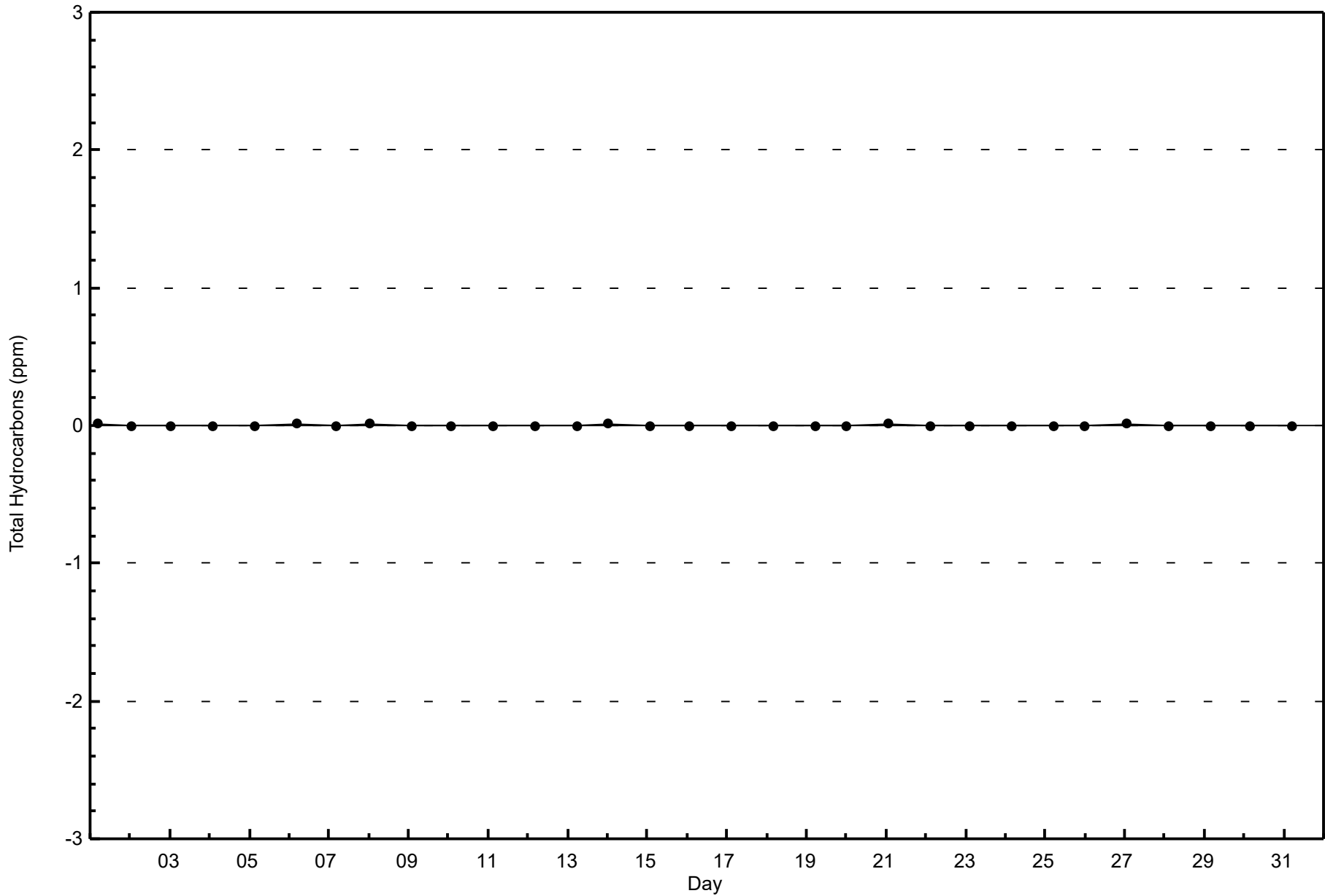
Total Number of Hours: 744

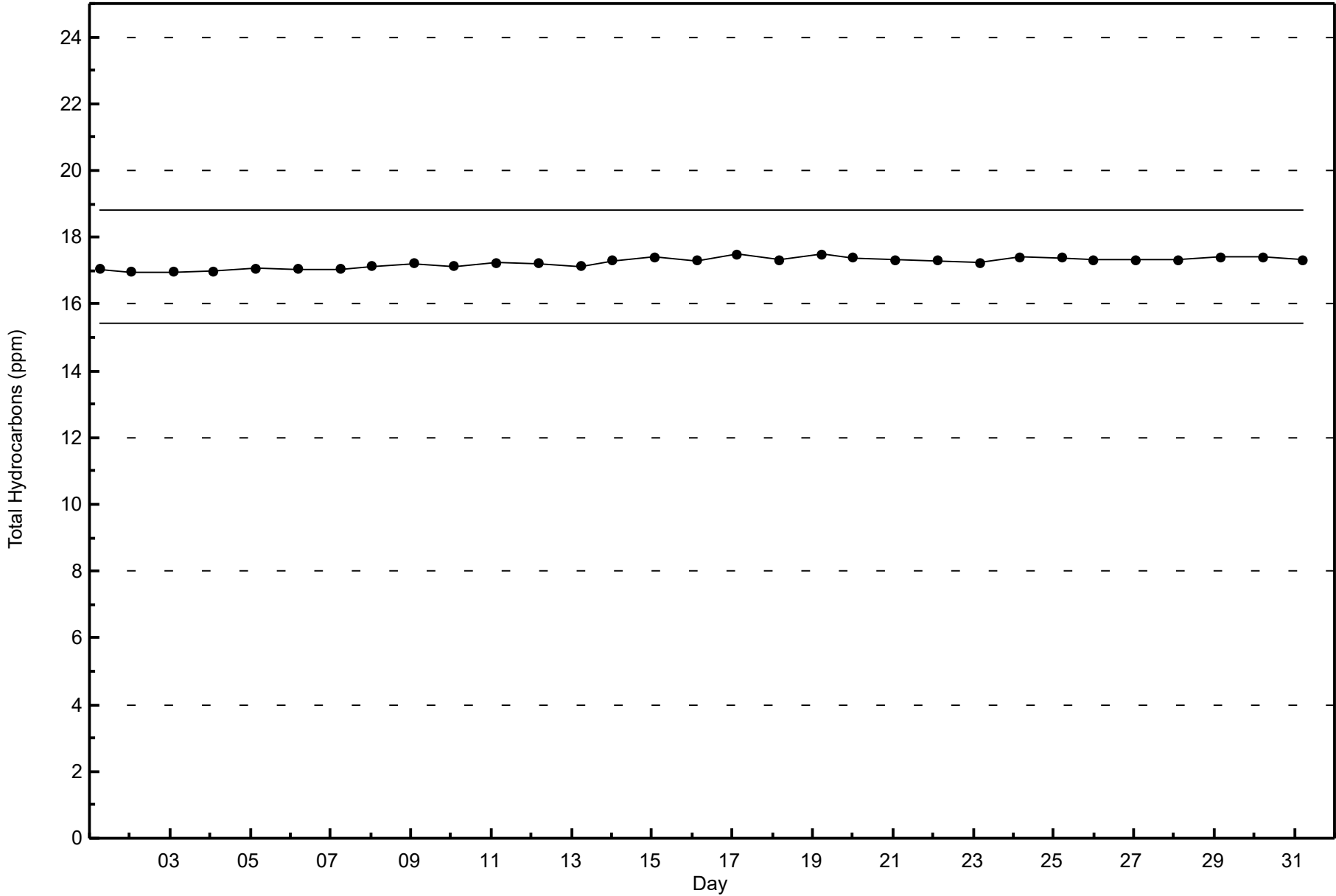


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Total Hydrocarbons (THC) - ppm
Patricia McInnes





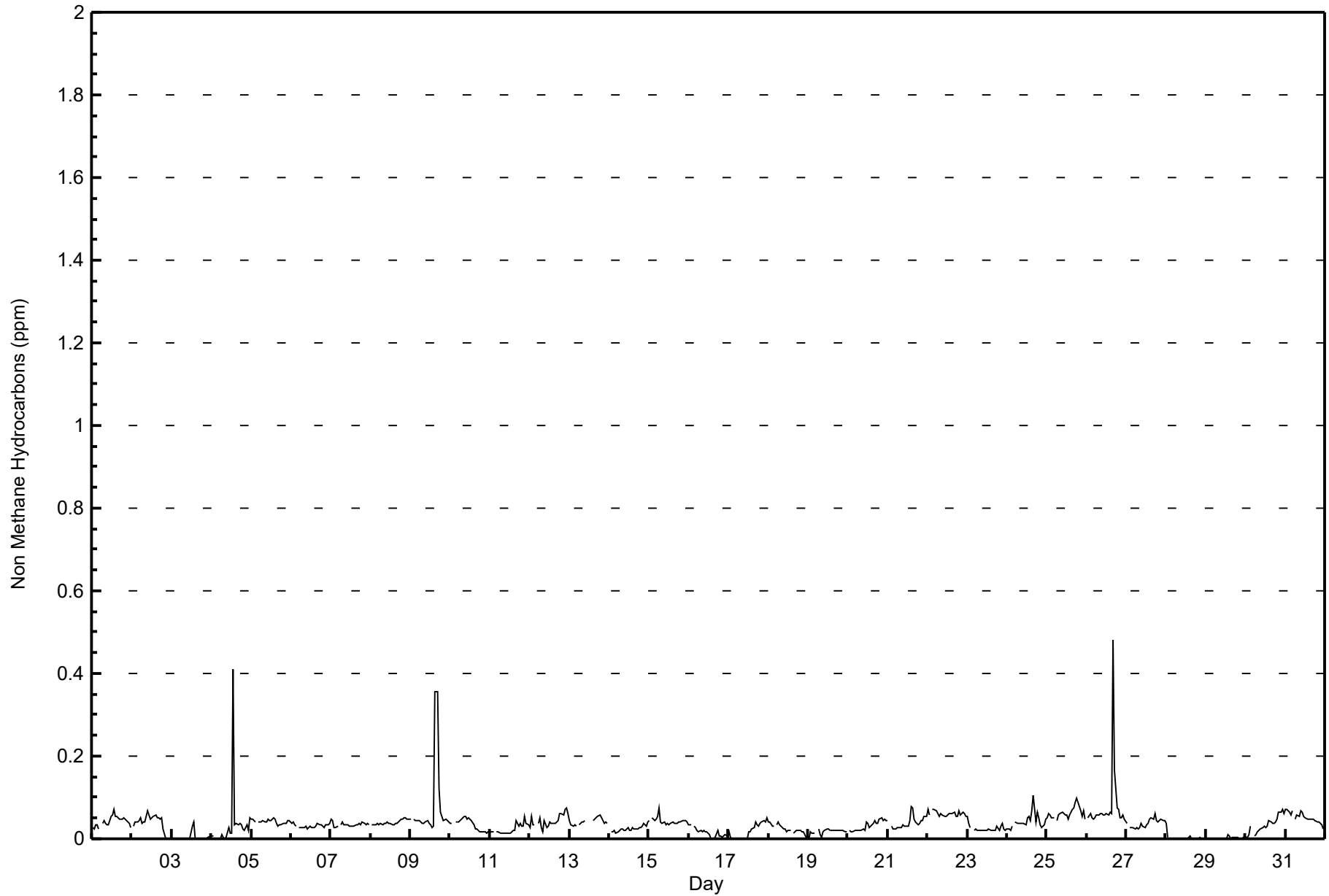




Summary of Hour Averages

Patricia McInnes - December 2023

Maximum Value: 0.483 ppm on Dec 26 17:00		Maximum Daily Average: 0.081 ppm on Dec 26		Hours in Service:	744																						
Minimum Value: 0.000 ppm on Dec 2 21:00		Minimum Daily Average: 0.001 ppm on Dec 29		Hours of Data:	708																						
Maximum Diurnal Average: 0.062 ppm at hour 17		Minimum Diurnal Average: 0.027 ppm at hour 6		Hours of Missing Data:	36																						
Monthly Average: 0.035 ppm		Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.0 Median = 0.0 Q ₃ = 0.0 P ₉₀ = 0.1 P ₉₉ = 0.1		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-Dec	0.027	0.023	0.033	0.035	0.023	Z	0.038	0.045	0.037	0.036	0.035	0.055	0.058	0.072	0.056	0.054	0.047	0.046	0.049	0.050	0.047	0.044	0.036	0.028	0.042	0.072	
2-Dec	Z	0.030	0.040	0.041	0.044	0.053	0.037	0.041	0.041	0.066	0.058	0.046	0.051	0.054	0.057	0.052	0.052	0.048	0.052	0.025	0.000	0.000	0.000	0.000	0.038	0.066	
3-Dec	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.030	0.041	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.008	0.004	0.041	
4-Dec	0.008	0.006	Z	0.000	0.000	0.000	0.011	0.004	0.001	0.005	0.026	0.015	0.013	0.409	0.033	0.036	0.035	0.036	0.034	0.025	0.020	0.032	0.022	0.050	0.036	0.409	
5-Dec	0.049	0.048	0.041	Z	0.041	0.041	0.041	0.043	0.040	0.042	0.049	0.044	0.044	0.049	0.049	0.038	0.032	0.035	0.033	0.037	0.036	0.038	0.043	0.044	0.041	0.049	
6-Dec	0.037	0.042	0.033	0.029	Z	0.027	0.027	0.027	0.027	0.030	0.025	0.030	0.027	0.028	0.026	0.031	0.037	0.035	0.033	0.031	0.028	0.033	0.032	0.036	0.031	0.042	
7-Dec	0.047	0.044	0.026	0.027	0.030	Z	0.032	0.042	0.035	0.033	0.032	0.031	0.032	0.031	0.031	0.035	0.034	0.036	0.032	0.040	0.036	0.035	0.036	0.035	0.034	0.047	
8-Dec	Z	0.034	0.035	0.035	0.039	0.033	0.037	0.036	0.038	0.038	0.041	0.037	0.036	0.035	0.033	0.038	0.037	0.042	0.047	0.049	0.052	0.051	0.049	0.049	0.040	0.052	
9-Dec	0.049	Z	0.047	0.045	0.043	0.045	0.042	0.038	0.038	0.039	0.044	0.036	0.033	0.028	0.031	0.355	0.355	0.122	0.065	0.056	0.045	0.047	0.044	0.041	0.073	0.355	
10-Dec	0.037	0.037	Z	0.042	0.041	0.042	0.043	0.047	0.056	0.054	0.049	0.050	0.047	0.044	0.033	0.025	0.024	0.022	0.018	0.016	0.017	0.017	0.014	0.018	0.034	0.056	
11-Dec	0.016	0.018	0.018	Z	0.015	0.016	0.015	0.013	0.015	0.014	0.015	0.014	0.015	0.016	0.020	0.021	0.045	0.031	0.037	0.032	0.032	0.053	0.039	0.032	0.024	0.053	
12-Dec	0.027	0.054	0.033	0.035	Z	0.036	0.051	0.029	0.016	0.045	0.028	0.030	0.040	0.038	0.039	0.037	0.042	0.043	0.060	0.060	0.056	0.073	0.074	0.061	0.044	0.074	
13-Dec	0.044	0.033	0.029	0.034	0.031	Z	0.034	0.040	0.042	0.044	C	C	C	C	0.043	0.047	0.051	0.055	0.057	0.051	0.044	0.037	0.040	0.038	0.042	0.057	
14-Dec	Z	0.017	0.017	0.019	0.014	0.018	0.019	0.024	0.022	0.020	0.020	0.026	0.021	0.019	0.026	0.025	0.025	0.024	0.026	0.027	0.029	0.039	0.031	0.041	0.024	0.041	
15-Dec	0.044	Z	0.051	0.043	0.047	0.054	0.073	0.042	0.036	0.042	0.033	0.038	0.035	0.037	0.039	0.038	0.037	0.037	0.040	0.041	0.044	0.044	0.043	0.042	0.043	0.073	
16-Dec	0.035	0.033	Z	0.031	0.026	0.021	0.018	0.021	0.017	0.019	0.019	0.019	0.012	0.000	0.000	0.002	0.004	0.020	0.007	0.008	0.005	0.006	0.012	0.008	0.015	0.035	
17-Dec	0.017	0.002	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.017	0.016	0.022	0.028	0.041	0.035	0.029	0.039	0.041	0.045	0.041	0.050	0.018	0.050	
18-Dec	0.041	0.039	0.032	0.032	Z	0.035	0.039	0.033	0.027	0.023	0.022	0.017	0.021	0.019	M	0.015	0.019	0.019	0.021	0.020	0.016	0.017	0.009	0.002	0.024	0.041	
19-Dec	0.002	0.016	0.015	0.014	0.013	Z	0.025	0.011	0.002	0.018	0.021	0.024	0.023	0.020	0.019	0.021	0.022	0.021	0.020	0.019	0.020	0.020	0.018	0.017	0.017	0.025	
20-Dec	Z	0.020	0.018	0.018	0.020	0.021	0.022	0.021	0.021	0.025	0.022	0.041	0.037	0.026	0.036	0.037	0.045	0.038	0.036	0.046	0.051	0.044	0.047	0.046	0.032	0.051	
21-Dec	0.044	Z	0.031	0.023	0.024	0.022	0.028	0.027	0.027	0.033	0.032	0.031	0.031	0.046	0.079	0.074	0.047	0.039	0.035	0.036	0.043	0.044	0.053	0.055	0.039	0.079	
22-Dec	0.070	0.058	Z	0.071	0.070	0.066	0.060	0.055	0.059	0.058	0.056	0.054	0.057	0.062	0.060	0.062	0.064	0.053	0.054	0.069	0.058	0.063	0.062	0.056	0.061	0.071	
23-Dec	0.054	0.037	0.026	Z	0.019	0.024	0.020	0.020	0.020	0.021	0.021	0.020	0.021	0.022	0.019	0.021	0.021	0.022	0.030	0.020	0.031	0.038	0.024	0.022	0.025	0.054	
24-Dec	0.024	0.023	0.022	0.029	Z	0.039	0.038	0.036	0.036	0.036	0.037	0.032	0.051	0.055	0.043	0.067	0.104	0.042	0.066	0.052	0.034	0.027	0.035	0.047	0.042	0.104	
25-Dec	0.051	0.060	0.058	0.050	0.051	Z	0.044	0.056	0.063	0.063	0.062	0.059	0.056	0.049	0.059	0.070	0.074	0.089	0.099	0.087	0.068	0.054	0.069	0.048	0.063	0.099	
26-Dec	Z	0.052	0.060	0.051	0.046	0.052	0.058	0.058	0.060	0.061	0.059	0.058	0.060	0.057	0.063	0.062	0.483	0.165	0.075	0.072	0.051	0.050	0.057	0.048	0.081	0.483	
27-Dec	0.038	Z	0.027	0.028	0.026	0.025	0.026	0.025	0.026	0.036	0.031	0.027	0.033	0.038	0.047	0.050	0.046	0.060	0.045	0.040	0.043	0.046	0.044	0.045	0.037	0.060	
28-Dec	0.037	0.004	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.006	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.001	0.000	0.002	0.037	
29-Dec	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.001	0.009	0.005	0.001	0.002	0.002	0.003	0.003	0.000	0.000	0.000	0.005	0.001	0.009	
30-Dec	0.004	0.004	0.009	0.030	Z	0.006	0.011	0.016	0.021	0.024	0.027	0.030	0.029	0.032	0.043	0.042	0.039	0.038	0.041	0.048	0.064	0.066	0.071	0.061	0.033	0.071	
31-Dec	0.071	0.073	0.063	0.059	0.067	Z	0.047	0.056	0.055	0.069	0.065	0.054	0.051	0.046	0.047	0.048	0.049	0.048	0.044	0.041	0.040	0.039	0.033	0.025	0.052	0.073	
		0.033	0.031	0.029	0.032	0.028	0.027	0.030	0.029	0.028	0.032	0.031	0.031	0.033	0.047	0.035	0.046	0.062	0.042	0.038	0.037	0.034	0.035	0.035	0.034	Diurnal Average	
		0.071	0.073	0.063	0.071	0.070	0.066	0.073	0.058	0.063	0.069	0.065	0.059	0.060	0.409	0.079	0.355	0.483	0.165	0.099	0.087	0.068	0.073	0.074	0.061	Diurnal Maximum	
Z - zerospan		C - Calibration				M - Maintenance																					





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Non Methane Hydrocarbons (NMHC) - ppm
Patricia McInnes - December 2023**

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 0.005	93	13.14	13.14
0.006 - 0.05	522	73.73	86.86
0.06 - 0.1	88	12.43	99.29
> 0.1	5	0.71	100.00

Total Number of Valid Hours: 708

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Non Methane Hydrocarbons (NMHC) - ppm
Patricia McInnes - December 2023**

Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 0.005	9	2	2	1	1	3	7	12	13	11	3	1	2	5	11	10	93
0.006 - 0.05	4	0	1	1	5	18	65	62	44	74	109	64	41	18	8	8	522
0.06 - 0.1	0	0	0	0	0	1	25	31	19	9	3	0	0	0	0	0	88
> 0.1	0	0	0	0	0	0	1	3	1	0	0	0	0	0	0	0	5
Totals	13	2	3	2	6	22	98	108	77	94	115	65	43	23	19	18	708

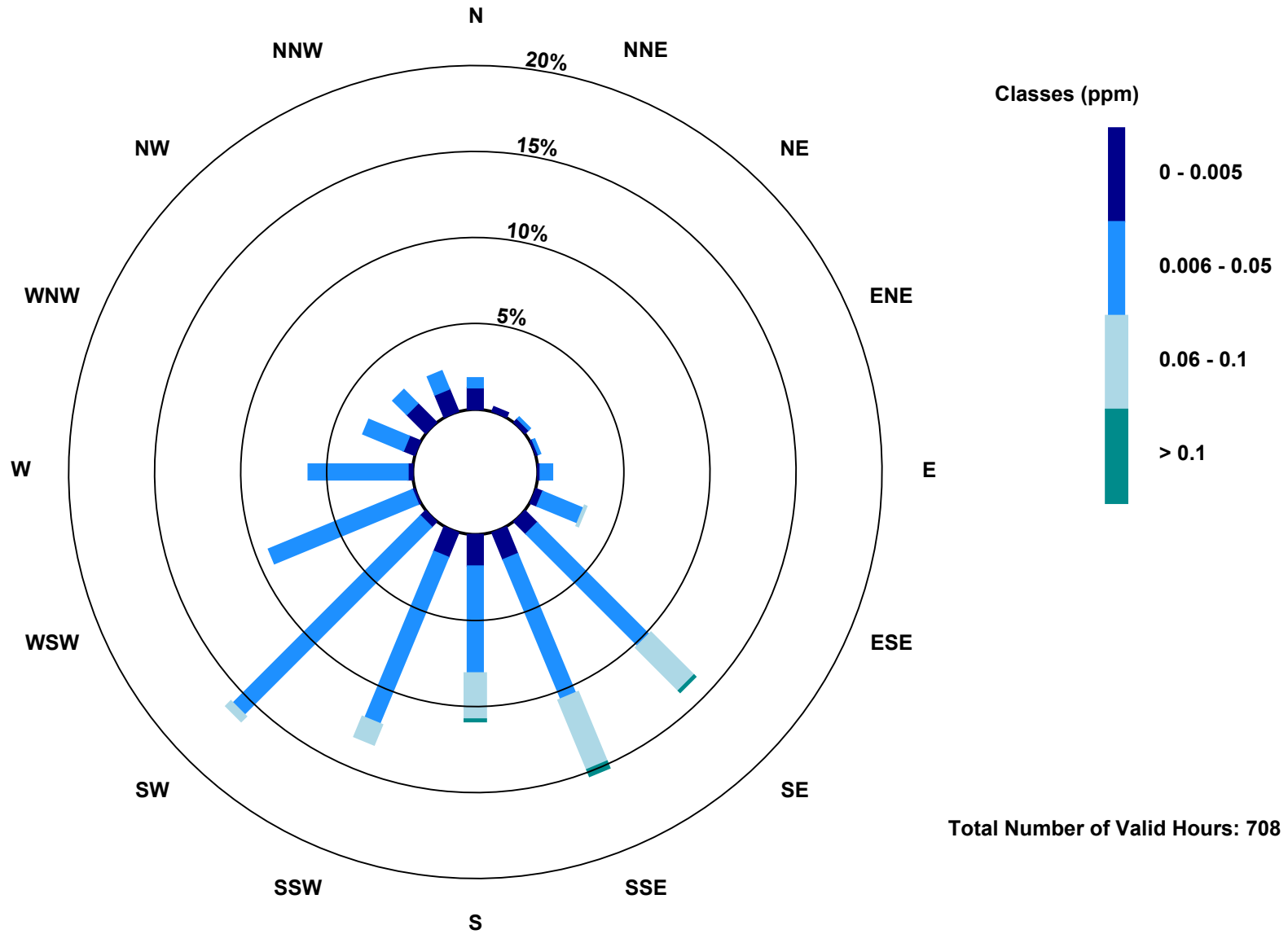
Total Number of Valid Hours: 708

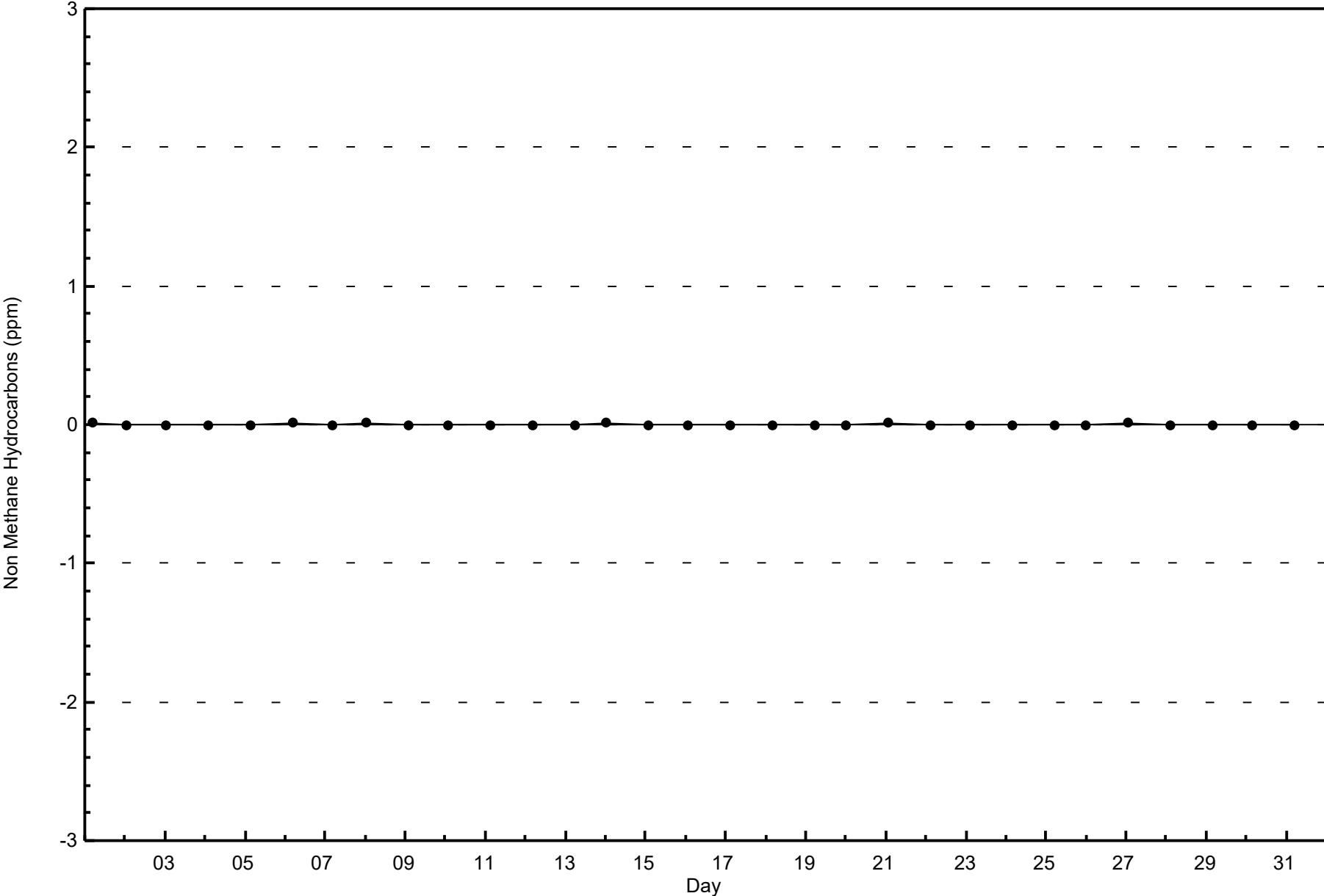
Total Number of Hours: 744

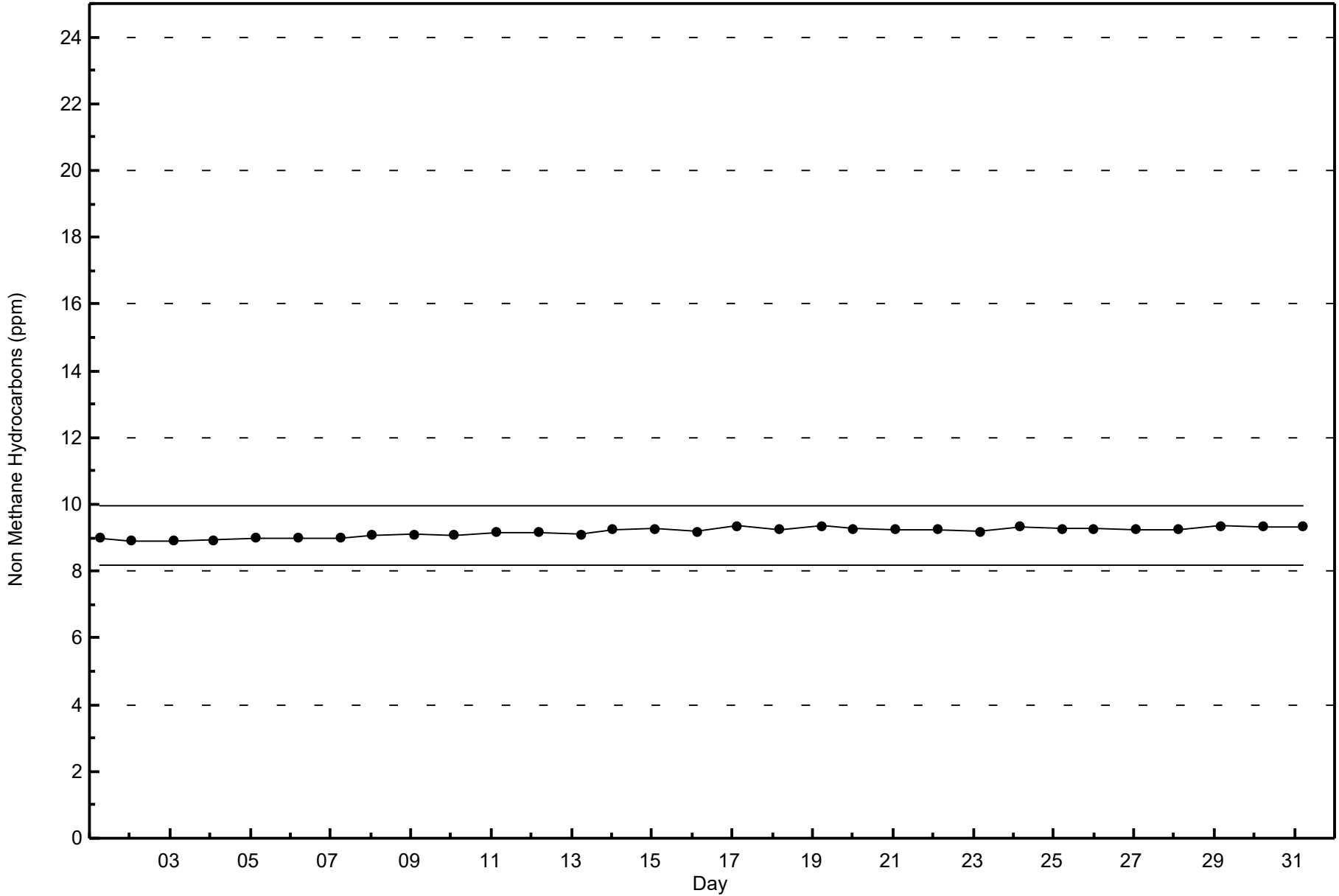


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Non Methane Hydrocarbons (NMHC) - ppm
Patricia McInnes







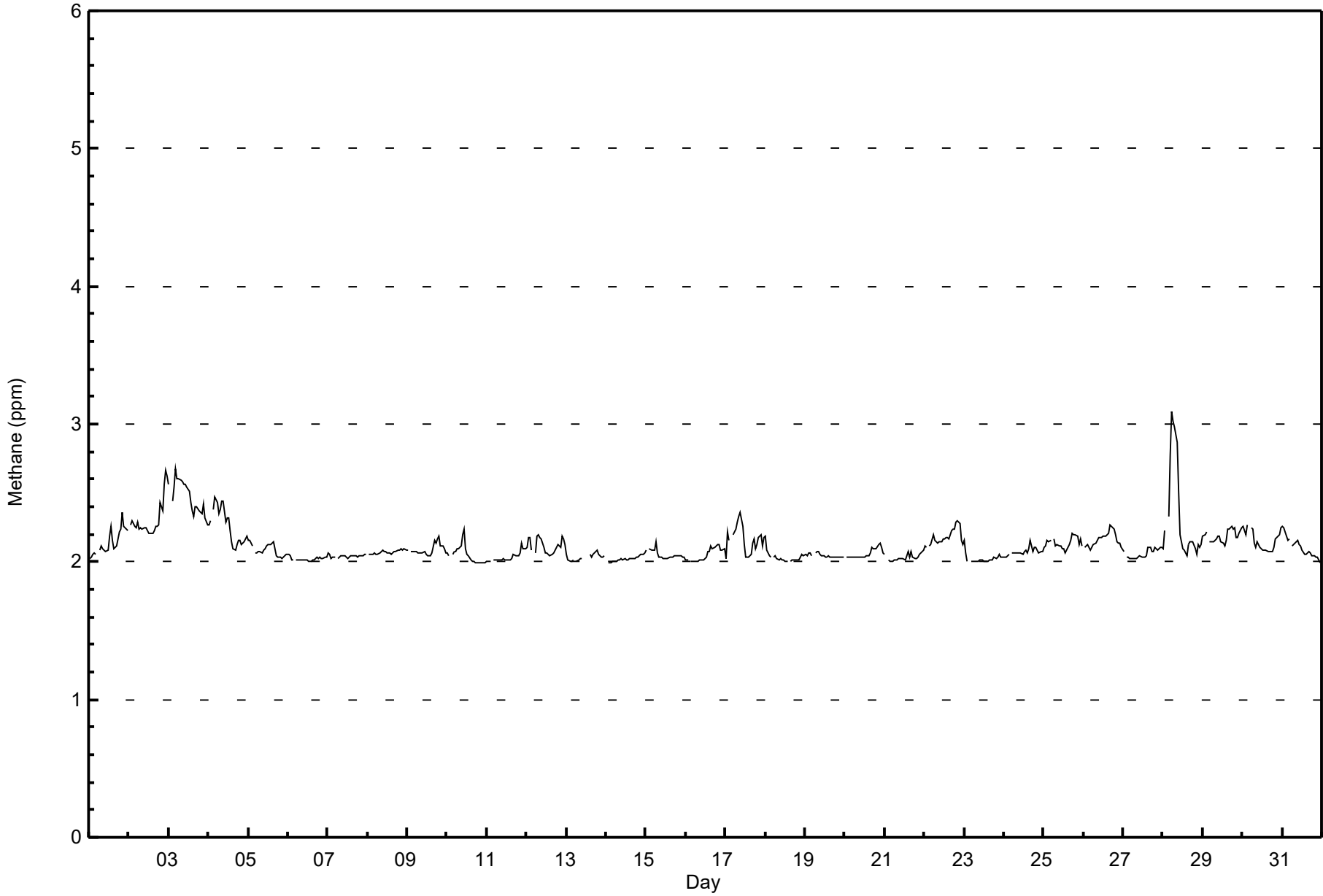


Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 3.1 ppm on Dec 28 06:00	Maximum Daily Average: 2.5 ppm on Dec 3		Hours of Data:	708
Minimum Value: 2.0 ppm on Dec 10 19:00	Minimum Daily Average: 2.0 ppm on Dec 6		Hours of Missing Data:	36
Maximum Diurnal Average: 2.2 ppm at hour 6	Minimum Diurnal Average: 2.1 ppm at hour 15		Hours of Calibration:	35
Monthly Average: 2.12 ppm	Percentiles: P ₁ = 2.0 P ₁₀ = 2.0 Q ₁ = 2.0 Median = 2.1 Q ₃ = 2.2 P ₉₀ = 2.3 P ₉₉ = 2.6		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-Dec	2.0	2.0	2.0	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.3	2.2	2.1	2.1	2.2	2.2	2.2	2.4	2.3	2.2	2.2	2.1	2.4
2-Dec	Z	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	2.4	2.4	2.6	2.7	2.6	2.3	2.7
3-Dec	2.6	Z	2.4	2.5	2.7	2.6	2.6	2.6	2.6	2.6	2.6	2.5	2.5	2.4	2.4	2.3	2.4	2.4	2.4	2.4	2.3	2.4	2.3	2.3	2.5	2.7
4-Dec	2.3	2.3	Z	2.4	2.5	2.4	2.3	2.4	2.4	2.4	2.3	2.3	2.3	2.2	2.1	2.1	2.1	2.1	2.2	2.2	2.1	2.1	2.2	2.2	2.3	2.5
5-Dec	2.2	2.2	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	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.2
6-Dec	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
7-Dec	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	2.1	2.1	2.0	2.1
8-Dec	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
9-Dec	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	2.2	2.1	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.2
10-Dec	2.1	2.0	Z	2.1	2.1	2.1	2.1	2.1	2.1	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	2.0	2.1	2.2
11-Dec	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	2.1	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.0	2.1
12-Dec	2.1	2.2	2.2	2.1	Z	2.1	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.1	2.1	2.2
13-Dec	2.1	2.0	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	C	C	C	C	2.1	2.0	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.1
14-Dec	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.0
15-Dec	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1
16-Dec	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
17-Dec	2.0	2.2	2.2	Z	2.2	2.2	2.2	2.3	2.3	2.4	2.3	2.1	2.0	2.0	2.0	2.1	2.1	2.2	2.1	2.1	2.2	2.2	2.1	2.2	2.2	2.4
18-Dec	2.2	2.1	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	M	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.2
19-Dec	2.1	2.0	2.1	2.1	2.0	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	2.1
20-Dec	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
21-Dec	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	2.1	2.0	2.1	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.0	2.1
22-Dec	2.1	2.1	Z	2.1	2.1	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	2.3	2.3	2.3	2.2	2.1	2.2	2.3
23-Dec	2.2	2.1	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.0	2.0	2.2
24-Dec	2.0	2.0	2.0	2.0	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2
25-Dec	2.1	2.1	2.2	2.1	2.2	Z	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.1	2.2	2.1	2.2
26-Dec	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.2	2.2	2.1	2.1	2.1	2.1	2.2	2.3
27-Dec	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	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
28-Dec	2.1	2.2	Z	2.3	2.8	3.1	3.0	3.0	2.9	2.5	2.2	2.1	2.1	2.1	2.0	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.3	3.1
29-Dec	2.2	2.2	2.2	Z	2.2	2.1	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3
30-Dec	2.3	2.2	2.2	2.3	Z	2.3	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.3
31-Dec	2.3	2.2	2.2	2.2	2.2	Z	2.1	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.3

2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	Diurnal Average
2.6	2.3	2.4	2.5	2.8	3.1	3.0	3.0	2.9	2.6	2.6	2.5	2.5	2.4	2.4	2.3	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.6	2.7	2.6	2.6	Diurnal Maximum

Z - zerospan C - Calibration M - Maintenance





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Methane (CH₄) - ppm
Patricia McInnes - December 2023

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	262	37.01	37.01
2.1 - 3.0	445	62.85	99.86
3.1 - 10.0	1	0.14	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 708

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Methane (CH₄) - ppm
Patricia McInnes - December 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	3	0	1	0	4	13	15	6	6	28	74	46	40	18	5	3	262
2.1 - 3.0	10	2	2	2	2	9	83	102	71	66	41	19	3	5	14	14	445
3.1 - 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	13	2	3	2	6	22	98	108	77	94	115	65	43	23	19	18	708

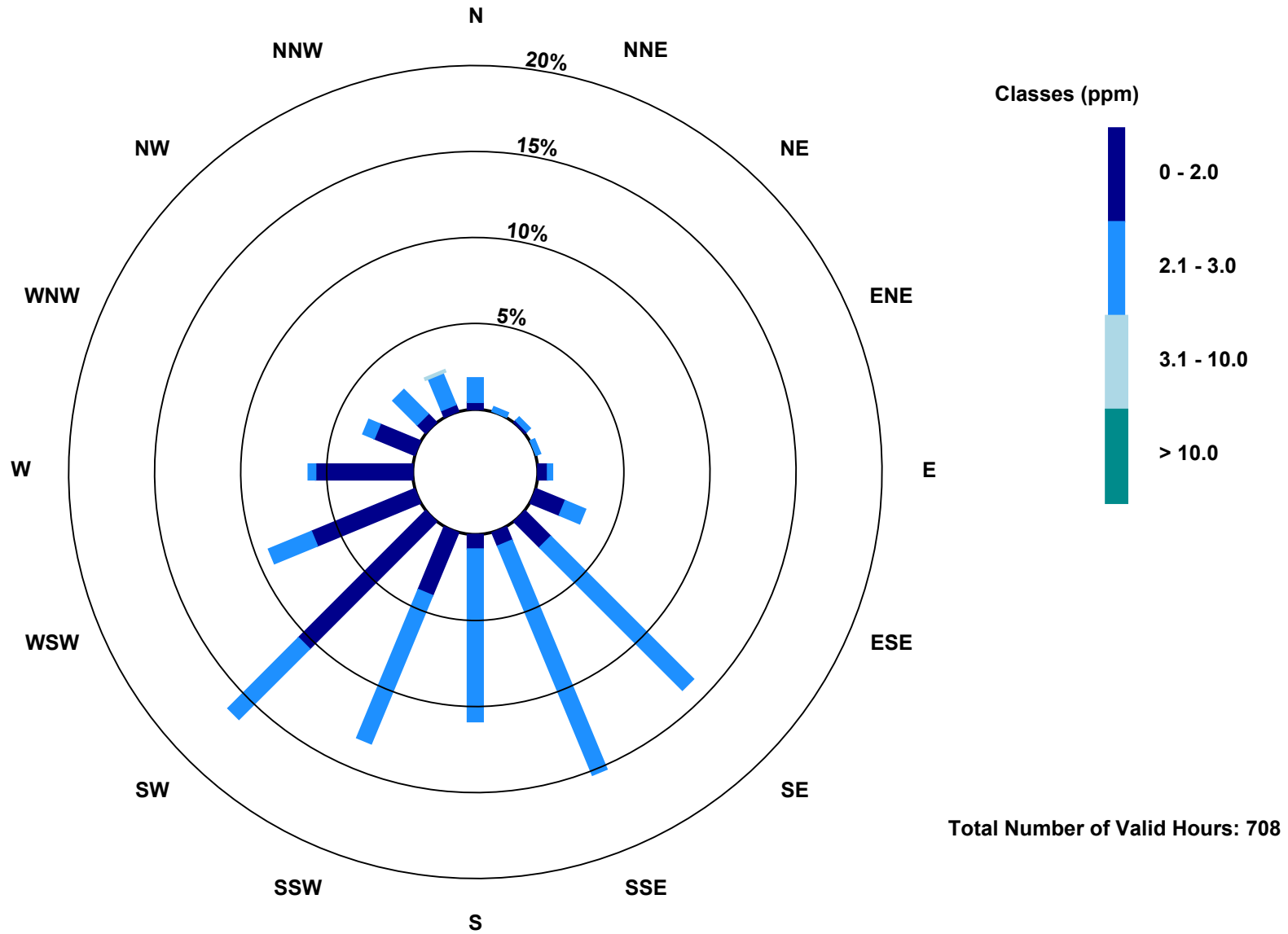
Total Number of Valid Hours: 708

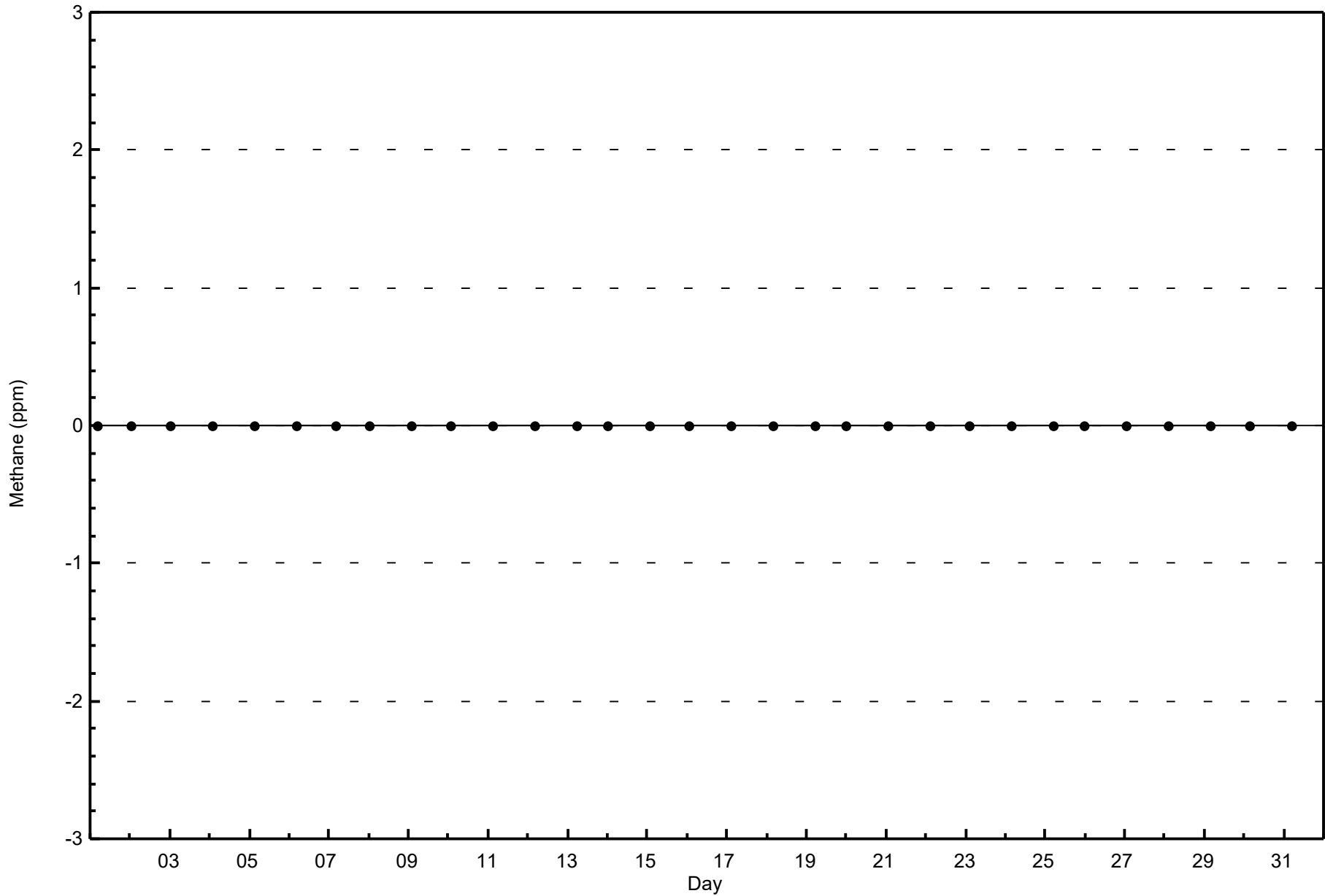
Total Number of Hours: 744

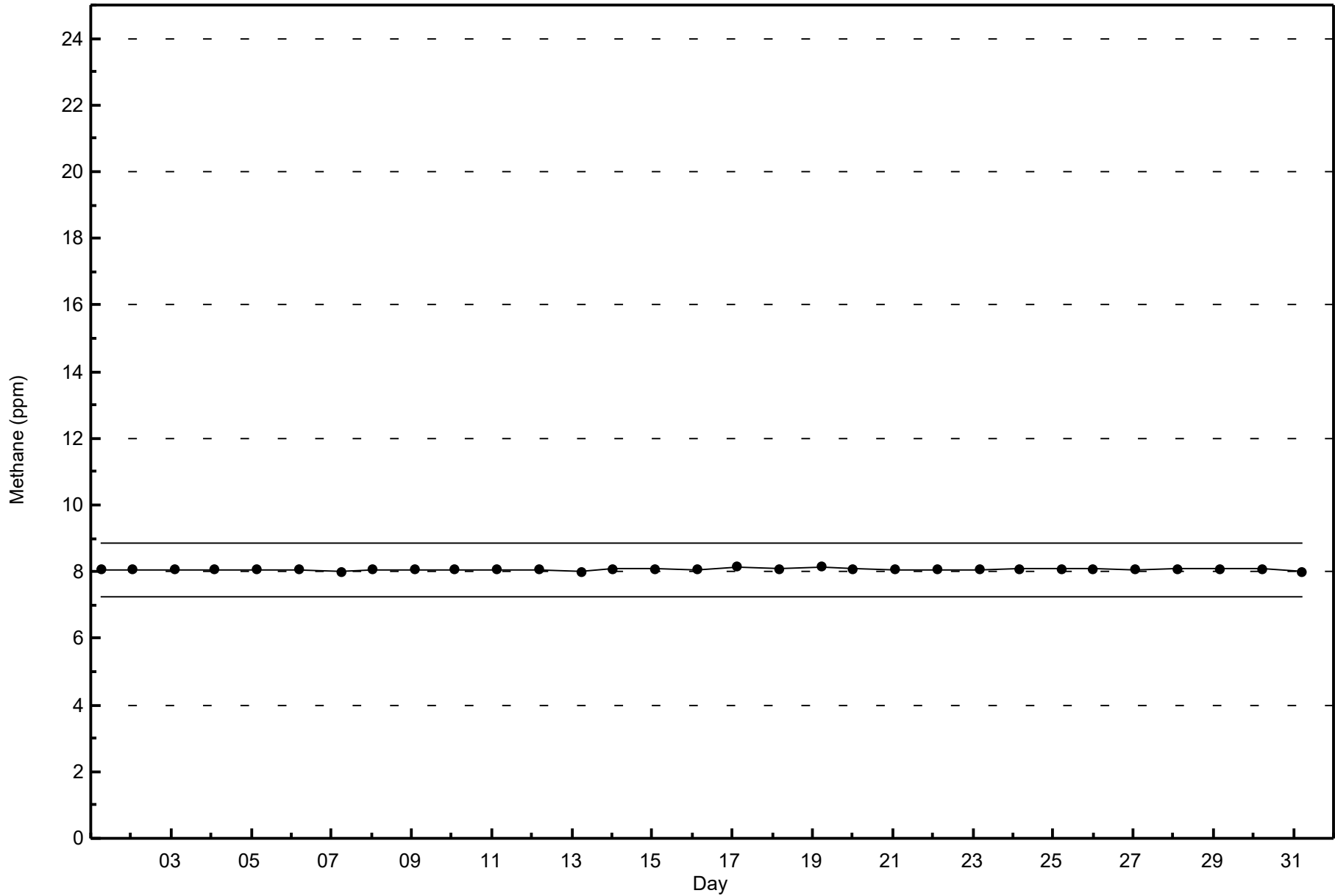


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Methane (CH₄) - ppm
Patricia McInnes





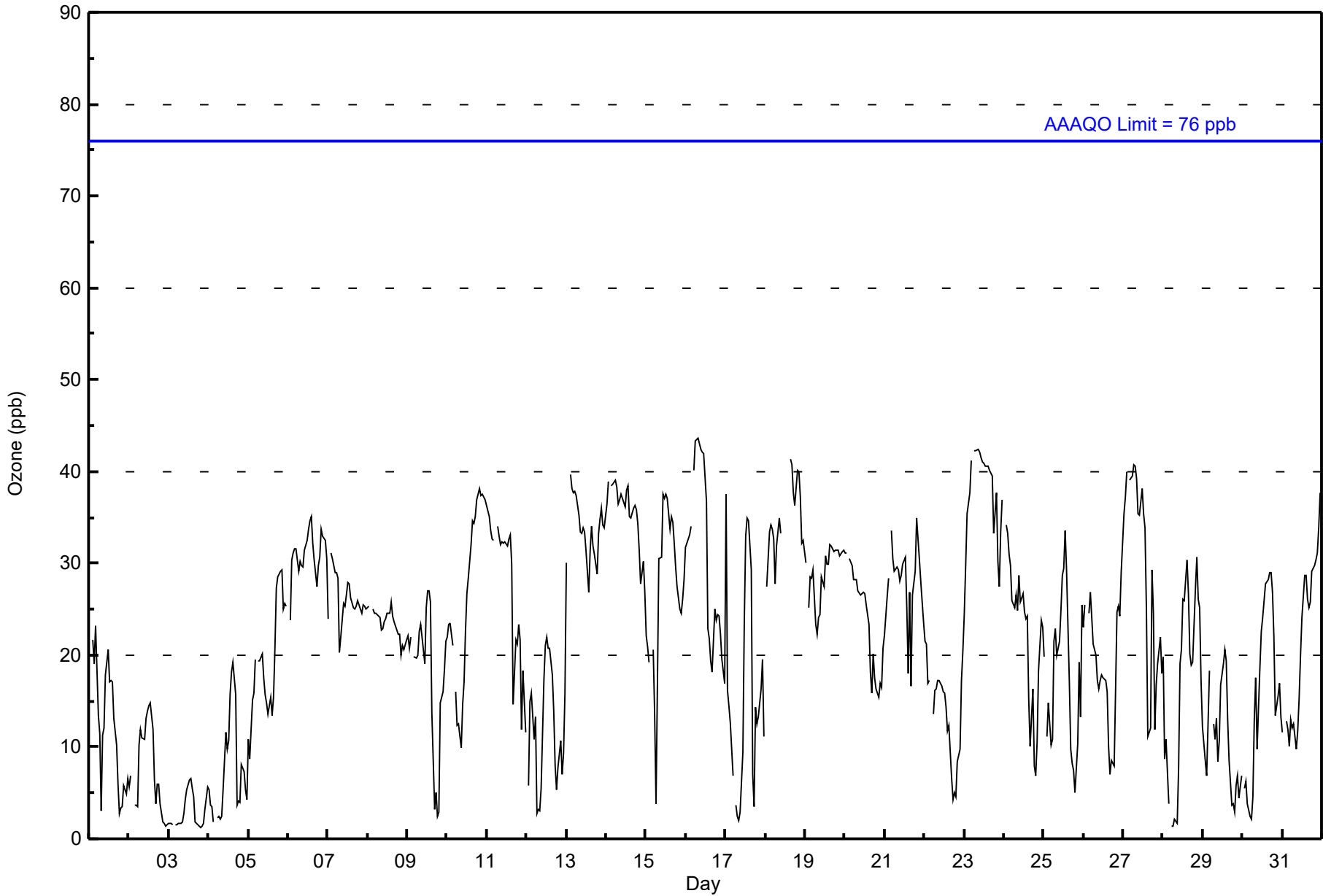




Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 43.7 ppb on Dec 16 08:00	Maximum Daily Average: 37.4 ppb on Dec 23		Hours of Data:	708
Minimum Value: 1.2 ppb on Dec 3 20:00	Minimum Daily Average: 2.9 ppb on Dec 3		Hours of Missing Data:	36
Maximum Diurnal Average: 25.9 ppb at hour 13	Minimum Diurnal Average: 19.3 ppb at hour 17		Hours of Calibration:	36
Monthly Average: 21.78 ppb	Percentiles: P ₁ = 1.5 P ₁₀ = 5.1 Q ₁ = 13.0 Median = 23.3 Q ₃ = 30.6 P ₉₀ = 36.0 P ₉₉ = 42.2		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-Dec	26.7	Z	21.7	19.1	23.1	13.5	11.4	3.1	11.3	12.1	17.8	20.6	17.1	17.2	17.1	13.1	10.1	5.9	2.8	3.3	3.5	5.8	4.9	6.6	12.5	26.7																							
2-Dec	5.7	6.9	Z	3.6	3.7	3.5	10.2	11.9	10.9	10.8	13.1	13.9	14.5	14.9	12.0	6.4	3.7	6.0	6.0	3.8	1.8	1.6	1.4	1.5	7.3	14.9																							
3-Dec	1.7	1.6	1.6	Z	1.5	1.6	1.6	1.7	1.8	2.8	4.2	5.4	6.4	6.6	5.5	4.5	1.8	1.6	1.3	1.2	1.3	1.7	3.2	5.7	2.9	6.6																							
4-Dec	5.3	3.7	3.6	1.9	Z	2.3	2.5	2.2	2.5	5.4	11.6	9.8	10.7	15.7	18.1	19.2	15.7	3.6	4.1	3.9	8.1	7.4	5.3	4.2	7.3	19.2																							
5-Dec	10.8	8.6	15.1	15.9	19.5	Z	19.3	19.4	20.2	17.5	15.7	14.7	13.6	15.4	13.5	15.4	20.7	27.3	28.5	29.2	29.3	25.0	25.7	25.3	19.4	29.3																							
6-Dec	Z	23.9	30.3	31.2	31.6	31.6	29.2	30.3	29.7	29.6	31.5	32.5	33.7	34.6	35.0	32.2	30.3	27.5	29.7	30.7	33.6	32.9	32.5	30.5	31.1	35.0																							
7-Dec	24.0	Z	31.1	30.5	29.1	29.0	28.4	20.2	22.0	25.6	25.3	26.5	27.9	27.8	26.3	25.2	25.0	25.3	26.0	25.5	24.6	25.5	25.4	25.1	26.1	31.1																							
8-Dec	25.2	25.4	Z	25.0	24.5	24.6	24.4	24.1	22.8	22.9	23.6	24.0	24.5	24.6	25.7	24.2	23.7	23.2	22.3	22.3	19.9	21.0	20.6	21.6	23.5	25.7																							
9-Dec	22.1	20.7	21.9	Z	19.9	19.7	20.0	22.6	23.3	22.0	19.1	25.1	26.9	27.0	25.8	13.7	3.2	5.1	2.4	2.9	14.8	16.1	18.4	21.4	18.0	27.0																							
10-Dec	21.9	23.4	23.4	21.0	Z	16.1	12.3	12.5	9.9	14.7	17.1	22.6	26.7	28.4	32.0	34.7	34.3	35.0	36.9	38.1	37.4	37.5	37.3	37.0	26.5	38.1																							
11-Dec	36.4	35.0	33.5	32.6	32.5	Z	34.0	32.9	32.1	32.3	32.1	32.3	31.9	32.6	33.1	29.9	14.7	21.7	21.2	23.4	21.6	11.9	18.3	11.6	27.7	36.4																							
12-Dec	Z	5.8	15.0	15.9	10.8	13.3	2.7	3.2	3.1	5.5	17.4	21.0	22.0	20.7	20.8	17.8	13.8	8.0	5.4	7.8	10.7	7.0	9.3	15.8	11.9	22.0																							
13-Dec	30.0	Z	39.7	38.2	37.6	37.8	37.4	35.3	33.4	33.3	33.8	33.3	31.5	26.9	31.4	34.0	31.9	30.9	28.8	33.3	34.8	36.0	34.1	33.9	33.8	39.7																							
14-Dec	36.5	38.9	Z	38.4	38.6	39.0	38.2	36.4	37.0	37.5	37.1	36.1	38.0	38.4	35.0	35.0	36.0	36.4	35.8	34.3	31.4	27.7	30.2	26.9	35.6	39.0																							
15-Dec	22.2	20.9	19.3	Z	20.6	13.7	3.8	16.7	30.6	30.7	37.5	37.1	37.5	37.0	33.7	35.1	34.5	32.1	29.6	27.4	25.1	24.6	26.1	28.2	27.1	37.5																							
16-Dec	31.8	32.7	33.1	34.1	Z	40.1	43.3	43.7	43.1	42.4	42.0	42.0	36.7	22.9	21.8	19.4	18.2	25.0	23.8	24.4	24.2	22.2	19.5	17.0	30.6	43.7																							
17-Dec	37.5	16.2	14.5	12.6	6.8	Z	3.6	2.5	2.0	2.9	9.5	23.7	33.0	34.9	34.7	29.4	7.0	3.6	14.3	12.5	13.2	16.4	19.5	11.1	15.7	37.5																							
18-Dec	Z	27.5	33.4	34.1	33.6	32.6	27.7	31.9	35.0	33.2	C	C	C	C	C	41.4	40.7	37.6	36.4	40.1	39.9	37.3	32.2	32.5	34.8	41.4																							
19-Dec	30.0	Z	25.2	28.5	28.3	29.3	23.3	22.2	24.1	24.4	28.6	27.4	30.8	29.8	29.9	32.0	31.9	31.3	31.5	31.5	31.4	30.8	31.3	31.4	28.9	32.0																							
20-Dec	31.0	31.1	Z	30.6	29.7	28.2	28.2	28.2	27.0	26.6	26.6	26.9	26.6	25.4	23.4	18.2	15.9	20.1	17.5	16.3	15.4	17.0	16.5	20.8	23.8	31.1																							
21-Dec	22.2	26.3	28.3	Z	33.6	30.5	29.1	29.6	29.3	28.1	28.6	29.8	30.7	25.1	18.0	26.9	16.6	26.5	29.1	35.0	32.7	30.3	27.8	23.4	27.7	35.0																							
22-Dec	21.5	21.3	17.0	17.3	Z	13.6	16.1	16.4	17.3	17.2	16.7	16.0	15.8	14.4	11.7	12.3	6.5	4.3	5.1	4.6	8.5	9.8	17.2	20.5	14.0	21.5																							
23-Dec	24.4	29.7	35.4	37.7	41.2	Z	42.3	42.3	42.5	42.2	41.5	41.1	40.9	40.6	40.5	40.2	39.8	39.5	33.3	37.7	30.2	27.4	33.5	36.9	37.4	42.5																							
24-Dec	Z	34.2	33.2	31.0	29.8	25.9	25.2	26.6	24.9	28.6	25.8	26.6	24.6	24.0	24.3	15.2	10.1	16.3	7.9	6.8	10.5	18.3	23.7	23.1	22.5	34.2																							
25-Dec	19.9	Z	11.1	14.8	10.3	10.8	21.5	22.9	20.0	21.4	24.9	28.6	29.4	33.6	29.3	17.1	9.7	8.2	7.4	5.0	10.4	19.3	13.2	25.5	18.0	33.6																							
26-Dec	23.1	25.5	Z	24.5	26.8	24.1	21.3	20.1	17.2	16.3	17.3	17.8	17.6	17.2	16.0	10.0	7.0	8.6	8.0	16.2	24.7	25.3	24.2	29.1	19.0	29.1																							
27-Dec	35.4	37.3	40.0	Z	39.0	39.5	40.7	40.6	39.2	35.3	35.2	38.1	35.4	33.8	25.0	11.1	12.0	29.3	24.6	11.9	16.8	19.0	21.9	18.0	29.5	40.7																							
28-Dec	19.9	8.7	10.9	3.8	Z	1.4	1.4	2.1	1.7	7.7	19.1	20.6	26.1	25.9	30.3	26.7	20.2	18.9	19.2	27.3	30.7	26.1	25.2	17.2	17.0	30.7																							
29-Dec	12.2	8.6	6.8	12.4	18.3	Z	12.5	10.9	13.0	8.3	10.7	16.7	19.0	20.7	19.4	12.9	8.6	3.7	3.8	2.9	5.8	6.8	4.4	6.9	10.7	20.7																							
30-Dec	Z	5.5	6.2	3.9	2.5	2.2	4.5	12.9	17.6	9.7	18.5	22.5	24.2	26.0	27.8	28.2	29.0	29.0	26.9	22.0	13.4	15.5	16.9	13.3	16.4	29.0																							
31-Dec	11.6	Z	12.8	12.0	10.1	13.0	12.1	12.6	9.8	11.8	15.3	20.0	24.1	28.7	28.6	26.1	25.2	25.8	29.1	29.8	30.4	31.1	33.8	37.7	21.4	37.7																							
																								22.7	20.8	21.7	21.9	23.2	20.7	20.3	20.6	21.1	21.3	23.2	25.1	25.9	25.7	24.9	22.8	19.3	19.9	19.3	19.7	20.5	20.5	21.1	21.3	Diurnal Average	
																								37.5	38.9	40.0	38.4	41.2	40.1	43.3	43.7	43.1	42.4	42.0	40.9	40.6	40.5	41.4	40.7	39.5	36.9	40.1	39.9	37.5	37.3	37.7	Diurnal Maximum		

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





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Ozone (O₃) - ppb
Patricia McInnes - December 2023

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	303	42.80	42.80
21 - 50	405	57.20	100.00
51 - 82	0	0.00	100.00
> 83	0	0.00	100.00

Total Number of Valid Hours: 708

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Ozone (O₃) - ppb
Patricia McInnes - December 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	5	1	1	0	2	6	64	89	64	36	7	2	3	5	10	8	303
21 - 50	8	1	2	1	4	16	33	17	14	62	107	65	36	17	11	11	405
51 - 82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 83	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	13	2	3	1	6	22	97	106	78	98	114	67	39	22	21	19	708

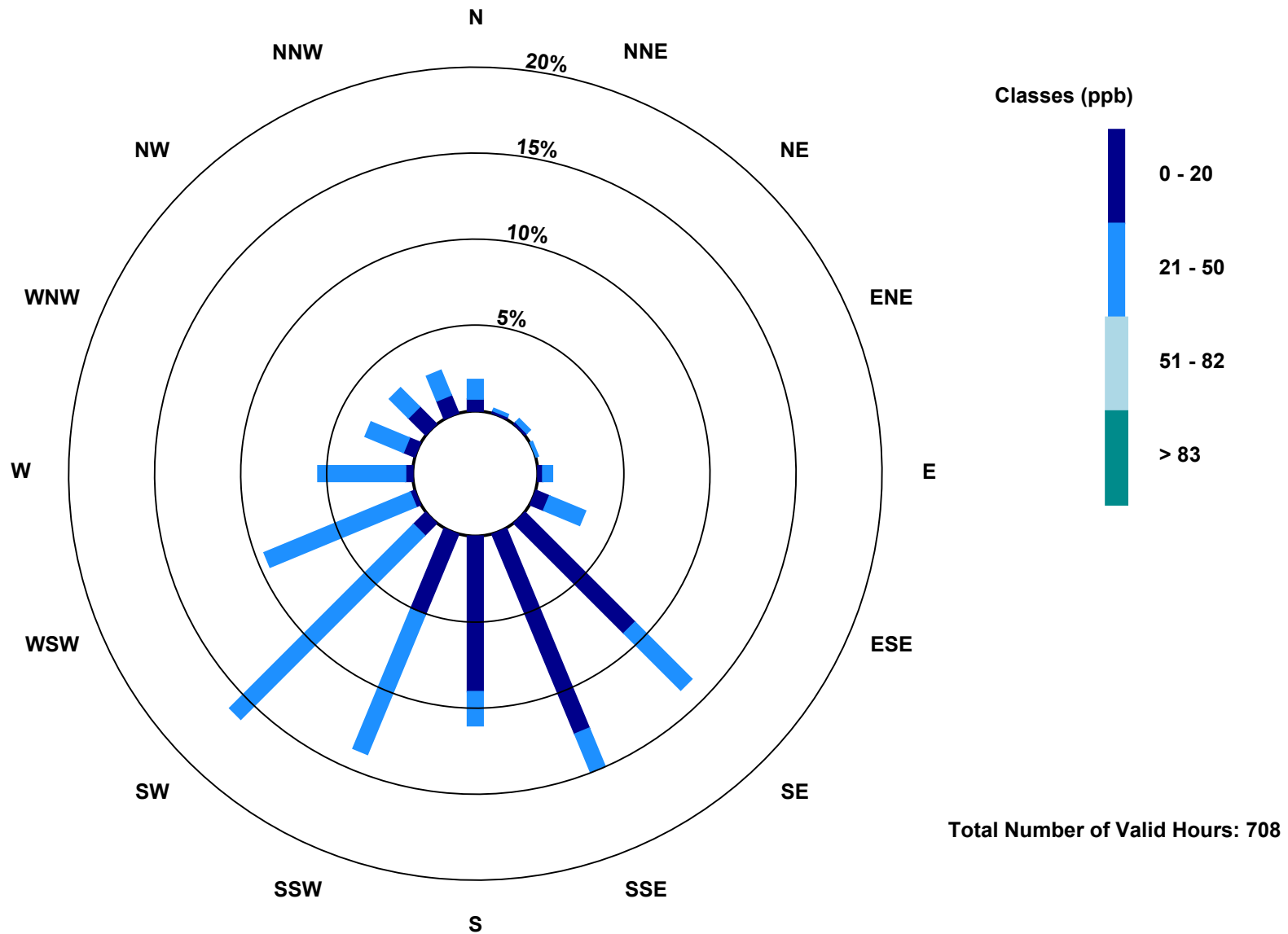
Total Number of Valid Hours: 708

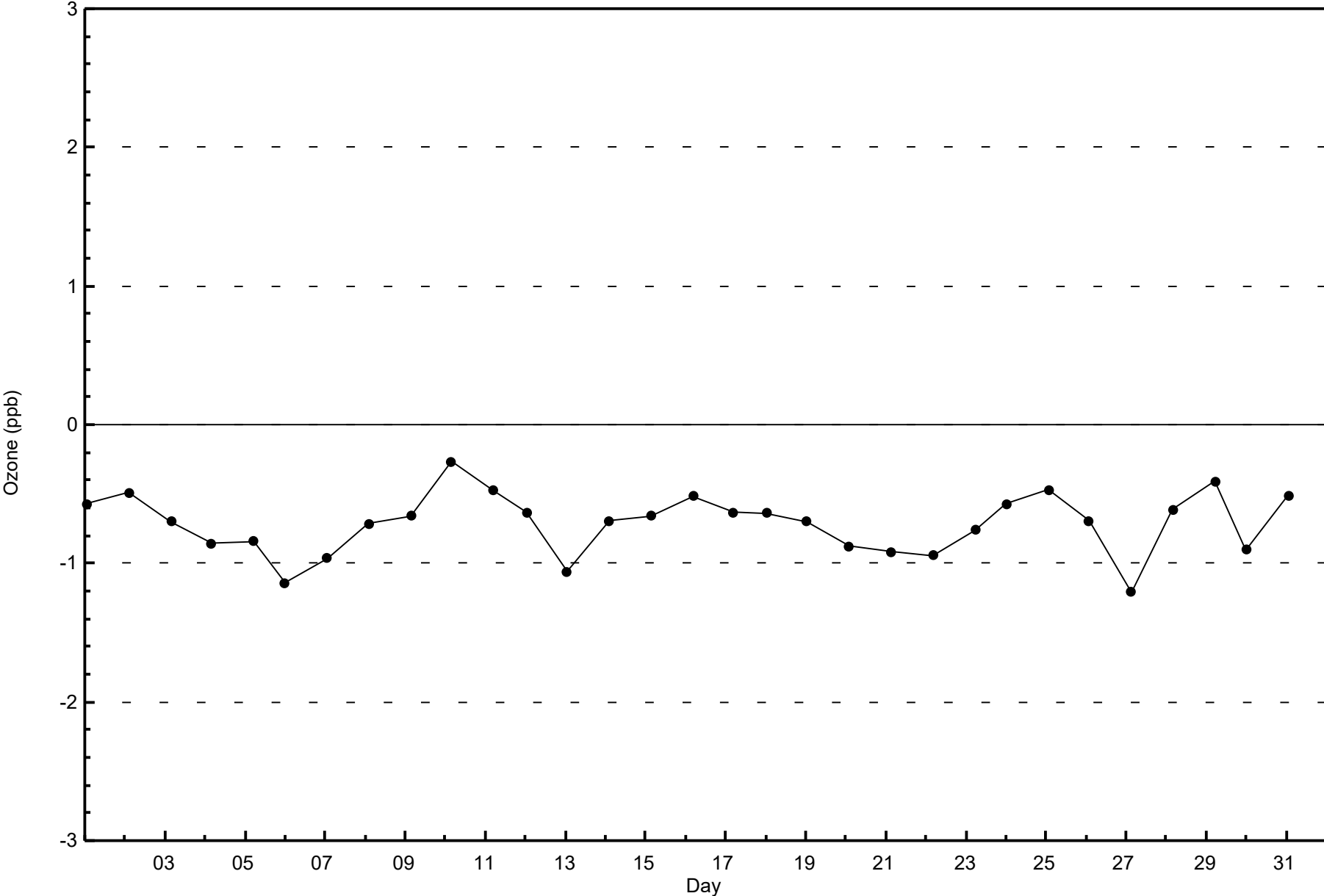
Total Number of Hours: 744

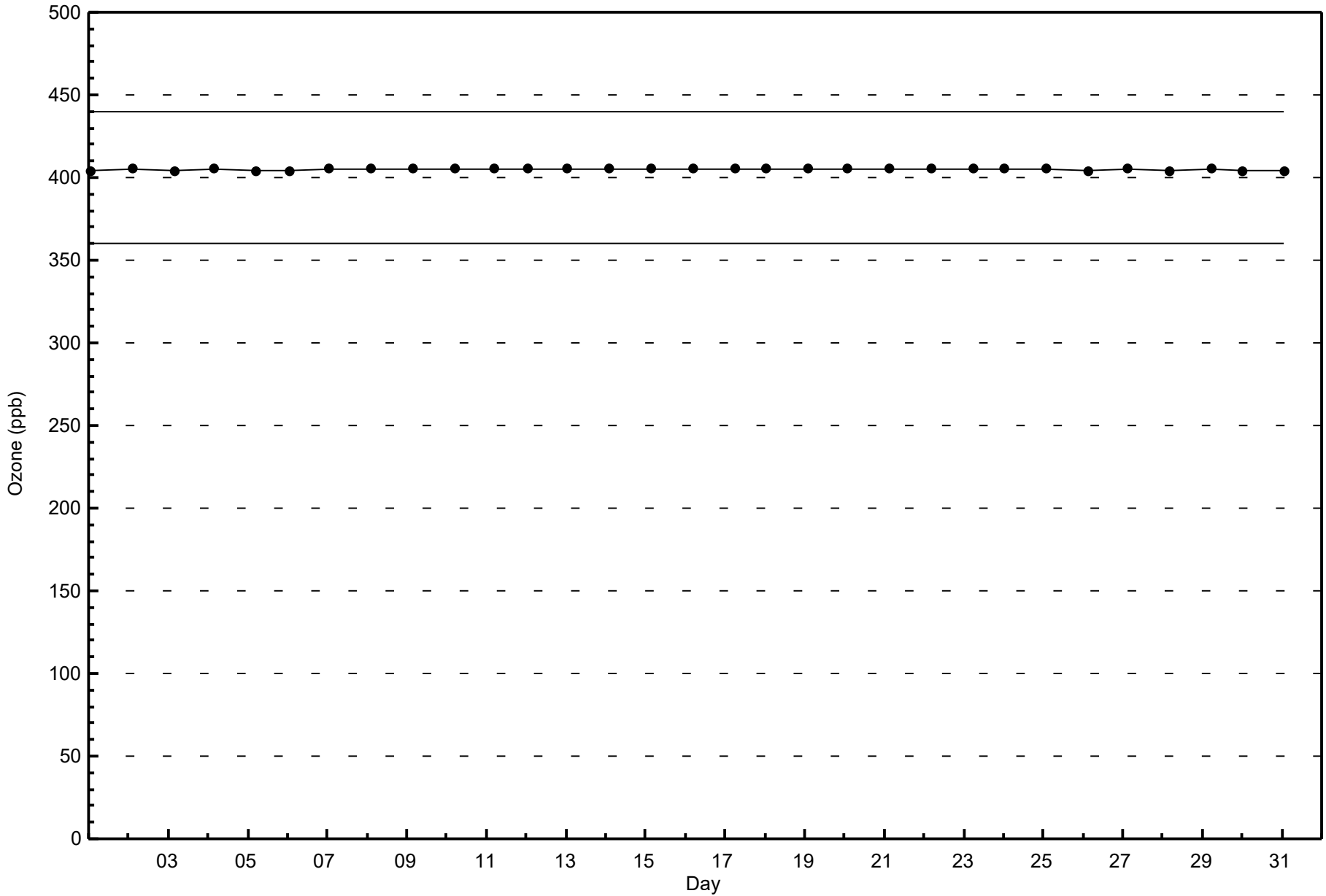


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Ozone (O₃) - ppb
Patricia McInnes







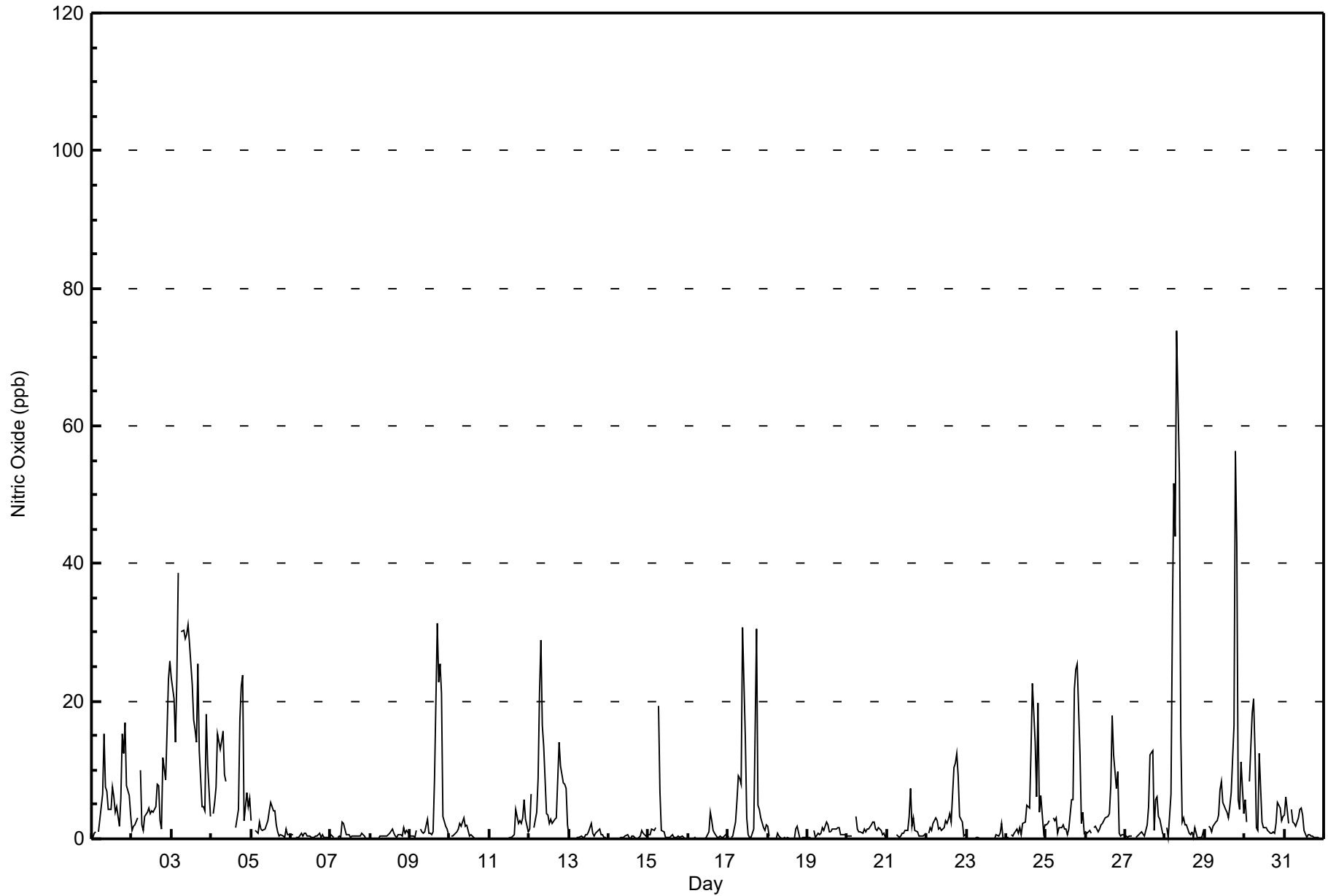


Maximum Value: 73.9 ppb on Dec 28 08:00																				Maximum Daily Average: 19.7 ppb on Dec 3					Hours in Service: 744	
Minimum Value: 0.0 ppb on Dec 7 23:00																				Minimum Daily Average: 0.2 ppb on Dec 23					Hours of Data: 707	
Maximum Diurnal Average: 7.0 ppb at hour 19																				Minimum Diurnal Average: 1.4 ppb at hour 3					Hours of Missing Data: 37	
Monthly Average: 3.94 ppb																				Percentiles: P ₁ = 0.0 P ₁₀ = 0.1 Q ₁ = 0.3 Median = 1.2 Q ₃ = 3.5 P ₉₀ = 12.2 P ₉₉ = 31.8					Hours of Calibration: 36	
																				Percent Operational Time: 99.9						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Dec	0.2	0.8	1.1	Z	1.0	4.7	6.4	15.3	7.6	6.9	4.2	4.2	7.5	6.0	3.8	4.6	1.8	5.9	15.2	12.5	17.0	7.6	6.3	3.5	6.3	17.0
2-Dec	1.3	1.8	2.0	3.0	Z	9.9	1.9	1.2	3.4	4.0	4.5	3.6	4.1	3.8	4.6	7.9	7.8	2.6	1.4	11.7	8.6	15.7	23.1	25.9	6.7	25.9
3-Dec	23.5	20.4	14.0	23.4	38.6	Z	30.1	30.3	29.1	29.7	31.1	28.5	22.5	17.3	15.9	14.1	25.4	12.7	4.6	4.6	4.1	18.2	10.8	3.2	19.7	38.6
4-Dec	Z	3.7	5.3	7.5	15.3	13.0	14.1	15.6	9.3	8.3	C	C	C	C	C	1.6	4.2	17.4	22.2	23.7	2.6	6.7	4.6	5.9	10.1	23.7
5-Dec	2.7	Z	1.2	1.0	0.8	2.4	1.4	1.2	1.5	2.1	2.6	4.1	5.3	4.1	4.0	2.0	1.1	0.4	0.6	0.4	0.2	1.5	0.7	0.6	1.8	5.3
6-Dec	0.6	0.6	Z	0.1	0.1	0.2	0.9	0.4	0.8	0.7	0.4	0.4	0.3	0.3	0.2	0.4	0.4	0.9	0.3	0.6	0.2	0.3	0.1	0.2	0.4	0.9
7-Dec	0.7	0.5	0.2	Z	0.3	0.4	0.2	2.5	2.2	0.6	0.7	0.6	0.3	0.4	0.5	0.4	0.4	0.5	0.4	0.7	0.4	0.1	0.0	0.0	0.6	2.5
8-Dec	0.0	0.0	0.0	0.0	Z	0.0	0.4	0.4	0.4	0.4	0.4	0.7	0.8	1.4	0.8	0.3	0.2	0.6	0.5	0.4	1.6	0.9	1.2	0.5	0.5	1.6
9-Dec	0.3	0.5	0.4	0.3	1.3	Z	1.5	1.0	0.9	1.1	2.8	0.9	0.9	0.7	1.1	8.5	31.3	22.7	25.4	21.2	3.2	1.9	1.4	0.6	5.6	31.3
10-Dec	Z	0.5	0.5	0.9	1.0	1.4	2.3	1.9	3.0	1.9	2.0	1.2	0.4	0.5	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	3.0
11-Dec	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.3	0.3	0.3	0.5	4.3	2.3	2.6	2.3	3.0	5.6	2.8	0.9	1.1	5.6
12-Dec	1.4	6.5	Z	1.7	3.9	8.8	21.2	29.0	16.4	13.5	3.7	3.4	2.2	2.8	2.2	2.8	3.1	8.5	14.0	10.7	8.1	8.0	7.3	2.0	7.9	29.0
13-Dec	0.5	0.1	0.0	Z	0.1	0.2	0.2	0.5	0.3	0.3	0.6	0.5	1.0	2.2	0.7	0.4	0.8	1.1	1.5	0.6	0.6	0.2	0.2	0.0	0.5	2.2
14-Dec	0.0	0.0	0.0	Z	0.0	0.0	0.2	0.3	0.2	0.4	0.6	0.3	0.0	0.5	0.4	0.1	0.0	0.2	0.3	0.3	1.3	0.8	0.3	0.6	0.3	1.3
15-Dec	0.6	0.5	1.4	1.1	1.6	Z	19.3	6.9	1.3	0.9	0.3	0.2	0.2	0.1	0.6	0.2	0.2	0.2	0.3	0.2	0.5	0.2	0.1	0.1	1.6	19.3
16-Dec	Z	0.0	0.0	0.0	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.2	1.1	3.9	2.6	1.2	0.7	0.2	0.3	0.3	0.1	0.2	0.4	0.9	0.5	3.9
17-Dec	0.2	Z	0.3	0.3	2.5	5.6	9.1	8.8	7.9	30.7	14.7	3.1	0.5	0.2	0.3	1.3	15.8	30.5	4.8	4.3	3.0	1.6	1.3	2.1	6.5	30.7
18-Dec	1.8	0.5	Z	0.1	0.0	0.1	0.7	0.4	0.0	0.1	0.1	0.1	0.1	0.1	M	0.0	0.0	1.4	1.8	0.0	0.0	0.1	0.2	0.2	0.4	1.8
19-Dec	0.2	0.1	0.1	Z	1.2	0.2	0.9	0.6	0.8	1.5	1.2	2.5	2.0	1.0	1.0	1.4	1.5	1.5	1.7	1.5	0.7	0.6	0.7	0.4	1.0	2.5
20-Dec	0.4	0.4	0.3	0.3	Z	3.2	1.3	1.0	1.1	0.9	1.4	0.9	1.5	1.5	2.0	2.4	2.5	1.4	1.3	1.7	1.3	0.7	0.8	0.3	1.2	3.2
21-Dec	0.0	0.0	0.0	0.0	0.0	Z	0.6	0.2	0.3	0.9	0.9	1.3	1.1	3.3	7.4	1.9	3.0	1.3	1.1	0.4	0.4	0.4	0.4	0.8	1.1	7.4
22-Dec	Z	0.8	1.5	1.2	2.2	3.1	2.7	1.5	1.7	1.2	1.6	2.7	2.2	2.9	3.7	2.4	10.3	11.0	12.4	9.2	3.2	2.4	0.3	0.6	3.5	12.4
23-Dec	0.5	Z	0.0	0.0	0.0	0.0	0.2	0.2	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.7	0.3	0.8	2.2	0.2	0.0	0.2	2.2
24-Dec	0.2	0.2	Z	0.5	0.4	0.8	1.5	0.7	1.5	0.7	2.3	2.5	4.8	4.7	4.5	12.5	22.5	14.0	6.1	19.7	3.9	6.4	1.0	2.0	4.9	22.5
25-Dec	2.0	2.2	2.5	Z	3.0	2.6	3.0	0.9	1.5	1.5	2.1	1.4	1.4	0.7	1.5	5.6	5.6	21.7	24.7	25.3	12.3	2.2	3.9	0.8	5.6	25.3
26-Dec	1.0	0.7	1.3	0.7	Z	1.6	1.8	1.0	1.4	2.0	2.3	2.5	3.1	3.3	3.6	7.8	18.0	12.2	7.4	9.7	0.7	0.5	0.7	0.7	3.7	18.0
27-Dec	0.3	0.2	0.3	0.3	0.4	Z	0.2	0.3	0.5	0.8	0.9	0.4	1.3	2.1	4.7	12.3	12.8	1.3	5.8	6.2	3.3	2.9	0.7	0.3	2.5	12.8
28-Dec	Z	1.6	0.1	6.5	31.9	51.7	43.9	73.9	53.1	15.1	2.4	3.0	2.1	2.0	0.8	0.6	1.1	0.2	1.7	0.0	0.2	0.2	0.3	1.0	12.8	73.9
29-Dec	0.5	Z	1.8	1.5	0.9	1.9	2.5	2.6	3.5	7.2	8.4	5.4	4.4	3.8	3.0	4.8	6.7	16.6	56.4	42.6	5.6	4.2	11.2	3.7	8.7	56.4
30-Dec	5.7	2.4	Z	8.4	18.4	20.2	12.8	1.6	1.3	12.3	2.5	1.6	1.7	1.7	1.2	0.7	0.8	1.0	0.9	2.2	5.2	4.5	2.7	3.2	4.9	20.2
31-Dec	3.5	6.2	2.2	Z	4.2	2.5	2.2	1.8	3.0	4.2	4.5	3.5	1.1	0.3	0.6	0.6	0.4	0.4	0.2	0.3	0.2	0.1	0.1	0.1	1.8	6.2
1.8 2.0 1.4 2.4 5.0 5.2 5.9 6.5 5.0 4.8 3.3 2.7 2.5 2.4 2.5 3.2 5.9 6.1 7.0 6.9 3.0 3.1 2.7 2.0																								Diurnal Average		
23.5 20.4 14.0 23.4 38.6 51.7 43.9 73.9 53.1 30.7 31.1 28.5 22.5 17.3 15.9 14.1 31.3 30.5 56.4 42.6 17.0 18.2 23.1 25.9																								Diurnal Maximum		
Z - zerospan C - Calibration M - Maintenance																										



Wood Buffalo Environmental Association
Hourly Averages

Nitric Oxide (NO) - ppb
Patricia McInnes - December 2023





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitric Oxide (NO) - ppb
Patricia McInnes - December 2023

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	673	95.19	95.19
21 - 40	28	3.96	99.15
41 - 80	6	0.85	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Nitric Oxide (NO) - ppb
Patricia McInnes - December 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	2	2	1	5	19	88	95	75	97	111	68	43	21	15	17	673
21 - 40	0	0	1	1	1	3	7	9	2	0	0	0	1	1	1	1	28
11 - 80	0	0	0	0	0	0	1	0	1	0	0	0	0	1	2	1	6
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	14	2	3	2	6	22	96	104	78	97	111	68	44	23	18	19	707

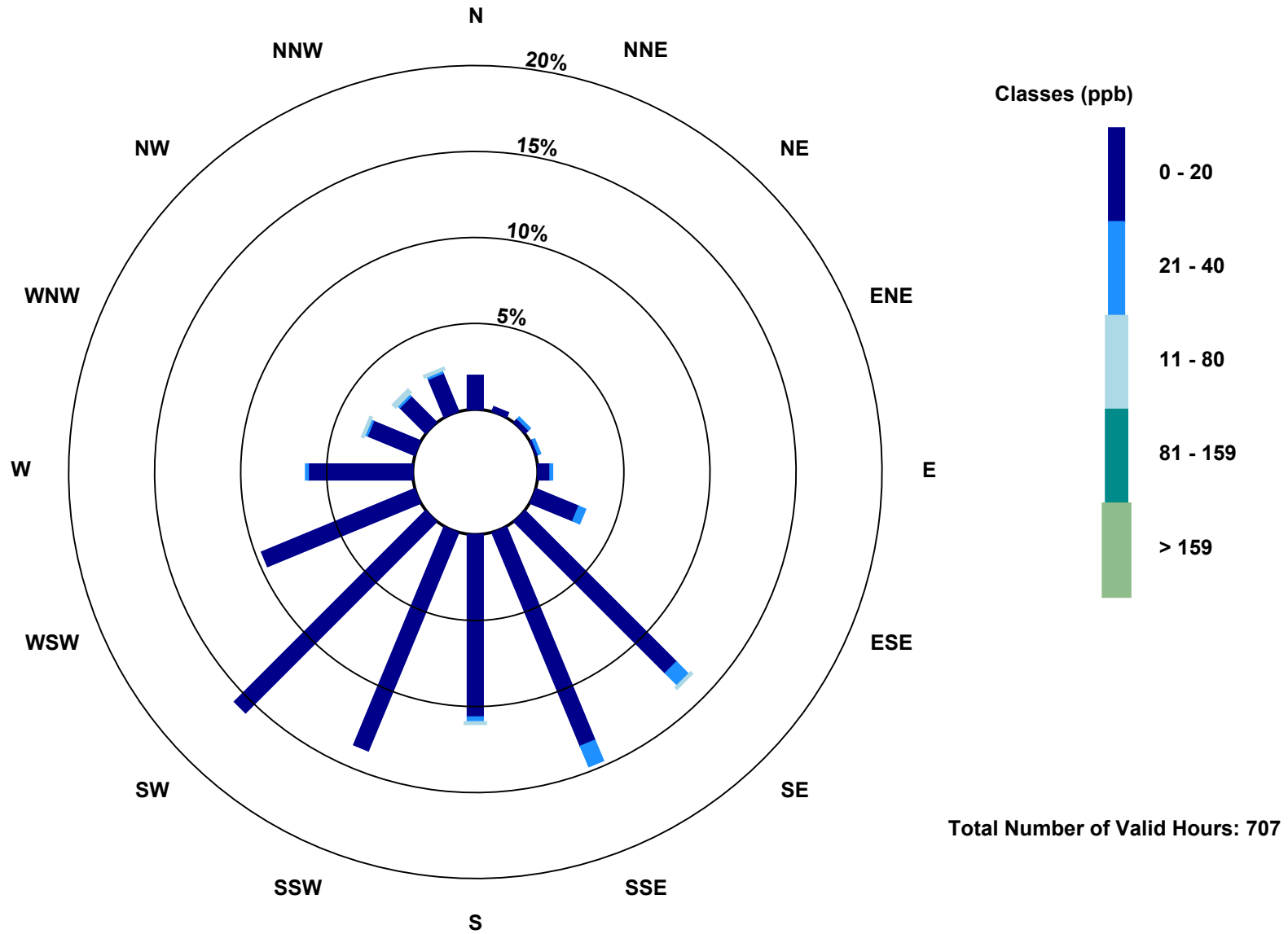
Total Number of Valid Hours: 707

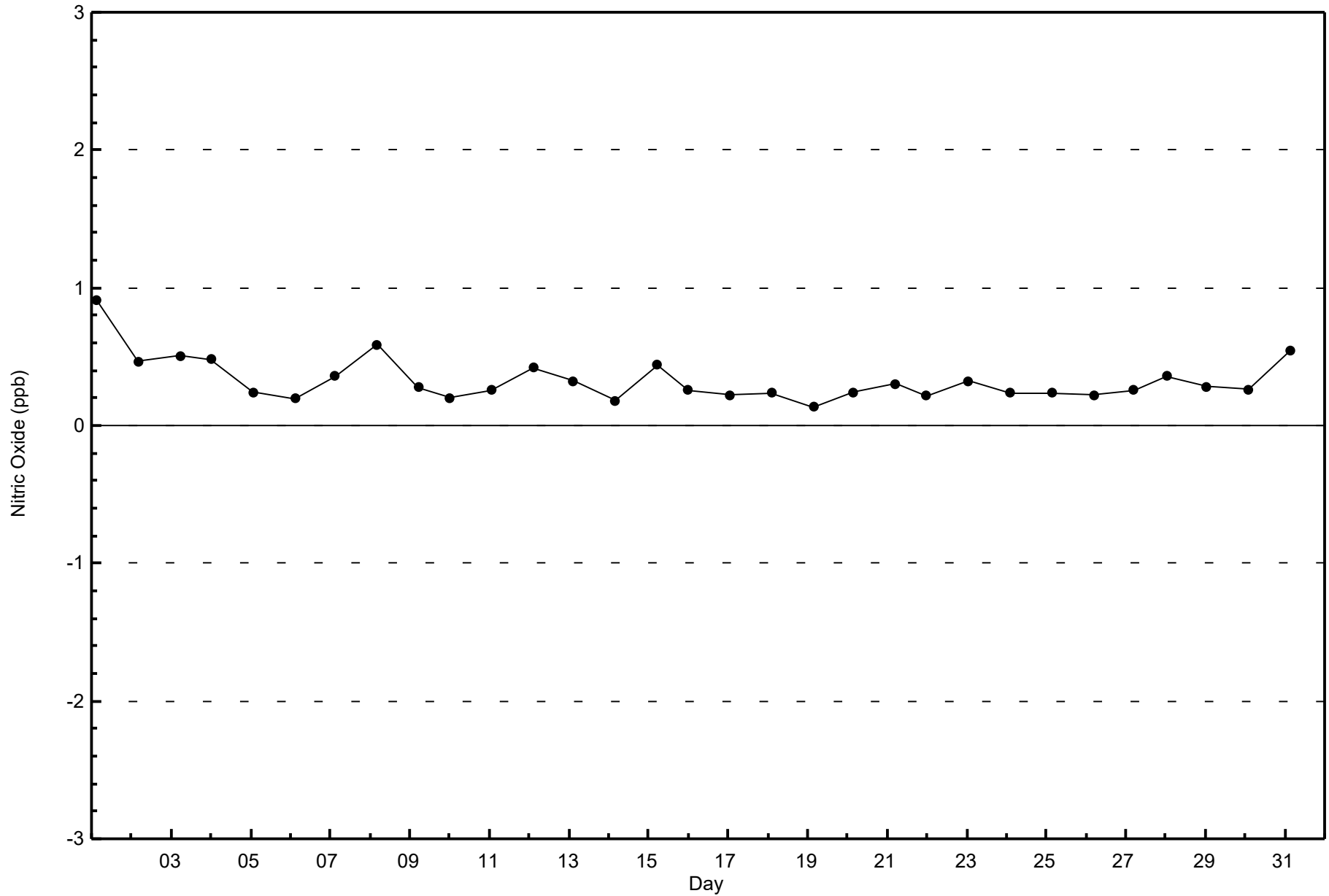
Total Number of Hours: 744

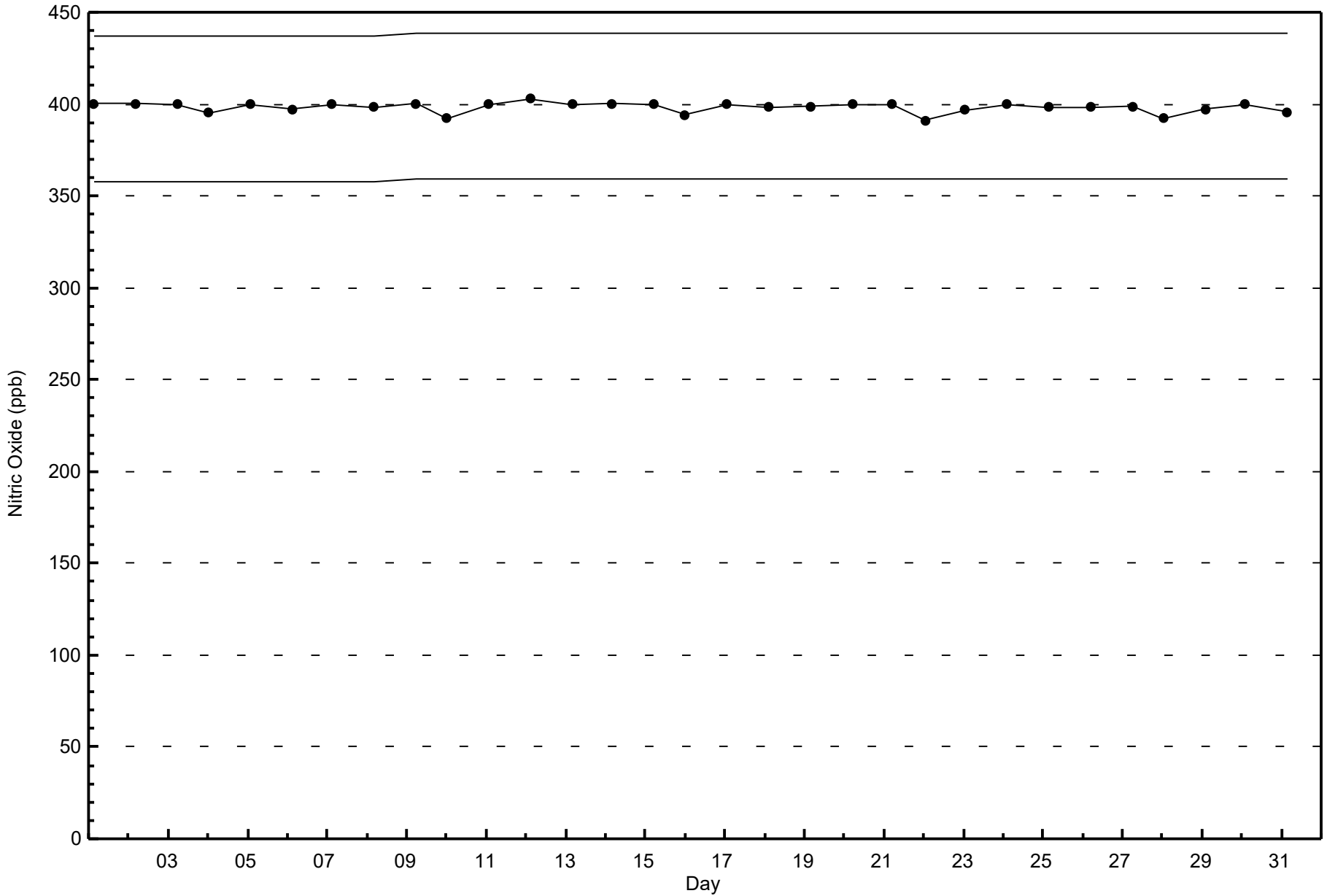


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Nitric Oxide (NO) - ppb
Patricia McInnes









Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO₂) - ppb

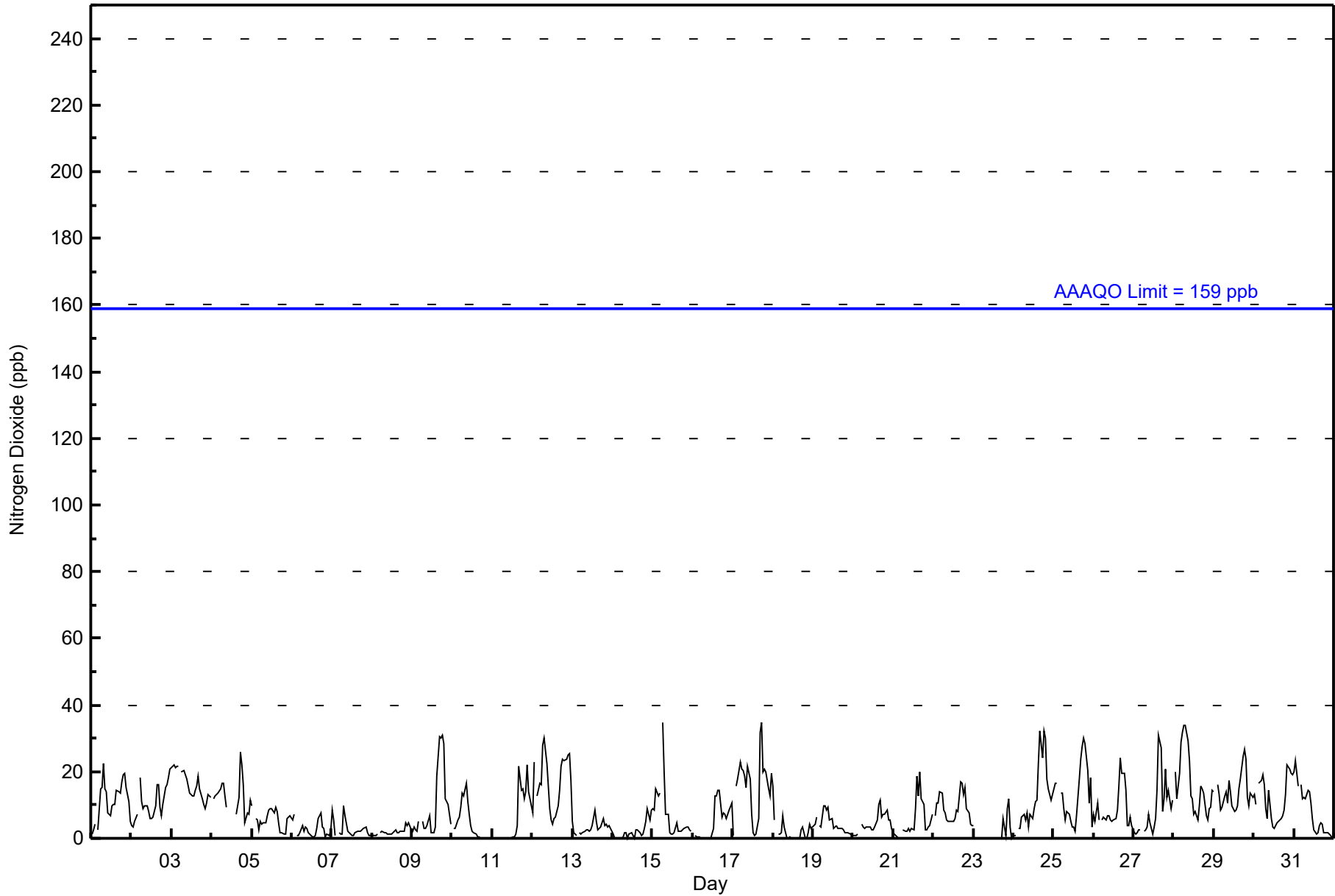
Patricia McInnes - December 2023

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 34.7 ppb on Dec 17 18:00	Maximum Daily Average: 17.3 ppb on Dec 12		Hours of Data:	707
Minimum Value: 0.0 ppb on Dec 10 21:00	Minimum Daily Average: 1.6 ppb on Dec 23		Hours of Missing Data:	37
Maximum Diurnal Average: 12.8 ppb at hour 17	Minimum Diurnal Average: 3.8 ppb at hour 13		Hours of Calibration:	36
Monthly Average: 8.15 ppb	Percentiles: P ₁ = 0.0 P ₁₀ = 0.6 Q ₁ = 2.1 Median = 5.8 Q ₃ = 12.8 P ₉₀ = 19.5 P ₉₉ = 31.7		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-Dec	1.4	2.4	4.3	Z	2.4	14.7	15.2	22.4	14.9	14.0	7.7	6.7	9.8	10.1	10.1	14.2	13.9	13.6	16.8	19.0	19.3	15.1	11.2	5.2	11.5	22.4
2-Dec	4.0	3.3	5.0	7.1	Z	18.2	11.1	8.8	9.9	9.9	8.1	6.0	6.1	6.2	9.7	16.0	15.9	9.5	6.7	10.3	15.3	16.1	18.3	20.9	10.5	20.9
3-Dec	21.3	22.0	21.2	21.5	21.8	Z	19.9	20.5	19.2	17.9	15.6	13.7	12.5	12.7	14.2	15.8	18.8	15.0	11.7	10.2	9.1	10.4	13.0	12.3	16.1	22.0
4-Dec	Z	12.0	12.5	13.0	13.5	14.9	16.4	16.4	12.9	9.2	C	C	C	C	C	7.0	12.2	25.8	21.9	16.0	4.8	7.6	7.3	11.4	13.0	25.8
5-Dec	9.6	Z	5.9	5.5	2.7	5.2	4.1	4.5	4.6	6.8	8.3	9.0	9.1	7.7	9.3	7.9	4.6	1.9	1.7	1.3	1.4	6.0	6.4	6.6	5.7	9.6
6-Dec	5.5	7.3	Z	0.9	1.0	1.5	3.8	2.1	3.2	3.1	1.5	0.8	0.5	0.6	1.0	3.1	6.1	7.6	3.3	3.0	0.6	1.4	0.9	2.6	2.7	7.6
7-Dec	8.5	5.7	0.8	Z	1.6	1.3	1.4	9.7	6.6	2.0	1.6	1.2	0.9	1.0	1.7	2.1	2.2	2.3	2.6	3.1	3.3	1.8	0.9	0.9	2.7	9.7
8-Dec	1.2	1.0	1.0	1.2	Z	1.8	2.2	1.8	1.9	1.2	1.2	1.2	1.2	2.1	2.4	1.8	1.5	2.3	2.3	2.3	4.6	3.7	4.5	2.7	2.0	4.6
9-Dec	2.1	3.4	2.4	2.1	5.1	Z	5.0	3.0	2.8	3.8	6.8	1.9	1.6	1.9	3.6	18.5	30.7	30.0	30.9	28.2	11.7	10.3	7.2	4.2	9.4	30.9
10-Dec	Z	3.0	3.1	5.6	6.5	9.4	13.5	12.9	16.7	11.1	7.1	3.8	2.2	1.7	1.1	0.5	0.3	0.2	0.2	0.1	0.0	0.0	0.0	0.0	4.3	16.7
11-Dec	0.0	Z	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.5	1.4	4.0	21.4	14.4	14.8	11.7	13.8	22.1	14.0	9.9	5.6	22.1
12-Dec	7.6	23.0	Z	12.8	16.6	16.3	27.8	29.9	26.3	22.4	8.8	5.5	4.4	6.0	6.4	9.7	14.2	21.7	23.6	23.4	23.8	25.2	25.3	17.4	17.3	29.9
13-Dec	5.1	1.9	1.0	Z	1.7	1.4	1.6	2.3	2.4	2.4	2.2	2.6	3.8	8.4	4.9	2.5	2.8	3.4	5.8	4.0	4.4	3.2	3.9	2.8	3.2	8.4
14-Dec	1.3	0.0	0.1	0.0	Z	0.0	0.3	1.9	1.5	0.0	1.2	1.9	0.7	0.2	2.4	2.6	1.7	1.0	1.4	2.9	5.2	8.8	5.4	8.3	2.1	8.8
15-Dec	9.1	8.5	14.8	12.6	13.6	Z	34.6	19.9	7.0	7.2	1.6	1.2	1.1	1.5	4.5	2.3	2.2	2.0	2.7	2.9	3.3	3.2	2.6	2.0	7.0	34.6
16-Dec	Z	0.9	0.5	0.5	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.0	12.6	12.8	14.2	14.2	6.5	7.5	7.0	6.1	7.0	8.6	10.4	4.9	14.2
17-Dec	0.8	Z	15.7	17.9	22.7	20.6	20.3	18.6	15.2	21.5	18.0	7.2	1.6	0.7	1.1	6.0	31.7	34.7	20.1	20.7	20.1	14.8	12.6	19.6	15.7	34.7
18-Dec	15.6	5.6	Z	1.3	1.1	1.5	6.6	3.4	0.0	0.1	0.3	0.0	0.1	0.0	M	0.0	0.0	2.4	3.3	0.0	0.0	1.7	4.3	2.8	2.3	15.6
19-Dec	3.9	4.4	6.5	Z	3.7	3.3	9.7	9.6	8.4	9.3	5.3	5.8	3.0	3.5	3.8	2.8	3.1	2.8	2.6	1.9	1.7	1.9	1.2	0.9	4.3	9.7
20-Dec	0.9	0.8	0.9	1.3	Z	4.4	3.2	2.8	3.6	3.4	3.3	2.7	2.5	3.5	5.3	10.3	11.4	6.2	7.2	7.4	8.4	5.6	5.4	2.9	4.5	11.4
21-Dec	1.9	1.0	0.6	0.2	0.1	Z	2.6	2.2	2.1	3.1	2.2	2.9	2.6	8.8	18.8	12.5	19.9	11.9	10.2	2.7	2.7	3.2	4.0	7.1	5.4	19.9
22-Dec	Z	6.8	10.7	10.6	13.9	13.5	8.4	7.6	5.7	5.1	4.9	5.2	4.9	5.9	8.6	8.1	16.9	16.4	13.2	15.1	9.1	7.5	4.1	3.7	9.0	16.9
23-Dec	4.0	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	0.2	6.1	1.0	8.7	11.9	3.6	0.0	1.6	11.9
24-Dec	1.0	1.0	Z	2.9	3.0	6.3	7.1	5.5	7.6	3.3	7.4	6.0	8.7	10.9	11.4	22.4	32.2	24.1	32.1	30.2	17.8	14.7	11.3	13.1	12.2	32.2
25-Dec	14.9	16.7	16.4	Z	13.6	13.4	8.9	5.7	8.2	7.4	5.0	3.2	3.3	2.3	6.8	17.8	23.6	27.4	30.0	28.3	20.2	10.4	18.3	3.5	13.3	30.0
26-Dec	7.2	4.9	10.8	5.4	Z	5.7	6.4	5.6	6.6	6.6	5.4	5.0	5.3	5.8	8.5	15.5	24.2	19.5	19.6	14.6	4.0	3.7	6.5	3.9	8.7	24.2
27-Dec	1.8	1.3	1.6	2.5	2.4	Z	2.3	2.5	3.6	7.0	4.8	1.1	3.5	5.9	14.6	31.0	27.1	8.2	11.7	20.6	12.2	14.2	8.8	11.5	8.7	31.0
28-Dec	Z	19.9	11.9	19.5	29.0	31.8	34.1	33.7	29.4	23.4	12.5	11.7	7.2	8.1	5.6	9.9	15.5	15.0	13.4	6.9	5.3	9.1	9.5	14.4	16.4	34.1
29-Dec	13.9	Z	16.3	13.2	8.4	9.5	12.6	13.9	10.7	17.5	13.8	9.9	8.1	8.6	9.6	14.7	17.9	24.5	26.8	23.8	12.4	9.6	13.5	12.1	14.0	26.8
30-Dec	13.0	10.2	Z	16.5	17.2	18.9	16.1	8.9	5.9	14.6	5.9	3.4	3.0	3.9	4.6	5.5	5.9	6.8	8.5	13.1	22.1	20.8	19.5	19.2	11.5	22.1
31-Dec	20.0	23.4	15.7	Z	16.2	11.9	12.1	11.7	14.4	13.9	10.8	6.0	2.7	1.3	1.9	3.8	4.6	4.3	1.6	1.6	1.7	1.4	0.7	0.0	7.9	23.4

6.8	7.3	6.9	7.0	8.4	8.7	9.9	9.3	8.1	8.0	5.7	4.2	3.8	4.7	6.4	9.1	12.8	11.7	11.6	10.8	8.8	8.8	8.2	7.5	Diurnal Average	
21.3	23.4	21.2	21.5	29.0	31.8	34.6	33.7	29.4	23.4	18.0	13.7	12.5	12.7	18.8	31.0	32.2	34.7	32.1	30.2	23.8	25.2	25.3	20.9	Diurnal Maximum	

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Patricia McInnes - December 2023**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	649	91.80	91.80
21 - 40	58	8.20	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Patricia McInnes - December 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	1	3	1	4	20	84	84	70	95	111	68	43	21	14	17	649
21 - 40	1	1	0	1	2	2	12	20	8	2	0	0	1	2	4	2	58
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	14	2	3	2	6	22	96	104	78	97	111	68	44	23	18	19	707

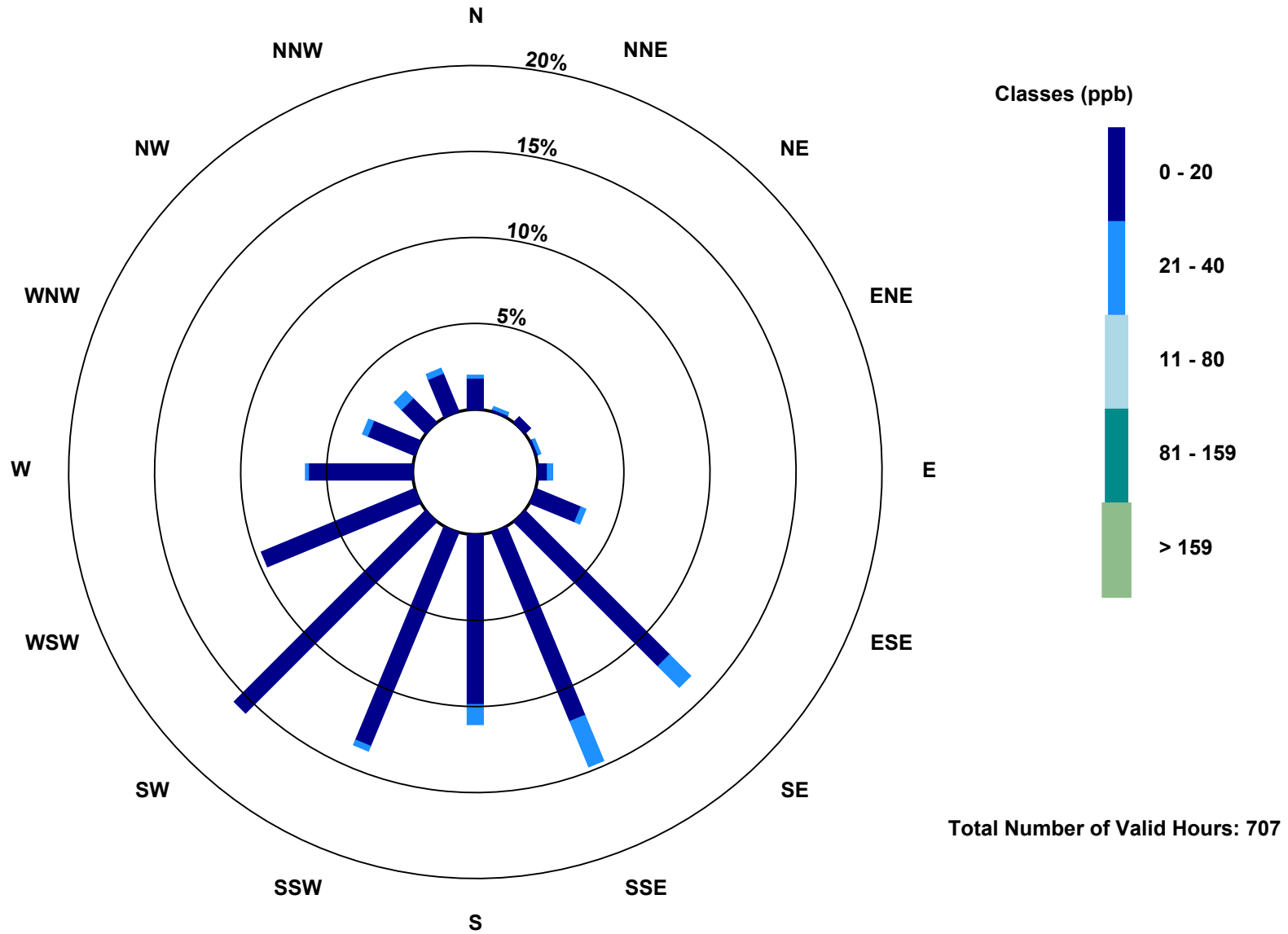
Total Number of Valid Hours: 707

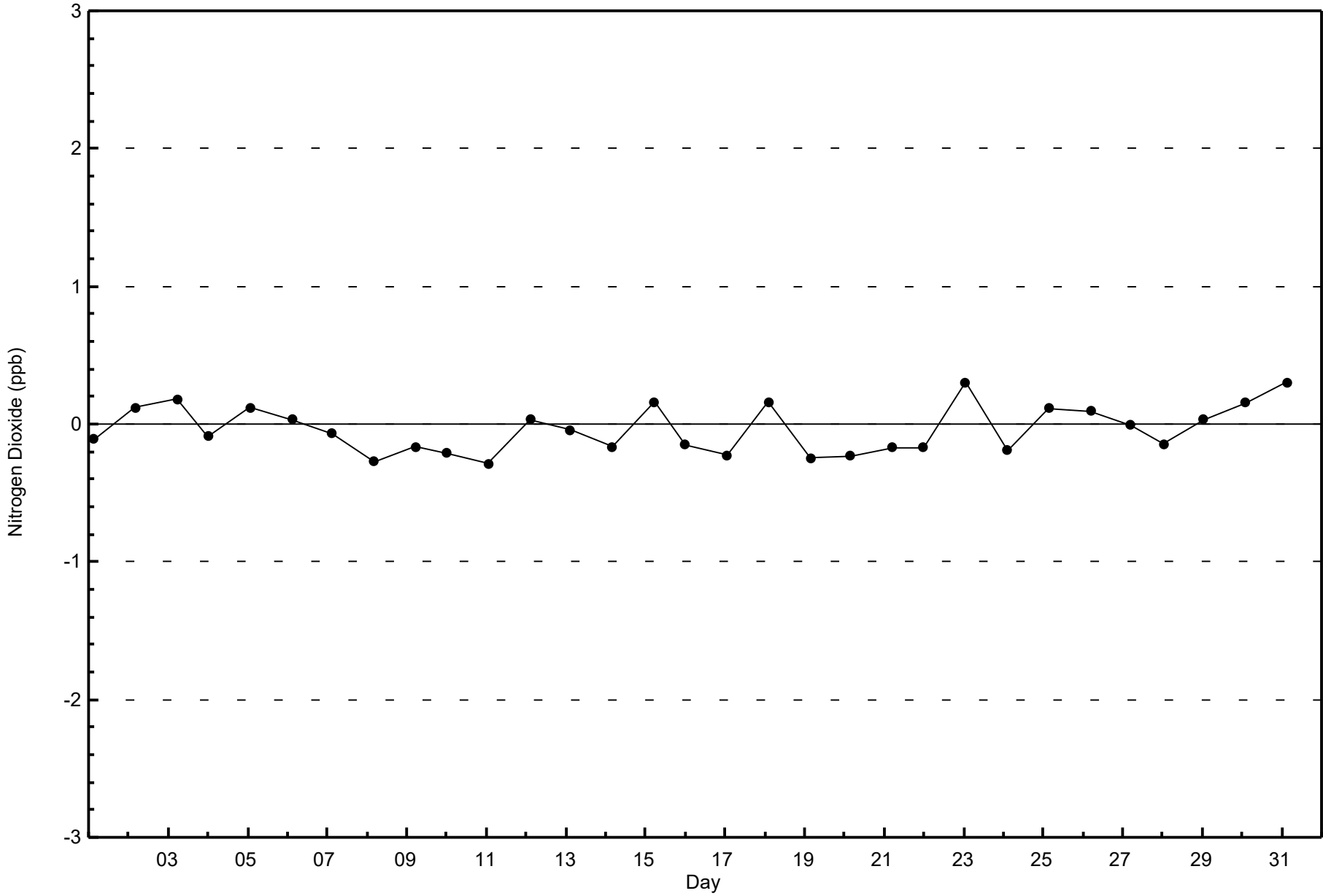
Total Number of Hours: 744

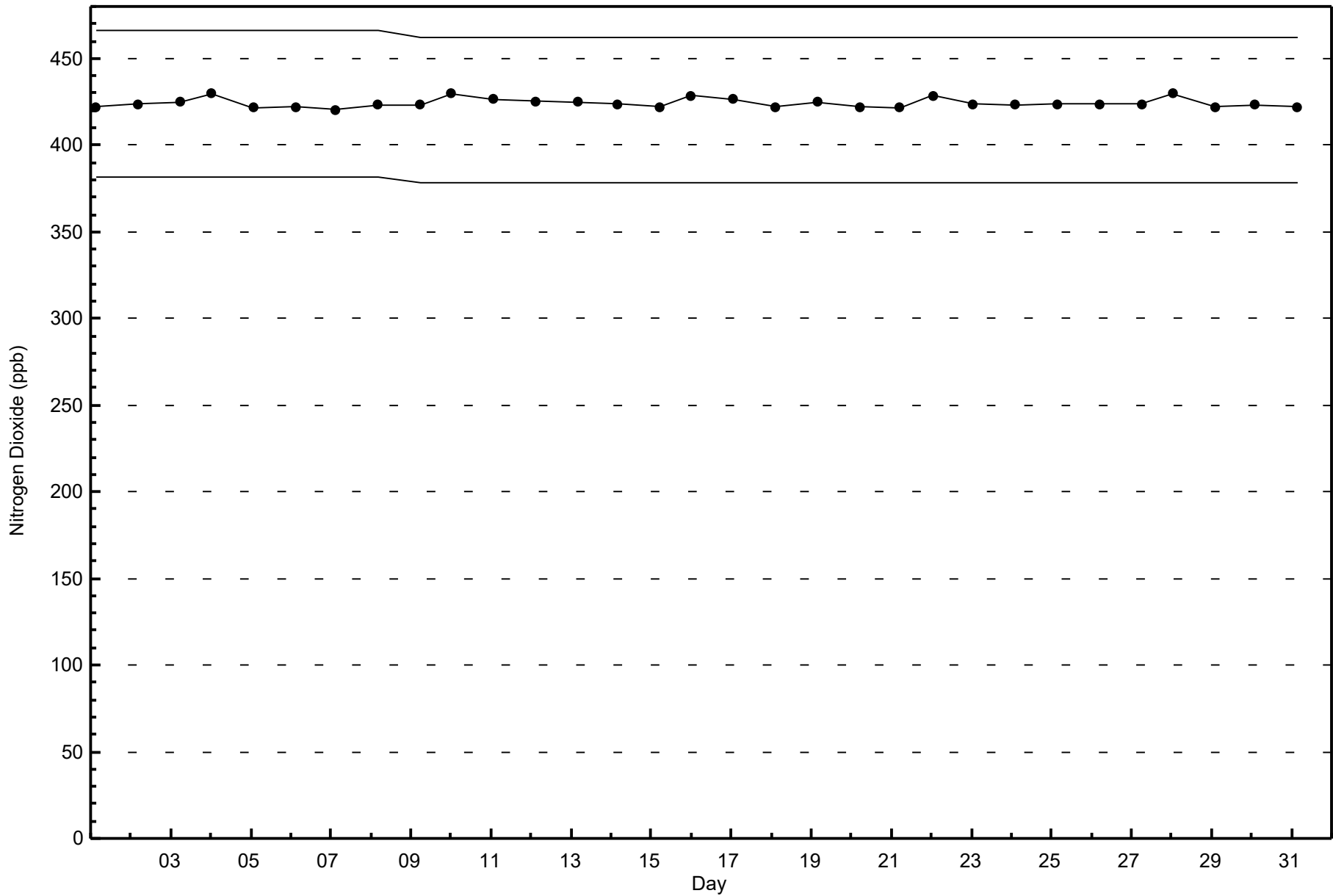


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Nitrogen Dioxide (NO₂) - ppb
Patricia McInnes









Wood Buffalo Environmental Association
Summary of Hour Averages

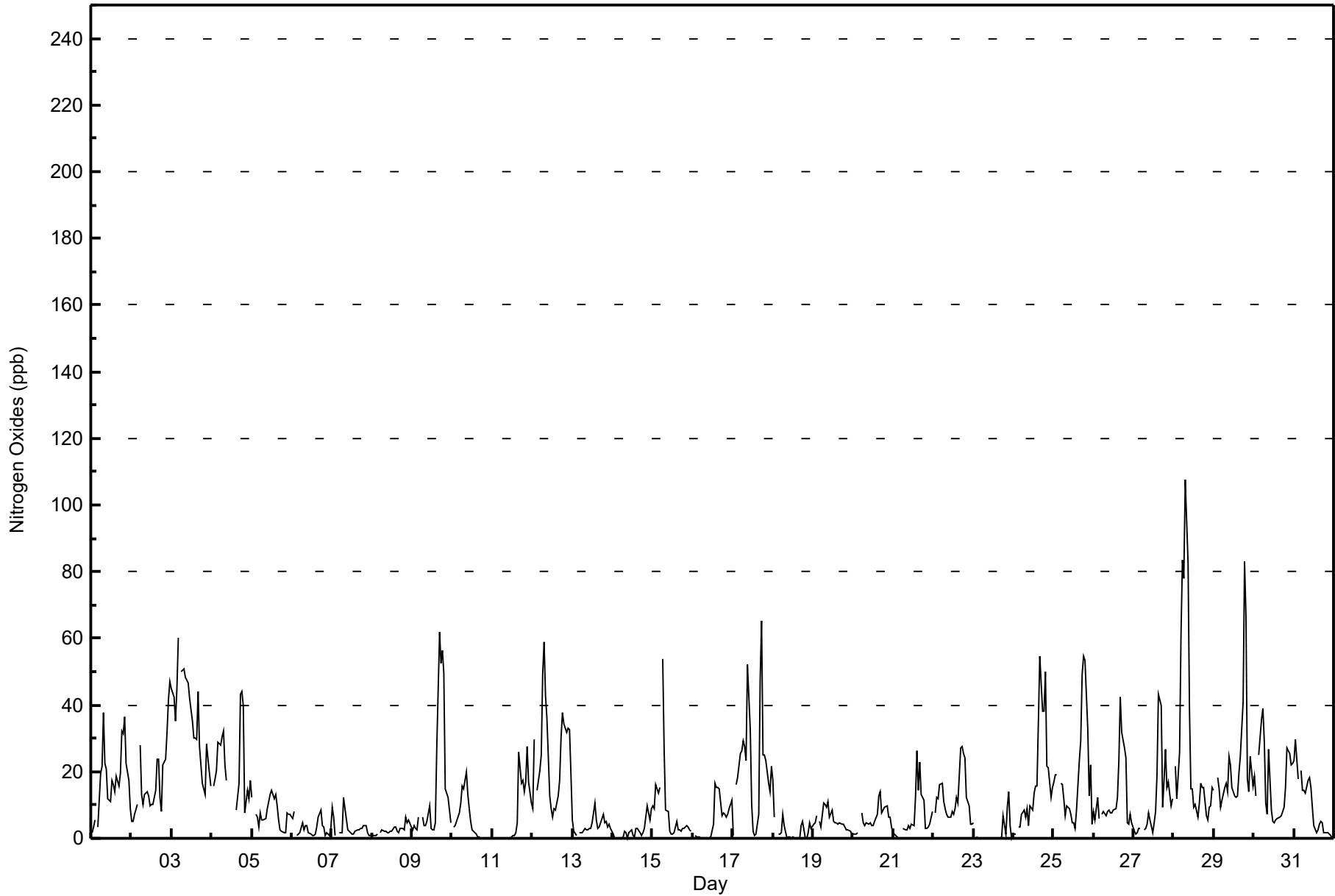
Nitrogen Oxides (NO_x) - ppb
Patricia McInnes - December 2023

Maximum Value: 107.6 ppb on Dec 28 08:00																								Maximum Daily Average: 35.7 ppb on Dec 3																								Hours in Service: 744	
Minimum Value: 0.0 ppb on Dec 10 21:00																								Minimum Daily Average: 1.8 ppb on Dec 23																								Hours of Data: 707	
Maximum Diurnal Average: 18.7 ppb at hour 17																								Minimum Diurnal Average: 6.3 ppb at hour 13																								Hours of Missing Data: 37	
Monthly Average: 12.09 ppb																								Percentiles: P ₁ = 0.0 P ₁₀ = 0.8 Q ₁ = 2.5 Median = 7.3 Q ₃ = 15.9 P ₉₀ = 29.7 P ₉₉ = 62.0																								Hours of Calibration: 36	
																																																Percent Operational Time: 99.9	
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Dec	1.6	3.2	5.4	Z	3.4	19.4	21.6	37.7	22.5	20.9	11.9	10.9	17.3	16.1	13.9	18.8	15.7	19.5	32.0	31.5	36.3	22.7	17.5	8.7	17.8	37.7																							
2-Dec	5.3	5.1	7.0	10.1	Z	28.1	13.0	10.0	13.3	13.9	12.6	9.6	10.2	10.0	14.3	23.9	23.7	12.1	8.1	22.0	23.9	31.8	41.4	46.8	17.2	46.8																							
3-Dec	44.8	42.4	35.2	44.9	60.4	Z	50.0	50.8	48.3	47.6	46.7	42.2	35.0	30.0	30.1	29.9	44.2	27.7	16.3	14.8	13.2	28.6	23.8	15.5	35.7	60.4																							
4-Dec	Z	15.7	17.8	20.5	28.8	27.9	30.5	32.0	22.2	17.5	C	C	C	C	8.6	16.4	43.2	44.1	39.7	7.4	14.3	11.9	17.3	23.1	44.1																								
5-Dec	12.3	Z	7.1	6.5	3.5	7.6	5.5	5.7	6.1	8.9	10.9	13.1	14.4	11.8	13.3	9.9	5.7	2.3	2.3	1.7	1.6	7.5	7.1	7.2	7.5	14.4																							
6-Dec	6.1	7.9	Z	1.0	1.1	1.7	4.7	2.5	4.0	3.8	1.9	1.2	0.8	0.9	1.2	3.5	6.5	8.5	3.6	3.6	0.8	1.7	1.0	2.8	3.1	8.5																							
7-Dec	9.2	6.2	1.0	Z	1.9	1.7	1.6	12.2	8.8	2.6	2.3	1.8	1.2	1.4	2.2	2.5	2.6	2.8	3.0	3.8	3.7	1.9	0.9	0.9	3.3	12.2																							
8-Dec	1.2	1.0	1.0	1.2	Z	1.8	2.6	2.2	2.3	1.6	1.6	1.9	2.0	3.5	3.2	2.1	1.7	2.9	2.8	2.7	6.2	4.6	5.7	3.2	2.6	6.2																							
9-Dec	2.4	3.9	2.8	2.4	6.4	Z	6.5	4.0	3.7	4.9	9.6	2.8	2.5	2.6	4.7	27.0	62.0	52.7	56.3	49.4	14.9	12.2	8.6	4.8	15.1	62.0																							
10-Dec	Z	3.5	3.6	6.5	7.5	10.8	15.8	14.8	19.7	13.0	9.1	5.0	2.6	2.2	1.3	0.5	0.3	0.2	0.2	0.1	0.0	0.0	0.0	0.0	5.1	19.7																							
11-Dec	0.0	Z	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.7	0.8	1.7	4.5	25.7	16.7	17.4	14.0	16.8	27.7	16.8	10.8	6.7	27.7																							
12-Dec	9.0	29.5	Z	14.5	20.5	25.1	49.0	58.9	42.7	35.9	12.5	8.9	6.6	8.8	8.6	12.5	17.3	30.2	37.6	34.1	31.9	33.2	32.6	19.4	25.2	58.9																							
13-Dec	5.6	2.0	1.0	Z	1.8	1.6	1.8	2.8	2.7	2.7	2.8	3.1	4.8	10.6	5.6	2.9	3.6	4.5	7.3	4.6	5.0	3.4	4.1	2.8	3.8	10.6																							
14-Dec	1.3	0.0	0.1	0.0	Z	0.0	0.3	2.1	1.8	0.2	1.6	2.5	1.0	0.2	2.9	3.0	1.8	1.0	1.6	3.2	6.5	9.6	5.7	8.9	2.4	9.6																							
15-Dec	9.7	9.0	16.2	13.7	15.2	Z	53.9	26.8	8.3	8.1	1.9	1.4	1.3	1.6	5.1	2.5	2.4	2.2	3.0	3.1	3.8	3.4	2.7	2.1	8.6	53.9																							
16-Dec	Z	0.9	0.5	0.5	0.6	0.1	0.0	0.0	0.0	0.0	0.0	0.2	4.1	16.5	15.4	15.4	14.9	6.7	7.8	7.3	6.2	7.2	9.0	11.3	5.4	16.5																							
17-Dec	1.0	Z	16.0	18.2	25.2	26.2	29.4	27.4	23.1	52.2	32.7	10.3	2.1	0.9	1.4	7.3	47.5	65.2	24.9	25.0	23.1	16.4	13.9	21.7	22.2	65.2																							
18-Dec	17.4	6.1	Z	1.4	1.1	1.6	7.3	3.8	0.0	0.2	0.4	0.1	0.2	0.1	M	0.0	0.0	3.8	5.1	0.0	0.0	1.8	4.5	3.0	2.6	17.4																							
19-Dec	4.1	4.5	6.6	Z	4.9	3.5	10.6	10.2	9.2	10.8	6.5	8.3	5.0	4.5	4.8	4.2	4.6	4.3	4.3	3.4	2.4	2.5	1.9	1.3	5.3	10.8																							
20-Dec	1.3	1.2	1.2	1.6	Z	7.6	4.5	3.8	4.7	4.3	4.7	3.6	4.0	5.0	7.3	12.7	13.9	7.6	8.5	9.1	9.7	6.3	6.2	3.2	5.7	13.9																							
21-Dec	1.9	1.0	0.6	0.2	0.1	Z	3.2	2.4	2.4	4.0	3.1	4.2	3.7	12.1	26.2	14.4	22.9	13.2	11.3	3.1	3.1	3.6	4.4	7.9	6.5	26.2																							
22-Dec	Z	7.6	12.2	11.8	16.1	16.6	11.1	9.1	7.4	6.3	6.5	7.9	7.1	8.8	12.3	10.5	27.2	27.4	25.6	24.3	12.3	9.9	4.4	4.3	12.5	27.4																							
23-Dec	4.5	Z	0.2	0.0	0.0	0.0	0.2	0.2	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.2	6.8	1.3	9.5	14.1	3.8	0.0	1.8	14.1																							
24-Dec	1.2	1.2	Z	3.4	3.4	7.1	8.6	6.2	9.1	4.0	9.7	8.5	13.5	15.6	15.9	34.9	54.7	38.1	38.2	49.9	21.7	21.1	12.3	15.1	17.1	54.7																							
25-Dec	16.9	18.9	18.9	Z	16.6	16.0	11.9	6.6	9.7	8.9	7.1	4.6	4.7	3.0	8.3	23.4	29.2	49.1	54.7	53.6	32.5	12.6	22.2	4.3	18.9	54.7																							
26-Dec	8.2	5.6	12.1	6.1	Z	7.3	8.2	6.6	8.0	8.6	7.7	7.5	8.4	9.1	12.1	23.3	42.2	31.7	27.0	24.3	4.7	4.2	7.2	4.6	12.4	42.2																							
27-Dec	2.1	1.5	1.9	2.8	2.8	Z	2.5	2.8	4.1	7.8	5.7	1.5	4.8	8.0	19.3	43.3	39.9	9.5	17.5	26.8	15.5	17.1	9.5	11.8	11.2	43.3																							
28-Dec	Z	21.5	12.0	26.0	60.9	83.5	78.0	107.6	82.5	38.5	14.9	14.7	9.3	10.1	6.4	10.5	16.6	15.2	15.1	6.9	5.5	9.3	9.8	15.4	29.1	107.6																							
29-Dec	14.4	Z	18.1	14.7	9.3	11.4	15.1	16.5	14.2	24.7	22.2	15.3	12.5	12.4	12.6	19.5	24.6	41.1	83.2	66.4	18.0	13.8	24.7	15.8	22.6	83.2																							
30-Dec	18.7	12.6	Z	24.9	35.6	39.1	28.9	10.5	7.2	26.9	8.4	5.0	4.7	5.6	5.8	6.2	6.7	7.8	9.4	15.3	27.3	25.3	22.2	22.4	16.4	39.1																							
31-Dec	23.5	29.6	17.9	Z	20.4	14.4	14.3	13.5	17.4	18.1	15.3	9.5	3.8	1.6	2.5	4.4	5.0	4.7	1.8	1.9	1.9	1.5	0.8	0.1	9.7	29.6																							
																								8.6	9.3	8.3	9.3	13.4	13.9	15.8	15.8	13.1	12.8	9.0	6.9	6.3	7.1	8.9	12.3	18.7	17.8	18.6	17.6	11.8	11.9	10.9	9.5	Diurnal Average	
																								44.8	42.4	35.2	44.9	60.9	83.5	78.0	107.6	82.5	52.2	46.7	42.2	35.0	30.0	30.1	43.3	62.0	65.2	83.2	66.4	36.3	33.2	41.4	46.8	Diurnal Maximum	
Z - zerospan																								C - Calibration				M - Maintenance																					



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Patricia McInnes - December 2023





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Patricia McInnes - December 2023**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	576	81.47	81.47
21 - 40	90	12.73	94.20
41 - 80	37	5.23	99.43
81 - 159	4	0.57	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Patricia McInnes - December 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	11	1	2	1	4	16	72	70	48	84	109	68	43	20	11	16	576
21 - 40	3	1	0	0	1	2	17	22	24	13	2	0	0	1	3	1	90
11 - 80	0	0	1	1	1	4	6	12	6	0	0	0	1	1	3	1	37
81 - 159	0	0	0	0	0	0	1	0	0	0	0	0	0	1	1	1	4
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	14	2	3	2	6	22	96	104	78	97	111	68	44	23	18	19	707

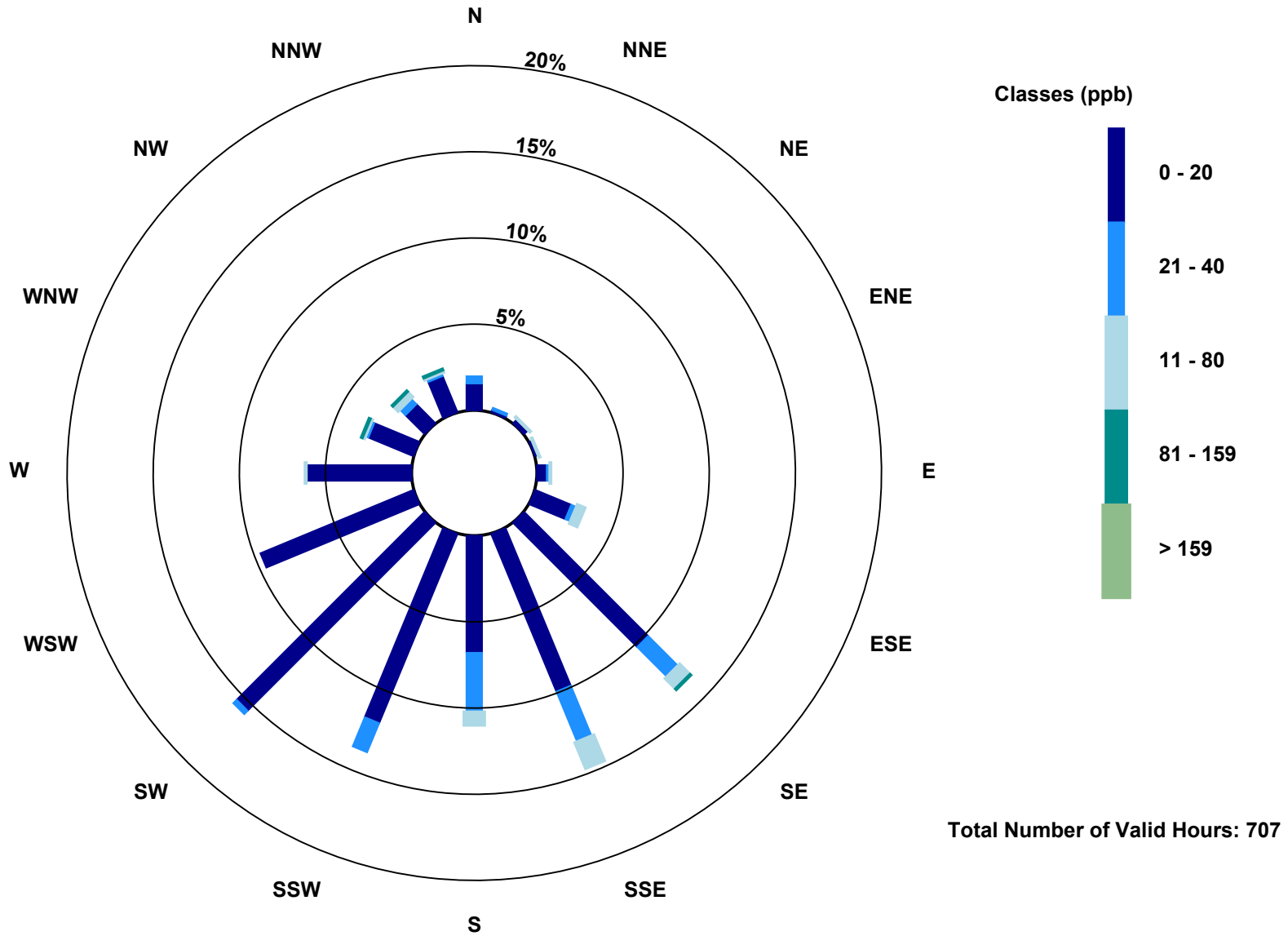
Total Number of Valid Hours: 707

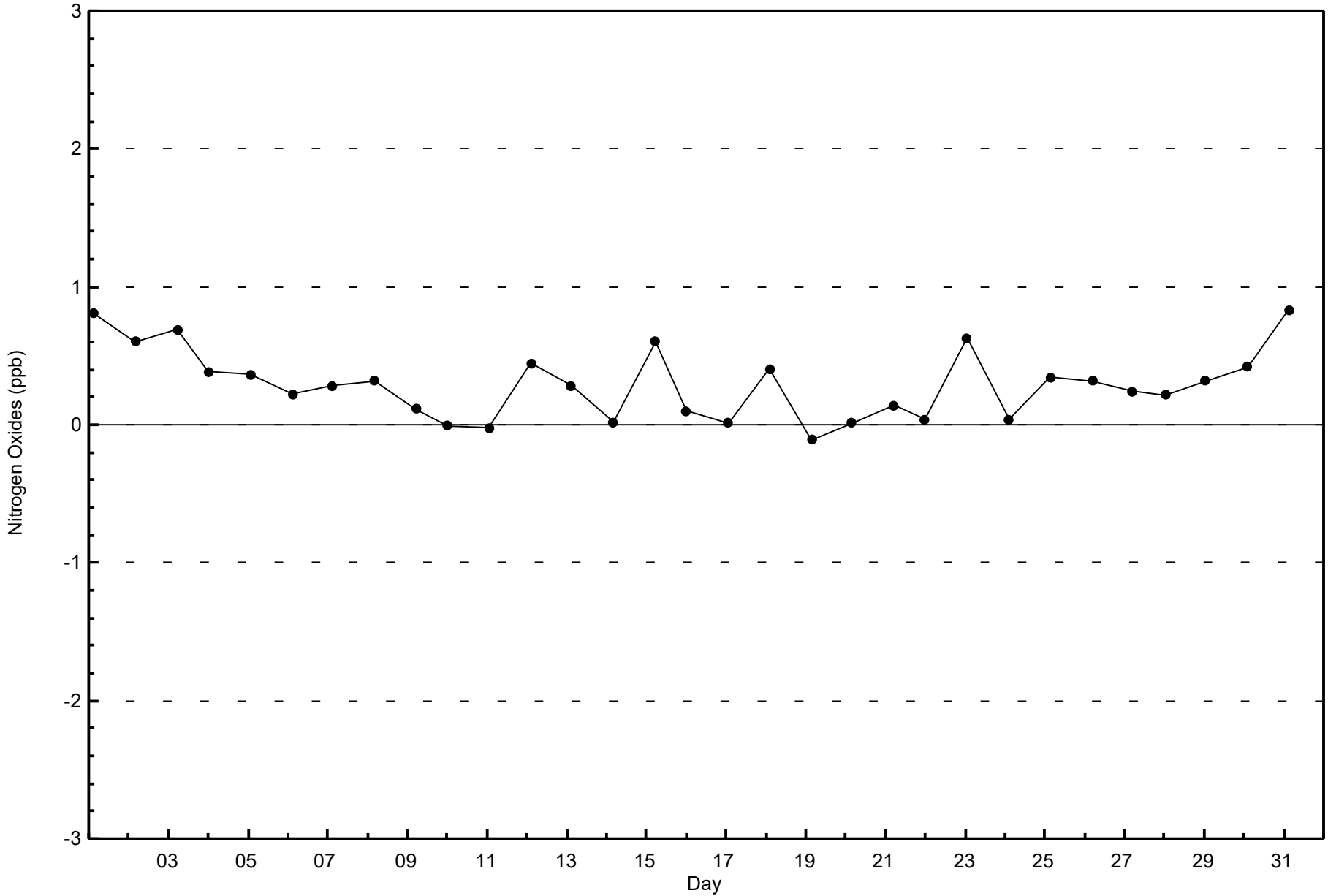
Total Number of Hours: 744

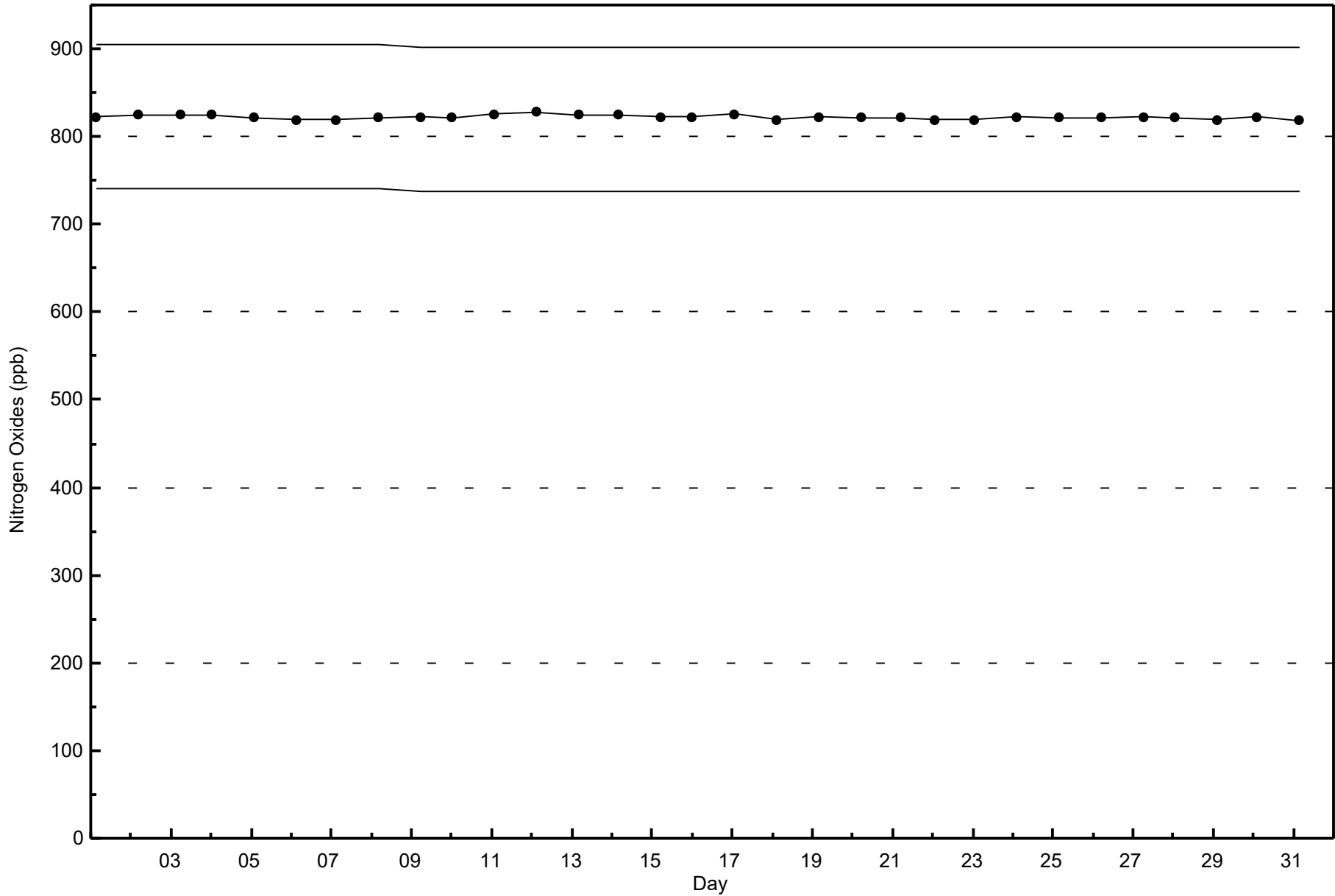


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Nitrogen Oxides (NO_x) - ppb
Patricia McInnes









Wood Buffalo Environmental Association

Summary of Hour Averages

Ammonia (NH₃) - ppb

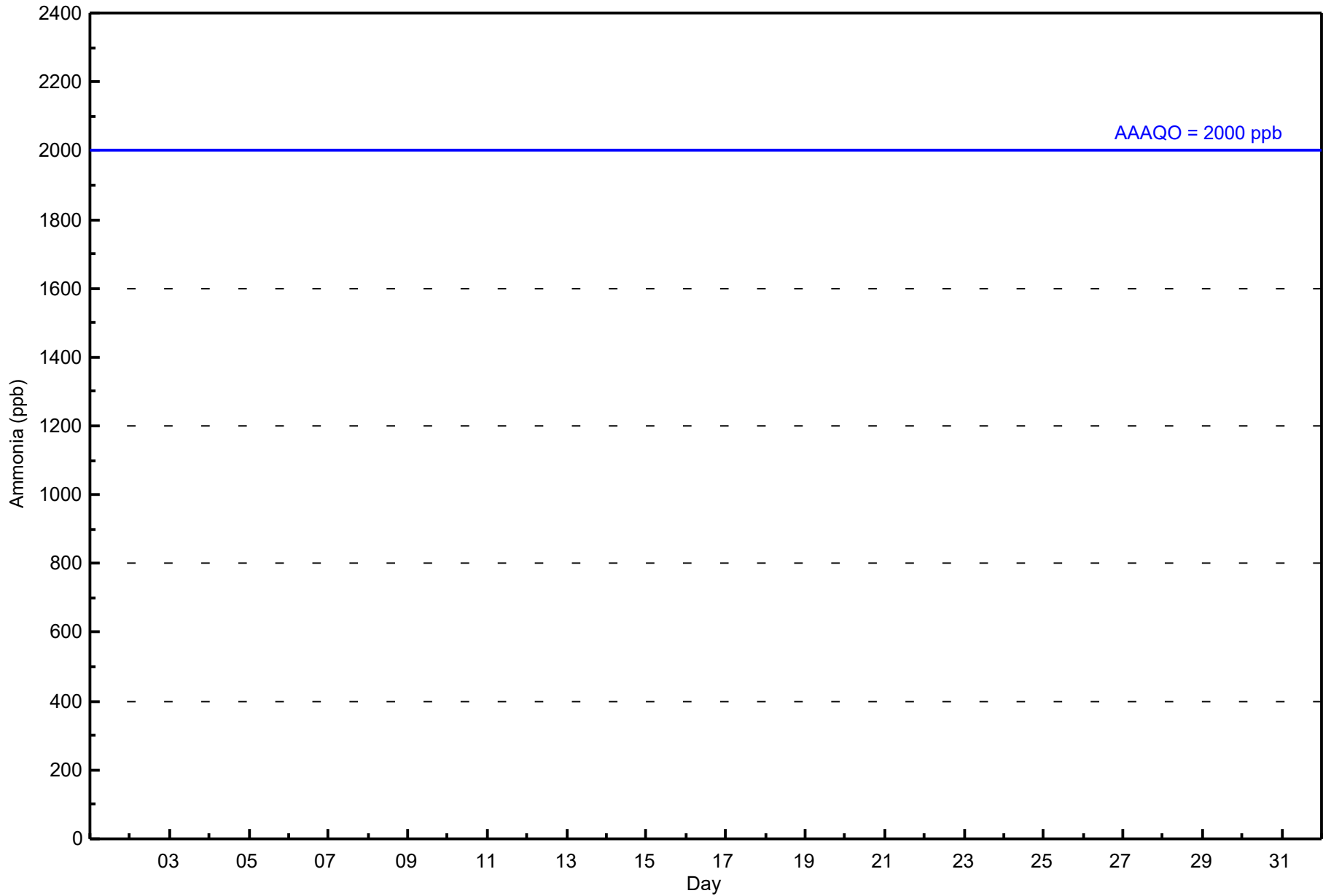
Patricia McInnes - December 2023

Number of Exceedences (AAAQO): 1-hr: 0		Hours in Service: 744																									
Maximum Value: 0.0 ppb on Dec 1 01:00		Maximum Daily Average: 0.0 ppb on Dec 1																									
Minimum Value: 0.0 ppb on Dec 1 01:00		Hours of Data: 670																									
Maximum Diurnal Average: 0.0 ppb at hour 1		Hours of Missing Data: 74																									
Monthly Average: 0.00 ppb		Hours of Calibration: 40																									
Minimum Daily Average: 0.0 ppb on Dec 1		Percent Operational Time: 95.4																									
Minimum Diurnal Average: 0.0 ppb at hour 1		Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.0 Median = 0.0 Q ₃ = 0.0 P ₉₀ = 0.0 P ₉₉ = 0.0																									
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Dec	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-Dec	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-Dec	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-Dec	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-Dec	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-Dec	0.0	Z	RE	0.0	0.0	0.0	0.0	0.0	0.0	C	C	C	C	C	C	C	C	C	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	--
7-Dec	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-Dec	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-Dec	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-Dec	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-Dec	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-Dec	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-Dec	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-Dec	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-Dec	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-Dec	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-Dec	Z	RE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	UO	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18-Dec	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	M	0.0	0.0	0.0	UO	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19-Dec	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-Dec	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-Dec	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-Dec	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-Dec	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-Dec	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-Dec	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-Dec	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-Dec	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-Dec	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-Dec	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-Dec	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
31-Dec	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																								Diurnal Average			
0.0																								Diurnal Maximum			
Z - zerospan C - Calibration M - Maintenance UO - Unstable Operation RE - Recovery																											
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 2000 ppb																											



Wood Buffalo Environmental Association
Hourly Averages

Ammonia (NH₃) - ppb
Patricia McInnes - December 2023





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Ammonia (NH₃) - ppb
Patricia McInnes - December 2023

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 5	670	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: 670

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Ammonia (NH₃) - ppb
Patricia McInnes - December 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	14	2	3	2	5	21	92	98	79	94	101	64	40	21	17	17	670
6 - 10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 - 15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16 - 20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21 - 25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	14	2	3	2	5	21	92	98	79	94	101	64	40	21	17	17	670

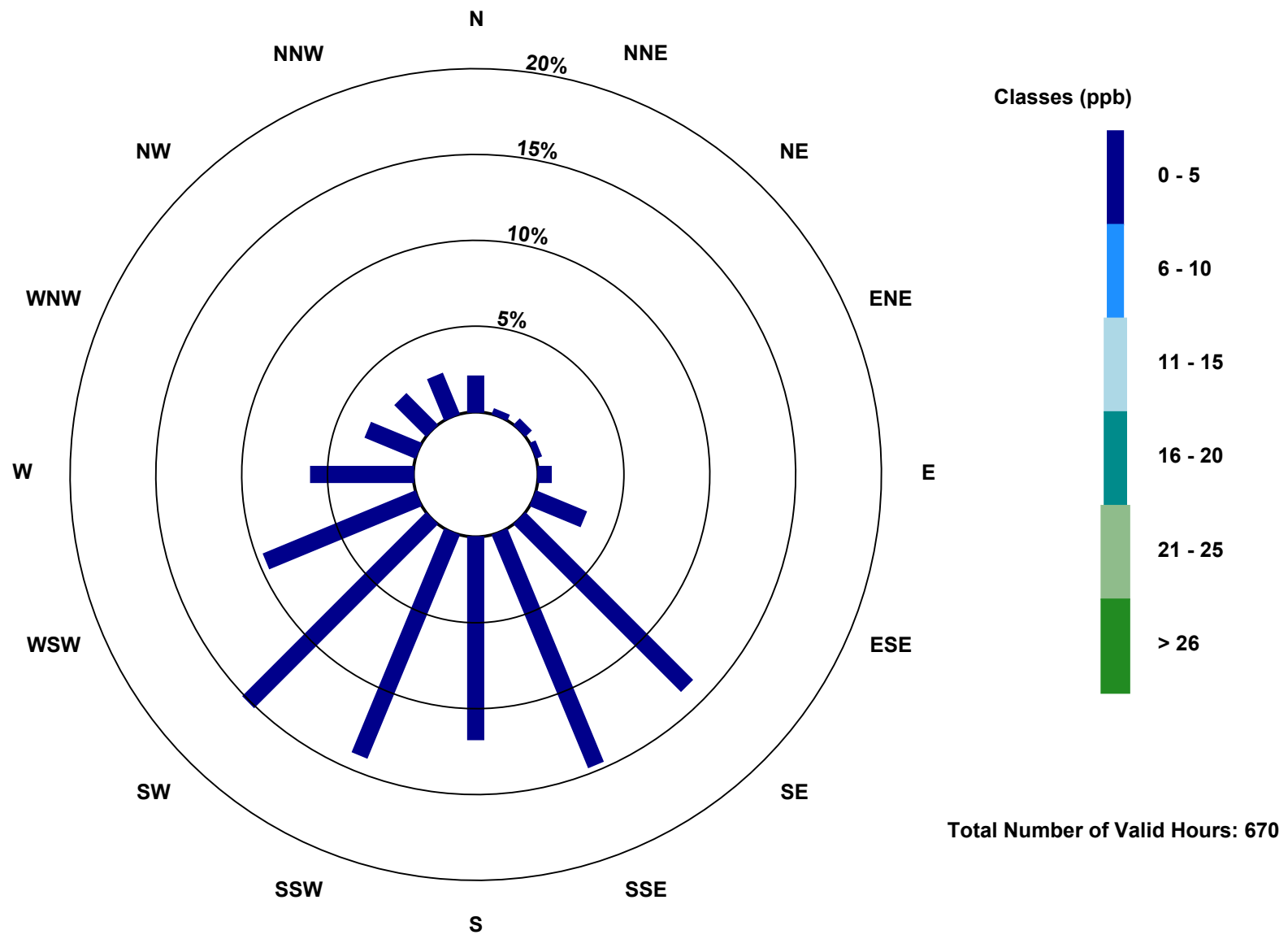
Total Number of Valid Hours: 670

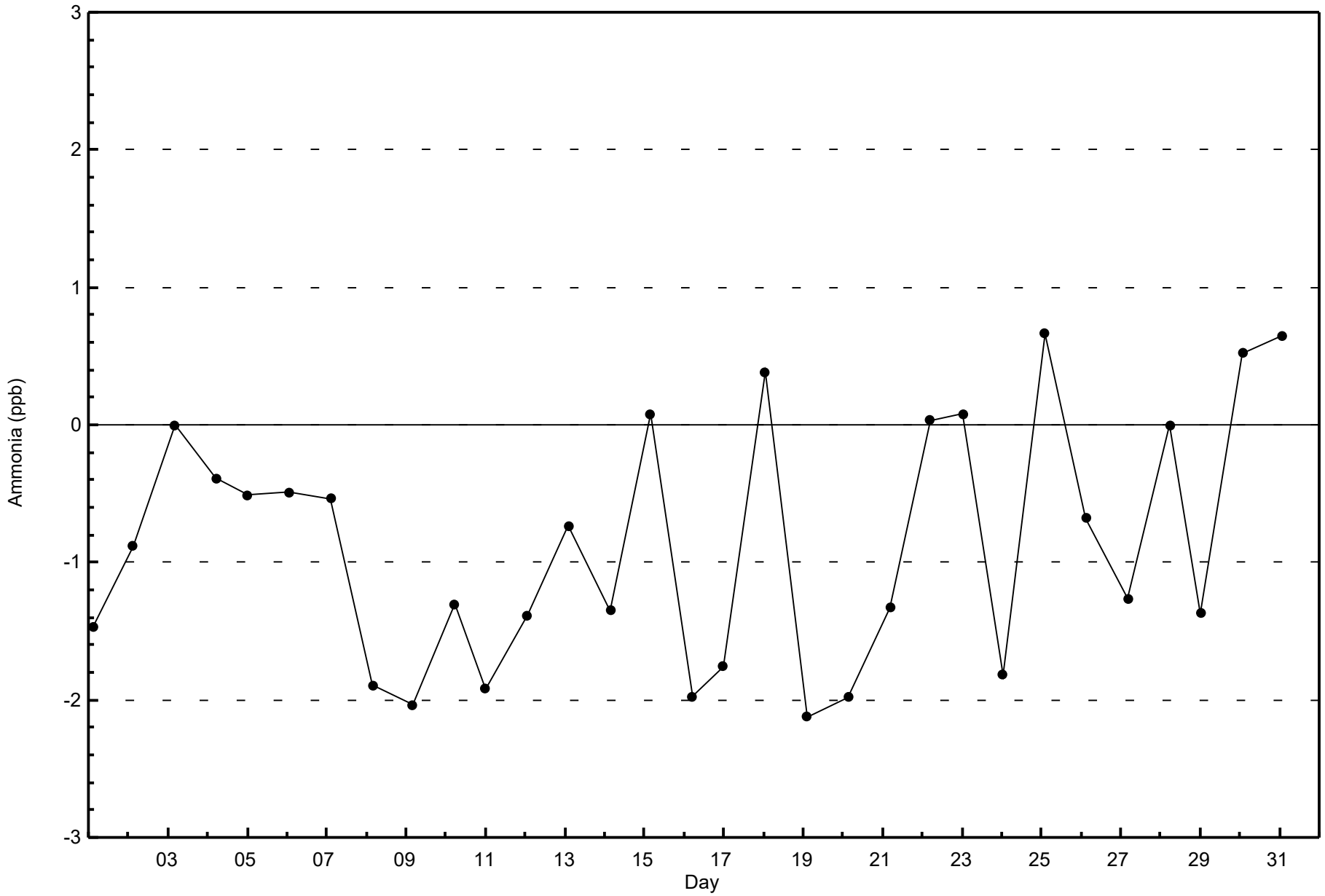
Total Number of Hours: 744

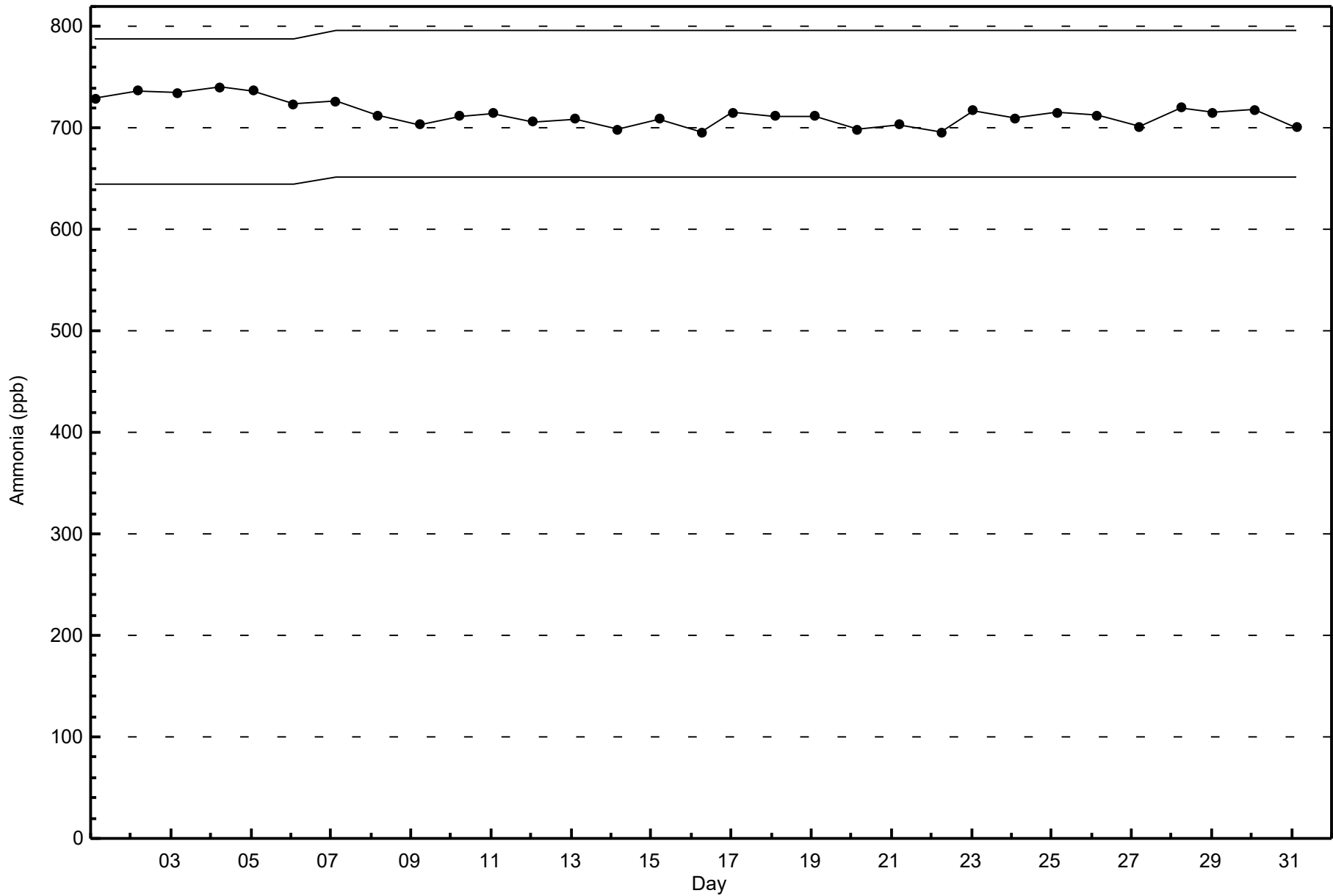


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Ammonia (NH₃) - ppb
Patricia McInnes









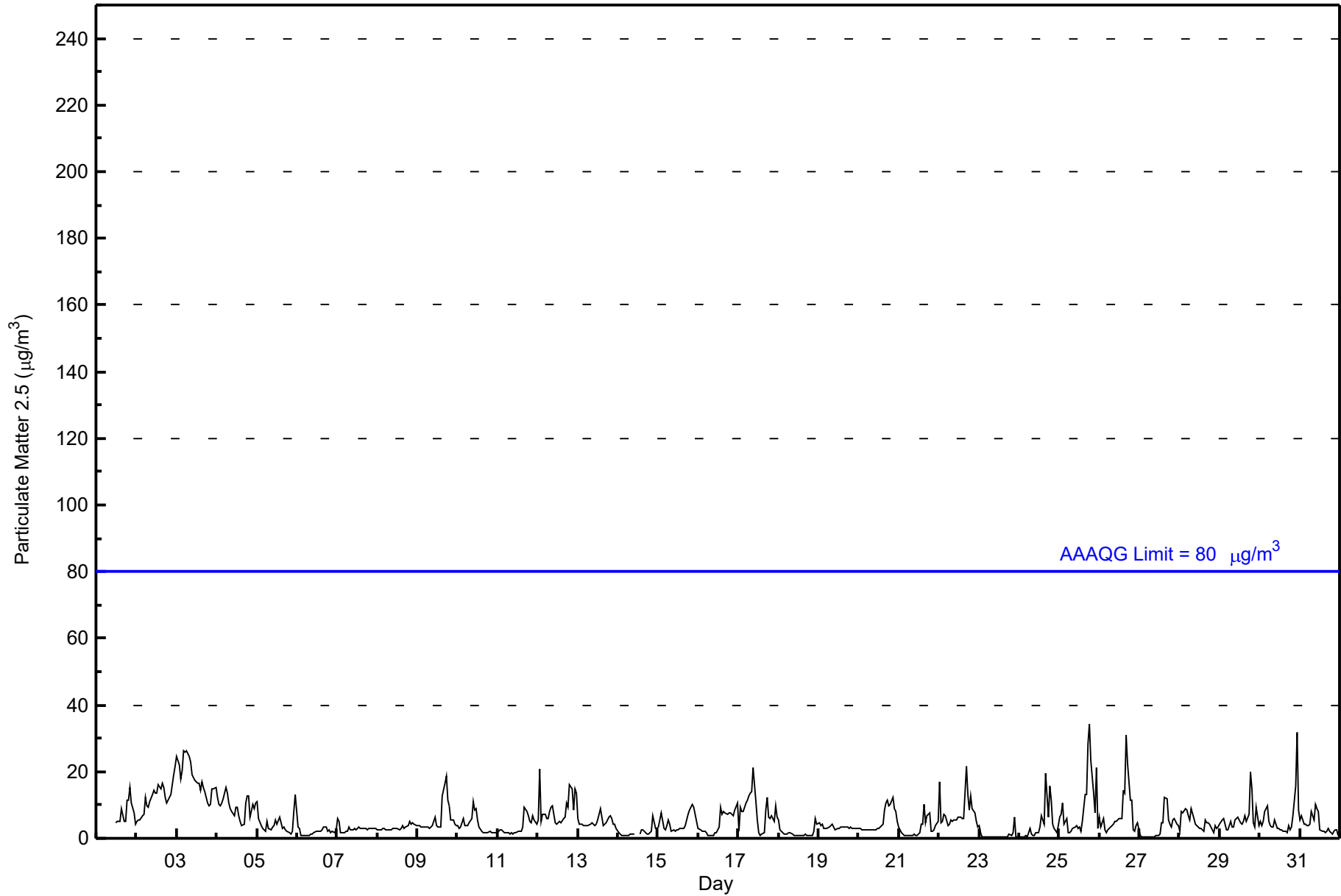
Wood Buffalo Environmental Association

Summary of Hour Averages

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

Patricia McInnes - December 2023

Number of Exceedences (AAAQO):		1-hr: 0	24-hr: 0	Hours in Service:																	744																												
Maximum Value: 34.3 µg/m ³ on Dec 25 19:00		Maximum Daily Average: 18.1 µg/m ³ on Dec 3																	Hours of Data:	731																													
Minimum Value: 0.2 µg/m ³ on Dec 23 10:00		Minimum Daily Average: 0.9 µg/m ³ on Dec 23																	Hours of Missing Data:	13																													
Maximum Diurnal Average: 7.8 µg/m ³ at hour 17		Minimum Diurnal Average: 4.2 µg/m ³ at hour 13																	Hours of Calibration:	1																													
Monthly Average: 5.53 µg/m ³		Percentiles: P ₁ = 0.3 P ₁₀ = 1.0 Q ₁ = 2.3 Median = 3.9 Q ₃ = 6.9 P ₉₀ = 12.4 P ₉₉ = 24.7																	Percent Operational Time:	98.4																													
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Dec	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	C	4.8	5.2	5.3	5.1	9.0	5.0	5.2	11.2	11.4	15.3	10.6	7.6	4.3	--	15.3																							
2-Dec	5.2	5.7	5.6	6.7	7.3	12.4	9.7	9.5	10.8	13.1	14.5	13.4	13.6	16.1	14.7	16.4	15.4	12.3	10.5	11.3	13.0	16.3	19.1	21.6	12.2	21.6																							
3-Dec	24.7	21.9	17.9	20.5	26.3	25.9	26.3	24.6	22.7	19.2	18.0	17.2	16.6	16.6	14.5	16.8	15.2	14.0	10.4	9.7	10.0	15.0	14.7	15.1	18.1	26.3																							
4-Dec	12.4	10.4	9.9	10.6	12.0	15.2	13.5	10.5	8.9	8.1	6.7	9.1	9.3	6.6	5.1	3.9	4.3	10.6	12.9	12.9	6.4	10.0	9.1	10.4	9.5	15.2																							
5-Dec	11.0	6.1	3.8	3.1	2.4	2.2	5.0	3.1	2.6	3.2	3.9	5.3	4.3	6.2	4.8	3.1	3.5	2.5	2.0	1.5	1.2	2.1	8.1	13.2	4.3	13.2																							
6-Dec	3.3	3.0	1.0	0.9	0.9	0.8	1.0	1.0	1.2	1.3	1.7	2.0	2.1	2.0	2.0	2.4	3.2	3.4	2.3	2.6	1.9	1.9	1.7	2.4	1.9	3.4																							
7-Dec	6.0	5.3	1.8	1.8	1.9	1.9	2.0	3.5	2.6	2.4	2.8	2.6	3.0	3.3	3.1	3.1	3.1	2.9	2.7	2.9	2.9	2.9	2.9	2.8	2.9	6.0																							
8-Dec	2.6	2.7	2.7	2.8	2.8	2.7	2.6	2.6	2.7	2.9	3.0	3.0	2.9	2.6	2.8	4.0	3.1	3.4	3.6	4.9	4.3	4.7	4.3	3.9	3.2	4.9																							
9-Dec	3.7	3.7	3.5	3.3	3.3	3.2	3.2	3.1	3.3	4.0	6.4	3.8	3.5	3.2	3.3	12.5	16.6	18.6	11.3	9.6	5.3	5.4	4.2	4.0	5.9	18.6																							
10-Dec	3.6	3.1	3.5	5.9	3.7	3.6	4.0	4.6	6.0	10.8	8.5	9.0	5.5	3.4	2.2	1.6	1.7	1.6	1.6	2.2	1.7	1.6	1.5	1.5	3.8	10.8																							
11-Dec	1.8	2.4	2.5	2.0	1.8	1.5	1.5	1.4	1.5	1.4	1.5	1.6	2.0	1.9	2.1	3.3	9.3	8.0	6.7	5.1	4.8	6.7	5.7	4.3	3.4	9.3																							
12-Dec	5.6	20.6	5.1	7.2	7.4	5.9	5.7	8.1	9.4	9.8	4.8	4.4	4.6	5.1	4.7	5.8	6.4	10.5	9.5	15.9	14.8	8.5	14.8	13.7	8.7	20.6																							
13-Dec	6.1	4.1	4.2	4.0	4.0	3.9	3.8	4.3	4.7	4.3	3.8	4.4	5.4	8.9	6.3	4.0	4.2	4.5	6.2	6.9	6.1	4.2	4.3	3.0	4.8	8.9																							
14-Dec	1.9	1.1	1.0	0.9	0.9	0.9	1.0	1.3	1.3	1.2	1.3	M	M	1.1	2.6	2.6	1.8	1.5	1.3	1.7	2.2	6.8	2.8	2.8	1.8	6.8																							
15-Dec	3.5	5.3	7.5	2.9	2.4	3.7	5.6	4.3	2.2	2.4	2.1	2.4	2.6	2.9	3.0	2.8	3.7	5.5	7.4	8.5	10.0	9.3	7.1	5.0	4.7	10.0																							
16-Dec	3.0	2.4	2.0	1.9	2.0	1.7	1.0	0.7	0.7	0.9	1.7	1.5	3.4	9.5	7.4	8.2	7.5	7.3	7.5	7.8	7.1	6.6	8.5	10.5	4.6	10.5																							
17-Dec	1.9	9.2	8.2	8.0	10.8	11.4	12.9	13.6	13.8	21.3	10.9	5.6	1.6	0.8	1.1	1.9	8.4	12.2	6.2	5.9	6.7	5.3	9.7	6.3	8.1	21.3																							
18-Dec	5.4	2.6	1.5	1.4	1.3	1.4	1.6	1.5	1.1	1.0	0.9	0.7	0.7	0.6	0.7	0.8	1.1	0.8	0.8	0.7	0.7	2.2	6.0	4.1	1.7	6.0																							
19-Dec	4.8	3.6	4.1	3.2	2.8	3.1	3.4	3.9	4.2	3.3	2.7	2.9	2.9	3.3	3.4	3.5	3.3	3.3	3.1	3.2	2.9	3.1	3.0	2.8	3.3	4.8																							
20-Dec	2.9	2.8	2.7	2.7	2.7	2.7	2.7	2.6	2.6	2.6	2.7	2.9	2.9	3.3	4.1	8.4	10.6	11.6	9.9	10.3	12.4	9.1	7.9	4.9	5.3	12.4																							
21-Dec	3.5	1.9	1.2	1.0	0.8	0.8	0.7	0.7	0.7	1.5	1.0	0.8	1.7	4.2	4.3	10.2	4.7	6.9	7.6	2.0	2.3	2.8	3.6	5.3	2.9	10.2																							
22-Dec	17.1	4.6	5.0	7.3	7.0	4.0	4.2	5.6	5.0	5.3	5.5	6.3	6.3	6.1	6.1	6.0	21.6	13.2	8.5	12.5	8.8	7.7	5.3	3.3	7.6	21.6																							
23-Dec	3.9	1.6	0.3	0.4	0.3	0.3	0.3	0.3	0.3	0.2	0.3	0.3	0.4	0.4	0.5	0.5	0.4	1.3	0.8	1.5	6.2	0.6	0.4	0.9	0.9	6.2																							
24-Dec	0.5	0.4	0.5	0.6	0.8	0.6	2.9	1.1	0.7	0.8	1.7	1.6	3.5	6.6	5.6	4.3	19.3	6.2	15.6	11.4	4.4	2.8	1.9	3.6	4.1	19.3																							
25-Dec	6.5	7.1	10.8	4.2	6.1	1.8	1.7	1.9	3.0	3.2	4.0	2.8	3.2	2.0	4.9	13.2	13.2	28.6	34.3	23.4	13.7	7.8	21.4	3.0	9.2	34.3																							
26-Dec	6.2	3.4	5.9	2.4	1.8	2.4	2.9	3.7	4.4	4.9	5.0	5.3	5.8	6.0	14.2	13.5	31.1	22.3	11.4	11.5	2.5	2.3	4.0	4.7	7.4	31.1																							
27-Dec	1.0	0.6	0.5	0.3	0.5	0.4	0.4	0.3	0.4	0.6	1.0	0.8	1.2	4.8	4.9	12.1	11.8	5.5	4.4	3.3	5.4	5.8	4.4	3.9	3.1	12.1																							
28-Dec	2.1	8.1	7.5	8.8	8.4	6.9	5.7	8.9	5.9	4.2	3.7	3.5	2.8	3.0	1.9	5.6	4.6	4.7	4.1	2.7	1.9	3.9	3.0	3.3	4.8	8.9																							
29-Dec	4.4	5.6	6.0	4.0	2.6	2.7	4.9	3.5	3.3	5.4	5.9	6.2	4.6	4.2	5.0	6.9	5.0	7.4	20.0	15.0	4.5	3.5	9.5	3.7	6.0	20.0																							
30-Dec	5.3	4.0	5.2	8.2	9.8	5.2	3.8	3.3	3.2	5.5	3.0	2.8	2.6	2.6	2.1	2.1	1.9	3.8	2.5	3.3	7.0	15.8	31.8	8.3	6.0	31.8																							
31-Dec	5.7	6.9	4.3	4.4	3.8	3.9	4.2	8.1	5.5	10.2	8.9	7.9	2.5	2.2	2.0	1.8	2.3	3.2	2.2	1.4	1.9	2.4	2.4	0.9	4.1	10.2																							
																								5.5	5.3	4.5	4.4	4.6	4.4	4.6	4.7	4.5	5.2	4.6	4.5	4.2	4.7	4.7	6.1	7.8	7.8	7.7	7.2	5.9	6.2	7.4	5.7	Diurnal Average	
																								24.7	21.9	17.9	20.5	26.3	25.9	26.3	24.6	22.7	21.3	18.0	17.2	16.6	16.6	14.7	16.8	31.1	28.6	34.3	23.4	15.3	16.3	31.8	21.6	Diurnal Maximum	
C - Calibration																								M - Maintenance				UO - Unstable Operation																					
Alberta Ambient Air Quality Guideline/Objectives: 1-hr 80 µg/m ³ 24-hr 29 µg/m ³																																																	





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Patricia McInnes - December 2023

Concentration Ranges ($\mu\text{g}/\text{m}^3$)	Number of Hours	%	Cumulative %
0 - 5	480	65.66	65.66
6 - 15	213	29.14	94.80
16 - 25	31	4.24	99.04
26 - 80	7	0.96	100.00
> 81.0	0	0.00	100.00

Total Number of Valid Hours: 731

Total Number of Hours: 744



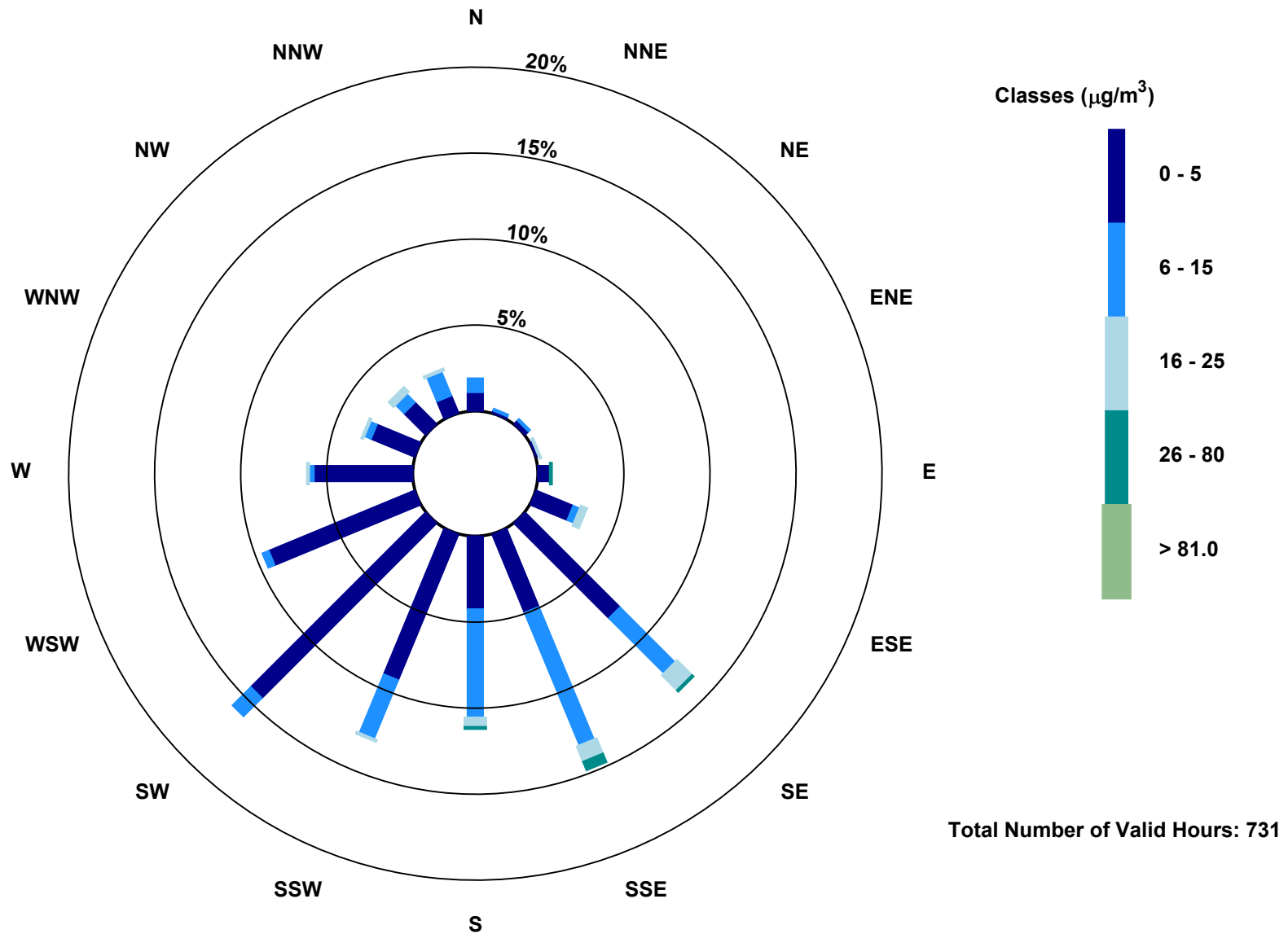
Wood Buffalo Environmental Association
Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - μg/m³
Patricia McInnes - December 2023

Concentration Ranges (μg/m ³)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	8	1	2	1	5	17	57	36	31	67	105	67	42	20	13	8	480
6 - 15	6	1	1	0	0	3	33	61	46	27	11	3	2	3	5	11	213
16 - 25	0	0	0	1	0	3	9	7	4	1	0	0	1	1	3	1	31
26 - 80	0	0	0	0	1	0	1	4	1	0	0	0	0	0	0	0	7
> 81.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	14	2	3	2	6	23	100	108	82	95	116	70	45	24	21	20	731

Total Number of Valid Hours: 731

Total Number of Hours: 744



Total Number of Valid Hours: 731



Wood Buffalo Environmental Association

Summary of Hour Averages

Ambient Temperature (AT) - C

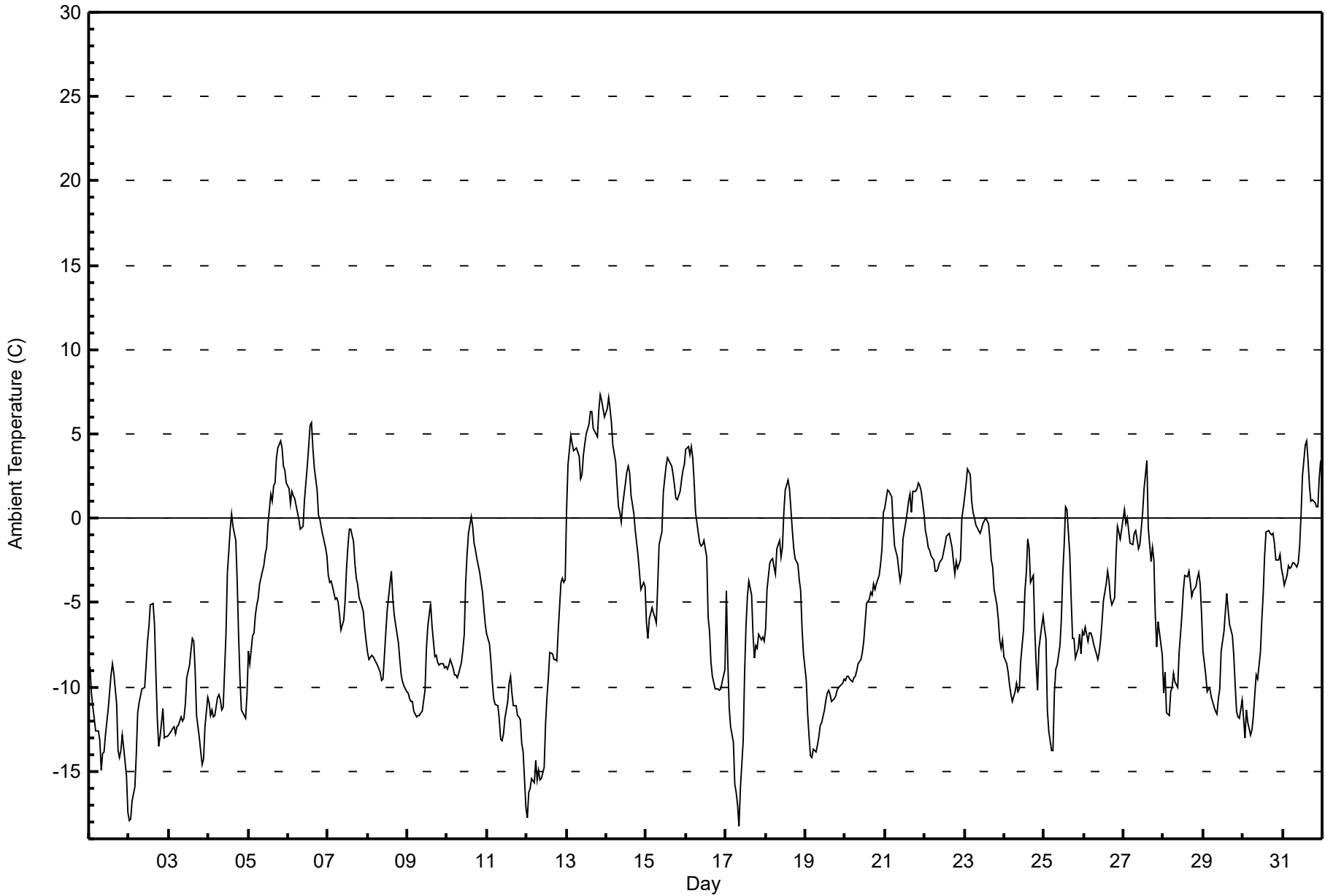
Patricia McInnes - December 2023

Maximum Value: 7.3 C on Dec 13 21:00																				Maximum Daily Average: 4.7 C on Dec 13					Hours in Service: 744				
Minimum Value: -18.2 C on Dec 17 09:00																				Minimum Daily Average: -12.4 C on Dec 1					Hours of Data: 744				
Maximum Diurnal Average: -1.8 C at hour 15																				Minimum Diurnal Average: -7.3 C at hour 9					Hours of Missing Data: 0				
Monthly Average: -5.39 C																				Percentiles: P ₁ = -16.6 P ₁₀ = -12.3 Q ₁ = -9.9 Median = -5.7 Q ₃ = -1.1 P ₉₀ = 2.0 P ₉₉ = 6.3					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-Dec	-8.8	-10.3	-11.2	-11.8	-12.6	-12.6	-13.2	-14.9	-13.9	-13.8	-12.8	-11.3	-10.3	-9.3	-8.6	-9.2	-11.0	-13.8	-14.2	-13.7	-12.9	-13.6	-15.3	-17.5	-12.4	-8.6			
2-Dec	-17.9	-17.8	-16.8	-16.0	-14.0	-11.5	-11.0	-10.5	-10.1	-10.0	-8.7	-7.3	-6.4	-5.1	-5.1	-6.3	-9.2	-11.8	-13.5	-13.0	-11.3	-13.0	-12.9	-13.0	-11.3	-5.1			
3-Dec	-12.9	-12.6	-12.5	-12.4	-12.7	-12.4	-12.3	-11.8	-12.0	-11.9	-11.0	-9.5	-8.7	-7.9	-7.2	-7.3	-9.1	-11.7	-13.0	-13.9	-14.6	-14.3	-12.3	-10.6	-11.4	-7.2			
4-Dec	-11.0	-11.7	-11.4	-11.8	-11.7	-10.6	-10.4	-10.7	-11.4	-11.2	-6.9	-3.2	-2.0	-0.6	0.2	-0.4	-1.3	-3.8	-7.0	-9.5	-11.3	-11.7	-11.8	-10.5	-8.0	0.2			
5-Dec	-7.8	-8.6	-6.9	-6.8	-5.7	-5.1	-4.7	-3.9	-3.1	-2.8	-2.1	-1.7	-0.3	1.4	1.0	1.9	2.1	3.6	4.2	4.6	4.2	3.1	2.8	2.1	-1.2	4.6			
6-Dec	1.8	0.9	1.6	1.3	1.2	0.8	0.0	-0.6	-0.6	-0.5	1.1	3.1	4.3	5.5	5.7	4.2	3.0	1.7	0.2	-0.1	-0.6	-1.0	-1.7	-2.2	1.2	5.7			
7-Dec	-3.3	-3.8	-3.7	-4.0	-4.8	-4.7	-5.0	-5.7	-6.6	-6.0	-4.9	-2.9	-1.7	-0.7	-0.6	-1.4	-2.7	-3.5	-3.9	-4.7	-5.2	-5.5	-6.5	-7.3	-4.1	-0.6			
8-Dec	-8.0	-8.3	-8.2	-8.2	-8.4	-8.5	-8.7	-9.1	-9.6	-9.5	-8.2	-6.8	-5.5	-3.9	-3.1	-4.7	-5.7	-6.3	-7.4	-8.4	-9.3	-9.7	-9.9	-10.3	-7.7	-3.1			
9-Dec	-10.3	-10.7	-10.8	-10.9	-11.4	-11.8	-11.7	-11.7	-11.6	-11.4	-10.2	-7.7	-6.4	-5.7	-5.1	-6.4	-8.2	-8.1	-8.5	-8.7	-8.6	-8.6	-8.8	-8.8	-9.3	-5.1			
10-Dec	-9.0	-8.7	-8.4	-8.9	-9.3	-9.3	-9.4	-9.2	-8.5	-7.8	-6.9	-3.8	-2.1	-0.9	0.1	-0.5	-1.5	-1.9	-2.4	-3.3	-3.8	-4.4	-5.4	-6.3	-5.5	0.1			
11-Dec	-6.9	-7.5	-8.4	-9.7	-10.7	-11.0	-11.1	-12.0	-13.1	-13.2	-12.8	-11.9	-10.9	-9.8	-9.4	-10.4	-11.1	-11.1	-11.7	-11.8	-11.9	-13.4	-13.9	-17.2	-11.3	-6.9			
12-Dec	-17.8	-16.2	-16.0	-15.4	-15.6	-14.3	-15.5	-14.9	-15.6	-15.5	-14.7	-12.2	-10.6	-9.4	-7.9	-8.1	-8.4	-8.4	-8.4	-6.7	-3.8	-3.5	-3.8	-3.6	-11.1	-3.5			
13-Dec	0.5	3.2	4.9	4.4	4.0	4.1	4.2	3.7	2.3	2.6	3.7	4.4	5.0	5.6	6.3	6.4	5.3	5.1	4.8	6.4	7.3	7.0	6.5	6.0	4.7	7.3			
14-Dec	6.5	7.2	6.5	5.6	4.4	3.4	2.0	0.7	0.3	-0.2	0.7	2.1	2.8	3.1	2.6	1.4	0.3	-0.7	-1.5	-2.2	-3.2	-4.2	-3.8	-4.0	1.2	7.2			
15-Dec	-6.2	-7.1	-5.9	-5.3	-5.6	-5.9	-6.2	-4.0	-1.6	-0.8	1.5	2.4	3.1	3.6	3.3	3.1	2.6	1.9	1.2	1.1	1.6	2.2	2.8	3.2	-0.6	3.6			
16-Dec	4.1	4.3	3.7	4.3	3.6	2.2	0.3	-0.9	-1.5	-1.7	-1.6	-1.3	-2.3	-5.9	-6.7	-8.5	-9.4	-10.1	-10.1	-10.1	-10.2	-10.1	-9.7	-8.9	-3.6	4.3			
17-Dec	-4.3	-8.5	-11.2	-12.3	-13.3	-15.7	-16.3	-17.0	-18.2	-16.1	-13.2	-9.2	-6.3	-4.6	-3.8	-4.6	-6.9	-8.3	-7.6	-7.7	-6.9	-7.2	-7.0	-7.3	-9.7	-3.8			
18-Dec	-6.6	-4.2	-2.7	-2.5	-2.4	-2.9	-3.3	-1.8	-1.3	-2.3	-1.8	0.3	1.7	2.2	1.7	0.6	-0.6	-1.7	-2.4	-2.7	-3.6	-4.3	-6.5	-8.1	-2.3	2.2			
19-Dec	-9.6	-11.6	-13.0	-14.1	-14.2	-13.7	-13.9	-13.4	-12.9	-12.3	-12.1	-11.4	-10.7	-10.3	-10.2	-10.5	-10.8	-10.7	-10.5	-10.2	-10.1	-10.0	-9.8	-9.6	-11.5	-9.6			
20-Dec	-9.6	-9.4	-9.3	-9.6	-9.7	-9.5	-9.3	-9.0	-8.6	-8.3	-8.0	-7.3	-6.2	-5.1	-4.8	-4.3	-4.6	-3.9	-4.2	-3.9	-3.4	-2.7	-1.8	0.4	-6.3	0.4			
21-Dec	0.6	1.7	1.6	1.4	1.2	-0.4	-1.6	-2.3	-3.0	-3.7	-3.2	-1.3	-0.2	0.4	1.0	1.4	0.3	1.6	1.6	1.8	2.1	1.9	1.6	0.3	0.2	2.1			
22-Dec	-0.7	-1.1	-1.7	-1.9	-2.2	-2.5	-3.1	-3.1	-2.9	-2.6	-2.4	-2.0	-1.6	-1.1	-1.0	-0.9	-1.7	-2.6	-3.3	-2.6	-2.9	-2.5	0.0	0.6	-1.9	0.6			
23-Dec	1.3	2.0	3.0	2.6	1.0	0.4	0.0	-0.4	-0.7	-0.9	-0.6	-0.3	-0.1	0.0	-0.3	-1.2	-2.5	-2.9	-4.2	-5.2	-5.9	-7.2	-7.7	-7.2	-1.5	3.0			
24-Dec	-8.2	-8.6	-9.1	-9.9	-10.5	-10.8	-10.3	-9.8	-10.3	-10.1	-8.5	-6.6	-4.3	-3.2	-1.3	-1.8	-3.8	-3.4	-6.5	-8.6	-10.2	-7.7	-6.4	-5.8	-7.3	-1.3			
25-Dec	-6.5	-7.1	-11.4	-12.6	-13.8	-13.8	-10.4	-9.0	-8.7	-7.5	-6.0	-3.3	-1.6	0.7	0.5	-2.1	-4.8	-7.1	-7.1	-8.3	-7.7	-6.9	-8.0	-6.7	-7.0	0.7			
26-Dec	-7.0	-6.5	-7.3	-6.8	-6.8	-7.0	-7.4	-8.1	-8.3	-7.9	-7.2	-6.1	-4.9	-3.9	-3.1	-3.8	-4.7	-5.1	-4.7	-2.2	-0.5	-0.8	-1.2	-0.6	-5.1	-0.5			
27-Dec	0.5	-0.3	0.0	-0.7	-1.4	-1.6	-0.9	-0.7	-1.2	-1.8	-1.5	0.3	1.8	2.6	3.4	-0.5	-2.5	-1.7	-2.5	-5.7	-7.6	-6.1	-7.5	-8.1	-1.8	3.4			
28-Dec	-10.4	-9.1	-11.5	-11.7	-10.3	-10.1	-9.2	-9.7	-10.1	-7.9	-6.9	-5.7	-4.3	-3.4	-3.5	-3.2	-3.8	-4.6	-4.3	-4.0	-3.6	-3.3	-3.9	-5.7	-6.7	-3.2			
29-Dec	-7.9	-9.3	-10.3	-10.1	-10.2	-10.6	-11.2	-11.4	-11.6	-10.7	-10.1	-7.8	-6.7	-5.5	-4.4	-5.4	-6.3	-6.9	-8.1	-9.9	-11.5	-11.8	-11.8	-10.8	-9.2	-4.4			
30-Dec	-11.8	-13.1	-11.3	-12.1	-12.8	-12.6	-11.7	-10.4	-9.3	-9.5	-7.9	-6.0	-4.4	-2.2	-0.8	-0.8	-0.9	-1.0	-0.9	-1.5	-2.4	-2.5	-2.1	-2.9	-6.3	-0.8			
31-Dec	-3.4	-4.0	-3.4	-2.8	-3.0	-2.9	-2.6	-2.6	-2.9	-2.6	-1.6	0.1	2.5	4.4	4.6	3.5	1.9	1.0	1.1	0.9	0.7	0.7	2.4	3.5	-0.2	4.6			
																								Diurnal Average					
																								Diurnal Maximum					



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature (AT) - C
Patricia McInnes - December 2023





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C
Patricia McInnes - December 2023**

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	603	81.05	81.05
0 - 10	141	18.95	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

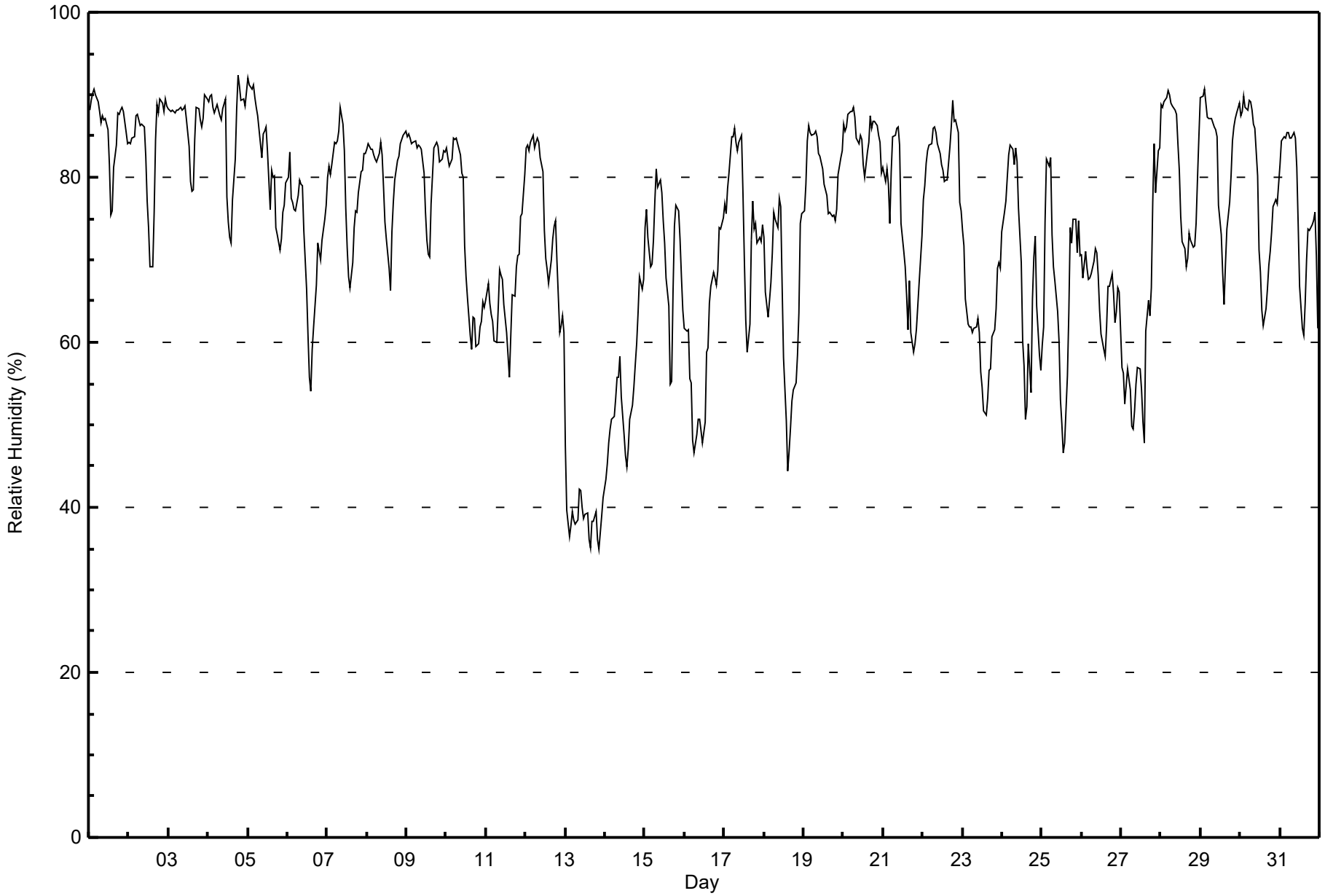
Patricia McInnes - December 2023

Maximum Value: 92.3 % on Dec 4 19:00																						Maximum Daily Average: 86.6 % on Dec 3																						Hours in Service: 744					
Minimum Value: 34.9 % on Dec 13 21:00																						Minimum Daily Average: 38.9 % on Dec 13																						Hours of Data: 744					
Maximum Diurnal Average: 77.8 % at hour 9																						Minimum Diurnal Average: 62.9 % at hour 15																						Hours of Missing Data: 0					
Monthly Average: 73.56 %																						Percentiles: P₁ = 38.1 P₁₀ = 55.0 Q₁ = 65.1 Median = 75.9 Q₃ = 84.3 P₉₀ = 87.9 P₉₉ = 90.6																						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-Dec	88.1	89.4	90.2	90.7	90.0	89.1	87.9	86.7	87.5	87.0	87.2	85.8	81.5	75.4	76.0	81.2	84.0	87.7	87.6	88.2	88.5	88.0	85.5	84.0	86.1	90.7																							
2-Dec	84.3	84.1	84.8	84.9	87.4	87.7	86.9	86.3	86.4	86.0	82.6	77.1	73.8	69.2	69.1	75.8	84.6	88.7	87.8	89.4	89.0	88.0	89.4	88.6	83.8	89.4																							
3-Dec	88.3	88.0	88.1	88.0	87.8	88.1	88.2	88.5	88.2	88.4	88.6	87.2	83.8	79.5	78.4	78.4	84.6	88.5	88.4	86.9	86.1	87.2	90.1	89.5	86.6	90.1																							
4-Dec	89.1	89.8	89.9	88.5	87.7	88.8	88.1	87.4	86.9	88.4	89.5	77.6	74.6	72.6	72.1	77.3	82.3	88.3	92.3	91.0	89.3	89.6	88.7	90.4	85.8	92.3																							
5-Dec	92.0	91.2	90.7	91.2	89.6	88.4	87.5	85.7	82.3	85.2	85.6	86.1	83.2	76.2	80.8	80.0	80.2	73.9	73.1	71.1	72.6	75.8	76.7	79.4	82.4	92.0																							
6-Dec	80.0	83.0	77.5	77.0	76.0	75.9	77.8	79.6	79.2	78.9	73.6	66.4	60.9	55.7	54.1	59.1	61.9	66.9	72.0	71.1	70.0	72.3	74.8	76.7	71.7	83.0																							
7-Dec	80.1	81.4	80.4	81.6	84.3	84.1	84.4	85.7	88.4	86.5	83.2	76.3	71.6	67.9	66.7	69.6	74.0	76.0	75.8	78.2	80.6	80.9	82.9	82.8	79.3	88.4																							
8-Dec	83.3	84.1	83.3	83.5	82.7	82.3	81.9	83.0	84.2	82.7	78.8	74.6	72.6	69.0	66.2	73.4	76.9	79.6	82.0	82.6	84.0	84.5	85.1	85.6	80.2	85.6																							
9-Dec	84.9	85.3	84.8	84.0	84.3	84.5	83.6	83.9	83.7	83.4	80.6	75.7	72.3	70.7	70.3	76.7	83.6	84.0	84.3	83.7	81.9	82.2	83.2	83.0	81.4	85.3																							
10-Dec	83.6	82.3	81.4	82.3	84.7	84.6	84.8	84.1	82.7	80.5	79.9	71.6	68.0	65.4	60.8	59.2	63.1	62.8	59.5	59.9	61.9	62.5	64.9	64.2	72.3	84.8																							
11-Dec	65.1	67.1	64.8	63.3	62.6	60.2	60.0	64.1	68.8	68.2	67.6	64.6	61.2	58.4	55.7	60.9	65.7	65.6	69.2	70.6	70.6	75.3	75.6	80.4	66.1	80.4																							
12-Dec	83.6	84.0	83.2	84.2	85.1	83.6	84.3	84.8	84.2	82.3	80.7	73.6	70.1	68.8	67.1	70.0	72.6	74.1	74.7	69.8	61.1	62.1	63.3	61.2	75.4	85.1																							
13-Dec	47.4	39.7	36.5	37.8	39.4	38.5	37.9	38.4	42.2	42.1	40.0	38.7	39.2	39.4	36.2	35.1	38.4	38.4	39.4	36.1	34.9	36.9	39.1	41.2	38.9	47.4																							
14-Dec	43.4	45.2	47.7	49.6	50.6	51.0	53.2	55.7	55.8	58.4	53.5	48.9	46.3	44.9	47.2	50.6	52.4	54.6	57.3	59.8	63.5	67.9	66.4	67.7	53.8	67.9																							
15-Dec	73.9	76.2	72.7	69.1	69.6	72.4	77.0	81.0	78.9	79.6	78.1	74.8	72.1	67.8	64.4	55.0	55.2	66.1	74.1	76.6	75.9	72.5	68.0	63.9	71.4	81.0																							
16-Dec	61.7	61.3	61.4	55.5	55.0	48.2	46.6	48.8	50.7	50.7	49.3	47.8	50.3	58.8	59.4	64.7	66.8	68.4	67.7	67.0	68.7	73.9	73.8	75.0	59.6	75.0																							
17-Dec	76.8	75.6	78.6	80.5	84.9	84.9	85.9	84.3	83.3	84.3	85.2	78.1	69.9	62.8	58.9	62.2	72.4	77.1	73.8	74.3	72.0	72.6	72.2	74.3	76.0	85.9																							
18-Dec	72.8	66.2	63.1	65.1	67.3	70.8	75.8	75.0	74.0	77.5	76.4	67.0	58.1	50.5	44.5	46.7	49.7	52.8	54.3	55.1	58.4	63.5	74.4	75.6	63.9	77.5																							
19-Dec	76.0	79.1	84.3	86.3	85.5	85.1	85.3	85.6	84.9	82.9	82.5	81.1	79.1	78.4	77.7	75.6	75.7	75.3	75.4	74.7	76.1	80.4	82.3	83.2	80.5	86.3																							
20-Dec	86.5	85.6	86.0	87.7	87.9	87.9	88.5	87.3	84.7	84.0	85.2	84.6	81.6	79.9	83.0	84.2	87.4	85.9	86.8	86.8	86.2	85.1	84.3	80.5	85.3	88.5																							
21-Dec	81.2	79.5	81.0	79.2	74.4	80.7	85.0	85.0	86.0	86.1	83.9	74.4	71.1	69.2	65.8	61.5	67.5	61.2	58.8	59.8	61.5	64.4	67.2	72.8	73.2	86.1																							
22-Dec	77.3	79.0	81.8	83.2	83.8	84.1	85.9	86.1	85.4	84.1	82.9	81.6	80.8	79.5	79.6	79.7	83.7	86.3	89.3	86.8	86.9	85.4	77.0	76.0	82.8	89.3																							
23-Dec	73.5	71.7	65.3	62.3	61.9	61.9	61.1	61.7	61.8	62.9	61.2	56.4	54.6	51.8	51.3	53.3	56.6	56.8	60.6	61.5	64.0	69.0	69.6	69.0	61.7	73.5																							
24-Dec	73.4	75.7	77.1	79.9	82.7	83.9	83.4	81.5	83.6	81.8	76.3	69.6	60.2	57.1	50.8	52.2	59.8	53.9	65.3	70.3	72.9	64.4	58.4	56.6	69.6	83.9																							
25-Dec	59.6	61.9	74.6	82.1	81.4	82.4	73.0	69.2	67.5	63.7	60.2	53.0	50.1	46.6	47.9	56.0	63.6	73.9	72.0	75.0	74.9	70.9	74.8	70.5	66.9	82.4																							
26-Dec	70.6	67.8	71.0	69.0	67.7	67.8	68.3	69.9	71.3	70.8	68.2	63.9	61.1	59.2	58.3	61.9	66.9	66.9	68.3	65.9	62.3	63.7	66.5	66.2	66.4	71.3																							
27-Dec	56.9	56.3	52.5	54.8	56.7	54.2	49.9	49.6	51.7	55.0	56.9	56.7	54.3	50.4	47.7	61.3	65.0	63.2	66.7	77.0	84.1	78.1	83.2	83.6	61.1	84.1																							
28-Dec	88.8	88.4	89.1	89.6	90.6	89.9	89.0	88.6	88.1	87.7	84.0	80.8	75.3	72.2	71.4	69.1	70.1	73.2	72.4	71.5	71.7	74.4	79.8	84.9	80.9	90.6																							
29-Dec	89.7	89.9	90.7	88.9	87.3	87.2	87.0	86.7	86.2	85.8	85.0	76.6	73.1	68.5	64.6	69.6	73.8	76.9	80.1	84.4	86.1	87.1	87.8	89.0	82.6	90.7																							
30-Dec	87.4	87.9	89.8	88.5	88.1	89.3	89.1	88.1	86.4	85.9	80.2	71.1	68.4	63.9	62.0	64.1	66.5	69.4	71.1	73.5	76.5	77.2	76.7	79.1	78.3	89.8																							
31-Dec	81.6	84.5	84.9	84.7	85.4	85.3	84.7	84.7	85.5	84.7	81.1	74.2	66.8	61.7	60.8	64.7	70.0	73.7	73.5	74.3	74.7	75.8	70.6	61.7	76.2	85.5																							
																								76.8	76.8	77.0	77.2	77.5	77.5	77.5	77.6	77.8	77.6	75.7	70.8	67.3	64.2	62.9	65.5	69.5	71.3	72.7	73.3	73.8	74.6	75.2	75.4	Diurnal Average	
																								92.0	91.2	90.7	91.2	90.6	89.9	89.1	88.6	88.4	88.4	89.5	87.2	83.8	79.9	83.0	84.2	87.4	88.7	92.3	91.0	89.3	89.6	90.1	90.4	Diurnal Maximum	



Wood Buffalo Environmental Association
Hourly Averages

Relative Humidity (RH) - %
Patricia McInnes - December 2023





Maximum Speed: 33 km/h on Dec 10 20:00		Maximum Daily Speed Average: 16.3 km/h on Dec 23		Hours in Service: 744																						
Minimum Speed Value: 1 km/h on Dec 28 08:00		Minimum Daily Speed Average: 2.0 km/h on Dec 3		Hours of Data: 744																						
Maximum Diurnal Speed Average: 6.7 km/h at hour 12		Minimum Diurnal Speed Average: 5.0 km/h at hour 2		Hours of Missing Data: 0																						
Monthly Average Velocity: 5.7 km/h 214.9 deg		Percentiles: P ₁ = 2 P ₁₀ = 4 Q ₁ = 6 Median = 9 Q ₃ = 13 P ₉₀ = 18 P ₉₉ = 26		Percent Operational Time: 100.0																						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Dec	SW10	SW8	SSW5	SSW5	WSW5	SSW5	SSW5	SSE5	S6	S5	SSE5	SSE5	SSE5	SSE6	SSE6	SSE5	SSW4	SSW4	S4	SSW5	S6	S5	S4	SSE4	S4.8	SW10
2-Dec	S5	S3	S3	SSE3	SSE4	SSE5	SE8	SE6	SSE8	SSE4	SE6	SE6	SE6	SE6	SSE4	SSE4	SW3	WSW2	W4	NW7	NW7	NNW6	NW6	WNW5	SSE2.1	SE8
3-Dec	W4	NW4	NW2	ENE4	E3	SE4	S3	ESE3	ESE5	SE4	ESE4	SE5	SE5	SE6	SE4	SE4	NE3	WNW3	WNW3	W2	SSW2	SSE4	SSE5	SSE6	SE2.0	SSE6
4-Dec	S7	SSW6	S5	S6	SSE5	S6	SSE5	SSW5	SSW4	SSW6	SSW6	SSE4	SSE6	SSE7	S7	SSW8	SSW7	S4	SSE4	SSE4	S4	SSE3	SSE3	SSE5	S4.9	SSW8
5-Dec	SSE7	SE5	S6	SE9	SE10	SE12	SE15	SE13	SE12	SSE9	SSE4	SSE7	SSE5	SE6	S9	SW11	SW18	SW20	WSW21	SW14	SSE4	S7	S7	S7.6	WSW21	
6-Dec	S7	SSW9	SW14	SW15	WSW13	SW12	WSW12	SW12	SW12	SW11	SW12	SW12	WSW14	WSW15	SW13	SW11	SW8	SW10	SW8	SW13	WSW15	WSW15	SW15	SW6	SW11.6	WSW15
7-Dec	SSW5	SW11	WSW14	SW11	SW15	SW15	WSW11	SSW6	SSW9	SW9	SW10	SW11	SW12	SW12	SW11	SW10	WSW12	WSW12	WSW12	SW11	WSW10	SW12	WSW14	WSW12	SW10.9	SW15
8-Dec	WSW12	SW15	WSW15	WSW13	WSW11	WSW12	WSW13	WSW15	WSW13	WSW14	SW9	SW9	SW13	SW11	SW9	SW12	WSW14	SW15	SW17	SW16	SSW8	SW9	SSW9	SSW11	SW12.1	SW17
9-Dec	SW13	SSW8	SSW12	SW12	SSW8	SSW10	SSW11	SSW12	SSW12	SSW10	S6	SW11	SW12	SSW11	SSW7	SSE6	SE6	SSE7	SE5	SE5	SE7	SE7	SE7	SE8	S7.6	SW13
10-Dec	SE10	SE11	SE11	SSE9	SE9	SE9	SE8	SSE8	SSE7	SSE9	S9	SW14	WSW20	WSW18	WSW17	W20	W22	W25	W27	WNW33	WNW29	WNW29	WNW31	WNW24	W10.1	WNW33
11-Dec	NW17	NW17	NW24	NW24	NW24	WNW26	WNW24	W19	W16	W17	WSW16	WSW16	SW10	SW12	SW10	SSW8	SSE7	SSE8	SSE7	SE8	SE6	SE5	SE6	SSE3	W8.6	WNW26
12-Dec	S4	SSE5	S8	S7	S6	S5	SE4	SSE5	SSE6	SSE5	SSE8	SSE8	SSE10	SSE8	SSE9	SSE8	SSE7	SE6	SSE6	SSE9	S7	SE6	SSE9	SSE9	SSE6.7	SSE10
13-Dec	SW13	SW13	SW20	SW12	SW16	SW21	WSW21	SW21	SW15	SW14	SW12	SW10	SSW8	SSW7	SSW9	SW14	SW14	SW13	SSW12	SSW11	SW8	SSW11	SSW9	SSW10	SW12.7	SW21
14-Dec	WSW9	W15	W17	W18	W17	W20	WSW17	WSW12	WSW14	WSW18	SW11	SSW8	SW13	WSW14	SSW8	SW9	WSW11	WSW12	WSW11	SW12	SW9	SSW7	SW7	SSW7	WSW11.5	W20
15-Dec	S6	SSE6	SSE7	S9	S7	SSE8	SSE6	SSW9	SSW9	S10	SSW15	SSW17	SSW19	SSW15	S9	SSW19	SSW18	SSW21	SSW20	SSW20	SSW21	SSW21	SSW22	SSW24	SSW13.5	SW24
16-Dec	WSW26	WSW23	W17	W20	W25	WNW27	WNW22	WNW21	W21	W24	WNW20	WNW23	NW16	N12	N11	N8	NNW7	NNW7	NNW6	NNW6	NW4	SW5	SSW3	SW8	WNW12.5	WNW27
17-Dec	W19	NNW20	NNW17	NNW9	NNE2	SSW4	SSW4	S2	SSW3	SSE5	S5	SSW7	SW11	SW15	SW13	SSW8	SSE5	SSE6	SSE9	SE8	SE7	SE7	SSE7	S6	SSW3.1	NNW20
18-Dec	SSW7	SW8	SW8	SW11	WSW11	WSW8	SSW9	WSW10	W18	WSW19	WSW20	W19	WSW15	W17	WNW22	W16	W13	W14	W12	WNW12	WNW14	NNW12	N16	N12	W10.7	WNW22
19-Dec	NNE14	N13	NNW9	NW8	NNW11	N7	N6	N6	NE4	ENE7	NE8	E7	E8	E9	E12	ESE14	ESE15	ESE17	ESE17	SE17	ESE16	ESE15	SE20	SE21	E7.1	SE21
20-Dec	ESE19	SE20	SE18	ESE16	ESE17	ESE17	ESE17	SE16	SE13	SE13	SE14	SE12	ESE12	SE9	SE11	SE7	SSE11	SE13	SE13	SSE12	SSE10	S11	SSW10	SW16	SE12.2	SE20
21-Dec	WSW18	WSW20	W18	W19	W19	WSW14	WSW14	SW11	SW12	SW11	SW12	SSW10	S10	SE7	S7	S8	SE8	SSE10	SSW9	SW14	SW15	SSW13	SSW9	SSW7	SW10.0	WSW20
22-Dec	S7	SSW8	S8	SSE9	SSE9	SE8	SE9	SE9	SE10	SE11	SE11	SE10	SE10	SE8	SE8	SE8	S4	SSW3	SW3	S6	S7	S7	SW9	SSW9	SSE7.1	SE11
23-Dec	S9	SW9	W14	W21	WNW24	W27	WNW26	W22	W22	W18	W23	W25	W25	W25	W20	W16	W12	W12	SW10	WSW13	SW6	SW7	WSW13	WSW16	W16.3	W27
24-Dec	WSW13	WSW13	SW12	SW11	SSW10	SSW7	SSW8	SSW8	SW7	SW10	SW6	SSW5	ESE5	SSE6	SSE7	SSE3	S8	S2	SSW5	S4	SSW6	SSW8	SSW8	SSW8	SSW6.6	WSW13
25-Dec	S8	S6	SSE4	S4	S5	S7	SW12	SW10	SSW10	SSW10	S9	S9	SSW8	SSW9	S6	ESE7	S4	SSE5	SSE7	SE9	SSE8	SSE7	SE15	S6.8	SE15	
26-Dec	SSE9	SE11	SSE7	SE13	SE16	SE14	SE12	SE13	SE11	SE11	SE11	SSE10	SSE9	SSE10	SSE8	S8	SSE7	S10	S9	SW11	WSW14	WSW13	SSW8	SSW10	SSE8.7	SE16
27-Dec	SW14	WSW13	SW12	SW11	SSW11	SW12	SW13	SW12	SW11	SW8	SSW9	SW14	SSE5	SE6	E3	ESE1	ESE7	SE11	ESE7	E2	SSE5	SE4	ESE6	NNW3	SSW5.7	SW14
28-Dec	NW5	N6	NNW5	N7	NNW5	NNW6	NW5	WNW1	NW2	N8	N11	NW12	NNW14	N12	NNW12	NNW7	NW5	WNW5	NW7	NW8	NNW9	NNW8	NW5	WSW5	NNW6.5	NNW14
29-Dec	SW5	SW5	SW6	SSW6	SSW6	S8	SSE7	S7	S7	SE5	SSE4	SSE7	SSE7	S6	SSE7	S6	S7	S7	SE4	S4	SSW3	S3	S4	SSW5	S5.1	S8
30-Dec	SSE4	SSE5	S5	S4	S4	S4	SSE7	SSE7	SSE10	S3	SE10	SSE13	SE14	SE12	SE14	SE15	SE15	SE14	SSE11	SE9	SE7	SE9	SSE9	SE8	SE8.5	SE15
31-Dec	SE8	SE8	SSE8	SSE9	SSE7	S10	S9	SSE8	S8	S5	S6	SSW10	SSW11	SW17	SW14	SW11	SSW10	SW12	WSW15	WSW17	WSW11	WSW13	WNW15	WNW17	SW8.0	WNW17
SW5.8 SW5.0 SW5.9 SW5.6 SW5.5 SW6.0 SW6.0SSW6.0SSW6.7 SW6.3SSW5.9SSW6.7SSW6.1SSW5.9SSW5.2SSW5.3SSW5.3SSW6.2SSW6.1 SW6.4 SW5.4SSW5.1 SW5.1SSW5.3																								Diurnal Average		
WSW26WSW23 NW24 NW24 W25WNW27WNW26 W22 W22 W24 W23 W25 W25 W25WNW22 W20 W22 W25 W27WNW33WNW29WNW29WNW31WNW24																								Diurnal Maximum		

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



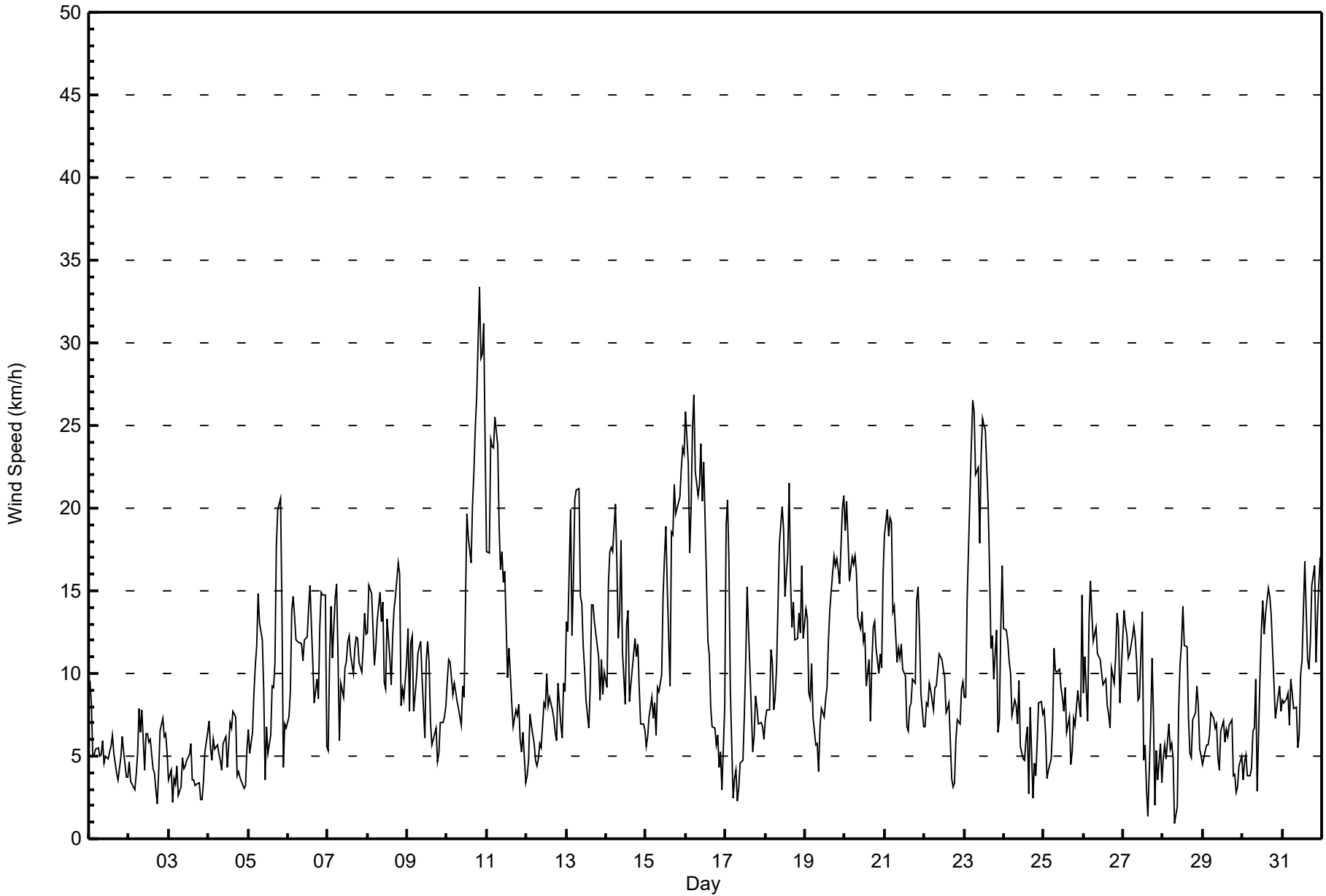
Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

Wind Speed (WS) - km/h

Patricia McInnes - December 2023

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





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Wind Speed (WS) - km/h
Patricia McInnes - December 2023

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	142	19.09	19.09
6 - 11	346	46.51	65.59
12 - 19	198	26.61	92.20
20 - 28	54	7.26	99.46
29 - 38	4	0.54	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed (WS) - km/h
Patricia McInnes - December 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	2	1	3	5	14	39	30	21	4	3	3	5	8	3	142
6 - 11	9	0	1	1	3	4	59	69	54	64	53	11	0	0	6	12	346
12 - 19	5	1	0	0	0	14	24	2	0	11	56	49	24	4	4	4	198
20 - 28	0	0	0	0	0	0	3	0	0	4	6	8	18	11	3	1	54
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	4
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	14	2	3	2	6	23	100	110	84	100	119	71	45	24	21	20	744

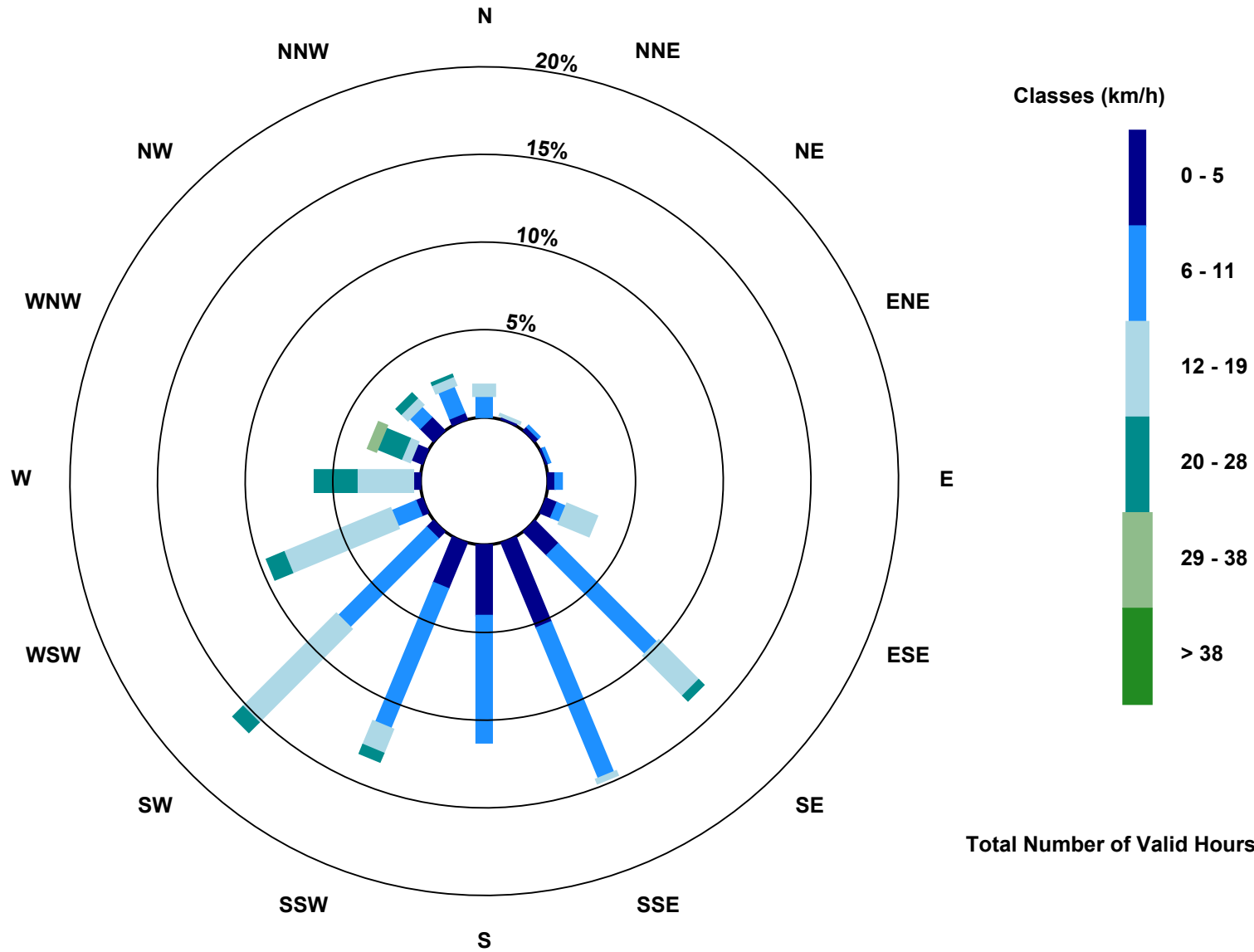
Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Dec 2023

Wind Speed (WS) - km/h
Patricia McInnes



Total Number of Valid Hours: 744



Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
Patricia McInnes - December 2023

Direction of Maximum Speed: 284 deg on Dec 10 20:00	Hours in Service: 744
Direction of Maximum Daily Speed Average: 267.2 deg on Dec 23	Hours of Data: 744
Direction of Minimum Speed: 301 deg on Dec 28 08:00	Hours of Missing Data: 0
Direction of Minimum Daily Speed Average: 2.0 deg on Dec 3	Percent Operational Time: 100.0
Monthly Average Direction: 214.9 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-Dec	235	220	198	201	244	204	192	167	187	181	162	160	148	165	151	167	197	198	185	197	175	191	180	152	187.8
2-Dec	189	187	169	165	164	157	140	144	151	160	140	140	145	130	152	149	215	258	281	323	322	342	308	299	168.2
3-Dec	264	305	321	57	86	130	190	115	121	139	121	128	138	137	141	129	51	300	282	271	193	149	157	150	139.2
4-Dec	169	192	190	184	167	169	161	198	209	202	201	155	154	154	182	209	205	179	151	163	171	147	157	152	177.8
5-Dec	155	140	170	139	143	138	132	134	138	156	159	155	155	141	190	190	220	230	231	239	231	167	173	182	178.9
6-Dec	186	210	234	236	238	234	239	236	233	230	231	226	239	246	235	217	221	215	236	226	247	238	236	225	231.9
7-Dec	206	225	239	227	220	233	247	206	205	226	219	221	225	216	229	235	238	242	243	222	237	234	242	242	229.8
8-Dec	238	235	242	240	239	241	242	238	238	239	231	224	220	217	226	234	242	231	229	225	202	214	205	213	231.0
9-Dec	222	204	208	221	199	192	200	207	208	196	175	217	214	202	200	168	139	157	134	131	139	136	134	142	189.9
10-Dec	133	139	137	149	141	145	144	151	154	155	178	236	258	252	256	264	269	270	281	284	295	294	295	302	259.9
11-Dec	320	323	311	307	309	298	288	273	268	266	252	255	231	227	225	207	147	159	159	145	141	133	143	163	272.8
12-Dec	182	161	177	170	176	187	138	157	156	151	150	150	153	157	151	152	147	134	156	166	169	135	163	157	157.6
13-Dec	220	230	235	233	228	231	238	235	230	229	222	215	203	194	213	227	233	219	195	201	224	192	207	213	222.7
14-Dec	248	278	279	271	267	259	253	240	240	249	228	194	227	246	197	222	238	247	244	231	215	200	233	203	244.2
15-Dec	185	164	161	172	178	168	165	196	202	190	198	200	209	206	191	194	205	209	208	207	212	222	228	240	204.0
16-Dec	247	245	259	275	281	300	300	289	270	270	283	294	318	357	1	357	343	333	338	346	307	227	195	217	286.5
17-Dec	278	347	346	337	25	202	206	187	196	166	182	192	215	227	231	204	159	162	149	141	144	142	156	185	213.7
18-Dec	209	219	231	235	241	245	208	255	260	249	246	260	258	266	284	276	273	268	276	289	295	338	10	8	267.6
19-Dec	12	351	341	318	336	349	3	1	35	74	50	83	91	100	101	105	104	113	122	124	119	121	125	126	88.2
20-Dec	122	126	124	116	120	122	122	125	127	125	125	127	122	128	137	130	149	146	145	152	162	176	201	234	135.9
21-Dec	251	258	266	271	271	246	239	235	236	219	222	193	176	136	178	171	138	167	199	216	220	212	203	192	226.0
22-Dec	183	192	179	160	156	135	134	135	139	134	141	143	139	134	134	135	184	207	214	173	191	191	222	202	159.5
23-Dec	178	222	260	280	283	279	282	276	272	270	269	277	272	274	275	275	261	264	223	251	234	224	251	254	267.2
24-Dec	244	243	235	221	210	202	201	199	221	234	224	193	111	156	168	152	188	181	197	190	197	202	213	197	208.5
25-Dec	187	171	155	183	191	191	221	221	209	205	188	189	192	211	175	123	181	167	160	162	139	148	151	134	178.8
26-Dec	153	141	163	130	133	135	129	127	138	134	139	147	150	149	150	171	161	181	187	222	238	239	202	193	159.8
27-Dec	229	242	229	217	203	222	232	227	225	220	210	226	166	132	94	119	113	127	119	79	154	135	109	341	203.2
28-Dec	305	3	346	4	335	345	318	301	306	4	355	308	339	353	337	348	322	298	315	317	344	346	322	246	334.7
29-Dec	234	227	233	206	203	170	162	174	180	143	156	158	154	182	159	174	188	175	145	171	197	188	189	205	180.6
30-Dec	157	157	171	171	170	178	164	162	155	169	131	148	136	137	128	128	126	134	147	136	132	139	152	125	142.1
31-Dec	137	142	147	165	151	173	176	165	174	170	183	212	209	233	231	215	212	226	237	242	247	242	282	294	214.3

219.9 226.8 234.4 231.7 228.5 223.8 219.6 213.4 212.8 214.0 207.9 211.7 206.3 207.9 205.8 200.9 203.9 207.5 210.0 217.4 217.4 209.6 214.3 212.7
 Diurnal Average

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



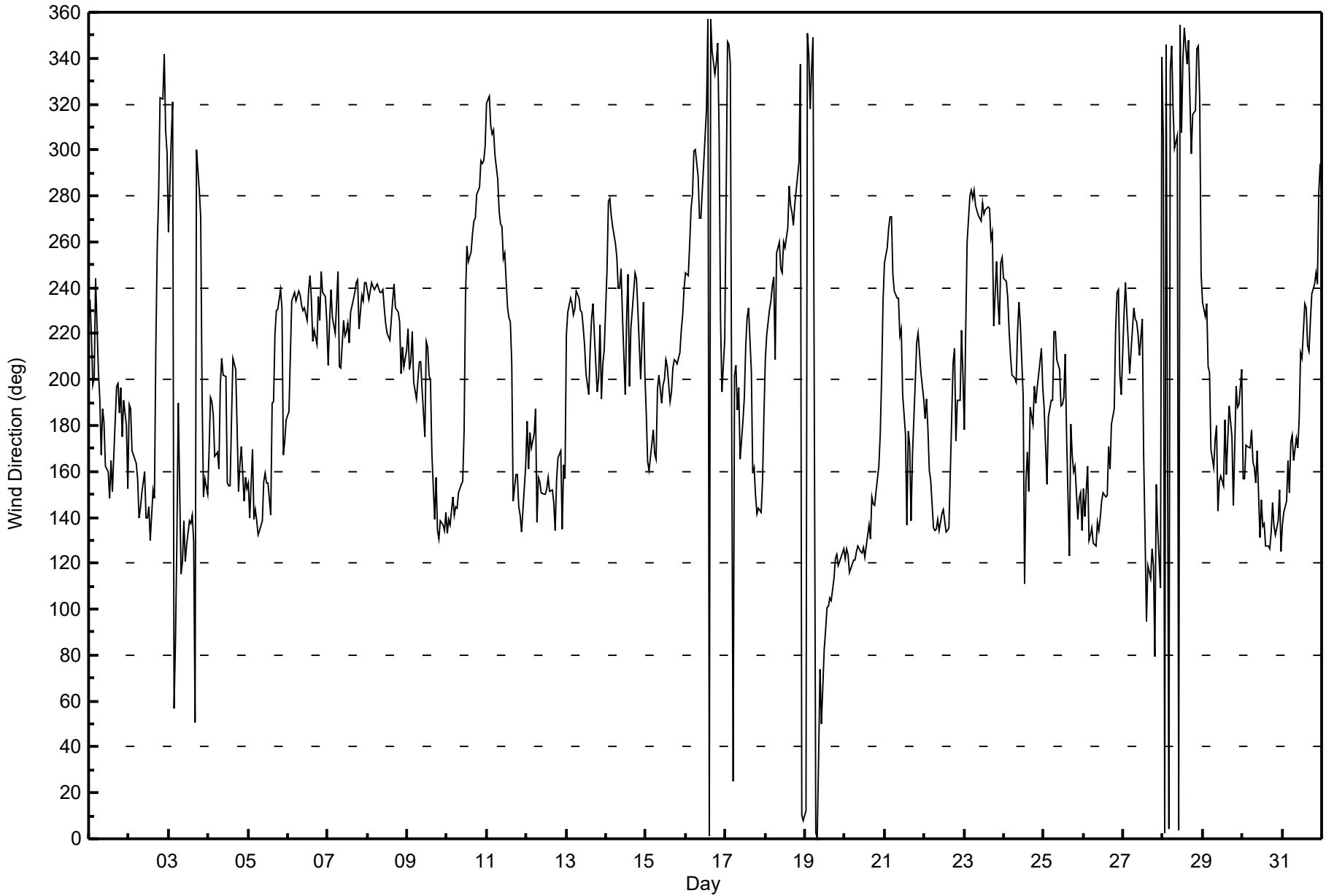
Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

Wind Direction (WD) - deg

Patricia McInnes - December 2023

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 80 deg on Dec 3 07:00																	Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0								
Minimum Value: 5 deg on Dec 31 01:00																									
Percentiles: P ₁ = 7 P ₁₀ = 9 Q ₁ = 11 Median = 13 Q ₃ = 17 P ₉₀ = 25 P ₉₉ = 64																									
Day	Hourly Period Ending At (MST)																							Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23		24
1-Dec	9	11	19	27	10	12	20	10	19	14	20	17	25	23	18	17	14	15	7	8	12	12	9	22	27
2-Dec	16	21	22	24	25	12	13	23	16	51	16	16	19	17	16	26	40	45	17	31	12	14	18	22	51
3-Dec	30	26	36	29	21	22	80	29	16	21	22	19	20	25	60	24	38	23	16	35	32	18	12	14	80
4-Dec	15	16	13	8	12	12	13	22	19	12	12	16	11	9	12	11	15	33	18	17	14	29	21	14	33
5-Dec	16	16	17	16	18	16	14	14	15	15	71	45	34	15	13	9	13	10	10	12	13	60	25	18	71
6-Dec	11	16	8	8	9	9	8	9	10	9	11	13	11	10	13	9	13	8	9	10	9	9	10	60	60
7-Dec	51	10	11	11	12	11	10	30	17	26	15	17	12	13	13	9	11	8	8	13	16	11	12	10	51
8-Dec	9	9	10	10	10	10	10	10	10	11	14	13	10	9	10	11	10	10	9	11	17	15	16	13	17
9-Dec	13	21	15	19	12	12	13	12	13	14	21	19	16	14	23	17	7	13	11	13	12	15	14	12	23
10-Dec	14	12	15	16	13	12	11	12	13	15	14	21	11	13	15	10	11	10	11	12	12	11	10	12	21
11-Dec	12	13	11	11	11	10	12	15	9	13	10	9	16	12	12	20	7	11	12	14	19	11	10	44	44
12-Dec	24	16	9	15	16	35	17	12	16	22	15	14	12	15	25	17	15	17	25	11	14	11	8	11	35
13-Dec	17	14	11	19	13	10	11	11	12	10	10	13	15	17	19	10	9	13	17	16	27	23	12	10	27
14-Dec	22	11	11	11	9	9	9	11	12	10	19	15	15	12	21	12	9	7	9	8	16	16	18	15	22
15-Dec	13	14	12	10	13	7	18	10	12	10	13	13	14	15	15	15	15	14	14	13	14	12	11	12	18
16-Dec	11	10	10	10	13	10	10	11	9	9	14	11	36	15	14	15	20	24	55	31	28	21	47	28	55
17-Dec	18	19	11	9	40	17	25	40	40	15	13	17	13	11	10	22	21	15	12	10	12	20	11	18	40
18-Dec	18	15	12	13	16	20	15	30	10	8	9	13	14	19	11	10	9	8	10	9	8	36	13	12	36
19-Dec	13	14	15	11	9	17	22	18	48	20	13	15	15	15	13	13	12	13	14	17	16	16	13	13	48
20-Dec	14	14	13	12	12	12	12	12	13	12	12	13	12	15	12	16	11	12	11	12	13	11	20	10	20
21-Dec	12	8	9	10	9	13	10	11	9	12	10	14	17	16	15	23	12	14	16	11	11	14	16	10	23
22-Dec	11	11	9	6	11	12	9	11	14	13	15	14	13	13	11	17	33	41	37	17	17	26	13	13	41
23-Dec	15	17	14	12	11	11	12	12	11	12	11	11	12	11	12	11	12	18	8	16	14	17	13	6	18
24-Dec	7	9	10	12	11	13	13	10	16	10	16	24	18	16	19	62	26	65	22	18	8	11	14	15	65
25-Dec	11	12	19	37	24	13	11	12	8	10	13	15	16	16	13	22	40	27	6	11	8	14	16	12	40
26-Dec	14	15	21	12	14	13	13	12	14	12	15	14	14	12	12	10	11	11	8	19	10	9	25	15	25
27-Dec	14	8	8	10	11	10	9	9	9	11	15	13	46	12	25	66	17	12	16	68	38	71	21	73	73
28-Dec	41	37	15	15	42	31	38	78	49	15	21	27	14	22	11	16	23	30	20	17	12	15	29	13	78
29-Dec	11	16	14	22	20	17	11	14	25	31	21	20	14	15	13	14	20	13	29	25	22	40	24	17	40
30-Dec	13	9	17	19	11	7	17	14	14	50	16	20	13	14	13	12	12	13	12	8	9	10	7	10	50
31-Dec	5	7	13	6	8	9	7	9	7	17	19	18	16	11	11	9	9	12	12	9	12	9	19	10	19
Diurnal Maximum																									





WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

AMS07 ATHABASCA VALLEY DECEMBER 2023

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

January 31, 2024

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - ATHABASCA VALLEY (AMS07)
 DECEMBER 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	708	35	36	99.87	12.8	0	3	0
TRS (ppb) Average	431	27	313	61.56	1.1	0	0.6	0
THC (ppm) Average	683	34	61	96.37	3.1	-	2.6	-
NMHC (ppm) Average	683	34	61	96.37	0.286	-	0.123	-
CH4(ppm) Average	683	34	61	96.37	3	-	2.5	-
O3 (ppb) Average	708	35	36	99.87	46.7	0	34.7	-
NO2 (ppb) Average	706	37	38	99.87	33.2	0	18.8	-
NO (ppb) Average	706	37	38	99.87	70.4	-	24.9	-
NOX (ppb) Average	706	37	38	99.87	103.6	-	43.2	-
PM2.5 (ug/m3) Average	738	5	6	99.87	24.1	0	13.5	0
CO(ppm) Average	709	34	35	99.87	0.8	0	0.3	-
Temperature 2 m (C) Average	743	0	1	99.87	6.8	-	0.8	-
Relative Humidity (%) Average	743	0	1	99.87	89.5	-	87.5	-
Barometric Pressure (inHg) Average	743	0	1	99.87	29.3	-	29.2	-
Wind Speed 10 m (km/h) Average	743	0	1	99.87	36	-	15	-
Wind Direction 10 m (deg) Average	743	0	1	99.87	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - ATHABASCA VALLEY (AMS07)
DECEMBER 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	708	0.36	1.1	-	0	0	0.1	0.1	0.2	0.4	12.8
TRS (ppb) Average	431	0.25	0.2	-	0.1	0.1	0.2	0.2	0.3	0.4	1.1
THC (ppm) Average	683	2.12	0.2	-	1.9	2	2	2.1	2.2	2.3	3.1
NMHC (ppm) Average	683	0.009	0.038	-	0	0	0	0	0	0	0.286
CH4(ppm) Average	683	2.11	0.2	-	1.9	2	2	2.1	2.1	2.3	3
O3 (ppb) Average	708	17.32	9.9	-	0	6	10.2	15.3	21.4	33.2	46.7
NO2 (ppb) Average	706	10.78	6.1	-	0.5	2.7	6.4	10.2	14.6	19	33.2
NO (ppb) Average	706	6.8	9.6	-	0	0.2	1.1	3.2	7.8	18.2	70.4
NOX (ppb) Average	706	17.58	14.5	-	0.5	3.3	8.1	14.1	21.6	37.3	103.6
PM2.5 (ug/m3) Average	738	4.1	3	-	0.3	1.7	2.5	3.3	4.7	7.5	24.1
CO(ppm) Average	709	0.2	0.1	-	0.1	0.1	0.1	0.2	0.2	0.3	0.8
Temperature 2 m (C) Average	743	-7.33	5.2	-	-17.7	-13.3	-11.4	-8.3	-3.4	0.3	6.8
Relative Humidity (%) Average	743	74.61	10.2	-	42.3	58.4	69.5	77.5	82.2	84.5	89.5
Barometric Pressure (inHg) Average	743	28.89	0.2	-	28.4	28.6	28.7	28.9	29.1	29.2	29.3
Wind Speed 10 m (km/h) Average	743	7.9	6	-	0	2	4	6	10	16	36
Wind Direction 10 m (deg) Average	743	-	-	-	-	-	-	-	-	-	-

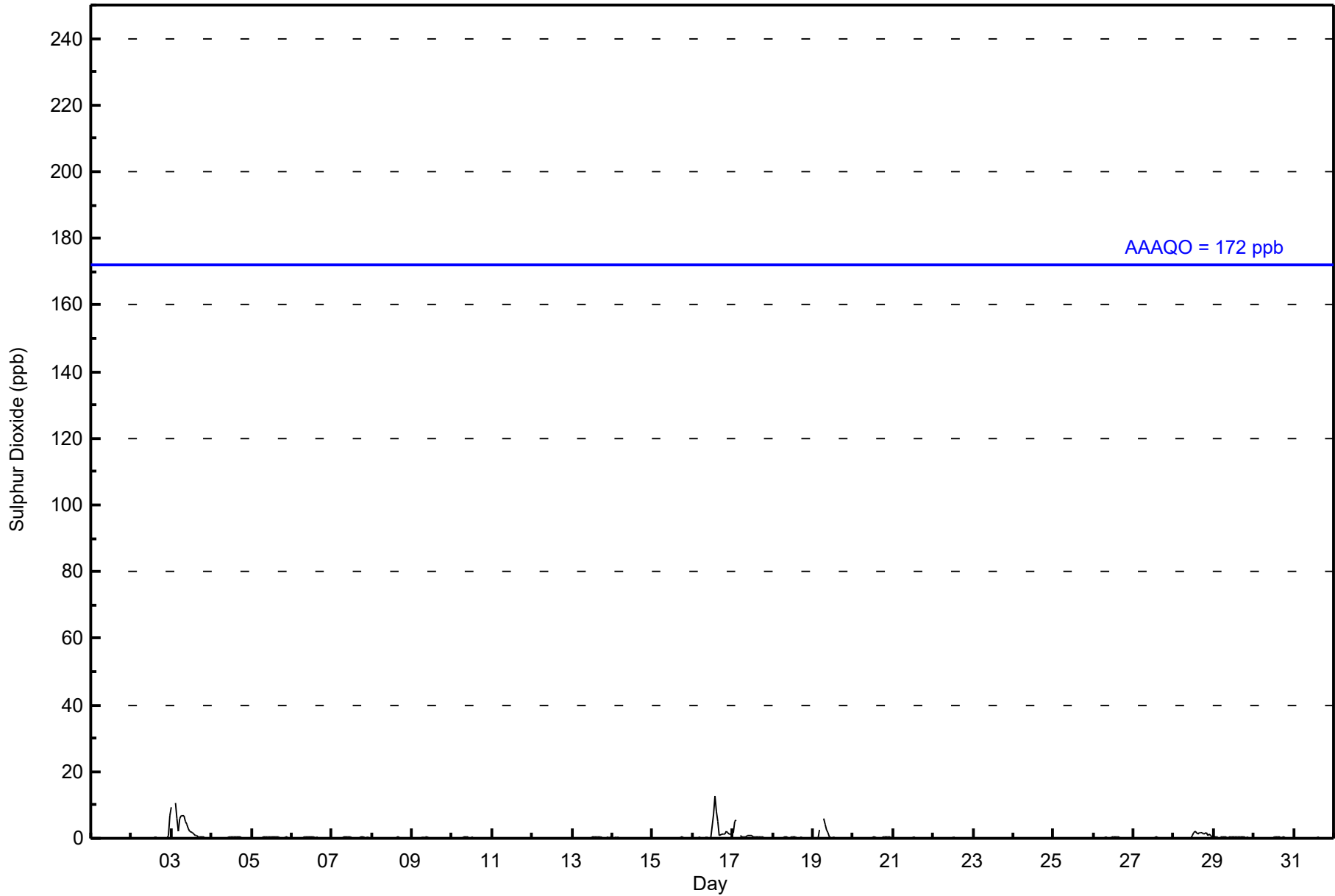
WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - ATHABASCA VALLEY (AMS07)
DECEMBER 2023

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
ALL PARAMETERS	14 Dec 2023 11:00	14 Dec 2023 11:00	1	Maintenance - station logger/modem reset
TRS	19 Dec 2023 19:00	31 Dec 2023 11:00	281	Unstable Operations - AMD non compliance
TRS	31 Dec 2023 11:00	31 Dec 2023 15:00	5	Maintenance - recalibration
THC/NMHC/CH4	18 Dec 2023 17:00	19 Dec 2023 11:00	19	Unstable Operations - flatline in analyzer output signal
THC/NMHC/CH4	19 Dec 2023 12:00	19 Dec 2023 13:00	2	Maintenance - analyzer rebooted
THC/NMHC/CH4	20 Dec 2023 11:00	20 Dec 2023 14:00	4	Unstable Operations - flatline in analyzer output signal
THC/NMHC/CH4	20 Dec 2023 15:00	20 Dec 2023 15:00	1	Maintenance - analyzer rebooted



Number of Exceedences (AAAQO):		1-hr: 0		24-hr: 0		Hours in Service:		744																																									
Maximum Value: 12.8 ppb on Dec 16 14:00		Maximum Daily Average: 3.0 ppb on Dec 3		Minimum Daily Average: 0.0 ppb on Dec 11		Hours of Data:		708																																									
Minimum Value: 0.0 ppb on Dec 8 04:00		Minimum Diurnal Average: 0.7 ppb at hour 14		Minimum Diurnal Average: 0.2 ppb at hour 23		Hours of Missing Data:		36																																									
Monthly Average: 0.36 ppb		Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.1 Median = 0.1 Q ₃ = 0.2 P ₉₀ = 0.4 P ₉₉ = 6.6		Hours of Calibration:		Percent Operational Time:		35																																									
								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-Dec	0.1	0.1	0.1	0.0	0.1	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	0.1	0.1	0.1	0.0	0.0	0.1	0.2																							
2-Dec	Z	0.1	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	0.1	0.0	0.0	0.0	0.0	0.8	6.7	0.4	6.7																							
3-Dec	9.1	Z	10.5	6.0	1.9	6.1	6.6	6.8	5.1	4.2	2.9	2.2	1.6	1.2	0.9	0.7	0.5	0.4	0.4	0.2	0.2	0.1	0.1	0.1	0.1	3.0	10.5																						
4-Dec	0.2	0.1	Z	0.2	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.4	0.4	0.4	0.5	0.3	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.2	0.5																						
5-Dec	0.1	0.1	0.1	Z	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	0.2	0.1	0.2	0.2	0.2	0.2	0.1	0.1	0.2	0.3																						
6-Dec	0.1	0.1	0.1	0.1	Z	0.1	0.1	0.3	0.4	0.2	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	0.0	0.2	0.4																						
7-Dec	0.0	0.0	0.0	0.0	0.1	Z	0.1	0.2	0.3	0.2	0.3	0.3	0.2	0.1	0.1	0.1	0.2	0.2	0.3	0.3	0.1	0.2	0.1	0.0	0.2	0.3																							
8-Dec	Z	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.2	0.2	0.2	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.2																						
9-Dec	0.1	Z	0.2	0.1	0.1	0.2	0.2	0.2	0.3	0.2	0.1	0.2	0.2	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.3																						
10-Dec	0.0	0.0	Z	0.1	0.1	0.2	0.1	0.2	0.3	0.3	0.2	0.2	0.3	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.1	0.3																						
11-Dec	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.1																						
12-Dec	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	0.1	0.2	0.2	0.1	0.1	0.2																						
13-Dec	0.1	0.1	0.1	0.1	0.1	Z	0.2	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3																						
14-Dec	Z	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.0	0.1	0.0	0.1	M	0.1	0.1	0.1	0.0	0.0	0.1	0.1	0.1	0.2	0.0	0.1	0.1	0.1	0.2																						
15-Dec	0.1	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	C	C	C	C	0.1	0.1	0.1	0.3	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.3																						
16-Dec	0.2	0.2	Z	0.2	0.2	0.1	0.0	0.0	0.3	0.2	0.2	0.1	7.1	12.8	8.1	5.2	0.7	1.5	1.4	1.4	2.0	1.8	1.5	1.2	2.0	12.8																							
17-Dec	1.5	5.0	5.4	Z	0.6	0.4	0.3	0.3	0.5	0.9	1.0	0.7	0.4	0.4	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.8	5.4																							
18-Dec	0.1	0.1	0.1	0.1	Z	0.1	0.2	0.2	0.2	0.2	0.1	0.2	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.0	0.0	0.1	0.3																						
19-Dec	0.0	0.0	0.0	0.1	2.4	Z	5.9	4.2	2.5	1.5	0.3	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.8	5.9																							
20-Dec	Z	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.2	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.3	0.3																						
21-Dec	0.1	Z	0.2	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.1	0.2	0.3	0.2	0.1	0.1	0.2	0.2	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.3																						
22-Dec	0.1	0.1	Z	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.1	0.1	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.2	0.2																						
23-Dec	0.1	0.1	0.1	Z	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.2																						
24-Dec	0.0	0.0	0.0	0.0	Z	0.1	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	0.0	0.1	0.1	0.1	0.1																						
25-Dec	0.0	0.1	0.0	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	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2																						
26-Dec	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.1	0.2	0.2	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.2	0.3	0.3																						
27-Dec	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	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.0	0.2	0.1	0.2	0.2																						
28-Dec	0.1	0.1	Z	0.1	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.7	1.7	2.2	1.2	1.5	1.6	1.6	1.5	1.5	1.0	1.1	1.0	0.6	0.8	2.2																						
29-Dec	0.5	0.4	0.3	Z	0.2	0.3	0.3	0.3	0.2	0.2	0.2	0.3	0.4	0.5	0.5	0.5	0.4	0.4	0.3	0.2	0.2	0.2	0.1	0.1	0.3	0.5	0.5																						
30-Dec	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	0.3	0.2	0.4	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.2	0.4																						
31-Dec	0.1	0.1	0.1	0.1	0.1	Z	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2																						
																								0.5	0.3	0.7	0.3	0.3	0.4	0.5	0.5	0.4	0.3	0.3	0.3	0.5	0.7	0.5	0.4	0.2	0.3	0.2	0.2	0.2	0.2	0.2	0.4	Diurnal Average	
																								9.1	5.0	10.5	6.0	2.4	6.1	6.6	6.8	5.1	4.2	2.9	2.2	7.1	12.8	8.1	5.2	1.6	1.6	1.5	1.5	2.0	1.8	1.5	6.7	Diurnal Maximum	
Z - zerospan C - Calibration M - Maintenance																																																	
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 172 ppb 24-hr 48 ppb																																																	





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Athabasca Valley - December 2023

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

Total Number of Valid Hours: 708

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Athabasca Valley - December 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	2	3	9	5	15	52	248	105	53	52	40	40	43	9	8	22	706
11 - 20	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	2
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	2	3	9	5	15	52	248	105	53	52	41	40	43	9	8	23	708

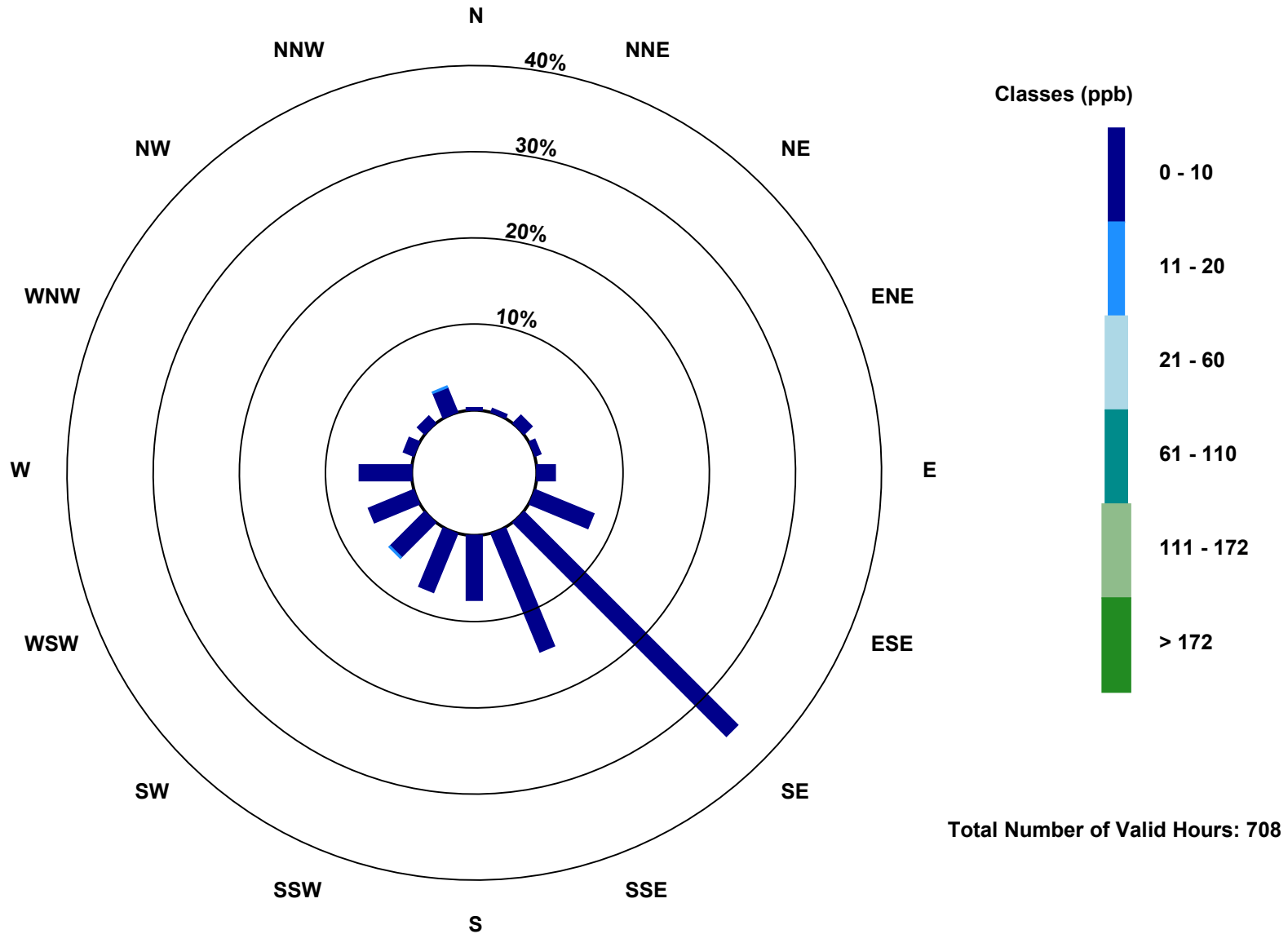
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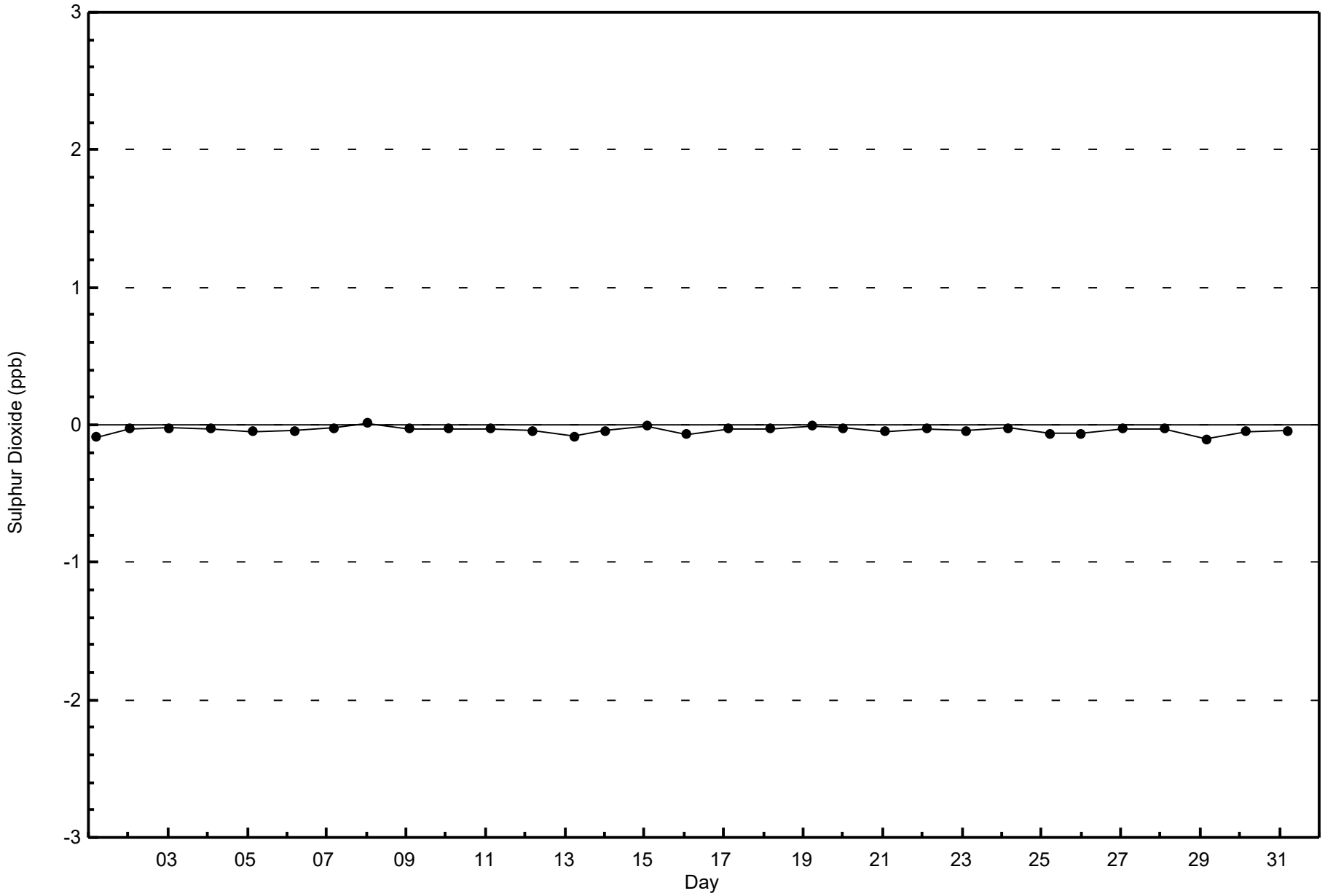
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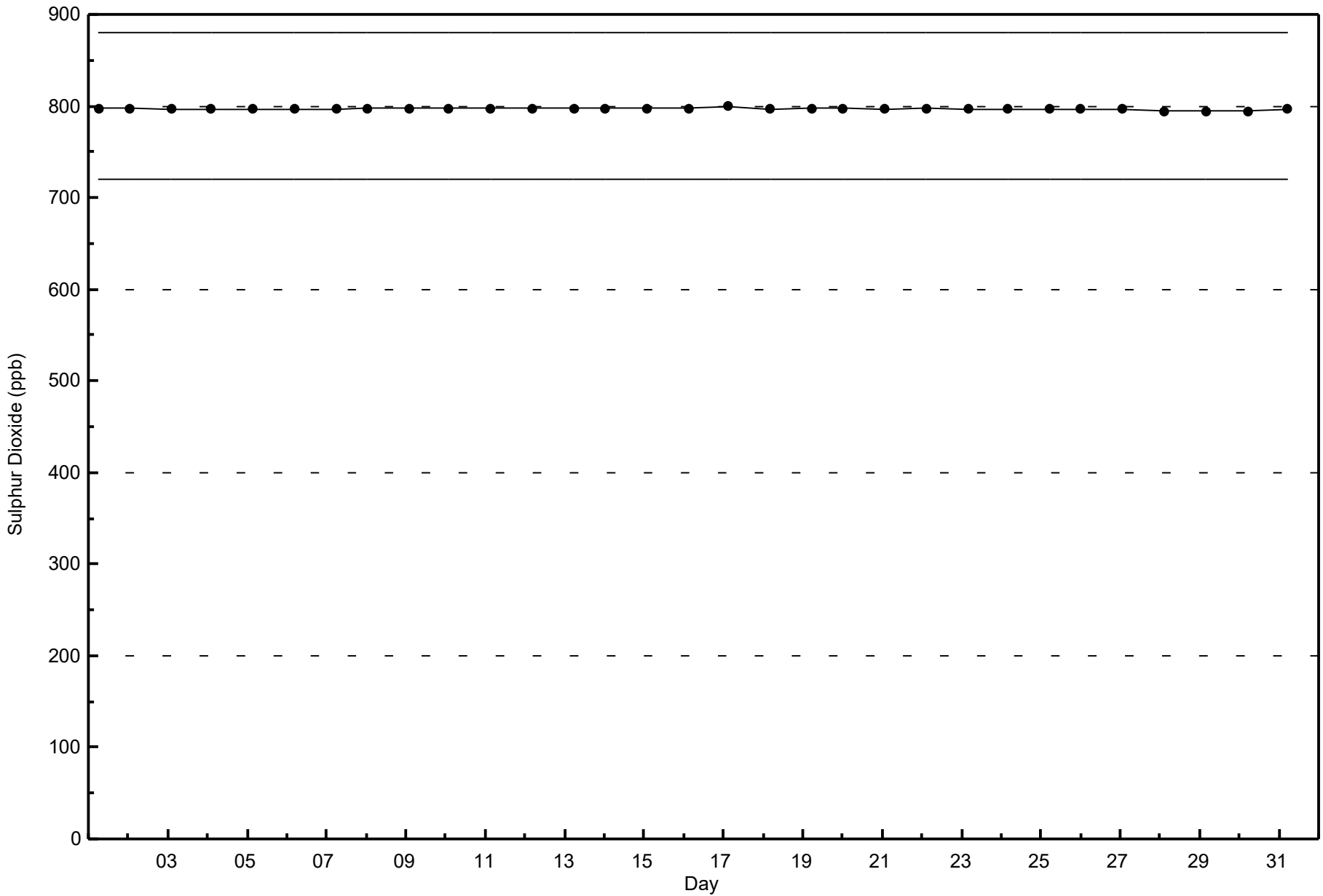


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Sulphur Dioxide (SO₂) - ppb
Athabasca Valley



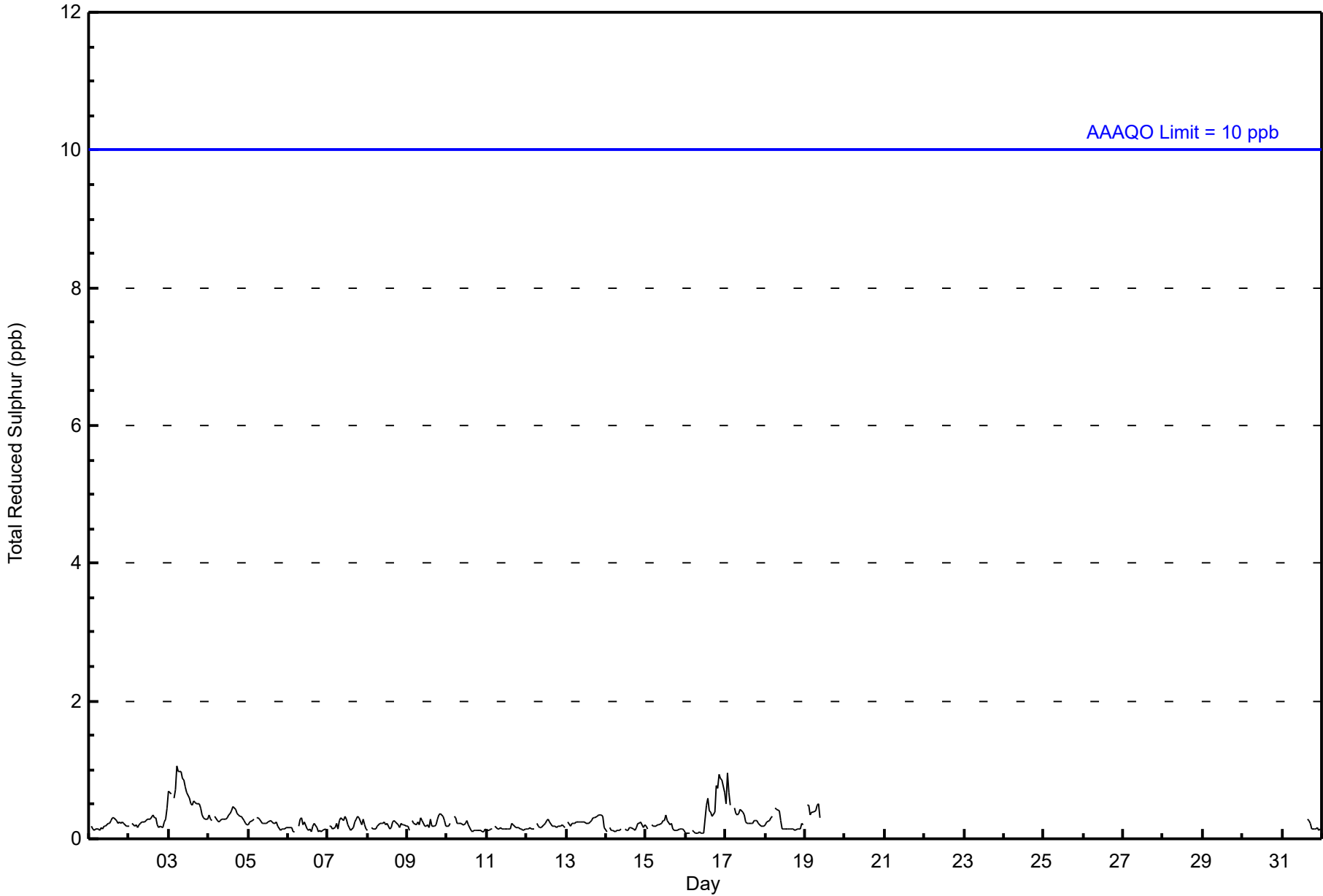






Wood Buffalo Environmental Association
Hourly Averages

Total Reduced Sulphur (TRS) - ppb
Athabasca Valley - December 2023





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Total Reduced Sulphur (TRS) - ppb
Athabasca Valley - December 2023**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	431	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: 431

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Total Reduced Sulphur (TRS) - ppb
Athabasca Valley - December 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	2	1	5	0	4	29	162	54	25	35	29	25	24	9	6	21	431
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	2	1	5	0	4	29	162	54	25	35	29	25	24	9	6	21	431

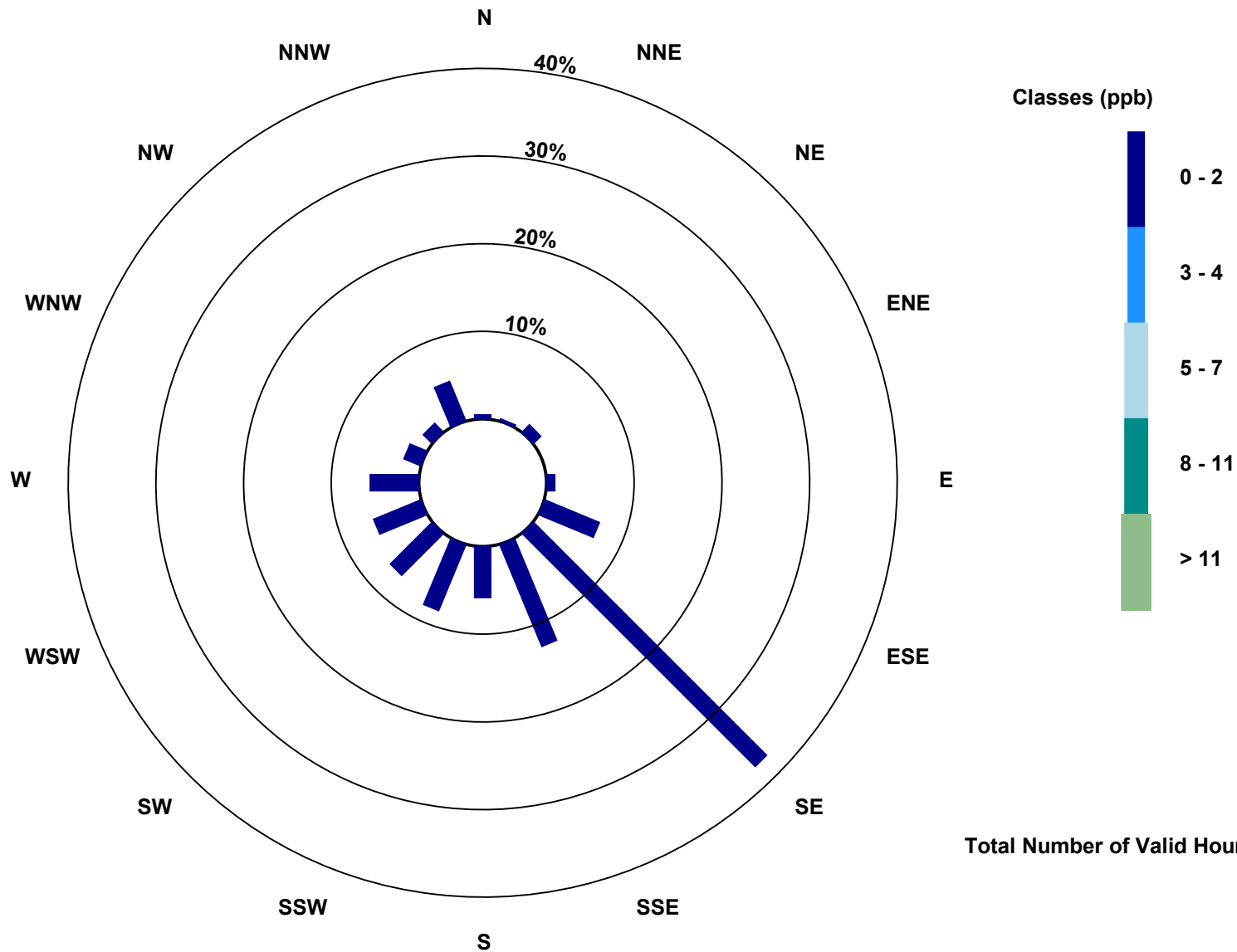
Total Number of Valid Hours: 431

Total Number of Hours: 744

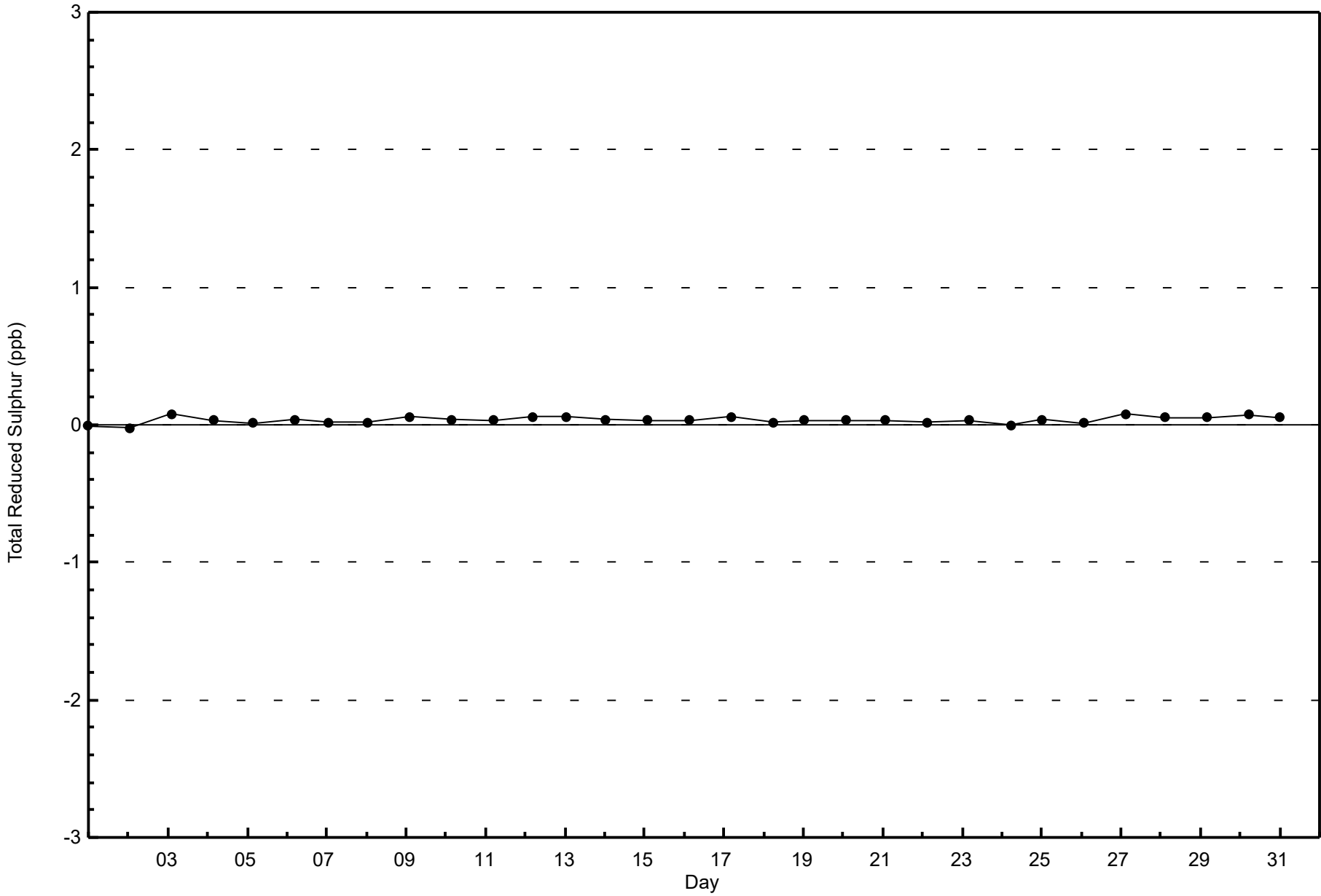


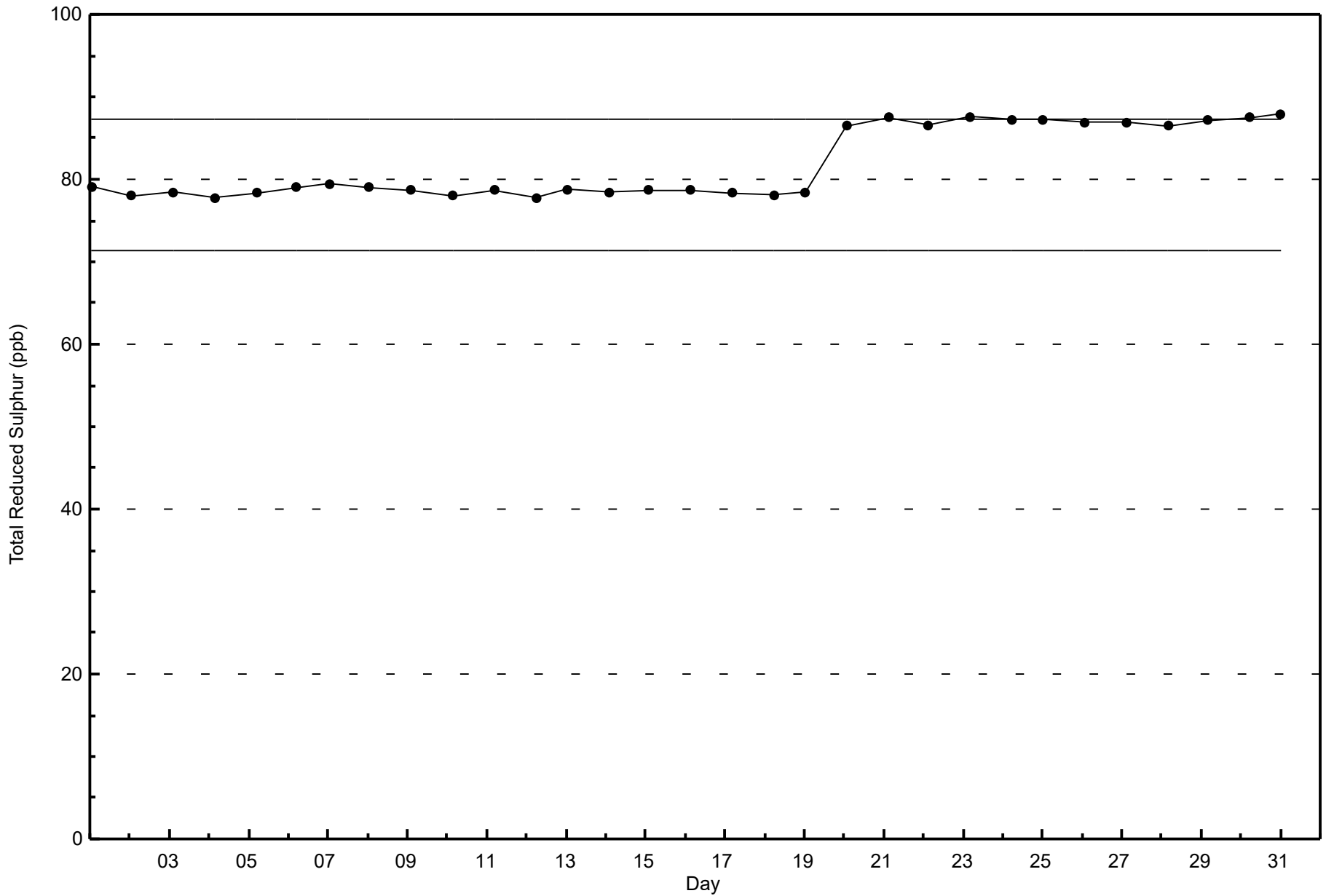
Wood Buffalo Environmental Association
Wind Rose Dec 2023

Total Reduced Sulphur (TRS) - ppb
Athabasca Valley



Total Number of Valid Hours: 431



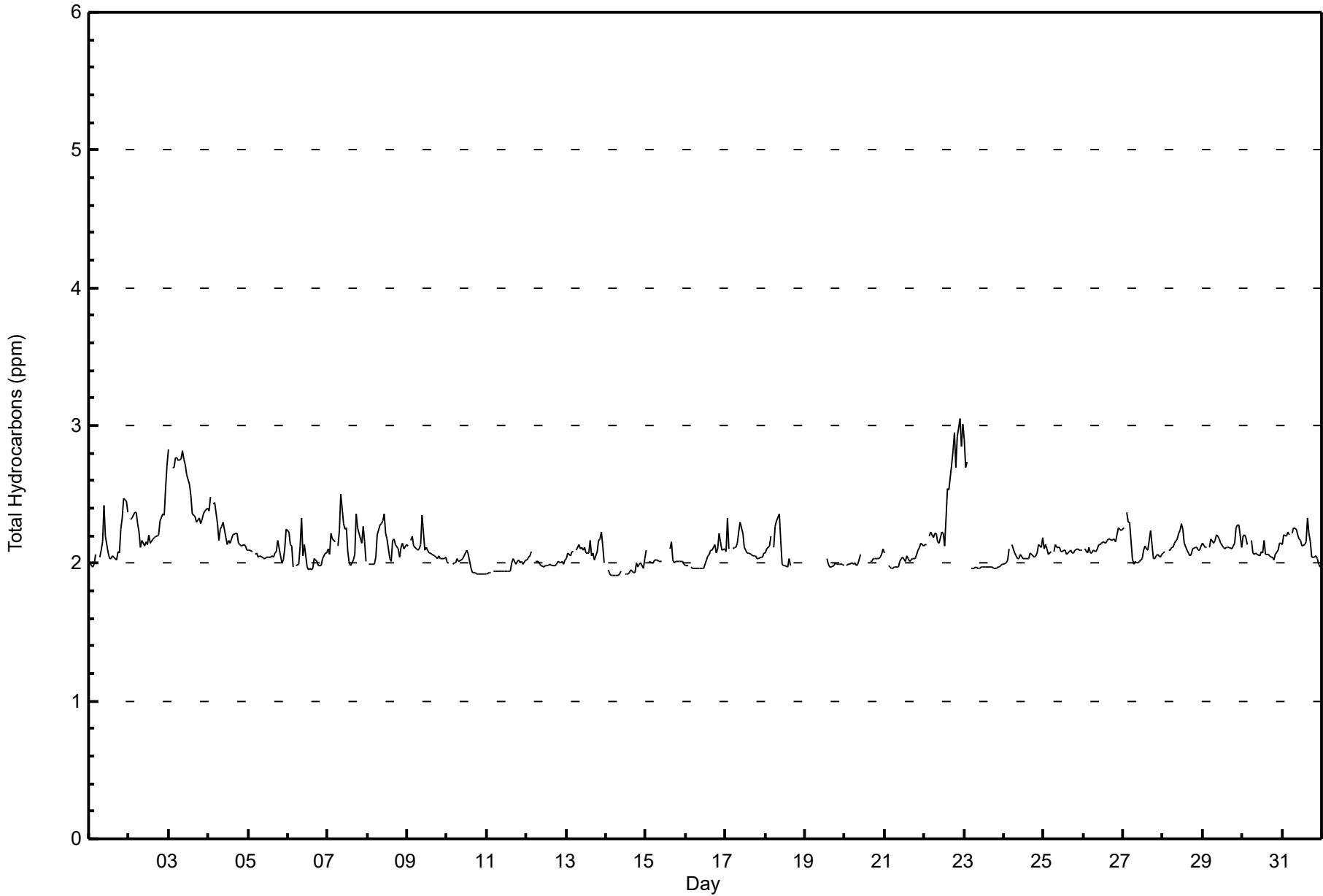




Wood Buffalo Environmental Association
Summary of Hour Averages

Total Hydrocarbons (THC) - ppm
Athabasca Valley - December 2023

Maximum Value: 3.1 ppm on Dec 22 22:00		Maximum Daily Average: 2.6 ppm on Dec 3		Hours in Service: 744																						
Minimum Value: 1.9 ppm on Dec 14 04:00		Minimum Daily Average: 1.9 ppm on Dec 14		Hours of Data: 683																						
Maximum Diurnal Average: 2.2 ppm at hour 1		Minimum Diurnal Average: 2.1 ppm at hour 14		Hours of Missing Data: 61																						
Monthly Average: 2.12 ppm		Percentiles: P ₁ = 1.9 P ₁₀ = 2.0 Q ₁ = 2.0 Median = 2.1 Q ₃ = 2.2 P ₉₀ = 2.3 P ₉₉ = 2.8		Hours of Calibration: 34																						
				Percent Operational Time: 96.4																						
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-Dec	2.0	2.0	2.0	2.0	2.1	Z	2.0	2.1	2.2	2.4	2.2	2.1	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.2	2.3	2.5	2.4	2.4	2.1	2.5
2-Dec	Z	2.3	2.3	2.4	2.4	2.3	2.2	2.1	2.2	2.1	2.2	2.1	2.2	2.1	2.2	2.2	2.2	2.2	2.2	2.3	2.4	2.3	2.6	2.7	2.3	2.7
3-Dec	2.8	Z	2.7	2.7	2.8	2.8	2.7	2.8	2.8	2.8	2.7	2.6	2.6	2.5	2.4	2.4	2.3	2.3	2.3	2.3	2.3	2.4	2.4	2.4	2.6	2.8
4-Dec	2.4	2.5	Z	2.4	2.4	2.3	2.2	2.2	2.3	2.3	2.2	2.1	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.5
5-Dec	2.1	2.1	2.1	Z	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.1	2.1	2.2	2.1	2.0	2.0	2.1	2.3	2.1	2.3
6-Dec	2.2	2.1	2.1	2.0	Z	2.0	2.0	2.1	2.3	2.0	2.1	2.0	2.0	2.0	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.0	2.3
7-Dec	2.1	2.1	2.2	2.2	2.2	Z	2.1	2.2	2.5	2.3	2.2	2.3	2.1	2.0	2.0	2.0	2.1	2.4	2.3	2.2	2.1	2.3	2.2	2.0	2.2	2.5
8-Dec	Z	2.0	2.0	2.0	2.0	2.0	2.2	2.3	2.3	2.3	2.4	2.2	2.2	2.0	2.0	2.2	2.2	2.1	2.1	2.0	2.1	2.1	2.1	2.1	2.1	2.4
9-Dec	2.1	Z	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.3	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.1	2.3
10-Dec	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	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.1
11-Dec	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
12-Dec	2.0	2.0	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	2.1
13-Dec	2.0	2.1	2.0	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.0	2.1	2.2	2.2	2.2	2.1	2.0	2.1	2.2
14-Dec	Z	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	M	1.9	1.9	1.9	2.0	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.0	1.9	2.0
15-Dec	2.1	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	C	C	C	C	2.1	2.2	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.2
16-Dec	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	2.2	2.2	2.1	2.1	2.0	2.2
17-Dec	2.1	2.3	2.1	Z	2.1	2.1	2.1	2.1	2.2	2.3	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.1	2.1	2.3
18-Dec	2.1	2.1	2.1	2.2	Z	2.1	2.3	2.3	2.4	2.2	2.0	2.0	2.0	2.0	2.0	2.0	UO	UO	UO	UO	UO	UO	UO	UO	UO	2.4
19-Dec	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	M	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
20-Dec	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	UO	UO	UO	UO	M	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.0	2.1
21-Dec	2.1	Z	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	2.1	2.1	2.1	2.1	2.0	2.1
22-Dec	2.1	2.1	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.3	2.5	2.5	2.7	2.8	3.0	2.7	2.9	3.1	2.8	3.0	2.5	3.1
23-Dec	2.9	2.7	2.7	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.9
24-Dec	2.0	2.0	2.0	2.1	Z	2.1	2.1	2.1	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.0	2.0	2.1	2.1	2.1	2.2	2.1	2.2
25-Dec	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
26-Dec	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.1	2.3
27-Dec	2.3	Z	2.4	2.3	2.3	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	2.0	2.0	2.1	2.1	2.0	2.1	2.1	2.4
28-Dec	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.3	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.3
29-Dec	2.1	2.1	2.1	Z	2.1	2.2	2.1	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.3	2.3	2.3	2.1	2.2	2.3
30-Dec	2.2	2.2	2.2	2.1	Z	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.1	2.1	2.2	2.1	2.2
31-Dec	2.1	2.2	2.2	2.2	2.2	Z	2.2	2.3	2.2	2.2	2.2	2.2	2.1	2.1	2.2	2.3	2.2	2.2	2.0	2.0	2.1	2.0	2.0	2.0	2.2	2.3
																								Diurnal Average		
																								Diurnal Maximum		
Z - zerospan																										
C - Calibration																										
M - Maintenance																										
UO - Unstable Operation																										





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Athabasca Valley - December 2023

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	274	40.12	40.12
2.1 - 3.0	408	59.74	99.85
3.1 - 10.0	1	0.15	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 683

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Total Hydrocarbons (THC) - ppm
Athabasca Valley - December 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	2	0	5	19	92	22	23	25	17	23	30	9	5	1	274
2.1 - 3.0	0	1	6	4	9	31	153	82	30	27	23	14	12	0	2	14	408
3.1 - 10.0	0	0	0	0	0	0	0	1	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
Totals	0	2	8	4	14	50	245	105	53	52	40	37	42	9	7	15	683

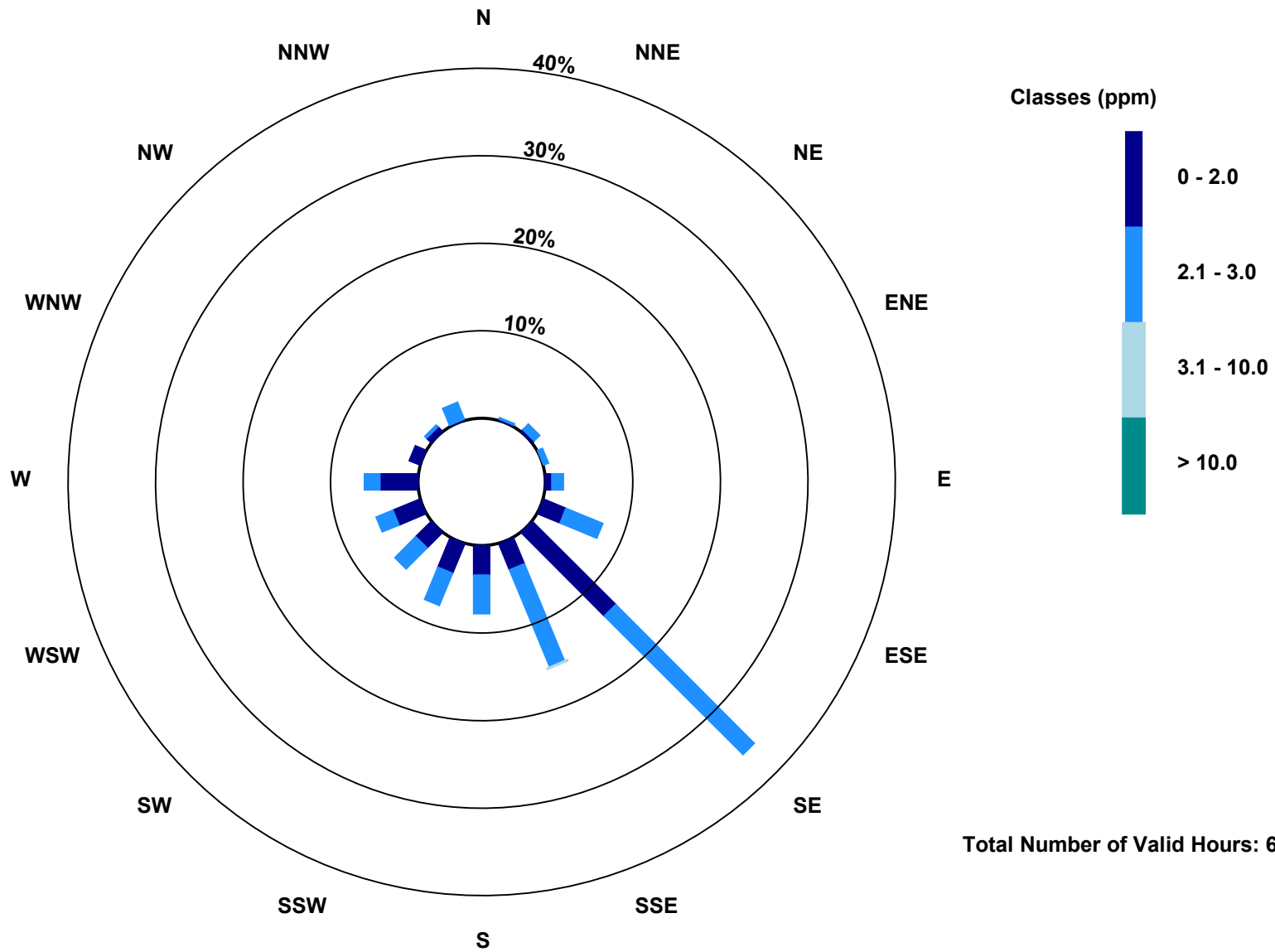
Total Number of Valid Hours: 683

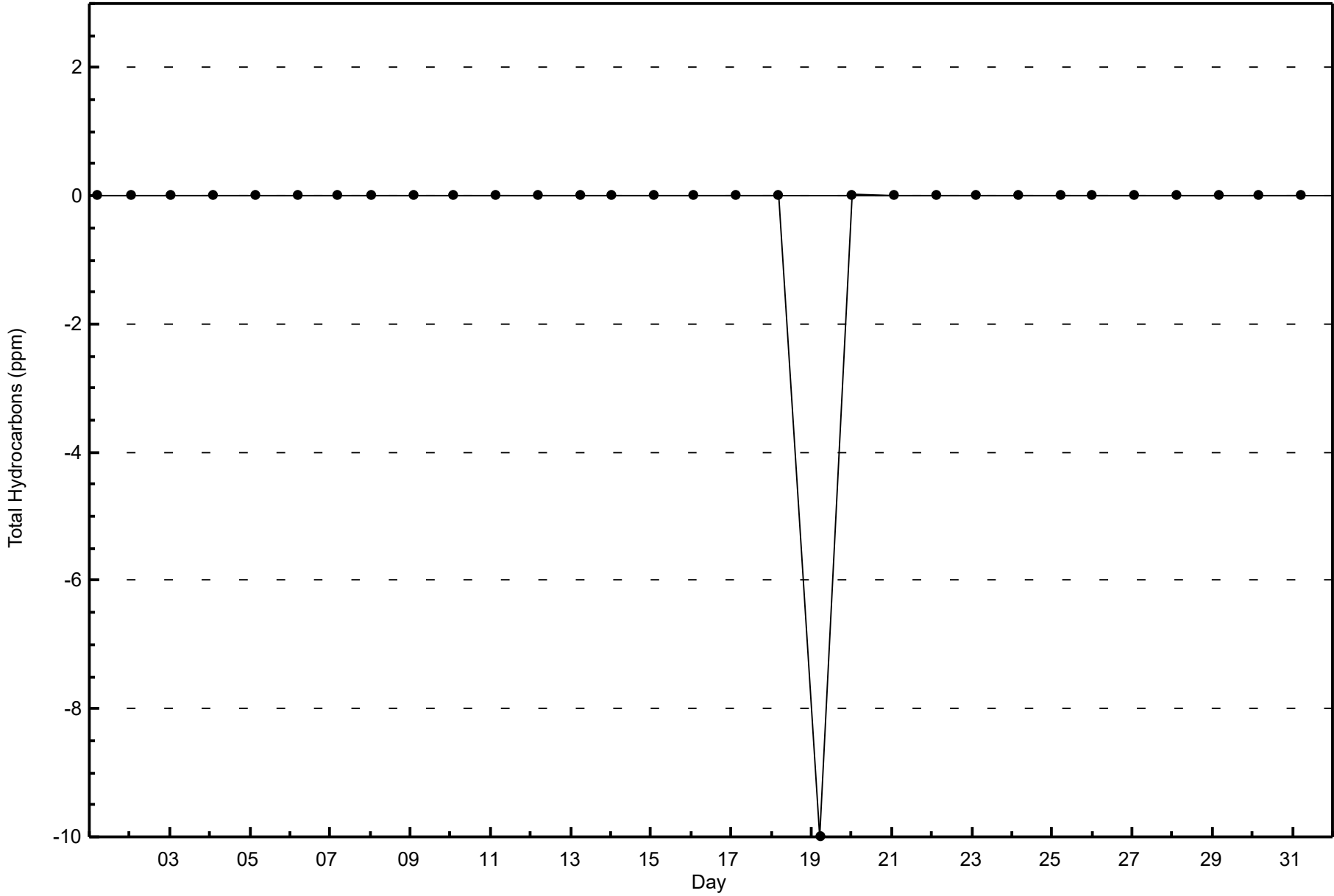
Total Number of Hours: 744

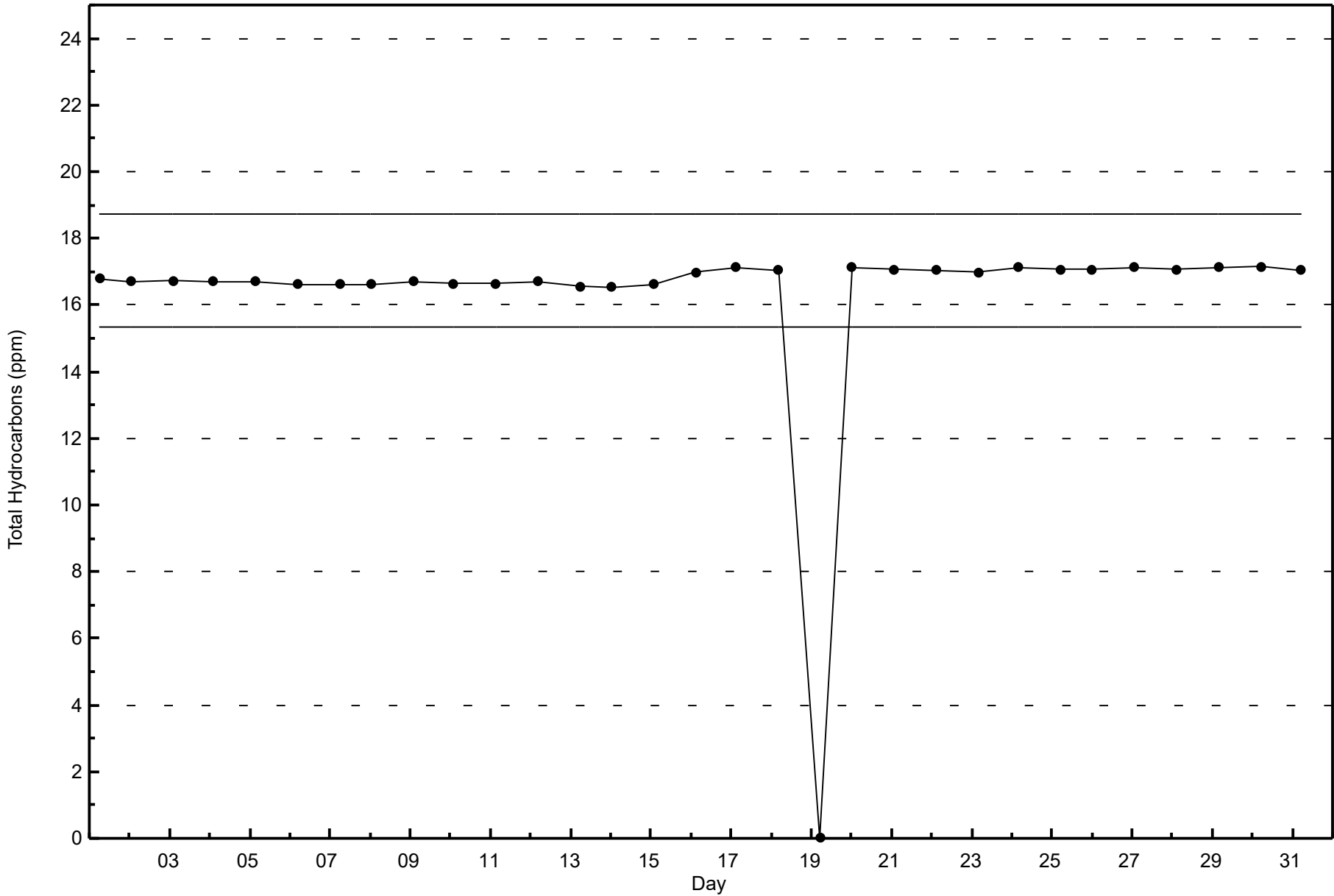


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Total Hydrocarbons (THC) - ppm
Athabasca Valley





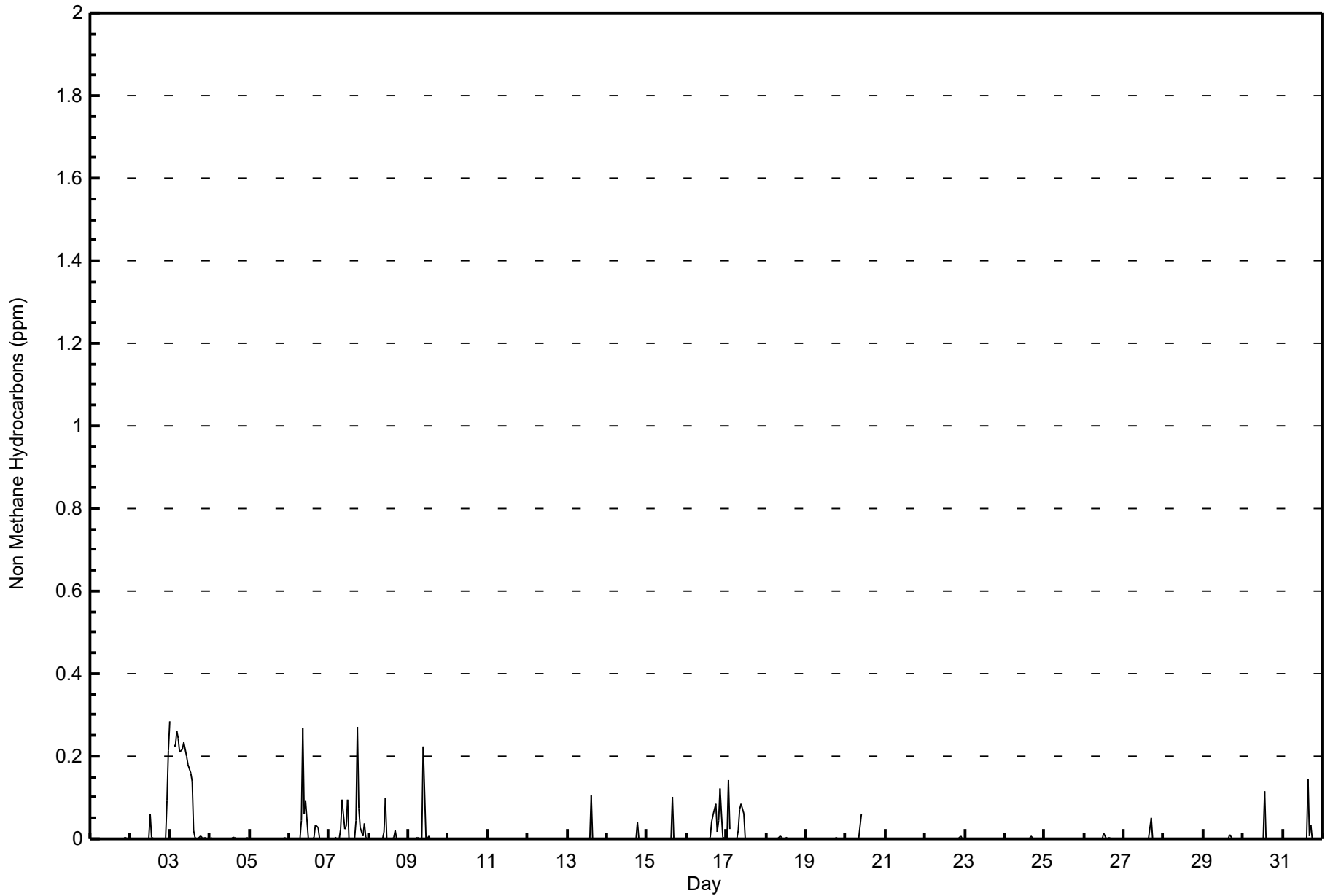




Wood Buffalo Environmental Association
Summary of Hour Averages

Non Methane Hydrocarbons (NMHC) - ppm
Athabasca Valley - December 2023

Maximum Value: 0.286 ppm on Dec 3 01:00		Maximum Daily Average: 0.123 ppm on Dec 3		Hours in Service: 744																								
Minimum Value: 0.000 ppm on Dec 1 01:00		Minimum Daily Average: 0.000 ppm on Dec 10		Hours of Data: 683																								
Maximum Diurnal Average: 0.023 ppm at hour 10		Minimum Diurnal Average: 0.002 ppm at hour 20		Hours of Missing Data: 61																								
Monthly Average: 0.009 ppm		Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.0 Median = 0.0 Q ₃ = 0.0 P ₉₀ = 0.0 P ₉₉ = 0.2		Hours of Calibration: 34																								
				Percent Operational Time: 96.4																								
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-Dec	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	0.004	0.000	0.000	0.000	0.000	0.000	0.004
2-Dec	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.062	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.090	0.213	0.016	0.213	
3-Dec	0.286	Z	0.227	0.225	0.260	0.243	0.211	0.217	0.235	0.217	0.200	0.179	0.158	0.138	0.021	0.002	0.000	0.000	0.005	0.002	0.000	0.002	0.000	0.000	0.000	0.123	0.286	
4-Dec	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	0.003	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.005	0.000	0.001	0.005	
5-Dec	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	0.003	0.000	0.000	0.000	0.000	0.003	
6-Dec	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.044	0.269	0.060	0.091	0.000	0.000	0.000	0.000	0.005	0.034	0.026	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.023	0.269	
7-Dec	0.000	0.000	0.000	0.000	0.004	Z	0.000	0.023	0.095	0.023	0.031	0.096	0.000	0.000	0.000	0.000	0.043	0.271	0.074	0.026	0.006	0.037	0.004	0.001	0.032	0.271		
8-Dec	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.016	0.099	0.000	0.000	0.000	0.000	0.005	0.020	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.006	0.099	
9-Dec	0.000	Z	0.000	0.000	0.000	0.004	0.000	0.000	0.000	0.000	0.222	0.000	0.000	0.007	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.010	0.222		
10-Dec	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	
11-Dec	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	
12-Dec	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	
13-Dec	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	0.106	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.005	0.106		
14-Dec	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	M	0.000	0.000	0.001	0.000	0.000	0.041	0.000	0.000	0.000	0.000	0.000	0.002	0.041		
15-Dec	0.000	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	0.000	0.102	0.000	0.000	0.000	0.000	0.000	0.000	0.005	0.102		
16-Dec	0.000	0.000	Z	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.039	0.057	0.084	0.016	0.046	0.121	0.062	0.002	0.000	0.019	0.121		
17-Dec	0.000	0.142	0.024	Z	0.000	0.000	0.000	0.020	0.073	0.083	0.061	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.018	0.142		
18-Dec	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.008	0.002	0.000	0.000	0.005	0.000	0.000	0.000	UO	UO	UO	UO	UO	UO	UO	UO	--	0.008		
19-Dec	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	M	M	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	--	0.002		
20-Dec	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.062	UO	UO	UO	UO	M	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.062		
21-Dec	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	
22-Dec	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	0.000	0.006	
23-Dec	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	
24-Dec	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	0.007	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.007	
25-Dec	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	
26-Dec	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.015	0.000	0.000	0.003	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.015		
27-Dec	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	0.050	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.050		
28-Dec	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	
29-Dec	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	0.009	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.009	
30-Dec	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	0.115	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.005	0.115		
31-Dec	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	0.145	0.006	0.033	0.000	0.000	0.000	0.000	0.000	0.000	0.008	0.145		
		0.011	0.006	0.010	0.009	0.011	0.010	0.007	0.010	0.023	0.023	0.018	0.010	0.009	0.009	0.004	0.010	0.008	0.014	0.005	0.002	0.004	0.004	0.003	0.007	Diurnal Average		
		0.286	0.142	0.227	0.225	0.260	0.243	0.211	0.217	0.269	0.222	0.200	0.179	0.158	0.138	0.106	0.145	0.057	0.271	0.074	0.046	0.121	0.062	0.090	0.213	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 - December 2023**

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 0.005	617	90.34	90.34
0.006 - 0.05	28	4.10	94.44
0.06 - 0.1	22	3.22	97.66
> 0.1	16	2.34	100.00

Total Number of Valid Hours: 683

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Non Methane Hydrocarbons (NMHC) - ppm
Athabasca Valley - December 2023**

Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 0.005	0	1	8	4	14	45	226	86	49	49	38	34	40	9	7	7	617
0.006 - 0.05	0	0	0	0	0	2	6	10	3	2	0	0	1	0	0	4	28
0.06 - 0.1	0	1	0	0	0	2	8	5	0	1	0	1	0	0	0	4	22
> 0.1	0	0	0	0	0	1	5	4	1	0	2	2	1	0	0	0	16
Totals	0	2	8	4	14	50	245	105	53	52	40	37	42	9	7	15	683

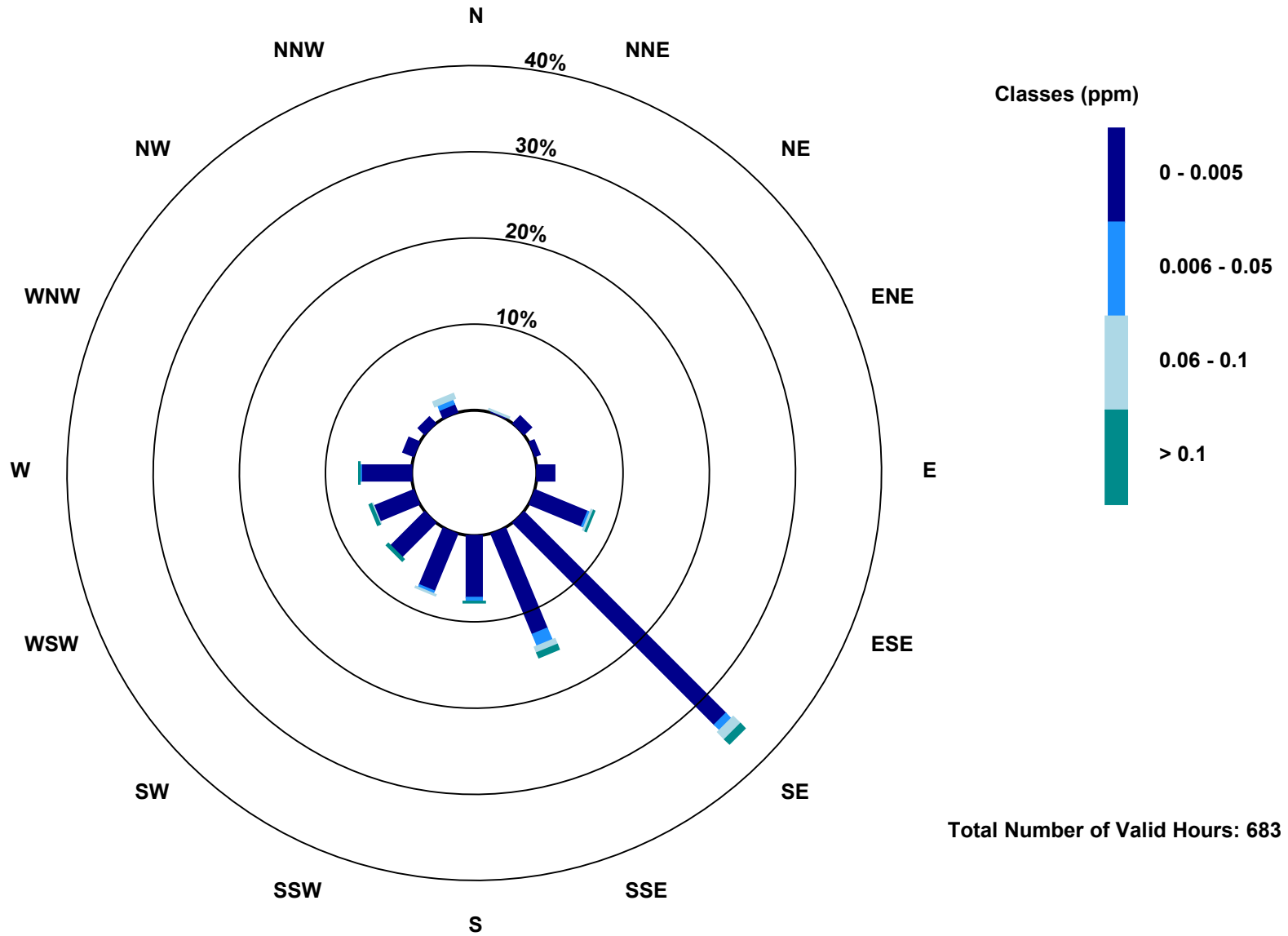
Total Number of Valid Hours: 683

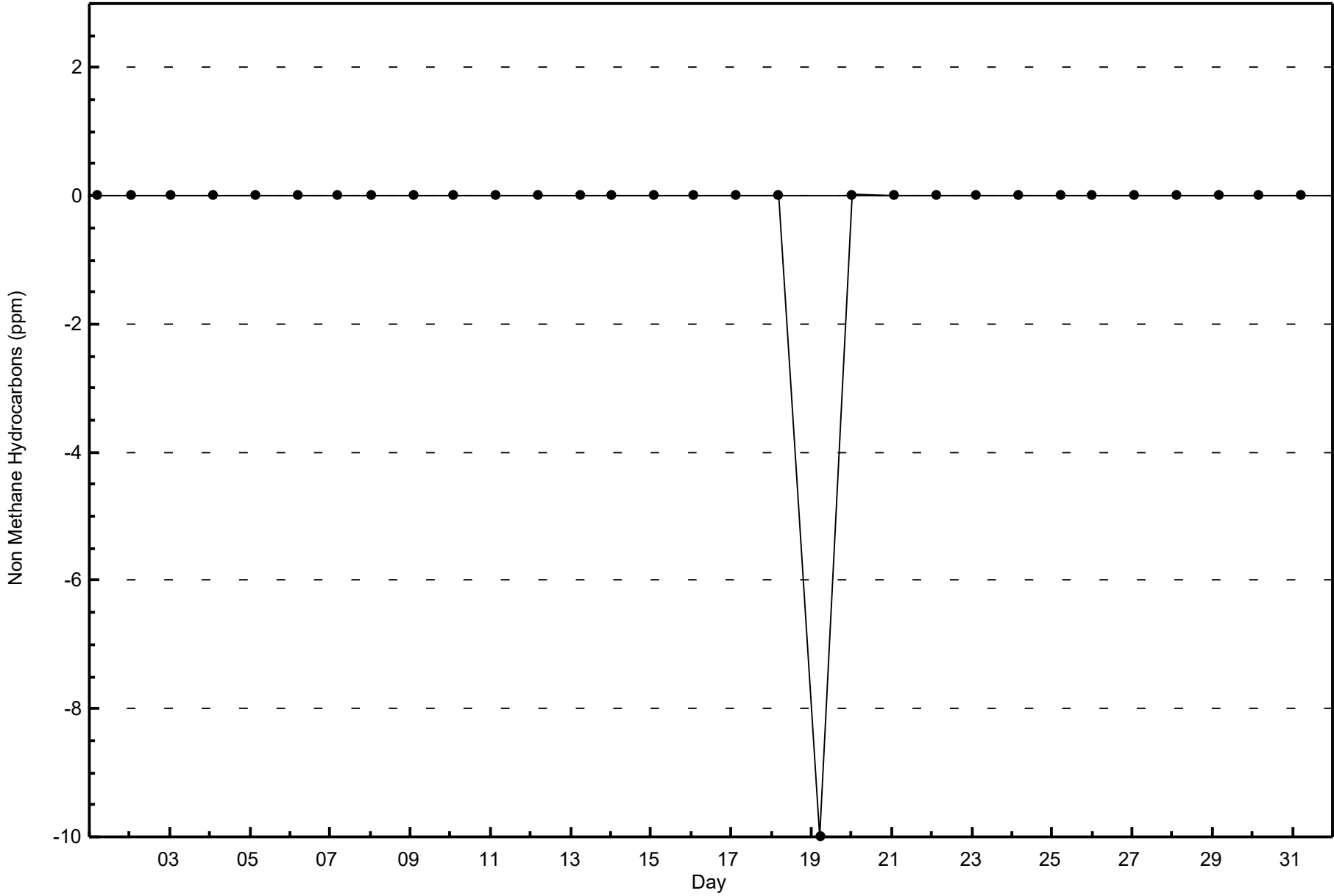
Total Number of Hours: 744

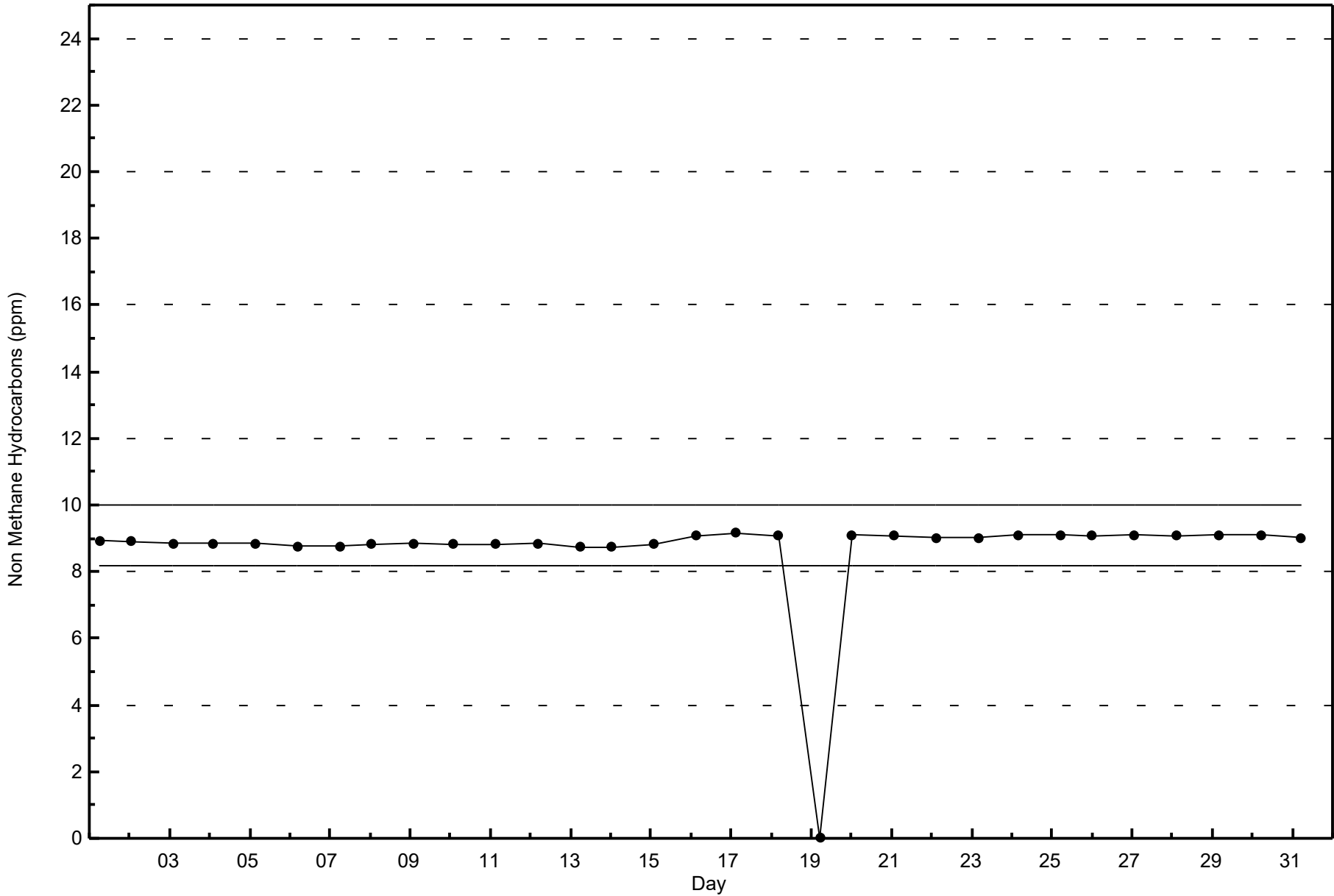


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Non Methane Hydrocarbons (NMHC) - ppm
Athabasca Valley







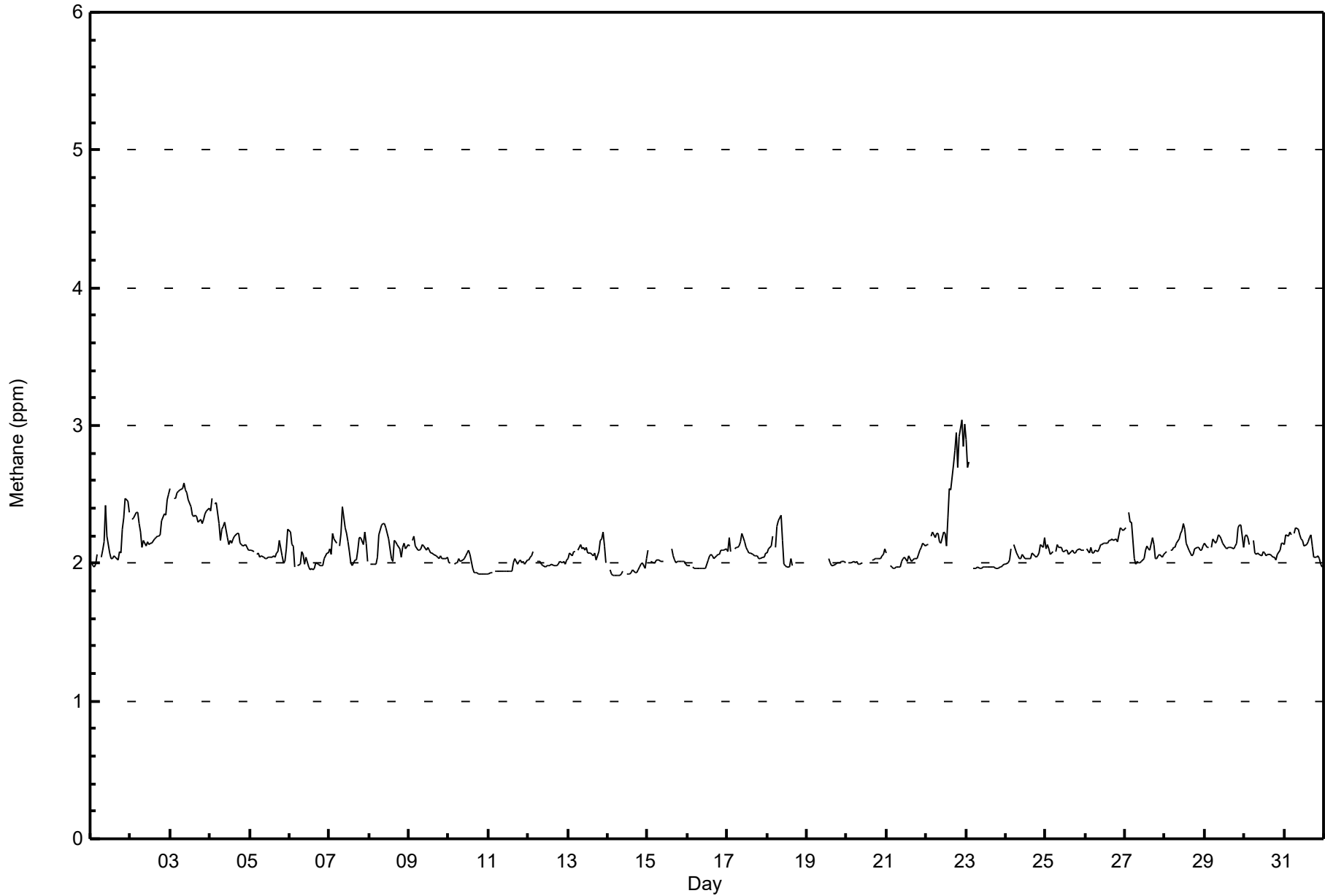


Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 3.0 ppm on Dec 22 22:00	Maximum Daily Average: 2.5 ppm on Dec 22		Hours of Data:	683
Minimum Value: 1.9 ppm on Dec 14 04:00	Minimum Daily Average: 1.9 ppm on Dec 14		Hours of Missing Data:	61
Maximum Diurnal Average: 2.1 ppm at hour 1	Minimum Diurnal Average: 2.1 ppm at hour 14		Hours of Calibration:	34
Monthly Average: 2.11 ppm	Percentiles: P ₁ = 1.9 P ₁₀ = 2.0 Q ₁ = 2.0 Median = 2.1 Q ₃ = 2.1 P ₉₀ = 2.3 P ₉₉ = 2.8		Percent Operational Time:	96.4

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-Dec	2.0	2.0	2.0	2.0	2.1	Z	2.0	2.1	2.2	2.4	2.2	2.1	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.2	2.3	2.5	2.4	2.4	2.1	2.5	
2-Dec	Z	2.3	2.3	2.4	2.4	2.3	2.2	2.1	2.2	2.1	2.2	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.3	2.4	2.3	2.5	2.5	2.3	2.5	
3-Dec	2.5	Z	2.5	2.5	2.5	2.5	2.5	2.5	2.6	2.5	2.5	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	2.6	
4-Dec	2.4	2.5	Z	2.4	2.4	2.3	2.2	2.2	2.3	2.3	2.2	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.5	
5-Dec	2.1	2.1	2.1	Z	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.1	2.1	2.2	2.1	2.0	2.0	2.1	2.3	2.1	2.3	
6-Dec	2.2	2.1	2.1	2.0	Z	2.0	2.0	2.1	2.1	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	2.1	2.1	2.0	2.2	
7-Dec	2.1	2.1	2.2	2.2	2.1	Z	2.1	2.2	2.4	2.3	2.2	2.2	2.1	2.0	2.0	2.0	2.0	2.1	2.2	2.2	2.1	2.2	2.1	2.0	2.1	2.4	
8-Dec	Z	2.0	2.0	2.0	2.0	2.0	2.2	2.3	2.3	2.3	2.3	2.2	2.2	2.0	2.0	2.2	2.2	2.1	2.1	2.0	2.1	2.1	2.1	2.1	2.1	2.3	
9-Dec	2.1	Z	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.1	2.2	
10-Dec	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	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.1	
11-Dec	1.9	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
12-Dec	2.0	2.0	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	2.1	
13-Dec	2.0	2.1	2.0	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	2.0	2.1	2.2	2.2	2.2	2.1	2.0	2.1	2.2	
14-Dec	Z	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	M	1.9	1.9	1.9	1.9	2.0	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.0	1.9	2.0	
15-Dec	2.1	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	C	C	C	C	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	
16-Dec	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	2.1	2.1	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
17-Dec	2.1	2.2	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	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.1	2.1	2.2	
18-Dec	2.1	2.1	2.1	2.2	Z	2.1	2.3	2.3	2.3	2.2	2.0	2.0	2.0	2.0	2.0	2.0	2.0	UO	UO	UO	UO	UO	UO	UO	UO	2.3	
19-Dec	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	M	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	
20-Dec	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	UO	UO	UO	UO	M	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.0	2.1	
21-Dec	2.1	Z	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	2.1	2.1	2.1	2.1	2.1	2.1	
22-Dec	2.1	2.1	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.3	2.5	2.5	2.7	2.8	3.0	2.7	2.9	3.0	2.8	3.0	2.5	3.0	
23-Dec	2.9	2.7	2.7	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.9	
24-Dec	2.0	2.0	2.0	2.1	Z	2.1	2.1	2.1	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.0	2.0	2.1	2.1	2.1	2.2	2.1	2.2	
25-Dec	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	
26-Dec	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.1	2.3	
27-Dec	2.3	Z	2.4	2.3	2.3	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	2.0	2.0	2.1	2.1	2.0	2.1	2.1	2.4	
28-Dec	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.3	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.3	
29-Dec	2.1	2.1	2.1	Z	2.1	2.2	2.1	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.3	2.3	2.3	2.1	2.2	2.3	
30-Dec	2.2	2.2	2.2	2.1	Z	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.1	2.1	2.2	2.1	2.1	2.2	
31-Dec	2.1	2.2	2.2	2.2	2.2	Z	2.2	2.3	2.2	2.2	2.2	2.2	2.1	2.1	2.2	2.2	2.2	2.1	2.0	2.0	2.1	2.0	2.0	2.0	2.1	2.3	

2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	Diurnal Average
2.9	2.7	2.7	2.5	2.5	2.5	2.5	2.5	2.5	2.6	2.5	2.5	2.5	2.4	2.4	2.5	2.5	2.7	2.8	3.0	2.7	2.9	3.0	2.8	3.0	2.1	2.1	2.1	Diurnal Maximum

Z - zerospan C - Calibration M - Maintenance UO - Unstable Operation





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Methane (CH₄) - ppm
Athabasca Valley - December 2023

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	278	40.70	40.70
2.1 - 3.0	405	59.30	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 683

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Methane (CH₄) - ppm
Athabasca Valley - December 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	2	0	5	19	93	24	23	25	17	23	30	9	5	2	278
2.1 - 3.0	0	1	6	4	9	31	152	81	30	27	23	14	12	0	2	13	405
3.1 - 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	0	2	8	4	14	50	245	105	53	52	40	37	42	9	7	15	683

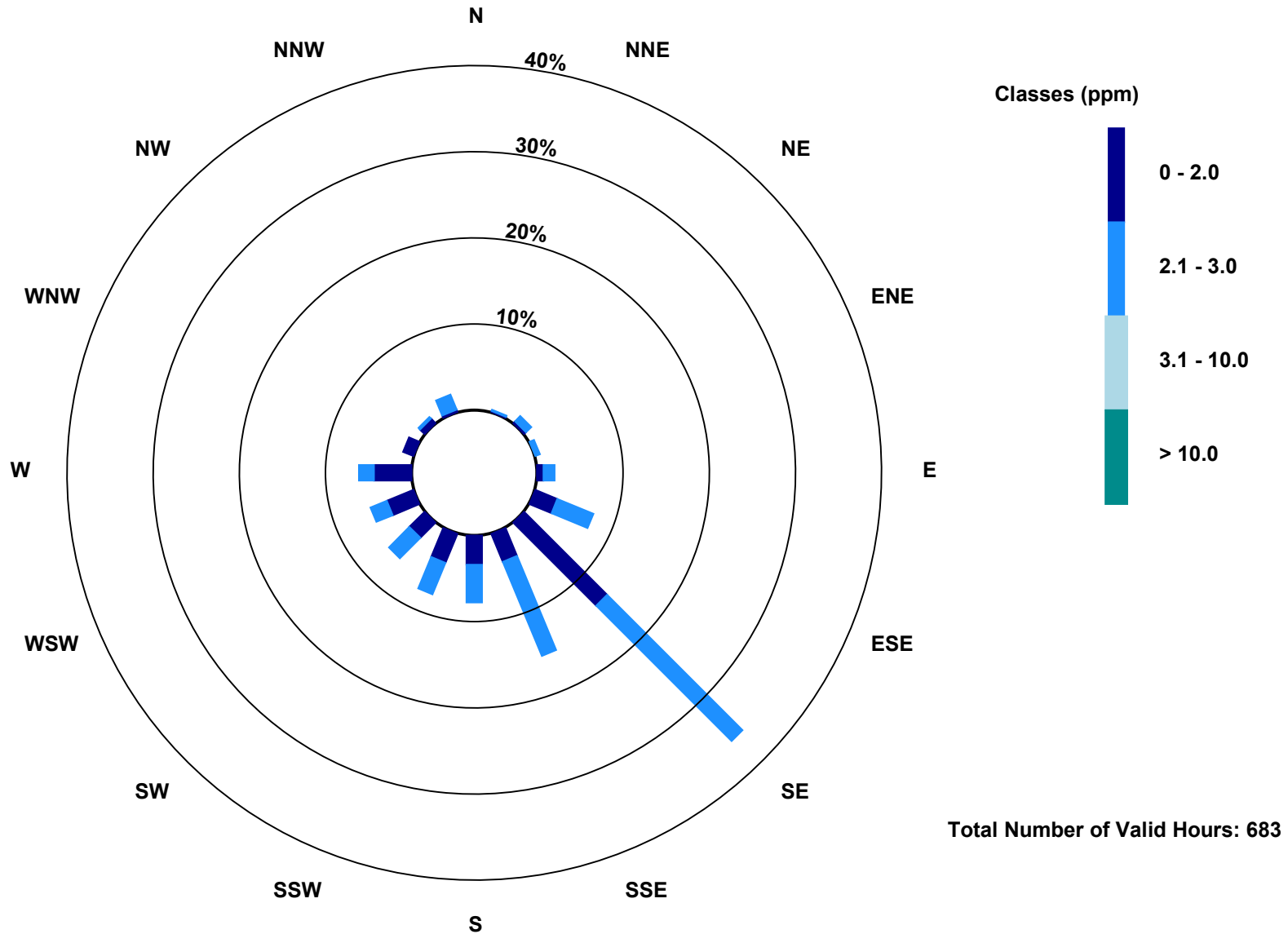
Total Number of Valid Hours: 683

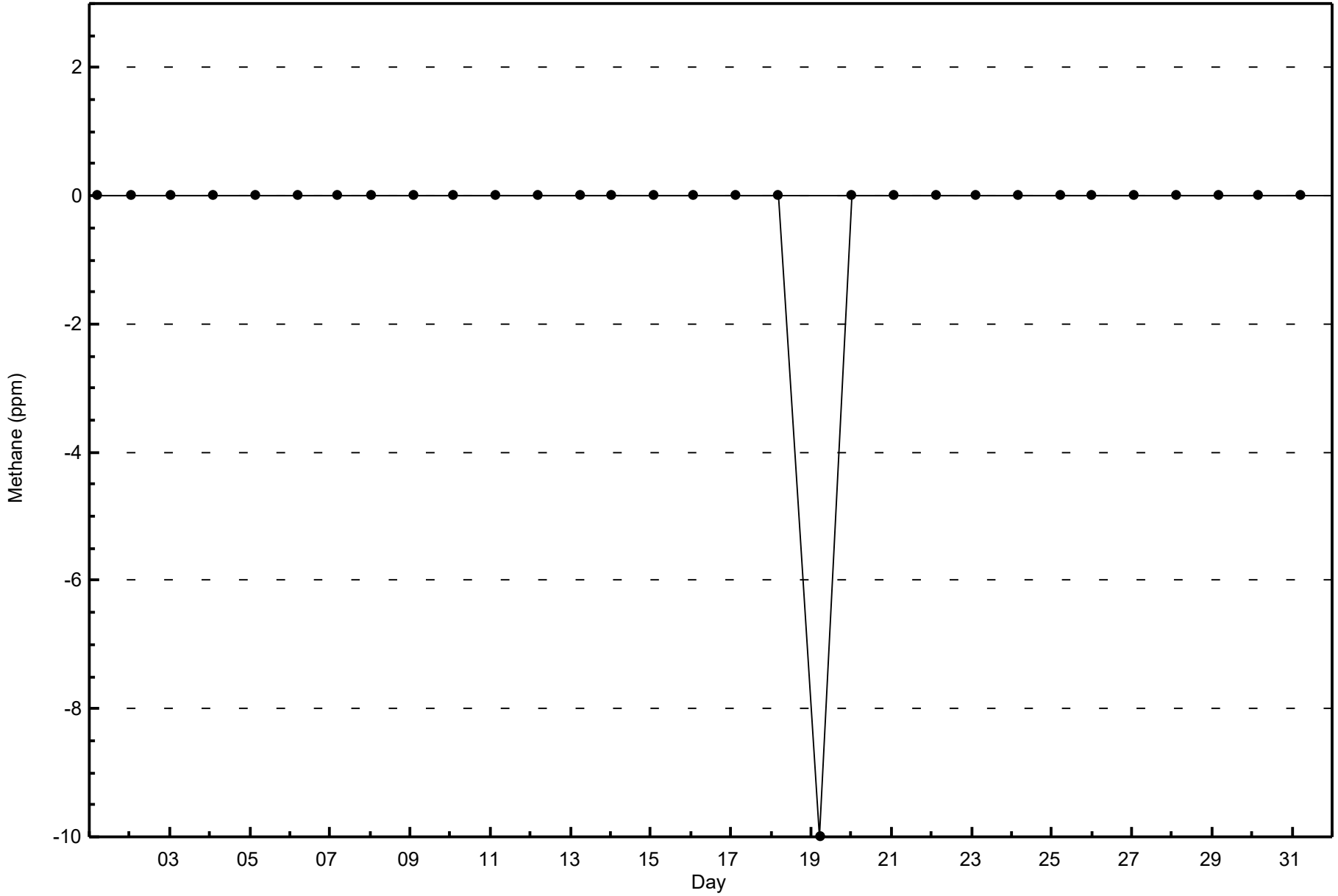
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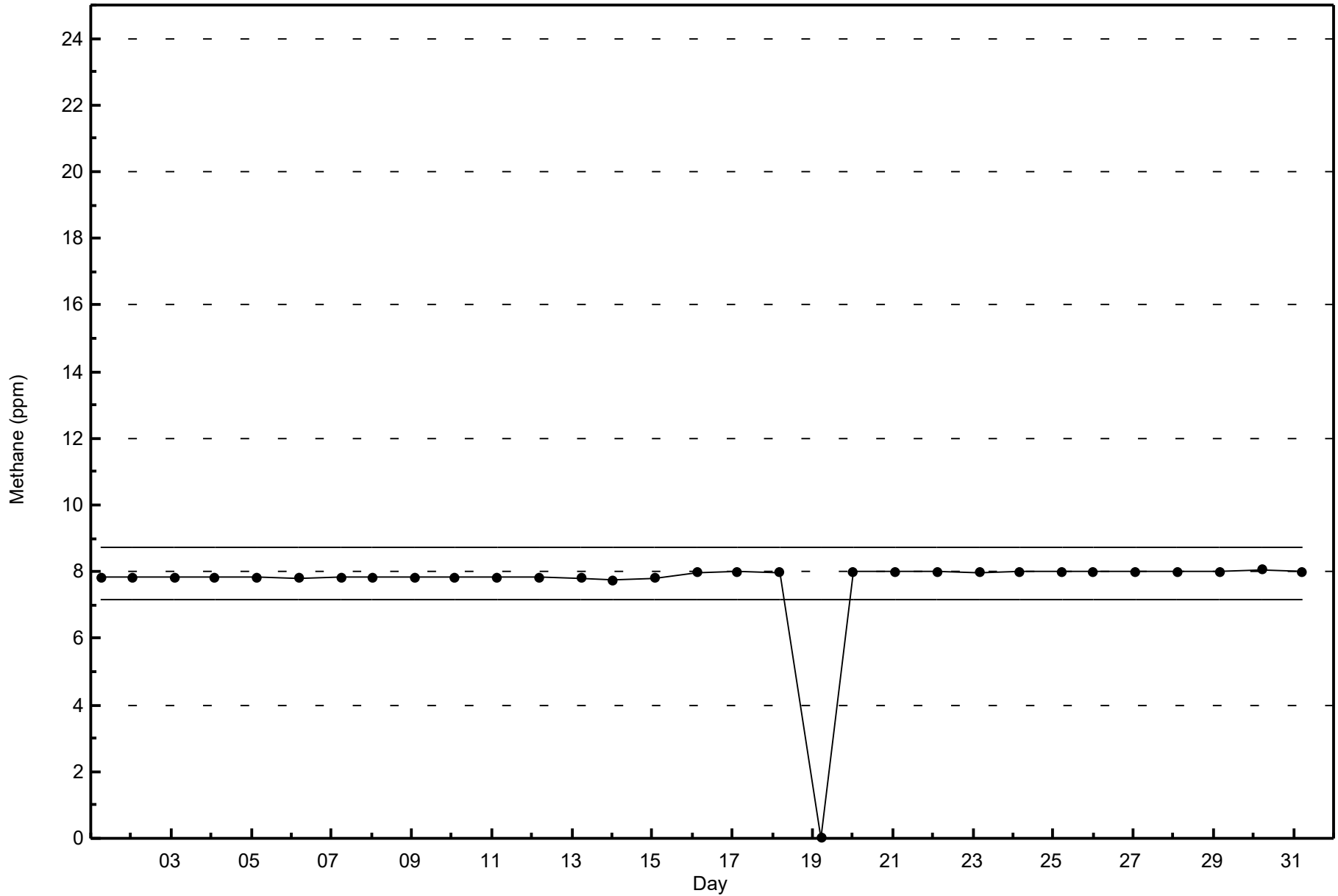


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Methane (CH₄) - ppm
Athabasca Valley

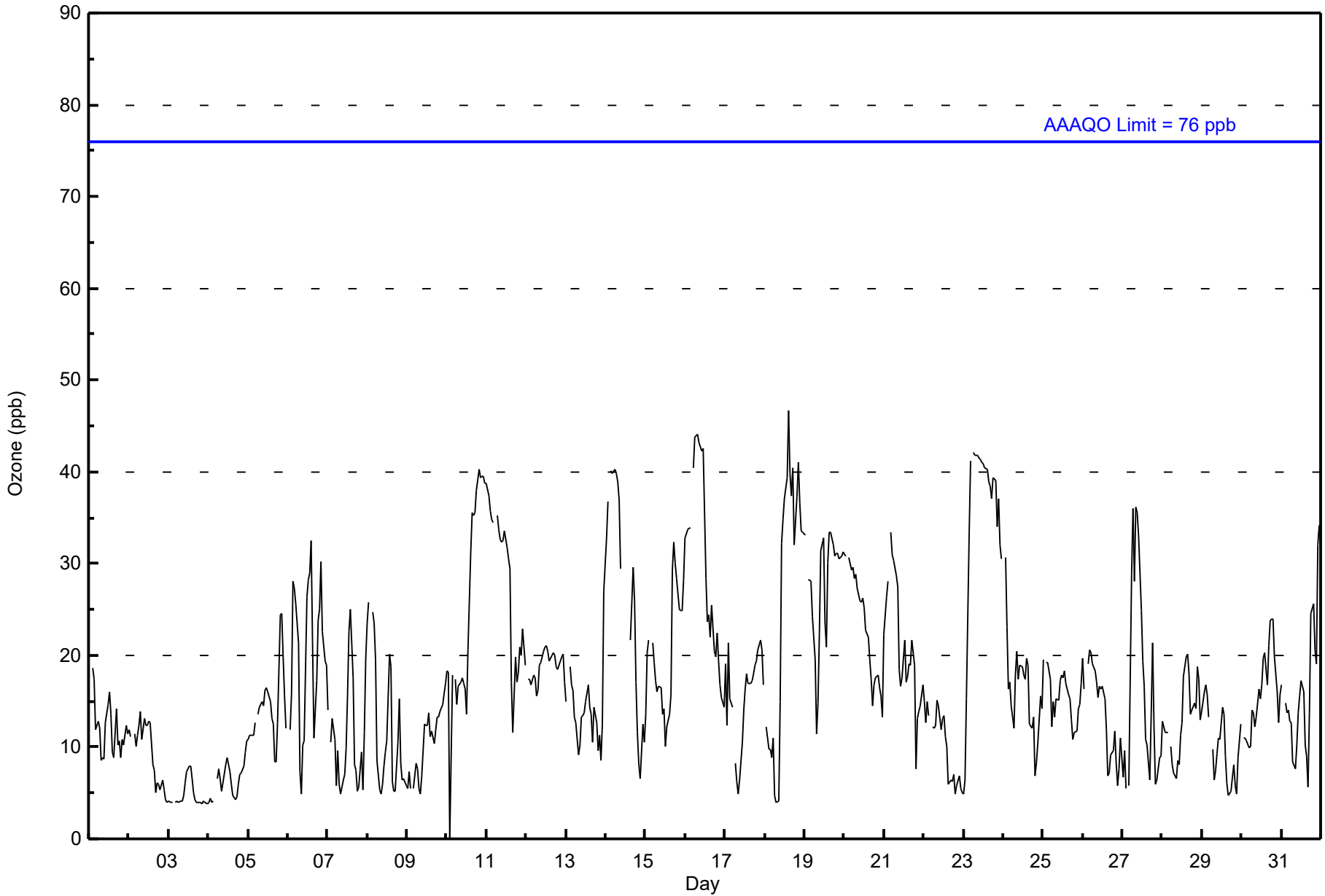








Number of Exceedences (AAAQO):		1-hr: 0		24-hr: 0		Hours in Service:															744										
Maximum Value: 46.7 ppb on Dec 18 15:00				Maximum Daily Average: 34.7 ppb on Dec 23		Hours of Data:															708										
Minimum Value: 0.0 ppb on Dec 10 03:00				Minimum Daily Average: 4.8 ppb on Dec 3		Hours of Missing Data:															36										
Maximum Diurnal Average: 19.5 ppb at hour 4				Minimum Diurnal Average: 15.8 ppb at hour 22		Hours of Calibration:															35										
Monthly Average: 17.32 ppb				Percentiles: P ₁ = 4.0 P ₁₀ = 6.0 Q ₁ = 10.2 Median = 15.3 Q ₃ = 21.4 P ₉₀ = 33.2 P ₉₉ = 42.2		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-Dec	13.4	Z	18.6	17.3	11.9	12.9	12.0	8.5	8.8	8.6	12.7	14.6	16.1	13.5	9.5	8.9	14.2	10.2	10.7	8.9	10.9	10.2	12.3	11.4	12.0	18.6					
2-Dec	11.8	11.1	Z	11.5	10.1	11.3	12.4	13.9	10.8	13.1	12.4	12.8	12.7	8.0	7.5	5.0	6.2	5.9	5.4	6.4	5.3	4.2	4.0	9.3	13.9						
3-Dec	4.1	4.0	4.0	Z	3.9	4.0	4.0	4.1	4.0	4.7	6.1	7.3	8.0	7.9	6.6	5.1	4.2	4.0	4.0	3.9	3.8	4.1	4.0	3.9	4.8	8.0					
4-Dec	4.0	4.4	4.0	4.1	Z	6.6	7.6	6.5	5.2	6.1	8.1	8.9	8.0	7.3	6.0	4.8	4.3	4.5	5.9	7.1	7.2	7.9	9.5	10.6	6.5	10.6					
5-Dec	10.9	11.2	11.2	11.3	12.7	Z	13.6	14.4	15.0	14.5	16.2	16.4	16.0	14.9	13.1	12.5	8.5	8.4	12.7	24.3	24.6	19.9	15.6	12.0	14.3	24.6					
6-Dec	Z	12.0	15.9	28.1	27.3	25.7	21.3	7.4	4.8	10.2	10.8	26.4	28.1	28.9	32.6	21.3	11.0	17.3	23.8	25.0	30.2	22.6	19.4	18.9	20.4	32.6					
7-Dec	14.1	Z	10.5	13.2	10.8	5.7	9.6	6.0	4.9	6.4	7.0	10.0	15.7	22.7	25.0	17.6	8.1	7.5	5.1	5.6	9.4	5.4	11.7	19.7	10.9	25.0					
8-Dec	23.6	25.8	Z	24.7	23.5	19.6	8.5	5.3	4.9	6.0	7.9	9.4	10.6	20.1	18.7	6.2	5.2	5.2	10.5	15.2	8.2	6.4	6.6	5.8	12.1	25.8					
9-Dec	5.4	7.3	5.4	Z	5.5	8.2	7.6	5.5	4.9	6.9	12.6	12.4	12.4	13.7	11.2	11.8	10.4	11.8	13.3	13.3	13.9	14.7	15.9	17.0	10.5	17.0					
10-Dec	18.3	18.1	0.0	17.8	Z	17.5	14.6	16.6	17.1	17.5	16.9	16.4	13.5	20.6	31.3	35.5	35.2	35.6	38.0	40.2	39.4	39.5	39.5	38.8	25.1	40.2					
11-Dec	38.7	37.4	35.7	34.7	34.4	Z	35.2	33.8	32.7	32.4	32.5	33.5	31.8	30.5	29.4	17.0	11.6	19.8	17.1	18.2	20.8	19.9	22.9	19.0	27.8	38.7					
12-Dec	Z	17.4	17.4	16.9	17.9	17.6	15.6	16.2	18.8	19.3	20.4	21.0	21.0	20.4	19.3	19.9	20.3	20.1	18.8	18.5	19.4	19.8	20.2	17.1	18.8	21.0					
13-Dec	14.9	Z	18.8	16.8	16.2	13.3	12.7	9.2	10.2	13.3	13.5	13.7	14.9	16.7	14.4	13.6	10.5	14.4	12.7	9.7	11.2	8.6	12.6	26.9	13.9	26.9					
14-Dec	32.7	36.8	Z	40.1	39.8	40.2	39.8	38.9	36.9	29.5	M	C	C	C	C	21.6	29.6	26.0	17.2	11.6	8.2	6.6	12.4	10.6	26.6	40.2					
15-Dec	13.6	20.3	21.6	Z	21.4	19.2	17.2	16.1	16.6	16.4	13.6	14.2	10.1	12.2	13.6	15.7	29.3	32.4	30.0	28.4	25.0	24.8	24.9	28.2	20.2	32.4					
16-Dec	32.7	33.7	33.8	33.8	Z	40.4	43.8	44.1	43.2	42.6	42.3	42.6	28.4	23.6	24.4	22.0	25.4	20.5	19.8	22.5	19.4	16.9	15.4	14.4	29.8	44.1					
17-Dec	19.1	12.3	21.3	15.2	14.3	Z	8.2	6.2	4.9	6.3	10.5	14.0	16.3	18.0	16.9	17.0	17.3	18.0	18.9	19.4	20.6	21.7	20.6	16.8	15.4	21.7					
18-Dec	Z	12.2	9.8	9.7	8.8	11.0	4.7	4.0	4.2	14.9	32.2	34.8	37.1	39.3	46.7	39.8	37.3	40.3	32.0	37.4	41.0	36.7	33.6	33.4	26.1	46.7					
19-Dec	33.1	Z	28.3	28.2	28.0	24.2	19.4	11.5	14.8	22.4	31.5	32.8	23.6	20.9	30.1	33.4	33.4	32.0	30.8	31.1	31.1	30.5	30.9	31.3	27.5	33.4					
20-Dec	30.9	30.8	Z	30.7	29.3	29.5	28.4	28.9	27.3	25.9	25.7	26.2	25.1	22.8	21.9	19.5	17.4	14.5	16.7	17.6	17.9	16.5	15.5	13.3	23.1	30.9					
21-Dec	22.2	26.4	28.0	Z	33.3	31.0	30.4	28.6	27.5	18.5	16.7	17.5	21.6	17.1	17.7	19.1	19.0	21.6	19.0	7.6	13.1	14.0	14.5	16.8	20.9	33.3					
22-Dec	14.9	12.6	15.0	13.4	Z	12.2	12.0	12.4	15.1	14.5	11.9	13.1	13.4	11.1	10.1	6.0	6.3	6.2	7.0	5.0	5.8	6.8	5.5	5.0	10.2	15.1					
23-Dec	4.9	6.4	15.3	33.5	41.2	Z	42.2	41.8	41.8	41.4	41.4	41.1	40.9	40.4	40.2	38.9	38.4	37.0	39.4	39.1	34.1	37.0	32.0	30.5	34.7	42.2					
24-Dec	Z	30.7	23.0	16.4	17.1	14.5	12.1	17.8	20.5	17.3	19.0	18.7	17.8	17.4	19.7	19.0	12.4	12.0	13.3	6.8	8.3	10.3	15.5	14.1	16.3	30.7					
25-Dec	19.5	Z	19.1	19.2	17.4	12.2	15.0	13.2	15.3	15.0	17.3	17.9	17.6	18.3	17.0	15.7	15.2	12.9	10.8	11.6	11.8	14.1	14.6	16.9	15.5	19.5					
26-Dec	19.6	16.4	Z	19.1	20.7	20.2	19.0	18.4	17.1	15.4	16.6	16.3	16.7	15.3	11.9	6.8	7.1	9.1	9.6	11.7	8.3	5.8	7.7	11.0	13.9	20.7					
27-Dec	6.7	9.6	5.4	Z	5.8	28.9	36.1	28.1	36.2	35.5	33.0	24.8	19.4	16.6	10.8	10.2	6.5	13.5	21.3	12.2	5.9	6.4	8.8	9.0	17.0	36.2					
28-Dec	12.9	12.3	11.6	11.6	Z	10.1	8.2	7.2	6.5	8.5	8.1	11.2	12.6	17.7	19.8	20.2	18.0	13.5	14.0	14.8	14.1	18.7	17.4	13.0	13.1	20.2					
29-Dec	13.9	16.1	16.8	15.8	13.3	Z	9.8	6.4	7.4	9.3	11.0	10.9	14.3	13.6	9.0	6.0	4.7	5.2	6.7	8.1	5.9	4.9	8.8	12.5	10.0	16.8					
30-Dec	Z	10.9	11.0	10.7	9.9	10.1	14.1	13.7	12.2	13.2	16.4	15.3	16.8	19.7	20.4	16.7	21.0	23.8	24.0	24.0	19.9	16.0	12.7	15.7	16.0	24.0					
31-Dec	16.7	Z	14.8	13.8	14.1	12.9	12.7	8.4	7.7	10.2	13.7	15.6	17.2	16.0	10.2	9.0	5.6	13.8	24.6	25.6	20.5	19.1	32.0	34.2	16.0	34.2					
		17.4	17.4	16.0	19.5	18.8	17.7	17.7	15.9	16.0	16.6	17.9	19.0	18.6	19.0	18.8	16.7	15.9	16.7	17.2	17.1	16.7	15.8	16.7	17.2	Diurnal Average					
		38.7	37.4	35.7	40.1	41.2	40.4	43.8	44.1	43.2	42.6	42.3	42.6	40.9	40.4	46.7	39.8	38.4	40.3	39.4	40.2	41.0	39.5	39.5	38.8	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 (O₃) - ppb
Athabasca Valley - December 2023

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	516	72.88	72.88
21 - 50	192	27.12	100.00
51 - 82	0	0.00	100.00
> 83	0	0.00	100.00

Total Number of Valid Hours: 708

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Ozone (O₃) - ppb
Athabasca Valley - December 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	0	2	8	4	11	42	223	96	36	33	23	12	12	0	4	10	516
21 - 50	2	1	1	1	5	12	27	8	15	18	17	29	29	9	5	13	192
51 - 82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 83	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	2	3	9	5	16	54	250	104	51	51	40	41	41	9	9	23	708

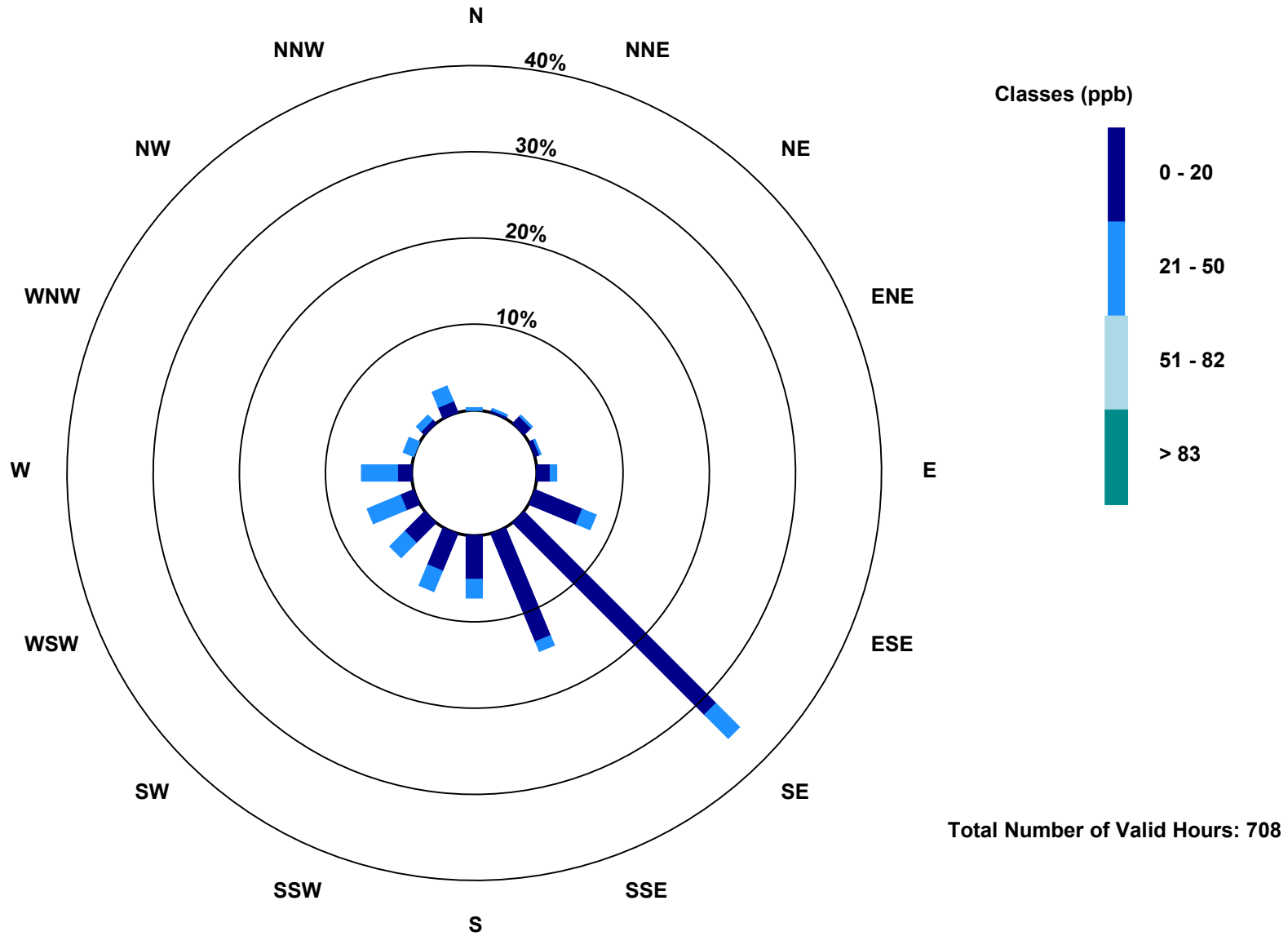
Total Number of Valid Hours: 708

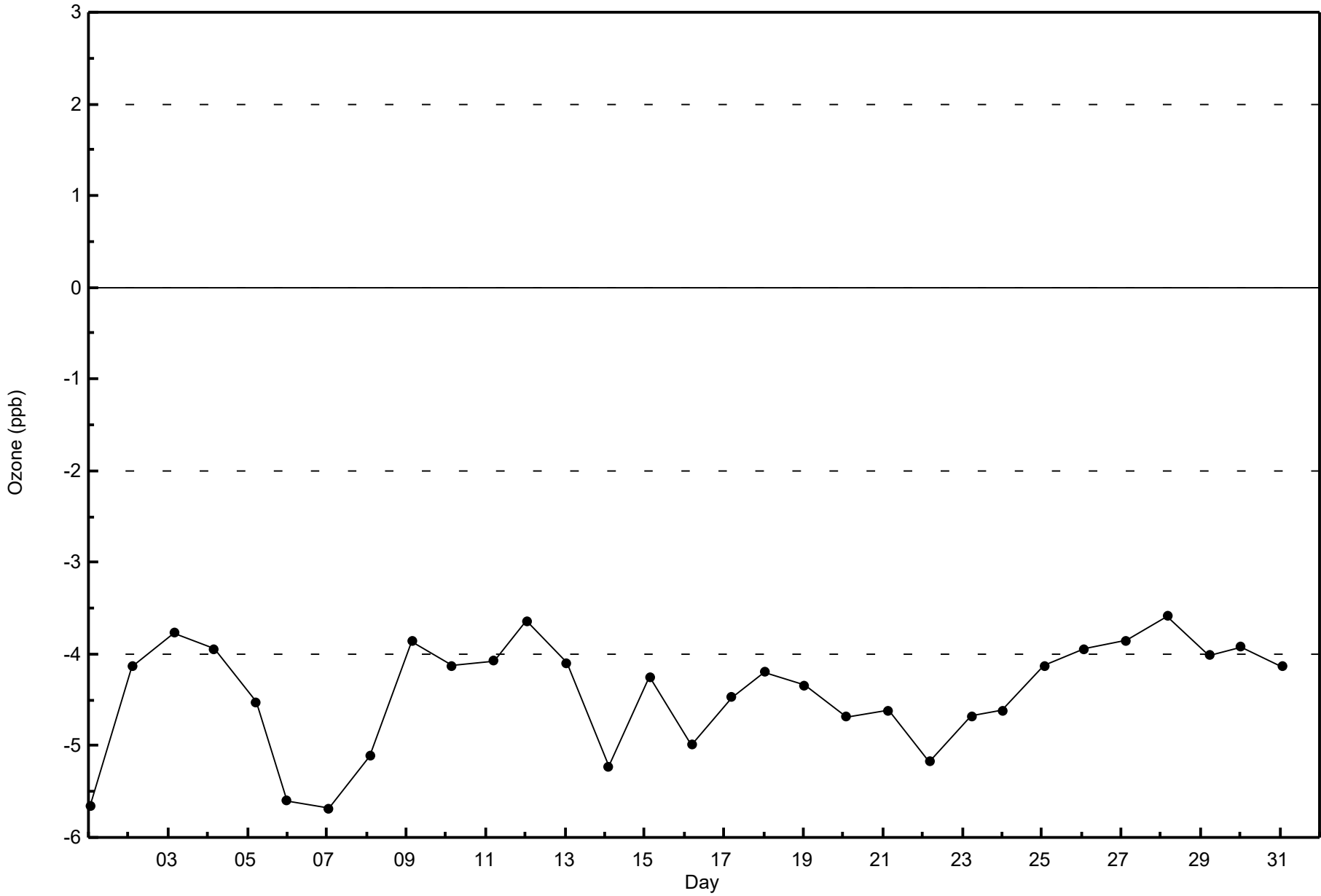
Total Number of Hours: 744

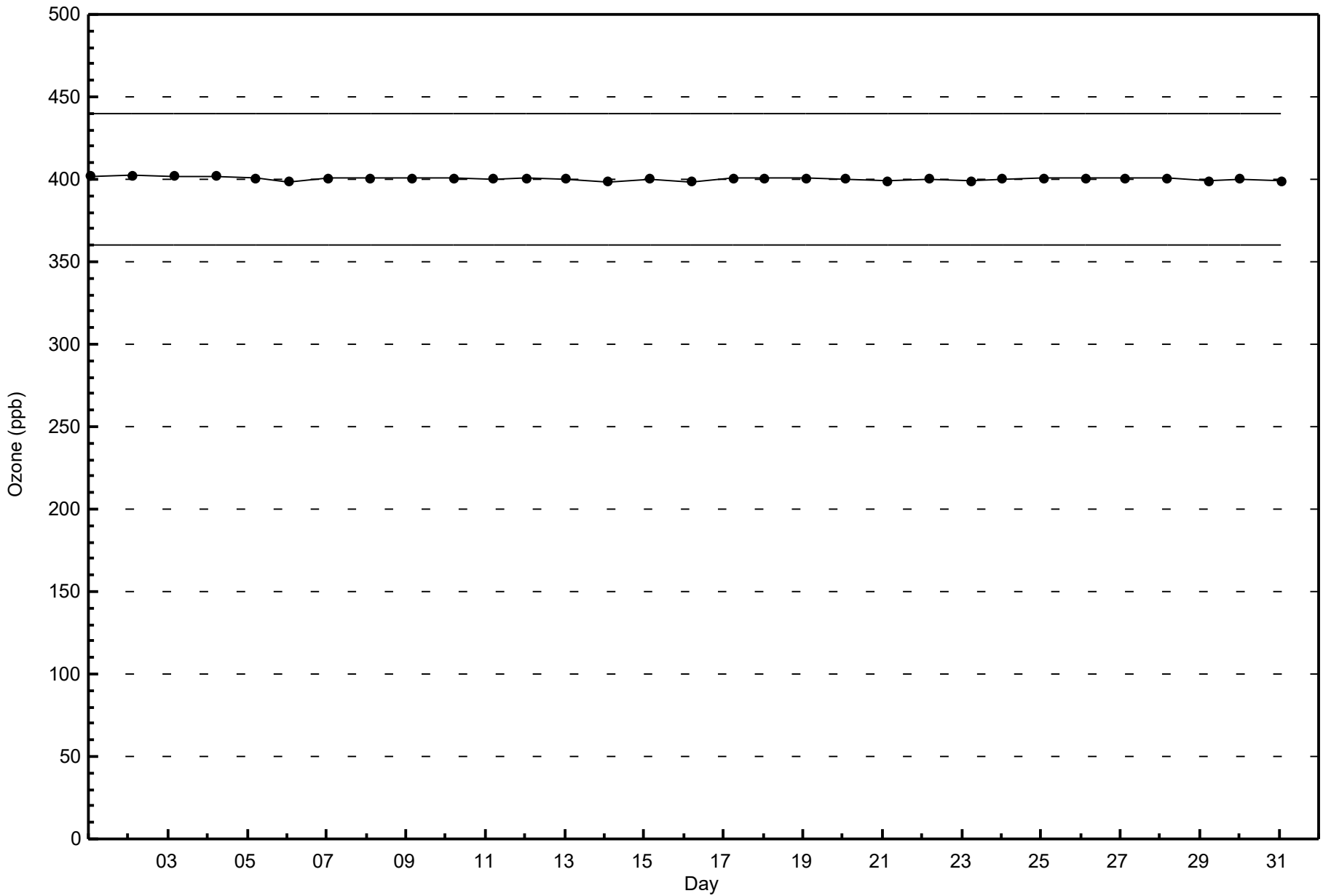


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Ozone (O₃) - ppb
Athabasca Valley

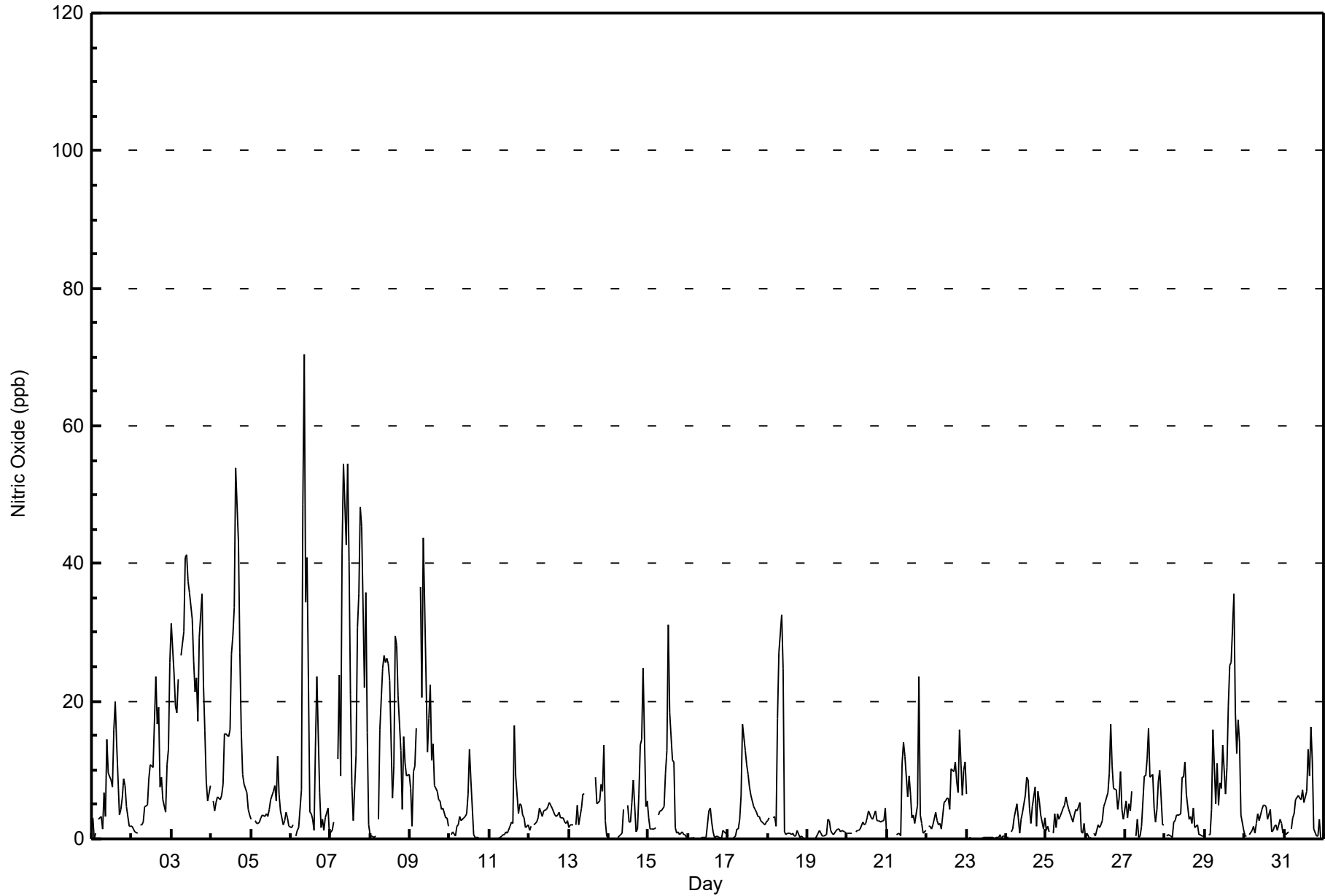








Maximum Value: 70.4 ppb on Dec 6 09:00																			Maximum Daily Average: 24.9 ppb on Dec 3																			Hours in Service: 744	
Minimum Value: 0.0 ppb on Dec 14 01:00																			Minimum Daily Average: 0.4 ppb on Dec 23																			Hours of Data: 706	
Maximum Diurnal Average: 11.2 ppb at hour 9																			Minimum Diurnal Average: 2.1 ppb at hour 2																			Hours of Missing Data: 38	
Monthly Average: 6.80 ppb																			Percentiles: P ₁ = 0.0 P ₁₀ = 0.2 Q ₁ = 1.1 Median = 3.2 Q ₃ = 7.8 P ₉₀ = 18.2 P ₉₉ = 43.6																			Hours of Calibration: 37	
																																						Percent Operational Time: 99.9	
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24															
1-Dec	3.0	0.1	0.8	Z	2.8	3.3	1.4	6.8	3.3	14.5	9.6	8.6	7.5	15.9	19.9	13.8	3.5	4.3	5.9	8.7	7.8	4.7	1.9	1.9	6.5	19.9													
2-Dec	1.9	1.4	1.0	0.8	Z	2.0	2.0	2.4	4.7	4.9	8.8	10.8	10.6	10.4	23.6	16.7	19.1	7.4	8.9	5.8	3.9	10.7	13.0	25.6	8.5	25.6													
3-Dec	31.3	24.0	19.2	18.2	23.2	Z	26.7	30.1	40.8	41.4	37.4	35.7	32.0	25.9	21.4	23.4	17.0	29.3	35.5	22.4	15.6	8.4	5.4	7.8	24.9	41.4													
4-Dec	Z	5.5	4.0	5.3	6.1	5.6	6.4	8.0	15.3	15.3	14.8	15.9	26.9	29.6	33.6	53.9	43.1	27.0	15.6	9.4	8.0	6.7	4.2	3.4	15.8	53.9													
5-Dec	2.8	Z	2.6	2.3	2.3	2.5	3.0	3.4	3.3	3.7	3.2	4.2	5.6	7.0	7.7	5.5	12.1	6.6	4.0	1.9	2.6	3.8	3.0	1.8	4.1	12.1													
6-Dec	1.7	2.1	Z	0.4	1.2	1.6	7.1	48.6	70.4	34.5	40.8	3.8	3.7	2.9	1.3	13.4	23.7	6.8	1.6	2.9	1.1	3.1	4.5	0.5	12.1	70.4													
7-Dec	1.1	1.3	2.4	Z	11.5	23.8	9.1	41.5	54.5	42.6	54.5	40.3	21.0	7.8	2.7	12.3	30.7	35.6	48.2	45.5	22.0	35.8	15.5	2.1	24.4	54.5													
8-Dec	0.7	0.4	0.3	0.4	Z	2.9	16.0	24.8	26.7	25.6	26.3	25.5	23.0	5.9	10.6	29.4	28.1	20.8	12.8	4.2	14.8	10.9	9.1	9.4	14.3	29.4													
9-Dec	7.2	1.8	9.7	10.5	16.0	Z	36.6	20.6	43.6	34.0	12.5	17.5	22.5	11.5	13.9	7.7	7.0	5.7	5.5	4.2	4.4	3.1	3.0	1.8	13.1	43.6													
10-Dec	Z	0.6	1.0	0.4	1.9	2.0	3.3	2.7	3.0	3.2	3.6	6.4	13.1	8.5	0.6	0.2	0.2	0.1	0.1	0.1	0.0	0.0	0.0	0.0	2.2	13.1													
11-Dec	0.0	Z	0.0	0.0	0.0	0.1	0.2	0.4	0.6	0.6	1.0	0.8	1.9	2.5	2.2	16.6	9.3	3.7	5.0	5.0	3.4	3.0	1.6	2.0	2.6	16.6													
12-Dec	1.3	1.9	Z	2.0	2.3	3.1	4.4	3.8	3.3	4.2	4.3	4.6	5.4	4.9	4.5	3.5	3.3	3.5	3.9	3.1	3.1	2.4	2.2	2.7	3.4	5.4													
13-Dec	1.6	2.0	2.1	Z	2.1	4.9	2.1	4.4	6.5	6.4	C	C	C	C	C	C	8.9	5.0	5.5	7.9	6.8	13.7	2.6	0.5	--	13.7													
14-Dec	0.0	0.0	0.0	0.0	Z	0.1	0.3	0.6	0.9	4.4	M	5.0	2.4	2.5	5.2	8.6	1.0	1.5	6.5	13.7	14.4	24.9	4.6	5.6	4.6	24.9													
15-Dec	3.0	1.5	1.5	1.5	1.6	Z	3.5	4.0	4.0	4.8	9.6	12.9	31.0	18.2	11.4	11.3	1.6	0.8	0.9	0.7	1.1	0.5	0.6	0.2	5.5	31.0													
16-Dec	Z	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.1	0.2	0.2	0.2	4.1	4.4	2.4	1.1	0.3	0.4	0.2	0.1	0.1	1.3	0.9	0.6	0.7	4.4													
17-Dec	0.3	Z	0.0	0.1	0.3	1.4	1.5	2.9	6.2	16.8	12.9	10.8	9.4	7.5	6.4	4.6	4.3	3.8	3.3	3.3	2.6	2.3	2.1	2.3	4.6	16.8													
18-Dec	2.7	3.0	Z	3.1	3.2	1.9	17.4	27.1	32.6	24.8	1.1	0.6	0.7	0.9	0.7	0.9	0.4	0.3	1.3	0.3	0.3	0.2	0.0	0.1	5.4	32.6													
19-Dec	0.0	0.0	0.0	Z	0.0	0.1	0.9	1.1	0.9	0.3	0.3	0.6	2.9	2.7	1.2	0.9	0.6	1.2	1.4	1.4	1.1	1.2	1.0	0.8	0.9	2.9													
20-Dec	0.8	0.8	0.8	0.8	Z	1.0	1.3	1.3	1.4	2.4	2.0	2.2	3.1	4.0	3.0	2.8	3.4	4.0	2.7	2.5	2.5	2.7	2.7	4.4	2.3	4.4													
21-Dec	0.1	0.1	0.1	0.0	0.1	Z	0.6	0.8	0.5	11.0	14.0	11.9	6.0	9.1	6.4	3.1	3.4	2.3	4.9	23.6	3.4	2.2	0.9	1.2	4.6	23.6													
22-Dec	Z	1.9	1.9	1.5	2.1	3.8	2.5	2.1	2.3	1.4	5.3	5.5	5.8	5.9	4.3	10.1	9.7	11.2	8.2	6.6	15.9	6.3	10.0	11.2	5.9	15.9													
23-Dec	6.4	Z	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.2	0.3	0.2	0.1	0.1	0.1	0.2	0.2	0.6	0.1	0.5	0.4	0.4	6.4													
24-Dec	0.3	0.1	Z	0.9	1.5	3.0	5.0	3.0	0.7	2.8	3.9	6.3	9.0	8.5	4.5	2.3	4.8	7.5	1.7	7.0	5.4	3.4	1.4	3.1	3.7	9.0													
25-Dec	1.3	1.8	1.0	Z	0.8	3.6	1.5	3.6	2.8	3.8	4.5	4.8	6.1	5.0	4.3	3.0	2.4	3.5	4.3	4.0	5.2	1.1	0.8	2.1	3.1	6.1													
26-Dec	0.1	0.8	0.1	0.1	Z	0.8	0.4	2.1	1.6	2.0	2.6	4.8	5.2	6.7	9.7	16.7	10.5	7.4	7.1	4.3	6.0	9.7	4.3	2.9	4.6	16.7													
27-Dec	5.5	3.0	5.1	4.0	6.9	Z	0.4	2.9	0.3	0.3	1.8	9.2	9.1	11.6	16.1	8.9	9.4	4.5	2.5	4.2	8.4	9.9	2.1	2.0	5.6	16.1													
28-Dec	Z	0.3	0.6	0.3	0.2	2.4	2.6	3.5	3.4	3.7	8.9	9.0	11.2	6.5	2.8	3.2	2.1	4.4	1.5	2.1	0.7	0.7	0.4	0.5	3.1	11.2													
29-Dec	0.5	Z	0.6	0.6	4.2	15.9	5.1	11.1	4.8	8.0	7.3	13.7	6.5	10.4	19.3	25.2	25.7	35.6	18.5	12.5	17.4	14.0	3.4	1.1	11.4	35.6													
30-Dec	0.5	0.3	Z	0.7	1.1	1.8	0.8	2.2	3.8	2.7	4.3	4.9	4.8	4.6	2.9	4.4	1.1	1.2	1.8	2.0	1.2	2.8	2.2	0.8	2.3	4.9													
31-Dec	1.2	0.5	1.0	Z	1.4	3.0	3.7	5.8	6.2	5.8	5.8	7.1	5.2	6.8	13.0	9.2	16.2	11.1	1.4	0.3	0.4	2.8	0.1	0.1	4.7	16.2													
																			2.9 2.1 2.2 2.2 3.6 3.5 5.4 8.8 11.2 10.5 10.4 9.5 9.9 8.3 8.5 10.4 9.8 8.3 7.1 6.8 5.8 6.2 3.4 3.2																			Diurnal Average	
																			31.3 24.0 19.2 18.2 23.2 23.8 36.6 48.6 70.4 42.6 54.5 40.3 32.0 29.6 33.6 53.9 43.1 35.6 48.2 45.5 22.0 35.8 15.5 25.6																			Diurnal Maximum	
Z - zerospan			C - Calibration			M - Maintenance																																	





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitric Oxide (NO) - ppb
Athabasca Valley - December 2023

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	641	90.79	90.79
21 - 40	51	7.22	98.02
41 - 80	14	1.98	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 706

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Nitric Oxide (NO) - ppb
Athabasca Valley - December 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	2	3	10	5	16	45	225	82	44	51	40	37	42	10	7	22	641
21 - 40	0	0	0	0	0	8	15	14	5	1	3	2	2	0	0	1	51
11 - 80	0	0	0	0	0	0	3	9	2	0	0	0	0	0	0	0	14
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	2	3	10	5	16	53	243	105	51	52	43	39	44	10	7	23	706

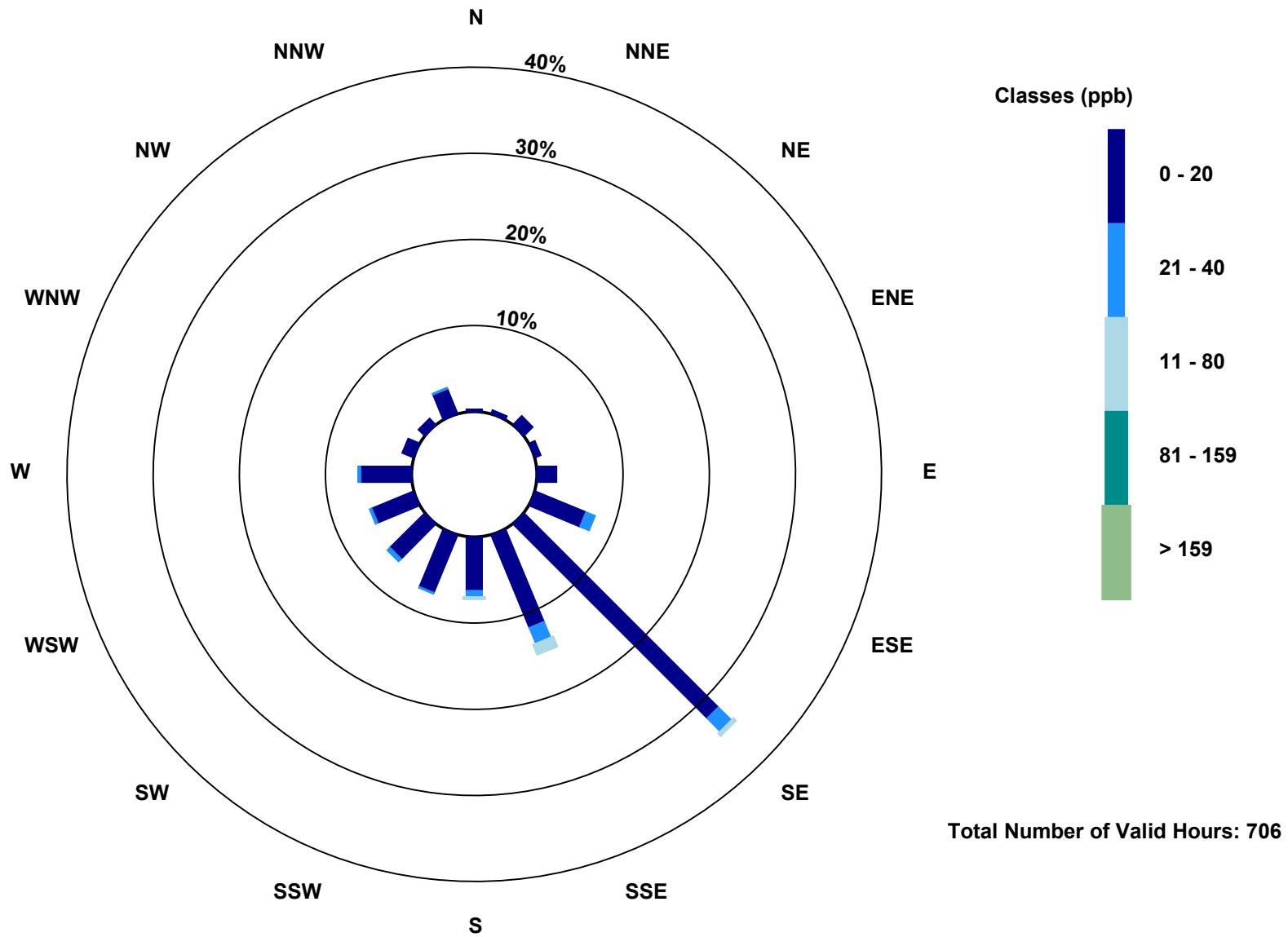
Total Number of Valid Hours: 706

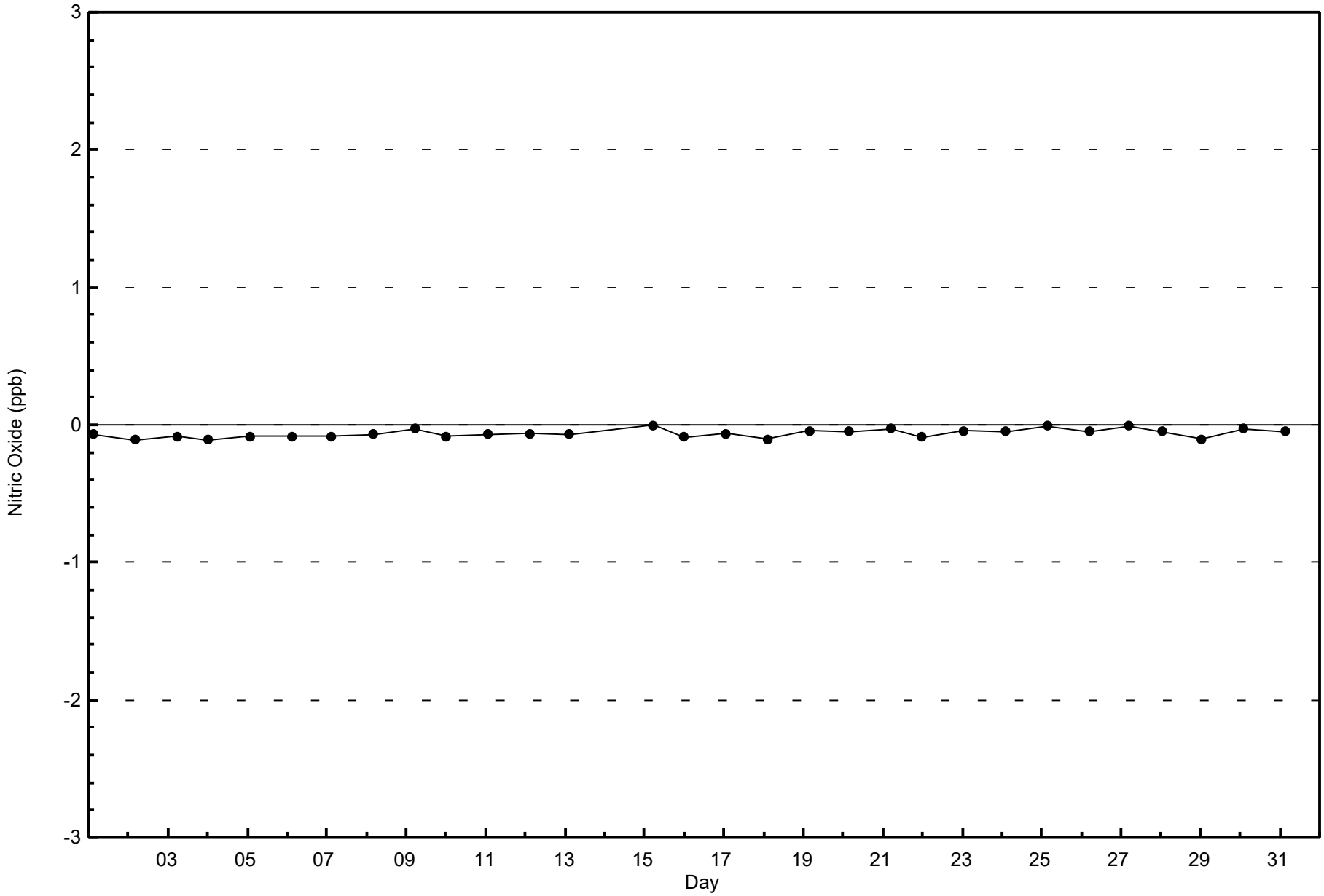
Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Dec 2023

Nitric Oxide (NO) - ppb
Athabasca Valley

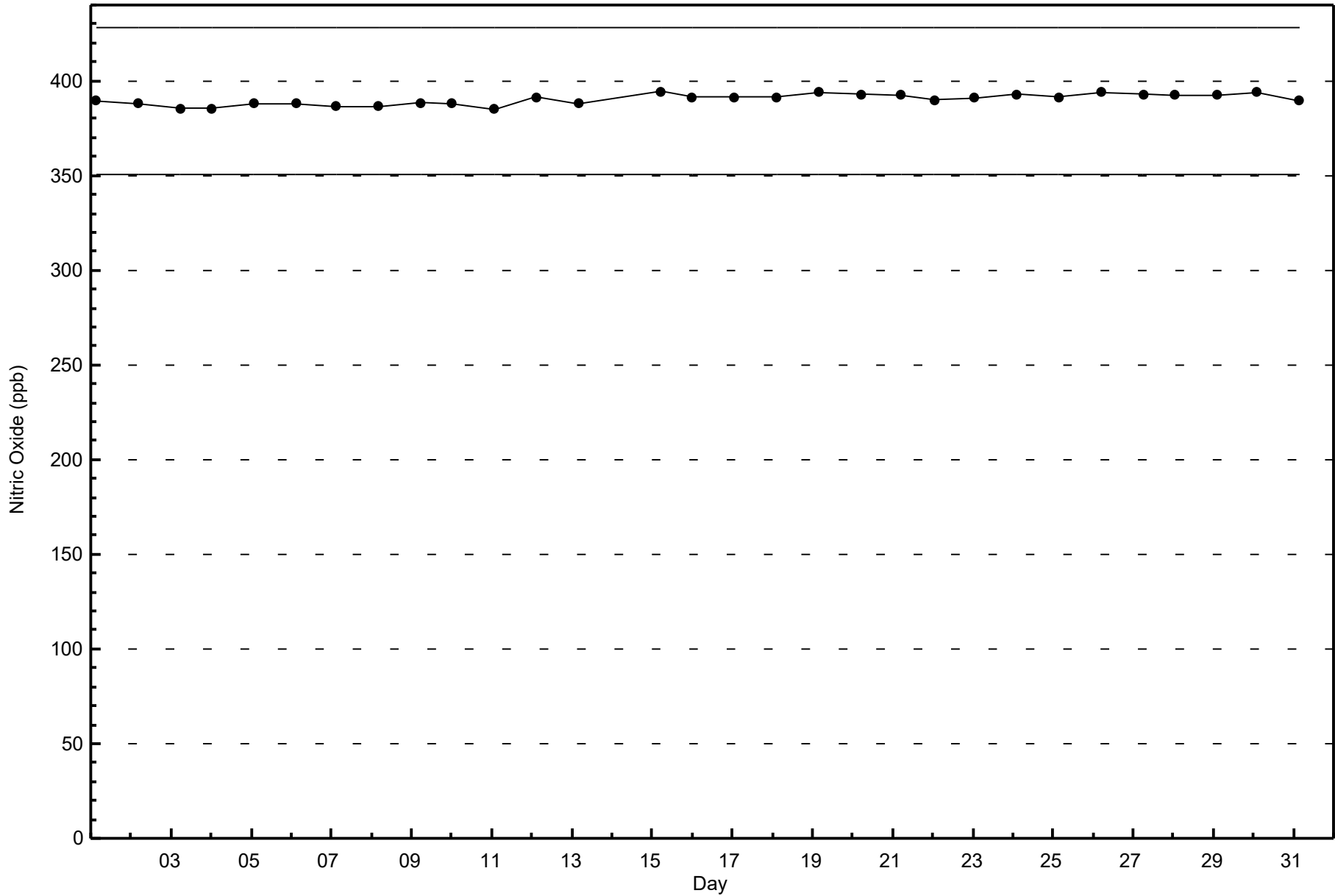






Wood Buffalo Environmental Association
Span Responses

Nitric Oxide (NO) - ppb
Athabasca Valley - December 2023





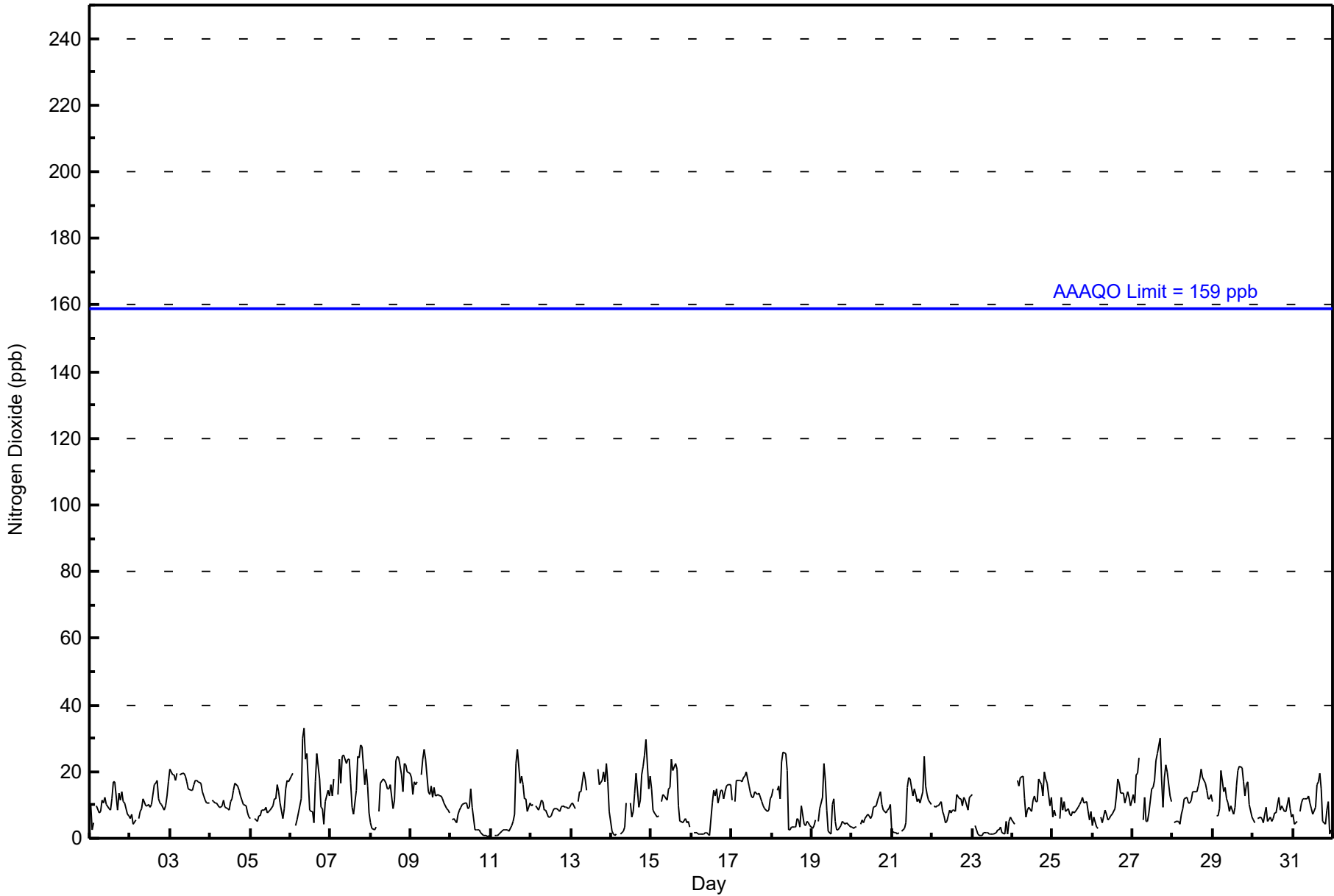
Wood Buffalo Environmental Association
Summary of Hour Averages

Nitrogen Dioxide (NO₂) - ppb
Athabasca Valley - December 2023

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 33.2 ppb on Dec 6 09:00	Maximum Daily Average: 18.8 ppb on Dec 7		Hours of Data:	706
Minimum Value: 0.5 ppb on Dec 11 01:00	Minimum Daily Average: 2.7 ppb on Dec 23		Hours of Missing Data:	38
Maximum Diurnal Average: 14.6 ppb at hour 17	Minimum Diurnal Average: 7.3 ppb at hour 3		Hours of Calibration:	37
Monthly Average: 10.78 ppb	Percentiles: P ₁ = 0.9 P ₁₀ = 2.7 Q ₁ = 6.4 Median = 10.2 Q ₃ = 14.6 P ₉₀ = 19.0 P ₉₉ = 26.9		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-Dec	10.3	2.7	4.6	Z	9.6	7.7	8.0	11.3	10.6	12.1	10.0	8.7	8.6	11.8	16.8	16.9	8.5	13.5	11.4	14.1	11.0	10.5	7.0	6.9	10.1	16.9
2-Dec	6.1	7.2	4.3	5.3	Z	6.1	8.0	8.7	12.0	9.6	9.9	10.1	9.5	10.3	16.1	16.6	17.3	11.9	10.4	10.2	8.4	9.8	12.9	17.1	10.3	17.3
3-Dec	20.8	19.1	19.0	17.5	19.3	Z	19.0	19.5	19.6	18.7	16.9	14.9	14.2	14.6	16.0	17.4	17.5	17.0	16.6	13.9	12.9	11.3	10.8	10.7	16.4	20.8
4-Dec	Z	11.3	10.9	10.7	10.5	9.5	9.4	9.9	11.3	9.4	8.8	8.5	11.1	11.9	14.5	16.7	15.6	14.6	12.8	11.3	10.2	9.6	7.6	6.4	11.0	16.7
5-Dec	6.1	Z	6.1	5.7	5.1	6.6	6.7	8.4	8.6	9.4	7.6	7.9	8.6	9.6	12.0	11.7	15.9	13.9	10.7	5.8	9.0	15.0	17.5	16.9	9.8	17.5
6-Dec	18.8	19.4	Z	3.7	5.7	7.6	11.8	30.2	33.2	23.9	25.6	8.4	8.1	7.9	4.7	16.9	25.6	17.9	9.5	9.1	4.2	11.0	14.6	12.8	14.4	33.2
7-Dec	16.3	12.8	18.0	Z	13.0	23.9	16.5	24.5	25.1	22.4	23.6	23.6	16.7	9.2	7.0	14.6	24.5	24.2	28.0	27.6	16.1	20.9	15.8	7.8	18.8	28.0
8-Dec	4.8	2.9	2.7	3.3	Z	8.0	16.6	18.0	17.4	16.5	15.0	15.0	16.2	8.8	11.4	23.3	24.4	24.1	19.2	14.1	22.4	22.2	19.9	19.5	15.0	24.4
9-Dec	18.2	13.3	16.9	15.9	17.0	Z	19.0	23.7	26.9	23.7	14.0	13.0	15.8	12.2	15.1	12.7	13.3	12.6	12.5	11.8	10.6	9.1	8.4	7.7	14.9	26.9
10-Dec	Z	5.3	5.8	4.8	7.0	8.4	9.5	10.3	10.4	10.4	9.0	9.4	14.8	9.3	2.7	2.7	2.5	2.7	1.8	1.0	1.0	0.8	0.6	0.8	5.7	14.8
11-Dec	0.5	Z	0.9	0.8	1.0	1.1	2.0	2.5	2.4	2.5	2.6	2.1	3.7	5.0	7.0	22.4	26.9	16.7	18.6	16.3	12.0	11.8	8.0	10.7	7.7	26.9
12-Dec	9.8	10.2	Z	9.7	8.6	9.7	11.5	11.2	8.3	8.5	6.4	6.4	6.7	7.9	8.8	8.9	8.5	8.2	9.5	9.6	9.4	9.2	8.9	9.2	8.9	11.5
13-Dec	10.2	10.8	8.7	Z	10.9	14.1	14.1	19.8	17.9	14.3	C	C	C	C	C	C	20.7	16.1	17.5	19.9	17.1	22.6	17.1	7.9	-	22.6
14-Dec	2.2	1.3	0.9	1.1	Z	1.3	1.5	2.0	3.6	10.4	M	10.6	6.3	8.0	13.4	19.7	9.2	11.6	19.0	21.8	25.2	29.5	15.0	18.6	10.6	29.5
15-Dec	14.9	8.4	7.6	6.5	6.7	Z	11.2	13.1	12.6	11.6	14.7	15.1	23.9	20.5	22.3	20.8	9.9	4.9	5.2	4.6	5.8	4.7	4.9	3.2	11.0	23.9
16-Dec	Z	1.5	1.5	1.5	1.4	1.1	1.3	1.3	1.8	1.6	1.3	0.9	10.7	14.3	12.8	14.9	10.5	14.2	14.2	11.7	13.8	15.7	16.1	16.2	7.8	16.2
17-Dec	11.3	Z	11.1	17.4	17.4	17.5	17.1	18.1	18.8	20.0	15.7	13.7	12.2	12.1	13.9	13.3	13.7	12.4	10.9	9.8	8.7	8.0	8.6	11.8	13.6	20.0
18-Dec	12.7	14.9	Z	14.4	15.8	11.8	22.9	25.9	25.4	20.3	2.7	2.4	3.2	3.4	6.1	5.6	3.4	9.9	4.2	3.8	4.9	4.8	3.8	9.8	25.9	
19-Dec	2.8	3.7	5.6	Z	5.0	8.8	12.4	22.5	17.3	8.3	2.2	1.4	10.1	11.9	5.1	2.4	2.4	4.0	5.2	4.6	4.1	4.5	3.8	3.3	6.6	22.5
20-Dec	3.2	3.0	3.3	3.4	Z	4.3	5.3	4.5	5.8	7.2	6.7	6.0	6.9	9.3	9.8	11.3	12.7	14.0	10.1	8.4	7.5	8.3	8.9	10.1	7.4	14.0
21-Dec	2.2	1.8	1.7	1.4	1.7	Z	2.0	3.1	4.5	15.1	18.2	17.8	12.5	15.0	13.2	10.9	11.8	10.7	13.8	24.7	15.6	13.2	11.4	10.0	10.1	24.7
22-Dec	Z	9.9	9.4	9.6	9.8	10.9	7.9	6.6	4.5	4.9	8.5	7.8	8.3	8.4	7.9	13.2	11.8	12.0	9.8	12.4	11.4	8.6	12.3	12.7	9.5	13.2
23-Dec	13.2	Z	4.0	1.3	0.7	0.8	1.0	1.6	1.6	1.7	1.3	1.2	1.1	1.3	1.5	2.6	2.7	3.2	1.6	1.2	5.1	1.3	5.1	6.5	2.7	13.2
24-Dec	5.3	4.1	Z	17.2	15.5	18.3	18.6	12.0	6.4	8.3	9.3	8.1	11.5	12.7	11.2	11.0	17.9	16.0	12.6	19.8	17.9	16.4	9.8	12.3	12.7	19.8
25-Dec	6.5	8.5	6.9	Z	5.9	12.3	8.6	11.2	8.1	8.8	7.3	6.9	7.9	7.7	8.2	9.4	10.1	10.9	12.3	10.8	11.2	8.1	5.7	7.9	8.7	12.3
26-Dec	3.7	6.3	3.6	3.1	Z	6.2	4.8	8.5	7.2	5.4	6.0	6.7	7.3	8.8	12.6	17.8	16.5	13.7	13.5	10.7	12.1	13.8	12.3	9.7	9.1	17.8
27-Dec	13.3	10.8	19.0	19.6	24.0	Z	5.3	12.4	4.9	4.9	7.6	15.0	15.4	17.3	23.2	25.3	29.9	17.9	9.2	18.3	22.0	20.0	12.7	11.1	15.6	29.9
28-Dec	Z	4.7	5.2	5.0	4.3	7.4	9.1	11.7	12.3	10.4	10.8	11.5	13.8	14.1	13.9	15.5	17.6	20.7	18.2	16.6	14.5	11.7	11.9	13.2	11.9	20.7
29-Dec	11.1	Z	6.9	6.9	9.1	20.4	13.9	15.3	11.8	10.4	8.0	9.8	7.2	9.3	15.6	20.2	21.6	21.0	17.1	12.8	16.1	16.9	10.2	6.2	12.9	21.6
30-Dec	5.7	4.5	Z	6.0	6.5	6.0	4.8	7.0	9.4	5.1	6.4	5.2	5.8	7.5	7.5	12.1	8.4	9.7	9.0	8.2	7.9	12.3	9.1	6.2	7.4	12.3
31-Dec	7.0	4.2	5.1	Z	7.9	10.5	11.7	11.8	12.0	12.8	10.4	8.7	7.1	9.3	15.9	17.0	19.6	14.7	5.0	4.4	8.3	11.1	1.3	2.5	9.5	19.6
9.1 7.8 7.3 7.7 9.2 9.2 10.0 12.5 12.0 11.2 9.9 9.2 10.2 10.3 11.5 14.1 14.6 13.2 12.1 11.9 11.5 12.0 10.1 9.7																								Diurnal Average		
20.8 19.4 19.0 19.6 24.0 23.9 22.9 30.2 33.2 23.9 25.6 23.6 23.9 20.5 23.2 25.3 29.9 24.2 28.0 27.6 25.2 29.5 19.9 19.5																								Diurnal Maximum		

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Athabasca Valley - December 2023**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	657	93.06	93.06
21 - 40	49	6.94	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 706
Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Athabasca Valley - December 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	2	3	10	5	16	49	223	91	45	50	41	39	44	10	7	22	657
21 - 40	0	0	0	0	0	4	20	14	6	2	2	0	0	0	0	1	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
Totals	2	3	10	5	16	53	243	105	51	52	43	39	44	10	7	23	706

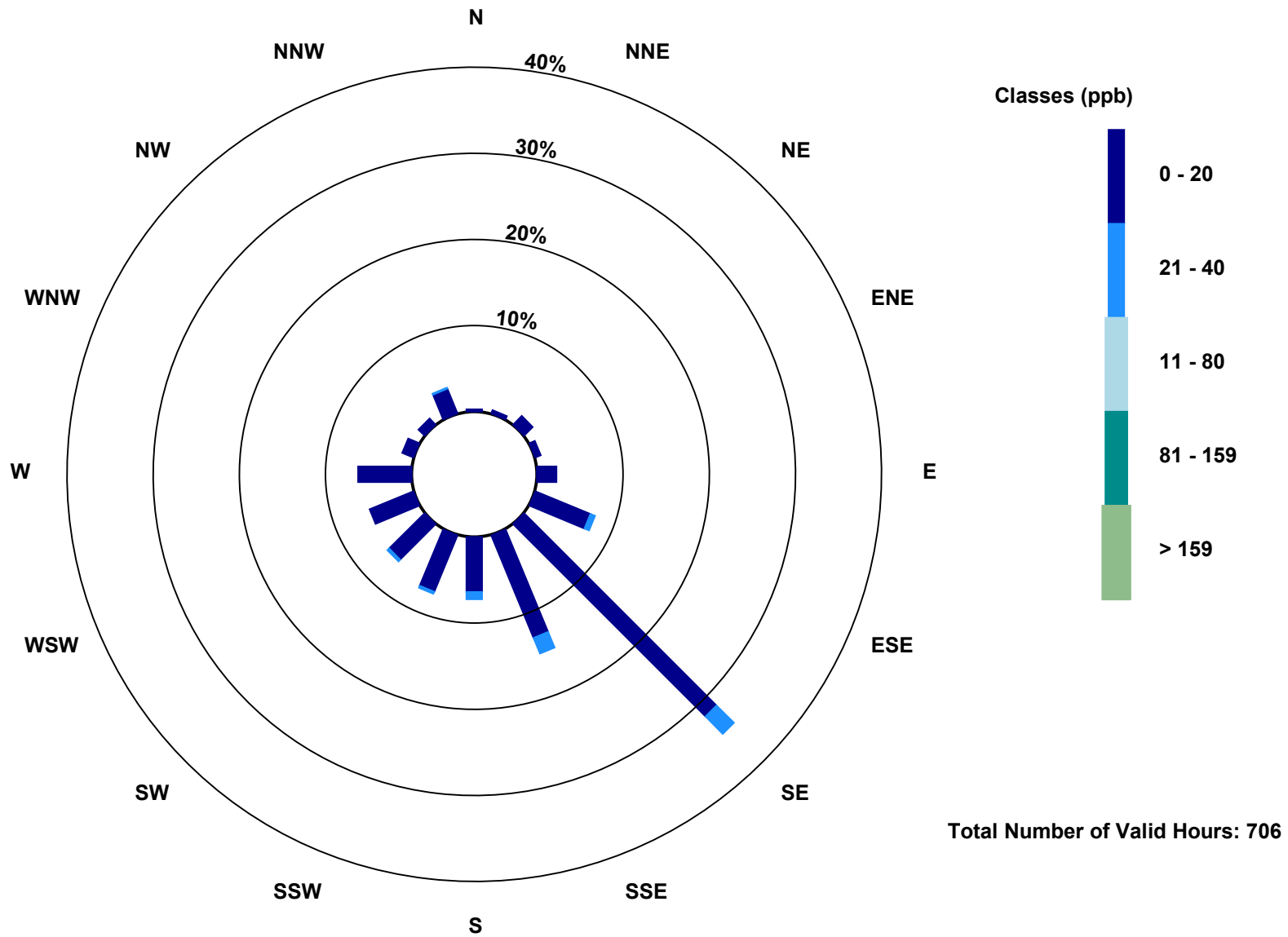
Total Number of Valid Hours: 706

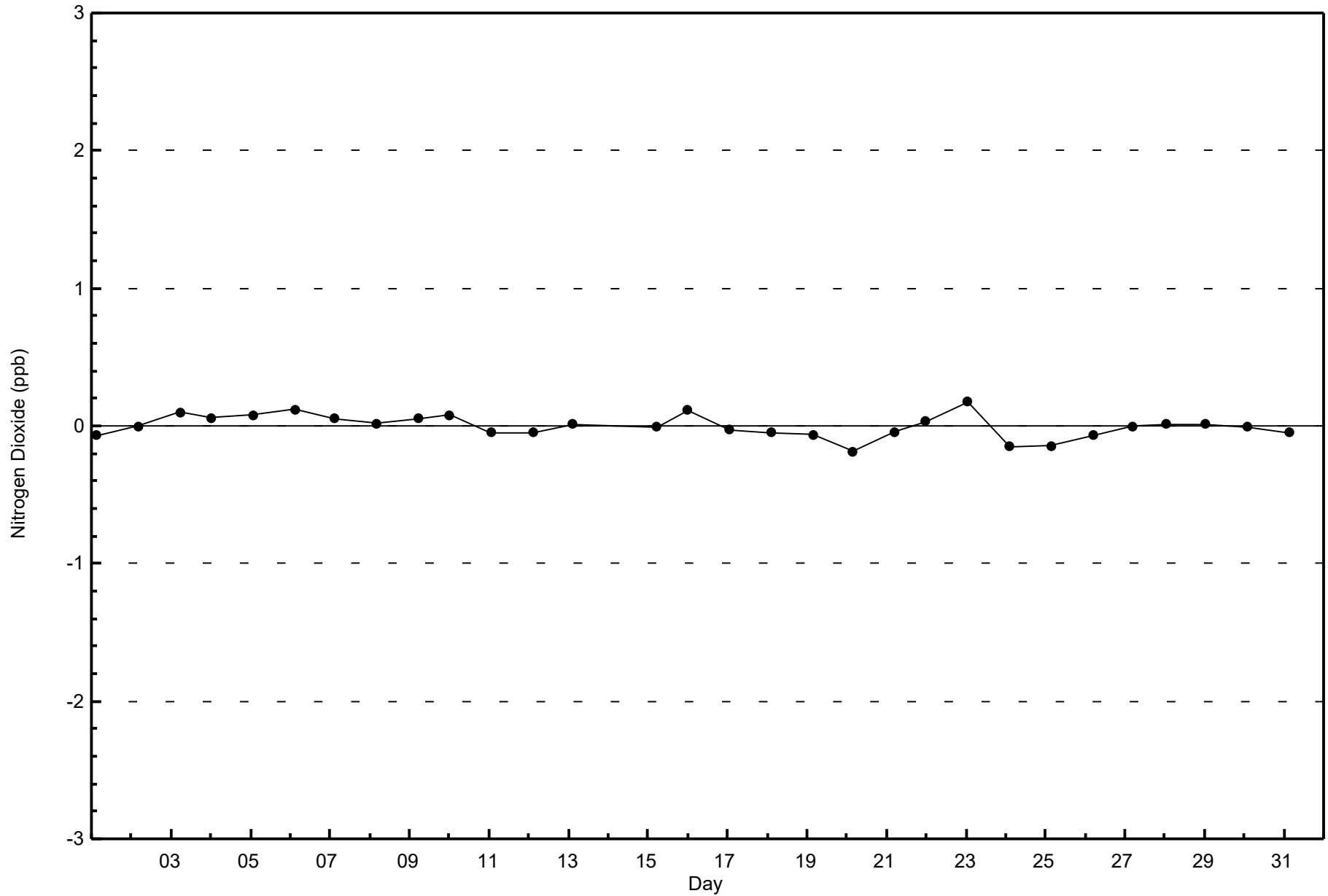
Total Number of Hours: 744

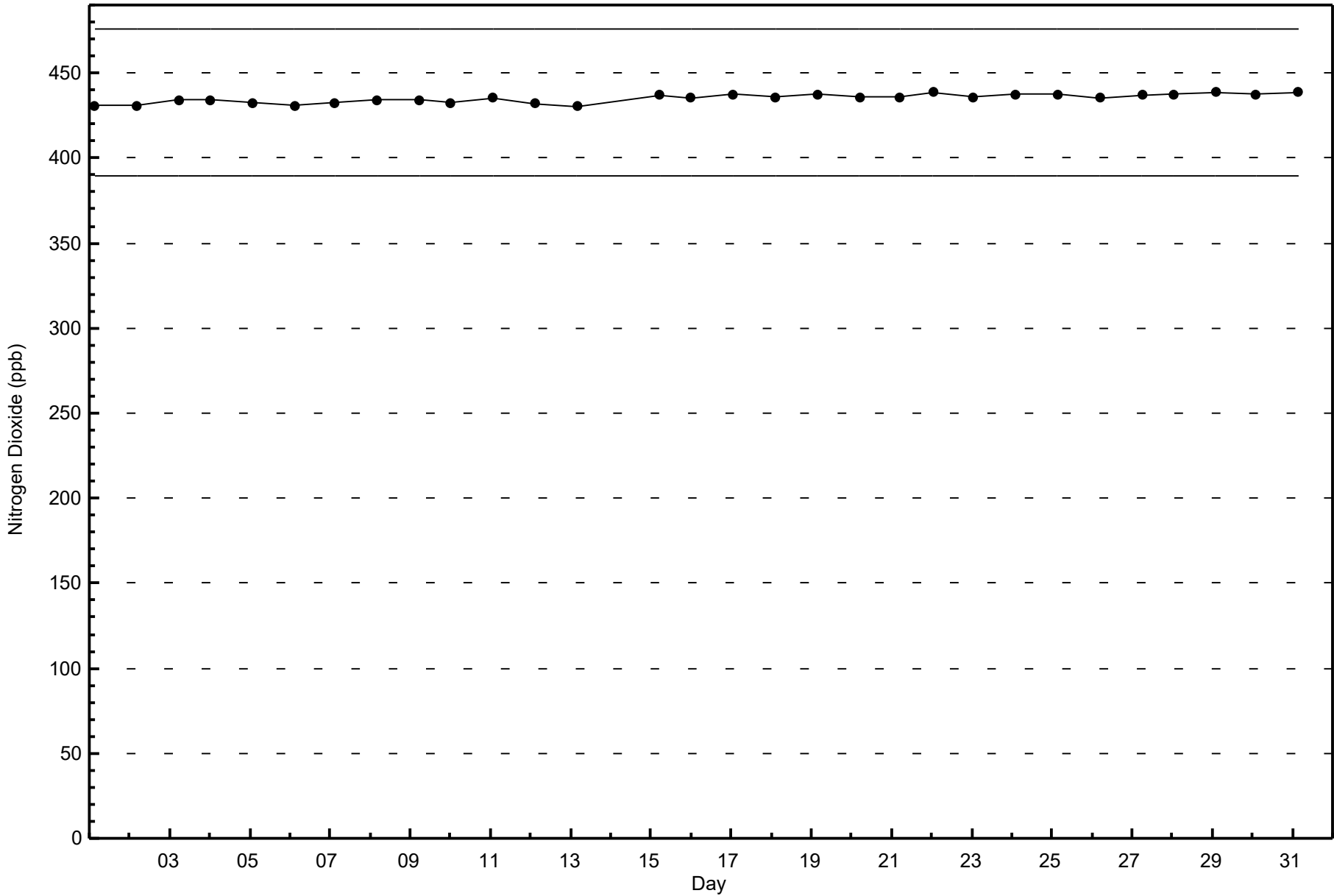


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Nitrogen Dioxide (NO₂) - ppb
Athabasca Valley





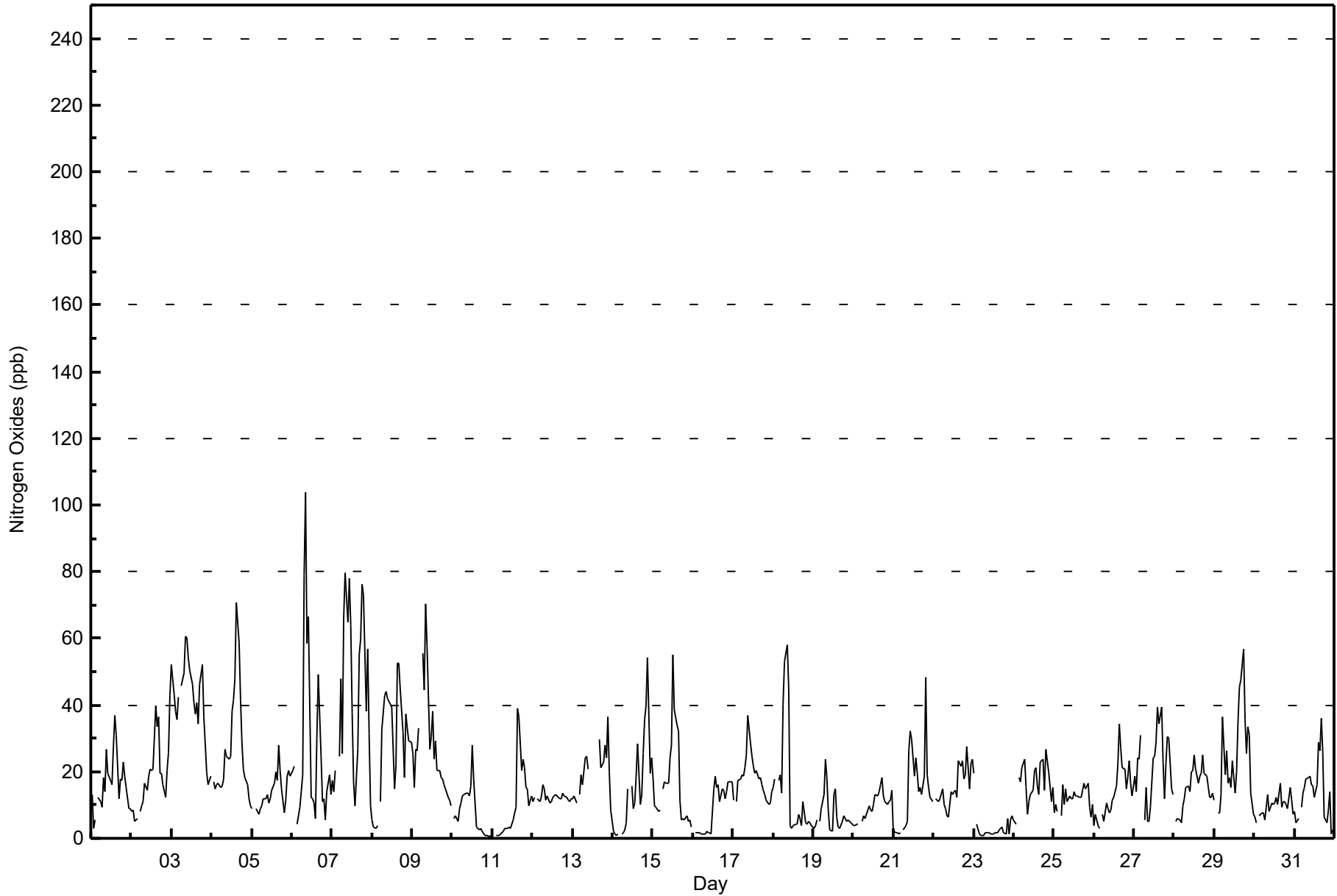




Wood Buffalo Environmental Association
Summary of Hour Averages

Nitrogen Oxides (NO_x) - ppb
Athabasca Valley - December 2023

Maximum Value: 103.6 ppb on Dec 6 09:00																					Maximum Daily Average: 43.2 ppb on Dec 7					Hours in Service: 744																							
Minimum Value: 0.5 ppb on Dec 11 01:00										Minimum Daily Average: 3.1 ppb on Dec 23											Hours of Data: 706																												
Maximum Diurnal Average: 24.6 ppb at hour 16										Minimum Diurnal Average: 9.5 ppb at hour 3											Hours of Missing Data: 38																												
Monthly Average: 17.58 ppb										Percentiles: P ₁ = 0.9 P ₁₀ = 3.3 Q ₁ = 8.1 Median = 14.1 Q ₃ = 21.6 P ₉₀ = 37.3 P ₉₉ = 70.3											Hours of Calibration: 37																												
																					Percent Operational Time: 99.9																												
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Dec	13.3	2.8	5.4	Z	12.4	11.0	9.4	18.1	13.9	26.6	19.6	17.3	16.1	27.7	36.7	30.7	12.0	17.8	17.3	22.8	18.8	15.2	8.9	8.8	16.6	36.7																							
2-Dec	8.0	8.6	5.3	6.1	Z	8.1	10.0	11.1	16.7	14.5	18.7	20.9	20.1	20.7	39.7	33.3	36.4	19.3	19.3	16.0	12.3	20.5	25.9	42.7	18.9	42.7																							
3-Dec	52.1	43.1	38.2	35.7	42.5	Z	45.7	49.6	60.4	60.1	54.3	50.6	46.2	40.5	37.4	40.8	34.5	46.3	52.1	36.3	28.5	19.7	16.2	18.5	41.3	60.4																							
4-Dec	Z	16.8	14.9	16.0	16.6	15.1	15.8	17.9	26.6	24.7	23.6	24.4	38.0	41.5	48.1	70.6	58.7	41.6	28.4	20.7	18.2	16.3	11.8	9.8	26.8	70.6																							
5-Dec	8.9	Z	8.7	8.0	7.4	9.1	9.7	11.8	11.9	13.1	10.8	12.1	14.2	16.6	19.7	17.2	28.0	20.5	14.7	7.7	11.6	18.8	20.5	18.7	13.9	28.0																							
6-Dec	20.5	21.5	Z	4.1	6.9	9.2	18.9	78.8	103.6	58.4	66.4	12.2	11.8	10.8	6.0	30.3	49.3	24.7	11.1	12.0	5.3	14.1	19.1	13.3	26.4	103.6																							
7-Dec	17.4	14.1	20.4	Z	24.5	47.7	25.6	66.0	79.6	65.0	78.1	63.9	37.7	17.0	9.7	26.9	55.2	59.8	76.2	73.1	38.1	56.7	31.3	9.9	43.2	79.6																							
8-Dec	5.5	3.3	3.0	3.7	Z	10.9	32.6	42.8	44.1	42.1	41.3	40.5	39.2	14.7	22.0	52.7	52.5	44.9	32.0	18.3	37.2	33.1	29.0	28.9	29.3	52.7																							
9-Dec	25.4	15.1	26.6	26.4	33.0	Z	55.6	44.3	70.5	57.7	26.5	30.5	38.3	23.7	29.0	20.4	20.3	18.3	18.0	16.0	15.0	12.2	11.4	9.5	28.0	70.5																							
10-Dec	Z	5.9	6.8	5.2	8.9	10.4	12.8	13.0	13.4	13.6	12.6	15.8	27.9	17.8	3.3	2.9	2.7	2.8	1.9	1.1	1.0	0.8	0.6	0.8	7.9	27.9																							
11-Dec	0.5	Z	0.9	0.8	1.0	1.2	2.2	2.9	3.0	3.1	3.6	2.9	5.6	7.5	9.2	39.0	36.2	20.4	23.6	21.3	15.4	14.8	9.6	12.7	10.3	39.0																							
12-Dec	11.1	12.1	Z	11.7	10.9	12.8	15.9	15.0	11.6	12.7	10.7	11.0	12.1	12.8	13.3	12.4	11.8	11.7	13.4	12.7	12.5	11.6	11.1	11.9	12.3	15.9																							
13-Dec	11.8	12.8	10.8	Z	13.0	19.0	16.2	24.2	24.4	20.7	C	C	C	C	C	C	29.6	21.1	23.0	27.8	23.9	36.3	19.7	8.4	-	36.3																							
14-Dec	2.2	1.3	0.9	1.1	Z	1.4	1.8	2.6	4.5	14.8	M	15.6	8.7	10.5	18.6	28.3	10.2	13.1	25.5	35.5	39.6	54.4	19.6	24.2	15.2	54.4																							
15-Dec	17.9	9.9	9.1	8.0	8.3	Z	14.7	17.1	16.6	16.4	24.3	28.0	54.9	38.7	33.7	32.1	11.5	5.7	6.1	5.3	6.9	5.2	5.5	3.4	16.5	54.9																							
16-Dec	Z	1.6	1.6	1.6	1.5	1.1	1.3	1.3	1.9	1.8	1.5	1.1	14.8	18.7	15.2	16.0	10.8	14.6	14.4	11.8	13.9	17.0	17.0	16.8	8.6	18.7																							
17-Dec	11.6	Z	11.1	17.5	17.7	18.9	18.6	21.0	25.0	36.8	28.6	24.5	21.6	19.6	20.3	17.9	18.0	16.2	14.2	13.1	11.3	10.3	10.7	14.1	18.2	36.8																							
18-Dec	15.4	17.9	Z	17.5	19.0	13.7	40.3	53.0	58.0	45.1	3.8	3.0	3.9	4.3	4.1	7.0	6.0	3.7	11.2	4.5	4.1	5.1	4.8	3.9	15.2	58.0																							
19-Dec	2.8	3.7	5.6	Z	5.0	8.9	13.3	23.6	18.2	8.6	2.5	2.0	13.0	14.6	6.3	3.3	3.0	5.2	6.6	6.0	5.2	5.7	4.8	4.1	7.5	23.6																							
20-Dec	4.0	3.8	4.1	4.2	Z	5.3	6.6	5.8	7.2	9.6	8.7	8.2	10.0	13.3	12.8	14.1	16.1	18.0	12.8	10.9	10.0	11.0	11.6	14.5	9.7	18.0																							
21-Dec	2.3	1.9	1.8	1.4	1.8	Z	2.6	3.9	5.0	26.1	32.2	29.7	18.5	24.1	19.6	14.0	15.2	13.0	18.7	48.3	19.0	15.4	12.3	11.2	14.7	48.3																							
22-Dec	Z	11.8	11.3	11.1	11.9	14.7	10.4	8.7	6.8	6.3	13.8	13.3	14.1	14.3	12.2	23.3	21.5	23.2	18.0	19.0	27.3	14.9	22.3	23.9	15.4	27.3																							
23-Dec	19.6	Z	4.2	1.3	0.7	0.8	1.0	1.6	1.6	1.8	1.4	1.4	1.3	1.6	1.7	2.7	2.8	3.3	1.8	1.4	5.7	1.4	5.6	6.9	3.1	19.6																							
24-Dec	5.6	4.2	Z	18.1	17.0	21.3	23.6	15.0	7.1	11.1	13.2	14.4	20.5	21.2	15.7	13.3	22.7	23.5	14.3	26.8	23.3	19.8	11.2	15.4	16.5	26.8																							
25-Dec	7.8	10.3	7.9	Z	6.7	15.9	10.1	14.8	10.9	12.6	11.8	11.7	14.0	12.7	12.5	12.4	12.5	14.4	16.6	14.8	16.4	9.2	6.5	10.0	11.8	16.6																							
26-Dec	3.8	7.1	3.7	3.2	Z	7.0	5.2	10.6	8.8	7.4	8.6	11.5	12.5	15.5	22.3	34.5	27.0	21.1	20.6	15.0	18.1	23.5	16.6	12.6	13.7	34.5																							
27-Dec	18.8	13.8	24.1	23.6	30.9	Z	5.7	15.3	5.2	5.2	9.4	24.2	24.5	28.9	39.3	34.2	39.3	22.4	11.7	22.5	30.4	29.9	14.8	13.1	21.2	39.3																							
28-Dec	Z	5.0	5.8	5.3	4.5	9.8	11.7	15.2	15.7	14.1	19.7	20.5	25.0	20.6	16.7	18.7	19.7	25.1	19.7	18.7	15.2	12.4	12.3	13.7	15.0	25.1																							
29-Dec	11.6	Z	7.5	7.5	13.3	36.3	19.0	26.4	16.6	18.4	15.3	23.5	13.7	19.7	34.9	45.4	47.3	56.6	35.6	25.3	33.5	30.9	13.6	7.3	24.3	56.6																							
30-Dec	6.2	4.8	Z	6.7	7.6	7.8	5.6	9.2	13.2	7.8	10.7	10.1	10.6	12.1	10.4	16.5	9.5	10.9	10.8	10.2	9.1	15.1	11.3	7.0	9.7	16.5																							
31-Dec	8.2	4.7	6.1	Z	9.3	13.5	15.4	17.6	18.2	18.6	16.2	15.8	12.3	16.1	28.9	26.2	35.8	25.8	6.4	4.7	8.7	13.9	1.4	2.6	14.2	35.8																							
																								12.0	9.9	9.5	9.8	12.8	12.7	15.4	21.2	23.2	21.8	20.3	18.7	20.0	18.6	20.0	24.6	24.4	21.5	19.2	18.7	17.3	18.2	13.5	12.9	Diurnal Average	
																								52.1	43.1	38.2	35.7	42.5	47.7	55.6	78.8	103.6	65.0	78.1	63.9	54.9	41.5	48.1	70.6	58.7	59.8	76.2	73.1	39.6	56.7	31.3	42.7	Diurnal Maximum	
Z - zerospan																								C - Calibration				M - Maintenance																					





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Athabasca Valley - December 2023**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	511	72.38	72.38
21 - 40	140	19.83	92.21
41 - 80	54	7.65	99.86
81 - 159	1	0.14	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 706

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Athabasca Valley - December 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	2	2	10	5	14	36	175	50	29	42	35	34	40	10	6	21	511
21 - 40	0	1	0	0	2	10	54	36	15	9	5	3	3	0	1	1	140
11 - 80	0	0	0	0	0	7	14	18	7	1	3	2	1	0	0	1	54
81 - 159	0	0	0	0	0	0	0	1	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
Totals	2	3	10	5	16	53	243	105	51	52	43	39	44	10	7	23	706

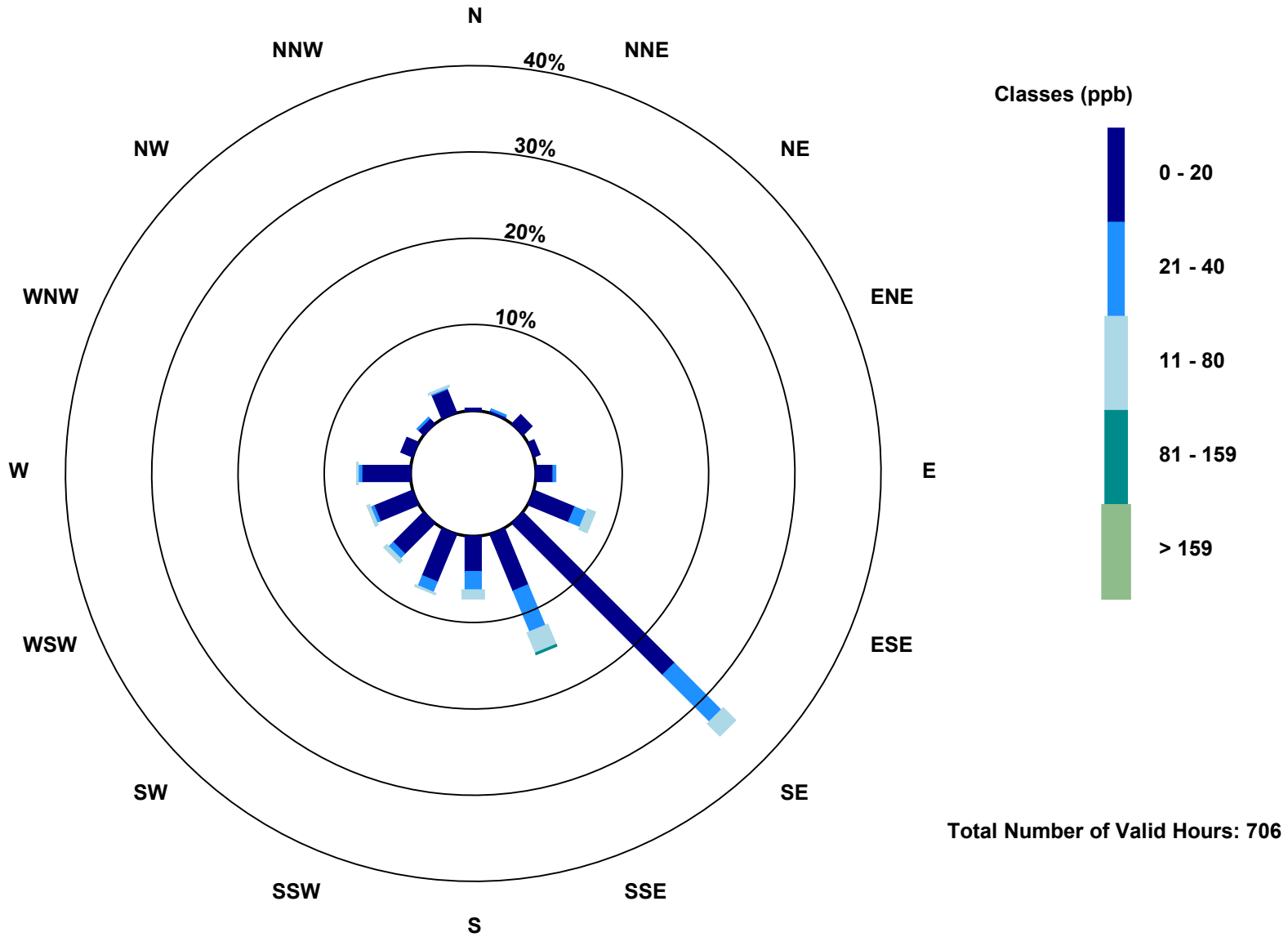
Total Number of Valid Hours: 706

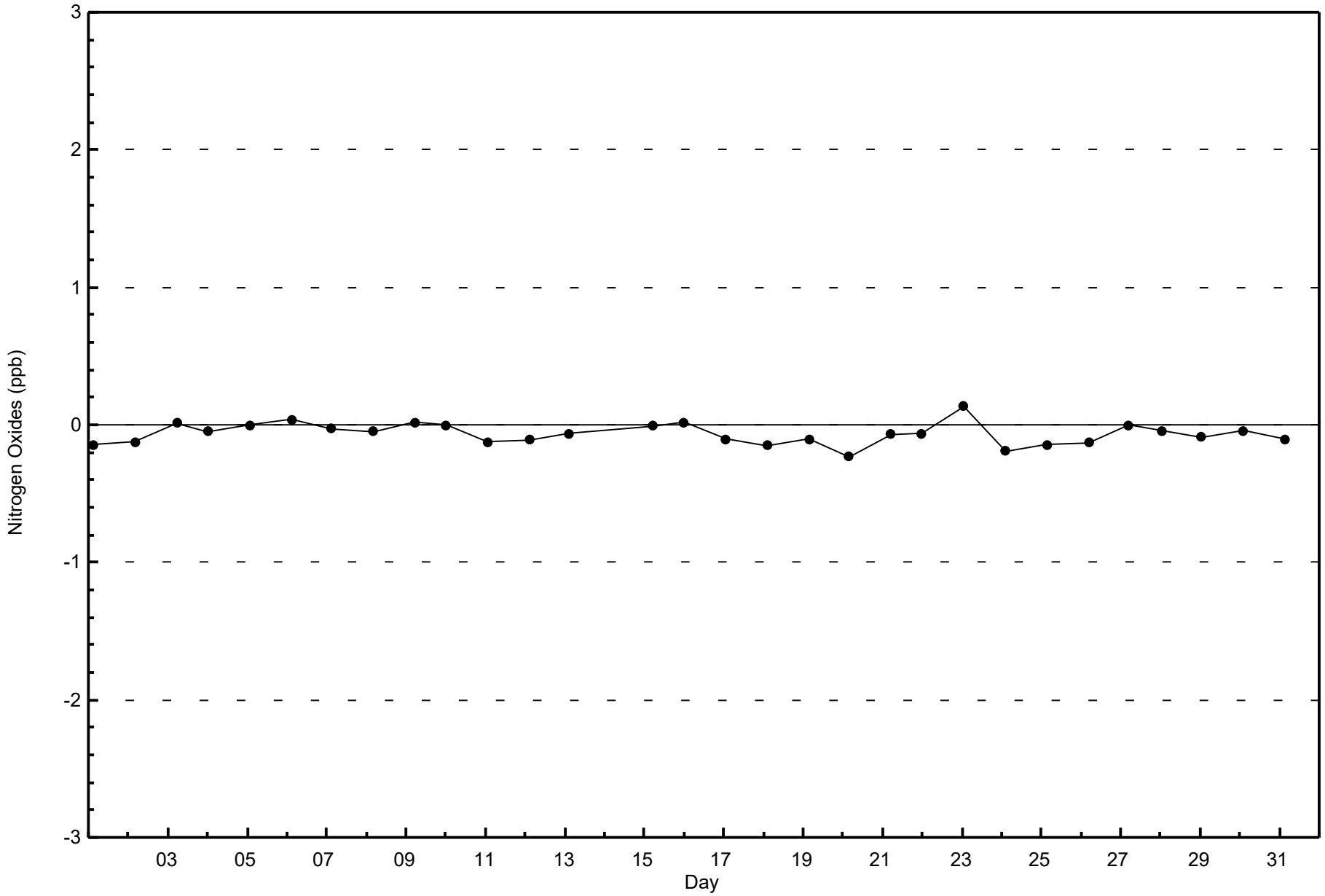
Total Number of Hours: 744

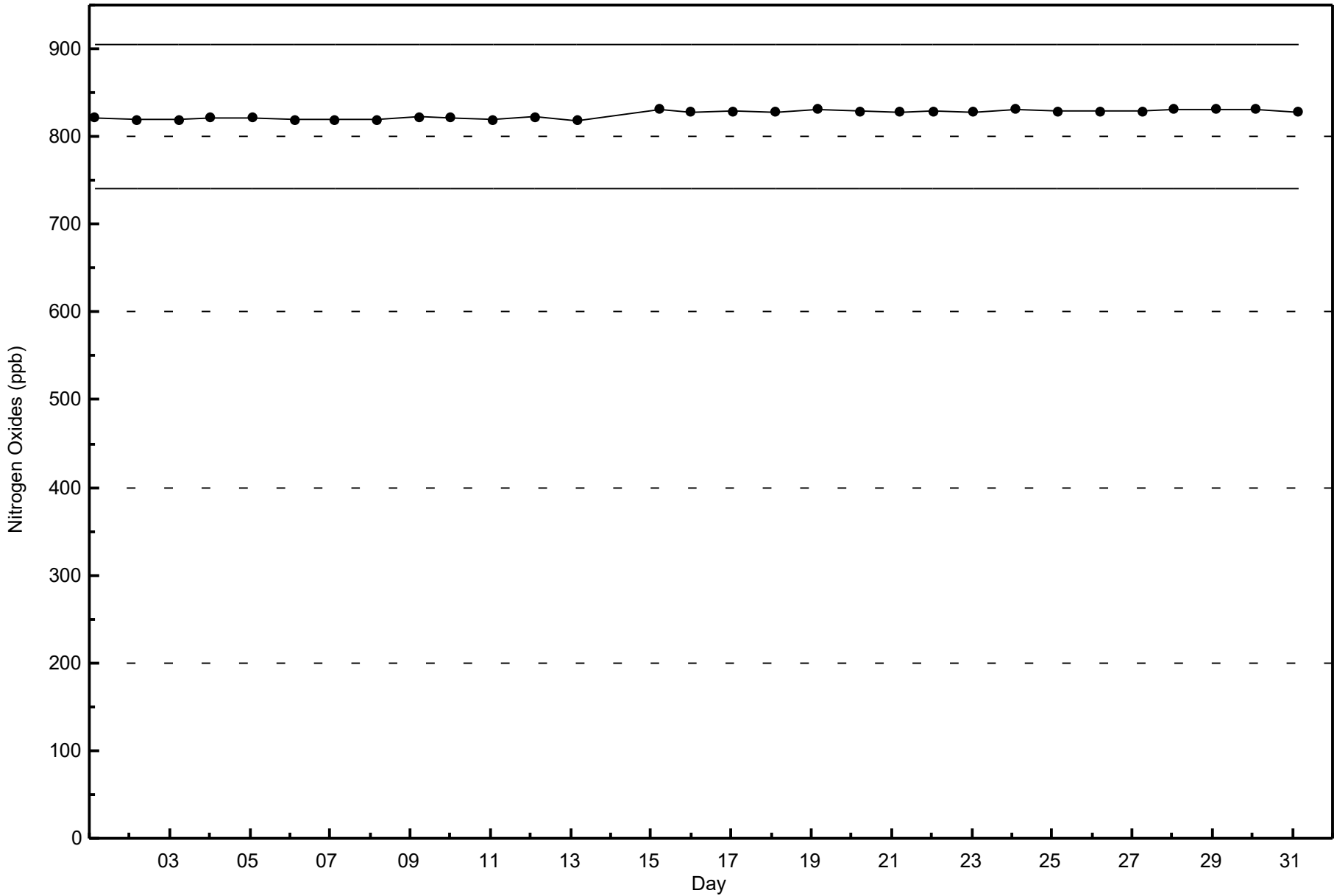


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Nitrogen Oxides (NO_x) - ppb
Athabasca Valley









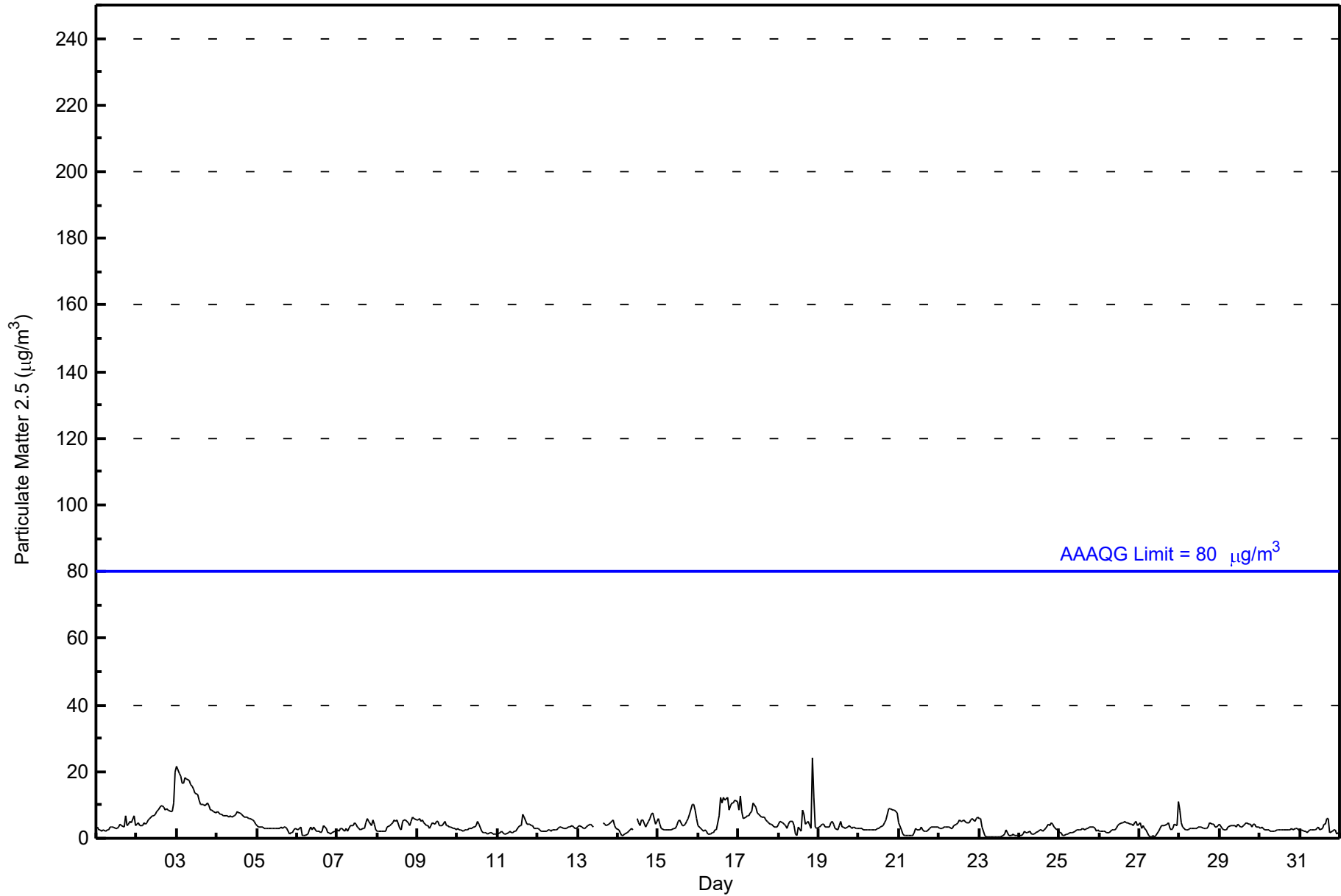
Wood Buffalo Environmental Association

Summary of Hour Averages

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

Athabasca Valley - December 2023

Number of Exceedences (AAAQO):		1-hr: 0	24-hr: 0	Hours in Service: 744																	744																											
Maximum Value: 24.1 µg/m ³ on Dec 18 21:00		Maximum Daily Average: 13.5 µg/m ³ on Dec 3																	Hours of Data: 738																													
Minimum Value: 0.3 µg/m ³ on Dec 23 07:00		Minimum Daily Average: 1.3 µg/m ³ on Dec 23																	Hours of Missing Data: 6																													
Maximum Diurnal Average: 5.3 µg/m ³ at hour 21		Minimum Diurnal Average: 3.1 µg/m ³ at hour 5																	Hours of Calibration: 5																													
Monthly Average: 4.10 µg/m ³		Percentiles: P ₁ = 0.4 P ₁₀ = 1.7 Q ₁ = 2.5 Median = 3.3 Q ₃ = 4.7 P ₉₀ = 7.5 P ₉₉ = 17.0																	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-Dec	3.3	2.7	2.6	2.3	2.6	2.2	2.4	2.7	3.2	3.6	3.3	3.0	3.0	3.5	4.0	3.9	3.3	6.9	3.9	4.3	5.2	4.7	6.7	3.9	3.6	6.9																						
2-Dec	4.2	4.7	3.7	4.0	4.5	4.2	4.8	5.5	6.0	6.7	6.6	7.1	7.8	8.4	9.6	9.7	9.5	8.7	9.1	8.4	7.9	8.1	10.6	19.9	7.5	19.9																						
3-Dec	21.6	19.5	18.7	16.5	16.6	18.1	17.7	17.2	15.9	15.5	15.0	13.5	13.1	11.4	10.4	10.3	10.2	9.8	10.5	9.8	8.3	8.3	8.0	7.6	13.5	21.6																						
4-Dec	7.9	7.4	7.2	7.1	6.9	6.7	6.7	6.5	6.6	6.5	6.6	7.3	8.2	7.8	7.6	7.1	6.4	6.2	6.4	5.9	6.0	5.4	5.0	4.3	6.7	8.2																						
5-Dec	3.9	3.6	3.3	3.3	3.0	3.1	3.1	2.9	2.9	3.0	3.1	3.1	3.1	3.1	3.2	3.0	3.3	3.2	2.8	1.4	1.7	1.8	2.7	3.2	2.9	3.9																						
6-Dec	2.6	3.0	3.3	0.9	0.8	0.9	1.1	2.5	3.2	2.6	3.3	2.0	2.2	2.2	1.6	2.3	4.0	2.8	1.8	1.7	1.3	1.7	2.0	2.2	2.2	4.0																						
7-Dec	2.5	2.1	3.0	2.9	2.3	2.8	2.0	2.8	3.9	3.9	4.5	4.3	3.5	2.8	2.5	2.9	3.2	4.8	5.8	5.1	3.7	5.4	4.4	2.6	3.5	5.8																						
8-Dec	2.3	2.1	2.1	2.1	2.1	2.3	3.3	4.0	4.2	4.5	5.3	5.3	5.4	3.2	2.5	4.9	5.4	5.3	4.7	3.7	5.2	6.6	5.7	5.6	4.1	6.6																						
9-Dec	5.6	5.8	5.2	5.4	4.7	3.6	3.6	3.1	3.7	4.5	4.3	5.1	4.9	3.8	3.7	3.9	5.0	3.6	3.9	3.4	3.6	3.1	2.9	2.7	4.1	5.8																						
10-Dec	2.9	2.6	2.4	2.2	2.3	2.6	2.6	2.8	3.0	3.4	3.4	3.9	5.2	4.4	2.2	1.6	1.6	1.5	1.4	1.7	1.5	1.4	1.2	1.2	2.5	5.2																						
11-Dec	1.3	1.7	2.0	1.7	1.5	1.4	1.7	2.1	1.8	1.8	2.2	2.1	3.2	4.0	3.6	7.4	6.4	4.2	4.4	4.4	3.9	4.0	3.0	3.1	3.0	7.4																						
12-Dec	2.8	2.5	2.1	2.2	2.0	2.1	2.4	2.4	2.3	2.4	2.5	2.7	3.1	3.5	3.3	3.2	3.0	3.1	3.6	3.6	3.9	3.3	3.0	3.0	2.8	3.9																						
13-Dec	3.4	3.6	3.3	3.1	3.0	3.4	3.8	4.1	3.8	3.4	C	C	C	C	C	4.8	4.3	3.9	4.2	4.8	5.1	5.3	3.7	3.0	3.9	5.3																						
14-Dec	2.5	1.7	1.0	0.8	1.1	1.6	2.2	2.7	3.0	2.5	M	5.8	4.8	3.6	5.3	5.4	3.6	4.1	5.3	5.9	7.3	7.6	4.2	5.0	3.8	7.6																						
15-Dec	5.8	4.2	2.9	2.7	2.6	2.7	2.7	2.7	2.7	2.8	3.2	3.6	5.0	5.4	3.9	3.9	4.1	5.2	6.0	7.3	10.1	10.1	8.5	6.1	4.8	10.1																						
16-Dec	3.7	3.0	2.4	1.9	2.4	2.3	1.4	1.3	1.7	1.9	2.5	2.4	6.8	12.2	10.5	12.4	11.4	12.4	8.6	9.8	10.6	10.8	11.6	11.1	6.5	12.4																						
17-Dec	8.4	12.8	8.0	6.0	6.2	6.9	6.7	7.6	8.0	10.5	9.4	7.8	7.3	6.6	6.4	6.2	5.5	5.2	4.7	4.4	4.4	3.6	3.3	3.6	6.6	12.8																						
18-Dec	4.2	4.9	4.6	4.1	4.0	3.1	4.1	5.0	4.9	3.8	1.1	1.0	3.5	2.3	8.4	7.3	4.3	4.7	5.2	3.1	24.1	12.2	3.3	2.9	5.3	24.1																						
19-Dec	3.4	3.9	4.4	4.3	3.5	3.4	3.5	4.5	5.2	4.2	2.9	2.6	3.9	4.9	3.2	3.2	3.0	3.2	3.7	3.4	3.2	3.2	3.1	3.0	3.6	5.2																						
20-Dec	3.0	2.9	2.8	2.7	2.7	2.7	2.6	2.6	2.7	2.7	2.7	2.9	3.2	3.6	3.9	4.6	5.3	7.0	8.8	8.9	8.6	8.4	8.0	7.6	4.6	8.9																						
21-Dec	4.5	2.3	1.5	1.0	0.9	0.9	0.9	0.9	0.8	1.6	2.8	2.7	2.4	3.3	2.4	2.1	2.3	2.2	2.9	3.4	3.5	3.6	3.5	3.5	2.3	4.5																						
22-Dec	2.9	3.1	3.2	3.4	3.3	3.2	3.2	2.9	3.1	3.7	4.1	4.7	5.4	5.1	4.9	5.5	4.7	4.8	4.5	5.6	5.8	5.2	6.0	6.3	4.4	6.3																						
23-Dec	6.1	6.0	3.2	1.0	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.5	0.6	0.7	1.1	2.3	1.7	0.8	0.8	1.4	0.7	1.0	1.0	1.3	6.1																						
24-Dec	0.7	0.7	1.3	1.9	1.9	1.6	2.0	1.4	1.2	1.5	1.9	2.1	2.5	2.6	2.3	2.6	3.2	4.3	3.7	4.5	4.4	3.5	2.7	2.5	2.4	4.5																						
25-Dec	1.5	1.5	1.0	0.8	1.2	1.4	1.6	1.9	1.9	2.1	2.6	2.7	2.7	2.7	2.9	2.6	2.8	3.1	3.2	3.3	3.5	2.8	2.2	2.7	2.3	3.5																						
26-Dec	2.2	2.2	2.0	2.0	1.7	1.8	1.9	2.6	2.7	2.4	3.1	3.7	4.2	4.5	4.8	4.9	4.5	4.6	4.4	4.4	4.0	4.8	4.9	3.9	3.4	4.9																						
27-Dec	4.5	3.1	4.0	2.9	2.6	0.7	0.4	0.6	0.7	0.5	0.9	2.0	2.8	3.8	3.9	3.9	4.2	4.8	3.0	2.4	3.1	4.2	3.9	11.2	3.1	11.2																						
28-Dec	8.4	4.6	3.4	2.7	2.4	2.7	2.8	2.9	2.9	3.0	3.0	3.3	3.5	3.4	3.0	2.9	3.0	3.4	4.6	4.1	4.1	3.6	3.6	4.0	3.5	8.4																						
29-Dec	4.1	3.1	2.6	2.5	2.4	3.3	3.6	3.9	3.8	4.0	3.3	4.1	3.5	3.4	3.8	4.3	4.6	4.4	4.3	3.5	4.3	4.2	3.4	3.5	3.7	4.6																						
30-Dec	2.9	3.3	2.9	2.6	2.4	2.4	2.0	2.3	2.3	2.2	2.7	2.6	2.7	2.7	2.6	2.6	2.4	2.7	2.6	3.2	2.7	3.1	2.9	2.4	2.6	3.3																						
31-Dec	2.2	2.4	2.1	2.1	1.8	2.1	2.5	2.7	2.4	2.5	2.9	3.2	2.6	2.8	4.1	4.3	5.8	5.9	1.8	2.1	2.4	2.4	1.2	1.7	2.7	5.9																						
4.4																								4.1	3.6	3.2	3.1	3.1	3.2	3.5	3.6	3.7	3.8	3.9	4.3	4.4	4.4	4.7	4.6	4.8	4.5	4.5	5.3	4.9	4.4	4.6	Diurnal Average	
21.6																								19.5	18.7	16.5	16.6	18.1	17.7	17.2	15.9	15.5	15.0	13.5	13.1	12.2	10.5	12.4	11.4	12.4	10.5	9.8	24.1	12.2	11.6	19.9	Diurnal Maximum	
C - Calibration M - Maintenance																																																
Alberta Ambient Air Quality Guideline/Objectives: 1-hr 80 µg/m ³ 24-hr 29 µg/m ³																																																





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Athabasca Valley - December 2023**

Concentration Ranges ($\mu\text{g}/\text{m}^3$)	Number of Hours	%	Cumulative %
0 - 5	606	82.11	82.11
6 - 15	121	16.40	98.51
16 - 25	11	1.49	100.00
26 - 80	0	0.00	100.00
> 81.0	0	0.00	100.00

Total Number of Valid Hours: 738

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Athabasca Valley - December 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	2	2	9	5	16	54	210	83	45	47	35	35	35	10	8	10	606
6 - 15	0	1	1	0	0	1	39	26	9	10	6	6	7	0	1	14	121
16 - 25	0	0	0	0	0	1	3	0	0	0	3	2	2	0	0	0	11
26 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 81.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	2	3	10	5	16	56	252	109	54	57	44	43	44	10	9	24	738

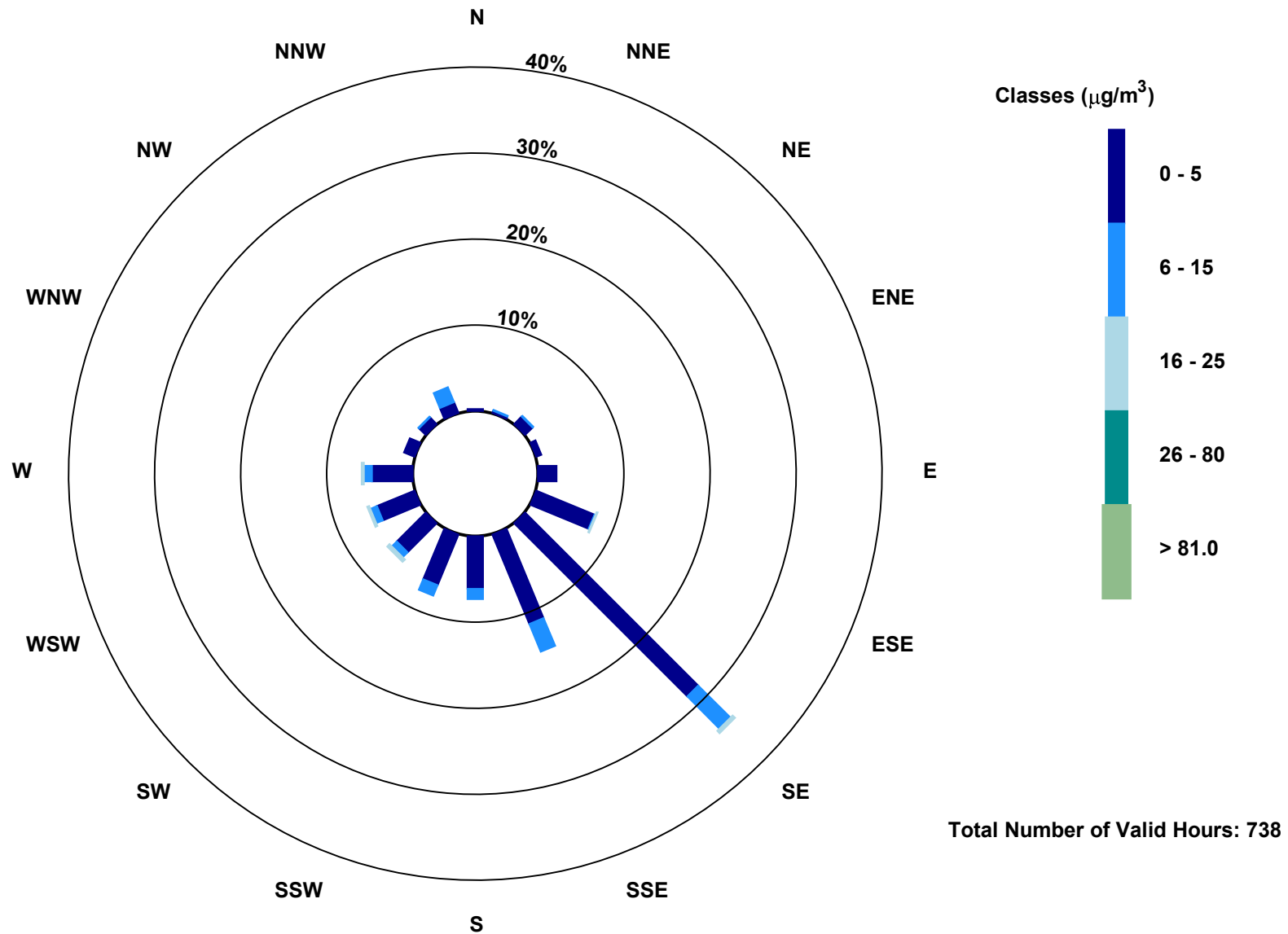
Total Number of Valid Hours: 738

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Dec 2023

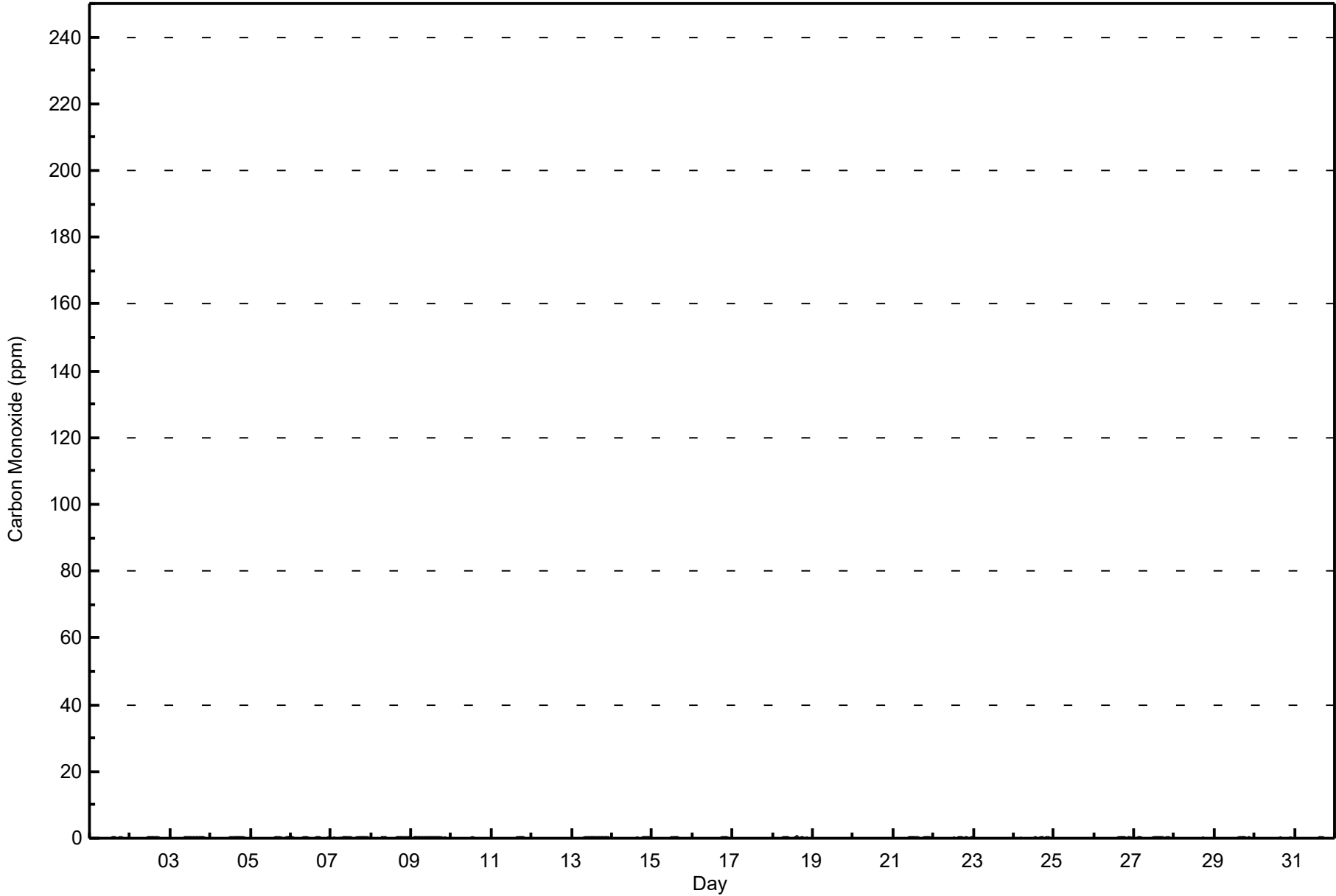
Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Athabasca Valley





Wood Buffalo Environmental Association
Hourly Averages

Carbon Monoxide (CO) - ppm
Athabasca Valley - December 2023





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Carbon Monoxide (CO) - ppm
Athabasca Valley - December 2023**

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 0.3	675	95.20	95.20
0.4 - 0.5	32	4.51	99.72
0.6 - 0.7	1	0.14	99.86
0.8 - 1.4	1	0.14	100.00
1.5 - 10	0	0.00	100.00
> 10	0	0.00	100.00

Total Number of Valid Hours: 709

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Carbon Monoxide (CO) - ppm
Athabasca Valley - December 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	1	3	10	5	16	47	236	92	50	55	40	40	40	10	8	22	675
0.4 - 0.5	0	0	0	0	0	4	10	13	2	0	0	0	2	0	0	1	32
0.6 - 0.7	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
0.8 - 1.4	0	0	0	0	0	0	0	0	0	0	0	0	1	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
Totals	1	3	10	5	16	51	247	105	52	55	40	40	43	10	8	23	709

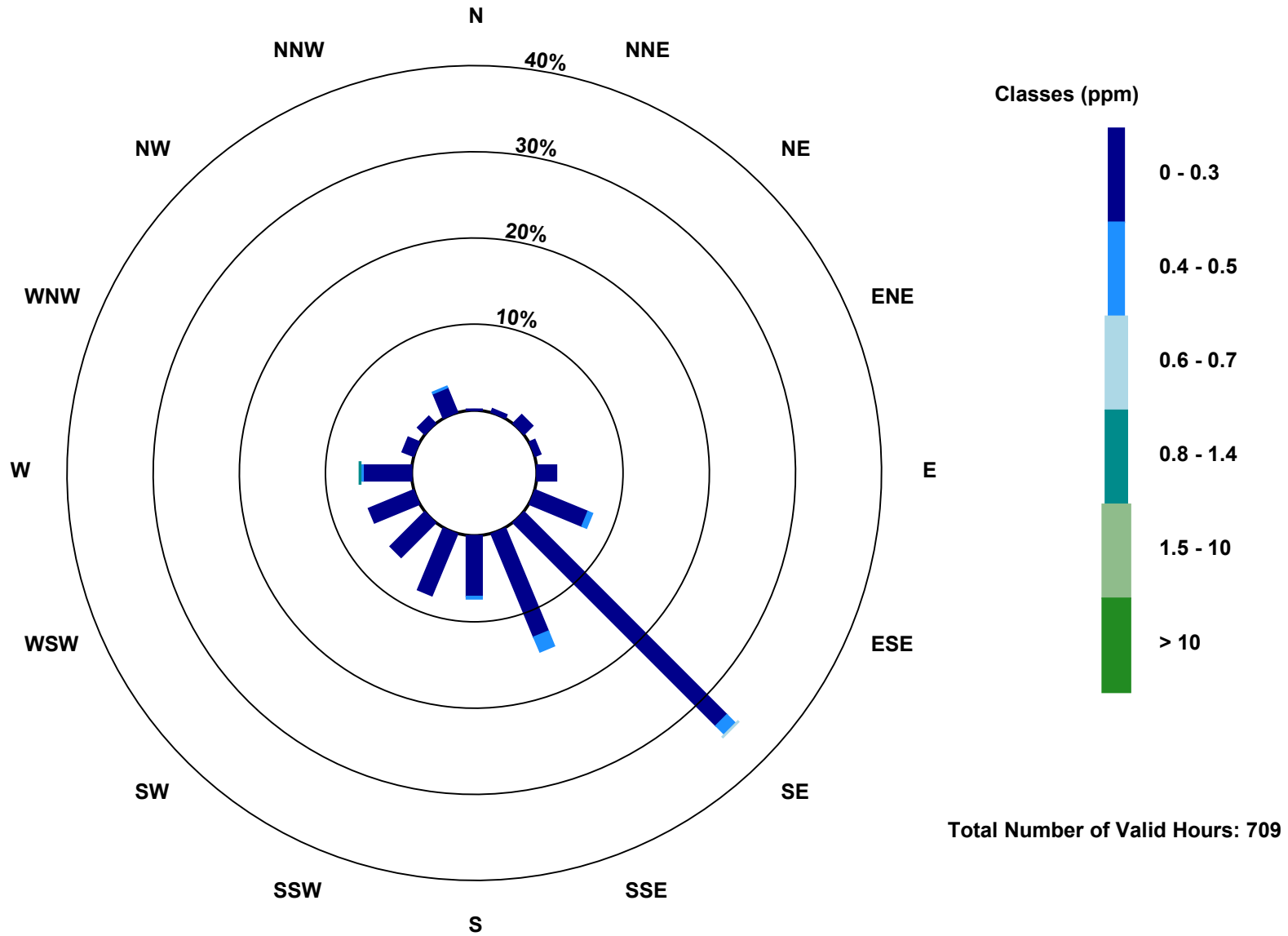
Total Number of Valid Hours: 709

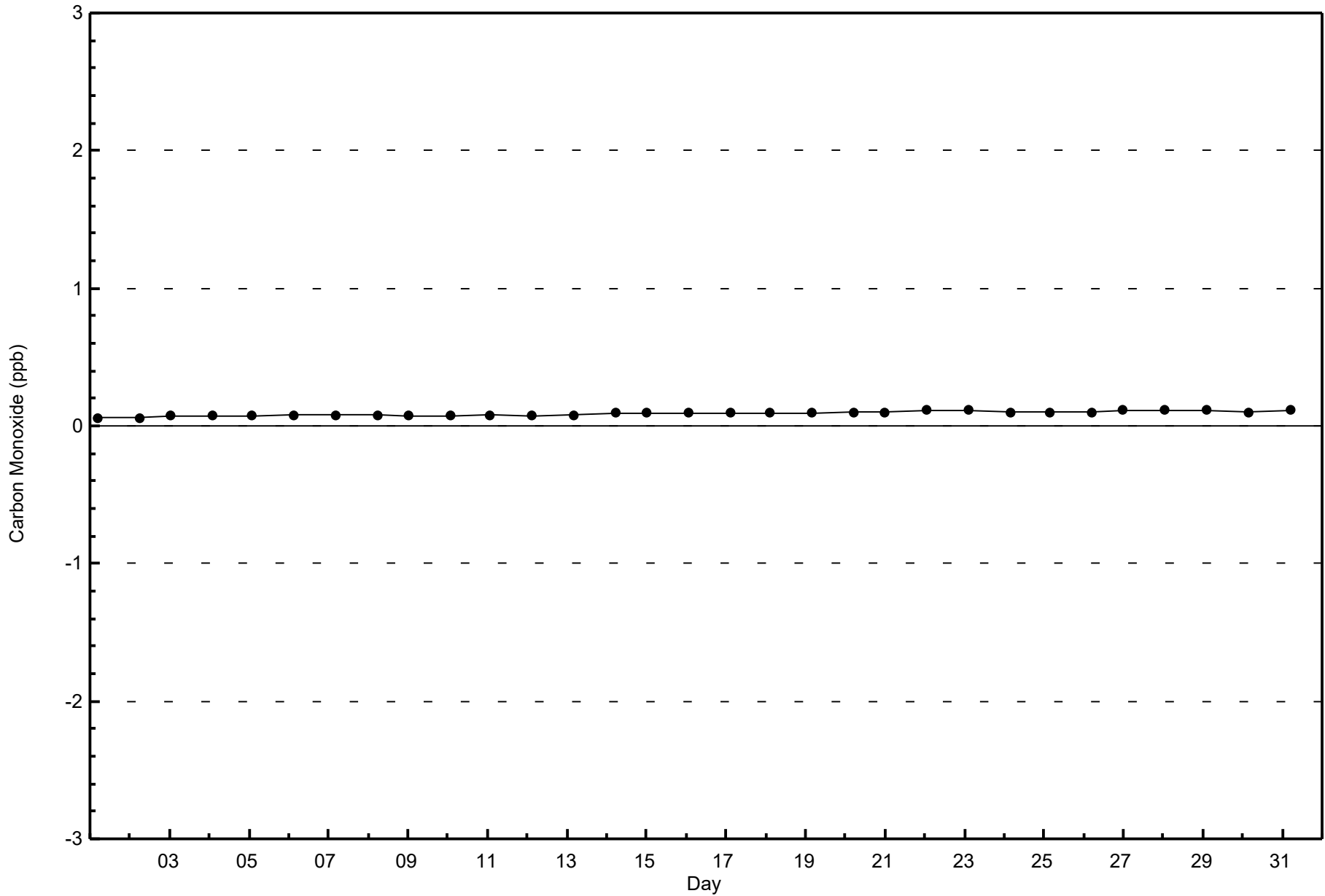
Total Number of Hours: 744

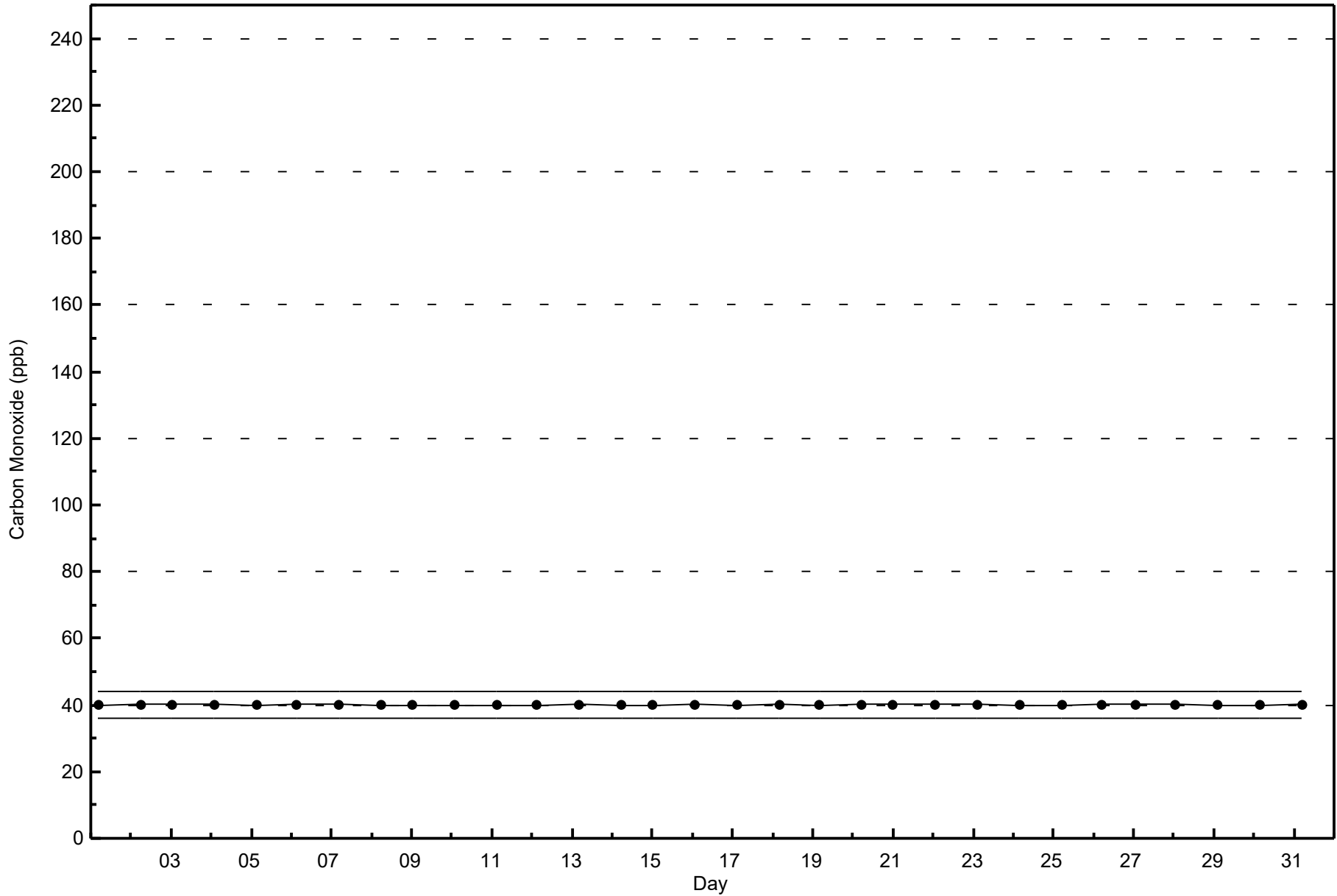


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Carbon Monoxide (CO) - ppm
Athabasca Valley









Wood Buffalo Environmental Association

Summary of Hour Averages

Ambient Temperature (AT) - C

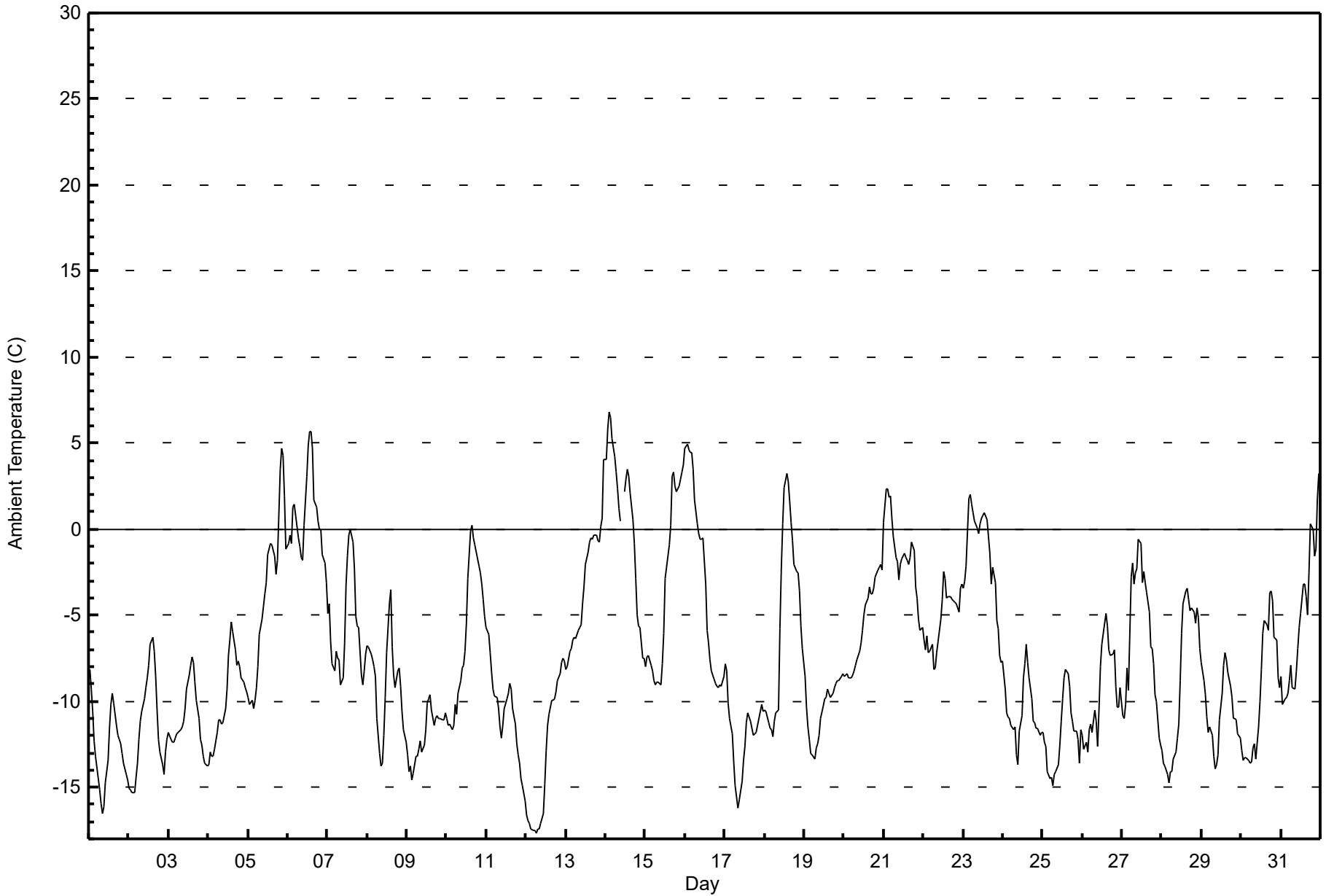
Athabasca Valley - December 2023

Maximum Value: 6.8 C on Dec 14 03:00		Maximum Daily Average: 0.8 C on Dec 14		Hours in Service: 744																							
Minimum Value: -17.7 C on Dec 12 07:00		Minimum Daily Average: -13.3 C on Dec 12		Hours of Data: 743																							
Maximum Diurnal Average: -4.2 C at hour 15		Minimum Diurnal Average: -9.3 C at hour 9		Hours of Missing Data: 1																							
Monthly Average: -7.33 C		Percentiles: P ₁ = -17.0 P ₁₀ = -13.3 Q ₁ = -11.4 Median = -8.3 Q ₃ = -3.4 P ₉₀ = 0.3 P ₉₉ = 4.8		Hours of Calibration: 0																							
				Percent Operational Time: 99.9																							
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Dec	-8.1	-9.3	-10.6	-12.3	-13.2	-14.5	-15.1	-15.9	-16.6	-16.1	-14.7	-13.4	-11.6	-10.2	-9.6	-10.1	-11.5	-12.0	-12.2	-12.4	-13.0	-13.6	-14.3	-14.6	-12.7	-8.1	
2-Dec	-15.0	-15.2	-15.3	-15.3	-14.4	-13.6	-12.2	-11.2	-10.6	-9.9	-9.2	-8.6	-7.9	-6.7	-6.3	-7.1	-8.6	-10.5	-12.2	-13.0	-13.7	-14.3	-13.0	-12.2	-11.5	-6.3	
3-Dec	-11.8	-12.3	-12.4	-12.4	-12.1	-11.9	-11.9	-11.6	-11.5	-11.1	-10.4	-9.3	-8.5	-7.9	-7.4	-7.7	-8.9	-9.9	-11.0	-12.2	-12.5	-13.2	-13.6	-13.8	-11.1	-7.4	
4-Dec	-13.7	-13.0	-13.2	-13.2	-12.8	-11.8	-11.1	-11.1	-11.3	-11.3	-10.4	-9.3	-7.4	-6.4	-5.4	-5.9	-7.0	-7.9	-7.7	-8.0	-8.6	-8.9	-9.2	-9.4	-9.7	-5.4	
5-Dec	-9.8	-10.2	-10.0	-10.4	-9.9	-9.2	-8.0	-6.1	-5.2	-4.5	-3.7	-3.1	-1.5	-0.9	-0.9	-1.2	-1.5	-2.6	-1.8	3.4	4.7	4.3	1.9	-1.2	-3.6	4.7	
6-Dec	-0.8	-0.3	-0.8	1.3	1.5	0.8	-0.5	-1.0	-1.6	-1.8	0.2	3.1	4.9	5.7	5.7	4.7	1.7	1.3	0.5	0.0	0.0	-1.5	-2.0	-3.1	0.7	5.7	
7-Dec	-4.9	-4.3	-6.6	-7.9	-8.2	-7.1	-7.5	-7.5	-9.1	-8.6	-6.6	-3.3	-1.6	-0.4	0.0	-0.8	-2.3	-5.0	-5.7	-5.7	-8.5	-9.1	-8.2	-7.2	-5.7	0.0	
8-Dec	-6.8	-6.9	-7.2	-7.6	-8.0	-8.6	-11.0	-13.1	-13.8	-13.6	-12.0	-9.8	-7.2	-4.3	-3.5	-6.9	-8.5	-9.2	-8.2	-8.1	-9.1	-10.6	-11.6	-12.4	-9.1	-3.5	
9-Dec	-13.1	-14.1	-13.8	-14.6	-14.2	-13.2	-13.2	-12.8	-12.3	-12.9	-12.6	-11.7	-10.1	-9.9	-9.7	-10.5	-11.4	-11.0	-10.8	-11.0	-11.0	-11.1	-11.1	-10.7	-11.9	-9.7	
10-Dec	-11.0	-11.4	-11.3	-11.6	-11.4	-10.2	-10.8	-9.6	-8.8	-8.0	-7.9	-7.1	-5.5	-2.9	-0.1	0.2	-0.5	-1.0	-1.3	-2.1	-2.6	-3.2	-4.1	-5.0	-6.1	0.2	
11-Dec	-5.7	-6.1	-7.2	-8.3	-9.3	-9.7	-9.8	-10.4	-11.5	-12.2	-11.4	-10.4	-9.9	-9.5	-8.9	-9.3	-10.5	-11.4	-12.5	-13.2	-13.6	-14.5	-14.9	-15.8	-10.7	-5.7	
12-Dec	-16.6	-17.0	-17.1	-17.4	-17.5	-17.5	-17.7	-17.4	-17.4	-17.1	-16.6	-14.8	-12.9	-11.4	-10.8	-9.9	-9.9	-9.9	-9.5	-8.8	-8.4	-7.8	-7.5	-7.7	-13.3	-7.5	
13-Dec	-8.2	-8.0	-7.1	-6.9	-6.4	-6.3	-6.4	-5.8	-5.7	-5.6	-4.3	-3.3	-2.1	-1.3	-0.8	-0.5	-0.6	-0.4	-0.3	-0.7	-0.8	0.2	0.7	4.1	-3.2	4.1	
14-Dec	4.1	5.8	6.8	6.5	5.3	4.2	3.3	2.3	1.2	0.5	M	2.2	2.9	3.5	3.0	2.1	0.5	-0.8	-2.9	-5.0	-5.7	-7.5	-7.5	0.8	6.8		
15-Dec	-8.0	-7.4	-7.3	-7.9	-8.2	-8.8	-9.0	-8.9	-8.9	-9.1	-7.9	-6.1	-2.9	-2.2	-0.9	0.3	3.1	3.3	2.5	2.2	2.5	2.9	3.3	3.7	-3.3	3.7	
16-Dec	4.7	4.9	4.6	4.5	4.4	3.5	1.7	0.3	-0.3	-0.5	-0.6	-0.5	-3.2	-5.8	-6.6	-7.6	-8.3	-8.7	-9.0	-9.1	-9.2	-9.1	-9.1	-8.6	-2.8	4.9	
17-Dec	-7.8	-8.3	-10.1	-11.0	-11.9	-13.5	-14.9	-15.6	-16.2	-15.7	-14.7	-13.5	-12.6	-11.3	-10.7	-11.2	-11.6	-12.0	-11.9	-11.8	-11.4	-10.6	-10.2	-10.6	-12.0	-7.8	
18-Dec	-10.5	-10.6	-11.2	-11.6	-11.6	-12.1	-11.2	-10.7	-10.5	-5.8	-2.3	0.3	2.4	3.2	2.7	1.6	0.4	-0.7	-2.1	-2.4	-2.6	-3.6	-5.6	-7.0	-5.1	3.2	
19-Dec	-8.5	-10.3	-11.5	-12.2	-13.0	-13.1	-13.4	-12.7	-12.4	-12.0	-11.0	-10.3	-9.9	-9.8	-9.3	-9.5	-9.8	-9.6	-9.2	-9.0	-8.8	-8.8	-8.5	-8.4	-10.5	-8.4	
20-Dec	-8.6	-8.5	-8.4	-8.6	-8.7	-8.4	-8.2	-7.9	-7.6	-7.1	-6.6	-5.9	-5.0	-4.4	-4.0	-3.4	-3.8	-3.7	-3.5	-2.8	-2.4	-2.2	-2.0	-2.4	-5.6	-2.0	
21-Dec	0.4	2.4	2.3	1.9	2.0	0.6	-0.4	-1.7	-1.9	-3.0	-2.1	-1.7	-1.4	-1.7	-1.8	-2.1	-1.6	-0.7	-1.2	-3.4	-4.0	-5.2	-5.9	-5.7	-1.5	2.4	
22-Dec	-6.4	-7.0	-6.2	-7.2	-7.1	-6.7	-8.1	-8.1	-7.2	-6.5	-5.2	-4.1	-2.4	-2.9	-4.0	-3.9	-3.9	-4.1	-4.2	-4.3	-4.3	-4.8	-3.5	-3.2	-5.2	-2.4	
23-Dec	-3.4	-3.0	-2.1	1.8	2.0	1.5	0.9	0.5	0.1	-0.2	0.3	0.6	0.8	0.9	0.5	-0.4	-1.4	-3.2	-2.2	-3.1	-5.3	-5.8	-7.4	-7.8	-1.5	2.0	
24-Dec	-7.6	-9.3	-10.7	-11.0	-11.0	-11.4	-11.7	-11.5	-13.1	-13.7	-11.7	-10.9	-8.6	-7.9	-6.7	-7.7	-8.6	-9.9	-11.1	-11.2	-11.6	-11.6	-12.0	-11.8	-10.5	-6.7	
25-Dec	-11.8	-12.4	-12.6	-14.1	-14.5	-14.4	-14.9	-14.3	-14.1	-13.7	-12.6	-11.2	-9.9	-8.6	-8.2	-8.4	-9.1	-10.7	-11.2	-11.8	-11.7	-12.3	-13.6	-11.7	-12.0	-8.2	
26-Dec	-12.0	-12.8	-12.4	-13.0	-11.6	-11.4	-11.8	-10.5	-11.2	-12.7	-10.4	-8.0	-6.7	-5.5	-4.9	-5.6	-7.0	-7.3	-7.3	-7.0	-9.1	-10.3	-10.4	-9.2	-9.5	-4.9	
27-Dec	-10.8	-11.0	-10.2	-8.1	-9.4	-2.8	-2.0	-3.2	-2.5	-2.3	-0.6	-0.8	-3.1	-2.4	-3.1	-3.7	-4.8	-6.8	-6.9	-7.9	-9.6	-10.0	-12.1	-12.5	-6.1	-0.6	
28-Dec	-12.9	-13.6	-13.8	-14.3	-14.8	-14.1	-14.1	-13.3	-12.9	-12.1	-11.3	-8.8	-6.0	-4.3	-3.6	-3.5	-4.1	-4.7	-4.6	-4.8	-5.5	-4.5	-5.2	-7.0	-8.9	-3.5	
29-Dec	-7.8	-8.8	-9.6	-10.9	-11.8	-11.5	-12.0	-13.2	-14.0	-13.7	-13.1	-11.1	-9.6	-7.9	-7.2	-7.6	-8.3	-9.2	-9.8	-11.0	-11.0	-11.1	-11.9	-12.2	-10.6	-7.2	
30-Dec	-12.9	-13.4	-13.3	-13.3	-13.4	-13.6	-13.5	-12.7	-12.4	-13.4	-11.5	-10.0	-8.1	-6.0	-5.3	-5.5	-5.9	-3.7	-3.6	-4.1	-6.3	-6.5	-8.6	-9.2	-9.4	-3.6	
31-Dec	-8.5	-10.2	-9.9	-9.8	-9.6	-8.8	-7.9	-9.2	-9.3	-8.3	-6.9	-5.7	-4.9	-3.2	-3.2	-3.9	-5.0	-2.5	0.3	-0.1	-1.5	-1.2	1.8	3.3	-5.2	3.3	
	-8.2	-8.4	-8.7	-8.9	-9.0	-8.8	-9.1	-9.2	-9.3	-9.1	-8.3	-6.7	-5.5	-4.6	-4.2	-4.7	-5.4	-6.0	-6.2	-6.4	-6.9	-7.2	-7.6	-7.6		Diurnal Average	
	4.7	5.8	6.8	6.5	5.3	4.2	3.3	2.3	1.2	0.5	0.3	3.1	4.9	5.7	5.7	4.7	3.1	3.3	2.5	3.4	4.7	4.3	3.3	4.1		Diurnal Maximum	
M - Maintenance																											



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature (AT) - C
Athabasca Valley - December 2023





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C
Athabasca Valley - December 2023**

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	663	89.23	89.23
0 - 10	80	10.77	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 743

Total Number of Hours: 744



Wood Buffalo Environmental Association
Summary of Hour Averages

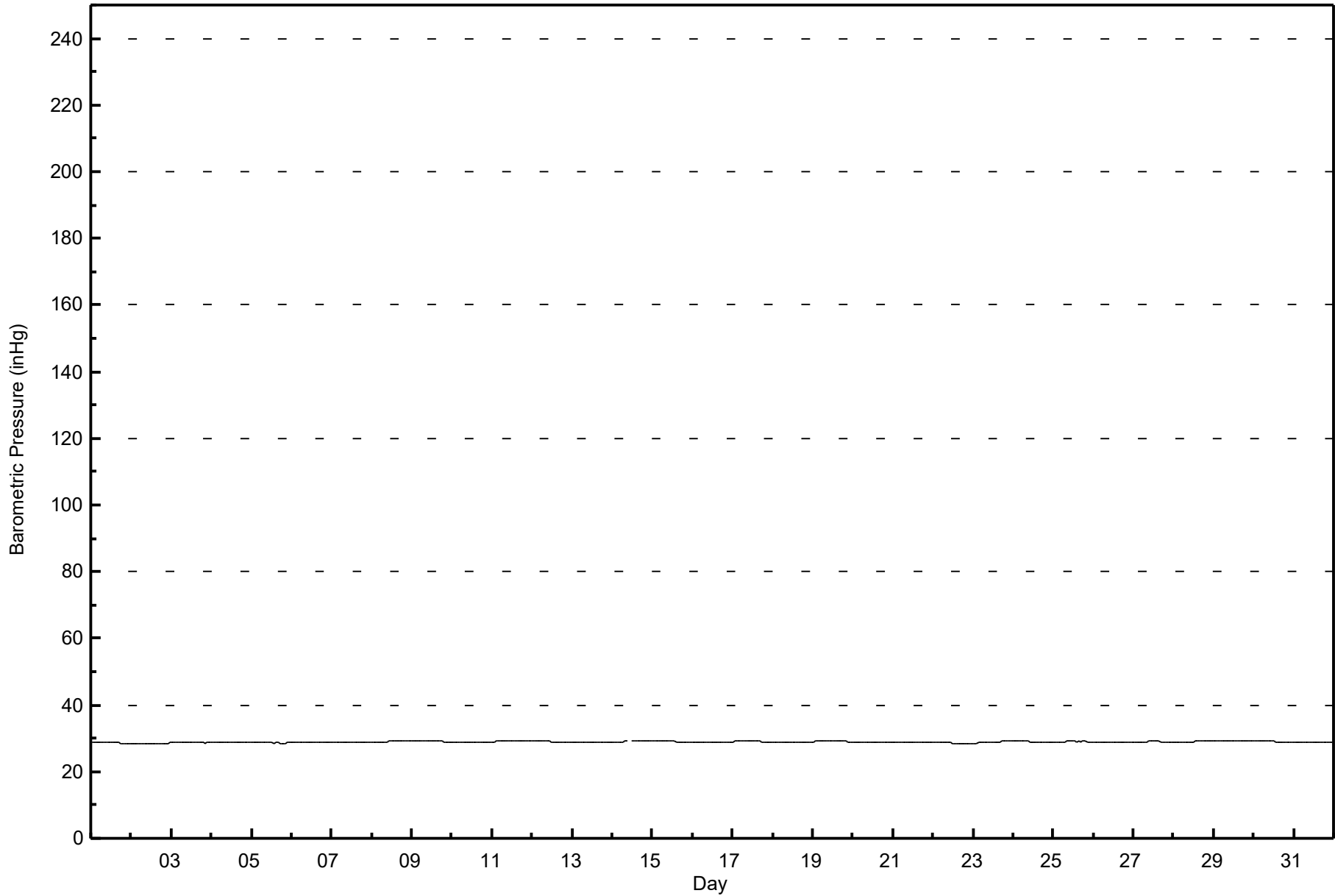
Barometric Pressure (BP) - inHg
Athabasca Valley - December 2023

Maximum Value: 29.3 inHg on Dec 11 12:00		Maximum Daily Average: 29.2 inHg on Dec 11		Hours in Service: 744																						
Minimum Value: 28.4 inHg on Dec 2 13:00		Minimum Daily Average: 28.5 inHg on Dec 2		Hours of Data: 743																						
Maximum Diurnal Average: 28.9 inHg at hour 10		Minimum Diurnal Average: 28.9 inHg at hour 21		Hours of Missing Data: 1																						
Monthly Average: 28.89 inHg		Percentiles: P ₁ = 28.5 P ₁₀ = 28.6 Q ₁ = 28.7 Median = 28.9 Q ₃ = 29.1 P ₉₀ = 29.2 P ₉₉ = 29.3		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-Dec	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.7	28.7	28.7	28.7	28.7	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.5	28.7	28.8
2-Dec	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.4	28.4	28.4	28.4	28.4	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.6	28.6	28.6	28.5	28.6
3-Dec	28.6	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.7	28.7
4-Dec	28.6	28.6	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.8	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
5-Dec	28.8	28.8	28.8	28.8	28.7	28.7	28.7	28.7	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.7	28.8
6-Dec	28.6	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7
7-Dec	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.9	28.9	28.7	28.9
8-Dec	28.9	28.9	28.9	28.9	28.9	28.9	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.0	29.2
9-Dec	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	28.9	28.9	29.1	29.2
10-Dec	28.9	28.9	28.8	28.8	28.8	28.8	28.8	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.8	28.8	28.8	28.9	28.9	28.9	28.8	28.9	29.3
11-Dec	29.0	29.0	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	29.2	29.2	29.2	29.2	29.2	29.1	29.1	29.2	29.3
12-Dec	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	28.9	28.9	28.9	28.9	28.9	28.8	28.8	28.8	28.8	28.8	29.0	29.1
13-Dec	28.8	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.6	28.6	28.6	28.6	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.8
14-Dec	28.8	28.8	28.9	28.9	28.9	29.0	29.0	29.0	29.1	29.1	M	29.1	29.1	29.2	29.2	29.2	29.2	29.2	29.2	29.3	29.3	29.3	29.3	29.3	29.1	29.3
15-Dec	29.3	29.3	29.3	29.3	29.3	29.3	29.2	29.2	29.2	29.2	29.2	29.1	29.1	29.1	29.0	29.0	28.9	28.9	28.8	28.8	28.7	28.7	28.7	28.6	29.1	29.3
16-Dec	28.6	28.7	28.7	28.7	28.7	28.8	28.8	28.8	28.8	28.8	28.8	28.9	28.9	28.9	28.9	28.9	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	28.9	29.0
17-Dec	29.0	29.0	29.1	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.1	29.1	29.1	29.1	29.1	29.0	29.0	28.9	28.9	28.8	28.8	28.8	29.1	29.2
18-Dec	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.8	28.8	28.8	28.8	28.8	28.9	28.9	28.9	29.0	28.7	29.0
19-Dec	29.0	29.0	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.2	29.2	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.0	29.0	29.0	29.1	29.2
20-Dec	29.0	28.9	28.9	28.9	28.9	28.9	28.9	28.8	28.8	28.8	28.8	28.8	28.8	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.8	29.0
21-Dec	28.7	28.7	28.8	28.8	28.8	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	28.7	28.7	28.7	28.7	28.8	28.9
22-Dec	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.6	28.6	28.6	28.6	28.6	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.6	28.7
23-Dec	28.5	28.6	28.6	28.6	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	29.1	29.1	29.1	29.1	29.1	29.1	28.9	29.1
24-Dec	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	28.9	28.9	28.9	29.0	29.0	29.1
25-Dec	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.1	29.1	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.1
26-Dec	28.9	28.9	28.9	28.9	28.9	28.9	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9
27-Dec	28.9	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	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.1
28-Dec	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.0	29.2
29-Dec	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
30-Dec	29.2	29.2	29.2	29.2	29.2	29.2	29.1	29.1	29.1	29.1	29.1	29.1	29.0	29.0	29.0	29.0	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	29.0	29.2
31-Dec	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.8	28.8	28.8	28.9	28.9	28.8	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																								Diurnal Average		
29.3 29.3 29.3 29.3 29.3 29.3 29.2 29.3 29.3 29.3 29.3 29.3 29.3 29.3 29.3 29.3 29.3 29.3 29.2 29.2 29.2 29.3 29.3 29.3 29.3																								Diurnal Maximum		
M - Maintenance																										



Wood Buffalo Environmental Association
Hourly Averages

Barometric Pressure (BP) - inHg
Athabasca Valley - December 2023





Wood Buffalo Environmental Association
Summary of Hour Averages

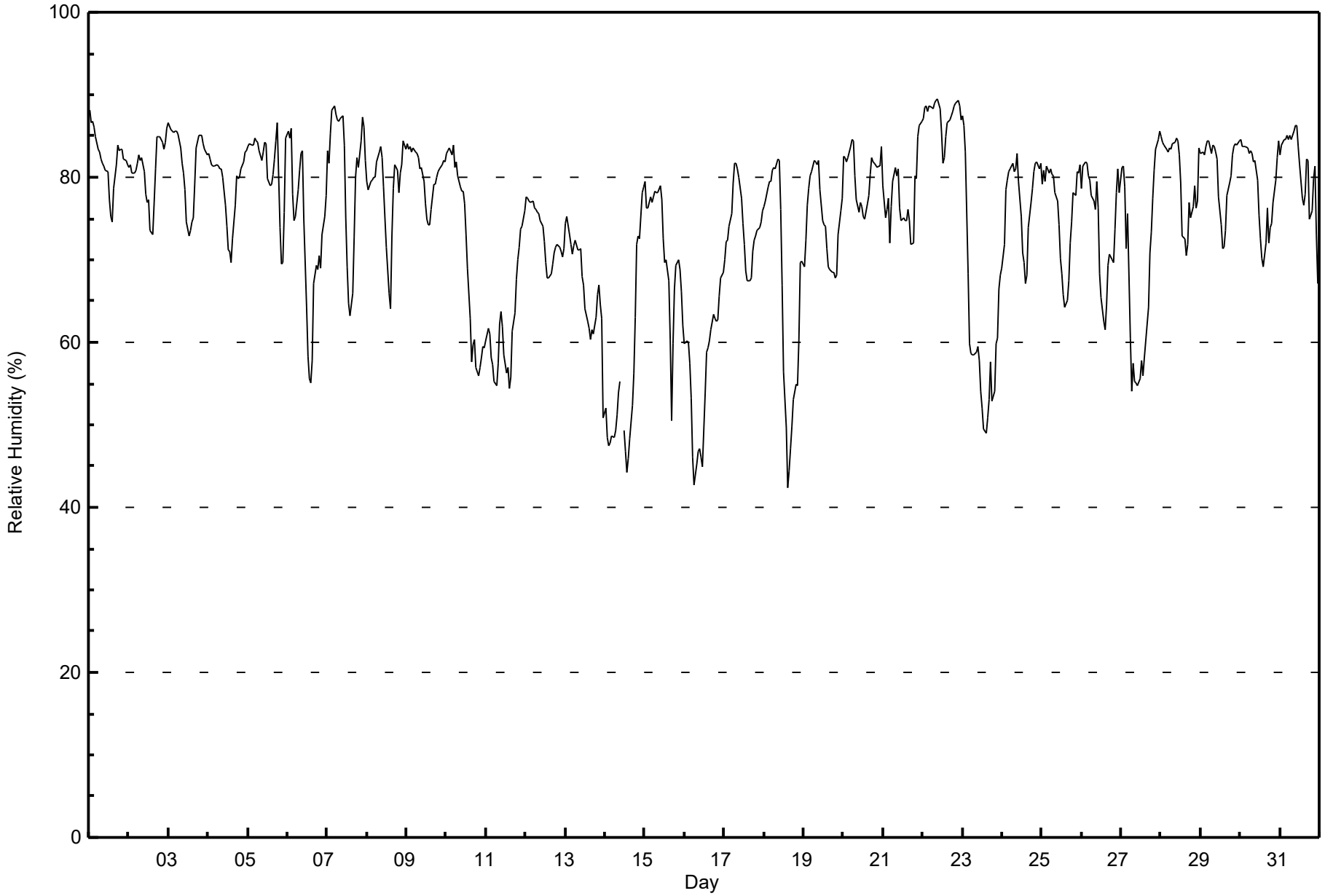
Relative Humidity (RH) - %
Athabasca Valley - December 2023

Maximum Value: 89.5 % on Dec 22 10:00		Maximum Daily Average: 87.5 % on Dec 22		Hours in Service:	744																						
Minimum Value: 42.3 % on Dec 18 15:00		Minimum Daily Average: 55.8 % on Dec 14		Hours of Data:	743																						
Maximum Diurnal Average: 78.8 % at hour 3		Minimum Diurnal Average: 66.3 % at hour 15		Hours of Missing Data:	1																						
Monthly Average: 74.61 %		Percentiles: P ₁ = 46.1 P ₁₀ = 58.4 Q ₁ = 69.5 Median = 77.5 Q ₃ = 82.2 P ₉₀ = 84.5 P ₉₉ = 88.6		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-Dec	88.1	86.7	86.8	86.2	85.0	83.4	83.1	82.3	81.7	81.3	80.9	80.6	77.2	75.3	74.5	78.6	81.6	84.0	83.2	83.3	83.3	82.3	82.0	81.6	82.2	88.1	
2-Dec	81.1	81.4	80.6	80.5	80.9	81.7	82.8	82.0	82.4	80.8	78.0	76.9	77.2	73.6	73.1	76.9	81.0	84.8	84.9	84.9	84.2	83.4	84.2	85.9	81.0	85.9	
3-Dec	86.7	85.8	85.5	85.5	85.5	85.7	85.2	83.6	81.7	80.5	78.4	74.5	72.8	73.5	74.5	75.0	79.1	83.6	85.1	85.0	84.1	83.4	82.7	81.8	86.7		
4-Dec	82.9	82.2	81.6	81.3	81.4	81.4	81.0	81.1	81.0	80.0	76.6	74.0	71.2	71.1	69.6	72.6	76.6	80.2	79.8	80.0	81.0	81.8	83.0	83.3	79.0	83.3	
5-Dec	83.7	84.1	83.9	83.9	84.7	84.4	84.2	83.3	82.0	83.1	84.2	84.1	79.8	78.9	79.2	80.4	82.3	84.4	86.6	74.0	69.5	69.7	75.8	84.8	81.3	86.6	
6-Dec	85.5	84.7	85.9	78.0	74.7	75.2	78.5	80.9	82.8	83.3	74.9	64.2	58.4	55.6	55.1	57.8	67.1	69.4	68.8	70.6	68.9	73.1	75.2	77.8	72.8	85.9	
7-Dec	83.2	81.6	85.2	88.1	88.6	87.6	87.0	86.8	87.1	87.4	83.9	75.1	69.1	64.7	63.2	66.0	72.7	80.1	82.5	81.2	84.3	87.2	86.1	82.1	80.9	88.6	
8-Dec	79.5	78.5	79.4	79.7	80.0	80.0	81.8	83.1	83.8	82.4	78.8	75.1	71.5	66.0	64.1	72.9	78.7	81.5	80.8	78.1	80.6	81.5	84.5	83.3	78.6	84.5	
9-Dec	84.1	83.4	83.7	83.1	83.6	83.0	82.8	82.4	80.9	81.1	79.5	76.8	74.9	74.2	74.2	76.1	79.1	79.1	80.0	80.6	80.9	81.5	82.0	81.9	80.4	84.1	
10-Dec	82.8	83.2	83.6	82.7	84.0	81.2	81.9	80.2	78.8	78.3	78.3	76.8	73.0	69.0	62.8	57.6	59.7	60.4	56.9	56.0	57.0	58.1	59.5	59.3	70.9	84.0	
11-Dec	60.2	61.6	61.1	58.2	57.3	55.2	54.8	57.5	62.2	63.8	61.9	58.5	56.3	57.0	54.5	55.7	61.3	63.6	67.7	70.1	71.5	73.8	74.1	75.9	62.2	75.9	
12-Dec	77.6	77.4	77.1	77.0	77.1	76.3	76.1	75.8	75.6	74.8	74.1	72.3	69.6	67.8	67.7	68.4	69.5	70.9	71.6	71.9	71.5	71.0	70.4	71.4	73.0	77.6	
13-Dec	74.4	75.3	73.0	71.9	70.7	71.7	72.4	71.2	71.2	71.3	67.9	67.0	64.1	62.6	61.7	60.4	61.6	61.0	63.0	65.8	66.9	64.6	62.9	50.8	66.8	75.3	
14-Dec	52.0	48.5	47.5	47.7	48.6	48.4	49.3	51.1	53.9	55.3	M	49.2	46.7	44.2	46.0	48.4	52.3	56.2	63.1	71.9	72.8	72.5	78.1	78.7	55.8	78.7	
15-Dec	79.5	76.3	76.2	77.6	77.0	77.6	78.2	78.1	78.2	79.0	77.4	72.5	69.7	70.0	67.5	60.3	50.4	59.8	66.4	69.3	70.0	68.8	66.1	62.0	71.2	79.5	
16-Dec	59.8	60.2	60.0	57.4	53.3	46.1	42.8	45.2	46.9	47.1	46.1	44.9	53.9	58.8	59.4	60.2	61.5	63.4	62.9	62.5	62.7	65.6	67.8	68.4	56.5	68.4	
17-Dec	70.1	72.2	72.4	74.1	75.7	79.3	81.6	81.7	81.1	79.9	77.4	74.4	71.9	68.7	67.4	67.4	67.8	70.9	72.4	72.8	73.6	73.8	74.6	75.9	74.0	81.7	
18-Dec	76.4	77.1	78.7	79.5	79.5	80.8	81.2	81.0	82.2	82.0	76.1	66.9	56.4	49.7	42.3	44.4	47.1	49.9	53.0	55.0	54.7	60.4	69.7	69.8	66.4	82.2	
19-Dec	69.1	72.3	76.6	78.6	80.2	80.6	82.1	81.9	81.6	82.0	78.4	74.7	74.3	74.1	71.4	69.2	68.9	68.5	68.5	67.9	68.1	73.1	75.9	77.4	74.8	82.1	
20-Dec	82.5	82.4	81.8	82.4	83.8	84.5	84.4	80.2	77.3	75.7	77.0	76.4	75.3	75.0	76.7	77.9	80.3	82.3	81.8	81.7	81.2	81.3	81.3	83.7	80.3	84.5	
21-Dec	79.0	75.2	76.1	77.5	72.1	76.5	79.5	81.2	80.2	81.1	76.3	74.8	75.1	74.8	74.8	76.1	74.8	71.9	72.0	80.1	79.8	85.0	86.3	86.8	77.8	86.8	
22-Dec	87.2	88.5	88.7	88.0	88.7	88.5	88.3	89.1	89.3	89.5	88.4	85.4	81.6	82.3	85.0	86.6	86.9	87.4	88.0	88.6	89.1	89.3	88.6	87.0	87.5	89.5	
23-Dec	87.5	86.3	83.0	68.3	59.8	58.7	58.6	58.5	58.8	59.5	57.9	54.0	52.1	49.6	49.0	50.8	53.1	57.7	52.9	54.1	59.8	60.6	66.4	68.1	61.0	87.5	
24-Dec	69.0	71.8	78.5	79.7	80.6	81.0	81.7	80.7	81.0	82.9	79.5	75.3	70.9	69.7	67.1	68.1	73.9	76.9	78.7	80.8	81.8	81.9	81.1	81.7	77.3	82.9	
25-Dec	79.2	80.8	79.5	81.3	80.5	81.1	80.3	80.2	78.1	77.1	74.3	70.2	68.4	65.8	64.3	65.0	67.4	72.0	74.6	78.1	77.7	80.7	80.6	81.6	75.8	81.6	
26-Dec	78.7	81.4	81.9	81.7	80.2	79.7	77.8	77.1	76.1	79.5	76.3	68.3	65.4	62.5	61.5	64.6	69.3	70.7	70.0	69.6	73.7	78.2	80.9	78.1	74.3	81.9	
27-Dec	81.1	81.4	78.7	71.4	75.6	60.4	54.1	57.4	55.2	55.1	54.8	55.6	57.9	56.0	58.1	60.2	64.2	70.8	73.4	77.5	80.9	83.3	84.6	85.6	68.1	85.6	
28-Dec	84.9	84.2	83.9	83.5	83.0	83.5	83.4	84.0	84.2	84.7	84.5	82.7	79.3	72.9	72.5	70.5	71.8	76.9	75.0	76.4	79.0	76.2	77.1	83.5	79.9	84.9	
29-Dec	83.0	83.1	82.7	83.7	84.4	84.4	82.9	83.9	83.7	83.1	82.2	77.7	74.2	71.3	71.5	73.6	77.8	79.3	80.2	82.6	83.7	84.1	84.0	84.5	80.9	84.5	
30-Dec	84.6	83.8	83.8	83.8	83.5	82.8	83.2	82.9	81.9	82.0	79.6	75.4	72.6	70.2	69.1	72.0	76.3	72.1	73.8	74.4	76.9	79.7	82.4	84.4	78.8	84.6	
31-Dec	82.8	83.9	84.5	84.6	85.1	84.5	85.2	84.6	85.6	86.3	86.2	83.8	81.5	77.4	76.7	78.0	82.3	82.0	75.0	76.0	79.9	81.4	73.0	67.1	81.1	86.3	
		78.6	78.6	78.8	78.0	77.6	77.0	77.0	77.1	77.0	77.1	75.7	71.6	69.1	67.2	66.3	67.5	70.2	72.6	73.3	74.2	75.2	76.4	77.5	77.6	Diurnal Average	
		88.1	88.5	88.7	88.1	88.7	88.5	88.3	89.1	89.3	89.5	88.4	85.4	81.6	82.3	85.0	86.6	86.9	87.4	88.0	88.6	89.1	89.3	88.6	87.0	Diurnal Maximum	
M - Maintenance																											



Wood Buffalo Environmental Association
Hourly Averages

Relative Humidity (RH) - %
Athabasca Valley - December 2023





Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Speed (WS) - km/h
Athabasca Valley - December 2023

Maximum Speed: 36 km/h on Dec 10 20:00	Maximum Daily Speed Average: 14.2 km/h on Dec 20	Hours in Service: 744
Minimum Speed Value: 0 km/h on Dec 29 11:00	Minimum Daily Speed Average: 2.2 km/h on Dec 1	Hours of Data: 743
Maximum Diurnal Speed Average: 5.0 km/h at hour 11	Minimum Diurnal Speed Average: 2.5 km/h at hour 2	Hours of Missing Data: 1
Monthly Average Velocity: 3.7 km/h 171.2 deg	Percentiles: P ₁ = 1 P ₁₀ = 2 Q ₁ = 4 Median = 6 Q ₃ = 10 P ₉₀ = 16 P ₉₉ = 27	Percent Operational Time: 99.9

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Dec	SSW4	SSW3	S2	SSW1	ESE1	WSW0	NE1	NNW1	NE1	S0	SE7	SE6	SE6	SE3	SSE5	SE6	E3	SE1	SSE1	S2	SSW1	SSW5	SW4	SSW3	SSE2.2	SE7
2-Dec	SSW5	SSW3	SW4	SW5	SSW3	SW3	ESE5	SE8	SE7	SE8	SE5	SE5	SE7	SE6	SE5	SE8	SE3	SW1	SW4	W3	WSW6	W4	WSW5	WSW4	S3.2	SE8
3-Dec	SW5	SW6	SW6	WSW4	W2	SE5	ESE4	SE5	SE6	SSE7	SE6	SSE6	S6	SSE7	SE4	SSE5	ESE3	WSW3	NNW1	W2	SW4	WSW4	SW6	SSW3	S3.1	SSE7
4-Dec	SSW4	SSW4	SSW7	SSW6	SSW5	SSE7	SSE8	SSE7	SSE5	SSE6	SSE8	SSE7	SSE7	SSE7	SSE6	SSE4	SSE3	SE4	SE7	SE8	SE7	SE8	SE9	SE10	SSE5.9	SE10
5-Dec	SE8	SE8	SE7	SE8	ESE8	SE8	SE11	SE11	SE12	SE11	SE9	SE11	SE8	SE9	SE9	SE10	SSE9	SE9	SSE6	SSW11	SE8	SE8	SE8	SE8	SE8.4	SE12
6-Dec	SE6	SSE3	S4	SW11	SSW8	S5	ESE3	S3	SSE4	SSW4	SSE4	SSW6	SSW5	SSW6	SW10	SSW8	SSE4	SSW7	SE2	SSW9	SW7	SW5	S2	NE1	SSW4.5	SW11
7-Dec	NE1	S4	SE4	SE1	SSE3	SSE5	WSW2	S3	SSE3	SSE4	SSE3	SE6	SSE6	S7	SSW6	SSE4	SSE3	SSE4	SE4	SSE4	SSE2	SE3	S3	SSW7	SSE3.4	SSW7
8-Dec	SSW8	S9	SSW7	S7	S7	SSW9	S7	SE6	ESE6	ESE5	ESE6	ESE5	SE4	S6	S6	ESE5	ESE6	SE5	SE5	ESE5	ESE5	SE6	SE5	SSE3	SSE5.1	S9
9-Dec	SE3	SE2	SSE3	SSE3	S3	SSE4	SSE3	SE5	SE4	SE5	SE8	SE6	SE9	SE11	SE9	SE9	SE8	SE8	SE9	SE7	SE8	ESE7	SE8	ESE8	SE6.2	SE11
10-Dec	ESE7	ESE5	ESE6	ESE5	SE6	SE7	SE5	SE9	SE10	SE11	SE6	SE6	SE7	SW7	WSW14	W16	W20	W24	W29	W36	WNW27	WNW27	WNW28	NW19	W7.0	W36
11-Dec	NW17	NW21	NW17	WNW25	WNW26	WNW24	W24	W23	WSW20	WSW12	SW7	W10	SW7	SW9	S6	SSE5	SE8	SE12	SE11	SE11	SE10	SE9	SE8	SE5	W6.4	WNW26
12-Dec	SE4	SSE5	SE6	SE5	SE8	SE9	SE9	SE9	SE12	SE11	SE13	SE12	SE12	SE10	SE10	SE12	SE13	SE13	SE9	SE8	SE9	SE9	SE10	SSE6	SE9.2	SE13
13-Dec	SSE4	ESE6	SE10	ESE9	ESE8	ESE9	E9	E9	ESE10	SE9	SE7	SE8	SE7	SE6	SE9	SE9	SE11	SE10	ESE7	ESE8	SE7	SSE3	SW8	SE7.3	SE11	
14-Dec	SW7	W13	W16	W20	WSW15	WSW18	WSW20	WSW16	SW11	SSE3	M	SW9	SW9	SSW8	SSW6	S4	SSW1	SSW3	SSE3	S2	SSE3	SSE4	SE1	SE3	SW7.1	W20
15-Dec	SE5	SE13	SE15	SE15	SE11	SE13	SE12	SE14	SE17	SE15	SE13	SE10	ESE8	SE10	SE8	SE12	S14	S9	SSW15	S12	S13	SSW11	S9	SSW9	SSE10.6	SE17
16-Dec	WSW14	SW17	WSW15	WSW17	W23	WNW27	WNW26	W24	W28	W27	WNW21	WNW20	NNW18	NNW15	NNW12	NNW8	NNW8	NNW6	NNW8	NNW9	NNW6	NNE1	NE3	S4	WNW12.0	W28
17-Dec	SSE3	NNW22	NNW17	NW9	NNW2	S1	SSW1	W0	SE1	SSE6	SSE8	SE11	SE13	SE15	SE16	SE17	SE14	SE16	SE16	SE13	SE13	SE12	SE8	SE5	SE5.8	NNW22
18-Dec	SE6	SE6	SSE4	SE4	ESE6	E7	SE6	SE6	SE6	SW7	WSW16	WSW18	W20	W19	W21	W13	WSW13	WSW8	SW5	WSW14	W11	NNW11	NNW14	N9	WSW5.5	W21
19-Dec	NNW13	NNW14	NNW9	NW11	N7	NNW7	NNW6	NNW5	NE2	NNW4	NE4	ENE4	E5	E4	E10	E11	E11	ESE12	SE14	ESE16	ESE17	ESE15	SE15	SE16	E4.4	ESE17
20-Dec	SE16	SE16	SE15	ESE16	SE13	SE15	SE17	SE18	SE16	SE17	ESE17	ESE18	SE14	SE11	SE14	SE13	SE13	SE14	SE16	SE16	SE15	SE14	SE11	SW7	SE14.2	ESE18
21-Dec	WSW16	WSW21	WSW17	WSW16	WSW20	WSW17	SW14	SSW9	SSE6	SE6	SSE8	SE11	SE12	SE8	SE12	SE12	SE13	SE13	SE10	S6	SE3	SE5	SE4	SE6	S6.6	WSW21
22-Dec	SSE3	SSE2	SE7	SSE5	SE6	SE6	E2	ENE4	ENE5	E4	ESE4	SE7	SE8	E2	NE1	ESE0	S1	SW1	SSW2	SSE2	S3	SSE3	SSE6	SSE5	SE3.1	SE8
23-Dec	SE6	SE2	WSW4	W16	W19	W24	W20	W15	WSW9	W18	W26	W26	W24	W21	W14	WSW10	WSW11	WSW19	WSW17	WSW6	WSW11	SSW5	SSE2	W13.2	W26	
24-Dec	S3	S5	S4	SSE4	SSE4	SE7	SSE7	SE9	SE2	S4	SSE6	S6	SSE6	SSE7	SSE8	SE5	SSE4	SSW2	ESE2	S2	S2	SSE4	SSE4	SSE6	SSE4.6	SE9
25-Dec	SE6	SE7	SE6	SE5	SSE4	SSE6	SE3	SSE9	SE9	SE9	SE11	SE10	SE12	SE16	SE14	ESE9	SE6	S4	S3	SSE4	SE5	SE4	SE1	SE9	SE7.0	SE16
26-Dec	NE2	S3	NE1	SSE1	SE4	SE4	E2	SE9	SE5	NE2	SE4	SSE4	SSE7	SSE8	SSE7	S5	SSE4	SSE5	SE8	SE9	SE4	SE3	SE5	SE9	SE4.4	SE9
27-Dec	SE3	E2	SE5	SSE5	SSE6	SSW7	SSW6	SSE3	S2	SSE3	S5	SSE8	SE9	ESE6	SE6	SE4	SE2	ESE3	NE4	NNE3	SSW0	SW2	NW3	W4	SSE2.9	SE9
28-Dec	WSW5	W3	SW3	W3	SW2	SW3	S1	SW1	ENE2	W2	SW2	SSW6	W2	NW7	NNW5	NW3	SW4	SW5	W3	WSW6	W3	WSW6	SSW2	SSE3	WSW2.4	NW7
29-Dec	S4	SSW6	S7	S5	SSW5	SSE5	SSE5	S2	ESE3	SE3	E0	SSW4	SW2	SW3	S3	S5	S6	S4	SSW3	SSW5	SSW4	S4	SSW4	E2	S3.5	S7
30-Dec	SSW1	SW1	SW1	S2	SSW3	S3	ESE3	SE7	SE4	SE3	SE10	SSE6	SSE6	SE10	ESE7	ESE4	E6	ESE8	SE12	SE14	ESE7	SE7	SSE5	ESE4	SE5.0	SE14
31-Dec	SE5	SSE4	SSE5	SSE5	SE5	SSE6	SSE8	SSE5	SSE4	SE5	SE10	SE14	SE17	SE12	SE10	SE8	SE4	SSW4	SW10	SW6	WSW3	SW9	SW15	WSW9	SSE5.7	SE17

S2.7 SSW2.5 SSW2.7 SW3.0 SSW3.0 SSW3.3 S2.9 S4.0 SSE4.1 SSE4.3 SSE5.0 SSE4.9 SSE5.0 SSE4.8 SSE4.5 SSE4.8 SSE4.2 SSE4.4 SSE4.4 S4.4 SSE3.6 S3.5 SSE3.0 SSE3.0	Diurnal Average
NNW17 NNW22 WSW17 WNW25 WNW26 WNW27 WNW26 W24 W28 W27 WNW21 W26 W26 W24 W21 SE17 W20 W24 W29 W36 WNW27 WNW27 WNW28 NW19	Diurnal Maximum

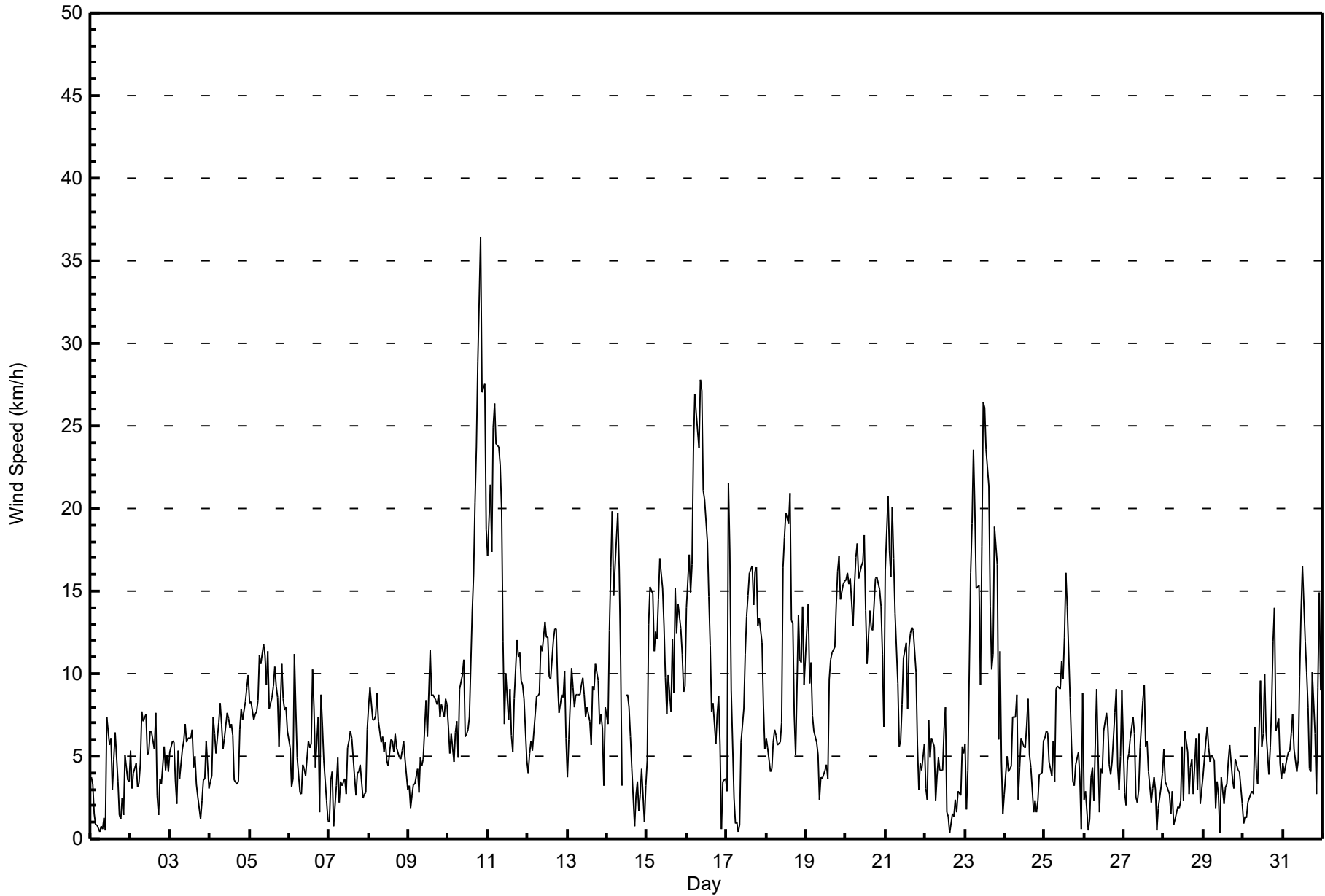
M - Maintenance
 All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Speed (WS) - km/h
Athabasca Valley - December 2023

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 8 km/h on Dec 10 20:00 Minimum Value: 1 km/h on Dec 3 19:00 Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 2 Median = 2 Q ₃ = 3 P ₉₀ = 4 P ₉₉ = 6																	Hours in Service: 744 Hours of Data: 743 Hours of Missing Data: 1 Hours of Calibration: 0 Percent Operational Time: 99.9									
Day	Hourly Period Ending At (MST)																								Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Dec	2	2	1	1	1	1	1	1	1	1	2	2	2	1	2	2	1	2	1	1	1	1	2	1	2	2
2-Dec	1	2	2	2	2	2	4	3	2	3	2	1	2	2	2	2	2	2	1	1	2	1	2	1	4	
3-Dec	2	2	2	1	1	3	2	2	1	2	1	2	2	2	1	2	2	1	1	1	1	1	2	1	3	
4-Dec	2	1	1	1	1	2	3	2	1	2	2	2	2	2	2	1	2	2	3	2	2	2	2	3	3	
5-Dec	3	3	2	3	2	3	3	3	4	3	4	3	2	2	2	3	3	2	4	5	3	3	3	2	5	
6-Dec	2	1	2	4	4	2	1	1	1	1	2	2	2	2	4	2	2	3	2	5	5	2	1	1	5	
7-Dec	2	2	2	1	2	1	1	2	1	2	1	1	2	2	3	1	1	1	1	1	1	1	2	3	3	
8-Dec	2	4	3	3	3	3	3	2	1	1	1	1	1	2	1	1	1	1	2	1	1	1	2	2	4	
9-Dec	3	1	1	1	1	2	2	1	1	1	3	2	2	2	2	3	2	2	2	2	2	2	2	2	3	
10-Dec	2	1	2	2	3	3	3	4	3	4	3	3	2	5	3	4	4	4	7	8	6	6	5	5	8	
11-Dec	4	4	4	5	5	5	6	5	3	5	4	3	2	2	2	2	2	2	2	3	2	2	3	1	6	
12-Dec	1	1	2	2	3	2	2	2	3	3	3	3	3	3	3	3	3	3	3	3	2	2	3	3	3	
13-Dec	1	2	3	2	4	2	2	1	2	2	3	2	2	3	2	2	2	3	2	2	3	3	2	3	4	
14-Dec	3	2	6	4	3	4	3	3	3	2	M	2	3	3	2	2	1	1	1	2	2	2	1	2	6	
15-Dec	2	4	3	3	3	2	3	3	3	3	3	2	2	2	3	2	2	5	6	3	4	4	4	3	6	
16-Dec	4	3	3	3	6	5	5	4	4	4	5	4	3	3	3	2	2	2	4	2	1	1	1	1	6	
17-Dec	3	4	4	3	1	1	2	1	1	2	3	3	2	2	2	3	3	3	3	3	3	3	3	2	4	
18-Dec	2	2	1	2	2	2	1	1	1	4	3	4	4	6	5	3	3	3	4	2	4	6	3	3	6	
19-Dec	4	3	2	2	2	2	2	1	1	1	1	1	1	4	3	3	3	3	4	5	4	4	4	4	5	
20-Dec	4	4	4	4	3	4	4	4	4	4	4	4	3	3	3	3	3	3	3	3	3	3	3	5	5	
21-Dec	4	3	3	3	4	4	3	3	3	2	2	2	2	2	3	3	2	3	3	1	2	2	2	3	4	
22-Dec	1	1	3	1	2	2	2	2	1	2	2	3	3	2	1	1	1	2	2	1	2	2	2	2	3	
23-Dec	2	2	2	6	4	5	5	4	5	3	4	5	5	4	5	4	2	4	3	5	4	4	2	1	6	
24-Dec	2	2	1	1	1	2	2	2	2	2	2	1	1	2	3	3	2	2	2	1	1	1	2	2	3	
25-Dec	3	2	2	2	2	2	1	3	3	3	2	3	2	3	4	2	2	2	1	2	2	2	1	4	4	
26-Dec	2	2	1	1	2	2	2	2	3	1	2	2	2	2	2	2	1	3	2	3	2	2	3	5	5	
27-Dec	2	1	1	2	2	3	3	2	1	2	2	3	2	2	1	1	2	1	2	1	1	1	2	1	3	
28-Dec	1	1	2	2	2	1	2	1	1	1	2	5	3	3	3	2	3	3	1	2	1	2	2	1	5	
29-Dec	3	2	2	2	3	2	2	1	2	3	1	2	1	2	1	1	1	1	2	1	2	1	2	1	3	
30-Dec	1	1	1	1	1	1	2	2	2	3	2	3	3	3	2	2	3	3	3	3	2	2	2	2	3	
31-Dec	2	2	2	1	2	2	2	2	2	2	3	4	3	3	1	2	2	4	5	3	1	7	7	3	7	
																	Diurnal Maximum									
M - Maintenance																										





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h
Athabasca Valley - December 2023**

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	300	40.38	40.38
6 - 11	292	39.30	79.68
12 - 19	116	15.61	95.29
20 - 28	33	4.44	99.73
29 - 38	2	0.27	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 743

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed (WS) - km/h
Athabasca Valley - December 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	3	10	5	9	21	62	68	37	33	21	11	12	0	2	6	300
6 - 11	2	0	0	0	7	25	135	41	14	23	20	10	2	0	3	10	292
12 - 19	0	0	0	0	0	10	60	0	3	1	3	18	11	0	3	7	116
20 - 28	0	0	0	0	0	0	0	0	0	0	0	4	17	10	1	1	33
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	2	3	10	5	16	56	257	109	54	57	44	43	44	10	9	24	743

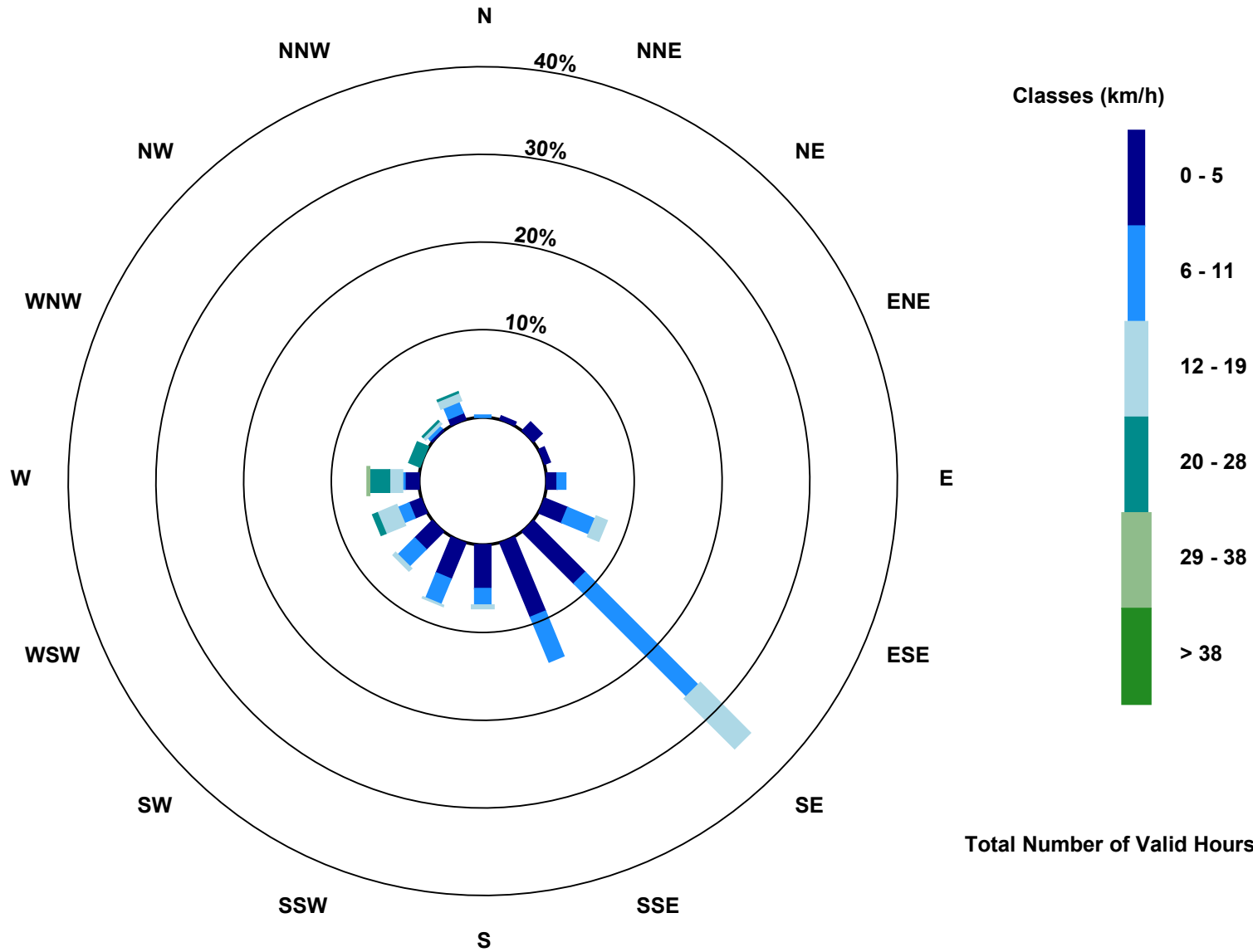
Total Number of Valid Hours: 743

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Dec 2023

Wind Speed (WS) - km/h
Athabasca Valley



Total Number of Valid Hours: 743



Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
Athabasca Valley - December 2023

Direction of Maximum Speed: 277 deg on Dec 10 20:00	Hours in Service: 744
Direction of Maximum Daily Speed Average: 130.2 deg on Dec 20	Hours of Data: 743
Direction of Minimum Speed: 97 deg on Dec 29 11:00	Hours of Missing Data: 1
Direction of Minimum Daily Speed Average: 2.2 deg on Dec 1	Percent Operational Time: 99.9
Monthly Average Direction: 171.2 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-Dec	198	208	186	200	115	243	47	339	54	174	138	128	126	138	151	142	96	130	159	181	200	207	219	211	158.2
2-Dec	210	204	215	214	192	225	119	130	140	135	132	128	135	133	142	135	129	236	224	262	244	260	238	258	171.1
3-Dec	218	216	225	258	278	140	117	136	135	156	136	160	174	165	135	149	108	239	340	273	218	248	235	203	178.8
4-Dec	196	198	210	207	198	154	149	162	161	166	147	155	152	166	150	162	158	142	139	136	139	137	129	133	156.5
5-Dec	133	125	127	126	120	125	137	137	143	140	133	134	132	134	140	143	149	128	166	212	165	145	134	124	139.4
6-Dec	129	160	171	214	198	174	113	181	165	194	152	207	198	209	234	205	159	199	133	203	234	223	169	45	194.5
7-Dec	56	188	143	135	158	159	239	170	149	168	149	137	166	185	196	159	164	152	128	164	158	144	170	204	165.6
8-Dec	197	186	195	180	182	193	169	134	123	112	107	119	125	178	177	114	123	129	127	122	122	128	127	149	151.4
9-Dec	135	129	158	147	179	161	163	141	145	141	133	131	139	140	128	130	130	130	131	125	130	120	125	119	134.3
10-Dec	106	112	119	111	146	140	129	141	136	143	144	139	131	221	246	262	266	269	275	277	291	290	294	311	261.6
11-Dec	311	306	308	303	300	286	275	261	255	254	225	263	224	215	181	153	128	127	132	135	130	127	127	126	262.9
12-Dec	143	148	142	145	138	132	135	129	134	135	135	134	137	134	134	134	137	137	142	136	134	129	140	148	136.3
13-Dec	164	121	124	111	123	111	94	94	101	117	128	127	138	131	131	145	144	134	136	121	122	141	167	216	127.5
14-Dec	233	261	263	270	252	246	244	240	230	154	M	214	214	197	209	176	204	211	150	182	165	168	133	131	234.4
15-Dec	129	126	127	128	133	133	139	143	141	137	141	129	122	135	141	145	170	198	188	180	180	198	183	206	151.6
16-Dec	240	234	250	248	273	298	292	278	266	264	282	295	329	340	343	342	343	344	333	333	338	26	53	182	287.4
17-Dec	162	333	341	320	338	180	199	264	135	154	154	142	141	141	142	135	130	134	135	129	130	129	126	133	131.5
18-Dec	137	140	160	139	107	88	125	132	134	216	244	258	265	266	278	269	252	250	214	254	264	332	341	356	257.2
19-Dec	348	337	331	321	351	346	328	328	37	329	34	65	83	91	101	99	97	111	124	122	123	123	124	127	82.1
20-Dec	125	126	124	122	124	124	124	125	126	124	123	122	125	132	136	136	131	134	139	134	140	141	141	215	130.2
21-Dec	240	245	246	251	258	239	231	213	157	142	164	144	141	134	136	133	128	127	145	173	125	125	128	135	190.4
22-Dec	152	165	146	158	146	132	101	67	70	84	123	139	139	89	50	118	187	224	209	152	186	153	162	157	138.3
23-Dec	126	139	245	274	278	281	279	270	260	254	266	270	270	270	271	266	251	258	246	242	238	249	210	161	263.4
24-Dec	175	169	178	148	160	145	153	138	136	180	148	179	166	163	151	143	148	195	106	191	184	157	160	152	156.9
25-Dec	145	142	126	135	153	161	137	147	145	145	143	137	130	136	136	122	136	171	186	159	141	141	153	142	141.1
26-Dec	46	180	55	154	142	130	94	142	124	43	138	159	149	150	153	171	159	157	143	143	146	146	142	128	142.4
27-Dec	135	95	136	153	162	199	209	167	176	156	175	147	128	122	127	132	125	113	51	22	200	227	306	263	151.2
28-Dec	244	260	214	260	228	231	186	216	70	278	218	195	268	318	346	307	235	229	261	240	271	243	212	155	247.8
29-Dec	188	198	174	189	204	161	155	175	108	134	97	192	214	229	191	171	179	189	205	202	196	189	210	89	183.3
30-Dec	205	218	215	189	213	190	111	141	140	131	137	165	158	138	107	108	92	122	137	137	122	146	153	114	138.1
31-Dec	145	147	153	160	143	149	150	158	151	142	135	135	136	135	136	124	126	205	224	229	249	232	231	248	164.4

181.5 205.3 192.6 215.5 212.0 196.7 189.6 171.4 161.6 161.0 156.9 165.2 158.5 165.2 163.0 151.8 151.1 162.7 166.8 181.8 167.7 172.4 168.2 163.3
 Diurnal Average

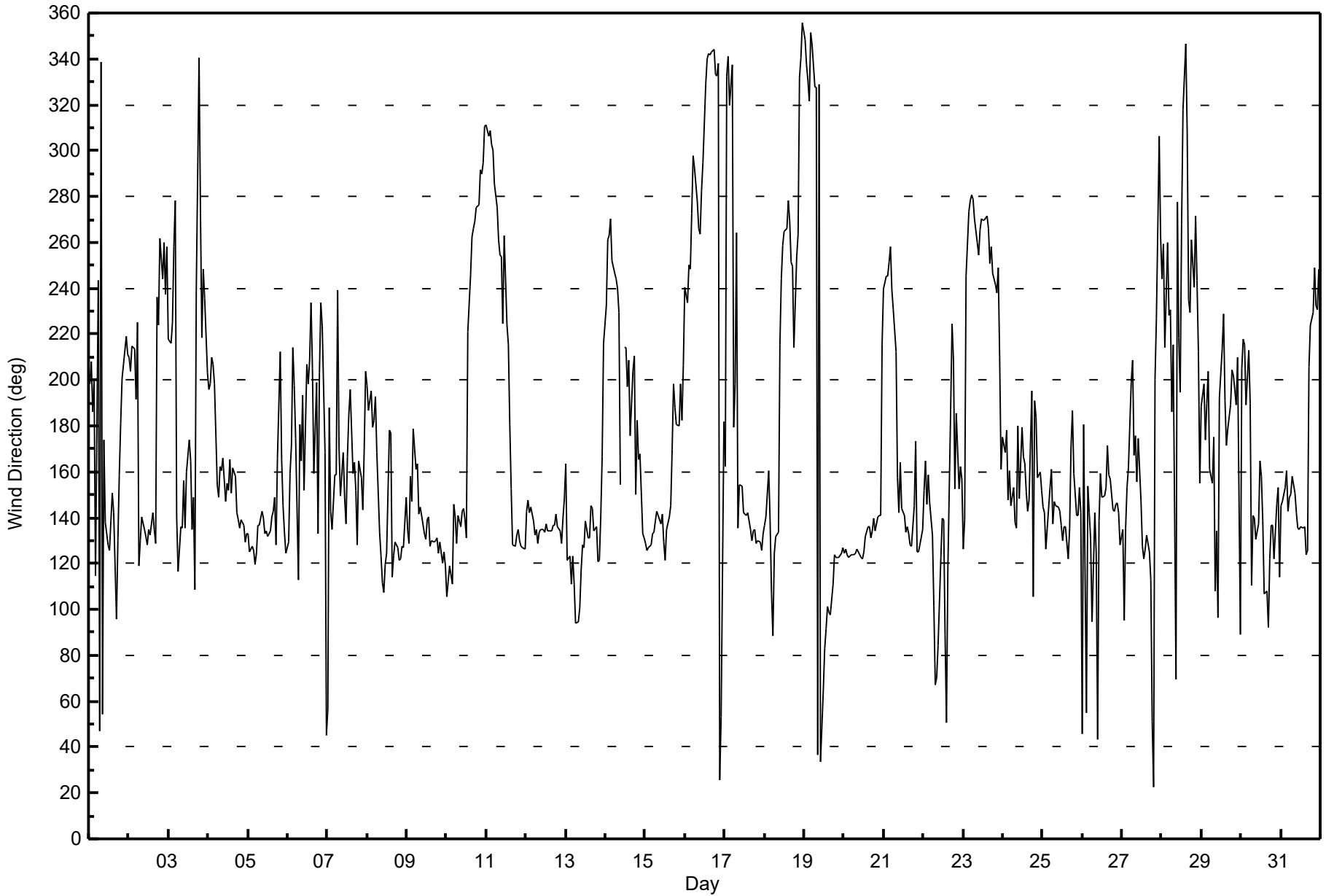
M - Maintenance
 All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Direction (WD) - deg
Athabasca Valley - December 2023

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 111 deg on Dec 14 17:00 Minimum Value: 8 deg on Dec 31 15:00 Percentiles: P ₁ = 9 P ₁₀ = 12 Q ₁ = 17 Median = 26 Q ₃ = 45 P ₉₀ = 70 P ₉₉ = 97																			Hours in Service: 744 Hours of Data: 743 Hours of Missing Data: 1 Hours of Calibration: 0 Percent Operational Time: 99.9						
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Dec	30	50	75	93	87	92	91	82	94	99	21	26	27	58	30	18	27	89	89	70	92	21	41	19	99
2-Dec	17	60	25	16	46	64	70	33	25	28	34	29	28	24	23	19	70	77	24	51	18	19	45	26	77
3-Dec	23	33	10	34	67	61	63	33	25	22	29	27	24	25	41	27	65	40	59	58	14	28	16	48	67
4-Dec	44	25	12	11	27	31	20	31	28	24	17	23	20	14	16	35	41	58	22	20	23	20	18	18	58
5-Dec	21	20	21	25	34	20	19	16	19	18	29	23	23	22	18	16	18	28	63	54	28	25	31	25	63
6-Dec	31	47	68	18	37	50	65	55	22	25	37	34	26	30	20	19	40	27	93	39	46	48	75	98	98
7-Dec	89	53	45	93	41	32	68	55	42	37	46	21	26	22	33	30	43	32	39	20	56	54	74	42	93
8-Dec	25	41	48	45	37	28	40	35	19	20	19	23	31	33	24	21	18	18	36	37	19	19	45	68	68
9-Dec	83	61	35	28	36	56	79	24	18	27	20	27	22	10	13	19	18	20	16	18	16	22	19	19	83
10-Dec	37	41	27	51	35	31	56	26	20	27	47	41	28	62	16	11	10	9	10	10	16	13	13	12	62
11-Dec	12	10	11	10	10	14	12	12	10	20	59	25	30	15	29	31	18	10	10	12	15	17	21	27	59
12-Dec	36	25	23	26	26	17	19	16	16	15	15	16	14	20	21	16	15	16	27	32	23	21	19	34	36
13-Dec	43	24	20	32	34	22	17	17	25	17	16	23	24	21	26	17	13	13	19	35	29	56	66	17	66
14-Dec	23	24	17	9	10	10	10	11	13	62	M	14	31	21	42	56	111	71	39	77	64	24	77	61	111
15-Dec	36	19	12	16	18	13	14	11	10	12	11	22	20	17	34	17	38	22	20	20	22	24	32	27	38
16-Dec	17	11	10	9	16	11	12	10	8	9	14	13	16	14	15	19	15	32	19	17	14	92	33	31	92
17-Dec	80	11	13	11	60	83	77	91	99	28	27	13	10	10	8	11	13	12	11	14	15	20	22	26	99
18-Dec	24	23	35	26	29	23	30	24	29	45	10	13	10	13	10	9	10	29	63	8	30	45	14	17	63
19-Dec	18	11	11	8	15	19	14	12	47	45	34	19	30	32	27	19	18	21	17	15	16	15	16	16	47
20-Dec	15	17	16	14	15	15	13	13	14	14	13	11	13	13	14	13	13	13	12	14	14	14	16	57	57
21-Dec	10	10	9	9	10	9	16	35	69	29	17	12	10	19	11	12	13	13	23	19	58	30	29	32	69
22-Dec	50	61	25	37	30	31	88	46	18	23	47	54	22	80	70	97	80	84	72	79	50	71	39	29	97
23-Dec	27	75	42	17	14	13	12	14	13	13	12	11	11	12	10	11	12	12	9	11	42	18	45	97	97
24-Dec	87	22	33	27	29	15	20	16	76	34	29	28	20	20	20	50	48	78	81	75	62	27	55	31	87
25-Dec	40	26	30	34	51	29	62	16	20	15	17	17	12	10	12	19	31	39	52	33	43	45	100	22	100
26-Dec	62	53	105	94	51	50	92	19	53	80	48	45	30	26	23	32	44	39	21	18	46	53	36	36	105
27-Dec	72	73	30	32	23	31	54	74	78	76	44	33	13	21	13	21	83	51	45	38	91	64	50	30	91
28-Dec	24	40	46	70	88	62	91	80	80	75	78	66	75	40	36	65	45	47	70	19	48	21	75	56	91
29-Dec	63	20	20	32	50	23	61	70	44	82	105	47	78	55	54	30	12	24	42	14	18	25	26	61	105
30-Dec	96	72	85	50	47	59	70	27	50	70	21	46	44	17	28	50	37	30	17	12	30	22	33	45	96
31-Dec	60	42	34	28	33	22	16	22	37	31	19	11	10	10	8	21	41	91	43	40	61	53	17	24	91
Diurnal Maximum																									
M - Maintenance																									





WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

AMS08 FORT CHIPEWYAN DECEMBER 2023

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

January 31, 2024

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FORT CHIPEWYAN (AMS08)
 DECEMBER 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	710	34	34	100	9.1	0	3.6	0
TRS (ppb) Average	708	36	36	100	0.5	0	0.3	0
O3(ppb) Average	710	34	34	100	41	0	39	-
NO2(ppb) Average	708	36	36	100	19.8	0	8.6	-
NO(ppb) Average	708	36	36	100	10.6	-	1.6	-
NOX(ppb) Average	708	36	36	100	27.2	-	10.1	-
PM2.5(ug/m3) Average	742	2	2	100	36.8	0	21.2	0
CO(ppm) Average	710	34	34	100	0.2	0	0.1	-
CO2(ppm) Average	590	29	154	83.2	459.4	-	450.3	-
Temperature 2 m (C) Average	744	0	0	100	7.7	-	2.1	-
Relative Humidity (%) Average	744	0	0	100	97.9	-	92.1	-
Wind Speed 10 m (km/h) Average	740	0	4	99.46	38	-	24	-
Wind Direction 10 m (deg) Average	740	0	4	99.46	-	-	-	-
PC(mm) Total	744	0	0	100	0.3	-	1.2	-
Leaf Wetness (% of range) Average	744	0	0	100	33.7	-	7.5	-
Global Solar Radiation (W/m2) Average	744	0	0	100	204.8	-	34.5	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FORT CHIPEWYAN (AMS08)
DECEMBER 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	710	0.69	1.2	-	0	0	0	0.1	0.7	2.2	9.1
TRS (ppb) Average	708	0.21	0.1	-	0.1	0.1	0.2	0.2	0.3	0.3	0.5
O3(ppb) Average	710	26.9	7.8	-	2.8	16.5	21.2	26.4	34	36.9	41
NO2(ppb) Average	708	3.43	3.9	-	0	0.2	0.4	1.7	5.5	9.3	19.8
NO(ppb) Average	708	0.28	0.9	-	0	0	0	0	0.1	0.5	10.6
NOX(ppb) Average	708	3.7	4.3	-	0.1	0.2	0.5	1.8	5.7	10	27.2
PM2.5(ug/m3) Average	742	5.87	6	-	0.3	1.4	2.5	3.7	6.6	14.8	36.8
CO(ppm) Average	710	0.03	0	-	0	0	0	0	0	0.1	0.2
CO2(ppm) Average	590	441.73	4.8	-	432.9	435.7	438.1	441.3	445.4	447.7	459.4
Temperature 2 m (C) Average	744	-7.76	5.8	-	-20.6	-15	-12.5	-8.1	-2.9	0.1	7.7
Relative Humidity (%) Average	744	79.87	10.8	-	42.3	64.8	74.2	83.6	87.6	89.9	97.9
Wind Speed 10 m (km/h) Average	740	13.5	7	-	0	5	8	12	18	24	38
Wind Direction 10 m (deg) Average	740	-	-	-	-	-	-	-	-	-	-
Precipitation (mm) Total	744	-	-	9.6	-	-	-	-	-	-	-
Leaf Wetness (% of range) Average	744	2.35	2	-	1.3	1.6	1.8	1.9	2.5	3.1	33.7
Global Solar Radiation (W/m2) Average	744	17.33	37.8	-	0	0	0	0	11.4	68	204.8

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FORT CHIPEWYAN (AMS08)
DECEMBER 2023

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
CO2	26 Dec 2023 20:00	26 Dec 2023 21:00	2	Maintenance - linearity adjustment
CO2	26 Dec 2023 22:00	28 Dec 2023 07:00	34	Analyzer within non-compliance of AMD
CO2	28 Dec 2023 08:00	28 Dec 2023 08:00	1	Maintenance - reinitiated daily QA check
CO2	28 Dec 2023 09:00	01 Jan 2024 00:00	88	Analyzer within non-compliance of AMD
Wind Speed, Wind Direction	02 Dec 2023 12:00	02 Dec 2023 12:00	1	Flat line in sensor output signal
Wind Speed, Wind Direction	02 Dec 2023 19:00	02 Dec 2023 21:00	3	Flat line in sensor output signal



Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO₂) - ppb

Fort Chipewyan - December 2023

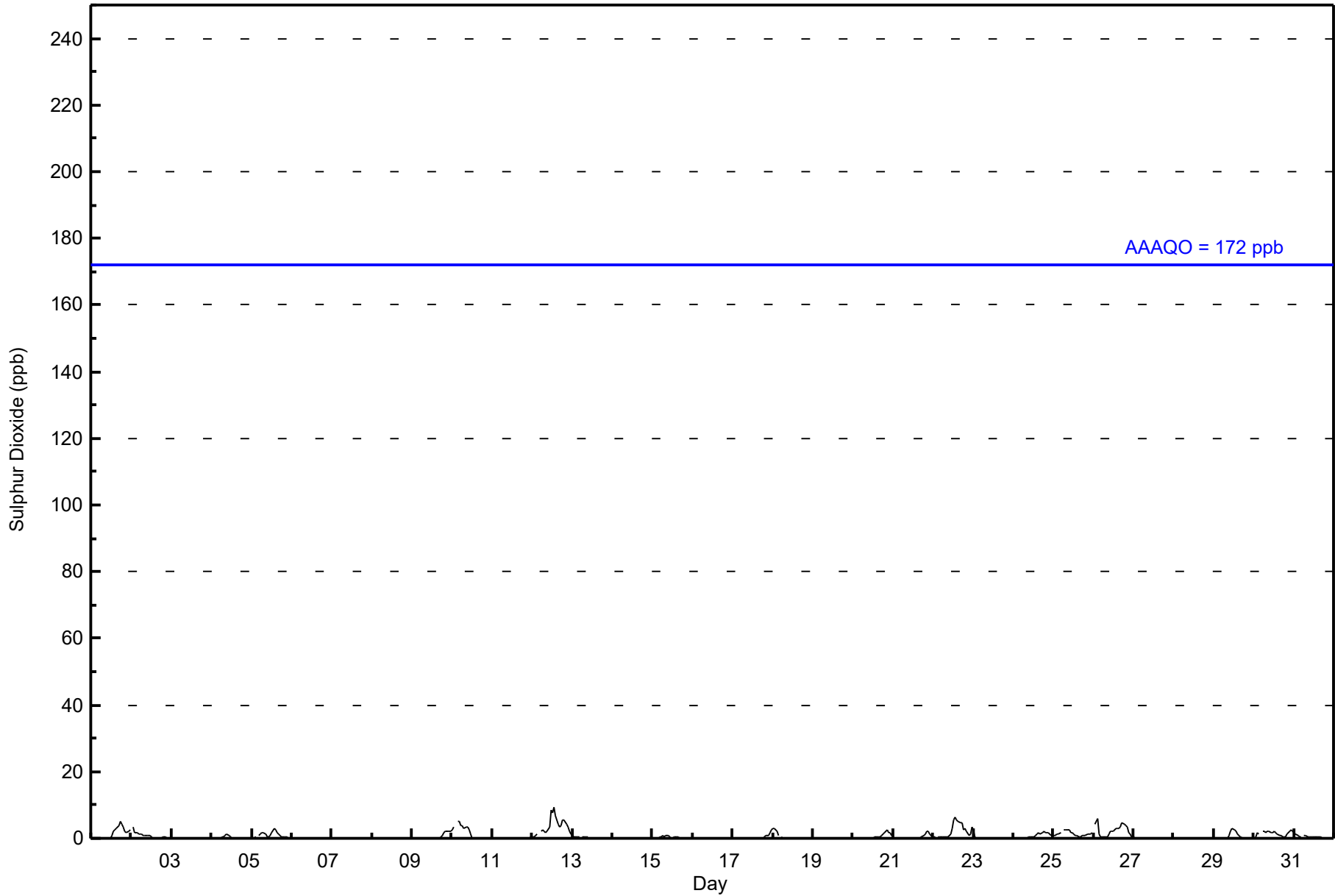
Number of Exceedences (AAAQO):		1-hr: 0	24-hr: 0	Hours in Service: 744																	744					
Maximum Value: 9.1 ppb on Dec 12 14:00		Maximum Daily Average: 3.6 ppb on Dec 12																	710							
Minimum Value: 0.0 ppb on Dec 1 01:00		Minimum Daily Average: 0.0 ppb on Dec 8																	34							
Maximum Diurnal Average: 1.0 ppb at hour 14		Minimum Diurnal Average: 0.5 ppb at hour 5																	34							
Monthly Average: 0.69 ppb		Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.0 Median = 0.1 Q ₃ = 0.7 P ₉₀ = 2.2 P ₉₉ = 5.6																	100.0							
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Dec	0.0	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.2	1.0	2.0	2.6	2.8	4.0	5.0	4.4	3.3	2.3	1.8	2.3	2.7	1.5	5.0
2-Dec	Z	3.4	1.7	1.6	1.3	1.2	1.2	0.9	1.0	1.0	1.1	0.7	0.2	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.7	3.4
3-Dec	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	0.1	0.0	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
4-Dec	0.2	0.1	Z	0.2	0.2	0.2	0.4	0.5	0.7	1.4	1.0	0.3	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.1	0.1	0.3	1.4
5-Dec	0.0	0.1	0.4	Z	0.9	1.2	1.9	1.8	1.1	0.6	0.4	0.7	1.9	2.8	2.7	1.9	1.3	0.9	0.6	0.4	0.3	0.2	0.2	0.1	1.0	2.8
6-Dec	0.1	0.1	0.1	0.1	Z	0.1	0.1	0.1	0.0	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
7-Dec	0.1	0.1	0.1	0.1	0.1	Z	0.1	0.1	0.1	0.1	0.0	0.1	0.1	0.0	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-Dec	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	0.0	0.0	0.1
9-Dec	0.0	Z	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	0.2	0.5	1.0	1.5	1.9	2.1	2.2	2.1	0.6	2.2
10-Dec	2.5	3.4	Z	5.3	5.1	3.6	3.8	2.8	3.5	3.4	2.7	1.2	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	1.7	5.3
11-Dec	0.0	0.0	0.0	Z	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	0.1	0.1	0.2	0.1	0.2
12-Dec	0.3	0.4	0.7	1.3	Z	1.9	2.4	2.1	1.7	2.0	3.4	8.5	7.8	9.1	6.8	4.4	3.3	4.0	5.7	5.6	4.4	3.6	2.2	1.4	3.6	9.1
13-Dec	0.9	0.6	0.5	0.4	0.4	Z	0.4	0.3	0.3	0.3	C	C	C	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.9
14-Dec	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	Z	0.1	0.1	0.3	0.6	0.7	0.6	0.7	0.7	0.2	0.2	0.1	0.2	0.3	0.2	0.1	0.1	0.2	0.2	0.1	0.1	0.1	0.1	0.3	0.7
16-Dec	0.1	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	0.0	0.0	0.0	0.0	0.1
17-Dec	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	0.1	0.1	0.4	0.7	1.0	1.7	2.5	0.3	2.5
18-Dec	3.1	3.0	2.0	0.8	Z	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	3.1
19-Dec	0.0	0.0	0.1	0.0	0.1	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	0.1
20-Dec	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	0.2	0.5	0.5	0.6	1.0	1.2	1.7	2.4	1.8	1.8	0.7	0.6	2.4
21-Dec	0.7	Z	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	0.1	0.2	0.5	0.7	1.1	2.3	2.1	1.2	0.6	0.4	2.3
22-Dec	0.4	0.3	Z	0.3	0.3	0.3	0.4	0.5	0.6	0.6	1.2	2.8	5.5	6.4	5.4	4.9	4.6	4.5	2.6	2.8	2.0	1.0	1.3	3.2	2.3	6.4
23-Dec	2.4	0.4	0.1	Z	0.1	0.0	0.1	0.0	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	0.2	2.4
24-Dec	0.1	0.1	0.1	0.1	Z	0.1	0.1	0.1	0.1	0.2	0.4	0.3	0.5	0.7	1.2	1.5	1.4	1.7	2.0	1.7	1.8	1.5	1.1	1.0	0.8	2.0
25-Dec	1.0	1.0	1.1	1.3	1.8	Z	2.5	2.6	2.6	2.4	1.7	1.8	1.3	0.6	0.7	0.4	0.5	0.7	0.7	0.9	1.1	1.1	1.3	1.7	1.3	2.6
26-Dec	Z	4.1	5.8	1.5	0.5	0.5	0.4	0.4	0.5	1.4	2.1	2.2	2.0	3.1	3.1	3.0	3.5	4.5	4.2	3.6	3.2	1.7	1.2	0.4	2.3	5.8
27-Dec	0.2	Z	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	0.1	0.1	0.0	0.1	0.1	0.1	0.2
28-Dec	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	0.1	0.1	0.1	0.0	0.0	0.1	0.0	0.0	0.1
29-Dec	0.0	0.0	0.0	Z	0.1	0.0	0.0	0.0	0.1	0.8	2.2	2.9	2.4	2.1	1.3	0.7	0.3	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.6	2.9
30-Dec	0.0	0.6	1.8	1.4	Z	2.2	2.0	1.9	2.2	2.0	1.7	1.5	1.9	1.7	1.2	1.0	0.7	0.5	0.5	0.6	1.1	2.3	2.5	2.1	1.5	2.5
31-Dec	1.9	1.2	0.7	0.5	0.4	Z	0.8	0.7	0.5	0.4	0.5	0.4	0.4	0.3	0.3	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.4	1.9
																								Diurnal Average		
																								Diurnal Maximum		
																								0.6 3.1		
																								0.7 4.1		
																								0.6 5.8		
																								0.6 5.3		
																								0.5 5.1		
																								0.5 3.6		
																								0.6 3.8		
																								0.5 2.8		
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																								0.6 3.4		
																								0.6 3.4		
																								0.8 8.5		
																								0.9 7.8		
																								1.0 9.1		
																								0.9 6.8		
																								0.7 4.9		
																								0.7 4.6		
																								0.8 5.0		
																								0.8 5.7		
																								0.8 5.6		
																								0.8 4.4		
																								0.7 3.6		
																								0.6 2.5		
																								0.6 3.2		

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



Wood Buffalo Environmental Association
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Fort Chipewyan - December 2023





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Fort Chipewyan - December 2023

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	710	100.00	100.00
11 - 20	0	0.00	100.00
21 - 60	0	0.00	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 710

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Sulphur Dioxide (SO₂) - ppb
Fort Chipewyan - December 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	3	12	30	180	39	21	26	28	43	40	51	106	78	30	14	706
11 - 20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	5	3	12	30	180	39	21	26	28	43	40	51	106	78	30	14	706

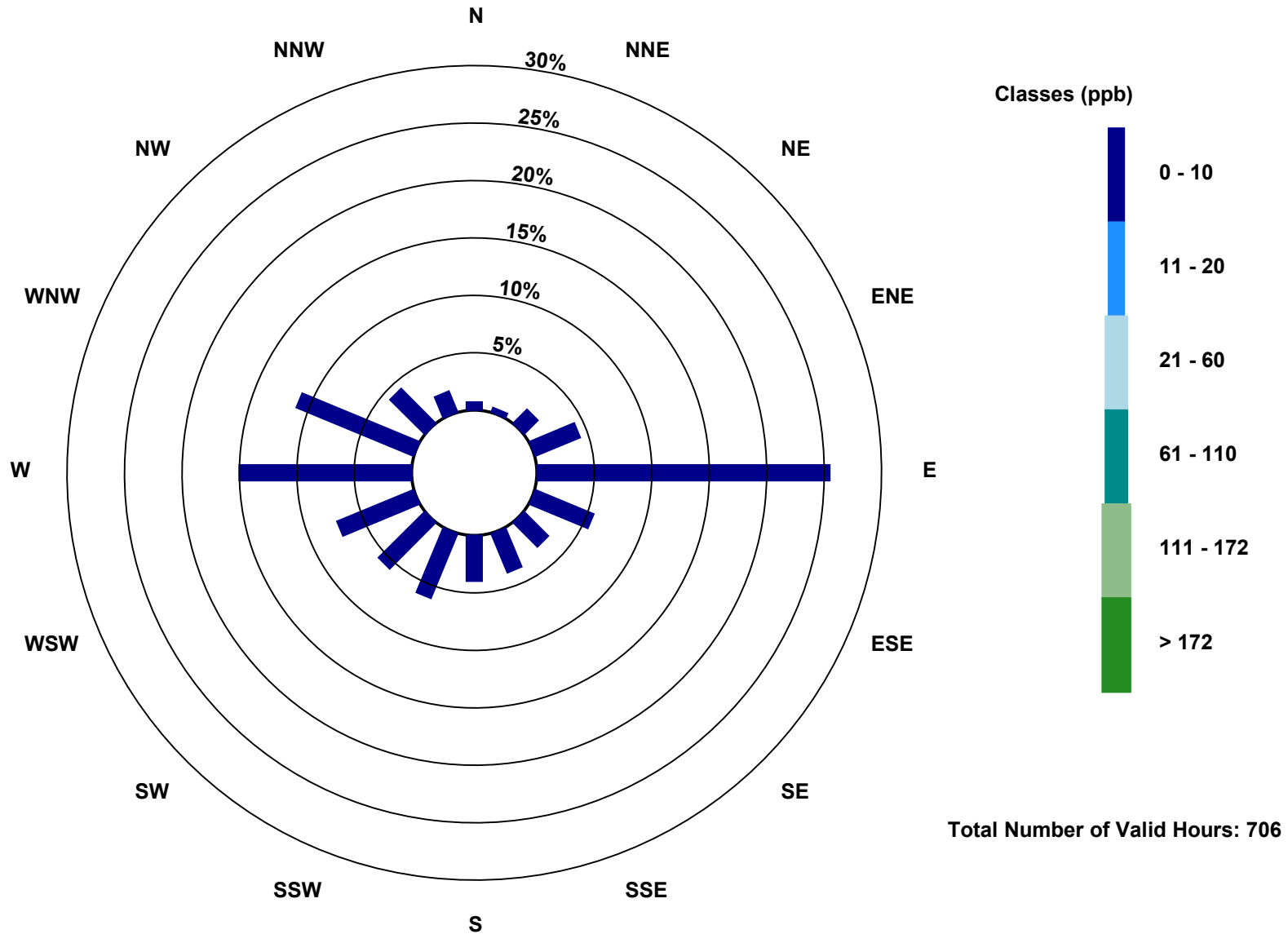
Total Number of Valid Hours: 706

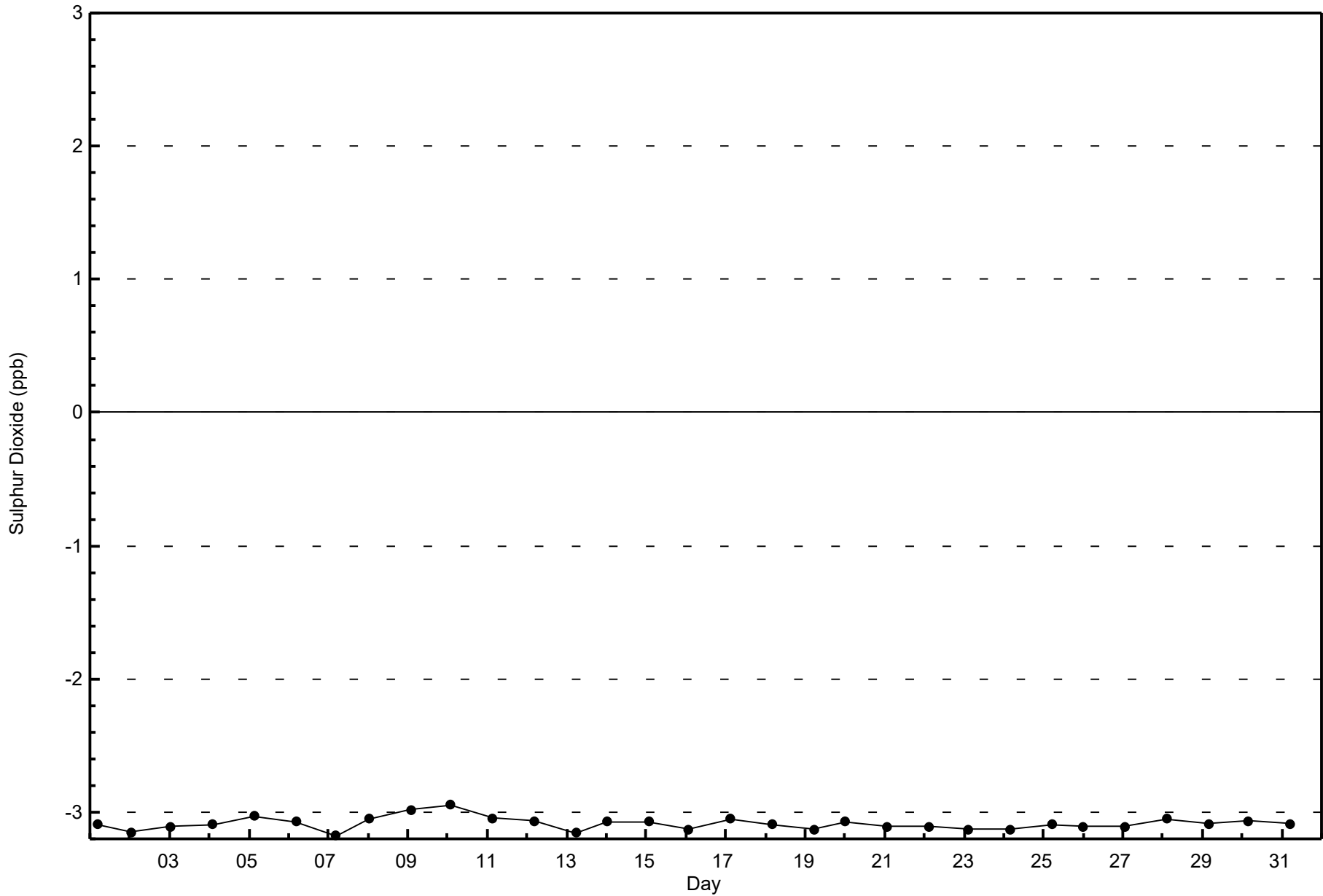
Total Number of Hours: 744

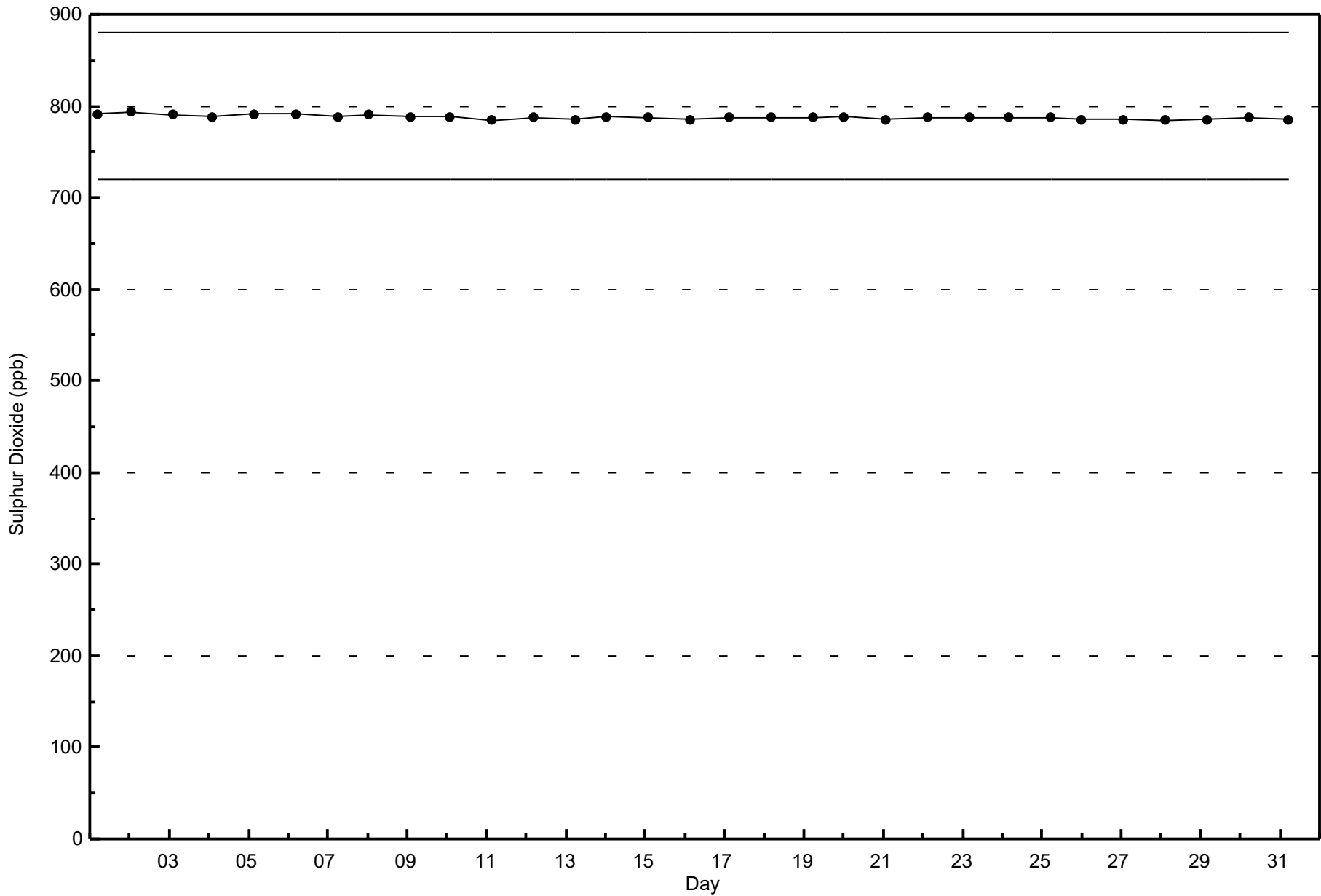


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Sulphur Dioxide (SO₂) - ppb
Fort Chipewyan









Wood Buffalo Environmental Association
Summary of Hour Averages

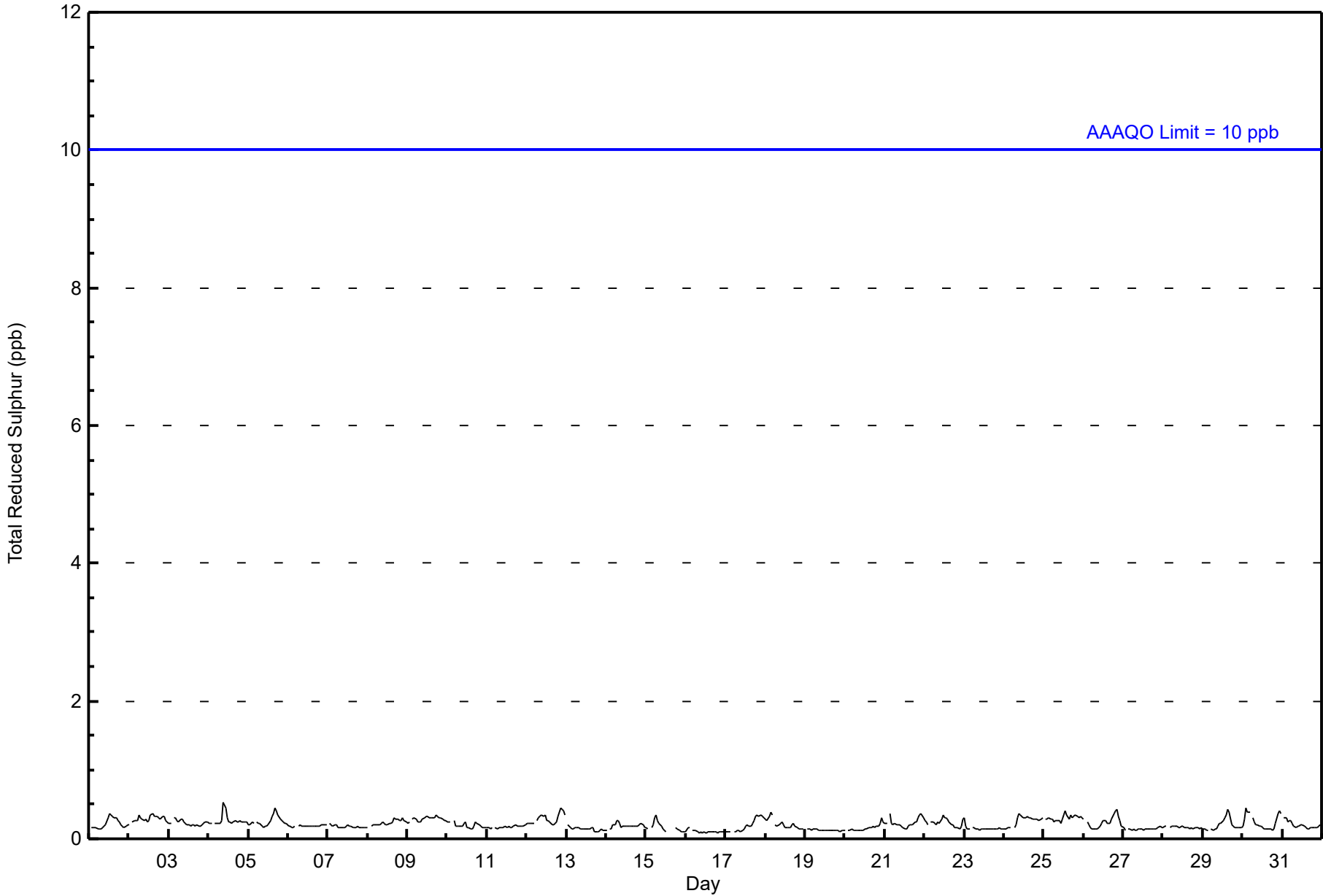
Total Reduced Sulphur (TRS) - ppb
Fort Chipewyan - December 2023

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0													Hours in Service: 744																
Maximum Value: 0.5 ppb on Dec 4 10:00													Maximum Daily Average: 0.3 ppb on Dec 25																
Minimum Value: 0.1 ppb on Dec 16 09:00													Hours of Data: 708																
Maximum Diurnal Average: 0.2 ppb at hour 22													Hours of Missing Data: 36																
Monthly Average: 0.21 ppb													Hours of Calibration: 36																
Minimum Daily Average: 0.1 ppb on Dec 16													Percent Operational Time: 100.0																
Minimum Diurnal Average: 0.2 ppb at hour 1													Percentages: $P_1 = 0.1$ $P_{10} = 0.1$ $Q_1 = 0.2$ Median = 0.2 $Q_3 = 0.3$ $P_{90} = 0.3$ $P_{99} = 0.4$																
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-Dec	Z	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.2	0.2	0.2	0.3	0.4	0.4	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.4
2-Dec	0.2	Z	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.3	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.3	0.4
3-Dec	0.2	0.2	Z	0.3	0.3	0.3	0.2	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3
4-Dec	0.2	0.2	0.2	Z	0.2	0.2	0.2	0.2	0.3	0.5	0.4	0.3	0.2	0.2	0.2	0.2	0.3	0.3	0.2	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.5
5-Dec	0.2	0.2	0.2	0.2	Z	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.3	0.4	
6-Dec	0.2	0.2	0.2	0.2	0.2	Z	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	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-Dec	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	0.2	0.2	0.2	0.2	0.2	0.2	0.2
8-Dec	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	0.3	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
9-Dec	0.2	0.2	Z	0.3	0.3	0.3	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	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
10-Dec	0.2	0.2	0.3	Z	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.3	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	0.2	0.2	0.3
11-Dec	0.2	0.2	0.2	0.2	Z	0.2	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
12-Dec	0.2	0.2	0.2	0.2	0.2	Z	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	0.3	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.4
13-Dec	Z	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2
14-Dec	0.1	Z	0.1	0.1	0.2	0.2	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3
15-Dec	0.2	0.1	Z	0.2	0.2	0.3	0.3	0.3	0.2	0.2	0.2	0.1	0.1	C	C	C	C	C	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.3
16-Dec	0.1	0.2	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	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2
17-Dec	0.1	0.1	0.1	0.1	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.3
18-Dec	0.3	0.3	0.3	0.4	0.4	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	0.1	0.1	0.1	0.1	0.2	0.4
19-Dec	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
20-Dec	0.1	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.2	0.3
21-Dec	0.2	0.2	Z	0.4	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	0.3	0.3	0.4	0.3	0.2	0.2	0.2	0.4
22-Dec	0.3	0.3	0.2	Z	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	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3
23-Dec	0.3	0.2	0.1	0.1	Z	0.2	0.2	0.1	0.2	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.2	0.3
24-Dec	0.1	0.1	0.2	0.2	0.2	Z	0.2	0.2	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	0.3	0.3	0.3	0.3	0.3	0.3	0.4
25-Dec	Z	0.3	0.3	0.3	0.3	0.3	0.2	0.3	0.3	0.3	0.2	0.3	0.3	0.3	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4
26-Dec	0.3	Z	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.2	0.2	0.2	0.3	0.3	0.2	0.2	0.2	0.3	0.4	0.4	0.4	0.4	0.3	0.3	0.2	0.2	0.2	0.2	0.4
27-Dec	0.2	0.1	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.2	0.2	0.2	0.1	0.1	0.1	0.2
28-Dec	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	0.1	0.2	0.2	0.2	0.2
29-Dec	0.1	0.1	0.1	0.1	Z	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.3	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	0.2	0.2	0.4
30-Dec	0.2	0.3	0.4	0.4	0.4	Z	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.4	0.4	0.4	0.2	0.2	0.2	0.4
31-Dec	Z	0.3	0.3	0.2	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	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	0.2	0.3
																								Diurnal Average					
																								Diurnal Maximum					
																								Z - zerospan C - Calibration					
																								Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 10 ppb 24-hr 3 ppb					



Wood Buffalo Environmental Association
Hourly Averages

Total Reduced Sulphur (TRS) - ppb
Fort Chipewyan - December 2023





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Reduced Sulphur (TRS) - ppb
Fort Chipewyan - December 2023

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	708	100.00	100.00
3 - 4	0	0.00	100.00
5 - 7	0	0.00	100.00
8 - 11	0	0.00	100.00
> 11	0	0.00	100.00

Total Number of Valid Hours: 708

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Total Reduced Sulphur (TRS) - ppb
Fort Chipewyan - December 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	4	12	29	181	40	21	26	25	43	41	53	106	75	30	13	704
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	5	4	12	29	181	40	21	26	25	43	41	53	106	75	30	13	704

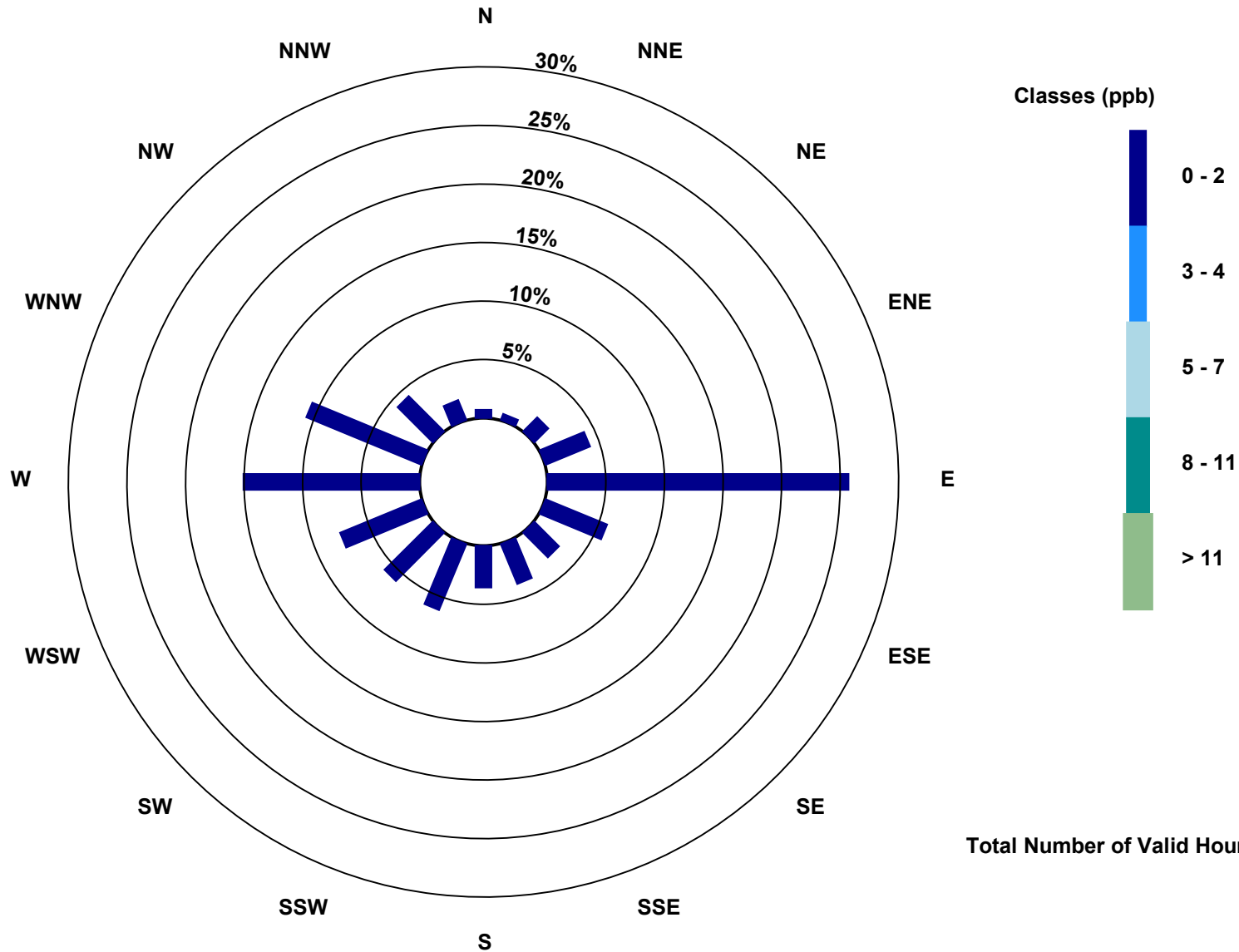
Total Number of Valid Hours: 704

Total Number of Hours: 744

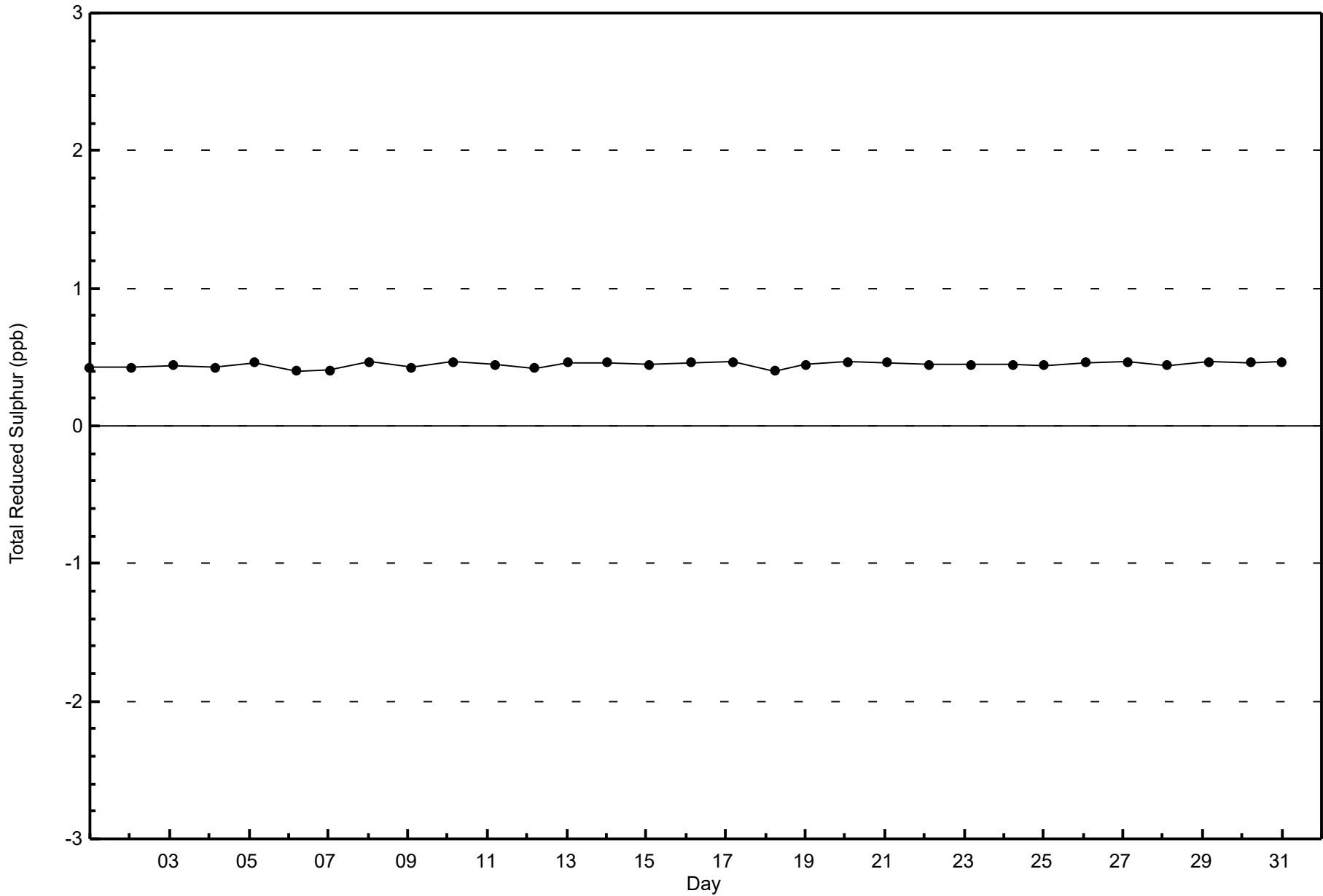


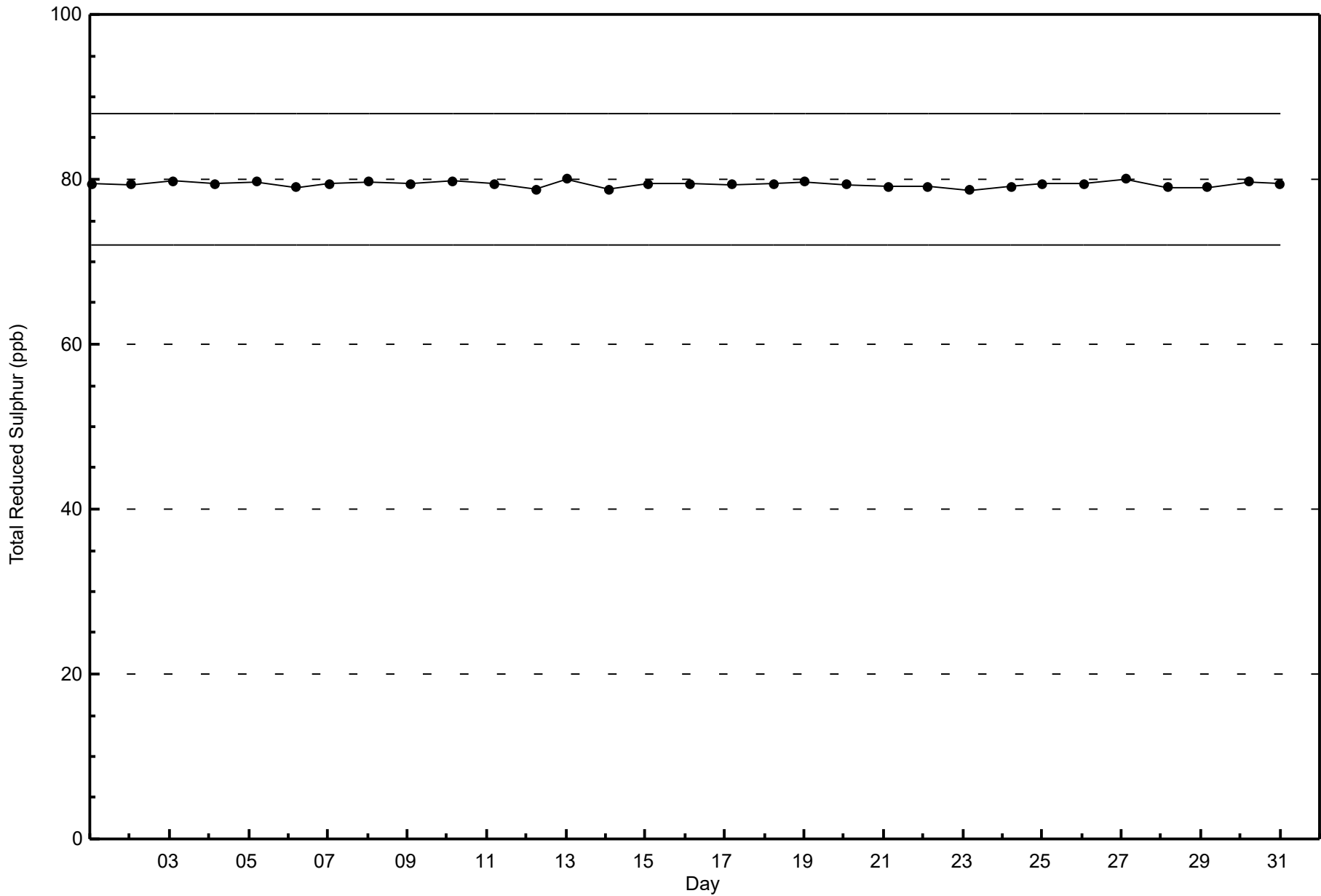
Wood Buffalo Environmental Association
Wind Rose Dec 2023

Total Reduced Sulphur (TRS) - ppb
Fort Chipewyan



Total Number of Valid Hours: 704





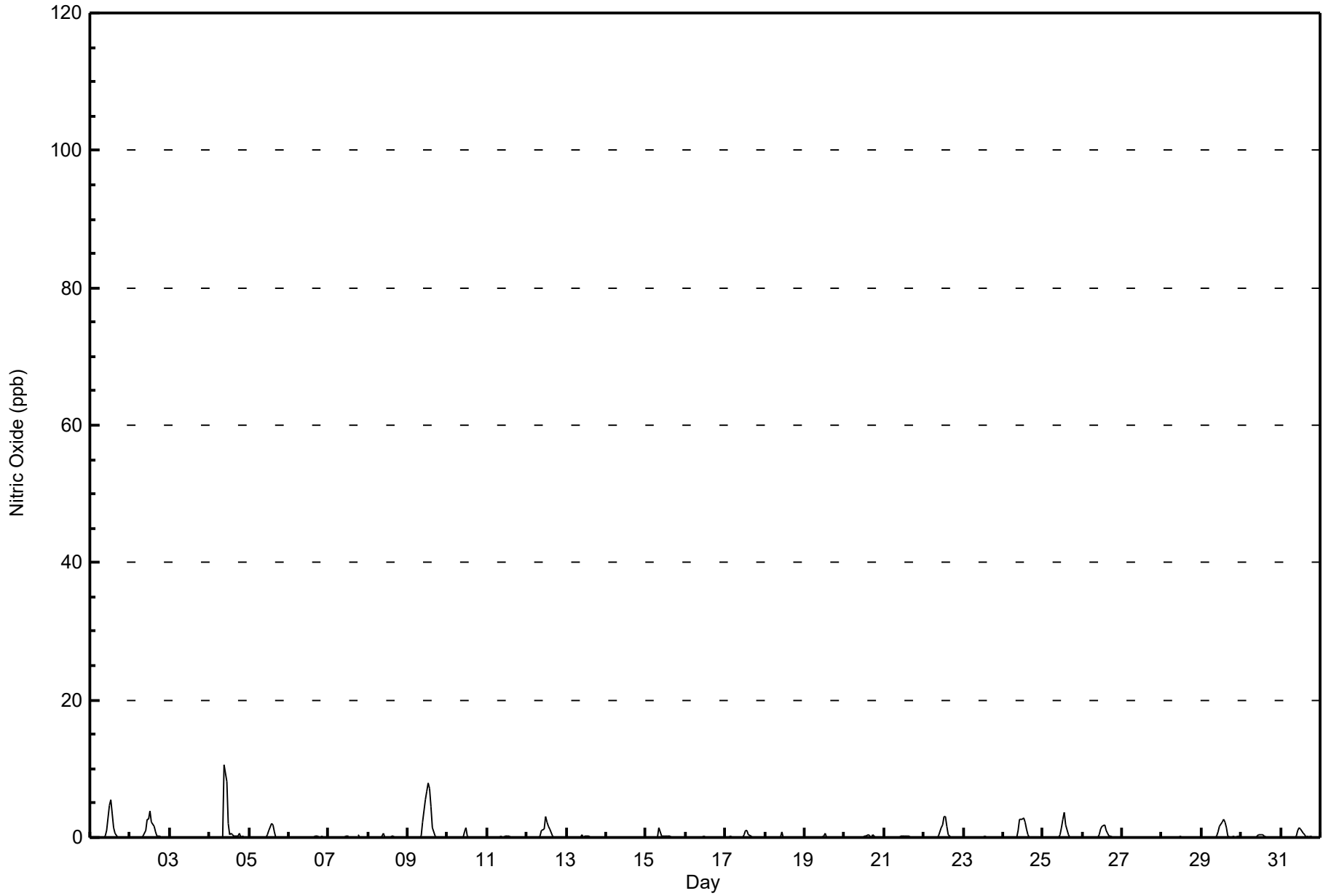


Maximum Value: 10.6 ppb on Dec 4 10:00																				Maximum Daily Average: 1.6 ppb on Dec 9					Hours in Service: 744				
Minimum Value: 0.0 ppb on Dec 1 01:00																				Minimum Daily Average: 0.0 ppb on Dec 23					Hours of Data: 708				
Maximum Diurnal Average: 1.2 ppb at hour 13																				Minimum Diurnal Average: 0.0 ppb at hour 2					Hours of Missing Data: 36				
Monthly Average: 0.28 ppb																				Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.0 Median = 0.0 Q ₃ = 0.1 P ₉₀ = 0.5 P ₉₉ = 4.6					Hours of Calibration: 36				
																				Percent Operational Time: 100.0									
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24					
1-Dec	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.2	1.0	4.7	5.5	3.4	1.5	0.5	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	5.5			
2-Dec	0.0	0.0	0.0	0.0	Z	0.0	0.1	0.1	0.1	1.0	2.6	2.5	3.9	2.2	1.7	0.8	0.1	0.3	0.2	0.1	0.0	0.0	0.0	0.0	0.7	3.9			
3-Dec	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	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.6		
4-Dec	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	10.6	8.1	2.1	0.5	0.6	0.3	0.2	0.1	0.2	0.5	0.0	0.2	0.0	0.0	0.0	1.0	10.6			
5-Dec	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.3	1.0	2.0	1.8	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	2.0			
6-Dec	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.1	0.2	0.1	0.0	0.0	0.0	0.0	0.2	0.2		
7-Dec	0.1	0.0	0.0	Z	0.0	0.0	0.0	0.1	0.0	0.1	0.1	0.3	0.2	C	C	C	C	C	0.5	0.0	0.0	0.0	0.0	0.0	0.1	0.5			
8-Dec	0.0	0.0	0.0	0.1	Z	0.0	0.0	0.0	0.2	0.6	0.0	0.1	0.0	0.0	0.2	0.2	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.6			
9-Dec	0.0	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.2	2.3	5.4	6.7	7.9	7.0	4.5	1.5	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.6	7.9			
10-Dec	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.7	1.3	0.1	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.1	1.3			
11-Dec	0.1	Z	0.0	0.1	0.0	0.1	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.0	0.1	0.1	0.1	0.0	0.0	0.1	0.0	0.1	0.2			
12-Dec	0.0	0.1	Z	0.1	0.0	0.0	0.0	0.1	0.1	0.9	1.3	3.1	2.2	1.7	1.3	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.5	3.1			
13-Dec	0.0	0.0	0.0	Z	0.0	0.1	0.0	0.0	0.0	0.4	0.1	0.1	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	0.4			
14-Dec	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	0.1	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.1			
15-Dec	0.0	0.0	0.0	0.0	0.0	Z	0.0	0.0	1.4	0.1	0.2	0.3	0.2	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	1.4			
16-Dec	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	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.1	0.1	0.3			
17-Dec	0.1	Z	0.1	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.3	1.1	1.0	0.4	0.2	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.2	1.1			
18-Dec	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7			
19-Dec	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.1	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	0.5			
20-Dec	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.3	0.3	0.2	0.0	0.4	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.4			
21-Dec	0.0	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.1	0.1	0.2	0.3	0.2	0.1	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.3			
22-Dec	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	1.4	1.9	3.1	3.0	1.7	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	3.1			
23-Dec	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1			
24-Dec	0.0	0.0	Z	0.1	0.0	0.0	0.0	0.0	0.0	1.0	2.6	2.6	2.8	2.2	1.2	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	2.8			
25-Dec	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.1	0.4	1.3	2.7	3.7	1.9	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	3.7			
26-Dec	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.5	1.2	1.7	1.8	1.1	0.6	0.2	0.3	0.1	0.1	0.1	0.0	0.0	0.0	0.3	1.8			
27-Dec	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			
28-Dec	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.1	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2			
29-Dec	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.9	1.6	2.3	2.7	2.3	1.3	0.2	0.0	0.0	0.2	0.0	0.0	0.1	0.0	0.5	2.7			
30-Dec	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.3	0.4	0.5	0.4	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.5			
31-Dec	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.3	1.0	1.4	1.2	0.6	0.3	0.1	0.1	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.2	1.4			
0.0																								Diurnal Average					
0.1																								Diurnal Maximum					
Z - zerospan C - Calibration																													



Wood Buffalo Environmental Association
Hourly Averages

Nitric Oxide (NO) - ppb
Fort Chipewyan - December 2023





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitric Oxide (NO) - ppb
Fort Chipewyan - December 2023

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	708	100.00	100.00
21 - 40	0	0.00	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 708

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitric Oxide (NO) - ppb
Fort Chipewyan - December 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	4	4	13	30	183	38	20	25	27	46	42	47	110	75	28	12	704
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	4	4	13	30	183	38	20	25	27	46	42	47	110	75	28	12	704

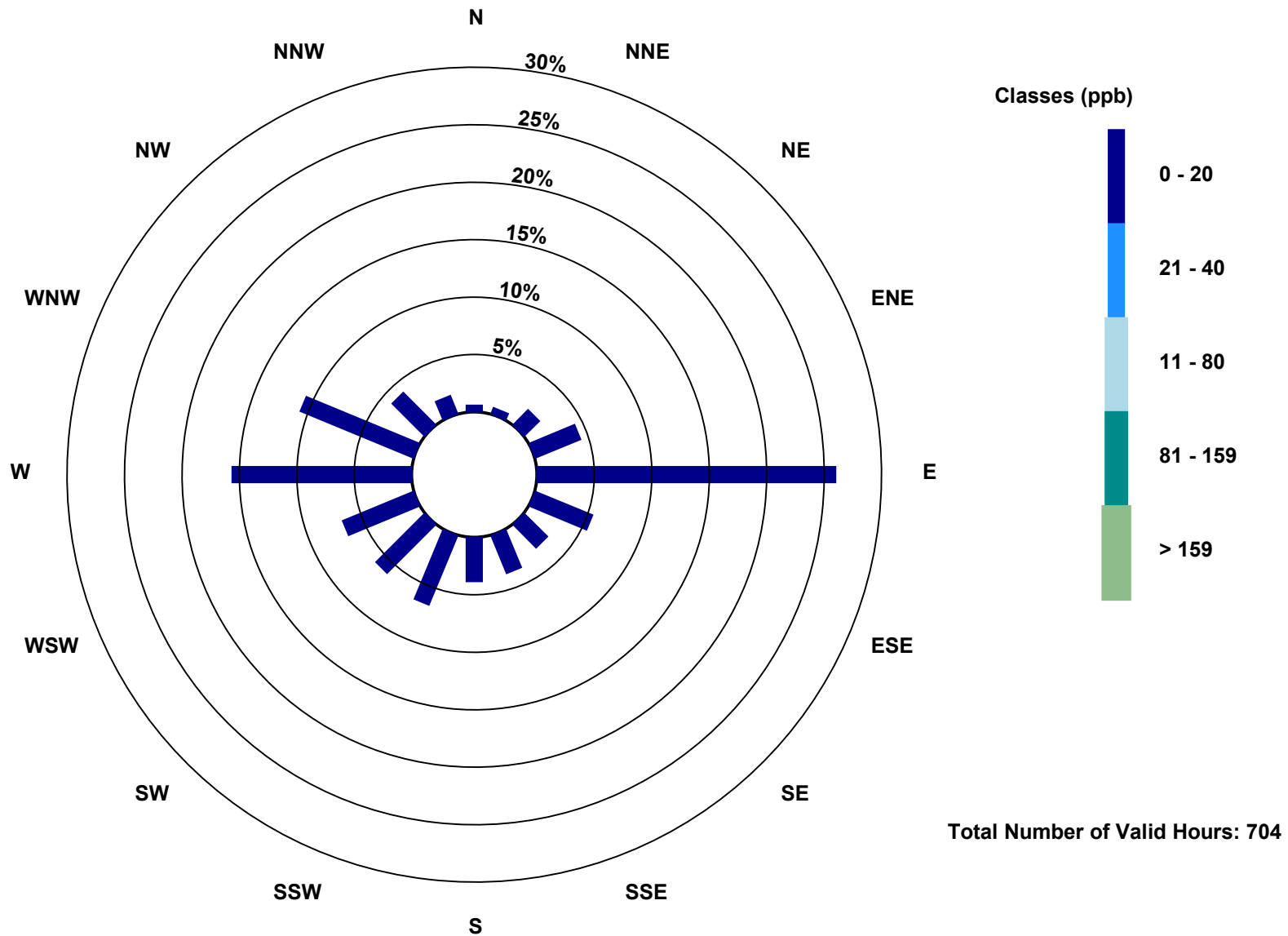
Total Number of Valid Hours: 704

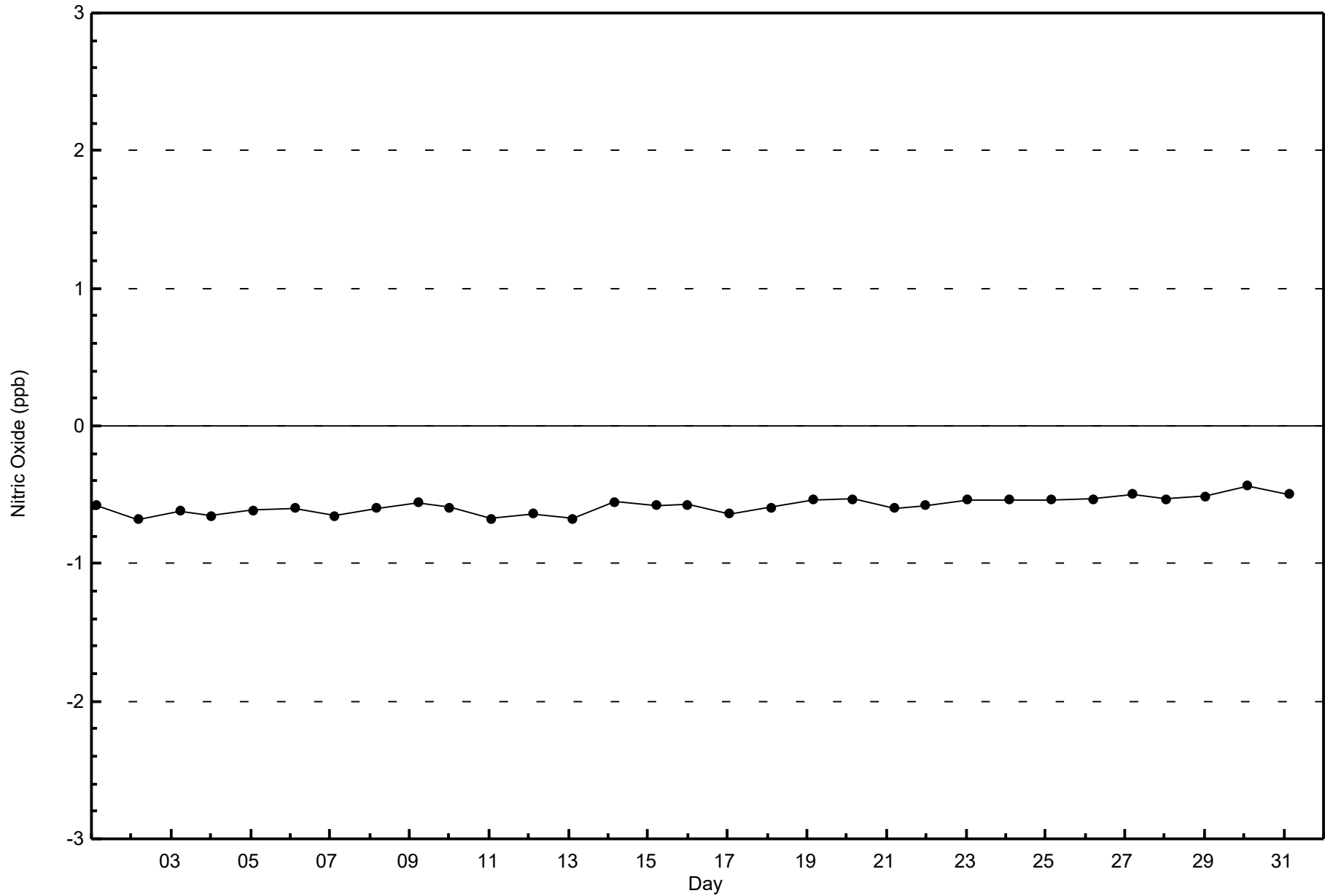
Total Number of Hours: 744

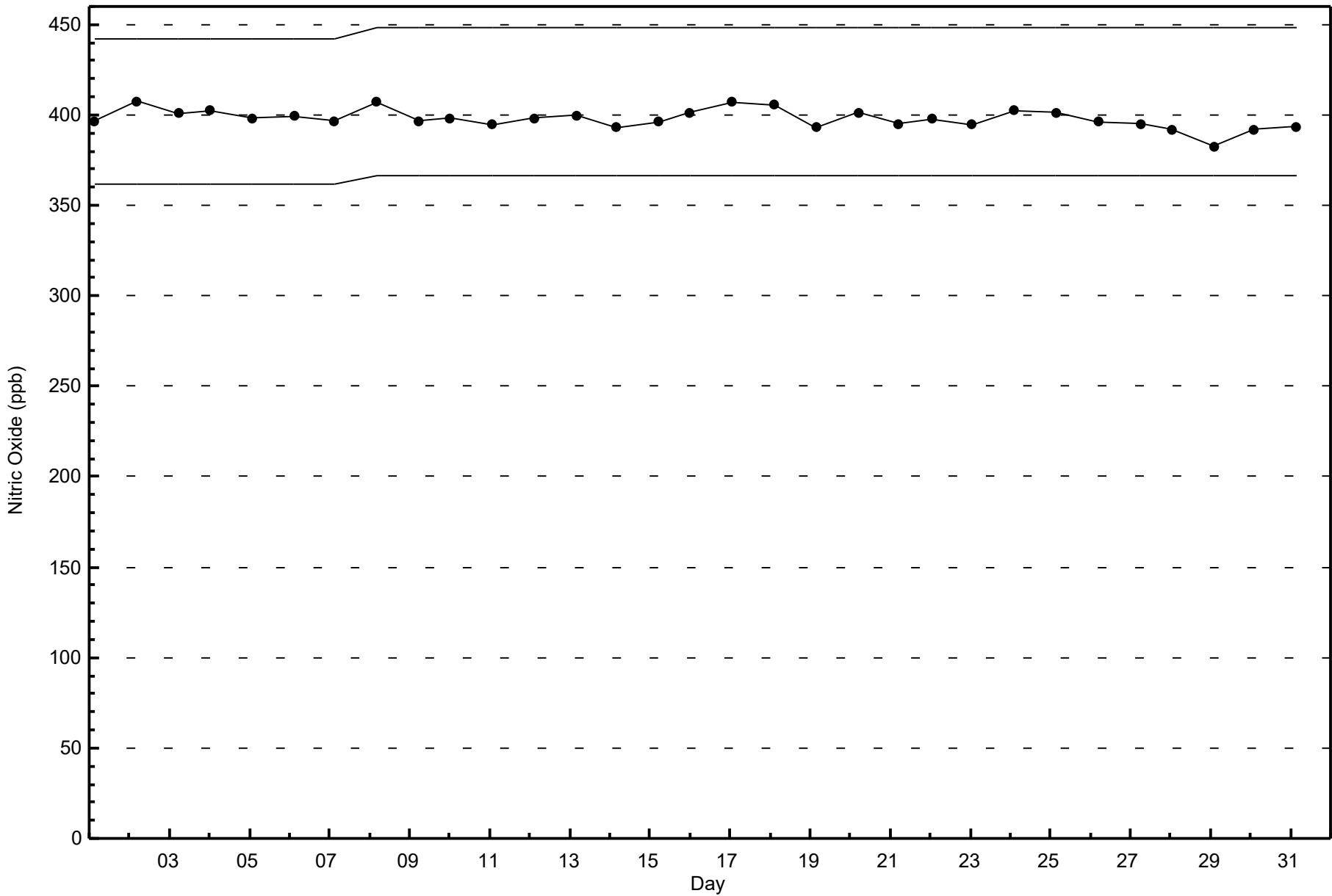


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Nitric Oxide (NO) - ppb
Fort Chipewyan









Wood Buffalo Environmental Association

Summary of Hour Averages

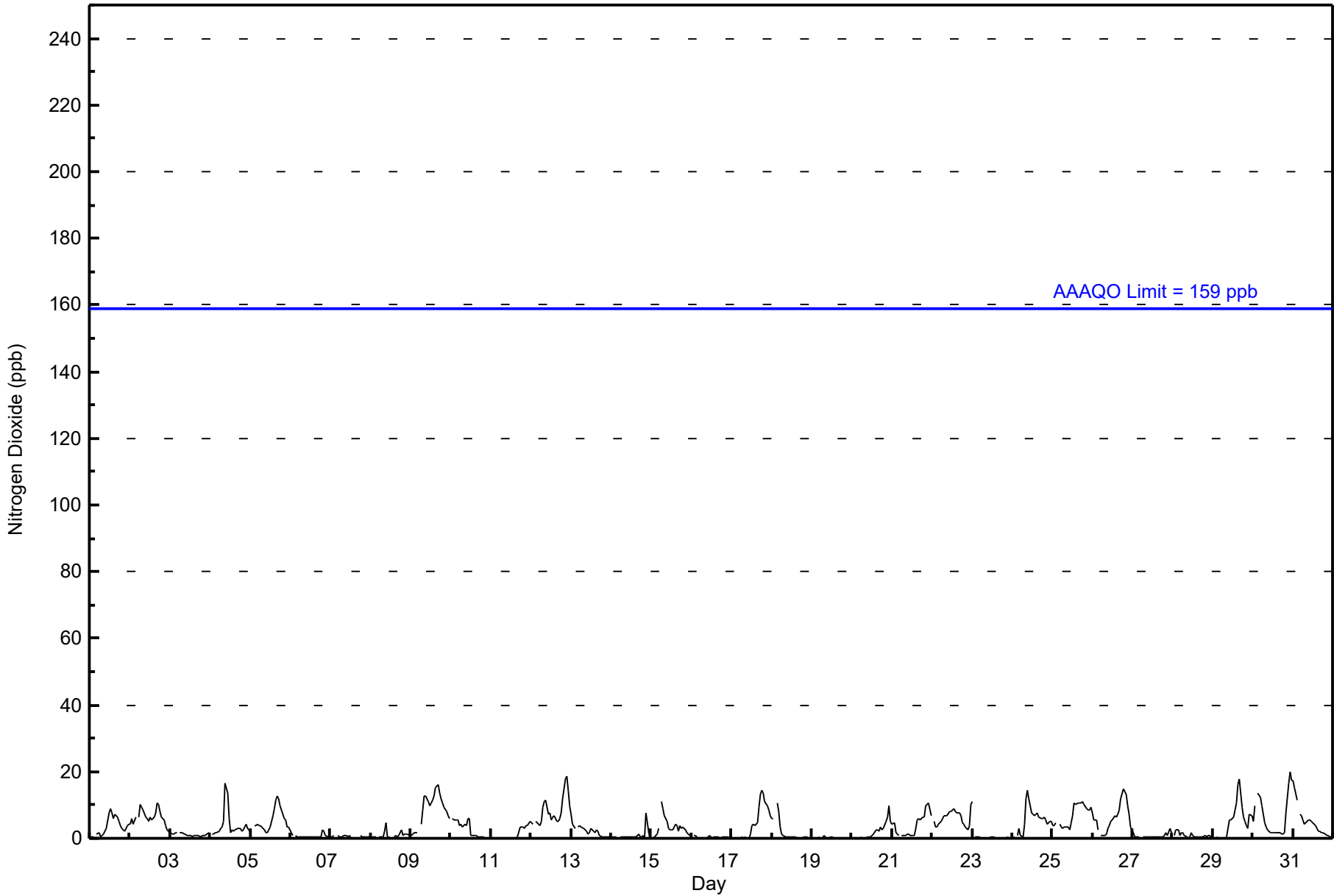
Nitrogen Dioxide (NO₂) - ppb

Fort Chipewyan - December 2023

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 19.8 ppb on Dec 30 23:00	Maximum Daily Average: 8.6 ppb on Dec 9		Hours of Data:	708
Minimum Value: 0.0 ppb on Dec 11 01:00	Minimum Daily Average: 0.2 ppb on Dec 19		Hours of Missing Data:	36
Maximum Diurnal Average: 4.5 ppb at hour 17	Minimum Diurnal Average: 2.1 ppb at hour 3		Hours of Calibration:	36
Monthly Average: 3.43 ppb	Percentiles: P ₁ = 0.1 P ₁₀ = 0.2 Q ₁ = 0.4 Median = 1.7 Q ₃ = 5.5 P ₉₀ = 9.3 P ₉₉ = 16.6		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-Dec	0.5	0.5	0.4	Z	1.4	1.8	0.5	0.8	1.4	2.0	2.9	7.5	8.8	7.5	6.0	7.1	6.5	4.9	3.8	3.0	2.6	2.3	3.7	4.3	3.5	8.8
2-Dec	4.2	5.9	4.2	6.3	Z	6.4	10.3	9.2	8.5	6.3	6.1	4.9	6.5	5.5	6.2	7.8	10.5	10.1	7.9	6.3	5.5	3.7	2.6	2.0	6.4	10.5
3-Dec	1.6	1.4	1.3	1.7	1.6	Z	1.6	1.5	1.4	1.2	1.0	0.9	0.8	0.6	0.7	0.7	0.7	0.7	0.6	0.8	0.7	1.0	1.3	1.7	1.1	1.7
4-Dec	Z	1.3	1.4	1.9	1.7	2.3	3.1	3.4	5.1	16.6	13.7	6.0	1.9	2.4	2.2	2.4	3.0	3.0	3.1	2.0	2.5	4.4	2.8	2.4	3.9	16.6
5-Dec	1.6	Z	3.9	3.7	4.3	3.7	3.9	3.4	2.7	1.9	1.8	2.4	3.6	6.6	9.0	11.4	12.5	11.7	9.6	7.1	6.1	5.5	3.5	3.2	5.4	12.5
6-Dec	1.7	1.0	Z	0.9	0.6	0.6	0.5	0.5	0.4	0.6	0.5	0.4	0.4	0.4	0.4	0.6	0.5	0.4	0.6	2.4	2.0	0.7	0.6	0.5	0.7	2.4
7-Dec	0.5	0.6	0.7	Z	0.8	0.6	0.6	0.6	0.8	0.8	0.6	1.0	0.6	C	C	C	C	C	1.0	0.5	0.4	0.5	0.4	0.3	0.6	1.0
8-Dec	0.2	0.3	0.4	0.5	Z	0.5	0.6	0.5	2.1	4.6	0.4	0.4	0.2	0.2	0.4	0.8	0.6	1.0	2.5	1.0	1.3	1.2	1.1	1.0	0.9	4.6
9-Dec	1.0	1.3	1.5	1.5	1.5	Z	4.4	8.5	12.8	12.5	11.1	9.6	10.6	11.4	12.7	15.1	16.3	13.4	12.0	10.4	9.4	8.0	6.6	5.9	8.6	16.3
10-Dec	Z	5.9	5.5	5.4	5.5	3.7	4.2	3.4	4.1	3.9	6.0	6.0	0.9	0.9	0.8	0.7	0.5	0.5	0.4	0.3	0.2	0.1	0.2	0.1	2.6	6.0
11-Dec	0.0	Z	0.2	0.1	0.1	0.1	0.1	0.2	0.2	0.1	0.2	0.2	0.1	0.2	0.1	0.2	0.3	3.3	3.6	3.2	3.0	3.9	3.9	5.1	1.2	5.1
12-Dec	4.7	4.2	Z	4.9	4.2	3.9	5.0	9.2	11.0	11.6	7.2	7.6	5.6	6.2	6.8	5.1	5.1	5.9	7.5	12.0	18.0	18.5	14.2	9.7	8.2	18.5
13-Dec	7.2	4.4	3.1	Z	3.2	4.0	3.4	3.1	2.7	2.3	1.2	1.9	2.8	2.2	1.6	2.7	2.3	0.8	0.6	0.5	0.6	0.5	0.4	0.4	2.3	7.2
14-Dec	0.3	0.3	0.3	0.3	Z	0.4	0.4	0.3	0.3	0.3	0.4	0.4	0.3	0.4	0.6	1.3	0.5	0.6	0.7	0.2	7.8	1.6	0.1	0.8	0.8	7.8
15-Dec	0.1	0.2	0.3	1.4	3.0	Z	11.0	9.0	6.8	5.0	3.0	2.7	2.4	2.5	4.2	3.7	2.3	3.9	2.8	3.3	2.6	1.7	1.1	0.8	3.2	11.0
16-Dec	Z	0.9	0.9	0.6	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.7	0.2	0.3	0.3	0.4	0.3	0.2	0.3	0.5	0.4	0.3	0.3	0.2	0.4	0.9
17-Dec	0.2	Z	0.1	0.2	0.2	0.1	0.3	0.1	0.5	0.1	0.2	1.4	3.8	4.3	3.9	4.7	9.3	13.3	14.6	13.4	11.1	9.6	8.3	6.9	4.6	14.6
18-Dec	5.9	5.8	Z	10.5	8.1	3.2	1.1	0.7	0.5	0.5	0.5	0.4	0.5	0.5	0.4	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.2	0.2	1.8	10.5
19-Dec	0.2	0.2	0.2	Z	0.5	0.2	0.2	1.0	0.3	0.1	0.2	0.4	0.5	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	1.0
20-Dec	0.1	0.2	0.2	0.2	Z	0.3	0.2	0.2	0.2	0.3	0.5	0.5	0.9	1.2	2.6	2.5	2.3	3.3	2.7	3.1	4.9	6.4	9.7	4.9	2.1	9.7
21-Dec	4.4	4.5	1.5	1.2	1.0	Z	0.9	0.9	1.0	1.1	1.4	1.0	0.7	0.8	3.1	5.5	5.9	5.7	6.4	6.4	9.9	10.0	10.4	6.9	3.9	10.4
22-Dec	Z	5.0	3.6	3.6	4.3	4.9	6.0	6.7	6.8	6.9	8.0	8.0	8.5	9.1	8.0	7.8	7.6	6.8	4.8	4.4	3.5	2.5	3.9	10.2	6.1	10.2
23-Dec	11.2	Z	0.6	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.6	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.2	0.2	0.7	11.2
24-Dec	0.2	0.4	Z	0.9	2.8	0.9	0.5	4.4	11.9	14.4	11.7	7.6	7.3	6.9	7.3	7.8	6.5	5.9	6.0	6.5	5.4	4.3	5.2	5.1	5.6	14.4
25-Dec	3.9	4.0	4.5	Z	4.1	3.4	2.8	3.5	3.5	3.5	2.6	4.6	6.9	10.6	10.0	10.5	10.7	10.5	11.0	10.1	8.9	8.4	8.6	9.2	6.8	11.0
26-Dec	7.6	5.7	5.4	2.7	Z	0.9	0.8	0.9	1.4	2.8	3.7	5.1	5.7	6.6	6.3	7.1	8.5	11.9	14.7	14.1	13.1	9.6	7.2	3.2	6.3	14.7
27-Dec	1.8	0.4	0.4	0.4	0.3	Z	0.4	0.4	0.3	0.3	0.4	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.5	0.8	1.5	0.9	3.0	1.5	0.7	3.0
28-Dec	Z	0.7	2.4	2.5	0.7	1.7	1.8	1.0	0.5	0.2	0.3	1.8	0.8	0.4	0.5	0.5	0.6	0.3	0.3	0.8	0.4	0.7	0.8	0.3	0.9	2.5
29-Dec	0.2	Z	0.3	0.2	0.2	0.2	0.2	0.2	0.6	2.9	5.3	5.6	6.5	8.3	10.8	16.2	17.8	9.3	6.2	5.2	4.0	3.1	7.0	6.7	5.1	17.8
30-Dec	5.2	9.6	Z	13.5	12.4	9.7	7.0	4.5	3.3	2.4	1.9	1.5	1.7	1.6	1.6	1.6	1.5	1.1	1.3	1.8	7.6	16.7	19.8	17.2	6.3	19.8
31-Dec	17.3	15.1	11.3	Z	7.4	6.6	5.7	4.4	5.1	5.7	5.6	5.0	4.5	3.8	3.1	2.3	2.0	1.5	1.6	1.2	0.9	0.8	0.6	0.5	4.9	17.3
	3.1	3.1	2.1	2.6	2.7	2.3	2.5	2.7	3.1	3.6	3.2	3.1	3.1	3.4	3.7	4.2	4.5	4.4	4.1	3.9	4.1	4.3	4.2	3.6		Diurnal Average
	17.3	15.1	11.3	13.5	12.4	9.7	11.0	9.2	12.8	16.6	13.7	9.6	10.6	11.4	12.7	16.2	17.8	13.4	14.7	14.1	18.0	18.5	19.8	17.2		Diurnal Maximum

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





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitrogen Dioxide (NO₂) - ppb
Fort Chipewyan - December 2023

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	708	100.00	100.00
21 - 40	0	0.00	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 708

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Nitrogen Dioxide (NO₂) - ppb
Fort Chipewyan - December 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	4	4	13	30	183	38	20	25	27	46	42	47	110	75	28	12	704
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	4	4	13	30	183	38	20	25	27	46	42	47	110	75	28	12	704

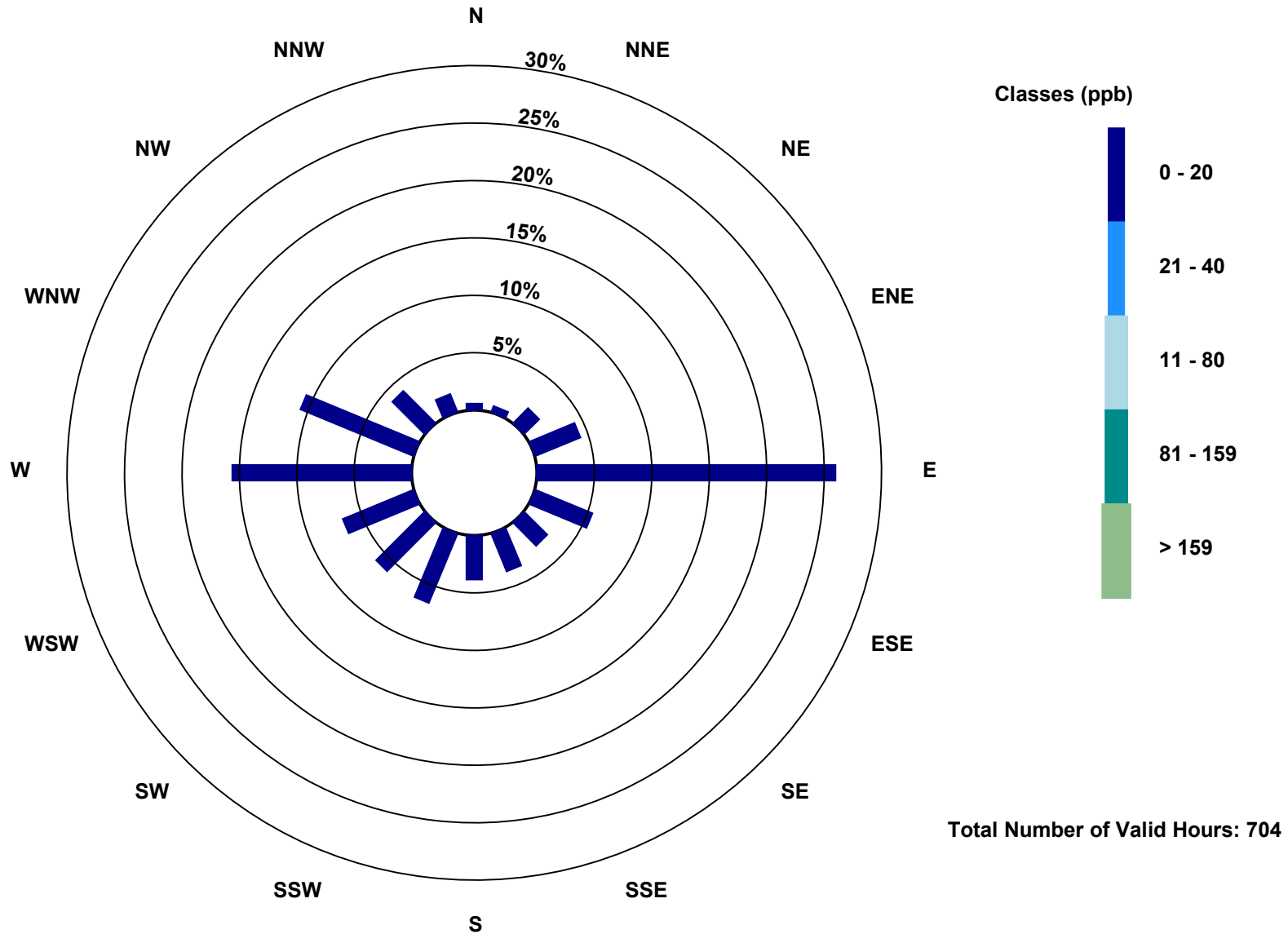
Total Number of Valid Hours: 704

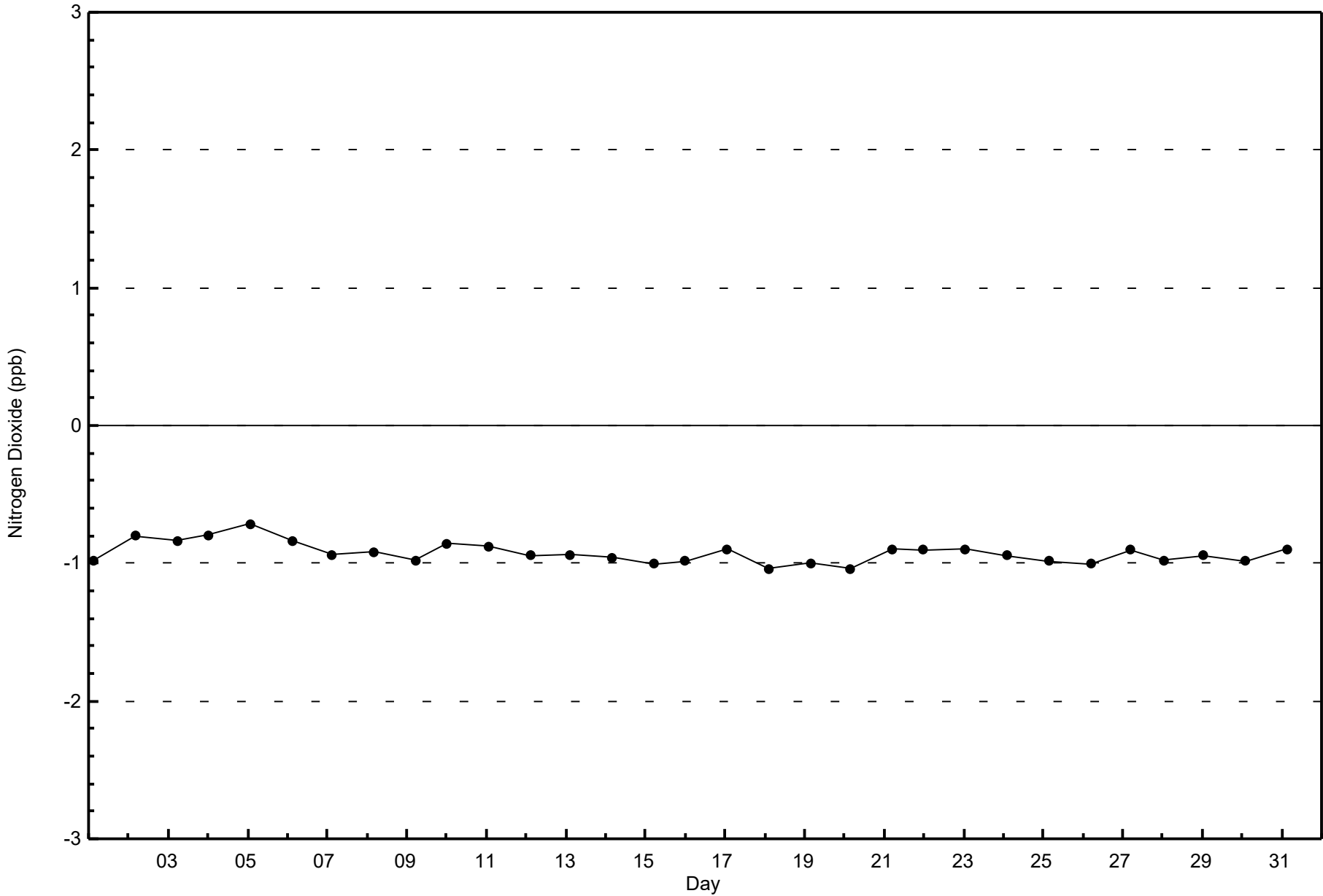
Total Number of Hours: 744

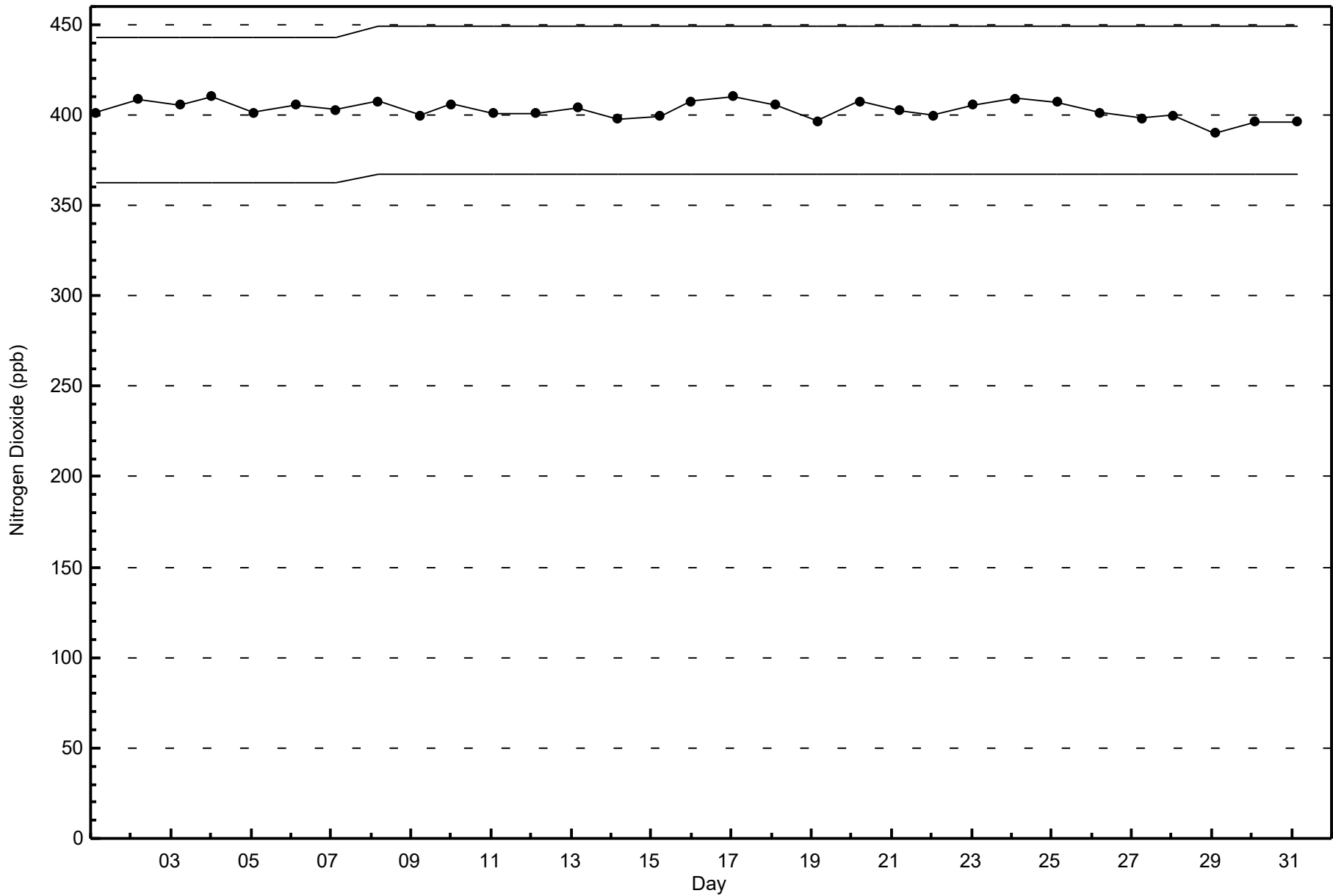


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Nitrogen Dioxide (NO₂) - ppb
Fort Chipewyan









Wood Buffalo Environmental Association
Summary of Hour Averages

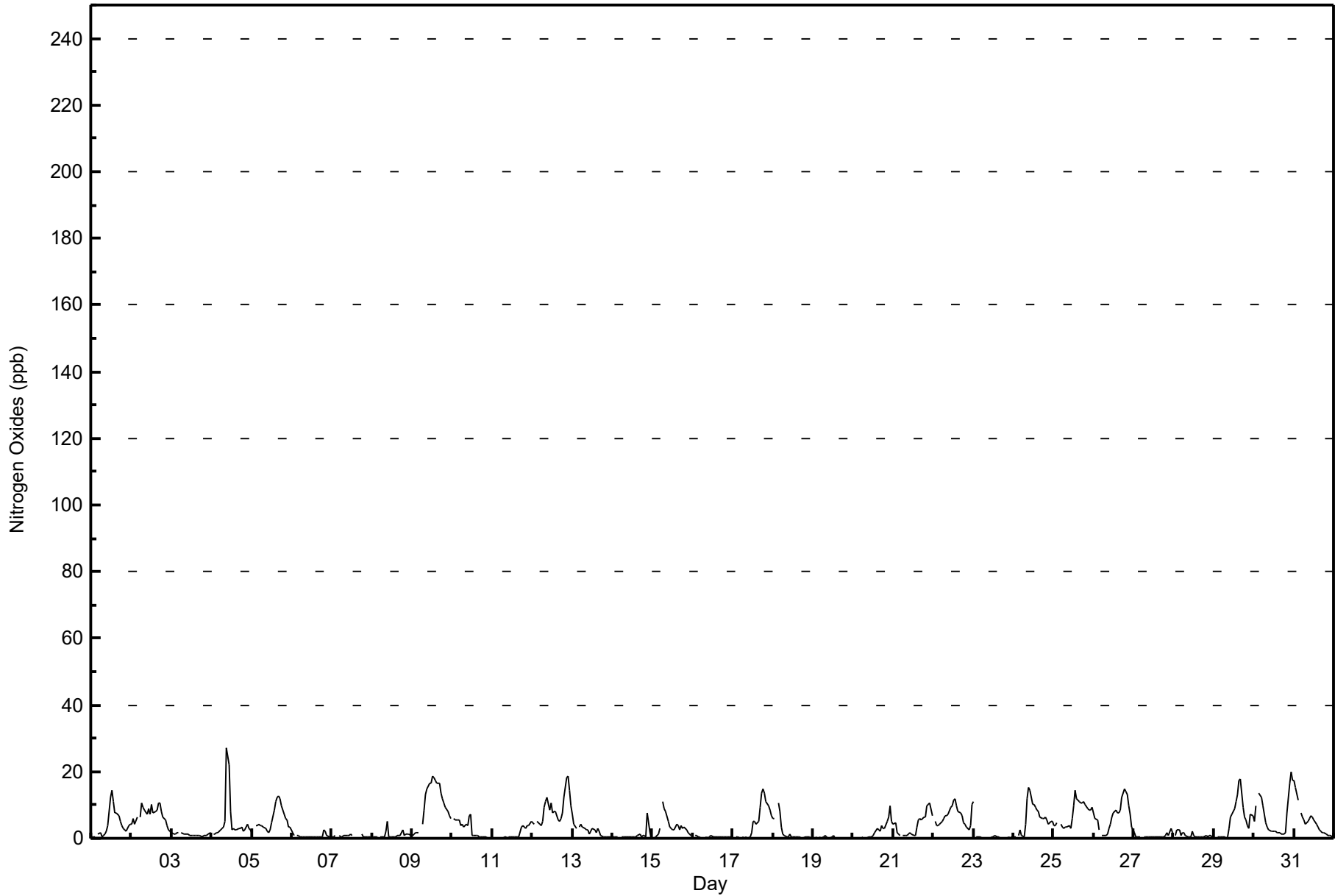
Nitrogen Oxides (NO_x) - ppb
Fort Chipewyan - December 2023

Maximum Value: 27.2 ppb on Dec 4 10:00		Maximum Daily Average: 10.1 ppb on Dec 9		Hours in Service: 744																						
Minimum Value: 0.1 ppb on Dec 19 17:00		Minimum Daily Average: 0.3 ppb on Dec 19		Hours of Data: 708																						
Maximum Diurnal Average: 4.6 ppb at hour 17		Minimum Diurnal Average: 2.1 ppb at hour 3		Hours of Missing Data: 36																						
Monthly Average: 3.70 ppb		Percentiles: P ₁ = 0.1 P ₁₀ = 0.2 Q ₁ = 0.5 Median = 1.8 Q ₃ = 5.7 P ₉₀ = 10.0 P ₉₉ = 18.0		Hours of Calibration: 36																						
				Percent Operational Time: 100.0																						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Dec	0.5	0.5	0.4	Z	1.4	1.8	0.5	0.8	1.4	2.2	3.9	12.2	14.3	10.9	7.5	7.6	6.6	4.9	3.8	3.0	2.6	2.3	3.7	4.3	4.2	14.3
2-Dec	4.2	5.9	4.2	6.3	Z	6.4	10.4	9.3	8.6	7.3	8.7	7.4	10.4	7.7	7.9	8.6	10.6	10.4	8.1	6.4	5.5	3.7	2.6	2.0	7.1	10.6
3-Dec	1.6	1.4	1.3	1.7	1.6	Z	1.6	1.5	1.4	1.2	1.1	1.0	0.9	0.7	0.8	0.7	0.7	0.7	0.6	0.8	0.7	1.0	1.3	1.7	1.1	1.7
4-Dec	Z	1.3	1.4	1.9	1.7	2.3	3.1	3.4	5.2	27.2	21.8	8.1	2.4	3.0	2.5	2.6	3.1	3.2	3.6	2.0	2.7	4.4	2.8	2.4	4.9	27.2
5-Dec	1.6	Z	3.9	3.7	4.3	3.7	3.9	3.4	2.8	2.0	1.9	2.7	4.6	8.6	10.8	12.1	12.5	11.7	9.6	7.1	6.1	5.5	3.5	3.2	5.6	12.5
6-Dec	1.7	1.0	Z	0.9	0.6	0.6	0.5	0.5	0.4	0.6	0.6	0.4	0.4	0.4	0.4	0.6	0.6	0.5	0.6	2.5	2.2	0.8	0.6	0.5	0.8	2.5
7-Dec	0.6	0.6	0.7	Z	0.8	0.6	0.6	0.7	0.8	0.9	0.7	1.3	0.8	C	C	C	C	C	1.5	0.5	0.4	0.5	0.4	0.3	0.7	1.5
8-Dec	0.2	0.3	0.4	0.6	Z	0.5	0.6	0.5	2.3	5.2	0.4	0.5	0.2	0.2	0.6	1.0	0.6	1.0	2.6	1.0	1.3	1.2	1.1	1.0	1.0	5.2
9-Dec	1.0	1.3	1.5	1.5	1.5	Z	4.4	8.5	13.0	14.8	16.5	16.3	18.5	18.4	17.2	16.6	16.4	13.4	12.0	10.4	9.4	8.0	6.6	5.9	10.1	18.5
10-Dec	Z	5.9	5.5	5.4	5.5	3.7	4.2	3.4	4.1	4.0	6.7	7.3	1.0	1.0	0.8	0.7	0.6	0.5	0.4	0.3	0.2	0.2	0.2	0.2	2.7	7.3
11-Dec	0.1	Z	0.2	0.2	0.1	0.2	0.2	0.2	0.3	0.2	0.3	0.3	0.2	0.4	0.2	0.3	0.3	3.4	3.7	3.3	3.0	3.9	4.0	5.1	1.3	5.1
12-Dec	4.7	4.3	Z	5.0	4.2	3.9	5.0	9.3	11.1	12.5	8.5	10.7	7.8	7.9	8.1	5.3	5.2	6.0	7.6	12.1	18.1	18.6	14.3	9.8	8.7	18.6
13-Dec	7.2	4.4	3.1	Z	3.2	4.1	3.4	3.1	2.7	2.7	1.3	2.0	3.1	2.4	1.7	2.8	2.3	0.8	0.6	0.5	0.6	0.5	0.4	0.4	2.3	7.2
14-Dec	0.3	0.3	0.3	0.3	Z	0.4	0.4	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.6	1.4	0.5	0.7	0.7	0.2	7.8	1.6	0.1	0.1	0.8	7.8
15-Dec	0.1	0.2	0.3	1.4	3.0	Z	11.0	9.0	8.2	5.1	3.2	3.0	2.6	2.7	4.4	3.7	2.3	3.9	2.8	3.3	2.6	1.7	1.1	0.8	3.3	11.0
16-Dec	Z	0.9	0.9	0.6	0.2	0.2	0.2	0.2	0.2	0.2	0.3	1.0	0.3	0.4	0.4	0.5	0.4	0.3	0.4	0.6	0.5	0.3	0.3	0.3	0.4	1.0
17-Dec	0.3	Z	0.2	0.3	0.2	0.2	0.3	0.1	0.5	0.1	0.3	1.7	4.9	5.3	4.3	4.9	9.4	13.4	14.7	13.4	11.1	9.6	8.3	6.9	4.8	14.7
18-Dec	5.9	5.8	Z	10.5	8.1	3.2	1.1	0.7	0.5	0.5	1.2	0.4	0.5	0.5	0.4	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.2	0.2	1.8	10.5
19-Dec	0.2	0.2	0.2	Z	0.5	0.2	0.2	1.0	0.3	0.1	0.2	0.5	1.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.3	1.0
20-Dec	0.1	0.2	0.2	0.2	Z	0.3	0.2	0.2	0.2	0.3	0.5	0.5	1.0	1.5	2.9	2.7	2.3	3.7	2.8	3.1	5.0	6.4	9.7	4.9	2.1	9.7
21-Dec	4.4	4.5	1.5	1.2	1.0	Z	0.9	0.9	1.1	1.2	1.6	1.3	0.9	0.9	3.3	5.6	6.0	5.7	6.4	6.4	9.9	10.0	10.4	6.9	4.0	10.4
22-Dec	Z	5.0	3.6	3.6	4.3	4.9	6.0	6.7	6.8	7.2	9.4	9.9	11.6	12.1	9.7	8.2	7.6	6.8	4.8	4.4	3.5	2.5	3.9	10.2	6.6	12.1
23-Dec	11.2	Z	0.6	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.7	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.2	0.2	0.7	11.2
24-Dec	0.2	0.4	Z	1.0	2.8	0.9	0.5	4.4	11.9	15.4	14.3	10.2	10.1	9.1	8.5	8.2	6.5	5.9	6.0	6.5	5.4	4.3	5.2	5.1	6.2	15.4
25-Dec	3.9	4.0	4.5	Z	4.1	3.4	2.8	3.5	3.5	3.6	3.0	5.9	9.6	14.3	11.9	11.0	10.7	10.5	11.0	10.1	8.9	8.4	8.6	9.2	7.2	14.3
26-Dec	7.6	5.7	5.4	2.7	Z	0.9	0.8	0.9	1.4	2.8	4.2	6.3	7.4	8.4	7.4	7.7	8.7	12.2	14.8	14.2	13.2	9.6	7.2	3.2	6.6	14.8
27-Dec	1.8	0.4	0.4	0.4	0.3	Z	0.4	0.4	0.3	0.3	0.4	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.5	0.8	1.5	0.9	3.0	1.5	0.7	3.0
28-Dec	Z	0.7	2.4	2.5	0.7	1.7	1.8	1.0	0.5	0.2	0.3	2.0	0.9	0.5	0.5	0.5	0.6	0.4	0.3	0.8	0.4	0.7	0.8	0.3	0.9	2.5
29-Dec	0.2	Z	0.3	0.2	0.2	0.2	0.2	0.2	0.6	3.0	6.2	7.2	8.8	11.0	13.1	17.5	18.0	9.3	6.2	5.4	4.0	3.1	7.1	6.7	5.6	18.0
30-Dec	5.2	9.6	Z	13.5	12.4	9.7	7.0	4.5	3.3	2.5	2.2	1.9	2.2	2.0	1.8	1.6	1.5	1.1	1.3	1.8	7.6	16.7	19.8	17.2	6.4	19.8
31-Dec	17.3	15.1	11.3	Z	7.4	6.6	5.7	4.4	5.1	6.0	6.6	6.4	5.7	4.4	3.4	2.4	2.1	1.5	1.8	1.2	0.9	0.8	0.6	0.5	5.1	17.3
																								Diurnal Average		
																								Diurnal Maximum		
																								3.2 3.1 2.1 2.6 2.7 2.3 2.5 2.7 3.2 4.2 4.1 4.2 4.3 4.6 4.4 4.5 4.6 4.4 4.2 4.0 4.1 4.3 4.2 3.6		
																								17.3 15.1 11.3 13.5 12.4 9.7 11.0 9.3 13.0 27.2 21.8 16.3 18.5 18.4 17.2 17.5 18.0 13.4 14.8 14.2 18.1 18.6 19.8 17.2		
Z - zerospan C - Calibration																										



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Fort Chipewyan - December 2023





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitrogen Oxides (NO_x) - ppb
Fort Chipewyan - December 2023

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	706	99.72	99.72
21 - 40	2	0.28	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 708

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Fort Chipewyan - December 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	4	4	13	30	183	38	20	25	27	46	41	46	110	75	28	12	702
21 - 40	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	2
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	4	4	13	30	183	38	20	25	27	46	42	47	110	75	28	12	704

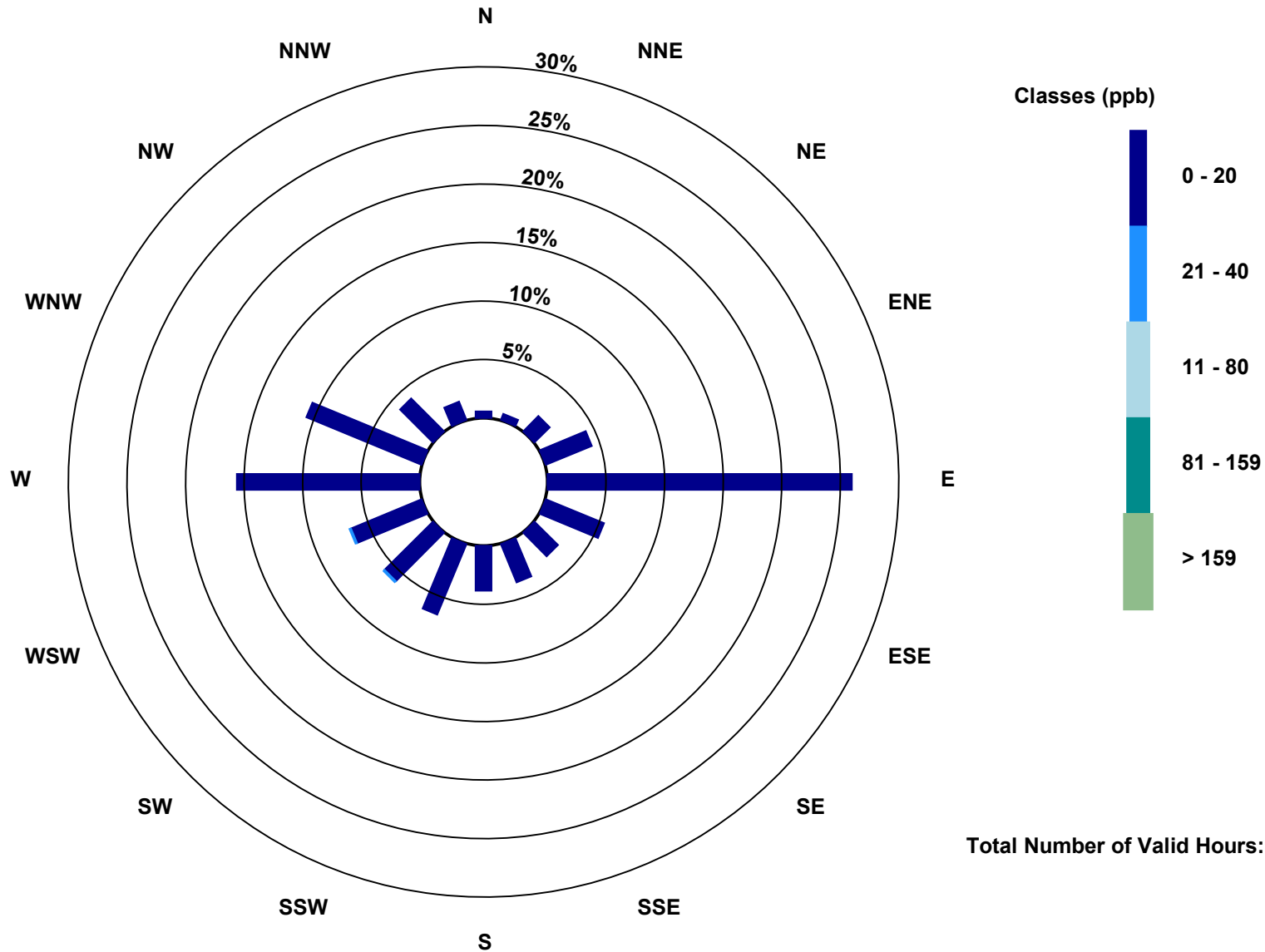
Total Number of Valid Hours: 704

Total Number of Hours: 744

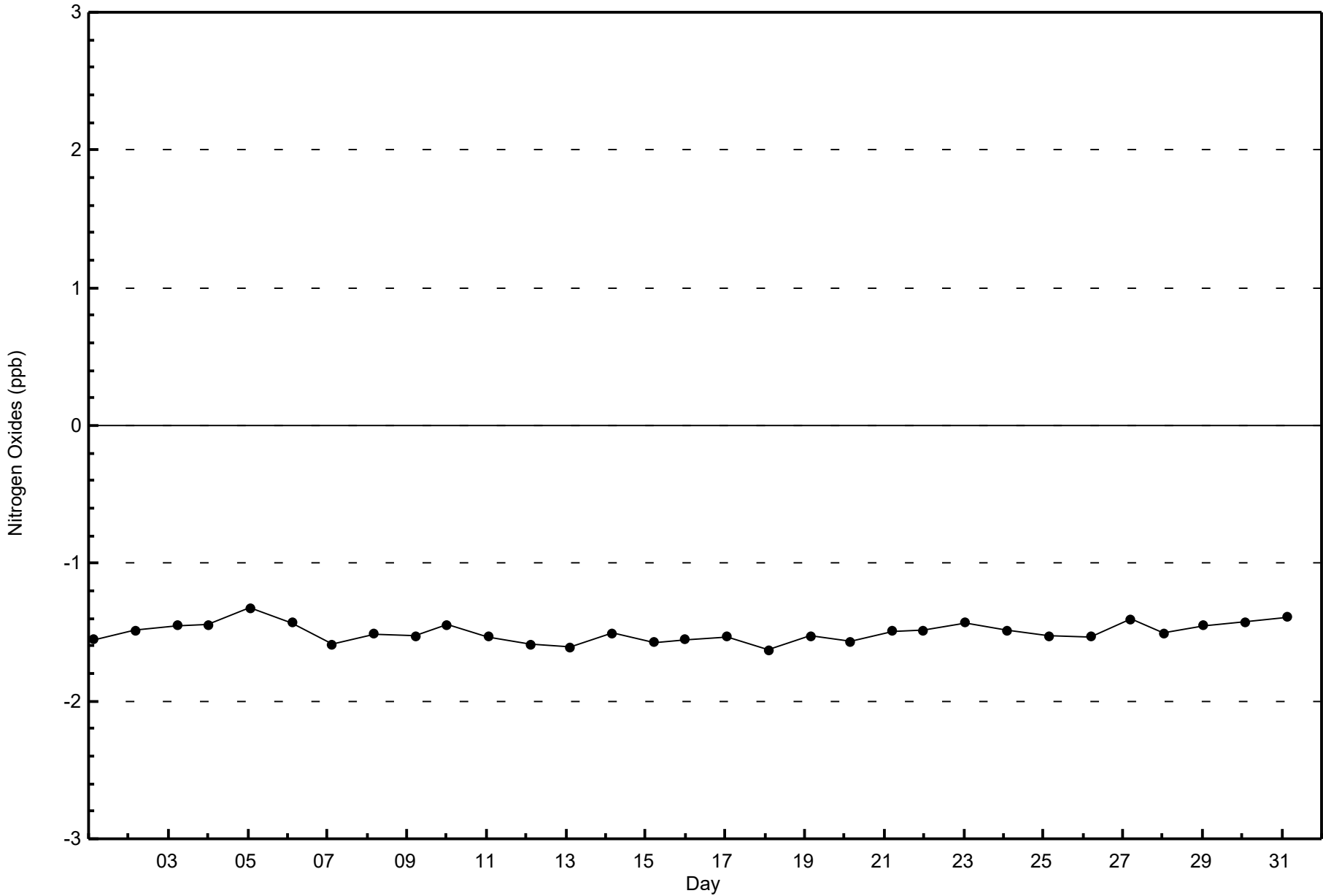


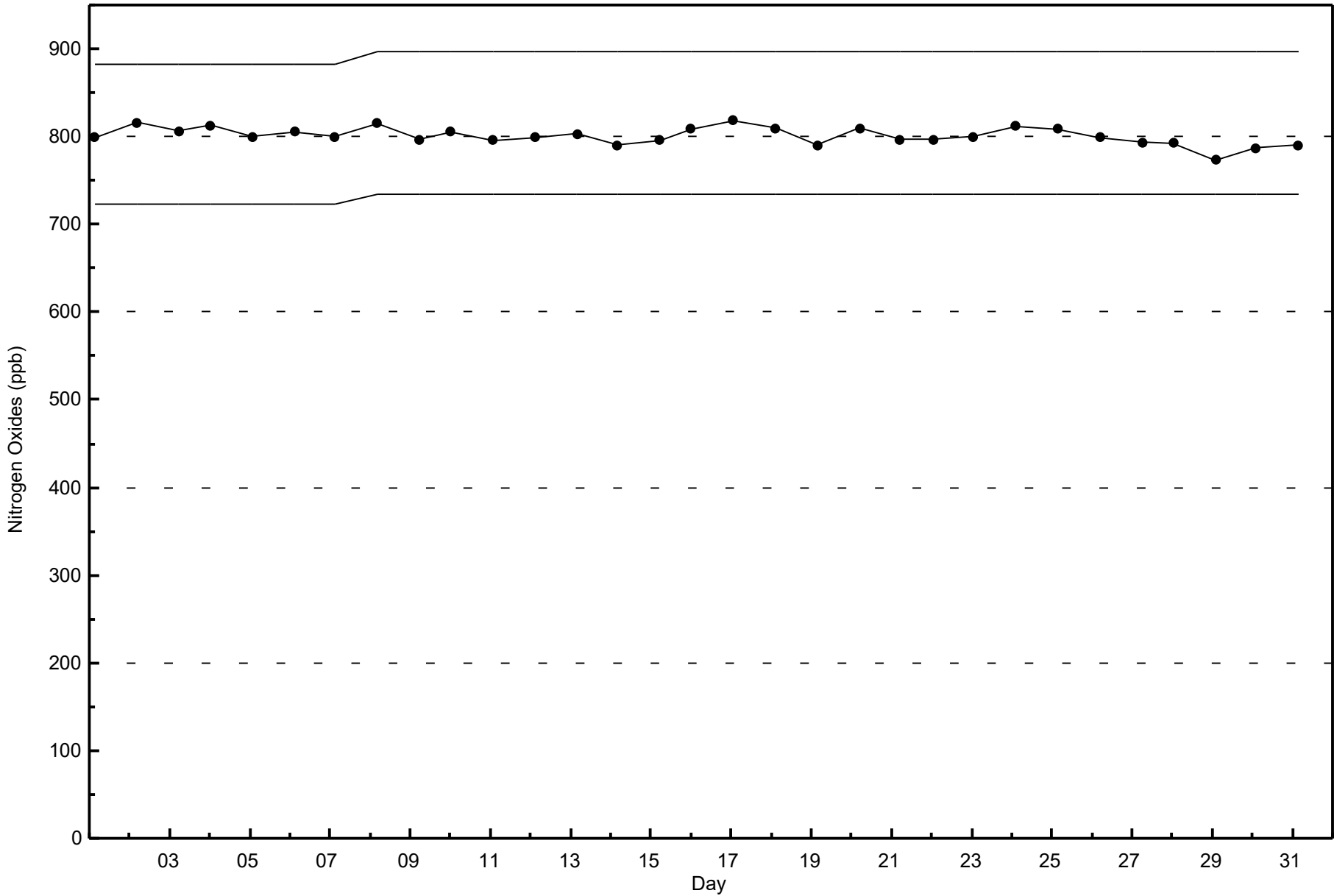
Wood Buffalo Environmental Association
Wind Rose Dec 2023

Nitrogen Oxides (NO_x) - ppb
Fort Chipewyan



Total Number of Valid Hours: 704







Wood Buffalo Environmental Association

Summary of Hour Averages

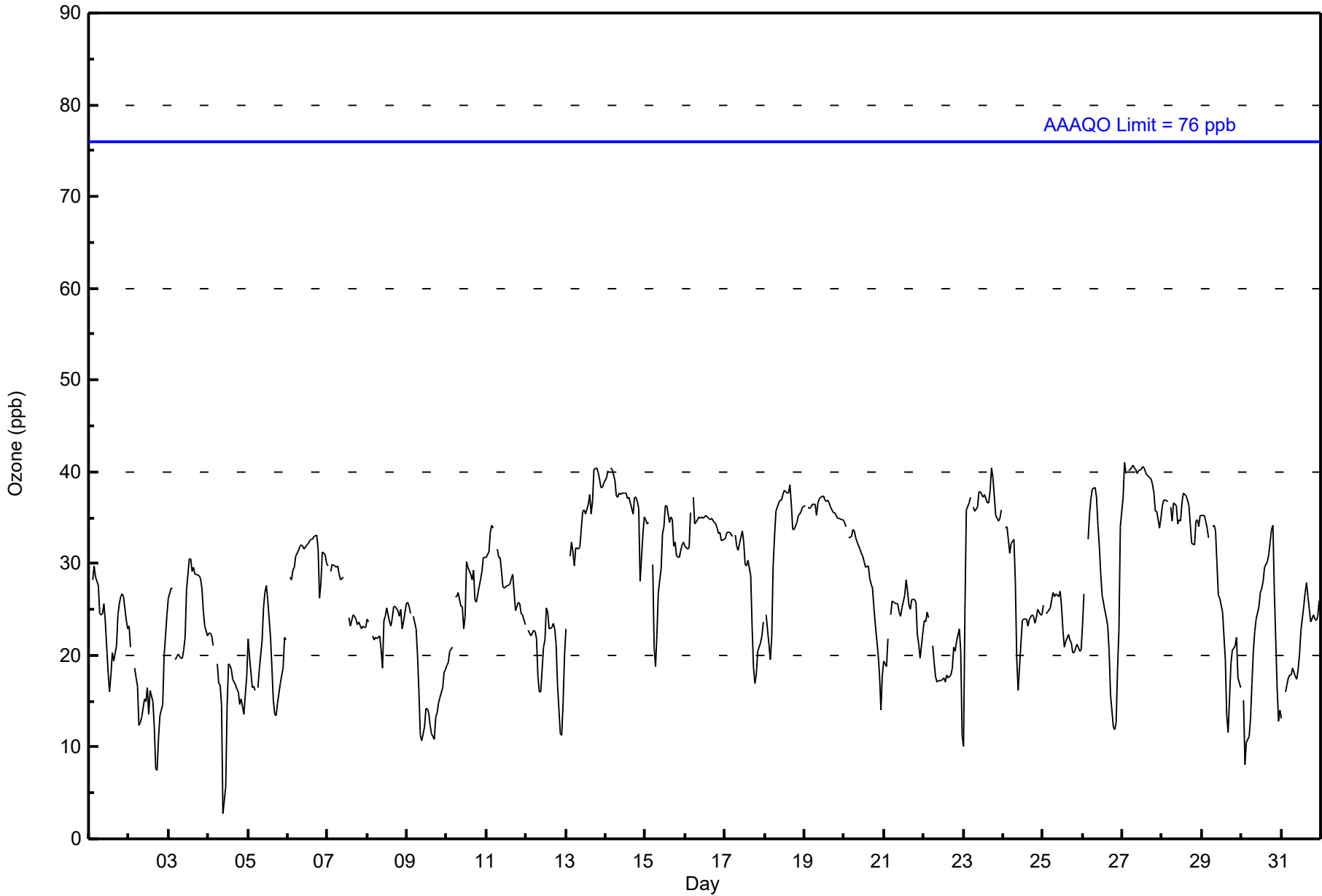
Ozone (O₃) - ppb

Fort Chipewyan - December 2023

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 41.0 ppb on Dec 27 02:00	Maximum Daily Average: 39.0 ppb on Dec 27		Hours of Data:	710
Minimum Value: 2.8 ppb on Dec 4 10:00	Minimum Daily Average: 15.6 ppb on Dec 2		Hours of Missing Data:	34
Maximum Diurnal Average: 28.2 ppb at hour 13	Minimum Diurnal Average: 25.1 ppb at hour 22		Hours of Calibration:	34
Monthly Average: 26.90 ppb	Percentiles: P ₁ = 10.7 P ₁₀ = 16.5 Q ₁ = 21.2 Median = 26.4 Q ₃ = 34.0 P ₉₀ = 36.9 P ₉₉ = 40.4		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-Dec	29.4	Z	28.2	29.8	28.5	27.7	24.6	24.4	24.6	25.6	23.7	18.1	16.0	17.9	20.2	19.4	21.0	24.5	25.7	26.4	26.7	26.4	23.8	22.9	24.1	29.8																							
2-Dec	23.1	20.9	Z	18.6	17.6	16.6	12.4	12.6	13.3	15.3	14.9	16.4	13.6	16.2	14.9	12.1	7.6	7.5	10.9	13.4	14.7	20.0	22.2	24.5	15.6	24.5																							
3-Dec	26.3	27.3	27.3	Z	19.5	19.9	20.1	19.7	19.7	20.5	21.9	27.1	30.5	30.5	29.1	29.6	28.9	28.8	28.7	28.4	27.3	24.9	23.2	22.1	25.3	30.5																							
4-Dec	22.4	22.4	22.1	21.0	Z	19.0	17.0	16.8	14.7	2.8	5.6	14.6	19.1	19.0	18.4	17.4	16.8	16.4	16.0	14.7	15.2	13.6	15.7	17.7	16.5	22.4																							
5-Dec	21.8	19.8	16.5	16.6	16.1	Z	16.4	18.5	21.6	25.1	26.9	27.6	26.0	21.9	18.6	15.0	13.5	13.4	14.8	17.0	17.8	18.6	21.9	21.6	19.4	27.6																							
6-Dec	Z	28.6	28.2	29.4	29.6	30.8	31.4	31.9	32.1	31.9	31.6	32.0	32.2	32.5	32.7	32.6	33.0	33.1	31.6	26.2	27.9	31.3	31.0	30.1	30.9	33.1																							
7-Dec	29.7	Z	29.1	29.9	29.7	29.6	29.7	28.8	28.2	28.5	C	C	C	24.1	23.2	24.4	24.3	24.0	23.3	23.7	22.9	23.3	23.1	23.0	26.1	29.9																							
8-Dec	23.9	23.6	Z	22.2	21.6	21.9	21.8	22.1	20.5	18.6	23.8	24.2	25.2	23.6	23.1	24.1	25.4	25.4	24.9	24.2	25.1	23.0	23.7	25.7	23.4	25.7																							
9-Dec	25.8	25.3	24.6	Z	24.3	22.9	19.9	16.1	11.3	10.7	12.2	14.2	14.2	13.8	12.4	11.4	10.9	13.2	13.7	14.7	15.5	16.5	18.1	18.4	16.5	25.8																							
10-Dec	18.9	19.3	20.4	20.9	Z	26.4	26.4	26.9	25.4	25.4	22.9	24.2	30.2	29.6	28.9	28.2	29.3	26.1	25.8	27.4	28.3	29.1	30.6	30.7	26.1	30.7																							
11-Dec	30.6	31.3	33.5	34.2	33.9	Z	31.6	30.6	30.7	29.2	27.4	27.3	27.7	27.6	27.7	28.3	28.9	24.9	25.4	25.7	25.6	24.5	24.4	23.3	28.4	34.2																							
12-Dec	Z	22.7	22.4	22.1	22.7	22.6	21.9	17.8	16.0	16.0	20.9	21.7	25.2	24.7	22.9	23.1	23.5	22.9	21.1	16.8	11.5	11.3	15.0	20.0	20.2	25.2																							
13-Dec	22.9	Z	30.9	32.4	31.2	29.8	31.8	31.5	31.9	33.9	35.6	35.8	35.4	36.4	37.5	35.4	36.7	40.3	40.4	39.9	39.1	38.3	38.2	38.8	35.0	40.4																							
14-Dec	39.4	40.2	Z	40.4	40.3	39.1	37.4	37.2	37.7	37.5	37.7	37.7	37.6	37.1	37.2	36.6	35.4	37.2	37.3	36.7	36.0	28.1	33.2	35.0	37.0	40.4																							
15-Dec	34.8	34.3	34.5	Z	29.9	20.9	18.7	22.2	26.8	29.4	33.2	34.0	36.4	36.3	34.5	35.1	34.8	31.9	32.4	30.8	30.7	31.5	32.1	32.3	31.2	36.4																							
16-Dec	31.9	31.5	31.8	35.5	Z	37.2	34.3	34.8	35.0	35.0	35.1	34.9	35.2	35.1	35.0	34.7	34.9	34.5	34.3	33.9	33.2	33.4	32.5	32.6	34.2	37.2																							
17-Dec	32.7	33.5	33.3	33.5	32.9	Z	33.1	31.9	31.4	32.3	33.5	32.4	30.0	29.7	30.4	28.7	23.1	18.6	16.9	18.0	20.5	21.3	22.2	23.7	28.0	33.5																							
18-Dec	Z	24.4	21.2	19.5	21.9	29.7	32.9	35.7	36.6	36.9	36.9	37.5	38.0	37.7	37.7	38.5	36.5	33.7	33.7	34.4	35.3	35.4	35.6	36.2	33.3	38.5																							
19-Dec	36.3	Z	36.2	36.1	36.1	36.4	36.5	35.3	36.6	37.0	37.2	37.3	36.9	36.8	37.0	36.7	36.1	35.5	35.6	35.2	34.9	35.0	34.8	34.8	36.1	37.3																							
20-Dec	34.5	34.0	Z	32.8	32.9	33.7	33.5	32.9	32.4	31.6	31.0	30.9	30.2	29.6	29.7	28.3	27.8	27.2	25.2	23.3	20.1	17.8	14.0	17.8	28.3	34.5																							
21-Dec	19.4	18.7	21.9	Z	24.3	25.9	25.8	25.6	25.6	24.7	24.3	25.2	26.6	28.2	27.0	25.5	25.0	26.0	26.1	25.8	22.2	21.2	19.7	22.6	24.2	28.2																							
22-Dec	23.8	23.6	24.8	24.1	Z	21.1	19.2	17.7	17.1	17.2	17.3	17.4	17.5	17.1	17.8	17.6	17.8	18.6	21.0	20.4	21.5	22.8	20.4	11.3	19.4	24.8																							
23-Dec	10.1	24.8	35.8	36.6	37.2	Z	36.1	35.7	36.2	37.8	37.9	37.5	37.2	37.5	36.6	36.6	38.0	40.5	39.4	35.3	34.9	34.6	34.9	35.8	35.1	40.5																							
24-Dec	Z	33.8	34.0	32.6	31.1	32.1	32.6	28.0	19.7	16.2	18.8	23.8	24.0	24.0	24.0	23.2	24.0	24.4	24.2	23.5	24.2	25.0	24.3	24.4	25.7	34.0																							
25-Dec	25.4	Z	24.6	24.7	25.1	26.2	26.9	26.4	26.8	26.4	27.0	25.3	22.7	20.9	21.5	22.3	21.7	21.4	20.2	20.3	21.2	20.9	20.4	20.6	23.4	27.0																							
26-Dec	23.3	26.7	Z	32.6	35.4	37.0	38.2	38.2	37.2	34.1	31.9	28.8	26.6	24.9	24.1	23.2	20.5	15.7	12.2	12.0	12.7	18.5	22.7	34.0	26.5	38.2																							
27-Dec	37.3	41.0	39.8	Z	40.2	40.5	40.7	40.5	40.2	39.8	40.1	40.3	40.5	40.4	40.0	39.6	39.3	39.2	38.6	37.7	35.7	35.6	33.9	35.0	39.0	41.0																							
28-Dec	36.3	37.0	36.9	36.8	Z	36.1	34.7	36.6	36.2	34.4	34.7	34.6	36.6	37.7	37.4	36.9	36.2	34.1	32.2	32.0	34.6	34.8	34.0	35.2	35.5	37.7																							
29-Dec	35.2	35.2	34.6	33.8	32.8	Z	34.0	34.1	33.5	30.1	26.6	26.3	24.6	22.1	19.6	13.5	11.6	19.0	20.5	20.7	21.1	22.0	17.5	16.4	25.4	35.2																							
30-Dec	Z	15.1	8.0	10.5	11.1	13.1	16.9	20.4	22.5	24.0	25.3	26.8	27.4	28.0	29.5	30.2	31.0	32.3	33.7	34.2	27.0	16.5	12.8	14.0	22.2	34.2																							
31-Dec	13.1	Z	16.0	16.8	17.6	17.8	17.9	18.6	17.7	17.4	18.5	20.1	22.7	25.3	26.9	27.9	26.3	25.0	23.7	24.5	23.9	23.8	24.3	26.0	21.4	27.9																							
																								27.3	27.8	27.6	27.8	27.8	27.5	27.6	27.4	27.1	26.6	27.2	27.8	28.2	27.9	27.6	27.0	26.4	26.3	26.1	25.7	25.4	25.1	25.2	26.0	Diurnal Average	
																								39.4	41.0	39.8	40.4	40.3	40.5	40.7	40.5	40.2	39.8	40.1	40.3	40.5	40.4	40.0	39.6	39.3	40.5	40.4	39.9	39.1	38.3	38.2	38.8	Diurnal Maximum	

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





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Ozone (O₃) - ppb
Fort Chipewyan - December 2023

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	160	22.54	22.54
21 - 50	550	77.46	100.00
51 - 82	0	0.00	100.00
> 83	0	0.00	100.00

Total Number of Valid Hours: 710

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Ozone (O₃) - ppb
Fort Chipewyan - December 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	0	0	0	11	55	13	4	4	6	20	13	10	14	5	0	1	156
21 - 50	5	4	12	19	125	28	15	22	21	26	29	42	93	68	29	12	550
51 - 82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 83	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	5	4	12	30	180	41	19	26	27	46	42	52	107	73	29	13	706

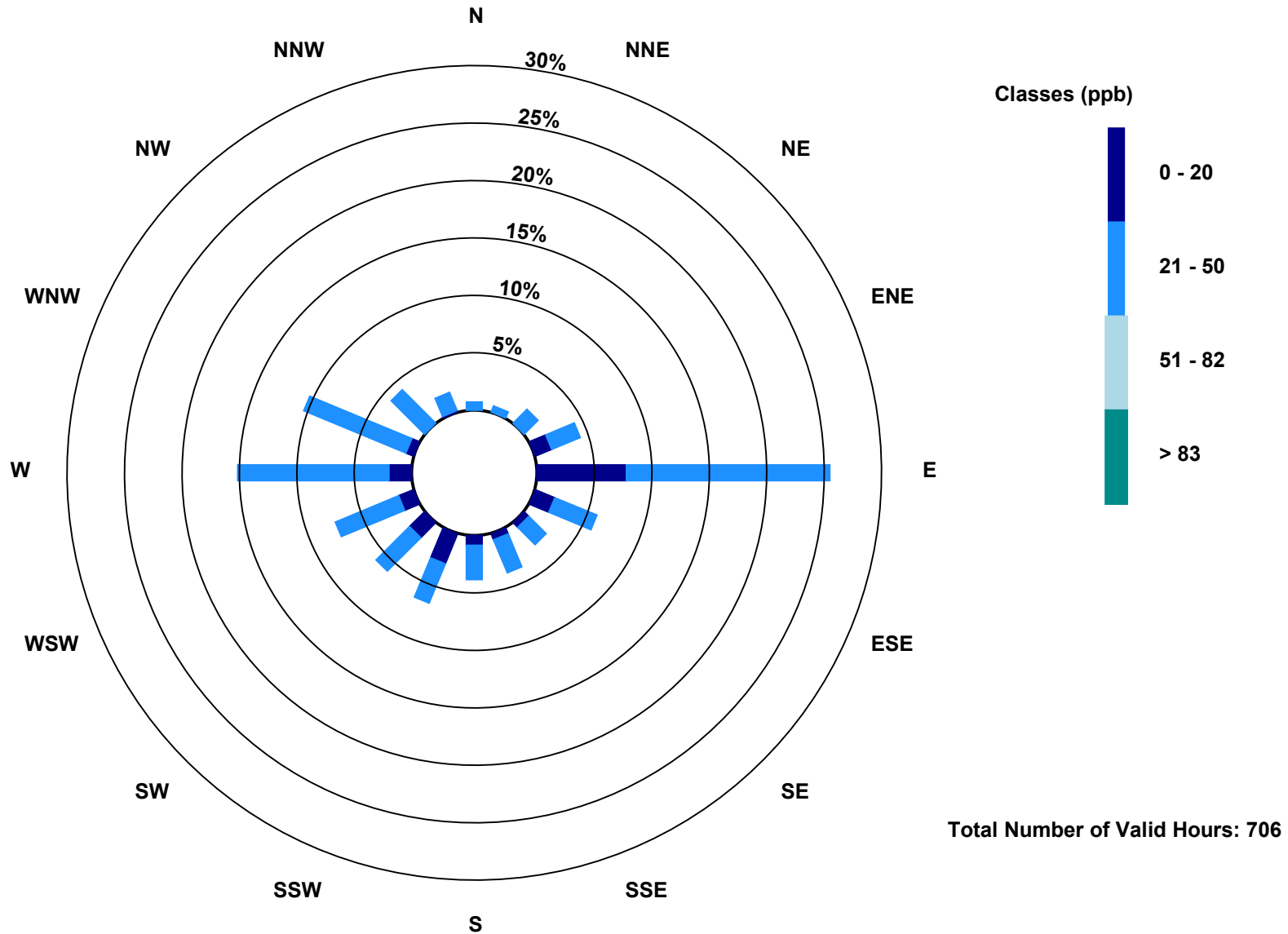
Total Number of Valid Hours: 706

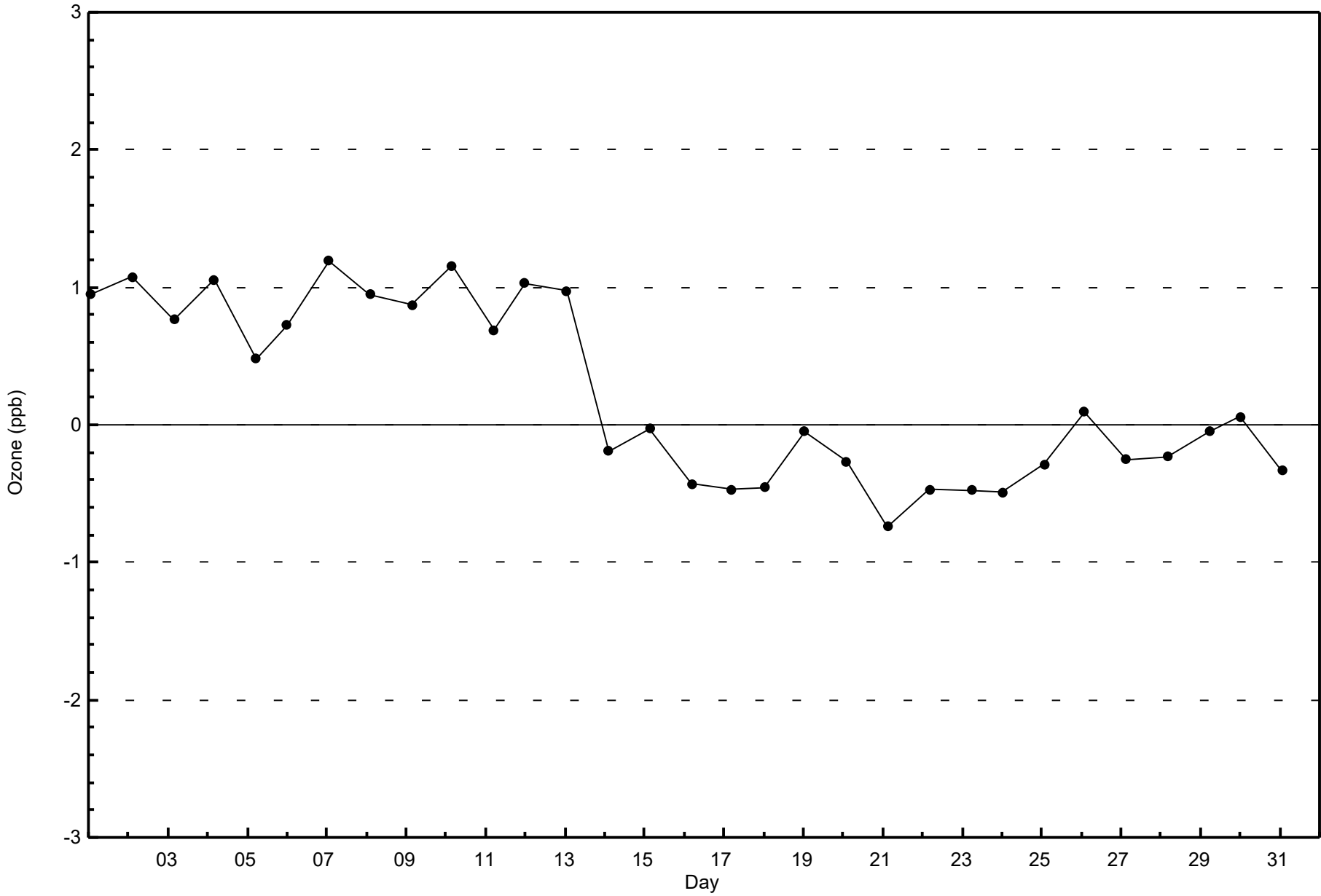
Total Number of Hours: 744

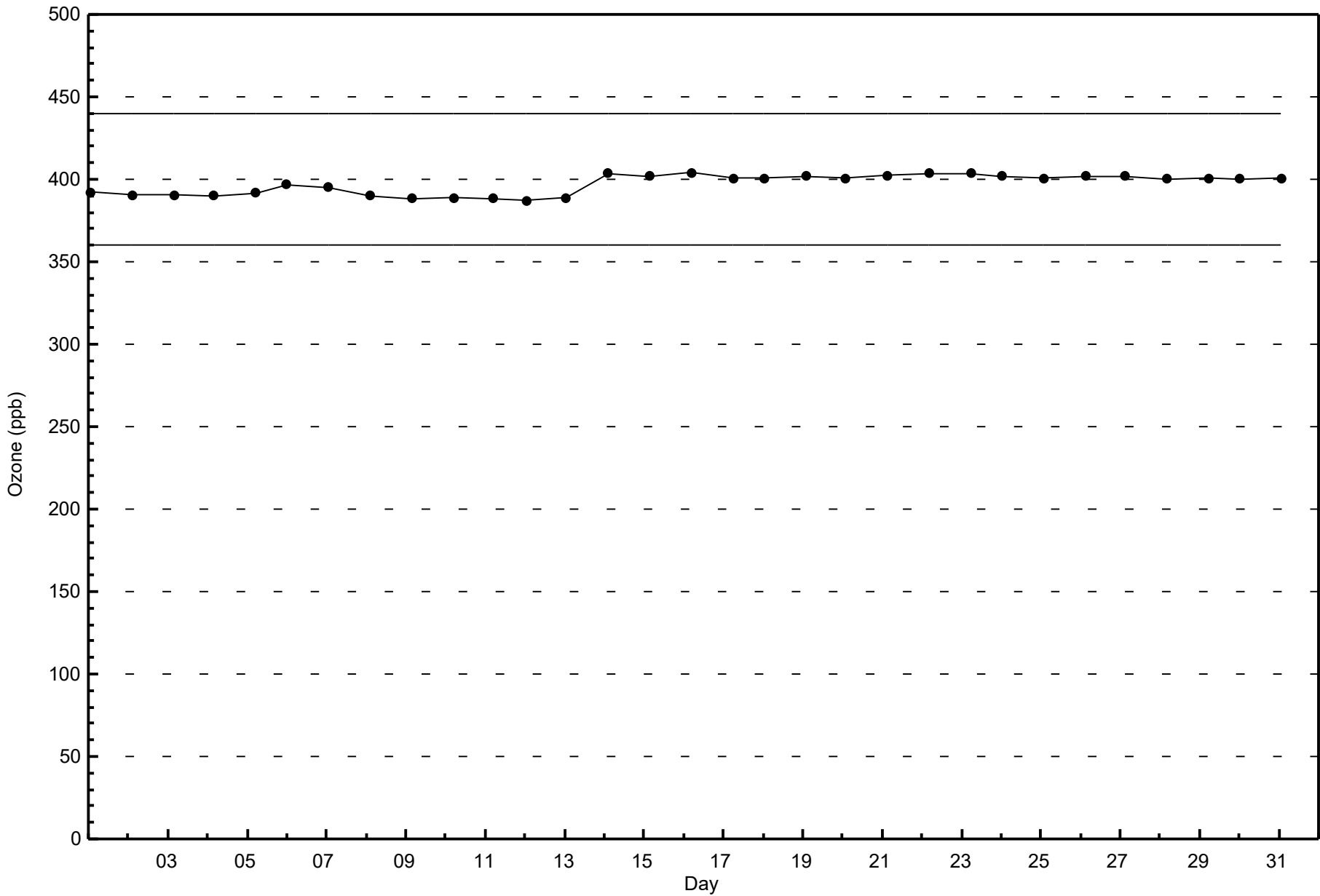


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Ozone (O₃) - ppb
Fort Chipewyan









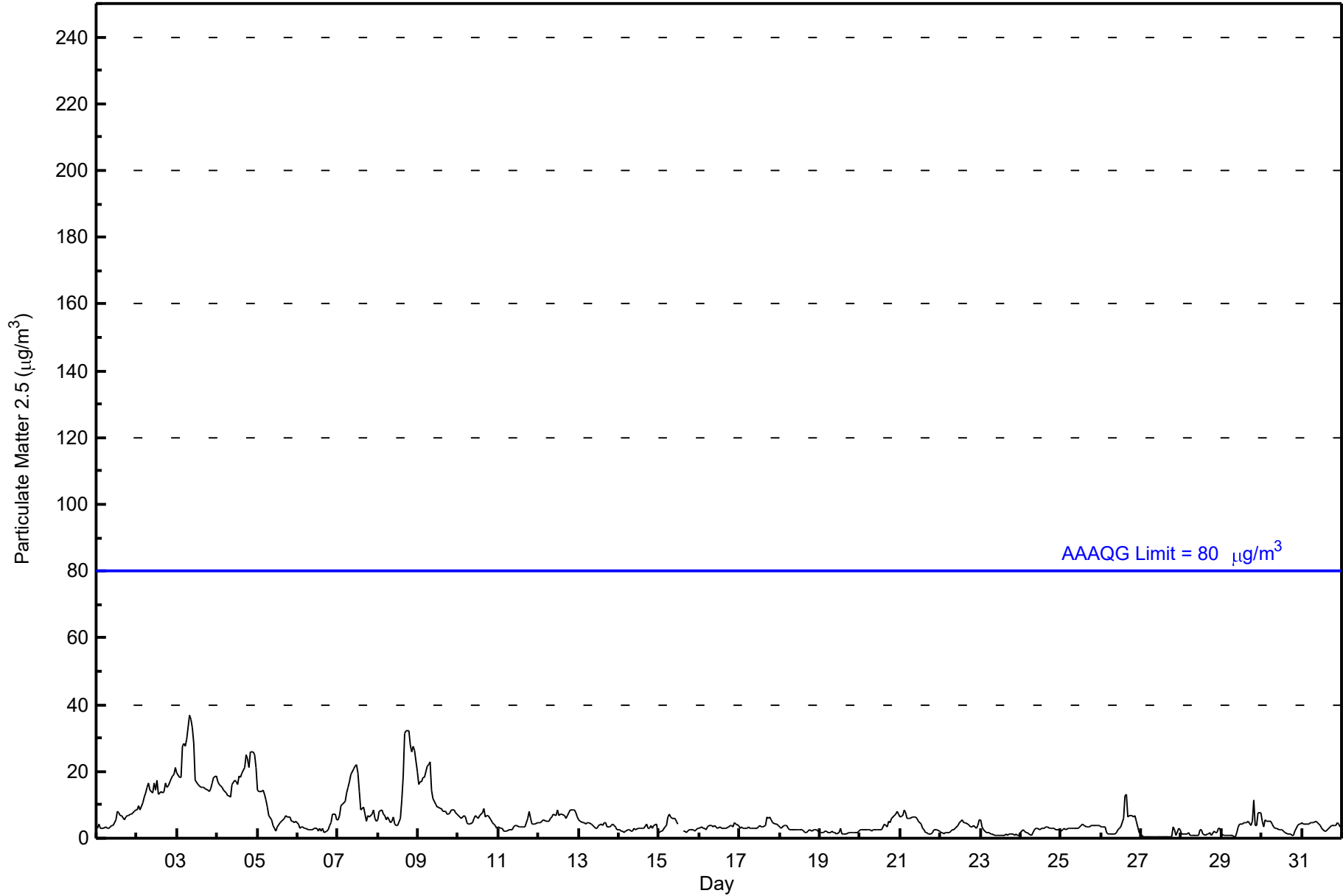
Wood Buffalo Environmental Association

Summary of Hour Averages

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

Fort Chipewyan - December 2023

Number of Exceedences (AAAQO):		1-hr: 0	24-hr: 0																		Hours in Service:	744																										
Maximum Value: 36.8 µg/m ³ on Dec 3 08:00		Maximum Daily Average: 21.2 µg/m ³ on Dec 3																	Hours of Data:	742																												
Minimum Value: 0.3 µg/m ³ on Dec 27 07:00		Minimum Daily Average: 0.9 µg/m ³ on Dec 27																	Hours of Missing Data:	2																												
Maximum Diurnal Average: 6.7 µg/m ³ at hour 23		Minimum Diurnal Average: 5.4 µg/m ³ at hour 2																	Hours of Calibration:	2																												
Monthly Average: 5.87 µg/m ³		Percentiles: P ₁ = 0.4 P ₁₀ = 1.4 Q ₁ = 2.5 Median = 3.7 Q ₃ = 6.6 P ₉₀ = 14.8 P ₉₉ = 28.4																	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-Dec	3.2	4.4	3.2	2.8	3.1	3.2	2.9	2.8	3.5	3.7	4.0	5.6	7.9	7.5	6.6	6.6	5.6	6.5	6.8	7.0	7.2	7.0	8.2	8.6	5.3	8.6																						
2-Dec	8.6	9.5	8.6	10.5	12.2	13.4	15.2	16.7	14.5	13.7	16.6	14.6	17.3	12.9	14.0	13.7	13.9	16.5	15.3	15.7	17.7	18.5	19.3	21.4	14.6	21.4																						
3-Dec	19.4	18.3	18.1	27.6	28.6	27.6	29.5	36.8	35.7	32.9	28.2	17.5	16.1	15.5	15.5	15.1	15.1	14.9	14.2	14.2	14.7	16.6	18.2	18.5	21.2	36.8																						
4-Dec	17.2	16.2	15.7	15.3	14.5	13.7	12.8	12.5	12.3	16.2	17.2	17.1	16.3	18.6	18.4	19.6	21.0	25.2	23.8	21.2	25.7	26.0	25.1	21.1	18.4	26.0																						
5-Dec	14.3	14.0	14.1	14.4	13.0	11.6	9.2	6.8	5.6	3.8	3.1	2.3	3.6	4.5	5.2	5.6	6.1	6.7	6.5	6.3	5.2	5.0	4.7	4.9	7.3	14.4																						
6-Dec	4.2	3.1	3.2	3.5	3.0	3.1	2.7	2.6	2.6	2.4	2.9	2.8	2.0	2.8	1.9	2.9	1.9	2.0	2.6	3.7	4.5	7.0	7.2	5.7	3.3	7.2																						
7-Dec	5.6	6.9	9.9	10.3	11.1	13.5	15.3	16.9	19.1	20.9	21.6	22.2	19.4	14.1	8.5	9.3	7.2	5.1	6.8	6.5	7.2	8.6	5.9	5.3	11.6	22.2																						
8-Dec	5.7	8.0	8.3	7.3	6.9	5.5	6.3	4.8	5.1	6.5	4.3	3.9	3.7	5.9	11.5	18.6	31.2	32.3	32.0	27.9	25.7	27.5	26.2	19.8	13.9	32.3																						
9-Dec	16.2	17.0	17.1	18.1	18.4	21.6	22.2	23.1	14.4	11.9	10.3	9.4	9.4	9.0	8.8	8.0	8.1	7.2	7.0	7.8	8.5	8.7	7.5	7.1	12.4	23.1																						
10-Dec	6.8	6.4	5.8	6.6	6.3	4.5	4.3	4.1	4.7	5.9	6.6	6.3	6.0	6.9	7.6	8.8	6.2	6.8	6.8	5.7	4.6	4.1	3.6	3.1	5.8	8.8																						
11-Dec	3.3	3.1	2.8	2.3	2.3	2.3	2.4	2.5	2.6	3.3	3.6	3.7	3.3	3.4	3.4	3.4	3.4	5.9	7.9	6.0	4.2	4.2	4.2	4.8	3.7	7.9																						
12-Dec	4.8	4.7	5.1	5.4	5.0	4.9	5.0	6.0	6.4	7.4	6.8	8.5	6.8	7.1	7.3	6.8	6.0	6.6	7.6	8.3	8.6	8.5	7.6	6.4	6.6	8.6																						
13-Dec	5.7	5.0	4.6	4.5	4.4	4.7	4.6	4.1	3.9	3.6	3.0	2.9	3.7	4.3	3.9	4.7	4.7	3.5	3.2	3.9	4.1	3.9	3.2	2.7	4.0	5.7																						
14-Dec	2.4	2.3	2.0	1.9	2.1	2.3	2.4	2.0	2.2	3.1	2.5	2.8	3.0	3.1	2.9	3.1	4.4	3.1	3.1	3.8	3.0	3.6	4.1	1.8	2.8	4.4																						
15-Dec	1.8	2.2	2.1	3.3	3.9	6.4	7.0	6.2	6.0	5.8	5.0	4.3	C	C	2.0	1.9	1.6	2.1	2.5	2.6	2.6	2.3	2.4	2.9	3.5	7.0																						
16-Dec	3.2	3.3	3.1	2.8	2.5	3.3	3.7	3.7	3.6	3.9	3.5	3.1	3.2	3.0	2.8	2.9	3.1	3.5	3.8	3.8	3.2	4.6	4.2	3.8	3.4	4.6																						
17-Dec	3.1	3.2	3.0	3.2	3.1	3.6	3.1	3.1	3.2	3.0	3.1	3.2	3.7	3.6	3.5	3.7	6.4	6.0	6.2	5.5	4.8	4.4	4.1	3.8	3.9	6.4																						
18-Dec	3.2	3.1	3.6	3.9	3.6	2.9	2.6	2.5	2.6	2.5	2.4	2.4	2.4	1.9	1.7	1.5	2.1	2.4	2.3	2.4	2.4	2.5	2.0	2.6	2.6	3.9																						
19-Dec	1.8	1.8	1.7	2.0	2.1	1.6	1.5	2.0	1.7	1.6	1.5	1.6	2.8	1.5	1.4	1.4	1.5	1.7	1.8	1.6	1.7	1.6	1.6	1.9	1.7	2.8																						
20-Dec	2.5	2.5	2.4	2.5	2.5	2.5	2.4	2.3	2.3	2.5	2.5	2.6	2.6	2.7	4.4	4.0	3.4	5.0	4.7	5.8	7.0	7.3	7.9	7.3	3.8	7.9																						
21-Dec	6.2	6.9	8.4	7.8	6.1	5.8	6.1	6.5	6.4	6.3	6.1	5.1	4.0	3.0	2.6	1.8	1.5	1.3	1.4	1.7	2.6	2.7	2.7	2.1	4.4	8.4																						
22-Dec	1.8	1.7	1.4	1.5	1.6	1.8	2.0	2.4	2.7	2.8	3.6	4.6	5.0	5.3	4.6	4.5	4.2	3.9	3.4	3.5	3.6	3.0	3.8	5.4	3.3	5.4																						
23-Dec	5.6	3.5	2.7	1.8	1.5	1.7	1.3	1.1	1.0	0.8	0.7	0.8	0.9	1.0	0.9	1.1	1.0	1.1	1.1	1.3	1.0	1.1	0.9	0.9	1.4	5.6																						
24-Dec	1.7	2.4	2.0	1.7	1.8	1.2	1.0	1.6	2.6	2.8	2.8	2.6	2.8	2.8	3.2	3.5	3.2	3.0	3.0	2.9	2.8	2.7	2.7	2.6	2.5	3.5																						
25-Dec	2.3	2.5	2.8	2.7	3.0	3.0	2.8	3.0	3.0	3.1	2.8	3.3	3.8	4.1	3.8	3.3	3.2	3.4	3.7	3.8	3.8	3.8	4.0	3.7	3.3	4.1																						
26-Dec	3.5	3.2	3.5	1.8	1.1	1.1	1.1	1.2	1.2	1.7	2.5	3.1	3.5	6.0	12.5	13.1	6.4	6.6	6.6	6.5	6.8	5.0	3.5	1.6	4.3	13.1																						
27-Dec	1.0	0.6	0.6	0.5	0.4	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.6	3.3	2.4	0.8	3.1	2.6	0.9	3.3																						
28-Dec	1.3	1.4	1.1	1.1	1.5	1.0	1.0	0.9	0.9	1.0	0.9	2.5	2.7	1.1	1.0	1.2	1.2	1.8	0.8	2.3	1.7	1.6	3.0	2.8	1.5	3.0																						
29-Dec	1.1	1.0	0.8	0.8	0.7	0.7	0.6	0.6	0.6	1.7	3.2	4.0	4.2	4.5	4.6	4.8	5.0	3.8	5.2	11.4	3.8	3.7	7.5	7.7	3.4	11.4																						
30-Dec	5.3	3.3	5.4	4.9	5.0	5.0	4.1	3.5	3.1	3.0	2.7	2.6	2.5	2.3	1.8	1.4	1.2	1.1	0.9	1.0	1.9	3.7	4.3	4.4	3.1	5.4																						
31-Dec	4.5	4.3	4.2	4.3	4.4	4.6	4.6	4.7	4.9	4.8	4.2	3.6	2.8	2.2	2.2	2.7	3.0	3.4	3.8	4.0	3.9	4.6	4.4	3.5	3.9	4.9																						
																								5.4	5.4	5.4	5.7	5.7	5.7	5.8	6.0	5.8	5.9	5.8	5.5	5.5	5.4	5.5	5.8	5.9	6.2	6.3	6.5	6.4	6.6	6.7	6.1	Diurnal Average
																								19.4	18.3	18.1	27.6	28.6	27.6	29.5	36.8	35.7	32.9	28.2	22.2	19.4	18.6	18.4	19.6	31.2	32.3	32.0	27.9	25.7	27.5	26.2	21.4	Diurnal Maximum
C - Calibration																																																
Alberta Ambient Air Quality Guideline/Objectives: 1-hr 80 µg/m ³ 24-hr 29 µg/m ³																																																





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Fort Chipewyan - December 2023**

Concentration Ranges ($\mu\text{g}/\text{m}^3$)	Number of Hours	%	Cumulative %
0 - 5	502	67.65	67.66
6 - 15	173	23.32	90.97
16 - 25	50	6.74	97.71
26 - 80	17	2.29	100.00
> 81.0	0	0.00	100.00

Total Number of Valid Hours: 742

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - μg/m³
Fort Chipewyan - December 2023

Concentration Ranges (μg/m ³)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	5	4	13	12	125	33	14	15	18	34	33	36	74	47	28	11	502
6 - 15	0	0	0	13	59	8	6	10	9	9	7	2	22	21	3	2	171
16 - 25	0	0	0	4	7	0	1	1	1	1	1	7	13	12	0	0	48
26 - 80	0	0	0	1	0	0	0	0	0	1	2	8	4	0	0	1	17
> 81.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	5	4	13	30	191	41	21	26	28	45	43	53	113	80	31	14	738

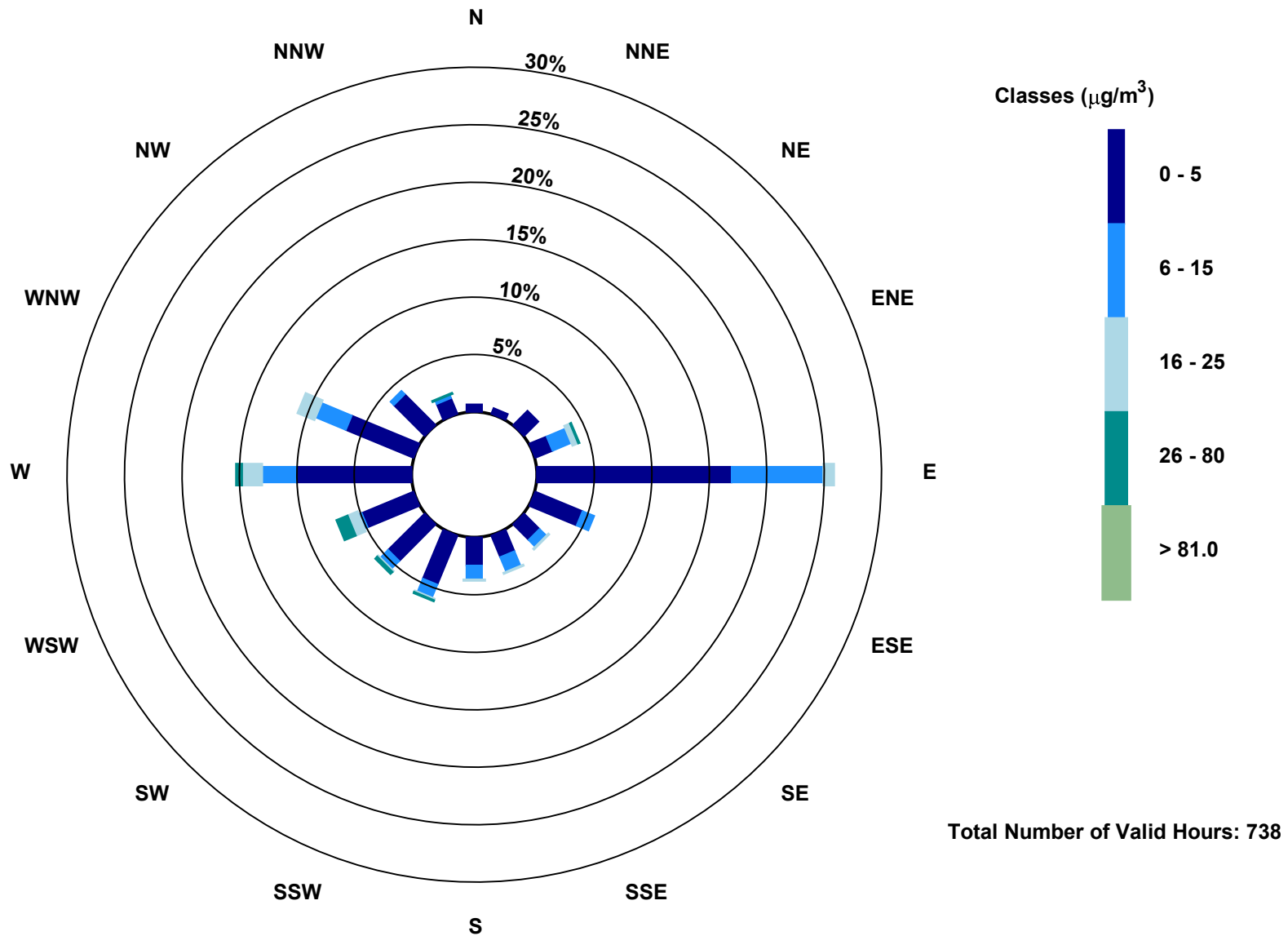
Total Number of Valid Hours: 738

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Dec 2023

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Fort Chipewyan



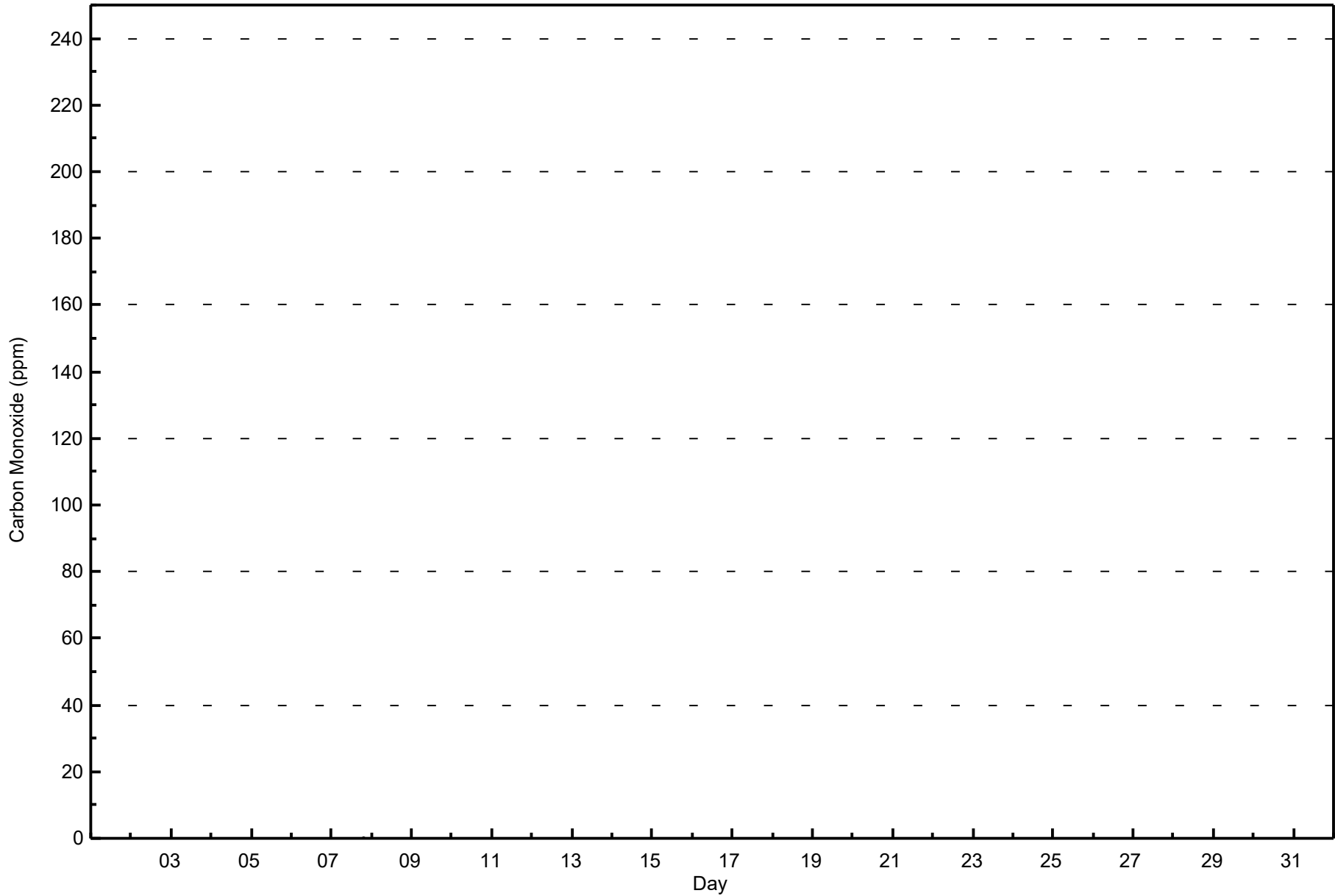


Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 0.2 ppm on Dec 7 20:00 Maximum Daily Average: 0.1 ppm on Dec 2		Hours in Service: 744 Hours of Data: 710 Hours of Missing Data: 34 Hours of Calibration: 34 Percent Operational Time: 100.0																										
Minimum Value: 0.0 ppm on Dec 5 08:00 Maximum Diurnal Average: 0.0 ppm at hour 19 Monthly Average: 0.03 ppm		Minimum Daily Average: 0.0 ppm on Dec 13 Minimum Diurnal Average: 0.0 ppm at hour 1 Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.0 Median = 0.0 Q ₃ = 0.0 P ₉₀ = 0.1 P ₉₉ = 0.1																										
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24				
1-Dec	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	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.0	0.1	0.0	0.1
2-Dec	0.0	0.0	0.1	0.1	0.0	Z	0.1	0.1	0.1	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.1	0.1	0.0	0.0	0.0	0.1	0.1	0.0	0.1
3-Dec	Z	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1
4-Dec	0.1	Z	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.2	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0
5-Dec	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	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	0.0	0.0
7-Dec	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	0.1	0.1	0.2	0.2	0.1	0.1	0.0	0.0	0.0	0.1	0.1	0.2
8-Dec	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	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
9-Dec	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	0.0	0.1	0.0	0.0	0.1	0.1	0.0	0.1	0.1	0.0	0.1	0.1	0.1
10-Dec	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	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	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
12-Dec	0.1	0.1	0.1	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
13-Dec	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	0.0	0.0
14-Dec	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	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.1
15-Dec	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.1	0.1	0.0	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
17-Dec	0.0	0.0	Z	0.0	0.0	0.1	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
18-Dec	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	0.0	0.0
19-Dec	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	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
20-Dec	0.1	0.1	0.1	0.1	0.1	Z	0.1	0.1	0.1	0.1	0.1	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	0.0	0.0	0.0	0.1
21-Dec	Z	0.0	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	0.0	0.1
22-Dec	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.1	0.1	0.1	Z	0.1	0.1	0.1	0.1	0.1	0.0	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
25-Dec	0.1	0.0	0.1	0.1	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	0.1
26-Dec	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	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
27-Dec	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	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	0.0	0.0
31-Dec	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	0.0	0.0
																								Diurnal Average				
																								Diurnal Maximum				
Z - zerospan C - Calibration Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 13 ppm																												



Wood Buffalo Environmental Association
Hourly Averages

Carbon Monoxide (CO) - ppm
Fort Chipewyan - December 2023





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Carbon Monoxide (CO) - ppm
Fort Chipewyan - December 2023

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 0.3	710	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: 710

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Carbon Monoxide (CO) - ppm
Fort Chipewyan - December 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	5	3	13	28	183	39	20	23	27	45	41	52	108	76	29	14	706
0.4 - 0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.6 - 0.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.8 - 1.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1.5 - 10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	5	3	13	28	183	39	20	23	27	45	41	52	108	76	29	14	706

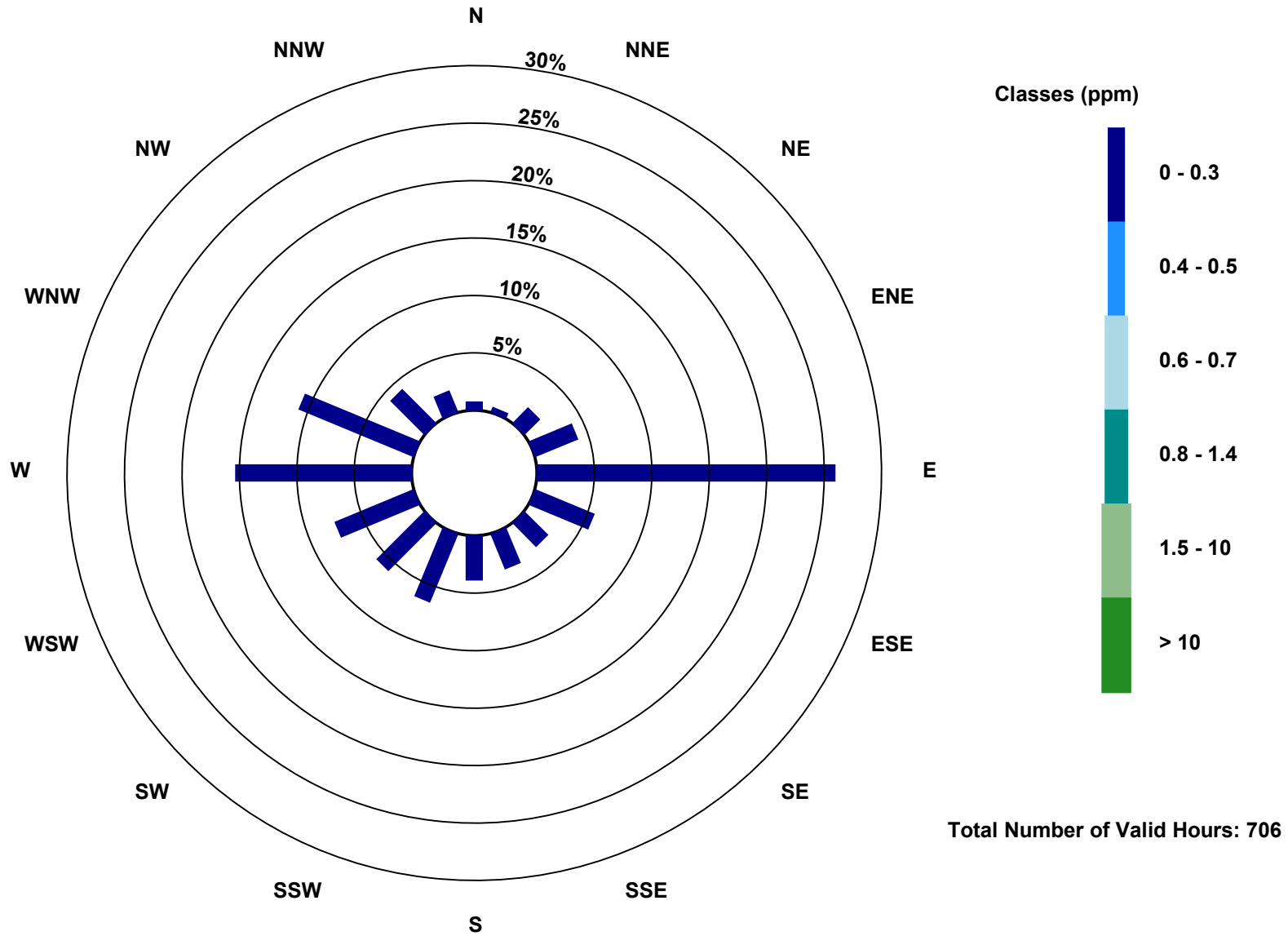
Total Number of Valid Hours: 706

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Dec 2023

Carbon Monoxide (CO) - ppm
Fort Chipewyan





Wood Buffalo Environmental Association
Summary of Hour Averages

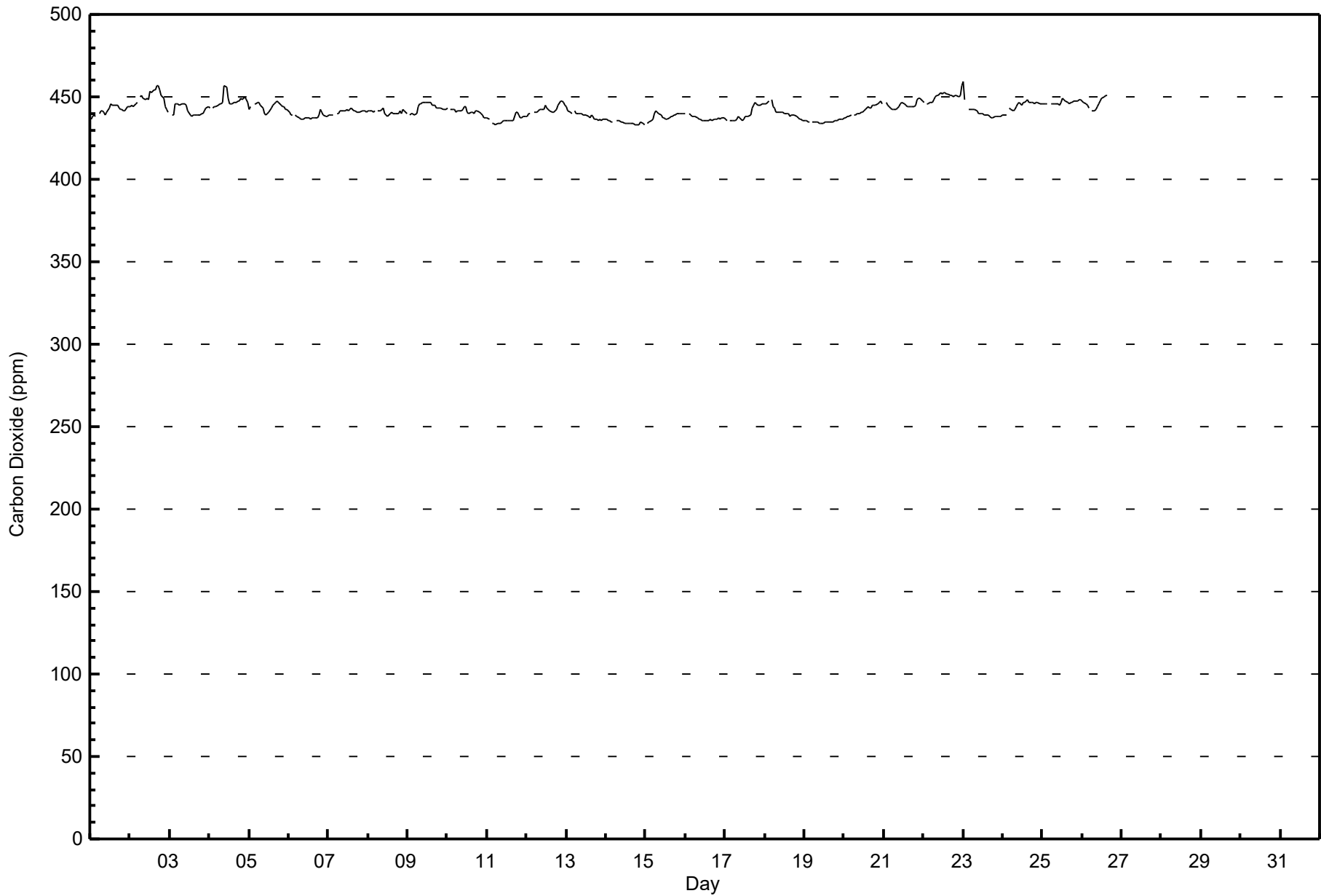
Carbon Dioxide (CO₂) - ppm
Fort Chipewyan - December 2023

Number of Exceedences (AAAQO):		1-hr: 0	24-hr: 0																		Hours in Service:	744					
Maximum Value: 459.4 ppm on Dec 23 01:00		Maximum Daily Average: 450.3 ppm on Dec 22																	Hours of Data:	590							
Minimum Value: 432.9 ppm on Dec 15 00:00		Minimum Daily Average: 434.4 ppm on Dec 14																	Hours of Missing Data:	154							
Maximum Diurnal Average: 442.2 ppm at hour 20		Minimum Diurnal Average: 440.6 ppm at hour 2																	Hours of Calibration:	29							
Monthly Average: 441.73 ppm		Percentiles: P ₁ = 433.5 P ₁₀ = 435.7 Q ₁ = 438.1 Median = 441.3 Q ₃ = 445.4 P ₉₀ = 447.7 P ₉₉ = 454.7																	Percent Operational Time:	83.2							
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Dec	436.8	437.8	438.6	437.8	Z	440.0	441.7	441.9	441.1	439.3	440.8	443.5	445.5	445.3	444.5	444.7	444.5	443.5	442.5	442.0	441.7	441.8	443.7	444.0	441.9	445.5	
2-Dec	443.9	445.2	443.9	446.1	446.6	Z	450.0	450.7	449.3	447.9	449.3	448.7	453.5	452.8	454.1	454.5	457.0	457.2	453.8	450.6	449.0	444.1	442.0	440.9	449.2	457.2	
3-Dec	Z	439.2	439.1	445.4	446.2	445.5	445.0	445.8	446.0	445.4	444.6	441.1	438.6	438.2	439.4	438.9	439.0	439.1	439.1	439.6	440.2	441.9	443.2	443.7	441.9	446.2	
4-Dec	443.5	Z	443.6	444.1	444.0	445.0	446.1	446.0	446.8	456.5	456.0	448.9	445.7	445.5	445.9	446.6	446.5	447.3	447.4	449.6	448.3	450.2	448.3	446.5	447.3	456.5	
5-Dec	442.4	444.2	Z	445.8	446.1	446.4	446.3	444.9	442.8	440.2	439.4	439.5	440.9	443.1	444.5	446.2	447.0	447.3	446.4	445.0	444.2	443.7	442.3	442.7	444.0	447.3	
6-Dec	440.4	438.8	439.2	Z	438.7	437.8	437.0	436.7	436.6	436.6	437.0	436.9	436.9	436.8	436.9	437.2	437.1	437.2	438.8	442.1	440.8	438.7	438.3	438.5	438.0	442.1	
7-Dec	438.7	438.9	439.1	439.0	Z	439.6	440.2	441.3	441.4	441.1	441.3	442.2	441.7	442.5	443.5	441.8	441.2	440.7	441.0	441.0	441.4	441.1	441.1	440.8	440.9	443.5	
8-Dec	441.2	441.6	441.3	441.1	441.9	Z	441.3	441.3	442.5	443.2	439.8	439.1	438.4	439.5	440.4	439.8	439.5	439.7	439.6	441.6	439.7	442.4	441.9	439.6	440.7	443.2	
9-Dec	Z	439.3	439.6	439.5	439.0	440.2	443.9	445.5	446.0	446.3	446.7	446.4	446.3	446.8	446.9	445.0	445.1	443.6	443.4	443.3	443.1	442.7	442.4	442.7	443.6	446.9	
10-Dec	442.9	Z	442.6	442.7	442.8	440.4	441.4	441.7	441.9	442.4	444.0	444.1	440.3	440.2	440.3	440.4	440.0	441.6	441.4	440.5	439.7	438.8	437.7	437.3	441.1	444.1	
11-Dec	437.1	436.6	Z	434.0	433.5	433.2	433.9	434.2	434.1	434.6	435.6	435.7	435.7	435.9	435.6	435.5	435.4	440.3	440.8	438.8	437.4	437.7	437.8	438.2	436.2	440.8	
12-Dec	438.5	439.5	439.8	Z	440.8	440.7	440.9	441.6	442.6	442.8	442.4	444.6	443.1	442.0	441.9	441.0	440.9	441.7	442.6	444.6	447.8	447.5	446.6	445.0	442.6	447.8	
13-Dec	443.7	441.7	440.6	440.1	Z	441.1	440.1	440.1	440.2	440.0	439.0	439.0	439.1	438.5	437.6	438.9	438.6	436.5	436.1	435.9	436.0	436.0	436.1	436.0	438.7	443.7	
14-Dec	436.1	435.9	435.5	434.9	435.0	Z	435.6	435.5	435.3	435.0	434.6	434.3	434.1	434.0	433.7	433.7	434.1	433.3	433.2	433.4	433.2	434.5	434.3	432.9	434.4	436.1	
15-Dec	Z	434.0	434.5	435.3	436.6	440.1	441.6	440.9	440.0	439.4	437.2	436.9	436.5	436.8	437.6	437.7	437.8	438.6	438.9	439.5	439.8	439.7	439.7	439.5	438.2	441.6	
16-Dec	439.5	Z	439.9	439.0	438.0	437.8	438.2	437.3	436.8	436.3	435.9	435.8	435.8	435.9	435.8	436.1	436.0	436.2	436.3	436.7	437.1	436.8	437.3	437.1	437.0	439.9	
17-Dec	436.7	435.9	Z	435.5	435.4	435.5	435.7	436.8	437.7	437.3	436.0	436.8	438.1	438.2	437.9	439.3	443.5	444.6	446.4	445.4	444.7	445.0	445.5	445.9	439.7	446.4	
18-Dec	445.8	445.9	447.1	Z	448.2	444.3	442.9	440.8	440.4	440.5	440.7	440.4	440.1	439.8	439.5	438.5	438.7	439.0	438.7	437.9	437.0	436.5	436.3	435.8	440.6	448.2	
19-Dec	435.6	435.2	435.0	435.2	Z	434.7	434.5	434.5	434.3	434.1	434.1	434.2	434.8	434.4	434.4	434.5	434.7	435.0	435.2	435.5	435.7	436.0	436.4	436.6	435.0	436.6	
20-Dec	437.0	437.5	438.0	438.4	438.6	Z	438.6	439.0	439.5	440.1	440.6	440.8	441.4	442.3	443.8	443.4	443.5	445.2	444.7	444.8	445.9	446.2	447.8	446.2	441.9	447.8	
21-Dec	Z	446.8	445.1	444.5	443.3	442.8	442.6	442.6	442.8	443.7	446.1	446.5	445.5	444.9	444.2	444.2	444.2	443.7	444.1	445.3	448.4	448.8	449.0	447.2	445.1	449.0	
22-Dec	446.6	Z	445.9	445.8	446.3	446.6	448.5	450.2	450.6	450.8	452.5	451.6	452.9	452.7	451.8	451.5	451.3	451.0	450.3	451.0	450.4	449.6	450.9	457.2	450.3	457.2	
23-Dec	459.4	448.5	Z	442.6	442.2	442.2	442.0	441.4	440.2	439.9	439.6	439.5	439.2	439.3	438.9	438.1	437.2	437.1	438.1	438.3	438.3	438.1	438.0	440.9	440.9	459.4	
24-Dec	439.0	439.0	438.8	Z	442.8	442.4	441.7	442.6	444.0	445.8	446.6	445.3	446.2	446.9	447.4	448.3	446.7	446.4	446.3	445.9	446.2	446.2	446.2	446.2	444.6	448.3	
25-Dec	445.9	445.7	445.8	Z	445.9	445.8	445.5	445.7	445.6	445.4	445.0	446.5	448.8	448.7	447.7	446.2	446.1	446.3	446.4	447.4	447.5	447.7	448.0	448.2	446.6	448.8	
26-Dec	447.2	446.5	445.5	444.6	442.8	Z	441.5	441.9	442.6	444.2	445.8	447.8	449.2	450.4	450.7	451.0	C	C	M	M	UO	UO	UO	--	--	451.0	
27-Dec	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	--	--	--
28-Dec	UO	UO	UO	UO	UO	UO	UO	UO	M	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	--	--	--
29-Dec	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	--	--	--
30-Dec	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	--	--	--
31-Dec	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	--	--	--
441.7 440.6 440.8 440.8 441.4 441.0 441.4 441.6 441.6 441.9 441.9 441.8 441.9 442.0 442.1 442.1 441.9 442.1 442.0 442.2 442.1 442.1 442.0 441.9																								Diurnal Average			
459.4 448.5 447.1 446.1 448.2 446.6 450.0 450.7 450.6 456.5 456.0 451.6 453.5 452.8 454.1 454.5 457.0 457.2 453.8 451.0 450.4 450.2 450.9 457.2																								Diurnal Maximum			
Z - zerospan C - Calibration M - Maintenance UO - Unstable Operation																											



Wood Buffalo Environmental Association
Hourly Averages

Carbon Dioxide (CO₂) - ppm
Fort Chipewyan - December 2023





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Carbon Dioxide (CO₂) - ppm
Fort Chipewyan - December 2023**

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
400 - 420	0	0.00	0.00
420 - 440	264	44.75	44.75
440 - 460	326	55.25	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: 590

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Carbon Dioxide (CO₂) - ppm
Fort Chipewyan - December 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	1	1	3	3	36	8	9	4	6	17	10	24	66	49	19	8	264
440 - 460	0	0	0	15	117	29	11	18	17	16	19	16	34	23	4	3	322
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
Totals	1	1	3	18	153	37	20	22	23	33	29	40	100	72	23	11	586

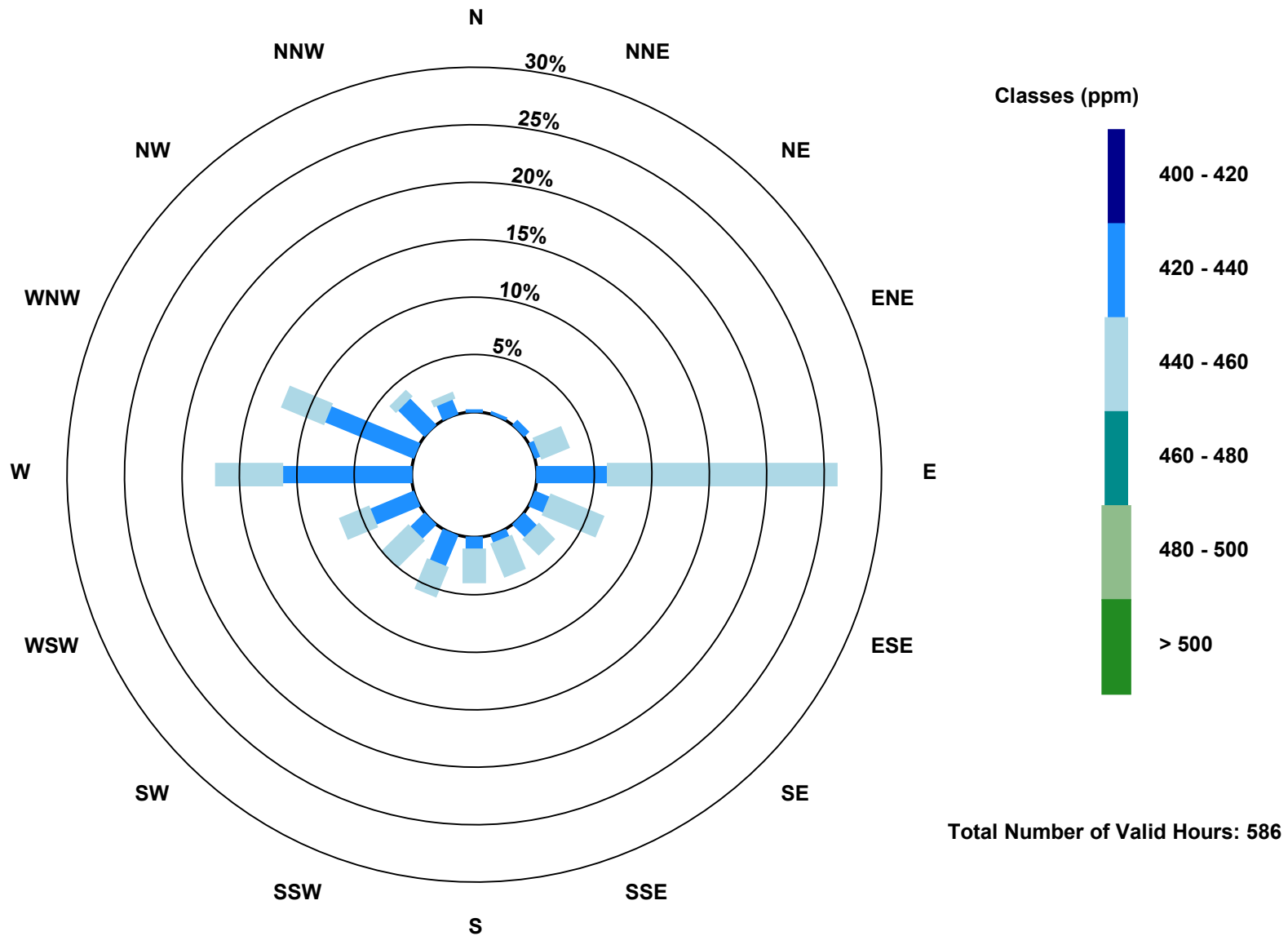
Total Number of Valid Hours: 586

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Dec 2023

Carbon Dioxide (CO₂) - ppm
Fort Chipewyan

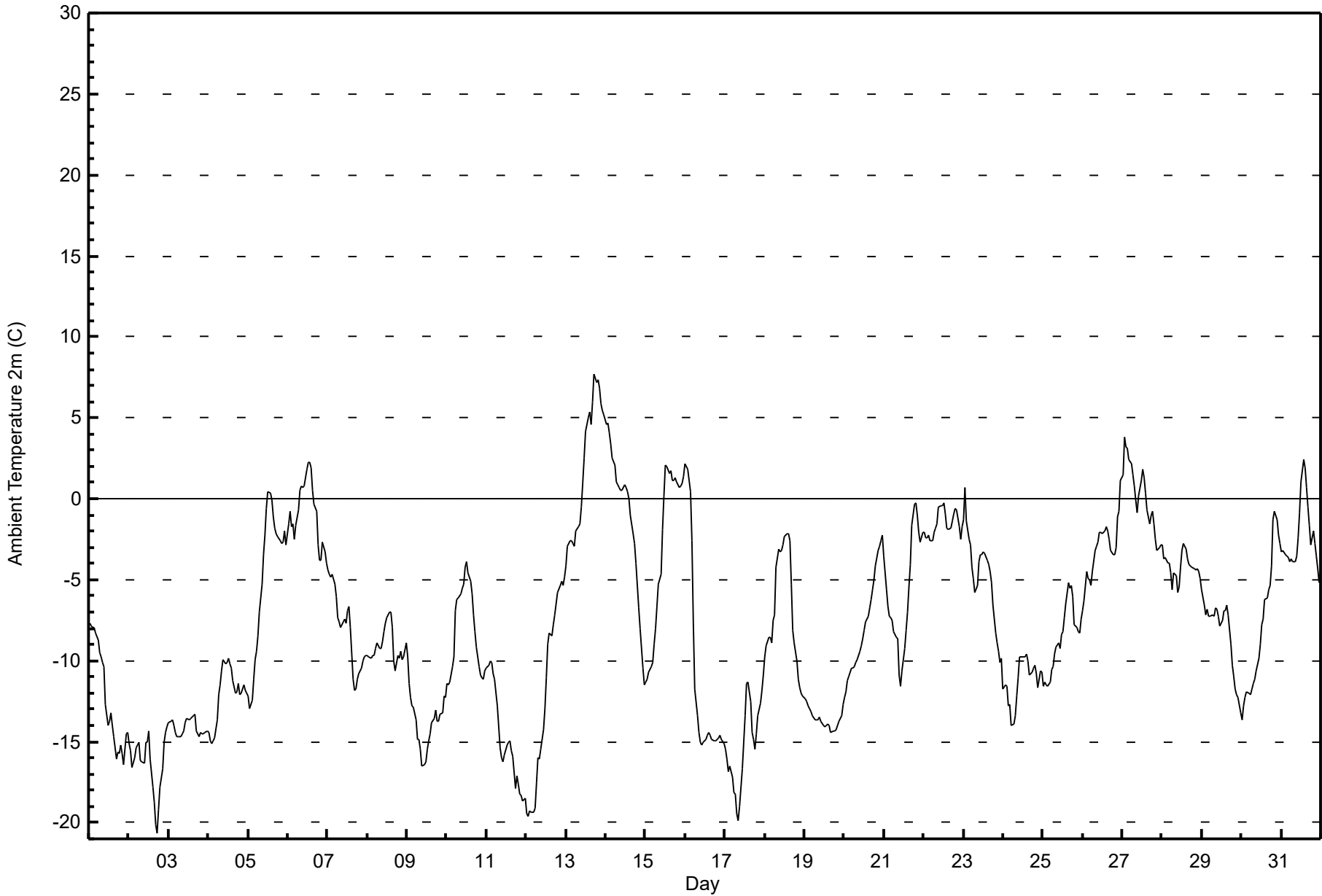




Wood Buffalo Environmental Association
Summary of Hour Averages

Ambient Temperature 2m (AT 2m) - C
Fort Chipewyan - December 2023

Maximum Value: 7.7 C on Dec 13 18:00																				Maximum Daily Average: 2.1 C on Dec 13					Hours in Service: 744				
Minimum Value: -20.6 C on Dec 2 18:00																				Minimum Daily Average: -16.4 C on Dec 2					Hours of Data: 744				
Maximum Diurnal Average: -6.3 C at hour 14																				Minimum Diurnal Average: -8.7 C at hour 7					Hours of Missing Data: 0				
Monthly Average: -7.76 C																				Percentiles: P ₁ = -19.3 P ₁₀ = -15.0 Q ₁ = -12.5 Median = -8.1 Q ₃ = -2.9 P ₉₀ = 0.1 P ₉₉ = 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-Dec	-7.7	-7.9	-8.0	-8.0	-8.3	-8.8	-9.5	-9.7	-10.1	-10.3	-12.7	-14.0	-13.7	-13.2	-14.0	-14.7	-16.1	-15.7	-15.7	-15.2	-15.7	-16.4	-14.5	-14.4	-12.3	-7.7			
2-Dec	-15.1	-15.5	-16.6	-16.0	-15.4	-15.2	-15.0	-16.1	-16.3	-16.3	-15.1	-15.0	-14.4	-16.1	-17.8	-18.8	-20.1	-20.6	-19.2	-17.8	-16.7	-15.0	-14.5	-14.1	-16.4	-14.1			
3-Dec	-13.9	-13.8	-13.7	-14.0	-14.4	-14.7	-14.7	-14.7	-14.6	-14.4	-13.9	-13.6	-13.7	-13.6	-13.5	-13.4	-13.3	-14.3	-14.7	-14.4	-14.6	-14.5	-14.4	-14.3	-14.1	-13.3			
4-Dec	-14.4	-14.9	-15.1	-15.0	-14.8	-13.6	-12.1	-11.5	-10.6	-10.0	-10.2	-10.1	-9.8	-10.2	-10.4	-11.3	-12.0	-11.9	-11.4	-12.1	-12.0	-11.5	-11.9	-12.0	-12.0	-9.8			
5-Dec	-12.2	-13.0	-12.5	-11.1	-10.0	-9.4	-8.5	-7.0	-5.3	-3.5	-2.3	-0.6	0.4	0.4	-0.1	-1.1	-1.8	-2.1	-2.3	-2.6	-2.7	-2.6	-2.0	-2.9	-4.8	0.4			
6-Dec	-1.5	-0.8	-1.8	-1.6	-2.5	-1.7	-0.7	0.5	0.8	0.7	0.8	1.8	2.2	2.3	1.9	0.5	-0.3	-0.8	-2.8	-3.8	-3.8	-2.7	-3.3	-4.0	-0.9	2.3			
7-Dec	-4.4	-4.7	-4.9	-4.7	-5.3	-6.1	-7.3	-7.6	-7.9	-7.6	-7.4	-7.7	-6.9	-6.6	-7.9	-11.1	-11.8	-11.7	-11.2	-10.8	-10.4	-10.0	-9.7	-9.6	-8.1	-4.4			
8-Dec	-9.6	-9.8	-9.9	-9.7	-9.7	-9.2	-8.9	-9.3	-9.3	-8.8	-8.2	-7.7	-7.3	-7.0	-7.0	-8.0	-10.0	-10.7	-9.7	-9.9	-9.4	-9.9	-9.7	-8.9	-9.1	-7.0			
9-Dec	-9.8	-11.4	-12.3	-12.8	-12.9	-13.6	-14.9	-14.9	-15.5	-16.5	-16.5	-16.2	-15.5	-14.9	-14.5	-13.9	-13.5	-13.0	-13.7	-13.8	-13.3	-13.3	-12.2	-12.2	-13.8	-9.8			
10-Dec	-11.4	-11.5	-11.3	-10.4	-9.8	-6.9	-6.2	-6.1	-5.8	-5.5	-5.3	-4.2	-3.9	-4.6	-5.1	-5.8	-7.1	-8.2	-9.2	-10.4	-10.9	-11.0	-11.2	-10.7	-8.0	-3.9			
11-Dec	-10.4	-10.3	-10.0	-10.1	-10.8	-11.1	-12.8	-14.1	-15.4	-16.0	-16.3	-15.8	-15.2	-15.1	-14.9	-15.6	-15.9	-17.9	-17.2	-17.7	-18.3	-18.3	-18.6	-18.5	-14.8	-10.0			
12-Dec	-19.4	-19.6	-19.3	-19.4	-19.4	-19.1	-17.5	-16.0	-16.1	-15.5	-14.3	-13.0	-11.1	-9.0	-8.3	-8.5	-7.8	-7.2	-6.5	-5.8	-5.3	-5.1	-5.4	-4.9	-12.2	-4.9			
13-Dec	-4.1	-2.9	-2.6	-2.6	-2.7	-3.0	-2.0	-1.7	-1.6	-0.6	0.9	2.5	4.1	5.0	5.4	4.6	6.0	7.7	7.2	7.4	6.9	5.9	5.4	5.2	2.1	7.7			
14-Dec	4.6	4.7	4.1	3.4	2.5	2.1	1.1	0.9	0.7	0.5	0.5	0.9	0.7	0.5	0.0	-1.0	-2.2	-2.8	-4.0	-5.4	-6.7	-8.0	-10.5	-11.5	-1.0	4.7			
15-Dec	-11.3	-11.1	-10.8	-10.4	-10.1	-9.0	-8.0	-6.6	-5.3	-4.7	-1.9	0.2	2.1	2.0	1.6	1.7	1.1	1.3	1.1	0.7	0.8	0.9	1.4	-3.0	2.1				
16-Dec	2.2	1.8	1.1	0.5	-2.6	-7.6	-11.7	-13.4	-14.4	-15.0	-15.2	-15.1	-14.9	-14.6	-14.5	-14.6	-14.8	-15.0	-14.9	-14.8	-14.6	-14.9	-15.1	-11.1	2.2				
17-Dec	-15.5	-16.0	-16.9	-16.5	-17.2	-18.2	-18.3	-19.5	-19.9	-19.0	-16.6	-15.0	-13.4	-11.4	-11.3	-12.5	-14.4	-14.9	-15.5	-14.5	-13.4	-12.6	-11.8	-10.9	-15.2	-10.9			
18-Dec	-9.7	-9.1	-8.6	-8.6	-8.9	-7.5	-7.1	-4.2	-3.1	-3.3	-3.2	-2.8	-2.4	-2.2	-2.2	-2.6	-5.3	-8.2	-8.9	-10.0	-11.2	-11.7	-12.0	-12.2	-6.9	-2.2			
19-Dec	-12.3	-12.5	-12.7	-12.9	-13.1	-13.4	-13.6	-13.7	-13.6	-13.5	-13.8	-14.0	-14.1	-14.0	-14.0	-14.0	-14.4	-14.3	-14.4	-14.2	-14.0	-13.8	-13.4	-12.7	-13.6	-12.3			
20-Dec	-12.2	-11.9	-11.2	-11.0	-10.4	-10.5	-10.4	-10.1	-9.9	-9.5	-9.1	-8.6	-8.1	-7.6	-7.3	-6.8	-6.2	-5.6	-5.0	-4.1	-3.2	-2.9	-2.6	-2.3	-7.8	-2.3			
21-Dec	-3.6	-5.6	-6.7	-7.2	-7.3	-7.5	-8.2	-8.6	-8.7	-10.9	-11.6	-10.6	-9.2	-8.1	-7.0	-5.5	-4.0	-1.7	-0.3	-0.3	-1.0	-2.0	-2.7	-2.1	-5.9	-0.3			
22-Dec	-2.1	-2.4	-2.4	-2.2	-2.6	-2.5	-2.1	-1.8	-1.6	-0.5	-0.4	-0.4	-0.2	-0.9	-1.8	-1.9	-1.8	-1.4	-1.0	-0.6	-0.7	-1.8	-2.5	-1.7	-1.6	-0.2			
23-Dec	-1.3	0.7	-1.4	-2.5	-2.8	-4.2	-4.9	-5.8	-5.3	-3.9	-3.5	-3.4	-3.3	-3.4	-3.8	-4.1	-4.5	-5.2	-6.6	-8.3	-8.9	-9.4	-10.1	-9.8	-4.8	0.7			
24-Dec	-11.8	-11.5	-11.6	-12.8	-12.7	-14.0	-13.9	-13.4	-12.2	-11.0	-9.8	-9.8	-9.8	-9.8	-9.6	-10.1	-10.9	-10.8	-10.4	-10.2	-10.8	-11.7	-10.6	-10.7	-11.2	-9.6			
25-Dec	-11.6	-11.3	-11.5	-11.6	-11.3	-10.6	-10.4	-9.6	-9.2	-8.9	-9.2	-8.4	-8.2	-7.3	-6.5	-5.1	-5.5	-5.4	-6.0	-7.8	-7.9	-8.2	-8.3	-7.4	-8.6	-5.1			
26-Dec	-6.9	-6.3	-4.5	-4.9	-5.0	-5.3	-4.5	-3.2	-2.9	-2.7	-2.1	-2.1	-2.2	-2.0	-1.7	-2.0	-2.5	-3.2	-3.5	-3.4	-3.0	-1.1	-0.7	1.1	-3.1	1.1			
27-Dec	1.5	3.8	3.2	3.1	2.5	2.1	1.5	0.8	-0.1	-0.9	0.2	1.1	1.8	1.3	0.4	-0.7	-1.5	-1.0	-0.8	-1.5	-2.5	-3.2	-3.0	-2.8	0.2	3.8			
28-Dec	-2.8	-3.7	-3.7	-4.0	-4.0	-4.6	-5.7	-4.6	-4.7	-5.8	-5.4	-4.2	-3.2	-2.8	-3.1	-3.7	-4.0	-4.1	-4.2	-4.3	-4.4	-4.3	-4.5	-4.9	-4.2	-2.8			
29-Dec	-5.6	-6.6	-7.1	-6.9	-7.2	-7.3	-7.2	-7.3	-6.8	-6.8	-7.2	-7.8	-7.5	-6.9	-6.9	-6.6	-7.2	-9.0	-10.3	-11.0	-11.7	-12.1	-12.3	-13.3	-8.3	-5.6			
30-Dec	-13.6	-12.8	-12.3	-11.9	-12.0	-12.1	-11.7	-11.4	-11.1	-10.6	-9.9	-9.0	-7.8	-7.5	-6.2	-6.1	-5.7	-5.4	-4.1	-1.3	-0.7	-1.3	-2.2	-2.7	-7.9	-0.7			
31-Dec	-3.3	-3.2	-3.4	-3.5	-3.7	-3.9	-3.7	-3.9	-3.9	-3.5	-2.4	-0.8	1.0	2.4	1.9	0.7	-0.5	-1.6	-2.9	-1.9	-2.7	-3.5	-4.3	-5.2	-2.3	2.4			
																								Diurnal Average					
																								Diurnal Maximum					





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature 2m (AT 2m) - C
Fort Chipewyan - December 2023**

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	2	0.27	0.27
-20 - 0	667	89.65	89.92
0 - 10	75	10.08	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association
Summary of Hour Averages

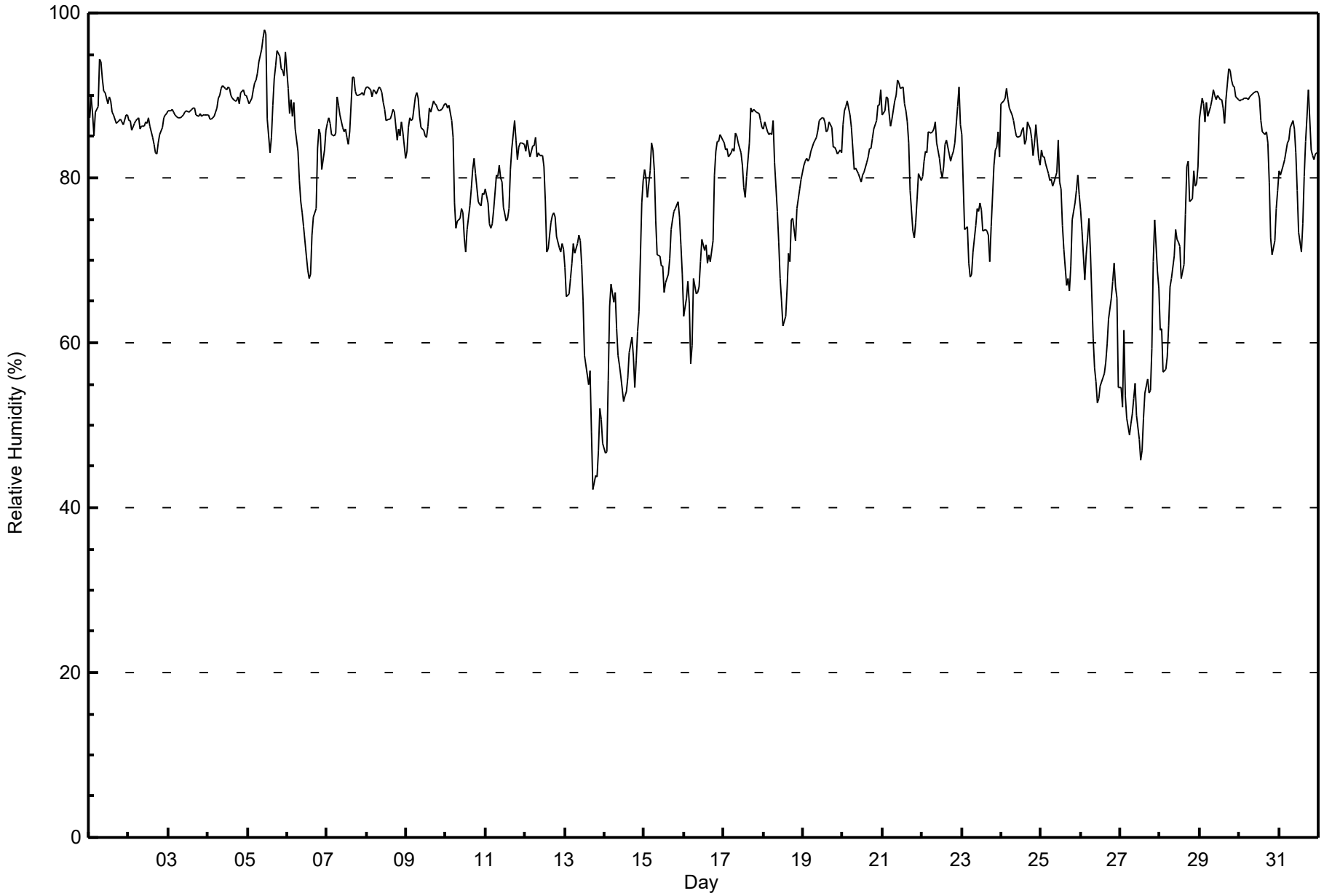
Relative Humidity (RH) - %
Fort Chipewyan - December 2023

Maximum Value: 97.9 % on Dec 5 11:00																						Maximum Daily Average: 92.1 % on Dec 5																						Hours in Service: 744			
Minimum Value: 42.3 % on Dec 13 18:00																						Minimum Daily Average: 55.5 % on Dec 27																						Hours of Data: 744			
Maximum Diurnal Average: 81.7 % at hour 23																						Minimum Diurnal Average: 76.2 % at hour 14																						Hours of Missing Data: 0			
Monthly Average: 79.87 %																						Percentiles: P ₁ = 47.3 P ₁₀ = 64.8 Q ₁ = 74.2 Median = 83.6 Q ₃ = 87.6 P ₉₀ = 89.9 P ₉₉ = 94.3																						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-Dec	87.2	89.8	87.9	85.0	87.9	88.6	94.5	94.0	92.0	90.4	90.3	89.0	89.9	89.4	87.9	87.6	86.7	86.9	87.0	87.2	86.8	86.4	87.7	87.7	88.7	94.5																					
2-Dec	87.0	86.9	85.8	86.7	86.9	87.1	87.3	86.0	86.2	86.3	86.7	86.6	87.3	86.2	85.0	84.1	83.1	82.9	84.3	85.2	86.0	87.2	87.6	87.8	86.1	87.8																					
3-Dec	88.1	88.2	88.2	87.9	87.6	87.4	87.3	87.4	87.5	87.6	88.0	88.1	88.1	88.2	88.3	88.5	88.5	87.7	87.4	87.7	87.5	87.6	87.6	87.7	87.8	88.5																					
4-Dec	87.6	87.2	87.0	87.3	87.4	88.4	89.6	90.1	90.8	91.2	90.9	90.7	91.0	90.8	90.0	89.7	89.3	89.4	89.8	89.0	90.4	90.8	90.0	90.0	89.5	91.2																					
5-Dec	89.5	89.0	89.6	90.7	91.6	91.9	92.7	94.1	95.6	97.0	97.9	97.4	97.2	83.1	84.9	88.7	92.1	93.6	95.4	94.8	93.3	93.1	92.4	95.3	92.1	97.9																					
6-Dec	90.8	87.8	89.5	87.5	89.1	85.9	83.2	79.6	77.1	75.7	74.1	70.5	68.8	67.8	68.4	73.0	75.2	76.2	83.6	85.9	85.3	81.1	83.4	85.7	80.2	90.8																					
7-Dec	86.6	87.2	86.7	85.3	85.1	85.4	89.8	88.7	87.6	86.0	85.6	85.9	85.0	84.0	85.6	92.2	92.2	90.5	90.1	90.0	90.2	90.4	90.0	90.6	87.9	92.2																					
8-Dec	91.0	91.1	90.8	89.9	90.7	90.6	90.2	91.1	90.9	90.4	89.2	88.4	87.0	87.1	87.1	87.6	88.3	87.9	84.6	85.9	85.1	86.7	85.6	82.3	88.3	91.1																					
9-Dec	83.2	86.2	87.4	87.0	87.2	89.9	90.3	89.7	87.5	86.1	85.8	85.1	85.0	86.3	88.4	88.0	89.3	88.9	88.8	88.3	88.1	88.4	88.6	89.0	87.6	90.3																					
10-Dec	89.0	88.6	88.8	86.9	84.9	76.9	73.9	74.8	75.1	76.2	75.7	72.6	71.0	73.7	76.6	78.7	81.1	82.4	80.5	77.2	76.8	76.7	78.1	77.9	78.9	89.0																					
11-Dec	78.6	77.0	74.4	73.9	74.3	76.1	80.4	80.2	81.6	80.0	79.5	76.4	74.7	75.0	76.3	81.0	83.5	86.9	84.7	82.2	83.8	84.2	84.2	84.1	79.7	86.9																					
12-Dec	83.3	84.6	83.6	82.6	83.9	83.9	84.9	82.6	83.1	82.7	82.6	81.3	77.1	71.1	71.3	74.6	75.4	75.8	75.3	72.9	71.5	71.1	72.1	71.4	78.3	84.9																					
13-Dec	69.2	65.6	65.9	67.8	69.7	72.0	70.9	72.0	73.0	72.4	69.5	65.0	58.4	56.2	54.8	56.6	49.1	42.3	43.9	43.8	47.0	52.0	50.7	47.8	59.8	73.0																					
14-Dec	46.6	46.7	55.4	64.5	67.2	64.9	66.1	61.8	58.5	57.3	55.9	52.9	53.5	54.1	55.7	58.8	60.7	58.3	54.5	57.8	61.4	63.8	76.9	79.6	59.7	79.6																					
15-Dec	80.9	80.0	77.7	80.9	84.2	83.4	80.9	74.7	70.8	70.6	69.4	69.3	66.0	67.3	68.2	70.2	73.8	74.9	75.9	76.3	77.1	75.2	71.9	68.2	74.5	84.2																					
16-Dec	63.1	65.4	67.5	64.7	57.4	59.7	67.8	66.0	66.2	66.9	69.9	72.5	71.1	71.9	69.7	70.7	69.7	72.4	80.3	83.2	84.5	84.3	85.3	84.6	71.4	85.3																					
17-Dec	84.2	83.4	83.6	82.5	83.0	83.6	83.2	85.4	85.1	84.2	83.1	81.5	78.9	77.6	80.2	84.2	88.5	87.9	88.4	88.2	87.9	87.9	87.0	86.2	84.4	88.5																					
18-Dec	85.9	86.8	85.6	85.3	85.5	85.2	87.0	81.9	75.9	72.2	67.9	65.0	62.0	63.2	66.7	70.8	69.8	75.0	75.0	72.4	76.3	77.4	78.6	79.9	76.3	87.0																					
19-Dec	81.5	82.1	82.4	82.1	82.4	83.2	84.2	84.6	84.9	85.7	86.9	87.2	87.3	86.8	85.7	85.8	86.7	86.2	83.7	83.7	83.5	82.9	83.3	83.0	84.4	87.3																					
20-Dec	86.5	88.2	88.7	89.3	87.7	86.0	83.5	81.1	81.2	80.5	79.9	79.5	80.4	80.7	81.9	82.6	83.6	83.6	84.8	85.9	87.0	88.8	88.9	90.7	84.6	90.7																					
21-Dec	87.6	88.1	89.8	89.6	87.9	86.3	87.2	89.3	90.0	91.9	91.5	90.9	91.0	89.0	88.1	86.8	84.3	78.4	73.6	72.8	74.5	77.4	80.5	79.6	85.3	91.9																					
22-Dec	80.1	82.0	83.2	83.0	85.6	85.4	85.6	86.0	86.7	84.2	82.3	80.8	80.0	81.3	84.0	84.6	82.9	82.1	82.7	83.3	84.3	88.7	91.1	86.4	84.0	91.1																					
23-Dec	85.2	79.3	73.7	74.1	69.6	68.0	68.4	71.0	74.2	76.3	76.0	76.9	76.1	73.5	73.8	73.6	73.0	69.7	74.0	81.6	83.3	83.7	85.6	82.5	76.0	85.6																					
24-Dec	88.9	89.3	89.7	90.9	89.6	88.5	87.6	87.0	86.0	85.1	85.0	85.0	85.8	86.1	84.1	84.6	86.7	86.0	84.8	82.7	84.3	86.5	82.3	81.5	86.2	90.9																					
25-Dec	83.4	82.6	82.6	81.6	80.5	79.7	79.9	79.1	79.5	80.6	84.6	79.4	78.7	74.2	71.4	66.9	67.8	66.2	69.4	74.9	76.9	78.5	80.3	78.0	77.4	84.6																					
26-Dec	76.2	73.6	67.6	70.7	72.6	75.0	71.2	60.6	57.0	55.3	52.7	53.2	54.7	55.8	56.2	57.7	59.8	62.9	65.4	67.5	69.7	66.7	65.5	54.6	63.4	76.2																					
27-Dec	54.6	52.2	61.5	53.5	50.8	48.7	50.1	51.3	53.2	55.1	51.2	48.2	45.8	47.0	50.8	54.0	55.6	53.9	54.3	59.4	69.8	75.0	68.6	66.6	55.5	75.0																					
28-Dec	61.5	61.7	56.4	56.7	58.3	62.0	66.8	67.8	70.5	73.8	72.5	72.3	71.7	67.9	69.4	75.7	81.3	82.1	77.1	77.5	80.8	79.0	79.3	81.3	71.0	82.1																					
29-Dec	87.1	89.7	89.0	86.8	89.1	87.5	88.6	89.4	90.6	90.1	89.5	89.9	89.5	89.4	88.5	86.6	89.4	93.3	93.0	91.9	91.1	91.0	89.9	89.5	89.6	93.3																					
30-Dec	89.4	89.4	89.5	89.7	89.6	89.4	89.8	90.0	90.1	90.3	90.4	90.3	89.7	87.0	85.6	85.2	85.6	84.2	79.5	72.7	70.6	72.5	76.3	78.5	85.2	90.4																					
31-Dec	80.8	80.3	81.5	82.1	83.3	84.2	84.6	86.1	87.0	85.9	83.0	78.4	73.4	71.0	74.4	80.2	84.4	87.5	90.7	83.4	82.7	82.2	82.8	83.1	82.2	90.7																					
																						81.1	81.0	81.0	80.9	81.0	80.8	81.5	80.7	80.5	80.3	79.6	78.4	77.0	76.2	76.8	78.4	79.3	79.2	79.4	79.5	80.6	81.2	81.7	81.0	Diurnal Average	
																						91.0	91.1	90.8	90.9	91.6	91.9	94.5	94.1	95.6	97.0	97.9	97.4	91.0	90.8	90.0	92.2	92.2	93.6	95.4	94.8	93.3	93.1	92.4	95.3	Diurnal Maximum	



Wood Buffalo Environmental Association
Hourly Averages

Relative Humidity (RH) - %
Fort Chipewyan - December 2023





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Relative Humidity (RH) - %
Fort Chipewyan - December 2023**

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	0	0.00	0.00
40 - 60	60	8.06	8.06
60 - 80	215	28.90	36.96
80 - 100	469	63.04	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744

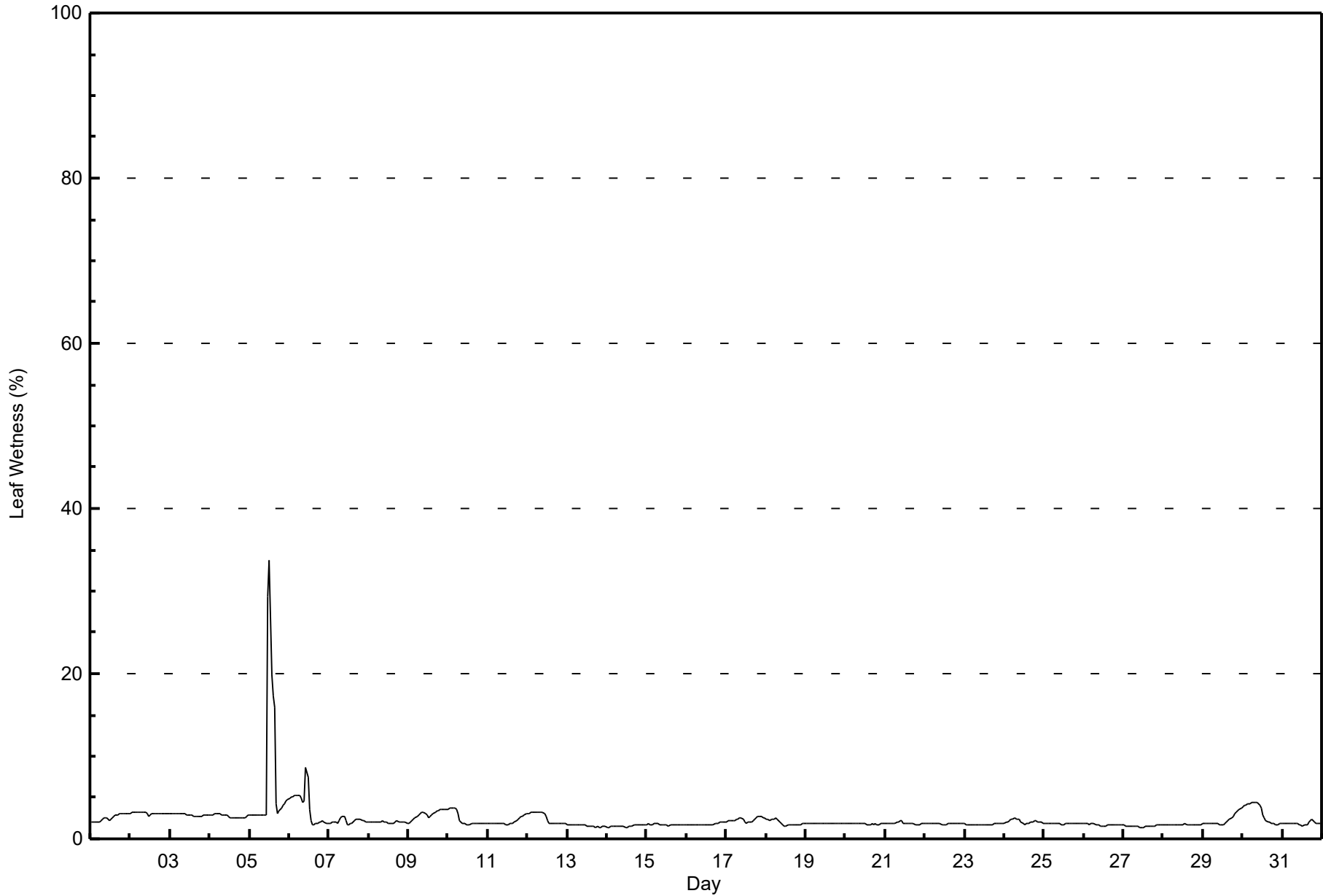


Maximum Value: 33.7 % on Dec 5 13:00																				Maximum Daily Average: 7.5 % on Dec 5					Hours in Service: 744		
Minimum Value: 1.3 % on Dec 27 13:00																				Minimum Daily Average: 1.6 % on Dec 27					Hours of Data: 744		
Maximum Diurnal Average: 3.0 % at hour 12																				Minimum Diurnal Average: 2.1 % at hour 18					Hours of Missing Data: 0		
Monthly Average: 2.35 %																				Percentiles: P ₁ = 1.4 P ₁₀ = 1.6 Q ₁ = 1.8 Median = 1.9 Q ₃ = 2.5 P ₉₀ = 3.1 P ₉₉ = 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-Dec	2.0	2.0	2.0	2.0	2.0	2.0	2.2	2.4	2.5	2.6	2.5	2.2	2.3	2.6	2.8	2.9	3.0	3.0	3.0	3.0	3.1	3.1	3.1	3.1	2.6	3.1	
2-Dec	3.1	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.0	2.8	2.8	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.1	3.2	
3-Dec	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	2.9	2.9	2.9	2.8	2.8	2.7	2.7	2.7	2.8	2.8	2.8	2.8	2.8	2.9	2.9	3.0	
4-Dec	2.9	2.9	3.0	3.0	3.0	3.0	3.0	2.9	2.9	2.9	2.8	2.7	2.6	2.6	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.6	2.7	2.8	2.7	3.0	
5-Dec	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.8	2.8	2.8	29.4	33.7	19.8	17.3	15.8	4.3	3.1	3.4	3.8	4.0	4.3	4.5	4.7	7.5	33.7
6-Dec	4.9	5.0	5.1	5.2	5.3	5.3	5.2	4.9	4.3	4.5	8.6	7.5	3.5	2.3	1.7	1.7	1.8	1.8	2.0	2.0	2.2	2.0	1.9	1.9	3.8	8.6	
7-Dec	1.9	1.9	2.0	2.0	2.0	1.9	2.2	2.5	2.7	2.7	2.2	1.7	1.7	1.8	1.9	2.2	2.4	2.4	2.4	2.3	2.3	2.2	2.1	2.0	2.1	2.7	
8-Dec	2.0	2.0	2.1	2.1	2.0	2.0	2.0	2.1	2.2	2.1	2.0	2.0	1.9	1.9	1.9	1.9	2.0	2.1	2.0	2.0	2.0	2.0	2.0	1.9	2.0	2.2	
9-Dec	1.9	2.0	2.2	2.4	2.6	2.7	2.9	3.1	3.2	3.2	3.1	2.8	2.6	2.7	2.9	3.0	3.2	3.3	3.4	3.5	3.5	3.6	3.6	3.6	3.0	3.6	
10-Dec	3.6	3.7	3.7	3.8	3.8	3.6	3.0	2.3	1.9	1.8	1.8	1.7	1.7	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.8	1.8	1.8	2.4	3.8	
11-Dec	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.8	1.8	1.7	1.7	1.8	1.9	1.9	2.1	2.3	2.4	2.6	2.7	2.8	2.9	3.0	2.1	3.0	
12-Dec	3.1	3.1	3.2	3.2	3.2	3.3	3.3	3.2	3.2	3.2	3.1	2.8	2.2	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	2.5	3.3	
13-Dec	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.7	1.7	1.6	1.6	1.6	1.5	1.5	1.5	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.6	1.8	
14-Dec	1.4	1.4	1.5	1.5	1.6	1.6	1.6	1.6	1.6	1.5	1.5	1.4	1.4	1.5	1.5	1.6	1.6	1.6	1.6	1.7	1.7	1.7	1.7	1.8	1.6	1.8	
15-Dec	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.7	1.7	1.6	1.6	1.6	1.6	1.6	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.8	
16-Dec	1.6	1.6	1.6	1.6	1.6	1.7	1.7	1.8	1.8	1.8	1.8	1.7	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	2.0	2.0	2.1	2.1	1.8	2.1	
17-Dec	2.1	2.2	2.2	2.2	2.2	2.3	2.3	2.4	2.5	2.5	2.4	2.1	1.9	2.0	2.0	2.1	2.3	2.4	2.5	2.6	2.7	2.6	2.6	2.5	2.3	2.7	
18-Dec	2.5	2.3	2.3	2.3	2.4	2.4	2.5	2.4	2.0	1.8	1.6	1.6	1.5	1.6	1.6	1.7	1.7	1.8	1.8	1.8	1.8	1.8	1.8	1.8	2.0	2.5	
19-Dec	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.8	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	
20-Dec	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	
21-Dec	1.8	1.8	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.2	2.2	1.9	1.8	1.9	1.9	1.9	1.8	1.8	1.7	1.7	1.8	1.8	1.8	1.8	1.9	2.2	
22-Dec	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.7	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.8	1.8	1.9	
23-Dec	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.7	1.7	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.8	1.9	
24-Dec	1.9	2.0	2.1	2.2	2.3	2.4	2.5	2.4	2.4	2.3	2.1	1.8	1.8	1.8	1.9	1.9	2.0	2.1	2.2	2.1	2.0	2.1	2.0	1.9	2.1	2.5	
25-Dec	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.6	1.6	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	
26-Dec	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.7	1.7	1.7	1.6	1.5	1.5	1.6	1.6	1.6	1.6	1.7	1.7	1.7	1.7	1.7	1.7	1.6	1.7	1.8	
27-Dec	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.4	1.3	1.3	1.5	1.5	1.5	1.6	1.6	1.6	1.6	1.6	1.7	1.7	1.7	1.6	1.7	
28-Dec	1.7	1.7	1.7	1.6	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.9	1.7	1.7	1.8	1.7	1.7	1.7	1.8	1.8	1.8	1.8	1.7	1.9	
29-Dec	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.8	1.8	1.7	1.6	1.8	2.0	2.2	2.3	2.6	2.8	3.0	3.2	3.4	3.5	3.7	2.2	3.7	
30-Dec	3.9	4.0	4.1	4.2	4.3	4.4	4.4	4.4	4.4	4.3	4.1	3.6	2.9	2.5	2.2	2.1	2.0	1.9	1.8	1.8	1.8	1.8	1.8	1.8	3.1	4.4	
31-Dec	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.7	1.7	1.5	1.6	1.7	1.8	2.0	2.2	2.3	2.0	1.8	1.8	1.8	1.8	1.9	2.3	
																								Diurnal Average			
																								Diurnal Maximum			



Wood Buffalo Environmental Association
Hourly Averages

Leaf Wetness (LW) - %
Fort Chipewyan - December 2023





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Leaf Wetness (LW) - %
Fort Chipewyan - December 2023

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 0.3	0	0.00	0.00
0.4 - 0.5	0	0.00	0.00
0.6 - 0.7	0	0.00	0.00
0.8 - 1.4	14	1.88	1.88
1.5 - 10	721	96.91	98.79
> 10	5	0.67	99.46

Total Number of Valid Hours: 744

Total Number of Hours: 744

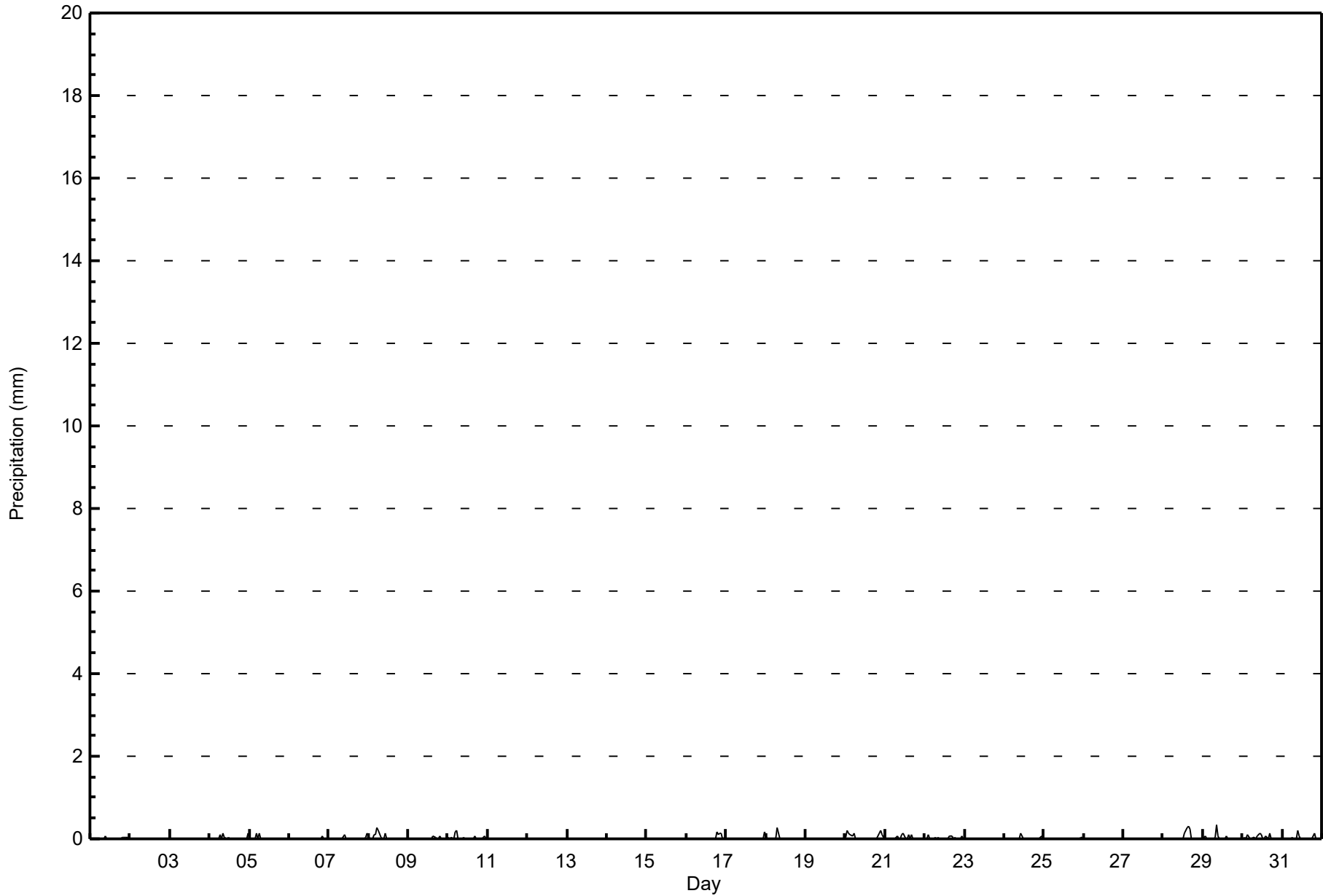


Maximum Value: 0.3 mm on Dec 29 09:00		Maximum Daily Total: 1.2 mm on Dec 20		Hours in Service: 744																							
Minimum Value: 0.0 mm on Dec 1 01:00		Minimum Daily Total: 0.0 mm on Dec 2		Hours of Data: 744																							
Maximum Diurnal Total: 0.6 mm at hour 17		Minimum Diurnal Total: 0.0 mm at hour 13		Hours of Missing Data: 0																							
Monthly Total: 9.60 mm		Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.0 Median = 0.0 Q ₃ = 0.0 P ₉₀ = 0.1 P ₉₉ = 0.2		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-Dec	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	0.1	0.1	0.1	0.0	0.0	0.2	0.1	
2-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	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	0.1	0.5	0.2	
5-Dec	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.1	
6-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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	0.1	
7-Dec	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	0.1	0.1	0.3	0.3	0.1	
8-Dec	0.1	0.0	0.0	0.1	0.1	0.3	0.2	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	1.0	0.3	0.3	
9-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.2	0.1	0.1	
10-Dec	0.1	0.0	0.1	0.0	0.2	0.2	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	0.1	0.1	0.0	0.7	0.2	0.2	
11-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	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	0.2	0.1	0.0	0.1	0.6	0.2	0.2	
17-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.2	0.2	
18-Dec	0.1	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	0.4	0.3	0.3	
19-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	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	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.1	0.1	1.2	0.2	0.2	
21-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.1	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.1	0.1	
22-Dec	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.1	0.0	0.0	0.0	0.1	0.0	0.5	0.1	0.1	
23-Dec	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	0.1	0.1	
24-Dec	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	0.1	0.0	0.2	0.2	0.2	
25-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	
26-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	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	0.3	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9	0.3	0.3	
29-Dec	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.3	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	0.6	0.3	0.3	
30-Dec	0.0	0.1	0.0	0.1	0.0	0.0	0.1	0.1	0.0	0.1	0.1	0.1	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.1	0.1	
31-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.5	0.2	0.2	
																								Diurnal Average			
																								Diurnal Maximum			



Wood Buffalo Environmental Association
Hourly Averages

Precipitation (PC) - mm
Fort Chipewyan - December 2023





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Precipitation (PC) - mm
Fort Chipewyan - December 2023

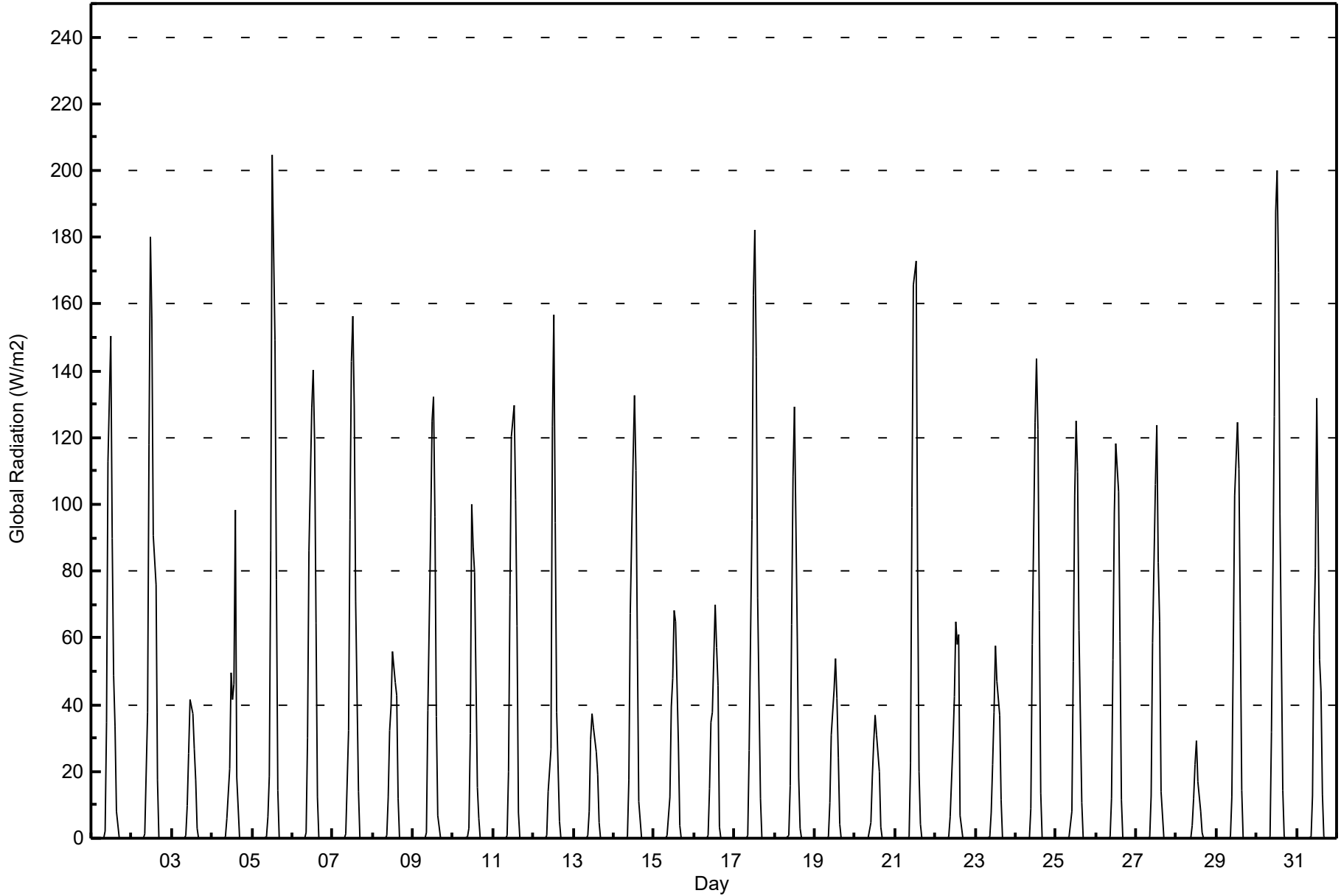
Concentration Ranges (mm)	Number of Hours	%	Cumulative %
0 - 0.3	744	100.00	100.00
0.4 - 0.5	0	0.00	100.00
0.6 - 0.7	0	0.00	100.00
0.8 - 1.4	0	0.00	100.00
1.5 - 10	0	0.00	100.00
> 10	0	0.00	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Maximum Value: 204.8 W/m2 on Dec 5 13:00 Maximum Daily Average: 34.5 W/m2 on Dec 30																						Hours in Service:	744			
Minimum Value: 0.0 W/m2 on Dec 1 01:00 Minimum Daily Average: 3.9 W/m2 on Dec 28																						Hours of Data:	744			
Maximum Diurnal Average: 109.2 W/m2 at hour 13 Minimum Diurnal Average: 0.0 W/m2 at hour 2																						Hours of Missing Data:	0			
Monthly Average: 17.33 W/m2 Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.0 Median = 0.0 Q ₃ = 11.4 P ₉₀ = 68.0 P ₉₉ = 164.6																						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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.1	34.7	112.6	150.4	89.7	48.9	33.4	7.9	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.0	150.4
2-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.4	37.6	117.9	180.0	155.7	90.5	75.7	17.5	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	28.2	180.0
3-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	9.8	25.5	41.7	37.4	26.8	17.5	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.8	41.7
4-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	6.1	20.8	49.4	41.7	46.1	98.4	18.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11.7	98.4
5-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	6.3	18.8	85.9	204.8	149.0	77.4	14.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	23.2	204.8
6-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.9	29.9	86.0	128.7	140.4	118.4	64.2	12.4	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	24.3	140.4
7-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.4	32.3	95.1	142.9	156.5	129.3	71.0	13.8	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	26.8	156.5
8-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	12.1	32.3	39.6	55.8	46.4	42.9	12.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.1	55.8
9-Dec	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	1.6	37.9	92.4	125.0	132.2	96.3	36.5	6.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	22.0	132.2
10-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	2.8	31.3	99.9	87.4	79.8	15.2	6.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	13.4	99.9
11-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	20.0	73.1	120.2	129.7	101.2	63.7	7.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	21.5	129.7
12-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	14.1	26.8	123.3	156.9	94.6	37.8	5.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	19.2	156.9
13-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	8.1	29.7	37.3	33.1	25.9	19.1	4.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.6	37.3
14-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	17.6	67.2	113.4	132.5	110.3	59.5	10.9	0.1	0.1	0.0	0.1	0.0	0.0	0.0	0.0	21.3	132.5
15-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	12.4	39.4	47.9	68.3	65.0	28.4	3.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11.1	68.3
16-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	14.6	34.6	37.5	69.9	57.1	45.8	3.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11.0	69.9
17-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	26.2	95.4	162.9	182.3	144.0	72.0	11.7	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	29.0	182.3
18-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	15.7	63.9	108.4	129.3	60.1	18.3	2.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	16.6	129.3
19-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	10.5	30.8	44.6	53.6	41.8	24.2	4.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.8	53.6
20-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	4.7	18.2	28.8	36.8	31.0	20.0	3.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.0	36.8
21-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	22.4	99.4	165.8	172.7	81.6	20.1	4.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	23.6	172.7
22-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	6.5	29.0	42.6	64.7	58.0	60.9	7.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11.2	64.7
23-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	7.7	21.9	37.8	57.7	46.9	37.0	11.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.2	57.7
24-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	9.0	58.1	124.4	143.5	122.4	68.3	13.4	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	22.5	143.5
25-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	8.3	53.0	102.7	124.9	109.6	62.3	10.7	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	19.7	124.9
26-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	12.0	53.6	97.7	118.4	104.0	58.9	11.6	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	19.0	118.4
27-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	12.8	58.7	106.1	123.7	82.8	65.0	14.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	19.3	123.7
28-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	4.0	12.0	22.0	29.4	16.8	8.0	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.9	29.4
29-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	12.1	55.6	102.5	124.4	110.7	64.8	14.4	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.2	124.4
30-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	31.9	126.4	187.8	200.0	169.5	96.9	14.3	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	34.5	200.0
31-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	12.7	61.0	81.0	131.8	53.5	43.9	13.2	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	16.6	131.8
																								Diurnal Average		
																								Diurnal Maximum		





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Global Radiation (GR) - W/m2
Fort Chipewyan - December 2023

Concentration Ranges (W/m2)	Number of Hours	%	Cumulative %
0 - 20	592	79.57	79.57
21 - 100	104	13.98	93.55
101 - 300	48	6.45	100.00
301 - 600	0	0.00	100.00
601 - 900	0	0.00	100.00
> 900	0	0.00	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Maximum Speed: 38 km/h on Dec 20 01:00		Maximum Daily Speed Average: 21.7 km/h on Dec 23		Hours in Service: 744																						
Minimum Speed Value: 0 km/h on Dec 2 16:00		Minimum Daily Speed Average: 1.2 km/h on Dec 17		Hours of Data: 740																						
Maximum Diurnal Speed Average: 4.1 km/h at hour 13		Minimum Diurnal Speed Average: 0.3 km/h at hour 1		Hours of Missing Data: 4																						
Monthly Average Velocity: 1.5 km/h 202.1 deg		Percentiles: P ₁ = 1 P ₁₀ = 5 Q ₁ = 8 Median = 12 Q ₃ = 18 P ₉₀ = 24 P ₉₉ = 33		Percent Operational Time: 99.5																						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Dec	W5	NW3	W3	ESE1	ENE4	ESE4	E4	E7	ESE8	SE12	ESE12	SE12	SE11	E12	E10	E8	E7	E10	E10	E9	E10	E10	E11	E11	ESE6.7	ESE12
2-Dec	E9	E9	E7	E8	E6	ESE5	ESE3	E5	E3	E2	E1	UO	W1	W0	WNW0	W0	W0	WNW0	UO	UO	UO	WNW1	W4	W4	E2.4	E9
3-Dec	WNW4	WNW5	WNW4	W5	WSW5	WSW5	WSW4	SW5	WSW4	SW3	SSW2	S4	SSE5	SE6	ESE8	E9	E12	E12	E13	ENE13	ENE16	ENE17	ENE14	ENE10	E3.6	ENE17
4-Dec	E16	E14	E15	E13	E11	E11	E7	E6	ESE6	SW6	WSW7	W9	W8	W9	W6	WSW6	W5	WNW4	W2	WSW3	NNW3	ENE4	E8	E10	E2.3	E16
5-Dec	E12	E12	ENE14	E13	E12	E19	E18	E18	ENE17	E18	E13	SE10	S14	S15	SSW13	SSW11	SW10	SSW9	SSW8	SSW9	SW9	WSW6	WSW10	SW7	SE6.0	E19
6-Dec	WSW11	WSW12	WSW10	WSW12	WSW11	W17	W18	W20	W22	W16	W14	W16	W14	W14	WSW12	W11	WSW10	WSW9	SW10	SW11	WSW9	W16	W14	W11	W13.1	W22
7-Dec	WNW12	WNW14	W9	W14	WNW15	W10	SW9	WSW9	WSW10	W9	W11	WNW13	WNW11	WNW9	NW7	NNW11	NNW11	NW6	WNW4	WNW5	NW4	NW5	WNW8	WNW9	WNW8.5	WNW15
8-Dec	W8	WNW8	WNW8	WNW7	WNW8	WNW5	W3	WSW6	W5	WNW5	WSW5	WSW6	WSW8	WSW8	W6	WSW6	WSW6	WSW7	W5	SW4	W4	WSW6	W7	W10	W5.8	W10
9-Dec	W8	WNW9	WNW10	WNW11	WNW6	WSW5	SSW2	ENE4	ENE4	ENE5	ENE4	ENE7	ENE5	E9	E9	E9	E9	E11	E13	E16	E17	E15	E13	E15	ENE4.9	E17
10-Dec	E15	E16	E15	E14	E10	SSE23	SSE26	S22	S19	S24	SSW20	SW20	W28	W27	W25	W30	WNW33	WNW28	WNW31	WNW33	WNW32	WNW29	WNW27	WNW27	W11.4	WNW33
11-Dec	WNW26	WNW22	NW25	NW26	NW26	WNW23	WNW24	WNW22	WNW21	W17	WNW18	WNW18	W11	WSW10	WSW12	WSW9	SW5	ENE8	E9	E12	E14	E16	E15	E13	WNW9.4	NW26
12-Dec	E15	E14	E13	E14	E15	E16	E18	ESE15	E16	E18	E20	E21	ESE17	SSE16	SSE17	SSE15	S24	S25	S22	S16	S15	SSW13	SSW15	SW13	SE11.3	S25
13-Dec	SW9	SSW10	SSE6	S6	SSW7	SSW10	SSE6	SSW13	SSW12	SW12	SW12	SSW15	SSW16	SSW19	SW23	SW18	SW18	WSW19	W19	W18	W19	W17	W16	W23	SW12.6	SW23
14-Dec	W22	W23	W19	WSW20	WSW20	W25	W21	W24	W26	W24	W29	W27	W24	W20	W18	WNW13	WNW9	NW9	WNW6	WNW4	N8	NE6	E11	E19	W14.0	W29
15-Dec	E23	E26	E22	E20	E13	SE8	SE8	S11	SSE10	SE9	S12	S14	SSW28	SSW22	SSW21	S31	S29	SSW22	SSW25	SSW26	SSW22	SW16	WSW11	W18	S12.1	S31
16-Dec	W23	W23	W20	WNW26	NW31	NW32	NW27	NW27	NW19	NW18	NW17	WNW20	NW16	WNW15	WNW13	WNW10	WNW11	WNW9	NW7	WNW6	WNW6	NW6	WNW7	WNW10	WNW16.2	NW32
17-Dec	WNW10	WNW12	WNW12	W12	W9	WNW10	W6	SSW6	SSW6	SSW14	S13	SSW12	SSW11	WSW10	W8	SW3	ESE4	E5	ENE10	E14	E19	E19	E19	E15	S1.2	E19
18-Dec	E13	ESE9	SSE5	SSW6	SW13	W12	W12	W21	W24	W24	W27	W24	W25	WNW20	W18	NW21	NW21	NNW19	NW17	NNW19	NW16	NNW13	NNW11	NNW9	WNW12.4	W27
19-Dec	NNW7	NNW7	NNW7	NW6	NW6	NNE5	NE4	NE4	ESE3	ESE10	E14	E14	E15	E17	ESE20	E24	E27	E27	E29	E29	E31	E33	E34	E36	E14.5	E36
20-Dec	E38	E36	E31	E29	ESE28	ESE26	SE23	SE21	SE17	SE17	SE16	SE14	SSE15	SSE13	SE13	SSE16	SSE19	SE16	SSE18	SSE15	S19	SSW19	SW18	WSW15	SE16.5	E38
21-Dec	W25	W23	W20	W19	W17	WNW18	WNW15	W14	WNW12	E4	E7	E6	ENE8	E10	E11	ESE11	ESE12	ESE11	S15	SSW16	SSW17	SW16	SW13	SW11	WSW5.6	W25
22-Dec	SW13	SW13	SW12	S6	SE6	ESE5	ESE8	ESE8	E11	ESE15	ESE13	ESE11	SE12	ESE11	E15	E15	E14	E13	E9	E10	E11	E11	ESE2	SW7	ESE7.4	E15
23-Dec	SW9	W27	W33	W34	W35	W35	W29	WNW22	WNW15	W22	W20	W20	W23	W23	W25	W24	WNW23	WNW22	WNW18	WNW17	WNW18	WNW16	W11	WNW10	W21.7	W35
24-Dec	W9	W9	WSW3	SSE2	E7	E9	E10	E9	ESE10	E12	E15	E15	E18	E15	E13	E15	E14	E16	E18	E21	E19	E18	E19	E19	E11.0	E21
25-Dec	ENE20	E22	E17	E18	E18	E21	E19	E14	E16	E13	E10	E7	E9	E11	E9	S8	SSW12	S8	SSE7	E7	ESE10	E11	E14	E16	E11.6	E22
26-Dec	E16	ESE16	SE18	ESE18	ESE23	E19	E10	ESE10	ESE12	SE13	SE15	SSE19	SSE16	SE14	SSE13	SE12	SSE11	SSE11	SSE8	S9	SSW8	S10	SSW11	SW21	SE11.7	ESE23
27-Dec	SW23	WSW26	SW25	SW24	SW16	WSW17	WSW20	WSW17	WSW12	SW12	WSW15	WSW18	WSW22	W16	W12	W12	WSW13	SW10	WSW6	NNW2	ENE4	ENE5	ENE5	NE4	WSW12.2	WSW26
28-Dec	N9	NNE9	NE11	NE12	NE13	NNE10	N7	NE9	NNE9	NNW9	N8	NE10	NE11	NE12	ENE11	ENE11	NE10	NNW6	N5	ENE4	E6	NE5	ENE5	E13	NE7.9	E13
29-Dec	E12	E16	E17	E18	E14	E15	E17	E21	E24	E19	ESE12	E11	E7	ENE3	SE2	SW7	W6	W7	W7	WNW5	W4	W5	ENE3	ENE6	E7.4	E24
30-Dec	E6	E7	E8	E10	E11	E16	E20	E23	E23	E23	E26	E28	E25	E25	E26	E21	E23	E22	ESE15	S15	SSW21	SSW21	SSW16	SSW10	E14.1	E28
31-Dec	SSW10	S11	SSW12	SSW11	S8	SSW9	SSW12	SW13	SW11	SW16	SW12	SW10	SW10	WSW10	W10	WNW10	NW7	WNW5	WNW10	NW15	NW17	NW17	NW14	NW14	WSW7.4	NW17
WNW0.3WNW1.0 SW0.8WSW0.7 W0.5WSW1.0SSW1.2SSW2.0SSW1.6 S2.9SSW2.8SSW3.5 SW4.1 SW3.1SSW3.0SSW2.8SSW2.2 S1.6 S2.1 S1.6 SSE1.3 SE0.8 SE0.4 N0.3																								Diurnal Average		
E38 E36 W33 W34 W35 W35 W29 NW27 W26 W24 W29 E28 W28 W27 E26 S31WNW33WNW28WNW31WNW33WNW32 E33 E34 E36																								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

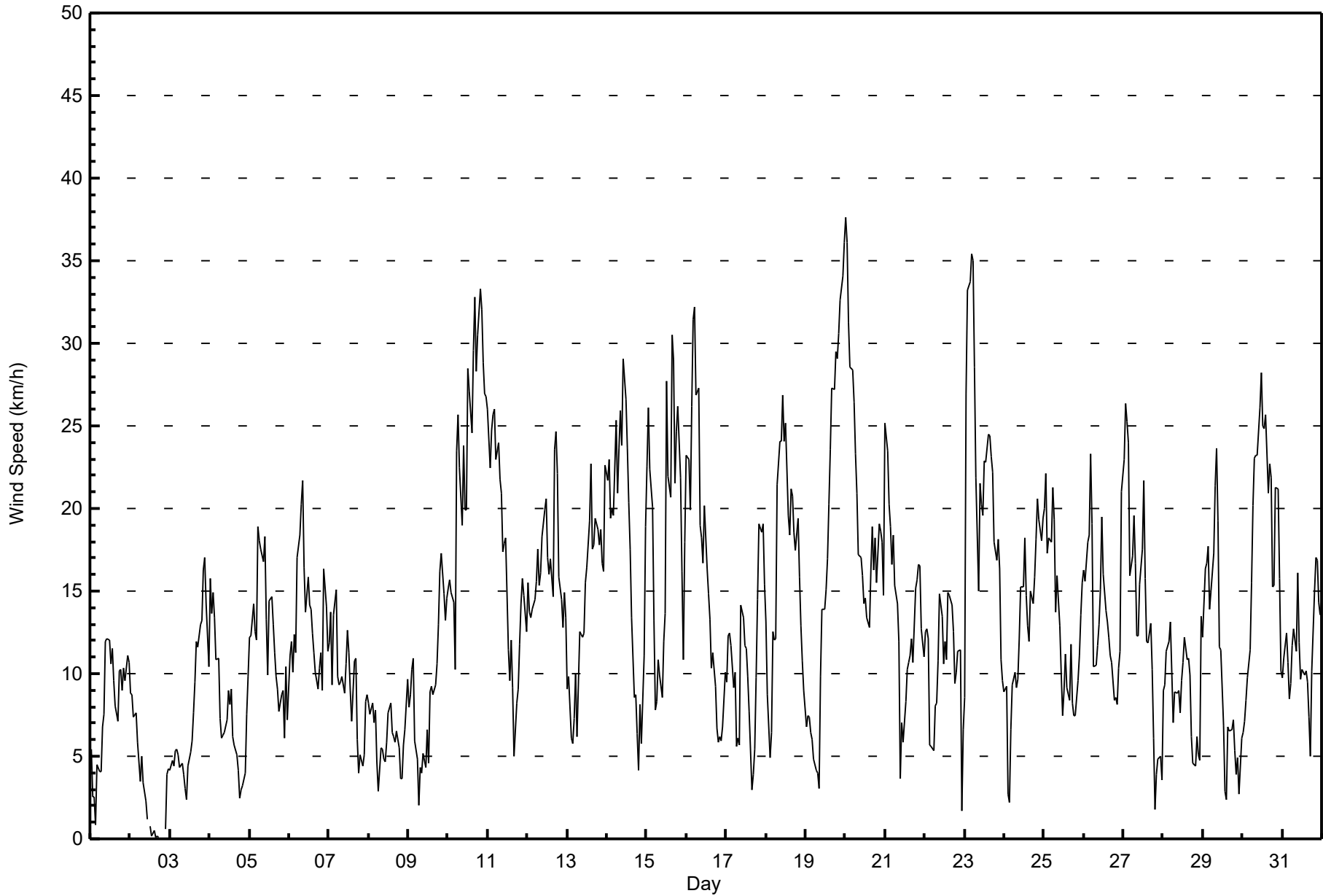
Wind Speed (WS) - km/h
Fort Chipewyan - December 2023

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 10 km/h on Dec 16 05:00 Minimum Value: 0 km/h on Dec 2 16:00 Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 2 Median = 2 Q ₃ = 3 P ₉₀ = 5 P ₉₉ = 8																		Hours in Service: 744 Hours of Data: 740 Hours of Missing Data: 4 Hours of Calibration: 0 Percent Operational Time: 99.5								
Day	Hourly Period Ending At (MST)																								Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Dec	1	2	2	1	1	1	1	1	2	2	2	2	1	2	1	1	1	1	1	2	2	1	2	2	2	2
2-Dec	1	1	1	1	1	1	1	1	1	1	1	UO	1	0	1	0	0	0	UO	UO	UO	1	1	1	1	1
3-Dec	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	3	2	3	3
4-Dec	2	2	1	2	1	1	2	1	1	2	2	2	2	2	2	1	1	1	1	1	1	1	1	2	2	2
5-Dec	1	2	2	2	3	2	2	2	2	3	2	2	3	2	2	2	2	2	1	1	2	2	2	1	3	3
6-Dec	2	2	2	3	3	4	4	5	5	4	2	3	3	3	2	3	2	2	4	2	2	4	3	3	5	5
7-Dec	3	3	2	3	3	4	2	3	3	3	2	2	3	2	2	3	3	1	1	2	2	2	2	1	4	4
8-Dec	2	1	2	1	1	1	1	2	1	1	1	2	2	2	2	2	2	2	2	1	2	3	1	4	4	4
9-Dec	2	2	2	2	3	2	2	1	2	1	1	1	2	1	1	1	1	1	1	3	2	1	1	1	3	3
10-Dec	1	2	1	2	3	4	4	4	4	3	3	5	7	7	6	7	9	6	7	7	8	8	8	7	9	9
11-Dec	7	7	7	7	7	7	5	5	4	4	4	4	3	3	2	2	2	2	1	2	1	1	1	1	7	7
12-Dec	1	2	1	2	3	2	3	2	1	2	2	2	2	3	3	3	4	3	3	3	3	2	3	2	4	4
13-Dec	1	3	1	1	4	3	1	2	2	2	2	2	3	3	3	5	4	4	4	4	4	5	6	6	6	
14-Dec	5	5	5	5	5	7	5	6	6	6	7	6	7	5	5	3	2	2	2	1	2	2	3	2	7	7
15-Dec	2	2	3	3	2	1	1	3	2	2	3	3	5	4	3	5	5	4	4	5	3	3	4	5	5	5
16-Dec	6	6	6	7	10	9	8	8	6	6	5	5	5	4	4	3	3	3	2	1	2	2	2	3	10	10
17-Dec	2	3	3	3	3	2	2	2	4	2	2	2	2	2	3	2	1	1	2	2	2	3	3	2	4	4
18-Dec	3	2	1	2	2	2	3	6	6	6	6	6	6	5	4	7	7	6	6	8	6	5	4	4	8	8
19-Dec	2	3	3	2	2	2	2	2	3	4	3	3	3	2	2	3	2	2	2	2	2	2	3	3	4	4
20-Dec	3	3	2	3	2	2	2	3	2	2	2	2	3	4	2	3	3	2	3	3	4	4	3	4	4	4
21-Dec	6	5	5	4	4	4	3	2	3	2	2	3	1	1	2	1	1	3	4	4	3	2	2	2	6	6
22-Dec	2	2	1	2	2	2	2	2	1	2	2	1	2	2	2	3	2	2	4	2	2	3	3	1	4	4
23-Dec	4	9	8	8	9	9	8	7	4	5	5	5	6	6	6	6	6	6	4	3	3	3	2	2	9	9
24-Dec	1	1	3	1	1	1	1	1	2	2	2	3	1	1	1	2	2	1	1	2	2	2	2	1	3	3
25-Dec	2	2	3	3	2	2	4	2	2	2	1	2	1	1	1	2	2	2	3	1	2	2	2	2	4	4
26-Dec	4	2	4	2	2	2	2	3	2	3	4	4	3	3	2	2	2	2	2	2	2	3	2	5	5	5
27-Dec	5	7	6	4	6	5	4	3	6	5	3	4	5	4	3	2	2	2	2	2	2	1	1	1	7	7
28-Dec	1	2	4	2	1	3	2	2	2	2	2	2	3	3	4	2	3	3	3	2	2	1	3	1	4	4
29-Dec	2	2	1	2	2	2	2	2	2	3	1	1	2	1	1	2	2	1	1	1	2	1	1	1	3	3
30-Dec	1	1	1	2	1	2	2	2	2	2	3	3	3	3	2	3	3	3	3	3	3	5	4	3	5	5
31-Dec	2	2	3	3	2	2	2	2	3	3	2	1	2	2	2	2	2	2	2	4	5	5	5	5	5	5
Diurnal Maximum																										
UO - Unstable Operation																										



Wood Buffalo Environmental Association
Hourly Averages

Wind Speed (WS) - km/h
Fort Chipewyan - December 2023





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Wind Speed (WS) - km/h
Fort Chipewyan - December 2023

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	91	12.30	12.30
6 - 11	246	33.24	45.54
12 - 19	258	34.86	80.41
20 - 28	119	16.08	96.49
29 - 38	26	3.51	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 740

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Wind Speed (WS) - km/h
Fort Chipewyan - December 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	1	1	4	14	7	8	1	3	1	2	4	9	17	14	3	2	91
6 - 11	4	3	6	8	60	14	7	7	9	18	15	26	26	26	8	9	246
12 - 19	0	0	3	7	89	14	11	14	11	17	18	13	27	20	11	3	258
20 - 28	0	0	0	1	25	5	2	2	5	10	6	5	36	15	7	0	119
29 - 38	0	0	0	0	10	0	0	0	2	0	0	0	7	5	2	0	26
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	5	4	13	30	191	41	21	26	28	47	43	53	113	80	31	14	740

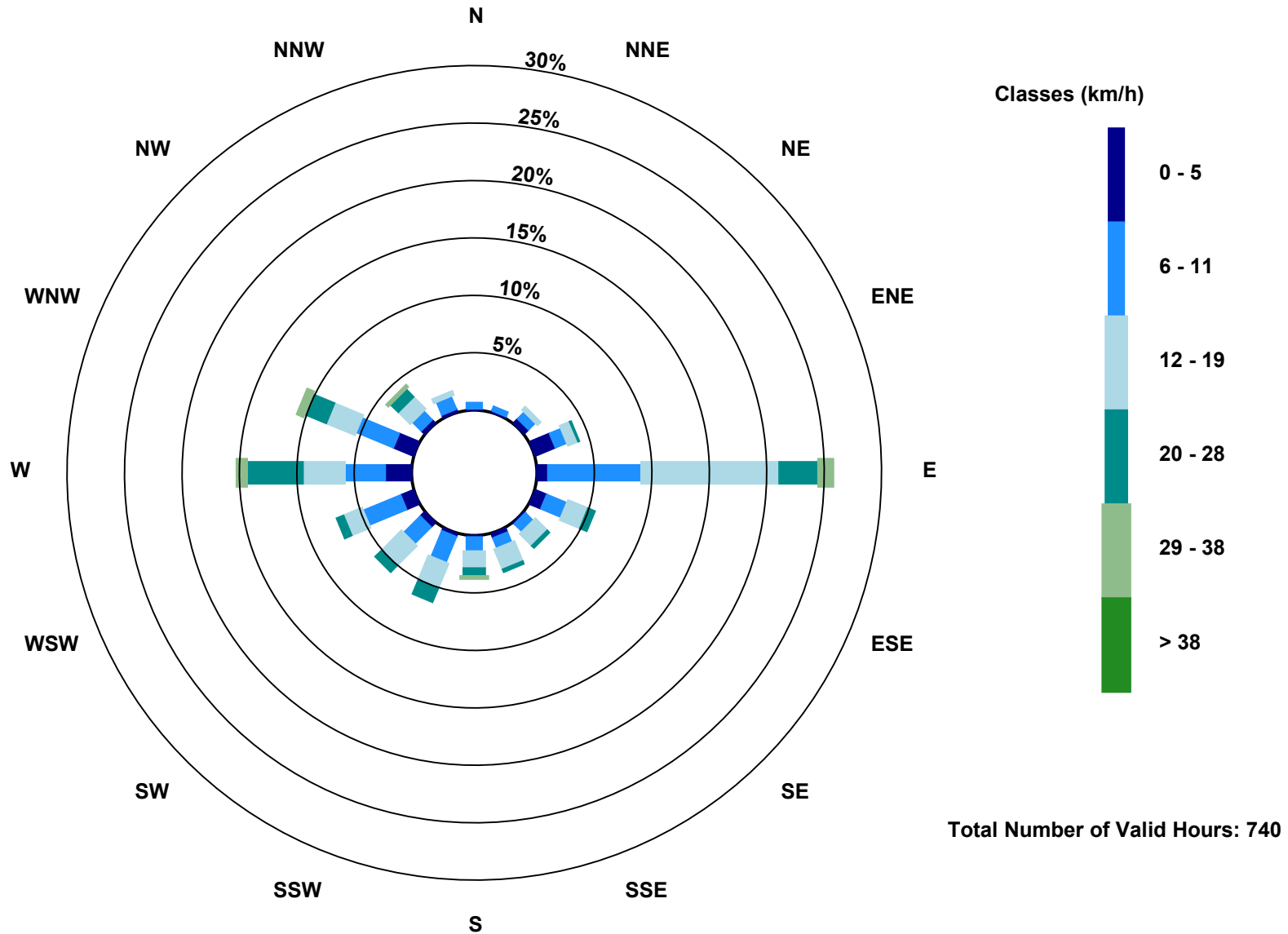
Total Number of Valid Hours: 740

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Dec 2023

Wind Speed (WS) - km/h
Fort Chipewyan





Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
Fort Chipewyan - December 2023

Direction of Maximum Speed: 85 deg on Dec 20 01:00	Hours in Service: 744
Direction of Maximum Daily Speed Average: 277.6 deg on Dec 23	Hours of Data: 740
Direction of Minimum Speed: 267 deg on Dec 2 16:00	Hours of Missing Data: 4
Direction of Minimum Daily Speed Average: 1.2 deg on Dec 17	Percent Operational Time: 99.5
Monthly Average Direction: 202.1 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-Dec	272	304	265	119	78	110	90	86	115	140	123	135	139	98	89	85	88	87	90	88	90	90	87	86	101.6
2-Dec	93	91	92	89	94	103	105	90	84	90	89	UO	272	273	285	267	279	290	UO	UO	UO	282	276	280	91.7
3-Dec	283	282	286	261	256	253	244	236	240	234	207	170	149	129	106	101	90	83	80	75	78	77	72	75	93.8
4-Dec	81	84	87	84	90	88	87	89	103	216	254	267	271	278	263	250	266	283	281	258	341	75	97	91	90.2
5-Dec	85	84	78	79	79	80	81	80	77	85	97	136	179	189	204	212	214	211	197	203	216	240	242	229	126.4
6-Dec	246	250	245	257	257	266	271	269	268	266	263	262	261	259	257	261	253	258	224	228	252	277	278	281	260.6
7-Dec	286	285	274	280	286	263	232	248	247	265	273	289	290	301	324	331	330	320	296	290	306	317	296	286	286.3
8-Dec	281	288	300	292	293	294	270	247	281	282	255	256	248	248	269	255	241	248	273	224	272	237	276	280	268.7
9-Dec	267	285	282	296	289	244	207	70	67	61	64	70	73	79	84	95	94	98	82	86	84	87	93	85	78.3
10-Dec	84	100	97	96	99	165	163	174	183	184	203	233	269	277	273	273	291	292	286	291	292	297	299	300	259.8
11-Dec	299	301	304	307	307	302	288	287	288	277	287	286	277	248	245	240	216	75	82	83	82	80	79	82	299.6
12-Dec	82	80	79	79	80	81	89	110	101	96	93	101	118	153	161	164	177	184	182	188	188	200	211	222	133.7
13-Dec	224	211	164	175	198	209	159	213	211	222	231	212	209	211	214	222	236	253	263	268	267	263	267	268	232.4
14-Dec	265	265	262	257	252	265	262	264	266	264	268	274	273	272	278	298	300	324	297	302	4	46	86	83	272.4
15-Dec	85	82	84	89	99	125	136	190	165	130	184	178	199	193	192	188	186	195	201	203	208	220	241	261	175.2
16-Dec	272	274	271	287	312	317	311	310	309	310	305	288	305	299	291	296	294	302	309	297	301	317	287	303	298.8
17-Dec	298	302	287	281	278	289	276	204	201	211	187	201	211	253	268	232	102	98	77	84	87	79	84	84	189.3
18-Dec	99	103	148	197	230	259	266	275	275	277	274	279	276	282	281	311	325	328	325	329	325	329	328	343	293.0
19-Dec	330	341	327	321	310	12	36	43	117	105	99	101	98	97	107	101	98	94	95	92	90	89	88	87	88.4
20-Dec	85	87	93	96	116	123	128	131	131	132	138	146	147	154	140	149	151	138	155	161	178	195	214	248	132.0
21-Dec	278	278	280	278	279	283	284	275	285	83	81	86	77	83	95	104	111	123	172	204	202	215	223	231	245.8
22-Dec	229	229	215	178	129	120	108	106	101	115	107	121	124	110	92	92	98	98	92	90	88	90	105	233	116.7
23-Dec	236	269	267	270	271	272	277	285	284	275	276	278	274	277	272	281	291	294	290	288	288	285	279	302	277.6
24-Dec	265	276	257	150	84	81	91	99	107	99	90	94	84	85	79	82	85	88	83	79	80	82	80	80	85.6
25-Dec	78	80	80	83	86	83	81	82	85	89	91	92	83	87	98	178	201	179	167	99	102	94	89	95	93.3
26-Dec	101	112	139	122	104	99	100	120	107	135	144	155	153	146	148	146	149	158	152	185	205	175	200	216	140.7
27-Dec	225	244	235	228	232	248	238	242	245	236	249	251	252	266	259	260	242	232	243	330	68	71	65	53	242.7
28-Dec	2	12	40	44	52	17	1	42	12	339	357	53	40	47	66	69	55	347	350	64	83	43	61	83	38.1
29-Dec	83	82	84	91	94	89	88	91	83	94	106	94	95	72	130	214	263	263	270	288	264	277	60	78	90.5
30-Dec	85	82	86	87	82	84	80	82	85	83	86	85	83	83	85	88	90	93	113	172	195	203	207	206	99.4
31-Dec	204	186	195	198	190	201	209	216	215	219	216	221	235	237	260	291	320	287	288	307	316	317	319	323	249.6

286.6 294.3 235.6 248.3 277.7 246.7 195.3 208.3 193.5 182.5 194.2 203.8 216.3 214.6 204.3 205.8 191.3 178.7 180.9 184.3 158.3 145.2 143.0 7.9
 Diurnal Average

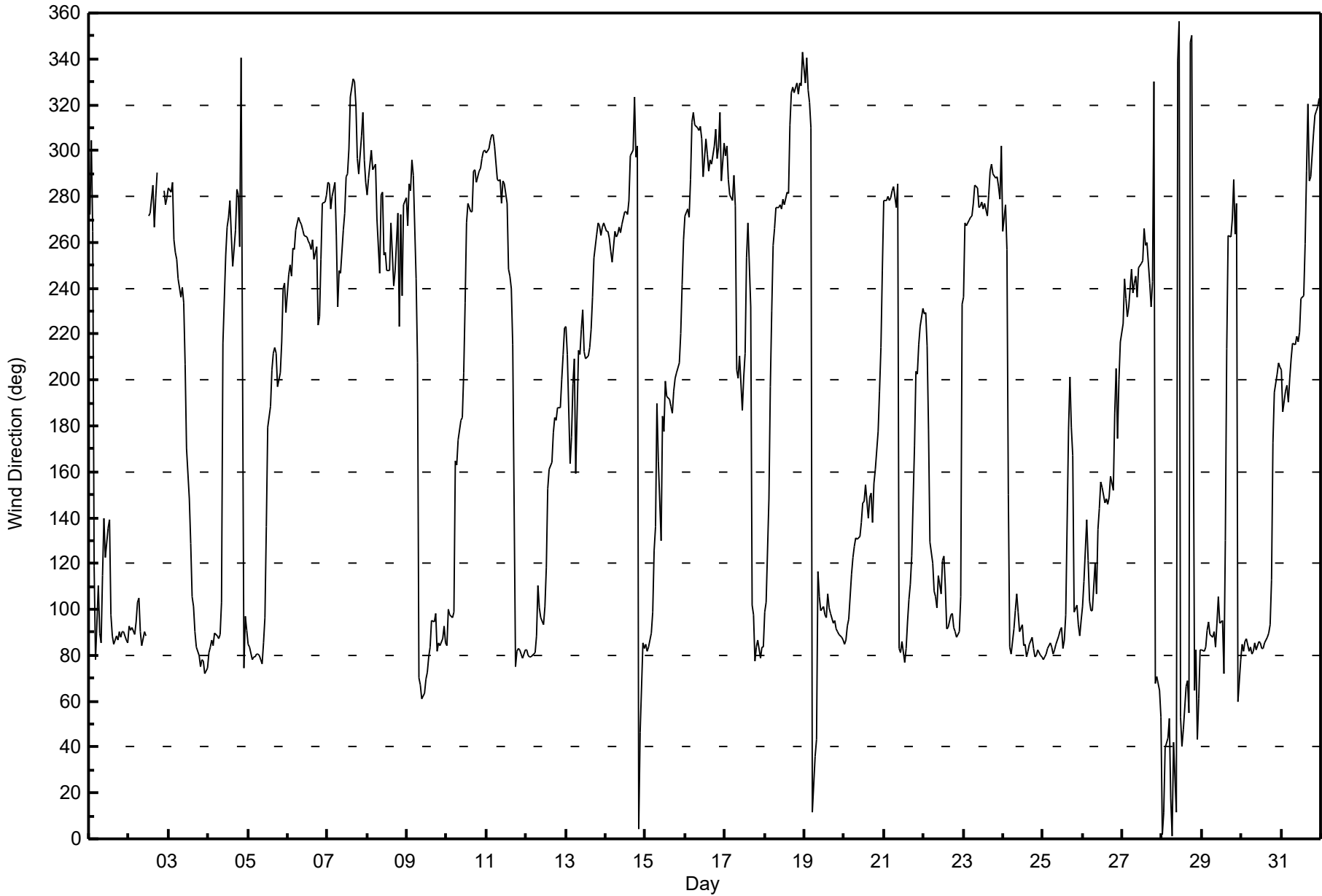
UO - Unstable Operation
 All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Direction (WD) - deg
Fort Chipewyan - December 2023

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 97 deg on Dec 22 23:00 Minimum Value: 3 deg on Dec 12 00:00 Percentiles: P ₁ = 4 P ₁₀ = 5 Q ₁ = 8 Median = 13 Q ₃ = 17 P ₉₀ = 24 P ₉₉ = 62																		Hours in Service: 744 Hours of Data: 740 Hours of Missing Data: 4 Hours of Calibration: 0 Percent Operational Time: 99.5							
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Dec	15	63	68	74	24	40	21	9	23	7	8	15	17	7	11	8	5	4	5	14	8	5	5	5	74
2-Dec	7	4	3	4	5	11	17	8	8	12	37	UO	12	11	11	36	10	20	UO	UO	UO	9	16	16	37
3-Dec	16	15	18	14	15	14	17	17	14	14	17	12	18	10	8	5	5	6	4	5	5	6	8	7	18
4-Dec	5	6	7	6	5	5	8	8	14	26	17	14	16	16	20	15	22	25	49	21	52	20	9	5	52
5-Dec	6	7	6	6	8	5	5	5	6	8	9	32	15	8	8	9	10	13	8	13	13	25	10	9	32
6-Dec	11	12	12	13	12	12	13	14	14	13	12	13	13	13	14	14	13	14	14	8	25	12	13	16	25
7-Dec	14	13	16	14	13	28	12	17	16	16	14	12	12	14	24	18	18	19	43	18	36	35	13	12	43
8-Dec	12	12	15	12	12	17	43	24	15	17	23	18	18	15	20	21	29	22	26	24	36	25	15	17	43
9-Dec	16	13	12	15	18	29	77	12	19	15	13	8	18	8	5	10	9	11	6	6	5	4	5	4	77
10-Dec	6	6	6	7	25	9	10	10	11	11	11	22	14	15	14	14	14	14	14	13	14	16	16	16	25
11-Dec	15	16	16	16	16	16	14	13	14	14	14	14	15	20	14	12	40	10	5	5	4	3	3	3	40
12-Dec	4	4	5	4	6	4	9	8	6	6	7	5	7	18	9	11	9	8	9	9	11	10	11	10	18
13-Dec	10	17	23	25	36	17	23	10	9	15	12	9	8	8	8	11	12	15	14	16	15	16	15	15	36
14-Dec	15	15	15	16	14	15	15	15	15	15	14	14	15	14	15	15	18	19	16	23	19	24	12	3	24
15-Dec	5	5	6	7	11	18	14	22	23	24	12	14	9	9	8	8	8	9	9	11	10	10	16	16	24
16-Dec	15	15	16	18	21	18	16	18	17	18	18	15	19	17	16	15	16	19	21	22	22	23	15	17	23
17-Dec	16	15	14	16	17	14	17	19	62	10	10	12	12	17	17	64	38	26	8	8	6	9	8	7	64
18-Dec	12	9	27	25	10	14	14	14	14	14	14	15	15	15	14	19	22	22	22	24	24	26	27	27	27
19-Dec	26	26	25	23	21	35	47	26	62	23	23	14	12	10	12	7	5	5	4	4	4	4	5	5	62
20-Dec	4	4	4	6	8	5	7	7	8	8	10	12	12	16	11	11	11	12	11	11	11	11	12	17	17
21-Dec	15	14	14	13	14	13	12	13	13	62	33	49	6	7	15	11	11	37	15	13	9	8	10	11	62
22-Dec	10	12	9	45	27	23	20	20	18	10	11	12	10	22	4	5	5	7	29	11	11	11	97	22	97
23-Dec	31	15	15	14	15	15	15	15	14	14	14	15	18	15	14	16	15	14	13	12	13	13	20	31	31
24-Dec	9	14	58	48	11	6	7	7	15	16	9	14	4	5	7	11	6	5	6	4	5	5	6	4	58
25-Dec	6	6	7	5	7	5	7	6	5	5	5	8	6	9	12	30	11	15	33	18	9	8	9	12	33
26-Dec	17	9	15	13	7	5	14	23	14	16	20	13	13	13	11	13	12	13	15	19	22	20	21	9	23
27-Dec	15	15	13	9	15	17	13	14	21	17	15	16	15	16	15	13	12	16	38	91	38	18	12	25	91
28-Dec	11	23	15	17	6	24	23	12	30	19	26	12	18	11	16	11	18	26	39	36	12	24	30	6	39
29-Dec	5	5	5	5	6	7	5	5	6	9	8	4	6	29	34	16	25	16	18	18	16	23	43	9	43
30-Dec	8	7	5	10	6	6	6	5	6	5	6	6	7	7	6	7	9	6	13	16	12	9	8	11	16
31-Dec	12	10	11	11	14	16	11	9	15	8	9	16	12	18	17	11	17	28	13	15	16	19	22	22	28
Diurnal Maximum																									
31 63 68 74 36 40 77 26 62 62 37 49 19 29 34 64 40 37 49 91 52 35 97 27																									
UO - Unstable Operation																									





WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

AMS09 BARGE LANDING DECEMBER 2023

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

January 31, 2024

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - BARGE LANDING (AMS09)

DECEMBER 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	710	34	34	100	7.4	0	3.6	0
TRS(ppb) Average	709	35	35	100	3.6	0	1.8	0
THC(ppm) Average	710	34	34	100	3.8	-	2.7	-
NMHC(ppm) Average	710	34	34	100	0.323	-	0.068	-
CH4(ppm) Average	710	34	34	100	3.5	-	2.6	-
NO2 (ppb) Average	708	36	36	100	37.9	0	24.8	-
NO (ppb) Average	708	36	36	100	84.7	-	30.7	-
NOX (ppb) Average	708	36	36	100	122.6	-	49.9	-
PM2.5(ug/m3) Average	743	1	1	100	36.8	0	22.1	0
Temperature (C) Average	744	0	0	100	6.4	-	2.2	-
Relative Humidity (%) Average	744	0	0	100	95.7	-	92.4	-
Barometric Pressure (inHg) Average	744	0	0	100	29.2	-	29.1	-
Wind Speed 20 m (km/h) Average	744	0	0	100	27	-	17	-
Wind Direction 20 m (deg) Average	744	0	0	100	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - BARGE LANDING (AMS09)
DECEMBER 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	710	0.96	1.3	-	0	0	0.1	0.4	1.3	2.7	7.4
TRS(ppb) Average	709	0.85	0.7	-	0.2	0.3	0.3	0.5	1.3	1.9	3.6
THC(ppm) Average	710	2.2	0.3	-	1.9	1.9	2	2.1	2.3	2.5	3.8
NMHC(ppm) Average	710	0.011	0.037	-	0	0	0	0	0	0	0.323
CH4(ppm) Average	710	2.18	0.3	-	1.9	1.9	2	2.1	2.3	2.5	3.5
NO2 (ppb) Average	708	14.47	8.6	-	0.2	1	7.9	15.4	20.5	25.6	37.9
NO (ppb) Average	708	8.5	14	-	0	0	0.2	2.4	10.1	26.7	84.7
NOX (ppb) Average	708	22.97	19.8	-	0.2	1.1	8.7	18.9	31.5	48.9	122.6
PM2.5(ug/m3) Average	743	7.81	6	-	0.4	1.6	3.3	6.4	10.8	15.8	36.8
Temperature (C) Average	744	-6.46	5.4	-	-18.3	-13.2	-10.8	-7	-2.4	1.1	6.4
Relative Humidity (%) Average	744	77.67	12.1	-	40.5	59.1	70.9	81.8	86.5	89.8	95.7
Barometric Pressure (inHg) Average	744	28.78	0.2	-	28.3	28.5	28.6	28.8	28.9	29.1	29.2
Wind Speed 20 m (km/h) Average	744	10.3	4	-	0	5	7	10	13	16	27
Wind Direction 20 m (deg) Average	744	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - BARGE LANDING (AMS09)
DECEMBER 2023

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
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No operational issues to note.



Wood Buffalo Environmental Association

Summary of Hour Averages

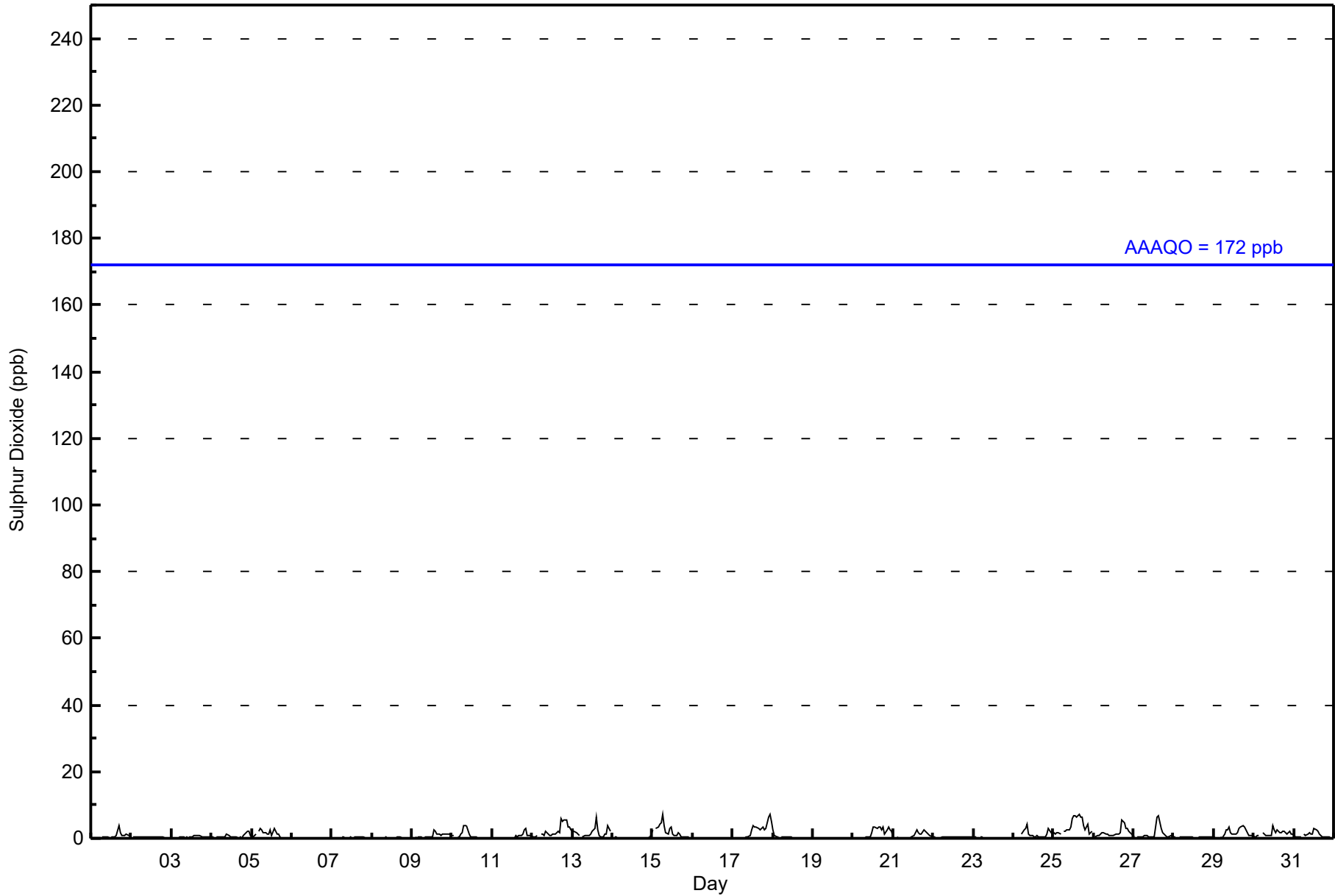
Sulphur Dioxide (SO₂) - ppb Barge Landing - December 2023

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 7.4 ppb on Dec 17 23:00 Maximum Daily Average: 3.6 ppb on Dec 25		Hours in Service: 744 Hours of Data: 710 Hours of Missing Data: 34 Hours of Calibration: 34 Percent Operational Time: 100.0																									
Minimum Value: 0.0 ppb on Dec 1 02:00 Maximum Diurnal Average: 1.5 ppb at hour 15 Monthly Average: 0.96 ppb		Minimum Daily Average: 0.0 ppb on Dec 19 Minimum Diurnal Average: 0.4 ppb at hour 2 Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.1 Median = 0.4 Q ₃ = 1.3 P ₉₀ = 2.7 P ₉₉ = 6.5																									
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Dec	0.1	0.0	0.0	0.1	0.1	Z	0.3	0.4	0.5	0.3	0.2	0.2	0.4	0.3	0.3	1.0	3.6	1.5	0.8	0.9	1.1	1.3	0.7	0.7	0.6	3.6	
2-Dec	Z	0.6	0.5	0.3	0.4	0.3	0.3	0.4	0.4	0.3	0.3	0.4	0.5	0.6	0.5	0.4	0.3	0.3	0.2	0.2	0.2	0.2	0.1	0.1	0.3	0.6	
3-Dec	0.2	Z	0.2	0.2	0.1	0.2	0.2	0.3	0.2	0.3	0.2	0.3	0.3	0.7	0.7	0.7	0.7	0.4	0.5	0.4	0.3	0.4	0.3	0.4	0.7	0.7	
4-Dec	0.3	0.3	Z	0.4	0.3	0.3	0.3	0.4	0.4	1.1	0.8	0.5	0.5	0.4	0.3	0.2	0.2	0.3	0.2	0.7	1.1	2.3	2.0	0.9	0.6	2.3	
5-Dec	0.4	0.3	1.3	Z	2.0	3.0	2.5	1.7	1.5	1.2	1.1	2.3	0.8	3.0	2.1	1.3	1.3	0.4	0.1	0.1	0.0	0.0	0.0	0.0	1.2	3.0	
6-Dec	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	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.1	
7-Dec	0.0	0.0	0.1	0.1	0.1	Z	0.2	0.3	0.1	0.1	0.1	0.2	0.1	0.1	0.2	0.4	0.4	0.3	0.3	0.2	0.1	0.1	0.2	0.1	0.2	0.4	
8-Dec	Z	0.1	0.1	0.0	0.1	0.1	0.2	0.1	0.2	0.0	C	C	C	0.2	0.1	0.3	0.6	0.3	0.1	0.1	0.1	0.0	0.0	0.1	0.1	0.6	
9-Dec	0.2	Z	0.2	0.2	0.2	0.3	0.2	0.2	0.3	0.3	0.6	0.5	0.5	2.6	2.1	1.4	1.2	0.7	1.2	1.4	1.2	1.1	1.3	1.0	0.8	2.6	
10-Dec	0.7	1.0	Z	0.6	0.6	1.2	1.8	3.7	3.6	2.5	1.1	0.5	0.4	0.3	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.0	0.8	3.7	
11-Dec	0.0	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	0.8	0.3	0.7	0.7	1.3	2.4	2.9	1.0	1.0	0.9	0.5	2.9	
12-Dec	0.6	0.4	0.6	1.0	Z	1.4	1.2	1.0	2.2	1.7	1.0	0.9	1.3	1.4	1.1	2.2	1.8	6.0	5.2	5.4	5.7	3.2	3.4	2.6	2.2	6.0	
13-Dec	2.0	2.0	1.7	1.4	0.9	Z	0.6	0.8	0.8	0.7	0.7	1.4	2.2	2.8	6.5	2.4	0.9	0.5	0.5	1.1	1.4	3.6	3.1	2.1	1.7	6.5	
14-Dec	Z	0.6	0.2	0.1	0.2	0.1	0.1	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.2	0.1	0.1	0.3	1.4	0.2	1.4	
15-Dec	2.7	Z	2.9	3.4	4.3	4.6	7.1	3.7	1.7	1.4	3.0	3.3	1.1	0.6	0.8	1.9	1.3	0.4	0.3	0.2	0.3	0.2	0.2	0.1	2.0	7.1	
16-Dec	0.1	0.1	Z	0.1	0.1	0.1	0.0	0.1	0.0	0.1	0.1	0.0	0.1	0.1	0.1	0.0	0.0	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
17-Dec	0.1	0.1	0.2	Z	0.2	0.1	0.1	0.1	0.2	0.3	0.8	2.8	4.0	3.3	3.6	3.1	2.5	2.8	3.2	2.6	3.2	6.5	7.4	5.0	2.3	7.4	
18-Dec	2.4	1.0	0.5	0.4	Z	0.4	0.3	0.3	0.3	0.3	0.2	0.3	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	2.4	
19-Dec	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	0.1	0.0	0.0	0.0	0.1	
20-Dec	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.5	0.2	1.7	3.2	3.3	3.1	3.3	3.3	2.5	3.5	1.3	2.4	3.2	2.7	2.0	1.6	3.5	
21-Dec	0.5	Z	0.3	0.2	0.1	0.1	0.1	0.2	0.1	0.2	0.2	0.4	1.0	1.5	2.7	1.5	1.2	1.1	2.5	2.0	1.5	1.3	0.9	0.4	0.9	2.7	
22-Dec	0.2	0.3	Z	0.2	0.2	0.2	0.2	0.3	0.4	0.4	0.3	0.4	0.4	0.4	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.5	
23-Dec	0.3	0.2	0.2	Z	0.2	0.2	0.2	0.2	0.1	0.2	0.2	0.2	0.2	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.1	0.3	
24-Dec	0.1	0.1	0.1	0.1	Z	1.1	2.7	3.0	4.0	1.2	1.0	0.7	0.4	0.4	0.7	0.5	0.3	0.3	0.5	0.6	1.2	3.0	1.8	1.1	1.1	4.0	
25-Dec	1.7	1.5	1.8	1.5	1.5	Z	2.3	2.2	2.7	2.7	3.5	6.0	6.7	6.7	6.4	7.3	6.3	6.4	3.9	2.7	4.1	1.3	1.6	2.1	3.6	7.3	
26-Dec	Z	0.6	0.8	0.9	1.1	1.7	1.5	1.1	1.4	0.9	0.9	0.9	1.0	1.2	1.2	1.1	1.8	5.5	4.8	3.1	2.8	2.2	1.5	1.4	1.7	5.5	
27-Dec	0.6	Z	0.3	0.3	0.3	0.3	0.7	0.8	0.9	0.4	0.3	0.4	0.5	3.2	6.3	6.9	3.1	1.8	1.2	0.7	0.5	0.5	0.9	0.4	1.4	6.9	
28-Dec	0.4	0.4	Z	0.4	0.5	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.2	0.2	0.3	0.3	0.3	0.5	
29-Dec	0.3	0.2	0.2	Z	0.3	0.2	1.4	2.7	2.5	3.4	1.5	1.2	1.4	1.2	1.5	2.9	3.3	3.9	3.4	2.7	1.6	1.0	0.7	1.0	1.7	3.9	
30-Dec	0.5	0.5	0.7	1.0	Z	1.6	1.3	0.9	0.8	0.7	0.9	3.7	2.7	1.5	2.5	1.8	1.6	2.0	2.3	1.7	1.4	1.9	1.3	1.1	1.5	3.7	
31-Dec	0.7	0.4	0.3	0.3	0.5	Z	1.3	1.0	1.1	1.5	1.3	1.4	3.1	2.5	2.2	1.3	0.7	0.5	0.4	0.3	0.2	0.2	0.2	0.1	0.9	3.1	
																								Diurnal Average			
																								Diurnal Maximum			
0.6 0.4 0.5 0.5 0.6 0.7 0.9 0.8 0.9 0.7 0.7 1.0 1.1 1.3 1.5 1.4 1.2 1.3 1.2 1.0 1.1 1.2 1.1 0.8 2.7 2.0 2.9 3.4 4.3 4.6 7.1 3.7 4.0 3.4 3.5 6.0 6.7 6.7 6.5 7.3 6.3 6.4 5.2 5.4 5.7 6.5 7.4 5.0																											
Z - zerospan C - Calibration Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 172 ppb 24-hr 48 ppb																											



Wood Buffalo Environmental Association
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Barge Landing - December 2023





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Barge Landing - December 2023

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	710	100.00	100.00
11 - 20	0	0.00	100.00
21 - 60	0	0.00	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 710

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Barge Landing - December 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	17	21	14	6	5	8	14	190	158	95	63	44	30	11	14	20	710
11 - 20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	17	21	14	6	5	8	14	190	158	95	63	44	30	11	14	20	710

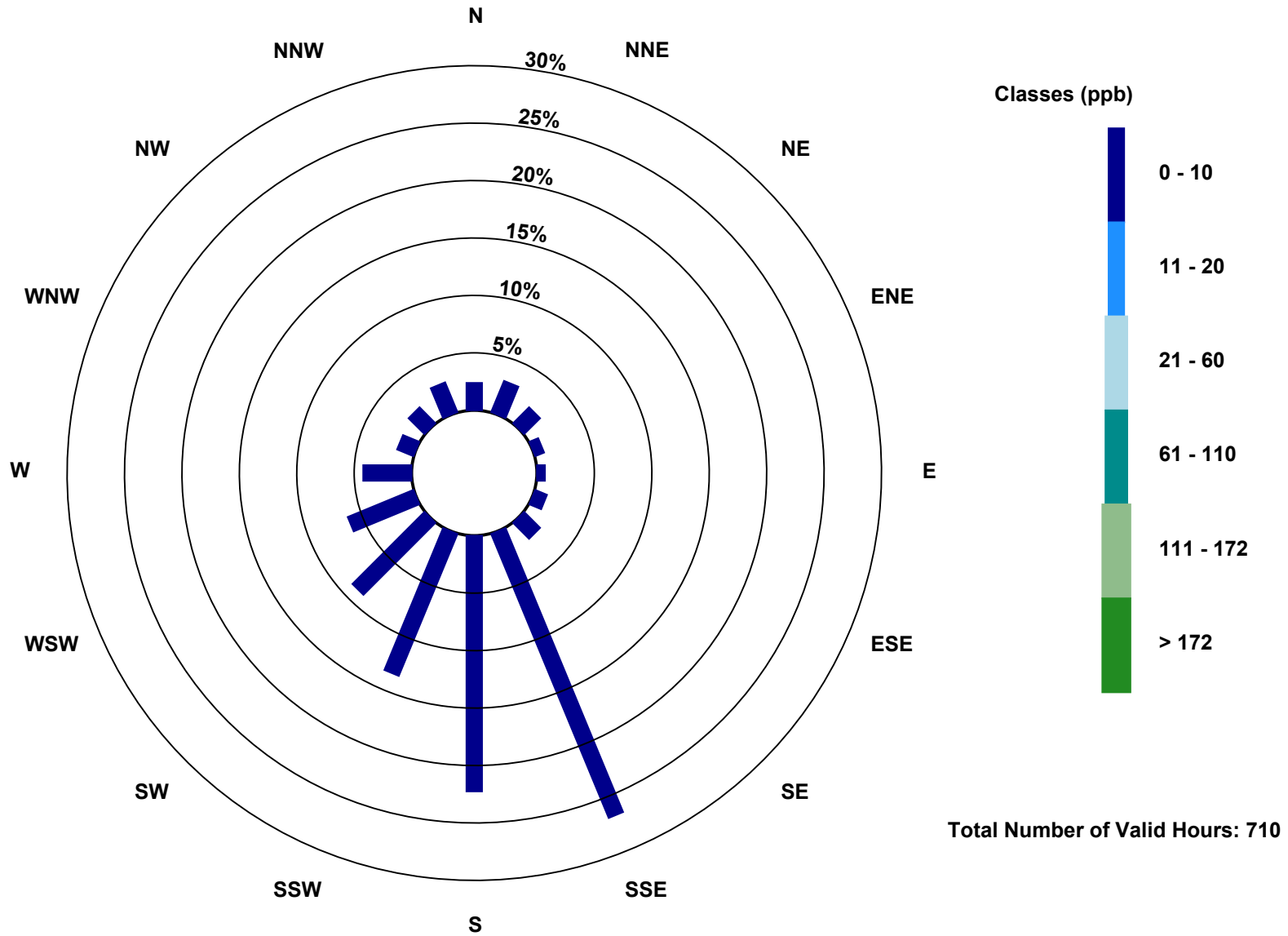
Total Number of Valid Hours: 710

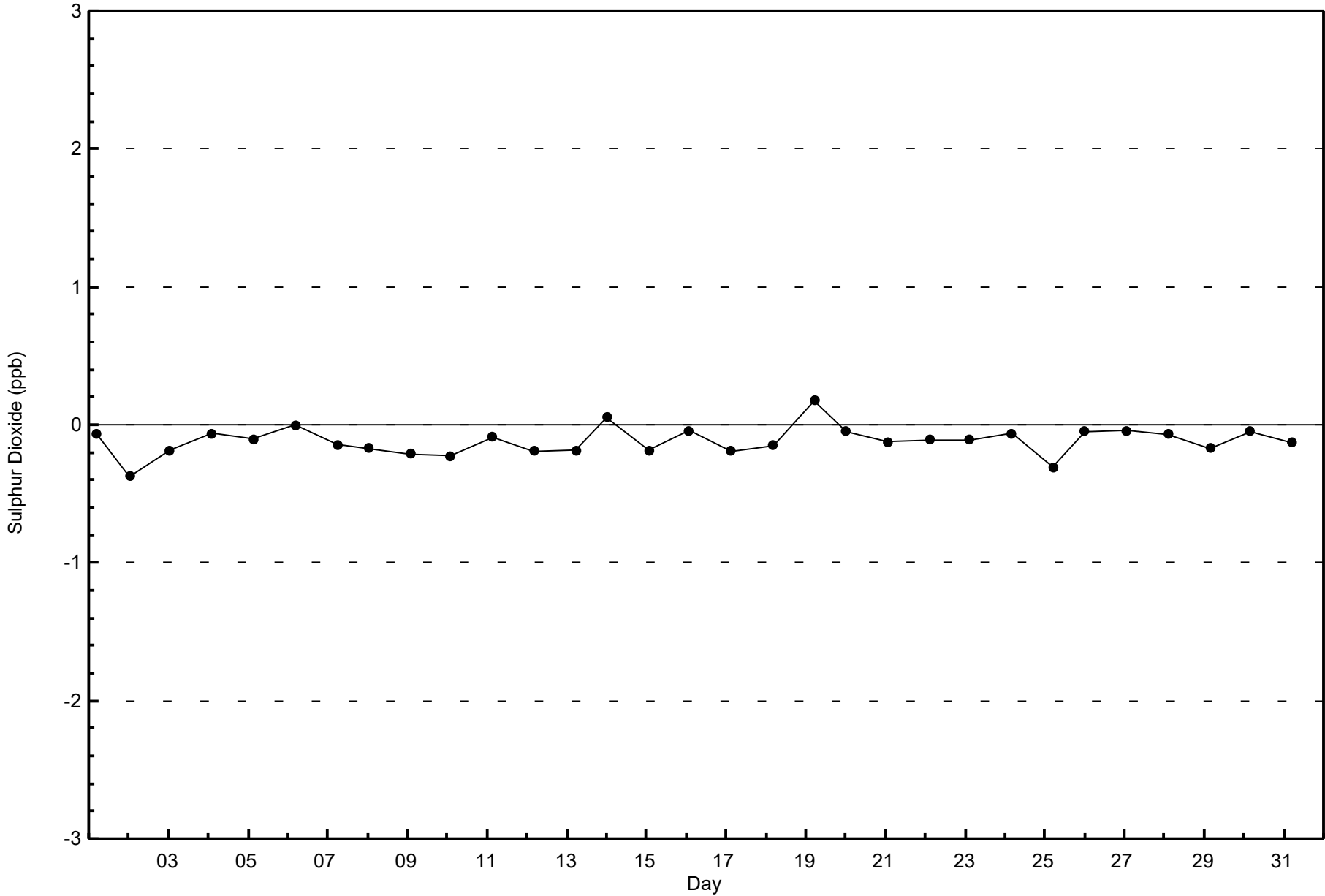
Total Number of Hours: 744

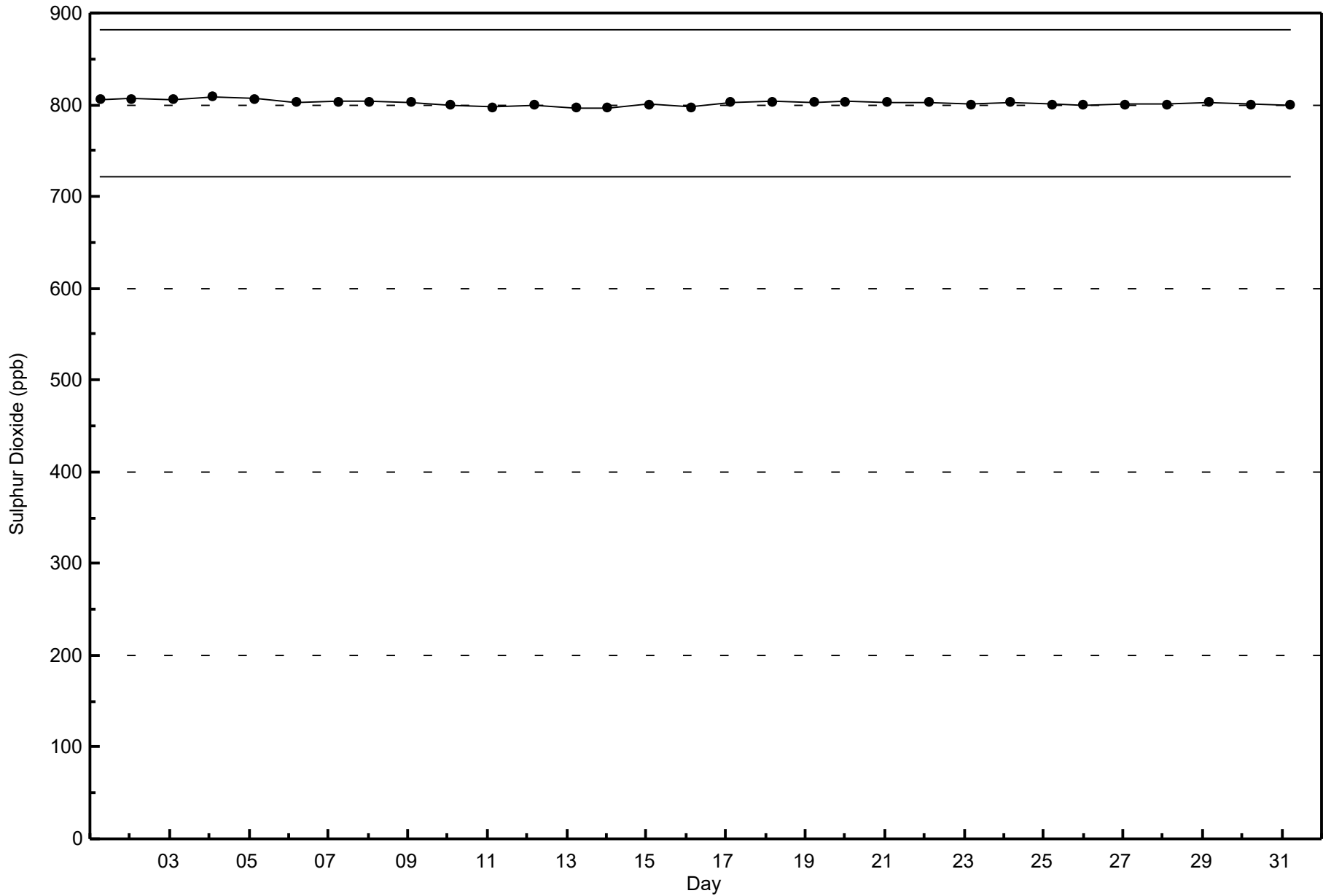


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Sulphur Dioxide (SO₂) - ppb
Barge Landing









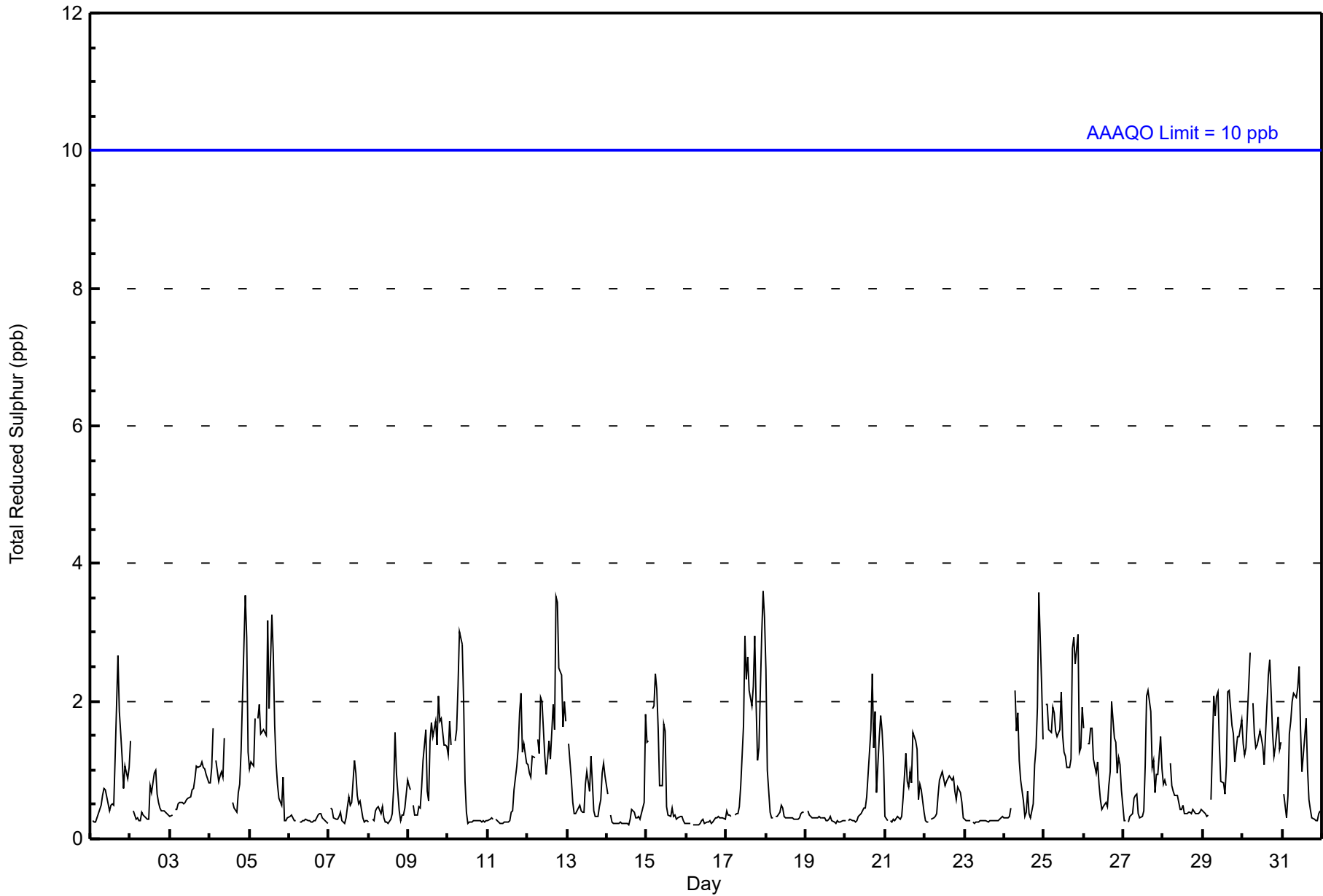
Wood Buffalo Environmental Association

Summary of Hour Averages

Total Reduced Sulphur (TRS) - ppb

Barge Landing - December 2023

Number of Exceedences (AAAQO):		1-hr: 0	24-hr: 0	Hours in Service: 744																	Daily Average		Daily Maximum				
Maximum Value: 3.6 ppb on Dec 17 23:00		Maximum Daily Average: 1.8 ppb on Dec 25																	Hours of Data: 709		Hours of Missing Data: 35						
Minimum Value: 0.2 ppb on Dec 16 06:00		Minimum Daily Average: 0.3 ppb on Dec 16																	Hours of Calibration: 35		Percent Operational Time: 100.0						
Maximum Diurnal Average: 1.1 ppb at hour 18		Minimum Diurnal Average: 0.6 ppb at hour 4																									
Monthly Average: 0.85 ppb		Percentiles: P ₁ = 0.2 P ₁₀ = 0.3 Q ₁ = 0.3 Median = 0.5 Q ₃ = 1.3 P ₉₀ = 1.9 P ₉₉ = 3.2																									
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-Dec	Z	0.3	0.2	0.2	0.3	0.4	0.5	0.6	0.7	0.7	0.6	0.4	0.5	0.5	0.5	1.2	2.7	1.9	1.5	1.2	0.7	1.1	0.9	1.0	0.8	2.7	
2-Dec	1.4	Z	0.4	0.3	0.3	0.3	0.3	0.4	0.4	0.3	0.3	0.3	0.8	0.7	1.0	1.0	0.6	0.5	0.5	0.4	0.4	0.4	0.4	0.3	0.5	1.4	
3-Dec	0.3	0.3	Z	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.6	0.6	0.6	0.7	0.7	0.9	1.1	1.0	1.1	1.1	1.0	1.0	0.9	0.8	0.7	1.1	
4-Dec	0.8	1.0	1.6	Z	1.1	0.8	0.9	1.0	0.9	1.5	C	C	C	C	0.5	0.5	0.4	0.7	0.8	1.3	2.1	3.5	2.9	1.3	1.2	3.5	
5-Dec	1.0	1.1	1.1	1.7	Z	1.7	2.0	1.5	1.6	1.5	1.5	3.2	1.9	3.3	2.7	1.6	1.1	0.8	0.6	0.5	0.9	0.3	0.3	0.3	1.4	3.3	
6-Dec	0.3	0.3	0.3	0.3	0.3	Z	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.2	0.3	0.3	0.3	0.3	0.4	0.4	0.3	0.3	0.2	0.2	0.3	0.4	
7-Dec	Z	0.4	0.4	0.3	0.3	0.3	0.3	0.4	0.3	0.2	0.3	0.5	0.6	0.5	0.5	1.1	0.9	0.6	0.5	0.6	0.3	0.2	0.3	0.3	0.4	1.1	
8-Dec	0.2	Z	0.3	0.3	0.4	0.4	0.5	0.4	0.5	0.3	0.2	0.2	0.2	0.3	0.4	0.7	1.5	1.0	0.4	0.3	0.4	0.3	0.4	0.9	0.5	1.5	
9-Dec	0.8	0.7	Z	0.5	0.4	0.4	0.5	0.5	0.8	1.1	1.6	0.7	0.5	1.4	1.7	1.5	1.7	1.4	2.1	1.7	1.8	1.4	1.4	1.3	1.1	2.1	
10-Dec	1.2	1.7	1.4	Z	1.4	1.6	2.2	3.0	2.8	2.0	0.8	0.4	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.2	0.3	0.3	0.3	0.9	3.0	
11-Dec	0.3	0.3	0.3	0.3	Z	0.3	0.2	0.2	0.2	0.2	0.2	0.3	0.2	0.3	0.4	0.4	0.7	1.1	1.3	1.8	2.1	1.3	1.4	1.1	0.6	2.1	
12-Dec	1.1	1.0	0.9	1.2	1.2	Z	1.4	1.2	2.1	2.0	1.2	0.9	1.2	1.4	1.2	2.0	1.6	3.5	3.4	2.5	2.4	1.6	2.0	1.7	1.7	3.5	
13-Dec	Z	1.4	0.8	0.5	0.4	0.4	0.4	0.5	0.4	0.4	0.4	0.8	1.0	0.7	1.2	0.8	0.4	0.3	0.3	0.5	0.6	1.0	1.1	0.9	0.7	1.4	
14-Dec	0.7	Z	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.4	0.5	1.8	0.4	1.8
15-Dec	1.4	1.4	Z	1.9	1.9	2.4	2.2	1.6	0.8	0.8	1.7	1.6	0.5	0.3	0.3	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.9	2.4	
16-Dec	0.2	0.2	0.2	Z	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.2	0.2	0.2	0.3	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	
17-Dec	0.4	0.3	0.3	0.3	Z	0.3	0.4	0.4	0.5	0.8	1.7	2.9	2.3	2.6	2.2	1.9	2.2	2.9	2.0	1.1	1.3	3.0	3.6	3.2	1.6	3.6	
18-Dec	2.5	1.0	0.4	0.3	0.3	Z	0.3	0.3	0.4	0.5	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.5	2.5	
19-Dec	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	0.2	0.2	0.3	0.2	0.3	0.3	0.3	0.3	0.4	
20-Dec	0.3	Z	0.3	0.3	0.3	0.3	0.2	0.3	0.3	0.4	0.4	0.4	0.4	0.6	1.3	1.6	2.4	1.3	1.8	0.7	1.5	1.8	1.6	1.2	0.8	2.4	
21-Dec	0.3	0.3	Z	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.6	1.2	0.8	0.8	1.0	0.8	1.6	1.4	1.3	0.6	0.8	0.7	0.4	0.6	1.6	
22-Dec	0.3	0.2	0.2	Z	0.3	0.3	0.3	0.4	0.6	0.9	1.0	0.9	0.8	0.8	0.9	0.9	0.8	0.9	0.7	0.6	0.8	0.7	0.5	0.3	0.6	1.0	
23-Dec	0.3	0.3	0.3	0.3	Z	0.2	0.2	0.2	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	
24-Dec	0.3	0.3	0.3	0.3	0.5	Z	2.1	1.6	1.8	1.1	0.9	0.5	0.3	0.4	0.7	0.4	0.3	0.5	1.1	1.3	1.9	3.6	2.2	1.4	1.0	3.6	
25-Dec	Z	1.9	2.0	1.6	1.5	1.9	1.8	1.6	1.5	1.6	2.1	1.5	1.3	1.2	1.0	1.0	1.1	2.8	2.9	2.5	3.0	1.3	1.3	1.9	1.8	3.0	
26-Dec	1.6	Z	1.4	1.4	1.6	1.6	1.2	1.0	1.1	0.8	0.6	0.4	0.5	0.5	0.5	0.8	1.0	2.0	1.5	1.4	1.0	1.2	1.1	0.7	1.1	2.0	
27-Dec	0.3	0.3	Z	0.2	0.3	0.4	0.6	0.6	0.7	0.4	0.3	0.3	0.4	1.1	2.1	2.2	1.9	1.0	1.1	0.7	0.9	0.9	1.5	1.0	0.8	2.2	
28-Dec	0.8	0.9	0.8	Z	1.1	0.8	0.7	0.6	0.6	0.5	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	0.5	1.1	
29-Dec	0.4	0.4	0.3	0.3	Z	0.6	2.1	1.8	2.1	2.1	1.4	0.8	0.8	0.7	1.1	2.1	2.2	1.6	1.5	1.1	1.3	1.5	1.5	1.7	1.3	2.2	
30-Dec	1.4	1.2	1.3	1.8	2.7	Z	2.0	1.5	1.3	1.4	1.6	1.5	1.3	1.1	1.5	2.4	2.6	2.1	1.6	1.2	1.3	1.8	1.3	1.4	1.6	2.7	
31-Dec	Z	0.7	0.3	0.6	1.5	1.7	2.0	2.1	2.1	2.2	2.5	1.6	1.0	1.5	1.7	1.0	0.6	0.4	0.3	0.3	0.3	0.3	0.4	0.4	1.1	2.5	
																								Diurnal Average		Diurnal Maximum	
																								0.7		2.5	
																								0.7		1.9	
																								0.6		2.0	
																								0.6		1.9	
																								0.7		2.7	
																								0.7		2.4	
																								0.9		2.2	
																								0.8		3.0	
																								0.9		2.8	
																								0.8		2.2	
																								0.8		2.5	
																								0.8		3.2	
																								0.7		2.3	
																								0.8		3.3	
																								0.9		2.7	
																								1.0		2.4	
																								1.0		2.7	
																								1.1		3.5	
																								1.0		3.4	
																								0.9		2.5	
																								0.9		3.0	
																								1.0		3.6	
																								1.0		3.6	
																								0.9		3.2	
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 - December 2023**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	685	96.61	96.62
3 - 4	24	3.39	100.00
5 - 7	0	0.00	100.00
8 - 11	0	0.00	100.00
> 11	0	0.00	100.00

Total Number of Valid Hours: 709

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Total Reduced Sulphur (TRS) - ppb
Barge Landing - December 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	17	21	14	6	5	8	15	178	147	93	63	45	29	10	15	19	685
3 - 4	0	0	0	0	0	0	0	12	11	1	0	0	0	0	0	0	24
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	17	21	14	6	5	8	15	190	158	94	63	45	29	10	15	19	709

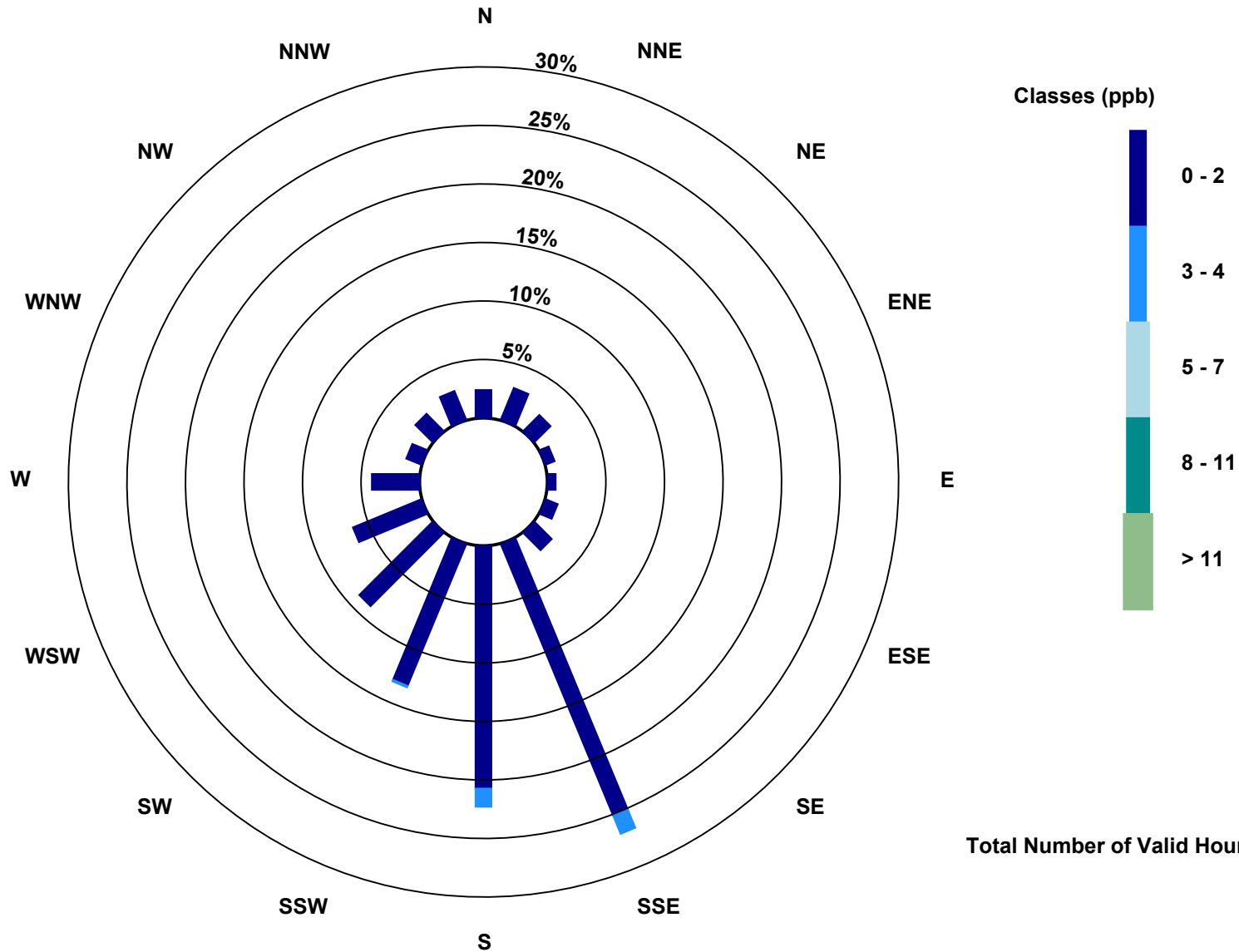
Total Number of Valid Hours: 709

Total Number of Hours: 744

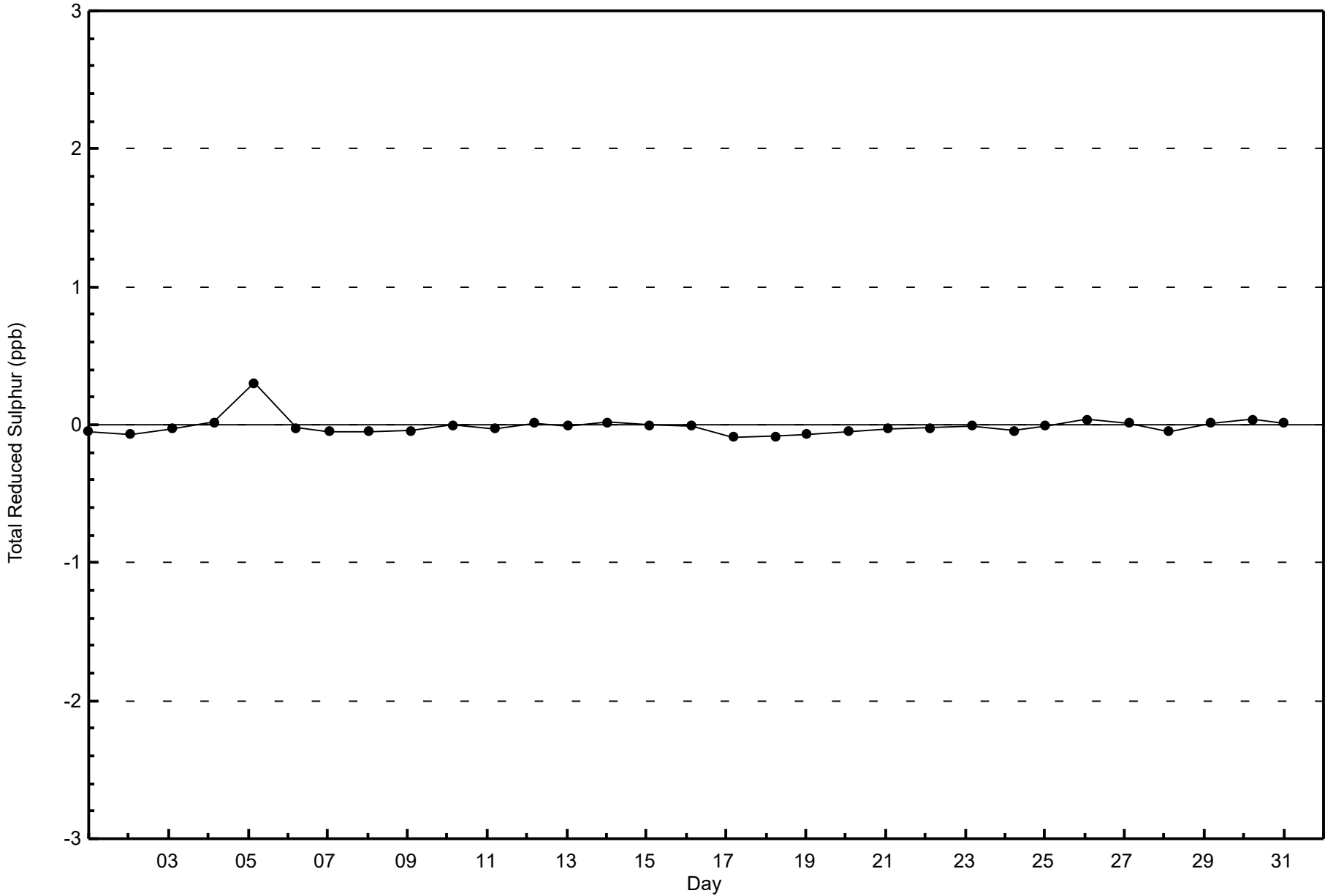


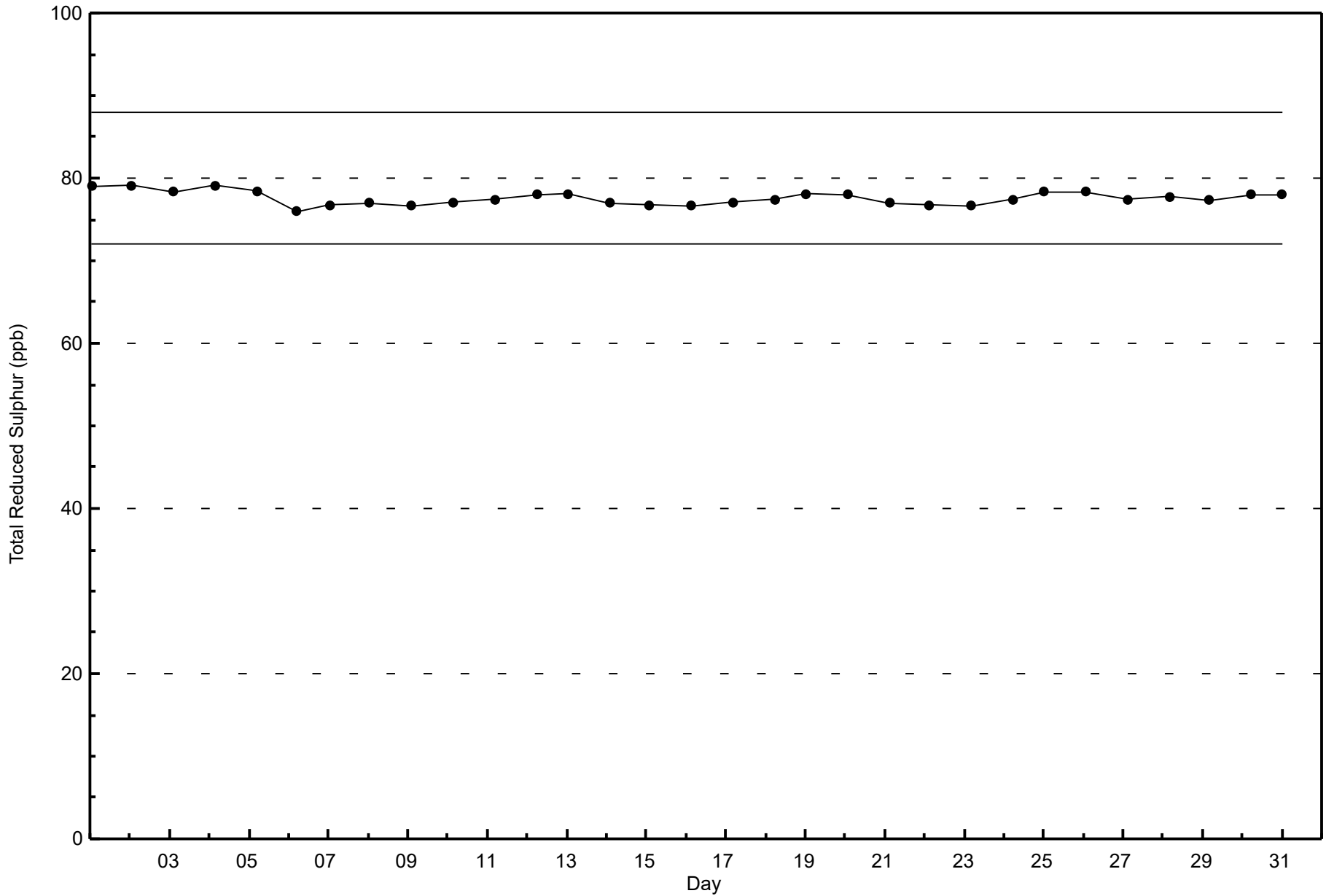
Wood Buffalo Environmental Association
Wind Rose Dec 2023

Total Reduced Sulphur (TRS) - ppb
Barge Landing



Total Number of Valid Hours: 709







Wood Buffalo Environmental Association
Summary of Hour Averages

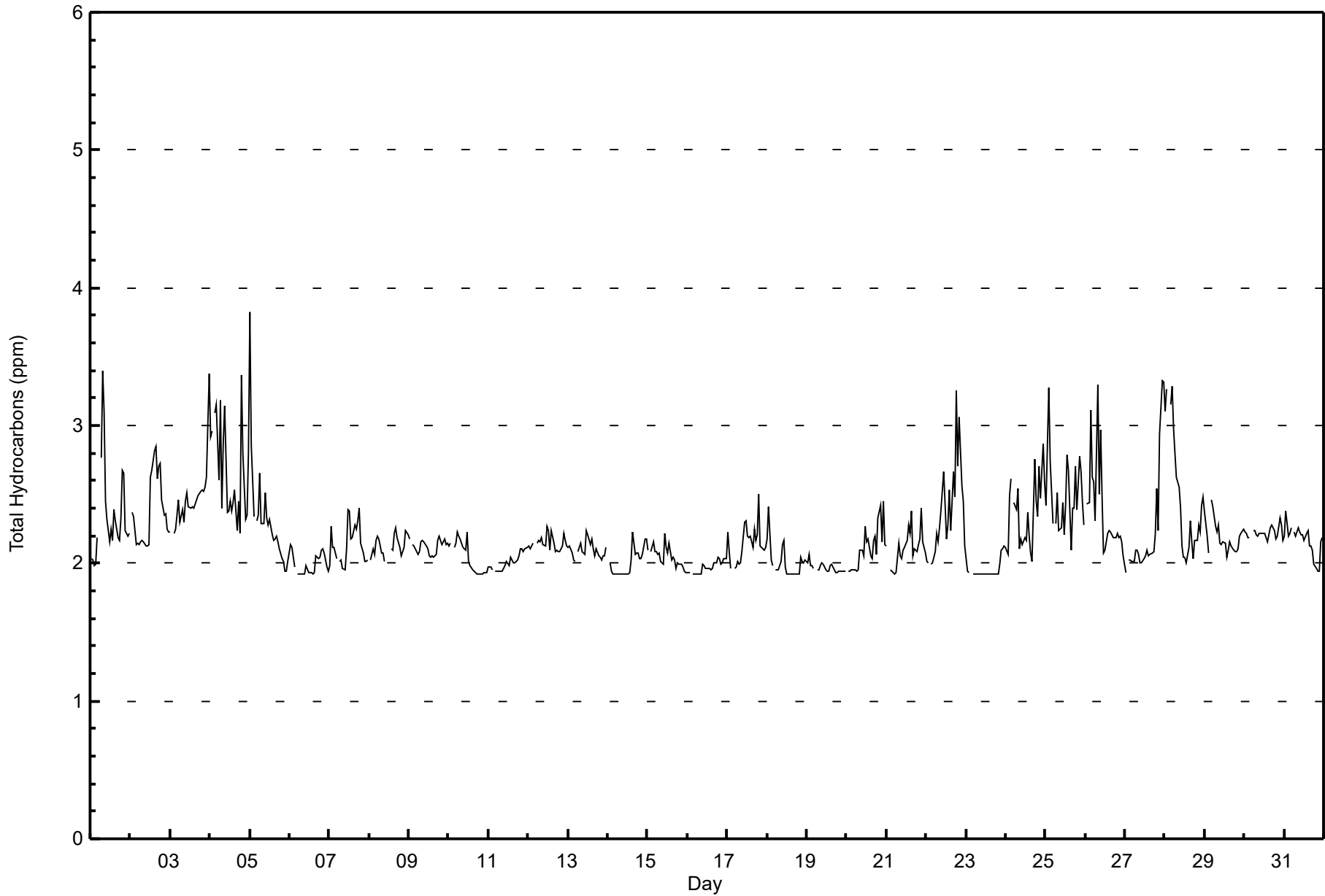
Total Hydrocarbons (THC) - ppm
Barge Landing - December 2023

Maximum Value: 3.8 ppm on Dec 5 01:00		Maximum Daily Average: 2.7 ppm on Dec 4		Hours in Service: 744																						
Minimum Value: 1.9 ppm on Dec 14 05:00		Minimum Daily Average: 2.0 ppm on Dec 23		Hours of Data: 710																						
Maximum Diurnal Average: 2.3 ppm at hour 2		Minimum Diurnal Average: 2.2 ppm at hour 3		Hours of Missing Data: 34																						
Monthly Average: 2.20 ppm		Percentiles: P ₁ = 1.9 P ₁₀ = 1.9 Q ₁ = 2.0 Median = 2.1 Q ₃ = 2.3 P ₉₀ = 2.5 P ₉₉ = 3.3		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-Dec	2.0	2.0	2.0	2.0	2.2	Z	2.8	3.4	3.1	2.4	2.3	2.2	2.2	2.4	2.3	2.2	2.2	2.3	2.7	2.7	2.2	2.2	2.2	2.4	2.4	
2-Dec	Z	2.4	2.3	2.1	2.1	2.1	2.2	2.2	2.2	2.1	2.1	2.1	2.6	2.7	2.8	2.8	2.6	2.7	2.7	2.5	2.4	2.4	2.3	2.2	2.4	2.8
3-Dec	2.2	Z	2.2	2.3	2.3	2.5	2.3	2.4	2.3	2.4	2.5	2.4	2.4	2.4	2.4	2.5	2.5	2.5	2.5	2.5	2.5	2.6	2.6	3.4	2.5	3.4
4-Dec	2.9	3.0	Z	3.1	3.2	2.6	3.2	2.4	2.9	3.1	2.4	2.4	2.5	2.4	2.4	2.5	2.2	2.5	2.2	3.4	2.8	2.3	2.3	2.8	2.7	3.4
5-Dec	3.8	2.9	2.3	Z	2.3	2.4	2.7	2.3	2.3	2.5	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.1	2.0	2.0	1.9	1.9	2.0	2.3	3.8
6-Dec	2.1	2.1	2.0	2.0	Z	1.9	1.9	1.9	1.9	1.9	2.0	1.9	1.9	1.9	1.9	1.9	2.1	2.0	2.0	2.1	2.1	2.1	2.0	1.9	2.0	2.1
7-Dec	2.0	2.3	2.1	2.1	2.0	Z	2.0	2.0	2.0	2.0	2.1	2.4	2.4	2.2	2.2	2.3	2.3	2.3	2.4	2.1	2.1	2.0	2.0	2.0	2.1	2.4
8-Dec	Z	2.0	2.1	2.1	2.2	2.2	2.2	2.1	2.1	2.0	C	C	C	2.1	2.1	2.2	2.3	2.2	2.1	2.0	2.1	2.1	2.2	2.2	2.1	2.3
9-Dec	2.2	Z	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.1	2.1	2.1	2.0	2.1	2.0	2.1	2.2	2.2	2.2	2.1	2.2	2.1	2.1	2.1	2.2
10-Dec	2.1	2.1	Z	2.1	2.1	2.2	2.2	2.2	2.1	2.1	2.1	2.2	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.2
11-Dec	2.0	2.0	2.0	Z	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.1
12-Dec	2.1	2.1	2.1	2.1	Z	2.2	2.2	2.2	2.2	2.1	2.1	2.3	2.2	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.1	2.1	2.3
13-Dec	2.1	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	2.2	2.1	2.0	2.1	2.1	2.0	2.0	2.1	2.1	2.1	2.1	2.2
14-Dec	Z	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.2	2.1	2.1	2.1	2.1	2.0	2.0	2.1	2.2	2.2	2.0	2.2
15-Dec	2.1	Z	2.1	2.2	2.1	2.1	2.1	2.1	2.0	2.0	2.2	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	2.0	2.2
16-Dec	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
17-Dec	2.2	2.1	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.1	2.3	2.3	2.2	2.2	2.2	2.1	2.2	2.2	2.2	2.5	2.1	2.1	2.1	2.1	2.1	2.5
18-Dec	2.2	2.4	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.1	2.2	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.4
19-Dec	2.0	2.1	2.0	2.0	2.0	Z	1.9	1.9	2.0	2.0	2.0	2.0	1.9	1.9	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.1
20-Dec	Z	1.9	1.9	2.0	1.9	1.9	1.9	2.0	2.1	2.1	2.1	2.3	2.2	2.2	2.1	2.0	2.2	2.2	2.1	2.3	2.4	2.2	2.5	2.1	2.1	2.5
21-Dec	2.1	Z	2.0	1.9	1.9	1.9	1.9	2.1	2.1	2.0	2.1	2.1	2.2	2.3	2.2	2.4	2.1	2.1	2.1	2.1	2.2	2.4	2.2	2.1	2.1	2.4
22-Dec	2.0	2.0	Z	2.0	2.0	2.1	2.2	2.2	2.3	2.4	2.7	2.4	2.2	2.3	2.5	2.2	2.7	2.5	3.2	2.7	3.1	2.6	2.4	2.1	2.4	3.2
23-Dec	2.0	1.9	1.9	Z	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.1	2.1	2.1	2.1	2.0	2.1
24-Dec	2.1	2.1	2.5	2.6	Z	2.4	2.4	2.5	2.1	2.2	2.1	2.2	2.2	2.4	2.2	2.1	2.0	2.8	2.5	2.3	2.7	2.5	2.9	2.6	2.4	2.9
25-Dec	2.4	2.9	3.3	2.7	2.3	Z	2.3	2.5	2.2	2.3	2.4	2.2	2.4	2.8	2.7	2.1	2.4	2.4	2.7	2.4	2.8	2.7	2.4	2.3	2.5	3.3
26-Dec	Z	2.4	2.4	3.1	2.6	2.6	2.3	3.3	2.5	3.0	2.5	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.4	3.3
27-Dec	1.9	Z	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.0	2.0	2.0	2.1	2.1	2.0	2.1	2.1	2.1	2.2	2.5	2.2	2.9	3.3	3.3	2.2	3.3
28-Dec	3.1	3.3	Z	3.1	3.3	3.0	2.8	2.6	2.6	2.4	2.1	2.0	2.0	2.1	2.3	2.2	2.0	2.2	2.2	2.3	2.2	2.4	2.5	2.5	2.5	3.3
29-Dec	2.4	2.2	2.1	Z	2.5	2.4	2.3	2.2	2.3	2.2	2.1	2.2	2.1	2.0	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.5
30-Dec	2.2	2.2	2.2	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.2	2.2	2.2	2.3	2.3	2.2	2.2	2.3
31-Dec	2.2	2.4	2.2	2.2	2.3	Z	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.0	2.0	1.9	1.9	2.2	2.2	2.2	2.4
																								Diurnal Average		
																								Diurnal Maximum		
Z - zerospan C - Calibration																										



Wood Buffalo Environmental Association
Hourly Averages

Total Hydrocarbons (THC) - ppm
Barge Landing - December 2023





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Barge Landing - December 2023

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	229	32.25	32.25
2.1 - 3.0	461	64.93	97.18
3.1 - 10.0	20	2.82	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 710

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Total Hydrocarbons (THC) - ppm
Barge Landing - December 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	5	12	10	4	4	5	8	17	24	27	37	33	28	7	6	2	229
2.1 - 3.0	11	8	2	2	1	3	6	161	132	68	26	11	2	4	8	16	461
3.1 - 10.0	1	1	2	0	0	0	0	12	2	0	0	0	0	0	0	2	20
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	17	21	14	6	5	8	14	190	158	95	63	44	30	11	14	20	710

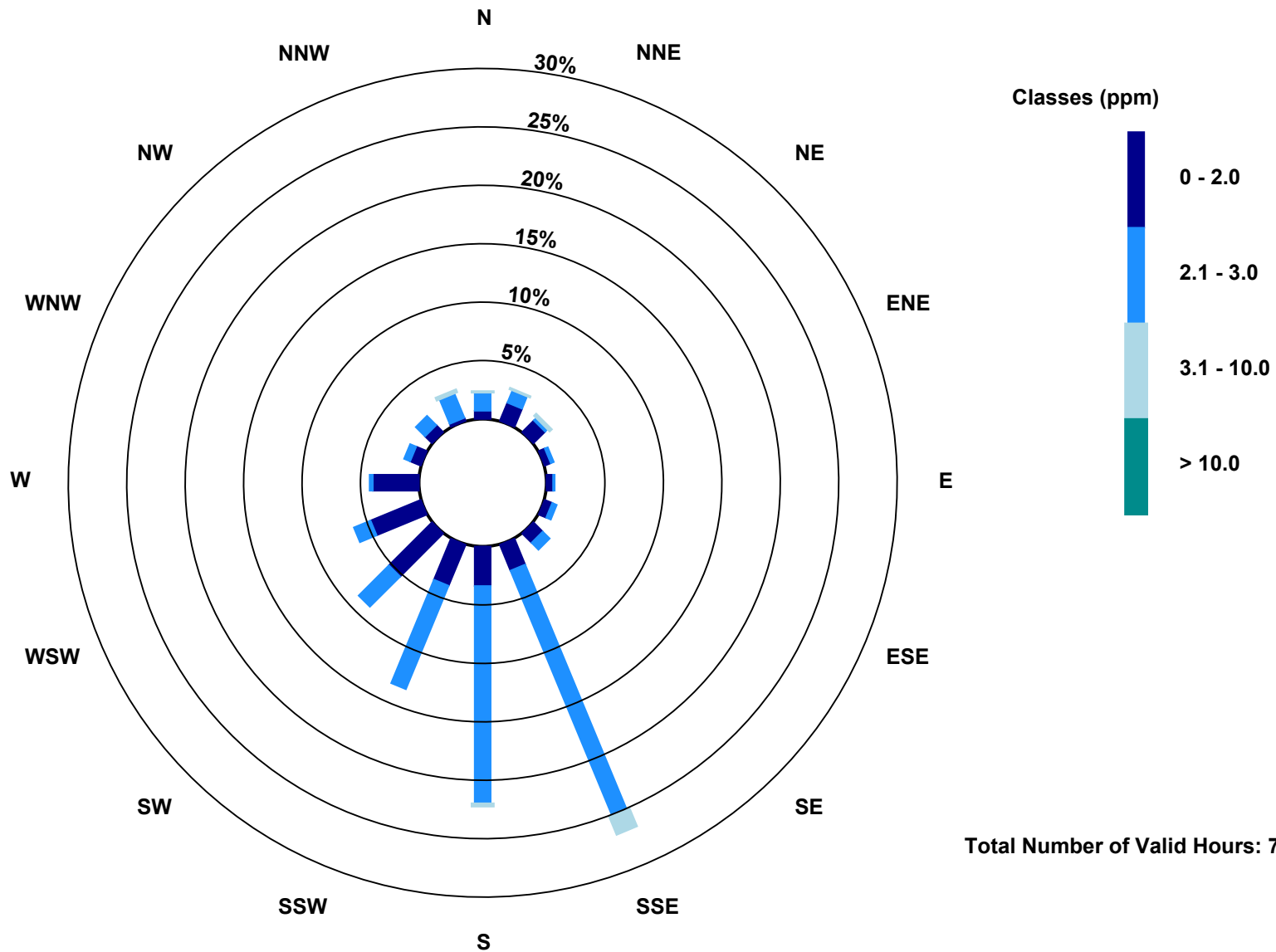
Total Number of Valid Hours: 710

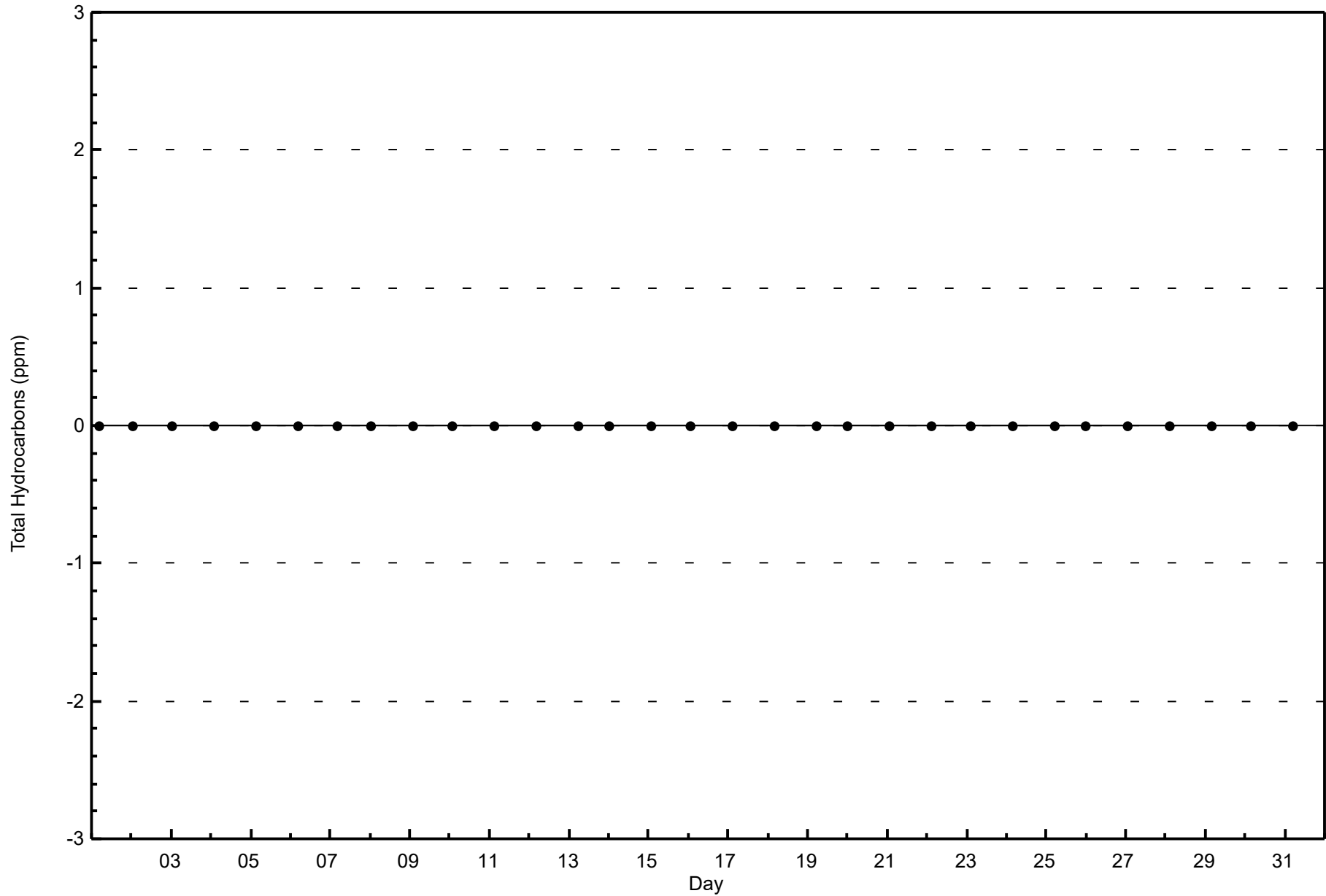
Total Number of Hours: 744

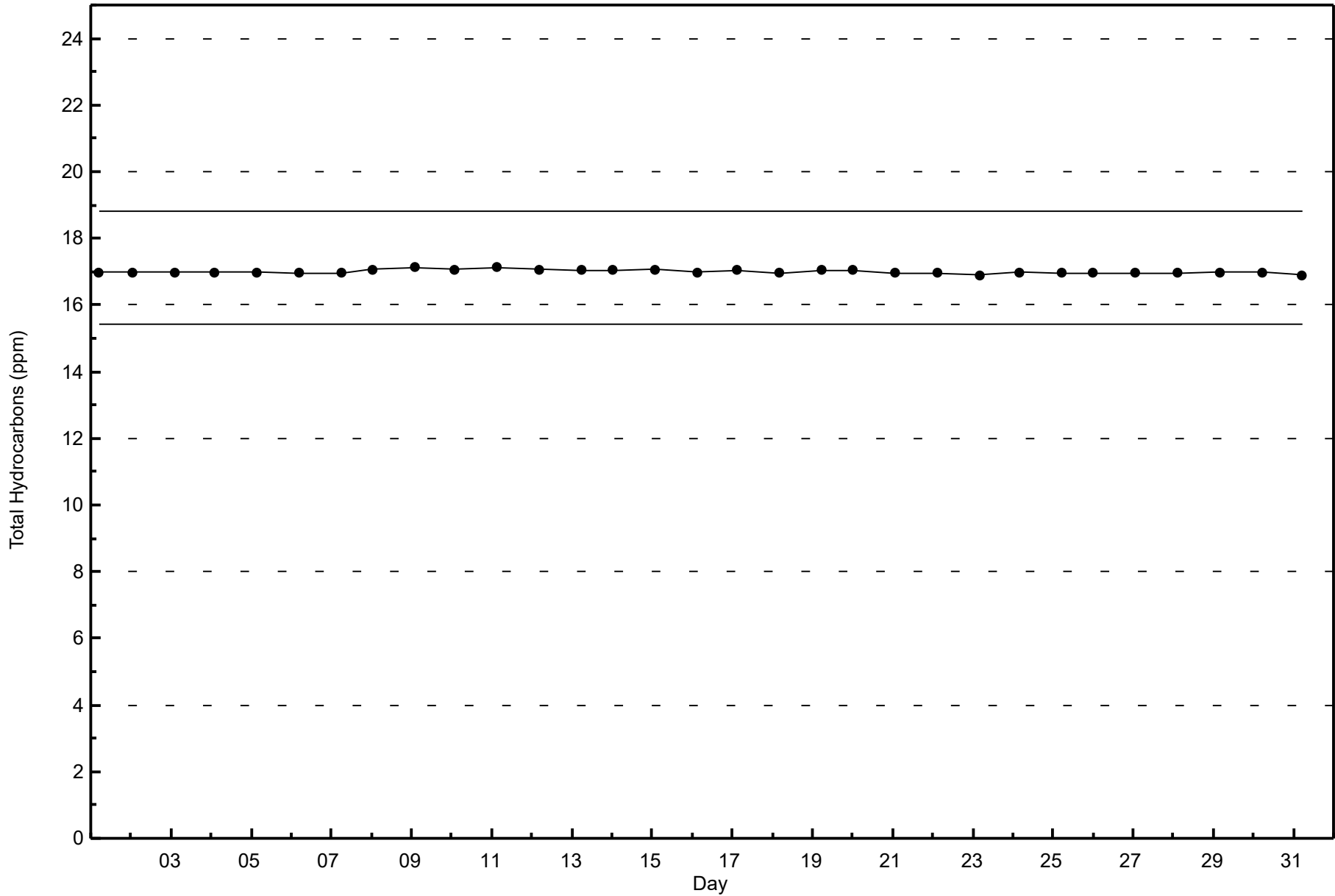


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Total Hydrocarbons (THC) - ppm
Barge Landing









Summary of Hour Averages

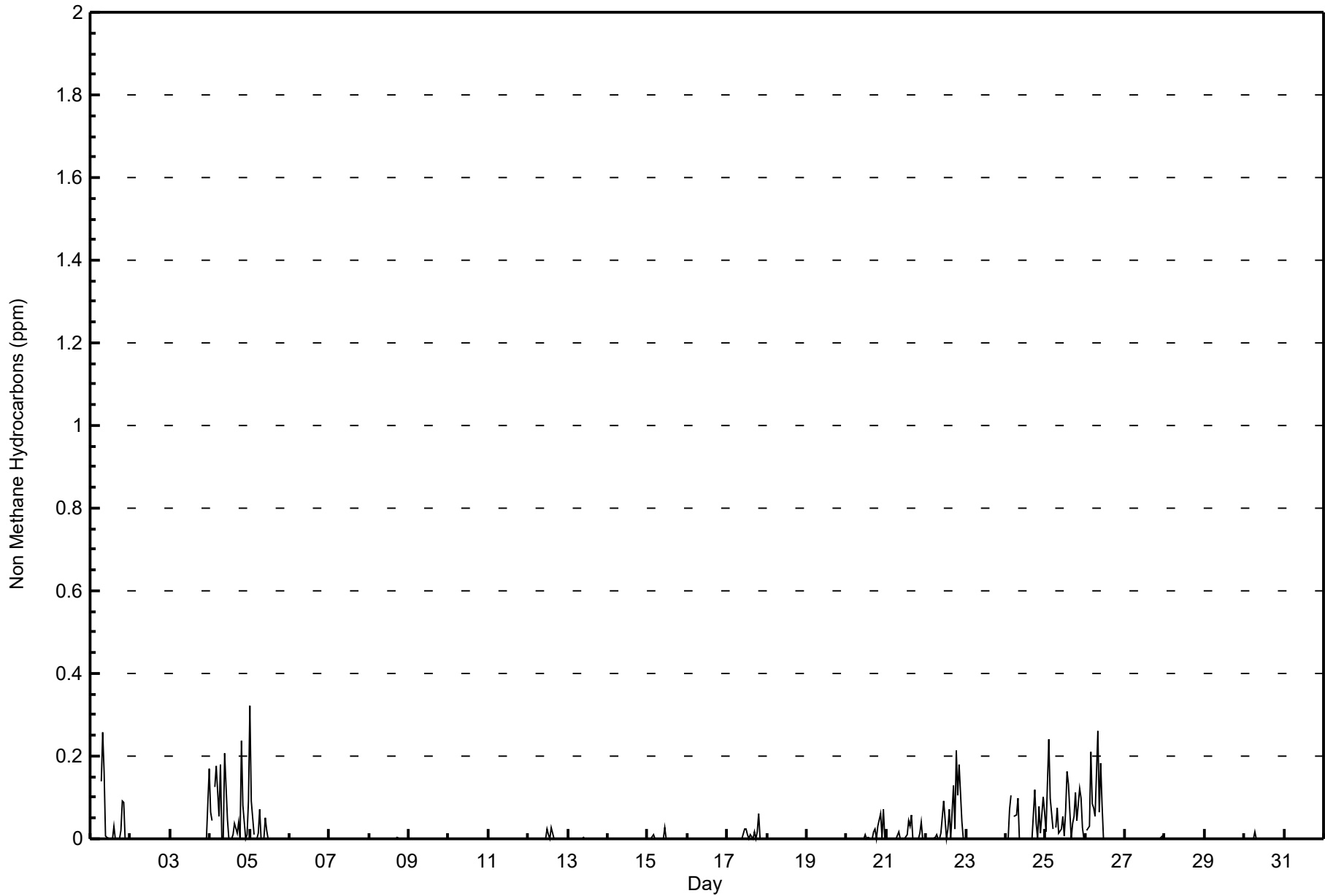
Barge Landing - December 2023

Maximum Value: 0.323 ppm on Dec 5 01:00		Maximum Daily Average: 0.068 ppm on Dec 25		Hours in Service: 744																							
Minimum Value: 0.000 ppm on Dec 1 01:00		Minimum Daily Average: 0.000 ppm on Dec 2		Hours of Data: 710																							
Maximum Diurnal Average: 0.023 ppm at hour 8		Minimum Diurnal Average: 0.003 ppm at hour 16		Hours of Missing Data: 34																							
Monthly Average: 0.011 ppm		Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.0 Median = 0.0 Q ₃ = 0.0 P ₉₀ = 0.0 P ₉₉ = 0.2		Hours of Calibration: 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-Dec	0.000	0.000	0.000	0.000	0.000	Z	0.140	0.256	0.164	0.008	0.002	0.000	0.000	0.000	0.030	0.001	0.000	0.000	0.021	0.090	0.087	0.000	0.000	0.000	0.035	0.256	
2-Dec	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	
3-Dec	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	0.002	0.000	0.168	0.007	0.168	
4-Dec	0.066	0.044	Z	0.127	0.176	0.056	0.179	0.000	0.000	0.206	0.048	0.000	0.000	0.000	0.010	0.036	0.012	0.040	0.000	0.237	0.083	0.001	0.010	0.092	0.062	0.237	
5-Dec	0.323	0.092	0.009	Z	0.000	0.013	0.072	0.000	0.000	0.052	0.020	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.025	0.323	
6-Dec	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-Dec	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-Dec	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	C	C	C	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
9-Dec	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-Dec	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-Dec	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-Dec	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.025	0.010	0.000	0.027	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.027	
13-Dec	0.000	0.000	0.000	0.000	0.000	Z	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	0.002	
14-Dec	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-Dec	0.000	Z	0.000	0.009	0.000	0.000	0.000	0.000	0.000	0.000	0.029	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.029	
16-Dec	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-Dec	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.023	0.025	0.009	0.000	0.011	0.000	0.016	0.000	0.018	0.059	0.000	0.000	0.000	0.000	0.007	0.059	
18-Dec	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	
19-Dec	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-Dec	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.002	0.003	0.000	0.000	0.016	0.022	0.000	0.030	0.060	0.005	0.070	0.000	0.009	0.070	
21-Dec	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.017	0.000	0.000	0.000	0.000	0.010	0.045	0.031	0.057	0.000	0.000	0.000	0.000	0.013	0.041	0.000	0.000	0.009	0.057	
22-Dec	0.000	0.000	Z	0.000	0.000	0.005	0.009	0.000	0.000	0.015	0.092	0.048	0.000	0.024	0.070	0.000	0.128	0.025	0.213	0.104	0.181	0.040	0.000	0.000	0.041	0.213	
23-Dec	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-Dec	0.000	0.000	0.071	0.104	Z	0.056	0.058	0.097	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.118	0.037	0.000	0.078	0.014	0.101	0.064	0.035	0.118	
25-Dec	0.015	0.132	0.240	0.098	0.025	Z	0.027	0.076	0.013	0.025	0.055	0.008	0.069	0.161	0.134	0.000	0.037	0.053	0.111	0.046	0.121	0.097	0.027	0.001	0.068	0.240	
26-Dec	Z	0.021	0.031	0.210	0.085	0.074	0.055	0.260	0.063	0.184	0.081	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.046	0.260	
27-Dec	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	0.008	0.000	0.000	0.008	
28-Dec	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-Dec	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	
30-Dec	0.000	0.000	0.000	0.000	Z	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	0.000	0.000	0.000	0.000	0.000	0.001	0.016	
31-Dec	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	
		0.016	0.011	0.013	0.021	0.011	0.008	0.018	0.023	0.008	0.016	0.012	0.004	0.003	0.008	0.010	0.003	0.007	0.008	0.013	0.018	0.020	0.006	0.007	0.011	Diurnal Average	
		0.323	0.132	0.240	0.210	0.176	0.074	0.179	0.260	0.164	0.206	0.092	0.048	0.069	0.161	0.134	0.057	0.128	0.118	0.213	0.237	0.181	0.097	0.101	0.168	Diurnal Maximum	
Z - zerospan		C - Calibration																									



Wood Buffalo Environmental Association
Hourly Averages

Non Methane Hydrocarbons (NMHC) - ppm
Barge Landing - December 2023





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Non Methane Hydrocarbons (NMHC) - ppm
Barge Landing - December 2023**

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 0.005	597	84.08	84.08
0.006 - 0.05	58	8.17	92.25
0.06 - 0.1	40	5.63	97.89
> 0.1	15	2.11	100.00

Total Number of Valid Hours: 710

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Non Methane Hydrocarbons (NMHC) - ppm
Barge Landing - December 2023**

Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 0.005	17	21	13	6	5	8	14	113	127	92	62	44	30	11	14	20	597
0.006 - 0.05	0	0	1	0	0	0	0	38	17	1	1	0	0	0	0	0	58
0.06 - 0.1	0	0	0	0	0	0	0	26	12	2	0	0	0	0	0	0	40
> 0.1	0	0	0	0	0	0	0	13	2	0	0	0	0	0	0	0	15
Totals	17	21	14	6	5	8	14	190	158	95	63	44	30	11	14	20	710

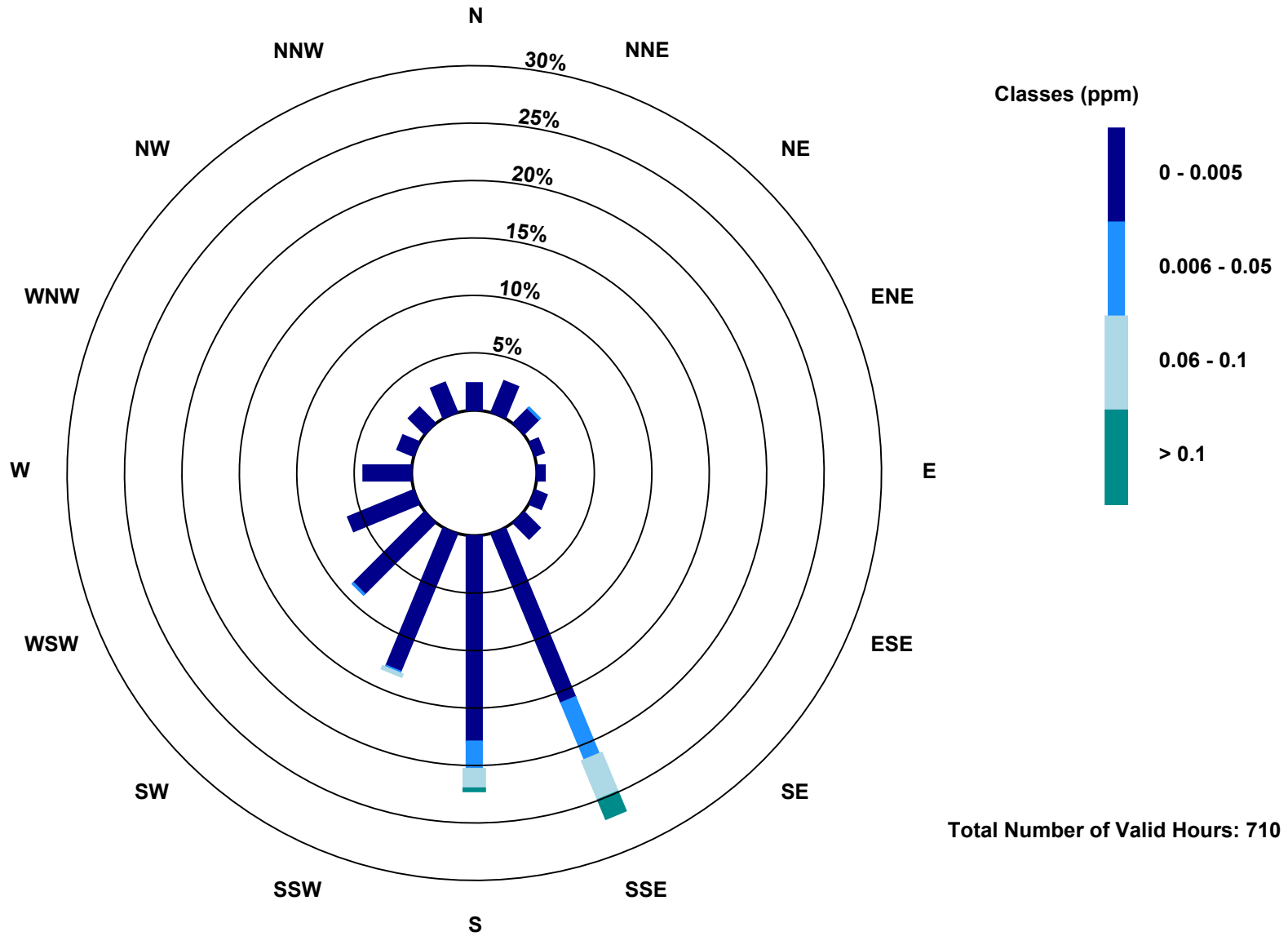
Total Number of Valid Hours: 710

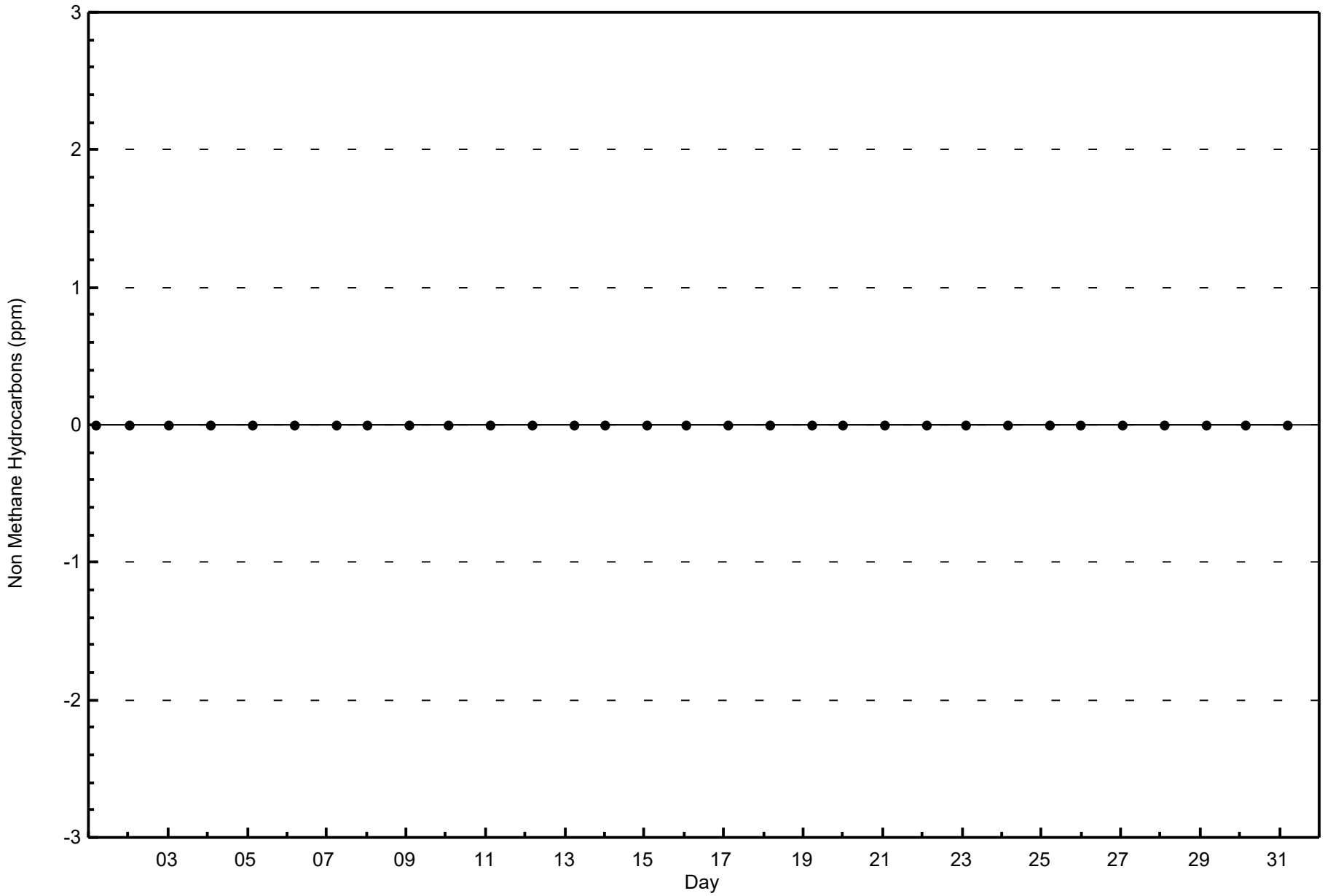
Total Number of Hours: 744

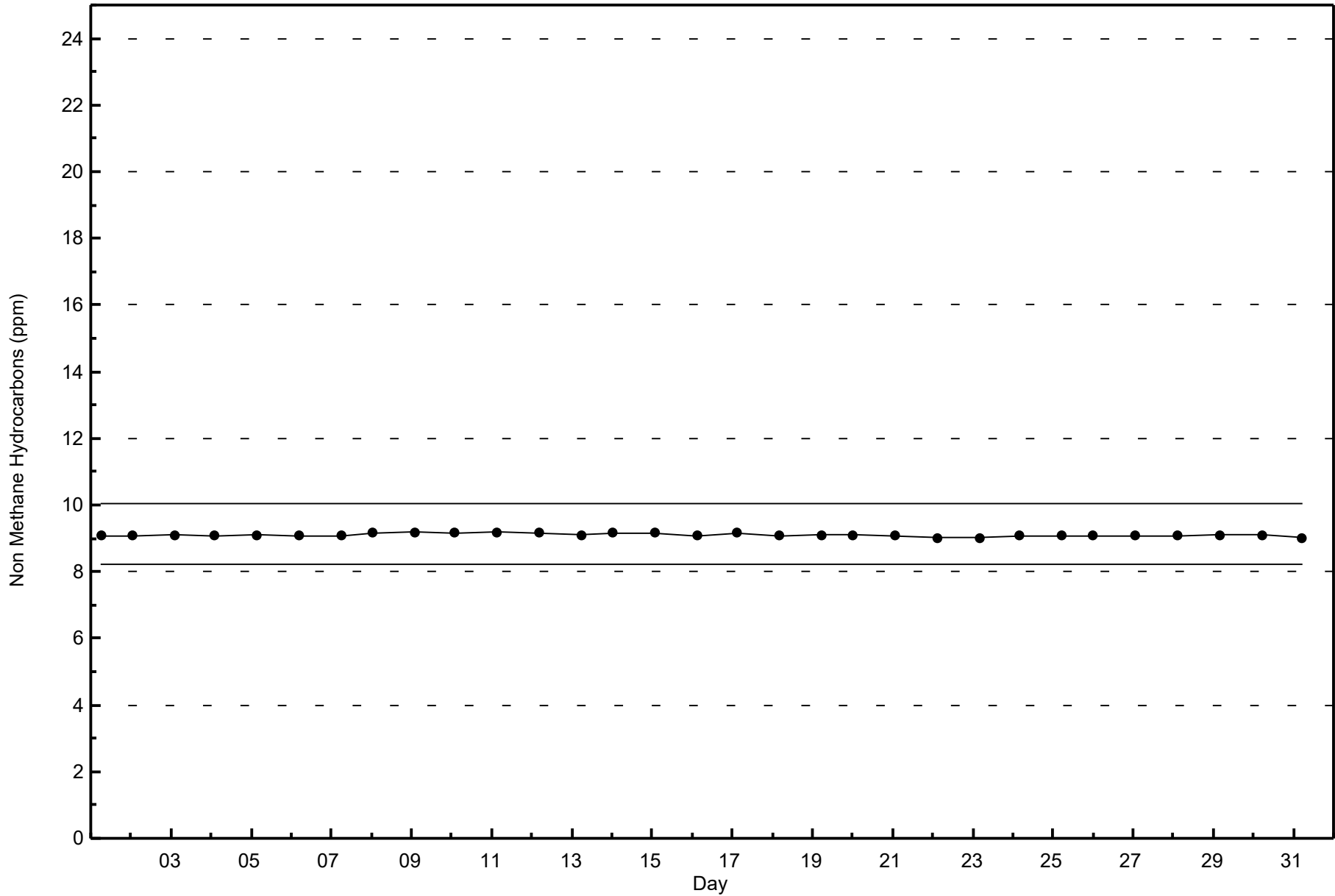


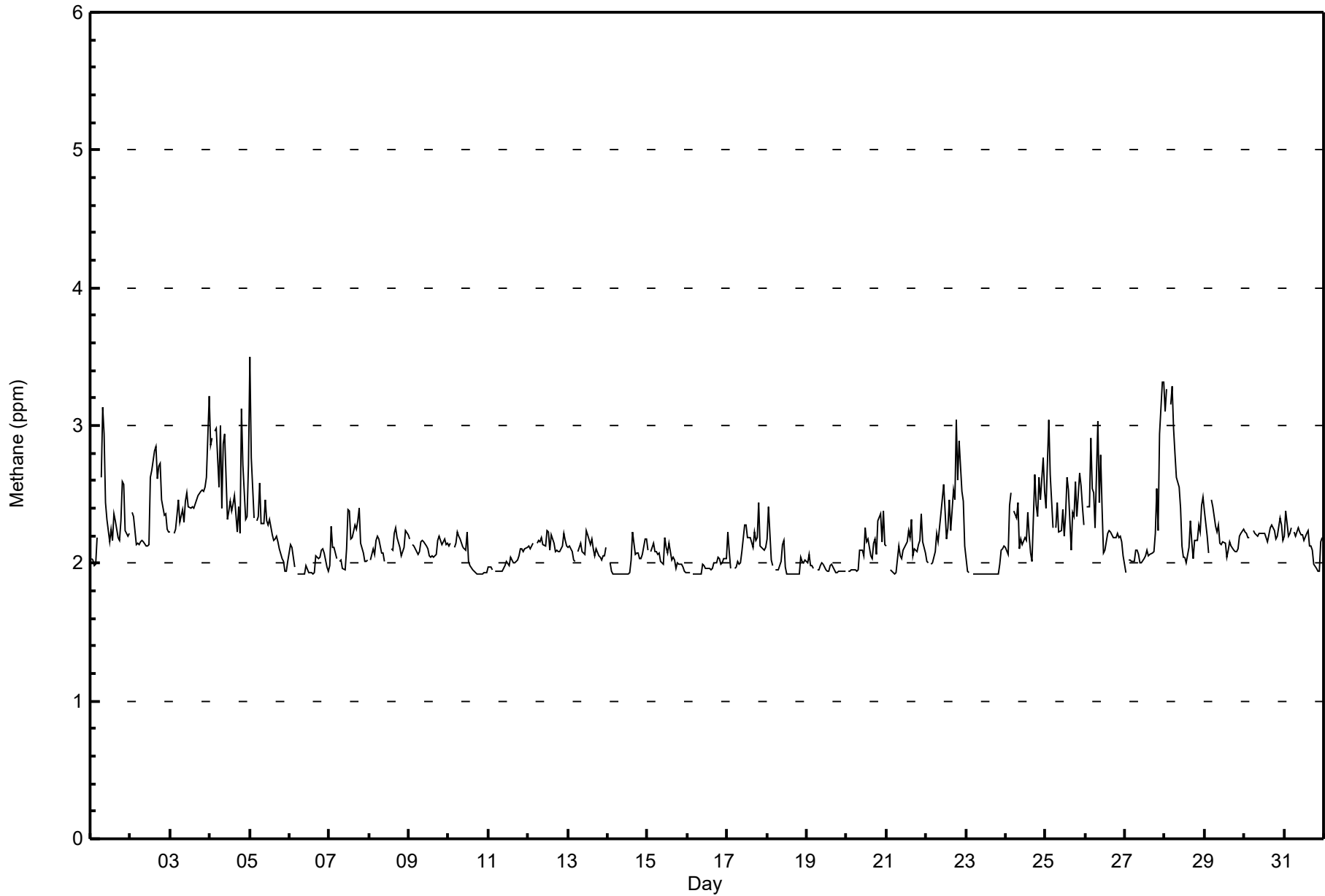
Wood Buffalo Environmental Association
Wind Rose Dec 2023

Non Methane Hydrocarbons (NMHC) - ppm
Barge Landing











Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Methane (CH₄) - ppm
Barge Landing - December 2023

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	229	32.25	32.25
2.1 - 3.0	471	66.34	98.59
3.1 - 10.0	10	1.41	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 710

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Methane (CH₄) - ppm
Barge Landing - December 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	5	12	10	4	4	5	8	17	24	27	37	33	28	7	6	2	229
2.1 - 3.0	11	8	2	2	1	3	6	171	132	68	26	11	2	4	8	16	471
3.1 - 10.0	1	1	2	0	0	0	0	2	2	0	0	0	0	0	0	2	10
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	17	21	14	6	5	8	14	190	158	95	63	44	30	11	14	20	710

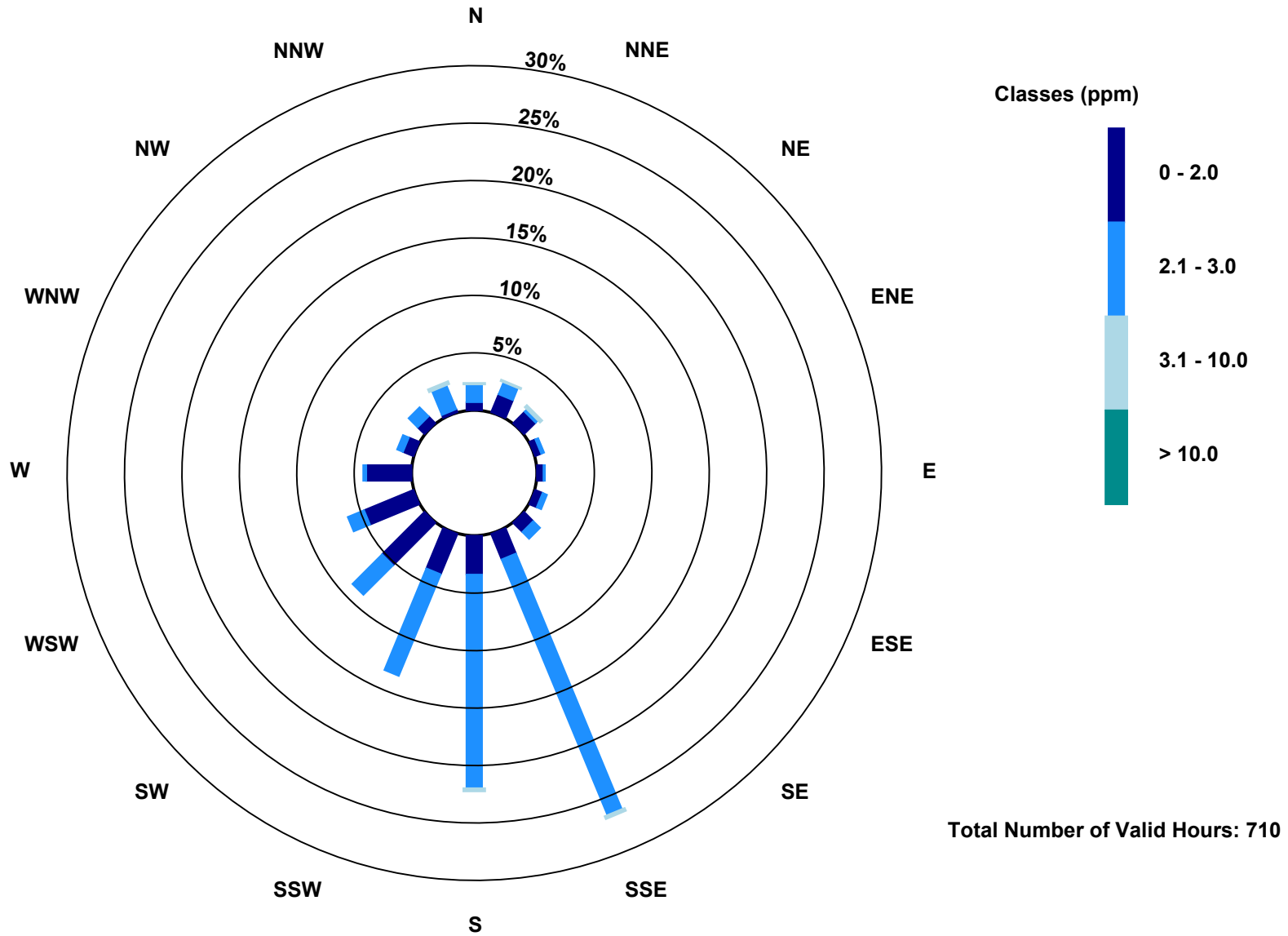
Total Number of Valid Hours: 710

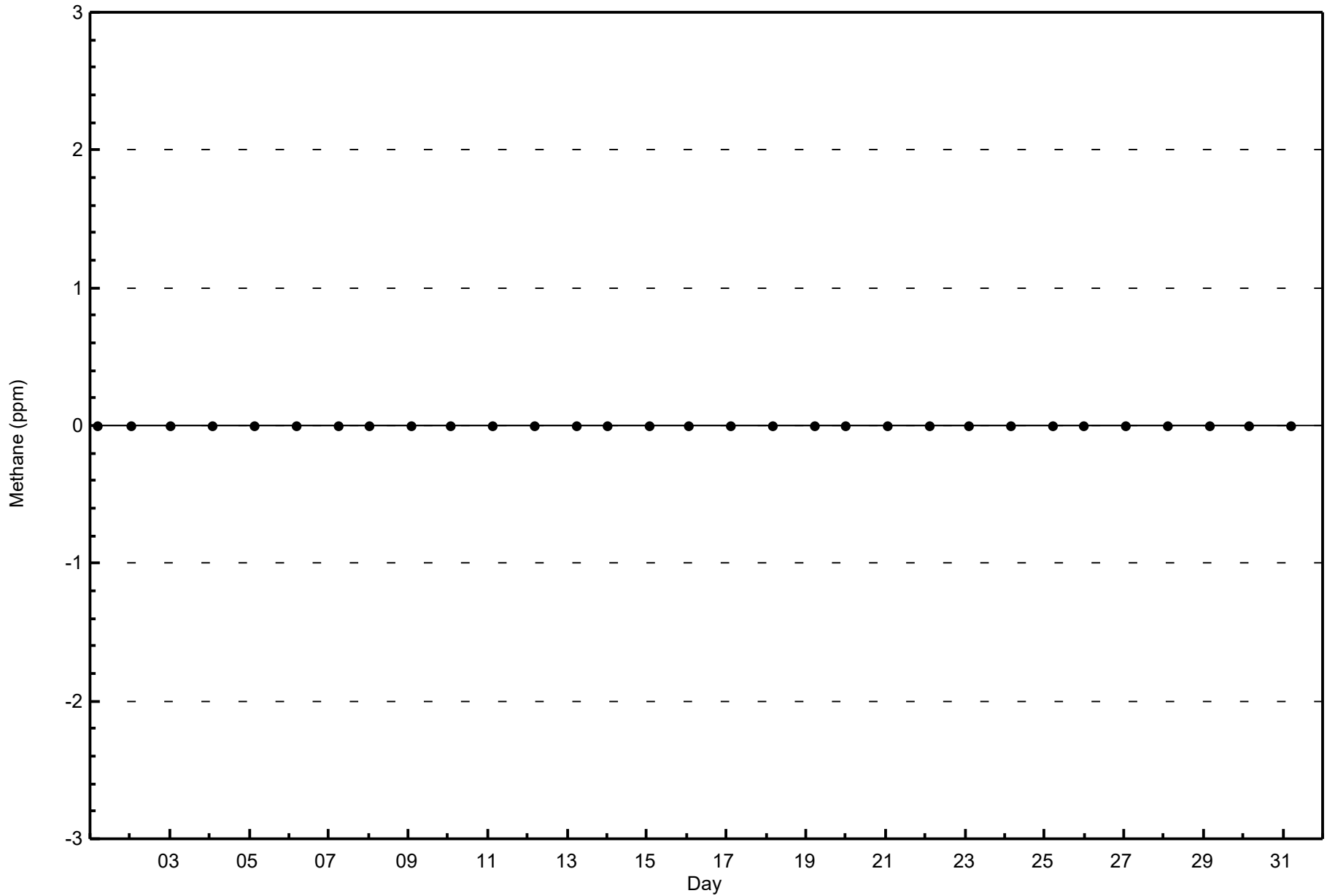
Total Number of Hours: 744

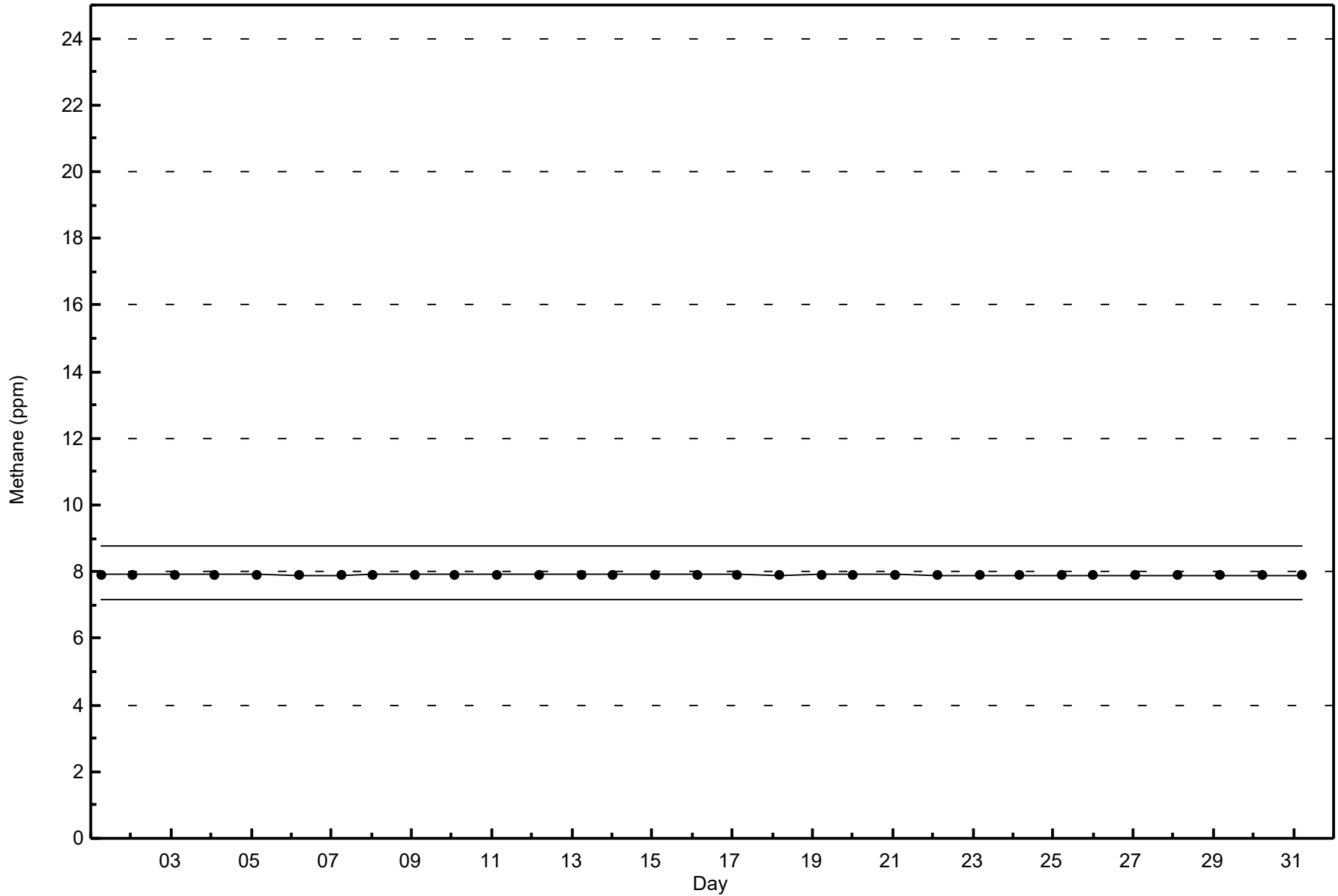


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Methane (CH₄) - ppm
Barge Landing









Wood Buffalo Environmental Association

Summary of Hour Averages

Nitric Oxide (NO) - ppb

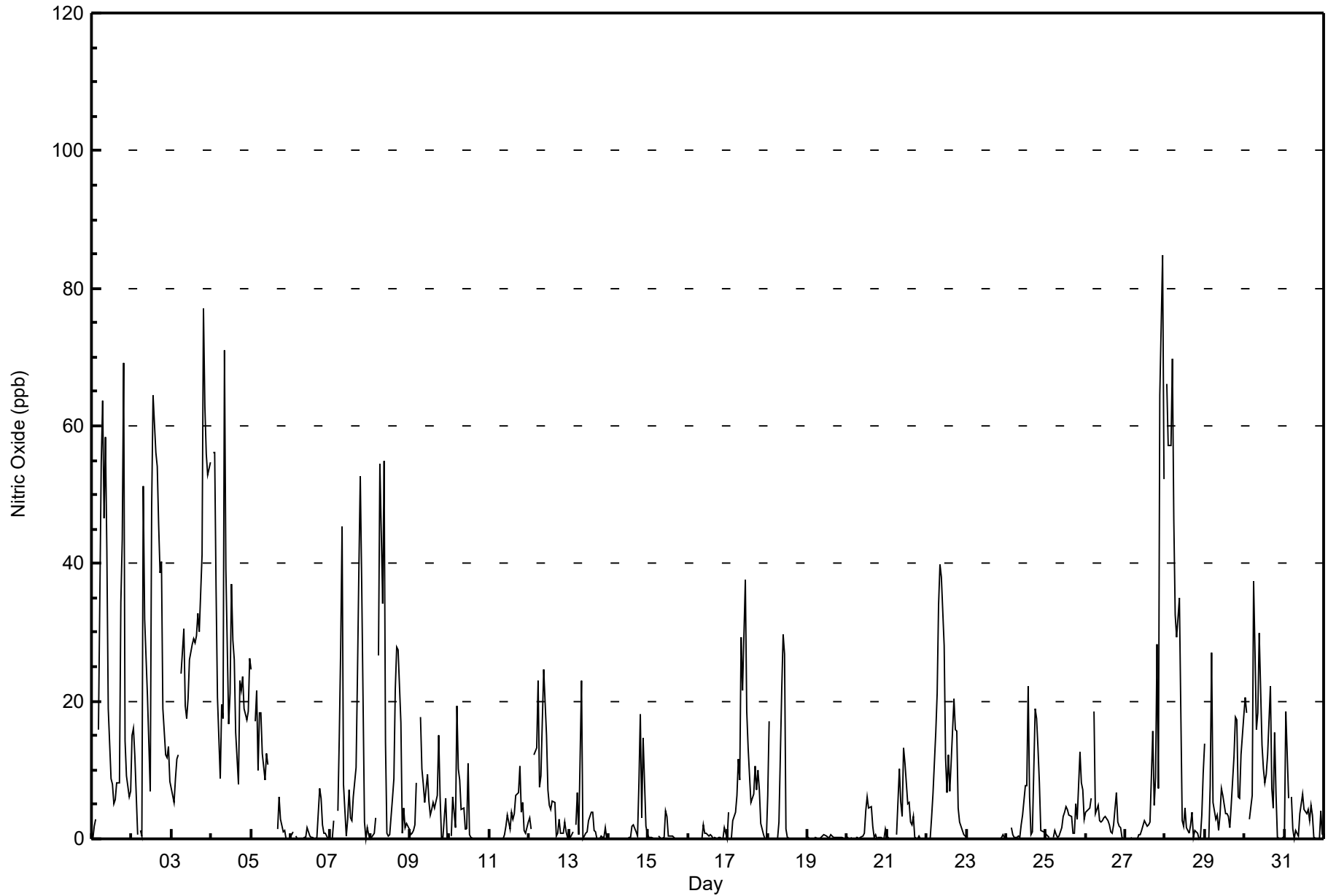
Barge Landing - December 2023

Maximum Value: 84.7 ppb on Dec 27 23:00																						Maximum Daily Average: 30.7 ppb on Dec 3																						Hours in Service: 744	
Minimum Value: 0.0 ppb on Dec 5 23:00																						Minimum Daily Average: 0.1 ppb on Dec 23																						Hours of Data: 708	
Maximum Diurnal Average: 14.1 ppb at hour 9																						Minimum Diurnal Average: 3.9 ppb at hour 1																						Hours of Missing Data: 36	
Monthly Average: 8.50 ppb																						Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.2 Median = 2.4 Q ₃ = 10.1 P ₉₀ = 26.7 P ₉₉ = 64.4																						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-Dec	0.0	1.8	2.9	Z	15.9	54.8	63.7	46.6	58.4	41.8	18.8	8.8	8.0	5.0	5.8	8.2	8.2	34.4	43.5	69.1	14.2	9.2	6.0	7.0	23.1	69.1																			
2-Dec	15.1	16.0	12.0	0.5	Z	1.2	0.5	51.2	31.9	20.8	13.9	7.0	48.2	64.5	56.0	54.2	45.6	38.6	40.2	19.0	12.2	11.8	13.4	8.3	25.3	64.5																			
3-Dec	7.3	5.2	8.7	11.7	12.3	Z	24.0	30.5	19.4	17.4	20.3	26.1	28.2	29.1	28.4	29.5	32.8	30.2	41.3	77.0	62.9	55.8	52.9	54.6	30.7	77.0																			
4-Dec	Z	56.2	56.1	36.4	20.5	8.8	19.5	17.5	71.0	39.3	16.7	21.1	37.1	28.8	26.0	15.5	7.9	22.9	21.6	23.6	18.9	17.2	18.4	26.3	27.3	71.0																			
5-Dec	24.6	Z	17.1	21.5	10.0	18.2	18.3	12.3	8.6	12.5	10.7	Z	Z	Z	Z	Z	1.5	6.1	2.8	0.9	1.3	0.0	0.0	0.0	9.3	24.6																			
6-Dec	0.7	1.1	Z	0.5	0.0	0.0	0.0	0.0	0.2	0.1	1.6	0.3	0.1	0.1	0.0	0.1	0.2	7.3	5.9	2.0	0.8	0.8	0.0	0.0	1.0	7.3																			
7-Dec	0.0	0.1	2.6	Z	4.0	14.8	27.7	45.3	8.0	0.5	2.8	7.1	3.0	2.7	6.2	10.4	23.9	39.3	52.6	37.3	2.5	0.0	1.7	0.7	12.7	52.6																			
8-Dec	0.0	0.2	0.8	3.1	Z	26.7	54.5	34.2	55.0	14.0	0.8	0.4	0.5	5.8	8.7	21.8	27.9	27.5	16.9	0.7	4.6	1.5	2.1	1.4	13.5	55.0																			
9-Dec	0.7	0.7	1.2	2.1	8.2	Z	17.8	10.1	7.9	5.4	9.4	5.5	3.5	4.2	5.3	4.6	6.4	15.1	6.1	0.3	0.1	5.8	0.2	0.4	5.3	17.8																			
10-Dec	Z	0.3	6.2	1.6	19.2	10.1	8.6	4.4	4.4	1.4	1.4	11.0	0.6	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.0	19.2																			
11-Dec	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	1.7	3.5	1.5	3.9	2.9	3.7	6.2	6.7	10.5	3.8	5.3	1.2	0.7	2.5	2.4	10.5																			
12-Dec	3.0	1.5	Z	12.2	13.3	22.9	7.5	9.2	17.0	24.5	15.1	7.1	4.9	4.2	5.4	5.3	0.3	0.7	2.9	0.8	0.7	2.5	1.0	0.2	7.1	24.5																			
13-Dec	0.1	0.1	1.0	Z	2.0	6.8	0.6	23.0	0.1	0.5	0.9	1.0	2.7	3.8	3.9	1.3	1.0	0.0	0.1	0.5	0.2	0.3	1.5	0.1	2.2	23.0																			
14-Dec	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2	1.8	2.0	1.0	0.4	8.1	18.1	3.0	14.7	1.8	0.9	2.3	18.1																			
15-Dec	0.3	0.3	0.1	0.0	0.0	Z	0.3	0.3	0.1	0.2	4.0	3.3	0.5	0.4	0.3	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	4.0																			
16-Dec	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.1	0.9	0.9	0.5	0.5	0.4	0.1	0.1	0.1	0.3	0.3	0.0	0.0	1.6	0.1	0.3	2.1																			
17-Dec	4.0	Z	0.0	2.6	3.9	6.4	11.6	8.5	29.4	21.5	37.6	18.5	13.3	9.2	5.3	6.5	10.5	7.1	10.1	7.2	2.3	0.6	0.1	0.0	9.4	37.6																			
18-Dec	6.3	17.1	Z	0.0	0.0	0.0	0.0	2.5	21.7	29.6	26.8	1.5	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	4.6	29.6																			
19-Dec	0.1	0.1	0.1	Z	0.1	0.1	0.0	0.0	0.1	0.4	0.6	0.4	0.3	0.2	0.7	0.4	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.2	0.7																			
20-Dec	0.2	0.1	0.1	0.1	Z	0.1	0.1	0.1	0.1	0.4	0.7	4.2	6.2	4.6	4.7	1.9	0.3	0.7	0.1	0.1	0.1	0.1	0.0	1.4	1.1	6.2																			
21-Dec	0.5	0.0	0.0	0.0	0.0	Z	0.6	10.2	5.3	3.2	13.1	11.0	5.1	5.2	2.5	2.1	3.3	0.2	0.0	0.3	0.1	0.0	0.0	0.0	2.7	13.1																			
22-Dec	Z	0.0	0.0	3.1	6.5	15.4	21.1	34.0	39.9	38.1	28.1	11.9	6.6	12.2	7.0	11.2	20.4	15.9	15.7	4.5	2.3	1.2	0.6	0.4	12.9	39.9																			
23-Dec	0.1	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.3	0.5	0.2	0.1	0.5																			
24-Dec	0.3	0.0	Z	1.6	0.6	0.2	0.3	0.4	0.2	2.1	3.5	7.7	22.2	6.2	0.6	0.9	19.0	17.6	13.2	8.1	1.3	1.0	1.0	1.0	5.0	22.2																			
25-Dec	0.6	0.3	0.1	Z	0.3	1.2	0.6	0.2	0.5	1.6	3.2	4.0	4.6	4.3	3.4	3.2	0.9	0.8	5.1	2.8	12.7	8.2	7.1	2.8	3.0	12.7																			
26-Dec	3.9	4.1	4.5	5.9	Z	18.5	3.7	4.9	2.7	2.5	2.5	3.1	3.3	2.6	2.0	1.0	0.8	1.9	6.7	2.4	1.9	1.5	0.2	0.0	3.5	18.5																			
27-Dec	0.0	0.0	0.0	0.0	0.2	Z	0.0	0.1	0.7	0.6	1.2	2.7	2.3	1.7	2.0	2.4	15.6	4.9	9.0	28.3	7.4	64.5	84.7	52.3	12.2	84.7																			
28-Dec	Z	66.1	57.1	57.2	69.7	46.4	32.6	29.3	34.9	18.8	2.6	1.7	4.5	1.6	0.8	2.1	4.0	0.3	1.1	0.9	0.1	0.2	3.5	9.5	19.3	69.7																			
29-Dec	13.9	Z	0.0	7.8	27.0	5.3	2.8	3.4	1.2	3.5	7.4	6.2	3.6	3.6	3.3	1.7	5.0	12.0	17.8	17.3	6.2	6.0	12.3	17.9	8.1	27.0																			
30-Dec	20.6	18.2	Z	2.8	6.3	37.4	27.0	15.8	18.3	29.9	13.6	10.1	8.1	9.3	12.3	22.1	7.3	4.5	15.4	6.4	0.2	0.0	0.1	0.3	12.4	37.4																			
31-Dec	0.4	18.6	5.8	Z	6.0	1.4	0.0	1.1	0.3	3.8	5.1	6.4	4.3	3.7	4.3	2.6	5.0	3.4	0.1	0.0	0.0	0.0	4.1	0.6	3.4	18.6																			
																								Diurnal Average																					
																								Diurnal Maximum																					
Z - zerospan C - Calibration																																													



Wood Buffalo Environmental Association
Hourly Averages

Nitric Oxide (NO) - ppb
Barge Landing - December 2023





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitric Oxide (NO) - ppb
Barge Landing - December 2023**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	614	86.72	86.72
21 - 40	60	8.47	95.20
41 - 80	33	4.66	99.86
81 - 159	1	0.14	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 708

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitric Oxide (NO) - ppb
Barge Landing - December 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	18	11	4	5	7	13	168	137	79	56	40	32	9	9	12	614
21 - 40	1	0	1	1	0	1	2	19	11	6	5	2	0	3	3	5	60
11 - 80	2	2	1	1	0	0	0	5	8	8	0	2	0	0	2	2	33
81 - 159	0	0	1	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
Totals	17	20	14	6	5	8	15	192	156	93	61	44	32	12	14	19	708

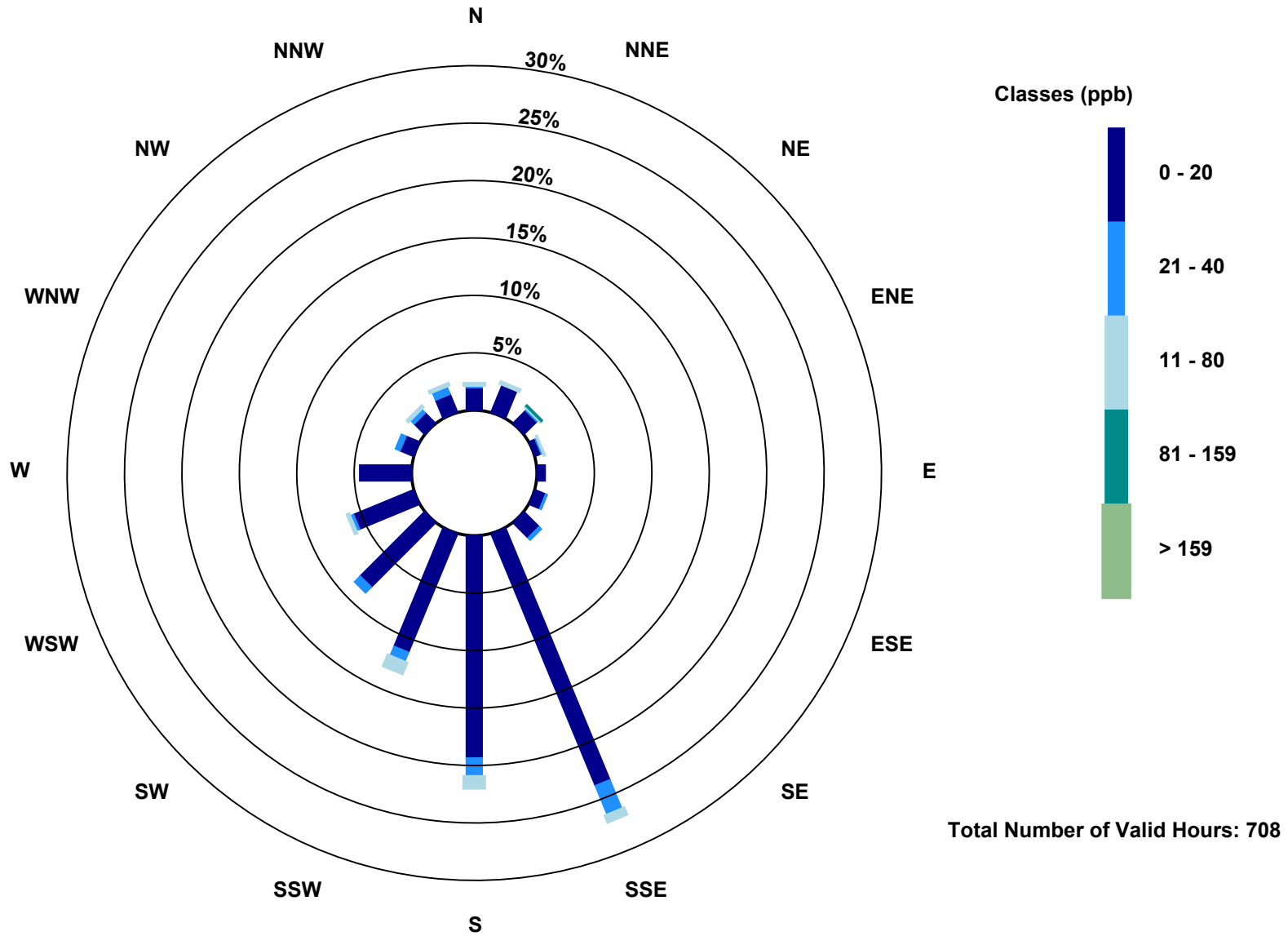
Total Number of Valid Hours: 708

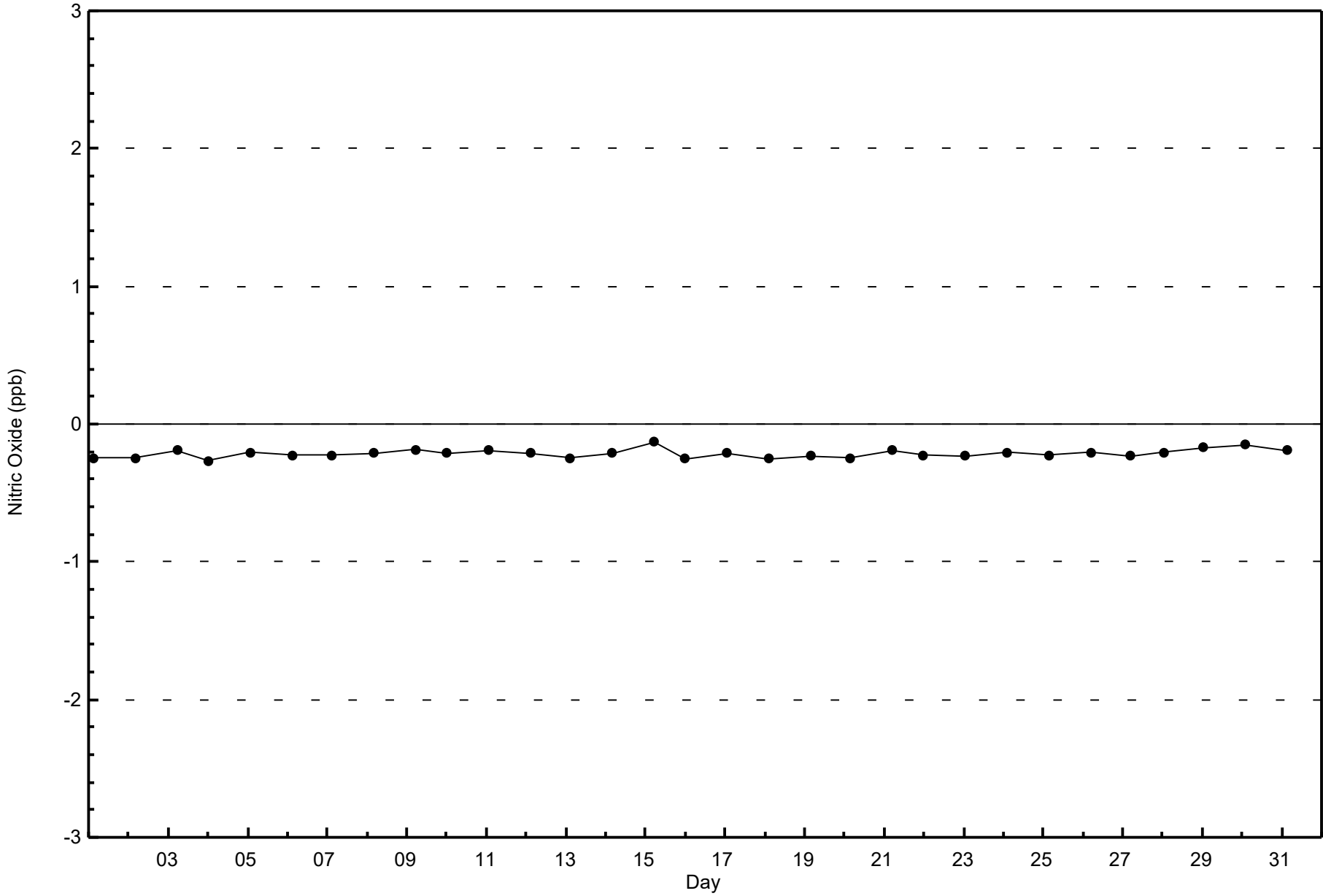
Total Number of Hours: 744

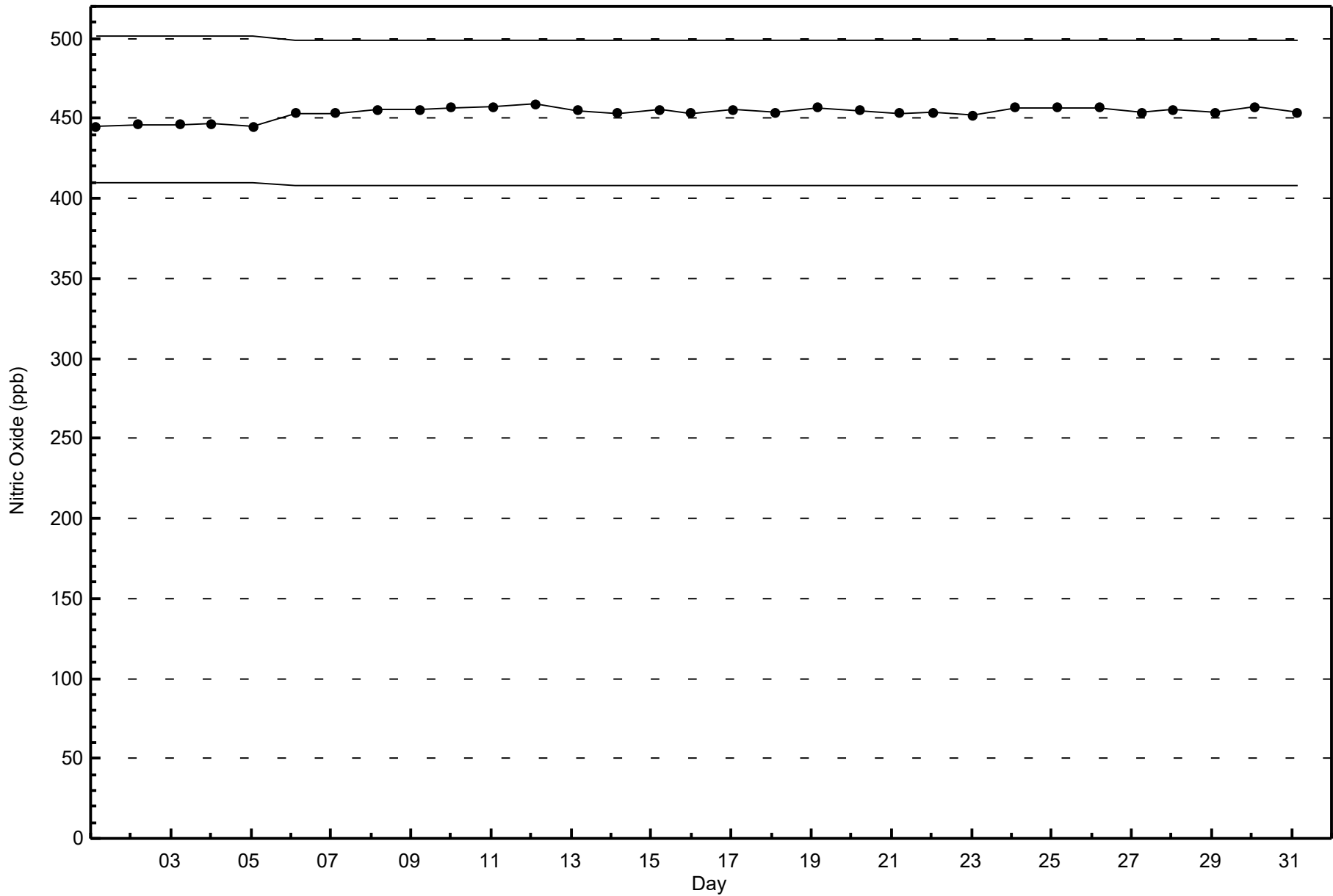


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Nitric Oxide (NO) - ppb
Barge Landing









Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO₂) - ppb

Barge Landing - December 2023

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 37.9 ppb on Dec 27 23:00	Maximum Daily Average: 24.8 ppb on Dec 28		Hours of Data:	708
Minimum Value: 0.2 ppb on Dec 10 21:00	Minimum Daily Average: 3.9 ppb on Dec 23		Hours of Missing Data:	36
Maximum Diurnal Average: 18.7 ppb at hour 19	Minimum Diurnal Average: 9.8 ppb at hour 13		Hours of Calibration:	36
Monthly Average: 14.47 ppb	Percentiles: P ₁ = 0.2 P ₁₀ = 1.0 Q ₁ = 7.9 Median = 15.4 Q ₃ = 20.5 P ₉₀ = 25.6 P ₉₉ = 32.5		Percent Operational Time:	100.0

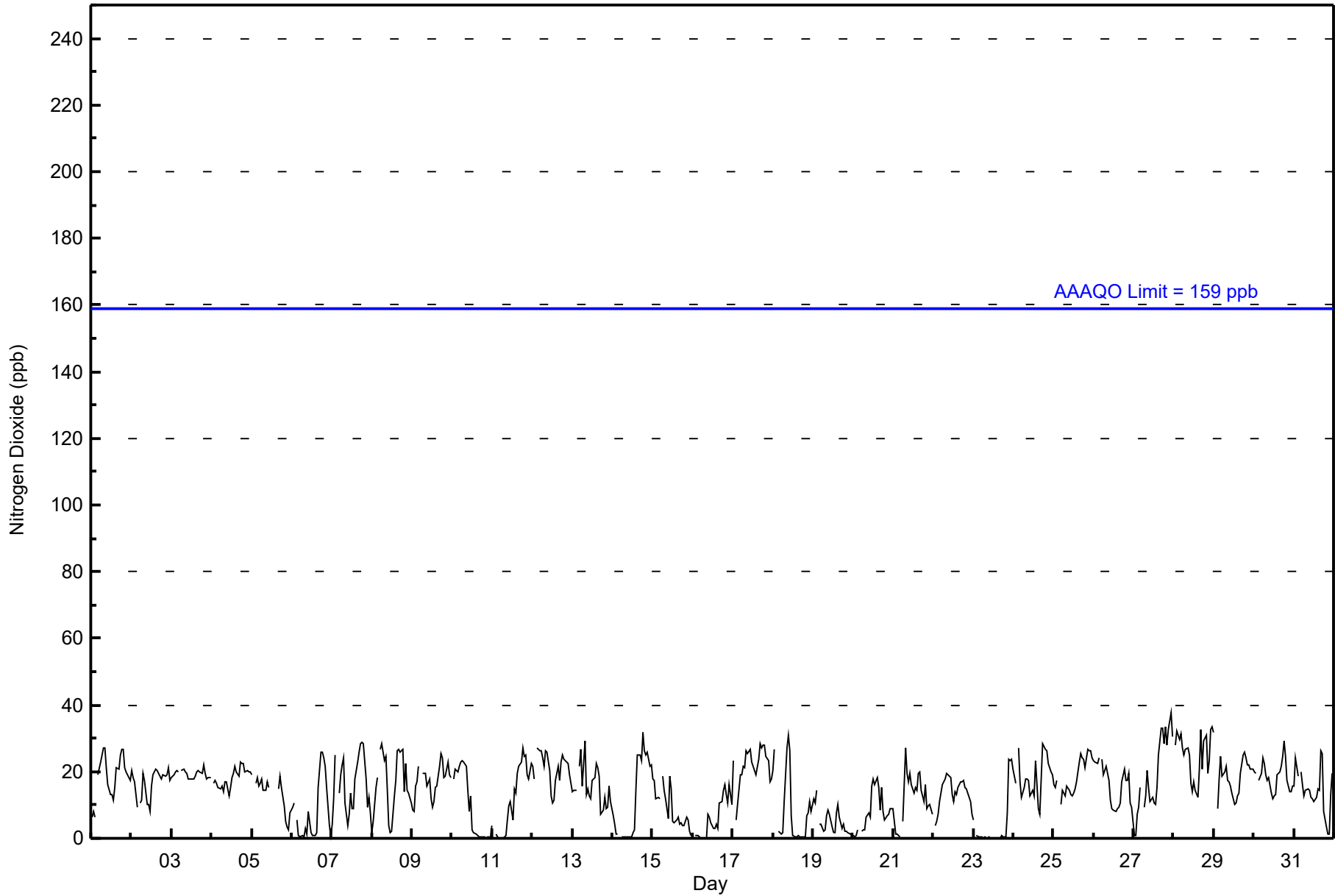
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Dec	6.3	8.2	6.3	Z	19.2	22.8	24.8	27.1	27.3	21.0	16.3	13.1	13.2	11.5	15.3	21.1	20.7	24.9	26.6	26.6	21.2	19.9	18.2	17.2	18.6	27.3																							
2-Dec	20.2	18.3	16.8	9.3	Z	10.8	11.3	19.6	17.4	10.3	10.2	8.0	15.6	19.0	20.8	20.2	19.5	18.5	18.0	18.9	18.6	18.9	21.0	17.2	16.5	21.0																							
3-Dec	18.2	18.9	19.9	20.4	19.9	Z	20.4	20.8	19.8	19.4	18.0	17.7	17.6	17.6	18.8	19.9	20.3	19.8	19.7	22.2	19.4	18.0	18.2	18.1	19.3	22.2																							
4-Dec	Z	16.4	17.3	16.7	15.1	14.7	15.6	14.0	17.1	16.9	12.8	15.2	18.4	19.4	21.7	19.9	18.6	23.0	22.6	22.5	20.0	20.2	20.1	20.0	18.2	23.0																							
5-Dec	19.1	Z	16.4	18.4	15.7	16.6	17.6	14.3	14.2	16.8	15.3	C	C	C	C	C	14.7	18.5	15.2	9.6	5.1	3.3	2.4	7.5	13.4	19.1																							
6-Dec	9.5	10.4	Z	5.5	0.7	0.5	1.0	0.5	2.8	1.4	8.2	1.5	0.8	0.8	0.8	1.5	15.3	25.8	26.0	24.1	21.8	15.3	3.9	0.9	7.8	26.0																							
7-Dec	4.1	11.9	25.2	Z	13.6	18.9	22.2	24.0	10.6	4.0	7.2	13.6	8.7	9.0	17.8	22.7	26.0	28.4	28.7	28.3	17.7	9.2	12.3	7.5	16.2	28.7																							
8-Dec	1.8	4.9	15.2	18.4	Z	26.5	28.6	23.1	24.7	14.5	4.0	1.9	2.2	12.6	17.4	26.1	26.7	26.0	26.5	13.8	22.5	14.2	13.5	10.4	16.3	28.6																							
9-Dec	8.6	8.2	15.6	16.9	21.8	Z	19.4	19.4	19.6	15.6	17.7	12.0	9.3	11.0	15.1	15.8	21.8	25.6	24.2	18.1	18.7	23.0	19.1	18.1	17.2	25.6																							
10-Dec	Z	17.8	20.6	20.0	21.6	22.8	23.5	22.8	21.4	14.4	8.0	12.9	2.6	1.7	1.3	1.0	0.5	0.4	0.3	0.3	0.2	0.3	0.3	0.2	9.3	23.5																							
11-Dec	3.7	Z	1.4	0.3	0.2	0.2	0.2	0.3	0.7	5.4	9.7	11.2	5.7	14.7	13.4	19.6	21.4	22.9	27.0	24.7	25.2	18.9	17.8	22.5	11.6	27.0																							
12-Dec	21.4	17.9	Z	27.2	26.2	26.3	24.0	21.6	26.4	25.8	20.4	12.6	10.7	11.3	17.2	21.6	17.2	23.0	25.0	23.6	22.8	22.5	18.9	16.4	20.9	27.2																							
13-Dec	13.9	14.4	14.2	Z	21.4	26.8	15.6	29.2	13.3	14.8	12.9	11.7	17.2	18.2	22.6	21.0	18.5	7.3	8.5	12.2	8.8	9.3	15.5	10.9	15.6	29.2																							
14-Dec	6.8	4.2	1.1	1.1	Z	0.5	0.4	0.5	0.4	0.4	0.4	0.4	1.6	2.5	14.4	25.2	24.8	23.2	31.8	26.4	25.2	25.8	21.6	22.1	11.3	31.8																							
15-Dec	18.0	17.2	11.9	12.4	11.7	Z	18.5	14.3	11.9	5.8	18.6	15.0	5.1	4.8	5.3	6.5	4.3	4.8	3.7	3.8	6.3	5.4	2.3	1.0	9.1	18.6																							
16-Dec	Z	0.9	0.8	0.8	0.5	0.2	0.2	0.2	0.2	7.0	6.3	4.6	3.0	3.0	4.2	2.9	10.4	11.0	14.6	16.1	13.0	10.7	16.1	10.1	5.9	16.1																							
17-Dec	23.2	Z	5.7	10.3	19.2	19.0	21.6	21.1	26.2	25.3	26.5	22.9	21.5	20.4	19.1	23.8	28.4	27.0	27.8	28.0	24.6	23.4	16.9	17.8	21.7	28.4																							
18-Dec	20.5	26.5	Z	2.1	1.7	1.4	1.6	11.0	27.3	30.9	26.2	6.7	1.0	0.5	0.4	0.8	0.4	0.3	0.4	0.3	6.6	7.8	11.1	8.1	8.4	30.9																							
19-Dec	12.0	10.4	14.3	Z	4.4	4.3	2.0	2.5	6.6	8.5	7.2	3.2	1.9	1.8	7.6	10.2	6.2	3.1	4.3	2.0	2.0	1.5	1.4	1.0	5.1	14.3																							
20-Dec	0.9	0.4	0.9	2.6	Z	2.3	2.4	2.5	6.4	7.7	6.4	15.5	17.7	16.1	18.3	15.4	8.6	15.4	8.1	5.5	6.9	7.2	8.9	9.1	8.1	18.3																							
21-Dec	8.8	1.4	1.1	0.9	0.6	Z	5.0	27.0	19.4	16.9	19.7	15.9	13.7	15.3	14.6	19.4	20.0	14.2	11.1	16.2	9.1	9.8	10.3	7.3	12.1	27.0																							
22-Dec	Z	4.0	5.1	7.1	10.9	16.2	17.1	17.9	19.5	19.2	18.3	13.2	10.9	13.9	13.2	15.4	17.1	17.1	17.4	15.4	14.7	12.3	11.1	7.4	13.7	19.5																							
23-Dec	5.6	Z	0.8	0.4	0.3	0.3	0.2	0.3	0.2	0.4	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.9	0.5	0.4	7.8	23.6	23.5	23.7	3.9	23.7																							
24-Dec	20.8	16.4	Z	27.1	16.9	12.2	15.3	17.8	18.0	17.3	12.8	14.2	12.8	23.5	16.2	9.0	7.3	28.5	27.5	26.6	26.1	22.5	19.9	18.9	18.6	28.5																							
25-Dec	16.3	15.2	17.2	Z	10.3	14.2	13.5	12.9	15.5	14.2	13.3	12.6	13.5	14.8	16.8	22.7	25.6	24.1	23.8	21.0	26.9	26.1	26.1	24.2	18.3	26.9																							
26-Dec	23.1	23.0	22.6	24.3	Z	23.9	19.0	21.8	19.3	17.3	11.3	9.1	8.4	8.0	8.7	9.5	10.8	16.8	20.6	17.3	17.2	19.3	10.6	9.4	16.1	24.3																							
27-Dec	1.0	0.9	7.0	9.3	15.2	Z	9.5	12.7	20.4	15.2	11.1	12.1	10.7	10.2	15.4	24.8	33.2	33.1	28.6	33.3	27.8	32.5	37.9	30.3	18.8	37.9																							
28-Dec	Z	28.0	32.3	29.5	31.4	27.2	25.1	26.5	27.3	24.8	16.5	14.0	17.0	14.5	12.2	20.6	32.6	20.7	29.1	30.9	19.7	23.1	32.8	33.5	24.8	33.5																							
29-Dec	31.8	Z	8.8	17.6	24.7	18.7	20.0	21.8	17.3	16.8	15.8	13.4	10.1	10.6	12.7	13.7	19.4	25.1	25.7	24.3	22.1	21.9	20.8	20.6	18.9	31.8																							
30-Dec	20.1	19.7	Z	17.2	19.4	24.3	22.6	18.9	17.3	18.3	13.5	12.0	12.5	13.1	19.2	20.0	21.8	24.7	29.2	24.6	17.5	14.0	13.9	15.8	18.7	29.2																							
31-Dec	15.8	24.2	18.7	Z	19.9	16.3	12.5	14.4	14.8	14.6	12.2	12.0	11.1	12.2	15.0	14.3	26.1	25.4	7.9	3.5	1.4	1.1	13.0	19.6	14.2	26.1																							
																								13.5	13.1	12.2	12.6	13.9	14.2	13.9	15.5	15.6	14.2	12.8	10.9	9.8	11.1	13.2	15.5	17.4	18.7	18.7	17.4	16.0	15.5	15.5	14.4	Diurnal Average	
																								31.8	28.0	32.3	29.5	31.4	27.2	28.6	29.2	27.3	30.9	26.5	22.9	21.5	23.5	22.6	26.1	33.2	33.1	31.8	33.3	27.8	32.5	37.9	33.5	Diurnal Maximum	

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



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Dioxide (NO₂) - ppb
Barge Landing - December 2023





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Barge Landing - December 2023**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	530	74.86	74.86
21 - 40	178	25.14	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 708

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Barge Landing - December 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	5	15	11	4	5	5	13	130	106	69	52	42	32	12	13	16	530
21 - 40	12	5	3	2	0	3	2	62	50	24	9	2	0	0	1	3	178
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	17	20	14	6	5	8	15	192	156	93	61	44	32	12	14	19	708

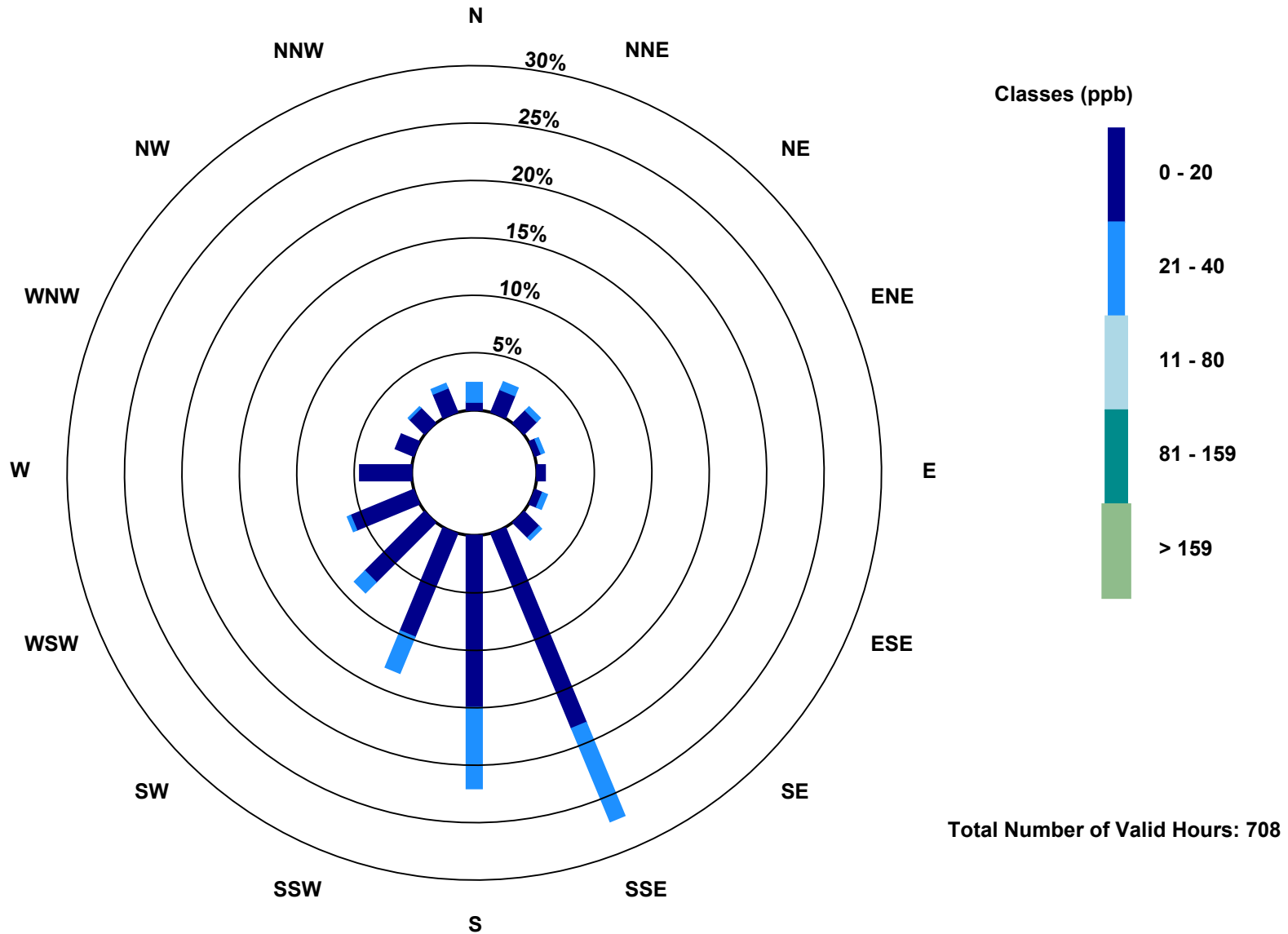
Total Number of Valid Hours: 708

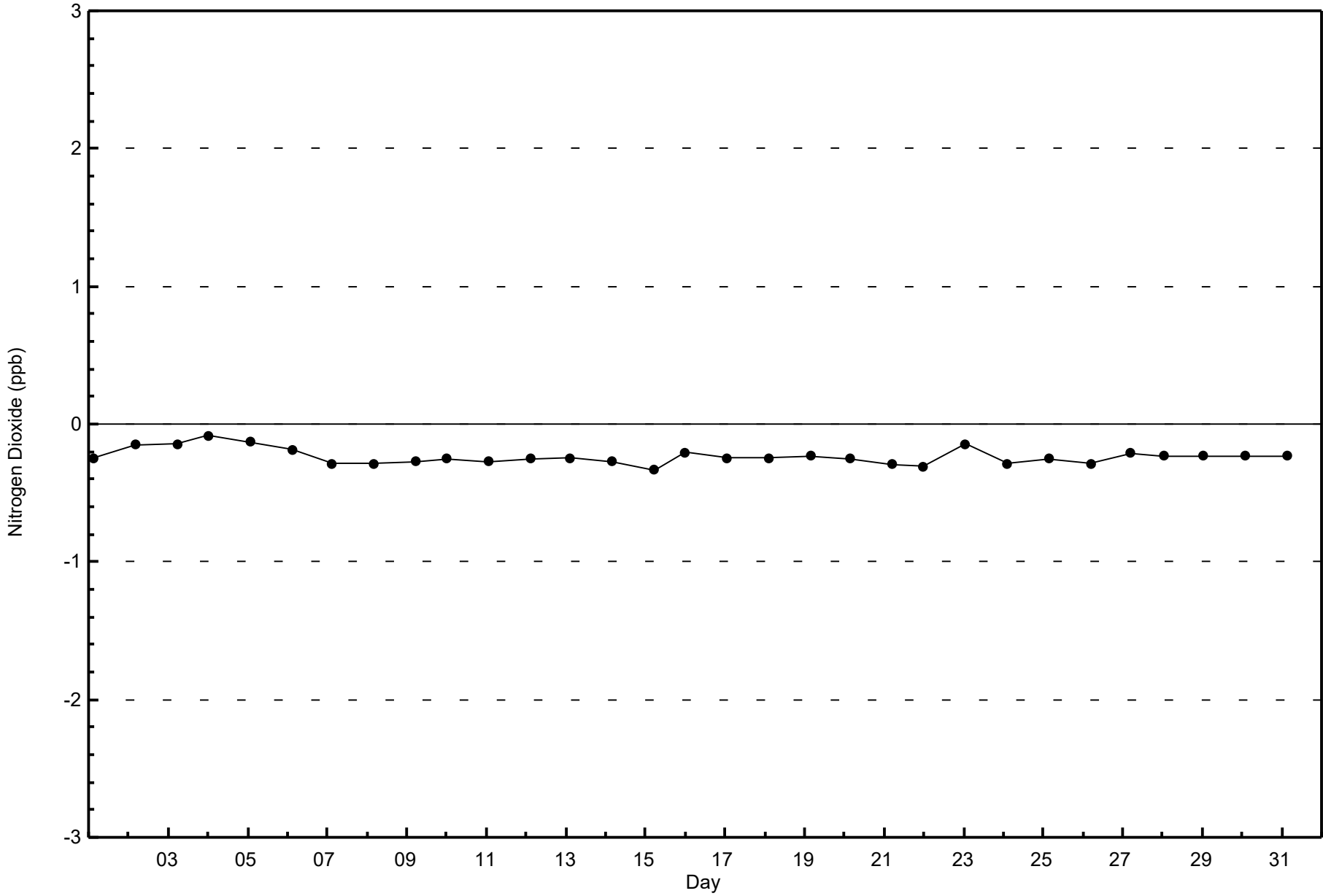
Total Number of Hours: 744

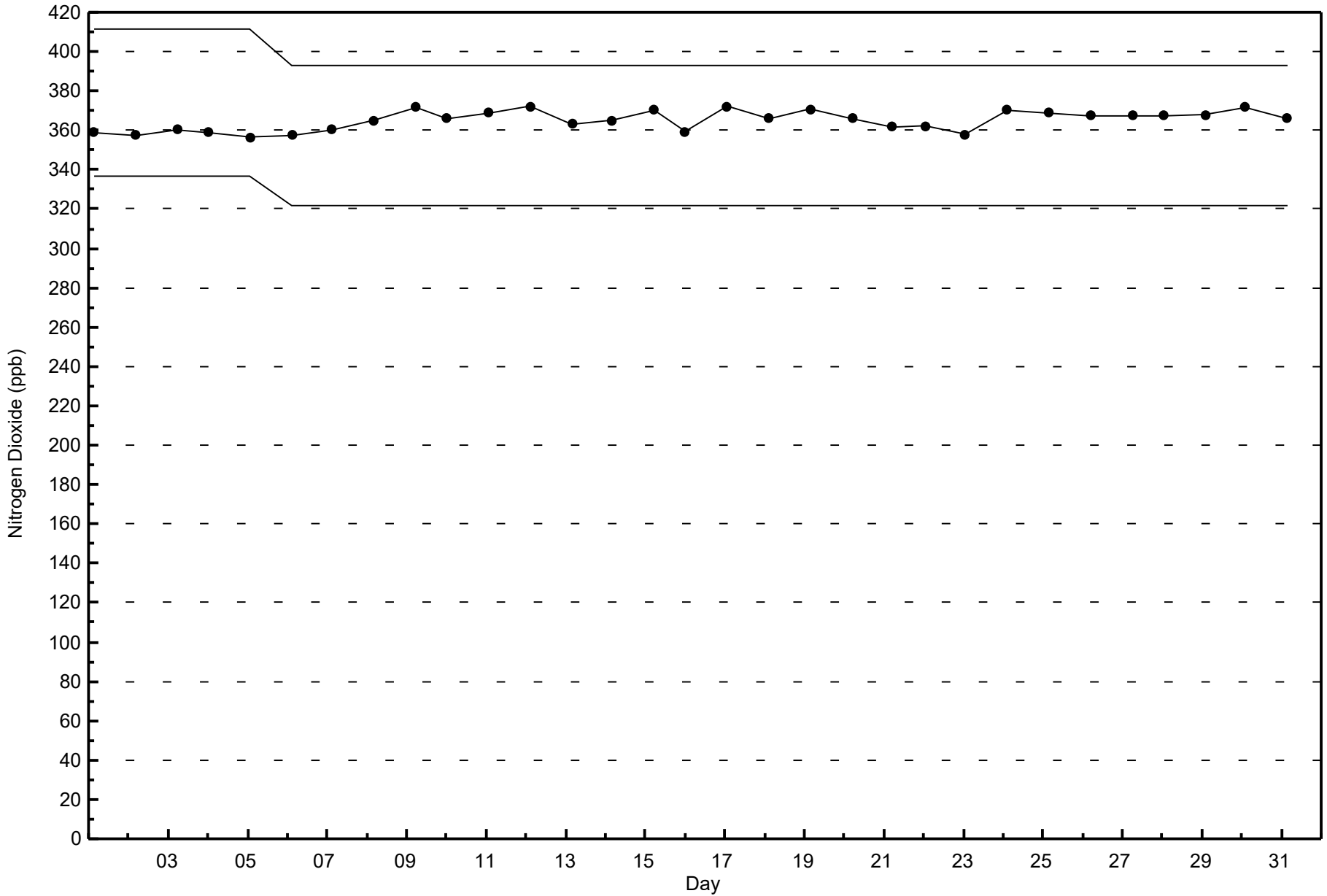


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Nitrogen Dioxide (NO₂) - ppb
Barge Landing









Wood Buffalo Environmental Association

Summary of Hour Averages

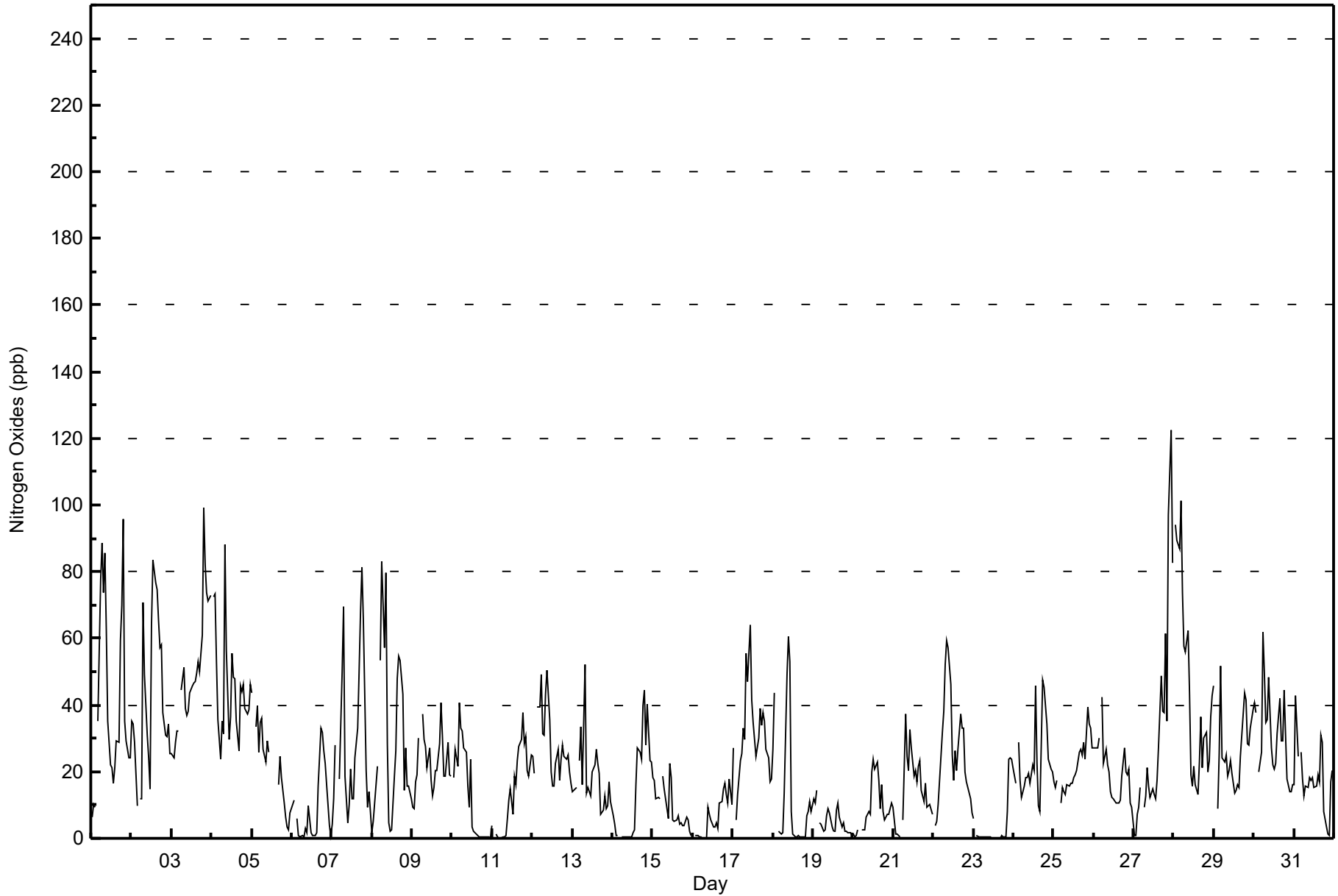
Nitrogen Oxides (NO_x) - ppb
Barge Landing - December 2023

Maximum Value: 122.6 ppb on Dec 27 23:00																						Maximum Daily Average: 49.9 ppb on Dec 3																						Hours in Service: 744					
Minimum Value: 0.2 ppb on Dec 23 17:00																						Minimum Daily Average: 4.0 ppb on Dec 23																						Hours of Data: 708					
Maximum Diurnal Average: 30.1 ppb at hour 19																						Minimum Diurnal Average: 16.8 ppb at hour 13																						Hours of Missing Data: 36					
Monthly Average: 22.97 ppb																						Percentiles: P ₁ = 0.2 P ₁₀ = 1.1 Q ₁ = 8.7 Median = 18.9 Q ₃ = 31.5 P ₉₀ = 48.9 P ₉₉ = 88.4																						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-Dec	6.3	10.0	9.2	Z	35.1	77.6	88.5	73.7	85.7	62.8	35.1	21.9	21.2	16.5	21.1	29.3	28.9	59.3	70.1	95.7	35.4	29.1	24.2	24.2	41.8	95.7																							
2-Dec	35.3	34.3	28.8	9.8	Z	12.0	11.8	70.8	49.3	31.1	24.1	15.0	63.8	83.5	76.8	74.4	65.1	57.1	58.2	37.9	30.8	30.7	34.4	25.5	41.8	83.5																							
3-Dec	25.5	24.1	28.6	32.1	32.2	Z	44.4	51.3	39.2	36.8	38.3	43.8	45.8	46.7	47.2	49.4	53.1	50.0	61.0	99.2	82.3	73.8	71.1	72.7	49.9	99.2																							
4-Dec	Z	72.6	73.4	53.1	35.6	23.5	35.1	31.5	88.1	56.2	29.5	36.3	55.5	48.2	47.7	35.4	26.5	45.9	44.2	46.1	38.9	37.4	38.5	46.3	45.5	88.1																							
5-Dec	43.7	Z	33.5	39.9	25.7	34.8	35.9	26.6	22.8	29.3	26.0	C	C	C	C	C	16.2	24.6	18.0	10.5	6.4	3.3	2.4	7.5	22.6	43.7																							
6-Dec	10.2	11.5	Z	6.0	0.7	0.5	1.0	0.5	3.0	1.5	9.8	1.8	0.9	0.9	0.8	1.6	15.5	33.1	31.9	26.1	22.6	16.1	3.9	0.9	8.7	33.1																							
7-Dec	4.1	12.0	27.8	Z	17.6	33.7	49.9	69.3	18.6	4.5	10.0	20.7	11.7	11.7	24.0	33.1	49.9	67.7	81.3	65.6	20.2	9.2	14.0	8.2	28.9	81.3																							
8-Dec	1.8	5.1	16.0	21.5	Z	53.2	83.1	57.3	79.7	28.5	4.8	2.3	2.7	18.4	26.1	47.9	54.6	53.6	43.4	14.5	27.1	15.7	15.6	11.8	29.8	83.1																							
9-Dec	9.3	8.9	16.8	19.0	30.0	Z	37.2	29.5	27.5	21.0	27.1	17.5	12.8	15.2	20.4	20.4	28.2	40.7	30.3	18.4	18.8	28.8	19.3	18.5	22.4	40.7																							
10-Dec	Z	18.1	26.8	21.6	40.8	32.9	32.1	27.2	25.8	15.8	9.4	23.9	3.2	1.9	1.4	1.0	0.5	0.4	0.3	0.3	0.2	0.3	0.3	0.2	12.4	40.8																							
11-Dec	3.7	Z	1.4	0.3	0.2	0.2	0.2	0.3	0.7	6.0	11.4	14.7	7.2	18.6	16.3	23.3	27.6	29.6	37.5	28.5	30.5	20.1	18.5	25.0	14.0	37.5																							
12-Dec	24.4	19.4	Z	39.4	39.5	49.2	31.5	30.8	43.4	50.3	35.5	19.7	15.6	15.5	22.6	26.9	17.5	23.7	27.9	24.4	23.5	25.0	19.9	16.6	27.9	50.3																							
13-Dec	14.0	14.5	15.2	Z	23.4	33.6	16.2	52.2	13.4	15.3	13.8	12.7	19.9	22.0	26.5	22.3	19.5	7.3	8.6	12.7	9.0	9.6	17.0	11.0	17.8	52.2																							
14-Dec	6.8	4.2	1.1	1.1	Z	0.5	0.4	0.4	0.5	0.4	0.4	0.4	1.8	2.7	16.2	27.2	25.8	23.6	39.9	44.5	28.2	40.5	23.4	23.0	13.6	44.5																							
15-Dec	18.3	17.5	12.0	12.4	11.7	Z	18.8	14.6	12.0	6.0	22.6	18.3	5.6	5.2	5.6	6.7	4.3	4.8	3.7	3.8	6.3	5.4	2.3	1.0	9.5	22.6																							
16-Dec	Z	0.9	0.8	0.8	0.5	0.2	0.2	0.2	0.2	9.1	7.2	5.5	3.5	3.5	4.6	3.0	10.5	11.1	14.9	16.4	13.0	10.7	17.7	10.2	6.3	17.7																							
17-Dec	27.2	Z	5.7	12.9	23.1	25.4	33.2	29.6	55.6	46.8	64.1	41.4	34.8	29.6	24.4	30.3	38.9	34.1	37.9	35.2	26.9	24.0	17.0	17.8	31.1	64.1																							
18-Dec	26.8	43.6	Z	2.1	1.7	1.4	1.6	13.5	49.0	60.5	53.0	8.2	1.1	0.5	0.4	0.8	0.4	0.3	0.4	0.3	6.7	7.9	11.2	8.2	13.0	60.5																							
19-Dec	12.1	10.5	14.4	Z	4.5	4.4	2.0	2.5	6.7	8.9	7.8	3.6	2.2	2.0	8.3	10.6	6.3	3.2	4.5	2.1	2.1	1.6	1.5	1.1	5.3	14.4																							
20-Dec	1.1	0.5	1.0	2.7	Z	2.4	2.5	2.6	6.5	8.1	7.1	19.7	23.9	20.7	23.0	17.3	8.9	16.1	8.2	5.6	7.0	7.3	8.9	10.5	9.2	23.9																							
21-Dec	9.3	1.4	1.1	0.9	0.6	Z	5.6	37.2	24.7	20.1	32.8	26.9	18.8	20.5	17.1	21.5	23.3	14.4	11.1	16.5	9.2	9.8	10.3	7.3	14.8	37.2																							
22-Dec	Z	4.0	5.1	10.2	17.4	31.6	38.2	51.9	59.4	57.3	46.4	25.1	17.5	26.1	20.2	26.6	37.5	33.0	33.1	19.9	17.0	13.5	11.7	7.8	26.5	59.4																							
23-Dec	5.7	Z	0.8	0.4	0.3	0.3	0.2	0.3	0.2	0.4	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.9	0.5	0.4	7.9	23.9	24.0	23.9	4.0	24.0																							
24-Dec	21.1	16.4	Z	28.7	17.5	12.4	15.6	18.2	18.2	19.4	16.3	21.9	20.5	45.7	22.4	9.6	8.2	47.5	45.1	39.8	34.2	23.8	20.9	19.9	23.6	47.5																							
25-Dec	16.9	15.5	17.3	Z	10.6	15.4	14.1	13.1	16.0	15.8	16.5	16.6	18.1	19.1	20.2	25.9	26.5	24.9	28.9	23.8	39.6	34.3	33.2	27.0	21.3	39.6																							
26-Dec	27.0	27.1	27.1	30.2	Z	42.4	22.7	26.7	22.0	19.8	13.8	12.2	11.7	10.6	10.7	10.5	11.6	18.7	27.3	19.7	19.1	20.8	10.8	9.4	19.6	42.4																							
27-Dec	1.0	0.9	7.0	9.3	15.4	Z	9.5	12.8	21.1	15.8	12.3	14.8	13.0	11.9	17.4	27.2	48.8	38.0	37.6	61.6	35.2	97.0	122.6	82.6	31.0	122.6																							
28-Dec	Z	94.1	89.4	86.7	101.1	73.6	57.7	55.8	62.2	43.6	19.1	15.7	21.5	16.1	13.0	22.7	36.6	21.0	30.2	31.8	19.8	23.3	36.3	43.0	44.1	101.1																							
29-Dec	45.7	Z	8.8	25.4	51.7	24.0	22.8	25.2	18.5	20.3	23.2	19.6	13.7	14.2	16.0	15.4	24.4	37.1	43.5	41.6	28.3	27.9	33.1	38.5	26.9	51.7																							
30-Dec	40.7	37.9	Z	20.0	25.7	61.7	49.6	34.7	35.6	48.2	27.1	22.1	20.6	22.4	31.5	42.1	29.1	29.2	44.6	31.0	17.7	14.0	14.0	16.1	31.1	61.7																							
31-Dec	16.2	42.8	24.5	Z	25.9	17.7	12.5	15.5	15.1	18.4	17.3	18.4	15.4	15.9	19.3	16.9	31.1	28.8	8.0	3.5	1.4	1.1	17.1	20.2	17.5	42.8																							
																								17.5	21.1	19.0	19.5	22.6	25.6	25.0	28.3	29.7	25.1	21.4	17.4	16.8	18.9	20.0	22.7	25.0	28.4	30.1	28.3	21.5	22.1	22.4	20.5	Diurnal Average	
																								45.7	94.1	89.4	86.7	101.1	77.6	88.5	73.7	88.1	62.8	64.1	43.8	63.8	83.5	76.8	74.4	65.1	67.7	81.3	99.2	82.3	97.0	122.6	82.6	Diurnal Maximum	
Z - zerospan C - Calibration																																																	



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Barge Landing - December 2023





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Barge Landing - December 2023**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	384	54.24	54.24
21 - 40	216	30.51	84.75
41 - 80	92	12.99	97.74
81 - 159	15	2.12	99.86
> 159	0	0.00	99.86

Total Number of Valid Hours: 708

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Barge Landing - December 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	4	13	11	4	5	3	12	81	72	49	45	38	30	8	5	4	384
21 - 40	9	5	0	0	0	4	1	81	60	29	11	2	2	1	3	8	216
11 - 80	2	0	1	2	0	1	2	27	23	11	5	3	0	3	6	6	92
81 - 159	2	2	2	0	0	0	0	3	1	3	0	1	0	0	0	1	15
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	17	20	14	6	5	8	15	192	156	92	61	44	32	12	14	19	707

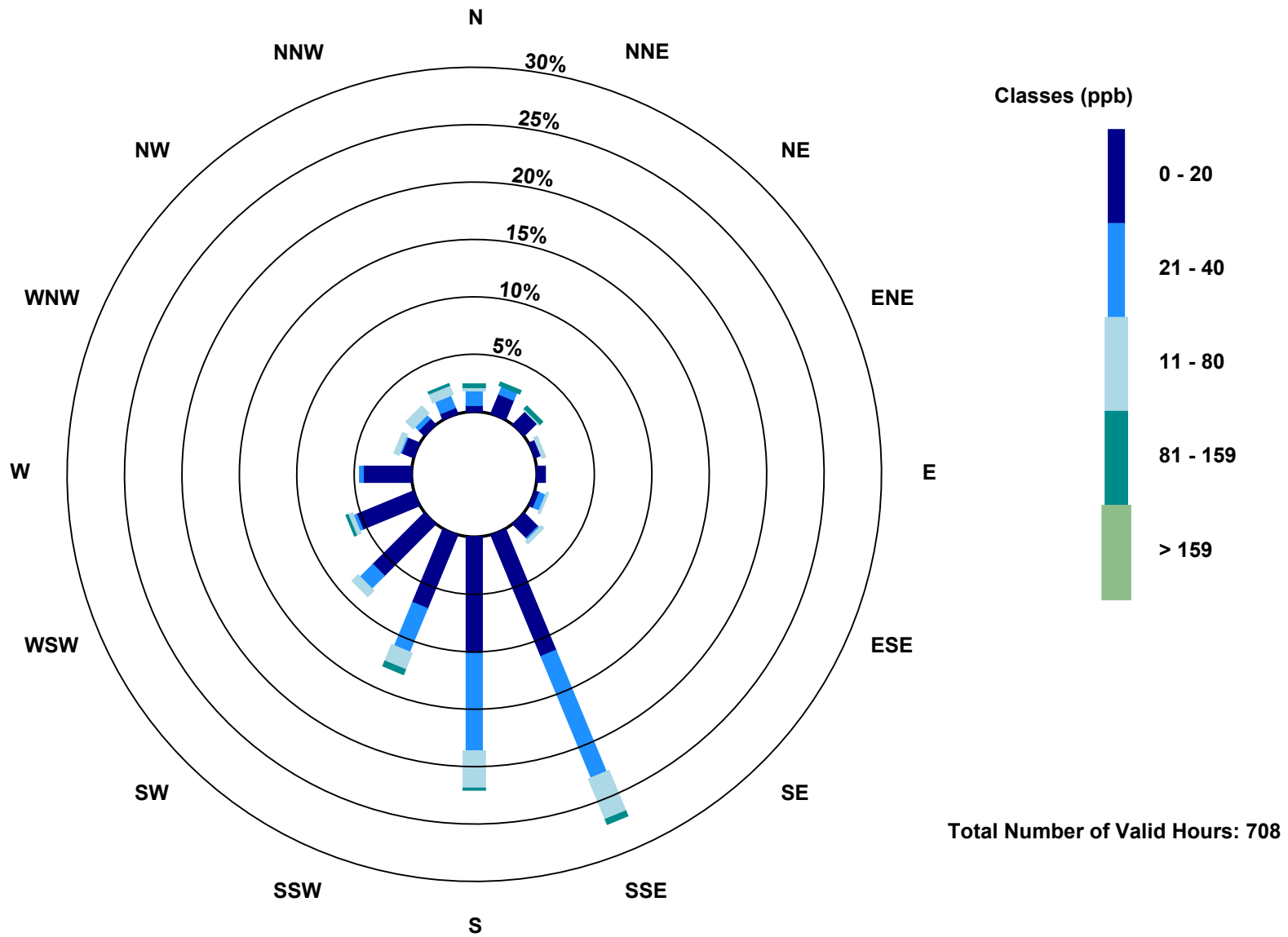
Total Number of Valid Hours: 708

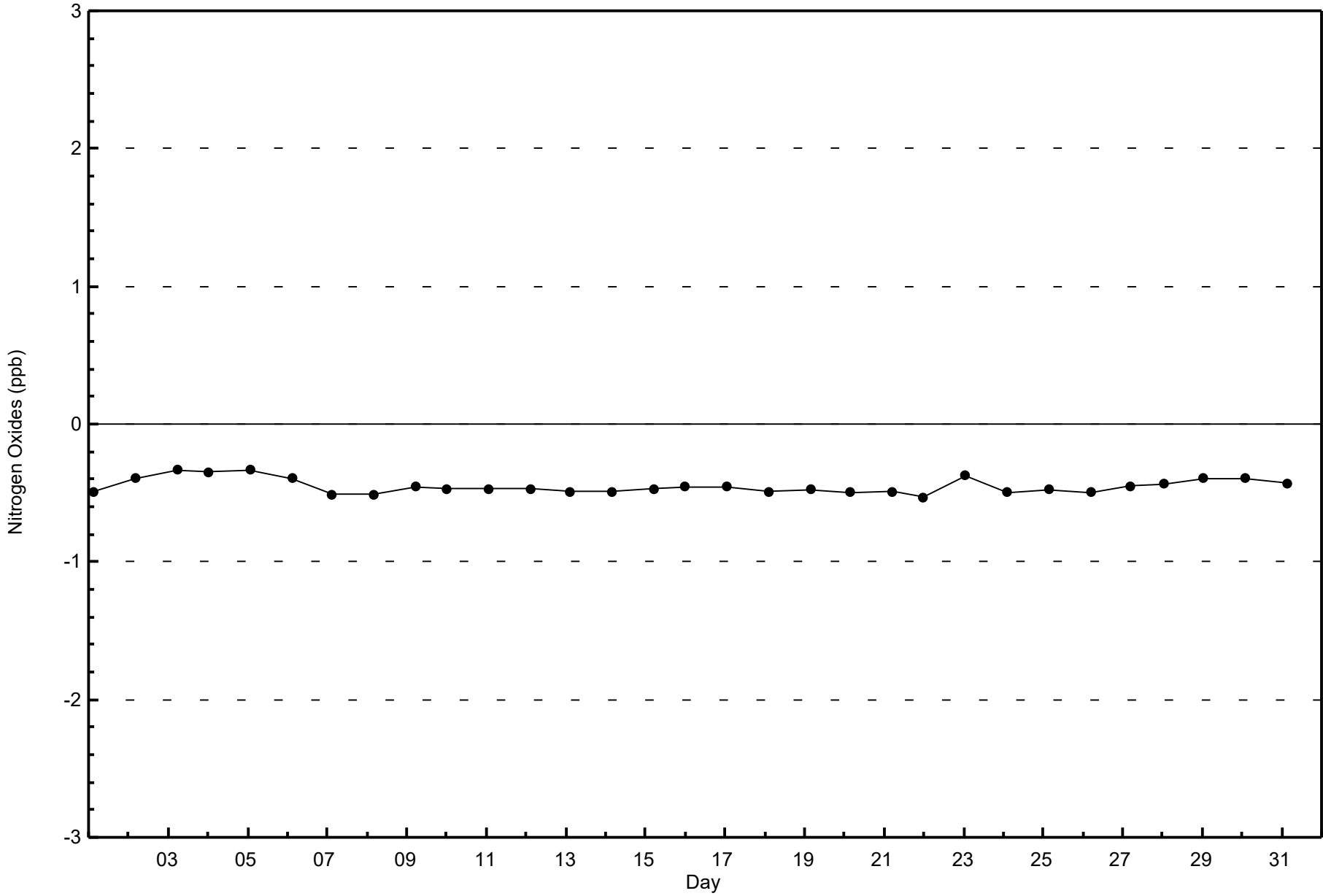
Total Number of Hours: 744

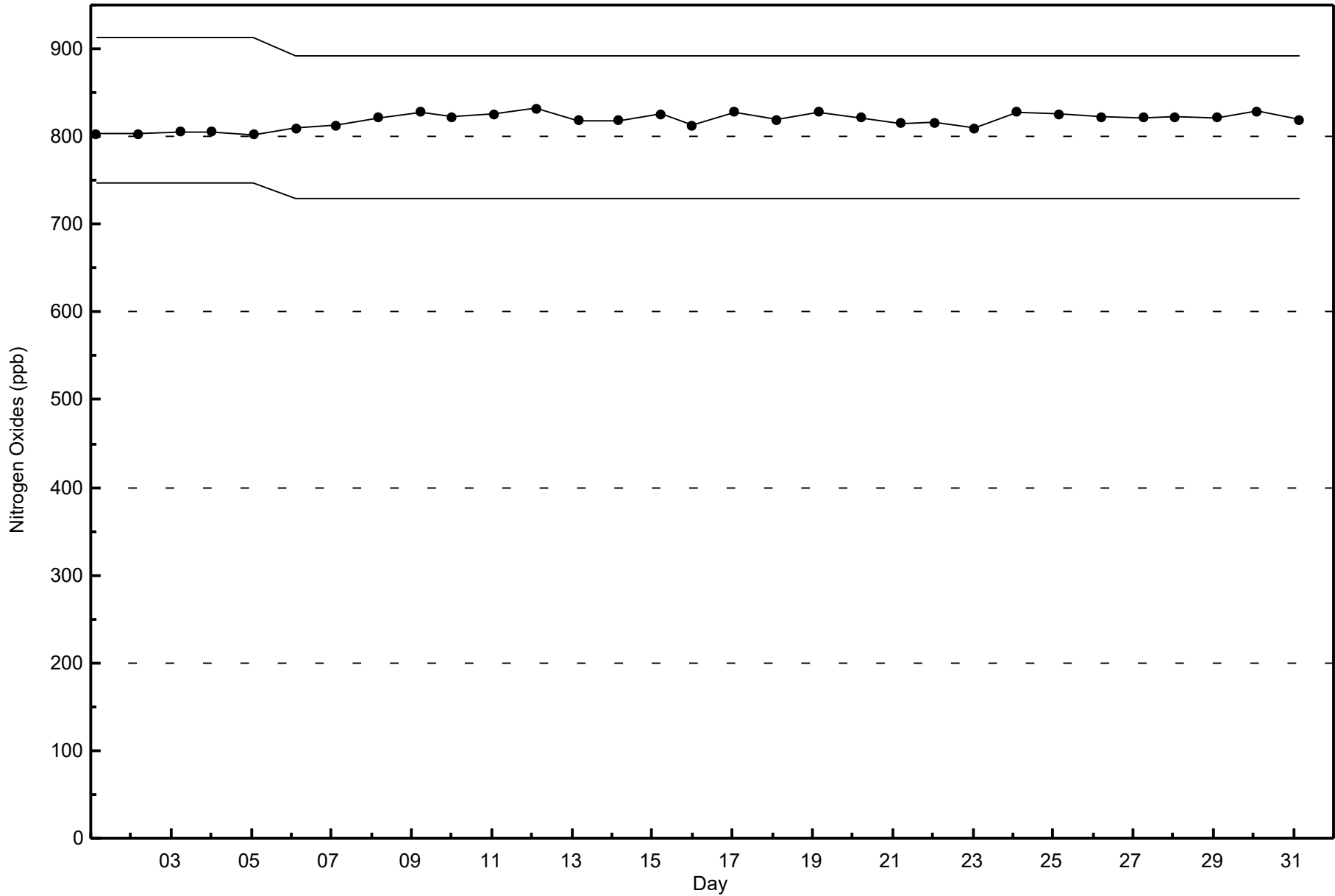


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Nitrogen Oxides (NO_x) - ppb
Barge Landing









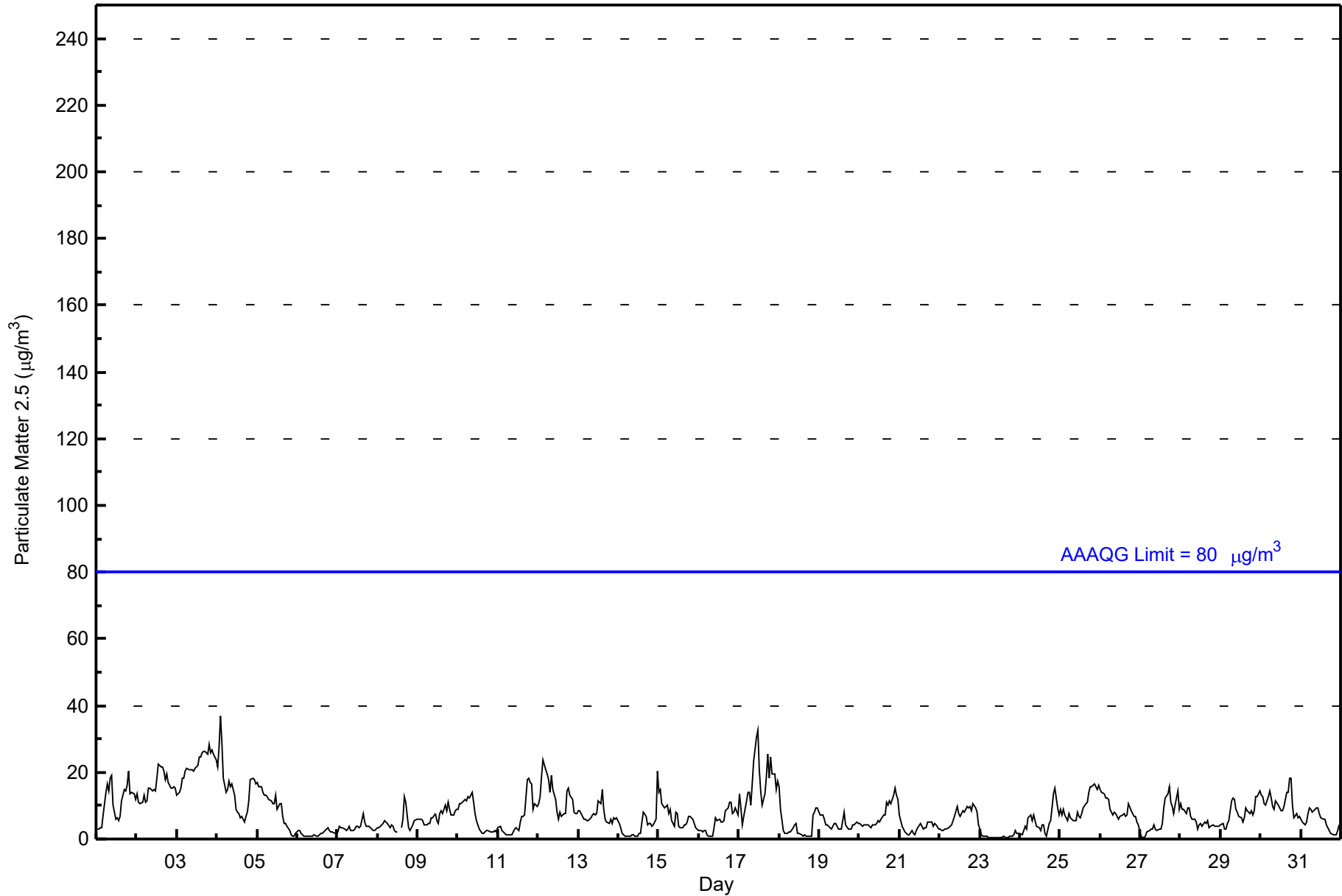
Summary of Hour Averages

Barge Landing - December 2023

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 36.8 µg/m ³ on Dec 4 03:00	Maximum Daily Average: 22.1 µg/m ³ on Dec 3		Hours of Data:	743
Minimum Value: 0.4 µg/m ³ on Dec 27 02:00	Minimum Daily Average: 0.9 µg/m ³ on Dec 23		Hours of Missing Data:	1
Maximum Diurnal Average: 9.2 µg/m ³ at hour 18	Minimum Diurnal Average: 6.4 µg/m ³ at hour 13		Hours of Calibration:	1
Monthly Average: 7.81 µg/m ³	Percentiles: P ₁ = 0.5 P ₁₀ = 1.6 Q ₁ = 3.3 Median = 6.4 Q ₃ = 10.8 P ₉₀ = 15.8 P ₉₉ = 26.4		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-Dec	3.0	3.0	3.6	3.3	7.1	14.2	16.7	14.3	18.4	19.2	10.1	5.8	6.6	5.6	6.7	11.3	14.9	14.5	16.3	20.3	13.4	13.9	13.7	11.9	11.2	20.3																						
2-Dec	13.5	10.8	10.7	11.1	13.0	11.2	11.5	15.2	15.2	14.3	15.0	14.3	18.2	22.4	21.8	21.8	20.5	17.6	19.3	17.1	15.2	15.4	15.8	15.1	15.7	22.4																						
3-Dec	13.3	14.0	15.4	18.1	18.1	20.3	21.1	20.9	20.7	20.6	20.4	21.3	22.1	24.4	24.7	26.0	26.3	26.4	25.5	28.6	25.7	26.7	25.2	23.7	22.1	28.6																						
4-Dec	21.7	27.4	36.8	28.8	18.2	14.1	14.7	17.5	15.8	16.5	13.2	8.8	8.2	7.6	6.4	6.8	5.2	6.8	8.1	11.5	17.6	18.4	17.6	16.5	15.2	36.8																						
5-Dec	17.0	15.8	15.6	14.0	13.0	13.3	12.9	12.0	11.6	10.5	10.7	13.3	9.0	10.6	10.8	6.7	4.9	4.7	3.7	2.4	1.4	0.9	0.9	1.7	9.1	17.0																						
6-Dec	2.5	2.5	1.7	1.1	0.8	0.8	0.8	0.9	1.0	0.9	1.1	0.9	1.0	1.2	1.6	1.7	2.2	3.2	3.6	2.6	2.3	2.1	1.7	1.8	1.7	3.6																						
7-Dec	2.2	3.7	3.6	3.2	2.9	2.7	3.1	3.8	2.5	2.4	2.9	3.8	3.8	3.3	3.8	7.5	5.2	3.7	3.7	4.0	2.9	2.4	2.5	2.9	3.4	7.5																						
8-Dec	3.4	3.2	4.4	4.6	5.6	5.1	4.6	3.6	4.3	3.8	2.4	2.3	2.1	C	3.3	5.8	12.8	11.2	3.4	2.7	3.3	4.0	5.4	5.8	4.7	12.8																						
9-Dec	6.1	5.7	6.1	5.3	4.4	4.2	4.6	4.9	6.5	6.5	7.8	5.4	4.8	7.6	8.4	7.7	10.3	8.3	10.9	8.8	7.4	7.4	8.5	8.7	6.9	10.9																						
10-Dec	8.7	10.8	10.5	11.2	12.0	11.6	12.7	12.1	14.1	11.0	7.7	5.5	4.3	2.9	1.9	1.7	2.2	2.6	2.6	2.1	2.1	2.2	2.4	2.2	6.5	14.1																						
11-Dec	3.2	3.9	2.7	2.0	1.5	1.4	1.3	1.3	1.4	2.1	3.0	3.5	2.4	5.2	7.0	6.8	7.4	17.6	18.4	16.7	16.5	9.0	10.7	9.8	6.5	18.4																						
12-Dec	10.5	12.7	18.5	23.9	20.7	19.6	18.0	14.0	19.1	14.7	11.7	7.9	6.1	7.9	6.9	7.8	7.5	14.4	15.4	13.0	12.1	8.0	7.5	7.8	12.7	23.9																						
13-Dec	8.3	8.5	6.7	5.9	5.8	5.6	5.7	6.2	7.2	7.7	7.1	7.5	11.6	10.8	14.8	9.0	6.1	4.9	4.5	6.0	4.8	6.3	6.1	6.2	7.2	14.8																						
14-Dec	4.5	3.5	1.8	1.4	1.0	1.0	0.9	1.0	1.1	1.1	1.1	1.0	1.6	1.6	5.1	7.9	6.7	4.2	4.7	4.5	3.8	4.4	5.7	20.1	3.7	20.1																						
15-Dec	13.8	14.7	10.5	9.3	9.7	10.2	7.7	8.7	5.7	3.8	8.0	7.8	3.7	3.3	3.5	4.1	4.1	4.9	6.6	6.7	6.1	4.7	3.6	2.9	6.8	14.7																						
16-Dec	2.6	2.4	2.3	2.6	2.6	1.2	0.8	0.8	0.9	3.5	6.6	5.7	6.0	5.0	5.1	5.5	8.6	9.3	11.0	11.0	7.5	8.0	9.2	7.2	5.2	11.0																						
17-Dec	13.6	9.3	4.3	6.8	11.4	13.9	13.9	10.1	16.7	23.4	30.7	32.8	20.6	14.5	10.4	13.7	18.8	25.5	18.1	24.5	19.4	19.6	14.9	17.3	16.8	32.8																						
18-Dec	15.8	9.0	2.6	1.6	1.8	1.7	2.1	2.1	3.4	4.0	4.6	1.6	1.6	1.1	0.8	1.3	0.7	0.7	0.7	0.7	7.2	8.0	9.2	9.5	3.8	15.8																						
19-Dec	7.4	7.3	7.4	6.0	4.1	4.1	3.3	3.1	4.0	4.6	4.6	3.0	2.8	2.8	5.7	8.2	4.3	2.9	2.9	2.9	4.1	4.4	5.1	4.7	4.6	8.2																						
20-Dec	4.6	4.3	3.9	4.1	4.4	4.2	3.6	3.3	4.3	4.4	4.5	5.4	5.3	6.1	7.3	7.4	11.1	10.0	11.6	10.6	13.3	15.2	13.2	11.8	7.2	15.2																						
21-Dec	7.2	3.7	3.0	2.3	1.7	1.4	1.5	2.4	1.8	1.3	2.3	3.3	4.6	3.6	3.0	3.6	3.2	5.1	5.1	5.3	3.6	4.7	4.4	2.9	3.4	7.2																						
22-Dec	2.8	2.7	2.7	2.8	2.9	3.5	3.9	4.1	5.5	6.6	9.7	7.8	6.8	7.5	8.6	7.9	9.9	9.4	9.6	8.5	10.4	9.3	8.2	4.1	6.5	10.4																						
23-Dec	2.8	1.1	0.7	0.9	0.7	0.5	0.4	0.5	0.5	0.4	0.4	0.4	0.5	0.7	0.6	0.6	0.6	0.6	0.6	1.1	2.5	1.9	1.6	0.9	2.8																							
24-Dec	1.9	1.2	2.6	3.6	3.1	6.3	7.1	5.5	7.1	5.4	3.9	3.5	2.4	4.0	4.1	1.6	1.0	4.8	5.7	9.5	13.4	15.4	9.4	7.2	5.4	15.4																						
25-Dec	9.0	7.1	8.8	7.3	5.4	7.7	6.5	5.8	5.5	5.7	8.0	6.7	6.4	7.4	9.2	10.8	10.9	13.8	15.7	15.5	16.5	15.6	14.8	15.9	9.8	16.5																						
26-Dec	14.9	14.1	13.6	12.1	12.4	11.7	8.9	7.0	8.1	7.7	6.9	6.1	6.6	7.3	7.4	6.7	7.1	10.5	8.3	7.7	6.6	6.7	5.1	4.2	8.6	14.9																						
27-Dec	1.0	0.4	0.6	0.9	2.3	2.5	2.9	3.2	4.0	3.0	2.6	3.0	2.8	4.8	9.4	12.4	13.6	15.8	11.0	9.8	7.7	10.2	14.4	8.9	6.1	15.8																						
28-Dec	10.4	8.9	8.7	7.6	9.5	9.3	6.6	6.0	5.9	5.0	3.1	4.3	4.8	3.7	5.2	4.7	5.5	3.5	3.8	4.2	3.8	3.6	3.9	4.0	5.7	10.4																						
29-Dec	4.2	4.8	3.0	3.1	4.6	5.3	11.4	12.3	11.8	8.9	8.0	7.0	6.4	5.0	6.4	9.3	8.4	7.7	8.3	7.4	8.5	12.6	12.8	14.4	8.0	14.4																						
30-Dec	13.1	12.7	10.6	10.2	12.6	14.4	12.2	9.9	9.0	11.5	10.2	9.2	8.6	8.5	9.9	14.0	13.9	18.3	18.0	10.2	6.5	7.7	6.5	6.8	11.0	18.3																						
31-Dec	6.1	5.0	4.1	5.0	7.4	9.4	9.0	8.2	8.8	9.5	9.5	7.7	6.5	6.0	5.8	4.3	3.4	2.6	1.5	1.3	1.4	1.3	2.5	4.1	5.4	9.5																						
																								8.0	7.6	7.3	7.1	7.1	7.5	7.4	7.1	7.8	7.8	7.7	7.0	6.4	6.7	7.3	7.9	8.3	9.2	9.0	8.9	8.6	8.7	8.5	8.4	Diurnal Average
																								21.7	27.4	36.8	28.8	20.7	20.3	21.1	20.9	20.7	23.4	30.7	32.8	22.1	24.4	24.7	26.0	26.3	26.4	25.5	28.6	25.7	26.7	25.2	23.7	Diurnal Maximum

C - Calibration
 Alberta Ambient Air Quality Guideline/Objectives: 1-hr 80 µg/m³ 24-hr 29 µg/m³





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Barge Landing - December 2023**

Concentration Ranges ($\mu\text{g}/\text{m}^3$)	Number of Hours	%	Cumulative %
0 - 5	329	44.28	44.28
6 - 15	333	44.82	89.10
16 - 25	69	9.29	98.38
26 - 80	12	1.62	100.00
> 81.0	0	0.00	100.00

Total Number of Valid Hours: 743

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Barge Landing - December 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	9	6	6	3	4	3	10	30	54	54	60	41	30	8	7	4	329
6 - 15	6	15	8	3	1	5	4	137	97	34	7	5	2	1	2	6	333
16 - 25	2	1	0	0	0	0	2	28	11	8	1	0	0	3	3	10	69
26 - 80	1	0	0	0	0	0	0	3	2	2	0	1	0	0	3	0	12
> 81.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	18	22	14	6	5	8	16	198	164	98	68	47	32	12	15	20	743

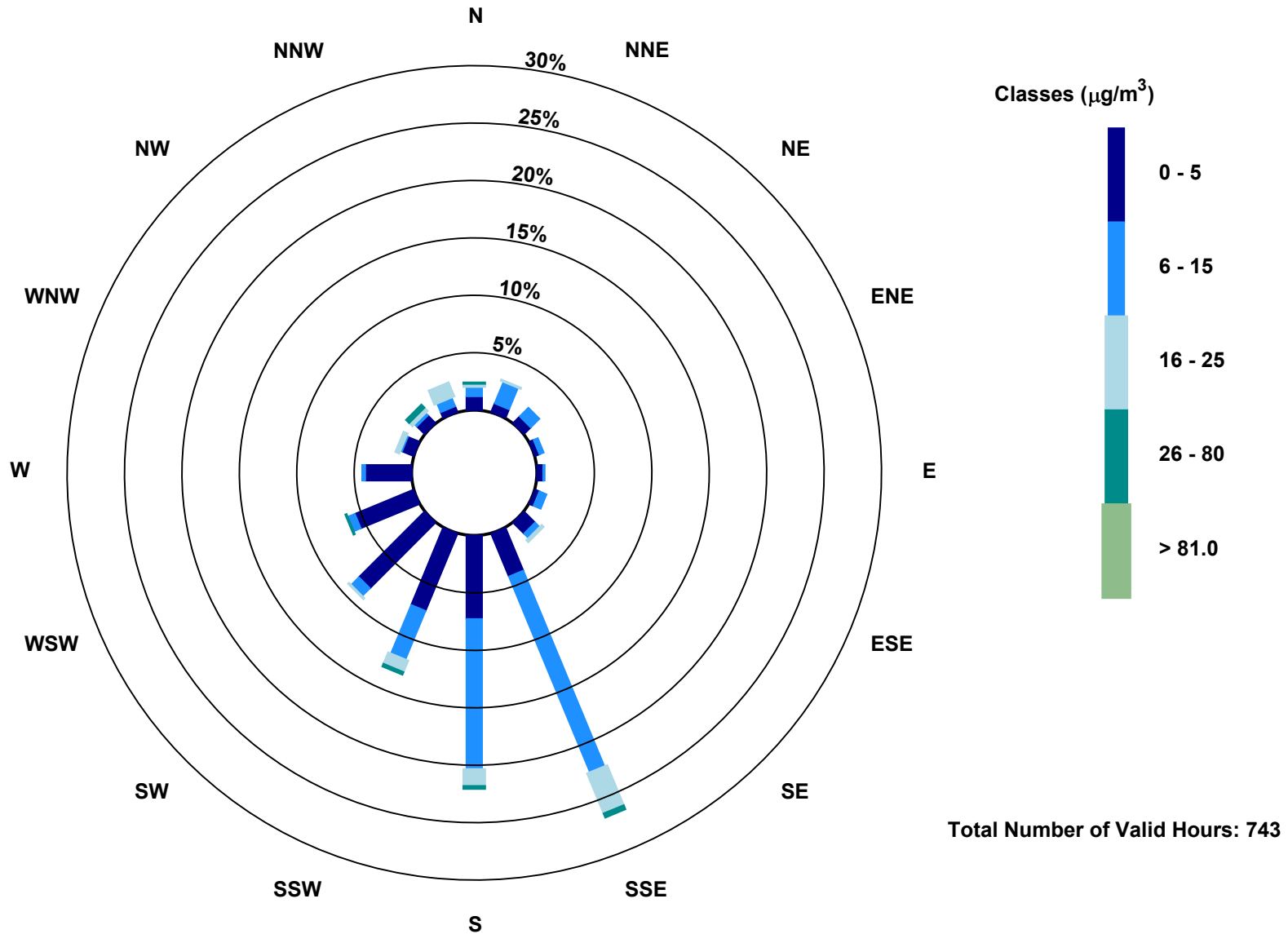
Total Number of Valid Hours: 743

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Dec 2023

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Barge Landing





Wood Buffalo Environmental Association

Summary of Hour Averages

Ambient Temperature (AT) - C

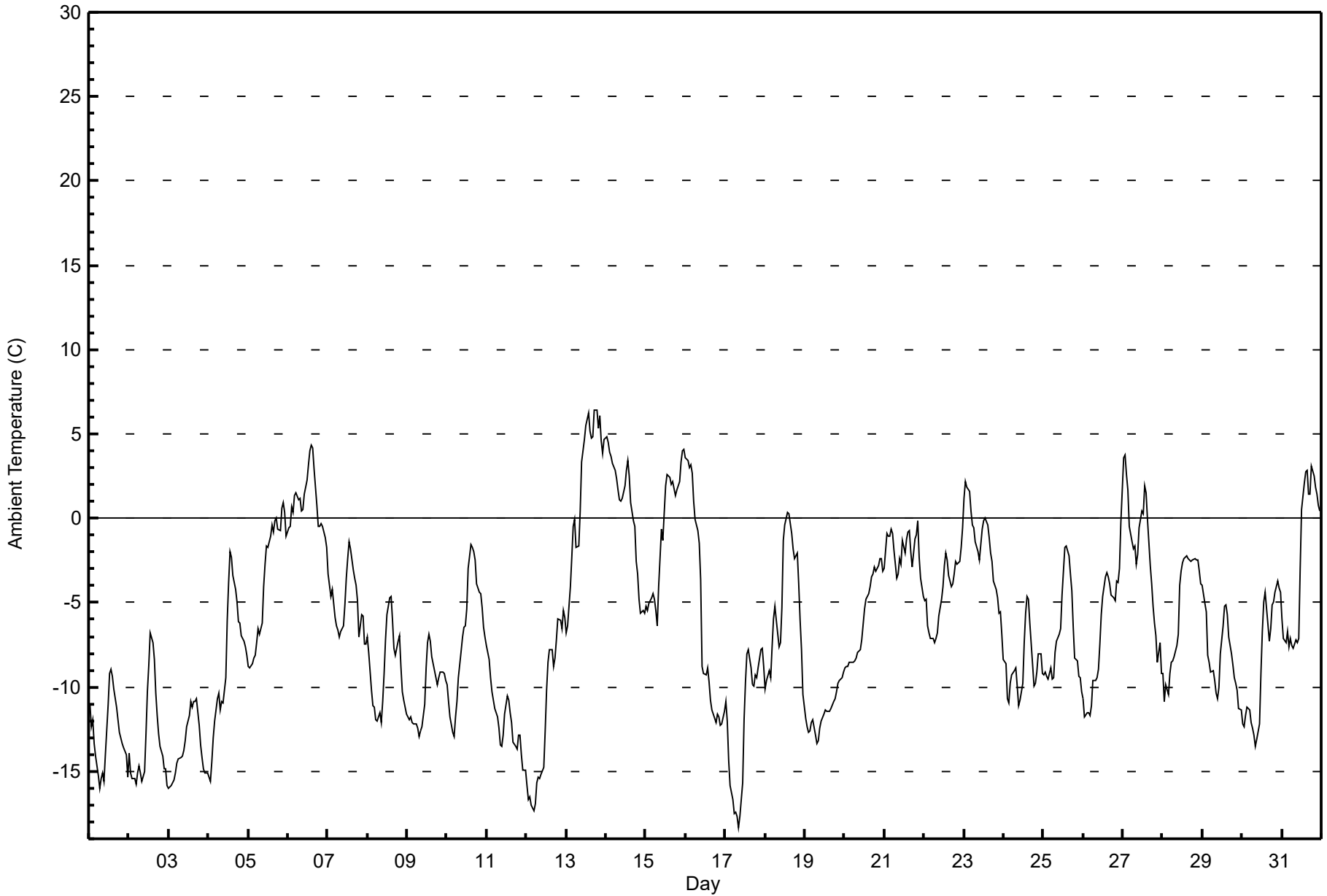
Barge Landing - December 2023

Maximum Value: 6.4 C on Dec 13 19:00 Maximum Daily Average: 2.2 C on Dec 13																						Hours in Service: 744 Hours of Data: 744				
Minimum Value: -18.3 C on Dec 17 09:00 Minimum Daily Average: -13.6 C on Dec 3 Maximum Diurnal Average: -3.4 C at hour 14 Minimum Diurnal Average: -8.4 C at hour 8 Monthly Average: -6.46 C Percentiles: P ₁ = -16.8 P ₁₀ = -13.2 Q ₁ = -10.8 Median = -7.0 Q ₃ = -2.4 P ₉₀ = 1.1 P ₉₉ = 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-Dec	-11.0	-12.4	-12.0	-13.3	-14.1	-15.3	-16.0	-15.4	-15.1	-15.6	-14.0	-11.0	-9.2	-8.9	-9.3	-10.1	-11.2	-12.0	-12.7	-13.0	-13.3	-13.6	-14.0	-15.4	-12.8	-8.9
2-Dec	-13.9	-15.1	-15.5	-15.4	-15.8	-15.1	-14.7	-15.1	-15.6	-15.0	-12.7	-10.3	-8.7	-6.8	-7.3	-8.4	-10.4	-11.7	-12.8	-13.5	-14.1	-14.9	-14.8	-15.8	-13.1	-6.8
3-Dec	-16.0	-15.8	-15.7	-15.5	-15.1	-14.5	-14.3	-14.2	-14.1	-13.8	-13.2	-12.4	-11.7	-10.9	-11.2	-10.9	-10.8	-10.7	-12.3	-13.5	-14.2	-14.9	-15.1	-15.1	-13.6	-10.7
4-Dec	-15.4	-15.6	-14.5	-13.0	-12.0	-10.7	-10.3	-11.4	-10.9	-11.0	-9.4	-6.0	-3.8	-2.0	-2.3	-3.4	-4.2	-5.0	-6.1	-6.2	-7.0	-7.3	-7.7	-8.1	-8.5	-2.0
5-Dec	-8.8	-8.9	-8.6	-8.3	-8.2	-7.4	-6.5	-6.9	-6.2	-4.0	-2.7	-1.6	-1.8	-1.1	-0.4	-0.8	-0.1	0.0	-0.6	-0.7	0.6	0.9	0.3	-1.0	-3.4	0.9
6-Dec	-0.6	-0.5	0.7	0.4	1.3	1.5	1.1	1.2	0.5	0.5	1.4	2.3	3.2	4.0	4.4	4.2	2.9	0.8	-0.5	-0.5	-0.3	-0.5	-1.1	-1.8	1.0	4.4
7-Dec	-3.3	-3.9	-4.6	-4.2	-5.9	-6.3	-6.6	-7.0	-6.7	-6.4	-5.1	-3.6	-2.4	-1.4	-1.8	-3.0	-3.6	-3.9	-4.8	-7.0	-5.7	-5.8	-7.4	-7.5	-4.9	-1.4
8-Dec	-7.1	-8.0	-10.2	-11.1	-11.2	-11.9	-12.0	-11.5	-12.1	-10.9	-9.2	-7.2	-5.7	-4.7	-4.7	-6.1	-7.7	-8.1	-7.3	-6.9	-8.8	-10.3	-10.8	-11.6	-9.0	-4.7
9-Dec	-11.7	-11.9	-11.8	-12.1	-12.2	-12.2	-12.4	-12.9	-12.6	-12.3	-11.0	-8.8	-7.3	-6.9	-7.3	-8.2	-9.0	-9.5	-9.9	-9.5	-9.2	-9.1	-9.2	-9.6	-10.3	-6.9
10-Dec	-9.8	-10.9	-11.8	-12.7	-13.0	-11.8	-10.8	-9.4	-7.9	-7.0	-6.5	-6.4	-5.4	-3.0	-1.6	-1.7	-2.0	-2.5	-3.9	-4.4	-4.5	-5.3	-6.5	-7.0	-6.9	-1.6
11-Dec	-7.5	-8.4	-9.4	-10.3	-10.8	-11.3	-11.8	-12.4	-13.4	-13.5	-12.8	-11.6	-10.5	-10.8	-11.5	-12.1	-13.2	-13.5	-13.7	-12.8	-12.9	-14.0	-15.0	-14.9	-12.0	-7.5
12-Dec	-15.9	-16.7	-16.5	-17.0	-17.3	-17.0	-15.7	-15.4	-15.4	-15.2	-14.7	-12.6	-10.2	-8.5	-7.8	-7.8	-8.8	-8.3	-7.2	-6.0	-6.0	-6.5	-5.5	-5.9	-11.6	-5.5
13-Dec	-6.8	-6.4	-4.1	-2.3	-0.5	-0.1	-1.8	-1.7	0.4	3.3	4.0	4.7	5.5	6.2	5.1	4.7	4.8	6.4	6.4	5.3	6.1	4.6	3.8	4.7	2.2	6.4
14-Dec	4.8	4.5	3.9	3.7	3.3	2.9	2.3	1.7	1.1	1.0	1.2	1.9	2.9	3.4	2.5	0.9	-0.2	-0.5	-2.5	-3.3	-4.8	-5.6	-5.4	-5.6	0.6	4.8
15-Dec	-5.2	-5.5	-5.1	-4.7	-4.4	-4.8	-5.5	-6.4	-4.0	-0.6	-1.3	0.4	1.9	2.6	2.4	2.1	2.2	1.8	1.4	1.7	2.2	3.4	4.0	4.1	-0.7	4.1
16-Dec	3.6	3.4	3.0	3.2	2.7	1.0	0.0	-0.7	-1.5	-3.7	-8.8	-9.2	-9.2	-8.9	-9.7	-10.8	-11.4	-11.9	-12.1	-11.6	-11.8	-12.3	-12.2	-11.4	-5.8	3.6
17-Dec	-10.9	-12.0	-14.3	-15.9	-16.7	-17.5	-17.5	-17.7	-18.3	-17.7	-15.7	-11.9	-9.7	-8.1	-7.8	-8.9	-9.9	-10.0	-9.3	-9.5	-8.9	-7.8	-7.7	-8.8	-12.2	-7.7
18-Dec	-10.1	-9.6	-9.1	-9.5	-7.6	-6.0	-5.2	-6.1	-7.6	-7.3	-5.3	-1.3	-0.4	0.3	0.3	-0.3	-0.9	-1.8	-2.4	-2.1	-3.9	-6.0	-7.8	-10.4	-5.0	0.3
19-Dec	-11.8	-12.3	-12.6	-12.6	-12.1	-12.0	-12.8	-13.4	-13.2	-12.4	-12.0	-11.6	-11.3	-11.5	-11.5	-11.5	-11.3	-10.8	-10.7	-10.3	-9.8	-9.6	-9.4	-9.1	-11.5	-9.1
20-Dec	-8.9	-8.8	-8.8	-8.5	-8.5	-8.5	-8.5	-8.3	-8.0	-7.8	-7.2	-6.3	-5.4	-4.8	-4.4	-4.1	-3.5	-3.3	-2.9	-3.1	-2.8	-2.4	-2.4	-3.1	-5.8	-2.4
21-Dec	-3.0	-0.9	-1.0	-1.0	-0.7	-0.9	-1.9	-3.5	-3.3	-2.4	-2.7	-1.3	-2.1	-1.2	-0.8	-0.7	-2.0	-2.9	-1.2	-1.0	-0.2	-2.3	-3.6	-4.6	-1.9	-0.2
22-Dec	-4.9	-4.8	-6.4	-6.8	-7.1	-7.2	-7.4	-7.1	-6.8	-5.8	-4.8	-4.1	-2.8	-2.0	-2.5	-3.4	-4.0	-3.9	-3.3	-2.5	-2.7	-2.6	-1.7	-0.5	-4.4	-0.5
23-Dec	1.2	2.2	1.9	1.6	0.5	-0.4	-0.6	-1.4	-2.0	-2.5	-1.5	-0.6	-0.2	0.0	-0.4	-1.2	-2.0	-2.6	-3.7	-4.2	-4.8	-5.6	-5.6	-6.9	-1.6	2.2
24-Dec	-8.4	-8.6	-10.7	-10.9	-9.8	-9.3	-9.0	-8.9	-9.9	-11.1	-10.8	-9.8	-7.3	-5.6	-4.7	-4.8	-6.2	-8.7	-10.0	-9.8	-9.2	-8.0	-8.0	-9.2	-8.7	-4.7
25-Dec	-9.3	-9.1	-9.3	-9.5	-8.9	-9.5	-9.4	-8.0	-7.3	-6.9	-6.6	-4.6	-3.1	-1.7	-1.6	-2.3	-3.3	-4.3	-6.4	-8.3	-8.5	-9.4	-9.4	-10.2	-7.0	-1.6
26-Dec	-10.7	-11.7	-11.6	-11.5	-11.7	-11.1	-9.6	-9.6	-9.4	-8.9	-7.4	-5.7	-4.6	-3.5	-3.2	-3.4	-3.9	-4.5	-4.7	-4.9	-3.7	-3.8	-2.9	-0.2	-6.8	-0.2
27-Dec	3.6	3.7	2.6	1.7	-0.5	-1.4	-1.8	-1.6	-2.7	-2.1	-0.6	0.4	0.3	1.9	1.5	-0.1	-2.8	-3.9	-5.3	-6.2	-6.9	-8.5	-7.4	-9.2	-1.9	3.7
28-Dec	-9.2	-10.8	-9.9	-10.4	-9.2	-8.5	-8.5	-8.2	-7.6	-6.9	-3.9	-3.1	-2.6	-2.4	-2.2	-2.4	-2.5	-2.5	-2.4	-2.4	-2.5	-2.5	-3.1	-3.9	-5.3	-2.2
29-Dec	-4.0	-5.0	-5.5	-8.1	-8.5	-9.1	-9.0	-9.6	-10.4	-10.7	-10.0	-8.0	-6.4	-5.3	-5.2	-5.7	-7.0	-8.0	-8.7	-9.4	-9.8	-10.2	-11.3	-11.4	-8.2	-4.0
30-Dec	-12.2	-12.3	-11.7	-11.2	-11.3	-12.1	-12.4	-12.9	-13.5	-13.1	-12.2	-9.2	-6.7	-5.0	-4.4	-6.3	-7.3	-6.5	-5.1	-5.0	-4.4	-3.7	-4.1	-4.4	-8.6	-3.7
31-Dec	-5.9	-7.2	-7.4	-6.7	-7.6	-7.1	-7.6	-7.7	-7.2	-7.4	-7.1	-3.1	0.6	2.1	2.7	2.9	1.4	1.4	3.1	2.5	1.9	1.4	0.8	0.4	-2.5	3.1
																								Diurnal Average		
																								Diurnal Maximum		



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature (AT) - C
Barge Landing - December 2023





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C
Barge Landing - December 2023**

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	646	86.83	86.83
0 - 10	98	13.17	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744

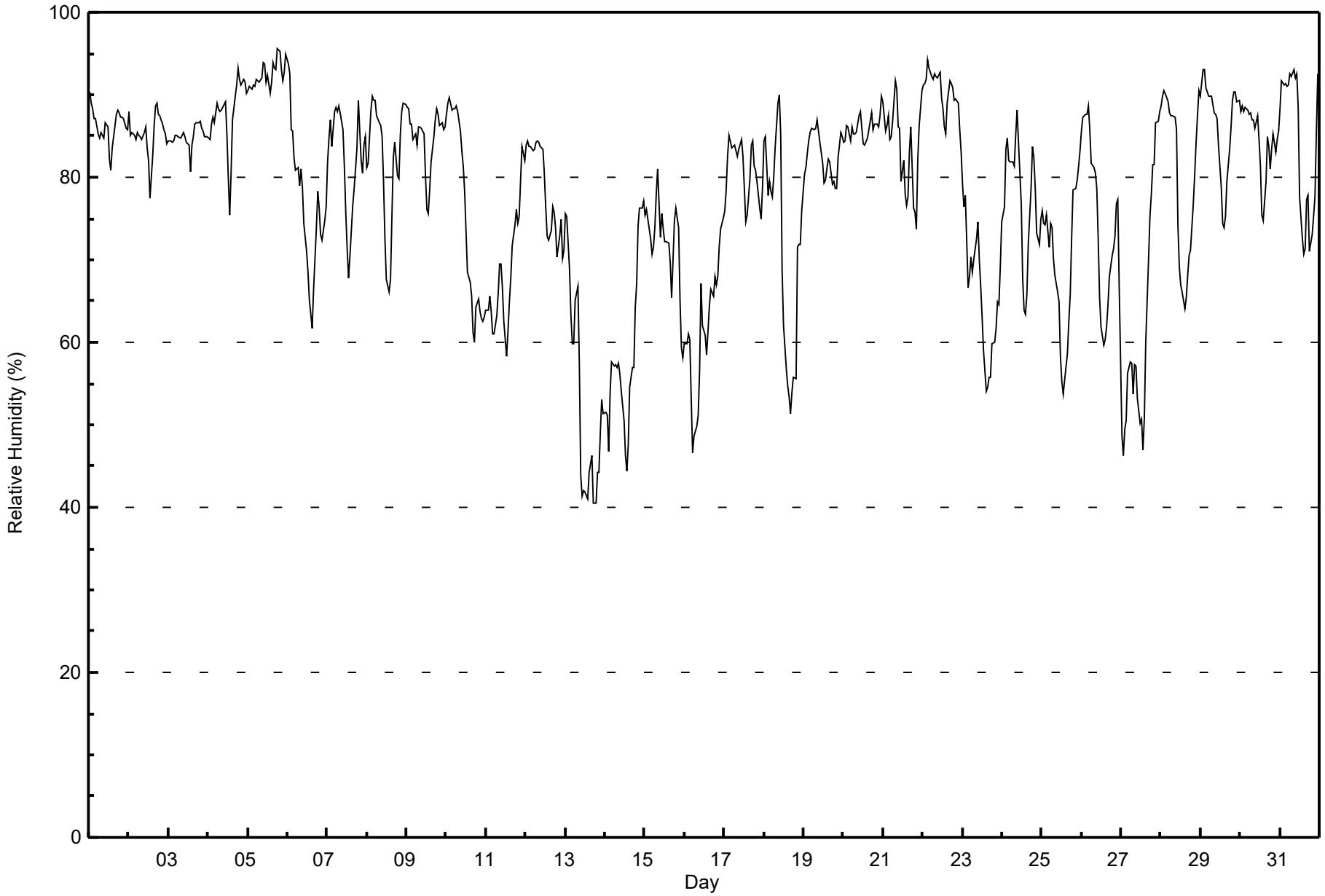


Maximum Value: 95.7 % on Dec 5 19:00 Maximum Daily Average: 92.4 % on Dec 5																						Hours in Service:	744			
Minimum Value: 40.5 % on Dec 13 18:00 Minimum Daily Average: 52.5 % on Dec 13																						Hours of Data:	744			
Maximum Diurnal Average: 81.2 % at hour 3 Minimum Diurnal Average: 68.7 % at hour 14																						Hours of Missing Data:	0			
Monthly Average: 77.67 % Percentiles: P ₁ = 44.3 P ₁₀ = 59.1 Q ₁ = 70.9 Median = 81.8 Q ₃ = 86.5 P ₉₀ = 89.8 P ₉₉ = 93.5																						Hours of Calibration:	0			
																						Percent Operational Time:	100.0			
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Dec	90.3	89.0	88.3	87.2	87.1	85.3	84.8	85.4	85.1	84.7	86.5	86.1	82.2	80.8	83.6	84.9	87.6	88.1	87.8	87.2	87.4	87.1	85.9	85.8	86.2	90.3
2-Dec	87.9	85.2	85.4	85.1	84.6	85.4	85.1	84.9	84.7	85.5	86.0	83.6	82.0	77.5	82.8	86.3	88.6	89.0	87.7	87.5	86.4	85.7	85.2	84.0	85.3	89.0
3-Dec	84.5	84.4	84.2	84.4	85.0	85.2	84.8	84.8	85.1	85.4	84.9	84.2	83.8	80.6	83.9	84.9	86.4	86.5	86.7	86.7	86.0	85.6	84.9	84.9	84.9	86.7
4-Dec	84.8	84.5	86.5	87.3	86.7	89.1	88.3	87.9	88.2	88.6	89.1	85.3	80.0	75.3	80.4	86.9	89.8	91.1	93.2	91.9	91.2	91.9	91.6	90.1	87.5	93.2
5-Dec	90.6	90.9	90.7	91.2	91.0	91.8	91.7	91.6	92.1	93.9	93.7	91.5	92.3	90.2	91.5	93.8	93.3	93.1	95.7	95.2	93.1	91.7	92.7	95.0	92.4	95.7
6-Dec	93.7	92.5	85.8	85.6	82.4	80.9	81.2	79.0	81.0	78.7	74.4	71.1	68.6	65.0	63.4	61.7	66.4	73.9	78.3	76.2	73.1	72.3	74.8	76.5	76.5	93.7
7-Dec	81.8	84.7	87.0	83.8	88.0	88.5	88.0	88.6	87.8	85.8	81.3	75.8	71.4	67.7	70.6	76.5	78.7	81.0	83.6	89.4	82.0	80.5	83.9	84.8	82.1	89.4
8-Dec	81.2	81.7	88.1	89.8	89.3	89.4	87.5	86.7	86.2	84.8	79.6	72.5	67.6	66.2	67.6	75.3	82.4	84.2	80.2	79.9	85.1	88.0	88.9	88.8	82.1	89.8
9-Dec	88.4	88.3	86.5	86.5	84.6	85.2	83.9	86.1	86.1	85.9	85.2	80.1	76.2	75.6	78.4	81.9	84.9	86.9	88.4	87.7	86.2	86.6	85.7	86.0	84.6	88.4
10-Dec	87.6	89.1	89.7	88.2	88.3	88.3	88.7	88.0	85.7	83.2	81.3	78.3	73.3	68.5	67.2	65.6	61.2	60.1	64.3	65.3	63.8	62.9	62.5	63.1	75.6	89.7
11-Dec	64.0	63.8	65.5	63.7	61.1	61.0	63.2	65.9	69.4	69.6	66.6	62.5	58.4	61.4	64.9	67.9	71.6	74.2	76.2	74.3	75.2	79.6	83.7	82.0	68.6	83.7
12-Dec	83.9	84.5	83.8	83.7	83.3	83.4	84.2	84.4	84.3	83.7	83.4	80.4	76.3	72.9	72.4	73.6	76.4	75.8	74.0	70.4	72.8	74.9	70.2	71.2	78.5	84.5
13-Dec	75.6	75.2	68.8	63.2	59.8	59.8	65.1	66.8	57.5	43.9	41.3	42.1	41.8	41.0	44.3	45.3	46.3	40.5	40.6	44.3	44.3	49.0	53.1	51.3	52.5	75.6
14-Dec	51.6	51.1	46.8	53.8	57.6	57.2	57.2	57.0	57.5	56.2	54.0	50.5	46.2	44.4	47.6	54.6	57.0	56.9	64.2	67.0	74.0	76.2	76.2	77.2	58.0	77.2
15-Dec	75.4	76.0	74.8	72.5	70.7	71.5	73.8	78.0	81.0	72.7	75.5	73.7	72.2	72.1	72.0	69.6	65.4	70.0	74.8	76.2	73.9	65.0	59.3	58.1	71.9	81.0
16-Dec	59.9	59.8	61.0	60.3	53.2	46.7	48.6	49.9	51.1	56.5	67.1	62.0	60.9	58.5	61.3	64.4	66.4	65.6	67.9	67.0	68.0	71.5	73.7	75.2	61.5	75.2
17-Dec	75.9	78.4	82.6	85.0	83.5	83.7	83.8	83.2	82.6	83.5	84.5	82.6	78.7	74.6	75.4	79.9	83.9	84.5	81.3	80.9	79.5	76.3	75.0	78.7	80.7	85.0
18-Dec	84.4	84.9	77.7	79.5	78.3	77.7	79.9	83.6	89.1	90.0	85.1	68.7	62.0	56.7	54.7	53.3	51.4	54.0	55.8	55.6	71.5	71.8	71.8	76.0	71.4	90.0
19-Dec	80.3	81.3	82.9	84.4	85.4	86.0	85.8	85.9	86.9	85.6	84.2	81.6	79.4	79.7	81.0	82.2	81.9	79.1	79.5	78.7	78.7	82.3	85.5	85.0	82.6	86.9
20-Dec	84.2	84.3	86.4	86.0	84.4	86.0	85.2	85.2	85.4	87.4	88.0	85.9	84.1	83.8	84.8	85.7	86.8	87.8	85.7	86.4	86.5	86.1	87.5	89.8	86.0	89.8
21-Dec	89.2	85.6	86.3	87.5	84.6	85.0	86.8	91.7	90.8	86.1	85.9	79.5	82.0	78.0	76.6	77.7	83.1	86.1	76.3	75.7	73.7	82.2	86.3	90.5	83.6	91.7
22-Dec	91.2	91.4	91.9	94.2	93.2	92.2	91.9	92.6	92.1	92.0	92.8	89.7	88.3	86.1	85.3	88.9	91.7	91.4	90.8	89.3	89.4	88.9	85.8	83.1	90.2	94.2
23-Dec	79.1	76.4	77.8	66.7	67.9	70.4	68.4	70.1	72.5	74.6	69.9	66.8	63.1	59.0	54.0	54.6	55.8	55.7	59.9	60.0	61.7	64.9	64.6	69.1	66.0	79.1
24-Dec	74.5	76.4	83.4	84.8	82.0	81.8	81.3	85.0	88.2	84.2	76.7	67.8	63.9	63.5	65.8	71.8	78.7	83.7	82.3	78.7	73.2	71.8	74.9	77.3	88.2	88.2
25-Dec	75.9	74.4	74.2	75.5	71.6	74.3	73.8	70.1	68.2	66.2	65.0	58.4	55.3	53.7	55.5	58.7	62.6	65.8	72.5	78.5	78.6	79.6	81.3	83.3	69.7	83.3
26-Dec	85.6	87.3	87.6	87.7	88.6	85.7	81.7	81.2	80.5	78.6	72.5	65.4	61.9	59.7	60.3	61.9	64.6	68.0	70.5	71.4	72.9	76.8	77.2	67.0	74.8	88.6
27-Dec	48.7	46.2	49.5	50.5	56.2	57.7	57.4	53.7	57.3	57.2	53.2	50.1	50.6	47.0	50.9	60.0	69.9	75.2	77.9	81.5	81.6	86.7	86.7	88.0	62.2	88.0
28-Dec	88.7	89.8	90.6	89.6	89.2	87.8	87.5	87.5	87.3	85.7	74.3	69.2	66.9	66.1	64.1	65.5	68.2	70.5	71.2	76.8	80.3	84.2	87.4	90.5	79.9	90.6
29-Dec	89.9	93.1	93.1	90.8	90.4	89.8	89.9	88.8	87.9	87.7	87.1	83.8	78.8	74.5	74.0	75.3	79.5	83.4	86.1	89.4	90.3	90.3	89.2	89.4	86.3	93.1
30-Dec	88.0	88.6	87.9	88.5	88.1	87.7	87.8	87.0	87.0	86.0	87.4	84.6	81.3	75.4	74.8	79.5	84.9	83.7	81.0	83.3	85.2	83.0	84.6	85.7	84.6	88.6
31-Dec	88.3	91.7	91.2	91.4	91.0	91.2	92.5	92.2	93.1	92.1	92.5	88.5	77.6	72.6	70.7	71.4	77.2	77.8	71.0	73.0	75.3	77.6	85.7	92.5	84.1	93.1
80.8 81.0 81.2 80.9 80.2 80.2 80.3 80.6 80.9 80.0 78.6 74.5 71.3 68.7 69.6 72.0 74.7 76.1 77.0 77.7 78.3 79.1 79.8 80.6																						Diurnal Average				
93.7 93.1 93.1 94.2 93.2 92.2 92.5 92.6 93.1 93.9 93.7 91.5 92.3 90.2 91.5 93.8 93.3 93.1 95.7 95.2 93.1 91.9 92.7 95.0																						Diurnal Maximum				



Wood Buffalo Environmental Association
Hourly Averages

Relative Humidity (RH) - %
Barge Landing - December 2023





Wood Buffalo Environmental Association

Summary of Hour Averages

Barometric Pressure (BP) - inHg

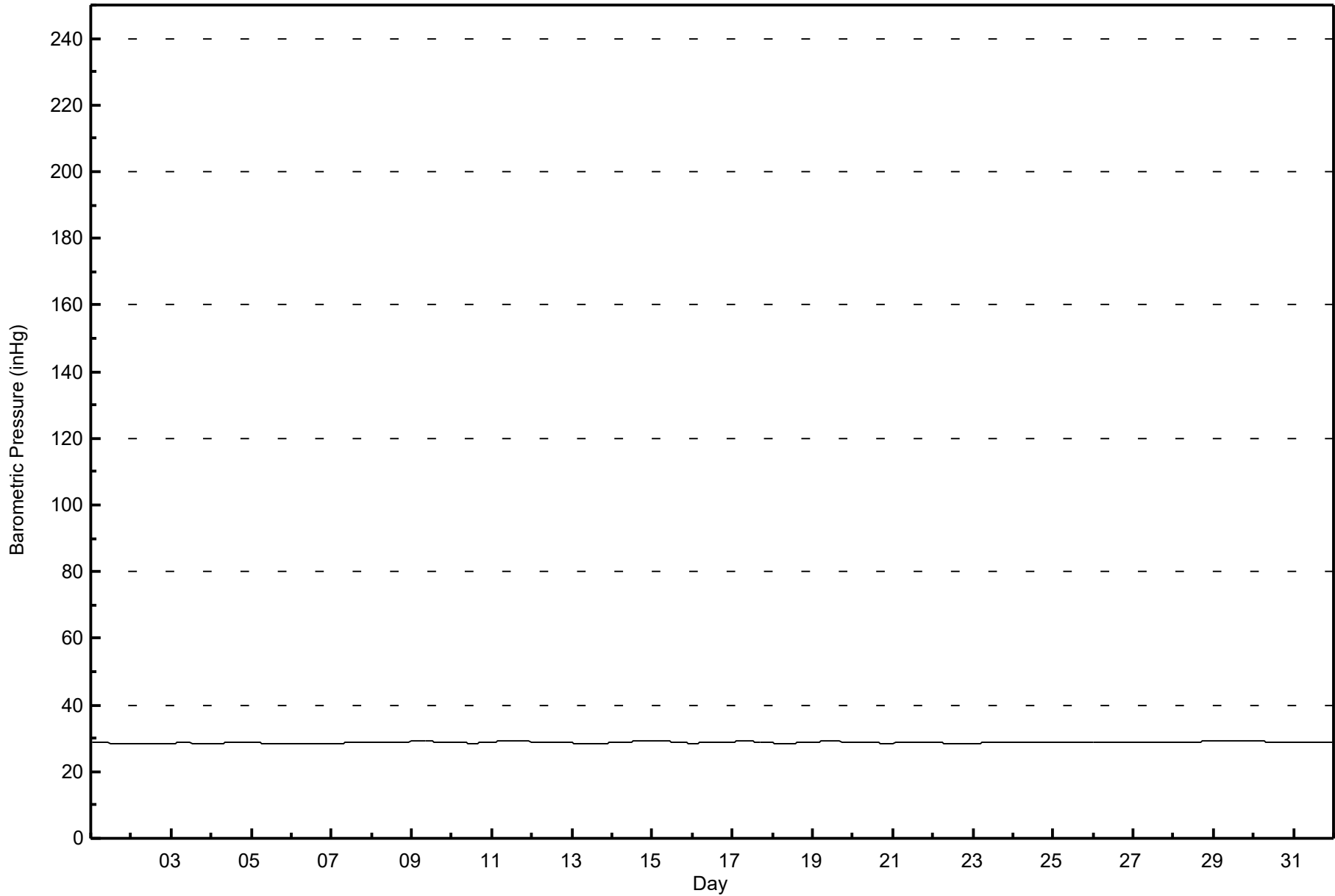
Barge Landing - December 2023

Maximum Value: 29.2 inHg on Dec 11 12:00 Maximum Daily Average: 29.1 inHg on Dec 11																						Hours in Service: 744				
Minimum Value: 28.3 inHg on Dec 2 13:00 Minimum Daily Average: 28.4 inHg on Dec 2																						Hours of Data: 744				
Maximum Diurnal Average: 28.8 inHg at hour 11 Minimum Diurnal Average: 28.8 inHg at hour 20																						Hours of Missing Data: 0				
Monthly Average: 28.78 inHg Percentiles: P ₁ = 28.4 P ₁₀ = 28.5 Q ₁ = 28.6 Median = 28.8 Q ₃ = 28.9 P ₉₀ = 29.1 P ₉₉ = 29.2																						Hours of Calibration: 0				
																						Percent Operational Time: 100.0				
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Dec	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.6	28.6	28.6	28.6	28.6	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.4	28.4	28.6	28.7	
2-Dec	28.4	28.4	28.4	28.4	28.4	28.4	28.4	28.4	28.4	28.4	28.4	28.4	28.3	28.3	28.4	28.4	28.4	28.4	28.4	28.4	28.5	28.5	28.5	28.5	28.4	28.5
3-Dec	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	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.6	28.6
4-Dec	28.5	28.5	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.6	28.7
5-Dec	28.7	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	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.7
6-Dec	28.5	28.5	28.5	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.5	28.6	28.6	28.6	28.6	28.6	28.6	28.6
7-Dec	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	28.7	28.7	28.7	28.7	28.7	28.8	28.6
8-Dec	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	29.0	29.0	29.0	29.0	29.0	29.0	28.9
9-Dec	29.0	29.0	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.0	29.0	29.0	29.0	29.0	29.0	28.9	28.9	28.9	28.9	28.8	28.8	29.0	29.1
10-Dec	28.8	28.8	28.7	28.7	28.7	28.7	28.7	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.7	28.7	28.7	28.8	28.8	28.9	28.7	28.9
11-Dec	28.9	28.9	29.0	29.1	29.1	29.1	29.1	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.1	29.1	29.1	29.1	29.1	29.1	29.0	29.0	29.1	29.2	29.2
12-Dec	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	28.9	28.9	28.9	28.9	28.8	28.8	28.8	28.8	28.8	28.7	28.7	28.7	28.7	28.7	28.6	28.9	29.0
13-Dec	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.6	28.6	28.6	28.6	28.7	28.6
14-Dec	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	29.1	29.2	29.2	29.2	29.2	29.0	29.2
15-Dec	29.2	29.2	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.0	29.0	29.0	28.9	28.9	28.8	28.8	28.7	28.7	28.6	28.6	28.6	28.6	28.5	28.9	29.2
16-Dec	28.5	28.5	28.6	28.6	28.6	28.7	28.7	28.7	28.7	28.8	28.8	28.8	28.8	28.8	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.8	28.9
17-Dec	28.9	29.0	29.0	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.0	29.0	29.0	29.0	28.9	28.9	28.9	28.8	28.8	28.7	28.7	28.7	29.0	29.1	
18-Dec	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	28.7	28.8	28.8	28.9	28.9	28.7	28.9
19-Dec	28.9	29.0	29.0	29.0	29.0	29.0	29.0	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.0	29.0	29.0	29.0	29.0	29.0	29.0	28.9	28.9	28.9	29.0	29.1
20-Dec	28.9	28.8	28.8	28.8	28.8	28.8	28.8	28.7	28.7	28.7	28.7	28.7	28.7	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.5	28.5	28.5	28.6	28.7	28.9
21-Dec	28.6	28.6	28.7	28.7	28.7	28.7	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.7	28.7	28.7	28.7	28.7	28.6	28.6	28.6	28.6	28.6	28.7	28.8
22-Dec	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.5	28.5	28.5	28.5	28.5	28.4	28.4	28.4	28.4	28.4	28.4	28.4	28.4	28.4	28.4	28.4	28.5	28.6
23-Dec	28.4	28.5	28.5	28.5	28.6	28.6	28.6	28.7	28.7	28.7	28.7	28.8	28.8	28.8	28.8	28.9	28.9	28.9	29.0	29.0	29.0	29.0	29.0	29.0	28.8	29.0
24-Dec	29.0	29.0	29.0	29.0	29.0	29.0	29.0	28.9	28.9	28.9	28.9	28.9	28.9	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.9	29.0
25-Dec	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	28.9	28.9
26-Dec	28.8	28.8	28.8	28.8	28.8	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.8	28.8	28.8	28.8	28.7	28.8
27-Dec	28.8	28.8	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	29.0	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
28-Dec	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	29.0	29.0	29.0	29.0	29.0	29.1	29.1	29.1	29.1	29.1	29.0	29.1
29-Dec	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1
30-Dec	29.1	29.1	29.1	29.1	29.1	29.0	29.0	29.0	29.0	29.0	29.0	29.0	28.9	28.9	28.9	28.9	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.9	29.1
31-Dec	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	28.7	28.8	28.8	28.8	28.7	28.8
28.8																						Diurnal Average				
29.2																						Diurnal Maximum				



Wood Buffalo Environmental Association
Hourly Averages

Barometric Pressure (BP) - inHg
Barge Landing - December 2023





Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed 20 m (WS20m) - km/h

Barge Landing - December 2023

Maximum Speed: 27 km/h on Dec 10 18:00	Maximum Daily Speed Average: 15.9 km/h on Dec 15	Hours in Service: 744
Minimum Speed Value: 0 km/h on Dec 29 01:00	Minimum Daily Speed Average: 2.1 km/h on Dec 3	Hours of Data: 744
Maximum Diurnal Speed Average: 7.9 km/h at hour 9	Minimum Diurnal Speed Average: 5.0 km/h at hour 24	Hours of Missing Data: 0
Monthly Average Velocity: 6.5 km/h 191.9 deg	Percentiles: P ₁ = 2 P ₁₀ = 5 Q ₁ = 7 Median = 10 Q ₃ = 13 P ₉₀ = 16 P ₉₉ = 22	Percent Operational Time: 100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Dec	WNW4	WSW6	WSW6	SSW5	S5	S5	SSE6	SSE8	SSE7	SSE6	S5	S8	SSE6	S6	SSE7	S7	S7	S7	S6	SSE8	S9	S10	S10	SSW9	S6.2	S10
2-Dec	SSW9	W6	W6	WSW5	SW4	WSW6	WSW7	WSW4	SW5	WSW5	SSW4	SSW5	SSW5	S7	S8	NW5	NNW9	NNW8	NNW9	NNW9	NW8	NNW9	N6	NNE3	W3.1	NNW9
3-Dec	NNW4	NW4	NNW4	NNW4	NNW3	NNE4	NW1	NNW3	NNW4	NNW4	NW3	WNW2	WNW3	WNW3	NNW5	N4	NW3	NW3	NW2	SSW2	WSW4	SSW4	SSW6	S7	NW2.1	SSE7
4-Dec	SSW7	S9	S10	SSE12	SSE8	SSE9	SSE7	SSW8	SSW9	SSE12	SSW13	SSW11	S8	S7	S7	SSE10	SSE10	S8	SSE10	SSE14	SSE13	SSE12	SSE11	SSE10	S9.4	SSE10
5-Dec	S10	SSE9	S10	SSE11	SSW7	SSE6	S6	WNW1	SW4	SSE7	SSE8	S11	S10	S10	S11	S14	S15	S10	ESE7	NW7WSW10	SSW8	SSW7	SE10	S7.3	S15	
6-Dec	S10	S10	SSW12	SW12	SW16	SW14	SW9	SW15	SSW9	SW11	SW11	SW13	SW13WSW17	SW17	SW16	SSW14	S6	S13	SSW11	SSW11	SW12	SSW7	WSW7	SW11.3	SW17	
7-Dec	S11	S9	SSW9	SW8	SSW8	SSW8	SSW8	S9	SSW9	SSW12	SSW11	S10	S11	S10	S10	S10	SSW11	SSW10	SSW7	SW8	SW11	SW10	S7	SSW11	SSW9.1	SSW12
8-Dec	SW12	SSW6	SE5	SSE6	S8	SSE5	SSW7	SW9	SSW8	SW11	SW14	SSW8	SSW7	SSW10	SSW8	S10	SSE10	SSW10	SSW9	SW11	S10	SSE11	SSE11	SSE12	SSW8.2	SW14
9-Dec	SSE12	SSE12	S11	S10	S10	SW10	S11	SSE12	SSE14	SSE14	SSE13	S14	S14	SSE13	SSE14	SSE13	SSE12	S9	S8	SSW10	SSW7	SSW8	S8	S5	S10.6	S14
10-Dec	SSE7	S6	SSE7	S5	SSE9	SSE10	SSE10	SSE12	S13	S12	SSW8	SW7	SW11WSW16	SW15	W17	W24	W27	WNW18	W18	WNW20	WNW19	NW15	NW14	WSW8.3	W27	
11-Dec	NW19	NW20	NW17	WNW13	WNW16	W13	WSW15	SW15	SSW11	SSW8	SW10	SSW8	SSW8	S8	SSE11	SSE11	SSE12	SSE13	SSE12	SSE10	SSE10	SSE8	SSE11	S8	SW6.0	NW20
12-Dec	SSE8	SSE9	SE8	SSE7	S7	SSE10	SSE10	SSE11	SSE11	SSE10	S8	S7	S7	S7	S11	S11	SSW10	S12	S13	S10	SSW8	SW9	S10	SSW5	S8.7	S13
13-Dec	SW7	SE7	S8	SSW8	SSW13	SSE13	SSE5	SSE11	S12	S14	SSW13	S14	S16	SSE14	SSE12	S14	SSE18	S19	S12	S9	SE11	SE7	S6	S10	S10.8	S19
14-Dec	W9	W8	W9	WSW13	WSW16	W22	WSW20	WSW22	WSW25	WSW26	W20	W15	SW7	S9	S9	S12	SSW11	SW9	SW5	SW4	S5	SSE10	S11	SSE12	SW10.8	WSW26
15-Dec	SSE14	SSE15	SSE16	SSE16	S15	S12	S8	SSW9	S16	S19	SSE16	SSE15	S23	S19	S17	SSE16	S19	S24	S24	S21	SSW19	SSW17	SW13	SW15	S15.9	S24
16-Dec	SW18	WSW20	WSW18	WSW18	W22	WNW20	W19	W22	W16	NNW10	NE15	NE10	NE10	NE9	NE9	NE8	NE11	ENE4	NNE6	E5	S1	SSW4	S3	NNE5	WNW4.7	W22
17-Dec	NNE11	NNE11	NNE4	S4	SSE8	ESE11	ESE12	ESE11	SSE8	SE9	SSE9	SSE11	S10	SSE9	SSE8	SSE10	SSE11	SSE13	SSE13	SSE12	S12	SSE14	S11	SSW9	SSE7.8	SSE14
18-Dec	SW4	SSW9	SW11	SW10	WSW14	SW11	SW10	SSW6	S10	SSW10	WSW13	WSW18	WSW19	WSW20	W14	W13	W12	W11	W10	W12	NNE18	NNE17	NNE14	NNE19	WSW6.9	WSW20
19-Dec	NNE12	NNE12	N9	N11	NNE10	NNE9	NNW5	N5	NE6	ENE5	ENE4	ENE5	E4	NE4	NE6	NE8	E7	E6	ESE5	ESE9	SE11	SE12	SE10	SE13	ENE5.0	SE13
20-Dec	SE15	SE15	SE14	SSE13	SSE18	SSE17	SSE18	SSE16	SSE13	SSE11	SSE9	SSE11	SSE10	SSE11	SSE12	SSE14	SSE15	SSE14	S17	SSE19	SSE16	SSE14	S9	SW8	SSE13.3	SSE19
21-Dec	SW11	WSW21	WSW17	WSW19	WSW17	WSW14	SW9	S8	SSW12	SSW9	SSW6	SSE7	SSE11	SSE14	SSE12	SSE12	SSE5	SSW7	S11	S15	S12	SSE3	WSW8	SW6	SSW8.9	WSW21
22-Dec	SW8	WSW9	SW3	SW3	SSW5	SSW4	SW5	SW5	S9	S10	SSE11	S8	S9	SSE9	S6	SSW6	S7	S8	SSE11	SSE12	SSE11	S15	SSW11	SW11	S7.5	S15
23-Dec	SW11	WSW14	WSW14	W19	W15	W15	W17	WSW14	W12	WSW11	WSW17	WSW21	W21	W19	W21	W19	W18	WSW9	SW11	WSW15	SW13	SW14	SW15	S5	WSW14.2	W21
24-Dec	SSW9	SSW10	S7	S10	SSE12	SSE12	SSE11	SSE11	SSW7	SSW8	SSW5	WSW6	SSW5	S8	SSW8	SW8	SW7	S8	SSE9	S9	S13	S12	SSE13	SSE11	S8.5	S13
25-Dec	SSE11	SSE12	SSE11	SSE15	S16	SSE16	SSE15	SSE14	SSE13	SSE15	SSE11	SSE11	SSE12	SSE12	SSE12	SSE12	SSE12	SSE10	S7	SSE10	SSE9	S9	SSE12	SSW8	SSE11.8	S16
26-Dec	S8	S9	S8	SSE7	SSW8	S10	SSE13	SSE14	SSE14	SSE15	SSE13	SSE13	SSE15	SSE14	SSE17	SSE16	SSE16	SSE12	SSE10	S9	S14	SSE15	SSE18	SSW17	SSE12.5	SSE18
27-Dec	WSW21	SW19	SW18	SSW16	S13	S15	S16	S14	S11	S13	SSW12	SSW5	WSW3	S6	S6	SSE8	SSE6	N2	NNE4	ESE6	N4	NNE6	NE8	NNW11	SSW6.4	WSW21
28-Dec	NNW12	NNE7	N6	N6	NE4	ENE3	NNW2	NE1	ENE3	N8	NNE18	N13	NNE14	N10	NNW9	N9	N7	NNE9	N8	N9	NNW7	N7	N6	NW3	N7.2	NNE18
29-Dec	S0	SW4	SW8	S7	SSE10	SSE12	SSE13	S13	SSE12	SSE10	SSE9	SSE12	SSE12	SSE13	SSE11	SSE9	ESE9	SSE9	SE9	SSE8	SSW5	SSW6	S7	S8	SSE8.5	SSE13
30-Dec	SSE6	SSE8	SSE11	SSE11	SSE10	SSE8	SSE7	S5	SSW7	SSE7	SSE8	S7	S5	S6	S7	S5	S8	SW11	S10	SSE13	SSE14	S13	S13	S12	S8.4	SSE14
31-Dec	SSW8	WSW8	SW8	SW9	SSE10	S10	SSW7	S7	SSW7	S8	S8	SSE13	SSE12	SSE13	S10	SSW11	SSW12	S8	SW10	SW10	SW12	WNW5	NE6	E8	S7.4	SSE13

SSW5.2SSW5.5SSW5.8SSW6.1SSW6.9SSW6.7SSW7.1SSW7.3SSW7.9	S7.7	S6.5	SSW6.9	S7.3	S7.4	S7.1	S6.9	S6.9	S6.8	S6.3	S6.8	S6.6	S6.0	S5.7	S5.0	Diurnal Average							
WSW21WSW21	SW18	W19	W22	WSW22	WSW20	W22	WSW25	WSW26	W20	WSW21	S23	WSW20	W21	W19	W24	W27	S24	S21	WNW20	WNW19	SSE18	NNE19	Diurnal Maximum

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



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

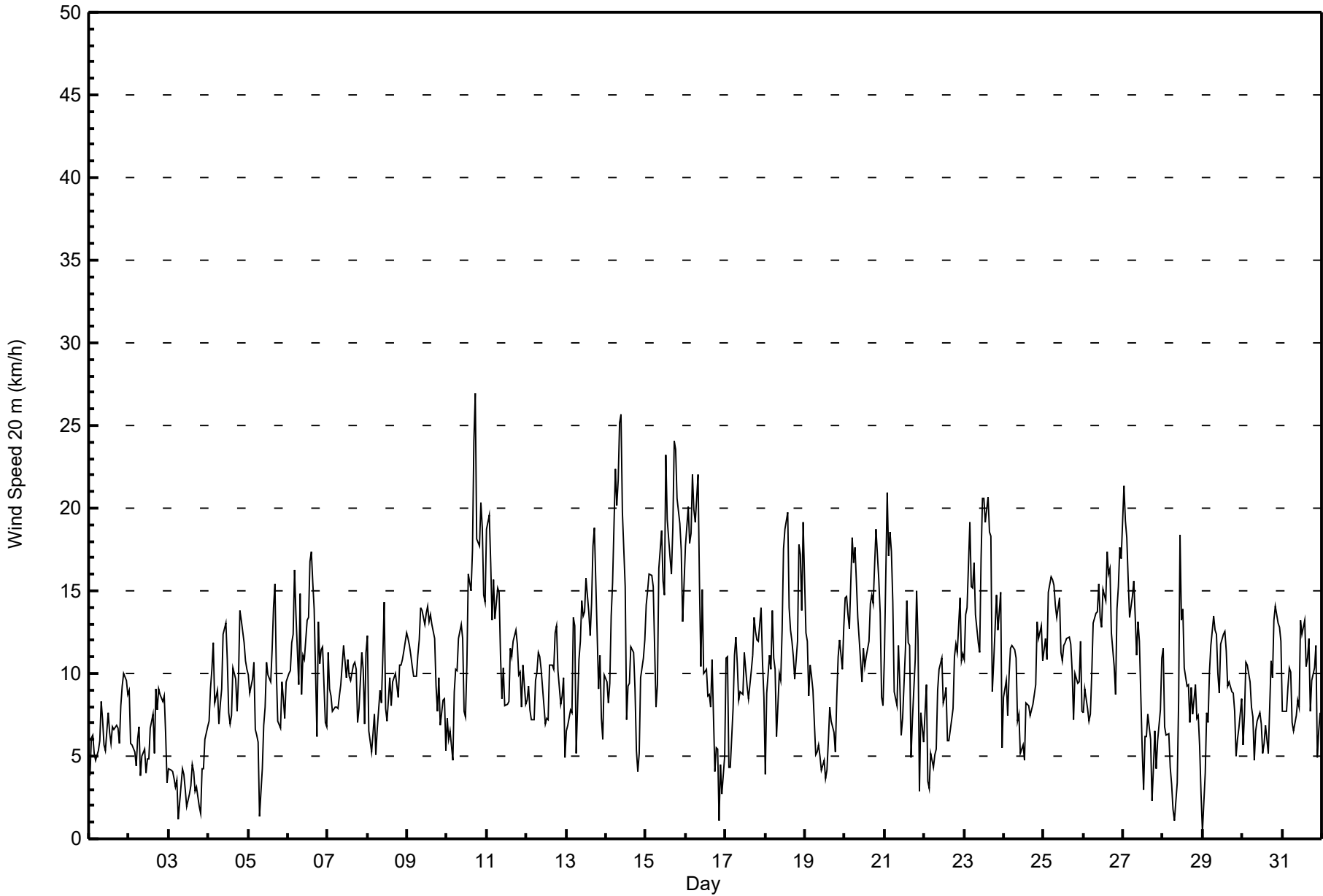
Wind Speed 20 m (WS20m) - km/h
Barge Landing - December 2023

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



Wood Buffalo Environmental Association
Hourly Averages

Wind Speed 20 m (WS20m) - km/h
Barge Landing - December 2023





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Wind Speed 20 m (WS20m) - km/h
Barge Landing - December 2023

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	94	12.63	12.63
6 - 11	392	52.69	65.32
12 - 19	234	31.45	96.77
20 - 28	24	3.23	100.00
29 - 38	0	0.00	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed 20 m (WS20m) - km/h
Barge Landing - December 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	4	5	3	6	2	1	1	5	13	14	11	5	0	6	8	10	94
6 - 11	13	9	10	0	3	6	10	97	107	72	35	12	7	0	2	9	392
12 - 19	1	8	1	0	0	1	5	96	40	13	22	20	18	4	4	1	234
20 - 28	0	0	0	0	0	0	0	0	4	0	0	10	7	2	1	0	24
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	18	22	14	6	5	8	16	198	164	99	68	47	32	12	15	20	744

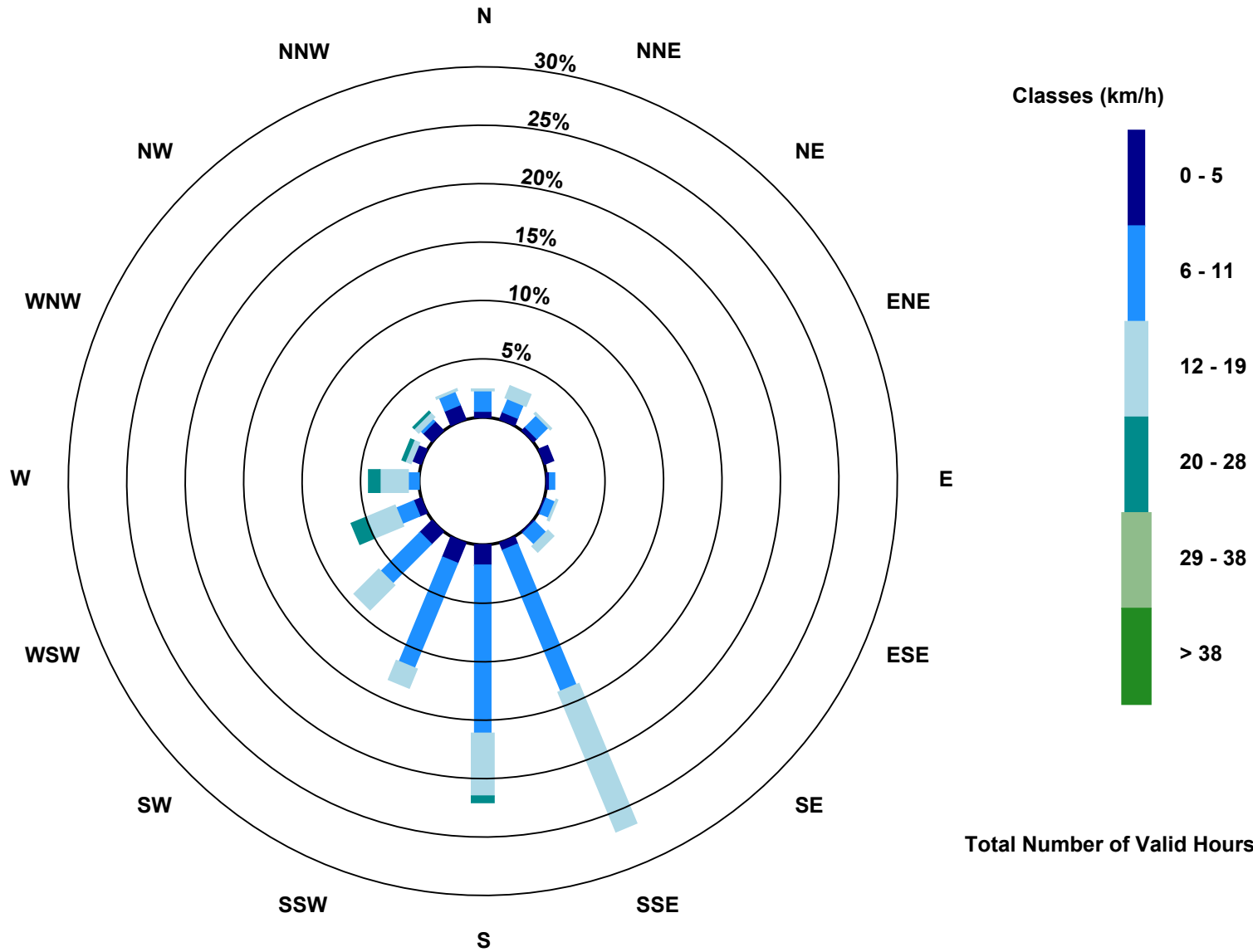
Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Dec 2023

Wind Speed 20 m (WS20m) - km/h
Barge Landing



Total Number of Valid Hours: 744



Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Direction 20 m (WD20m) - deg

Barge Landing - December 2023

Direction of Maximum Speed: 269 deg on Dec 10 18:00		Hours in Service:	744
Direction of Maximum Daily Speed Average: 181.1 deg on Dec 15		Hours of Data:	744
Direction of Minimum Speed: 179 deg on Dec 29 01:00		Hours of Missing Data:	0
Direction of Minimum Daily Speed Average: 2.1 deg on Dec 3		Percent Operational Time:	100.0
Monthly Average Direction: 191.9 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-Dec	284	238	237	202	173	185	161	166	164	156	172	169	168	177	165	173	185	183	176	166	187	171	177	196	180.5
2-Dec	201	260	266	245	229	239	237	237	235	240	199	200	201	178	171	306	339	338	338	330	326	333	350	23	271.9
3-Dec	335	305	345	348	332	13	311	342	329	332	323	300	302	302	333	357	321	318	311	197	237	212	206	180	309.6
4-Dec	210	173	171	164	161	161	167	208	200	166	192	200	184	188	170	155	159	169	159	167	155	154	157	166	171.6
5-Dec	170	167	181	138	201	156	177	303	236	158	152	172	171	180	170	171	177	174	111	310	242	208	205	144	175.5
6-Dec	175	176	208	226	232	230	224	234	202	223	216	228	224	238	236	229	205	191	180	193	202	215	212	238	216.4
7-Dec	184	180	198	220	204	199	208	182	207	200	197	177	175	177	170	170	206	213	209	214	226	221	183	196	196.2
8-Dec	219	204	145	157	184	159	193	223	210	216	226	211	201	210	201	176	161	197	211	218	180	164	163	150	192.9
9-Dec	155	158	169	176	187	214	180	162	159	157	165	175	170	160	161	156	163	175	183	198	212	207	186	173	172.2
10-Dec	159	178	149	184	155	166	160	167	169	178	196	235	217	239	236	259	274	269	282	280	284	300	308	317	244.7
11-Dec	321	306	305	302	296	274	247	230	212	202	217	206	205	171	159	162	158	149	162	163	162	165	158	174	219.0
12-Dec	159	157	143	163	169	162	162	153	164	168	175	187	180	182	170	173	199	188	172	187	199	234	180	198	175.1
13-Dec	220	133	173	208	192	167	148	167	189	184	194	184	176	163	166	175	168	184	184	188	137	132	172	176	175.4
14-Dec	261	279	262	244	247	259	256	249	251	256	261	262	226	188	179	186	199	218	216	235	182	164	169	163	235.5
15-Dec	163	160	160	168	170	169	185	192	182	185	160	168	179	178	172	168	190	189	185	184	194	198	216	233	181.1
16-Dec	233	246	253	250	281	283	267	265	280	329	48	51	44	53	35	50	55	77	17	88	189	212	180	25	289.5
17-Dec	22	26	29	169	158	112	117	118	150	136	153	155	169	161	151	147	159	147	149	162	169	166	185	195	146.7
18-Dec	232	210	218	234	238	222	219	193	187	205	238	244	242	257	261	262	266	271	260	277	27	25	18	22	255.1
19-Dec	18	19	360	9	25	30	331	0	55	58	57	66	79	34	34	46	79	96	114	120	131	140	133	136	62.4
20-Dec	136	139	142	147	155	156	156	157	161	162	156	164	164	155	154	153	160	162	172	164	164	167	176	215	158.5
21-Dec	229	250	248	255	251	237	228	173	198	200	193	148	158	162	161	162	155	213	189	179	176	162	243	230	207.0
22-Dec	230	237	226	235	208	211	230	223	182	177	167	190	181	166	188	203	170	179	163	165	164	175	193	214	188.7
23-Dec	222	239	247	274	265	260	261	258	259	243	256	258	262	268	272	273	271	240	225	237	231	229	231	191	253.3
24-Dec	203	204	177	176	166	163	162	164	194	212	209	250	211	186	206	227	215	175	162	183	175	176	168	164	183.9
25-Dec	167	164	165	158	171	149	164	164	168	168	156	168	161	161	156	158	165	166	170	157	167	175	149	201	163.6
26-Dec	174	178	169	148	198	187	161	164	167	165	168	168	164	164	163	165	155	153	157	176	173	161	160	198	167.4
27-Dec	241	229	216	208	179	177	177	184	183	182	196	198	238	179	172	168	154	351	17	110	354	22	50	337	196.5
28-Dec	336	14	2	350	37	61	346	36	69	3	25	8	16	6	340	6	7	12	352	359	343	351	349	317	4.3
29-Dec	179	231	228	178	160	155	165	169	161	159	164	165	168	167	160	153	123	154	143	155	201	203	179	173	165.8
30-Dec	159	157	162	160	159	164	158	174	192	162	165	189	182	173	184	185	185	214	189	159	168	175	179	177	173.3
31-Dec	196	237	228	215	166	170	198	191	207	185	170	165	166	166	177	200	192	188	218	223	231	285	41	85	191.0

207.0 208.5 206.7 206.5 202.6 194.6 195.9 194.6 193.5 189.6 189.0 193.0 187.3 186.5 183.5 182.9 185.1 190.3 184.3 188.6 189.5 187.3 180.5 185.7
Diurnal Average

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



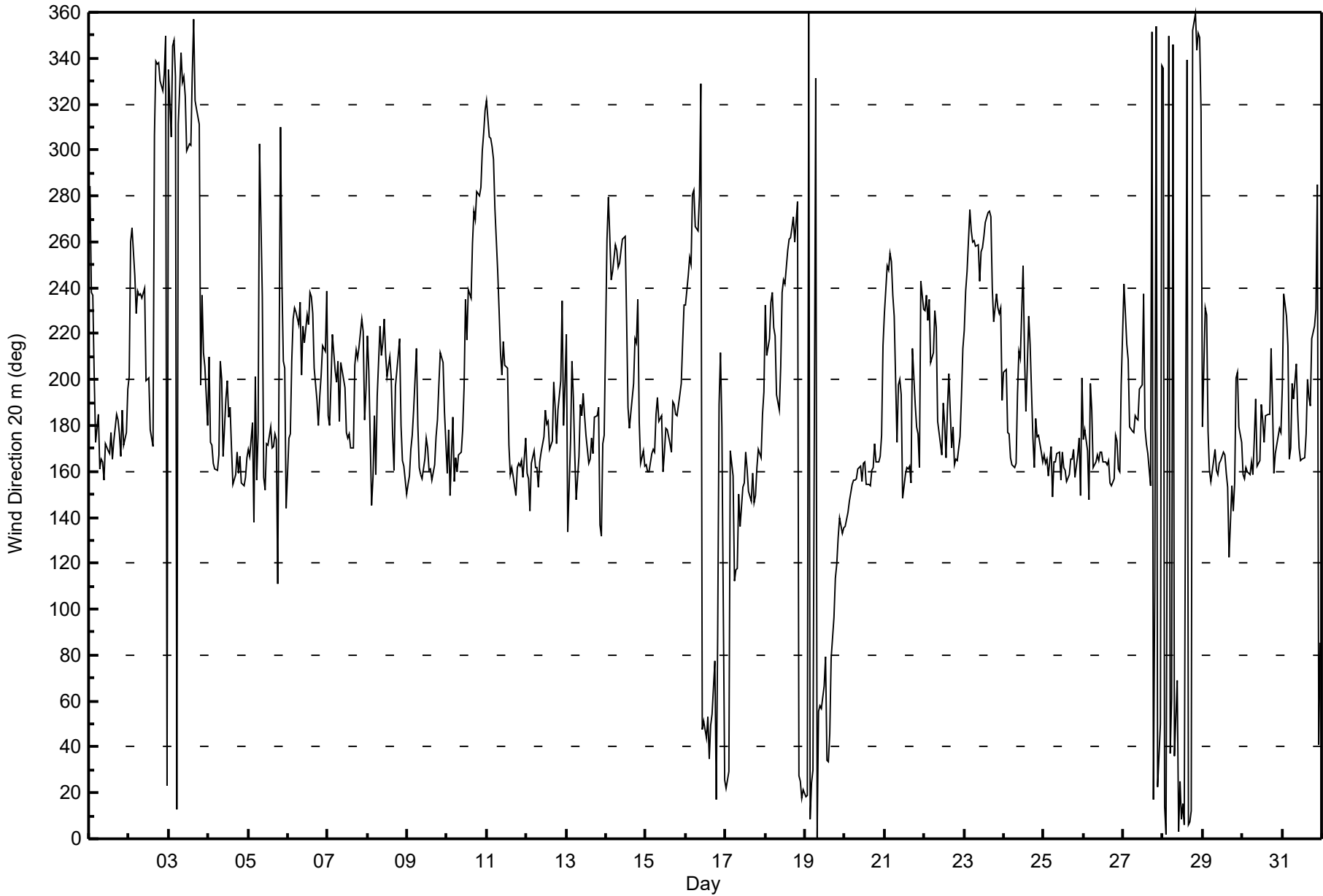
Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

Wind Direction 20 m (WD20m) - deg

Barge Landing - December 2023

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 92 deg on Dec 27 18:00 Minimum Value: 5 deg on Dec 1 20:00 Percentiles: P ₁ = 6 P ₁₀ = 9 Q ₁ = 11 Median = 14 Q ₃ = 18 P ₉₀ = 29 P ₉₉ = 80																	Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0								
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Dec	17	16	12	18	18	12	13	8	8	14	15	13	14	16	15	10	12	9	12	5	8	8	7	10	18
2-Dec	7	31	18	6	10	14	11	14	11	14	25	21	21	15	17	33	8	10	9	9	14	18	19	44	44
3-Dec	19	26	19	19	25	37	84	37	19	19	30	43	30	28	24	23	49	33	34	66	9	14	26	23	84
4-Dec	11	8	10	9	9	10	17	11	13	10	12	16	18	18	17	7	12	28	16	5	7	10	7	6	28
5-Dec	11	16	21	11	26	12	44	91	45	23	18	24	18	15	12	11	12	17	33	43	16	19	35	11	91
6-Dec	13	14	12	14	14	17	26	17	25	19	18	16	19	14	13	13	13	21	11	17	13	15	23	19	26
7-Dec	16	11	13	14	20	16	15	14	14	13	18	16	16	15	10	9	14	8	6	18	10	10	27	9	27
8-Dec	14	46	30	16	14	30	21	13	15	12	10	20	19	14	15	12	10	17	18	20	10	9	7	8	46
9-Dec	11	7	10	14	10	15	18	13	9	9	11	15	14	13	11	11	6	8	16	9	15	10	11	21	21
10-Dec	21	18	22	22	12	12	11	14	18	22	19	21	21	13	14	13	16	15	19	20	15	16	18	18	22
11-Dec	15	13	15	18	16	16	14	14	14	19	15	19	19	13	9	10	7	7	6	7	7	10	15	13	19
12-Dec	10	9	13	12	11	13	6	9	10	10	17	21	19	18	12	13	14	12	15	23	40	20	9	27	40
13-Dec	24	46	22	21	12	11	41	21	13	11	14	13	12	12	11	10	10	15	28	52	20	47	49	33	52
14-Dec	21	21	13	10	12	11	12	12	13	12	14	17	45	17	13	11	11	13	21	48	31	8	11	11	48
15-Dec	6	6	9	10	11	8	17	11	15	15	10	15	15	15	16	15	17	16	15	17	15	16	22	17	22
16-Dec	14	13	11	12	18	15	14	13	21	47	17	18	17	17	12	13	12	57	31	26	74	19	50	15	74
17-Dec	15	14	48	15	18	6	10	8	13	14	9	12	13	11	14	11	17	8	11	11	11	10	11	7	48
18-Dec	45	15	11	11	10	17	12	32	16	15	12	11	10	11	12	11	12	12	10	26	15	12	14	13	45
19-Dec	13	15	17	17	18	16	16	32	17	17	25	18	24	18	14	16	18	12	13	10	13	12	12	12	32
20-Dec	12	14	12	15	13	14	12	13	13	13	13	15	16	13	13	12	12	14	15	11	13	12	19	14	19
21-Dec	25	13	13	11	12	11	43	32	16	17	19	16	9	12	11	9	25	28	12	9	11	89	19	29	89
22-Dec	14	10	34	45	19	33	16	29	7	9	10	15	11	11	14	17	22	20	9	10	12	12	17	17	45
23-Dec	20	20	16	17	16	13	13	13	14	10	14	14	14	15	16	15	13	49	15	14	19	14	15	38	49
24-Dec	27	14	17	10	9	13	10	11	15	10	24	15	37	19	13	11	12	13	11	9	10	12	10	9	37
25-Dec	9	7	7	8	11	9	10	11	11	13	16	14	11	10	11	9	10	8	13	20	11	14	14	25	25
26-Dec	27	11	14	16	24	22	6	8	9	8	11	12	12	12	10	11	9	8	9	22	15	7	7	25	27
27-Dec	15	15	14	14	15	11	10	11	9	9	13	48	71	21	17	12	12	92	56	37	41	30	22	11	92
28-Dec	8	33	35	32	82	77	82	88	50	19	13	15	14	30	17	16	12	12	18	18	20	16	18	57	88
29-Dec	83	32	6	28	13	6	9	11	12	12	13	13	14	14	11	9	19	12	12	18	16	9	19	9	83
30-Dec	15	9	7	10	11	14	16	26	12	27	15	16	18	17	35	38	19	12	13	6	8	10	7	8	38
31-Dec	21	12	16	12	11	12	20	40	23	13	20	11	14	10	16	15	10	31	16	11	14	47	27	25	47
	83	46	48	45	82	77	84	91	50	47	30	48	71	30	35	38	49	92	56	66	74	89	50	57	
	Diurnal Maximum																								





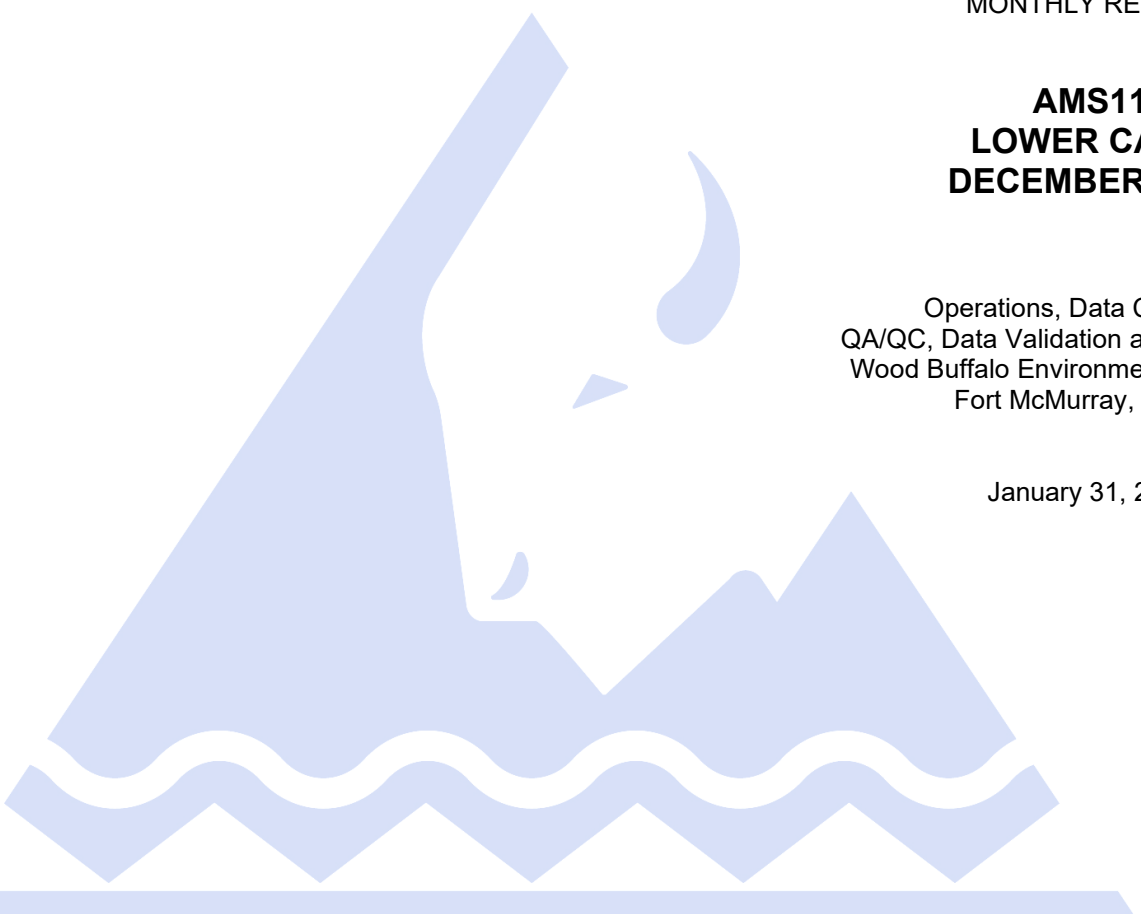
WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

AMS11 LOWER CAMP DECEMBER 2023

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

January 31, 2024



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - LOWER CAMP (AMS11)
 DECEMBER 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	709	35	35	100	146.5	0	12.5	0
H2S (ppb) Average	707	35	37	99.73	35.8	4	3.9	1
THC (ppm) Average	709	35	35	100	3.1	-	2.5	-
CH4(ppm) Average	709	35	35	100	3.1	-	2.5	-
NMHC(ppm) Average	709	35	35	100	0.126	-	0.071	-
Temperature (C) Average	744	0	0	100	6.4	-	0.4	-
Relative Humidity (%) Average	744	0	0	100	96.5	-	89.8	-
Barometric Pressure (inHg) Average	744	0	0	100	29.4	-	29.3	-
Wind Speed 10 m (km/h) Average	744	0	0	100	31	-	19	-
Wind Direction 10 m (deg) Average	744	0	0	100	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - LOWER CAMP (AMS11)
DECEMBER 2023

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
H2S	19 Dec 2023 12:00	19 Dec 2023 13:00	2	Maintenance - sample manifold cleaned



Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO₂) - ppb Lower Camp - December 2023

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 146.5 ppb on Dec 6 18:00	Maximum Daily Average: 12.5 ppb on Dec 6		Hours of Data:	709
Minimum Value: 0.0 ppb on Dec 1 02:00	Minimum Daily Average: 0.0 ppb on Dec 25		Hours of Missing Data:	35
Maximum Diurnal Average: 7.7 ppb at hour 18	Minimum Diurnal Average: 0.5 ppb at hour 2		Hours of Calibration:	35
Monthly Average: 2.25 ppb	Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.1 Median = 0.3 Q ₃ = 0.7 P ₉₀ = 3.3 P ₉₉ = 42.4		Percent Operational Time:	100.0

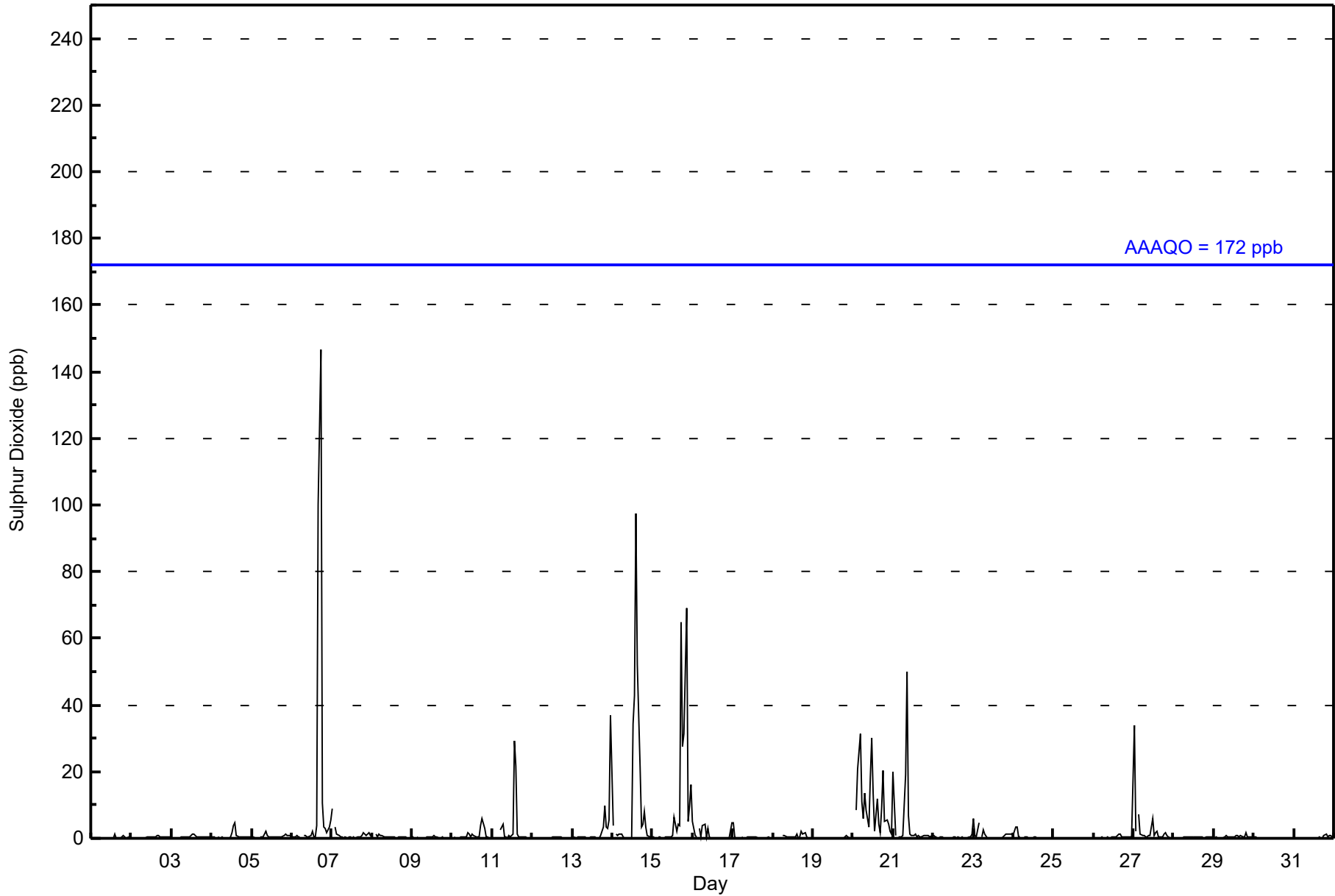
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Dec	Z	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.1	1.1	0.2	0.1	0.2	0.5	0.8	0.2	0.2	0.3	0.3	0.2	1.1																						
2-Dec	0.2	Z	0.1	0.1	0.1	0.0	0.1	0.2	0.2	0.2	0.3	0.3	0.3	0.4	0.6	0.7	1.0	0.5	0.3	0.4	0.3	0.3	0.2	0.3	0.3	1.0																						
3-Dec	0.2	0.1	Z	0.2	0.1	0.2	0.3	0.5	0.4	0.5	0.5	1.3	1.3	0.9	0.6	0.5	0.5	0.5	0.3	0.4	0.4	0.4	0.4	0.4	0.5	1.3																						
4-Dec	0.3	0.4	0.3	Z	0.2	0.1	0.3	0.1	0.2	0.2	0.4	1.9	3.6	4.8	0.7	0.5	0.5	0.5	0.3	0.3	0.3	0.3	0.2	0.2	0.7	4.8																						
5-Dec	0.2	0.2	0.2	0.2	Z	0.3	0.4	0.3	2.0	0.8	0.5	0.5	0.4	0.5	0.3	0.3	0.3	0.4	1.0	1.3	1.0	0.7	0.7	0.6	2.0																							
6-Dec	0.4	0.4	0.3	0.8	0.5	0.6	Z	0.8	0.8	0.4	0.5	1.0	2.2	0.6	0.4	3.7	99.9	146.5	10.4	3.4	3.1	1.5	3.3	5.5	12.5	146.5																						
7-Dec	9.1	Z	3.4	1.4	0.8	0.5	0.3	0.2	0.3	0.2	0.4	0.2	0.2	0.2	0.1	0.2	0.5	0.5	0.7	1.5	0.9	1.2	1.6	0.7	1.1	9.1																						
8-Dec	0.8	Z	1.2	0.6	1.4	1.0	0.7	0.6	0.6	0.5	0.5	0.2	0.2	0.2	0.1	0.3	0.4	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.5	1.4																						
9-Dec	0.3	0.2	Z	0.4	0.2	0.1	0.1	0.1	0.1	0.3	0.3	0.3	0.6	0.8	0.3	0.3	0.1	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.2	0.8																						
10-Dec	0.1	0.1	0.2	Z	0.1	0.3	0.3	0.3	0.3	1.7	1.2	0.5	1.2	0.9	0.5	0.3	0.4	3.7	5.8	3.0	0.6	0.4	0.2	0.2	1.0	5.8																						
11-Dec	0.2	0.2	0.1	0.1	Z	2.6	4.1	0.3	0.3	0.2	1.0	0.6	1.2	29.1	21.8	1.1	0.5	0.4	0.4	0.3	0.3	0.2	0.2	0.1	2.8	29.1																						
12-Dec	0.1	0.1	0.1	0.0	0.1	Z	0.1	0.0	0.0	0.0	0.0	0.1	0.4	0.3	0.5	0.4	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.2	0.5																						
13-Dec	Z	0.2	0.1	0.4	0.6	0.3	0.3	0.2	0.2	0.2	0.2	0.3	0.2	0.4	0.2	0.1	0.1	0.9	3.3	9.8	3.3	3.0	5.5	36.9	2.9	36.9																						
14-Dec	3.8	Z	1.1	0.9	1.1	1.2	0.3	0.2	0.1	0.1	0.1	0.1	34.2	42.8	97.3	52.1	21.0	3.3	4.1	8.0	3.5	0.7	0.6	0.5	12.0	97.3																						
15-Dec	0.4	0.3	Z	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.8	6.5	2.1	4.2	3.7	64.9	27.5	31.3	69.1	5.1	9.9	16.0	10.6	69.1																						
16-Dec	5.1	1.0	0.6	Z	3.1	0.4	3.7	4.1	0.4	3.1	0.3	0.1	0.1	0.1	0.1	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	4.8	1.2	5.1																						
17-Dec	4.6	0.3	0.1	0.1	Z	0.4	0.1	0.0	0.1	0.4	0.5	0.6	0.6	0.5	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.5	0.2	0.2	0.5	4.6																						
18-Dec	0.2	0.2	0.2	0.2	0.2	Z	0.7	0.7	0.4	0.4	0.3	0.3	0.3	0.2	1.3	0.2	0.4	2.1	1.1	1.6	0.6	0.1	0.1	0.0	0.5	2.1																						
19-Dec	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	Z	C	C	C	C	0.0	0.0	0.0	0.0	0.0	0.4	0.7	0.5	0.0	0.3	0.1	0.7																					
20-Dec	0.5	Z	8.3	20.6	31.5	10.9	6.1	13.8	8.3	3.2	18.2	30.0	13.7	2.2	11.9	4.1	1.6	8.8	20.3	5.2	5.4	4.4	2.1	1.1	10.1	31.5																						
21-Dec	19.9	1.0	Z	0.4	0.3	0.4	0.9	19.3	49.9	6.6	1.2	0.7	0.8	1.2	0.6	0.7	0.6	0.6	1.0	0.7	0.9	0.7	0.6	0.8	4.8	49.9																						
22-Dec	0.8	0.6	0.4	Z	0.2	0.2	0.1	0.1	0.1	0.1	0.2	0.1	0.5	0.3	0.2	0.3	0.2	0.3	0.2	0.2	0.2	0.3	0.5	1.1	0.3	1.1																						
23-Dec	6.1	0.7	0.3	4.5	Z	0.6	2.5	1.4	0.2	0.1	0.1	0.1	0.0	0.1	0.1	0.0	0.1	0.1	0.4	1.3	1.2	1.3	1.2	1.4	1.0	6.1																						
24-Dec	0.6	3.2	3.2	0.6	0.4	Z	0.5	0.6	0.3	0.1	0.0	0.1	0.4	0.2	0.2	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.5	3.2																						
25-Dec	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	0.1	0.1	0.1	0.0	0.1	0.0	0.1	0.1	0.1	0.0	0.1																						
26-Dec	0.1	Z	0.1	0.1	0.2	0.3	0.1	0.2	0.2	0.2	0.2	0.3	0.6	0.5	1.0	1.1	1.1	0.6	0.3	0.4	0.3	0.2	0.2	0.4	0.4	1.1																						
27-Dec	34.0	1.9	Z	7.3	1.5	0.7	0.9	0.6	0.5	0.8	0.7	5.9	1.1	1.7	2.2	0.6	0.5	0.5	1.4	1.7	0.8	0.4	0.2	0.2	2.9	34.0																						
28-Dec	0.1	0.2	0.2	Z	0.2	0.2	0.3	0.3	0.3	0.2	0.2	0.3	0.3	0.3	0.3	0.2	0.3	0.3	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3																						
29-Dec	0.2	0.4	0.1	0.1	Z	0.2	0.4	0.8	0.5	0.5	0.4	0.5	0.6	0.8	0.7	0.6	0.7	0.5	0.4	1.5	0.3	0.3	0.2	0.2	0.5	1.5																						
30-Dec	0.2	0.2	0.2	0.2	0.1	Z	0.2	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.0	0.0	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.1	0.2																						
31-Dec	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.1	0.0	0.6	1.3	0.5	0.8	0.8	0.5	0.2	1.3																						
																								3.4	0.5	0.8	1.5	1.7	0.8	0.8	1.5	2.2	0.7	0.9	1.5	2.2	3.2	4.8	2.4	4.3	7.7	2.6	2.4	3.1	0.8	1.0	2.4	Diurnal Average
																								34.0	3.2	8.3	20.6	31.5	10.9	6.1	19.3	49.9	6.6	18.2	30.0	34.2	42.8	97.3	52.1	99.9	146.5	27.5	31.3	69.1	5.1	9.9	36.9	Diurnal Maximum

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



Wood Buffalo Environmental Association
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Lower Camp - December 2023





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Lower Camp - December 2023

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	681	96.05	96.05
11 - 20	9	1.27	97.32
21 - 60	14	1.97	99.29
61 - 110	4	0.56	99.86
111 - 172	1	0.14	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 709

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Lower Camp - December 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	6	1	2	16	360	87	11	3	3	23	48	33	39	26	15	681
11 - 20	0	0	0	0	0	4	2	0	0	2	0	1	0	0	0	0	9
21 - 60	0	0	0	0	0	4	2	3	2	2	0	0	1	0	0	0	14
61 - 110	0	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	4
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
Totals	8	6	1	2	16	368	91	16	8	7	23	49	34	39	26	15	709

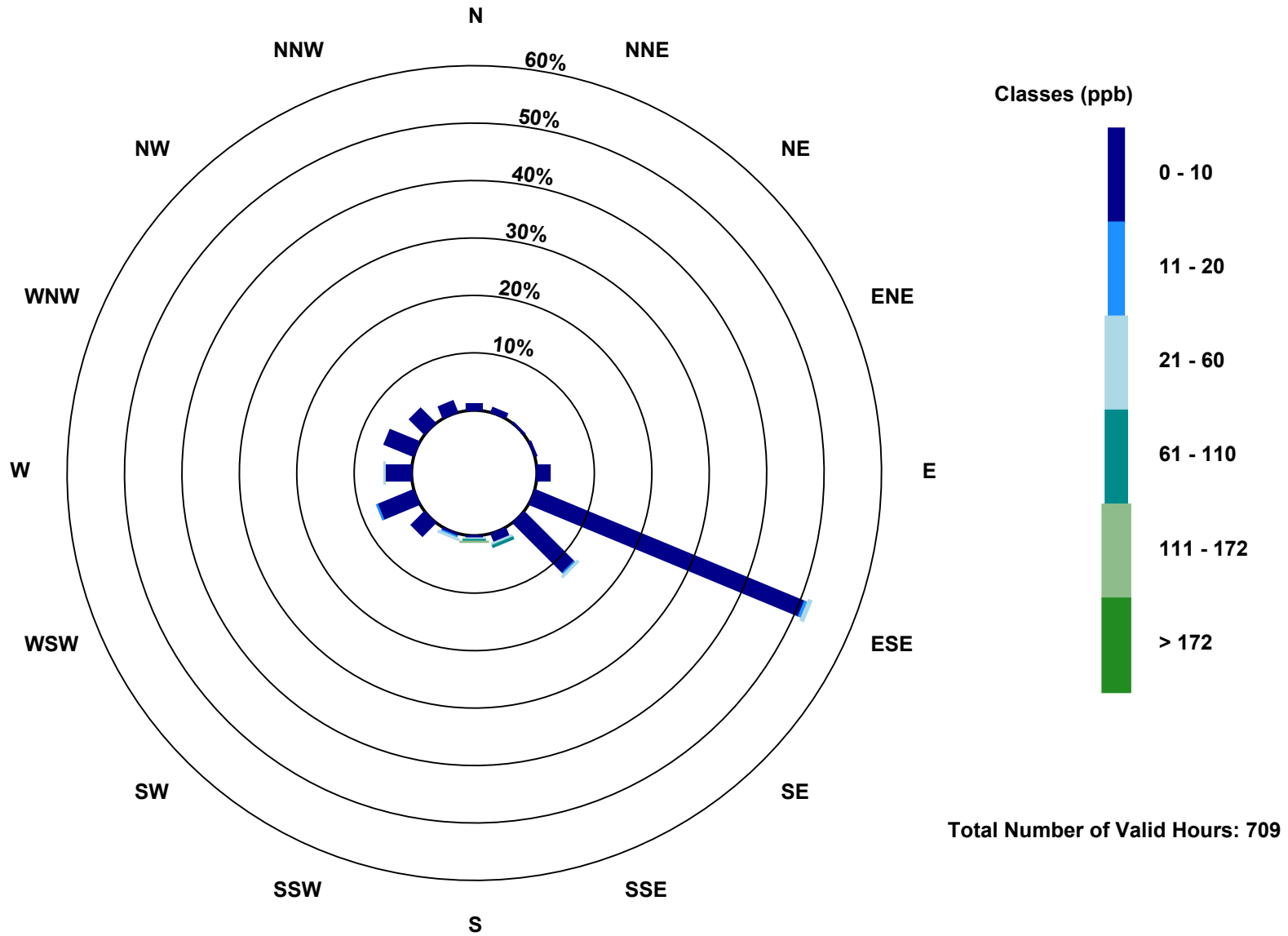
Total Number of Valid Hours: 709

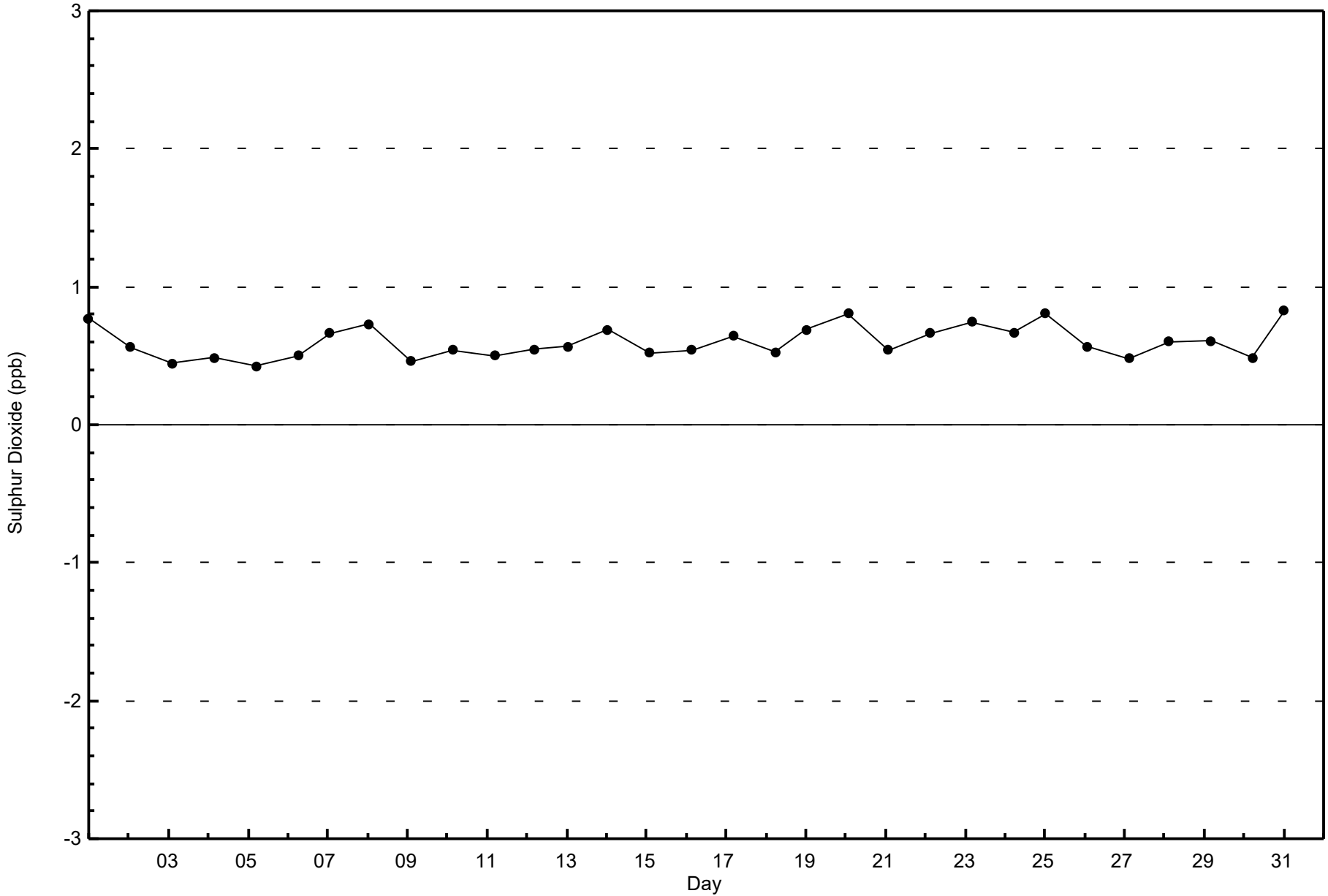
Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Dec 2023

Sulphur Dioxide (SO₂) - ppb
Lower Camp

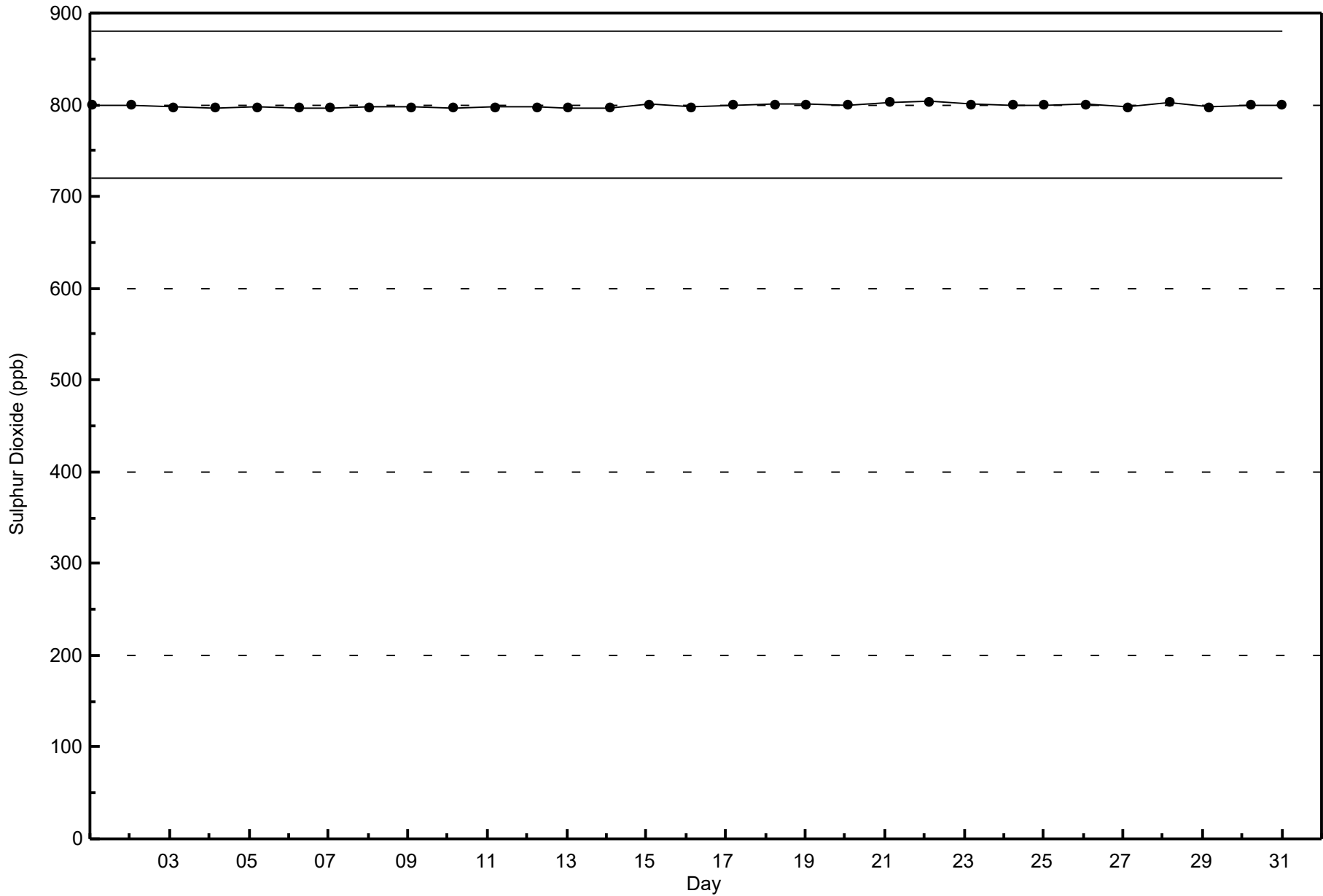






Wood Buffalo Environmental Association
Span Responses

Sulphur Dioxide (SO₂) - ppb
Lower Camp - December 2023





Wood Buffalo Environmental Association

Summary of Hour Averages

Hydrogen Sulphide (H₂S) - ppb

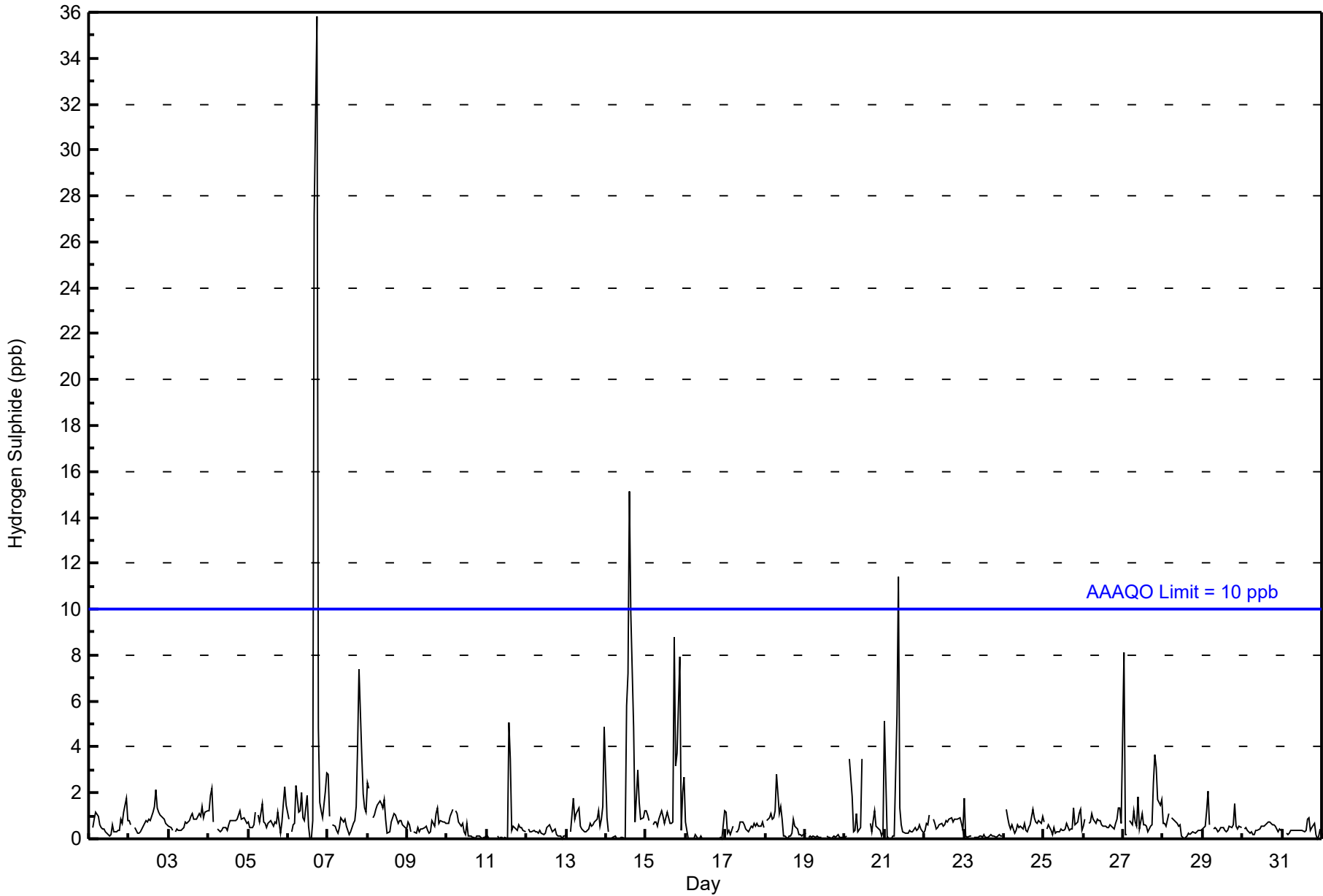
Lower Camp - December 2023

Number of Exceedences (AAAQO):		1-hr: 4	24-hr: 1	Hours in Service: 744																	Daily Average		Daily Maximum																									
Maximum Value: 35.8 ppb on Dec 6 18:00		Maximum Daily Average: 3.9 ppb on Dec 6		Hours of Data: 707																	3.9		35.8																									
Minimum Value: 0.0 ppb on Dec 11 02:00		Minimum Daily Average: 0.1 ppb on Dec 19		Hours of Missing Data: 37																	0.1		0.0																									
Maximum Diurnal Average: 2.0 ppb at hour 18		Minimum Diurnal Average: 0.5 ppb at hour 12		Hours of Calibration: 35																	2.0		0.5																									
Monthly Average: 0.87 ppb		Percentiles: P ₁ = 0.0 P ₁₀ = 0.1 Q ₁ = 0.3 Median = 0.5 Q ₃ = 0.8 P ₉₀ = 1.4 P ₉₉ = 7.9		Percent Operational Time: 99.7																	0.87		0.5																									
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-Dec	0.7	Z	0.5	0.9	1.2	1.0	0.6	0.5	0.4	0.5	0.3	0.2	0.1	0.2	0.6	0.3	0.3	0.3	0.4	0.8	0.7	1.1	1.8	0.8	0.6	1.8																						
2-Dec	0.8	0.6	Z	0.5	0.4	0.3	0.2	0.3	0.4	0.7	0.8	0.7	0.9	0.8	1.2	1.4	2.1	1.4	1.1	1.0	0.9	0.8	0.7	0.6	0.8	2.1																						
3-Dec	0.6	0.5	0.3	Z	0.3	0.5	0.4	0.4	0.4	0.5	0.7	0.7	0.8	1.0	1.1	0.8	0.8	0.9	1.1	1.0	1.4	0.9	1.2	1.2	0.8	1.4																						
4-Dec	1.2	1.9	2.2	0.7	Z	0.4	0.4	0.3	0.4	0.5	0.5	0.4	0.6	0.8	0.8	0.8	0.8	0.8	1.0	1.2	0.9	0.9	0.8	0.7	0.8	2.2																						
5-Dec	0.7	0.5	0.5	0.6	1.2	Z	1.0	0.7	1.5	0.7	0.7	0.5	0.7	0.8	0.6	0.6	0.7	0.7	1.2	0.3	0.7	1.5	2.2	1.5	0.9	2.2																						
6-Dec	0.8	Z	0.3	0.6	0.7	2.3	1.1	1.2	2.0	0.9	0.8	1.9	0.6	0.0	0.0	0.8	27.2	35.8	4.8	1.6	1.2	0.9	2.1	2.8	3.9	35.8																						
7-Dec	2.8	1.0	Z	0.6	0.5	0.4	0.3	0.5	0.9	0.8	0.9	0.5	0.4	0.2	0.3	0.6	0.8	1.4	4.0	7.4	3.6	2.0	1.3	1.1	1.4	7.4																						
8-Dec	2.4	2.2	Z	0.9	1.1	1.3	1.4	1.7	1.5	1.4	1.7	0.8	0.3	0.3	0.7	0.9	1.1	1.0	0.7	0.8	0.8	0.6	0.6	0.4	1.1	2.4																						
9-Dec	0.7	0.6	0.3	Z	0.3	0.3	0.5	0.3	0.4	0.5	0.5	0.5	0.4	0.2	0.3	0.8	0.5	1.1	1.3	0.7	0.8	0.7	0.7	0.7	0.6	1.3																						
10-Dec	0.7	0.7	1.0	1.3	Z	1.2	1.1	0.7	0.5	0.7	0.3	0.2	0.7	0.1	0.1	0.1	0.1	0.0	0.1	0.1	0.1	0.0	0.1	0.1	0.4	1.3																						
11-Dec	0.2	0.0	0.0	0.0	0.0	Z	0.1	0.0	0.1	0.1	0.0	0.0	0.0	5.1	3.5	0.4	0.6	0.4	0.4	0.6	0.5	0.5	0.4	0.3	0.6	5.1																						
12-Dec	Z	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.5	0.6	0.6	0.3	0.4	0.4	0.2	0.1	0.1	0.0	0.1	0.1	0.3	0.6																						
13-Dec	0.2	Z	0.3	1.0	1.8	0.8	1.1	1.3	0.5	0.4	0.4	0.3	0.3	0.4	0.7	0.6	0.6	0.7	0.8	1.2	0.6	0.9	1.4	4.9	0.9	4.9																						
14-Dec	0.9	0.3	Z	0.0	0.1	0.1	0.0	0.0	0.0	0.1	0.1	0.0	5.8	7.2	15.1	9.8	4.9	0.7	1.9	3.0	1.6	0.8	0.9	1.2	2.4	15.1																						
15-Dec	1.2	1.0	0.8	Z	0.6	0.7	0.8	0.6	0.9	1.2	1.0	0.7	0.9	1.1	0.7	0.7	0.7	8.8	3.2	3.7	7.9	0.3	2.0	2.7	1.8	8.8																						
16-Dec	0.7	0.0	0.0	0.0	Z	0.0	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	0.1	0.0	1.2	0.1	1.2																							
17-Dec	1.1	0.2	0.4	0.2	0.6	Z	0.3	0.3	0.4	0.7	0.7	0.6	0.4	0.4	0.3	0.6	0.5	0.7	0.6	0.7	0.5	0.5	0.7	0.5	0.5	1.1																						
18-Dec	Z	0.8	0.9	1.1	0.9	0.9	1.2	2.8	1.1	1.4	0.9	0.1	0.1	0.0	0.2	0.1	0.2	0.8	0.5	0.4	0.2	0.2	0.1	0.2	0.7	2.8																						
19-Dec	0.3	Z	0.1	0.1	0.0	0.2	0.1	0.1	0.1	0.1	0.0	M	M	0.1	0.1	0.1	0.0	0.1	0.1	0.1	0.2	0.1	0.1	0.0	0.1	0.3																						
20-Dec	0.1	0.1	Z	3.5	1.8	0.3	0.4	1.1	0.3	0.5	3.5	C	C	C	C	0.7	0.3	0.8	1.2	0.6	0.4	0.4	0.1	0.3	0.9	3.5																						
21-Dec	5.1	0.0	0.0	Z	0.0	0.1	0.1	5.4	11.4	1.3	0.6	0.3	0.2	0.3	0.2	0.4	0.3	0.3	0.5	0.4	0.4	0.6	0.5	0.3	1.3	11.4																						
22-Dec	0.4	0.7	0.6	1.0	Z	0.8	0.7	0.5	0.5	0.6	0.7	0.5	0.6	0.8	0.7	0.9	0.9	0.7	0.8	0.9	0.9	0.9	0.7	0.4	0.7	1.0																						
23-Dec	1.8	0.2	0.1	0.2	0.1	Z	0.0	0.1	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	0.2	0.1	0.1	0.2	1.8																						
24-Dec	Z	1.3	0.9	0.6	0.4	0.6	0.3	0.4	0.6	0.5	0.5	0.4	0.7	0.4	0.3	0.5	0.6	1.3	0.9	0.7	0.7	0.8	0.7	1.0	0.7	1.3																						
25-Dec	0.8	Z	0.4	0.6	0.4	0.2	0.5	0.3	0.3	0.3	0.4	0.3	0.4	0.4	0.7	0.4	0.4	0.4	1.4	0.6	0.8	1.1	1.3	0.4	0.5	1.4																						
26-Dec	0.6	0.9	Z	0.7	0.7	1.1	0.9	0.7	0.8	0.8	0.8	0.6	0.5	0.5	0.5	0.5	0.6	0.5	0.5	0.7	0.9	1.4	1.4	0.7	0.7	1.4																						
27-Dec	8.1	0.2	0.2	Z	0.8	0.6	1.2	0.7	0.6	1.9	0.4	1.1	0.6	0.6	0.6	0.3	0.5	0.6	2.4	3.7	3.1	1.7	1.4	1.7	1.4	8.1																						
28-Dec	0.7	0.7	0.6	1.1	Z	0.9	0.8	0.8	0.6	0.5	0.6	0.2	0.1	0.0	0.1	0.2	0.2	0.2	0.3	0.3	0.3	0.4	0.4	0.4	0.4	1.1																						
29-Dec	0.4	0.6	1.3	2.1	0.6	Z	0.4	0.5	0.4	0.3	0.3	0.5	0.5	0.4	0.3	0.4	0.6	0.5	0.6	1.6	0.5	0.4	0.6	0.5	0.6	2.1																						
30-Dec	Z	0.5	0.5	0.4	0.2	0.3	0.2	0.2	0.4	0.3	0.4	0.5	0.6	0.6	0.6	0.7	0.7	0.6	0.6	0.6	0.5	0.3	0.4	0.3	0.5	0.7																						
31-Dec	0.4	Z	0.2	0.2	0.2	0.4	0.4	0.4	0.3	0.4	0.3	0.4	0.4	0.3	0.4	0.9	0.9	0.4	0.5	0.7	0.2	0.0	0.1	0.4	0.4	0.9																						
																								1.3	0.6	0.5	0.7	0.6	0.6	0.5	0.7	0.9	0.6	0.6	0.5	0.6	0.8	1.0	0.8	1.6	2.0	1.1	1.1	1.0	0.7	0.8	0.9	Diurnal Average
																								8.1	2.2	2.2	3.5	1.8	2.3	1.4	5.4	11.4	1.9	3.5	1.9	5.8	7.2	15.1	9.8	27.2	35.8	4.8	7.4	7.9	2.0	2.2	4.9	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 (H₂S) - ppb
Lower Camp - December 2023





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Hydrogen Sulphide (H₂S) - ppb
Lower Camp - December 2023

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	676	95.62	95.62
3 - 4	14	1.98	97.60
5 - 7	9	1.27	98.87
8 - 11	4	0.57	99.43
> 11	4	0.57	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Hydrogen Sulphide (H₂S) - ppb
Lower Camp - December 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	6	1	2	17	361	86	10	3	1	24	49	30	38	26	17	676
3 - 4	0	0	0	0	0	3	4	3	0	2	0	0	1	1	0	0	14
5 - 7	0	0	0	0	1	2	0	1	2	1	0	1	1	0	0	0	9
8 - 11	0	0	0	0	0	0	1	2	0	1	0	0	0	0	0	0	4
> 11	0	0	0	0	0	0	0	0	3	1	0	0	0	0	0	0	4
Totals	5	6	1	2	18	366	91	16	8	6	24	50	32	39	26	17	707

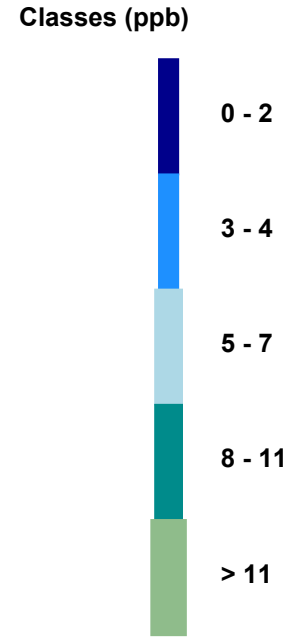
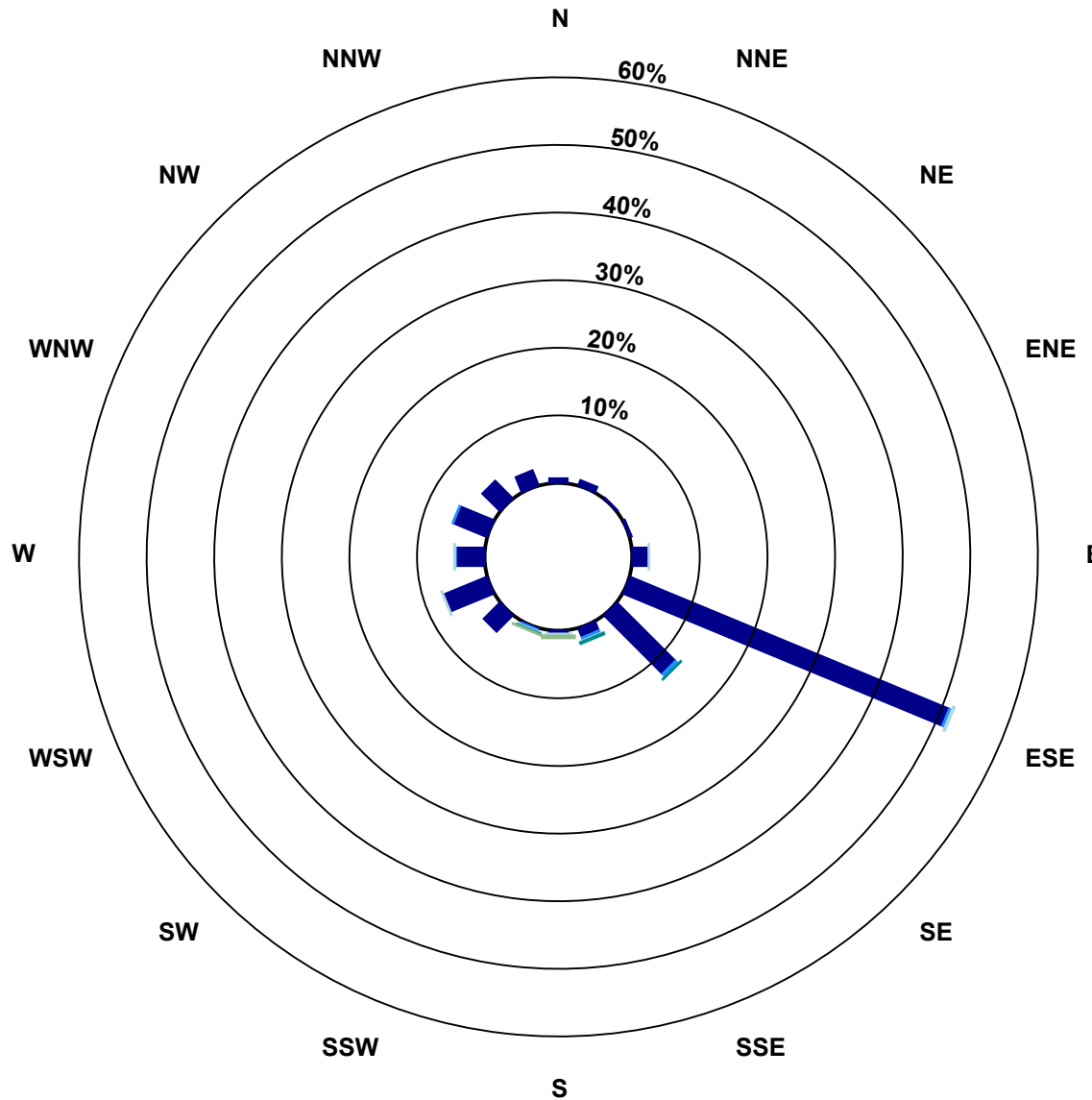
Total Number of Valid Hours: 707

Total Number of Hours: 744

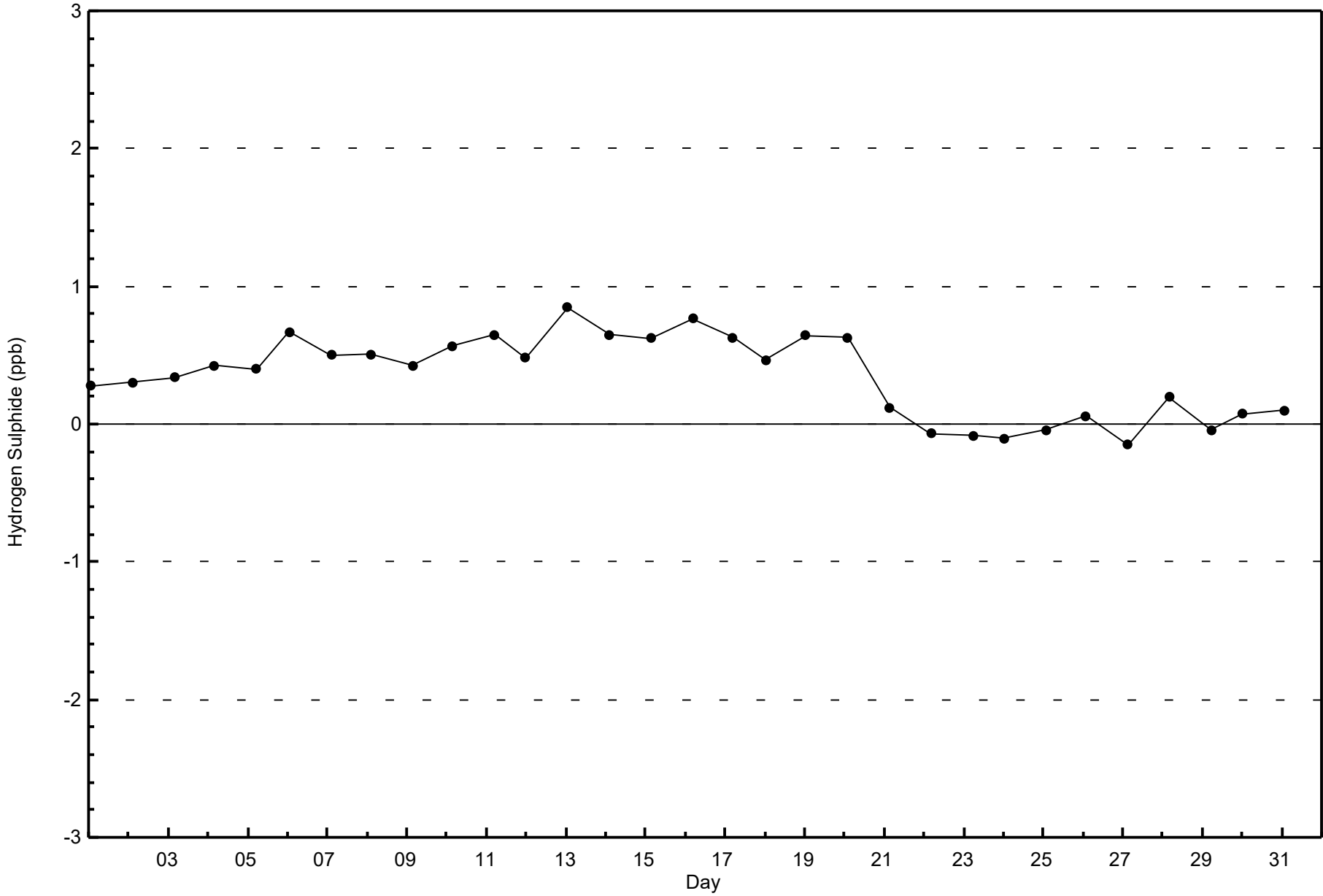


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Hydrogen Sulphide (H₂S) - ppb
Lower Camp



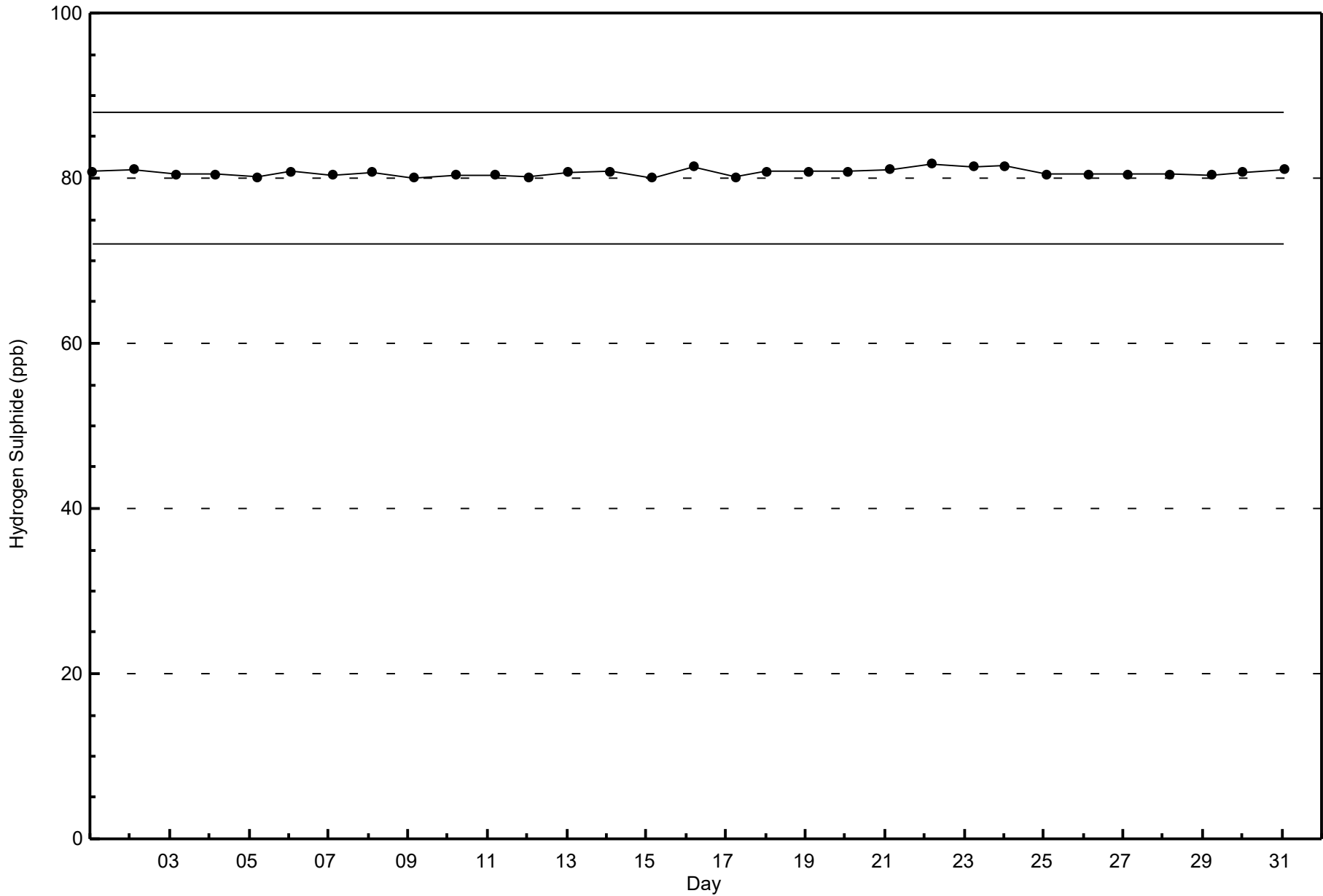
Total Number of Valid Hours: 707





Wood Buffalo Environmental Association
Span Responses

Hydrogen Sulphide (H₂S) - ppb
Lower Camp - December 2023





Wood Buffalo Environmental Association

Summary of Hour Averages

Total Hydrocarbons (THC) - ppm

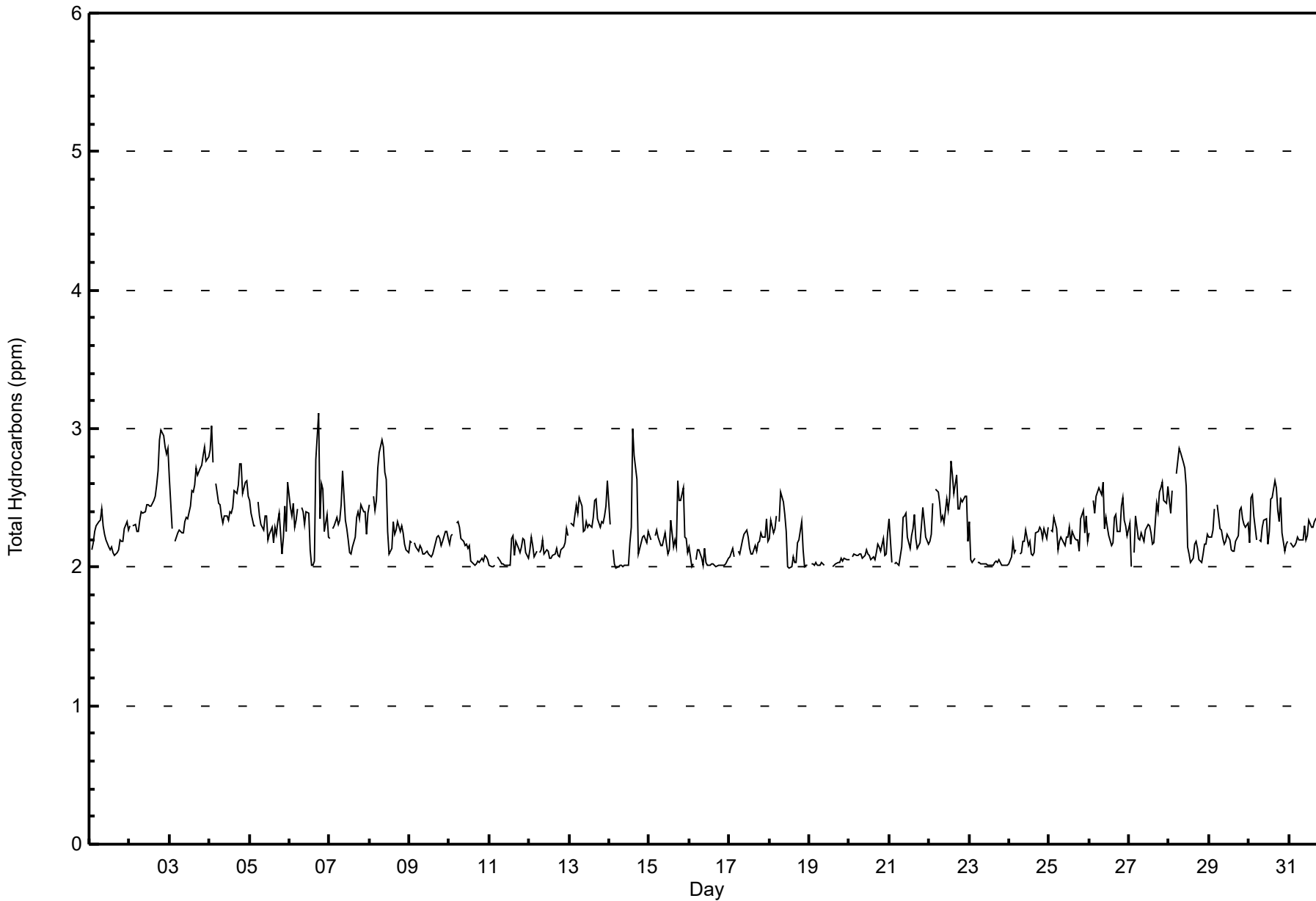
Lower Camp - December 2023

Maximum Value: 3.1 ppm on Dec 6 18:00		Maximum Daily Average: 2.5 ppm on Dec 4		Hours in Service: 744																						
Minimum Value: 2.0 ppm on Dec 14 05:00		Minimum Daily Average: 2.0 ppm on Dec 19		Hours of Data: 709																						
Maximum Diurnal Average: 2.3 ppm at hour 20		Minimum Diurnal Average: 2.2 ppm at hour 13		Hours of Missing Data: 35																						
Monthly Average: 2.26 ppm		Percentiles: P ₁ = 2.0 P ₁₀ = 2.0 Q ₁ = 2.1 Median = 2.2 Q ₃ = 2.4 P ₉₀ = 2.5 P ₉₉ = 2.9		Hours of Calibration: 35																						
				Percent Operational Time: 100.0																						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Dec	Z	2.1	2.2	2.3	2.3	2.3	2.3	2.4	2.3	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.3	2.3	2.3	2.2	2.4
2-Dec	2.3	Z	2.3	2.3	2.3	2.3	2.3	2.4	2.4	2.4	2.5	2.5	2.4	2.4	2.5	2.5	2.6	2.7	2.9	3.0	2.9	2.9	2.8	2.9	2.5	3.0
3-Dec	2.6	2.3	Z	2.2	2.2	2.2	2.3	2.2	2.2	2.3	2.4	2.4	2.4	2.6	2.5	2.6	2.7	2.7	2.7	2.7	2.8	2.9	2.8	2.8	2.5	2.9
4-Dec	2.8	3.0	2.8	Z	2.6	2.5	2.5	2.4	2.3	2.4	2.4	2.3	2.4	2.4	2.5	2.5	2.5	2.6	2.7	2.7	2.5	2.6	2.6	2.5	2.5	3.0
5-Dec	2.5	2.4	2.3	2.3	Z	2.5	2.4	2.3	2.3	2.4	2.4	2.2	2.2	2.3	2.2	2.3	2.2	2.3	2.4	2.1	2.2	2.4	2.3	2.6	2.3	2.6
6-Dec	2.4	2.4	2.5	2.3	2.3	2.4	Z	2.4	2.4	2.3	2.4	2.4	2.1	2.0	2.0	2.0	2.8	3.1	2.4	2.6	2.6	2.3	2.4	2.2	2.4	3.1
7-Dec	2.2	Z	2.3	2.3	2.4	2.3	2.3	2.5	2.7	2.3	2.3	2.2	2.1	2.1	2.1	2.2	2.4	2.4	2.3	2.5	2.4	2.4	2.2	2.4	2.3	2.7
8-Dec	2.4	Z	2.5	2.4	2.5	2.7	2.8	2.9	2.9	2.7	2.6	2.3	2.1	2.1	2.3	2.2	2.3	2.3	2.3	2.3	2.2	2.2	2.1	2.1	2.4	2.9
9-Dec	2.2	2.2	Z	2.2	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.2	2.2	2.3
10-Dec	2.2	2.2	2.2	Z	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.1	2.2	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.1	2.1	2.1	2.1	2.3
11-Dec	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	2.2	2.2	2.1	2.2	2.1	2.1	2.1	2.2	2.2	2.1	2.1	2.1	2.2
12-Dec	2.1	2.2	2.2	2.1	2.1	Z	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.3	2.2	2.1	2.3
13-Dec	Z	2.3	2.3	2.4	2.4	2.4	2.5	2.4	2.3	2.3	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	2.6	2.4	2.6
14-Dec	2.3	Z	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.2	2.3	3.0	2.8	2.6	2.1	2.1	2.2	2.2	2.2	2.2	2.3	2.2	3.0
15-Dec	2.2	2.2	Z	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.3	2.1	2.2	2.1	2.6	2.5	2.5	2.6	2.2	2.2	2.1	2.3	2.6
16-Dec	2.2	2.0	2.0	Z	2.1	2.1	2.1	2.1	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.2
17-Dec	2.1	2.1	2.1	2.1	Z	2.1	2.1	2.1	2.2	2.2	2.3	2.2	2.1	2.1	2.1	2.2	2.1	2.2	2.2	2.3	2.2	2.2	2.4	2.2	2.2	2.4
18-Dec	2.2	2.3	2.2	2.3	2.4	Z	2.3	2.5	2.5	2.4	2.3	2.0	2.0	2.0	2.1	2.0	2.0	2.2	2.2	2.3	2.1	2.0	2.0	2.0	2.2	2.5
19-Dec	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	C	C	C	C	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.1	2.1	2.1	2.0	2.1
20-Dec	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	2.2	2.1	2.1	2.2	2.1	2.1	2.2	2.1	2.2
21-Dec	2.3	2.0	Z	2.0	2.0	2.0	2.0	2.1	2.4	2.4	2.4	2.2	2.1	2.2	2.3	2.4	2.2	2.1	2.2	2.3	2.4	2.3	2.2	2.2	2.2	2.4
22-Dec	2.2	2.2	2.5	Z	2.6	2.5	2.5	2.3	2.4	2.3	2.5	2.4	2.5	2.8	2.7	2.5	2.7	2.4	2.4	2.5	2.5	2.5	2.5	2.2	2.5	2.8
23-Dec	2.3	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	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.3
24-Dec	2.0	2.1	2.2	2.1	2.1	Z	2.1	2.1	2.2	2.2	2.3	2.2	2.2	2.1	2.1	2.1	2.2	2.3	2.3	2.3	2.2	2.3	2.2	2.3	2.2	2.3
25-Dec	Z	2.3	2.3	2.4	2.3	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.3	2.2	2.2	2.2	2.2	2.1	2.3	2.4	2.2	2.4	2.2	2.4
26-Dec	2.2	Z	2.5	2.4	2.5	2.5	2.6	2.5	2.6	2.3	2.4	2.3	2.2	2.2	2.2	2.4	2.4	2.3	2.3	2.4	2.5	2.3	2.3	2.2	2.4	2.6
27-Dec	2.3	2.0	Z	2.1	2.4	2.2	2.2	2.3	2.2	2.2	2.3	2.3	2.3	2.2	2.2	2.2	2.5	2.4	2.5	2.6	2.6	2.5	2.5	2.6	2.3	2.6
28-Dec	2.5	2.4	2.6	Z	2.7	2.8	2.9	2.8	2.8	2.7	2.6	2.1	2.1	2.0	2.1	2.2	2.2	2.1	2.1	2.0	2.1	2.2	2.2	2.2	2.4	2.9
29-Dec	2.2	2.2	2.3	2.4	Z	2.5	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.2	2.2	2.4	2.4	2.3	2.3	2.3	2.3	2.3	2.5
30-Dec	2.2	2.5	2.5	2.4	2.2	Z	2.2	2.2	2.3	2.3	2.3	2.2	2.3	2.5	2.5	2.6	2.6	2.4	2.3	2.5	2.3	2.1	2.2	2.2	2.3	2.6
31-Dec	Z	2.2	2.1	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	2.3	2.4	2.3	2.0	2.0	2.1	2.2	2.2	2.4
																								Diurnal Average		
																								Diurnal Maximum		
Z - zerospan C - Calibration																										



Wood Buffalo Environmental Association
Hourly Averages

Total Hydrocarbons (THC) - ppm
Lower Camp - December 2023





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Lower Camp - December 2023

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	99	13.96	13.96
2.1 - 3.0	609	85.90	99.86
3.1 - 10.0	1	0.14	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 709

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Total Hydrocarbons (THC) - ppm
Lower Camp - December 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	4	3	1	0	3	3	0	0	0	1	18	36	9	8	5	8	99
2.1 - 3.0	4	3	0	2	13	365	91	16	7	6	5	13	25	31	21	7	609
3.1 - 10.0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	8	6	1	2	16	368	91	16	8	7	23	49	34	39	26	15	709

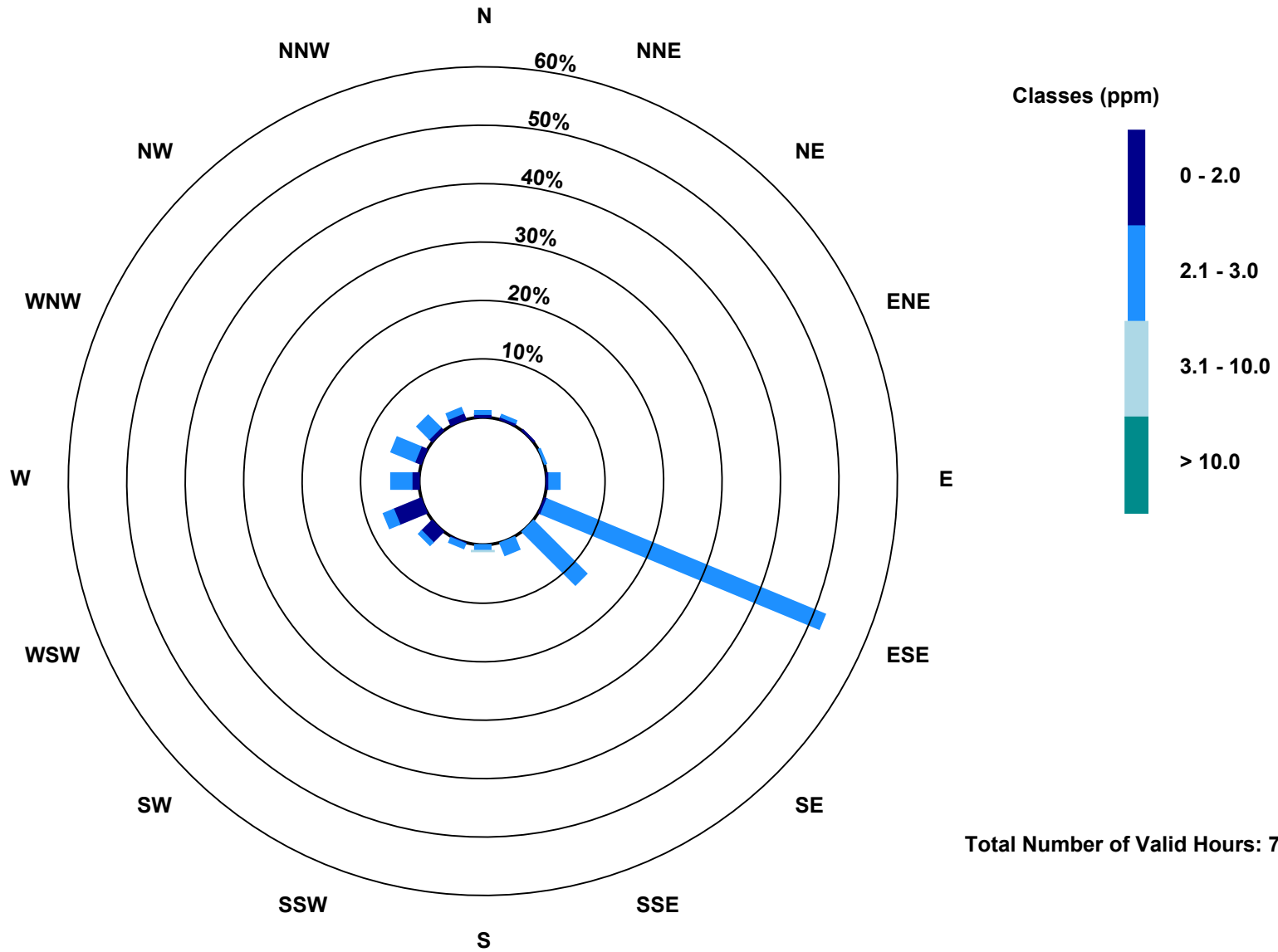
Total Number of Valid Hours: 709

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Dec 2023

Total Hydrocarbons (THC) - ppm
Lower Camp



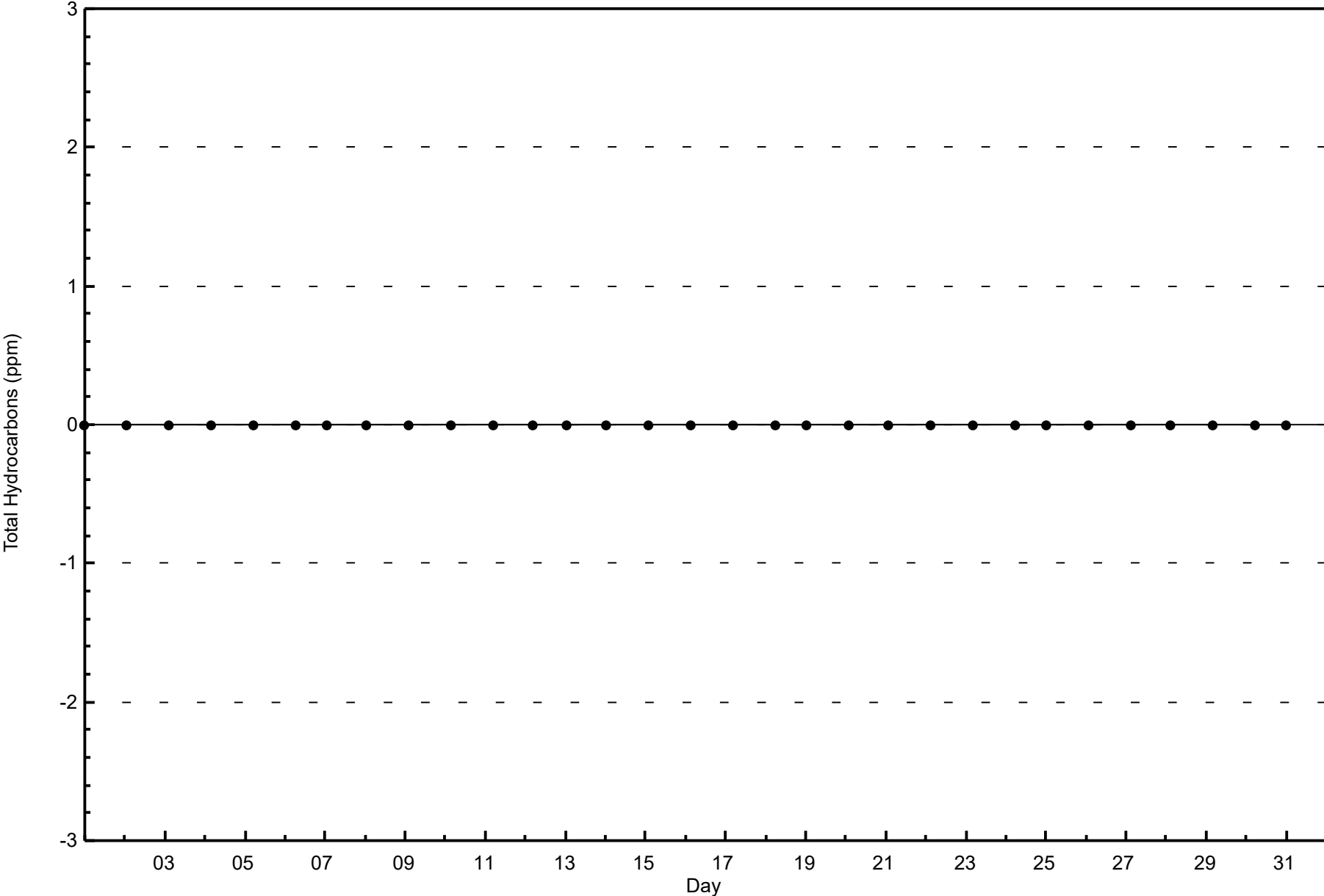


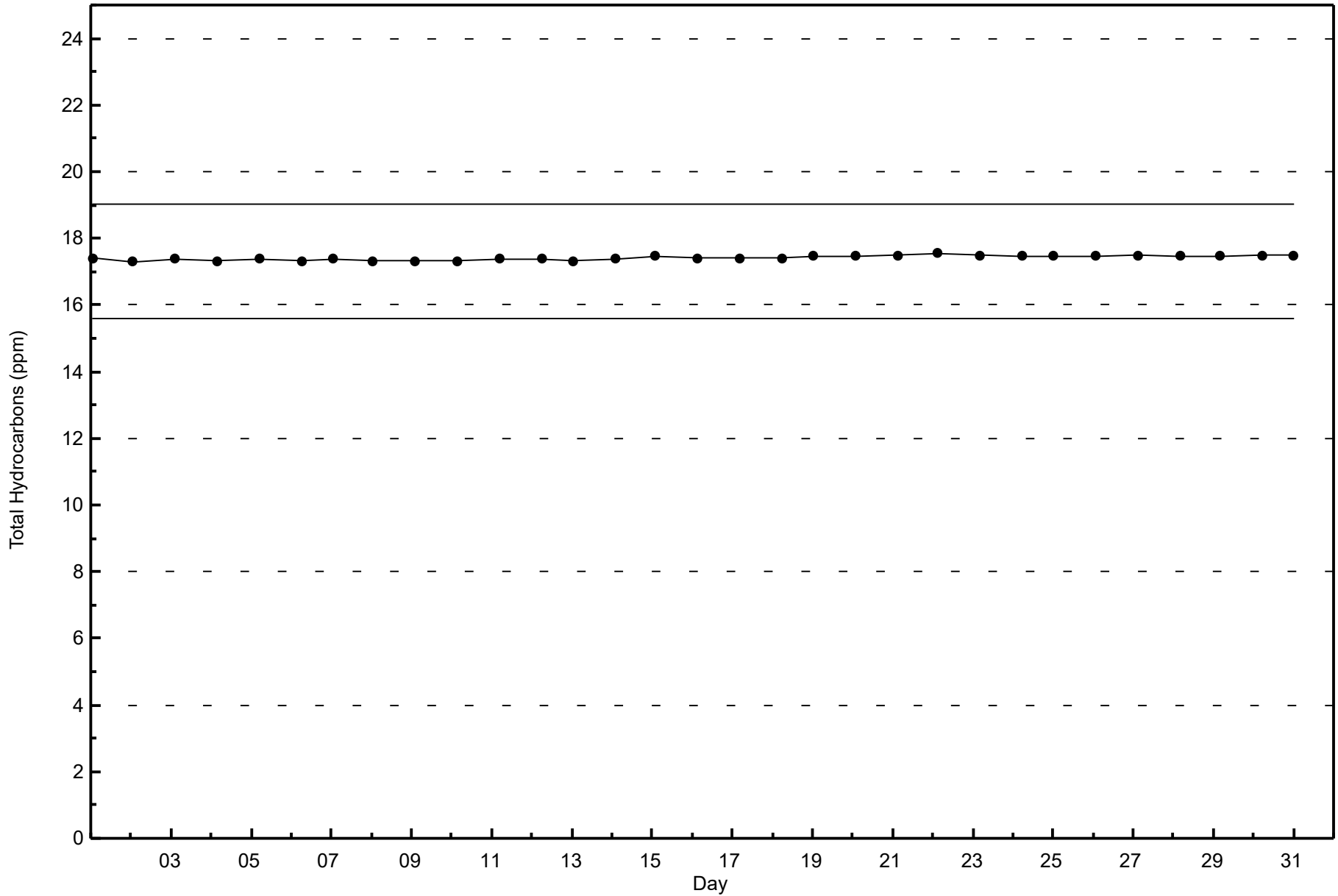
Wood Buffalo Environmental Association

Zero Responses

Total Hydrocarbons (THC) - ppm

Lower Camp - December 2023







Wood Buffalo Environmental Association

Summary of Hour Averages

Methane (CH₄) - ppm

Lower Camp - December 2023

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 3.1 ppm on Dec 6 18:00	Maximum Daily Average: 2.5 ppm on Dec 2		Hours of Data:	709
Minimum Value: 2.0 ppm on Dec 14 05:00	Minimum Daily Average: 2.0 ppm on Dec 19		Hours of Missing Data:	35
Maximum Diurnal Average: 2.3 ppm at hour 20	Minimum Diurnal Average: 2.2 ppm at hour 13		Hours of Calibration:	35
Monthly Average: 2.24 ppm	Percentiles: P ₁ = 2.0 P ₁₀ = 2.0 Q ₁ = 2.1 Median = 2.2 Q ₃ = 2.3 P ₉₀ = 2.5 P ₉₉ = 2.8		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-Dec	Z	2.1	2.2	2.3	2.3	2.3	2.3	2.4	2.3	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.3	2.3	2.3	2.2	2.4
2-Dec	2.3	Z	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	2.6	2.6	2.8	2.9	2.8	2.8	2.7	2.8	2.5	2.9	
3-Dec	2.6	2.3	Z	2.2	2.2	2.2	2.3	2.2	2.2	2.3	2.3	2.3	2.4	2.5	2.5	2.6	2.6	2.6	2.6	2.7	2.8	2.7	2.7	2.4	2.8	
4-Dec	2.7	2.9	2.7	Z	2.5	2.4	2.4	2.3	2.3	2.3	2.3	2.3	2.3	2.4	2.5	2.4	2.5	2.6	2.6	2.5	2.5	2.6	2.5	2.5	2.9	
5-Dec	2.4	2.4	2.3	2.3	Z	2.4	2.3	2.3	2.2	2.3	2.3	2.2	2.2	2.3	2.1	2.2	2.2	2.3	2.3	2.1	2.2	2.4	2.3	2.5	2.3	2.5
6-Dec	2.4	2.3	2.4	2.3	2.3	2.4	Z	2.4	2.4	2.3	2.4	2.3	2.1	2.0	2.0	2.0	2.8	3.1	2.3	2.6	2.5	2.2	2.3	2.2	2.4	3.1
7-Dec	2.2	Z	2.3	2.3	2.3	2.3	2.3	2.4	2.6	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	2.2	2.4	2.3	2.6
8-Dec	2.4	Z	2.5	2.4	2.4	2.7	2.8	2.9	2.8	2.6	2.6	2.2	2.1	2.1	2.3	2.2	2.2	2.3	2.2	2.3	2.2	2.1	2.1	2.1	2.4	2.9
9-Dec	2.1	2.1	Z	2.2	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.1	2.2	2.2	2.2	2.2	2.1	2.2
10-Dec	2.2	2.2	2.2	Z	2.3	2.3	2.3	2.2	2.2	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.1	2.1	2.1	2.1	2.3
11-Dec	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	2.2	2.2	2.1	2.2	2.1	2.1	2.1	2.2	2.2	2.1	2.1	2.1	2.2
12-Dec	2.1	2.2	2.2	2.1	2.1	Z	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.1	2.2
13-Dec	Z	2.3	2.3	2.3	2.4	2.3	2.4	2.4	2.2	2.2	2.3	2.2	2.3	2.3	2.3	2.4	2.4	2.3	2.3	2.3	2.2	2.3	2.4	2.6	2.3	2.6
14-Dec	2.3	Z	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.2	2.3	3.0	2.8	2.6	2.1	2.1	2.2	2.2	2.2	2.2	2.3	2.2	3.0
15-Dec	2.2	2.2	Z	2.2	2.2	2.2	2.2	2.1	2.1	2.2	2.2	2.1	2.1	2.3	2.1	2.2	2.1	2.6	2.5	2.5	2.6	2.2	2.2	2.1	2.2	2.6
16-Dec	2.1	2.0	2.0	Z	2.0	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	2.0	2.1	2.0	2.1
17-Dec	2.1	2.1	2.1	2.1	Z	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.3
18-Dec	2.2	2.3	2.2	2.3	2.4	Z	2.3	2.5	2.4	2.3	2.2	2.0	2.0	2.0	2.1	2.0	2.0	2.2	2.2	2.3	2.1	2.0	2.0	2.0	2.2	2.5
19-Dec	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	C	C	C	C	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.1	2.1	2.1	2.0	2.1
20-Dec	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.2	2.1	2.2
21-Dec	2.3	2.0	Z	2.0	2.0	2.0	2.0	2.1	2.4	2.3	2.4	2.2	2.1	2.2	2.3	2.4	2.2	2.1	2.2	2.3	2.4	2.3	2.2	2.2	2.2	2.4
22-Dec	2.2	2.2	2.4	Z	2.5	2.5	2.4	2.3	2.3	2.3	2.4	2.3	2.4	2.7	2.6	2.5	2.6	2.3	2.3	2.4	2.4	2.4	2.4	2.2	2.4	2.7
23-Dec	2.3	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	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.3
24-Dec	2.0	2.1	2.2	2.1	2.1	Z	2.1	2.1	2.2	2.2	2.2	2.1	2.2	2.1	2.1	2.1	2.2	2.2	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.3
25-Dec	Z	2.3	2.3	2.4	2.3	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.3	2.4	2.2	2.3	2.2	2.2	2.4
26-Dec	2.2	Z	2.4	2.3	2.4	2.5	2.5	2.5	2.6	2.3	2.3	2.2	2.2	2.2	2.2	2.3	2.3	2.2	2.2	2.4	2.4	2.3	2.2	2.2	2.3	2.6
27-Dec	2.3	2.0	Z	2.1	2.4	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.2	2.1	2.2	2.4	2.4	2.5	2.5	2.6	2.5	2.4	2.5	2.3	2.6
28-Dec	2.4	2.3	2.5	Z	2.6	2.7	2.8	2.7	2.7	2.6	2.5	2.1	2.1	2.0	2.1	2.2	2.2	2.1	2.1	2.0	2.1	2.2	2.1	2.2	2.3	2.8
29-Dec	2.2	2.2	2.3	2.4	Z	2.4	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.2	2.4	2.4	2.3	2.3	2.3	2.3	2.2	2.4
30-Dec	2.2	2.5	2.5	2.3	2.2	Z	2.2	2.2	2.3	2.3	2.3	2.2	2.3	2.4	2.4	2.6	2.5	2.3	2.3	2.4	2.2	2.1	2.2	2.2	2.3	2.6
31-Dec	Z	2.2	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.3	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.0	2.0	2.1	2.2	2.2	2.3

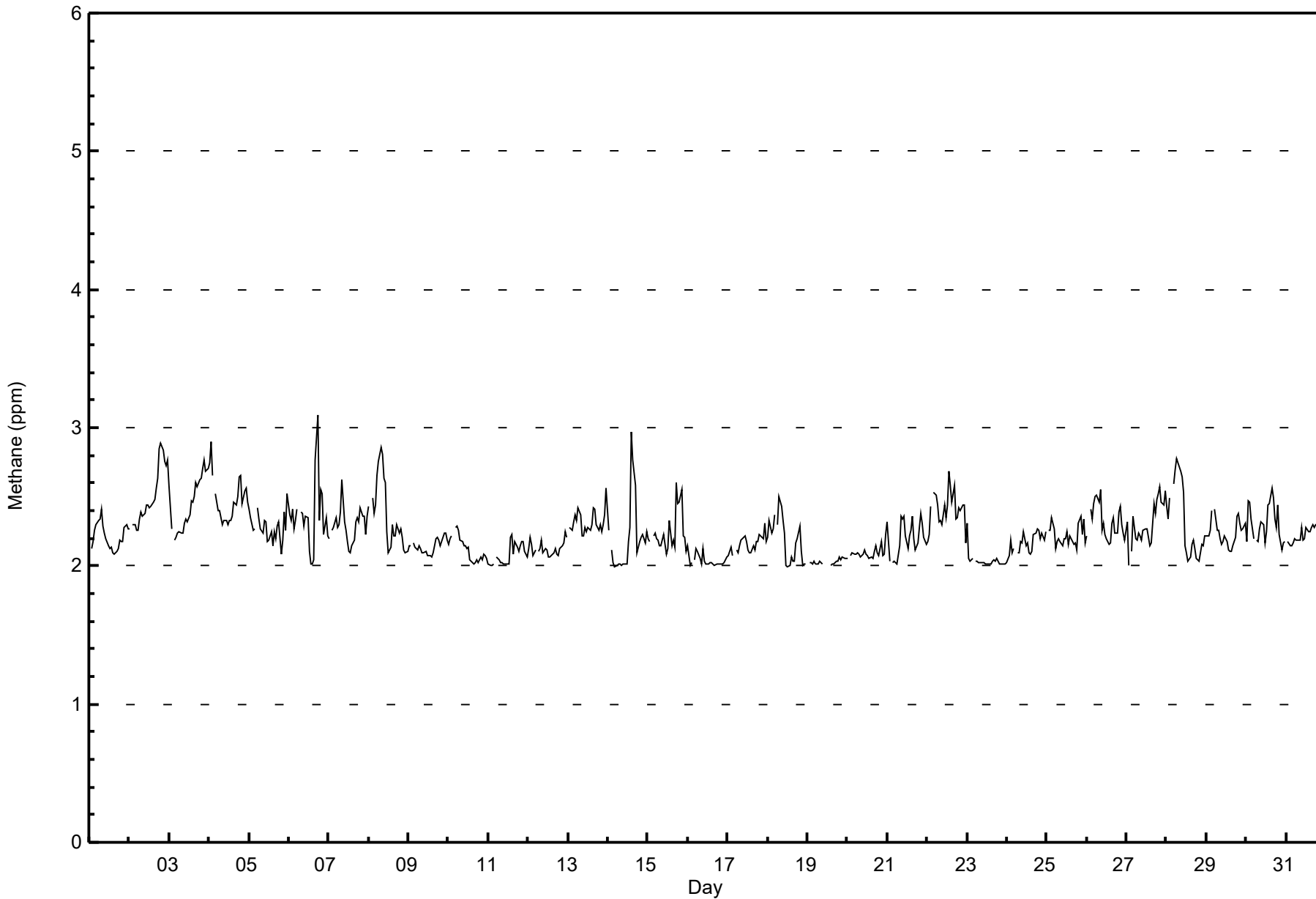
2.3	2.2	2.2	2.2	2.3	2.3	2.2	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.3	2.2	2.3	Diurnal Average
2.7	2.9	2.7	2.4	2.6	2.7	2.8	2.9	2.8	2.6	2.6	2.4	2.4	2.7	3.0	2.8	2.8	3.1	2.8	2.9	2.8	2.8	2.7	2.8	2.2	2.8	2.2	Diurnal Maximum

Z - zerospan C - Calibration



Wood Buffalo Environmental Association
Hourly Averages

Methane (CH₄) - ppm
Lower Camp - December 2023





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Methane (CH₄) - ppm
Lower Camp - December 2023

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	100	14.10	14.10
2.1 - 3.0	608	85.75	99.86
3.1 - 10.0	1	0.14	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 709

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Methane (CH₄) - ppm
Lower Camp - December 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	4	3	1	0	3	3	0	0	0	1	18	36	10	8	5	8	100
2.1 - 3.0	4	3	0	2	13	365	91	16	7	6	5	13	24	31	21	7	608
3.1 - 10.0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	8	6	1	2	16	368	91	16	8	7	23	49	34	39	26	15	709

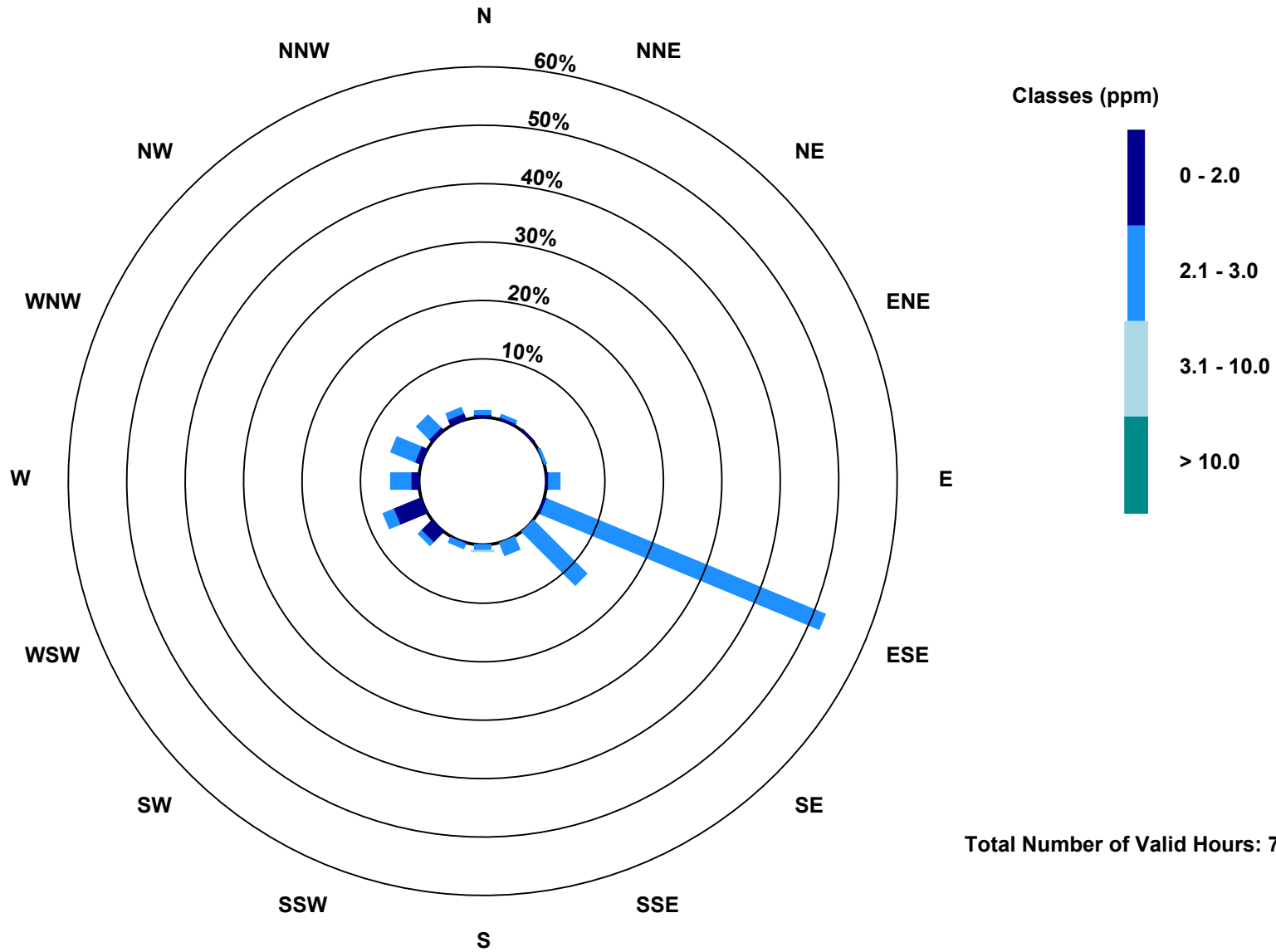
Total Number of Valid Hours: 709

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Dec 2023

Methane (CH₄) - ppm
Lower Camp



Total Number of Valid Hours: 709

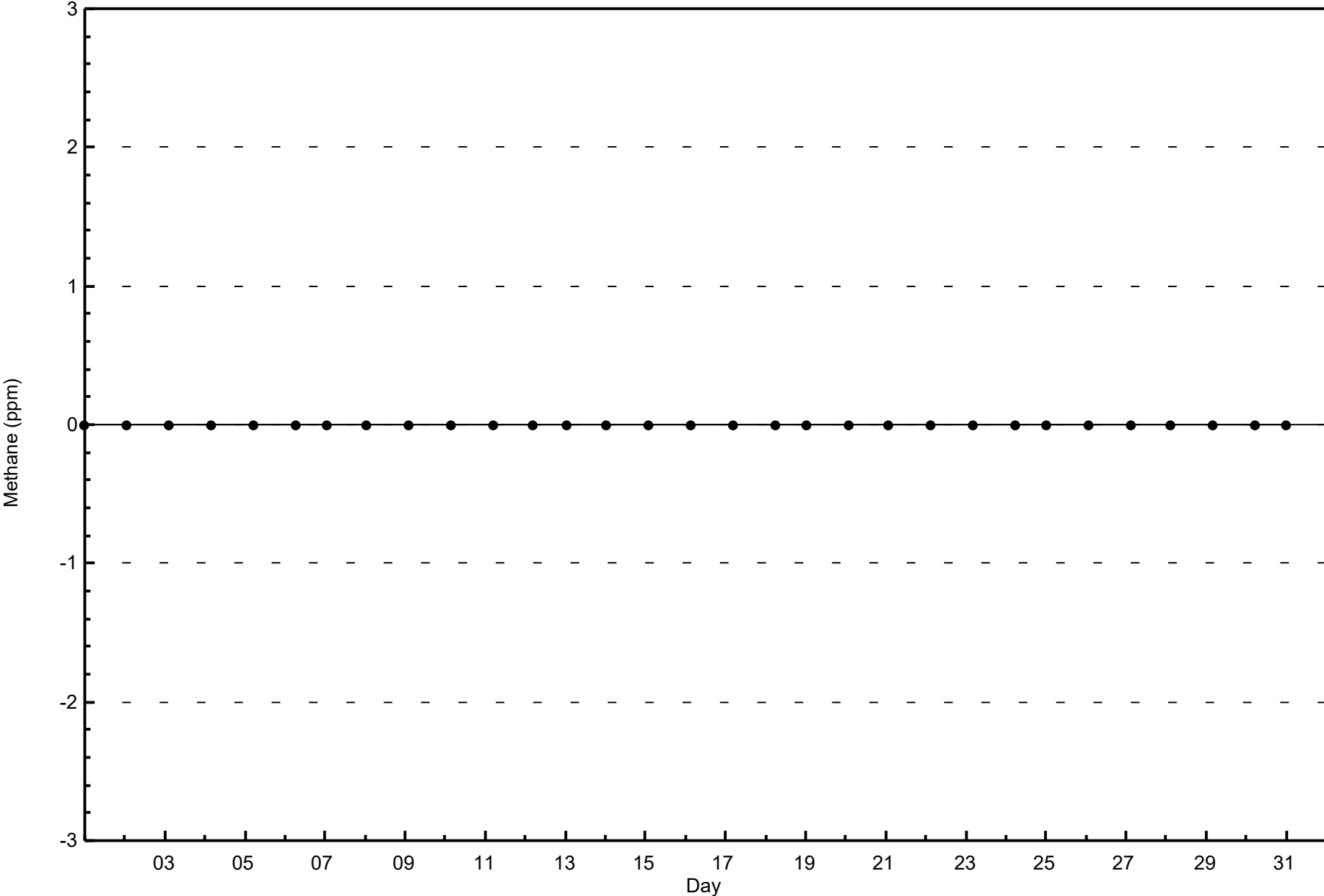


Wood Buffalo Environmental Association

Zero Responses

Methane (CH₄) - ppm

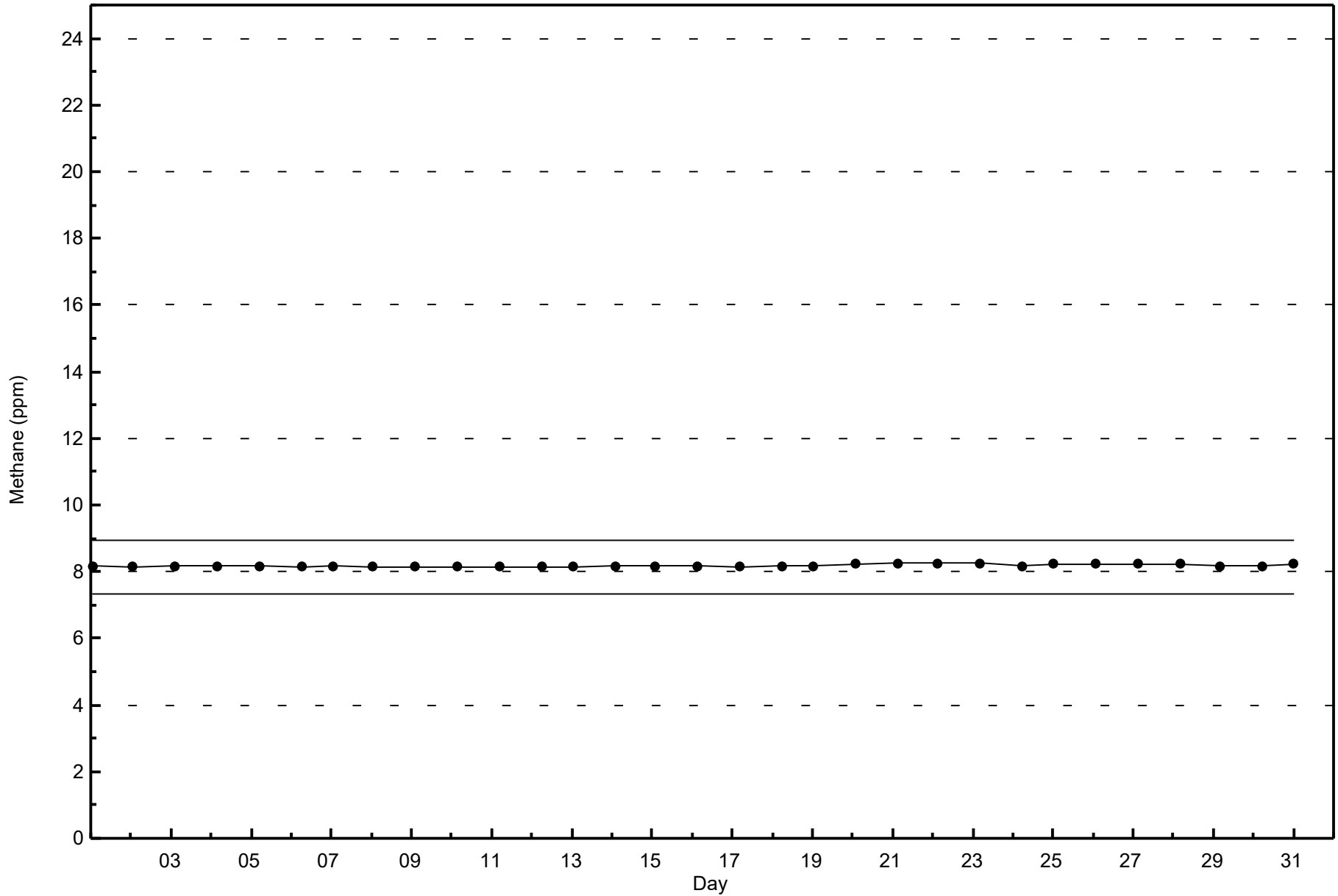
Lower Camp - December 2023





Wood Buffalo Environmental Association
Span Responses

Methane (CH₄) - ppm
Lower Camp - December 2023



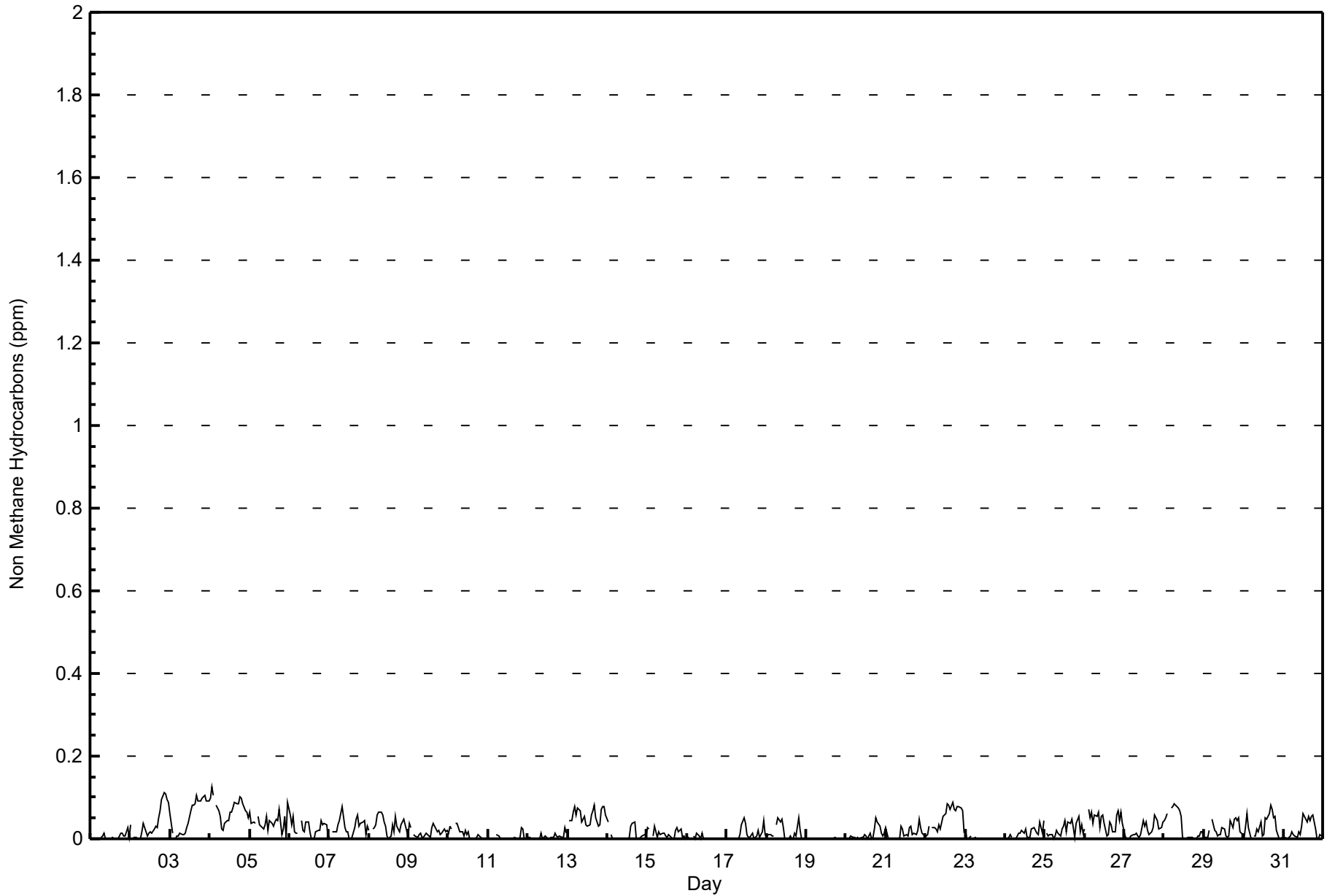


Maximum Value: 0.126 ppm on Dec 4 02:00		Maximum Daily Average: 0.071 ppm on Dec 4		Hours in Service: 744																							
Minimum Value: 0.000 ppm on Dec 1 02:00		Minimum Daily Average: 0.000 ppm on Dec 19		Hours of Data: 709																							
Maximum Diurnal Average: 0.032 ppm at hour 20		Minimum Diurnal Average: 0.012 ppm at hour 4		Hours of Missing Data: 35																							
Monthly Average: 0.023 ppm		Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.0 Median = 0.0 Q ₃ = 0.0 P ₉₀ = 0.1 P ₉₉ = 0.1		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-Dec	Z	0.000	0.000	0.000	0.000	0.001	0.002	0.006	0.014	0.001	0.000	0.000	0.000	0.004	0.001	0.001	0.001	0.006	0.014	0.014	0.005	0.005	0.028	0.004	0.005	0.028	
2-Dec	0.036	Z	0.003	0.003	0.000	0.000	0.001	0.017	0.037	0.018	0.008	0.015	0.017	0.014	0.023	0.030	0.026	0.052	0.068	0.094	0.112	0.109	0.096	0.089	0.038	0.112	
3-Dec	0.062	0.013	Z	0.001	0.007	0.006	0.013	0.011	0.011	0.014	0.028	0.036	0.068	0.082	0.082	0.086	0.106	0.090	0.092	0.100	0.102	0.105	0.090	0.093	0.056	0.106	
4-Dec	0.098	0.126	0.106	Z	0.081	0.067	0.055	0.024	0.022	0.038	0.044	0.045	0.065	0.064	0.075	0.088	0.085	0.085	0.102	0.099	0.083	0.069	0.066	0.050	0.071	0.126	
5-Dec	0.066	0.037	0.041	0.036	Z	0.054	0.033	0.032	0.023	0.033	0.053	0.021	0.045	0.038	0.031	0.039	0.048	0.044	0.070	0.011	0.023	0.056	0.005	0.088	0.040	0.088	
6-Dec	0.056	0.034	0.053	0.017	0.012	0.014	Z	0.043	0.019	0.018	0.041	0.042	0.016	0.000	0.000	0.000	0.016	0.021	0.020	0.045	0.035	0.037	0.033	0.002	0.025	0.056	
7-Dec	0.006	Z	0.018	0.017	0.018	0.033	0.043	0.062	0.077	0.028	0.017	0.018	0.000	0.001	0.004	0.028	0.048	0.059	0.029	0.037	0.042	0.045	0.010	0.031	0.029	0.077	
8-Dec	0.020	Z	0.024	0.026	0.035	0.058	0.063	0.064	0.059	0.041	0.029	0.008	0.000	0.007	0.035	0.018	0.053	0.031	0.018	0.035	0.040	0.046	0.034	0.006	0.033	0.064	
9-Dec	0.037	0.026	Z	0.009	0.007	0.002	0.009	0.014	0.003	0.003	0.013	0.011	0.008	0.005	0.027	0.039	0.023	0.016	0.020	0.009	0.014	0.025	0.016	0.019	0.015	0.039	
10-Dec	0.013	0.029	0.025	Z	0.036	0.036	0.029	0.018	0.016	0.007	0.020	0.012	0.015	0.000	0.000	0.000	0.000	0.004	0.011	0.004	0.000	0.000	0.000	0.000	0.012	0.036	
11-Dec	0.000	0.000	0.000	0.000	Z	0.012	0.007	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.003	0.001	0.001	0.003	0.027	0.023	0.002	0.000	0.000	0.004	0.027	
12-Dec	0.002	0.005	0.000	0.000	0.000	Z	0.000	0.000	0.013	0.000	0.006	0.003	0.000	0.000	0.004	0.004	0.013	0.006	0.002	0.006	0.004	0.005	0.027	0.014	0.005	0.027	
13-Dec	Z	0.043	0.045	0.063	0.079	0.059	0.076	0.069	0.041	0.049	0.054	0.035	0.031	0.035	0.057	0.069	0.081	0.052	0.029	0.033	0.072	0.076	0.077	0.056	0.056	0.081	
14-Dec	0.041	Z	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.004	0.032	0.037	0.042	0.000	0.000	0.000	0.004	0.007	0.011	0.006	0.009	0.009	0.042	
15-Dec	0.027	0.023	Z	0.007	0.030	0.019	0.004	0.017	0.011	0.013	0.014	0.008	0.005	0.011	0.002	0.001	0.001	0.022	0.027	0.016	0.022	0.002	0.006	0.000	0.013	0.030	
16-Dec	0.008	0.000	0.000	Z	0.008	0.001	0.015	0.006	0.000	0.012	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.015	
17-Dec	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.001	0.010	0.034	0.050	0.038	0.011	0.003	0.002	0.014	0.001	0.004	0.008	0.020	0.003	0.019	0.046	0.009	0.012	0.050	
18-Dec	0.004	0.011	0.009	0.006	0.007	Z	0.035	0.050	0.040	0.048	0.027	0.000	0.000	0.000	0.006	0.000	0.000	0.013	0.007	0.050	0.019	0.000	0.000	0.000	0.015	0.050	
19-Dec	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	0.000	0.000	0.002	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.005	
20-Dec	0.000	Z	0.001	0.008	0.003	0.003	0.000	0.003	0.002	0.002	0.005	0.010	0.008	0.000	0.013	0.001	0.004	0.024	0.051	0.039	0.029	0.015	0.007	0.013	0.011	0.051	
21-Dec	0.027	0.000	Z	0.000	0.000	0.000	0.000	0.001	0.002	0.032	0.025	0.006	0.009	0.007	0.026	0.030	0.010	0.014	0.012	0.020	0.047	0.027	0.015	0.007	0.014	0.047	
22-Dec	0.008	0.011	0.030	Z	0.026	0.027	0.023	0.018	0.034	0.024	0.055	0.058	0.061	0.084	0.082	0.072	0.088	0.072	0.069	0.078	0.076	0.073	0.068	0.017	0.050	0.088	
23-Dec	0.019	0.000	0.000	0.008	Z	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	0.001	0.019	
24-Dec	0.000	0.000	0.004	0.009	0.003	Z	0.001	0.007	0.012	0.014	0.021	0.013	0.023	0.003	0.002	0.002	0.023	0.026	0.022	0.015	0.010	0.041	0.013	0.045	0.013	0.045	
25-Dec	Z	0.015	0.007	0.011	0.010	0.000	0.008	0.020	0.013	0.008	0.024	0.031	0.045	0.016	0.041	0.036	0.047	0.028	0.003	0.036	0.054	0.016	0.034	0.014	0.022	0.054	
26-Dec	0.025	Z	0.070	0.050	0.064	0.039	0.057	0.056	0.066	0.028	0.054	0.057	0.036	0.006	0.009	0.041	0.036	0.018	0.017	0.059	0.067	0.044	0.063	0.038	0.043	0.070	
27-Dec	0.006	0.000	Z	0.001	0.007	0.011	0.011	0.014	0.005	0.003	0.012	0.045	0.029	0.041	0.022	0.010	0.019	0.026	0.056	0.052	0.043	0.022	0.026	0.042	0.022	0.056	
28-Dec	0.045	0.050	0.062	Z	0.074	0.079	0.084	0.081	0.074	0.068	0.056	0.002	0.002	0.000	0.002	0.005	0.005	0.003	0.000	0.000	0.005	0.006	0.017	0.017	0.032	0.084	
29-Dec	0.004	0.003	0.004	0.020	Z	0.048	0.022	0.016	0.007	0.010	0.011	0.028	0.023	0.006	0.004	0.006	0.043	0.029	0.048	0.052	0.044	0.050	0.016	0.011	0.022	0.052	
30-Dec	0.004	0.032	0.061	0.027	0.001	Z	0.005	0.007	0.023	0.018	0.042	0.008	0.010	0.052	0.048	0.061	0.082	0.070	0.050	0.055	0.019	0.002	0.001	0.003	0.030	0.082	
31-Dec	Z	0.002	0.002	0.005	0.007	0.016	0.009	0.008	0.005	0.018	0.011	0.031	0.062	0.046	0.039	0.056	0.045	0.053	0.057	0.024	0.000	0.000	0.009	0.006	0.022	0.062	
		0.024	0.018	0.022	0.012	0.020	0.022	0.020	0.021	0.021	0.019	0.024	0.019	0.020	0.018	0.022	0.025	0.031	0.028	0.029	0.032	0.032	0.030	0.026	0.022	Diurnal Average	
		0.098	0.126	0.106	0.063	0.081	0.079	0.084	0.081	0.077	0.068	0.056	0.058	0.068	0.084	0.082	0.088	0.106	0.090	0.102	0.100	0.112	0.109	0.096	0.093	Diurnal Maximum	
Z - zerospan		C - Calibration																									



Wood Buffalo Environmental Association
Hourly Averages

Non Methane Hydrocarbons (NMHC) - ppm
Lower Camp - December 2023





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Non Methane Hydrocarbons (NMHC) - ppm
Lower Camp - December 2023

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 0.005	243	34.27	34.27
0.006 - 0.05	369	52.05	86.32
0.06 - 0.1	97	13.68	100.00
> 0.1	0	0.00	100.00

Total Number of Valid Hours: 709

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Non Methane Hydrocarbons (NMHC) - ppm
Lower Camp - December 2023**

Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 0.005	8	3	1	2	6	87	20	3	2	5	18	39	11	18	9	11	243
0.006 - 0.05	0	0	0	0	9	228	58	12	5	2	5	9	18	15	6	2	369
0.06 - 0.1	0	3	0	0	1	53	13	1	1	0	0	1	5	6	11	2	97
> 0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	8	6	1	2	16	368	91	16	8	7	23	49	34	39	26	15	709

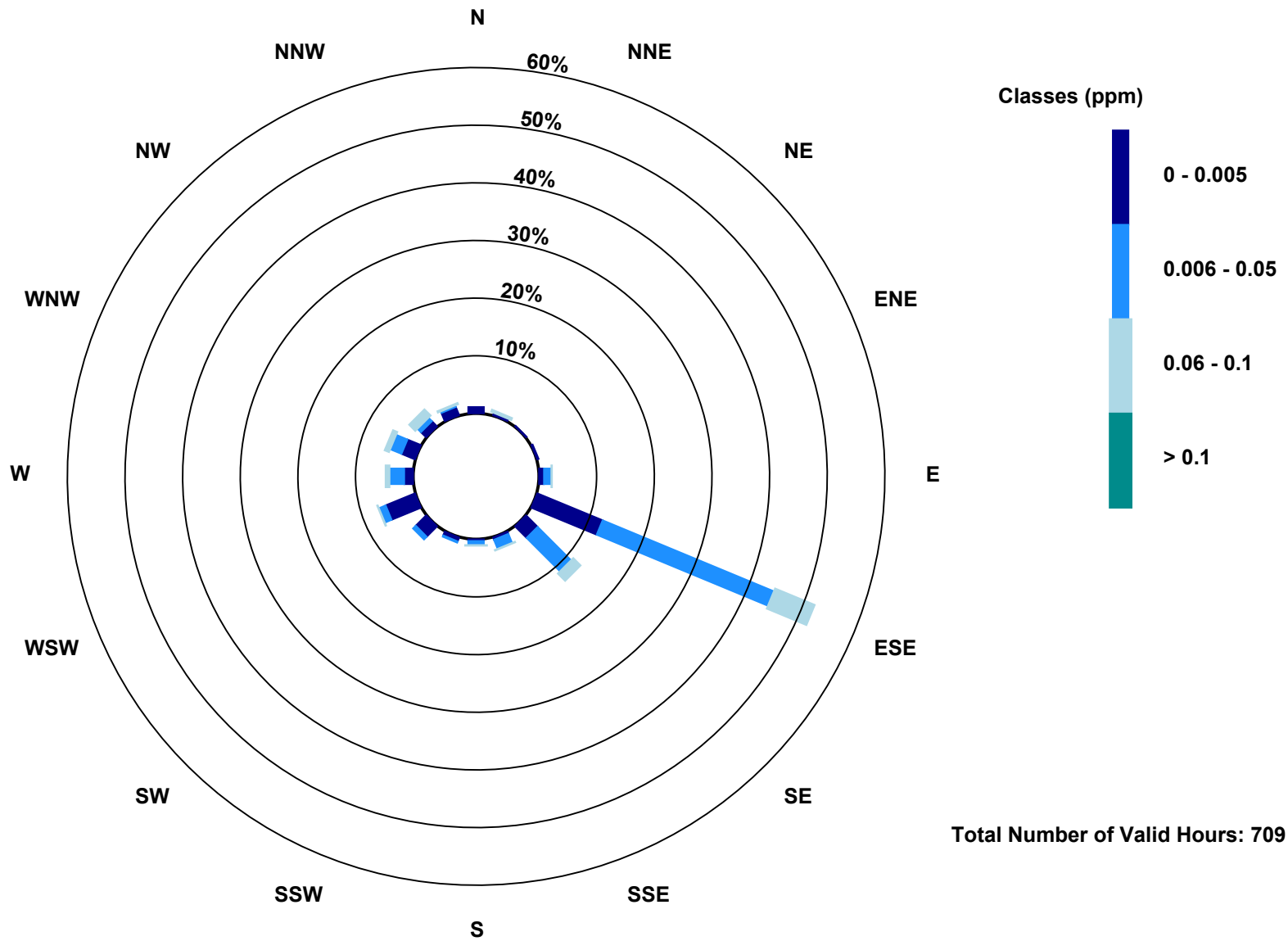
Total Number of Valid Hours: 709

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Dec 2023

Non Methane Hydrocarbons (NMHC) - ppm
Lower Camp



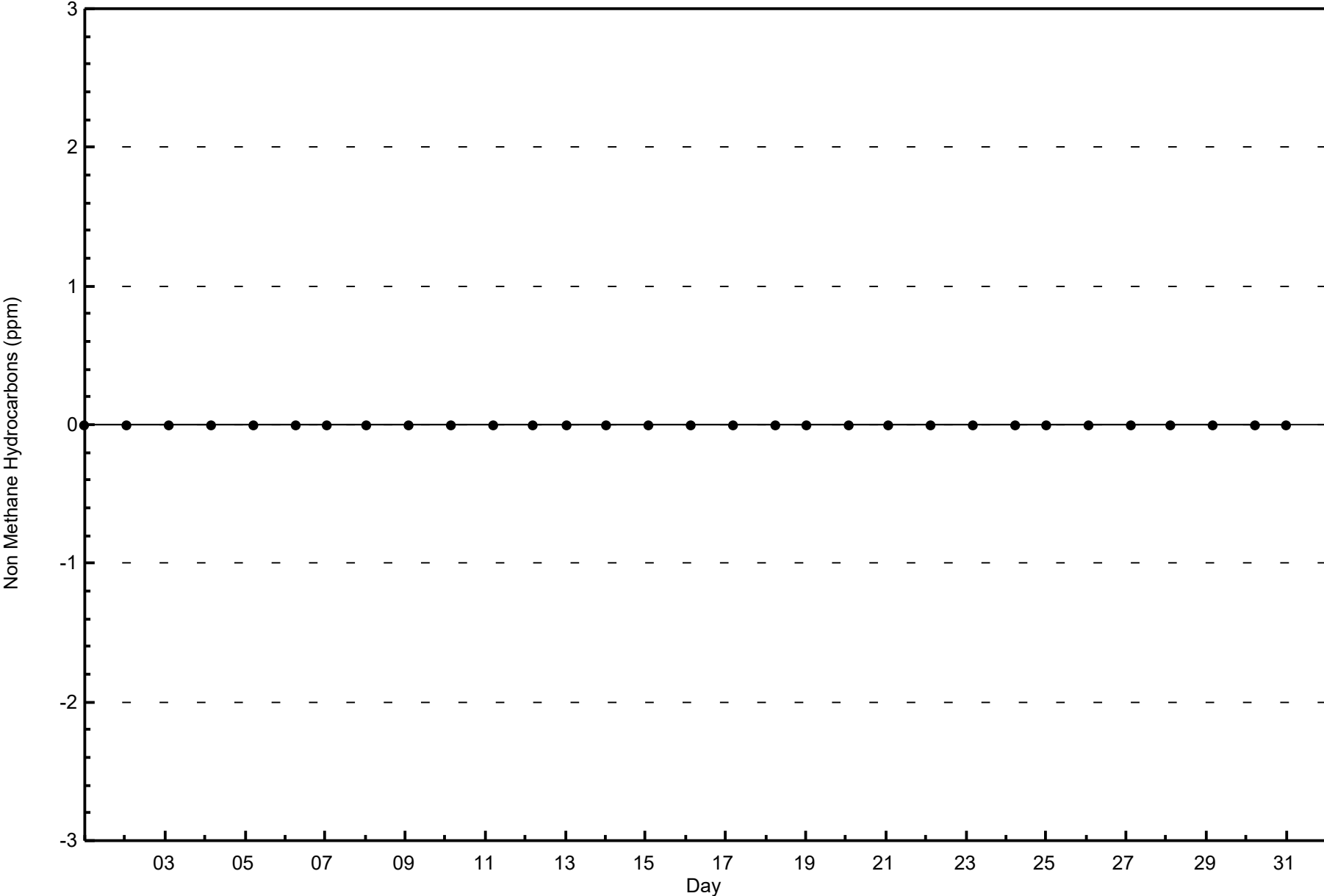


Wood Buffalo Environmental Association

Zero Responses

Non Methane Hydrocarbons (NMHC) - ppm

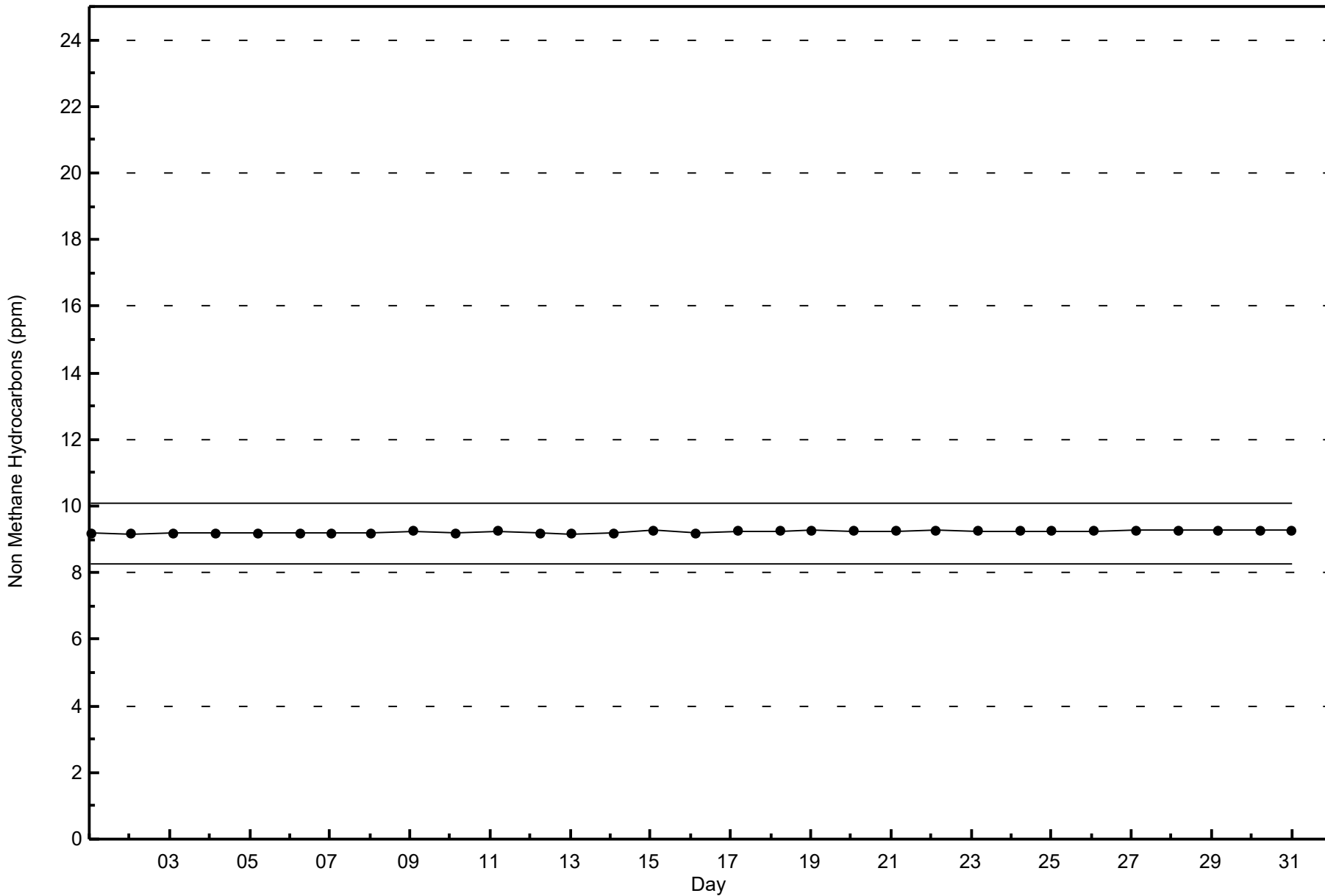
Lower Camp - December 2023





Wood Buffalo Environmental Association
Span Responses

Non Methane Hydrocarbons (NMHC) - ppm
Lower Camp - December 2023





Wood Buffalo Environmental Association
Summary of Hour Averages

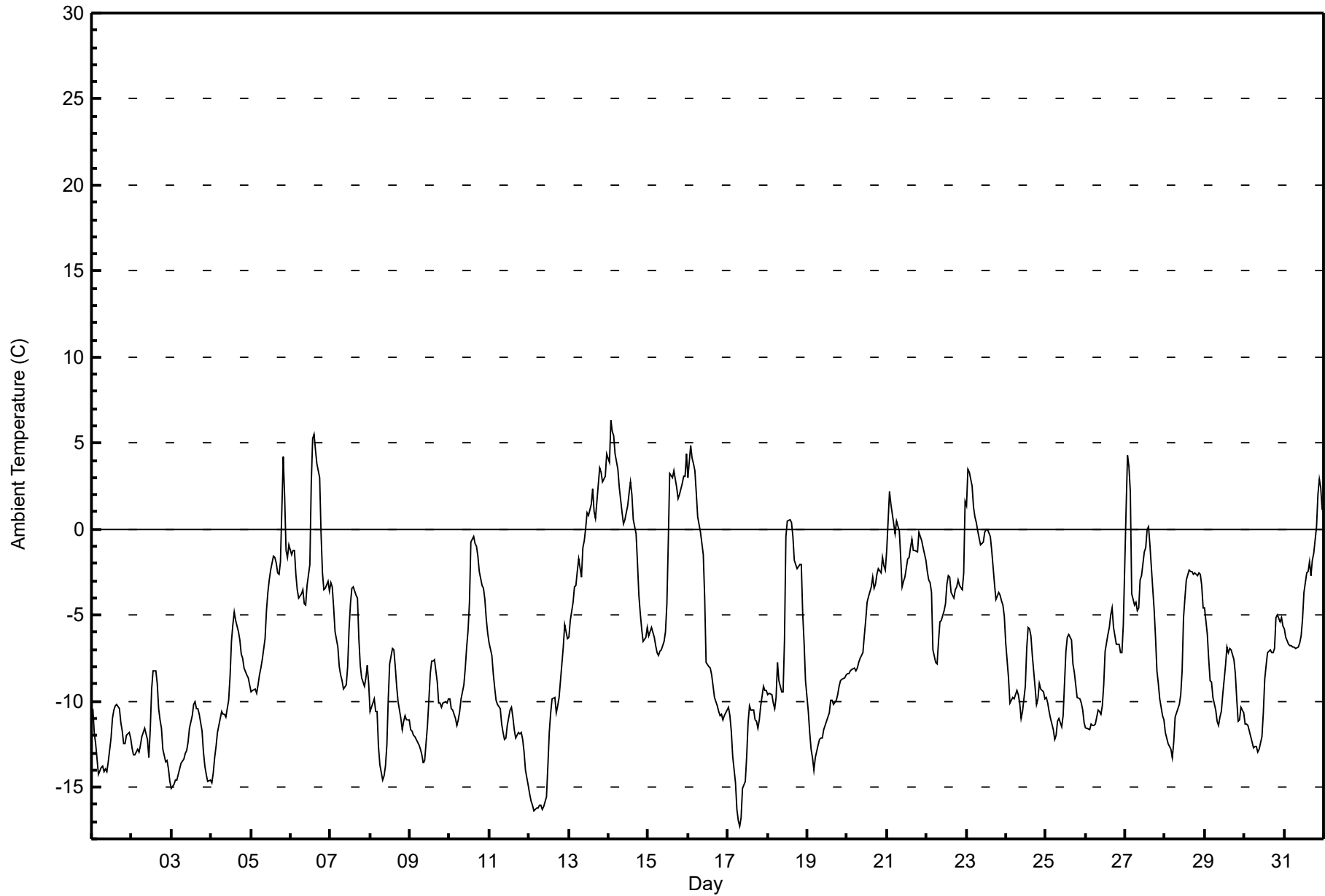
Ambient Temperature (AT) - C
Lower Camp - December 2023

Maximum Value: 6.4 C on Dec 14 02:00 Maximum Daily Average: 0.4 C on Dec 14 Minimum Value: -17.3 C on Dec 17 08:00 Minimum Daily Average: -12.9 C on Dec 3 Maximum Diurnal Average: -4.3 C at hour 15 Minimum Diurnal Average: -8.8 C at hour 9 Monthly Average: -6.93 C Percentiles: P ₁ = -16.2 P ₁₀ = -12.8 Q ₁ = -10.9 Median = -7.9 Q ₃ = -3.0 P ₉₀ = 0.4 P ₉₉ = 4.4																								Hours in Service:	744		
																								Hours of Data:	744		
																								Hours of Missing Data:	0		
																								Hours of Calibration:	0		
																								Percent Operational Time:	100.0		
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Dec	-10.4	-11.9	-12.4	-13.4	-14.2	-13.8	-13.8	-14.1	-13.9	-14.1	-13.5	-12.1	-11.0	-10.5	-10.2	-10.2	-10.5	-11.3	-11.7	-12.5	-12.5	-12.0	-11.8	-12.2	-12.3	-10.2	
2-Dec	-12.7	-13.1	-13.1	-12.8	-13.0	-12.5	-12.1	-11.8	-11.6	-12.2	-13.3	-11.7	-9.3	-8.2	-8.2	-9.0	-10.5	-11.1	-11.6	-12.8	-13.5	-13.5	-14.0	-14.7	-11.9	-8.2	
3-Dec	-15.1	-14.8	-14.6	-14.5	-14.2	-13.9	-13.6	-13.4	-13.0	-12.9	-12.4	-11.6	-10.8	-10.2	-10.0	-10.4	-10.5	-10.8	-11.7	-12.9	-13.8	-14.3	-14.6	-14.6	-12.9	-10.0	
4-Dec	-14.8	-14.2	-13.3	-12.6	-11.8	-11.0	-10.6	-10.8	-10.7	-10.9	-9.9	-8.6	-6.5	-5.5	-4.8	-5.3	-6.0	-6.5	-7.3	-7.5	-8.1	-8.5	-8.7	-9.0	-9.3	-4.8	
5-Dec	-9.4	-9.4	-9.3	-9.5	-9.1	-8.5	-8.0	-7.6	-6.4	-4.7	-3.6	-2.9	-2.4	-1.5	-1.7	-2.0	-2.5	-2.6	-1.9	4.2	1.8	-1.2	-1.6	-0.9	-4.2	4.2	
6-Dec	-1.5	-1.3	-1.2	-2.6	-3.6	-4.0	-3.8	-3.5	-4.3	-4.4	-3.3	-2.0	2.6	5.2	5.5	4.6	3.8	3.0	-0.3	-2.5	-3.5	-3.4	-3.0	-3.6	-1.1	5.5	
7-Dec	-3.1	-3.4	-4.6	-6.0	-6.8	-8.0	-8.5	-8.8	-9.3	-9.1	-8.0	-5.8	-4.3	-3.5	-3.3	-3.8	-4.0	-6.4	-7.9	-8.7	-9.1	-8.6	-7.9	-9.0	-6.6	-3.1	
8-Dec	-10.6	-10.4	-9.9	-10.6	-10.6	-12.6	-13.7	-14.5	-14.3	-13.8	-12.6	-9.9	-7.8	-6.9	-7.0	-8.0	-9.1	-10.0	-11.0	-11.7	-11.2	-10.9	-11.1	-11.1	-10.8	-6.9	
9-Dec	-11.7	-11.7	-11.9	-12.1	-12.2	-12.6	-12.8	-13.1	-13.6	-13.4	-11.4	-10.0	-8.4	-7.6	-7.7	-7.6	-8.9	-10.1	-10.1	-10.3	-10.1	-10.0	-10.1	-9.8	-10.7	-7.6	
10-Dec	-9.9	-10.4	-10.5	-11.0	-11.4	-11.1	-10.6	-9.9	-9.0	-8.1	-6.8	-5.9	-4.2	-0.8	-0.4	-0.8	-1.0	-1.6	-2.5	-3.3	-3.4	-4.1	-5.2	-6.1	-6.2	-0.4	
11-Dec	-6.6	-7.3	-8.4	-9.2	-10.0	-10.2	-10.5	-11.3	-11.8	-12.3	-12.2	-11.4	-10.5	-10.4	-10.9	-11.6	-12.2	-11.8	-11.9	-11.8	-12.2	-12.9	-14.0	-14.9	-11.1	-6.6	
12-Dec	-15.4	-15.8	-16.0	-16.4	-16.2	-16.2	-16.0	-16.1	-16.3	-16.1	-15.5	-13.7	-11.9	-10.7	-9.9	-9.8	-10.7	-10.3	-9.8	-8.8	-6.9	-5.5	-6.0	-6.3	-12.3	-5.5	
13-Dec	-6.3	-5.3	-4.3	-3.3	-3.3	-2.4	-1.7	-2.8	-1.1	-0.7	0.1	0.9	0.8	1.5	2.3	1.0	0.6	1.6	3.5	3.4	2.7	2.9	3.1	4.3	-0.1	4.3	
14-Dec	3.9	6.4	5.6	5.4	4.4	3.4	2.4	1.7	1.0	0.3	0.5	1.3	2.1	2.8	2.0	0.6	-0.3	-1.9	-3.8	-4.9	-5.8	-6.6	-6.3	-5.8	0.4	6.4	
15-Dec	-6.2	-5.9	-5.7	-6.3	-6.8	-7.2	-7.4	-7.1	-7.0	-6.6	-5.9	-4.3	-0.8	3.3	3.0	3.4	2.9	2.4	1.7	2.0	2.6	3.1	3.1	4.4	-1.9	4.4	
16-Dec	3.0	4.9	4.1	3.8	3.4	2.1	0.7	-0.2	-0.8	-1.5	-4.0	-7.7	-8.0	-8.0	-8.4	-9.1	-9.8	-10.3	-10.6	-10.8	-10.8	-11.0	-10.9	-10.5	-4.6	4.9	
17-Dec	-10.3	-10.9	-11.8	-13.2	-14.8	-16.3	-16.9	-17.3	-16.8	-15.1	-14.7	-13.2	-11.2	-10.3	-10.6	-10.5	-11.1	-11.2	-11.6	-11.1	-10.3	-9.2	-9.3	-9.4	-12.4	-9.2	
18-Dec	-9.6	-9.6	-9.6	-10.1	-10.5	-9.8	-7.7	-8.8	-9.5	-9.5	-6.5	-0.4	0.4	0.6	0.4	-0.4	-1.8	-2.1	-2.3	-2.1	-2.1	-4.9	-6.6	-8.8	-5.5	0.6	
19-Dec	-10.6	-11.8	-12.8	-13.3	-14.0	-13.3	-12.5	-12.2	-12.1	-12.1	-11.6	-11.2	-11.0	-10.7	-10.0	-9.9	-10.2	-9.9	-9.6	-9.2	-8.8	-8.7	-8.6	-8.4	-10.9	-8.4	
20-Dec	-8.4	-8.4	-8.2	-8.2	-8.1	-8.2	-8.1	-7.7	-7.5	-7.2	-6.2	-5.3	-4.2	-3.9	-3.3	-2.8	-3.5	-3.2	-2.6	-2.3	-2.5	-1.6	-2.1	-2.4	-5.3	-1.6	
21-Dec	-1.3	2.2	1.5	0.9	0.3	-0.3	0.4	-0.1	-1.6	-3.3	-3.0	-2.8	-1.8	-1.7	-1.1	-0.6	-1.2	-1.2	-1.3	-0.2	-0.4	-0.7	-1.1	-1.8	-0.8	2.2	
22-Dec	-2.4	-2.9	-3.1	-3.7	-7.0	-7.8	-7.9	-6.5	-5.4	-5.3	-4.8	-4.3	-3.2	-2.7	-2.8	-3.7	-4.0	-3.5	-3.4	-2.9	-3.2	-3.5	-2.6	1.6	-4.0	1.6	
23-Dec	1.4	3.5	3.3	2.5	1.3	0.7	0.3	-0.1	-0.9	-0.8	-0.8	-0.2	0.0	0.0	-0.4	-1.2	-2.2	-3.2	-4.1	-3.7	-3.9	-4.2	-4.4	-5.1	-0.9	3.5	
24-Dec	-6.6	-8.6	-10.1	-9.9	-9.8	-9.9	-9.4	-9.6	-10.1	-11.0	-10.6	-9.1	-7.0	-5.7	-5.8	-6.2	-7.3	-9.2	-10.2	-9.9	-8.9	-9.3	-9.4	-9.9	-8.9	-5.7	
25-Dec	-9.8	-10.1	-10.6	-11.0	-11.7	-12.2	-12.0	-11.1	-11.0	-11.5	-10.8	-8.9	-7.1	-6.3	-6.1	-6.5	-7.8	-8.3	-9.1	-9.8	-9.9	-10.1	-10.5	-11.2	-9.7	-6.1	
26-Dec	-11.5	-11.6	-11.7	-11.4	-11.4	-11.4	-11.3	-10.5	-10.6	-10.7	-10.3	-9.1	-7.1	-6.1	-5.7	-5.0	-4.6	-5.7	-6.7	-6.7	-6.7	-7.2	-7.2	-5.6	-8.6	-4.6	
27-Dec	1.2	4.3	3.6	2.2	-3.7	-4.4	-4.2	-4.8	-4.6	-3.0	-2.7	-1.3	-1.0	0.0	0.1	-1.0	-3.5	-4.7	-6.3	-8.2	-8.9	-9.9	-10.8	-11.1	-3.4	4.3	
28-Dec	-11.8	-12.1	-12.4	-12.8	-13.3	-12.4	-11.0	-10.7	-10.2	-9.6	-8.2	-5.2	-4.0	-3.0	-2.4	-2.5	-2.4	-2.6	-2.5	-2.7	-2.5	-2.6	-3.2	-4.6	-6.9	-2.4	
29-Dec	-4.6	-6.1	-7.6	-8.8	-8.9	-9.8	-10.5	-11.2	-11.4	-11.0	-10.6	-9.7	-7.9	-6.9	-7.2	-6.9	-7.1	-7.6	-8.4	-9.9	-11.2	-11.1	-10.4	-10.7	-9.0	-4.6	
30-Dec	-11.4	-11.3	-11.4	-11.7	-12.4	-12.7	-12.6	-12.7	-12.9	-12.8	-12.1	-10.7	-8.7	-7.9	-7.2	-7.0	-7.2	-7.2	-7.0	-5.2	-5.0	-5.4	-5.1	-5.6	-9.3	-5.0	
31-Dec	-5.8	-6.2	-6.7	-6.7	-6.7	-6.9	-6.9	-6.9	-6.9	-6.6	-6.2	-5.3	-3.7	-2.6	-2.5	-1.9	-2.7	-1.8	-1.4	0.1	2.0	2.9	2.5	1.1	-3.6	2.9	
																								Diurnal Average			
																								Diurnal Maximum			



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature (AT) - C
Lower Camp - December 2023





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C
Lower Camp - December 2023**

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	662	88.98	88.98
0 - 10	82	11.02	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association
Summary of Hour Averages

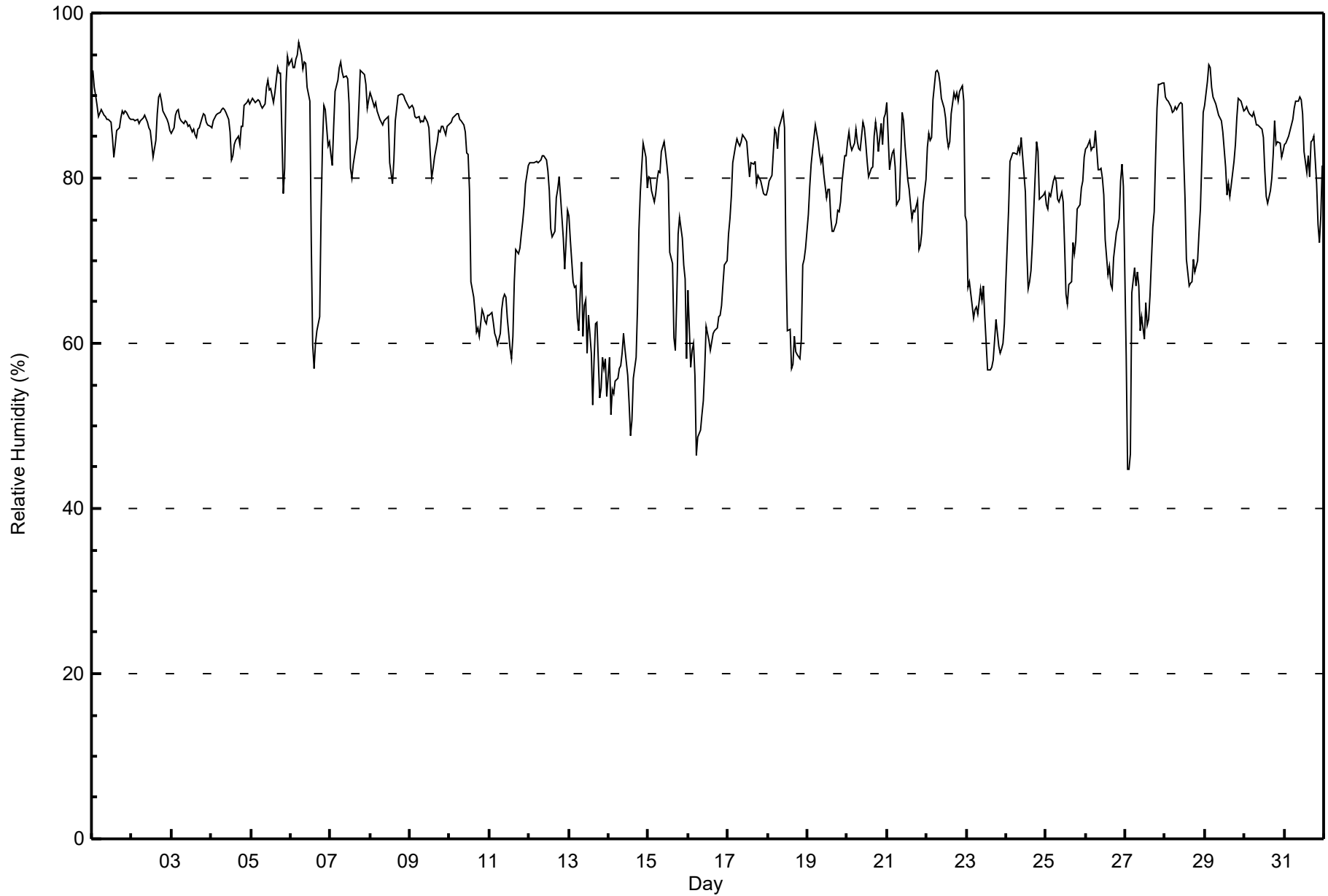
Relative Humidity (RH) - %
Lower Camp - December 2023

Maximum Value: 96.5 % on Dec 6 06:00																								Maximum Daily Average: 89.8 % on Dec 5																								Hours in Service: 744	
Minimum Value: 44.7 % on Dec 27 03:00																								Minimum Daily Average: 59.5 % on Dec 16																								Hours of Data: 744	
Maximum Diurnal Average: 82.0 % at hour 10																								Minimum Diurnal Average: 72.5 % at hour 14																								Hours of Missing Data: 0	
Monthly Average: 78.89 %																								Percentiles: P ₁ = 50.9 P ₁₀ = 61.1 Q ₁ = 72.2 Median = 82.6 Q ₃ = 87.2 P ₉₀ = 89.5 P ₉₉ = 93.9																								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-Dec	93.0	91.1	90.0	88.8	87.4	88.2	88.0	87.6	87.5	87.0	87.2	86.8	84.9	82.5	84.1	85.8	86.2	87.3	88.1	87.9	88.2	88.0	87.4	87.1	87.5	93.0																							
2-Dec	87.1	87.1	87.0	87.1	86.7	87.0	87.1	87.2	87.6	86.8	86.2	85.8	84.2	82.5	84.6	87.9	89.8	90.2	89.3	88.2	87.4	87.1	86.6	85.8	86.9	90.2																							
3-Dec	85.4	86.1	87.7	88.2	88.2	87.4	86.9	86.7	86.9	86.8	86.4	86.4	85.6	86.0	85.3	85.0	86.0	86.2	87.3	87.8	87.6	86.8	86.4	86.2	86.6	88.2																							
4-Dec	86.2	87.0	87.2	87.6	87.8	88.0	88.3	88.4	88.3	87.9	87.2	85.7	82.2	82.7	84.1	84.6	85.1	84.1	86.2	86.2	88.7	89.1	89.5	89.0	86.7	89.5																							
5-Dec	89.3	89.7	89.2	89.4	89.5	89.3	88.9	88.4	89.0	91.1	91.9	90.7	90.9	89.1	90.3	91.8	93.3	92.7	92.7	78.1	81.2	91.5	94.7	93.7	89.8	94.7																							
6-Dec	94.4	93.4	93.4	94.5	95.0	96.5	94.9	93.2	94.0	93.8	91.0	89.3	72.3	59.8	57.0	60.0	61.6	63.2	75.8	84.1	88.8	88.3	83.9	84.5	83.4	96.5																							
7-Dec	82.9	81.5	86.2	90.5	91.9	93.3	94.0	92.8	92.2	92.3	92.1	89.0	81.2	80.1	81.8	83.9	84.9	88.9	93.1	92.9	92.6	91.4	88.5	89.6	88.6	94.0																							
8-Dec	90.3	89.9	88.6	89.1	88.2	87.7	87.2	86.5	86.9	87.2	87.3	87.4	81.8	79.3	82.2	86.9	88.5	90.0	90.1	90.1	90.0	89.5	89.2	88.6	87.6	90.3																							
9-Dec	88.6	88.7	88.4	87.5	87.3	87.5	86.8	86.9	86.8	87.4	86.8	86.1	82.8	80.0	81.2	82.6	84.4	85.8	85.5	86.4	86.3	85.2	86.2	86.5	85.9	88.7																							
10-Dec	86.6	86.8	87.3	87.6	87.8	87.7	87.1	87.0	86.5	85.6	83.1	82.8	78.4	67.5	65.7	63.8	61.4	61.9	60.9	64.1	63.6	62.7	62.3	63.5	75.5	87.8																							
11-Dec	63.3	63.7	62.6	61.1	60.6	59.8	61.1	64.1	65.5	66.0	65.5	63.0	59.3	58.1	60.8	67.4	71.3	70.9	71.5	73.2	74.7	76.6	79.3	81.5	66.7	81.5																							
12-Dec	81.9	81.9	81.9	81.9	82.0	81.9	82.0	82.2	82.7	82.7	82.2	80.8	78.5	73.8	72.8	73.5	77.6	78.6	80.1	77.8	72.8	68.9	72.5	76.0	78.6	82.7																							
13-Dec	75.5	72.6	67.5	66.8	66.9	63.0	61.6	69.9	60.8	64.5	65.2	58.8	63.4	58.8	52.5	58.1	62.5	62.6	53.3	54.5	58.3	57.0	58.1	53.6	61.9	75.5																							
14-Dec	58.3	51.4	54.4	53.9	55.3	55.7	56.9	57.3	58.8	61.2	59.2	56.1	52.7	48.8	50.7	55.7	58.2	64.5	73.8	78.3	81.3	84.2	82.5	78.8	62.0	84.2																							
15-Dec	80.1	80.1	78.4	77.2	78.2	79.9	80.8	80.8	83.3	84.3	83.0	81.5	79.7	71.0	69.7	60.6	59.1	65.3	73.2	75.2	72.7	69.4	67.8	58.1	74.6	84.3																							
16-Dec	66.4	57.1	59.1	60.0	56.0	46.4	48.6	49.5	51.3	53.0	56.9	62.1	60.4	59.1	60.1	61.2	61.5	61.8	63.3	63.4	64.7	67.1	69.5	70.0	59.5	70.0																							
17-Dec	73.2	75.1	77.8	81.8	83.9	84.8	84.2	83.8	84.4	85.3	84.8	84.4	82.2	80.1	81.8	81.6	82.0	79.4	80.4	79.9	79.6	78.1	78.0	78.0	81.0	85.3																							
18-Dec	78.6	79.7	80.4	83.3	86.0	85.5	83.5	86.1	87.3	88.0	86.1	70.4	61.6	61.6	56.9	57.4	60.9	59.0	58.7	58.1	60.5	69.6	70.2	71.5	72.5	88.0																							
19-Dec	75.6	78.9	81.6	83.4	84.9	86.4	84.4	82.9	81.9	82.6	80.6	77.7	78.7	78.6	75.3	73.5	73.6	74.5	76.1	75.9	77.2	79.4	82.8	82.7	79.6	86.4																							
20-Dec	84.4	85.5	84.0	83.5	84.2	86.0	84.4	83.6	83.4	86.8	86.2	84.2	82.1	80.1	81.2	81.4	85.0	86.7	85.4	83.2	86.6	84.1	87.2	87.8	84.5	87.8																							
21-Dec	89.1	81.0	82.3	83.1	83.4	81.3	76.8	77.5	82.6	87.9	86.9	84.0	79.8	78.6	76.8	75.1	76.0	75.9	77.3	71.3	71.9	73.4	77.0	79.9	79.5	89.1																							
22-Dec	83.7	85.4	84.5	84.9	89.5	92.9	93.1	92.8	91.5	89.7	88.5	87.3	84.9	83.7	84.4	87.8	90.4	89.6	90.4	89.3	90.6	91.3	89.2	75.4	88.0	93.1																							
23-Dec	74.7	66.8	67.5	64.6	63.0	64.0	64.3	63.6	66.6	65.3	66.9	63.2	60.0	56.8	56.7	57.0	58.0	60.4	62.8	59.6	58.8	59.3	59.9	62.4	62.6	74.7																							
24-Dec	67.3	76.2	82.1	82.5	83.0	83.0	82.9	83.7	83.0	84.9	82.7	78.4	71.2	66.7	67.5	68.8	72.0	80.3	84.3	83.2	77.5	77.7	78.0	78.4	78.1	84.9																							
25-Dec	76.8	76.3	78.2	77.8	79.6	80.2	79.7	77.5	77.2	78.4	77.1	71.9	65.8	64.7	67.1	67.4	72.2	70.8	72.4	76.2	76.8	78.9	79.6	82.5	75.2	82.5																							
26-Dec	83.6	83.7	84.7	83.5	83.7	83.8	85.8	81.0	81.0	81.2	80.1	78.0	72.6	68.4	69.3	67.2	66.6	70.3	73.4	74.1	75.1	79.6	81.6	79.0	77.8	85.8																							
27-Dec	58.5	44.8	44.7	46.6	66.1	69.1	66.9	68.6	67.0	61.5	63.2	60.6	64.9	62.2	62.9	65.8	74.1	75.9	82.5	88.5	91.3	91.3	91.5	91.6	69.2	91.6																							
28-Dec	89.8	89.5	89.3	88.7	88.0	88.2	88.7	88.3	89.0	89.2	89.1	82.8	77.6	70.2	67.0	67.4	67.5	70.1	68.7	70.1	73.4	76.3	82.0	87.9	80.8	89.8																							
29-Dec	88.8	91.8	93.7	93.4	91.0	89.9	88.9	88.2	87.7	87.4	87.0	85.5	81.3	78.0	79.4	77.9	79.1	82.1	84.0	87.2	89.7	89.5	89.4	88.2	86.6	93.7																							
30-Dec	88.3	88.6	88.1	87.7	87.5	87.9	87.4	86.5	86.4	86.2	85.9	84.9	80.9	77.8	77.0	78.5	80.0	82.9	87.0	84.0	84.5	84.2	82.6	83.2	84.5	88.6																							
31-Dec	84.0	84.3	85.0	85.8	86.4	87.1	88.4	89.3	89.4	89.8	89.5	87.8	83.3	80.6	82.8	80.2	84.5	84.6	85.0	79.3	74.4	72.3	75.4	81.6	83.8	89.8																							
80.8 79.9 80.4 80.7 81.6 81.6 81.3 81.4 81.5 82.0 81.5 79.1 75.6 72.5 72.5 73.4 75.3 76.7 78.5 78.3 78.9 79.6 80.3 80.1																								Diurnal Average																									
94.4 93.4 93.7 94.5 95.0 96.5 94.9 93.2 94.0 93.8 92.1 90.7 90.9 89.1 90.3 91.8 93.3 92.7 93.1 92.9 92.6 91.5 94.7 93.7																								Diurnal Maximum																									



Wood Buffalo Environmental Association
Hourly Averages

Relative Humidity (RH) - %
Lower Camp - December 2023





Wood Buffalo Environmental Association

Summary of Hour Averages

Barometric Pressure (BP) - inHg

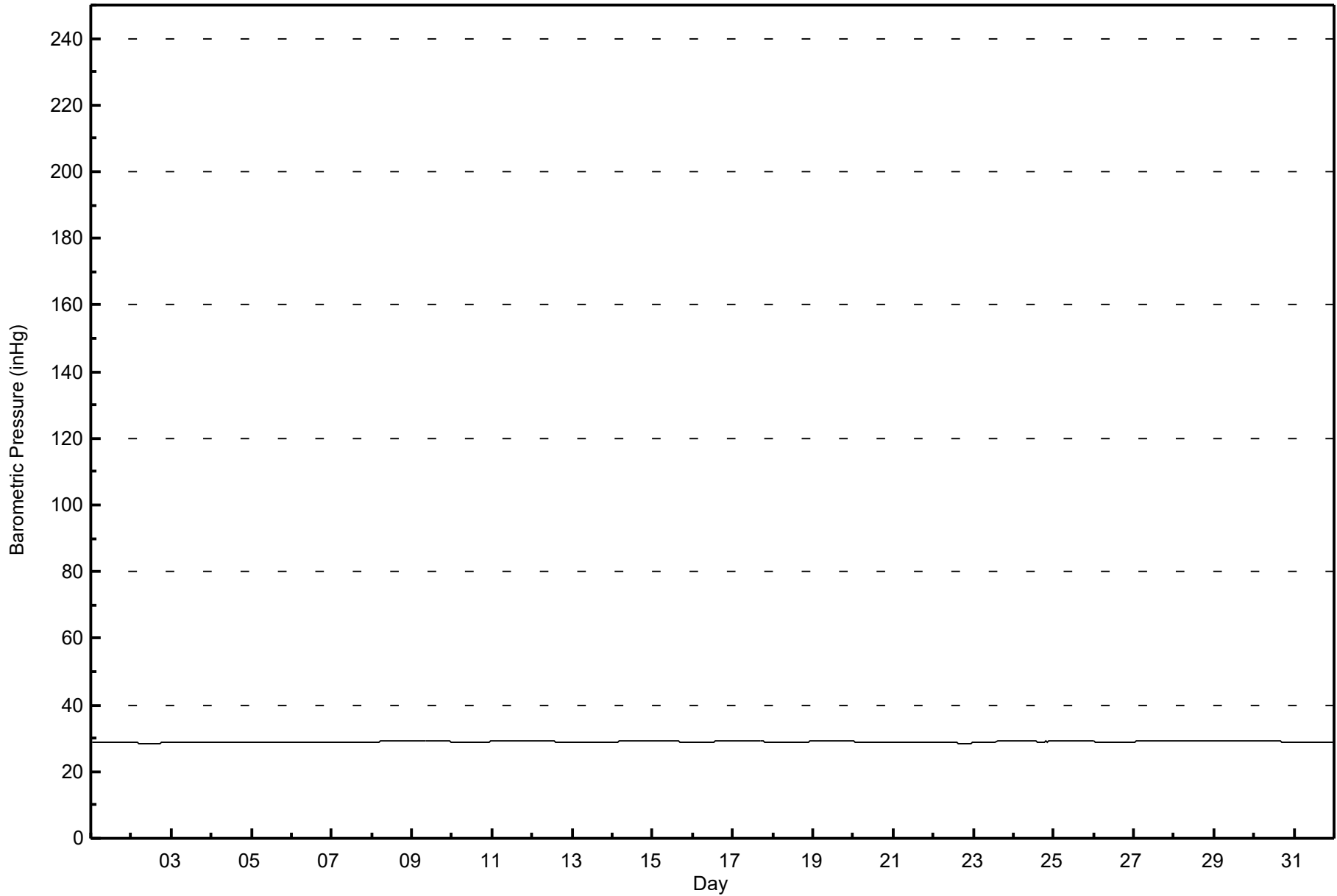
Lower Camp - December 2023

Maximum Value: 29.4 inHg on Dec 11 11:00 Maximum Daily Average: 29.3 inHg on Dec 11																						Hours in Service: 744				
Minimum Value: 28.5 inHg on Dec 2 13:00 Minimum Daily Average: 28.6 inHg on Dec 2																						Hours of Data: 744				
Maximum Diurnal Average: 29.0 inHg at hour 11 Minimum Diurnal Average: 29.0 inHg at hour 21																						Hours of Missing Data: 0				
Monthly Average: 28.97 inHg Percentiles: P ₁ = 28.6 P ₁₀ = 28.7 Q ₁ = 28.8 Median = 29.0 Q ₃ = 29.1 P ₉₀ = 29.3 P ₉₉ = 29.4																						Hours of Calibration: 0				
																						Percent Operational Time: 100.0				
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Dec	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.8	28.8	28.8	28.8	28.8	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.6	28.6	28.6	28.6	28.8	28.9
2-Dec	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.5	28.5	28.5	28.5	28.5	28.5	28.6	28.6	28.6	28.6	28.6	28.6	28.7	28.7	28.7	28.7	28.6	28.7
3-Dec	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	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.8	28.8
4-Dec	28.7	28.7	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.8	28.9
5-Dec	28.9	28.9	28.9	28.9	28.8	28.8	28.8	28.8	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.9
6-Dec	28.7	28.7	28.7	28.7	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.7	28.7	28.7	28.8	28.8	28.8	28.8	28.8	28.8
7-Dec	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.8	29.0
8-Dec	29.0	29.0	29.0	29.0	29.0	29.0	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.1	29.2
9-Dec	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	29.2	29.2	29.2	29.2	29.2	29.1	29.1	29.1	29.1	29.0	29.0	29.2	29.3
10-Dec	29.0	29.0	28.9	28.9	28.9	28.9	28.9	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.9	28.9	28.9	29.0	29.0	29.0	28.9	29.0	29.0
11-Dec	29.1	29.1	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	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.2	29.2	29.3	29.4
12-Dec	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.1	29.1	29.1	29.1	29.0	29.0	29.0	29.0	29.0	28.9	28.9	28.9	28.9	28.9	28.8	29.1	29.2
13-Dec	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.8	28.8	28.8	28.8	28.8	28.9
14-Dec	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	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.4	29.4	29.4	29.4	29.2	29.4
15-Dec	29.4	29.4	29.4	29.4	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.2	29.2	29.1	29.1	29.0	29.0	29.0	28.9	28.8	28.8	28.8	28.7	28.7	29.1	29.4
16-Dec	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	29.0	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.0	29.1
17-Dec	29.1	29.2	29.2	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.2	29.2	29.2	29.2	29.1	29.1	29.1	29.0	29.0	28.9	28.9	28.8	29.2	29.3
18-Dec	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.9	28.9	28.9	28.9	28.9	29.0	29.0	29.0	29.1	28.8	29.1
19-Dec	29.1	29.1	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.3	29.3	29.3	29.3	29.3	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.1	29.1	29.2	29.3
20-Dec	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	28.8	28.8	28.8	28.8	28.8	28.8	28.7	28.7	28.7	28.8	28.9	29.0
21-Dec	28.8	28.8	28.9	28.9	28.9	28.9	29.0	29.0	29.0	29.0	29.0	29.0	29.0	28.9	28.9	28.9	28.9	28.9	28.9	28.8	28.8	28.8	28.8	28.8	28.9	29.0
22-Dec	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.7	28.7	28.7	28.7	28.7	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.7	28.8
23-Dec	28.6	28.7	28.7	28.7	28.8	28.8	28.8	28.8	28.9	28.9	28.9	29.0	29.0	29.0	29.0	29.1	29.1	29.1	29.2	29.2	29.2	29.2	29.2	29.2	29.0	29.2
24-Dec	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	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.1	29.2
25-Dec	29.0	29.0	29.0	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1
26-Dec	29.0	29.0	29.0	29.0	29.0	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	29.0	29.0	29.0	29.0	28.9	29.0
27-Dec	29.0	29.0	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1
28-Dec	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.3	29.3	29.3	29.1	29.3
29-Dec	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3
30-Dec	29.3	29.3	29.3	29.3	29.3	29.2	29.2	29.2	29.2	29.2	29.2	29.2	29.1	29.1	29.1	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.1	29.3
31-Dec	29.0	29.0	29.0	29.0	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	29.0	29.0	28.9	29.0
																								Diurnal Average		
																								Diurnal Maximum		



Wood Buffalo Environmental Association
Hourly Averages

Barometric Pressure (BP) - inHg
Lower Camp - December 2023





Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed (WS) - km/h

Lower Camp - December 2023

Maximum Speed: 31 km/h on Dec 20 04:00		Maximum Daily Speed Average: 18.7 km/h on Dec 20		Hours in Service: 744																						
Minimum Speed Value: 0 km/h on Dec 24 18:00		Minimum Daily Speed Average: 2.3 km/h on Dec 2		Hours of Data: 744																						
Maximum Diurnal Speed Average: 7.8 km/h at hour 12		Minimum Diurnal Speed Average: 4.3 km/h at hour 1		Hours of Missing Data: 0																						
Monthly Average Velocity: 5.8 km/h 133.4 deg		Percentiles: P ₁ = 1 P ₁₀ = 3 Q ₁ = 6 Median = 10 Q ₃ = 14 P ₉₀ = 18 P ₉₉ = 26		Percent Operational Time: 100.0																						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Dec	NW3	N3	ESE1	ESE2	ENE1	ESE3	E2	E3	ESE5	ESE7	ESE9	ESE10	ESE10	ESE11	ESE9	ESE10	ESE8	ESE4	E2	ESE5	SE7	SE11	SE11	SE12	ESE5.8	SE12
2-Dec	SE13	ESE8	ESE10	E11	ESE13	ESE14	ESE11	ESE12	SE9	WSW0	WNW3	NW3	WNW2	WNW2	W2	W3	W4	WNW3	WNW5	NW4	NW5	NW3	WNW4	NW4	ESE2.3	ESE14
3-Dec	NW5	NW5	NNW5	N4	NW3	NW5	WNW4	NNW4	WNW5	WNW5	WNW4	NW3	NW3	NW3	NW5	NW6	WNW5	W5	W3	NW2	WNW3	NNE0	NNW1	NNW0	NW3.4	NW6
4-Dec	NNE1	ESE7	ESE7	SE6	ESE8	ESE10	ESE10	ESE9	SE8	ESE11	ESE14	ESE12	ESE11	ESE9	SE8	ESE11	SE10	ESE9	ESE8	ESE12	ESE11	ESE10	ESE14	ESE14	ESE9.6	ESE14
5-Dec	ESE13	ESE11	SE10	ESE15	ESE10	ESE10	ESE9	SE9	SE6	ESE9	ESE13	ESE13	ESE16	SE11	ESE13	ESE15	ESE13	ESE11	ESE10	SW13	ESE6	ESE6	E4	ESE8	ESE9.9	ESE16
6-Dec	ESE9	ESE9	ESE9	E4	ESE4	ESE4	E2	ESE6	ESE7	ESE7	ESE6	ESE8	SW9	SW12	SW17	SSW11	S8	S8	E4	SSE2	SE4	ESE6	SE3	SE6	SSE4.6	SW17
7-Dec	SSW5	SE6	ESE8	ESE7	ESE6	ESE6	ESE6	ESE6	ESE6	ESE9	ESE7	ESE11	ESE13	SE6	SE7	ESE7	SE7	SE6	SSE4	ESE4	SE6	SE6	SE7	ESE8	SE6.6	ESE13
8-Dec	ESE5	SE7	SE7	ESE8	SE7	ESE7	ESE7	ESE8	ESE7	ESE7	ESE8	ESE10	SE10	ESE9	ESE11	ESE9	SE6	SE6	ESE6	ESE7	ESE6	ESE10	ESE11	ESE9	ESE7.8	ESE11
9-Dec	ESE6	ESE8	ESE6	ESE8	ESE8	ESE9	ESE9	ESE12	ESE10	ESE10	SE13	ESE13	ESE14	SE13	SE11	SE9	ESE11	ESE14	ESE14	ESE13	ESE12	ESE11	ESE9	ESE7	ESE10.3	ESE14
10-Dec	ESE8	ESE8	ESE11	ESE6	SE9	SE8	SE6	ESE10	ESE11	ESE11	ESE14	ESE11	SE6	SW13	WSW14	WSW17	W21	W26	W29	WNW16	WNW24	WNW25	WNW25	WNW18	WSW5.2	W29
11-Dec	WNW15	WNW17	WNW19	WNW20	W22	W23	WSW24	WSW23	WSW22	SW18	SW18	SW18	SW10	S3	SE6	ESE9	ESE10	SE11	ESE8	ESE10	ESE12	SE11	ESE10	ESE11	SW7.0	WSW24
12-Dec	ESE9	ESE8	ESE10	ESE10	ESE12	ESE13	ESE13	ESE12	ESE10	ESE15	ESE15	ESE15	ESE16	ESE15	ESE16	ESE16	ESE19	ESE19	ESE19	ESE21	ESE19	ESE15	ESE17	ESE19	ESE14.7	ESE21
13-Dec	ESE14	ESE18	ESE18	ESE15	ESE14	ESE17	ESE15	ESE14	ESE14	ESE13	ESE14	ESE15	ESE17	ESE20	SE16	ESE13	ESE15	ESE13	ESE11	ESE9	E10	ESE8	ESE10	ESE2	ESE13.5	ESE20
14-Dec	WSW6	WSW13	WSW13	SW17	SW16	SW18	WSW18	WSW18	WSW19	WSW21	WSW19	WSW7	SSE6	S5	S4	SE2	W2	NNW3	ENE1	SE3	ESE5	ESE4	ESE12	ESE10	SW7.2	WSW21
15-Dec	ESE10	ESE14	ESE14	ESE17	ESE18	ESE17	ESE18	ESE17	ESE18	ESE16	SE17	SE17	SE14	SSE9	SE9	SSE11	SSE9	SSE13	SSE12	SSE13	SSE11	SE9	SE8	SSW8	SE12.3	ESE18
16-Dec	SW4	WSW19	WSW19	WSW19	W22	WNW25	W22	WSW22	WSW20	NNW14	NNW15	N12	NNW12	NNW9	N9	NNW7	NNW8	NW5	NNW8	NW2	NW4	W3	NE2	NNW3	WNW9.0	WNW25
17-Dec	NNW9	NW10	NW7	W4	ESE1	N1	NW1	N2	ESE4	ESE13	ESE12	ESE16	ESE12	ESE15	ESE14	ESE14	ESE14	ESE16	ESE15	ESE15	ESE14	ESE14	ESE16	ESE13	ESE7.9	ESE16
18-Dec	ESE12	SE9	SE9	ESE8	ESE9	ESE11	SSE4	ESE11	ESE9	ESE8	S4	WSW18	SW20	WSW19	W14	WSW13	WSW10	WSW6	W9	WSW14	NW11	NNW14	N15	N16	SW2.5	SW20
19-Dec	NNW13	NW8	WNW8	WNW7	W2	WNW2	NW5	NNE5	NNE5	NNE5	E2	ENE8	NNE6	WNW4	E9	E14	E16	ESE19	ESE20	ESE22	ESE22	ESE23	ESE23	ESE26	E6.9	ESE26
20-Dec	ESE27	ESE26	ESE29	ESE31	ESE28	ESE27	ESE28	ESE27	ESE22	ESE21	ESE18	ESE18	ESE17	SE9	SE11	SE8	ESE10	ESE14	SE12	SE10	ESE13	ESE17	ESE17	ESE10	ESE18.7	ESE31
21-Dec	WSW8	WSW18	WSW12	WSW14	WSW17	WSW11	SW15	SSW12	SSW2	ESE8	ESE13	ESE14	ESE13	ESE12	SE9	ESE7	ESE8	SSE2	SE4	SE10	ESE8	ESE6	ESE6	E7	S5.1	WSW18
22-Dec	ESE9	ESE9	SE15	ESE9	WNW2	WNW3	E5	ESE12	SE11	SE12	SE10	ESE11	SE6	SE8	SE9	SE3	ESE8	ESE7	ESE6	ESE12	ESE12	ESE10	ESE13	SW11	SE7.8	SE15
23-Dec	SSE5	WSW12	WSW14	WSW19	W21	W20	W18	WSW19	WSW14	WSW15	WSW14	WSW22	WSW20	WSW23	WSW17	WSW12	WSW11	WSW8	WSW8	SW12	SW22	SW18	SW14	SW14	WSW15.0	WSW23
24-Dec	W4	ESE3	ESE7	ESE11	ESE12	ESE12	ESE12	ESE14	ESE11	ESE16	ESE14	ESE17	ESE9	ESE11	SE12	ESE13	ESE5	NNW0	SE3	ESE6	SE11	SE11	ESE16	SE15	ESE9.8	ESE17
25-Dec	SE13	ESE16	ESE16	ESE17	ESE13	ESE13	ESE14	ESE21	ESE17	ESE19	ESE18	ESE18	ESE17	ESE19	ESE18	ESE16	SE17	ESE15	ESE14	ESE13	ESE11	ESE14	ESE12	ESE15.3	ESE21	
26-Dec	ESE12	SE11	ESE10	ESE13	ESE7	SSE2	SE7	SE9	ESE9	SE13	ESE15	SE13	ESE14	SE14	SE15	SE17	ESE17	ESE16	ESE18	ESE16	ESE15	ESE14	ESE17	SE17	ESE12.9	ESE18
27-Dec	SSW11	SW22	SW18	SSW10	ESE10	E8	E6	ESE8	ESE12	SE11	ESE12	ESE13	ESE11	ESE11	SE11	ESE7	ESE5	SE3	W2	WNW3	W3	W2	WNW2	W4	SSE5.1	SW22
28-Dec	WNW2	WNW3	WNW3	WNW3	WNW3	W2	W3	NW2	S1	NNE1	WSW4	W8	WNW4	NNW7	WNW9	WNW4	W6	NW3	WNW6	W5	WNW5	W4	W4	W3	WNW3.7	WNW9
29-Dec	WSW1	WSW1	ESE3	ESE5	ESE8	ESE9	ESE10	ESE8	ESE10	ESE11	ESE12	ESE12	ESE13	ESE11	ESE10	ESE10	ESE9	SSE1	SE1	S1	E3	ESE6	SE9	ESE9	ESE7.1	ESE13
30-Dec	ESE8	SE7	ESE8	ESE11	ESE9	ESE7	SE8	ESE8	SE7	ESE12	ESE11	SE9	SE7	ESE10	SE10	SE9	SE9	SSE3	SE6	SE7	ESE12	ESE16	SE12	ESE15	ESE9.2	ESE16
31-Dec	ESE14	ESE17	ESE18	ESE18	ESE18	ESE17	ESE16	ESE17	ESE16	ESE14	ESE14	ESE16	ESE16	ESE17	ESE18	ESE13	ESE11	ESE9	ESE5	SW5	WSW10	SW19	W7	W4	SE10.9	SW19
SE4.3 SSE4.3 SE5.3 SE5.6 SE4.9 SE4.8 SE4.8 SE6.5 SE6.4 SE7.2 SE7.7 SE7.8 SE7.2 SE6.1 SE6.4 SE6.3 SE5.9 SE5.5 SE4.7 SE5.3 SE5.4 SE5.8 ESE6.5 SE5.8																								Diurnal Average		
ESE27 ESE26 ESE29 ESE31 ESE28 ESE27 ESE28 ESE27 ESE22 WSW21 WSW19 WSW22 WSW20 WSW23 ESE18 ESE18 W21 W26 W29 ESE22 WNW24 WNW25 WNW25 ESE26																								Diurnal Maximum		

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



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

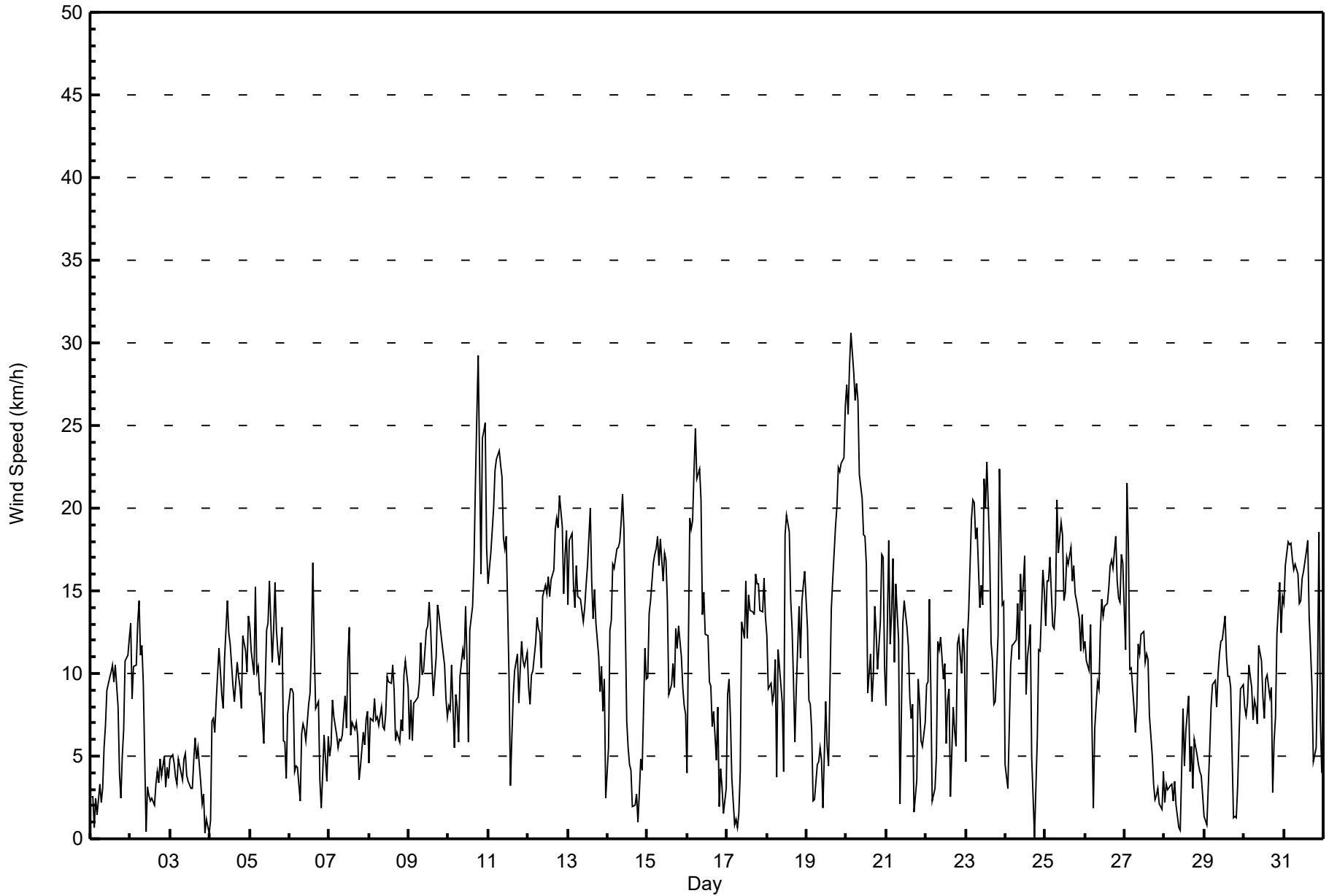
Wind Speed (WS) - km/h
Lower Camp - December 2023

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



Wood Buffalo Environmental Association
Hourly Averages

Wind Speed (WS) - km/h
Lower Camp - December 2023





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Wind Speed (WS) - km/h
Lower Camp - December 2023

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	151	20.30	20.30
6 - 11	292	39.25	59.54
12 - 19	256	34.41	93.95
20 - 28	42	5.65	99.60
29 - 38	3	0.40	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed (WS) - km/h
Lower Camp - December 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	4	6	1	2	10	21	9	8	6	2	2	4	21	26	22	7	151
6 - 11	1	1	0	1	6	175	65	5	2	4	3	10	4	4	5	6	292
12 - 19	3	0	0	0	2	169	21	3	0	1	16	29	2	6	0	4	256
20 - 28	0	0	0	0	0	17	0	0	0	0	3	9	8	5	0	0	42
29 - 38	0	0	0	0	0	2	0	0	0	0	0	0	1	0	0	0	3
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	8	7	1	3	18	384	95	16	8	7	24	52	36	41	27	17	744

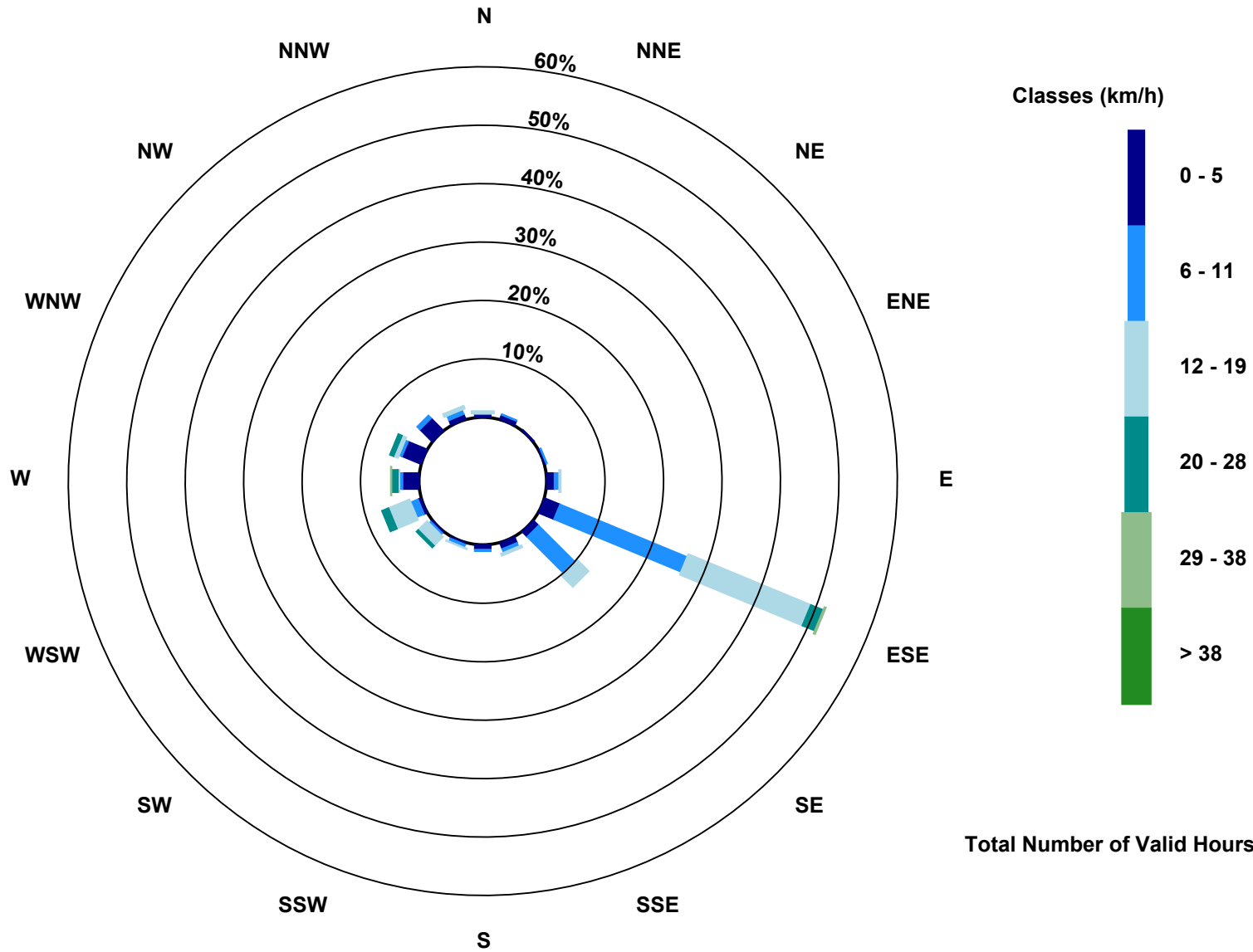
Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Dec 2023

Wind Speed (WS) - km/h
Lower Camp



Total Number of Valid Hours: 744



Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
Lower Camp - December 2023

Direction of Maximum Speed: 117 deg on Dec 20 04:00																				Hours in Service: 744					
Direction of Maximum Daily Speed Average: 117.3 deg on Dec 20																				Hours of Data: 744					
Direction of Minimum Speed: 332 deg on Dec 24 18:00										Direction of Minimum Daily Speed Average: 2.3 deg on Dec 2										Hours of Missing Data: 0					
Monthly Average Direction: 133.4 deg																				Percent Operational Time: 100.0					
Day	Hourly Period Ending At (MST)																								Daily Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Dec	316	349	117	106	77	115	85	86	108	117	112	108	111	121	122	108	102	102	97	119	126	126	129	130	113.9
2-Dec	126	107	107	96	109	112	117	118	124	258	283	311	294	294	273	274	274	294	286	310	313	310	284	307	113.2
3-Dec	308	311	341	10	313	308	288	346	298	295	296	315	317	310	309	304	292	280	273	305	283	32	334	341	307.2
4-Dec	25	117	119	124	117	119	121	120	125	119	120	122	121	114	122	124	121	125	114	118	121	122	123	122	120.2
5-Dec	120	121	125	116	119	121	119	125	129	119	120	119	121	124	119	115	116	105	111	217	121	118	99	116	121.5
6-Dec	114	116	115	101	120	122	99	112	119	117	116	116	216	236	230	207	187	185	100	149	131	117	140	132	151.0
7-Dec	211	138	122	117	120	115	122	113	116	120	118	121	121	124	127	115	128	124	149	123	127	132	125	121	124.4
8-Dec	121	128	124	123	124	118	115	114	109	113	119	120	124	122	122	123	125	124	117	116	105	121	120	120	119.7
9-Dec	123	121	123	121	121	121	120	120	117	114	124	121	120	124	125	130	123	118	119	115	114	122	121	120	120.4
10-Dec	119	114	120	122	124	127	134	115	109	123	120	118	136	228	240	248	261	260	263	296	287	284	291	297	243.8
11-Dec	303	292	288	282	278	272	258	243	240	231	225	229	226	190	129	123	123	125	120	118	121	124	119	119	235.2
12-Dec	121	121	120	119	122	122	122	122	117	115	116	114	110	121	122	120	117	119	116	118	118	120	113	112	117.8
13-Dec	113	118	123	116	116	122	122	113	117	112	109	117	117	120	124	122	118	118	121	103	100	110	111	105	116.5
14-Dec	237	243	241	234	229	229	243	237	246	245	242	238	150	171	179	134	278	331	67	136	114	108	119	117	225.7
15-Dec	113	111	111	118	118	114	116	119	120	120	124	124	125	147	143	155	157	168	162	160	162	142	144	206	131.6
16-Dec	215	243	246	244	269	283	273	258	253	282	330	7	345	340	4	341	338	319	333	317	311	261	39	329	285.4
17-Dec	329	322	306	267	103	353	313	352	104	121	120	118	118	119	116	119	116	119	112	115	116	114	118	120	113.8
18-Dec	123	130	126	114	109	118	164	121	115	109	188	242	234	249	267	258	257	246	266	249	320	344	357	356	233.6
19-Dec	344	314	287	288	278	283	324	17	27	18	79	60	33	289	82	86	94	104	110	110	112	111	111	113	90.6
20-Dec	113	112	115	117	115	112	113	115	116	111	119	120	116	127	128	136	123	123	127	132	122	119	116	118	117.3
21-Dec	247	243	250	237	245	239	230	208	204	113	121	119	123	122	125	122	119	158	131	125	122	115	110	101	171.2
22-Dec	114	119	124	118	296	282	98	112	125	127	127	121	133	127	127	137	115	122	119	122	119	122	123	226	125.1
23-Dec	163	251	245	257	262	261	262	257	249	253	253	250	254	254	256	256	254	239	221	230	227	220	224	247.2	
24-Dec	271	119	122	123	115	114	117	117	122	118	121	119	123	121	124	122	123	332	124	123	126	130	123	125	121.8
25-Dec	126	118	120	120	120	118	122	121	122	119	117	115	118	117	117	119	118	124	122	120	119	123	122	119	119.8
26-Dec	121	124	117	113	119	147	125	124	123	124	122	124	122	126	124	124	123	119	121	122	122	111	118	126	121.7
27-Dec	210	223	214	203	116	100	98	117	119	124	118	120	107	111	125	118	123	131	278	293	276	281	288	275	147.8
28-Dec	294	289	298	285	297	275	280	305	175	23	251	273	302	327	300	302	270	316	293	278	291	275	266	263	288.1
29-Dec	257	257	108	123	122	121	120	113	111	116	115	119	117	116	113	122	118	150	138	184	90	112	124	121	118.2
30-Dec	118	125	122	123	118	119	125	123	129	122	121	124	127	121	132	124	125	150	128	124	121	121	125	120	123.4
31-Dec	122	122	122	122	123	123	118	118	119	119	118	113	116	110	115	119	106	110	108	225	237	234	276	273	125.5
127.7 148.4 142.9 141.2 140.4 138.8 143.7 135.8 134.9 129.1 129.0 127.9 129.3 136.8 134.9 132.2 129.3 132.9 131.8 136.7 130.7 130.9 122.4 126.3																									
Diurnal Average																									
All monthly, daily, and diurnal averages have been calculated using vector methods																									



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

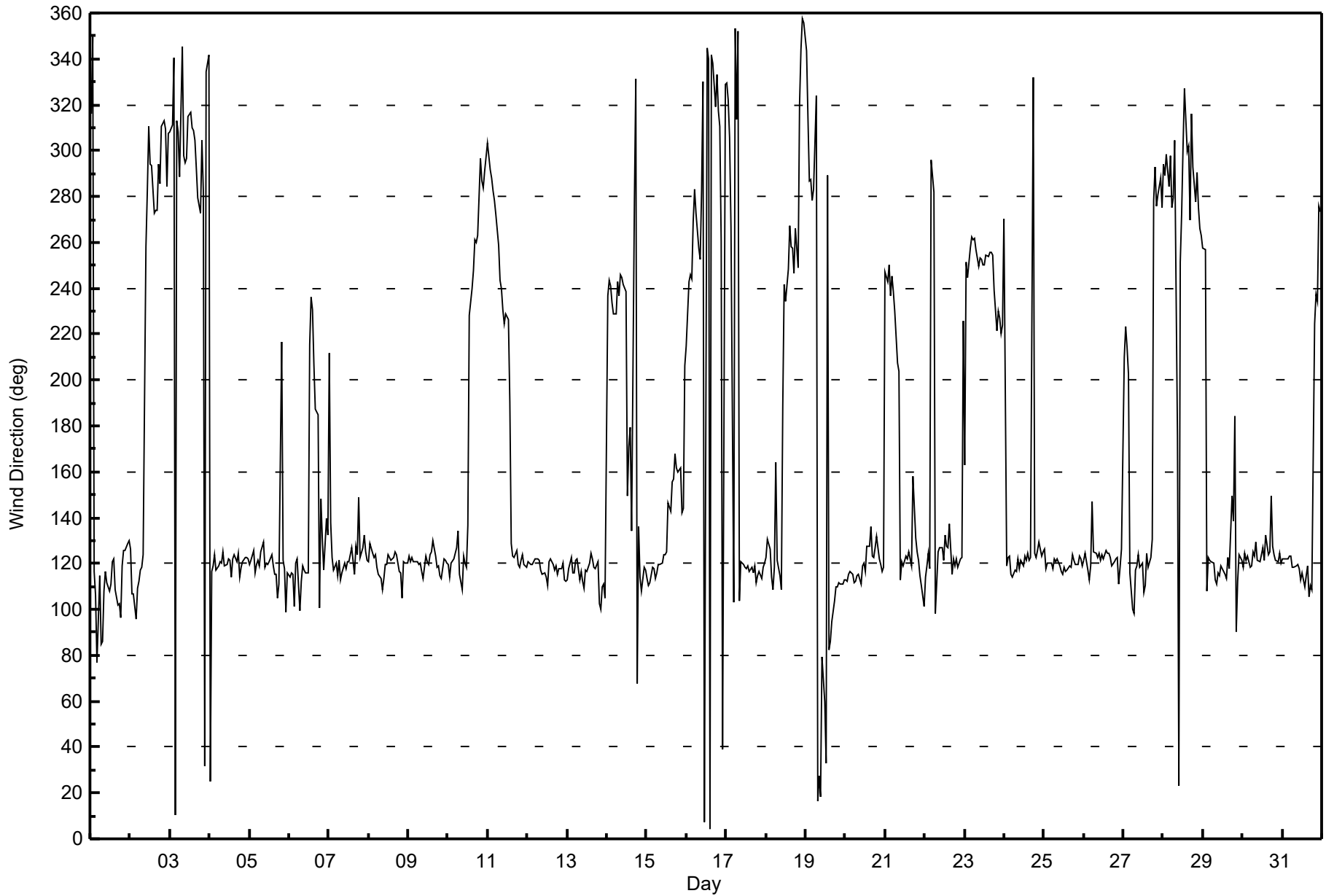
Wind Direction (WD) - deg
Lower Camp - December 2023

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 106 deg on Dec 21 09:00 Minimum Value: 5 deg on Dec 13 00:00 Percentiles: P ₁ = 5 P ₁₀ = 7 Q ₁ = 9 Median = 13 Q ₃ = 26 P ₉₀ = 51 P ₉₉ = 91																			Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0						
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Dec	33	43	91	45	55	35	62	41	28	19	11	9	8	9	10	10	12	45	80	22	17	11	15	14	91
2-Dec	13	23	10	13	9	9	8	11	13	89	36	20	21	33	44	18	27	29	9	22	21	35	17	33	89
3-Dec	25	23	33	38	28	22	37	37	15	16	19	32	29	35	32	23	36	16	19	33	19	77	68	95	95
4-Dec	75	18	10	21	11	11	12	13	25	11	9	7	7	7	12	14	8	13	18	22	10	13	13	10	75
5-Dec	9	12	15	10	12	15	16	20	40	21	9	13	8	32	6	6	16	11	13	27	59	55	67	19	67
6-Dec	7	7	24	58	42	35	91	29	13	26	16	7	53	16	11	20	23	37	67	79	40	56	89	40	91
7-Dec	43	50	10	16	11	18	11	8	17	9	33	5	6	18	16	11	12	17	52	36	11	22	19	17	52
8-Dec	40	37	20	12	16	8	8	6	14	6	8	6	9	8	9	17	19	11	10	11	24	19	9	14	40
9-Dec	25	7	17	10	11	12	8	9	11	16	9	8	8	10	11	13	9	6	6	7	8	11	10	14	25
10-Dec	22	18	9	64	13	29	28	14	12	23	9	9	56	16	13	14	11	12	13	19	14	11	14	12	64
11-Dec	12	10	10	11	10	13	11	11	11	11	12	11	17	29	16	10	9	11	11	9	9	9	9	9	29
12-Dec	10	12	10	11	11	9	9	9	10	8	9	8	10	10	10	8	6	6	5	7	7	9	8	5	12
13-Dec	7	6	8	9	8	8	9	8	8	7	8	9	7	7	11	9	9	26	39	47	27	26	32	75	75
14-Dec	66	13	13	13	11	11	11	11	12	11	12	67	37	36	32	67	75	49	90	61	41	50	8	12	90
15-Dec	12	6	7	7	6	6	5	8	6	8	8	8	12	28	24	28	27	30	32	29	30	25	36	45	45
16-Dec	88	15	12	12	19	10	12	11	14	14	35	18	16	19	16	21	16	32	20	57	26	30	73	59	88
17-Dec	18	19	20	54	95	64	80	60	67	8	11	6	16	7	6	6	7	6	7	7	7	8	7	9	95
18-Dec	9	19	17	21	12	9	67	9	13	20	72	15	12	13	10	16	16	63	33	11	51	22	19	19	72
19-Dec	17	19	12	17	32	26	23	44	22	30	99	20	44	25	57	13	11	10	9	9	9	8	8	8	99
20-Dec	8	8	8	10	10	8	7	8	10	10	13	11	11	26	23	33	17	16	23	26	13	12	7	18	33
21-Dec	38	12	18	12	13	18	12	28	106	31	10	8	8	7	12	15	14	78	72	12	12	14	18	9	106
22-Dec	10	10	8	48	28	19	66	26	12	11	12	9	15	11	11	82	24	27	56	8	9	31	10	35	82
23-Dec	60	18	14	12	12	13	12	13	14	12	15	12	13	11	11	12	13	20	27	12	9	12	16	15	60
24-Dec	52	71	22	9	9	10	9	6	15	7	9	7	22	7	12	8	47	102	62	41	13	17	9	11	102
25-Dec	13	8	8	8	9	9	18	8	10	7	8	8	6	5	5	6	6	12	11	7	7	16	9	15	18
26-Dec	8	14	13	8	29	80	24	8	8	8	6	7	5	10	11	10	8	7	8	14	12	9	7	13	80
27-Dec	27	13	15	29	25	22	16	10	7	10	10	9	8	17	15	22	36	75	50	32	20	27	57	21	75
28-Dec	41	61	45	37	34	72	56	56	97	90	39	26	29	39	15	23	16	41	13	31	24	25	30	61	97
29-Dec	68	81	41	23	14	10	11	13	13	14	7	8	7	9	12	13	19	91	90	56	43	11	11	8	91
30-Dec	7	13	10	11	8	9	10	14	17	9	11	26	19	9	20	14	11	76	16	16	8	7	9	7	76
31-Dec	8	7	6	6	7	8	6	5	7	8	12	14	8	7	8	9	14	20	69	61	66	20	28	21	69
Diurnal Maximum																									



Wood Buffalo Environmental Association
Hourly Averages

Wind Direction (WD) - deg
Lower Camp - December 2023





WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

AMS13 FORT MCKAY SOUTH DECEMBER 2023

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

January 31, 2024

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FORT McKAY SOUTH (AMS13)
 DECEMBER 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	709	35	35	100	10	0	2.5	0
TRS(ppb) Average	709	35	35	100	4.6	0	2	0
THC(ppm) Average	709	35	35	100	4	-	2.7	-
NMHC(ppm) Average	709	35	35	100	0.528	-	0.058	-
CH4(ppm) Average	709	35	35	100	3.8	-	2.7	-
O3(ppb) Average	637	35	107	90.32	41.8	0	29.9	-
NO2(ppb) Average	707	37	37	100	33.8	0	17.5	-
NO(ppb) Average	707	37	37	100	124.3	-	47.2	-
NOX(ppb) Average	707	37	37	100	137.7	-	60	-
PM2.5(ug/m3) Average	743	1	1	100	25.6	0	18	0
ET(C) Average	744	0	0	100	6.3	-	0.7	-
RH(%) Average	744	0	0	100	96.7	-	92.7	-
WS(km/h) Average	742	0	2	99.73	20	-	13	-
WD(deg) Average	742	0	2	99.73	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FORT MCKAY SOUTH (AMS13)
 DECEMBER 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	709	0.85	1.2	-	0	0.2	0.3	0.5	0.9	1.5	10
TRS(ppb) Average	709	0.82	0.6	-	0.3	0.4	0.5	0.6	1	1.5	4.6
THC(ppm) Average	709	2.32	0.3	-	2	2.1	2.1	2.3	2.4	2.6	4
NMHC(ppm) Average	709	0.005	0.039	-	0	0	0	0	0	0	0.528
CH4(ppm) Average	709	2.32	0.3	-	2	2.1	2.1	2.3	2.4	2.6	3.8
O3(ppb) Average	637	11.84	10.8	-	0	1.7	2.7	7.2	19.7	29.4	41.8
NO2(ppb) Average	707	11.62	6.7	-	0	1.4	7.2	11.6	16.1	20.2	33.8
NO(ppb) Average	707	11.22	18.5	-	0	0	0.3	3.2	14.6	32.5	124.3
NOX(ppb) Average	707	22.84	21.6	-	0	1.6	8.4	16.9	31.6	48.8	137.7
PM2.5(ug/m3) Average	743	5.99	4.3	-	0.4	1.5	3.2	5	7.7	11.1	25.6
Temperature 2 m (C) Average	744	-8.2	6.2	-	-21.5	-16	-13	-9.1	-3.4	1.3	6.3
Relative Humidity (%) Average	744	79.26	11.6	-	41.6	60	73.1	83.5	87.1	90.4	96.7
Wind Speed 10 m (km/h) Average	742	5.7	4	-	0	1	3	4	8	11	20
Wind Direction 10 m (deg) Average	742	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FORT MCKAY SOUTH (AMS13)
DECEMBER 2023

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
O3	02 Dec 2023 19:00	03 Dec 2023 02:00	8	Unstable Operation - excessive baseline noise
O3	03 Dec 2023 23:00	04 Dec 2023 03:00	5	Unstable Operation - excessive baseline noise
O3	08 Dec 2023 10:00	08 Dec 2023 10:00	1	Unstable Operation - excessive baseline noise
O3	10 Dec 2023 07:00	10 Dec 2023 20:00	14	Unstable Operation - excessive baseline noise
O3	11 Dec 2023 15:00	12 Dec 2023 12:00	22	Maintenance - stabilization post maintenance
O3	12 Dec 2023 15:00	13 Dec 2023 10:00	20	Unstable Operation - unstable lamp voltage
O3	13 Dec 2023 11:00	13 Dec 2023 12:00	2	Maintenance - lamp voltage adjustment
Wind Speed, Wind Direction	01 Dec 2023 09:00	01 Dec 2023 09:00	1	Flat line in sensor output signal - Sensor frozen
Wind Speed, Wind Direction	02 Dec 2023 05:00	02 Dec 2023 05:00	1	Flat line in sensor output signal - Sensor frozen



Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 10.0 ppb on Dec 26 17:00	Maximum Daily Average: 2.5 ppb on Dec 20		Hours of Data:	709
Minimum Value: 0.0 ppb on Dec 19 10:00	Minimum Daily Average: 0.1 ppb on Dec 19		Hours of Missing Data:	35
Maximum Diurnal Average: 1.8 ppb at hour 14	Minimum Diurnal Average: 0.5 ppb at hour 23		Hours of Calibration:	35
Monthly Average: 0.85 ppb	Percentiles: P ₁ = 0.0 P ₁₀ = 0.2 Q ₁ = 0.3 Median = 0.5 Q ₃ = 0.9 P ₉₀ = 1.5 P ₉₉ = 6.9		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-Dec	Z	0.2	0.2	0.2	0.2	0.2	0.7	0.9	0.7	0.5	0.5	0.5	1.4	1.7	0.5	0.3	0.3	0.3	0.2	0.3	0.4	0.6	0.5	0.4	0.5	1.7																						
2-Dec	0.8	Z	0.6	0.8	0.6	0.4	0.4	0.4	0.4	0.5	0.6	1.3	1.8	2.4	2.4	2.2	2.2	2.6	2.0	1.4	1.0	0.8	0.6	0.5	1.2	2.6																						
3-Dec	0.5	0.4	Z	0.4	0.4	0.6	0.9	1.0	0.9	0.7	0.7	1.2	1.4	1.5	1.2	1.2	1.1	1.0	0.9	0.8	0.9	0.9	0.9	1.2	0.9	1.5																						
4-Dec	1.2	1.6	2.6	Z	1.8	1.3	1.1	0.9	1.1	1.4	1.5	1.1	1.6	1.3	0.9	0.7	0.7	0.7	0.7	0.8	0.9	0.9	0.6	0.7	1.1	2.6																						
5-Dec	0.5	0.5	0.4	0.9	Z	0.7	0.8	1.4	2.1	2.5	1.5	1.0	0.7	0.7	0.9	0.8	1.5	0.7	0.7	0.6	0.5	0.4	0.4	0.3	0.9	2.5																						
6-Dec	0.3	0.4	0.4	0.3	0.3	Z	0.2	0.2	0.2	0.3	0.3	0.3	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.3	0.3	0.3	0.3	0.3	0.4	0.6																					
7-Dec	Z	0.3	0.4	0.4	0.6	1.0	0.9	0.4	0.4	0.4	0.5	0.4	0.4	0.5	0.8	0.4	1.1	1.5	1.5	1.5	1.4	1.4	1.1	0.7	0.8	1.5																						
8-Dec	0.7	Z	0.3	1.3	0.9	0.9	0.9	0.9	0.5	0.7	0.3	0.2	0.8	0.9	1.4	1.1	0.8	0.7	0.5	0.4	0.3	0.3	0.4	0.5	0.7	1.4																						
9-Dec	0.7	0.7	Z	0.4	0.4	0.5	0.6	0.7	0.8	0.3	0.1	0.2	0.2	1.9	0.6	0.3	0.2	0.3	0.6	0.8	0.8	0.7	0.6	0.6	0.6	1.9																						
10-Dec	0.6	0.4	0.3	Z	0.2	0.2	0.3	0.5	0.8	1.3	1.5	1.0	0.7	0.8	0.7	0.7	0.6	0.6	0.6	0.6	0.5	0.5	0.4	0.4	0.6	1.5																						
11-Dec	0.4	0.4	0.3	0.3	Z	0.2	0.1	0.2	0.3	0.3	0.6	0.5	0.4	0.3	0.4	0.4	0.3	0.4	0.6	0.5	0.3	0.3	0.2	0.2	0.4	0.6																						
12-Dec	0.5	0.5	0.5	0.7	0.7	Z	0.5	0.7	0.8	1.5	0.9	0.7	1.0	2.9	1.6	0.7	0.6	0.6	1.1	0.8	4.2	1.1	0.6	0.5	1.0	4.2																						
13-Dec	Z	0.7	0.8	0.6	0.6	0.7	1.0	1.2	1.3	0.7	1.2	3.1	5.7	9.5	6.5	1.9	0.9	0.8	0.8	1.3	2.1	2.7	1.1	1.1	2.0	9.5																						
14-Dec	0.6	Z	0.4	0.4	0.3	0.2	0.2	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.3	0.5	0.2	0.3	0.2	0.2	0.3	0.3	0.3	0.6	0.3	0.6																						
15-Dec	0.4	0.3	Z	0.7	0.9	1.1	2.1	1.4	1.7	6.1	3.1	3.3	0.7	0.4	0.4	0.4	0.3	0.5	0.5	0.5	0.5	0.6	0.6	0.5	1.2	6.1																						
16-Dec	0.5	0.4	0.3	Z	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.3	0.3	0.2	0.5																						
17-Dec	0.5	0.4	0.2	0.2	Z	0.4	0.4	0.4	0.7	0.5	0.6	1.4	2.5	3.3	3.4	0.3	0.3	1.0	1.0	0.8	0.5	0.5	0.4	0.4	0.9	3.4																						
18-Dec	0.5	0.5	0.4	0.4	0.8	Z	0.5	0.8	0.9	1.2	C	C	C	C	0.4	0.3	0.3	0.2	0.3	0.3	0.3	0.2	0.2	0.2	0.5	1.2																						
19-Dec	Z	0.2	0.1	0.1	0.0	0.0	0.1	0.0	0.2	0.0	0.0	0.0	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.1	0.2																						
20-Dec	0.3	Z	2.5	9.9	5.8	5.3	8.1	6.6	2.6	1.8	1.1	0.6	0.7	0.7	0.7	0.7	1.3	0.8	1.6	1.4	1.5	1.5	0.8	0.9	2.5	9.9																						
21-Dec	0.5	0.5	Z	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.5	1.4	1.8	1.8	0.4	0.4	0.3	0.3	0.4	0.4	0.4	0.3	0.5	0.6	1.8																						
22-Dec	0.4	0.3	0.3	Z	0.3	0.2	0.3	0.3	0.3	0.4	0.6	0.9	1.0	1.4	1.0	0.7	0.7	1.0	1.2	1.2	0.8	0.6	0.5	0.6	0.7	1.4																						
23-Dec	0.5	0.5	0.5	0.4	Z	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	0.0	0.2	0.3	0.1	0.2	0.2	0.5																						
24-Dec	0.3	0.3	0.3	0.3	0.5	Z	0.7	2.0	0.6	0.5	0.5	0.7	0.6	0.7	0.7	0.8	0.5	0.4	0.4	0.9	1.7	1.4	0.5	0.7	2.0	2.0																						
25-Dec	Z	0.4	0.3	0.3	0.3	0.4	0.6	0.6	1.1	3.2	3.4	5.3	7.3	9.2	6.9	1.9	0.9	0.5	0.9	0.5	0.4	0.4	0.5	0.6	2.0	9.2																						
26-Dec	0.5	Z	0.3	0.3	0.4	0.4	0.5	0.4	0.4	0.5	1.2	5.3	4.1	1.9	1.3	9.0	10.0	1.4	1.0	0.7	0.6	0.6	0.7	0.7	1.8	10.0																						
27-Dec	0.5	0.5	Z	0.4	0.4	0.5	0.5	0.4	0.4	0.4	0.3	0.8	1.1	4.8	3.9	0.9	0.6	0.5	0.5	0.5	0.5	0.4	0.5	0.8	0.9	4.8																						
28-Dec	1.1	1.4	1.7	Z	1.7	1.6	1.4	1.1	1.0	0.9	0.8	0.5	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.3	0.3	0.7	1.7																						
29-Dec	0.2	0.2	0.2	0.2	Z	0.5	0.5	0.5	0.5	0.3	0.3	1.0	2.1	0.8	1.2	1.1	0.4	0.5	0.3	0.3	0.3	0.2	0.3	0.7	0.6	2.1																						
30-Dec	1.5	2.1	2.5	1.7	0.9	Z	0.5	0.3	0.3	0.3	1.0	1.2	1.5	1.4	1.9	0.7	0.5	0.5	0.5	0.5	0.5	0.5	0.4	0.4	0.9	2.5																						
31-Dec	Z	0.8	1.1	0.9	0.5	0.5	0.4	0.4	0.6	0.7	0.8	0.6	1.2	1.5	0.9	0.8	0.6	0.7	0.5	0.5	0.5	0.5	0.4	0.4	0.7	1.5																						
																								0.6	0.6	0.7	0.9	0.8	0.7	0.8	0.8	0.7	0.9	0.8	1.1	1.4	1.8	1.4	1.0	0.9	0.6	0.7	0.6	0.7	0.7	0.5	0.5	Diurnal Average
																								1.5	2.1	2.6	9.9	5.8	5.3	8.1	6.6	2.6	6.1	3.4	5.3	7.3	9.5	6.9	9.0	10.0	2.6	2.0	1.5	4.2	2.7	1.4	1.2	Diurnal Maximum

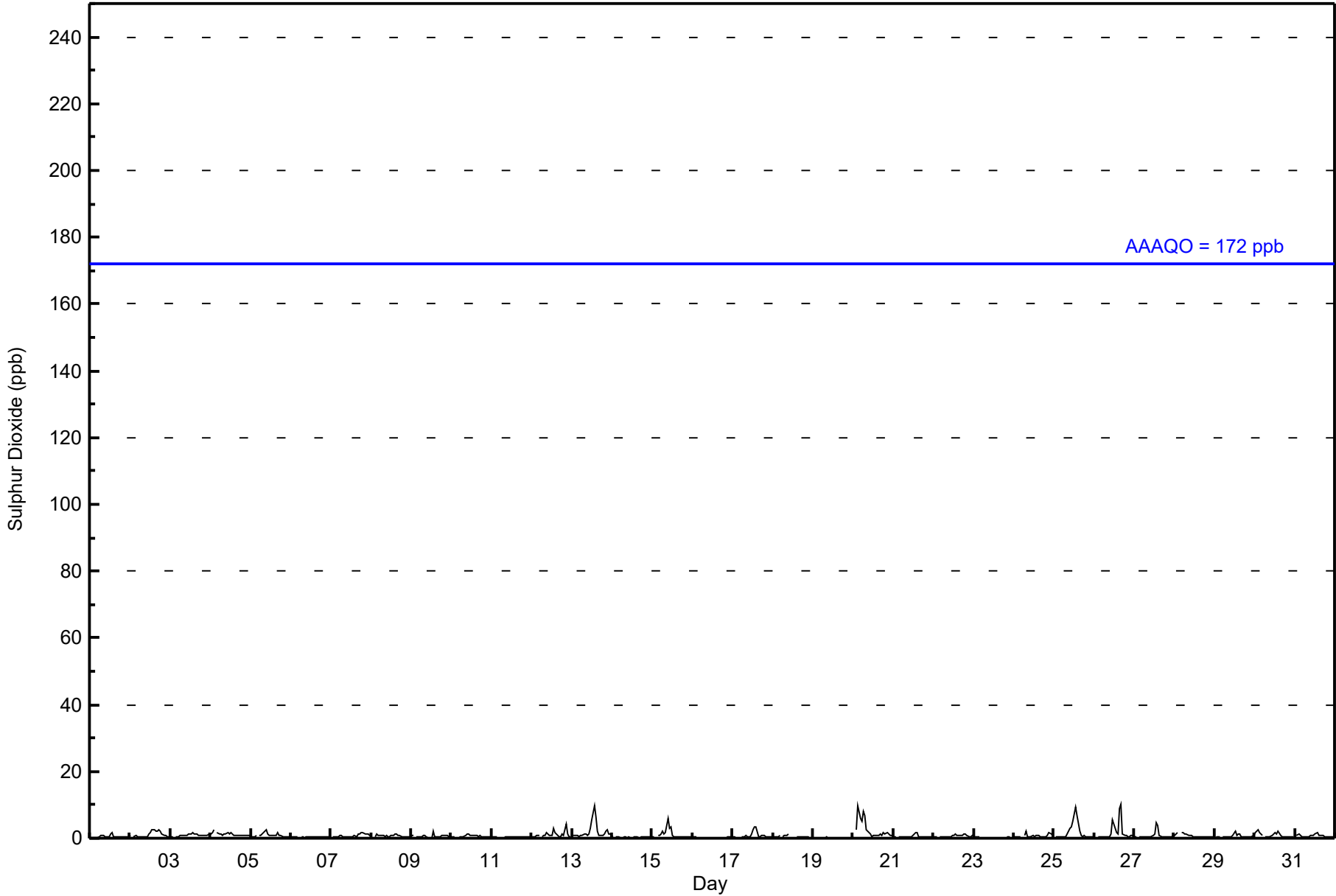
Z - zerospan C - Calibration

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



Wood Buffalo Environmental Association
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Fort McKay South - December 2023





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Fort McKay South - December 2023

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	709	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: 709

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Fort McKay South - December 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	31	13	8	0	0	2	11	93	194	95	77	71	41	18	23	30	707
11 - 20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	31	13	8	0	0	2	11	93	194	95	77	71	41	18	23	30	707

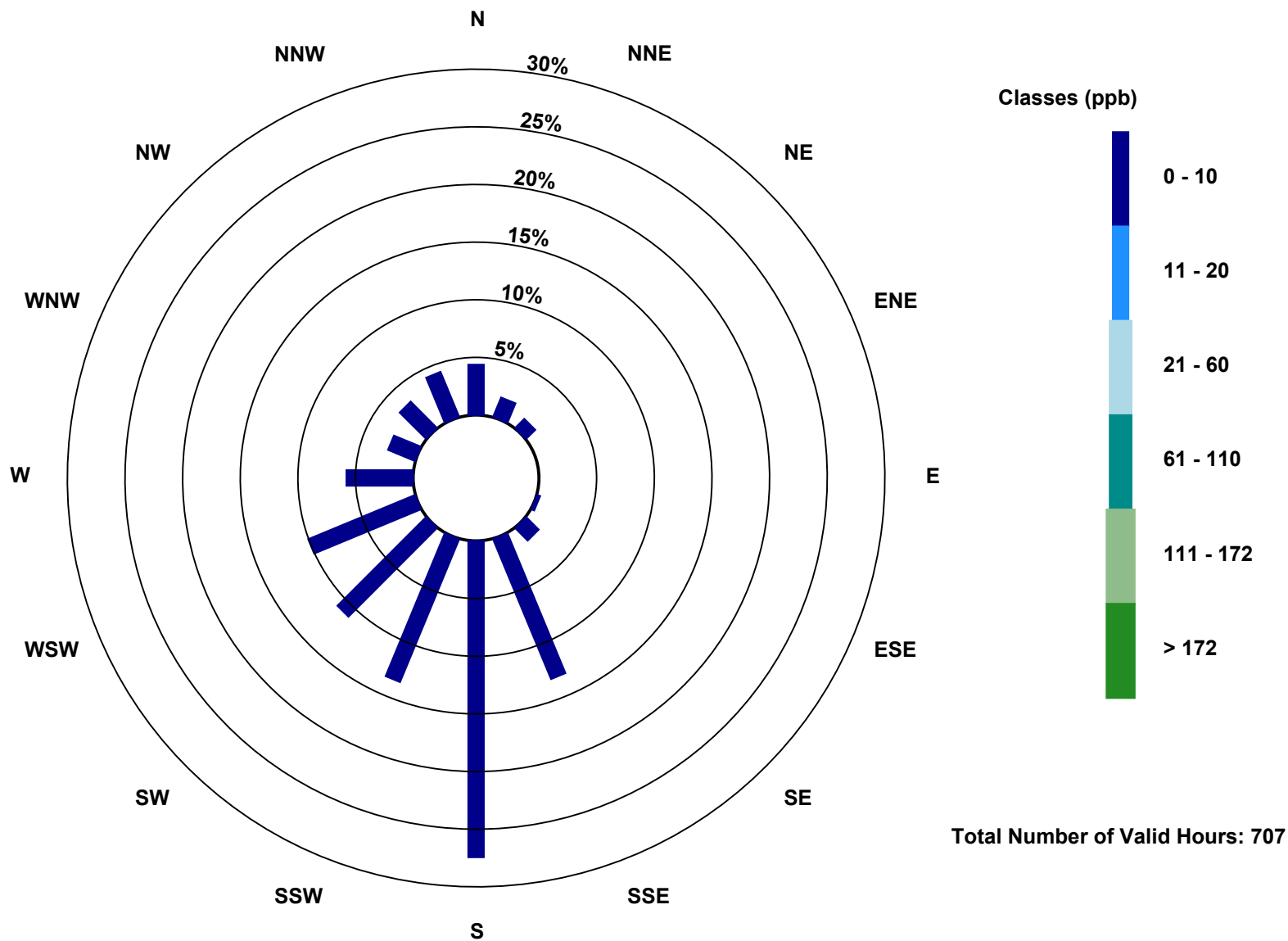
Total Number of Valid Hours: 707

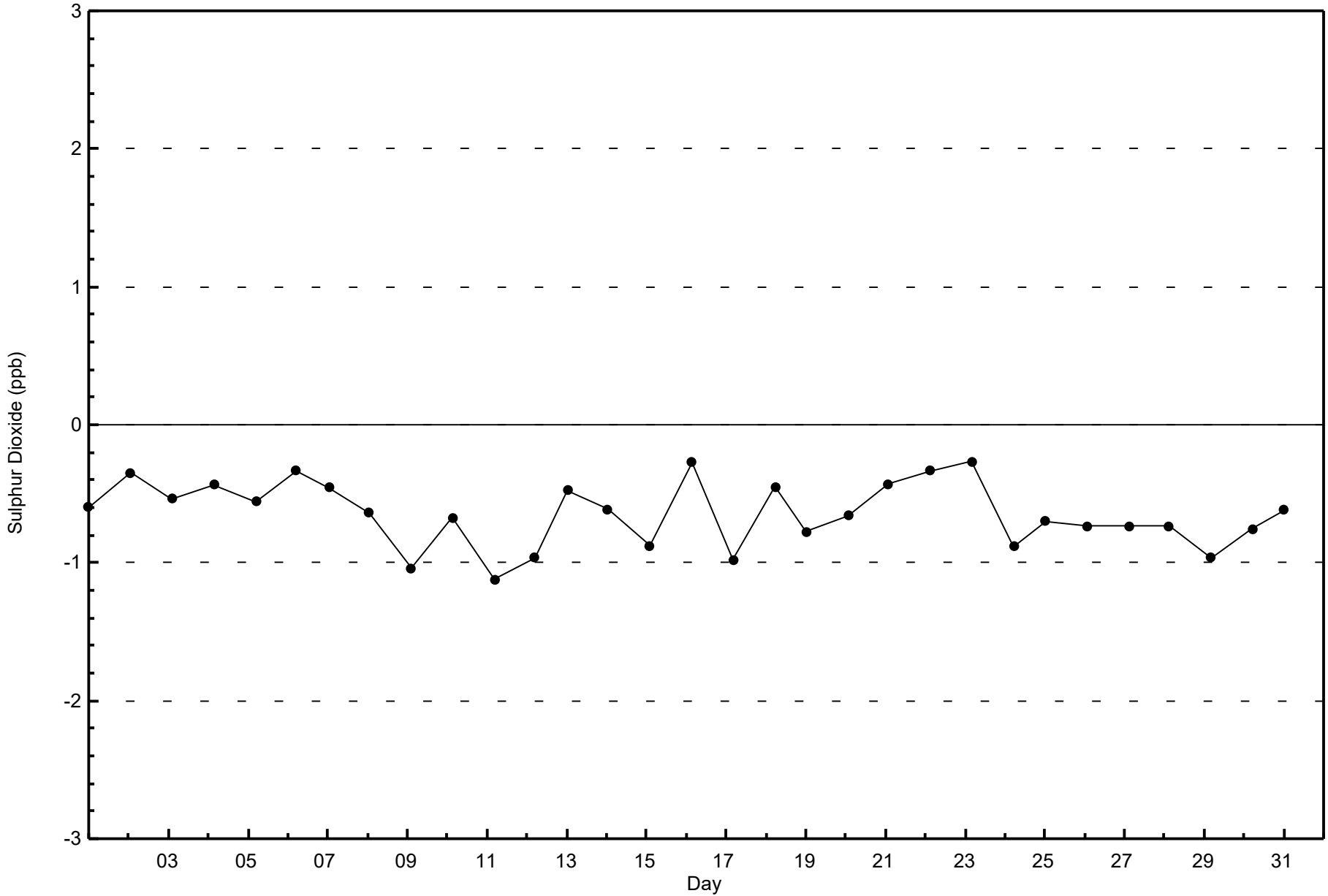
Total Number of Hours: 744

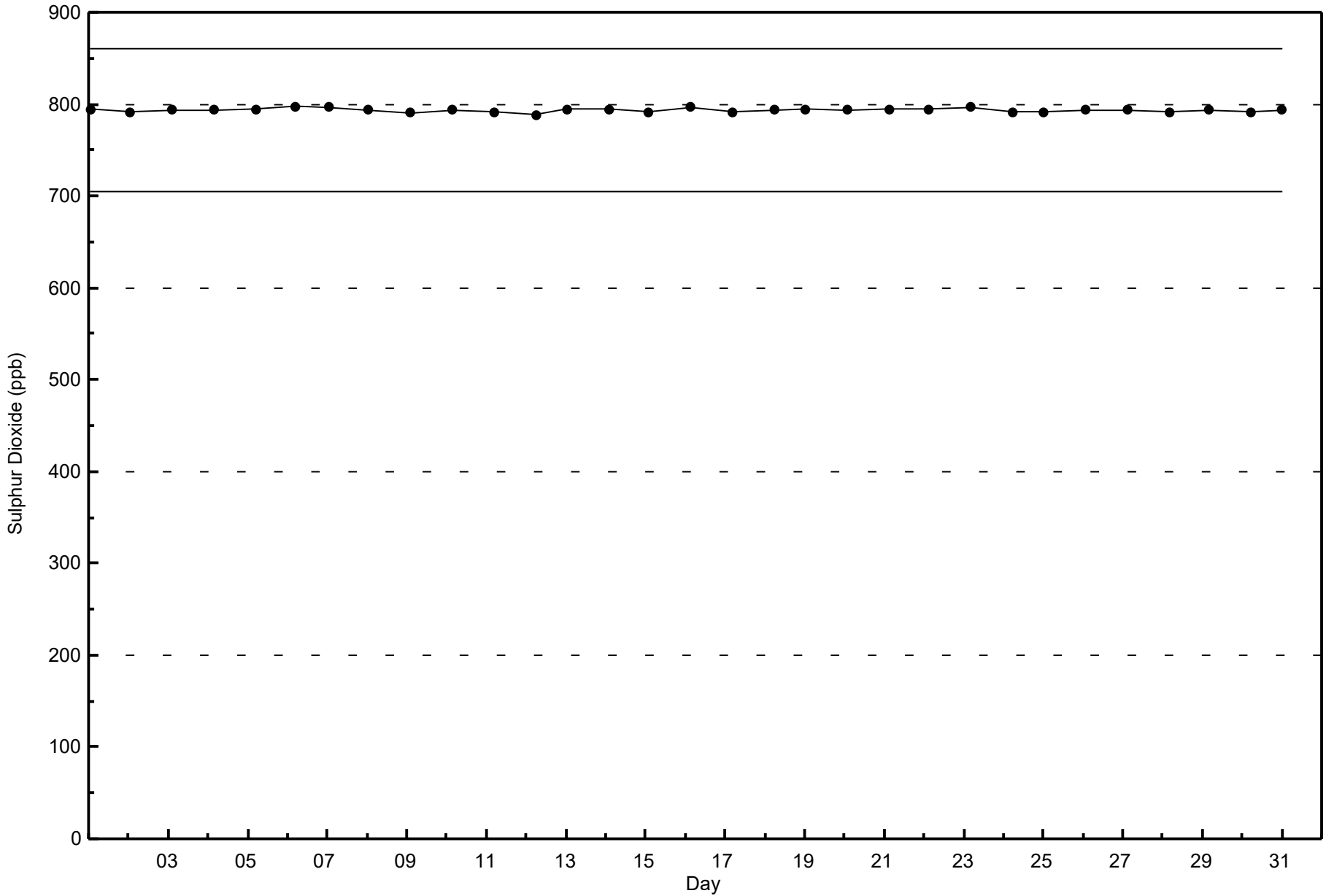


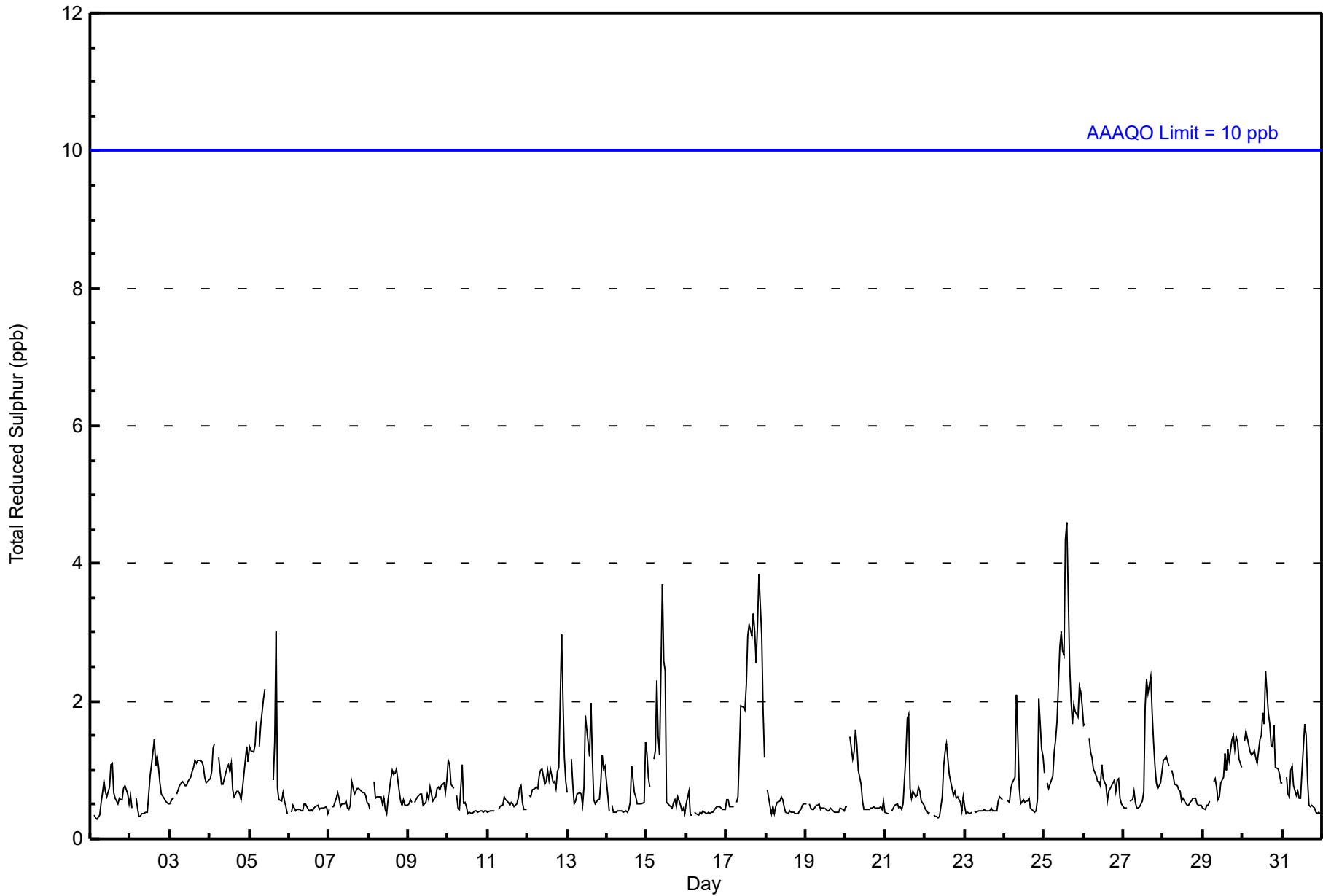
Wood Buffalo Environmental Association
Wind Rose Dec 2023

Sulphur Dioxide (SO₂) - ppb
Fort McKay South











**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Total Reduced Sulphur (TRS) - ppb
Fort McKay South - December 2023**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	689	97.18	97.18
3 - 4	19	2.68	99.86
5 - 7	1	0.14	100.00
8 - 11	0	0.00	100.00
> 11	0	0.00	100.00

Total Number of Valid Hours: 709

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Total Reduced Sulphur (TRS) - ppb
Fort McKay South - December 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	30	14	8	0	0	2	11	82	183	93	76	76	41	16	25	30	687
3 - 4	0	0	0	0	0	0	0	9	8	1	1	0	0	0	0	0	19
5 - 7	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	30	14	8	0	0	2	11	92	191	94	77	76	41	16	25	30	707

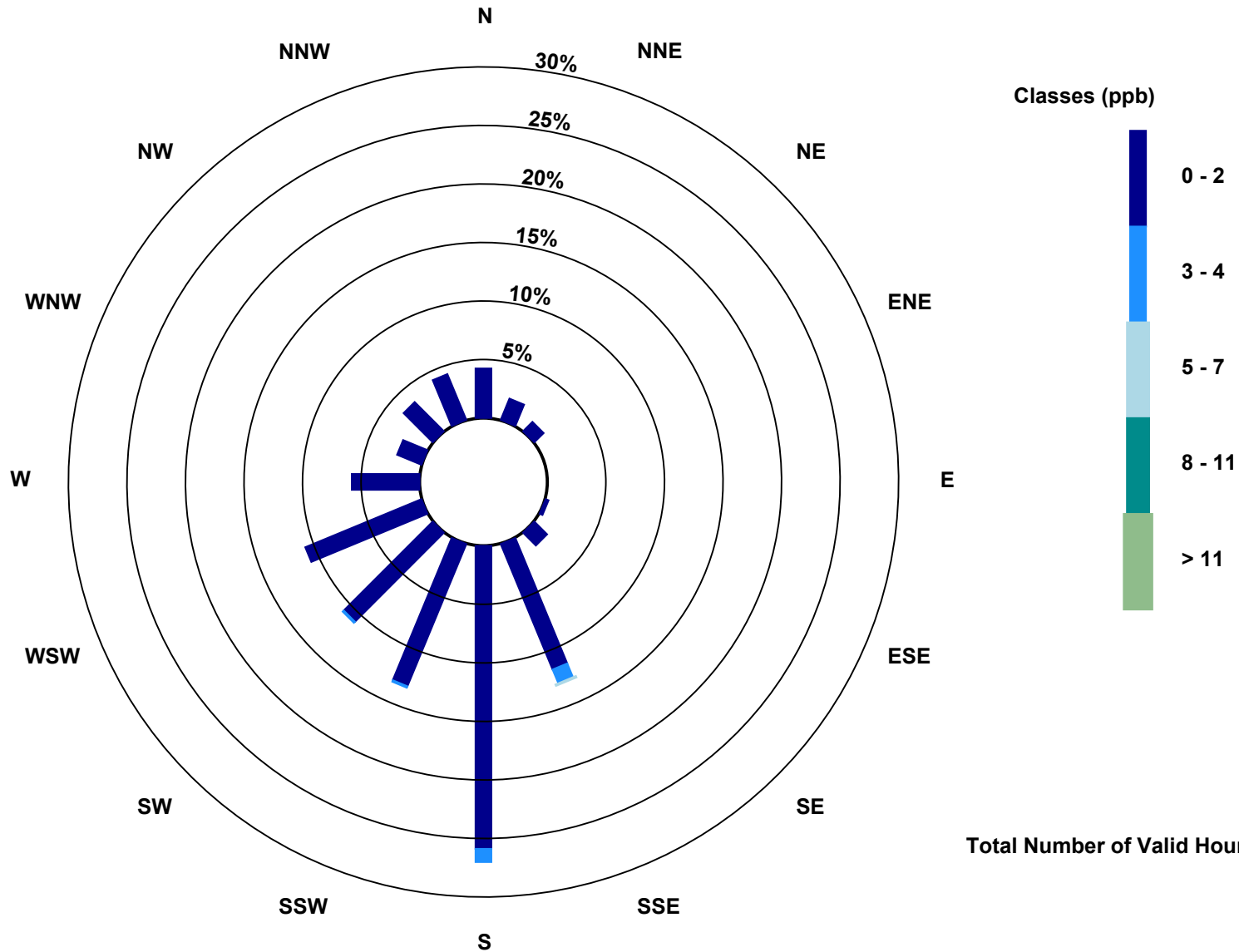
Total Number of Valid Hours: 707

Total Number of Hours: 744

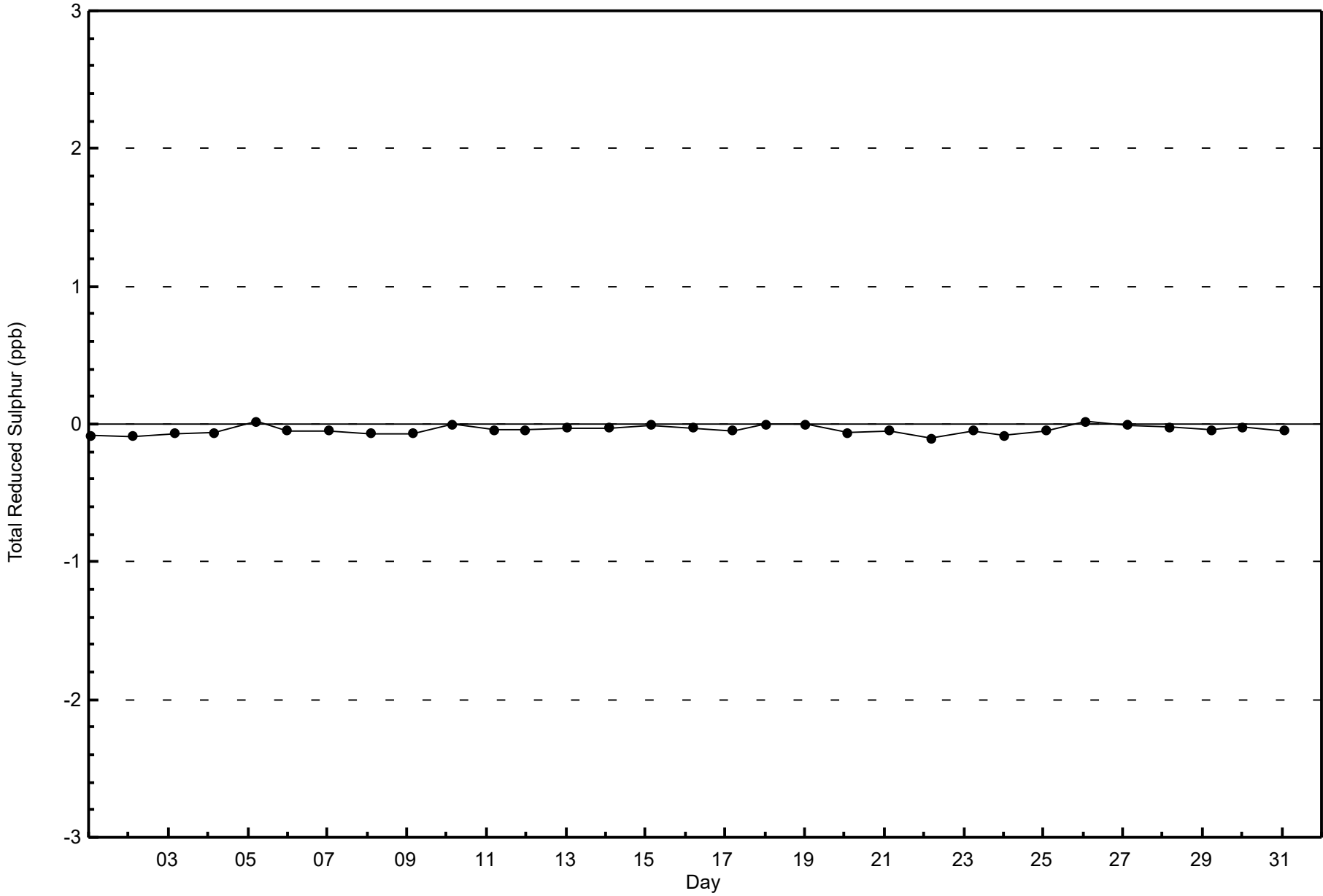


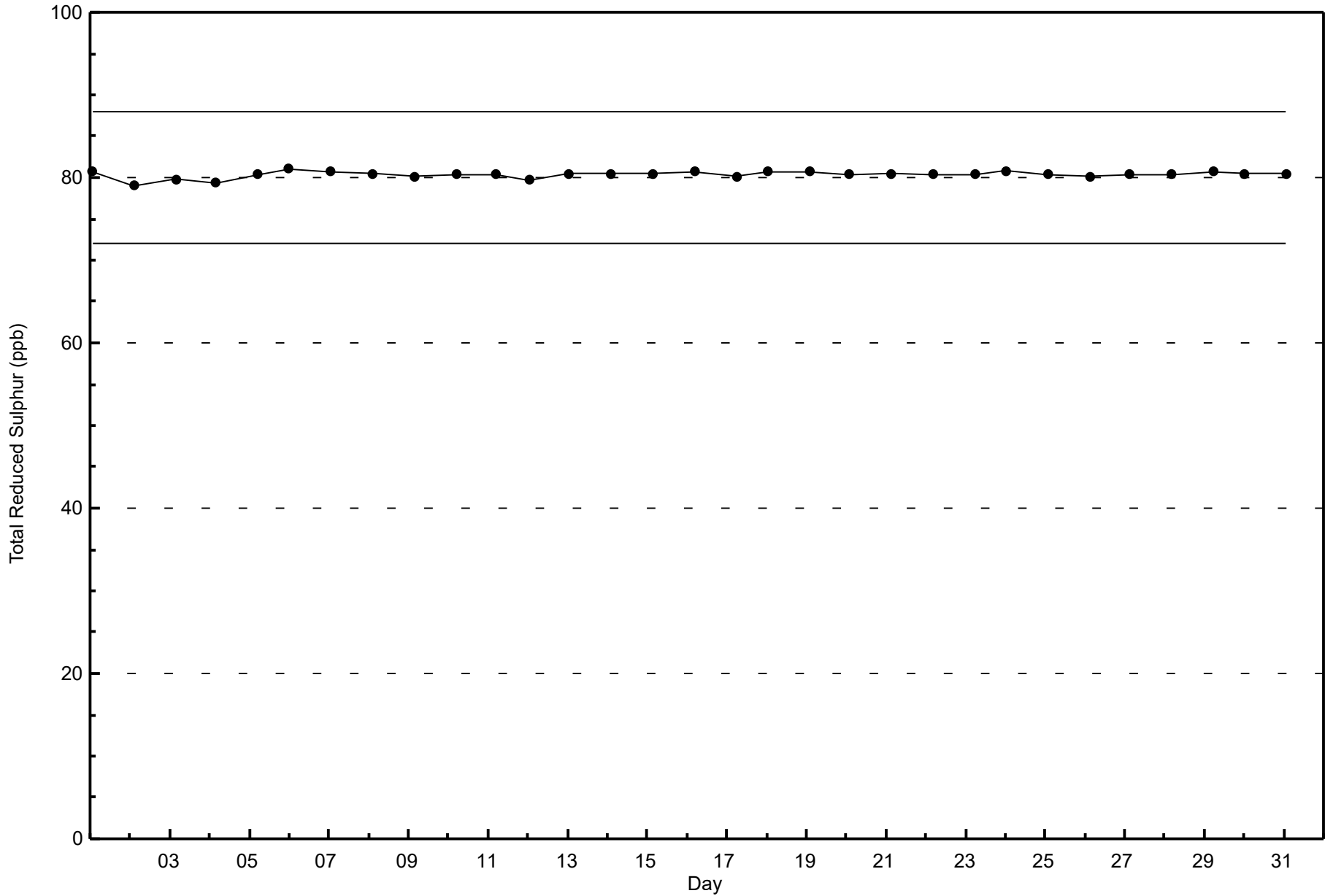
Wood Buffalo Environmental Association
Wind Rose Dec 2023

Total Reduced Sulphur (TRS) - ppb
Fort McKay South



Total Number of Valid Hours: 707







Wood Buffalo Environmental Association
Summary of Hour Averages

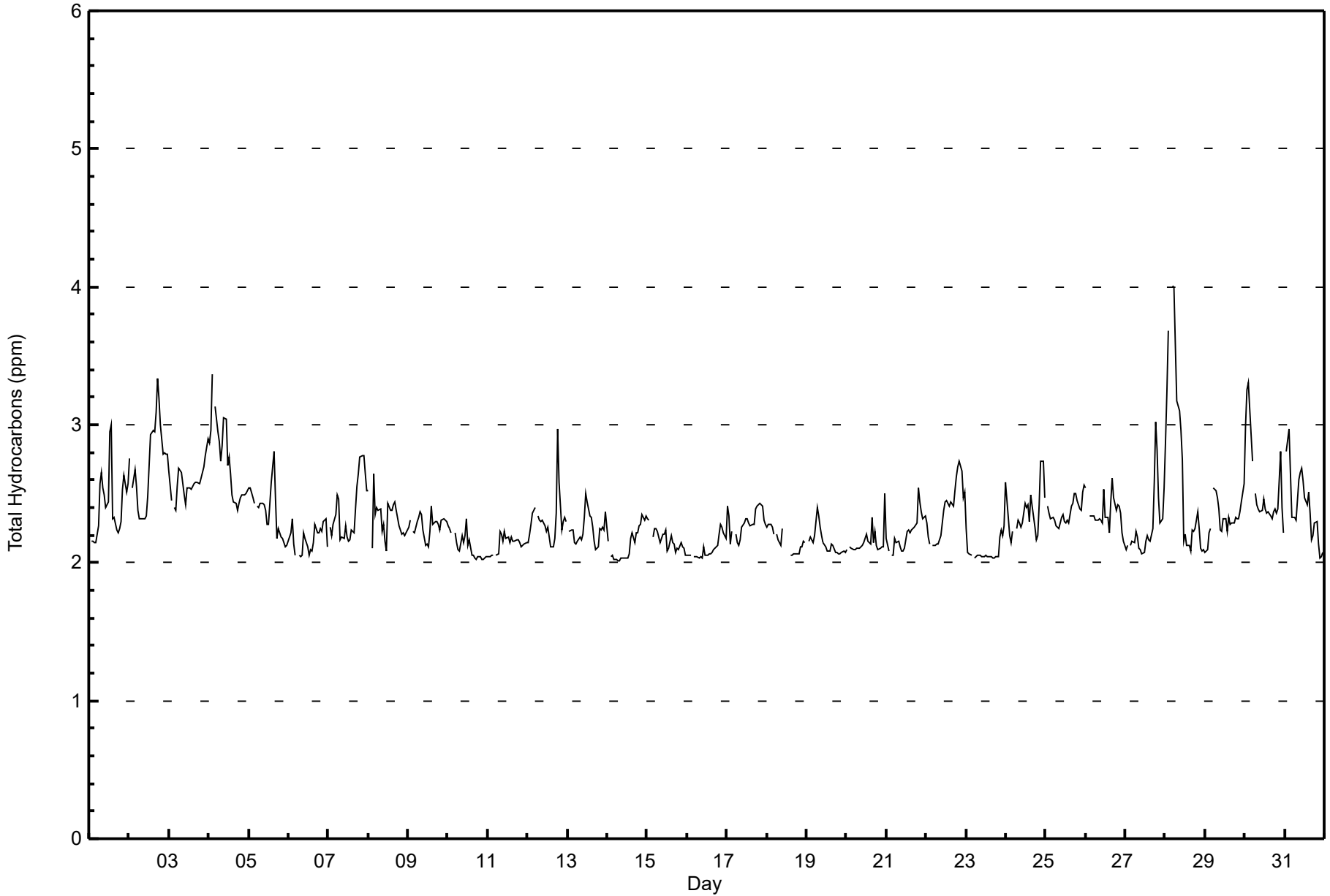
Total Hydrocarbons (THC) - ppm
Fort McKay South - December 2023

Maximum Value: 4.0 ppm on Dec 28 05:00		Maximum Daily Average: 2.7 ppm on Dec 4		Hours in Service: 744																																													
Minimum Value: 2.0 ppm on Dec 14 07:00		Minimum Daily Average: 2.1 ppm on Dec 23		Hours of Data: 709																																													
Maximum Diurnal Average: 2.4 ppm at hour 3		Minimum Diurnal Average: 2.3 ppm at hour 15		Hours of Missing Data: 35																																													
Monthly Average: 2.32 ppm		Percentiles: P ₁ = 2.0 P ₁₀ = 2.1 Q ₁ = 2.1 Median = 2.3 Q ₃ = 2.4 P ₉₀ = 2.6 P ₉₉ = 3.3		Hours of Calibration: 35																																													
				Percent Operational Time: 100.0																																													
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Dec	Z	2.2	2.2	2.1	2.1	2.3	2.6	2.7	2.5	2.5	2.4	2.4	2.9	3.0	2.3	2.3	2.2	2.2	2.2	2.3	2.5	2.6	2.5	2.6	2.4	3.0																							
2-Dec	2.8	Z	2.5	2.7	2.6	2.4	2.3	2.3	2.3	2.3	2.3	2.5	2.7	2.9	3.0	3.0	3.1	3.3	3.2	3.0	2.8	2.8	2.8	2.8	2.7	3.3																							
3-Dec	2.7	2.5	Z	2.4	2.4	2.6	2.7	2.6	2.6	2.5	2.4	2.5	2.5	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.7	2.7	2.8	2.9	2.6	2.9																							
4-Dec	2.9	3.0	3.4	Z	3.1	2.9	2.9	2.7	2.8	3.1	3.0	2.7	2.8	2.6	2.5	2.4	2.4	2.4	2.4	2.5	2.5	2.5	2.5	2.5	2.7	3.4																							
5-Dec	2.5	2.5	2.5	2.4	Z	2.4	2.4	2.4	2.4	2.4	2.4	2.3	2.3	2.6	2.7	2.8	2.5	2.2	2.3	2.2	2.2	2.1	2.1	2.1	2.4	2.8																							
6-Dec	2.2	2.2	2.3	2.1	2.1	Z	2.1	2.0	2.1	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.3	2.2	2.2	2.3	2.2	2.3	2.3	2.1	2.2	2.3																							
7-Dec	Z	2.3	2.2	2.3	2.4	2.5	2.5	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.4	2.6	2.6	2.8	2.8	2.8	2.6	2.5	2.4	2.8																							
8-Dec	2.5	Z	2.1	2.6	2.3	2.4	2.4	2.4	2.2	2.3	2.2	2.1	2.4	2.4	2.4	2.4	2.4	2.4	2.3	2.2	2.2	2.2	2.2	2.2	2.3	2.6																							
9-Dec	2.3	2.3	Z	2.2	2.2	2.3	2.3	2.4	2.4	2.2	2.1	2.1	2.1	2.2	2.4	2.3	2.3	2.3	2.3	2.2	2.3	2.3	2.3	2.3	2.3	2.4																							
10-Dec	2.3	2.2	2.2	Z	2.2	2.2	2.1	2.1	2.2	2.1	2.2	2.3	2.1	2.2	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.3																							
11-Dec	2.0	2.0	2.1	2.1	Z	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.2																							
12-Dec	2.1	2.2	2.3	2.4	2.4	Z	2.3	2.3	2.3	2.3	2.3	2.2	2.3	2.2	2.1	2.1	2.2	2.4	3.0	2.6	2.2	2.3	2.3	2.3	2.3	3.0																							
13-Dec	Z	2.2	2.2	2.2	2.1	2.1	2.2	2.2	2.2	2.2	2.3	2.5	2.4	2.3	2.3	2.3	2.2	2.1	2.1	2.2	2.2	2.3	2.2	2.4	2.2	2.5																							
14-Dec	2.2	Z	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	2.1	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.1	2.3																							
15-Dec	2.3	2.3	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.2	2.2	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.3																							
16-Dec	2.1	2.1	2.1	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	2.2	2.3	2.3	2.2	2.2	2.1	2.3																							
17-Dec	2.4	2.3	2.1	2.2	Z	2.2	2.1	2.1	2.2	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	2.3	2.3	2.4																							
18-Dec	2.3	2.3	2.3	2.3	2.2	Z	2.2	2.2	2.1	2.2	C	C	C	C	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.3																							
19-Dec	Z	2.2	2.2	2.2	2.1	2.2	2.4	2.3	2.3	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.4																							
20-Dec	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.1	2.3	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.5	2.5																							
21-Dec	2.2	2.1	Z	2.1	2.1	2.2	2.1	2.2	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.5	2.4	2.4	2.3	2.3	2.2	2.5																							
22-Dec	2.3	2.2	2.1	Z	2.1	2.1	2.1	2.1	2.2	2.2	2.4	2.4	2.5	2.4	2.4	2.4	2.4	2.5	2.6	2.7	2.7	2.7	2.5	2.5	2.4	2.7																							
23-Dec	2.2	2.1	2.1	2.1	Z	2.0	2.0	2.1	2.1	2.0	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.2	2.2	2.2	2.3	2.1	2.3																							
24-Dec	2.6	2.3	2.2	2.1	2.2	Z	2.2	2.3	2.3	2.3	2.3	2.4	2.4	2.4	2.3	2.5	2.4	2.3	2.2	2.2	2.4	2.7	2.7	2.5	2.4	2.7																							
25-Dec	Z	2.4	2.4	2.3	2.3	2.3	2.3	2.3	2.2	2.3	2.4	2.3	2.3	2.3	2.3	2.4	2.4	2.5	2.5	2.4	2.4	2.4	2.5	2.6	2.4	2.6																							
26-Dec	2.5	Z	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.5	2.3	2.3	2.2	2.4	2.6	2.5	2.4	2.4	2.4	2.4	2.2	2.2	2.4	2.6																							
27-Dec	2.1	2.1	Z	2.1	2.2	2.1	2.2	2.2	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.6	3.0	2.8	2.5	2.3	2.3	2.5	2.3	3.0																							
28-Dec	2.9	3.2	3.7	Z	4.0	4.0	3.6	3.2	3.1	3.0	2.7	2.2	2.2	2.1	2.1	2.1	2.2	2.2	2.2	2.4	2.3	2.1	2.1	2.1	2.7	4.0																							
29-Dec	2.1	2.1	2.2	2.2	Z	2.5	2.5	2.5	2.4	2.2	2.2	2.3	2.3	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.4	2.4	2.6	2.3	2.6																							
30-Dec	3.0	3.3	3.3	3.1	2.7	Z	2.5	2.4	2.4	2.4	2.4	2.4	2.5	2.4	2.4	2.3	2.3	2.4	2.4	2.4	2.4	2.4	2.8	2.4	2.2	3.3																							
31-Dec	Z	2.8	3.0	2.6	2.3	2.3	2.3	2.3	2.6	2.7	2.7	2.6	2.5	2.4	2.5	2.4	2.2	2.2	2.3	2.3	2.1	2.0	2.0	2.1	2.4	3.0																							
																								2.4	2.4	2.4	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.4	2.3	2.3	Diurnal Average		
																								3.0	3.3	3.7	3.1	4.0	4.0	3.6	3.2	3.1	3.1	3.0	2.7	2.9	3.0	3.0	3.0	3.1	3.3	3.2	3.0	2.8	2.8	2.8	2.9	Diurnal Maximum	
Z - zerospan																								C - Calibration																									



Wood Buffalo Environmental Association
Hourly Averages

Total Hydrocarbons (THC) - ppm
Fort McKay South - December 2023





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Fort McKay South - December 2023

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	42	5.92	5.92
2.1 - 3.0	651	91.82	97.74
3.1 - 10.0	16	2.26	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 709

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Total Hydrocarbons (THC) - ppm
Fort McKay South - December 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	1	0	3	13	13	4	5	3	42
2.1 - 3.0	31	13	8	0	0	2	11	92	190	91	73	56	27	13	16	26	649
3.1 - 10.0	0	0	0	0	0	0	0	1	3	4	1	2	1	1	2	1	16
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	31	13	8	0	0	2	11	93	194	95	77	71	41	18	23	30	707

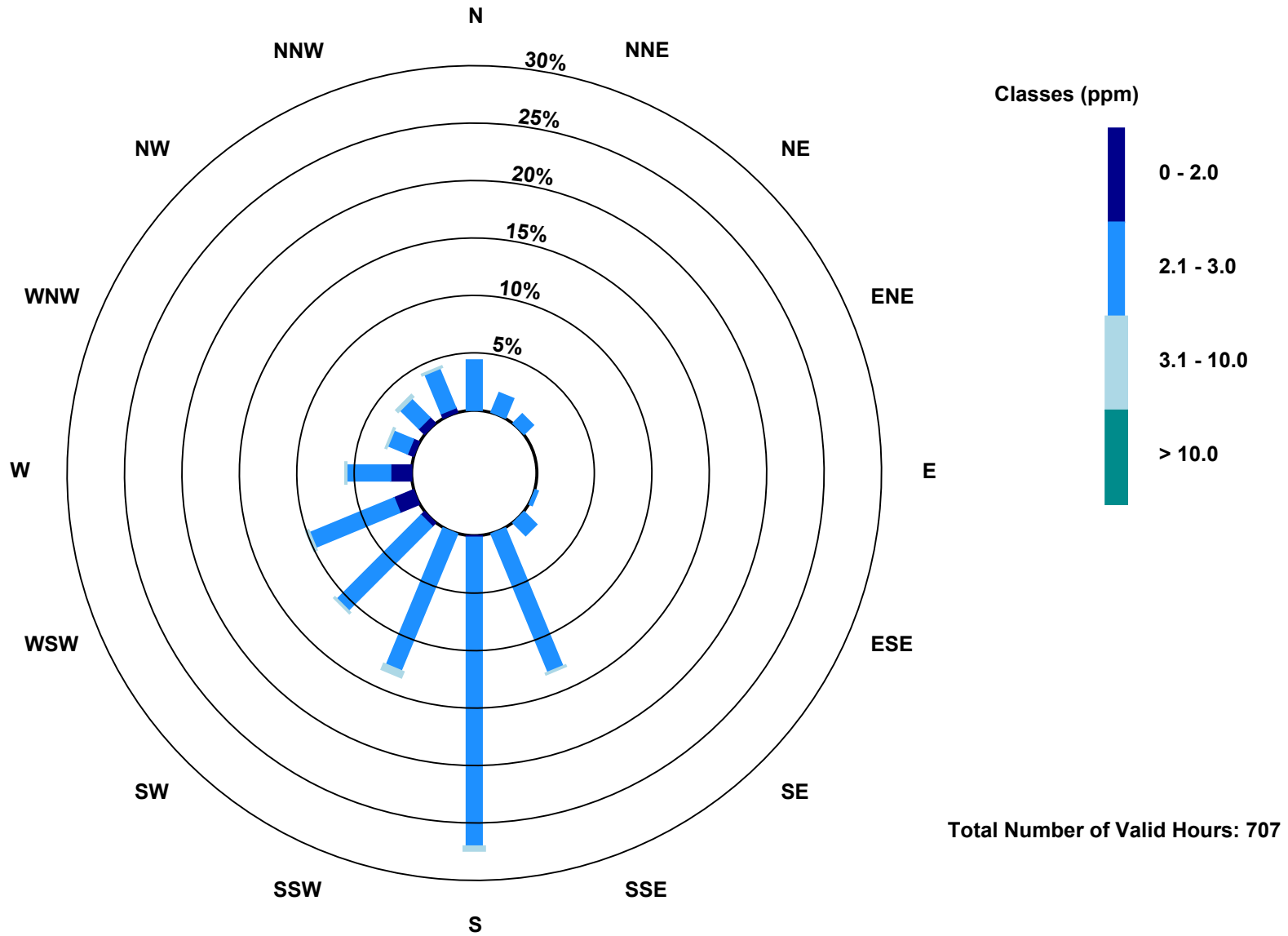
Total Number of Valid Hours: 707

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Dec 2023

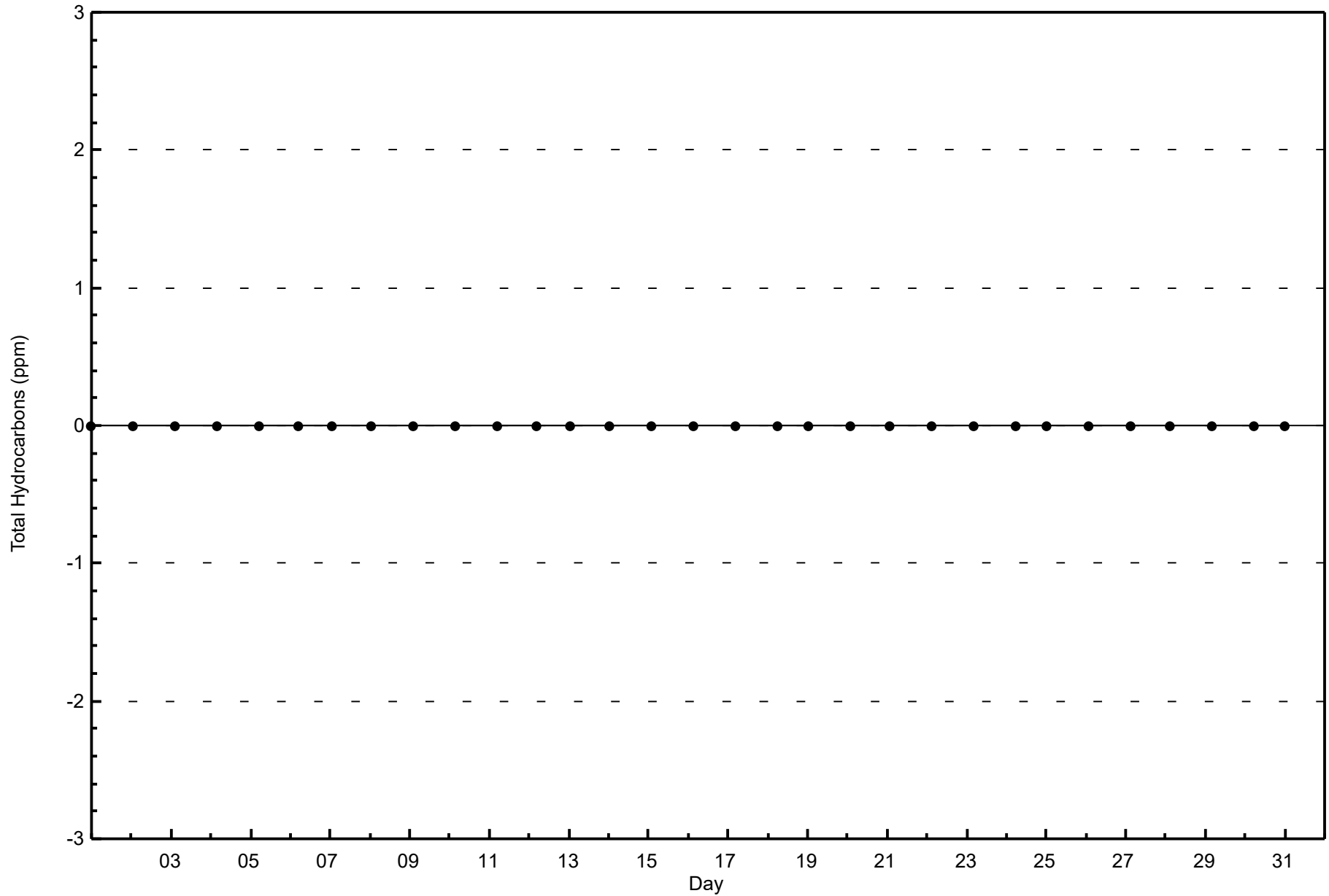
Total Hydrocarbons (THC) - ppm
Fort McKay South

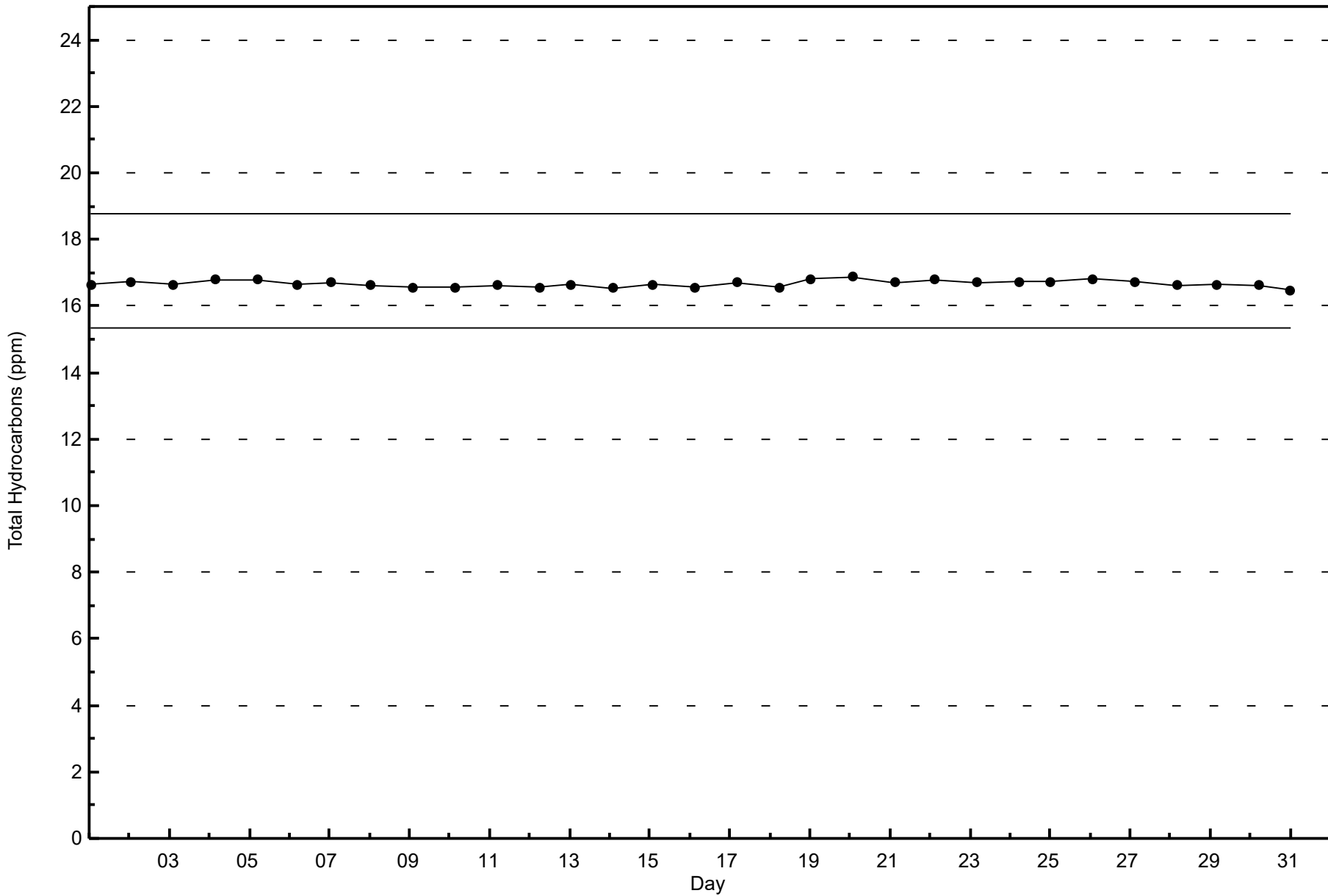




Wood Buffalo Environmental Association
Zero Responses

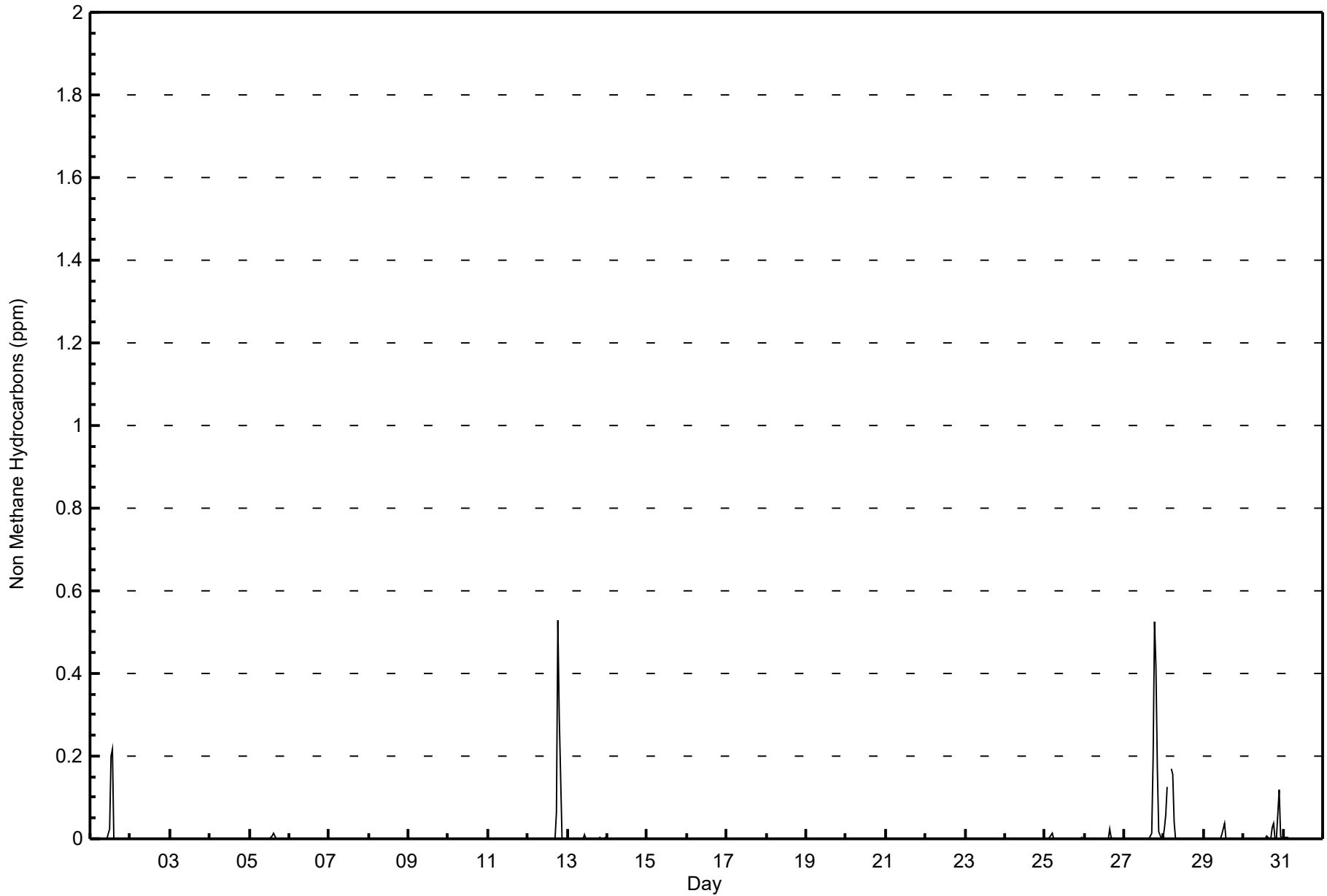
Total Hydrocarbons (THC) - ppm
Fort McKay South - December 2023







Maximum Value: 0.528 ppm on Dec 12 19:00																				Maximum Daily Average: 0.058 ppm on Dec 27					Hours in Service:	744
Minimum Value: 0.000 ppm on Dec 1 02:00																				Minimum Daily Average: 0.000 ppm on Dec 2					Hours of Data:	709
Maximum Diurnal Average: 0.035 ppm at hour 19																				Minimum Diurnal Average: 0.000 ppm at hour 10					Hours of Missing Data:	35
Monthly Average: 0.005 ppm																				Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.0 Median = 0.0 Q ₃ = 0.0 P ₉₀ = 0.0 P ₉₉ = 0.2					Hours of Calibration:	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-Dec	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.023	0.200	0.217	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.019	0.217
2-Dec	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-Dec	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4-Dec	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-Dec	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	0.007	0.015	0.008	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.015
6-Dec	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
7-Dec	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-Dec	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-Dec	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-Dec	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
11-Dec	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
12-Dec	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	0.065	0.528	0.295	0.000	0.000	0.000	0.000	0.039	0.528
13-Dec	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.000	0.000	0.000	0.002	0.001	0.011
14-Dec	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-Dec	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-Dec	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-Dec	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-Dec	0.000	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	C	C	C	C	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
19-Dec	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
20-Dec	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-Dec	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
22-Dec	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-Dec	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-Dec	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-Dec	Z	0.000	0.001	0.002	0.012	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.001	0.012
26-Dec	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	0.023	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.023
27-Dec	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	0.013	0.195	0.526	0.417	0.174	0.018	0.000	0.000	0.058	0.526	
28-Dec	0.024	0.057	0.125	Z	0.170	0.157	0.040	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	0.025	0.170	
29-Dec	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.009	0.038	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.038	
30-Dec	0.000	0.001	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.007	0.000	0.000	0.026	0.038	0.000	0.000	0.120	0.006	0.009	0.120	
31-Dec	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
																				0.001 0.002 0.005 0.000 0.007 0.006 0.001 0.000 0.000 0.000 0.000 0.001 0.008 0.008 0.001 0.001 0.001 0.009 0.035 0.023 0.006 0.004 0.000 0.000					Diurnal Average	
																				0.024 0.057 0.125 0.002 0.170 0.157 0.040 0.001 0.000 0.000 0.011 0.023 0.200 0.217 0.015 0.023 0.013 0.195 0.528 0.417 0.174 0.120 0.006 0.002					Diurnal Maximum	
Z - zerospan		C - Calibration																								





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Non Methane Hydrocarbons (NMHC) - ppm
Fort McKay South - December 2023**

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 0.005	678	95.63	95.63
0.006 - 0.05	17	2.40	98.03
0.06 - 0.1	4	0.56	98.59
> 0.1	10	1.41	100.00

Total Number of Valid Hours: 709

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Non Methane Hydrocarbons (NMHC) - ppm
Fort McKay South - December 2023**

Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 0.005	30	12	8	0	0	2	10	89	184	92	74	70	40	18	19	28	676
0.006 - 0.05	1	1	0	0	0	0	1	3	7	0	2	0	1	0	1	0	17
0.06 - 0.1	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	1	4
> 0.1	0	0	0	0	0	0	0	1	2	3	1	0	0	0	2	1	10
Totals	31	13	8	0	0	2	11	93	194	95	77	71	41	18	23	30	707

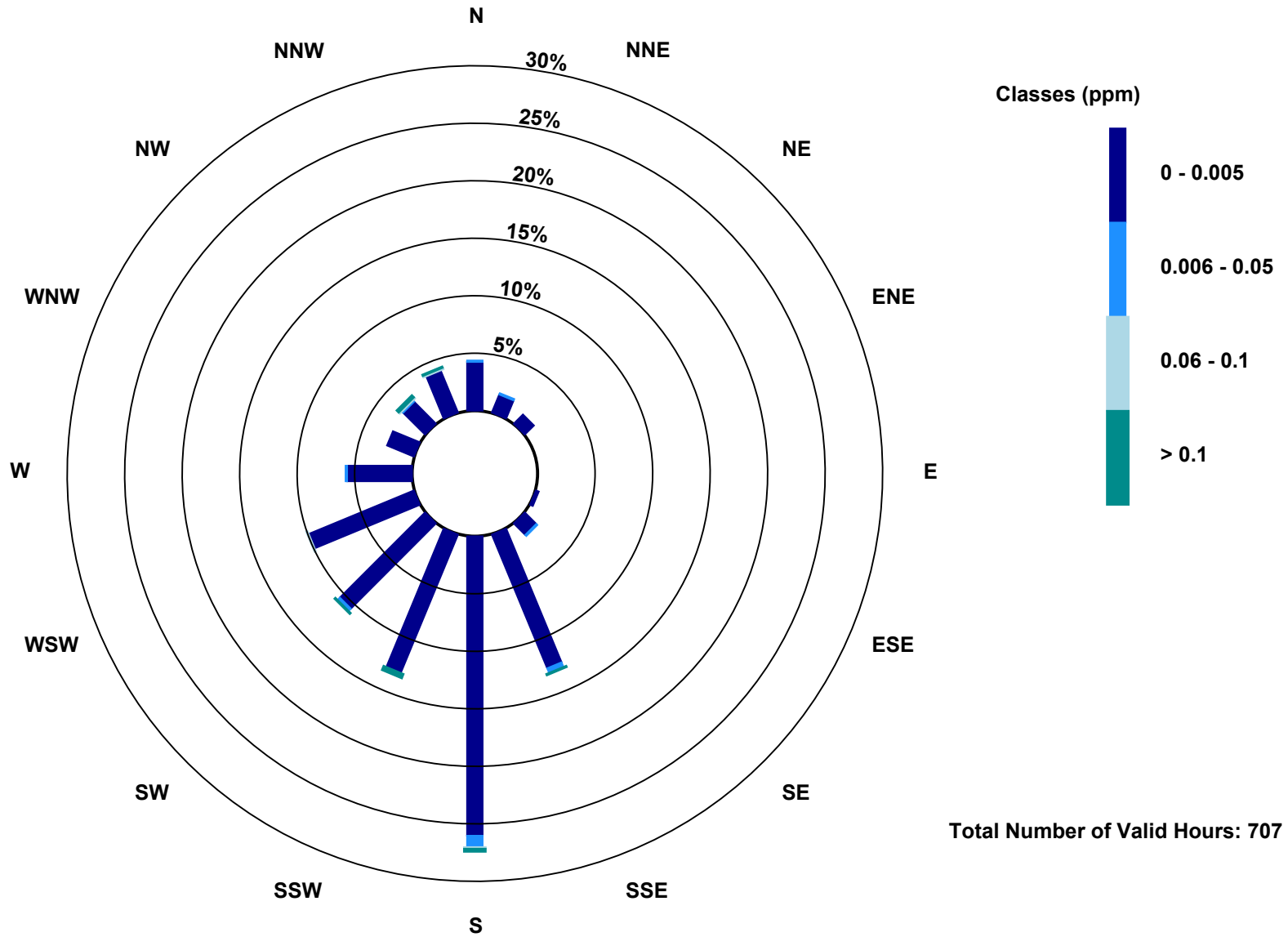
Total Number of Valid Hours: 707

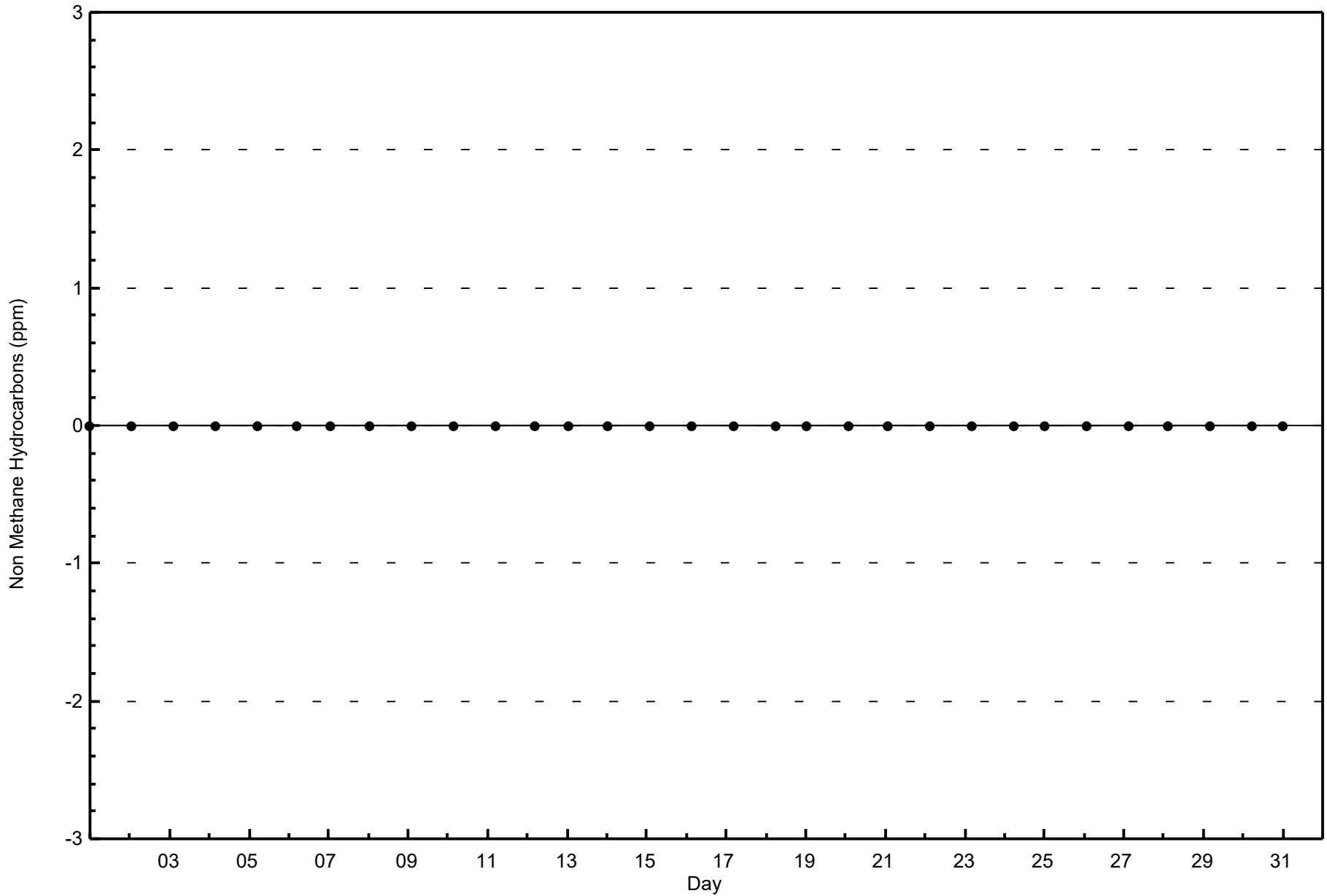
Total Number of Hours: 744

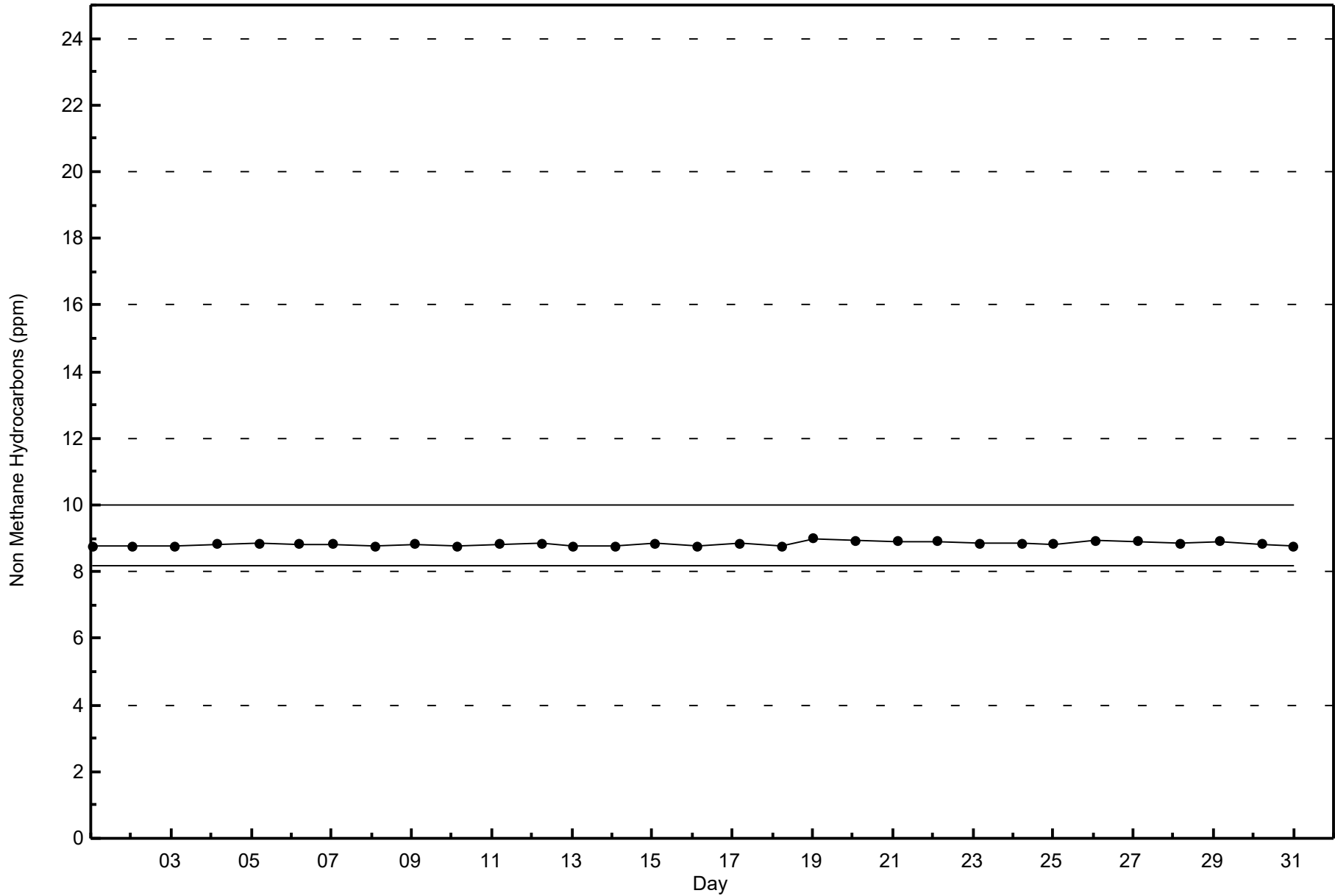


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Non Methane Hydrocarbons (NMHC) - ppm
Fort McKay South

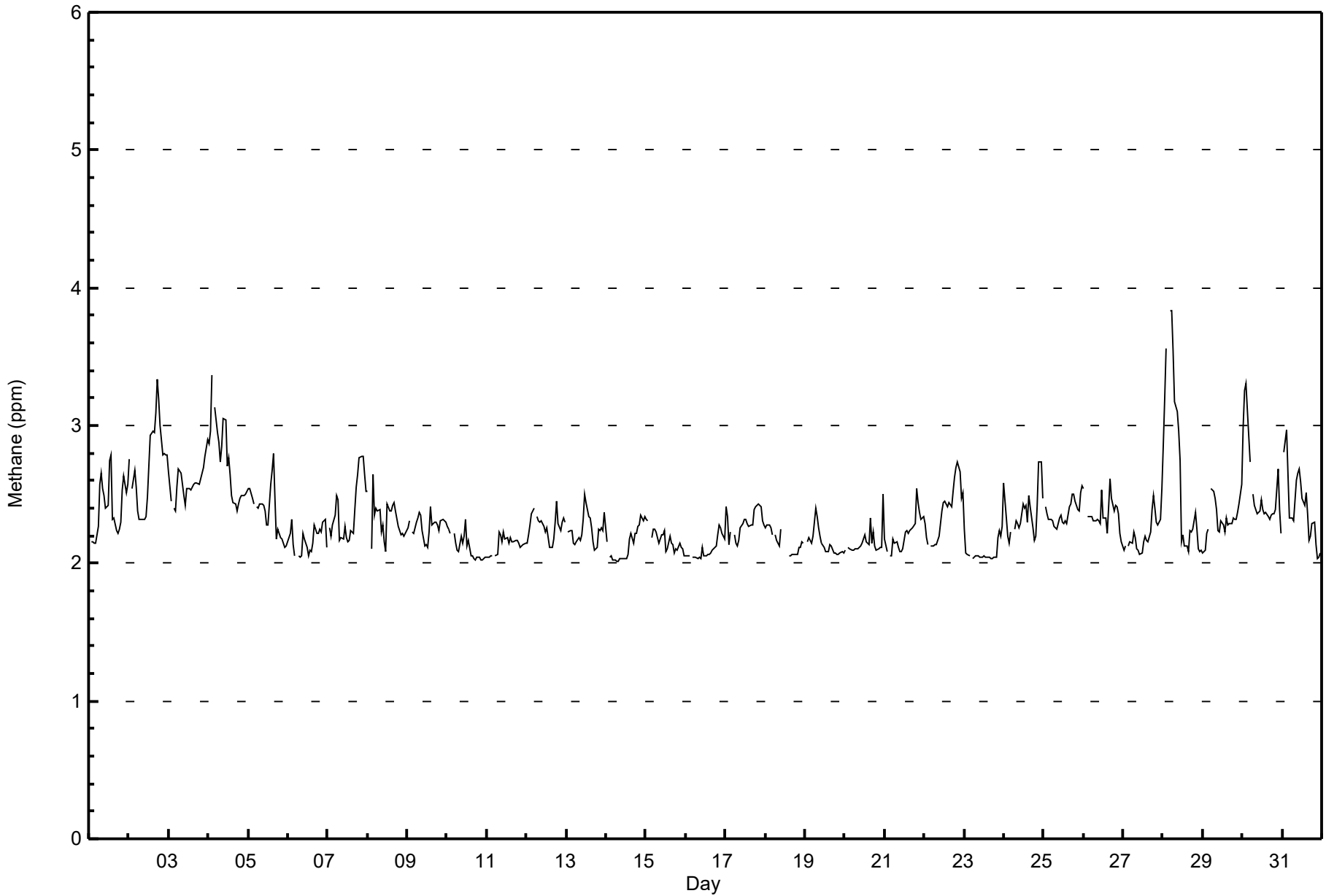








Number of Exceedences (AAAQO):		1-hr: 0		24-hr: 0		Hours in Service:														744						
Maximum Value: 3.8 ppm on Dec 28 06:00		Maximum Daily Average: 2.7 ppm on Dec 4		Hours of Data:														709								
Minimum Value: 2.0 ppm on Dec 14 07:00		Minimum Daily Average: 2.1 ppm on Dec 23		Hours of Missing Data:														35								
Maximum Diurnal Average: 2.4 ppm at hour 3		Minimum Diurnal Average: 2.3 ppm at hour 15		Hours of Calibration:														35								
Monthly Average: 2.32 ppm		Percentiles: P ₁ = 2.0 P ₁₀ = 2.1 Q ₁ = 2.1 Median = 2.3 Q ₃ = 2.4 P ₉₀ = 2.6 P ₉₉ = 3.2		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-Dec	Z	2.2	2.2	2.1	2.1	2.3	2.6	2.7	2.5	2.5	2.4	2.4	2.7	2.8	2.3	2.3	2.2	2.2	2.2	2.3	2.5	2.6	2.5	2.6	2.4	2.8
2-Dec	2.8	Z	2.5	2.7	2.6	2.4	2.3	2.3	2.3	2.3	2.3	2.5	2.7	2.9	3.0	3.0	3.1	3.3	3.2	3.0	2.8	2.8	2.8	2.8	2.7	3.3
3-Dec	2.7	2.5	Z	2.4	2.4	2.6	2.7	2.6	2.6	2.5	2.4	2.5	2.5	2.5	2.6	2.6	2.6	2.6	2.6	2.6	2.7	2.7	2.8	2.9	2.6	2.9
4-Dec	2.9	3.0	3.4	Z	3.1	2.9	2.9	2.7	2.8	3.1	3.0	2.7	2.8	2.6	2.5	2.4	2.4	2.4	2.4	2.5	2.5	2.5	2.5	2.5	2.7	3.4
5-Dec	2.5	2.5	2.5	2.4	Z	2.4	2.4	2.4	2.4	2.4	2.4	2.3	2.3	2.6	2.7	2.8	2.5	2.2	2.3	2.2	2.2	2.1	2.1	2.1	2.4	2.8
6-Dec	2.2	2.2	2.3	2.1	2.1	Z	2.1	2.0	2.1	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.3	2.2	2.2	2.3	2.2	2.3	2.3	2.1	2.2	2.3
7-Dec	Z	2.3	2.2	2.3	2.4	2.5	2.5	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.4	2.6	2.6	2.8	2.8	2.8	2.6	2.5	2.4	2.8
8-Dec	2.5	Z	2.1	2.6	2.3	2.4	2.4	2.4	2.2	2.3	2.2	2.1	2.4	2.4	2.4	2.4	2.4	2.4	2.3	2.2	2.2	2.2	2.2	2.2	2.3	2.6
9-Dec	2.3	2.3	Z	2.2	2.2	2.3	2.3	2.4	2.4	2.2	2.1	2.1	2.1	2.2	2.4	2.3	2.3	2.3	2.3	2.2	2.3	2.3	2.3	2.3	2.3	2.4
10-Dec	2.3	2.2	2.2	Z	2.2	2.2	2.1	2.1	2.2	2.1	2.2	2.3	2.1	2.2	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.3
11-Dec	2.0	2.0	2.1	2.1	Z	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.2
12-Dec	2.1	2.2	2.3	2.4	2.4	Z	2.3	2.3	2.3	2.3	2.3	2.2	2.3	2.2	2.1	2.1	2.2	2.3	2.4	2.3	2.2	2.3	2.3	2.3	2.3	2.4
13-Dec	Z	2.2	2.2	2.2	2.1	2.1	2.2	2.2	2.2	2.2	2.3	2.5	2.4	2.3	2.3	2.3	2.2	2.1	2.1	2.2	2.2	2.3	2.2	2.4	2.2	2.5
14-Dec	2.2	Z	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	2.3	2.3	2.3	2.3	2.1	2.3
15-Dec	2.3	2.3	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.2	2.2	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.3
16-Dec	2.1	2.1	2.1	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	2.2	2.3	2.3	2.2	2.2	2.1	2.3
17-Dec	2.4	2.3	2.1	2.2	Z	2.2	2.1	2.1	2.2	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	2.3	2.3	2.4
18-Dec	2.3	2.3	2.3	2.3	2.2	Z	2.2	2.2	2.1	2.2	C	C	C	C	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.3
19-Dec	Z	2.2	2.2	2.2	2.1	2.2	2.4	2.3	2.3	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.4
20-Dec	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.1	2.3	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.5	2.5
21-Dec	2.2	2.1	Z	2.1	2.1	2.2	2.1	2.2	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.5	2.4	2.4	2.3	2.3	2.2	2.5
22-Dec	2.3	2.2	2.1	Z	2.1	2.1	2.1	2.1	2.2	2.2	2.4	2.4	2.5	2.4	2.4	2.4	2.4	2.5	2.6	2.7	2.7	2.7	2.5	2.5	2.4	2.7
23-Dec	2.2	2.1	2.1	2.1	Z	2.0	2.0	2.1	2.1	2.0	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.2	2.2	2.2	2.3	2.1	2.3
24-Dec	2.6	2.3	2.2	2.1	2.2	Z	2.2	2.3	2.3	2.3	2.3	2.4	2.4	2.4	2.3	2.5	2.4	2.3	2.2	2.2	2.4	2.7	2.7	2.5	2.4	2.7
25-Dec	Z	2.4	2.4	2.3	2.3	2.3	2.3	2.3	2.2	2.3	2.4	2.3	2.3	2.3	2.3	2.4	2.4	2.5	2.5	2.4	2.4	2.4	2.5	2.6	2.4	2.6
26-Dec	2.5	Z	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.5	2.3	2.3	2.2	2.4	2.6	2.5	2.4	2.4	2.4	2.4	2.2	2.2	2.4	2.6
27-Dec	2.1	2.1	Z	2.1	2.2	2.1	2.2	2.2	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.4	2.5	2.4	2.3	2.3	2.3	2.5	2.2	2.5
28-Dec	2.9	3.2	3.6	Z	3.8	3.8	3.5	3.2	3.1	3.0	2.7	2.2	2.2	2.1	2.1	2.1	2.2	2.2	2.2	2.4	2.3	2.1	2.1	2.1	2.7	3.8
29-Dec	2.1	2.1	2.2	2.2	Z	2.5	2.5	2.5	2.4	2.2	2.2	2.3	2.3	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.4	2.4	2.6	2.3	2.6
30-Dec	3.0	3.3	3.3	3.1	2.7	Z	2.5	2.4	2.4	2.4	2.4	2.4	2.5	2.4	2.4	2.3	2.3	2.3	2.3	2.4	2.4	2.4	2.7	2.4	2.2	3.3
31-Dec	Z	2.8	3.0	2.6	2.3	2.3	2.3	2.3	2.6	2.7	2.7	2.6	2.5	2.4	2.5	2.4	2.2	2.2	2.3	2.3	2.1	2.0	2.0	2.1	2.4	3.0
																								Diurnal Average		
																								Diurnal Maximum		
Z - zerospan C - Calibration																										





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Methane (CH₄) - ppm
Fort McKay South - December 2023

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	42	5.92	5.92
2.1 - 3.0	651	91.82	97.74
3.1 - 10.0	16	2.26	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 709

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Methane (CH₄) - ppm
Fort McKay South - December 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	1	0	3	13	13	4	5	3	42
2.1 - 3.0	31	13	8	0	0	2	11	92	190	91	73	56	27	13	16	26	649
3.1 - 10.0	0	0	0	0	0	0	0	1	3	4	1	2	1	1	2	1	16
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	31	13	8	0	0	2	11	93	194	95	77	71	41	18	23	30	707

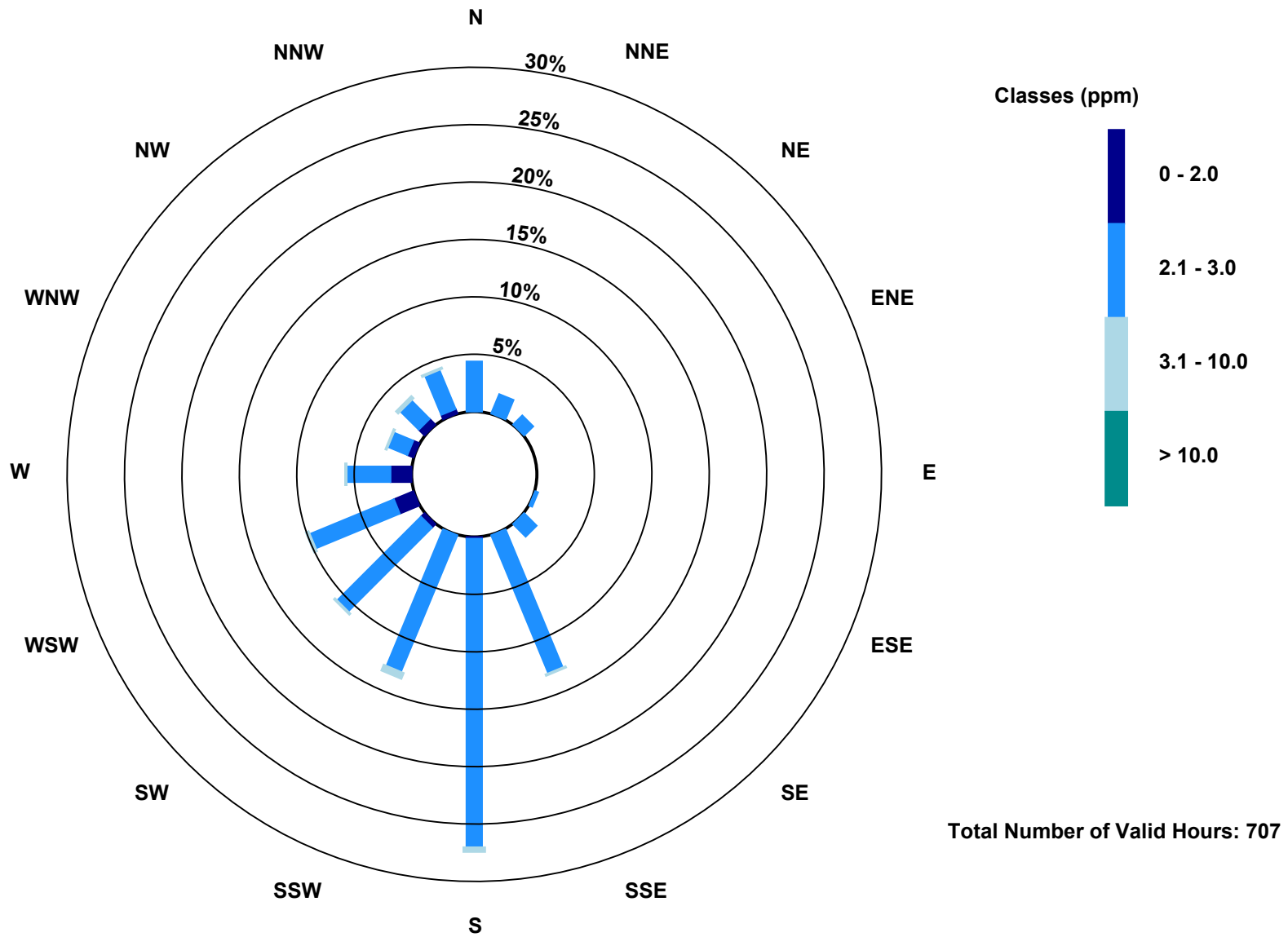
Total Number of Valid Hours: 707

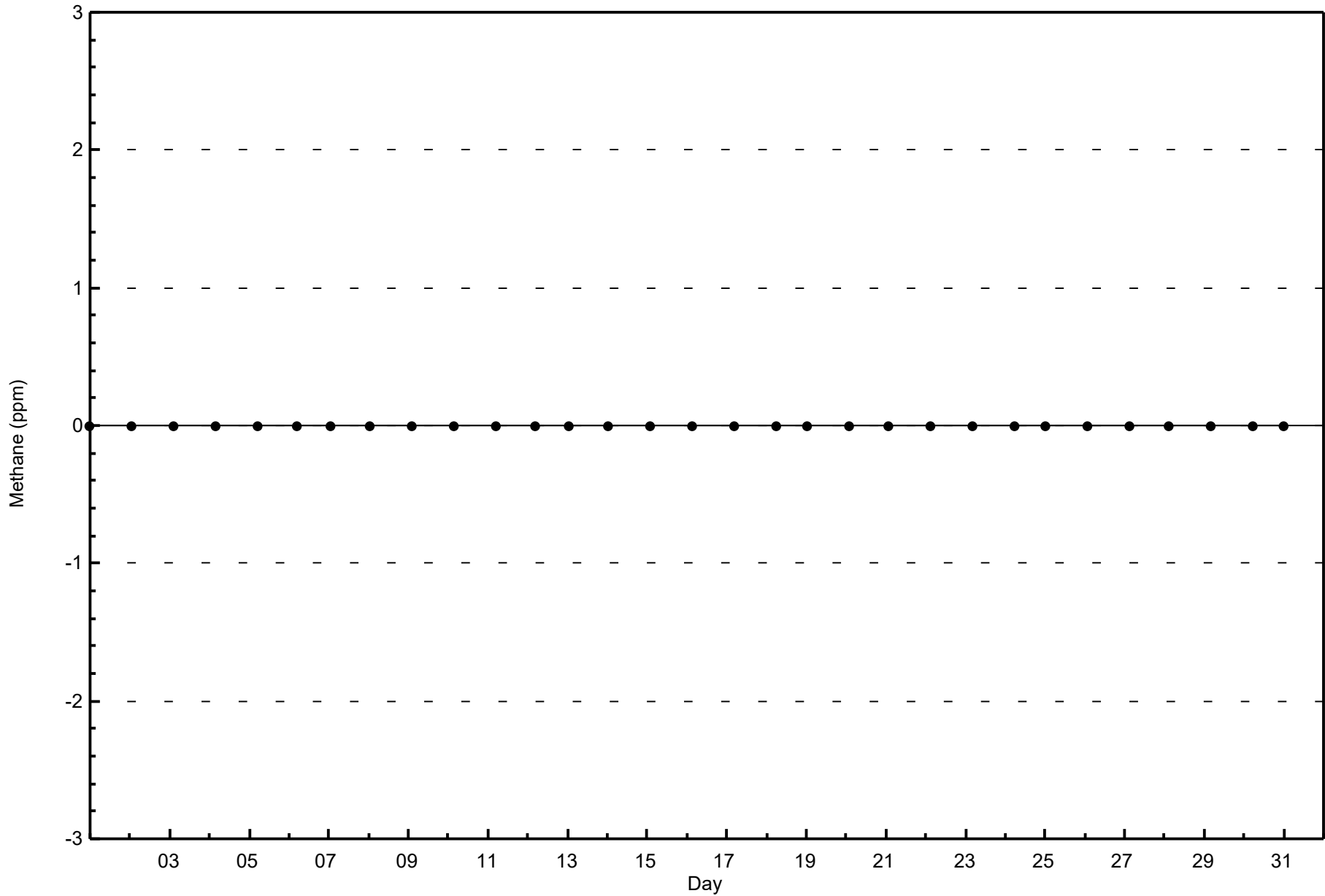
Total Number of Hours: 744

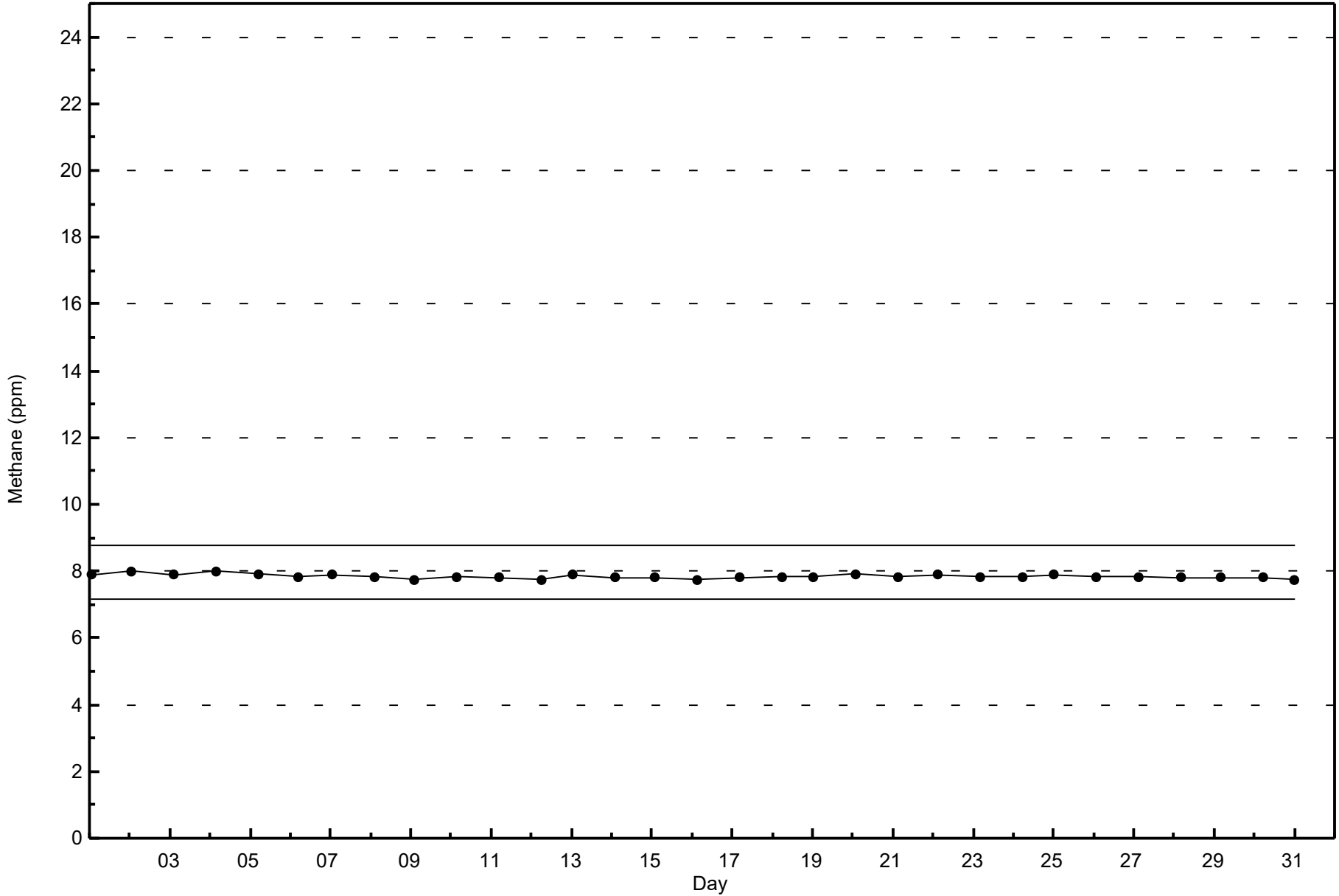


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Methane (CH₄) - ppm
Fort McKay South









Wood Buffalo Environmental Association

Summary of Hour Averages

Ozone (O₃) - ppb

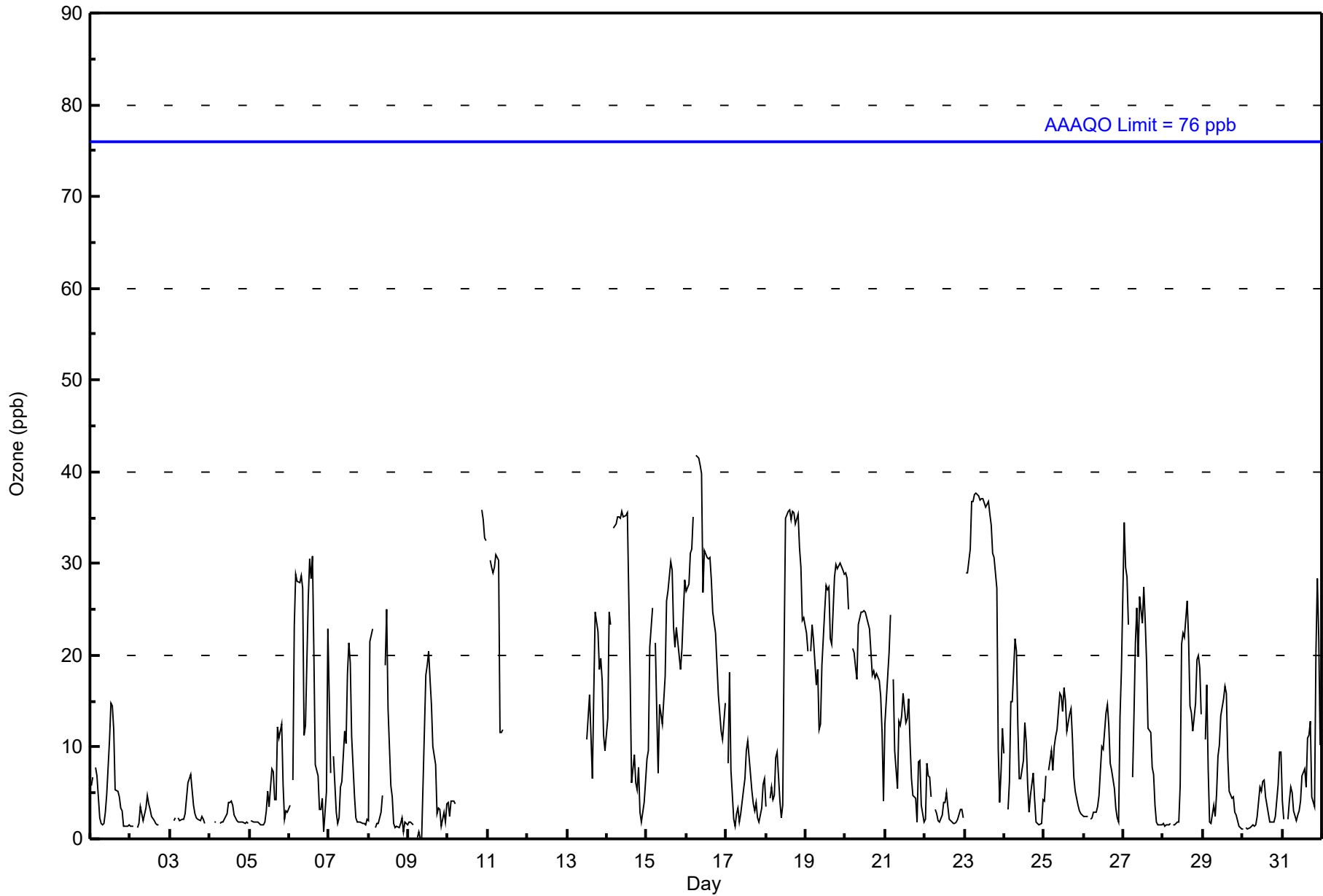
Fort McKay South - December 2023

Number of Exceedences (AAAQO):		1-hr: 0	24-hr: 0	Hours in Service:																	744																												
Maximum Value: 41.8 ppb on Dec 16 07:00		Maximum Daily Average: 29.9 ppb on Dec 23																	Hours of Data:	637																													
Minimum Value: 0.0 ppb on Dec 9 08:00		Minimum Daily Average: 2.3 ppb on Dec 4																	Hours of Missing Data:	107																													
Maximum Diurnal Average: 17.5 ppb at hour 13		Minimum Diurnal Average: 9.1 ppb at hour 20																	Hours of Calibration:	35																													
Monthly Average: 11.84 ppb		Percentiles: P ₁ = 1.1 P ₁₀ = 1.7 Q ₁ = 2.7 Median = 7.2 Q ₃ = 19.7 P ₉₀ = 29.4 P ₉₉ = 37.3																	Percent Operational Time:	90.3																													
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-Dec	5.7	6.7	Z	7.8	6.8	2.3	1.6	1.6	1.7	2.8	4.9	10.8	14.8	14.5	11.9	5.4	5.2	4.5	3.3	3.0	1.3	1.4	1.4	1.5	5.3	14.8																							
2-Dec	1.4	1.4	1.4	Z	1.3	1.8	3.5	2.8	2.0	3.3	4.7	3.7	3.2	2.4	2.1	1.6	1.6	1.6	UO	UO	UO	UO	UO	UO	--	4.7																							
3-Dec	UO	UO	1.9	2.2	Z	2.2	2.0	2.2	2.1	2.8	4.4	6.1	6.9	5.4	3.7	2.8	2.2	2.1	2.0	2.4	2.1	1.7	UO	UO	3.0	6.9																							
4-Dec	UO	UO	1.8	1.9	Z	1.7	1.8	1.8	2.1	2.8	4.0	3.9	4.1	3.6	2.7	1.9	1.8	1.9	1.8	1.9	1.7	1.9	1.7	2.3	4.1	6.9																							
5-Dec	Z	2.0	1.8	1.8	1.9	1.8	1.6	1.6	1.5	1.9	3.0	5.1	3.5	7.6	7.3	4.3	4.2	12.2	11.0	12.5	6.0	2.1	3.1	2.9	4.4	12.5																							
6-Dec	3.7	Z	6.3	23.2	28.8	28.1	27.8	28.7	27.3	11.3	12.3	26.3	30.5	28.3	30.8	20.3	8.1	6.9	3.2	3.3	4.5	0.7	5.1	22.9	16.9	30.8																							
7-Dec	15.2	7.2	Z	9.0	2.8	1.7	2.3	5.6	6.2	11.8	10.4	18.0	21.3	19.2	11.1	4.7	2.3	1.8	1.9	1.9	1.6	1.7	1.5	2.1	7.0	21.3																							
8-Dec	1.9	21.5	22.9	Z	1.3	1.7	1.7	2.9	4.8	UO	18.9	25.0	14.1	5.8	4.5	1.7	1.3	1.3	1.2	1.7	2.2	0.8	1.9	1.5	6.4	25.0																							
9-Dec	1.8	1.8	1.7	1.6	Z	0.2	0.7	0.0	0.0	5.9	17.8	19.0	20.5	17.4	14.7	10.0	8.1	2.7	3.4	3.2	1.4	2.9	1.8	3.8	6.1	20.5																							
10-Dec	3.9	2.4	4.1	4.2	3.8	Z	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	35.9	34.7	32.9	32.5	--	35.9																				
11-Dec	Z	30.4	29.5	29.0	29.5	30.9	30.3	11.6	11.6	11.9	C	C	C	C	M	M	M	M	M	M	M	M	M	M	--	30.9																							
12-Dec	M	M	M	M	M	M	M	M	M	M	M	M	C	C	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	--	--																							
13-Dec	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	M	M	10.9	15.7	11.2	6.6	15.9	24.7	22.5	18.5	19.7	17.3	11.3	9.6	--	24.7																							
14-Dec	13.2	24.8	23.3	Z	33.9	34.3	35.0	35.0	35.0	35.7	35.1	35.2	35.5	26.5	17.5	6.2	9.2	6.1	5.3	7.8	2.9	1.8	4.0	6.2	20.4	35.7																							
15-Dec	8.8	9.7	20.9	25.1	Z	21.4	13.9	7.1	14.6	12.5	15.1	17.7	26.0	27.0	30.1	29.3	23.1	20.8	23.1	21.4	18.5	20.8	24.8	28.2	20.0	30.1																							
16-Dec	27.0	27.8	31.1	31.5	35.1	Z	41.8	41.5	40.7	39.8	26.8	31.4	30.6	30.5	30.6	28.2	24.7	22.4	19.1	15.7	13.7	11.7	10.8	14.9	27.3	41.8																							
17-Dec	Z	8.2	18.2	7.5	2.1	1.4	2.8	3.3	1.8	2.8	5.3	6.6	9.6	10.7	8.8	5.3	3.9	3.0	4.0	2.3	1.8	3.3	6.0	6.5	5.5	18.2																							
18-Dec	3.5	Z	4.4	5.6	4.2	4.7	8.8	9.4	4.2	2.2	3.6	20.6	35.0	35.7	35.9	34.7	35.8	35.5	34.3	35.4	31.8	29.5	23.9	24.1	20.1	35.9																							
19-Dec	22.4	20.5	Z	20.5	23.3	21.7	16.8	18.4	12.0	12.6	18.9	24.8	27.6	27.1	27.5	21.9	21.2	28.5	30.0	29.5	29.8	30.0	29.3	28.8	23.6	30.0																							
20-Dec	29.0	28.4	25.0	Z	20.7	20.3	18.8	17.4	23.3	24.7	24.8	24.9	24.6	24.2	22.9	20.5	17.8	18.2	17.6	18.1	17.2	15.6	11.6	4.1	20.4	29.0																							
21-Dec	12.6	17.6	20.3	24.4	Z	17.3	9.6	5.5	12.8	12.3	13.4	15.8	12.6	13.2	15.3	10.3	6.5	4.8	4.5	1.9	8.4	8.6	3.6	1.8	11.0	24.4																							
22-Dec	2.1	8.2	6.8	6.7	4.6	Z	3.2	2.7	2.0	1.8	2.7	4.0	3.9	5.0	3.5	2.2	1.9	1.7	1.6	1.8	2.2	3.3	3.2	2.2	3.4	8.2																							
23-Dec	Z	29.0	28.9	31.6	36.8	36.8	37.5	37.7	37.4	37.0	37.1	37.1	36.7	36.2	36.8	35.4	34.1	31.2	30.6	27.3	9.8	3.9	7.3	12.0	29.9	37.7																							
24-Dec	9.4	Z	3.3	6.3	14.9	15.0	21.8	20.4	12.3	6.6	6.6	8.6	12.6	10.5	5.9	2.9	4.7	7.2	4.2	1.9	1.6	1.6	1.7	4.3	8.0	21.8																							
25-Dec	4.2	6.8	Z	7.5	9.7	7.5	10.1	11.2	11.9	15.9	15.6	13.9	16.5	15.2	11.8	13.6	14.3	11.0	6.7	5.1	3.7	3.1	2.8	2.6	9.6	16.5																							
26-Dec	2.4	2.4	2.4	Z	2.2	2.3	2.9	2.9	3.5	4.7	7.5	10.0	9.7	13.8	14.7	12.4	8.2	7.4	5.5	3.4	2.3	1.8	13.3	18.4	6.7	18.4																							
27-Dec	34.4	29.6	28.5	23.3	Z	6.8	13.6	21.3	25.1	19.8	26.4	23.5	27.4	23.8	19.2	12.0	11.5	7.9	7.0	3.7	1.9	1.5	1.6	1.5	16.2	34.4																							
28-Dec	1.6	1.4	1.5	1.6	1.7	Z	1.6	1.6	1.8	1.9	5.9	21.2	22.4	21.9	25.9	21.7	14.5	13.7	11.7	14.7	19.6	20.0	18.6	13.6	11.3	25.9																							
29-Dec	Z	10.9	16.8	7.6	1.8	1.7	3.7	2.4	4.8	9.1	10.2	13.5	15.3	16.7	15.8	8.8	5.2	4.5	4.5	2.9	2.6	1.9	1.3	1.1	7.1	16.8																							
30-Dec	1.1	Z	1.3	1.1	1.3	1.4	1.5	1.4	1.6	2.5	5.7	5.3	6.3	6.4	4.5	2.7	1.8	1.9	1.9	1.9	2.4	5.9	9.5	9.4	3.4	9.5																							
31-Dec	4.0	2.2	Z	2.1	4.1	5.7	5.1	3.1	2.0	2.5	3.1	4.0	6.8	7.6	5.7	11.0	11.3	12.9	4.5	3.5	20.2	28.4	22.0	10.3	7.9	28.4																							
																								9.5	13.1	13.1	11.8	11.4	11.2	11.5	10.7	10.9	11.0	12.7	16.2	17.5	16.9	15.5	12.1	10.7	10.7	9.9	9.1	9.5	9.2	9.5	9.9	Diurnal Average	
																								34.4	30.4	31.1	31.6	36.8	36.8	41.8	41.5	40.7	39.8	37.1	37.1	36.7	36.2	36.8	35.4	35.8	35.5	34.3	35.4	35.9	34.7	32.9	32.5	Diurnal Maximum	
Z - zerospan																								C - Calibration				M - Maintenance				UO - Unstable Operation																	
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 76 ppb																																																	



Wood Buffalo Environmental Association
Hourly Averages

Ozone (O₃) - ppb
Fort McKay South - December 2023





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Ozone (O₃) - ppb
Fort McKay South - December 2023

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	489	76.77	76.77
21 - 50	148	23.23	100.00
51 - 82	0	0.00	100.00
> 83	0	0.00	100.00

Total Number of Valid Hours: 637

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Ozone (O₃) - ppb
Fort McKay South - December 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	19	5	2	0	0	0	3	75	156	68	51	44	20	10	13	21	487
21 - 50	8	9	6	0	0	2	7	11	17	8	17	26	22	3	8	4	148
51 - 82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 83	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	27	14	8	0	0	2	10	86	173	76	68	70	42	13	21	25	635

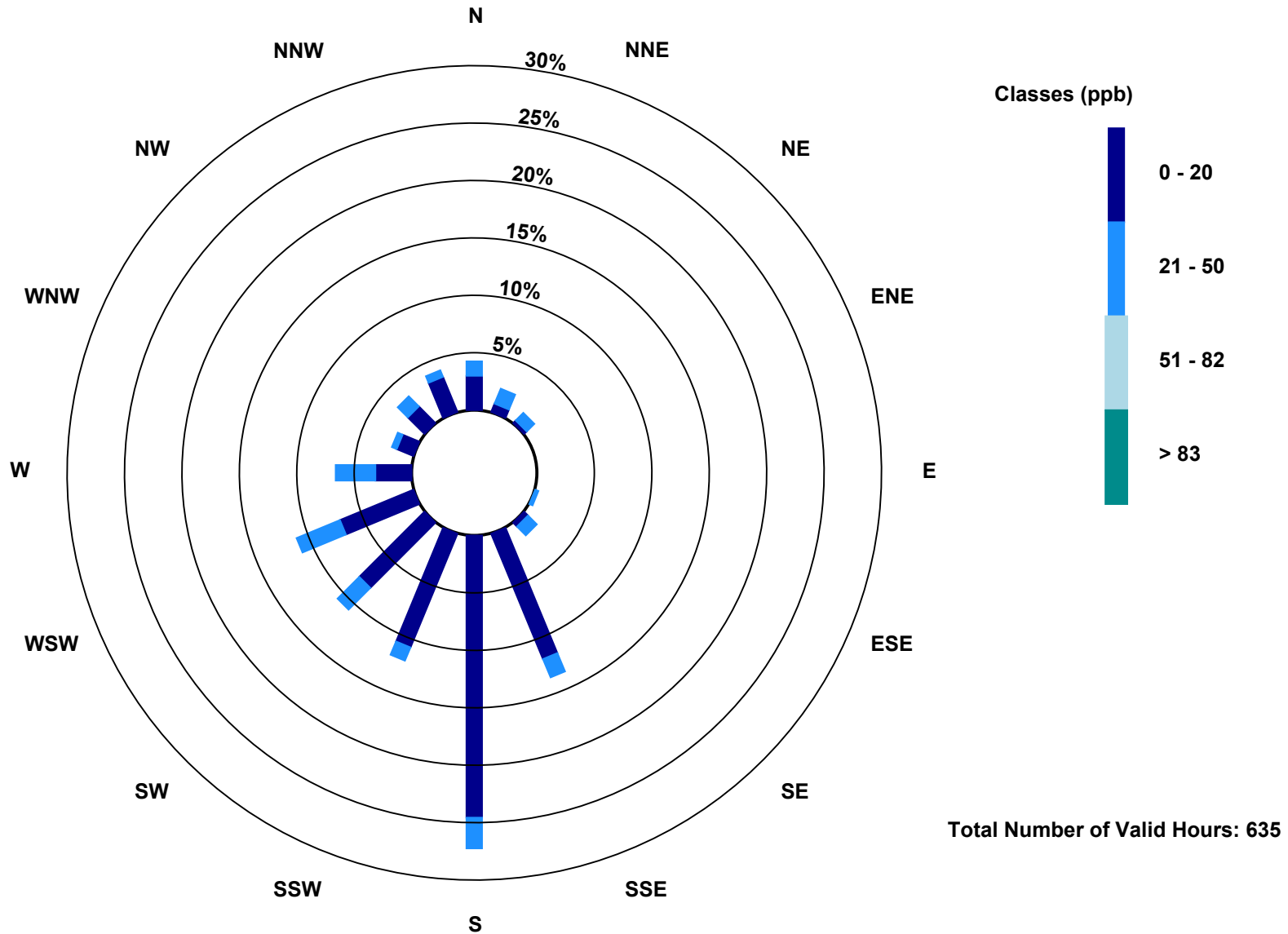
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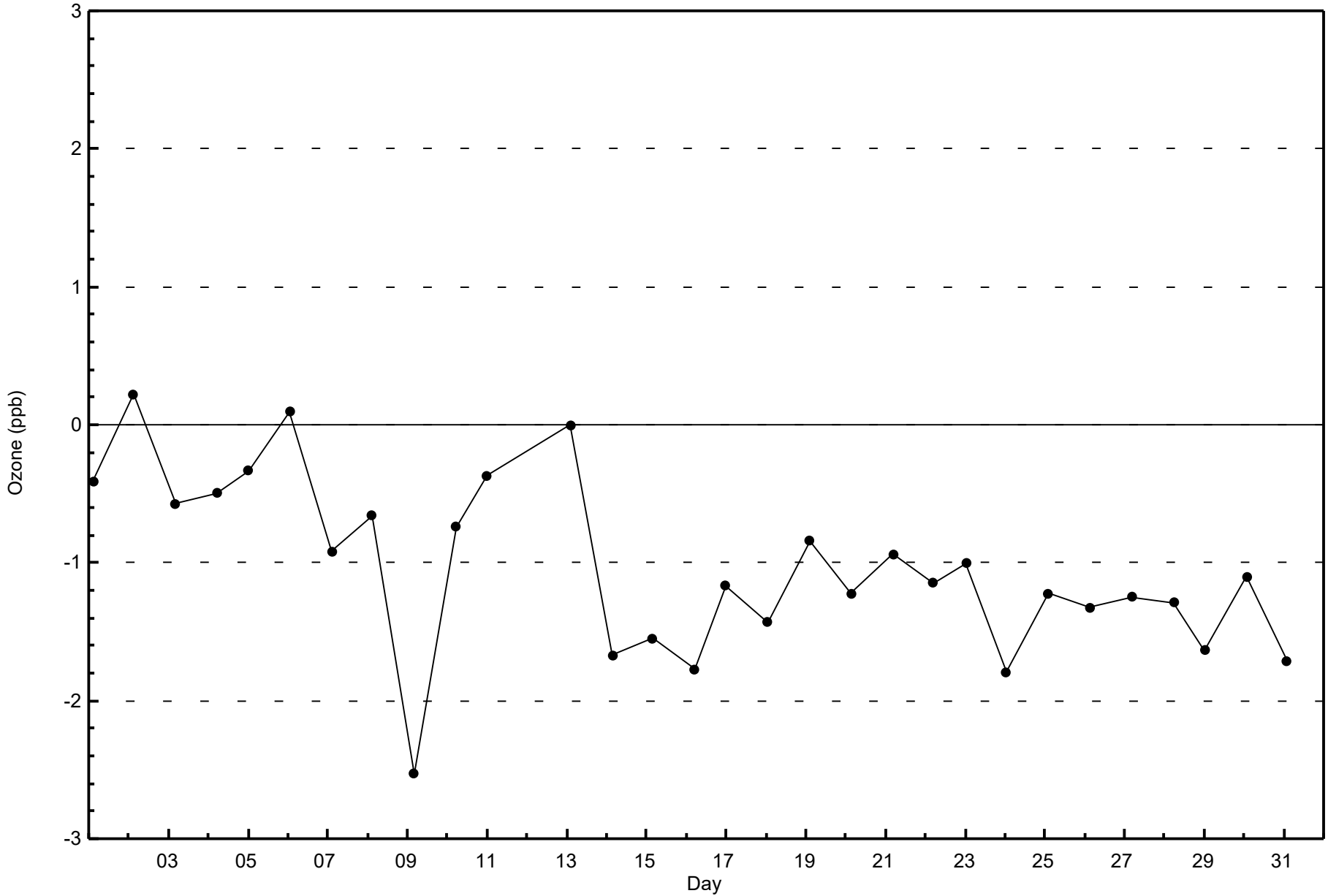
Total Number of Hours: 744

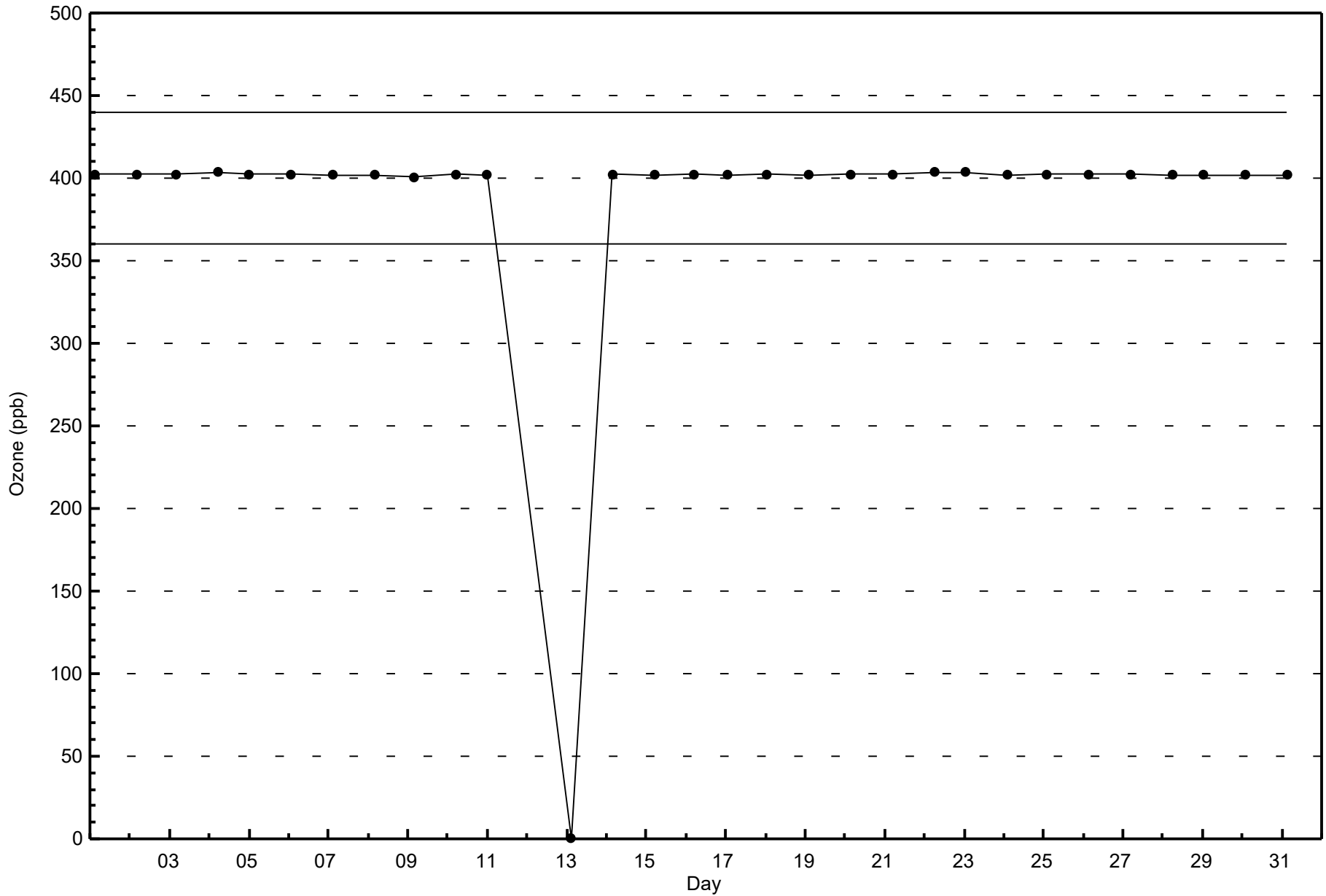


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Ozone (O₃) - ppb
Fort McKay South

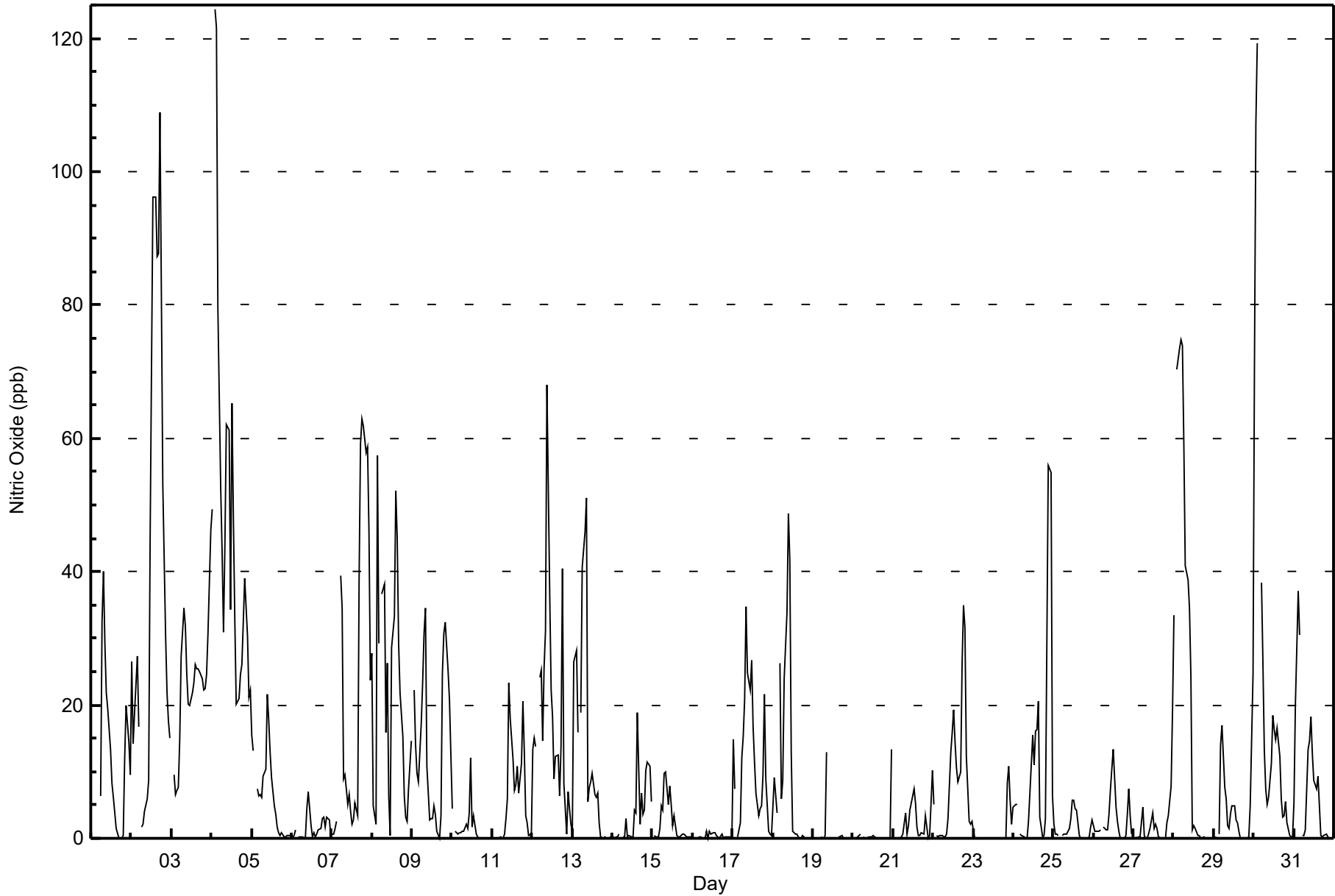








Maximum Value: 124.3 ppb on Dec 4 03:00																						Maximum Daily Average: 47.2 ppb on Dec 4																						Hours in Service: 744					
Minimum Value: 0.0 ppb on Dec 1 01:00																						Minimum Daily Average: 0.3 ppb on Dec 16																						Hours of Data: 707					
Maximum Diurnal Average: 17.3 ppb at hour 3																						Minimum Diurnal Average: 7.6 ppb at hour 24																						Hours of Missing Data: 37					
Monthly Average: 11.22 ppb																						Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.3 Median = 3.2 Q ₃ = 14.6 P ₉₀ = 32.5 P ₉₉ = 87.6																						Hours of Calibration: 37					
																																												Percent Operational Time: 100.0					
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Dec	0.0	0.0	0.0	0.0	Z	6.3	32.7	40.1	29.3	21.8	19.4	13.4	8.2	6.1	3.8	1.5	0.0	0.0	0.0	0.5	11.9	19.8	14.5	9.5	10.4	40.1																							
2-Dec	26.5	14.1	18.8	27.4	16.8	Z	1.7	2.2	4.1	6.0	8.6	43.9	70.1	96.3	96.1	87.2	87.7	108.9	81.9	53.2	30.2	21.9	17.6	15.0	40.7	108.9																							
3-Dec	Z	9.6	6.7	7.1	7.7	14.7	27.3	34.6	31.8	24.6	20.1	19.8	21.8	23.4	26.1	25.5	25.5	25.1	23.9	22.2	22.4	24.6	30.7	46.1	22.7	46.1																							
4-Dec	49.3	Z	124.3	121.6	79.7	52.7	43.0	31.0	44.2	62.0	61.2	34.3	65.3	48.0	32.8	20.0	20.9	24.6	26.0	32.5	38.9	30.3	21.3	22.3	47.2	124.3																							
5-Dec	15.5	13.1	Z	7.4	6.4	6.5	6.1	9.4	10.3	21.7	17.8	13.0	9.2	4.8	3.6	1.8	0.9	0.4	0.8	0.1	0.2	0.4	0.4	0.5	6.5	21.7																							
6-Dec	0.3	0.5	1.2	Z	0.2	0.2	0.2	0.1	0.1	4.5	7.1	1.9	0.2	0.8	0.2	0.6	1.3	1.6	2.9	3.2	1.6	3.1	2.8	0.1	1.5	7.1																							
7-Dec	0.7	0.7	1.4	2.6	Z	39.5	34.6	9.0	9.5	5.2	6.6	4.0	2.1	2.7	5.2	3.3	38.6	59.0	62.9	61.9	57.9	58.8	46.0	23.8	23.3	62.9																							
8-Dec	27.8	4.8	2.1	57.4	29.2	Z	36.7	38.0	16.0	26.4	6.4	0.5	28.7	33.3	52.2	44.9	29.2	21.9	15.3	6.4	3.2	2.6	7.4	14.6	22.0	57.4																							
9-Dec	Z	22.2	14.0	9.7	8.5	17.1	23.3	30.6	34.6	10.8	2.8	3.0	3.0	4.9	3.6	1.2	0.0	3.3	24.8	30.8	32.4	25.3	20.7	12.4	14.8	34.6																							
10-Dec	4.5	Z	1.1	0.6	0.8	0.9	1.0	1.0	2.2	1.4	3.7	12.0	1.7	3.4	0.7	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	1.5	12.0																							
11-Dec	0.0	0.0	Z	0.0	0.0	0.1	0.0	0.5	3.0	6.0	23.4	18.1	11.8	7.2	8.1	10.9	6.9	11.2	20.6	12.8	3.3	2.4	0.4	0.5	6.4	23.4																							
12-Dec	13.3	15.0	13.7	Z	24.2	25.2	14.7	25.7	31.1	68.0	36.5	22.2	18.1	8.9	12.2	12.5	6.4	13.7	40.4	8.3	0.7	7.0	4.4	2.0	18.4	68.0																							
13-Dec	0.8	26.4	28.2	15.8	Z	19.0	40.6	45.9	51.0	5.4	7.6	8.5	9.7	6.5	6.2	6.8	2.4	0.3	0.0	0.1	0.0	0.0	0.0	0.2	12.2	51.0																							
14-Dec	0.1	0.1	0.2	0.2	0.6	Z	0.3	0.2	3.0	0.2	0.3	0.3	0.3	4.2	3.9	18.8	2.2	6.9	3.7	4.2	10.1	11.5	10.9	5.5	3.8	18.8																							
15-Dec	Z	0.3	0.2	0.2	1.6	5.0	4.2	9.8	9.9	5.0	7.9	5.0	2.0	3.3	0.4	0.1	0.2	0.4	0.7	0.5	0.3	0.1	0.1	0.2	2.5	9.9																							
16-Dec	0.0	Z	0.0	0.0	0.1	0.1	0.0	0.0	1.2	0.0	1.1	0.6	0.8	0.8	0.4	0.2	0.0	0.7	0.1	0.2	0.2	0.2	0.3	0.3	0.3	1.2																							
17-Dec	14.8	7.3	Z	0.2	2.3	12.0	15.3	20.7	34.8	24.7	22.3	26.6	16.7	11.4	6.8	3.5	4.4	4.9	9.5	21.7	9.0	1.1	0.6	0.4	11.8	34.8																							
18-Dec	4.6	9.1	3.8	Z	26.2	6.0	8.6	23.9	33.8	48.7	41.7	12.9	1.1	0.7	0.6	0.3	0.0	0.0	0.5	0.1	0.0	0.0	0.0	0.0	9.7	48.7																							
19-Dec	0.0	0.0	0.0	0.0	Z	0.1	0.0	0.5	13.0	C	C	C	C	C	C	0.0	0.2	0.3	0.0	0.0	0.0	0.0	0.0	0.0	--	13.0																							
20-Dec	0.0	0.0	0.0	0.2	0.7	Z	0.3	0.1	0.1	0.2	0.2	0.3	0.4	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	13.2	0.7	13.2																							
21-Dec	Z	0.0	0.0	0.0	0.0	0.1	0.5	3.9	0.6	2.0	4.2	5.4	7.4	5.2	1.7	0.4	0.4	0.8	0.7	3.5	1.8	0.1	0.4	10.1	2.1	10.1																							
22-Dec	5.2	Z	0.4	0.2	0.4	0.4	0.3	0.3	0.6	3.0	13.0	16.0	19.2	14.5	10.5	8.5	10.0	26.3	34.9	31.5	12.3	2.6	2.0	2.4	9.3	34.9																							
23-Dec	1.1	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	0.0	0.0	0.0	0.0	8.3	10.8	5.7	2.1	1.2	10.8																							
24-Dec	4.7	5.1	5.0	Z	0.6	0.5	0.2	0.0	0.1	2.6	6.9	15.5	11.1	16.1	16.3	20.6	3.1	0.2	0.4	2.9	29.1	56.0	54.9	6.4	11.2	56.0																							
25-Dec	2.2	0.6	0.6	0.4	Z	0.4	0.5	0.6	0.6	1.5	3.0	5.6	5.7	4.5	4.3	0.4	0.0	0.0	0.0	0.0	0.0	0.3	1.7	2.7	1.6	5.7																							
26-Dec	1.8	1.1	1.0	1.1	1.2	Z	1.8	1.4	1.2	3.7	7.2	10.4	13.4	4.7	2.5	1.1	0.1	0.0	0.0	0.4	3.5	7.5	3.5	0.7	3.0	13.4																							
27-Dec	Z	0.2	0.1	0.2	0.3	4.6	0.5	0.0	0.0	0.7	1.4	3.9	1.5	2.0	1.5	0.3	0.0	0.0	0.0	0.0	2.4	3.5	7.7	19.3	2.2	19.3																							
28-Dec	33.4	Z	70.4	73.5	74.9	73.9	59.4	40.8	38.9	34.5	24.3	1.3	1.8	1.4	0.5	0.4	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.1	23.0	74.9																							
29-Dec	0.1	0.2	Z	0.6	13.9	17.0	7.7	5.9	1.8	1.4	3.7	5.0	5.0	2.7	2.4	1.1	0.0	0.0	0.0	0.0	0.1	0.3	4.9	24.6	4.3	24.6																							
30-Dec	70.7	107.0	119.4	Z	38.3	26.5	13.0	7.5	5.0	6.1	11.1	18.4	16.4	14.9	16.5	12.3	5.9	3.1	3.5	5.5	2.2	0.3	0.2	0.2	21.9	119.4																							
31-Dec	5.5	20.1	37.1	30.4	Z	0.5	0.3	1.3	13.3	14.6	18.3	12.7	8.6	7.4	9.4	5.0	0.5	0.1	0.4	0.7	0.1	0.0	0.0	0.0	8.1	37.1																							
																								10.9	9.9	17.3	13.7	13.4	12.7	12.1	12.4	13.7	13.8	12.9	11.1	12.0	11.3	10.9	9.3	8.0	10.1	11.4	9.8	9.1	9.4	8.4	7.6	Diurnal Average	
																								70.7	107.0	124.3	121.6	79.7	73.9	59.4	45.9	51.0	68.0	61.2	43.9	70.1	96.3	96.1	87.2	87.7	108.9	81.9	61.9	57.9	58.8	54.9	46.1	Diurnal Maximum	
Z - zerospan																								C - Calibration																									





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitric Oxide (NO) - ppb
Fort McKay South - December 2023

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	569	80.48	80.48
21 - 40	91	12.87	93.35
41 - 80	37	5.23	98.59
81 - 159	10	1.41	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitric Oxide (NO) - ppb
Fort McKay South - December 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	23	10	5	0	0	2	10	81	152	72	59	63	37	13	19	22	568
21 - 40	6	1	0	0	0	0	1	7	28	16	12	8	2	3	2	4	90
11 - 80	0	0	1	0	0	0	0	3	9	9	3	4	4	0	1	3	37
81 - 159	0	0	0	0	0	0	0	1	4	1	0	0	0	2	1	1	10
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	29	11	6	0	0	2	11	92	193	98	74	75	43	18	23	30	705

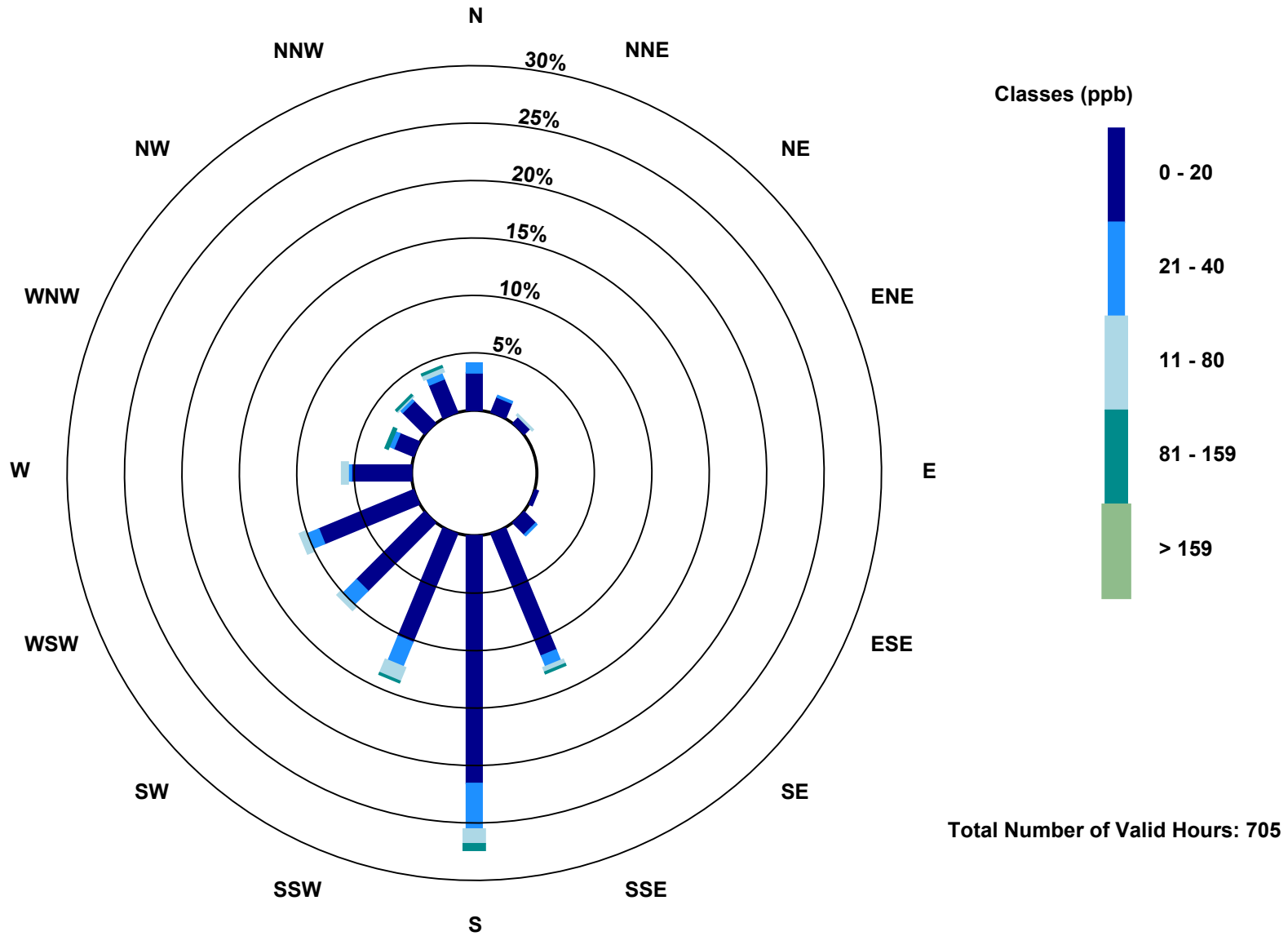
Total Number of Valid Hours: 705

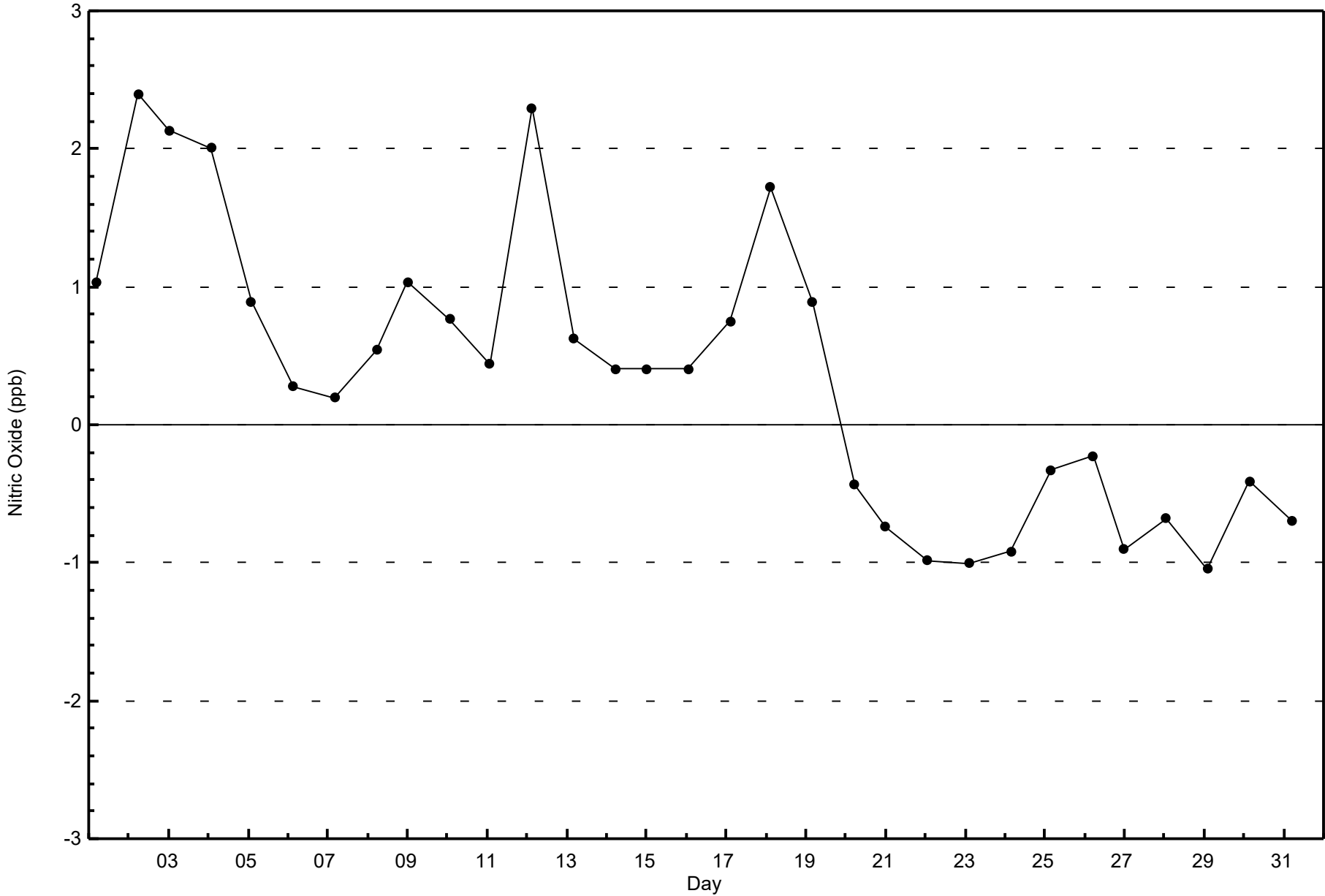
Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Dec 2023

Nitric Oxide (NO) - ppb
Fort McKay South

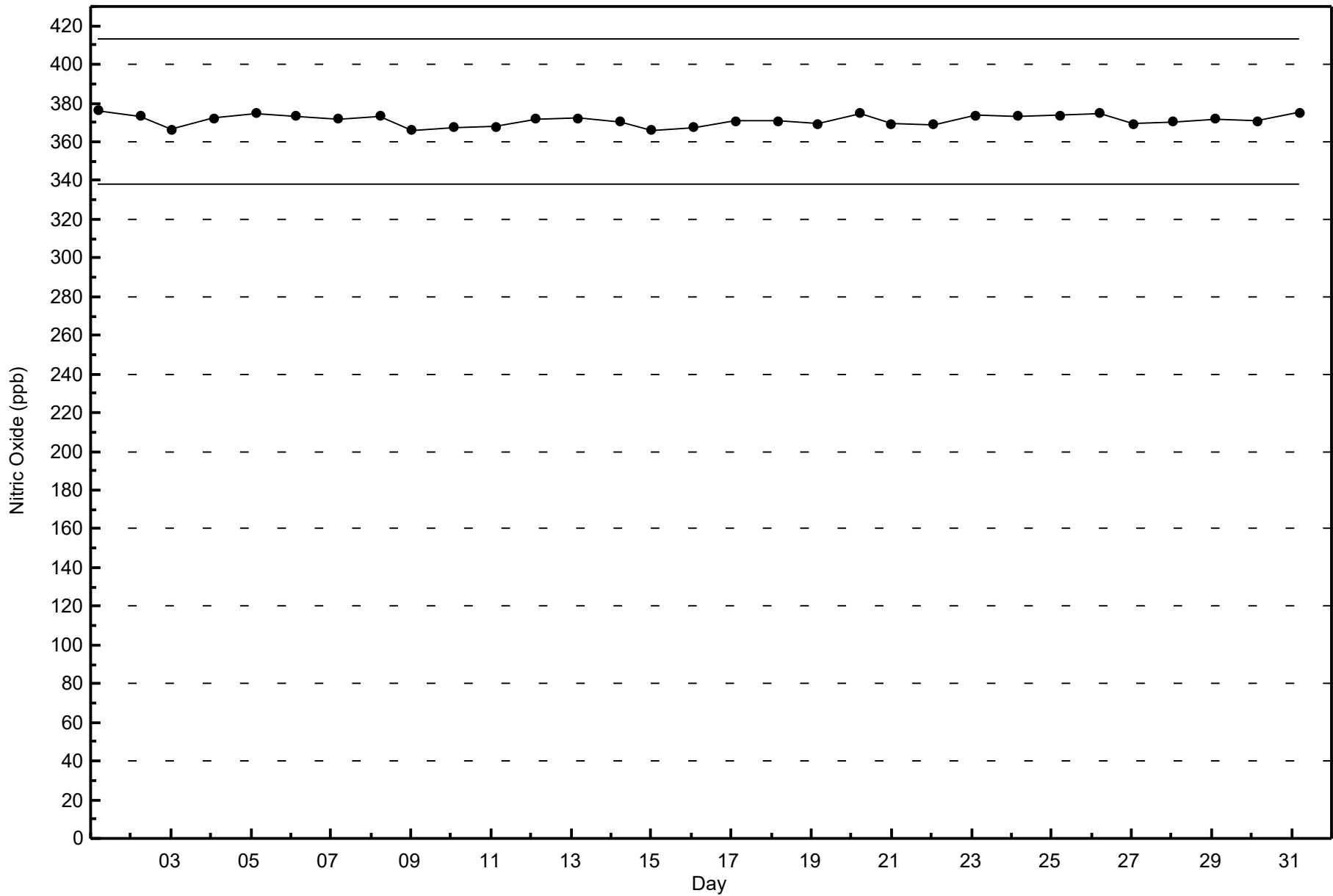






Wood Buffalo Environmental Association
Span Responses

Nitric Oxide (NO) - ppb
Fort McKay South - December 2023





Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO₂) - ppb

Fort McKay South - December 2023

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 33.8 ppb on Dec 23 22:00	Maximum Daily Average: 17.5 ppb on Dec 17		Hours of Data:	707
Minimum Value: 0.0 ppb on Dec 10 22:00	Minimum Daily Average: 5.4 ppb on Dec 23		Hours of Missing Data:	37
Maximum Diurnal Average: 12.8 ppb at hour 8	Minimum Diurnal Average: 10.0 ppb at hour 13		Hours of Calibration:	37
Monthly Average: 11.62 ppb	Percentiles: P ₁ = 0.1 P ₁₀ = 1.4 Q ₁ = 7.2 Median = 11.6 Q ₃ = 16.1 P ₉₀ = 20.2 P ₉₉ = 29.9		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-Dec	2.4	2.5	2.0	2.0	Z	9.5	13.0	16.0	15.3	11.8	10.1	12.0	11.9	12.4	12.2	9.5	8.1	7.0	8.7	9.8	12.0	11.6	13.5	12.2	9.8	16.0																							
2-Dec	11.9	11.8	10.9	10.7	9.5	Z	7.7	9.2	8.3	7.2	5.7	12.8	15.3	18.2	19.1	14.9	13.5	12.6	11.9	11.9	12.9	13.6	12.9	12.8	12.0	19.1																							
3-Dec	Z	19.9	19.8	19.9	19.8	20.8	21.4	21.7	21.4	20.1	18.1	16.7	16.3	16.5	17.5	19.1	18.6	16.8	13.5	11.5	10.3	9.3	9.2	10.6	16.9	21.7																							
4-Dec	11.0	Z	13.4	12.5	10.8	10.9	9.6	9.5	10.4	9.2	8.8	9.6	18.0	16.5	16.8	15.3	15.4	17.2	15.3	12.6	12.7	13.9	13.6	10.4	12.8	18.0																							
5-Dec	10.9	9.3	Z	12.9	12.8	9.0	8.0	11.1	13.7	14.9	14.3	11.2	6.3	7.3	8.0	6.2	13.3	12.1	17.0	7.6	6.6	4.1	3.3	2.5	9.7	17.0																							
6-Dec	4.3	13.6	21.8	Z	0.9	0.9	0.7	0.6	1.4	20.7	18.8	5.4	0.7	3.8	2.1	13.5	26.0	25.3	20.5	23.1	20.7	19.5	19.7	3.6	11.6	26.0																							
7-Dec	8.1	18.1	21.9	22.3	Z	23.5	19.7	18.7	18.0	12.0	11.3	8.2	4.4	5.7	11.8	11.6	17.4	15.2	16.0	16.0	13.9	14.7	15.8	15.8	14.8	23.5																							
8-Dec	11.8	3.9	5.4	30.2	24.1	Z	22.4	19.5	17.8	17.3	5.7	0.8	13.6	21.5	22.1	20.6	17.6	17.8	22.0	22.0	19.5	18.8	16.9	15.1	16.8	30.2																							
9-Dec	Z	15.3	19.2	20.4	20.3	22.6	21.2	19.4	18.2	12.1	4.4	5.4	5.2	8.5	11.5	11.5	7.9	12.4	14.1	14.3	15.5	14.2	11.1	12.9	13.8	22.6																							
10-Dec	14.5	Z	9.1	8.4	7.8	8.9	7.0	9.3	15.1	9.8	7.5	14.5	3.6	8.7	1.5	1.1	0.6	0.4	0.2	0.3	0.1	0.0	0.0	0.1	5.6	15.1																							
11-Dec	0.1	0.2	Z	0.2	0.2	0.1	0.3	18.2	20.2	22.4	26.7	22.8	19.4	8.0	14.3	13.8	14.5	15.3	20.9	18.9	14.9	14.0	11.5	12.7	12.6	26.7																							
12-Dec	17.1	18.3	17.8	Z	16.0	15.8	14.2	15.4	16.7	15.7	14.3	14.3	14.1	10.9	10.9	17.2	16.7	16.8	15.3	15.5	20.1	18.5	17.8	13.9	15.8	20.1																							
13-Dec	9.9	16.4	18.6	20.3	Z	22.4	21.3	21.6	22.3	18.3	21.1	21.3	20.7	17.4	16.4	21.2	18.2	9.5	9.3	10.6	9.7	8.9	7.8	10.6	16.3	22.4																							
14-Dec	7.6	1.5	2.5	3.5	0.7	Z	0.6	0.9	1.4	0.6	1.0	0.8	0.7	8.5	14.0	28.7	26.8	31.6	31.9	26.9	24.1	24.9	22.4	22.3	12.3	31.9																							
15-Dec	Z	13.7	8.1	5.4	6.8	9.7	14.3	20.3	17.6	20.7	16.3	13.9	10.4	6.7	5.2	5.9	10.6	10.8	6.7	8.0	11.0	10.4	6.9	3.3	10.6	20.7																							
16-Dec	4.0	Z	0.9	0.8	0.8	0.5	0.3	0.3	0.4	0.4	7.6	2.6	3.5	3.6	3.2	4.0	6.8	9.4	12.0	16.3	15.3	12.3	10.2	10.1	5.4	16.3																							
17-Dec	20.9	25.9	Z	16.7	20.3	20.9	22.2	18.1	19.2	17.2	13.2	18.6	18.0	17.5	16.9	16.1	15.5	22.0	19.7	19.6	17.0	11.2	9.3	6.8	17.5	25.9																							
18-Dec	11.7	15.1	13.4	Z	13.3	9.9	16.0	12.3	17.4	19.7	18.1	7.8	1.5	0.9	1.3	2.3	1.0	1.2	2.0	1.5	4.0	4.7	8.6	7.7	8.3	19.7																							
19-Dec	8.7	10.5	15.3	10.5	Z	6.3	11.7	10.4	11.2	C	C	C	C	C	C	8.8	9.4	2.8	1.0	2.0	1.4	0.9	1.2	1.6	--	15.3																							
20-Dec	1.2	1.6	5.7	13.3	11.4	Z	11.7	12.8	5.6	3.6	3.3	2.9	2.9	3.2	4.0	5.3	6.6	5.6	5.3	3.8	4.2	4.5	3.8	11.7	5.8	13.3																							
21-Dec	Z	1.3	0.9	0.7	0.5	12.0	19.9	22.6	16.7	17.5	14.0	12.8	14.4	10.6	8.4	7.3	6.4	5.8	6.1	7.9	9.8	7.2	7.8	11.9	9.7	22.6																							
22-Dec	9.7	Z	2.6	1.6	1.1	1.0	1.4	1.8	2.4	2.8	6.0	9.9	10.0	11.0	8.6	6.4	6.5	6.3	7.2	6.1	8.8	7.9	6.4	8.9	5.8	11.0																							
23-Dec	4.4	0.8	Z	0.5	0.3	0.2	0.3	0.1	0.1	0.2	0.2	0.2	0.2	0.1	0.0	0.0	0.0	0.2	0.1	0.8	24.3	33.8	30.6	25.8	5.4	33.8																							
24-Dec	27.8	30.0	30.8	Z	16.1	14.0	6.2	6.9	9.1	10.8	10.0	17.0	15.7	15.9	15.7	19.8	13.7	6.8	9.0	12.1	14.4	19.7	20.2	21.6	15.8	30.8																							
25-Dec	17.1	17.7	15.0	12.8	Z	12.4	13.8	12.0	11.0	10.9	10.9	11.4	11.6	11.2	15.0	10.8	7.0	6.5	12.6	11.4	11.4	11.9	13.7	17.3	12.4	17.7																							
26-Dec	14.3	13.4	14.1	12.9	13.4	Z	17.2	15.7	15.2	14.4	10.1	12.8	13.4	8.5	7.6	9.3	11.5	9.0	7.8	8.8	13.6	16.6	14.7	17.5	12.7	17.5																							
27-Dec	Z	10.0	10.8	16.3	22.4	32.4	23.3	16.8	11.7	15.2	12.4	15.4	7.4	9.6	10.6	9.1	9.2	8.0	8.7	12.4	16.0	16.1	15.6	15.4	14.1	32.4																							
28-Dec	15.8	Z	17.8	16.0	16.0	15.0	16.5	17.1	15.3	14.5	18.1	13.3	13.6	14.0	10.0	14.6	16.1	21.2	25.4	20.0	12.3	13.0	12.8	11.4	15.6	25.4																							
29-Dec	8.4	5.1	Z	9.9	14.7	16.9	18.5	17.9	16.3	11.0	8.9	10.0	9.8	7.1	9.5	9.5	8.4	9.8	8.8	7.9	8.4	9.4	10.2	10.4	10.7	18.5																							
30-Dec	11.6	11.0	13.2	Z	12.8	12.8	13.1	12.1	9.6	7.4	10.4	8.4	10.8	11.9	14.6	13.2	12.5	9.7	9.3	17.2	15.2	11.1	8.2	7.2	11.4	17.2																							
31-Dec	15.9	15.8	14.2	10.3	Z	9.2	8.1	8.2	10.3	10.0	7.7	5.3	7.2	9.0	7.9	14.9	17.3	19.1	17.4	14.4	4.1	0.7	1.0	3.0	10.0	19.1																							
																								10.8	11.6	12.5	11.2	10.9	12.2	12.3	12.8	12.6	12.3	11.2	10.6	10.0	10.2	10.6	11.7	12.0	11.7	12.1	12.0	12.4	12.2	11.5	11.2	Diurnal Average	
																								27.8	30.0	30.8	30.2	24.1	32.4	23.3	22.6	22.3	22.4	26.7	22.8	20.7	21.5	22.1	28.7	26.8	31.6	31.9	26.9	24.3	33.8	30.6	25.8	Diurnal Maximum	

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



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Dioxide (NO₂) - ppb
Fort McKay South - December 2023





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Fort McKay South - December 2023**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	642	90.81	90.81
21 - 40	65	9.19	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Fort McKay South - December 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	24	11	6	0	0	2	11	81	175	86	66	68	42	17	23	28	640
21 - 40	5	0	0	0	0	0	0	11	18	12	8	7	1	1	0	2	65
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	29	11	6	0	0	2	11	92	193	98	74	75	43	18	23	30	705

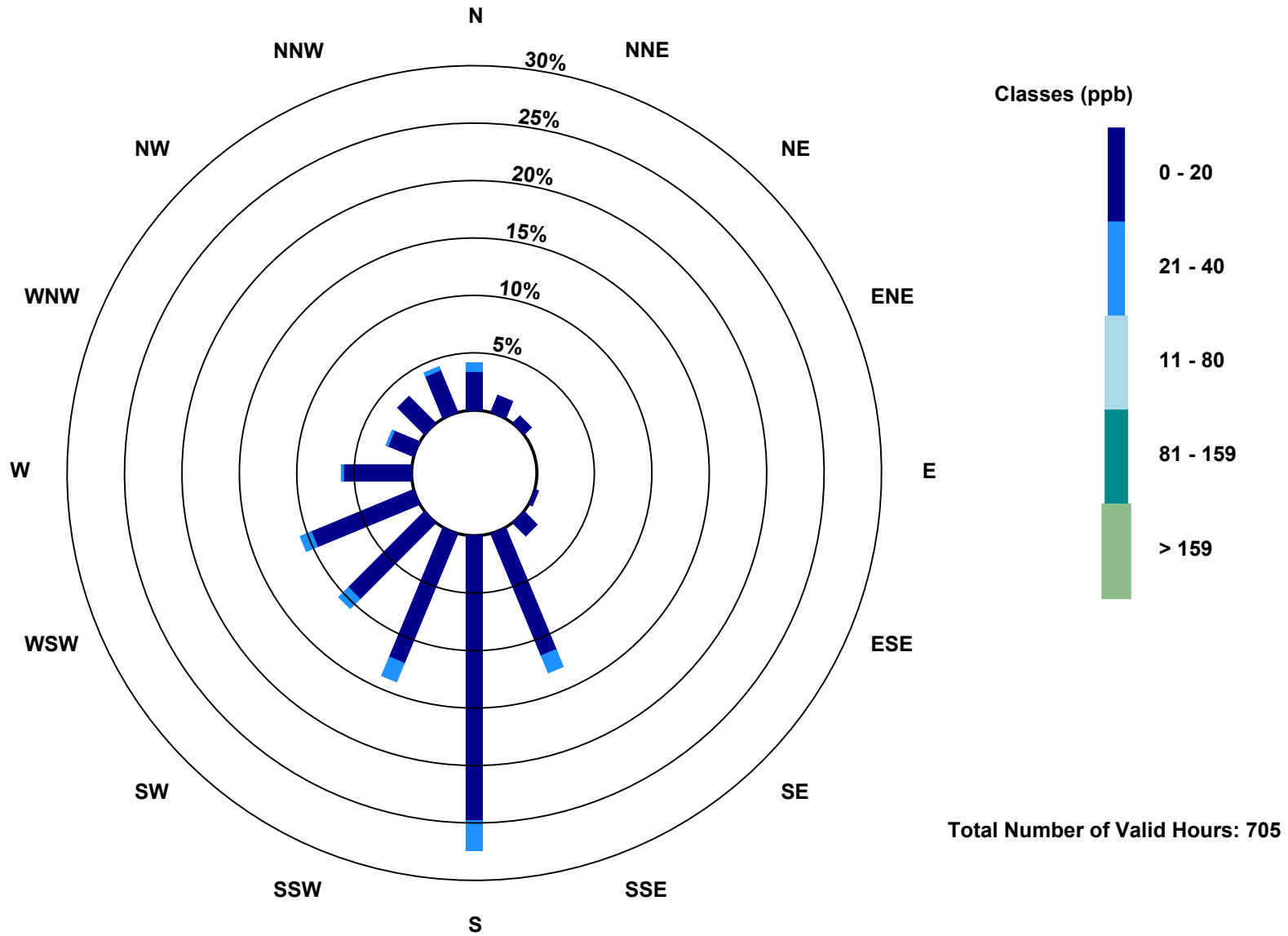
Total Number of Valid Hours: 705

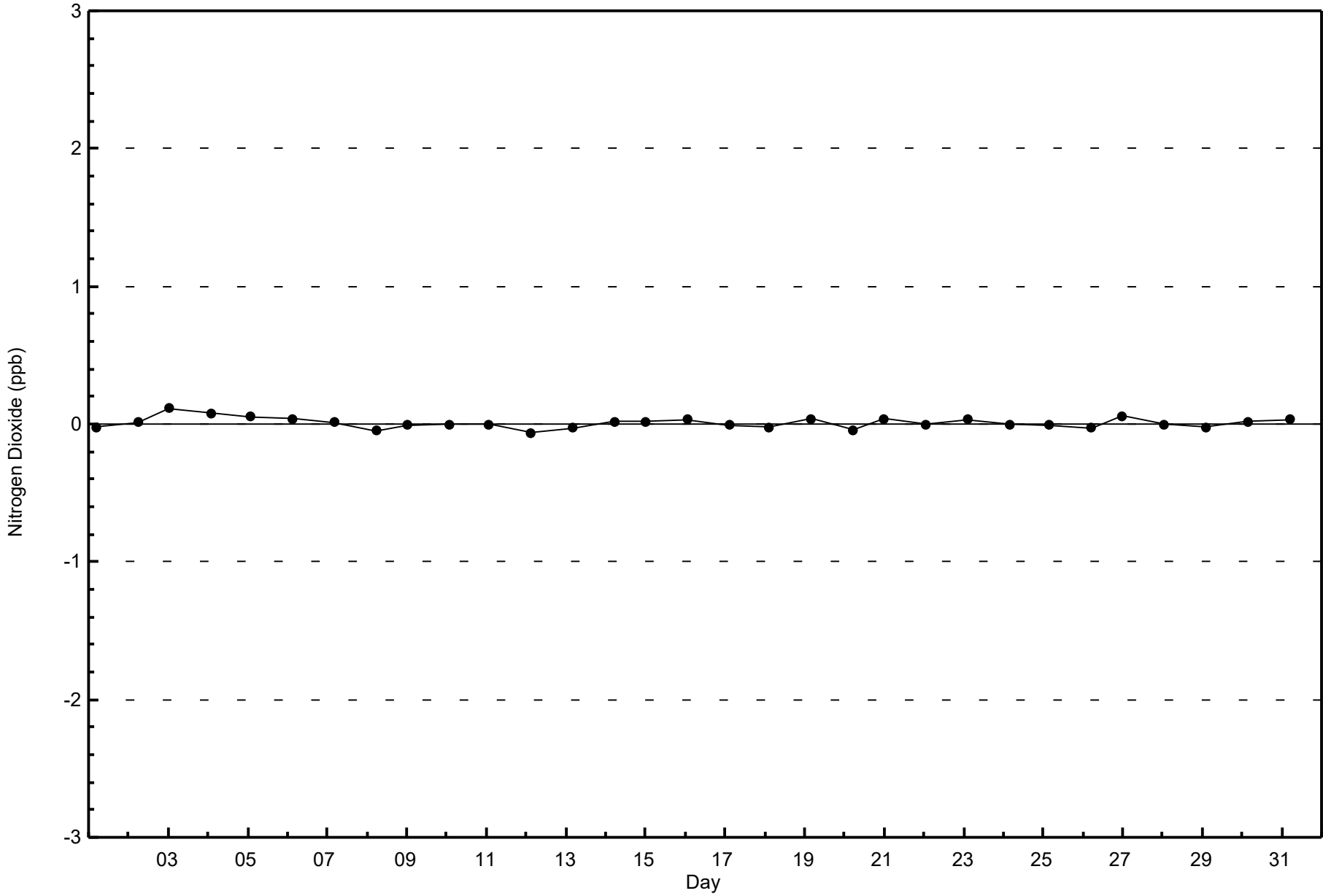
Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Dec 2023

Nitrogen Dioxide (NO₂) - ppb
Fort McKay South

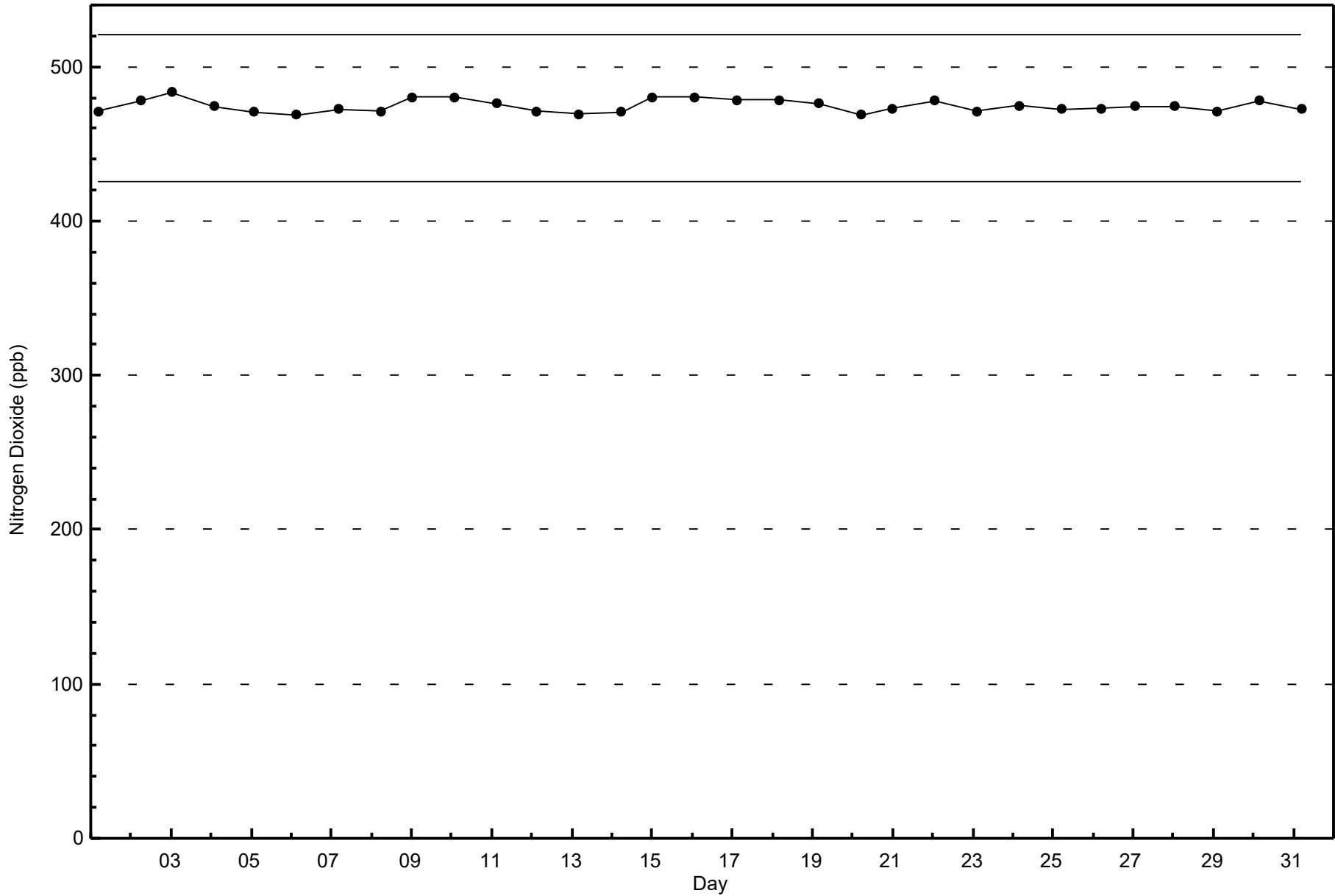






Wood Buffalo Environmental Association
Span Responses

Nitrogen Dioxide (NO₂) - ppb
Fort McKay South - December 2023

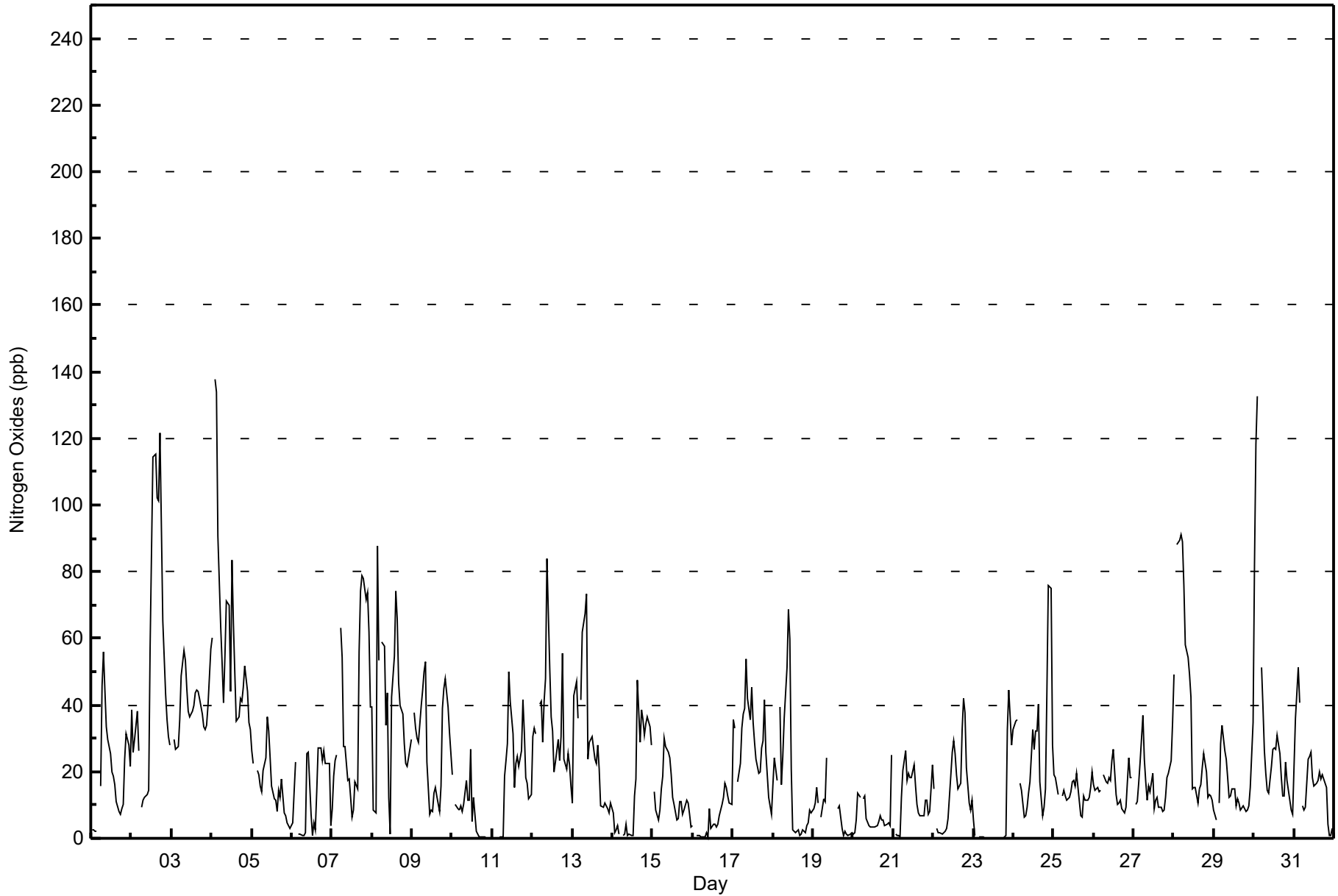




Wood Buffalo Environmental Association
Summary of Hour Averages

Nitrogen Oxides (NO_x) - ppb
Fort McKay South - December 2023

Maximum Value: 137.7 ppb on Dec 4 03:00																						Maximum Daily Average: 60.0 ppb on Dec 4																						Hours in Service: 744					
Minimum Value: 0.0 ppb on Dec 23 16:00																						Minimum Daily Average: 5.8 ppb on Dec 16																						Hours of Data: 707					
Maximum Diurnal Average: 29.8 ppb at hour 3																						Minimum Diurnal Average: 18.8 ppb at hour 24																						Hours of Missing Data: 37					
Monthly Average: 22.84 ppb																						Percentiles: P ₁ = 0.1 P ₁₀ = 1.6 Q ₁ = 8.4 Median = 16.9 Q ₃ = 31.6 P ₉₀ = 48.8 P ₉₉ = 102.0																						Hours of Calibration: 37					
																						Percent Operational Time: 100.0																											
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Dec	2.4	2.5	2.0	2.0	Z	15.8	45.7	56.1	44.6	33.6	29.5	25.4	20.1	18.5	16.0	11.0	8.1	7.0	8.7	10.3	23.9	31.4	28.0	21.7	20.2	56.1																							
2-Dec	38.4	25.9	29.7	38.1	26.3	Z	9.4	11.4	12.4	13.2	14.3	56.7	85.4	114.5	115.2	102.1	101.2	121.5	93.8	65.1	43.1	35.5	30.5	27.8	52.7	121.5																							
3-Dec	Z	29.5	26.5	27.0	27.5	35.5	48.7	56.3	53.2	44.7	38.2	36.5	38.1	39.9	43.6	44.6	44.1	41.9	37.4	33.7	32.7	33.9	39.9	56.7	39.6	56.7																							
4-Dec	60.3	Z	137.7	134.1	90.5	63.6	52.6	40.5	54.6	71.2	70.0	43.9	83.3	64.5	49.6	35.3	36.3	41.8	41.3	45.1	51.6	44.2	34.9	32.7	60.0	137.7																							
5-Dec	26.4	22.4	Z	20.3	19.2	15.5	14.1	20.5	24.0	36.6	32.1	24.2	15.5	12.1	11.6	8.0	14.2	12.5	17.8	7.7	6.8	4.5	3.7	3.0	16.2	36.6																							
6-Dec	4.6	14.1	23.0	Z	1.1	1.1	0.9	0.7	1.5	25.2	25.9	7.3	0.9	4.6	2.3	14.1	27.3	26.9	23.4	26.3	22.3	22.6	22.5	3.7	13.1	27.3																							
7-Dec	8.8	18.8	23.3	24.9	Z	63.0	54.3	27.7	27.5	17.2	17.9	12.2	6.5	8.4	17.0	14.9	56.0	74.2	78.9	77.9	71.8	73.5	61.8	39.6	38.1	78.9																							
8-Dec	39.6	8.7	7.5	87.6	53.3	Z	59.1	57.5	33.8	43.7	12.1	1.3	42.3	54.8	74.3	65.5	46.8	39.7	37.3	28.4	22.7	21.4	24.3	29.7	38.8	87.6																							
9-Dec	Z	37.5	33.2	30.1	28.8	39.7	44.5	50.0	52.8	22.9	7.2	8.4	8.2	13.4	15.1	12.7	7.9	15.7	38.9	45.1	47.9	39.5	31.8	25.3	28.5	52.8																							
10-Dec	19.0	Z	10.2	9.0	8.6	9.8	8.0	10.3	17.3	11.2	11.2	26.5	5.3	12.1	2.2	1.2	0.6	0.4	0.3	0.3	0.1	0.0	0.0	0.1	7.1	26.5																							
11-Dec	0.1	0.2	Z	0.2	0.2	0.2	0.3	18.7	23.2	28.4	50.1	40.9	31.2	15.2	22.4	24.7	21.4	26.5	41.5	31.7	18.2	16.4	11.9	13.2	19.0	50.1																							
12-Dec	30.4	33.3	31.5	Z	40.2	41.0	28.9	41.1	47.8	83.7	50.8	36.5	32.2	19.8	23.1	29.7	23.1	30.5	55.7	23.8	20.8	25.5	22.2	15.9	34.2	83.7																							
13-Dec	10.7	42.8	46.8	36.1	Z	41.4	61.9	67.5	73.3	23.7	28.7	29.8	30.4	23.9	22.6	28.0	20.6	9.8	9.3	10.7	9.7	8.9	7.8	10.8	28.5	73.3																							
14-Dec	7.7	1.6	2.7	3.7	1.3	Z	0.9	1.1	4.4	0.8	1.3	1.1	1.0	12.7	17.9	47.5	29.0	38.5	35.6	31.1	34.2	36.4	33.3	27.8	16.2	47.5																							
15-Dec	Z	14.0	8.3	5.6	8.4	14.7	18.5	30.1	27.5	25.7	24.2	18.9	12.4	10.0	5.6	6.0	10.8	11.2	7.4	8.5	11.3	10.5	7.0	3.5	13.0	30.1																							
16-Dec	4.0	Z	0.9	0.8	0.9	0.6	0.3	0.3	1.6	0.4	8.7	3.2	4.3	4.4	3.6	4.2	6.8	10.1	12.1	16.5	15.5	12.5	10.5	10.4	5.8	16.5																							
17-Dec	35.7	33.2	Z	16.9	22.6	32.9	37.5	38.8	54.0	41.9	35.5	45.2	34.7	28.9	23.7	19.6	19.9	26.9	29.2	41.3	26.0	12.3	9.9	7.2	29.3	54.0																							
18-Dec	16.3	24.2	17.2	Z	39.5	15.9	24.6	36.2	51.2	68.4	59.8	20.7	2.6	1.6	1.9	2.6	1.0	1.2	2.5	1.6	4.0	4.7	8.6	7.7	18.0	68.4																							
19-Dec	8.7	10.5	15.3	10.5	Z	6.4	11.7	10.9	24.2	C	C	C	C	C	C	8.8	9.6	3.1	1.0	2.0	1.4	0.9	1.2	1.6	--	24.2																							
20-Dec	1.2	1.6	5.7	13.5	12.1	Z	12.0	12.9	5.7	3.8	3.5	3.2	3.3	3.4	4.0	5.3	6.6	5.6	5.3	3.8	4.2	4.5	3.8	24.9	6.5	24.9																							
21-Dec	Z	1.3	0.9	0.7	0.5	12.1	20.4	26.5	17.3	19.5	18.2	18.2	21.8	15.8	10.1	7.7	6.8	6.6	6.8	11.4	11.6	7.3	8.2	22.0	11.8	26.5																							
22-Dec	14.9	Z	3.0	1.8	1.5	1.4	1.7	2.1	3.0	5.8	19.0	25.9	29.2	25.5	19.1	14.9	16.5	32.6	42.1	37.6	21.1	10.5	8.4	11.3	15.2	42.1																							
23-Dec	5.5	0.8	Z	0.6	0.3	0.3	0.1	0.1	0.2	0.2	0.2	0.2	0.1	0.0	0.0	0.0	0.0	0.2	0.1	0.8	32.6	44.6	36.3	27.9	6.6	44.6																							
24-Dec	32.5	35.1	35.8	Z	16.7	14.5	6.4	6.9	9.2	13.4	16.9	32.5	26.8	32.0	32.0	40.4	16.8	7.0	9.4	15.0	43.5	75.7	75.1	28.0	27.0	75.7																							
25-Dec	19.3	18.3	15.6	13.2	Z	12.8	14.3	12.6	11.6	12.4	13.9	17.0	17.3	15.7	19.3	11.2	7.0	6.5	12.6	11.4	11.4	12.2	15.4	20.0	14.0	20.0																							
26-Dec	16.1	14.5	15.1	14.0	14.6	Z	19.0	17.1	16.4	18.1	17.3	23.2	26.8	13.2	10.1	10.4	11.6	9.0	7.8	9.2	17.1	24.1	18.2	18.2	15.7	26.8																							
27-Dec	Z	10.2	10.9	16.5	22.7	37.0	23.8	16.8	11.7	15.9	13.8	19.3	8.9	11.6	12.1	9.4	9.2	8.0	8.7	12.4	18.4	19.6	23.3	34.7	16.3	37.0																							
28-Dec	49.2	Z	88.2	89.5	90.9	88.9	75.9	57.9	54.2	49.0	42.4	14.6	15.4	15.4	10.5	15.0	16.1	21.3	25.5	20.0	12.3	13.0	12.8	11.5	38.7	90.9																							
29-Dec	8.5	5.3	Z	10.5	28.6	33.9	26.2	23.8	18.1	12.4	12.6	15.0	14.8	9.8	11.9	10.6	8.4	9.8	8.8	7.9	8.5	9.7	15.1	35.0	15.0	35.0																							
30-Dec	82.3	118.0	132.6	Z	51.1	39.3	26.1	19.6	14.6	13.5	21.5	26.8	27.2	26.8	31.1	25.5	18.4	12.8	12.8	22.7	17.4	11.4	8.4	7.4	33.4	132.6																							
31-Dec	21.4	35.9	51.3	40.7	Z	9.7	8.4	9.5	23.6	24.6	26.0	18.0	15.8	16.4	17.3	19.9	17.8	19.2	17.8	15.1	4.2	0.7	1.0	3.0	18.2	51.3																							
																								21.7	21.5	29.8	24.9	24.3	24.9	24.4	25.2	26.3	26.0	24.1	21.8	22.1	21.5	21.5	21.0	20.0	21.9	23.5	21.8	21.5	21.6	19.9	18.8	Diurnal Average	
																								82.3	118.0	137.7	134.1	90.9	88.9	75.9	67.5	73.3	83.7	70.0	56.7	85.4	114.5	115.2	102.1	101.2	121.5	93.8	77.9	71.8	75.7	75.1	56.7	Diurnal Maximum	
Z - zerospan C - Calibration																																																	





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitrogen Oxides (NO_x) - ppb
Fort McKay South - December 2023

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	410	57.99	57.99
21 - 40	189	26.73	84.72
41 - 80	88	12.45	97.17
81 - 159	20	2.83	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Fort McKay South - December 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	16	10	4	0	0	2	8	54	99	49	45	51	33	10	15	14	410
21 - 40	8	0	1	0	0	0	3	27	61	29	18	19	5	3	4	10	188
11 - 80	5	1	0	0	0	0	0	10	27	16	10	3	5	3	3	4	87
81 - 159	0	0	1	0	0	0	0	1	6	4	1	2	0	2	1	2	20
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	29	11	6	0	0	2	11	92	193	98	74	75	43	18	23	30	705

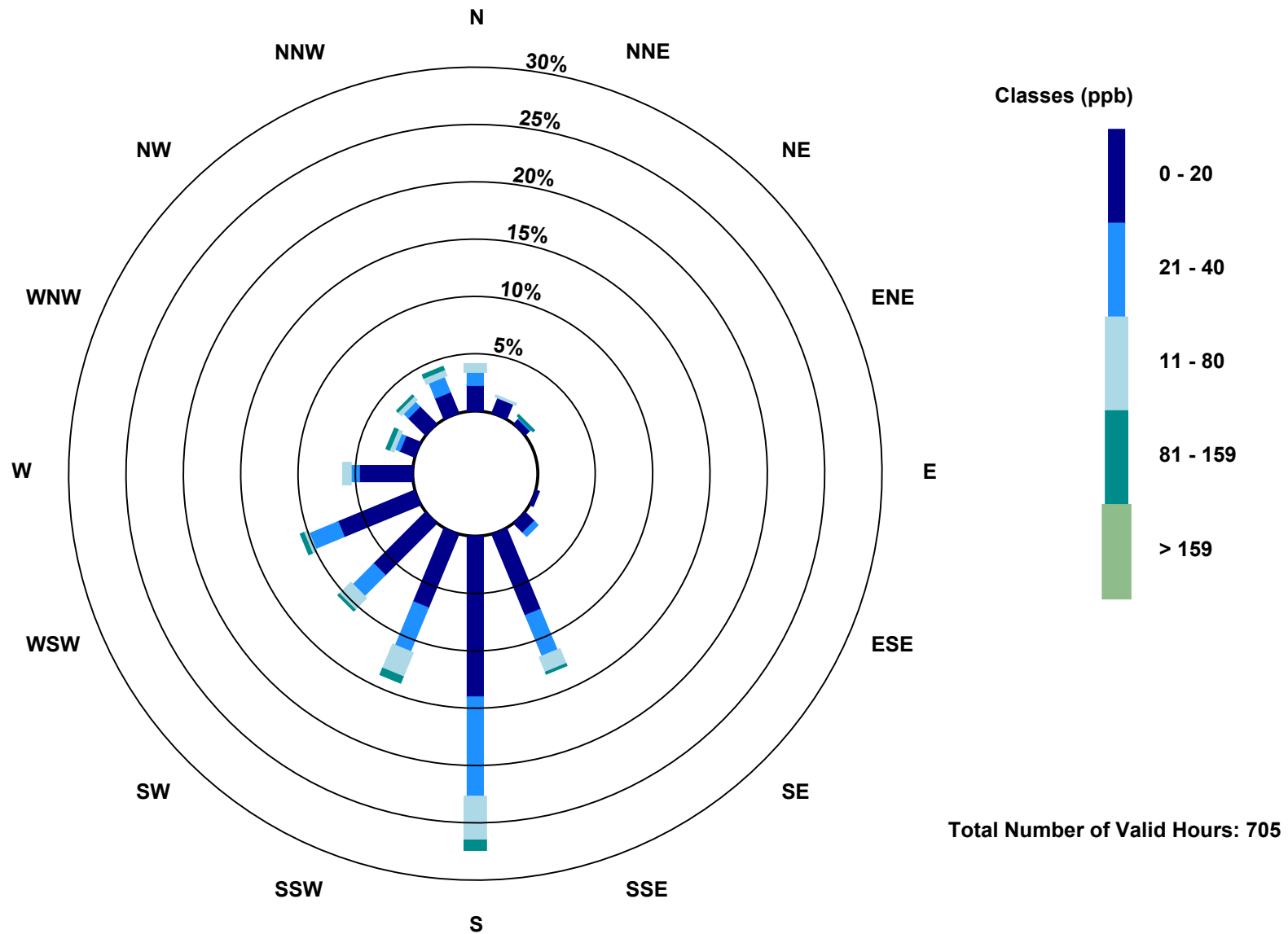
Total Number of Valid Hours: 705

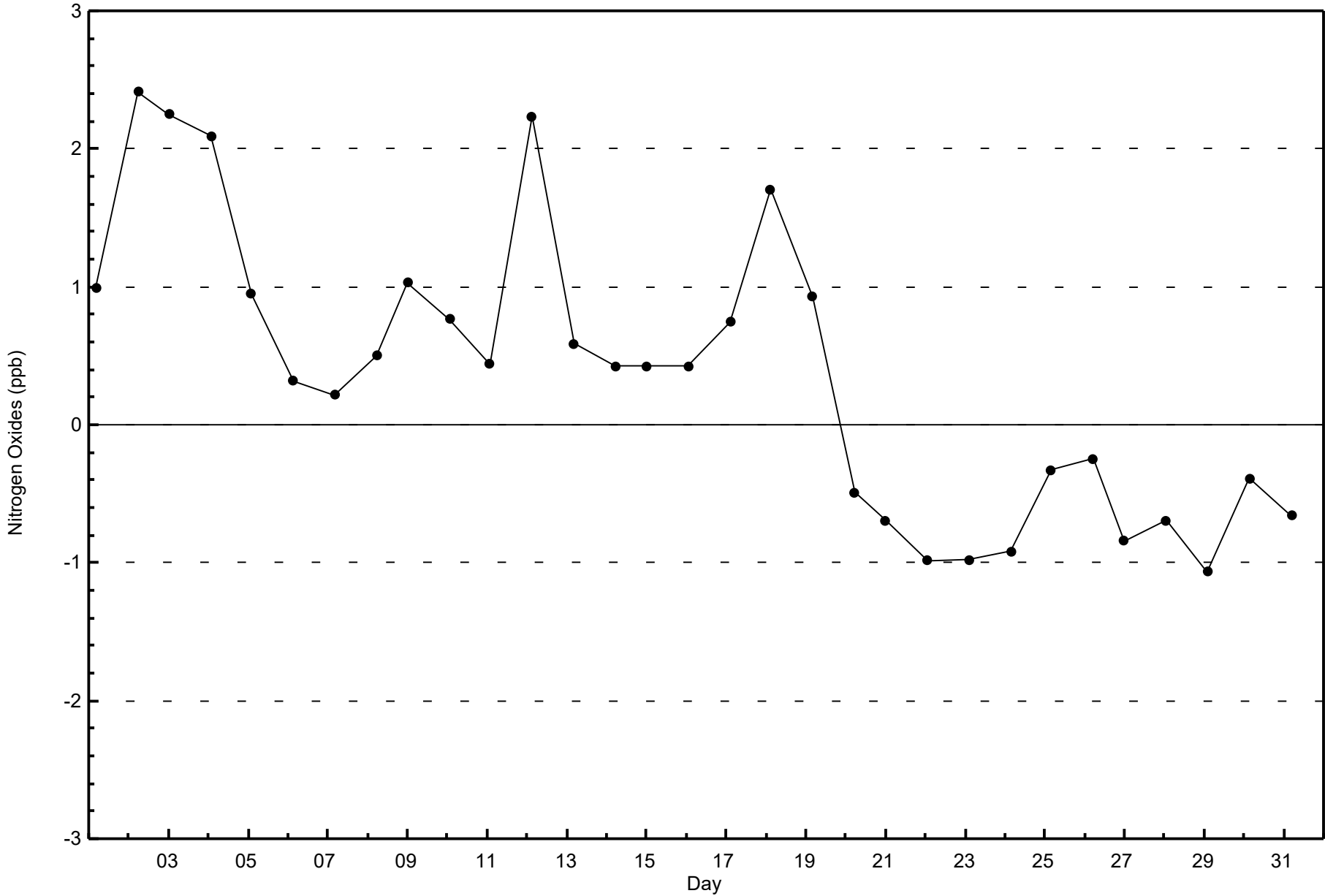
Total Number of Hours: 744

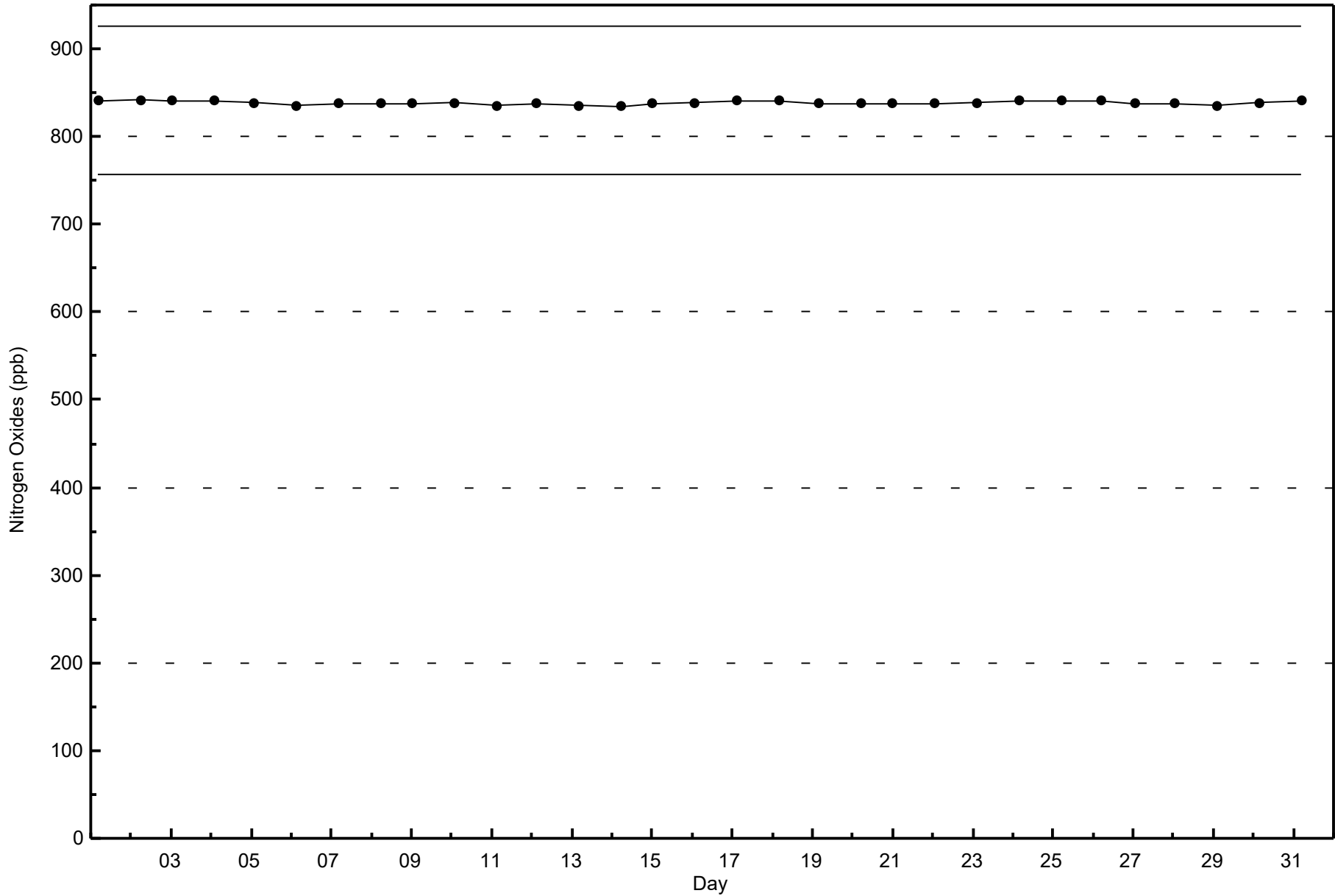


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Nitrogen Oxides (NO_x) - ppb
Fort McKay South









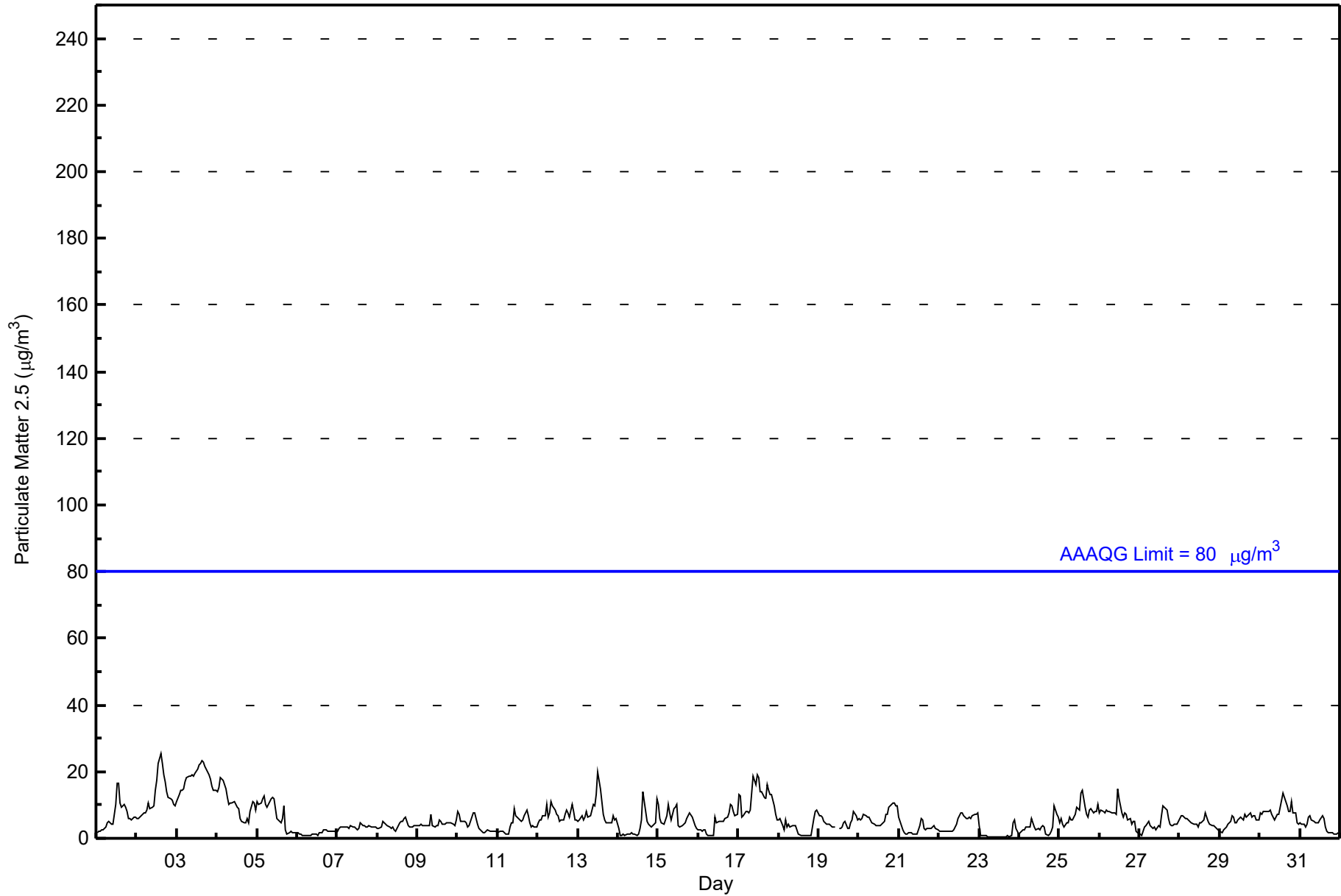
Wood Buffalo Environmental Association

Summary of Hour Averages

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

Fort McKay South - December 2023

Number of Exceedences (AAAQO):		1-hr: 0	24-hr: 0																		Hours in Service:	744																											
Maximum Value: 25.6 µg/m ³ on Dec 2 15:00		Maximum Daily Average: 18.0 µg/m ³ on Dec 3																	Hours of Data:	743																													
Minimum Value: 0.4 µg/m ³ on Dec 23 11:00		Minimum Daily Average: 1.2 µg/m ³ on Dec 23																	Hours of Missing Data:	1																													
Maximum Diurnal Average: 7.3 µg/m ³ at hour 14		Minimum Diurnal Average: 5.1 µg/m ³ at hour 3																	Hours of Calibration:	1																													
Monthly Average: 5.99 µg/m ³		Percentiles: P ₁ = 0.5 P ₁₀ = 1.5 Q ₁ = 3.2 Median = 5.0 Q ₃ = 7.7 P ₉₀ = 11.1 P ₉₉ = 21.4																	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-Dec	1.8	2.0	2.2	2.4	2.6	3.4	4.6	5.0	4.7	4.2	4.4	10.0	16.4	16.6	10.5	9.3	10.1	9.4	7.9	5.7	5.8	5.5	6.2	6.3	6.5	16.6																							
2-Dec	6.1	5.9	6.4	7.3	7.6	7.5	8.5	10.6	8.9	9.4	9.7	14.3	17.4	22.3	25.6	22.6	18.9	17.1	13.9	12.4	11.8	11.6	10.3	10.0	12.3	25.6																							
3-Dec	10.8	13.2	14.2	14.2	14.9	16.9	18.1	18.6	18.8	18.9	18.7	19.5	20.9	22.2	22.4	23.4	22.8	21.8	20.1	18.9	17.7	15.9	14.6	14.4	18.0	23.4																							
4-Dec	14.1	15.1	18.2	17.6	17.6	14.8	12.2	10.3	10.7	10.5	10.8	10.1	9.3	8.9	6.0	5.0	4.7	4.7	5.8	4.8	7.9	11.0	10.5	8.5	10.4	18.2																							
5-Dec	11.1	10.0	10.5	12.1	12.6	10.4	9.3	10.1	11.8	12.5	11.7	8.7	6.0	4.9	4.8	5.9	9.6	2.4	1.2	1.6	2.0	1.8	1.7	1.5	7.3	12.6																							
6-Dec	1.5	1.2	1.4	1.0	0.7	0.8	0.8	0.8	0.8	1.4	1.4	1.1	1.1	1.5	1.6	1.9	2.5	2.4	2.2	2.2	2.0	2.2	2.3	1.8	1.5	2.5																							
7-Dec	2.1	3.1	3.2	3.3	3.4	3.5	3.3	3.2	3.7	3.5	3.5	2.8	2.7	2.9	4.5	4.0	3.6	3.5	3.6	3.6	3.3	3.2	3.3	3.5	3.3	4.5																							
8-Dec	3.1	2.8	3.5	5.3	4.6	4.1	3.7	3.5	3.0	3.5	2.7	2.3	3.0	4.8	4.9	5.1	6.1	6.2	4.0	3.4	3.3	3.4	3.6	3.8	3.9	6.2																							
9-Dec	3.9	4.0	4.1	4.0	4.0	4.0	3.9	4.0	7.2	3.7	3.5	4.0	3.9	5.3	5.2	4.2	4.2	4.6	4.8	4.5	4.7	4.4	4.0	5.6	4.4	7.2																							
10-Dec	8.1	7.3	5.3	5.3	5.1	4.7	3.6	3.7	6.5	7.6	7.8	5.8	4.3	3.1	1.9	1.8	1.8	2.1	2.4	2.0	1.9	2.1	2.2	1.9	4.1	8.1																							
11-Dec	1.8	2.0	2.1	1.9	1.5	1.4	1.3	3.4	4.5	4.6	8.8	6.6	5.9	5.4	5.2	5.5	6.8	8.4	6.9	4.6	3.3	3.8	3.3	3.4	4.3	8.8																							
12-Dec	4.8	5.6	5.4	6.7	6.8	10.2	6.3	7.5	10.9	9.8	8.4	7.1	6.9	5.2	5.3	5.6	7.1	8.3	7.7	6.2	10.0	8.1	5.7	5.4	7.1	10.9																							
13-Dec	4.9	5.5	6.9	5.4	6.5	8.1	6.6	7.0	8.6	10.0	9.7	13.3	20.1	14.8	11.0	7.3	5.6	4.8	4.7	4.6	4.7	6.6	5.5	5.9	7.8	20.1																							
14-Dec	3.2	1.0	1.0	1.3	1.0	1.1	1.1	1.1	1.7	1.5	1.2	1.0	1.1	2.8	5.5	14.0	8.1	4.9	4.4	3.7	3.6	4.0	4.6	12.1	3.5	14.0																							
15-Dec	10.2	5.9	4.7	4.1	5.6	6.6	10.0	7.7	5.6	9.1	9.2	10.0	4.0	3.5	3.8	4.2	4.6	5.8	6.8	7.5	6.5	4.9	3.8	3.1	6.1	10.2																							
16-Dec	2.7	2.6	2.3	2.6	2.7	1.2	0.9	0.8	1.0	1.0	6.5	4.6	5.0	5.1	4.9	5.1	5.7	6.2	7.8	10.2	9.8	7.8	6.7	7.3	4.6	10.2																							
17-Dec	13.0	12.7	6.5	6.6	8.0	8.1	7.6	8.6	13.8	18.5	16.1	19.2	18.0	14.0	14.1	12.3	11.9	16.1	14.4	13.3	13.0	9.7	7.3	5.4	12.0	19.2																							
18-Dec	5.4	5.7	3.7	2.6	5.5	3.5	4.1	3.3	3.8	3.6	3.6	2.5	1.1	1.0	0.8	0.8	0.8	0.7	0.8	0.8	3.5	5.8	8.1	8.3	3.3	8.3																							
19-Dec	6.7	6.9	6.5	5.3	4.7	4.3	4.1	3.8	3.4	3.3	3.5	C	3.1	3.1	3.2	4.8	5.3	3.0	3.1	4.9	5.6	8.1	7.0	5.7	4.7	8.1																							
20-Dec	6.0	5.5	5.8	7.3	6.7	6.4	6.3	5.4	4.5	4.2	3.8	3.6	3.8	4.0	4.5	5.3	7.0	7.1	9.4	9.8	10.5	10.6	9.7	9.9	6.5	10.6																							
21-Dec	6.3	3.6	2.6	1.9	1.5	1.5	1.6	1.6	1.1	1.2	1.4	1.4	3.6	5.8	5.7	2.8	2.4	3.0	2.9	2.9	3.4	3.7	3.0	2.5	2.8	6.3																							
22-Dec	2.2	2.3	2.1	2.1	1.9	2.0	2.0	2.2	2.3	2.7	4.2	6.1	6.8	7.8	7.5	6.8	6.1	5.8	6.2	6.0	6.8	7.4	7.3	7.6	4.7	7.8																							
23-Dec	3.9	1.0	0.7	0.8	0.7	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.6	0.7	0.6	0.6	4.8	5.3	2.9	1.9	1.2	5.3																							
24-Dec	1.5	2.3	2.5	2.7	3.3	3.5	3.2	5.9	4.9	3.2	2.5	3.1	2.6	3.3	4.0	3.2	1.2	0.8	1.3	2.0	3.6	9.7	7.2	6.2	3.5	9.7																							
25-Dec	4.8	6.0	4.2	3.6	4.9	4.8	6.5	5.5	5.7	7.2	9.3	8.7	8.3	13.5	14.4	9.4	7.2	6.2	8.6	9.0	7.7	8.0	8.3	10.0	7.6	14.4																							
26-Dec	7.7	8.5	8.2	7.8	8.6	8.0	7.9	7.7	7.7	7.7	7.3	14.8	11.8	7.4	6.4	7.4	7.0	5.7	6.0	4.4	5.0	5.3	2.3	1.8	7.2	14.8																							
27-Dec	1.4	0.9	2.0	3.4	4.0	5.0	4.0	3.5	2.9	3.6	2.7	3.7	3.6	6.6	9.9	9.3	8.4	6.0	4.4	3.7	3.7	4.1	4.4	5.2	4.4	9.9																							
28-Dec	6.0	6.6	6.6	6.1	6.0	5.4	4.9	4.5	4.2	4.1	4.1	3.6	4.6	4.7	5.5	7.5	6.2	5.2	4.2	3.8	3.8	3.4	3.1	2.7	4.9	7.5																							
29-Dec	2.0	1.5	2.6	2.9	3.4	4.3	5.1	7.0	6.4	4.5	4.5	5.6	6.6	5.7	5.6	7.2	6.4	7.4	7.7	6.5	6.9	6.9	5.5	5.6	5.3	7.7																							
30-Dec	7.5	7.1	7.9	8.1	7.9	8.3	8.3	7.3	6.4	5.7	7.0	7.3	9.2	11.4	13.4	10.8	9.6	7.9	8.1	10.9	7.8	7.8	4.6	4.2	8.1	13.4																							
31-Dec	4.8	4.3	4.1	3.6	4.2	6.2	6.6	5.5	5.0	4.8	4.6	4.8	5.4	6.6	5.8	3.4	2.1	1.7	1.8	1.6	1.4	1.2	1.4	1.9	3.9	6.6																							
																								5.5	5.2	5.1	5.1	5.4	5.5	5.4	5.5	5.8	6.0	6.2	6.9	7.0	7.3	7.2	7.0	6.6	6.1	5.9	5.7	6.0	6.2	5.5	5.6	Diurnal Average	
																								14.1	15.1	18.2	17.6	17.6	16.9	18.1	18.6	18.8	18.9	18.7	19.5	20.9	22.3	25.6	23.4	22.8	21.8	20.1	18.9	17.7	15.9	14.6	14.4	Diurnal Maximum	
C - Calibration																																																	
Alberta Ambient Air Quality Guideline/Objectives: 1-hr 80 µg/m ³ 24-hr 29 µg/m ³																																																	





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Fort McKay South - December 2023**

Concentration Ranges ($\mu\text{g}/\text{m}^3$)	Number of Hours	%	Cumulative %
0 - 5	409	55.05	55.05
6 - 15	300	40.38	95.42
16 - 25	33	4.44	99.87
26 - 80	1	0.13	100.00
> 81.0	0	0.00	100.00

Total Number of Valid Hours: 743

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Fort McKay South - December 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	13	6	5	0	0	2	2	41	82	66	51	61	37	11	17	14	408
6 - 15	12	7	1	0	0	0	9	51	111	33	27	15	6	5	6	16	299
16 - 25	6	1	1	0	0	0	0	4	7	1	1	3	1	3	2	3	33
26 - 80	0	0	0	0	0	0	0	0	1	0	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
Totals	31	14	7	0	0	2	11	96	201	100	79	79	44	19	25	33	741

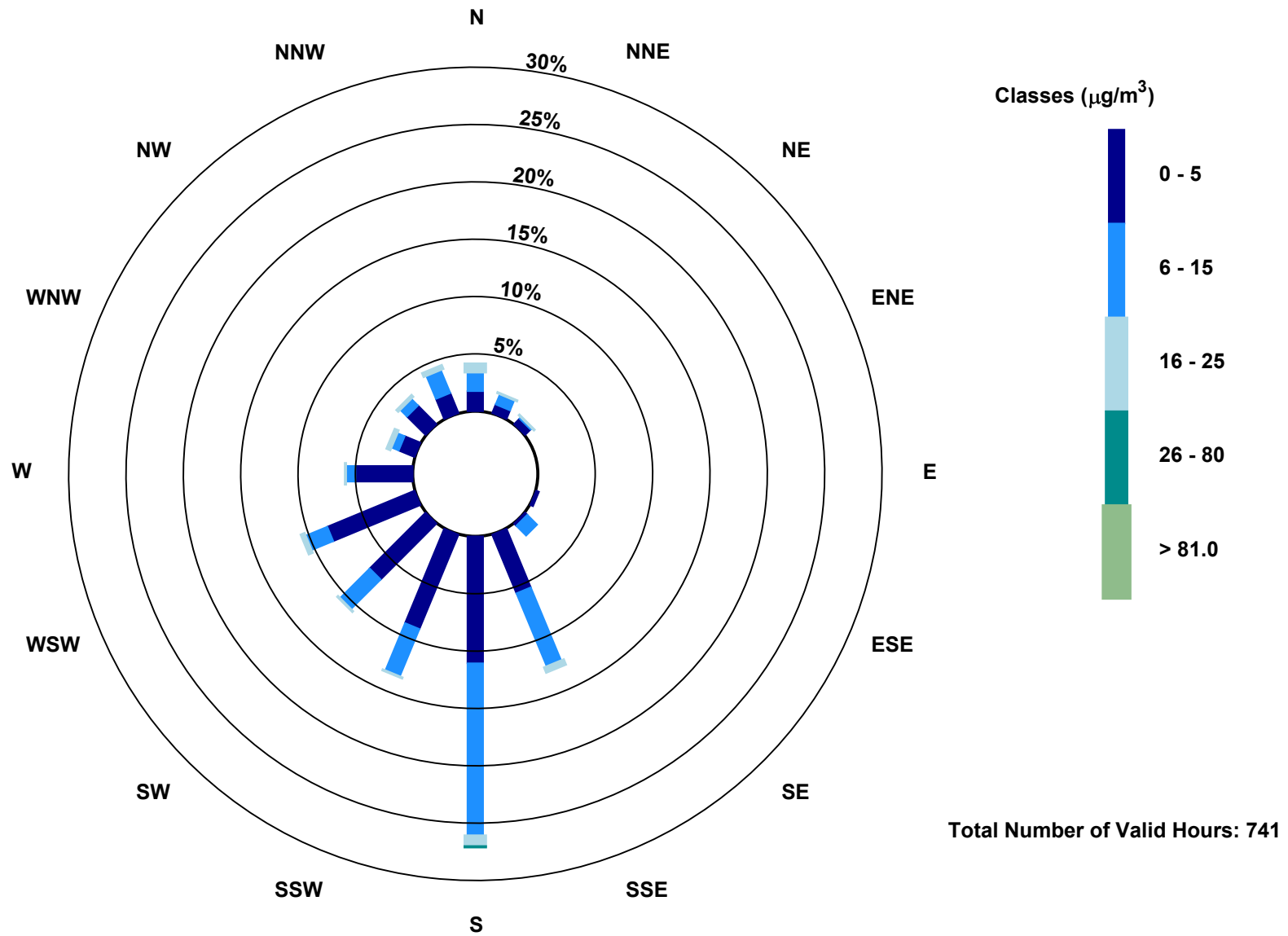
Total Number of Valid Hours: 741

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Dec 2023

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

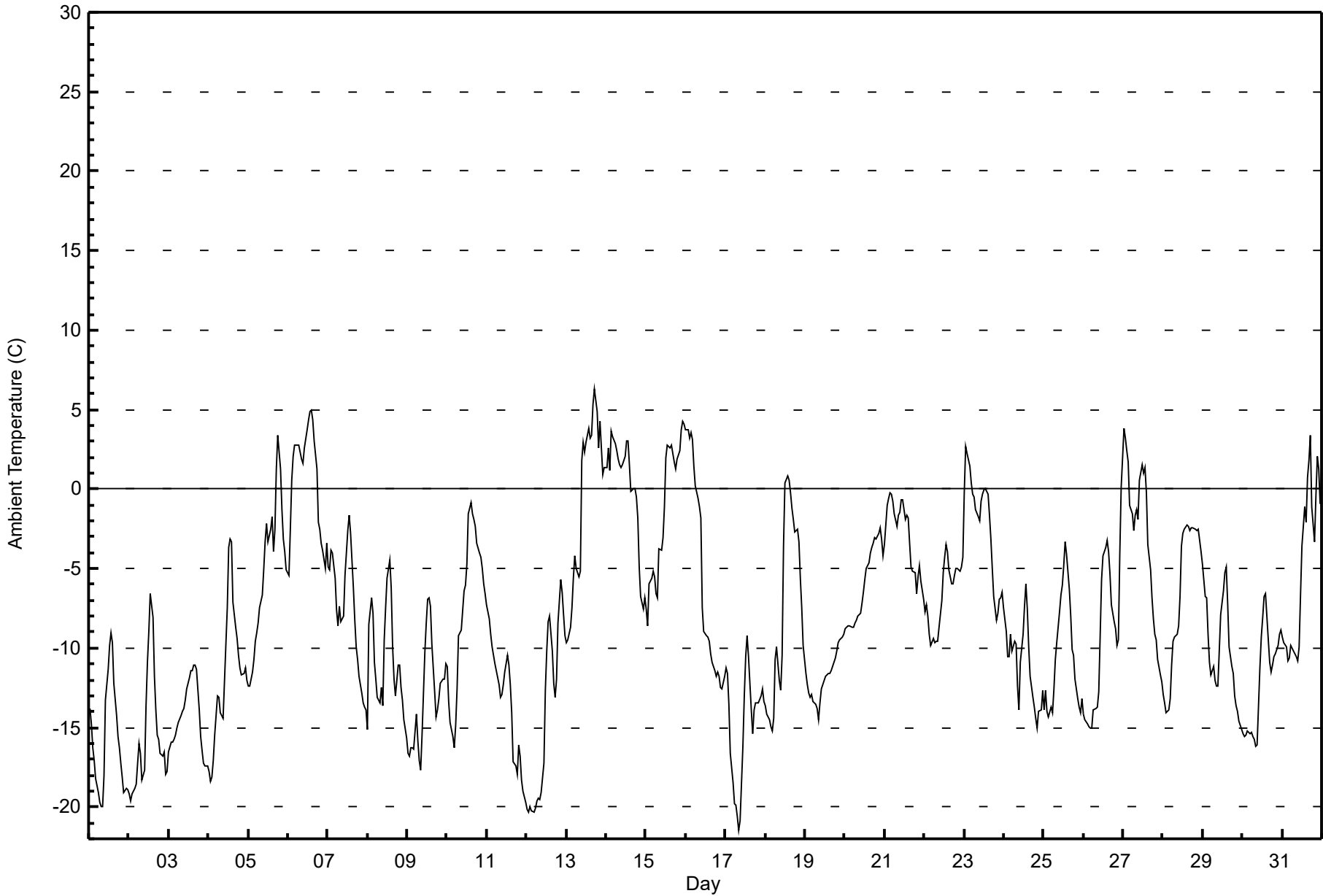




Wood Buffalo Environmental Association
Summary of Hour Averages

Ambient Temperature (AT) - C
Fort McKay South - December 2023

Maximum Value: 6.3 C on Dec 13 18:00 Maximum Daily Average: 0.7 C on Dec 6																						Hours in Service:	744			
Minimum Value: -21.5 C on Dec 17 09:00 Minimum Daily Average: -15.9 C on Dec 1																						Hours of Data:	744			
Maximum Diurnal Average: -3.8 C at hour 14 Minimum Diurnal Average: -10.1 C at hour 9																						Hours of Missing Data:	0			
Monthly Average: -8.20 C Percentiles: P ₁ = -20.0 P ₁₀ = -16.0 Q ₁ = -13.0 Median = -9.1 Q ₃ = -3.4 P ₉₀ = 1.3 P ₉₉ = 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-Dec	-13.8	-14.7	-16.3	-17.1	-18.2	-19.1	-19.7	-19.9	-20.0	-18.1	-13.3	-11.3	-9.9	-9.1	-9.7	-12.2	-14.2	-15.5	-16.3	-17.3	-18.1	-19.1	-18.9	-18.9	-15.9	-9.1
2-Dec	-19.2	-19.6	-19.2	-18.9	-18.5	-17.2	-16.0	-16.6	-18.3	-17.7	-13.7	-10.9	-9.0	-6.6	-8.0	-11.8	-13.9	-15.5	-15.8	-16.6	-16.8	-16.5	-18.0	-17.8	-15.5	-6.6
3-Dec	-16.5	-15.9	-15.9	-15.8	-15.4	-15.0	-14.6	-14.3	-14.0	-13.8	-13.3	-12.6	-11.9	-11.4	-11.4	-11.1	-11.1	-11.4	-13.9	-15.6	-16.4	-17.2	-17.4	-17.4	-14.3	-11.1
4-Dec	-17.8	-18.4	-18.1	-17.1	-15.5	-13.0	-13.1	-14.1	-14.2	-14.4	-9.8	-7.5	-3.7	-3.1	-3.3	-7.1	-8.7	-9.4	-10.4	-11.2	-11.7	-11.6	-11.3	-12.1	-11.5	-3.1
5-Dec	-12.4	-12.4	-11.5	-10.7	-9.6	-9.1	-8.4	-7.5	-6.7	-5.0	-3.3	-2.2	-3.3	-2.5	-1.8	-3.9	-2.5	1.3	3.3	1.3	-1.3	-3.2	-3.9	-5.1	-5.0	3.3
6-Dec	-5.4	-2.5	0.6	2.1	2.7	2.8	2.8	2.3	1.9	1.6	2.6	3.8	4.4	4.9	5.0	4.3	3.0	1.3	-2.1	-2.5	-3.4	-3.9	-5.0	-3.4	0.7	5.0
7-Dec	-4.9	-5.1	-3.8	-4.0	-5.6	-7.6	-8.6	-7.3	-8.3	-8.0	-5.4	-4.1	-2.6	-1.6	-2.8	-6.2	-8.3	-9.9	-10.7	-11.7	-12.8	-13.5	-13.7	-13.9	-7.5	-1.6
8-Dec	-15.1	-8.5	-6.9	-7.8	-10.9	-12.0	-13.1	-13.4	-12.5	-13.6	-9.5	-7.4	-5.6	-4.5	-6.2	-9.9	-12.0	-13.0	-11.1	-11.1	-12.4	-13.2	-14.5	-15.6	-10.8	-4.5
9-Dec	-16.6	-16.8	-16.3	-16.2	-16.4	-14.2	-15.8	-17.1	-17.7	-15.5	-10.3	-8.4	-6.9	-6.9	-7.3	-9.7	-12.7	-14.4	-13.9	-13.2	-12.2	-12.0	-12.0	-11.0	-13.1	-6.9
10-Dec	-11.2	-13.3	-14.7	-15.5	-16.2	-14.9	-12.6	-9.2	-8.8	-7.7	-6.4	-6.0	-4.7	-1.5	-0.8	-1.5	-1.9	-2.3	-3.4	-4.0	-4.3	-5.0	-6.0	-6.5	-7.4	-0.8
11-Dec	-7.3	-8.2	-9.1	-9.9	-10.5	-11.0	-11.8	-12.3	-13.1	-12.9	-12.3	-11.5	-10.4	-11.1	-12.3	-14.1	-17.1	-17.4	-18.0	-16.1	-16.8	-18.3	-19.0	-19.7	-13.3	-7.3
12-Dec	-20.2	-20.3	-20.0	-20.2	-20.3	-20.1	-19.6	-19.5	-19.6	-19.1	-17.2	-12.7	-10.2	-8.3	-8.0	-10.2	-12.2	-13.1	-12.0	-8.5	-5.7	-6.5	-7.9	-9.2	-14.2	-5.7
13-Dec	-9.6	-9.5	-8.7	-7.5	-5.6	-4.2	-5.0	-5.5	-5.2	1.8	2.9	2.4	3.0	3.9	3.2	3.4	5.3	6.3	4.9	2.6	4.2	2.5	0.9	1.3	-0.5	6.3
14-Dec	1.3	2.6	1.2	3.7	3.3	2.9	2.4	1.9	1.5	1.3	1.5	2.1	3.0	3.1	1.5	-0.1	0.1	0.0	-0.5	-1.9	-4.9	-6.8	-7.5	-6.8	0.2	3.7
15-Dec	-7.6	-8.6	-6.0	-5.6	-5.1	-5.6	-6.5	-6.8	-3.8	-3.9	-3.0	-1.1	1.9	2.8	2.6	2.8	2.2	1.7	1.3	1.9	2.4	3.8	4.3	4.1	-1.3	4.3
16-Dec	3.8	3.7	3.2	3.6	3.1	1.5	0.2	-0.6	-1.1	-1.8	-7.4	-8.9	-9.2	-9.3	-9.6	-10.4	-10.9	-11.4	-11.8	-11.5	-11.8	-12.5	-12.6	-11.8	-5.6	3.8
17-Dec	-11.2	-11.6	-13.5	-16.6	-18.5	-19.8	-19.9	-20.6	-21.5	-20.8	-16.1	-13.0	-10.6	-9.2	-10.5	-13.9	-15.4	-13.9	-13.4	-13.5	-13.5	-13.0	-12.6	-13.4	-14.8	-9.2
18-Dec	-13.6	-14.1	-14.5	-14.9	-15.2	-14.4	-10.7	-9.9	-12.1	-12.6	-10.5	-3.6	0.4	0.8	0.6	-0.2	-1.2	-1.9	-2.7	-2.5	-3.3	-5.6	-7.4	-9.8	-7.5	0.8
19-Dec	-11.6	-12.3	-12.8	-13.1	-12.9	-13.3	-13.5	-13.8	-14.5	-13.5	-12.5	-12.0	-11.8	-11.7	-11.6	-11.6	-11.4	-10.9	-10.6	-10.2	-9.7	-9.4	-9.3	-9.1	-11.8	-9.1
20-Dec	-8.8	-8.7	-8.6	-8.6	-8.7	-8.7	-8.4	-8.2	-8.0	-7.8	-7.2	-6.5	-5.7	-5.0	-4.6	-4.0	-3.7	-3.4	-3.0	-3.1	-2.7	-2.5	-3.2	-4.2	-6.0	-2.5
21-Dec	-3.5	-1.0	-0.6	-0.2	-0.4	-0.7	-1.5	-2.4	-1.7	-1.4	-0.6	-0.7	-1.9	-1.6	-1.8	-3.4	-4.9	-5.2	-5.3	-6.6	-5.5	-4.8	-5.8	-7.0	-2.8	-0.2
22-Dec	-7.8	-7.3	-8.0	-9.1	-9.9	-9.4	-9.6	-9.6	-9.6	-8.7	-7.1	-5.2	-4.3	-3.5	-4.0	-5.0	-6.0	-5.9	-5.4	-5.0	-5.0	-5.1	-4.9	-4.3	-6.7	-3.5
23-Dec	-0.2	2.7	2.2	1.4	0.4	-0.4	-0.5	-1.3	-1.7	-2.0	-0.8	-0.4	-0.1	0.0	-0.3	-1.7	-3.1	-5.0	-6.7	-8.2	-7.8	-6.9	-6.9	-6.5	-2.2	2.7
24-Dec	-7.5	-9.0	-10.6	-10.6	-9.1	-10.2	-9.6	-9.8	-12.4	-13.9	-10.9	-9.1	-7.4	-5.9	-7.6	-9.9	-11.8	-13.1	-13.7	-14.5	-15.0	-14.0	-13.9	-12.6	-10.9	-5.9
25-Dec	-13.9	-12.7	-14.0	-14.3	-13.7	-14.1	-12.6	-10.7	-9.6	-7.7	-6.7	-6.0	-4.8	-3.3	-4.1	-6.3	-8.0	-10.1	-10.4	-11.9	-13.2	-13.7	-14.0	-13.2	-10.4	-3.3
26-Dec	-14.2	-14.5	-14.8	-15.0	-15.0	-15.1	-13.9	-13.8	-13.8	-12.7	-9.2	-5.7	-4.2	-3.6	-3.2	-3.9	-5.3	-7.3	-8.3	-8.7	-9.8	-9.4	-4.1	0.1	-9.4	0.1
27-Dec	3.8	3.2	2.4	1.7	-1.0	-1.5	-2.6	-1.6	-1.3	-1.9	0.6	1.5	1.0	1.3	-0.3	-3.5	-5.1	-6.8	-8.2	-9.2	-9.5	-10.7	-11.7	-12.1	-3.0	3.8
28-Dec	-12.9	-13.5	-14.1	-13.9	-13.2	-11.1	-9.6	-9.4	-9.1	-8.6	-6.7	-3.6	-2.8	-2.5	-2.2	-2.4	-2.6	-2.5	-2.4	-2.5	-2.6	-2.5	-3.2	-3.9	-6.6	-2.2
29-Dec	-4.7	-6.7	-6.8	-9.1	-10.9	-11.7	-11.2	-12.0	-12.4	-12.4	-10.2	-7.9	-6.4	-5.2	-4.9	-7.2	-9.9	-11.1	-11.6	-13.0	-13.6	-14.0	-14.6	-15.1	-10.1	-4.7
30-Dec	-15.4	-15.6	-15.5	-15.2	-15.4	-15.3	-15.5	-15.8	-16.2	-16.1	-11.3	-9.3	-8.0	-6.7	-6.6	-9.5	-10.9	-11.5	-11.0	-10.5	-10.3	-9.8	-9.1	-8.9	-12.1	-6.6
31-Dec	-9.3	-9.7	-10.0	-10.8	-10.7	-9.8	-10.0	-10.2	-10.5	-10.8	-9.9	-6.7	-3.6	-1.1	-2.1	0.8	1.8	3.4	-1.1	-3.3	-0.4	2.1	1.2	-1.0	-5.1	3.4
																						Diurnal Average				
																						Diurnal Maximum				





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C
Fort McKay South - December 2023**

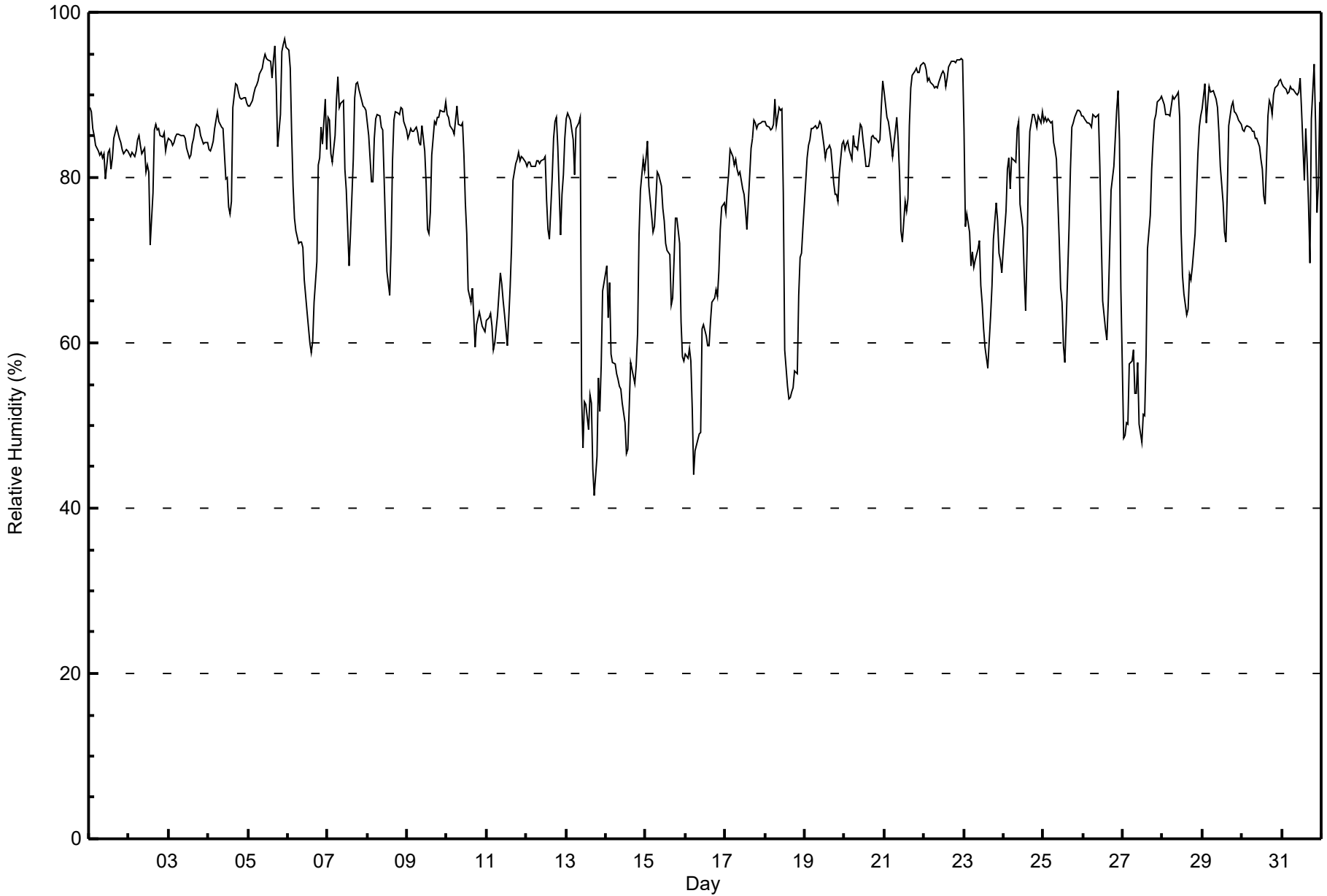
Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	10	1.34	1.34
-20 - 0	643	86.42	87.77
0 - 10	91	12.23	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Maximum Value: 96.7 % on Dec 5 23:00																						Maximum Daily Average: 92.7 % on Dec 22																						Hours in Service: 744			
Minimum Value: 41.6 % on Dec 13 18:00																						Minimum Daily Average: 60.2 % on Dec 14																						Hours of Data: 744			
Maximum Diurnal Average: 83.2 % at hour 23																						Minimum Diurnal Average: 69.5 % at hour 14																						Hours of Missing Data: 0			
Monthly Average: 79.26 %																						Percentiles: P ₁ = 47.5 P ₁₀ = 60.0 Q ₁ = 73.1 Median = 83.5 Q ₃ = 87.1 P ₉₀ = 90.4 P ₉₉ = 94.4																						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-Dec	88.5	88.0	85.9	85.1	83.9	83.3	82.7	83.0	82.3	82.8	79.8	83.1	83.4	81.0	82.4	84.8	86.1	85.4	84.8	84.3	83.5	82.8	83.4	83.1	83.9	88.5																					
2-Dec	82.9	82.6	83.0	82.6	83.2	84.6	85.0	83.9	82.9	83.6	80.6	81.5	80.7	71.8	78.1	85.8	86.4	85.8	86.0	85.1	84.9	85.3	83.2	84.2	83.1	86.4																					
3-Dec	84.8	84.4	84.0	84.3	84.9	85.3	85.3	85.1	85.1	85.1	84.7	83.6	82.4	82.7	84.1	84.7	85.9	86.5	86.0	85.0	84.5	84.0	84.2	84.2	84.6	86.5																					
4-Dec	83.5	83.2	83.7	84.5	86.0	87.9	86.8	86.4	86.2	86.0	79.8	79.9	76.5	75.6	77.0	88.5	91.3	91.2	90.3	89.7	89.5	89.7	89.7	89.0	85.5	91.3																					
5-Dec	88.6	88.7	89.3	90.2	90.9	91.3	91.8	92.6	93.2	94.3	94.9	94.4	94.2	94.1	92.0	94.3	95.9	91.0	83.7	87.7	95.2	96.2	96.7	95.8	92.4	96.7																					
6-Dec	95.4	93.2	85.2	78.9	75.1	73.6	72.0	72.1	72.2	71.5	67.6	63.8	61.9	60.1	58.9	60.1	64.9	69.9	81.5	82.3	86.1	84.0	89.5	83.4	75.1	95.4																					
7-Dec	87.4	87.0	82.9	81.8	85.0	89.4	92.2	88.5	89.0	89.3	80.9	78.5	73.9	69.3	73.2	82.3	89.7	91.4	91.5	90.6	89.3	88.6	88.4	88.1	85.3	92.2																					
8-Dec	86.6	85.0	79.5	79.4	84.7	87.1	87.7	87.4	86.1	85.7	80.0	74.1	68.6	65.8	71.9	82.1	86.9	87.9	87.8	87.7	88.5	88.3	86.8	85.7	83.0	88.5																					
9-Dec	84.8	85.2	86.0	85.7	85.6	86.1	85.4	84.3	84.0	86.3	83.2	79.4	73.8	73.1	75.7	82.7	86.7	86.5	87.2	87.3	88.1	88.0	88.0	89.1	84.3	89.1																					
10-Dec	87.7	87.3	86.3	85.8	85.3	87.0	88.7	86.5	86.3	86.6	82.7	77.0	73.2	66.4	64.9	66.7	63.2	59.5	62.3	63.7	62.9	62.1	61.8	61.4	74.8	88.7																					
11-Dec	62.8	63.0	63.5	62.0	59.2	60.0	63.3	65.9	68.5	67.2	65.2	63.3	59.7	63.1	66.8	71.6	79.6	81.7	82.3	83.1	82.1	82.5	82.3	81.9	70.0	83.1																					
12-Dec	81.4	81.8	81.8	81.4	81.3	81.3	82.1	82.0	81.7	82.0	82.2	82.5	77.4	73.7	72.6	80.0	84.8	86.7	87.3	83.8	73.1	78.0	80.3	84.8	81.0	87.3																					
13-Dec	87.1	87.8	87.0	85.8	84.5	80.3	85.9	86.6	87.2	53.6	47.3	52.9	52.6	49.5	53.7	52.8	44.8	41.6	46.2	55.7	51.8	57.3	66.3	67.2	65.2	87.8																					
14-Dec	69.4	63.0	67.4	58.7	57.7	57.4	56.2	55.6	54.7	54.4	52.7	50.3	46.5	47.2	52.3	57.6	56.0	55.1	57.2	61.3	73.0	78.4	82.2	80.9	60.2	82.2																					
15-Dec	82.4	84.5	79.0	75.4	73.4	74.1	77.1	80.7	80.3	79.0	76.3	74.8	72.1	71.2	70.6	64.6	65.4	70.1	75.0	75.1	72.0	62.6	58.3	57.9	73.0	84.5																					
16-Dec	58.6	58.1	59.3	57.8	52.0	44.0	47.0	48.4	49.0	49.1	61.6	62.3	60.9	59.7	59.7	62.5	65.0	65.4	66.5	65.5	68.6	73.7	76.4	76.9	60.3	76.9																					
17-Dec	75.8	78.4	80.5	83.4	82.6	81.5	82.2	81.1	80.3	80.7	78.7	78.0	76.2	73.8	77.0	83.6	84.8	87.0	86.6	85.9	86.4	86.7	86.8	86.7	81.9	87.0																					
18-Dec	86.8	86.2	86.2	85.7	85.9	86.4	89.5	86.3	88.5	88.2	88.3	78.1	59.2	54.8	53.2	53.4	54.0	54.6	56.6	56.3	65.7	70.3	70.9	73.9	73.3	89.5																					
19-Dec	79.5	82.5	83.9	84.6	86.0	85.9	86.3	86.0	86.1	86.9	86.5	83.9	82.3	83.4	83.5	83.9	83.5	79.4	77.9	77.9	77.2	80.6	84.1	84.4	83.2	86.9																					
20-Dec	83.4	84.0	84.4	83.4	82.2	85.1	83.7	83.7	83.4	86.5	86.2	84.3	83.1	81.4	81.4	82.6	85.0	85.1	84.7	84.8	84.3	84.6	88.7	91.7	84.5	91.7																					
21-Dec	90.3	87.3	86.8	85.6	84.2	82.6	84.1	87.3	84.6	80.4	73.6	72.3	77.1	75.9	77.5	86.3	90.9	92.4	92.9	93.3	92.7	92.7	93.6	93.9	85.8	93.9																					
22-Dec	93.7	93.1	91.7	92.1	91.5	91.3	90.9	91.0	90.9	91.6	92.6	92.9	92.6	91.1	92.0	93.4	94.0	94.1	94.1	93.8	94.2	94.2	94.4	94.3	92.7	94.4																					
23-Dec	86.0	74.1	75.7	73.3	69.4	71.0	69.2	70.1	71.4	72.3	67.0	64.8	61.7	59.4	57.0	60.2	63.2	66.9	72.6	76.9	74.8	70.9	70.1	68.5	69.4	86.0																					
24-Dec	71.1	75.9	81.0	82.4	78.6	82.4	82.0	81.9	85.9	86.8	76.7	73.9	68.3	64.0	71.2	80.2	85.6	87.6	87.6	86.9	86.2	87.5	86.6	87.9	80.8	87.9																					
25-Dec	86.8	87.3	86.9	87.2	86.7	86.8	84.2	83.4	82.3	72.4	66.5	64.9	59.7	57.6	62.5	73.9	81.0	86.2	86.7	87.3	88.1	88.2	88.0	87.4	80.1	88.2																					
26-Dec	87.4	87.2	86.6	86.6	86.4	86.1	87.6	87.3	87.4	87.6	81.4	72.8	65.1	61.7	60.4	64.8	71.1	78.4	81.3	84.7	88.1	90.6	84.5	66.6	80.1	90.6																					
27-Dec	48.4	48.8	50.3	50.1	57.4	57.8	59.2	53.9	53.9	57.6	50.2	47.9	51.3	51.2	58.4	71.3	75.3	81.0	84.4	87.0	87.7	89.1	89.5	89.9	64.7	89.9																					
28-Dec	89.3	88.8	87.6	87.6	87.5	88.7	89.8	89.5	90.1	90.3	87.3	73.5	68.1	66.0	63.4	64.1	68.4	67.7	69.2	73.3	78.2	82.9	86.0	87.5	80.2	90.3																					
29-Dec	88.3	91.3	86.6	89.0	91.0	90.4	90.5	90.0	89.4	88.5	85.5	81.4	76.9	73.4	72.2	78.3	86.3	88.7	89.1	88.0	87.7	87.4	86.9	86.4	86.0	91.3																					
30-Dec	85.8	85.6	86.1	86.2	86.1	86.0	85.7	85.5	84.8	84.8	83.7	82.2	81.0	77.8	76.7	87.5	89.3	88.8	87.7	90.1	90.9	91.2	91.7	91.8	86.1	91.8																					
31-Dec	91.3	91.1	90.8	90.1	90.4	91.0	90.7	90.6	90.2	90.0	90.3	92.1	88.1	79.6	86.0	81.9	76.5	69.7	87.1	93.7	86.6	75.8	79.0	89.1	86.7	93.7																					
																						82.4	82.1	81.6	80.9	80.6	80.8	81.4	81.2	80.0	77.2	75.0	71.9	69.5	71.2	75.7	78.1	78.8	80.5	81.5	82.0	82.4	83.2	83.0	Diurnal Average		
																						95.4	93.2	91.7	92.1	91.5	91.3	92.2	92.6	93.2	94.3	94.9	94.4	94.2	94.1	92.0	94.3	95.9	94.1	94.1	93.8	95.2	96.2	96.7	95.8	Diurnal Maximum	





Maximum Speed: 20 km/h on Dec 15 16:00	Maximum Daily Speed Average: 13.1 km/h on Dec 20	Hours in Service: 744
Minimum Speed Value: 0 km/h on Dec 31 01:00	Minimum Daily Speed Average: 1.2 km/h on Dec 30	Hours of Data: 742
Maximum Diurnal Speed Average: 4.7 km/h at hour 14	Minimum Diurnal Speed Average: 1.8 km/h at hour 24	Hours of Missing Data: 2
Monthly Average Velocity: 3.4 km/h 205.3 deg	Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 3 Median = 4 Q ₃ = 8 P ₉₀ = 11 P ₉₉ = 17	Percent Operational Time: 99.7

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Dec	WSW4	SSW2	SSW3	SW2	SW2	WSW2	SW2	S2	UO	S2	SSE2	SSE5	SSE7	S8	S6	SW2	WSW2	W1	W2	SW3	SW2	S3	S1	WSW2	SSW2.4	S8
2-Dec	W1	WSW3	NNW1	WSW2	UO	W1	WSW4	NW1	WSW1	NW0	SSE1	SSE3	NE1	S3	S5	WNW2	NW2	WNW2	NNW6	NW5	NW5	NNW4	NW1	NNW3	WNW1.3	NNW6
3-Dec	NNW3	WNW3	NNW3	NNW3	NNW3	N5	WNW3	NNW4	N4	N4	N3	NNW1	NNW1	N2	N3	NNE3	NW1	W2	SW2	WSW3	WSW2	WSW2	SSW3	S3	NNW1.8	N5
4-Dec	WSW2	S3	SSE4	S3	S3	S3	NNW1	WSW4	SW3	SSW4	S3	SSE6	S5	SSE2	SSE6	S4	SSW1	S2	S5	S4	S5	S4	S4	S4	S3.2	SSE6
5-Dec	S3	S2	SSE3	S3	W2	SW1	S1	N2	SW1	SE2	SSE2	S4	S2	S6	S7	S5	S11	SSW11	SW13	NW5	NNW3	SSW3	SSW2	WSW2	SSW3.0	SW13
6-Dec	SSW6	SSW6	SW7	SW8	SW10	SW11	SW11	SW10	SW8	SSW6	SSW6	SW8	SW11	SW10	SW11	SSW11	SSW10	SSW7	S9	SSE4	S3	NW1	SSW3	SW5	SW7.2	SSW11
7-Dec	SSW7	S3	SW6	SSW3	SSE4	SSE3	S4	SSE5	SSE4	S7	S7	S11	S9	S7	SSE7	S5	SW5	W1	W1	W2	SSW2	SSW3	SSW3	SSW2	S4.3	S11
8-Dec	SSW5	WSW12	WSW11	WSW8	S3	S4	SSE5	S5	S6	S6	SW9	WSW12	S6	SSE4	SSE5	S4	SW1	S4	SSW2	SSE4	SSE5	S3	SSW3	SSW2	SSW4.4	WSW12
9-Dec	S3	SSW2	S4	SSE2	S4	SSW3	S5	SSW3	S4	S8	S10	S12	SSE12	SSE11	S10	S6	SSW2	SW4	WSW3	SSW2	SW2	SW3	SSW3	S2	S4.6	SSE12
10-Dec	SSE1	WNW1	WSW1	WNW1	WSW1	WNW2	SSW4	SSE7	SSE4	S6	SSW6	SW5	SW8	SW8	SW8	WSW10	W11	W15	WNW12	WNW13	NW12	NW13	NW13	NW12	W5.1	W15
11-Dec	NNW11	NW12	NW10	NW11	NW11	WNW11	W11	WSW11	WSW11	WSW9	SW7	SW7	S7	SSE6	S7	S6	S4	SSW4	SSW3	SSW4	SSW4	S4	SW4	SSW4	WSW4.4	NW12
12-Dec	SSW2	S5	SSW1	SSW3	SW3	SSW3	S4	SSW4	SSW3	SSW2	S2	S3	SE3	S7	SSE7	SSE5	S4	S3	S6	SSW6	S9	WNW2	SSW3	SSW4	S3.7	S9
13-Dec	NW1	NNW2	N4	N3	S8	S6	WSW1	SSW2	S5	S11	SSE9	SSE9	S9	S11	S7	S8	S13	S15	S9	SSW8	SSE8	S4	SSE5	SSW6	S5.9	S15
14-Dec	W4	WSW6	WSW6	WSW8	SW8	WSW11	WSW11	WSW12	WSW14	W15	W13	W12	SW6	SSE7	S7	SSW7	SW9	SW10	WSW8	WSW4	W1	S3	S6	SSE5	WSW7.1	W15
15-Dec	SSE6	SSE6	S11	S13	S14	S10	S7	S6	SSE9	SSE8	SSE9	SSE8	S17	S16	S17	S20	S18	S20	S16	SSW17	S14	SSW11	SW11	SW8	S11.8	S20
16-Dec	SW10	SW9	WSW9	WSW9	WNW12	WNW12	W11	W10	W10	NNW10	NNE13	NE9	NNE10	NE9	NNE7	NE4	NNE5	NNE2	N5	NNE1	WNW2	WSW2	S1	N6	NW3.6	NNE13
17-Dec	N9	N9	N4	SW3	SSW3	S3	S4	S3	SSW2	SSW3	S5	SSE5	SSE5	SSE6	SSE5	SSW3	S4	S6	S3	S3	SW1	S4	SW1	W2	S1.9	N9
18-Dec	W1	S3	S4	S2	SSW2	S4	SW5	WSW1	WNW1	SW2	NNW3	W6	WSW9	WSW10	W9	WSW7	WSW8	W7	W7	W9	N11	NNE14	N15	NNE15	WNW3.0	NNE15
19-Dec	NNE10	N8	N8	NNW8	NNW4	WNW4	NW3	NNW3	NW2	NNW1	NNE2	NE3	NE2	N4	NNE4	N5	NE3	ESE4	ESE4	SE7	SE10	SE11	SE9	SE11	NE1.9	SE11
20-Dec	SE13	SSE14	SSE17	SSE16	SSE20	SSE15	SSE13	SSE17	SSE15	SSE12	SSE14	SSE15	SSE13	SSE13	SSE13	SSE12	SSE11	S15	S13	S16	S14	S11	SSW5	WSW5	SSE13.1	SSE20
21-Dec	SW7	WSW13	WSW11	W11	WSW9	SW7	SW7	SSW8	SSW10	SSW7	S6	SSE7	SSE6	S6	S5	SW4	SW2	WSW4	WSW3	S6	SSW7	SSW2	SW3	WSW3	SW5.4	WSW13
22-Dec	SSW2	WSW6	W1	SSW1	S2	SW2	W1	SSW2	S3	SW1	S3	S1	S3	S3	W1	SW1	SW2	SW1	S3	S5	S4	S7	SSE3	SSE3	SSW2.2	S7
23-Dec	WSW8	WSW14	WSW10	W8	W8	W8	W9	WSW7	W6	WSW6	WSW9	WSW13	W11	W10	W9	WSW5	WSW5	S5	SW6	WSW6	SSW8	SW10	WSW12	WSW9	WSW8.0	WSW14
24-Dec	SW8	SSW4	SSE3	S6	SSE9	SSE6	S9	S7	SSW3	WSW4	WSW3	W3	WSW4	SSE3	SE1	S3	S4	SSW2	SW3	SSW3	S5	S7	S6	S4	S4.0	SSE9
25-Dec	S6	SSE4	SSE3	S4	NNE1	S6	S8	SSE5	SSE7	SSE10	SSE7	SSE3	SSE6	SSE7	SSE6	S4	S4	SSW2	S5	S3	S4	SSW3	S4	SSW3	SSE4.7	SSE10
26-Dec	SSW1	S2	S3	NNW2	W2	S3	SSE5	S3	S4	SSE5	S7	S9	S12	SSE13	SSE14	S11	S8	S5	WSW1	SW2	S4	S8	S11	S12	S5.8	SSE14
27-Dec	SW12	SSW12	SSW12	SSW10	S8	S12	S9	SSW9	SSW7	S8	SSW11	S7	S7	SE5	S5	SSW2	SW2	NNW1	SSW1	NW1	NW1	NW1	W2	NW3	SSW5.4	SW12
28-Dec	S2	NW1	WSW1	NNW1	SSW3	SW1	W2	SSW1	WSW1	WNW1	N5	N10	N9	N7	NNW8	N7	NNW3	N6	NNW7	NNW4	N6	NNW6	N3	W2	NNW3.2	N10
29-Dec	WSW2	WSW5	WSW6	S3	S5	S6	S7	S5	S5	SSW5	S5	S8	S10	S11	SSE8	SSE4	SSE1	SSW4	SSW1	SW3	SW3	WSW2	WSW2	SW2	S4.2	S11
30-Dec	SSW3	SSW3	S4	S3	S4	SW1	SSW3	SW2	SW2	S4	SSW4	SSE1	NE1	N1	SE3	NNW1	WNW2	SW3	SE1	SSE2	NNW3	NNW3	N2	NNE1	SSW1.2	S4
31-Dec	SSE0	WNW1	SSW2	SW2	SSW4	S4	SSW2	SSW3	WSW2	SW3	SW2	S3	SSE4	SSE5	S5	SSW8	SSW8	SW7	SSE4	S1	WSW8	W11	NNW4	N2	SW3.0	W11

SW2.3 SW3.0 SW3.1 SW3.2SSW3.7 SW3.6SSW4.2SSW3.8SSW3.9SSW3.9SSW3.7SSW4.0 S4.5 S4.7 S4.6SSW3.9SSW3.8SSW4.1SSW3.2SSW3.1SSW2.6SSW2.4 SW2.3 SW1.8	Diurnal Average
SE13 SSE14 SSE17 SSE16 SSE20 SSE15 SSE13 SSE17 SSE15 W15 SSE14 SSE15 S17 S16 S17 S20 S18 S20 S16 SSW17 S14 NNE14 N15 NNE15	Diurnal Maximum

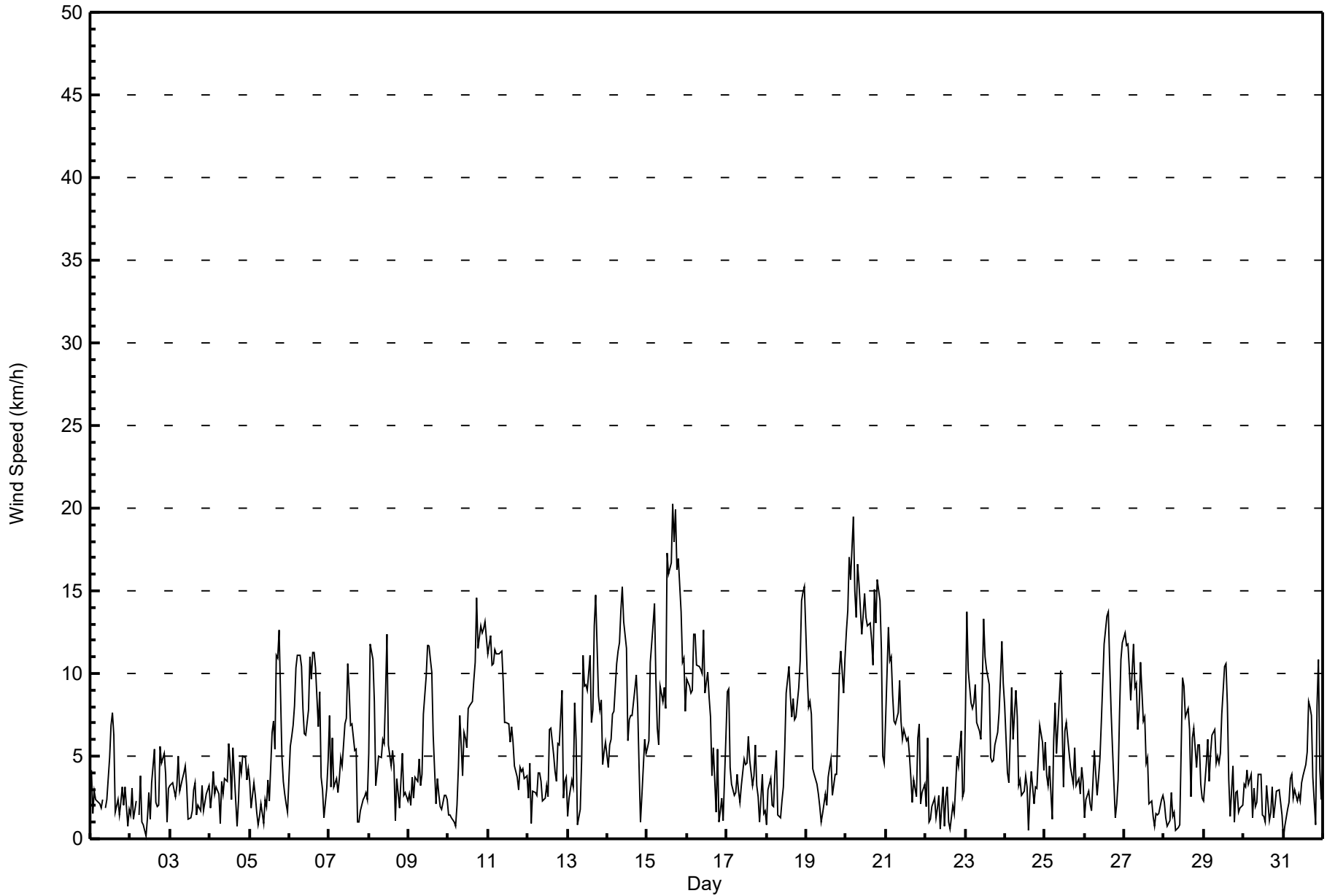
UO - Unstable Operation
 All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Speed (WS) - km/h
Fort McKay South - December 2023

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h
Fort McKay South - December 2023**

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	431	58.09	58.09
6 - 11	242	32.61	90.70
12 - 19	66	8.89	99.60
20 - 28	3	0.40	100.00
29 - 38	0	0.00	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 742

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed (WS) - km/h
Fort McKay South - December 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	8	6	0	0	2	5	47	112	71	46	39	20	14	17	26	431
6 - 11	12	3	2	0	0	0	5	31	69	26	31	32	20	1	3	7	242
12 - 19	1	3	0	0	0	0	1	17	18	3	2	8	4	4	5	0	66
20 - 28	0	0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	3
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	31	14	8	0	0	2	11	96	201	100	79	79	44	19	25	33	742

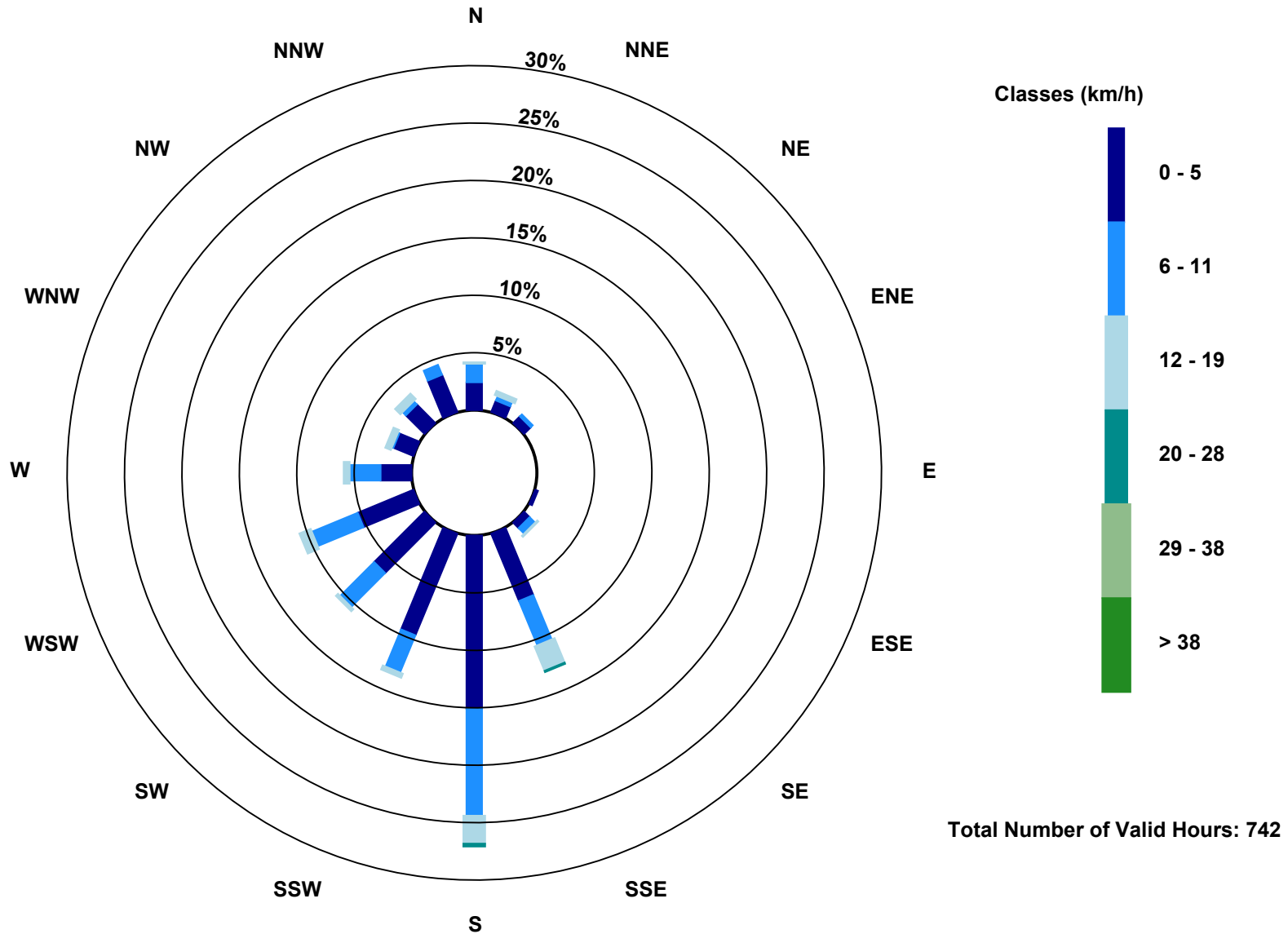
Total Number of Valid Hours: 742

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Dec 2023

Wind Speed (WS) - km/h
Fort McKay South





Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
Fort McKay South - December 2023

Direction of Maximum Speed: 186 deg on Dec 15 16:00	Hours in Service: 744
Direction of Maximum Daily Speed Average: 165.8 deg on Dec 20	Hours of Data: 742
Direction of Minimum Speed: 157 deg on Dec 31 01:00	Hours of Missing Data: 2
Direction of Minimum Daily Speed Average: 1.2 deg on Dec 30	Percent Operational Time: 99.7
Monthly Average Direction: 205.3 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-Dec	245	198	192	229	229	239	221	175	UO	189	168	155	153	182	177	232	241	259	259	233	233	179	191	257	199.3
2-Dec	264	246	343	241	UO	274	246	314	241	307	149	160	52	170	185	289	315	303	328	305	305	336	315	340	282.6
3-Dec	341	303	339	336	335	353	298	345	353	354	7	345	340	354	5	14	313	278	236	246	245	245	200	189	326.1
4-Dec	242	190	168	188	180	191	334	240	228	197	176	165	189	149	157	176	213	169	173	182	181	186	186	178	183.4
5-Dec	185	189	167	176	281	223	191	7	227	131	160	176	185	191	185	184	188	207	174	324	346	210	210	240	199.0
6-Dec	200	208	222	230	230	233	232	236	234	198	206	231	228	229	224	209	196	200	181	168	189	314	195	222	217.5
7-Dec	193	184	214	208	163	162	176	158	168	175	179	177	174	176	164	175	226	275	262	277	210	198	194	210	184.5
8-Dec	198	250	253	246	169	174	156	182	172	170	221	246	186	163	157	171	221	176	210	164	164	178	203	208	203.0
9-Dec	189	192	173	158	171	199	179	195	191	184	176	174	168	162	172	190	211	219	250	211	222	230	205	173	182.5
10-Dec	165	285	249	287	249	291	195	167	161	186	202	234	231	225	235	254	281	275	297	296	310	309	313	321	269.8
11-Dec	342	322	324	318	304	290	259	237	237	242	224	224	189	165	172	182	182	192	197	205	192	189	215	213	250.2
12-Dec	201	187	201	212	229	202	188	194	192	203	178	178	136	183	162	166	188	187	185	192	179	283	193	207	187.9
13-Dec	309	346	359	352	189	171	255	201	177	189	167	164	172	169	185	180	184	186	176	192	165	182	168	192	179.9
14-Dec	279	258	246	241	236	254	253	253	254	260	262	261	233	166	181	208	216	235	239	256	263	191	184	166	238.9
15-Dec	150	163	186	181	183	188	186	177	166	163	165	162	179	185	180	186	190	190	183	192	189	199	221	222	184.5
16-Dec	221	234	249	250	286	295	269	261	270	333	28	35	29	41	22	34	22	24	359	16	293	243	185	7	312.5
17-Dec	2	10	351	228	207	187	184	188	201	195	180	161	164	158	164	199	180	172	180	175	226	186	220	273	183.3
18-Dec	276	183	189	188	211	174	221	252	282	218	346	261	246	256	263	257	255	270	262	267	7	21	6	19	288.4
19-Dec	18	11	351	347	332	298	314	339	321	332	15	42	35	3	14	3	42	110	123	130	138	144	138	139	54.6
20-Dec	140	148	154	161	166	166	161	168	167	166	168	166	168	160	164	162	168	174	172	171	173	172	199	243	165.8
21-Dec	234	255	256	260	247	219	223	209	213	210	181	162	156	170	187	214	227	244	237	191	198	211	234	252	219.6
22-Dec	192	248	261	211	183	226	260	202	186	233	186	170	177	169	267	230	219	225	176	184	170	179	165	157	194.2
23-Dec	255	250	256	269	261	261	261	256	264	247	253	253	262	281	275	251	251	176	218	237	211	233	238	238	250.9
24-Dec	228	193	153	186	163	162	175	170	192	239	254	279	238	156	136	182	182	205	229	210	185	176	182	169	188.6
25-Dec	183	161	163	170	29	170	181	156	163	154	149	162	158	159	153	176	179	180	175	177	186	209	186	208	168.5
26-Dec	196	189	185	333	260	180	167	181	184	166	174	183	169	166	166	175	173	187	241	223	186	179	180	190	178.5
27-Dec	221	210	207	201	176	184	173	192	196	185	203	180	173	143	172	203	236	327	198	311	312	318	267	319	197.0
28-Dec	184	320	252	336	207	229	269	212	245	288	1	353	10	357	343	4	335	7	348	340	350	347	354	279	346.9
29-Dec	252	249	239	177	176	180	185	172	185	196	178	177	183	178	159	157	163	197	206	219	234	258	244	216	190.1
30-Dec	195	193	191	173	182	232	211	220	223	185	196	154	42	359	146	347	301	216	139	153	348	347	356	20	196.2
31-Dec	157	283	195	229	194	185	199	200	240	223	222	191	157	161	180	208	207	219	166	189	247	261	329	353	214.1

221.3 233.6 224.5 224.7 211.5 214.0 211.6 207.0 208.7 200.2 193.3 195.9 185.0 179.3 182.6 196.0 206.0 207.1 208.9 212.2 203.2 212.9 215.1 221.5
 Diurnal Average

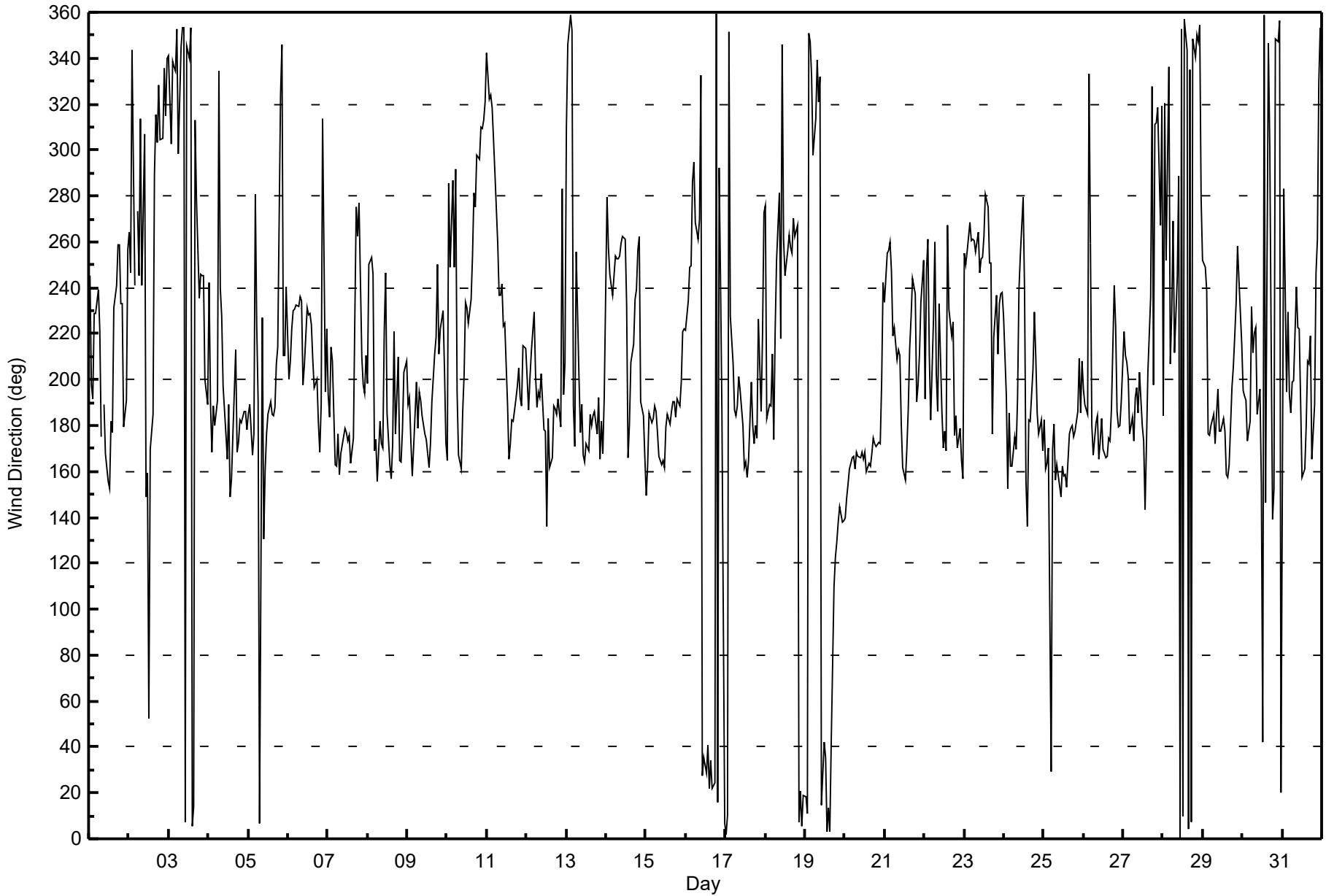
UO - Unstable Operation
 All monthly, daily, and diurnal averages have been calculated using vector methods



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Direction (WD) - deg
Fort McKay South - December 2023

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 97 deg on Dec 31 01:00 Minimum Value: 6 deg on Dec 27 07:00 Percentiles: P ₁ = 8 P ₁₀ = 11 Q ₁ = 16 Median = 24 Q ₃ = 39 P ₉₀ = 63 P ₉₉ = 85																			Hours in Service: 744 Hours of Data: 742 Hours of Missing Data: 2 Hours of Calibration: 0 Percent Operational Time: 99.7						
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Dec	10	70	18	27	30	20	29	51	UO	75	37	15	13	14	15	49	37	47	25	8	30	53	54	42	75
2-Dec	24	24	69	35	UO	34	17	70	63	91	68	29	69	17	41	55	36	32	11	16	13	30	64	30	91
3-Dec	14	34	24	22	31	16	35	27	20	20	29	65	60	43	42	25	73	22	37	18	33	28	55	34	73
4-Dec	30	20	16	66	23	29	61	21	43	17	19	10	41	58	12	15	79	58	13	11	12	13	31	14	79
5-Dec	19	37	13	56	69	59	70	47	82	67	72	63	71	15	10	23	9	14	19	57	74	33	70	68	82
6-Dec	18	20	24	24	22	25	22	21	23	33	29	33	25	23	22	17	14	20	6	39	69	69	59	31	69
7-Dec	19	62	37	69	44	58	36	30	31	20	14	9	10	11	13	14	13	80	48	46	36	28	30	34	80
8-Dec	21	26	21	44	23	40	21	29	22	15	33	21	28	18	6	16	63	43	83	42	23	25	43	24	83
9-Dec	39	38	21	43	21	57	20	20	25	11	10	11	15	14	11	10	20	21	39	49	41	18	25	35	57
10-Dec	83	42	74	65	71	55	35	27	48	22	26	24	33	26	28	31	35	30	35	30	29	22	21	26	83
11-Dec	23	17	19	24	24	25	23	19	18	17	20	24	27	15	9	8	9	16	18	15	17	11	19	24	27
12-Dec	28	12	84	22	9	18	9	11	25	60	60	31	59	10	15	21	29	31	21	22	37	46	31	23	84
13-Dec	66	37	22	47	10	21	78	77	23	14	20	8	13	12	13	11	10	12	24	51	38	68	20	27	78
14-Dec	31	16	14	23	22	25	24	22	24	26	27	49	15	10	14	19	16	20	63	70	25	16	13	70	70
15-Dec	10	13	9	6	8	12	16	17	33	20	15	19	14	14	12	13	15	15	14	16	16	28	31	28	33
16-Dec	25	28	24	24	30	26	27	26	32	20	21	18	16	19	16	25	17	85	20	78	54	30	57	19	85
17-Dec	14	17	48	29	24	35	29	20	29	20	13	14	19	12	17	15	17	10	24	27	62	22	57	55	62
18-Dec	83	22	44	66	55	22	38	91	71	65	38	67	26	25	24	21	15	20	20	20	46	17	16	16	91
19-Dec	17	17	14	14	16	22	21	27	17	21	21	21	24	17	16	13	44	21	21	16	17	14	17	16	44
20-Dec	15	13	13	13	11	11	11	12	10	11	12	10	12	12	10	10	10	11	11	9	10	11	23	27	27
21-Dec	31	23	25	25	25	22	19	16	22	27	18	14	16	13	23	15	25	25	53	9	15	58	73	60	73
22-Dec	68	18	83	74	75	37	62	45	18	68	25	85	14	15	66	78	53	54	31	18	31	12	64	62	85
23-Dec	57	28	37	34	32	29	30	32	30	32	35	27	34	30	29	31	30	43	25	22	17	11	11	34	57
24-Dec	29	55	39	19	15	20	10	17	51	21	26	38	35	49	77	50	18	50	42	16	11	14	9	28	77
25-Dec	15	27	23	54	82	30	17	26	11	14	19	81	10	8	9	14	17	14	16	31	29	37	27	33	82
26-Dec	88	70	28	57	58	27	11	34	22	14	20	10	10	9	9	7	13	13	63	39	34	8	10	21	88
27-Dec	25	20	19	18	13	8	6	19	17	12	19	27	16	37	36	33	39	83	86	51	57	44	39	47	86
28-Dec	65	77	82	80	53	63	70	93	88	71	36	16	16	35	18	17	46	19	16	30	13	19	46	54	93
29-Dec	41	10	37	24	10	12	10	23	23	14	17	11	13	10	9	28	85	17	48	20	25	54	47	36	85
30-Dec	15	17	11	16	18	58	23	47	31	20	14	57	54	70	53	61	53	36	67	41	33	19	17	46	70
31-Dec	97	48	37	33	30	13	18	25	50	28	39	36	32	25	12	15	19	46	26	89	26	31	43	49	97
97 77 84 80 82 63 78 93 88 91 72 85 71 70 77 78 85 85 86 89 74 69 73 68																									
Diurnal Maximum																									
UO - Unstable Operation																									





WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

**AMS14
ANZAC
DECEMBER 2023**

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

January 31, 2024

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - ANZAC (AMS14)
DECEMBER 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	707	35	37	99.73	15.3	0	4.2	0
TRS(ppb) Average	703	37	41	99.46	1.6	0	0.5	0
THC(ppm) Average	705	35	39	99.46	3.2	-	2.3	-
NMHC(ppm) Average	705	35	39	99.46	0.512	-	0.057	-
CH4(ppm) Average	705	35	39	99.46	3.1	-	2.3	-
NO2(ppb) Average	704	36	40	99.46	28.2	0	11.2	-
NO(ppb) Average	704	36	40	99.46	29.5	-	3.3	-
NOX(ppb) Average	704	36	40	99.46	39.3	-	13.9	-
O3(ppb) Average	705	35	39	99.46	44.6	0	38.8	-
PM2.5(ug/m3) Average	740	2	4	99.73	56	0	11.8	0
AT 2m(C) Average	744	0	0	100	9.7	-	7.4	-
RH(%) Average	744	0	0	100	95.3	-	85.8	-
WS(km/h) Average	744	0	0	100	34	-	20	-
WD(deg) Average	744	0	0	100	-	-	-	-
Leaf Wetness (% of range) Average	744	0	0	100	7.4	-	1.9	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - ANZAC (AMS14)
DECEMBER 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	707	0.81	1.5	-	0	0.1	0.2	0.4	0.7	1.5	15.3
TRS(ppb) Average	703	0.22	0.1	-	0.1	0.1	0.1	0.2	0.2	0.4	1.6
THC(ppm) Average	705	2.03	0.1	-	1.9	2	2	2	2	2.2	3.2
NMHC (ppm) Average	705	0.008	0.039	-	0	0	0	0	0	0	0.512
CH4(ppm) Average	705	2.03	0.1	-	1.9	1.9	2	2	2	2.1	3.1
NO2(ppb) Average	704	3.6	3.8	-	0.2	0.7	1.1	2.2	5	8.3	28.2
NO(ppb) Average	704	0.76	2.1	-	0	0	0.1	0.2	0.5	1.6	29.5
NOX(ppb) Average	704	4.36	5.2	-	0.2	0.8	1.2	2.4	5.6	10	39.3
O3(ppb) Average	705	27.47	9.7	-	0	13.5	20.1	29.9	34.9	38.7	44.6
PM2.5(ug/m3) Average	740	4.01	4.3	-	0.3	1.1	1.8	2.8	4.5	8.6	56
Temperature 2 m (C) Average	744	-4.06	5.9	-	-18.5	-11.9	-8.7	-4.5	0.5	3.7	9.7
Relative Humidity (%) Average	744	67.66	15.7	-	23.7	47.5	58.6	67.9	81.5	86.6	95.3
Wind Speed 20 m (km/h) Average	744	12.3	6	-	1	6	8	11	16	21	34
Wind Direction 20 m (deg) Average	744	185.6	-	-	-	-	-	-	-	-	-
Leaf Wetness (% of range) Average	744	0.33	0.8	-	0	0	0	0	0	1.6	7.4

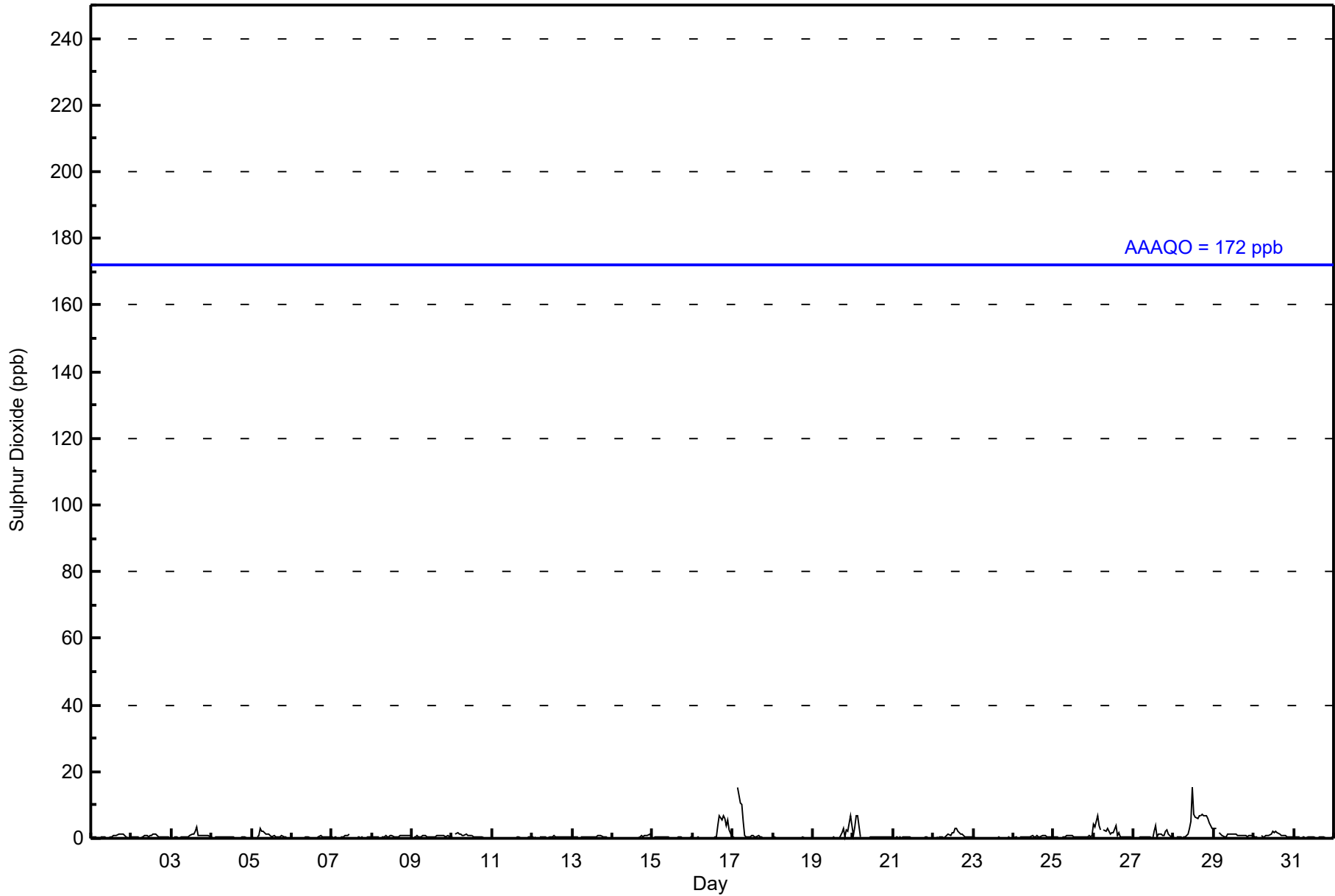
WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - ANZAC (AMS14)
DECEMBER 2023

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
AIR QUALITY ANALYZERS	04 Dec 2023 16:00	04 Dec 2023 17:00	2	Station power failure
NO2, O3, TRS	07 Dec 2023 13:00	07 Dec 2023 14:00	2	Maintenance - sample manifold cleaned
THC/NMHC/CH4	21 Dec 2023 11:00	21 Dec 2023 12:00	2	Maintenance - replaced support gas cylinder



Number of Exceedences (AAAQO):		1-hr: 0		24-hr: 0		Hours in Service:		744																		
Maximum Value: 15.3 ppb on Dec 28 12:00		Maximum Daily Average: 4.2 ppb on Dec 28		Hours of Data:		707																				
Minimum Value: 0.0 ppb on Dec 14 02:00		Minimum Daily Average: 0.1 ppb on Dec 18		Hours of Missing Data:		37																				
Maximum Diurnal Average: 1.3 ppb at hour 4		Minimum Diurnal Average: 0.5 ppb at hour 8		Hours of Calibration:		35																				
Monthly Average: 0.81 ppb		Percentiles: P ₁ = 0.0 P ₁₀ = 0.1 Q ₁ = 0.2 Median = 0.4 Q ₃ = 0.7 P ₉₀ = 1.5 P ₉₉ = 6.9		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-Dec	0.3	0.5	0.4	0.6	Z	0.3	0.3	0.5	0.3	0.2	0.2	0.3	0.6	0.8	0.9	1.0	1.2	1.2	1.2	1.3	0.7	0.4	0.2	0.2	0.6	1.3
2-Dec	0.3	0.5	0.5	0.3	0.4	Z	0.5	0.6	0.8	0.6	0.5	0.7	0.7	1.2	1.4	0.7	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.1	0.5	1.4
3-Dec	Z	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.4	0.4	0.5	0.7	1.1	1.2	1.9	3.4	0.9	1.1	0.7	0.8	0.9	0.7	0.7	0.6	0.8	3.4
4-Dec	0.4	Z	0.5	0.5	0.4	0.4	0.5	0.5	0.4	0.3	0.3	0.3	0.2	0.2	PF	PF	0.2	0.3	0.4	0.4	0.4	0.2	0.2	0.2	0.3	0.5
5-Dec	0.1	0.5	Z	0.2	0.9	2.8	2.1	2.1	1.3	1.4	1.2	1.0	0.5	0.7	0.6	0.5	0.2	0.4	0.7	0.5	0.3	0.2	0.2	0.2	0.8	2.8
6-Dec	0.1	0.1	0.2	Z	0.2	0.1	0.2	0.2	0.2	0.4	0.3	0.2	0.2	0.2	0.1	0.1	0.4	0.7	0.6	0.5	0.4	0.4	0.3	0.3	0.3	0.7
7-Dec	0.3	0.2	0.3	0.4	Z	0.4	0.3	0.4	0.6	0.8	1.1	C	C	C	C	0.3	0.4	0.2	0.2	0.1	0.2	0.3	0.5	0.5	0.4	1.1
8-Dec	0.3	0.4	0.4	0.4	0.5	Z	0.6	0.6	0.7	0.6	0.6	0.8	1.0	0.5	0.4	0.3	0.4	0.7	1.1	0.8	0.8	1.0	0.9	0.7	0.6	1.1
9-Dec	Z	0.4	0.6	0.7	0.5	0.5	0.9	0.7	0.7	0.5	0.5	0.6	0.6	0.6	0.6	0.8	0.6	0.7	0.7	0.7	0.6	0.7	0.6	0.7	0.6	0.9
10-Dec	0.6	Z	1.2	1.6	1.4	1.1	0.9	0.9	1.1	1.0	0.8	0.7	0.7	0.5	0.3	0.3	0.4	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.6	1.6
11-Dec	0.0	0.2	Z	0.1	0.1	0.1	0.0	0.1	0.1	0.1	0.2	0.2	0.1	0.1	0.2	0.6	0.4	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.1	0.6
12-Dec	0.2	0.2	0.2	Z	0.3	0.3	0.3	0.2	0.2	0.2	0.4	0.6	0.5	0.7	0.6	0.5	0.4	0.4	0.4	0.5	0.4	0.4	0.3	0.3	0.4	0.7
13-Dec	0.3	0.4	0.3	0.3	Z	0.4	0.3	0.3	0.3	0.6	0.5	0.5	0.4	0.3	0.4	0.8	0.7	0.8	0.6	0.4	0.2	0.1	0.2	0.0	0.4	0.8
14-Dec	0.0	0.0	0.0	0.2	0.1	Z	0.0	0.2	0.1	0.1	0.2	0.2	0.1	0.1	0.2	0.4	0.7	0.5	0.8	0.9	0.9	1.1	0.5	0.3	1.1	
15-Dec	Z	0.6	0.5	0.6	0.5	0.5	0.3	0.3	0.3	0.4	0.2	0.2	0.0	0.0	0.1	0.2	0.3	0.3	0.1	0.2	0.1	0.0	0.2	0.3	0.3	0.6
16-Dec	0.2	Z	0.1	0.2	0.1	0.1	0.0	0.1	0.0	0.1	0.0	0.0	0.1	0.2	0.4	3.6	6.9	5.7	7.0	6.0	4.0	5.6	2.4	0.3	1.9	7.0
17-Dec	0.3	0.2	Z	15.1	10.6	10.1	4.9	1.0	0.3	0.3	0.5	0.9	1.0	0.5	0.5	0.7	0.5	0.2	0.2	0.1	0.1	0.1	0.1	0.2	2.1	15.1
18-Dec	0.2	0.3	0.1	Z	0.0	0.1	0.2	0.1	0.0	0.1	0.1	0.0	0.1	0.0	0.1	0.1	0.0	0.0	0.3	0.1	0.0	0.2	0.2	0.1	0.1	0.3
19-Dec	0.0	0.1	0.1	0.1	Z	0.1	0.0	0.1	0.0	0.1	0.0	0.0	0.3	0.0	0.1	0.1	0.0	1.6	2.9	0.6	2.4	2.3	6.8	3.9	0.9	6.8
20-Dec	0.9	3.2	6.6	6.7	0.3	Z	0.1	0.2	0.1	0.2	0.3	0.5	0.6	0.3	0.3	0.2	0.2	0.4	0.6	0.5	0.6	0.5	0.6	0.6	1.1	6.7
21-Dec	Z	0.4	0.3	0.2	0.2	0.2	0.2	0.3	0.4	0.6	0.4	0.2	0.1	0.0	0.2	0.1	0.0	0.1	0.1	0.3	0.2	0.1	0.1	0.1	0.2	0.6
22-Dec	0.2	Z	0.3	0.2	0.2	0.2	0.2	0.3	1.0	1.2	0.8	1.6	1.6	3.1	3.1	2.3	1.5	1.1	0.8	0.6	0.4	0.5	0.4	0.3	1.0	3.1
23-Dec	0.3	0.2	Z	0.1	0.2	0.1	0.1	0.2	0.0	0.1	0.1	0.1	0.2	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.2	0.2	0.1	0.2	0.3
24-Dec	0.2	0.2	0.4	Z	0.4	0.6	0.6	0.4	0.5	0.3	0.4	0.7	0.6	0.5	1.0	0.5	0.6	0.7	0.9	0.7	0.6	0.6	0.6	0.5	0.5	1.0
25-Dec	0.4	0.5	0.5	0.3	Z	0.5	0.4	0.6	0.9	0.9	1.0	0.9	0.6	0.3	0.2	0.5	0.6	0.6	0.5	0.5	0.6	0.8	0.6	1.0	0.6	1.0
26-Dec	4.2	3.2	6.9	3.6	2.7	Z	2.5	2.1	3.1	2.3	1.3	1.8	1.5	3.7	0.8	1.6	0.6	0.6	0.4	0.4	0.4	0.3	0.3	0.4	1.9	6.9
27-Dec	Z	0.1	0.2	0.1	0.3	0.5	0.3	0.4	0.6	0.4	0.3	0.2	2.1	4.0	0.5	1.2	1.2	0.9	0.9	2.2	2.7	1.2	0.6	0.8	0.9	4.0
28-Dec	0.4	Z	0.3	0.3	0.3	0.2	0.3	0.3	1.2	2.9	5.1	15.3	7.3	6.4	5.8	6.6	6.9	7.1	6.6	6.7	5.8	4.5	3.7	2.9	4.2	15.3
29-Dec	2.8	2.9	Z	1.7	1.4	0.8	0.6	0.4	1.1	1.4	1.1	1.3	1.3	1.1	0.8	1.0	0.9	0.7	0.8	1.0	0.5	0.7	0.9	0.6	1.1	2.9
30-Dec	0.5	0.6	0.6	Z	0.7	0.6	0.6	0.8	0.8	1.0	1.3	2.2	1.6	2.1	1.5	1.3	1.0	0.9	0.9	0.7	0.3	0.4	0.3	0.4	0.9	2.2
31-Dec	0.3	0.4	0.4	0.5	Z	0.4	0.3	0.2	0.2	0.5	0.4	0.4	0.3	0.2	0.2	0.2	0.2	0.2	0.4	0.2	0.1	0.2	0.2	0.2	0.3	0.5
																								Diurnal Average		
																								Diurnal Maximum		
																								0.5 0.6 0.8 1.3 0.9 0.8 0.6 0.5 0.6 0.6 0.7 1.1 0.9 1.0 0.8 1.0 0.9 0.9 1.0 0.9 0.8 0.8 0.8 0.6		
																								4.2 3.2 6.9 15.1 10.6 10.1 4.9 2.1 3.1 2.9 5.1 15.3 7.3 6.4 5.8 6.6 6.9 7.1 7.0 6.7 5.8 5.6 6.8 3.9		
Z - zerospan C - Calibration PF - Power Failure																										
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 172 ppb 24-hr 48 ppb																										





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Anzac - December 2023

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	704	99.58	99.58
11 - 20	3	0.42	100.00
21 - 60	0	0.00	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Sulphur Dioxide (SO₂) - ppb
Anzac - December 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	2	1	1	19	55	111	66	51	65	27	76	157	52	14	6	1	704
11 - 20	0	0	0	0	0	0	0	0	0	0	0	2	0	1	0	0	3
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	2	1	1	19	55	111	66	51	65	27	76	159	52	15	6	1	707

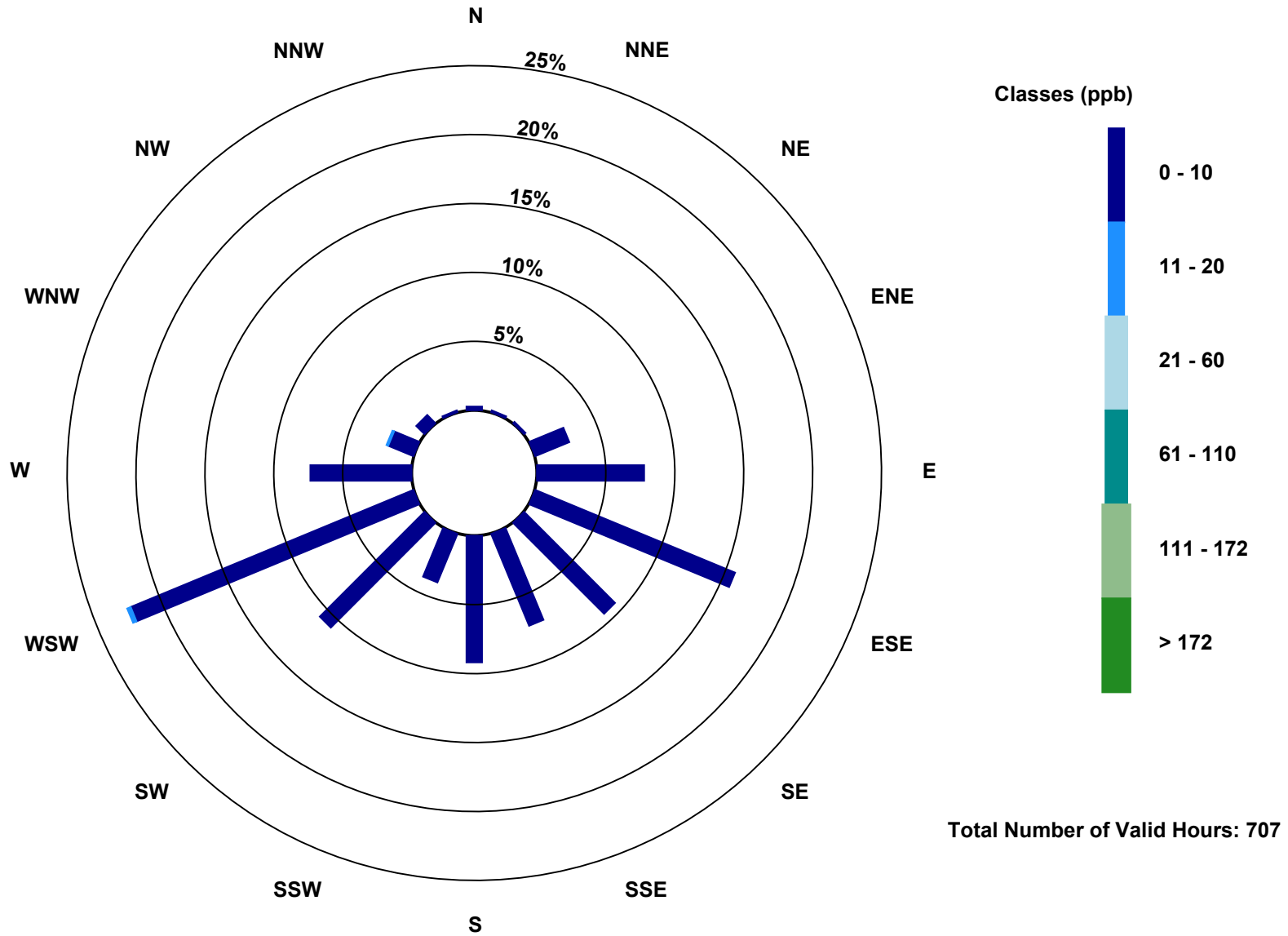
Total Number of Valid Hours: 707

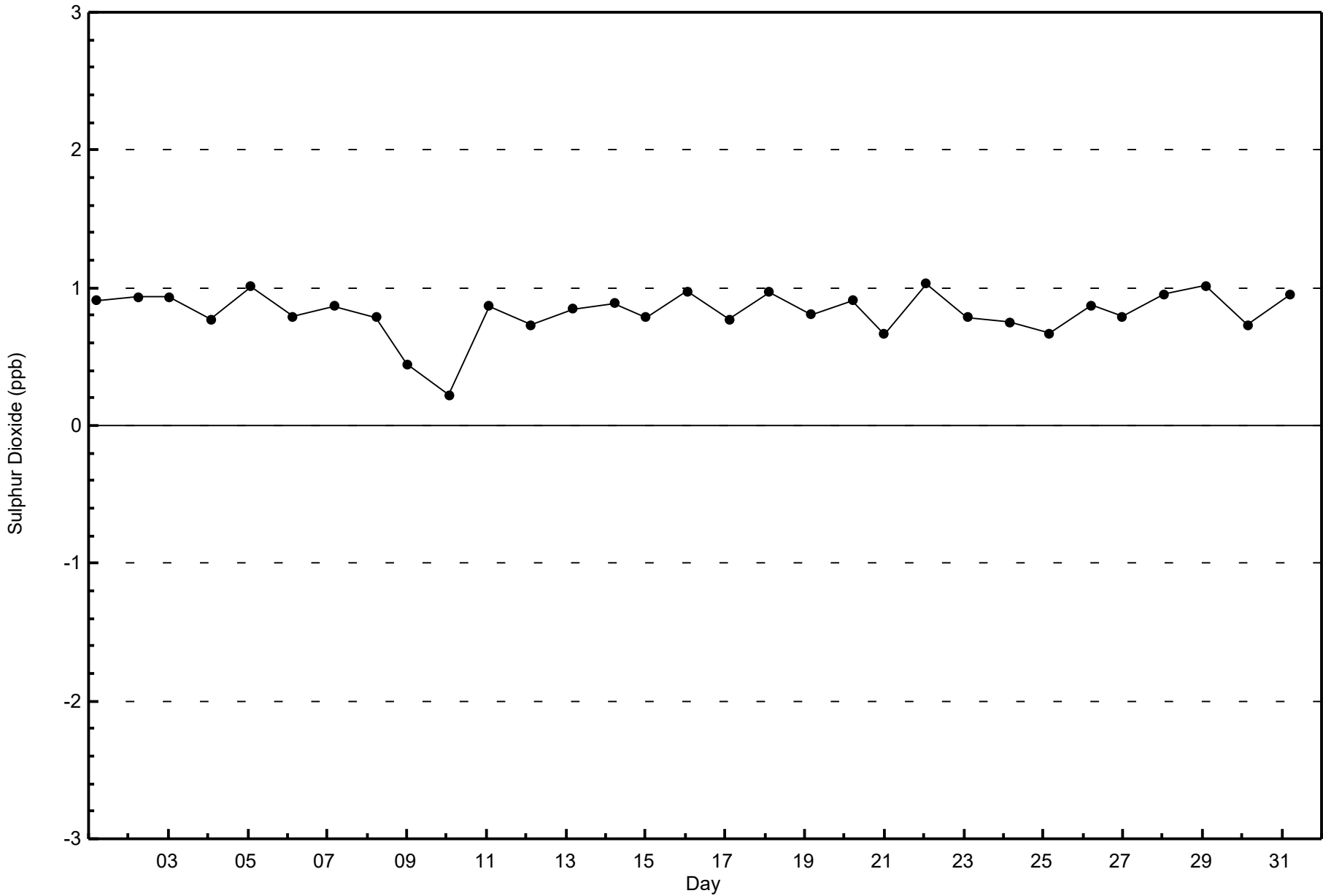
Total Number of Hours: 744

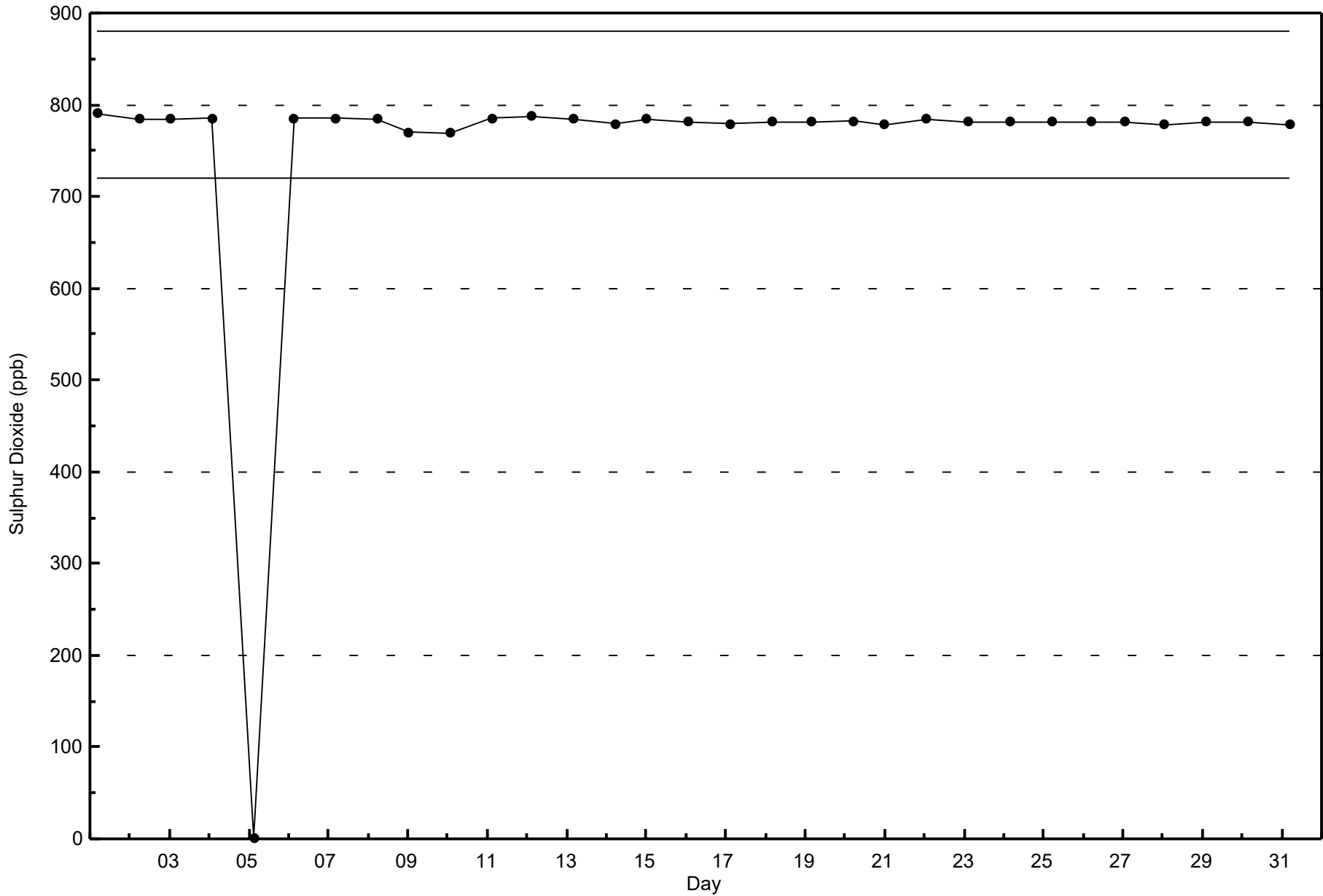


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Sulphur Dioxide (SO₂) - ppb
Anzac

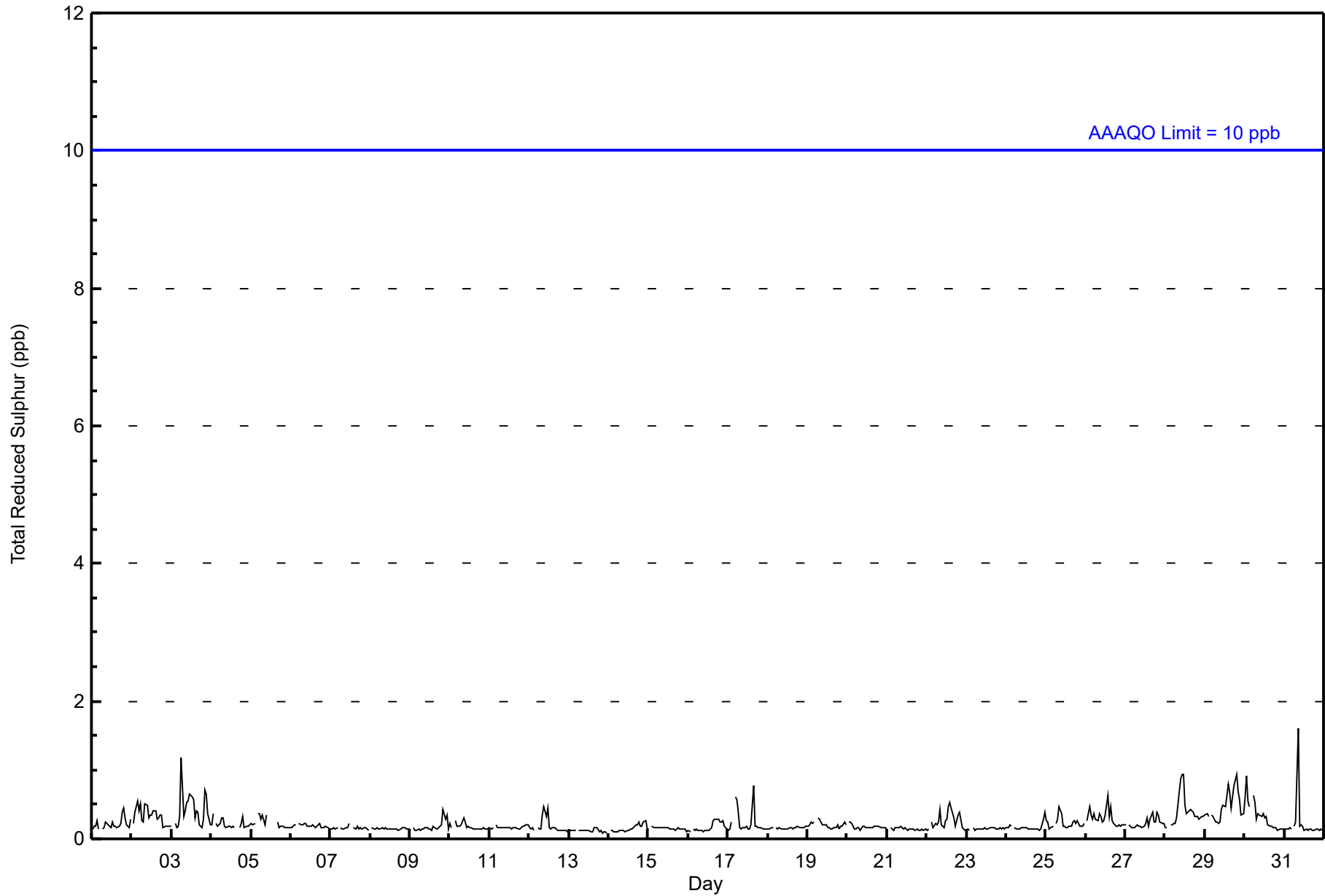








Number of Exceedences (AAAQO):		1-hr: 0		24-hr: 0		Hours in Service:														744							
Maximum Value: 1.6 ppb on Dec 31 09:00		Maximum Daily Average: 0.5 ppb on Dec 29														Hours of Data:		703									
Minimum Value: 0.1 ppb on Dec 14 00:00		Minimum Daily Average: 0.1 ppb on Dec 13														Hours of Missing Data:		41									
Maximum Diurnal Average: 0.3 ppb at hour 9		Minimum Diurnal Average: 0.2 ppb at hour 24														Hours of Calibration:		37									
Monthly Average: 0.22 ppb		Percentiles: P ₁ = 0.1 P ₁₀ = 0.1 Q ₁ = 0.1 Median = 0.2 Q ₃ = 0.2 P ₉₀ = 0.4 P ₉₉ = 0.9														Percent Operational Time:		99.5									
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Dec	0.1	0.2	0.2	0.3	0.1	Z	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.4	0.5	0.3	0.2	0.2	0.3	0.2	0.5	
2-Dec	Z	0.2	0.4	0.5	0.4	0.5	0.3	0.2	0.5	0.5	0.3	0.3	0.3	0.4	0.4	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.3	0.5	
3-Dec	0.2	Z	0.2	0.2	0.2	0.3	1.2	0.3	0.4	0.5	0.6	0.7	0.6	0.6	0.3	0.4	0.4	0.2	0.2	0.3	0.7	0.6	0.4	0.2	0.4	1.2	
4-Dec	0.2	0.4	Z	0.2	0.2	0.2	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.4	0.4	0.2	0.2	0.3	0.2	0.2	0.2	0.2	0.2	0.4	
5-Dec	0.2	0.2	0.2	Z	0.4	0.4	0.3	0.4	0.2	0.3	C	C	C	C	C	C	PF	PF	0.2	0.2	0.2	0.2	0.2	0.2	0.4		
6-Dec	0.2	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	0.1	0.2	0.2	
7-Dec	0.1	0.1	0.2	0.1	0.2	Z	0.2	0.1	0.1	0.2	0.2	0.2	M	M	0.2	0.2	0.2	0.1	0.2	0.1	0.2	0.2	0.1	0.1	0.2	0.2	
8-Dec	Z	0.2	0.2	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	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.1	0.1	0.2	
9-Dec	0.1	Z	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.4	0.3	0.3	0.2	0.2	0.4	
10-Dec	0.2	0.2	Z	0.3	0.2	0.2	0.2	0.2	0.3	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.2	0.1	0.1	0.2	0.2	0.2	0.1	0.1	0.2	0.3	
11-Dec	0.2	0.1	0.2	Z	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	0.2	0.2	0.2	0.2	0.2	0.2	0.2	
12-Dec	0.2	0.2	0.2	0.1	Z	0.2	0.1	0.1	0.3	0.5	0.3	0.5	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	0.5	
13-Dec	0.1	0.1	0.1	0.1	0.1	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	
14-Dec	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.3	0.2	0.2	0.2	0.3	0.1	0.2	0.3	
15-Dec	0.1	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	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.2	
16-Dec	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	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.1	0.2	0.3	
17-Dec	0.1	0.1	0.2	Z	0.6	0.6	0.4	0.2	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.8	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.2	0.8	
18-Dec	0.2	0.1	0.2	0.2	Z	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	
19-Dec	0.2	0.2	0.2	0.2	0.3	Z	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.2	0.2	0.2	0.1	0.2	0.2	0.2	0.2	0.2	0.3	
20-Dec	Z	0.2	0.2	0.2	0.1	0.1	0.2	0.2	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	
21-Dec	0.1	Z	0.2	0.1	0.1	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	0.1	0.1	0.2	
22-Dec	0.1	0.1	Z	0.2	0.2	0.2	0.2	0.3	0.4	0.2	0.2	0.3	0.3	0.5	0.5	0.4	0.3	0.2	0.3	0.3	0.4	0.2	0.1	0.1	0.3	0.5	
23-Dec	0.1	0.1	0.1	Z	0.2	0.1	0.1	0.1	0.2	0.1	0.2	0.2	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.2	0.1	0.2	0.1	0.1	0.2	
24-Dec	0.2	0.2	0.2	0.2	Z	0.2	0.2	0.1	0.1	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.3	0.4	0.2	0.4	
25-Dec	0.3	0.2	0.1	0.2	0.2	Z	0.2	0.3	0.5	0.4	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.2	0.3	0.2	0.2	0.2	0.2	0.5		
26-Dec	Z	0.3	0.5	0.3	0.3	0.4	0.3	0.3	0.4	0.3	0.2	0.3	0.3	0.6	0.3	0.5	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.6		
27-Dec	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	0.3	0.2	0.3	0.4	0.2	0.2	0.4	0.3	0.3	0.2	0.2	0.4		
28-Dec	0.2	0.2	Z	0.2	0.2	0.2	0.2	0.3	0.7	0.9	0.9	0.9	0.5	0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.9		
29-Dec	0.3	0.4	0.3	Z	0.3	0.3	0.2	0.3	0.2	0.2	0.4	0.5	0.5	0.6	0.8	0.7	0.5	0.8	0.9	0.9	0.7	0.6	0.3	0.4	0.9		
30-Dec	0.6	0.9	0.5	0.5	Z	0.6	0.5	0.3	0.4	0.3	0.3	0.4	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.2	0.1	0.9		
31-Dec	0.2	0.1	0.1	0.2	0.1	Z	0.2	0.2	1.6	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	1.6		
																								Diurnal Average		0.2	
																								Diurnal Maximum		0.6	
Z - zerospan C - Calibration M - Maintenance PF - Power Failure																											
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 10 ppb 24-hr 3 ppb																											





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Reduced Sulphur (TRS) - ppb
Anzac - December 2023

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

Total Number of Valid Hours: 703

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Total Reduced Sulphur (TRS) - ppb
Anzac - December 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	2	1	1	19	54	113	64	46	66	27	79	155	54	15	6	1	703
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	2	1	1	19	54	113	64	46	66	27	79	155	54	15	6	1	703

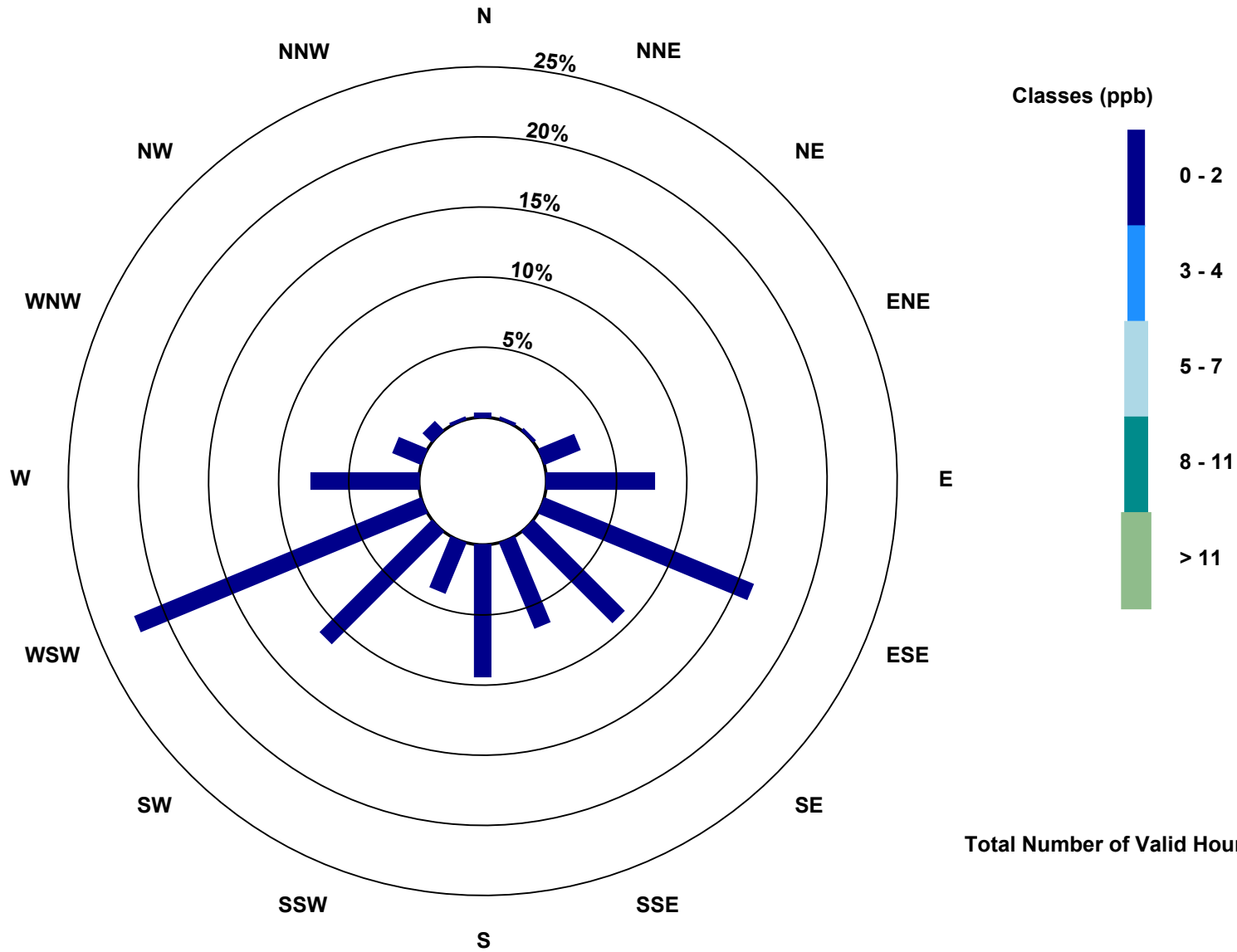
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Total Number of Hours: 744

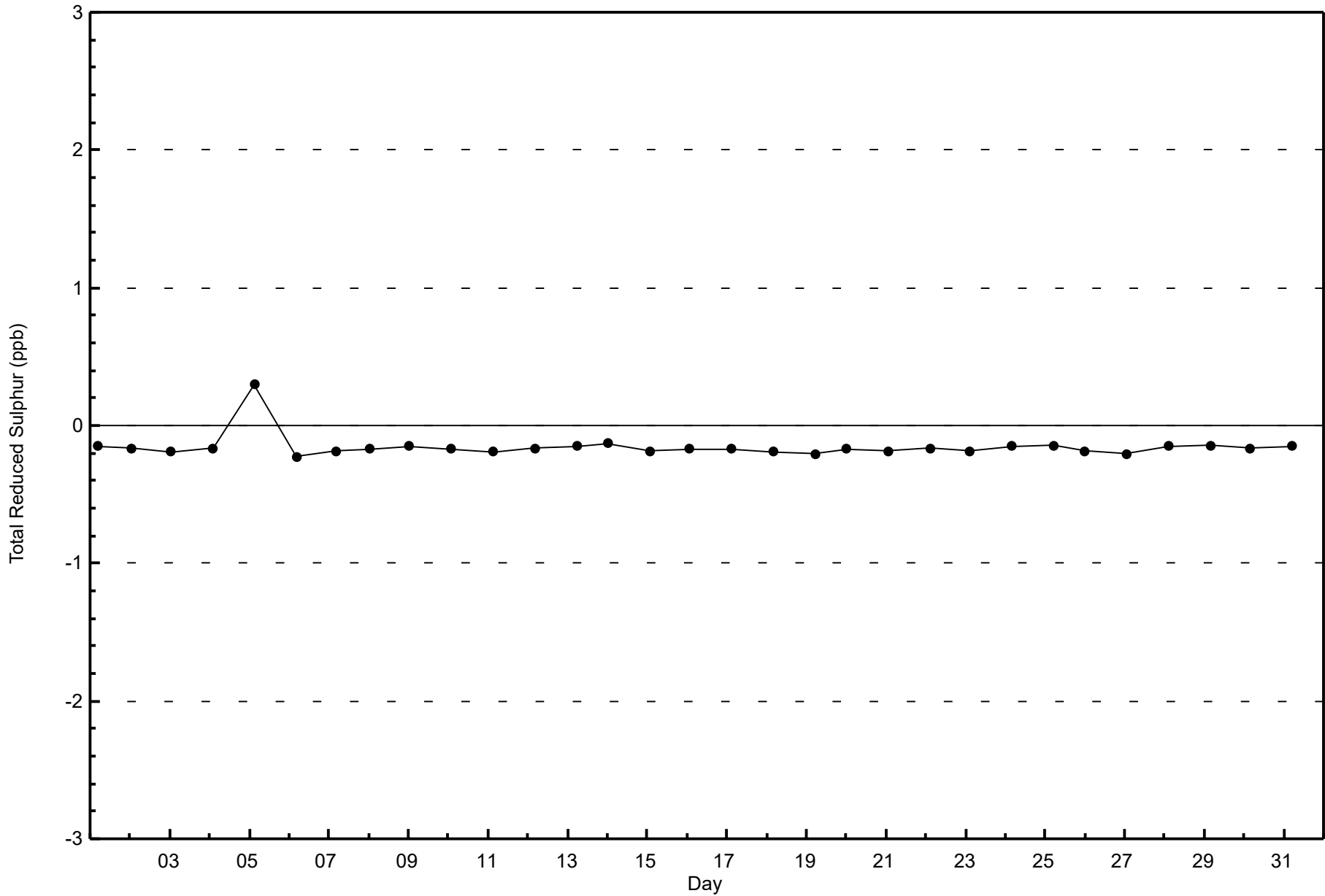


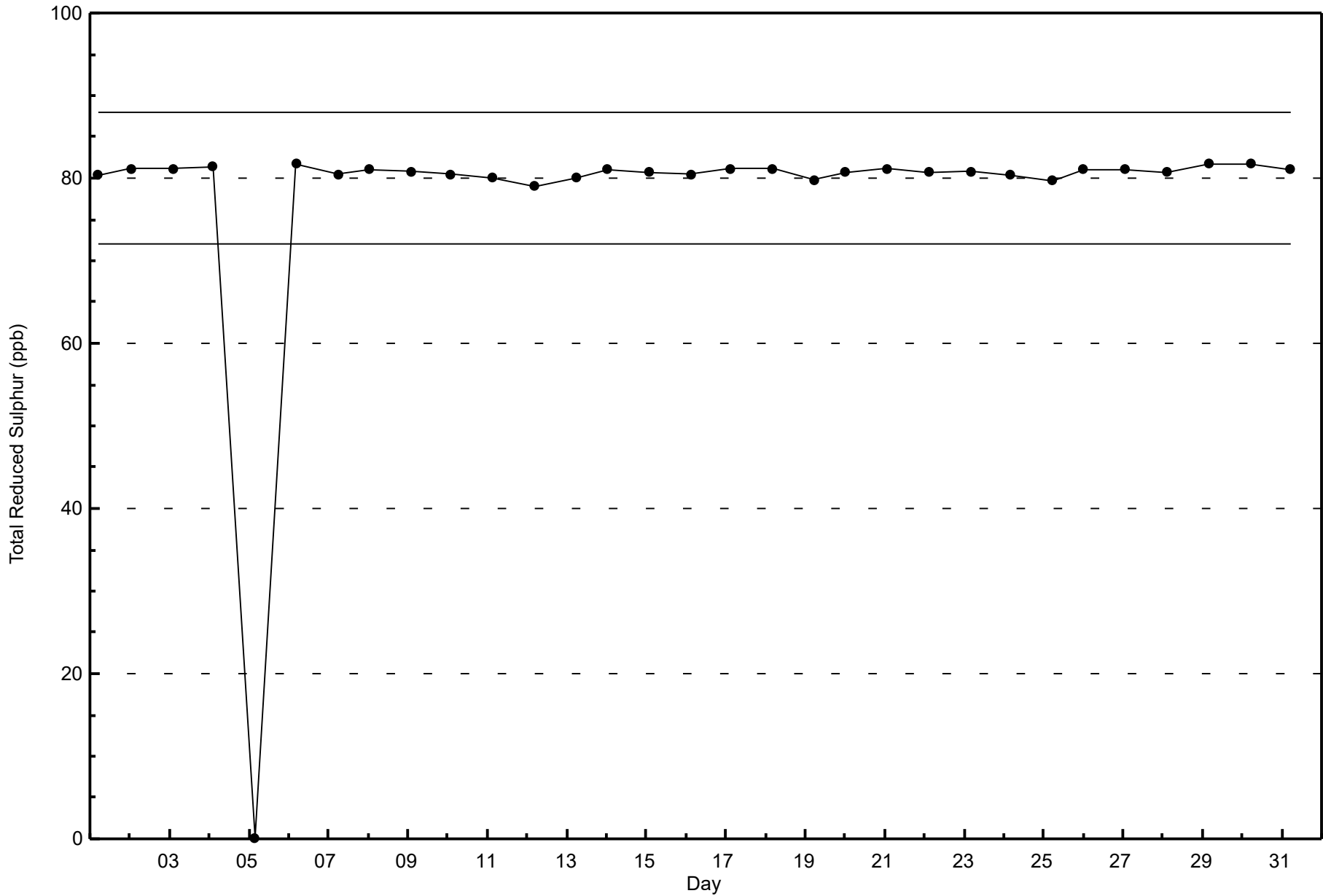
Wood Buffalo Environmental Association
Wind Rose Dec 2023

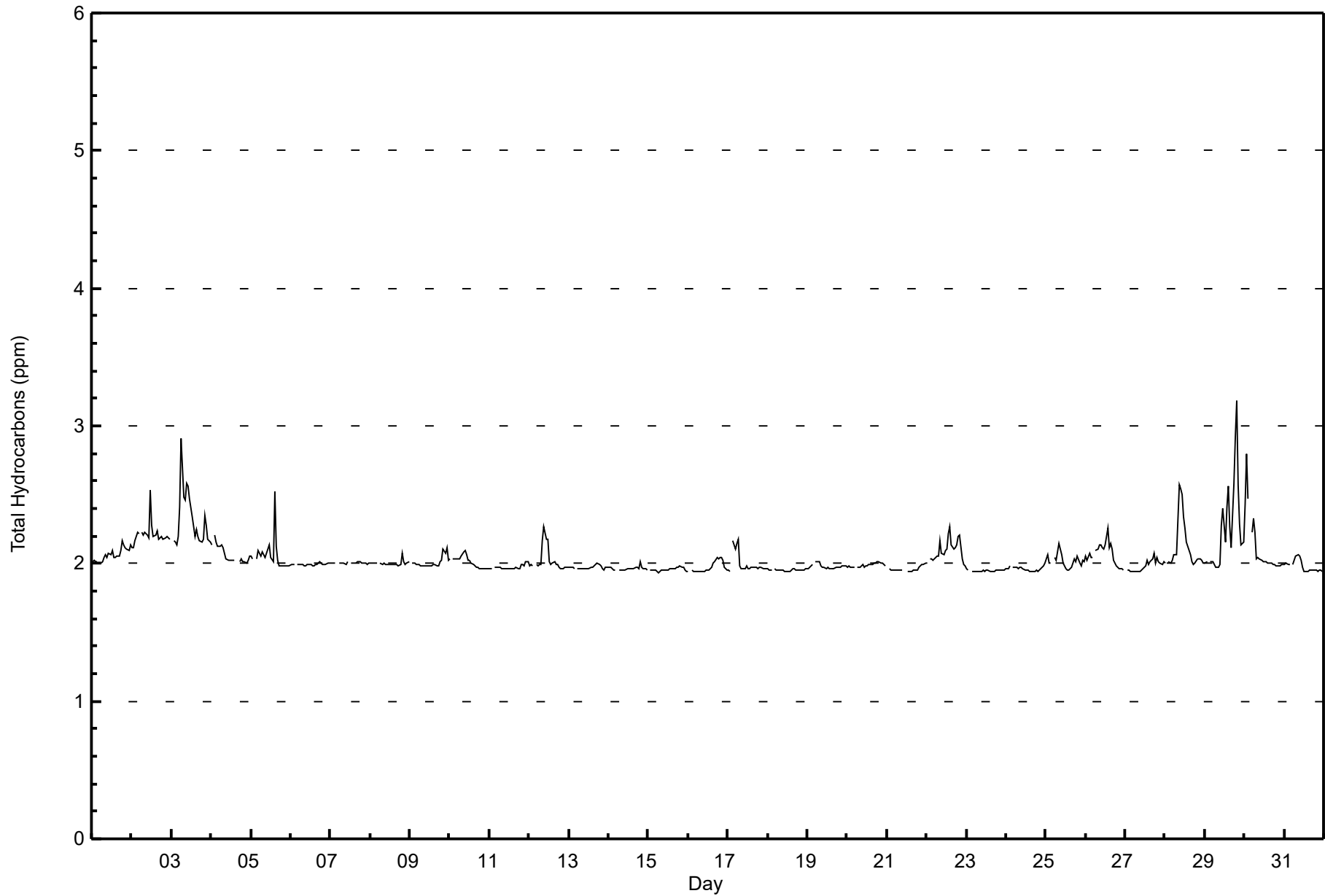
Total Reduced Sulphur (TRS) - ppb
Anzac



Total Number of Valid Hours: 703









Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Anzac - December 2023

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	546	77.45	77.45
2.1 - 3.0	158	22.41	99.86
3.1 - 10.0	1	0.14	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 705

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Total Hydrocarbons (THC) - ppm
Anzac - December 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	6	27	61	42	40	63	25	75	151	39	10	6	1	546
2.1 - 3.0	2	1	1	13	28	50	23	10	1	2	1	8	13	5	0	0	158
3.1 - 10.0	0	0	0	0	0	0	0	1	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
Totals	2	1	1	19	55	111	65	51	64	27	76	159	52	15	6	1	705

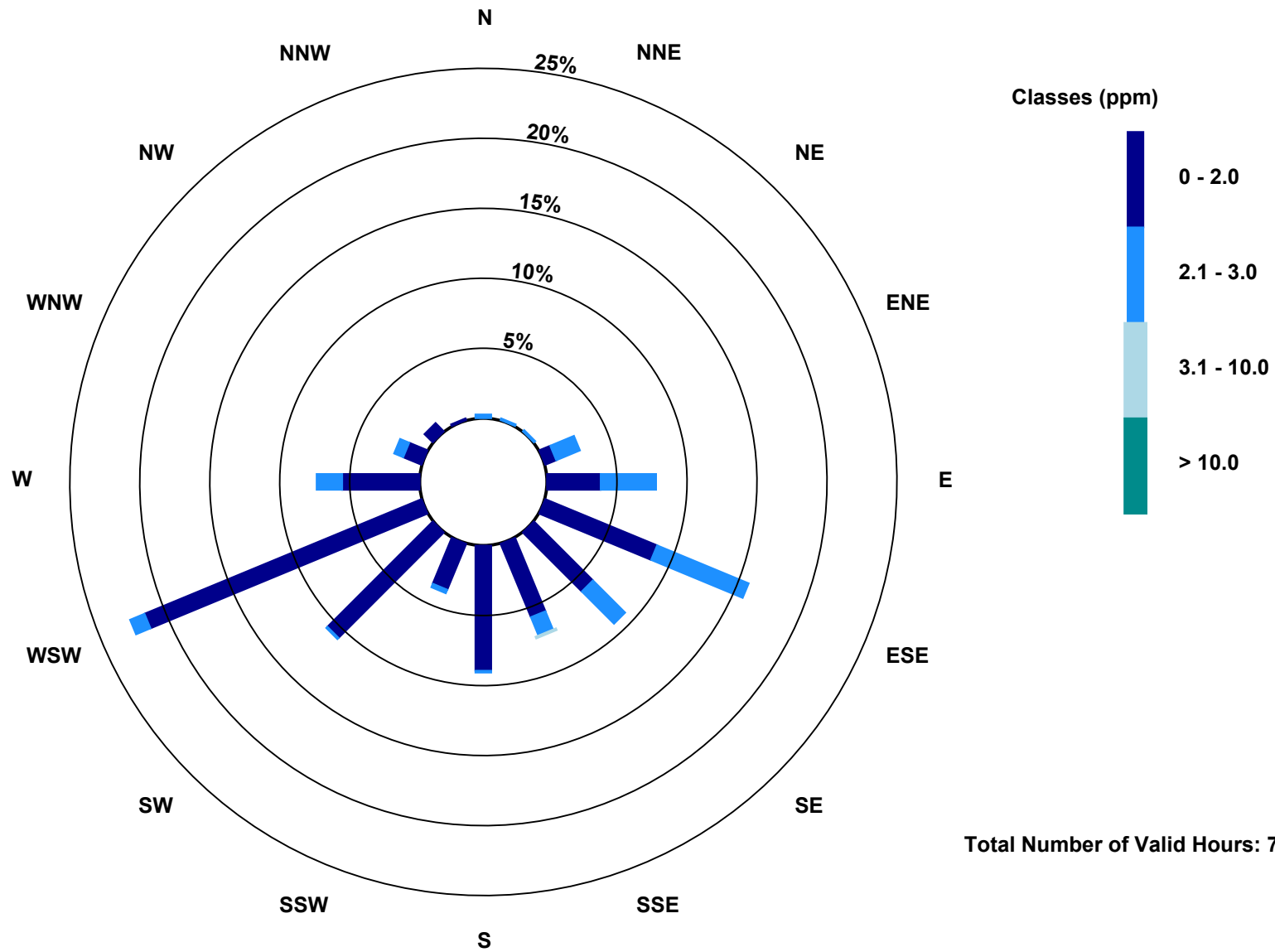
Total Number of Valid Hours: 705

Total Number of Hours: 744

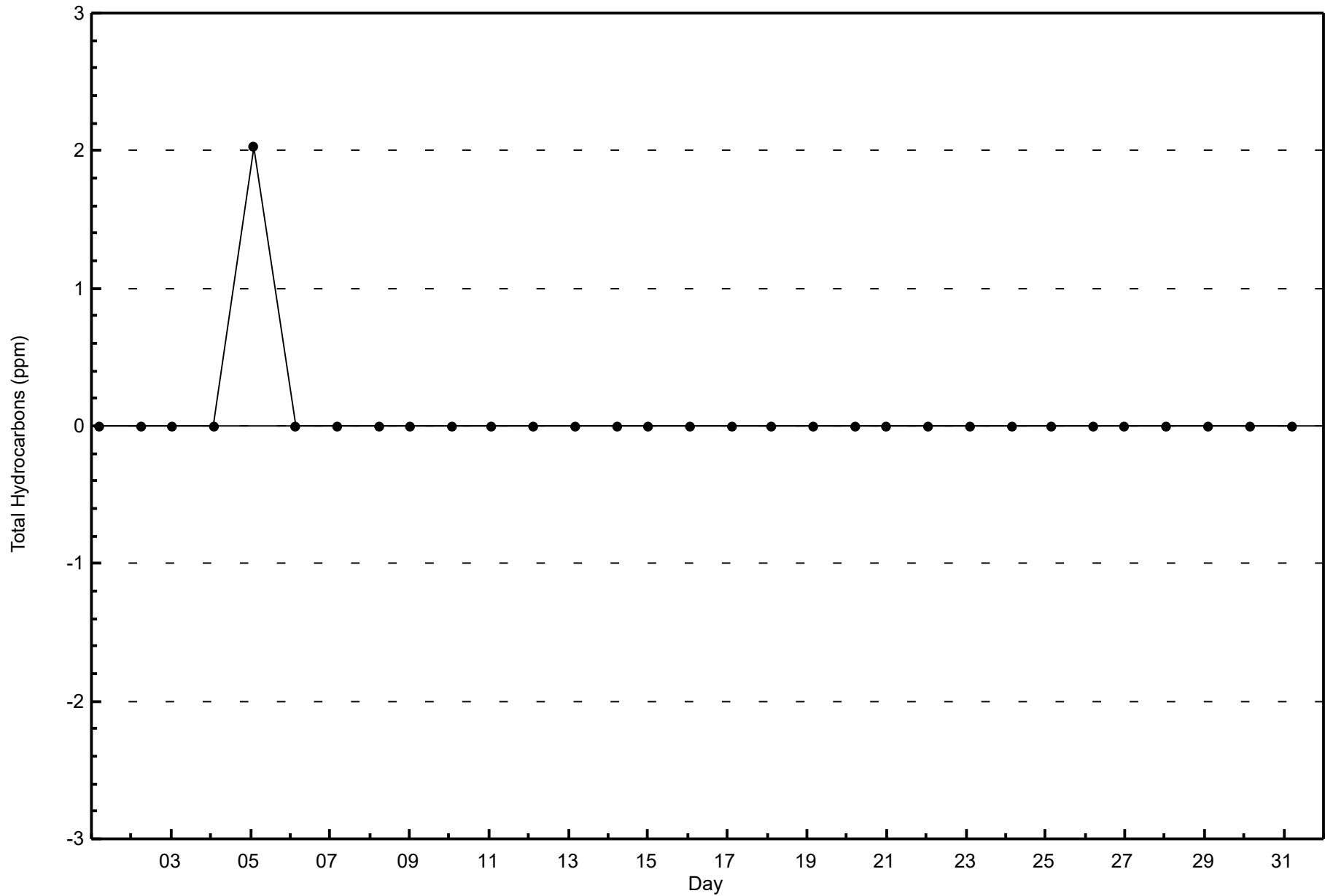


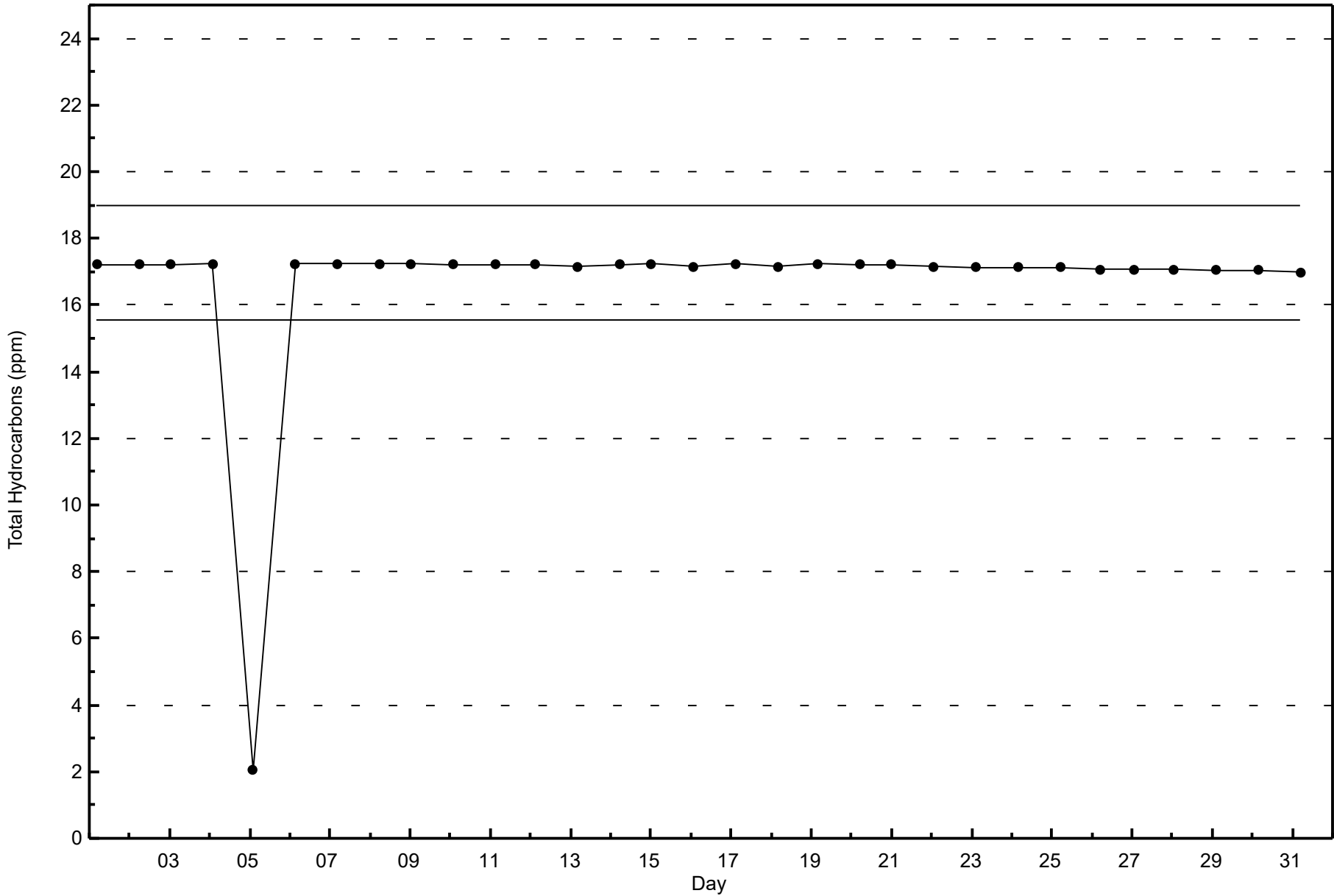
Wood Buffalo Environmental Association
Wind Rose Dec 2023

Total Hydrocarbons (THC) - ppm
Anzac



Total Number of Valid Hours: 705



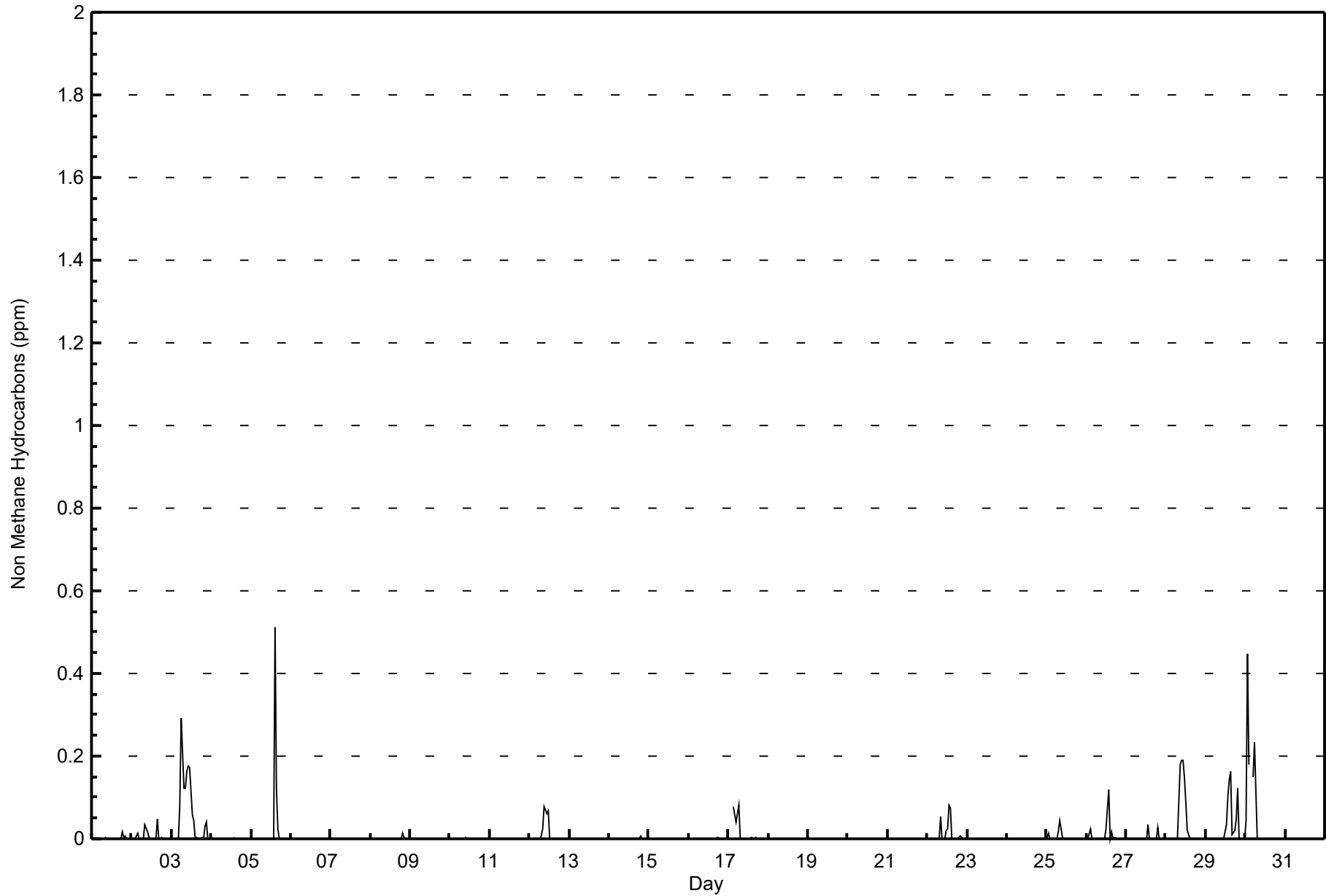




Summary of Hour Averages

Anzac - December 2023

Maximum Value: 0.512 ppm on Dec 5 15:00		Maximum Daily Average: 0.057 ppm on Dec 3		Hours in Service: 744																							
Minimum Value: 0.000 ppm on Dec 1 01:00		Minimum Daily Average: 0.000 ppm on Dec 6		Hours of Data: 705																							
Maximum Diurnal Average: 0.025 ppm at hour 15		Minimum Diurnal Average: 0.000 ppm at hour 23		Hours of Missing Data: 39																							
Monthly Average: 0.008 ppm		Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.0 Median = 0.0 Q ₃ = 0.0 P ₉₀ = 0.0 P ₉₉ = 0.2		Hours of Calibration: 35																							
				Percent Operational Time: 99.5																							
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Dec	0.000	0.000	0.000	0.000	Z	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	0.017	0.004	0.007	0.000	0.000	0.000	0.001	0.017	
2-Dec	0.000	0.000	0.002	0.014	0.000	Z	0.000	0.000	0.035	0.017	0.002	0.000	0.000	0.000	0.046	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.005	0.046	
3-Dec	Z	0.000	0.000	0.000	0.000	0.081	0.292	0.122	0.123	0.163	0.177	0.173	0.057	0.045	0.000	0.003	0.000	0.000	0.002	0.000	0.030	0.042	0.000	0.000	0.057	0.292	
4-Dec	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	PF	PF	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	
5-Dec	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	0.512	0.120	0.024	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.029	0.512	
6-Dec	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
7-Dec	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	C	C	C	C	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
8-Dec	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	0.013	0.005	0.000	0.000	0.000	0.001	0.013	
9-Dec	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	
10-Dec	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004	
11-Dec	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
12-Dec	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.006	0.025	0.079	0.063	0.069	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.079	
13-Dec	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
14-Dec	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	0.006	0.000	0.000	0.000	0.000	0.000	0.006	
15-Dec	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	
16-Dec	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	0.003	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.003	
17-Dec	0.000	0.000	Z	0.077	0.041	0.059	0.080	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.000	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.080	
18-Dec	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
19-Dec	0.000	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
20-Dec	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	
21-Dec	Z	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	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
22-Dec	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.053	0.000	0.000	0.021	0.023	0.080	0.075	0.000	0.000	0.000	0.000	0.002	0.006	0.000	0.000	0.000	0.011	0.080	
23-Dec	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.001	
24-Dec	0.000	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
25-Dec	0.004	0.013	0.000	0.000	Z	0.000	0.000	0.017	0.045	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	0.004	0.045		
26-Dec	0.003	0.000	0.022	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.025	0.118	0.000	0.019	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.008	0.118		
27-Dec	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	0.036	0.000	0.000	0.000	0.000	0.000	0.029	0.000	0.000	0.000	0.003	0.036		
28-Dec	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.179	0.190	0.191	0.148	0.087	0.020	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.035	0.191		
29-Dec	0.000	0.000	Z	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.033	0.102	0.144	0.162	0.011	0.020	0.047	0.122	0.005	0.000	0.000	0.028	0.162		
30-Dec	0.043	0.447	0.178	Z	0.149	0.236	0.116	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.051	0.447		
31-Dec	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	
		0.002	0.018	0.008	0.003	0.008	0.014	0.016	0.005	0.015	0.015	0.014	0.014	0.007	0.013	0.025	0.012	0.001	0.001	0.002	0.006	0.002	0.001	0.000	0.000	0.000	Diurnal Average
		0.043	0.447	0.178	0.077	0.149	0.236	0.292	0.122	0.179	0.190	0.191	0.173	0.087	0.118	0.512	0.162	0.024	0.020	0.047	0.122	0.030	0.042	0.000	0.000	0.000	Diurnal Maximum
Z - zerospan		C - Calibration			M - Maintenance			PF - Power Failure																			





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Non Methane Hydrocarbons (NMHC) - ppm
Anzac - December 2023**

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 0.005	639	90.64	90.64
0.006 - 0.05	33	4.68	95.32
0.06 - 0.1	21	2.98	98.30
> 0.1	12	1.70	100.00

Total Number of Valid Hours: 705

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Non Methane Hydrocarbons (NMHC) - ppm
Anzac - December 2023

Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 0.005	2	1	0	18	41	90	55	49	64	25	75	153	48	11	6	1	639
0.006 - 0.05	0	0	1	1	10	9	4	1	0	2	1	3	1	0	0	0	33
0.06 - 0.1	0	0	0	0	4	6	4	1	0	0	0	2	2	2	0	0	21
> 0.1	0	0	0	0	0	6	2	0	0	0	0	1	1	2	0	0	12
Totals	2	1	1	19	55	111	65	51	64	27	76	159	52	15	6	1	705

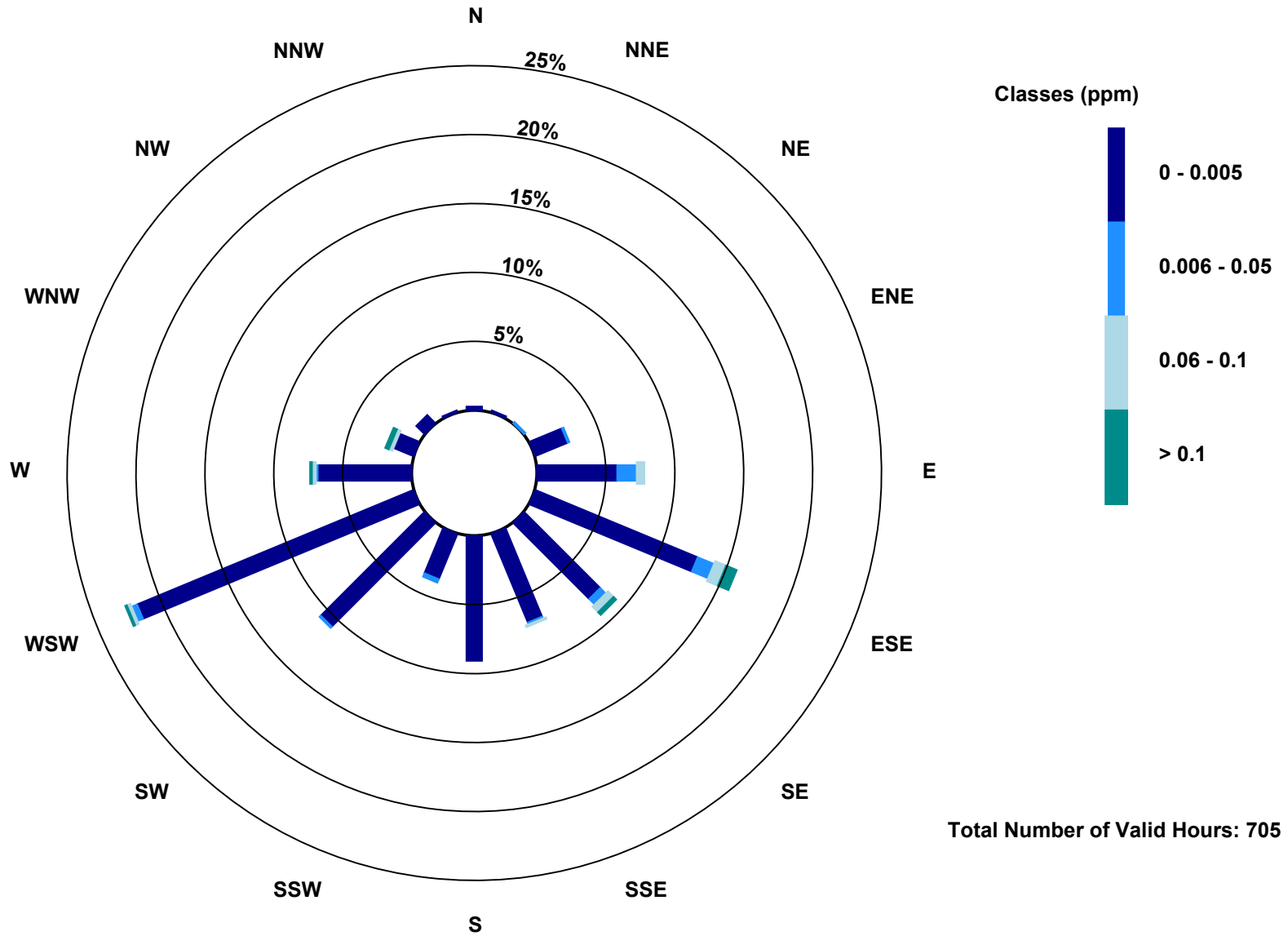
Total Number of Valid Hours: 705

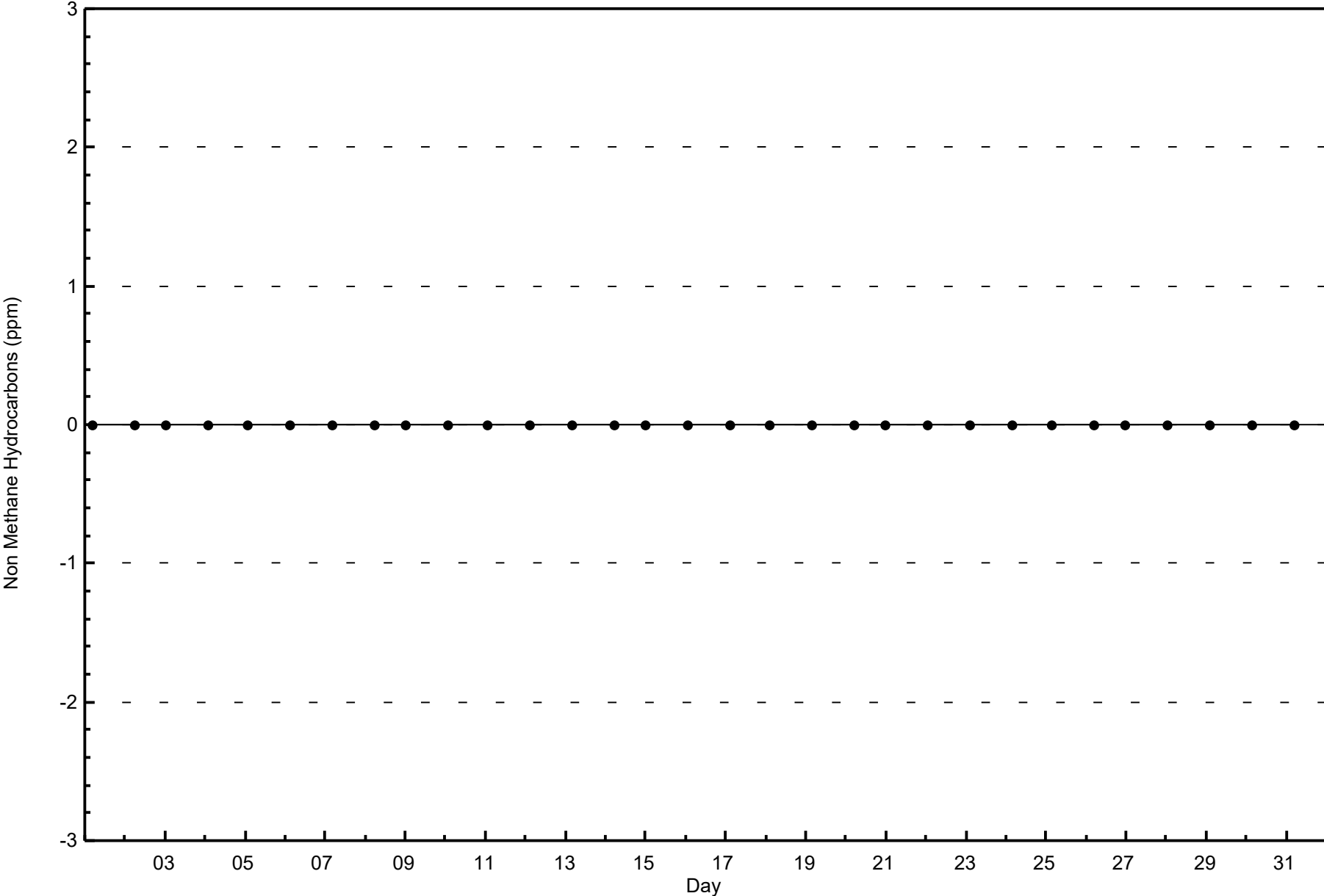
Total Number of Hours: 744

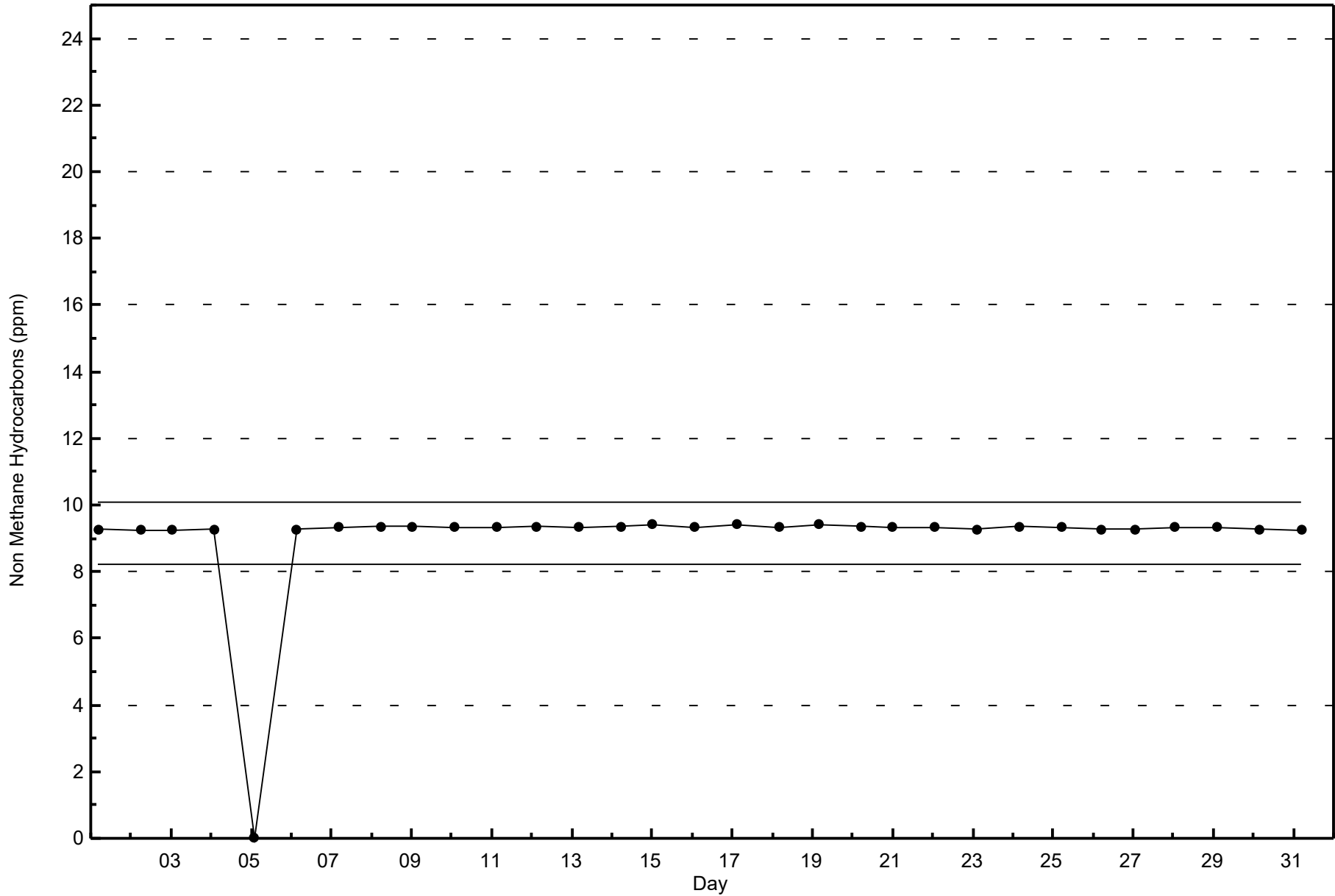


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Non Methane Hydrocarbons (NMHC) - ppm
Anzac



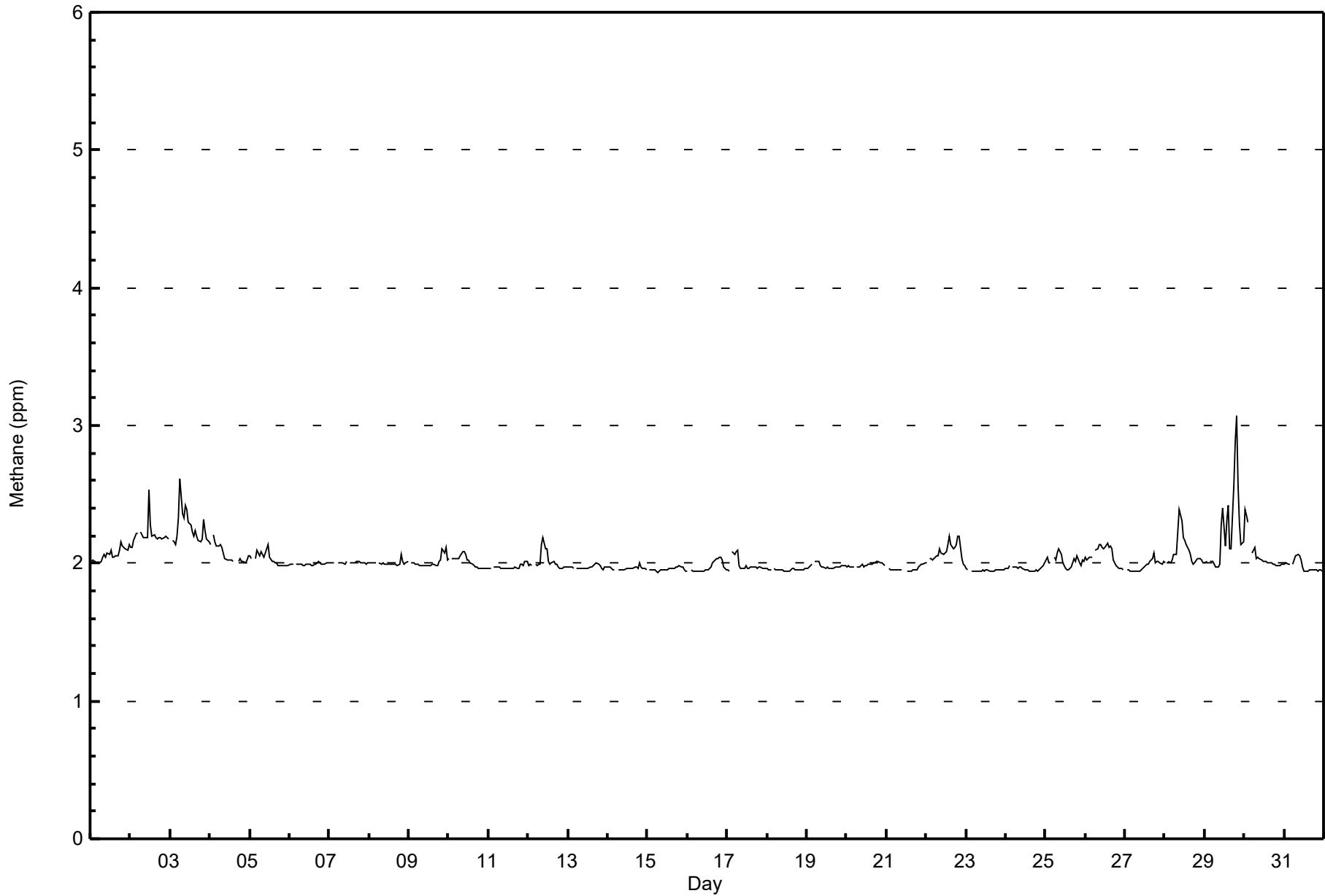






Wood Buffalo Environmental Association
Hourly Averages

Methane (CH₄) - ppm
Anzac - December 2023





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Methane (CH₄) - ppm
Anzac - December 2023**

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	551	78.16	78.16
2.1 - 3.0	153	21.70	99.86
3.1 - 10.0	1	0.14	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 705

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Methane (CH₄) - ppm
Anzac - December 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	6	29	61	43	40	63	25	75	153	39	10	6	1	551
2.1 - 3.0	2	1	1	13	26	50	22	10	1	2	1	6	13	5	0	0	153
3.1 - 10.0	0	0	0	0	0	0	0	1	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
Totals	2	1	1	19	55	111	65	51	64	27	76	159	52	15	6	1	705

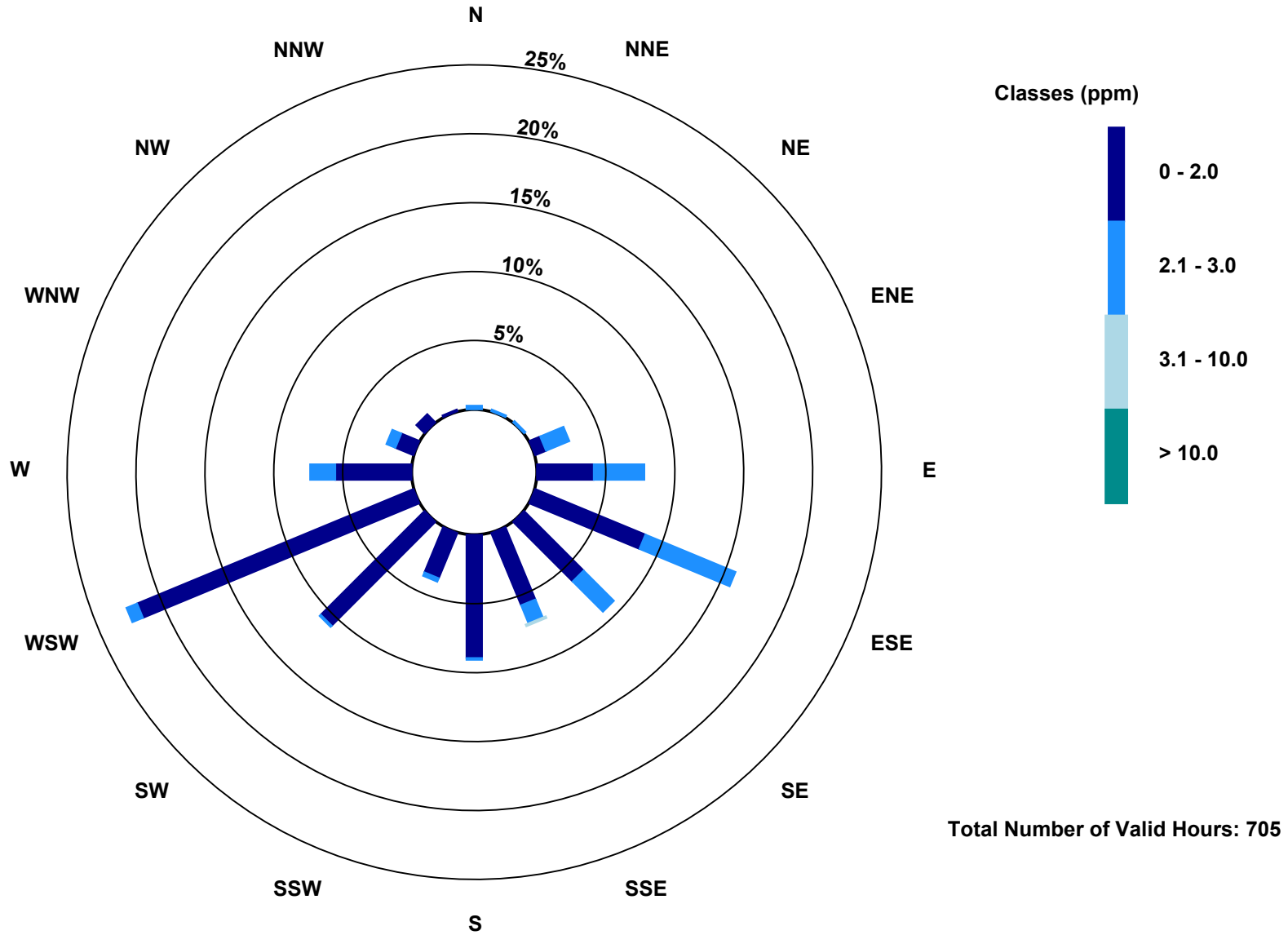
Total Number of Valid Hours: 705

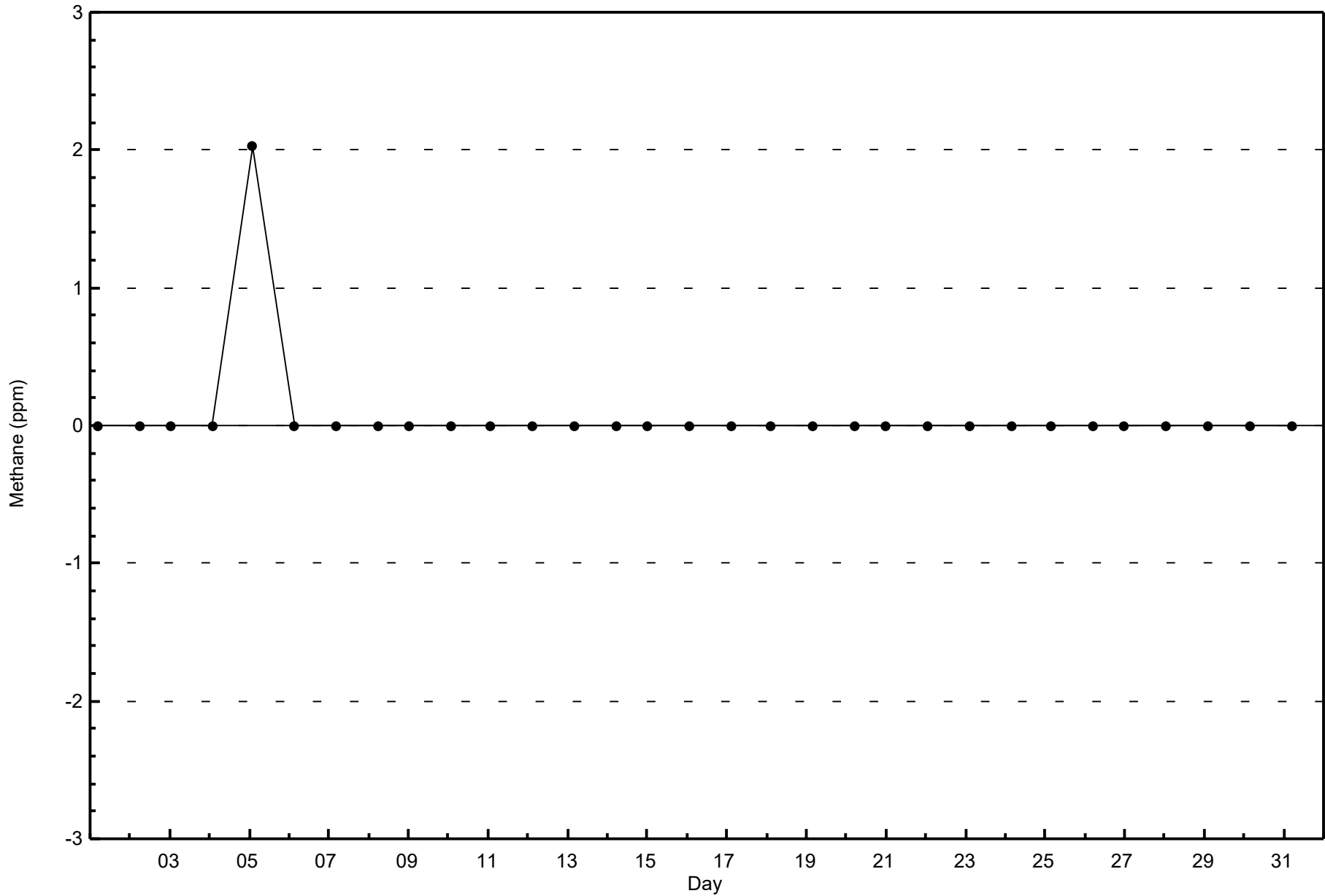
Total Number of Hours: 744

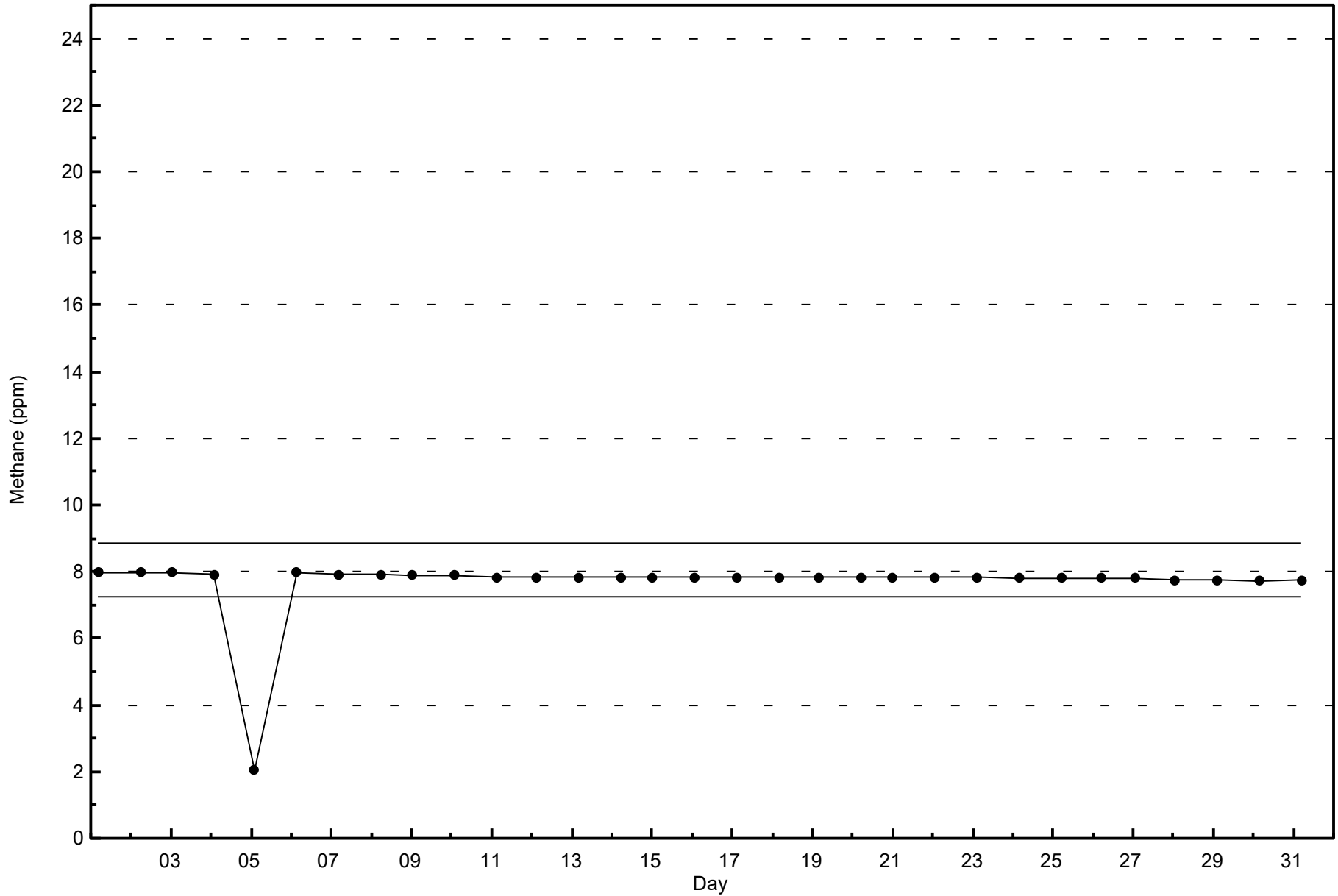


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Methane (CH₄) - ppm
Anzac









Wood Buffalo Environmental Association

Summary of Hour Averages

Nitric Oxide (NO) - ppb

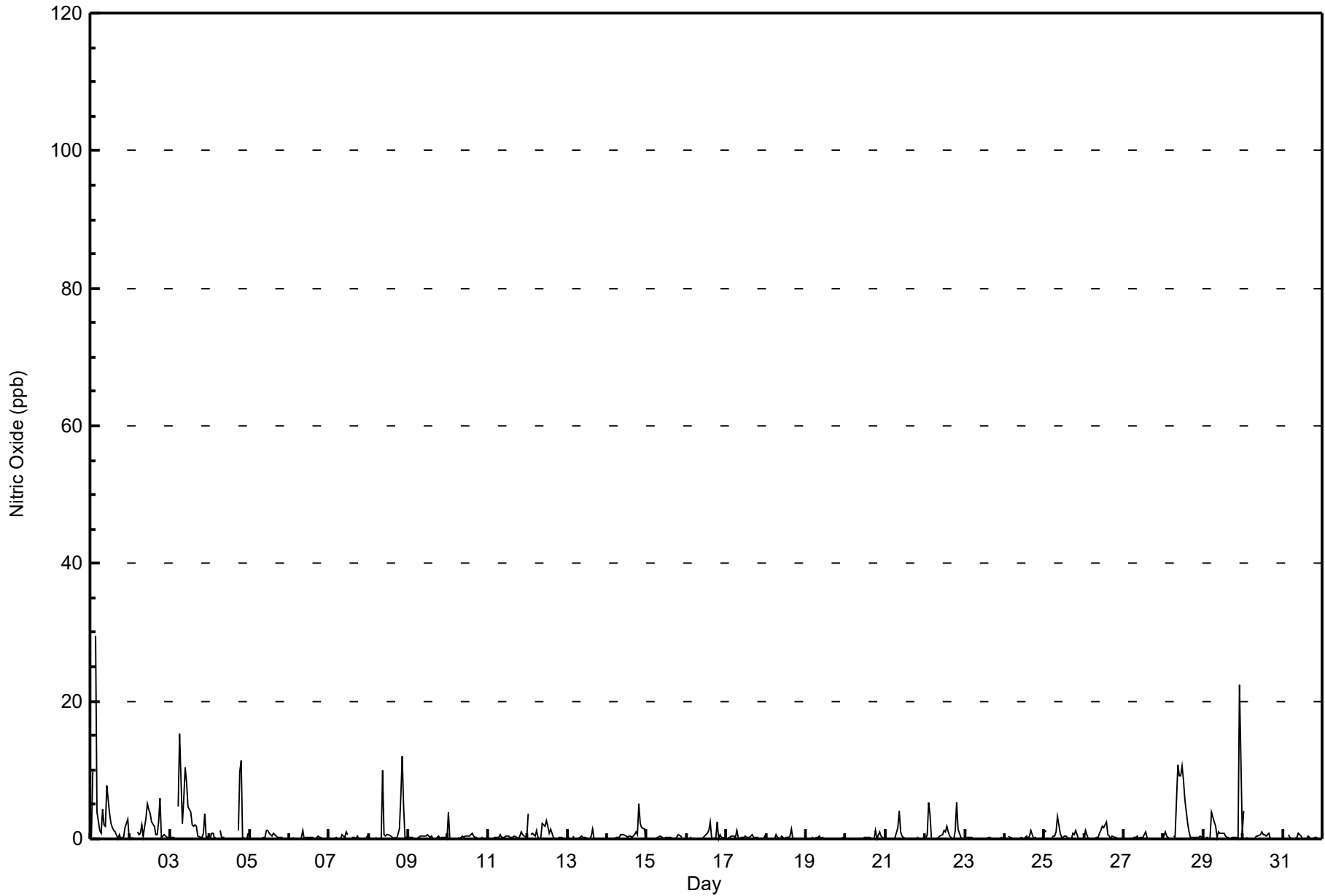
Anzac - December 2023

Maximum Value: 29.5 ppb on Dec 1 04:00		Maximum Daily Average: 3.3 ppb on Dec 1		Hours in Service: 744																																												
Minimum Value: 0.0 ppb on Dec 4 23:00		Minimum Daily Average: 0.1 ppb on Dec 19		Hours of Data: 704																																												
Maximum Diurnal Average: 1.4 ppb at hour 9		Minimum Diurnal Average: 0.2 ppb at hour 24		Hours of Missing Data: 40																																												
Monthly Average: 0.76 ppb		Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.1 Median = 0.2 Q ₃ = 0.5 P ₉₀ = 1.6 P ₉₉ = 10.3		Hours of Calibration: 36																																												
				Percent Operational Time: 99.5																																												
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Dec	0.3	9.7	Z	29.5	3.8	1.2	0.9	4.2	2.1	1.9	7.6	3.6	2.2	1.5	1.1	1.0	0.1	0.7	0.1	0.1	0.3	1.6	2.8	0.0	3.3	29.5																						
2-Dec	0.2	0.1	0.2	Z	1.0	0.6	0.7	2.0	0.5	3.0	5.1	4.4	3.6	2.5	1.9	0.6	0.7	2.4	5.8	0.1	0.5	0.5	0.2	0.2	1.6	5.8																						
3-Dec	0.2	0.3	0.2	0.0	Z	4.7	15.3	2.2	6.0	10.3	8.2	4.6	3.9	2.1	1.9	2.1	1.8	0.4	0.3	0.2	0.8	3.7	0.1	0.4	3.0	15.3																						
4-Dec	0.2	0.8	0.8	0.1	0.2	Z	1.2	0.2	0.3	0.2	C	C	C	C	C	PF	PF	1.2	9.8	11.4	0.3	0.1	0.0	0.8	--	11.4																						
5-Dec	Z	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.2	0.2	1.2	1.2	0.7	0.4	0.8	0.5	0.3	0.2	0.1	0.1	0.0	0.0	0.0	0.1	0.3	1.2																						
6-Dec	0.2	Z	0.1	0.1	0.1	0.0	0.1	0.2	1.3	0.1	0.2	0.1	0.1	0.3	0.2	0.1	0.1	0.4	0.2	0.2	0.1	0.1	0.1	0.1	0.2	1.3																						
7-Dec	0.1	0.1	Z	0.1	0.1	0.1	0.1	0.1	0.6	0.2	1.1	0.7	M	M	0.2	0.1	0.1	0.5	0.1	0.0	0.0	0.1	0.1	0.3	0.2	1.1																						
8-Dec	0.4	0.0	0.0	Z	0.1	0.1	0.0	0.0	10.0	0.6	0.4	0.7	0.7	0.4	0.2	0.1	0.2	0.1	1.3	6.1	12.0	4.8	0.2	0.1	1.7	12.0																						
9-Dec	0.2	0.1	0.1	0.1	Z	0.2	0.3	0.4	0.4	0.4	0.5	0.5	0.5	0.3	0.3	0.1	0.1	0.2	0.4	0.1	0.2	0.2	0.3	0.1	0.3	0.5																						
10-Dec	3.9	0.0	0.0	0.0	0.0	Z	0.1	0.0	0.4	0.3	0.5	0.4	0.4	0.4	0.9	0.4	0.3	0.3	0.1	0.0	0.1	0.1	0.0	0.1	0.4	3.9																						
11-Dec	Z	0.0	0.0	0.0	0.2	0.2	0.2	0.6	0.2	0.1	0.1	0.5	0.4	0.2	0.1	0.3	0.3	0.2	0.0	0.4	1.1	0.7	0.5	0.3	0.3	1.1																						
12-Dec	3.6	Z	0.6	0.8	0.4	1.1	0.3	0.1	0.2	2.2	1.8	2.7	1.8	0.7	1.3	0.2	0.0	0.1	0.1	0.2	0.1	0.0	0.0	0.0	0.8	3.6																						
13-Dec	0.0	0.3	Z	0.4	0.1	0.0	0.0	0.3	0.4	0.2	0.2	0.2	0.1	0.1	0.5	1.5	0.1	0.1	0.0	0.1	0.1	0.1	0.0	0.0	0.2	1.5																						
14-Dec	0.0	0.0	0.1	Z	0.1	0.1	0.3	0.1	0.7	0.5	0.7	0.5	0.3	0.4	0.4	0.2	0.6	1.1	0.6	5.0	2.2	1.7	1.4	0.0	0.7	5.0																						
15-Dec	0.0	0.0	0.0	0.0	Z	0.0	0.2	0.1	0.5	0.2	0.1	0.2	0.1	0.2	0.3	0.1	0.1	0.0	0.3	0.5	0.3	0.1	0.0	0.0	0.1	0.5																						
16-Dec	0.1	0.1	0.1	0.1	0.0	Z	0.0	0.1	0.1	0.1	0.2	0.5	0.8	1.3	2.5	0.3	0.1	0.2	2.5	0.1	0.5	0.2	0.1	0.1	0.4	2.5																						
17-Dec	Z	0.2	0.1	0.3	0.5	0.2	1.2	0.2	0.1	0.2	0.2	0.5	0.2	0.2	0.2	0.5	0.1	0.2	0.1	0.2	0.0	0.0	0.0	0.5	0.3	1.2																						
18-Dec	0.3	Z	0.1	0.0	0.0	0.1	0.6	0.2	0.1	0.3	0.2	0.1	0.3	0.3	0.3	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	1.4																						
19-Dec	0.0	0.0	Z	0.0	0.2	0.1	0.1	0.1	0.3	0.1	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.2	0.1	0.1	0.3																						
20-Dec	0.0	0.1	0.1	Z	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.2	0.2	0.1	0.2	0.1	0.0	0.0	1.2	0.0	1.0	0.4	0.2	0.0	0.2	1.2																						
21-Dec	0.1	0.0	0.1	0.0	Z	0.1	0.1	1.7	4.1	0.9	0.4	0.2	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.4	4.1																						
22-Dec	0.0	0.7	5.3	3.4	0.0	Z	0.0	0.0	0.2	0.3	0.5	1.1	1.1	1.8	1.0	0.4	0.0	0.0	1.1	5.2	1.5	0.2	0.0	0.1	1.0	5.3																						
23-Dec	Z	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	0.3	0.2	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.3																						
24-Dec	0.1	Z	0.4	0.2	0.3	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.4	0.0	0.5	1.1	0.1	0.2	0.0	0.0	0.0	0.0	0.8	0.2	1.1																						
25-Dec	1.1	1.3	Z	0.1	0.0	0.4	0.4	1.1	3.3	0.9	0.2	0.3	0.5	0.4	0.2	0.0	0.1	0.9	0.5	1.2	0.0	0.0	0.0	0.0	0.6	3.3																						
26-Dec	0.0	1.3	0.0	Z	0.0	0.0	0.0	0.2	0.2	0.8	1.2	1.8	1.7	2.4	0.6	0.3	0.0	0.3	0.1	0.1	0.1	0.1	0.0	0.0	0.5	2.4																						
27-Dec	0.1	0.0	0.1	0.1	Z	0.2	0.2	0.2	0.5	0.1	0.2	0.2	0.6	1.1	0.2	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.2	1.1																						
28-Dec	0.5	1.0	0.4	0.0	0.0	Z	0.4	0.1	10.8	9.1	9.2	10.5	8.5	5.8	2.3	1.0	0.2	0.3	0.1	0.2	0.3	0.2	0.5	0.2	2.7	10.8																						
29-Dec	Z	0.3	0.1	0.1	0.3	3.8	2.5	1.9	0.2	1.0	0.7	0.8	0.7	0.5	0.3	0.1	0.1	0.3	0.1	0.2	0.2	0.0	22.4	0.9	1.6	22.4																						
30-Dec	4.0	Z	0.3	0.0	0.0	0.0	0.0	0.0	0.4	0.4	0.7	1.0	0.5	0.6	0.4	0.7	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.4	4.0																						
31-Dec	0.0	0.2	Z	0.6	0.2	0.0	0.0	0.0	0.2	0.9	0.7	0.5	0.1	0.1	0.0	0.3	0.2	0.0	0.1	0.2	0.2	0.0	0.0	0.0	0.2	0.9																						
																								0.6	0.7	0.4	1.4	0.3	0.5	0.8	0.5	1.4	1.1	1.4	1.3	1.0	0.8	0.6	0.4	0.2	0.3	0.8	1.0	0.7	0.5	0.9	0.2	Diurnal Average
																								4.0	9.7	5.3	29.5	3.8	4.7	15.3	4.2	10.8	10.3	9.2	10.5	8.5	5.8	2.5	2.1	1.8	2.4	9.8	11.4	12.0	4.8	22.4	0.9	Diurnal Maximum
Z - zerospan			C - Calibration			M - Maintenance			PF - Power Failure																																							



Wood Buffalo Environmental Association
Hourly Averages

Nitric Oxide (NO) - ppb
Anzac - December 2023





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitric Oxide (NO) - ppb
Anzac - December 2023**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	702	99.72	99.72
21 - 40	2	0.28	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 704

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitric Oxide (NO) - ppb
Anzac - December 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	1	1	1	17	55	114	64	49	65	27	79	154	51	16	7	1	702
21 - 40	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	2
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	1	1	1	18	55	114	64	50	65	27	79	154	51	16	7	1	704

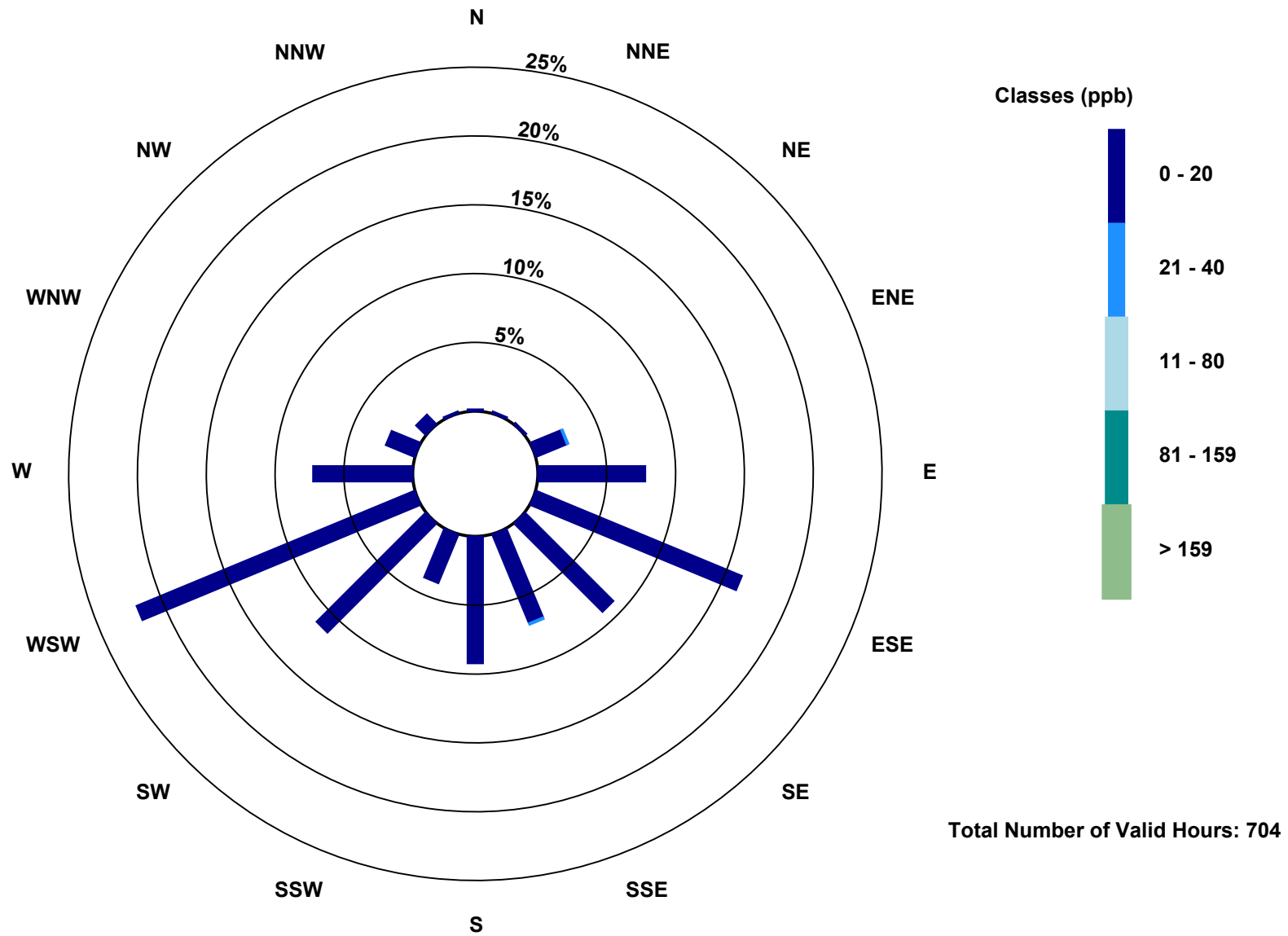
Total Number of Valid Hours: 704

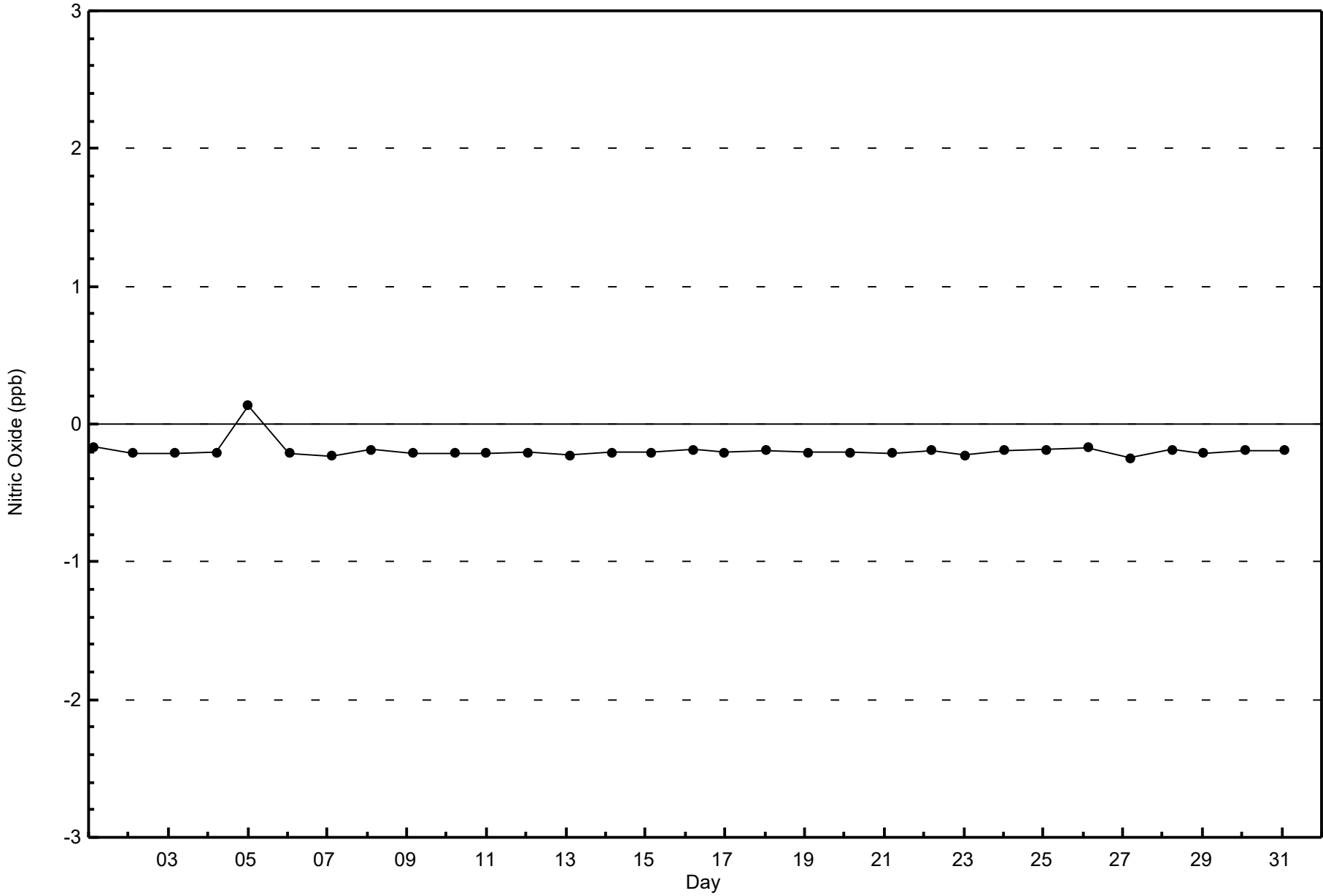
Total Number of Hours: 744

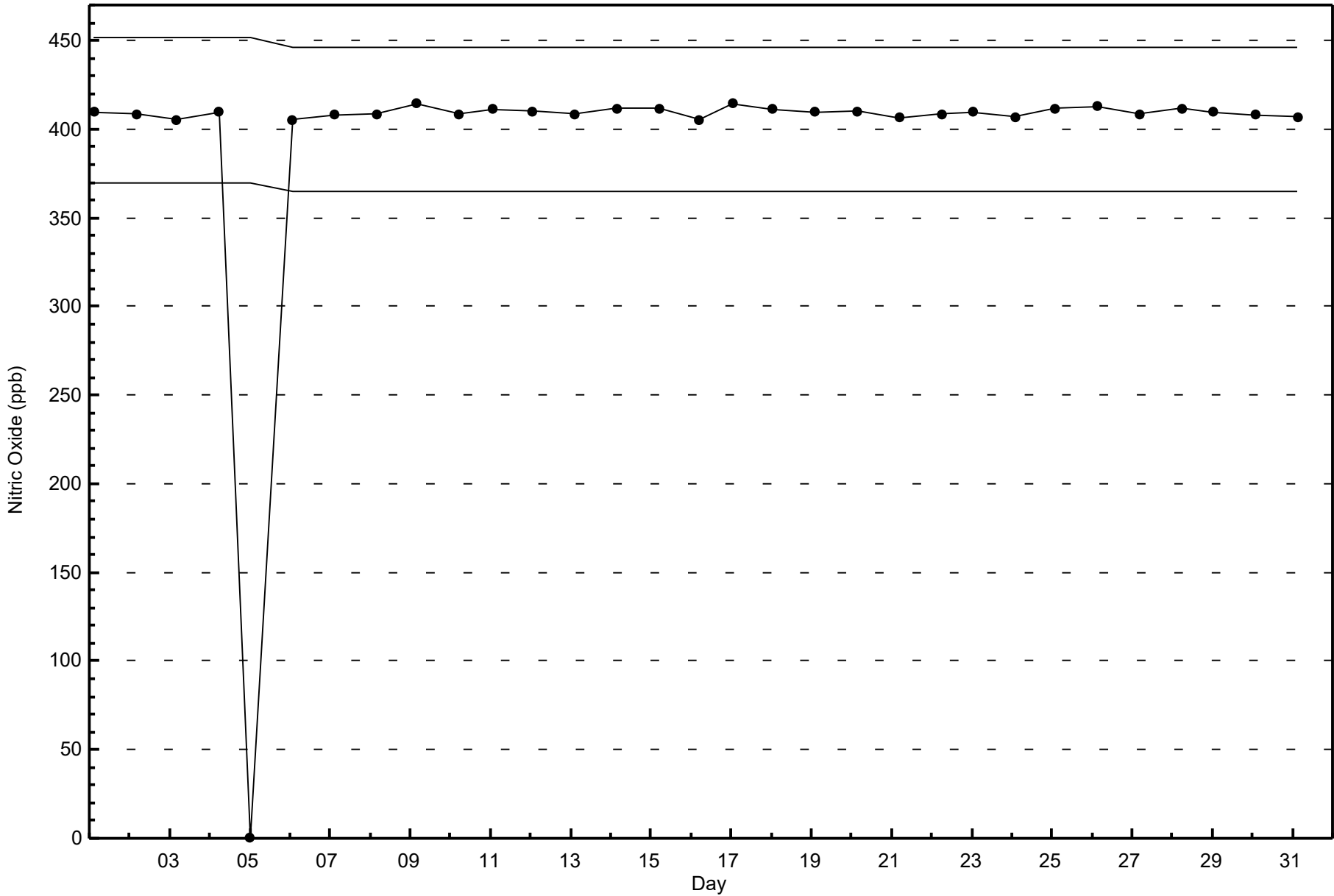


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Nitric Oxide (NO) - ppb
Anzac









Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO₂) - ppb

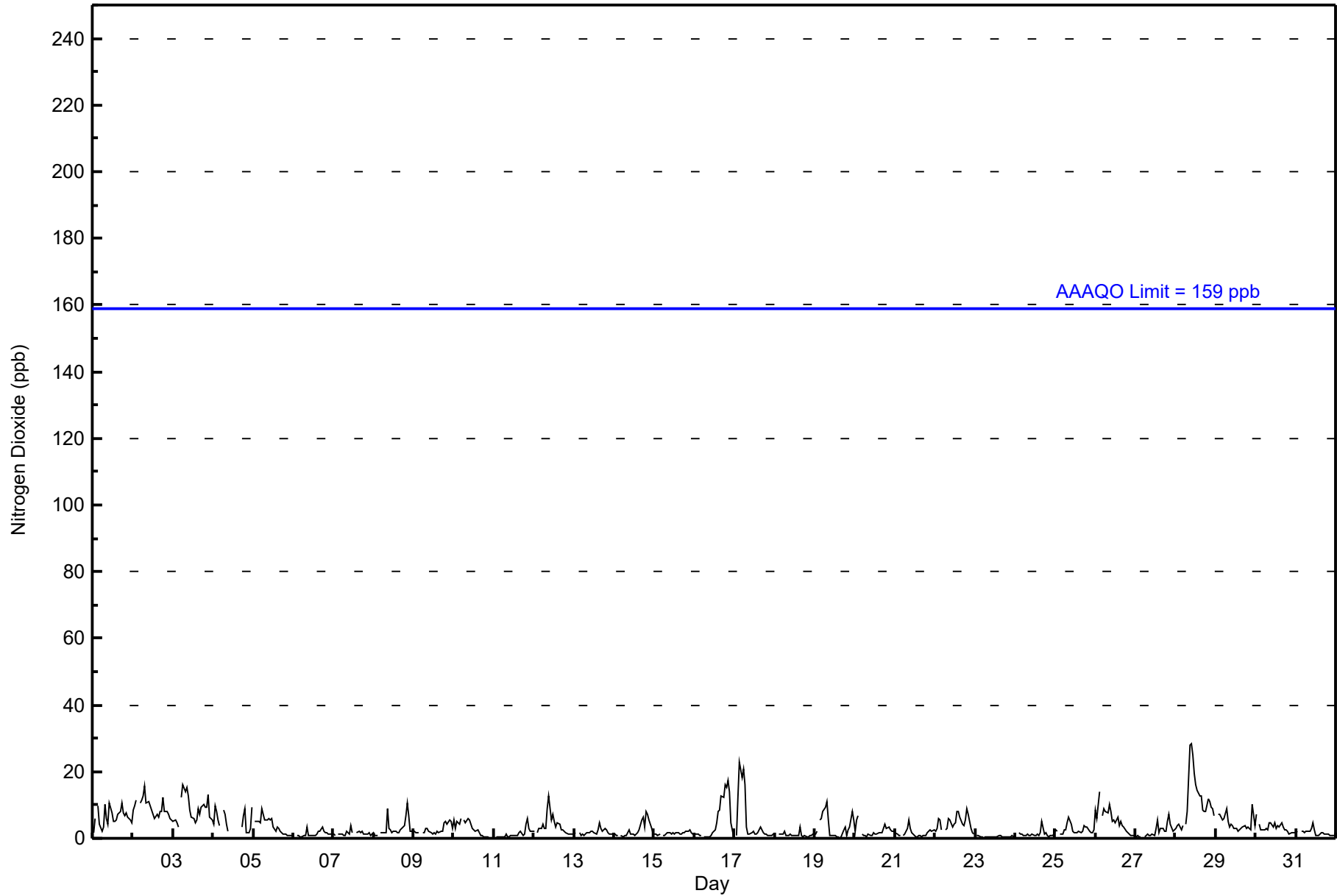
Anzac - December 2023

Number of Exceedences (AAAQO):		1-hr: 0	24-hr: 0	Hours in Service: 744																	Daily Average		Daily Maximum																										
Maximum Value: 28.2 ppb on Dec 28 10:00		Maximum Daily Average: 11.2 ppb on Dec 28		Hours of Data: 704																	Hours of Missing Data: 40		Hours of Calibration: 36																										
Minimum Value: 0.2 ppb on Dec 10 22:00		Minimum Daily Average: 0.5 ppb on Dec 23		Hours of Calibration: 36																	Percent Operational Time: 99.5																												
Maximum Diurnal Average: 5.0 ppb at hour 9		Minimum Diurnal Average: 2.5 ppb at hour 24		Percentiles: P ₁ = 0.3 P ₁₀ = 0.7 Q ₁ = 1.1 Median = 2.2 Q ₃ = 5.0 P ₉₀ = 8.3 P ₉₉ = 17.2																																													
Monthly Average: 3.60 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-Dec	1.9	6.0	Z	9.8	4.1	2.0	3.4	10.2	6.1	4.2	10.5	7.5	5.2	5.0	5.7	7.0	7.9	10.7	7.5	6.7	7.6	6.5	5.6	4.6	6.3	10.7																							
2-Dec	8.4	9.9	11.3	Z	10.6	11.3	12.8	15.8	10.8	11.0	9.9	8.3	7.3	5.8	7.0	6.5	8.0	7.9	12.2	8.0	8.1	7.0	5.9	5.6	9.1	15.8																							
3-Dec	5.0	5.6	4.7	3.6	Z	12.3	16.0	14.0	15.1	12.9	8.3	6.3	5.8	4.7	5.5	8.8	7.1	9.5	10.2	9.3	9.3	13.2	6.5	5.3	8.7	16.0																							
4-Dec	4.2	9.6	7.9	5.7	3.9	Z	8.5	7.0	4.2	2.2	C	C	C	C	C	PF	PF	3.2	6.9	8.9	1.5	1.7	3.0	9.2	--	9.6																							
5-Dec	Z	5.1	5.0	5.1	4.6	8.8	7.0	5.5	5.5	2.8	5.6	5.8	3.2	2.2	3.3	2.8	2.3	1.5	1.3	1.2	1.0	0.9	0.9	1.0	3.7	8.8																							
6-Dec	1.0	Z	0.8	0.7	0.6	0.6	0.7	1.0	3.4	1.0	1.0	0.9	0.8	1.0	1.3	2.0	2.3	3.5	2.2	1.7	1.6	1.1	1.3	1.2	1.4	3.5																							
7-Dec	1.2	1.0	Z	1.2	1.3	1.1	0.9	1.0	2.1	1.4	4.0	1.9	M	M	1.5	2.1	1.7	2.0	1.3	1.1	1.3	1.5	1.0	1.4	1.5	4.0																							
8-Dec	1.6	0.9	1.0	Z	1.5	1.5	1.5	1.5	8.7	3.1	2.4	1.9	2.2	2.0	1.8	1.7	2.6	3.0	3.7	6.8	10.4	6.7	2.2	2.1	3.1	10.4																							
9-Dec	2.1	1.8	1.7	1.6	Z	1.5	1.7	2.8	2.9	2.0	1.9	1.4	1.6	1.3	2.2	1.7	2.0	2.0	4.8	5.0	4.4	5.7	5.0	2.8	2.6	5.7																							
10-Dec	5.5	3.1	5.0	4.3	6.1	Z	5.5	4.8	6.1	5.5	4.2	2.8	2.4	2.0	2.5	1.5	0.9	0.7	0.4	0.4	0.4	0.2	0.2	0.2	2.8	6.1																							
11-Dec	Z	0.3	0.3	0.3	0.4	0.4	0.3	1.2	0.4	0.6	0.7	0.9	0.9	0.7	0.8	1.7	2.3	1.0	1.1	4.4	5.8	2.8	2.0	2.0	1.4	5.8																							
12-Dec	2.1	Z	1.7	2.9	3.1	4.3	3.1	3.1	8.9	12.8	5.6	7.3	5.1	3.2	4.5	4.3	2.7	2.4	2.0	1.5	1.3	1.3	1.4	1.3	3.7	12.8																							
13-Dec	1.4	1.8	Z	1.8	1.0	1.1	0.9	1.6	1.6	1.6	2.2	2.1	1.7	1.4	2.4	4.7	2.8	2.0	3.0	2.7	1.5	1.4	1.3	1.2	1.9	4.7																							
14-Dec	1.1	1.0	0.7	Z	0.7	0.6	0.9	0.9	1.9	2.5	1.4	1.2	1.0	1.3	1.8	2.5	5.5	6.4	3.3	8.0	7.2	5.7	2.9	1.1	2.6	8.0																							
15-Dec	1.3	1.2	0.9	1.1	Z	1.0	1.0	1.1	1.5	1.6	1.1	1.6	1.3	1.5	1.6	1.4	1.4	1.6	1.8	2.2	2.3	2.5	1.6	1.2	1.5	2.5																							
16-Dec	1.3	1.2	1.2	1.0	0.7	Z	0.5	0.4	0.4	0.5	0.8	1.9	2.5	4.7	8.1	8.6	12.6	12.3	15.9	15.3	17.2	13.8	4.8	0.6	5.5	17.2																							
17-Dec	Z	0.8	12.3	22.7	18.3	20.6	16.3	3.2	1.4	1.3	1.7	2.3	1.2	1.1	1.7	3.5	2.7	1.6	1.1	1.2	1.0	0.8	0.8	1.4	5.2	22.7																							
18-Dec	1.3	Z	1.2	1.2	1.2	1.2	2.1	1.0	0.8	1.3	1.0	0.7	0.8	0.8	1.0	3.5	0.7	0.5	1.0	0.6	0.6	0.9	1.0	1.1	1.1	3.5																							
19-Dec	1.2	2.0	Z	5.6	5.8	8.2	9.5	11.0	5.5	0.8	0.8	0.7	0.8	0.4	0.3	0.2	0.3	2.5	3.4	0.8	2.6	3.2	7.9	5.4	3.4	11.0																							
20-Dec	2.2	5.4	6.6	Z	1.1	0.8	0.8	0.5	1.1	0.8	0.7	1.5	1.4	1.4	1.8	1.8	1.8	3.0	4.2	3.0	3.6	2.5	2.3	2.2	2.2	6.6																							
21-Dec	1.7	1.4	1.0	0.9	Z	0.8	1.4	3.1	5.3	2.8	1.9	1.2	0.6	0.6	0.7	0.7	0.6	0.7	0.8	1.7	2.2	2.4	2.3	2.4	1.6	5.3																							
22-Dec	2.1	3.1	6.0	5.6	2.5	Z	2.4	2.9	5.8	5.3	3.2	4.4	4.8	8.2	8.2	6.3	4.3	3.8	5.4	8.7	7.1	3.1	1.8	1.4	4.6	8.7																							
23-Dec	Z	1.0	0.8	0.6	0.5	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.7	0.8	0.4	0.4	0.3	0.3	0.5	0.5	0.9	0.6	0.5	1.0																							
24-Dec	0.8	Z	1.9	1.2	1.1	0.9	1.0	1.1	1.0	1.0	1.1	0.7	0.9	1.3	0.7	1.8	4.9	1.3	1.6	0.9	0.6	1.0	0.9	1.9	1.3	4.9																							
25-Dec	2.7	2.3	Z	1.4	1.3	2.6	2.7	4.8	6.4	4.1	2.3	1.8	1.9	1.7	2.1	1.6	2.1	3.9	3.3	3.2	2.1	1.8	1.7	2.6	2.6	6.4																							
26-Dec	8.6	5.9	13.8	Z	6.6	8.8	8.1	7.5	10.0	8.0	5.2	5.3	4.8	6.2	3.9	4.9	4.0	3.4	2.2	1.7	1.3	1.0	1.0	0.8	5.3	13.8																							
27-Dec	0.5	0.7	0.6	0.5	Z	0.6	0.9	1.1	1.0	0.9	1.3	1.0	2.9	5.5	1.5	3.0	3.1	2.2	2.2	5.0	7.2	4.2	2.2	2.7	2.2	7.2																							
28-Dec	2.8	3.9	4.3	2.6	3.7	Z	4.1	8.2	28.0	28.2	25.0	19.3	16.1	14.6	12.6	12.8	8.4	8.0	7.9	11.7	11.1	9.4	8.7	6.9	11.2	28.2																							
29-Dec	Z	7.1	7.3	6.2	5.4	5.9	8.9	5.0	3.6	4.3	3.9	3.0	2.9	2.3	2.6	2.9	3.3	3.8	3.0	3.2	2.8	2.5	10.2	4.0	4.5	10.2																							
30-Dec	7.1	Z	4.1	2.6	2.5	2.7	2.9	2.7	4.6	4.7	3.4	4.5	2.8	3.9	3.5	4.7	3.4	2.7	2.5	2.0	1.2	1.5	1.6	1.6	3.2	7.1																							
31-Dec	1.6	2.1	Z	2.3	2.1	1.9	2.0	2.2	2.1	3.1	4.5	2.4	1.0	1.0	1.1	1.8	1.5	1.2	1.1	1.1	1.0	1.0	1.0	0.7	1.7	4.5																							
																								2.7	3.2	4.1	3.6	3.5	3.9	4.1	4.1	5.0	4.4	3.9	3.4	2.9	3.0	3.1	3.6	3.5	3.5	3.8	4.1	4.1	3.5	2.9	2.5	Diurnal Average	
																								8.6	9.9	13.8	22.7	18.3	20.6	16.3	15.8	28.0	28.2	25.0	19.3	16.1	14.6	12.6	12.8	12.6	12.3	15.9	15.3	17.2	13.8	10.2	9.2	Diurnal Maximum	
Z - zerospan C - Calibration M - Maintenance PF - Power Failure																																																	
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 159 ppb																																																	



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Dioxide (NO₂) - ppb
Anzac - December 2023





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitrogen Dioxide (NO₂) - ppb
Anzac - December 2023

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	699	99.29	99.29
21 - 40	5	0.71	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 704

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Anzac - December 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	1	1	1	18	55	114	64	50	65	27	79	154	50	12	7	1	699
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	1	4	0	0	5
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	1	1	1	18	55	114	64	50	65	27	79	154	51	16	7	1	704

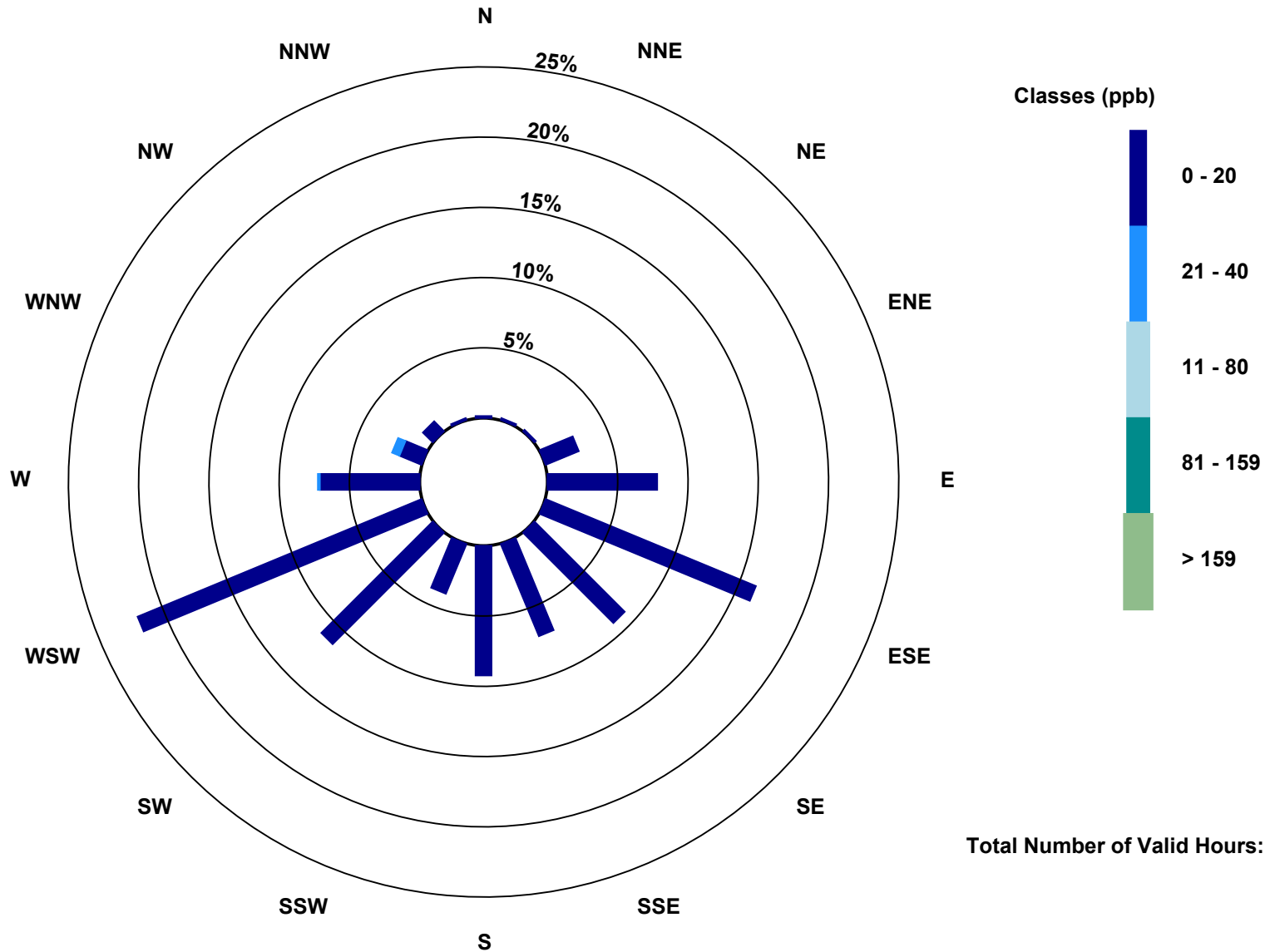
Total Number of Valid Hours: 704

Total Number of Hours: 744

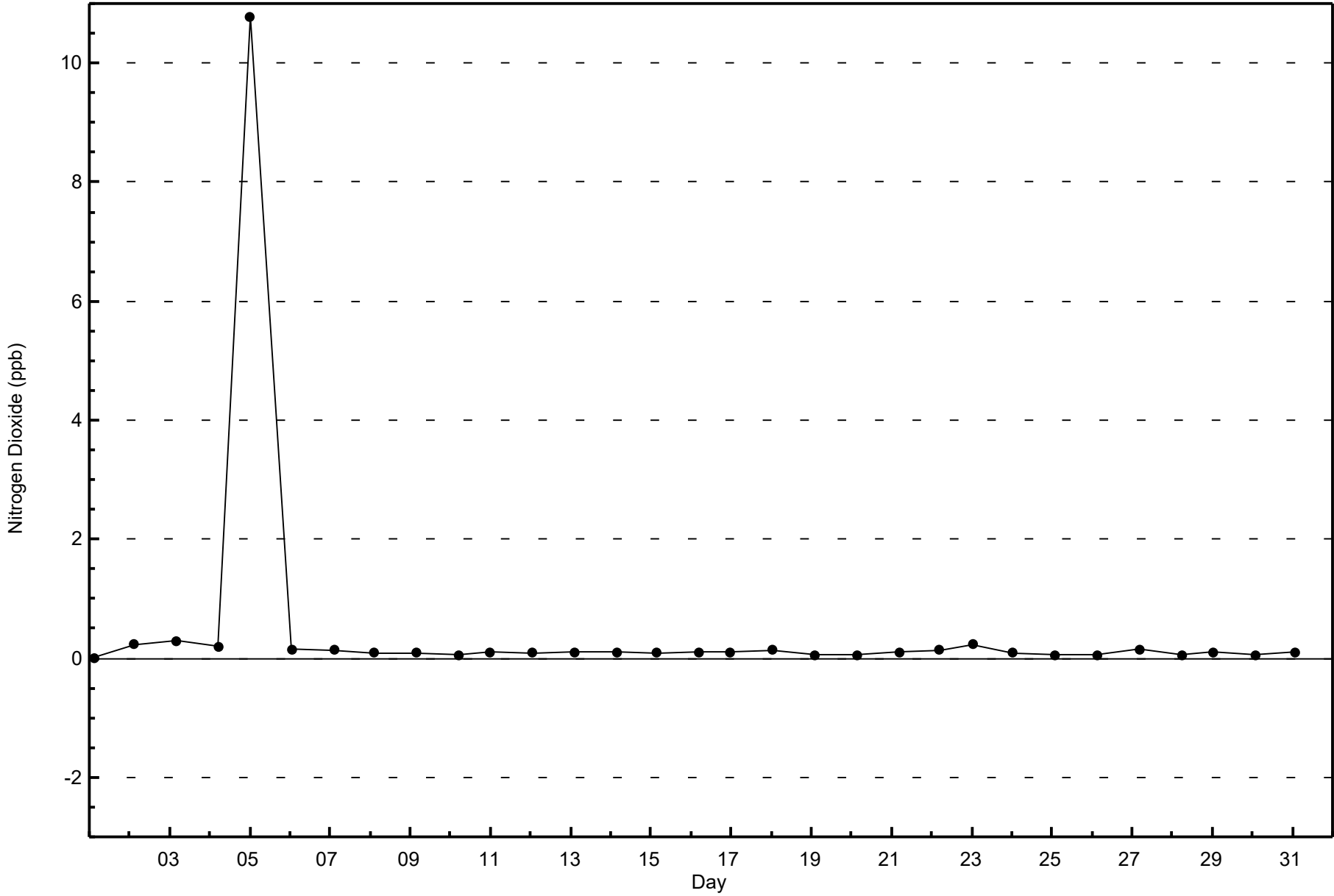


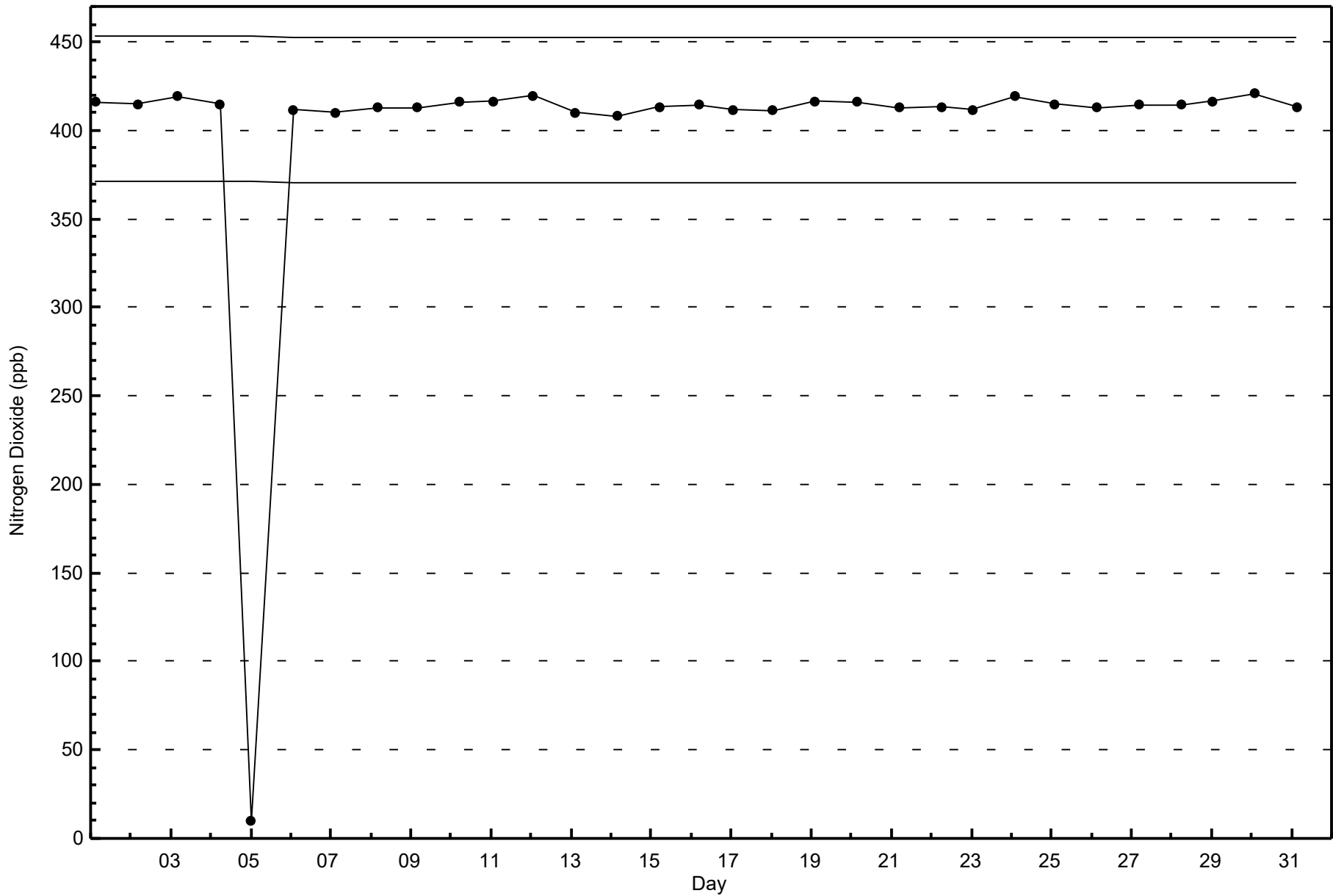
Wood Buffalo Environmental Association
Wind Rose Dec 2023

Nitrogen Dioxide (NO₂) - ppb
Anzac



Total Number of Valid Hours: 704



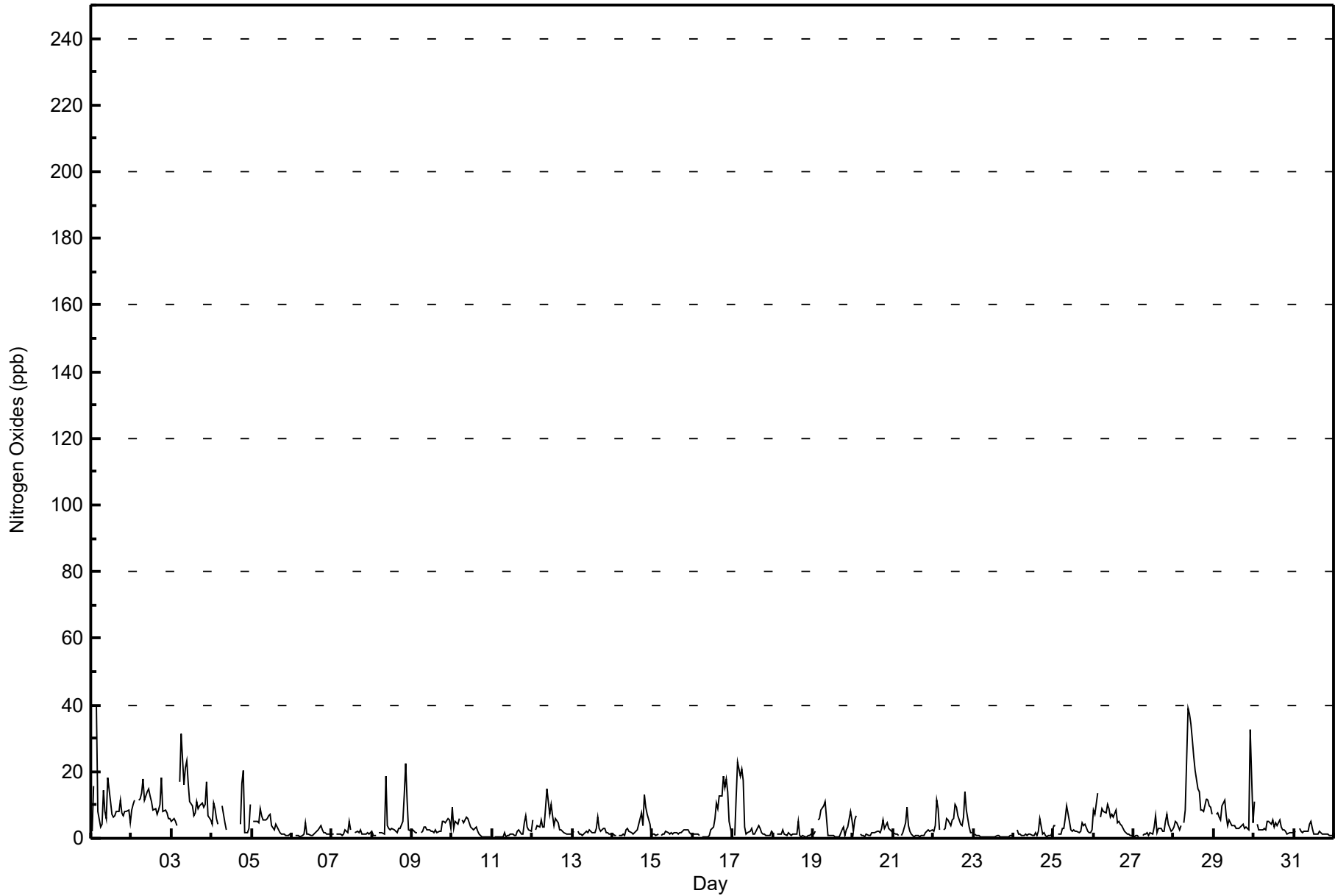




Wood Buffalo Environmental Association
Summary of Hour Averages

Nitrogen Oxides (NO_x) - ppb
Anzac - December 2023

Maximum Value: 39.3 ppb on Dec 1 04:00		Maximum Daily Average: 13.9 ppb on Dec 28		Hours in Service: 744																									
Minimum Value: 0.2 ppb on Dec 19 16:00		Minimum Daily Average: 0.6 ppb on Dec 23		Hours of Data: 704																									
Maximum Diurnal Average: 6.5 ppb at hour 9		Minimum Diurnal Average: 2.6 ppb at hour 24		Hours of Missing Data: 40																									
Monthly Average: 4.36 ppb		Percentiles: P ₁ = 0.3 P ₁₀ = 0.8 Q ₁ = 1.2 Median = 2.4 Q ₃ = 5.6 P ₉₀ = 10.0 P ₉₉ = 24.5		Hours of Calibration: 36																									
				Percent Operational Time: 99.5																									
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24					
1-Dec	2.2	15.7	Z	39.3	7.9	3.2	4.3	14.4	8.2	6.1	18.1	11.1	7.4	6.5	6.8	8.0	8.0	11.4	7.6	6.8	7.9	8.1	8.4	4.6	9.6	39.3			
2-Dec	8.6	10.0	11.5	Z	11.6	11.9	13.5	17.8	11.3	14.0	15.0	12.7	10.9	8.3	8.9	7.1	8.7	10.3	18.0	8.1	8.6	7.5	6.1	5.8	10.7	18.0			
3-Dec	5.2	5.9	4.9	3.6	Z	17.0	31.3	16.2	21.1	23.2	16.5	10.9	9.7	6.8	7.4	10.9	8.9	9.9	10.5	10.1	16.9	6.6	5.7	11.7	31.3				
4-Dec	4.4	10.4	8.7	5.8	4.1	Z	9.7	7.2	4.5	2.4	C	C	C	C	C	PF	PF	4.4	16.7	20.3	1.8	1.8	3.0	10.0	--	20.3			
5-Dec	Z	5.1	5.0	5.2	4.6	8.8	7.0	5.5	5.7	6.0	6.8	7.0	3.9	2.6	4.1	3.3	2.6	1.7	1.4	1.3	1.0	0.9	0.9	1.1	4.0	8.8			
6-Dec	1.2	Z	0.9	0.8	0.7	0.6	0.8	1.2	4.7	1.1	1.2	1.0	0.9	1.3	1.5	2.1	2.4	3.9	2.4	1.9	1.7	1.2	1.4	1.3	1.6	4.7	13.8		
7-Dec	1.3	1.1	Z	1.3	1.4	1.2	1.0	1.1	2.7	1.6	5.1	2.6	M	M	1.7	2.2	1.8	2.5	1.4	1.1	1.3	1.6	1.1	1.7	1.7	5.1	11.1		
8-Dec	2.0	0.9	1.0	Z	1.6	1.6	1.5	1.5	18.7	3.7	2.8	2.6	2.9	2.4	2.0	1.8	2.8	3.1	5.0	12.9	22.4	11.5	2.4	2.2	4.7	22.4	11.1		
9-Dec	2.3	1.9	1.8	1.7	Z	1.7	2.0	3.2	3.3	2.4	2.4	1.9	2.1	1.6	2.5	1.8	2.1	2.2	5.2	5.1	4.6	5.9	5.3	2.9	2.9	5.9	5.9		
10-Dec	9.4	3.1	5.0	4.3	6.1	Z	5.6	4.8	6.5	5.8	4.7	3.2	2.8	2.4	3.4	1.9	1.2	1.0	0.5	0.4	0.5	0.3	0.2	0.3	3.2	9.4	11.1		
11-Dec	Z	0.3	0.3	0.3	0.6	0.6	0.5	1.8	0.6	0.7	0.8	1.4	1.3	0.9	0.9	2.0	2.6	1.2	1.1	4.8	6.9	3.5	2.5	2.3	1.7	6.9	11.1		
12-Dec	5.7	Z	2.3	3.7	3.5	5.4	3.4	3.2	9.1	15.0	7.4	10.0	6.9	3.9	5.8	4.5	2.7	2.5	2.1	1.7	1.4	1.3	1.4	1.3	4.5	15.0	11.1		
13-Dec	1.4	2.1	Z	2.2	1.1	1.1	0.9	1.9	2.0	1.8	2.4	2.3	1.8	1.5	2.9	6.2	2.9	2.1	3.0	2.8	1.6	1.5	1.3	1.2	2.1	6.2	11.1		
14-Dec	1.1	1.0	0.8	Z	0.8	0.7	1.2	1.0	2.6	3.0	2.1	1.7	1.3	1.7	2.2	2.7	6.1	7.5	3.9	13.0	9.4	7.4	4.3	1.1	3.3	13.0	11.1		
15-Dec	1.3	1.2	0.9	1.1	Z	1.0	1.2	1.2	2.0	1.8	1.2	1.8	1.4	1.7	1.9	1.5	1.5	1.6	2.1	2.7	2.6	1.6	1.2	1.6	1.6	2.7	11.1		
16-Dec	1.4	1.3	1.3	1.1	0.7	Z	0.5	0.5	0.5	0.6	1.0	2.4	3.3	6.0	10.6	8.9	12.7	12.5	18.4	15.4	17.7	14.0	4.9	0.7	5.9	18.4	11.1		
17-Dec	Z	1.0	12.4	23.0	18.8	20.8	17.5	3.4	1.5	1.5	1.9	2.8	1.4	1.3	1.9	4.0	2.8	1.8	1.2	1.4	1.0	0.8	0.8	1.9	5.4	23.0	11.1		
18-Dec	1.6	Z	1.3	1.2	1.2	1.3	2.7	1.2	0.9	1.6	1.2	0.8	1.1	1.1	1.3	4.9	0.7	0.5	1.0	0.6	0.6	0.9	1.0	1.1	1.3	4.9	11.1		
19-Dec	1.2	2.0	Z	5.6	6.0	8.3	9.6	11.1	5.8	0.9	1.0	0.7	0.8	0.4	0.3	0.2	0.3	2.5	3.5	0.8	2.6	3.2	8.1	5.5	3.5	11.1	11.1		
20-Dec	2.2	5.5	6.7	Z	1.1	0.9	0.8	0.5	1.1	0.8	0.8	1.7	1.6	1.5	2.0	1.9	1.8	3.0	5.4	3.0	4.6	2.9	2.5	2.2	2.4	6.7	11.1		
21-Dec	1.8	1.4	1.1	0.9	Z	0.9	1.5	4.8	9.4	3.7	2.3	1.4	0.6	0.7	0.8	0.7	0.6	0.7	0.8	1.8	2.2	2.4	2.3	2.4	2.0	9.4	11.1		
22-Dec	2.1	3.8	11.3	9.0	2.5	Z	2.4	2.9	6.0	5.6	3.7	5.5	5.9	10.0	9.2	6.7	4.3	3.8	6.5	13.9	8.6	3.3	1.8	1.5	5.7	13.9	11.1		
23-Dec	Z	1.2	1.0	0.8	0.6	0.3	0.4	0.4	0.4	0.3	0.4	0.3	0.3	0.4	1.0	1.0	0.4	0.5	0.4	0.4	0.6	0.6	1.0	0.7	0.6	1.2	11.1		
24-Dec	0.9	Z	2.3	1.4	1.4	0.9	1.0	1.1	1.0	1.1	1.2	0.8	1.0	1.7	0.7	2.3	6.0	1.4	1.8	0.9	0.6	1.0	0.9	2.7	1.5	6.0	11.1		
25-Dec	3.8	3.6	Z	1.5	1.3	3.0	3.1	5.9	9.7	5.0	2.5	2.1	2.4	2.1	2.3	1.6	2.2	4.8	3.8	4.4	2.1	1.8	1.7	2.6	3.2	9.7	11.1		
26-Dec	8.6	7.2	13.8	Z	6.6	8.8	8.1	7.7	10.2	8.8	6.4	7.1	6.5	8.6	4.5	5.2	4.0	3.7	2.3	1.8	1.4	1.1	1.0	0.8	5.8	13.8	11.1		
27-Dec	0.6	0.7	0.7	0.6	Z	0.8	1.1	1.3	1.5	1.0	1.5	1.2	3.5	6.6	1.7	3.1	3.1	2.2	2.2	5.0	7.3	4.2	2.3	2.7	2.4	7.3	11.1		
28-Dec	3.3	4.9	4.7	2.6	3.7	Z	4.5	8.3	38.8	37.3	34.2	29.8	24.6	20.4	14.9	13.8	8.6	8.3	8.0	11.9	11.4	9.6	9.2	7.1	13.9	38.8	11.1		
29-Dec	Z	7.4	7.4	6.3	5.7	9.7	11.4	6.9	3.8	5.3	4.6	3.8	3.6	2.8	2.9	3.0	3.4	4.1	3.1	3.4	3.0	2.5	32.6	4.9	6.2	32.6	11.1		
30-Dec	11.1	Z	4.4	2.6	2.5	2.7	2.9	2.7	5.0	5.1	4.1	5.5	3.3	4.5	3.9	5.4	3.4	2.7	2.5	2.1	1.2	1.5	1.6	1.6	3.6	11.1	11.1		
31-Dec	1.6	2.3	Z	2.9	2.3	1.9	2.0	2.2	2.3	4.0	5.2	2.9	1.1	1.1	1.1	2.1	1.7	1.2	1.2	1.3	1.2	1.0	1.0	0.7	1.9	5.2	11.1		
																								Diurnal Average					
																								Diurnal Maximum					
																								3.3 3.9 4.5 5.0 3.8 4.4 5.0 4.6 6.5 5.5 5.3 4.6 3.9 3.8 3.7 4.0 3.7 3.8 4.6 5.2 4.8 4.0 3.8 2.6					
																								11.1 15.7 13.8 39.3 18.8 20.8 31.3 17.8 38.8 37.3 34.2 29.8 24.6 20.4 14.9 13.8 12.7 12.5 18.4 20.3 22.4 16.9 32.6 10.0					
Z - zerospan																								C - Calibration		M - Maintenance		PF - Power Failure	





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Anzac - December 2023**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	691	98.15	98.15
21 - 40	13	1.85	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 704

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Anzac - December 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	1	1	1	17	55	112	63	49	65	26	79	153	49	12	7	1	691
21 - 40	0	0	0	1	0	2	1	1	0	1	0	1	2	4	0	0	13
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	1	1	1	18	55	114	64	50	65	27	79	154	51	16	7	1	704

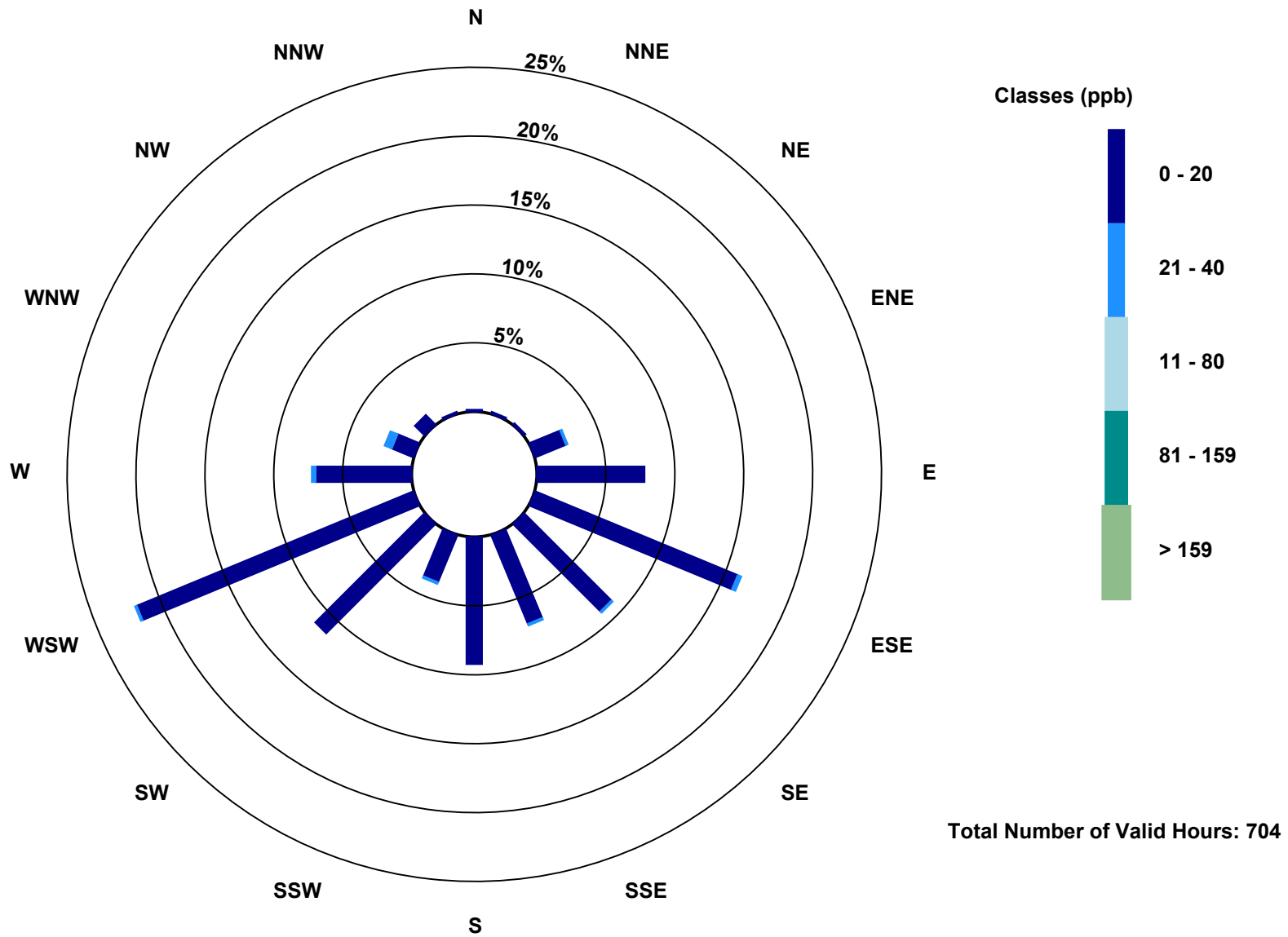
Total Number of Valid Hours: 704

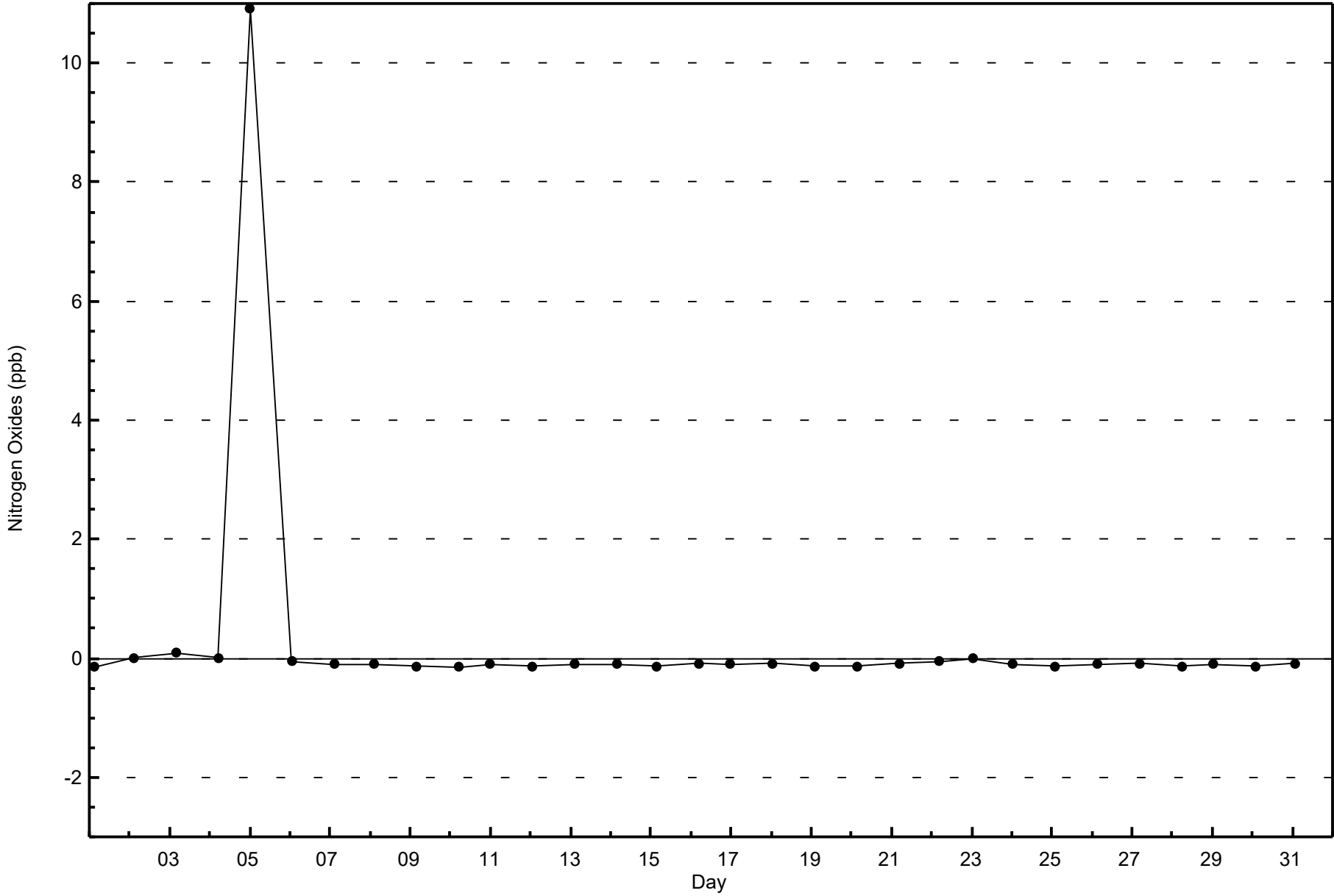
Total Number of Hours: 744

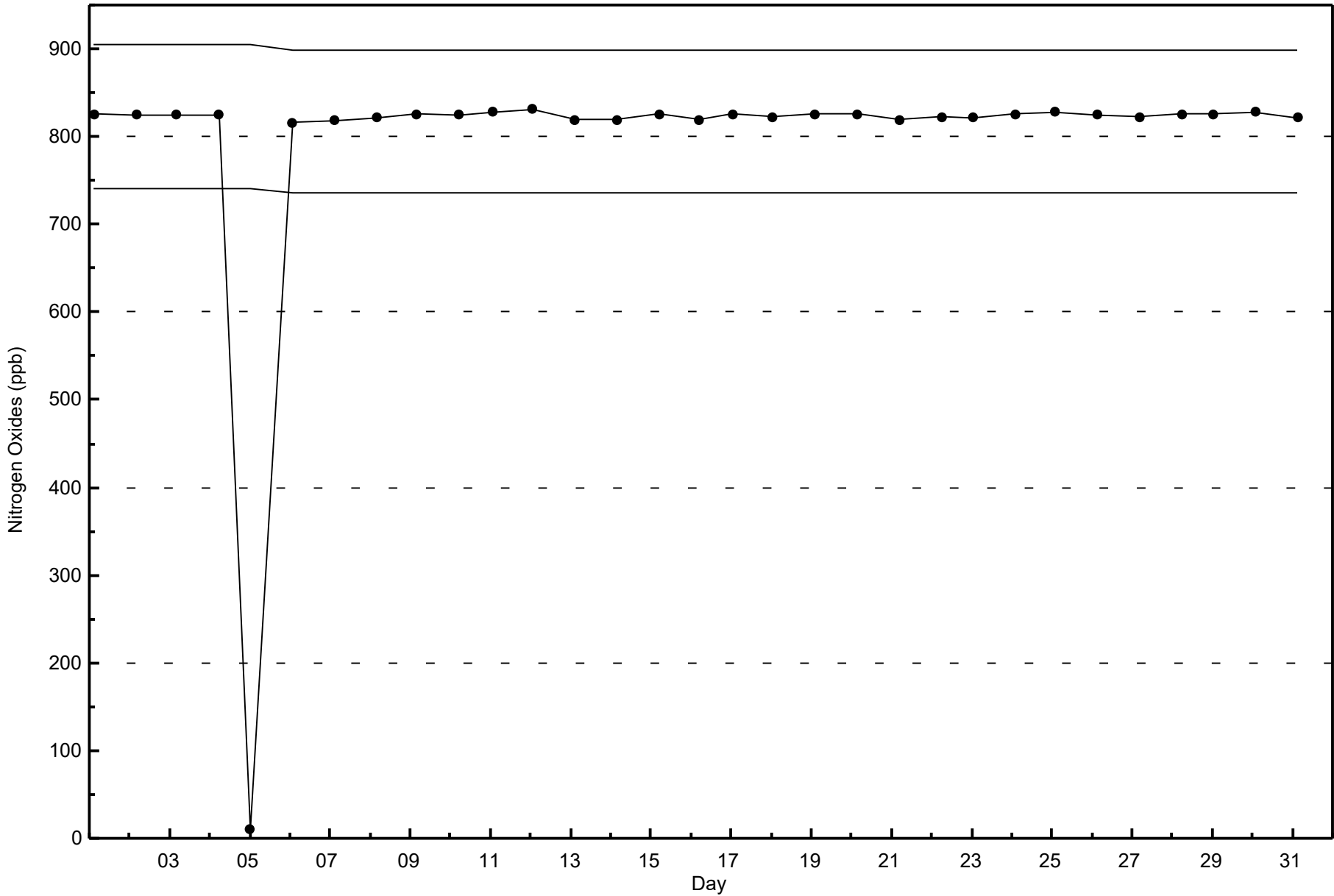


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Nitrogen Oxides (NO_x) - ppb
Anzac









Wood Buffalo Environmental Association

Summary of Hour Averages

Ozone (O₃) - ppb

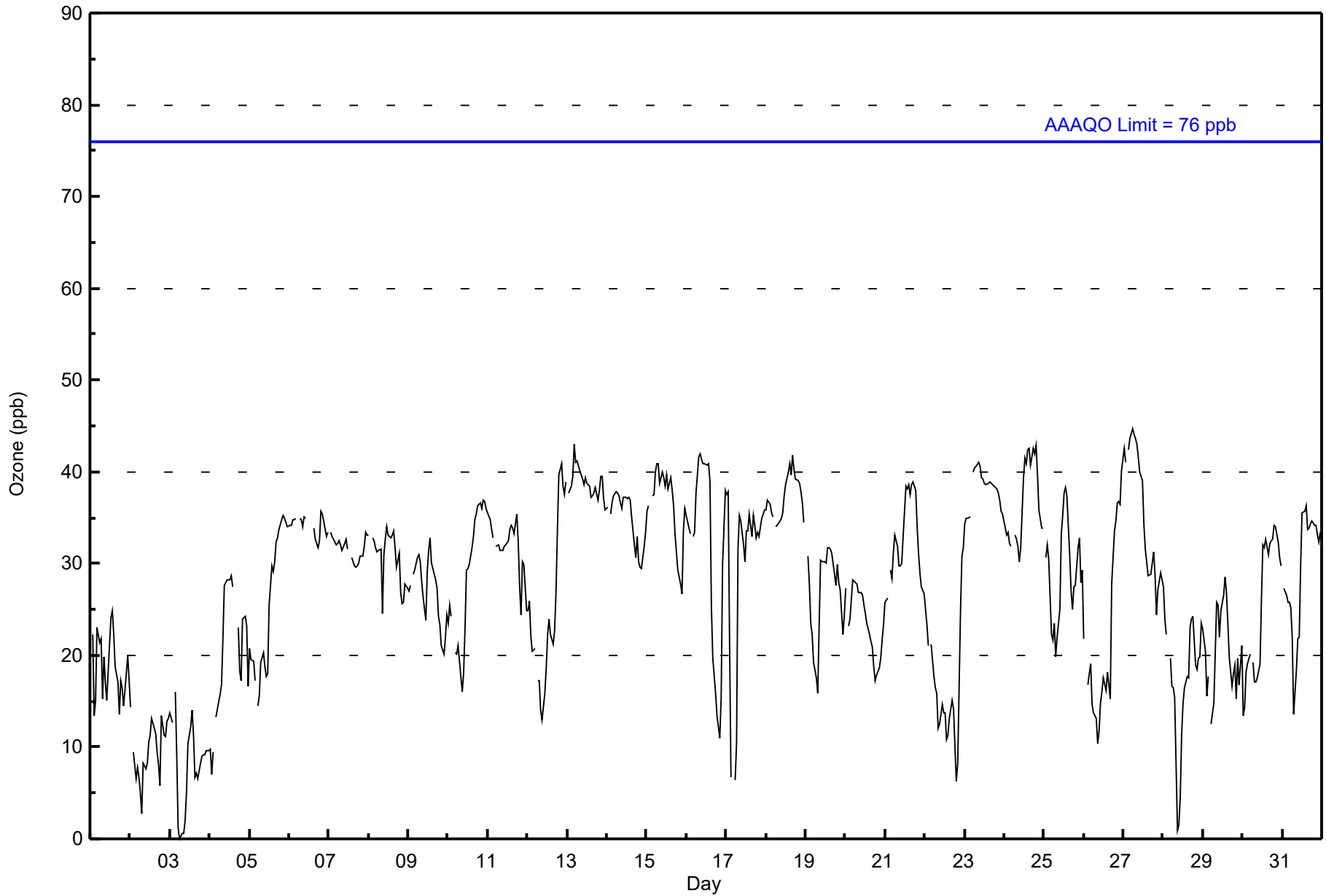
Anzac - December 2023

Number of Exceedences (AAAQO):		1-hr: 0	24-hr: 0	Hours in Service: 744																	Daily Average		Daily Maximum						
Maximum Value: 44.6 ppb on Dec 27 06:00		Maximum Daily Average: 38.8 ppb on Dec 13		Hours of Data: 705																	9.6		14.3						
Minimum Value: 0.0 ppb on Dec 3 07:00		Minimum Daily Average: 8.0 ppb on Dec 3		Hours of Missing Data: 39																	8.0		15.9						
Maximum Diurnal Average: 30.1 ppb at hour 14		Minimum Diurnal Average: 24.4 ppb at hour 6		Hours of Calibration: 35																	20.2		28.6						
Monthly Average: 27.47 ppb		Percentiles: P ₁ = 2.9 P ₁₀ = 13.5 Q ₁ = 20.1 Median = 29.9 Q ₃ = 34.9 P ₉₀ = 38.7 P ₉₉ = 42.6		Percent Operational Time: 99.5																	25.6		35.3						
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-Dec	Z	22.3	13.4	14.9	23.1	21.4	21.9	15.2	19.9	17.1	15.1	21.2	24.2	24.9	22.3	18.7	17.1	13.6	17.3	16.5	14.5	16.1	20.0	17.3	18.6	24.9			
2-Dec	14.3	Z	9.4	6.5	7.7	6.8	5.0	2.8	8.3	7.6	8.2	10.6	11.2	13.1	12.0	11.5	9.5	8.1	5.8	13.4	11.3	11.2	12.8	13.1	9.6	14.3			
3-Dec	13.8	12.6	Z	15.9	9.1	1.2	0.0	0.6	0.6	2.0	5.2	10.4	12.2	14.0	11.3	6.7	7.1	6.5	8.2	9.0	9.2	9.1	9.5	9.6	8.0	15.9			
4-Dec	9.8	7.0	9.5	Z	13.3	14.9	15.7	16.7	21.8	27.6	28.1	28.2	28.3	28.6	27.4	PF	PF	23.0	18.3	17.2	24.0	24.2	23.1	16.6	20.2	28.6			
5-Dec	20.8	19.6	19.4	17.2	Z	14.5	15.6	19.2	20.2	18.7	17.6	18.0	25.5	29.8	29.2	30.2	32.4	32.8	33.7	34.8	35.3	34.9	34.5	34.0	25.6	35.3			
6-Dec	34.2	34.2	34.7	34.7	34.9	Z	34.9	34.7	34.1	35.0	35.0	C	C	C	C	33.9	32.7	31.7	32.5	35.7	35.5	34.6	33.0	33.4	34.2	35.7			
7-Dec	Z	33.4	33.0	32.6	32.1	32.2	32.5	32.1	31.4	32.1	32.6	31.5	M	M	30.6	29.7	29.6	29.7	30.1	30.9	30.8	31.9	33.4	33.2	31.7	33.4			
8-Dec	33.0	Z	32.8	32.4	31.8	31.3	31.5	31.5	24.6	31.0	32.6	33.9	33.2	32.8	33.1	33.5	31.7	29.7	31.1	26.8	25.6	25.8	27.7	27.3	30.6	33.9			
9-Dec	27.1	27.6	Z	28.8	29.3	30.7	31.0	30.1	28.0	26.4	23.8	29.2	31.4	32.7	30.0	29.4	28.2	27.4	24.2	23.3	21.1	20.1	21.9	24.5	27.2	32.7			
10-Dec	23.5	25.4	24.3	Z	20.2	20.2	21.1	19.3	16.1	18.1	23.0	29.3	29.4	29.9	31.8	33.0	34.8	35.3	36.3	36.6	35.9	36.9	36.7	36.0	28.4	36.9			
11-Dec	35.5	34.8	33.7	32.7	Z	31.9	32.1	31.5	31.4	31.4	31.8	32.0	32.6	33.8	34.2	33.9	33.2	35.4	32.3	27.4	24.4	30.3	29.9	24.8	31.8	35.5			
12-Dec	24.8	25.9	22.2	20.5	20.7	Z	17.3	17.3	14.0	12.9	15.9	18.7	22.2	24.0	22.3	21.2	22.7	27.0	33.8	39.7	40.8	38.5	37.5	38.9	25.2	40.8			
13-Dec	Z	37.6	38.4	39.6	43.1	41.0	41.1	40.2	39.7	39.2	38.6	39.3	38.7	38.5	37.2	37.4	37.6	38.3	36.9	38.0	39.6	39.4	37.0	35.9	38.8	43.1			
14-Dec	36.1	Z	35.4	36.6	37.3	37.8	37.6	37.4	36.6	36.0	37.2	37.2	37.1	37.2	36.9	35.1	32.1	30.7	32.9	30.2	29.6	29.5	31.9	33.4	34.9	37.8			
15-Dec	35.7	36.3	Z	37.4	37.5	40.0	40.9	40.8	38.8	40.0	39.3	38.4	39.7	38.1	39.3	38.0	36.4	33.2	31.2	29.2	27.8	26.7	33.5	36.0	36.3	40.9			
16-Dec	35.3	33.9	33.2	Z	33.0	33.4	37.7	41.6	41.9	41.4	40.9	40.8	40.7	41.0	38.9	25.4	19.7	15.9	13.5	12.2	10.9	15.4	29.9	38.0	31.1	41.9			
17-Dec	37.6	37.8	21.3	6.8	Z	6.4	10.6	31.6	35.2	34.7	32.0	30.2	33.6	33.6	35.3	33.0	35.3	34.1	32.8	33.4	33.0	35.0	35.3	35.9	30.2	37.8			
18-Dec	35.9	36.9	36.4	35.5	35.1	Z	33.9	34.2	34.6	34.9	35.5	37.4	38.6	40.0	40.9	39.6	41.8	40.3	39.2	39.1	38.7	37.8	36.7	34.5	37.3	41.8			
19-Dec	Z	30.8	27.8	23.5	22.2	19.1	17.6	15.9	23.4	30.3	30.1	30.2	30.1	31.8	31.8	31.5	31.1	28.8	27.6	30.0	28.0	27.2	22.2	24.5	26.8	31.8			
20-Dec	27.2	Z	23.2	24.0	28.2	28.1	27.9	27.8	26.8	26.8	26.5	25.5	24.6	23.4	22.3	21.5	21.0	18.8	17.3	17.8	18.6	19.7	21.6	23.3	23.6	28.2			
21-Dec	25.7	26.3	Z	29.3	28.4	31.2	33.1	31.9	29.8	29.7	30.0	32.9	38.4	38.2	38.6	37.5	38.6	38.8	38.0	33.9	31.0	29.0	27.5	26.7	32.4	38.8			
22-Dec	25.1	23.4	21.1	Z	21.1	17.8	16.5	15.8	12.0	12.4	14.7	13.7	13.7	10.8	11.3	13.1	15.1	14.2	10.1	6.2	8.3	24.8	30.9	31.7	16.7	31.7			
23-Dec	34.4	35.0	34.9	35.1	Z	39.9	40.4	40.6	41.0	40.6	39.4	39.3	38.7	38.6	38.7	38.9	38.8	38.6	38.4	38.1	37.6	37.0	35.7	35.3	38.0	41.0			
24-Dec	34.7	33.1	33.4	32.1	32.0	Z	33.0	32.7	31.9	30.3	31.8	39.3	41.5	41.0	42.4	42.6	40.7	42.5	41.9	42.9	39.6	35.8	33.9	33.9	36.7	42.9			
25-Dec	Z	30.7	32.0	30.5	22.3	21.7	23.5	19.8	22.0	25.1	33.3	35.2	37.6	38.3	37.4	31.0	27.0	25.0	27.5	27.6	31.8	32.8	28.0	29.3	29.1	38.3			
26-Dec	21.8	Z	16.8	18.1	19.0	14.6	13.7	13.2	10.3	11.8	14.9	16.1	17.6	16.2	18.2	16.8	15.3	27.7	33.6	34.6	36.6	36.8	36.5	40.1	21.7	40.1			
27-Dec	42.6	41.0	Z	42.4	43.6	44.6	44.0	43.6	43.0	41.6	39.9	39.0	34.4	31.5	30.2	28.8	28.8	30.1	31.3	28.7	24.4	27.2	28.9	28.2	35.6	44.6			
28-Dec	27.4	23.9	22.2	Z	19.6	16.7	16.4	15.4	1.0	1.5	4.5	11.5	14.9	16.5	17.7	17.6	23.1	24.0	24.2	18.9	18.5	19.7	19.9	23.5	17.3	27.4			
29-Dec	22.8	20.4	15.6	17.7	Z	12.5	14.7	20.2	25.8	25.5	21.9	24.9	26.5	28.6	26.9	23.4	19.8	16.6	18.0	18.9	15.2	19.7	16.8	21.1	20.6	28.6			
30-Dec	13.4	14.3	18.1	19.0	20.1	Z	19.2	17.2	17.1	17.5	19.1	26.1	32.1	31.7	32.6	31.0	32.1	32.5	32.6	34.2	34.1	32.4	30.7	29.8	25.5	34.2			
31-Dec	Z	27.3	26.5	25.8	25.7	25.1	21.9	13.5	18.4	21.9	22.0	29.8	35.6	35.7	36.3	33.7	33.8	34.3	34.6	34.2	34.2	33.1	32.3	33.4	29.1	36.3			
		27.7	28.1	25.7	26.5	26.6	24.4	25.2	25.3	25.2	25.8	26.5	28.3	29.8	30.1	29.9	28.6	28.2	27.9	27.9	27.7	27.3	28.1	28.7	29.1	Diurnal Average			
		42.6	41.0	38.4	42.4	43.6	44.6	44.0	43.6	43.0	41.6	40.9	40.8	41.5	41.0	42.4	42.6	41.8	42.5	41.9	42.9	40.8	39.4	37.5	40.1	Diurnal Maximum			
Z - zerospan		C - Calibration			M - Maintenance			PF - Power Failure																					
Alberta Ambient Air Quality Objectives (AAAQO):		1-hr		76 ppb																									



Wood Buffalo Environmental Association
Hourly Averages

Ozone (O₃) - ppb
Anzac - December 2023





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Ozone (O₃) - ppb
Anzac - December 2023

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	183	25.96	25.96
21 - 50	522	74.04	100.00
51 - 82	0	0.00	100.00
> 83	0	0.00	100.00

Total Number of Valid Hours: 705

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Ozone (O₃) - ppb
Anzac - December 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	2	1	1	14	30	57	23	11	4	1	1	9	17	9	2	1	183
21 - 50	0	0	0	5	24	53	44	38	61	26	76	148	35	7	5	0	522
51 - 82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 83	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	2	1	1	19	54	110	67	49	65	27	77	157	52	16	7	1	705

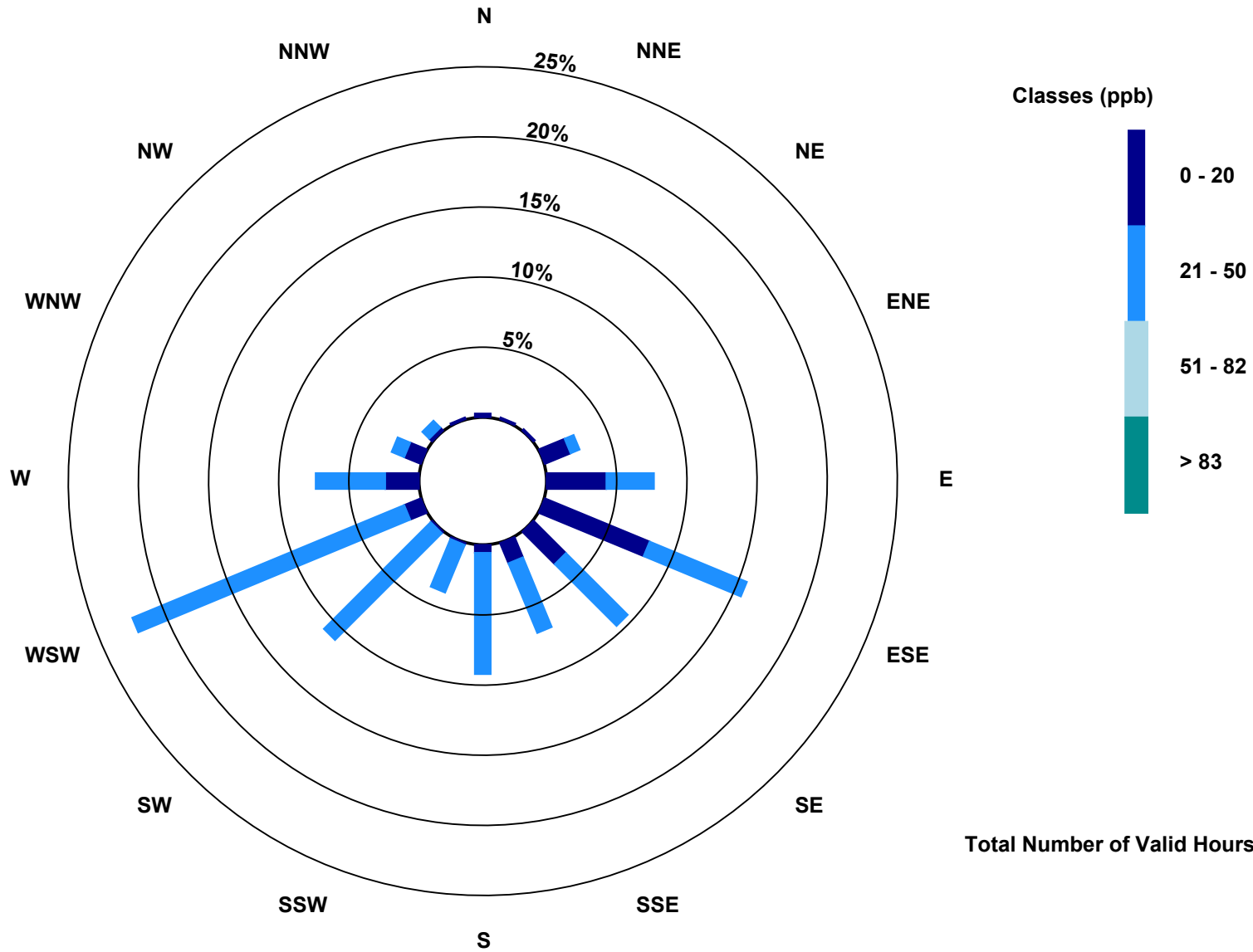
Total Number of Valid Hours: 705

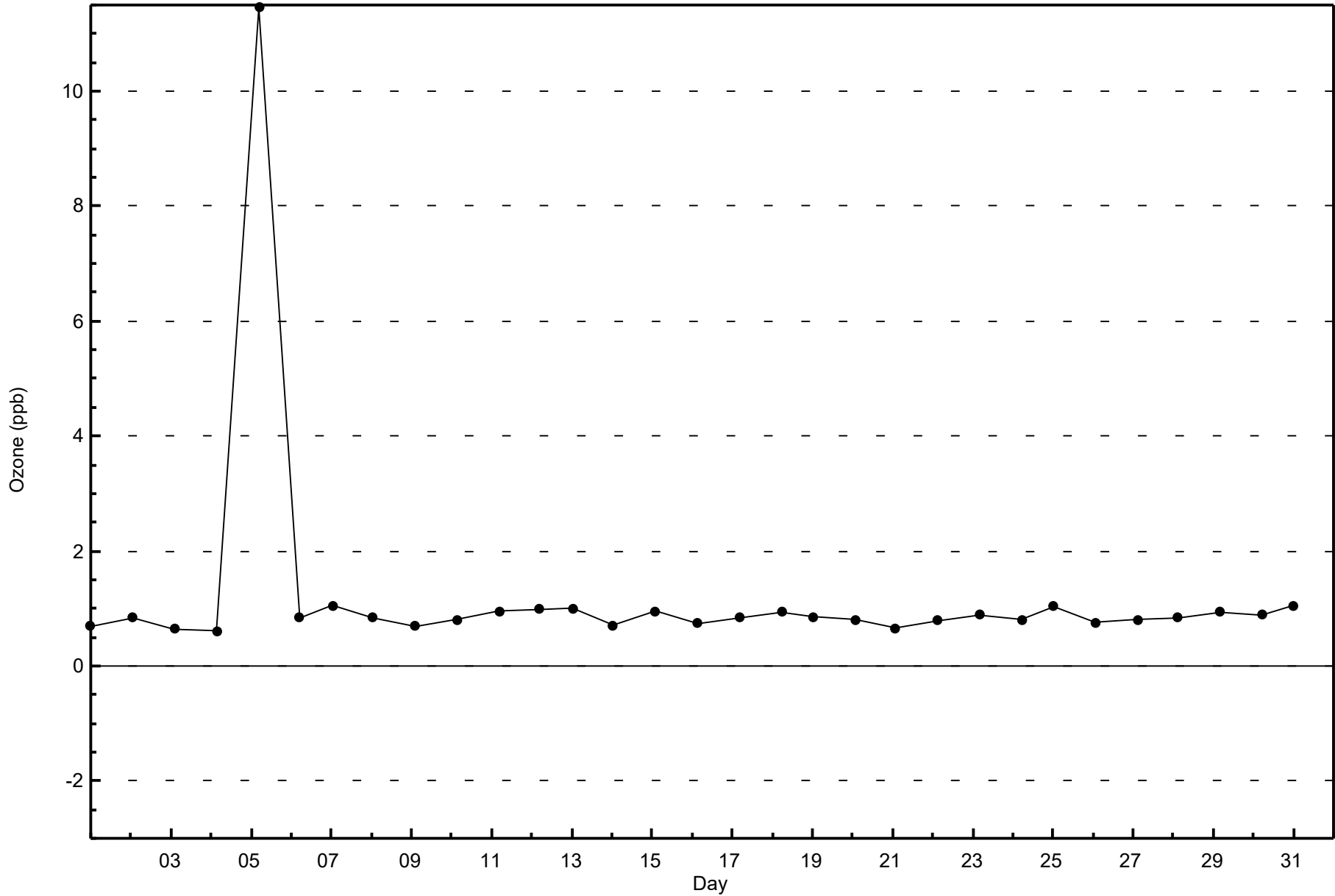
Total Number of Hours: 744

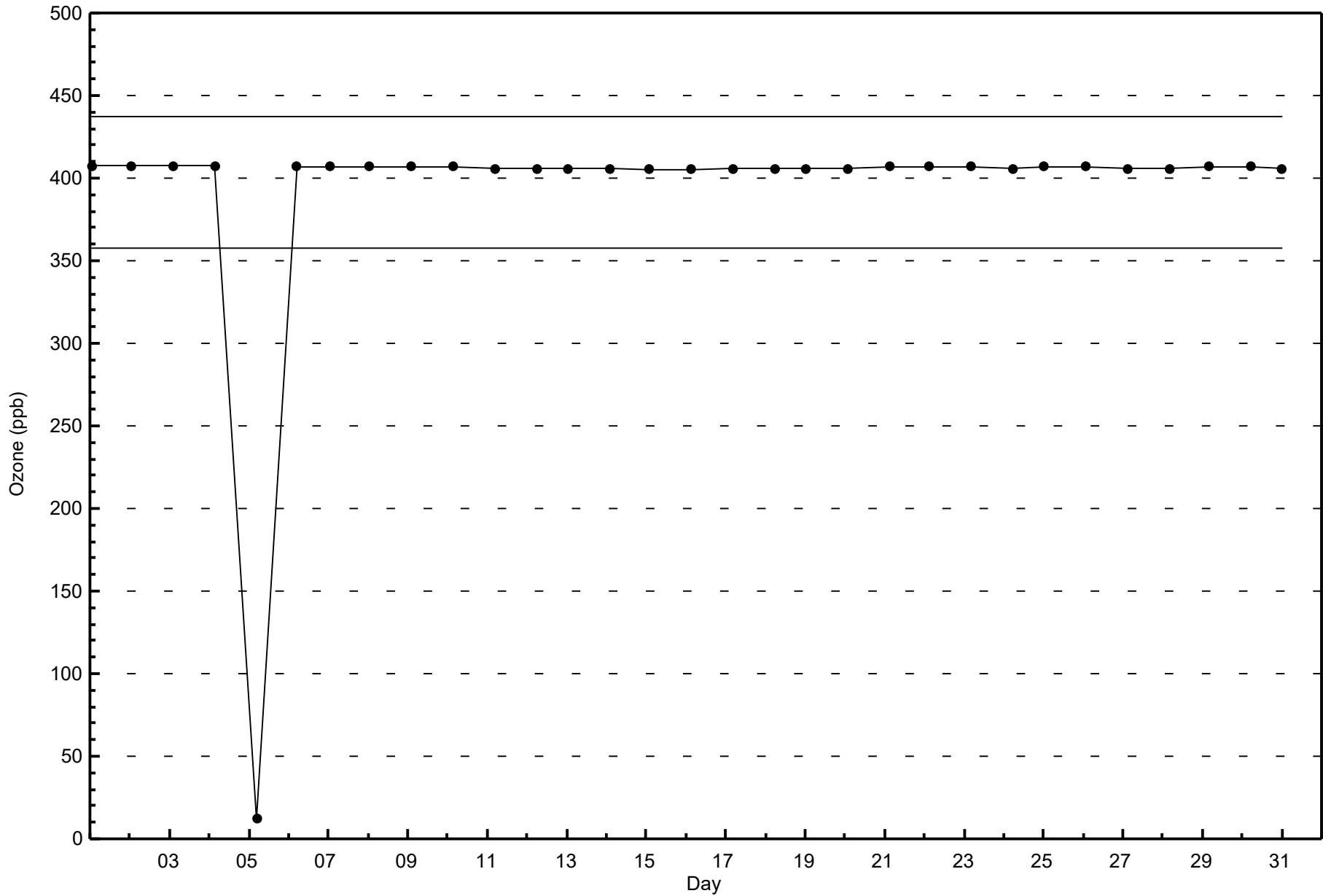


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Ozone (O₃) - ppb
Anzac





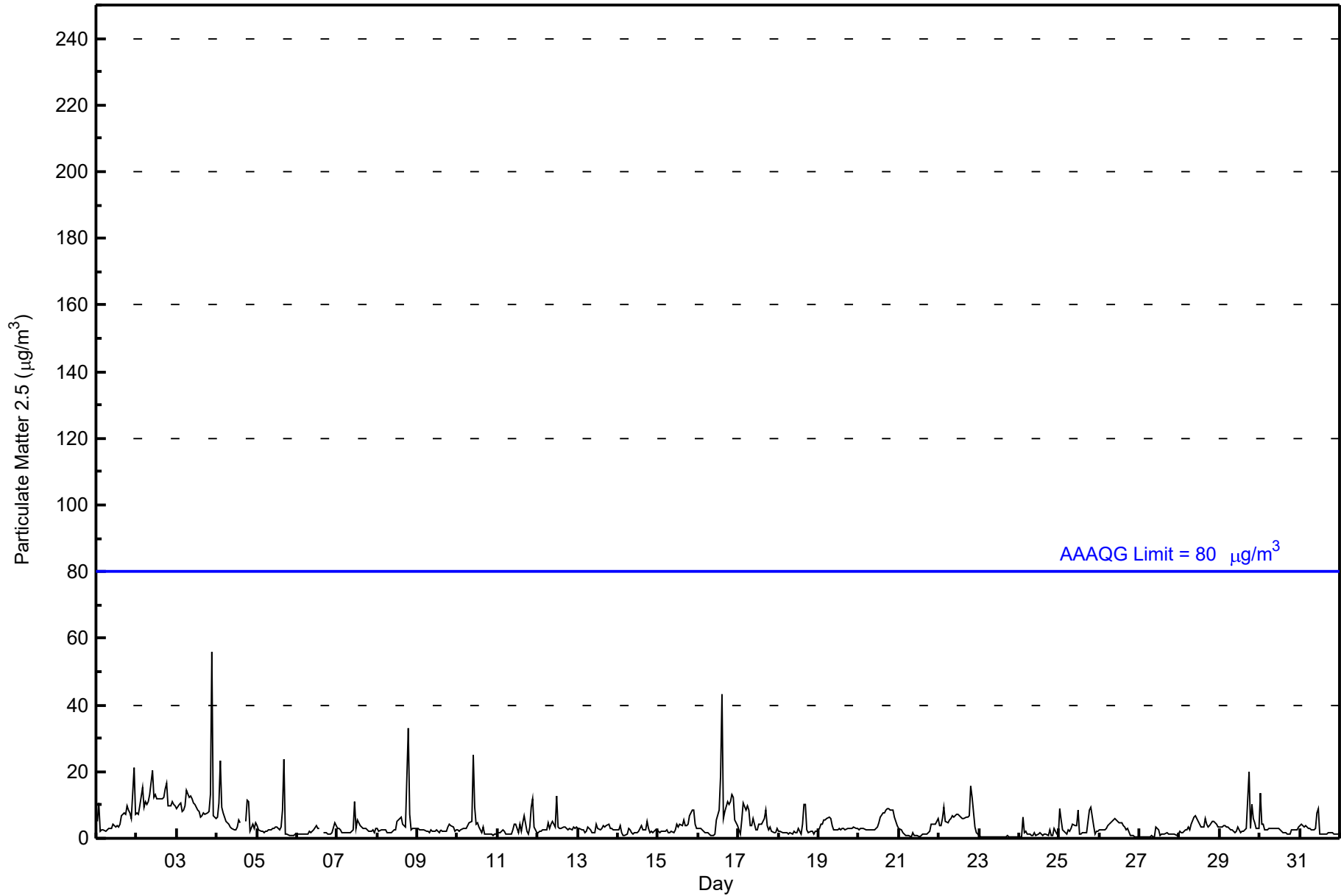




Summary of Hour Averages

Anzac - December 2023

Number of Exceedences (AAAQO):		1-hr: 0	24-hr: 0	Hours in Service: 744																	744																											
Maximum Value: 56.0 µg/m ³ on Dec 3 22:00		Maximum Daily Average: 11.8 µg/m ³ on Dec 2																	Hours of Data: 740																													
Minimum Value: 0.3 µg/m ³ on Dec 23 09:00		Minimum Daily Average: 0.5 µg/m ³ on Dec 23																	Hours of Missing Data: 4																													
Maximum Diurnal Average: 5.5 µg/m ³ at hour 22		Minimum Diurnal Average: 3.0 µg/m ³ at hour 5																	Hours of Calibration: 2																													
Monthly Average: 4.01 µg/m ³		Percentiles: P ₁ = 0.4 P ₁₀ = 1.1 Q ₁ = 1.8 Median = 2.8 Q ₃ = 4.5 P ₉₀ = 8.6 P ₉₉ = 20.1																	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-Dec	4.9	10.5	2.3	2.6	2.4	2.2	2.5	2.8	2.9	2.9	4.4	3.4	3.9	3.2	4.1	6.9	7.6	7.1	9.8	8.6	7.6	6.1	21.3	7.2	5.7	21.3																						
2-Dec	7.7	7.2	9.5	15.2	9.5	11.1	10.4	11.0	13.0	20.2	12.3	13.3	11.7	11.9	11.9	11.9	12.3	14.9	16.7	9.6	9.8	10.9	10.2	9.8	11.8	20.2																						
3-Dec	9.0	10.0	10.5	8.0	8.6	9.9	14.4	12.3	12.8	12.0	10.5	10.0	8.5	8.0	6.4	6.6	7.8	7.3	7.5	8.0	13.0	56.0	6.9	5.8	11.2	56.0																						
4-Dec	6.2	10.6	23.2	9.3	7.8	4.9	4.6	4.3	3.5	3.0	2.6	2.7	3.5	5.3	4.6	PF	PF	4.9	11.5	11.2	2.0	4.2	2.8	4.8	6.3	23.2																						
5-Dec	3.8	2.5	2.0	2.3	1.8	2.0	2.1	2.5	2.7	2.8	2.9	3.6	3.2	2.4	3.6	8.4	23.8	1.4	1.2	0.9	1.0	1.0	1.0	1.2	3.3	23.8																						
6-Dec	1.2	1.2	1.1	1.2	1.1	1.2	1.5	1.9	1.8	2.0	2.6	3.7	3.0	3.1	C	C	1.8	1.5	1.3	1.3	1.4	1.9	4.6	3.9	2.0	4.6																						
7-Dec	2.9	2.9	2.6	1.7	1.5	1.5	1.6	1.7	1.8	2.4	10.9	3.1	5.5	4.8	3.7	2.8	3.1	2.8	2.6	2.0	2.0	2.3	1.7	2.9	2.9	10.9																						
8-Dec	2.8	2.0	2.6	2.4	2.6	2.4	1.8	1.7	1.9	2.1	2.3	2.6	4.9	5.9	6.4	4.3	3.8	3.4	33.2	7.2	2.5	3.0	2.9	2.8	4.5	33.2																						
9-Dec	2.8	2.7	2.6	2.5	2.4	2.3	2.0	1.7	2.5	2.2	2.2	2.4	2.1	1.9	2.5	2.1	2.2	2.3	3.5	4.2	3.9	3.2	2.3	2.4	2.5	4.2																						
10-Dec	2.3	2.2	2.7	3.0	3.0	3.1	3.7	4.6	5.1	25.1	9.4	4.3	4.8	3.4	1.6	3.3	1.2	1.1	1.1	1.4	1.2	1.0	1.4	1.4	3.8	25.1																						
11-Dec	1.6	1.8	2.0	2.4	1.9	1.4	1.3	1.5	1.2	2.4	4.2	4.1	1.6	4.3	2.0	4.7	6.9	2.2	1.1	3.6	9.3	12.0	3.3	1.7	3.3	12.0																						
12-Dec	1.7	2.1	2.1	2.6	2.6	2.6	4.8	3.0	4.0	5.0	3.4	12.8	3.4	2.8	2.8	3.2	3.3	2.9	2.7	2.8	2.4	3.4	3.0	3.3	3.5	12.8																						
13-Dec	3.1	3.0	2.6	2.5	1.6	2.2	3.2	2.7	1.8	1.9	1.7	4.3	2.9	2.4	2.9	3.6	3.4	3.9	4.2	2.8	2.9	2.4	2.7	2.4	2.8	4.3																						
14-Dec	2.6	3.7	1.5	1.0	1.0	1.1	3.0	2.6	1.6	1.4	1.7	1.5	2.1	3.1	3.7	2.5	2.4	5.0	2.8	1.8	2.0	1.8	2.4	2.5	2.3	5.0																						
15-Dec	2.1	1.9	2.0	2.3	2.0	2.3	1.9	1.7	2.0	1.8	2.3	4.1	3.6	4.1	3.8	5.6	4.0	3.7	4.2	6.8	8.5	8.6	4.4	2.8	3.6	8.6																						
16-Dec	2.9	2.8	2.4	2.0	1.7	1.8	1.8	1.0	0.7	0.9	1.4	5.5	8.3	18.7	43.0	5.9	8.1	11.0	10.3	11.2	13.3	12.3	5.6	3.6	7.3	43.0																						
17-Dec	2.3	1.4	5.4	10.5	8.5	9.8	8.5	4.0	3.6	6.0	2.6	2.5	4.1	4.0	4.4	6.1	8.4	3.7	2.4	3.3	2.1	1.9	1.7	2.9	4.6	10.5																						
18-Dec	2.0	2.3	1.7	1.6	1.6	1.5	1.5	1.7	1.5	1.9	1.5	1.6	3.0	1.3	4.3	10.2	10.3	2.5	1.6	2.2	2.0	1.3	2.0	2.3	2.6	10.3																						
19-Dec	3.1	4.3	4.1	5.5	5.3	6.1	6.4	6.0	3.9	2.4	2.5	2.7	2.8	2.7	2.8	2.9	2.8	3.0	2.8	2.9	3.1	3.2	3.1	2.9	3.6	6.4																						
20-Dec	2.7	2.8	2.9	2.9	2.7	2.6	2.6	2.6	2.6	2.6	2.9	3.4	4.6	6.5	7.5	7.7	8.3	8.8	8.9	8.7	8.6	6.6	5.0	3.7	4.9	8.9																						
21-Dec	2.8	2.5	1.5	1.1	1.0	0.9	0.7	0.6	1.9	1.0	1.0	0.9	0.6	0.7	1.4	1.4	1.5	1.2	2.2	4.1	4.1	4.2	4.1	6.0	2.0	6.0																						
22-Dec	3.9	3.9	6.1	9.4	4.9	4.6	5.4	5.9	6.9	6.3	7.0	7.4	6.7	6.3	5.9	5.7	6.2	6.3	6.8	15.9	12.4	3.3	1.8	1.4	6.3	15.9																						
23-Dec	1.0	0.6	0.4	0.4	0.5	0.4	0.4	0.3	0.3	0.3	0.6	0.3	0.4	0.5	0.4	0.4	1.0	0.6	0.4	0.4	0.5	0.5	0.5	0.5	0.5	1.0																						
24-Dec	0.5	0.6	6.3	1.7	2.0	1.3	1.3	1.0	0.7	1.6	0.9	1.1	1.7	1.2	0.9	1.2	1.2	1.0	2.5	0.8	0.9	2.8	1.2	1.0	1.5	6.3																						
25-Dec	9.1	5.7	2.4	2.0	1.3	2.7	2.1	2.8	4.3	4.0	3.6	8.4	1.3	1.2	1.8	1.7	1.9	4.9	8.5	9.3	3.8	1.5	2.2	2.3	3.7	9.3																						
26-Dec	2.6	2.5	2.6	2.6	2.8	3.9	4.2	5.0	5.6	5.8	5.5	5.0	4.6	4.5	3.7	3.5	2.7	3.0	1.0	1.0	0.7	0.6	0.6	0.5	3.1	5.8																						
27-Dec	0.6	0.5	0.4	0.3	0.4	0.3	0.3	1.0	0.4	0.5	3.6	2.6	1.0	1.1	1.3	1.4	1.7	1.3	1.3	1.3	1.3	1.2	1.0	1.3	1.1	3.6																						
28-Dec	2.0	1.8	1.8	2.4	2.5	3.5	2.6	4.2	6.2	6.6	5.8	5.0	4.1	3.5	3.3	6.1	4.2	3.3	4.0	5.0	5.1	4.5	4.4	3.6	4.0	6.6																						
29-Dec	3.3	3.4	3.8	3.6	3.2	3.2	2.5	2.6	2.0	1.6	2.1	3.2	1.8	2.2	2.1	2.7	2.8	19.7	3.0	10.3	6.1	4.7	3.0	3.0	4.0	19.7																						
30-Dec	13.4	4.2	4.3	2.7	2.6	2.8	3.1	3.1	2.9	3.0	2.9	2.8	2.5	2.1	1.8	1.6	1.4	1.2	1.2	2.5	2.7	2.8	2.5	3.3	3.1	13.4																						
31-Dec	4.0	4.4	3.2	3.6	3.4	3.1	2.8	2.4	2.6	3.2	7.6	8.9	1.1	1.2	1.3	1.4	1.3	1.5	1.5	1.6	1.2	1.4	1.3	1.2	2.7	8.9																						
																								3.6	3.5	3.8	3.6	3.0	3.2	3.4	3.2	3.4	4.4	4.0	4.4	3.7	4.0	4.9	4.3	4.9	4.4	5.2	4.9	4.4	5.5	3.6	3.1	Diurnal Average
																								13.4	10.6	23.2	15.2	9.5	11.1	14.4	12.3	13.0	25.1	12.3	13.3	11.7	18.7	43.0	11.9	23.8	19.7	33.2	15.9	13.3	56.0	21.3	9.8	Diurnal Maximum
C - Calibration PF - Power Failure																																																
Alberta Ambient Air Quality Guideline/Objectives: 1-hr 80 µg/m ³ 24-hr 29 µg/m ³																																																





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Anzac - December 2023

Concentration Ranges ($\mu\text{g}/\text{m}^3$)	Number of Hours	%	Cumulative %
0 - 5	591	79.86	79.86
6 - 15	137	18.51	98.38
16 - 25	9	1.22	99.59
26 - 80	3	0.41	100.00
> 81.0	0	0.00	100.00

Total Number of Valid Hours: 740

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - μg/m³
Anzac - December 2023

Concentration Ranges (μg/m ³)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	0	0	0	13	41	79	51	40	58	23	78	157	39	8	4	0	591
6 - 15	2	1	1	6	15	36	15	8	11	3	3	9	14	9	3	1	137
16 - 25	0	0	0	0	0	1	2	3	0	0	0	2	1	0	0	0	9
26 - 80	0	0	0	0	0	1	0	0	0	1	0	0	1	0	0	0	3
> 81.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	2	1	1	19	56	117	68	51	69	27	81	168	55	17	7	1	740

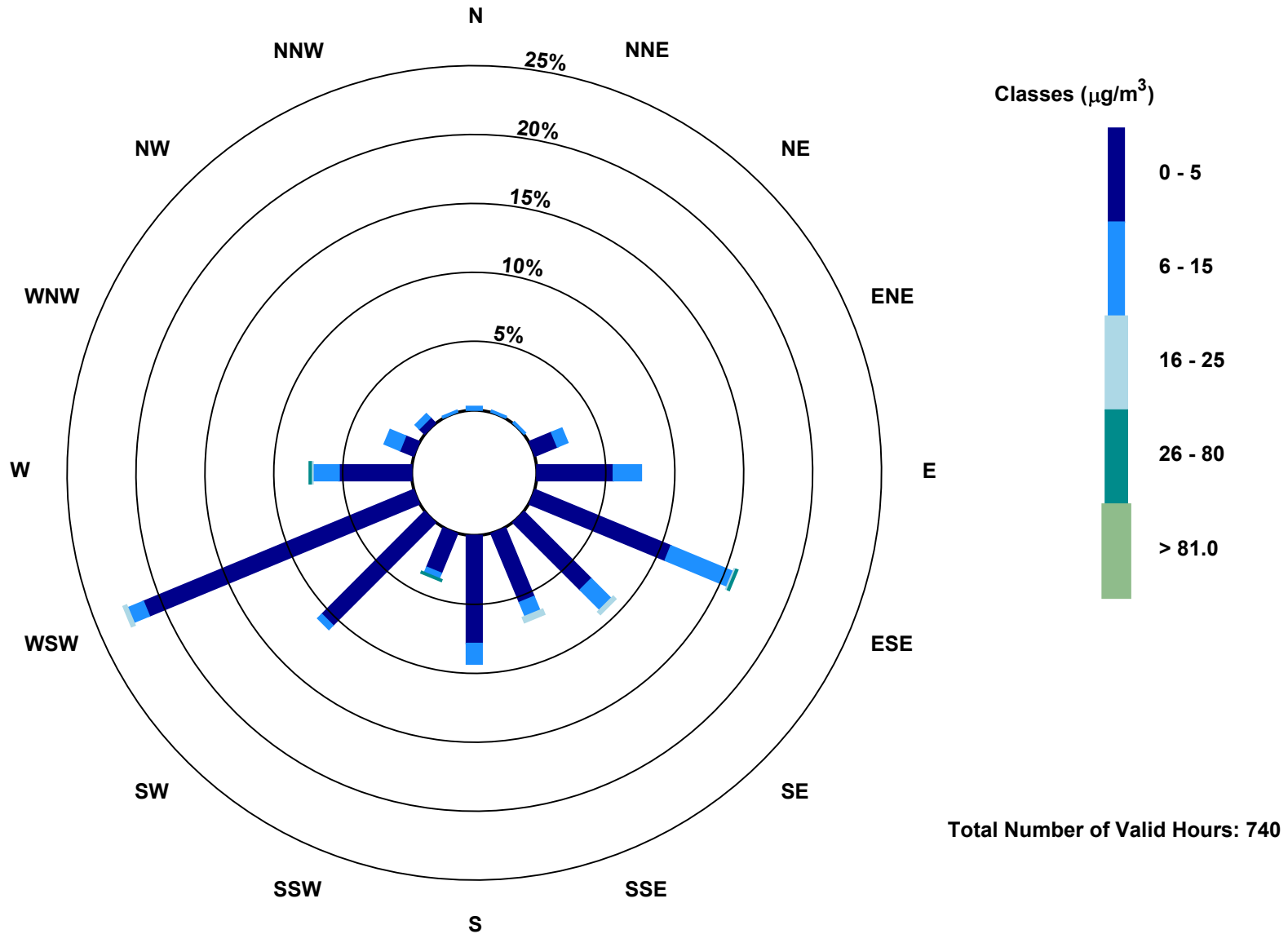
Total Number of Valid Hours: 740

Total Number of Hours: 744



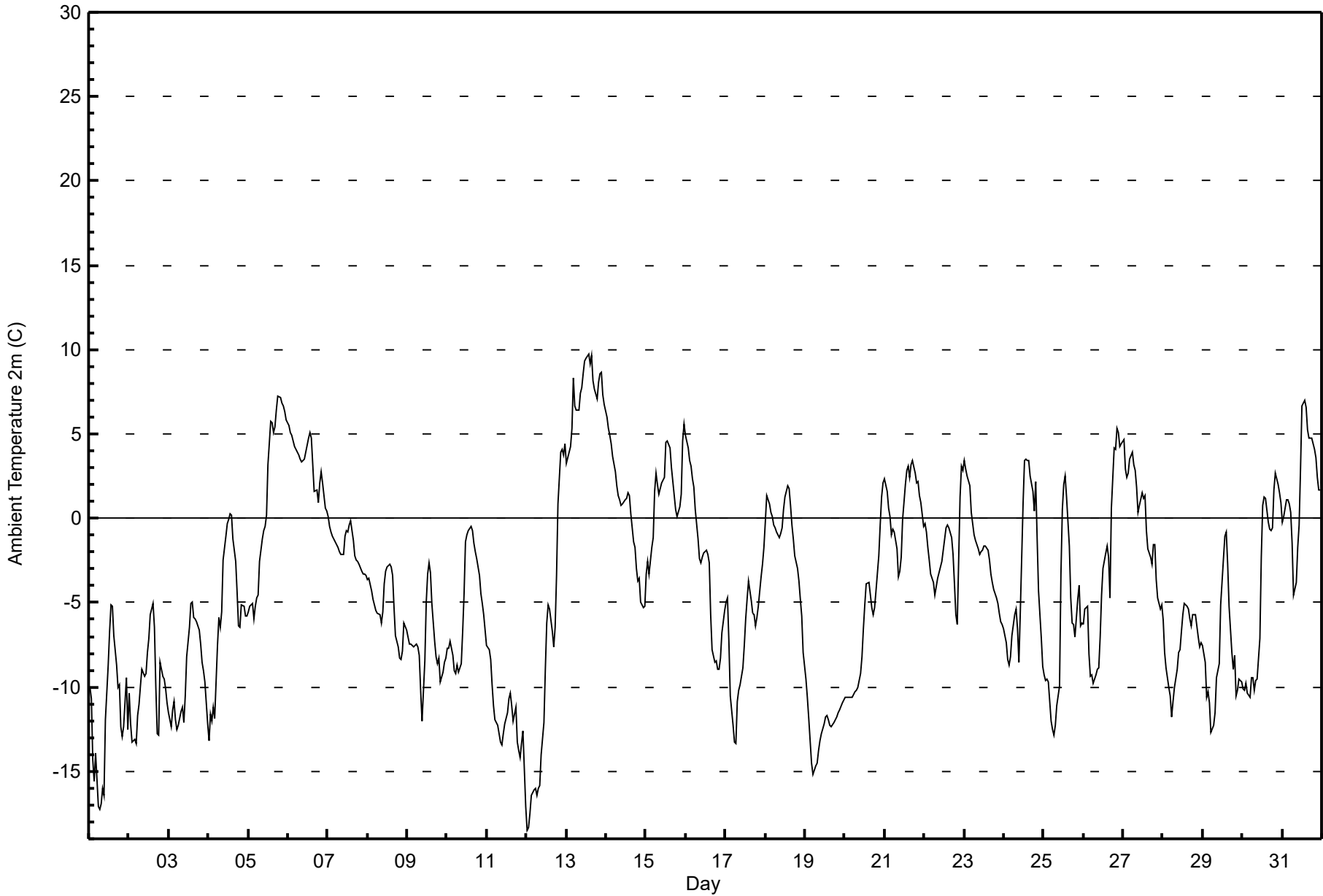
Wood Buffalo Environmental Association
Wind Rose Dec 2023

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Anzac





Maximum Value: 9.7 C on Dec 13 14:00																				Maximum Daily Average: 7.4 C on Dec 13					Hours in Service:	744
Minimum Value: -18.5 C on Dec 12 01:00																				Minimum Daily Average: -12.4 C on Dec 19					Hours of Data:	744
Maximum Diurnal Average: -0.8 C at hour 14																				Minimum Diurnal Average: -6.2 C at hour 8					Hours of Missing Data:	0
Monthly Average: -4.06 C																				Percentiles: P ₁ = -16.4 P ₁₀ = -11.9 Q ₁ = -8.7 Median = -4.5 Q ₃ = 0.5 P ₉₀ = 3.7 P ₉₉ = 8.5					Hours of Calibration:	0
																									Percent Operational Time:	100.0
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Dec	-10.0	-10.7	-14.4	-15.6	-14.0	-17.1	-17.3	-16.9	-16.0	-16.4	-12.0	-8.7	-6.7	-5.1	-5.2	-7.0	-8.7	-10.0	-9.9	-12.4	-12.9	-12.4	-9.4	-12.5	-11.7	-5.1
2-Dec	-10.4	-12.2	-13.3	-13.1	-13.3	-11.7	-11.1	-9.9	-8.9	-9.3	-9.2	-7.9	-7.1	-5.7	-5.0	-6.5	-10.1	-12.8	-12.9	-8.6	-9.4	-9.6	-10.1	-11.0	-10.0	-5.0
3-Dec	-11.6	-12.4	-11.3	-10.8	-11.9	-12.5	-12.3	-11.5	-11.2	-12.1	-10.5	-8.2	-6.4	-5.1	-4.9	-5.9	-6.0	-6.2	-6.7	-7.4	-8.6	-9.0	-9.7	-12.2	-9.3	-4.9
4-Dec	-13.2	-11.6	-12.0	-11.2	-11.8	-7.5	-5.9	-6.4	-5.6	-2.5	-1.1	-0.3	0.0	0.3	0.2	-1.2	-2.5	-4.4	-6.3	-6.4	-5.1	-5.2	-5.8	-5.8	-5.5	0.3
5-Dec	-5.6	-5.2	-5.1	-5.9	-5.2	-4.7	-4.5	-2.5	-1.2	-0.7	-0.5	0.2	3.2	5.7	5.7	5.1	5.4	6.4	7.2	7.2	6.8	6.7	6.3	5.8	1.3	7.2
6-Dec	5.5	5.1	4.9	4.6	4.2	4.1	3.8	3.5	3.4	3.4	3.5	4.3	4.8	5.1	4.8	3.2	1.6	1.7	0.9	2.1	2.8	2.1	0.6	0.5	3.3	5.5
7-Dec	0.1	-0.4	-0.8	-1.1	-1.4	-1.5	-1.8	-2.0	-2.2	-2.1	-1.1	-0.8	-0.8	-0.4	-0.2	-1.3	-2.2	-2.5	-2.6	-2.8	-3.1	-3.3	-3.3	-3.4	-1.7	0.1
8-Dec	-3.6	-3.6	-4.3	-4.8	-5.1	-5.4	-5.6	-5.7	-6.2	-5.5	-3.9	-3.1	-2.9	-2.7	-2.8	-3.4	-5.3	-7.0	-7.6	-8.3	-8.4	-7.9	-6.2	-6.6	-5.3	-2.7
9-Dec	-7.1	-7.5	-7.4	-7.6	-7.6	-7.5	-7.6	-8.2	-10.2	-12.0	-8.5	-5.0	-3.3	-2.6	-3.2	-5.0	-7.3	-8.2	-8.6	-8.3	-9.7	-9.1	-8.5	-8.3	-7.4	-2.6
10-Dec	-7.7	-7.7	-7.3	-8.1	-9.0	-9.2	-8.7	-9.1	-8.6	-6.7	-4.4	-1.4	-1.0	-0.7	-0.4	-0.8	-1.5	-1.9	-2.4	-3.4	-4.5	-5.1	-5.7	-6.6	-5.1	-0.4
11-Dec	-7.5	-7.8	-8.4	-9.9	-11.1	-11.9	-12.3	-12.8	-13.3	-13.4	-12.8	-12.2	-11.5	-10.7	-10.3	-11.1	-12.0	-11.2	-13.2	-13.7	-14.1	-13.3	-12.6	-17.1	-11.9	-7.5
12-Dec	-18.5	-18.3	-17.5	-16.4	-16.1	-16.0	-16.4	-16.0	-15.9	-14.1	-12.1	-8.9	-6.2	-5.2	-5.4	-6.7	-7.6	-6.5	-3.4	0.8	3.9	4.1	3.8	4.4	-8.8	4.4
13-Dec	3.3	3.6	4.2	5.3	8.3	6.6	6.4	6.4	7.4	7.7	8.6	9.3	9.5	9.7	9.1	9.7	8.2	7.7	7.1	8.1	8.6	8.6	7.3	6.7	7.4	9.7
14-Dec	6.0	5.3	4.9	4.5	3.7	2.8	1.9	1.3	1.1	0.8	0.8	1.1	1.2	1.5	1.4	0.2	-1.4	-1.7	-3.0	-3.7	-3.5	-5.0	-5.3	-5.2	0.4	6.0
15-Dec	-3.3	-2.6	-3.3	-1.7	-1.2	1.6	2.6	2.0	1.4	2.1	2.2	2.4	4.5	4.6	4.1	3.0	2.1	1.3	0.5	0.1	0.7	1.5	4.6	5.6	1.5	5.6
16-Dec	4.9	4.2	3.4	3.1	2.3	1.8	0.5	-1.2	-2.4	-2.7	-2.3	-2.1	-1.9	-2.1	-2.6	-5.7	-7.8	-8.5	-8.4	-9.0	-9.0	-8.3	-6.8	-5.4	-2.7	4.9
17-Dec	-5.0	-4.7	-7.3	-10.5	-12.2	-13.2	-13.4	-10.9	-10.2	-9.9	-8.9	-7.5	-6.0	-4.8	-3.7	-4.9	-5.6	-5.7	-6.4	-5.9	-5.2	-3.4	-2.7	-1.7	-7.1	-1.7
18-Dec	-0.3	1.4	0.8	0.4	0.1	-0.4	-0.6	-0.8	-1.1	-0.9	-0.6	0.5	1.3	1.9	1.8	0.8	-0.4	-1.2	-2.2	-3.0	-3.8	-4.8	-5.8	-8.0	-1.0	1.9
19-Dec	-9.6	-10.6	-11.9	-13.2	-14.5	-15.1	-14.7	-14.5	-13.8	-13.2	-12.8	-12.2	-11.8	-11.7	-11.9	-12.3	-12.3	-12.1	-12.0	-11.8	-11.5	-11.3	-11.0	-10.8	-12.4	-9.6
20-Dec	-10.7	-10.6	-10.6	-10.6	-10.6	-10.5	-10.3	-10.2	-10.0	-9.2	-8.2	-6.6	-5.1	-3.9	-3.8	-4.6	-5.3	-5.7	-5.3	-4.3	-2.2	-0.4	1.3	2.1	-6.5	2.1
21-Dec	2.4	1.6	0.6	0.1	-0.9	-0.7	-0.8	-1.8	-3.5	-3.1	-2.3	-0.1	2.0	2.8	3.1	2.5	3.1	3.4	2.7	2.1	2.2	1.4	0.9	-0.4	0.7	3.4
22-Dec	-0.3	-0.9	-1.8	-2.4	-3.3	-3.8	-4.6	-4.1	-3.6	-3.2	-2.5	-1.9	-1.2	-0.6	-0.4	-0.6	-1.1	-2.1	-3.9	-5.7	-6.3	1.3	3.1	2.9	-2.0	3.1
23-Dec	3.4	2.9	2.5	2.0	0.4	-0.3	-1.0	-1.3	-1.8	-2.1	-2.0	-1.9	-1.7	-1.6	-1.9	-2.5	-3.3	-3.8	-4.2	-4.7	-5.1	-5.7	-6.1	-6.3	-1.9	3.4
24-Dec	-6.5	-7.4	-8.4	-8.7	-8.2	-7.0	-5.7	-5.4	-6.5	-8.5	-5.6	1.0	3.4	3.5	3.5	3.4	2.5	1.6	0.4	2.2	-1.1	-4.3	-7.1	-8.8	-3.2	3.5
25-Dec	-9.3	-9.7	-9.5	-9.7	-12.0	-12.5	-12.8	-12.3	-11.1	-10.0	-3.3	0.5	2.0	2.5	1.2	-1.6	-4.7	-6.2	-6.3	-7.0	-4.8	-4.0	-6.3	-6.2	-6.4	2.5
26-Dec	-6.3	-5.4	-5.2	-8.0	-9.3	-9.3	-9.8	-9.3	-9.0	-8.9	-7.1	-4.5	-3.0	-2.0	-1.6	-2.3	-4.7	0.6	4.2	4.1	5.4	5.0	4.3	4.4	-3.2	5.4
27-Dec	4.7	3.0	2.5	2.7	3.5	3.9	3.2	2.8	1.8	0.4	0.7	1.5	1.1	1.4	-0.7	-1.8	-2.3	-2.7	-1.6	-1.5	-3.6	-4.7	-5.4	-5.2	0.2	4.7
28-Dec	-6.0	-7.9	-8.9	-10.0	-10.5	-11.8	-10.9	-10.0	-8.9	-8.0	-7.8	-6.7	-5.7	-5.1	-5.2	-5.4	-5.9	-6.4	-5.7	-5.7	-6.4	-7.0	-7.6	-7.3	-7.5	-5.1
29-Dec	-7.5	-8.5	-10.6	-10.3	-11.0	-12.7	-12.2	-11.5	-9.5	-9.0	-8.7	-5.1	-2.4	-1.1	-0.8	-2.7	-5.2	-8.0	-8.9	-8.1	-10.5	-10.2	-9.5	-9.7	-8.1	-0.8
30-Dec	-10.1	-10.2	-9.8	-10.3	-10.6	-9.5	-9.4	-10.2	-9.6	-9.5	-7.2	-2.3	0.7	1.2	1.2	-0.2	-0.6	-0.7	-0.5	1.7	2.7	2.0	1.5	1.0	-4.1	2.7
31-Dec	-0.2	0.1	1.1	1.1	0.9	0.4	-1.4	-4.6	-3.8	-1.7	-0.4	2.9	6.6	7.0	6.5	5.2	4.7	4.8	4.7	4.1	3.6	2.4	1.7	1.7	2.0	7.0
																								Diurnal Average		
																								Diurnal Maximum		





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature 2m (AT 2m) - C
Anzac - December 2023**

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	539	72.45	72.45
0 - 10	205	27.55	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

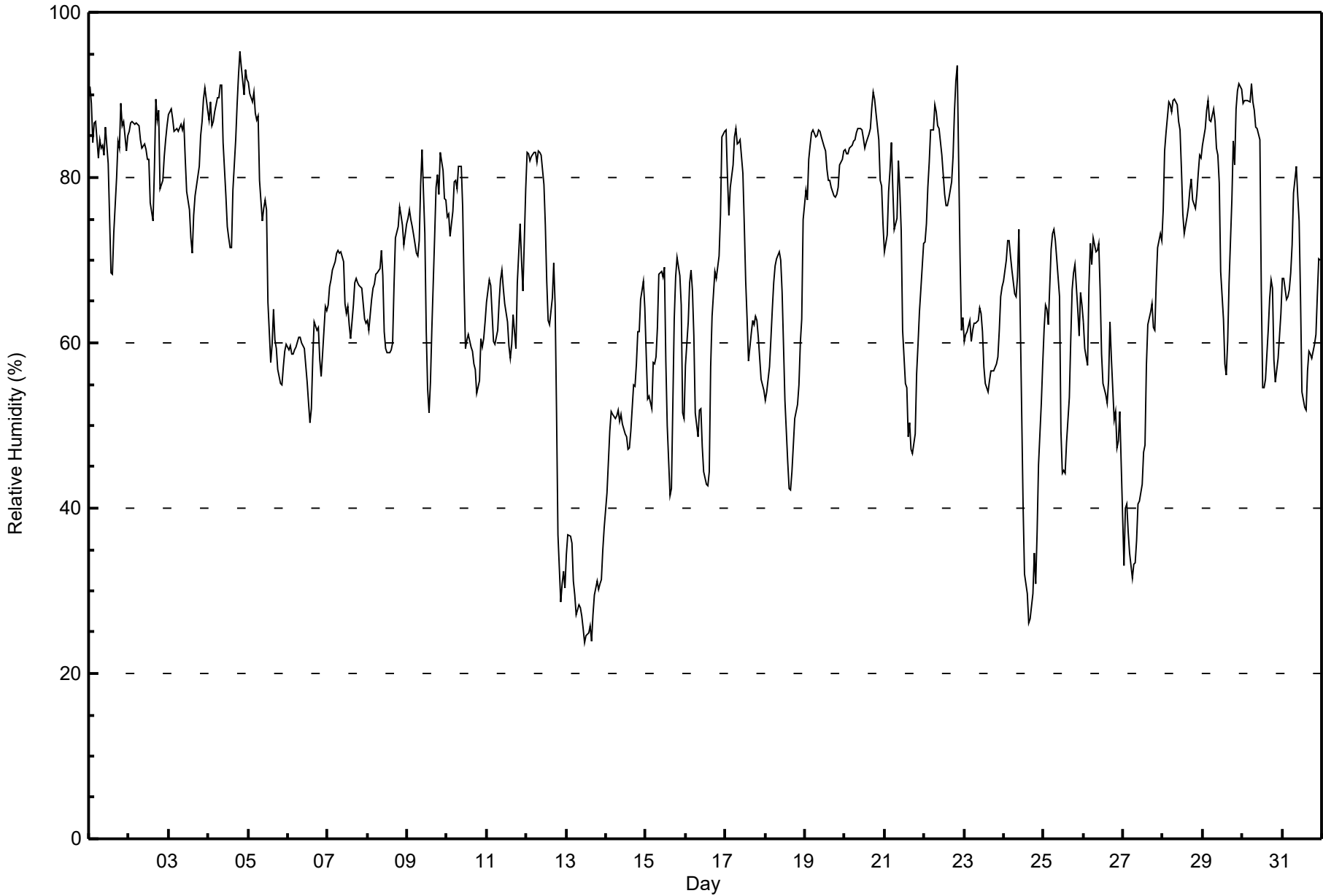
Anzac - December 2023

Maximum Value: 95.3 % on Dec 4 20:00																						Maximum Daily Average: 85.8 % on Dec 4																						Hours in Service: 744			
Minimum Value: 23.7 % on Dec 13 12:00																						Minimum Daily Average: 29.8 % on Dec 13																						Hours of Data: 744			
Maximum Diurnal Average: 73.4 % at hour 9																						Minimum Diurnal Average: 57.5 % at hour 15																						Hours of Missing Data: 0			
Monthly Average: 67.66 %																						Percentiles: P ₁ = 26.8 P ₁₀ = 47.5 Q ₁ = 58.6 Median = 67.9 Q ₃ = 81.5 P ₉₀ = 86.6 P ₉₉ = 91.5																						Hours of Calibration: 0			
																																												Percent Operational Time: 100.0			
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																					
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																							
1-Dec	91.0	89.1	84.2	86.6	86.7	82.3	84.5	83.6	83.8	82.7	86.1	81.7	75.0	68.5	68.3	73.4	80.1	84.4	83.6	88.9	86.3	86.7	83.2	85.2	82.7	91.0																					
2-Dec	85.6	86.6	86.8	86.5	86.7	86.4	86.2	84.6	83.5	84.1	83.4	82.2	82.1	77.0	74.7	81.2	89.4	87.0	88.1	78.7	79.7	82.5	84.6	86.2	83.9	89.4																					
3-Dec	87.6	88.3	87.2	85.7	85.8	85.9	85.6	86.4	85.8	86.6	82.1	78.3	76.1	72.7	70.8	75.4	77.8	79.0	81.3	85.1	86.7	89.4	90.9	88.2	83.3	90.9																					
4-Dec	87.0	89.2	86.3	86.8	88.0	89.7	89.7	91.3	91.2	84.2	77.8	74.0	72.7	71.6	71.5	78.5	84.6	88.8	92.4	95.3	93.4	90.0	93.0	91.8	85.8	95.3																					
5-Dec	91.6	90.1	89.2	90.4	87.8	87.0	87.5	79.7	74.8	76.2	77.2	76.1	64.8	57.7	59.8	64.0	60.3	59.3	56.8	55.0	54.9	57.1	59.0	59.9	71.5	91.6																					
6-Dec	59.1	59.7	58.7	58.7	59.2	59.4	60.6	60.7	60.0	59.7	59.3	55.3	52.7	50.3	52.0	58.2	62.6	61.5	61.8	57.9	56.0	58.7	64.3	63.8	58.8	64.3																					
7-Dec	64.6	66.7	67.5	68.9	69.8	70.8	71.2	70.9	71.0	69.9	64.7	63.6	64.4	62.2	60.6	64.6	67.3	67.8	67.3	66.9	66.6	64.7	62.9	62.4	66.6	71.2																					
8-Dec	62.7	61.5	65.2	66.6	67.1	68.3	68.4	69.0	71.2	68.2	61.4	59.3	58.9	58.9	59.1	60.0	66.9	72.7	74.1	76.4	75.5	74.2	71.9	74.4	67.2	76.4																					
9-Dec	75.1	76.0	74.9	74.1	73.0	70.9	70.6	72.3	79.2	83.4	73.2	61.4	54.4	51.5	55.2	61.7	72.8	78.8	80.4	78.0	83.1	80.8	77.4	77.3	72.3	83.4																					
10-Dec	75.3	75.6	72.9	76.0	79.4	79.6	78.6	81.4	81.3	76.4	66.9	59.3	60.4	61.0	59.4	58.9	57.4	56.8	53.9	55.5	60.6	59.5	60.4	62.5	67.0	81.4																					
11-Dec	65.0	67.6	66.9	63.5	60.2	59.8	61.6	64.9	67.6	68.8	66.6	64.8	62.5	59.7	58.1	59.8	63.3	59.3	67.4	70.9	74.4	70.0	66.2	78.7	65.3	78.7																					
12-Dec	83.1	82.9	82.0	82.6	83.1	83.0	81.9	83.2	83.1	82.8	79.2	74.3	67.4	62.8	62.1	65.4	69.6	64.6	51.6	36.9	28.6	30.9	32.3	30.3	66.0	83.2																					
13-Dec	34.5	36.8	36.6	35.8	31.2	29.4	27.1	28.3	28.0	27.0	25.4	23.7	24.6	24.9	25.8	23.9	27.2	29.5	31.1	30.2	30.8	31.4	35.0	37.6	29.8	37.6																					
14-Dec	41.9	45.6	49.3	51.7	51.4	50.8	51.2	51.9	50.6	51.4	50.1	49.0	48.6	47.1	47.2	49.3	55.0	54.7	57.5	61.3	61.3	65.3	67.5	64.3	53.1	67.5																					
15-Dec	58.6	53.3	53.6	52.0	57.7	57.4	58.4	61.9	68.4	68.6	68.0	69.1	57.8	50.1	41.5	42.4	52.5	62.8	68.0	70.4	68.2	64.6	51.6	50.8	58.6	70.4																					
16-Dec	57.4	62.6	67.3	68.9	66.2	60.9	51.6	48.6	51.8	52.1	47.5	44.4	42.8	42.8	44.3	57.1	63.3	68.6	67.8	69.2	70.6	75.4	85.0	85.6	60.5	85.6																					
17-Dec	85.8	80.0	75.3	78.7	81.5	84.9	86.0	84.0	84.2	84.6	80.5	74.2	67.5	62.9	57.9	61.1	62.7	62.3	63.1	62.8	60.7	55.6	54.9	54.3	71.1	86.0																					
18-Dec	53.0	54.1	57.1	60.5	64.1	67.4	69.3	70.2	71.0	70.1	66.1	59.7	53.1	45.6	42.3	42.3	44.4	47.6	50.9	52.6	55.0	60.1	62.8	74.9	58.1	74.9																					
19-Dec	78.4	77.3	82.2	83.9	85.5	85.8	84.9	85.0	85.7	85.6	84.9	83.7	83.2	81.1	79.6	79.7	78.8	77.7	77.6	77.9	78.9	81.5	82.2	83.2	81.9	85.8																					
20-Dec	83.4	82.9	83.0	83.5	83.9	84.5	84.5	85.5	86.0	85.9	85.8	84.7	83.6	84.3	85.3	86.0	88.5	90.3	89.5	87.7	84.6	79.6	79.0	74.5	84.4	90.3																					
21-Dec	70.9	73.1	78.2	80.8	84.3	78.7	73.7	75.1	82.1	78.5	73.6	61.6	55.1	54.6	48.6	50.4	47.1	46.5	49.0	56.2	59.9	63.8	66.5	72.1	65.9	84.3																					
22-Dec	72.2	74.5	78.8	81.8	85.8	85.8	88.9	88.0	86.2	85.9	82.7	80.4	78.0	76.6	76.6	77.5	79.4	82.5	88.0	91.7	93.6	70.4	61.5	63.0	80.4	93.6																					
23-Dec	60.2	61.0	61.4	62.6	60.2	61.6	62.3	62.4	62.7	64.2	63.5	61.4	57.1	55.0	54.1	55.3	56.6	56.6	56.7	57.4	58.3	61.6	65.6	66.7	60.2	66.7																					
24-Dec	67.5	70.1	72.4	72.4	70.6	68.8	66.0	65.5	68.0	73.7	62.7	40.2	32.0	30.9	29.6	26.2	26.6	29.7	34.7	30.9	37.2	45.3	52.7	57.4	51.3	73.7																					
25-Dec	61.8	64.6	64.0	62.2	71.4	73.3	73.7	72.3	70.3	65.5	49.3	44.3	42.6	44.2	47.9	53.3	60.4	66.4	68.5	69.5	64.1	60.9	66.1	64.6	61.8	73.7																					
26-Dec	62.6	59.4	57.3	67.0	72.1	69.5	72.8	71.1	71.2	72.1	66.3	58.6	55.1	53.7	52.8	55.4	62.6	58.2	50.7	51.8	47.2	48.2	51.8	45.5	59.7	72.8																					
27-Dec	33.0	40.0	40.5	37.1	34.6	31.6	33.1	33.5	36.1	40.4	40.9	42.9	46.9	47.5	57.3	62.2	63.8	64.7	61.9	61.6	67.3	71.5	73.1	72.4	49.7	73.1																					
28-Dec	76.0	83.2	85.5	89.2	88.8	87.9	89.3	89.5	88.8	86.8	85.7	81.1	75.5	73.2	75.2	76.4	78.4	79.9	77.3	76.2	77.9	80.5	82.7	82.3	82.0	89.5																					
29-Dec	83.8	85.9	88.1	89.3	87.0	86.8	88.3	86.8	83.6	82.7	79.2	68.6	62.9	57.4	56.1	60.2	67.2	77.3	84.3	81.6	88.3	90.5	91.4	90.7	79.9	91.4																					
30-Dec	89.1	89.3	89.3	89.2	89.1	91.3	89.2	88.2	86.1	86.0	84.6	66.4	54.6	54.6	55.7	61.6	65.5	67.6	66.6	58.0	55.2	58.1	60.9	63.5	73.3	91.3																					
31-Dec	67.8	67.9	65.2	65.5	66.5	68.5	71.9	78.2	81.3	77.9	74.8	65.4	54.1	52.1	51.8	56.7	58.9	58.6	58.1	59.8	61.0	65.8	70.1	69.9	65.3	81.3																					
																						69.9	70.8	71.2	72.2	72.9	72.5	72.5	72.7	73.4	73.0	69.4	64.2	60.3	57.8	57.5	60.6	64.2	65.9	66.5	66.2	66.6	66.9	68.0	68.8	Diurnal Average	
																						91.6	90.1	89.3	90.4	89.1	91.3	89.7	91.3	91.2	86.8	86.1	84.7	83.6	84.3	85.3	86.0	89.4	90.3	92.4	95.3	93.6	90.5	93.0	91.8	Diurnal Maximum	



Wood Buffalo Environmental Association
Hourly Averages

Relative Humidity (RH) - %
Anzac - December 2023





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Relative Humidity (RH) - %
Anzac - December 2023

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	45	6.05	6.05
40 - 60	173	23.25	29.30
60 - 80	323	43.41	72.72
80 - 100	203	27.28	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744

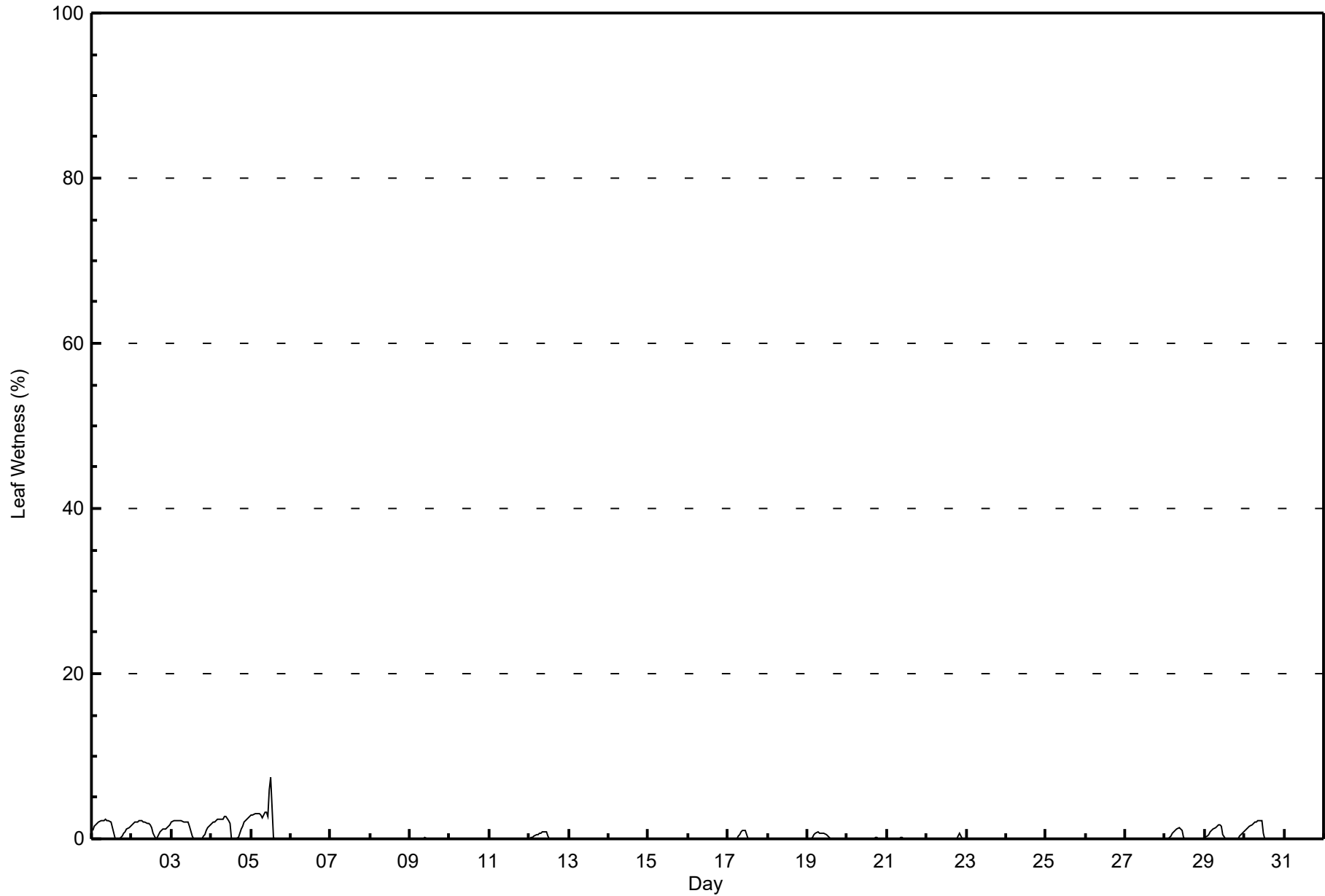


Maximum Value: 7.4 % on Dec 5 13:00		Maximum Daily Average: 1.9 % on Dec 5		Hours in Service: 744																						
Minimum Value: 0.0 % on Dec 1 15:00		Minimum Daily Average: 0.0 % on Dec 6		Hours of Data: 744																						
Maximum Diurnal Average: 0.7 % at hour 10		Minimum Diurnal Average: 0.0 % at hour 15		Hours of Missing Data: 0																						
Monthly Average: 0.33 %		Percentiles: $P_1 = 0.0$ $P_{10} = 0.0$ $Q_1 = 0.0$ Median = 0.0 $Q_3 = 0.0$ $P_{90} = 1.6$ $P_{99} = 3.0$		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-Dec	1.0	1.5	1.7	1.9	2.1	2.2	2.2	2.2	2.3	2.3	2.2	2.0	1.4	0.6	0.0	0.0	0.0	0.2	0.4	0.6	0.9	1.2	1.4	1.5	1.3	2.3
2-Dec	1.7	1.8	2.0	2.1	2.2	2.1	2.1	2.1	2.0	1.9	1.9	1.7	1.4	0.6	0.0	0.1	0.5	0.8	1.0	1.1	1.2	1.3	1.5	1.7	1.4	2.2
3-Dec	2.0	2.2	2.2	2.2	2.2	2.1	2.1	2.0	2.0	2.1	2.0	1.5	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.6	1.0	1.4	1.6	1.2	2.2
4-Dec	1.8	2.0	2.1	2.3	2.4	2.4	2.4	2.4	2.6	2.7	2.2	1.8	0.0	0.0	0.0	0.0	0.3	0.6	1.1	1.6	2.0	2.4	2.6	2.8	1.7	2.8
5-Dec	2.9	3.0	3.0	3.0	3.0	3.0	2.9	2.6	3.2	3.2	2.8	6.0	7.4	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.9	7.4
6-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
10-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.1	0.3	0.4	0.5	0.6	0.7	0.8	0.8	0.9	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	0.3	0.9
13-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.1	0.3	0.5	0.8	1.0	1.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	1.0
18-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.2	0.5	0.7	0.8	0.8	0.7	0.7	0.7	0.6	0.4	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.8
20-Dec	0.0	0.0	0.0	0.0	0.0	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	0.2
21-Dec	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	0.2
22-Dec	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	0.4	0.7	0.0	0.0	0.0	0.1	0.7
23-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.3	0.6	0.8	1.0	1.2	1.3	1.2	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	0.3	1.3
29-Dec	0.1	0.3	0.5	0.8	1.0	1.2	1.4	1.6	1.7	1.7	1.6	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.3	0.5	0.8	0.6	1.7
30-Dec	1.1	1.2	1.4	1.6	1.7	1.9	2.0	2.1	2.2	2.2	2.2	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	2.2
31-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		0.3	0.4	0.4	0.5	0.5	0.6	0.6	0.6	0.6	0.7	0.6	0.5	0.3	0.0	0.0	0.0	0.1	0.1	0.1	0.2	0.2	0.2	0.3	Diurnal Average	
		2.9	3.0	3.0	3.0	3.0	3.0	2.9	2.6	3.2	3.2	2.8	6.0	7.4	0.6	0.1	0.5	0.8	1.1	1.6	2.0	2.4	2.6	2.8	Diurnal Maximum	



Wood Buffalo Environmental Association
Hourly Averages

Leaf Wetness (LW) - %
Anzac - December 2023





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Leaf Wetness (LW) - %
Anzac - December 2023**

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 0.3	599	80.51	80.51
0.4 - 0.5	11	1.48	81.99
0.6 - 0.7	16	2.15	84.14
0.8 - 1.4	37	4.97	89.11
1.5 - 10	78	10.48	99.60
> 10	0	0.00	99.60

Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed (WS) - km/h

Anzac - December 2023

Maximum Speed: 34 km/h on Dec 16 00:00		Maximum Daily Speed Average: 20.0 km/h on Dec 23		Hours in Service: 744																						
Minimum Speed Value: 1 km/h on Dec 28 06:00		Minimum Daily Speed Average: 2.4 km/h on Dec 2		Hours of Data: 744																						
Maximum Diurnal Speed Average: 8.1 km/h at hour 24		Minimum Diurnal Speed Average: 4.8 km/h at hour 11		Hours of Missing Data: 0																						
Monthly Average Velocity: 6.3 km/h 207.7 deg		Percentiles: P ₁ = 2 P ₁₀ = 6 Q ₁ = 8 Median = 11 Q ₃ = 16 P ₉₀ = 21 P ₉₉ = 28		Percent Operational Time: 100.0																						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Dec	S8	S7	S5	SSE6	S7	SSE7	SE6	SE9	SSE9	SSE7	ESE5	ESE7	ESE7	ESE7	ESE6	ESE9	ESE12	ESE14	E10	E6	ESE11	SE7	SSE11	ENE7	SE6.9	ESE14
2-Dec	ESE10	ESE7	ESE7	ESE8	E7	ESE7	ESE7	ESE10	ESE7	ESE11	ESE8	ESE8	ENE6	E4	NNE4	NE3	ESE4	SSE3	WSW8	W12	WSW11	W15	W15	W15	SSE2.4	W15
3-Dec	W11	WSW7	W8	WNW10	N1	ESE4	SE4	SE6	ESE6	ESE6	ESE6	ESE6	E7	E8	E9	ESE10	E10	ESE12	ESE10	ESE8	ESE10	ESE8	E8	ESE5	ESE4.4	ESE12
4-Dec	SE6	SE11	SSE9	S7	SE8	SE11	SE11	SSE9	SSW8	WSW13	WSW14	WSW12	WSW10	WSW7	SW9	SSW9	SSW6	SSW5	S7	SSE8	SSE8	SE10	SE11	S6.6	WSW14	
5-Dec	SE13	ESE11	ESE11	ESE11	E12	E9	E12	ESE13	ESE11	E6	ESE8	SE12	S10	WSW13	WSW10	WSW12	WSW12	SW17	SW23	SE26	SW25	SW25	SW24	SW21	SSW7.8	SW26
6-Dec	SW21	SW20	SW21	SW21	SW21	SW22	SW20	SW19	SW17	SW16	WSW20	WSW20	SW18	SW16	SW17	SW10	SSW9	SW8	SSW4	WSW10	SW12	WSW13	WSW10	WSW16	SW15.7	SW22
7-Dec	SW11	WSW11	WSW11	SW10	WSW13	WSW15	WSW14	WSW15	WSW15	WSW14	W14	WSW16	WSW15	WSW13	W12	WSW10	WSW11	WSW13	WSW14	WSW14	WSW11	WSW10	WSW12	WSW13	WSW12.6	WSW16
8-Dec	SW11	WSW14	WSW13	WSW12	WSW11	WSW10	WSW10	WSW10	WSW9	WSW9	WSW9	WSW13	WSW12	WSW12	WSW12	WSW10	SSW5	S7	SSW8	SSW9	SSW8	SW11	WSW13	WSW16	WSW10.2	WSW16
9-Dec	WSW13	WSW13	WSW15	WSW15	WSW16	WSW13	WSW11	WSW11	SSW8	S4	S3	SSE4	SSW1	SE5	SSE6	SE9	SE11	SE8	ESE9	ESE8	ESE7	ESE8	ESE9	ESE11	SSW4.7	WSW16
10-Dec	ESE12	ESE13	ESE11	ESE13	ESE11	ESE13	SE13	ENE5	ESE5	SE4	SSE5	SW18	WSW18	WSW18	WSW20	WSW24	WSW26	WSW25	WSW28	W27	WSW28	W25	W29	W26	SW10.2	W29
11-Dec	W24	W23	W24	W27	W27	W24	W22	WSW22	WSW20	WSW20	WSW20	WSW19	WSW15	WSW13	WSW11	S8	S9	S12	SE7	SE8	SE5	SSE8	SSE10	SE6	WSW12.4	W27
12-Dec	SSW6	W6	W6	SW5	SE3	SSE2	E5	ESE4	E6	SE10	ESE8	ESE9	ESE10	ESE11	ESE10	ESE11	SE12	SSE12	S12	S14	SSW17	S14	S12	S15	SSE7.1	SSW17
13-Dec	S13	S11	S9	S10	SW14	SSE10	SSE10	S13	SSW15	S15	SSW9	S9	S10	S7	S8	SW13	SW12	WSW12	SW9	SW10	SW12	SW12	SW8	WSW10	SSW9.8	S15
14-Dec	WSW11	WSW13	WSW12	WSW17	WSW18	WSW19	WSW19	WSW18	SW20	SW20	SW20	SW19	WSW17	WSW15	SW11	SW9	SW8	SW10	SSW6	SSW8	SW9	S5	S8	S7	SW12.7	SW20
15-Dec	S12	S9	S9	S12	S12	SSW15	SSW17	S17	S17	S13	SE8	SSW10	S11	SSE15	SSE19	SSE20	SSE25	S26	S22	S17	S18	S14	SSW22	SW34	S15.5	SW34
16-Dec	SW30	SW30	SW23	WSW23	WSW20	W21	W25	W22	WSW19	WSW18	WSW19	W21	W20	W16	W14	NW9	NW5	WNW6	WNW3	NW7	WSW5	W9	WSW14	WSW18	WSW15.3	SW30
17-Dec	WSW20	W21	NW26	WNW17	WSW10	WNW8	W8	W10	WSW10	SW6	SE7	SSE8	SSE7	SSE5	SSE5	S9	S11	S10	SSE9	SSE10	SE9	SE11	SE12	S16	SW5.7	WNW26
18-Dec	S15	SW19	SW19	SW19	WSW18	SW14	WSW15	WSW22	WSW22	WSW21	WSW18	WSW21	WSW23	WSW24	W24	W22	W20	W20	W17	W14	W13	WSW11	WNW12	NW10	WSW16.9	W24
19-Dec	WNW10	WNW11	WNW11	WNW10	WNW7	WNW7	WNW4	NNW2	ENE4	ENE6	E9	E10	E10	E14	E17	E16	E16	E16	ESE21	ESE21	ESE19	E18	E18	E19	E7.3	ESE21
20-Dec	E20	E19	ESE20	ESE22	ESE19	ESE18	ESE16	ESE16	ESE15	ESE14	ESE13	ESE12	ESE10	SE15	SE15	SE14	ESE12	ESE12	ESE14	ESE10	S7	S15	S16	SSW16	ESE13.0	ESE22
21-Dec	SW20	SW22	WSW18	WSW15	WSW15	WSW16	SW13	WSW9	S8	S10	S5	SE10	SSE18	SSE12	S17	SSE15	SSE22	SSE22	SSE23	S20	S16	S12	S10	SSE9	S11.9	SSE23
22-Dec	SE13	SE11	SE8	SE8	ESE4	ENE7	ENE10	E9	E7	ENE8	E12	E7	ENE8	E7	E6	ESE8	ESE10	ESE6	ENE5	SSE5	SW6	WSW19	WSW23	WSW20	SE3.9	WSW23
23-Dec	WSW25	WSW25	WSW26	WSW25	W28	W26	WSW24	WSW22	WSW23	WSW19	WSW21	WSW21	WSW21	WSW20	WSW20	WSW18	WSW17	WSW19	WSW20	WSW15	WSW14	WSW11	WSW12	WSW13	WSW20.0	W28
24-Dec	WSW12	SW7	SSW9	S10	S9	SSE9	S9	SSE9	SE11	SE8	SE6	SW15	SSW11	SW10	SW15	SSW15	SW12	WSW8	SW13	SW12	NW4	WNW1	ENE5	SE5	SSW7.4	SSW15
25-Dec	ESE7	SE8	SE8	SSE10	NW5	NW2	ENE7	E3	WSW2	SSE5	SW7	WSW13	SW12	WSW14	SW4	E6	SE8	SE8	SE9	SE11	ESE13	ESE11	ESE16	ESE15	SE4.9	ESE16
26-Dec	E15	ESE14	E11	E8	E11	E9	ENE8	E11	E10	ENE6	ENE8	ENE7	E8	ESE8	E6	E5	ENE2	WSW13	WSW16	WSW11	SW19	SW21	SW21	SSW20	SE3.8	SW21
27-Dec	SW29	SW25	WSW21	SW21	SW21	SW22	SW17	SW16	SSW14	S10	SSE11	SE9	E9	E9	E8	E9	ESE11	ESE11	ESE14	E14	E7	E9	E9	ESE11	S7.0	SW29
28-Dec	SE11	ESE9	SE7	ESE7	SE6	SSE1	W8	W9	WNW12	W12	W11	WSW17	W14	W15	W14	W14	W13	W11	W11	W12	W11	W11	WSW11	WSW10	W7.6	WSW17
29-Dec	W9	WSW7	WSW7	WSW7	WSW2	ESE2	ESE8	SE11	ESE13	ESE10	SE11	ESE5	ESE5	SE3	E5	ESE5	SE8	SE10	SSE7	SSE7	N4	SE2	ENE4	ESE4	SE4.0	ESE13
30-Dec	SE7	SE6	ESE3	ESE5	SE3	ESE5	ESE7	ESE9	ESE10	ESE7	E9	E10	ESE12	E13	ESE15	ESE20	ESE20	ESE19	ESE16	SE15	SE12	S13	SSE13	SSE11	ESE10.0	ESE20
31-Dec	ESE5	SSE11	S13	S14	S11	SSE10	SE8	SE8	SE10	SE10	SSE6	SW8	WSW19	WSW21	WSW20	WSW16	SW15	SW15	SW19	SW18	WSW21	WSW18	WSW22	WSW22	SW10.9	WSW22
SSW8.0 SW7.6 SW7.2 SW7.1 SW6.7 SW5.9 SW5.0SSW5.5SSW6.0SSW5.5SSW4.8SSW6.4 SW6.1 SW5.8SSW5.6 S5.0 S5.9 S7.0 S6.9SSW6.7SSW7.1SSW7.3SSW7.6 SW8.1																								Diurnal Average		
SW30 SW30WNW26 W27 W28 W26 W25 W22WSW23WSW21WSW21WSW21WSW21WSW23WSW24 W24WSW24WSW26 S26WSW28 W27WSW28 SW25 W29 SW34																								Diurnal Maximum		

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



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

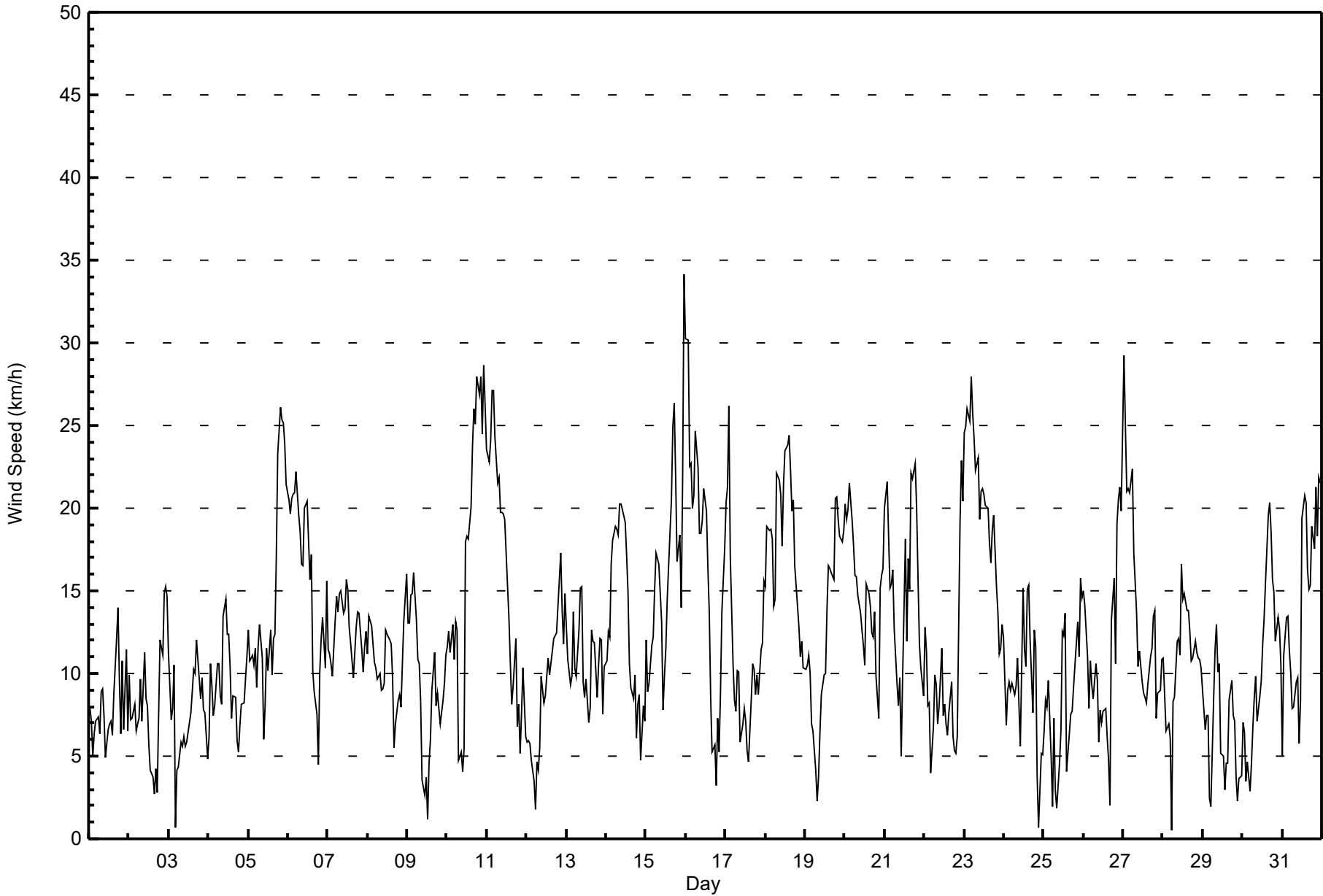
Wind Speed (WS) - km/h
Anzac - December 2023

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



Wood Buffalo Environmental Association
Hourly Averages

Wind Speed (WS) - km/h
Anzac - December 2023





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h
Anzac - December 2023**

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	71	9.54	9.54
6 - 11	326	43.82	53.36
12 - 19	235	31.59	84.95
20 - 28	107	14.38	99.33
29 - 38	5	0.67	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed (WS) - km/h
Anzac - December 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	1	1	6	5	16	9	9	5	4	2	3	0	3	4	1	71
6 - 11	0	0	0	12	36	65	48	30	33	15	20	40	15	9	3	0	326
12 - 19	0	0	0	1	14	30	11	7	28	7	33	83	17	4	0	0	235
20 - 28	0	0	0	0	1	6	0	5	3	2	25	42	22	1	0	0	107
29 - 38	0	0	0	0	0	0	0	0	0	0	4	0	1	0	0	0	5
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	2	1	1	19	56	117	68	51	69	28	84	168	55	17	7	1	744

Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
Anzac - December 2023

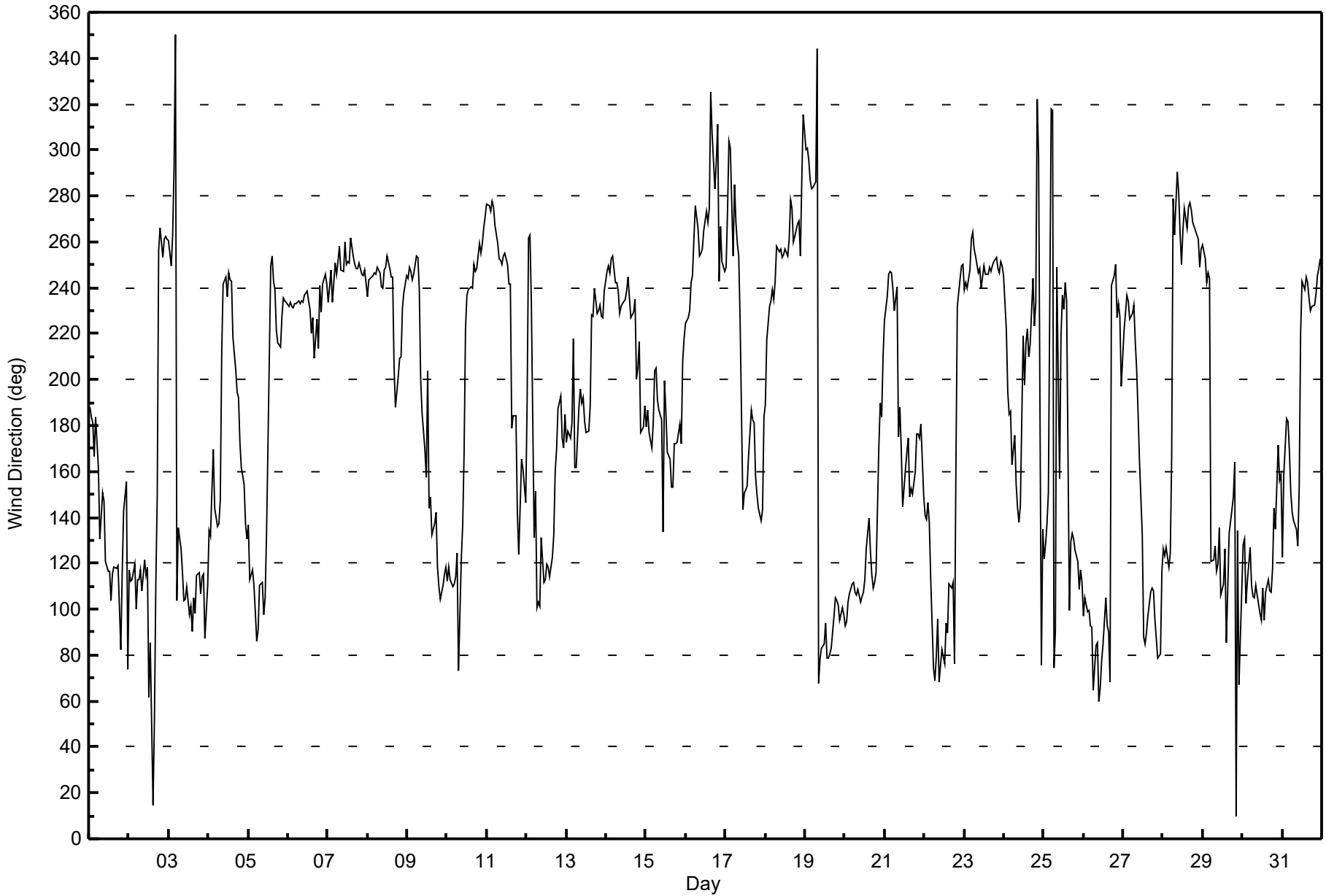
Direction of Maximum Speed: 218 deg on Dec 16 00:00 Direction of Maximum Daily Speed Average: 248.9 deg on Dec 23																						Hours in Service:	744		
Direction of Minimum Speed: 167 deg on Dec 28 06:00 Direction of Minimum Daily Speed Average: 2.4 deg on Dec 2																						Hours of Data:	744		
Monthly Average Direction: 207.7 deg																						Hours of Missing Data:	0		
																						Percent Operational Time:	100.0		
Day	Hourly Period Ending At (MST)																								Daily Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Dec	188	184	182	166	184	161	131	140	151	147	121	116	117	103	115	119	118	119	101	83	116	143	156	74	133.5
2-Dec	117	112	113	120	100	113	113	117	108	121	115	119	62	85	15	53	111	149	256	266	253	261	263	261	146.8
3-Dec	260	250	263	293	350	104	136	126	116	104	104	110	98	101	90	105	98	115	116	107	114	115	87	111	113.6
4-Dec	134	132	151	170	144	136	137	148	211	242	244	236	246	244	243	218	204	195	192	173	162	154	137	131	185.2
5-Dec	137	113	117	110	99	86	91	110	112	98	105	133	171	250	254	243	239	222	216	214	228	235	234	234	193.1
6-Dec	232	233	232	231	233	233	234	233	234	233	237	239	234	230	220	227	209	227	213	241	230	242	246	241	232.9
7-Dec	234	240	248	234	251	246	251	258	247	247	260	250	251	251	262	253	250	249	248	251	246	245	248	242	248.8
8-Dec	236	243	244	245	246	246	249	247	241	240	248	249	254	248	245	245	206	188	201	209	210	231	238	245	238.6
9-Dec	244	249	247	243	246	254	254	240	200	185	169	158	204	144	149	132	137	142	119	110	104	110	115	119	193.6
10-Dec	112	118	113	110	111	114	124	73	122	137	168	222	237	239	240	240	250	247	248	260	255	260	266	271	233.4
11-Dec	277	276	274	278	275	267	259	253	252	250	254	255	250	242	241	179	185	184	142	124	144	165	161	146	249.5
12-Dec	192	262	263	233	131	152	101	103	101	131	112	113	120	118	114	123	133	160	170	188	193	175	170	185	154.7
13-Dec	172	177	175	181	218	162	162	189	196	190	192	182	177	177	188	228	228	240	229	230	232	228	227	238	201.6
14-Dec	247	249	247	252	254	242	242	239	229	232	233	235	239	244	236	227	230	235	200	205	217	177	179	189	234.3
15-Dec	179	187	177	170	181	204	205	191	187	182	134	200	186	168	165	153	153	172	172	172	181	172	208	218	181.4
16-Dec	224	227	230	242	246	261	276	265	254	255	257	265	274	268	274	325	307	283	295	311	243	267	252	247	256.0
17-Dec	249	273	304	301	254	285	269	259	254	225	144	150	152	153	167	187	182	181	158	150	144	138	143	183	218.7
18-Dec	189	217	232	234	239	235	243	258	255	257	253	255	257	254	261	278	275	260	262	268	269	254	286	316	253.9
19-Dec	300	301	295	287	283	283	286	344	68	78	83	85	94	79	79	80	83	97	105	104	102	95	101	98	84.8
20-Dec	92	95	103	107	111	112	108	106	109	103	106	108	113	126	140	125	115	109	112	116	171	190	184	210	119.6
21-Dec	226	236	246	247	247	240	230	241	175	188	169	145	161	168	174	149	153	150	160	176	177	175	180	150	190.0
22-Dec	141	139	146	138	114	75	69	79	96	69	82	79	76	94	90	111	109	112	76	162	232	244	249	250	128.1
23-Dec	239	242	240	248	261	264	257	254	248	240	245	250	246	246	249	247	249	252	253	248	246	251	250	248.9	
24-Dec	245	221	194	185	186	163	176	155	144	138	145	219	198	216	222	210	216	244	223	234	322	297	76	135	199.9
25-Dec	122	128	137	151	318	317	74	91	249	157	219	237	231	242	234	100	130	133	131	126	121	109	117	112	143.4
26-Dec	97	105	99	99	93	92	65	84	86	60	66	77	85	105	92	90	68	241	245	250	227	233	228	197	142.9
27-Dec	222	229	237	235	227	229	232	217	205	186	165	132	88	85	90	97	107	109	108	96	87	79	81	116	182.5
28-Dec	127	123	127	118	125	167	279	263	291	281	264	250	265	274	266	275	277	274	268	265	263	261	249	257	260.3
29-Dec	259	253	242	247	244	121	121	128	116	120	135	106	111	126	86	108	133	144	149	164	10	134	67	108	139.1
30-Dec	128	130	102	112	127	110	105	105	111	106	98	95	109	95	107	113	108	107	118	144	135	172	156	159	119.2
31-Dec	122	159	183	182	169	151	142	139	135	128	153	219	243	239	244	242	236	230	232	232	238	245	248	252	217.8
208.2 214.2 222.1 220.6 223.7 218.4 214.3 208.9 200.8 200.6 199.2 211.5 214.3 214.3 210.1 190.4 180.4 189.8 190.8 199.7 205.6 210.1 210.8 213.8																									
Diurnal Average																									
All monthly, daily, and diurnal averages have been calculated using vector methods																									



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Direction (WD) - deg
Anzac - December 2023

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 97 deg on Dec 3 05:00																	Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0								
Minimum Value: 4 deg on Dec 29 18:00																									
Percentiles: P ₁ = 7 P ₁₀ = 10 Q ₁ = 13 Median = 16 Q ₃ = 18 P ₉₀ = 26 P ₉₉ = 67																									
Day	Hourly Period Ending At (MST)																							Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23		24
1-Dec	9	10	10	12	9	11	11	7	11	7	21	13	15	15	21	11	9	8	13	24	13	23	15	27	27
2-Dec	13	20	14	11	10	10	10	9	17	9	10	10	28	51	17	44	16	39	19	12	12	11	11	12	51
3-Dec	13	16	24	14	97	24	29	15	16	13	15	17	15	17	15	12	13	11	12	12	12	13	12	56	97
4-Dec	20	10	11	22	21	8	7	20	28	15	16	19	17	19	21	10	12	12	10	8	7	8	7	9	28
5-Dec	6	12	10	14	12	18	15	12	24	41	21	9	27	16	19	15	18	16	15	15	18	18	17	17	41
6-Dec	17	18	18	17	17	18	18	17	17	19	18	16	17	17	15	12	13	20	49	21	18	21	17	15	49
7-Dec	17	20	16	16	11	13	12	13	13	13	13	13	14	13	13	18	17	15	16	13	14	13	15	16	20
8-Dec	17	17	16	16	14	14	13	13	12	14	20	16	17	16	15	14	22	10	7	8	6	13	16	13	22
9-Dec	11	13	15	14	13	13	12	15	7	30	44	42	95	36	27	9	7	9	9	14	17	12	11	9	95
10-Dec	10	9	12	10	13	10	29	35	41	38	44	18	16	17	17	16	16	17	17	17	18	18	17	16	44
11-Dec	15	15	16	15	15	16	17	16	17	16	15	15	16	15	16	18	14	17	9	9	10	19	18	20	20
12-Dec	9	17	11	44	18	51	15	15	22	13	11	16	12	13	12	11	8	12	14	17	20	18	15	17	51
13-Dec	17	22	22	29	30	18	17	14	14	14	17	19	17	47	30	15	15	14	14	16	22	21	26	20	47
14-Dec	21	21	21	18	18	17	16	19	16	17	17	16	17	16	16	12	9	12	14	10	9	25	19	18	25
15-Dec	13	13	14	12	17	14	16	17	18	23	35	35	34	23	18	17	16	16	19	21	19	24	22	16	35
16-Dec	17	16	17	17	17	18	16	16	17	16	16	16	16	17	21	11	17	25	54	30	30	20	18	16	54
17-Dec	17	19	13	17	17	11	26	14	15	27	8	13	16	26	22	13	17	15	21	13	13	14	15	17	27
18-Dec	14	17	19	17	17	17	19	17	16	16	17	17	17	16	18	14	15	15	17	16	15	16	16	12	19
19-Dec	12	10	9	14	15	13	21	52	37	18	16	15	16	13	14	14	14	15	14	13	14	14	15	14	52
20-Dec	14	14	14	13	12	13	13	13	13	15	14	14	13	14	11	12	14	12	13	19	27	17	17	18	27
21-Dec	18	19	17	17	16	17	15	14	19	15	23	26	15	32	21	21	16	13	17	19	19	21	20	19	32
22-Dec	10	8	12	9	32	19	7	10	19	17	11	19	14	15	32	13	17	28	35	37	26	15	17	16	37
23-Dec	16	16	15	16	16	17	16	16	16	16	16	16	16	16	16	16	17	16	16	16	15	14	13	15	17
24-Dec	13	20	12	11	12	11	15	13	8	9	27	23	26	30	22	17	13	26	11	16	51	94	15	20	94
25-Dec	18	8	9	14	40	82	10	53	67	48	21	15	15	14	70	21	12	10	7	7	12	10	8	12	82
26-Dec	12	13	15	15	10	21	14	12	11	27	18	17	15	18	20	22	87	19	14	21	16	16	18	16	87
27-Dec	18	16	16	16	15	16	18	15	16	23	11	25	19	12	13	11	11	13	11	13	41	12	20	11	41
28-Dec	9	20	13	11	39	84	31	20	13	13	20	15	17	14	15	13	13	13	13	12	12	11	12	14	84
29-Dec	12	19	12	12	47	46	10	9	10	11	13	19	17	41	21	41	15	4	11	46	60	38	21	11	60
30-Dec	11	14	67	12	52	17	12	9	11	13	12	15	12	14	13	12	12	13	12	22	29	18	16	16	67
31-Dec	32	22	15	14	16	9	10	7	6	9	47	27	19	18	17	16	16	16	17	17	17	18	17	17	47
																	Diurnal Maximum								
																	32 22 67 44 97 84 31 53 67 48 47 42 95 51 70 44 87 39 54 46 60 94 26 56								





WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

**AMS17
WAPASU
DECEMBER 2023**

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

January 31, 2024

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - WAPASU (AMS17)

DECEMBER 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	708	36	36	100	34.6	0	9.9	0
H2S (ppb) Average	707	37	37	100	0.9	0	0.4	0
THC (ppm) Average	695	36	49	98.25	2.9	-	2.5	-
O3 (ppb) Average	709	35	35	100	42	0	36.6	-
NO2 (ppb) Average	708	36	36	100	28.6	0	11.1	-
NO (ppb) Average	708	36	36	100	30.7	-	2.4	-
NOX (ppb) Average	708	36	36	100	50.8	-	11.4	-
PM2.5 (ug/m3) Average	742	2	2	100	18	0	9.6	0
Temperature 2 m (C) Average	744	0	0	100	9	-	4.4	-
Relative Humidity (%) Average	744	0	0	100	97.5	-	88.6	-
Wind Speed 10 m (km/h) Average	744	0	0	100	23	-	17	-
Wind Direction 10 m (deg) Average	744	0	0	100	-	-	-	-
Precipitation (mm) Total	744	0	0	100	0.6	-	2.5	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - WAPASU (AMS17)
 DECEMBER 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	708	3.14	4.7	-	0	0	0.3	0.8	4.1	10.6	34.6
H2S (ppb) Average	707	0.17	0.2	-	0	0	0.1	0.1	0.2	0.4	0.9
THC (ppm) Average	695	2.35	0.1	-	2.2	2.3	2.3	2.3	2.4	2.4	2.9
O3 (ppb) Average	709	28.05	7.7	-	2	17	22.9	29.4	33.9	36.8	42
NO2 (ppb) Average	708	5.08	4.3	-	0.2	0.8	1.7	3.9	7.5	10.9	28.6
NO (ppb) Average	708	0.4	1.7	-	0	0	0	0.1	0.2	0.9	30.7
NOX (ppb) Average	708	5.48	5.1	-	0.2	0.9	1.7	4	7.9	11.8	50.8
PM2.5 (ug/m3) Average	742	3.63	2.4	-	0.4	1.2	2.2	3.1	4.5	6.3	18
Temperature 2 m (C) Average	744	-4.79	5.5	-	-21.6	-13.1	-8.4	-4.7	-0.4	1.9	9
Relative Humidity (%) Average	744	73.63	14.1	-	29	52.5	65	76.2	85.1	89.4	97.5
Wind Speed 10 m (km/h) Average	744	9.8	4	-	1	6	7	9	12	15	23
Wind Direction 10 m (deg) Average	744	-	-	-	-	-	-	-	-	-	-
Precipitation (mm) Total	744	-	-	4.05	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - WAPASU (AMS17)
DECEMBER 2023

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
THC	20 Dec 2023 19:00	20 Dec 2023 20:00	2	Unstable Operation - excessive baseline drift
THC	20 Dec 2023 22:00	21 Dec 2023 00:00	3	Unstable Operation - excessive baseline drift
THC	21 Dec 2023 02:00	21 Dec 2023 04:00	3	Unstable Operation - excessive baseline drift
THC	21 Dec 2023 06:00	21 Dec 2023 06:00	1	Unstable Operation - excessive baseline drift
THC	21 Dec 2023 12:00	21 Dec 2023 15:00	4	Maintenance - replaced support gas cylinder



Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO₂) - ppb

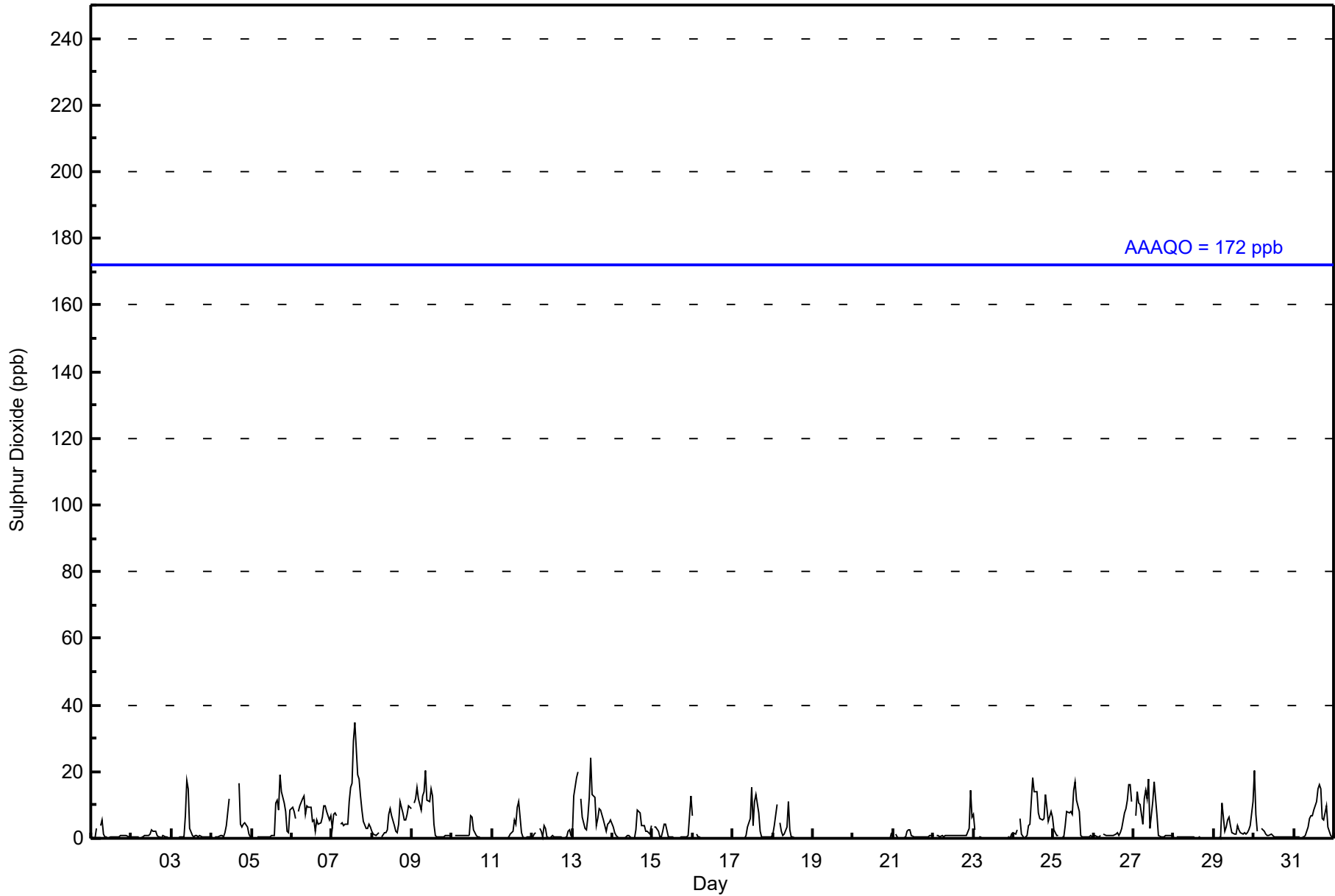
Wapasu - December 2023

Number of Exceedences (AAAQO):		1-hr: 0		24-hr: 0		Hours in Service: 744																Daily Average		Daily Maximum			
Maximum Value: 34.6 ppb on Dec 7 15:00		Maximum Daily Average: 9.9 ppb on Dec 7		Hours of Data: 708																Hours of Missing Data: 36		Hours of Calibration: 36					
Minimum Value: 0.0 ppb on Dec 10 22:00		Minimum Daily Average: 0.0 ppb on Dec 19		Hours of Missing Data: 36																Hours of Calibration: 36		Percent Operational Time: 100.0					
Maximum Diurnal Average: 5.1 ppb at hour 12		Minimum Diurnal Average: 2.1 ppb at hour 5		Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.3 Median = 0.8 Q ₃ = 4.1 P ₉₀ = 10.6 P ₉₉ = 18.8																							
Monthly Average: 3.14 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-Dec	0.2	0.1	0.2	2.9	Z	3.9	5.5	1.3	0.4	0.2	0.2	0.5	0.6	0.5	0.6	0.6	0.6	0.7	0.8	1.0	1.0	0.7	0.4	0.3	1.0	5.5	
2-Dec	0.4	0.4	0.5	0.5	0.5	Z	0.6	0.5	0.7	0.7	0.8	1.4	2.6	2.3	2.1	0.7	0.3	0.3	0.1	0.7	0.6	0.3	0.1	0.1	0.7	2.6	
3-Dec	Z	0.0	0.0	0.0	0.0	0.3	0.3	0.3	6.8	17.4	14.9	2.9	0.9	0.5	0.8	0.7	0.6	0.7	0.3	0.4	0.5	0.4	0.3	0.4	2.1	17.4	
4-Dec	0.5	Z	0.4	0.3	0.4	0.7	0.8	0.4	1.7	4.0	11.8	C	C	C	C	C	16.7	4.4	3.4	4.2	4.7	3.3	1.3	0.4	3.3	16.7	
5-Dec	0.3	0.2	Z	0.5	0.4	0.4	0.5	0.5	0.6	0.6	0.5	0.6	0.9	0.8	10.8	11.3	8.6	19.2	13.9	10.6	7.9	2.3	1.7	8.4	4.4	19.2	
6-Dec	9.4	7.9	6.1	Z	8.2	9.8	11.9	12.6	7.1	9.9	9.5	9.2	5.0	5.7	2.2	5.3	4.1	4.8	6.4	9.7	9.9	7.9	5.6	6.9	7.6	12.6	
7-Dec	2.8	7.3	7.8	6.6	Z	4.2	4.7	3.8	4.1	4.3	10.9	15.1	16.4	29.2	34.6	18.9	18.0	12.5	8.6	5.2	3.2	2.9	4.3	3.3	9.9	34.6	
8-Dec	1.9	1.3	0.8	1.2	1.5	Z	0.5	1.7	1.5	2.7	7.3	8.8	6.6	3.8	2.0	1.7	4.3	10.9	7.5	5.6	5.4	7.3	9.6	8.7	4.5	10.9	
9-Dec	Z	10.4	11.9	15.4	11.8	8.6	12.7	13.9	20.4	11.4	11.1	15.0	12.9	4.2	1.0	0.5	0.5	0.4	0.5	0.6	0.9	0.8	0.7	0.8	7.2	20.4	
10-Dec	0.7	Z	0.8	0.8	0.8	1.0	0.9	1.0	0.8	0.8	0.8	6.7	6.2	2.4	0.9	0.5	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.0	1.1	6.7	
11-Dec	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	1.3	2.2	5.5	4.0	9.1	10.8	1.7	0.2	0.2	0.1	0.2	0.3	0.3	1.6	10.8	
12-Dec	0.2	1.2	1.5	Z	3.0	2.0	0.3	3.7	3.0	0.2	0.2	0.6	0.7	0.6	0.5	0.3	0.3	0.2	0.1	0.2	0.6	2.3	2.5	0.8	1.1	3.7	
13-Dec	1.0	12.8	18.3	19.8	Z	11.8	6.2	3.0	2.5	6.2	12.4	24.2	13.1	12.5	4.0	6.0	8.7	8.7	5.5	4.0	2.1	4.1	4.5	5.6	8.6	24.2	
14-Dec	3.3	1.9	0.9	0.5	0.2	Z	0.1	0.1	0.5	0.8	0.6	0.1	0.1	0.1	2.7	8.6	7.6	3.7	3.6	3.8	2.3	2.3	1.4	4.0	2.1	8.6	
15-Dec	Z	3.6	3.4	2.1	0.4	0.6	2.2	4.4	4.1	0.4	0.3	0.4	0.6	0.1	0.0	0.0	0.0	0.5	0.2	0.3	0.2	0.8	6.8	12.7	1.9	12.7	
16-Dec	6.7	Z	1.1	0.3	0.3	0.0	0.0	0.1	0.2	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	0.1	0.0	0.4	6.7	
17-Dec	0.0	0.0	Z	0.0	0.1	0.0	0.0	0.0	0.8	3.3	5.8	15.1	3.9	11.1	13.2	7.6	2.2	0.6	0.5	0.3	0.3	0.4	0.4	0.4	2.9	15.1	
18-Dec	1.2	4.0	10.2	Z	4.7	2.0	0.8	1.2	3.3	11.0	2.4	0.6	0.2	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8	11.0	
19-Dec	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	0.0
20-Dec	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	0.1	0.0	0.1	0.1	0.1	0.2	1.6	0.1	1.6	
21-Dec	Z	1.3	0.3	0.2	0.1	0.1	0.0	0.6	2.0	2.5	2.6	1.0	0.5	0.3	0.3	0.4	0.3	0.5	0.3	0.3	0.3	0.3	0.9	0.9	0.7	2.6	
22-Dec	0.7	Z	0.8	0.9	0.6	0.7	0.6	0.7	0.8	0.8	0.8	1.0	1.0	1.0	1.0	0.8	0.6	0.7	0.6	0.9	0.7	3.1	14.4	6.6	1.7	14.4	
23-Dec	7.2	2.5	Z	0.4	0.3	0.2	0.1	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	0.2	0.0	1.2	0.5	7.2		
24-Dec	1.6	1.4	2.4	Z	6.1	1.5	0.2	0.5	1.0	3.8	4.3	18.4	13.8	14.2	14.1	7.6	5.8	5.4	5.9	12.9	9.3	5.1	8.2	6.3	6.5	18.4	
25-Dec	2.7	1.7	0.8	0.6	Z	0.4	0.4	3.7	7.9	7.5	8.2	7.2	14.3	16.9	11.6	7.9	0.9	0.6	0.5	0.5	0.3	0.6	0.8	0.4	4.2	16.9	
26-Dec	0.4	0.7	0.5	0.5	0.9	Z	1.2	0.9	0.9	1.0	0.9	0.8	1.0	1.1	1.7	1.0	1.6	3.0	7.7	8.9	11.6	16.3	16.2	11.2	3.9	16.3	
27-Dec	Z	7.0	13.9	10.6	10.2	4.0	11.8	14.4	11.7	17.7	3.1	10.9	17.2	11.9	7.0	0.7	0.5	0.5	0.5	0.7	0.7	0.8	0.7	0.8	6.8	17.7	
28-Dec	0.5	Z	0.4	0.3	0.2	0.3	0.3	0.5	0.3	0.2	0.3	0.3	0.3	0.2	0.2	0.2	0.1	0.2	0.1	0.0	0.1	0.1	0.0	0.1	0.2	0.5	
29-Dec	0.0	0.1	Z	0.4	0.0	10.4	2.2	3.3	5.5	6.3	3.6	1.7	1.5	1.3	3.9	2.7	1.6	1.3	1.6	1.5	1.9	2.7	3.9	11.0	3.0	11.0	
30-Dec	20.3	7.0	1.9	Z	2.9	2.7	2.1	1.3	1.0	0.7	1.4	1.0	0.4	0.6	0.6	0.5	0.6	0.5	0.4	0.3	0.4	0.4	0.4	0.4	2.1	20.3	
31-Dec	0.3	0.3	0.4	0.5	Z	0.6	0.5	0.8	3.4	6.0	6.6	6.9	8.3	11.0	14.9	16.0	14.9	6.0	5.6	9.6	3.5	2.3	0.9	0.3	5.2	16.0	
																								Diurnal Average		Diurnal Maximum	
																								2.4		20.3	
																								2.8		12.8	
																								3.3		18.3	
																								2.5		19.8	
																								2.1		11.8	
																								2.5		11.8	
																								2.2		12.7	
																								2.4		14.4	
																								3.0		20.4	
																								3.9		17.7	
																								3.9		14.9	
																								5.1		24.2	
																								4.4		17.2	
																								4.6		29.2	
																								4.5		34.6	
																								3.7		18.9	
																								3.6		18.0	
																								2.8		19.2	
																								2.4		13.9	
																								2.7		12.9	
																								2.2		11.6	
																								2.2		16.3	
																								2.8		16.2	
																								3.0		12.7	
Z - zerospan C - Calibration																											
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 172 ppb 24-hr 48 ppb																											



Wood Buffalo Environmental Association
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Wapasu - December 2023





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Wapasu - December 2023

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	636	89.83	89.83
11 - 20	69	9.75	99.58
21 - 60	3	0.42	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 708

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Wapasu - December 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	16	15	13	7	9	4	27	134	209	68	66	29	19	9	7	4	636
11 - 20	0	0	0	0	0	0	0	5	17	30	17	0	0	0	0	0	69
21 - 60	0	0	0	0	0	0	0	0	0	1	2	0	0	0	0	0	3
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	16	15	13	7	9	4	27	139	226	99	85	29	19	9	7	4	708

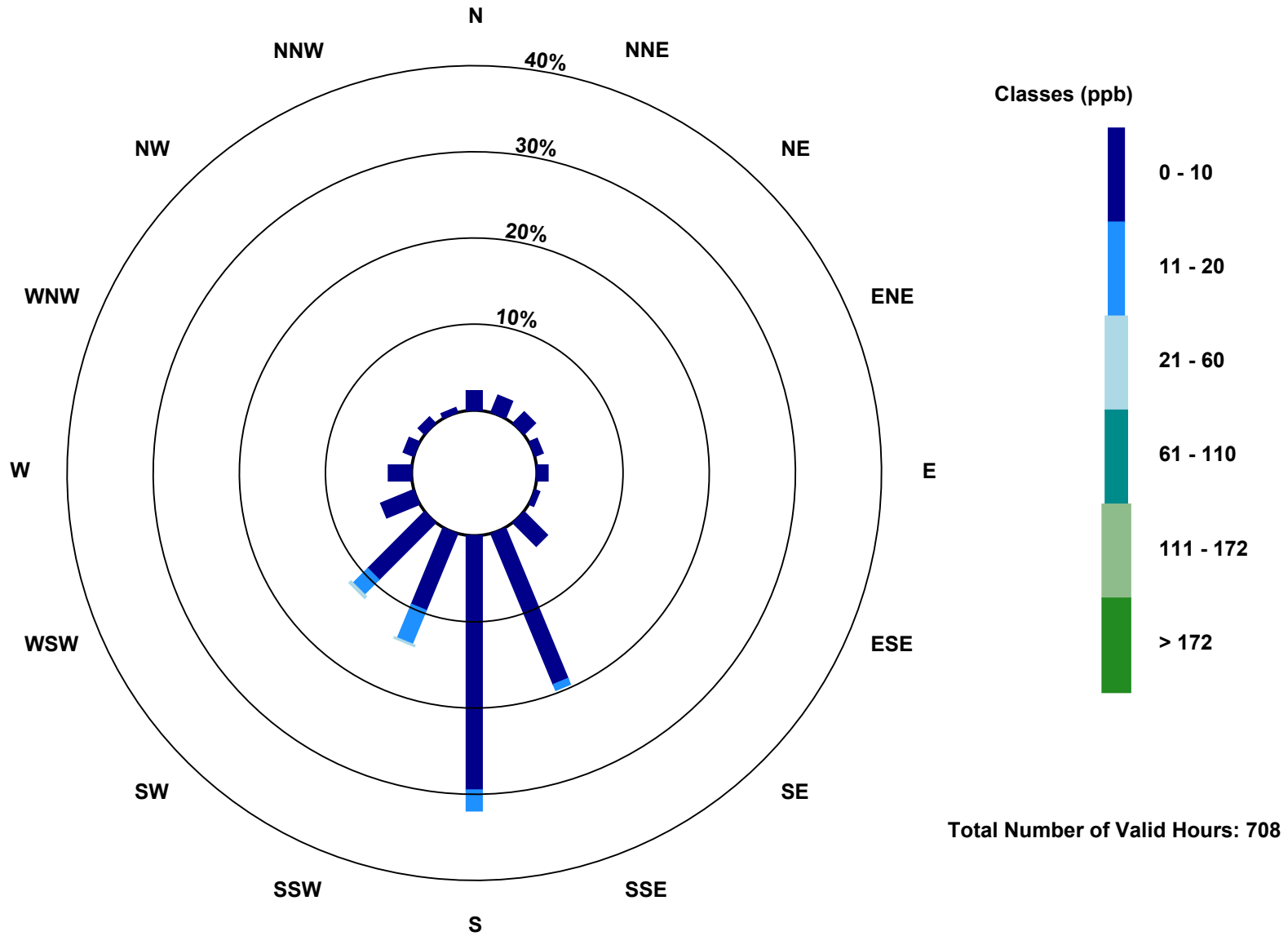
Total Number of Valid Hours: 708

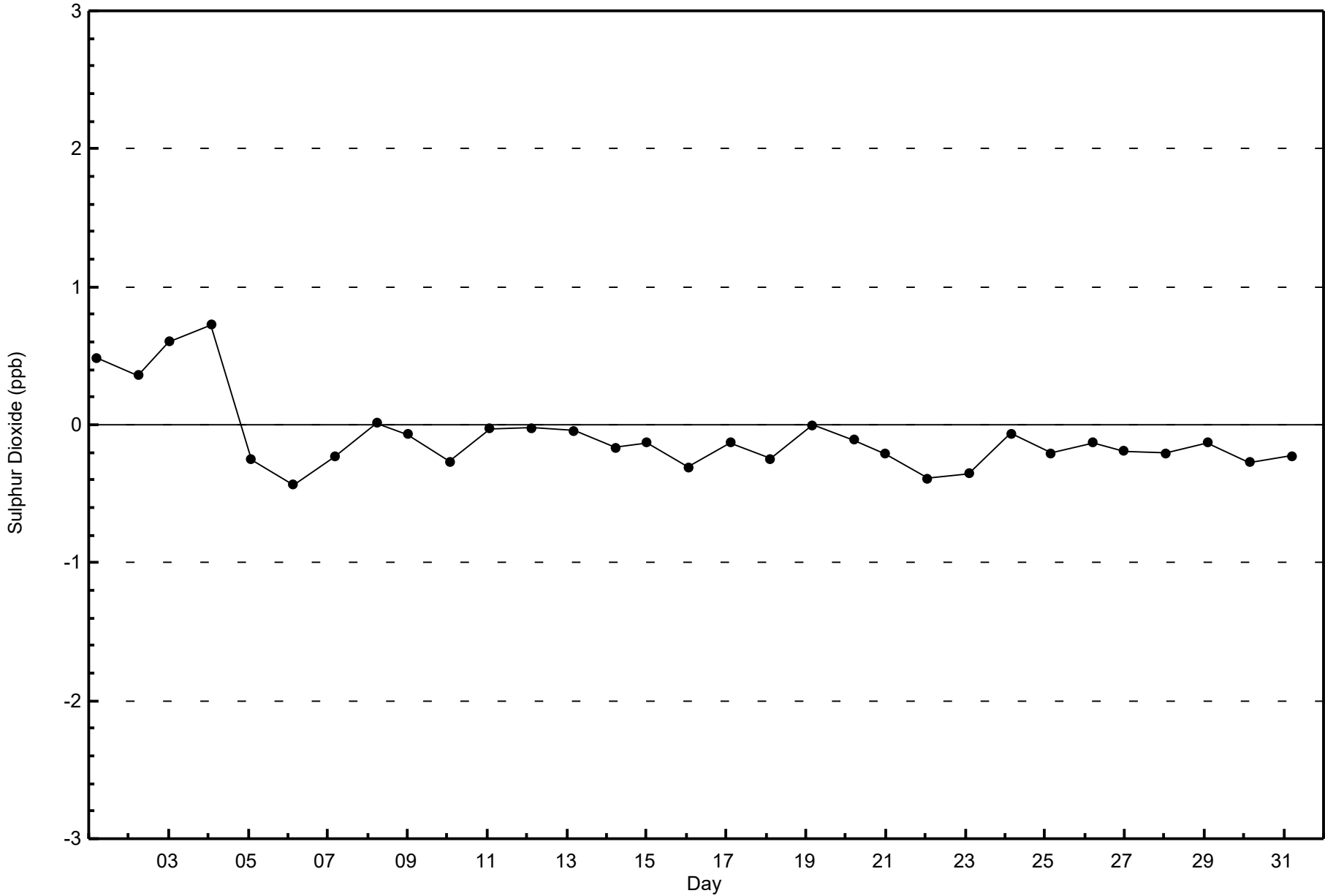
Total Number of Hours: 744

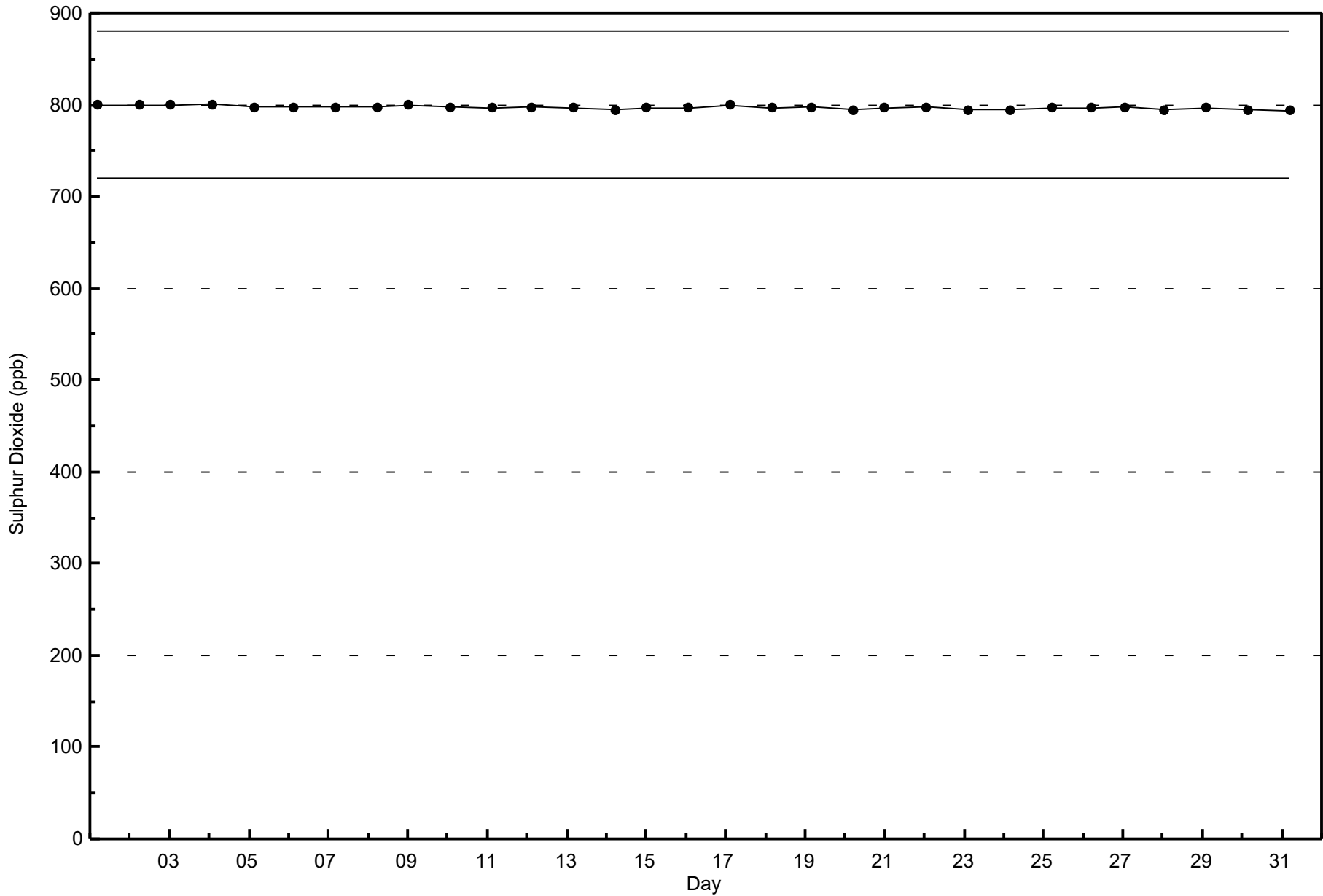


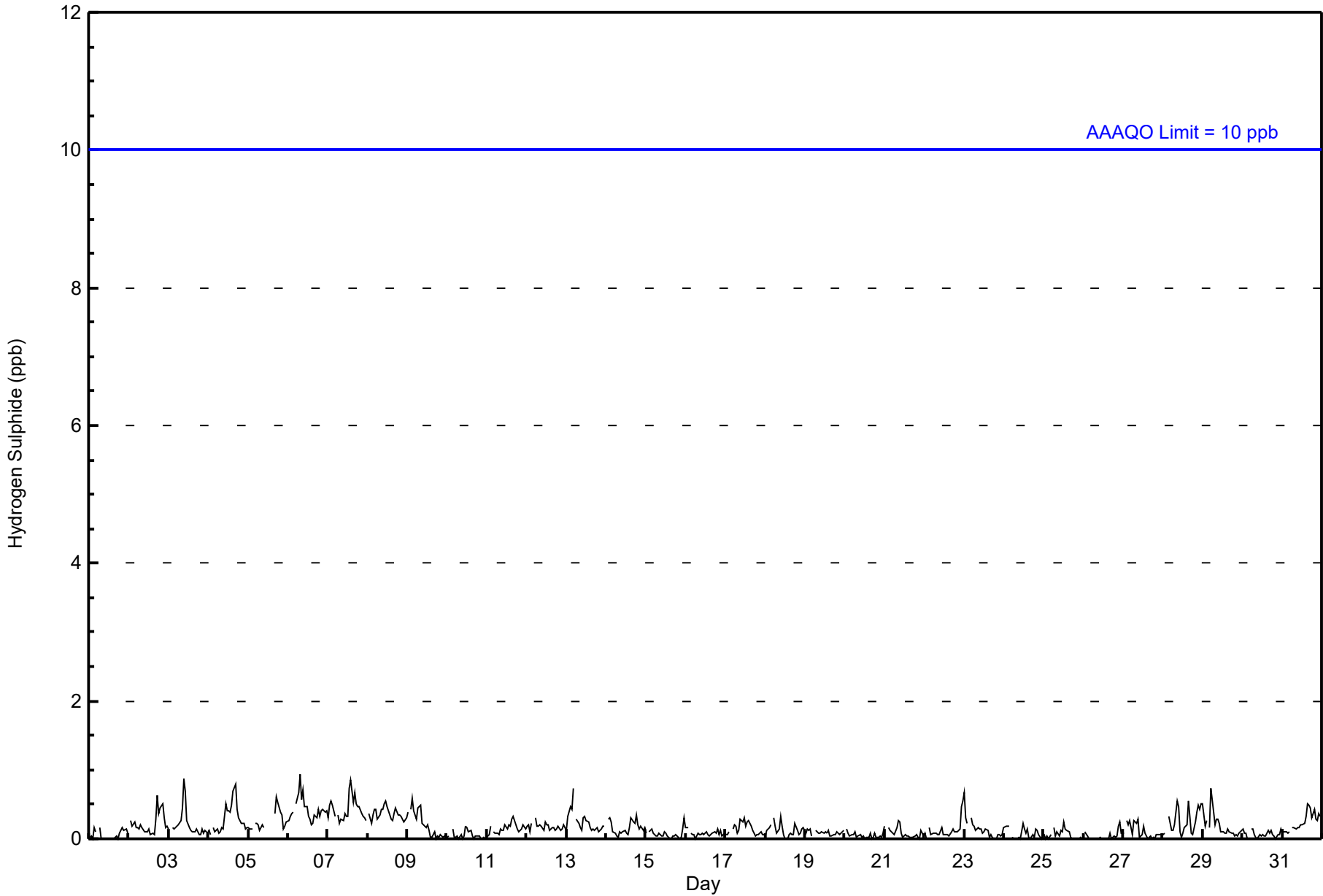
Wood Buffalo Environmental Association
Wind Rose Dec 2023

Sulphur Dioxide (SO₂) - ppb
Wapasu











**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Hydrogen Sulphide (H₂S) - ppb
Wapasu - December 2023**

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

Total Number of Valid Hours: 707

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Hydrogen Sulphide (H₂S) - ppb
Wapasu - December 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	17	16	11	7	8	4	26	141	227	93	91	27	19	9	6	5	707
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	17	16	11	7	8	4	26	141	227	93	91	27	19	9	6	5	707

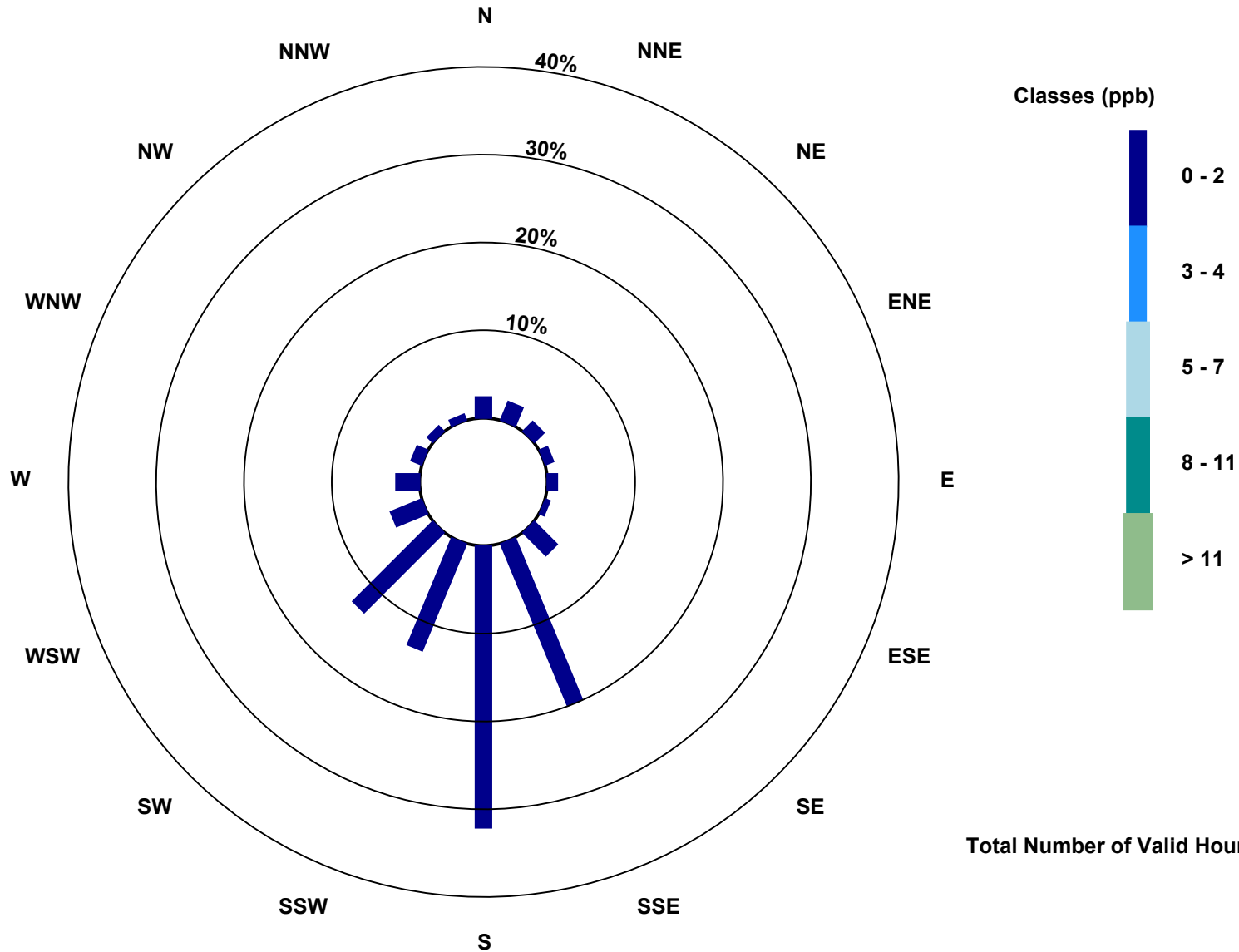
Total Number of Valid Hours: 707

Total Number of Hours: 744

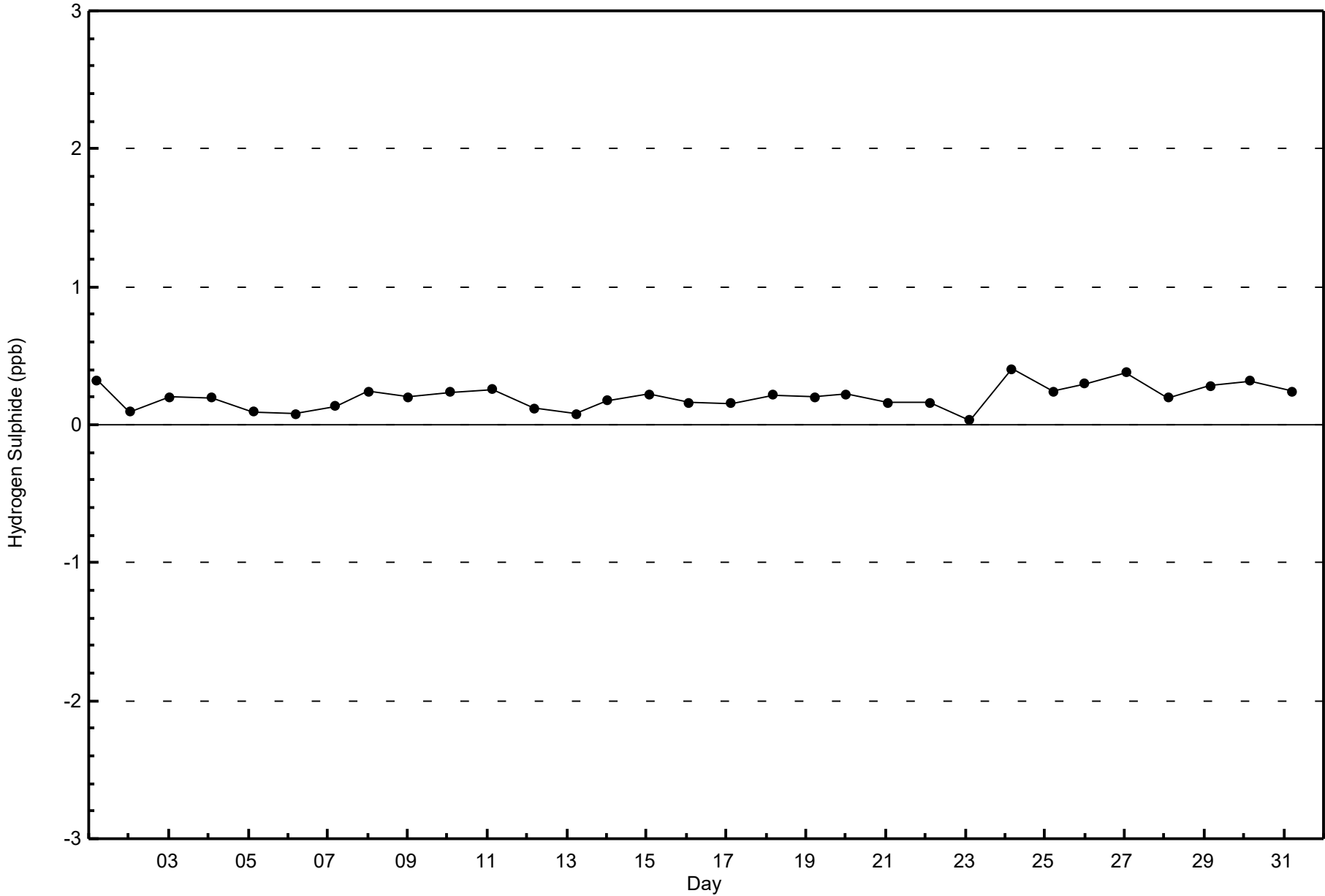


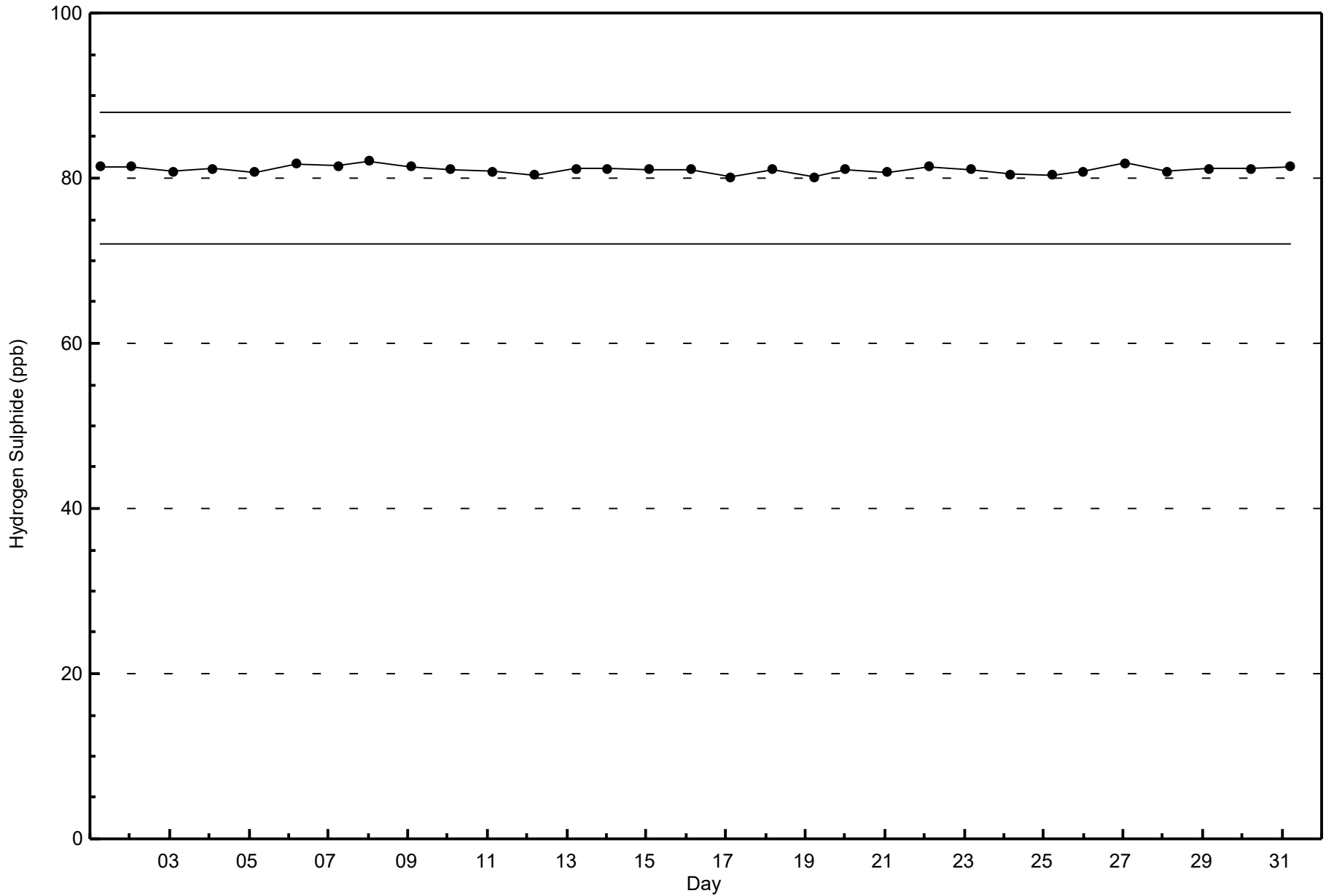
Wood Buffalo Environmental Association
Wind Rose Dec 2023

Hydrogen Sulphide (H₂S) - ppb
Wapasu



Total Number of Valid Hours: 707

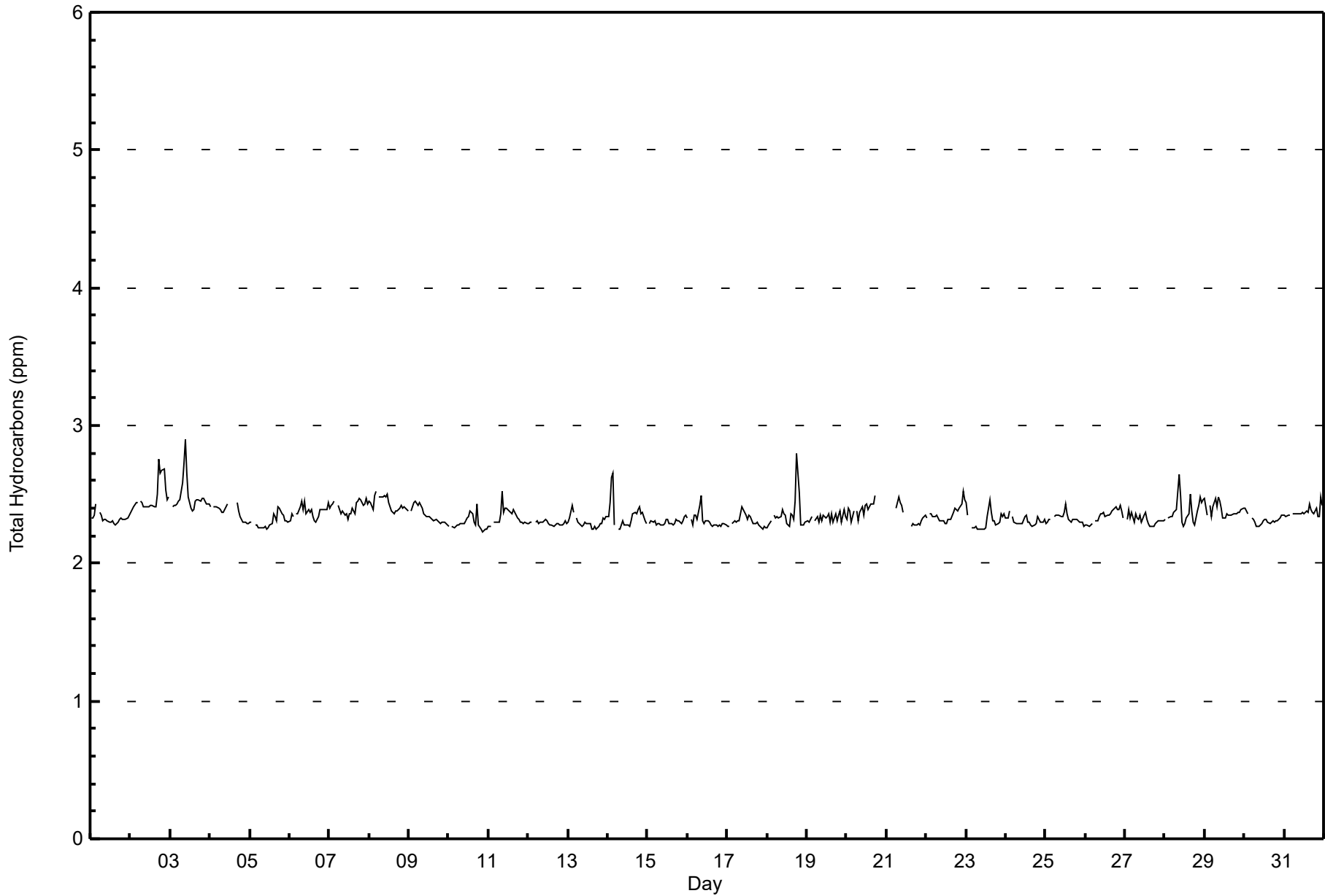






Wood Buffalo Environmental Association
Hourly Averages

Total Hydrocarbons (THC) - ppm
Wapasu - December 2023





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Wapasu - December 2023

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	0	0.00	0.00
2.1 - 3.0	695	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: 695

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Total Hydrocarbons (THC) - ppm
Wapasu - December 2023

Concentration Ranges (ppm)	Wind Direction																
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Totals
0 - 2.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2.1 - 3.0	16	15	13	7	9	4	27	138	220	97	83	27	19	9	7	4	695
3.1 - 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	16	15	13	7	9	4	27	138	220	97	83	27	19	9	7	4	695

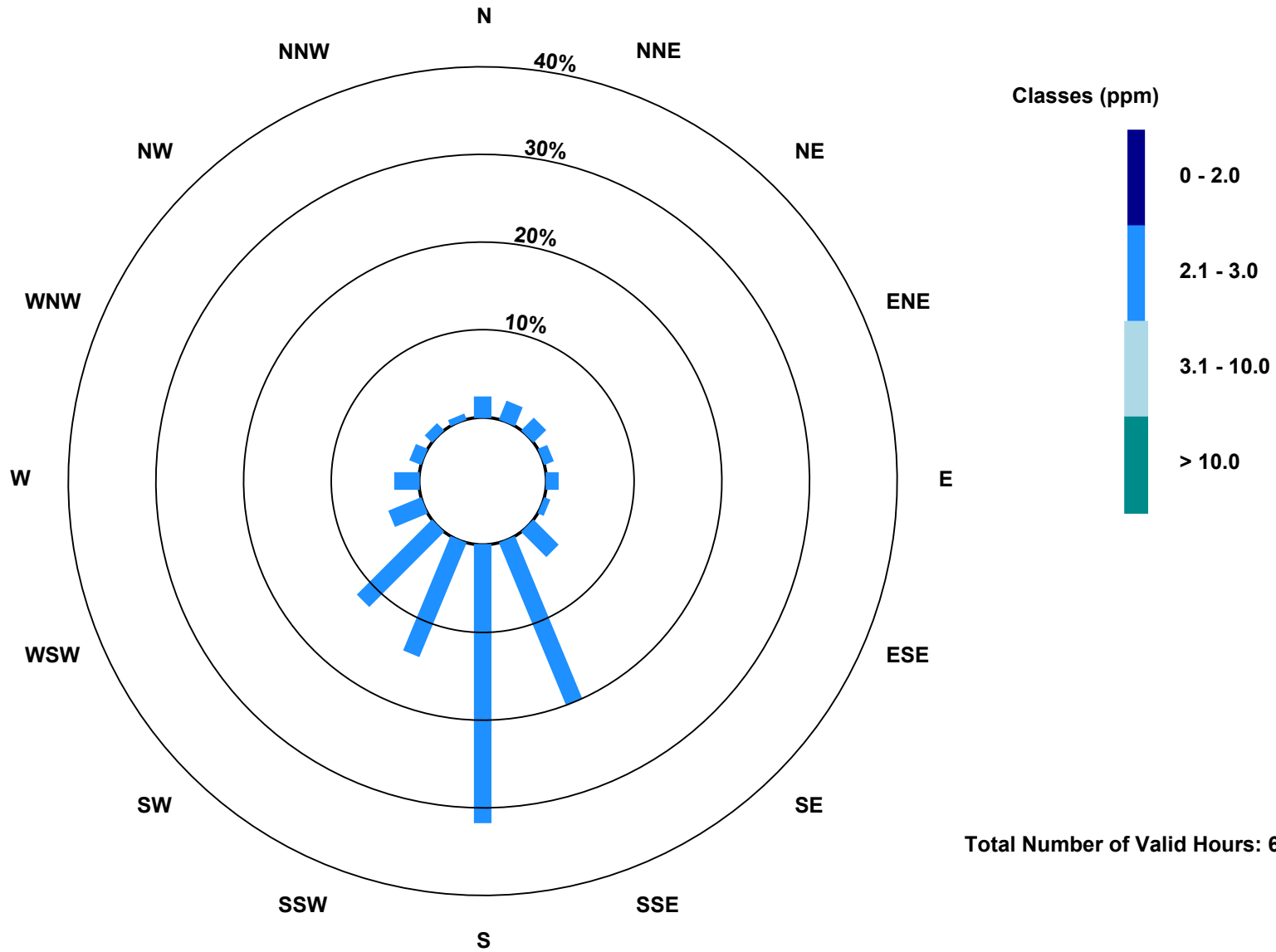
Total Number of Valid Hours: 695

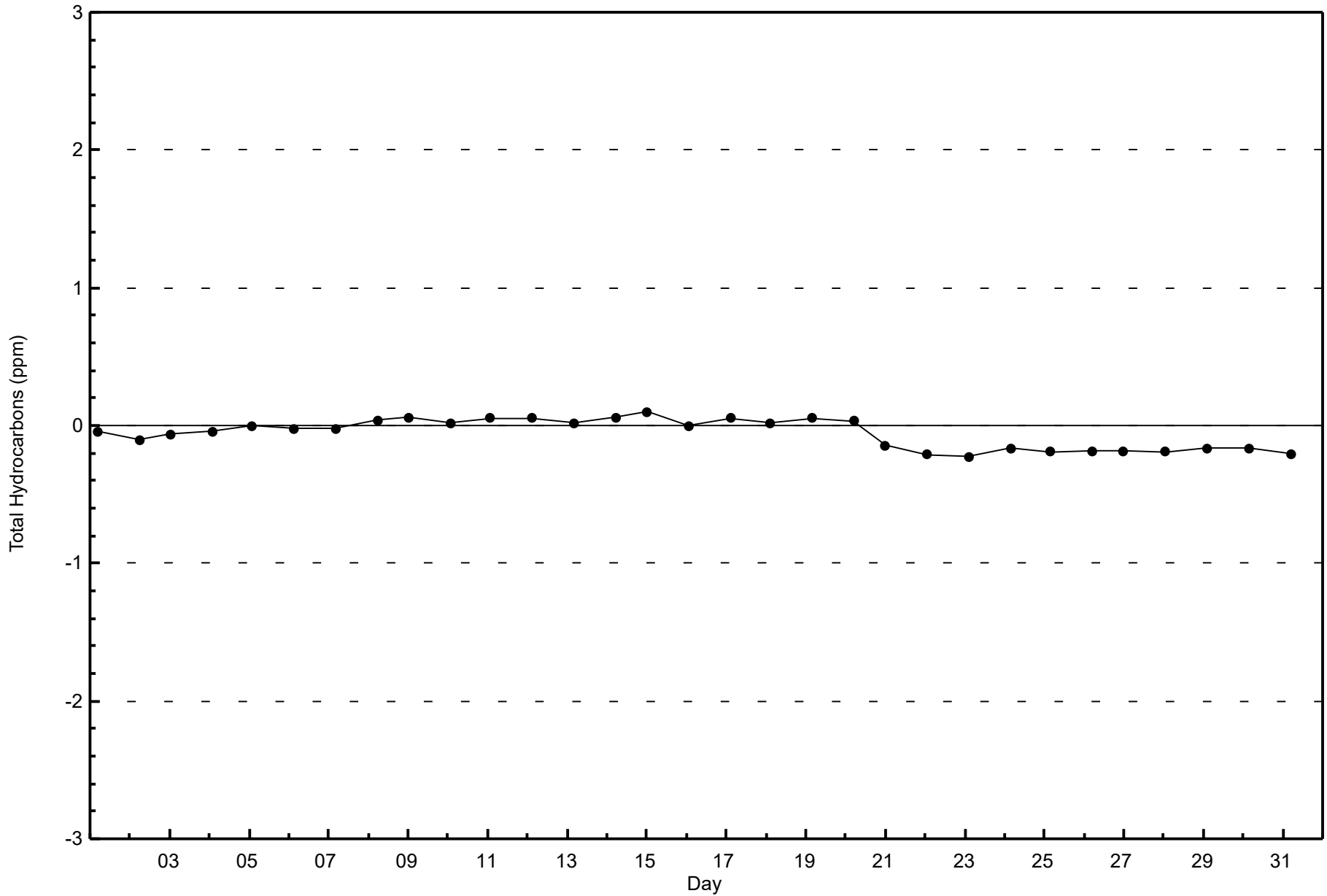
Total Number of Hours: 744

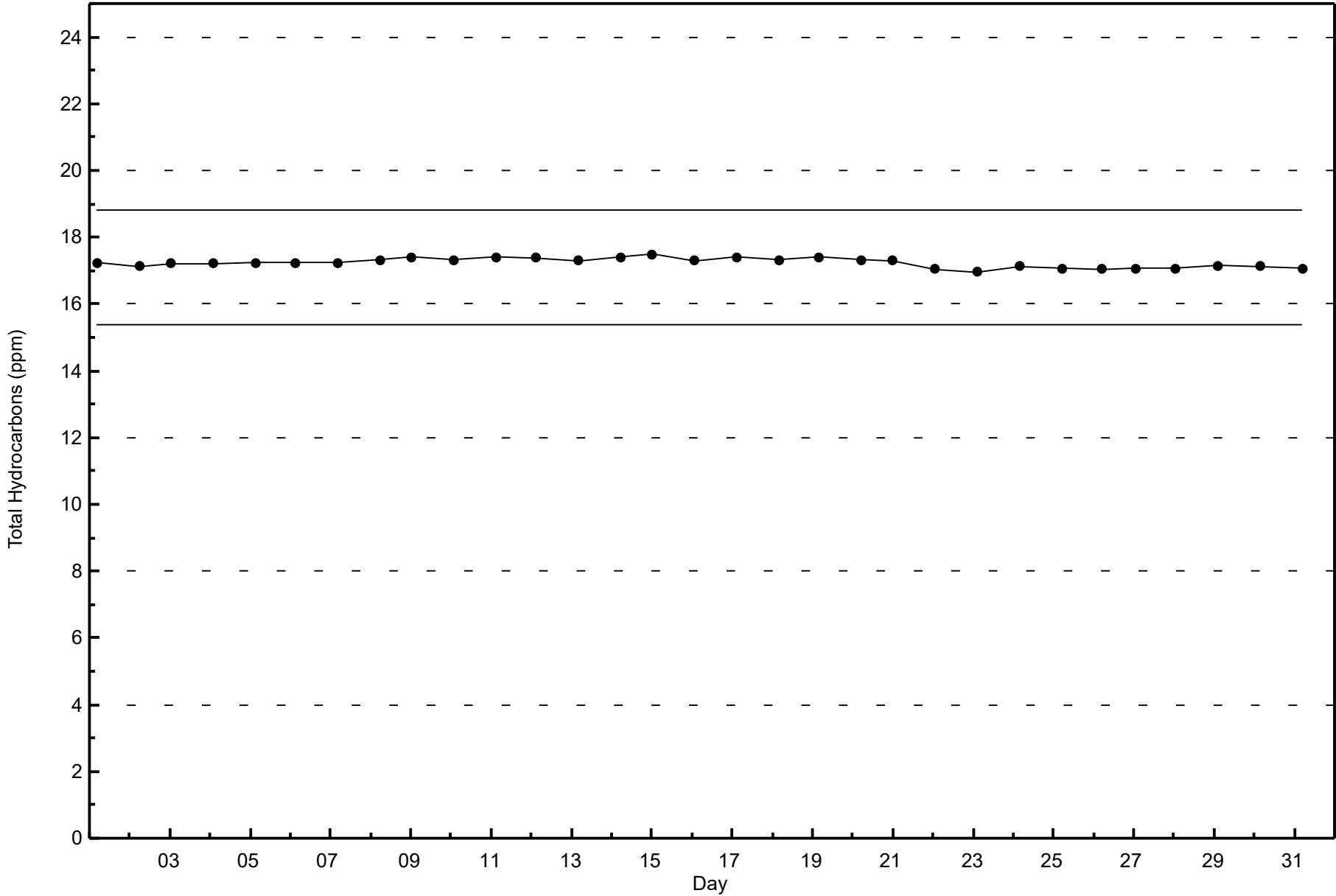


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Total Hydrocarbons (THC) - ppm
Wapasu









Wood Buffalo Environmental Association

Summary of Hour Averages

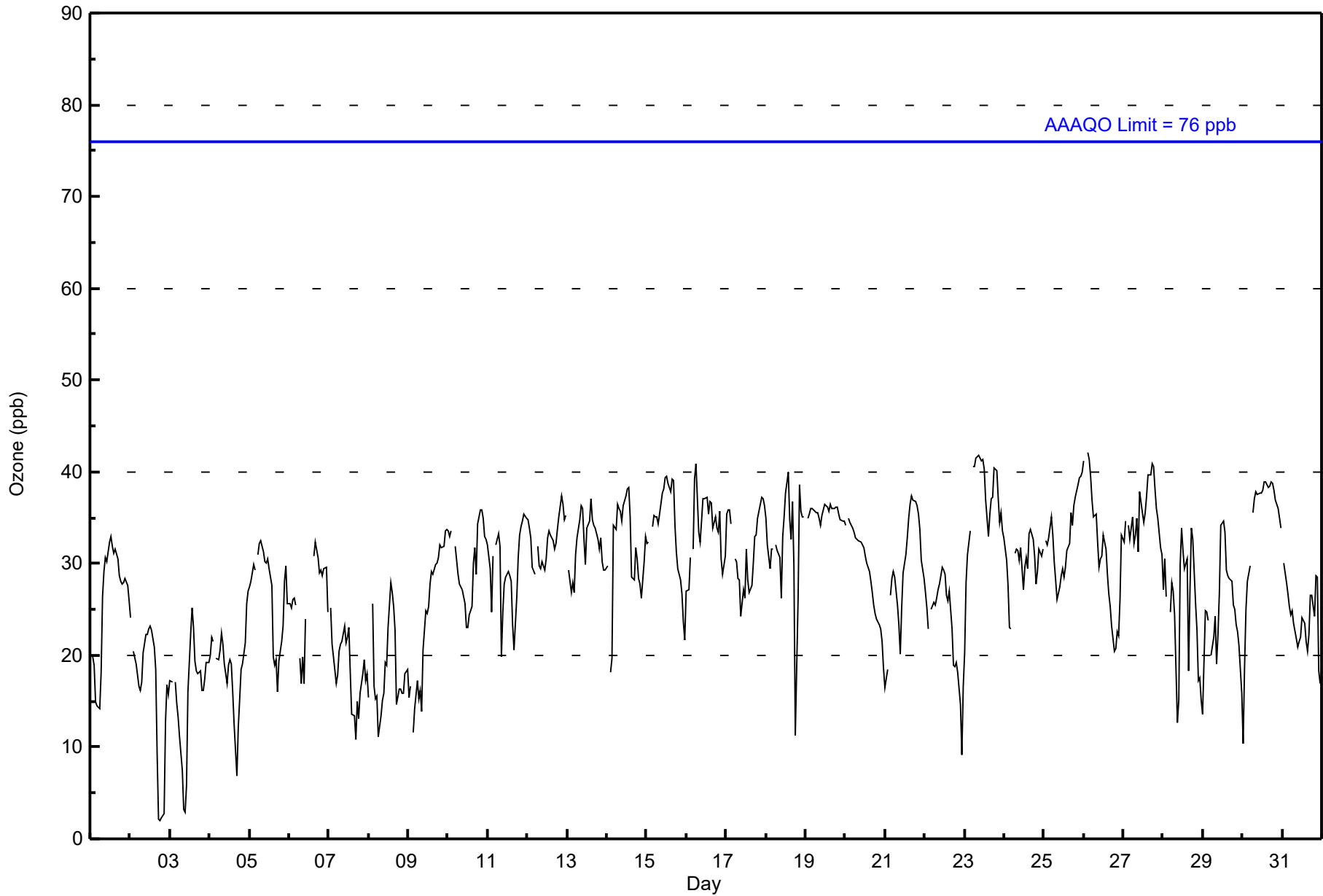
Ozone (O₃) - ppb

Wapasu - December 2023

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 42.0 ppb on Dec 26 03:00	Maximum Daily Average: 36.6 ppb on Dec 23		Hours of Data:	709
Minimum Value: 2.0 ppb on Dec 2 19:00	Minimum Daily Average: 15.6 ppb on Dec 3		Hours of Missing Data:	35
Maximum Diurnal Average: 30.8 ppb at hour 13	Minimum Diurnal Average: 26.4 ppb at hour 1		Hours of Calibration:	35
Monthly Average: 28.05 ppb	Percentiles: P ₁ = 6.9 P ₁₀ = 17.0 Q ₁ = 22.9 Median = 29.4 Q ₃ = 33.9 P ₉₀ = 36.8 P ₉₉ = 41.2		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-Dec	Z	19.8	18.8	14.9	14.5	14.3	18.2	26.4	29.1	30.7	30.3	32.3	33.0	31.9	31.0	31.6	30.5	28.7	28.1	27.7	27.9	28.4	27.6	25.9	26.2	33.0																							
2-Dec	24.1	Z	20.5	19.1	17.8	16.6	16.1	17.1	20.2	22.2	22.3	22.9	23.2	22.7	20.9	18.4	9.3	2.1	2.0	2.3	2.8	12.8	16.8	15.7	16.0	24.1																							
3-Dec	17.3	17.1	Z	17.0	14.8	13.2	11.1	7.5	3.1	2.9	5.8	16.0	22.4	25.1	23.0	19.3	18.3	17.9	18.3	16.2	16.2	17.5	19.2	19.2	15.6	25.1																							
4-Dec	20.0	22.0	21.5	Z	19.7	19.6	20.5	22.4	21.2	19.0	16.9	18.9	19.5	19.0	16.0	12.4	6.9	12.2	15.3	18.5	19.0	21.3	25.6	27.0	18.9	27.0																							
5-Dec	27.4	28.1	29.9	29.3	Z	31.0	32.2	32.5	31.3	30.2	30.1	30.4	29.5	27.6	19.9	18.9	19.6	16.0	19.3	21.5	23.3	28.1	29.7	25.6	26.6	32.5																							
6-Dec	25.6	25.1	26.1	26.2	25.5	Z	19.7	16.9	19.8	16.9	24.0	C	C	C	C	30.9	32.3	30.7	29.0	29.2	28.7	29.4	29.6	24.7	25.8	32.3																							
7-Dec	Z	25.2	21.1	19.9	16.9	17.8	20.4	21.3	21.6	23.2	21.3	22.0	23.1	18.2	13.6	13.4	10.8	15.0	13.2	15.9	18.0	19.5	17.3	18.1	18.5	25.2																							
8-Dec	15.4	Z	25.6	16.6	15.3	15.6	11.2	13.4	15.1	15.9	19.2	18.9	23.1	28.0	26.8	25.4	22.8	14.6	16.3	16.3	15.9	15.8	18.0	18.5	18.4	28.0																							
9-Dec	15.4	16.6	Z	11.6	14.2	17.2	15.3	16.2	13.9	20.7	24.8	24.6	25.3	27.8	29.2	28.9	30.0	30.0	30.7	32.0	31.8	31.9	33.5	33.7	24.1	33.7																							
10-Dec	33.5	33.0	33.6	Z	31.9	30.4	28.8	27.8	27.2	26.3	25.6	23.0	23.1	24.4	25.3	30.1	31.8	28.8	34.4	35.8	35.9	34.9	33.0	32.7	30.1	35.9																							
11-Dec	32.1	29.5	24.7	30.8	Z	32.1	33.3	31.9	19.8	24.8	27.8	28.5	29.1	28.7	28.1	23.3	20.6	26.3	30.7	33.1	34.0	34.7	35.3	35.0	29.3	35.3																							
12-Dec	34.8	33.9	32.9	29.6	28.8	Z	31.8	29.8	29.5	30.2	29.3	30.5	32.8	33.6	33.0	32.5	31.6	32.2	33.7	35.1	37.4	36.5	34.8	35.2	32.6	37.4																							
13-Dec	Z	29.3	26.8	27.9	26.9	31.0	32.7	34.8	36.3	36.0	32.7	29.9	33.8	34.6	37.0	34.7	34.1	33.9	32.6	31.6	32.8	30.2	29.3	29.3	32.1	37.0																							
14-Dec	29.8	Z	18.1	19.7	34.2	33.6	36.4	36.0	35.7	34.6	36.3	37.3	38.1	38.3	35.0	28.6	28.3	31.8	30.5	28.4	27.7	26.2	30.3	33.0	31.6	38.3																							
15-Dec	32.2	32.4	Z	34.0	35.2	35.1	35.0	34.3	35.4	37.7	38.2	39.4	39.6	38.8	37.9	39.2	39.1	34.2	31.3	29.5	28.2	26.7	23.6	21.7	33.9	39.6																							
16-Dec	27.0	27.2	30.7	Z	31.5	39.1	40.9	33.5	32.4	34.6	37.1	37.0	37.2	35.4	36.8	36.6	33.9	35.0	33.9	33.4	35.7	30.6	28.8	30.8	33.9	40.9																							
17-Dec	35.4	35.9	35.9	34.3	Z	30.5	30.2	28.3	28.2	24.3	27.2	26.2	31.5	28.1	26.8	27.6	30.0	33.0	33.1	35.0	35.7	37.1	37.1	36.2	31.6	37.1																							
18-Dec	34.9	32.0	29.4	31.6	31.6	Z	32.0	31.4	30.7	26.2	33.0	35.0	37.6	40.0	34.8	32.6	36.7	29.7	11.3	26.3	38.6	35.7	35.1	35.0	32.2	40.0																							
19-Dec	Z	34.9	35.4	35.9	35.9	35.8	35.6	35.5	34.9	34.1	35.2	36.4	36.4	36.1	35.7	36.5	36.1	36.0	36.2	36.2	35.5	34.8	34.7	34.6	35.6	36.5																							
20-Dec	34.2	Z	34.9	34.5	33.8	33.4	32.8	32.6	32.5	32.3	32.0	31.7	30.8	30.1	29.1	28.1	26.8	25.5	24.6	23.9	23.4	22.9	21.6	18.6	29.1	34.9																							
21-Dec	16.4	18.5	Z	26.5	28.4	29.2	28.5	25.5	23.3	20.2	25.1	29.0	30.9	32.8	34.9	36.5	37.3	36.9	36.8	36.3	35.3	33.7	30.4	28.4	29.6	37.3																							
22-Dec	26.9	25.2	23.0	Z	25.1	25.7	25.5	26.3	27.2	27.8	29.5	29.2	28.9	26.5	26.0	27.1	22.9	19.0	18.7	19.2	18.2	14.7	9.2	16.7	23.4	29.5																							
23-Dec	20.2	27.9	31.0	33.6	Z	40.6	40.5	41.5	41.8	41.5	41.3	41.3	40.2	37.0	33.0	35.3	37.0	37.3	40.5	40.2	37.0	34.4	35.5	33.6	36.6	41.8																							
24-Dec	32.7	30.3	27.7	23.1	22.8	Z	31.1	31.6	31.5	30.4	31.7	27.1	29.5	30.6	29.5	33.2	33.8	32.7	30.8	27.7	29.1	31.5	30.8	31.6	30.0	33.8																							
25-Dec	Z	32.4	32.0	32.8	35.0	33.1	30.3	28.3	26.2	27.5	28.7	29.4	28.5	29.5	31.5	32.2	35.6	34.2	36.3	37.2	38.5	39.4	39.5	40.0	33.0	40.0																							
26-Dec	41.2	Z	42.0	41.4	39.5	37.0	35.1	35.4	32.3	29.6	30.5	30.7	33.1	31.5	28.8	26.7	25.3	23.2	20.4	20.8	22.6	22.1	26.0	33.1	30.8	42.0																							
27-Dec	32.3	34.6	Z	34.2	32.6	35.0	32.1	33.1	35.0	31.2	37.8	35.5	34.4	35.6	37.4	39.6	39.7	40.9	40.6	38.1	35.9	34.9	31.7	31.0	35.4	40.9																							
28-Dec	27.1	30.5	26.5	Z	24.7	27.9	27.0	24.4	12.7	15.2	29.8	33.9	31.5	29.5	30.5	18.4	27.1	33.9	32.7	25.6	22.8	17.3	17.5	15.1	25.3	33.9																							
29-Dec	13.5	24.8	24.7	23.8	Z	20.0	21.9	24.2	19.1	22.3	26.8	34.2	34.6	33.3	29.3	28.6	28.3	28.0	25.5	25.1	23.4	22.5	21.1	15.8	24.8	34.6																							
30-Dec	10.4	18.8	25.0	28.0	29.8	Z	35.6	37.1	37.9	37.6	37.7	37.7	38.0	38.8	38.9	38.4	38.4	38.9	38.8	38.0	37.0	35.9	35.0	33.9	34.2	38.9																							
31-Dec	Z	30.1	28.0	26.7	25.3	24.4	24.9	23.5	21.9	20.9	21.6	21.9	24.0	23.5	21.5	20.4	22.3	26.6	26.6	24.3	28.7	28.6	18.3	17.0	23.9	30.1																							
																								26.4	27.5	27.9	27.0	26.6	27.7	28.0	27.7	26.7	26.7	28.7	29.7	30.8	30.6	29.4	28.6	28.3	27.9	27.5	27.8	28.3	28.1	27.6	27.3	Diurnal Average	
																								41.2	35.9	42.0	41.4	39.5	40.6	40.9	41.5	41.8	41.5	41.3	41.3	40.2	40.0	38.9	39.6	39.7	40.9	40.6	40.2	38.6	39.4	39.5	40.0	Diurnal Maximum	

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





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Ozone (O₃) - ppb
Wapasu - December 2023

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	138	19.46	19.46
21 - 50	571	80.54	100.00
51 - 82	0	0.00	100.00
> 83	0	0.00	100.00

Total Number of Valid Hours: 709

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Ozone (O₃) - ppb
Wapasu - December 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	5	4	4	2	5	1	2	26	45	28	11	2	2	0	1	0	138
21 - 50	11	12	9	5	4	3	23	113	186	69	76	26	15	8	6	5	571
51 - 82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 83	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	16	16	13	7	9	4	25	139	231	97	87	28	17	8	7	5	709

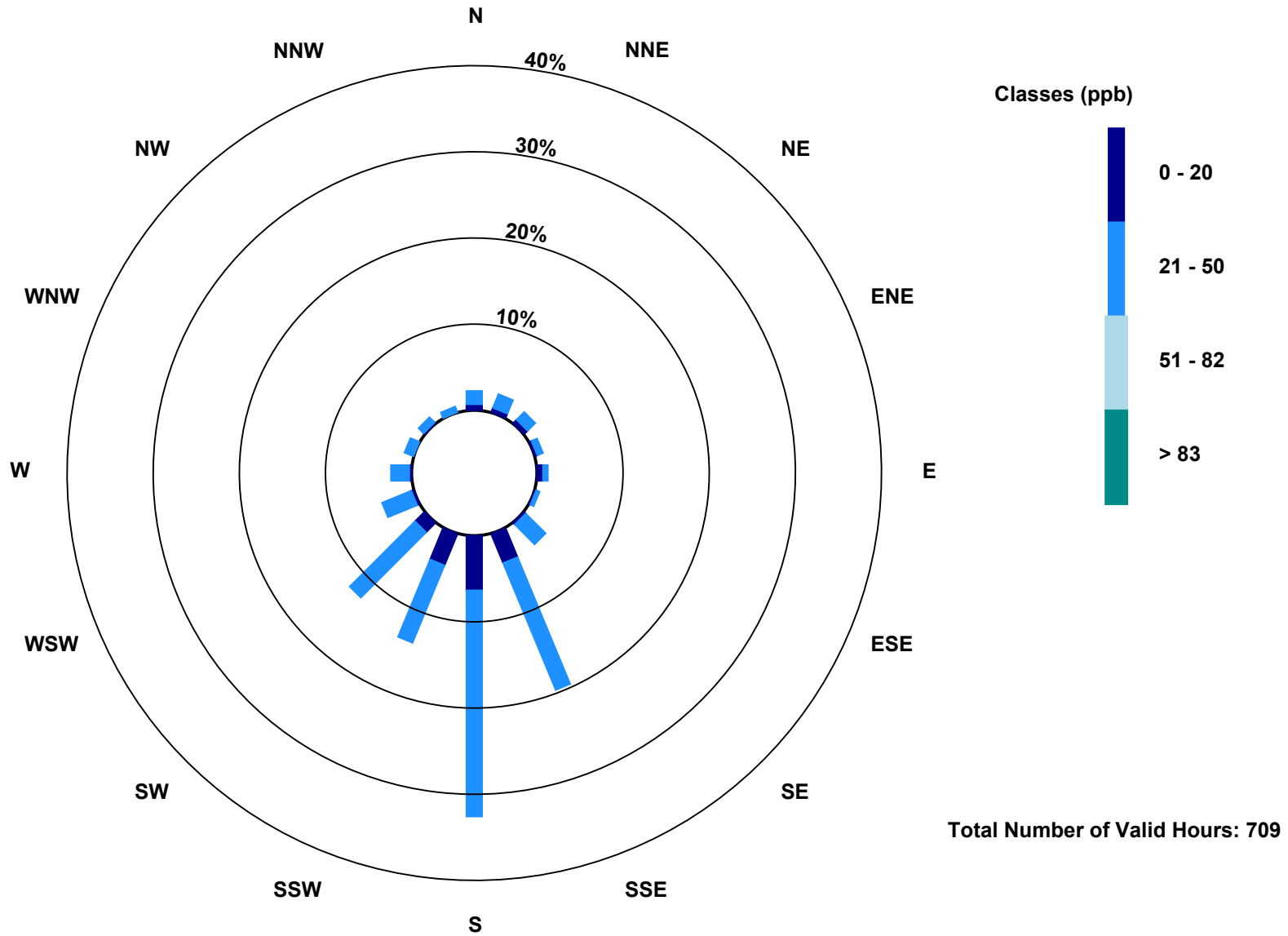
Total Number of Valid Hours: 709

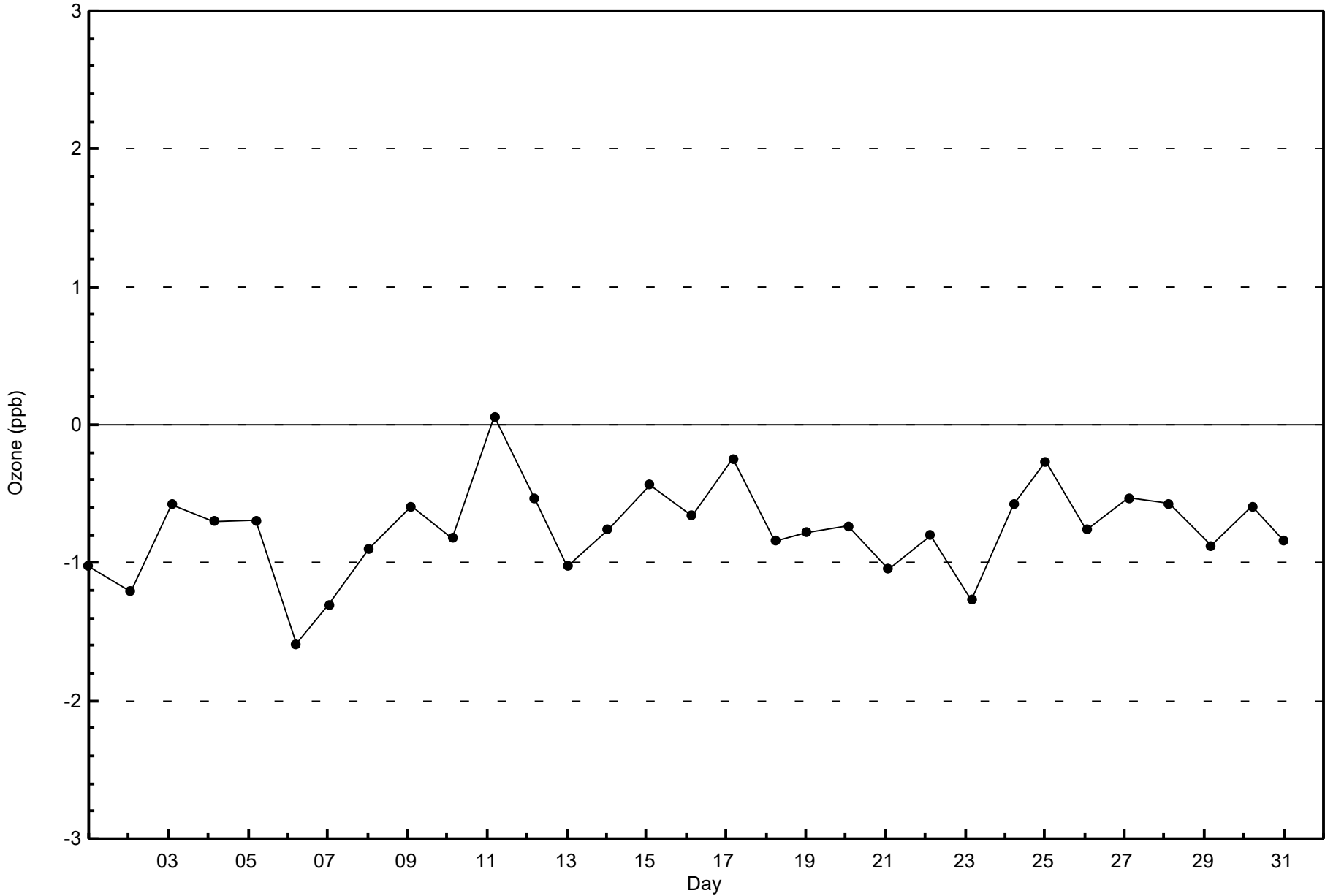
Total Number of Hours: 744

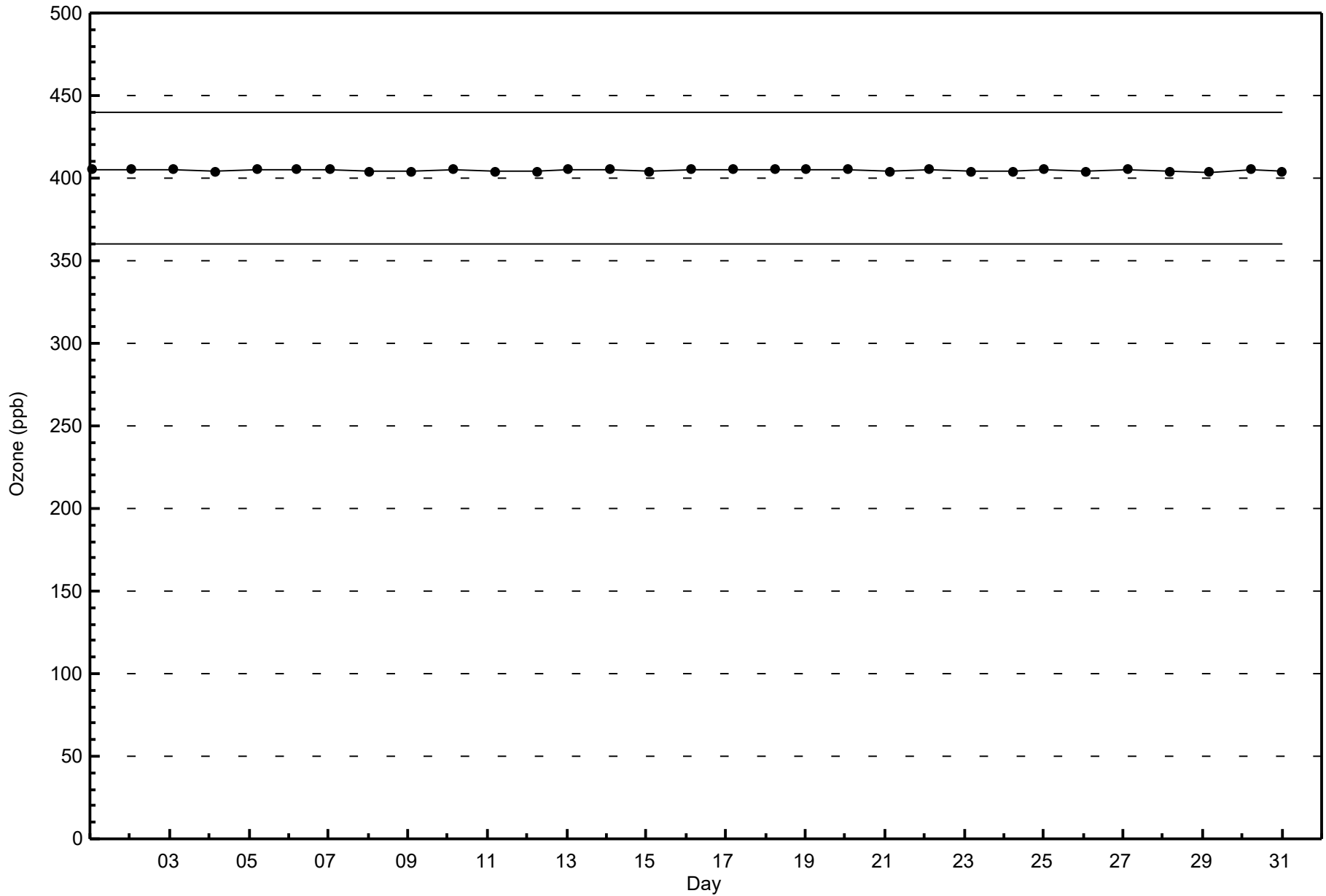


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Ozone (O₃) - ppb
Wapasu









Wood Buffalo Environmental Association
Summary of Hour Averages

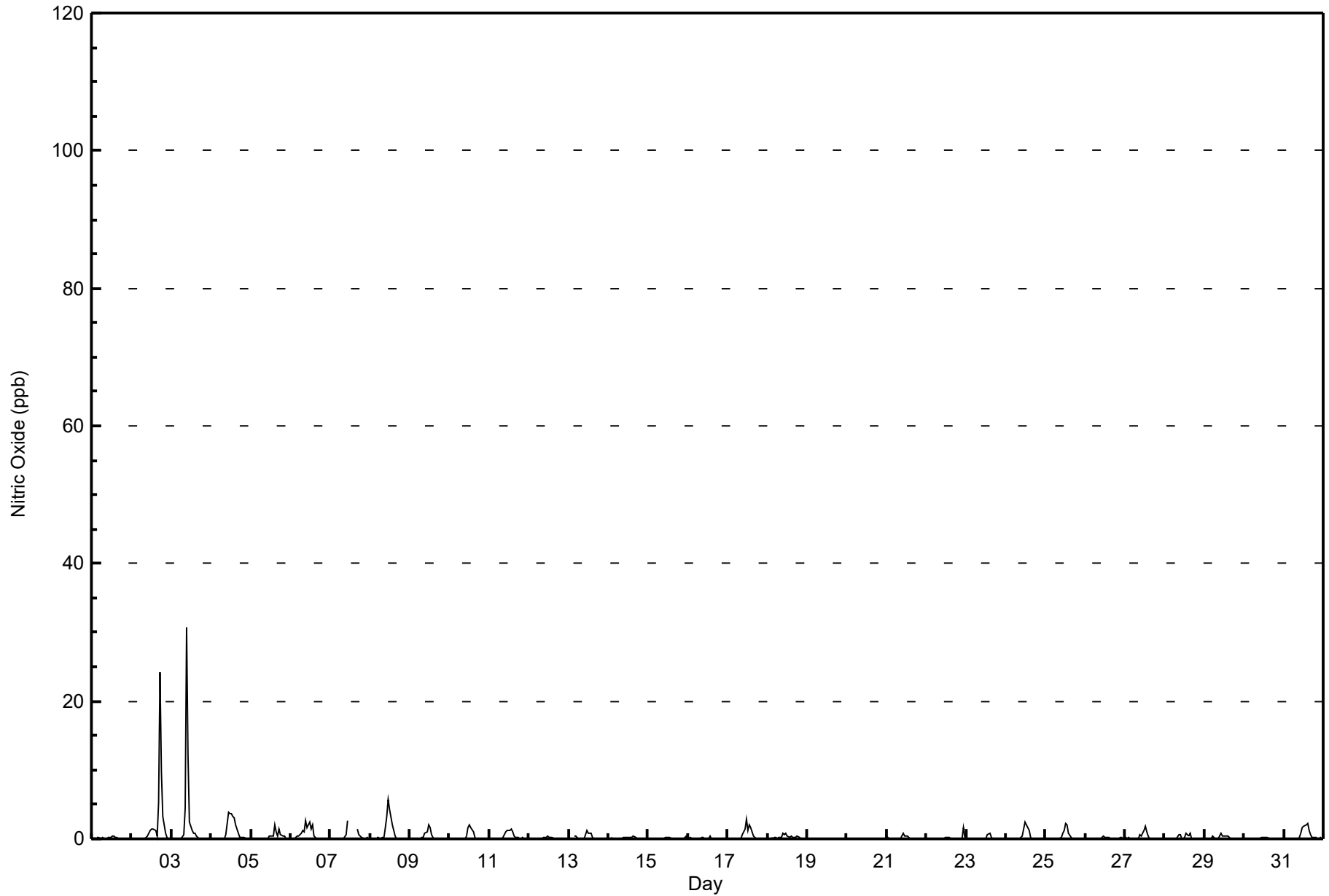
Nitric Oxide (NO) - ppb
Wapasu - December 2023

Maximum Value: 30.7 ppb on Dec 3 10:00		Maximum Daily Average: 2.4 ppb on Dec 3		Hours in Service: 744																						
Minimum Value: 0.0 ppb on Dec 1 19:00		Minimum Daily Average: 0.0 ppb on Dec 20		Hours of Data: 708																						
Maximum Diurnal Average: 1.4 ppb at hour 10		Minimum Diurnal Average: 0.0 ppb at hour 2		Hours of Missing Data: 36																						
Monthly Average: 0.40 ppb		Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.0 Median = 0.1 Q ₃ = 0.2 P ₉₀ = 0.9 P ₉₉ = 4.2		Hours of Calibration: 36																						
				Percent Operational Time: 100.0																						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Dec	0.1	0.1	Z	0.2	0.1	0.1	0.1	0.0	0.0	0.1	0.2	0.3	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
2-Dec	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.3	0.9	1.3	1.5	1.4	1.2	0.3	5.3	24.3	9.7	3.2	0.9	0.3	0.1	0.1	2.2	24.3
3-Dec	0.1	0.1	0.1	0.1	Z	0.1	0.1	0.5	4.5	30.7	12.3	2.5	1.2	0.9	0.7	0.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	2.4	30.7
4-Dec	0.1	0.0	0.0	0.1	0.0	Z	0.1	0.1	0.1	0.1	0.6	3.9	3.6	3.3	3.1	1.9	0.8	0.2	0.2	0.1	0.1	0.1	0.1	0.0	1.0	3.9
5-Dec	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.3	0.3	0.3	2.1	0.9	0.3	1.3	0.6	0.4	0.3	0.0	0.0	0.0	0.3	2.1
6-Dec	0.1	Z	0.0	0.1	0.3	0.4	0.8	1.2	1.0	2.7	1.6	2.4	1.3	2.0	0.3	0.2	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.7	2.7
7-Dec	0.1	0.1	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.6	2.6	C	C	C	C	C	1.5	0.6	0.4	0.1	0.0	0.0	0.2	0.1	0.4	2.6
8-Dec	0.1	0.0	0.0	Z	0.1	0.2	0.1	0.2	0.2	1.7	3.2	5.6	4.2	1.9	1.2	0.4	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.0	0.9	5.6
9-Dec	0.1	0.0	0.0	0.1	Z	0.1	0.1	0.1	0.3	0.7	1.1	2.0	1.7	0.6	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	2.0
10-Dec	0.0	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.1	0.3	1.7	1.9	1.7	1.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.3	1.9
11-Dec	Z	0.1	0.1	0.0	0.1	0.1	0.1	0.1	0.2	0.6	1.0	1.3	1.3	1.4	1.0	0.5	0.2	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.4	1.4
12-Dec	0.1	Z	0.0	0.1	0.1	0.0	0.0	0.0	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	0.0	0.1	0.3
13-Dec	0.0	0.2	Z	0.4	0.5	0.1	0.1	0.1	0.0	0.1	0.7	1.3	0.9	0.9	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	1.3
14-Dec	0.0	0.0	0.3	Z	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.3	0.2	0.2	0.3	0.3	0.1	0.1	0.1	0.1	0.0	0.1	0.0	0.0	0.1	0.3
15-Dec	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.1	0.3	0.2	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.4	0.1	0.4
16-Dec	0.0	0.1	0.0	0.0	0.0	Z	0.0	0.1	0.1	0.1	0.0	0.0	0.1	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.3
17-Dec	Z	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.7	1.4	2.9	1.1	2.1	1.5	0.4	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.5	2.9
18-Dec	0.0	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.8	0.6	0.7	0.4	0.1	0.5	0.3	0.1	0.1	0.4	0.1	0.0	0.1	0.0	0.0	0.2	0.8
19-Dec	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	0.0	0.1
20-Dec	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
21-Dec	0.3	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.4	0.8	0.4	0.4	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.8
22-Dec	0.0	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	1.7	0.2	1.7
23-Dec	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.5	0.7	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.7
24-Dec	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.4	2.5	2.0	1.6	1.2	0.2	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.4	2.5
25-Dec	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.8	1.3	2.3	2.1	0.8	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	2.3
26-Dec	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.1	0.3	0.3	0.3	0.3	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.2	0.1	0.1	0.3
27-Dec	0.1	0.0	0.1	0.0	Z	0.0	0.1	0.1	0.1	0.6	0.3	1.2	1.7	1.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	1.7
28-Dec	0.0	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.6	0.7	0.1	0.0	0.2	0.8	0.4	0.9	0.1	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.2	0.9
29-Dec	Z	0.0	0.0	0.1	0.0	0.3	0.1	0.1	0.1	0.4	0.7	0.4	0.4	0.4	0.5	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.7
30-Dec	0.1	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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	0.0	0.2
31-Dec	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.9	1.7	1.8	2.1	2.2	1.2	0.7	0.2	0.1	0.2	0.1	0.1	0.2	0.1	0.5	2.2
																								Diurnal Average		
																								Diurnal Maximum		
0.0 0.0 0.0 0.1 0.1 0.1 0.1 0.1 0.2 1.4 1.1 1.2 1.0 0.9 0.7 0.3 0.3 0.9 0.4 0.2 0.1 0.0 0.1 0.1																										
0.3 0.2 0.3 0.4 0.5 0.4 0.8 1.2 4.5 30.7 12.3 5.6 4.2 3.3 3.1 1.9 5.3 24.3 9.7 3.2 0.9 0.3 1.7 0.4																										
Z - zerospan C - Calibration																										



Wood Buffalo Environmental Association
Hourly Averages

Nitric Oxide (NO) - ppb
Wapasu - December 2023





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitric Oxide (NO) - ppb
Wapasu - December 2023**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	706	99.72	99.72
21 - 40	2	0.28	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 708

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitric Oxide (NO) - ppb
Wapasu - December 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	17	15	13	7	7	4	25	139	224	97	91	29	19	8	6	5	706
21 - 40	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	2
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	17	15	13	7	8	4	25	139	225	97	91	29	19	8	6	5	708

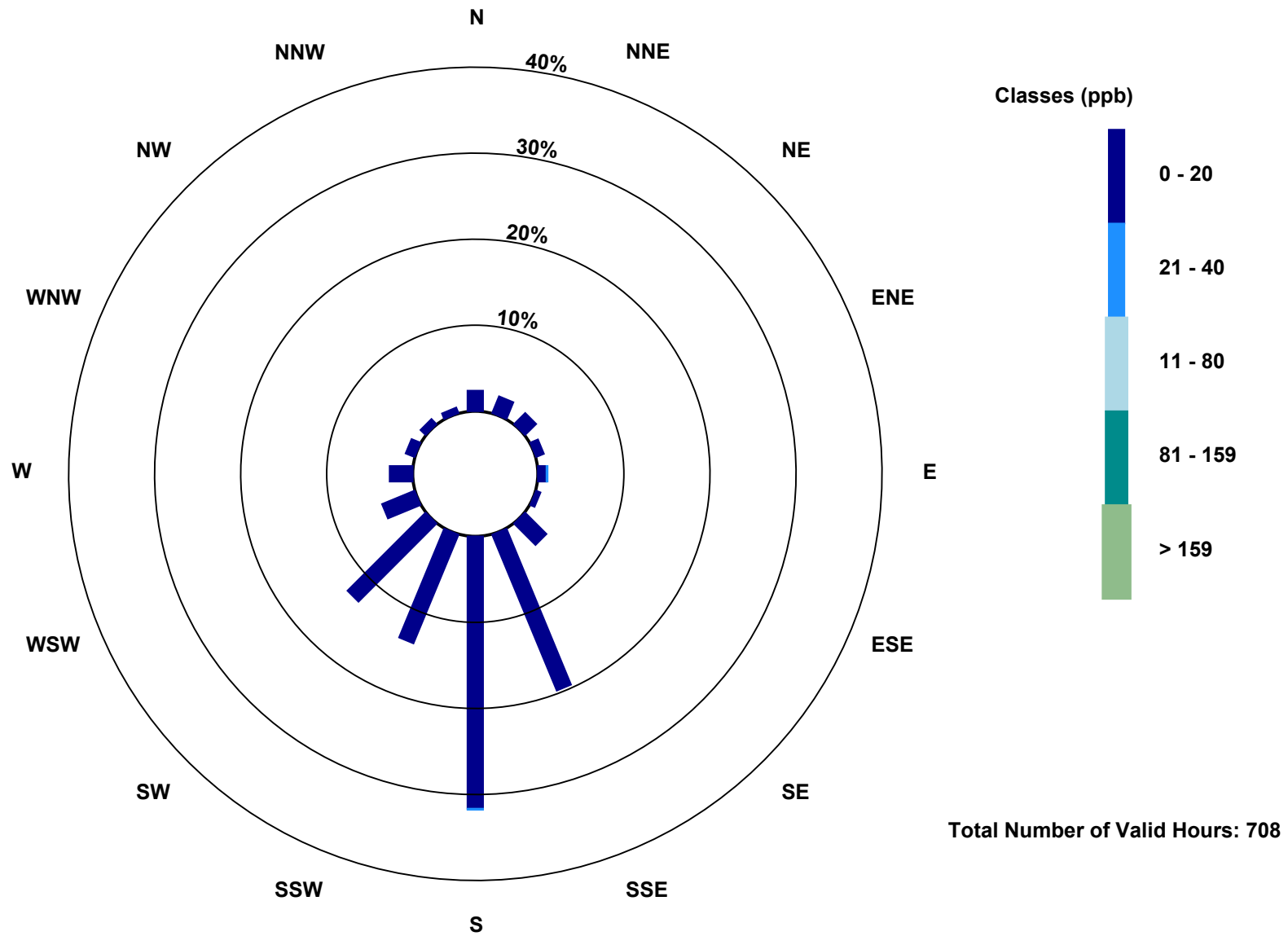
Total Number of Valid Hours: 708

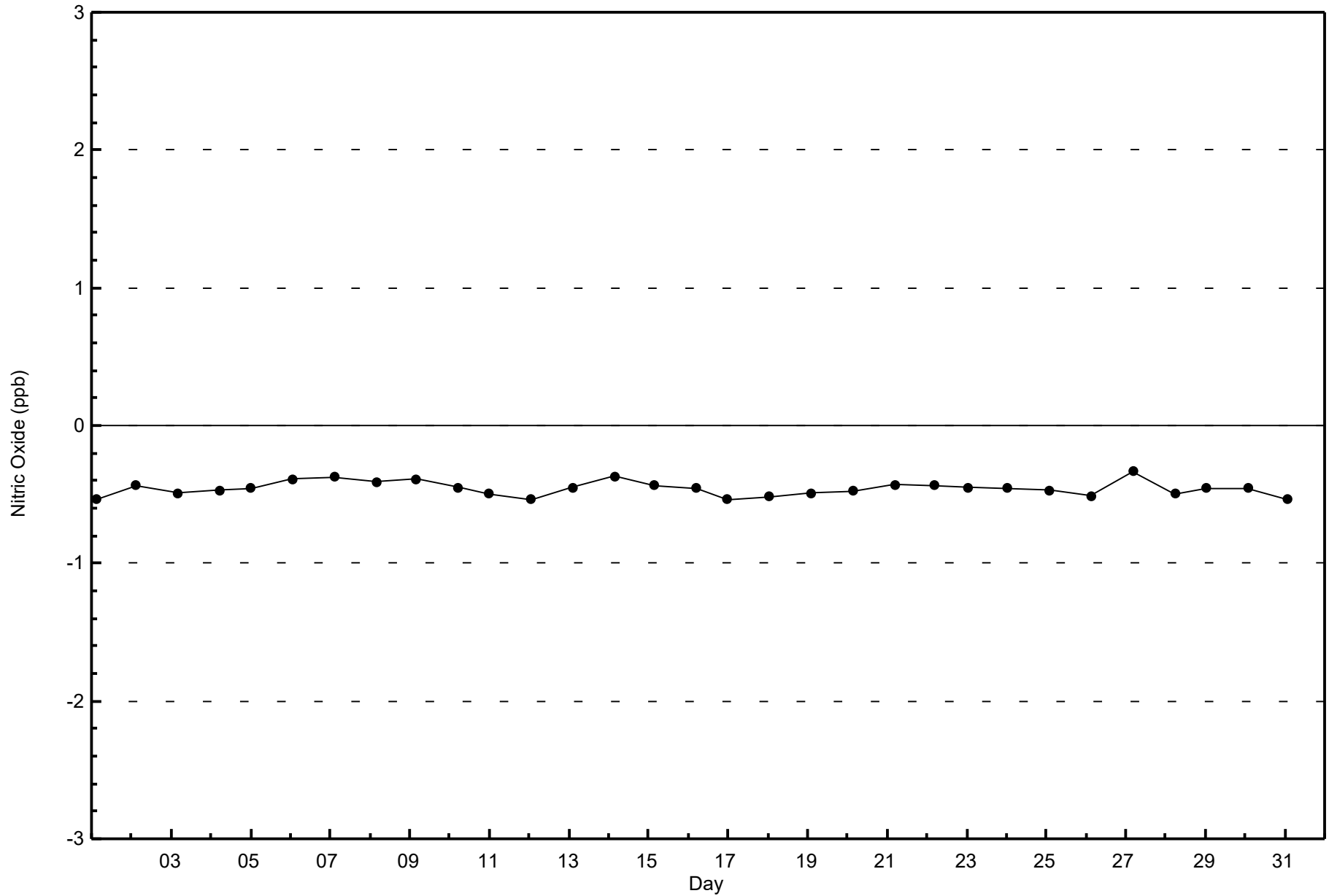
Total Number of Hours: 744

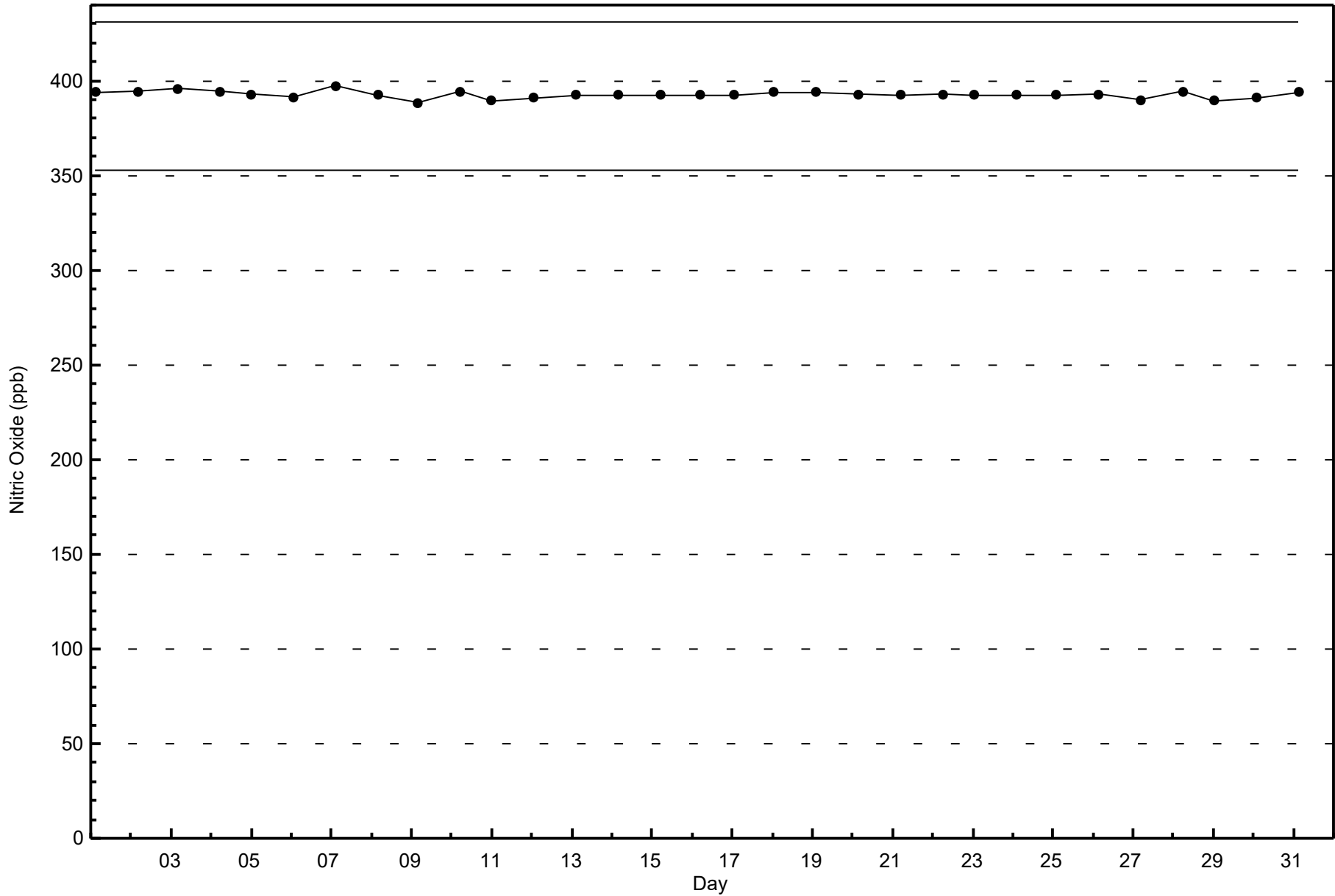


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Nitric Oxide (NO) - ppb
Wapasu









Wood Buffalo Environmental Association

Summary of Hour Averages

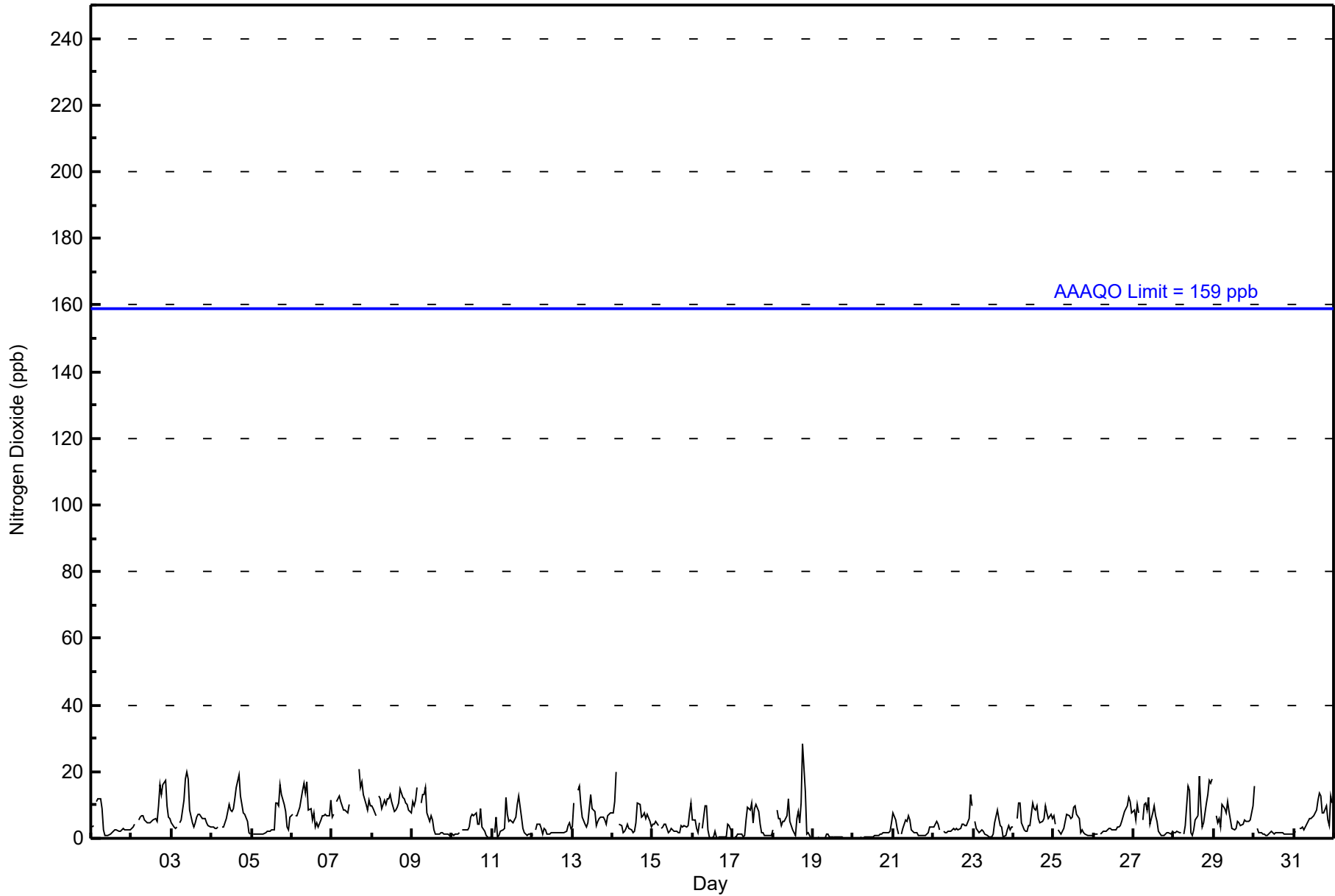
Nitrogen Dioxide (NO₂) - ppb

Wapasu - December 2023

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 28.6 ppb on Dec 18 19:00	Maximum Daily Average: 11.1 ppb on Dec 7		Hours of Data:	708
Minimum Value: 0.2 ppb on Dec 10 23:00	Minimum Daily Average: 0.4 ppb on Dec 19		Hours of Missing Data:	36
Maximum Diurnal Average: 6.2 ppb at hour 9	Minimum Diurnal Average: 4.3 ppb at hour 13		Hours of Calibration:	36
Monthly Average: 5.08 ppb	Percentiles: P ₁ = 0.2 P ₁₀ = 0.8 Q ₁ = 1.7 Median = 3.9 Q ₃ = 7.5 P ₉₀ = 10.9 P ₉₉ = 17.9		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-Dec	3.2	4.0	Z	10.9	11.7	11.9	9.1	2.5	1.0	0.8	1.0	1.1	1.5	2.3	2.7	2.4	2.2	2.3	2.5	2.8	2.6	2.6	2.4	2.4	3.7	11.9
2-Dec	2.8	3.4	4.3	Z	5.6	6.4	6.8	6.7	5.3	4.6	4.6	4.6	5.0	5.3	5.9	5.0	9.6	16.0	13.1	16.1	17.4	9.9	6.4	6.1	7.4	17.4
3-Dec	4.5	3.4	3.1	3.5	Z	4.6	5.6	11.5	17.9	20.1	17.6	8.5	4.5	3.5	4.8	6.3	7.4	7.1	5.9	5.9	5.8	4.8	3.8	3.6	7.1	20.1
4-Dec	3.4	3.3	3.1	3.1	3.2	Z	3.3	3.2	4.8	6.0	10.2	8.5	8.1	8.8	11.8	15.4	19.1	12.8	10.0	7.6	7.3	5.1	1.8	1.4	7.0	19.1
5-Dec	Z	1.2	1.2	1.3	1.2	1.3	1.1	1.4	1.7	2.1	2.1	2.0	2.6	2.4	10.5	10.7	9.8	16.1	13.2	10.1	8.2	3.4	2.6	6.2	4.9	16.1
6-Dec	7.1	Z	6.6	6.7	8.1	9.3	14.4	16.7	13.4	16.9	8.6	8.7	5.5	7.7	3.5	4.6	3.4	5.4	6.6	6.7	7.2	6.8	6.6	11.5	8.3	16.9
7-Dec	6.3	7.4	Z	11.1	12.7	11.2	9.6	8.6	8.6	7.7	10.2	Z	Z	Z	Z	Z	20.6	15.4	16.9	13.0	10.2	8.3	11.5	9.6	11.1	20.6
8-Dec	9.6	9.0	6.9	Z	12.9	11.8	8.7	11.4	10.1	11.9	11.9	13.3	11.1	8.0	8.5	9.4	10.6	14.8	12.2	11.8	10.7	10.1	8.4	7.8	10.5	14.8
9-Dec	11.0	9.9	11.5	15.3	Z	10.6	13.2	13.2	15.2	7.8	5.1	6.6	5.4	2.4	1.3	1.2	1.4	1.5	1.8	1.2	1.2	1.1	0.9	0.9	6.1	15.3
10-Dec	1.1	1.0	1.1	1.4	1.6	Z	2.4	2.5	2.5	2.7	3.4	6.4	7.1	6.7	7.8	4.4	4.4	8.8	3.3	2.1	0.9	0.3	0.2	0.3	3.1	8.8
11-Dec	Z	1.8	6.2	0.3	0.8	2.0	2.4	3.1	12.3	7.0	5.0	5.3	4.6	5.6	6.5	10.3	12.9	6.4	2.9	1.5	1.1	0.8	1.1	1.2	4.4	12.9
12-Dec	1.0	Z	2.6	4.4	4.4	2.9	1.1	2.8	2.6	1.3	1.4	1.7	1.5	1.6	1.8	1.7	1.7	1.6	1.5	1.5	2.0	3.9	4.6	2.9	2.3	4.6
13-Dec	3.2	10.4	Z	14.3	15.6	10.1	6.5	4.1	3.6	4.7	9.0	13.1	8.7	8.1	3.9	5.2	6.0	6.5	6.3	5.3	4.4	6.9	7.2	7.5	7.4	15.6
14-Dec	7.7	10.9	19.8	Z	4.2	3.9	1.6	2.1	2.8	4.1	2.9	2.4	1.7	2.2	4.6	10.6	10.3	6.4	6.9	7.6	6.1	7.0	4.9	3.3	5.8	19.8
15-Dec	4.3	4.2	5.2	3.7	Z	2.9	3.5	4.4	4.4	1.5	2.0	2.8	2.6	2.3	2.3	1.5	1.7	3.8	3.6	3.7	3.6	4.0	7.7	10.5	3.7	10.5
16-Dec	5.5	5.5	3.0	1.5	4.8	Z	2.9	9.8	9.7	2.7	0.3	0.2	0.5	2.1	0.4	0.2	0.3	0.4	0.4	0.3	0.3	4.3	3.9	1.7	2.6	9.8
17-Dec	Z	0.3	0.3	1.4	1.3	1.4	0.6	1.0	5.3	9.3	8.3	10.7	4.7	9.1	10.3	7.9	4.2	1.5	1.9	0.8	0.8	0.8	0.8	0.9	3.6	10.7
18-Dec	2.4	Z	8.4	6.0	5.8	3.9	5.0	5.2	6.9	11.7	5.1	4.0	2.5	1.0	6.1	8.0	4.6	10.4	28.6	14.0	1.3	1.9	0.7	0.2	6.2	28.6
19-Dec	0.2	0.2	Z	0.3	0.2	0.2	0.2	0.2	1.3	1.3	0.6	0.3	0.5	0.4	0.4	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.4	1.3
20-Dec	0.2	0.2	0.2	Z	0.3	0.2	0.2	0.3	0.3	0.3	0.4	0.4	0.5	0.7	0.8	1.0	1.2	1.4	1.6	1.5	1.6	1.8	2.3	4.8	1.0	4.8
21-Dec	7.6	5.4	2.9	1.4	Z	1.1	3.1	5.4	5.1	6.8	5.7	2.7	1.8	1.8	1.5	1.0	0.8	0.8	0.7	0.9	1.1	1.8	3.3	3.6	2.9	7.6
22-Dec	3.5	4.1	5.2	4.3	2.5	Z	2.0	1.9	1.9	2.1	2.1	2.5	2.8	2.6	3.0	2.6	3.1	4.1	4.1	3.9	3.8	6.0	13.1	9.8	4.0	13.1
23-Dec	Z	5.0	3.0	1.5	2.1	2.5	2.2	1.3	0.9	0.6	0.5	0.4	1.2	4.5	8.4	5.9	3.7	3.2	0.6	0.7	2.7	4.0	2.4	3.4	2.6	8.4
24-Dec	3.5	Z	6.1	10.6	10.6	4.7	2.4	2.1	2.0	3.9	3.8	10.6	8.7	8.4	9.8	6.1	4.5	5.0	6.0	9.9	7.8	6.0	7.0	6.1	6.3	10.6
25-Dec	6.6	4.1	Z	2.5	1.3	2.2	3.0	5.1	7.4	6.7	6.0	6.2	9.2	9.6	7.2	5.9	1.6	2.7	1.7	1.3	1.0	0.9	0.9	0.9	4.1	9.6
26-Dec	0.7	1.3	1.2	Z	1.4	1.9	2.2	2.1	2.5	3.1	3.0	2.7	2.5	2.6	3.5	3.3	4.0	5.2	8.1	8.8	9.8	12.2	11.1	7.8	4.4	12.2
27-Dec	8.5	5.6	10.0	7.8	Z	5.4	10.1	10.4	8.4	12.2	4.3	7.8	9.9	6.9	4.9	2.0	0.9	0.8	0.7	1.1	1.7	1.5	1.4	2.3	5.4	12.2
28-Dec	1.7	1.8	2.0	1.8	1.5	Z	1.3	3.8	15.8	14.5	1.8	0.7	2.6	5.7	6.7	18.6	9.7	3.4	4.6	10.7	13.1	17.3	16.4	17.9	7.5	18.6
29-Dec	Z	6.8	4.7	6.0	3.6	10.3	8.7	7.5	11.0	8.2	5.4	2.8	2.6	3.0	4.9	4.7	4.0	4.2	5.5	4.9	5.2	4.9	5.3	9.7	5.8	11.0
30-Dec	15.8	Z	3.1	1.9	1.7	1.4	1.1	1.0	0.9	1.3	2.2	1.8	1.4	1.8	1.8	1.9	1.9	1.7	1.3	1.2	1.2	1.4	1.4	1.3	2.2	15.8
31-Dec	1.4	2.2	Z	2.8	2.9	3.2	2.4	3.2	5.2	6.1	5.8	6.5	6.8	8.6	11.6	13.6	12.8	7.8	7.7	9.7	5.3	4.0	12.8	10.7	6.7	13.6
	4.7	4.3	4.9	4.8	4.7	4.9	4.4	5.0	6.2	6.1	4.8	4.8	4.3	4.5	5.2	5.7	5.8	5.7	5.8	5.4	4.7	4.6	4.9	5.0	Diurnal Average	
	15.8	10.9	19.8	15.3	15.6	11.9	14.4	16.7	17.9	20.1	17.6	13.3	11.1	9.6	11.8	18.6	20.6	16.1	28.6	16.1	17.4	17.3	16.4	17.9	Diurnal Maximum	

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Wapasu - December 2023**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	706	99.72	99.72
21 - 40	2	0.28	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 708

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Wapasu - December 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	17	15	13	7	8	4	25	139	225	96	91	29	18	8	6	5	706
21 - 40	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	2
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	17	15	13	7	8	4	25	139	225	97	91	29	19	8	6	5	708

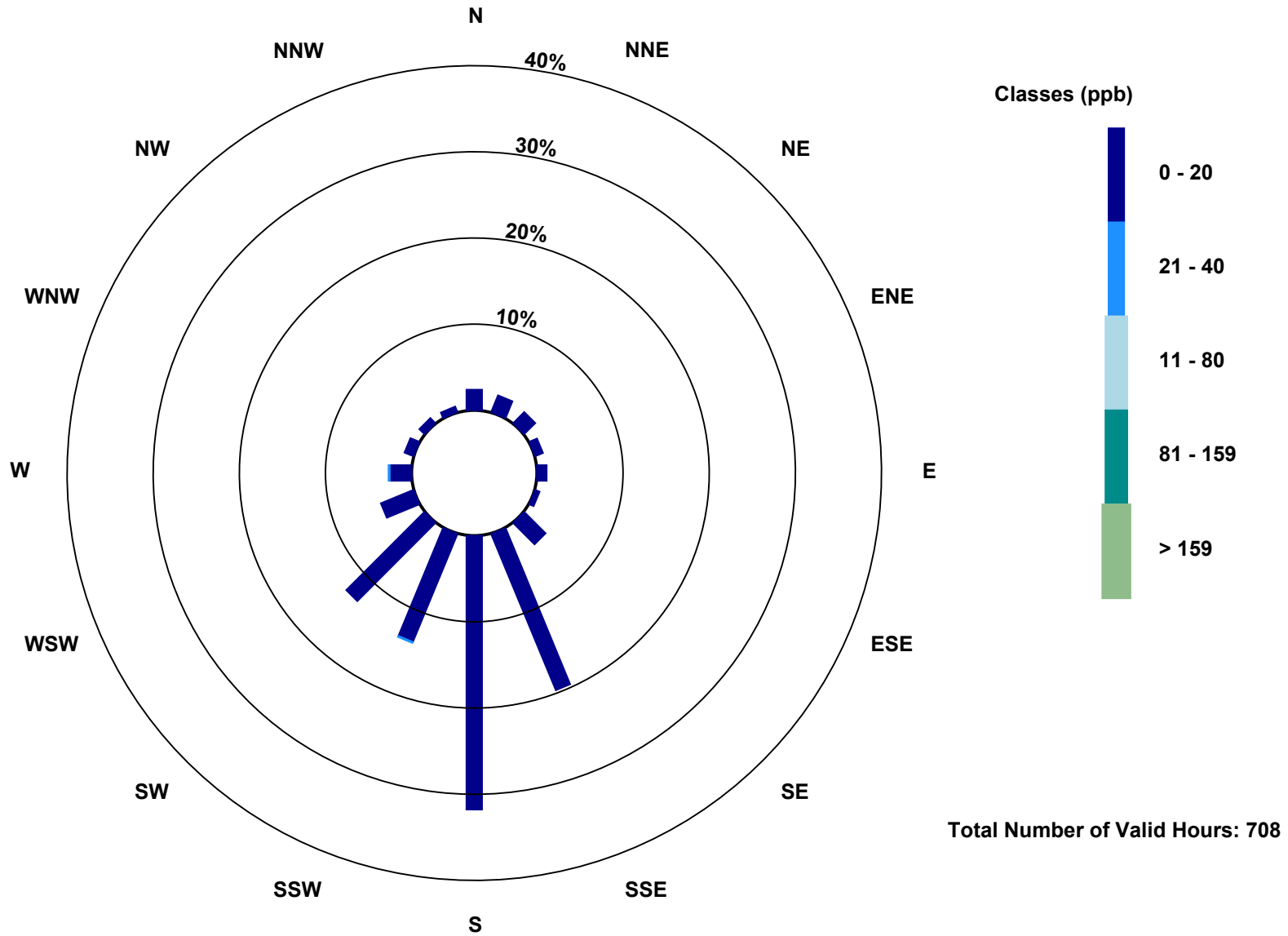
Total Number of Valid Hours: 708

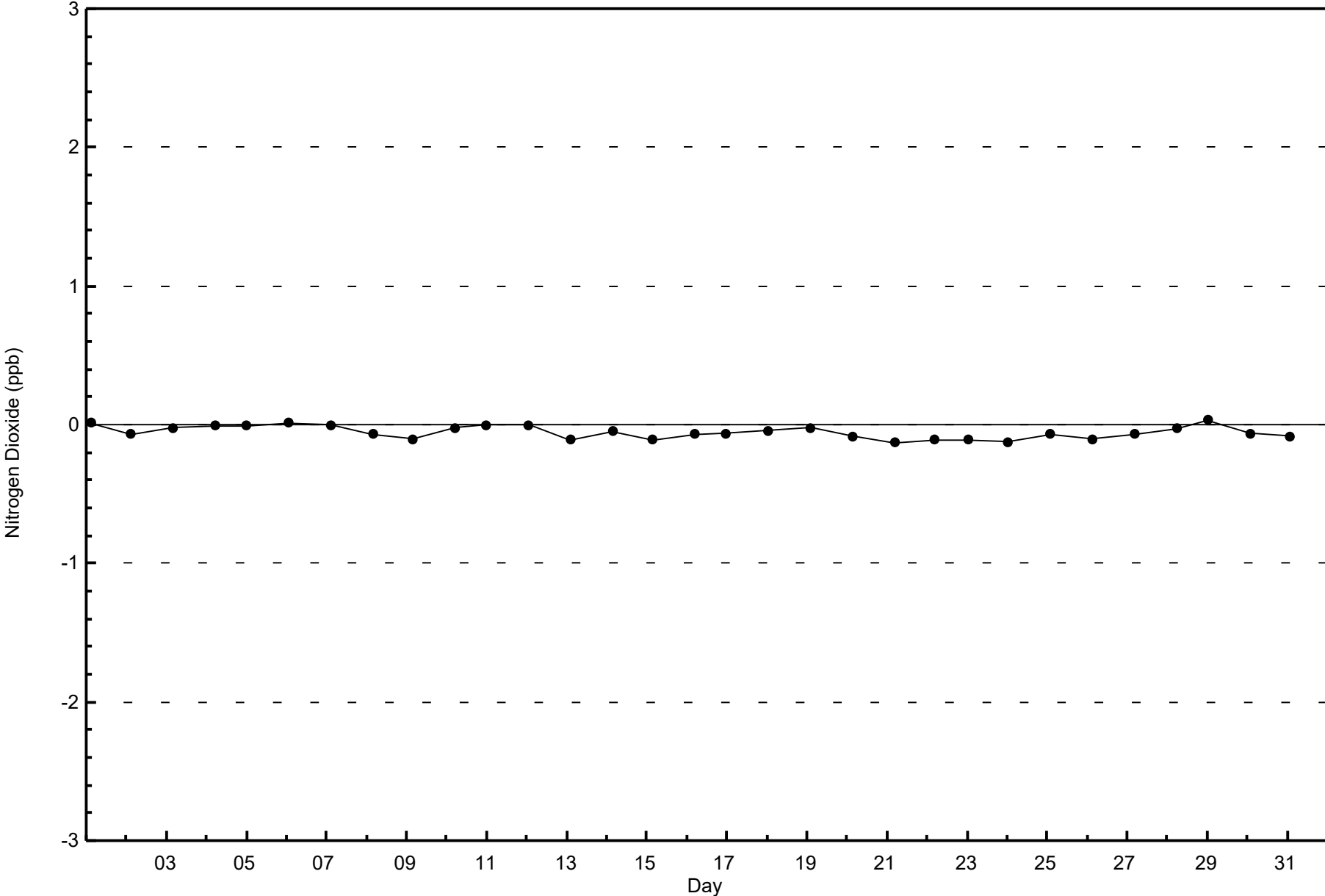
Total Number of Hours: 744

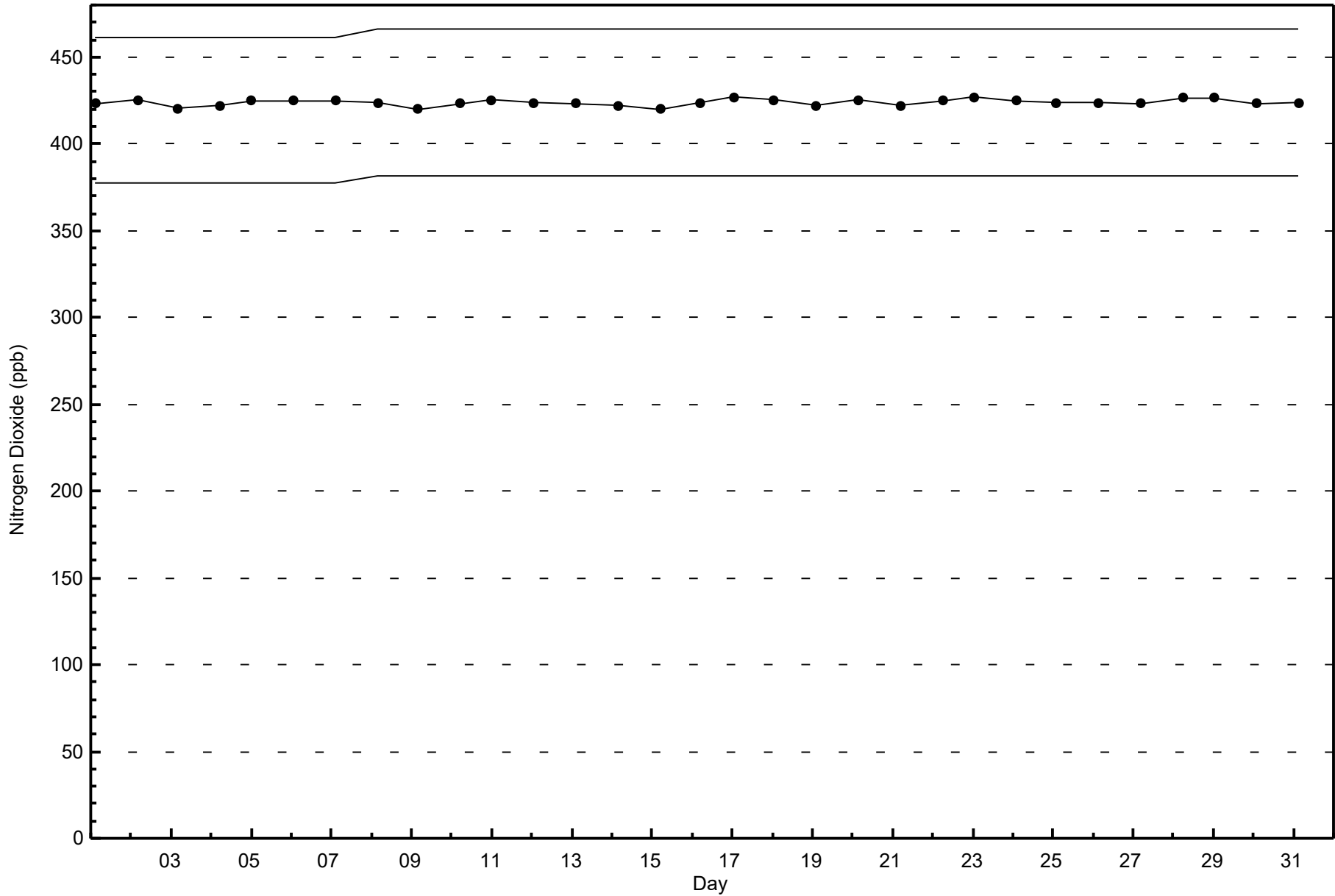


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Nitrogen Dioxide (NO₂) - ppb
Wapasu









Wood Buffalo Environmental Association
Summary of Hour Averages

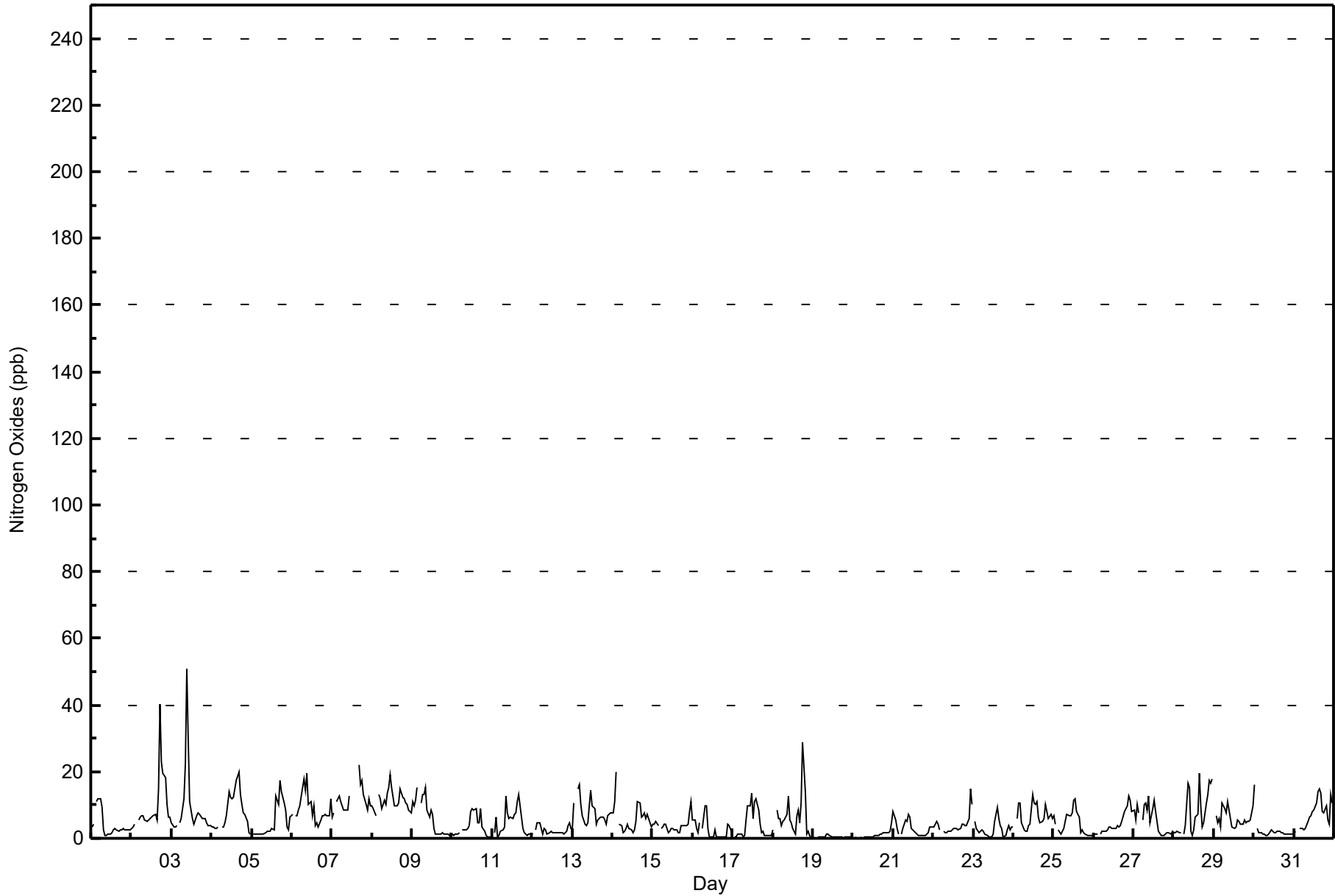
Nitrogen Oxides (NO_x) - ppb
Wapasu - December 2023

Maximum Value: 50.8 ppb on Dec 3 10:00																				Maximum Daily Average: 11.4 ppb on Dec 7					Hours in Service: 744				
Minimum Value: 0.2 ppb on Dec 19 19:00																				Minimum Daily Average: 0.4 ppb on Dec 19					Hours of Data: 708				
Maximum Diurnal Average: 7.5 ppb at hour 10																				Minimum Diurnal Average: 4.3 ppb at hour 2					Hours of Missing Data: 36				
Monthly Average: 5.48 ppb																				Percentiles: P ₁ = 0.2 P ₁₀ = 0.9 Q ₁ = 1.7 Median = 4.0 Q ₃ = 7.9 P ₉₀ = 11.8 P ₉₉ = 20.1					Hours of Calibration: 36				
																				Percent Operational Time: 100.0									
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24					
1-Dec	3.3	4.1	Z	11.1	11.8	12.0	9.2	2.5	1.0	0.9	1.2	1.4	1.9	2.7	3.0	2.5	2.2	2.3	2.5	2.8	2.6	2.6	2.4	2.4	3.8	12.0			
2-Dec	2.8	3.4	4.3	Z	5.6	6.4	6.8	6.7	5.3	4.9	5.5	5.9	6.5	6.7	7.1	5.3	14.9	40.3	22.8	19.3	18.3	10.2	6.5	6.2	9.6	40.3			
3-Dec	4.6	3.5	3.2	3.6	Z	4.7	5.7	12.0	22.4	50.8	29.9	11.0	5.7	4.4	5.5	6.7	7.5	7.2	6.0	6.0	5.9	4.9	3.9	3.7	9.5	50.8			
4-Dec	3.5	3.3	3.1	3.2	3.2	Z	3.4	3.3	4.9	6.6	14.1	12.1	11.7	12.1	14.9	17.3	19.9	13.0	10.2	7.7	7.4	5.2	1.9	1.4	8.0	19.9			
5-Dec	Z	1.2	1.2	1.3	1.2	1.3	1.1	1.4	1.7	2.1	2.2	2.3	2.9	2.7	12.6	11.6	10.1	17.4	13.8	10.5	8.5	3.4	2.6	6.2	5.2	17.4			
6-Dec	7.2	Z	6.6	6.8	8.4	9.7	15.2	17.9	14.4	19.6	10.2	11.1	6.8	9.7	3.8	4.8	3.5	5.4	6.7	6.8	7.3	6.9	6.7	11.8	9.0	19.6			
7-Dec	6.4	7.5	Z	11.1	12.7	11.2	9.6	8.6	8.6	8.3	12.8	C	C	C	C	C	22.1	16.0	17.3	13.1	10.2	8.3	11.7	9.7	11.4	22.1			
8-Dec	9.7	9.0	6.9	Z	13.0	12.0	8.8	11.6	10.3	13.6	15.1	18.9	15.3	9.9	9.7	9.8	10.7	14.9	12.3	11.9	10.8	10.1	8.5	7.8	11.3	18.9			
9-Dec	11.1	9.9	11.5	15.4	Z	10.7	13.3	13.3	15.5	8.5	6.2	8.6	7.1	3.0	1.5	1.3	1.4	1.5	1.8	1.2	1.2	1.1	0.9	0.9	6.4	15.5			
10-Dec	1.1	1.0	1.1	1.4	1.6	Z	2.4	2.5	2.5	2.8	3.7	8.1	9.0	8.4	8.9	4.6	4.5	8.9	3.4	2.2	1.0	0.4	0.3	0.4	3.5	9.0			
11-Dec	Z	1.9	6.3	0.3	0.9	2.1	2.5	3.2	12.5	7.6	6.0	6.6	5.9	7.0	7.5	10.8	13.1	6.5	3.0	1.6	1.2	0.9	1.1	1.3	4.8	13.1			
12-Dec	1.1	Z	2.6	4.5	4.5	2.9	1.1	2.8	2.7	1.4	1.6	2.0	1.8	1.8	1.9	1.7	1.7	1.6	1.5	1.5	2.0	3.9	4.6	2.9	2.4	4.6			
13-Dec	3.2	10.6	Z	14.7	16.1	10.2	6.6	4.2	3.6	4.8	9.7	14.4	9.6	9.0	4.1	5.3	6.0	6.5	6.3	5.3	4.4	6.9	7.2	7.5	7.7	16.1			
14-Dec	7.7	10.9	20.1	Z	4.2	3.9	1.6	2.1	2.8	4.2	3.1	2.7	1.9	2.4	4.9	10.9	10.4	6.5	7.0	7.7	6.1	7.1	4.9	3.3	5.9	20.1			
15-Dec	4.3	4.2	5.2	3.7	Z	2.9	3.5	4.4	4.4	1.5	2.1	3.1	2.8	2.5	2.4	1.5	1.7	3.8	3.6	3.7	3.6	4.0	8.0	10.9	3.8	10.9			
16-Dec	5.5	5.6	3.0	1.5	4.8	Z	2.9	9.9	9.8	2.8	0.3	0.2	0.6	2.4	0.4	0.2	0.3	0.4	0.4	0.3	0.3	4.3	4.0	1.7	2.7	9.9			
17-Dec	Z	0.3	0.3	1.4	1.3	1.5	0.6	1.0	5.4	10.0	9.7	13.6	5.8	11.2	11.8	8.3	4.3	1.6	2.0	0.9	0.9	0.9	0.8	0.9	4.1	13.6			
18-Dec	2.4	Z	8.5	6.1	5.9	4.0	5.1	5.3	7.1	12.5	5.7	4.7	2.9	1.1	6.6	8.3	4.7	10.5	29.0	14.1	1.3	2.0	0.7	0.2	6.5	29.0			
19-Dec	0.2	0.2	Z	0.3	0.2	0.2	0.2	0.2	1.3	1.4	0.6	0.3	0.5	0.4	0.4	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.4	1.4			
20-Dec	0.2	0.2	0.2	Z	0.3	0.2	0.2	0.3	0.3	0.3	0.4	0.4	0.5	0.7	0.8	1.0	1.2	1.4	1.6	1.5	1.6	1.8	2.3	4.8	1.0	4.8			
21-Dec	7.9	5.4	2.9	1.4	Z	1.1	3.1	5.4	5.1	7.2	6.5	3.1	2.2	1.9	1.5	1.0	0.8	0.8	0.7	0.9	1.1	1.8	3.3	3.6	3.0	7.9			
22-Dec	3.5	4.1	5.2	4.3	2.5	Z	2.0	1.9	1.9	2.1	2.1	2.6	3.0	2.8	3.1	2.6	3.1	4.1	4.1	3.9	3.8	6.0	14.8	10.0	4.1	14.8			
23-Dec	Z	5.0	3.0	1.5	2.1	2.5	2.2	1.3	0.9	0.6	0.5	0.4	1.3	5.0	9.1	6.1	3.7	3.2	0.6	0.7	2.7	4.0	2.4	3.4	2.7	9.1			
24-Dec	3.5	Z	6.1	10.6	10.6	4.7	2.4	2.1	2.0	4.0	4.2	13.1	10.7	10.0	11.0	6.3	4.5	5.0	6.0	10.0	7.9	6.0	7.0	6.1	6.7	13.1			
25-Dec	6.6	4.1	Z	2.5	1.3	2.2	3.0	5.1	7.4	6.9	6.8	7.5	11.5	11.7	8.0	6.1	1.7	2.7	1.7	1.3	1.0	0.9	0.9	0.9	4.4	11.7			
26-Dec	0.7	1.3	1.2	Z	1.4	1.9	2.2	2.1	2.5	3.2	3.3	3.0	2.8	2.9	3.7	3.3	4.0	5.2	8.1	8.8	9.8	12.5	11.3	7.9	4.5	12.5			
27-Dec	8.6	5.6	10.1	7.8	Z	5.4	10.2	10.5	8.5	12.8	4.6	9.0	11.6	7.9	5.3	2.0	0.9	0.8	0.7	1.1	1.7	1.5	1.4	2.3	5.7	12.8			
28-Dec	1.7	1.8	2.0	1.8	1.5	Z	1.3	3.8	16.4	15.2	1.9	0.7	2.8	6.5	7.1	19.5	9.8	3.4	4.6	10.7	13.2	17.4	16.5	18.0	7.7	19.5			
29-Dec	Z	6.8	4.7	6.1	3.6	10.6	8.8	7.6	11.1	8.6	6.1	3.2	3.0	3.4	5.4	4.9	4.0	4.2	5.5	4.9	5.2	4.9	5.3	9.7	6.0	11.1			
30-Dec	15.9	Z	3.1	1.9	1.7	1.4	1.1	1.0	0.9	1.3	2.4	2.0	1.6	1.9	1.9	2.0	1.9	1.7	1.3	1.2	1.2	1.4	1.4	1.3	2.2	15.9			
31-Dec	1.4	2.2	Z	2.8	2.9	3.2	2.4	3.2	5.2	6.4	6.7	8.2	8.6	10.7	13.8	14.8	13.5	8.0	7.8	9.9	5.4	4.1	13.0	10.8	7.2	14.8			
4.8 4.3 4.9 4.9 4.7 5.0 4.5 5.1 6.4 7.5 6.0 6.0 5.3 5.4 5.9 6.0 6.1 6.6 6.2 5.5 4.8 4.7 5.1 5.1																								Diurnal Average					
15.9 10.9 20.1 15.4 16.1 12.0 15.2 17.9 22.4 50.8 29.9 18.9 15.3 12.1 14.9 19.5 22.1 40.3 29.0 19.3 18.3 17.4 16.5 18.0																								Diurnal Maximum					
Z - zerospan C - Calibration																													



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Wapasu - December 2023





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Wapasu - December 2023**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	701	99.01	99.01
21 - 40	6	0.85	99.86
41 - 80	1	0.14	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 708

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Nitrogen Oxides (NO_x) - ppb
Wapasu - December 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	17	15	13	7	6	4	25	139	223	95	91	29	18	8	6	5	701
21 - 40	0	0	0	0	2	0	0	0	1	2	0	0	1	0	0	0	6
11 - 80	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	17	15	13	7	8	4	25	139	225	97	91	29	19	8	6	5	708

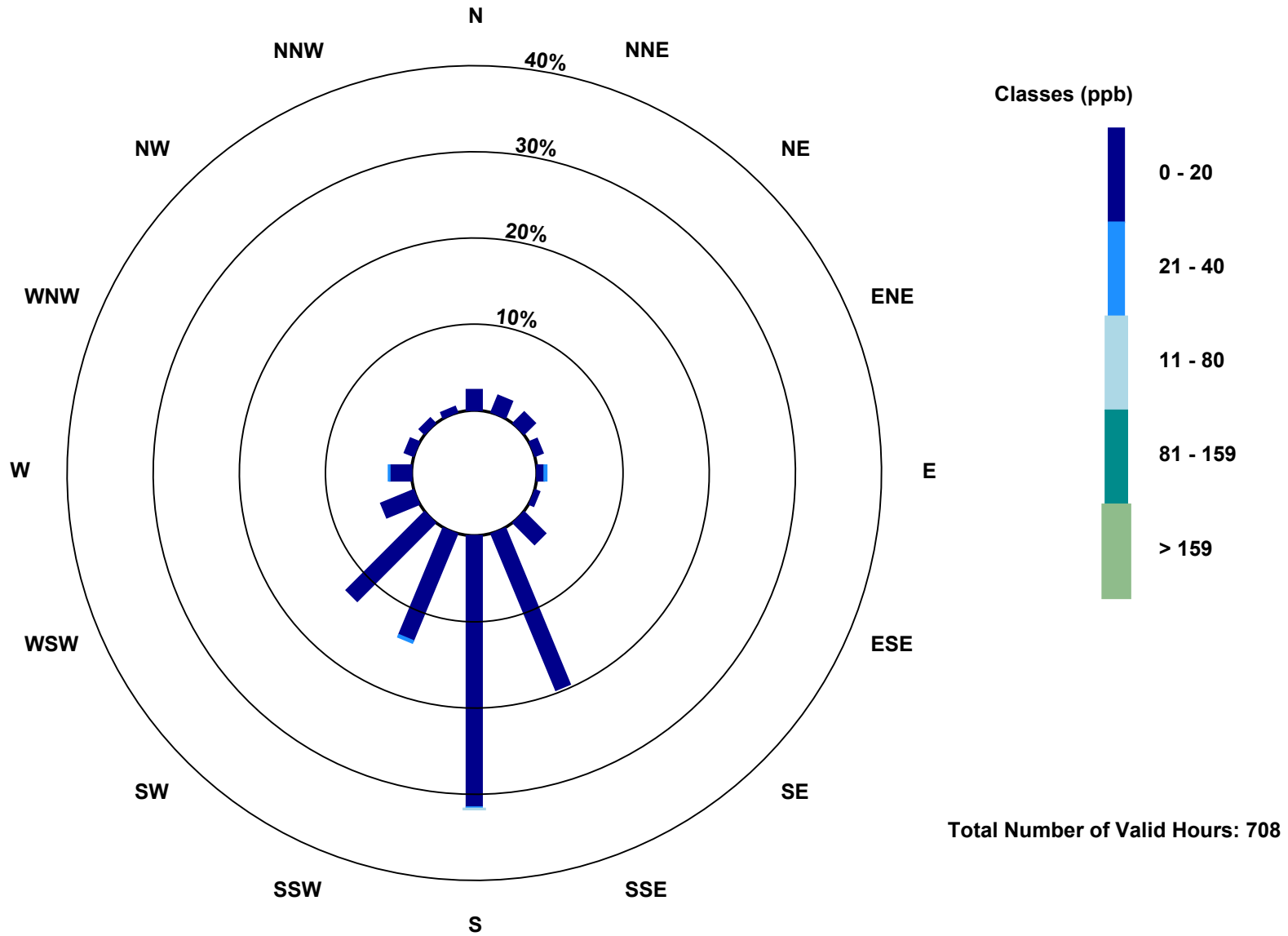
Total Number of Valid Hours: 708

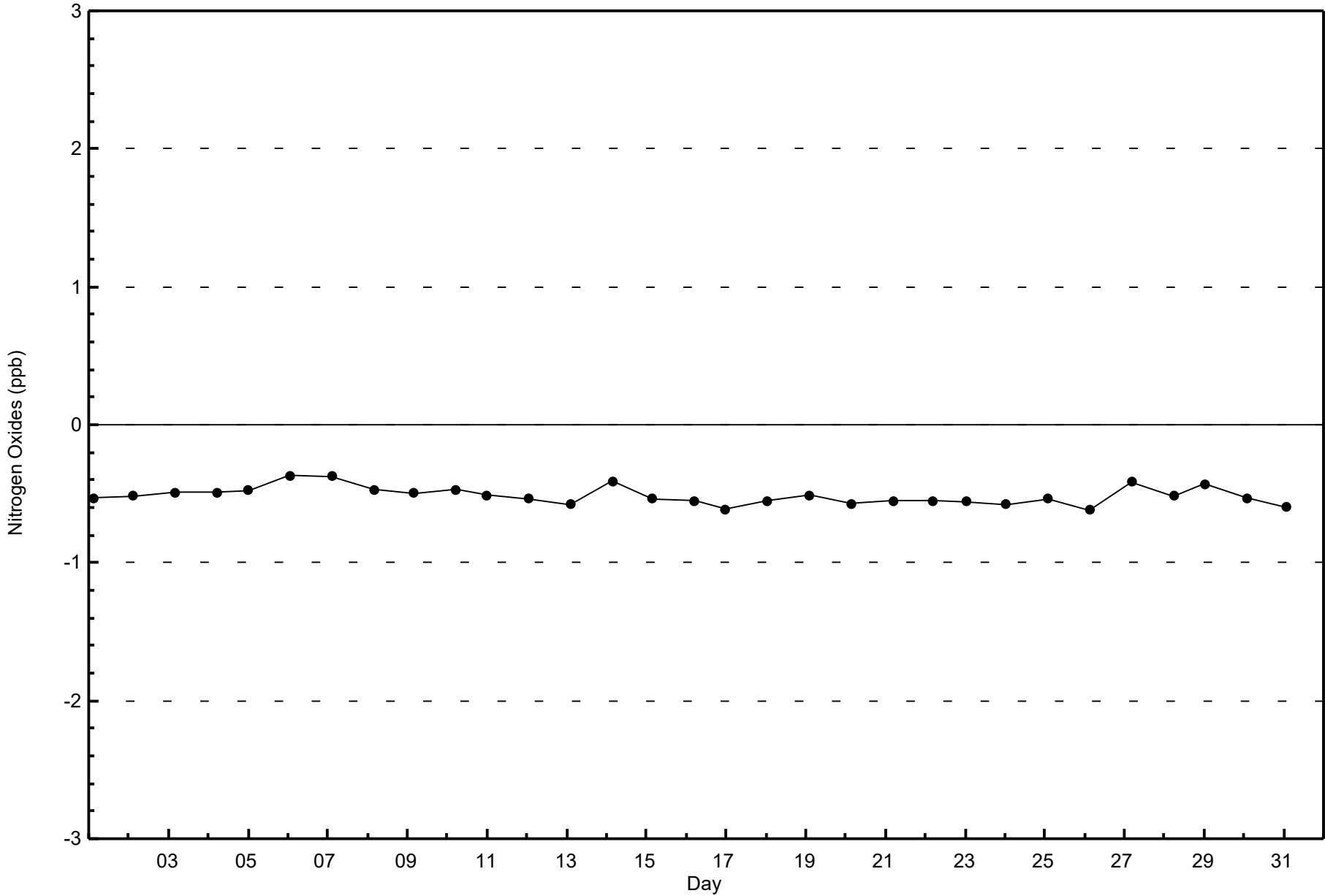
Total Number of Hours: 744

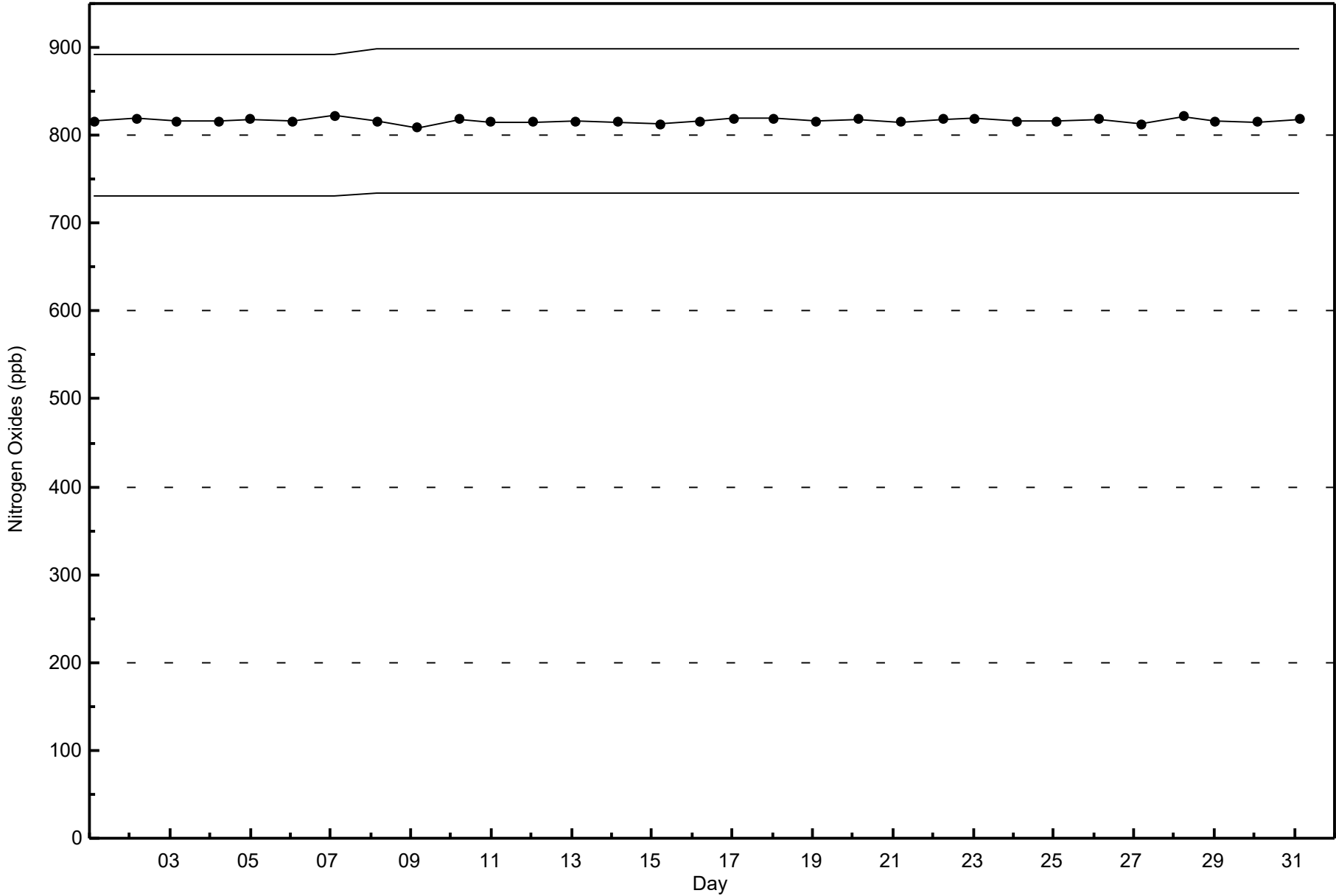


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Nitrogen Oxides (NO_x) - ppb
Wapasu

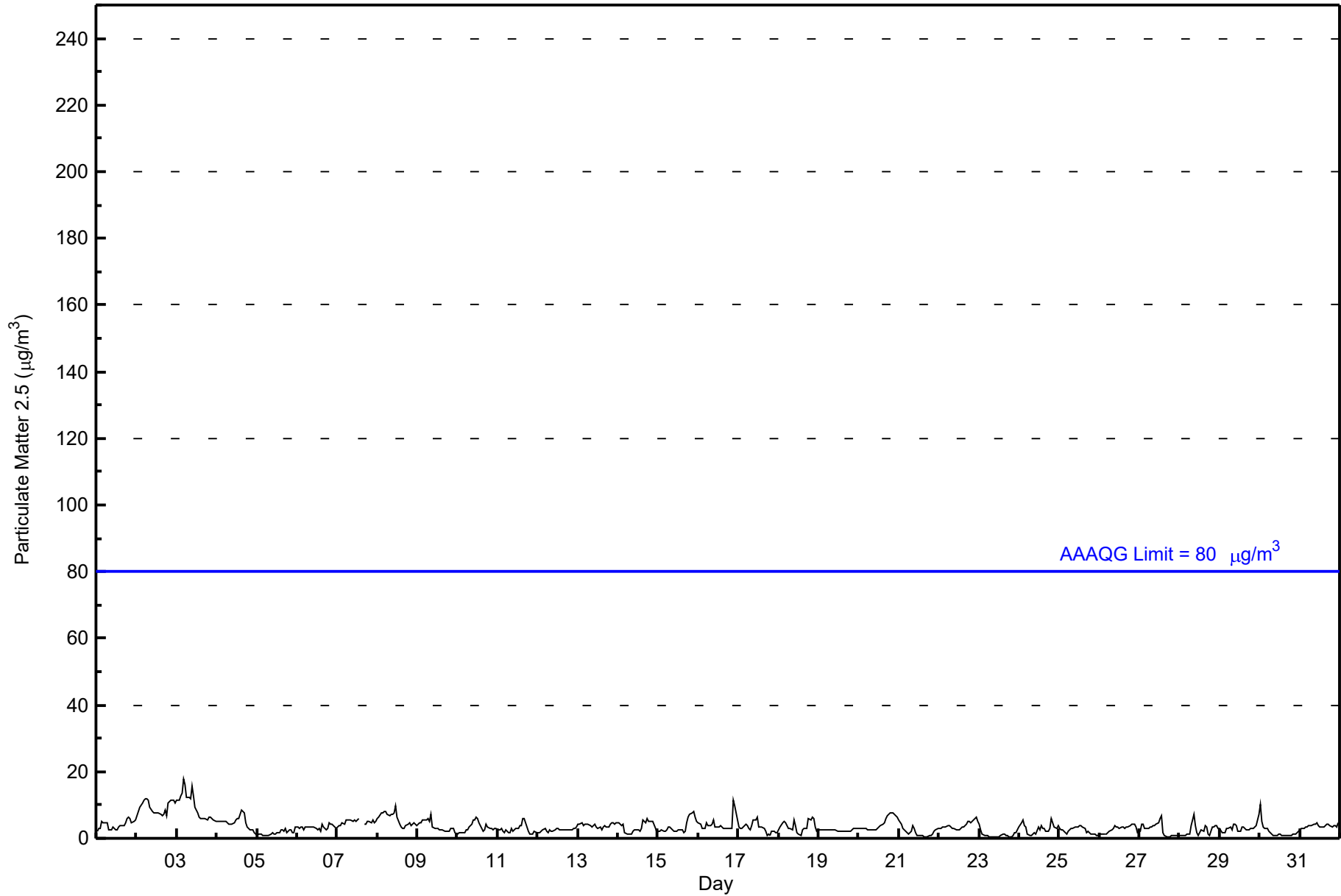








Number of Exceedences (AAAQO):		1-hr: 0		24-hr: 0		Hours in Service:														744																													
Maximum Value: 18.0 µg/m ³ on Dec 3 05:00				Maximum Daily Average: 9.6 µg/m ³ on Dec 3		Hours of Data:														742																													
Minimum Value: 0.4 µg/m ³ on Dec 23 12:00				Minimum Daily Average: 1.1 µg/m ³ on Dec 23		Hours of Missing Data:														2																													
Maximum Diurnal Average: 4.1 µg/m ³ at hour 22				Minimum Diurnal Average: 3.2 µg/m ³ at hour 15		Hours of Calibration:														2																													
Monthly Average: 3.63 µg/m ³				Percentiles: P ₁ = 0.5 P ₁₀ = 1.2 Q ₁ = 2.2 Median = 3.1 Q ₃ = 4.5 P ₉₀ = 6.3 P ₉₉ = 12.1		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-Dec	2.2	2.9	3.1	5.0	4.7	4.5	4.6	2.7	2.6	2.6	3.4	2.7	2.7	3.4	4.0	3.7	3.7	4.6	6.1	6.5	5.7	4.8	5.0	5.6	4.0	6.5																							
2-Dec	6.8	7.9	9.5	10.8	11.6	11.9	11.9	11.6	9.4	8.1	7.6	7.6	7.6	7.5	7.2	6.8	7.1	8.5	6.7	10.7	11.6	11.6	11.4	10.8	9.3	11.9																							
3-Dec	11.3	11.4	12.7	13.6	18.0	16.2	12.4	12.2	11.9	15.6	12.9	9.1	7.6	6.4	6.0	5.9	5.9	5.8	5.5	6.2	6.2	5.8	5.5	5.2	9.6	18.0																							
4-Dec	5.0	5.0	5.1	5.1	5.2	5.0	4.7	4.3	4.2	4.1	4.8	5.5	5.8	6.0	7.1	8.4	7.7	4.5	3.4	3.1	2.6	2.5	1.7	1.2	4.7	8.4																							
5-Dec	1.0	1.2	1.2	0.9	0.8	0.8	0.8	0.9	1.2	1.5	1.4	1.4	1.6	1.6	2.6	2.6	2.3	2.8	1.8	2.6	2.7	1.8	1.6	3.5	1.7	3.5																							
6-Dec	3.3	3.0	3.3	3.3	2.6	3.2	3.5	3.6	3.3	3.5	3.5	3.1	2.6	2.8	2.3	4.2	3.3	2.6	3.1	4.8	4.4	4.1	3.5	2.8	3.3	4.8																							
7-Dec	3.4	3.9	3.8	4.5	4.1	5.5	5.4	5.5	5.5	5.2	5.4	5.2	5.7	6.1	C	C	4.2	4.2	5.0	5.2	4.5	5.4	4.7	5.2	4.9	6.1																							
8-Dec	5.7	6.5	7.5	7.8	8.1	8.0	7.4	6.9	7.3	7.1	7.6	9.6	6.2	4.4	3.6	3.2	3.2	3.7	4.1	4.6	3.9	4.2	4.6	3.8	5.8	9.6																							
9-Dec	4.2	4.7	4.8	5.3	5.7	5.6	5.8	5.1	7.1	3.4	3.1	3.2	2.8	2.5	2.5	2.6	2.2	2.1	2.0	2.1	3.0	2.8	1.8	1.4	3.6	7.1																							
10-Dec	1.4	1.5	1.6	1.6	1.7	2.4	2.7	3.4	4.2	5.3	5.7	6.3	6.1	4.6	3.1	2.3	2.4	4.2	3.5	3.1	2.8	2.7	2.8	2.8	3.3	6.3																							
11-Dec	2.6	2.7	3.1	1.9	1.7	2.5	1.8	1.8	3.1	2.3	2.5	3.0	2.9	4.0	3.8	6.1	6.0	3.4	2.0	1.4	1.2	1.4	2.2	1.8	2.7	6.1																							
12-Dec	1.7	1.7	2.2	2.7	2.8	2.3	1.9	2.4	2.1	2.2	2.7	3.1	2.9	2.7	2.5	2.6	2.6	2.7	2.7	2.6	2.7	2.8	3.0	3.5	2.5	3.5																							
13-Dec	4.1	4.1	4.5	3.9	4.2	4.2	4.4	3.8	3.4	3.8	4.2	3.2	2.9	3.3	2.7	3.2	3.7	3.3	3.4	4.1	4.6	4.6	4.3	4.7	3.9	4.7																							
14-Dec	4.5	4.4	3.9	4.1	1.6	1.4	1.1	1.4	1.3	2.3	2.5	2.4	2.3	2.0	3.1	5.7	4.8	5.8	5.2	5.1	4.9	5.0	3.1	1.9	3.3	5.8																							
15-Dec	2.0	2.0	2.4	2.0	2.1	2.7	3.2	3.6	2.8	2.1	2.0	2.2	2.5	2.4	2.5	1.8	2.1	4.6	6.3	7.2	7.7	7.9	6.4	5.2	3.6	7.9																							
16-Dec	4.6	4.2	3.1	2.9	3.2	4.8	3.7	3.7	4.3	5.4	3.5	3.4	3.4	3.8	3.3	3.1	3.0	2.9	2.9	2.8	3.0	11.4	9.7	5.3	4.2	11.4																							
17-Dec	3.2	2.9	3.0	3.4	4.2	3.6	2.9	2.7	3.7	5.3	5.6	6.2	3.5	3.3	3.5	3.1	2.0	0.9	1.2	1.1	2.3	2.3	1.7	1.6	3.1	6.2																							
18-Dec	2.4	3.2	4.6	5.2	4.8	3.7	2.9	3.1	2.5	5.4	3.6	1.8	1.1	1.0	2.4	2.8	2.9	3.1	5.7	5.3	6.3	5.8	3.3	2.2	3.5	6.3																							
19-Dec	2.4	2.7	2.5	2.5	2.6	2.7	2.7	2.6	2.4	2.6	2.4	2.3	2.3	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.4	2.9	2.9	2.8	2.4	2.9																							
20-Dec	2.8	2.9	2.8	2.8	2.8	2.7	2.5	2.5	2.5	2.6	2.7	2.9	3.3	3.7	4.2	4.8	6.1	7.0	7.2	7.8	7.5	7.2	7.0	6.4	4.4	7.8																							
21-Dec	5.6	4.2	3.0	2.6	2.2	1.8	1.3	1.9	3.8	2.8	1.6	0.9	0.8	0.8	0.8	0.5	0.5	0.6	0.8	1.0	1.3	1.9	2.5	2.8	1.9	5.6																							
22-Dec	2.9	3.0	3.3	3.4	3.5	3.7	3.9	3.6	3.1	2.8	2.4	2.4	2.5	3.1	3.2	3.3	4.1	5.3	5.2	4.8	5.2	5.9	6.4	5.2	3.8	6.4																							
23-Dec	4.4	2.8	1.5	0.7	0.8	0.7	0.6	0.5	0.4	0.4	0.4	0.4	0.4	0.8	1.3	1.4	1.0	1.0	0.5	0.5	0.8	1.7	1.5	2.7	1.1	4.4																							
24-Dec	3.5	4.7	5.5	4.0	3.4	1.3	0.8	0.9	1.1	1.6	1.3	3.2	2.5	3.7	3.1	3.1	2.2	2.1	2.8	6.0	4.5	3.2	3.0	3.9	3.0	6.0																							
25-Dec	2.9	2.4	2.4	1.9	1.5	1.9	2.5	2.8	3.2	3.4	3.3	3.6	3.9	3.7	3.6	3.1	1.5	2.0	1.6	1.4	1.3	1.2	1.0	1.0	2.4	3.9																							
26-Dec	1.1	1.3	1.2	1.2	1.3	1.7	2.3	2.6	3.1	3.6	3.5	3.4	2.9	3.2	3.5	3.1	3.5	3.4	4.0	4.2	4.3	4.3	3.4	1.8	2.8	4.3																							
27-Dec	2.2	4.0	4.1	3.0	3.0	3.0	3.5	3.6	3.8	3.7	4.3	4.6	6.0	7.0	1.8	0.9	0.6	0.5	0.5	0.7	0.8	0.8	0.8	0.9	2.7	7.0																							
28-Dec	0.9	1.0	1.0	1.0	1.1	1.4	1.3	3.6	7.4	3.9	1.6	1.0	1.5	2.6	2.0	3.8	3.3	1.4	1.0	3.3	3.4	3.7	3.7	3.1	2.4	7.4																							
29-Dec	3.1	1.6	1.6	1.9	2.8	3.1	3.3	2.6	4.0	4.4	3.9	2.3	2.3	3.2	3.4	2.9	2.5	2.5	3.0	3.0	3.1	3.4	3.8	7.3	3.1	7.3																							
30-Dec	10.3	5.2	3.5	3.1	3.0	2.2	1.6	1.2	0.8	0.9	1.0	1.1	1.1	1.0	0.9	1.0	1.0	1.0	0.9	1.0	1.1	1.4	1.8	2.1	2.0	10.3																							
31-Dec	2.4	2.9	3.0	3.2	3.5	3.6	3.7	3.8	4.1	4.3	4.5	3.7	3.2	3.3	3.6	3.9	4.4	4.3	4.0	3.3	3.7	3.8	3.3	4.6	3.7	4.6																							
																								3.7	3.6	3.7	3.7	3.8	3.8	3.6	3.6	3.9	3.9	3.7	3.6	3.3	3.4	3.2	3.4	3.3	3.3	3.4	3.8	3.9	4.1	3.8	3.6	Diurnal Average	
																								11.3	11.4	12.7	13.6	18.0	16.2	12.4	12.2	11.9	15.6	12.9	9.6	7.6	7.5	7.2	8.4	7.7	8.5	7.2	10.7	11.6	11.6	11.4	10.8	Diurnal Maximum	
C - Calibration																																																	
Alberta Ambient Air Quality Guideline/Objectives: 1-hr 80 µg/m ³ 24-hr 29 µg/m ³																																																	





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Wapasu - December 2023

Concentration Ranges ($\mu\text{g}/\text{m}^3$)	Number of Hours	%	Cumulative %
0 - 5	629	84.77	84.77
6 - 15	110	14.82	99.60
16 - 25	3	0.40	100.00
26 - 80	0	0.00	100.00
> 81.0	0	0.00	100.00

Total Number of Valid Hours: 742

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - μg/m³
Wapasu - December 2023

Concentration Ranges (μg/m ³)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	14	12	12	5	4	3	27	129	200	74	80	31	17	9	7	5	629
6 - 15	3	4	2	2	3	1	0	19	35	25	14	0	2	0	0	0	110
16 - 25	0	0	0	0	2	0	0	0	1	0	0	0	0	0	0	0	3
26 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 81.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	17	16	14	7	9	4	27	148	236	99	94	31	19	9	7	5	742

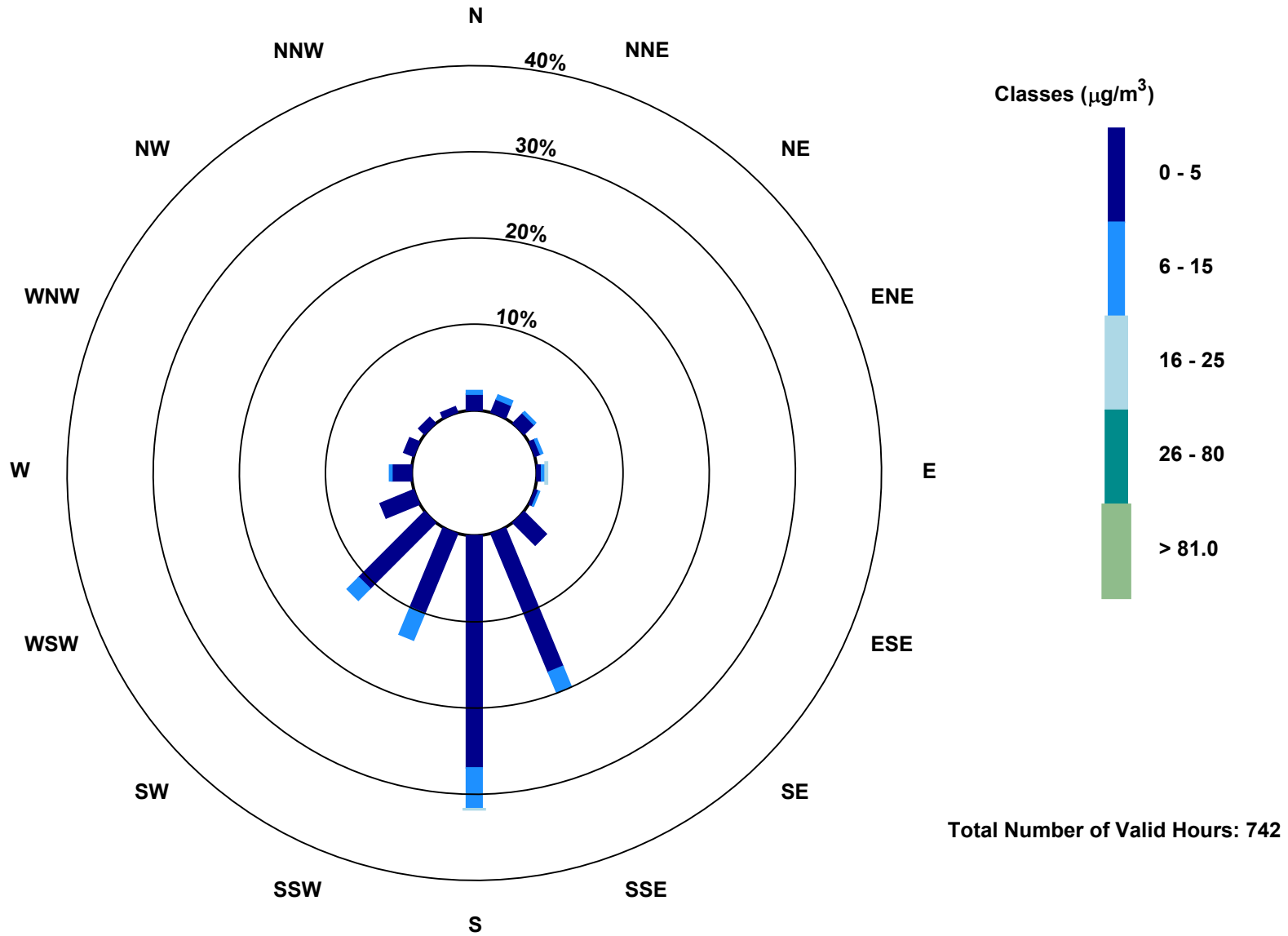
Total Number of Valid Hours: 742

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Dec 2023

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Wapasu



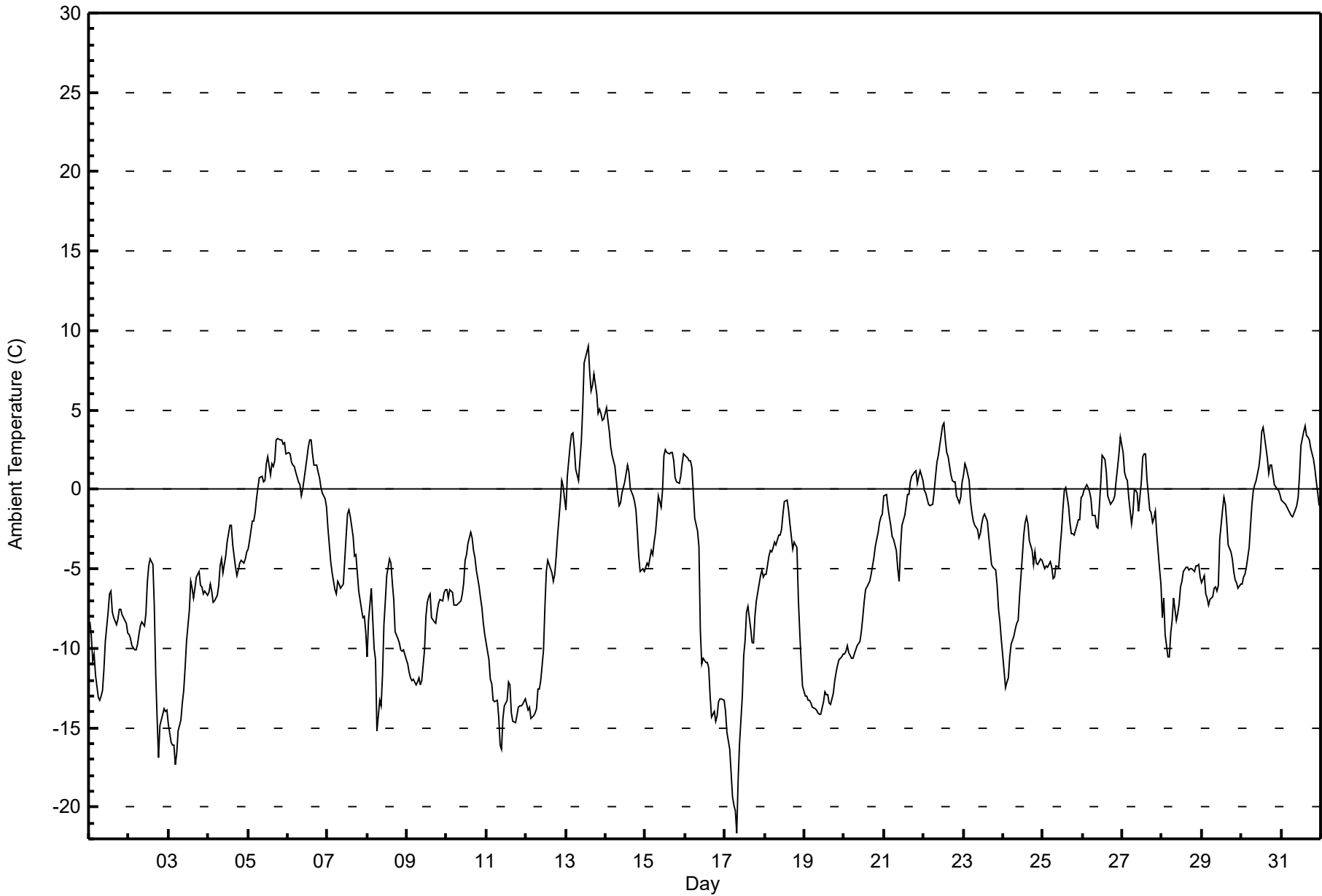


Maximum Value: 9.0 C on Dec 13 14:00																								Maximum Daily Average: 4.4 C on Dec 13																								Hours in Service: 744	
Minimum Value: -21.6 C on Dec 17 08:00																								Minimum Daily Average: -13.4 C on Dec 11																								Hours of Data: 744	
Maximum Diurnal Average: -2.2 C at hour 14																								Minimum Diurnal Average: -6.5 C at hour 7																								Hours of Missing Data: 0	
Monthly Average: -4.79 C																								Percentiles: P ₁ = -16.5 P ₁₀ = -13.1 Q ₁ = -8.4 Median = -4.7 Q ₃ = -0.4 P ₉₀ = 1.9 P ₉₉ = 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-Dec	-8.3	-9.2	-10.8	-10.4	-11.7	-13.1	-13.3	-13.0	-12.6	-11.4	-9.5	-7.7	-6.5	-6.4	-7.7	-8.1	-8.5	-8.2	-7.6	-7.5	-7.9	-8.1	-8.4	-9.0	-9.4	-6.4																							
2-Dec	-9.2	-9.4	-9.8	-10.1	-10.1	-9.8	-9.2	-8.6	-8.3	-8.6	-7.8	-5.9	-4.8	-4.4	-4.8	-7.4	-11.6	-14.4	-16.9	-14.9	-14.2	-13.8	-14.0	-13.9	-10.1	-4.4																							
3-Dec	-14.7	-15.9	-16.1	-16.1	-17.3	-16.7	-15.2	-14.5	-13.4	-12.6	-11.3	-9.6	-7.7	-5.8	-6.2	-6.8	-6.2	-5.5	-5.2	-6.1	-6.2	-6.6	-6.4	-6.6	-10.4	-5.2																							
4-Dec	-6.5	-5.9	-6.4	-7.1	-7.0	-6.7	-6.0	-4.8	-4.4	-5.3	-4.2	-3.3	-2.8	-2.3	-2.2	-3.5	-4.9	-5.4	-5.1	-4.7	-4.5	-4.7	-4.3	-3.9	-4.8	-2.2																							
5-Dec	-3.7	-3.2	-2.0	-2.0	-1.4	-0.6	0.1	0.8	0.8	0.5	0.5	1.7	2.0	0.9	1.6	1.5	1.8	3.1	3.2	3.2	3.1	2.9	2.9	2.2	0.8	3.2																							
6-Dec	2.4	2.3	1.7	1.5	1.4	1.1	0.5	0.3	-0.4	0.1	0.7	2.0	2.7	3.1	3.1	2.3	1.6	1.5	1.1	0.7	0.1	-0.3	-0.6	-1.2	1.2	3.1																							
7-Dec	-2.4	-3.5	-4.6	-5.2	-6.3	-6.6	-5.7	-6.0	-6.2	-5.9	-4.4	-2.9	-1.6	-1.3	-1.7	-3.0	-4.2	-4.1	-5.3	-6.4	-7.6	-8.1	-7.9	-9.0	-5.0	-1.3																							
8-Dec	-10.6	-8.3	-6.2	-8.2	-10.0	-10.8	-15.2	-13.2	-13.6	-11.7	-8.5	-7.0	-5.4	-4.4	-4.6	-5.9	-6.9	-8.9	-9.4	-9.7	-10.1	-10.2	-10.1	-10.8	-9.1	-4.4																							
9-Dec	-11.0	-11.5	-11.9	-12.0	-12.0	-12.3	-12.1	-11.9	-12.3	-12.0	-10.1	-8.0	-7.1	-6.8	-6.5	-8.1	-8.4	-8.4	-7.7	-7.2	-7.0	-7.0	-6.5	-6.3	-9.3	-6.3																							
10-Dec	-6.3	-6.8	-6.3	-6.5	-7.2	-7.3	-7.3	-7.2	-7.0	-6.6	-5.9	-4.4	-4.1	-3.4	-2.7	-3.0	-3.8	-4.3	-5.1	-6.1	-6.8	-7.5	-8.4	-9.1	-6.0	-2.7																							
11-Dec	-9.6	-10.7	-11.9	-12.2	-13.3	-13.4	-13.3	-14.3	-16.1	-16.3	-14.4	-13.7	-13.3	-12.1	-12.3	-14.1	-14.6	-14.7	-14.3	-13.7	-13.6	-13.7	-13.5	-13.2	-13.4	-9.6																							
12-Dec	-13.6	-13.9	-13.7	-14.4	-14.3	-14.0	-13.8	-12.6	-12.6	-12.1	-10.1	-7.4	-5.2	-4.4	-4.8	-5.3	-5.8	-5.4	-4.3	-3.0	-0.8	0.6	0.2	-0.5	-8.0	0.6																							
13-Dec	-1.3	0.8	2.8	3.5	3.5	2.6	1.3	0.6	1.8	3.0	5.1	8.0	8.4	9.0	7.4	6.2	6.6	7.3	6.0	4.8	5.0	4.8	4.3	4.4	4.4	9.0																							
14-Dec	5.2	4.3	3.6	2.6	2.1	1.5	0.6	-0.3	-1.0	-0.8	-0.2	0.5	1.0	1.5	1.1	0.0	-0.4	-0.7	-1.3	-2.6	-4.2	-5.1	-5.0	-5.2	-0.1	5.2																							
15-Dec	-4.9	-4.7	-4.8	-3.8	-4.1	-3.3	-2.7	-1.7	-0.4	-1.1	0.0	2.2	2.5	2.3	2.2	2.4	2.3	1.8	0.7	0.5	0.4	0.8	1.6	2.2	-0.4	2.5																							
16-Dec	2.2	2.0	1.8	1.8	1.3	-0.2	-1.8	-2.6	-3.6	-8.8	-10.9	-10.6	-10.9	-10.9	-11.2	-13.0	-14.3	-14.0	-14.6	-14.3	-13.4	-13.2	-13.2	-13.3	-7.7	2.2																							
17-Dec	-14.0	-15.3	-15.8	-16.4	-19.3	-19.9	-20.3	-21.6	-18.3	-16.0	-13.0	-10.4	-9.4	-7.8	-7.3	-8.7	-9.7	-9.7	-7.9	-7.0	-6.5	-5.4	-5.0	-5.5	-12.1	-5.0																							
18-Dec	-5.3	-5.3	-4.2	-3.9	-4.0	-3.7	-3.3	-3.5	-2.9	-2.9	-2.5	-1.5	-0.8	-0.7	-1.3	-2.2	-3.0	-3.7	-3.3	-3.7	-6.8	-9.0	-10.8	-12.4	-4.2	-0.7																							
19-Dec	-13.0	-13.0	-13.3	-13.3	-13.5	-13.7	-13.8	-13.9	-14.0	-14.2	-14.1	-13.3	-12.7	-12.9	-13.0	-13.4	-13.5	-12.9	-12.0	-11.5	-11.0	-10.7	-10.5	-10.4	-12.8	-10.4																							
20-Dec	-10.3	-10.2	-9.8	-10.2	-10.6	-10.6	-10.4	-10.1	-9.8	-9.6	-8.9	-8.0	-7.1	-6.3	-6.0	-5.8	-5.4	-4.8	-4.3	-3.6	-2.7	-2.1	-1.8	-1.5	-7.1	-1.5																							
21-Dec	-0.4	-0.3	-1.1	-1.8	-2.3	-3.0	-3.1	-3.9	-5.0	-5.8	-3.6	-2.2	-1.6	-1.0	-0.3	-0.3	0.5	0.8	1.1	1.1	0.4	0.8	1.2	0.6	-1.2	1.2																							
22-Dec	-0.1	-0.3	-0.6	-0.9	-1.1	-0.9	-0.2	0.8	1.7	2.2	3.4	4.0	4.1	3.1	2.3	2.0	0.9	0.6	0.5	0.5	-0.4	-0.8	-0.5	0.5	0.9	4.1																							
23-Dec	0.9	1.7	1.3	0.6	-0.7	-1.4	-2.0	-2.3	-2.5	-3.1	-2.8	-2.2	-1.8	-2.0	-3.0	-3.9	-4.7	-4.9	-5.1	-6.1	-7.5	-8.3	-9.4	-2.9	1.7																								
24-Dec	-10.4	-12.5	-12.1	-11.9	-10.6	-9.7	-9.3	-8.8	-8.4	-8.3	-6.8	-4.2	-2.9	-2.1	-1.7	-2.1	-3.2	-3.9	-4.7	-4.0	-4.7	-4.7	-4.4	-4.4	-6.5	-1.7																							
25-Dec	-4.7	-5.0	-4.8	-4.9	-4.6	-4.9	-5.6	-5.5	-4.8	-4.9	-3.7	-2.6	-1.2	0.0	0.1	-1.0	-2.1	-2.8	-2.8	-2.9	-2.3	-1.9	-1.9	-0.5	-3.1	0.1																							
26-Dec	-0.4	-0.1	0.3	0.1	-0.2	-0.6	-1.7	-1.7	-2.4	-2.5	-1.1	0.4	2.1	1.8	1.1	-0.4	-0.7	-0.9	-0.7	-0.4	0.5	1.3	2.2	3.3	0.0	3.3																							
27-Dec	2.4	1.1	0.8	0.6	-0.5	-2.2	-1.5	-0.1	-0.1	-0.3	-1.4	0.5	2.1	2.2	2.3	0.6	-1.3	-1.5	-2.1	-1.8	-1.4	-2.8	-5.0	-5.9	-0.6	2.4																							
28-Dec	-8.1	-6.8	-9.1	-10.5	-10.5	-9.1	-8.2	-6.9	-8.2	-7.8	-7.2	-6.2	-5.7	-5.2	-4.9	-4.9	-5.1	-5.0	-5.0	-5.2	-4.8	-4.8	-4.7	-5.5	-6.6	-4.7																							
29-Dec	-5.9	-5.4	-6.6	-6.9	-7.3	-7.0	-6.8	-6.2	-6.1	-6.4	-6.0	-3.1	-1.3	-0.5	-0.9	-2.1	-3.5	-3.9	-4.4	-5.2	-5.7	-5.9	-6.3	-6.0	-5.0	-0.5																							
30-Dec	-6.0	-5.6	-5.4	-4.9	-3.6	-2.3	-0.9	-0.1	0.3	0.5	1.4	2.2	3.6	3.9	3.3	1.9	1.0	1.6	1.5	0.9	0.3	0.0	0.0	-0.3	-0.3	3.9																							
31-Dec	-0.6	-0.8	-1.0	-1.1	-1.3	-1.5	-1.7	-1.7	-1.3	-1.1	-0.5	1.0	2.8	3.6	4.0	3.4	3.3	3.1	2.5	1.9	1.2	0.5	-0.2	-1.1	0.6	4.0																							
																								-5.4 -5.5 -5.7 -5.9 -6.3 -6.4 -6.5 -6.3 -6.2 -6.1 -5.1 -3.6 -2.7 -2.2 -2.4 -3.3 -4.0 -4.1 -4.3 -4.3 -4.4 -4.6 -4.7 -4.9				Diurnal Average																					
																								5.2 4.3 3.6 3.5 3.5 2.6 1.3 0.8 1.8 3.0 5.1 8.0 8.4 9.0 7.4 6.2 6.6 7.3 6.0 4.8 5.0 4.8 4.3 4.4				Diurnal Maximum																					



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature (AT) - C
Wapasu - December 2023





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C
Wapasu - December 2023**

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	2	0.27	0.27
-20 - 0	578	77.69	77.96
0 - 10	164	22.04	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association
Summary of Hour Averages

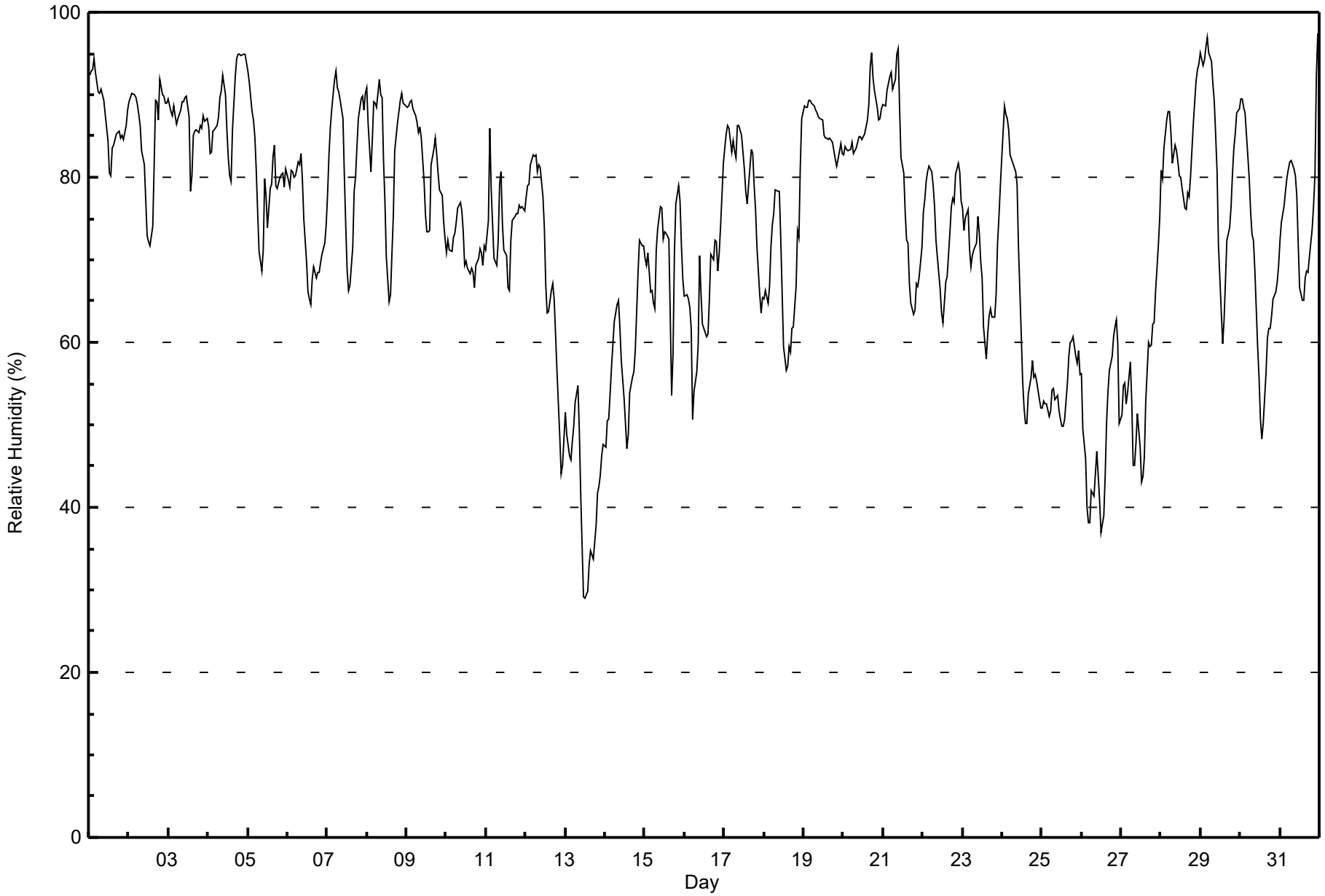
Relative Humidity (RH) - %
Wapasu - December 2023

Maximum Value: 97.5 % on Jan 1 00:00																								Maximum Daily Average: 88.6 % on Dec 4																								Hours in Service: 744	
Minimum Value: 29.0 % on Dec 13 13:00																								Minimum Daily Average: 42.0 % on Dec 13																								Hours of Data: 744	
Maximum Diurnal Average: 77.6 % at hour 4																								Minimum Diurnal Average: 64.9 % at hour 14																								Hours of Missing Data: 0	
Monthly Average: 73.63 %																								Percentiles: P ₁ = 36.0 P ₁₀ = 52.5 Q ₁ = 65.0 Median = 76.2 Q ₃ = 85.1 P ₉₀ = 89.4 P ₉₉ = 95.0																								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-Dec	92.3	92.9	93.1	94.4	92.8	90.3	90.2	90.6	90.1	89.3	87.6	84.4	80.6	80.2	83.5	83.9	85.3	85.4	85.6	84.7	85.1	84.6	86.3	88.2	87.6	94.4																							
2-Dec	89.2	89.7	90.2	90.1	89.7	88.9	87.7	86.3	83.3	81.5	77.1	72.8	72.1	71.7	74.0	81.5	89.4	89.2	86.9	91.8	90.0	89.8	88.9	89.1	85.0	91.8																							
3-Dec	89.5	87.9	87.5	88.6	87.4	86.4	87.1	88.2	89.1	89.2	89.7	89.8	87.3	78.2	80.1	85.1	85.6	85.8	85.5	86.3	86.0	87.4	86.8	87.2	86.7	89.8																							
4-Dec	86.2	82.8	83.1	85.6	85.8	86.3	87.2	89.7	90.4	92.4	90.0	85.7	82.4	80.1	79.5	85.8	92.1	94.4	95.0	94.9	94.7	94.9	94.9	93.8	88.6	95.0																							
5-Dec	92.8	91.6	88.0	86.9	84.8	80.8	75.8	70.9	68.7	71.2	79.9	77.7	73.9	78.6	79.2	82.5	84.0	78.9	78.6	79.9	80.4	80.6	78.8	81.0	80.2	92.8																							
6-Dec	79.7	78.9	80.9	80.7	80.1	80.1	81.8	81.5	83.0	79.6	74.9	69.6	66.2	65.2	64.7	67.6	69.1	67.7	68.6	68.6	69.7	70.7	72.0	74.3	73.9	83.0																							
7-Dec	78.0	82.8	86.1	88.2	91.8	92.9	90.9	90.3	89.3	87.1	80.1	74.1	68.7	66.2	67.0	71.6	78.3	80.0	83.7	87.1	89.4	89.9	88.2	90.1	83.0	92.9																							
8-Dec	90.9	86.5	80.6	84.6	89.1	88.9	88.4	91.9	90.0	89.6	82.1	77.1	70.3	64.8	65.7	70.7	75.2	83.2	86.6	88.0	89.4	90.2	89.0	88.7	83.4	91.9																							
9-Dec	88.4	88.7	89.2	89.4	88.3	87.5	86.6	85.4	86.1	84.7	79.5	75.4	73.4	73.4	73.6	81.5	83.4	84.8	82.9	80.5	78.5	77.8	74.5	72.5	81.9	89.4																							
10-Dec	70.9	72.4	71.2	70.9	72.7	73.2	74.6	76.3	76.9	75.9	73.4	69.3	69.8	69.0	68.3	68.9	68.4	66.5	69.3	70.2	71.3	70.8	69.4	71.7	71.3	76.9																							
11-Dec	71.2	74.7	85.9	78.5	74.2	70.2	69.3	72.4	79.2	80.7	74.4	71.2	70.5	66.7	66.3	72.1	74.8	75.3	75.7	75.6	76.5	76.3	76.4	75.9	74.3	85.9																							
12-Dec	77.7	79.0	79.1	81.6	82.6	82.6	82.6	80.7	81.5	81.2	77.6	73.8	67.0	63.5	63.6	66.3	67.2	65.3	61.0	56.5	48.7	44.0	45.2	48.3	69.0	82.6																							
13-Dec	51.5	48.9	46.2	45.8	48.0	49.8	52.7	54.7	49.3	41.5	35.3	29.1	29.0	29.8	33.1	34.8	34.2	33.7	37.9	41.8	42.5	43.9	46.4	47.7	42.0	54.7																							
14-Dec	47.2	50.5	50.6	53.7	57.0	62.5	63.6	64.5	65.1	61.9	57.7	53.3	50.2	47.0	48.9	53.9	55.8	56.4	58.9	63.7	68.5	72.3	71.8	71.6	58.6	72.3																							
15-Dec	70.2	69.4	70.9	66.1	66.3	64.8	64.1	71.2	73.8	76.4	76.3	72.5	73.4	73.3	72.6	63.2	53.6	58.7	70.8	76.9	79.1	77.2	71.7	67.6	70.0	79.1																							
16-Dec	65.5	65.8	65.2	64.3	61.7	50.8	54.1	56.5	59.8	70.5	66.0	62.3	61.1	60.7	61.0	65.3	70.7	70.0	72.4	72.3	68.7	70.9	74.0	81.7	65.5	81.7																							
17-Dec	83.6	85.2	86.3	85.9	83.1	84.4	83.3	82.4	86.3	86.2	85.0	83.0	81.1	78.3	76.9	81.1	83.4	82.8	79.0	76.0	71.6	65.8	63.5	65.4	80.0	86.3																							
18-Dec	65.3	66.3	64.7	66.8	71.5	74.3	75.7	78.4	78.2	78.4	72.7	66.0	59.5	56.6	57.1	59.6	58.9	61.7	61.8	66.9	73.5	72.6	81.3	87.1	69.0	87.1																							
19-Dec	88.7	88.4	88.5	89.3	89.3	89.0	88.6	88.2	87.8	87.3	87.2	86.9	85.1	84.7	84.8	84.5	84.7	84.2	83.2	82.3	81.4	82.2	84.1	83.0	86.0	89.3																							
20-Dec	82.8	83.8	83.4	83.3	83.3	84.3	82.8	83.2	83.5	85.0	84.9	84.5	84.9	85.3	86.9	88.9	93.4	95.1	92.0	90.6	88.5	87.0	87.1	88.4	86.4	95.1																							
21-Dec	88.8	88.7	90.5	91.3	92.2	92.7	90.6	91.8	94.9	95.6	88.2	82.4	80.4	75.8	72.3	72.1	67.1	64.8	63.4	63.9	67.1	66.8	67.9	71.6	80.0	95.6																							
22-Dec	75.7	77.3	79.4	80.7	81.4	80.6	78.9	76.4	72.4	70.4	66.4	63.5	62.3	64.8	67.2	68.0	73.3	76.5	77.5	76.9	80.4	81.6	80.6	77.1	74.6	81.6																							
23-Dec	76.3	73.5	75.0	76.2	71.3	69.2	70.5	71.1	72.0	75.2	73.2	69.9	67.8	61.8	58.0	61.0	63.3	64.1	63.0	63.1	65.7	71.9	75.1	78.7	69.5	78.7																							
24-Dec	82.1	88.7	87.6	87.1	85.7	82.8	81.7	81.2	80.7	79.1	71.5	60.9	55.2	52.0	50.1	50.2	53.8	55.7	57.9	55.8	56.2	55.3	53.1	52.0	67.4	88.7																							
25-Dec	52.1	52.8	52.5	52.5	51.0	51.6	54.2	54.4	53.0	53.6	51.7	50.7	49.8	49.9	50.7	55.1	58.3	59.9	60.2	60.6	58.3	57.4	59.0	56.0	54.4	60.6																							
26-Dec	56.3	49.4	45.9	39.9	38.1	38.1	42.0	41.3	44.1	46.8	43.9	40.9	36.9	39.1	43.8	50.3	54.0	56.5	58.3	60.8	61.8	62.7	59.8	50.1	48.4	62.7																							
27-Dec	51.2	54.7	55.0	52.5	53.9	57.7	52.8	45.2	45.1	47.8	51.3	47.4	43.1	43.7	46.0	52.9	60.1	59.5	59.7	62.2	62.3	66.1	71.7	75.0	54.9	75.0																							
28-Dec	80.8	79.8	83.5	87.0	88.0	88.0	85.4	81.8	83.9	83.3	81.9	80.2	79.9	78.7	76.2	76.2	78.1	77.6	80.0	86.4	89.1	91.8	93.1	93.7	83.5	93.7																							
29-Dec	95.1	93.6	94.3	95.8	97.0	95.1	94.1	91.4	89.2	85.0	80.7	71.7	63.7	59.8	62.7	67.5	72.5	73.9	76.4	80.3	83.6	85.3	87.8	88.3	82.7	97.0																							
30-Dec	89.5	89.5	88.4	87.8	82.6	79.9	75.8	73.0	72.4	68.8	59.5	55.8	50.7	48.2	50.2	56.2	60.5	61.6	61.8	63.2	65.2	66.2	67.3	69.3	68.5	89.5																							
31-Dec	72.3	74.6	76.6	78.5	80.0	81.0	81.8	82.1	80.9	80.1	77.8	72.1	66.7	65.1	65.0	67.8	68.6	68.5	70.4	73.7	76.6	80.3	92.3	97.5	76.3	97.5																							
																								76.8	77.1	77.4	77.6	77.4	76.9	76.6	76.5	76.8	76.6	73.5	69.5	66.5	64.9	65.5	68.6	70.9	71.5	72.4	73.6	74.2	74.7	75.4	76.2	Diurnal Average	
																								95.1	93.6	94.3	95.8	97.0	95.1	94.1	91.9	94.9	95.6	90.0	89.8	87.3	85.3	86.9	88.9	93.4	95.1	95.0	94.9	94.7	94.9	94.9	97.5	Diurnal Maximum	



Wood Buffalo Environmental Association
Hourly Averages

Relative Humidity (RH) - %
Wapasu - December 2023





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Relative Humidity (RH) - %
Wapasu - December 2023**

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	14	1.88	1.88
40 - 60	121	16.26	18.15
60 - 80	302	40.59	58.74
80 - 100	307	41.26	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association

Summary of Hour Averages

Precipitation (PC) - mm

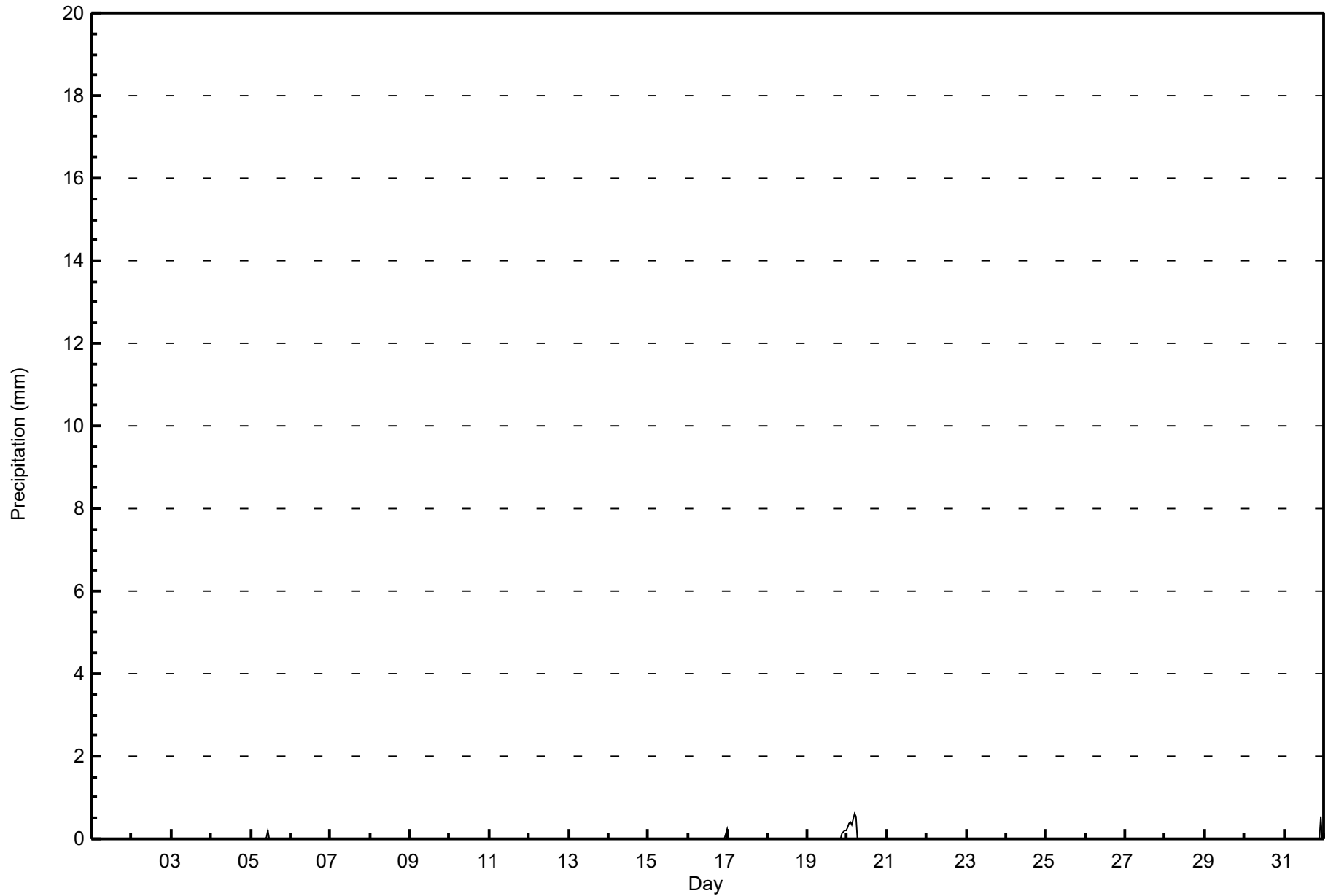
Wapasu - December 2023

Maximum Value: 0.6 mm on Dec 20 05:00																				Maximum Daily Total: 2.5 mm on Dec 20					Hours in Service: 744																								
Minimum Value: 0.0 mm on Dec 1 01:00																				Minimum Daily Total: 0.0 mm on Dec 1					Hours of Data: 744																								
Maximum Diurnal Total: 0.7 mm at hour 23																				Minimum Diurnal Total: 0.0 mm at hour 7					Hours of Missing Data: 0																								
Monthly Total: 4.05 mm																				Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.0 Median = 0.0 Q ₃ = 0.0 P ₉₀ = 0.0 P ₉₉ = 0.2					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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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																	
17-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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	0.2	0.5																
20-Dec	0.3	0.4	0.4	0.3	0.6	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.5																	
21-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0																	
31-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.5																	
																								0.3	0.4	0.4	0.3	0.6	0.5	0.0	0.0	0.0	0.1	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.7	0.4	Diurnal Average	
																								0.3	0.4	0.4	0.3	0.6	0.5	0.0	0.0	0.0	0.1	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.5	0.2	Diurnal Maximum	



Wood Buffalo Environmental Association
Hourly Averages

Precipitation (PC) - mm
Wapasu - December 2023





Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed (WS) - km/h

Wapasu - December 2023

Maximum Speed: 23 km/h on Dec 15 18:00	Maximum Daily Speed Average: 16.3 km/h on Dec 20	Hours in Service: 744
Minimum Speed Value: 1 km/h on Dec 3 07:00	Minimum Daily Speed Average: 3.2 km/h on Dec 28	Hours of Data: 744
Maximum Diurnal Speed Average: 8.6 km/h at hour 12	Minimum Diurnal Speed Average: 6.1 km/h at hour 23	Hours of Missing Data: 0
Monthly Average Velocity: 7.2 km/h 189.3 deg	Percentiles: P ₁ = 2 P ₁₀ = 6 Q ₁ = 7 Median = 9 Q ₃ = 12 P ₉₀ = 15 P ₉₉ = 21	Percent Operational Time: 100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Dec	SSE4	SE4	SSE5	S7	SSE7	SSE7	SSE7	SSE7	SSE6	SSE7	S8	S8	S8	S7	S8	S9	S9	SSE10	S11	S11	S10	S10	S10	S9	S7.8	S11
2-Dec	SSW10	SSW11	SSW9	S9	S9	S10	S9	S10	S10	S9	S9	S8	SSW8	SSW6	SSW5	SSW2	NNE2	E3	E4	ENE6	ENE4	NE4	NNE4	NNE3	S4.9	SSW11
3-Dec	N3	NE2	W2	E1	E2	E1	ESE1	SW3	SSW2	S3	S3	S4	S5	S6	SSE7	SSE7	SSE9	SSE8	SSE9	SSE11	SSE11	SSE9	SSE10	SSE9	SSE4.6	SSE11
4-Dec	SSE8	S9	S10	S9	S9	S10	S9	S10	S10	S8	SW12	SW10	SW10	SW8	S6	S6	S6	SSE7	S7	S7	S7	SSE7	SSE8	SSE8	S8.0	SW12
5-Dec	SSE9	SSE10	SSE13	SSE15	SSE14	SSE13	SSE15	SSE15	SSE15	S13	S11	S12	SSW11	S10	SSW11	SSW10	SSW10	SW14	SSW11	SW11	SW11	WSW10	WSW11	SW9	S10.4	SSE15
6-Dec	SW12	SW13	SW14	SW15	SW16	SW13	SSW10	SSW11	SSW9	SSW10	SSW10	SSW11	SW11	SW11	SW15	SW11	SW14	SW14	SW15	SW15	SW12	SW11	SW10	SW9	SW12.1	SW16
7-Dec	SSW6	S5	S7	S6	SSE7	SSE8	S7	SSE7	S7	SSE8	S8	S8	S7	SW8	SSW7	SSW6	SSW7	SW9	SSW6	SSW6	S6	S6	SSW7	S5	S6.4	SW9
8-Dec	SSW6	SW8	SW7	S5	S5	SSW7	S4	SSW6	SSE6	S6	SSW7	SSW7	SSW6	SW8	SW8	SW6	S6	SSE7	S7	S7	SSE8	S7	S9	S8	SSW6.3	S9
9-Dec	S7	S7	SSE7	S7	S7	S7	SSE8	S8	S8	S9	S9	S9	S9	S8	S9	S11	S10	S10	S10	S9	S9	S10	S9	S10	S8.6	S11
10-Dec	SSE11	SSE12	SSE13	SSE14	SSE13	SSE15	SSE14	S13	S13	S14	SSW12	SW15	SW17	WSW17	WSW16	WSW13	W15	WNNW13	WNNW11	WNNW11	NW11	NW14	NW16	NW16	SW7.1	SW17
11-Dec	NW18	NNW17	NNW15	NW14	WNN9	WNN9	WNN10	W5	SW6	SW7	SSW7	SW9	SW9	SW9	SSW6	S7	S7	S8	S8	S8	S8	S9	S9	S8	WSW4.1	NW18
12-Dec	S6	S7	S7	SSE7	SSE8	SSE8	SSE10	SSE9	SSE9	S10	SSE13	S14	S12	S13	S13	S13	S15	S13	S14	S13	SSW14	SSW13	SSW10	S9	S10.7	S15
13-Dec	SSE10	SSW10	SSW12	SW12	SSW12	SSW10	S6	SSE9	S9	S10	SSW14	SW17	SSW13	SSW12	S9	S8	SSW10	SSW11	SSW8	SSE7	S7	S5	S6	SSW8	SSW9.3	SW17
14-Dec	WSW6	WSW6	W5	WSW7	WSW11	WSW12	WSW11	SW9	SW8	SW11	SW10	SW13	SW11	SW12	SW10	SW12	SW12	SW11	SW9	S5	SSE6	SSE7	SSE8	S8	SW8.2	SW13
15-Dec	S9	S10	S9	S11	S10	S10	SSW12	SSW12	SSW12	S13	S14	SSW20	SSW22	SSW19	SSW18	S18	SSW19	SSW23	SSW19	SSW18	SSW18	SSW17	SW16	SW15	SSW14.8	SSW23
16-Dec	SW14	SW13	WSW12	WSW13	W15	WNNW14	W13	W13	WNNW11	N12	NNE9	NNE7	NNE8	NNE8	NNE7	NE5	E3	ENE5	N1	ESE4	SSE2	S2	SSE1	NNE4	WNNW3.6	W15
17-Dec	NE7	NNE6	NNE6	NE6	NE2	ENE6	SE5	SSE6	SSE7	S7	SSE7	S7	S8	SSW8	SSW8	S7	SSE8	S9	SSE11	S11	SSE10	S11	S9	S9	SSE5.3	S11
18-Dec	S9	S7	SW12	SW13	SW11	SW12	SW14	SW13	SW11	SSW9	SW11	WSW12	WSW15	W9	WSW10	WSW7	W6	WSW5	W6	NNW11	N17	N18	N13	NNE9	WSW6.0	N18
19-Dec	N8	NNE9	NNE9	NE9	NE9	NE8	NE6	NE5	ENE5	SE3	SE4	SE6	SE6	SE6	SE6	SE8	SE8	SE11	SE12	SSE12	SSE16	SE20	SE19	SE20	ESE6.3	SE20
20-Dec	SE21	SE22	SSE21	SSE22	SSE22	SSE21	SSE19	SSE19	SSE19	SSE17	SSE15	SSE16	SSE13	SSE13	SSE15	SSE14	SSE15	SSE16	SSE16	S14	S15	S14	SSW12	SSW11	SSE16.3	SSE22
21-Dec	SW15	WSW13	WSW11	SW8	WSW7	SW6	SW7	SSW7	S6	SSE7	S8	S9	S10	S11	S12	S11	SSE14	SSE15	S14	S13	S13	S14	SSW14	SSW11	SSW9.6	SW15
22-Dec	S9	S10	SSW10	S9	S11	S10	S11	SSE11	S11	S10	S10	SSE10	S9	SSE9	SSE9	SSE8	SSE10	S11	S11	S10	SSW10	SSW9	SSW11	SW11	S9.6	SSW11
23-Dec	SW13	SW15	WSW13	WSW11	W13	W15	W11	WSW12	WSW13	WSW12	WSW13	WSW15	W14	W12	W13	W13	W11	W9	WSW9	WSW9	SW7	SSW6	SW7	SSW5	WSW10.7	WSW15
24-Dec	S6	SSE6	SSE7	S7	S8	S9	S9	S9	S9	S10	S10	SSW12	SSW11	SW15	SW11	SSW9	S7	S6	S7	SSW8	S7	S8	S9	S9	S8.3	SW15
25-Dec	S9	SSE10	SSE9	S10	S9	S10	S11	S11	S11	S10	S10	SSW11	SSW12	SW15	SSW10	S7	SSE8	S8	S9	SSE9	S9	SSE10	SSE11	SSE15	S9.8	SSE15
26-Dec	SSE16	SSE20	SSE20	SSE17	SSE18	SSE13	SE13	SSE11	SSE11	SSE10	SSE11	S10	S10	SSW12	S12	S12	SSW12	S9	S10	S9	SSW9	SSW11	SSW14	SW20	S11.9	SSE20
27-Dec	SW18	SW15	SW15	SSW13	SSW10	S8	SSW11	SW13	SW15	SW12	S9	SW12	SW13	S7	S7	SSE6	SE6	SE7	SE7	SE10	SE8	ENE1	ENE3	E3	SSW7.8	SW18
28-Dec	SSE5	SSE5	E2	SE4	E4	SE4	ESE5	WNN2	NNE3	NE5	NNE9	NE11	N8	N7	NNW6	N6	N6	N5	N6	NNW6	N5	NW4	NE5	N2	NNE3.2	NE11
29-Dec	SE3	ESE4	SW5	SSW6	SSE7	S7	S9	SSE10	SSE12	S10	S10	S12	S10	SSW9	S9	S6	S6	S8	SSE6	SSE7	SSE8	SE7	SSE7	SSE7	S7.3	SSE12
30-Dec	SSE7	SSE7	SSE7	SSE7	SSE8	SSE10	S9	SSE9	SSE10	SSE10	S11	SSE12	SSE12	SSE15	SSE16	SSE18	SSE20	SSE22	SSE18	S15	S14	S15	S14	S14	SSE12.4	SSE22
31-Dec	SSW13	S13	S12	S11	S12	S12	S12	S12	S9	S9	S9	SSW10	SSW11	SSW10	SW11	SSW10	SW14	SW12	SW9	SW10	SW10	WSW6	N6	N4	SSW9.0	SW14

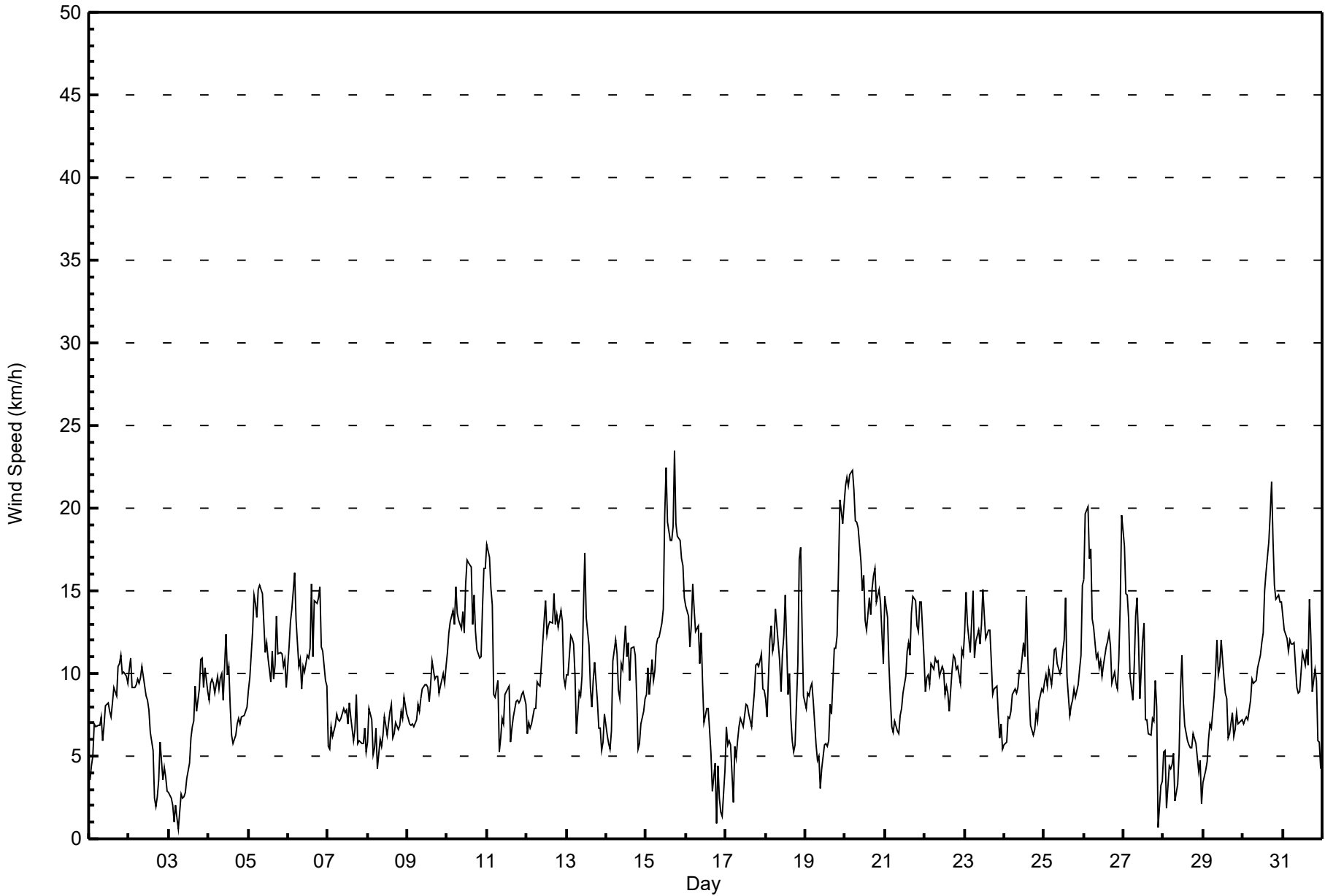
S6.3	S6.3	SSW6.4	S6.7	S6.8	S6.8	S7.1	S7.6	S7.7	S7.7	S8.0	SSW8.6	SSW8.5	SSW8.2	SSW7.9	S7.3	S7.7	S8.0	S7.6	S7.1	S6.8	S6.4	S6.1	S6.2		Diurnal Average
SE21	SE22	SSE21	SSE22	SSE22	SSE21	SSE19	SSE19	SSE19	SSE17	SSE15	SSW20	SSW22	SSW19	SSW18	S18	SSE20	SSW23	SSW19	SSW18	SSW18	SE20	SE19	SE20		Diurnal Maximum

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



Wood Buffalo Environmental Association
Hourly Averages

Wind Speed (WS) - km/h
Wapasu - December 2023





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h
Wapasu - December 2023**

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	73	9.81	9.81
6 - 11	459	61.69	71.51
12 - 19	196	26.34	97.85
20 - 28	16	2.15	100.00
29 - 38	0	0.00	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed (WS) - km/h
Wapasu - December 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	6	5	7	5	9	4	7	6	11	5	2	1	3	1	1	0	73
6 - 11	7	11	7	2	0	0	13	91	187	64	46	15	6	6	1	3	459
12 - 19	4	0	0	0	0	0	3	43	38	29	45	15	10	2	5	2	196
20 - 28	0	0	0	0	0	0	4	8	0	3	1	0	0	0	0	0	16
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	17	16	14	7	9	4	27	148	236	101	94	31	19	9	7	5	744

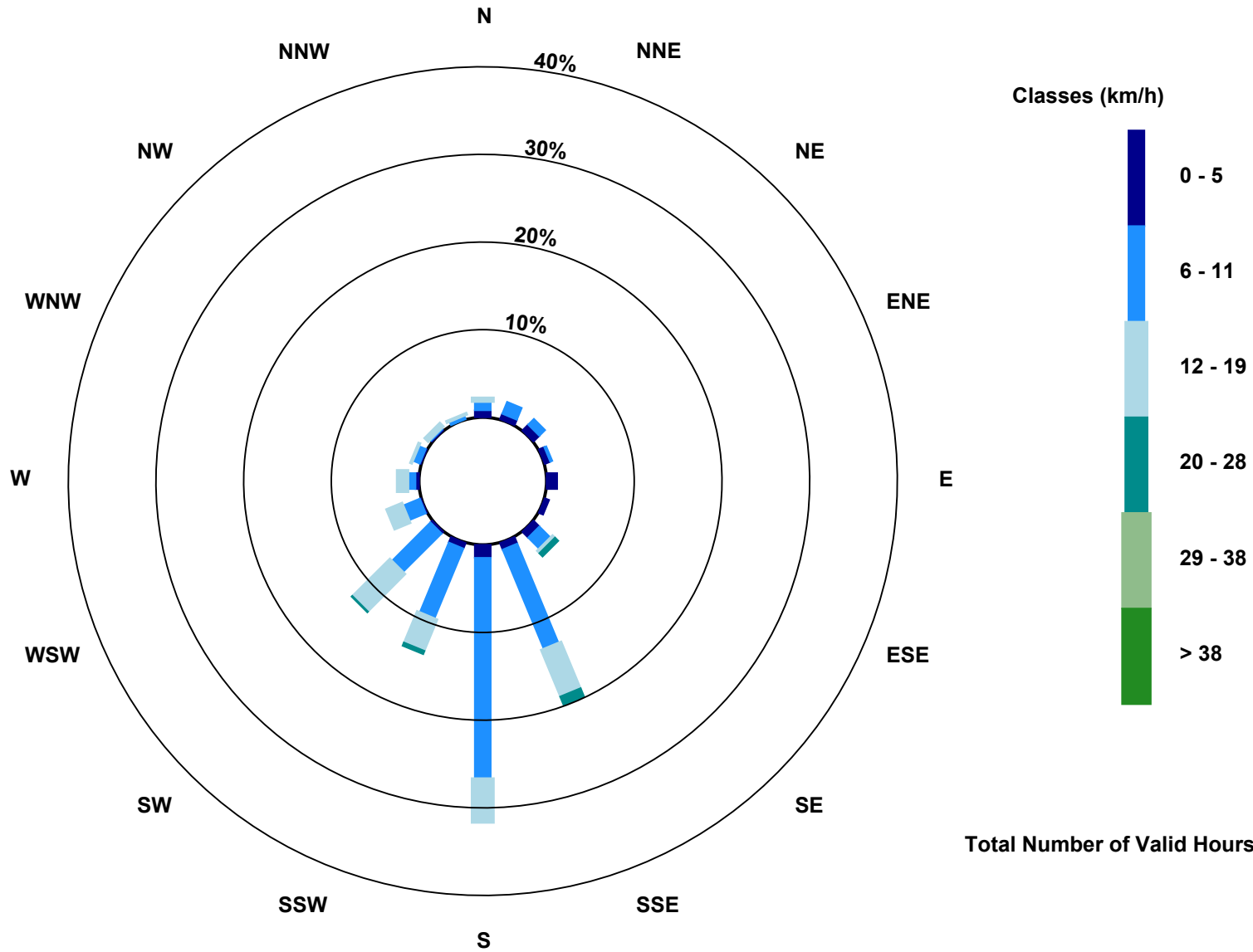
Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Dec 2023

Wind Speed (WS) - km/h
Wapasu



Total Number of Valid Hours: 744



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Speed (WS) - km/h
Wapasu - December 2023

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 8 km/h on Dec 15 18:00 Minimum Value: 1 km/h on Dec 3 02:00 Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 2 Median = 3 Q ₃ = 4 P ₉₀ = 5 P ₉₉ = 6																		Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0								
Day	Hourly Period Ending At (MST)																								Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Dec	1	1	1	2	1	1	1	1	2	1	2	3	2	2	2	3	3	3	3	3	3	3	3	3	3	3
2-Dec	3	3	3	3	3	3	3	3	3	3	3	2	2	2	2	2	2	1	1	1	1	1	1	1	1	3
3-Dec	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	3	3	3	3	3	2	2	2	2	3
4-Dec	2	2	3	3	3	3	3	3	3	3	3	4	3	2	2	2	1	1	1	2	2	1	2	2	2	4
5-Dec	2	3	4	4	4	4	4	4	4	4	4	4	4	3	4	3	3	4	3	3	3	3	3	2	4	
6-Dec	3	3	3	3	4	4	3	3	3	3	3	3	4	4	4	3	3	3	3	4	3	3	2	2	4	
7-Dec	1	2	3	2	1	2	2	1	1	1	2	2	2	2	2	1	2	2	1	1	1	1	2	1	3	
8-Dec	1	2	2	1	1	2	1	1	1	1	2	2	2	2	2	2	1	2	2	1	2	2	2	2	2	
9-Dec	2	2	1	2	2	1	2	2	2	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	
10-Dec	3	3	4	3	4	4	4	4	4	4	4	6	4	4	4	4	5	5	4	3	4	4	4	5	6	
11-Dec	5	5	4	4	3	3	4	1	2	2	2	3	3	3	2	1	2	2	3	2	2	2	3	3	5	
12-Dec	2	2	2	2	2	2	2	2	3	3	4	5	4	4	4	4	5	4	4	4	5	4	3	3	5	
13-Dec	2	4	4	4	4	3	2	2	2	3	4	5	5	4	4	2	4	4	3	2	2	2	2	3	5	
14-Dec	2	2	2	2	3	3	3	2	3	3	3	3	3	3	3	3	3	3	2	1	1	1	2	2	3	
15-Dec	2	3	3	3	3	3	4	4	4	4	4	7	7	6	6	6	6	8	6	6	6	5	5	4	8	
16-Dec	4	3	3	4	5	5	4	5	5	4	3	3	2	3	2	2	1	2	1	2	1	1	1	2	5	
17-Dec	2	2	2	1	1	1	1	1	1	2	1	2	2	3	3	2	2	2	3	3	3	4	3	3	4	
18-Dec	2	2	3	3	3	3	3	3	3	3	4	4	3	3	3	3	2	1	2	7	5	5	4	3	7	
19-Dec	3	3	3	3	3	3	2	2	2	1	2	2	2	2	2	2	2	4	4	4	5	6	5	6	6	
20-Dec	6	6	6	6	6	6	7	5	5	5	5	5	5	4	4	4	5	5	5	5	5	5	4	3	7	
21-Dec	4	4	3	2	2	2	2	2	1	1	2	3	3	3	4	3	4	5	5	4	4	5	5	4	5	
22-Dec	3	3	3	3	3	3	3	3	3	3	3	3	3	2	2	2	4	4	3	3	3	3	3	3	4	
23-Dec	4	4	3	4	5	5	4	4	3	3	4	4	5	4	4	4	3	3	3	2	2	1	1	1	5	
24-Dec	1	1	1	2	2	2	3	2	3	3	3	4	3	4	3	3	2	2	2	2	2	2	3	2	4	
25-Dec	2	3	2	3	3	3	4	3	3	3	3	4	4	4	4	3	2	2	2	2	2	3	3	4	4	
26-Dec	4	5	5	5	5	5	3	3	3	3	3	3	3	4	4	4	4	3	3	3	3	3	5	5	5	
27-Dec	5	4	5	5	3	2	4	3	3	4	2	4	4	2	2	2	1	1	2	2	2	1	2	1	5	
28-Dec	1	2	2	1	1	1	2	2	1	2	3	4	2	2	2	2	2	1	2	1	2	1	1	2	4	
29-Dec	1	2	2	1	1	2	2	3	3	3	4	4	3	3	3	2	1	2	1	1	1	1	1	1	4	
30-Dec	1	1	1	1	2	2	2	2	2	3	4	3	3	4	4	5	5	6	6	5	5	5	5	5	6	
31-Dec	4	4	4	4	4	4	4	4	3	3	3	3	3	3	4	3	4	4	2	3	2	2	2	2	4	
Diurnal Maximum																										



Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
Wapasu - December 2023

Direction of Maximum Speed: 210 deg on Dec 15 18:00 Direction of Maximum Daily Speed Average: 159.6 deg on Dec 20	Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0
Direction of Minimum Speed: 112 deg on Dec 3 07:00 Direction of Minimum Daily Speed Average: 3.2 deg on Dec 28	Percent Operational Time: 100.0
Monthly Average Direction: 189.3 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-Dec	152	146	157	169	158	152	158	160	166	164	170	179	181	183	182	181	182	168	172	174	180	176	180	185	171.8
2-Dec	193	198	192	184	184	171	175	172	174	178	179	177	194	203	200	194	23	81	83	58	62	47	22	17	175.0
3-Dec	360	50	278	100	98	87	112	220	194	175	180	177	185	182	168	161	150	154	157	153	159	157	158	163	160.8
4-Dec	164	170	172	179	177	171	174	179	191	191	218	227	224	216	189	180	174	168	171	181	179	168	165	166	184.2
5-Dec	163	158	162	157	154	155	155	151	156	173	178	186	196	188	208	192	199	214	210	216	229	238	239	226	184.4
6-Dec	226	225	226	222	221	219	206	209	206	209	201	213	219	222	229	227	224	229	228	228	225	221	221	218	220.7
7-Dec	197	189	178	173	157	165	171	167	172	167	181	182	184	220	207	201	204	222	198	198	182	181	203	185	186.9
8-Dec	208	227	235	191	191	206	182	193	162	187	198	198	205	226	222	214	184	167	176	175	165	176	181	170	193.7
9-Dec	180	179	159	180	177	170	164	176	173	170	172	182	191	184	180	173	182	180	183	181	174	171	170	169	175.9
10-Dec	159	154	158	157	165	164	167	172	173	176	195	215	230	240	239	251	264	283	303	297	322	325	319	316	222.1
11-Dec	325	339	339	324	300	295	298	267	224	222	213	223	219	218	200	171	178	176	182	175	173	174	178	183	241.9
12-Dec	179	175	175	168	163	164	162	161	166	170	166	171	179	185	184	174	174	179	178	182	195	203	194	181	177.2
13-Dec	160	202	211	216	212	199	172	163	176	190	206	220	210	201	188	188	194	192	197	167	186	190	190	205	196.3
14-Dec	250	256	264	253	247	243	245	236	219	224	229	235	234	232	225	226	221	225	220	190	162	158	167	174	225.3
15-Dec	172	177	176	173	174	185	197	196	193	176	182	205	209	205	195	190	194	210	205	201	199	207	216	220	196.9
16-Dec	227	227	245	257	278	297	277	280	301	2	16	31	12	14	25	49	91	73	354	112	160	191	158	30	299.9
17-Dec	35	33	32	46	45	71	136	148	168	169	162	178	180	195	195	181	167	170	167	173	166	178	173	175	161.5
18-Dec	187	184	227	228	220	227	231	225	219	207	233	243	244	265	253	252	267	252	271	343	6	1	9	15	252.1
19-Dec	10	14	27	40	47	48	37	51	73	127	138	129	135	140	137	141	145	145	145	153	148	143	139	141	118.2
20-Dec	141	142	147	151	151	152	153	148	156	155	164	159	162	167	160	167	167	167	165	173	170	182	193	201	159.6
21-Dec	232	245	240	234	241	220	226	201	175	163	176	182	182	188	190	172	162	164	181	182	179	191	203	199	195.3
22-Dec	190	189	192	183	175	169	169	168	173	171	174	168	173	162	152	165	159	171	173	187	193	199	212	221	178.9
23-Dec	218	233	239	256	264	261	261	251	245	239	243	251	266	280	275	270	262	260	252	246	236	213	225	197	250.3
24-Dec	183	164	165	175	176	169	174	179	182	186	191	211	212	224	221	200	174	185	186	192	179	177	187	173	188.7
25-Dec	172	165	164	169	174	178	183	184	183	186	190	202	210	217	201	183	167	169	170	164	169	158	150	153	178.1
26-Dec	155	152	155	156	153	149	146	152	151	155	159	175	187	194	185	182	195	183	188	185	197	207	210	223	173.2
27-Dec	220	224	217	213	207	189	209	222	223	214	190	214	219	189	172	163	143	136	141	137	129	74	57	86	197.6
28-Dec	151	149	91	133	101	137	108	286	21	37	30	40	354	351	348	356	9	356	351	344	4	315	47	4	24.8
29-Dec	145	111	216	196	151	172	170	163	166	186	185	175	183	195	188	184	171	170	166	155	157	146	153	153	170.9
30-Dec	149	159	151	154	164	165	172	164	156	159	173	160	153	154	155	154	155	158	167	173	177	182	187	191	164.3
31-Dec	193	191	190	182	179	181	178	175	181	179	186	197	201	206	217	208	222	224	222	221	229	254	352	4	200.4

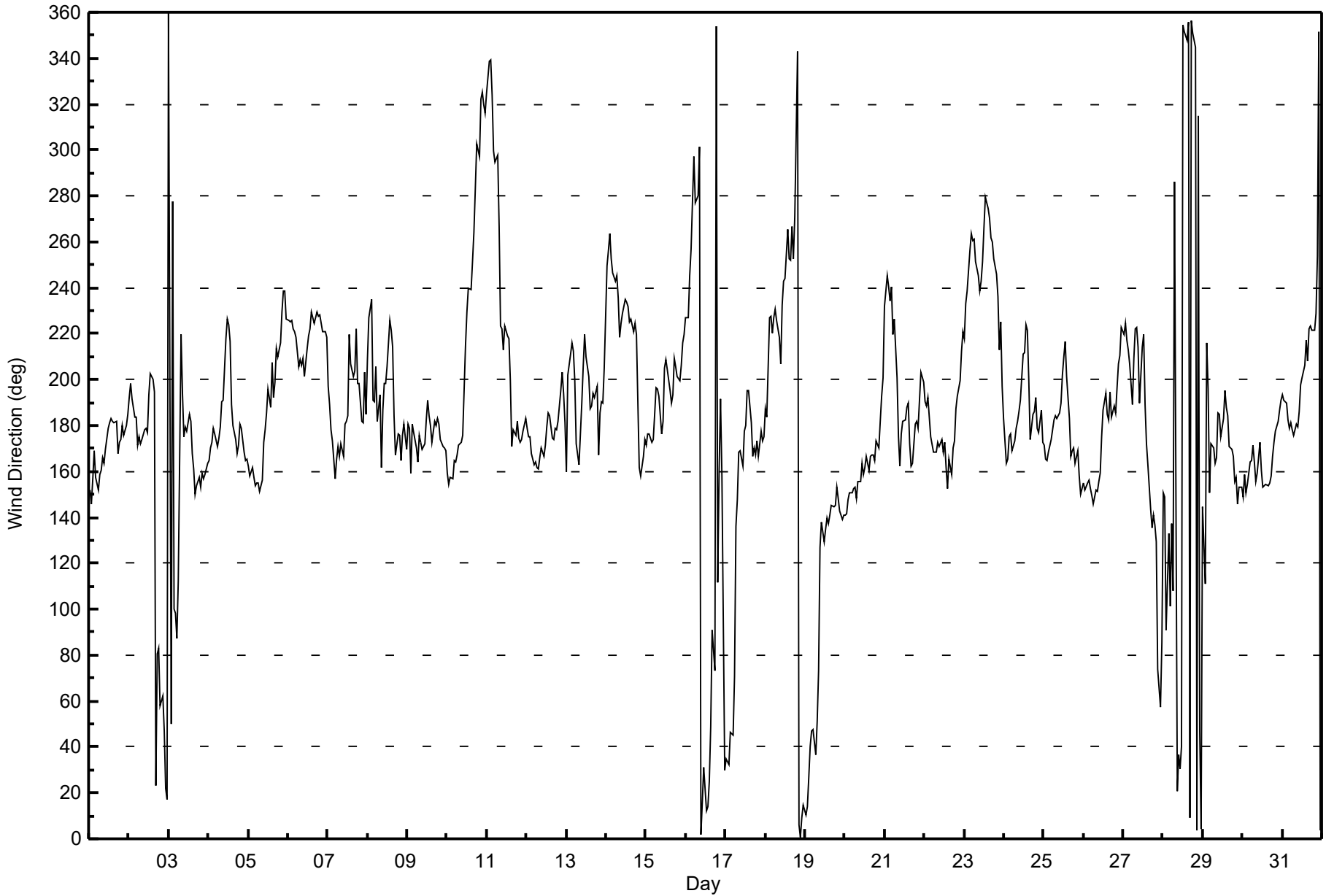
188.1 187.6 191.4 188.2 185.7 183.9 184.1 184.9 182.6 182.0 187.6 196.3 203.7 205.4 199.1 190.0 187.4 187.3 187.8 185.7 182.9 187.4 189.3 188.3
 Diurnal Average

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



Wood Buffalo Environmental Association
Hourly Averages

Wind Direction (WD) - deg
Wapasu - December 2023





Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Direction (WD) - deg
Wapasu - December 2023

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 93 deg on Dec 27 22:00														Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0											
Minimum Value: 8 deg on Dec 1 02:00																									
Percentiles: P ₁ = 10 P ₁₀ = 16 Q ₁ = 19 Median = 23 Q ₃ = 26 P ₉₀ = 28 P ₉₉ = 56																									
Day	Hourly Period Ending At (MST)																							Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23		24
1-Dec	22	8	10	18	13	10	11	14	19	17	26	26	26	25	26	25	27	20	24	23	27	25	27	26	27
2-Dec	27	25	27	27	29	26	25	22	24	25	26	25	28	26	25	49	64	33	20	13	17	26	36	26	64
3-Dec	21	21	40	51	9	16	88	41	43	26	32	25	28	26	27	26	19	27	26	20	20	21	18	21	88
4-Dec	19	21	22	26	27	23	25	25	26	26	23	17	14	19	25	21	16	14	15	20	19	15	18	19	27
5-Dec	20	22	21	20	19	20	20	19	22	26	26	29	28	29	24	26	25	22	23	19	19	16	16	15	29
6-Dec	14	15	15	17	17	22	25	22	20	20	26	22	24	21	16	16	14	14	15	16	19	18	17	16	26
7-Dec	20	26	32	23	10	13	18	14	15	12	22	23	26	18	17	19	22	17	18	15	13	20	16	18	32
8-Dec	18	14	23	17	15	15	22	14	17	19	21	23	24	16	15	18	26	13	18	18	14	17	21	19	26
9-Dec	22	21	14	17	22	15	14	22	20	20	22	26	25	27	27	23	25	26	27	27	24	22	22	21	27
10-Dec	18	17	18	19	21	22	24	25	27	27	29	26	18	18	17	22	27	30	28	25	22	19	20	21	30
11-Dec	21	19	18	18	27	29	28	28	16	14	18	16	17	17	23	18	22	22	24	20	22	24	25	27	29
12-Dec	22	19	19	16	15	17	20	20	22	24	24	24	28	28	28	25	25	26	28	28	27	24	26	25	28
13-Dec	18	34	24	21	22	24	25	18	23	27	22	19	24	29	34	26	30	27	25	27	25	23	26	29	34
14-Dec	23	28	25	23	21	20	21	19	17	18	20	17	17	17	16	15	19	16	16	19	17	12	18	20	28
15-Dec	19	23	24	23	23	26	26	25	29	26	26	26	22	24	26	28	28	23	24	26	27	24	22	19	29
16-Dec	17	17	22	24	28	27	28	29	33	26	28	35	26	30	30	20	46	26	80	28	52	66	57	20	80
17-Dec	24	22	21	18	18	15	19	8	18	17	17	25	25	27	28	25	18	19	21	24	26	27	25	25	28
18-Dec	27	27	18	17	18	19	17	17	25	27	18	19	20	27	24	23	24	21	23	44	28	25	29	28	44
19-Dec	29	28	29	26	26	26	28	25	26	33	24	26	25	18	20	19	19	20	23	23	21	20	20	20	33
20-Dec	19	19	20	21	21	20	24	19	20	23	24	20	26	23	21	24	23	24	25	26	26	28	28	25	28
21-Dec	19	20	21	19	21	20	14	21	23	14	26	27	25	25	28	24	24	24	29	27	27	27	26	27	29
22-Dec	29	26	27	28	22	23	23	21	24	23	22	24	25	19	18	20	20	25	25	28	29	26	24	18	29
23-Dec	20	18	18	27	27	25	26	22	21	17	20	24	26	27	25	25	24	26	24	21	19	16	14	19	27
24-Dec	20	10	12	17	21	23	27	24	27	25	29	23	22	17	22	25	19	20	20	21	19	19	24	19	29
25-Dec	20	22	19	22	25	26	27	27	27	24	29	27	23	19	25	23	19	21	19	18	21	20	14	17	29
26-Dec	19	18	18	20	19	18	16	17	18	20	21	26	26	28	30	31	33	25	27	25	27	23	24	19	33
27-Dec	18	16	20	22	24	24	22	17	16	24	26	26	21	27	22	19	13	14	13	13	14	93	52	29	93
28-Dec	15	12	41	31	39	25	20	82	43	29	26	28	23	22	33	29	27	23	21	23	36	24	24	64	82
29-Dec	41	54	33	21	13	21	21	21	22	29	27	26	28	27	27	28	17	20	16	12	11	9	12	9	54
30-Dec	8	10	9	13	14	17	21	19	16	19	26	22	20	18	19	18	19	21	25	26	27	27	27	26	27
31-Dec	26	27	27	28	27	28	27	24	29	28	26	25	27	25	20	24	21	20	20	19	15	36	37	29	37
														Diurnal Maximum 41 54 41 51 39 29 88 82 43 33 32 35 28 30 34 49 64 33 80 44 52 93 57 64											



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

AMS18 STONY MOUNTAIN DECEMBER 2023

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

January 31, 2024

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - STONY MOUNTAIN (AMS18)
DECEMBER 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	709	35	35	100	8.9	0	2.8	0
TRS(ppb) Average	706	38	38	100	0.4	0	0.3	0
THC(ppm) Average	709	35	35	100	2.3	-	2.2	-
NMHC(ppm) Average	709	35	35	100	0.037	-	0.004	-
CH4(ppm) Average	709	35	35	100	2.2	-	2.2	-
O3 (ppb) Average	710	34	34	100	38.5	0	35.4	-
NO2 (ppb) Average	707	37	37	100	9.6	0	5.5	-
NO (ppb) Average	707	37	37	100	2	-	0.4	-
NOX (ppb) Average	707	37	37	100	9.6	-	5.7	-
PM2.5 (ug/m3) Average	701	2	43	94.49	16	0	9.7	0
CO(ppm) Average	690	35	54	97.45	0.2	0	0.2	0
CO2(ppm) Average	710	34	34	100	452.6	0	446.8	0
Temperature 2 m (C) Average	744	0	0	100	6.6	-	2.4	-
Relative Humidity (%) Average	744	0	0	100	95.8	-	89.6	-
Wind Speed 20 m (km/h) Average	744	0	0	100	27	-	21	-
Wind Direction 20 m (deg) Average	744	0	0	100	-	-	-	-
Precipitation (mm) Total	744	0	0	100	0.4	-	2.4	-
Leaf Wetness (% of range) Average	744	0	0	100	4.6	-	4.1	-
Global Solar Radiation (W/m2) Average	744	0	0	100	294.9	-	40.5	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - STONY MOUNTAIN (AMS18)
DECEMBER 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	709	0.5	0.9	-	0	0	0.1	0.2	0.5	1.2	8.9
TRS (ppb) Average	706	0.22	0	-	0.1	0.2	0.2	0.2	0.2	0.3	0.4
THC (ppm) Average	709	2.06	0.1	-	1.9	2	2	2	2.1	2.1	2.3
NMHC(ppm) Average	709	0	0.002	-	0	0	0	0	0	0	0.037
CH4(ppm) Average	709	2.05	0.1	-	1.9	2	2	2	2.1	2.1	2.2
O3 (ppb) Average	710	26.57	6.3	-	6.4	17.5	22.9	27.2	31	35	38.5
NO2 (ppb) Average	707	2.37	1.9	-	0.1	0.4	0.9	1.8	3.5	5.1	9.6
NO (ppb) Average	707	0.09	0.2	-	0	0	0	0	0.1	0.2	2
NOX (ppb) Average	707	2.45	2	-	0.1	0.4	0.9	1.9	3.6	5.3	9.6
PM2.5 (ug/m3) Average	701	3.61	3	-	0.3	0.8	1.4	2.8	4.4	8.4	16
CO(ppm) Average	690	0.17	0	-	0.1	0.1	0.2	0.2	0.2	0.2	0.2
CO2(ppm) Average	710	435.81	4	-	428.7	431.3	433.1	435.2	438	441.1	452.6
Temperature 2 m (C) Average	744	-4.18	4.2	-	-14.8	-9.9	-7	-4	-1	1	6.6
Relative Humidity (%) Average	744	70.7	13.3	-	31.4	52.5	61.7	72	81.5	87.1	95.8
Wind Speed 20 m (km/h) Average	744	16	4	-	2	11	13	16	19	22	27
Wind Direction 20 m (deg) Average	744	-	-	-	-	-	-	-	-	-	-
Precipitation (mm) Total	744	-	-	3.14	-	-	-	-	-	-	-
Surface Wetness (% of range) Average	744	2.18	0.6	-	1.4	1.7	1.8	2	2.2	3.1	4.6
Global Solar Radiation (W/m2) Average	744	22.95	47.6	-	0	0	0.1	0.4	16.7	87.3	294.9

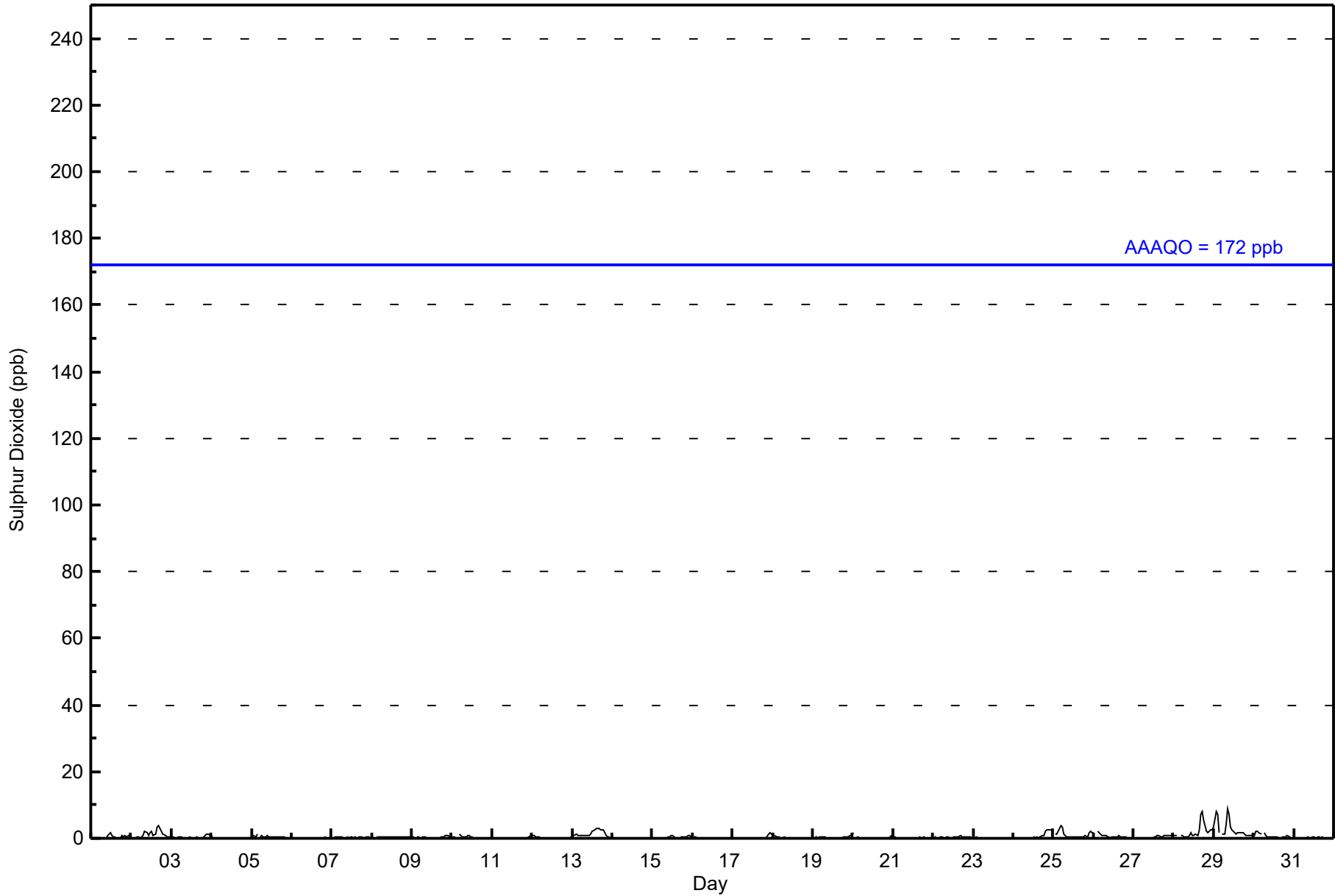
WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - STONY MOUNTAIN (AMS18)
DECEMBER 2023

MONTHLY SUMMARY

Parameter	Period Start	Period End	Duration (Hours)	Notes
PM2.5	18 Dec 2023 20:00	20 Dec 2023 11:00	40	Analyzer Failure - sample pump failure
PM2.5	20 Dec 2023 12:00	20 Dec 2023 12:00	1	Maintenance - sample pump replaced
CO	31 Dec 2023 06:00	01 Jan 2024 00:00	19	Unstable Operations - excessive baseline drift



Number of Exceedences (AAAQO):		1-hr: 0	24-hr: 0	Hours in Service: 744																	Daily Average		Daily Maximum										
Maximum Value: 8.9 ppb on Dec 29 09:00		Maximum Daily Average: 2.8 ppb on Dec 29																	Hours of Data: 709		Hours of Missing Data: 35												
Minimum Value: 0.0 ppb on Dec 1 03:00		Minimum Daily Average: 0.1 ppb on Dec 11																	Hours of Calibration: 35		Percent Operational Time: 100.0												
Maximum Diurnal Average: 0.7 ppb at hour 3		Minimum Diurnal Average: 0.3 ppb at hour 7																															
Monthly Average: 0.50 ppb		Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.1 Median = 0.2 Q ₃ = 0.5 P ₉₀ = 1.2 P ₉₉ = 4.4																															
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-Dec	Z	0.1	0.0	0.1	0.1	0.0	0.0	0.1	0.1	0.1	1.0	1.5	1.0	0.5	0.2	0.2	0.2	0.1	0.7	0.6	1.1	0.4	0.9	0.3	0.4	1.5							
2-Dec	0.2	Z	0.2	0.3	0.3	0.2	0.3	0.9	2.1	1.5	0.8	1.7	2.0	1.0	1.5	3.4	4.0	2.9	1.9	1.3	0.7	0.5	0.5	0.5	1.2	4.0							
3-Dec	0.4	0.4	Z	0.2	0.2	0.2	0.3	0.2	0.2	0.1	0.2	0.2	0.2	0.2	0.0	0.3	0.1	0.2	0.2	0.4	0.7	1.2	1.1	0.7	0.3	1.2							
4-Dec	0.4	0.2	0.1	Z	0.1	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.4							
5-Dec	0.1	0.7	0.3	1.4	Z	0.5	0.6	0.5	0.5	0.8	0.3	0.3	0.5	0.4	0.3	0.3	0.4	0.4	0.3	0.2	0.2	0.1	0.1	0.1	0.4	1.4							
6-Dec	0.0	0.1	0.1	0.1	0.1	Z	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.2	0.1	0.2	0.1	0.1	0.1	0.2	0.2	0.1	0.1	0.2	0.1	0.2							
7-Dec	Z	0.2	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.3	0.2	0.3	0.2	0.3	0.3	0.2	0.2	0.3	0.2	0.2	0.2	0.2	0.3							
8-Dec	0.2	Z	0.2	0.3	0.4	0.3	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.4	0.4	0.3	0.4	0.5	0.4	0.3	0.2	0.3	0.4	0.3	0.4	0.5							
9-Dec	0.2	0.2	Z	0.3	0.2	0.2	0.2	0.3	0.3	0.2	0.1	0.1	0.1	0.1	0.0	0.1	0.2	0.3	0.3	0.2	1.0	0.7	0.3	0.2	0.3	1.0							
10-Dec	0.3	0.3	0.4	Z	1.1	0.8	0.4	0.3	0.4	0.9	0.8	0.4	0.3	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	1.1							
11-Dec	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	0.0	0.0	0.0	0.0	0.0	0.2	0.4	0.7	0.1	0.7							
12-Dec	0.7	0.7	0.5	0.4	0.3	Z	0.2	0.1	0.2	0.0	0.1	0.1	0.0	0.1	0.1	0.1	0.2	0.1	0.0	0.0	0.0	0.0	0.2	0.6	0.2	0.7							
13-Dec	Z	1.0	1.4	1.0	0.8	0.8	0.8	0.7	0.7	0.7	0.7	1.2	2.0	2.7	2.8	3.0	2.9	2.5	2.3	1.7	0.8	0.6	0.3	0.1	1.4	3.0							
14-Dec	0.1	Z	0.1	0.1	0.0	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	0.0	0.1	0.0	0.0	0.1	0.1	0.1							
15-Dec	0.1	0.1	Z	0.1	0.1	0.1	0.1	0.2	0.2	0.1	0.6	0.5	0.9	0.7	0.5	0.1	0.1	0.2	0.3	0.4	0.3	0.5	0.7	0.7	0.6	0.3	0.9						
16-Dec	0.6	0.3	0.2	Z	0.2	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	0.0	0.0	0.0	0.0	0.1	0.6							
17-Dec	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	0.2	1.3	1.5	1.1	0.2	1.5							
18-Dec	0.8	0.7	0.5	0.5	0.4	Z	0.2	0.2	0.2	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.8							
19-Dec	Z	0.2	0.2	0.2	0.3	0.4	0.4	0.3	0.1	0.1	0.0	C	C	C	C	0.0	0.2	0.2	0.4	0.6	0.4	0.3	0.7	1.0	0.3	1.0							
20-Dec	1.6	Z	0.2	0.2	0.2	0.1	0.1	0.1	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.4	0.8	0.2	1.6							
21-Dec	0.5	0.3	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.0	0.4	0.1	0.3	0.0	0.0	0.1	0.0	0.2	0.1	0.5							
22-Dec	0.2	0.2	0.2	Z	0.3	0.3	0.2	0.1	0.3	0.5	0.2	0.2	0.5	0.5	0.5	0.6	0.7	0.2	0.4	0.6	0.2	0.2	0.2	0.1	0.3	0.7							
23-Dec	0.1	0.1	0.2	0.1	Z	0.1	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.2							
24-Dec	0.1	0.2	0.1	0.1	0.1	Z	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.2	0.3	0.2	0.3	0.8	1.0	2.0	2.5	2.7	2.7	2.4	0.7	2.7							
25-Dec	Z	1.1	1.2	2.3	3.8	3.3	1.3	0.7	0.6	0.5	0.5	0.4	0.4	0.3	0.2	0.2	0.2	0.4	0.4	0.7	0.4	1.8	2.0	1.7	1.1	3.8							
26-Dec	1.5	Z	2.2	1.6	1.2	1.0	0.7	0.7	0.5	0.3	0.2	0.2	0.3	0.2	0.3	0.8	0.5	0.5	0.3	0.2	0.2	0.2	0.1	0.0	0.6	2.2							
27-Dec	0.0	0.0	Z	0.1	0.0	0.0	0.1	0.1	0.2	0.1	0.2	0.2	0.4	0.6	0.7	0.7	0.4	0.5	0.8	0.8	0.9	0.8	0.8	0.8	0.4	0.9							
28-Dec	0.6	0.7	0.7	Z	0.6	0.7	0.6	0.3	0.3	0.8	1.5	0.8	0.7	1.1	0.9	2.7	7.2	8.1	5.4	2.0	1.6	1.9	2.5	2.7	1.9	8.1							
29-Dec	3.4	8.2	7.1	1.6	Z	1.4	1.4	4.4	8.9	7.1	3.6	2.6	1.8	1.4	1.5	1.9	1.6	1.6	1.1	0.8	0.7	0.8	0.7	0.7	2.8	8.9							
30-Dec	0.8	2.2	2.1	1.8	1.2	Z	1.5	0.7	0.6	0.6	0.6	0.6	0.4	0.3	0.3	0.1	0.2	0.3	0.5	0.6	1.0	0.4	0.1	0.1	0.7	2.2							
31-Dec	Z	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.2	0.2	0.2	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.3							
		0.5	0.7	0.7	0.5	0.5	0.4	0.3	0.4	0.6	0.5	0.4	0.4	0.4	0.4	0.5	0.7	0.7	0.6	0.5	0.4	0.5	0.6	0.5	Diurnal Average								
		3.4	8.2	7.1	2.3	3.8	3.3	1.5	4.4	8.9	7.1	3.6	2.6	2.0	2.7	2.8	3.4	7.2	8.1	5.4	2.0	2.5	2.7	2.7	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
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Stony Mountain - December 2023

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	709	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: 709

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Stony Mountain - December 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	1	0	5	1	2	6	4	6	61	181	175	57	92	96	21	1	709
11 - 20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	1	0	5	1	2	6	4	6	61	181	175	57	92	96	21	1	709

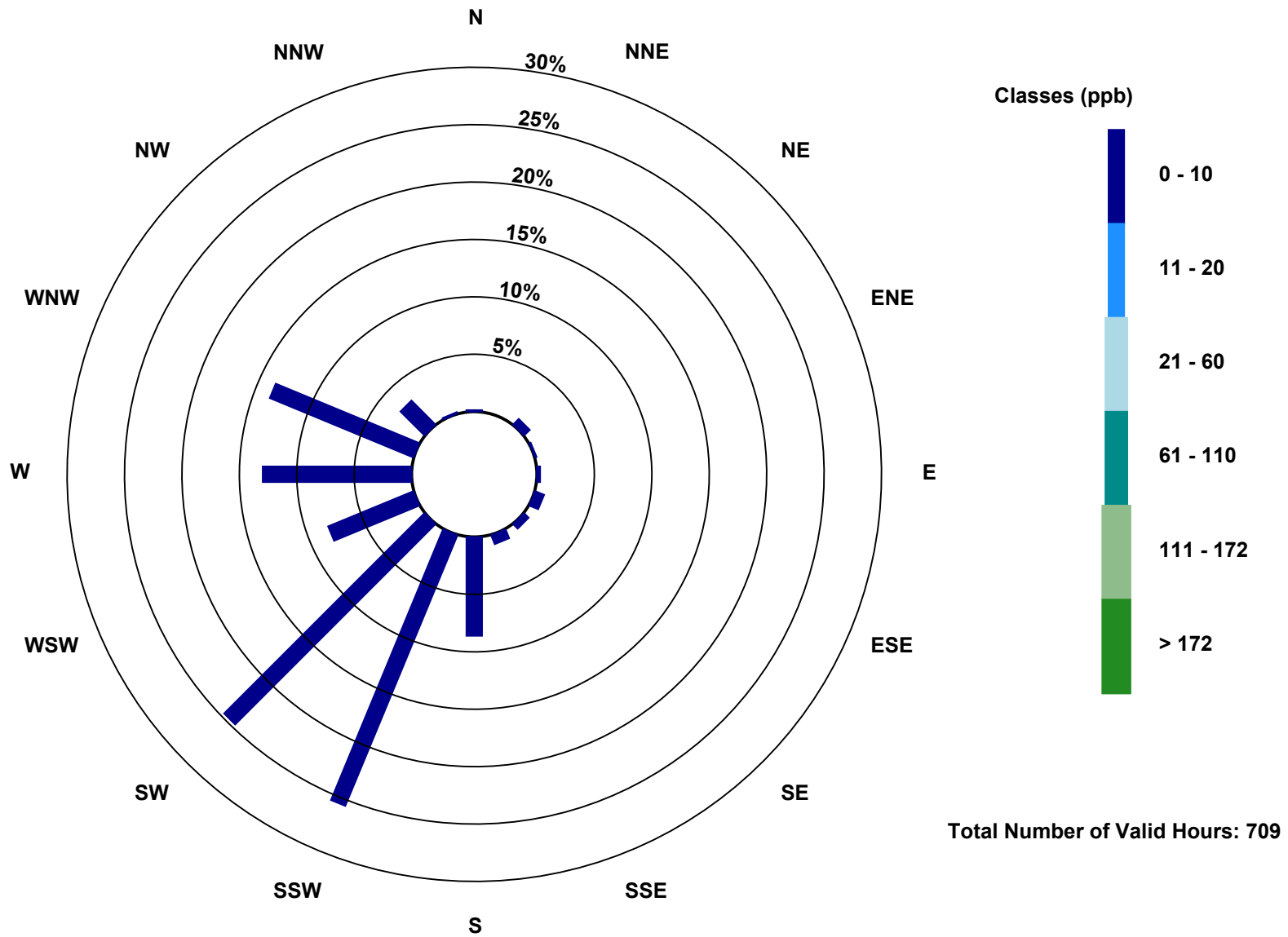
Total Number of Valid Hours: 709

Total Number of Hours: 744

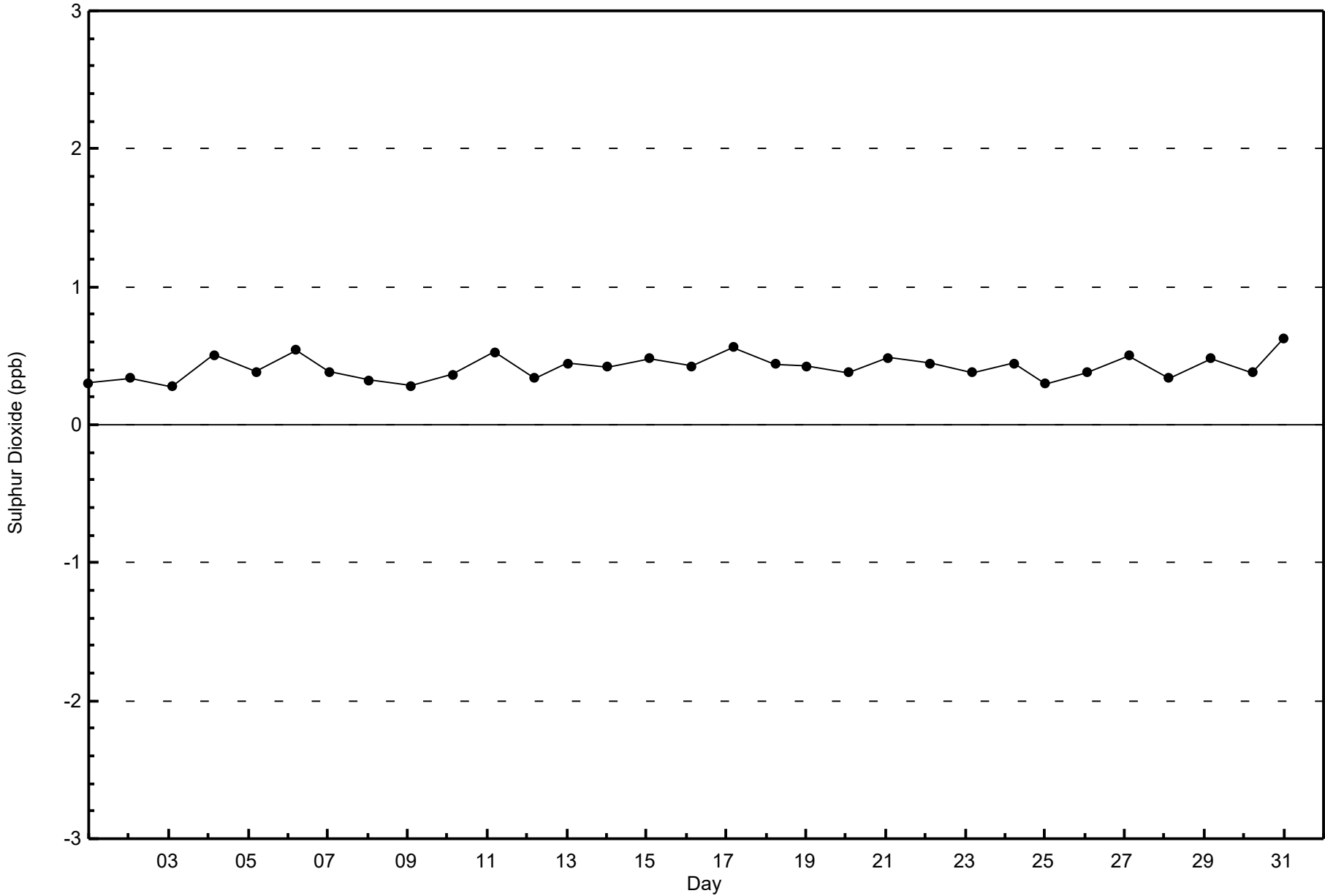


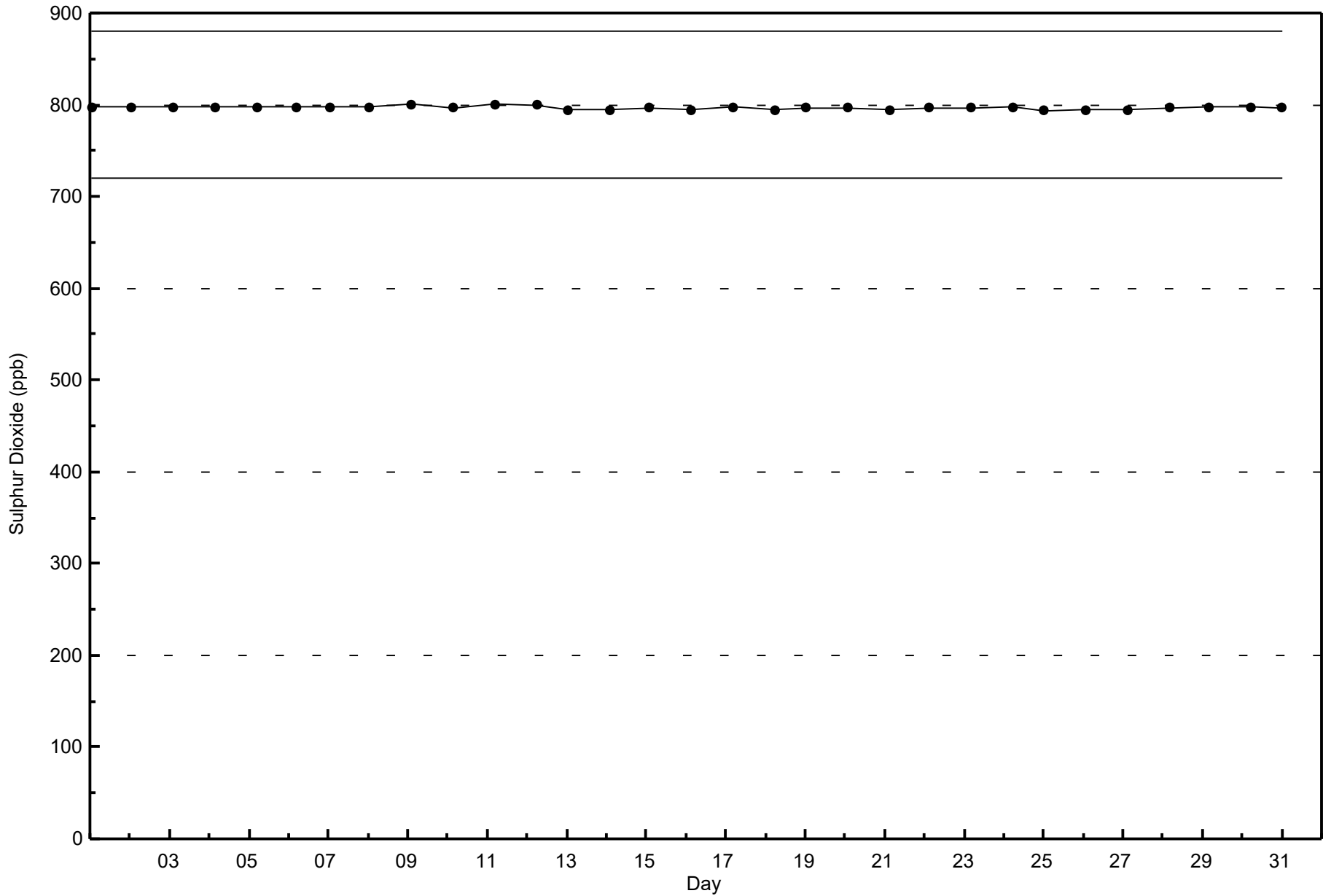
Wood Buffalo Environmental Association
Wind Rose Dec 2023

Sulphur Dioxide (SO₂) - ppb
Stony Mountain



Total Number of Valid Hours: 709







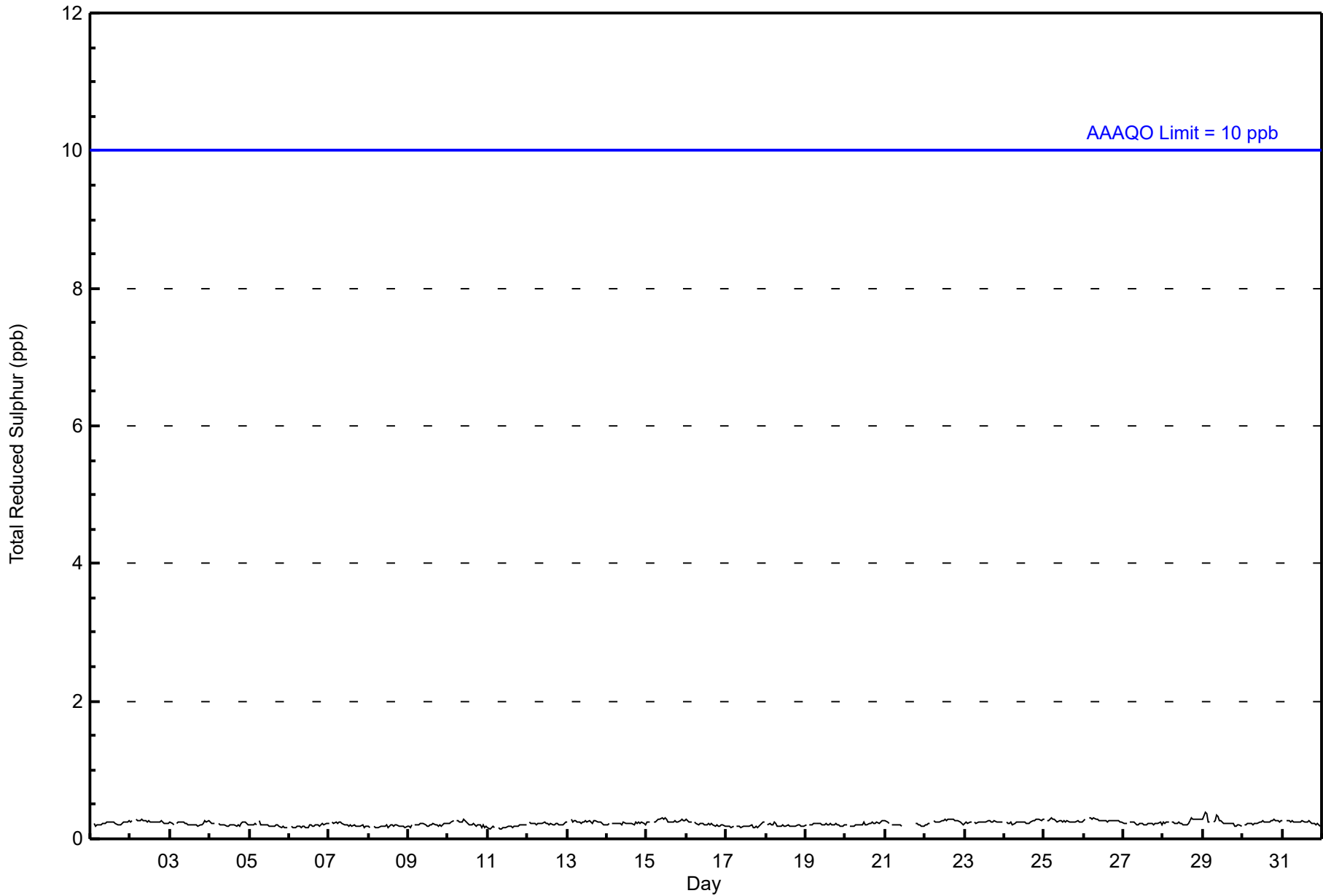
Wood Buffalo Environmental Association

Summary of Hour Averages

Total Reduced Sulphur (TRS) - ppb

Stony Mountain - December 2023

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 0.4 ppb on Dec 29 02:00 Maximum Daily Average: 0.3 ppb on Dec 26		Hours in Service: 744 Hours of Data: 706 Hours of Missing Data: 38 Hours of Calibration: 38 Percent Operational Time: 100.0																									
Minimum Value: 0.1 ppb on Dec 11 08:00 Maximum Diurnal Average: 0.2 ppb at hour 6 Monthly Average: 0.22 ppb		Minimum Daily Average: 0.2 ppb on Dec 11 Minimum Diurnal Average: 0.2 ppb at hour 14 Percentiles: P ₁ = 0.2 P ₁₀ = 0.2 Q ₁ = 0.2 Median = 0.2 Q ₃ = 0.2 P ₉₀ = 0.3 P ₉₉ = 0.3																									
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Dec	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	0.3	0.2	0.3	
2-Dec	0.3	0.3	Z	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.3
3-Dec	0.2	0.2	0.2	Z	0.2	0.2	0.2	0.2	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.2	0.3	0.2	0.3	
4-Dec	0.2	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	
5-Dec	0.2	0.2	0.2	0.2	0.2	Z	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	
6-Dec	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	0.2	0.2	0.2	0.2	
7-Dec	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	0.2	0.2	0.2	
8-Dec	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	0.2	0.2	
9-Dec	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	0.2	
10-Dec	0.2	0.2	0.2	0.3	Z	0.3	0.3	0.2	0.2	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	
11-Dec	0.2	0.1	0.2	0.2	0.2	Z	0.2	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	
12-Dec	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	0.2	0.2	0.2	0.2	
13-Dec	0.2	Z	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.3	0.3	0.2	0.3	0.2	0.2	0.3	0.3	0.2	0.3	0.2	0.2	0.2	0.2	0.2	0.3	
14-Dec	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	0.2	0.2	
15-Dec	0.2	0.2	0.3	Z	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	0.3	0.3	0.2	0.3	0.3	0.3	0.3	0.3	0.3	
16-Dec	0.3	0.3	0.2	0.2	Z	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	
17-Dec	0.2	0.2	0.2	0.2	0.2	Z	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	
18-Dec	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	0.2	0.2	0.2	0.2	
19-Dec	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	0.2	0.2	0.2	
20-Dec	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	0.3	0.3	0.2	
21-Dec	0.3	0.2	0.2	Z	0.2	0.2	0.2	0.2	0.2	0.2	0.2	C	C	C	C	C	C	C	0.2	0.2	0.2	0.2	0.2	0.2	0.2	--	
22-Dec	0.2	0.2	0.2	0.2	Z	0.3	0.2	0.2	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	0.2	0.2	0.2	0.2	0.2	
23-Dec	0.2	0.2	0.2	0.2	0.2	Z	0.3	0.2	0.2	0.2	0.2	0.2	0.3	0.2	0.3	0.3	0.2	0.2	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	
24-Dec	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	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.2	
25-Dec	0.3	Z	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.3	0.3	0.3	0.2	0.3	0.3	0.3	0.3	0.2	0.2	0.3	0.2	0.3	0.2	0.2	0.3	
26-Dec	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	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.3	
27-Dec	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	0.3	0.2	0.2	0.2	
28-Dec	0.2	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	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.2	
29-Dec	0.3	0.4	0.4	0.2	0.3	Z	0.2	0.3	0.4	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	
30-Dec	Z	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.2	0.3	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.3	0.2	0.3	
31-Dec	0.3	Z	0.3	0.3	0.3	0.2	0.3	0.2	0.2	0.2	0.2	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	
																								Diurnal Average			
																								Diurnal Maximum			
Z - zerospan C - Calibration																											
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 10 ppb 24-hr 3 ppb																											





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Total Reduced Sulphur (TRS) - ppb
Stony Mountain - December 2023**

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

Total Number of Valid Hours: 706

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Total Reduced Sulphur (TRS) - ppb
Stony Mountain - December 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	2	0	5	1	6	5	4	6	60	173	176	60	90	98	19	1	706
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	2	0	5	1	6	5	4	6	60	173	176	60	90	98	19	1	706

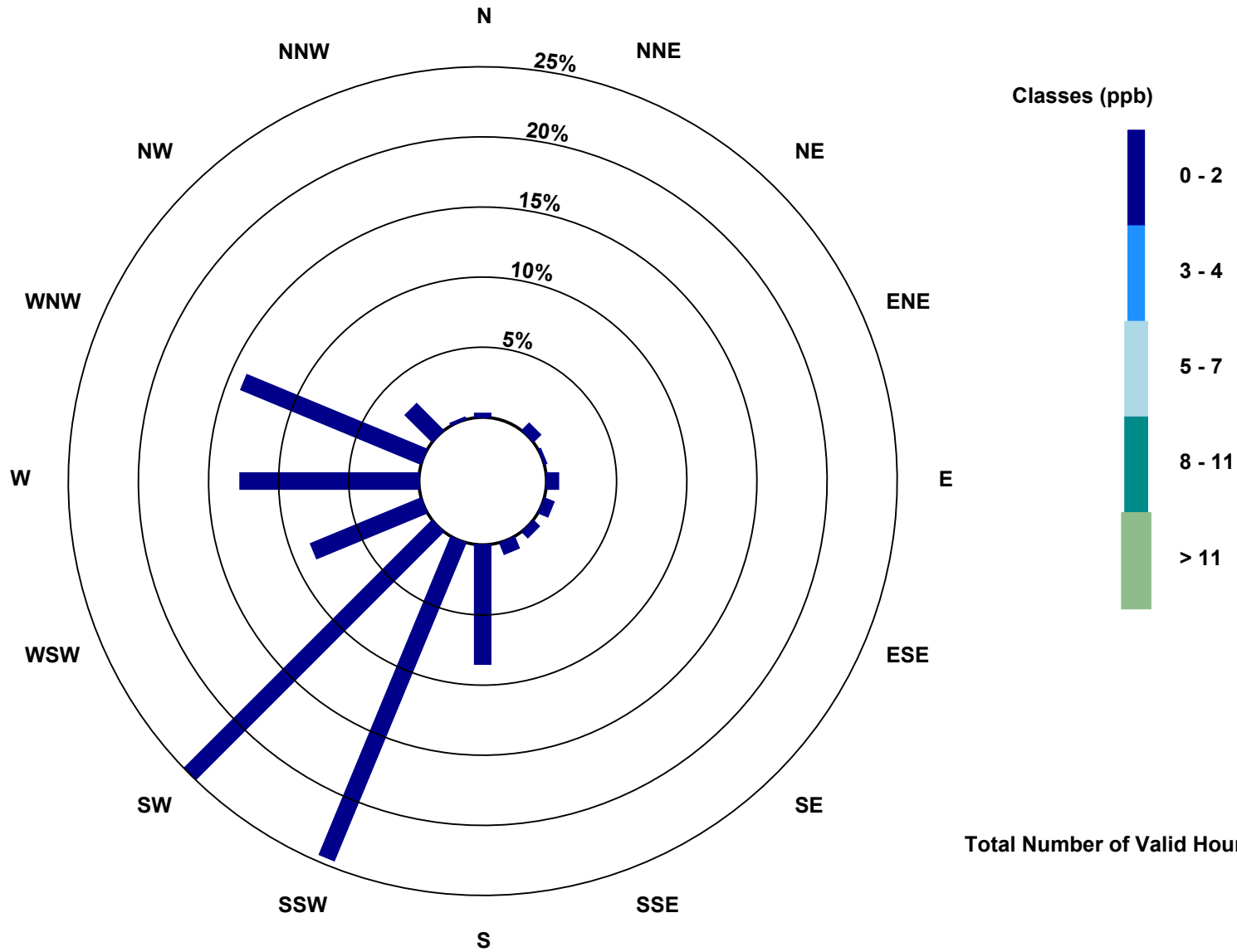
Total Number of Valid Hours: 706

Total Number of Hours: 744

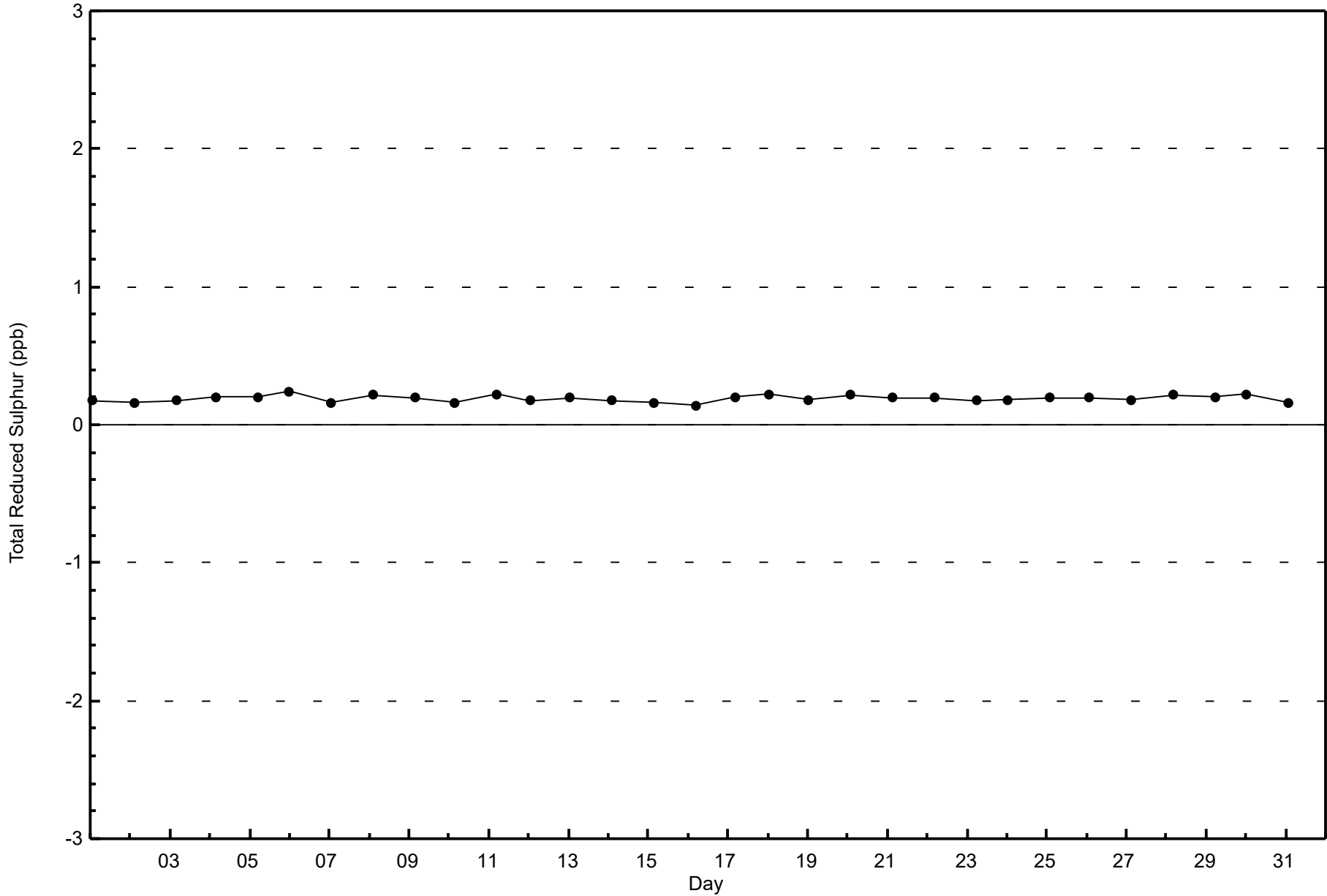


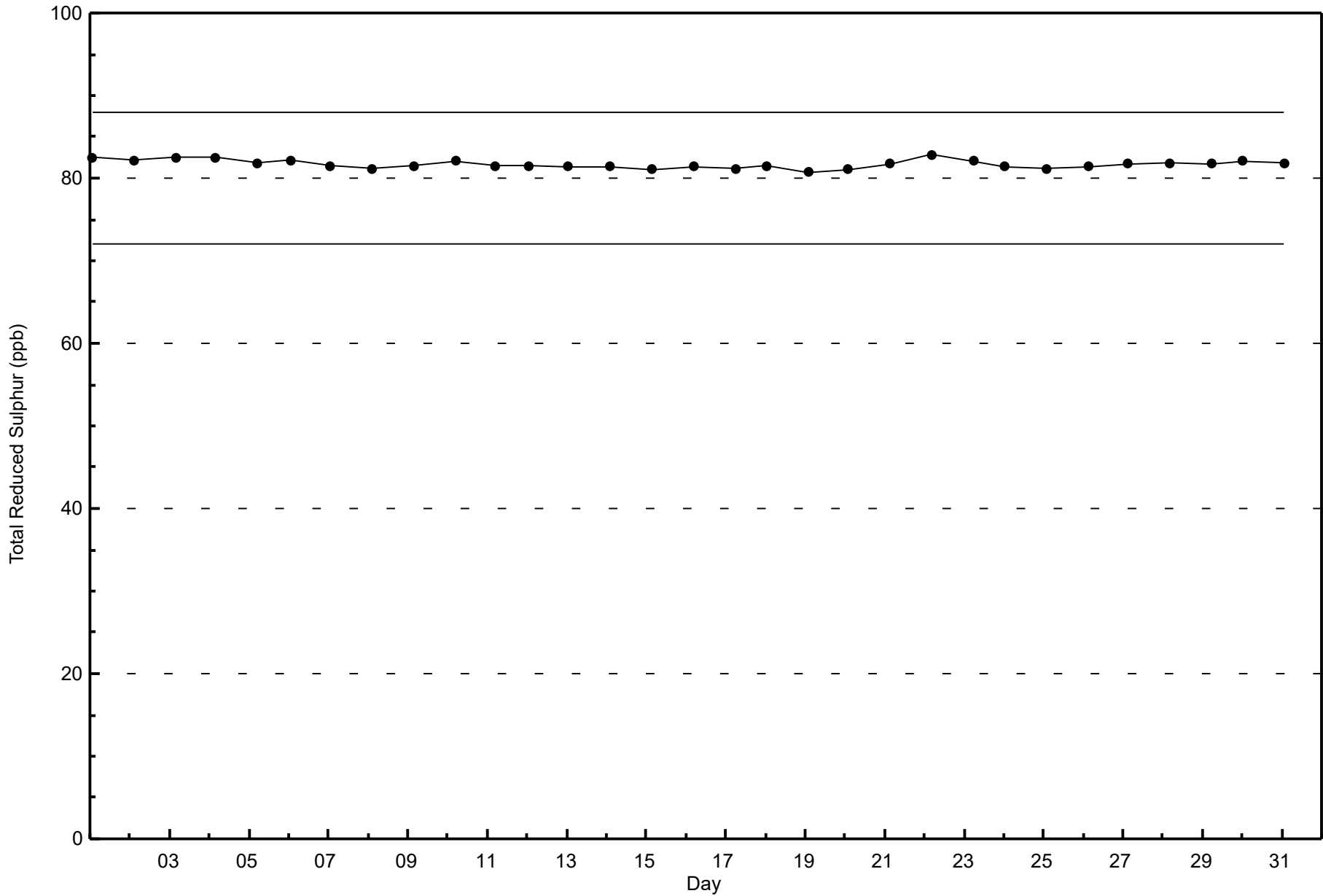
Wood Buffalo Environmental Association
Wind Rose Dec 2023

Total Reduced Sulphur (TRS) - ppb
Stony Mountain



Total Number of Valid Hours: 706



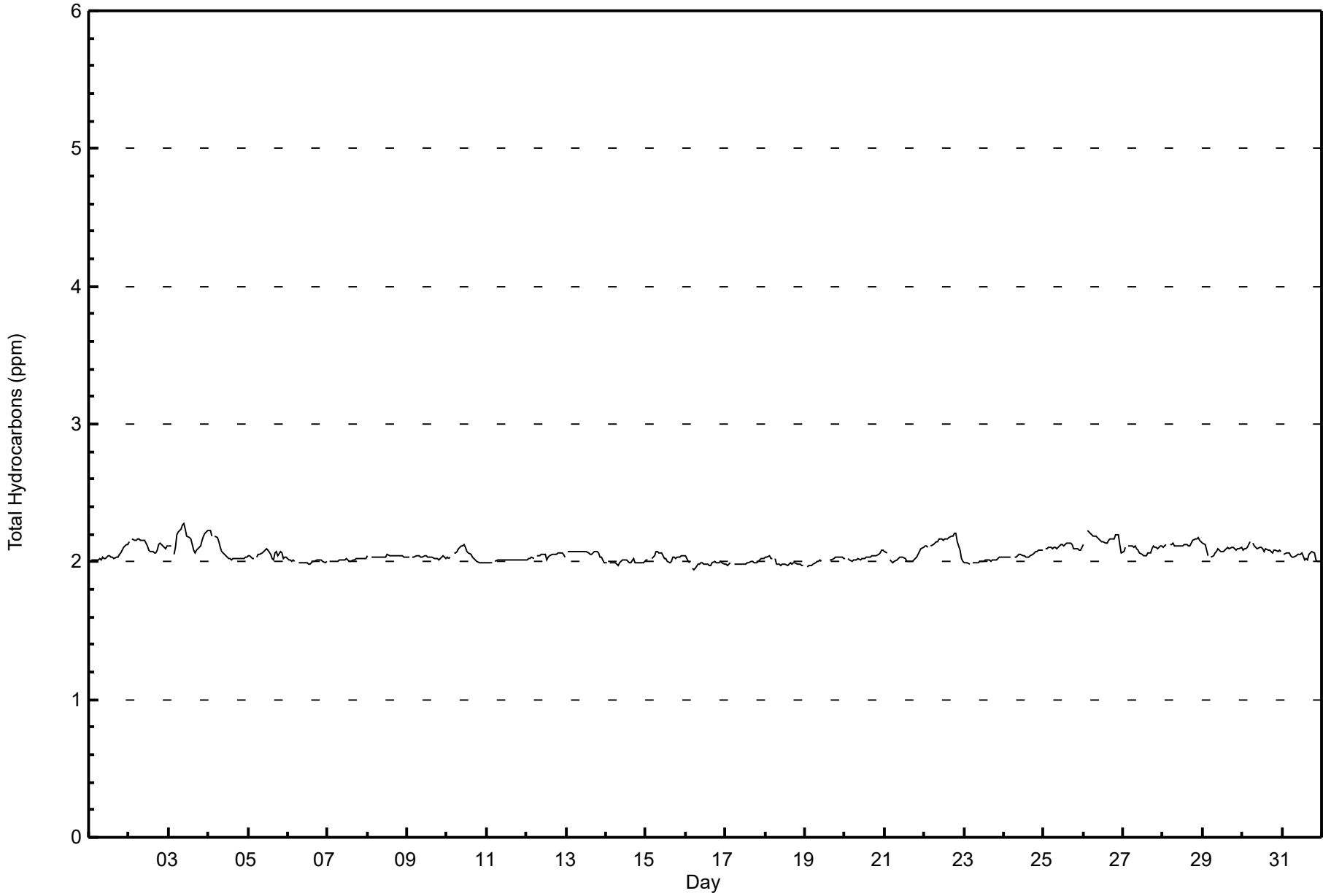




Wood Buffalo Environmental Association
Summary of Hour Averages

Total Hydrocarbons (THC) - ppm
Stony Mountain - December 2023

Maximum Value: 2.3 ppm on Dec 3 10:00		Maximum Daily Average: 2.2 ppm on Dec 26		Hours in Service: 744																							
Minimum Value: 1.9 ppm on Dec 16 06:00		Minimum Daily Average: 2.0 ppm on Dec 16		Hours of Data: 709																							
Maximum Diurnal Average: 2.1 ppm at hour 10		Minimum Diurnal Average: 2.0 ppm at hour 4		Hours of Missing Data: 35																							
Monthly Average: 2.06 ppm		Percentiles: P ₁ = 2.0 P ₁₀ = 2.0 Q ₁ = 2.0 Median = 2.0 Q ₃ = 2.1 P ₉₀ = 2.1 P ₉₉ = 2.2		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-Dec	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	2.1	2.1	2.1	2.1	2.0	2.1	
2-Dec	2.1	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2
3-Dec	2.1	2.1	Z	2.1	2.1	2.2	2.2	2.2	2.3	2.3	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.3	
4-Dec	2.2	2.2	2.2	Z	2.2	2.2	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.2	
5-Dec	2.0	2.0	2.0	2.0	Z	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.1	2.1	2.0	2.1	2.1	2.0	2.0	2.0	2.1	2.1	
6-Dec	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
7-Dec	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
8-Dec	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	2.1	
9-Dec	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
10-Dec	2.0	2.0	2.0	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	
11-Dec	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
12-Dec	2.0	2.0	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.1	2.1	2.1	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.1	
13-Dec	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	2.0	2.0	2.0	2.0	2.0	2.1	
14-Dec	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
15-Dec	2.0	2.0	Z	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	2.0	2.0	2.0	2.0	2.0	2.0	2.1	
16-Dec	2.0	2.0	2.0	Z	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
17-Dec	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
18-Dec	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
19-Dec	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	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
20-Dec	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	2.1	2.1	2.0	2.1	
21-Dec	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	2.1	2.1	2.1	2.1	2.0	2.1	
22-Dec	2.1	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.0	2.0	2.1	2.2	
23-Dec	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
24-Dec	2.0	2.0	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
25-Dec	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
26-Dec	2.1	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.2	2.2	
27-Dec	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
28-Dec	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	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.2
29-Dec	2.1	2.1	2.1	2.0	Z	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
30-Dec	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
31-Dec	Z	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.0	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
		2.1	2.1	2.1	2.0	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	Diurnal Average
		2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	Diurnal Maximum
Z - zerospan		C - Calibration																									





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Total Hydrocarbons (THC) - ppm
Stony Mountain - December 2023**

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	406	57.26	57.26
2.1 - 3.0	303	42.74	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 709

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Total Hydrocarbons (THC) - ppm
Stony Mountain - December 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	1	0	5	1	2	5	4	3	23	67	76	43	81	83	11	1	406
2.1 - 3.0	0	0	0	0	0	1	0	3	38	114	99	14	11	13	10	0	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
Totals	1	0	5	1	2	6	4	6	61	181	175	57	92	96	21	1	709

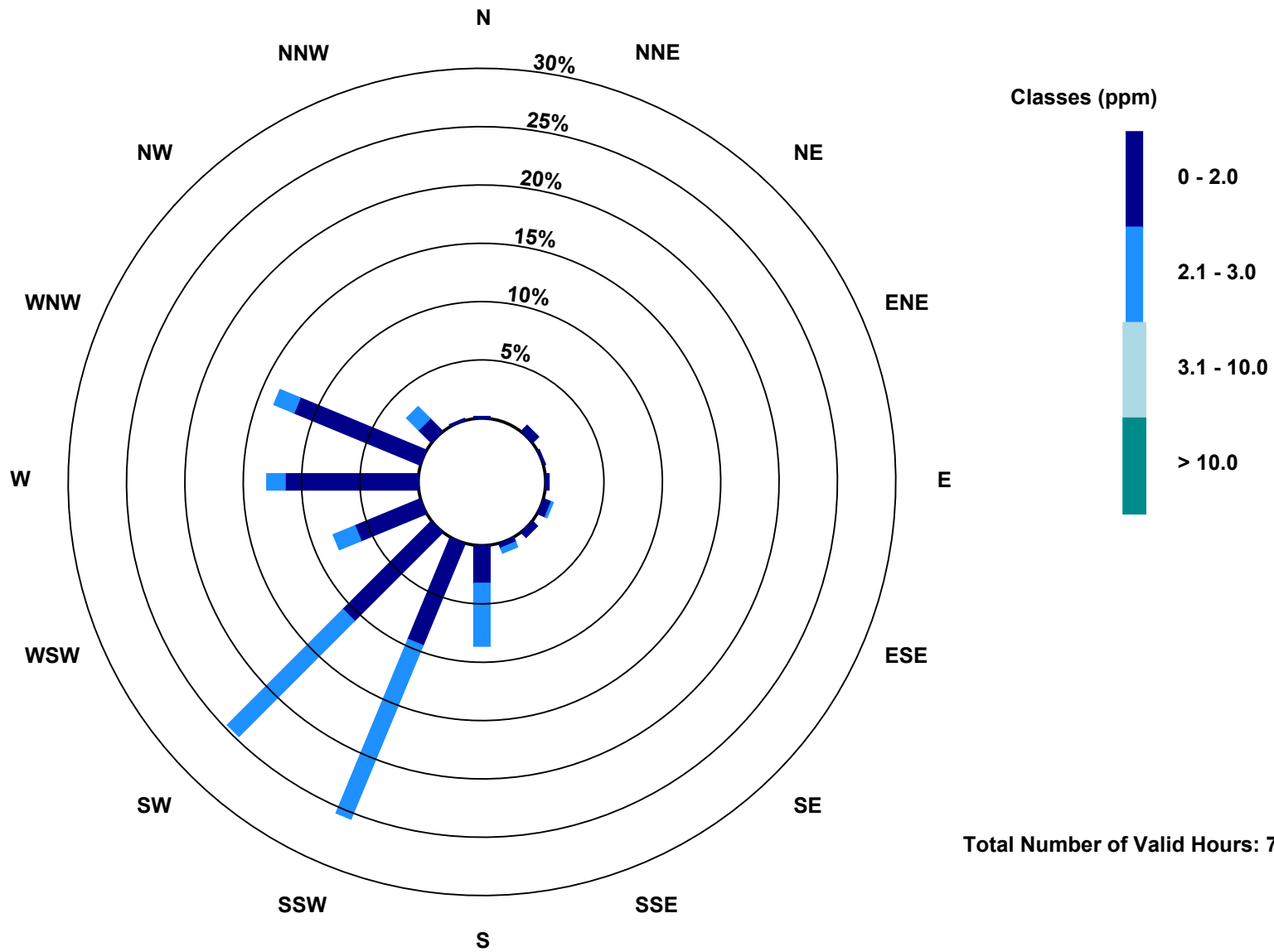
Total Number of Valid Hours: 709

Total Number of Hours: 744

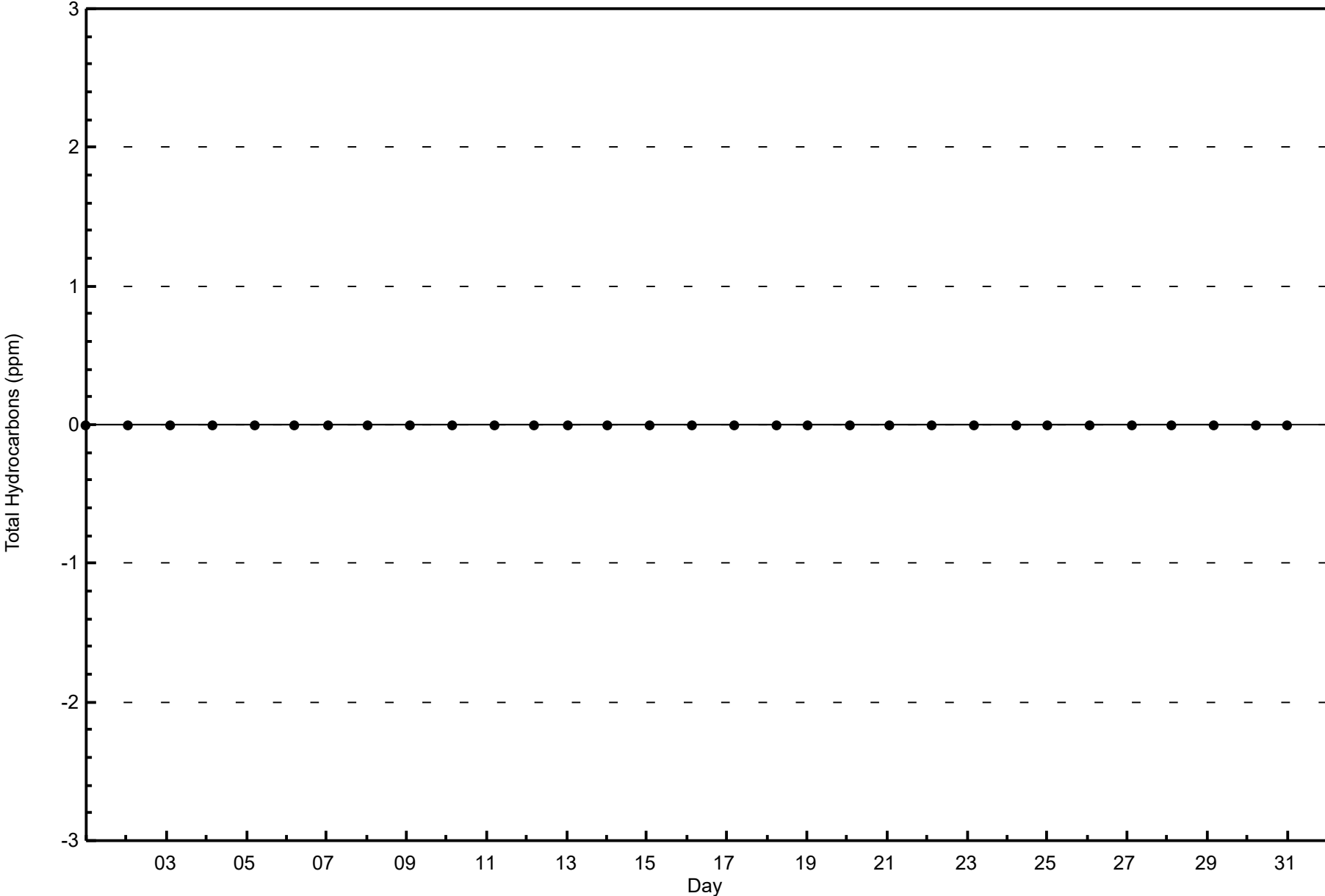


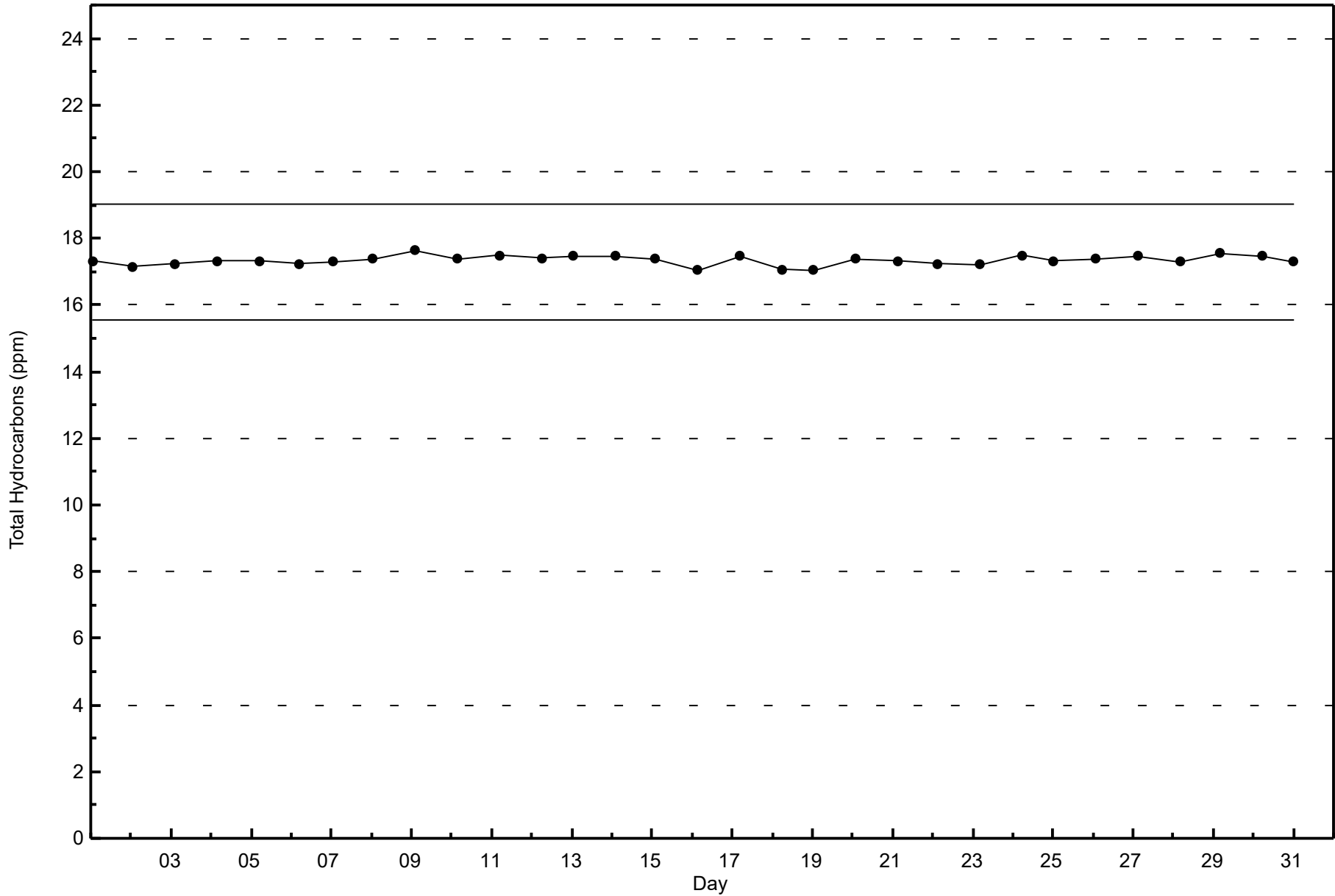
Wood Buffalo Environmental Association
Wind Rose Dec 2023

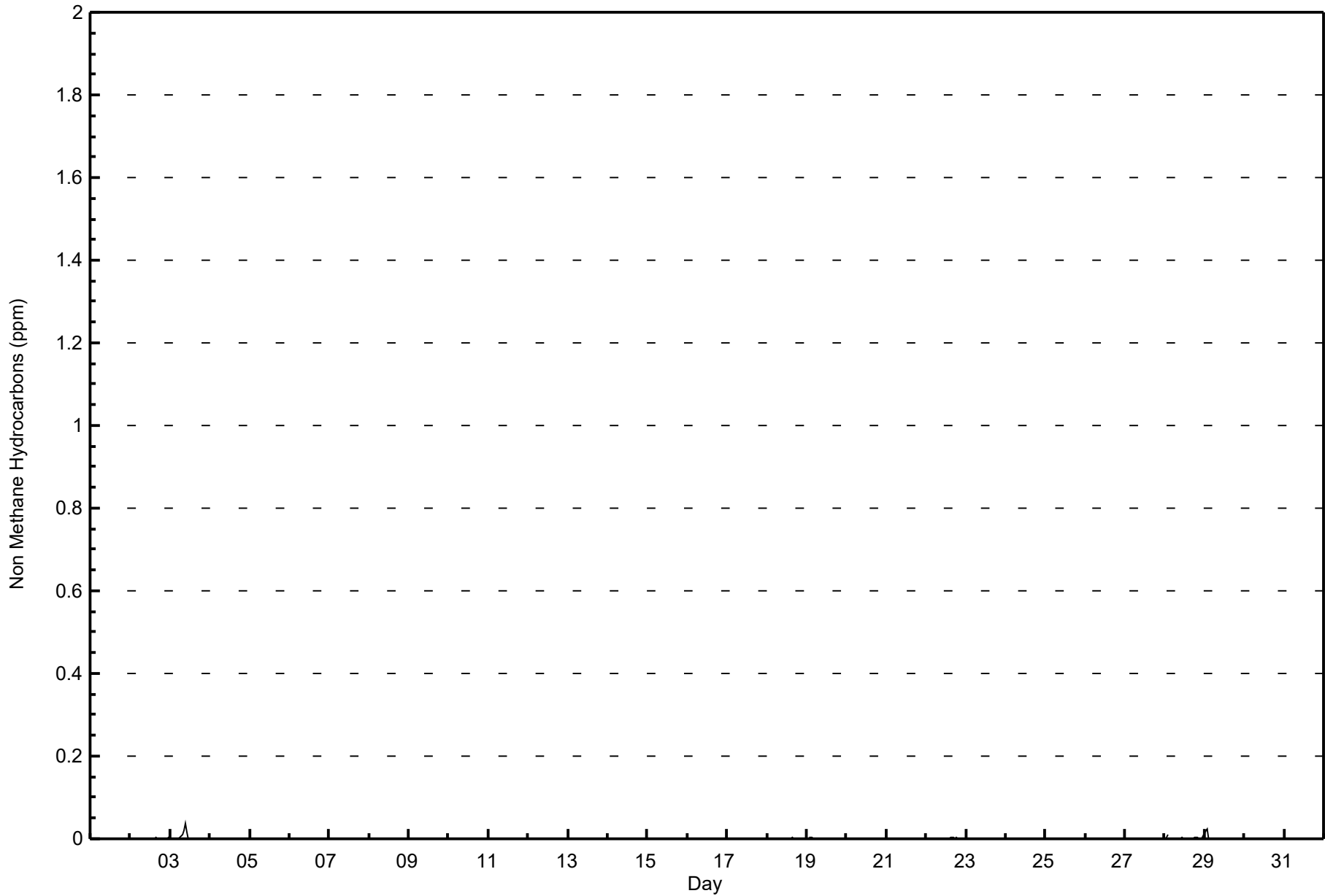
Total Hydrocarbons (THC) - ppm
Stony Mountain



Total Number of Valid Hours: 709









Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Non Methane Hydrocarbons (NMHC) - ppm
Stony Mountain - December 2023

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 0.005	701	98.87	98.87
0.006 - 0.05	8	1.13	100.00
0.06 - 0.1	0	0.00	100.00
> 0.1	0	0.00	100.00

Total Number of Valid Hours: 709

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Non Methane Hydrocarbons (NMHC) - ppm
Stony Mountain - December 2023**

Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 0.005	1	0	5	1	2	6	4	6	61	179	173	57	91	95	19	1	701
0.006 - 0.05	0	0	0	0	0	0	0	0	0	2	2	0	1	1	2	0	8
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
Totals	1	0	5	1	2	6	4	6	61	181	175	57	92	96	21	1	709

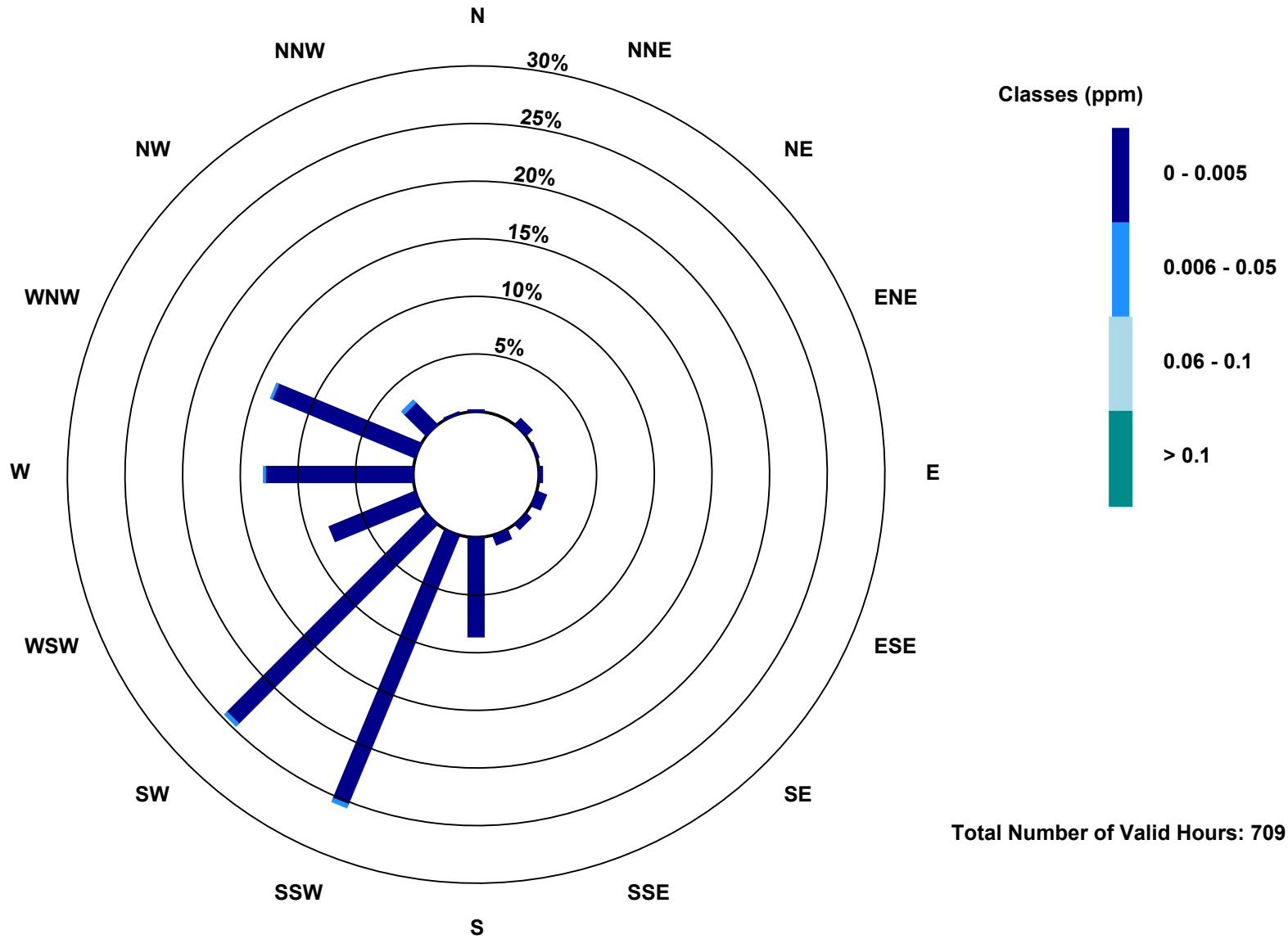
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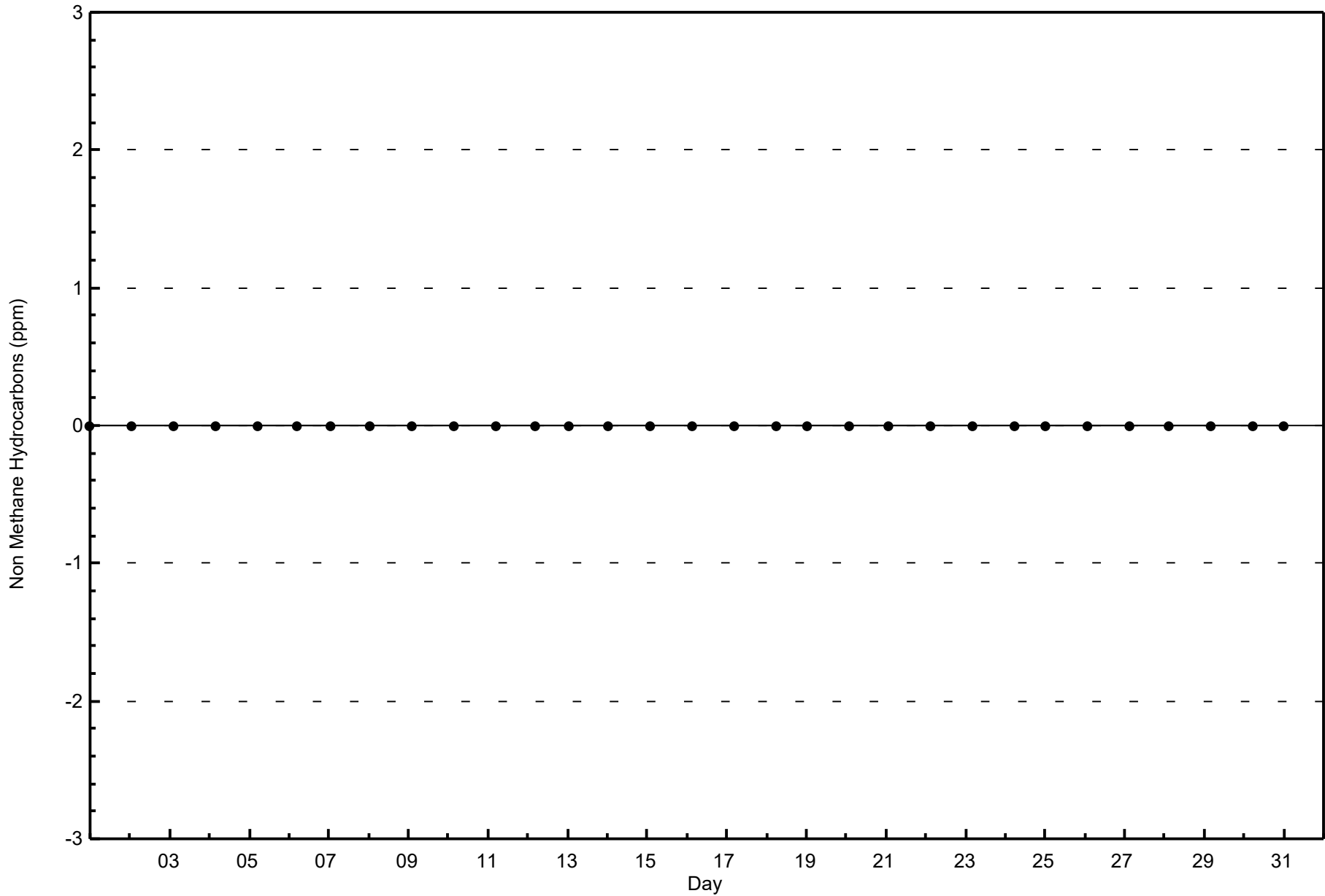
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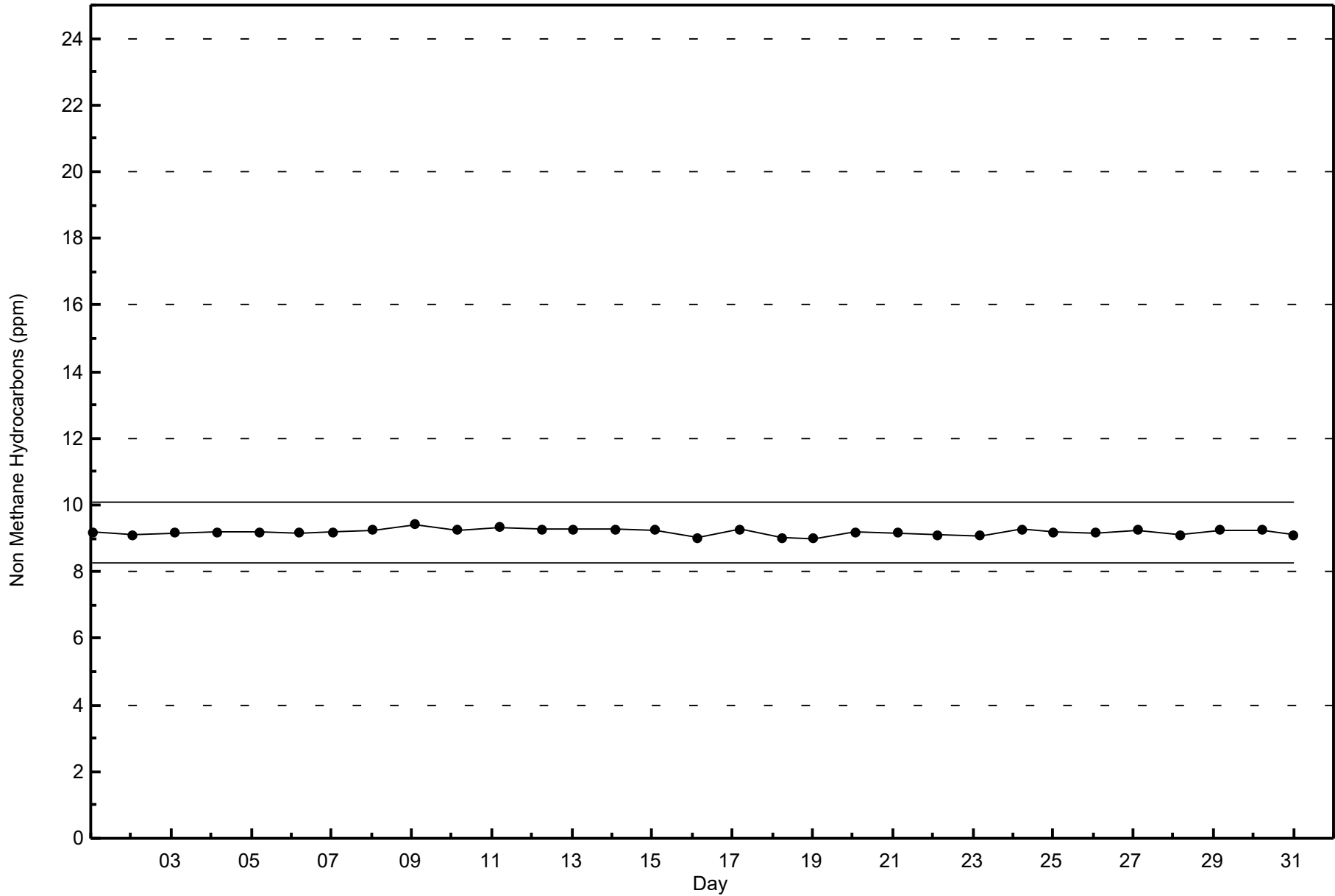


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Non Methane Hydrocarbons (NMHC) - ppm
Stony Mountain







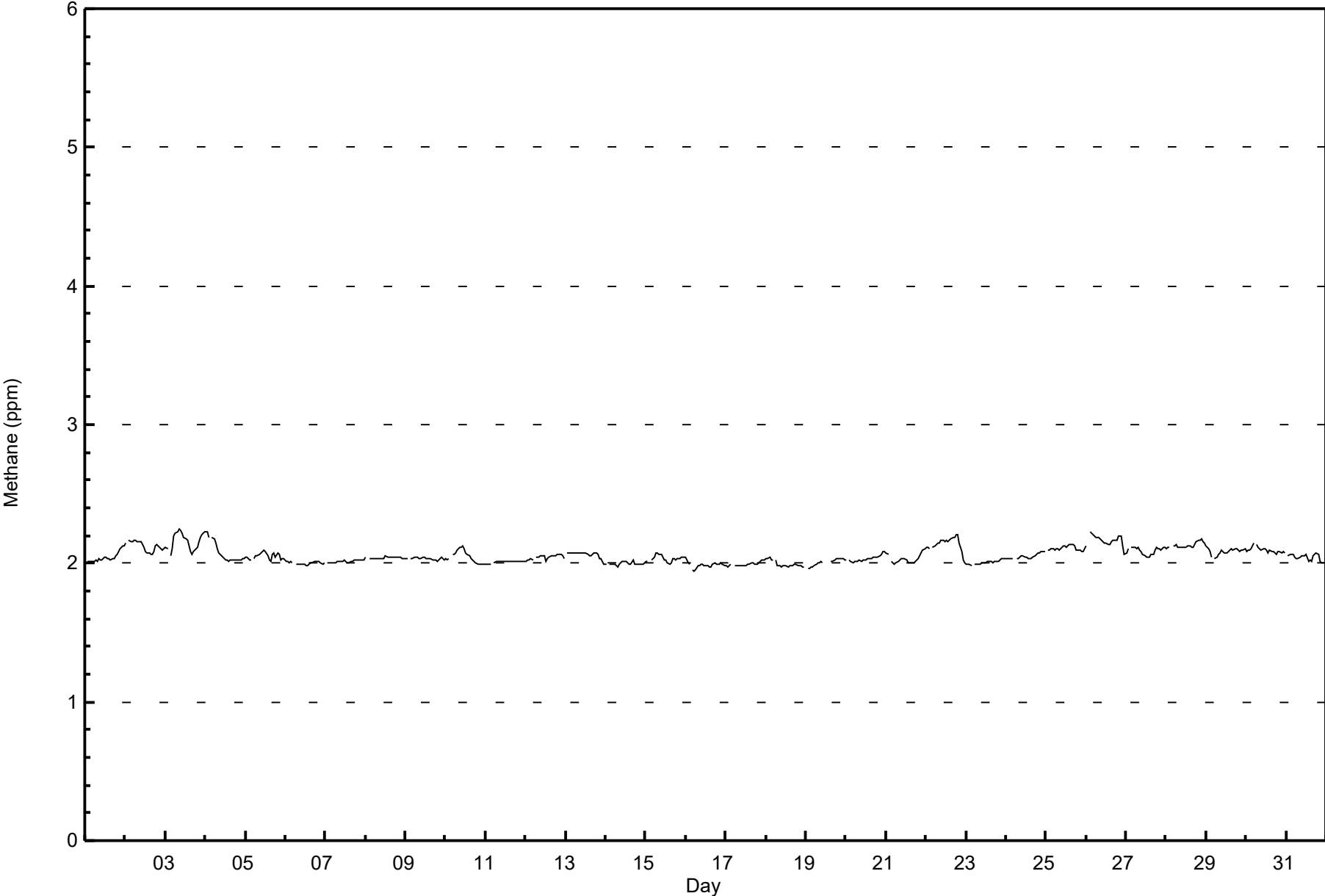


Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 2.2 ppm on Dec 3 09:00	Maximum Daily Average: 2.2 ppm on Dec 26		Hours of Data:	709
Minimum Value: 1.9 ppm on Dec 16 06:00	Minimum Daily Average: 2.0 ppm on Dec 16		Hours of Missing Data:	35
Maximum Diurnal Average: 2.1 ppm at hour 10	Minimum Diurnal Average: 2.0 ppm at hour 4		Hours of Calibration:	35
Monthly Average: 2.05 ppm	Percentiles: P ₁ = 2.0 P ₁₀ = 2.0 Q ₁ = 2.0 Median = 2.0 Q ₃ = 2.1 P ₉₀ = 2.1 P ₉₉ = 2.2		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-Dec	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	2.1	2.1	2.1	2.1	2.0	2.1	
2-Dec	2.1	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2
3-Dec	2.1	2.1	Z	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	2.2	2.2	2.2	2.2	2.1	2.2	
4-Dec	2.2	2.2	2.2	Z	2.2	2.2	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.2	
5-Dec	2.0	2.0	2.0	2.0	Z	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.1	2.1	2.0	2.1	2.1	2.0	2.0	2.0	2.1	2.1	
6-Dec	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	
7-Dec	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	
8-Dec	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	2.0	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-Dec	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	
10-Dec	2.0	2.0	2.0	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	
11-Dec	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	
12-Dec	2.0	2.0	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.1	2.1	2.1	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.1	
13-Dec	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	2.0	2.0	2.0	2.0	2.0	2.1	
14-Dec	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	
15-Dec	2.0	2.0	Z	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	2.0	2.0	2.0	2.0	2.0	2.0	2.1	
16-Dec	2.0	2.0	2.0	Z	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
17-Dec	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	
18-Dec	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	
19-Dec	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	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
20-Dec	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	2.1	2.1	2.0	2.1	
21-Dec	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	2.1	2.1	2.1	2.1	2.0	2.1	
22-Dec	2.1	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.0	2.0	2.1	2.2	
23-Dec	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	
24-Dec	2.0	2.0	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	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.1	
25-Dec	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	
26-Dec	2.1	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.2	2.2	
27-Dec	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	
28-Dec	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	2.2	2.2	2.2	2.2	2.2	2.1	2.2	
29-Dec	2.1	2.1	2.1	2.0	Z	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	
30-Dec	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	
31-Dec	Z	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.0	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	2.1	2.1	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	Diurnal Average
2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	Diurnal Maximum

Z - zerospan C - Calibration





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Methane (CH₄) - ppm
Stony Mountain - December 2023

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	406	57.26	57.26
2.1 - 3.0	303	42.74	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 709

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Methane (CH₄) - ppm
Stony Mountain - December 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	1	0	5	1	2	5	4	3	23	67	76	43	81	83	11	1	406
2.1 - 3.0	0	0	0	0	0	1	0	3	38	114	99	14	11	13	10	0	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
Totals	1	0	5	1	2	6	4	6	61	181	175	57	92	96	21	1	709

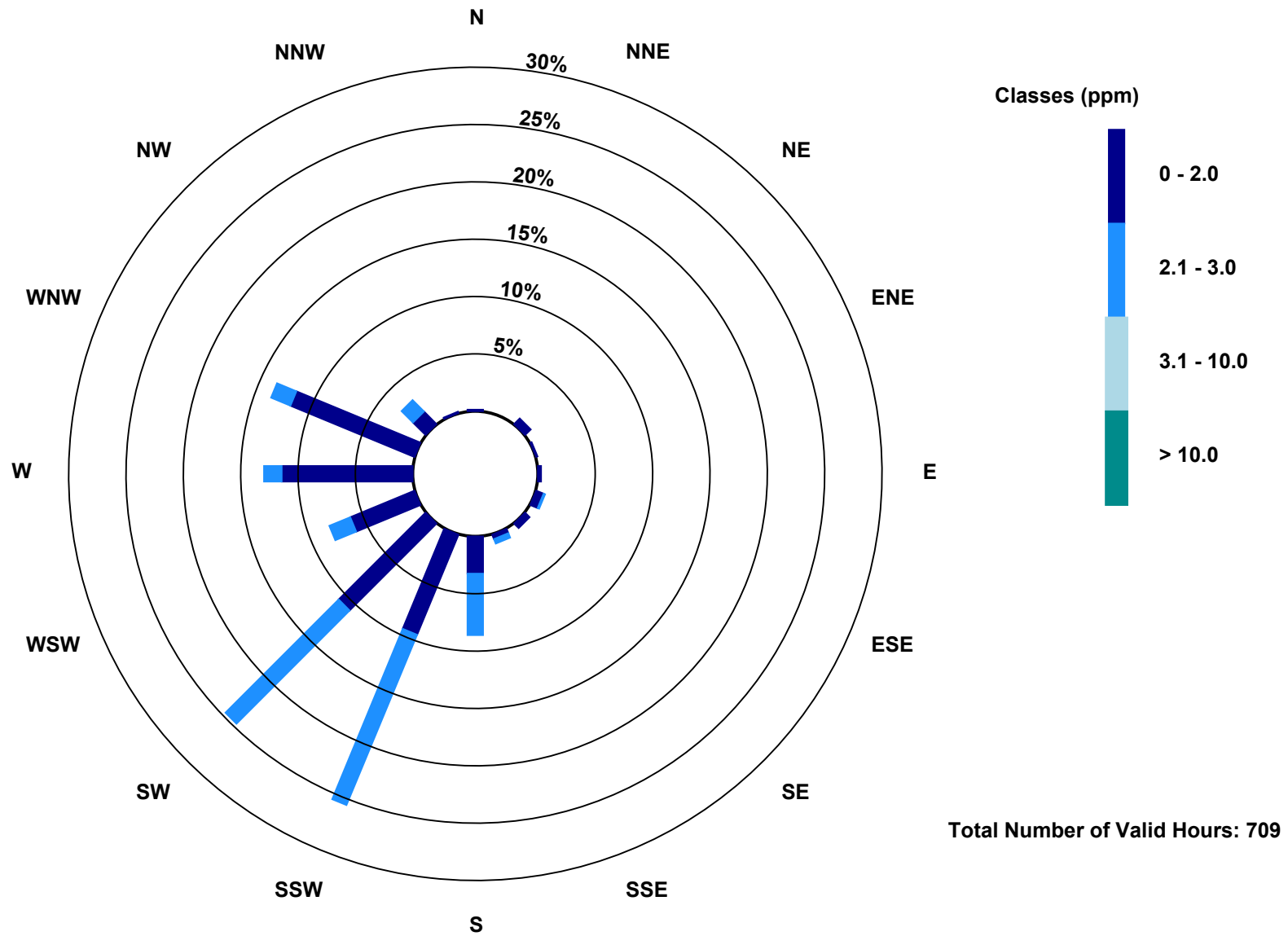
Total Number of Valid Hours: 709

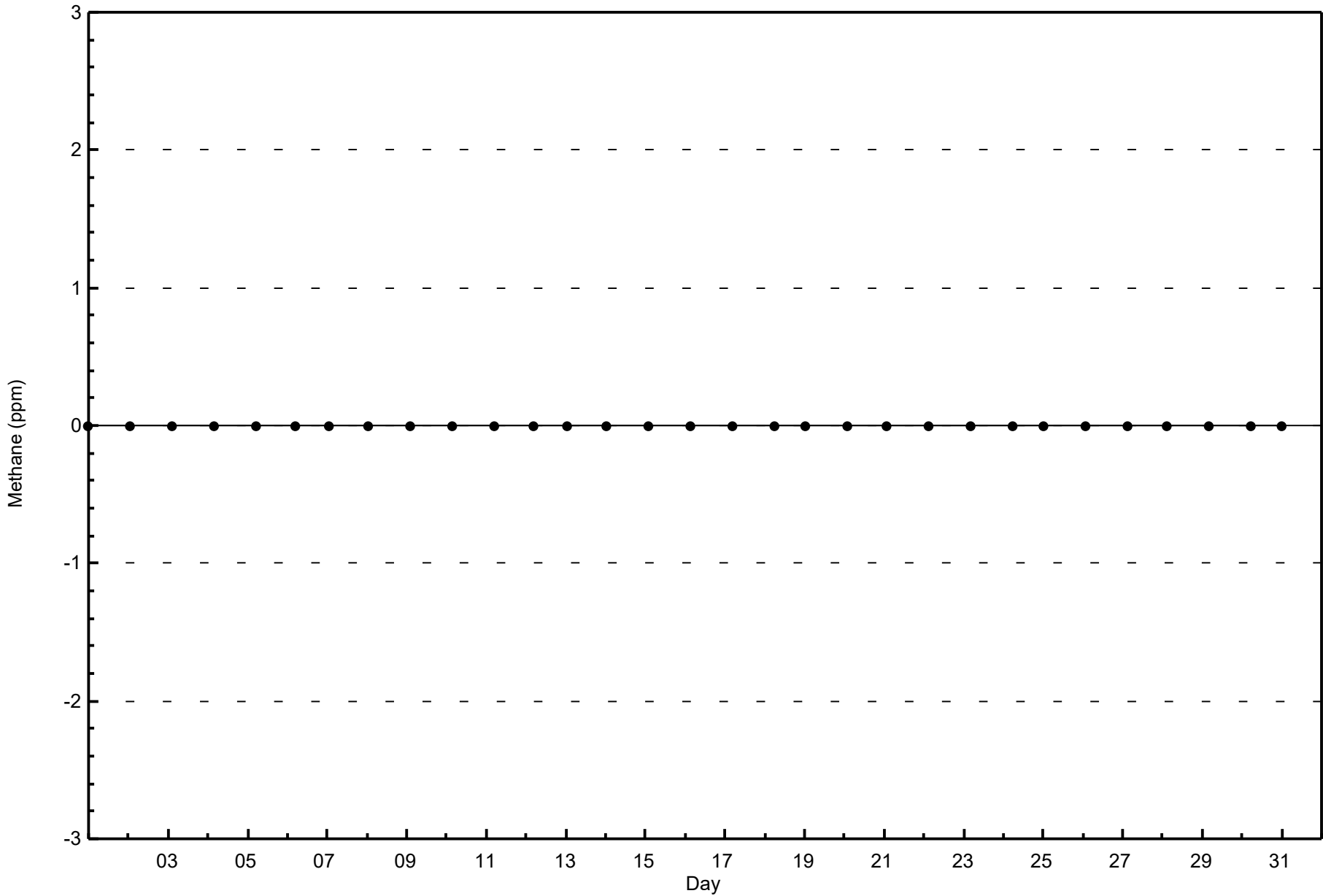
Total Number of Hours: 744

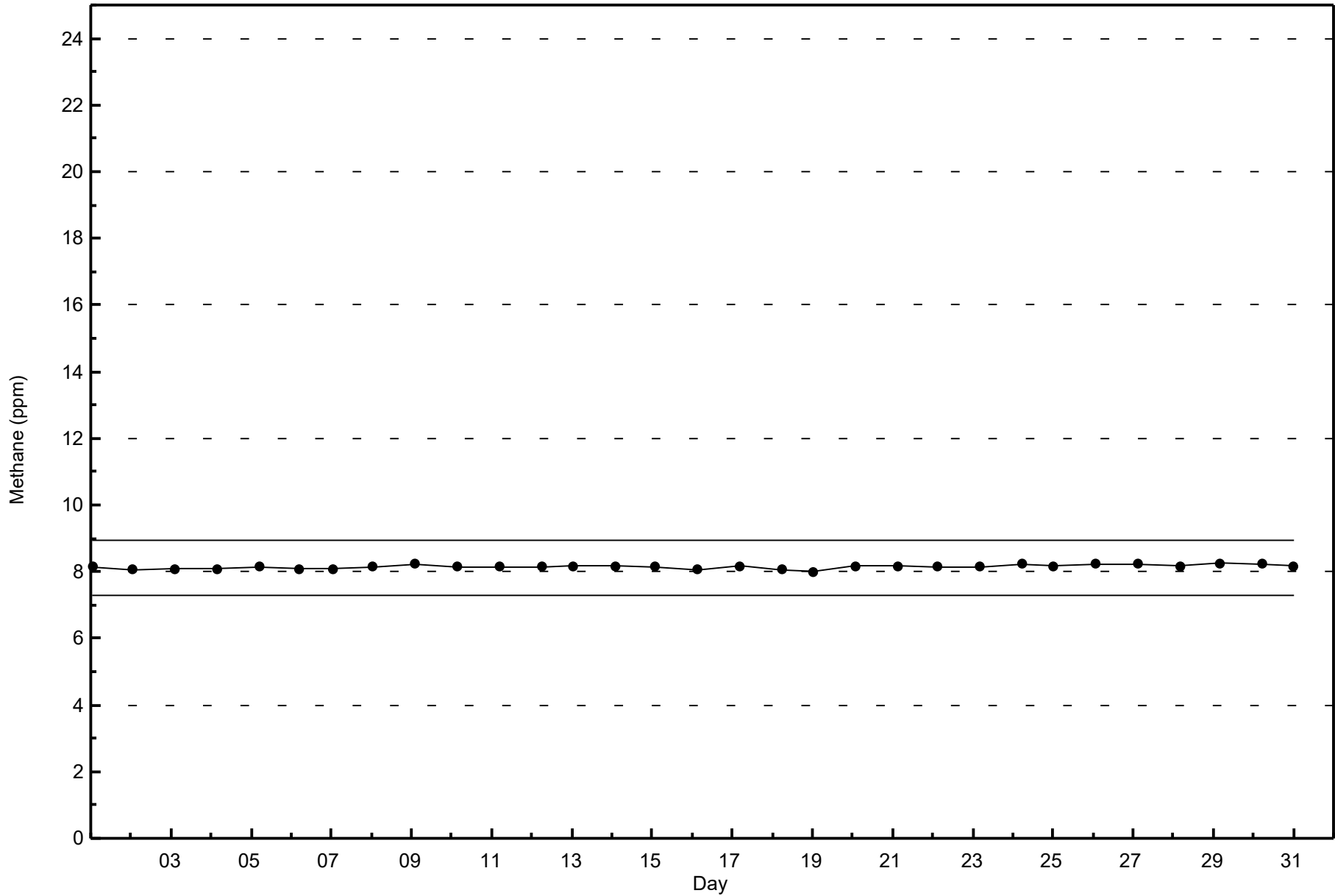


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Methane (CH₄) - ppm
Stony Mountain







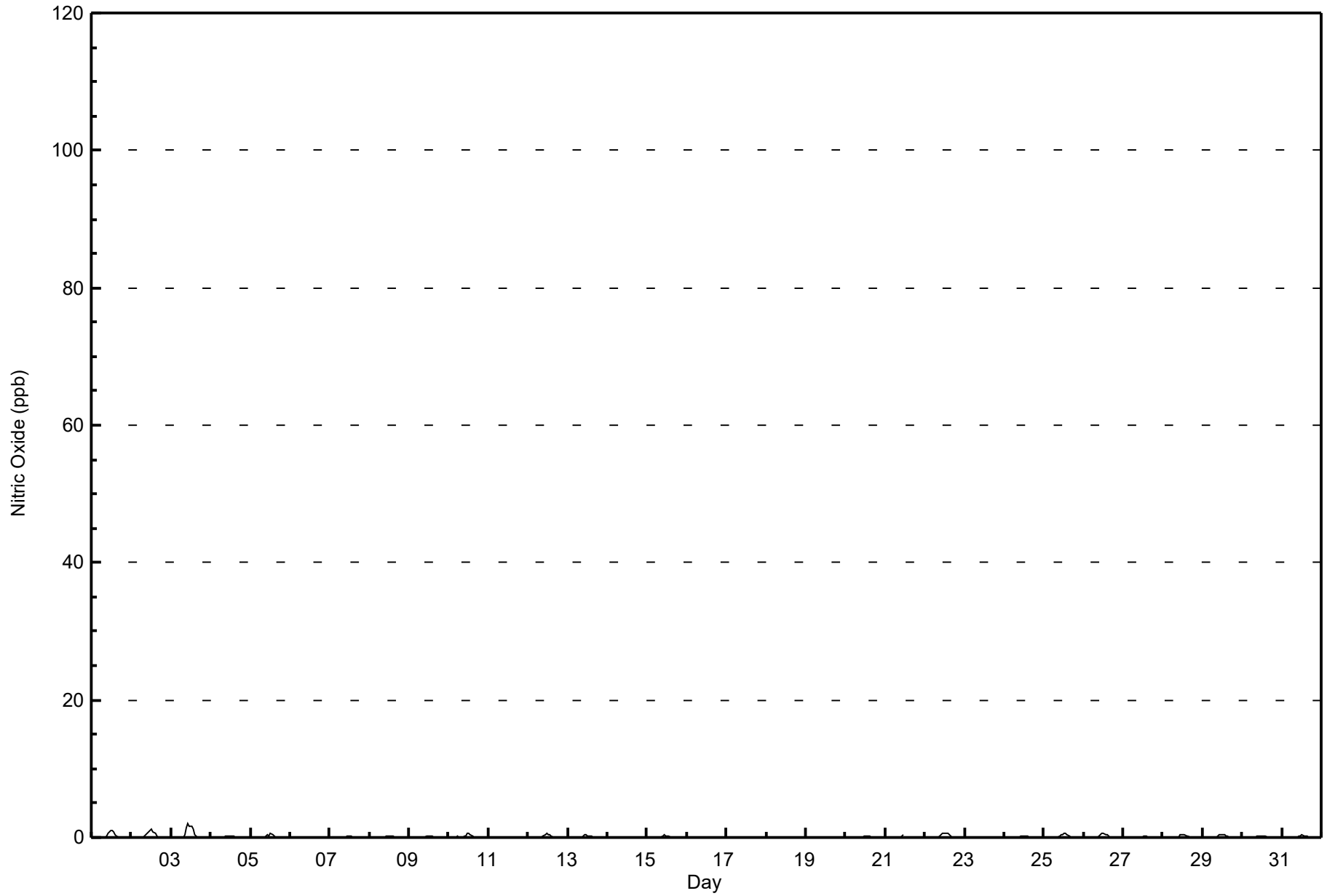


Maximum Value: 2.0 ppb on Dec 3 11:00																				Maximum Daily Average: 0.4 ppb on Dec 3					Hours in Service: 744				
Minimum Value: 0.0 ppb on Dec 1 02:00																				Minimum Daily Average: 0.0 ppb on Dec 18					Hours of Data: 707				
Maximum Diurnal Average: 0.4 ppb at hour 13																				Minimum Diurnal Average: 0.0 ppb at hour 7					Hours of Missing Data: 37				
Monthly Average: 0.09 ppb																				Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.0 Median = 0.0 Q ₃ = 0.1 P ₉₀ = 0.2 P ₉₉ = 1.0					Hours of Calibration: 37				
																				Percent Operational Time: 100.0									
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24					
1-Dec	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.1	0.2	0.6	1.0	0.9	0.7	0.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	1.0			
2-Dec	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.1	0.6	0.8	1.0	1.2	0.8	0.6	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	1.2			
3-Dec	0.0	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.3	1.4	2.0	1.7	1.5	1.2	0.5	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	2.0				
4-Dec	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.2	0.2	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2				
5-Dec	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.4	0.3	0.6	0.4	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.6				
6-Dec	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	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1				
7-Dec	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.1	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	0.2				
8-Dec	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.2	0.3	0.3	0.3	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.3				
9-Dec	0.0	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.1	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	0.0	0.2				
10-Dec	Z	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.3	0.6	0.6	0.4	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.6				
11-Dec	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.5	0.6	0.5	0.3	0.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.6				
13-Dec	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.2	0.3	0.4	0.3	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.4				
14-Dec	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				
15-Dec	0.0	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.1	0.3	0.4	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	0.4				
16-Dec	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1				
18-Dec	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	0.1				
19-Dec	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	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1				
20-Dec	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	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	0.1	0.2				
21-Dec	0.0	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.1	0.2	0.3	C	C	C	C	C	C	0.0	0.0	0.0	0.0	0.0	--	0.3				
22-Dec	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.5	0.5	0.6	0.5	0.7	0.4	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.7				
23-Dec	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.2	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2				
25-Dec	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.1	0.3	0.5	0.5	0.6	0.4	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.6				
26-Dec	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.2	0.4	0.5	0.6	0.5	0.4	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.6				
27-Dec	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	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2				
28-Dec	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.3	0.4	0.4	0.5	0.3	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.5				
29-Dec	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.3	0.3	0.4	0.4	0.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.4				
30-Dec	0.0	0.0	Z	0.1	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.3	0.2	0.2	0.2	0.1	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.1	0.3				
31-Dec	0.1	0.0	0.0	Z	0.0	0.1	0.0	0.1	0.0	0.1	0.2	0.2	0.3	0.2	0.2	0.1	0.1	0.1	0.0	0.0	0.1	0.1	0.1	0.1	0.3				
0.0																								Diurnal Average					
0.1																								Diurnal Maximum					
Z - zerospan C - Calibration																													



Wood Buffalo Environmental Association
Hourly Averages

Nitric Oxide (NO) - ppb
Stony Mountain - December 2023





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitric Oxide (NO) - ppb
Stony Mountain - December 2023**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	707	100.00	100.00
21 - 40	0	0.00	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitric Oxide (NO) - ppb
Stony Mountain - December 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	1	0	5	1	6	6	4	6	58	177	173	59	91	98	21	1	707
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	1	0	5	1	6	6	4	6	58	177	173	59	91	98	21	1	707

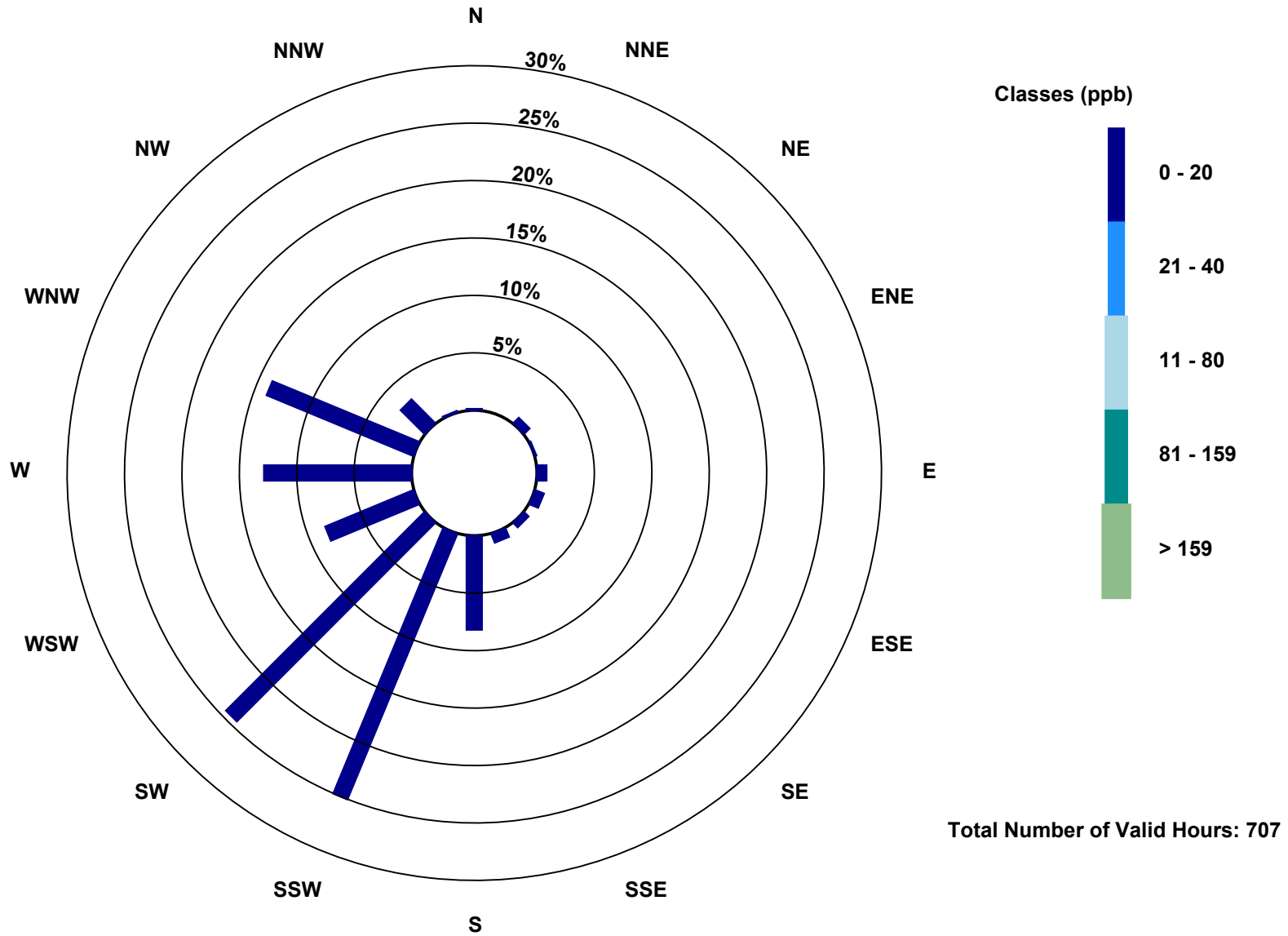
Total Number of Valid Hours: 707

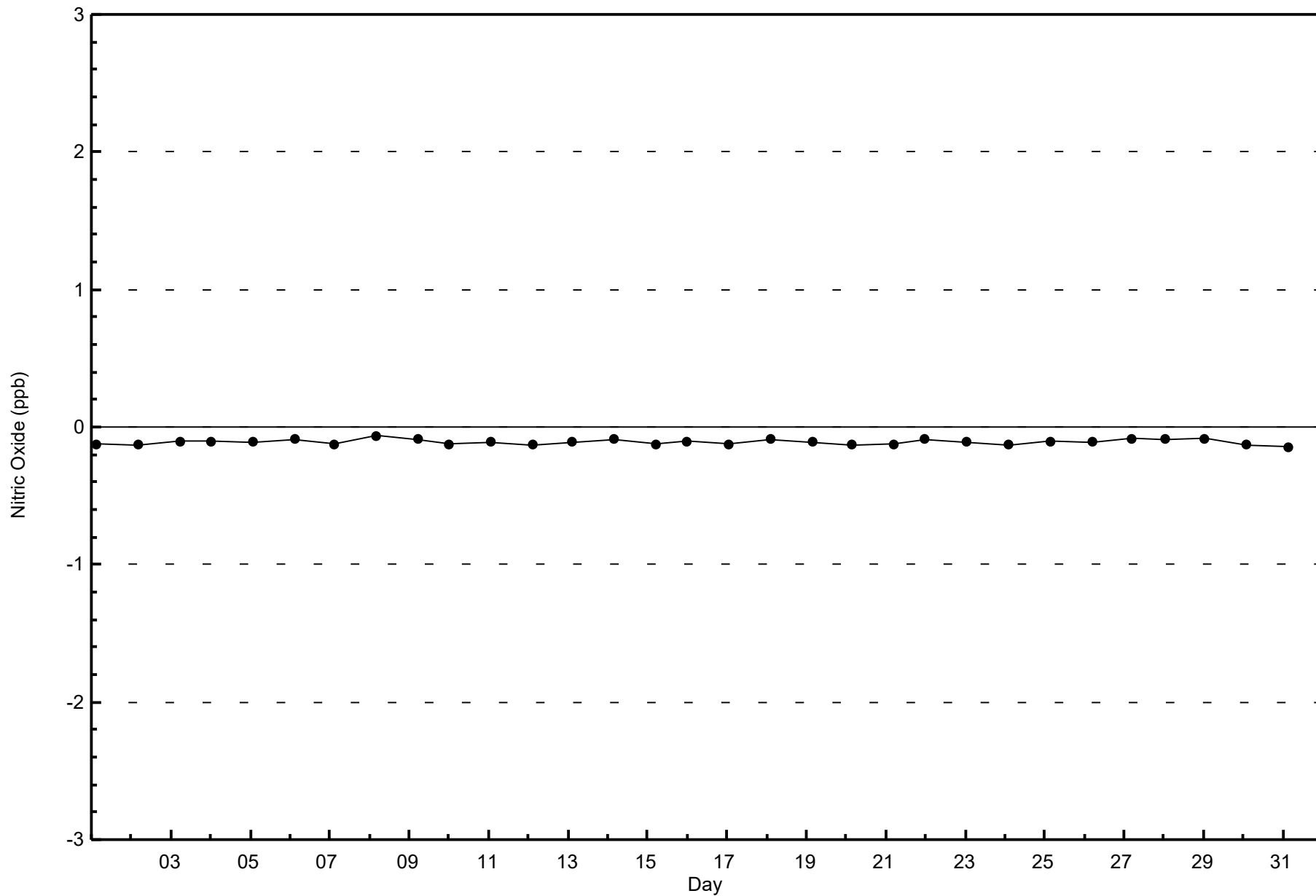
Total Number of Hours: 744

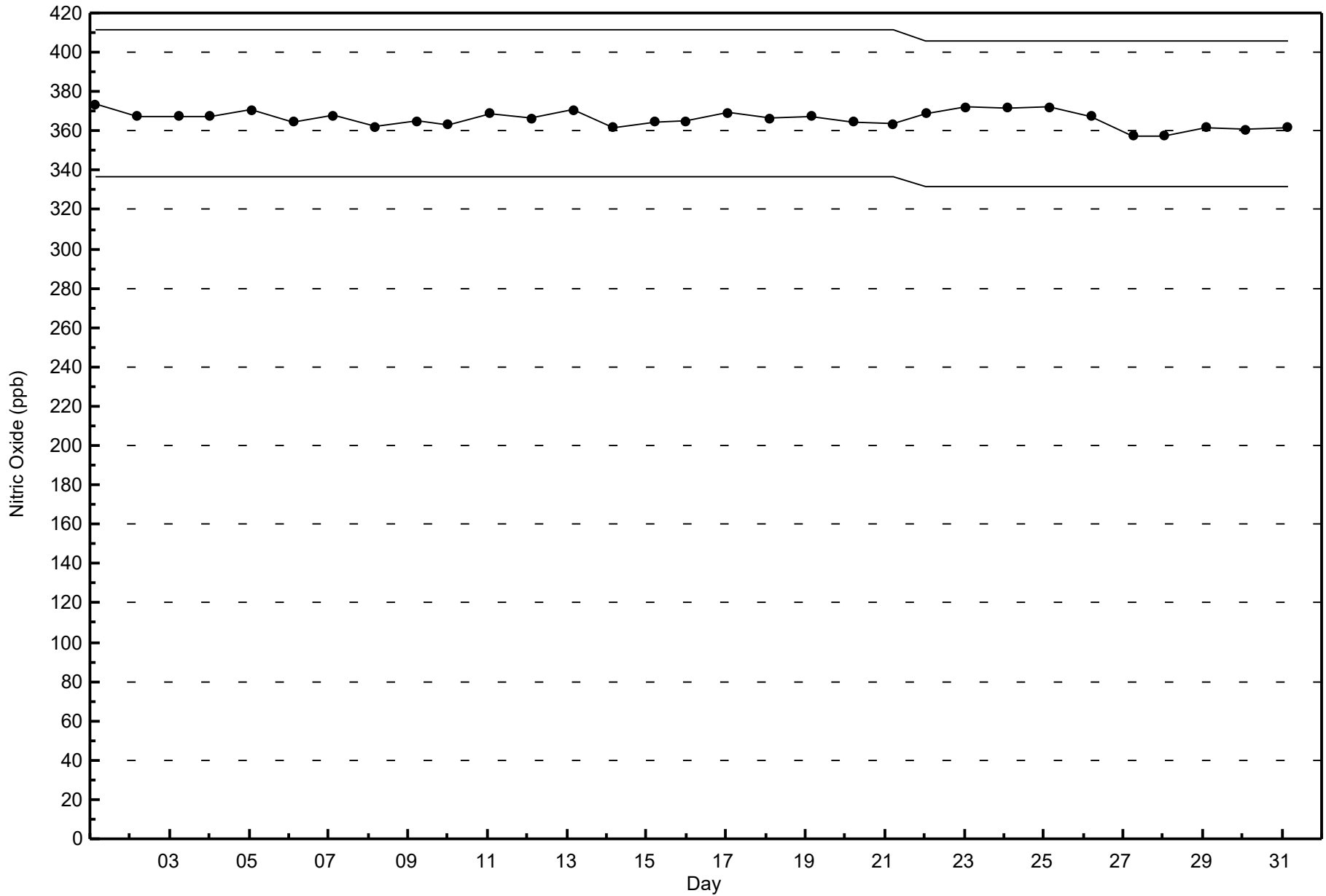


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Nitric Oxide (NO) - ppb
Stony Mountain









Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO₂) - ppb

Stony Mountain - December 2023

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 9.6 ppb on Dec 26 03:00	Maximum Daily Average: 5.5 ppb on Dec 2		Hours of Data:	707
Minimum Value: 0.1 ppb on Dec 10 22:00	Minimum Daily Average: 0.3 ppb on Dec 23		Hours of Missing Data:	37
Maximum Diurnal Average: 2.8 ppb at hour 2	Minimum Diurnal Average: 2.0 ppb at hour 15		Hours of Calibration:	37
Monthly Average: 2.37 ppb	Percentiles: P ₁ = 0.1 P ₁₀ = 0.4 Q ₁ = 0.9 Median = 1.8 Q ₃ = 3.5 P ₉₀ = 5.1 P ₉₉ = 7.9		Percent Operational Time:	100.0

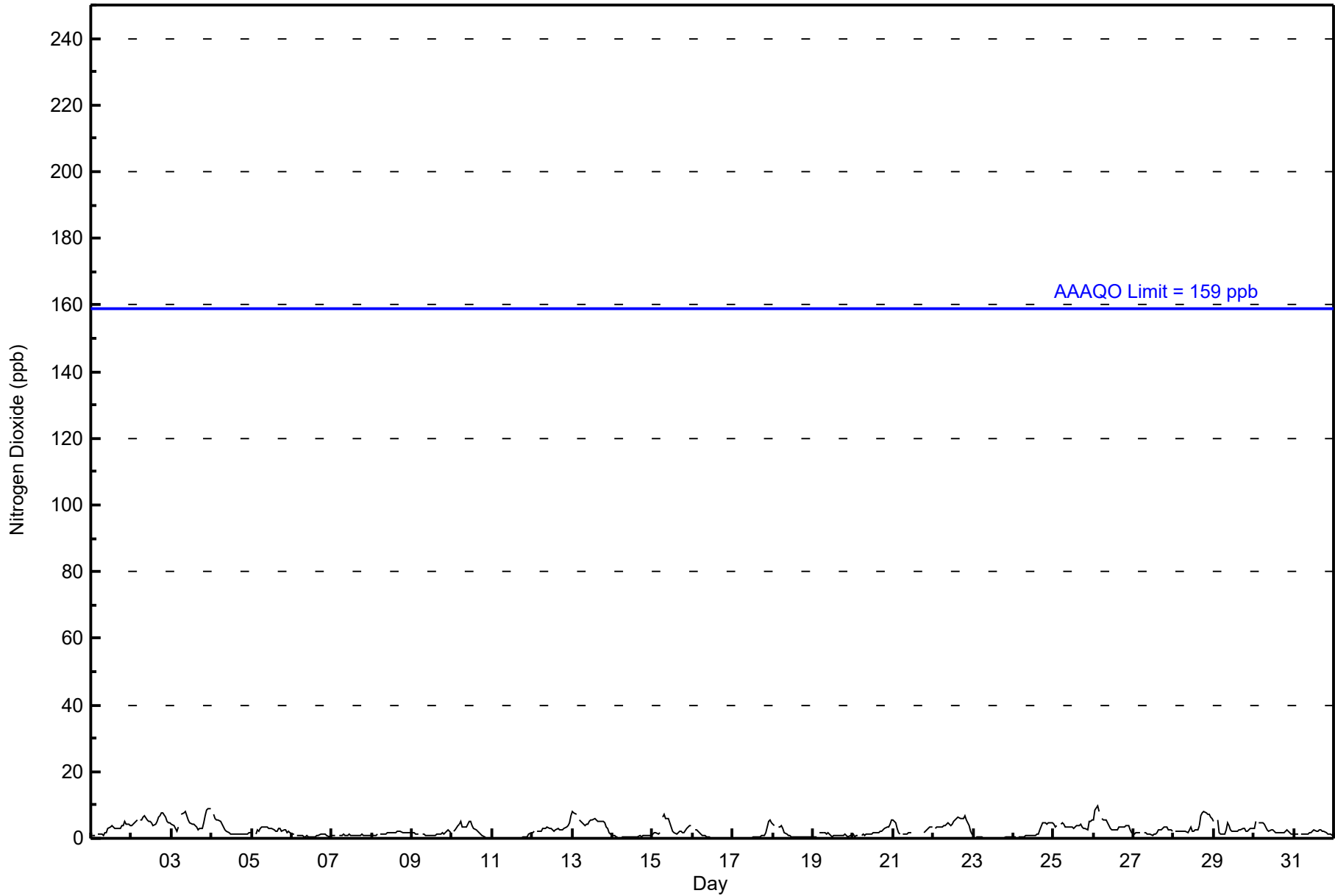
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Dec	0.7	0.8	0.9	Z	1.1	1.1	1.1	1.0	1.6	1.9	2.8	3.6	3.8	3.6	3.1	3.1	3.0	3.0	4.0	3.9	4.9	4.3	4.2	3.9	2.7	4.9																							
2-Dec	4.0	4.3	4.7	5.5	Z	5.4	5.5	6.5	6.8	5.7	5.0	4.9	4.7	4.0	4.1	5.2	6.3	6.8	7.7	7.8	6.4	5.1	4.6	4.8	5.5	7.8																							
3-Dec	4.4	3.8	2.9	2.1	3.5	Z	7.0	7.6	8.1	6.7	5.4	4.7	4.3	4.1	3.8	3.2	2.5	2.8	3.1	4.6	6.8	8.6	8.7	8.8	5.1	8.8																							
4-Dec	Z	7.1	6.0	5.5	5.5	5.0	4.1	3.2	2.6	2.1	1.7	1.4	1.2	1.2	1.1	1.1	1.1	1.1	1.2	1.2	1.2	1.3	1.5	1.6	2.6	7.1																							
5-Dec	1.5	Z	1.3	2.5	2.2	2.8	3.6	3.4	3.2	3.6	2.9	3.0	3.0	2.7	2.2	2.2	2.9	3.1	2.3	2.6	2.5	1.7	2.0	1.8	2.6	3.6																							
6-Dec	1.3	1.2	Z	1.0	0.9	0.8	0.7	0.6	0.6	0.7	0.6	0.5	0.5	0.5	0.6	0.8	0.8	1.1	1.2	1.1	1.1	0.7	0.6	0.8	0.8	1.3																							
7-Dec	0.8	0.9	0.9	Z	0.8	0.9	0.8	1.1	1.0	1.0	1.1	1.0	0.9	0.9	1.0	1.0	0.9	1.0	1.1	1.0	1.0	1.0	1.0	1.0	1.0	1.1																							
8-Dec	1.1	0.9	1.0	1.1	Z	1.2	1.3	1.3	1.3	1.6	1.7	1.6	1.7	1.7	1.9	2.2	2.1	2.0	1.8	1.9	1.7	1.8	1.5	1.5	1.6	2.2																							
9-Dec	1.5	1.5	1.4	1.3	1.3	Z	1.2	1.1	1.0	1.0	0.9	0.9	0.9	0.9	1.0	1.1	1.2	1.3	1.5	1.1	1.8	2.4	2.2	1.9	1.3	2.4																							
10-Dec	Z	2.0	2.6	3.9	4.1	5.2	3.4	3.4	3.6	4.4	5.1	5.0	3.8	3.1	2.6	2.1	1.8	1.2	0.8	0.4	0.2	0.1	0.1	0.1	2.6	5.2																							
11-Dec	0.1	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.5	0.5	0.6	1.3	1.7	0.3	1.7																							
12-Dec	1.8	2.2	Z	2.1	2.1	2.2	2.8	2.8	3.0	3.2	3.0	2.8	2.4	2.3	2.5	2.8	2.6	2.6	2.6	2.9	3.6	3.8	4.7	6.9	2.9	6.9																							
13-Dec	7.9	7.7	7.1	Z	5.3	5.0	4.6	4.0	4.1	4.3	5.0	5.3	5.7	5.8	5.5	5.1	5.1	5.1	4.9	4.6	3.4	2.8	1.8	1.1	4.8	7.9																							
14-Dec	0.8	0.7	0.5	0.4	Z	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.4	0.5	0.5	0.8	0.6	0.7	0.7	0.7	0.8	0.8	0.8	0.6	0.8																							
15-Dec	1.4	1.6	1.6	1.4	1.5	Z	6.3	7.0	6.1	5.9	4.5	3.2	2.1	1.7	1.3	1.6	2.2	2.1	1.7	1.8	2.8	3.4	3.7	4.0	3.0	7.0																							
16-Dec	Z	2.7	2.6	2.2	1.6	1.2	0.9	0.7	0.6	0.4	0.3	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	0.7	2.7																							
17-Dec	0.2	Z	0.2	0.2	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.3	0.3	0.5	0.4	0.6	0.7	0.7	0.9	1.9	4.9	5.4	4.5	1.0	5.4																							
18-Dec	4.1	4.0	Z	3.6	3.5	3.7	3.0	1.7	1.3	1.0	0.8	0.6	0.6	0.5	0.4	0.4	0.4	0.4	0.5	0.4	0.3	0.3	0.3	0.3	1.4	4.1																							
19-Dec	0.3	0.4	0.6	Z	1.7	1.5	1.8	1.7	1.3	1.5	1.2	0.5	0.7	0.7	0.7	0.8	1.0	0.7	0.9	1.2	0.7	0.6	0.8	1.1	1.0	1.8																							
20-Dec	1.3	0.6	0.7	0.9	Z	1.0	1.1	0.9	1.3	1.1	1.2	1.4	1.5	1.8	1.7	1.8	2.1	2.1	2.4	2.9	3.2	3.6	4.3	5.7	1.9	5.7																							
21-Dec	5.4	4.6	2.9	1.7	1.3	Z	1.2	1.1	1.4	1.6	1.5	1.6	C	C	C	C	C	C	1.9	2.0	2.5	2.9	3.3	3.4	--	5.4																							
22-Dec	Z	3.1	3.2	3.3	3.5	3.6	3.7	3.9	4.1	4.8	4.0	4.1	4.9	5.5	5.8	6.3	5.9	5.9	6.1	6.8	5.7	3.9	2.2	1.4	4.4	6.8																							
23-Dec	0.9	Z	0.5	0.4	0.4	0.3	0.2	0.2	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.2	0.2	0.3	0.3	0.4	0.5	0.6	0.3	0.9	0.9																							
24-Dec	0.6	0.5	Z	0.6	0.5	0.5	0.5	0.7	0.8	0.8	0.9	0.8	1.0	1.0	1.1	1.3	2.4	4.6	4.7	4.5	4.3	4.5	4.8	4.7	2.0	4.8																							
25-Dec	4.3	3.5	4.0	Z	4.4	4.5	4.1	3.5	3.3	3.2	3.3	3.3	3.1	3.3	3.7	4.0	4.1	3.6	2.8	3.0	2.4	5.2	5.0	5.5	3.8	5.5																							
26-Dec	5.6	8.4	9.6	8.0	Z	5.9	5.3	5.3	4.8	3.7	3.0	2.7	2.6	2.5	2.6	3.3	3.6	3.6	3.5	3.8	3.7	3.8	2.7	1.7	4.3	9.6																							
27-Dec	1.4	1.6	1.8	1.6	1.5	Z	1.5	1.6	1.4	1.2	1.1	0.9	1.4	1.4	1.8	2.6	2.4	3.0	3.4	3.3	3.3	2.7	2.5	2.3	2.0	3.4																							
28-Dec	Z	2.2	2.3	2.3	2.1	2.2	2.2	2.0	1.9	2.5	3.2	2.1	2.0	2.5	2.5	3.9	6.9	7.7	7.9	7.5	7.3	7.3	6.4	5.8	4.0	7.9																							
29-Dec	5.0	Z	5.5	1.6	1.3	1.4	1.3	2.7	4.5	3.9	2.7	2.1	2.0	2.1	2.3	2.6	2.7	2.9	3.1	2.2	2.2	2.6	2.8	2.9	2.7	5.5																							
30-Dec	2.8	5.2	Z	4.7	4.5	4.6	4.1	3.2	2.6	2.3	2.5	2.7	2.1	1.7	1.8	1.5	1.5	1.8	1.7	2.0	2.5	1.7	1.4	1.4	2.6	5.2																							
31-Dec	1.3	1.3	1.4	Z	1.3	1.1	1.2	1.3	1.4	1.6	1.8	2.3	2.5	2.2	2.1	2.4	2.5	2.3	2.3	1.9	1.3	1.3	1.2	1.0	1.7	2.5																							
																								2.3	2.8	2.6	2.3	2.2	2.4	2.4	2.4	2.4	2.3	2.2	2.1	2.0	2.0	2.1	2.3	2.5	2.5	2.5	2.6	2.7	2.7	2.7	Diurnal Average		
																								7.9	8.4	9.6	8.0	5.5	5.9	7.0	7.6	8.1	6.7	5.4	5.3	5.7	5.8	5.8	6.3	6.9	7.7	7.9	7.8	7.3	8.6	8.7	8.8	Diurnal Maximum	

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



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Dioxide (NO₂) - ppb
Stony Mountain - December 2023





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Stony Mountain - December 2023**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	707	100.00	100.00
21 - 40	0	0.00	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Stony Mountain - December 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	1	0	5	1	6	6	4	6	58	177	173	59	91	98	21	1	707
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	1	0	5	1	6	6	4	6	58	177	173	59	91	98	21	1	707

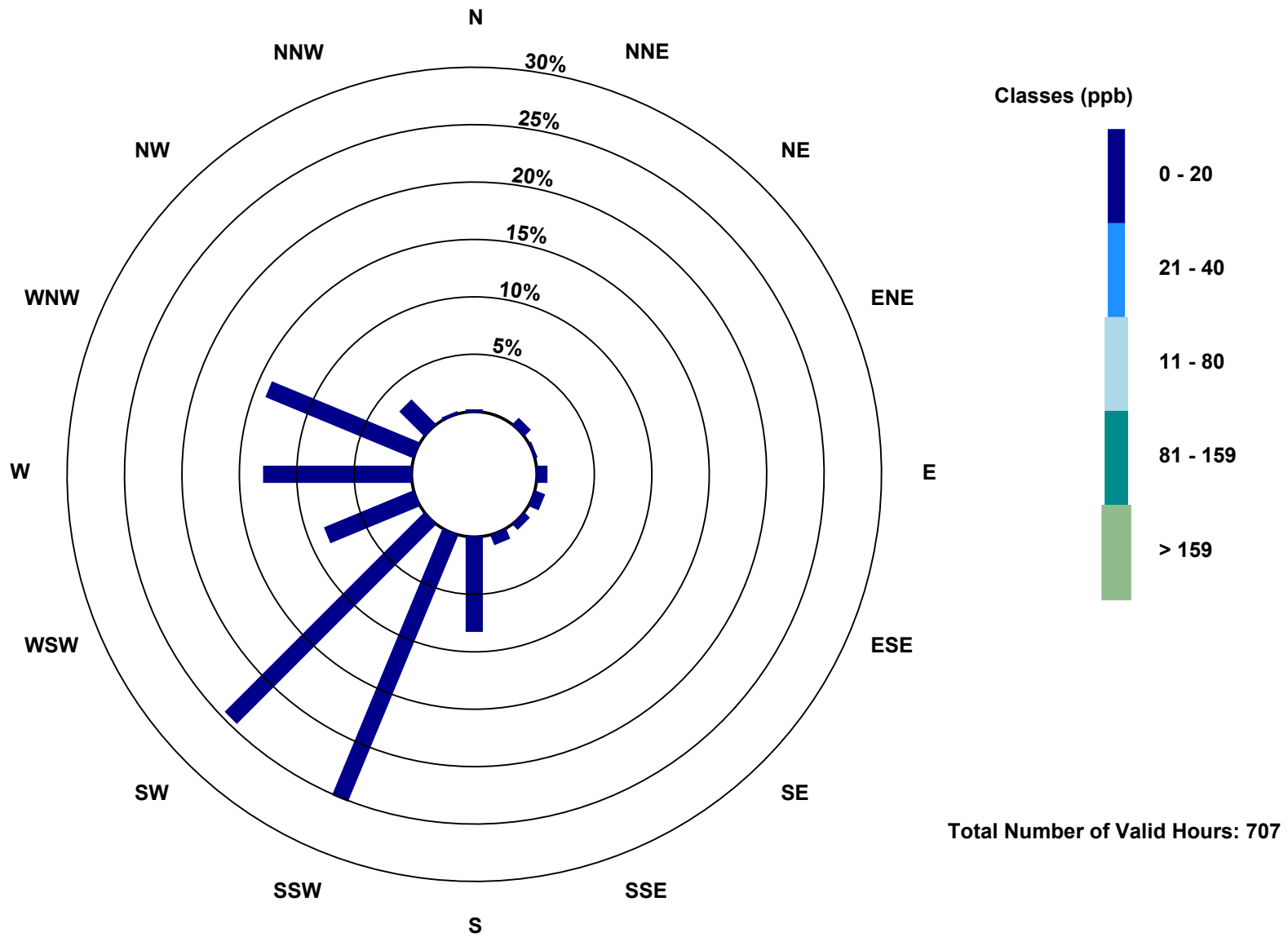
Total Number of Valid Hours: 707

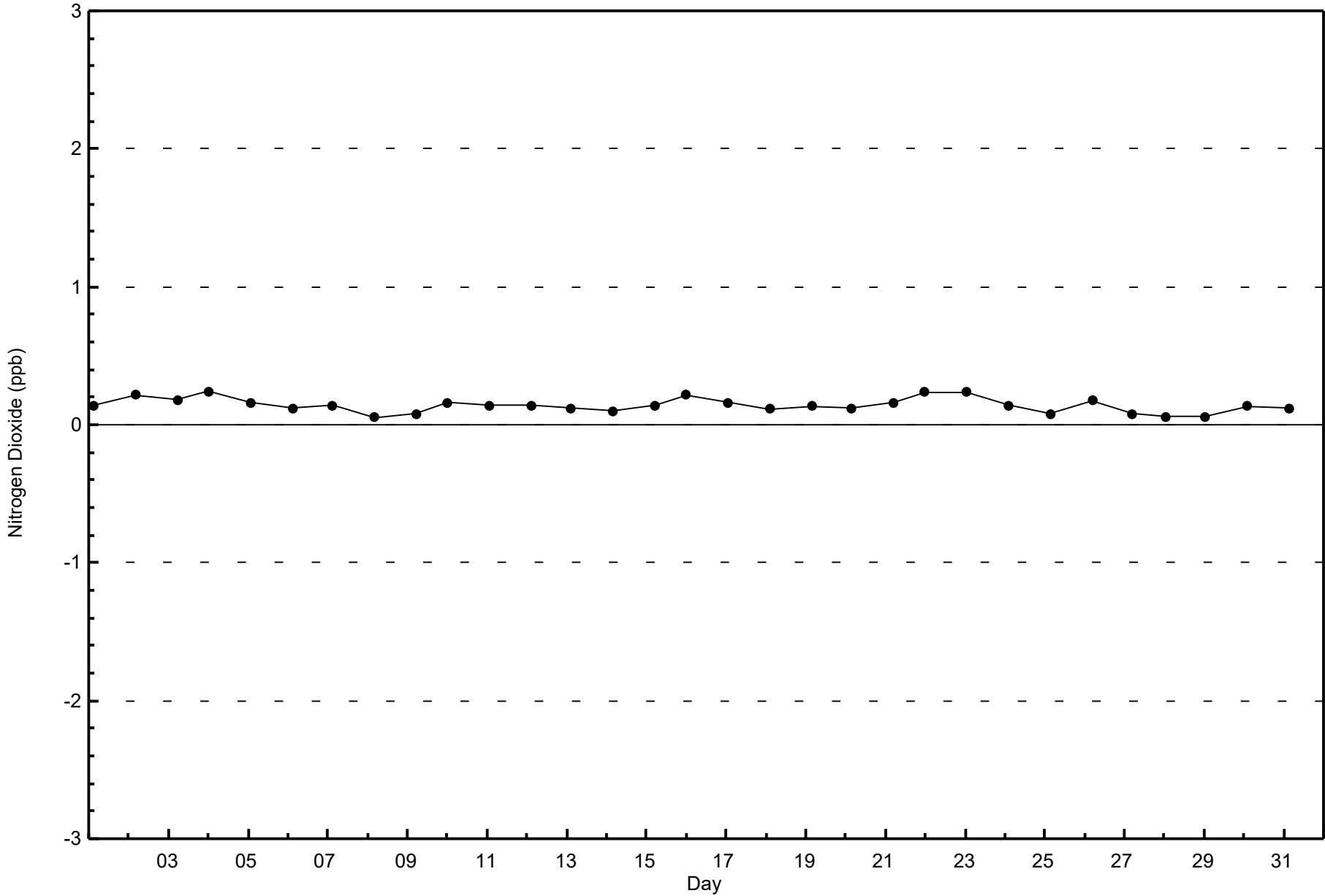
Total Number of Hours: 744

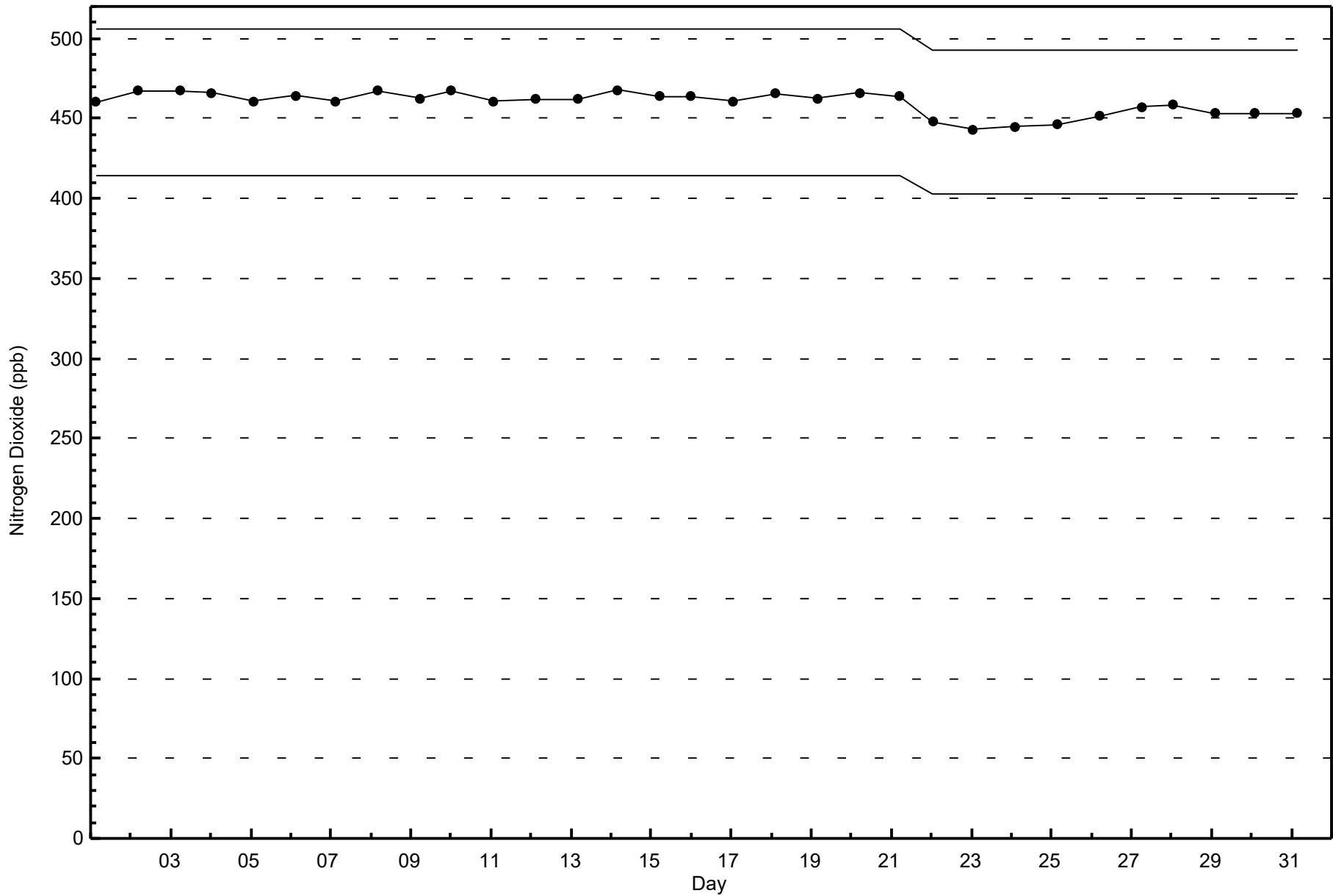


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Nitrogen Dioxide (NO₂) - ppb
Stony Mountain









Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Oxides (NO_x) - ppb

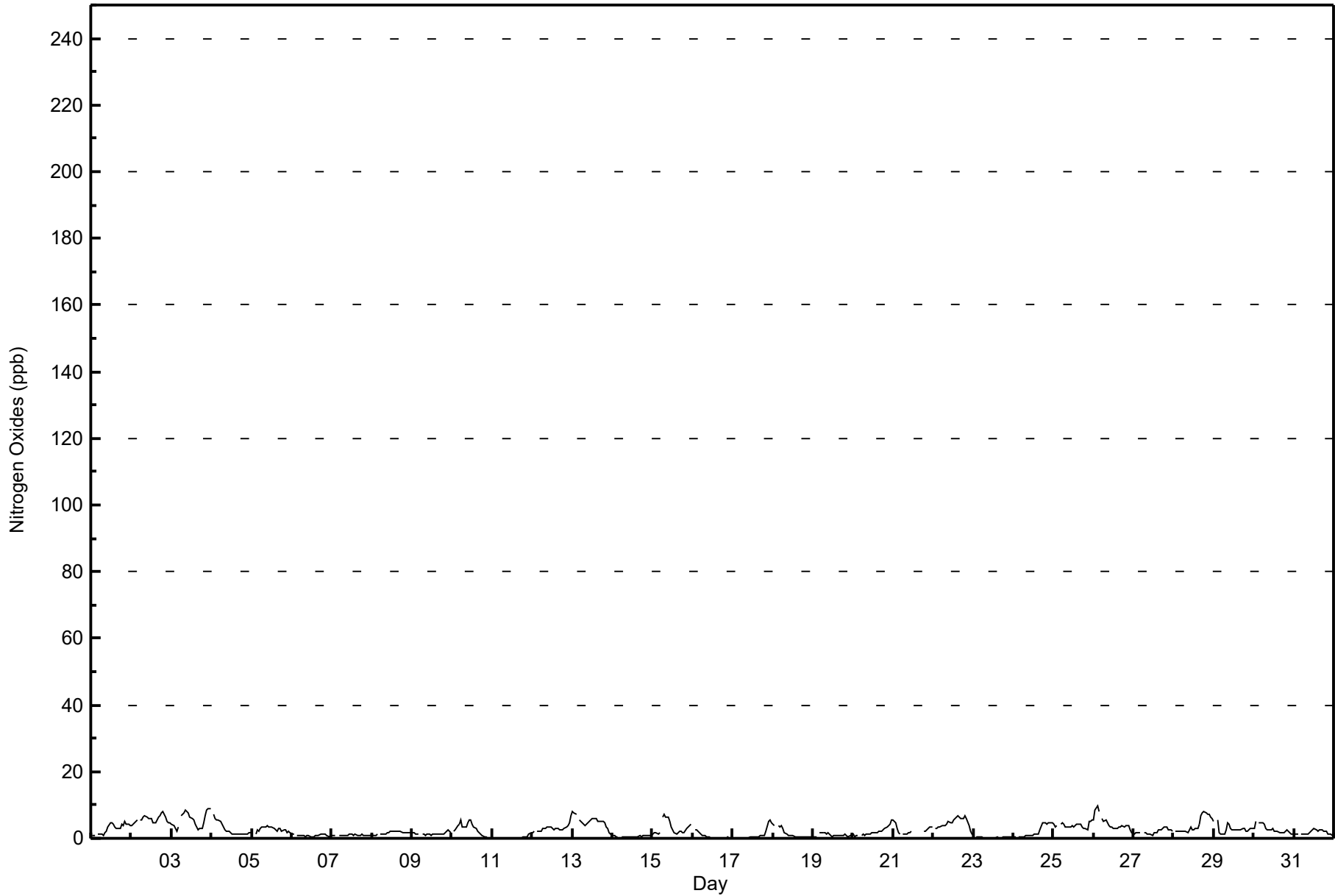
Stony Mountain - December 2023

Maximum Value: 9.6 ppb on Dec 26 03:00																				Maximum Daily Average: 5.7 ppb on Dec 2					Hours in Service: 744																								
Minimum Value: 0.1 ppb on Dec 11 05:00																				Minimum Daily Average: 0.3 ppb on Dec 23					Hours of Data: 707																								
Maximum Diurnal Average: 2.8 ppb at hour 2																				Minimum Diurnal Average: 2.2 ppb at hour 15					Hours of Missing Data: 37																								
Monthly Average: 2.45 ppb																				Percentiles: P ₁ = 0.1 P ₁₀ = 0.4 Q ₁ = 0.9 Median = 1.9 Q ₃ = 3.6 P ₉₀ = 5.3 P ₉₉ = 8.0					Hours of Calibration: 37																								
																									Percent Operational Time: 100.0																								
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Dec	0.7	0.8	0.9	Z	1.1	1.1	1.1	1.0	1.7	2.1	3.4	4.6	4.7	4.3	3.4	3.2	3.0	3.0	4.0	3.9	4.9	4.3	4.2	3.9	2.8	4.9																							
2-Dec	4.0	4.3	4.7	5.5	Z	5.4	5.5	6.5	6.9	6.3	5.8	5.9	5.9	4.8	4.7	5.4	6.3	6.8	7.7	7.8	6.4	5.1	4.6	4.8	5.7	7.8																							
3-Dec	4.4	3.8	2.9	2.1	3.5	Z	7.0	7.6	8.4	8.1	7.4	6.4	5.8	5.3	4.3	3.3	2.5	2.8	3.1	4.6	6.8	8.6	8.7	8.8	5.5	8.8																							
4-Dec	Z	7.1	6.0	5.5	5.5	5.0	4.1	3.2	2.6	2.2	1.9	1.6	1.4	1.4	1.3	1.2	1.1	1.1	1.2	1.2	1.2	1.3	1.5	1.6	2.6	7.1																							
5-Dec	1.5	Z	1.3	2.5	2.2	2.8	3.6	3.4	3.2	3.7	3.3	3.3	3.6	3.1	2.4	2.3	2.9	3.1	2.3	2.6	2.5	1.7	2.0	1.8	2.7	3.7																							
6-Dec	1.3	1.2	Z	1.0	0.9	0.8	0.7	0.6	0.6	0.7	0.7	0.6	0.6	0.6	0.7	0.8	0.8	1.1	1.2	1.1	1.1	0.7	0.6	0.8	0.8	1.3																							
7-Dec	0.8	0.9	0.9	Z	0.8	0.9	0.8	1.1	1.0	1.0	1.2	1.2	1.1	1.0	1.1	1.0	0.9	1.0	1.1	1.0	1.0	1.0	1.0	1.0	1.0	1.2																							
8-Dec	1.1	0.9	1.0	1.1	Z	1.2	1.3	1.3	1.3	1.6	1.9	1.9	2.0	2.0	2.1	2.2	2.1	2.0	1.8	1.9	1.7	1.8	1.5	1.5	1.6	2.2																							
9-Dec	1.5	1.5	1.4	1.3	1.3	Z	1.2	1.1	1.0	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.2	1.3	1.5	1.1	1.8	2.4	2.2	1.9	1.4	2.4																							
10-Dec	Z	2.0	2.6	3.9	4.1	5.3	3.4	3.4	3.6	4.5	5.4	5.6	4.4	3.5	2.8	2.2	1.8	1.2	0.8	0.4	0.2	0.1	0.1	0.1	2.7	5.6																							
11-Dec	0.1	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.5	0.5	0.6	1.3	1.7	0.3	1.7																							
12-Dec	1.8	2.2	Z	2.1	2.1	2.2	2.8	2.8	3.1	3.4	3.5	3.4	2.9	2.6	2.8	2.9	2.6	2.6	2.6	2.9	3.6	3.8	4.7	6.9	3.1	6.9																							
13-Dec	7.9	7.7	7.1	Z	5.3	5.0	4.6	4.0	4.1	4.5	5.3	5.7	6.0	6.0	5.7	5.1	5.1	5.1	4.9	4.6	3.4	2.8	1.8	1.1	4.9	7.9																							
14-Dec	0.8	0.7	0.5	0.4	Z	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.4	0.5	0.5	0.8	0.6	0.7	0.7	0.7	0.8	0.8	0.8	0.6	0.8																							
15-Dec	1.4	1.6	1.6	1.4	1.5	Z	6.3	7.0	6.2	6.2	4.9	3.5	2.3	1.8	1.4	1.6	2.2	2.1	1.7	1.8	2.8	3.4	3.7	4.0	3.1	7.0																							
16-Dec	Z	2.7	2.6	2.2	1.6	1.2	0.9	0.7	0.6	0.4	0.3	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	0.7	2.7																							
17-Dec	0.2	Z	0.2	0.2	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.3	0.4	0.4	0.5	0.4	0.6	0.7	0.7	0.9	1.9	4.9	5.4	4.5	1.0	5.4																							
18-Dec	4.1	4.0	Z	3.6	3.5	3.7	3.0	1.7	1.3	1.0	0.9	0.7	0.7	0.5	0.4	0.4	0.4	0.4	0.5	0.4	0.3	0.3	0.3	0.3	1.4	4.1																							
19-Dec	0.3	0.4	0.6	Z	1.7	1.5	1.8	1.7	1.3	1.6	1.3	0.6	0.8	0.8	0.7	0.8	1.0	0.7	0.9	1.2	0.7	0.6	0.8	1.1	1.0	1.8																							
20-Dec	1.3	0.6	0.7	0.9	Z	1.0	1.1	0.9	1.3	1.2	1.3	1.5	1.7	1.9	1.8	1.9	2.1	2.1	2.4	2.9	3.2	3.6	4.3	5.7	2.0	5.7																							
21-Dec	5.4	4.6	2.9	1.7	1.3	Z	1.2	1.1	1.4	1.7	1.7	1.9	C	C	C	C	C	C	1.9	2.0	2.5	2.9	3.3	3.4	--	5.4																							
22-Dec	Z	3.1	3.2	3.3	3.5	3.6	3.7	3.9	4.1	5.0	4.5	4.6	5.5	6.0	6.5	6.7	6.0	5.9	6.1	6.8	5.7	3.9	2.2	1.4	4.6	6.8																							
23-Dec	0.9	Z	0.5	0.4	0.4	0.3	0.2	0.2	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.2	0.2	0.3	0.3	0.4	0.5	0.6	0.3	0.9	0.9																							
24-Dec	0.6	0.5	Z	0.6	0.5	0.5	0.5	0.7	0.8	0.9	1.0	1.0	1.2	1.1	1.2	1.4	2.4	4.6	4.7	4.5	4.3	4.5	4.8	4.7	2.0	4.8																							
25-Dec	4.3	3.5	4.0	Z	4.4	4.5	4.1	3.5	3.3	3.3	3.6	3.8	3.6	3.9	4.1	4.2	4.1	3.6	2.8	3.0	2.4	5.2	5.0	5.5	3.9	5.5																							
26-Dec	5.6	8.4	9.6	8.0	Z	5.9	5.3	5.3	4.8	3.9	3.4	3.2	3.2	3.0	3.0	3.4	3.6	3.6	3.5	3.8	3.7	3.8	2.7	1.7	4.4	9.6																							
27-Dec	1.4	1.6	1.8	1.6	1.5	Z	1.5	1.6	1.4	1.2	1.2	1.0	1.6	1.6	1.9	2.6	2.4	3.0	3.4	3.3	3.3	2.7	2.5	2.3	2.0	3.4																							
28-Dec	Z	2.2	2.3	2.3	2.1	2.2	2.2	2.0	1.9	2.6	3.5	2.5	2.4	3.0	2.8	4.1	6.9	7.7	7.9	7.5	7.3	7.3	6.4	5.8	4.1	7.9																							
29-Dec	5.0	Z	5.5	1.6	1.3	1.4	1.3	2.7	4.5	4.1	3.0	2.4	2.4	2.5	2.6	2.7	2.7	2.9	3.1	2.2	2.2	2.6	2.8	2.9	2.8	5.5																							
30-Dec	2.8	5.2	Z	4.8	4.5	4.6	4.1	3.2	2.7	2.4	2.7	3.0	2.3	1.9	2.0	1.6	1.5	1.8	1.7	2.1	2.6	1.7	1.4	1.4	2.7	5.2																							
31-Dec	1.4	1.3	1.4	Z	1.3	1.2	1.2	1.4	1.4	1.7	2.0	2.5	2.8	2.4	2.3	2.5	2.6	2.4	2.3	1.9	1.4	1.4	1.3	1.0	1.8	2.8																							
																								2.3	2.8	2.5	2.3	2.2	2.4	2.4	2.4	2.4	2.5	2.5	2.4	2.4	2.2	2.2	2.2	2.3	2.5	2.5	2.6	2.6	2.7	2.7	2.7	Diurnal Average	
																								7.9	8.4	9.6	8.0	5.5	5.9	7.0	7.6	8.4	8.1	7.4	6.4	6.0	6.0	6.5	6.7	6.9	7.7	7.9	7.8	7.3	8.6	8.7	8.8	Diurnal Maximum	
Z - zerospan																								C - Calibration																									



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Stony Mountain - December 2023





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Stony Mountain - December 2023**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	707	100.00	100.00
21 - 40	0	0.00	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Stony Mountain - December 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	1	0	5	1	6	6	4	6	58	177	173	59	91	98	21	1	707
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	1	0	5	1	6	6	4	6	58	177	173	59	91	98	21	1	707

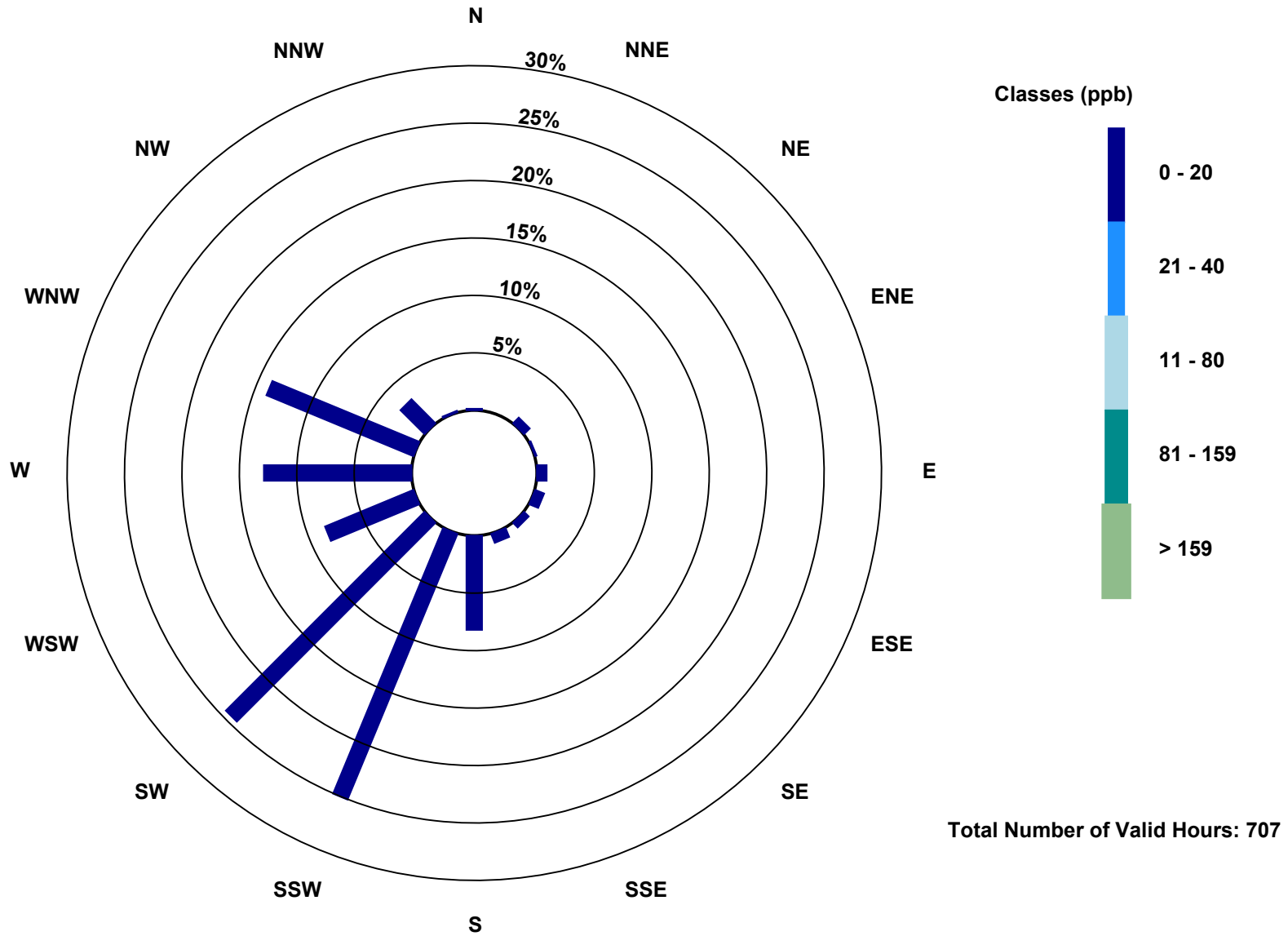
Total Number of Valid Hours: 707

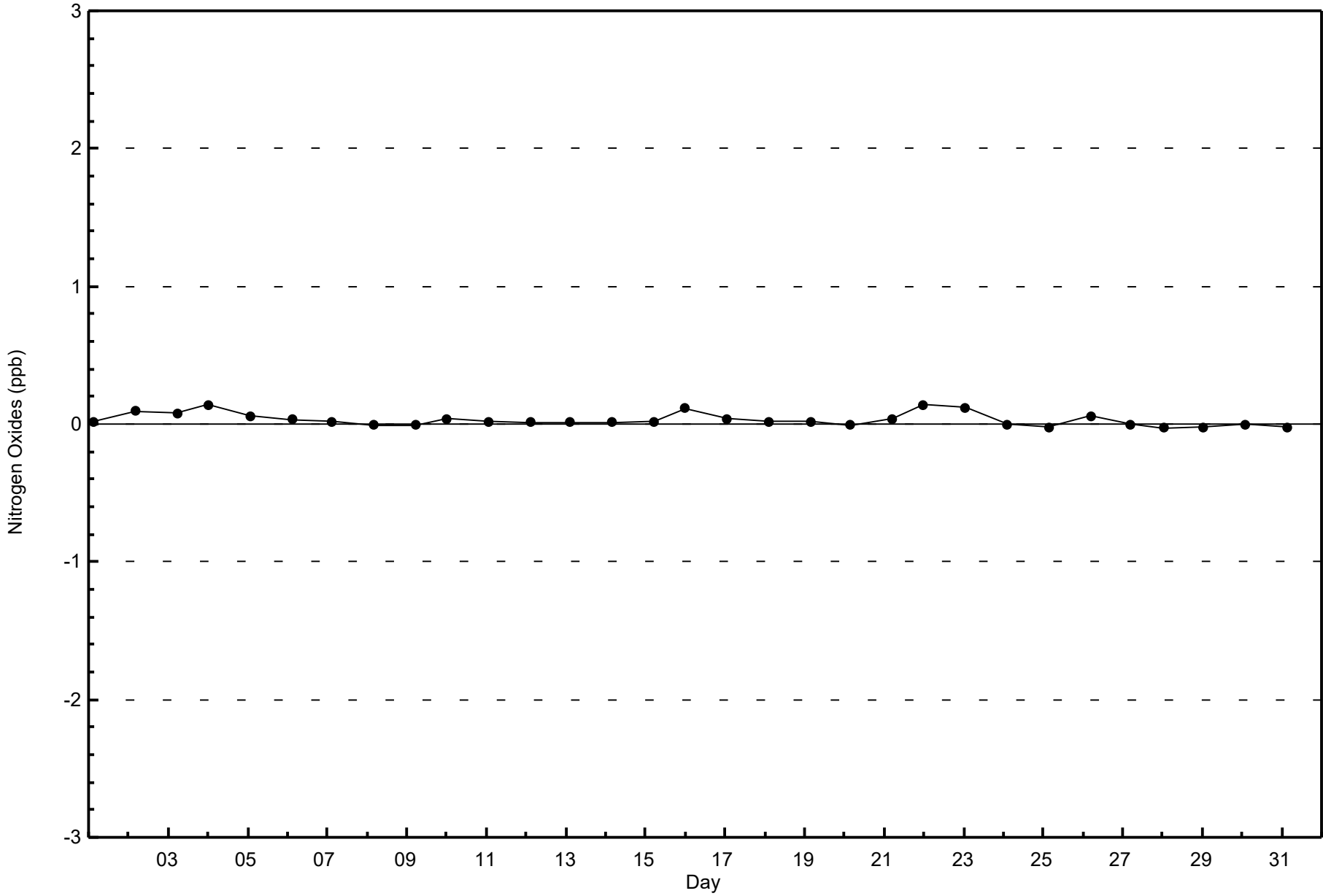
Total Number of Hours: 744

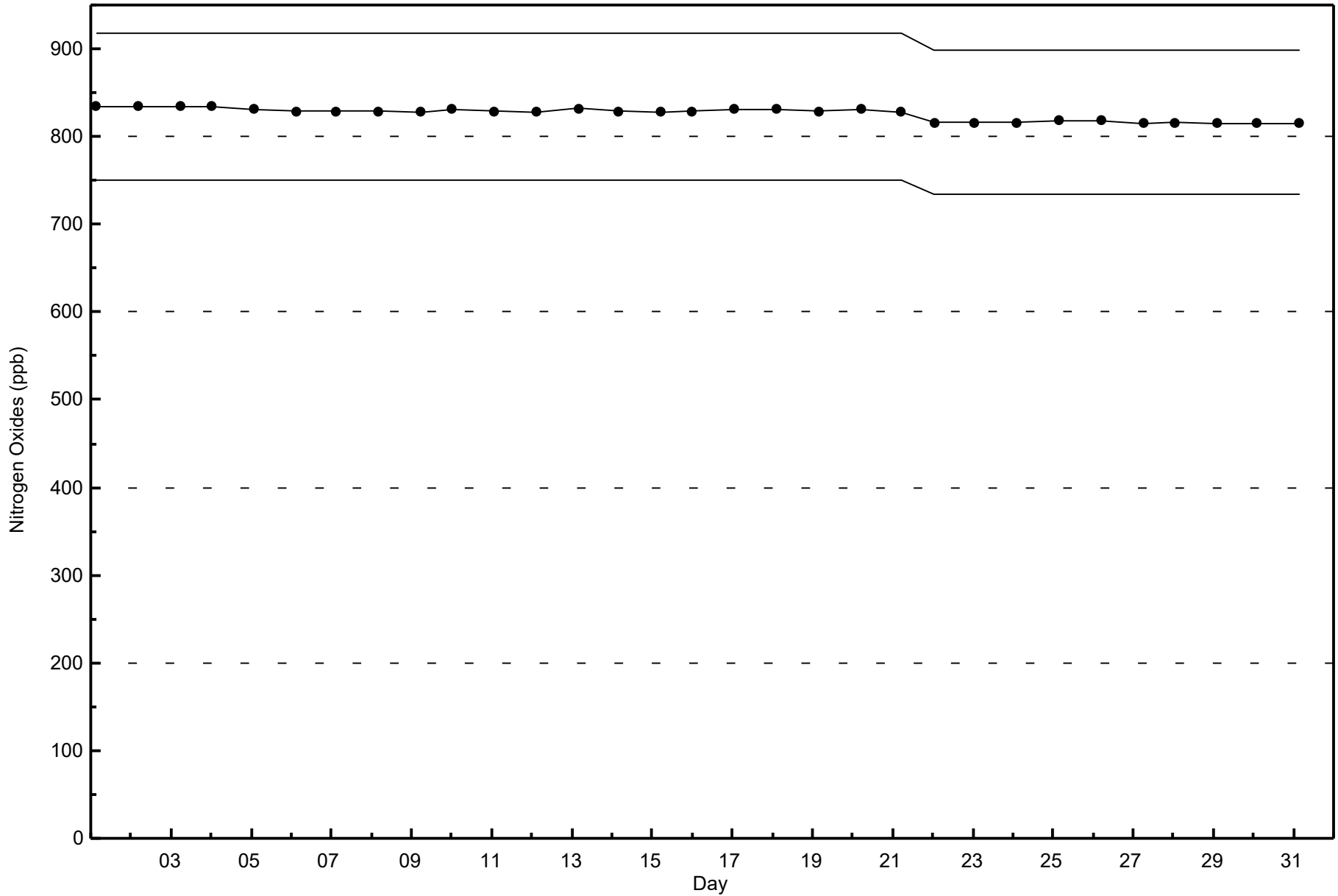


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Nitrogen Oxides (NO_x) - ppb
Stony Mountain









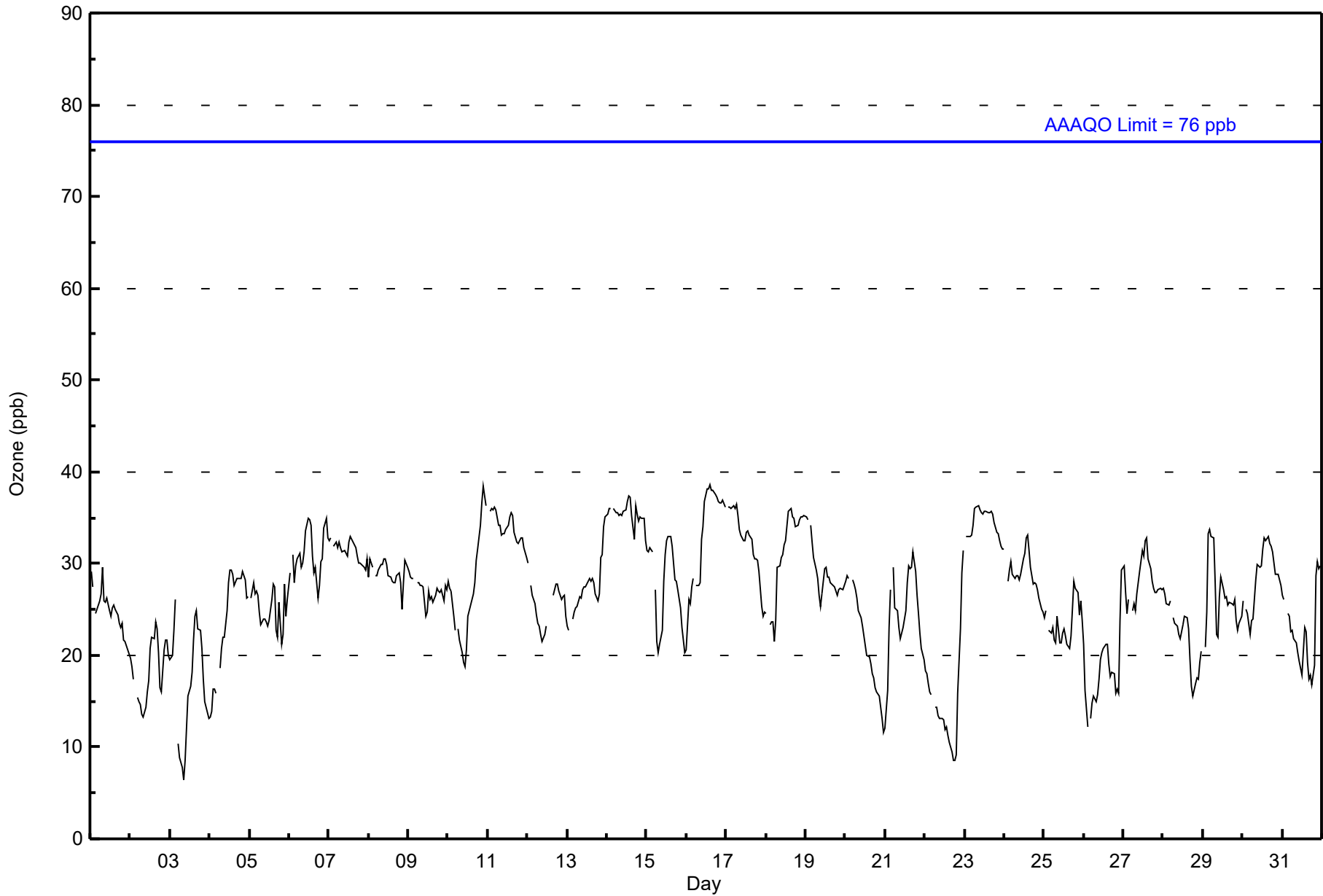
Wood Buffalo Environmental Association

Summary of Hour Averages

Ozone (O₃) - ppb

Stony Mountain - December 2023

Number of Exceedences (AAAQO):		1-hr: 0	24-hr: 0	Hours in Service: 744																	744						
Maximum Value: 38.5 ppb on Dec 16 15:00		Maximum Daily Average: 35.4 ppb on Dec 14																	Hours of Data: 710								
Minimum Value: 6.4 ppb on Dec 3 09:00		Minimum Daily Average: 15.1 ppb on Dec 22																	Hours of Missing Data: 34								
Maximum Diurnal Average: 28.3 ppb at hour 15		Minimum Diurnal Average: 25.0 ppb at hour 9																	Hours of Calibration: 34								
Monthly Average: 26.57 ppb		Percentiles: P ₁ = 9.5 P ₁₀ = 17.5 Q ₁ = 22.9 Median = 27.2 Q ₃ = 31.0 P ₉₀ = 35.0 P ₉₉ = 37.4																	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-Dec	29.2	27.5	Z	24.5	25.0	25.9	26.6	29.5	25.9	25.7	26.3	24.9	24.2	25.1	25.5	25.0	24.5	23.5	23.0	23.4	21.7	21.5	20.5	20.2	24.8	29.5	
2-Dec	19.7	18.7	17.4	Z	15.4	15.0	14.6	13.6	13.2	14.3	15.9	17.3	20.7	22.0	21.9	23.6	23.0	20.3	16.5	16.0	20.6	21.6	21.7	20.0	18.4	23.6	
3-Dec	19.5	20.1	22.7	26.2	Z	10.4	8.8	7.8	6.4	8.6	12.1	15.6	16.7	18.2	21.6	24.3	24.9	22.9	22.8	20.7	17.4	15.0	14.3	13.0	16.9	26.2	
4-Dec	13.3	13.9	16.4	16.3	15.9	Z	18.6	20.7	21.9	22.0	24.9	27.9	29.3	29.2	28.8	27.6	28.3	28.4	28.4	29.1	28.2	26.3	26.5	23.9	29.3		
5-Dec	Z	26.2	27.9	26.8	27.0	26.6	24.6	23.4	23.9	23.9	23.7	23.2	23.8	26.0	27.7	27.4	22.8	21.9	25.8	21.3	22.3	27.8	24.3	26.1	25.0	27.9	
6-Dec	29.0	30.9	Z	27.9	29.8	30.5	31.1	29.6	30.0	31.3	33.6	35.0	34.8	34.1	30.8	29.0	29.5	26.2	27.6	30.2	30.6	33.9	34.9	32.9	31.0	35.0	
7-Dec	32.5	32.8	Z	31.9	32.4	31.8	32.4	31.7	31.2	31.4	31.1	30.8	32.3	33.0	32.7	32.0	31.8	30.9	30.1	30.1	29.7	29.6	29.4	30.5	31.4	33.0	
8-Dec	28.5	30.5	29.6	Z	28.7	28.6	29.3	29.9	30.0	30.5	30.4	30.0	28.6	28.6	28.1	27.9	27.9	28.7	29.0	27.9	25.0	27.9	30.4	29.7	28.9	30.5	
9-Dec	29.2	28.6	28.4	28.3	Z	28.0	28.0	27.7	27.7	27.5	24.2	24.8	27.0	26.0	26.4	25.8	26.5	27.3	27.1	26.8	27.1	25.9	27.6	27.1	27.1	29.2	
10-Dec	28.1	27.2	27.0	24.3	22.7	Z	22.9	21.7	20.3	19.3	18.8	20.6	24.3	24.8	26.1	26.7	27.9	30.4	31.5	34.2	36.6	38.5	37.4	36.3	27.3	38.5	
11-Dec	Z	35.8	35.9	35.9	36.1	35.8	34.2	34.1	33.1	33.2	33.3	33.8	34.1	35.0	35.5	35.2	33.4	32.4	32.2	32.5	32.7	32.8	31.7	30.6	33.9	36.1	
12-Dec	30.0	Z	27.5	26.5	25.6	24.4	23.5	23.2	22.3	21.6	22.3	23.2	Z	Z	Z	26.5	27.1	27.8	27.8	26.9	26.1	26.5	26.6	24.3	25.5	30.0	
13-Dec	23.1	22.7	Z	24.0	24.8	25.1	25.3	26.4	26.3	27.2	27.5	27.5	27.7	28.3	28.1	28.4	27.8	26.7	25.9	26.6	30.6	31.0	34.1	35.1	27.4	35.1	
14-Dec	35.4	36.0	36.0	Z	35.9	35.5	35.5	35.3	35.5	35.3	35.6	35.9	36.8	37.4	37.3	35.2	32.7	36.3	35.4	34.7	35.1	35.0	34.9	32.5	35.4	37.4	
15-Dec	31.4	31.2	31.8	31.3	Z	27.2	21.4	20.3	21.3	22.7	28.1	30.9	32.5	33.0	32.9	31.9	30.0	28.3	28.0	27.1	25.1	23.1	21.7	20.2	27.5	33.0	
16-Dec	20.6	26.1	25.7	27.4	28.3	Z	27.6	27.6	27.9	32.6	34.1	36.7	38.1	38.1	38.5	38.0	38.0	37.5	37.3	36.7	36.5	36.6	36.9	36.2	33.2	38.5	
17-Dec	Z	36.1	36.2	35.9	36.3	36.0	36.5	35.2	33.8	33.1	32.5	32.5	33.5	33.5	33.1	32.7	31.0	30.5	30.5	30.4	29.2	25.3	24.2	24.7	32.3	36.5	
18-Dec	24.6	Z	23.3	23.7	23.6	21.6	23.8	29.6	29.8	30.7	31.0	32.1	32.6	35.7	35.8	36.0	35.2	34.9	34.0	34.1	34.8	35.1	35.1	35.3	31.0	36.0	
19-Dec	35.1	34.7	Z	34.2	32.3	30.6	29.3	28.4	26.5	25.3	26.7	29.4	29.5	28.5	28.5	28.0	27.7	27.5	27.0	26.5	27.2	27.3	27.1	27.6	28.9	35.1	
20-Dec	28.1	28.7	28.4	Z	28.2	27.7	27.1	26.2	24.9	24.0	23.3	22.2	21.1	20.0	19.9	19.1	18.1	17.5	16.5	16.0	15.5	14.4	13.1	11.5	21.4	28.7	
21-Dec	12.0	16.2	23.0	27.2	Z	29.6	25.1	24.8	23.0	21.9	22.4	23.0	24.8	27.9	29.7	29.4	29.6	31.2	29.1	26.6	24.5	22.4	20.7	19.5	24.5	31.2	
22-Dec	18.3	18.0	16.9	16.1	15.7	Z	14.3	14.4	13.5	13.1	13.1	12.9	12.0	12.2	11.4	10.5	9.4	8.6	8.6	9.2	15.8	23.0	29.0	31.4	15.1	31.4	
23-Dec	Z	32.9	33.0	33.0	33.1	34.2	35.9	36.1	36.3	35.9	35.5	35.5	35.6	35.6	35.5	35.6	35.7	35.3	34.5	33.5	33.3	32.4	31.8	31.6	34.4	36.3	
24-Dec	31.6	Z	33.1	29.3	30.2	28.9	28.3	28.6	28.7	28.2	28.8	30.5	31.1	32.8	33.2	31.5	29.6	27.7	28.0	27.8	27.2	26.2	25.0	24.7	29.0	33.2	
25-Dec	24.1	24.8	Z	22.8	22.5	23.0	21.6	21.4	24.3	21.4	21.3	22.5	22.9	22.1	21.3	20.8	22.1	25.0	28.1	27.3	26.9	24.3	25.9	23.8	23.5	28.1	
26-Dec	21.3	16.1	12.2	Z	13.2	14.7	15.5	15.0	15.8	17.5	19.6	20.3	20.7	21.3	21.1	19.0	17.7	18.2	18.1	15.8	16.3	15.8	23.8	29.2	18.2	29.2	
27-Dec	29.7	26.8	24.5	26.1	Z	24.9	25.6	24.8	26.7	27.9	29.2	31.4	30.8	32.5	32.8	30.5	29.4	28.0	27.4	26.9	26.9	27.2	27.3	27.2	28.0	32.8	
28-Dec	27.4	26.7	25.7	25.5	25.9	Z	24.1	23.5	23.2	22.3	21.7	22.6	23.3	24.3	24.1	22.8	19.5	16.6	15.5	17.0	17.6	17.5	19.3	20.4	22.0	27.4	
29-Dec	Z	21.0	24.6	33.2	33.7	32.9	32.8	28.0	22.3	21.9	26.3	28.6	27.2	26.2	26.4	25.5	25.8	25.6	25.4	26.1	23.7	22.7	23.5	24.3	26.4	33.7	
30-Dec	25.9	Z	24.9	24.6	22.3	23.8	24.0	26.1	28.3	29.8	29.6	29.8	31.5	32.8	32.5	32.9	32.3	31.9	31.3	30.0	28.8	28.8	28.2	27.6	28.6	32.9	
31-Dec	26.6	26.1	Z	24.5	24.2	22.6	22.7	21.9	21.4	20.2	19.4	18.6	17.8	23.1	22.6	19.3	17.4	17.9	16.8	18.9	28.6	30.2	29.4	29.8	22.6	30.2	
		25.9	26.4	26.3	27.2	26.5	26.8	25.5	25.4	25.0	25.2	25.9	26.8	27.5	28.3	28.3	27.7	27.0	26.6	26.4	26.1	26.5	26.7	27.0	26.8	Diurnal Average	
		35.4	36.1	36.2	35.9	36.3	36.0	36.5	36.1	36.3	35.9	35.6	36.7	38.1	38.1	38.5	38.0	38.0	37.5	37.3	36.7	36.6	38.5	37.4	36.3	Diurnal Maximum	
Z - zerospan		C - Calibration																									
Alberta Ambient Air Quality Objectives (AAAQO):		1-hr 76 ppb																									





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Ozone (O₃) - ppb
Stony Mountain - December 2023

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	110	15.49	15.49
21 - 50	600	84.51	100.00
51 - 82	0	0.00	100.00
> 83	0	0.00	100.00

Total Number of Valid Hours: 710

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Ozone (O₃) - ppb
Stony Mountain - December 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	0	0	0	0	0	0	0	0	6	56	32	5	0	5	6	0	110
21 - 50	2	0	5	1	6	6	4	6	54	122	144	52	91	92	15	0	600
51 - 82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 83	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	2	0	5	1	6	6	4	6	60	178	176	57	91	97	21	0	710

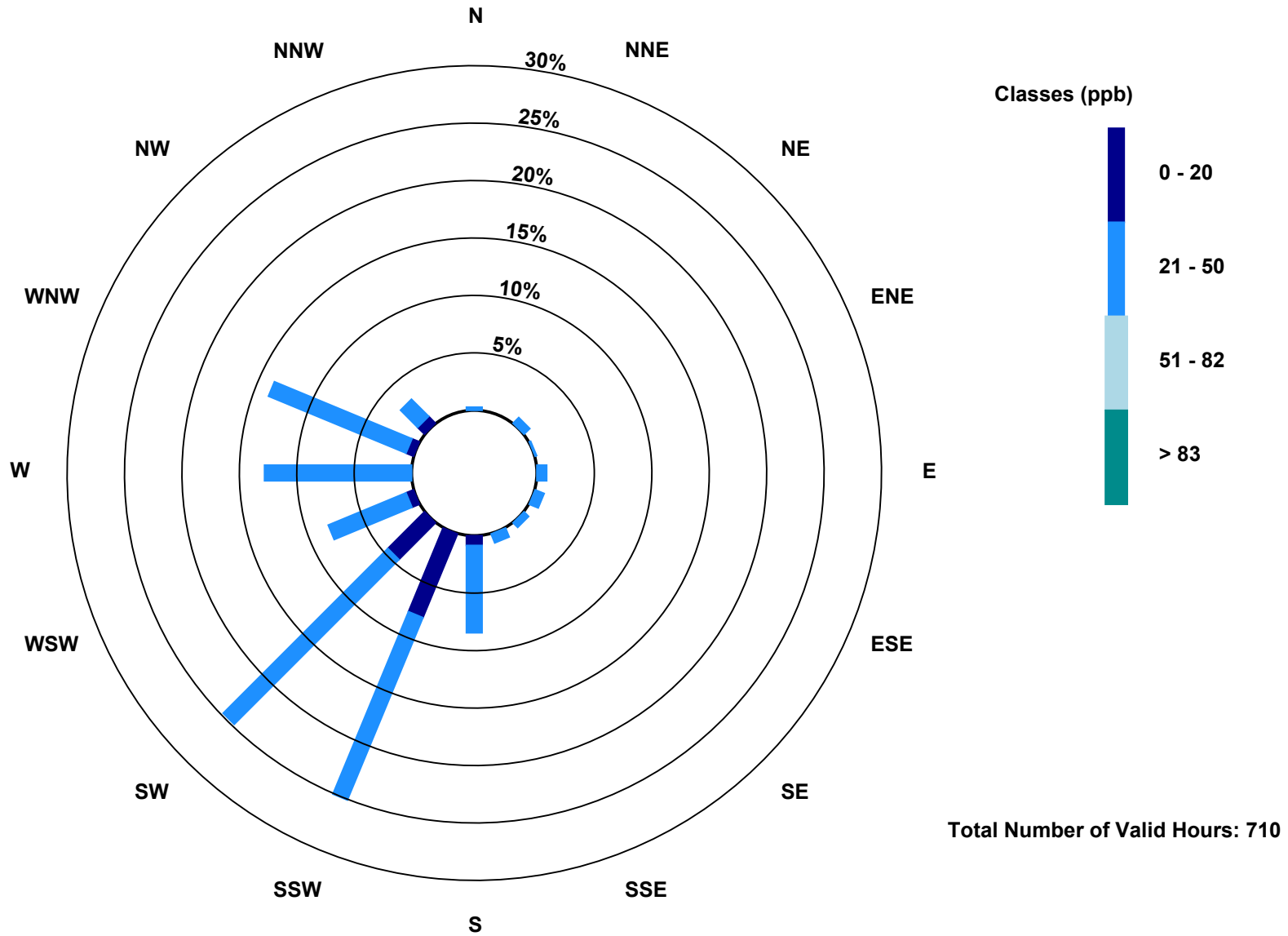
Total Number of Valid Hours: 710

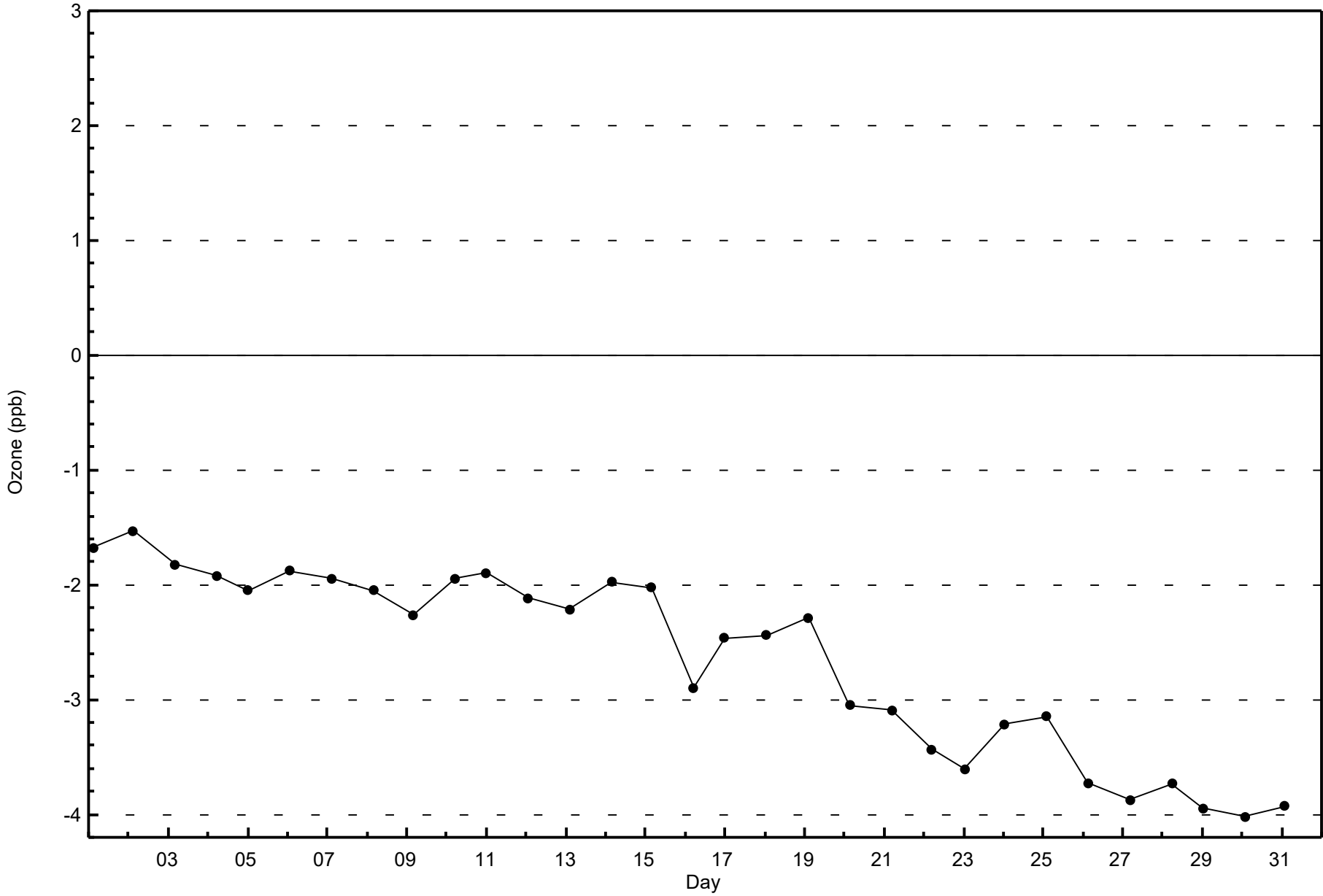
Total Number of Hours: 744

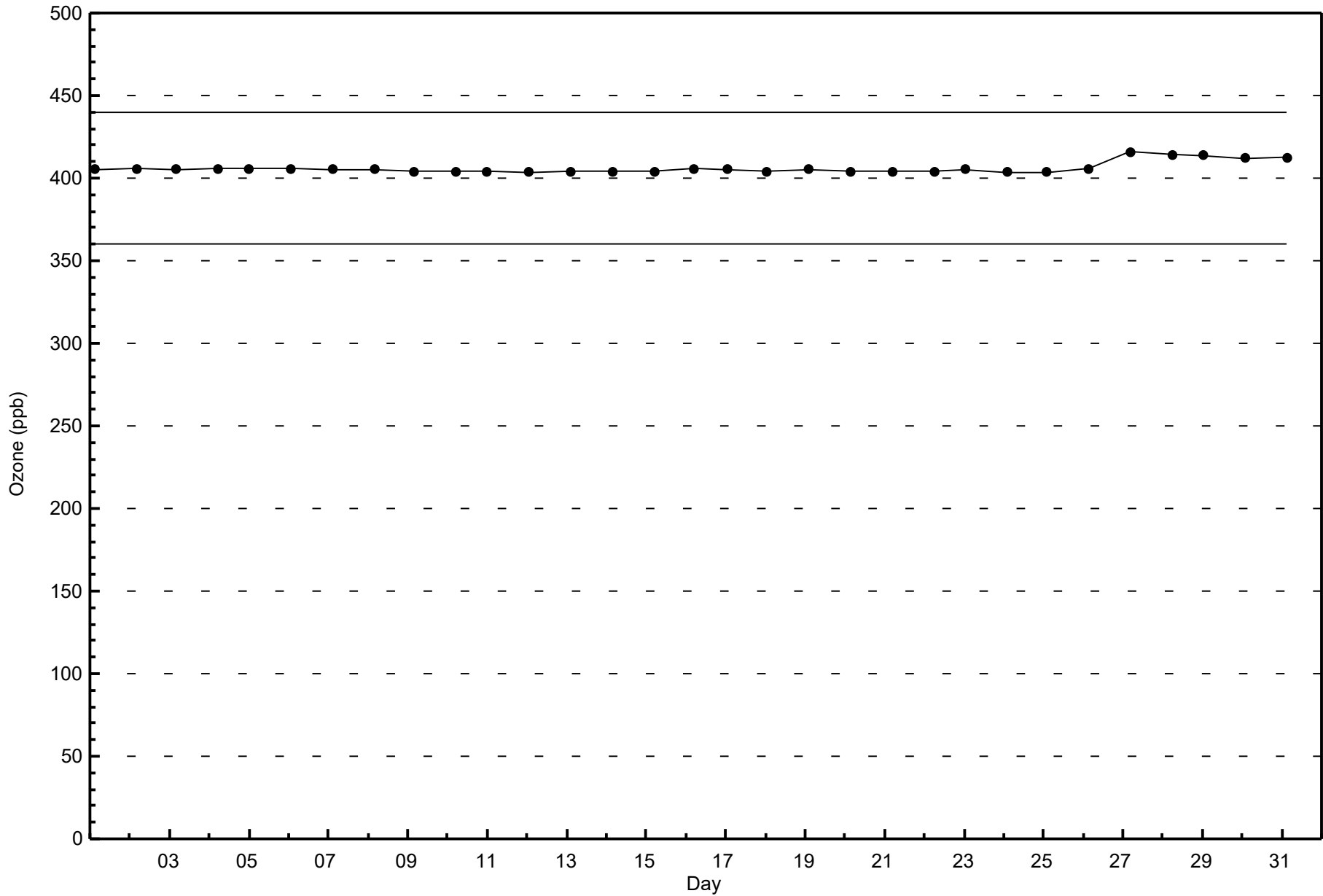


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Ozone (O₃) - ppb
Stony Mountain









Summary of Hour Averages

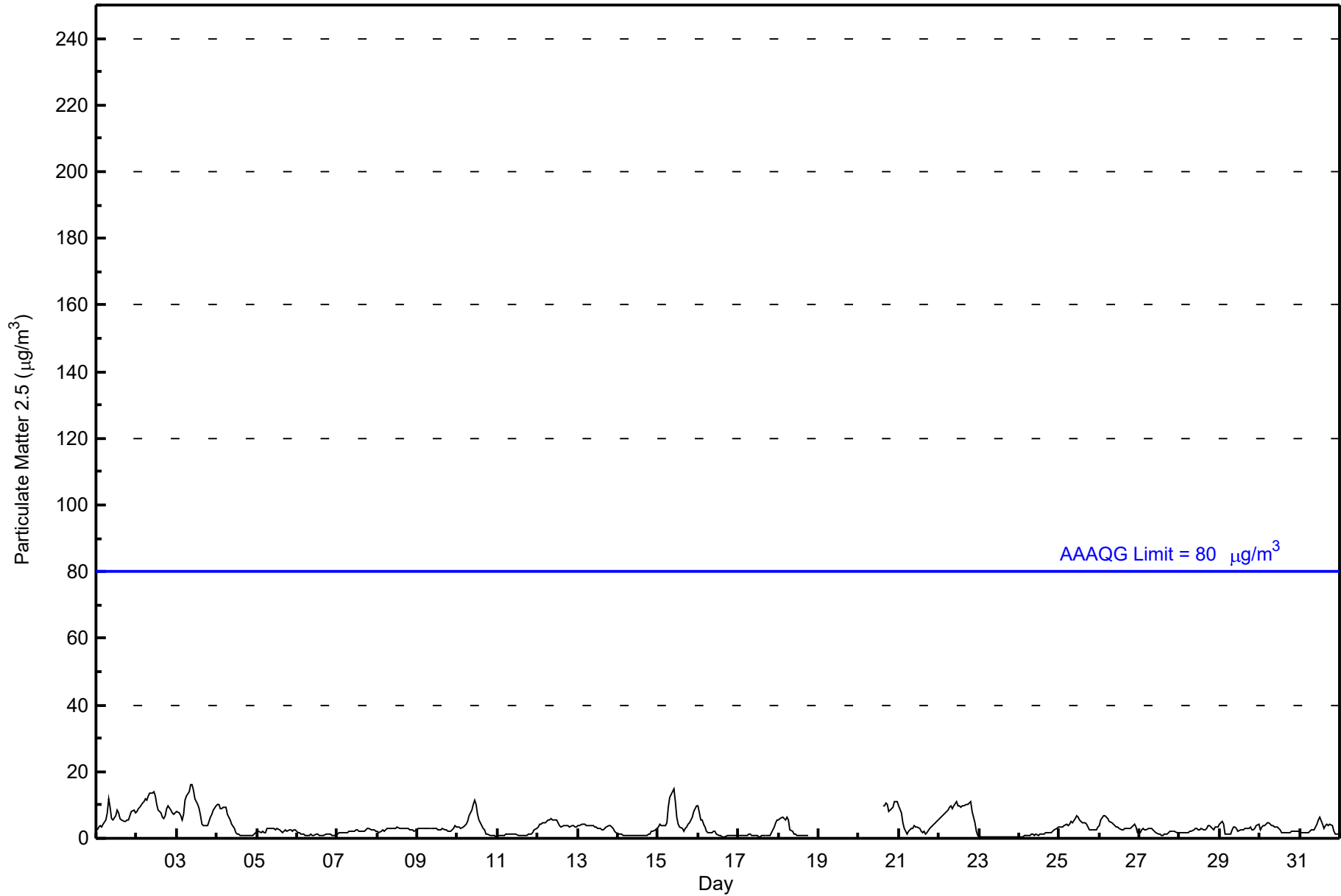
Stony Mountain - December 2023

Number of Exceedences (AAAQO):		1-hr: 0	24-hr: 0																		Hours in Service:	744																											
Maximum Value: 16.0 µg/m ³ on Dec 3 10:00		Maximum Daily Average: 9.7 µg/m ³ on Dec 2																	Hours of Data:	701																													
Minimum Value: 0.3 µg/m ³ on Dec 23 09:00		Minimum Daily Average: 0.4 µg/m ³ on Dec 23																	Hours of Missing Data:	43																													
Maximum Diurnal Average: 4.6 µg/m ³ at hour 10		Minimum Diurnal Average: 2.9 µg/m ³ at hour 16																	Hours of Calibration:	2																													
Monthly Average: 3.61 µg/m ³		Percentiles: P ₁ = 0.3 P ₁₀ = 0.8 Q ₁ = 1.4 Median = 2.8 Q ₃ = 4.4 P ₉₀ = 8.4 P ₉₉ = 13.5																	Percent Operational Time:	94.5																													
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-Dec	2.6	3.2	4.0	3.4	4.4	5.4	7.7	12.0	9.1	6.1	5.5	6.9	8.6	7.6	6.0	5.6	5.3	5.3	5.4	5.5	6.9	8.0	8.6	7.8	6.3	12.0																							
2-Dec	7.9	8.7	9.5	10.5	11.1	11.7	11.6	12.9	13.5	13.7	14.1	12.8	10.0	8.4	7.7	6.2	5.9	6.7	9.1	9.8	8.7	7.8	7.2	7.8	9.7	14.1																							
3-Dec	8.0	7.6	6.8	5.6	7.1	11.6	12.6	13.8	16.0	16.0	14.6	11.7	10.2	9.0	6.6	4.4	3.6	3.9	4.0	5.2	6.5	7.4	8.4	9.7	8.8	16.0																							
4-Dec	10.1	10.2	9.1	8.8	9.5	9.3	7.2	6.2	5.4	4.1	3.0	1.7	1.3	1.1	1.0	1.0	0.9	0.8	0.9	0.9	1.0	1.4	1.8	4.1	10.2																								
5-Dec	2.3	2.2	1.7	2.1	1.8	1.9	2.8	2.8	2.9	2.8	2.8	2.7	2.8	2.4	1.9	1.7	2.2	2.7	2.1	2.5	2.6	1.9	2.4	2.6	2.4	2.9																							
6-Dec	1.7	1.5	1.2	1.4	1.1	1.0	1.0	1.0	1.1	1.0	1.0	1.1	1.1	1.0	0.9	0.9	1.0	1.1	1.3	1.3	1.4	1.1	1.0	1.4	1.1	1.7																							
7-Dec	1.4	1.5	1.5	1.6	1.7	1.8	1.9	2.2	2.2	2.2	2.3	2.7	2.6	2.3	2.2	2.3	2.3	2.7	2.8	2.8	2.7	2.4	2.4	2.0	2.2	2.8																							
8-Dec	2.3	1.9	2.2	2.4	2.3	2.4	2.8	2.8	3.1	2.9	2.9	3.0	3.2	2.9	3.0	3.2	3.0	2.9	2.8	2.5	2.5	2.6	2.2	2.6	2.7	3.2																							
9-Dec	2.9	3.0	2.9	2.9	2.9	2.9	3.0	3.1	3.0	2.9	2.9	2.8	2.7	2.7	2.7	2.8	2.7	2.4	2.2	2.1	2.1	3.0	3.6	3.3	2.8	3.6																							
10-Dec	3.4	3.2	3.2	3.5	3.8	4.2	5.3	6.9	8.6	10.4	11.4	10.3	7.1	5.4	4.0	2.9	2.3	1.3	1.1	0.8	0.8	0.7	0.6	0.6	4.2	11.4																							
11-Dec	0.7	0.8	0.8	0.8	1.0	1.2	1.2	1.2	1.5	1.3	1.2	1.1	0.9	0.9	0.8	0.8	0.8	0.8	1.1	1.5	1.4	1.7	2.5	3.0	1.2	3.0																							
12-Dec	3.5	4.1	4.3	4.7	4.5	4.9	5.7	5.5	5.8	5.6	5.6	5.3	4.6	3.6	3.5	3.9	3.8	3.9	3.7	3.6	3.7	3.7	3.6	3.5	4.4	5.8																							
13-Dec	3.7	3.9	4.1	4.2	4.1	4.0	3.8	3.8	3.9	3.8	3.4	3.4	3.0	2.8	2.6	2.7	3.0	3.4	3.7	3.7	3.2	3.0	2.2	1.5	3.4	4.2																							
14-Dec	1.5	1.4	1.2	0.9	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.8	0.8	0.7	0.8	1.0	1.1	1.3	2.1	2.3	2.6	2.8	1.2	2.8																							
15-Dec	3.5	4.1	3.7	3.8	3.7	4.8	9.4	12.4	13.2	14.6	11.0	6.3	4.1	3.5	2.8	2.0	2.8	3.5	4.2	4.8	6.5	7.9	8.9	9.6	6.3	14.6																							
16-Dec	9.7	5.5	5.5	4.4	3.2	2.0	1.5	1.5	1.6	2.2	2.1	1.5	0.9	0.7	0.6	0.6	0.6	0.7	0.7	0.8	0.9	1.0	0.8	0.8	2.1	9.7																							
17-Dec	0.8	0.7	0.7	0.9	1.0	1.0	1.3	1.3	1.0	1.0	0.8	0.7	0.5	0.6	0.9	0.8	0.9	0.9	0.9	1.0	1.7	3.4	4.8	5.6	1.4	5.6																							
18-Dec	5.7	6.1	6.2	6.0	5.7	6.5	5.3	2.6	1.9	1.3	1.1	1.0	0.9	0.7	0.7	0.7	0.7	0.8	0.8	AF	AF	AF	AF	AF	2.9	6.5																							
19-Dec	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-Dec	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	AF	M	C	C	9.8	9.9	10.6	10.0	8.0	8.4	9.5	10.9	10.8	10.9	--	10.9																							
21-Dec	9.7	7.7	4.8	2.8	2.1	1.3	2.1	2.8	3.2	3.6	3.3	3.2	2.9	2.1	1.6	2.0	1.4	1.9	2.9	3.4	3.8	4.2	4.8	5.4	3.5	9.7																							
22-Dec	5.8	6.3	6.9	7.3	7.6	8.3	9.1	9.9	9.1	9.8	10.8	9.9	9.8	9.4	9.7	9.7	10.2	10.2	10.8	11.0	8.2	4.8	2.2	1.0	8.2	11.0																							
23-Dec	0.7	0.4	0.4	0.5	0.6	0.4	0.4	0.3	0.3	0.3	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.5	0.5	0.5	0.4	0.7																							
24-Dec	0.5	0.5	0.5	0.6	1.0	0.9	1.0	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.3	1.5	1.9	1.8	1.7	2.1	2.6	3.1	3.4	1.4	3.4																							
25-Dec	3.6	3.5	3.5	3.8	4.1	3.8	4.1	5.0	4.6	5.9	6.7	6.5	5.3	5.0	4.7	4.7	4.3	3.3	2.7	2.6	2.7	2.7	2.5	3.2	4.1	6.7																							
26-Dec	3.7	5.3	6.9	6.7	6.3	5.8	5.1	4.5	4.1	3.9	3.4	3.2	2.9	2.7	2.7	2.8	2.8	2.9	2.8	3.2	3.7	4.4	3.5	1.9	4.0	6.9																							
27-Dec	1.5	2.4	2.9	2.7	2.6	2.9	2.9	2.9	2.5	2.1	1.8	1.3	1.1	0.9	0.9	1.3	1.4	1.9	2.2	2.2	2.0	1.9	1.8	1.6	2.0	2.9																							
28-Dec	1.5	1.7	1.8	1.7	1.9	1.9	2.0	2.3	2.6	3.2	2.9	2.7	2.7	2.8	2.6	2.6	3.0	3.7	3.8	3.1	2.7	3.3	3.5	3.5	2.7	3.8																							
29-Dec	4.1	4.9	4.2	1.4	1.2	1.5	1.4	2.5	3.3	3.3	2.9	2.3	2.5	2.6	2.6	2.8	2.9	3.1	3.3	2.7	2.5	3.1	3.6	4.1	2.9	4.9																							
30-Dec	2.6	3.2	3.9	3.9	4.7	4.5	4.2	3.9	3.7	3.4	3.5	3.1	2.3	1.9	1.9	1.6	1.6	1.8	1.8	2.1	2.1	2.2	2.2	2.0	2.8	4.7																							
31-Dec	1.9	1.8	1.8	1.8	1.8	1.8	2.1	2.6	2.7	3.3	4.3	5.6	6.2	4.1	3.1	3.6	4.2	3.7	4.1	3.8	1.9	1.3	1.4	1.1	2.9	6.2																							
																								3.7	3.7	3.7	3.5	3.6	3.8	4.1	4.5	4.5	4.6	4.4	4.0	3.5	3.1	3.0	2.9	2.9	3.0	3.1	3.3	3.3	3.5	3.6	3.6	Diurnal Average	
																								10.1	10.2	9.5	10.5	11.1	11.7	12.6	13.8	16.0	16.0	14.6	12.8	10.2	9.4	9.8	9.9	10.6	10.2	10.8	11.0	9.5	10.9	10.8	10.9	Diurnal Maximum	
C - Calibration																								M - Maintenance				AF - Analyzer Failure																					
Alberta Ambient Air Quality Guideline/Objectives: 1-hr 80 µg/m ³ 24-hr 29 µg/m ³																																																	



Wood Buffalo Environmental Association
Hourly Averages

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Stony Mountain - December 2023





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Stony Mountain - December 2023

Concentration Ranges ($\mu\text{g}/\text{m}^3$)	Number of Hours	%	Cumulative %
0 - 5	565	80.60	80.60
6 - 15	134	19.12	99.71
16 - 25	2	0.29	100.00
26 - 80	0	0.00	100.00
> 81.0	0	0.00	100.00

Total Number of Valid Hours: 701

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - μg/m³
Stony Mountain - December 2023

Concentration Ranges (μg/m ³)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	1	0	0	0	0	1	0	3	47	112	144	53	92	91	21	0	565
6 - 15	0	0	0	0	0	0	0	0	10	70	38	8	3	5	0	0	134
16 - 25	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	2
26 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 81.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	1	0	0	0	0	1	0	3	57	183	183	61	95	96	21	0	701

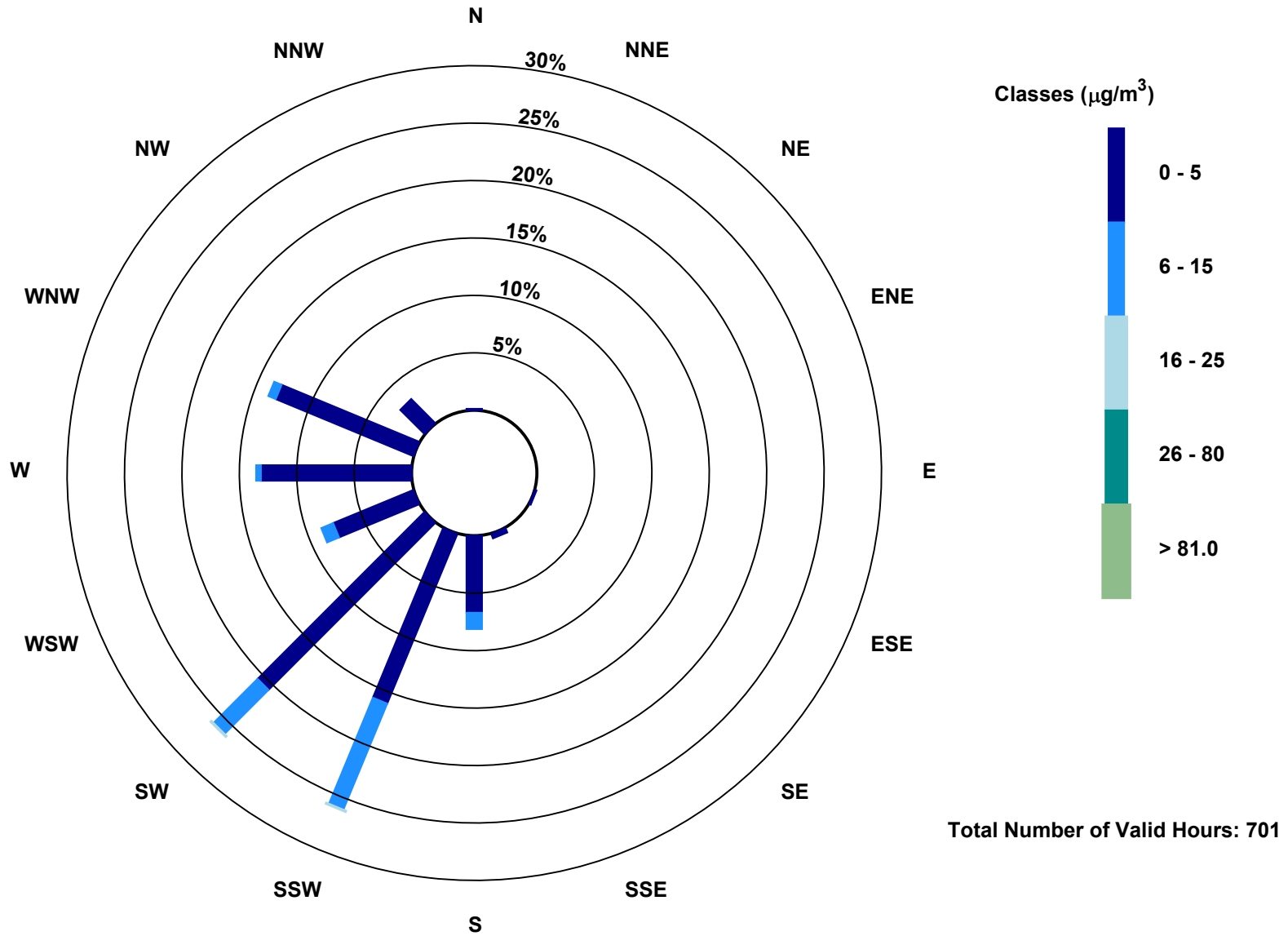
Total Number of Valid Hours: 701

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Dec 2023

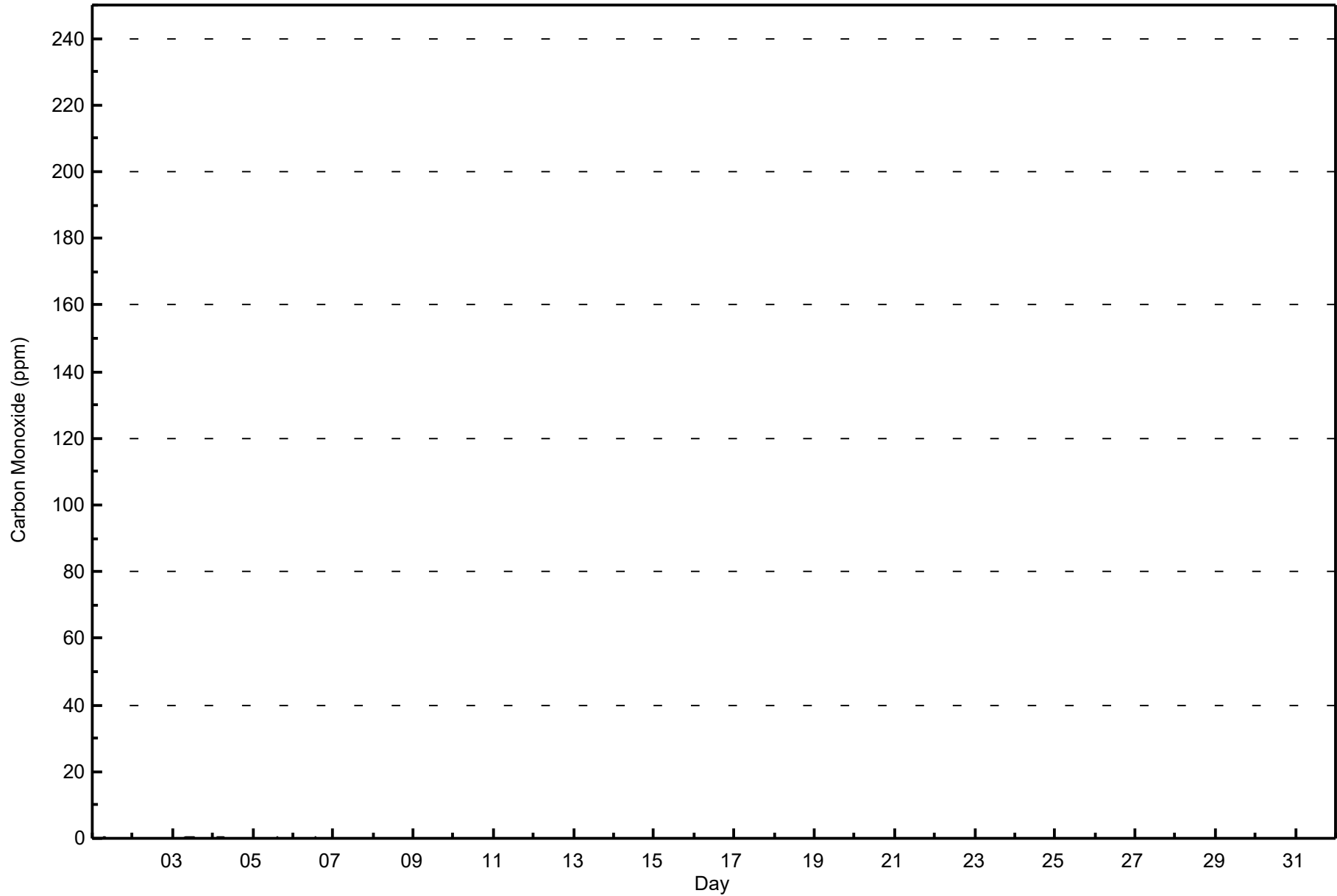
Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Stony Mountain





Wood Buffalo Environmental Association
Hourly Averages

Carbon Monoxide (CO) - ppm
Stony Mountain - December 2023





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Carbon Monoxide (CO) - ppm
Stony Mountain - December 2023

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 0.3	690	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: 690

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Carbon Monoxide (CO) - ppm
Stony Mountain - December 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	2	0	4	1	6	6	4	7	60	178	162	53	89	96	21	1	690
0.4 - 0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.6 - 0.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.8 - 1.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1.5 - 10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	2	0	4	1	6	6	4	7	60	178	162	53	89	96	21	1	690

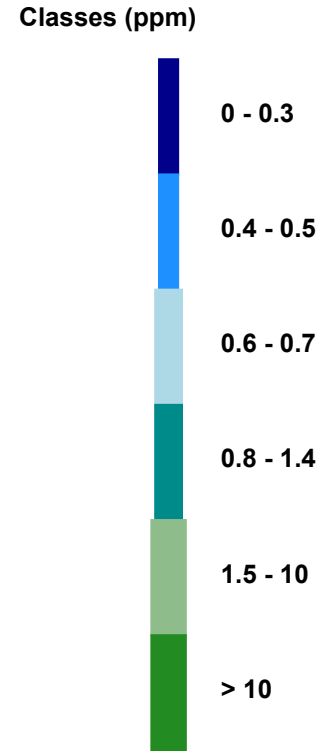
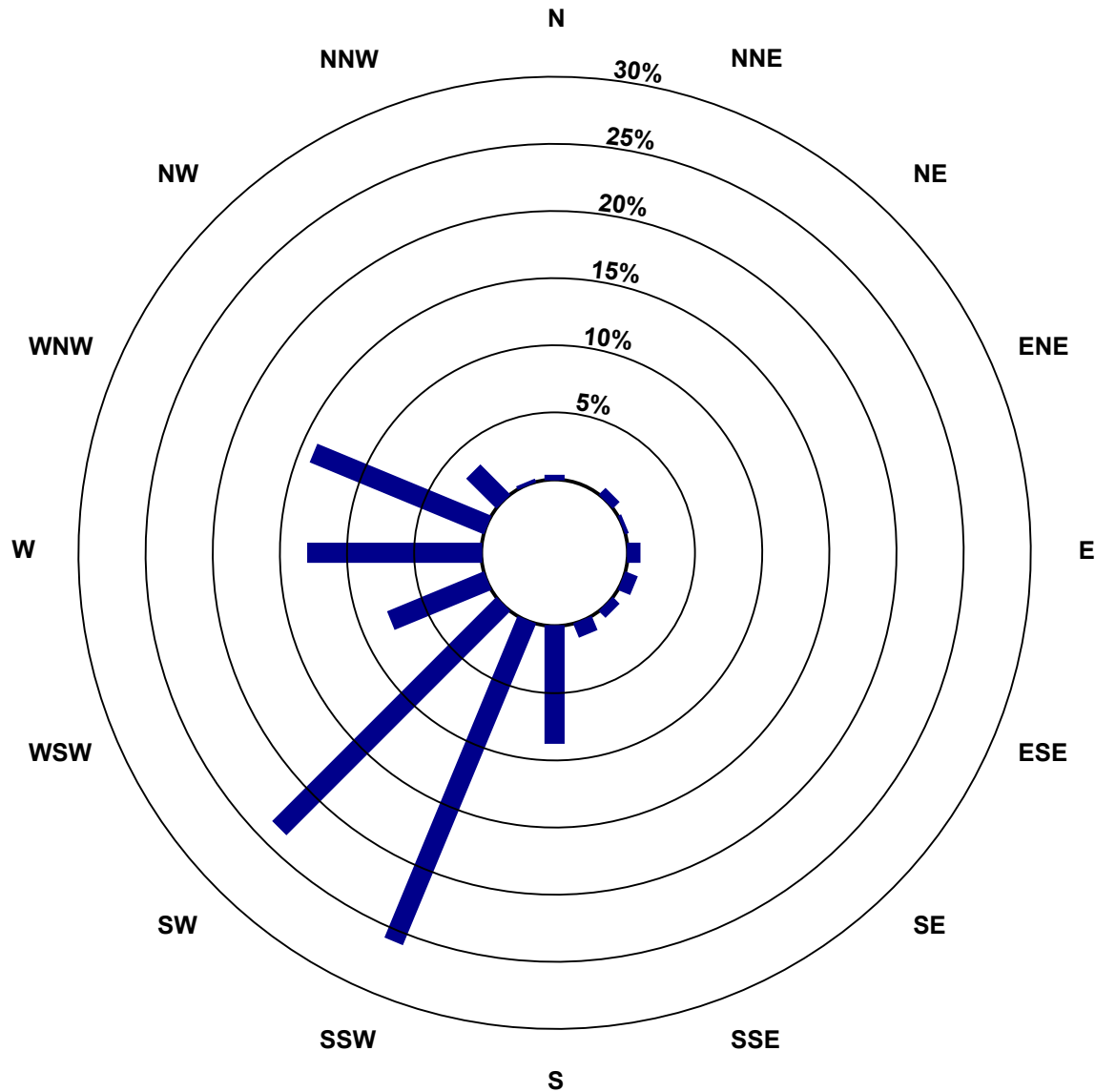
Total Number of Valid Hours: 690

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Dec 2023

Carbon Monoxide (CO) - ppm
Stony Mountain



Total Number of Valid Hours: 690

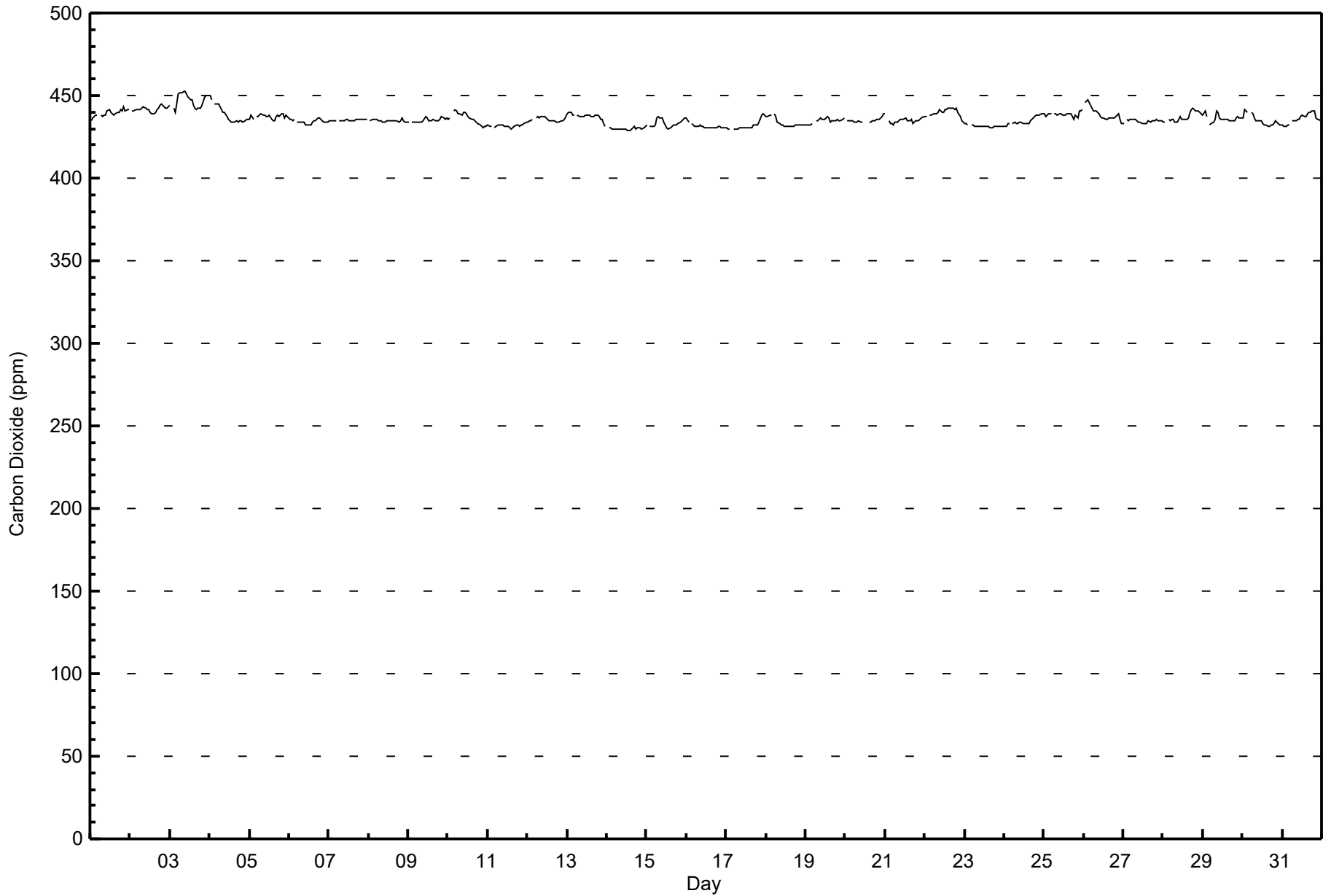


Number of Exceedences (AAAQO):		1-hr: 0	24-hr: 0	Hours in Service:																	744					
Maximum Value: 452.6 ppm on Dec 3 10:00		Maximum Daily Average: 446.8 ppm on Dec 3																	Hours of Data:		710					
Minimum Value: 428.7 ppm on Dec 14 14:00		Minimum Daily Average: 429.8 ppm on Dec 14																	Hours of Missing Data:		34					
Maximum Diurnal Average: 436.5 ppm at hour 4		Minimum Diurnal Average: 434.7 ppm at hour 15																	Hours of Calibration:		34					
Monthly Average: 435.81 ppm		Percentiles: P ₁ = 429.5 P ₁₀ = 431.3 Q ₁ = 433.1 Median = 435.2 Q ₃ = 438.0 P ₉₀ = 441.1 P ₉₉ = 449.9																	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-Dec	434.9	436.1	437.3	438.5	438.4	Z	437.9	437.0	438.4	438.3	440.4	441.3	439.5	438.7	438.4	439.1	439.4	440.2	441.2	440.5	442.8	440.8	441.5	441.4	439.2	442.8
2-Dec	Z	440.3	440.6	441.2	441.3	441.4	441.5	442.7	443.4	442.5	441.4	441.4	440.2	438.8	438.8	439.7	441.1	442.5	444.4	444.7	443.2	442.0	442.2	443.5	441.7	444.7
3-Dec	443.9	Z	442.1	440.1	444.7	450.8	451.5	451.8	452.4	452.6	451.2	448.9	447.7	447.2	444.5	442.5	441.2	442.2	442.5	443.8	446.6	449.2	449.9	450.1	446.8	452.6
4-Dec	449.6	447.8	Z	445.1	445.3	444.5	443.2	441.8	440.2	439.6	437.4	435.2	434.6	433.9	434.0	434.3	434.4	434.3	434.4	434.3	434.1	434.5	435.6	435.5	438.4	449.6
5-Dec	435.6	437.7	435.9	Z	437.0	437.2	438.4	439.2	438.3	438.5	437.3	437.2	437.8	435.7	434.5	434.8	437.4	438.4	437.0	439.1	438.8	436.1	438.5	437.2	437.3	439.2
6-Dec	435.6	435.9	434.6	435.9	Z	434.0	433.7	434.2	434.2	433.6	432.5	431.9	432.1	432.5	433.7	434.5	435.1	436.7	436.3	435.3	435.0	434.0	433.8	434.1	434.3	436.7
7-Dec	434.8	434.8	434.9	435.2	435.0	Z	434.5	434.8	435.0	435.1	435.3	435.5	434.9	434.4	434.8	434.8	435.3	435.2	435.7	435.7	435.6	435.6	435.7	435.3	435.1	435.7
8-Dec	Z	435.0	435.4	435.2	435.5	435.3	434.7	434.3	434.1	434.0	434.0	434.4	435.2	434.9	434.7	434.8	434.9	434.3	434.2	434.8	436.6	435.0	433.8	433.9	434.7	436.6
9-Dec	434.3	Z	434.1	434.1	434.3	434.2	434.2	434.2	434.0	434.3	436.9	436.4	434.7	435.1	434.7	435.4	434.9	434.9	435.2	435.7	436.9	436.5	435.5	436.2	435.1	436.9
10-Dec	435.7	436.7	Z	440.6	441.6	441.1	439.3	438.8	438.4	439.5	439.7	439.1	437.5	436.8	436.0	435.7	434.8	433.5	433.1	432.2	431.6	430.9	431.4	431.6	436.3	441.6
11-Dec	431.9	431.6	431.4	Z	430.9	431.5	432.1	432.0	432.0	432.1	431.8	431.3	430.9	430.4	430.1	430.7	431.6	432.3	432.1	431.7	431.9	432.2	433.1	433.6	431.7	433.6
12-Dec	434.0	434.6	435.1	435.6	Z	436.1	436.9	436.8	436.9	437.3	437.1	436.7	435.5	434.4	434.8	435.1	434.5	434.0	433.9	434.2	434.9	435.0	435.5	437.4	435.5	437.4
13-Dec	438.8	439.4	439.6	438.4	438.1	Z	438.3	437.6	437.7	437.6	437.4	437.9	438.2	438.1	437.6	437.3	437.4	437.8	438.0	437.6	435.7	435.4	432.9	431.6	437.3	439.6
14-Dec	Z	430.4	430.1	429.8	429.6	429.6	429.5	429.4	429.5	429.7	429.7	429.5	429.1	428.7	428.9	429.6	431.1	429.5	430.1	430.2	430.2	430.1	430.2	431.3	429.8	431.3
15-Dec	432.0	Z	431.7	431.4	431.4	432.3	436.1	437.2	436.6	436.8	434.1	431.9	430.3	430.0	430.6	431.3	431.9	432.2	432.2	432.7	433.8	434.8	435.5	436.2	433.2	437.2
16-Dec	436.5	433.7	Z	433.1	432.0	431.6	431.5	431.6	432.0	431.5	431.4	430.8	430.3	430.4	430.5	430.3	430.4	430.5	430.8	431.1	431.0	430.6	430.5	430.2	431.4	436.5
17-Dec	430.1	430.1	429.8	Z	429.5	429.4	429.4	429.9	430.6	430.7	430.9	430.8	430.4	430.3	430.4	430.9	431.8	432.1	432.2	432.6	433.7	437.9	439.1	438.0	431.8	439.1
18-Dec	437.4	437.5	437.9	437.8	Z	439.0	437.5	433.8	433.2	432.5	432.2	431.8	431.7	431.2	431.2	431.2	431.5	431.6	432.0	432.0	431.9	432.0	432.0	432.0	433.5	439.0
19-Dec	432.1	432.4	432.6	432.2	432.8	Z	434.8	434.9	435.7	436.1	435.7	435.6	436.7	437.1	436.1	433.9	435.0	434.4	434.7	435.6	434.9	435.1	435.8	436.6	434.8	437.1
20-Dec	Z	434.9	434.5	434.6	434.4	434.1	434.2	433.9	434.6	434.1	433.9	C	C	C	434.1	434.2	434.5	434.7	435.0	435.4	435.6	436.0	437.2	438.8	434.9	438.8
21-Dec	439.1	Z	435.0	433.2	432.8	432.2	433.9	434.3	435.1	435.6	435.4	435.9	436.8	435.1	434.9	434.5	435.4	433.2	434.9	434.5	435.1	435.8	436.4	436.9	435.0	439.1
22-Dec	437.5	437.6	Z	438.3	438.4	438.7	438.7	438.8	440.1	441.5	439.6	439.8	441.6	441.7	442.5	442.7	442.2	442.0	441.9	442.2	440.2	437.5	435.1	433.6	439.7	442.7
23-Dec	433.3	432.6	432.3	Z	432.2	431.9	431.3	431.1	431.0	431.4	431.5	431.3	431.2	431.0	430.9	430.8	430.9	430.9	431.1	431.3	431.2	431.5	431.6	431.7	431.5	433.3
24-Dec	431.7	431.6	433.4	432.8	Z	433.0	433.5	433.4	433.5	433.9	433.8	433.4	433.3	432.7	432.7	433.4	434.9	436.8	437.6	438.1	438.4	438.5	439.0	439.1	434.7	439.1
25-Dec	438.6	437.5	437.9	438.8	438.9	Z	439.1	438.9	438.0	439.0	438.7	438.4	438.0	438.4	438.6	438.9	438.7	437.5	436.0	437.8	438.8	441.0	440.7	441.5	438.6	441.5
26-Dec	Z	445.8	447.2	445.5	444.3	442.8	441.1	441.0	439.9	438.6	437.0	436.7	436.1	435.5	435.6	436.2	436.5	436.2	436.5	437.3	438.0	438.8	436.0	433.0	438.9	447.2
27-Dec	433.2	Z	435.7	434.9	435.2	435.5	435.4	435.8	435.0	434.3	433.8	433.0	433.0	433.2	433.1	434.4	434.1	434.4	434.6	435.1	435.2	434.7	434.6	434.6	434.5	435.8
28-Dec	434.0	434.2	Z	435.9	434.9	435.3	435.3	434.3	433.8	435.5	437.6	435.7	435.5	436.0	435.5	436.6	439.5	441.9	442.0	440.8	440.6	440.8	439.7	439.0	437.2	442.0
29-Dec	438.3	440.8	437.6	Z	432.6	432.7	433.6	435.8	440.3	439.6	436.3	435.4	435.5	435.8	435.4	435.4	434.9	435.0	435.0	434.7	436.4	437.0	436.6	436.1	436.1	440.8
30-Dec	436.1	441.6	440.6	439.9	Z	439.6	438.9	436.5	435.2	434.4	434.8	434.6	433.2	432.0	432.2	431.6	431.6	432.0	432.2	433.1	435.1	432.9	432.1	431.9	434.9	441.6
31-Dec	432.0	431.6	431.5	431.9	431.9	Z	434.5	434.8	435.0	435.4	436.0	437.6	438.4	437.1	437.5	438.7	439.8	440.2	440.8	440.3	436.6	435.5	435.6	435.1	436.0	440.8
435.8 436.2 435.7 436.5 435.9 436.2 436.3 436.2 436.3 436.3 436.0 435.6 435.3 434.9 434.7 434.9 435.4 435.5 435.7 436.0 436.1 436.1 436.0 436.0																								Diurnal Average		
449.6 447.8 447.2 445.5 445.3 450.8 451.5 451.8 452.4 452.6 451.2 448.9 447.7 447.2 444.5 442.7 442.2 442.5 444.4 444.7 446.6 449.2 449.9 450.1																								Diurnal Maximum		
Z - zerospan		C - Calibration																								



Wood Buffalo Environmental Association
Hourly Averages

Carbon Dioxide (CO₂) - ppm
Stony Mountain - December 2023





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Carbon Dioxide (CO₂) - ppm
Stony Mountain - December 2023**

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
400 - 420	0	0.00	0.00
420 - 440	626	88.17	88.17
440 - 460	84	11.83	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: 710

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Carbon Dioxide (CO₂) - ppm
Stony Mountain - December 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	2	0	4	1	6	6	3	7	51	135	160	52	89	93	16	1	626
440 - 460	0	0	0	0	0	0	0	0	9	44	16	3	3	4	5	0	84
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
Totals	2	0	4	1	6	6	3	7	60	179	176	55	92	97	21	1	710

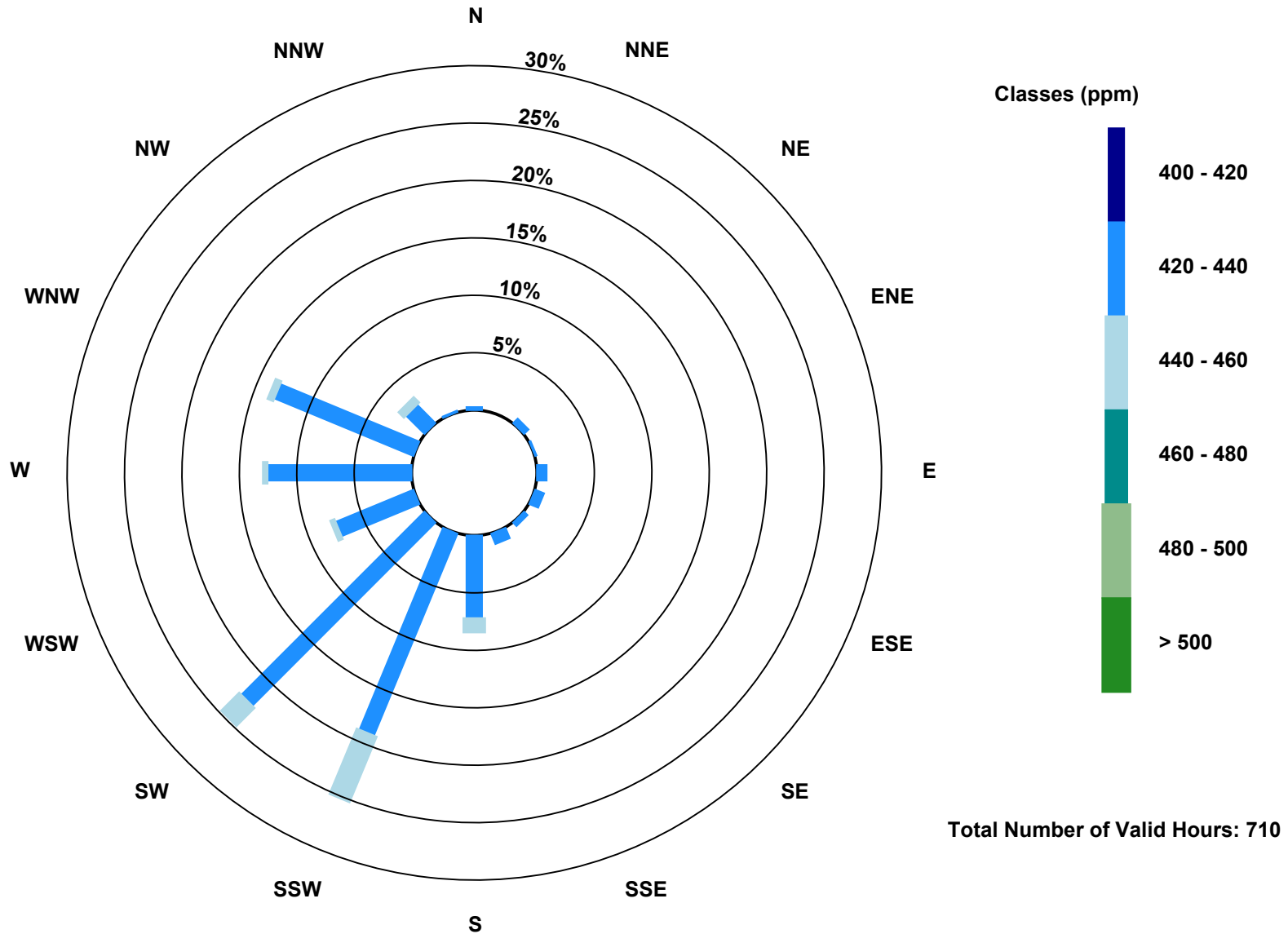
Total Number of Valid Hours: 710

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Dec 2023

Carbon Dioxide (CO₂) - ppm
Stony Mountain



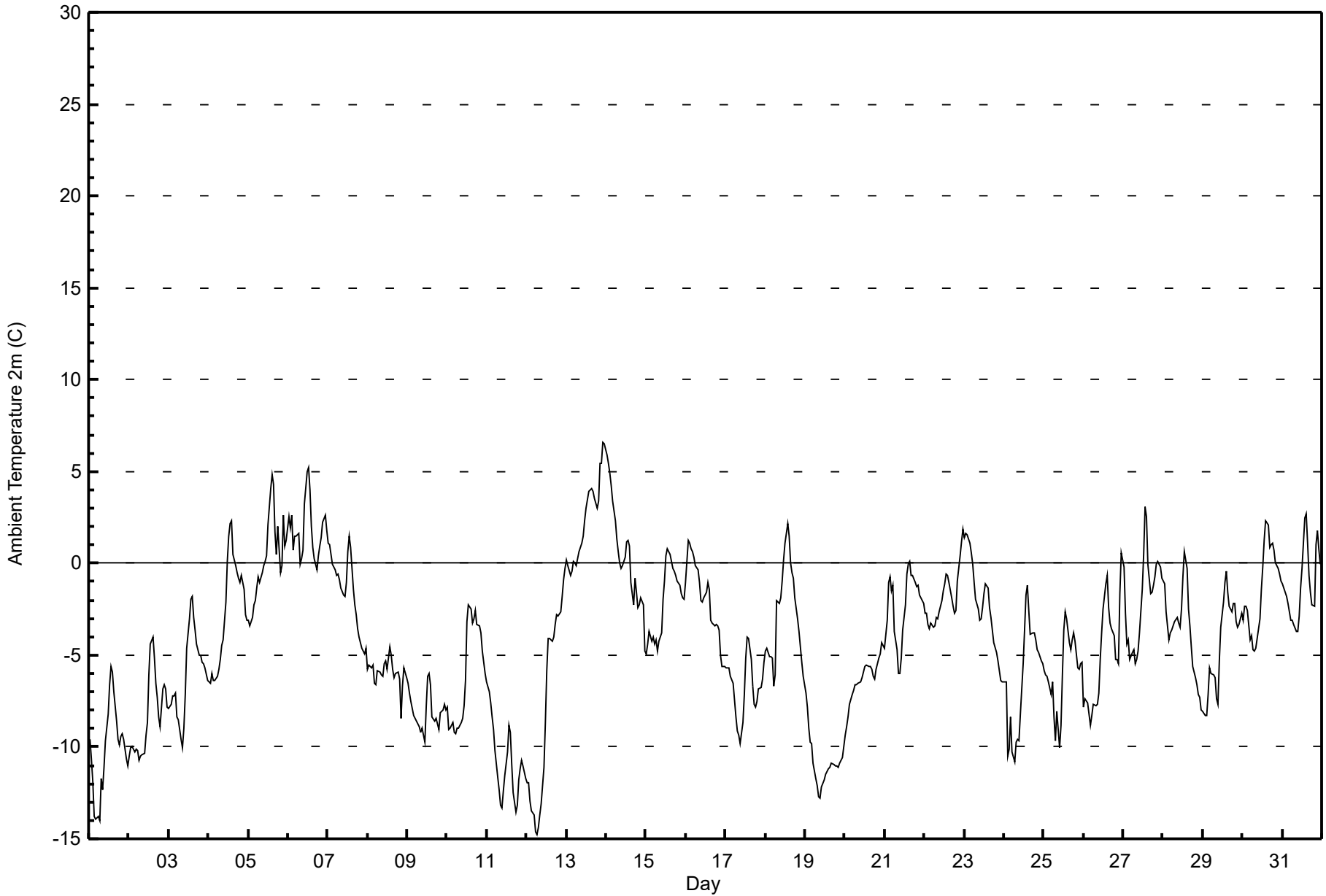


Maximum Value: 6.6 C on Dec 13 23:00																				Maximum Daily Average: 2.4 C on Dec 13					Hours in Service: 744	
Minimum Value: -14.8 C on Dec 12 07:00																				Minimum Daily Average: -10.8 C on Dec 19					Hours of Data: 744	
Maximum Diurnal Average: -1.3 C at hour 14																				Minimum Diurnal Average: -6.0 C at hour 9					Hours of Missing Data: 0	
Monthly Average: -4.18 C																				Percentiles: P ₁ = -13.7 P ₁₀ = -9.9 Q ₁ = -7.0 Median = -4.0 Q ₃ = -1.0 P ₉₀ = 1.0 P ₉₉ = 4.9					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-Dec	-9.6	-10.6	-11.9	-13.8	-13.9	-13.8	-14.0	-11.7	-12.3	-11.1	-9.7	-8.2	-6.6	-5.7	-5.9	-7.0	-8.6	-9.6	-9.9	-9.4	-9.3	-9.6	-10.6	-11.0	-10.2	-5.7
2-Dec	-10.5	-10.0	-10.0	-10.3	-10.1	-10.2	-10.7	-10.5	-10.4	-10.3	-9.3	-8.7	-6.1	-4.4	-4.0	-5.2	-6.5	-7.3	-8.3	-8.9	-6.8	-6.6	-6.8	-7.8	-8.3	-4.0
3-Dec	-7.9	-7.7	-7.2	-7.2	-7.1	-8.4	-8.5	-9.6	-10.0	-9.0	-7.1	-4.6	-3.0	-1.9	-1.8	-2.9	-3.6	-4.4	-5.0	-5.0	-5.4	-5.5	-5.7	-6.4	-6.0	-1.8
4-Dec	-6.5	-6.5	-6.0	-6.4	-6.4	-6.2	-5.8	-5.2	-4.5	-4.2	-2.1	0.1	1.5	2.2	2.3	0.4	-0.2	-0.5	-0.8	-1.1	-0.7	-1.4	-2.8	-3.1	-2.7	2.3
5-Dec	-3.1	-3.4	-3.0	-2.3	-2.0	-1.4	-0.8	-1.0	-0.5	-0.2	0.1	0.4	2.0	4.1	4.8	4.3	1.7	0.5	2.0	-0.5	-0.1	2.6	0.9	1.3	0.3	4.8
6-Dec	2.5	1.9	2.6	0.7	1.5	1.5	1.6	0.0	0.2	0.7	3.2	5.0	5.2	4.0	2.0	0.8	0.3	-0.4	0.4	1.0	1.4	2.3	2.6	1.7	1.8	5.2
7-Dec	1.1	1.0	0.5	-0.1	-0.3	-0.7	-0.6	-0.9	-1.3	-1.8	-1.8	-1.0	0.6	1.5	0.8	-1.4	-2.2	-2.8	-3.5	-4.0	-4.6	-4.8	-4.9	-4.6	-1.5	1.5
8-Dec	-5.8	-5.5	-5.7	-5.5	-6.5	-6.6	-5.8	-5.9	-6.1	-6.2	-5.5	-5.3	-5.7	-4.6	-5.0	-5.8	-6.2	-6.0	-6.0	-6.3	-8.4	-6.7	-5.7	-6.3	-6.0	-4.6
9-Dec	-6.6	-7.0	-7.6	-7.9	-8.3	-8.6	-8.8	-8.9	-9.2	-9.0	-9.7	-7.8	-6.1	-6.0	-6.6	-8.4	-8.6	-8.4	-8.8	-9.0	-8.1	-8.0	-7.7	-8.0	-8.0	-6.0
10-Dec	-7.8	-9.1	-9.0	-8.6	-9.2	-9.3	-9.0	-9.0	-8.7	-8.4	-7.7	-6.4	-3.2	-2.3	-2.5	-3.3	-3.0	-2.6	-3.4	-3.4	-3.8	-4.7	-5.4	-6.0	-6.1	-2.3
11-Dec	-6.5	-7.0	-7.6	-8.3	-9.0	-10.2	-11.7	-12.3	-13.2	-13.4	-12.4	-11.6	-10.2	-8.8	-9.2	-11.0	-12.5	-13.6	-13.1	-11.8	-11.2	-10.7	-11.0	-11.7	-10.8	-6.5
12-Dec	-11.9	-12.0	-12.9	-13.5	-13.7	-14.6	-14.8	-14.4	-13.7	-13.1	-11.1	-8.6	-5.9	-4.1	-4.1	-4.3	-4.0	-3.3	-2.8	-2.9	-2.6	-1.8	-0.9	-0.3	-8.0	-0.3
13-Dec	0.2	-0.1	-0.6	-0.4	0.1	0.0	-0.2	0.7	0.8	1.1	1.5	2.3	3.0	3.9	4.0	4.0	3.9	3.5	3.0	3.4	5.5	5.4	6.6	6.5	2.4	6.6
14-Dec	5.9	5.4	4.9	4.2	3.3	2.3	1.3	0.6	0.1	-0.3	-0.2	0.3	1.1	1.3	0.9	-1.0	-2.3	-0.8	-1.6	-2.4	-2.3	-1.9	-2.3	-4.8	0.5	5.9
15-Dec	-4.9	-4.4	-3.7	-4.2	-4.0	-4.4	-4.2	-4.8	-4.3	-3.8	-2.0	-0.9	0.4	0.8	0.5	0.1	-0.3	-0.4	-0.7	-1.0	-1.2	-1.6	-1.9	-1.9	-2.2	0.8
16-Dec	-1.0	1.2	1.1	0.8	0.7	0.4	-0.1	-0.4	-1.1	-2.0	-2.1	-1.9	-1.5	-1.0	-1.4	-3.1	-3.3	-3.4	-3.4	-3.4	-3.7	-5.0	-5.6	-5.6	-1.9	1.2
17-Dec	-5.7	-5.7	-5.7	-6.1	-6.6	-7.4	-8.3	-9.1	-9.4	-9.8	-8.7	-7.1	-5.1	-4.0	-4.1	-5.3	-6.7	-7.7	-7.8	-7.5	-6.8	-6.7	-6.3	-5.4	-6.8	-4.0
18-Dec	-4.7	-4.6	-5.1	-5.1	-5.2	-6.7	-6.1	-2.0	-2.2	-1.9	-1.0	0.2	1.1	2.2	1.5	0.1	-0.5	-0.8	-1.9	-3.0	-3.7	-4.6	-5.4	-6.1	-2.7	2.2
19-Dec	-7.1	-7.8	-9.0	-9.7	-9.8	-10.9	-11.7	-12.1	-12.7	-12.8	-12.2	-11.8	-11.5	-11.3	-11.2	-11.1	-10.9	-11.0	-11.0	-11.0	-11.1	-10.9	-10.6	-10.0	-10.8	-7.1
20-Dec	-9.4	-8.9	-8.4	-7.7	-7.2	-6.9	-6.6	-6.6	-6.5	-6.5	-6.2	-5.9	-5.7	-5.6	-5.6	-5.6	-5.8	-6.1	-6.3	-5.8	-5.1	-4.9	-4.3	-4.5	-6.3	-4.3
21-Dec	-4.6	-3.1	-1.0	-0.7	-1.5	-1.2	-3.7	-4.7	-6.0	-6.0	-5.2	-3.6	-2.3	-0.6	0.0	0.1	-0.6	-0.7	-1.1	-1.3	-1.2	-1.7	-1.9	-2.2	-2.3	0.1
22-Dec	-2.7	-2.7	-3.3	-3.6	-3.3	-3.5	-3.4	-3.0	-3.0	-2.6	-2.0	-1.5	-1.1	-0.6	-0.7	-1.0	-1.9	-2.4	-2.7	-2.6	-0.9	0.4	1.2	1.8	-1.9	1.8
23-Dec	1.4	1.6	1.6	1.1	0.6	0.0	-1.0	-2.0	-2.5	-3.1	-3.1	-2.4	-1.6	-1.2	-1.4	-2.4	-3.0	-3.6	-4.3	-4.9	-5.3	-5.8	-6.4	-6.4	-2.3	1.6
24-Dec	-6.5	-6.4	-10.5	-10.1	-8.4	-10.2	-10.8	-9.7	-9.6	-9.7	-8.2	-5.5	-3.6	-1.7	-1.2	-2.6	-3.9	-3.8	-3.8	-4.2	-4.7	-4.9	-5.3	-5.5	-6.3	-1.2
25-Dec	-5.9	-6.0	-6.1	-6.5	-7.2	-6.5	-8.4	-9.6	-8.1	-10.1	-8.8	-6.0	-3.6	-2.6	-3.0	-4.3	-4.7	-4.2	-3.8	-4.2	-5.7	-5.7	-5.5	-5.4	-5.9	-2.6
26-Dec	-7.8	-7.4	-7.6	-8.2	-8.8	-8.3	-7.7	-7.8	-7.7	-7.1	-5.3	-3.8	-2.5	-1.1	-0.7	-2.4	-3.2	-3.5	-3.9	-5.2	-5.3	-5.5	-1.6	0.6	-5.1	0.6
27-Dec	-0.2	-2.8	-4.4	-4.2	-5.2	-4.9	-4.7	-5.5	-5.3	-4.8	-3.8	-1.4	0.5	3.1	2.6	0.0	-1.7	-1.6	-1.2	-0.7	-0.1	0.1	-0.2	-0.8	-2.0	3.1
28-Dec	-1.0	-1.1	-2.6	-4.2	-3.8	-3.6	-3.4	-3.2	-3.0	-3.3	-3.5	-2.5	-0.7	0.7	-0.3	-2.5	-3.4	-4.6	-5.6	-6.2	-6.6	-7.2	-7.3	-8.0	-3.6	0.7
29-Dec	-8.0	-8.3	-8.3	-7.1	-5.7	-6.0	-6.1	-6.2	-7.4	-7.7	-5.3	-3.5	-2.1	-1.1	-0.5	-1.6	-2.3	-2.6	-2.2	-2.2	-3.2	-3.5	-3.3	-2.7	-4.5	-0.5
30-Dec	-3.1	-2.3	-2.3	-2.6	-4.1	-3.9	-4.7	-4.8	-4.6	-4.1	-3.0	-1.4	-0.2	1.3	2.3	2.1	0.9	1.0	1.1	0.7	0.0	-0.3	-0.6	-0.9	-1.4	2.3
31-Dec	-1.1	-1.3	-1.8	-2.2	-2.7	-3.1	-3.1	-3.3	-3.7	-3.7	-2.9	-1.3	-0.3	2.4	2.7	1.1	-0.7	-1.6	-2.2	-2.4	1.0	1.8	0.8	-0.1	-1.1	2.7
																								Diurnal Average		
																								Diurnal Maximum		



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature 2m (AT 2m) - C
Stony Mountain - December 2023





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Ambient Temperature 2m (AT 2m) - C
Stony Mountain - December 2023

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	623	83.74	83.74
0 - 10	121	16.26	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 744

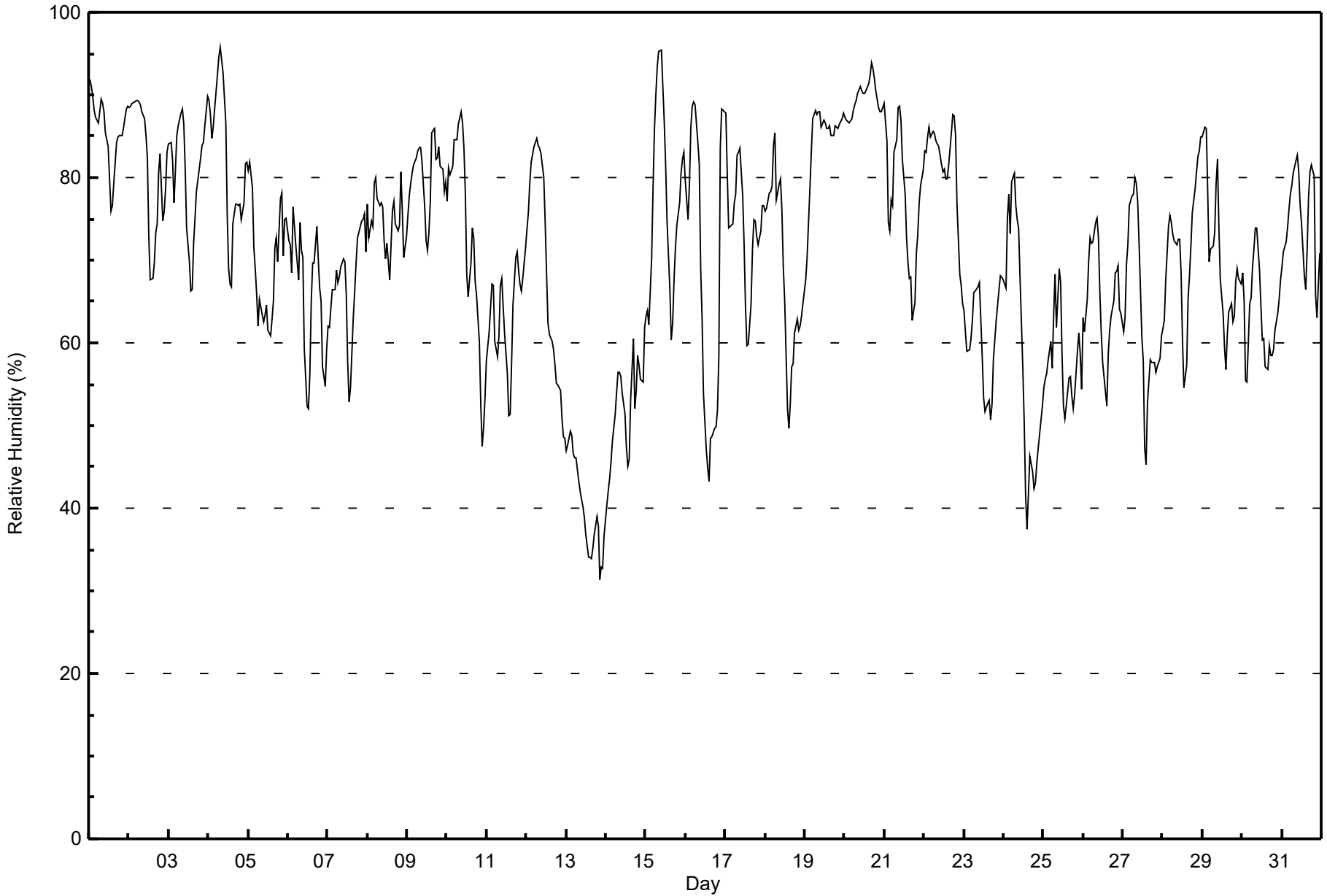
Total Number of Hours: 744



Wood Buffalo Environmental Association
Summary of Hour Averages

Relative Humidity (RH) - %
Stony Mountain - December 2023

Maximum Value: 95.8 % on Dec 4 08:00																						Maximum Daily Average: 89.6 % on Dec 20																						Hours in Service: 744			
Minimum Value: 31.4 % on Dec 13 21:00																						Minimum Daily Average: 39.9 % on Dec 13																						Hours of Data: 744			
Maximum Diurnal Average: 77.9 % at hour 9																						Minimum Diurnal Average: 61.1 % at hour 14																						Hours of Missing Data: 0			
Monthly Average: 70.70 %																						Percentiles: P ₁ = 36.7 P ₁₀ = 52.5 Q ₁ = 61.7 Median = 72.0 Q ₃ = 81.5 P ₉₀ = 87.1 P ₉₉ = 93.0																						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-Dec	91.8	91.1	89.9	88.1	87.4	86.7	87.9	89.4	89.0	87.9	85.5	83.7	79.8	76.0	76.7	79.4	84.2	84.9	85.1	85.0	85.1	86.1	88.4	88.6	85.7	91.8																					
2-Dec	88.4	88.7	89.0	89.2	89.3	89.4	89.2	88.8	88.0	87.1	85.0	82.3	72.9	67.6	67.8	69.8	73.4	74.4	80.5	82.8	74.8	75.9	78.7	83.0	81.5	89.4																					
3-Dec	84.0	84.3	82.1	77.0	80.8	85.1	86.3	87.9	88.3	86.5	81.0	73.8	69.8	66.2	66.4	72.0	75.1	78.3	81.1	82.3	84.0	84.3	86.3	89.9	80.5	89.9																					
4-Dec	89.3	87.7	84.8	86.1	88.3	92.3	94.5	95.8	94.3	92.8	86.6	75.4	69.0	67.1	66.8	74.4	76.8	76.6	76.8	75.0	77.0	81.8	81.9	82.0	95.8																						
5-Dec	80.8	81.9	78.9	71.5	68.9	65.9	62.1	65.3	63.4	62.6	63.3	64.6	61.6	60.9	62.8	65.0	71.5	72.7	69.8	77.5	78.1	70.5	74.8	75.1	69.6	81.9																					
6-Dec	72.3	71.8	68.4	76.4	74.1	71.7	67.6	74.5	71.1	70.3	59.2	52.3	52.1	56.2	65.1	69.7	69.7	74.0	70.2	66.6	65.1	57.1	54.7	59.2	66.2	76.4																					
7-Dec	62.0	61.9	64.2	66.4	66.5	68.8	67.3	68.0	69.2	70.2	69.7	65.7	57.6	52.9	54.7	63.1	66.3	69.7	72.8	73.3	74.8	75.0	75.5	71.0	66.9	75.5																					
8-Dec	76.7	72.8	74.8	74.0	79.3	80.1	77.5	76.6	77.0	76.4	72.4	70.2	72.1	67.7	72.0	76.1	77.1	74.4	73.5	74.2	80.7	76.0	70.3	73.0	74.8	80.7																					
9-Dec	75.4	77.8	79.3	80.4	81.6	82.3	83.2	83.5	83.8	82.1	76.4	72.4	71.2	73.3	77.1	85.5	85.9	82.2	82.4	83.7	81.4	81.0	78.3	79.4	80.0	85.9																					
10-Dec	77.1	81.2	80.3	81.4	84.5	84.6	84.6	86.4	88.1	86.6	83.6	78.1	68.3	65.6	69.7	73.8	72.6	67.5	65.8	60.2	52.8	47.4	49.7	53.2	72.6	88.1																					
11-Dec	57.7	61.4	64.3	67.1	66.9	60.2	58.3	60.8	67.0	67.8	64.4	61.3	56.2	51.3	51.3	57.5	64.5	70.3	71.1	68.9	67.1	66.3	67.9	71.5	63.4	71.5																					
12-Dec	73.8	75.8	79.3	81.9	83.7	84.3	84.8	83.8	83.5	82.9	80.1	74.6	68.3	62.4	61.0	60.2	59.2	57.2	55.1	54.9	54.2	50.9	48.6	48.5	68.7	84.8																					
13-Dec	46.9	47.6	49.3	48.7	46.6	46.1	46.1	43.2	42.1	41.0	40.1	38.9	36.8	34.0	34.1	33.9	35.1	36.8	38.9	37.9	31.4	32.9	32.7	36.7	39.9	49.3																					
14-Dec	40.3	42.1	43.6	45.6	48.1	51.3	54.1	56.4	56.5	55.9	53.9	51.3	47.2	45.1	45.9	53.1	60.5	52.1	54.2	58.5	57.3	55.6	55.2	61.9	51.9	61.9																					
15-Dec	63.3	63.9	62.2	70.2	78.6	85.8	90.1	93.4	95.3	95.4	91.0	86.9	81.5	74.7	66.6	60.4	62.3	67.6	71.5	74.2	76.9	80.4	82.3	83.1	77.4	95.4																					
16-Dec	79.6	74.9	79.4	86.2	88.6	89.2	88.8	84.2	81.7	69.2	63.0	53.9	47.0	44.9	43.3	48.4	48.7	49.7	49.9	51.9	58.5	83.5	88.2	87.9	68.4	89.2																					
17-Dec	87.9	80.3	73.9	74.1	74.5	76.9	77.9	82.6	83.0	83.5	77.7	72.1	64.5	59.7	59.8	64.8	71.4	75.0	74.7	72.9	71.8	73.6	76.5	76.6	74.4	87.9																					
18-Dec	75.9	76.2	78.1	78.3	79.0	83.8	85.4	77.3	79.2	79.9	76.1	69.2	65.2	52.0	49.7	52.7	57.1	57.5	61.1	62.9	61.6	62.0	63.2	64.8	68.7	85.4																					
19-Dec	67.7	70.4	74.6	78.7	83.1	87.1	88.1	87.6	88.0	88.0	86.2	87.0	86.6	85.9	86.0	86.3	85.1	85.0	86.3	86.1	86.0	86.5	87.2	87.8	84.2	88.1																					
20-Dec	87.3	87.0	86.8	86.5	87.1	88.2	88.8	89.4	90.1	91.1	90.5	90.1	90.1	90.4	91.4	92.3	94.0	93.2	92.1	90.5	88.4	88.0	88.0	88.4	89.6	94.0																					
21-Dec	89.0	84.4	74.6	73.6	77.2	76.6	83.1	84.6	88.4	88.7	86.9	82.2	78.0	72.8	69.6	67.8	68.0	62.8	64.9	70.8	73.1	76.9	79.0	81.0	77.2	89.0																					
22-Dec	83.3	83.0	84.8	86.0	85.0	85.5	85.3	84.4	84.1	83.7	81.6	80.7	81.1	79.9	79.9	81.3	85.4	87.6	87.5	85.1	76.8	68.3	67.0	64.8	81.3	87.6																					
23-Dec	63.8	61.4	59.0	59.2	60.6	62.7	66.0	66.2	66.7	67.4	62.9	58.5	53.4	51.8	52.8	53.0	50.6	52.5	58.0	62.7	64.5	66.5	68.1	67.9	60.7	68.1																					
24-Dec	67.6	66.6	75.2	78.0	73.2	79.5	80.5	76.7	74.9	73.9	68.0	56.9	50.4	41.5	37.4	41.8	46.3	44.4	42.4	43.1	45.3	47.3	50.6	52.4	58.9	80.5																					
25-Dec	54.5	55.6	56.3	57.8	60.2	56.9	63.2	68.3	61.9	68.9	67.3	58.7	52.4	50.9	52.4	55.7	56.0	53.6	52.1	53.7	59.1	61.1	58.7	54.4	57.9	68.9																					
26-Dec	63.0	61.3	65.2	69.9	72.7	72.0	72.3	74.5	75.1	72.7	66.1	61.2	57.5	54.0	52.4	58.6	61.5	63.2	65.0	68.4	68.7	69.3	64.1	63.5	65.5	75.1																					
27-Dec	61.4	63.0	69.4	71.8	76.7	77.8	78.0	79.9	79.3	77.2	72.0	60.6	57.7	47.2	45.2	52.8	57.9	57.6	57.6	57.6	56.5	57.0	58.2	60.8	63.9	79.9																					
28-Dec	61.8	62.7	67.5	74.1	75.4	74.6	73.2	72.3	71.9	72.6	72.6	68.5	60.3	54.5	57.3	65.5	68.2	71.6	75.7	78.7	80.6	82.5	83.2	84.8	71.3	84.8																					
29-Dec	84.9	86.0	86.0	78.3	69.8	71.3	71.6	73.5	79.4	82.2	73.9	67.6	63.6	59.5	56.7	61.0	63.8	64.8	62.6	63.3	67.4	68.9	67.8	67.1	70.5	86.0																					
30-Dec	68.6	65.1	55.4	55.3	64.8	65.4	69.1	71.3	74.0	74.0	68.8	64.3	60.3	60.4	57.2	56.8	59.7	58.4	58.5	59.2	61.6	63.5	65.2	67.6	63.5	74.0																					
31-Dec	69.2	70.9	72.3	73.9	76.1	78.0	79.0	80.4	82.1	82.8	80.6	76.6	74.4	68.1	66.5	71.4	77.6	80.7	81.5	80.1	65.7	63.1	67.1	70.8	74.5	82.8																					
																						72.4	72.2	72.5	73.7	75.1	76.1	76.9	77.6	77.9	77.5	73.8	69.0	64.7	61.1	61.1	64.7	67.3	67.6	68.3	69.2	68.5	68.9	69.6	70.9	Diurnal Average	
																						91.8	91.1	89.9	89.2	89.3	92.3	94.5	95.8	95.3	95.4	91.0	90.1	90.1	90.4	91.4	92.3	94.0	93.2	92.1	90.5	88.4	88.0	88.4	89.9	Diurnal Maximum	



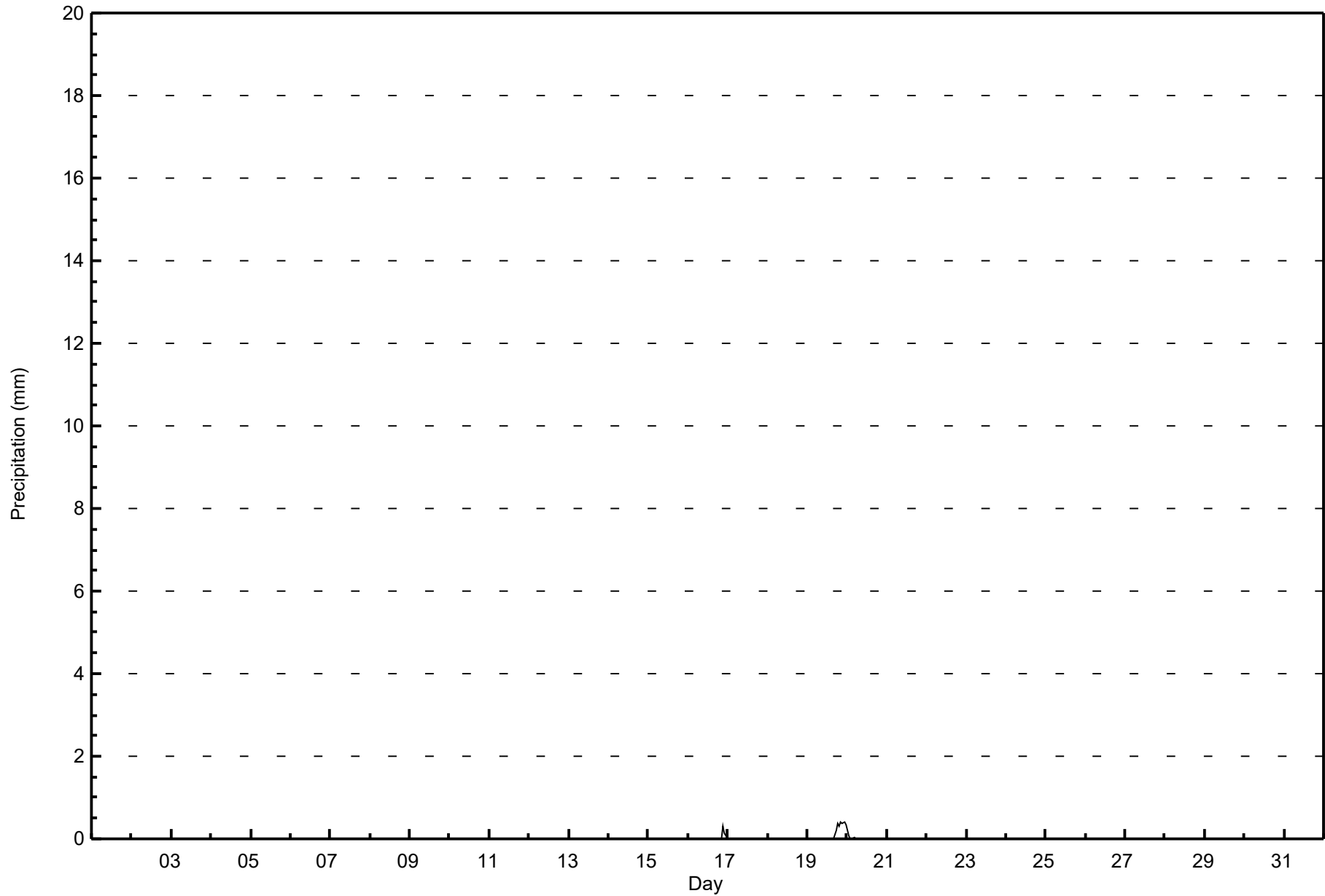


Maximum Value: 0.4 mm on Dec 19 23:00		Maximum Daily Total: 2.4 mm on Dec 19		Hours in Service: 744																														
Minimum Value: 0.0 mm on Dec 1 01:00		Minimum Daily Total: 0.0 mm on Dec 1		Hours of Data: 744																														
Maximum Diurnal Total: 0.7 mm at hour 22		Minimum Diurnal Total: 0.0 mm at hour 3		Hours of Missing Data: 0																														
Monthly Total: 3.14 mm		Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.0 Median = 0.0 Q ₃ = 0.0 P ₉₀ = 0.0 P ₉₉ = 0.2		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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.4	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.3	2.4	0.4	0.4	0.4	0.4	
20-Dec	0.2	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	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
31-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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	0.0	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	0.4	0.3	0.4	0.7	0.5	0.4			Diurnal Average							
		0.2	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	0.4	0.3	0.4	0.4	0.4	0.3			Diurnal Maximum							



Wood Buffalo Environmental Association
Hourly Averages

Precipitation (PC) - mm
Stony Mountain - December 2023





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Precipitation (PC) - mm
Stony Mountain - December 2023

Concentration Ranges (mm)	Number of Hours	%	Cumulative %
0 - 0.3	740	99.46	99.46
0.4 - 0.5	4	0.54	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: 744

Total Number of Hours: 744

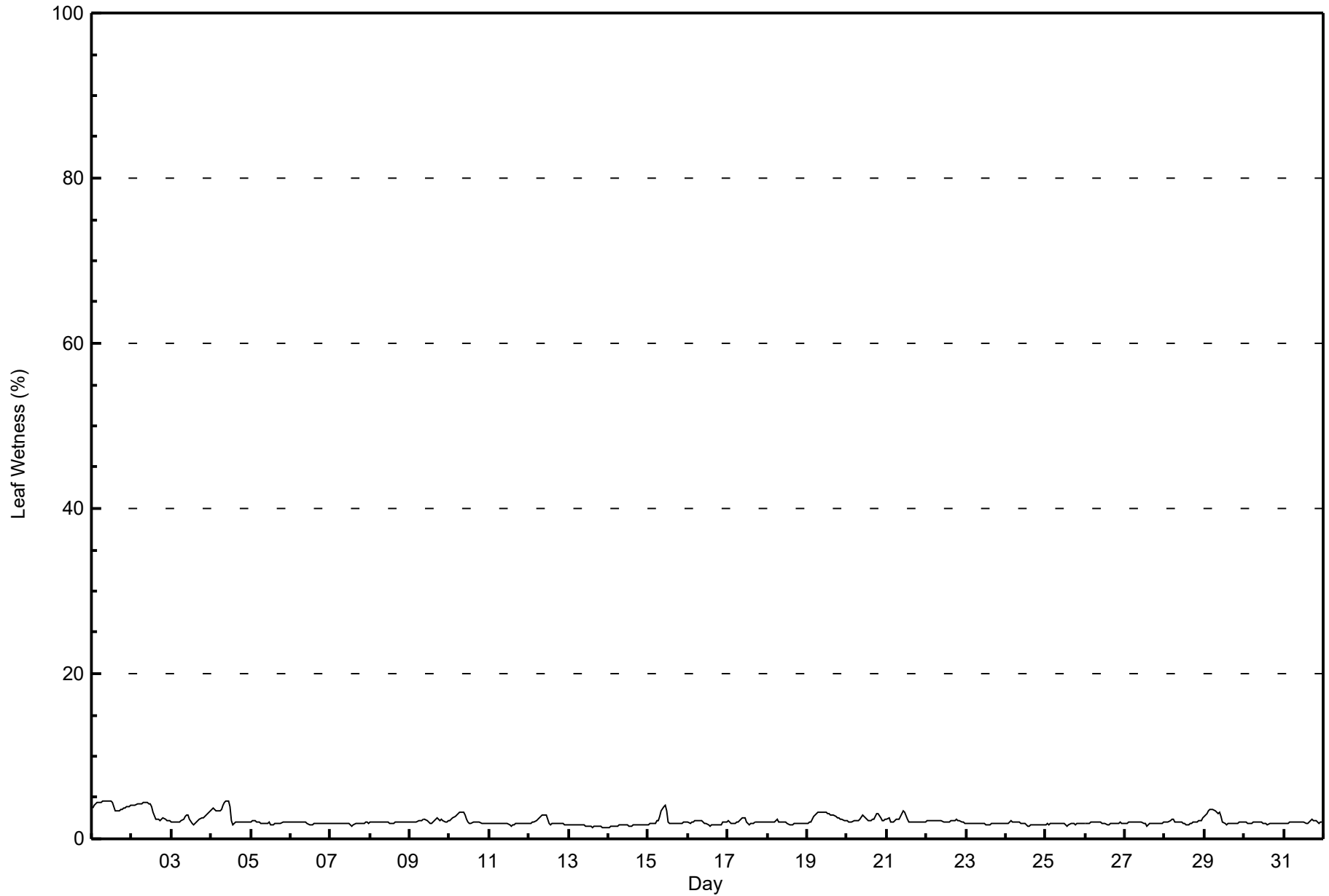


Maximum Value: 4.6 % on Dec 1 10:00		Maximum Daily Average: 4.1 % on Dec 1		Hours in Service: 744																																													
Minimum Value: 1.4 % on Dec 13 23:00		Minimum Daily Average: 1.6 % on Dec 13		Hours of Data: 744																																													
Maximum Diurnal Average: 2.5 % at hour 10		Minimum Diurnal Average: 1.9 % at hour 15		Hours of Missing Data: 0																																													
Monthly Average: 2.18 %		Percentiles: P ₁ = 1.5 P ₁₀ = 1.7 Q ₁ = 1.8 Median = 2.0 Q ₃ = 2.2 P ₉₀ = 3.1 P ₉₉ = 4.5		Hours of Calibration: 0																																													
				Percent Operational Time: 100.0																																													
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Dec	3.8	4.0	4.2	4.3	4.4	4.4	4.5	4.5	4.6	4.6	4.5	4.5	4.4	3.9	3.4	3.3	3.4	3.5	3.6	3.7	3.8	3.8	3.9	4.0	4.1	4.6																							
2-Dec	4.0	4.1	4.2	4.2	4.3	4.3	4.3	4.3	4.4	4.3	4.3	4.2	4.0	3.3	2.5	2.3	2.3	2.2	2.3	2.5	2.4	2.2	2.1	2.1	3.4	4.4																							
3-Dec	2.1	2.1	2.1	2.0	2.0	2.1	2.1	2.5	2.8	2.9	2.8	2.3	1.9	1.7	1.8	2.1	2.2	2.3	2.5	2.6	2.8	2.9	3.0	3.3	2.4	3.3																							
4-Dec	3.6	3.7	3.6	3.5	3.3	3.3	3.6	4.0	4.3	4.5	4.6	3.9	2.2	1.8	1.8	2.0	2.1	2.1	2.1	2.0	2.0	2.0	2.1	2.1	2.9	4.6																							
5-Dec	2.1	2.2	2.2	2.0	2.0	2.0	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	2.0	2.0	2.0	2.1	2.0	2.2																							
6-Dec	2.0	2.0	2.0	2.1	2.0	2.0	2.0	2.1	2.0	2.0	1.9	1.7	1.7	1.7	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.9	2.1																							
7-Dec	1.8	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.7	1.5	1.6	1.8	1.9	1.9	1.9	1.9	1.9	2.0	2.0	1.9	1.9	2.0																							
8-Dec	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.8	1.9	2.0	2.1	2.0	2.0	2.0	2.1	2.1	2.0	2.0	2.0	2.1																							
9-Dec	2.0	2.0	2.1	2.1	2.1	2.1	2.2	2.2	2.3	2.4	2.2	2.1	1.9	1.8	2.0	2.2	2.5	2.3	2.2	2.3	2.2	2.1	2.1	2.2	2.2	2.5																							
10-Dec	2.2	2.3	2.6	2.8	2.9	3.1	3.2	3.2	3.2	2.9	2.4	2.0	1.9	1.9	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.8	1.8	1.8	2.3	3.2																							
11-Dec	1.9	1.8	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.9	1.8	1.8	1.7	1.6	1.7	1.8	1.8	1.9	1.8	1.8	1.8	1.8	1.9	1.9	1.8	1.9																							
12-Dec	1.9	1.9	2.0	2.1	2.2	2.3	2.6	2.7	2.9	2.9	2.9	2.4	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.7	1.7	2.1	2.9																							
13-Dec	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.6	1.6	1.6	1.5	1.5	1.4	1.4	1.5	1.5	1.5	1.5	1.4	1.4	1.4	1.4	1.6	1.7																							
14-Dec	1.4	1.5	1.5	1.5	1.5	1.6	1.6	1.7	1.7	1.7	1.7	1.6	1.6	1.6	1.6	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.6	1.7																							
15-Dec	1.8	1.8	1.8	1.8	1.9	2.1	2.3	2.8	3.4	3.9	4.0	3.5	2.1	1.9	1.9	1.8	1.8	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.3	4.0																							
16-Dec	2.0	1.9	2.0	2.1	2.2	2.1	2.3	2.2	2.2	2.0	1.9	1.8	1.7	1.5	1.6	1.7	1.7	1.7	1.7	1.7	1.7	2.0	2.1	2.1	1.9	2.3																							
17-Dec	2.2	2.1	1.9	1.9	1.9	2.0	2.0	2.2	2.3	2.6	2.6	2.1	1.9	1.7	1.8	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.6																							
18-Dec	2.0	2.0	2.0	2.0	2.1	2.2	2.4	2.1	2.1	2.1	2.1	2.0	1.9	1.6	1.7	1.8	1.8	1.8	1.8	1.9	1.8	1.8	1.8	1.8	1.9	2.4																							
19-Dec	1.9	2.0	2.1	2.3	2.6	3.0	3.2	3.2	3.3	3.3	3.3	3.2	3.1	3.0	2.9	2.9	2.8	2.7	2.6	2.5	2.4	2.3	2.3	2.2	2.7	3.3																							
20-Dec	2.2	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.4	2.8	2.7	2.5	2.3	2.2	2.2	2.3	2.4	2.7	3.0	3.0	2.5	2.2	2.2	2.3	2.4	3.0																							
21-Dec	2.4	2.5	2.1	2.1	2.1	2.1	2.4	2.5	2.8	3.1	3.4	3.2	2.3	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.3	3.4																							
22-Dec	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.3	2.3	2.2	2.1	2.0	2.0	1.9	2.1	2.3																							
23-Dec	1.9	1.9	1.8	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.7	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9																							
24-Dec	1.9	1.9	2.0	2.1	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.8	1.7	1.6	1.6	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.8	2.1																							
25-Dec	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.8	1.7	1.6	1.7	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.8	1.8	1.9																							
26-Dec	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.8	1.7	1.7	1.8	1.8	1.9	1.9	1.9	1.9	2.0	1.9	1.9	1.9	2.0																							
27-Dec	1.9	1.9	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.0	1.9	1.8	1.6	1.6	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	1.9	2.1																							
28-Dec	2.0	2.0	2.0	2.2	2.3	2.3	2.1	2.0	2.0	2.0	2.0	1.9	1.8	1.6	1.7	1.9	1.9	2.0	2.0	2.1	2.2	2.2	2.3	2.5	2.0	2.5																							
29-Dec	2.8	3.0	3.3	3.6	3.6	3.5	3.5	3.2	3.1	3.2	2.6	2.0	1.9	1.8	1.8	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.5	3.6																							
30-Dec	2.0	2.0	1.9	1.9	1.9	2.0	2.0	2.1	2.1	2.1	2.1	1.9	1.9	1.9	1.7	1.8	1.9	1.9	1.8	1.8	1.9	1.9	1.9	1.9	1.9	2.1																							
31-Dec	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.0	2.0	2.0	1.9	1.9	2.0	2.2	2.3	2.3	2.2	2.0	1.9	2.0	2.0	2.0	2.3																							
																								2.2	2.2	2.2	2.3	2.3	2.3	2.4	2.4	2.5	2.5	2.5	2.3	2.1	1.9	1.9	2.0	2.0	2.0	2.1	2.1	2.0	2.0	2.1	Diurnal Average		
																								4.0	4.1	4.2	4.3	4.4	4.4	4.5	4.5	4.6	4.6	4.6	4.5	4.4	3.9	3.4	3.3	3.4	3.5	3.6	3.7	3.8	3.8	3.9	4.0	Diurnal Maximum	



Wood Buffalo Environmental Association
Hourly Averages

Leaf Wetness (LW) - %
Stony Mountain - December 2023





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Leaf Wetness (LW) - %
Stony Mountain - December 2023

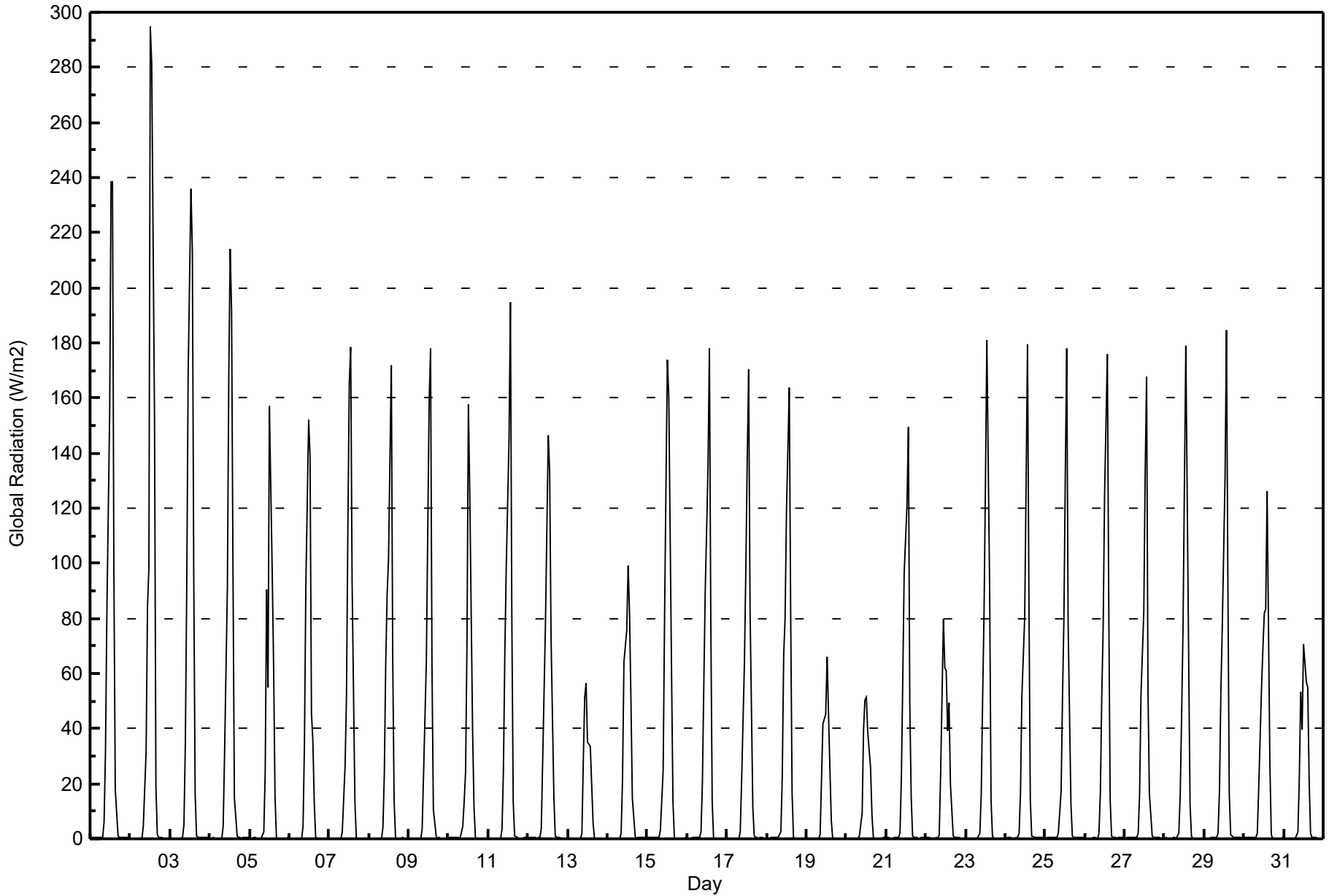
Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 0.3	0	0.00	0.00
0.4 - 0.5	0	0.00	0.00
0.6 - 0.7	0	0.00	0.00
0.8 - 1.4	7	0.94	0.94
1.5 - 10	731	98.25	99.19
> 10	0	0.00	99.19

Total Number of Valid Hours: 744

Total Number of Hours: 744



Maximum Value: 294.9 W/m2 on Dec 2 13:00																						Maximum Daily Average: 40.5 W/m2 on Dec 2				Hours in Service: 744	
Minimum Value: 0.0 W/m2 on Dec 3 00:00																						Minimum Daily Average: 9.4 W/m2 on Dec 20				Hours of Data: 744	
Maximum Diurnal Average: 145.0 W/m2 at hour 14																						Minimum Diurnal Average: 0.2 W/m2 at hour 23				Hours of Missing Data: 0	
Monthly Average: 22.95 W/m2																						Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.1 Median = 0.4 Q ₃ = 16.7 P ₉₀ = 87.3 P ₉₉ = 193.2				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-Dec	0.6	0.7	0.6	0.6	0.6	0.7	0.6	0.6	6.0	31.5	82.0	155.2	238.3	238.4	97.6	17.8	1.1	0.5	0.4	0.4	0.4	0.3	0.4	0.2	36.5	238.4	
2-Dec	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	4.6	31.7	84.4	98.9	294.9	281.3	152.9	18.8	1.4	0.6	0.5	0.5	0.2	0.1	0.0	0.0	40.5	294.9	
3-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.4	5.3	34.8	91.7	168.1	236.2	213.7	95.5	16.2	1.2	0.6	0.6	0.6	0.5	0.5	0.4	0.4	36.1	236.2	
4-Dec	0.2	0.2	0.3	0.1	0.0	0.0	0.1	0.2	4.4	30.9	91.1	167.6	214.1	191.0	97.1	14.8	0.9	0.4	0.3	0.3	0.3	0.3	0.3	0.3	34.0	214.1	
5-Dec	0.4	0.2	0.4	0.3	0.0	0.2	0.0	0.0	2.4	24.2	90.3	55.1	157.2	96.6	62.8	15.3	0.7	0.3	0.2	0.1	0.2	0.2	0.1	0.3	21.2	157.2	
6-Dec	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.2	4.6	34.7	91.9	152.3	138.9	45.7	35.5	13.0	0.6	0.2	0.2	0.1	0.1	0.0	0.0	0.0	21.6	152.3	
7-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.8	26.7	51.7	113.3	165.3	178.4	93.8	13.8	0.6	0.0	0.0	0.0	0.0	0.0	0.1	0.1	26.9	178.4	
8-Dec	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	4.1	23.2	63.4	88.5	101.5	171.9	65.3	13.7	0.7	0.0	0.1	0.2	0.4	0.2	0.1	0.1	22.2	171.9	
9-Dec	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	3.7	23.5	64.6	112.4	158.4	177.9	63.6	10.8	0.8	0.2	0.3	0.2	0.2	0.2	0.2	0.1	25.7	177.9	
10-Dec	0.3	0.3	0.5	0.5	0.4	0.4	0.3	0.2	4.5	13.8	24.4	71.9	157.8	124.5	39.2	11.4	0.7	0.1	0.1	0.0	0.0	0.0	0.0	0.0	18.8	157.8	
11-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.3	25.2	67.1	98.1	145.1	194.8	80.1	13.3	1.0	0.6	0.2	0.1	0.0	0.1	0.4	0.4	26.2	194.8	
12-Dec	0.4	0.4	0.4	0.3	0.3	0.2	0.4	0.4	3.6	28.2	78.1	112.2	146.4	133.5	72.9	15.3	1.0	0.4	0.3	0.3	0.2	0.1	0.0	0.0	24.8	146.4	
13-Dec	0.3	0.0	0.0	0.0	0.0	0.1	0.0	0.0	2.0	28.0	51.2	56.2	35.0	33.5	19.4	5.5	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.6	56.2	
14-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.1	21.8	64.1	75.6	98.9	81.8	50.6	14.8	1.0	0.2	0.4	0.5	0.3	0.3	0.4	0.5	17.2	98.9	
15-Dec	0.4	0.5	0.4	0.5	0.5	0.4	0.5	0.4	2.8	25.1	80.5	128.4	174.0	160.8	59.6	13.3	0.6	0.2	0.2	0.1	0.1	0.2	0.2	0.3	27.1	174.0	
16-Dec	0.1	0.0	0.0	0.3	0.5	0.6	0.6	0.6	2.7	20.1	55.4	89.4	134.7	178.1	78.8	13.1	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	24.0	178.1	
17-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	2.8	21.4	64.1	98.2	137.7	170.4	83.2	11.3	0.9	0.5	0.3	0.2	0.3	0.3	0.1	0.0	24.7	170.4	
18-Dec	0.0	0.1	0.3	0.3	0.5	0.3	0.5	0.4	2.5	22.8	66.4	79.7	119.0	163.7	81.3	16.7	0.7	0.1	0.0	0.0	0.0	0.0	0.0	0.0	23.1	163.7	
19-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	21.3	41.7	45.3	66.1	45.4	25.3	6.8	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.6	66.1	
20-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9	9.4	39.4	50.4	51.3	38.7	25.9	8.8	0.4	0.1	0.2	0.0	0.0	0.0	0.3	0.3	9.4	51.3	
21-Dec	0.5	0.6	0.2	0.3	0.1	0.3	0.6	0.6	2.2	22.3	57.8	96.8	120.9	149.7	49.6	15.4	0.9	0.3	0.3	0.1	0.1	0.3	0.4	0.4	21.7	149.7	
22-Dec	0.4	0.4	0.4	0.1	0.1	0.1	0.3	0.2	1.8	23.5	79.9	62.2	60.9	38.9	49.1	19.8	1.0	0.5	0.4	0.4	0.3	0.0	0.0	0.0	14.2	79.9	
23-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.9	16.1	51.5	82.4	129.3	181.0	90.4	13.9	1.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	23.7	181.0	
24-Dec	0.1	0.3	0.6	0.6	0.2	0.2	0.4	0.4	2.0	16.7	52.1	80.2	128.3	179.4	89.4	14.2	1.3	0.5	0.4	0.3	0.3	0.3	0.3	0.4	23.7	179.4	
25-Dec	0.2	0.3	0.3	0.4	0.3	0.3	0.4	0.4	2.2	17.2	51.9	80.4	133.3	177.9	77.8	12.7	1.1	0.6	0.6	0.5	0.5	0.5	0.5	0.5	23.4	177.9	
26-Dec	0.2	0.1	0.2	0.2	0.1	0.3	0.3	0.1	2.1	16.8	51.4	76.8	124.4	176.0	84.6	14.3	1.2	0.3	0.3	0.2	0.4	0.5	0.3	0.3	23.0	176.0	
27-Dec	0.2	0.3	0.4	0.5	0.5	0.5	0.4	0.5	2.2	16.4	52.2	82.6	133.3	167.9	53.3	16.2	0.9	0.3	0.3	0.4	0.3	0.3	0.1	0.2	22.1	167.9	
28-Dec	0.2	0.3	0.1	0.0	0.2	0.4	0.4	0.1	1.9	16.0	44.8	76.9	129.0	179.1	66.9	13.0	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	22.1	179.1	
29-Dec	0.0	0.0	0.0	0.2	0.3	0.6	0.5	0.6	2.1	17.0	53.6	76.9	131.9	184.8	93.4	16.1	1.4	0.4	0.5	0.5	0.4	0.5	0.5	0.5	24.3	184.8	
30-Dec	0.5	0.5	0.5	0.3	0.3	0.4	0.3	0.4	2.1	18.1	54.6	69.0	81.7	83.4	126.2	26.5	1.4	0.1	0.0	0.0	0.1	0.1	0.2	0.3	19.5	126.2	
31-Dec	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	2.5	22.2	53.3	39.4	70.8	57.0	54.8	21.5	1.8	0.5	0.4	0.4	0.2	0.0	0.0	0.0	13.6	70.8	
																								Diurnal Average			
																								Diurnal Maximum			





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Global Radiation (GR) - W/m2
Stony Mountain - December 2023**

Concentration Ranges (W/m2)	Number of Hours	%	Cumulative %
0 - 20	568	76.34	76.34
21 - 100	120	16.13	92.47
101 - 300	56	7.53	100.00
301 - 600	0	0.00	100.00
601 - 900	0	0.00	100.00
> 900	0	0.00	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Speed 20 m (WS20m) - km/h
Stony Mountain - December 2023

Maximum Speed: 27 km/h on Dec 15 21:00	Maximum Daily Speed Average: 20.8 km/h on Dec 15	Hours in Service: 744
Minimum Speed Value: 2 km/h on Dec 29 04:00	Minimum Daily Speed Average: 6.8 km/h on Dec 19	Hours of Data: 744
Maximum Diurnal Speed Average: 14.1 km/h at hour 20	Minimum Diurnal Speed Average: 10.3 km/h at hour 15	Hours of Missing Data: 0
Monthly Average Velocity: 12.4 km/h 230.7 deg	Percentiles: P ₁ = 6 P ₁₀ = 11 Q ₁ = 13 Median = 16 Q ₃ = 19 P ₉₀ = 22 P ₉₉ = 26	Percent Operational Time: 100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Dec	WSW8	SW9	WSW9	SW10	SW10	SW10	SW10	SSW10	SSW10	SSW11	SSW12	SSW14	SSW14	SSW12	S13	S12	SSW15	S15	S17	SSW16	SSW15	SSW13	SSW14	SSW11.5	S17	
2-Dec	S17	SSW18	SSW19	SSW18	SSW19	SSW18	SSW16	SSW15	SSW17	SSW15	SSW16	SSW13	SSW12	SSW9	SSW8	WSW6	WSW8	SW11	SW11	WSW12	W12	W14	W14	WNW12	SSW12.2	SSW19
3-Dec	WNW11	WNW10	WNW11	WNW9	WSW6	SW11	SW11	SSW13	SSW15	SW15	SW13	SW11	SSW12	SSW10	S12	S13	S13	SSW13	SSW15	SSW15	SSW15	SSW14	SSW16	SSW15	SSW10.7	SSW16
4-Dec	SW16	SW17	SW16	SW14	SW16	SW17	SW17	SW16	SW15	SW13	WSW14	WSW14	WSW17	WSW15	WSW10	SW13	WSW14	SW14	SW15	SW14	WSW15	SW13	SW14	SW16	SSW14.5	SW17
5-Dec	SSW16	SSW14	SSW14	SSW16	S17	S15	S17	S15	S19	SSW20	SSW19	SW21	SSW15	WSW15	W15	WSW14	SW14	SW16	WSW17	SW16	SW18	WSW18	SW17	WSW18	SSW15.2	SW21
6-Dec	WSW18	WSW17	WSW17	WSW16	WSW19	WSW18	WSW16	WSW15	WSW15	WSW18	WSW19	WSW18	WSW14	WSW11	SW13	SW15	SW13	SW15	SW15	SW15	SW12	WSW13	W12	W15	WSW15.1	WSW19
7-Dec	WNW13	WNW15	WNW14	W13	W12	W15	W16	W15	WNW13	WNW13	WNW14	WNW13	WNW12	WNW10	WNW9	W9	WNW13	WNW15	WNW15	W14	W15	WNW15	W15	W17	WNW13.5	W17
8-Dec	WNW14	W14	W16	W16	W16	W17	W18	W18	WNW16	WNW16	W18	W18	W15	W13	W11	W11	W11	W15	W14	WSW13	WSW12	W14	W15	W15	W14.6	W18
9-Dec	W16	W18	W19	W17	W18	W17	W16	W17	W15	W13	WSW10	SW11	SW11	SW10	SSW12	SSW12	SSW15	SSW16	S14	S14	SSW15	SSW15	S14	S13	SW11.7	W19
10-Dec	S14	S12	S15	SSW17	SSW18	SSW21	SSW22	SSW24	SSW25	SSW23	SSW22	SW21	WSW16	W17	W13	WSW12	W16	W21	W19	WNW21	WNW23	WNW26	WNW23	WNW22	WSW14.5	WNW26
11-Dec	NW23	WNW25	WNW27	NW22	NW24	NW22	NW20	NW19	NW13	WNW9	W10	W11	W11	W9	W9	SW8	SSW12	SSW14	SSW17	SW20	SSW19	SSW20	SSW18	SSW17	W11.8	WNW27
12-Dec	SW17	SW15	SW12	SW13	WSW13	WSW13	SW11	SW13	SW17	SSW17	SSW19	SSW18	SW18	SSW17	SSW19	SW21	SW24	SW25	SW24	SW24	SSW24	SSW23	SSW24	SW22	SW18.2	SW25
13-Dec	SW21	SW22	SW23	SW24	SW24	SW23	SW23	SW21	SW22	SSW22	SSW22	SSW20	SSW22	SSW20	SSW21	SW21	SW21	SW18	SW16	WSW14	W13	WNW16	WNW19	WNW18	SW18.6	SW24
14-Dec	WNW18	WNW18	WNW16	WNW17	WNW16	WNW16	WNW18	WNW18	W16	W17	W18	W16	W13	W13	W10	SW10	SW13	W14	WSW13	SW15	SW16	SW16	SW16	SW16	W14.1	WNW18
15-Dec	SW18	SW17	SW16	SW17	SW19	SW21	SW20	SW19	SSW19	SSW21	SW23	SSW24	SSW23	SSW22	S17	S19	SSW23	SSW26	SSW26	SSW26	SSW27	SW24	SW23	SW20	SSW20.8	SSW27
16-Dec	WSW19	WSW19	WSW19	WSW17	W18	WNW16	WNW16	WNW14	NW13	NW14	WNW15	WNW15	WNW13	WNW11	W11	W10	W11	W9	W7	WNW13	NW12	WNW13	WNW14	W13.1	WSW19	
17-Dec	W18	WNW23	WNW26	WNW21	WNW19	NW15	WNW12	W12	W11	SW12	SW12	SW13	SW14	SW16	SW14	SSW15	SSW16	SSW16	SSW19	SSW21	SSW22	SSW22	SSW21	SSW24	WSW13.2	WNW26
18-Dec	SSW21	SSW20	SW19	SW17	SW15	SW14	WSW14	W20	WNW18	W18	WNW16	W13	WNW13	WNW16	WNW15	W13	W15	W15	WNW14	WNW14	WNW14	WNW13	WNW15	WNW12	W13.1	SSW21
19-Dec	WNW10	NW10	NNW9	N6	NE8	NE10	NE9	NE10	NE9	ENE8	E7	E8	E9	E9	E10	E10	ESE13	ESE14	ESE13	ESE14	SE13	SE11	SE11	SE14	E6.8	ESE14
20-Dec	SE17	SSE15	SSE13	SSE15	SSE16	S15	S15	S15	S13	S13	SSW13	SSW16	SSW13	SSW12	SSW13	SSW13	S15	S15	SSW19	SSW24	SSW25	SSW23	SW22	SW19	S15.0	SSW25
21-Dec	SW16	WSW19	W22	W17	W15	W13	WSW13	SW14	SW14	SW14	SSW17	SSW18	SSW18	SSW20	SSW23	SSW21	SSW20	S22	SSW23	SSW22	SSW23	SSW21	SSW21	SSW20	SW16.5	SSW23
22-Dec	SSW20	SSW21	SSW21	SSW20	SSW19	SSW18	SSW18	SSW15	SSW12	SSW13	SSW16	S12	S12	SSW13	S16	SSW15	SSW19	SSW19	SW18	SW21	WSW19	W23	WNW24	WNW22	SW15.2	WNW24
23-Dec	WNW19	WNW22	WNW24	WNW21	WNW21	WNW24	WNW22	WNW22	WNW22	WNW19	WNW19	WNW18	WNW20	WNW18	WNW16	WNW17	W14	W14	W15	WNW15	WNW14	WNW15	W18	WNW18.6	WNW24	
24-Dec	W16	WSW14	SW12	WSW15	SW16	SW18	SW18	SW20	SW20	SW21	SW20	SW21	SW20	SW18	SW17	SW17	SSW20	SW22	SW24	SW25	SW24	SW25	SW24	SW21	SW19.0	SW25
25-Dec	SW22	SW20	SW22	SW21	SW20	WSW16	SW14	SW15	W16	SW14	SW13	SW13	SW12	SW12	SSW12	SSW15	SSW15	SSW15	SSW14	SSW15	SSW15	S15	SSW13	SSW13	SW15.0	SSW22
26-Dec	S13	SSW14	SSW17	S16	S12	SSW13	SSW15	SSW18	SSW18	SSW17	SSW15	SSW16	SSW18	SSW14	SW10	SSW18	SW22	SW20	SW17	SW17	SW16	SW17	WSW19	W17	SSW15.1	SW22
27-Dec	WSW17	WSW16	SW17	SW18	SW16	SW19	SW21	SW20	SW19	SW18	SSW19	SSW18	S18	S15	S13	SW11	SSE13	S15	S18	S20	S19	S18	S11	SSE11	SSW15.1	SW21
28-Dec	S7	SSW8	W3	N2	ESE4	S7	SW11	W11	WNW13	NW11	WNW12	WNW10	WNW8	WNW9	WNW10	NW12	WNW13	WNW14	NW14	NW13	NW15	NW13	NW14	NW9	WNW8.0	NW15
29-Dec	WNW9	NW8	NW4	SW2	SW8	SSW8	SW10	SW12	SW10	SSW16	SSW16	SSW16	SSW16	SW16	SSW16	SW17	SW18	SW17	SW16	SW17	SW16	SW16	SSW16	SSW14	SW12.2	SW18
30-Dec	SSW14	SSW16	SSW15	SSW16	SSW15	SSW15	S15	S17	SSW17	S16	S17	S16	S16	S18	S19	S19	S20	S25	S22	S25	S25	S25	SSW25	SSW24	S18.6	S25
31-Dec	SSW26	SSW25	SSW21	SSW21	SW20	SSW19	SW21	SW20	SW22	SW21	SW18	SW16	SW14	WSW14	WSW11	WSW11	WSW11	SW12	SW14	SW15	W19	W20	W20	WNW19	SW16.5	SSW26

SW12.1	WSW12.1	WSW12.1	WSW12.1	WSW11.8	WSW11.9	SSW12.3	SSW12.5	SSW12.2	SSW12.5	SSW12.8	SSW12.4	SSW11.7	SSW10.8	SSW10.3	SSW11.2	SSW12.6	SSW13.5	SSW13.4	SSW14.1	SSW13.8	SSW13.1	SSW13.1	SSW12.5	Diurnal Average
SSW26	WNW25	WNW27	SW24	NW24	WNW24	SW23	SSW24	SSW25	SSW23	SW23	SSW24	SSW23	SSW22	SSW23	SW21	SW24	SSW26	SSW26	SSW26	SSW27	WNW26	SSW25	SSW24	Diurnal Maximum

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



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

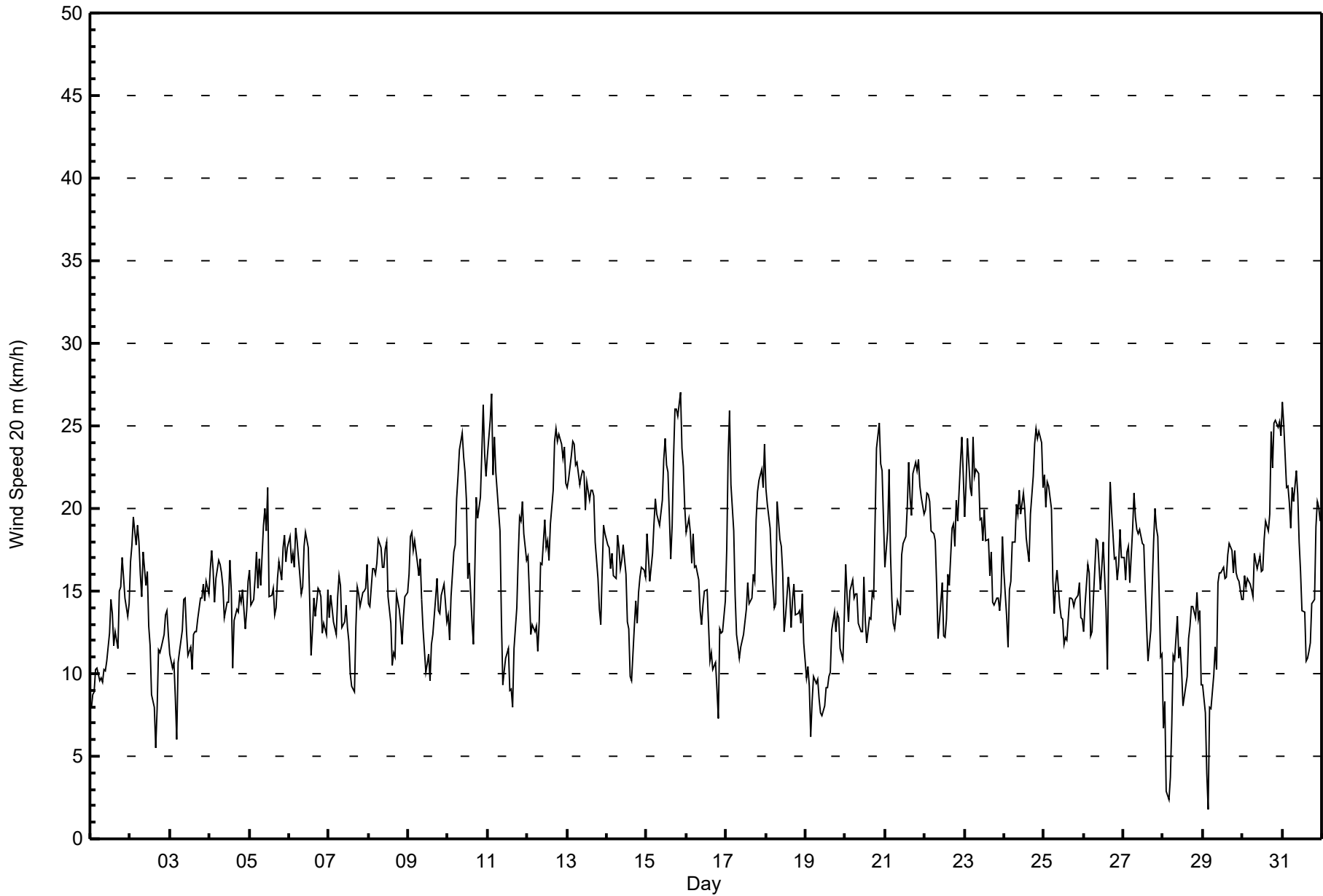
Wind Speed 20 m (WS20m) - km/h
Stony Mountain - December 2023

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 8 km/h on Dec 10 22:00 Minimum Value: 1 km/h on Dec 28 05:00 Percentiles: P ₁ = 1 P ₁₀ = 2 Q ₁ = 3 Median = 4 Q ₃ = 5 P ₉₀ = 6 P ₉₉ = 7																	Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0								
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Dec	1	2	2	1	1	1	1	1	2	2	3	3	4	4	3	2	2	3	3	3	3	3	3	3	4
2-Dec	4	5	5	5	5	4	4	4	4	4	4	3	3	3	2	2	2	2	2	3	3	4	4	3	5
3-Dec	3	2	2	3	2	2	3	2	3	3	2	2	3	3	3	2	2	2	3	2	3	3	3	3	3
4-Dec	4	4	4	3	3	4	3	4	4	3	4	2	5	5	5	3	4	3	3	3	4	3	3	4	5
5-Dec	3	3	3	3	3	3	4	3	5	5	6	5	5	4	4	3	3	3	4	3	4	5	4	5	6
6-Dec	4	5	5	4	4	5	5	4	4	5	6	5	5	4	3	3	3	3	3	3	3	3	3	4	6
7-Dec	3	4	3	3	3	4	5	4	3	4	4	4	4	3	3	2	3	4	4	3	3	4	4	4	5
8-Dec	4	3	5	4	4	4	5	5	4	4	5	5	4	4	3	3	3	4	4	4	3	4	4	4	5
9-Dec	5	5	5	5	5	5	4	5	4	3	3	3	3	2	3	3	3	4	2	2	3	3	3	3	5
10-Dec	3	2	3	3	4	5	5	6	6	6	5	5	5	5	4	3	5	6	5	7	7	8	7	7	8
11-Dec	7	8	8	8	8	7	6	5	4	3	3	3	4	3	3	2	2	3	4	5	5	5	4	4	8
12-Dec	4	4	3	3	3	2	2	2	3	4	4	4	4	4	4	5	6	6	6	6	6	5	6	5	6
13-Dec	5	5	5	6	6	5	5	5	5	5	5	5	5	5	5	5	5	4	4	3	4	5	5	5	6
14-Dec	5	5	5	5	5	5	6	5	4	5	5	5	4	4	3	2	3	4	3	3	4	4	4	3	6
15-Dec	5	4	3	4	4	5	5	5	4	6	6	6	6	7	5	5	7	8	7	7	7	6	6	5	8
16-Dec	5	7	6	5	5	5	5	4	4	4	4	5	5	4	3	3	3	3	3	2	4	4	4	5	7
17-Dec	5	7	8	7	6	4	3	4	3	2	3	3	4	4	4	4	4	3	5	5	5	5	5	6	8
18-Dec	5	5	4	4	4	4	4	6	5	5	5	4	4	6	5	4	4	5	4	3	3	3	4	3	6
19-Dec	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3	4	4
20-Dec	5	4	3	4	4	4	4	4	4	4	4	5	4	3	4	4	4	5	5	6	6	6	5	4	6
21-Dec	3	6	6	5	4	4	3	3	2	3	4	4	4	5	5	5	5	5	5	5	5	5	5	4	6
22-Dec	4	5	5	4	4	4	4	5	2	4	4	3	3	4	4	4	5	5	4	6	5	7	7	7	7
23-Dec	6	7	7	7	7	8	7	7	7	7	6	6	7	6	6	5	5	4	4	5	4	4	5	8	
24-Dec	4	4	2	4	3	4	4	5	5	5	5	5	5	5	4	5	5	6	6	6	6	5	5	6	
25-Dec	5	4	5	5	5	5	3	3	4	3	2	3	2	2	3	3	3	3	3	3	2	3	2	3	5
26-Dec	2	3	3	3	2	3	3	4	4	4	4	5	5	4	3	4	5	4	4	3	3	3	6	5	6
27-Dec	5	4	4	4	4	4	5	4	4	4	4	4	4	4	3	2	2	3	4	4	4	5	3	3	5
28-Dec	3	3	2	2	1	2	3	3	4	3	3	3	2	2	2	3	3	3	3	2	3	3	2	2	4
29-Dec	2	1	2	2	1	1	2	2	3	2	3	3	4	4	4	4	4	3	3	4	4	3	3	3	4
30-Dec	3	3	3	3	3	3	3	3	3	3	4	4	4	5	5	6	5	7	7	7	6	6	6	7	7
31-Dec	7	6	6	6	5	4	5	5	5	4	4	3	3	4	3	3	2	2	3	4	6	6	6	6	7
Diurnal Maximum																									



Wood Buffalo Environmental Association
Hourly Averages

Wind Speed 20 m (WS20m) - km/h
Stony Mountain - December 2023





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Wind Speed 20 m (WS20m) - km/h
Stony Mountain - December 2023**

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	5	0.67	0.67
6 - 11	97	13.04	13.71
12 - 19	490	65.86	79.57
20 - 28	152	20.43	100.00
29 - 38	0	0.00	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed 20 m (WS20m) - km/h
Stony Mountain - December 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	1	0	0	0	0	1	0	0	0	0	1	0	1	0	1	0	5
6 - 11	1	0	5	1	6	0	2	2	3	8	22	11	17	14	4	1	97
12 - 19	0	0	0	0	0	5	2	5	51	121	106	50	71	67	12	0	490
20 - 28	0	0	0	0	0	0	0	0	8	58	54	0	6	21	5	0	152
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	2	0	5	1	6	6	4	7	62	187	183	61	95	102	22	1	744

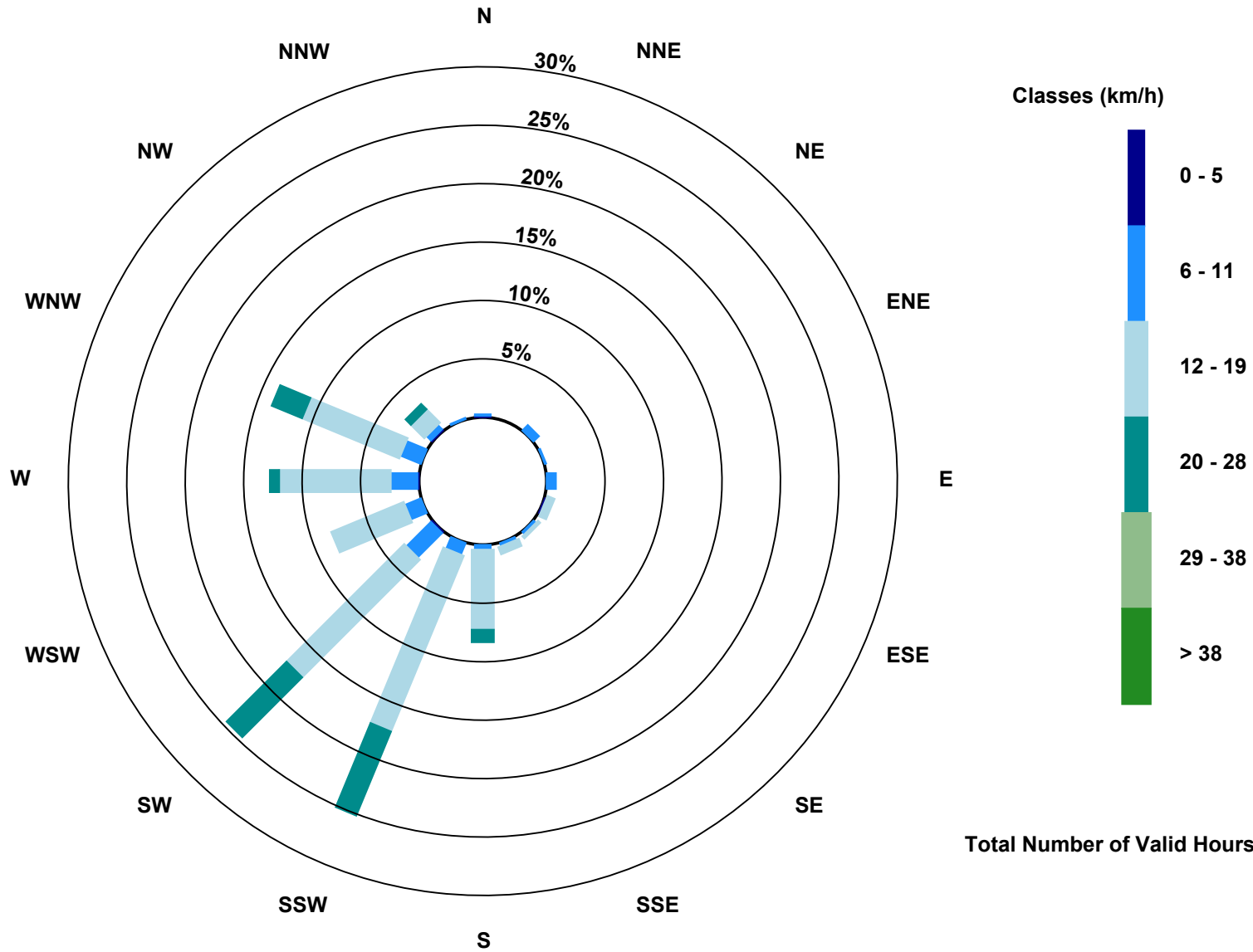
Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Dec 2023

Wind Speed 20 m (WS20m) - km/h
Stony Mountain



Total Number of Valid Hours: 744



Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction 20 m (WD20m) - deg
Stony Mountain - December 2023

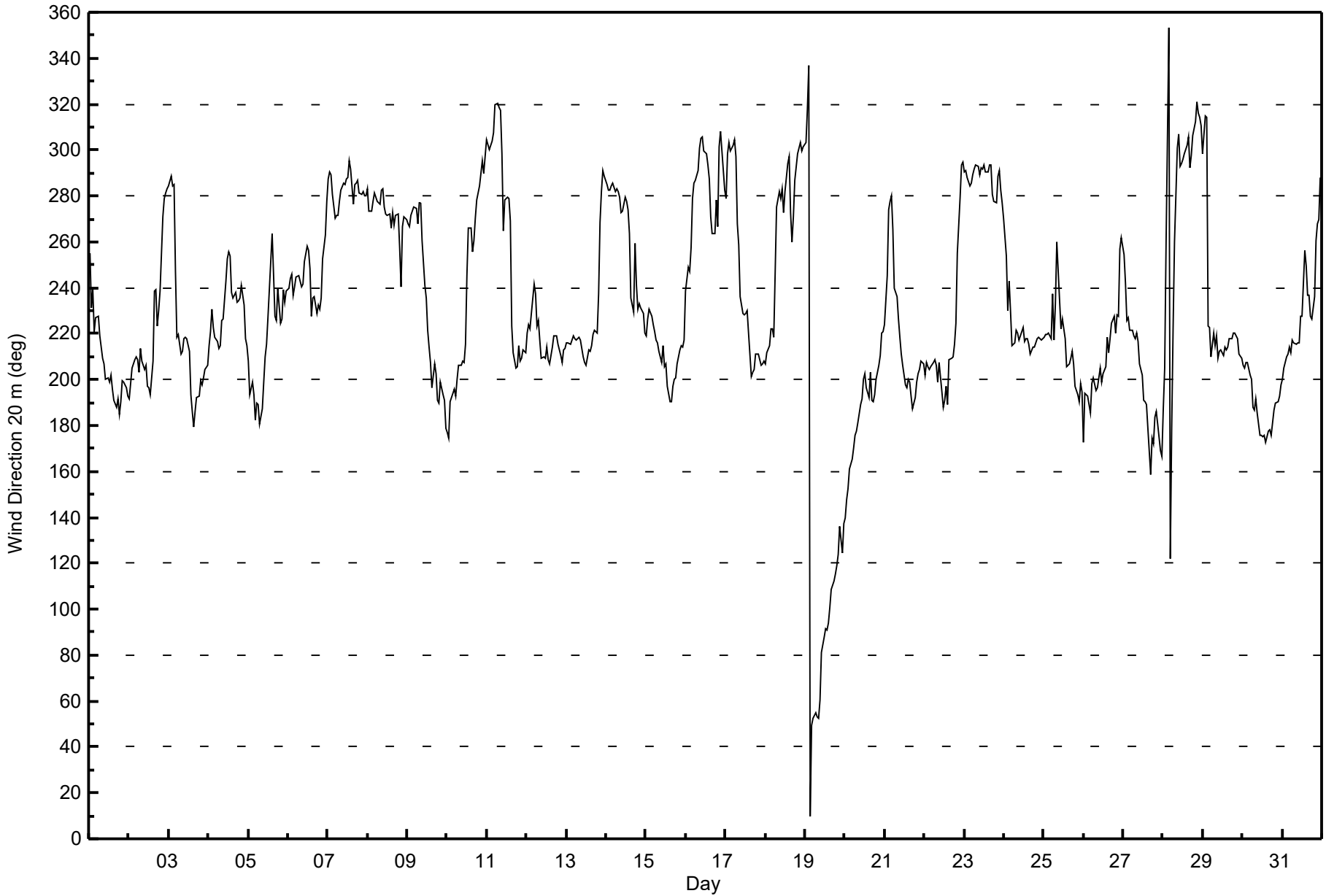
Direction of Maximum Speed: 213 deg on Dec 15 21:00																				Hours in Service: 744							
Direction of Maximum Daily Speed Average: 210.7 deg on Dec 15																				Hours of Data: 744							
Direction of Minimum Speed: 224 deg on Dec 29 04:00										Direction of Minimum Daily Speed Average: 6.8 deg on Dec 19										Hours of Missing Data: 0							
Monthly Average Direction: 230.7 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-Dec	255	231	239	221	227	228	219	214	210	207	200	201	199	202	196	191	188	192	185	190	200	199	196	193	204.4		
2-Dec	191	198	205	209	210	209	203	213	208	204	206	197	196	193	208	239	239	223	230	239	271	279	281	283	218.4		
3-Dec	284	289	284	285	247	218	220	211	212	218	218	212	212	193	186	179	186	192	193	200	198	201	204	206	213.2		
4-Dec	215	221	231	223	218	217	214	215	226	226	243	253	256	254	238	236	238	234	234	236	241	232	218	215	230.0		
5-Dec	208	193	199	194	183	190	189	181	188	199	210	216	227	252	264	246	227	226	240	224	226	239	233	239	215.7		
6-Dec	240	244	246	237	240	244	245	243	240	241	251	258	256	249	228	236	236	229	233	231	235	252	263	278	244.0		
7-Dec	287	291	289	281	270	271	271	277	282	285	285	287	288	295	292	277	285	285	287	281	281	282	280	280	282.7		
8-Dec	283	274	274	278	281	280	278	277	282	283	275	272	272	272	266	273	267	272	272	257	241	267	271	269	273.1		
9-Dec	268	267	271	273	275	274	268	277	277	261	241	236	221	214	207	196	207	203	191	190	199	194	191	179	236.0		
10-Dec	177	174	190	194	196	193	200	206	206	208	207	216	245	266	266	255	261	270	278	284	290	296	290	297	238.1		
11-Dec	305	300	302	304	307	320	320	318	317	298	265	278	280	279	269	223	211	205	205	215	208	210	213	212	271.5		
12-Dec	220	224	222	229	242	237	223	226	217	209	210	209	214	209	207	214	219	219	219	215	210	207	213	214	216.6		
13-Dec	216	216	216	217	219	218	217	218	217	213	210	207	206	213	212	215	220	222	221	237	268	282	291	288	223.9		
14-Dec	285	282	283	284	285	282	283	282	280	273	274	279	278	274	264	235	229	259	241	231	233	231	229	220	264.2		
15-Dec	219	227	231	228	224	221	217	216	212	208	215	206	207	197	190	191	197	200	200	207	213	215	214	217	210.7		
16-Dec	239	249	247	258	279	286	287	291	301	305	306	300	299	293	287	271	264	264	278	267	302	308	299	282	280.8		
17-Dec	279	298	303	300	302	305	297	268	259	236	229	228	229	230	220	201	203	204	211	211	211	206	207	208	242.0		
18-Dec	207	212	215	222	222	219	246	275	282	279	283	273	282	294	297	273	260	271	287	298	301	303	300	302	265.1		
19-Dec	303	318	337	10	49	53	55	53	53	60	81	88	91	91	94	101	109	112	115	119	124	136	125	137	88.3		
20-Dec	140	147	153	161	165	170	175	178	181	189	192	200	203	197	192	203	191	190	193	200	206	210	220	221	189.1		
21-Dec	224	245	274	277	280	265	240	236	226	219	211	206	198	197	200	199	193	187	192	199	203	205	208	207	216.3		
22-Dec	202	208	206	204	205	208	209	206	199	208	195	188	191	197	189	209	210	210	215	225	255	279	293	295	218.2		
23-Dec	290	291	288	284	286	290	292	293	289	292	292	293	291	290	294	294	281	277	277	289	291	283	277	277	288.5		
24-Dec	270	254	230	243	230	215	216	222	220	217	219	223	217	218	218	216	211	214	214	216	218	218	217	218	221.4		
25-Dec	218	220	220	220	218	237	217	233	260	234	222	226	222	218	206	207	209	212	207	197	194	191	198	194	216.3		
26-Dec	173	194	193	189	185	199	201	196	197	201	205	199	202	206	219	212	218	224	227	220	228	227	257	262	210.6		
27-Dec	254	242	226	227	221	222	219	218	220	216	207	202	191	191	189	179	159	175	172	184	186	181	169	167	202.7		
28-Dec	187	205	260	353	122	179	222	260	301	307	293	294	296	298	302	306	292	297	306	313	321	316	314	310	293.3		
29-Dec	298	315	314	224	222	210	220	215	219	209	212	213	211	214	213	214	218	218	220	220	219	218	211	209	219.3		
30-Dec	206	205	208	207	202	200	188	187	192	185	176	176	175	176	173	178	178	176	181	186	190	190	193	198	187.9		
31-Dec	200	205	210	211	214	212	217	216	216	216	216	227	228	256	250	237	237	227	227	236	261	268	270	288	228.4		
235.3	239.2	242.2	238.5	236.5	235.0	232.9	235.0	234.7	229.9	228.4	228.2	228.2	229.6	224.1	220.3	219.8	220.6	220.9	221.6	228.6	233.3	237.6	237.6				
Diurnal Average																											
All monthly, daily, and diurnal averages have been calculated using vector methods																											



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Direction 20 m (WD20m) - deg
Stony Mountain - December 2023

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0																			Hours in Service: 744						
Maximum Value: 85 deg on Dec 29 04:00																			Hours of Data: 744						
Minimum Value: 9 deg on Dec 29 07:00																			Hours of Missing Data: 0						
Percentiles: P ₁ = 12 P ₁₀ = 14 Q ₁ = 16 Median = 17 Q ₃ = 20 P ₉₀ = 21 P ₉₉ = 26																			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-Dec	15	17	19	9	10	12	10	12	12	15	17	17	18	18	17	15	12	14	13	14	15	16	14	14	19
2-Dec	16	19	16	18	17	16	17	32	16	17	18	16	20	20	23	26	19	12	13	16	19	19	21	20	32
3-Dec	22	16	16	23	34	15	14	14	14	13	14	17	16	21	17	13	13	12	14	13	13	13	14	16	34
4-Dec	16	16	17	14	15	15	15	16	16	15	20	24	23	21	20	18	17	17	16	17	17	18	14	16	24
5-Dec	14	14	13	17	14	15	18	16	17	17	19	19	21	21	19	22	14	14	21	14	17	19	18	17	22
6-Dec	18	20	20	19	18	20	23	22	21	19	21	23	23	21	18	16	16	15	15	15	17	18	22	22	23
7-Dec	17	17	16	21	17	18	19	18	19	18	19	19	20	21	19	19	20	18	18	17	17	18	19	19	21
8-Dec	19	17	20	20	18	18	19	18	16	18	19	19	22	20	22	19	18	20	22	19	16	20	19	19	22
9-Dec	20	19	19	19	20	20	18	19	18	18	24	18	19	17	18	17	16	16	13	13	14	16	14	13	24
10-Dec	13	13	12	14	16	17	15	16	16	18	17	17	25	22	20	20	22	20	21	22	20	20	21	20	25
11-Dec	20	21	21	20	22	20	20	19	19	28	21	23	21	23	24	18	14	15	16	17	17	17	16	15	28
12-Dec	16	15	17	14	21	12	12	12	13	15	15	15	17	17	16	17	17	18	16	18	17	16	17	17	21
13-Dec	15	17	16	17	16	15	16	16	16	16	17	17	17	17	16	17	17	16	20	21	20	21	19	18	21
14-Dec	20	20	20	20	20	20	22	21	21	19	20	21	23	23	20	16	16	21	18	15	16	17	17	14	23
15-Dec	16	16	15	14	15	17	17	17	17	18	17	19	20	21	21	21	19	20	18	19	19	18	18	16	21
16-Dec	21	23	22	24	21	20	20	19	19	19	20	21	19	20	20	21	21	19	19	21	19	21	19	22	24
17-Dec	20	20	19	21	21	20	21	19	19	15	18	19	21	20	19	17	16	16	16	16	17	16	17	17	21
18-Dec	18	17	17	20	18	18	19	22	19	19	18	20	21	22	19	23	21	21	19	17	16	17	16	17	23
19-Dec	16	12	13	23	14	14	15	17	16	16	19	20	18	19	17	17	17	15	16	16	16	16	16	18	23
20-Dec	17	17	16	17	17	20	19	20	21	25	23	22	23	22	22	22	20	21	19	18	17	21	17	16	25
21-Dec	15	20	20	21	20	21	15	14	12	13	15	16	16	17	18	17	16	15	16	17	15	16	16	16	21
22-Dec	15	16	16	16	17	16	16	17	14	18	18	16	17	19	18	21	19	16	19	17	23	20	19	20	23
23-Dec	20	20	20	21	21	21	21	21	21	22	21	22	21	22	21	22	20	19	19	20	20	21	18	18	22
24-Dec	19	21	16	17	18	14	15	17	17	18	17	18	18	19	18	18	17	16	17	16	17	17	15	16	21
25-Dec	15	15	15	16	16	20	17	16	19	19	12	14	14	16	14	13	13	13	14	16	13	12	14	14	20
26-Dec	12	16	16	14	13	14	16	17	18	19	19	20	19	20	28	19	16	16	15	14	13	15	23	22	28
27-Dec	21	18	15	15	13	14	15	16	15	16	17	17	16	17	18	14	12	15	15	15	16	16	18	16	21
28-Dec	22	23	65	65	20	27	16	23	17	18	16	19	21	18	16	16	15	16	13	13	12	14	13	20	65
29-Dec	15	12	14	85	14	11	9	11	13	10	14	15	17	16	15	14	14	14	14	14	16	15	15	14	85
30-Dec	14	16	14	16	14	14	15	14	14	14	16	16	16	18	19	21	18	18	20	19	18	18	18	19	21
31-Dec	17	17	20	18	17	16	16	16	14	14	14	16	17	20	19	20	17	12	13	22	21	22	22	19	22
Diurnal Maximum																									





WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

AMS19 FIREBAG DECEMBER 2023

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

January 31, 2024

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FIREBAG (AMS19)
 DECEMBER 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	708	36	36	100	49.8	0	11.9	0
H2S (ppb) Average	707	37	37	100	3.3	0	0.4	0
THC (ppm) Average	708	36	36	100	2.7	-	2.5	-
NO2 (ppb) Average	706	38	38	100	29.8	0	12.2	-
NO (ppb) Average	706	38	38	100	45.2	-	4.9	-
NOX (ppb) Average	706	38	38	100	75	-	14	-
Temperature 2 m (C) Average	744	0	0	100	7.1	-	3.5	-
Relative Humidity (%) Average	744	0	0	100	94.8	-	86.7	-
Wind Speed 10 m (km/h) Average	744	0	0	100	36	-	27	-
Wind Direction 10 m (deg) Average	744	0	0	100	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FIREBAG (AMS19)
DECEMBER 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	708	2.55	4.4	-	0	0.1	0.3	0.8	2.8	7.4	49.8	
H2S (ppb) Average	707	0.16	0.2	-	0	0.1	0.1	0.1	0.2	0.3	3.3	
THC (ppm) Average	708	2.3	0.1	-	2.2	2.2	2.3	2.3	2.3	2.4	2.7	
NO2 (ppb) Average	706	5.32	4.3	-	0.1	1.2	2.4	4.2	7.1	11.2	29.8	
NO (ppb) Average	706	1.04	2.4	-	0	0	0.1	0.5	1.2	2.3	45.2	
NOX (ppb) Average	706	6.36	5.9	-	0.1	1.2	2.9	5.1	8.1	12.8	75	
Temperature 2 m (C) Average	744	-5.12	5.1	-	-20.4	-12.8	-8.6	-4.6	-0.8	0.9	7.1	
Relative Humidity (%) Average	744	72.83	12.9	-	32.6	52.2	65.7	75.5	83.3	86.8	94.8	
Wind Speed 10 m (km/h) Average	744	15.7	6	-	0	8	11	16	20	23	36	
Wind Direction 10 m (deg) Average	744	-	-	-	-	-	-	-	-	-	-	

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FIREBAG (AMS19)
DECEMBER 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 (SO₂) - ppb

Firebag - December 2023

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 49.8 ppb on Dec 3 10:00	Maximum Daily Average: 11.9 ppb on Dec 7		Hours of Data:	708
Minimum Value: 0.0 ppb on Dec 10 23:00	Minimum Daily Average: 0.1 ppb on Dec 19		Hours of Missing Data:	36
Maximum Diurnal Average: 4.2 ppb at hour 10	Minimum Diurnal Average: 1.5 ppb at hour 5		Hours of Calibration:	36
Monthly Average: 2.55 ppb	Percentiles: P ₁ = 0.0 P ₁₀ = 0.1 Q ₁ = 0.3 Median = 0.8 Q ₃ = 2.8 P ₉₀ = 7.4 P ₉₉ = 20.3		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-Dec	0.8	0.4	0.3	6.2	5.3	Z	4.3	1.3	0.1	0.0	0.1	0.5	0.5	0.5	0.8	0.8	0.7	0.9	0.6	1.1	1.0	0.7	0.5	0.3	1.2	6.2
2-Dec	Z	0.5	0.8	0.6	0.6	0.6	0.5	0.5	1.0	0.7	0.7	1.0	2.6	2.5	2.6	1.8	0.6	0.3	0.7	2.2	1.6	0.9	0.7	0.5	1.1	2.6
3-Dec	0.4	Z	0.2	0.5	0.6	0.9	1.8	1.2	12.6	49.8	14.2	1.9	0.6	0.6	1.1	1.0	1.0	0.9	0.6	0.7	0.8	0.6	0.5	0.5	4.0	49.8
4-Dec	0.6	0.5	Z	0.6	0.5	0.4	0.4	0.2	0.7	4.1	8.1	12.8	7.2	7.3	11.8	21.4	20.6	2.7	3.3	5.8	4.2	3.1	2.3	0.4	5.2	21.4
5-Dec	0.1	0.2	0.4	Z	0.3	0.4	0.5	0.6	0.9	0.7	0.5	0.5	0.5	0.5	3.0	3.9	3.6	5.1	3.6	4.0	4.9	2.3	1.8	8.4	2.0	8.4
6-Dec	7.6	6.7	5.3	6.9	Z	5.8	6.5	6.2	4.9	7.0	9.6	7.9	4.7	5.0	6.9	6.1	8.8	7.5	8.4	10.3	12.0	10.1	5.7	2.5	7.1	12.0
7-Dec	2.4	10.7	8.2	8.8	9.8	Z	8.6	6.1	7.1	8.5	20.3	26.1	17.3	19.2	28.9	23.9	17.9	13.9	8.9	8.2	4.8	5.1	3.9	4.5	11.9	28.9
8-Dec	Z	2.3	1.3	0.9	2.0	3.4	3.9	2.9	2.7	3.3	7.3	8.3	7.4	3.9	2.3	2.0	4.7	9.6	11.8	7.4	7.1	10.3	15.2	12.0	5.7	15.2
9-Dec	13.3	Z	13.2	17.9	11.5	11.9	17.9	20.2	29.9	15.7	13.5	15.5	12.3	1.5	0.4	0.3	0.3	0.3	0.3	0.6	0.7	0.7	0.6	0.7	8.7	29.9
10-Dec	0.7	0.8	Z	0.9	1.0	1.0	1.1	1.0	0.9	0.9	0.9	0.9	2.7	7.5	3.2	1.1	0.9	0.5	0.3	0.3	0.0	0.0	0.0	0.0	1.1	7.5
11-Dec	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.1	0.2	0.1	0.1	0.7	1.1	3.0	3.4	10.2	10.8	0.6	0.2	0.2	0.2	0.4	0.3	0.2	1.4	10.8
12-Dec	0.2	0.4	0.4	0.8	Z	4.2	0.6	0.3	0.3	0.3	0.2	0.7	0.8	0.8	0.7	0.4	0.3	0.3	0.3	0.3	0.3	0.4	0.2	0.2	0.6	4.2
13-Dec	1.3	2.0	1.9	1.6	1.8	Z	1.1	0.9	0.5	2.1	5.4	C	C	C	C	C	3.2	4.5	1.8	0.9	1.3	2.5	1.7	2.7	2.1	5.4
14-Dec	Z	2.5	1.0	1.7	0.3	0.2	0.1	0.2	0.1	1.2	1.1	0.3	0.2	0.2	1.4	9.0	6.5	4.2	2.7	3.4	2.9	3.2	2.6	0.4	2.0	9.0
15-Dec	1.3	Z	2.8	0.9	0.2	0.3	0.6	1.0	0.7	0.1	0.2	0.2	0.2	0.1	0.0	0.1	0.2	0.2	0.3	0.3	0.2	0.1	0.7	1.4	0.5	2.8
16-Dec	4.3	4.9	Z	0.6	0.5	0.1	0.1	0.2	0.2	0.0	0.1	0.0	0.0	0.1	0.1	0.0	0.1	0.1	0.0	0.1	0.2	0.7	0.5	0.4	0.6	4.9
17-Dec	0.1	0.1	0.1	Z	0.1	0.1	0.2	0.1	1.0	5.3	9.8	20.0	5.3	8.9	2.2	2.0	1.1	0.2	0.2	0.1	0.3	0.3	0.2	0.4	2.5	20.0
18-Dec	0.3	1.8	6.4	9.6	Z	3.0	0.9	1.1	0.5	7.8	5.2	0.7	0.2	0.7	0.6	0.6	0.5	0.1	0.1	0.1	0.0	0.0	0.0	0.0	1.8	9.6
19-Dec	0.0	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.6	0.4	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	0.6
20-Dec	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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	0.2	0.9	0.1	0.9
21-Dec	3.8	Z	0.4	0.1	0.3	0.1	0.1	0.6	2.8	3.0	0.9	0.3	0.2	0.2	0.4	0.4	0.4	0.4	0.2	0.3	0.4	0.4	0.4	0.7	0.7	3.8
22-Dec	0.5	0.4	Z	0.5	0.8	0.7	0.6	0.8	0.8	0.9	0.9	1.1	1.0	1.2	1.1	0.9	0.8	0.8	0.8	1.2	1.1	2.4	6.1	5.1	1.3	6.1
23-Dec	4.3	2.4	1.1	Z	0.7	0.4	0.9	0.3	0.2	0.2	0.1	0.1	0.7	0.6	0.4	0.7	1.2	2.0	0.2	0.1	0.1	0.3	0.5	0.9	0.8	4.3
24-Dec	1.9	4.2	2.9	7.9	Z	0.4	0.2	0.2	0.3	1.8	1.5	4.7	2.7	9.4	10.6	2.5	2.2	5.0	9.2	11.7	7.3	1.9	4.5	4.1	4.2	11.7
25-Dec	1.0	0.9	0.2	0.3	0.3	Z	0.4	1.0	5.1	6.2	3.6	2.7	5.4	7.2	6.1	3.5	0.4	0.3	0.3	0.2	0.2	0.6	0.8	0.5	2.0	7.2
26-Dec	Z	0.8	0.5	0.5	1.1	1.7	1.4	1.0	1.2	1.4	1.0	0.6	0.9	1.0	1.2	0.9	1.0	1.8	4.7	6.7	6.3	6.1	6.9	1.0	2.2	6.9
27-Dec	1.2	Z	5.3	3.3	1.0	2.0	0.6	0.6	1.5	0.9	1.3	4.6	7.4	2.0	0.6	0.2	0.2	0.2	0.3	0.6	0.6	0.6	0.7	0.5	1.6	7.4
28-Dec	0.5	0.6	Z	0.4	0.4	0.3	0.3	0.5	0.6	0.7	0.4	0.3	0.4	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.2	0.3	0.2	0.4	0.7
29-Dec	0.3	0.3	0.3	Z	0.2	0.3	0.3	0.3	1.7	2.4	1.3	1.3	1.5	1.4	2.0	1.5	1.1	1.0	0.9	1.1	1.7	3.4	6.7	8.1	1.7	8.1
30-Dec	5.8	9.8	1.5	1.8	Z	2.5	2.0	1.1	1.2	1.5	1.4	0.9	0.8	0.9	0.8	0.6	0.6	0.4	0.4	0.4	0.3	0.4	0.4	0.4	1.6	9.8
31-Dec	0.4	0.5	0.5	0.4	0.4	Z	0.3	0.3	1.3	3.3	3.2	4.2	5.0	6.5	7.4	5.8	7.1	6.5	5.2	3.9	3.3	3.4	0.9	0.2	3.0	7.4

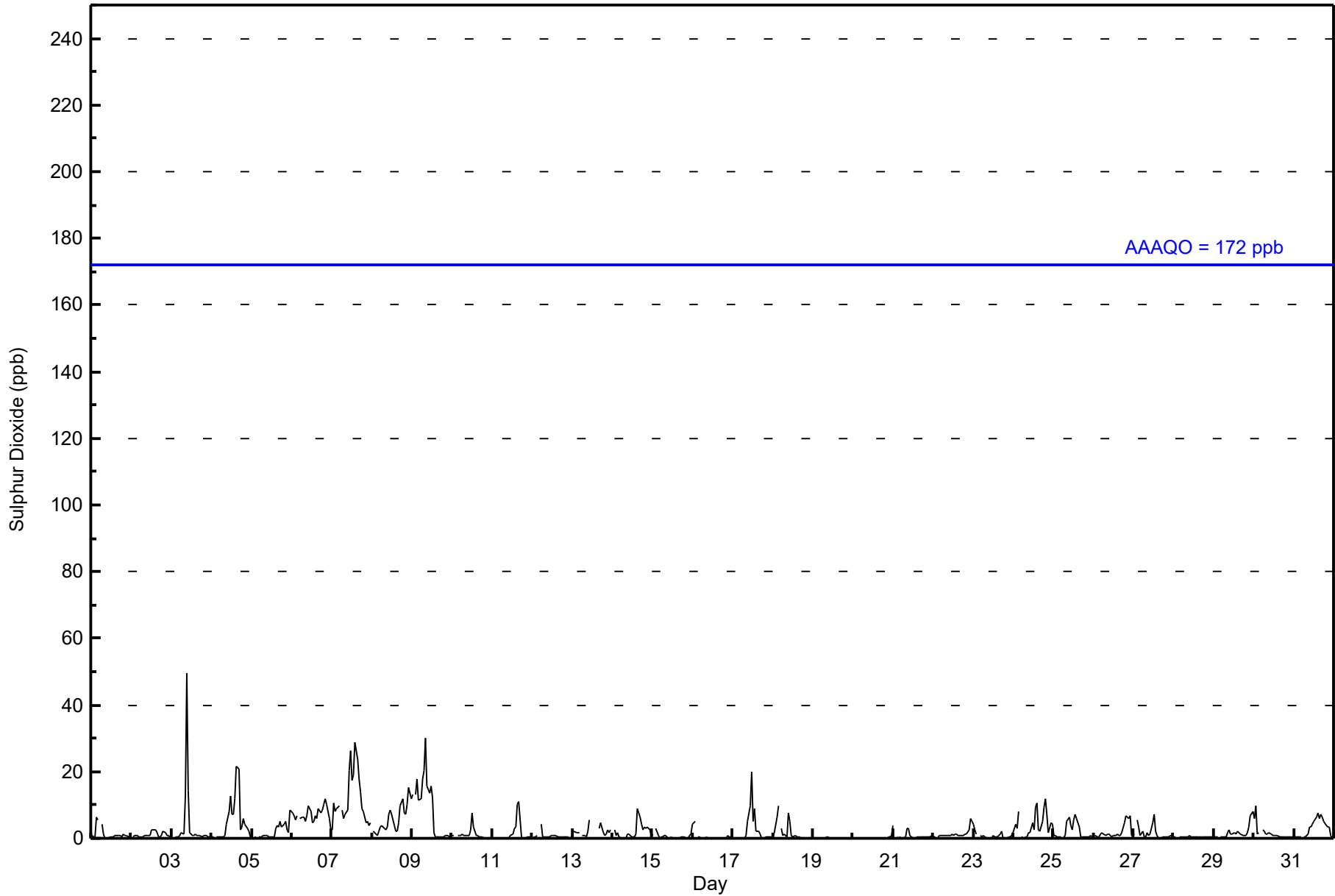
2.0	2.1	2.1	2.8	1.5	1.6	1.8	1.6	2.6	4.2	3.6	4.0	3.1	3.0	3.3	3.4	3.1	2.3	2.1	2.3	2.1	2.0	2.1	1.9	Diurnal Average	
13.3	10.7	13.2	17.9	11.5	11.9	17.9	20.2	29.9	49.8	20.3	26.1	17.3	19.2	28.9	23.9	20.6	13.9	11.8	11.7	12.0	10.3	15.2	12.0	Diurnal Maximum	

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



Wood Buffalo Environmental Association
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Firebag - December 2023





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Firebag - December 2023

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	672	94.92	94.92
11 - 20	29	4.10	99.01
21 - 60	7	0.99	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 708

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Firebag - December 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	16	20	12	3	2	7	22	54	79	178	145	70	32	16	7	9	672
11 - 20	0	0	0	0	0	0	0	0	1	5	18	5	0	0	0	0	29
21 - 60	0	0	0	0	0	0	0	0	0	3	3	1	0	0	0	0	7
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	16	20	12	3	2	7	22	54	80	186	166	76	32	16	7	9	708

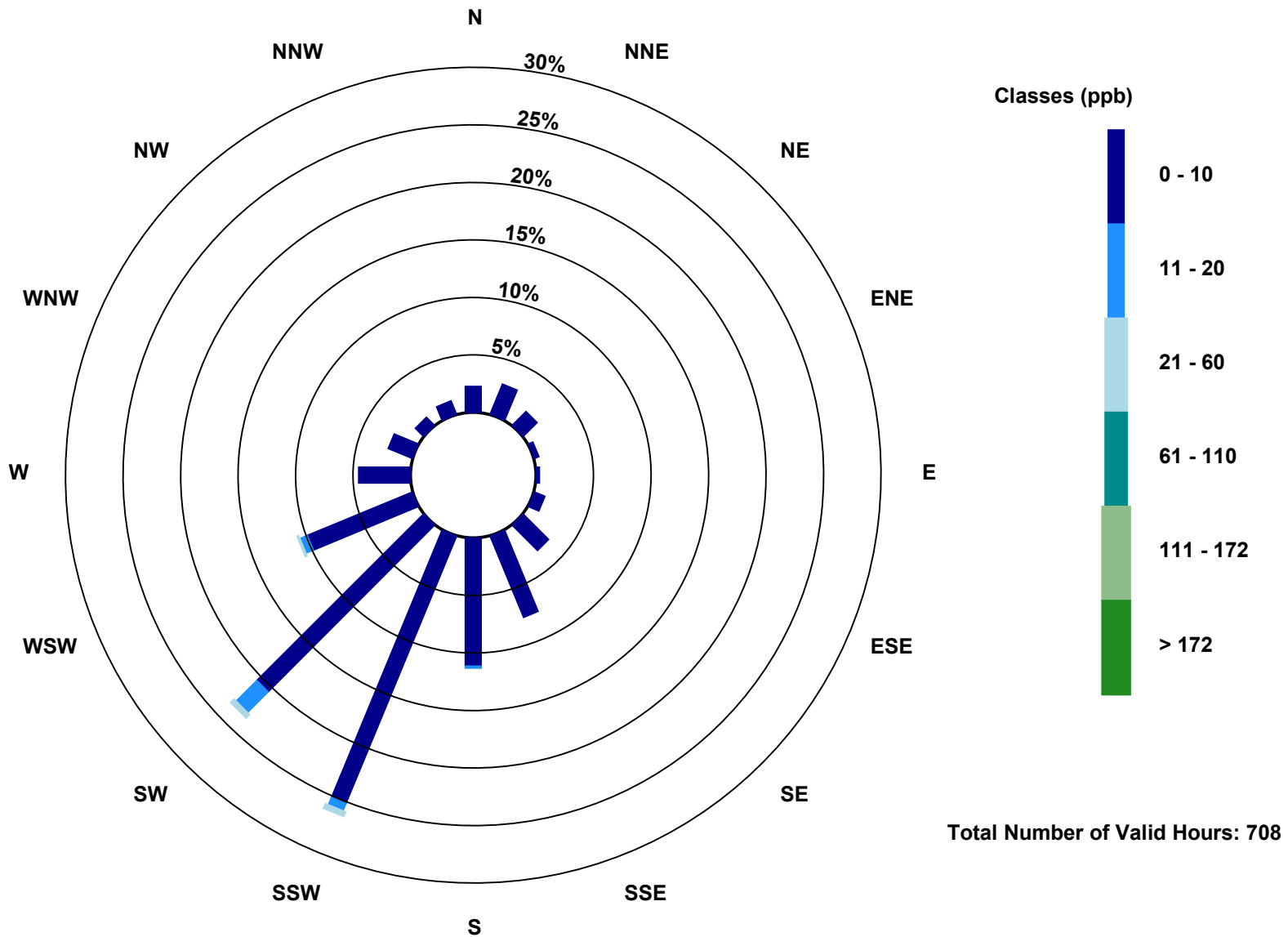
Total Number of Valid Hours: 708

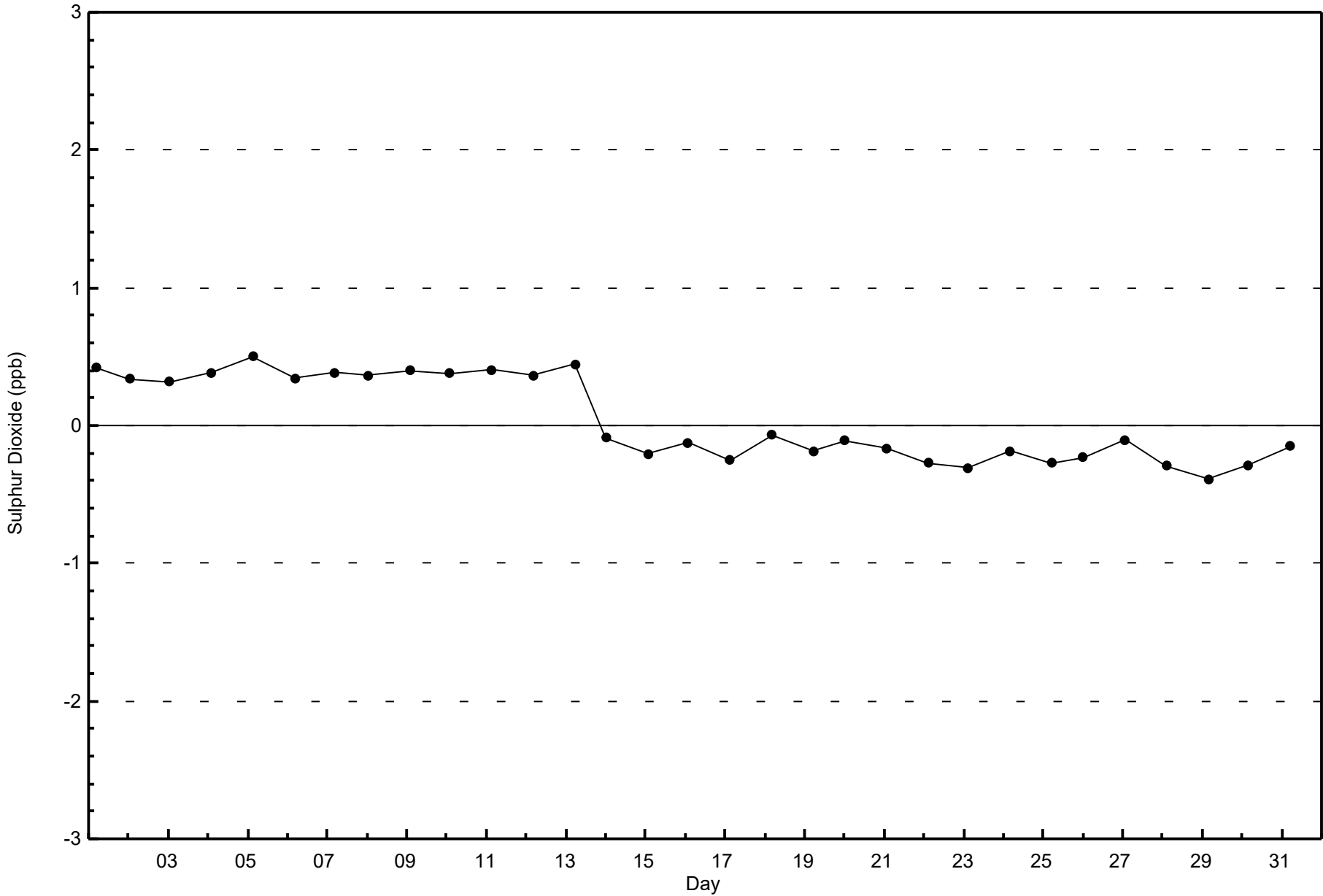
Total Number of Hours: 744

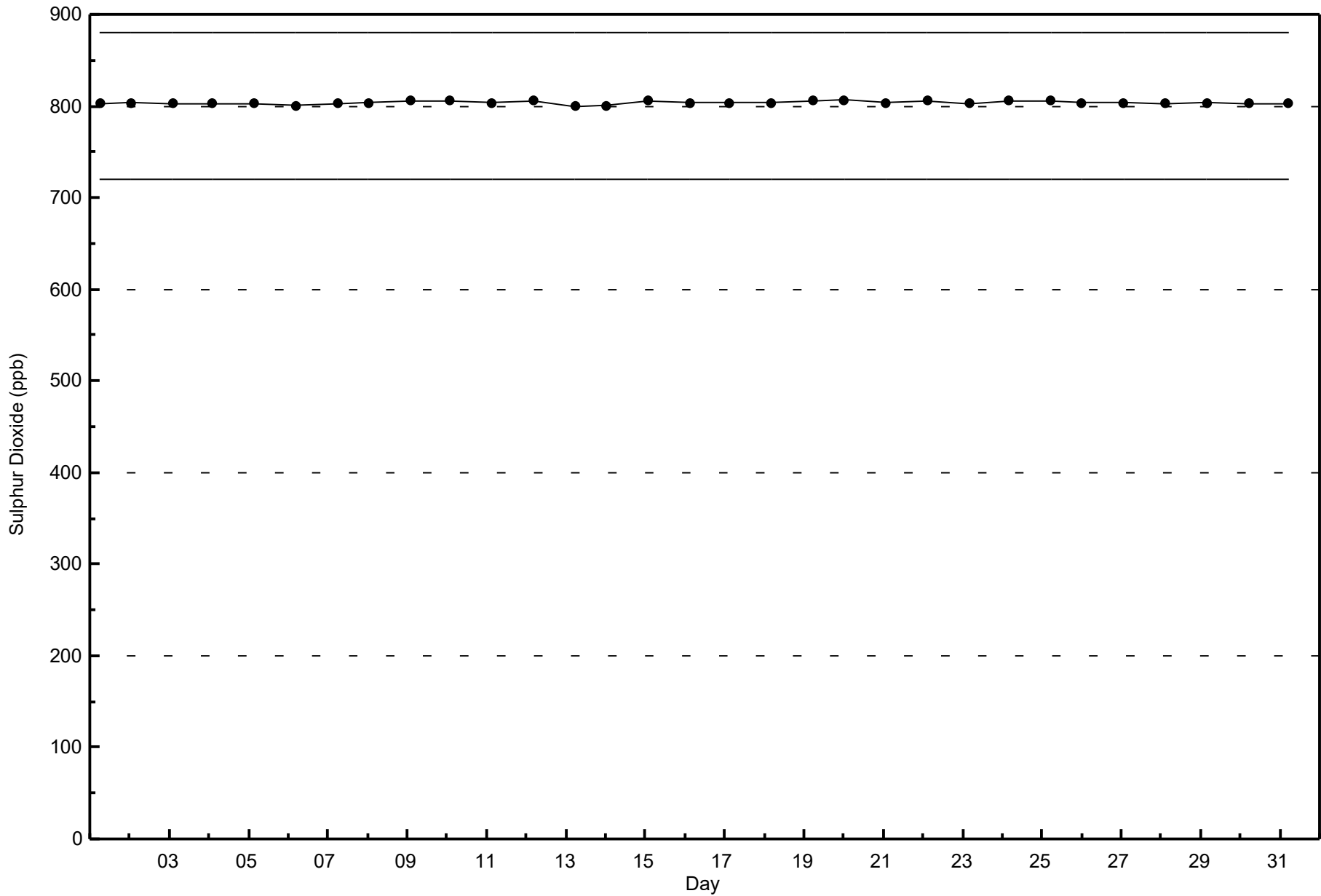


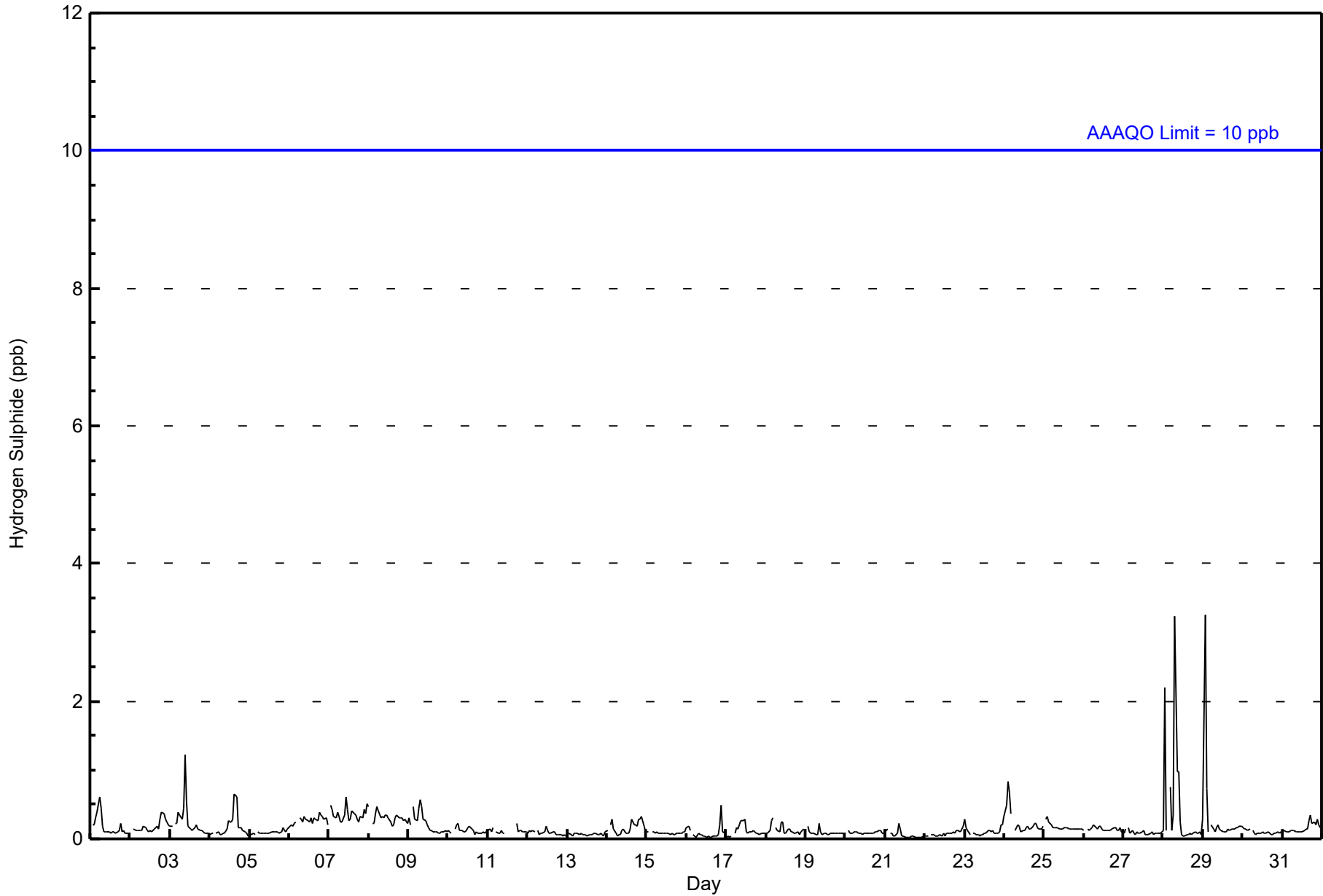
Wood Buffalo Environmental Association
Wind Rose Dec 2023

Sulphur Dioxide (SO₂) - ppb
Firebag











**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Hydrogen Sulphide (H₂S) - ppb
Firebag - December 2023**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	705	99.72	99.72
3 - 4	2	0.28	100.00
5 - 7	0	0.00	100.00
8 - 11	0	0.00	100.00
> 11	0	0.00	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Hydrogen Sulphide (H₂S) - ppb
Firebag - December 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	15	19	13	3	1	7	23	54	80	186	168	72	31	16	7	10	705
3 - 4	0	0	0	0	1	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
Totals	15	19	13	3	2	7	23	54	81	186	168	72	31	16	7	10	707

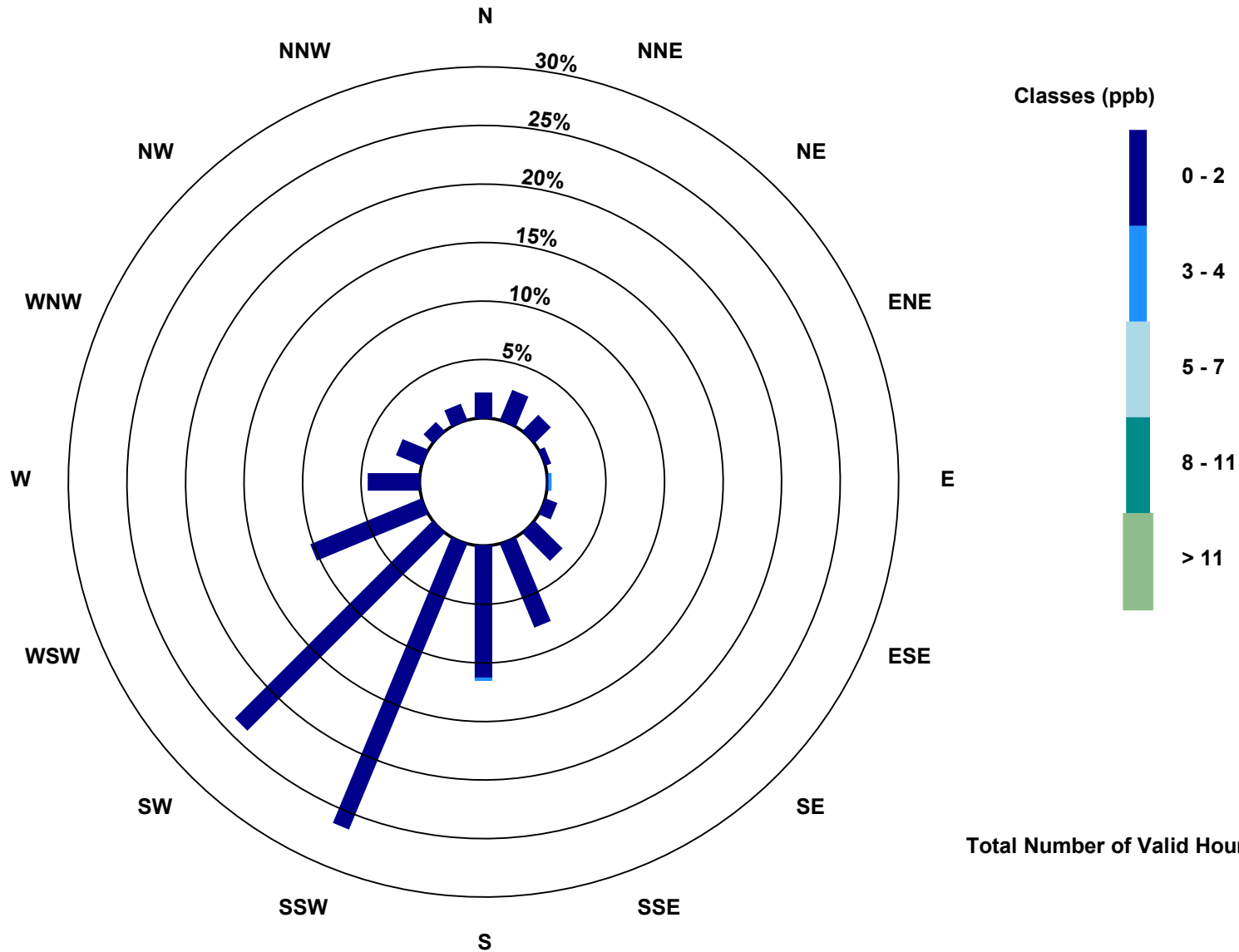
Total Number of Valid Hours: 707

Total Number of Hours: 744

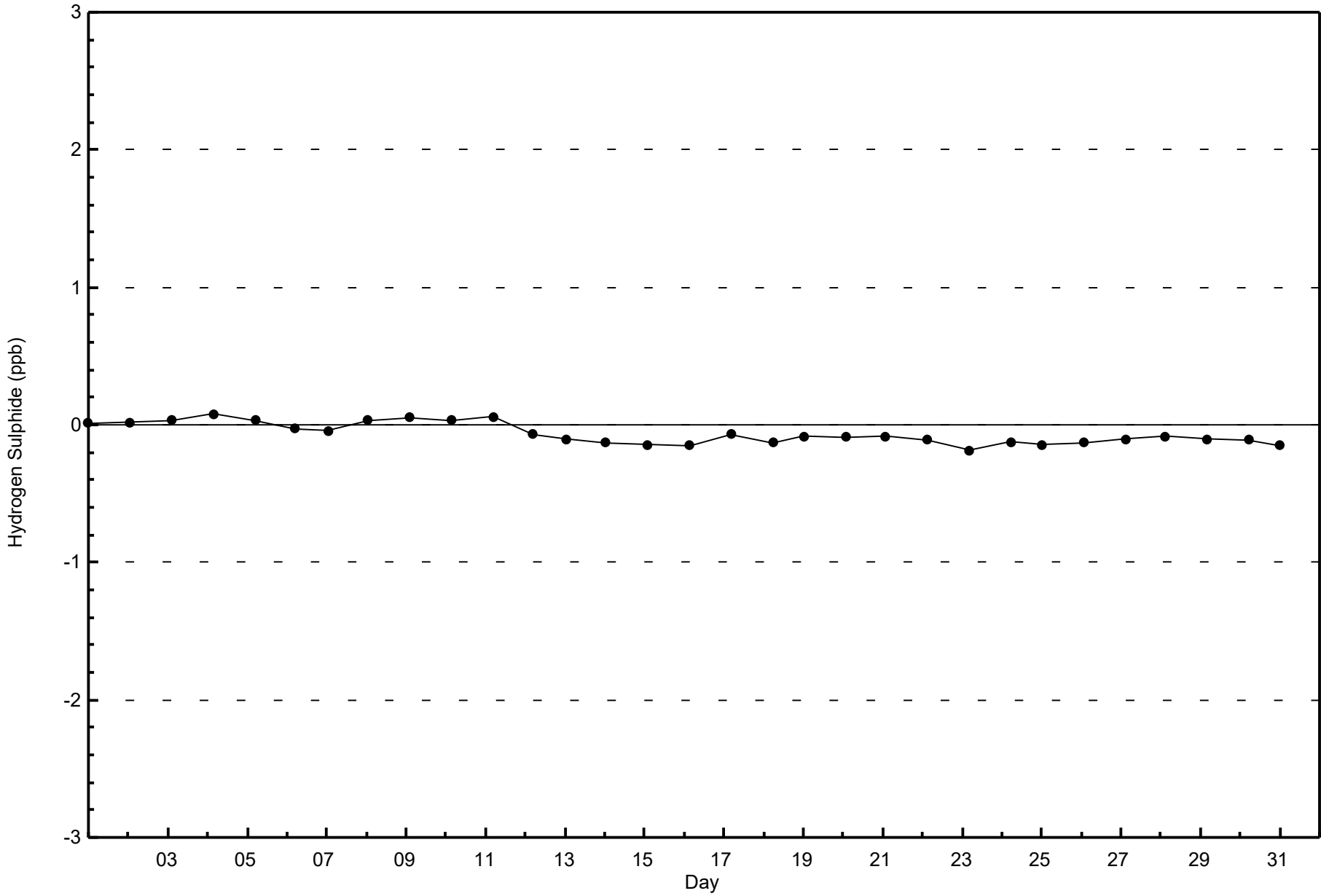


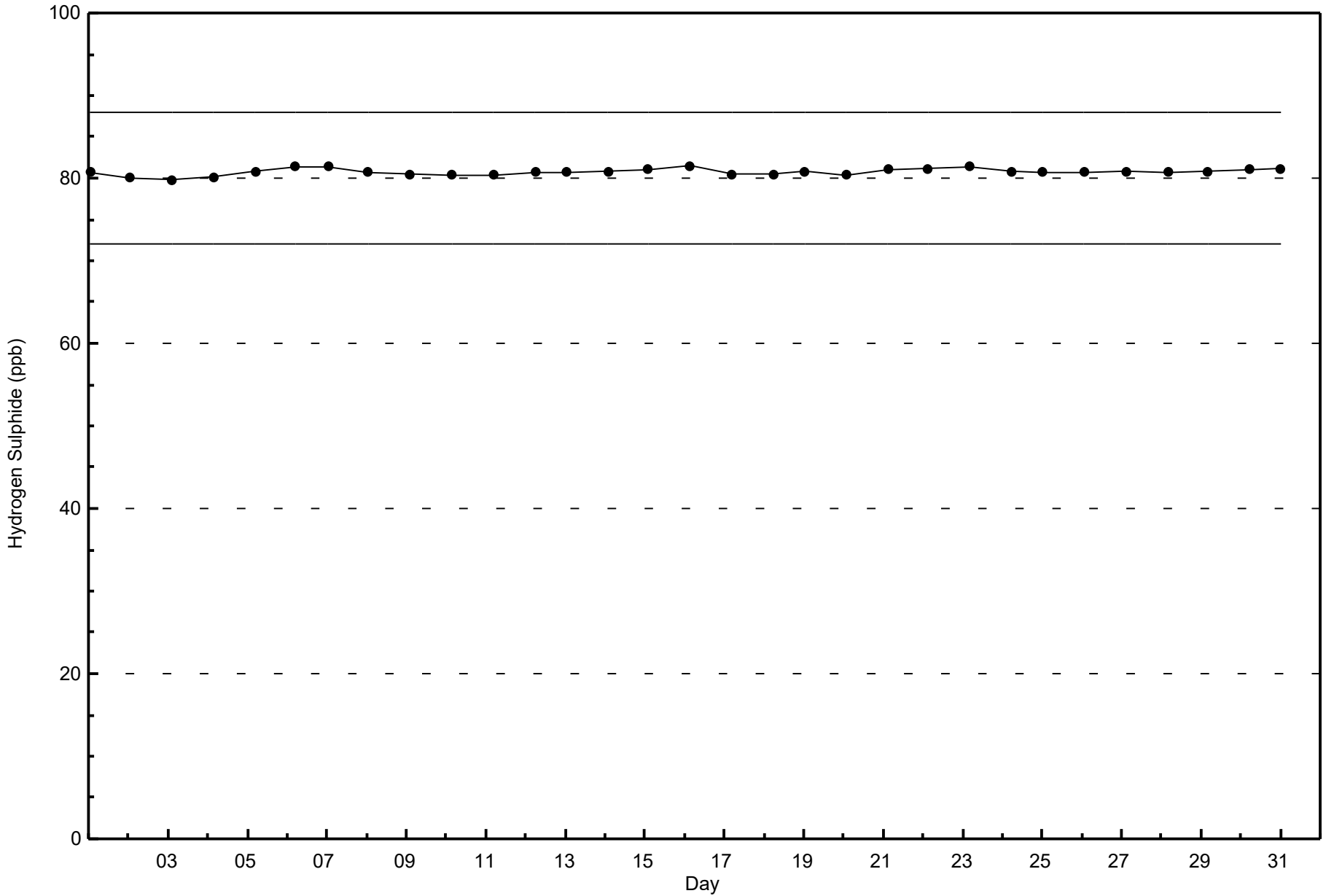
Wood Buffalo Environmental Association
Wind Rose Dec 2023

Hydrogen Sulphide (H₂S) - ppb
Firebag



Total Number of Valid Hours: 707





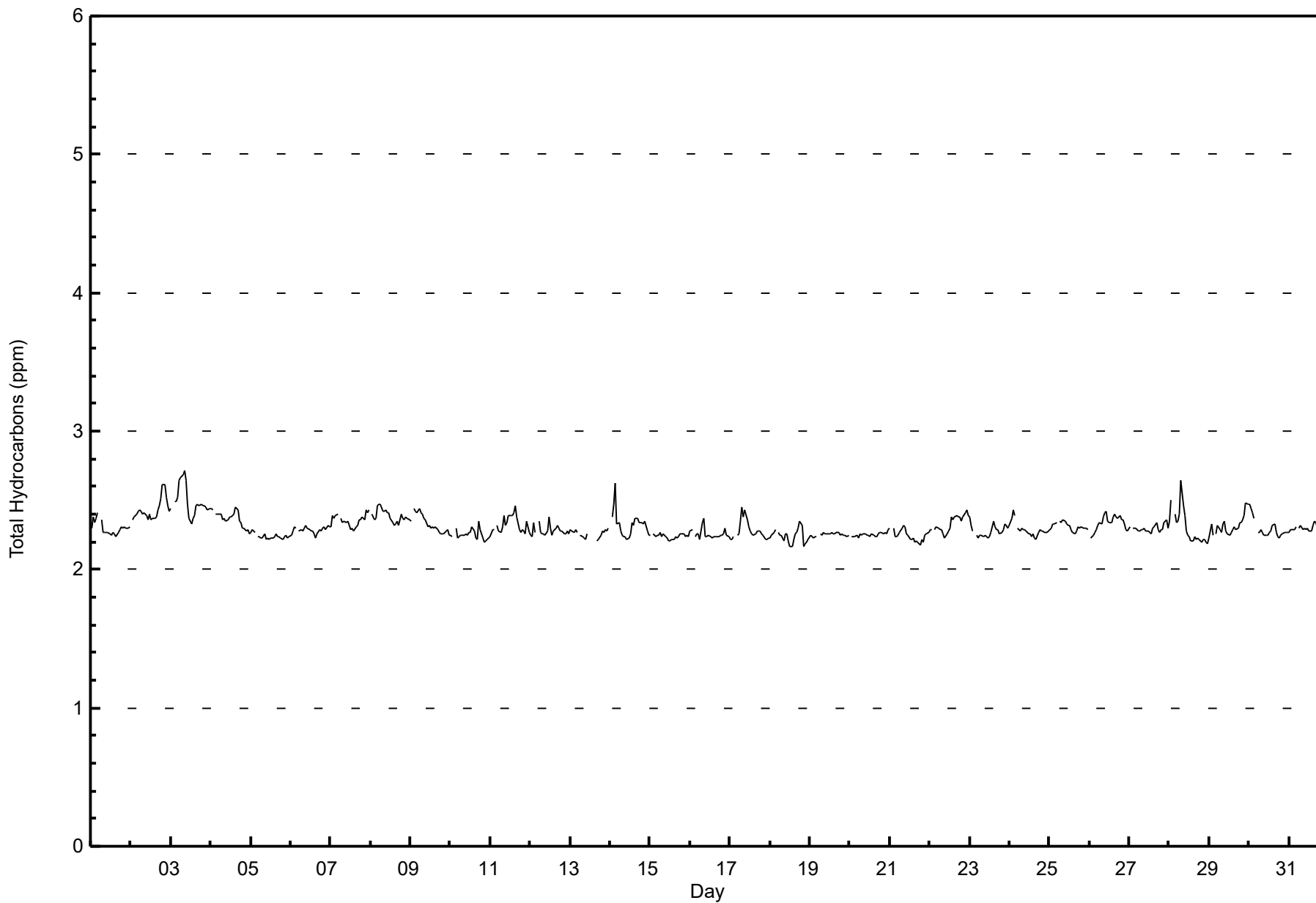


Wood Buffalo Environmental Association

Hourly Averages

Total Hydrocarbons (THC) - ppm

Firebag - December 2023





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Firebag - December 2023

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	0	0.00	0.00
2.1 - 3.0	708	100.00	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 708

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Total Hydrocarbons (THC) - ppm
Firebag - December 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	0
2.1 - 3.0	16	20	12	3	2	7	22	54	80	186	166	76	32	16	7	9	708	
3.1 - 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	16	20	12	3	2	7	22	54	80	186	166	76	32	16	7	9	708	

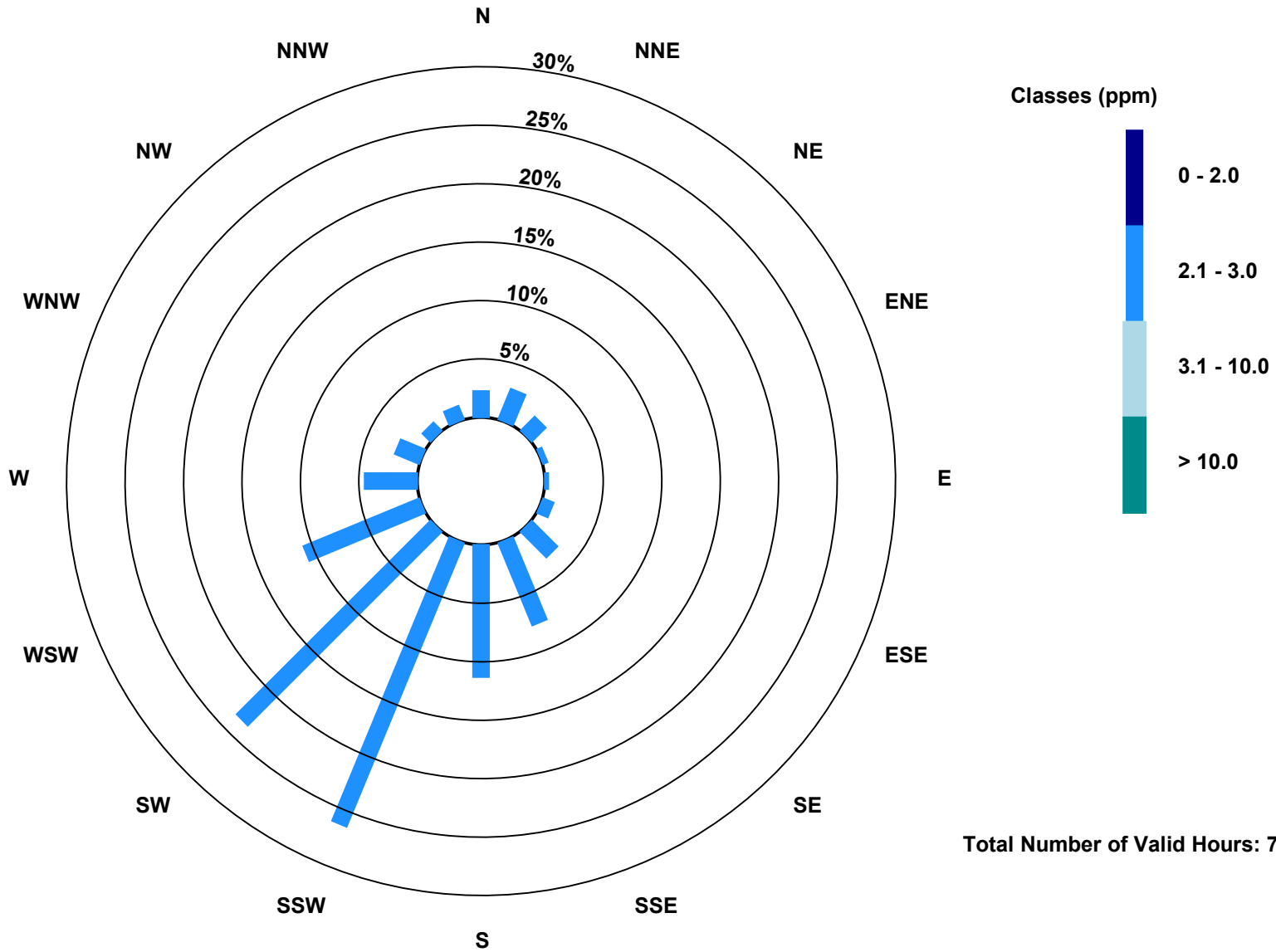
Total Number of Valid Hours: 708

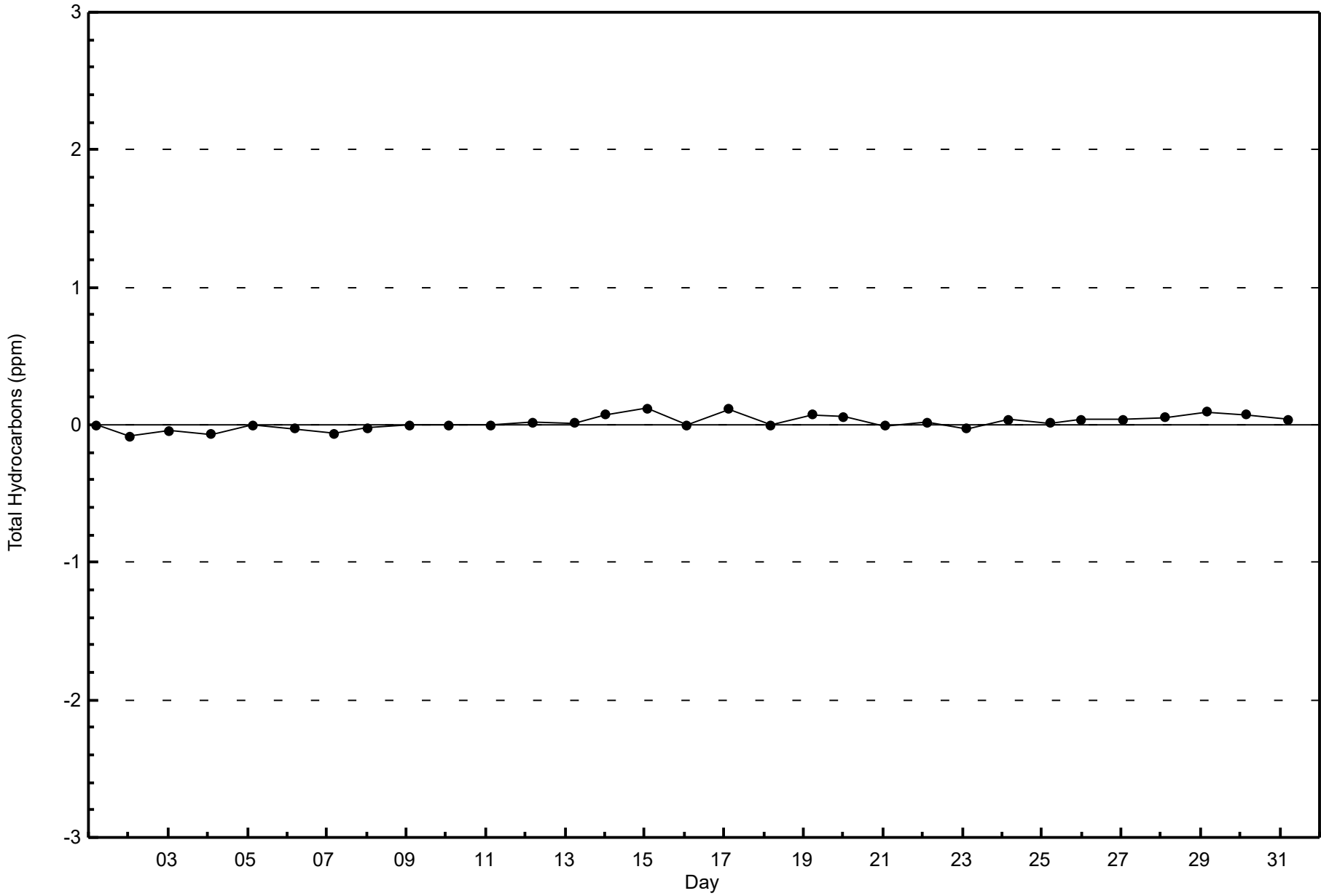
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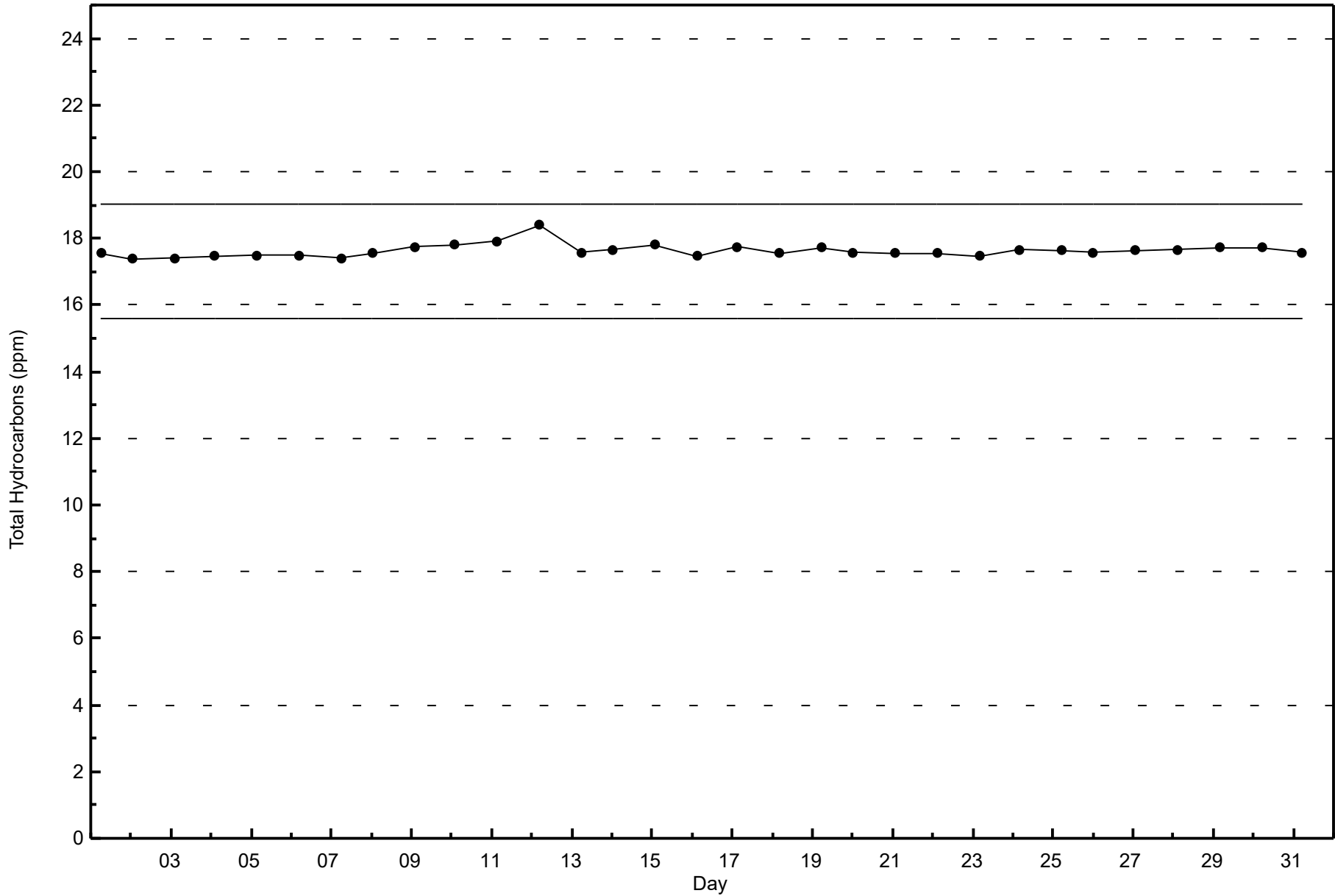


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Total Hydrocarbons (THC) - ppm
Firebag









Wood Buffalo Environmental Association

Summary of Hour Averages

Nitric Oxide (NO) - ppb

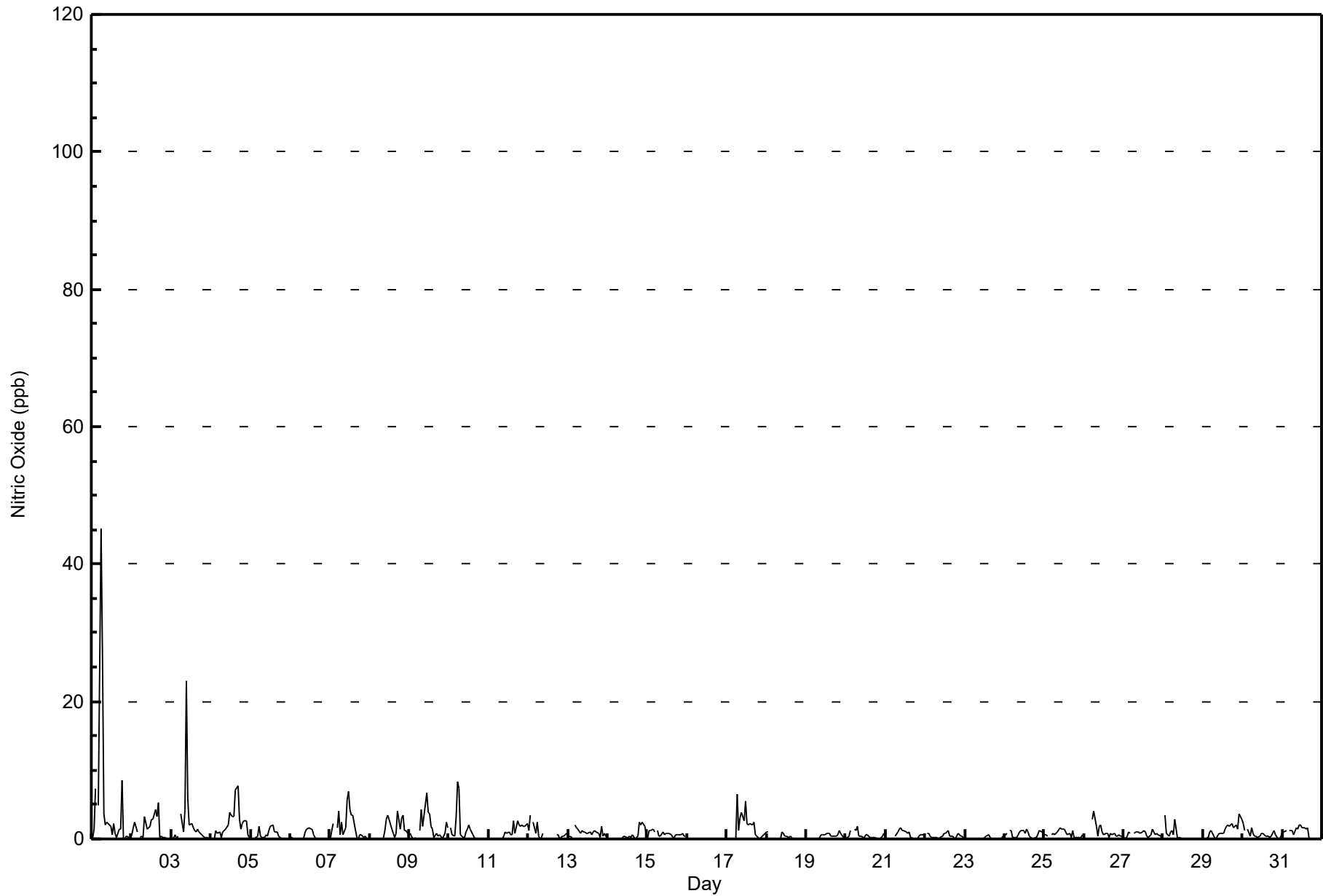
Firebag - December 2023

Maximum Value: 45.2 ppb on Dec 1 06:00																				Maximum Daily Average: 4.9 ppb on Dec 1					Hours in Service: 744								
Minimum Value: 0.0 ppb on Dec 1 20:00																				Minimum Daily Average: 0.0 ppb on Dec 16					Hours of Data: 706								
Maximum Diurnal Average: 2.9 ppb at hour 6																				Minimum Diurnal Average: 0.4 ppb at hour 1					Hours of Missing Data: 38								
Monthly Average: 1.04 ppb																				Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.1 Median = 0.5 Q ₃ = 1.2 P ₉₀ = 2.3 P ₉₉ = 7.3					Hours of Calibration: 38								
																				Percent Operational Time: 100.0													
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24									
1-Dec	0.2	1.4	7.3	Z	4.8	45.2	26.5	3.6	2.1	2.5	2.3	1.8	0.6	2.3	0.8	0.2	1.4	1.5	8.6	0.0	0.0	0.5	0.1	0.1	4.9	45.2							
2-Dec	0.6	1.5	2.4	1.0	Z	0.2	0.5	0.2	3.3	1.5	1.7	1.8	2.9	2.8	4.2	3.3	5.2	0.1	0.4	0.3	0.2	0.0	0.0	0.0	1.5	5.2							
3-Dec	0.0	0.1	0.6	0.0	0.4	Z	3.7	1.1	4.3	22.9	5.9	2.0	2.2	1.7	1.2	1.1	1.5	1.0	0.6	0.4	0.3	0.2	0.1	0.1	2.2	22.9							
4-Dec	Z	0.0	0.1	1.2	0.8	1.1	0.3	1.0	1.3	1.4	2.1	3.9	3.5	3.3	3.3	7.1	7.7	2.9	1.5	2.2	2.7	2.6	0.7	0.2	2.2	7.7							
5-Dec	0.1	Z	0.2	0.2	0.4	1.9	0.5	0.2	0.2	0.7	0.4	1.1	1.9	2.1	1.0	0.9	1.0	0.3	0.2	0.0	0.0	0.0	0.0	0.0	0.6	2.1							
6-Dec	0.2	0.2	Z	0.0	0.0	0.0	0.0	0.1	0.2	1.0	1.3	1.7	1.3	1.5	0.6	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	1.7							
7-Dec	0.0	1.3	2.3	Z	1.6	4.2	0.5	2.5	0.6	1.7	5.7	6.9	4.3	3.4	3.4	1.3	0.2	0.1	0.5	0.5	0.2	0.3	0.1	0.0	1.8	6.9							
8-Dec	0.1	0.0	0.0	0.0	Z	0.1	0.0	0.1	0.2	1.3	2.9	3.5	2.9	1.5	0.8	0.3	0.9	4.1	1.5	3.1	3.4	1.2	1.2	0.7	1.3	4.1							
9-Dec	0.8	0.3	0.1	0.1	0.2	Z	1.3	4.3	1.9	3.5	6.6	3.8	3.6	1.8	1.4	0.2	0.9	0.4	0.7	0.4	0.0	0.7	2.4	1.6	1.6	6.6							
10-Dec	Z	1.6	0.5	0.4	3.2	8.4	7.3	0.7	0.3	0.2	1.0	1.3	2.0	1.4	0.6	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	8.4							
11-Dec	0.0	Z	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.4	1.0	0.9	1.0	0.7	0.6	2.6	0.8	2.6	2.0	1.8	2.1	1.8	1.9	2.2	1.0	2.6							
12-Dec	1.1	3.4	Z	2.4	0.8	2.4	0.3	0.1	0.1	0.8	C	C	C	C	C	C	C	0.6	0.5	0.1	0.4	0.4	0.6	0.9	--	3.4							
13-Dec	0.3	0.5	0.2	Z	2.1	1.6	1.4	0.7	1.3	1.0	1.0	0.9	0.9	0.9	0.7	1.0	1.2	1.1	0.9	0.2	1.9	0.4	0.9	0.4	0.9	2.1							
14-Dec	0.0	0.0	0.0	0.1	Z	0.0	0.0	0.0	0.0	0.3	0.3	0.3	0.3	0.3	0.3	0.6	0.0	0.2	0.4	2.5	2.1	2.4	1.8	0.7	0.6	2.5							
15-Dec	0.2	1.2	1.3	1.5	1.0	Z	1.1	0.4	0.4	1.0	0.5	0.8	0.9	0.8	0.6	0.2	0.2	0.6	0.7	0.6	0.6	0.7	0.5	0.5	0.7	1.5							
16-Dec	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	0.1	0.0	0.0	0.0	0.0	0.1							
17-Dec	0.0	Z	0.0	0.0	0.0	0.0	6.5	1.2	3.1	3.8	2.7	5.4	2.2	2.0	2.3	2.1	2.4	0.6	0.5	0.1	0.1	0.5	0.7	0.9	1.6	6.5							
18-Dec	1.1	1.1	Z	0.0	0.0	0.0	0.0	0.0	0.0	1.1	0.9	0.5	0.4	0.2	0.3	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	1.1							
19-Dec	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.3	0.6	0.6	0.5	0.8	0.8	0.8	0.5	0.5	0.4	0.3	0.6	1.2	0.7	0.3	0.3	0.4	1.2							
20-Dec	0.3	0.2	0.4	1.2	Z	1.5	1.3	1.7	0.4	0.5	0.2	0.2	0.6	0.7	0.3	0.2	0.3	0.3	0.1	0.0	0.1	0.2	0.4	0.8	0.5	1.7							
21-Dec	0.2	0.0	0.0	0.0	0.0	Z	0.3	1.1	1.3	1.7	1.1	1.2	1.1	0.8	1.0	0.1	0.2	0.1	0.1	0.1	0.3	0.5	0.6	0.7	0.5	1.7							
22-Dec	Z	0.7	0.9	0.4	0.3	0.1	0.2	0.1	0.1	0.1	0.4	0.9	0.9	1.0	1.3	0.5	0.4	0.2	0.0	0.4	0.8	0.5	0.4	0.0	0.5	1.3							
23-Dec	0.1	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.2	0.5	0.6	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.1	0.6							
24-Dec	0.4	0.8	Z	1.2	1.1	0.1	0.1	0.3	0.6	1.0	1.1	1.2	0.8	1.4	0.9	0.4	0.2	0.1	0.2	0.2	0.6	1.3	1.0	0.9	0.7	1.4							
25-Dec	0.6	0.7	0.5	Z	0.7	0.7	0.5	0.8	1.1	1.7	1.5	1.4	1.3	1.0	0.7	0.8	0.2	1.3	0.2	0.1	0.1	0.2	0.3	0.6	0.7	1.7							
26-Dec	0.2	0.0	0.0	0.0	Z	2.8	4.1	1.8	0.4	1.9	2.0	1.0	0.6	0.9	0.8	0.3	0.7	0.7	0.8	0.4	0.4	0.5	0.5	0.4	0.9	4.1							
27-Dec	0.2	0.0	0.4	1.1	0.8	Z	0.9	1.0	1.0	1.0	0.9	1.0	1.2	1.0	0.4	0.3	0.5	1.5	1.1	0.6	0.8	0.6	0.3	0.1	0.7	1.5							
28-Dec	Z	3.4	0.9	0.3	1.1	1.1	0.7	2.9	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	0.5	3.4							
29-Dec	0.1	Z	0.3	0.2	0.9	1.1	0.3	0.1	0.2	0.5	0.8	0.7	0.9	1.5	1.7	2.0	1.7	2.2	1.6	1.8	2.1	1.4	3.6	2.9	1.3	3.6							
30-Dec	2.2	1.2	Z	1.3	0.5	1.6	0.9	0.4	0.3	0.2	0.5	0.8	0.8	0.6	0.5	0.3	0.3	0.3	0.9	1.1	0.6	0.1	0.1	0.4	0.7	2.2							
31-Dec	1.0	1.0	1.2	Z	1.3	1.2	1.3	0.5	1.6	1.4	2.0	2.1	1.6	1.7	1.4	1.6	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9	2.1							
																								Diurnal Average									
																								Diurnal Maximum									
Z - zerospan C - Calibration																																	



Wood Buffalo Environmental Association
Hourly Averages

Nitric Oxide (NO) - ppb
Firebag - December 2023





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitric Oxide (NO) - ppb
Firebag - December 2023**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	703	99.58	99.58
21 - 40	2	0.28	99.86
41 - 80	1	0.14	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 706

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitric Oxide (NO) - ppb
Firebag - December 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	16	19	12	2	1	8	24	55	70	187	167	74	35	16	8	9	703
21 - 40	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	2
11 - 80	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	16	19	12	2	1	8	24	55	71	189	167	74	35	16	8	9	706

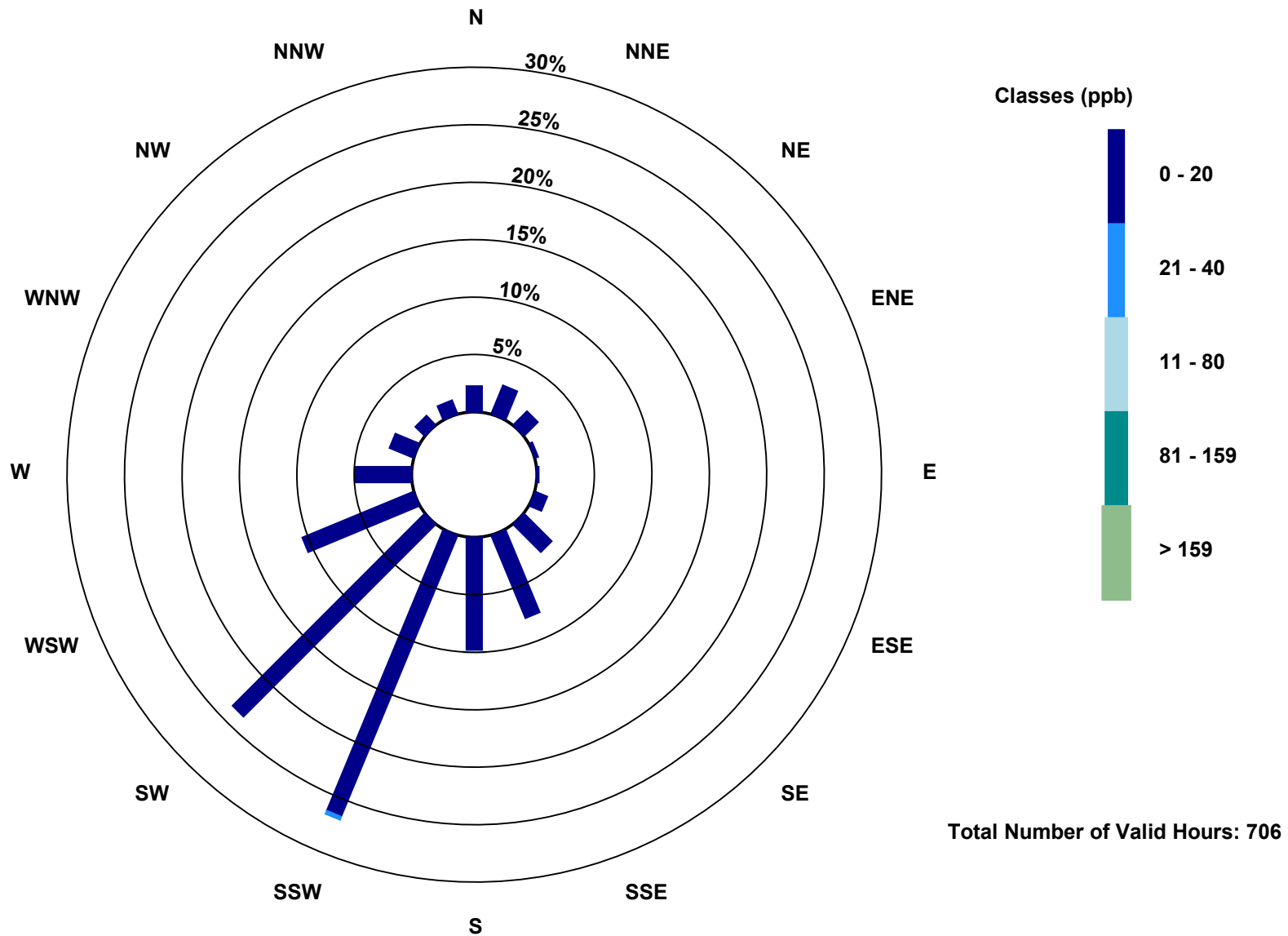
Total Number of Valid Hours: 706

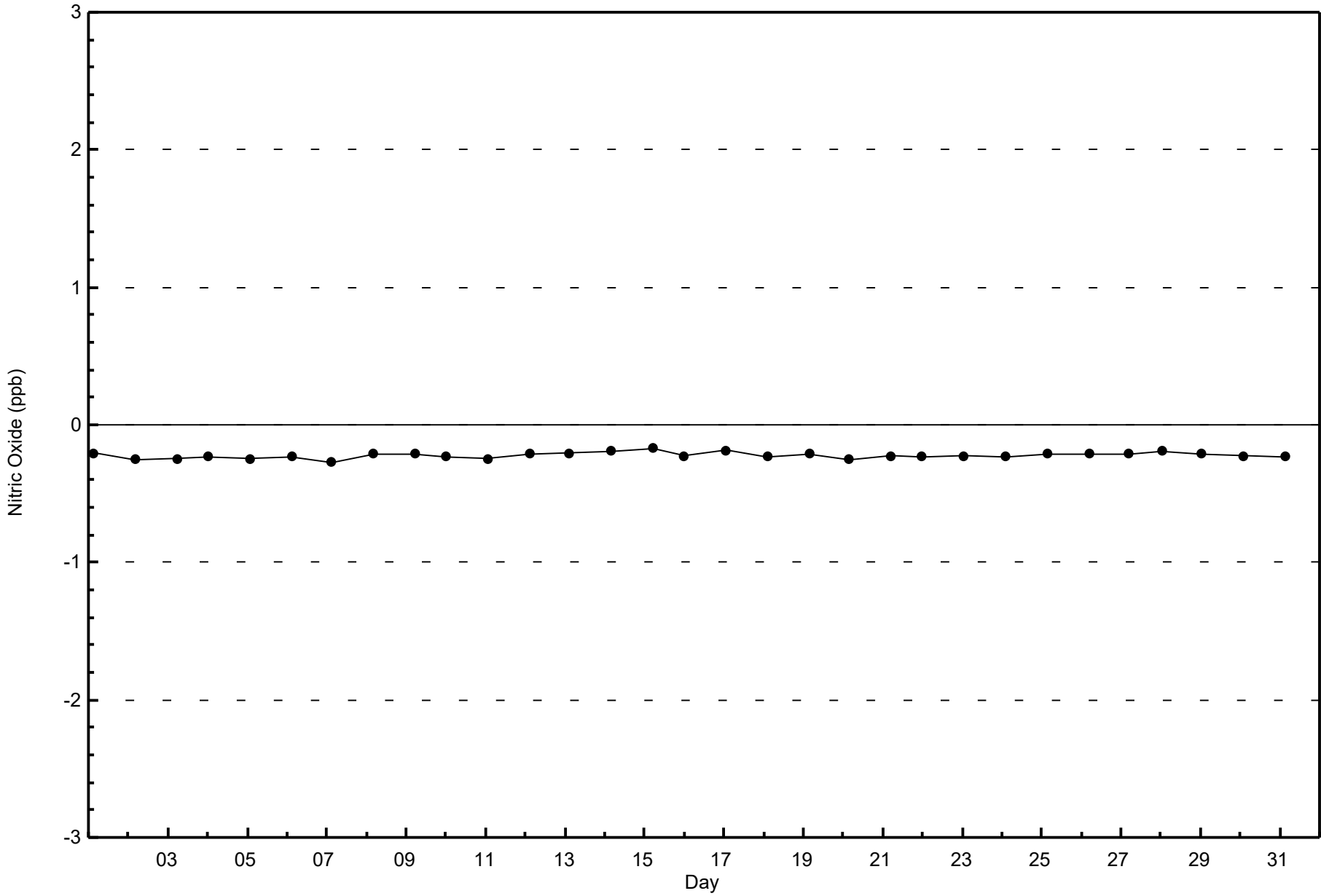
Total Number of Hours: 744

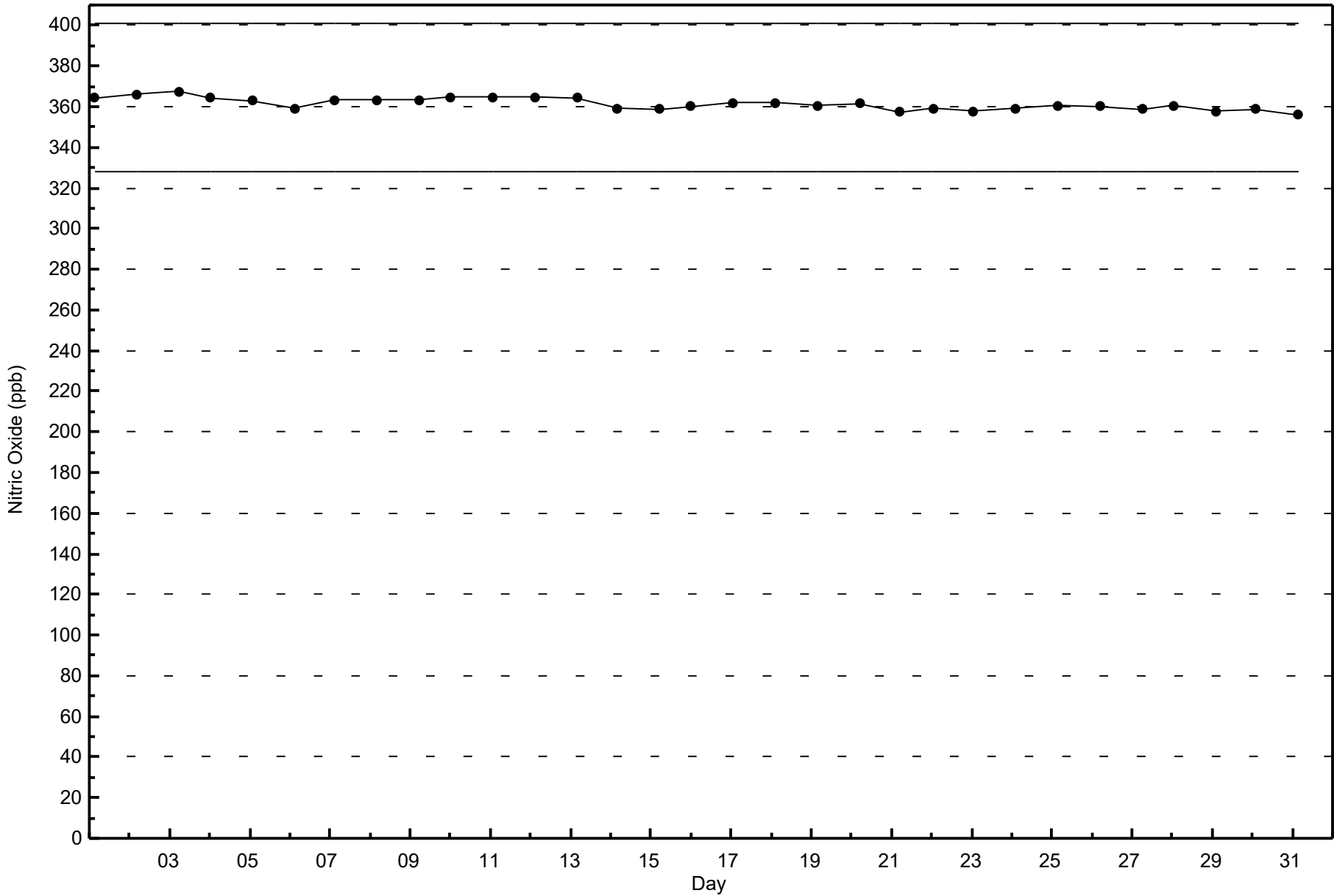


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Nitric Oxide (NO) - ppb
Firebag









Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO₂) - ppb

Firebag - December 2023

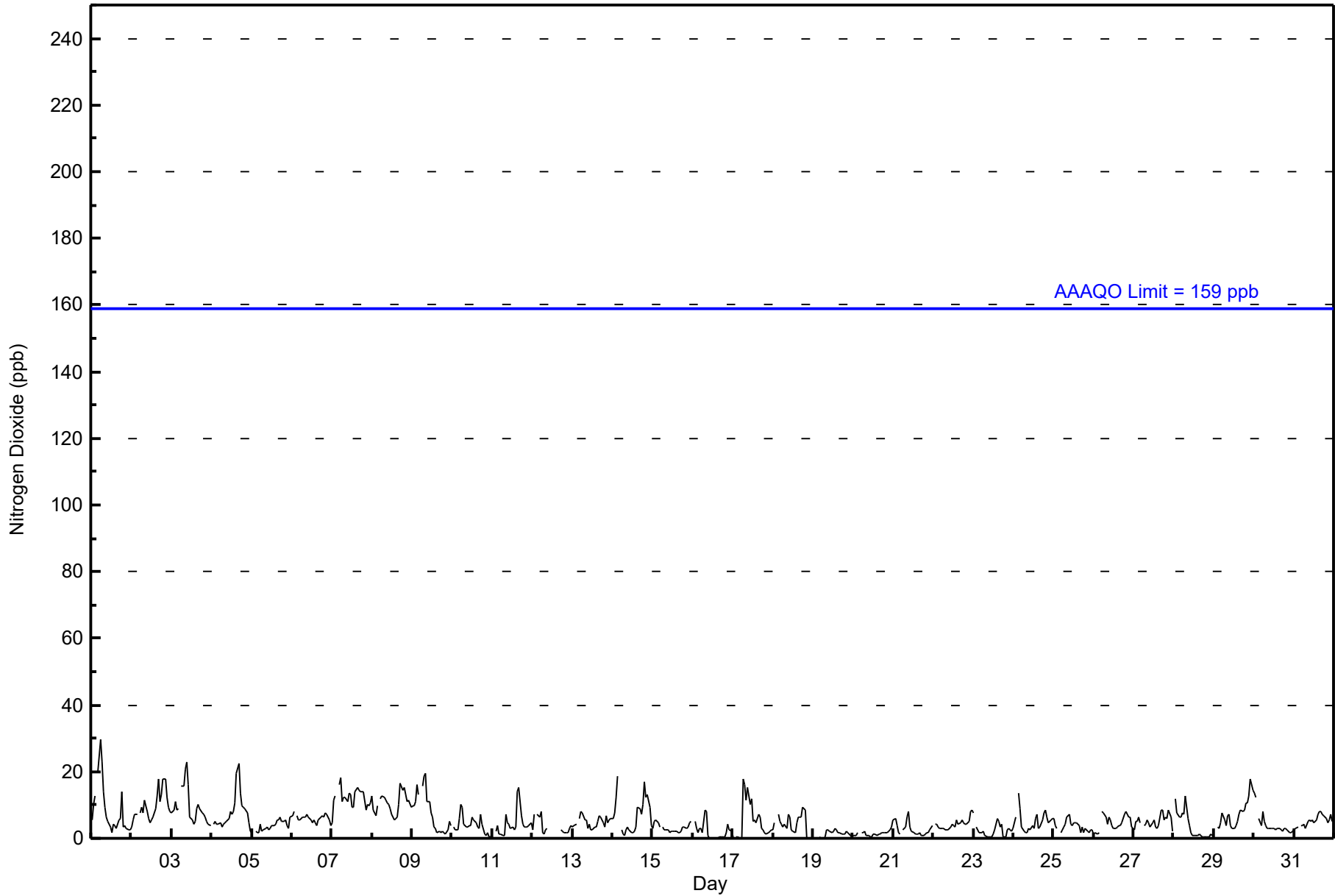
Number of Exceedences (AAQO):		1-hr: 0	24-hr: 0	Hours in Service: 744																	Daily Average		Daily Maximum																										
Maximum Value: 29.8 ppb on Dec 1 06:00		Maximum Daily Average: 12.2 ppb on Dec 7		Hours of Data: 706																	Hours of Missing Data: 38		Hours of Calibration: 38																										
Minimum Value: 0.1 ppb on Dec 18 21:00		Minimum Daily Average: 1.3 ppb on Dec 19		Hours of Calibration: 38																	Percent Operational Time: 100.0																												
Maximum Diurnal Average: 6.4 ppb at hour 17		Minimum Diurnal Average: 3.7 ppb at hour 13		Percentiles: P ₁ = 0.2 P ₁₀ = 1.2 Q ₁ = 2.4 Median = 4.2 Q ₃ = 7.1 P ₉₀ = 11.2 P ₉₉ = 19.3																																													
Monthly Average: 5.32 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-Dec	5.7	10.3	12.8	Z	19.9	29.8	22.9	14.0	9.2	6.5	5.0	3.6	1.8	4.4	3.8	2.9	5.7	5.8	13.9	3.4	4.0	3.0	2.6	2.7	8.4	29.8																							
2-Dec	3.6	5.3	7.4	7.3	Z	7.5	9.3	7.6	11.4	8.2	6.0	4.7	5.7	6.2	9.1	12.9	17.6	11.0	13.2	18.0	17.6	12.4	9.5	7.9	9.5	18.0																							
3-Dec	7.6	8.4	10.9	8.3	9.1	Z	15.8	15.5	20.8	22.7	16.2	6.2	5.4	4.4	5.1	8.7	10.2	8.9	7.6	7.0	6.4	5.2	4.2	3.9	9.5	22.7																							
4-Dec	Z	4.3	5.1	4.4	4.4	4.5	3.5	4.3	4.7	5.1	6.1	8.0	7.3	8.1	10.7	19.6	22.5	13.6	9.6	9.5	8.7	7.7	4.5	2.1	7.8	22.5																							
5-Dec	1.7	Z	2.0	1.9	1.9	4.4	2.3	2.4	3.1	3.3	2.5	2.9	3.8	4.0	4.1	5.7	5.7	6.5	5.2	5.0	5.6	4.0	2.9	6.4	3.8	6.5																							
6-Dec	6.7	8.2	Z	6.8	5.6	5.6	6.5	6.5	6.3	7.2	6.3	5.6	4.5	5.3	4.6	3.8	5.5	6.5	6.8	6.5	7.6	7.2	5.3	4.0	6.0	8.2																							
7-Dec	4.6	11.6	12.7	Z	16.3	18.1	11.2	12.2	12.1	11.1	13.6	13.1	9.3	9.5	13.9	15.4	14.5	13.8	13.9	14.1	8.3	10.3	9.8	10.8	12.2	18.1																							
8-Dec	12.5	8.5	6.7	9.7	Z	11.9	12.5	12.2	11.6	10.6	10.2	9.0	7.4	5.5	6.1	6.3	10.0	16.5	14.3	15.1	13.1	11.0	11.3	9.4	10.5	16.5																							
9-Dec	9.9	9.8	11.1	16.2	13.2	Z	15.5	18.5	19.3	11.0	11.1	7.5	6.3	3.4	3.0	1.5	2.3	1.8	2.0	1.6	1.4	2.7	5.0	3.7	7.7	19.3																							
10-Dec	Z	3.5	2.7	2.6	5.9	10.3	9.4	4.4	3.6	3.2	4.0	4.0	6.5	5.6	4.7	3.2	3.0	7.4	4.4	1.2	0.8	1.9	0.3	0.3	4.0	10.3																							
11-Dec	0.9	Z	2.3	3.9	1.3	1.2	0.9	0.8	7.0	4.6	4.2	3.0	3.3	2.6	3.3	13.8	15.3	6.9	4.1	3.2	3.6	3.5	3.9	4.6	4.3	15.3																							
12-Dec	2.4	7.1	Z	7.1	6.3	7.9	1.8	1.2	2.6	2.8	C	C	C	C	C	C	C	2.7	2.1	1.5	1.9	1.8	3.0	3.7	--	7.9																							
13-Dec	3.4	3.9	4.4	Z	6.1	8.0	7.7	5.4	5.6	3.1	4.1	2.7	2.7	3.3	3.3	4.9	6.8	6.3	4.8	3.6	6.7	4.8	5.7	5.9	4.9	8.0																							
14-Dec	6.0	7.6	12.4	18.6	Z	2.4	1.2	0.8	2.6	3.5	2.6	1.6	1.6	2.1	3.3	9.5	8.8	7.1	10.3	17.0	12.3	13.1	9.3	3.9	6.9	18.6																							
15-Dec	3.1	5.1	5.7	4.5	3.6	Z	3.4	2.6	2.4	2.6	1.9	2.2	2.2	2.3	2.2	1.8	1.6	2.3	3.3	3.5	3.1	3.6	4.5	5.1	3.2	5.7																							
16-Dec	Z	4.9	3.1	1.5	3.1	2.9	1.8	8.3	8.1	1.0	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.4	0.4	0.4	1.9	4.4	2.5	2.2	2.1	8.3																							
17-Dec	0.2	Z	0.6	0.4	0.2	0.2	17.6	16.2	11.5	15.4	10.2	12.0	5.0	5.6	4.7	7.3	6.4	2.9	2.5	1.5	1.2	1.7	2.2	2.6	5.6	17.6																							
18-Dec	2.7	4.8	Z	7.1	5.0	4.2	3.6	4.2	3.1	7.3	6.3	2.6	2.0	1.6	4.5	6.4	6.2	6.5	9.4	8.4	0.1	0.2	0.2	0.2	4.2	9.4																							
19-Dec	0.2	0.2	0.2	Z	0.3	0.2	0.2	0.3	2.4	2.5	2.0	1.6	2.0	2.9	2.6	1.8	1.9	1.4	1.1	1.3	2.1	1.5	0.7	0.6	1.3	2.9																							
20-Dec	0.7	0.7	0.7	1.9	Z	1.9	1.9	2.0	0.7	0.7	0.5	0.4	1.1	1.2	0.9	1.1	1.4	1.5	1.6	1.8	1.9	2.2	2.4	3.4	1.4	3.4																							
21-Dec	5.7	6.0	3.9	1.6	1.2	Z	2.5	3.4	6.4	8.1	3.4	2.0	1.7	1.4	1.4	1.1	1.9	1.0	0.9	1.1	1.5	1.8	2.7	3.8	2.8	8.1																							
22-Dec	Z	4.3	4.4	3.5	2.8	2.9	2.8	2.4	2.5	2.7	3.6	4.1	3.7	3.5	5.3	4.2	4.6	5.3	4.7	4.3	4.4	5.2	8.1	8.4	4.2	8.4																							
23-Dec	7.8	Z	3.2	1.7	1.6	1.8	2.1	0.8	0.5	0.5	0.4	0.3	1.1	2.7	6.0	5.0	3.4	4.2	0.5	0.5	2.4	3.1	2.7	2.3	2.4	7.8																							
24-Dec	2.9	6.4	Z	13.6	8.8	3.2	2.0	1.5	1.6	2.8	2.5	4.0	2.8	5.9	7.1	3.0	3.2	5.5	7.8	8.4	6.5	4.6	5.4	5.9	5.0	13.6																							
25-Dec	5.9	3.7	3.1	Z	1.7	2.5	3.5	4.1	6.5	7.1	4.3	3.8	4.5	4.6	4.6	3.7	1.6	3.3	1.6	3.0	2.0	1.8	2.4	2.5	3.6	7.1																							
26-Dec	1.4	1.5	1.2	1.5	Z	7.9	7.7	6.4	4.4	6.5	5.6	3.7	2.8	2.8	3.5	3.7	4.0	4.8	7.1	7.9	7.2	6.5	6.3	3.2	4.7	7.9																							
27-Dec	2.7	5.1	5.0	6.3	4.5	Z	4.0	4.3	5.5	4.5	3.2	4.5	5.5	3.3	2.8	4.0	8.5	8.6	5.6	6.2	6.1	8.3	6.2	2.1	5.1	8.6																							
28-Dec	Z	12.0	7.7	6.4	6.2	7.7	7.0	12.9	6.0	3.8	1.8	0.7	0.7	0.8	0.8	1.3	0.9	0.5	0.3	0.4	0.3	0.5	1.1	0.9	3.5	12.9																							
29-Dec	1.3	Z	3.4	3.0	4.7	7.5	5.3	3.8	6.8	7.1	4.0	2.9	3.0	4.0	5.0	7.4	8.3	7.9	8.3	10.6	10.6	12.8	18.0	14.6	7.0	18.0																							
30-Dec	13.7	12.4	Z	6.0	4.0	8.0	5.1	3.8	3.1	3.0	3.0	3.1	2.9	2.5	2.8	2.8	2.5	2.1	2.8	3.1	2.4	1.6	1.6	2.0	4.1	13.7																							
31-Dec	2.4	2.8	3.3	Z	3.8	3.8	4.2	3.0	5.1	5.5	5.1	5.3	4.6	5.4	7.2	8.1	8.2	7.0	6.7	5.9	4.8	5.4	7.4	5.1	5.2	8.2																							
																								4.5	6.1	5.2	5.8	5.4	6.4	6.3	6.0	6.3	5.9	5.0	4.2	3.7	3.8	4.6	5.7	6.4	5.8	5.7	5.6	5.0	5.0	4.9	4.3	Diurnal Average	
																								13.7	12.4	12.8	18.6	19.9	29.8	22.9	18.5	20.8	22.7	16.2	13.1	9.3	9.5	13.9	19.6	22.5	16.5	14.3	18.0	17.6	13.1	18.0	14.6	Diurnal Maximum	

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



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Dioxide (NO₂) - ppb
Firebag - December 2023





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Firebag - December 2023**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	701	99.29	99.29
21 - 40	5	0.71	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 706

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Firebag - December 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	16	19	12	2	1	8	24	55	70	185	167	74	35	16	8	9	701
21 - 40	0	0	0	0	0	0	0	0	1	4	0	0	0	0	0	0	5
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	16	19	12	2	1	8	24	55	71	189	167	74	35	16	8	9	706

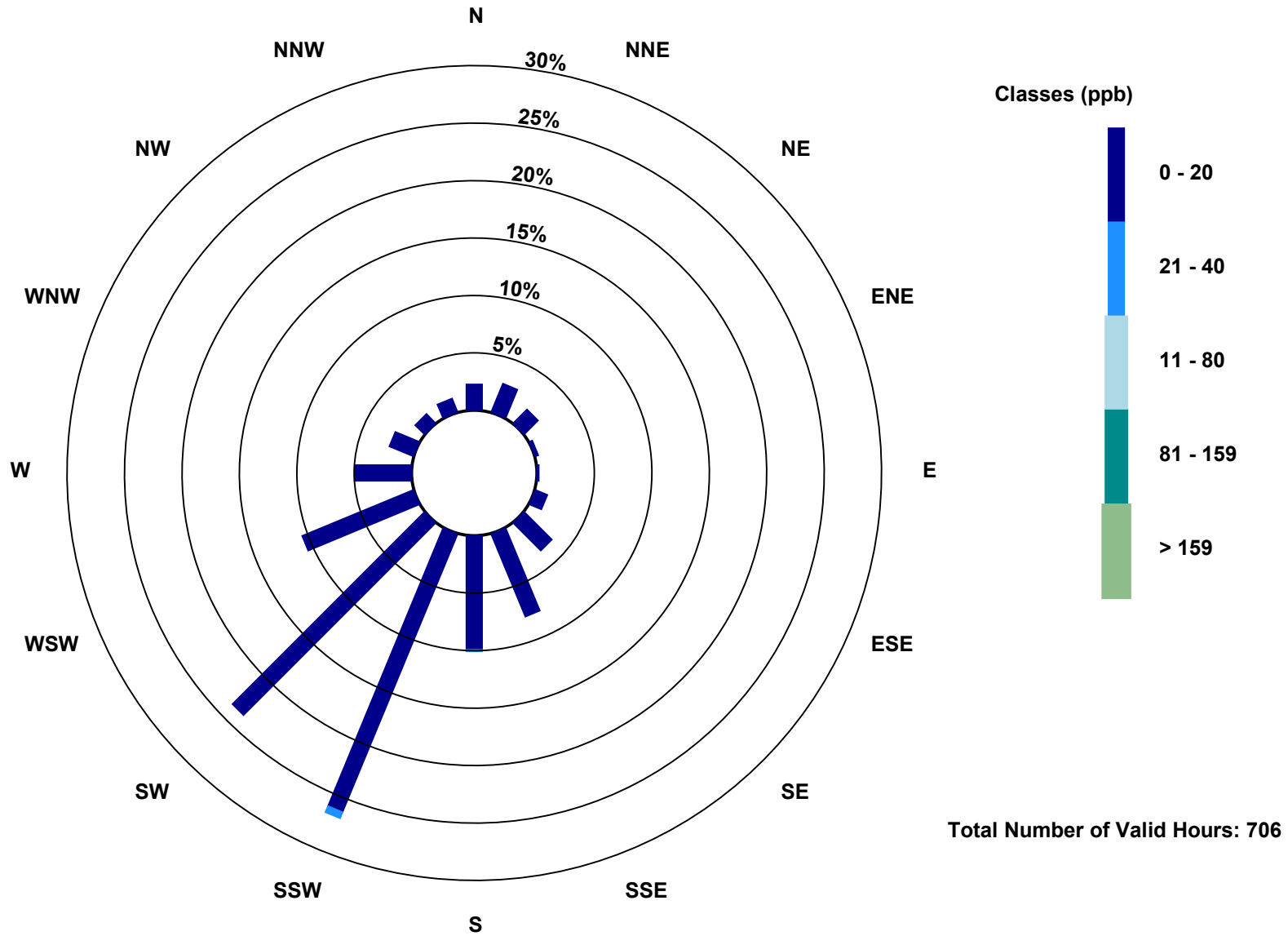
Total Number of Valid Hours: 706

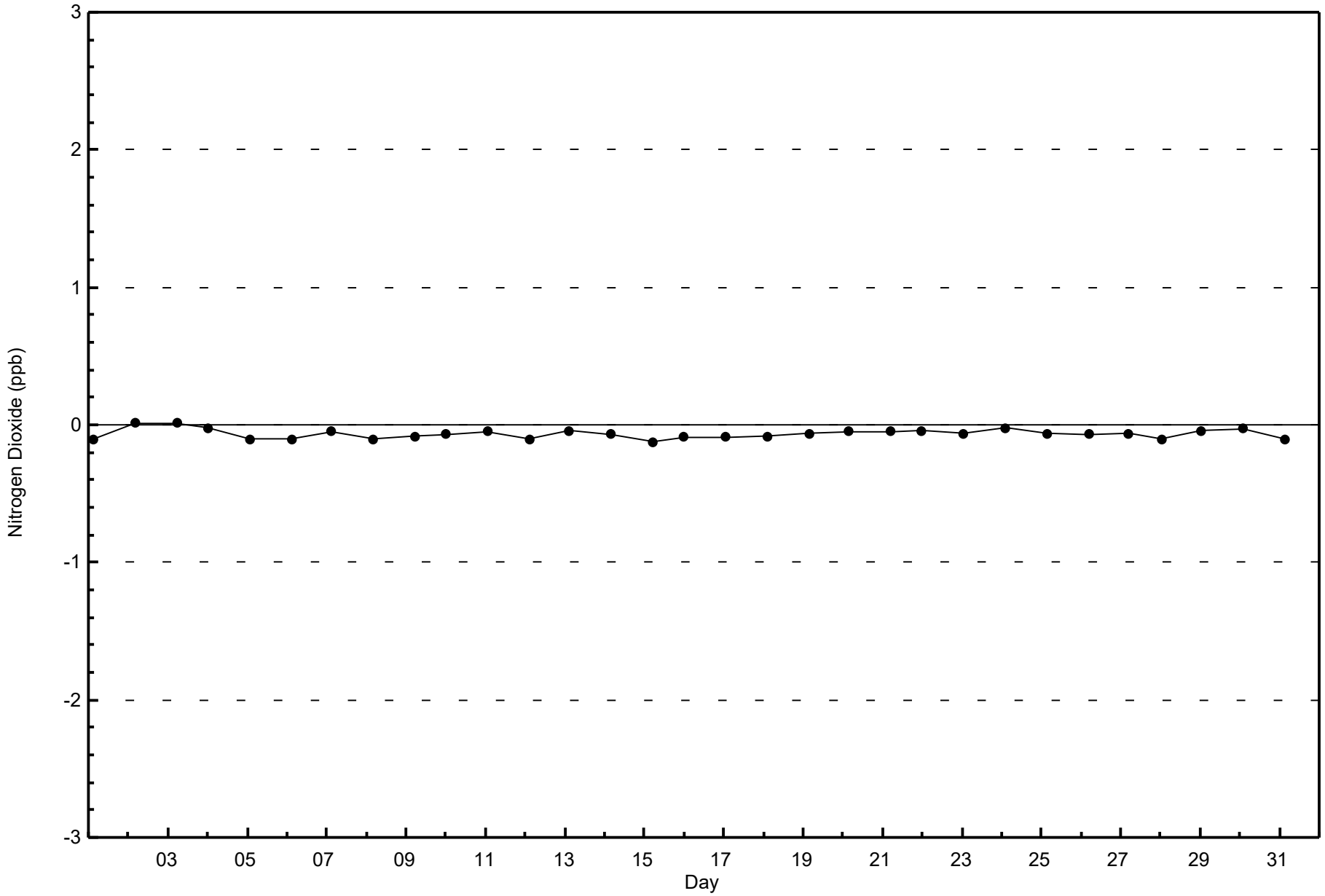
Total Number of Hours: 744

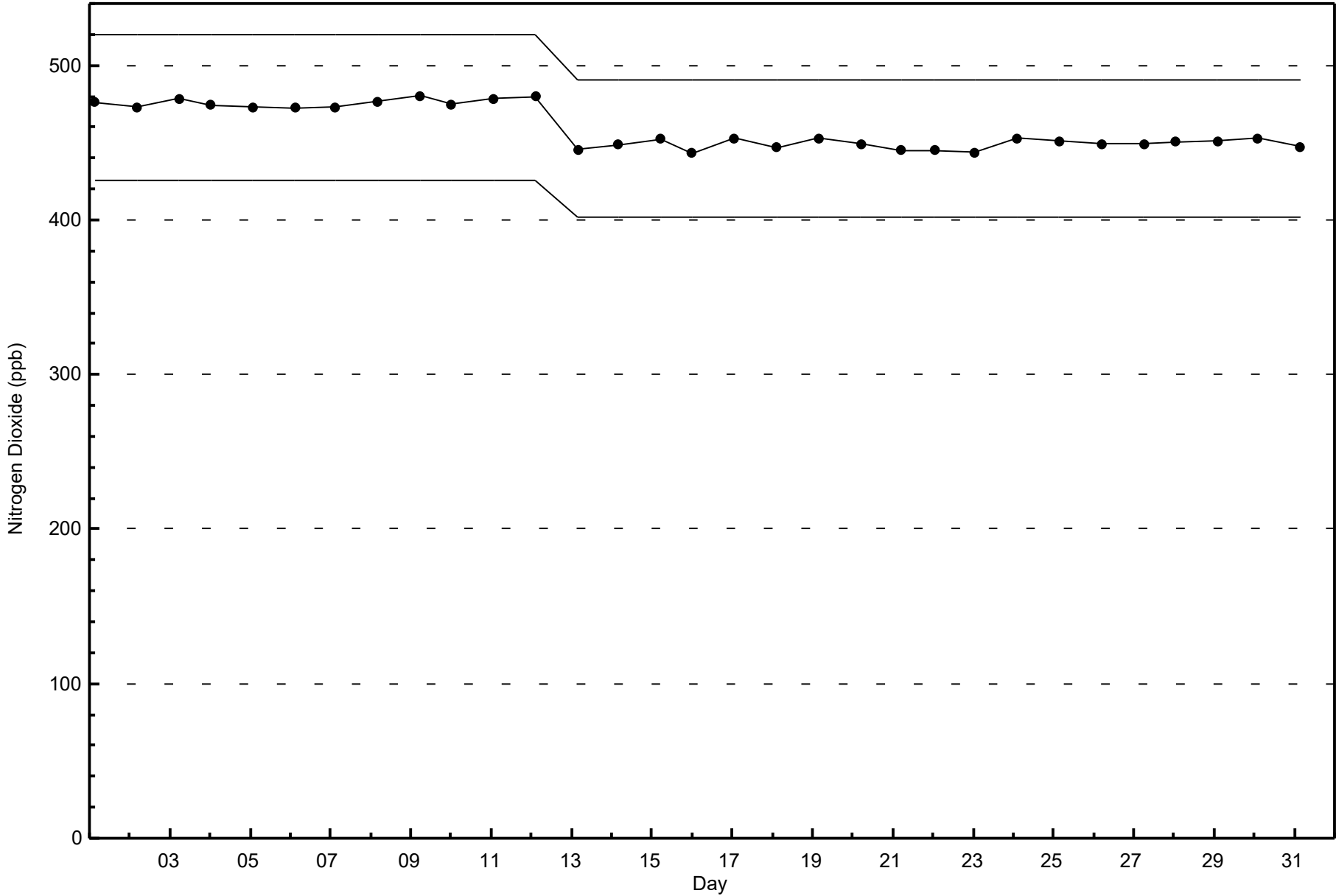


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Nitrogen Dioxide (NO₂) - ppb
Firebag









Wood Buffalo Environmental Association
Summary of Hour Averages

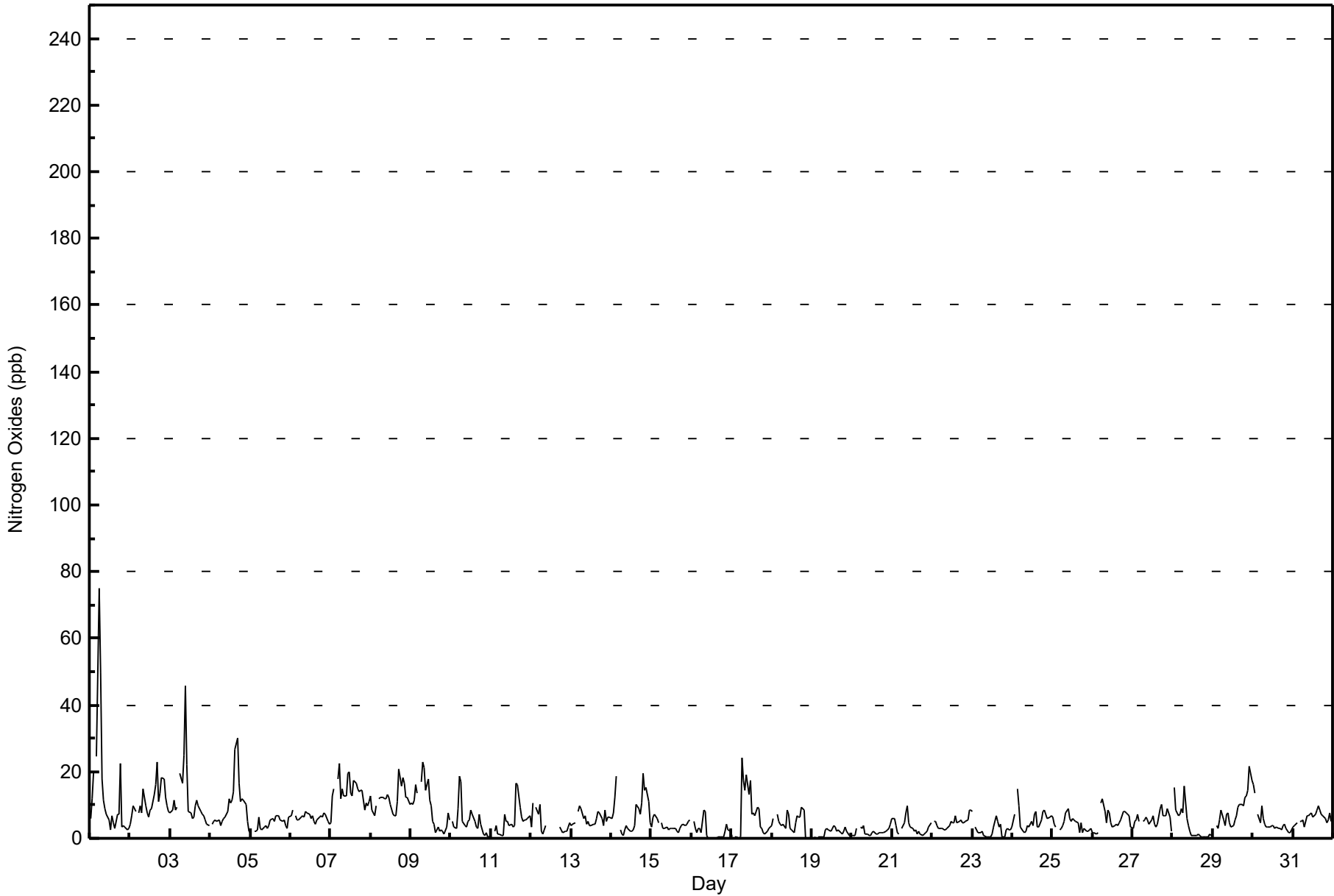
Nitrogen Oxides (NO_x) - ppb
Firebag - December 2023

Maximum Value: 75.0 ppb on Dec 1 06:00		Maximum Daily Average: 14.0 ppb on Dec 7		Hours in Service: 744																																													
Minimum Value: 0.1 ppb on Dec 18 21:00		Minimum Daily Average: 1.7 ppb on Dec 19		Hours of Data: 706																																													
Maximum Diurnal Average: 9.3 ppb at hour 6		Minimum Diurnal Average: 4.8 ppb at hour 1		Hours of Missing Data: 38																																													
Monthly Average: 6.36 ppb		Percentiles: P ₁ = 0.2 P ₁₀ = 1.2 Q ₁ = 2.9 Median = 5.1 Q ₃ = 8.1 P ₉₀ = 12.8 P ₉₉ = 24.1		Hours of Calibration: 38																																													
				Percent Operational Time: 100.0																																													
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Dec	5.9	11.7	20.1	Z	24.7	75.0	49.4	17.6	11.3	9.0	7.3	5.4	2.4	6.7	4.6	3.1	7.1	7.3	22.5	3.4	4.0	3.5	2.7	2.8	13.4	75.0																							
2-Dec	4.2	6.8	9.8	8.3	Z	7.7	9.8	7.8	14.7	9.7	7.7	6.5	8.6	9.0	13.3	16.2	22.8	11.1	13.6	18.3	17.8	12.4	9.5	7.9	11.0	22.8																							
3-Dec	7.6	8.5	11.5	8.3	9.5	Z	19.5	16.6	25.1	45.6	22.1	8.2	7.6	6.1	6.3	9.8	11.7	9.9	8.2	7.4	6.7	5.4	4.3	4.0	11.7	45.6																							
4-Dec	Z	4.3	5.2	5.6	5.2	5.6	3.8	5.3	6.0	6.5	8.2	11.9	10.8	11.4	14.0	26.7	30.2	16.5	11.1	11.7	11.4	10.3	5.2	2.3	10.0	30.2																							
5-Dec	1.8	Z	2.2	2.1	2.3	6.3	2.8	2.6	3.3	4.0	2.9	4.0	5.7	6.1	5.1	6.6	6.7	6.8	5.4	5.0	5.6	4.0	2.9	6.4	4.4	6.8																							
6-Dec	6.9	8.4	Z	6.8	5.6	5.6	6.5	6.6	6.5	8.2	7.6	7.3	5.8	6.8	5.2	4.0	5.5	6.5	6.8	6.5	7.6	7.2	5.3	4.0	6.4	8.4																							
7-Dec	4.6	12.9	15.0	Z	17.9	22.3	11.7	14.7	12.7	12.8	19.3	20.0	13.6	12.9	17.3	16.7	14.7	13.9	14.4	14.6	8.5	10.6	9.9	10.8	14.0	22.3																							
8-Dec	12.6	8.5	6.7	9.7	Z	12.0	12.5	12.3	11.8	11.9	13.1	12.5	10.3	7.0	6.9	6.6	10.9	20.6	15.8	18.2	16.5	12.2	12.5	10.1	11.8	20.6																							
9-Dec	10.7	10.1	11.2	16.3	13.4	Z	16.8	22.8	21.2	14.5	17.7	11.3	9.9	5.2	4.4	1.7	3.2	2.2	2.7	2.0	1.4	3.4	7.4	5.3	9.3	22.8																							
10-Dec	Z	5.1	3.2	3.0	9.1	18.7	16.7	5.1	3.9	3.4	5.0	5.3	8.5	7.0	5.3	3.3	3.0	7.4	4.4	1.2	0.8	1.9	0.3	0.3	5.3	18.7																							
11-Dec	0.9	Z	2.3	4.0	1.3	1.2	0.9	0.8	7.1	5.0	5.2	3.9	4.3	3.3	3.9	16.4	16.1	9.5	6.1	5.0	5.7	5.3	5.8	6.8	5.2	16.4																							
12-Dec	3.5	10.5	Z	9.5	7.1	10.3	2.1	1.3	2.7	3.6	C	C	C	C	C	C	C	3.3	2.6	1.6	2.3	2.2	3.6	4.6	--	10.5																							
13-Dec	3.7	4.4	4.6	Z	8.2	9.6	9.1	6.1	6.9	4.1	5.1	3.6	3.6	4.2	4.0	5.9	8.0	7.4	5.7	3.8	8.6	5.2	6.6	6.3	5.9	9.6																							
14-Dec	6.0	7.6	12.4	18.7	Z	2.4	1.2	0.8	2.6	3.8	2.9	1.9	1.9	2.4	3.6	10.1	8.8	7.3	10.7	19.5	14.4	15.5	11.1	4.6	7.4	19.5																							
15-Dec	3.3	6.3	7.0	6.0	4.6	Z	4.5	3.0	2.8	3.6	2.4	3.0	3.1	3.1	2.8	2.0	1.8	2.9	4.0	4.1	3.7	4.3	5.0	5.6	3.9	7.0																							
16-Dec	Z	4.9	3.1	1.5	3.1	2.9	1.8	8.3	8.2	1.0	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.4	0.4	0.4	2.0	4.4	2.5	2.2	2.1	8.3																							
17-Dec	0.2	Z	0.6	0.4	0.2	0.2	24.1	17.4	14.6	19.2	12.9	17.4	7.2	7.6	7.0	9.4	8.8	3.5	3.0	1.6	1.3	2.2	2.9	3.5	7.2	24.1																							
18-Dec	3.8	5.9	Z	7.1	5.0	4.2	3.6	4.2	3.1	8.4	7.2	3.1	2.4	1.8	4.8	6.6	6.2	6.5	9.4	8.4	0.1	0.2	0.2	0.2	4.5	9.4																							
19-Dec	0.2	0.2	0.2	Z	0.3	0.2	0.2	0.3	2.7	3.1	2.6	2.1	2.8	3.7	3.4	2.3	2.4	1.8	1.4	1.9	3.3	2.2	1.0	0.9	1.7	3.7																							
20-Dec	1.0	0.9	1.1	3.1	Z	3.4	3.2	3.7	1.1	1.2	0.7	0.6	1.7	1.9	1.2	1.3	1.7	1.8	1.7	1.8	2.0	2.4	2.8	4.2	1.9	4.2																							
21-Dec	5.9	6.0	3.9	1.6	1.2	Z	2.8	4.5	7.7	9.8	4.5	3.2	2.8	2.2	2.4	1.2	2.1	1.1	1.0	1.2	1.8	2.3	3.3	4.5	3.3	9.8																							
22-Dec	Z	5.0	5.3	3.9	3.1	3.0	3.0	2.5	2.6	2.8	4.0	5.0	4.6	4.5	6.6	4.7	5.0	5.5	4.7	4.7	5.2	5.7	8.5	8.4	4.7	8.5																							
23-Dec	7.9	Z	3.2	1.7	1.6	1.8	2.1	0.8	0.5	0.5	0.5	0.3	1.3	3.2	6.6	5.2	3.5	4.2	0.5	0.5	2.4	3.1	2.7	2.6	2.5	7.9																							
24-Dec	3.3	7.2	Z	14.8	9.9	3.3	2.1	1.8	2.2	3.8	3.6	5.2	3.6	7.3	8.0	3.4	3.4	5.6	8.0	8.6	7.1	5.9	6.4	6.8	5.7	14.8																							
25-Dec	6.5	4.4	3.6	Z	2.4	3.2	4.0	4.9	7.6	8.8	5.8	5.2	5.8	5.3	5.3	4.5	1.8	4.6	1.8	3.1	2.1	2.0	2.7	3.1	4.3	8.8																							
26-Dec	1.6	1.5	1.2	1.5	Z	10.7	11.8	8.2	4.8	8.4	7.6	4.7	3.4	3.7	4.3	4.0	4.7	5.5	7.9	8.3	7.6	7.0	6.8	3.6	5.6	11.8																							
27-Dec	2.9	5.1	5.4	7.4	5.3	Z	4.9	5.3	6.5	5.5	4.1	5.5	6.7	4.3	3.2	4.3	9.0	10.1	6.7	6.8	6.9	8.9	6.5	2.2	5.8	10.1																							
28-Dec	Z	15.4	8.6	6.7	7.3	8.8	7.7	15.8	6.0	3.9	1.9	0.8	0.8	0.9	0.9	1.3	0.9	0.5	0.3	0.4	0.3	0.5	1.1	0.9	4.0	15.8																							
29-Dec	1.4	Z	3.7	3.2	5.6	8.6	5.6	3.9	7.0	7.6	4.8	3.6	3.9	5.5	6.7	9.4	10.0	10.1	9.9	12.4	12.7	14.2	21.6	17.5	8.2	21.6																							
30-Dec	15.9	13.6	Z	7.3	4.5	9.6	6.0	4.2	3.4	3.2	3.5	3.9	3.7	3.1	3.3	3.1	2.8	2.4	3.7	4.2	3.0	1.7	1.7	2.4	4.8	15.9																							
31-Dec	3.4	3.8	4.5	Z	5.1	5.0	5.5	3.5	6.7	6.9	7.1	7.4	6.2	7.1	8.6	9.7	8.5	7.0	6.7	5.9	4.8	5.4	7.4	5.1	6.2	9.7																							
																								4.8	6.9	6.0	6.3	6.3	9.3	8.3	6.9	7.2	7.7	6.6	5.8	5.1	5.1	5.6	6.7	7.4	6.6	6.5	6.2	5.7	5.5	5.5	4.8	Diurnal Average	
																								15.9	15.4	20.1	18.7	24.7	75.0	49.4	22.8	25.1	45.6	22.1	20.0	13.6	12.9	17.3	26.7	30.2	20.6	22.5	19.5	17.8	15.5	21.6	17.5	Diurnal Maximum	
Z - zerospan																								C - Calibration																									



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Firebag - December 2023





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Firebag - December 2023**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	690	97.73	97.73
21 - 40	13	1.84	99.58
41 - 80	3	0.42	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 706

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Firebag - December 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	16	19	12	2	1	8	23	54	67	182	164	74	35	16	8	9	690
21 - 40	0	0	0	0	0	0	1	1	3	5	3	0	0	0	0	0	13
11 - 80	0	0	0	0	0	0	0	0	1	2	0	0	0	0	0	0	3
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	16	19	12	2	1	8	24	55	71	189	167	74	35	16	8	9	706

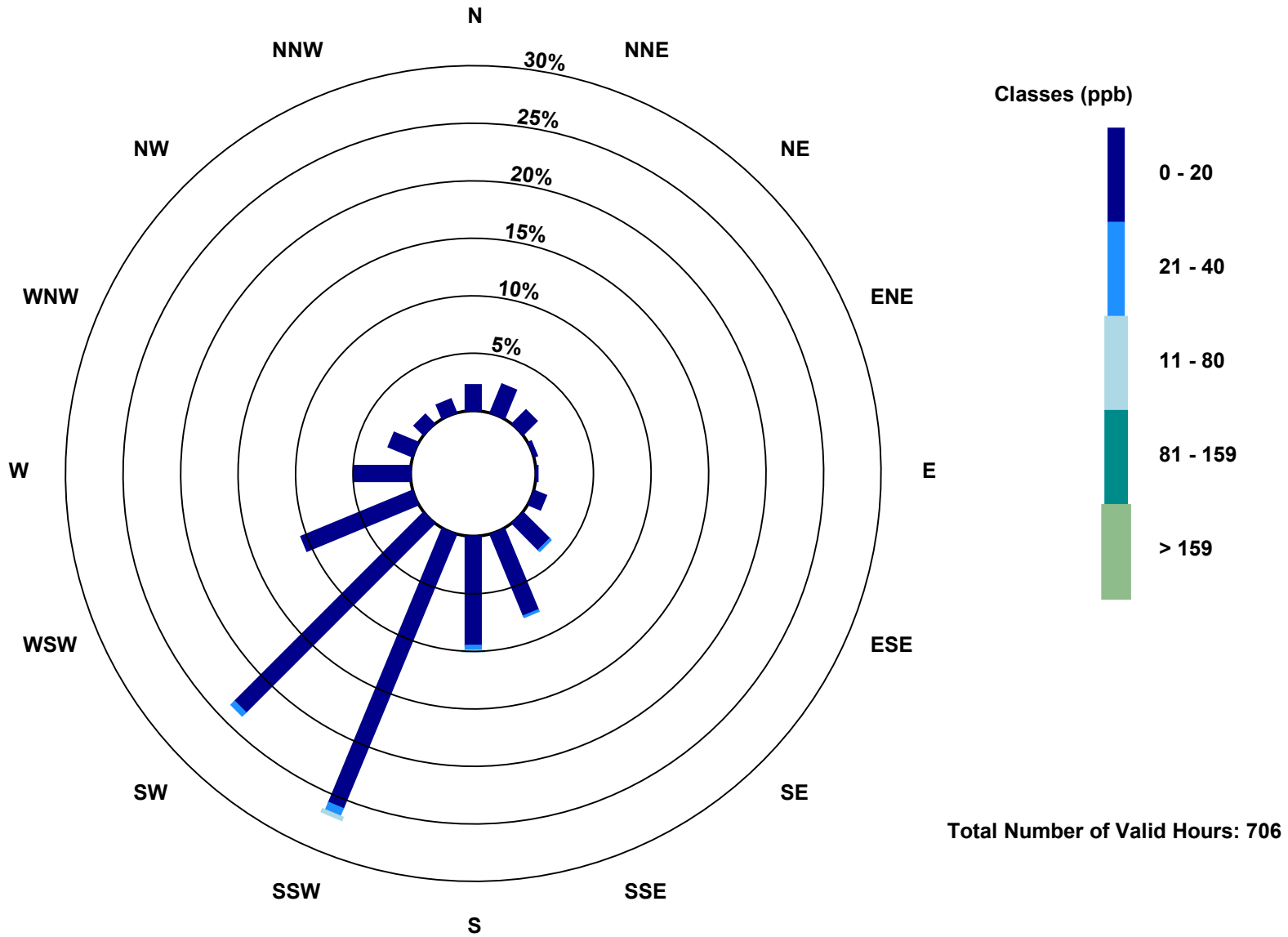
Total Number of Valid Hours: 706

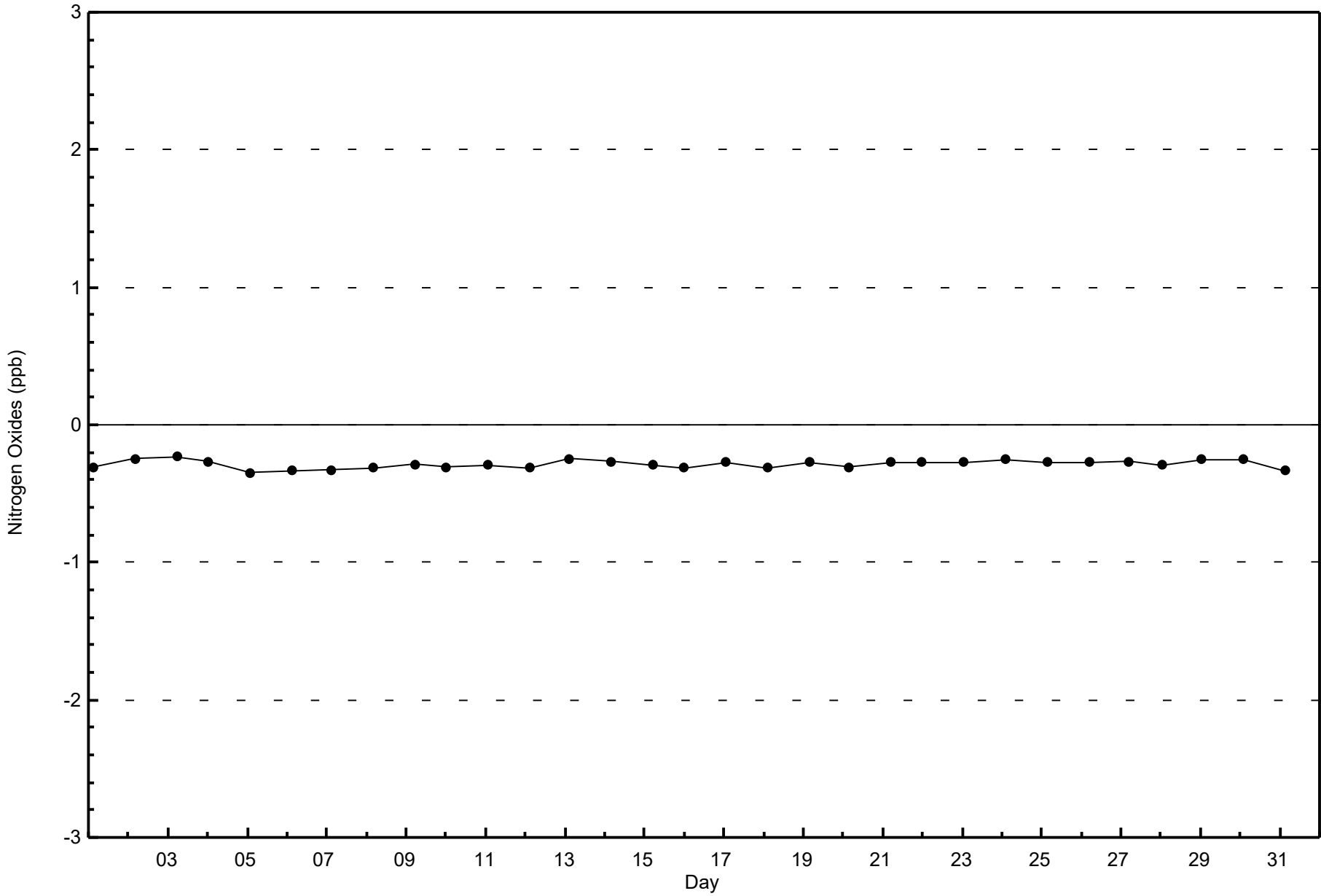
Total Number of Hours: 744

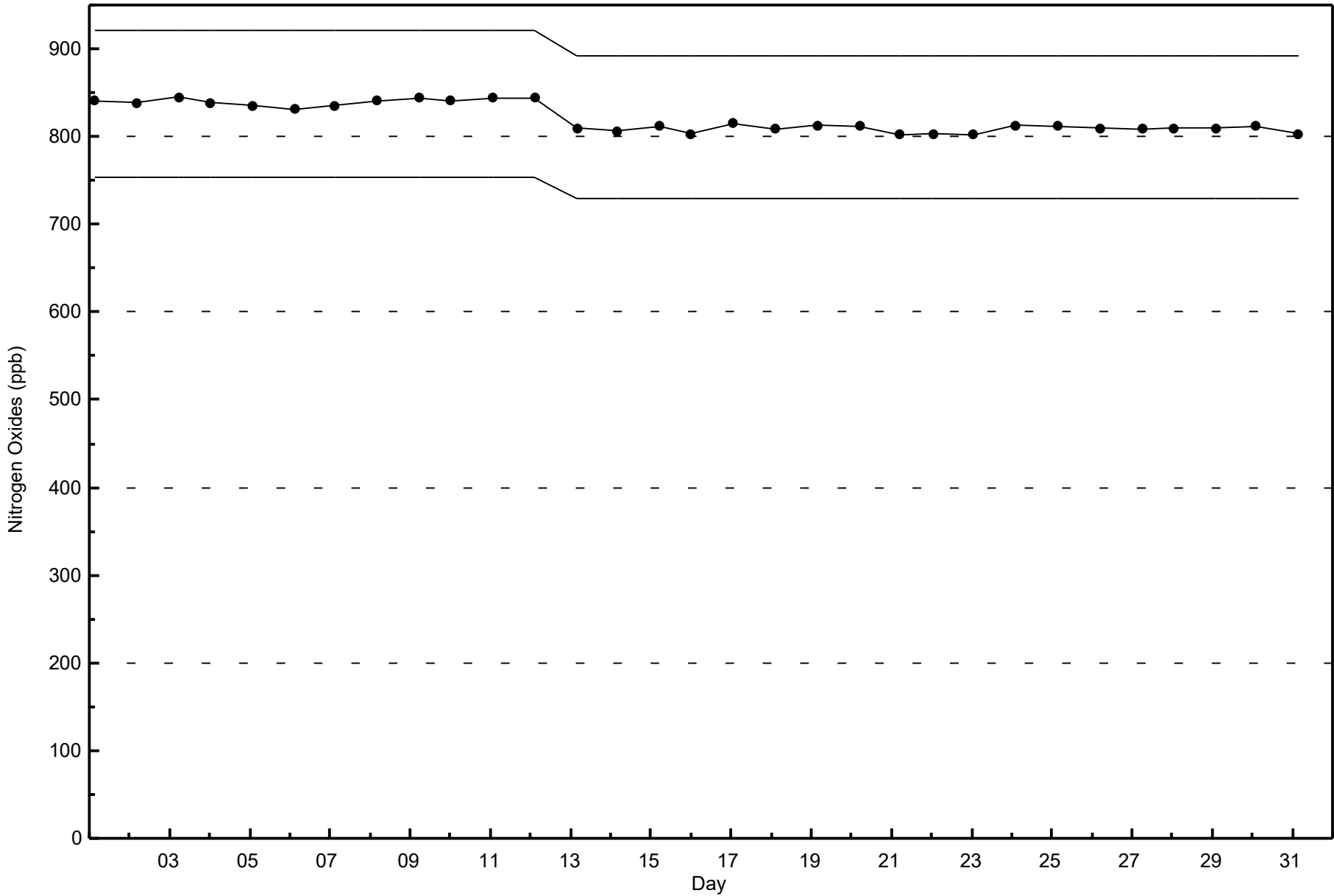


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Nitrogen Oxides (NO_x) - ppb
Firebag









Wood Buffalo Environmental Association

Summary of Hour Averages

Ambient Temperature (AT) - C

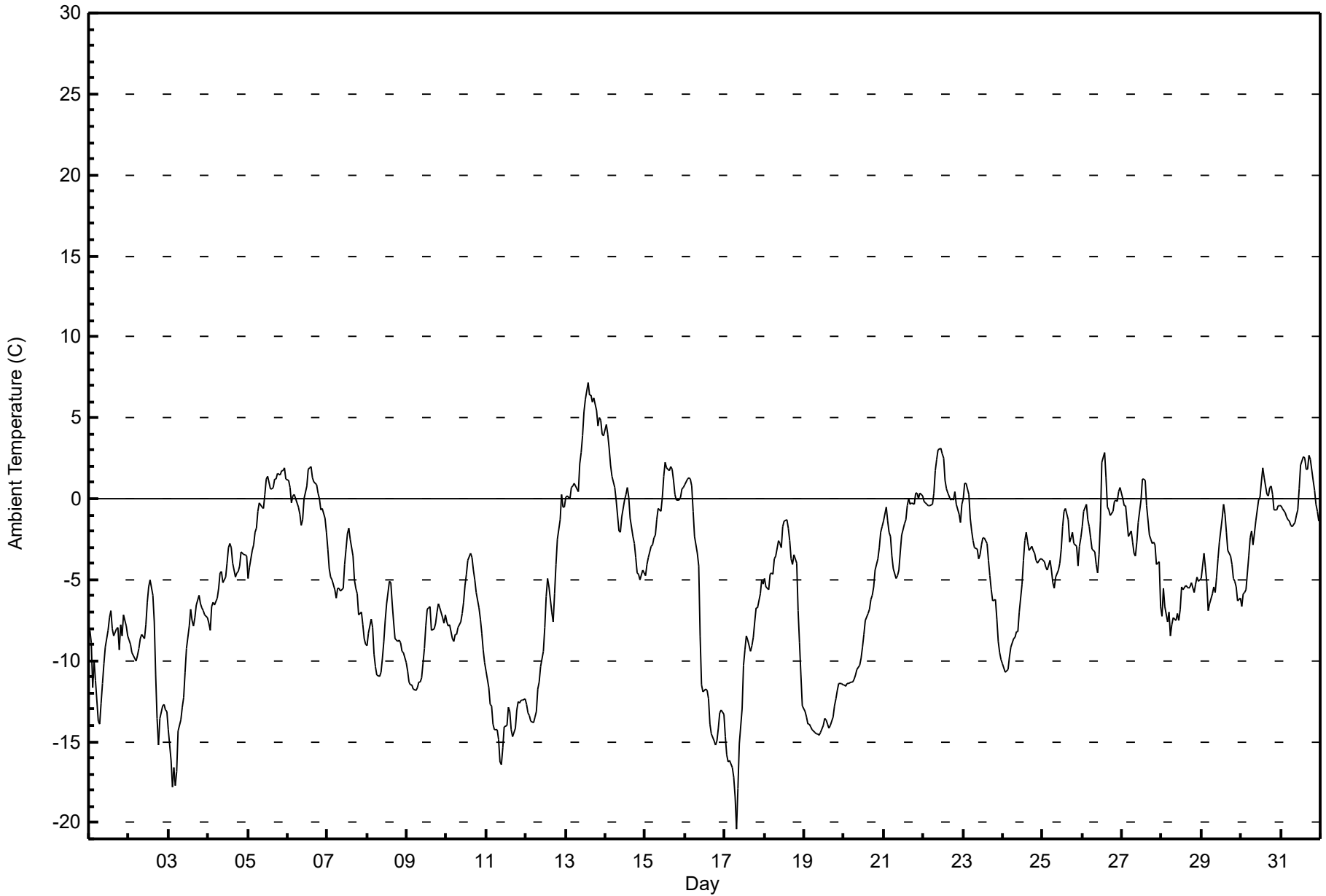
Firebag - December 2023

Maximum Value: 7.1 C on Dec 13 14:00 Maximum Daily Average: 3.5 C on Dec 13																						Hours in Service: 744				
Minimum Value: -20.4 C on Dec 17 08:00 Minimum Daily Average: -13.6 C on Dec 11																						Hours of Data: 744				
Maximum Diurnal Average: -2.9 C at hour 14 Minimum Diurnal Average: -6.6 C at hour 6																						Hours of Missing Data: 0				
Monthly Average: -5.12 C Percentiles: P ₁ = -16.6 P ₁₀ = -12.8 Q ₁ = -8.6 Median = -4.6 Q ₃ = -0.8 P ₉₀ = 0.9 P ₉₉ = 5.2																						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-Dec	-8.1	-8.9	-11.6	-10.1	-11.2	-13.7	-13.9	-12.6	-11.4	-10.2	-9.2	-8.1	-7.4	-6.9	-8.0	-8.5	-8.1	-8.0	-9.3	-7.8	-8.5	-7.2	-7.9	-8.5	-9.4	-6.9
2-Dec	-8.7	-9.0	-9.5	-9.9	-10.0	-9.7	-9.3	-8.6	-8.4	-8.7	-7.7	-6.4	-5.5	-5.0	-6.0	-7.6	-10.9	-13.5	-15.2	-13.6	-12.8	-12.7	-13.0	-13.2	-9.8	-5.0
3-Dec	-14.3	-16.2	-17.8	-16.6	-17.7	-16.8	-14.4	-13.7	-12.9	-12.3	-10.7	-9.2	-7.9	-6.9	-7.5	-7.9	-7.3	-6.6	-5.9	-6.5	-6.7	-6.9	-7.1	-7.4	-10.7	-5.9
4-Dec	-7.7	-8.1	-6.6	-6.4	-6.5	-6.2	-5.5	-4.6	-4.5	-5.2	-4.8	-3.9	-3.0	-2.7	-3.0	-4.0	-4.8	-4.6	-4.5	-4.1	-3.3	-3.4	-3.5	-3.6	-4.8	-2.7
5-Dec	-4.9	-4.2	-3.2	-2.9	-2.1	-1.8	-0.8	-0.2	-0.5	-0.6	0.3	1.2	1.4	0.6	0.6	0.7	1.2	1.2	1.6	1.5	1.7	1.7	1.9	1.2	-0.2	1.9
6-Dec	1.1	0.7	-0.2	0.2	0.2	0.0	-0.5	-0.9	-1.6	-1.3	0.0	0.8	1.8	1.9	2.0	1.3	1.0	0.9	0.4	0.0	-0.7	-0.6	-1.2	-2.0	0.1	2.0
7-Dec	-3.1	-4.3	-4.8	-5.0	-5.6	-6.2	-5.5	-5.5	-5.7	-5.5	-4.1	-3.1	-2.2	-1.8	-2.5	-3.5	-5.0	-5.5	-5.9	-7.2	-7.0	-7.8	-8.6	-9.0	-5.2	-1.8
8-Dec	-9.1	-8.3	-7.4	-8.0	-9.6	-10.4	-10.9	-11.0	-10.7	-9.9	-8.8	-7.5	-6.5	-5.1	-5.1	-6.5	-7.6	-8.6	-8.8	-8.7	-8.9	-9.4	-9.5	-10.1	-8.6	-5.1
9-Dec	-10.7	-11.3	-11.5	-11.5	-11.7	-11.8	-11.7	-11.3	-11.3	-11.1	-9.3	-7.8	-6.8	-6.7	-6.7	-8.1	-8.0	-7.7	-7.0	-6.5	-6.8	-7.4	-7.6	-7.2	-9.1	-6.5
10-Dec	-7.6	-7.8	-7.7	-8.6	-8.8	-8.4	-8.4	-7.9	-7.6	-7.1	-6.4	-5.4	-4.7	-3.8	-3.4	-3.6	-4.4	-5.0	-5.8	-6.8	-7.4	-8.3	-9.3	-10.1	-6.8	-3.4
11-Dec	-10.6	-11.7	-12.7	-12.8	-13.9	-14.3	-14.3	-14.8	-16.3	-16.4	-15.4	-14.1	-14.0	-12.9	-13.1	-14.3	-14.7	-14.2	-13.1	-12.5	-12.6	-12.5	-12.4	-12.4	-13.6	-10.6
12-Dec	-12.7	-13.2	-13.4	-13.7	-13.8	-13.4	-13.1	-11.8	-11.3	-10.3	-9.4	-7.9	-6.0	-5.0	-5.5	-7.0	-7.6	-5.8	-4.0	-2.5	-1.3	0.2	-0.5	-0.5	-7.9	0.2
13-Dec	0.1	0.1	0.0	0.7	0.8	0.9	0.7	0.4	2.2	2.9	3.9	5.4	6.1	7.1	6.4	6.4	6.0	6.2	5.5	4.5	5.0	4.9	3.9	3.9	3.5	7.1
14-Dec	4.5	4.0	3.1	2.1	1.4	0.7	-0.1	-1.1	-2.0	-2.1	-1.1	-0.1	0.3	0.7	0.1	-1.2	-2.4	-2.7	-3.7	-4.6	-4.6	-5.0	-4.4	-4.6	-0.9	4.5
15-Dec	-4.8	-4.1	-3.6	-2.9	-2.9	-2.4	-2.3	-1.3	-0.6	-0.8	0.1	1.4	2.3	1.9	1.7	2.0	1.8	1.2	0.2	-0.1	-0.1	0.1	0.6	0.7	-0.5	2.3
16-Dec	0.9	1.3	1.3	1.2	0.8	-0.8	-2.3	-3.3	-4.2	-8.5	-11.5	-11.9	-11.8	-11.8	-12.4	-13.9	-14.5	-15.0	-15.2	-15.0	-14.2	-13.2	-13.0	-13.3	-8.3	1.3
17-Dec	-14.7	-15.9	-16.3	-16.2	-16.6	-17.2	-18.4	-20.4	-17.9	-15.1	-12.9	-10.3	-9.3	-8.5	-8.8	-9.4	-9.1	-8.6	-7.6	-6.7	-6.7	-5.9	-5.0	-5.2	-11.8	-5.0
18-Dec	-5.0	-5.4	-5.6	-4.7	-4.5	-4.7	-3.7	-3.6	-2.6	-2.8	-3.0	-1.7	-1.4	-1.3	-1.8	-2.6	-3.7	-4.1	-3.4	-4.0	-6.9	-8.9	-10.9	-12.8	-4.5	-1.3
19-Dec	-13.1	-13.5	-13.9	-13.9	-14.1	-14.3	-14.4	-14.5	-14.6	-14.6	-14.4	-14.0	-13.5	-13.7	-13.9	-14.2	-14.0	-13.5	-12.8	-12.3	-11.9	-11.4	-11.4	-11.5	-13.5	-11.4
20-Dec	-11.5	-11.6	-11.4	-11.4	-11.3	-11.3	-11.1	-10.9	-10.6	-10.3	-9.8	-9.1	-8.4	-7.5	-7.1	-6.8	-6.3	-5.9	-5.5	-4.4	-3.7	-3.0	-2.1	-1.7	-8.0	-1.7
21-Dec	-1.3	-0.5	-1.3	-2.0	-2.3	-3.5	-4.3	-4.9	-4.7	-4.4	-3.3	-2.2	-1.5	-1.3	-0.4	0.0	-0.4	-0.2	-0.4	0.3	0.3	0.0	0.3	0.2	-1.6	0.3
22-Dec	-0.2	-0.3	-0.3	-0.4	-0.4	-0.3	0.4	1.7	2.5	3.1	3.1	2.8	2.5	1.1	0.6	0.3	-0.1	0.0	-0.1	0.4	-0.3	-1.0	-1.4	-0.3	0.6	3.1
23-Dec	0.0	1.0	1.0	0.2	-1.2	-2.0	-2.6	-3.0	-3.1	-3.7	-3.4	-2.8	-2.4	-2.8	-3.8	-4.8	-5.6	-6.3	-6.2	-7.4	-8.8	-9.5	-10.0	-3.7	1.0	
24-Dec	-10.2	-10.7	-10.6	-10.5	-9.8	-9.2	-8.6	-8.5	-8.2	-8.2	-7.0	-5.2	-3.8	-2.6	-2.1	-2.6	-3.2	-2.9	-3.2	-3.4	-3.8	-3.9	-3.7	-3.7	-6.1	-2.1
25-Dec	-3.8	-3.9	-4.2	-4.4	-3.8	-4.4	-5.2	-5.5	-4.8	-4.4	-4.0	-3.1	-1.8	-0.7	-0.6	-1.3	-2.6	-2.4	-2.1	-2.8	-2.9	-4.1	-2.9	-2.4	-3.3	-0.6
26-Dec	-1.8	-0.8	-0.4	-1.3	-1.8	-2.4	-3.1	-3.3	-4.1	-4.6	-3.5	-1.3	2.2	2.9	1.3	-0.5	-0.7	-1.0	-0.8	-0.1	-0.1	-0.2	0.4	0.7	-1.0	2.9
27-Dec	0.0	-0.4	-0.5	-1.4	-2.3	-1.9	-2.7	-3.4	-3.5	-2.7	-1.5	-0.1	1.2	1.2	1.1	-0.4	-2.2	-2.5	-2.8	-2.7	-2.9	-4.0	-3.9	-6.6	-1.9	1.2
28-Dec	-7.3	-5.5	-6.6	-7.6	-7.0	-8.4	-7.8	-7.4	-7.5	-7.1	-7.5	-6.8	-5.4	-5.6	-5.3	-5.5	-5.5	-5.5	-5.2	-5.8	-5.2	-4.8	-5.1	-5.0	-6.3	-4.8
29-Dec	-5.0	-3.3	-4.3	-5.2	-6.9	-6.4	-5.8	-5.4	-5.7	-4.9	-3.7	-2.7	-1.2	-0.4	-0.9	-2.0	-3.2	-3.6	-4.0	-4.9	-5.1	-5.5	-6.3	-6.1	-4.3	-0.4
30-Dec	-6.7	-5.8	-5.8	-5.6	-3.5	-2.5	-2.0	-2.8	-2.2	-1.4	-0.1	0.1	1.0	1.9	1.3	0.3	0.2	0.7	0.8	0.3	-0.7	-0.7	-0.4	-0.5	-1.4	1.9
31-Dec	-0.4	-0.6	-0.8	-1.1	-1.3	-1.4	-1.7	-1.7	-1.5	-1.0	-0.7	0.7	2.1	2.6	2.5	1.8	1.8	2.7	2.4	1.1	0.5	-0.3	-0.8	-1.4	0.1	2.7
																								Diurnal Average		
																								Diurnal Maximum		



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature (AT) - C
Firebag - December 2023





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C
Firebag - December 2023**

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	1	0.13	0.13
-20 - 0	617	82.93	83.06
0 - 10	126	16.94	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

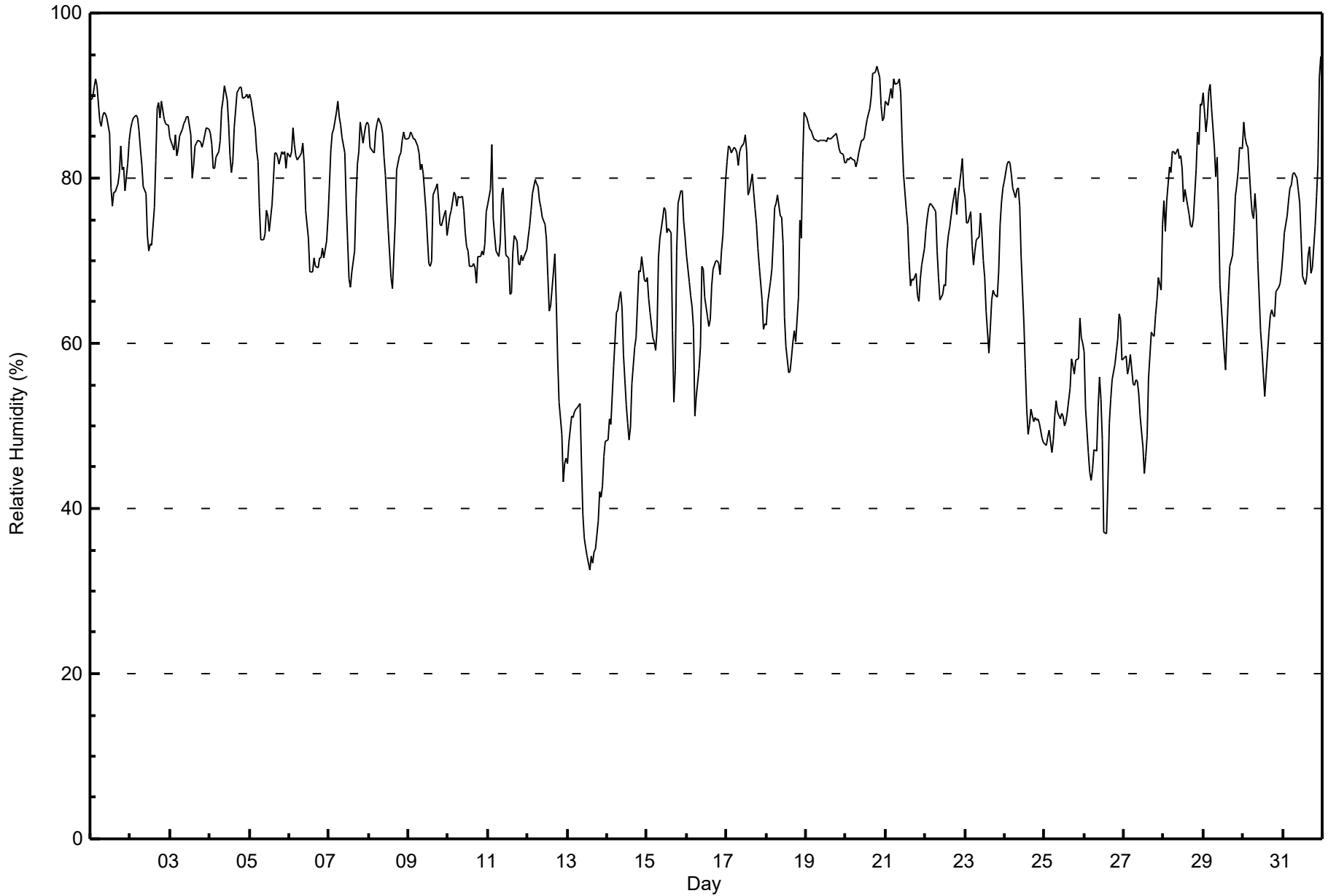
Firebag - December 2023

Maximum Value: 94.8 % on Jan 1 00:00																						Maximum Daily Average: 86.7 % on Dec 4																						Hours in Service: 744			
Minimum Value: 32.6 % on Dec 13 14:00																						Minimum Daily Average: 42.7 % on Dec 13																						Hours of Data: 744			
Maximum Diurnal Average: 76.2 % at hour 4																						Minimum Diurnal Average: 65.6 % at hour 14																						Hours of Missing Data: 0			
Monthly Average: 72.83 %																						Percentiles: P ₁ = 36.6 P ₁₀ = 52.2 Q ₁ = 65.7 Median = 75.5 Q ₃ = 83.3 P ₉₀ = 86.8 P ₉₉ = 92.0																						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-Dec	89.5	89.9	91.0	92.0	91.3	86.9	86.3	87.4	87.9	87.7	87.4	85.5	78.9	76.6	78.4	78.4	79.2	80.7	83.9	81.1	81.3	78.5	81.8	84.5	84.4	92.0																					
2-Dec	85.9	86.8	87.3	87.6	87.3	85.8	83.6	81.6	78.9	78.1	73.1	71.2	72.1	71.9	76.4	82.2	88.4	89.1	87.3	89.2	87.2	86.6	86.4	86.4	86.4	89.2																					
3-Dec	84.9	83.8	83.4	85.2	82.8	83.6	85.1	85.9	86.7	86.9	87.5	87.5	85.2	79.9	81.5	83.9	84.2	84.5	84.4	83.7	84.4	85.3	86.0	85.9	85.9	87.5																					
4-Dec	85.4	84.0	81.3	81.1	82.5	83.3	84.5	88.4	89.4	91.2	89.5	86.6	82.7	80.7	82.0	86.2	90.3	90.7	91.1	91.0	89.7	89.9	90.1	89.7	89.7	91.2																					
5-Dec	90.2	89.5	87.1	86.1	83.4	82.0	76.5	72.5	72.5	73.1	76.1	75.5	73.6	76.7	79.8	83.0	83.0	82.6	81.6	83.3	82.9	83.2	81.1	83.0	83.0	90.2																					
6-Dec	82.5	83.2	86.0	84.0	82.8	82.1	82.7	83.1	84.3	81.7	76.2	72.8	68.6	68.7	70.3	69.4	69.2	70.4	70.3	71.5	70.3	72.4	75.2	75.2	75.2	86.0																					
7-Dec	79.2	83.4	85.5	85.9	88.0	89.3	87.4	86.4	84.9	83.1	77.0	72.4	67.8	66.7	68.6	71.3	77.4	81.6	83.3	86.8	84.2	85.4	86.5	86.7	86.7	89.3																					
8-Dec	86.4	83.7	83.2	83.1	85.6	86.7	87.2	86.5	85.4	82.6	80.4	77.0	73.7	67.9	66.5	70.6	74.8	80.9	82.8	83.1	84.5	85.6	84.7	84.7	84.7	87.2																					
9-Dec	84.8	85.5	85.3	84.8	84.8	83.9	83.1	81.0	81.7	80.4	75.9	72.7	69.7	69.4	70.0	78.0	78.8	79.4	77.2	74.5	74.3	75.6	76.1	73.0	73.0	85.5																					
10-Dec	74.2	75.4	76.1	78.4	78.0	76.6	77.7	77.6	77.8	76.0	73.3	71.7	71.2	69.4	69.3	69.7	69.2	67.4	70.6	70.5	71.2	70.7	72.1	75.9	75.9	78.4																					
11-Dec	76.8	78.7	84.1	75.1	73.1	71.2	70.5	72.2	77.9	78.8	74.9	70.6	70.3	65.9	66.2	71.0	73.0	72.3	69.7	69.6	70.7	70.0	70.4	71.4	71.4	84.1																					
12-Dec	73.0	74.2	76.0	78.2	79.8	79.3	78.9	77.4	76.4	75.2	74.3	72.6	68.1	63.9	64.6	68.6	70.9	65.1	58.2	52.8	49.0	43.3	45.4	46.1	46.1	79.8																					
13-Dec	45.4	48.0	51.2	51.1	51.7	52.0	52.3	52.7	45.5	39.2	36.4	35.2	34.3	32.6	34.3	33.3	34.7	35.2	38.4	42.0	41.3	42.7	46.3	48.1	48.1	52.7																					
14-Dec	48.3	50.8	50.2	53.7	57.3	63.7	64.1	65.4	66.3	64.2	58.7	52.6	50.3	48.2	49.9	55.1	59.5	60.6	64.7	68.8	68.7	70.5	67.7	67.5	67.5	70.5																					
15-Dec	67.9	65.5	63.7	60.7	60.1	59.2	61.8	70.4	72.6	75.1	76.4	76.1	73.4	73.9	73.4	61.6	52.9	56.8	71.2	77.0	78.4	78.4	74.8	72.8	72.8	78.4																					
16-Dec	70.6	67.5	65.8	64.4	61.9	51.2	53.5	57.0	59.6	69.3	68.9	65.7	63.2	62.0	62.9	66.9	68.9	70.0	70.0	69.7	68.3	71.2	73.0	79.8	79.8	79.8																					
17-Dec	82.0	83.9	83.8	83.0	83.7	83.6	83.0	81.5	83.2	83.8	84.3	85.3	83.3	77.9	78.5	80.4	78.3	76.3	74.4	71.5	69.2	65.2	61.6	62.5	62.5	85.3																					
18-Dec	62.2	64.9	67.5	69.1	72.5	76.4	77.0	77.9	75.5	75.2	72.1	63.2	59.6	56.5	56.7	58.3	60.2	61.4	60.2	65.5	74.9	72.8	81.9	88.1	88.1	88.1																					
19-Dec	87.3	86.7	85.9	85.7	85.2	84.8	84.6	84.5	84.6	84.6	84.5	84.5	84.5	84.9	84.8	84.7	84.9	85.3	85.3	84.6	83.6	83.1	82.8	81.8	81.8	87.3																					
20-Dec	81.9	82.3	82.2	82.6	82.1	82.2	81.3	82.0	83.1	84.6	84.6	84.8	86.2	87.1	88.5	90.0	92.7	92.6	92.9	93.6	92.1	88.9	86.9	87.3	87.3	93.6																					
21-Dec	89.4	88.8	89.8	90.8	89.7	92.1	91.3	91.5	92.0	90.3	84.7	80.6	76.1	74.2	70.0	67.0	67.8	67.6	68.5	65.8	65.1	67.8	69.4	71.5	71.5	92.1																					
22-Dec	73.8	75.2	76.4	77.0	76.8	76.2	75.9	71.1	68.0	65.2	65.9	67.0	67.0	71.4	73.0	74.1	76.8	77.7	78.8	75.6	77.8	80.6	82.4	78.8	78.8	82.4																					
23-Dec	77.7	74.6	74.6	76.0	71.9	69.6	71.2	72.5	72.9	75.8	73.2	70.0	68.0	63.9	58.9	61.9	65.3	66.5	66.0	65.6	68.8	74.4	77.1	78.8	78.8	78.8																					
24-Dec	79.6	81.8	82.0	81.8	80.6	78.9	77.6	78.7	78.8	76.7	70.4	62.4	57.0	52.0	49.0	50.1	52.1	50.5	51.0	50.7	50.9	50.3	48.4	47.9	47.9	82.0																					
25-Dec	47.9	47.7	48.7	49.4	46.8	48.3	51.2	53.0	51.7	50.8	51.5	51.1	50.0	50.5	51.7	54.6	58.1	57.4	56.3	58.0	58.2	63.0	60.6	60.1	60.1	63.0																					
26-Dec	58.9	52.2	46.8	44.4	43.3	44.8	47.1	46.9	52.2	55.9	53.2	48.2	37.2	36.9	43.3	50.3	53.2	55.7	57.5	58.9	60.5	63.5	62.8	57.9	57.9	63.5																					
27-Dec	58.4	58.5	56.3	57.0	58.6	55.1	55.0	55.6	55.4	53.9	51.1	47.5	44.2	46.2	48.9	55.7	61.3	61.0	60.8	63.4	65.3	67.9	66.4	74.5	74.5	74.5																					
28-Dec	77.2	73.5	77.3	81.3	80.7	83.3	83.3	82.9	83.5	82.3	82.7	81.2	77.2	78.6	76.6	75.6	74.2	74.1	75.1	81.0	85.5	84.0	89.0	88.7	88.7	89.0																					
29-Dec	90.4	85.6	87.3	90.6	91.4	88.5	83.7	80.1	82.5	76.1	67.2	64.4	58.9	56.8	61.5	65.8	69.4	70.7	73.6	77.8	79.2	80.9	83.8	83.5	83.5	91.4																					
30-Dec	86.8	84.9	84.1	83.7	77.9	75.7	75.2	78.1	75.8	69.9	61.5	59.2	56.3	53.6	56.2	61.3	63.4	64.1	63.3	63.2	66.3	66.8	67.2	68.8	68.8	86.8																					
31-Dec	70.9	73.3	75.5	77.4	78.7	79.2	80.5	80.6	80.0	78.4	77.0	72.5	68.1	67.1	68.1	70.6	71.8	68.5	69.2	74.2	77.8	81.7	92.1	94.8	94.8	94.8																					
																						75.8	75.6	76.0	76.2	75.8	75.3	75.3	75.6	75.7	75.0	72.6	69.9	67.0	65.6	66.4	68.7	70.5	70.8	71.5	72.3	73.0	73.5	74.4	75.3	75.3	Diurnal Average
																						90.4	89.9	91.0	92.0	91.4	92.1	91.3	91.5	92.0	91.2	89.5	87.5	86.2	87.1	88.5	90.0	92.7	92.6	92.9	93.6	92.1	89.9	92.1	94.8	94.8	Diurnal Maximum



Wood Buffalo Environmental Association
Hourly Averages

Relative Humidity (RH) - %
Firebag - December 2023





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Relative Humidity (RH) - %
Firebag - December 2023**

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	12	1.61	1.61
40 - 60	118	15.86	17.47
60 - 80	344	46.24	63.71
80 - 100	270	36.29	100.00

Total Number of Valid Hours: 744

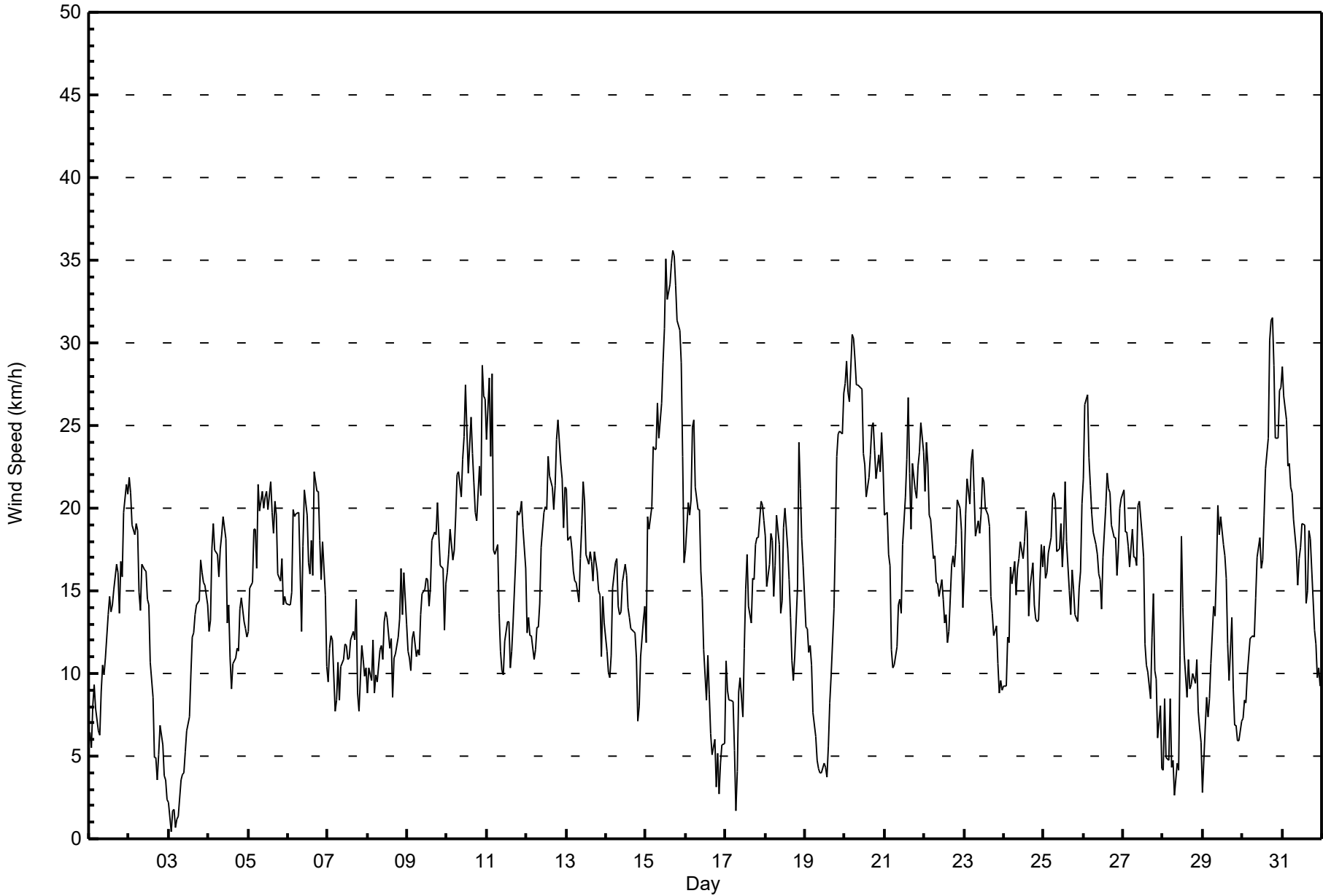
Total Number of Hours: 744



Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Speed (WS) - km/h
Firebag - December 2023

Maximum Speed: 36 km/h on Dec 15 17:00 Minimum Speed Value: 0 km/h on Dec 3 02:00 Maximum Diurnal Speed Average: 13.5 km/h at hour 13 Monthly Average Velocity: 11.6 km/h 212.8 deg		Maximum Daily Speed Average: 26.9 km/h on Dec 15 Minimum Daily Speed Average: 5.5 km/h on Dec 28 Minimum Diurnal Speed Average: 9.8 km/h at hour 1 Percentiles: P ₁ = 2 P ₁₀ = 8 Q ₁ = 11 Median = 16 Q ₃ = 20 P ₉₀ = 23 P ₉₉ = 31		Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 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-Dec	SSW6	SSE6	S8	SSW9	S8	S7	SSW6	SSW9	SSW11	SSW10	SSW11	SSW14	SSW15	SSW14	SSW14	SSW15	SSW17	SSW16	S14	SSW17	SSW16	SSW20	SSW21	SSW21	SSW12.5	SSW21
2-Dec	SSW22	SSW21	SSW19	SSW18	SSW19	SSW19	S15	SSW14	S17	S16	SSW16	SSW14	SSW14	SSW11	SSW9	SW5	SSW5	NNE4	NE5	NE7	NE6	NE4	NNE4	NNE2	SSW9.2	SSW22
3-Dec	NE2	ESE0	SW2	WSW2	S1	S1	SE1	SW4	SSW4	SSW4	S5	SSW7	S7	S10	S12	SSE12	SSE14	SSE14	SSE14	SSE17	S16	SSE15	S15	S14	S7.6	SSE17
4-Dec	S13	S13	SSW18	SSW19	SSW17	SSW17	SSW16	SSW18	SW18	SW20	SW18WSW13WSW14WSW11	SW9	SSW11	SSW11	SSW11	SSW11	SSW14	SSW15	SSW13	SSW13	SSW12	SSW12	SSW12	SSW13.7	SW20	
5-Dec	S13	S15	S15	SSE19	SSE19	SSE16	S21	SSE20	SSE21	S20	SSW21	SSW21	SSW20	SSW2	SSW20	SW18	SW20	SW20	SW16	SW16WSW17WSW14WSW15WSW14	SSW15.6	SSW22				
6-Dec	SW14	SW14	SW15	SW20	SW19WSW20	SW20	SW16	SW13	SW18	SW21	SW20	SW17	SW16	SW18WSW16WSW22WSW21WSW21WSW18WSW16WSW18WSW15WSW10	WSW17.3	WSW22										
7-Dec	WSW10	SW12	SW12	SW12	SW8	SW8	SW11	SW8	SW10	SW11	SW12	SW12	SW11WSW11WSW12	SW13	SW12WSW14	WSW9	WSW8	SW12	SW11	SW10	SW10	SW10	SW10	SW10.6	WSW14	
8-Dec	WSW9	W10WSW10WSW12	SW9WSW10WSW10WSW11WSW12WSW11WSW13WSW14WSW13WSW12WSW12	WSW9	SW11	SW11	SW12	SW13	SSW16	SW14	SW16	SW13	SW11.4	SSW16												
9-Dec	SW11	SW11	SW10	SW12	SW13	SW11	SW11	SW11	SW14	SSW15	SSW15	SW16	SSW16	SSW14	SSW15	SSW18	SSW19	SSW18	SSW20	SSW18	SSW17	S16	S13	SSE15	SSW14.0	SSW20
10-Dec	S16	S17	SSE19	SSE17	S17	S20	S22	S22	S21	S23	SSW24	SW27WSW25WSW22WSW25	W23	W21WNW20WNW19WNW23	NW21	NW29	NW27	NW27	WSW12.6	NW29						
11-Dec	NW24	NNW28	NNW23	NW28	NW17	NW17WNW18WNW14	W11	W10WSW10WSW12WSW13WSW13	SW10	SSW11	SSW13	SSW17	SSW20	SSW20	SSW20	SSW20	SSW20	SSW20	SSW20	SSW19	SSW16	W11.1	NW28			
12-Dec	SW12	SSW13	SSW12	SSW12	SSW11	SSW11	SSW13	SSW13	SSW14	SSW18	S20	S20	S20	SSW23	S22	S21	S20	SSW21	SSW24	SSW25	SSW23	SW22	SW19	SW21	SSW17.5	SSW25
13-Dec	SW21	SW18	SW18	SW17	SW16	SSW16	SSW16	SSW14	SSW17	SW19	SSW22	SW20	SW17	SSW17	SSW17	SW17	SSW16	SSW17	SW16	SSW15	SSW15	SW11	SSW15	SW13	SSW16.5	SSW22
14-Dec	W11	W10	W10	W11	W15WSW17	W17WSW14	SW14	SSW14WSW15WSW17WSW16WSW14WSW13	SW13	SW13	SW12	SW11	SW7	SW8	SSW11	SSW13	SSW14	WSW12.1	W17							
15-Dec	SSW12	SSW20	SW19	SSW20	SSW24	SSW24	SW24	SW26	SW24	SSW26	SSW29	SSW31	SW35	SW33	SSW34	SSW35	SSW36	SSW35	SSW33	SSW31	SSW31	SSW29	SSW23	SSW17	SSW26.9	SSW36
16-Dec	WSW17WSW20	W20	W21WNW25WNW25WNW21WNW20WNW20	N16	N15	NNE11	N8	N11	NNE9	NNE6	NE5	ENE6	NNE3	ENE5	ESE3	WSW5	W6	NNW6	WNW8.2	WNW25						
17-Dec	NNE11	NNE9	N8	NNW8	N8	NNE5	SE2	SSE4	SSW9	SSW10	SSW7	SW12	SW15	SW17	SW14	SSW13	SSW16	SSW16	SSW18	SSW18	S18	SSW20	SSW20	SSW19	SSW8.3	SSW20
18-Dec	SSW18	SW15WSW17WSW18WSW18WSW15WSW17WSW20WSW18	SW14WSW14	W19WSW20	W18	W16	W13WNW11WNW10WNW11	NNW15	N24	NNW21	N18	N17	W11.7	N24												
19-Dec	N13	NNE13	NNE11	NE12	NE11	NE8	NE6	NE5	E4	SE4	SE4	ESE5	ESE4	SE4	SE6	SE8	SE10	SE14	SE18	SE23	SSE25	SE25	SE25	SE27	ESE8.0	SE27
20-Dec	SE28	SE29	SE27	SSE26	SSE31	SSE30	SSE29	SSE27	SSE27	SSE27	S27	S23	S23	S21	S22	S23	S25	S25	SSE23	S22	S23	S22	SSW25	SW23	SSE24.0	SSE31
21-Dec	SW20	W20	W17WSW17	W11WSW10	SW10	SW12	SSW14	SSW14	SSW14	SW18	SSW21	SSW23	SSW27	SSW22	S19	S23	S21	SSW21	SSW23	SSW23	SW25	SW23	SW23	SW16.9	SSW27	
22-Dec	SW21	SW24	SW23	SSW20	SSW19	SSW17	SSW17	SSW16	SSW15	SSW15	S16	S15	S13	SSE14	SSE12	SSE13	SSE16	S17	S16	SSW18	SSW21	SW20	SW19WSW14	SSW15.9	SW24	
23-Dec	SW16WSW20WSW22	W20	W23	W24	W21	W18	W19	W18	W20	W22	W22WNW20WNW20WNW19	W15	W14	W12	W13WSW11	WSW9WSW10	SW9	W16.8	W24							
24-Dec	SW9	SW9	SSW12	SSW12	SSW16	SSW15	SSW17	SSW15	SSW16	SSW17	SW18	SW17	SW18	SW20WSW19	SW14	SW15	SW17	SW14	SW13	SW13	SW13	SW18	SSW16	SSW16	SSW14.8	SW20
25-Dec	SSW18	SSW16	SSW16	SSW17	SSW18	SSW21	SSW21	SSW20	SSW17	SW18	SSW19	SW16	SW18	SSW22	SW18	SW15	SSW14	SSW16	SSW15	SSW14	S13	SSE15	SSE16	SSE20	SSW16.2	WSW22
26-Dec	SSE22	SSE26	S27	SSE23	SSE21	SSE20	SSE19	SSE18	SSE17	SSE16	SSE16	S14	SSW17	SSW20	SSW22	SSW21	SW21	SW19	SW18	SW18	SW16	SW18	SW20	SW21	S17.4	S27
27-Dec	SW21	SW19	SW19	SW18	SSW16	SW19	SW17	SW17	SW17	SW20	SW20	SW18	SW17	SW12	SSW11	S10	SSE9	SE12	SSE15	SSE10	ESE10	SE6	SE8	NE4	SSW11.9	SW21
28-Dec	ENE4	SE8	SE5	ESE5	ESE8	SE4	ESE5	S3	NNW5	NNE4	NNE11	NNE18	N14	N11	N9	N11	NNE9	N9	N10	NNW9	NNE11	NNW8	NNE7	NNE6	NNE5.5	NNE18
29-Dec	NE3	E7	SE9	S7	SSW8	S11	S14	S14	S16	S20	SSW18	SSW19	SSW18	SSW17	SW16	SSW12	SSW10	SSW13	SW9	SW7	SSW7	S6	SSE6	SSE7	S10.3	S20
30-Dec	S7	S8	S8	S10	SSW12	S12	S12	SSE12	SSE15	SSE17	S18	S16	SSE17	SSE20	SSE22	SSE24	SSE30	S31	S32	S29	S24	S24	SSW27	SSW27	S18.5	S32
31-Dec	SSW29	SW27	SW25	SSW23	SSW23	SSW21	SSW21	SSW19	SW17	SW15	SW17	SW18	SW19	SW19	SW14	SW15	SW19WSW18WSW16WSW13WSW12	W10	NW10	N9	SW16.2	SSW29				
SSW9.8SSW9.9SSW10.4SW10.8SW10.8SSW10.9SSW11.3SSW11.6SSW12.5SSW12.7SSW13.3SSW13.0SSW13.5SSW13.1SSW12.8SSW12.6SSW12.5SSW12.6SSW12.8SSW11.8SSW11.1SSW11.3SSW11.0SSW9.9																								Diurnal Average		
SSW29 SE29 SE27 NW28 SSE31 SSE30 SSE29 SSE27 SSE27 SSE27 SSW29 SSW31 SW35 SW33 SSW34 SSW35 SSW36 SW35 SW33 SW31 SSW31 SW29 SSW27 SSW27																								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
Firebag - December 2023**

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	43	5.78	5.78
6 - 11	147	19.76	25.54
12 - 19	352	47.31	72.85
20 - 28	180	24.19	97.04
29 - 38	22	2.96	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed (WS) - km/h
Firebag - December 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	6	7	2	1	6	7	1	4	3	3	2	0	0	0	1	43
6 - 11	10	11	5	1	1	2	7	5	13	27	29	18	10	3	0	5	147
12 - 19	5	3	1	0	0	0	3	29	33	110	102	45	14	4	2	1	352
20 - 28	1	0	0	0	0	0	6	18	29	50	34	13	12	9	5	3	180
29 - 38	0	0	0	0	0	0	1	4	3	7	6	0	0	0	1	0	22
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	16	20	13	3	2	8	24	57	82	197	174	78	36	16	8	10	744

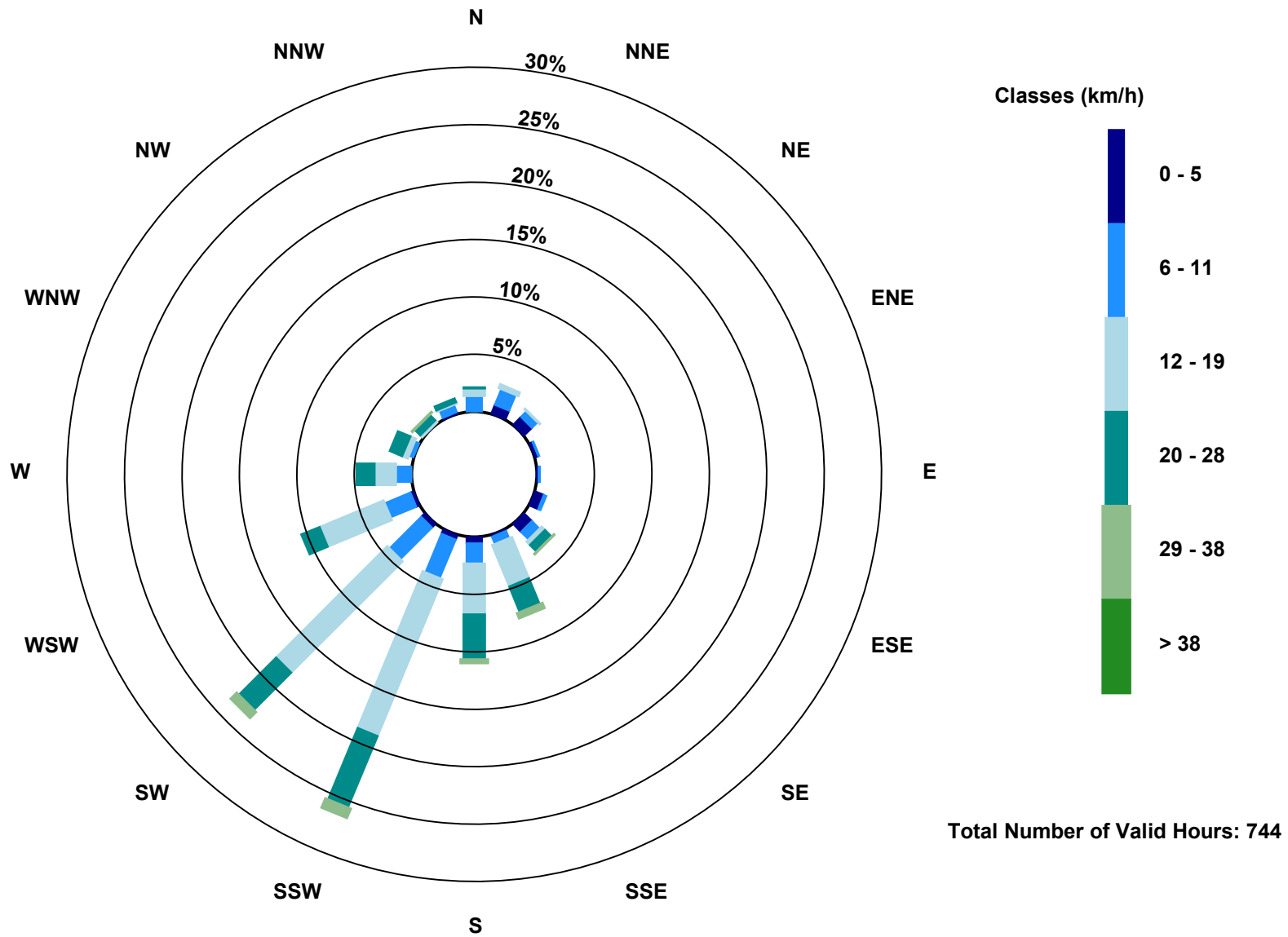
Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Dec 2023

Wind Speed (WS) - km/h
Firebag





Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Speed (WS) - km/h
Firebag - December 2023

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 8 km/h on Dec 16 05:00 Minimum Value: 0 km/h on Dec 3 06:00 Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 2 Median = 3 Q ₃ = 3 P ₉₀ = 4 P ₉₉ = 6																	Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0								
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Dec	2	2	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	3	3	3	3	3
2-Dec	3	3	3	2	3	2	2	2	2	2	2	2	2	2	2	2	2	1	1	1	1	2	1	1	3
3-Dec	1	1	1	1	1	0	1	2	1	1	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2
4-Dec	1	1	3	2	2	2	2	3	3	3	3	3	3	3	2	1	2	1	1	2	2	1	1	2	3
5-Dec	1	2	2	2	3	3	3	3	3	3	3	4	4	3	3	3	3	3	3	3	2	3	2	2	4
6-Dec	2	3	3	3	3	4	3	3	3	3	4	3	3	3	4	3	4	4	3	4	3	4	3	2	4
7-Dec	1	2	2	3	2	3	2	1	1	1	1	2	2	2	2	2	1	2	3	4	1	2	1	1	4
8-Dec	1	2	2	1	1	1	1	2	2	2	2	3	2	2	2	2	2	2	2	2	2	2	2	2	3
9-Dec	2	2	2	2	2	2	1	2	2	2	3	2	2	2	2	2	2	3	3	2	2	2	2	2	3
10-Dec	2	2	2	2	2	3	3	3	3	3	4	5	5	5	5	5	6	5	6	6	5	6	6	7	7
11-Dec	7	7	5	7	4	3	4	3	2	2	2	3	3	2	2	1	2	2	3	3	3	3	2	2	7
12-Dec	3	2	1	2	1	2	2	2	2	3	2	3	3	4	4	3	3	4	4	4	3	4	3	4	4
13-Dec	3	3	3	3	2	2	2	2	3	3	4	3	4	3	4	3	2	3	4	3	2	3	5	2	5
14-Dec	2	2	2	2	3	3	3	3	2	3	3	4	3	3	2	2	2	2	2	1	2	2	1	2	4
15-Dec	2	3	3	3	4	4	4	4	4	4	4	6	6	6	6	5	6	6	6	6	6	6	4	3	6
16-Dec	4	3	4	4	8	6	5	5	5	3	3	3	2	3	2	1	1	1	1	2	1	1	1	1	8
17-Dec	3	2	2	2	2	1	1	1	2	2	1	2	2	3	2	2	2	2	3	2	3	5	3	3	5
18-Dec	3	3	3	3	3	3	3	4	4	2	3	5	4	4	4	3	2	2	2	5	5	5	4	4	5
19-Dec	3	3	3	3	3	2	1	1	1	1	1	1	1	1	2	2	2	3	4	5	4	5	5	5	5
20-Dec	5	5	5	5	5	5	4	4	4	4	4	4	3	3	3	3	3	4	4	3	3	5	4	4	5
21-Dec	3	4	4	3	3	2	2	2	2	2	2	3	4	4	4	3	3	4	3	4	4	4	4	4	4
22-Dec	4	3	4	3	3	2	2	3	2	2	2	2	2	2	2	2	3	2	2	3	3	4	3	2	4
23-Dec	3	4	4	5	6	6	5	5	4	4	4	5	6	5	5	4	4	3	2	3	2	1	1	1	6
24-Dec	1	1	1	2	2	2	2	2	2	2	3	3	3	4	4	2	3	3	2	2	2	2	3	2	4
25-Dec	2	2	2	2	2	3	3	3	3	3	3	3	4	4	3	3	2	2	2	1	2	2	2	4	4
26-Dec	3	4	4	4	3	3	2	3	3	2	2	2	3	3	3	3	4	3	3	2	3	3	3	4	4
27-Dec	3	3	3	2	2	3	3	2	2	3	3	3	4	2	2	2	2	2	3	2	2	2	2	2	4
28-Dec	1	2	2	2	3	3	2	2	1	2	4	4	3	3	2	3	2	2	2	2	3	2	1	2	4
29-Dec	2	3	2	2	1	2	2	2	2	4	4	4	3	3	3	2	3	2	2	2	2	2	0	1	4
30-Dec	1	1	1	2	1	1	2	2	3	2	2	2	3	3	4	3	4	5	5	4	4	4	4	4	5
31-Dec	4	5	4	3	3	3	4	3	3	2	2	3	3	3	3	2	3	3	3	2	2	2	3	2	5
																	Diurnal Maximum								



Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
Firebag - December 2023

Direction of Maximum Speed: 202 deg on Dec 15 17:00	Hours in Service: 744
Direction of Maximum Daily Speed Average: 212.8 deg on Dec 15	Hours of Data: 744
Direction of Minimum Speed: 122 deg on Dec 3 02:00	Hours of Missing Data: 0
Direction of Minimum Daily Speed Average: 5.5 deg on Dec 28	Percent Operational Time: 100.0
Monthly Average Direction: 212.8 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-Dec	200	161	170	195	180	178	196	200	203	207	203	200	197	205	196	196	204	193	185	194	193	204	201	200	196.3
2-Dec	203	208	209	205	206	200	188	193	182	185	198	197	204	213	213	215	213	20	55	40	35	35	22	19	198.7
3-Dec	48	122	227	245	177	171	135	231	204	202	191	199	189	181	173	163	157	153	165	166	169	168	170	178	172.4
4-Dec	175	181	198	206	204	206	200	206	217	221	231	247	247	228	210	210	212	203	209	215	210	202	196	211.3	
5-Dec	182	172	180	166	165	167	169	165	163	176	194	203	213	214	224	223	221	226	228	234	242	254	252	244	201.6
6-Dec	234	232	230	233	233	238	234	234	230	227	235	235	236	229	236	240	240	242	240	244	241	246	245	245	236.7
7-Dec	243	223	223	229	221	215	224	222	224	223	223	222	223	242	239	232	231	238	238	237	233	228	232	234	229.2
8-Dec	246	259	258	241	235	243	254	238	244	240	246	244	244	250	249	248	227	214	223	217	213	221	221	223	236.0
9-Dec	222	226	233	234	229	225	220	219	220	211	213	214	213	209	205	199	205	204	206	203	195	186	174	168	208.1
10-Dec	172	169	165	165	172	175	180	185	185	190	207	228	240	256	256	259	273	293	297	297	318	319	316	312	238.7
11-Dec	322	335	331	321	308	305	303	295	269	268	247	251	243	241	233	206	202	213	211	213	212	210	209	213	261.6
12-Dec	219	211	212	209	203	208	198	197	196	202	189	180	182	195	188	181	181	200	203	201	207	224	222	218	200.2
13-Dec	226	224	227	227	216	212	207	201	213	218	220	221	221	213	210	218	211	211	216	199	213	228	210	227	216.6
14-Dec	265	270	275	272	265	258	265	257	236	233	245	255	256	253	251	231	232	231	227	221	216	207	208	200	244.2
15-Dec	193	209	216	212	209	211	214	224	223	213	205	212	216	216	208	202	202	215	215	214	213	217	223	225	212.8
16-Dec	237	244	262	267	286	299	290	289	298	351	3	16	353	3	13	32	55	62	14	59	106	245	261	341	303.7
17-Dec	21	12	351	346	349	22	133	162	210	211	204	215	215	223	218	210	209	199	199	194	188	198	202	206	209.2
18-Dec	213	221	243	250	245	244	254	248	255	226	244	261	254	280	275	270	283	288	294	333	355	347	0	8	272.4
19-Dec	11	14	24	37	46	37	42	56	87	126	139	113	119	131	135	130	136	137	137	140	149	144	135	137	115.2
20-Dec	137	135	140	147	150	157	158	160	164	165	172	173	172	174	169	169	171	170	168	181	185	191	206	216	166.4
21-Dec	236	260	259	255	275	244	230	218	211	212	209	214	212	210	207	196	181	171	174	193	202	209	218	217	213.9
22-Dec	216	217	216	205	204	196	195	200	196	195	184	179	175	165	157	165	167	180	182	202	210	224	230	249	198.6
23-Dec	234	245	257	266	274	275	275	266	263	262	264	267	278	282	283	283	277	277	266	266	255	239	242	226	265.8
24-Dec	226	216	207	208	210	199	198	201	207	210	219	228	231	236	241	227	227	234	228	229	224	216	220	211	219.3
25-Dec	208	208	207	202	208	209	205	210	217	222	213	220	232	238	229	219	202	211	200	193	185	165	161	159	206.3
26-Dec	167	168	171	168	157	154	160	155	163	162	163	177	195	207	206	200	217	222	221	225	226	226	225	225	189.4
27-Dec	228	233	225	217	210	217	219	219	220	219	221	233	233	216	199	181	160	136	157	147	123	141	144	44	206.7
28-Dec	66	130	130	116	111	138	102	178	329	32	24	29	1	354	355	350	18	9	1	332	16	327	19	33	21.2
29-Dec	48	92	135	172	195	189	184	177	169	180	192	192	199	209	215	213	210	210	217	214	207	179	167	167	190.1
30-Dec	173	171	178	185	194	191	183	168	163	168	176	169	164	165	162	161	165	169	175	182	186	190	199	205	177.0
31-Dec	211	214	214	212	210	208	206	204	214	219	218	221	228	225	231	221	230	243	249	241	245	271	326	352	223.8

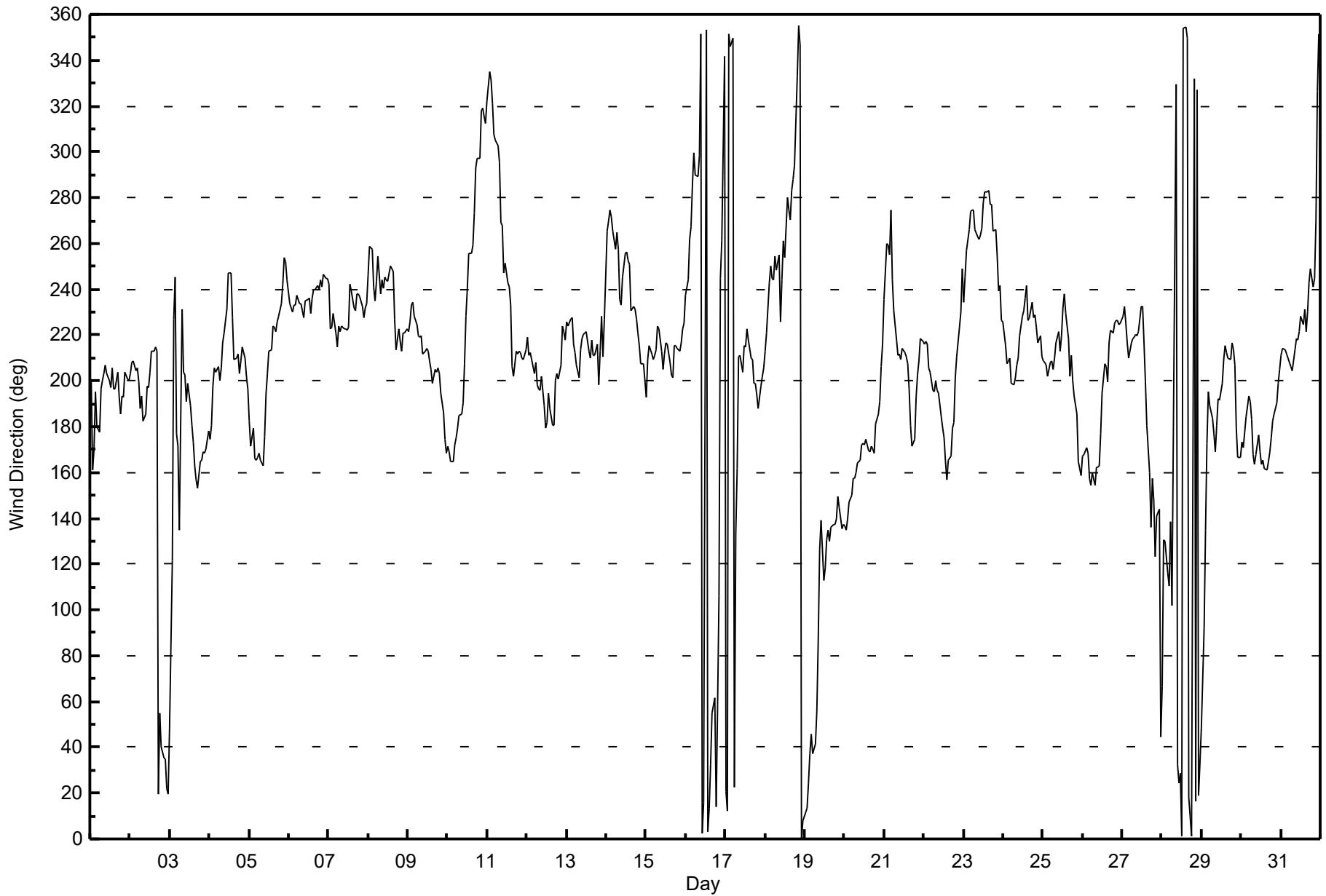
213.6 213.0 215.8 217.5 214.0 213.3 210.4 209.7 209.9 207.6 211.2 216.8 220.5 222.4 217.7 209.5 206.6 208.0 207.5 209.1 209.2 215.1 214.6 213.7
 Diurnal Average

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



Wood Buffalo Environmental Association
Hourly Averages

Wind Direction (WD) - deg
Firebag - December 2023





Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Direction (WD) - deg
Firebag - December 2023

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 72 deg on Dec 3 05:00 Minimum Value: 4 deg on Dec 30 05:00 Percentiles: P ₁ = 6 P ₁₀ = 7 Q ₁ = 8 Median = 9 Q ₃ = 12 P ₉₀ = 16 P ₉₉ = 53																	Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0								
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Dec	8	15	9	7	11	5	11	4	7	8	8	8	7	10	8	6	7	9	7	6	7	8	8	8	15
2-Dec	8	8	8	8	7	7	6	7	8	8	6	7	8	10	9	15	8	55	7	13	10	22	26	33	55
3-Dec	16	45	57	14	72	17	31	21	18	15	12	14	11	11	7	12	9	12	10	8	7	8	7	10	72
4-Dec	6	7	8	8	8	7	7	9	9	9	12	11	11	13	12	7	9	9	7	8	7	8	7	8	13
5-Dec	7	8	10	9	11	10	8	8	9	10	10	13	10	8	10	9	9	10	10	9	12	11	12	9	13
6-Dec	11	10	9	8	9	10	9	10	10	9	9	9	12	10	10	10	8	9	9	11	9	12	11	13	13
7-Dec	12	9	8	8	10	9	9	13	8	7	7	9	9	16	9	7	8	7	12	17	9	8	7	9	17
8-Dec	10	12	12	9	7	8	8	10	7	11	9	10	9	12	10	10	11	8	9	9	8	7	7	8	12
9-Dec	8	9	8	8	8	8	7	8	7	9	7	10	9	9	8	7	8	8	9	7	8	6	9	7	10
10-Dec	7	7	7	7	9	8	10	7	9	10	13	12	12	14	13	13	20	19	16	16	13	11	12	12	20
11-Dec	15	12	12	11	13	12	13	16	14	13	12	11	11	10	11	8	7	8	8	8	8	7	7	8	16
12-Dec	9	6	7	9	7	8	7	7	7	8	9	8	8	9	9	7	8	12	9	8	13	11	10	10	13
13-Dec	10	9	9	9	7	8	9	10	9	9	9	9	10	11	13	11	9	9	12	12	9	13	9	11	13
14-Dec	18	18	17	14	13	13	14	14	9	10	12	16	13	13	11	11	9	9	8	8	10	6	6	9	18
15-Dec	6	9	9	8	8	10	9	9	11	9	9	11	10	10	11	9	9	10	10	11	11	10	11	10	11
16-Dec	9	11	13	14	19	14	16	16	14	16	15	16	16	14	14	12	12	15	53	19	56	23	16	36	56
17-Dec	11	10	14	10	11	18	60	15	13	9	6	9	11	8	9	8	7	7	7	8	9	14	9	10	60
18-Dec	10	12	12	11	9	11	13	11	12	12	12	14	15	16	17	14	15	14	16	25	15	14	14	14	25
19-Dec	13	14	14	12	14	14	17	14	21	20	18	20	17	17	18	14	14	13	11	12	11	12	12	12	21
20-Dec	11	11	11	12	11	10	9	9	9	8	7	8	7	8	8	7	8	8	9	9	10	12	12	11	12
21-Dec	13	13	13	13	15	13	10	9	7	8	8	9	10	9	8	9	8	8	11	11	10	10	10	9	15
22-Dec	10	9	9	8	8	7	6	8	7	8	8	10	6	9	9	8	8	12	6	12	9	10	13	11	13
23-Dec	11	13	13	16	16	16	16	15	14	13	14	14	16	17	15	15	15	15	13	14	13	7	8	7	17
24-Dec	7	9	7	10	8	7	7	8	8	9	10	11	10	10	11	11	9	9	9	9	8	9	8	8	11
25-Dec	7	7	7	7	8	7	9	8	9	9	9	12	12	10	11	10	7	8	7	5	14	7	7	8	14
26-Dec	10	8	8	8	9	10	8	9	8	9	8	8	10	9	9	8	11	9	9	9	9	10	12	10	12
27-Dec	10	9	9	9	8	9	9	9	9	9	10	12	12	11	8	8	15	14	10	12	11	15	21	33	33
28-Dec	51	14	35	19	13	53	31	65	32	23	14	11	15	19	25	19	26	18	15	13	18	25	31	18	65
29-Dec	58	14	24	41	19	14	8	8	8	7	10	8	8	9	9	9	9	8	9	9	13	19	9	8	58
30-Dec	8	9	5	11	4	5	9	7	7	7	7	12	9	7	9	8	8	8	9	8	7	7	8	9	12
31-Dec	9	9	9	8	8	8	7	8	9	9	8	10	11	10	12	11	10	11	11	10	12	16	17	13	17
58 45 57 41 72 53 60 65 32 23 18 20 17 19 25 19 26 55 53 25 56 25 31 36																									
Diurnal Maximum																									



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

AMS20 MACKAY RIVER DECEMBER 2023

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

January 31, 2024

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - MACKAY RIVER (AMS20)
DECEMBER 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	710	34	34	100	9.6	0	0.6	0
H2S (ppb) Average	708	36	36	100	0.9	0	0.3	0
THC (ppm) Average	710	34	34	100	3.2	-	2.6	-
NO2 (ppb) Average	701	35	43	98.92	33.9	0	9.4	-
NO (ppb) Average	701	35	43	98.92	22.6	-	2.1	-
NOX (ppb) Average	701	35	43	98.92	55	-	11.3	-
Temperature 2 m (C) Average	744	0	0	100	7.6	-	3.4	-
Relative Humidity (%) Average	744	0	0	100	95.7	-	90.8	-
Wind Speed 10 m (km/h) Average	744	0	0	100	20	-	13	-
Wind Direction 10 m (deg) Average	744	0	0	100	-	-	-	-
Precipitation (mm) Total	744	0	0	100	1.2	-	3.4	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - MACKAY RIVER (AMS20)
DECEMBER 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	710	0.15	0.4	-	0	0	0	0.1	0.2	0.3	9.6
H2S (ppb) Average	708	0.09	0.1	-	0	0	0.1	0.1	0.1	0.1	0.9
THC (ppm) Average	710	2.28	0.1	-	2	2.2	2.2	2.2	2.3	2.4	3.2
NO2 (ppb) Average	701	1.83	2.8	-	0.2	0.3	0.6	1	2	4.2	33.9
NO (ppb) Average	701	0.19	1.2	-	0	0	0	0	0	0.2	22.6
NOX (ppb) Average	701	2	3.7	-	0.2	0.3	0.6	1	2	4.2	55
Temperature 2 m (C) Average	744	-5.28	5.5	-	-19	-12.3	-9.4	-4.7	-1	1.5	7.6
Relative Humidity (%) Average	744	74.74	14.1	-	36.3	53.6	64.7	78.8	86.5	90	95.7
Wind Speed 10 m (km/h) Average	744	7.7	3	-	0	4	5	7	10	12	20
Wind Direction 10 m (deg) Average	744	-	-	-	-	-	-	-	-	-	-
Precipitation (mm) Total	744	-	-	4.84	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION -MACKAY RIVER (AMS20)
DECEMBER 2023

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
NO2	01 Dec 2023 01:00	01 Dec 2023 08:00	8	Maintenance - replaced sample pump



Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO₂) - ppb Mackay River - December 2023

Number of Exceedences (AAAQO):		1-hr: 0		24-hr: 0		Hours in Service:		744																		
Maximum Value: 9.6 ppb on Dec 17 02:00		Maximum Daily Average: 0.6 ppb on Dec 17				Hours of Data:		710																		
Minimum Value: 0.0 ppb on Dec 4 13:00		Minimum Daily Average: 0.0 ppb on Dec 27				Hours of Missing Data:		34																		
Maximum Diurnal Average: 0.5 ppb at hour 2		Minimum Diurnal Average: 0.1 ppb at hour 22				Hours of Calibration:		34																		
Monthly Average: 0.15 ppb		Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.0 Median = 0.1 Q ₃ = 0.2 P ₉₀ = 0.3 P ₉₉ = 1.0				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-Dec	0.2	0.2	0.2	0.1	Z	0.1	0.2	0.2	0.1	0.1	0.1	0.3	0.6	0.8	1.0	0.5	0.2	0.4	0.2	0.6	0.7	0.2	0.1	0.2	0.3	1.0
2-Dec	0.1	0.1	0.1	0.1	0.1	Z	0.1	0.1	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	0.1	0.1	0.1	0.2
3-Dec	Z	0.1	0.2	0.1	0.2	0.2	0.1	0.1	0.1	0.1	0.2	0.3	0.2	0.3	0.4	0.3	0.2	0.2	0.3	0.2	0.1	0.1	0.0	0.1	0.1	0.4
4-Dec	0.3	Z	0.3	0.2	0.3	0.2	0.2	0.2	0.2	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	0.0	0.3
5-Dec	0.0	0.0	Z	0.0	0.1	0.1	0.1	0.1	0.1	0.2	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	0.3
6-Dec	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
7-Dec	0.0	0.1	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
8-Dec	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	0.1	0.0	0.0	0.1	0.0	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.1
9-Dec	Z	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	0.1	0.2	0.2	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3
10-Dec	0.3	Z	0.3	0.3	0.2	0.3	0.4	0.4	0.4	0.4	0.4	0.3	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	0.4
11-Dec	0.1	0.0	Z	0.5	0.1	0.1	0.1	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.0	0.1	0.1	0.1	0.0	0.1	0.0	0.1	0.1	0.1	0.1	0.5
12-Dec	0.1	0.1	0.1	Z	0.1	0.1	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1
13-Dec	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	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.1
14-Dec	0.0	0.0	0.1	0.0	0.0	Z	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.0	0.1	0.0	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.1
15-Dec	Z	0.1	0.1	0.1	0.0	0.1	0.2	0.0	0.1	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	0.1	0.1	0.2
16-Dec	0.1	Z	0.1	0.0	0.1	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.3	0.3	0.0	0.0	0.0	0.0	0.9
17-Dec	2.2	9.6	Z	2.1	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	0.0	0.0	0.0	9.6
18-Dec	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.1	0.0	0.1	0.1	0.1	0.0	0.2	0.1	0.1	0.2
19-Dec	0.2	0.1	0.1	0.1	Z	0.9	0.3	0.3	0.2	0.4	0.7	0.2	0.1	0.2	0.2	0.2	0.1	0.1	0.2	0.2	0.2	0.2	0.1	0.3	0.1	0.9
20-Dec	0.1	0.1	0.1	0.1	0.1	Z	0.2	0.1	0.2	0.1	0.1	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2
21-Dec	Z	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	0.1	0.2	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
22-Dec	0.2	Z	0.2	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.7	1.0	0.9	0.5	0.8	1.1	1.0	0.9	0.7	0.2	0.2	0.2	0.1	0.1	1.1
23-Dec	0.2	0.1	Z	0.1	0.1	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.1	0.0	0.1	0.1	0.1	0.0	0.1	0.1	0.0	0.0	0.1	0.1	0.2
24-Dec	0.1	0.1	0.0	Z	0.1	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	0.1	0.0	0.2	0.1	0.1	0.1	0.2
25-Dec	0.0	0.1	0.1	0.1	Z	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.0	0.1	0.1	0.2	0.4	0.1	0.4
26-Dec	0.4	0.4	0.4	0.4	0.7	Z	0.6	0.3	0.2	0.1	0.3	0.9	1.6	1.6	1.2	0.8	0.5	0.2	0.1	0.1	0.1	0.0	0.0	0.1	0.1	1.6
27-Dec	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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	0.0	0.1
28-Dec	0.0	Z	0.0	0.2	0.6	0.4	0.4	0.3	0.4	1.0	0.7	0.4	0.3	0.2	0.2	0.5	0.4	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	1.0
29-Dec	0.1	0.1	Z	0.1	0.0	0.1	0.1	0.1	0.2	0.3	0.4	0.5	0.3	0.3	0.3	0.2	0.1	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.5
30-Dec	0.0	0.0	0.0	Z	0.2	0.1	0.2	0.1	0.2	0.2	0.3	0.4	0.4	0.3	0.3	0.3	0.2	0.1	0.1	0.1	0.1	0.1	0.3	0.5	0.6	0.6
31-Dec	0.5	0.3	0.3	0.2	Z	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.5
																								Diurnal Average		
																								Diurnal Maximum		
																								0.2 2.2		
																								0.5 9.6		
																								0.1 0.4		
																								0.2 2.1		
																								0.1 0.7		
																								0.2 0.9		
																								0.1 0.6		
																								0.1 0.4		
																								0.1 0.4		
																								0.1 1.0		
																								0.2 0.7		
																								0.2 0.9		
																								0.2 1.6		
																								0.2 1.6		
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																								0.1 0.5		
																								0.1 1.1		
																								0.1 1.0		
																								0.1 0.9		
																								0.1 0.7		
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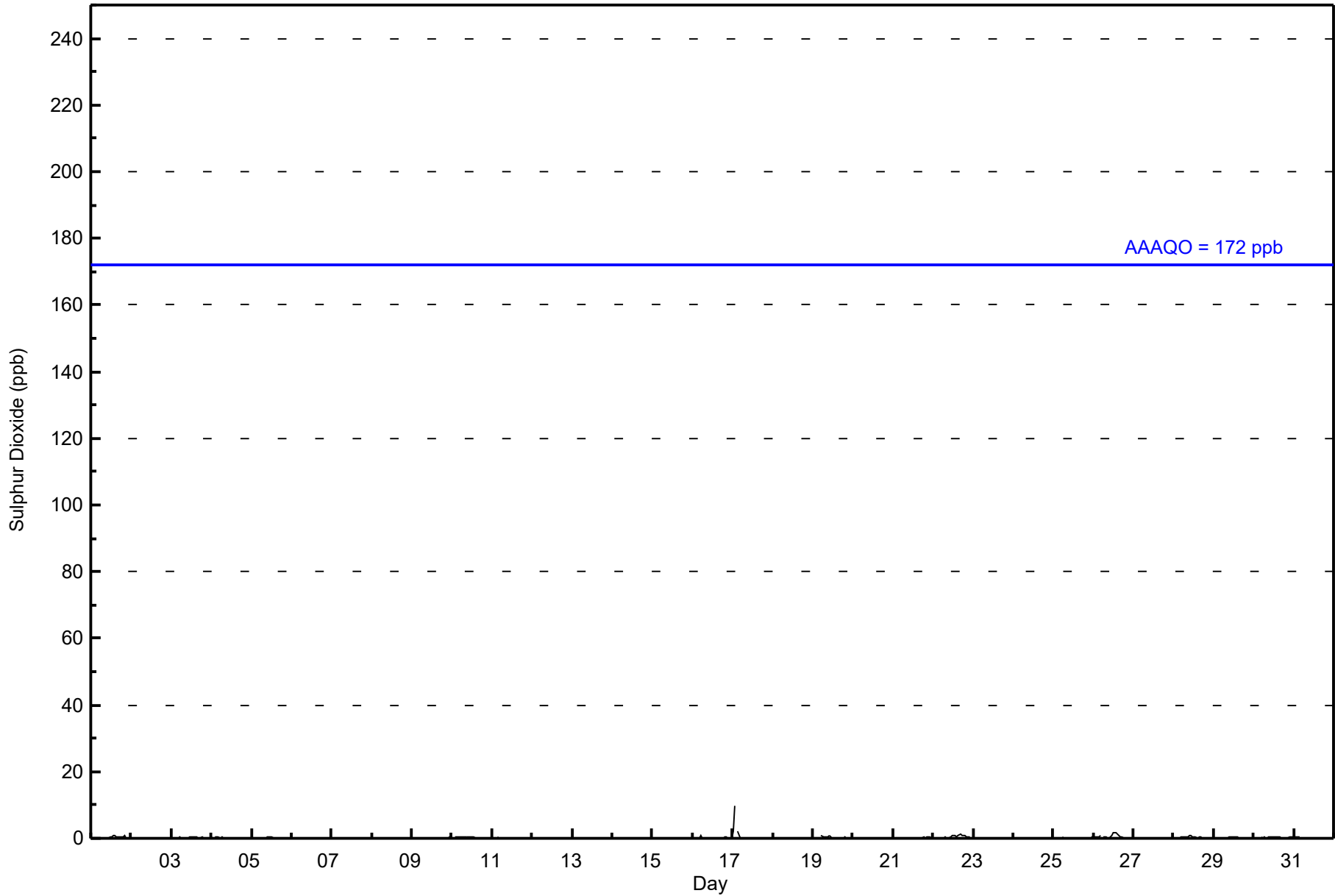
Z - zerospan C - Calibration

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



Wood Buffalo Environmental Association
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Mackay River - December 2023





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Mackay River - December 2023

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	710	100.00	100.00
11 - 20	0	0.00	100.00
21 - 60	0	0.00	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 710

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Sulphur Dioxide (SO₂) - ppb
Mackay River - December 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	10	9	6	2	9	19	48	47	211	114	72	75	53	21	7	7	710
11 - 20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	10	9	6	2	9	19	48	47	211	114	72	75	53	21	7	7	710

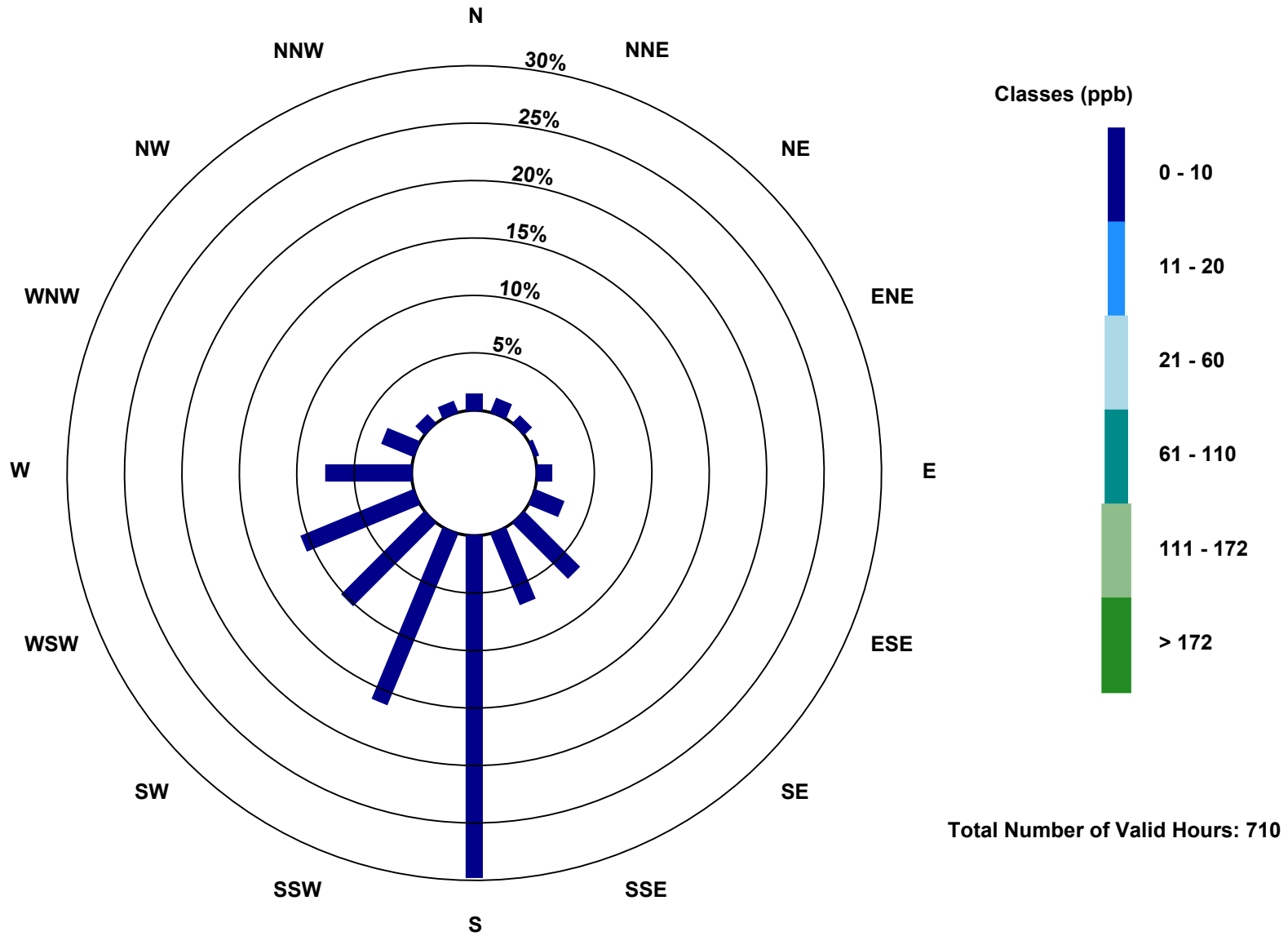
Total Number of Valid Hours: 710

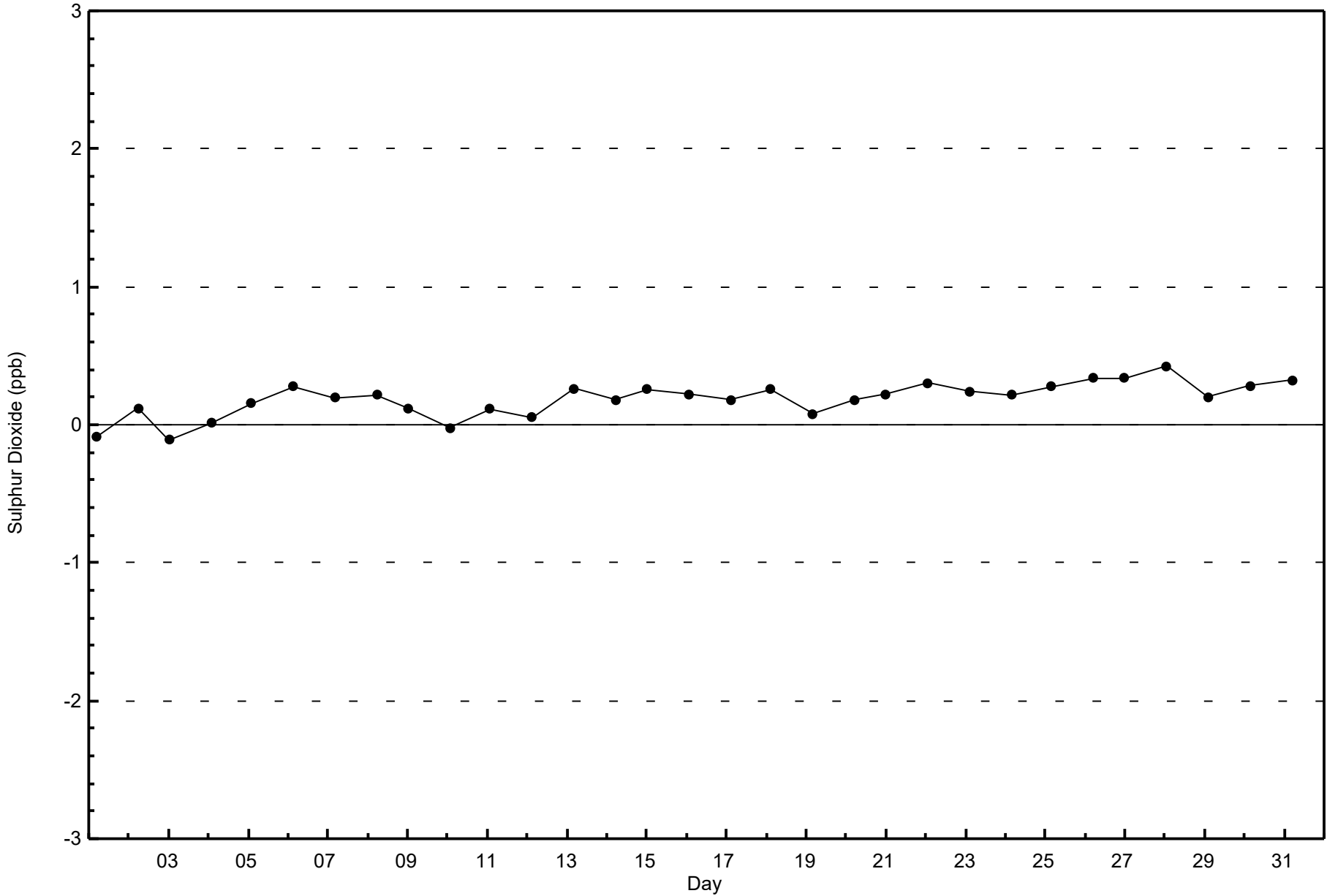
Total Number of Hours: 744

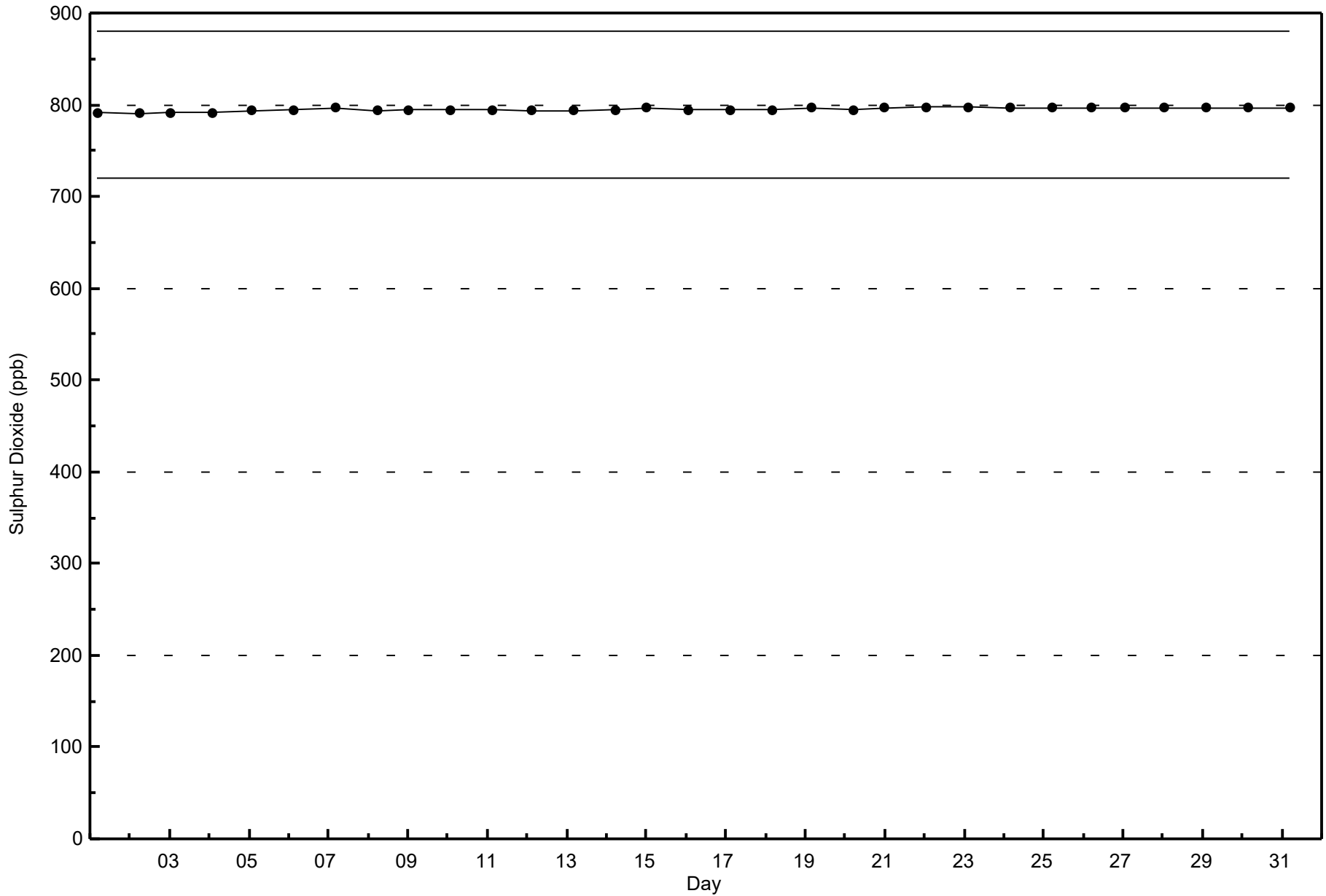


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Sulphur Dioxide (SO₂) - ppb
Mackay River





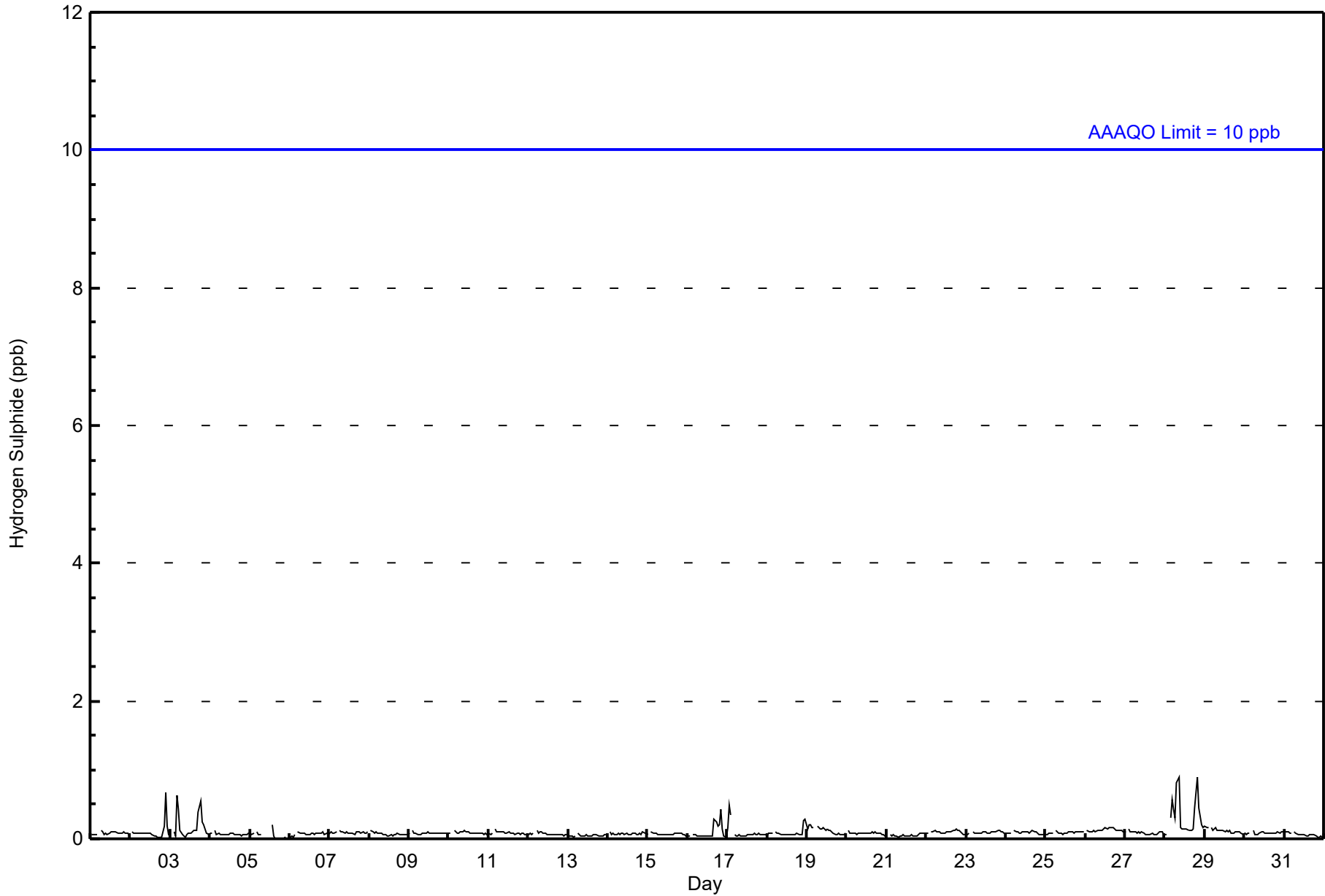




Wood Buffalo Environmental Association
Summary of Hour Averages

Hydrogen Sulphide (H₂S) - ppb
Mackay River - December 2023

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 0.9 ppb on Dec 28 20:00 Maximum Daily Average: 0.3 ppb on Dec 28		Hours in Service: 744 Hours of Data: 708 Hours of Missing Data: 36 Hours of Calibration: 36 Percent Operational Time: 100.0																										
Minimum Value: 0.0 ppb on Dec 5 16:00 Maximum Diurnal Average: 0.1 ppb at hour 5 Monthly Average: 0.09 ppb		Minimum Daily Average: 0.0 ppb on Dec 5 Minimum Diurnal Average: 0.1 ppb at hour 24 Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.1 Median = 0.1 Q ₃ = 0.1 P ₉₀ = 0.1 P ₉₉ = 0.5																										
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-Dec	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		
2-Dec	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	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.7	0.2	0.1	0.1	0.1		
3-Dec	0.0	Z	0.1	0.0	0.6	0.4	0.1	0.1	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.4	0.5	0.3	0.2	0.1	0.1	0.1	0.1	0.2	0.6	
4-Dec	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	0.1	0.1	0.1	0.1	0.1	0.1	0.1	
5-Dec	0.1	0.1	0.1	Z	0.1	0.1	0.1	0.1	C	C	C	C	C	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	
6-Dec	0.0	0.0	0.0	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	
7-Dec	0.1	0.1	0.1	0.1	0.1	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	
8-Dec	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.1	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	
9-Dec	0.1	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	
10-Dec	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-Dec	0.1	0.1	0.1	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	
12-Dec	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	0.0	0.1	0.1	0.1	0.1	0.1	
13-Dec	0.1	0.0	0.0	0.0	0.0	Z	0.1	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	
14-Dec	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	
15-Dec	0.1	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	
16-Dec	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	0.1	0.3	0.3	0.2	0.2	0.4	0.1	0.0	0.0	0.1	0.1	0.1	0.4	
17-Dec	0.2	0.5	0.3	Z	0.1	0.0	0.0	0.1	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	
18-Dec	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	0.3	0.3	0.1	0.3
19-Dec	0.1	0.2	0.2	0.2	0.2	Z	0.2	0.2	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	
20-Dec	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	
21-Dec	0.0	Z	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	
22-Dec	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	
23-Dec	0.1	0.1	0.1	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	
24-Dec	0.1	0.1	0.1	0.1	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	
25-Dec	0.1	0.1	0.1	0.1	0.1	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	
26-Dec	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	
27-Dec	0.1	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	
28-Dec	0.1	0.1	Z	0.3	0.6	0.4	0.3	0.8	0.9	0.2	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.4	0.9	0.5	0.3	0.2	0.2	0.3	0.9	
29-Dec	0.2	0.2	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	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	
30-Dec	0.1	0.1	0.1	0.1	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	
31-Dec	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	0.0	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.1	
																								Diurnal Average				
																								Diurnal Maximum				
0.1 0.2 0.5 0.3 0.3 0.6 0.4 0.3 0.8 0.9 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.3 0.4 0.5 0.9 0.5 0.7 0.3 0.3																												
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 (H₂S) - ppb
Mackay River - December 2023**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	708	100.00	100.00
3 - 4	0	0.00	100.00
5 - 7	0	0.00	100.00
8 - 11	0	0.00	100.00
> 11	0	0.00	100.00

Total Number of Valid Hours: 708

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Hydrogen Sulphide (H₂S) - ppb
Mackay River - December 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	10	8	7	2	9	18	51	46	205	114	74	78	51	21	7	7	708
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	10	8	7	2	9	18	51	46	205	114	74	78	51	21	7	7	708

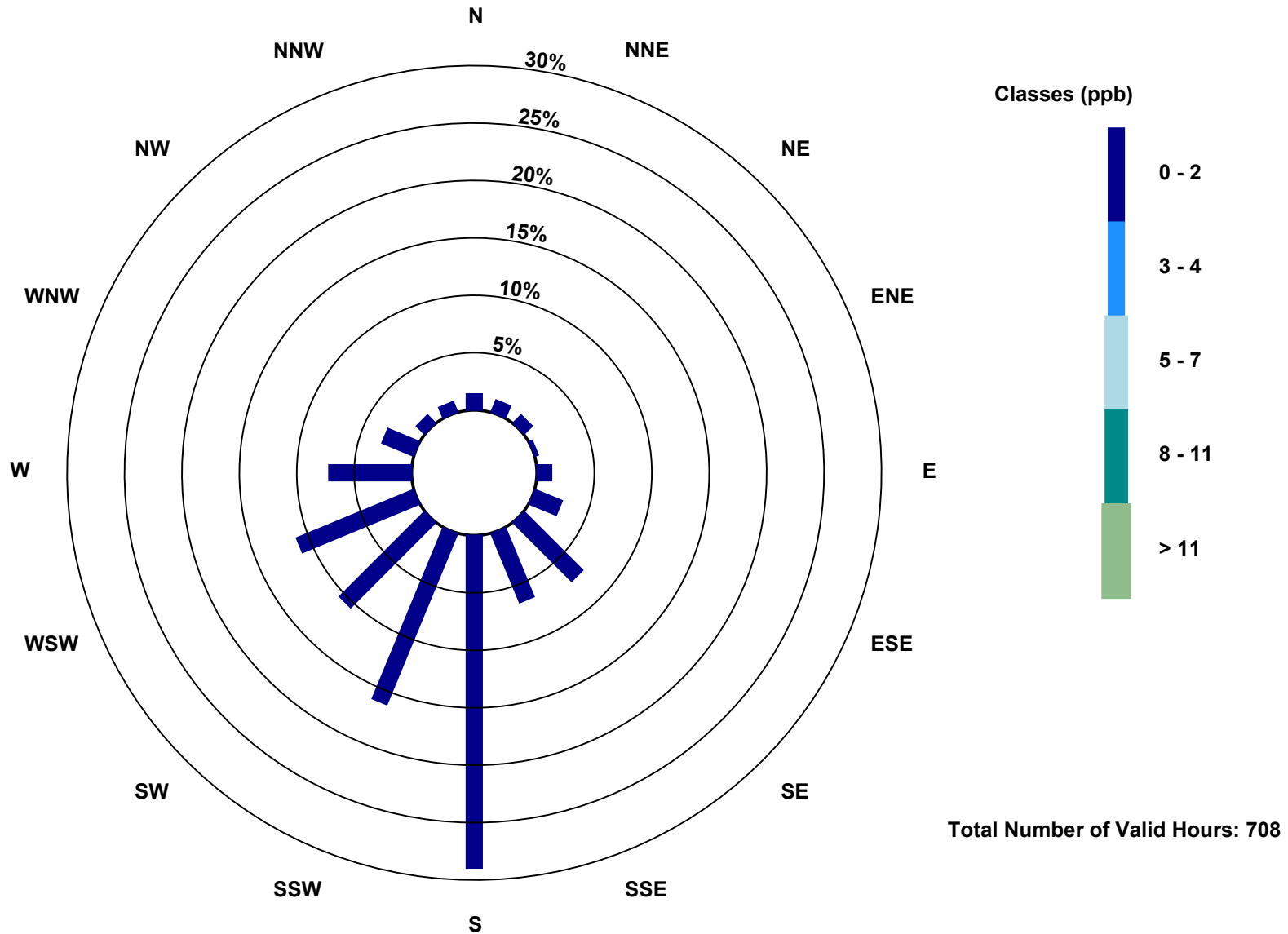
Total Number of Valid Hours: 708

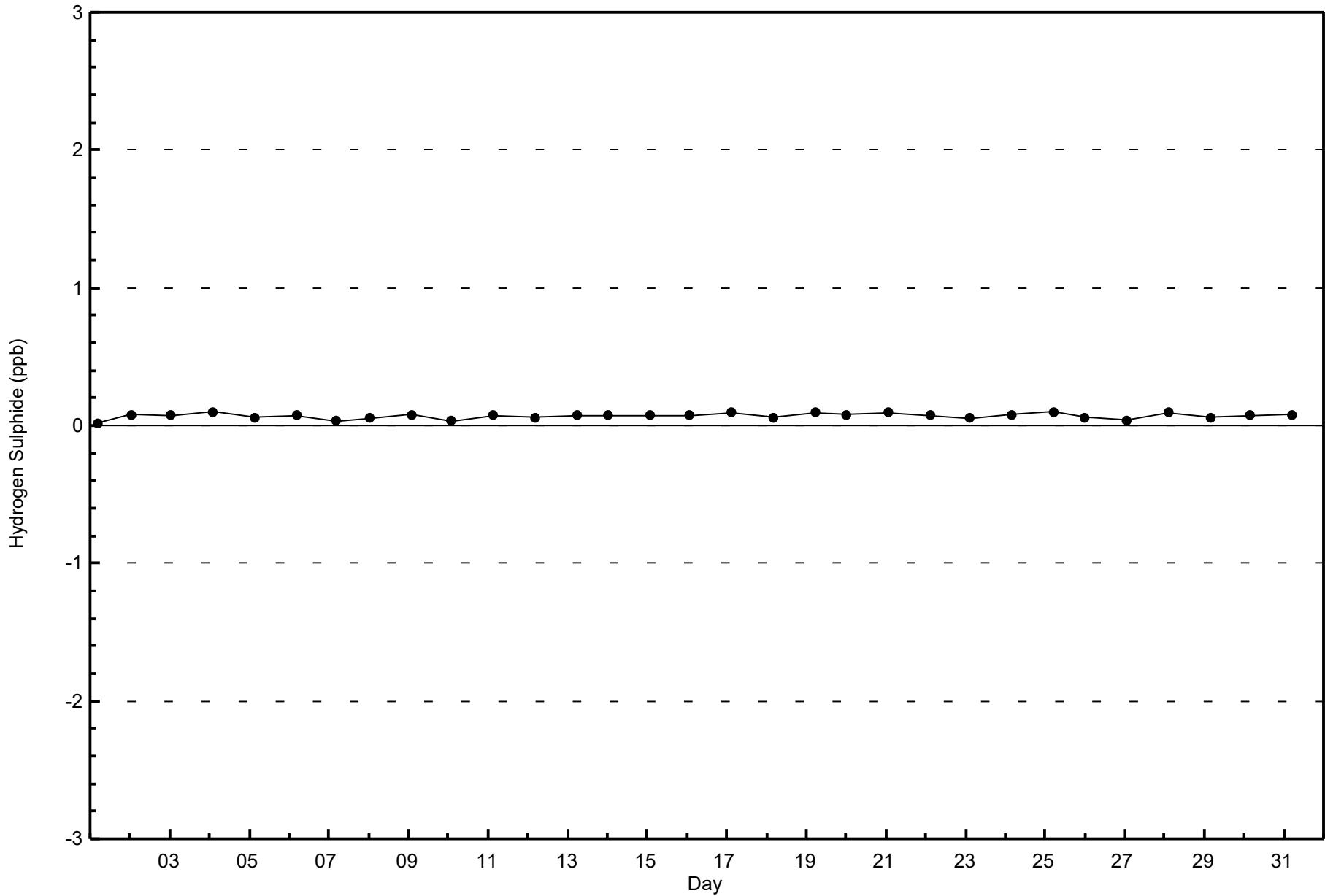
Total Number of Hours: 744

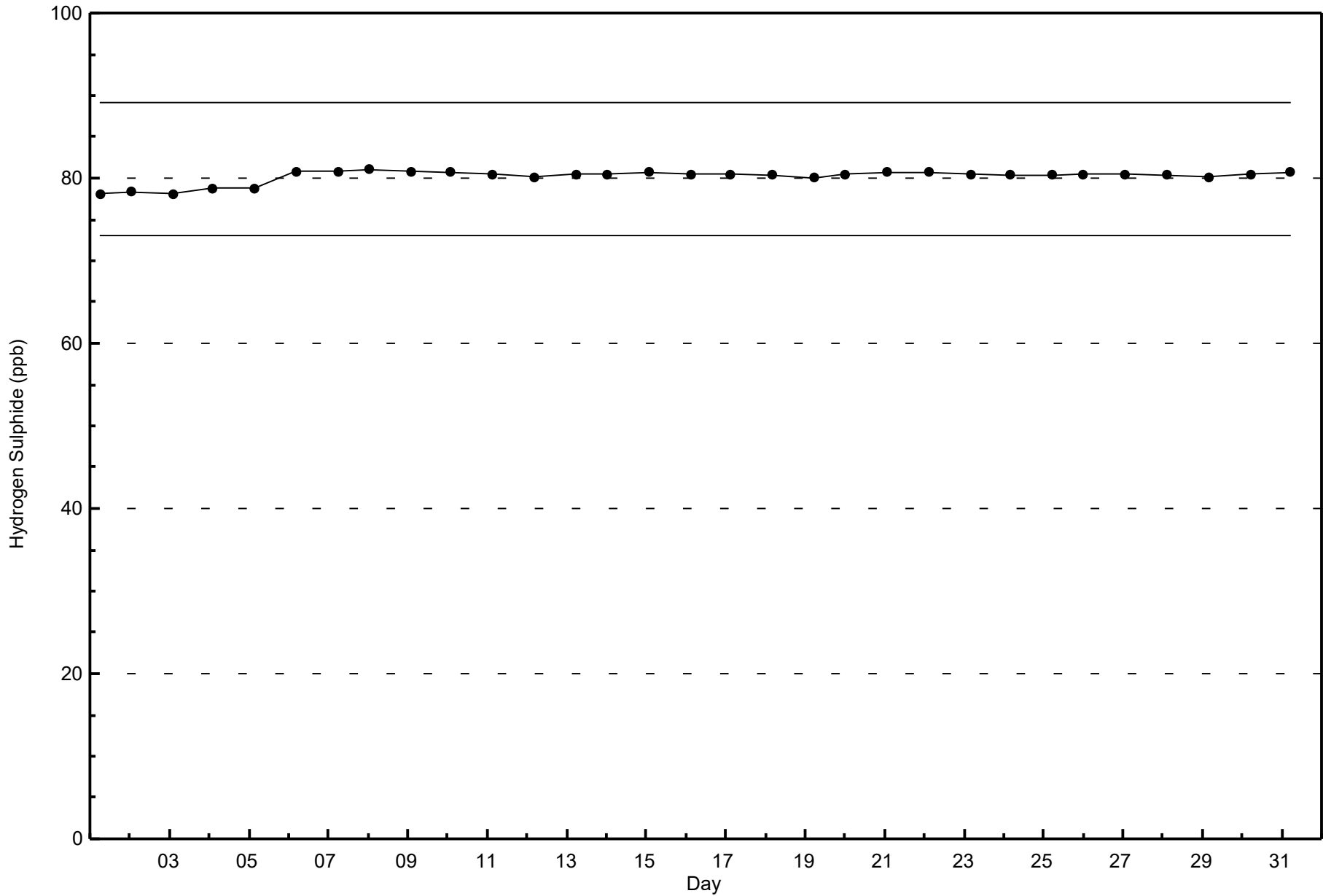


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Hydrogen Sulphide (H₂S) - ppb
Mackay River









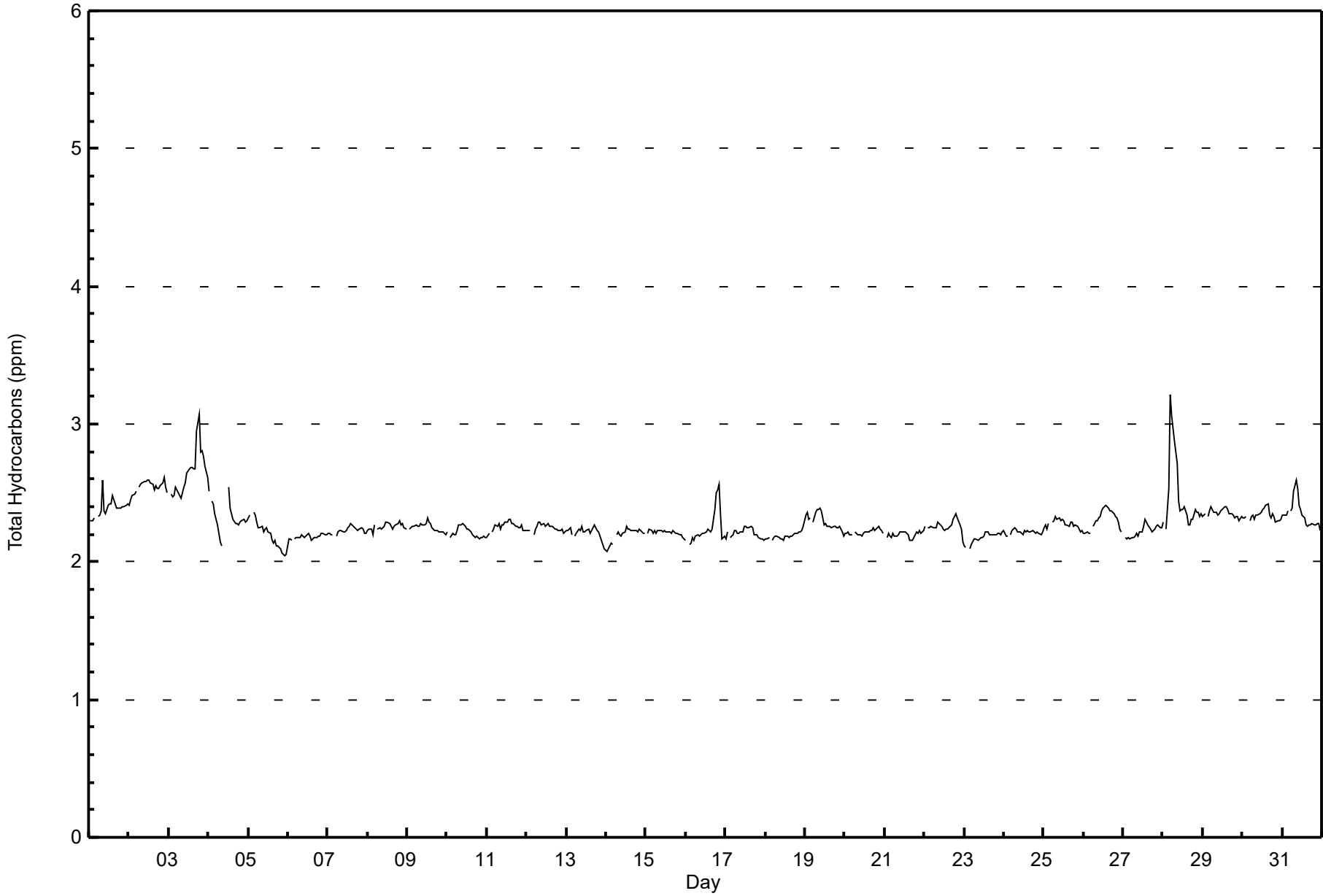
Wood Buffalo Environmental Association

Summary of Hour Averages

Total Hydrocarbons (THC) - ppm

Mackay River - December 2023

Maximum Value: 3.2 ppm on Dec 28 05:00																				Maximum Daily Average: 2.6 ppm on Dec 3					Hours in Service:	744		
Minimum Value: 2.0 ppm on Dec 5 23:00																				Minimum Daily Average: 2.2 ppm on Dec 23					Hours of Data:	710		
Maximum Diurnal Average: 2.3 ppm at hour 13																				Minimum Diurnal Average: 2.2 ppm at hour 24					Hours of Missing Data:	34		
Monthly Average: 2.28 ppm																				Percentiles: P ₁ = 2.1 P ₁₀ = 2.2 Q ₁ = 2.2 Median = 2.2 Q ₃ = 2.3 P ₉₀ = 2.4 P ₉₉ = 2.8					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-Dec	2.3	2.3	2.3	2.3	Z	2.3	2.3	2.4	2.6	2.4	2.3	2.4	2.4	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	2.6
2-Dec	2.4	2.4	2.5	2.5	2.5	Z	2.5	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.5	2.5	2.5	2.5	2.6	2.6	2.6	2.5	2.5	2.5	2.5	2.5	2.6
3-Dec	Z	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.6	2.7	2.7	2.7	2.7	2.7	2.9	3.1	2.8	2.8	2.8	2.7	2.6	2.6	2.6	2.6	3.1
4-Dec	2.5	Z	2.4	2.4	2.3	2.3	2.2	2.1	2.1	C	C	C	2.5	2.4	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.5
5-Dec	2.3	2.3	Z	2.4	2.3	2.3	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.0	2.1	2.1	2.1	2.2	2.4
6-Dec	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	2.2	2.2
7-Dec	2.2	2.2	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	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3
8-Dec	2.2	2.2	2.2	2.2	2.3	Z	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.3	2.3
9-Dec	Z	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	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3
10-Dec	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3
11-Dec	2.2	2.2	Z	2.2	2.2	2.3	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	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.3	2.3
12-Dec	2.2	2.2	2.2	Z	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	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3
13-Dec	2.2	2.2	2.2	2.2	Z	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.2	2.3
14-Dec	2.1	2.1	2.1	2.1	2.1	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3
15-Dec	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
16-Dec	2.2	Z	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.4	2.5	2.5	2.6	2.3	2.2	2.2	2.2	2.2	2.2	2.6
17-Dec	2.2	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3
18-Dec	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	2.3	2.3	2.3	2.2	2.3
19-Dec	2.3	2.4	2.3	2.3	Z	2.3	2.4	2.4	2.4	2.4	2.4	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.3	2.4
20-Dec	2.2	2.2	2.2	2.2	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.3
21-Dec	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
22-Dec	2.3	Z	2.2	2.2	2.3	2.2	2.2	2.2	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.1	2.1	2.1	2.3	2.3
23-Dec	2.1	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	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
24-Dec	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	2.2	2.2
25-Dec	2.2	2.3	2.2	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	2.2	2.2	2.2	2.2	2.2	2.3	2.3
26-Dec	2.2	2.2	2.2	2.2	2.2	Z	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	2.3	2.3	2.3	2.2	2.2	2.2	2.3	2.4
27-Dec	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.2	2.2	2.2	2.2	2.3
28-Dec	2.3	Z	2.2	2.5	3.2	3.1	3.0	2.9	2.7	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	2.3	2.3	2.3	2.5	3.2
29-Dec	2.3	2.3	Z	2.3	2.4	2.4	2.4	2.4	2.4	2.4	2.3	2.3	2.4	2.4	2.4	2.4	2.4	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.4	2.4
30-Dec	2.3	2.3	2.3	Z	2.3	2.3	2.3	2.3	2.3	2.3	2.4	2.4	2.4	2.4	2.4	2.4	2.3	2.3	2.4	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.4
31-Dec	2.3	2.3	2.3	2.4	Z	2.4	2.4	2.5	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	2.2	2.2	2.3	2.6
																								Diurnal Average		2.2	2.2	
																								Diurnal Maximum		2.5	2.6	
Z - zerospan C - Calibration																												





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Mackay River - December 2023

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	1	0.14	0.14
2.1 - 3.0	706	99.44	99.58
3.1 - 10.0	3	0.42	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 710

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Total Hydrocarbons (THC) - ppm
Mackay River - December 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	1	0	0	0	0	0	1
2.1 - 3.0	8	9	6	2	9	19	47	47	211	114	71	75	53	21	7	7	706	
3.1 - 10.0	2	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	3	
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Totals	10	9	6	2	9	19	48	47	211	114	72	75	53	21	7	7	710	

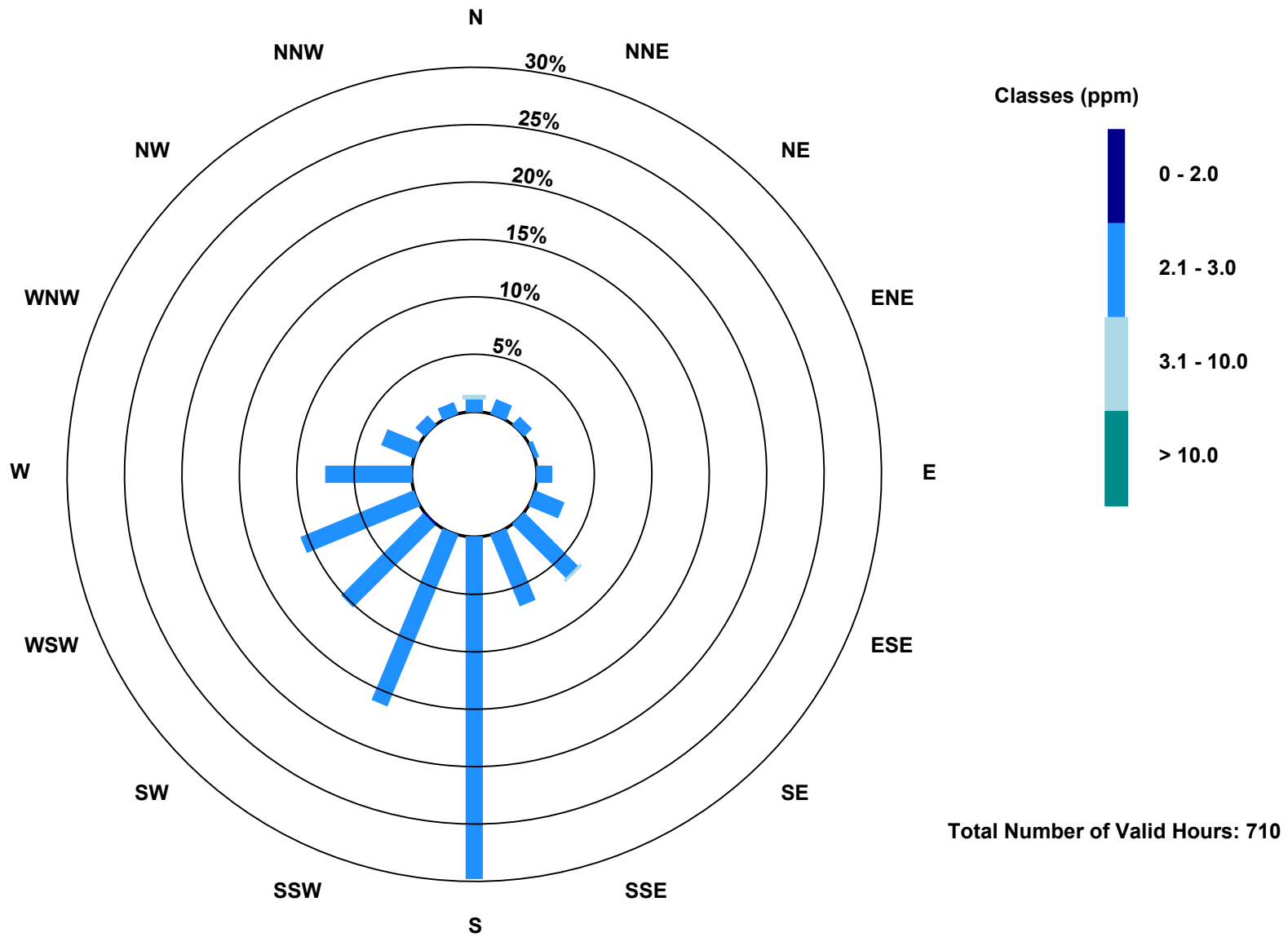
Total Number of Valid Hours: 710

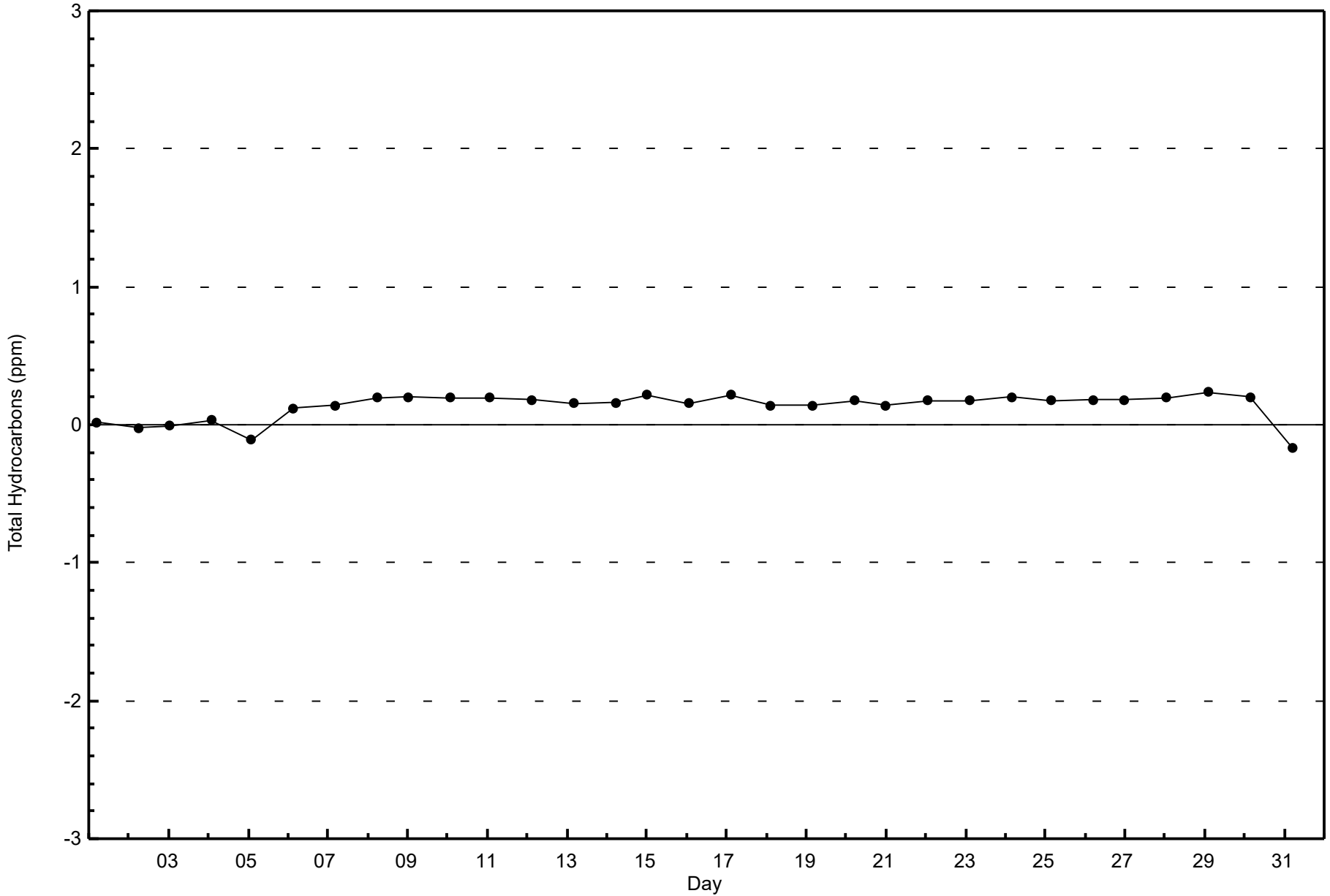
Total Number of Hours: 744

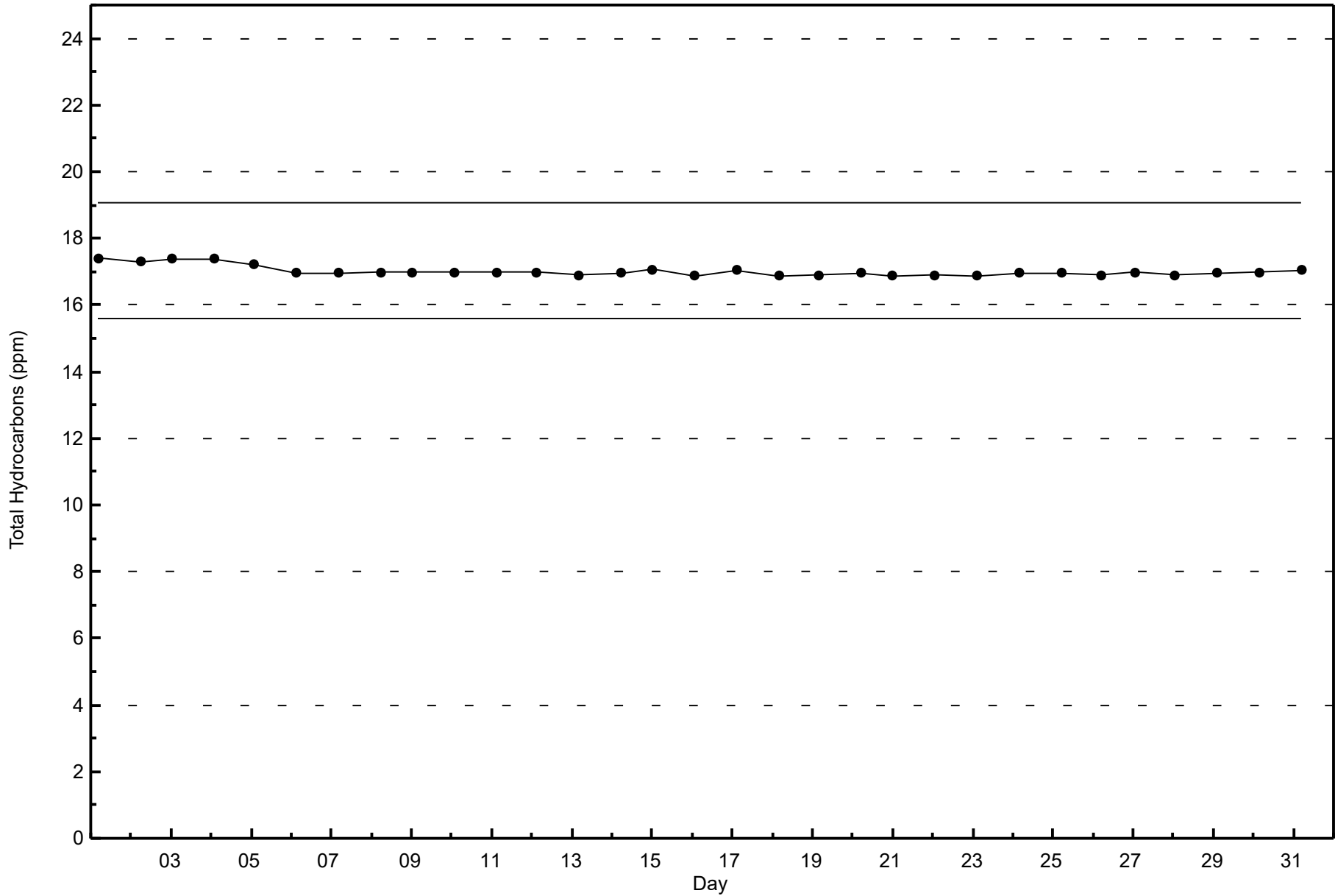


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Total Hydrocarbons (THC) - ppm
Mackay River







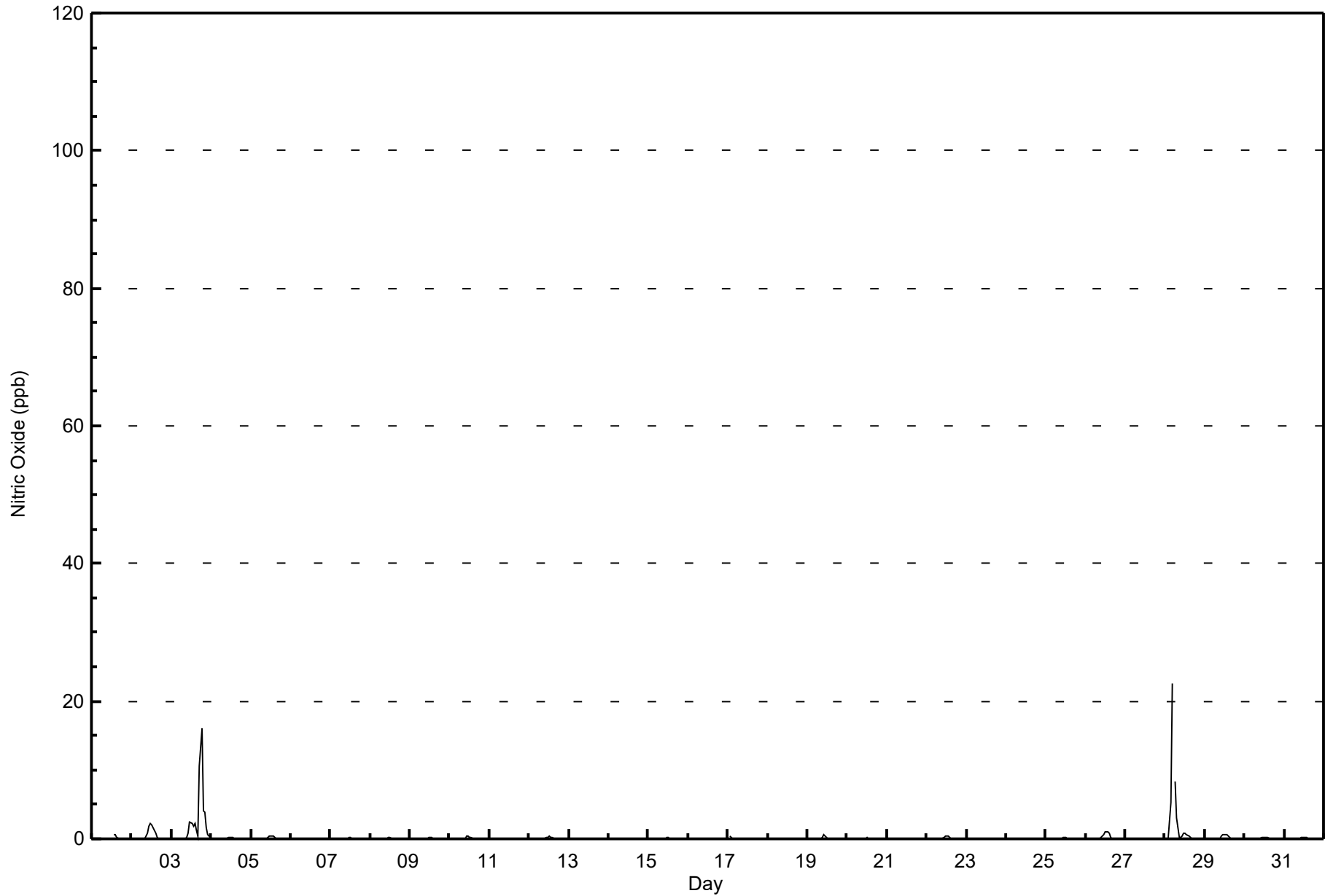


Maximum Value: 22.6 ppb on Dec 28 05:00		Maximum Daily Average: 2.1 ppb on Dec 3		Hours in Service: 744																						
Minimum Value: 0.0 ppb on Dec 1 17:00		Minimum Daily Average: 0.0 ppb on Dec 23		Hours of Data: 701																						
Maximum Diurnal Average: 0.9 ppb at hour 5		Minimum Diurnal Average: 0.0 ppb at hour 6		Hours of Missing Data: 43																						
Monthly Average: 0.19 ppb		Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.0 Median = 0.0 Q ₃ = 0.0 P ₉₀ = 0.2 P ₉₉ = 3.0		Hours of Calibration: 35																						
				Percent Operational Time: 98.9																						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Dec	M	M	M	M	M	M	M	M	C	C	C	C	C	0.7	0.6	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	--	0.7
2-Dec	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.1	0.9	1.9	2.2	2.1	1.6	0.8	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	2.2
3-Dec	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.2	0.8	2.4	2.3	1.9	2.2	1.3	0.3	10.5	16.0	4.0	3.8	1.7	0.6	0.2	2.1	16.0
4-Dec	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
5-Dec	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.3	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	0.4
6-Dec	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
7-Dec	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	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
8-Dec	0.0	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
9-Dec	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	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
10-Dec	0.0	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.1	0.3	0.4	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	0.4
11-Dec	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.3	0.3	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.3
13-Dec	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	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
14-Dec	0.0	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
15-Dec	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	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
16-Dec	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	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
17-Dec	Z	0.5	0.2	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.5
18-Dec	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
19-Dec	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.5	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	0.5
20-Dec	0.0	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
21-Dec	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
22-Dec	0.0	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.1	0.3	0.4	0.5	0.4	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.5
23-Dec	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
25-Dec	0.0	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	0.2
26-Dec	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.1	0.4	0.7	1.0	1.0	0.7	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	1.0
27-Dec	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
28-Dec	0.0	0.0	0.0	5.2	22.6	Z	8.3	3.0	0.2	0.2	0.4	0.8	0.9	0.7	0.4	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.9	22.6
29-Dec	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.3	0.6	0.7	0.6	0.4	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.7
30-Dec	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.2	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
31-Dec	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.1	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	0.0	0.0	0.2
																								Diurnal Average		
																								Diurnal Maximum		
Z - zerospan C - Calibration M - Maintenance																										



Wood Buffalo Environmental Association
Hourly Averages

Nitric Oxide (NO) - ppb
Mackay River - December 2023





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitric Oxide (NO) - ppb
Mackay River - December 2023

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	700	99.86	99.86
21 - 40	1	0.14	100.00
11 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 701

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitric Oxide (NO) - ppb
Mackay River - December 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	10	5	2	9	19	48	45	202	113	74	78	53	20	7	7	700
21 - 40	1	0	0	0	0	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
Totals	9	10	5	2	9	19	48	45	202	113	74	78	53	20	7	7	701

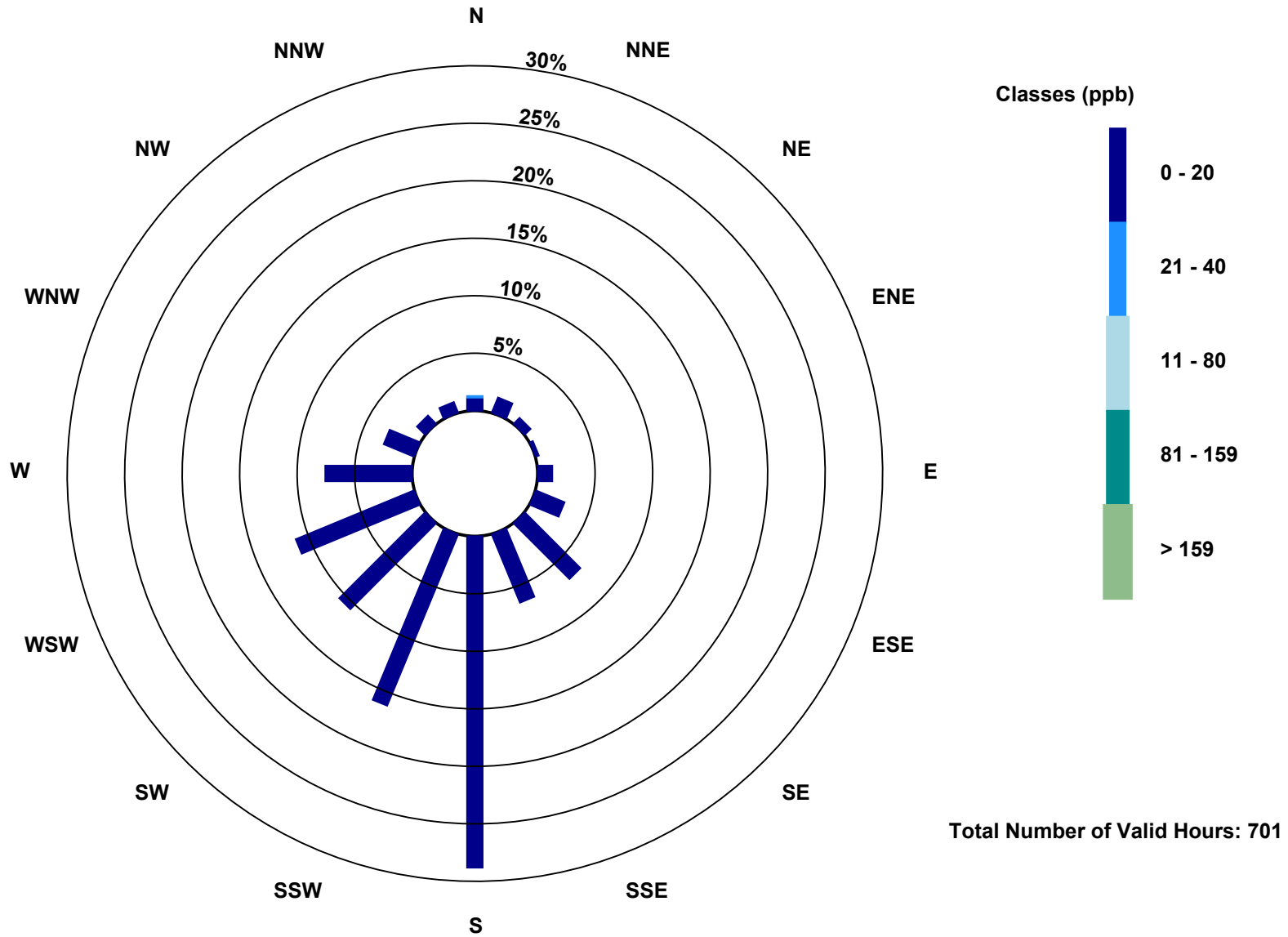
Total Number of Valid Hours: 701

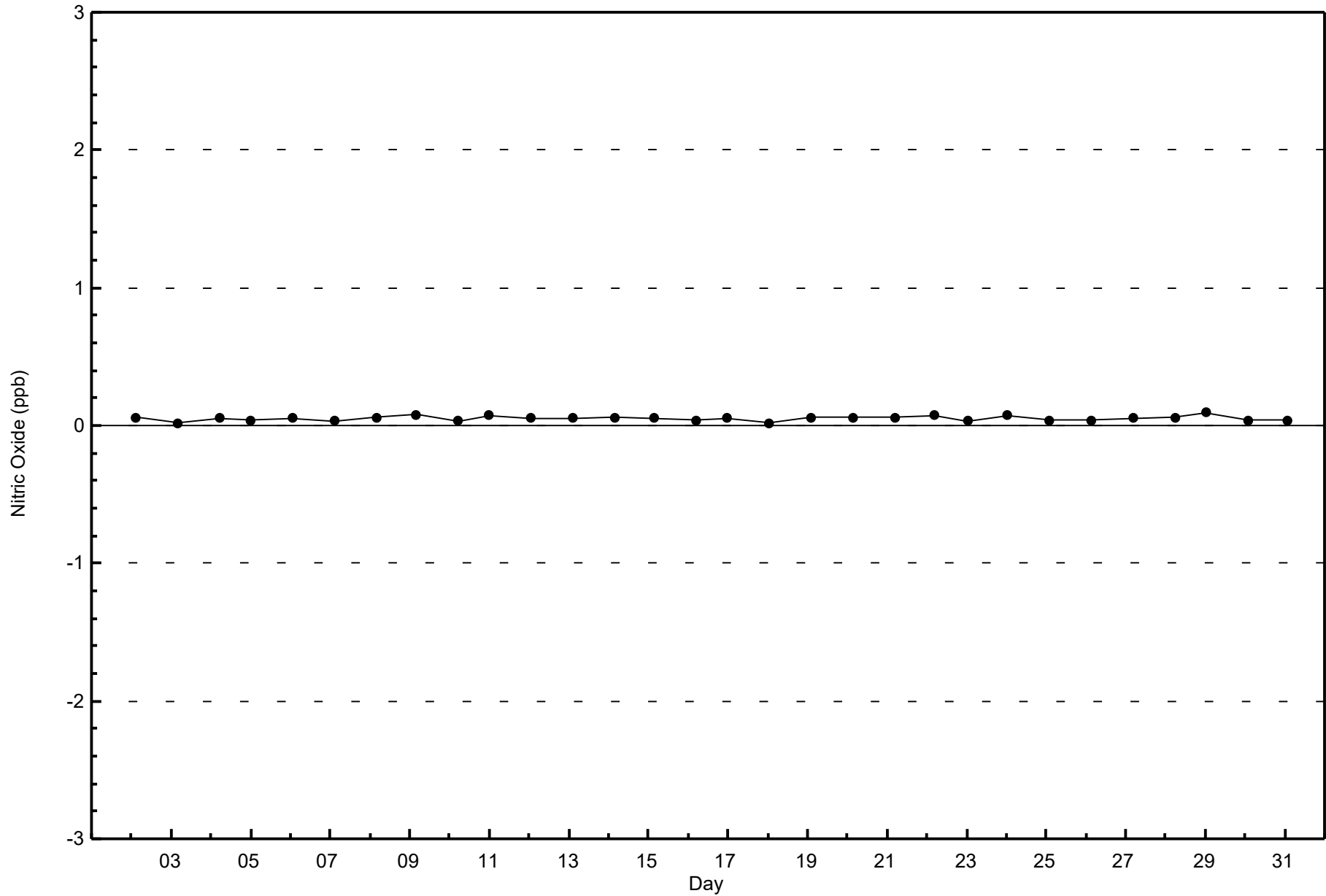
Total Number of Hours: 744

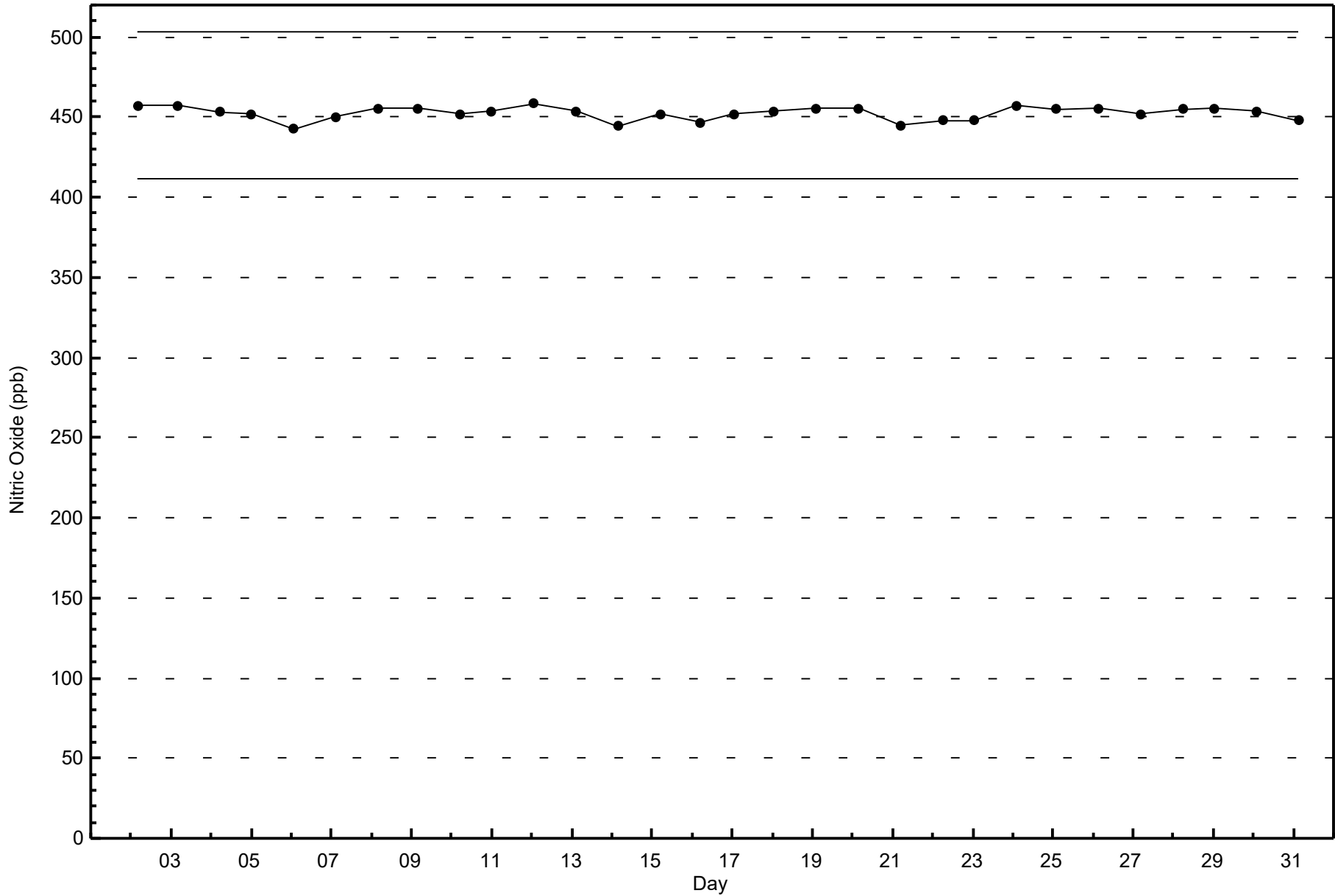


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Nitric Oxide (NO) - ppb
Mackay River









Wood Buffalo Environmental Association
Summary of Hour Averages

Nitrogen Dioxide (NO₂) - ppb
Mackay River - December 2023

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 33.9 ppb on Dec 28 07:00	Maximum Daily Average: 9.4 ppb on Dec 28		Hours of Data:	701
Minimum Value: 0.2 ppb on Dec 17 12:00	Minimum Daily Average: 0.2 ppb on Dec 23		Hours of Missing Data:	43
Maximum Diurnal Average: 2.8 ppb at hour 5	Minimum Diurnal Average: 1.3 ppb at hour 24		Hours of Calibration:	35
Monthly Average: 1.83 ppb	Percentiles: P ₁ = 0.2 P ₁₀ = 0.3 Q ₁ = 0.6 Median = 1.0 Q ₃ = 2.0 P ₉₀ = 4.2 P ₉₉ = 11.0		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-Dec	M	M	M	M	M	M	M	M	C	C	C	C	C	3.4	4.8	4.7	4.1	4.1	3.5	4.0	5.0	4.2	4.0	3.8	--	5.0
2-Dec	4.0	4.8	5.4	Z	6.6	7.1	7.0	6.8	7.4	6.8	6.0	5.5	5.2	5.1	4.7	3.8	3.2	2.6	2.2	1.9	1.9	2.2	1.9	1.6	4.5	7.4
3-Dec	1.4	1.5	1.6	1.7	Z	1.7	1.4	1.3	1.3	1.1	2.2	4.1	4.7	6.3	7.7	8.7	9.1	13.6	13.7	11.0	9.1	7.6	5.8	4.1	5.2	13.7
4-Dec	4.2	4.9	4.8	4.2	3.5	Z	2.8	2.3	1.8	1.2	1.2	1.2	1.2	1.2	1.2	1.0	0.9	0.8	0.7	0.6	0.6	0.6	0.7	1.9	4.9	
5-Dec	Z	1.0	0.9	0.9	1.0	1.0	1.0	1.2	1.2	1.6	1.7	2.0	2.0	1.9	1.7	1.4	1.0	0.9	0.9	0.9	1.0	0.9	0.9	0.8	1.2	2.0
6-Dec	0.7	Z	0.6	0.5	0.4	0.4	0.4	0.5	0.5	0.6	0.6	0.5	0.5	0.5	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.5	0.6	0.5	0.7
7-Dec	0.5	0.5	Z	0.6	0.6	0.6	0.6	0.7	0.7	0.7	0.7	0.7	0.7	0.6	0.7	0.7	0.7	0.7	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.7
8-Dec	0.6	0.7	0.8	Z	0.8	0.8	0.8	0.7	0.5	0.5	0.5	0.8	0.8	0.7	0.8	0.6	0.9	1.0	1.0	1.1	1.3	1.1	1.4	1.4	0.9	1.4
9-Dec	1.5	1.5	1.4	1.3	Z	1.1	0.9	0.7	0.7	0.7	0.7	0.8	0.6	0.7	0.8	0.9	1.0	1.1	1.1	1.0	1.0	0.9	0.9	0.8	1.0	1.5
10-Dec	0.9	0.9	0.8	0.8	0.9	Z	1.9	2.4	2.9	3.4	3.2	2.5	1.8	1.3	0.9	0.7	0.6	0.4	0.3	0.3	0.4	0.3	0.2	0.2	1.2	3.4
11-Dec	Z	0.3	0.3	0.5	0.2	0.7	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.4	0.5	0.5	0.4	0.3	0.3	0.3	0.7
12-Dec	0.3	Z	0.4	0.4	0.5	0.5	0.6	0.9	1.1	1.2	1.3	1.4	1.4	1.5	1.5	1.7	1.5	1.4	1.2	1.4	1.6	1.6	1.6	1.6	1.2	1.7
13-Dec	1.4	1.2	Z	1.0	1.0	1.0	1.1	1.2	1.3	1.4	1.3	1.3	1.3	1.4	1.4	1.7	1.7	1.3	1.3	0.8	0.7	0.6	0.6	1.2	1.7	
14-Dec	0.6	0.5	0.6	Z	0.4	0.3	0.3	0.3	0.4	0.5	0.5	0.4	0.5	0.5	0.6	0.5	0.5	0.4	0.4	0.5	0.5	0.5	0.5	0.6	0.5	0.6
15-Dec	0.8	0.8	0.7	0.8	Z	0.9	0.8	0.8	1.0	0.9	1.0	1.1	1.1	1.0	1.1	1.5	2.1	2.2	2.3	2.3	2.2	1.9	1.6	1.1	1.3	2.3
16-Dec	0.8	0.8	0.8	0.8	0.8	Z	0.7	0.5	0.2	0.2	0.2	0.2	0.2	0.6	0.8	0.3	0.3	3.2	5.1	5.1	5.4	1.9	0.3	0.2	1.3	5.4
17-Dec	Z	3.9	3.0	0.9	0.3	0.4	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.4	0.6	1.0	0.8	0.9	0.9	0.7	0.7	0.8	0.8	0.8	3.9
18-Dec	0.8	Z	0.8	0.8	0.7	0.8	0.7	0.7	0.5	0.5	0.4	0.4	0.4	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.6	0.7	0.7	1.7	0.6	1.7
19-Dec	8.2	10.5	Z	4.6	5.4	7.2	6.5	6.1	5.5	5.6	6.3	1.4	0.7	0.7	1.0	0.9	1.0	0.7	0.6	0.6	0.6	0.5	0.5	0.7	3.3	10.5
20-Dec	0.5	0.4	0.4	Z	0.4	0.4	0.5	0.5	0.6	0.6	0.7	0.9	1.1	1.6	1.9	2.2	2.2	2.4	2.5	2.5	2.6	2.4	2.2	1.7	1.4	2.6
21-Dec	1.2	1.0	0.7	0.5	Z	0.5	0.4	0.4	0.4	0.4	0.6	0.4	0.6	0.7	0.8	1.0	0.8	0.7	1.2	1.8	2.2	2.4	2.5	2.6	1.0	2.6
22-Dec	2.7	2.9	2.9	2.9	3.0	Z	2.9	3.0	3.0	2.9	3.1	3.4	3.4	3.2	2.8	3.1	4.1	5.2	5.7	5.9	5.1	3.1	2.0	1.1	3.4	5.9
23-Dec	Z	0.6	0.5	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	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.6
24-Dec	0.2	Z	0.5	0.5	0.6	0.6	0.7	0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.8	0.9	1.0	0.7	1.0
25-Dec	1.1	1.4	Z	2.0	2.5	2.8	2.7	2.5	2.1	1.6	1.5	1.3	1.0	0.9	1.2	1.3	1.3	1.3	1.7	1.8	1.4	1.2	1.1	1.1	1.6	2.8
26-Dec	1.0	1.1	1.2	Z	1.5	1.7	1.6	1.7	1.8	2.0	3.0	3.2	4.2	4.7	5.1	5.7	5.3	4.7	3.8	3.0	2.5	1.8	1.3	0.9	2.7	5.7
27-Dec	0.3	0.3	0.3	0.3	Z	0.3	0.3	0.3	0.3	0.5	0.7	0.6	0.6	0.7	0.8	0.9	0.8	1.2	1.2	1.6	1.5	1.3	1.1	1.1	0.7	1.6
28-Dec	1.1	1.1	1.2	12.0	32.4	Z	33.9	30.1	20.6	10.1	8.0	8.6	7.7	7.5	6.3	5.4	4.7	4.2	3.6	3.2	3.2	3.2	4.2	4.5	9.4	33.9
29-Dec	Z	3.8	3.3	3.1	3.1	2.8	2.3	1.7	1.7	1.9	2.3	2.2	2.1	2.3	2.3	2.1	2.0	1.8	2.0	2.1	1.8	1.7	1.6	1.5	2.2	3.8
30-Dec	1.5	Z	1.4	1.4	1.4	1.3	1.2	1.2	1.1	1.2	1.4	1.5	1.6	1.6	1.5	1.4	1.4	1.4	1.5	1.5	1.4	1.7	2.3	2.5	1.5	2.5
31-Dec	2.4	2.2	Z	2.0	2.0	2.0	2.0	2.0	2.0	1.8	1.6	1.4	1.1	1.1	1.1	1.0	0.9	0.8	0.7	0.6	0.6	0.6	0.6	0.5	1.3	2.4

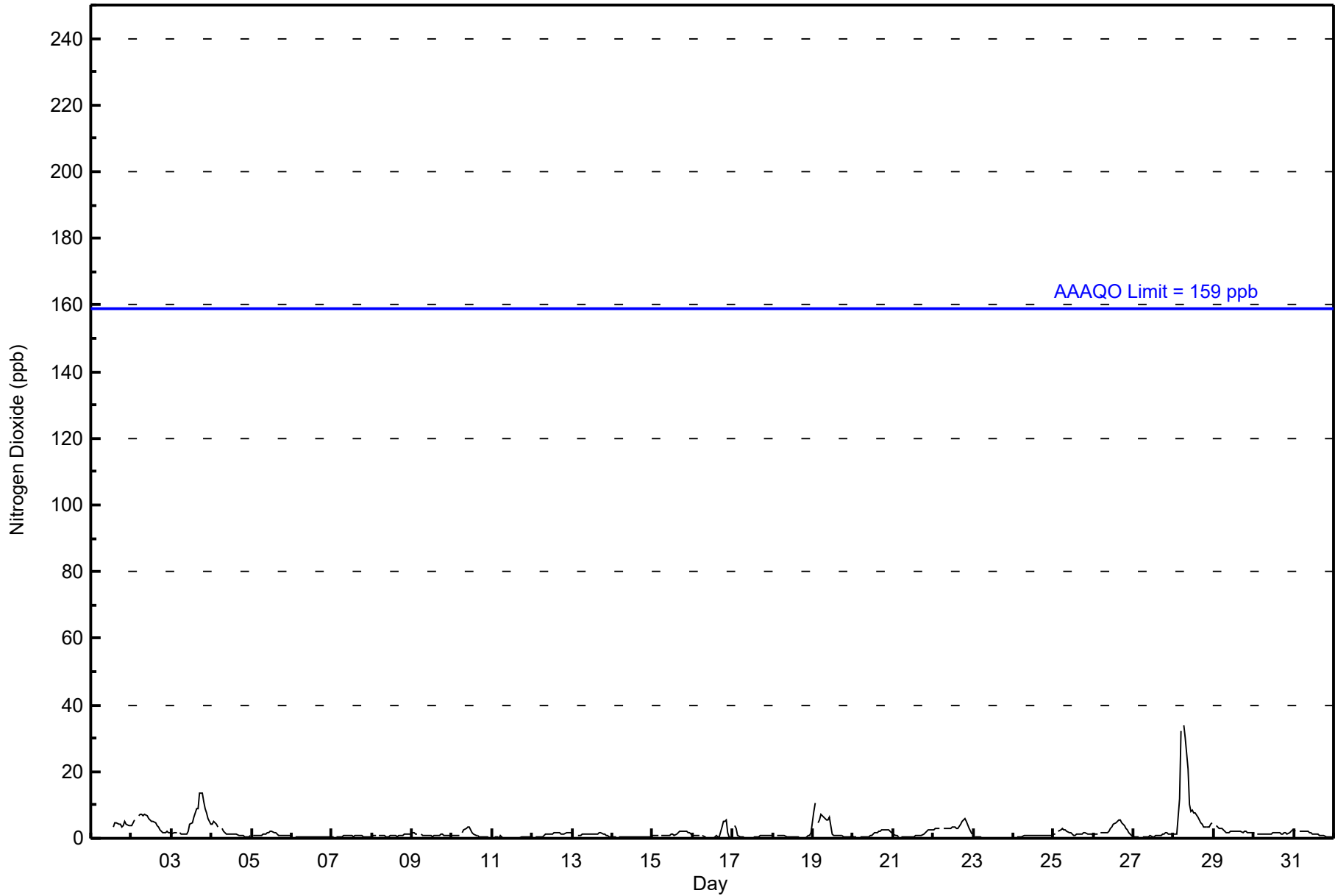
1.5	1.9	1.4	1.8	2.8	1.5	2.6	2.4	2.1	1.7	1.7	1.6	1.6	1.7	1.8	1.8	1.8	2.0	2.0	1.9	1.9	1.6	1.4	1.3	Diurnal Average	
8.2	10.5	5.4	12.0	32.4	7.2	33.9	30.1	20.6	10.1	8.0	8.6	7.7	7.5	7.7	8.7	9.1	13.6	13.7	11.0	9.1	7.6	5.8	4.5	Diurnal Maximum	

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



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Dioxide (NO₂) - ppb
Mackay River - December 2023





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitrogen Dioxide (NO₂) - ppb
Mackay River - December 2023

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	697	99.43	99.43
21 - 40	4	0.57	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 701

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Mackay River - December 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	10	5	2	9	19	48	45	202	113	74	78	53	20	6	5	697
21 - 40	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	4
41 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	9	10	5	2	9	19	48	45	202	113	74	78	53	20	7	7	701

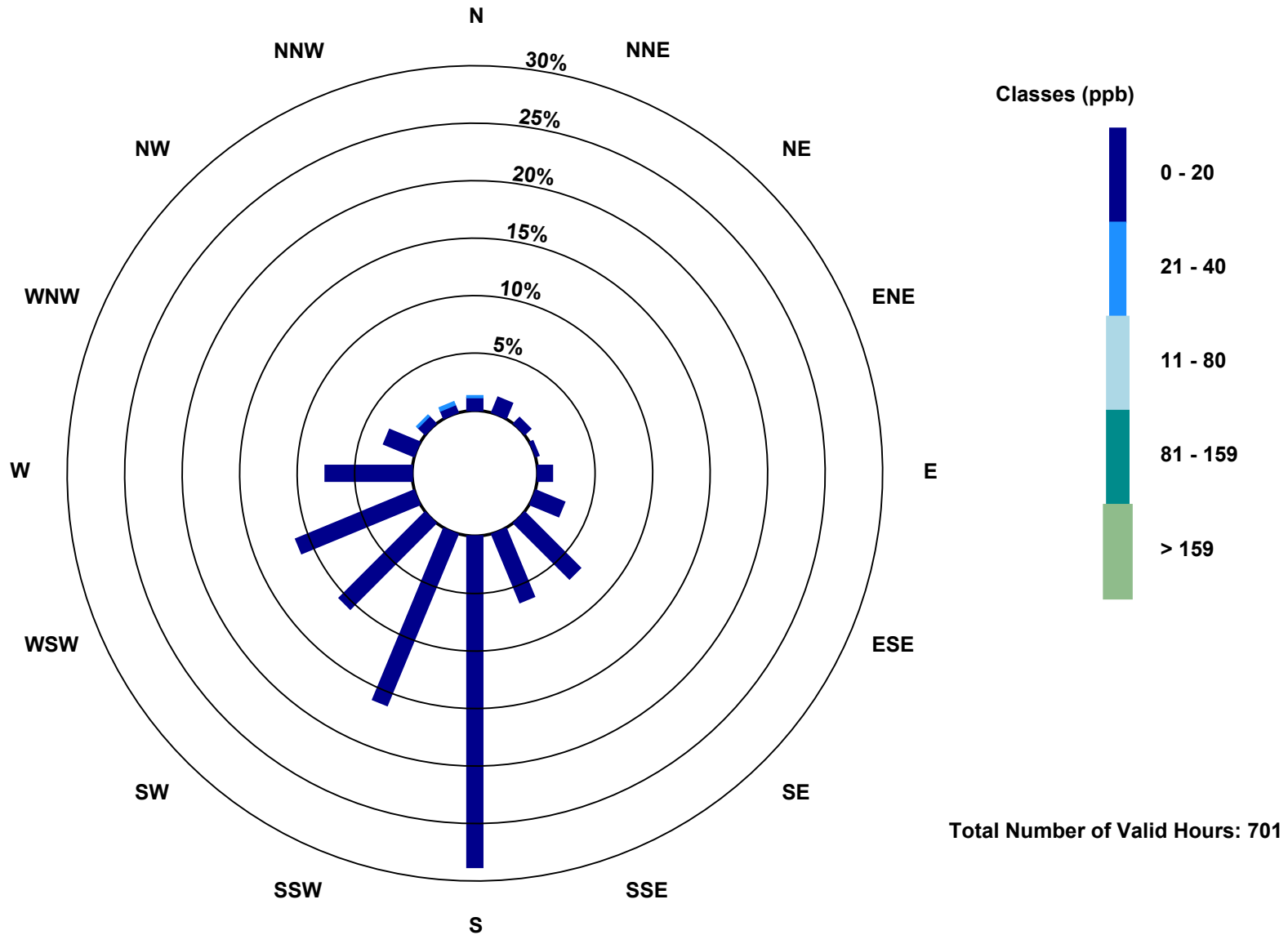
Total Number of Valid Hours: 701

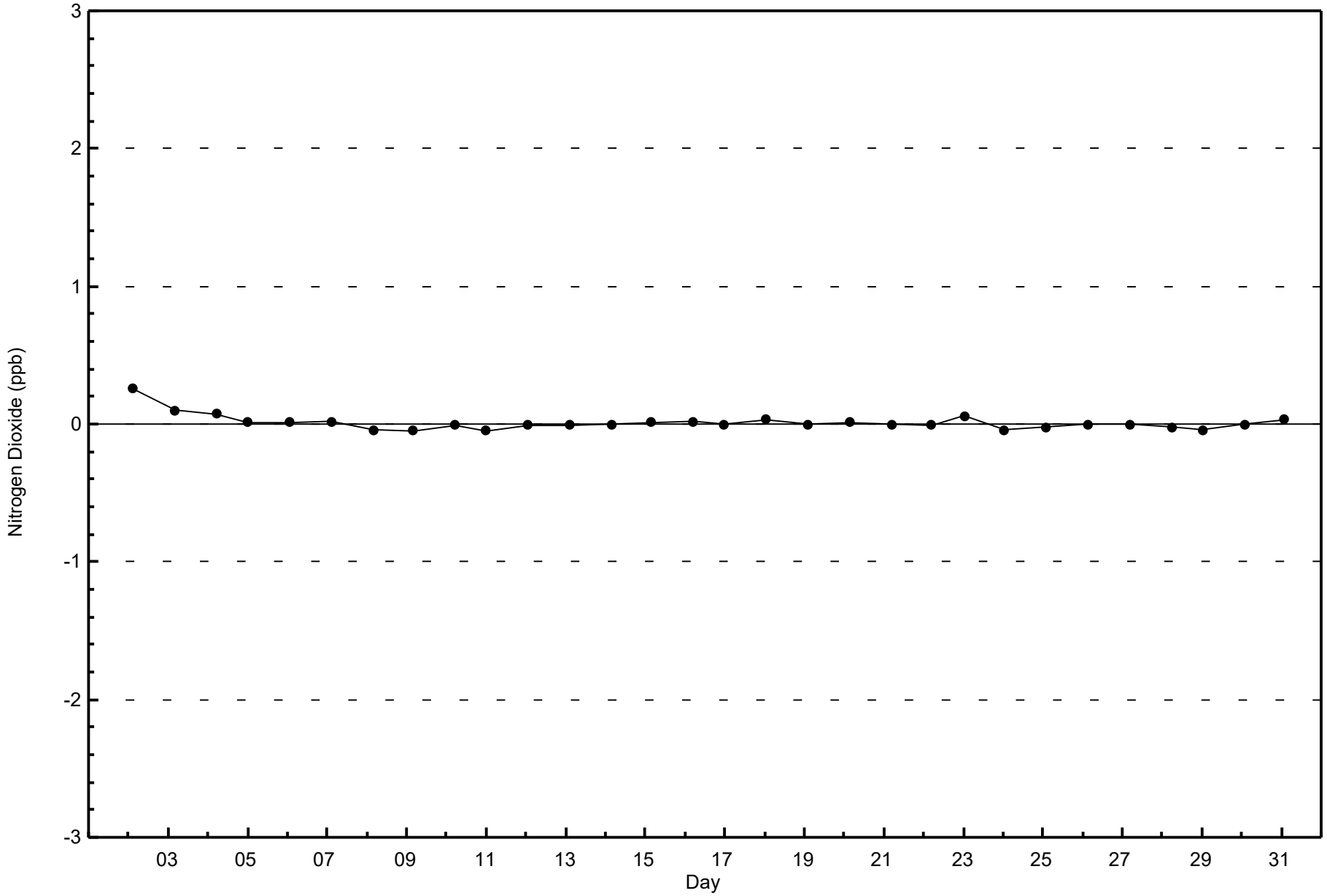
Total Number of Hours: 744

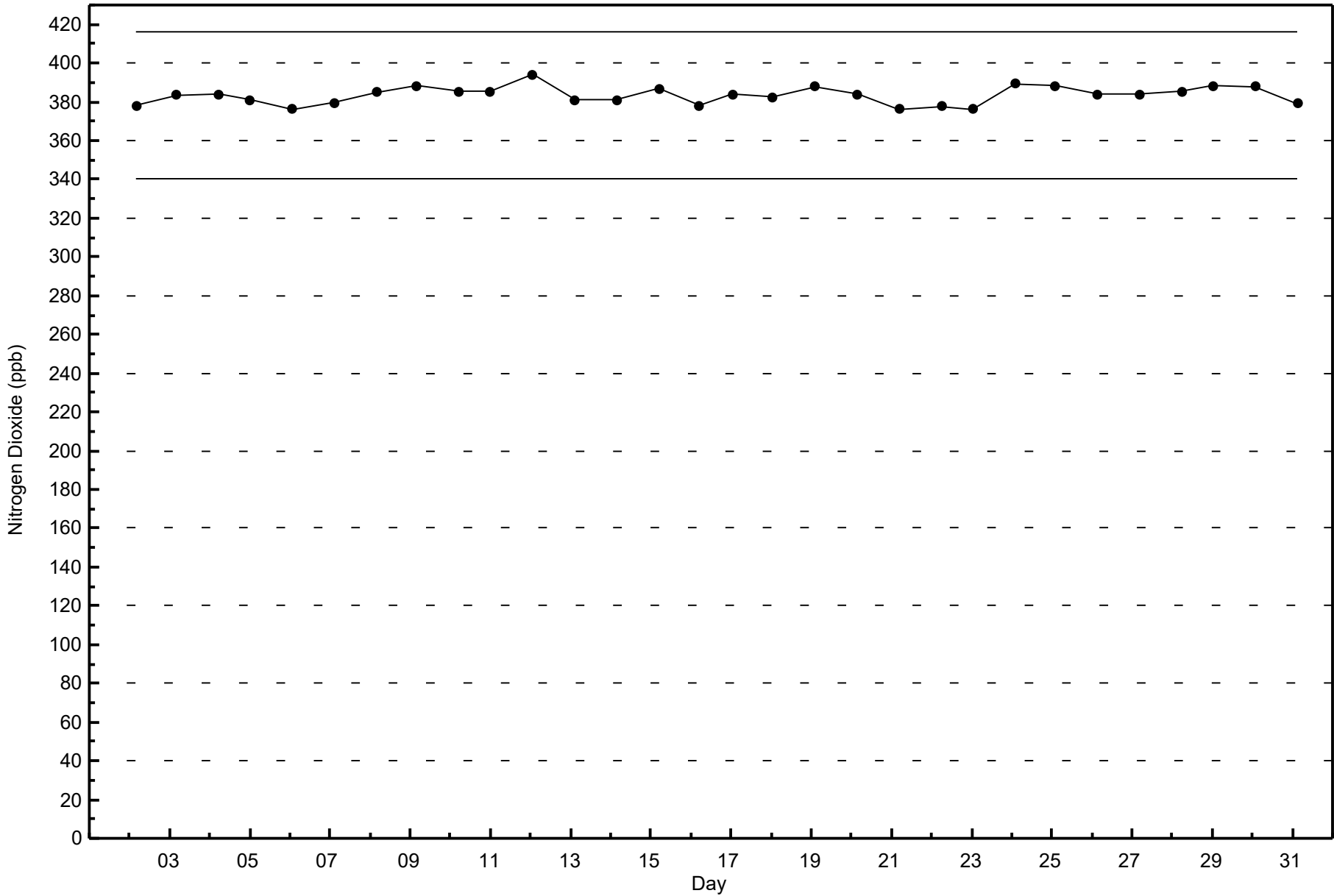


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Nitrogen Dioxide (NO₂) - ppb
Mackay River









Wood Buffalo Environmental Association
Summary of Hour Averages

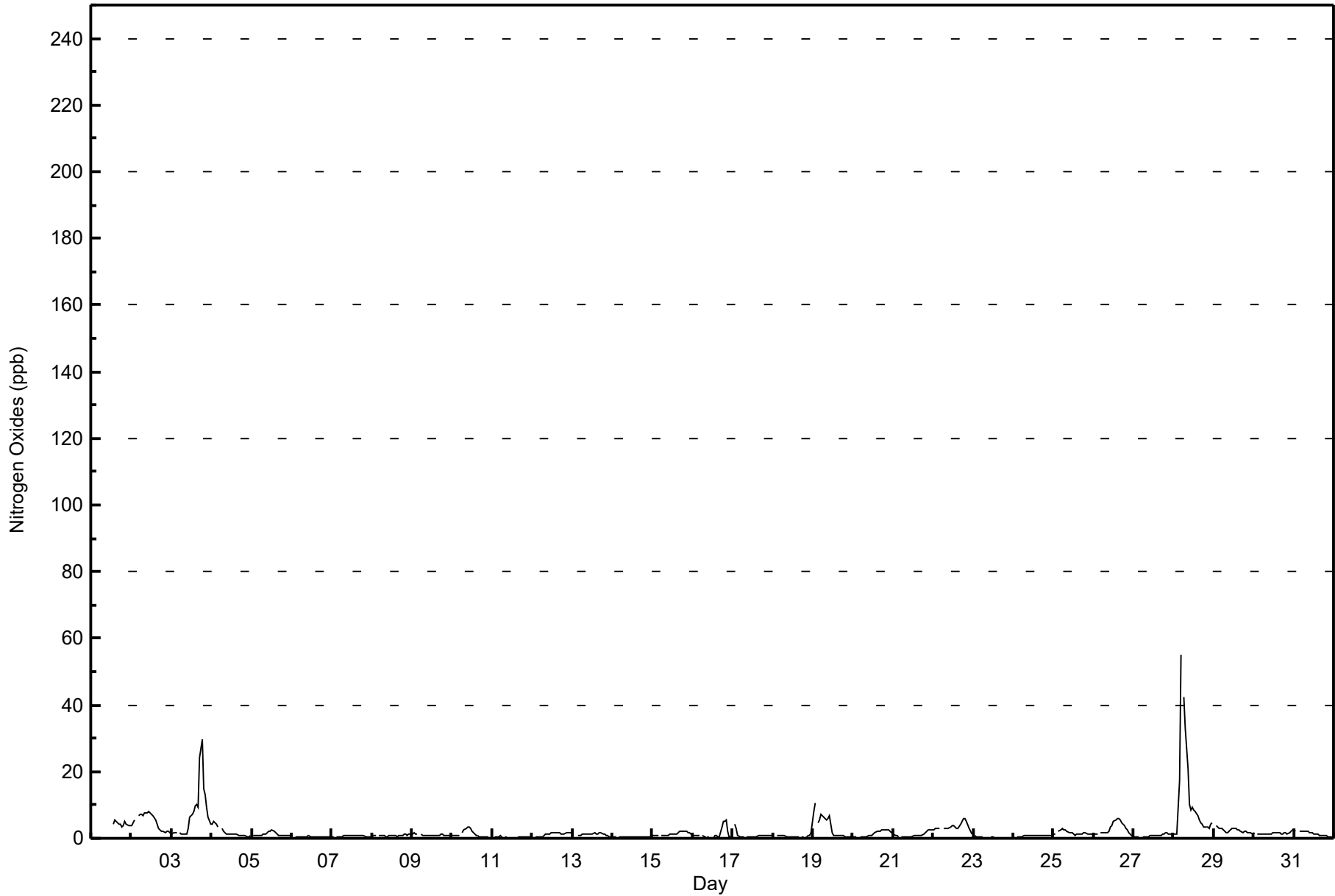
Nitrogen Oxides (NO_x) - ppb
Mackay River - December 2023

Maximum Value: 55.0 ppb on Dec 28 05:00 Maximum Daily Average: 11.3 ppb on Dec 28																				Hours in Service: 744 Hours of Data: 701						
Minimum Value: 0.2 ppb on Dec 11 07:00 Minimum Daily Average: 0.2 ppb on Dec 23																				Hours of Missing Data: 43 Hours of Calibration: 35						
Maximum Diurnal Average: 3.7 ppb at hour 5 Minimum Diurnal Average: 1.3 ppb at hour 24																				Percent Operational Time: 98.9						
Monthly Average: 2.00 ppb Percentiles: P ₁ = 0.2 P ₁₀ = 0.3 Q ₁ = 0.6 Median = 1.0 Q ₃ = 2.0 P ₉₀ = 4.2 P ₉₉ = 15.0																										
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Dec	M	M	M	M	M	M	M	M	C	C	C	C	C	4.1	5.4	4.9	4.1	4.1	3.5	4.0	5.0	4.2	4.0	3.8	--	5.4
2-Dec	4.0	4.8	5.4	Z	6.6	7.1	7.0	6.8	7.5	7.7	7.9	7.7	7.3	6.7	5.5	4.1	3.2	2.6	2.2	1.9	1.9	2.2	1.9	1.6	4.9	7.9
3-Dec	1.4	1.5	1.6	1.7	Z	1.7	1.4	1.3	1.3	1.3	3.0	6.5	7.0	8.2	9.9	10.0	9.4	24.1	29.7	15.0	12.9	9.3	6.4	4.3	7.3	29.7
4-Dec	4.2	4.9	4.8	4.2	3.5	Z	2.8	2.3	1.8	1.3	1.3	1.4	1.4	1.4	1.3	1.2	1.0	0.9	0.8	0.7	0.6	0.6	0.7	1.9	4.9	
5-Dec	Z	1.0	0.9	0.9	1.0	1.0	1.0	1.2	1.2	1.6	1.9	2.3	2.4	2.2	1.8	1.4	1.0	0.9	0.9	0.9	1.0	0.9	0.9	0.8	1.3	2.4
6-Dec	0.7	Z	0.6	0.5	0.4	0.4	0.4	0.5	0.5	0.6	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.5	0.6	0.6	0.7
7-Dec	0.5	0.5	Z	0.6	0.6	0.6	0.6	0.7	0.7	0.7	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.6	0.6	0.6	0.6	0.6	0.7	0.8
8-Dec	0.6	0.7	0.8	Z	0.8	0.8	0.8	0.7	0.5	0.5	0.6	0.9	0.9	0.8	0.8	0.6	0.9	1.0	1.0	1.1	1.3	1.1	1.4	1.4	0.9	1.4
9-Dec	1.5	1.5	1.4	1.3	Z	1.1	0.9	0.7	0.7	0.7	0.8	0.9	0.8	0.8	0.9	0.9	1.0	1.1	1.1	1.0	1.0	0.9	0.9	0.8	1.0	1.5
10-Dec	0.9	0.9	0.8	0.8	0.9	Z	1.9	2.4	2.9	3.5	3.5	2.9	2.1	1.5	1.0	0.7	0.6	0.4	0.3	0.3	0.4	0.3	0.2	0.2	1.3	3.5
11-Dec	Z	0.3	0.3	0.5	0.2	0.7	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.4	0.5	0.5	0.4	0.3	0.3	0.3	0.7
12-Dec	0.3	Z	0.4	0.4	0.5	0.5	0.6	0.9	1.1	1.3	1.5	1.7	1.7	1.7	1.7	1.5	1.4	1.2	1.4	1.6	1.6	1.6	1.6	1.6	1.2	1.7
13-Dec	1.4	1.2	Z	1.0	1.0	1.0	1.1	1.2	1.3	1.4	1.4	1.4	1.4	1.5	1.4	1.4	1.7	1.7	1.3	1.3	0.8	0.7	0.6	0.6	1.2	1.7
14-Dec	0.6	0.5	0.6	Z	0.4	0.3	0.3	0.3	0.4	0.5	0.5	0.5	0.5	0.6	0.6	0.5	0.5	0.4	0.4	0.4	0.5	0.5	0.5	0.6	0.5	0.6
15-Dec	0.8	0.8	0.7	0.8	Z	0.9	0.8	0.8	1.0	1.0	1.1	1.2	1.2	1.1	1.2	1.5	2.1	2.2	2.3	2.3	2.2	1.9	1.6	1.1	1.3	2.3
16-Dec	0.8	0.8	0.8	0.8	0.8	Z	0.7	0.5	0.2	0.2	0.2	0.2	0.2	0.7	0.8	0.3	0.3	3.2	5.1	5.1	5.4	1.9	0.3	0.2	1.3	5.4
17-Dec	Z	4.4	3.2	1.0	0.3	0.4	0.3	0.2	0.2	0.2	0.2	0.3	0.3	0.4	0.4	0.6	1.0	0.8	0.9	0.9	0.7	0.7	0.8	0.8	0.8	4.4
18-Dec	0.8	Z	0.8	0.8	0.7	0.8	0.7	0.7	0.5	0.5	0.5	0.4	0.4	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.6	0.7	0.7	1.7	0.6	1.7
19-Dec	8.2	10.5	Z	4.6	5.4	7.2	6.5	6.1	5.5	5.8	6.8	1.5	0.8	0.8	1.0	0.9	1.0	0.7	0.6	0.6	0.6	0.5	0.5	0.7	3.3	10.5
20-Dec	0.5	0.4	0.4	Z	0.4	0.4	0.5	0.5	0.6	0.6	0.7	1.0	1.2	1.7	2.0	2.2	2.2	2.4	2.5	2.5	2.6	2.4	2.2	1.7	1.4	2.6
21-Dec	1.2	1.0	0.7	0.5	Z	0.5	0.4	0.4	0.4	0.4	0.6	0.5	0.7	0.8	0.8	1.0	0.8	0.7	1.2	1.8	2.2	2.4	2.5	2.6	1.1	2.6
22-Dec	2.7	2.9	2.9	2.9	3.0	Z	2.9	3.0	3.0	3.0	3.4	3.8	3.9	3.6	3.0	3.2	4.1	5.2	5.7	5.9	5.1	3.1	2.0	1.1	3.5	5.9
23-Dec	Z	0.6	0.5	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	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.6
24-Dec	0.2	Z	0.5	0.5	0.6	0.6	0.7	0.8	0.8	0.8	0.8	0.9	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.8	0.9	1.0	0.7	1.0
25-Dec	1.1	1.4	Z	2.0	2.5	2.8	2.7	2.5	2.1	1.7	1.7	1.5	1.2	1.0	1.3	1.3	1.3	1.3	1.7	1.8	1.4	1.2	1.1	1.1	1.6	2.8
26-Dec	1.0	1.1	1.2	Z	1.5	1.7	1.6	1.7	1.8	2.1	3.4	3.9	5.2	5.7	5.8	6.0	5.3	4.7	3.8	3.0	2.5	1.8	1.3	0.9	2.9	6.0
27-Dec	0.3	0.3	0.3	0.3	Z	0.3	0.3	0.3	0.3	0.5	0.7	0.7	0.7	0.8	0.8	0.9	0.8	1.2	1.2	1.6	1.5	1.3	1.1	1.1	0.8	1.6
28-Dec	1.1	1.1	1.2	17.2	55.0	Z	42.2	33.1	20.8	10.3	8.4	9.4	8.6	8.2	6.7	5.6	4.7	4.2	3.6	3.2	3.2	3.2	4.2	4.5	11.3	55.0
29-Dec	Z	3.8	3.3	3.1	3.1	2.8	2.3	1.7	1.7	2.0	2.6	2.8	2.8	2.9	2.7	2.3	2.0	1.8	2.0	2.1	1.8	1.7	1.6	1.5	2.4	3.8
30-Dec	1.5	Z	1.4	1.4	1.4	1.3	1.2	1.2	1.1	1.3	1.5	1.7	1.9	1.8	1.7	1.6	1.4	1.4	1.5	1.5	1.4	1.7	2.3	2.5	1.6	2.5
31-Dec	2.4	2.2	Z	2.0	2.0	2.0	2.0	2.0	2.0	1.9	1.8	1.6	1.2	1.2	1.2	1.0	0.9	0.8	0.7	0.6	0.6	0.6	0.6	0.5	1.4	2.4
																								Diurnal Average		
																								Diurnal Maximum		
Z - zerospan C - Calibration M - Maintenance																										



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Mackay River - December 2023





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Mackay River - December 2023**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	695	99.14	99.14
21 - 40	4	0.57	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: 701

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Mackay River - December 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	10	5	2	9	19	47	45	202	113	74	78	53	20	5	5	695
21 - 40	0	0	0	0	0	0	1	0	0	0	0	0	0	0	2	1	4
41 - 80	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	9	10	5	2	9	19	48	45	202	113	74	78	53	20	7	7	701

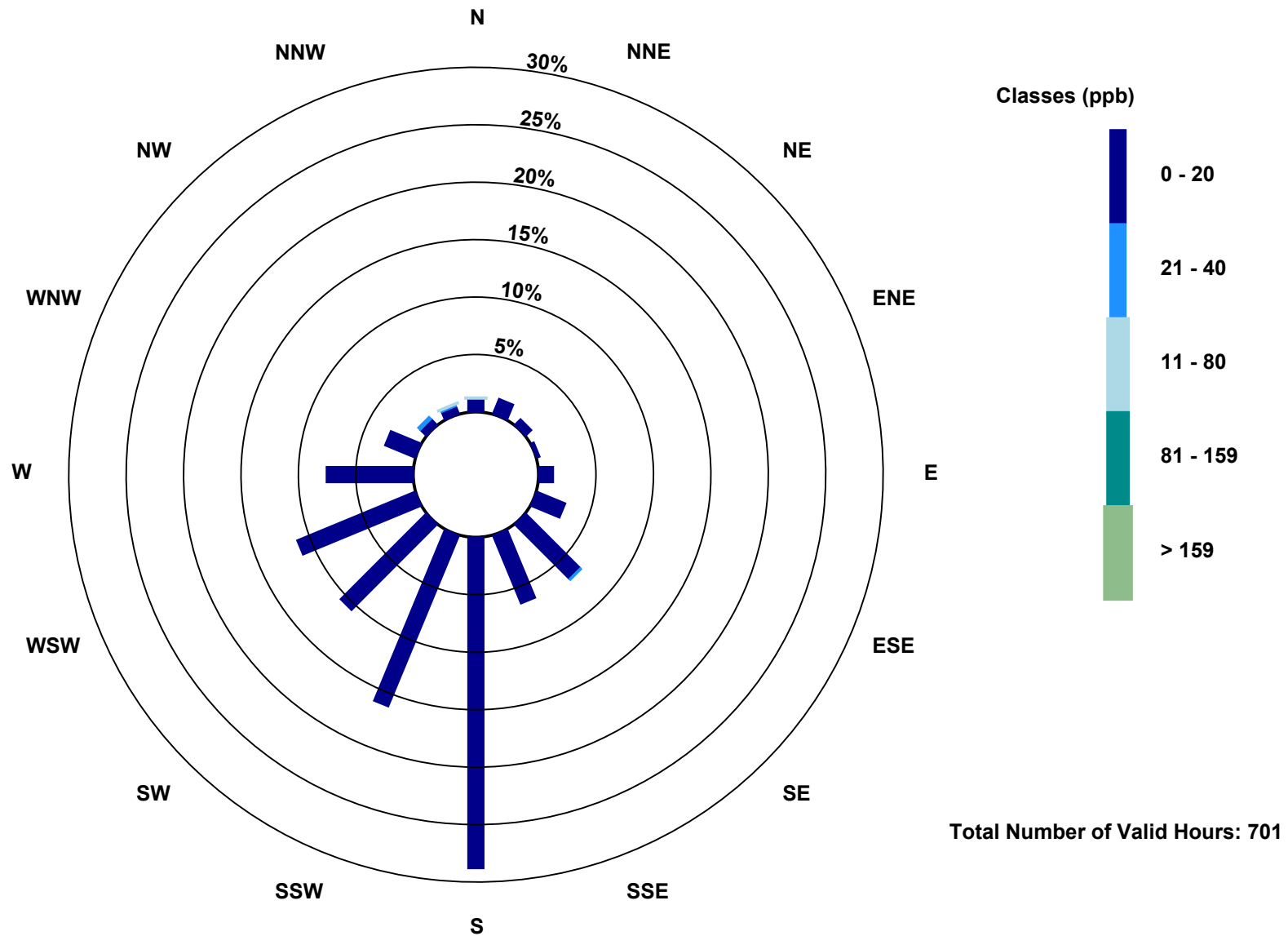
Total Number of Valid Hours: 701

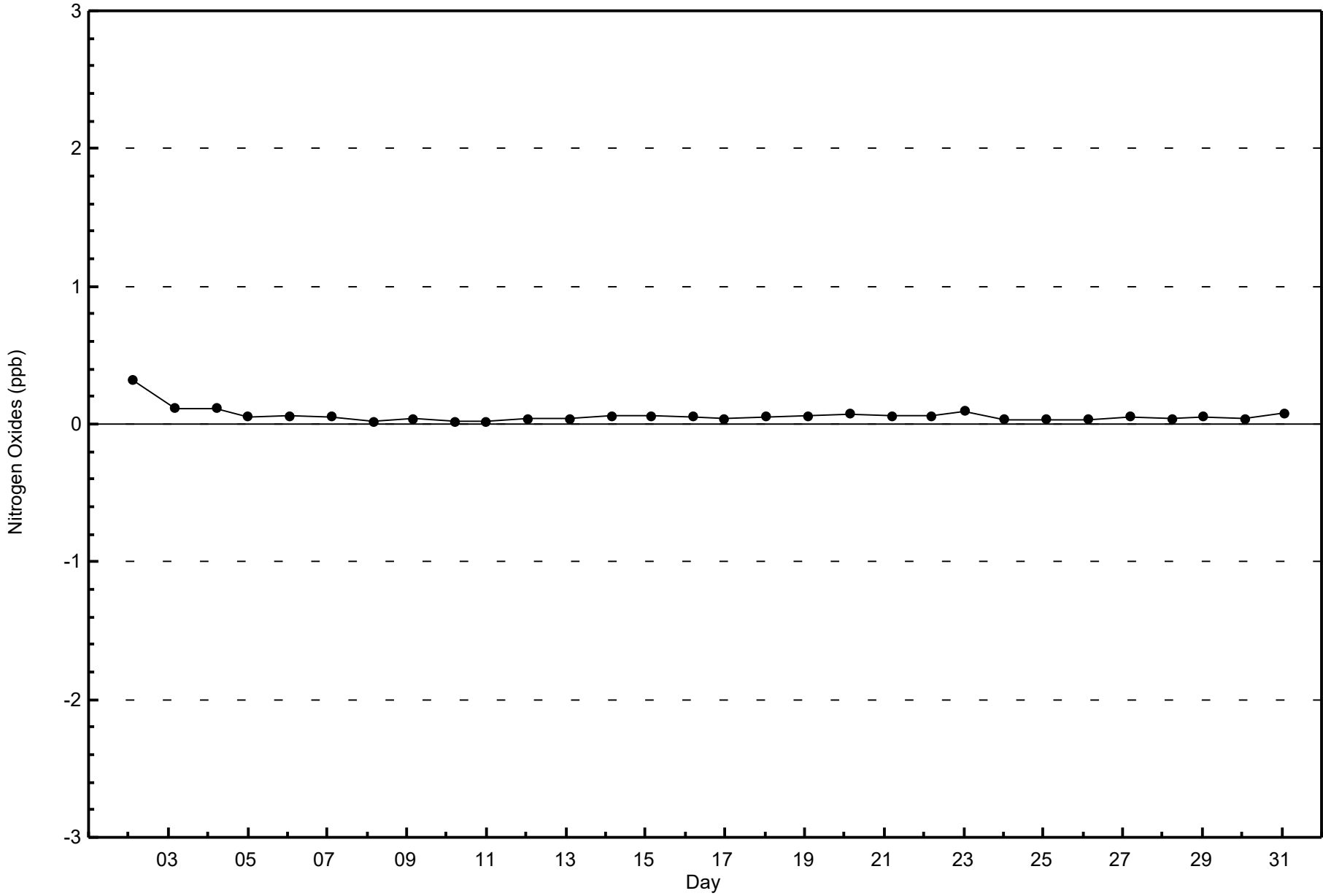
Total Number of Hours: 744

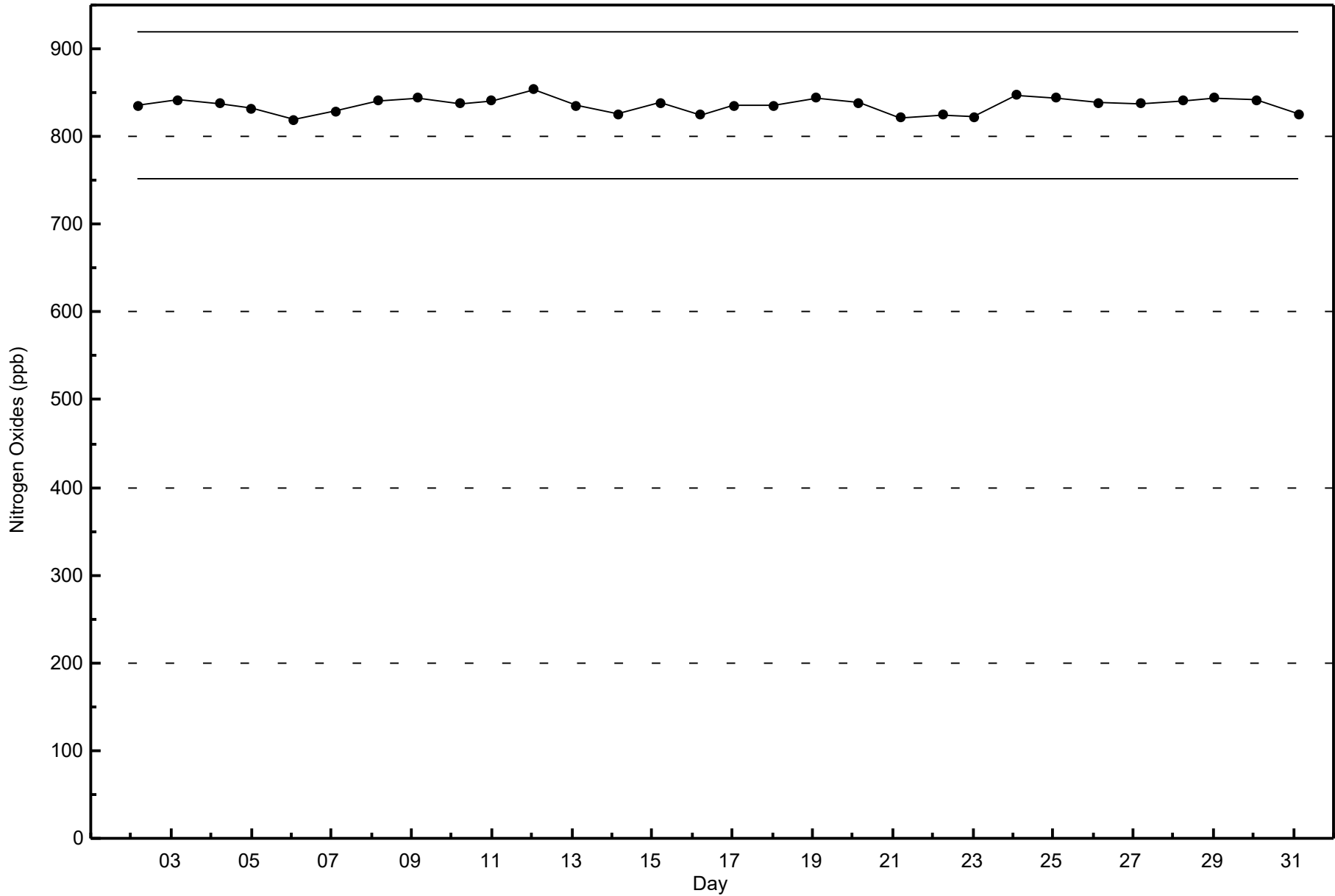


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Nitrogen Oxides (NO_x) - ppb
Mackay River





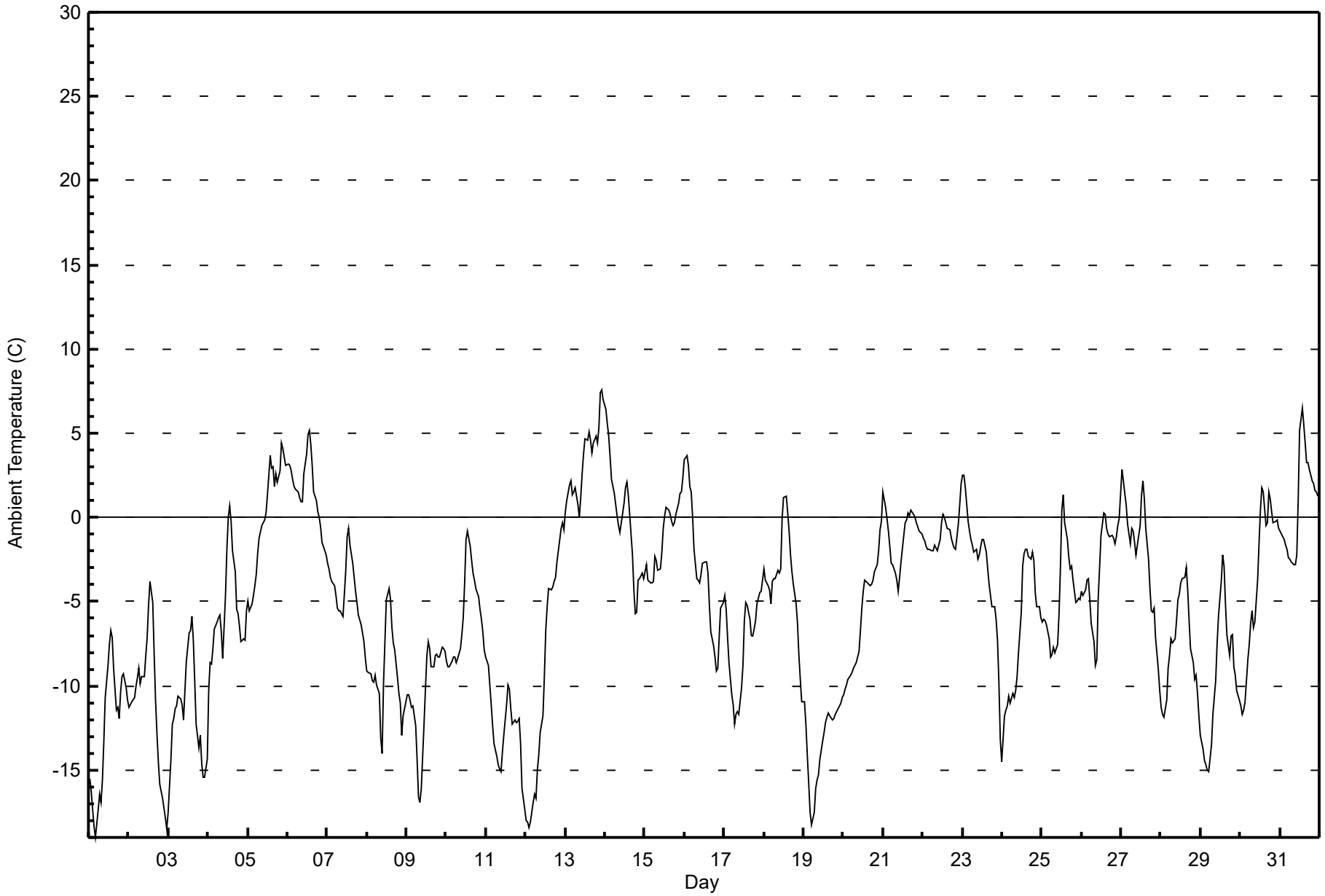




Wood Buffalo Environmental Association
Summary of Hour Averages

Ambient Temperature (AT) - C
Mackay River - December 2023

Maximum Value: 7.6 C on Dec 13 23:00 Maximum Daily Average: 3.4 C on Dec 13																								Hours in Service: 744 Hours of Data: 744		
Minimum Value: -19.0 C on Dec 1 05:00 Minimum Daily Average: -13.4 C on Dec 19 Maximum Diurnal Average: -1.6 C at hour 14 Minimum Diurnal Average: -7.2 C at hour 9 Monthly Average: -5.28 C Percentiles: P ₁ = -17.9 P ₁₀ = -12.3 Q ₁ = -9.4 Median = -4.7 Q ₃ = -1.0 P ₉₀ = 1.5 P ₉₉ = 5.3																								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-Dec	-15.5	-16.2	-17.3	-18.3	-19.0	-17.3	-16.5	-17.0	-15.6	-13.4	-10.7	-8.8	-7.6	-6.7	-7.2	-9.0	-11.4	-11.3	-12.0	-10.4	-9.4	-9.2	-10.1	-10.8	-12.5	-6.7
2-Dec	-11.2	-11.1	-11.0	-10.7	-10.1	-9.5	-8.9	-9.8	-9.4	-9.4	-8.2	-7.2	-5.2	-3.8	-5.0	-8.1	-10.9	-12.9	-14.5	-15.8	-16.7	-17.3	-17.8	-18.5	-11.0	-3.8
3-Dec	-17.5	-14.4	-12.3	-11.9	-11.4	-11.2	-10.6	-10.8	-11.1	-12.1	-10.3	-8.6	-6.9	-6.7	-5.9	-7.3	-9.7	-12.2	-13.7	-12.9	-14.6	-15.4	-15.4	-14.3	-11.5	-5.9
4-Dec	-10.2	-8.6	-8.7	-7.8	-6.6	-6.2	-6.0	-5.8	-6.8	-8.4	-4.6	-1.9	0.1	0.7	-0.2	-2.0	-3.3	-5.5	-5.8	-6.4	-7.4	-7.2	-7.3	-5.6	-5.5	0.7
5-Dec	-5.0	-5.6	-5.1	-4.6	-4.1	-3.4	-2.1	-1.3	-0.5	-0.3	-0.1	0.3	1.3	3.6	2.9	3.0	1.9	2.6	2.1	2.7	4.4	4.1	3.6	3.1	0.2	4.4
6-Dec	3.1	3.1	2.8	2.3	1.8	1.6	1.5	1.2	0.9	0.9	2.6	3.8	4.9	5.2	4.3	3.1	1.5	1.0	0.4	0.0	-0.6	-1.5	-2.0	-2.2	1.7	5.2
7-Dec	-2.7	-3.0	-3.5	-3.8	-4.1	-4.7	-5.4	-5.6	-5.6	-5.9	-4.6	-3.1	-1.1	-0.7	-1.7	-2.7	-3.6	-4.4	-5.0	-5.8	-6.3	-6.9	-7.4	-8.4	-4.4	-0.7
8-Dec	-9.1	-9.2	-9.3	-9.7	-9.8	-9.4	-10.0	-10.5	-13.1	-14.0	-9.8	-7.4	-4.9	-4.2	-4.9	-6.5	-7.5	-7.9	-9.5	-10.5	-11.0	-12.9	-11.8	-10.9	-9.3	-4.2
9-Dec	-10.5	-10.5	-10.9	-11.3	-11.2	-12.4	-14.4	-16.6	-17.0	-16.1	-12.2	-10.1	-8.2	-7.4	-7.8	-8.9	-8.9	-8.2	-8.1	-8.3	-8.3	-7.7	-7.8	-7.9	-10.4	-7.4
10-Dec	-8.5	-8.9	-8.9	-8.5	-8.3	-8.3	-8.6	-8.4	-7.8	-7.0	-6.0	-3.9	-1.3	-0.8	-1.7	-2.6	-3.3	-3.7	-4.2	-4.7	-5.5	-6.0	-6.8	-7.9	-5.9	-0.8
11-Dec	-8.3	-8.8	-10.0	-11.1	-12.4	-13.4	-14.2	-14.6	-15.0	-15.1	-14.0	-12.9	-11.1	-10.0	-10.2	-11.4	-12.3	-12.0	-12.2	-12.1	-12.0	-13.4	-16.1	-17.3	-12.5	-8.3
12-Dec	-18.0	-18.1	-18.4	-18.1	-16.9	-16.4	-16.7	-15.1	-14.1	-12.8	-11.7	-9.4	-6.7	-5.3	-4.3	-4.3	-4.2	-3.8	-3.6	-2.6	-1.3	-0.6	-0.3	-0.8	-9.3	-0.3
13-Dec	0.4	1.0	1.9	2.2	1.4	1.5	1.8	0.8	0.1	1.2	2.6	3.8	4.7	4.6	5.1	4.6	3.8	4.4	4.8	4.4	5.3	7.4	7.6	7.0	3.4	7.6
14-Dec	6.4	5.6	4.8	3.6	2.3	1.4	0.8	0.1	-0.5	-0.9	-0.3	0.9	1.7	2.1	1.3	0.1	-2.2	-4.3	-5.7	-5.6	-3.7	-3.6	-3.3	-3.7	-0.1	6.4
15-Dec	-3.2	-2.8	-3.7	-3.9	-3.9	-3.8	-2.3	-2.5	-3.1	-3.0	-2.1	-0.6	0.1	0.6	0.4	0.2	-0.2	-0.5	-0.3	0.1	0.8	1.4	1.5	2.4	-1.2	2.4
16-Dec	3.4	3.6	3.1	1.8	1.5	0.0	-1.9	-3.6	-3.7	-3.9	-3.4	-2.7	-2.6	-2.7	-3.3	-5.2	-6.8	-7.6	-8.3	-9.1	-8.9	-7.2	-5.4	-5.0	-3.2	3.6
17-Dec	-4.6	-5.4	-7.2	-8.7	-10.5	-11.1	-12.2	-11.7	-11.5	-11.7	-10.1	-8.8	-6.2	-5.0	-5.2	-6.0	-7.0	-7.0	-6.6	-6.2	-5.2	-4.5	-4.4	-3.7	-7.5	-3.7
18-Dec	-3.0	-3.7	-4.1	-4.3	-5.1	-3.8	-3.7	-3.6	-3.1	-3.3	-3.0	0.0	1.1	1.3	0.3	-0.8	-2.2	-3.2	-4.0	-5.2	-6.3	-8.2	-9.6	-11.0	-3.7	1.3
19-Dec	-10.9	-12.3	-14.1	-15.8	-17.5	-18.3	-17.5	-16.1	-15.6	-15.3	-14.4	-13.3	-12.8	-12.2	-11.8	-11.6	-11.8	-12.0	-12.0	-11.7	-11.5	-11.3	-11.0	-10.7	-13.4	-10.7
20-Dec	-10.5	-10.2	-9.9	-9.6	-9.4	-9.2	-9.0	-8.8	-8.6	-8.0	-6.7	-5.4	-4.4	-3.7	-3.9	-4.0	-4.0	-4.0	-3.7	-3.2	-2.8	-1.9	-0.8	-0.2	-5.9	-0.2
21-Dec	1.5	0.6	-0.1	-0.9	-1.7	-2.7	-2.8	-3.3	-3.7	-4.3	-3.5	-2.6	-1.1	-0.3	-0.1	0.3	0.1	0.5	0.2	0.1	-0.3	-0.5	-0.8	-1.0	-1.1	1.5
22-Dec	-1.2	-1.4	-1.7	-1.9	-1.9	-1.9	-1.9	-1.7	-1.8	-2.0	-1.3	-0.3	0.2	0.1	-0.3	-0.6	-0.7	-1.2	-1.6	-1.8	-1.9	-0.4	0.8	2.0	-1.0	2.0
23-Dec	2.5	2.5	1.8	-0.3	-0.8	-1.3	-1.6	-2.1	-1.9	-2.5	-2.2	-1.7	-1.3	-1.4	-2.1	-3.0	-4.0	-4.6	-5.3	-5.3	-6.0	-7.3	-9.8	-13.2	-3.0	2.5
24-Dec	-14.5	-11.8	-11.4	-11.2	-10.7	-11.0	-10.4	-10.7	-10.3	-9.5	-8.0	-5.6	-2.9	-2.2	-1.9	-1.9	-2.3	-2.4	-2.0	-2.6	-4.4	-5.3	-5.3	-6.0	-6.8	-1.9
25-Dec	-6.2	-6.0	-6.1	-6.4	-7.2	-8.3	-8.1	-7.7	-8.1	-7.6	-5.7	-3.0	0.4	1.3	-0.3	-1.3	-2.4	-3.0	-2.9	-3.7	-5.1	-5.0	-4.8	-4.9	-4.7	1.3
26-Dec	-4.4	-4.6	-4.3	-3.7	-3.6	-4.9	-6.3	-7.4	-8.8	-8.4	-4.8	-3.0	-1.1	0.2	0.2	-0.7	-1.0	-1.1	-1.1	-1.3	-1.5	-1.1	-0.5	-0.1	-3.0	0.2
27-Dec	2.8	2.1	1.4	0.8	-0.4	-1.6	-0.6	-0.8	-1.5	-2.2	-1.6	-0.5	1.4	2.2	1.1	-0.7	-2.5	-4.2	-5.6	-5.6	-5.4	-7.1	-9.0	-10.3	-2.0	2.8
28-Dec	-11.3	-11.7	-11.8	-10.9	-9.0	-8.2	-7.2	-7.4	-7.2	-6.1	-4.9	-4.5	-3.9	-3.6	-3.6	-3.0	-4.3	-6.1	-7.7	-8.6	-9.6	-9.4	-10.4	-11.8	-7.6	-3.0
29-Dec	-13.0	-13.7	-14.4	-14.7	-15.0	-15.1	-13.5	-11.7	-10.7	-9.7	-7.6	-5.8	-3.8	-2.3	-2.9	-5.2	-7.0	-8.2	-7.0	-7.0	-8.9	-9.4	-10.2	-10.8	-9.5	-2.3
30-Dec	-11.2	-11.7	-11.5	-11.0	-8.5	-7.5	-6.3	-5.5	-6.5	-6.2	-3.8	-1.6	0.4	1.7	1.5	-0.5	-0.3	1.5	1.1	0.3	-0.3	-0.3	-0.2	-0.6	-3.6	1.7
31-Dec	-0.9	-1.0	-1.3	-1.6	-1.9	-2.4	-2.5	-2.7	-2.8	-2.8	-2.2	1.0	5.2	6.5	5.5	4.4	3.2	3.3	2.9	2.2	2.0	1.6	1.5	1.3	0.8	6.5
	-6.2	-6.2	-6.5	-6.8	-6.9	-7.1	-7.0	-7.1	-7.2	-7.1	-5.6	-4.0	-2.3	-1.6	-2.0	-3.0	-4.0	-4.5	-4.9	-5.1	-5.2	-5.4	-5.6	-5.9	Diurnal Average	
	6.4	5.6	4.8	3.6	2.3	1.6	1.8	1.2	0.9	1.2	2.6	3.8	5.2	6.5	5.5	4.6	3.8	4.4	4.8	4.4	5.3	7.4	7.6	7.0	Diurnal Maximum	





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C
Mackay River - December 2023**

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	611	82.12	82.12
0 - 10	133	17.88	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association

Summary of Hour Averages

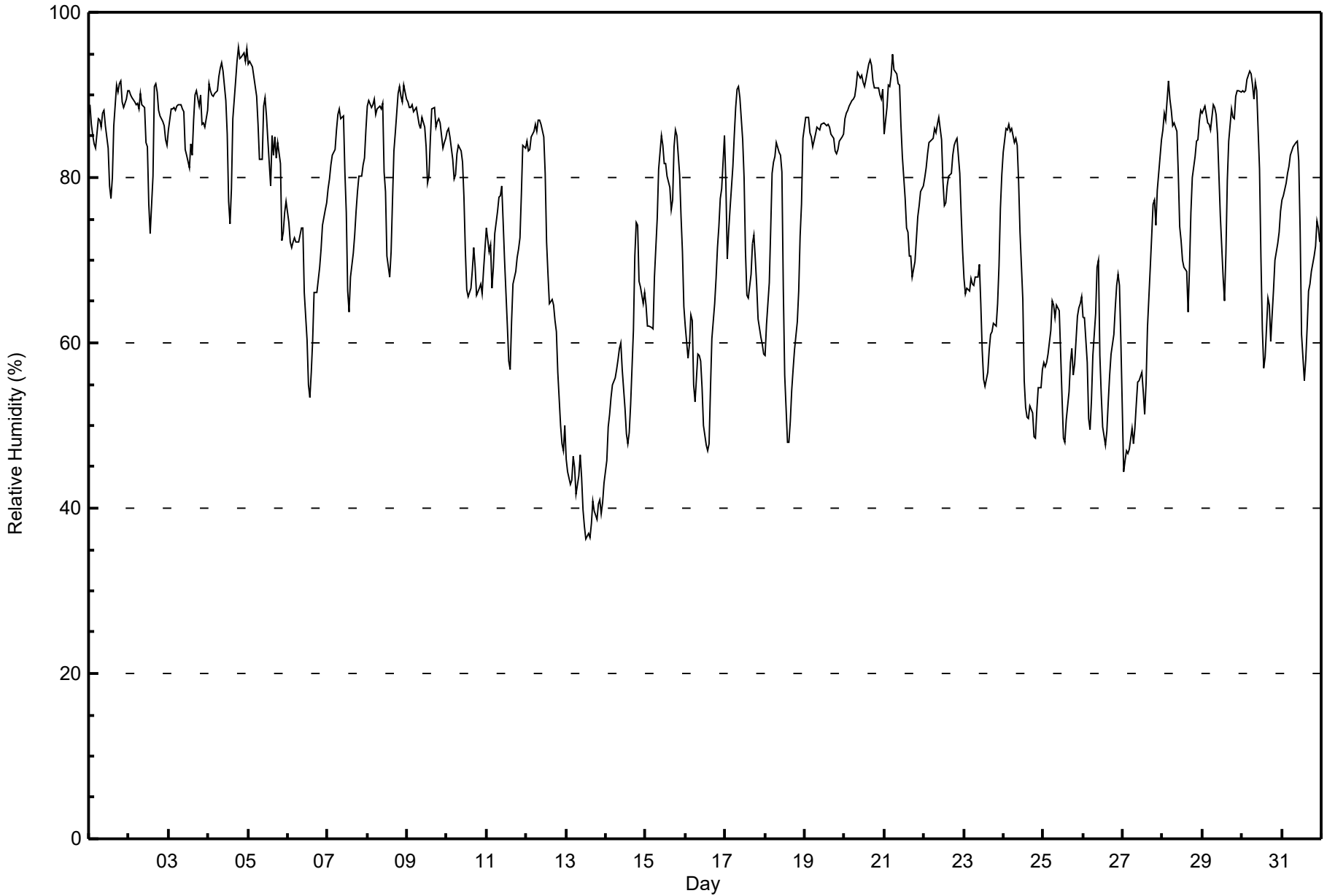
**Relative Humidity (RH) - %
Mackay River - December 2023**

Maximum Value: 95.7 % on Dec 4 19:00 Maximum Daily Average: 90.8 % on Dec 20																						Hours in Service:	744			
Minimum Value: 36.3 % on Dec 13 13:00 Minimum Daily Average: 41.4 % on Dec 13																						Hours of Data:	744			
Maximum Diurnal Average: 80.2 % at hour 9 Minimum Diurnal Average: 64.5 % at hour 14																						Hours of Missing Data:	0			
Monthly Average: 74.74 % Percentiles: P ₁ = 39.7 P ₁₀ = 53.6 Q ₁ = 64.7 Median = 78.8 Q ₃ = 86.5 P ₉₀ = 90.0 P ₉₉ = 94.1																						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-Dec	88.9	86.4	85.1	84.0	83.6	87.2	86.9	86.0	87.8	88.2	86.2	83.5	79.1	77.4	80.0	86.3	91.1	90.4	91.3	91.7	89.2	88.5	89.4	90.4	86.6	91.7
2-Dec	90.5	90.1	89.7	89.2	88.8	89.0	88.4	90.1	88.7	88.4	84.2	83.8	76.8	73.3	80.1	91.0	91.3	90.3	88.2	87.5	86.8	86.3	84.6	83.9	86.7	91.3
3-Dec	85.7	88.2	88.3	88.4	88.2	88.6	88.9	88.9	88.3	87.9	83.4	82.7	81.3	84.0	82.7	86.9	90.1	90.6	88.7	90.0	86.4	86.6	86.2	88.1	87.0	90.6
4-Dec	91.4	90.6	90.0	89.9	90.1	90.5	92.1	93.2	93.9	92.8	89.4	85.3	77.1	74.5	78.7	87.1	91.7	94.0	95.7	94.4	94.6	95.0	94.0	95.6	90.1	95.7
5-Dec	93.7	94.1	93.5	92.3	91.1	89.9	86.5	82.2	82.2	88.7	89.7	87.5	84.6	79.0	85.1	82.7	84.9	82.4	84.3	81.6	72.4	73.4	75.8	77.1	84.8	94.1
6-Dec	74.6	72.3	71.5	72.2	72.7	72.2	72.1	73.0	73.8	73.9	66.1	60.4	54.9	53.4	56.4	60.3	66.1	66.0	67.7	69.2	71.4	74.2	76.1	77.0	68.6	77.0
7-Dec	78.7	79.8	81.5	82.7	83.4	85.7	87.6	88.3	87.1	87.5	80.8	75.8	66.3	63.7	67.9	70.9	73.0	76.0	78.3	80.1	80.2	81.5	82.4	85.8	79.4	88.3
8-Dec	88.6	89.3	88.6	88.9	89.5	87.6	88.3	88.6	88.3	88.9	80.6	78.2	70.6	67.9	71.0	77.2	83.2	85.5	90.2	90.9	89.8	89.2	91.1	89.6	85.1	91.1
9-Dec	89.1	88.6	88.5	88.8	88.0	88.5	87.5	86.4	86.0	87.3	86.2	83.7	79.3	80.2	84.6	88.4	88.5	86.2	86.8	87.1	86.7	83.5	84.2	84.8	86.2	89.1
10-Dec	85.6	85.9	85.0	82.2	79.9	80.4	82.8	83.8	83.3	81.8	77.7	71.3	66.4	65.6	66.6	68.9	71.6	69.2	65.8	66.5	67.0	66.0	68.8	71.3	74.7	85.9
11-Dec	73.9	71.0	71.8	66.5	69.1	73.2	76.0	77.6	77.7	78.9	74.5	70.1	62.0	57.7	56.7	62.5	67.1	68.7	70.3	71.3	72.8	78.0	83.9	83.5	71.5	83.9
12-Dec	84.4	83.2	83.5	84.8	85.6	86.5	85.6	87.0	87.0	86.4	84.8	80.5	72.3	68.3	64.7	65.2	64.6	62.6	61.3	56.5	50.1	47.8	46.9	50.0	72.1	87.0
13-Dec	46.0	44.4	42.9	43.4	46.3	45.0	41.7	43.8	46.4	43.8	39.9	37.8	36.3	37.0	36.4	38.1	40.8	39.6	38.6	40.4	41.1	39.4	40.6	43.0	41.4	46.4
14-Dec	45.7	49.8	51.4	53.5	55.0	55.8	56.7	57.9	59.3	59.9	56.8	52.0	49.0	47.8	49.2	52.5	61.6	70.5	74.5	74.3	67.4	66.9	64.7	66.1	58.3	74.5
15-Dec	64.6	62.1	62.1	61.9	61.7	67.9	71.5	75.1	81.0	85.1	83.9	81.8	81.7	80.2	78.8	76.1	77.3	83.7	85.8	85.0	80.4	75.2	71.1	64.4	74.9	85.8
16-Dec	62.0	58.1	59.9	63.3	62.7	54.9	52.9	58.6	58.5	57.9	54.5	50.0	47.7	46.9	47.8	54.4	60.5	64.7	67.8	71.5	74.0	77.5	78.6	85.1	61.2	85.1
17-Dec	79.3	70.1	73.5	76.3	81.4	85.0	88.4	90.8	91.0	89.7	84.5	80.0	71.1	65.7	65.4	68.3	72.1	73.0	70.2	67.0	63.0	60.6	59.9	58.6	74.4	91.0
18-Dec	58.5	62.1	67.3	73.8	80.4	81.9	82.6	84.3	83.0	82.7	80.7	66.6	56.1	48.0	48.0	50.5	54.3	56.8	59.1	62.6	66.2	72.8	76.7	84.8	68.3	84.8
19-Dec	87.3	87.3	87.3	85.4	85.0	83.8	85.2	86.0	85.9	85.7	86.4	86.7	86.5	86.3	86.4	86.1	85.3	84.7	83.2	82.9	83.4	84.4	84.9	85.3	85.5	87.3
20-Dec	87.2	87.8	88.1	88.7	89.4	89.5	89.9	91.0	92.6	92.1	92.3	91.5	91.1	91.9	93.7	94.3	93.5	91.8	90.9	90.8	90.9	90.0	89.5	90.7	90.8	94.3
21-Dec	85.2	88.4	91.1	91.1	92.4	94.9	93.0	92.5	91.4	91.3	86.2	82.5	77.5	73.9	73.4	70.5	70.5	68.0	69.8	72.6	75.3	76.6	78.3	79.1	81.9	94.9
22-Dec	79.9	81.1	82.8	84.2	84.4	84.8	85.9	85.4	86.5	87.4	84.5	79.5	76.7	76.9	79.0	80.1	80.6	82.7	83.9	84.5	84.7	80.5	75.6	71.2	81.8	87.4
23-Dec	67.9	66.0	66.6	66.3	67.8	67.0	67.0	68.0	68.0	69.5	64.8	59.1	55.6	54.8	56.5	59.2	61.0	61.4	62.4	62.0	64.7	69.4	76.3	80.3	65.1	80.3
24-Dec	83.0	85.9	85.7	86.5	85.6	86.0	84.2	84.7	83.8	79.5	73.4	65.3	55.5	52.2	51.1	50.8	52.3	51.6	48.6	48.5	51.9	54.5	54.6	56.7	67.2	86.5
25-Dec	57.6	57.0	57.6	58.6	61.5	65.1	64.6	63.1	64.6	63.9	58.9	53.4	48.5	47.9	50.7	54.0	57.6	59.4	56.2	57.4	63.3	64.3	64.7	65.5	59.0	65.5
26-Dec	63.1	63.0	57.7	50.9	49.5	53.1	58.4	63.5	69.1	70.1	58.5	53.8	49.8	47.6	49.3	52.9	56.1	58.6	61.1	64.3	67.0	68.3	66.9	60.2	58.9	70.1
27-Dec	44.4	45.8	46.9	46.6	47.2	49.7	47.8	49.6	52.6	55.2	55.5	56.4	54.0	51.4	55.0	61.8	69.1	72.8	76.9	77.3	74.3	78.4	82.5	84.6	59.8	84.6
28-Dec	85.8	87.8	86.9	91.8	89.5	88.2	86.4	86.7	85.6	80.5	74.1	72.3	70.0	69.1	68.6	63.7	69.1	75.8	80.1	82.5	84.3	84.6	86.8	88.2	80.8	91.8
29-Dec	87.9	88.7	87.6	86.6	86.5	85.7	88.8	88.4	87.6	85.2	80.3	75.5	67.9	65.1	70.8	79.6	84.4	88.4	87.3	87.1	89.8	90.4	90.6	90.3	84.2	90.6
30-Dec	90.5	90.3	90.5	91.9	92.9	92.5	91.1	89.5	91.5	90.5	81.0	70.4	61.7	56.9	58.4	65.5	64.6	60.2	63.4	66.5	70.0	72.0	73.4	76.0	77.1	92.9
31-Dec	77.3	77.8	79.3	80.5	81.3	82.8	83.2	83.8	84.3	84.4	82.0	73.5	61.0	55.4	57.9	61.8	66.4	67.1	68.6	70.6	71.7	74.7	74.0	72.2	73.8	84.4
																						Diurnal Average				
																						Diurnal Maximum				



Wood Buffalo Environmental Association
Hourly Averages

Relative Humidity (RH) - %
Mackay River - December 2023





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Relative Humidity (RH) - %
Mackay River - December 2023

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	9	1.21	1.21
40 - 60	127	17.07	18.28
60 - 80	253	34.01	52.29
80 - 100	355	47.72	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744

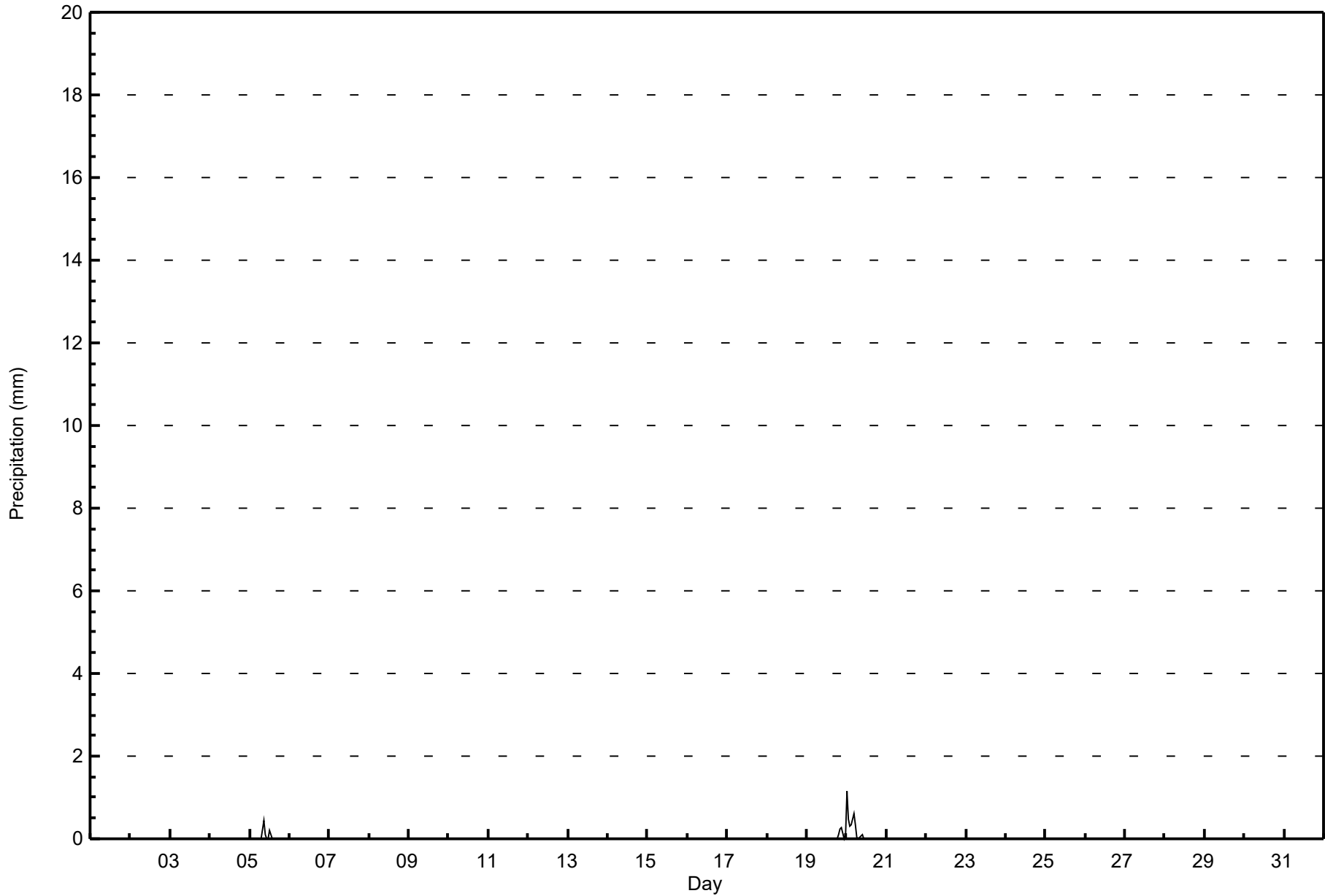


Maximum Value: 1.2 mm on Dec 20 01:00																				Maximum Daily Total: 3.4 mm on Dec 20					Hours in Service: 744									
Minimum Value: 0.0 mm on Dec 1 01:00																				Minimum Daily Total: 0.0 mm on Dec 1					Hours of Data: 744									
Maximum Diurnal Total: 1.2 mm at hour 1																				Minimum Diurnal Total: 0.0 mm at hour 8					Hours of Missing Data: 0									
Monthly Total: 4.84 mm																				Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.0 Median = 0.0 Q ₃ = 0.0 P ₉₀ = 0.0 P ₉₉ = 0.3					Hours of Calibration: 0									
																									Percent Operational Time: 100.0									
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum								
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24										
1-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	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	0.0	0.0	0.0	0.0	0.0	0.7	0.4
6-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	1.2	0.5	0.3	0.4	0.6	0.3	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	0.0	0.0	0.0	0.0	0.0	3.4	1.2
21-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
31-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
																								Diurnal Average										
																								Diurnal Maximum										



Wood Buffalo Environmental Association
Hourly Averages

Precipitation (PC) - mm
Mackay River - December 2023





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Precipitation (PC) - mm
Mackay River - December 2023

Concentration Ranges (mm)	Number of Hours	%	Cumulative %
0 - 0.3	740	99.46	99.46
0.4 - 0.5	2	0.27	99.73
0.6 - 0.7	1	0.13	99.87
0.8 - 1.4	1	0.13	100.00
1.5 - 10	0	0.00	100.00
> 10	0	0.00	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744

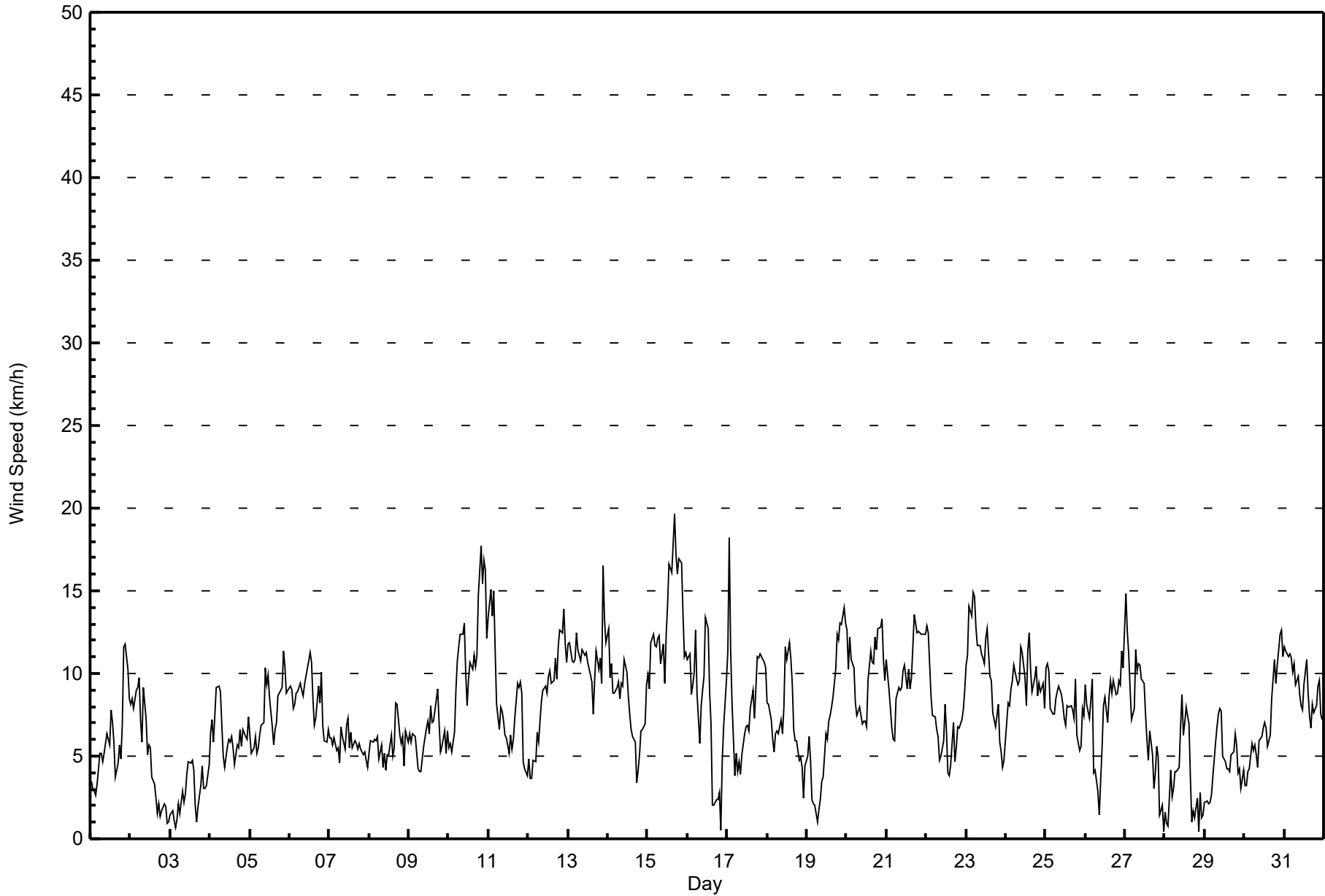


Maximum Speed: 20 km/h on Dec 15 17:00	Maximum Daily Speed Average: 13.3 km/h on Dec 15	Hours in Service: 744
Minimum Speed Value: 0 km/h on Dec 28 00:00	Minimum Daily Speed Average: 2.1 km/h on Dec 3	Hours of Data: 744
Maximum Diurnal Speed Average: 6.3 km/h at hour 20	Minimum Diurnal Speed Average: 4.7 km/h at hour 4	Hours of Missing Data: 0
Monthly Average Velocity: 5.5 km/h 203.2 deg	Percentiles: P ₁ = 1 P ₁₀ = 4 Q ₁ = 5 Median = 7 Q ₃ = 10 P ₉₀ = 12 P ₉₉ = 17	Percent Operational Time: 100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24					
1-Dec	SW3	SSW3	SE3	SE3	SE3	S5	S5	S5	S5	S6	SSW6	S6	SSW8	SSW7	S6	SSE4	S5	S6	SSE5	S7	S12	SSW12	SSW10	S8	S5.7	SSW12			
2-Dec	S8	S8	S8	S9	S9	S10	S7	S6	S9	S7	S5	SSW6	S6	SW4	SW3	WSW2	SW2	WSW2	SW1	W2	WNW2	WSW2	SSW1	SSW1	SSW4.6	S10			
3-Dec	SW1	W2	W1	NNW1	NE1	SSW2	SE2	SE3	ESE2	ESE3	SE4	SE5	SSE5	SE5	SE4	E2	E1	NW2	SE3	SSE4	SSE3	SE3	SSE3	SSE5	SE2.1	SE5			
4-Dec	S6	S7	S6	S7	S9	S9	SSW7	SSW5	SSW5	SW4	WSW6	SW6	WSW6	WSW6	WSW6	SSW5	SSW6	SSW6	S5	S7	S6	S7	SSE6	SSE6	SSE7	SSW5.8	S9		
5-Dec	SSE6	SE5	SE6	SE6	SE5	SE6	SE6	SE7	S7	S10	S9	SSW10	SSW9	SW7	SSW6	SSW7	SSW7	SSW9	SSW9	SSW9	SSW9	SSW11	SSW10	SSW9	S9	S9	S9	S6.6	WSW11
6-Dec	SW9	SW9	SW8	SW8	SW9	SW9	SW9	SW9	SW9	SW9	SW9	SW10	WSW11	WSW11	WSW11	SW9	SW7	SSW7	SSW9	SW8	SSW10	SW7	SW6	SW6	SW7	SW8.4	WSW11		
7-Dec	WSW6	SW6	WSW6	WSW6	WSW5	SW5	WSW5	WSW7	W6	WSW5	WSW7	WSW7	WSW5	WSW6	SW5	SW6	SW6	SW5	SW6	SW5	SW5	WSW5	SW5	WSW4	WSW5.6	WSW7			
8-Dec	WSW5	SW6	SW6	SW6	SW6	SW6	SW5	SW6	S4	SSW5	WSW4	WSW5	WSW5	WSW6	SW5	SSW5	S8	SSW8	S6	SSW6	SW6	SSW4	SW7	SW6	SW5.4	S8			
9-Dec	WSW6	WSW6	WSW6	WSW6	WSW6	SW4	SSW4	S4	S5	SSE6	S7	S7	S6	S8	S7	S7	S8	S9	S7	SSE5	SSE6	SSE7	SE5	SE7	S5.4	S9			
10-Dec	SE5	SE6	SSE5	S6	S9	S11	S12	S12	S12	S13	SSW10	SW8	WSW10	WSW11	W10	W11	W10	W11	W15	W18	W15	WNW17	WNW16	WNW12	WSW7.6	W18			
11-Dec	WNW13	WNW15	WNW13	WNW15	WNW11	W8	SW7	WSW8	W8	WSW7	WSW6	SW6	WSW5	WSW6	SSW5	S6	S7	S9	S9	S10	S9	S5	S4	SSE4	WSW5.7	WNW15			
12-Dec	S5	S4	S4	SSW5	S5	S6	S6	S7	S8	S9	S9	S9	S10	S10	S9	S10	S11	S10	S12	S13	SSW12	SSW14	SSW12	S11	S8.6	SSW14			
13-Dec	SSW12	SSW12	SSW11	SSW11	SSW11	SSW12	SSW11	S11	S11	S11	S11	S11	S11	S10	SSW10	S8	SSW10	SSW11	SSW10	SW11	WSW9	W17	WNW13	W12	SSW9.5	W17			
14-Dec	W13	W10	W11	W9	WSW9	WSW9	WSW10	WSW8	WSW9	WSW9	WSW11	WSW10	WSW9	WSW8	SW7	SSW6	S6	S3	S4	SSW5	SSW7	S7	S7	S9	WSW6.8	W13			
15-Dec	S10	S9	S12	S12	S12	S12	SSW12	S12	S11	SSW12	SSW9	SSW12	SSW14	SSW17	S16	SSW18	SSW20	SSW17	SSW16	SSW17	SSW17	SSW14	SSW11	SW11	SSW13.3	SSW20			
16-Dec	SW11	WSW11	WSW9	W9	W10	WNW13	WNW9	W6	W8	W9	W10	WNW13	WNW13	WNW9	WNW7	NW2	SW2	N2	NNW2	NW3	WNW0	WSW5	WSW7	W10	W6.9	WNW13			
17-Dec	WNW11	NW18	WNW11	WNW8	W4	W5	WSW4	WSW5	WSW4	SW5	SSW6	S7	SSW7	S7	SSW8	S9	S7	S9	S11	S11	S11	S11	S11	SSW10	SW5.7	NW18			
18-Dec	SSW8	SSW8	SSW7	SSW6	SSW5	WSW6	WSW7	SW6	SW7	SW6	SW8	WSW12	WSW11	W12	WNW11	W9	W7	W6	W6	W5	W5	W4	NW2	NNE4	WSW5.9	W12			
19-Dec	NE5	NE6	NE5	ENE2	NE2	NNE2	NNE1	NNE2	NNE2	NNE3	NE4	E6	ESE6	E7	E7	E8	E9	ESE10	ESE12	ESE12	ESE13	ESE13	ESE14	ESE13	E6.1	ESE14			
20-Dec	ESE13	ESE10	ESE12	SE11	SE10	SE8	ESE7	SE8	SE8	SE7	SSE7	SSE7	S7	S10	S11	S11	S11	S12	S11	S13	S13	SSW13	SSW11	SW10	SSE8.5	SSW13			
21-Dec	WSW11	WSW9	WSW8	WSW7	WSW6	SW6	SSW8	S9	S9	S9	S10	S11	S9	S10	S9	SSE10	SSE12	S14	S12	S13	S12	S12	S12	S12	SSW8.9	S14			
22-Dec	S13	S12	S10	S9	S7	SSE7	S7	SSE6	S5	SSE5	SSE6	SSE8	S6	SSE4	SSE4	SSE4	S7	SSW5	S6	SSW7	SW7	WSW7	WSW8	WSW9	S6.2	S13			
23-Dec	WSW10	WSW11	W14	W14	W15	W15	W13	W12	W12	W11	W11	W11	W12	W13	W10	W10	W8	W7	WSW7	SW8	WSW6	SW5	SSW4	SSE5	W9.6	W15			
24-Dec	S6	S8	S8	S9	S10	S11	S10	S9	S10	S12	S11	SSW10	SSW8	SSW11	SSW12	SSW10	SSW9	SSW10	SSW10	S9	S9	S9	S9	S8	S9.4	SSW12			
25-Dec	S10	S11	S10	S8	SSW8	S8	S9	S9	S9	S9	SSW8	SSW7	SW7	SSW8	S8	S8	S8	S7	S10	SSE6	SE5	S6	SE8	SE7	S7.5	S11			
26-Dec	SE9	SE8	SE7	SE8	SE10	SE4	ESE4	ESE3	SE1	SSE4	S6	S8	SSW9	SSW7	S9	S10	SSW9	S10	S9	S9	S10	SSW9	S11	SW10	S6.7	S11			
27-Dec	SW15	SW13	SW11	SW9	S7	S8	SSW11	SSW10	SSW11	S11	S10	S9	SSW8	SSW6	S5	SE6	ESE5	E3	E4	ESE6	SE5	NNW1	ESE2	ENE0	SSW5.7	SW15			
28-Dec	NE2	NNE1	NNE1	NNE4	N3	N3	NNW4	NW4	NNW4	N7	N9	N6	N7	N8	N7	N4	NNW1	W2	NW1	NNW2	WNW0	NNE3	SSW1	SSE1	N3.1	N9			
29-Dec	SSE2	S2	SSE2	SSE2	SSE3	SE4	SSE6	S7	S8	S8	S8	S5	S5	S4	S4	S4	S5	SSE5	S6	S6	SSE4	SSE4	SSE3	SSE4	S4.5	S8			
30-Dec	SE3	SSE3	SSE4	SSE4	SSE6	SE5	SE6	SE5	SE4	SE6	SE6	SE7	SE7	SE7	SE6	SE6	SE8	S10	S11	S9	SSW11	S12	SSW13	SSW11	SSE6.4	SSW13			
31-Dec	SSW12	SSW11	SSW11	SSW11	S11	SSW10	S11	S9	SSW10	SSW9	SSW8	SSW8	SW9	WSW11	SW9	SW7	SW7	SW8	SW8	WSW8	WSW9	W10	WNW8	W7	SW8.2	SSW12			

SSW5.3 SW4.9SSW4.7SSW4.7SSW4.9SSW5.0SSW5.3SSW5.4SSW5.5SSW5.8SSW5.7SSW6.0 SW5.8 SW5.9SSW5.4SSW5.2 S5.9SSW6.1SSW6.3SSW6.3SSW6.3SSW5.8SSW5.3SSW5.2 SW15 NW18 W14WNW15 W15 W15 W13 S12 S12 S13 S11WNW13 SSW14 SSW17 S16 SSW18 SSW20 SSW17 SSW16 W18 SSW17WNW17WNW16 ESE13	Diurnal Average
	Diurnal Maximum

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





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Wind Speed (WS) - km/h
Mackay River - December 2023

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	191	25.67	25.67
6 - 11	463	62.23	87.90
12 - 19	89	11.96	99.87
20 - 28	1	0.13	100.00
29 - 38	0	0.00	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed (WS) - km/h
Mackay River - December 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	4	10	6	2	4	6	24	30	26	17	19	18	9	3	6	7	191
6 - 11	6	0	1	0	5	5	29	18	163	79	56	63	29	9	0	0	463
12 - 19	0	0	0	0	0	8	0	1	27	22	2	1	16	11	1	0	89
20 - 28	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	10	10	7	2	9	19	53	49	216	119	77	82	54	23	7	7	744

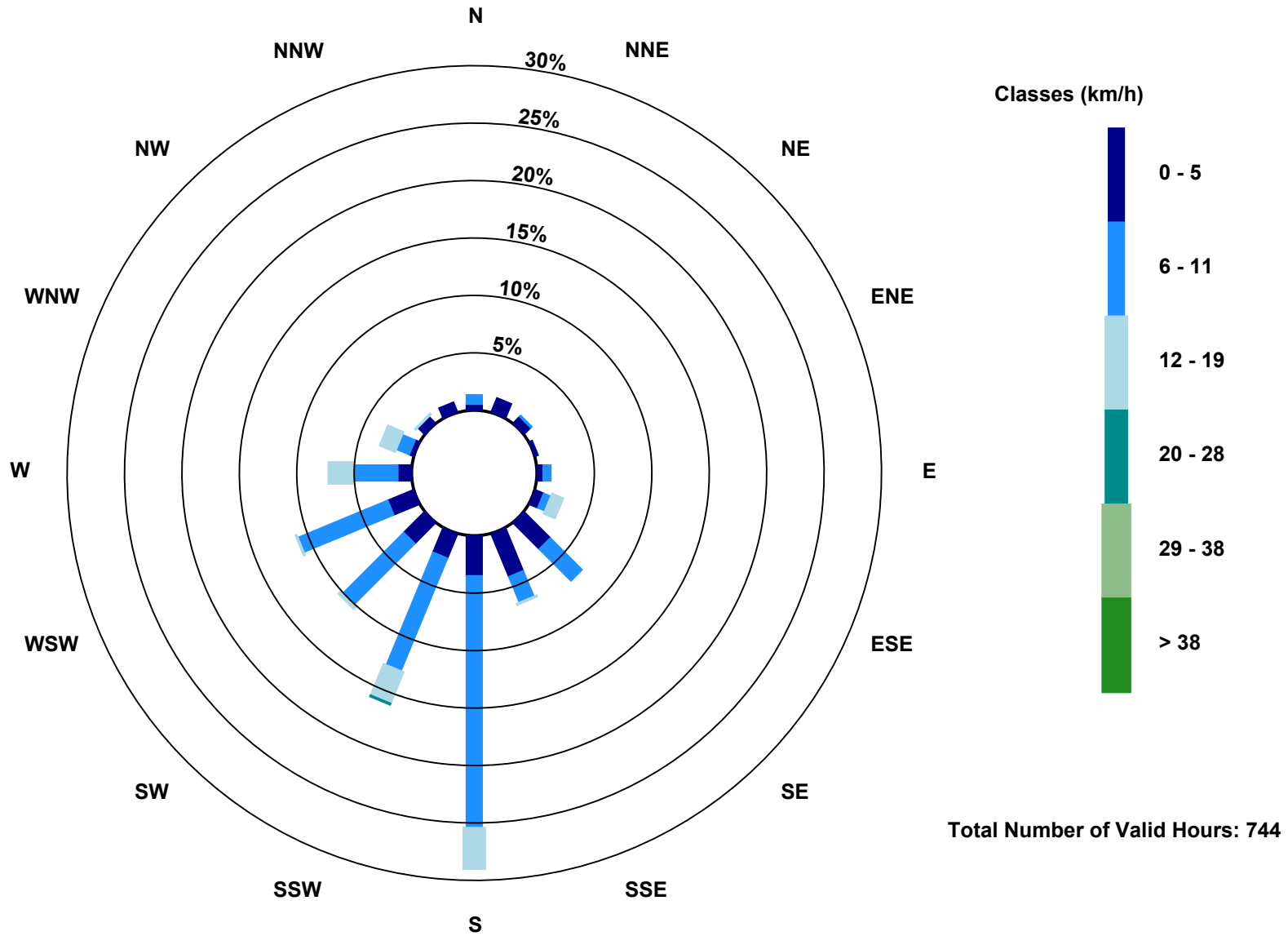
Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Dec 2023

Wind Speed (WS) - km/h
Mackay River





Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Speed (WS) - km/h
Mackay River - December 2023

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 7 km/h on Dec 13 22:00 Minimum Value: 0 km/h on Dec 1 03:00 Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 2 Median = 2 Q ₃ = 3 P ₉₀ = 4 P ₉₉ = 6																	Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0								
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Dec	1	1	0	1	1	1	1	1	1	1	2	2	3	2	2	1	1	1	1	2	3	3	3	2	3
2-Dec	2	2	2	2	2	3	3	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	3
3-Dec	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	1	1	1	1	1	1	1	1	2	2
4-Dec	1	2	1	2	2	2	2	2	1	1	2	2	2	3	2	1	1	1	1	1	1	1	1	1	3
5-Dec	2	1	1	2	2	2	2	2	3	4	3	3	3	2	1	2	2	2	2	3	5	3	3	5	5
6-Dec	3	4	3	3	3	3	4	3	3	3	4	5	5	4	3	2	2	3	2	3	2	2	2	2	5
7-Dec	2	2	2	2	2	2	2	3	2	2	2	3	2	2	2	2	2	2	1	2	2	2	1	1	3
8-Dec	2	2	2	2	2	2	2	1	1	1	2	2	2	2	2	2	2	2	1	2	1	1	2	2	2
9-Dec	2	2	2	2	2	2	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	1	2	2
10-Dec	1	2	2	2	3	3	3	4	3	4	4	3	4	5	4	4	4	5	6	7	6	6	6	4	7
11-Dec	4	5	5	5	5	3	2	3	3	3	3	2	2	2	2	1	2	2	2	3	3	1	1	1	5
12-Dec	1	1	1	1	1	1	1	2	2	3	2	3	3	3	3	2	2	2	3	3	4	4	3	3	4
13-Dec	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	2	3	3	3	3	4	7	6	5	7
14-Dec	6	5	5	4	4	4	4	3	4	4	4	4	4	4	2	2	1	1	1	1	2	2	1	3	6
15-Dec	2	2	3	3	3	3	3	3	3	3	3	4	5	5	5	6	7	6	5	5	6	4	3	4	7
16-Dec	4	5	4	4	4	5	4	2	3	4	4	5	4	3	3	1	1	1	2	2	2	2	3	4	5
17-Dec	5	6	4	3	2	2	1	2	1	1	1	2	2	2	2	2	2	2	3	3	3	3	3	4	6
18-Dec	2	2	2	2	1	2	2	2	3	2	3	5	5	5	4	4	2	2	2	2	2	1	2	2	5
19-Dec	2	2	2	1	2	2	1	1	1	1	1	2	2	2	2	3	3	3	4	3	4	4	4	4	4
20-Dec	4	3	3	3	3	2	2	2	2	2	2	2	3	4	3	3	4	3	3	3	4	4	4	4	4
21-Dec	4	4	3	3	3	2	2	2	2	2	3	3	3	3	3	3	3	4	4	4	3	3	3	3	4
22-Dec	3	3	3	2	2	2	2	2	1	1	2	2	2	2	1	1	2	2	1	2	2	3	3	3	3
23-Dec	4	5	6	5	7	6	5	5	5	5	5	4	5	5	4	4	3	3	3	3	2	2	1	1	7
24-Dec	2	2	2	2	2	3	2	2	2	3	3	3	3	4	3	3	3	3	2	2	2	2	2	1	4
25-Dec	3	2	3	2	2	2	2	2	2	2	2	2	2	2	2	1	2	2	2	2	1	2	2	2	3
26-Dec	2	2	2	2	3	2	1	1	1	1	2	2	3	2	2	3	3	2	2	2	2	2	3	4	4
27-Dec	6	5	4	4	2	2	3	3	3	3	3	2	3	3	2	1	2	2	1	1	2	2	1	1	6
28-Dec	2	1	1	2	1	2	1	1	1	2	3	2	3	2	2	2	1	1	1	1	1	1	1	1	3
29-Dec	1	1	1	1	1	1	1	2	2	2	3	1	1	1	1	1	1	1	1	2	2	2	1	1	3
30-Dec	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	3	3	3	3	4	4	3	4
31-Dec	3	3	3	3	3	3	3	2	2	2	2	2	3	4	3	3	2	3	3	3	4	4	3	3	4
																	Diurnal Maximum								
																	6 6 6 5 7 6 5 5 5 5 5 5 5 5 5 6 7 6 6 7 6 7 6 5								



Wood Buffalo Environmental Association
Summary of Hour Averages

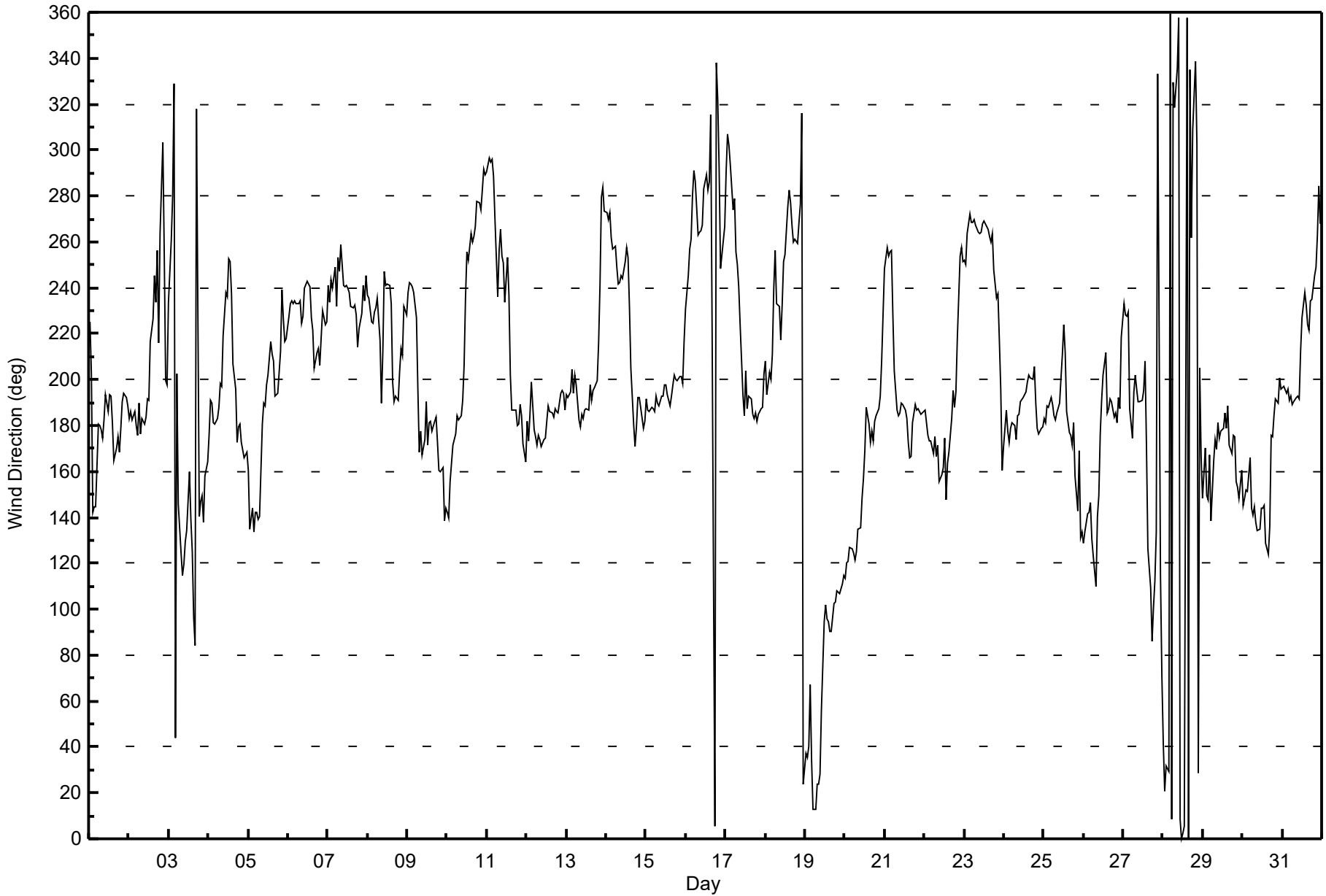
Wind Direction (WD) - deg
Mackay River - December 2023

Direction of Maximum Speed: 198 deg on Dec 15 17:00	Hours in Service: 744
Direction of Maximum Daily Speed Average: 195.0 deg on Dec 15	Hours of Data: 744
Direction of Minimum Speed: 71 deg on Dec 28 00:00	Hours of Missing Data: 0
Direction of Minimum Daily Speed Average: 2.1 deg on Dec 3	Percent Operational Time: 100.0
Monthly Average Direction: 203.2 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-Dec	225	203	142	145	145	181	180	178	174	182	193	186	193	193	181	165	170	175	168	179	191	194	192	188	183.6
2-Dec	183	186	182	186	180	176	190	176	183	180	183	192	191	217	226	246	234	256	216	264	303	255	200	198	191.9
3-Dec	234	261	280	329	44	203	146	125	115	119	129	134	160	139	125	96	84	318	140	147	149	138	158	164	142.9
4-Dec	176	191	190	181	180	183	188	198	197	219	238	236	252	251	237	207	196	173	179	181	173	166	167	168	194.0
5-Dec	160	135	144	134	142	142	139	141	180	190	188	197	202	216	211	208	193	193	194	212	239	226	217	218	190.7
6-Dec	227	233	234	233	234	233	233	234	224	228	240	243	242	241	227	221	205	212	214	206	218	230	224	225	228.4
7-Dec	241	234	244	240	249	232	253	247	259	241	240	241	240	238	232	231	233	228	214	222	229	241	234	245	237.9
8-Dec	237	236	225	224	229	231	236	217	190	212	247	241	242	241	233	199	191	193	191	204	214	211	232	228	219.9
9-Dec	238	242	241	241	238	227	196	169	177	167	174	190	171	181	182	178	182	184	173	160	160	161	139	144	186.8
10-Dec	142	140	155	172	174	176	184	182	185	191	206	235	256	252	264	260	263	267	278	277	274	283	292	289	239.0
11-Dec	290	296	295	296	288	270	236	256	265	254	251	234	253	237	202	187	186	187	180	181	189	185	172	164	244.6
12-Dec	182	173	185	199	178	175	171	176	174	171	174	174	182	189	186	185	184	188	186	185	194	195	194	187	183.9
13-Dec	194	192	195	204	194	202	198	183	180	185	183	187	187	187	197	191	195	196	200	216	242	280	284	273	205.5
14-Dec	273	270	273	262	257	258	249	242	242	245	244	252	258	253	232	205	180	171	179	193	192	188	179	182	237.3
15-Dec	191	187	186	188	187	186	193	190	188	193	193	197	197	193	189	193	198	202	200	200	201	201	198	216	195.0
16-Dec	231	245	257	261	280	291	286	263	264	265	267	283	289	282	286	316	222	5	338	322	292	249	254	267	271.7
17-Dec	290	307	302	294	274	279	256	250	241	224	193	184	204	187	193	191	185	183	185	182	185	187	188	203	219.2
18-Dec	208	194	203	200	211	240	256	233	232	217	232	251	254	275	282	277	267	260	261	259	268	276	316	24	247.7
19-Dec	37	36	40	67	34	13	13	24	24	28	56	94	102	96	95	90	90	103	103	108	108	107	111	115	91.1
20-Dec	113	120	121	127	126	124	121	125	135	135	148	157	169	188	180	172	178	173	182	184	187	193	208	228	160.1
21-Dec	248	257	254	256	257	228	204	187	185	185	190	189	187	183	172	166	167	181	189	187	187	186	185	186	195.4
22-Dec	187	181	176	173	173	168	175	166	172	155	159	161	174	148	164	168	183	195	188	195	218	254	257	252	185.7
23-Dec	252	250	263	272	268	269	270	267	264	264	268	269	268	266	263	260	264	248	235	237	217	196	161		259.6
24-Dec	171	187	177	173	179	181	180	174	184	185	190	192	193	195	199	202	201	200	206	190	179	177	179	180	187.0
25-Dec	183	181	188	188	192	189	184	183	186	190	201	211	224	211	186	177	176	171	181	158	143	169	131	134	182.0
26-Dec	129	134	142	142	146	130	123	110	141	150	176	191	202	212	185	187	192	190	183	185	181	192	187	218	174.7
27-Dec	233	228	227	230	187	175	194	202	196	190	190	191	195	208	171	127	109	86	101	112	133	333	115	71	191.9
28-Dec	41	21	32	29	359	9	330	318	335	358	9	0	3	5	358	0	335	262	308	338	303	29	205	167	357.2
29-Dec	148	170	149	147	167	139	165	174	170	181	174	177	179	186	179	189	171	168	175	175	155	153	148	161	169.5
30-Dec	145	148	152	151	166	144	141	145	138	134	135	144	144	145	129	124	136	176	175	184	192	190	201	196	162.5
31-Dec	197	197	194	196	191	193	189	191	192	193	192	212	227	238	233	224	221	234	235	245	249	263	284	268	215.9

210.6 214.0 211.2 209.8 204.4 204.5 201.7 197.3 198.7 198.1 202.0 207.9 214.2 215.1 205.7 196.1 191.0 194.9 193.3 196.1 199.6 207.3 203.4 205.0
 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
Mackay River - December 2023

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 95 deg on Dec 28 21:00 Minimum Value: 8 deg on Dec 1 03:00 Percentiles: P ₁ = 13 P ₁₀ = 17 Q ₁ = 19 Median = 23 Q ₃ = 33 P ₉₀ = 43 P ₉₉ = 68																			Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0						
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Dec	18	29	8	19	21	20	13	13	15	17	20	27	26	24	21	19	20	15	17	19	18	20	20	19	29
2-Dec	18	17	18	18	19	22	35	20	19	19	27	26	21	33	27	20	55	18	60	29	38	10	50	60	60
3-Dec	70	28	52	29	65	56	53	35	47	24	19	21	34	37	24	65	81	50	15	16	19	20	24	22	81
4-Dec	14	18	21	17	17	18	18	20	19	19	35	42	47	47	37	23	16	12	12	15	12	15	15	15	47
5-Dec	24	20	20	26	36	33	28	24	27	28	20	23	24	23	20	22	17	19	17	27	40	28	26	24	40
6-Dec	35	36	37	38	34	33	34	37	31	26	42	42	44	39	30	28	20	22	22	22	25	30	30	30	44
7-Dec	35	31	36	32	42	31	30	39	43	34	38	44	41	33	32	34	30	28	21	25	26	35	29	32	44
8-Dec	31	29	24	22	25	26	37	21	22	21	36	44	41	45	32	22	14	16	15	17	21	21	25	26	45
9-Dec	36	42	35	37	38	30	28	22	21	15	21	20	22	21	15	16	16	18	22	24	25	27	23	22	42
10-Dec	21	23	29	23	22	21	20	21	20	22	25	43	48	44	40	45	45	40	33	33	34	31	24	23	48
11-Dec	24	22	23	23	26	35	34	39	39	40	47	33	47	41	32	18	16	19	20	21	20	19	14	19	47
12-Dec	21	22	24	17	17	13	15	17	17	20	19	21	19	20	19	18	18	18	17	19	20	19	20	21	24
13-Dec	18	21	22	23	19	21	19	17	17	19	18	18	18	19	21	18	19	21	20	27	41	30	35	41	41
14-Dec	39	43	37	42	41	44	45	43	45	44	41	46	46	53	35	21	13	23	27	19	16	14	16	16	53
15-Dec	17	17	17	17	18	17	17	17	19	20	22	25	24	23	23	23	24	24	24	25	25	24	21	28	28
16-Dec	34	43	47	39	35	23	26	33	38	37	37	29	25	28	27	56	35	50	64	49	91	32	45	38	91
17-Dec	35	22	21	24	34	29	28	38	33	24	22	20	25	22	19	18	16	17	18	18	20	21	20	25	38
18-Dec	25	20	20	20	23	42	40	36	37	28	32	43	45	35	29	31	38	41	38	35	24	20	53	26	53
19-Dec	24	21	28	36	25	66	60	31	23	24	38	28	30	26	26	29	29	22	20	20	20	18	18	20	66
20-Dec	18	23	20	23	21	21	21	21	23	22	23	25	31	25	23	24	24	22	22	20	20	19	24	32	32
21-Dec	43	44	40	45	37	25	21	17	16	18	18	19	20	19	24	26	24	21	22	22	19	19	18	19	45
22-Dec	18	18	18	21	21	24	25	26	23	22	23	24	25	25	22	31	26	30	24	20	28	46	41	45	46
23-Dec	47	45	41	35	39	41	37	39	41	41	43	41	38	38	43	40	47	43	45	37	39	24	20	16	47
24-Dec	16	15	15	16	18	17	19	18	16	18	19	22	24	19	22	23	22	20	22	20	17	15	15	15	24
25-Dec	18	16	19	17	19	20	18	19	18	19	25	24	26	25	16	14	15	15	18	26	20	23	19	21	26
26-Dec	18	21	24	22	24	31	20	28	65	25	24	26	26	26	19	19	21	18	16	17	14	18	17	34	65
27-Dec	32	31	32	33	19	13	20	23	19	18	20	22	26	27	28	17	17	32	25	13	19	68	25	86	86
28-Dec	68	71	73	32	55	65	29	33	21	25	26	32	30	25	27	45	54	26	48	41	95	43	48	43	95
29-Dec	33	40	46	23	35	13	18	15	20	18	24	26	22	20	18	15	14	14	14	20	29	24	24	16	46
30-Dec	17	16	16	16	20	19	20	27	25	20	22	22	23	24	22	21	22	23	23	23	20	20	23	22	27
31-Dec	23	23	22	21	18	20	19	21	20	19	19	24	33	37	36	29	23	35	35	45	49	38	30	35	49
																			70 71 73 45 65 66 60 43 65 44 47 46 48 53 43 65 81 50 64 49 95 68 53 86						
Diurnal Maximum																									



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

**AMS21
CONKLIN
DECEMBER 2023**

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

January 31, 2024

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CONKLIN (AMS21)
 DECEMBER 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	709	35	35	100	6.2	0	1.4	0
TRS(ppb) Average	708	36	36	100	4.1	0	0.5	0
THC(ppm) Average	673	39	71	95.7	2.5	-	2.3	-
NMHC(ppm) Average	673	39	71	95.7	0.21	-	0.023	-
CH4(ppm) Average	673	39	71	95.7	2.5	-	2.3	-
O3 (ppb) Average	709	35	35	100	40.9	0	37.5	-
NO2 (ppb) Average	705	37	39	99.73	16	0	6.7	-
NO (ppb) Average	705	37	39	99.73	18.5	-	1.9	-
NOX (ppb) Average	705	37	39	99.73	34.5	-	8.4	-
PM2.5 (ug/m3) Average	742	2	2	100	78.8	0	17.3	0
Temperature 2 m (C) Average	744	0	0	100	6.5	-	2.8	-
Relative Humidity (%) Average	744	0	0	100	94.7	-	86.1	-
Wind Speed 10 m (km/h) Average	744	0	0	100	22	-	12	-
Wind Direction 10 m (deg) Average	744	0	0	100	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CONKLIN (AMS21)
DECEMBER 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	709	0.34	0.6	-	0	0	0.1	0.2	0.3	0.8	6.2
TRS (ppb) Average	708	0.38	0.1	-	0.2	0.3	0.4	0.4	0.4	0.4	4.1
THC (ppm) Average	673	2.14	0.1	-	2	2	2.1	2.1	2.2	2.3	2.5
NMHC(ppm) Average	673	0.003	0.011	-	0	0	0	0	0	0	0.21
CH4(ppm) Average	673	2.14	0.1	-	2	2	2.1	2.1	2.2	2.3	2.5
O3 (ppb) Average	709	23.71	10.3	-	1.5	7.7	16	25	31.7	36.6	40.9
NO2 (ppb) Average	705	3.25	2.3	-	0	1	1.6	2.6	4.2	6.2	16
NO (ppb) Average	705	0.7	1.6	-	0	0	0.1	0.2	0.5	1.9	18.5
NOX (ppb) Average	705	3.95	3.5	-	0.3	1.1	1.8	3.1	5	7.9	34.5
PM2.5 (ug/m3) Average	742	4.93	5.5	-	0.2	1	2.1	3.4	5.9	10.3	78.8
Temperature 2 m (C) Average	744	-5.67	5.7	-	-21.2	-14	-10.1	-5.1	-0.9	1.2	6.5
Relative Humidity (%) Average	744	73.48	14	-	30.5	52.4	64.7	77.7	85.2	87.6	94.7
Wind Speed 10 m (km/h) Average	744	7	4	-	0	1	3	7	10	13	22
Wind Direction 10 m (deg) Average	744	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CONKLIN (AMS 21)
DECEMBER 2023

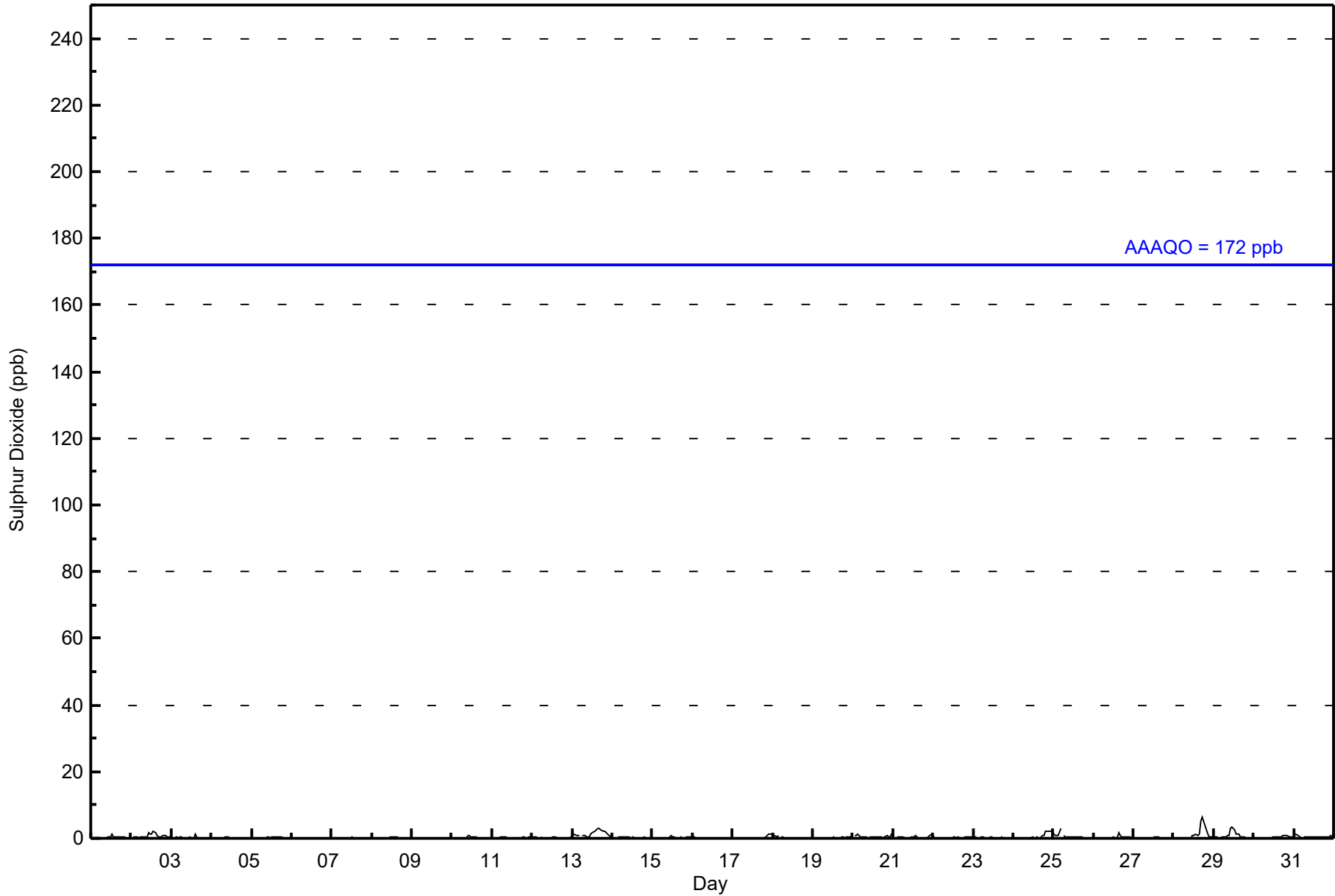
OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
THC/NMHC/CH4	05 Dec 2023 13:00	05 Dec 2023 15:00	3	Maintenance - station operator activities
THC/NMHC/CH4	08 Dec 2023 04:00	08 Dec 2023 11:00	8	Unstable Operation - excessive baseline noise
THC/NMHC/CH4	08 Dec 2023 12:00	08 Dec 2023 14:00	3	Maintenance - retention time adjusted
THC/NMHC/CH4	10 Dec 2023 04:00	10 Dec 2023 07:00	4	Unstable Operation - excessive baseline noise
THC/NMHC/CH4	10 Dec 2023 18:00	10 Dec 2023 22:00	5	Unstable Operation - excessive baseline noise
THC/NMHC/CH4	11 Dec 2023 07:00	11 Dec 2023 10:00	4	Unstable Operation - excessive baseline noise
THC/NMHC/CH4	11 Dec 2023 12:00	11 Dec 2023 13:00	2	Maintenance - analyzer replaced
THC/NMHC/CH4	14 Dec 2023 12:00	14 Dec 2023 14:00	3	Maintenance - retention time adjusted
NO2	05 Dec 2023 09:00	05 Dec 2023 09:00	1	Maintenance - reinitiated daily QA check
NO2	05 Dec 2023 12:00	05 Dec 2023 12:00	1	Maintenance - reinitiated daily QA check



Wood Buffalo Environmental Association
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Conklin - December 2023





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Sulphur Dioxide (SO₂) - ppb
Conklin - December 2023**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	709	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: 709

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Sulphur Dioxide (SO₂) - ppb
Conklin - December 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	4	2	4	4	10	16	34	81	76	164	135	17	34	80	33	15	709
11 - 20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	4	2	4	4	10	16	34	81	76	164	135	17	34	80	33	15	709

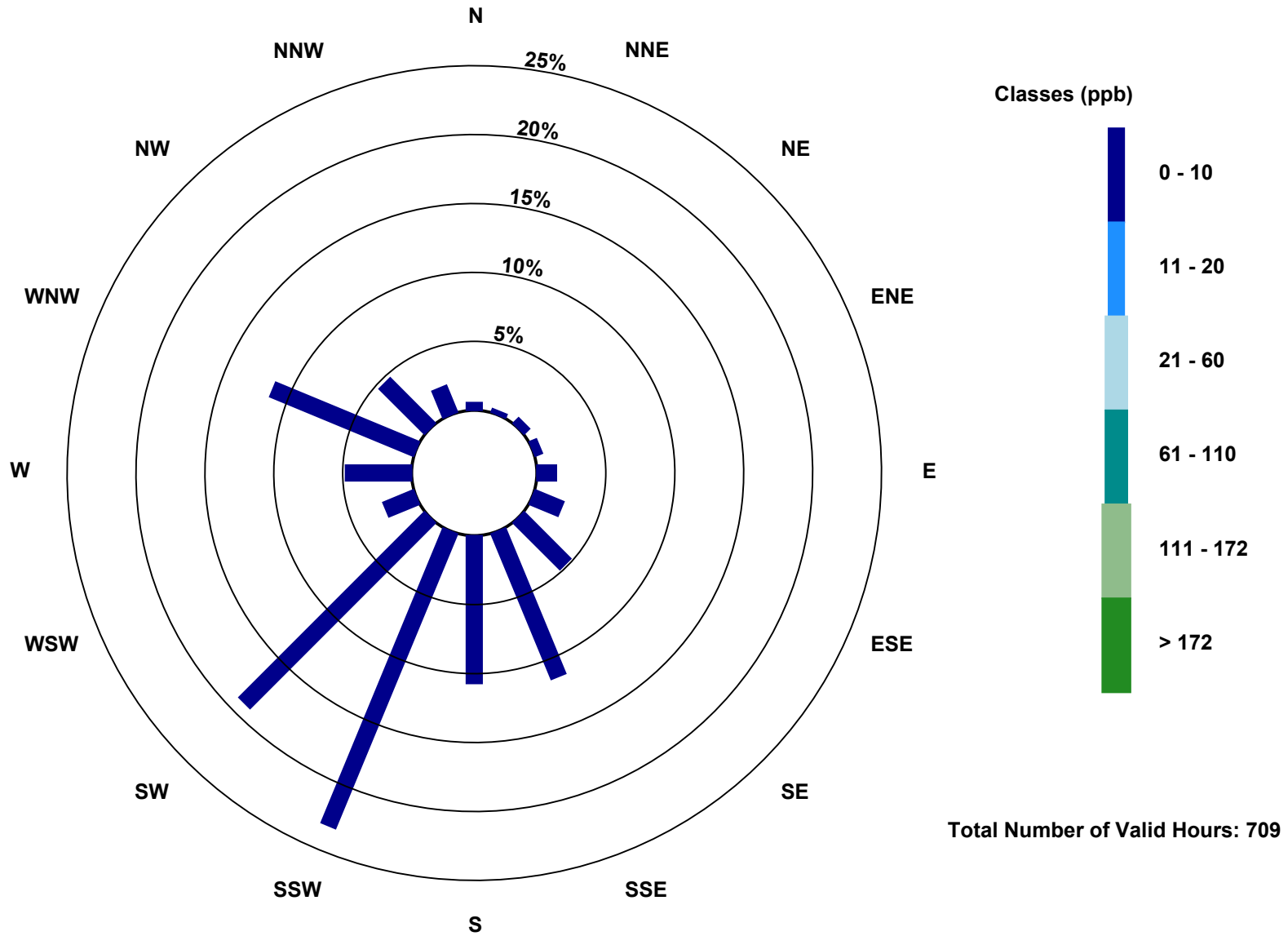
Total Number of Valid Hours: 709

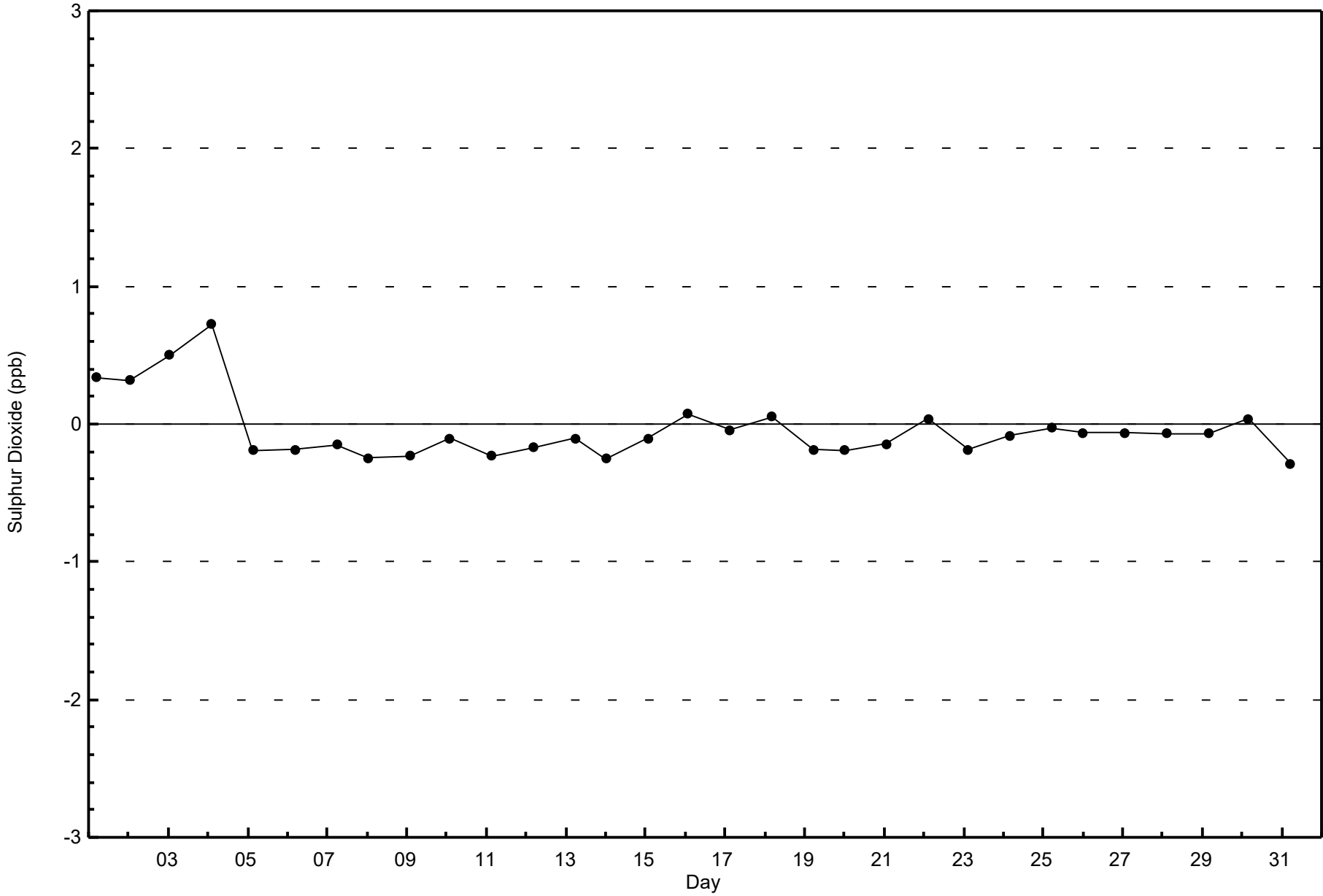
Total Number of Hours: 744

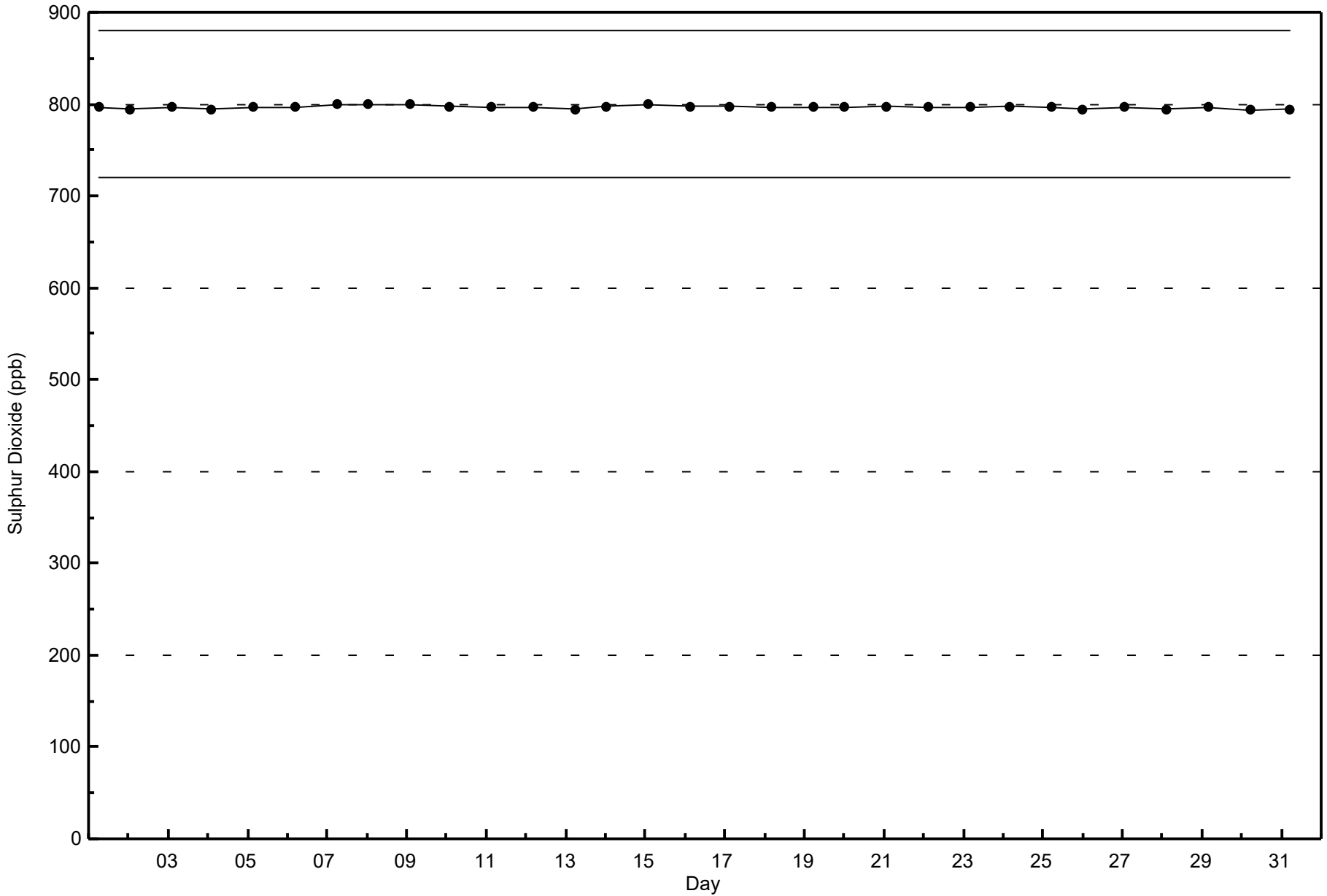


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Sulphur Dioxide (SO₂) - ppb
Conklin

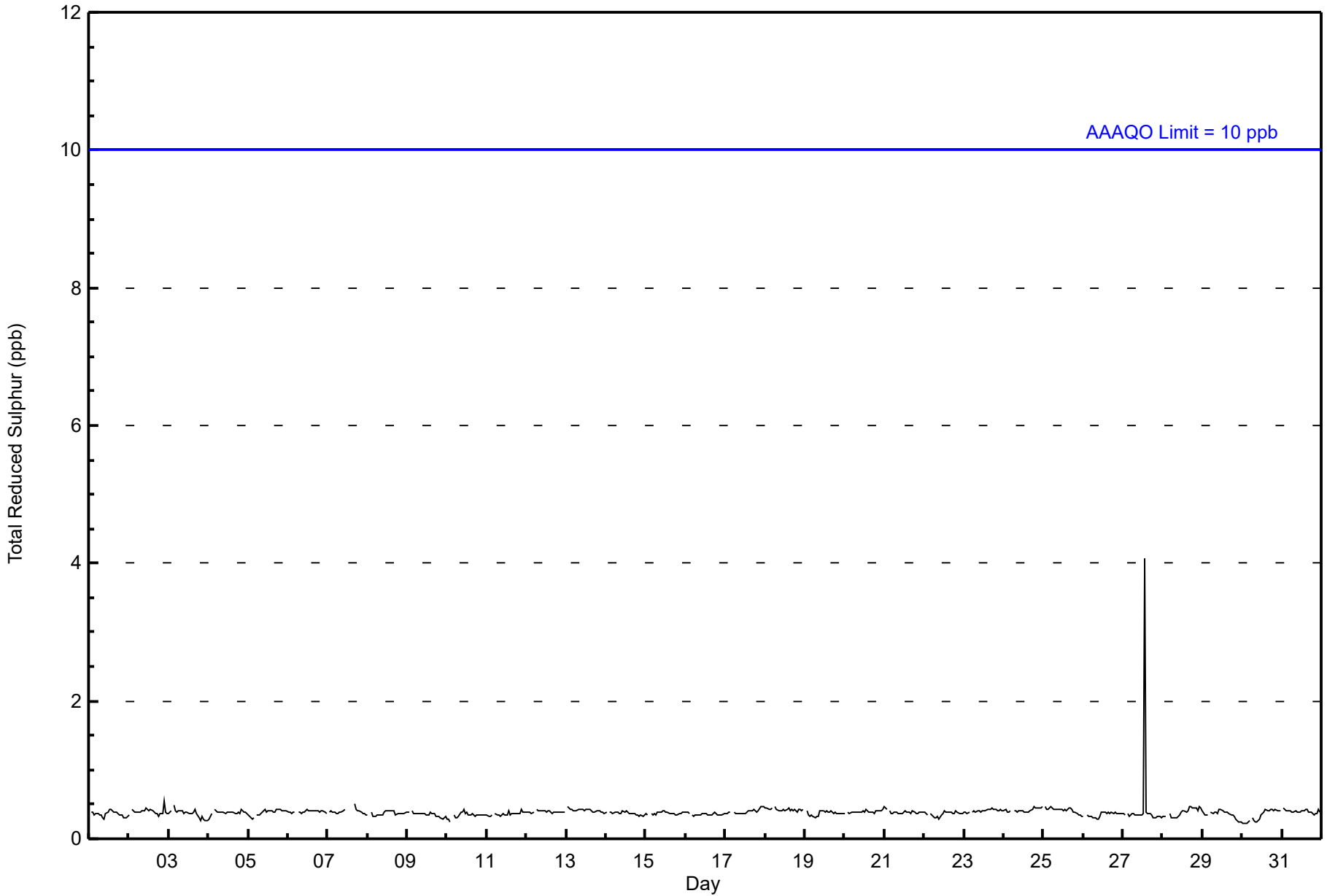








Number of Exceedences (AAAQO):		1-hr: 0		24-hr: 0		Hours in Service:																744					
Maximum Value: 4.1 ppb on Dec 27 14:00		Maximum Daily Average: 0.5 ppb on Dec 27																Hours of Data:		708							
Minimum Value: 0.2 ppb on Dec 30 02:00		Minimum Daily Average: 0.3 ppb on Dec 10																Hours of Missing Data:		36							
Maximum Diurnal Average: 0.5 ppb at hour 14		Minimum Diurnal Average: 0.4 ppb at hour 1																Hours of Calibration:		36							
Monthly Average: 0.38 ppb		Percentiles: P ₁ = 0.3 P ₁₀ = 0.3 Q ₁ = 0.4 Median = 0.4 Q ₃ = 0.4 P ₉₀ = 0.4 P ₉₉ = 0.5																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-Dec	Z	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.4	0.3	0.3	0.3	0.4	0.4	0.4
2-Dec	0.3	Z	0.4	0.4	0.4	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	0.3	0.4	0.4	0.5	0.4	0.4	0.4	0.4	0.4
3-Dec	0.4	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	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.5
4-Dec	0.3	0.3	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	0.4	0.4
5-Dec	0.4	0.3	0.3	0.3	Z	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
6-Dec	0.4	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
7-Dec	Z	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	C	C	C	C	C	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5
8-Dec	0.4	Z	0.4	0.3	0.3	0.3	0.3	0.3	0.4	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
9-Dec	0.4	0.4	Z	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.4	0.3	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4
10-Dec	0.3	0.3	0.3	Z	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.4	0.3	0.3	0.4	0.3	0.3	0.3	0.3	0.3	0.4	0.3	0.4
11-Dec	0.4	0.3	0.3	0.3	Z	0.4	0.3	0.3	0.3	0.3	0.4	0.3	0.3	0.4	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
12-Dec	0.4	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
13-Dec	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	0.4	0.4	0.4	0.4	0.4	0.4	0.5
14-Dec	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	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4
15-Dec	0.4	0.3	Z	0.4	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	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
16-Dec	0.4	0.4	0.4	Z	0.4	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.3	0.4	0.4	0.3	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.4	0.4	0.4
17-Dec	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	0.5	0.5	0.5	0.4	0.4	0.5
18-Dec	0.5	0.4	0.4	0.4	0.5	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	0.4	0.5
19-Dec	Z	0.4	0.4	0.3	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
20-Dec	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	0.4	0.4	0.4	0.4
21-Dec	0.5	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	0.4	0.4	0.5
22-Dec	0.4	0.4	0.3	Z	0.4	0.3	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
23-Dec	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	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5
24-Dec	0.4	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	0.5	0.4	0.5	0.4	0.5	0.4	0.5	0.5
25-Dec	Z	0.5	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	0.4	0.4	0.4	0.4	0.3	0.4	0.4	0.5
26-Dec	0.3	Z	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
27-Dec	0.4	0.3	Z	0.4	0.3	0.4	0.4	0.3	0.4	0.4	0.3	0.3	0.4	4.1	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	4.1
28-Dec	0.3	0.3	0.3	Z	0.4	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.4	0.4	0.4	0.5	0.5	0.4	0.5	0.5
29-Dec	0.4	0.4	0.3	0.3	Z	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	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4
30-Dec	0.2	0.2	0.2	0.2	0.3	Z	0.3	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
31-Dec	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	0.4	0.4	0.4	0.4	0.4
																								Diurnal Average		0.4	
																								Diurnal Maximum		0.5	
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

Total Reduced Sulphur (TRS) - ppb
Conklin - December 2023

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

Total Number of Valid Hours: 708

Total Number of Hours: 744



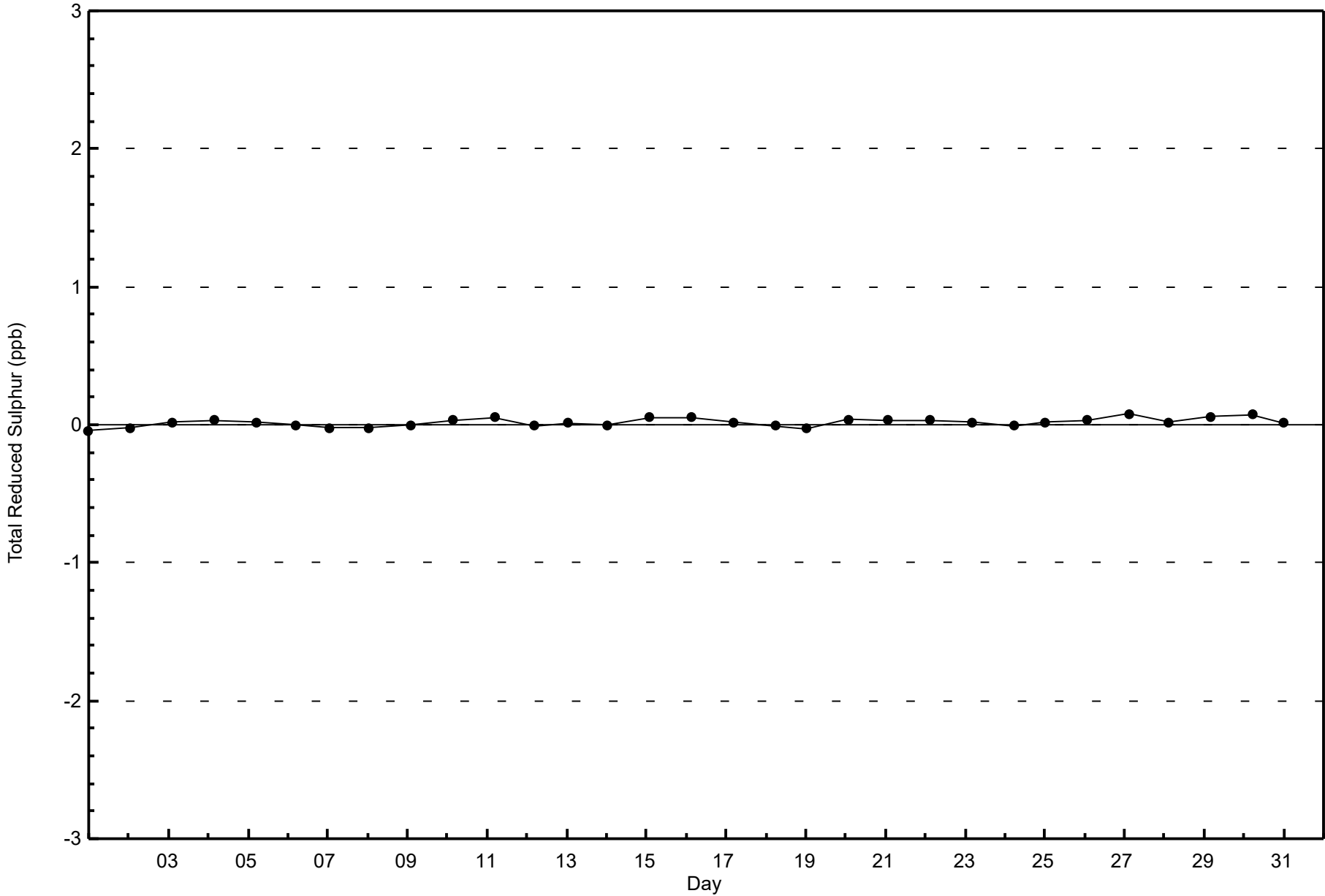
Wood Buffalo Environmental Association
Frequency Distribution

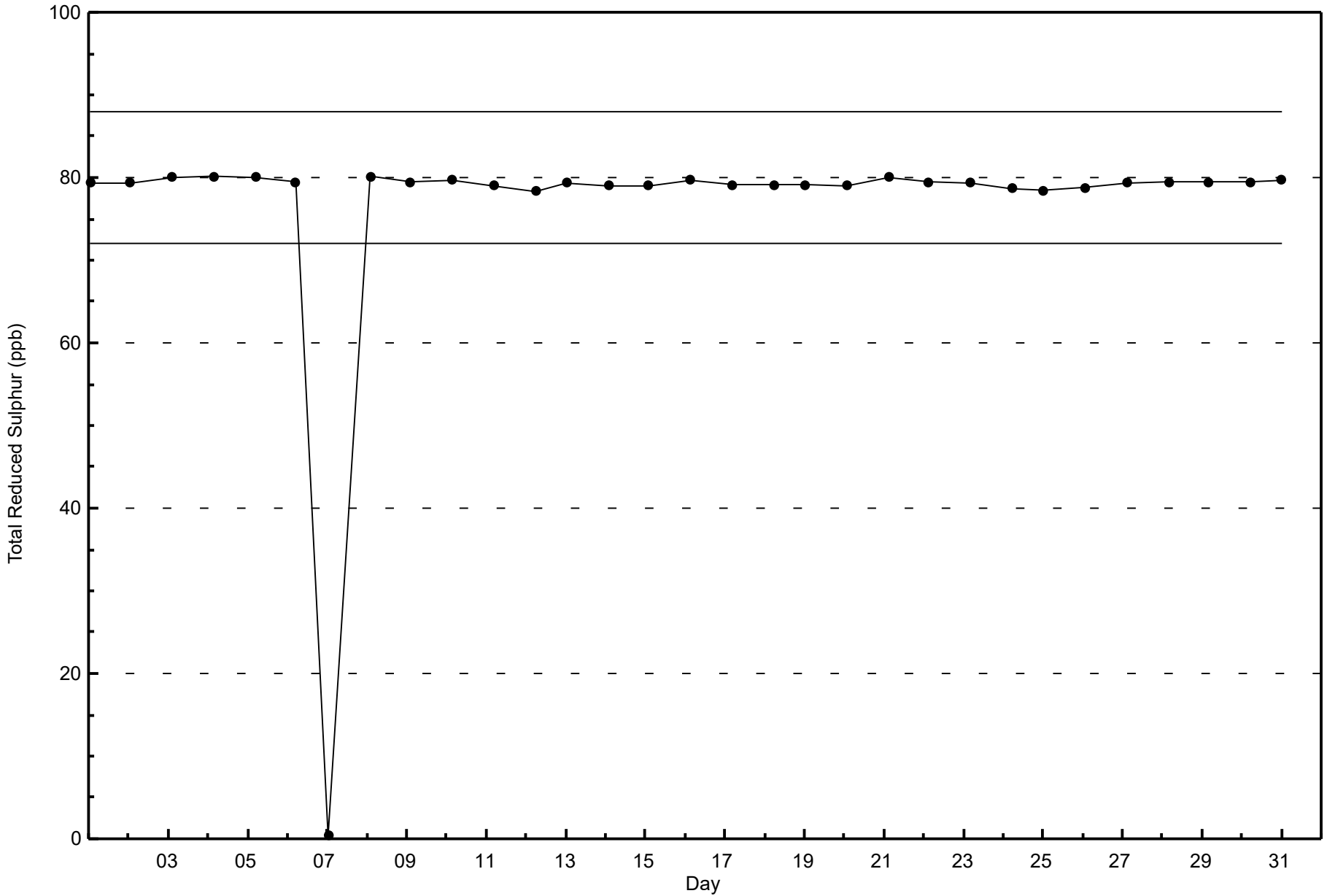
Total Reduced Sulphur (TRS) - ppb
Conklin - December 2023

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	2	4	5	10	16	35	80	73	164	139	19	31	78	30	16	707
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
Totals	5	2	4	5	10	16	35	80	74	164	139	19	31	78	30	16	708

Total Number of Valid Hours: 708

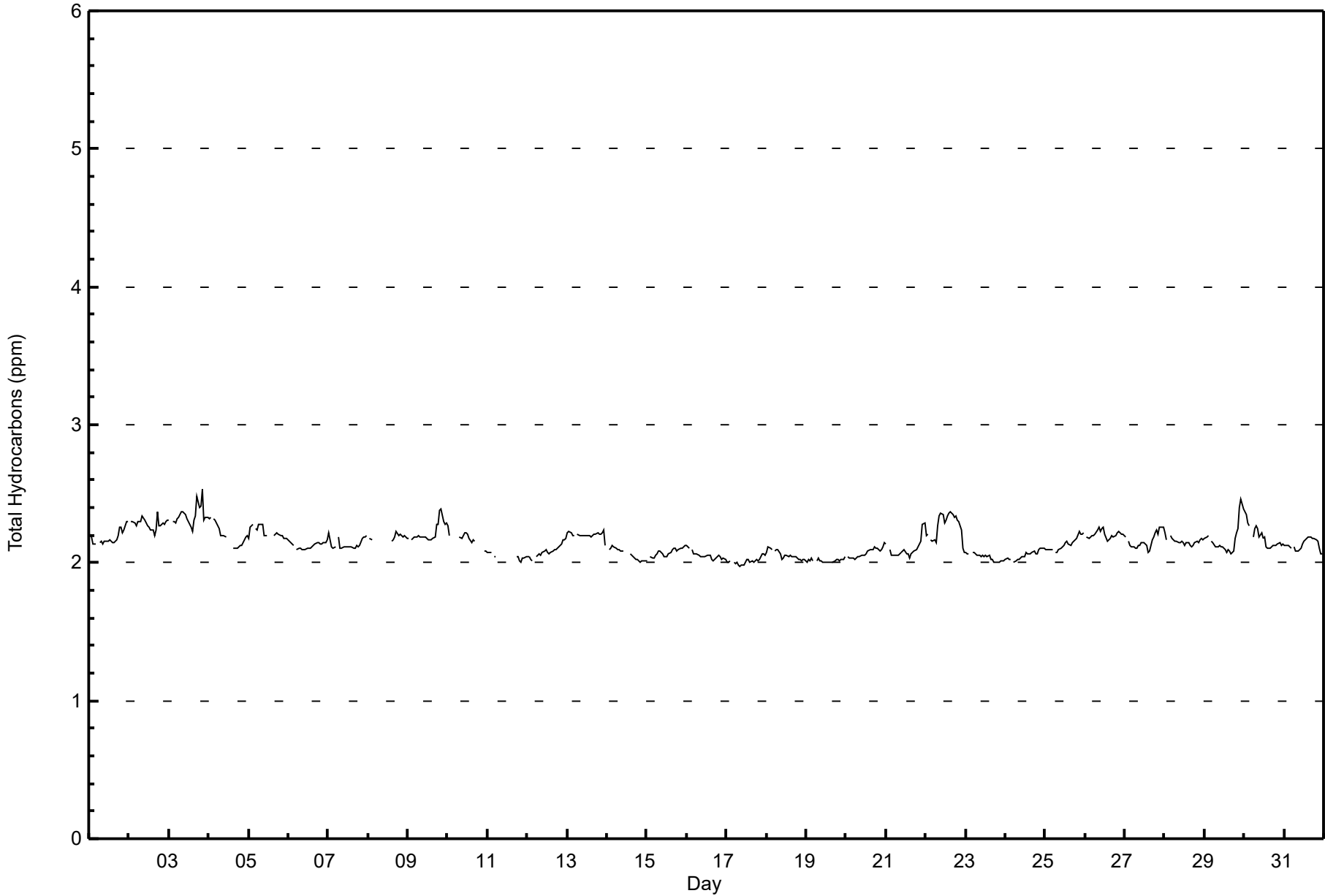
Total Number of Hours: 744







Maximum Value: 2.5 ppm on Dec 3 21:00		Maximum Daily Average: 2.3 ppm on Dec 3		Hours in Service: 744																						
Minimum Value: 2.0 ppm on Dec 17 09:00		Minimum Daily Average: 2.0 ppm on Dec 17		Hours of Data: 673																						
Maximum Diurnal Average: 2.2 ppm at hour 23		Minimum Diurnal Average: 2.1 ppm at hour 15		Hours of Missing Data: 71																						
Monthly Average: 2.14 ppm		Percentiles: P ₁ = 2.0 P ₁₀ = 2.0 Q ₁ = 2.1 Median = 2.1 Q ₃ = 2.2 P ₉₀ = 2.3 P ₉₉ = 2.4		Hours of Calibration: 39																						
				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-Dec	2.2	2.2	2.1	2.1	2.1	Z	2.1	2.2	2.1	2.2	2.2	2.2	2.2	2.1	2.1	2.2	2.2	2.3	2.3	2.2	2.2	2.3	2.3	2.2	2.3	
2-Dec	Z	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	2.4	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	
3-Dec	2.3	Z	2.3	2.3	2.3	2.3	2.3	2.4	2.4	2.4	2.3	2.3	2.3	2.2	2.3	2.3	2.5	2.4	2.4	2.5	2.3	2.3	2.3	2.3	2.5	
4-Dec	2.3	2.3	Z	2.3	2.3	2.3	2.2	2.2	2.2	2.2	C	C	C	C	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2	
5-Dec	2.2	2.3	2.3	Z	2.3	2.2	2.3	2.3	2.3	2.2	2.2	M	M	M	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	
6-Dec	2.2	2.1	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.1	2.2	
7-Dec	2.2	2.2	2.1	2.1	2.1	Z	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.1	2.2	
8-Dec	Z	2.2	2.2	UO	UO	UO	UO	UO	UO	UO	UO	M	M	M	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	
9-Dec	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.4	2.4	2.3	2.3	2.3	2.4	
10-Dec	2.3	2.2	Z	UO	UO	UO	UO	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	UO	UO	UO	UO	UO	2.1	2.1	2.3	
11-Dec	2.1	2.1	2.1	Z	2.0	2.0	UO	UO	UO	UO	2.1	M	M	C	C	C	C	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	
12-Dec	2.0	2.0	2.0	2.0	Z	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.1	2.2	
13-Dec	2.2	2.2	2.2	2.2	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.2	
14-Dec	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	M	M	M	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	
15-Dec	2.0	Z	2.0	2.0	2.0	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	
16-Dec	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.1	
17-Dec	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	2.1	2.1	
18-Dec	2.1	2.1	2.1	2.1	Z	2.1	2.1	2.1	2.1	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	2.1	
19-Dec	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	
20-Dec	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	2.1	2.1	2.1	2.1	2.1	2.1	
21-Dec	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	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.3	2.3	2.1	2.3	
22-Dec	2.2	2.2	Z	2.2	2.2	2.2	2.1	2.3	2.3	2.4	2.4	2.3	2.3	2.3	2.4	2.4	2.4	2.3	2.3	2.3	2.3	2.2	2.1	2.1	2.3	
23-Dec	2.1	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.1	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	
24-Dec	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	2.1	2.1	2.1	2.1	2.1	2.1	2.1	
25-Dec	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	2.2	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	
26-Dec	Z	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	2.2	2.2	2.2	2.2	2.3	
27-Dec	2.2	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	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	
28-Dec	2.2	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.2	2.2	2.2	2.2	
29-Dec	2.2	2.2	2.2	Z	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.4	2.5	2.4	2.5	
30-Dec	2.4	2.4	2.3	2.3	Z	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.4	
31-Dec	2.1	2.1	2.1	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.2	
2.2																								Diurnal Average		
2.4																								Diurnal Maximum		
Z - zerospan C - Calibration M - Maintenance UO - Unstable Operation																										





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Conklin - December 2023

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	129	19.17	19.17
2.1 - 3.0	544	80.83	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 673

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Total Hydrocarbons (THC) - ppm
Conklin - December 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	1	0	0	0	5	7	6	5	8	25	19	6	9	24	11	3	129
2.1 - 3.0	3	2	4	4	4	7	28	73	64	135	112	10	15	51	20	12	544
3.1 - 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	4	2	4	4	9	14	34	78	72	160	131	16	24	75	31	15	673

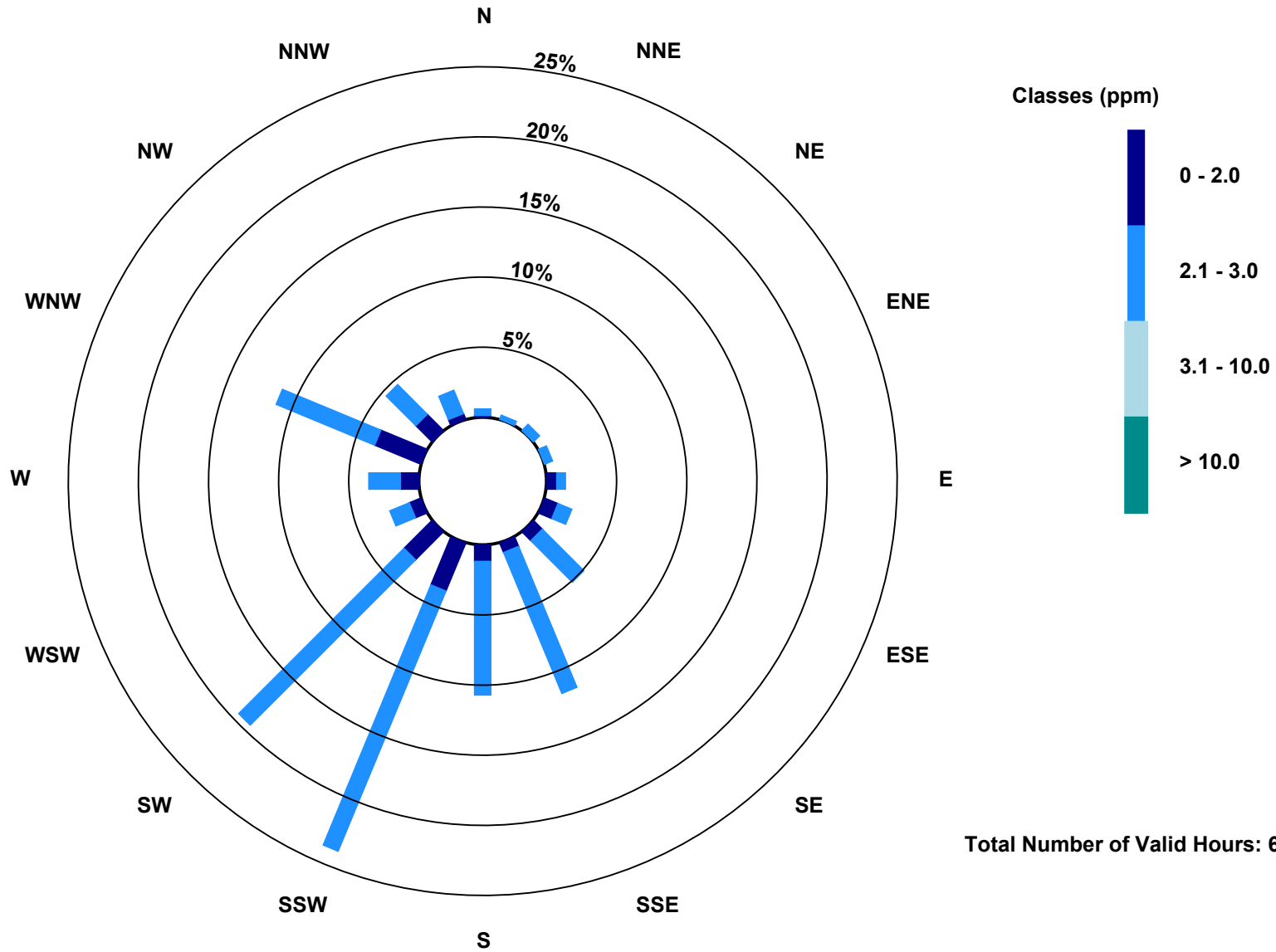
Total Number of Valid Hours: 673

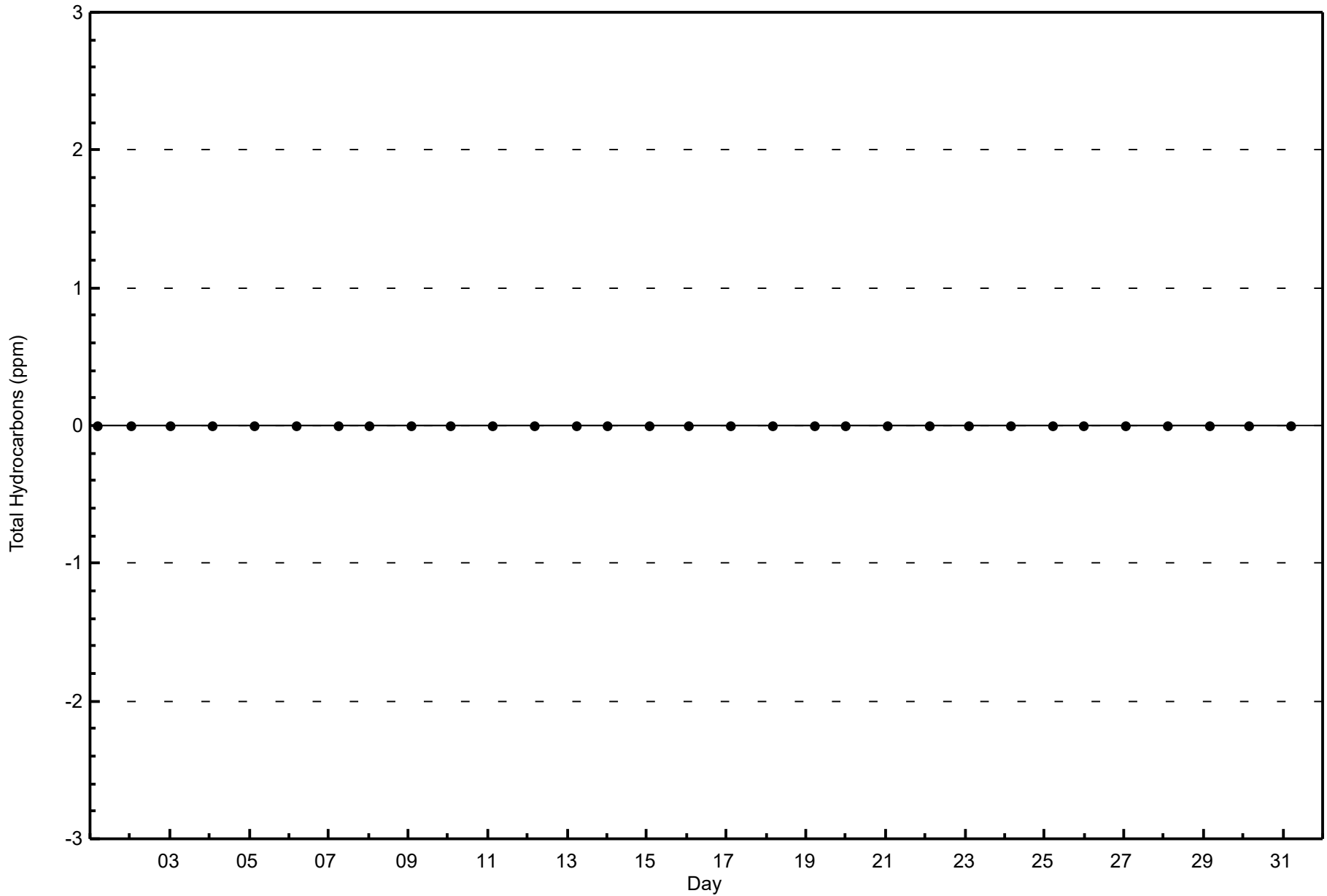
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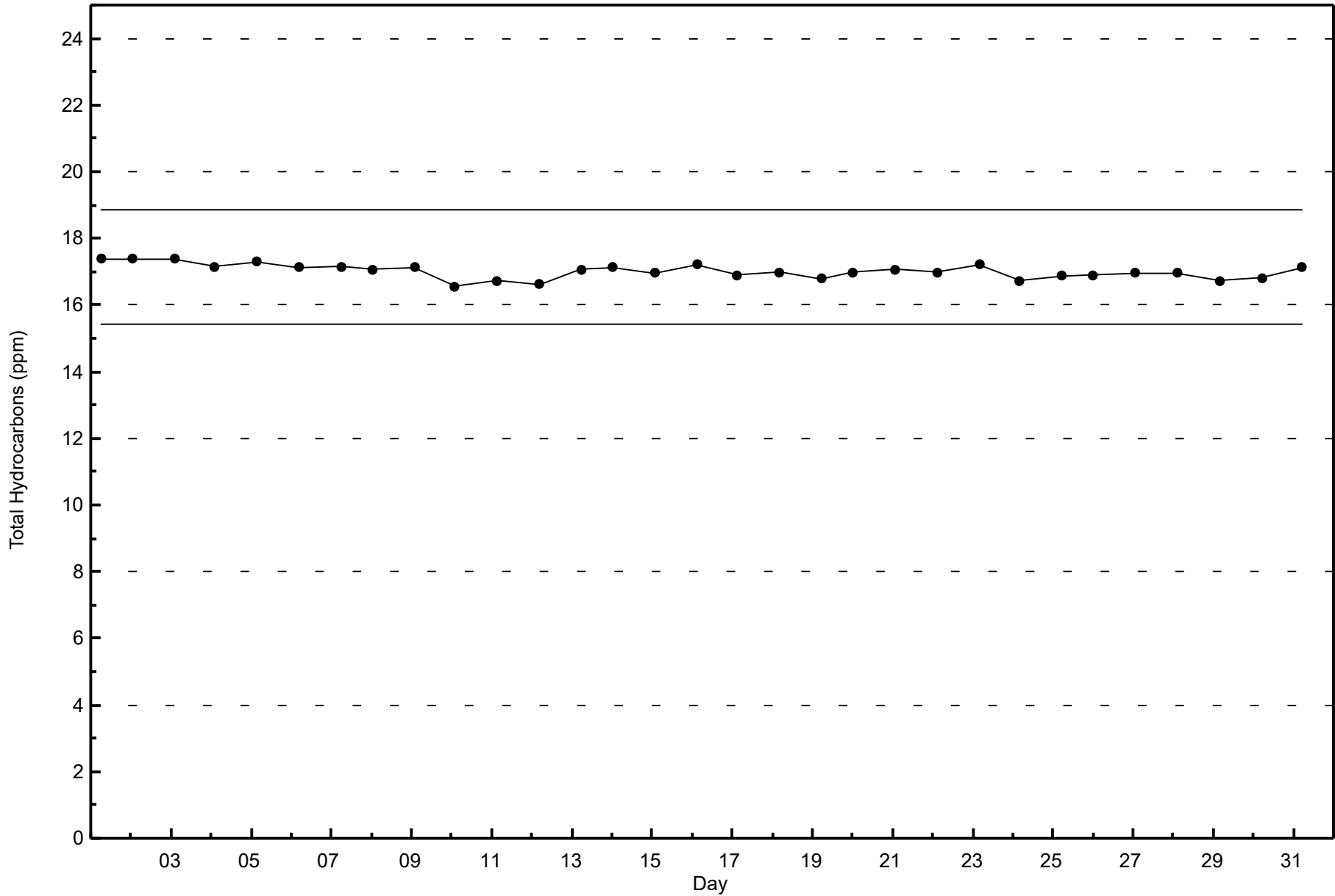


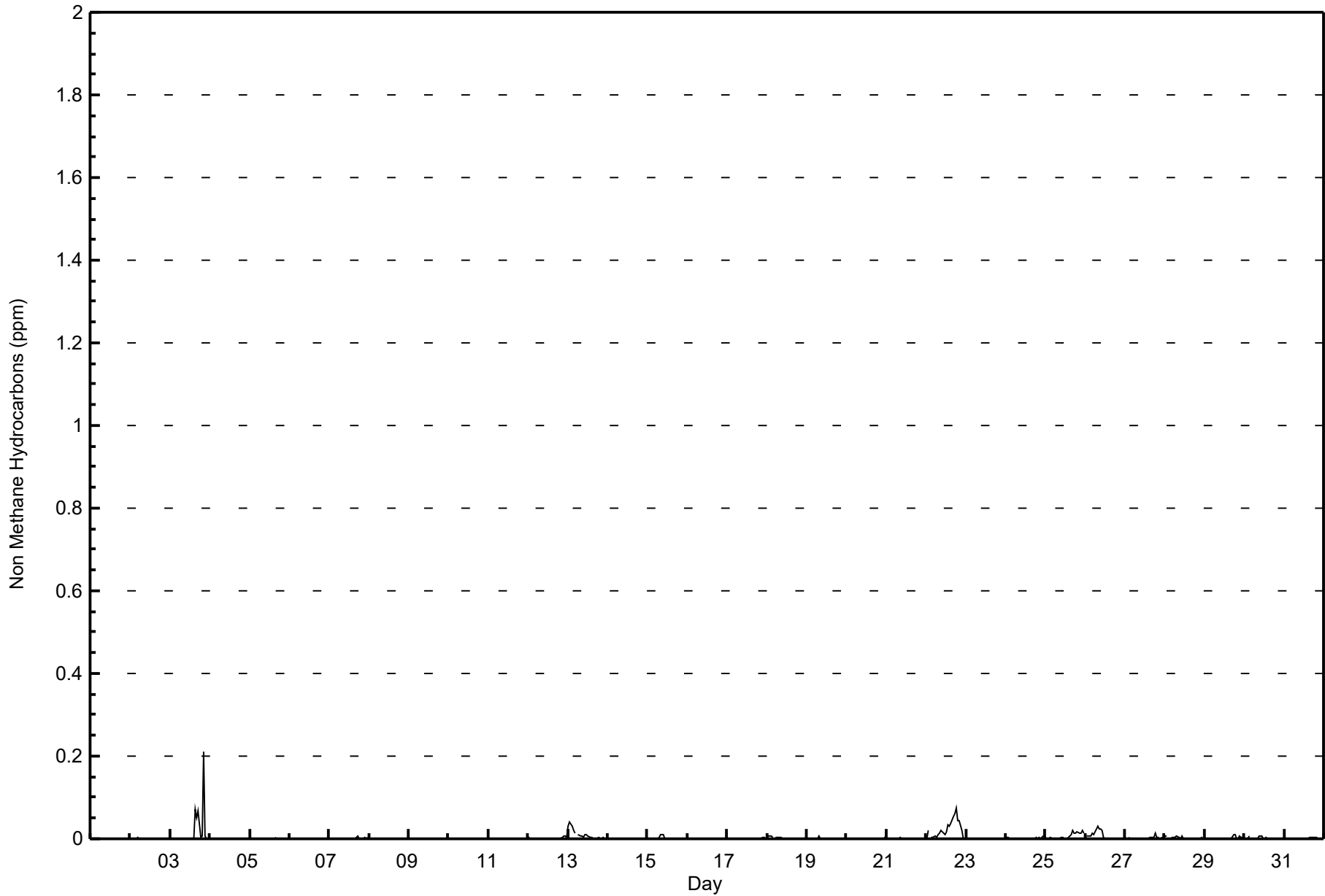
Wood Buffalo Environmental Association
Wind Rose Dec 2023

Total Hydrocarbons (THC) - ppm
Conklin











Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Non Methane Hydrocarbons (NMHC) - ppm
Conklin - December 2023

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 0.005	600	89.15	89.15
0.006 - 0.05	68	10.10	99.26
0.06 - 0.1	4	0.59	99.85
> 0.1	1	0.15	100.00

Total Number of Valid Hours: 673

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Non Methane Hydrocarbons (NMHC) - ppm
Conklin - December 2023**

Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 0.005	2	1	2	3	6	14	27	58	68	148	123	15	23	74	27	9	600
0.006 - 0.05	2	1	1	1	3	0	6	18	4	12	8	1	1	1	4	5	68
0.06 - 0.1	0	0	1	0	0	0	1	1	0	0	0	0	0	0	0	1	4
> 0.1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1
Totals	4	2	4	4	9	14	34	78	72	160	131	16	24	75	31	15	673

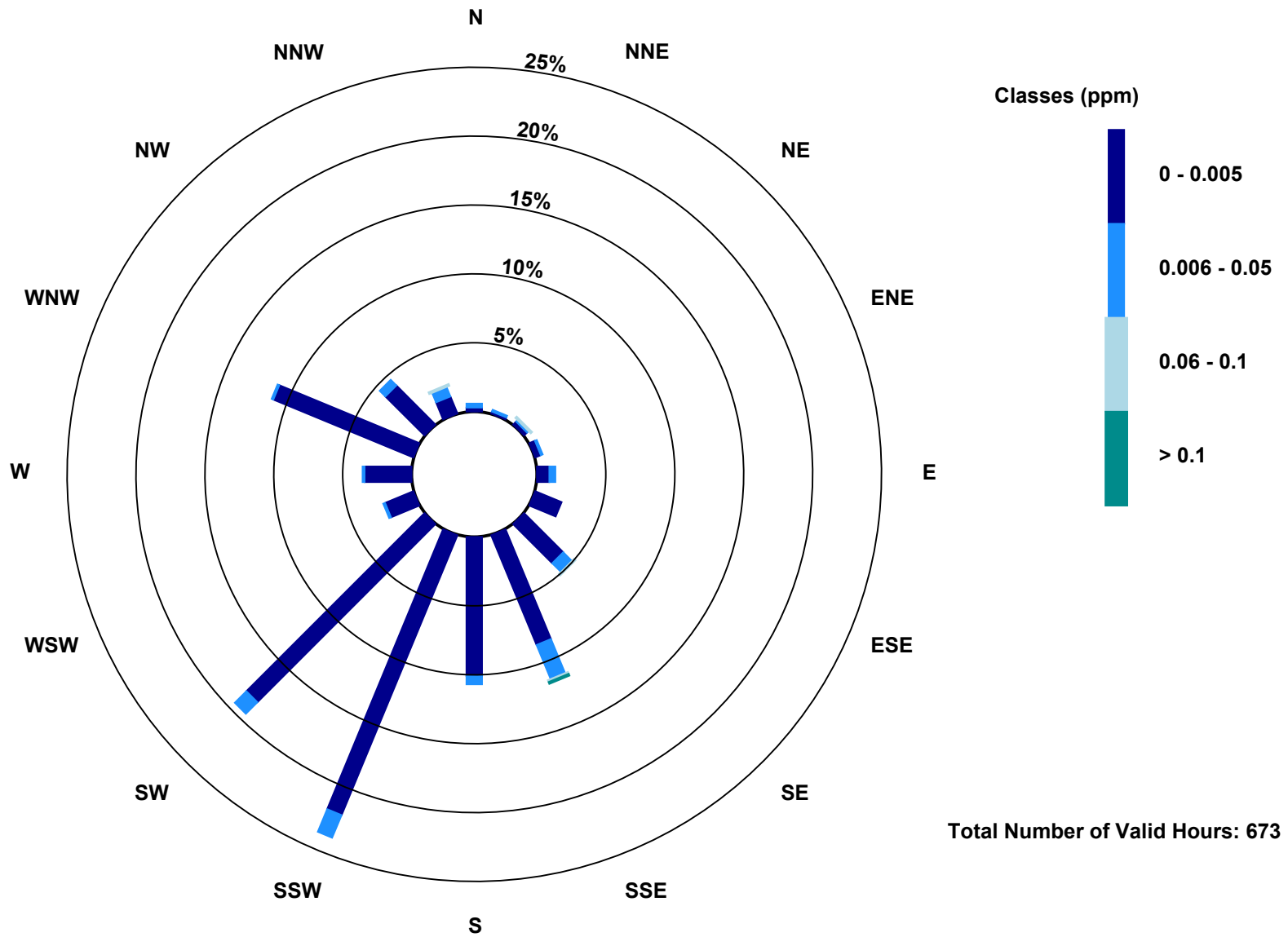
Total Number of Valid Hours: 673

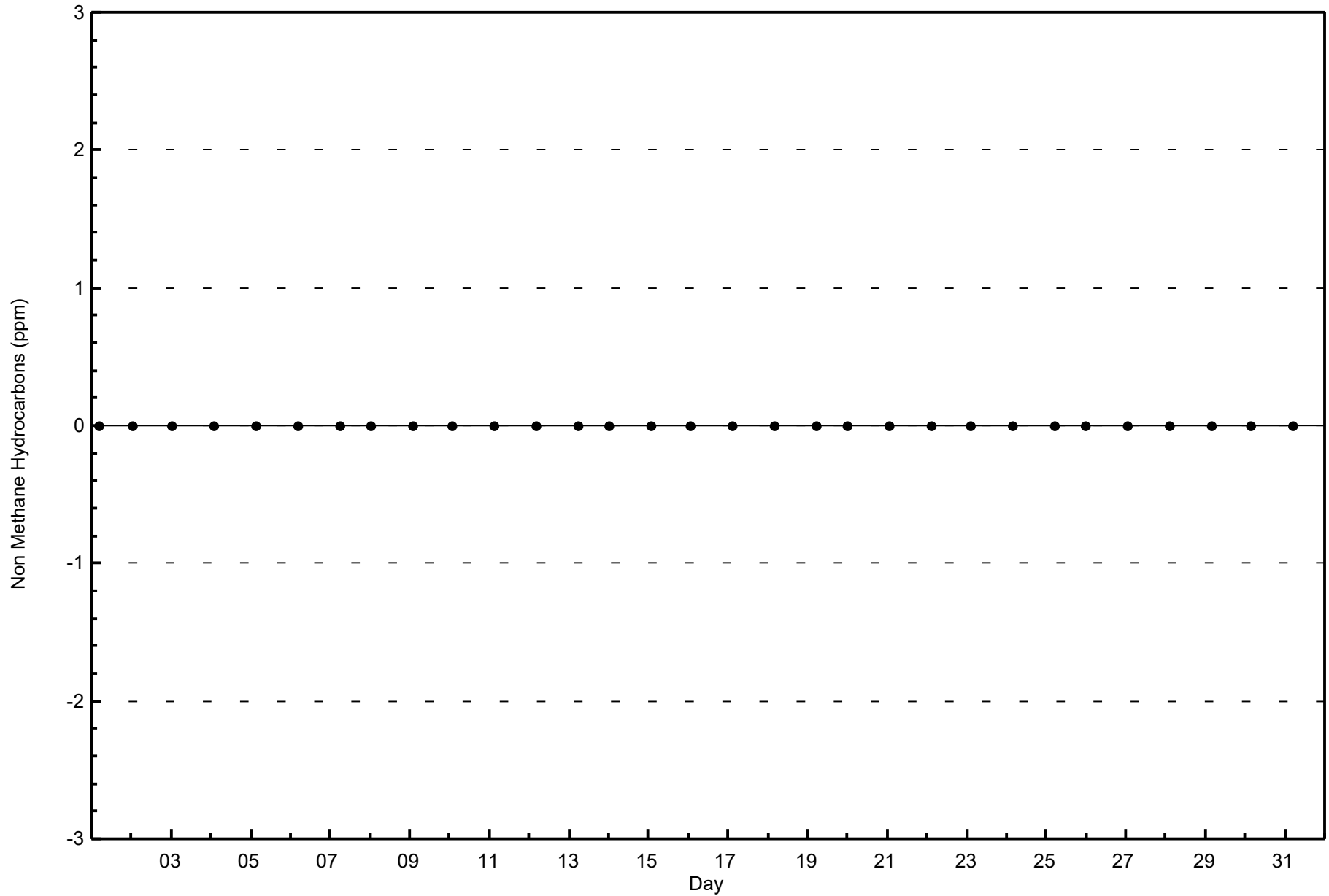
Total Number of Hours: 744

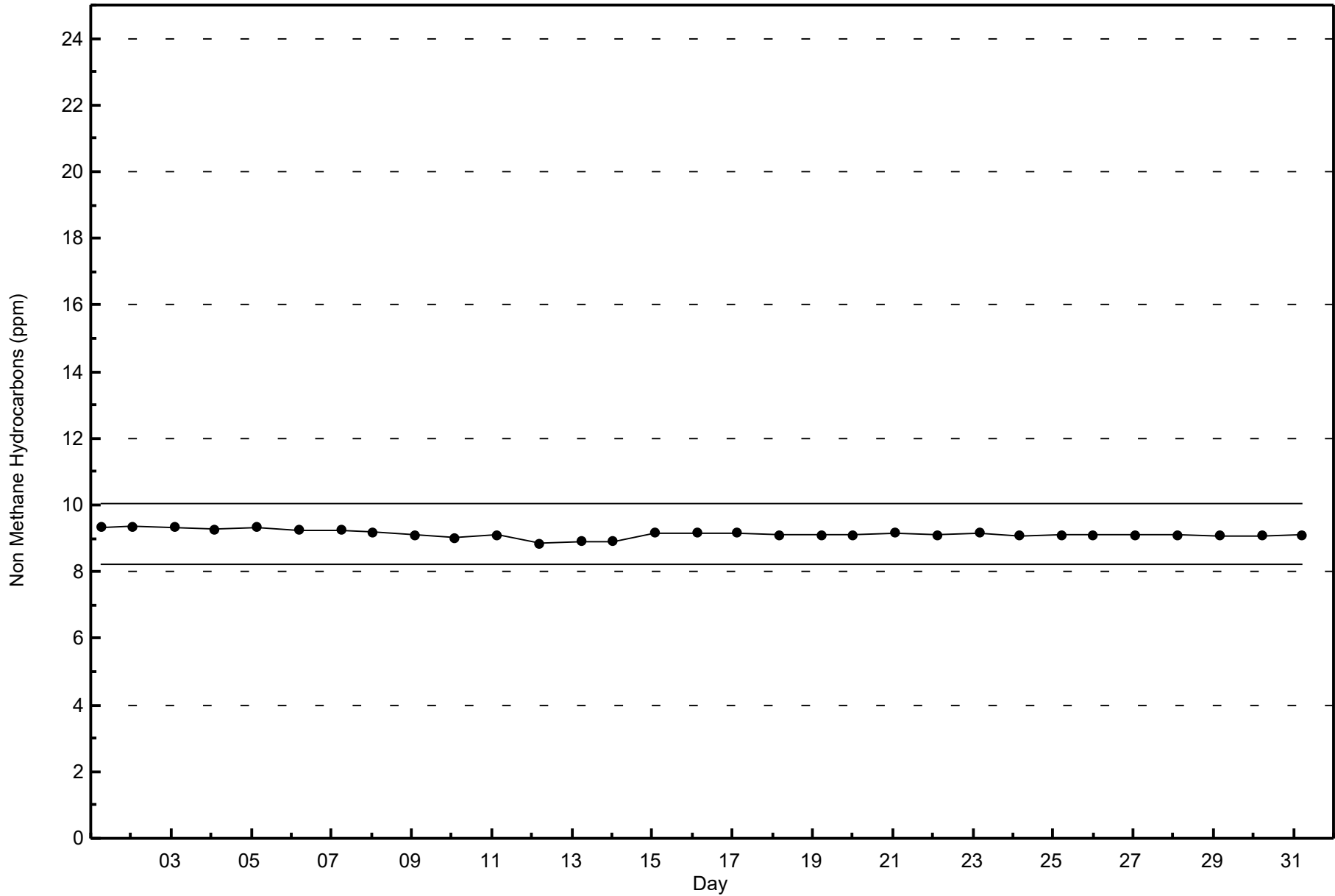


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Non Methane Hydrocarbons (NMHC) - ppm
Conklin







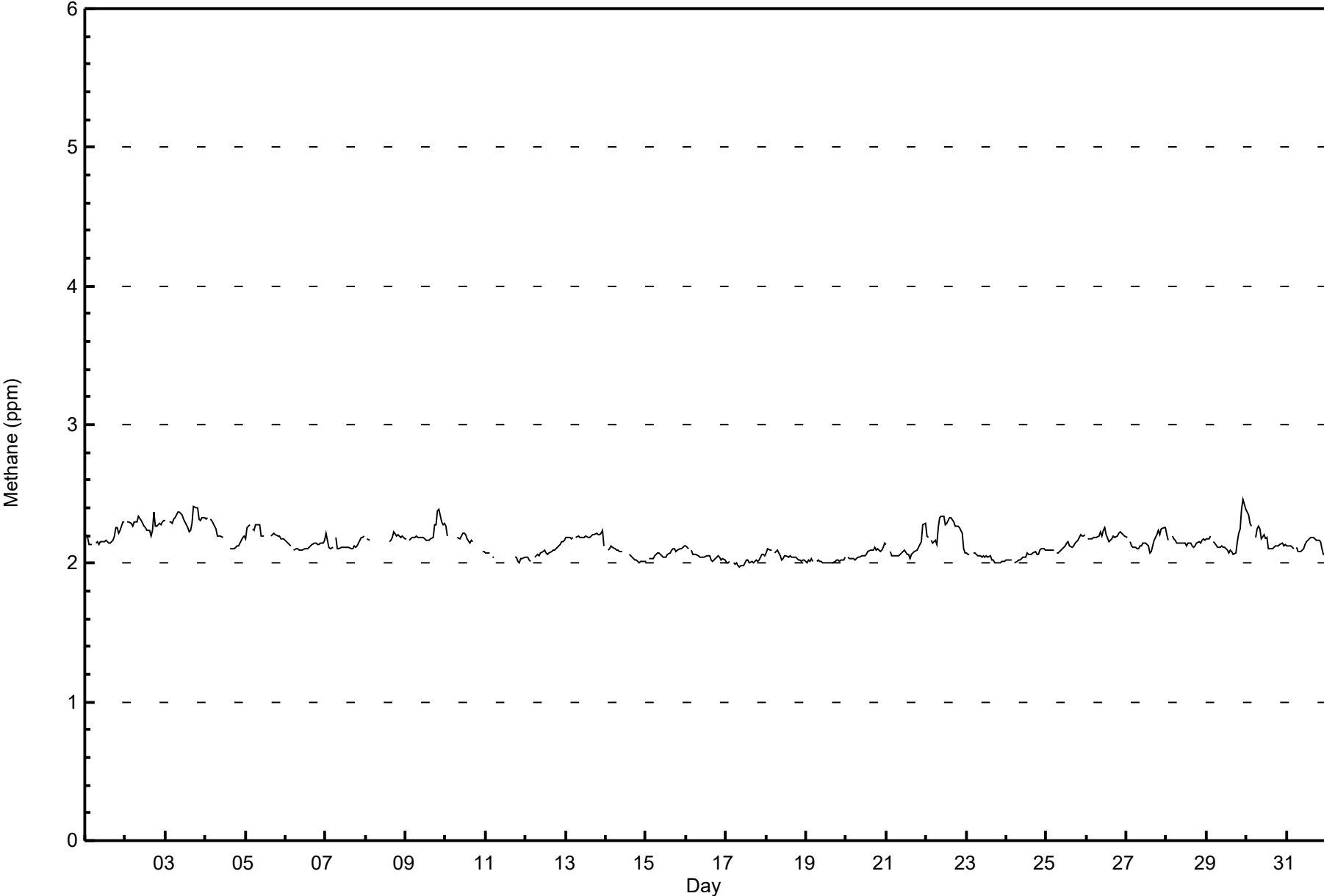


Wood Buffalo Environmental Association

Summary of Hour Averages

Methane (CH₄) - ppm
Conklin - December 2023

Number of Exceedences (AAAQO):		1-hr: 0		24-hr: 0		Hours in Service:		744																																										
Maximum Value: 2.5 ppm on Dec 29 23:00		Maximum Daily Average: 2.3 ppm on Dec 3				Hours of Data:		673																																										
Minimum Value: 2.0 ppm on Dec 17 09:00		Minimum Daily Average: 2.0 ppm on Dec 17				Hours of Missing Data:		71																																										
Maximum Diurnal Average: 2.2 ppm at hour 23		Minimum Diurnal Average: 2.1 ppm at hour 15				Hours of Calibration:		39																																										
Monthly Average: 2.14 ppm		Percentiles: P ₁ = 2.0 P ₁₀ = 2.0 Q ₁ = 2.1 Median = 2.1 Q ₃ = 2.2 P ₉₀ = 2.3 P ₉₉ = 2.4				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-Dec	2.2	2.2	2.1	2.1	2.1	Z	2.1	2.2	2.1	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.2	2.2	2.3	2.3	2.2	2.2	2.3	2.3	2.2	2.3																								
2-Dec	Z	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	2.2	2.4	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3																								
3-Dec	2.3	Z	2.3	2.3	2.3	2.3	2.3	2.4	2.4	2.4	2.3	2.3	2.3	2.3	2.2	2.2	2.3	2.4	2.4	2.4	2.3	2.3	2.3	2.3	2.3	2.4																								
4-Dec	2.3	2.3	Z	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	C	C	C	C	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2																								
5-Dec	2.2	2.3	2.3	Z	2.3	2.2	2.3	2.3	2.3	2.2	2.2	M	M	M	M	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3																								
6-Dec	2.2	2.1	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.1	2.2																								
7-Dec	2.2	2.2	2.1	2.1	2.1	Z	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.1	2.2																								
8-Dec	Z	2.2	2.2	UO	UO	UO	UO	UO	UO	UO	UO	M	M	M	M	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2																								
9-Dec	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.4	2.4	2.3	2.3	2.3	2.4																								
10-Dec	2.3	2.2	Z	UO	UO	UO	UO	UO	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	UO	UO	UO	UO	UO	2.1	2.1	2.3																								
11-Dec	2.1	2.1	2.1	Z	2.0	2.0	UO	UO	UO	UO	2.1	M	M	C	C	C	C	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1																								
12-Dec	2.0	2.0	2.0	2.0	Z	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.1	2.2																								
13-Dec	2.2	2.2	2.2	2.2	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.2																								
14-Dec	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	M	M	M	M	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1																								
15-Dec	2.0	Z	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1																								
16-Dec	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	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.1																								
17-Dec	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	2.1	2.1																								
18-Dec	2.1	2.1	2.1	2.1	Z	2.1	2.1	2.1	2.1	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	2.1																								
19-Dec	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																								
20-Dec	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	2.1	2.1	2.1	2.1	2.1	2.1	2.1																								
21-Dec	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	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.3	2.3	2.1	2.3																								
22-Dec	2.2	2.2	Z	2.2	2.2	2.2	2.1	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	2.1	2.1	2.2	2.3																								
23-Dec	2.1	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.1	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	2.0	2.1																								
24-Dec	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	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1																								
25-Dec	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	2.2	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.1	2.2																								
26-Dec	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3																								
27-Dec	2.2	Z	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3																								
28-Dec	2.2	2.2	Z	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.2	2.2	2.2	2.2																								
29-Dec	2.2	2.2	2.2	Z	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.4	2.5	2.4	2.5																								
30-Dec	2.4	2.4	2.3	2.3	Z	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.4																								
31-Dec	2.1	2.1	2.1	2.1	2.1	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.2																								
																								2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	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	Diurnal Average			
																								2.4	2.4	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	2.3	2.3	2.4	2.4	2.4	2.4	2.4	2.4	2.5	2.4	Diurnal Maximum	
Z - zerospan																								C - Calibration				M - Maintenance				UO - Unstable Operation																		





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Methane (CH₄) - ppm
Conklin - December 2023**

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	129	19.17	19.17
2.1 - 3.0	544	80.83	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 673

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Methane (CH₄) - ppm
Conklin - December 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	1	0	0	0	5	7	6	5	8	25	19	6	9	24	11	3	129
2.1 - 3.0	3	2	4	4	4	7	28	73	64	135	112	10	15	51	20	12	544
3.1 - 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	4	2	4	4	9	14	34	78	72	160	131	16	24	75	31	15	673

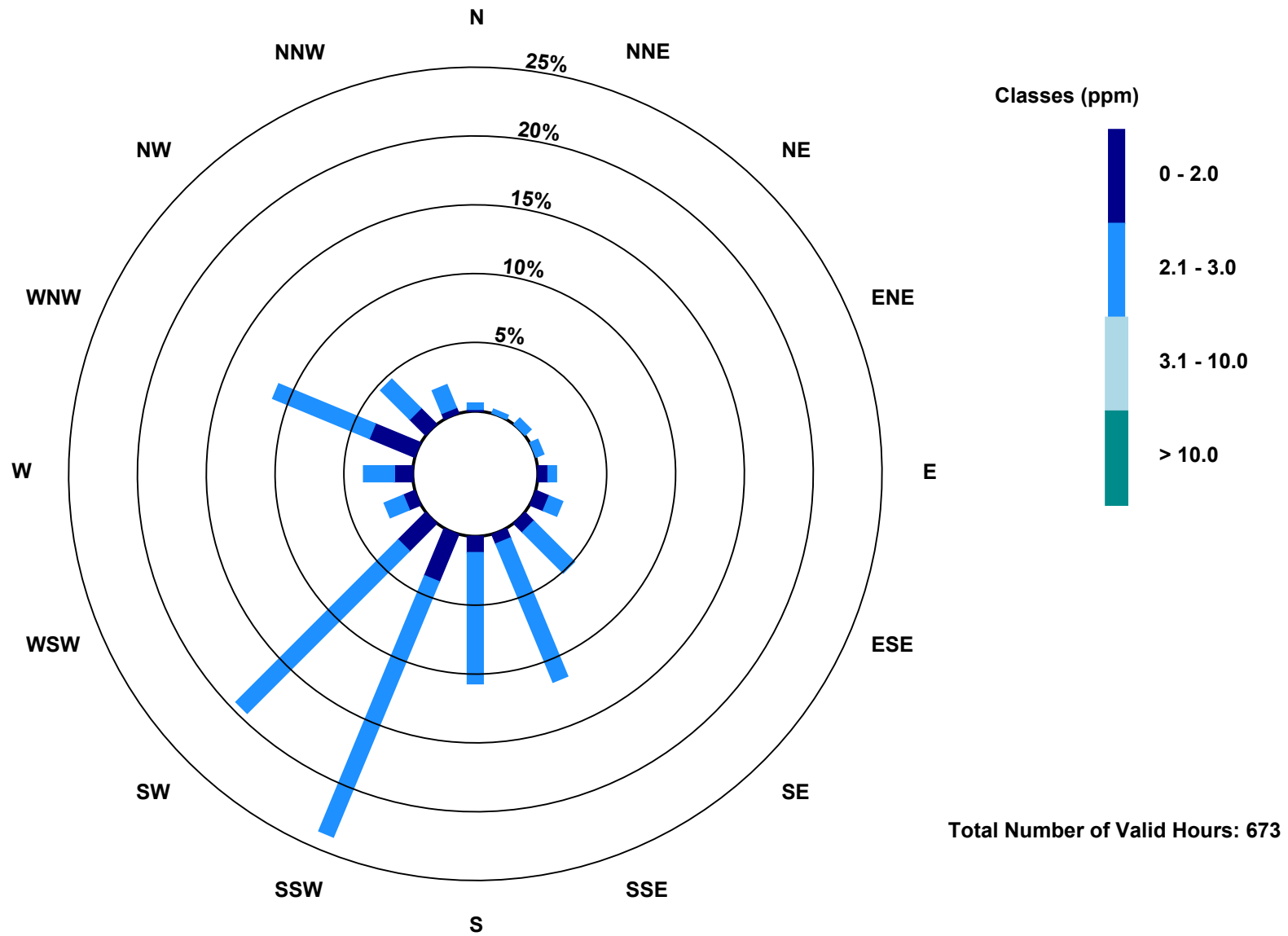
Total Number of Valid Hours: 673

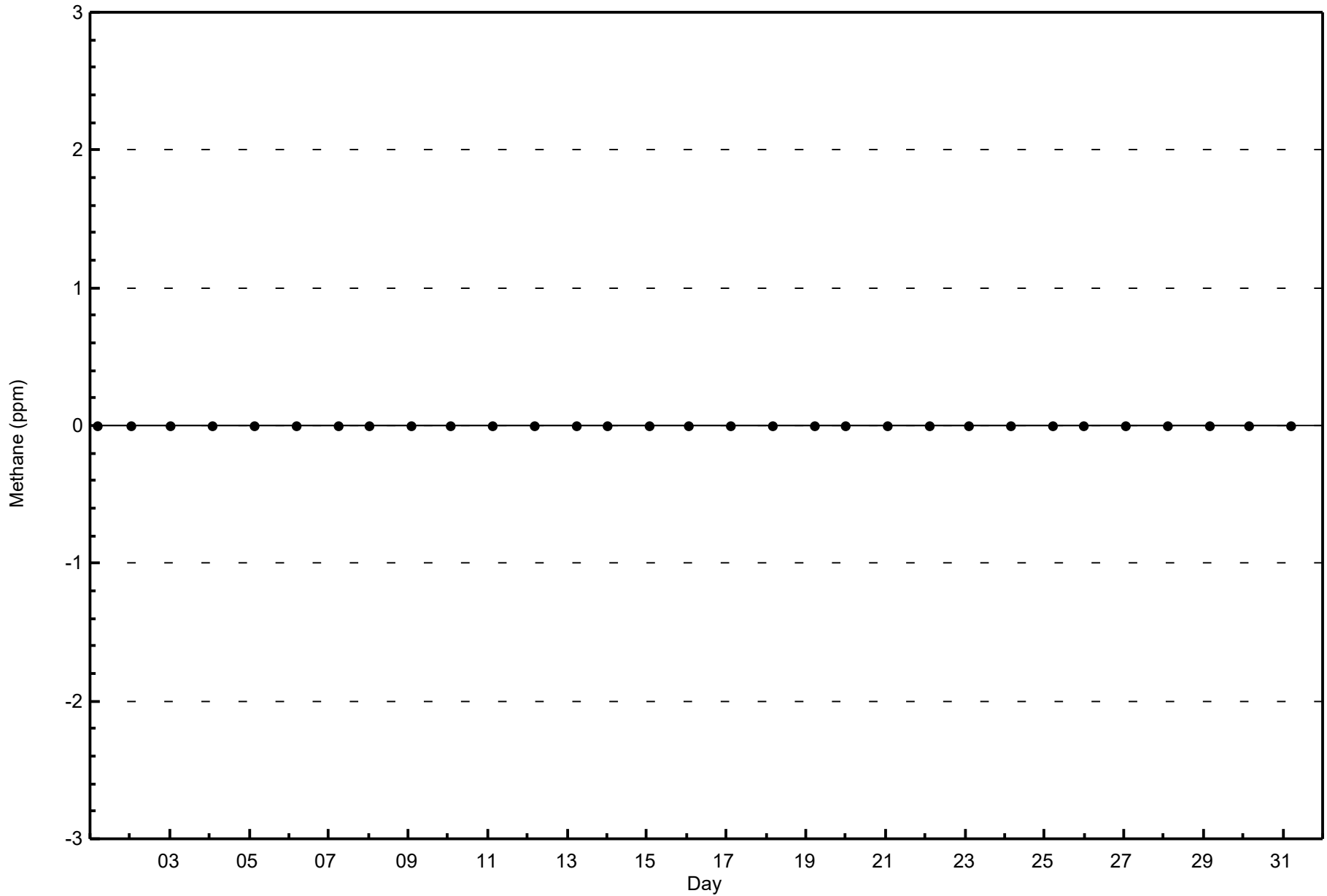
Total Number of Hours: 744

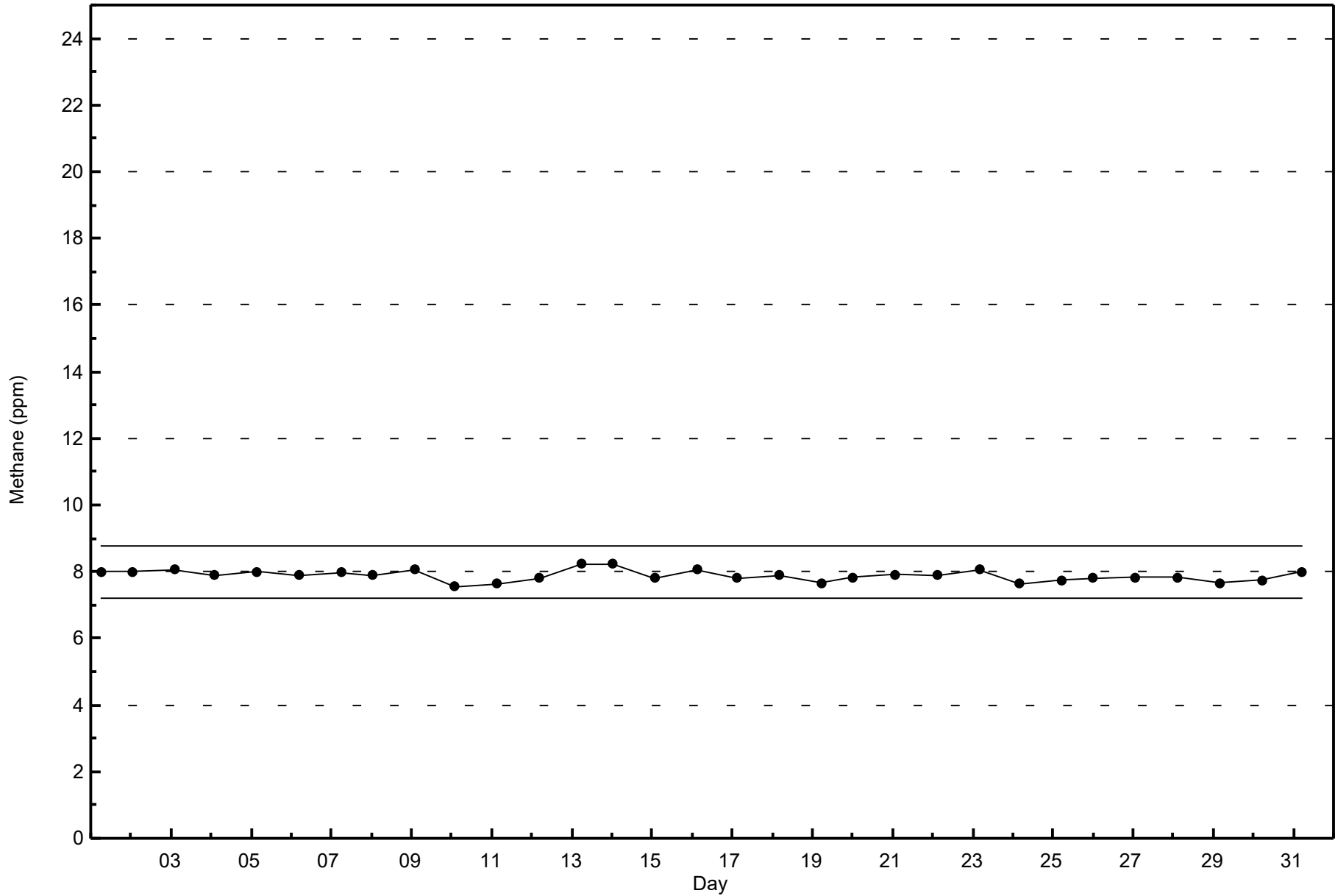


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Methane (CH₄) - ppm
Conklin









Wood Buffalo Environmental Association
Summary of Hour Averages

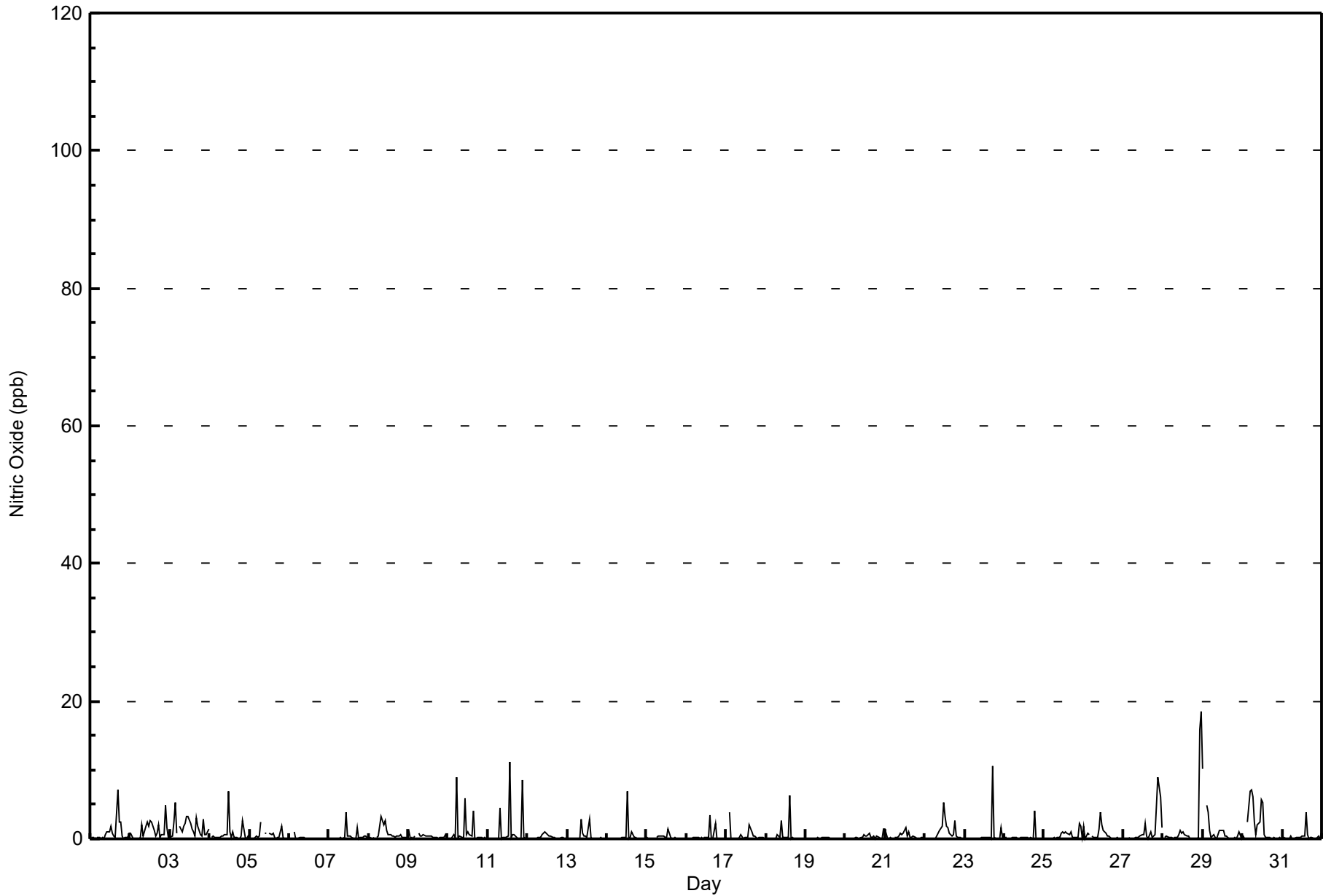
Nitric Oxide (NO) - ppb
Conklin - December 2023

Maximum Value: 18.5 ppb on Dec 29 00:00		Maximum Daily Average: 1.9 ppb on Dec 30		Hours in Service: 744																											
Minimum Value: 0.0 ppb on Dec 6 18:00		Minimum Daily Average: 0.1 ppb on Dec 19		Hours of Data: 705																											
Maximum Diurnal Average: 1.3 ppb at hour 12		Minimum Diurnal Average: 0.1 ppb at hour 2		Hours of Missing Data: 39																											
Monthly Average: 0.70 ppb		Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.1 Median = 0.2 Q ₃ = 0.5 P ₉₀ = 1.9 P ₉₉ = 8.5		Hours of Calibration: 37																											
				Percent Operational Time: 99.7																											
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum					
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24							
1-Dec	0.2	0.1	0.2	Z	0.1	0.1	0.1	0.1	0.1	0.5	0.9	1.0	1.8	0.9	0.3	0.2	7.1	2.4	2.5	0.4	0.0	0.2	0.3	0.8	0.9	7.1					
2-Dec	0.7	0.4	0.1	0.1	Z	0.1	0.1	1.9	0.3	1.7	2.5	1.9	2.7	2.4	1.2	0.4	0.8	2.0	0.1	0.6	0.6	4.8	1.5	0.3	1.2	4.8					
3-Dec	0.3	0.3	2.5	5.3	0.7	Z	1.8	1.0	1.9	2.2	3.3	3.3	2.3	1.4	0.9	0.4	3.0	1.8	0.6	0.5	2.9	0.5	0.7	1.4	1.7	5.3					
4-Dec	Z	0.2	0.3	0.2	0.2	0.2	0.2	0.5	0.5	0.7	0.7	7.0	1.1	0.2	1.0	0.1	0.2	0.1	0.1	0.5	2.6	0.2	0.1	0.4	0.7	7.0					
5-Dec	0.1	Z	0.0	0.2	0.3	0.1	0.4	2.5	M	0.9	0.8	M	0.9	0.7	0.8	0.2	0.1	0.2	0.2	1.7	0.1	0.1	0.1	0.1	0.5	2.5					
6-Dec	0.1	0.0	Z	0.9	0.1	0.0	0.2	0.2	0.1	0.1	0.1	C	C	C	C	C	C	0.0	0.0	0.0	0.0	0.0	0.0	0.1	--	0.9					
7-Dec	0.0	0.0	0.0	Z	0.0	0.0	0.1	0.1	0.0	0.2	3.9	0.3	0.5	0.4	0.3	0.1	0.0	1.7	0.1	0.1	0.2	0.4	0.4	0.2	0.4	3.9					
8-Dec	0.3	0.2	0.1	0.1	Z	0.1	0.3	3.3	2.7	2.1	2.6	1.1	0.6	0.6	0.4	0.4	0.3	0.3	0.4	0.6	0.3	0.2	0.2	0.1	0.8	3.3					
9-Dec	1.0	0.1	0.3	0.1	0.4	Z	0.8	0.5	0.3	0.6	0.5	0.5	0.4	0.3	0.5	0.3	0.1	0.3	0.1	0.3	0.3	0.2	0.7	0.3	0.4	1.0					
10-Dec	Z	0.0	0.0	0.6	0.3	8.9	0.3	0.4	0.2	0.3	5.9	0.6	0.9	0.5	0.3	4.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	1.1	8.9					
11-Dec	0.0	Z	0.0	0.0	0.0	0.0	0.0	4.4	0.1	0.2	0.2	0.2	0.3	11.2	0.2	0.6	0.7	0.2	0.1	0.1	0.1	8.6	0.3	0.0	1.2	11.2					
12-Dec	0.0	0.1	Z	0.1	0.0	0.1	0.1	0.2	0.2	0.7	1.0	0.8	0.7	0.5	0.4	0.2	0.2	0.0	0.1	0.1	0.1	0.2	0.1	0.1	0.3	1.0					
13-Dec	0.1	0.0	0.1	Z	0.0	0.0	0.0	0.0	2.8	0.8	0.4	0.5	0.3	2.9	0.2	0.1	0.0	0.0	0.1	0.0	0.1	0.1	0.0	0.0	0.4	2.9					
14-Dec	0.1	0.1	0.1	0.1	Z	0.1	0.1	0.1	0.1	0.1	0.2	0.2	6.9	0.1	0.1	1.0	0.1	0.1	0.1	0.1	0.0	0.1	0.1	0.1	0.4	6.9					
15-Dec	0.2	0.1	0.1	0.1	0.0	Z	0.2	0.3	0.5	0.4	0.4	0.3	0.2	1.5	0.2	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.2	1.5					
16-Dec	Z	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.0	0.1	0.1	0.2	0.3	0.2	3.4	0.0	0.0	2.3	0.1	0.0	0.0	0.0	0.0	0.1	0.3	3.4					
17-Dec	0.1	Z	3.8	0.1	0.0	0.0	0.1	0.0	0.1	0.5	0.1	0.1	0.1	0.1	1.9	1.0	0.5	0.4	0.2	0.1	0.1	0.2	0.1	0.1	0.4	3.8					
18-Dec	0.1	0.0	Z	0.0	0.0	0.0	0.0	0.5	0.1	2.6	0.2	0.3	0.2	0.2	6.3	0.1	0.2	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.5	6.3					
19-Dec	0.0	0.1	0.0	Z	0.0	0.0	0.0	0.1	0.0	0.1	0.1	0.1	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2					
20-Dec	0.0	0.0	0.0	0.0	Z	0.1	0.2	0.2	0.1	0.2	0.3	0.7	0.4	0.4	0.8	0.2	0.2	0.4	0.1	0.4	0.1	0.1	0.0	1.3	0.3	1.3					
21-Dec	1.4	0.0	0.1	0.1	0.1	Z	0.1	0.3	0.3	0.7	0.6	0.7	1.6	0.3	1.1	0.1	0.1	0.4	0.2	0.1	0.1	0.1	0.1	0.2	0.4	1.6					
22-Dec	Z	0.0	0.0	0.0	0.0	0.0	0.4	0.7	1.3	1.9	5.3	3.3	1.8	1.6	0.9	0.4	0.6	2.7	0.4	0.2	0.2	0.0	0.0	0.0	0.9	5.3					
23-Dec	0.0	Z	0.0	0.0	0.1	0.1	0.0	0.0	0.1	0.1	0.1	0.2	0.2	0.2	0.1	0.1	10.5	0.1	0.0	0.1	0.1	1.6	0.2	0.6	10.5						
24-Dec	0.1	0.2	Z	0.0	0.1	0.1	0.2	0.3	0.1	0.1	0.2	0.2	0.3	0.2	0.1	0.1	0.2	0.1	4.0	0.1	0.0	0.0	0.0	0.0	0.3	4.0					
25-Dec	0.0	0.0	0.0	Z	0.0	0.0	0.2	0.0	0.1	0.3	0.7	0.9	0.8	1.1	0.7	0.7	1.0	0.1	0.3	0.1	0.2	2.2	1.9	0.2	0.5	2.2					
26-Dec	1.8	0.1	0.9	0.7	Z	0.4	0.2	0.3	0.3	1.4	3.8	2.0	1.2	0.8	0.5	0.3	0.1	0.0	0.0	0.1	0.2	0.0	0.0	0.1	0.7	3.8					
27-Dec	0.0	0.0	0.0	0.0	0.1	Z	0.1	0.3	0.3	0.2	0.3	0.7	0.5	2.1	0.4	0.1	1.1	0.3	0.3	0.6	4.8	9.0	6.2	1.5	1.3	9.0					
28-Dec	Z	0.1	0.4	0.1	0.2	0.2	0.1	0.2	0.1	0.6	1.1	0.8	0.9	0.7	0.4	0.3	0.1	0.1	0.1	0.1	0.1	0.2	15.8	18.5	1.8	18.5					
29-Dec	10.3	Z	4.9	3.9	1.3	0.2	0.5	0.2	0.1	0.7	1.2	1.3	1.2	0.4	0.3	0.2	0.0	0.0	0.0	0.2	0.0	0.3	1.0	0.1	1.2	10.3					
30-Dec	0.3	0.1	Z	2.5	7.0	7.1	6.1	2.5	0.7	2.1	2.5	5.7	5.3	0.6	0.2	0.2	0.2	0.0	0.1	0.2	0.1	0.1	0.1	0.1	1.9	7.1					
31-Dec	0.1	0.2	0.1	Z	0.0	0.4	0.0	0.0	0.2	0.2	0.2	0.2	0.4	0.5	4.0	0.5	0.1	0.1	0.1	0.0	0.0	0.2	0.4	0.1	0.3	4.0					
		0.7	0.1	0.5	0.6	0.4	0.7	0.4	0.7	0.4	0.7	1.2	1.3	1.2	1.1	1.0	0.4	0.6	0.8	0.4	0.2	0.4	0.9	1.0	0.9	Diurnal Average					
		10.3	0.4	4.9	5.3	7.0	8.9	6.1	4.4	2.8	2.6	5.9	7.0	6.9	11.2	6.3	4.1	7.1	10.5	4.0	1.7	4.8	9.0	15.8	18.5	Diurnal Maximum					
Z - zerospan		C - Calibration			M - Maintenance																										



Wood Buffalo Environmental Association
Hourly Averages

Nitric Oxide (NO) - ppb
Conklin - December 2023





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitric Oxide (NO) - ppb
Conklin - December 2023**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	705	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: 705

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitric Oxide (NO) - ppb
Conklin - December 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	5	2	4	4	10	15	36	78	76	160	138	17	33	79	34	14	705
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	5	2	4	4	10	15	36	78	76	160	138	17	33	79	34	14	705

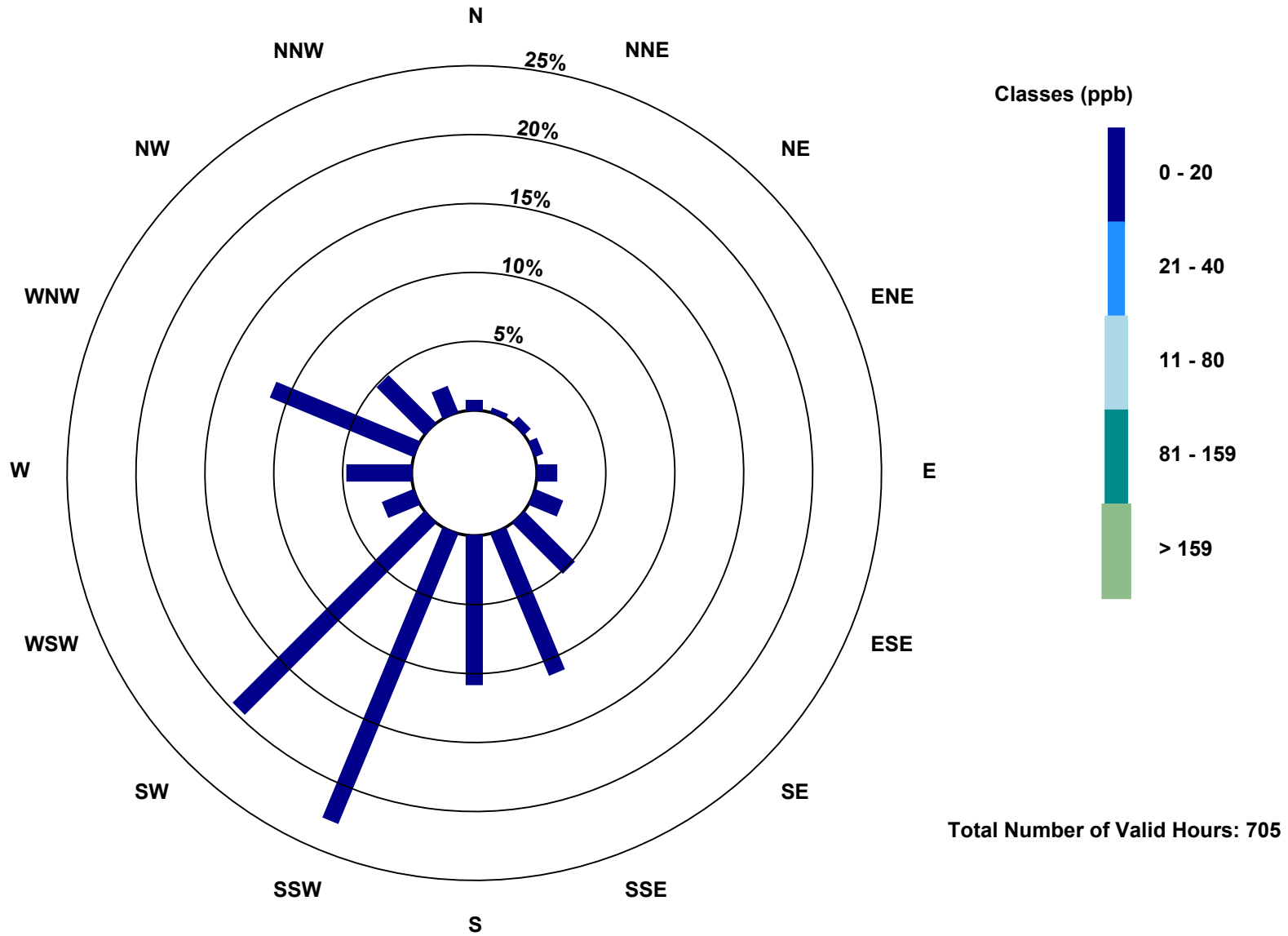
Total Number of Valid Hours: 705

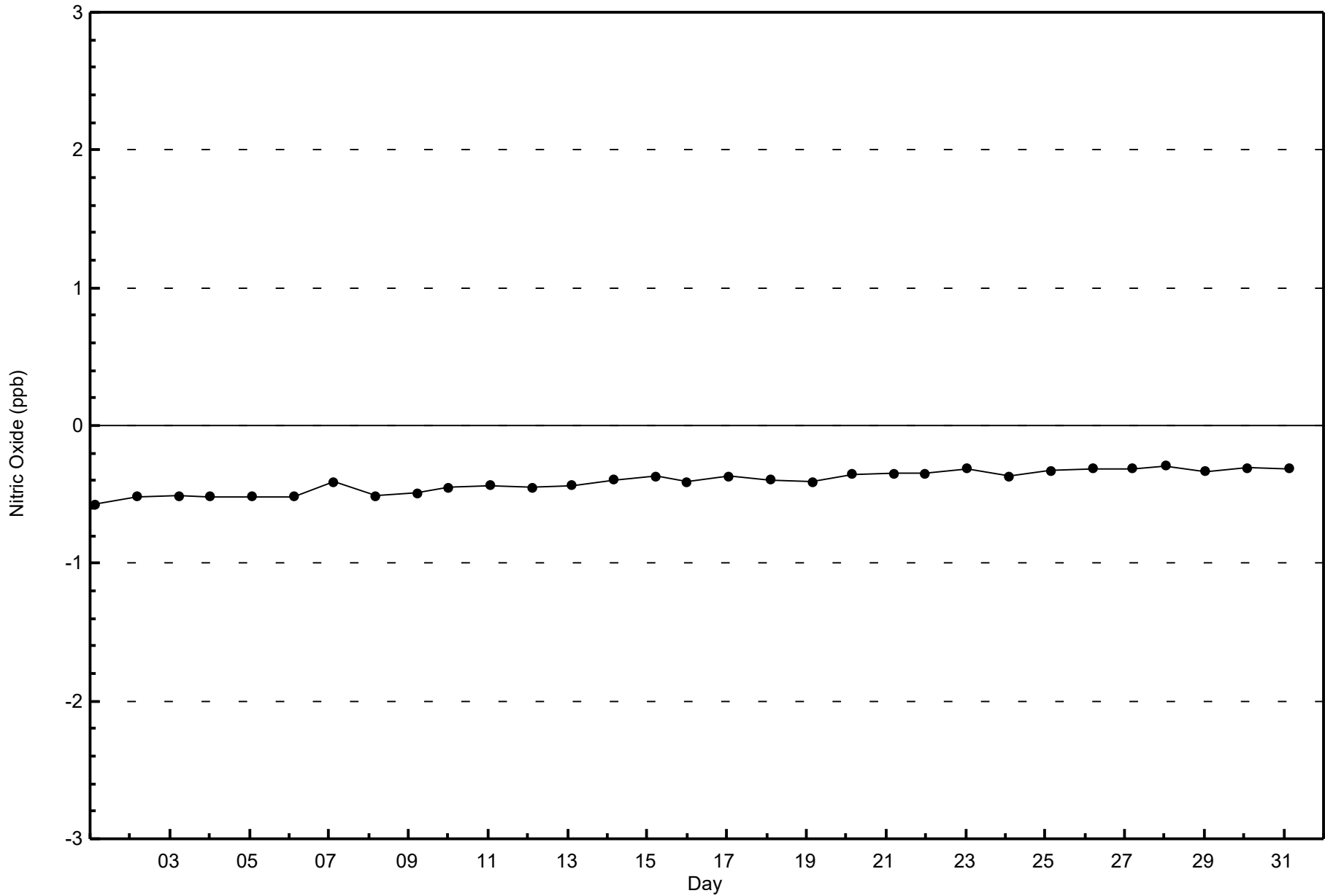
Total Number of Hours: 744

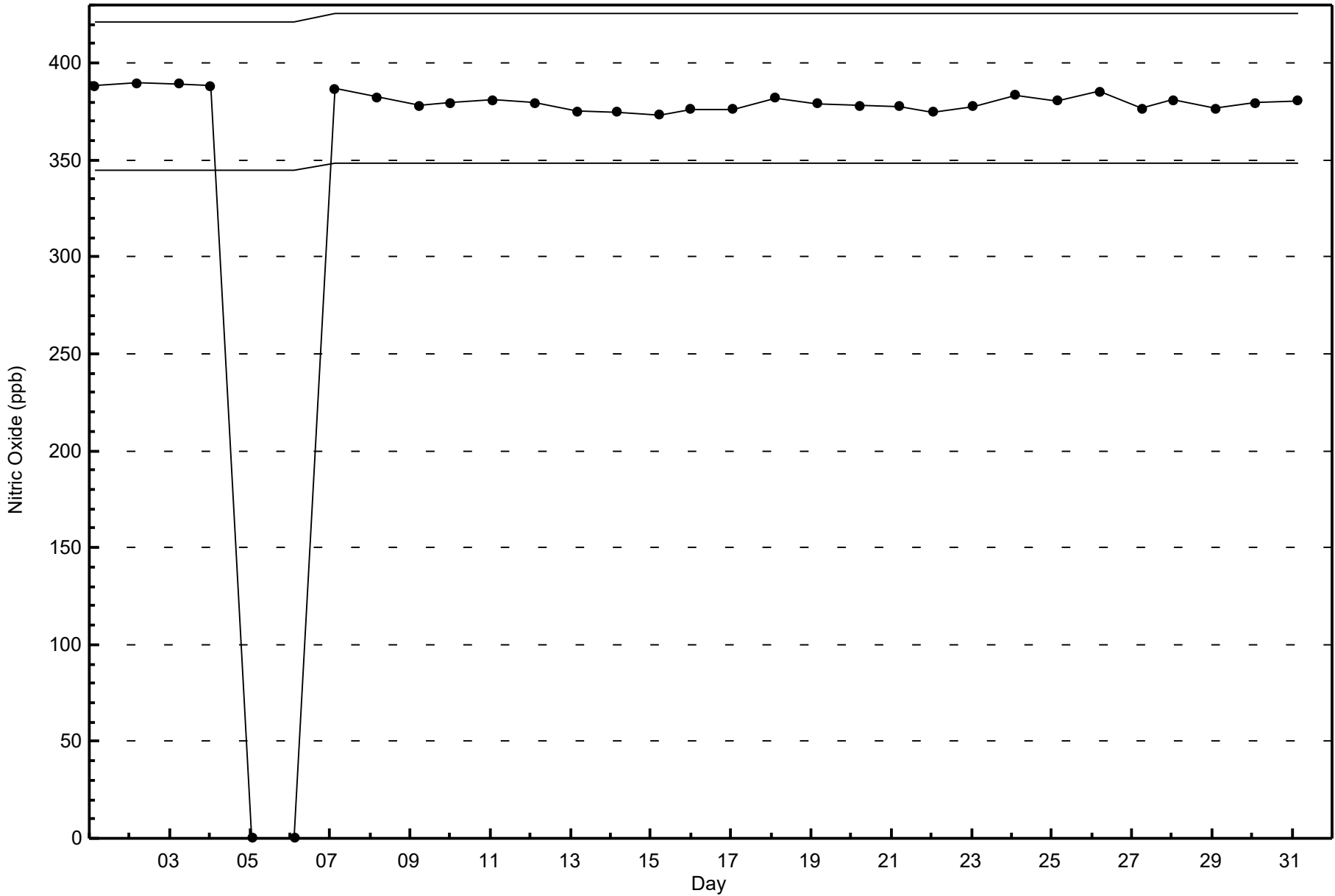


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Nitric Oxide (NO) - ppb
Conklin









Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO₂) - ppb

Conklin - December 2023

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 16.0 ppb on Dec 29 00:00	Maximum Daily Average: 6.7 ppb on Dec 3		Hours of Data:	705
Minimum Value: 0.0 ppb on Dec 23 18:00	Minimum Daily Average: 1.0 ppb on Dec 19		Hours of Missing Data:	39
Maximum Diurnal Average: 4.1 ppb at hour 23	Minimum Diurnal Average: 2.7 ppb at hour 14		Hours of Calibration:	37
Monthly Average: 3.25 ppb	Percentiles: P ₁ = 0.5 P ₁₀ = 1.0 Q ₁ = 1.6 Median = 2.6 Q ₃ = 4.2 P ₉₀ = 6.2 P ₉₉ = 11.8		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-Dec	1.0	1.1	1.3	Z	1.7	1.7	1.5	1.4	1.0	1.2	2.4	2.7	4.9	3.6	3.1	4.1	7.7	9.4	9.9	6.4	4.2	4.5	4.9	4.4	3.7	9.9
2-Dec	4.2	3.3	3.4	3.5	Z	4.3	4.6	7.5	6.7	5.9	6.5	5.7	5.8	6.9	5.9	6.3	8.4	8.1	5.6	6.9	7.5	9.7	13.4	8.7	6.5	13.4
3-Dec	7.7	7.8	8.2	15.5	13.0	Z	8.7	8.1	8.4	6.9	5.8	5.4	5.0	4.6	5.1	4.6	9.9	8.3	6.0	3.7	4.3	2.6	2.5	2.9	6.7	15.5
4-Dec	Z	4.6	6.8	6.4	6.0	5.1	4.5	3.8	3.4	3.1	2.5	2.0	3.2	1.5	2.6	1.8	2.3	1.6	1.4	2.0	3.6	1.7	1.3	1.6	3.2	6.8
5-Dec	1.4	Z	1.2	1.2	1.8	2.4	2.3	4.5	M	4.8	4.1	M	3.2	3.4	4.3	3.2	3.5	3.7	3.6	5.2	5.7	2.9	3.1	3.1	3.3	5.7
6-Dec	2.3	2.1	Z	1.7	1.4	1.1	1.5	1.3	1.2	0.8	0.7	C	C	C	C	C	C	1.6	2.0	1.8	1.9	2.0	2.1	2.0	--	2.3
7-Dec	1.6	1.1	1.4	Z	1.5	1.9	2.1	1.9	2.8	2.9	2.3	1.9	2.3	2.2	2.3	2.5	3.7	6.6	2.2	2.6	2.4	3.9	4.9	3.8	2.6	6.6
8-Dec	4.1	2.7	2.1	2.2	Z	2.0	4.2	8.4	7.9	5.6	3.7	2.6	2.4	2.3	2.7	5.2	7.1	4.4	3.7	2.9	2.2	2.5	2.6	2.3	3.7	8.4
9-Dec	3.1	1.7	1.9	1.6	1.9	Z	2.7	2.1	1.9	1.9	1.3	1.3	1.2	1.2	1.7	1.7	2.3	2.2	2.3	3.0	2.6	1.8	2.2	2.2	2.0	3.1
10-Dec	Z	1.6	1.7	2.3	1.8	4.8	3.1	3.2	3.4	4.6	5.8	4.9	4.2	3.4	3.1	4.5	3.1	1.9	1.3	1.1	0.9	0.6	0.6	0.5	2.7	5.8
11-Dec	0.5	Z	0.5	0.3	0.3	0.3	0.4	2.0	1.7	1.7	0.8	0.6	1.0	1.4	1.2	3.8	3.6	1.6	2.1	1.4	0.8	7.3	2.6	2.5	1.7	7.3
12-Dec	2.1	2.3	Z	1.9	2.0	2.5	3.1	3.5	3.4	3.7	3.8	3.1	2.6	2.4	2.6	2.9	3.0	2.5	2.4	2.6	3.1	3.8	4.5	6.1	3.0	6.1
13-Dec	7.7	7.8	6.3	Z	5.0	4.8	4.6	4.3	5.4	6.9	4.6	5.3	5.3	6.2	5.1	5.1	5.3	5.0	4.9	4.5	4.8	4.4	3.5	1.7	5.2	7.8
14-Dec	1.3	1.1	1.1	1.1	Z	1.0	1.1	1.2	1.2	1.4	1.6	1.8	4.1	1.2	1.4	2.8	1.8	1.4	1.0	0.9	0.9	1.2	1.3	1.3	1.4	4.1
15-Dec	1.7	1.7	1.7	1.6	1.4	Z	3.4	5.9	6.8	5.3	3.7	2.5	1.6	1.8	1.6	2.2	3.0	2.9	1.7	1.9	2.6	3.3	3.7	3.8	2.9	6.8
16-Dec	Z	3.2	3.3	2.9	2.2	1.9	1.7	1.7	1.3	1.9	1.0	1.0	1.3	1.4	1.7	1.5	0.9	2.5	1.6	0.9	1.1	0.6	0.8	0.9	1.6	3.3
17-Dec	0.8	Z	0.6	0.6	0.5	0.7	2.7	1.4	1.2	1.5	0.5	0.5	0.6	0.6	1.7	3.6	2.1	2.2	1.6	1.1	2.3	5.7	5.2	4.3	1.8	5.7
18-Dec	3.8	3.8	Z	3.9	4.0	3.8	3.6	3.5	2.2	2.9	1.6	1.6	1.4	1.0	3.7	1.1	1.9	1.0	1.4	1.5	1.1	1.1	1.1	0.6	2.2	4.0
19-Dec	0.8	0.9	0.6	Z	0.9	0.8	1.1	1.9	1.3	1.1	1.0	0.9	1.5	0.8	1.0	0.6	0.6	1.1	1.1	0.8	0.7	0.7	0.8	1.0	1.0	1.9
20-Dec	1.8	1.4	1.1	1.5	Z	1.3	1.8	2.0	1.8	1.5	1.5	2.2	2.0	2.4	3.4	2.6	3.2	3.2	2.8	3.5	5.0	3.8	4.1	6.7	2.6	6.7
21-Dec	8.1	5.9	3.7	2.3	1.9	Z	2.7	3.1	3.2	3.3	2.3	2.4	4.0	2.2	1.6	1.2	1.4	2.3	2.4	2.6	3.1	3.8	5.7	6.3	3.3	8.1
22-Dec	Z	3.5	3.1	3.1	3.2	3.0	2.5	3.2	3.7	3.5	3.6	4.4	5.1	5.4	5.3	5.1	6.3	5.9	7.7	6.2	6.3	5.6	2.8	2.1	4.4	7.7
23-Dec	1.7	Z	1.2	1.0	0.8	0.8	0.7	0.7	0.7	0.8	0.9	0.9	0.8	0.7	0.9	1.2	1.3	0.0	1.2	0.8	1.1	1.6	3.4	1.4	1.1	3.4
24-Dec	1.5	1.1	Z	0.9	0.7	0.9	1.1	1.2	1.0	1.0	1.0	1.1	1.2	1.2	1.4	1.5	2.7	4.9	8.9	5.8	5.1	5.2	4.9	5.0	2.6	8.9
25-Dec	4.5	4.0	3.7	Z	4.4	3.8	3.8	3.4	3.3	3.4	3.8	3.8	3.6	4.0	4.5	5.1	6.0	4.7	4.8	4.1	3.3	4.3	9.7	6.2	4.4	9.7
26-Dec	5.7	3.4	3.7	5.0	Z	6.2	5.3	5.6	5.1	4.2	4.6	3.5	3.1	2.8	2.8	3.9	4.1	3.9	3.9	4.1	4.2	4.1	3.9	3.4	4.2	6.2
27-Dec	3.3	3.1	2.8	2.2	2.0	Z	3.5	2.4	2.4	1.9	1.8	2.5	1.9	4.0	2.3	2.3	4.6	6.6	7.7	6.0	9.1	11.8	11.9	9.4	4.6	11.9
28-Dec	Z	6.8	5.5	4.8	3.9	3.4	3.2	3.6	3.9	5.4	3.4	2.7	3.5	3.1	3.1	5.3	8.2	8.7	9.5	9.2	7.8	7.3	14.0	16.0	6.2	16.0
29-Dec	15.6	Z	7.4	10.8	7.0	4.5	5.3	3.6	3.3	3.5	3.5	3.3	2.9	2.2	2.4	3.3	3.1	2.8	3.5	2.6	1.5	2.0	2.0	1.7	4.3	15.6
30-Dec	1.1	1.0	Z	3.0	5.8	6.0	6.5	5.6	4.0	4.2	3.2	5.1	7.4	2.9	1.9	1.8	2.1	2.4	2.7	2.1	1.9	1.8	1.7	1.7	3.3	7.4
31-Dec	1.7	3.3	1.8	Z	1.5	1.9	1.6	1.5	1.6	1.7	1.8	2.3	2.6	2.9	6.4	5.6	3.5	3.2	2.9	2.5	2.2	2.0	2.2	1.5	2.5	6.4

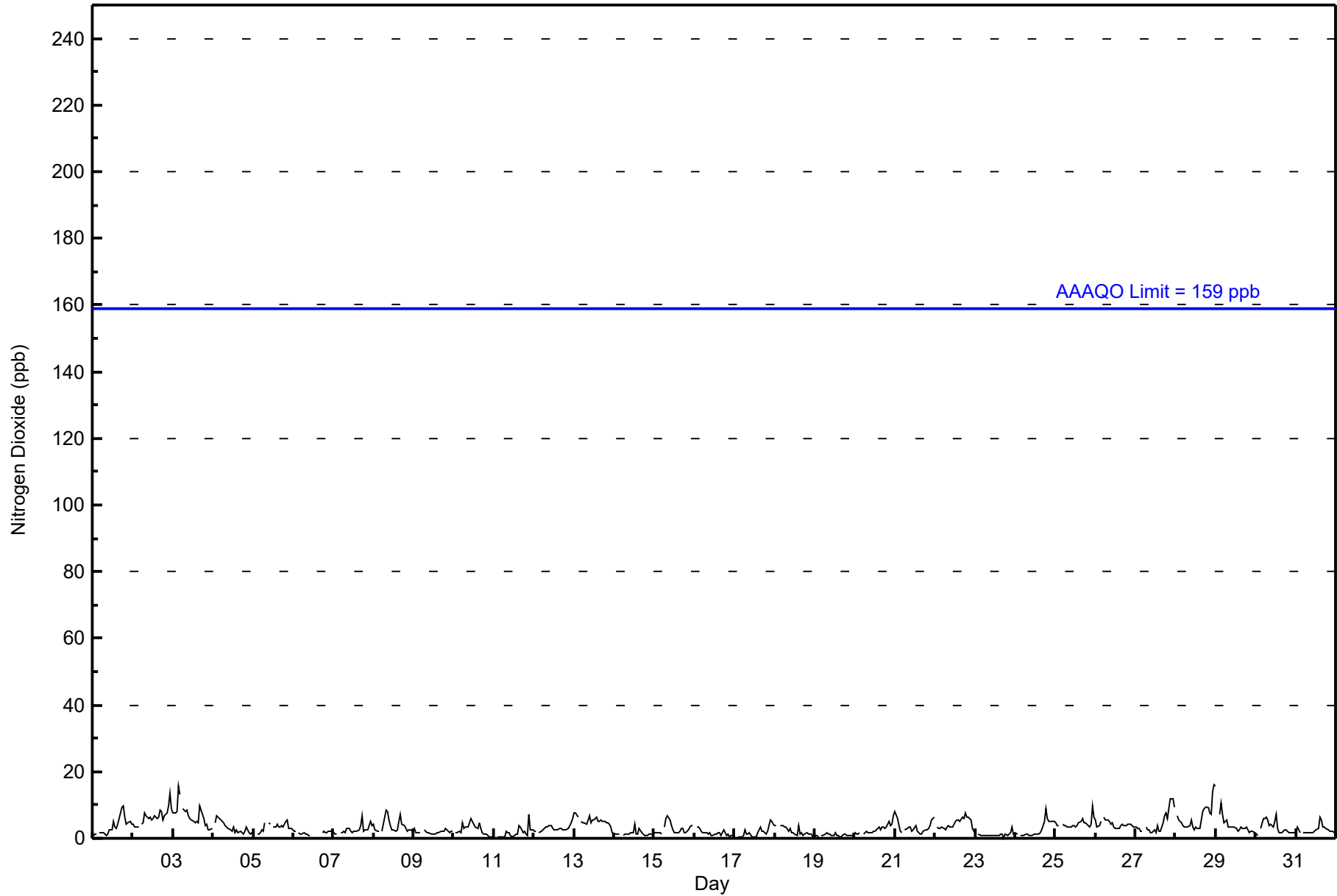
3.4	3.1	2.9	3.3	2.9	2.7	3.1	3.3	3.2	3.2	2.7	2.7	3.0	2.7	2.9	3.2	3.9	3.8	3.7	3.2	3.3	3.7	4.1	3.7	Diurnal Average	
15.6	7.8	8.2	15.5	13.0	6.2	8.7	8.4	8.4	6.9	6.5	5.7	7.4	6.9	6.4	6.3	9.9	9.4	9.9	9.2	9.1	11.8	14.0	16.0	Diurnal Maximum	

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



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Dioxide (NO₂) - ppb
Conklin - December 2023





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitrogen Dioxide (NO₂) - ppb
Conklin - December 2023

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	705	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: 705

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Conklin - December 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	5	2	4	4	10	15	36	78	76	160	138	17	33	79	34	14	705
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	5	2	4	4	10	15	36	78	76	160	138	17	33	79	34	14	705

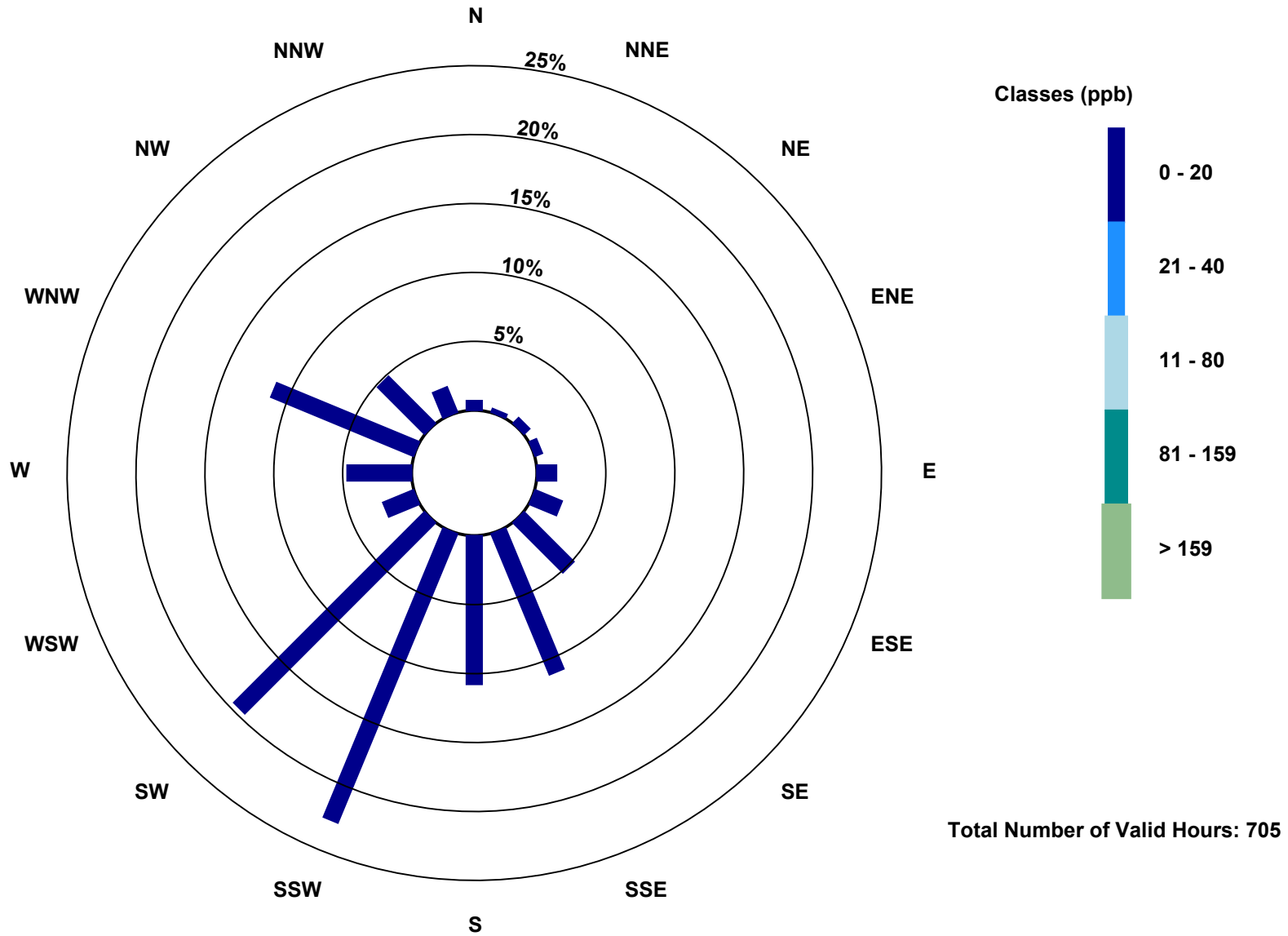
Total Number of Valid Hours: 705

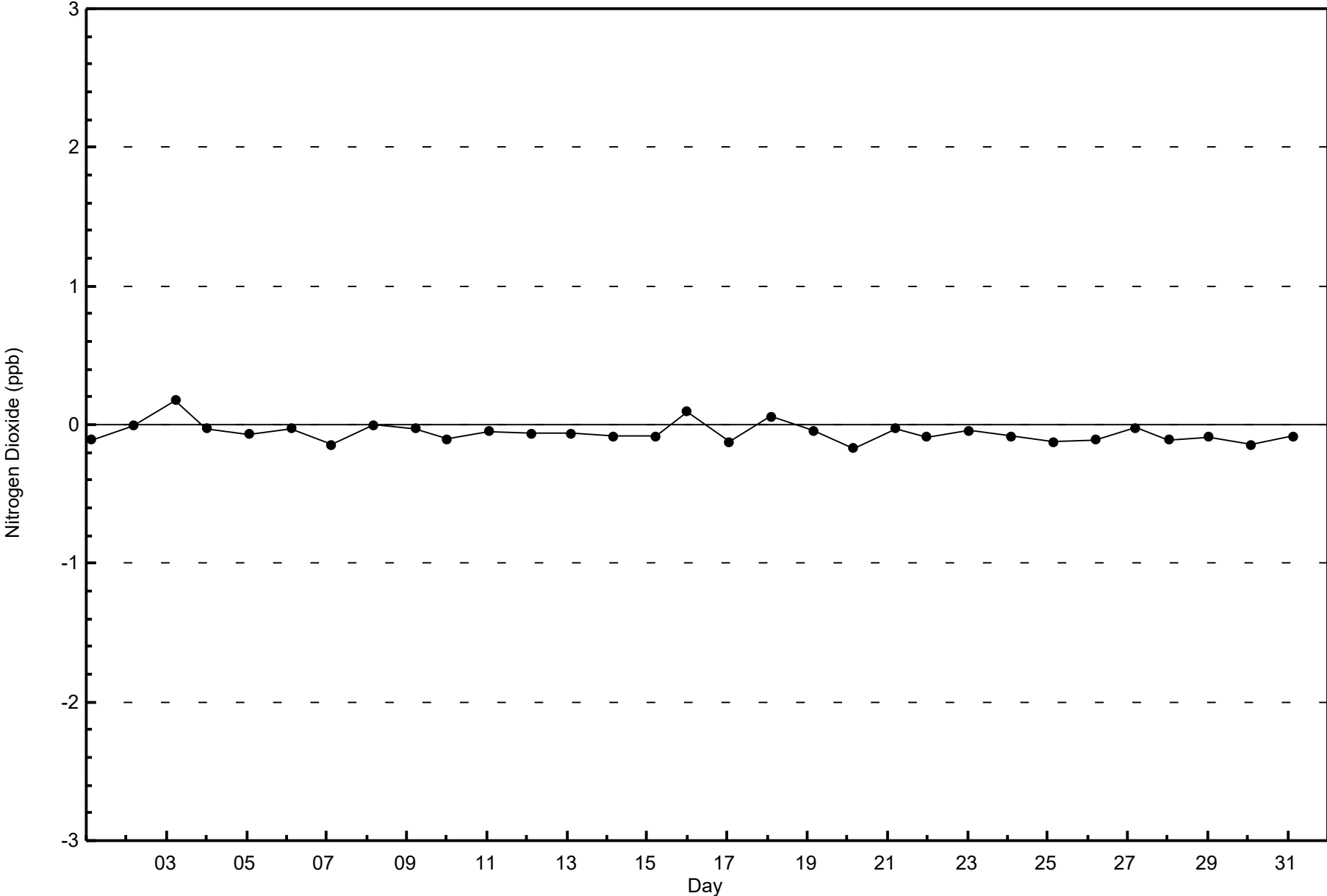
Total Number of Hours: 744

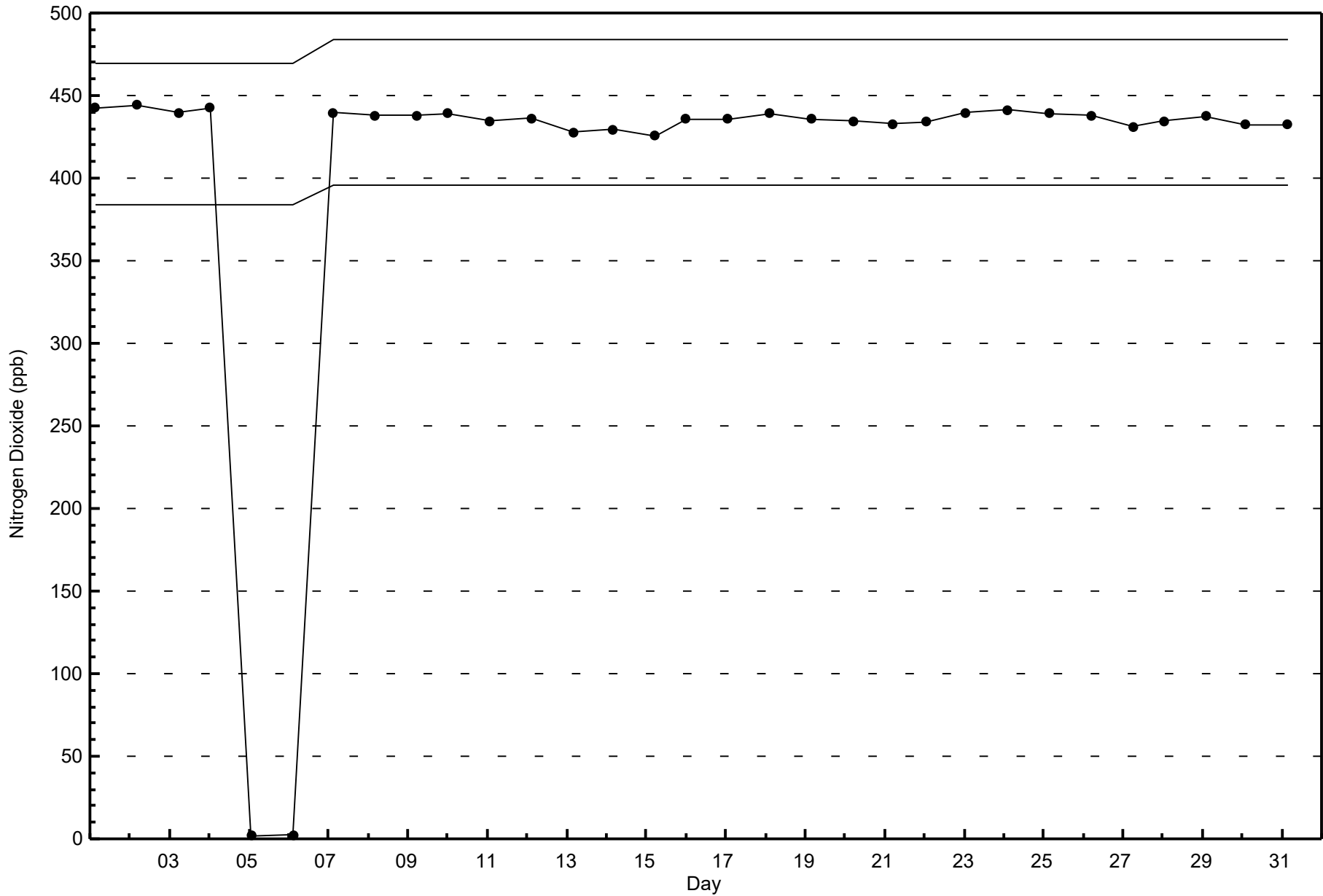


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Nitrogen Dioxide (NO₂) - ppb
Conklin









Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Oxides (NO_x) - ppb

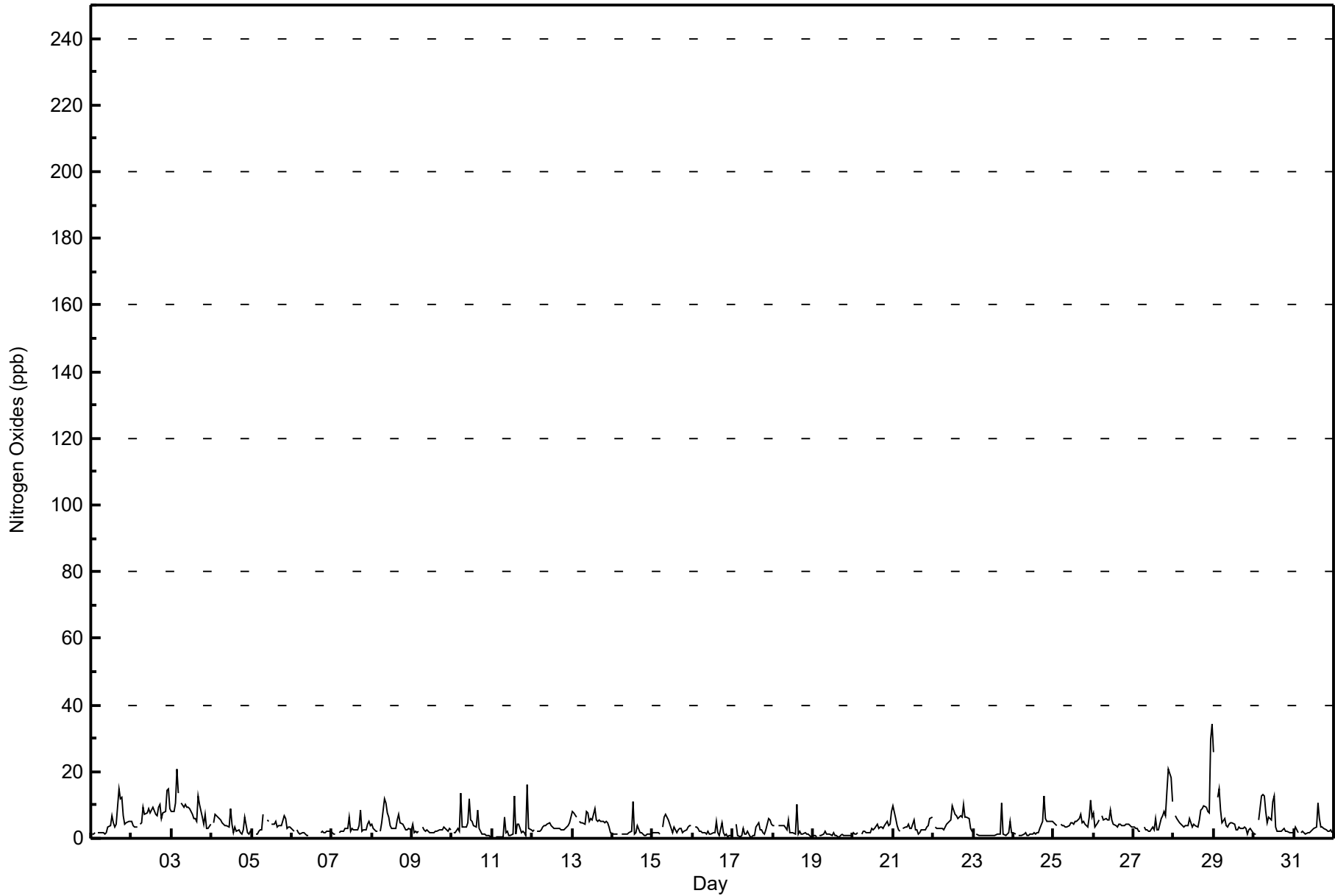
Conklin - December 2023

Maximum Value: 34.5 ppb on Dec 29 00:00																				Maximum Daily Average: 8.4 ppb on Dec 3					Hours in Service: 744	
Minimum Value: 0.3 ppb on Dec 11 05:00																				Minimum Daily Average: 1.0 ppb on Dec 19					Hours of Data: 705	
Maximum Diurnal Average: 5.1 ppb at hour 23																				Minimum Diurnal Average: 3.2 ppb at hour 2					Hours of Missing Data: 39	
Monthly Average: 3.95 ppb																				Percentiles: P ₁ = 0.6 P ₁₀ = 1.1 Q ₁ = 1.8 Median = 3.1 Q ₃ = 5.0 P ₉₀ = 7.9 P ₉₉ = 14.9					Hours of Calibration: 37	
																									Percent Operational Time: 99.7	
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Dec	1.2	1.2	1.5	Z	1.8	1.8	1.6	1.5	1.1	1.7	3.3	3.7	6.7	4.5	3.4	4.3	14.8	11.8	12.4	6.8	4.2	4.7	5.2	5.2	4.5	14.8
2-Dec	4.9	3.7	3.5	3.6	Z	4.4	4.7	9.4	7.0	7.6	9.0	7.6	8.5	9.3	7.1	6.7	9.2	10.1	5.7	7.5	8.1	14.5	14.9	9.0	7.7	14.9
3-Dec	8.0	8.1	10.7	20.8	13.7	Z	10.5	9.1	10.3	9.1	9.1	8.7	7.3	6.0	6.0	5.0	12.9	10.1	6.6	4.2	7.2	3.1	3.2	4.3	8.4	20.8
4-Dec	Z	4.8	7.1	6.6	6.2	5.3	4.7	4.3	3.9	3.8	3.2	9.0	4.3	1.7	3.6	1.9	2.5	1.7	1.5	2.5	6.2	1.9	1.4	2.0	3.9	9.0
5-Dec	1.5	Z	1.2	1.4	2.1	2.5	2.7	7.0	M	5.7	4.9	M	4.1	4.1	5.1	3.4	3.6	3.9	3.8	6.9	5.8	3.0	3.2	3.2	3.8	7.0
6-Dec	2.4	2.1	Z	2.6	1.5	1.1	1.7	1.5	1.3	0.9	0.8	C	C	C	C	C	C	1.6	2.0	1.8	1.9	2.0	2.1	2.1	--	2.6
7-Dec	1.6	1.1	1.4	Z	1.5	1.9	2.2	2.0	2.8	3.1	6.2	2.2	2.8	2.6	2.6	2.6	3.7	8.3	2.3	2.7	2.6	4.3	5.3	4.0	3.0	8.3
8-Dec	4.4	2.9	2.2	2.3	Z	2.1	4.5	11.7	10.6	7.7	6.3	3.7	3.0	2.9	3.1	5.6	7.4	4.7	4.1	3.5	2.5	2.7	2.8	2.4	4.5	11.7
9-Dec	4.1	1.8	2.2	1.7	2.3	Z	3.5	2.6	2.2	2.5	1.8	1.8	1.6	1.5	2.2	2.0	2.4	2.5	2.4	3.3	2.9	2.0	2.9	2.5	2.4	4.1
10-Dec	Z	1.6	1.7	2.9	2.1	13.7	3.4	3.6	3.6	4.9	11.7	5.5	5.1	3.9	3.4	8.6	3.2	2.0	1.4	1.2	1.0	0.7	0.7	0.6	3.7	13.7
11-Dec	0.5	Z	0.5	0.3	0.3	0.3	0.4	6.4	1.8	1.9	1.0	0.8	1.3	12.6	1.4	4.4	4.3	1.8	2.2	1.5	0.9	15.9	2.9	2.5	2.9	15.9
12-Dec	2.1	2.4	Z	2.0	2.0	2.6	3.2	3.7	3.6	4.4	4.8	3.9	3.3	2.9	3.0	3.1	3.2	2.5	2.5	2.7	3.2	4.0	4.6	6.2	3.3	6.2
13-Dec	7.8	7.8	6.4	Z	5.0	4.8	4.6	4.3	8.2	7.7	5.0	5.8	5.6	9.1	5.3	5.2	5.3	5.0	5.0	4.5	4.9	4.5	3.5	1.7	5.5	9.1
14-Dec	1.4	1.2	1.2	Z	1.1	1.2	1.3	1.3	1.5	1.8	2.0	11.0	1.3	1.5	3.8	1.9	1.5	1.1	1.0	0.9	1.3	1.4	1.4	1.4	1.9	11.0
15-Dec	1.9	1.8	1.8	1.7	1.4	Z	3.6	6.2	7.3	5.7	4.1	2.8	1.8	3.3	1.8	2.3	3.1	3.0	1.8	2.0	2.6	3.3	3.7	3.8	3.1	7.3
16-Dec	Z	3.2	3.3	2.9	2.3	2.0	1.8	1.8	1.3	2.0	1.1	1.2	1.6	1.6	5.1	1.5	0.9	4.8	1.7	0.9	1.1	0.6	0.8	1.0	1.9	5.1
17-Dec	0.9	Z	4.4	0.7	0.5	0.7	2.8	1.4	1.3	2.0	0.6	0.6	0.7	0.7	3.6	4.6	2.6	2.6	1.8	1.2	2.4	5.9	5.3	4.4	2.2	5.9
18-Dec	3.9	3.8	Z	3.9	4.0	3.8	3.6	4.0	2.3	5.5	1.8	1.9	1.6	1.2	10.0	1.2	2.1	1.1	1.5	1.6	1.1	1.1	1.1	0.6	2.7	10.0
19-Dec	0.8	1.0	0.6	Z	0.9	0.8	1.1	2.0	1.3	1.2	1.1	1.0	1.7	0.9	1.1	0.6	0.6	1.1	1.1	0.8	0.7	0.7	0.8	1.0	1.0	2.0
20-Dec	1.8	1.4	1.1	1.5	Z	1.4	2.0	2.2	1.9	1.7	1.8	2.9	2.4	2.8	4.2	2.8	3.4	3.6	2.9	3.9	5.1	3.9	4.1	8.0	2.9	8.0
21-Dec	9.5	5.9	3.8	2.4	2.0	Z	2.8	3.4	3.5	4.0	2.9	3.1	5.6	2.5	2.7	1.3	1.5	2.7	2.6	2.7	3.2	3.9	5.8	6.5	3.7	9.5
22-Dec	Z	3.5	3.1	3.1	3.2	3.0	2.5	3.6	4.4	4.8	5.5	9.7	8.4	7.2	6.9	6.0	6.7	6.5	10.4	6.6	6.5	5.8	2.8	2.1	5.3	10.4
23-Dec	1.7	Z	1.2	1.0	0.9	0.9	0.7	0.7	0.8	0.9	1.0	1.1	1.0	0.9	1.1	1.3	1.4	10.5	1.3	0.8	1.2	1.7	5.0	1.6	1.7	10.5
24-Dec	1.6	1.3	Z	0.9	0.8	1.0	1.3	1.5	1.1	1.1	1.2	1.3	1.5	1.4	1.5	1.6	2.9	5.0	12.9	5.9	5.1	5.2	4.9	5.0	2.9	12.9
25-Dec	4.5	4.0	3.7	Z	4.4	3.8	4.0	3.4	3.4	3.7	4.5	4.7	4.4	5.1	5.2	5.8	7.0	4.8	5.1	4.2	3.5	6.5	11.6	6.4	4.9	11.6
26-Dec	7.5	3.5	4.6	5.7	Z	6.6	5.5	5.9	5.4	5.6	8.4	5.5	4.3	3.6	3.3	4.2	4.2	3.9	3.9	4.2	4.4	4.1	3.9	3.5	4.9	8.4
27-Dec	3.3	3.1	2.8	2.2	2.1	Z	3.6	2.7	2.7	2.1	2.1	3.2	2.4	6.1	2.7	2.4	5.7	6.9	8.0	6.6	13.9	20.8	18.1	10.9	5.9	20.8
28-Dec	Z	6.9	5.9	4.9	4.1	3.6	3.3	3.8	4.0	6.0	4.5	3.5	4.4	3.8	3.5	5.6	8.3	8.8	9.6	9.3	7.9	7.5	29.8	34.5	8.0	34.5
29-Dec	25.9	Z	12.3	14.7	8.3	4.7	5.8	3.8	3.4	4.2	4.7	4.6	4.1	2.6	2.7	3.5	3.1	2.8	3.5	2.8	1.5	2.3	3.0	1.8	5.5	25.9
30-Dec	1.4	1.1	Z	5.5	12.8	13.1	12.6	8.1	4.7	6.3	5.7	10.8	12.7	3.5	2.1	2.0	2.3	2.4	2.8	2.3	2.0	1.9	1.8	1.8	5.2	13.1
31-Dec	1.8	3.5	1.9	Z	1.5	2.3	1.6	1.5	1.8	1.9	2.0	2.5	3.0	3.4	10.4	6.1	3.6	3.3	3.0	2.5	2.2	2.2	2.6	1.6	2.9	10.4
																								Diurnal Average		
																								Diurnal Maximum		
																								Diurnal Average		
																								Diurnal Maximum		
Z - zerospan C - Calibration M - Maintenance																										



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Conklin - December 2023





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Conklin - December 2023**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	700	99.29	99.29
21 - 40	5	0.71	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 705

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Conklin - December 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	5	2	4	4	10	14	35	77	76	158	138	17	33	79	34	14	700
21 - 40	0	0	0	0	0	1	1	1	0	2	0	0	0	0	0	0	5
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	5	2	4	4	10	15	36	78	76	160	138	17	33	79	34	14	705

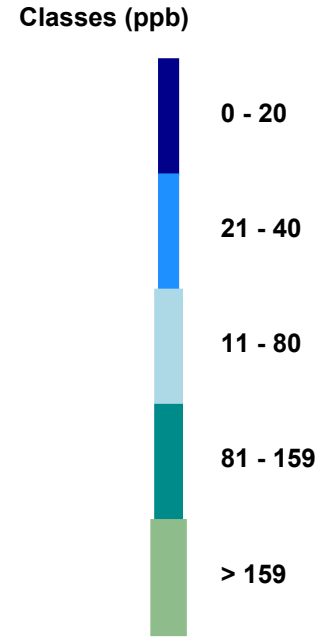
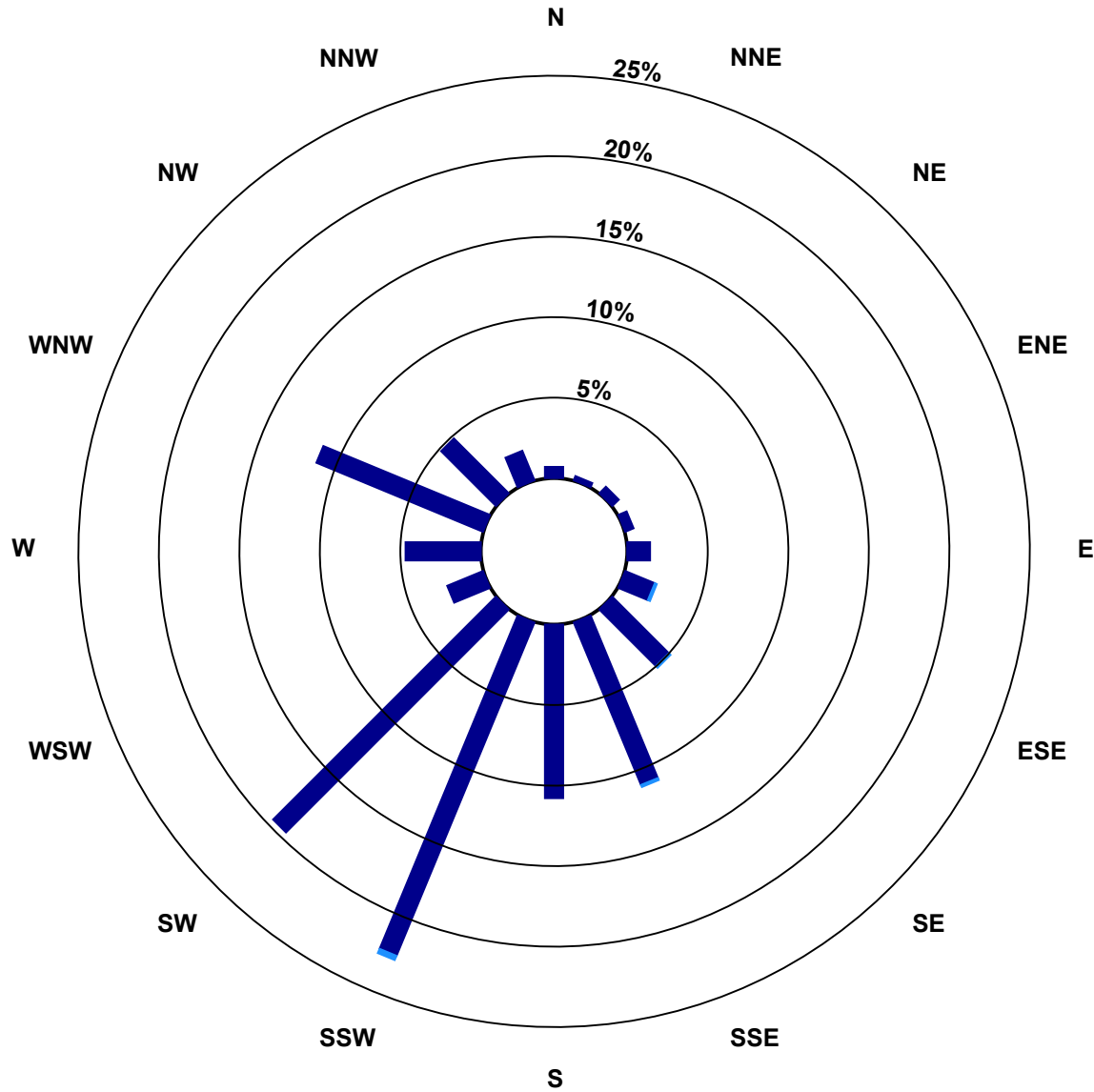
Total Number of Valid Hours: 705

Total Number of Hours: 744

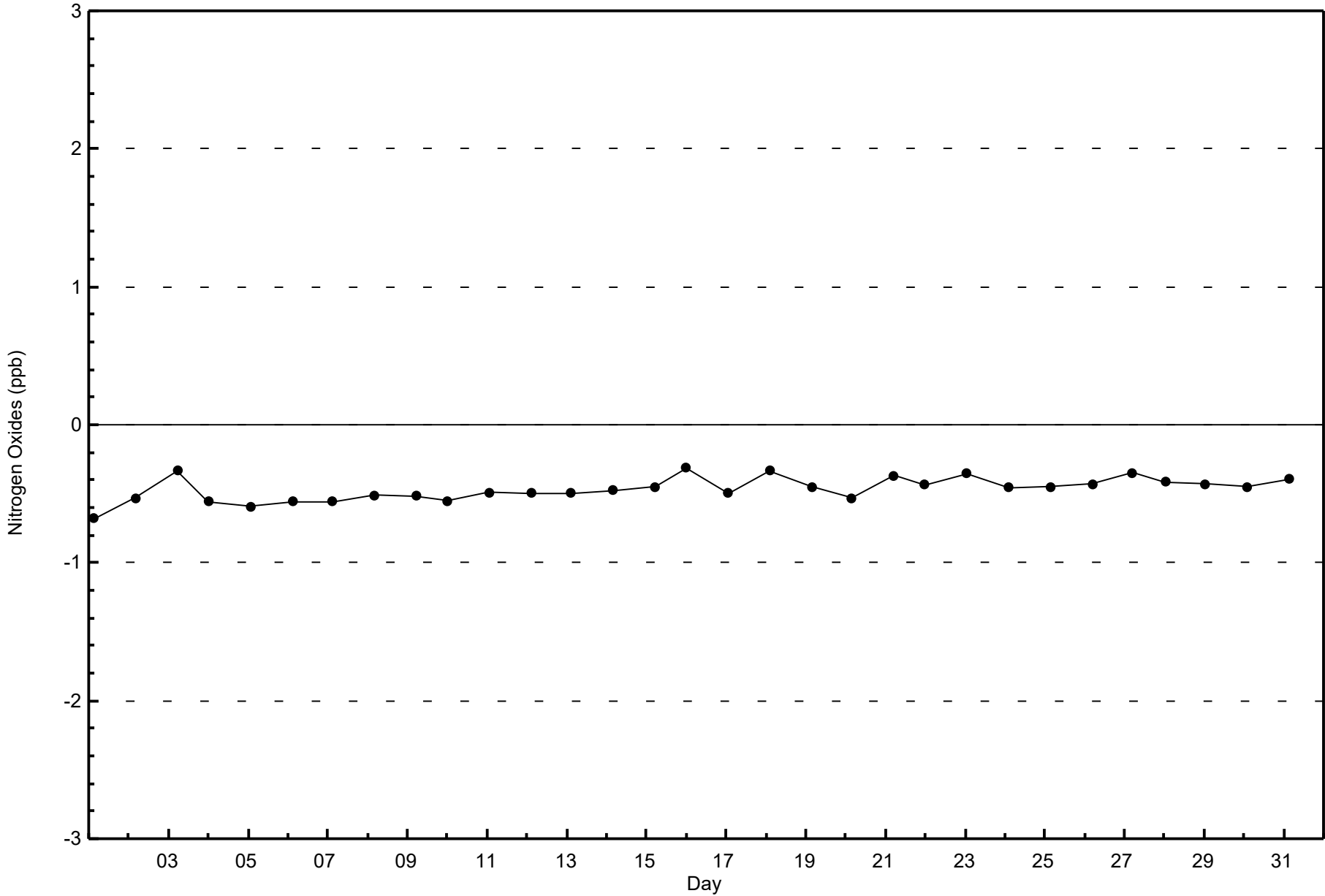


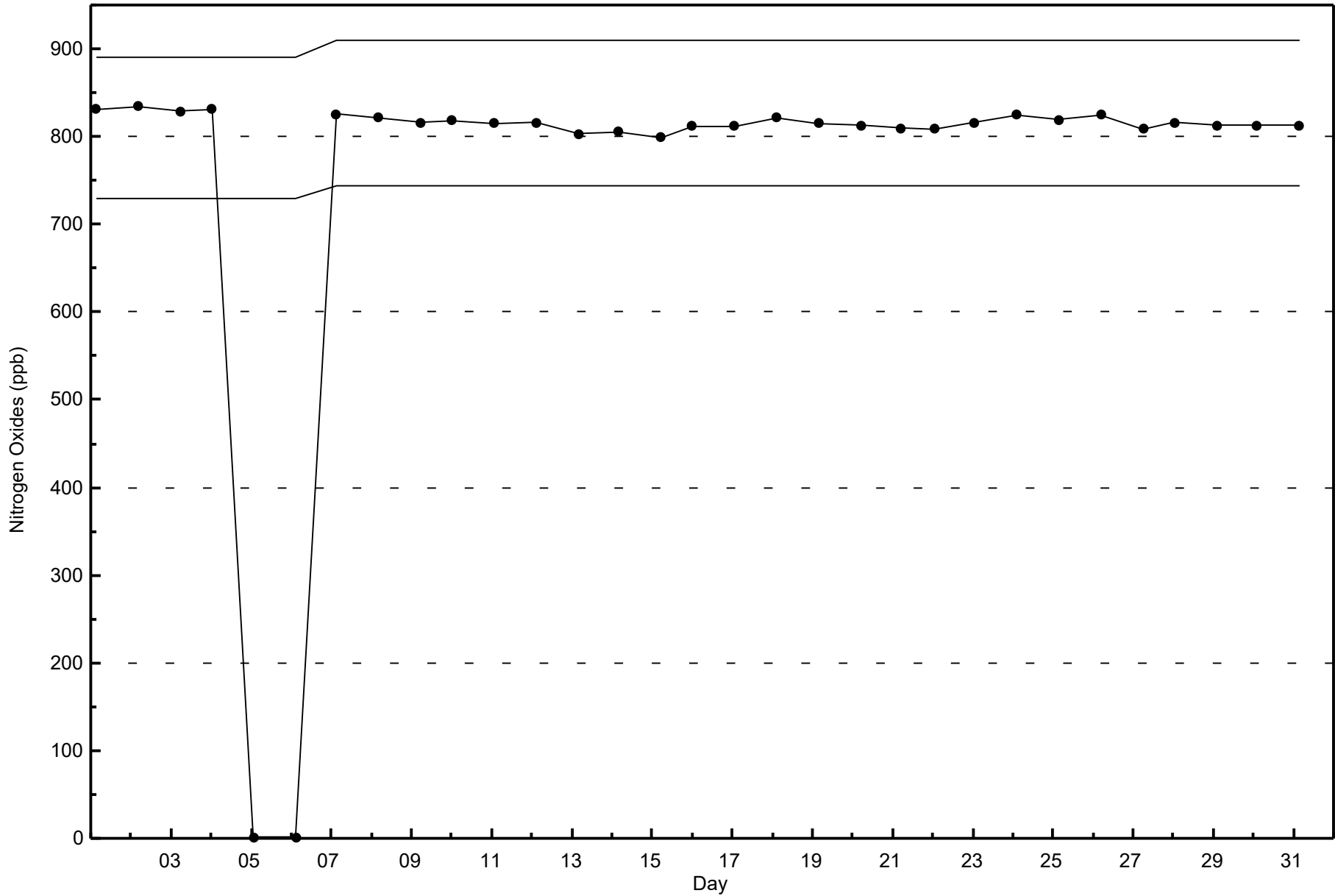
Wood Buffalo Environmental Association
Wind Rose Dec 2023

Nitrogen Oxides (NO_x) - ppb
Conklin



Total Number of Valid Hours: 705





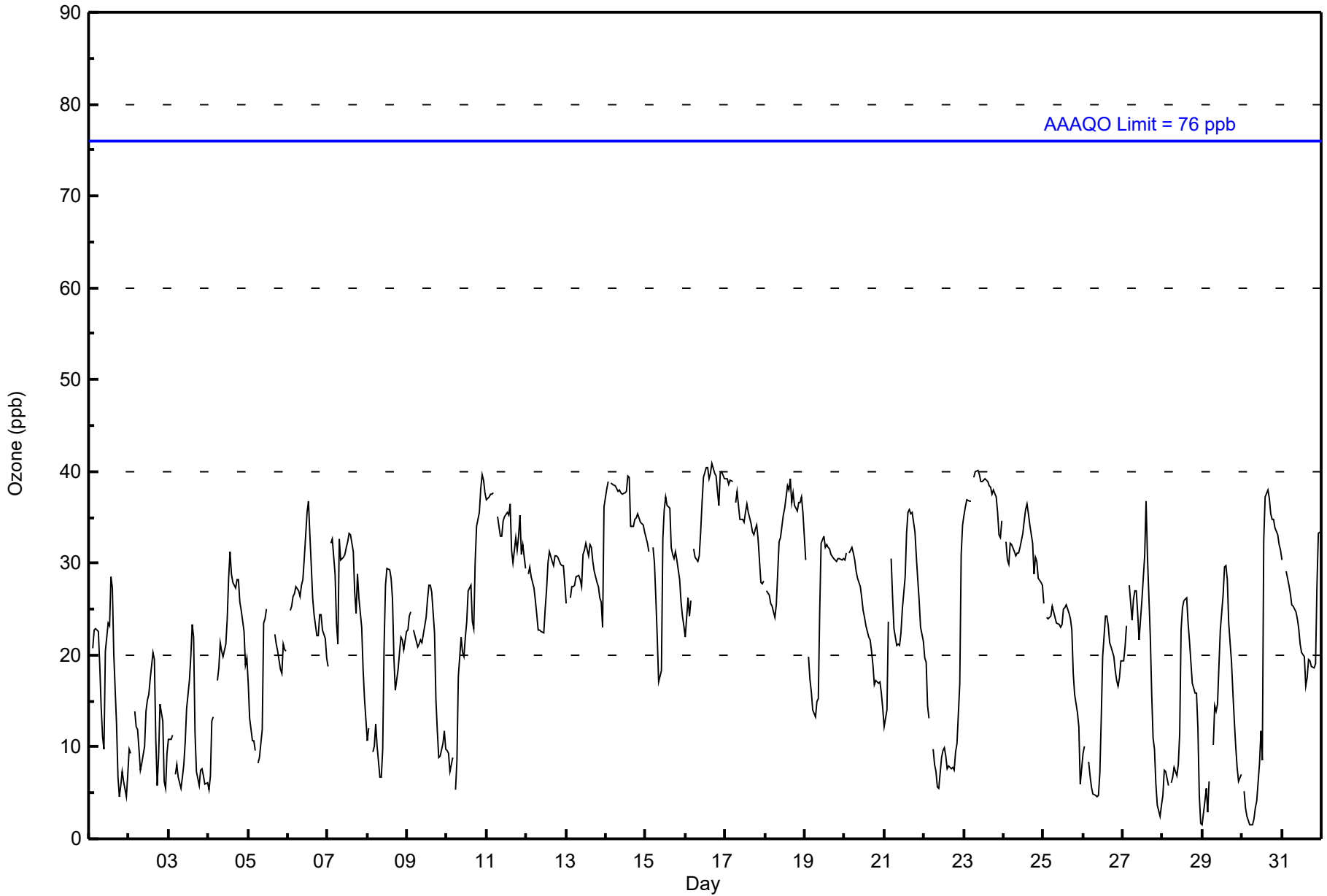


Number of Exceedences (AAAQO):		1-hr: 0	24-hr: 0	Hours in Service: 744																	Daily Average		Daily Maximum				
Maximum Value: 40.9 ppb on Dec 16 17:00		Maximum Daily Average: 37.5 ppb on Dec 23		Hours of Data: 709																	Hours of Missing Data: 35		Hours of Calibration: 35		Percent Operational Time: 100.0		
Minimum Value: 1.5 ppb on Dec 30 06:00		Minimum Daily Average: 10.5 ppb on Dec 3		Hours of Calibration: 35																	Hours of Calibration: 35		Percent Operational Time: 100.0				
Maximum Diurnal Average: 30.1 ppb at hour 15		Minimum Diurnal Average: 20.4 ppb at hour 6		Hours of Calibration: 35																	Hours of Calibration: 35		Percent Operational Time: 100.0				
Monthly Average: 23.71 ppb		Percentiles: P ₁ = 2.5 P ₁₀ = 7.7 Q ₁ = 16.0 Median = 25.0 Q ₃ = 31.7 P ₉₀ = 36.6 P ₉₉ = 39.8		Hours of Calibration: 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-Dec	14.4	Z	20.8	22.8	22.9	22.5	18.9	14.3	11.2	9.8	20.4	23.5	23.2	28.5	27.3	20.2	12.4	6.8	4.6	5.8	7.4	6.3	4.6	7.1	15.5	28.5	
2-Dec	9.8	9.3	Z	13.9	12.3	11.9	9.8	7.5	8.2	10.1	13.9	15.1	15.7	17.4	20.3	19.5	10.8	5.8	9.0	14.7	12.8	6.2	5.5	9.3	11.7	20.3	
3-Dec	10.9	10.9	11.2	Z	7.0	8.1	6.7	5.5	6.7	8.1	10.5	14.1	17.2	19.9	23.4	22.0	11.6	7.3	5.8	7.5	7.6	6.9	5.9	6.1	10.5	23.4	
4-Dec	5.4	6.9	12.8	13.3	Z	17.2	18.6	21.3	20.5	19.8	21.2	24.0	28.3	31.3	28.9	27.9	27.3	28.2	25.8	24.9	22.5	19.0	19.7	21.4	31.3		
5-Dec	16.9	13.1	10.6	10.6	9.6	Z	8.3	8.8	12.0	23.5	24.0	25.0	C	C	C	C	22.2	21.1	20.4	18.4	18.0	21.2	20.6	20.5	17.1	25.0	
6-Dec	Z	24.9	25.3	26.4	26.6	27.5	27.1	26.4	27.6	28.2	30.6	35.6	36.8	33.0	29.8	26.3	24.3	22.1	22.1	24.5	24.5	22.7	21.8	19.7	26.7	36.8	
7-Dec	18.8	Z	32.2	32.6	28.8	23.5	21.2	32.7	30.4	30.6	31.0	31.7	32.4	32.2	33.1	31.2	26.8	24.6	28.8	26.2	23.1	18.5	15.2	12.9	26.9	33.2	
8-Dec	10.7	12.0	Z	9.4	10.1	12.5	10.1	6.8	6.7	9.8	21.0	27.5	29.4	29.3	28.4	26.0	19.6	16.2	18.4	20.2	22.0	21.7	20.5	22.6	17.9	29.4	
9-Dec	22.7	24.2	24.7	Z	22.7	21.5	20.9	21.3	21.6	21.4	23.1	24.1	26.2	27.7	27.7	26.9	22.5	15.1	11.8	8.8	8.9	10.3	11.8	9.8	19.8	27.7	
10-Dec	9.6	9.4	7.3	8.9	Z	5.3	8.5	17.7	22.0	20.3	19.9	22.0	23.6	27.1	27.6	23.7	22.9	30.1	34.0	35.6	38.2	39.6	39.1	37.7	23.0	39.6	
11-Dec	36.9	37.2	37.5	37.5	37.6	Z	35.1	34.0	33.0	32.9	34.6	35.1	35.5	35.2	36.5	31.4	30.1	32.7	31.4	33.0	35.2	30.9	32.0	29.4	34.1	37.6	
12-Dec	Z	28.9	29.6	28.6	27.3	25.9	24.4	22.7	22.7	22.5	22.5	25.0	27.2	30.1	31.2	30.2	29.7	30.8	30.9	30.6	29.9	29.7	29.8	27.8	27.7	31.2	
13-Dec	25.6	Z	26.2	27.4	27.5	27.7	28.5	28.6	28.2	27.5	31.0	31.5	32.2	30.9	32.0	31.8	30.3	29.1	27.9	27.5	26.3	25.8	23.0	36.2	28.8	36.2	
14-Dec	38.2	38.9	Z	38.8	38.5	38.5	38.2	37.8	37.9	37.7	37.5	37.6	37.8	39.5	39.3	34.0	34.0	34.8	35.0	35.4	34.9	34.4	34.2	33.4	36.8	39.5	
15-Dec	32.7	32.2	31.3	Z	31.7	30.1	26.3	22.0	17.1	18.4	32.6	35.9	37.2	36.4	36.1	31.8	30.9	30.5	31.3	30.3	28.2	25.9	24.3	23.2	29.4	37.2	
16-Dec	22.0	26.2	24.3	25.9	Z	31.6	30.6	30.2	30.9	33.4	36.7	39.3	40.4	40.4	39.2	39.8	40.9	39.8	39.6	37.9	36.3	39.8	39.9	39.2	35.0	40.9	
17-Dec	39.3	39.2	38.6	39.0	38.9	Z	36.7	37.8	36.2	34.8	34.8	34.5	35.6	36.5	35.6	34.3	33.4	33.2	33.7	34.1	32.6	27.9	27.8	28.0	34.9	39.3	
18-Dec	Z	27.0	26.6	25.6	25.3	24.7	24.1	25.4	32.4	32.8	34.0	35.2	35.9	38.5	37.9	39.2	36.6	37.6	36.3	35.7	36.6	36.6	37.2	35.6	32.9	39.2	
19-Dec	30.3	Z	19.9	17.3	16.0	14.0	13.3	15.0	15.3	24.8	32.2	33.0	31.7	32.0	31.7	31.6	31.0	30.4	30.4	30.2	30.4	30.5	30.4	30.5	26.2	33.0	
20-Dec	30.3	31.1	Z	31.1	31.7	31.1	30.3	29.2	28.4	27.5	26.3	24.9	24.1	23.2	22.0	21.6	20.4	18.9	16.8	17.3	16.9	17.1	15.9	14.2	23.9	31.7	
21-Dec	12.2	14.1	23.7	Z	30.5	26.3	22.8	21.0	21.3	21.1	22.5	25.0	28.5	33.3	35.5	35.8	35.4	35.6	33.4	30.7	28.3	25.9	23.1	21.5	26.4	35.8	
22-Dec	19.7	19.2	14.6	13.1	Z	9.7	8.1	7.3	5.7	5.5	8.9	9.6	9.9	9.0	7.7	7.9	7.6	7.8	7.5	9.5	10.4	17.0	31.0	34.2	12.2	34.2	
23-Dec	35.3	36.2	36.9	36.8	36.8	Z	39.3	39.9	40.1	39.7	39.0	39.0	39.1	39.3	38.9	38.5	38.3	37.6	38.0	37.2	35.6	33.1	32.8	34.6	37.5	40.1	
24-Dec	Z	32.4	30.3	29.9	32.2	32.0	31.2	30.8	31.1	31.1	31.7	33.2	34.6	35.9	36.5	35.3	34.2	32.1	28.9	30.6	30.1	28.4	28.0	27.6	31.7	36.5	
25-Dec	25.6	Z	24.1	24.0	24.3	25.4	24.8	24.0	23.5	23.4	23.0	23.3	25.1	25.2	25.5	24.6	23.9	22.7	18.0	15.7	13.8	12.1	5.9	7.7	21.1	25.6	
26-Dec	9.3	10.0	Z	8.4	6.8	5.6	4.9	4.7	4.6	4.8	7.2	13.2	19.9	24.3	24.3	23.2	21.4	20.9	19.9	18.4	17.2	16.7	17.6	19.4	14.0	24.3	
27-Dec	19.3	20.8	23.2	Z	27.6	23.9	26.1	27.0	27.0	24.6	21.6	26.0	28.4	30.8	36.7	30.7	22.1	15.8	11.0	9.7	6.0	3.6	2.5	3.7	20.4	36.7	
28-Dec	4.7	7.5	7.3	5.8	Z	6.0	6.7	7.7	6.8	8.1	11.4	22.7	25.2	25.9	26.3	23.4	21.6	19.2	16.9	15.9	15.9	12.1	4.7	1.7	13.2	26.3	
29-Dec	1.5	4.2	5.6	2.8	6.2	Z	10.2	14.6	13.8	14.7	18.8	22.8	26.5	29.5	29.7	28.2	23.5	19.2	15.8	12.8	10.0	7.8	6.2	7.0	14.4	29.7	
30-Dec	Z	5.1	3.4	2.4	1.6	1.5	1.5	2.1	3.3	4.1	8.3	11.8	8.6	32.4	37.3	38.0	37.0	35.5	34.8	34.8	33.9	33.1	32.1	31.4	18.9	38.0	
31-Dec	30.4	Z	29.1	28.3	27.6	26.7	25.5	25.3	24.7	23.9	22.8	21.2	20.3	19.8	16.7	17.5	19.6	19.3	18.7	18.6	19.1	27.7	33.2	33.3	23.9	33.3	
		20.5	20.8	22.2	21.6	23.4	20.4	20.6	20.9	21.0	21.8	24.3	26.5	27.9	29.9	30.1	28.4	25.9	24.5	23.9	23.7	23.1	22.3	21.8	22.1	Diurnal Average	
		39.3	39.2	38.6	39.0	38.9	38.5	39.3	39.9	40.1	39.7	39.0	39.3	40.4	40.4	39.3	39.8	40.9	39.8	39.6	37.9	38.2	39.8	39.9	39.2	Diurnal Maximum	
Z - zerospan		C - Calibration																									
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 76 ppb																											



Wood Buffalo Environmental Association
Hourly Averages

Ozone (O₃) - ppb
Conklin - December 2023





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Ozone (O₃) - ppb
Conklin - December 2023

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	241	33.99	33.99
21 - 50	468	66.01	100.00
51 - 82	0	0.00	100.00
> 83	0	0.00	100.00

Total Number of Valid Hours: 709

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Ozone (O₃) - ppb
Conklin - December 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	4	2	3	4	5	7	23	64	36	37	31	3	1	2	9	10	241
21 - 50	1	0	1	1	5	9	11	17	43	124	106	16	32	76	23	3	468
51 - 82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 83	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	5	2	4	5	10	16	34	81	79	161	137	19	33	78	32	13	709

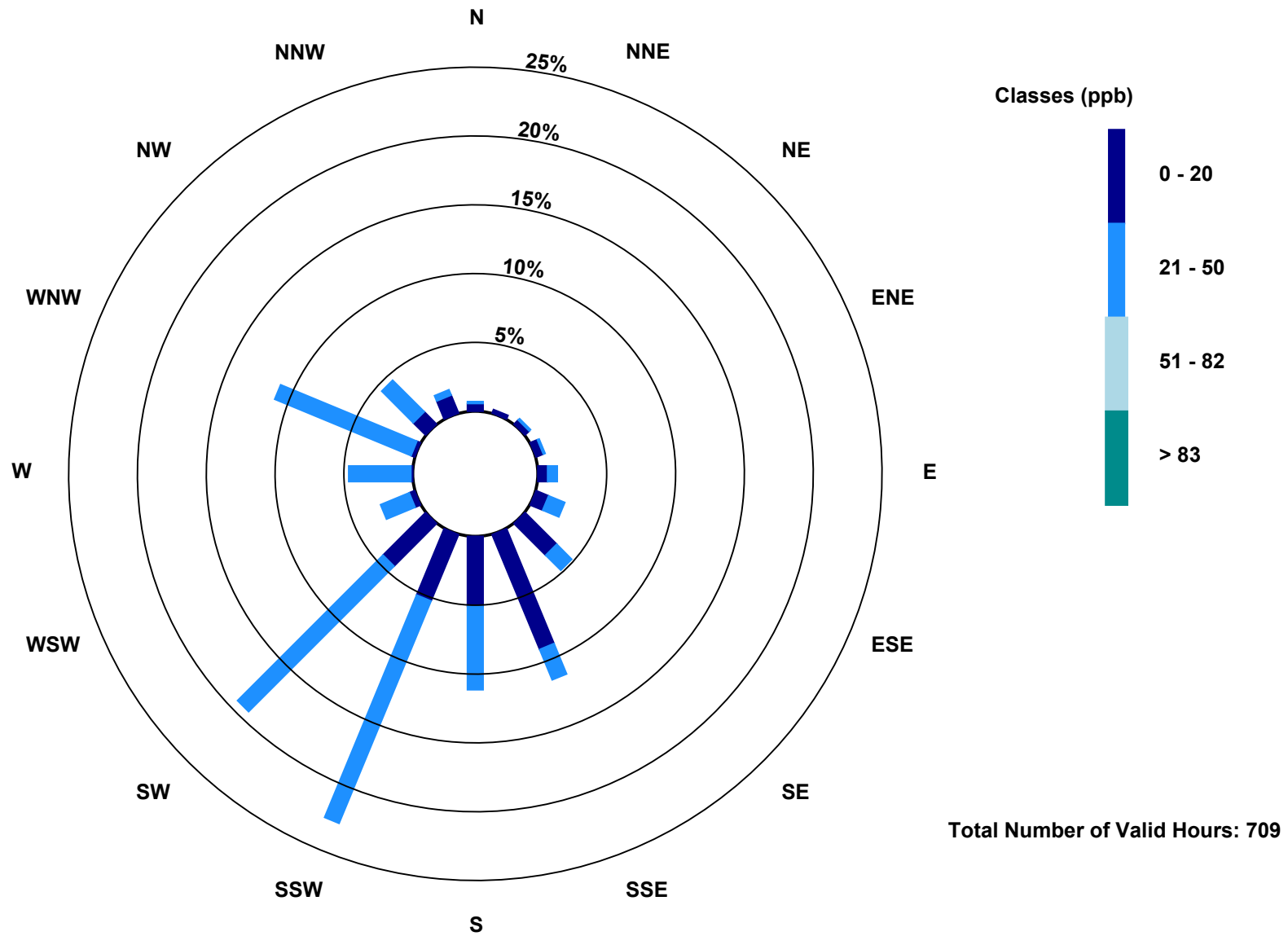
Total Number of Valid Hours: 709

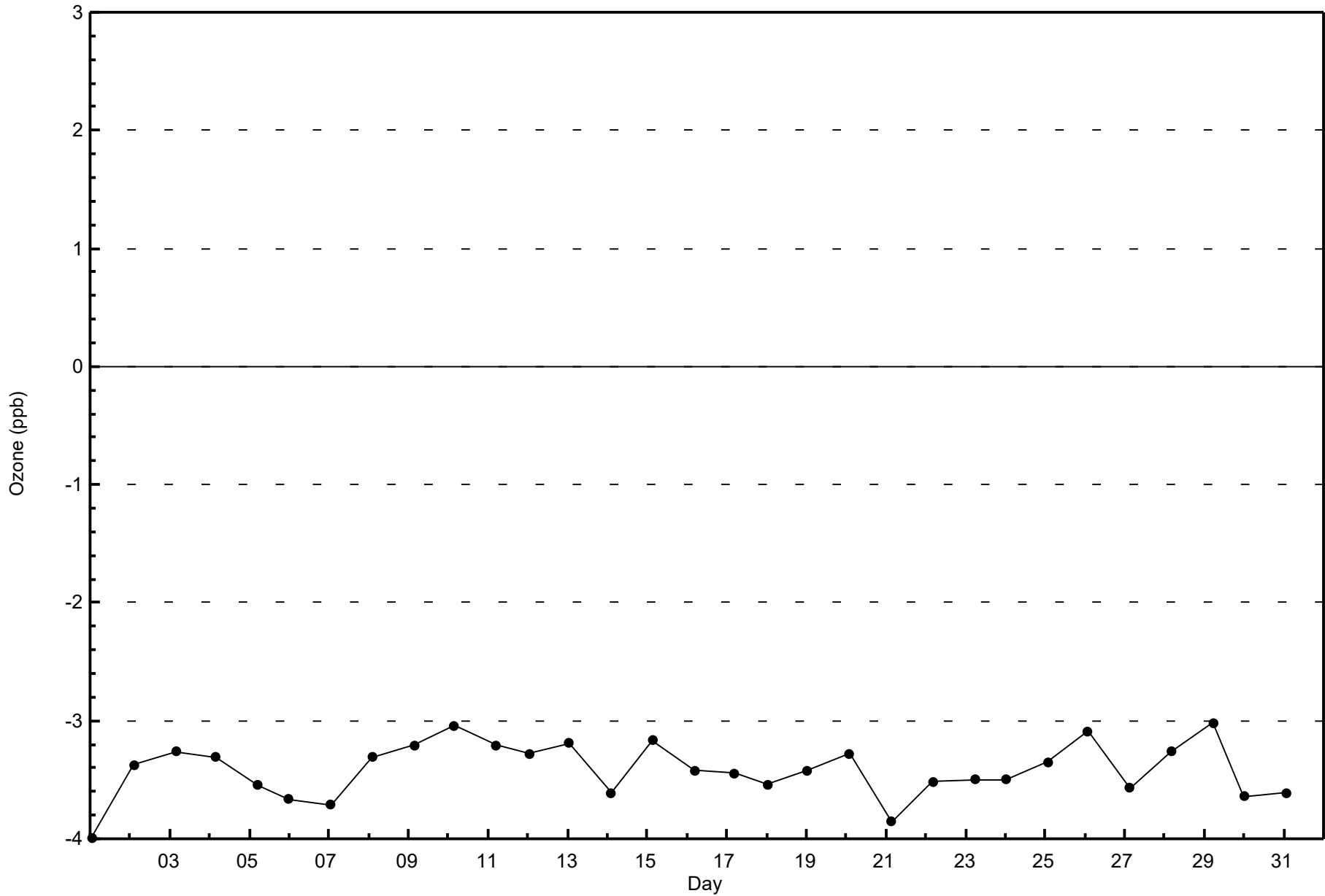
Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Dec 2023

Ozone (O₃) - ppb
Conklin

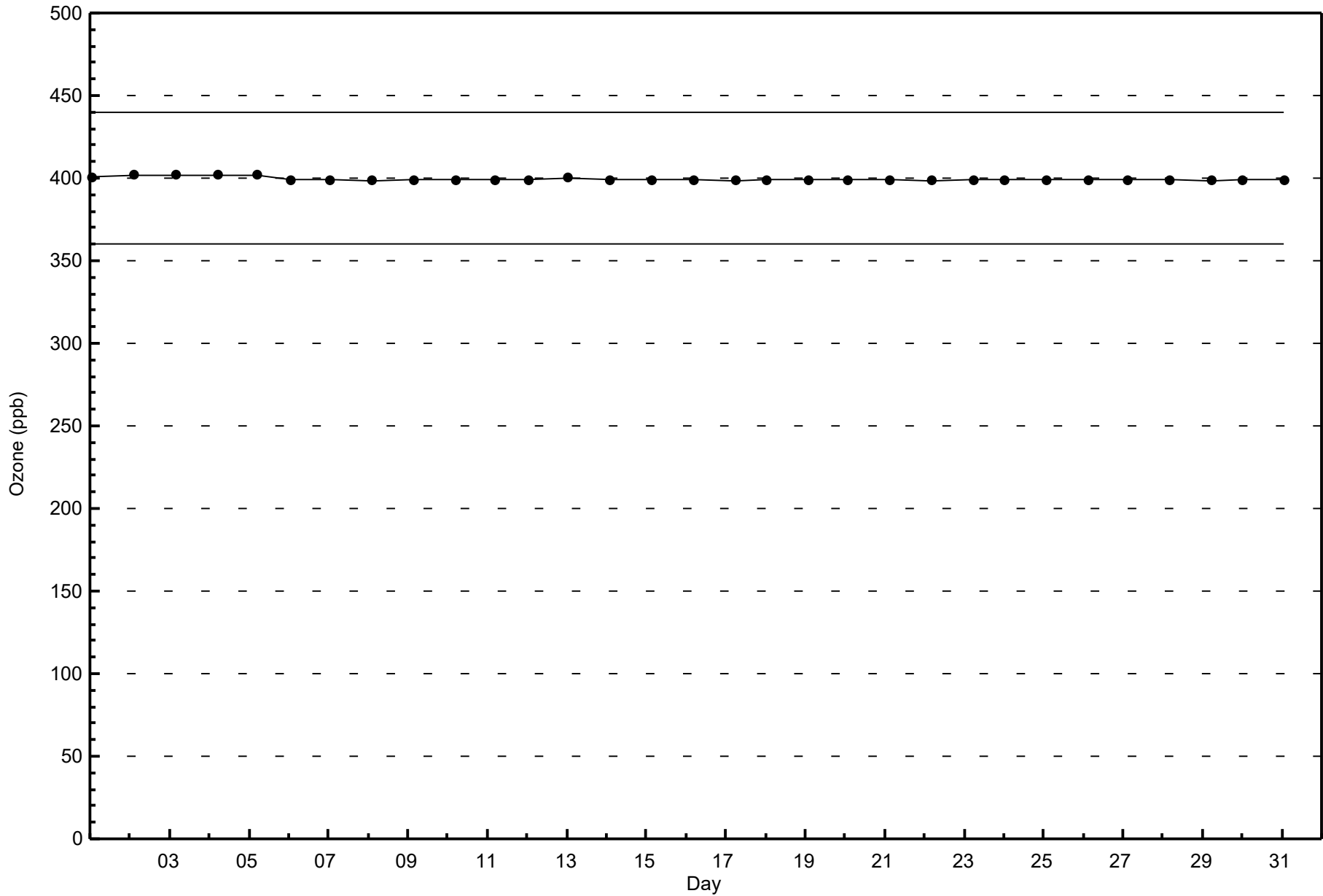






Wood Buffalo Environmental Association
Span Responses

Ozone (O₃) - ppb
Conklin - December 2023





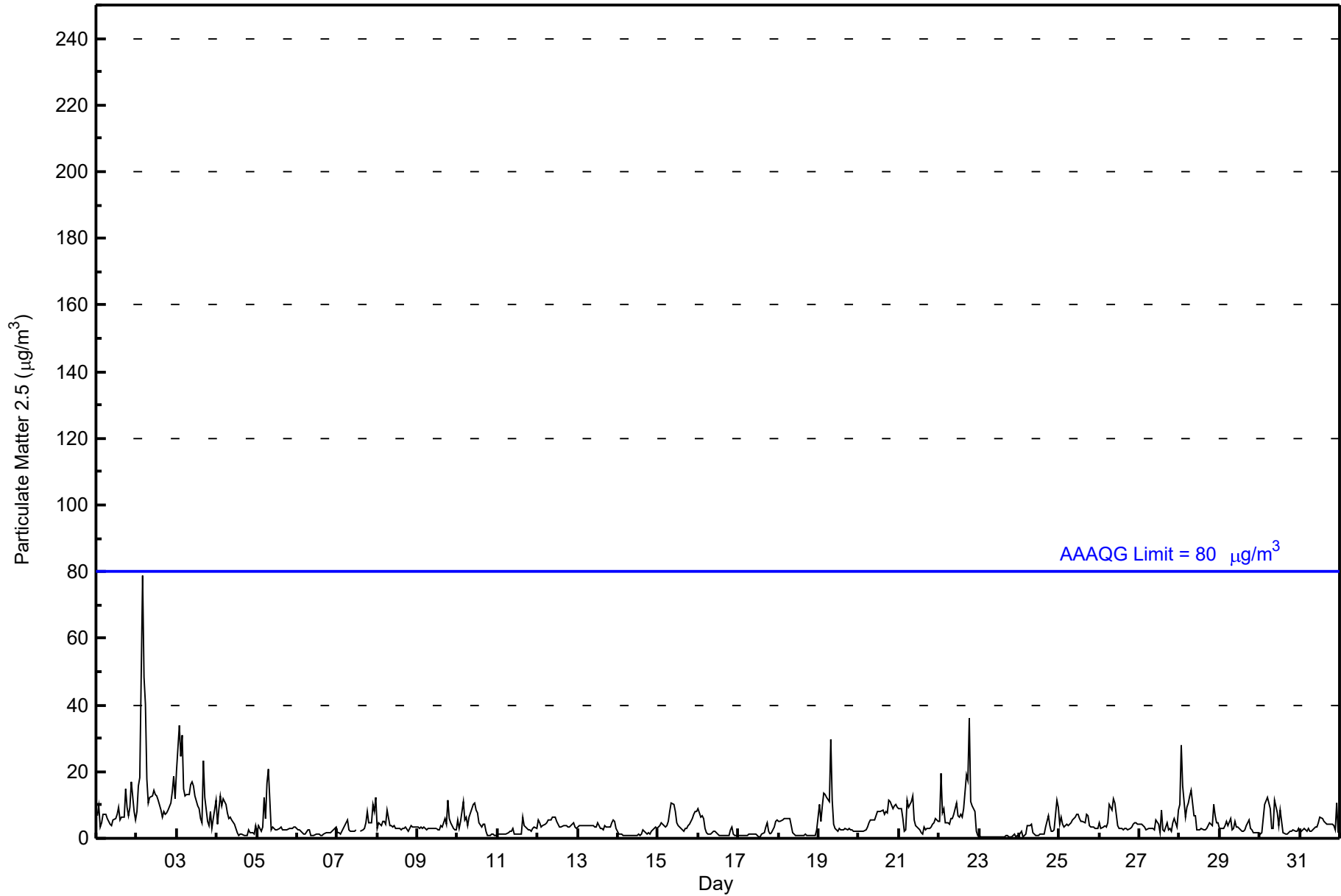
Summary of Hour Averages

Conklin - December 2023

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 78.8 µg/m ³ on Dec 2 04:00	Maximum Daily Average: 17.3 µg/m ³ on Dec 2		Hours of Data:	742
Minimum Value: 0.2 µg/m ³ on Dec 23 09:00	Minimum Daily Average: 0.5 µg/m ³ on Dec 23		Hours of Missing Data:	2
Maximum Diurnal Average: 7.7 µg/m ³ at hour 4	Minimum Diurnal Average: 3.0 µg/m ³ at hour 15		Hours of Calibration:	2
Monthly Average: 4.93 µg/m ³	Percentiles: P ₁ = 0.4 P ₁₀ = 1.0 Q ₁ = 2.1 Median = 3.4 Q ₃ = 5.9 P ₉₀ = 10.3 P ₉₉ = 26.8		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-Dec	6.6	9.6	3.6	4.5	7.0	7.3	5.8	5.1	4.0	3.9	5.6	5.9	7.1	9.1	5.5	6.2	6.3	14.7	9.5	6.9	9.2	17.0	8.0	5.5	7.3	17.0
2-Dec	8.1	15.5	18.3	78.8	48.2	40.4	17.9	10.5	12.3	12.5	14.5	13.1	12.8	11.3	8.5	6.5	8.2	7.3	7.6	8.4	10.4	13.8	18.6	12.0	17.3	78.8
3-Dec	20.6	33.7	24.8	30.8	14.8	12.6	13.0	13.2	16.1	16.8	15.5	12.9	9.9	8.8	6.1	4.6	23.4	12.3	4.9	3.9	7.9	3.2	6.0	11.4	13.6	33.7
4-Dec	4.3	8.9	12.8	9.9	12.0	10.0	7.7	6.1	6.4	5.5	4.4	3.1	1.7	1.0	1.1	1.1	1.0	0.9	1.0	2.4	1.6	1.5	1.1	3.6	4.5	12.8
5-Dec	1.9	3.7	1.9	3.3	12.5	5.9	16.3	20.8	2.6	3.4	3.0	2.7	2.7	2.8	3.4	2.5	2.5	2.7	2.7	2.8	2.9	3.0	3.5	3.4	4.7	20.8
6-Dec	2.8	2.4	2.1	1.6	1.4	1.3	2.4	2.5	1.1	0.9	1.0	1.1	1.3	1.2	1.0	0.9	1.1	1.7	1.7	1.7	1.9	2.1	3.1	3.6	1.7	3.6
7-Dec	1.6	1.8	1.4	2.1	3.7	4.8	5.3	2.4	2.1	2.0	2.1	2.5	C	C	2.0	2.4	2.9	4.8	8.1	4.7	4.5	10.2	8.0	12.4	4.2	12.4
8-Dec	3.0	4.8	4.0	5.3	5.0	4.4	8.3	4.0	3.7	3.5	3.9	3.1	3.0	2.8	2.7	3.1	3.1	3.5	2.3	2.8	3.7	3.2	3.4	3.3	3.7	8.3
9-Dec	3.2	3.1	3.2	3.1	3.4	2.7	3.0	3.2	3.0	3.1	3.0	2.8	2.7	2.6	3.7	3.6	5.9	4.2	11.5	5.9	4.6	2.9	2.5	2.4	3.7	11.5
10-Dec	5.6	2.9	4.9	11.2	5.5	6.5	3.6	6.2	9.0	10.0	10.8	8.3	7.5	4.5	3.4	4.4	4.1	2.2	0.9	0.7	1.1	1.2	0.7	0.8	4.8	11.2
11-Dec	1.1	1.2	1.3	1.2	1.4	1.1	1.6	2.1	1.9	3.1	1.3	1.2	1.3	1.3	1.1	6.4	3.9	2.9	2.4	2.4	2.0	3.0	3.5	2.8	2.2	6.4
12-Dec	5.4	4.5	3.4	3.6	4.1	4.8	5.3	5.5	5.7	6.2	6.2	5.0	4.3	3.5	3.5	3.7	3.8	3.7	3.4	3.3	4.1	4.5	3.2	3.2	4.3	6.2
13-Dec	3.4	3.7	3.6	3.6	3.7	3.7	3.6	3.7	3.8	3.5	3.3	4.6	2.8	2.8	2.7	3.8	3.4	3.6	3.3	4.6	5.3	4.9	2.8	3.7	5.3	5.3
14-Dec	1.3	1.3	1.1	0.9	0.8	0.9	0.8	0.8	0.8	0.8	0.9	0.8	1.2	1.0	1.2	2.7	1.5	1.2	1.7	1.2	2.0	2.7	3.3	3.1	1.4	3.3
15-Dec	3.5	3.7	4.6	3.7	3.3	3.7	5.2	8.2	10.5	10.0	8.1	4.6	3.6	3.3	2.5	2.1	2.8	3.1	3.7	4.4	5.8	7.2	7.8	8.3	5.2	10.5
16-Dec	9.1	6.5	6.9	5.9	2.9	1.9	1.4	1.4	1.6	2.1	2.0	1.7	1.0	0.8	0.8	0.8	0.8	0.8	0.7	2.5	3.4	1.2	0.7	0.8	2.4	9.1
17-Dec	0.7	0.7	0.9	0.8	0.8	1.0	1.1	1.3	1.1	1.1	1.1	0.9	0.6	0.5	1.1	1.6	3.5	4.5	2.2	1.5	1.7	3.6	5.0	5.4	1.8	5.4
18-Dec	5.2	5.3	5.5	5.9	6.0	6.0	6.0	5.8	1.9	1.2	1.0	0.9	0.8	0.7	0.8	0.7	1.3	0.9	0.7	0.7	0.7	0.8	0.8	2.4	2.6	6.0
19-Dec	10.0	5.3	9.9	13.4	13.2	12.3	10.9	29.5	11.3	4.3	2.8	2.3	2.8	2.7	2.5	2.4	2.8	2.7	2.8	2.5	2.3	2.2	2.2	2.3	6.5	29.5
20-Dec	2.3	2.2	2.1	2.1	2.5	3.3	4.5	5.3	5.5	5.6	6.7	8.1	8.1	8.0	8.3	7.4	8.0	7.8	11.6	11.1	9.1	9.9	10.0	9.5	6.6	11.6
21-Dec	8.7	8.8	5.9	2.2	2.4	11.5	9.5	11.2	12.6	5.3	4.0	3.4	2.6	1.6	1.1	3.3	2.5	2.8	3.0	3.3	4.0	4.8	5.8	5.0	5.2	12.6
22-Dec	5.0	19.3	7.5	8.8	4.8	4.6	4.3	5.8	5.9	7.4	10.7	6.6	6.3	7.0	6.5	8.9	19.2	17.2	35.9	10.9	9.7	7.9	2.3	1.0	9.3	35.9
23-Dec	0.7	0.4	0.4	0.5	0.5	0.4	0.4	0.4	0.2	0.3	0.5	0.4	0.4	0.5	0.5	0.6	0.7	0.8	0.6	0.6	0.8	1.3	0.6	0.7	0.5	1.3
24-Dec	1.0	2.0	0.4	0.6	1.3	3.7	3.6	4.1	1.9	1.3	1.0	1.0	1.1	1.1	1.1	1.3	3.4	6.9	3.7	2.1	2.3	2.5	11.5	9.2	2.8	11.5
25-Dec	4.3	6.2	4.1	3.4	4.2	3.9	4.3	4.8	5.5	6.6	7.1	7.4	5.8	5.3	5.2	4.5	7.4	6.7	3.6	3.6	3.6	3.0	3.1	3.0	4.8	7.4
26-Dec	4.8	2.9	3.3	3.7	3.3	4.5	10.4	8.7	11.7	10.5	7.0	3.9	3.1	3.0	2.5	3.1	2.8	2.7	2.8	3.2	4.1	4.5	4.6	4.1	4.8	11.7
27-Dec	4.3	4.1	3.7	3.6	2.6	3.0	2.8	2.8	2.9	2.6	5.7	4.4	1.7	8.4	2.6	2.0	4.8	2.5	2.9	2.0	4.5	5.9	3.5	8.3	3.8	8.4
28-Dec	10.1	28.1	15.8	6.4	9.3	10.7	12.8	14.6	6.7	6.6	2.6	2.6	2.5	2.8	2.7	2.5	2.9	3.6	4.5	3.9	10.2	6.8	4.8	4.5	7.4	28.1
29-Dec	3.1	3.1	3.0	3.7	4.9	3.6	6.0	2.6	2.8	5.2	3.2	3.3	2.6	2.3	2.3	2.7	3.8	5.6	3.0	2.5	1.7	1.8	1.6	1.6	3.2	6.0
30-Dec	1.3	1.7	6.0	10.3	12.1	10.7	9.0	2.8	2.8	11.2	7.5	3.7	8.5	5.1	1.9	1.4	1.3	1.5	2.2	2.0	2.4	2.2	2.1	2.9	4.7	12.1
31-Dec	1.8	2.3	3.2	2.6	2.1	3.0	2.1	2.0	2.8	3.4	3.5	4.5	6.2	5.9	5.2	4.7	4.3	4.2	4.3	4.1	3.8	2.6	10.6	1.6	3.8	10.6
	4.7	6.4	5.5	7.7	6.4	6.3	6.1	6.4	5.2	5.2	4.8	4.0	3.9	3.7	3.0	3.2	4.6	4.5	4.8	3.6	4.2	4.6	4.7	4.5	Diurnal Average	
	20.6	33.7	24.8	78.8	48.2	40.4	17.9	29.5	16.1	16.8	15.5	13.1	12.8	11.3	8.5	8.9	23.4	17.2	35.9	11.1	10.4	17.0	18.6	12.4	Diurnal Maximum	

C - Calibration
 Alberta Ambient Air Quality Guideline/Objectives: 1-hr 80 µg/m³ 24-hr 29 µg/m³





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Conklin - December 2023

Concentration Ranges ($\mu\text{g}/\text{m}^3$)	Number of Hours	%	Cumulative %
0 - 5	533	71.83	71.83
6 - 15	184	24.80	96.63
16 - 25	17	2.29	98.92
26 - 80	8	1.08	100.00
> 81.0	0	0.00	100.00

Total Number of Valid Hours: 742

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Conklin - December 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	1	0	1	1	7	16	24	51	46	118	115	15	30	78	25	5	533
6 - 15	4	2	2	1	2	1	11	28	31	45	31	4	4	3	8	7	184
16 - 25	0	0	1	1	1	0	1	4	3	4	0	0	0	0	1	1	17
26 - 80	0	0	0	2	0	0	0	1	0	2	0	0	0	0	0	3	8
> 81.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	5	2	4	5	10	17	36	84	80	169	146	19	34	81	34	16	742

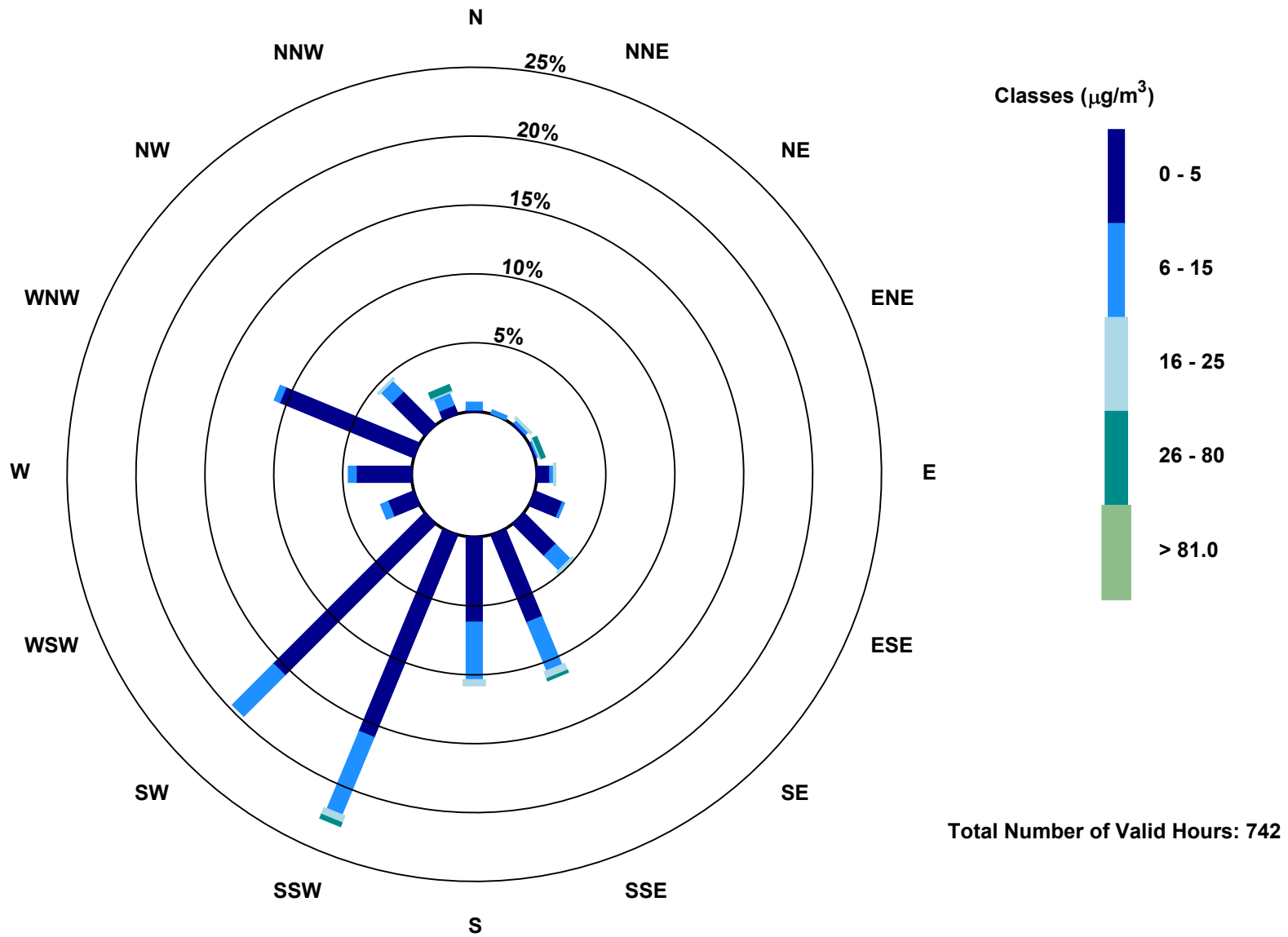
Total Number of Valid Hours: 742

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Dec 2023

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Conklin



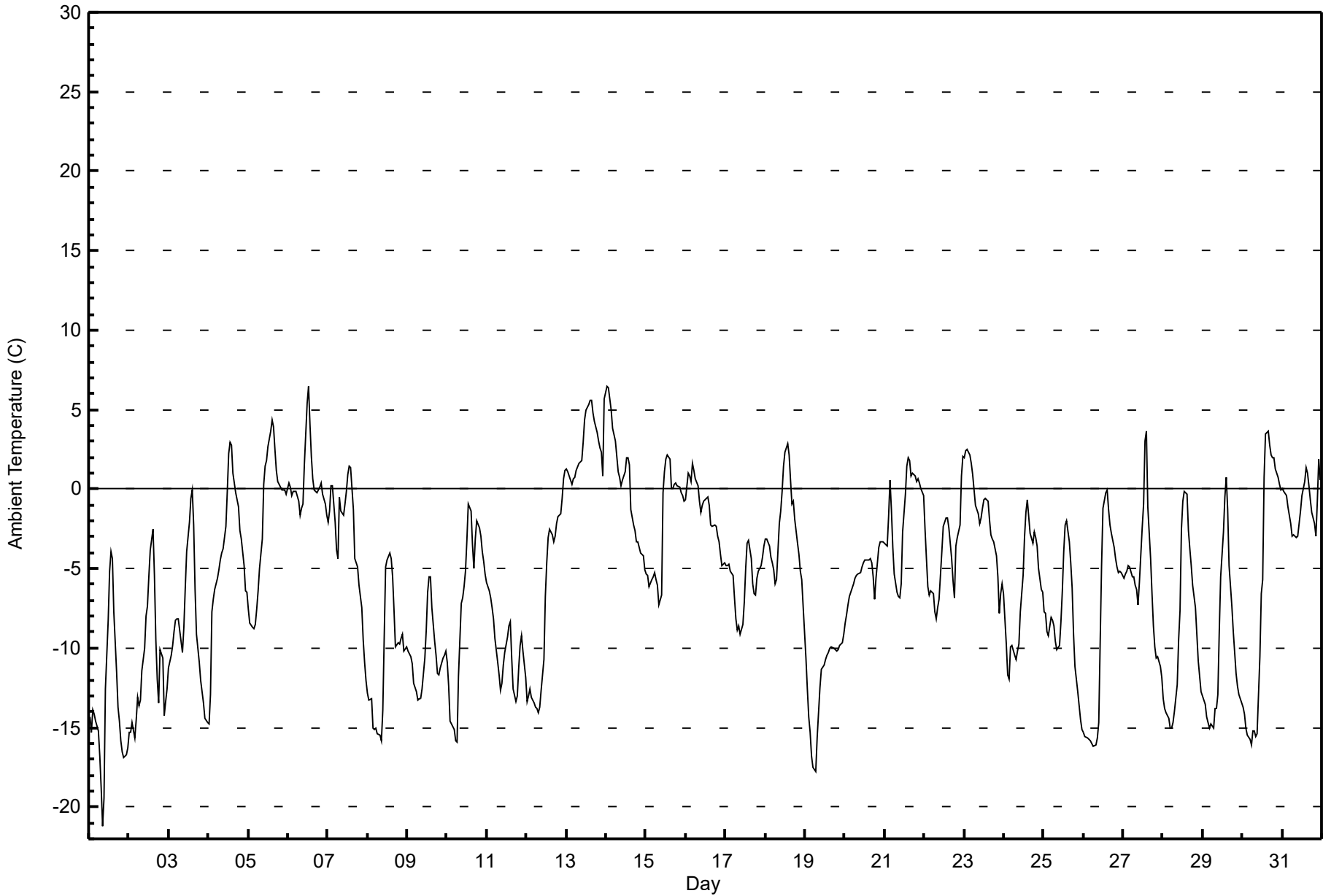


Maximum Value: 6.5 C on Dec 14 01:00 Maximum Daily Average: 2.8 C on Dec 13																						Hours in Service: 744 Hours of Data: 744				
Minimum Value: -21.2 C on Dec 1 09:00 Minimum Daily Average: -13.7 C on Dec 1 Maximum Diurnal Average: -0.7 C at hour 15 Minimum Diurnal Average: -8.6 C at hour 7 Monthly Average: -5.67 C Percentiles: P ₁ = -16.7 P ₁₀ = -14.0 Q ₁ = -10.1 Median = -5.1 Q ₃ = -0.9 P ₉₀ = 1.2 P ₉₉ = 5.4																						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-Dec	-14.4	-15.3	-13.9	-14.1	-14.6	-15.2	-16.8	-18.8	-21.2	-19.4	-12.6	-8.3	-5.2	-3.9	-4.3	-7.7	-11.5	-13.7	-14.6	-15.9	-16.5	-16.9	-16.7	-16.3	-13.7	-3.9
2-Dec	-15.3	-15.3	-14.6	-15.7	-14.5	-13.1	-13.7	-13.3	-11.4	-10.0	-8.0	-7.3	-5.5	-3.8	-2.6	-5.5	-9.5	-12.0	-13.5	-10.1	-10.6	-14.3	-13.3	-12.6	-11.1	-2.6
3-Dec	-11.2	-10.4	-9.8	-9.0	-8.2	-8.2	-8.1	-9.6	-10.2	-8.7	-6.2	-4.0	-2.1	-0.6	-0.1	-2.3	-6.3	-9.1	-10.9	-12.0	-12.8	-13.4	-14.4	-14.7	-8.4	-0.1
4-Dec	-14.8	-12.9	-7.7	-7.0	-6.3	-5.6	-5.1	-4.5	-4.1	-3.7	-2.4	-0.1	2.2	2.9	2.8	1.0	-0.3	-0.7	-1.1	-2.6	-3.1	-4.8	-6.4	-6.5	-3.8	2.9
5-Dec	-7.6	-8.4	-8.7	-8.8	-8.5	-7.6	-6.4	-5.0	-3.1	0.3	1.5	1.8	2.7	3.7	4.4	3.9	2.5	1.2	0.5	0.1	-0.1	-0.1	-0.1	-0.3	-1.8	4.4
6-Dec	0.4	0.1	-0.4	-0.1	-0.1	-0.2	-0.8	-1.6	-1.2	-0.9	1.5	5.5	6.5	4.1	2.1	0.7	0.0	-0.2	-0.1	0.1	0.4	-0.3	-0.9	-1.6	0.5	6.5
7-Dec	-2.1	-1.4	0.2	0.2	-2.0	-3.9	-4.4	-0.5	-1.3	-1.7	-0.9	-0.1	0.9	1.5	1.3	-1.3	-4.4	-4.7	-4.9	-6.0	-7.5	-9.5	-10.9	-12.0	-3.1	1.5
8-Dec	-12.8	-13.3	-13.2	-15.1	-15.2	-15.0	-15.4	-15.5	-15.9	-13.9	-9.3	-4.9	-4.5	-4.0	-4.4	-5.5	-7.7	-9.9	-9.7	-9.8	-9.4	-9.2	-10.2	-10.0	-10.6	-4.0
9-Dec	-10.2	-10.3	-10.6	-11.0	-12.3	-12.8	-13.3	-13.2	-13.2	-12.6	-10.6	-8.9	-6.5	-5.5	-5.5	-7.5	-9.6	-10.5	-11.6	-11.7	-11.3	-10.6	-10.5	-10.2	-10.4	-5.5
10-Dec	-10.9	-12.4	-14.6	-14.9	-15.1	-15.9	-16.0	-11.8	-7.2	-6.8	-6.1	-5.2	-3.2	-0.9	-1.3	-3.5	-5.0	-3.1	-2.0	-2.5	-3.0	-4.0	-4.6	-5.3	-7.3	-0.9
11-Dec	-5.8	-6.4	-6.9	-7.5	-8.2	-9.4	-10.9	-11.7	-12.7	-12.2	-11.1	-10.3	-9.4	-8.6	-8.4	-10.6	-12.6	-13.3	-13.0	-11.3	-9.8	-9.2	-10.2	-11.8	-10.1	-5.8
12-Dec	-13.4	-13.0	-12.6	-13.1	-13.4	-13.7	-13.8	-14.1	-13.7	-12.7	-10.7	-6.8	-4.6	-3.1	-2.5	-2.9	-3.3	-3.0	-2.2	-1.7	-1.6	-0.6	0.6	1.2	-7.3	1.2
13-Dec	1.3	1.1	0.6	0.3	0.7	0.8	1.2	1.6	1.7	1.8	3.0	4.3	5.0	5.3	5.6	5.6	4.8	4.2	3.5	3.0	2.6	2.3	0.8	5.7	2.8	5.7
14-Dec	6.5	6.4	5.7	5.0	3.8	3.0	2.1	1.1	0.7	0.2	0.5	1.1	1.9	2.0	1.5	-1.3	-2.2	-2.6	-3.3	-3.3	-3.7	-4.0	-4.2	-5.1	0.5	6.5
15-Dec	-5.3	-5.4	-6.2	-5.7	-5.5	-5.3	-5.7	-6.0	-7.3	-6.7	-0.3	1.1	1.9	2.2	1.9	0.0	0.0	0.3	0.4	0.2	0.1	-0.2	-0.4	-0.7	-2.2	2.2
16-Dec	-0.7	1.0	0.8	0.5	1.6	1.2	0.7	0.2	-0.8	-1.5	-1.1	-0.8	-0.6	-0.5	-1.0	-2.2	-2.3	-2.3	-2.4	-2.9	-3.3	-4.1	-4.8	-4.7	-1.3	1.6
17-Dec	-4.8	-4.8	-4.7	-5.1	-5.5	-6.9	-8.2	-8.9	-8.6	-9.2	-8.5	-7.1	-5.0	-3.4	-3.2	-4.4	-5.9	-6.6	-6.6	-5.6	-5.2	-4.8	-4.3	-3.6	-5.9	-3.2
18-Dec	-3.2	-3.2	-3.6	-4.3	-4.7	-5.0	-5.9	-5.7	-2.1	-1.4	-0.1	1.4	2.3	2.9	2.2	0.6	-0.9	-0.8	-1.9	-3.4	-4.1	-5.1	-5.7	-7.3	-2.5	2.9
19-Dec	-10.6	-12.6	-14.4	-15.3	-16.8	-17.5	-17.8	-15.7	-14.1	-12.5	-11.4	-11.1	-10.7	-10.5	-10.3	-10.0	-9.9	-10.0	-10.1	-10.2	-10.1	-9.9	-9.6	-9.1	-12.1	-9.1
20-Dec	-8.5	-7.9	-7.3	-6.8	-6.2	-5.9	-5.6	-5.5	-5.3	-5.2	-4.9	-4.6	-4.4	-4.4	-4.5	-4.4	-4.6	-5.5	-6.9	-5.6	-3.6	-3.3	-3.3	-3.3	-5.3	-3.3
21-Dec	-3.4	-3.6	-1.8	0.6	-1.3	-3.7	-5.3	-6.5	-6.8	-6.9	-5.9	-2.7	-0.3	1.5	2.0	1.8	0.8	1.0	0.8	0.5	0.7	0.4	0.1	-0.4	-1.6	2.0
22-Dec	-2.5	-4.4	-6.1	-6.6	-6.4	-6.6	-7.7	-8.2	-7.4	-6.9	-4.0	-2.4	-2.1	-1.8	-1.8	-2.4	-4.3	-5.8	-6.9	-3.6	-3.0	-2.3	0.8	2.1	-4.2	2.1
23-Dec	1.9	2.4	2.5	2.2	1.6	0.9	0.0	-1.0	-1.6	-2.1	-1.8	-1.2	-0.7	-0.5	-0.8	-1.9	-2.9	-3.2	-3.3	-4.2	-5.5	-7.8	-6.6	-6.0	-1.6	2.5
24-Dec	-6.5	-9.7	-11.6	-11.9	-9.9	-9.8	-10.5	-10.7	-10.2	-9.8	-7.7	-5.4	-3.0	-1.5	-0.7	-1.7	-2.8	-3.4	-2.7	-3.0	-3.6	-5.0	-6.3	-6.5	-6.4	-0.7
25-Dec	-7.7	-7.8	-9.0	-9.3	-8.0	-8.2	-8.6	-9.6	-10.1	-9.9	-8.3	-6.4	-3.9	-2.3	-2.0	-3.3	-4.6	-6.2	-9.1	-11.2	-12.7	-13.6	-14.5	-15.1	-8.4	-2.0
26-Dec	-15.3	-15.5	-15.7	-15.8	-15.9	-16.0	-16.2	-16.1	-15.6	-14.6	-9.6	-4.8	-1.2	-0.2	0.0	-1.3	-2.3	-2.7	-3.7	-4.3	-4.9	-5.2	-5.2	-5.2	-8.6	0.0
27-Dec	-5.6	-5.4	-5.2	-4.8	-4.9	-5.5	-5.5	-6.0	-6.3	-7.3	-5.9	-2.4	-0.9	3.0	3.7	-1.1	-4.4	-6.6	-8.6	-10.0	-10.6	-10.5	-11.2	-11.9	-5.6	3.7
28-Dec	-13.2	-13.8	-14.0	-14.4	-15.1	-15.1	-14.7	-14.0	-12.3	-9.5	-7.7	-2.5	-0.8	-0.2	-0.3	-2.6	-3.8	-4.8	-6.0	-7.4	-9.1	-10.8	-11.8	-12.7	-9.0	-0.2
29-Dec	-13.0	-13.5	-14.3	-14.7	-15.0	-14.8	-15.1	-13.8	-13.8	-12.9	-9.0	-5.5	-2.7	-0.5	0.7	-1.3	-4.9	-7.4	-8.9	-10.2	-11.6	-12.4	-12.9	-13.5	-10.0	0.7
30-Dec	-13.7	-14.2	-15.0	-15.5	-15.7	-16.1	-15.2	-15.2	-15.6	-15.4	-10.6	-6.6	-5.7	0.7	3.5	3.7	2.8	2.2	2.0	2.0	1.3	0.8	0.3	0.0	-6.5	3.7
31-Dec	0.1	-0.2	-0.4	-1.1	-1.6	-2.2	-3.0	-2.8	-3.0	-3.0	-2.1	-1.3	-0.4	0.5	1.4	1.0	0.2	-0.7	-1.5	-2.2	-3.0	-0.8	1.9	0.6	-1.0	1.9
																								Diurnal Average		
																								Diurnal Maximum		



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature (AT) - C
Conklin - December 2023





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C
Conklin - December 2023**

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	1	0.13	0.13
-20 - 0	611	82.12	82.26
0 - 10	132	17.74	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association
Summary of Hour Averages

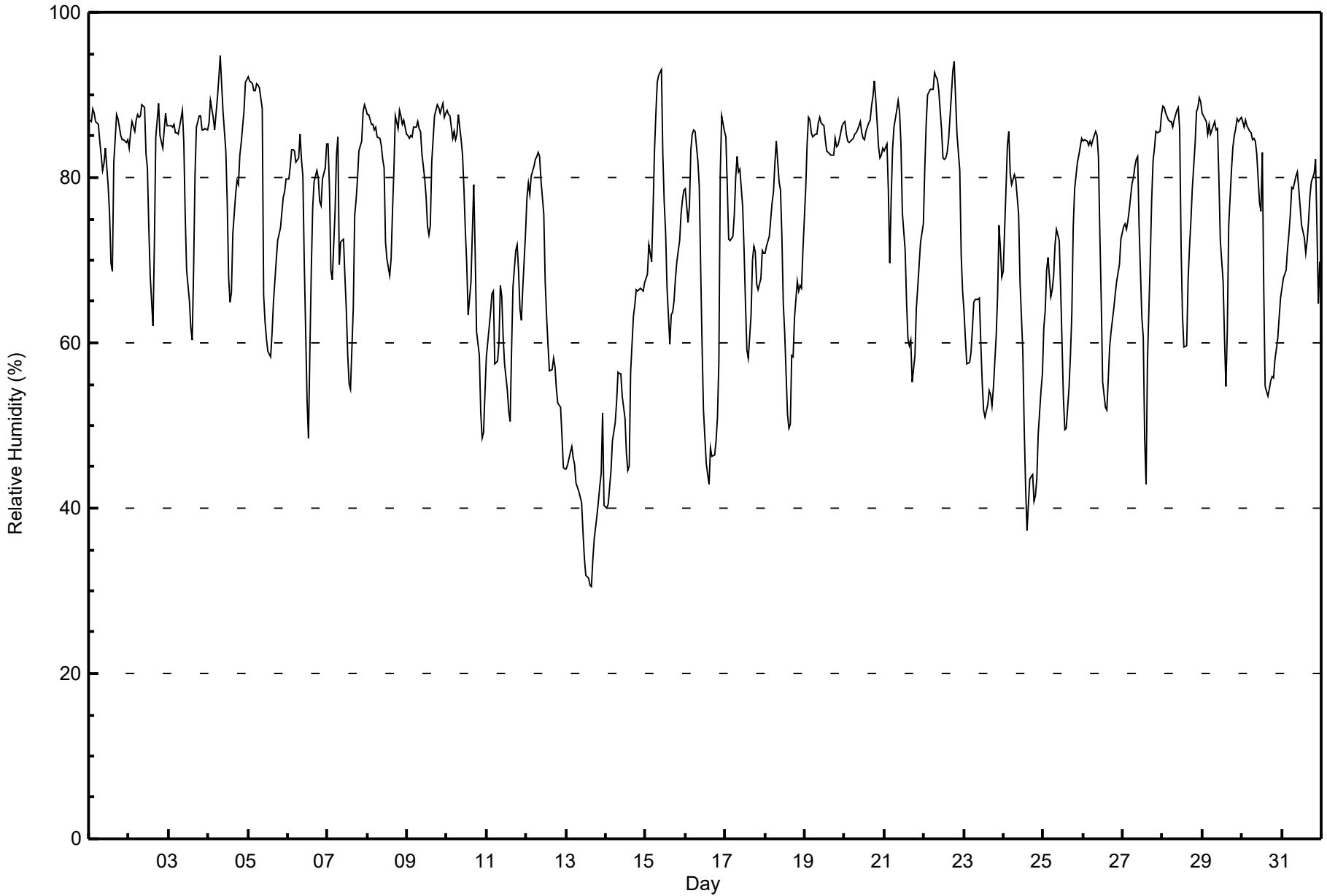
Relative Humidity (RH) - %
Conklin - December 2023

Maximum Value: 94.7 % on Dec 4 08:00 Maximum Daily Average: 86.1 % on Dec 22																						Hours in Service:	744			
Minimum Value: 30.5 % on Dec 13 16:00 Minimum Daily Average: 40.3 % on Dec 13																						Hours of Data:	744			
Maximum Diurnal Average: 81.0 % at hour 8 Minimum Diurnal Average: 59.2 % at hour 15																						Hours of Missing Data:	0			
Monthly Average: 73.48 % Percentiles: P ₁ = 37.2 P ₁₀ = 52.4 Q ₁ = 64.7 Median = 77.7 Q ₃ = 85.2 P ₉₀ = 87.6 P ₉₉ = 92.1																						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-Dec	87.0	86.8	88.3	87.8	86.8	86.4	84.4	82.7	80.9	81.7	83.5	79.1	75.6	69.6	68.7	81.8	87.7	87.2	86.1	85.0	84.7	84.6	84.3	84.6	83.1	88.3
2-Dec	83.5	85.4	86.8	85.5	87.0	87.6	87.3	87.5	88.8	88.5	82.9	81.2	74.0	68.1	62.1	72.0	85.0	86.9	88.9	85.0	83.6	85.8	87.8	86.2	83.2	88.9
3-Dec	86.4	86.3	86.2	86.4	85.5	85.5	85.2	87.2	88.2	84.2	75.4	68.8	65.1	61.9	60.4	69.0	80.3	86.1	87.4	87.5	85.8	85.8	85.9	85.8	81.1	88.2
4-Dec	86.7	89.2	88.4	87.2	85.7	89.7	92.0	94.7	91.4	88.0	83.3	77.0	68.0	65.0	66.1	73.2	78.0	79.6	79.2	82.7	84.2	88.2	91.6	91.8	83.4	94.7
5-Dec	92.3	91.6	91.4	90.5	90.5	91.4	91.2	90.8	88.3	65.8	62.5	60.5	59.0	58.3	61.1	64.9	67.5	70.0	72.5	74.0	75.8	77.7	78.3	79.8	76.9	92.3
6-Dec	79.9	81.4	83.5	83.4	83.3	81.8	82.4	85.3	82.2	80.1	69.6	53.0	48.5	59.0	68.7	76.3	79.4	80.9	80.0	77.2	76.6	79.8	81.2	84.0	76.6	85.3
7-Dec	84.0	78.7	68.9	67.7	75.9	82.8	84.9	69.4	72.2	72.5	68.2	64.0	58.6	55.1	54.5	64.2	75.4	77.3	79.9	83.2	84.4	88.0	88.8	88.3	74.4	88.8
8-Dec	87.6	87.7	86.4	86.4	85.8	86.0	84.9	84.7	83.8	82.3	81.1	72.1	70.2	68.1	70.2	75.9	81.0	87.4	85.9	88.1	87.4	86.5	87.0	85.3	82.6	88.1
9-Dec	85.1	84.7	85.0	85.0	86.2	86.1	86.9	86.0	85.6	83.0	79.9	77.7	74.0	73.1	74.3	81.9	87.5	88.1	88.8	88.5	87.7	89.0	87.3	87.9	84.1	89.0
10-Dec	88.2	87.6	87.5	84.7	85.7	84.6	85.2	87.6	84.7	82.7	78.7	73.5	69.4	63.5	67.3	73.4	79.2	71.0	61.4	58.5	51.5	48.5	49.2	53.9	73.2	88.2
11-Dec	58.3	61.9	63.7	66.0	66.2	57.5	57.8	60.0	66.9	65.6	60.7	57.4	54.3	51.8	50.5	59.1	66.7	71.2	71.9	68.7	64.1	62.7	66.6	73.3	62.6	73.3
12-Dec	77.6	79.3	78.0	80.1	81.4	82.2	82.6	83.1	82.6	79.6	75.7	67.4	63.3	59.8	56.7	56.7	58.1	57.1	54.5	52.7	52.2	48.6	44.9	44.7	66.6	83.1
13-Dec	44.8	45.3	46.7	47.5	46.2	45.3	43.0	42.0	41.3	40.7	37.2	33.9	31.9	31.4	30.8	30.5	33.7	36.3	39.1	40.9	42.8	44.3	51.5	40.4	40.3	51.5
14-Dec	39.9	40.5	42.5	44.6	48.1	50.4	52.9	56.4	56.2	56.2	53.6	50.8	46.6	44.5	45.1	56.5	63.2	64.5	66.4	66.3	66.5	66.6	66.3	67.3	54.7	67.3
15-Dec	67.8	68.3	71.9	69.9	76.0	83.1	87.6	91.6	92.3	93.1	82.8	77.0	73.2	66.6	59.8	63.3	63.7	65.1	67.7	69.8	72.4	75.6	77.2	78.4	74.8	93.1
16-Dec	78.6	74.5	76.7	83.4	85.2	85.7	85.7	82.0	79.0	69.1	59.8	51.9	45.4	44.0	42.9	47.3	46.2	46.5	48.1	51.1	57.6	80.6	87.5	85.6	66.4	87.5
17-Dec	84.9	79.0	72.5	72.4	72.8	75.4	80.1	82.5	80.7	81.0	76.4	71.1	64.7	59.1	58.1	63.4	70.0	71.6	71.0	67.1	66.4	67.8	71.2	70.8	72.1	84.9
18-Dec	70.9	71.7	72.9	75.0	77.0	78.3	81.8	84.5	79.5	78.4	72.9	64.7	61.2	51.4	49.6	50.2	58.5	58.3	63.1	67.5	66.2	66.9	66.7	71.2	68.3	84.5
19-Dec	78.6	84.1	87.4	87.0	85.4	84.9	85.2	85.2	86.7	87.3	86.6	86.2	84.6	83.2	83.0	82.9	82.8	82.6	84.7	83.8	83.9	84.7	86.2	86.6	84.7	87.4
20-Dec	86.8	85.2	84.4	84.3	84.6	84.8	85.3	85.4	85.7	86.8	85.4	84.7	84.5	85.5	86.6	87.0	88.6	89.8	91.7	89.5	83.7	82.4	82.8	83.5	85.8	91.7
21-Dec	83.3	84.0	78.5	69.7	77.2	83.3	86.0	88.1	89.3	88.0	84.1	75.8	71.3	64.9	60.5	59.6	60.3	55.3	58.5	64.3	66.8	69.5	72.2	74.4	73.5	89.3
22-Dec	81.1	86.5	90.0	90.4	90.7	90.8	92.7	92.2	91.8	90.5	85.8	82.4	82.2	82.4	83.1	84.7	90.0	92.8	94.1	89.7	85.2	80.9	70.7	66.2	86.1	94.1
23-Dec	63.9	60.6	57.4	57.7	58.9	61.7	64.9	65.2	65.3	65.4	59.9	55.3	51.8	51.0	52.5	54.3	53.7	52.4	54.7	60.9	65.7	74.2	71.3	68.0	60.3	74.2
24-Dec	68.7	78.6	83.9	85.6	80.4	79.1	80.4	79.7	77.6	75.6	67.5	59.0	49.6	42.5	37.3	40.5	43.6	44.1	40.8	41.6	43.6	49.1	54.3	56.3	60.8	85.6
25-Dec	61.8	64.0	68.8	70.3	65.7	66.4	68.2	71.9	73.8	72.4	66.6	59.9	53.2	49.6	49.7	54.6	58.5	63.6	74.0	78.7	81.8	82.8	83.7	84.7	67.7	84.7
26-Dec	84.4	84.7	84.4	84.0	84.3	83.9	84.7	85.6	85.0	82.5	73.3	65.2	55.2	52.2	51.8	55.7	59.6	61.3	64.2	66.0	67.4	68.5	69.4	72.6	71.9	85.6
27-Dec	74.0	74.5	73.7	74.8	76.2	79.4	80.0	81.4	82.2	82.5	74.2	63.1	60.7	48.5	42.9	57.8	70.1	77.4	82.1	83.6	85.7	85.5	85.5	87.6	74.3	87.6
28-Dec	88.7	88.5	87.8	87.0	86.8	86.8	86.1	86.9	88.2	88.5	85.8	71.6	63.2	59.6	59.6	67.6	71.4	74.8	78.7	84.1	88.0	88.5	89.6	89.2	81.1	89.6
29-Dec	87.9	87.2	86.7	85.3	86.5	85.3	86.3	86.8	85.7	85.9	79.8	72.3	67.5	60.4	54.7	61.6	74.2	81.0	83.8	85.1	85.9	87.2	86.9	87.3	80.5	87.9
30-Dec	86.7	86.1	87.0	86.3	85.6	85.5	84.5	84.8	84.4	82.8	77.0	76.0	83.0	66.8	54.8	53.6	54.5	55.5	55.9	55.8	58.0	60.5	63.1	65.5	72.2	87.0
31-Dec	66.5	67.8	68.8	71.4	73.3	75.6	78.8	78.7	80.2	80.6	78.6	76.4	74.2	72.7	70.9	72.3	74.8	77.8	79.5	80.6	82.3	73.9	64.7	69.9	74.6	82.3
																						Diurnal Average				
																						Diurnal Maximum				



Wood Buffalo Environmental Association
Hourly Averages

Relative Humidity (RH) - %
Conklin - December 2023





Maximum Speed: 22 km/h on Dec 15 22:00	Maximum Daily Speed Average: 11.4 km/h on Dec 15	Hours in Service: 744
Minimum Speed Value: 0 km/h on Dec 26 07:00	Minimum Daily Speed Average: 0.9 km/h on Dec 22	Hours of Data: 744
Maximum Diurnal Speed Average: 6.6 km/h at hour 20	Minimum Diurnal Speed Average: 4.1 km/h at hour 3	Hours of Missing Data: 0
Monthly Average Velocity: 5.1 km/h 218.9 deg	Percentiles: P ₁ = 0 P ₁₀ = 1 Q ₁ = 3 Median = 7 Q ₃ = 10 P ₉₀ = 13 P ₉₉ = 18	Percent Operational Time: 100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Dec	SSE3	S4	S4	S4	S4	SSE3	SSE3	SSE2	ESE2	SE3	S6	SSE5	S4	SSW9	SSW5	SSE1	WSW0	NNW1	SSE1	NNW1	N1	S1	SSE1	SSE2	S2.5	SSW9	
2-Dec	SSE3	NW1	SE2	ENE2	ENE1	SSE2	SSE3	SE1	SE3	SE1	S4	SSE5	SSW1	NE1	S3	SW2	S1	S1	SSE2	SSW6	SSW3	SSW4	SSW5	SSW5	S2.2	SSW6	
3-Dec	SSW5	SSW4	SSW4	SSW4	SSW4	SSW4	SSW4	SSW3	S3	SSW5	S5	S5	SW5	SW5	SSW5	S6	SE5	SSE3	SSE3	SSE3	SE5	SSE4	SSE3	SSE1	S3	S3.8	S6
4-Dec	ESE2	SSE4	SSW7	SSW7	SSW9	SSW10	SSW12	SW13	SW12	SW11	SW10	SW9	WSW11	WSW11	WSW11	SW8	SW7	SW6	SW8	SW8	SSW7	SSW5	S6	SSE5	S5	SW7.4	SW13
5-Dec	SE5	SSE5	SE4	SE4	S3	W1	SSE3	SSE3	SSE4	S8	SSW5	SSW11	SW9	SW7	SSW5	SW8	SW10	SW12	SW11	SW13	SW14	SW12	SW13	SW13	SSW6.7	SW14	
6-Dec	SW13	SW11	SW11	SW12	SW13	SW11	SW9	SSW8	SW12	SW12	SW11	WSW11	W12	SW7	SW9	SW10	SW11	SW11	SW11	SW10	SW11	SW8	SSW4	SSE4	SW9.7	SW13	
7-Dec	SSW1	NNW3	NW4	WSW3	NW0	ESE1	SSE3	WNW8	NW4	WNW5	WNW6	WNW5	WNW5	WNW5	W4	W3	WNW3	WNW2	NW3	NW1	SSW2	SSE2	S2	SSE2	WNW2.4	WNW8	
8-Dec	S2	SSW4	SSW4	ESE1	SSE2	SSW4	S2	S1	S2	SSW3	SSW6	SW4	W5	WNW5	WNW4	WSW5	SW4	SSW6	SSW6	S6	S7	SW6	SW6	SW7	SSW3.5	SW7	
9-Dec	SW8	SW8	SW7	SSW7	SSW7	SSW6	SSW6	SSW7	SSW6	SSW6	SW9	SW10	WSW7	SW8	SSW6	SSE5	SE3	ESE2	SE0	SE2	SE2	SE4	SE4	SSE2	SSW4.8	SW10	
10-Dec	S2	SSE2	S0	SSE3	ESE3	SSE1	E1	S7	SSW15	SSW12	SSW13	SW16	WSW12	W11	W8	SW8	SW8	WSW11	W13	W12	WNW13	WNW13	WNW13	WNW11	WSW6.4	SW16	
11-Dec	NW11	WNW12	NW13	NW12	NW13	NW17	NW11	NW9	WNW5	W6	W8	W8	W7	W6	W7	SW2	S5	S7	SSE6	SSW6	SSW10	SSW6	SSW4	SE4	W5.3	NW17	
12-Dec	SSW1	S4	SSW9	SW10	SSW10	SW10	SW9	SSW10	SSW10	SSW8	S8	SSW5	SSW10	SSW14	SSW14	SSW14	SSW12	SW12	SW15	SSW17	SSW16	SSW15	SSW17	SW14	SSW11.0	SSW17	
13-Dec	SW14	SW15	SSW15	SSW15	SSW15	SW15	SW14	SW13	SW13	SSW15	SSW13	SSW8	SSW9	SW6	SSW12	SW14	WSW6	SW6	SW5	SW7	SSW5	SW5	ESE2	WNW7	SW10.0	SSW15	
14-Dec	WNW8	W10	WNW8	WNW7	WNW7	W8	WNW9	WNW8	W8	WNW8	WNW8	WNW6	W6	W6	W5	SSW6	SW8	SW6	SW8	SW11	SW11	SSW9	SSW6	SSW7	WSW6.4	SW11	
15-Dec	SSW9	SSW7	S6	SW9	SW11	SW10	SSW9	SSW5	E1	S2	SW11	SSW13	SSW16	SSW16	S9	SE8	S10	SSW13	SSW18	SSW20	SSW21	SW22	SW21	SW18	SSW11.4	SW22	
16-Dec	SW15	SW12	SW13	SW10	WNW10	W9	WNW8	WNW7	NW7	NW5	NW8	WNW8	WNW8	WNW7	WNW5	W5	W7	W7	WNW5	NW2	WNW4	NW8	WNW6	W7	W6.8	SW15	
17-Dec	W9	WNW11	NW13	WNW10	NW8	NW7	WNW5	W6	WSW7	SW8	SW11	SW10	SW11	WSW11	SW11	SSW9	SSW9	SSW10	SSW15	SSW15	SSW15	SSW16	SSW20	SW8.2	SSW20		
18-Dec	SSW17	SSW16	SW16	SW14	SW11	SW11	SW8	SW6	WNW6	WNW7	WNW7	WNW7	W7	WNW7	WNW7	WSW7	SW7	W8	WNW5	WNW5	NW4	WNW4	WNW5	NW3	WSW6.6	SSW17	
19-Dec	NW3	NNW0	WSW1	SSW1	WNW0	SSW1	S1	NNW2	NNW3	N3	E5	ESE7	E6	E7	E7	E6	ESE7	ESE10	ESE9	ESE10	ESE9	SE8	ESE7	SE9	ESE4.1	ESE10	
20-Dec	SE11	SE10	SE9	SE8	SSE8	SSE8	S8	S8	S9	S6	S8	SSW10	SSW13	SSW10	SSW12	SSW8	S9	SSE5	SE4	SSE6	SSW8	SSW11	SW13	SW14	S7.9	SW14	
21-Dec	SW13	SW12	WNW8	WNW10	WNW5	SSW7	SSW8	SSW9	SSW9	SSW7	S7	S6	S8	SSW11	SSW14	SSW11	S9	S12	SSW16	SSW14	SSW17	SSW18	SSW16	SSW7	SSW9.6	SSW18	
22-Dec	ESE3	ENE1	ENE1	ESE3	NNW1	E1	SSE1	SE2	SSE1	NW0	SE2	SSE3	S1	N0	SE2	NNE0	E2	NE2	NNW1	SW8	SW9	WSW6	NW9	WNW9	SW0.9	SW9	
23-Dec	WNW9	WNW10	WNW11	WNW12	WNW12	WNW11	WNW11	WNW12	WNW11	WNW11	WNW10	WNW10	WNW10	WNW10	WNW11	WNW10	WNW8	WNW6	WNW8	W8	WSW7	WSW6	W4	WNW7	WNW8	WNW9.0	WNW12
24-Dec	SW5	S5	SSE6	S6	SW10	SSW10	SSW11	SSW10	SSW11	SSW13	SW13	SW17	SW16	SW14	SW14	SW10	SSW9	S7	SSW15	SSW15	SW7	NNW2	NNW3	W4	SW8.9	SW17	
25-Dec	S0	SW0	NE1	NNW1	S5	SW5	SSW8	SW10	SSW11	SSW12	SSW11	SSW10	SSW8	SSW6	SSW7	SSW7	SSW7	S4	SE3	SSE2	SE4	SSE4	SSE3	SSE2	SSW5.0	SSW12	
26-Dec	SSE4	SSE3	SSE3	SSE3	SSE2	SSW0	NW0	SSE2	NW1	NNW0	SE2	SE3	SSW5	SSW8	SW8	SSW7	SSW10	SW13	SW13	SW11	SSW9	SW13	SW12	SW9	SSW5.3	SW13	
27-Dec	SW11	SW11	SW10	SW10	SW9	SSW10	SSW12	SSW8	SSE4	S1	S1	SE4	S2	S6	SE3	SSE4	S3	SSE4	SSE4	SSW1	SE2	SE2	W0	SSW5.0	SSW12		
28-Dec	NNW3	NNW1	NNW3	S1	WNW1	SW1	NNW2	NW0	NW1	S1	SSE1	NW4	WNW4	NW4	NW5	WNW2	WNW3	NW3	NW3	WNW2	NW2	SSW1	ESE1	SSW1	NW1.6	NW5	
29-Dec	SSE1	S2	S3	S3	SSE3	SSE3	S3	SSE5	SSE3	SSE5	SSE4	SSE5	SSW6	WSW5	SW4	S2	ENE1	NE0	SSE2	SE2	SSE3	S2	SSE3	SSE2	S2.7	SSW6	
30-Dec	SSE3	SSE2	S1	E0	N1	S1	SSE3	SE3	S1	N1	SSE3	S1	NNE1	SSE10	S13	S12	SSE13	SSE14	S14	S15	S15	S11	SSE8	S8	S6.1	S15	
31-Dec	S12	SSW8	SSW6	SSW4	SSW5	S6	SW5	SSW10	SSW10	SSW10	SSW9	SW7	SW9	SW7	SW8	SW8	SW9	SW10	SW12	SW12	SW10	WSW10	W13	WNW9	SW7.9	W13	

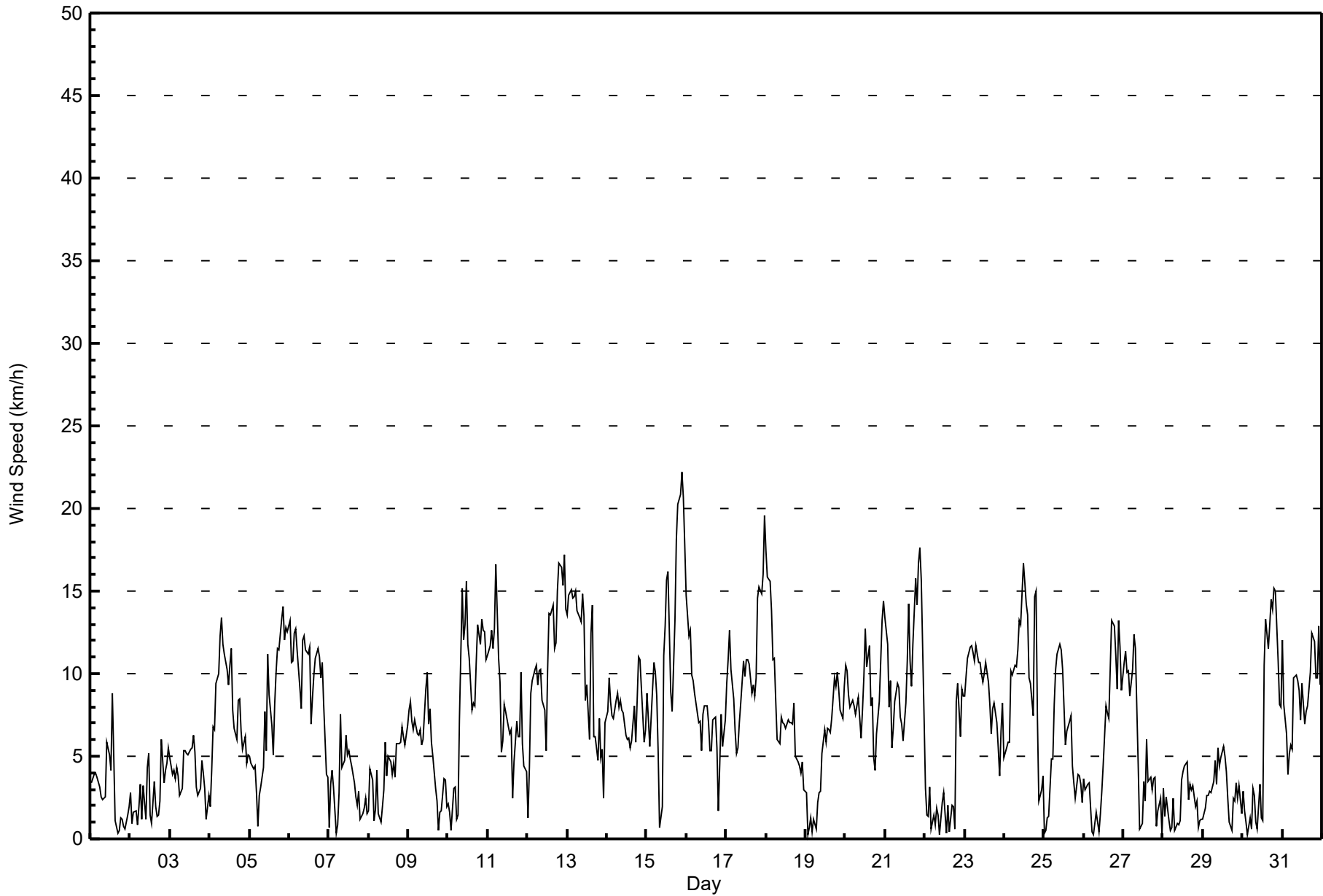
SW4.5 SW4.4 SW4.1 SW4.2 SW4.3 SW4.5 SW4.5 SW4.7 SW4.7 SW4.8 SW5.4 SW5.5 SW5.9 SW5.8 SW5.7	SSW5.1 SSW5.2 SSW5.3 SSW5.8 SSW6.6 SSW6.5 SSW5.8 SW5.0 SW4.7	Diurnal Average
SSW17 SSW16 SW16 SSW15 SSW15 NW17 SW14 SW13 SSW15 SSW15 SSW13 SW17 SSW16 SSW16 SSW14 SW14 SSE13 SSE14 SSW18 SSW20 SSW21 SW22 SW21 SSW20		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 - December 2023





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h
Conklin - December 2023**

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	311	41.80	41.80
6 - 11	314	42.20	84.01
12 - 19	114	15.32	99.33
20 - 28	5	0.67	100.00
29 - 38	0	0.00	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed (WS) - km/h
Conklin - December 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	2	4	5	6	10	29	74	46	41	13	5	9	25	21	16	311
6 - 11	0	0	0	0	4	7	7	8	27	82	86	13	21	51	8	0	314
12 - 19	0	0	0	0	0	0	0	2	7	43	45	1	4	7	5	0	114
20 - 28	0	0	0	0	0	0	0	0	0	3	2	0	0	0	0	0	5
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	5	2	4	5	10	17	36	84	80	169	146	19	34	83	34	16	744

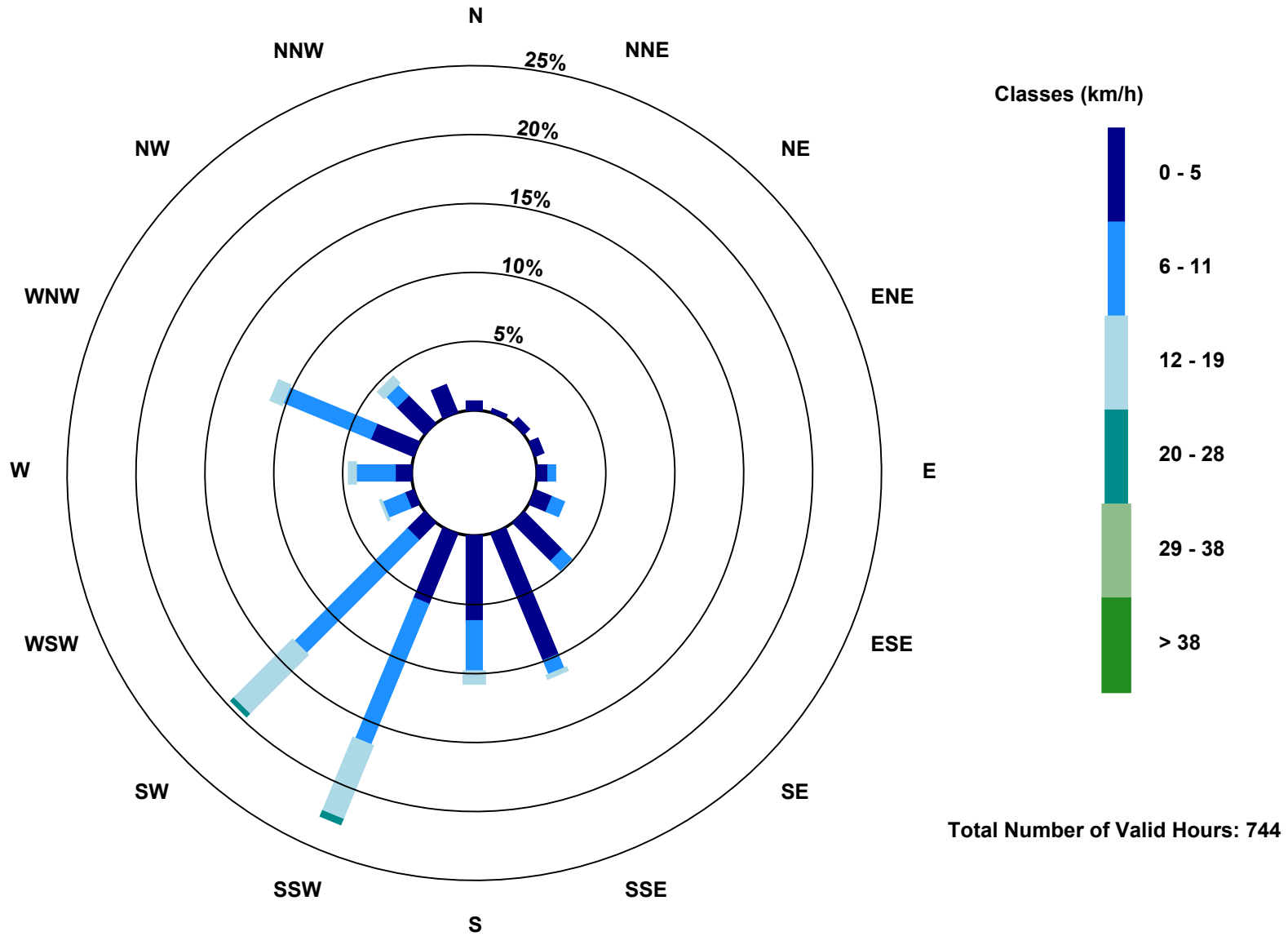
Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Dec 2023

Wind Speed (WS) - km/h
Conklin





Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Speed (WS) - km/h
Conklin - December 2023

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



Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
Conklin - December 2023

Direction of Maximum Speed: 215 deg on Dec 15 22:00		Hours in Service: 744
Direction of Maximum Daily Speed Average: 205.6 deg on Dec 15		Hours of Data: 744
Direction of Minimum Speed: 305 deg on Dec 26 07:00	Direction of Minimum Daily Speed Average: 0.9 deg on Dec 22	Hours of Missing Data: 0
Monthly Average Direction: 218.9 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-Dec	163	180	172	175	176	160	160	150	121	132	170	164	187	195	210	168	241	338	161	341	3	174	161	168	173.2
2-Dec	160	320	142	70	75	158	162	143	140	140	188	151	201	50	184	235	174	169	161	207	192	198	193	202	177.1
3-Dec	202	199	201	201	197	202	195	178	192	181	187	217	218	197	179	139	168	163	161	141	156	151	161	173	184.1
4-Dec	111	155	199	193	207	209	211	214	223	229	225	226	248	255	232	225	228	234	228	204	205	175	148	173	216.2
5-Dec	133	152	136	144	183	279	166	160	156	189	212	207	235	227	213	230	228	228	230	209	229	224	226	228	213.6
6-Dec	230	228	220	226	226	227	216	212	224	222	230	254	266	231	219	224	218	224	222	230	224	214	199	154	225.7
7-Dec	195	331	311	253	306	108	150	289	310	296	295	293	294	284	281	272	282	287	304	315	208	154	176	162	284.6
8-Dec	175	202	203	108	166	200	174	178	177	200	193	217	269	284	285	257	226	208	206	180	190	220	215	218	212.8
9-Dec	220	226	215	211	202	205	198	204	200	199	214	214	237	223	199	167	142	104	144	145	145	131	143	148	201.9
10-Dec	170	164	183	157	121	157	82	182	197	203	207	217	239	274	268	232	222	257	275	280	290	293	288	300	245.5
11-Dec	304	303	307	308	312	322	315	314	301	270	262	271	271	273	270	221	185	180	167	192	205	207	195	145	277.9
12-Dec	192	190	211	216	213	218	214	208	208	195	177	207	212	207	204	206	207	214	217	212	204	199	208	217	208.1
13-Dec	218	219	210	204	212	220	223	228	216	206	205	209	202	228	211	215	251	216	223	228	212	214	118	295	216.4
14-Dec	288	277	283	283	287	272	282	287	281	285	291	286	271	270	264	206	221	214	215	215	214	204	211	208	255.2
15-Dec	208	207	184	219	218	216	205	211	91	169	220	207	205	198	179	137	179	195	205	208	211	215	216	220	205.6
16-Dec	235	234	235	233	283	280	283	294	309	304	306	297	288	291	289	272	262	270	286	311	302	309	300	280	275.1
17-Dec	277	298	307	298	305	305	291	270	252	234	233	229	229	238	224	195	196	194	198	207	206	201	201	206	232.8
18-Dec	208	210	214	228	225	228	220	220	288	290	296	283	281	290	291	255	232	263	295	295	307	303	302	322	249.5
19-Dec	311	334	251	194	296	202	186	337	336	10	85	107	93	98	94	97	104	110	115	116	119	125	114	128	106.9
20-Dec	129	139	144	146	157	159	169	172	176	172	191	200	202	202	193	210	191	163	146	167	201	213	227	226	183.4
21-Dec	224	227	286	285	283	206	202	200	197	192	187	175	187	197	200	200	188	186	194	201	204	205	201	192	205.5
22-Dec	123	67	70	107	339	92	155	140	159	306	134	151	183	358	144	12	99	54	329	223	228	244	306	300	223.8
23-Dec	289	282	287	283	287	291	297	295	291	286	293	291	295	288	293	293	296	285	271	258	247	272	289	292	287.1
24-Dec	236	170	162	178	224	206	202	202	208	210	226	223	225	227	233	218	197	189	209	224	209	328	341	276	214.1
25-Dec	189	224	34	329	186	222	204	218	209	205	207	211	207	195	194	192	196	187	137	156	146	147	154	162	197.2
26-Dec	156	156	155	156	161	196	305	147	321	331	142	141	198	199	224	207	206	222	226	215	210	215	227	217	207.6
27-Dec	220	218	224	225	214	207	206	206	196	158	169	179	134	185	177	138	163	172	156	155	208	136	145	281	198.1
28-Dec	334	340	330	184	296	214	328	311	322	191	148	317	294	308	312	293	301	313	309	299	320	203	111	207	306.8
29-Dec	160	180	191	172	158	162	185	156	149	161	161	168	192	253	219	188	73	51	154	136	155	186	156	153	172.7
30-Dec	147	148	171	100	349	174	158	145	184	3	158	183	27	168	170	169	167	165	172	177	180	170	165	170	168.9
31-Dec	181	192	199	196	209	188	222	210	200	195	209	223	230	230	223	218	225	222	228	229	220	242	275	288	220.4

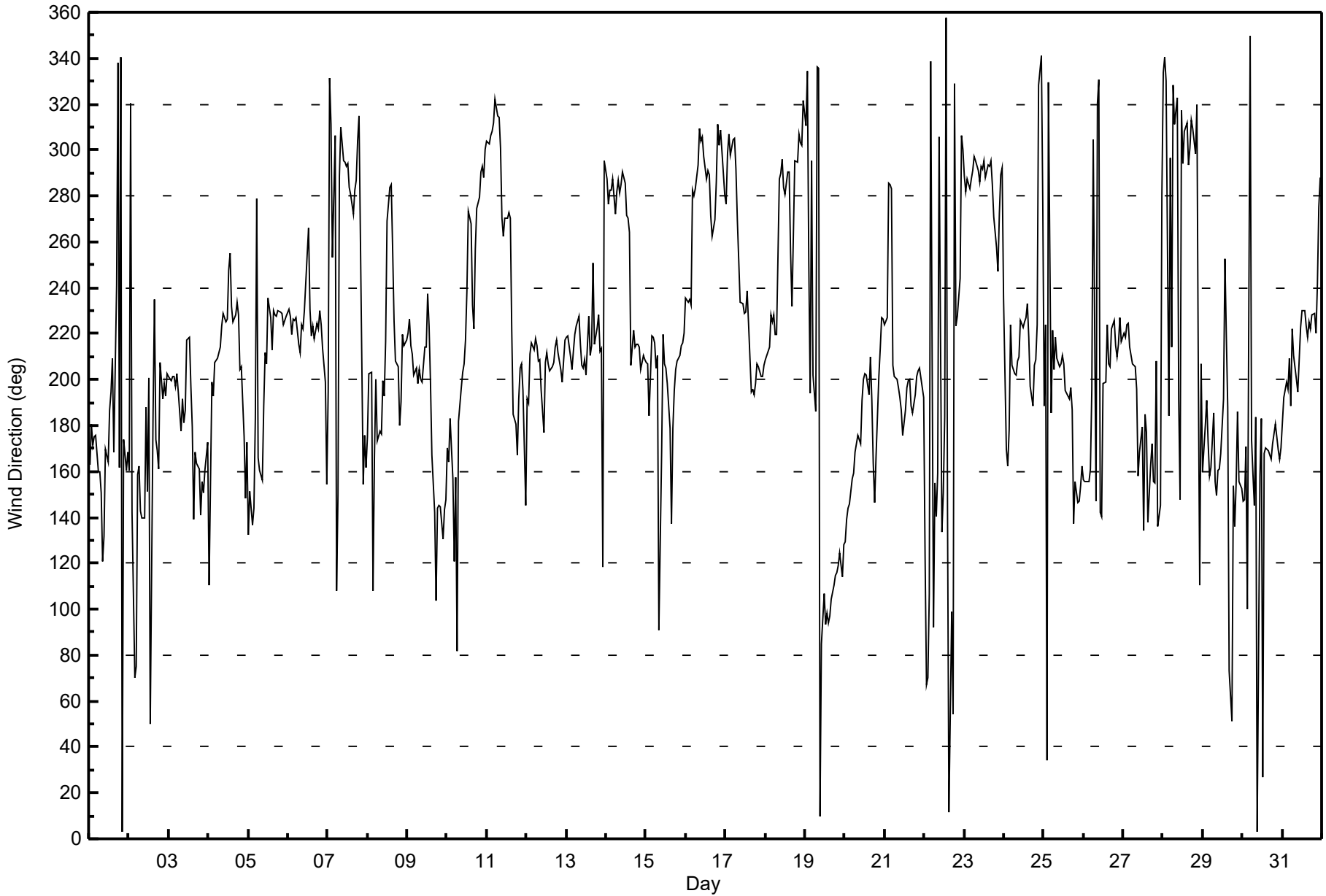
218.7 222.4 227.2 225.4 229.9 227.1 220.6 221.0 219.4 217.0 218.6 222.6 231.8 229.9 219.2 209.7 206.4 209.9 212.1 209.7 211.3 211.6 218.2 223.6
 Diurnal Average

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



Wood Buffalo Environmental Association
Hourly Averages

Wind Direction (WD) - deg
Conklin - December 2023





Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Direction (WD) - deg
Conklin - December 2023

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 111 deg on Dec 25 01:00		Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0																							
Minimum Value: 8 deg on Dec 3 16:00																									
Percentiles: P ₁ = 12 P ₁₀ = 17 Q ₁ = 19 Median = 25 Q ₃ = 36 P ₉₀ = 72 P ₉₉ = 96																									
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Dec	18	21	26	29	30	24	35	30	20	16	15	17	25	20	39	54	78	93	83	75	82	80	22	22	93
2-Dec	20	87	82	66	89	64	57	98	75	76	27	24	79	73	45	45	40	73	69	34	26	20	15	12	98
3-Dec	16	20	23	49	30	26	39	45	24	29	33	39	29	26	23	8	19	24	18	12	11	13	82	44	82
4-Dec	33	34	30	37	20	17	17	17	20	21	20	23	25	24	23	20	19	18	19	19	29	16	24	25	37
5-Dec	22	18	29	22	39	91	72	35	30	21	66	31	31	22	21	20	21	20	19	18	19	19	19	19	91
6-Dec	18	20	18	19	19	20	24	22	18	19	21	29	28	20	19	19	19	20	19	21	20	17	71	29	71
7-Dec	97	32	33	55	83	79	44	33	28	35	33	38	33	39	36	34	47	65	60	95	80	71	32	53	97
8-Dec	33	14	48	47	69	21	59	70	35	26	14	48	31	33	31	21	24	17	10	16	26	24	20	19	70
9-Dec	18	17	18	21	12	14	12	13	22	21	20	16	32	20	22	22	37	48	86	29	57	12	19	26	86
10-Dec	28	67	92	32	28	80	69	55	18	24	22	22	24	30	35	17	18	28	29	28	31	33	31	30	92
11-Dec	28	32	30	28	26	19	22	23	34	27	27	33	35	34	29	49	17	17	20	34	21	44	42	27	49
12-Dec	105	43	20	19	15	16	17	13	15	19	20	51	21	17	15	15	19	19	19	17	15	15	16	22	105
13-Dec	21	21	15	14	18	20	21	24	19	16	16	22	24	51	23	23	41	48	46	23	27	38	61	31	61
14-Dec	33	30	31	33	30	24	29	32	30	31	33	34	34	27	22	17	25	23	22	19	19	20	38	25	38
15-Dec	21	39	23	21	20	19	18	24	80	87	26	23	23	21	23	19	22	23	19	19	18	18	18	20	87
16-Dec	19	19	20	19	29	29	32	30	25	28	28	35	33	35	32	30	22	24	32	41	35	29	31	32	41
17-Dec	29	33	30	32	30	25	28	26	29	18	21	20	22	21	23	17	16	17	18	16	16	17	15	15	33
18-Dec	17	16	17	21	20	21	22	49	40	34	33	33	36	36	35	27	16	29	29	24	23	27	27	31	49
19-Dec	43	90	93	82	87	79	88	50	15	28	35	25	32	29	30	27	25	20	19	18	18	17	16	16	93
20-Dec	15	15	15	14	18	18	17	17	21	27	27	22	20	21	19	23	24	31	38	30	38	47	27	24	47
21-Dec	22	22	38	30	34	18	23	17	16	16	18	21	19	19	18	19	19	17	16	16	16	15	18	31	38
22-Dec	44	64	65	45	83	55	50	79	51	98	71	20	39	91	77	88	71	72	90	47	25	52	31	32	98
23-Dec	34	32	34	34	32	36	32	32	34	33	36	33	33	35	31	30	27	23	22	20	34	30	33	33	36
24-Dec	42	17	14	25	23	20	16	19	19	18	22	20	21	22	21	23	19	22	17	17	57	82	50	55	82
25-Dec	111	99	84	81	44	54	20	21	17	16	17	18	24	22	18	15	15	33	17	38	16	14	18	50	111
26-Dec	16	22	19	23	53	81	94	66	92	86	77	27	49	21	36	24	26	23	25	27	31	22	20	18	94
27-Dec	18	17	19	19	24	21	18	17	20	32	91	87	71	92	24	38	10	12	16	14	73	79	23	94	94
28-Dec	55	97	58	41	89	95	48	100	75	76	79	65	33	25	29	33	33	50	28	30	25	88	48	85	100
29-Dec	51	43	22	26	37	36	21	16	23	20	20	19	31	40	46	49	67	79	15	44	13	23	14	43	79
30-Dec	14	57	66	86	72	75	17	17	77	86	23	70	81	22	16	16	17	16	18	20	19	18	24	21	86
31-Dec	23	40	48	76	33	26	47	20	22	25	33	38	24	22	18	18	18	19	18	18	18	31	30	31	76
	111	99	93	86	89	95	94	100	92	98	91	87	81	92	77	88	78	93	90	95	82	88	82	94	
	Diurnal Maximum																								



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

**AMS22
JANVIER
DECEMBER 2023**

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

January 31, 2024

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - JANVIER (AMS22)
DECEMBER 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	705	37	39	99.73	2.5	0	1	0
TRS(ppb) Average	709	35	35	100	0.4	0	0.3	0
THC(ppm) Average	680	36	64	96.24	2.4	-	2.2	-
NMHC(ppm) Average	680	36	64	96.24	0.079	-	0.047	-
CH4(ppm) Average	680	36	64	96.24	2.4	-	2.2	-
O3 (ppb) Average	709	34	35	99.87	45.1	0	40.7	-
NO2 (ppb) Average	706	37	38	99.87	9.6	0	6.4	-
NO (ppb) Average	706	37	38	99.87	5.1	-	1.2	-
NOX (ppb) Average	706	37	38	99.87	12.9	-	7.4	-
PM2.5 (ug/m3) Average	742	1	2	99.87	26.1	0	8.6	0
Temperature 2 m (C) Average	744	0	0	100	5.2	-	2.5	-
Relative Humidity (%) Average	744	0	0	100	94.7	-	87.3	-
Wind Speed 20 m (km/h) Average	743	0	1	99.87	28	-	16	-
Wind Direction 20 m (deg) Average	743	0	1	99.87	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - JANVIER (AMS22)
 DECEMBER 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	705	0.3	0.4	-	0	0	0.1	0.2	0.4	0.8	2.5
TRS (ppb) Average	709	0.23	0.1	-	0	0.2	0.2	0.2	0.3	0.3	0.4
THC (ppm) Average	680	2.09	0.1	-	2	2	2	2.1	2.1	2.2	2.4
NMHC(ppm) Average	680	0.003	0.011	-	0	0	0	0	0	0	0.079
CH4(ppm) Average	680	2.08	0.1	-	2	2	2	2.1	2.1	2.2	2.4
O3 (ppb) Average	709	27.75	8.9	-	6.9	14	21.7	28.8	33.9	39.6	45.1
NO2 (ppb) Average	706	2.56	1.9	-	0	0.2	1.1	2.2	3.7	5.2	9.6
NO (ppb) Average	706	0.39	0.6	-	0	0	0	0.2	0.4	1.2	5.1
NOX (ppb) Average	706	2.95	2.3	-	0	0.2	1.2	2.5	4.3	6.2	12.9
PM2.5 (ug/m3) Average	742	3.56	2.8	-	0.2	0.9	1.7	2.7	4.7	7.5	26.1
Temperature 2 m (C) Average	744	-5.13	4.7	-	-15.2	-11.6	-9.1	-4.5	-1.3	1.1	5.2
Relative Humidity (%) Average	744	74.59	14.1	-	35.6	52.5	64.5	78.2	86.9	89.1	94.7
Wind Speed 20 m (km/h) Average	743	10.2	4	-	0	4	7	10	13	15	28
Wind Direction 20 m (deg) Average	743	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - JANVIER (AMS22)
DECEMBER 2023

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
SO2	23 Dec 2023 13:00	23 Dec 2023 14:00	2	Maintenance - reinitiated daily QA check
THC/NMHC/CH4	23 Dec 2023 13:00	23 Dec 2023 13:00	1	Maintenance - reinitiated daily QA check
NO2, O3	23 Dec 2023 14:00	23 Dec 2023 14:00	1	Maintenance - reinitiated daily QA check
THC/NMHC/CH4	19 Dec 2023 10:00	19 Dec 2023 11:00	2	Maintenance - replaced support gas cylinder
THC/NMHC/CH4	22 Dec 2023 12:00	23 Dec 2023 12:00	25	Unstable Operation - zero air generator failure
PM2.5	01 Dec 2023 12:00	01 Dec 2023 12:00	1	Maintenance - firmware update
Wind Speed, Wind Direction 20m	03 Dec 2023 16:00	03 Dec 2023 16:00	1	Flat line in sensor output signal - Sensor frozen

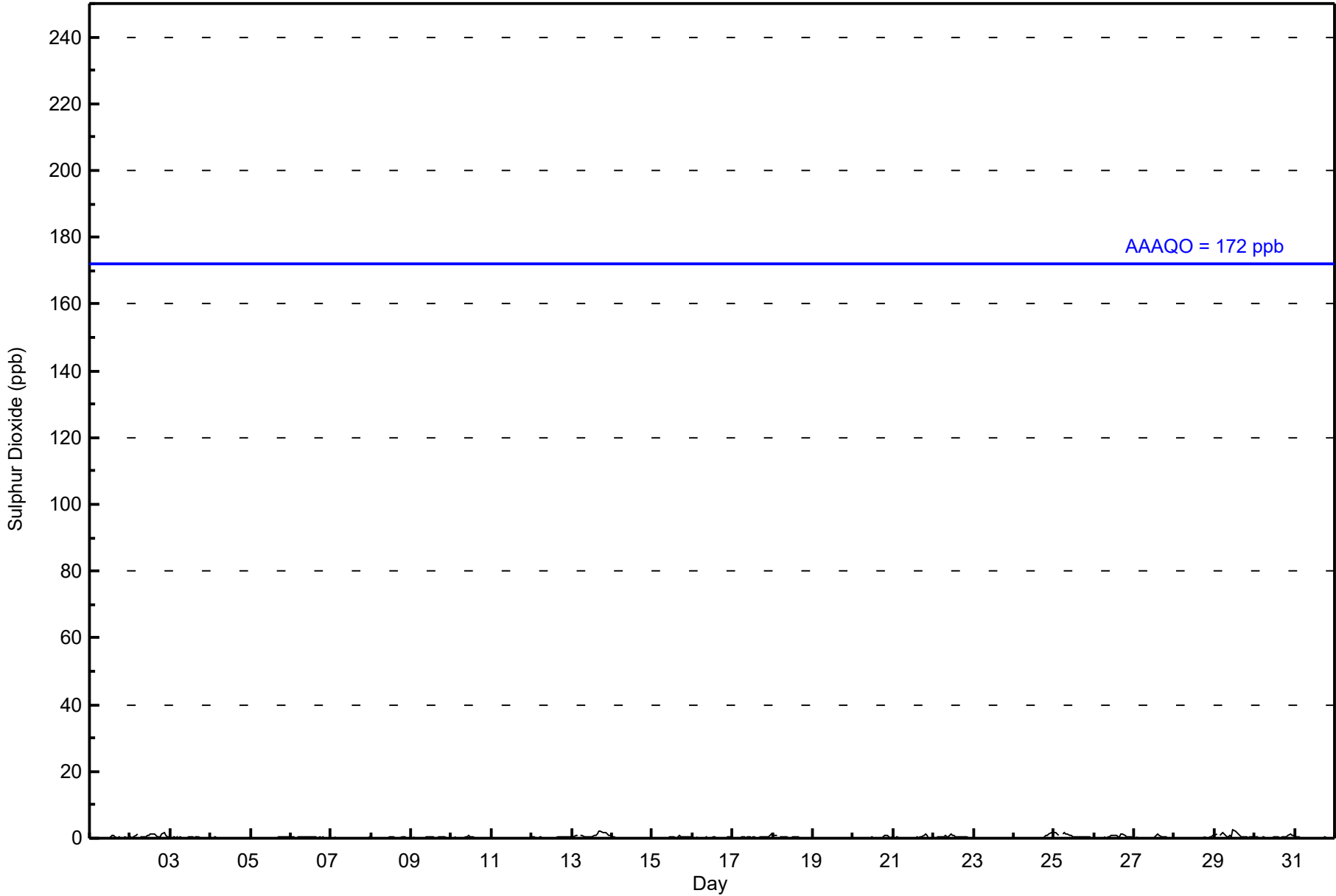


Number of Exceedences (AAAQO):		1-hr: 0		24-hr: 0		Hours in Service:														744																													
Maximum Value: 2.5 ppb on Dec 29 12:00		Maximum Daily Average: 1.0 ppb on Dec 13														Hours of Data:		705																															
Minimum Value: 0.0 ppb on Dec 4 19:00		Minimum Daily Average: 0.0 ppb on Dec 23														Hours of Missing Data:		39																															
Maximum Diurnal Average: 0.4 ppb at hour 14		Minimum Diurnal Average: 0.2 ppb at hour 8														Hours of Calibration:		37																															
Monthly Average: 0.30 ppb		Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.1 Median = 0.2 Q ₃ = 0.4 P ₉₀ = 0.8 P ₉₉ = 1.8														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-Dec	0.2	0.1	0.1	0.1	Z	0.2	0.1	0.1	0.2	0.1	0.1	0.1	0.4	1.0	0.9	0.4	0.2	0.2	0.1	0.1	0.1	0.3	0.1	0.2	0.2	0.2																							
2-Dec	0.2	0.2	0.4	0.8	1.1	Z	0.4	0.3	0.4	0.6	0.8	0.9	1.1	1.4	1.3	1.0	0.6	0.4	0.5	1.3	1.5	0.8	0.3	0.3	0.7	1.5																							
3-Dec	Z	0.2	0.3	0.2	0.2	0.2	0.2	0.1	0.1	0.2	0.1	0.3	0.2	0.2	0.3	0.3	0.2	0.1	0.1	0.1	0.2	0.1	0.1	0.2	0.2	0.3																							
4-Dec	0.2	Z	0.4	0.3	0.2	0.2	0.1	0.1	0.0	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	0.1	0.4																							
5-Dec	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	C	C	C	C	C	C	0.6	0.5	0.3	0.3	0.4	0.3	0.3	0.3	--	0.6																							
6-Dec	0.3	0.3	0.4	Z	0.3	0.3	0.3	0.4	0.4	0.3	0.3	0.4	0.4	0.6	0.5	0.3	0.2	0.3	0.2	0.2	0.2	0.1	0.2	0.1	0.3	0.6																							
7-Dec	0.2	0.2	0.2	0.2	Z	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.3	0.1	0.3																							
8-Dec	0.2	0.0	0.1	0.1	0.1	Z	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.2	0.2	0.2	0.2	0.1	0.2	0.2	0.2																							
9-Dec	Z	0.3	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.2	0.3	0.3	0.5	0.2	0.2	0.1	0.4	0.4	0.4	0.4	0.3	0.1	0.2	0.2	0.2	0.5																							
10-Dec	0.2	Z	0.3	0.1	0.1	0.1	0.1	0.1	0.3	0.5	0.7	0.5	0.4	0.3	0.2	0.1	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.7																							
11-Dec	0.0	0.0	Z	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	0.2	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.2																							
12-Dec	0.3	0.5	0.5	Z	0.3	0.2	0.1	0.0	0.2	0.1	0.1	0.1	0.1	0.2	0.1	0.2	0.4	0.2	0.2	0.3	0.3	0.2	0.2	0.3	0.2	0.5																							
13-Dec	0.4	0.5	0.6	0.7	Z	0.8	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.7	1.1	1.2	2.0	2.1	1.8	1.8	1.8	1.2	0.9	0.8	1.0	2.1																							
14-Dec	0.5	0.3	0.2	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.1	0.0	0.2	0.0	0.0	0.1	0.0	0.1	0.1	0.0	0.0	0.1	0.5																							
15-Dec	Z	0.1	0.1	0.1	0.0	0.1	0.1	0.1	0.1	0.0	0.2	0.3	0.5	0.3	0.2	0.6	0.7	0.5	0.3	0.3	0.3	0.4	0.4	0.3	0.3	0.7																							
16-Dec	0.3	Z	0.2	0.1	0.0	0.1	0.0	0.1	0.2	0.2	0.1	0.0	0.2	0.2	0.0	0.0	0.1	0.1	0.1	0.1	0.2	0.3	0.4	0.2	0.1	0.4																							
17-Dec	0.2	0.1	Z	0.2	0.2	0.3	0.3	0.2	0.2	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.4	0.3	0.3	0.4	0.7	1.1	0.3	1.1																							
18-Dec	1.0	1.0	0.7	Z	0.5	0.4	0.3	0.3	0.2	0.2	0.2	0.2	0.3	0.3	0.2	0.3	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.3	1.0																							
19-Dec	0.1	0.2	0.1	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	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.2																							
20-Dec	0.0	0.0	0.0	0.0	0.0	Z	0.0	0.1	0.1	0.0	0.2	0.5	0.2	0.1	0.1	0.1	0.1	0.2	0.4	0.7	0.8	0.4	0.2	0.3	0.2	0.8																							
21-Dec	Z	0.5	0.4	0.2	0.1	0.1	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.2	0.3	0.1	0.3	0.6	0.9	1.3	0.7	0.2	0.2	0.2	0.3	1.3																							
22-Dec	0.4	Z	0.5	0.5	0.5	0.5	0.5	0.7	0.3	0.5	1.2	0.9	0.8	0.5	0.4	0.3	0.5	0.4	0.6	0.3	0.2	0.2	0.1	0.1	0.5	1.2																							
23-Dec	0.1	0.1	Z	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	M	M	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1																							
24-Dec	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.5	0.6	0.8	1.4	1.8	1.9	0.3																							
25-Dec	1.8	1.8	1.4	1.0	Z	1.2	1.6	1.3	1.1	0.9	0.7	0.6	0.5	0.4	0.3	0.3	0.3	0.5	0.5	0.3	0.3	0.2	0.2	0.1	0.8	1.8																							
26-Dec	0.1	0.1	0.1	0.1	0.1	Z	0.3	0.2	0.2	0.4	0.8	0.8	1.0	0.9	0.4	0.3	1.1	1.4	0.8	0.6	0.4	0.3	0.3	0.3	0.5	1.4																							
27-Dec	Z	0.2	0.2	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.3	0.9	1.1	0.8	0.6	0.5	0.4	0.2	0.1	0.0	0.2	0.1	0.3	1.1																							
28-Dec	0.0	Z	0.1	0.1	0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.2	0.3	0.1	0.1	0.5	0.5	0.8	0.1	0.8																							
29-Dec	0.8	1.3	Z	0.9	1.3	1.5	0.9	0.3	0.5	0.7	0.6	2.5	1.9	1.8	1.3	1.0	0.5	0.3	0.3	0.2	0.2	0.3	0.3	0.3	0.9	2.5																							
30-Dec	0.4	0.5	0.5	Z	0.4	0.3	0.2	0.2	0.1	0.1	0.2	0.2	0.3	0.3	0.3	0.2	0.2	0.5	0.5	0.4	0.9	1.1	0.9	0.8	0.4	1.1																							
31-Dec	0.6	0.4	0.4	0.2	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	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.2	0.6																							
																								Diurnal Average		0.3		0.3		0.3		0.2		0.2		0.3		0.2		0.2		0.2		0.2		0.3		0.3	
																								Diurnal Maximum		1.8		1.8		1.4		1.0		1.3		1.5		1.6		1.3		1.1		0.9		1.2		2.5	
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 (SO₂) - ppb
Janvier - December 2023





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Janvier - December 2023

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	705	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: 705

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Janvier - December 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	4	10	5	2	11	11	6	18	40	241	244	38	36	27	10	1	704
11 - 20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	4	10	5	2	11	11	6	18	40	241	244	38	36	27	10	1	704

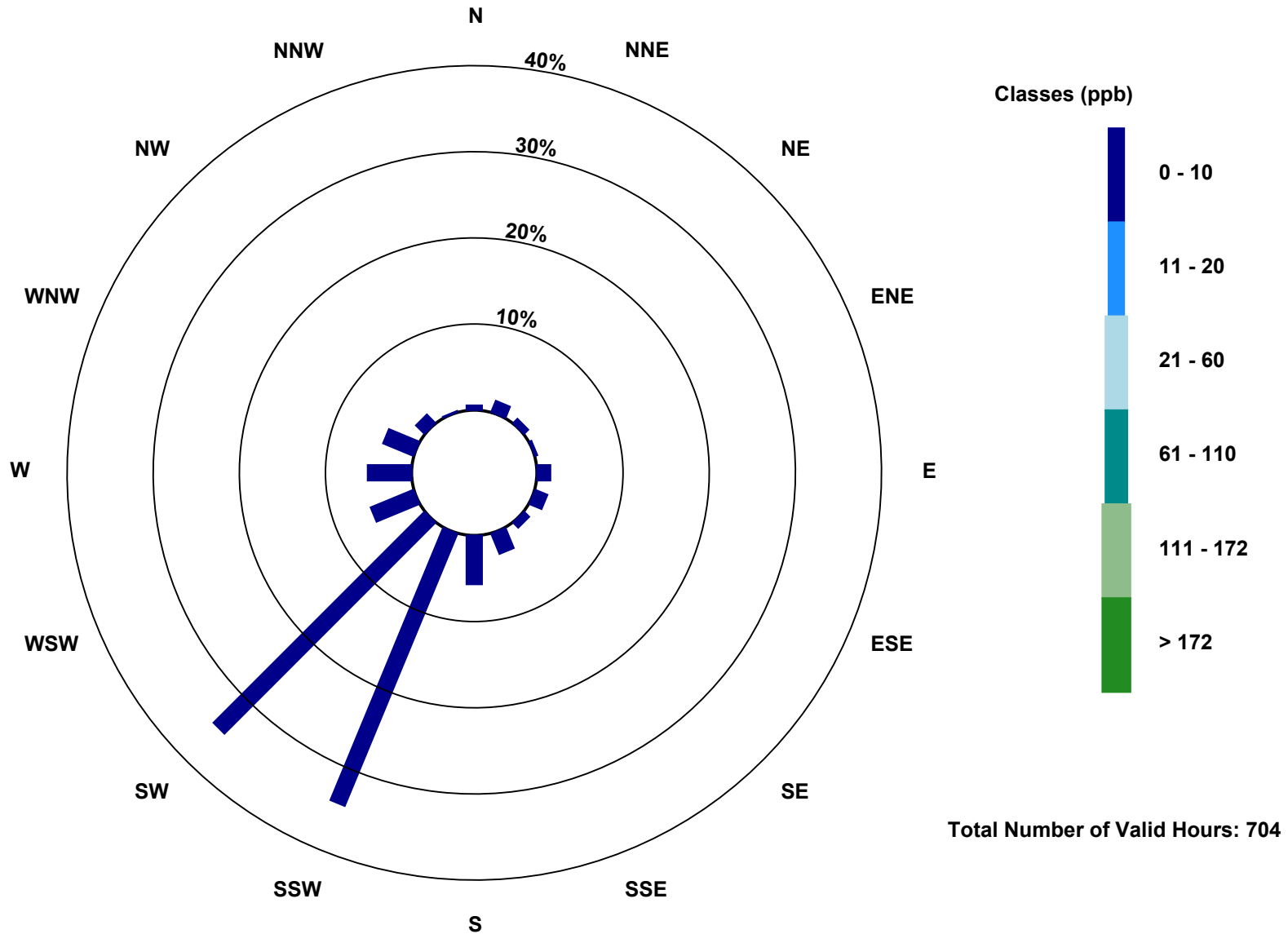
Total Number of Valid Hours: 704

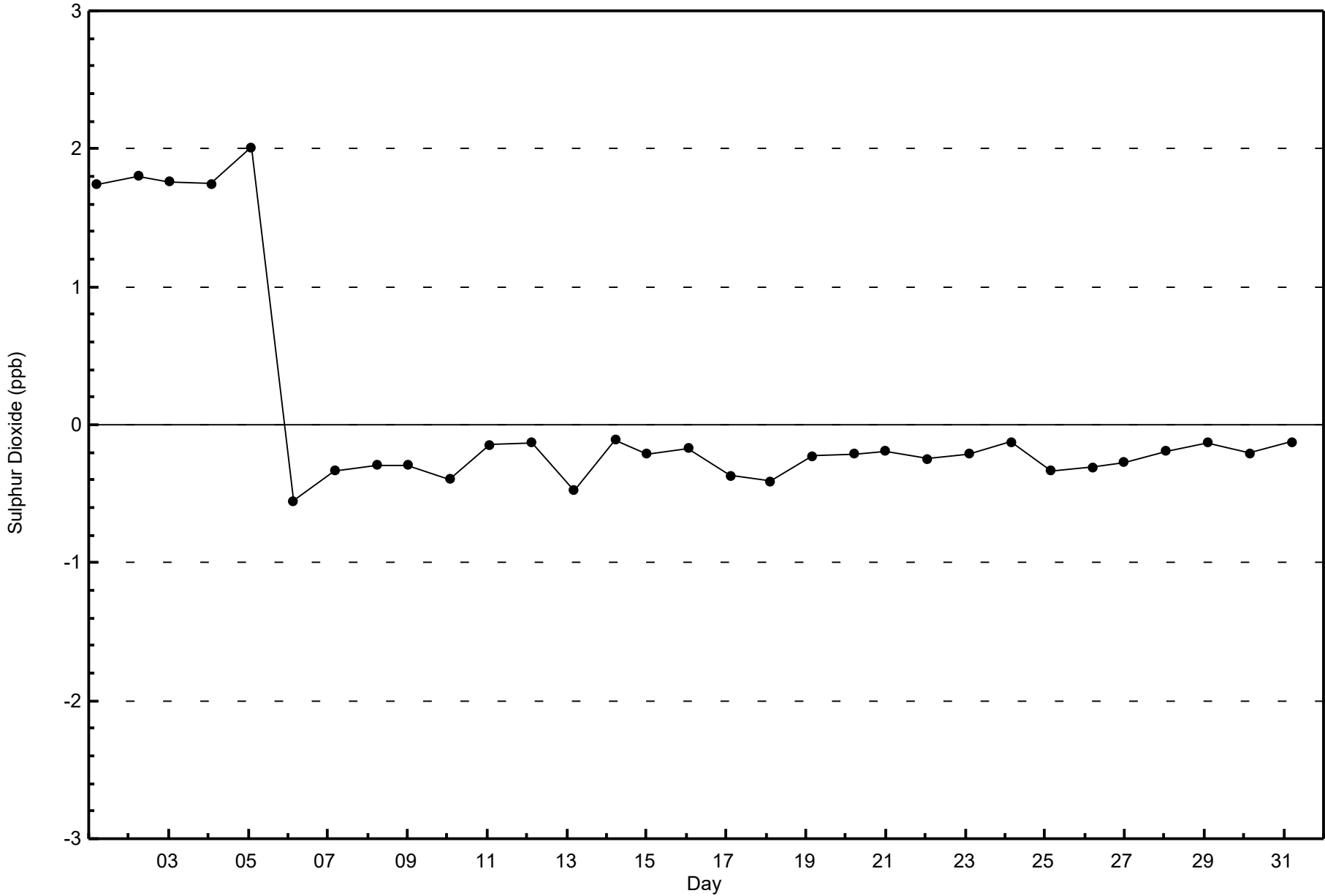
Total Number of Hours: 744

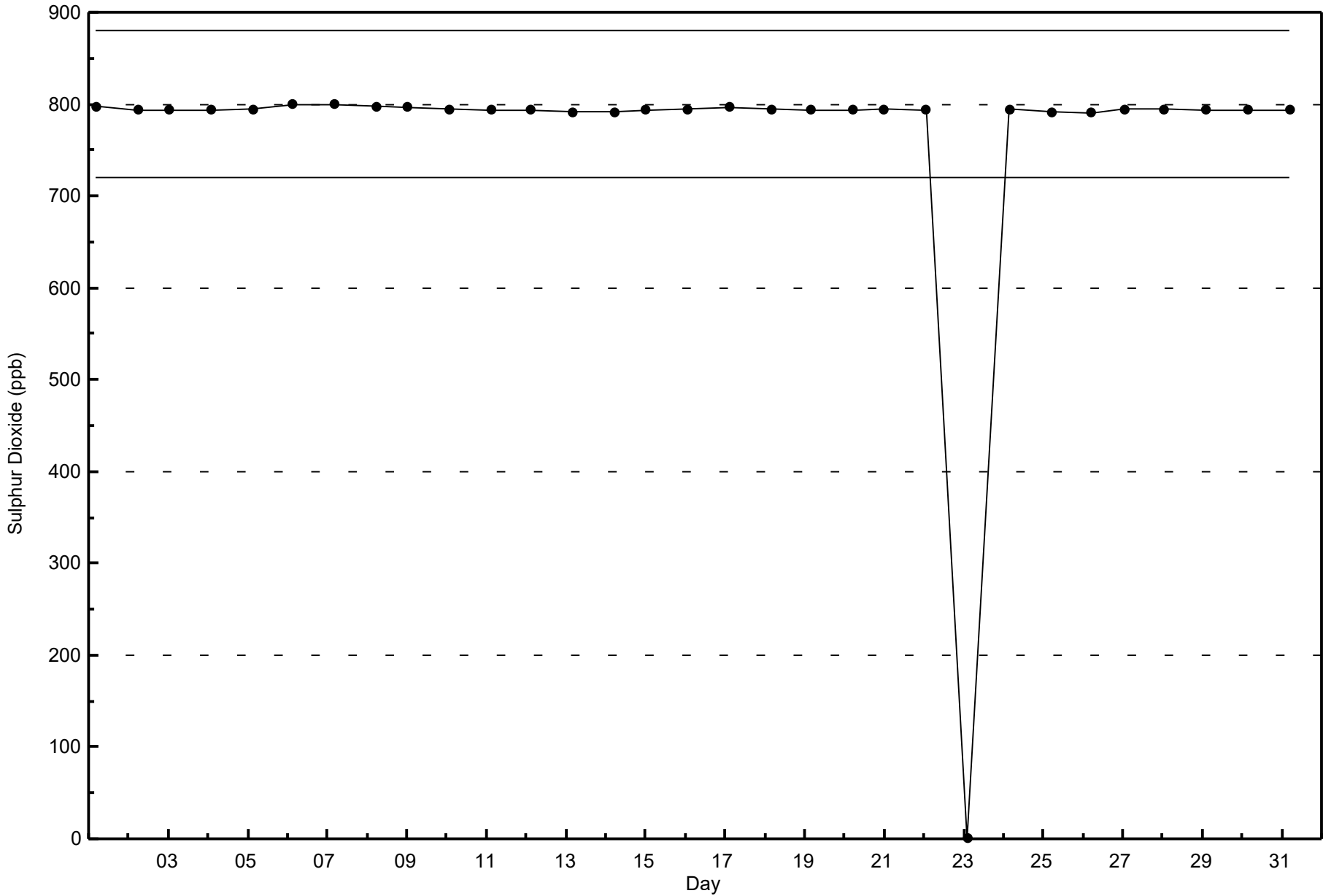


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Sulphur Dioxide (SO₂) - ppb
Janvier

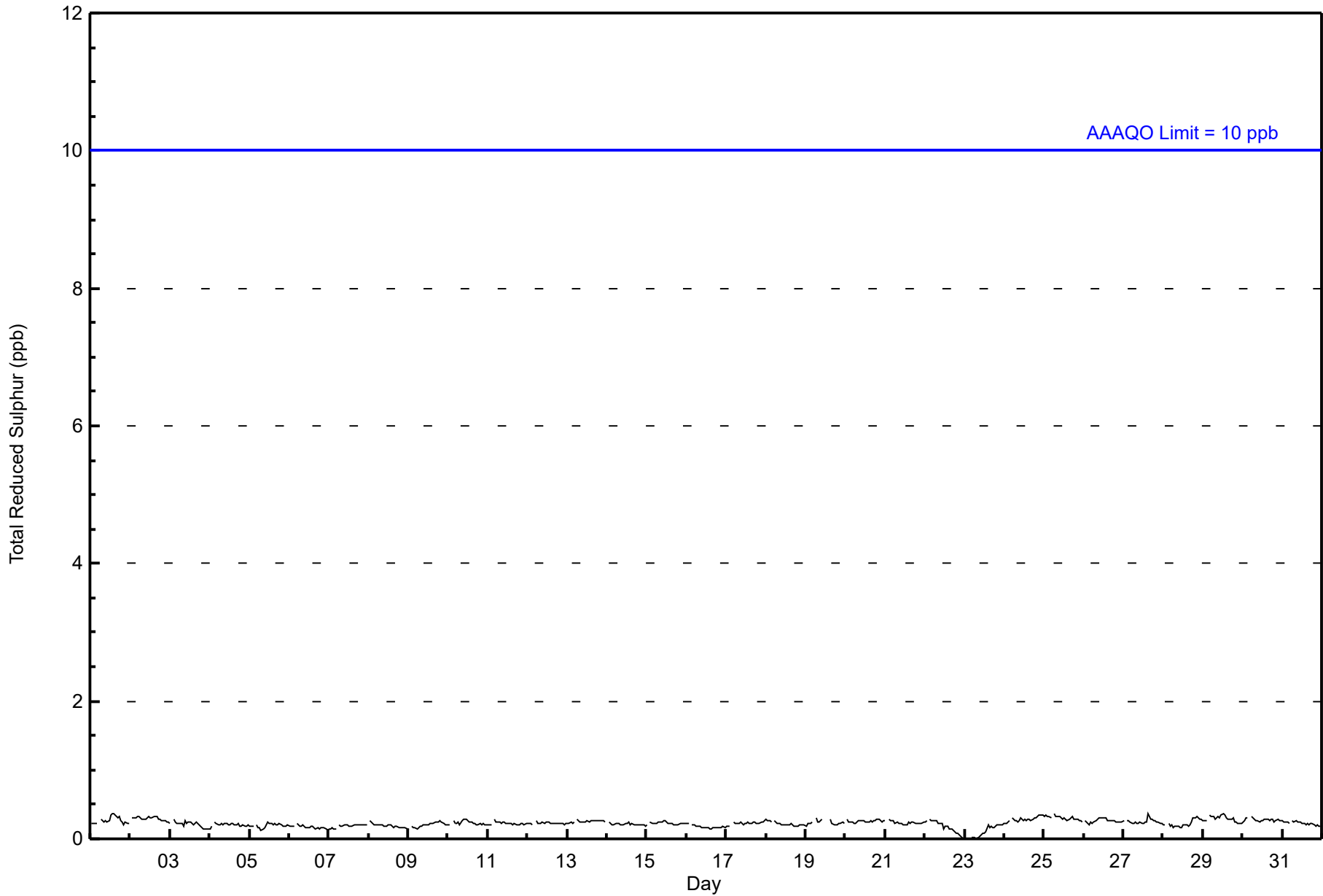








Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 0.4 ppb on Dec 25 07:00 Maximum Daily Average: 0.3 ppb on Dec 25		Hours in Service: 744 Hours of Data: 709 Hours of Missing Data: 35 Hours of Calibration: 35 Percent Operational Time: 100.0																									
Minimum Value: 0.0 ppb on Dec 23 00:00 Maximum Diurnal Average: 0.2 ppb at hour 14 Monthly Average: 0.23 ppb		Minimum Daily Average: 0.1 ppb on Dec 23 Minimum Diurnal Average: 0.2 ppb at hour 1 Percentiles: P ₁ = 0.0 P ₁₀ = 0.2 Q ₁ = 0.2 Median = 0.2 Q ₃ = 0.3 P ₉₀ = 0.3 P ₉₉ = 0.3																									
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Dec	0.2	0.2	0.2	0.2	0.2	Z	0.3	0.3	0.2	0.3	0.2	0.3	0.3	0.4	0.4	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.3	0.4	
2-Dec	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	0.3	0.3	0.3	0.3	0.3	0.2	0.3	0.3
3-Dec	0.2	Z	0.3	0.2	0.2	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	0.1	0.1	0.1	0.1	0.2	0.3
4-Dec	0.1	0.2	Z	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3
5-Dec	0.2	0.2	0.2	Z	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	0.2	0.2	0.2	0.2	0.2	0.2	0.2
6-Dec	0.2	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	0.1	0.2	0.2	0.2	0.1	0.1	0.2	0.2	0.2
7-Dec	0.1	0.1	0.2	0.1	0.1	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
8-Dec	Z	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.2	0.3
9-Dec	0.1	Z	0.2	0.2	0.2	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.2	0.2	0.2	0.2	0.2	0.3
10-Dec	0.2	0.2	Z	0.3	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3
11-Dec	0.2	0.2	0.2	Z	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3
12-Dec	0.2	0.2	0.2	0.2	Z	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3
13-Dec	0.2	0.2	0.2	0.2	0.3	Z	0.3	0.2	0.2	0.2	0.2	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	0.2	0.3	0.3
14-Dec	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	0.2	0.2	0.2	0.2	0.2
15-Dec	0.2	Z	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3
16-Dec	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	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
17-Dec	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	0.3	0.2	0.3
18-Dec	0.3	0.3	0.3	0.3	Z	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3
19-Dec	0.2	0.2	0.2	0.2	0.2	Z	0.3	0.2	0.2	0.3	0.3	C	C	C	C	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3
20-Dec	Z	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.2	0.2	0.3	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.3	0.3	0.3
21-Dec	0.3	Z	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3
22-Dec	0.3	0.3	Z	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.1	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.2	0.3
23-Dec	0.0	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	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.2
24-Dec	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	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
25-Dec	0.3	0.3	0.3	0.3	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	0.4
26-Dec	Z	0.3	0.2	0.2	0.2	0.2	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	0.3
27-Dec	0.3	Z	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	0.4	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.3	0.4
28-Dec	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	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.3
29-Dec	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	0.2	0.2	0.2	0.2	0.2	0.3	0.4
30-Dec	0.2	0.3	0.3	0.3	Z	0.3	0.3	0.3	0.3	0.3	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.3	0.3	0.3	0.3	0.3	0.3
31-Dec	0.3	0.3	0.2	0.2	0.2	Z	0.3	0.2	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3
																								Diurnal Average			
																								Diurnal Maximum			
Z - zerospan C - Calibration																											
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 10 ppb 24-hr 3 ppb																											





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Total Reduced Sulphur (TRS) - ppb
Janvier - December 2023**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	709	100.00	100.00
3 - 4	0	0.00	100.00
5 - 7	0	0.00	100.00
8 - 11	0	0.00	100.00
> 11	0	0.00	100.00

Total Number of Valid Hours: 709

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Total Reduced Sulphur (TRS) - ppb
Janvier - December 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	4	10	5	3	9	9	5	17	41	241	249	38	37	29	10	1	708
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	4	10	5	3	9	9	5	17	41	241	249	38	37	29	10	1	708

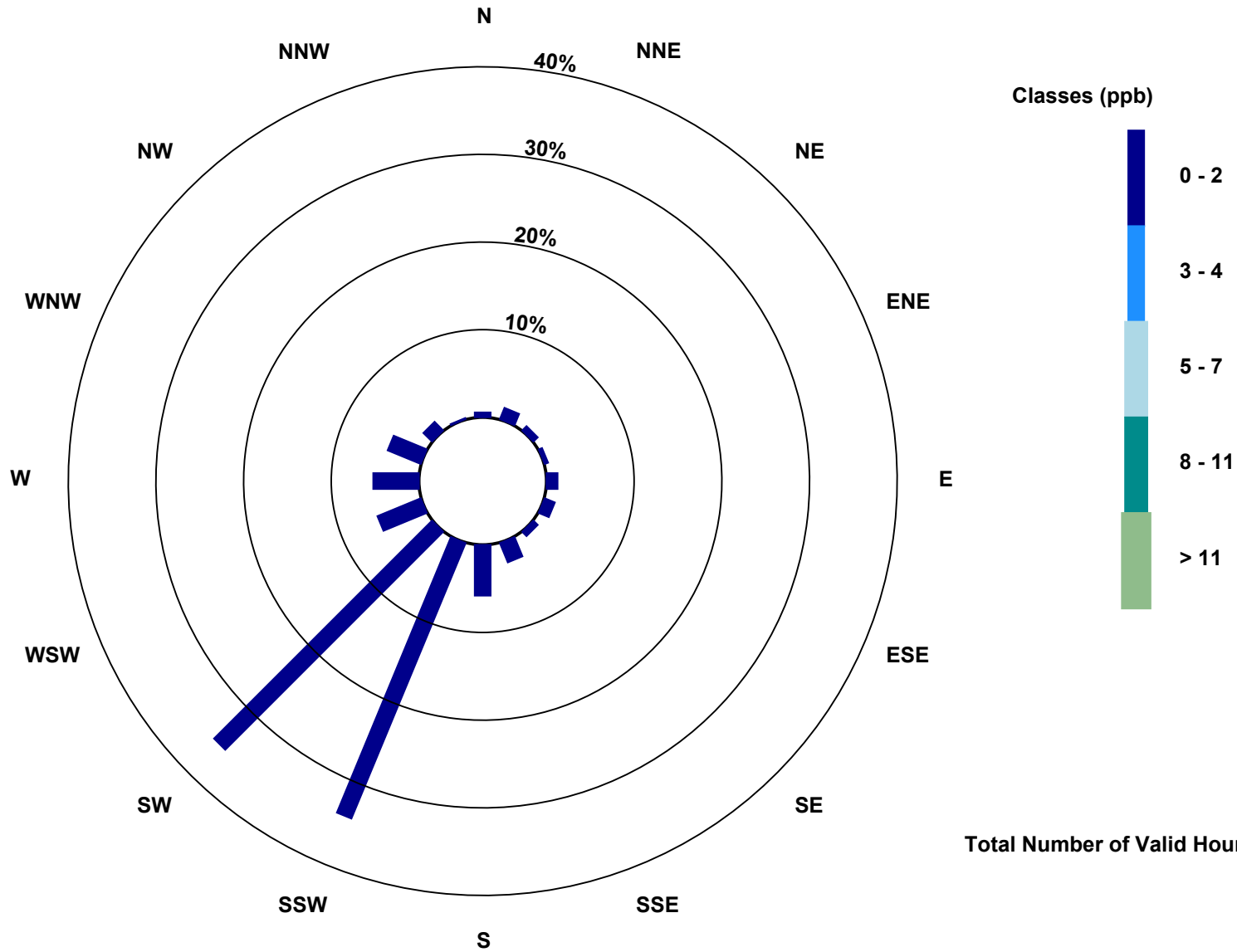
Total Number of Valid Hours: 708

Total Number of Hours: 744

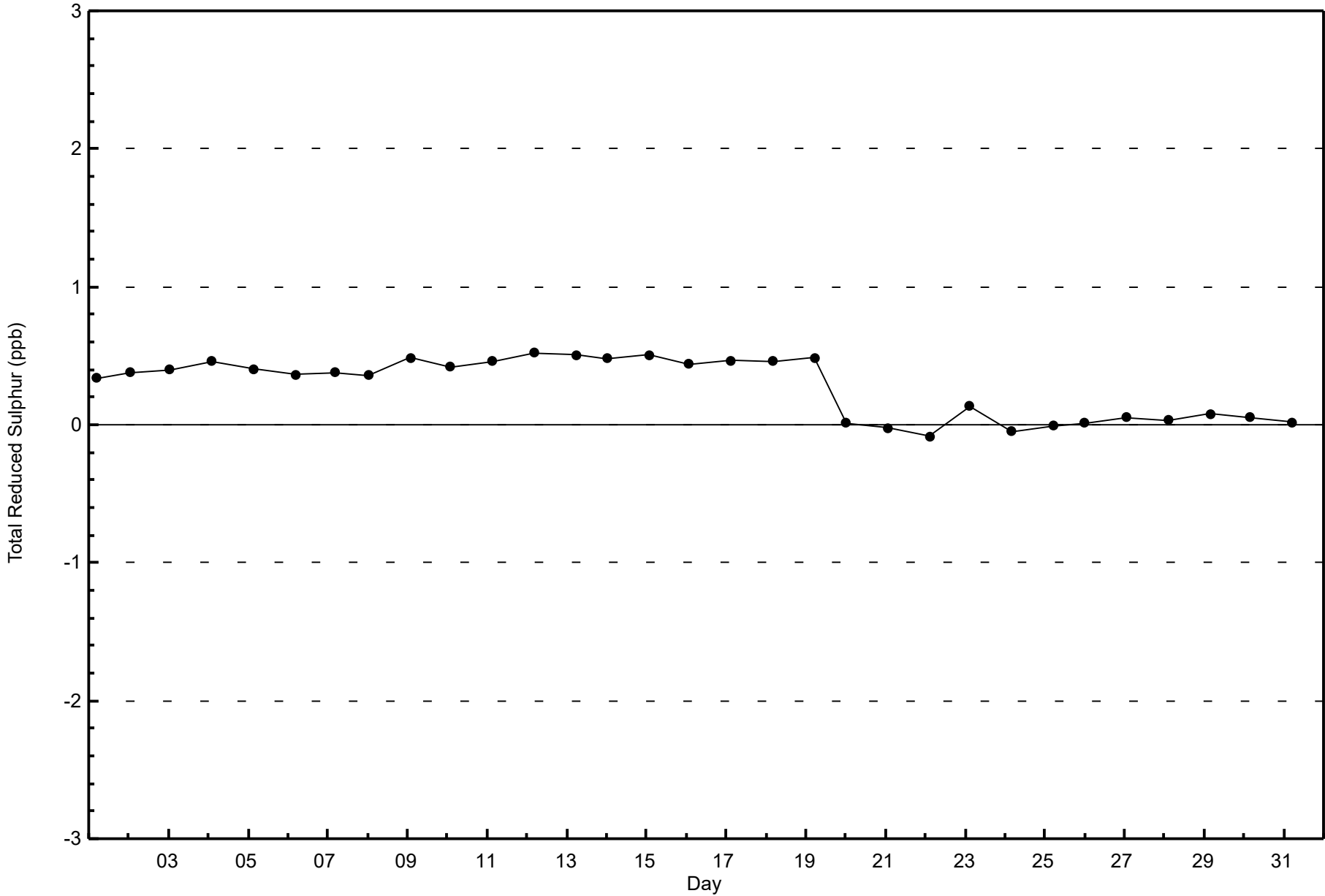


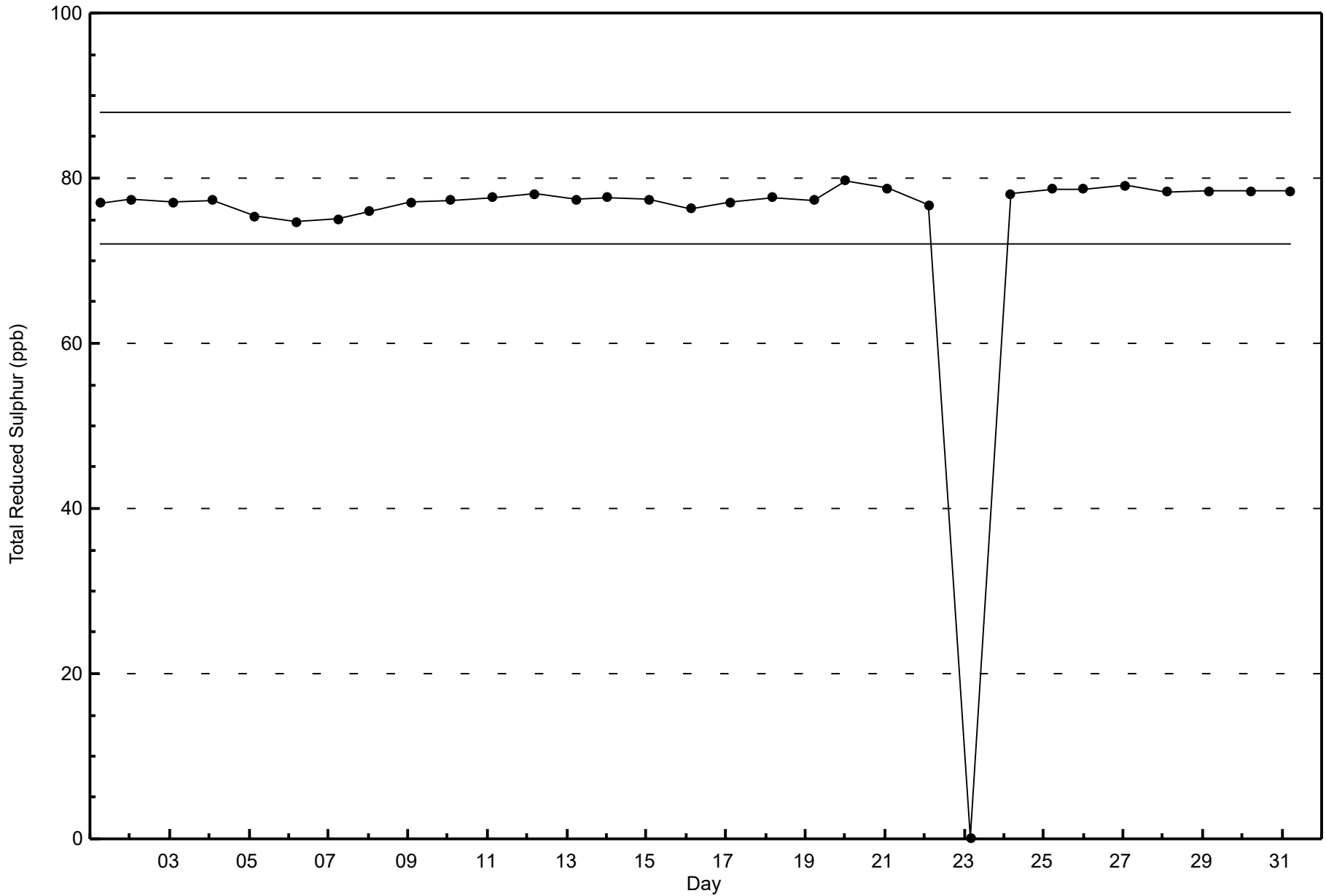
Wood Buffalo Environmental Association
Wind Rose Dec 2023

Total Reduced Sulphur (TRS) - ppb
Janvier



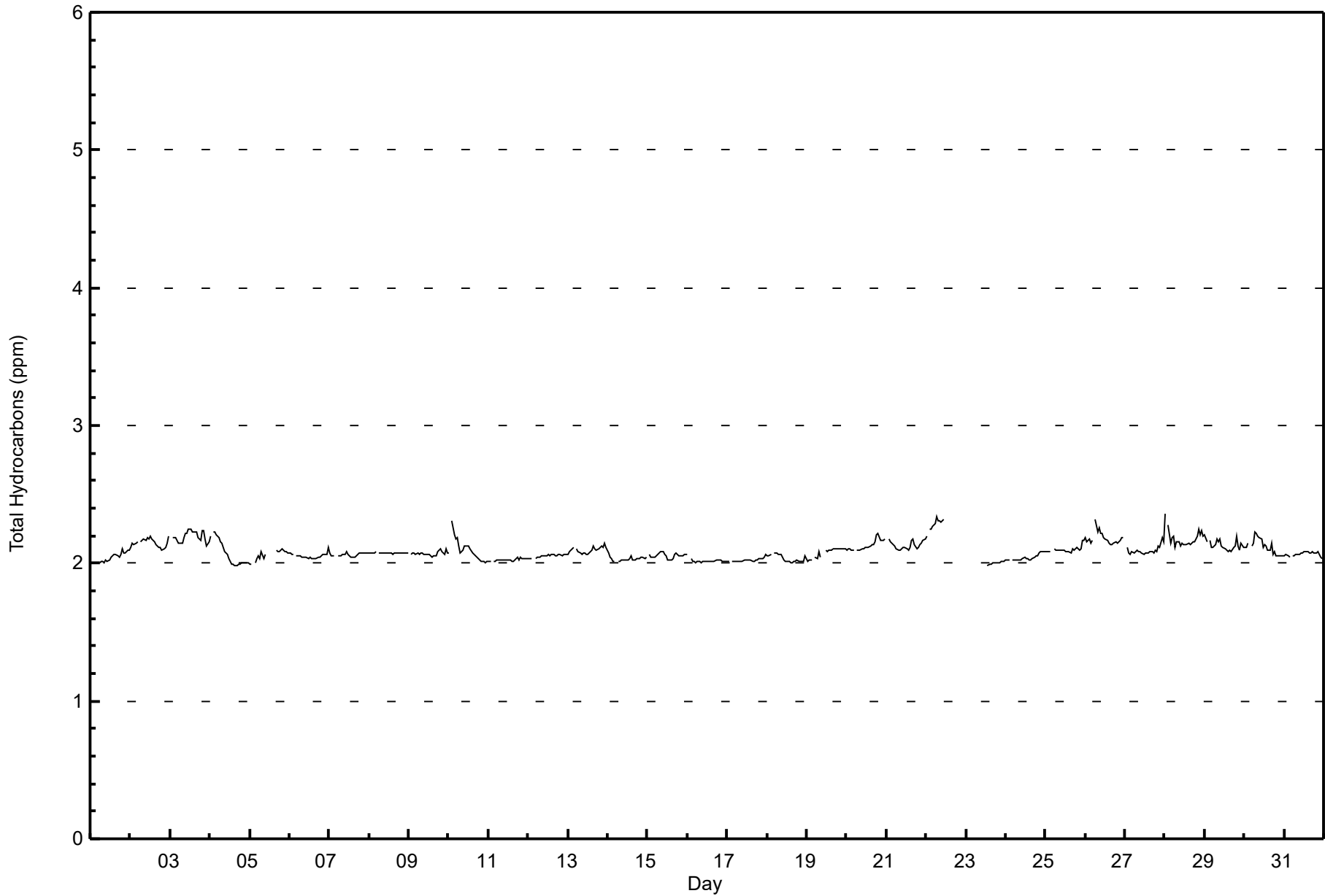
Total Number of Valid Hours: 708







Maximum Value: 2.4 ppm on Dec 28 01:00																				Maximum Daily Average: 2.2 ppm on Dec 3					Hours in Service: 744																											
Minimum Value: 2.0 ppm on Dec 4 16:00										Minimum Daily Average: 2.0 ppm on Dec 16										Hours of Data: 680																																
Maximum Diurnal Average: 2.1 ppm at hour 3										Minimum Diurnal Average: 2.1 ppm at hour 15										Hours of Missing Data: 64																																
Monthly Average: 2.09 ppm										Percentiles: P ₁ = 2.0 P ₁₀ = 2.0 Q ₁ = 2.0 Median = 2.1 Q ₃ = 2.1 P ₉₀ = 2.2 P ₉₉ = 2.3										Hours of Calibration: 36																																
Percent Operational Time: 96.2																				Daily Average	Daily Maximum																															
Day	Hourly Period Ending At (MST)																																																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																												
1-Dec	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	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.1	2.1																								
2-Dec	2.1	2.1	2.1	2.1	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.2	2.1																								
3-Dec	Z	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.2	2.1	2.2	2.2	2.2																								
4-Dec	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	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-Dec	2.0	2.0	Z	2.0	2.0	2.1	2.0	2.1	2.0	2.1	C	C	C	C	C	C	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	--	2.1																									
6-Dec	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	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1																								
7-Dec	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	2.0	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																								
8-Dec	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	2.1																								
9-Dec	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	2.1	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-Dec	2.1	Z	2.3	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.3	2.1																								
11-Dec	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																								
12-Dec	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1																								
13-Dec	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																								
14-Dec	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	2.1	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																								
15-Dec	Z	2.1	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1																								
16-Dec	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																								
17-Dec	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	2.1	2.0	2.1	2.0																								
18-Dec	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	2.0	2.0	2.0	2.0	2.0	2.1	2.0	2.1	2.0																								
19-Dec	2.0	2.0	2.0	2.0	Z	2.0	2.0	2.1	2.0	M	M	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1																								
20-Dec	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	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.2	2.1																								
21-Dec	Z	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.1	2.2	2.1																								
22-Dec	2.2	Z	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.3	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	--	2.3	2.3																									
23-Dec	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	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																								
24-Dec	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	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0																								
25-Dec	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	2.2	2.2	2.1	2.2	2.1																								
26-Dec	2.2	2.2	2.2	2.1	2.2	Z	2.3	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3																								
27-Dec	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	2.2	2.2	2.1	2.2	2.1																								
28-Dec	2.4	Z	2.3	2.1	2.2	2.2	2.1	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.4																								
29-Dec	2.2	2.2	Z	2.2	2.1	2.1	2.1	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1																								
30-Dec	2.1	2.1	2.1	Z	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2																								
31-Dec	2.1	2.1	2.1	2.0	Z	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.1	2.1	2.1	2.1																								
																								2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	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 Average	
																								2.4	2.2	2.3	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	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	Diurnal Maximum
Z - zerospan				C - Calibration				M - Maintenance				UO - Unstable Operation																																								





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Janvier - December 2023

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	214	31.47	31.47
2.1 - 3.0	466	68.53	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 680

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Total Hydrocarbons (THC) - ppm
Janvier - December 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	2	5	0	0	0	1	1	2	6	39	70	28	27	23	9	1	214
2.1 - 3.0	2	5	4	1	11	10	5	16	32	195	170	8	3	2	1	0	465
3.1 - 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	4	10	4	1	11	11	6	18	38	234	240	36	30	25	10	1	679

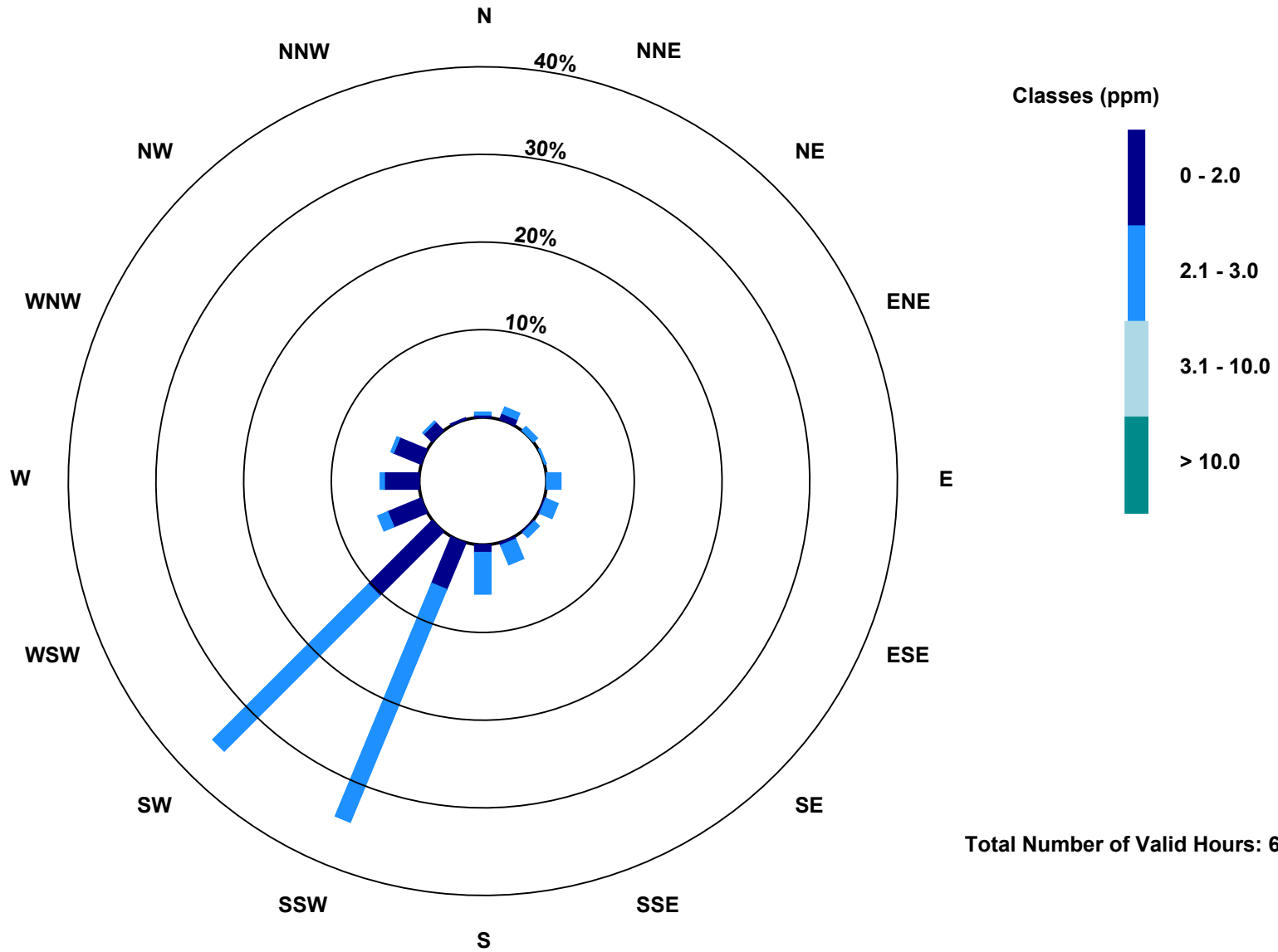
Total Number of Valid Hours: 679

Total Number of Hours: 744

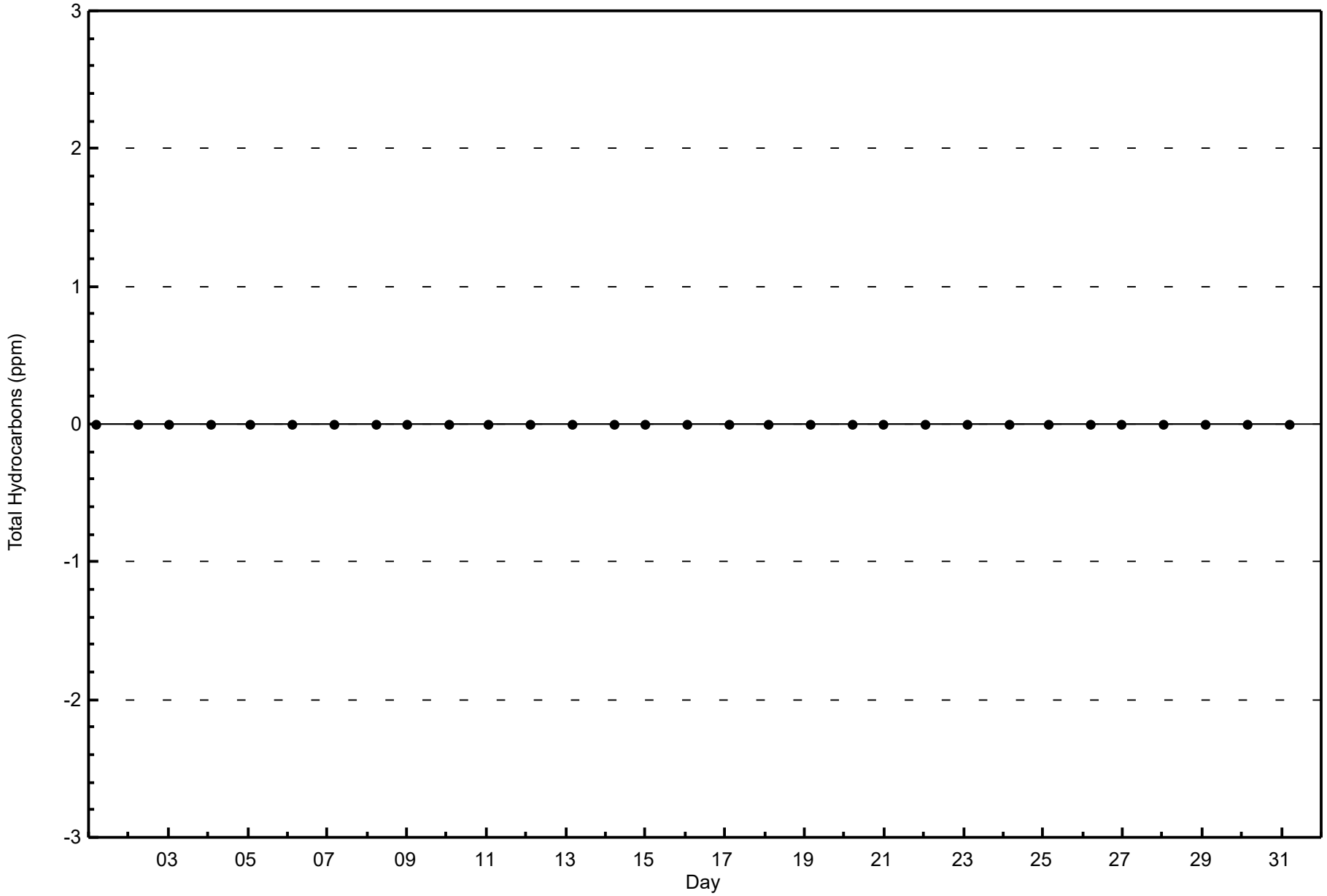


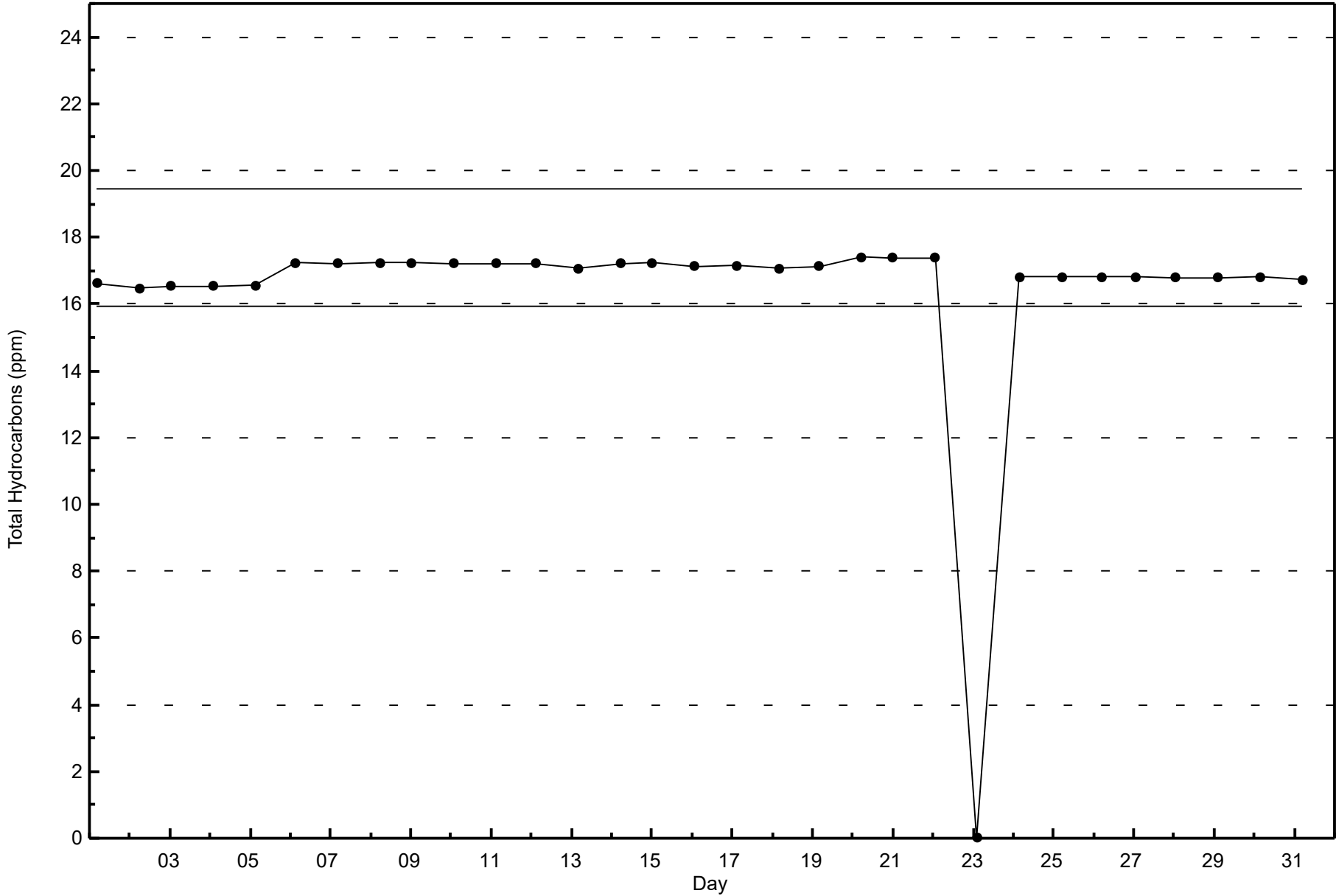
Wood Buffalo Environmental Association
Wind Rose Dec 2023

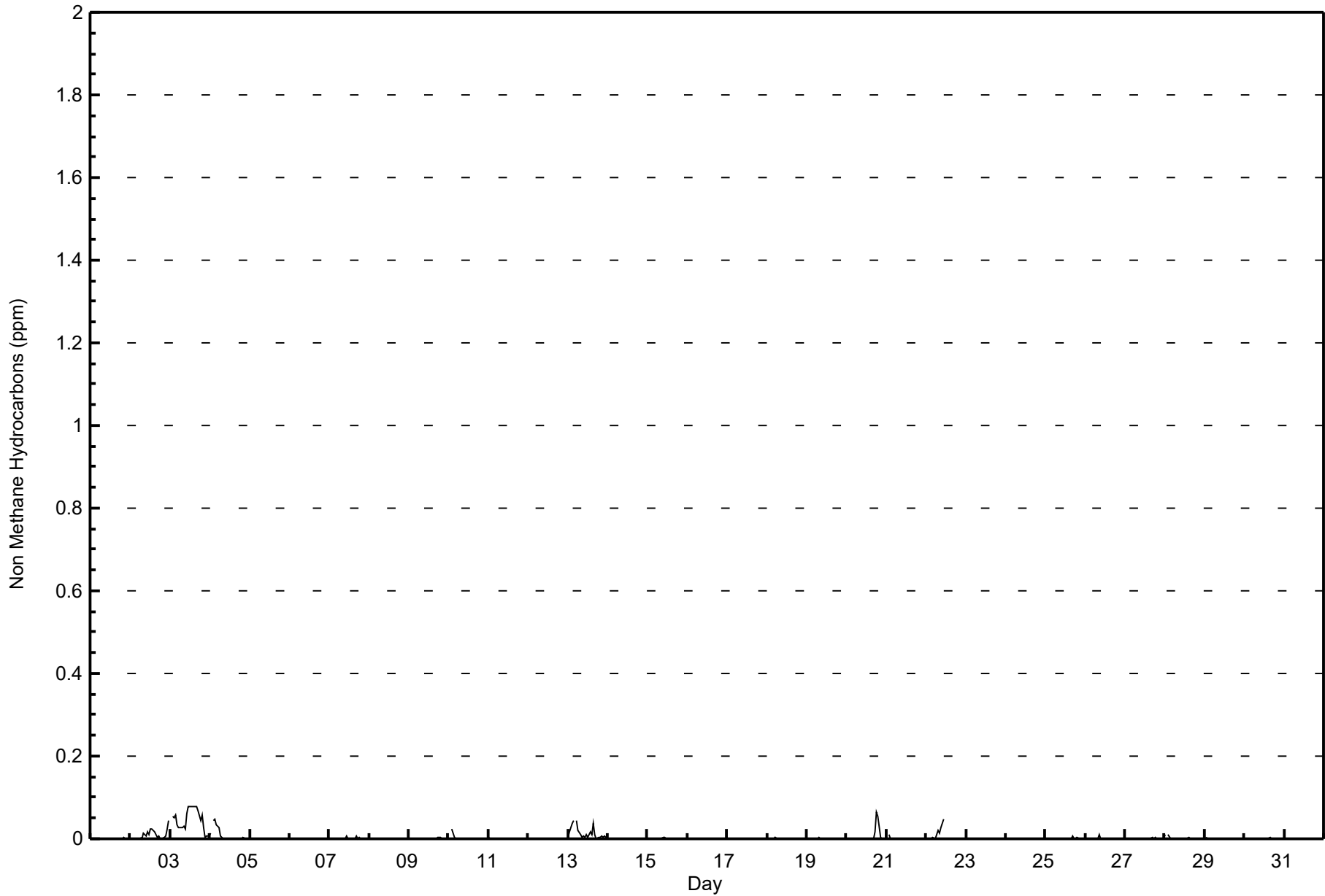
Total Hydrocarbons (THC) - ppm
Janvier



Total Number of Valid Hours: 679









Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Non Methane Hydrocarbons (NMHC) - ppm
Janvier - December 2023

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 0.005	610	89.71	89.71
0.006 - 0.05	58	8.53	98.24
0.06 - 0.1	12	1.76	100.00
> 0.1	0	0.00	100.00

Total Number of Valid Hours: 680

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Non Methane Hydrocarbons (NMHC) - ppm
Janvier - December 2023

Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 0.005	4	9	3	1	11	11	3	16	35	203	215	35	29	25	9	1	610
0.006 - 0.05	0	1	0	0	0	0	1	2	2	26	23	1	1	0	1	0	58
0.06 - 0.1	0	0	1	0	0	0	2	0	1	5	2	0	0	0	0	0	11
> 0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	4	10	4	1	11	11	6	18	38	234	240	36	30	25	10	1	679

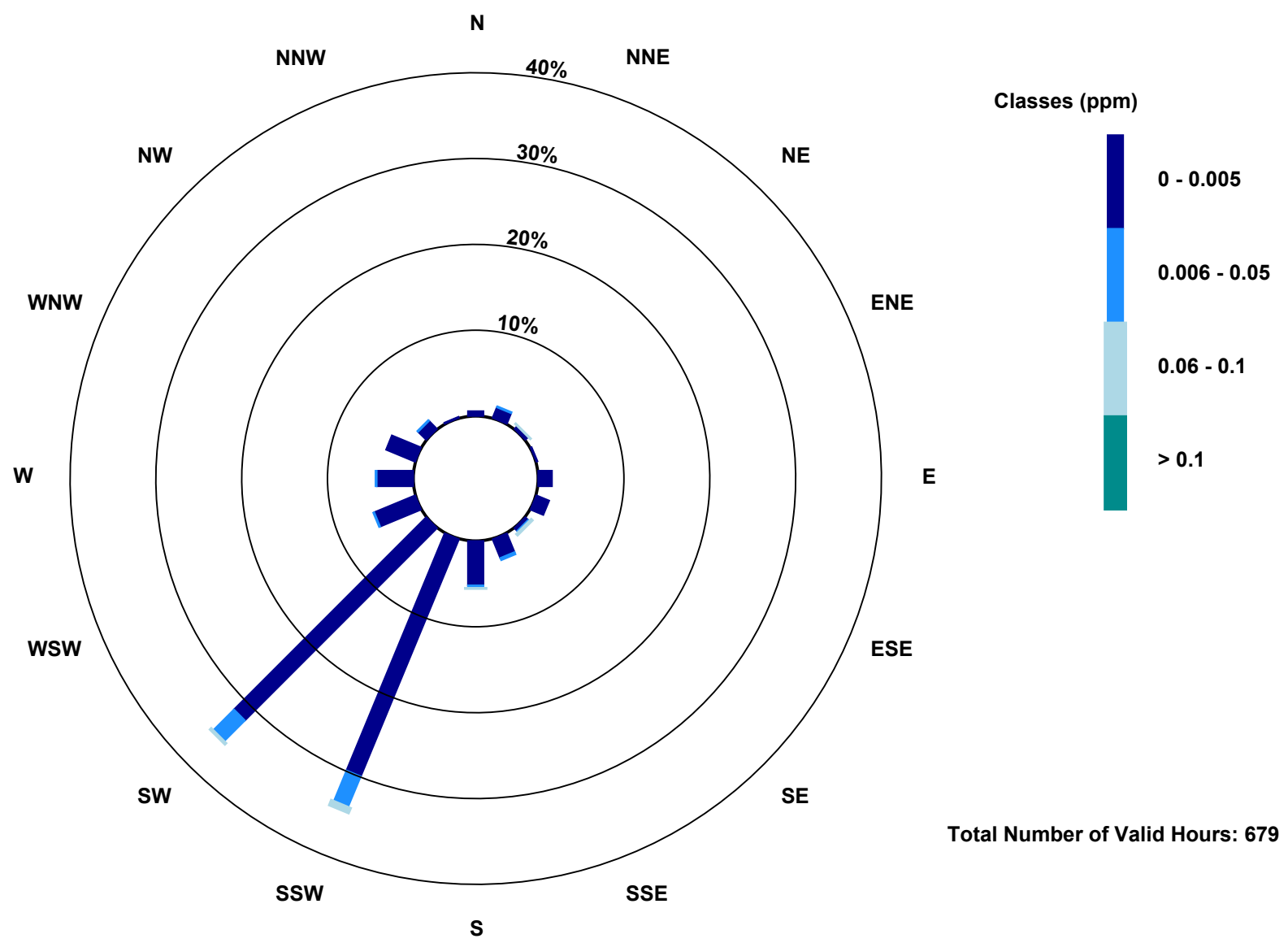
Total Number of Valid Hours: 679

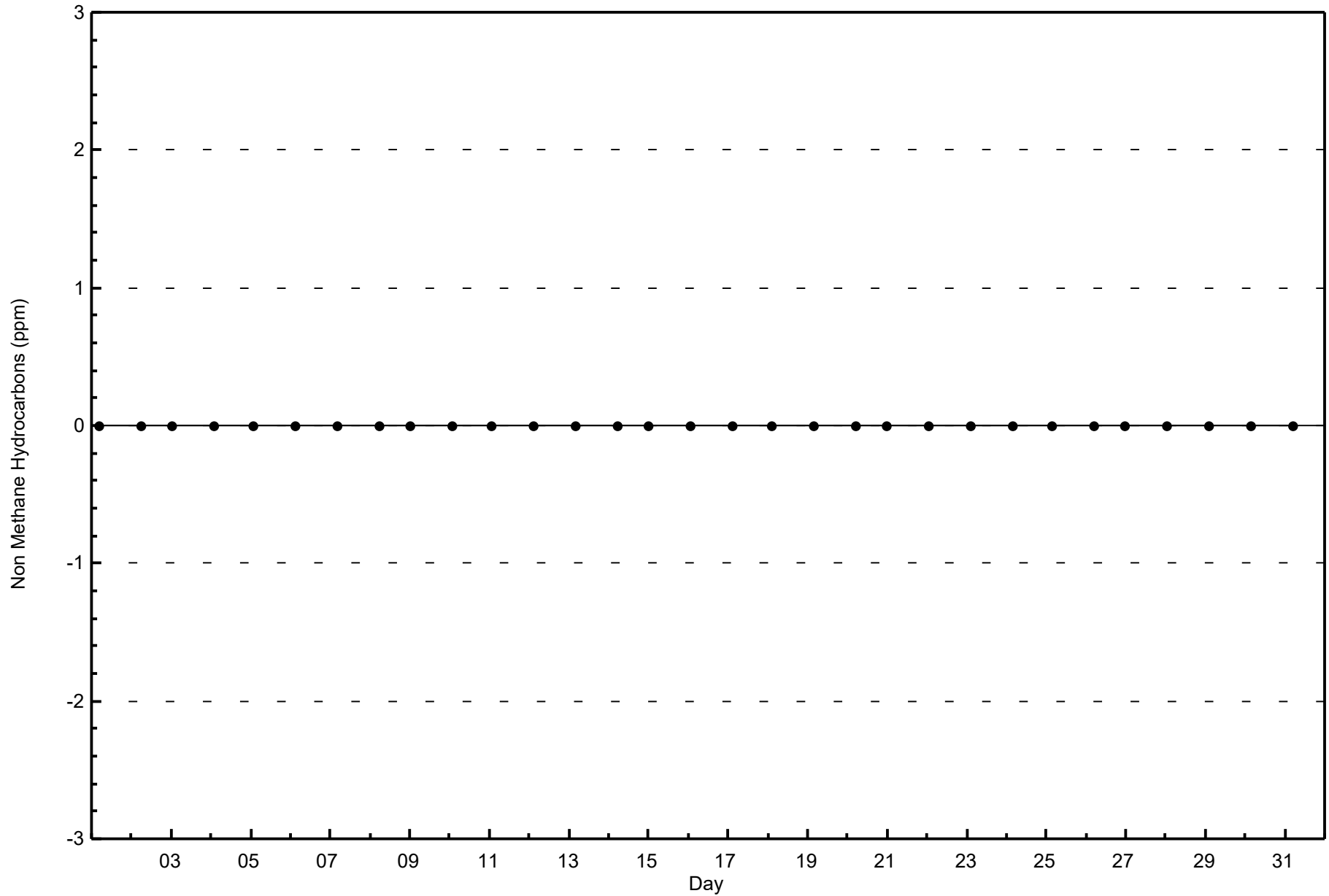
Total Number of Hours: 744

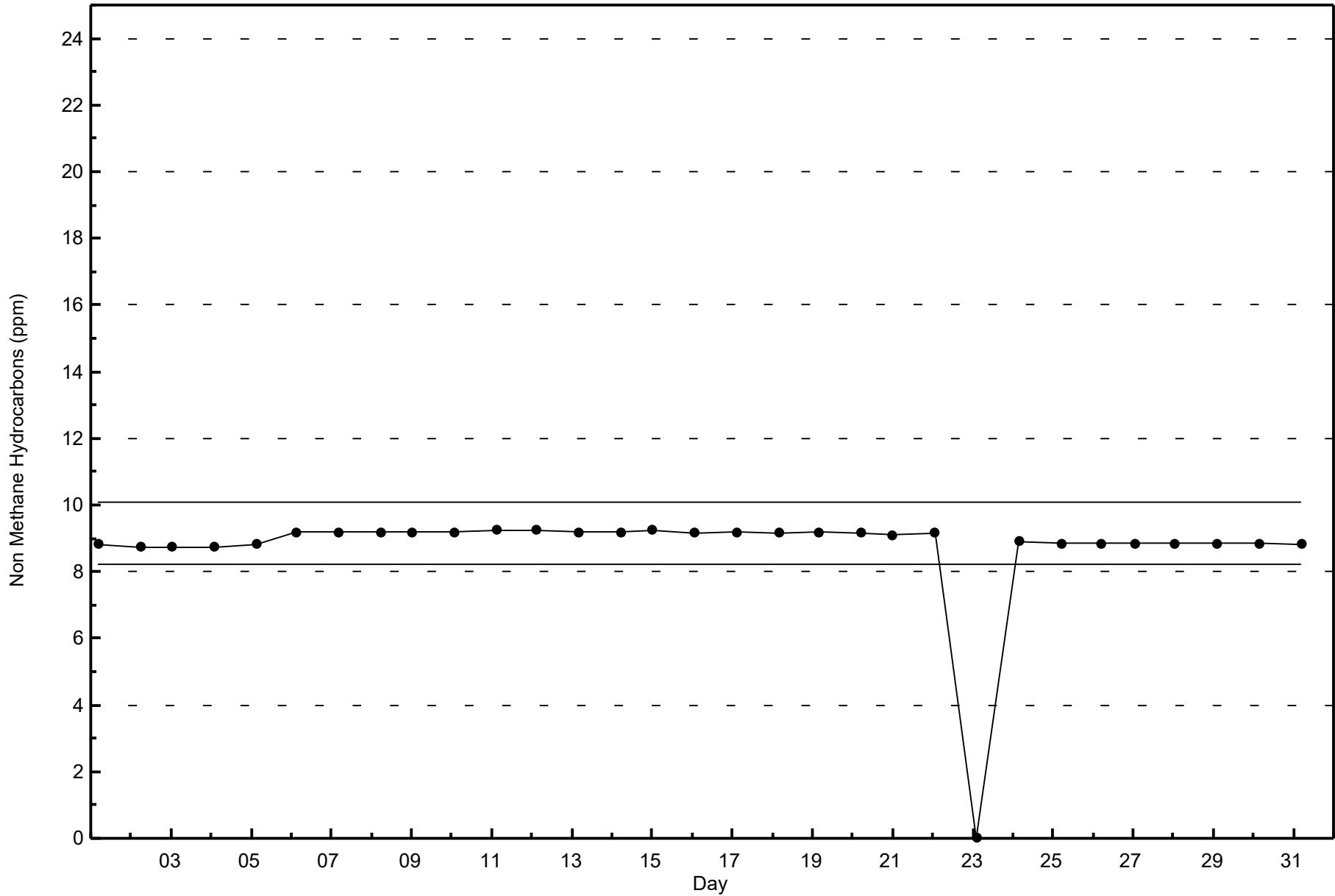


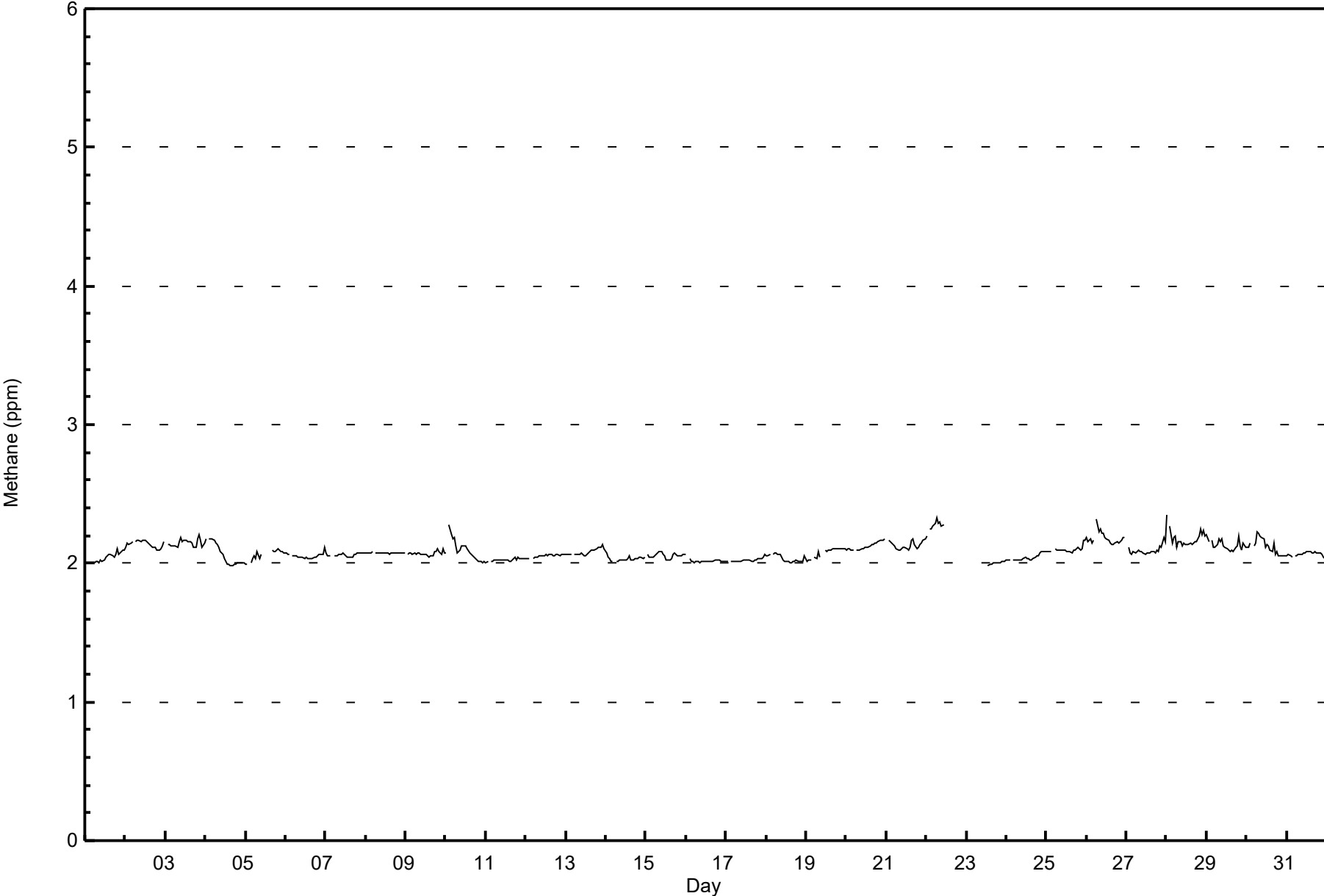
Wood Buffalo Environmental Association
Wind Rose Dec 2023

Non Methane Hydrocarbons (NMHC) - ppm
Janvier











Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Methane (CH₄) - ppm
Janvier - December 2023

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	215	31.62	31.62
2.1 - 3.0	465	68.38	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 680

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Methane (CH₄) - ppm
Janvier - December 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	2	5	0	0	0	1	1	2	6	39	71	28	27	23	9	1	215
2.1 - 3.0	2	5	4	1	11	10	5	16	32	195	169	8	3	2	1	0	464
3.1 - 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	4	10	4	1	11	11	6	18	38	234	240	36	30	25	10	1	679

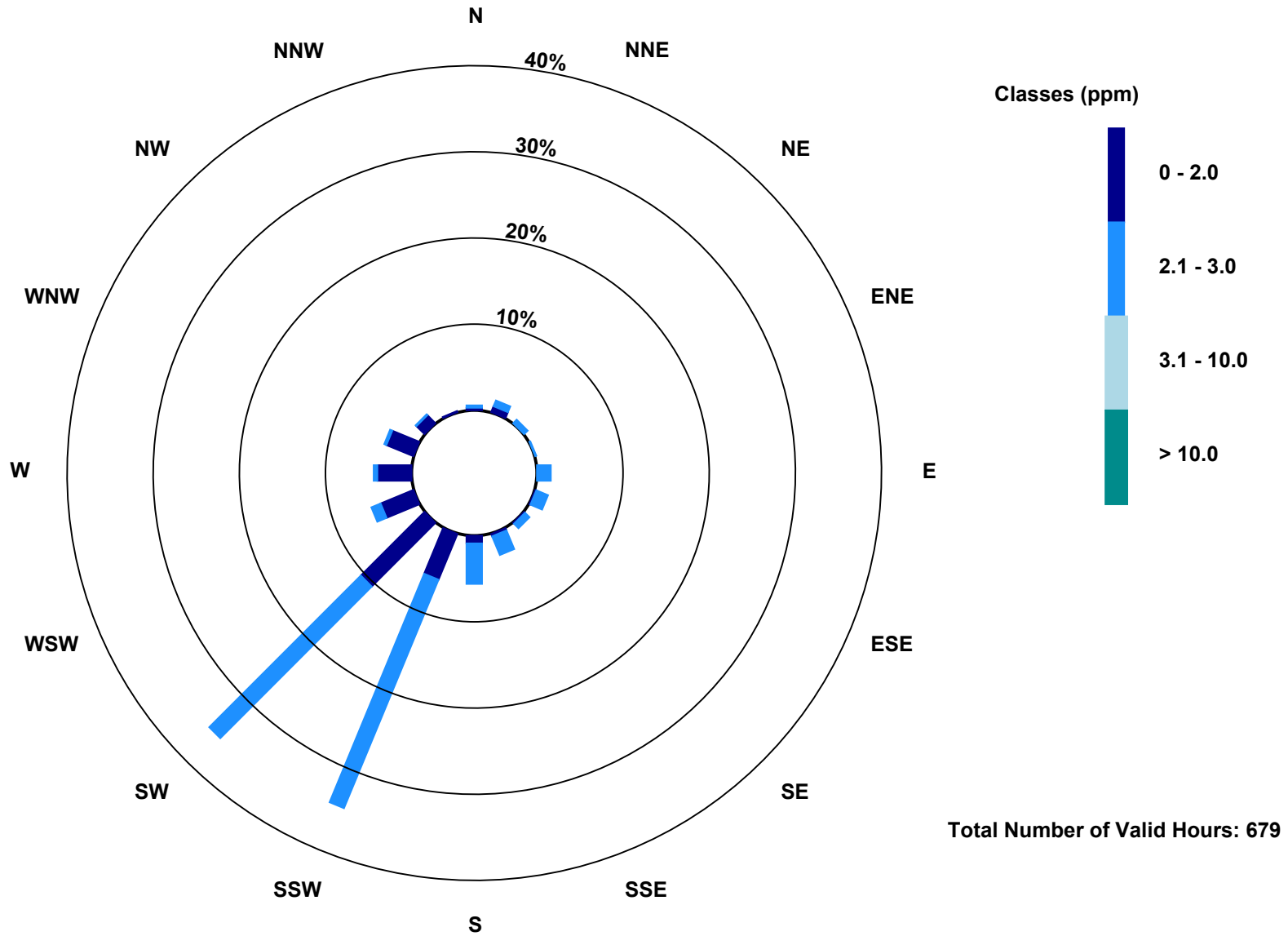
Total Number of Valid Hours: 679

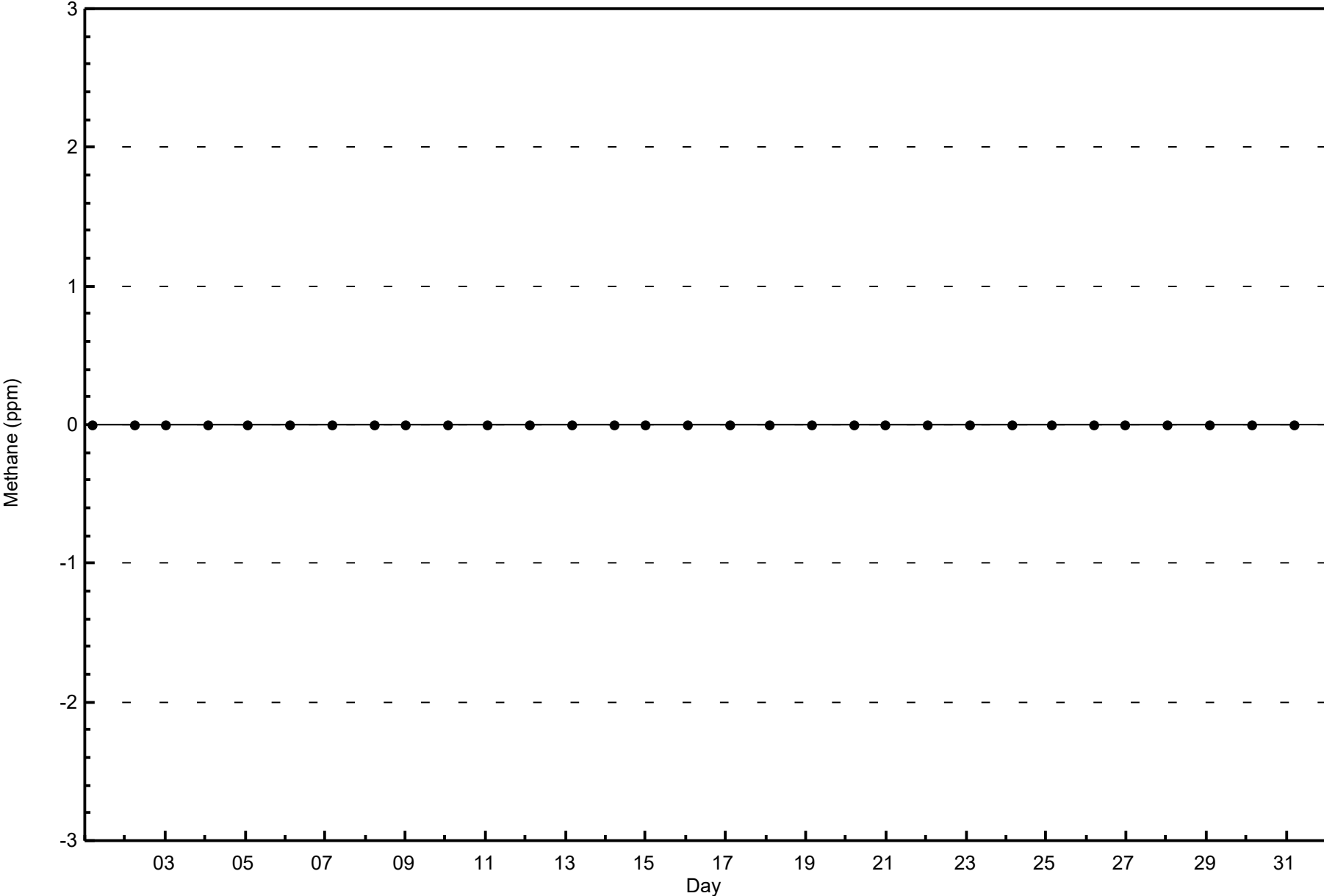
Total Number of Hours: 744

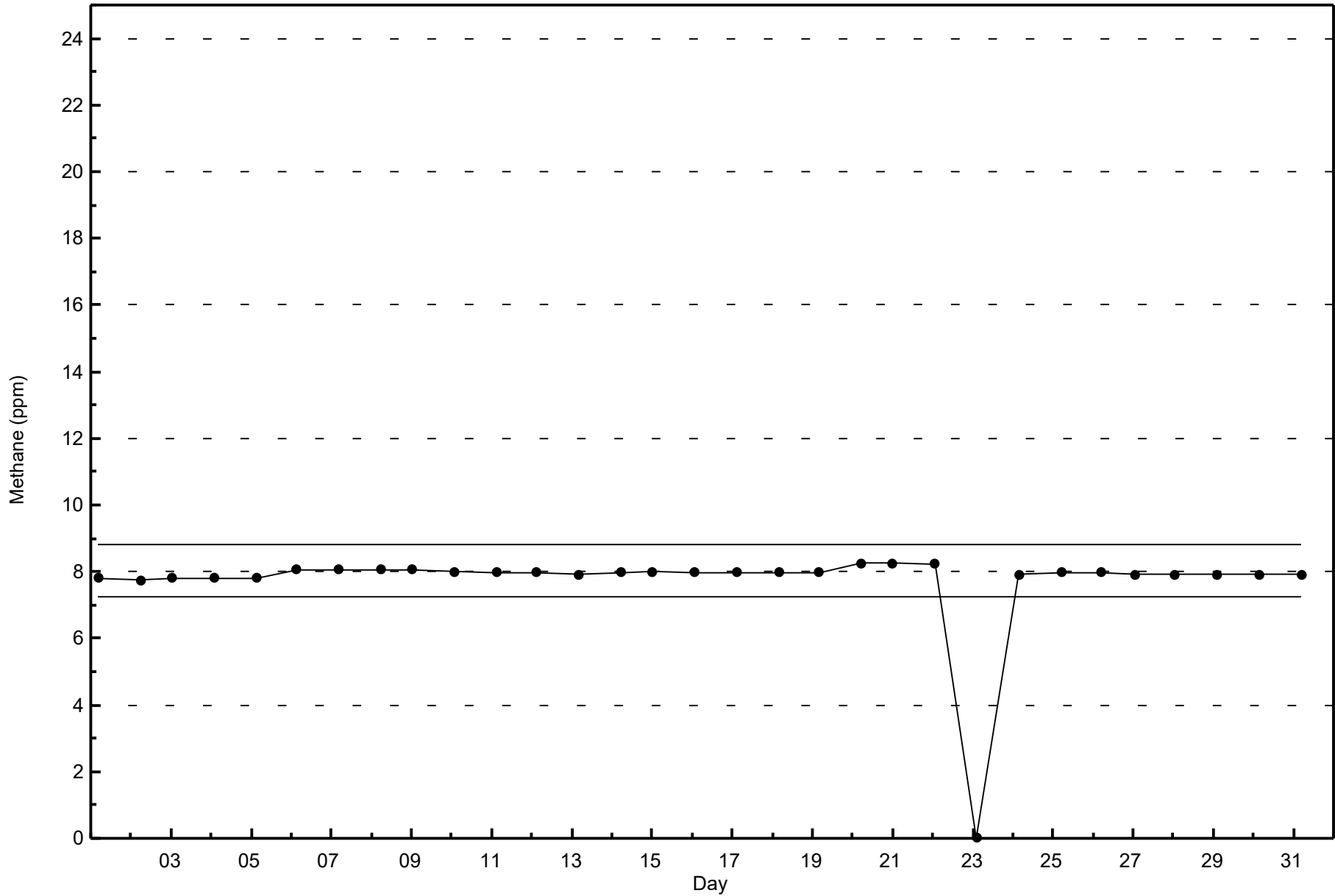


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Methane (CH₄) - ppm
Janvier







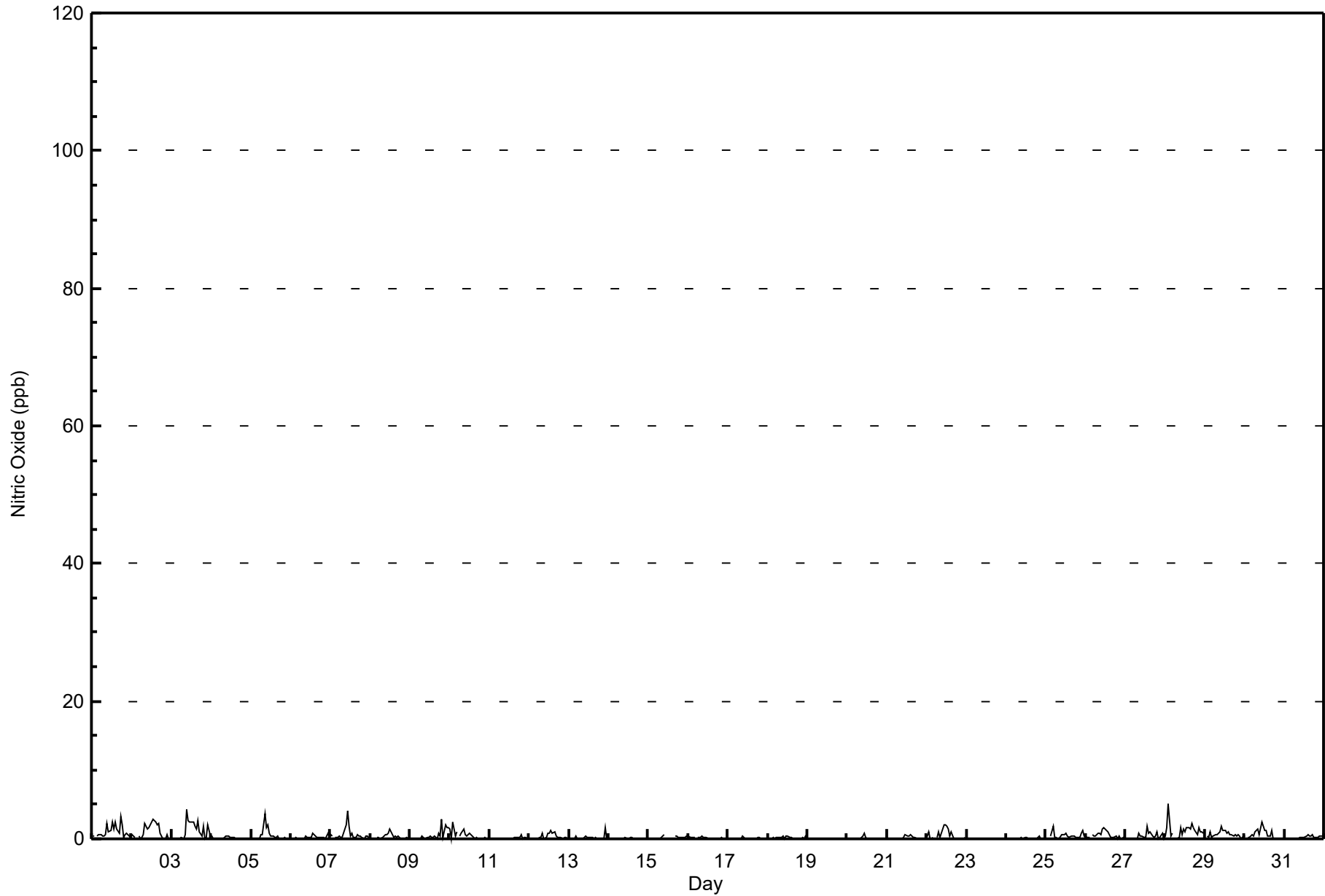


Maximum Value: 5.1 ppb on Dec 28 03:00		Maximum Daily Average: 1.2 ppb on Dec 28		Hours in Service: 744																							
Minimum Value: 0.0 ppb on Dec 2 06:00		Minimum Daily Average: 0.0 ppb on Dec 19		Hours of Data: 706																							
Maximum Diurnal Average: 0.8 ppb at hour 11		Minimum Diurnal Average: 0.1 ppb at hour 6		Hours of Missing Data: 38																							
Monthly Average: 0.39 ppb		Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.0 Median = 0.2 Q ₃ = 0.4 P ₉₀ = 1.2 P ₉₉ = 2.7		Hours of Calibration: 37																							
				Percent Operational Time: 99.9																							
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Dec	0.3	0.4	Z	0.4	0.6	0.6	0.4	0.4	0.5	2.1	1.0	1.3	2.5	1.5	2.4	1.5	0.9	3.3	1.9	0.2	0.7	0.8	0.4	0.2	1.1	3.3	
2-Dec	0.7	0.5	0.2	Z	0.3	0.0	0.2	0.6	2.2	1.3	1.6	2.1	2.4	2.8	2.4	2.0	2.2	0.7	0.5	0.0	0.0	0.6	0.0	0.0	1.0	2.8	
3-Dec	0.0	0.0	0.0	0.0	Z	0.0	0.1	0.0	0.7	4.2	2.7	2.4	2.5	2.4	1.9	1.3	2.7	0.9	0.4	1.9	0.1	0.2	2.0	0.3	1.2	4.2	
4-Dec	0.4	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.2	0.3	0.4	0.2	0.1	0.3	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.4	
5-Dec	Z	0.0	0.0	0.0	0.0	0.0	0.5	0.6	3.6	1.7	1.9	0.9	0.5	0.4	0.2	0.2	0.5	0.0	0.0	0.1	0.2	0.0	0.0	0.0	0.5	3.6	
6-Dec	0.0	Z	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.3	0.3	0.3	0.2	0.8	0.6	0.3	0.3	0.2	0.2	0.3	0.1	0.0	0.8	0.1	0.2	0.8	
7-Dec	0.7	0.4	Z	0.2	0.2	0.4	0.1	0.2	0.7	2.0	4.1	1.8	0.4	0.7	0.3	0.3	0.6	0.4	0.4	0.1	0.1	0.3	0.3	0.3	0.7	4.1	
8-Dec	0.2	0.1	0.1	Z	0.1	0.3	0.1	0.1	0.4	0.5	0.7	0.7	1.4	0.6	0.3	0.4	0.2	0.4	0.0	0.0	0.0	0.0	0.2	0.0	0.3	1.4	
9-Dec	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.3	0.2	0.0	0.1	0.3	0.4	0.2	0.2	0.4	0.0	0.9	0.5	2.9	0.2	2.0	1.5	1.6	0.5	2.9	
10-Dec	1.4	0.0	2.5	0.3	1.0	Z	0.3	0.7	1.5	0.5	0.4	0.6	0.8	0.6	0.2	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.5	2.5	
11-Dec	Z	0.0	0.0	0.0	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	0.2	0.1	0.5	0.0	0.3	0.2	0.0	0.1	0.5	
12-Dec	0.0	Z	0.0	0.0	0.0	0.0	0.3	0.1	0.7	0.0	0.2	0.8	0.9	1.1	0.9	1.0	0.4	0.2	0.2	0.2	0.1	0.1	0.2	0.0	0.3	1.1	
13-Dec	0.1	0.3	Z	0.0	0.4	0.0	0.1	0.0	0.0	0.3	0.4	0.3	0.2	0.2	0.2	0.1	0.2	0.0	0.0	0.0	0.1	0.0	1.5	0.0	0.2	1.5	
14-Dec	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.2	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	0.2	
15-Dec	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.2	0.6	C	C	C	C	C	C	0.4	0.3	0.3	0.3	0.2	0.3	0.2	0.3	--	0.6	
16-Dec	0.4	0.2	0.2	0.3	0.2	Z	0.3	0.2	0.3	0.2	0.3	0.3	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.2	0.0	0.0	0.0	0.1	0.4	
17-Dec	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.2	0.2	0.1	0.0	0.1	0.1	0.0	0.3	
18-Dec	0.2	Z	0.0	0.2	0.1	0.2	0.2	0.2	0.2	0.4	0.0	0.3	0.3	0.1	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.4	0.1	0.4	
19-Dec	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.4	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	0.1	0.7	
21-Dec	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.1	0.1	0.6	0.3	0.3	0.6	0.5	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.6	
22-Dec	0.3	1.1	0.0	0.0	0.2	Z	0.2	1.0	0.2	0.8	2.0	2.1	1.8	1.5	0.5	1.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.2	0.6	2.1	
23-Dec	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	M	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1	
24-Dec	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.4	0.0	0.0	0.2	0.1	0.4	
25-Dec	0.0	0.0	Z	0.4	1.9	0.2	0.2	0.1	0.0	0.5	0.6	0.5	0.8	0.5	0.3	0.3	0.4	0.4	0.2	0.3	0.2	0.9	1.3	0.3	0.4	1.9	
26-Dec	0.4	0.2	0.2	Z	0.7	0.3	0.3	0.8	0.8	0.6	1.4	1.6	1.4	0.9	0.7	0.2	0.3	0.2	0.4	0.1	0.4	0.0	0.0	0.2	0.5	1.6	
27-Dec	0.1	0.0	0.0	0.1	Z	0.0	0.0	0.0	0.7	0.4	0.5	0.3	0.1	1.8	0.7	1.0	0.3	0.2	0.5	0.9	0.1	0.2	0.7	0.0	0.4	1.8	
28-Dec	0.5	1.6	5.1	0.4	0.8	Z	0.0	0.0	0.3	1.7	0.7	1.4	1.0	1.7	1.7	1.4	2.2	1.6	1.3	0.7	1.6	1.1	1.0	0.8	1.2	5.1	
29-Dec	Z	0.4	0.2	1.1	0.2	0.4	0.7	0.7	0.7	1.0	1.8	1.2	1.2	0.7	1.1	0.6	0.5	0.4	0.6	0.4	0.6	0.4	0.1	0.3	0.7	1.8	
30-Dec	0.4	Z	0.2	0.2	0.6	0.4	1.0	1.3	1.5	0.6	2.4	1.7	1.3	1.3	0.4	0.4	1.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.7	2.4	
31-Dec	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.1	0.3	0.2	0.4	0.6	0.5	0.5	0.6	0.3	0.2	0.3	0.4	0.4	0.4	0.2	0.6	
		0.2	0.2	0.3	0.1	0.3	0.1	0.2	0.2	0.5	0.7	0.8	0.7	0.7	0.7	0.5	0.5	0.5	0.4	0.3	0.3	0.2	0.3	0.4	0.2	Diurnal Average	
		1.4	1.6	5.1	1.1	1.9	0.6	1.0	1.3	3.6	4.2	4.1	2.4	2.5	2.8	2.4	2.0	2.7	3.3	1.9	2.9	1.6	2.0	2.0	1.6	Diurnal Maximum	
Z - zerospan		C - Calibration			M - Maintenance																						



Wood Buffalo Environmental Association
Hourly Averages

Nitric Oxide (NO) - ppb
Janvier - December 2023





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitric Oxide (NO) - ppb
Janvier - December 2023**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	706	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: 706

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitric Oxide (NO) - ppb
Janvier - December 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	12	5	3	11	11	6	18	37	242	244	38	35	28	11	1	705
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	3	12	5	3	11	11	6	18	37	242	244	38	35	28	11	1	705

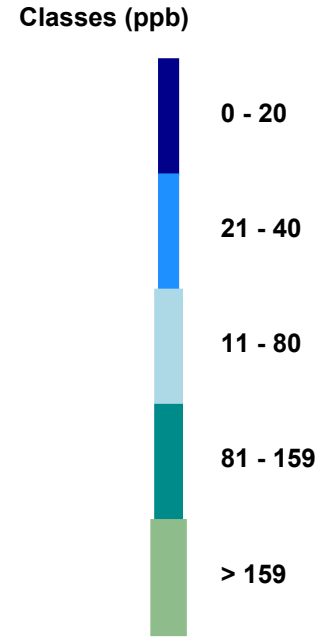
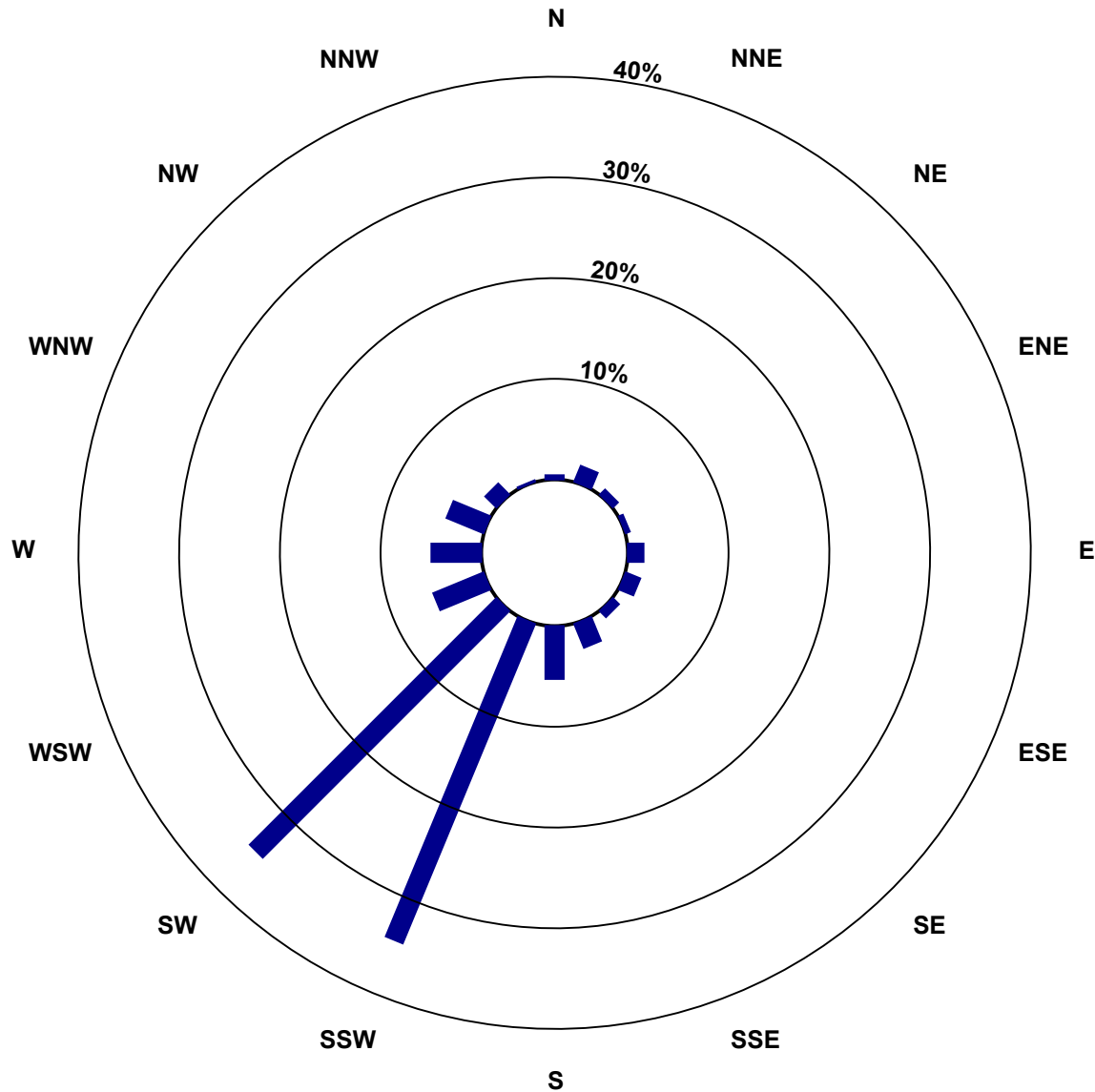
Total Number of Valid Hours: 705

Total Number of Hours: 744

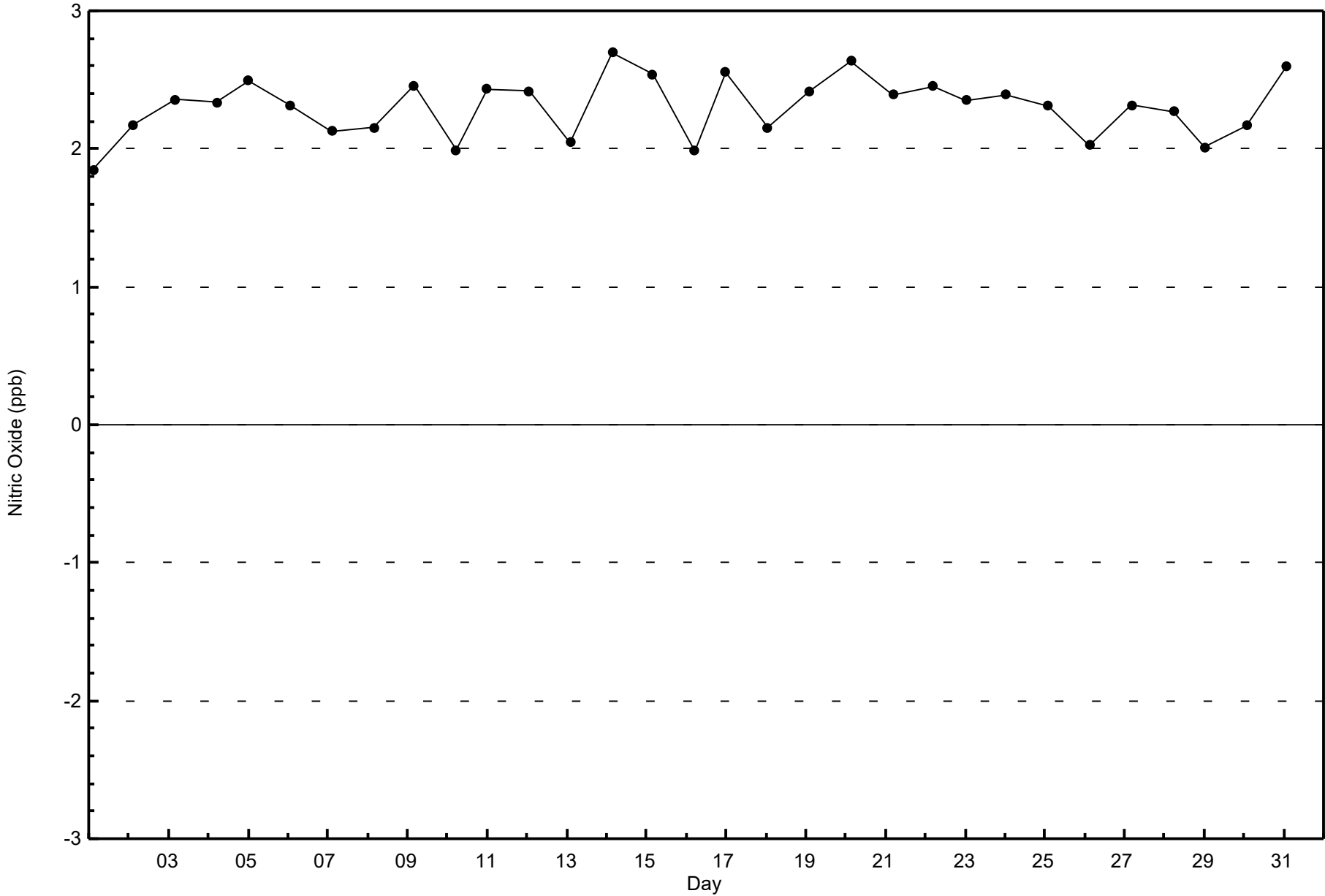


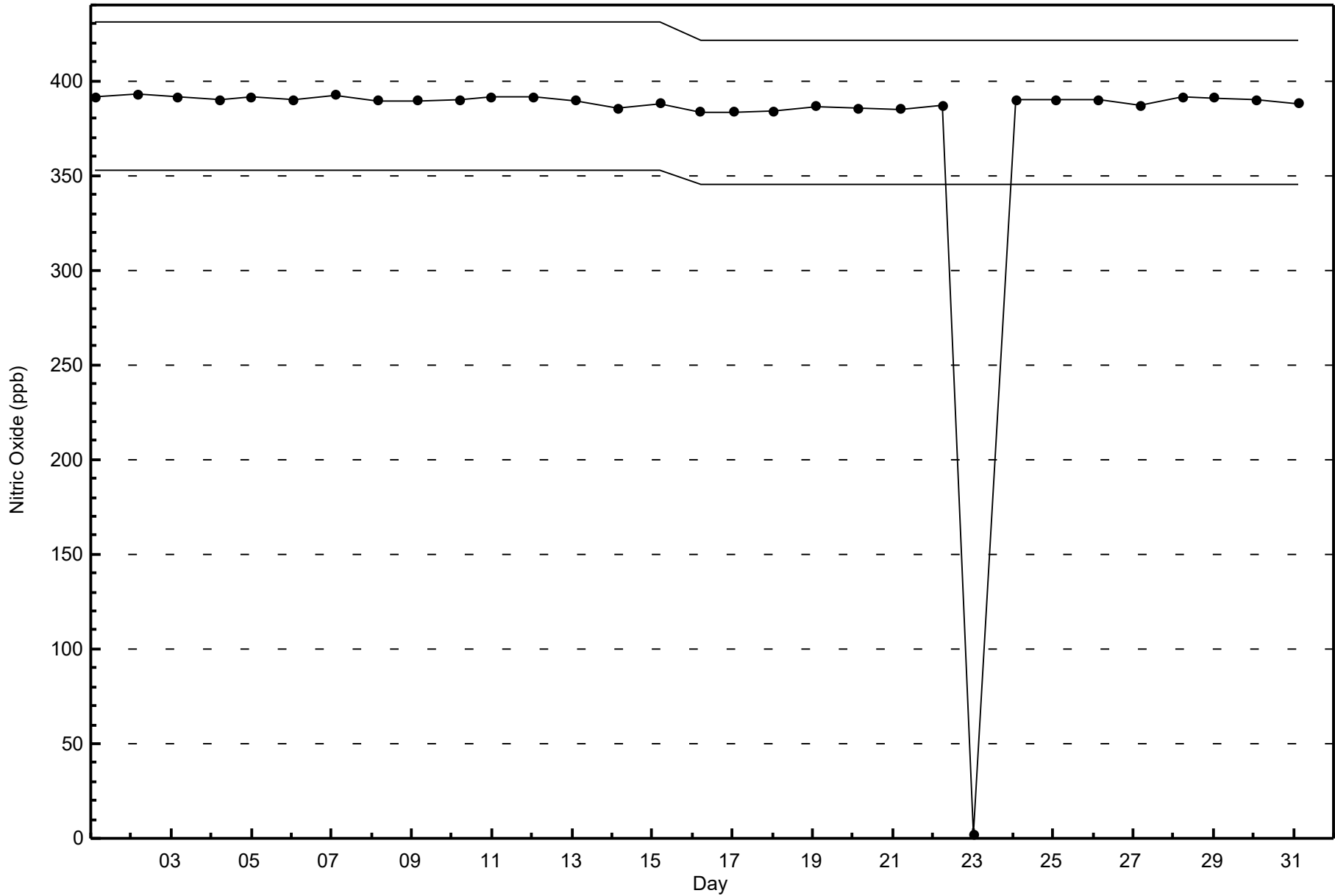
Wood Buffalo Environmental Association
Wind Rose Dec 2023

Nitric Oxide (NO) - ppb
Janvier



Total Number of Valid Hours: 705





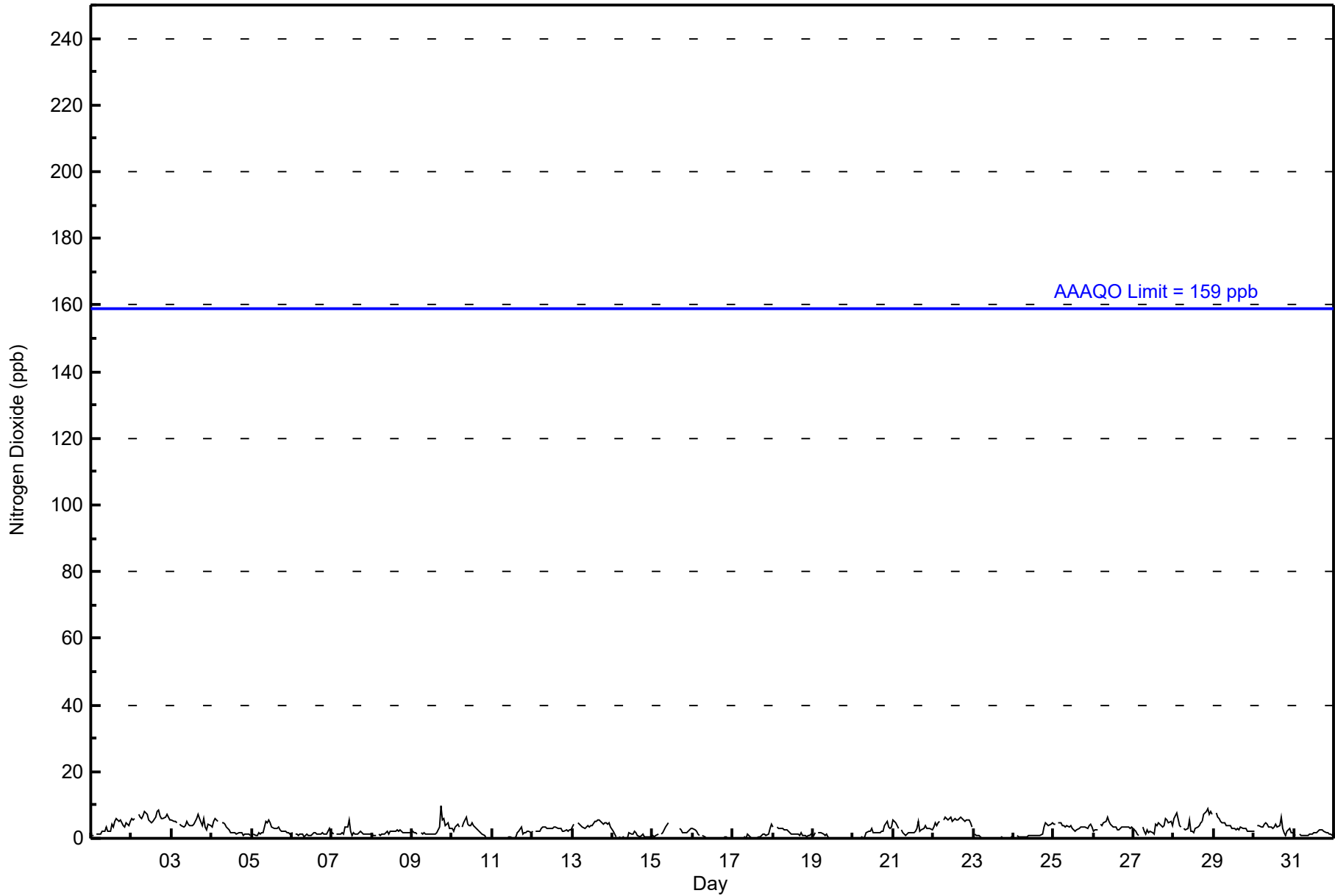


Number of Exceedences (AAAQO):		1-hr: 0		24-hr: 0		Hours in Service:														744																																																			
Maximum Value: 9.6 ppb on Dec 9 18:00		Maximum Daily Average: 6.4 ppb on Dec 2														Hours of Data:		706																																																					
Minimum Value: 0.0 ppb on Dec 11 06:00		Minimum Daily Average: 0.2 ppb on Dec 23														Hours of Missing Data:		38																																																					
Maximum Diurnal Average: 3.0 ppb at hour 18		Minimum Diurnal Average: 2.1 ppb at hour 6														Hours of Calibration:		37																																																					
Monthly Average: 2.56 ppb		Percentiles: P ₁ = 0.0 P ₁₀ = 0.2 Q ₁ = 1.1 Median = 2.2 Q ₃ = 3.7 P ₉₀ = 5.2 P ₉₉ = 7.8														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-Dec	0.8	0.9	Z	1.2	1.2	1.4	2.0	2.1	2.3	3.5	2.1	2.3	4.3	3.5	5.0	5.8	5.1	5.5	4.6	3.8	3.2	4.6	4.0	5.2	3.2	5.8																																													
2-Dec	6.1	5.5	5.8	Z	7.1	6.3	6.1	6.8	8.0	7.1	5.4	5.2	4.7	5.2	6.5	8.2	8.5	6.9	6.1	5.8	6.5	7.0	6.2	5.5	6.4	8.5																																													
3-Dec	5.5	5.1	5.0	4.5	Z	4.1	3.9	3.4	3.7	4.9	4.3	3.8	4.0	4.4	5.0	6.0	7.3	5.8	4.0	6.1	3.2	2.4	4.3	3.7	4.5	7.3																																													
4-Dec	3.6	5.1	6.1	5.6	5.0	Z	4.8	4.5	4.3	3.2	2.5	1.9	1.6	1.5	1.6	1.3	1.6	1.8	1.6	0.9	1.1	1.2	1.4	0.8	2.7	6.1																																													
5-Dec	Z	1.4	0.9	0.9	1.5	1.2	1.7	1.7	4.9	4.7	5.3	4.5	3.3	2.9	3.1	3.1	3.3	2.4	2.3	2.3	2.3	1.8	1.6	1.2	2.5	5.3																																													
6-Dec	1.5	Z	1.4	1.1	0.9	1.4	1.1	0.6	0.9	1.3	0.7	0.8	1.1	1.7	1.7	1.3	1.2	1.1	1.5	1.4	1.2	1.3	2.8	1.4	1.3	2.8																																													
7-Dec	1.6	1.1	Z	1.1	1.2	1.4	1.6	1.2	3.5	3.4	5.7	2.3	1.0	1.6	1.3	1.3	1.8	2.0	1.6	1.4	1.4	1.4	1.3	1.4	1.8	5.7																																													
8-Dec	1.2	0.9	0.8	Z	1.3	1.0	1.1	1.3	1.5	2.0	1.4	2.1	2.3	2.0	2.0	2.7	2.2	2.4	1.9	1.9	1.9	1.8	1.7	1.9	1.7	2.7																																													
9-Dec	2.0	1.8	1.5	1.3	Z	1.6	1.3	1.8	1.4	1.2	1.3	1.1	1.4	1.1	1.2	1.8	3.6	9.6	5.4	6.1	3.7	4.7	2.8	3.0	2.6	9.6																																													
10-Dec	3.1	2.3	3.6	4.3	3.6	Z	3.6	4.7	6.3	4.2	3.8	3.8	4.5	3.7	3.1	2.7	2.2	1.9	1.4	0.7	0.2	0.2	0.1	0.1	2.8	6.3																																													
11-Dec	Z	0.2	0.2	0.1	0.1	0.0	0.2	0.1	0.0	0.2	0.3	0.5	0.2	0.2	0.5	1.9	2.1	3.6	1.2	1.6	1.7	2.3	2.1	1.8	0.9	3.6																																													
12-Dec	2.1	Z	2.0	2.2	2.2	2.8	3.2	3.5	3.4	2.8	2.8	2.9	3.0	3.3	3.5	3.1	3.1	3.1	2.2	2.3	2.4	2.3	2.4	2.5	2.7	3.5																																													
13-Dec	3.4	4.4	Z	4.8	4.4	3.8	3.4	3.1	3.3	3.7	3.3	3.7	3.9	4.9	5.1	5.4	5.4	4.9	4.3	4.7	4.8	4.3	4.7	3.4	4.2	5.4																																													
14-Dec	2.0	1.1	0.4	Z	0.4	0.0	0.3	0.1	0.0	0.1	1.8	1.1	1.2	2.0	1.5	1.0	0.4	0.7	1.1	0.6	0.5	0.6	0.4	0.6	0.8	2.0																																													
15-Dec	0.7	0.6	1.0	1.1	Z	1.3	1.6	2.5	3.6	4.8	C	C	C	C	C	C	3.1	2.7	1.8	1.5	1.5	2.1	2.6	2.8	--	4.8																																													
16-Dec	2.9	2.7	2.1	1.1	0.7	Z	0.7	0.3	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.2	0.0	0.2	0.5	0.6	0.0	0.0	0.0	0.5	2.9																																													
17-Dec	Z	0.1	0.1	0.0	0.0	0.0	0.0	0.4	0.2	1.4	0.6	0.2	0.2	0.0	0.2	0.5	0.5	0.9	1.3	1.2	1.0	1.2	3.0	4.1	0.7	4.1																																													
18-Dec	3.6	Z	3.3	3.0	3.0	2.9	2.9	2.6	2.6	2.1	1.5	1.3	1.3	1.1	1.3	1.2	0.9	1.6	0.7	0.9	0.3	1.0	0.7	1.3	1.8	3.6																																													
19-Dec	0.9	1.5	Z	1.9	1.5	1.6	1.4	1.0	1.1	0.3	0.1	0.0	0.1	0.0	0.0	0.1	0.2	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.5	1.9																																													
20-Dec	0.0	0.0	0.0	Z	0.1	0.4	0.1	0.6	1.9	2.2	2.1	2.8	1.6	1.5	1.7	1.6	1.8	2.2	2.1	4.0	4.9	3.4	3.0	3.3	1.8	4.9																																													
21-Dec	5.4	4.7	4.0	3.1	Z	2.5	1.6	0.9	1.4	1.6	1.6	1.6	1.6	2.3	2.9	5.1	2.3	2.6	2.8	4.0	3.0	2.8	2.8	2.7	2.8	5.4																																													
22-Dec	3.5	4.5	3.9	4.5	4.9	Z	5.3	6.4	6.1	5.7	6.3	5.0	5.3	5.9	5.7	5.4	6.5	5.9	5.3	5.2	5.3	5.5	4.7	3.5	5.2	6.5																																													
23-Dec	Z	1.1	0.7	0.7	0.4	0.2	0.0	0.1	0.1	0.0	0.0	0.0	0.0	M	0.1	0.1	0.2	0.3	0.0	0.2	0.0	0.1	0.1	0.3	0.2	1.1																																													
24-Dec	0.9	Z	0.8	0.5	0.4	0.6	0.4	0.5	0.4	0.8	0.9	0.7	0.8	0.9	0.8	0.7	0.7	1.3	3.2	4.6	4.4	3.8	4.4	4.5	1.6	4.6																																													
25-Dec	4.4	4.3	Z	4.6	4.7	4.0	3.7	3.2	3.7	3.6	3.7	2.9	2.5	2.3	2.4	3.0	3.2	3.3	3.3	3.2	3.1	3.7	4.2	3.4	3.5	4.7																																													
26-Dec	2.3	2.5	2.6	Z	4.2	4.0	4.6	5.1	6.3	5.1	4.4	3.8	3.5	3.3	2.7	2.6	3.1	3.2	3.5	3.2	3.2	3.2	3.1	3.2	3.6	6.3																																													
27-Dec	2.7	2.0	1.4	0.8	Z	3.3	2.1	1.4	2.6	1.7	2.1	1.5	1.3	4.1	4.0	4.6	3.8	3.6	3.7	6.1	5.6	4.6	5.0	3.9	3.1	6.1																																													
28-Dec	5.9	6.7	7.8	3.8	3.2	Z	3.0	2.7	2.8	5.5	2.2	2.3	1.7	2.8	3.6	3.7	4.8	5.1	7.4	8.1	9.1	7.4	8.1	7.2	5.0	9.1																																													
29-Dec	Z	7.6	6.3	6.0	5.1	4.5	4.8	3.8	3.9	3.7	3.7	3.0	2.8	2.7	2.9	2.7	3.5	2.8	3.0	2.9	2.3	2.2	2.0	2.0	3.7	7.6																																													
30-Dec	2.2	Z	3.8	3.8	3.5	3.6	4.1	4.7	4.1	3.4	3.6	3.0	3.2	4.3	3.6	3.8	6.3	3.0	1.9	1.0	2.3	2.9	1.5	1.5	3.3	6.3																																													
31-Dec	1.4	1.0	Z	1.2	0.7	0.9	0.9	0.9	0.9	1.2	1.3	1.4	1.6	1.7	2.2	2.7	2.6	2.6	2.1	1.9	1.5	1.2	1.1	0.7	1.5	2.7																																													
																								Diurnal Average		2.7		2.6		2.4		2.4		2.1		2.3		2.3		2.8		2.8		2.5		2.2		2.1		2.4		2.5		2.8		3.0		3.0		2.6		2.8		2.7		2.6		2.7		2.5	
																								Diurnal Maximum		6.1		7.6		7.8		6.0		7.1		6.3		6.1		6.8		8.0		7.1		6.3		5.2		5.3		5.9		6.5		8.2		8.5		9.6		7.4		8.1		7.4		8.1		7.2	
Z - zerospan																								C - Calibration		M - Maintenance																																													
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 159 ppb																																																																							



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Dioxide (NO₂) - ppb
Janvier - December 2023





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Janvier - December 2023**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	706	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: 706

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Janvier - December 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	12	5	3	11	11	6	18	37	242	244	38	35	28	11	1	705
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	3	12	5	3	11	11	6	18	37	242	244	38	35	28	11	1	705

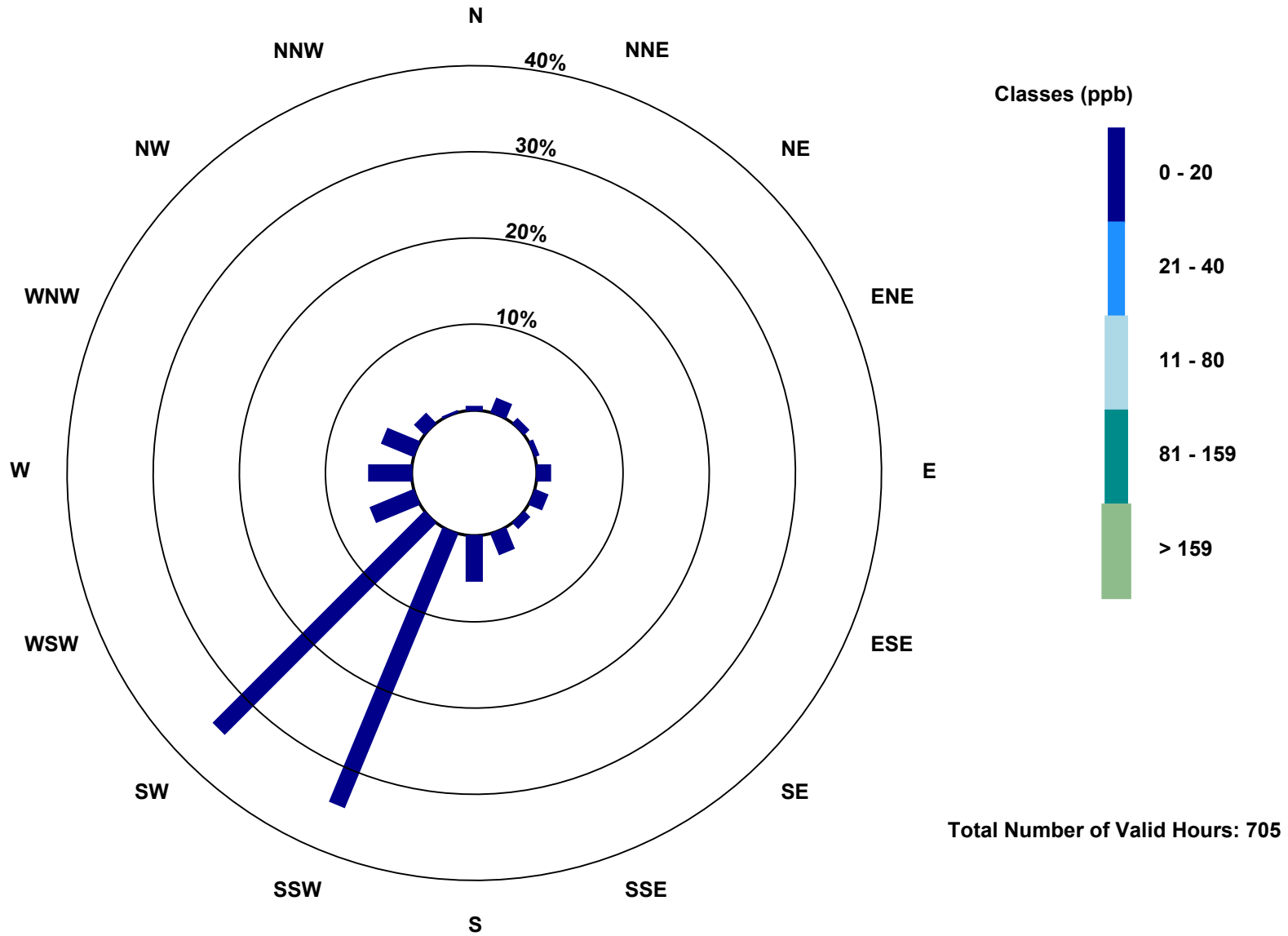
Total Number of Valid Hours: 705

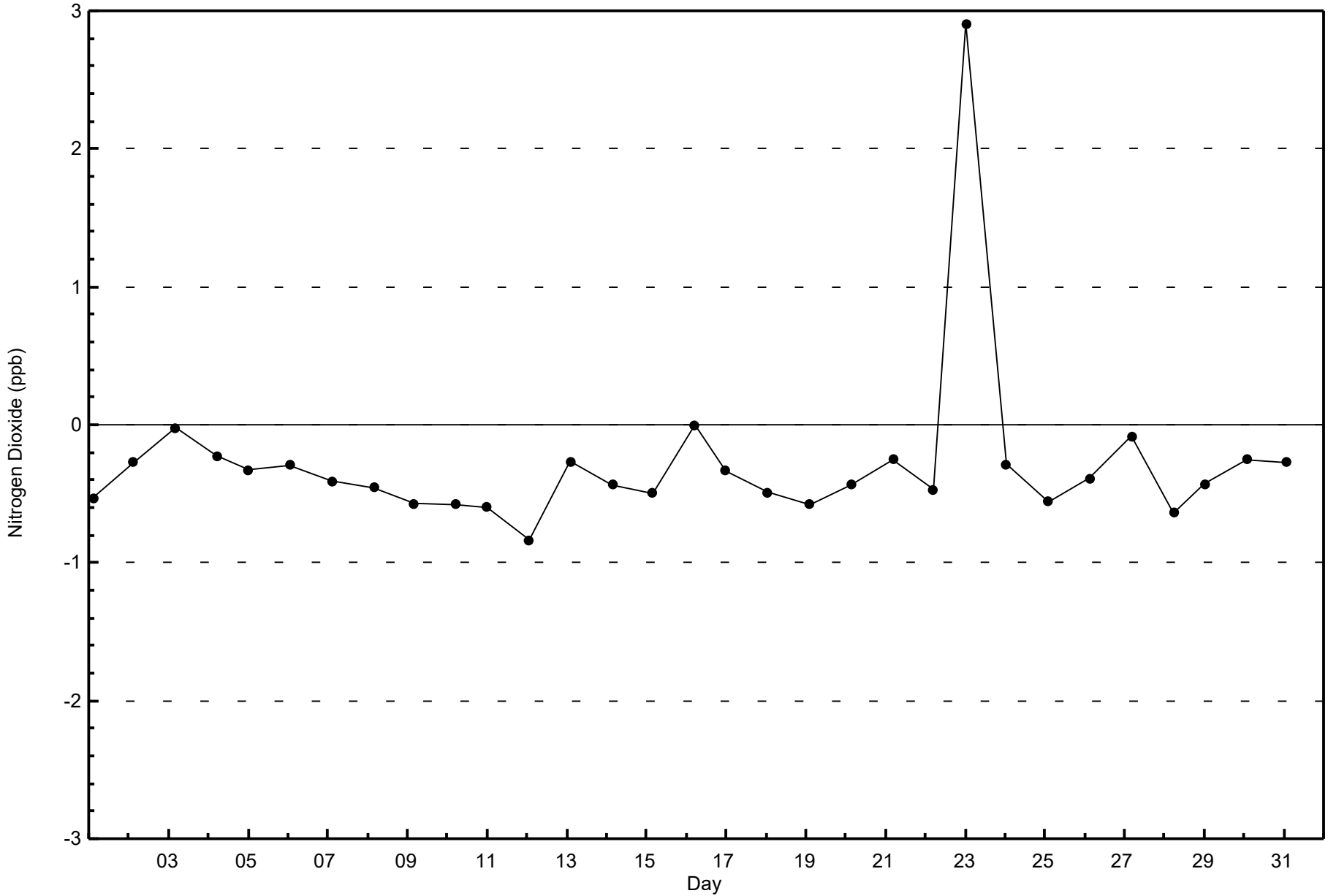
Total Number of Hours: 744

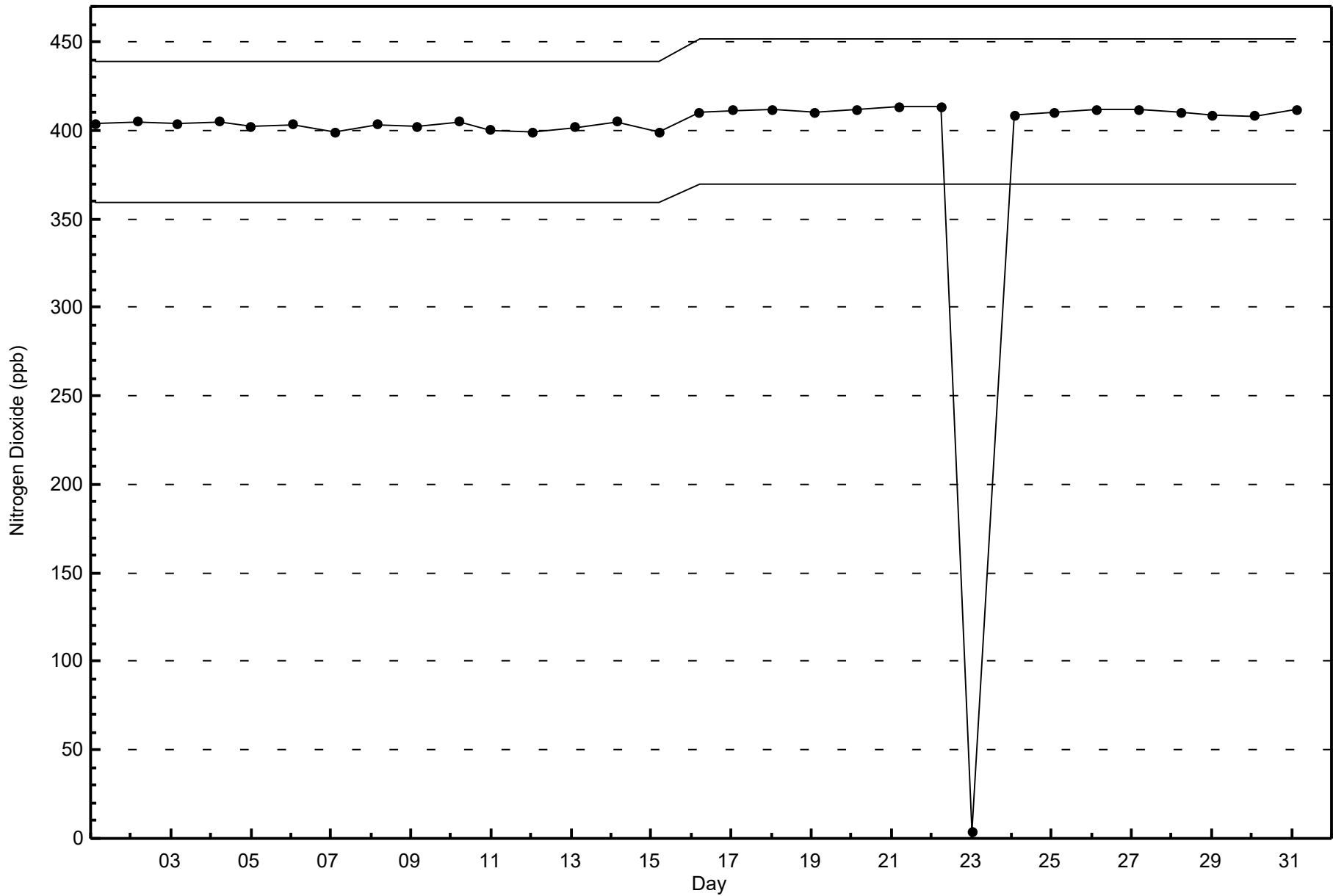


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Nitrogen Dioxide (NO₂) - ppb
Janvier









Wood Buffalo Environmental Association
Summary of Hour Averages

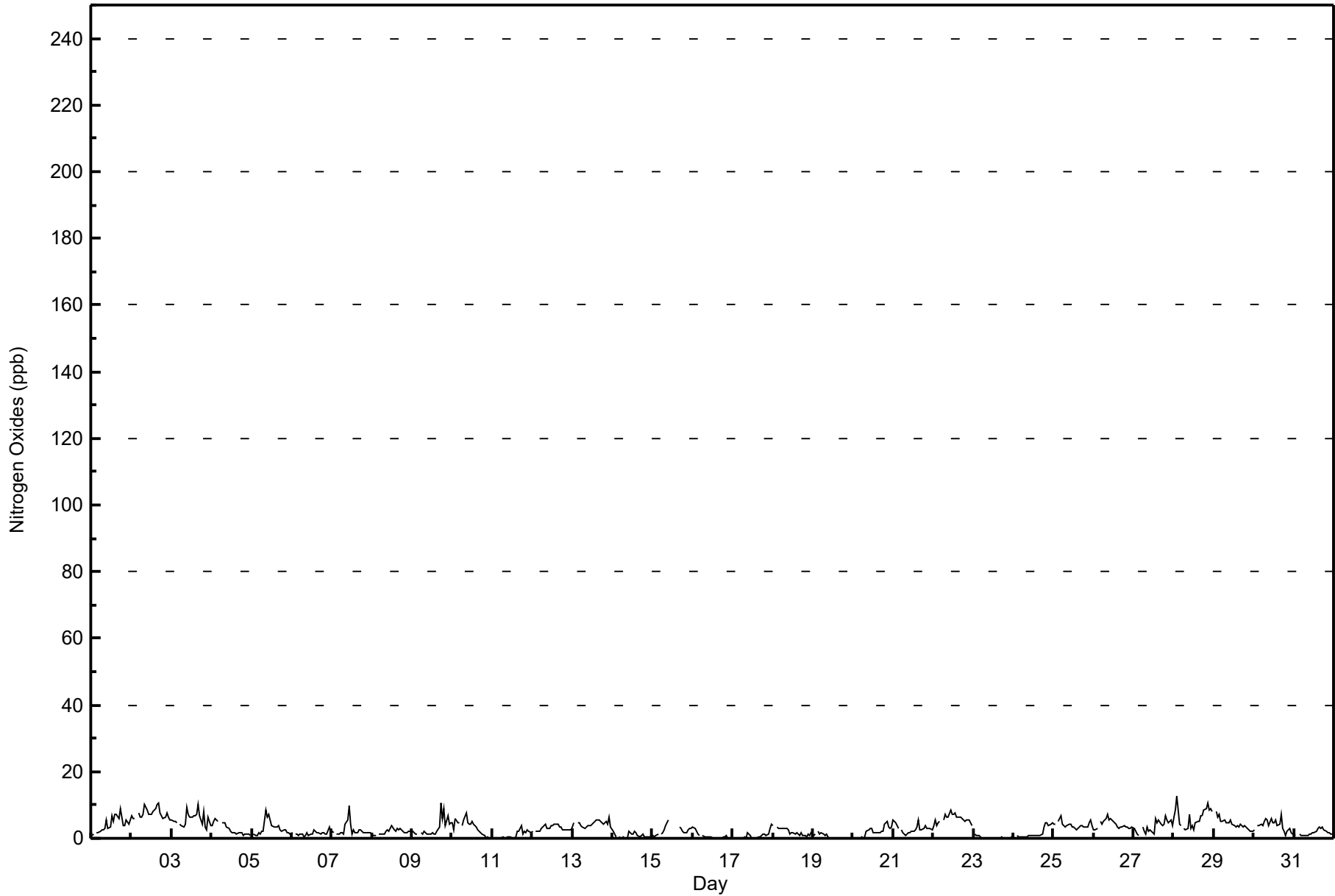
Nitrogen Oxides (NO_x) - ppb
Janvier - December 2023

Maximum Value: 12.9 ppb on Dec 28 03:00																					Maximum Daily Average: 7.4 ppb on Dec 2					Hours in Service: 744																							
Minimum Value: 0.0 ppb on Dec 11 09:00											Minimum Daily Average: 0.2 ppb on Dec 23					Hours of Data: 706																																	
Maximum Diurnal Average: 3.4 ppb at hour 10											Minimum Diurnal Average: 2.2 ppb at hour 6					Hours of Missing Data: 38																																	
Monthly Average: 2.95 ppb											Percentiles: P ₁ = 0.0 P ₁₀ = 0.2 Q ₁ = 1.2 Median = 2.5 Q ₃ = 4.3 P ₉₀ = 6.2 P ₉₉ = 9.7					Hours of Calibration: 37																																	
																Percent Operational Time: 99.9																																	
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Dec	1.1	1.3	Z	1.6	1.8	2.0	2.4	2.5	2.8	5.6	3.1	3.6	6.8	5.0	7.4	7.3	6.0	8.8	6.5	4.0	3.9	5.4	4.4	5.4	4.3	8.8																							
2-Dec	6.8	6.0	6.0	Z	7.4	6.3	6.3	7.4	10.2	8.4	7.0	7.3	7.1	8.0	8.9	10.2	10.7	7.6	6.6	5.8	6.5	7.6	6.2	5.5	7.4	10.7																							
3-Dec	5.5	5.1	5.0	4.5	Z	4.1	4.0	3.4	4.4	9.1	7.0	6.2	6.5	6.8	6.9	7.3	10.0	6.7	4.4	8.0	3.3	2.6	6.3	4.0	5.7	10.0																							
4-Dec	4.0	5.1	6.1	5.6	5.0	Z	4.8	4.5	4.5	3.5	2.9	2.1	1.7	1.8	1.7	1.3	1.6	1.8	1.6	0.9	1.2	1.2	1.4	0.8	2.8	6.1																							
5-Dec	Z	1.4	0.9	0.9	1.5	1.2	2.2	2.3	8.5	6.4	7.2	5.4	3.8	3.3	3.3	3.8	2.4	2.3	2.4	2.5	1.8	1.6	1.2	3.0	8.5																								
6-Dec	1.5	Z	1.4	1.2	1.0	1.4	1.1	0.6	0.9	1.6	1.0	1.1	1.3	2.5	2.3	1.6	1.5	1.3	1.7	1.7	1.3	1.3	3.6	1.5	1.5	3.6																							
7-Dec	2.3	1.5	Z	1.3	1.4	1.8	1.7	1.4	4.2	5.4	9.8	4.1	1.4	2.3	1.6	1.6	2.4	2.4	2.0	1.5	1.5	1.7	1.6	1.7	2.5	9.8																							
8-Dec	1.4	1.0	0.9	Z	1.4	1.3	1.2	1.4	1.9	2.5	2.1	2.8	3.7	2.6	2.3	3.1	2.4	2.8	1.9	1.9	1.9	1.8	1.9	1.9	2.0	3.7																							
9-Dec	2.0	1.8	1.5	1.3	Z	1.6	1.3	2.1	1.6	1.2	1.4	1.4	1.8	1.3	1.4	2.2	3.6	10.5	5.9	9.0	3.9	6.7	4.3	4.6	3.1	10.5																							
10-Dec	4.5	2.3	6.1	4.6	4.6	Z	3.9	5.4	7.8	4.7	4.2	4.4	5.3	4.3	3.3	2.7	2.3	1.9	1.4	0.7	0.2	0.3	0.1	0.1	3.3	7.8																							
11-Dec	Z	0.2	0.2	0.1	0.1	0.0	0.2	0.1	0.0	0.2	0.3	0.5	0.2	0.2	0.5	2.0	2.3	3.8	1.3	2.1	1.7	2.6	2.3	1.8	1.0	3.8																							
12-Dec	2.1	Z	2.0	2.2	2.2	2.8	3.5	3.6	4.1	2.8	3.0	3.7	3.9	4.4	4.4	4.1	3.5	3.3	2.4	2.5	2.5	2.4	2.6	2.5	3.1	4.4																							
13-Dec	3.5	4.7	Z	4.8	4.8	3.8	3.5	3.1	3.3	4.0	3.7	4.0	4.1	5.1	5.3	5.5	5.6	4.9	4.3	4.7	4.9	4.3	6.2	3.4	4.4	6.2																							
14-Dec	2.0	1.1	0.4	Z	4.4	0.0	0.3	0.1	0.0	0.1	2.0	1.1	1.3	2.1	1.6	1.0	0.4	0.7	1.1	0.6	0.5	0.6	0.4	0.6	0.8	2.1																							
15-Dec	0.7	0.6	1.0	1.1	Z	1.3	1.6	2.5	3.8	5.4	C	C	C	C	C	C	3.5	3.0	2.1	1.8	1.7	2.4	2.8	3.1	--	5.4																							
16-Dec	3.3	2.9	2.3	1.4	0.9	Z	1.0	0.5	0.4	0.2	0.3	0.3	0.1	0.0	0.0	0.1	0.2	0.0	0.3	0.5	0.8	0.0	0.0	0.0	0.7	3.3																							
17-Dec	Z	0.1	0.1	0.0	0.0	0.0	0.0	0.4	0.2	1.7	0.7	0.2	0.2	0.0	0.2	0.6	0.5	0.9	1.5	1.4	1.1	1.2	3.1	4.2	0.8	4.2																							
18-Dec	3.8	Z	3.3	3.2	3.1	3.1	3.1	2.8	2.8	2.5	1.5	1.6	1.6	1.2	1.5	1.3	0.9	1.6	0.7	0.9	0.3	1.3	0.7	1.7	1.9	3.8																							
19-Dec	0.9	1.5	Z	1.9	1.5	1.6	1.4	1.0	1.1	0.3	0.1	0.0	0.1	0.0	0.0	0.1	0.2	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.5	1.9																							
20-Dec	0.0	0.0	0.0	Z	0.1	0.4	0.1	0.6	1.9	2.6	2.8	3.0	1.6	1.5	1.7	1.6	1.8	2.2	2.1	4.0	4.9	3.4	3.0	3.3	1.9	4.9																							
21-Dec	5.4	4.7	4.0	3.1	Z	2.5	1.6	0.9	1.4	1.7	1.7	2.2	1.9	2.6	3.5	5.6	2.5	2.7	2.9	4.0	3.0	2.8	2.8	2.7	2.9	5.6																							
22-Dec	3.8	5.6	3.9	4.5	5.1	Z	5.5	7.4	6.3	6.5	8.3	7.1	7.1	7.4	6.2	6.5	6.5	6.0	5.3	5.2	5.3	5.5	4.7	3.7	5.8	8.3																							
23-Dec	Z	1.1	0.7	0.7	0.4	0.2	0.0	0.1	0.1	0.0	0.0	0.0	0.0	M	0.1	0.1	0.2	0.4	0.0	0.2	0.0	0.1	0.1	0.4	0.2	1.1																							
24-Dec	0.9	Z	0.8	0.5	0.4	0.6	0.4	0.5	0.4	0.9	0.9	0.9	0.9	0.9	0.8	0.7	0.7	1.3	3.2	4.7	4.8	3.8	4.4	4.7	1.7	4.8																							
25-Dec	4.4	4.3	Z	5.0	6.6	4.2	3.9	3.3	3.7	4.1	4.3	3.4	3.3	2.8	2.7	3.3	3.6	3.7	3.5	3.5	3.3	4.6	5.5	3.7	3.9	6.6																							
26-Dec	2.7	2.7	2.8	Z	4.9	4.3	4.9	5.9	7.1	5.7	5.8	5.4	4.9	4.2	3.4	2.8	3.4	3.4	3.9	3.3	3.6	3.2	3.1	3.4	4.1	7.1																							
27-Dec	2.8	2.0	1.4	0.9	Z	3.3	2.1	1.4	3.3	2.1	2.6	1.8	1.4	5.9	4.7	5.6	4.1	3.8	4.2	7.0	5.7	4.8	5.7	3.9	3.5	7.0																							
28-Dec	6.4	8.3	12.9	4.2	4.0	Z	3.0	2.7	3.1	7.2	2.9	3.7	2.7	4.5	5.3	5.1	7.0	6.7	8.7	8.8	10.7	8.5	9.1	8.0	6.2	12.9																							
29-Dec	Z	8.0	6.5	7.1	5.3	4.9	5.5	4.5	4.6	4.7	5.5	4.2	4.0	3.4	4.0	3.3	4.0	3.2	3.6	3.3	2.9	2.6	2.1	2.3	4.3	8.0																							
30-Dec	2.6	Z	4.0	4.0	4.1	4.0	5.1	6.0	5.6	4.0	6.0	4.7	4.5	5.6	4.0	4.2	7.4	3.1	1.9	1.0	2.3	2.9	1.5	1.5	3.9	7.4																							
31-Dec	1.4	1.0	Z	1.2	0.7	0.9	0.9	0.9	0.9	1.5	1.4	1.7	1.8	2.1	2.8	3.2	3.1	3.2	2.4	2.1	1.8	1.6	1.5	1.1	1.7	3.2																							
																								2.9	2.9	3.0	2.6	2.6	2.2	2.5	2.6	3.3	3.4	3.3	2.9	2.8	3.2	3.1	3.2	3.4	3.4	2.9	3.1	2.8	2.9	3.0	2.7	Diurnal Average	
																								6.8	8.3	12.9	7.1	7.4	6.3	6.3	7.4	10.2	9.1	9.8	7.3	7.1	8.0	8.9	10.2	10.7	10.5	8.7	9.0	10.7	8.5	9.1	8.0	Diurnal Maximum	
Z - zerospan			C - Calibration			M - Maintenance																																											



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Janvier - December 2023





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitrogen Oxides (NO_x) - ppb
Janvier - December 2023

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	706	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: 706

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Janvier - December 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	12	5	3	11	11	6	18	37	242	244	38	35	28	11	1	705
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	3	12	5	3	11	11	6	18	37	242	244	38	35	28	11	1	705

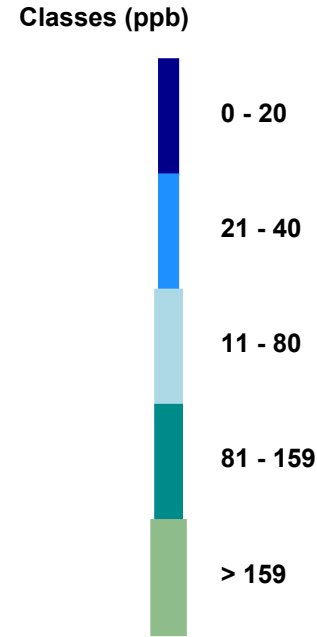
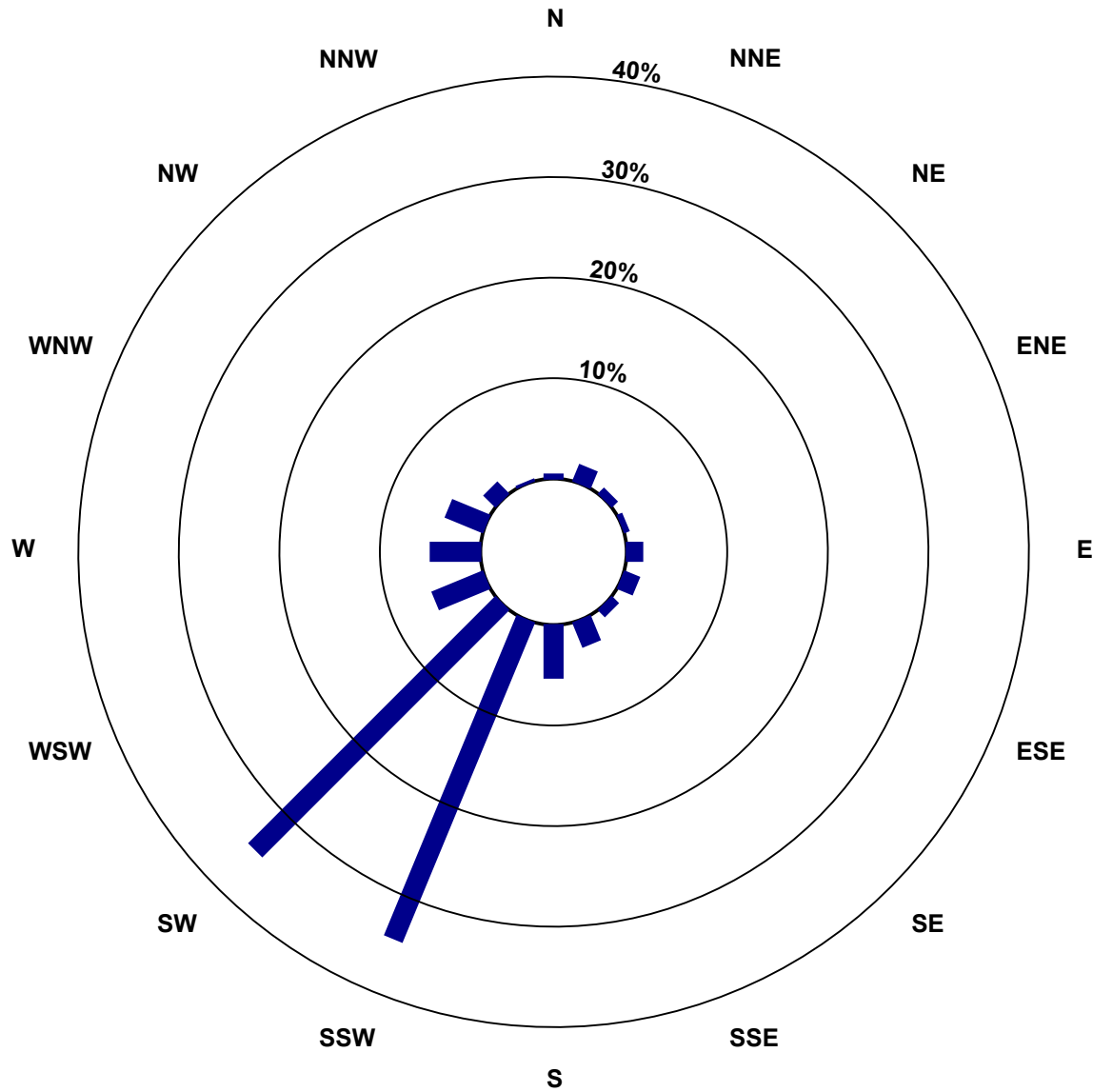
Total Number of Valid Hours: 705

Total Number of Hours: 744

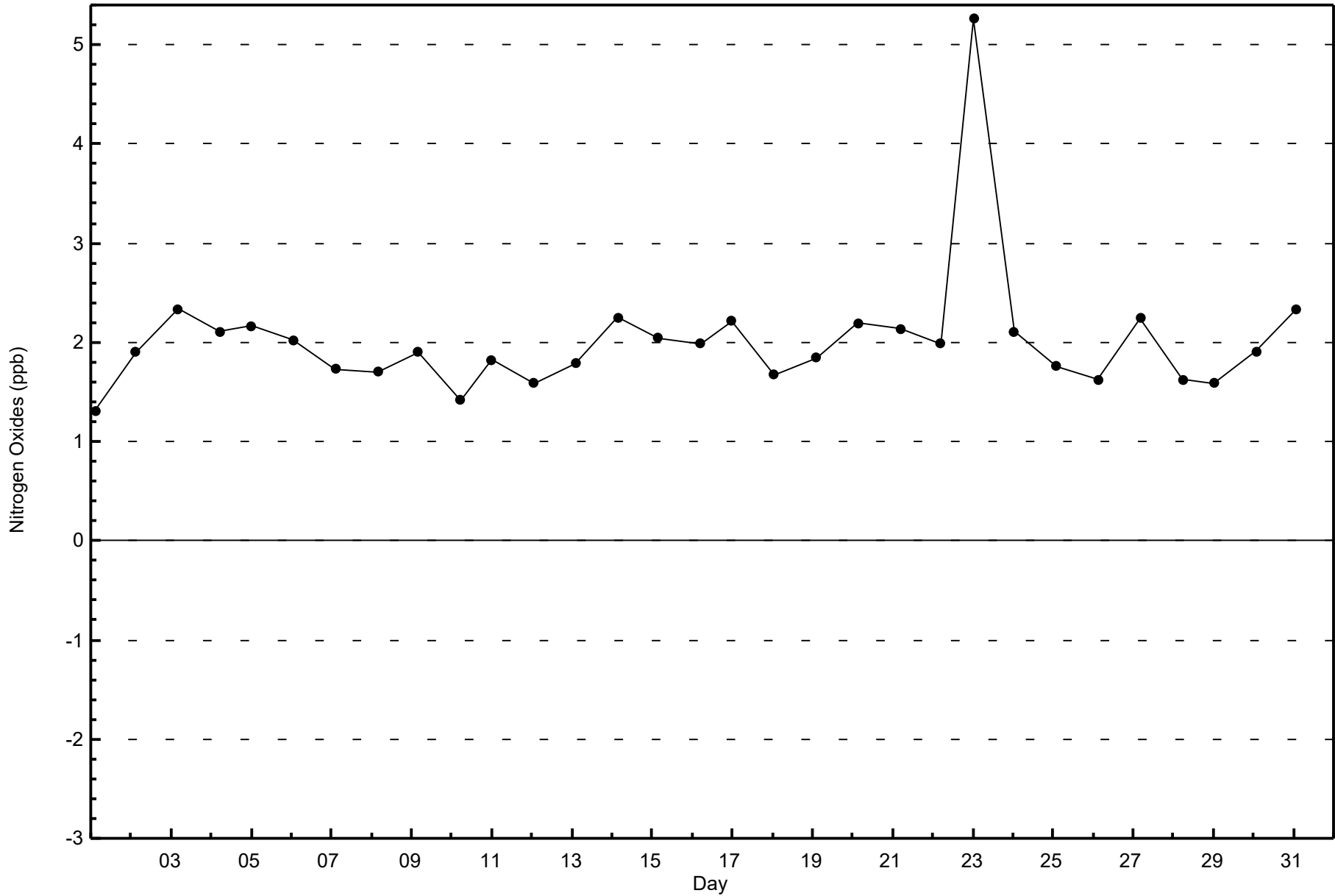


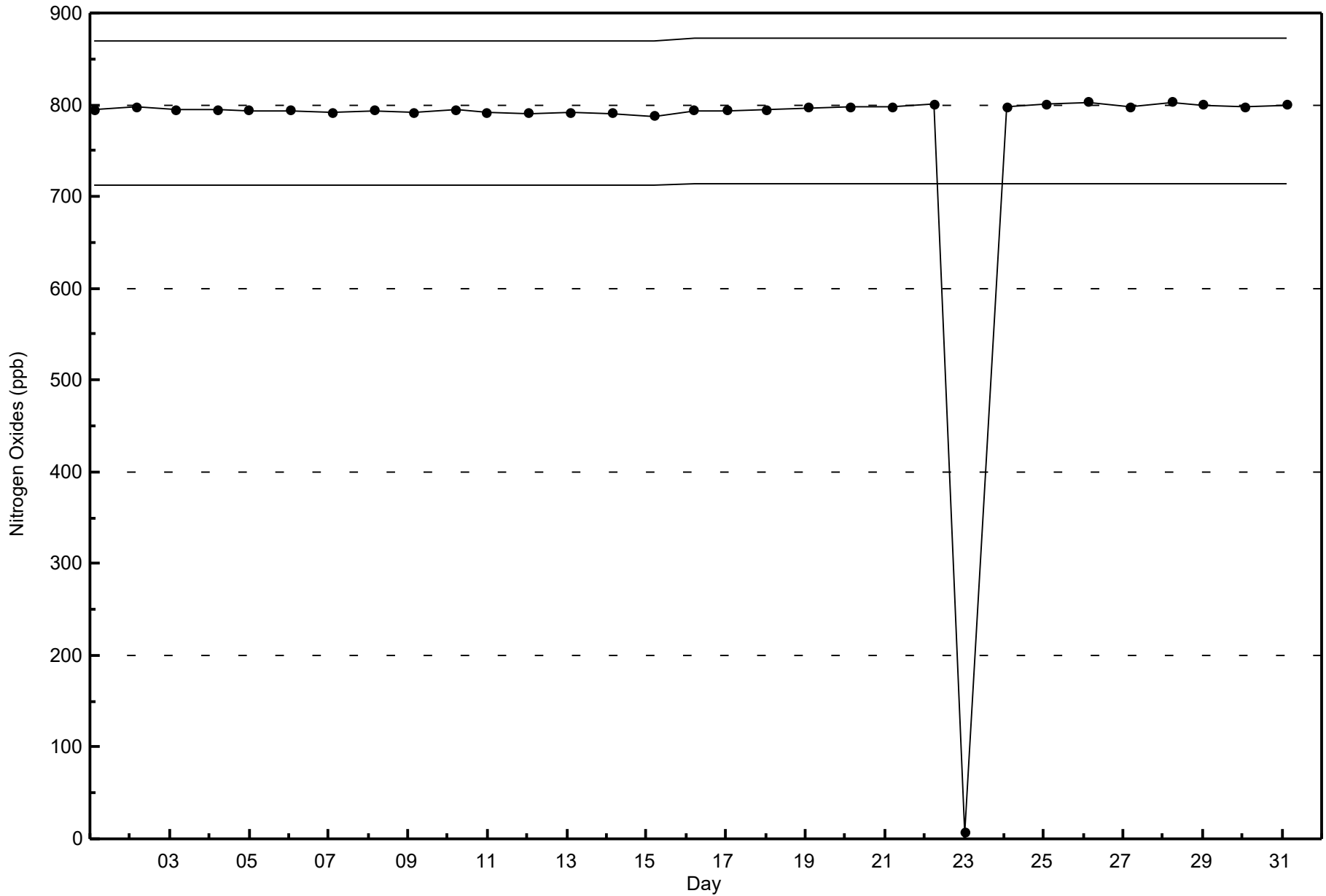
Wood Buffalo Environmental Association
Wind Rose Dec 2023

Nitrogen Oxides (NO_x) - ppb
Janvier



Total Number of Valid Hours: 705







Wood Buffalo Environmental Association

Summary of Hour Averages

Ozone (O₃) - ppb

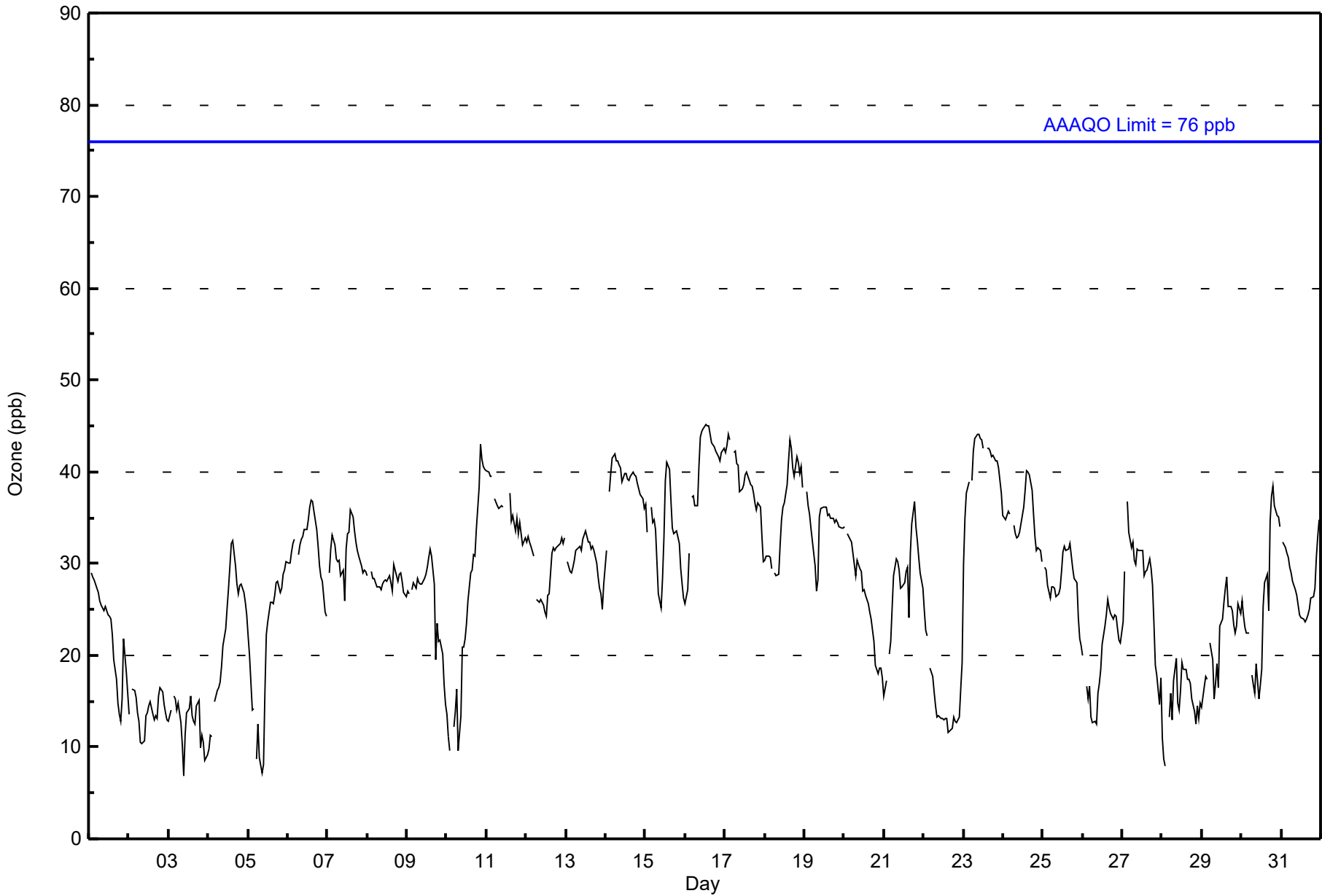
Janvier - December 2023

Number of Exceedences (AAAQO):		1-hr: 0	24-hr: 0	Hours in Service:																	744										
Maximum Value: 45.1 ppb on Dec 16 13:00		Maximum Daily Average: 40.7 ppb on Dec 23																	Hours of Data:	709											
Minimum Value: 6.9 ppb on Dec 3 10:00		Minimum Daily Average: 12.6 ppb on Dec 3																	Hours of Missing Data:	35											
Maximum Diurnal Average: 30.3 ppb at hour 15		Minimum Diurnal Average: 25.2 ppb at hour 1																	Hours of Calibration:	34											
Monthly Average: 27.75 ppb		Percentiles: P ₁ = 8.9 P ₁₀ = 14.0 Q ₁ = 21.7 Median = 28.8 Q ₃ = 33.9 P ₉₀ = 39.6 P ₉₉ = 44.0																	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-Dec	Z	28.9	28.5	28.3	27.7	26.8	25.9	25.4	25.2	24.9	25.3	24.4	24.2	24.0	22.3	19.6	17.3	14.7	13.6	12.8	15.3	21.9	18.1	15.8	22.2	28.9					
2-Dec	13.5	Z	16.3	16.1	15.3	13.8	12.8	10.5	10.4	10.7	13.4	13.8	14.5	14.9	13.6	13.0	13.5	13.1	15.6	16.4	16.0	14.6	13.7	12.9	13.8	16.4					
3-Dec	12.8	14.0	Z	15.5	15.3	14.1	14.7	12.7	10.3	6.9	11.2	13.7	14.3	15.5	13.5	12.8	12.5	14.4	15.1	10.0	11.3	10.5	8.5	9.1	12.6	15.5					
4-Dec	9.7	11.3	11.2	Z	15.0	16.2	16.5	17.1	18.8	21.1	22.9	25.1	27.3	29.7	32.1	32.5	29.8	27.7	26.6	27.7	27.8	26.8	25.8	24.4	22.8	32.5					
5-Dec	22.1	20.0	14.1	14.1	Z	8.7	12.5	8.9	7.2	8.1	16.0	22.3	23.6	25.8	25.7	25.6	26.5	27.9	28.1	26.9	27.3	28.8	29.3	30.3	20.9	30.3					
6-Dec	30.1	30.1	31.3	32.2	32.6	Z	31.0	32.0	32.6	33.0	33.7	33.7	34.8	36.1	36.9	36.8	35.7	33.8	32.0	29.7	28.6	28.0	24.7	24.3	31.9	36.9					
7-Dec	Z	29.0	31.5	33.1	32.0	30.5	30.2	30.4	28.7	29.3	25.9	31.5	33.2	33.4	35.9	35.1	33.6	32.3	31.5	30.8	29.8	29.0	29.2	29.2	31.1	35.9					
8-Dec	28.7	Z	29.2	28.4	28.4	27.9	27.5	27.4	27.2	27.8	28.1	28.3	28.1	28.6	28.0	27.1	29.9	29.3	28.0	28.8	28.9	28.0	26.8	26.3	28.1	29.9					
9-Dec	27.0	26.6	Z	27.2	27.8	27.3	28.3	28.0	27.7	27.8	28.4	28.8	29.5	30.6	31.6	30.9	27.8	19.5	23.5	21.5	21.6	20.2	16.8	14.6	25.8	31.6					
10-Dec	13.6	11.2	9.6	Z	12.2	13.8	16.3	9.6	13.4	20.9	20.9	21.7	23.4	25.9	28.9	29.3	30.9	30.8	33.8	38.3	43.1	41.4	40.6	40.2	24.8	43.1					
11-Dec	40.2	39.9	39.5	39.5	Z	37.1	36.3	35.9	36.2	36.3	36.1	C	C	C	37.7	34.6	35.2	33.6	34.9	33.3	34.4	33.3	32.0	32.8	35.9	40.2					
12-Dec	32.3	32.9	32.4	31.8	30.8	Z	26.0	25.9	25.8	26.1	25.4	24.8	24.2	26.5	26.7	31.1	31.8	31.4	31.7	31.9	32.2	32.8	32.1	32.8	29.5	32.9					
13-Dec	Z	30.2	29.2	29.0	29.6	30.3	31.4	31.8	31.9	31.4	32.7	33.1	33.5	32.4	32.4	31.5	31.8	31.4	30.1	28.6	27.4	26.7	25.1	27.7	30.4	33.5					
14-Dec	31.5	Z	37.8	39.9	41.4	41.9	41.1	41.1	40.8	40.4	38.8	39.7	39.2	39.1	39.5	40.0	39.7	39.5	38.8	38.1	37.5	37.0	36.0	36.0	39.1	41.9					
15-Dec	36.5	33.4	Z	36.1	34.5	34.7	33.7	30.2	26.7	25.2	28.4	32.9	39.0	41.0	40.3	36.9	33.8	33.2	33.3	33.5	32.2	29.5	27.7	26.2	33.0	41.0					
16-Dec	25.7	27.1	31.2	Z	37.2	37.4	36.4	36.3	40.6	43.8	44.5	44.7	45.1	45.1	45.0	44.1	43.1	42.7	42.2	41.9	41.7	41.2	42.1	42.6	40.1	45.1					
17-Dec	42.1	42.9	44.0	43.4	Z	42.1	42.2	40.9	40.7	37.9	38.1	38.6	39.6	39.9	39.5	38.6	38.5	37.6	36.6	35.9	36.6	36.2	32.9	30.2	38.9	44.0					
18-Dec	30.4	30.9	30.8	30.7	29.4	Z	28.9	28.7	28.8	32.0	34.8	36.2	36.6	38.6	41.2	43.4	42.6	40.5	39.6	41.6	41.0	39.8	40.6	38.4	35.9	43.4					
19-Dec	Z	37.9	36.3	35.4	33.9	32.5	29.8	27.0	28.3	35.2	36.0	36.1	36.2	36.2	35.3	35.4	34.9	34.9	34.5	34.8	34.5	34.0	33.8	33.9	34.2	37.9					
20-Dec	34.0	Z	33.3	32.9	32.3	31.2	29.9	28.7	30.4	29.5	29.1	27.0	27.2	26.6	25.6	24.8	24.0	22.8	21.5	18.9	18.0	18.6	18.7	17.5	26.2	34.0					
21-Dec	15.5	17.2	Z	20.1	21.4	25.2	28.6	30.5	30.2	29.3	27.3	27.4	28.0	29.2	29.6	24.1	31.1	34.2	36.8	34.0	32.6	30.7	29.0	27.2	27.8	36.8					
22-Dec	24.9	22.7	22.1	Z	18.6	17.7	16.0	14.4	13.2	13.5	13.1	13.1	13.0	13.1	13.1	11.6	11.9	12.1	13.3	12.9	12.7	13.3	16.3	19.2	15.3	24.9					
23-Dec	30.0	34.9	37.6	38.9	Z	39.0	42.3	43.7	44.0	44.2	43.7	43.5	42.6	M	42.6	42.5	42.2	41.7	41.8	41.3	41.1	40.5	39.0	37.7	40.7	44.2					
24-Dec	35.3	34.8	35.3	35.7	35.4	Z	34.1	33.3	32.8	32.9	33.4	35.3	36.2	38.0	40.2	39.9	39.7	38.0	35.3	33.0	31.5	31.8	31.5	30.3	34.9	40.2					
25-Dec	Z	29.6	29.3	27.6	26.3	27.5	27.5	27.3	26.4	26.8	27.3	29.2	31.2	31.9	31.4	31.6	32.2	30.7	29.5	28.4	27.9	24.1	21.8	21.0	28.1	32.2					
26-Dec	19.9	Z	16.7	15.3	16.6	13.3	12.7	12.8	12.6	15.8	16.9	18.4	21.3	23.2	24.4	26.1	25.2	24.6	24.0	24.4	24.2	22.9	21.6	21.3	19.7	26.1					
27-Dec	23.6	29.1	Z	36.8	33.5	31.7	32.4	30.4	29.9	31.6	31.4	31.4	31.4	28.7	29.2	29.3	30.5	29.5	27.6	23.5	18.9	17.8	14.6	17.5	27.8	36.8					
28-Dec	10.9	8.8	8.0	Z	13.3	15.8	12.9	17.3	19.7	14.8	14.0	16.2	19.2	18.5	18.5	17.4	17.4	16.9	15.2	13.9	12.4	14.5	13.1	14.8	14.9	19.7					
29-Dec	14.4	16.6	17.7	17.4	Z	21.4	19.5	15.3	17.0	19.1	16.4	23.1	23.9	25.8	27.3	28.5	25.4	25.4	24.9	23.3	22.4	23.2	25.6	24.5	21.7	28.5					
30-Dec	25.9	24.2	23.1	22.4	22.4	Z	17.9	16.9	15.9	19.0	15.3	16.9	18.4	25.3	27.9	28.8	24.9	34.7	37.4	38.5	36.3	35.3	35.2	34.0	25.9	38.5					
31-Dec	Z	32.4	31.7	31.1	30.7	29.7	29.0	28.0	27.1	26.5	25.5	24.4	24.1	24.0	23.7	23.9	24.5	25.0	26.3	26.4	27.3	30.6	33.0	34.7	27.8	34.7					
		25.2	26.8	27.2	29.2	26.7	26.4	26.6	25.8	25.8	26.5	26.9	27.8	28.8	29.2	30.3	29.9	29.6	29.2	29.2	28.4	28.2	27.8	27.0	26.7	Diurnal Average					
		42.1	42.9	44.0	43.4	41.4	42.1	42.3	43.7	44.0	44.2	44.5	44.7	45.1	45.1	45.0	44.1	43.1	42.7	42.2	41.9	43.1	41.4	42.1	42.6	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 (O₃) - ppb
Janvier - December 2023





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Ozone (O₃) - ppb
Janvier - December 2023

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	165	23.27	23.27
21 - 50	544	76.73	100.00
51 - 82	0	0.00	100.00
> 83	0	0.00	100.00

Total Number of Valid Hours: 709

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Ozone (O₃) - ppb
Janvier - December 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	2	4	3	1	1	1	5	10	19	73	37	4	2	1	1	0	164
21 - 50	1	8	2	2	11	9	1	7	22	168	210	33	33	28	9	0	544
51 - 82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 83	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	3	12	5	3	12	10	6	17	41	241	247	37	35	29	10	0	708

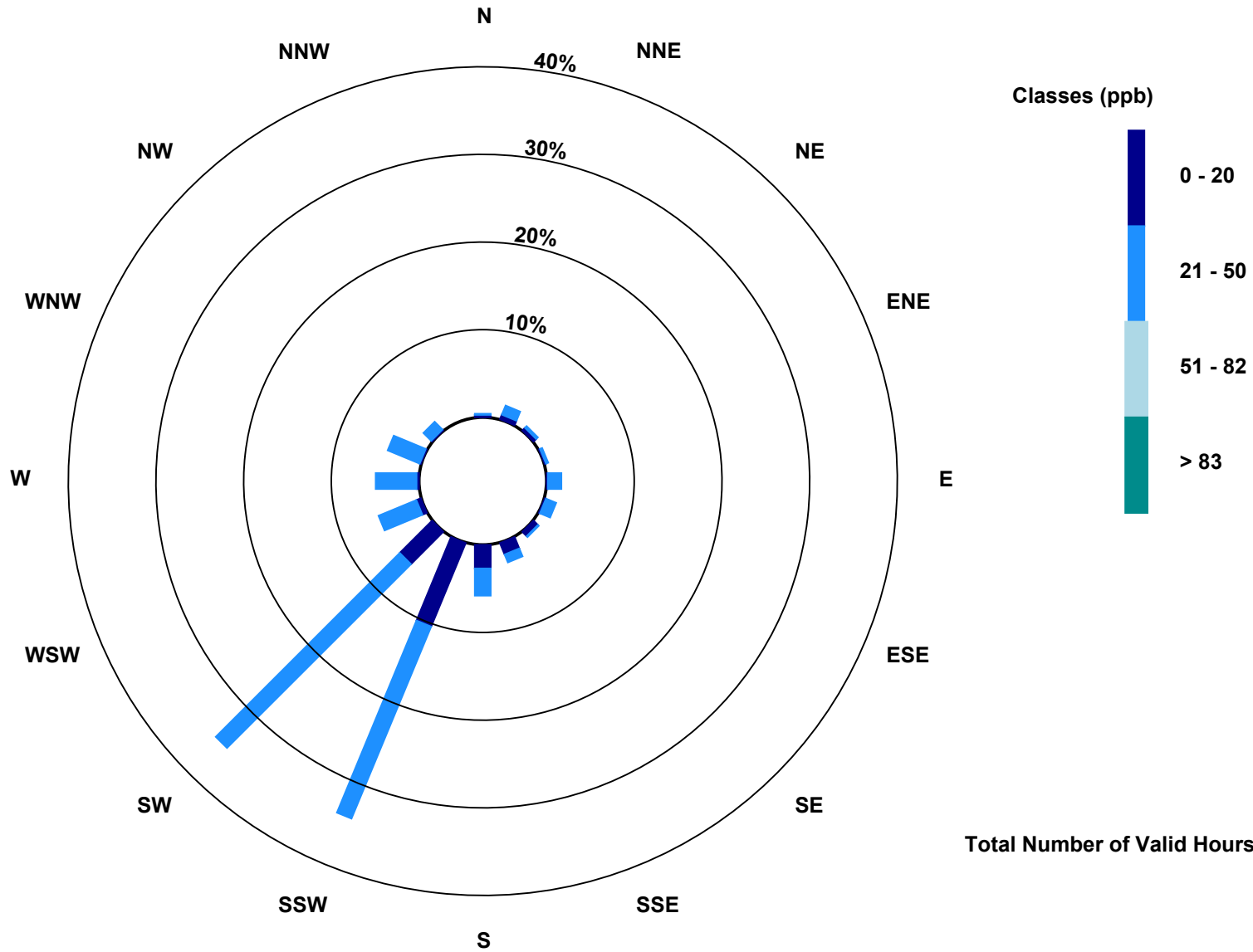
Total Number of Valid Hours: 708

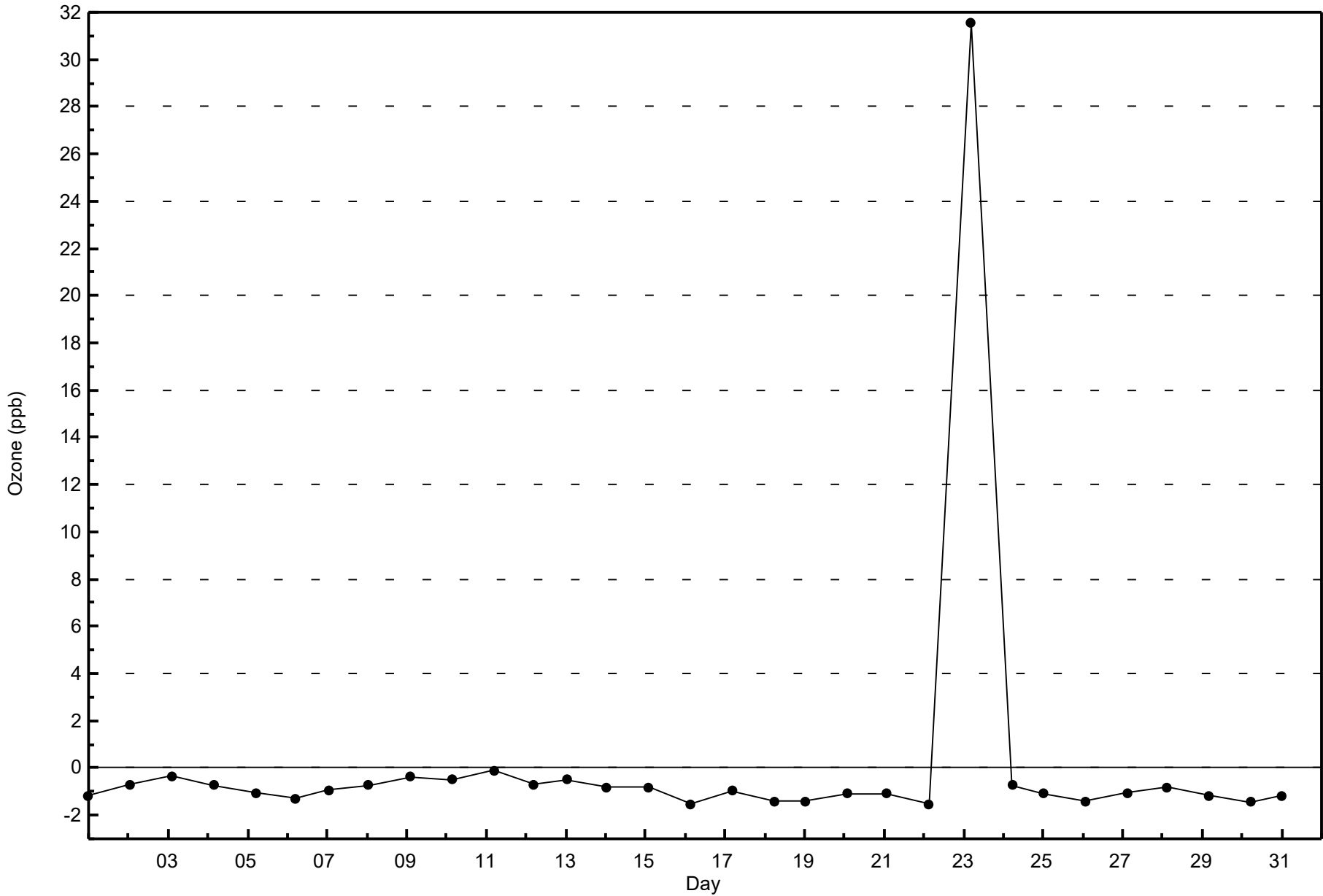
Total Number of Hours: 744

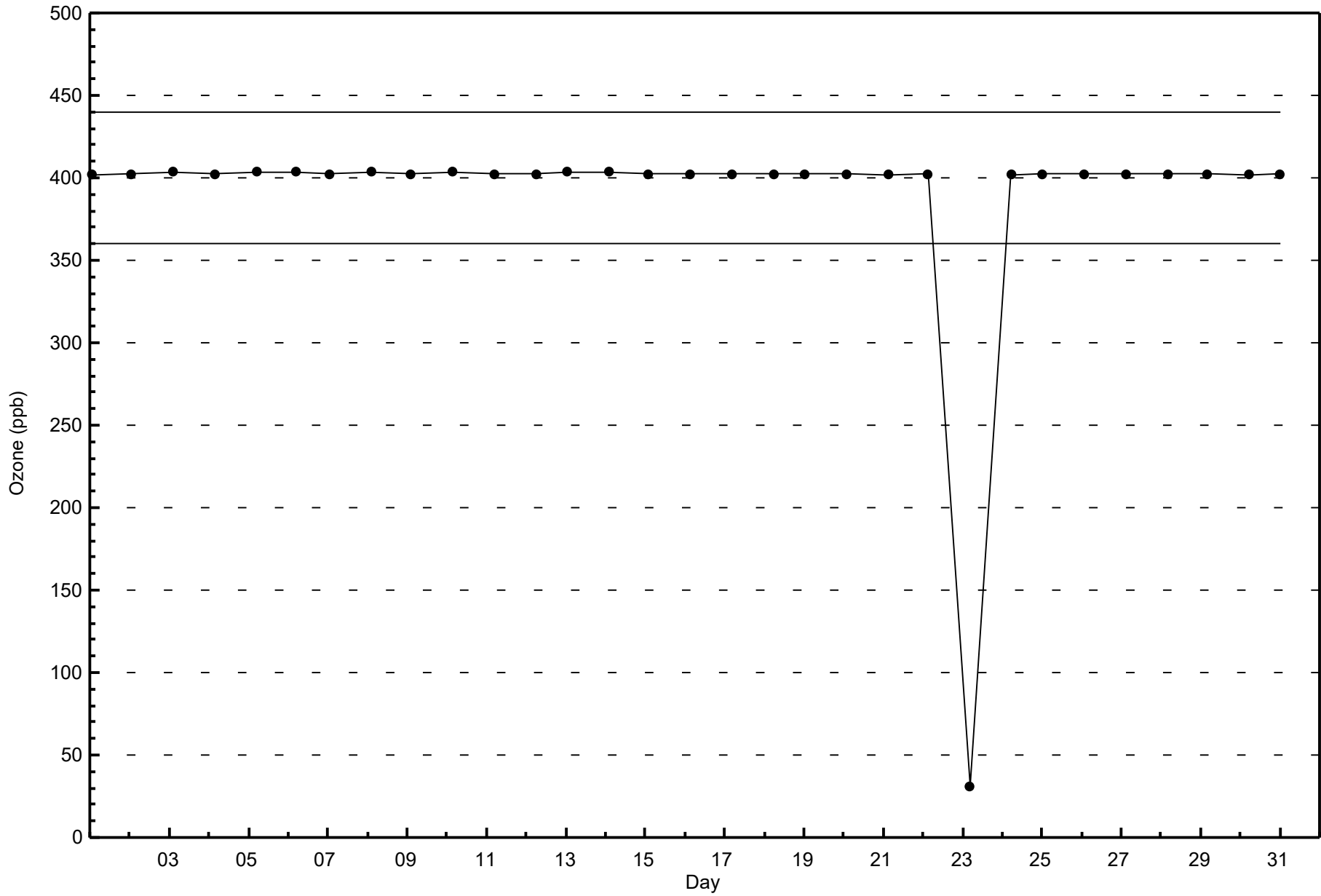


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Ozone (O₃) - ppb
Janvier









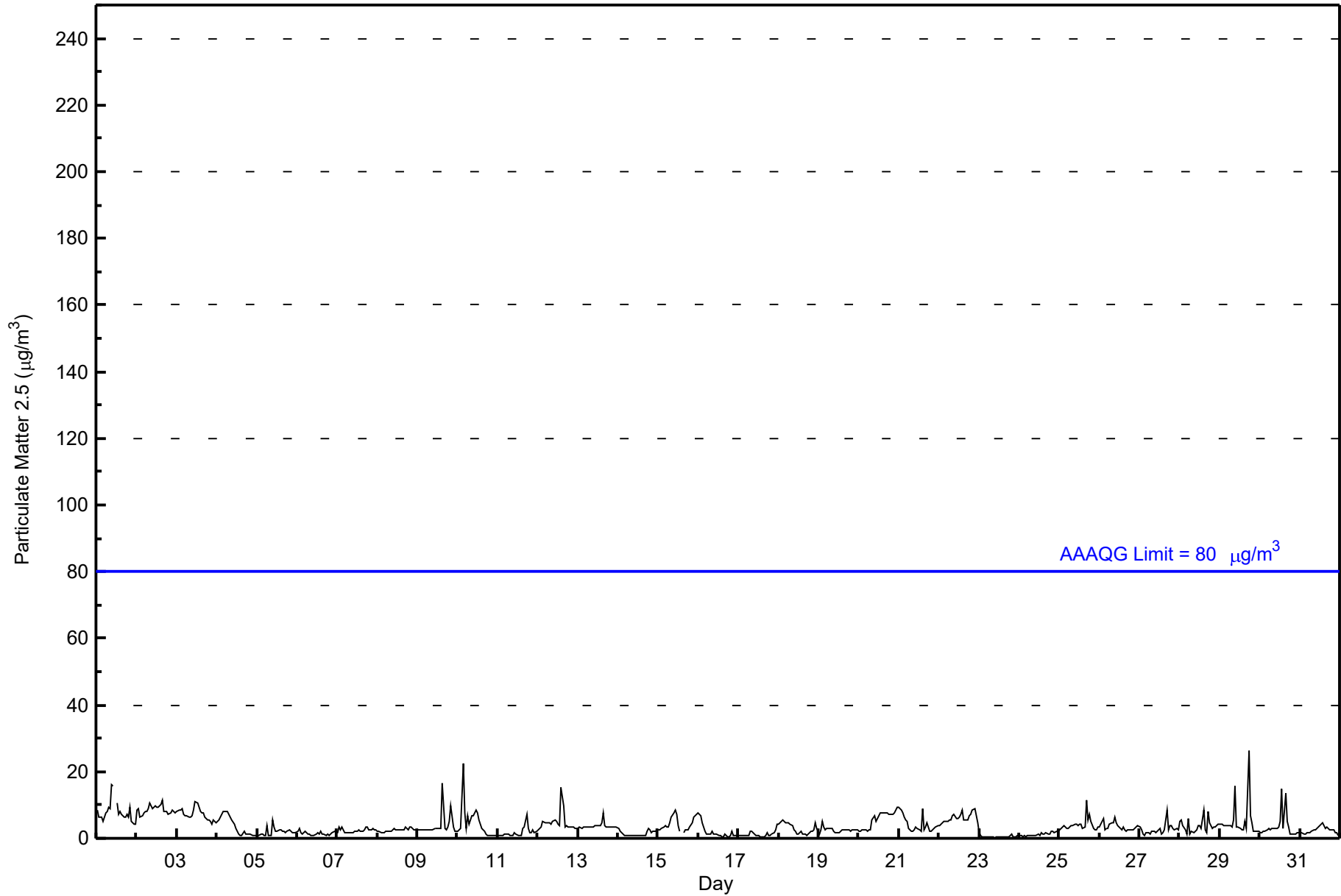
Wood Buffalo Environmental Association

Summary of Hour Averages

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

Janvier - December 2023

Number of Exceedences (AAAQO):		1-hr: 0		24-hr: 0		Hours in Service:														744																													
Maximum Value: 26.1 µg/m ³ on Dec 29 18:00		Maximum Daily Average: 8.6 µg/m ³ on Dec 2		Hours of Data:														742																															
Minimum Value: 0.2 µg/m ³ on Dec 23 10:00		Minimum Daily Average: 0.5 µg/m ³ on Dec 23		Hours of Missing Data:														2																															
Maximum Diurnal Average: 4.4 µg/m ³ at hour 10		Minimum Diurnal Average: 3.1 µg/m ³ at hour 22		Hours of Calibration:														1																															
Monthly Average: 3.56 µg/m ³		Percentiles: P ₁ = 0.3 P ₁₀ = 0.9 Q ₁ = 1.7 Median = 2.7 Q ₃ = 4.7 P ₉₀ = 7.5 P ₉₉ = 14.3		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-Dec	8.4	6.4	6.4	6.5	5.1	7.4	8.1	9.4	9.0	16.0	15.7	M	10.5	7.0	8.2	7.3	6.4	6.2	7.4	6.5	9.5	5.0	4.4	4.4	7.9	16.0																							
2-Dec	8.3	9.0	6.3	6.7	7.7	8.0	8.0	8.7	10.7	8.9	9.4	9.9	9.4	9.3	10.1	11.4	8.2	8.0	7.9	7.3	7.8	8.3	8.0	7.8	8.6	11.4																							
3-Dec	7.9	8.3	8.4	8.8	7.2	6.7	6.6	6.2	6.3	6.6	8.5	11.1	10.7	9.3	8.2	7.8	7.4	6.5	5.6	5.7	5.0	4.3	5.6	4.7	7.2	11.1																							
4-Dec	4.9	5.5	6.3	7.4	8.0	7.9	7.9	7.3	6.5	5.4	4.4	3.1	2.1	1.4	1.0	0.9	2.2	1.2	1.2	1.2	1.2	1.0	0.9	1.0	3.8	8.0																							
5-Dec	0.9	0.9	1.1	1.1	1.0	0.9	3.8	1.0	1.0	5.6	3.3	2.2	2.3	2.6	2.5	2.2	2.2	1.9	2.0	2.3	2.0	1.8	1.8	1.7	2.0	5.6																							
6-Dec	2.3	2.8	1.6	1.3	1.8	2.0	1.4	1.2	1.0	0.9	1.0	1.4	1.5	1.4	2.0	1.4	1.1	0.9	1.1	1.0	1.3	1.8	2.1	1.7	1.5	2.8																							
7-Dec	1.6	3.4	2.4	3.4	1.9	1.7	1.8	1.8	1.6	1.8	2.1	2.1	2.3	2.5	2.2	2.1	2.5	3.6	3.4	2.6	2.7	2.8	2.5	2.4	2.4	3.6																							
8-Dec	2.1	1.9	1.8	1.7	1.9	2.1	2.1	2.0	2.0	2.4	2.9	2.6	2.6	2.6	2.5	2.4	2.4	3.2	2.7	3.4	3.5	3.0	2.6	2.6	2.5	3.5																							
9-Dec	2.3	2.7	2.7	2.6	2.6	2.6	2.5	2.5	2.6	2.7	2.8	2.8	3.1	2.8	3.1	16.4	3.1	2.6	3.4	5.2	9.8	3.5	2.0	2.1	3.7	16.4																							
10-Dec	2.2	2.7	2.9	22.4	7.6	2.8	6.9	4.4	6.7	6.8	7.5	8.6	7.6	5.6	3.1	2.6	2.0	1.4	0.9	0.7	0.7	0.8	0.7	0.7	4.5	22.4																							
11-Dec	1.0	0.9	1.0	1.0	1.1	1.2	1.1	1.1	1.0	1.0	1.6	1.2	1.0	0.9	1.0	3.2	3.2	7.4	3.0	1.6	1.7	2.7	1.6	2.2	1.8	7.4																							
12-Dec	2.4	2.9	3.5	4.9	4.6	4.7	4.7	4.5	4.4	5.3	5.5	4.9	4.2	3.9	15.2	9.8	3.2	3.8	3.3	3.4	3.3	3.2	2.9	3.1	4.7	15.2																							
13-Dec	3.1	3.3	3.2	3.2	3.5	3.5	3.4	3.3	3.2	3.6	3.8	3.8	3.9	4.0	4.5	7.5	3.9	3.3	3.2	3.4	3.5	3.4	3.2	3.2	3.7	7.5																							
14-Dec	2.9	2.3	1.6	1.1	0.8	0.9	1.1	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.9	0.8	0.8	2.0	3.1	2.7	1.8	2.0	2.0	2.5	1.4	3.1																							
15-Dec	2.5	2.4	2.8	3.4	3.6	3.2	3.3	4.7	6.5	7.8	8.3	7.2	3.6	2.1	C	1.7	2.4	2.7	2.7	3.3	4.8	6.4	6.8	7.3	4.3	8.3																							
16-Dec	7.5	6.8	4.8	3.2	2.1	1.2	1.2	1.4	2.1	1.4	1.3	1.4	1.0	0.7	0.5	0.6	1.3	0.6	0.6	0.7	2.3	0.9	1.0	0.9	1.9	7.5																							
17-Dec	0.8	0.7	0.9	0.9	1.0	1.0	1.0	2.0	2.2	1.5	1.1	0.7	0.7	0.5	0.4	0.6	1.0	1.5	0.9	0.9	1.1	1.5	2.5	4.1	1.2	4.1																							
18-Dec	4.3	4.7	5.4	4.9	4.7	4.9	4.6	4.3	3.7	2.5	2.2	1.1	1.4	2.2	1.2	1.2	1.2	0.9	1.4	1.9	2.3	2.7	4.6	3.0	3.0	5.4																							
19-Dec	1.3	2.4	5.3	3.5	2.6	2.9	2.8	2.8	2.8	1.9	1.6	1.8	1.8	2.0	2.5	2.6	2.7	2.6	2.5	2.3	2.4	2.5	2.5	2.4	2.5	5.3																							
20-Dec	2.2	2.3	2.4	2.4	2.4	2.3	2.5	2.7	5.5	6.6	5.1	5.7	6.7	7.5	7.5	7.7	7.5	7.6	7.3	7.1	7.3	7.7	8.6	9.2	5.6	9.2																							
21-Dec	9.2	8.6	7.7	6.2	5.4	5.1	2.9	2.3	2.1	2.4	3.2	2.9	2.5	2.1	8.9	2.6	3.3	4.6	2.2	2.1	2.5	3.0	3.4	3.8	4.1	9.2																							
22-Dec	3.8	4.0	4.5	4.9	5.1	5.1	5.3	5.5	6.7	7.3	6.1	5.8	6.2	7.2	8.3	5.6	5.5	5.3	6.6	7.2	8.3	8.9	7.0	4.6	6.0	8.9																							
23-Dec	1.8	0.8	0.5	0.4	0.4	0.4	0.4	0.3	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.4	0.4	0.6	1.4	0.3	0.3	0.6	0.8	0.5	1.8	1.8																							
24-Dec	0.8	0.9	0.6	0.8	0.5	0.9	0.8	0.9	0.9	1.0	0.9	1.2	0.9	1.6	1.4	1.3	1.5	1.4	1.5	2.2	2.0	1.9	2.0	2.2	1.3	2.2																							
25-Dec	2.6	2.8	3.2	3.7	2.8	3.1	3.6	3.9	3.9	4.3	4.1	3.9	4.3	4.3	3.2	3.5	11.4	5.5	7.1	4.9	3.2	2.7	2.7	3.2	4.1	11.4																							
26-Dec	3.5	4.4	5.8	2.6	2.9	3.0	4.2	4.5	4.6	6.4	4.8	3.7	3.2	2.5	3.6	2.4	1.9	2.6	2.4	2.4	2.5	3.1	3.5	3.6	3.5	6.4																							
27-Dec	3.4	2.5	1.4	1.0	1.6	1.9	1.5	2.0	2.2	1.9	1.9	2.4	3.1	1.4	1.6	2.7	8.7	2.5	3.7	3.7	2.8	2.7	3.0	2.5	2.6	8.7																							
28-Dec	4.9	5.3	3.9	2.7	1.4	5.9	1.2	2.0	1.6	1.9	2.5	3.6	3.9	3.1	8.6	2.5	1.9	8.0	4.5	2.9	3.5	3.4	3.8	4.4	3.6	8.6																							
29-Dec	4.3	4.3	3.9	3.7	3.6	3.8	3.7	3.4	5.4	15.9	3.3	3.2	2.9	2.6	2.7	4.9	2.9	26.1	6.9	4.8	2.2	2.2	2.3	2.0	5.0	26.1																							
30-Dec	1.8	1.9	2.2	2.2	2.5	2.8	2.7	2.8	2.8	3.1	3.1	3.2	5.2	14.7	2.9	13.6	5.0	3.3	1.4	1.2	1.4	1.4	1.7	1.6	3.5	14.7																							
31-Dec	1.7	1.6	1.4	1.5	1.6	1.5	1.6	2.0	2.4	2.4	2.8	3.5	3.9	4.7	4.0	3.1	3.3	2.8	2.7	2.5	2.5	1.8	1.6	1.0	2.4	4.7																							
																								3.4	3.5	3.4	3.9	3.2	3.3	3.3	3.6	4.4	3.9	3.5	3.7	3.7	4.1	4.3	3.6	4.2	3.3	3.2	3.4	3.1	3.2	3.1	Diurnal Average		
																								9.2	9.0	8.4	22.4	8.0	8.0	8.1	9.4	10.7	16.0	15.7	11.1	10.7	14.7	15.2	16.4	11.4	26.1	7.9	7.3	9.8	8.9	8.6	9.2	Diurnal Maximum	
C - Calibration																								M - Maintenance																									
Alberta Ambient Air Quality Guideline/Objectives: 1-hr 80 µg/m ³																								24-hr 29 µg/m ³																									





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Janvier - December 2023

Concentration Ranges ($\mu\text{g}/\text{m}^3$)	Number of Hours	%	Cumulative %
0 - 5	596	80.32	80.32
6 - 15	140	18.87	99.19
16 - 25	5	0.67	99.87
26 - 80	1	0.13	100.00
> 81.0	0	0.00	100.00

Total Number of Valid Hours: 742

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - µg/m³
Janvier - December 2023

Concentration Ranges (µg/m ³)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	4	12	3	3	11	11	3	14	25	186	211	34	37	30	11	1	596
6 - 15	0	0	2	0	1	0	3	4	16	62	45	5	1	0	0	0	139
16 - 25	0	0	0	0	0	0	0	0	0	4	1	0	0	0	0	0	5
26 - 80	0	0	0	0	0	0	0	0	1	0	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
Totals	4	12	5	3	12	11	6	18	42	252	257	39	38	30	11	1	741

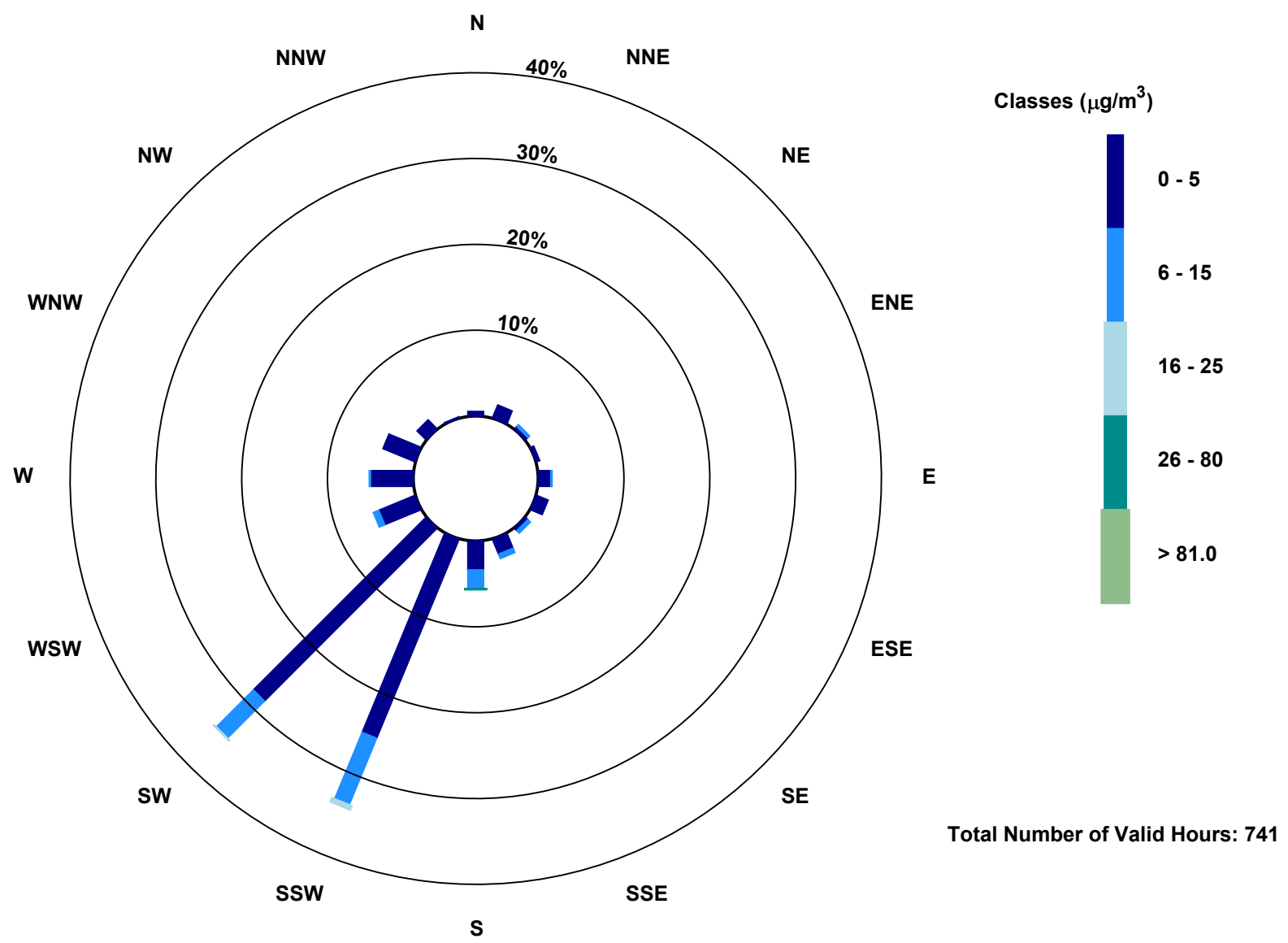
Total Number of Valid Hours: 741

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Dec 2023

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Janvier





Wood Buffalo Environmental Association
Summary of Hour Averages

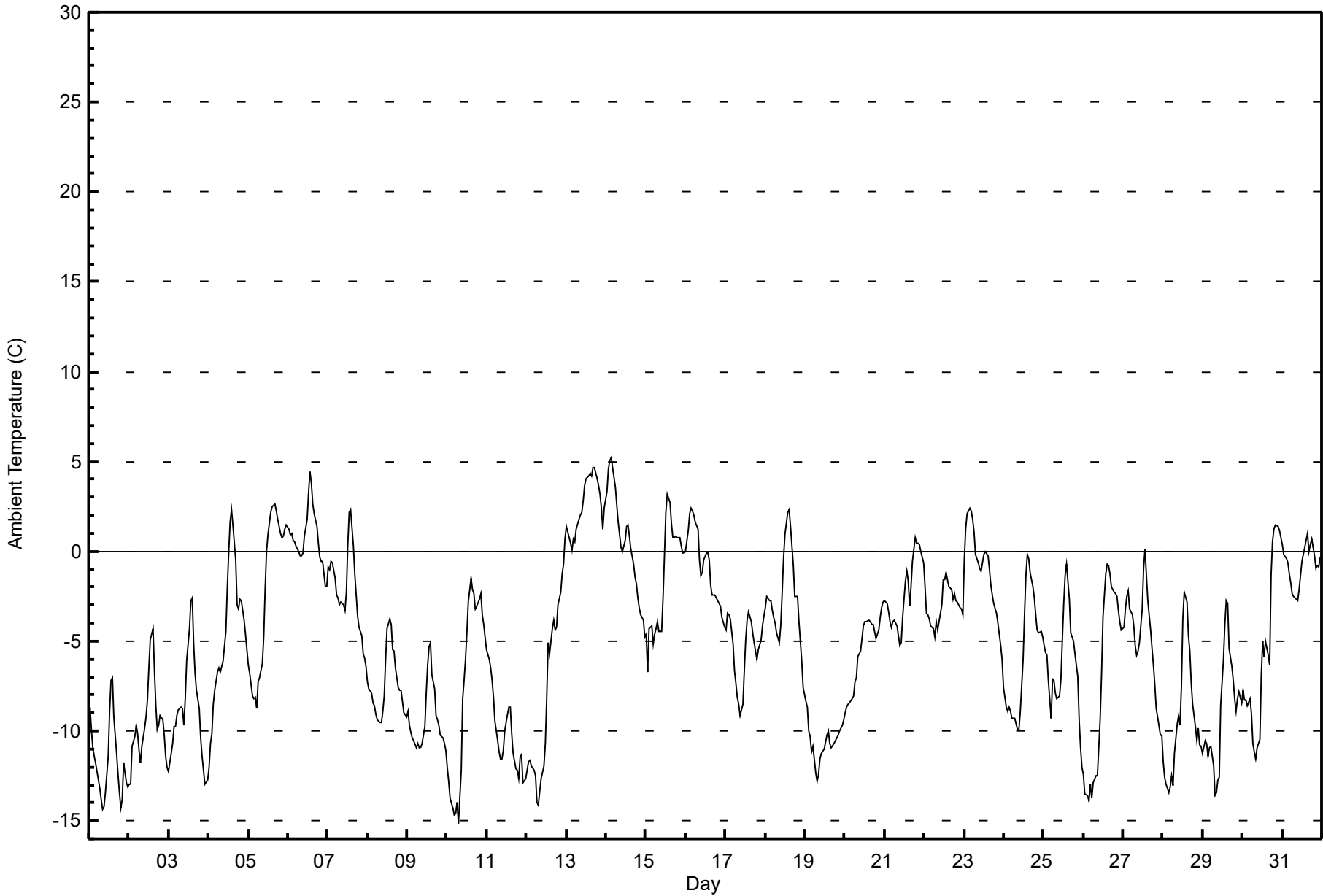
Ambient Temperature (AT) - C
Janvier - December 2023

Maximum Value: 5.2 C on Dec 14 04:00 Maximum Daily Average: 2.5 C on Dec 13 Minimum Value: -15.2 C on Dec 10 08:00 Minimum Daily Average: -11.7 C on Dec 1 Maximum Diurnal Average: -1.7 C at hour 15 Minimum Diurnal Average: -7.3 C at hour 8 Monthly Average: -5.13 C Percentiles: P ₁ = -14.1 P ₁₀ = -11.6 Q ₁ = -9.1 Median = -4.5 Q ₃ = -1.3 P ₉₀ = 1.1 P ₉₉ = 4.3																								Hours in Service:	744	
																								Hours of Data:	744	
																								Hours of Missing Data:	0	
																								Hours of Calibration:	0	
																								Percent Operational Time:	100.0	
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Dec	-8.6	-9.9	-10.9	-11.4	-11.8	-12.7	-13.2	-13.8	-14.4	-14.2	-13.4	-11.4	-8.9	-7.2	-7.0	-9.2	-11.2	-12.4	-13.4	-14.3	-13.8	-11.8	-12.9	-13.1	-11.7	-7.0
2-Dec	-13.0	-12.9	-10.9	-10.3	-9.7	-10.2	-11.1	-11.8	-10.9	-9.8	-9.2	-8.3	-6.5	-5.0	-4.3	-6.7	-8.6	-10.0	-9.7	-9.1	-9.4	-10.3	-11.4	-12.0	-9.6	-4.3
3-Dec	-12.3	-11.2	-10.7	-9.7	-9.7	-9.1	-8.9	-8.7	-8.8	-9.7	-8.2	-6.1	-4.3	-2.8	-2.6	-5.1	-6.8	-7.7	-8.8	-10.4	-11.4	-12.1	-12.9	-12.7	-8.8	-2.6
4-Dec	-12.0	-10.7	-10.1	-8.5	-7.7	-6.7	-6.5	-6.7	-6.4	-6.1	-4.5	-2.1	-0.1	1.6	2.3	1.5	-0.5	-3.0	-3.2	-2.7	-2.7	-3.9	-4.6	-5.5	-4.5	2.3
5-Dec	-6.3	-6.8	-8.1	-8.2	-8.2	-8.8	-7.3	-7.0	-6.3	-4.8	-2.2	0.0	0.9	2.2	2.5	2.5	2.6	2.3	1.8	1.0	0.8	0.9	1.2	1.5	-2.2	2.6
6-Dec	1.2	0.9	1.0	0.6	0.5	0.3	0.0	-0.2	-0.3	-0.1	0.8	1.8	3.2	4.4	3.8	2.6	2.1	1.4	0.5	-0.3	-0.5	-0.6	-2.0	-2.0	0.8	4.4
7-Dec	-0.9	-1.0	-0.6	-0.6	-1.5	-2.5	-2.6	-3.0	-2.8	-3.0	-3.3	-2.2	0.3	2.2	2.3	0.3	-1.3	-2.4	-3.6	-4.2	-4.7	-5.7	-6.0	-6.4	-2.2	2.3
8-Dec	-7.3	-7.6	-7.9	-8.5	-8.6	-9.1	-9.3	-9.5	-9.6	-8.9	-8.1	-6.0	-4.3	-3.7	-4.0	-5.4	-5.6	-6.5	-7.6	-7.7	-7.7	-8.3	-8.9	-9.2	-7.5	-3.7
9-Dec	-8.9	-9.7	-10.1	-10.4	-10.5	-11.0	-10.7	-10.9	-10.9	-10.7	-9.7	-7.9	-6.3	-5.3	-5.1	-6.9	-7.7	-9.1	-9.4	-9.7	-10.2	-10.4	-10.7	-11.1	-9.3	-5.1
10-Dec	-12.0	-12.8	-13.8	-14.3	-14.6	-14.6	-13.9	-15.2	-12.2	-8.2	-7.2	-6.0	-4.5	-2.8	-1.5	-2.1	-2.4	-3.2	-3.1	-2.7	-2.3	-3.5	-4.1	-4.7	-7.6	-1.5
11-Dec	-5.5	-6.0	-6.5	-7.2	-8.1	-9.5	-10.6	-11.2	-11.5	-11.6	-11.1	-10.0	-9.1	-8.7	-8.7	-10.1	-11.3	-12.1	-12.2	-12.6	-11.5	-11.3	-12.9	-12.7	-10.1	-5.5
12-Dec	-12.2	-11.7	-11.6	-12.0	-12.2	-12.5	-14.0	-14.2	-13.3	-12.7	-11.9	-10.7	-8.1	-5.1	-5.7	-4.3	-3.9	-4.4	-4.3	-3.0	-2.3	-1.2	-0.7	0.7	-8.0	0.7
13-Dec	1.4	1.1	0.4	0.1	0.6	0.6	1.2	1.7	2.0	2.2	2.8	3.7	4.1	4.2	4.3	4.2	4.7	4.7	4.0	3.6	3.2	2.4	1.2	2.4	2.5	4.7
14-Dec	3.3	4.6	5.1	5.2	4.7	3.6	2.5	1.6	0.9	0.2	0.0	0.6	1.4	1.5	0.8	0.1	-0.7	-1.4	-1.8	-2.6	-3.1	-3.5	-3.8	-4.8	0.6	5.2
15-Dec	-4.6	-6.7	-4.3	-4.2	-5.1	-4.6	-4.3	-3.9	-4.5	-4.5	-2.6	-0.2	2.2	3.2	2.7	1.5	0.7	0.8	0.9	0.7	0.7	0.3	-0.1	-0.1	-1.5	3.2
16-Dec	0.0	1.1	2.1	2.4	2.2	2.0	1.6	1.3	-0.5	-1.3	-1.2	-0.5	-0.1	-0.1	-0.5	-1.9	-2.5	-2.4	-2.6	-2.7	-2.9	-3.1	-3.7	-4.2	-0.7	2.4
17-Dec	-4.4	-3.4	-3.5	-3.8	-5.2	-6.6	-7.4	-8.1	-8.5	-9.1	-8.5	-6.6	-4.9	-3.8	-3.4	-3.9	-4.5	-5.1	-5.6	-6.0	-5.4	-4.9	-4.1	-3.6	-5.4	-3.4
18-Dec	-3.1	-2.5	-2.7	-2.8	-3.3	-3.7	-4.0	-4.5	-5.1	-4.1	-2.4	-0.4	0.9	2.2	2.3	1.4	0.3	-0.8	-2.5	-2.5	-3.9	-5.0	-6.1	-7.6	-2.5	2.3
19-Dec	-8.4	-8.7	-10.0	-10.3	-11.2	-10.9	-12.3	-12.8	-12.4	-11.6	-11.2	-11.0	-10.6	-10.2	-10.0	-10.7	-10.9	-10.7	-10.5	-10.4	-10.3	-10.0	-9.7	-9.4	-10.6	-8.4
20-Dec	-9.0	-8.7	-8.5	-8.4	-8.2	-8.0	-7.3	-7.1	-5.9	-5.5	-4.8	-4.1	-3.9	-3.9	-3.9	-4.1	-4.1	-4.4	-4.8	-4.4	-3.7	-3.1	-2.8	-5.5	-2.8	
21-Dec	-2.8	-2.9	-3.4	-3.9	-4.2	-3.9	-3.8	-4.1	-4.7	-5.2	-5.1	-3.7	-1.7	-1.1	-1.6	-3.0	-2.0	-0.5	0.8	0.5	0.5	0.3	0.0	-0.6	-2.3	0.8
22-Dec	-2.0	-3.5	-3.5	-3.8	-4.2	-4.3	-4.8	-3.9	-4.4	-3.9	-3.0	-1.6	-1.6	-1.2	-1.6	-2.0	-2.1	-2.6	-2.4	-2.7	-2.8	-3.1	-3.2	-3.5	-3.0	-1.2
23-Dec	-0.5	1.3	2.1	2.4	2.2	1.8	1.1	-0.2	-0.6	-1.0	-1.1	-0.7	-0.2	0.0	-0.3	-1.0	-1.9	-2.5	-2.9	-3.4	-4.0	-4.6	-5.2	-6.0	-1.0	2.4
24-Dec	-7.6	-8.6	-8.9	-8.6	-8.9	-9.3	-9.3	-9.6	-9.9	-9.9	-8.9	-6.0	-3.5	-1.3	-0.1	-0.4	-1.2	-1.9	-2.6	-3.5	-4.4	-4.5	-4.5	-4.8	-5.8	-0.1
25-Dec	-5.2	-5.6	-5.8	-7.2	-9.3	-7.1	-7.2	-7.9	-8.2	-8.0	-7.1	-4.9	-2.9	-1.3	-0.7	-2.6	-4.5	-4.7	-5.0	-5.7	-6.9	-9.4	-10.9	-12.0	-6.3	-0.7
26-Dec	-12.4	-13.5	-13.6	-13.9	-13.0	-13.7	-12.9	-12.5	-12.5	-10.9	-9.3	-6.8	-3.7	-1.3	-0.7	-0.8	-1.3	-2.0	-2.3	-2.3	-2.5	-3.3	-3.9	-4.4	-7.2	-0.7
27-Dec	-4.2	-3.2	-2.6	-2.2	-3.2	-3.5	-4.1	-5.3	-5.8	-5.6	-5.1	-3.2	-1.0	0.1	-1.4	-2.8	-4.4	-5.4	-6.3	-7.4	-8.7	-9.2	-10.3	-10.2	-4.8	0.1
28-Dec	-11.7	-12.6	-13.0	-13.4	-13.1	-12.5	-13.0	-11.3	-9.6	-9.2	-9.7	-7.5	-3.8	-2.2	-2.8	-4.7	-5.5	-7.3	-8.5	-9.8	-10.5	-9.8	-10.8	-10.9	-9.3	-2.2
29-Dec	-11.2	-10.5	-10.7	-11.4	-10.9	-10.9	-11.9	-13.6	-13.4	-12.7	-12.6	-8.6	-6.0	-4.0	-2.7	-2.9	-5.4	-6.4	-7.2	-8.2	-8.9	-8.2	-7.8	-8.4	-8.9	-2.7
30-Dec	-7.8	-8.3	-8.3	-8.6	-8.2	-9.1	-10.7	-11.1	-11.5	-10.9	-10.5	-6.9	-5.0	-5.9	-5.0	-5.8	-6.3	-1.4	0.6	1.2	1.4	1.4	1.2	0.8	-5.6	1.4
31-Dec	0.4	-0.1	-0.4	-0.7	-1.2	-1.8	-2.4	-2.5	-2.6	-2.7	-2.1	-1.3	-0.6	0.2	0.6	1.0	0.0	0.4	0.7	-0.3	-1.0	-0.8	-0.9	-0.3	-0.8	1.0
	-6.1	-6.1	-6.1	-6.2	-6.5	-6.7	-7.0	-7.3	-7.2	-6.9	-6.1	-4.5	-2.9	-1.8	-1.7	-2.6	-3.4	-3.9	-4.2	-4.6	-4.8	-5.1	-5.5	-5.7		Diurnal Average
	3.3	4.6	5.1	5.2	4.7	3.6	2.5	1.7	2.0	2.2	2.8	3.7	4.1	4.4	4.3	4.2	4.7	4.7	4.0	3.6	3.2	2.4	1.2	2.4		Diurnal Maximum



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature (AT) - C
Janvier - December 2023





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Ambient Temperature (AT) - C
Janvier - December 2023

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	622	83.60	83.60
0 - 10	122	16.40	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association
Summary of Hour Averages

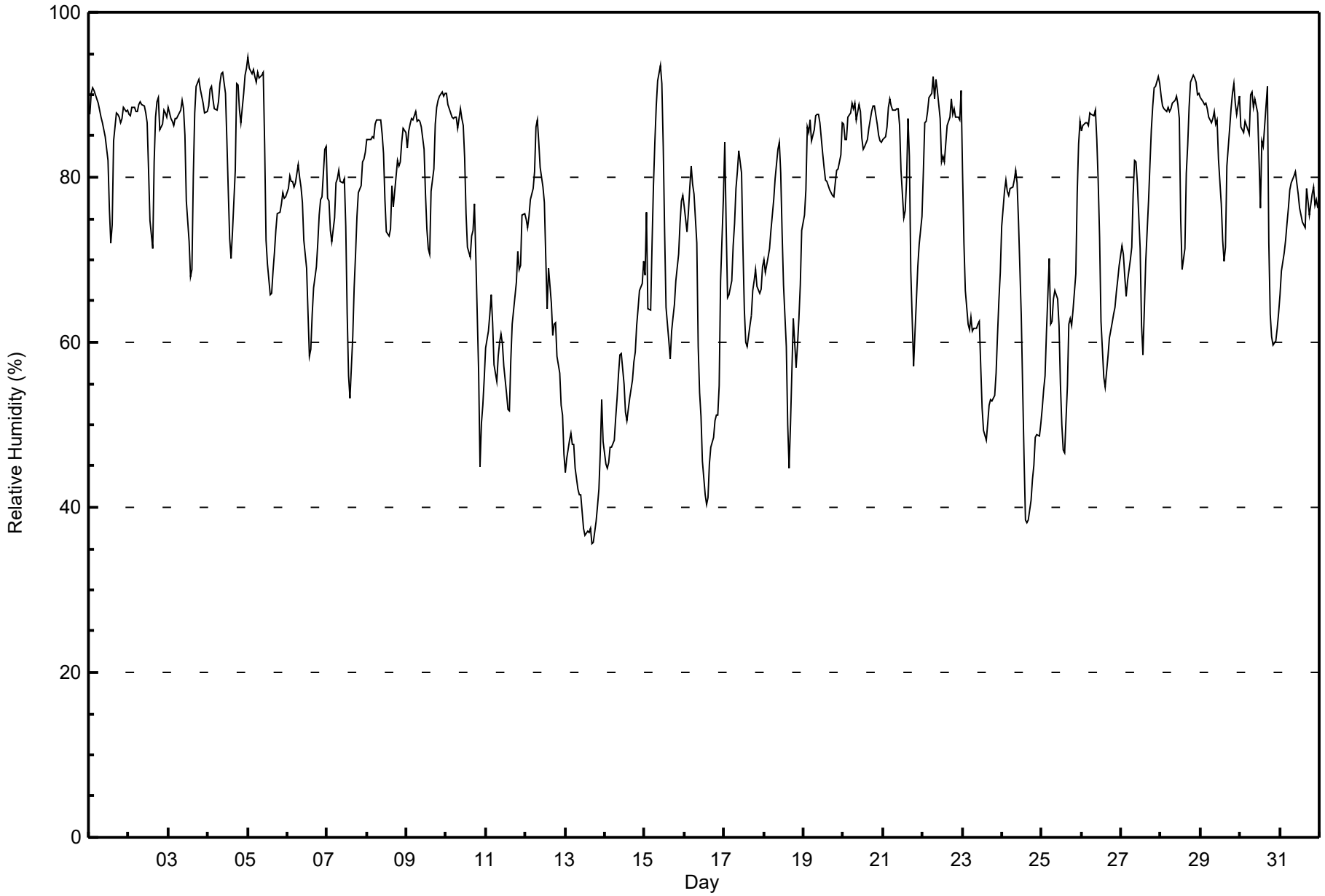
Relative Humidity (RH) - %
Janvier - December 2023

Maximum Value: 94.7 % on Dec 5 01:00																						Maximum Daily Average: 87.3 % on Dec 22																						Hours in Service: 744			
Minimum Value: 35.6 % on Dec 13 17:00																						Minimum Daily Average: 42.4 % on Dec 13																						Hours of Data: 744			
Maximum Diurnal Average: 80.9 % at hour 9																						Minimum Diurnal Average: 63.8 % at hour 15																						Hours of Missing Data: 0			
Monthly Average: 74.59 %																						Percentiles: P ₁ = 38.2 P ₁₀ = 52.5 Q ₁ = 64.5 Median = 78.2 Q ₃ = 86.9 P ₉₀ = 89.1 P ₉₉ = 92.6																						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-Dec	87.6	90.1	90.9	90.5	89.9	89.0	88.2	87.3	86.7	85.7	84.9	82.1	76.0	72.1	74.3	84.4	87.8	87.6	87.2	86.7	87.1	88.4	88.0	88.1	85.9	90.9																					
2-Dec	87.6	87.4	88.4	88.5	88.0	88.0	88.9	89.1	88.8	88.7	87.7	86.6	80.8	74.7	71.4	81.8	87.3	89.2	89.6	85.8	86.5	88.2	87.7	87.3	86.2	89.6																					
3-Dec	88.4	87.1	86.8	86.2	87.2	87.1	87.5	88.1	89.3	88.3	85.0	77.1	72.2	68.1	68.7	80.2	87.8	91.0	91.8	90.7	89.9	89.0	87.7	88.0	85.1	91.8																					
4-Dec	88.6	90.8	91.0	89.6	88.4	88.2	89.2	91.4	92.6	92.7	90.2	84.3	78.3	72.6	70.2	73.4	80.8	91.3	91.2	88.1	86.5	90.2	92.4	93.2	86.9	93.2																					
5-Dec	94.7	93.2	92.6	93.0	92.2	91.5	92.7	92.0	92.4	92.7	83.8	72.3	69.5	65.7	65.9	68.6	70.8	73.5	75.5	75.8	76.8	78.1	77.5	77.7	81.6	94.7																					
6-Dec	78.7	80.2	79.5	79.5	78.8	79.2	81.6	80.1	78.9	76.9	72.3	68.9	63.6	58.3	59.1	63.5	66.6	69.1	72.0	75.4	77.2	77.6	83.4	83.8	74.3	83.8																					
7-Dec	77.5	77.1	73.5	72.2	75.0	79.3	79.8	80.9	79.6	79.3	79.8	74.1	63.5	55.9	53.3	60.8	66.6	70.7	75.3	78.1	79.0	81.9	82.3	83.0	74.1	83.0																					
8-Dec	84.6	84.5	84.6	84.9	84.8	86.5	86.9	87.0	87.0	85.3	82.8	77.3	73.4	72.9	73.8	78.9	76.5	78.3	82.0	81.4	81.8	84.3	85.9	85.4	82.1	87.0																					
9-Dec	83.6	85.6	86.4	87.1	87.0	87.9	86.8	86.9	86.8	86.0	83.4	78.0	73.8	71.4	70.7	78.2	81.0	86.4	88.5	89.3	89.9	90.3	89.8	90.2	84.4	90.3																					
10-Dec	90.2	88.9	88.3	87.3	87.1	87.4	87.3	85.9	88.4	87.2	86.2	82.3	75.5	71.4	70.4	73.0	73.5	76.8	70.4	56.4	44.9	50.1	52.3	55.7	75.7	90.2																					
11-Dec	59.3	61.4	63.4	65.7	62.3	57.3	55.3	58.2	60.0	61.1	59.8	57.1	53.7	51.9	51.7	57.8	62.2	65.6	67.3	71.1	68.8	69.3	75.5	75.7	62.1	75.7																					
12-Dec	74.9	73.8	75.3	77.2	78.7	80.7	86.0	86.9	84.2	81.2	78.8	76.9	70.3	64.1	68.9	64.8	60.9	62.1	62.4	58.3	56.2	52.3	51.2	46.4	69.7	86.9																					
13-Dec	44.3	46.0	48.1	49.1	47.6	47.6	44.7	42.2	41.6	41.4	39.5	37.4	36.7	37.1	36.9	37.4	35.6	35.7	38.3	40.1	42.2	46.7	53.0	47.9	42.4	53.0																					
14-Dec	45.3	44.8	45.4	47.3	47.2	48.1	50.8	53.2	56.1	58.4	58.7	54.9	51.5	50.5	51.9	53.1	55.4	57.7	58.8	62.0	64.1	66.3	67.2	69.8	54.9	69.8																					
15-Dec	68.1	75.8	64.0	63.9	71.8	79.0	84.3	88.6	91.7	93.6	91.3	83.7	73.2	64.2	60.1	58.0	61.3	63.1	64.5	67.4	70.6	74.3	77.2	77.8	73.6	93.6																					
16-Dec	76.5	73.5	75.8	78.8	81.3	79.1	77.9	72.1	59.4	53.8	51.0	45.6	41.5	40.3	41.2	45.3	47.3	48.4	50.6	51.2	51.2	54.8	67.5	77.5	60.1	81.3																					
17-Dec	84.2	74.0	65.4	65.8	67.5	71.7	74.4	78.6	80.6	83.3	80.6	71.4	63.9	60.0	59.5	62.1	63.3	66.3	67.5	68.9	66.9	65.9	66.4	69.2	69.9	84.2																					
18-Dec	70.0	68.5	70.4	71.4	73.5	75.5	77.2	79.8	83.3	84.3	80.6	73.2	67.0	59.4	50.0	44.7	50.2	56.6	62.9	56.9	59.7	62.8	66.9	73.5	67.4	84.3																					
19-Dec	75.5	78.5	86.0	85.5	86.9	84.5	85.8	87.4	87.6	87.6	86.7	82.9	81.2	79.7	79.4	79.0	78.5	77.9	77.6	79.3	80.8	81.1	82.7	86.6	82.4	87.6																					
20-Dec	86.4	84.5	84.6	87.3	87.9	88.9	88.2	88.9	87.0	88.9	87.9	84.8	83.4	83.8	84.6	86.0	86.9	88.0	88.6	88.6	86.5	85.1	84.5	84.3	86.5	88.9																					
21-Dec	84.5	84.9	86.0	88.4	89.5	88.7	88.1	88.2	88.3	88.4	86.2	80.8	75.2	76.0	79.6	87.2	82.6	68.6	57.1	61.2	65.1	69.1	71.8	75.3	79.6	89.5																					
22-Dec	80.6	86.6	86.9	88.0	89.7	90.2	92.3	89.5	91.9	90.6	87.1	81.9	82.6	81.8	84.0	86.3	87.3	89.5	87.6	88.4	87.3	87.3	86.9	90.5	87.3	92.3																					
23-Dec	80.7	72.1	66.3	62.2	61.5	63.1	61.4	61.7	61.7	62.3	62.5	57.1	52.0	49.4	48.1	50.1	52.3	53.1	52.8	53.6	56.3	60.8	65.1	68.4	59.8	80.7																					
24-Dec	74.0	78.2	79.6	78.2	77.9	78.6	78.9	79.7	80.9	79.3	74.8	63.3	54.5	45.9	38.5	38.2	38.5	40.9	43.3	45.1	48.4	48.8	48.7	50.1	61.0	80.9																					
25-Dec	52.1	54.3	56.0	61.1	70.1	62.2	62.6	65.3	66.2	65.2	62.0	55.0	50.0	46.9	46.6	54.7	62.2	62.9	62.1	63.9	68.3	78.1	84.0	86.7	62.4	86.7																					
26-Dec	85.6	86.3	86.7	86.7	86.3	87.8	87.7	87.5	88.2	84.6	79.5	72.7	62.5	55.8	54.5	56.4	58.3	60.5	62.3	63.4	64.2	66.1	67.6	69.4	73.4	88.2																					
27-Dec	71.6	70.6	68.0	65.5	67.4	70.0	71.5	78.0	82.0	81.9	79.3	71.3	62.1	58.4	64.0	69.9	77.1	81.5	85.7	88.6	90.9	91.1	92.2	91.4	76.3	92.2																					
28-Dec	89.8	88.7	88.3	88.1	88.4	88.1	88.4	89.1	89.4	89.8	88.8	87.1	74.9	68.7	71.4	80.6	83.9	88.4	91.4	92.4	92.0	91.5	89.9	90.2	86.6	92.4																					
29-Dec	89.7	89.2	88.8	89.0	88.2	87.2	86.7	87.2	88.0	86.4	87.0	82.2	76.8	72.4	69.8	71.6	81.3	85.9	88.3	90.1	91.3	89.0	87.6	89.8	85.1	91.3																					
30-Dec	86.1	85.7	85.4	86.7	85.7	85.3	90.0	90.3	88.4	89.6	87.9	82.2	76.4	84.4	83.8	88.7	91.0	72.0	63.3	60.7	59.7	60.2	61.7	63.6	79.5	91.0																					
31-Dec	65.7	68.7	70.9	72.3	74.5	76.3	78.4	79.4	80.2	80.6	79.3	77.9	76.3	74.6	74.3	73.9	78.6	77.1	75.5	78.0	78.9	76.7	77.3	76.3	75.9	80.6																					
																						77.6	77.8	77.5	78.0	78.8	79.2	80.0	80.7	80.9	80.5	78.2	73.0	67.5	64.1	63.8	67.4	70.1	71.5	72.0	72.2	72.5	74.0	75.9	77.2	Diurnal Average	
																						94.7	93.2	92.6	93.0	92.2	91.5	92.7	92.0	92.6	93.6	91.3	87.1	83.4	84.4	84.6	88.7	91.0	91.3	91.8	92.4	92.0	91.5	92.4	93.2	Diurnal Maximum	



Wood Buffalo Environmental Association
Hourly Averages

Relative Humidity (RH) - %
Janvier - December 2023





Maximum Speed: 28 km/h on Dec 10 21:00	Maximum Daily Speed Average: 15.2 km/h on Dec 15	Hours in Service: 744
Minimum Speed Value: 0 km/h on Dec 28 01:00	Minimum Daily Speed Average: 2.4 km/h on Dec 28	Hours of Data: 743
Maximum Diurnal Speed Average: 9.0 km/h at hour 22	Minimum Diurnal Speed Average: 7.7 km/h at hour 16	Hours of Missing Data: 1
Monthly Average Velocity: 8.5 km/h 221.7 deg	Percentiles: P ₁ = 1 P ₁₀ = 4 Q ₁ = 7 Median = 10 Q ₃ = 13 P ₉₀ = 15 P ₉₉ = 21	Percent Operational Time: 99.9

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Dec	SW9	SW9	SW9	SSW10	SSW11	SW10	SSW12	SSW11	SSW10	SSW10	SW8	SW7	SW3	WSW4	SSW4	SSE4	S4	S3	S4	SSW7	SSW8	SSW9	S7	S7	SSW7.3	SSW12
2-Dec	S6	SW6	SSW9	S10	SSW10	SSW5	SSW6	SSW6	S6	SSW5	SW3	SSW3	W2	WSW4	SW4	SSW4	SSW5	SSW4	SW9	SW9	SW9	SSW8	SW10	SSW9	SSW6.0	S10
3-Dec	SSW9	SW9	SSW8	SW9	SSW5	SSW4	SW5	S1	SSE2	SW3	SSW8	SSW9	SSW9	SSW6	NE0	UO	SE1	SE2	SE3	S3	SSE4	SSE5	SW4	SSW5	SSW4.5	SW9
4-Dec	SSW7	SSW10	SSW11	SW12	SW12	SW13	SW11	SW11	SW12	SSW11	SW14	SW15	WSW14	WSW12	WSW11	WSW10	WSW4	S5	SSW8	SW8	SW9	SSW7	SSW8	S4	SW9.4	SW15
5-Dec	S6	SSE5	SSW2	SE2	SSE2	N3	ESE2	SSW5	SW3	SSW7	SW9	SSW10	SW9	SW10	SW12	SSW12	SSW14	SW14	SW18	SW13	SW16	SW16	SW18	SW16	SSW8.6	SW18
6-Dec	SW15	SW15	SW16	SW13	SW14	SW15	SW15	SSW13	SSW12	SW12	SW11	SW11	SW10	SW11	SW11	SW13	SSW13	SSW12	SSW11	SW10	SW8	SW4	SW7	SW12.0	SW16	
7-Dec	SW8	SW8	WSW9	WSW10	SW8	SSW8	SSW9	SSW8	S8	SSW9	SW7	SW9	SW7	WSW7	W6	WSW8	SW9	SW8	SW8	SW8	SW9	SW10	SSW11	SSW13	SSW8.2	SSW13
8-Dec	SSW12	SSW13	SSW13	SSW13	SSW14	SSW13	SSW14	SSW13	SSW12	SSW13	SW10	SW10	SSW9	SSW9	SW8	SW8	SW11	SW10	SSW10	SW10	SW12	SW14	SW13	SW13	SSW11.3	SSW14
9-Dec	SW11	SW11	SW11	SSW13	SSW13	SSW12	SW11	SSW12	SSW13	SSW12	SSW12	SW11	SW12	SW11	SW11	SSW8	SSW9	SSW7	SSW6	S5	SSE2	SSE3	SSE5	SE5	SSW9.0	SSW13
10-Dec	E1	ENE1	SSW1	SSW3	S5	S4	S8	S8	S11	SSW13	SW13	SW13	SW13	WSW14	WSW13	SW12	SW13	WSW12	WSW12	W14	WNW28	WNW25	WNW23	WNW22	WSW9.1	WNW28
11-Dec	NW22	WNW19	NW19	WNW20	NW21	NW21	NW19	NW19	NW15	NW14	WSW10	WSW12	W12	W10	WSW8	SW8	SW9	SSW11	SSW11	SSW8	SW10	SSW7	SSW9	SW10	W10.2	WNW22
12-Dec	SW10	SW12	SW11	SW12	SW13	SSW9	SSW9	SSW10	SSW11	SW15	SW11	SSW8	SSW7	SW9	SSW9	SSW12	SSW13	SSW12	SSW15	SSW17	SSW15	SW15	SSW13	SW15	SSW11.5	SSW17
13-Dec	SW17	SW15	SSW16	SSW14	SW17	SSW17	SW16	SW19	SW18	SW14	SW14	SW13	SW14	SW12	SW11	SW11	SW13	SW13	SW12	SW12	SW10	SSW10	SSW8	SW10	WSW13.6	SW19
14-Dec	SW10	SW12	W10	W11	W11	W11	W9	W11	W14	W12	SW9	WSW9	SW7	SW9	SW10	SW10	SW11	SW10	SW10	SW11	SW10	SSW11	SSW11	S10	WSW9.5	W14
15-Dec	S8	SSW10	SSW14	SW12	SW11	SW14	SW16	SW16	SW12	SSW11	SW13	SW14	SW18	SW19	SSW17	S17	SSW21	SSW20	SSW19	SSW17	SW17	SW19	SW18	SW20	SSW15.2	SSW21
16-Dec	SW19	WSW17	WSW13	WSW12	W13	W13	W16	WNW14	NW10	WNW12	WNW12	WNW16	W14	W12	WNW8	W7	W8	WSW6	WSW6	WSW5	WNW9	WNW11	W12	W10.7	SW19	
17-Dec	W11	WNW18	WNW22	NW17	NNW14	NW9	WNW10	WSW8	SW11	SW9	SSW11	SW13	SW12	SW14	SW13	SW12	SSW14	SW15	SSW12	SSW12	SSW14	SSW13	SW13	SW14	WSW9.7	WNW22
18-Dec	SW13	SSW16	SW13	SW17	SW19	SW19	SW17	WSW16	SW10	SW12	SW12	WSW11	SW10	SW10	W10	WSW11	WSW10	W8	W7	W9	WNW7	WNW8	WNW6	W6	WSW10.8	SW19
19-Dec	N3	NNE5	N6	NNE8	NNE7	NNE6	NNE7	NNE5	NNE6	NE7	ENE7	E7	E8	E7	E7	ENE10	E8	ESE10	ESE9	ESE9	ESE7	ESE6	E7	ENE5.6	ESE10	
20-Dec	ESE9	ESE9	ESE5	E6	E5	E4	SSE4	SSE5	SSE5	SSE6	S8	SSW11	SSW14	SSW14	SSW13	SSW12	SSW12	SSW13	SSW13	SSW11	SSW11	SW15	SW15	SW17	S8.0	SW17
21-Dec	SW15	SW15	SW11	SW11	SW12	SW12	SW12	SW12	SW13	SSW14	SSW12	SSW12	SSW10	SW10	SSW8	SSW8	SSW9	S12	SSW14	SSW13	SSW13	SW12	SW13	SSW12	SSW11.7	SW15
22-Dec	S8	SSW6	SSW9	SSW9	SSW7	SSW8	SSW8	SSW6	SSW5	SSW7	SSW7	WSW3	SW4	SSW5	S5	SW5	SSW9	SSW10	SSW10	SSW13	SW14	SSW13	S10	SSW11	SSW7.9	SW14
23-Dec	SW10	WSW11	W11	W10	W11	W13	WNW20	WNW16	WNW17	W16	W13	W16	WNW19	WNW17	WNW14	W10	W11	W11	WSW11	WSW11	WSW12	W10	WSW8	W12.4	WNW20	
24-Dec	SW8	SW10	SW12	SW13	SSW12	SSW14	SW14	SW10	SSW11	SW12	SW13	SW16	SW16	SW14	SSW16	SSW17	SW16	SW19	SW17	SW7	SSW9	SSW12	SW15	SW15	WSW13.1	SW19
25-Dec	SW14	SSW15	SW14	SSW9	S6	SSW17	SSW14	SSW13	SSW14	SSW12	SSW12	SW11	SW11	SW9	SW10	SW7	SSW6	SW8	SSW10	S9	S5	SSE4	SE2	SSW4	SSW9.6	SSW17
26-Dec	SSE4	SW5	S6	S5	SSW6	SSW6	SSW6	SSW7	SW6	SSW10	SSW10	SW8	SSW9	SW9	SSW11	SSW12	SSW15	SW15	SW15	SW15	SW16	SW15	SW16	SSW14	SSW9.8	SW16
27-Dec	SW15	SW15	SW14	SW14	SW13	SW13	SW16	SW13	SW11	SW12	SSW9	SW4	WNW2	NE2	E1	NNE2	E1	S1	SSW2	E2	N3	NNE1	SW3	S1	SSW6.0	SW16
28-Dec	NW0	NNE3	NNE2	S3	SSW6	SSW4	SSW8	SSW9	SW7	SSE1	SSW4	SSE3	SW1	W2	SW2	WNW1	NNE5	NE3	NE2	WSW2	SW6	SW6	SSW7	SSW5	SSW2.4	SSW9
29-Dec	SSW9	SSW9	SSW9	SSW9	SSW11	SSW10	SSW7	SSW7	SSW9	SSW8	SSW7	SSW10	SW9	SSW9	SSW13	SSW11	S7	S7	S3	SSW5	SSW10	SSW11	SSW9	SSW8	SSW8.6	SSW13
30-Dec	SSW10	SSW9	SSW11	SSW11	SSW11	SSW9	SSW6	SSW5	SSW6	SSW5	SW3	SW2	SW4	S5	SSE5	S3	S9	S11	SSW14	SSW14	SSW16	SSW16	SSW15	SSW15	SSW8.7	SSW16
31-Dec	SSW15	SW13	SSW15	SW13	SW13	SW12	SW14	SSW14	SSW15	SW13	SSW14	SSW12	SSW12	SW10	SSW10	SSW11	SSW11	SW12	SW14	SW12	SW13	SW13	SW11	SW12	SW12.6	SSW15

SW8.5 SW8.4 SW8.4 SW8.3 SW8.2 SW8.1 SW8.7 SW8.5 SW8.1 SW8.5 SW8.8 SW8.8 SW8.5 SW8.2 SW7.8 SW7.7	SSW8.0 SSW8.5 SSW8.8 SW8.9 SW9.0 SW9.0 SW8.7 SW9.0	Diurnal Average
WNW22WNW19WNW22WNW20 NW21 NW21WNW20 NW19 SW18 W16 SSW14 W16WNW19 SW19 SSW17 S17 SSW21 SSW20 SSW19 SSW17WNW28WNW25WNW23WNW22		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

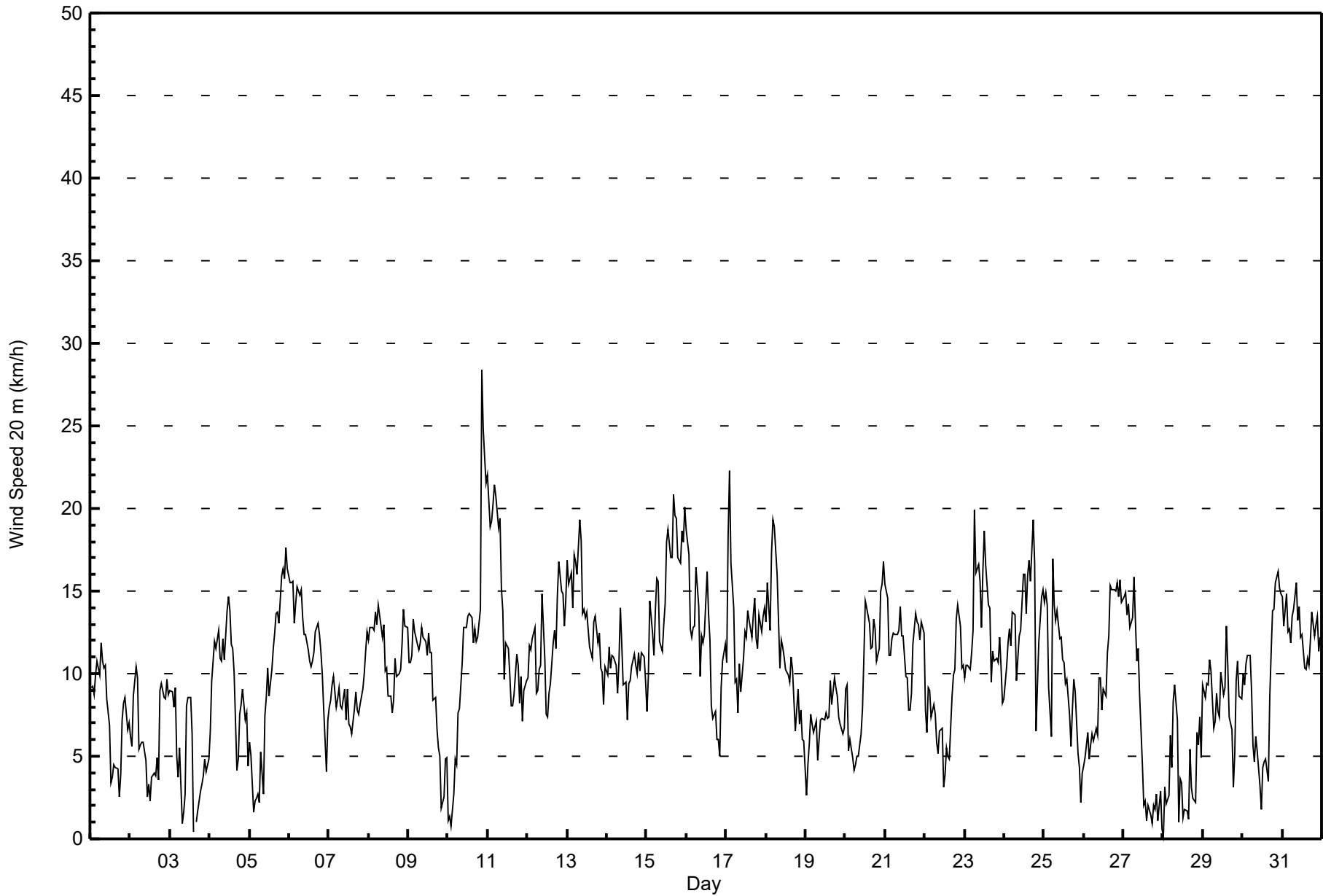
Wind Speed 20 m (WS20m) - km/h
Janvier - December 2023

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 11 km/h on Dec 10 21:00														Hours in Service: 744 Hours of Data: 743 Hours of Missing Data: 1 Hours of Calibration: 0 Percent Operational Time: 99.9												
Minimum Value: 1 km/h on Dec 1 16:00																										
Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 2 Median = 2 Q ₃ = 3 P ₉₀ = 4 P ₉₉ = 6																										
Day	Hourly Period Ending At (MST)																							Daily Maximum		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23		24	
1-Dec	2	2	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1	2	2	1	1	2	1	2	
2-Dec	2	2	2	2	2	2	1	1	1	1	1	2	1	1	1	1	1	2	2	2	2	1	2	1	2	
3-Dec	1	2	2	2	3	2	2	1	2	2	2	2	2	2	1	UO	1	1	1	1	1	1	1	1	1	
4-Dec	2	1	2	2	2	2	2	2	2	3	2	4	4	4	3	2	3	1	2	2	2	1	1	1	1	
5-Dec	1	1	2	2	2	2	1	2	1	1	2	3	2	3	3	2	3	3	3	3	4	4	4	4	4	
6-Dec	4	3	4	3	3	4	3	3	2	2	3	2	2	3	2	2	3	2	3	2	2	2	1	1	4	
7-Dec	1	1	2	2	2	2	1	2	1	1	1	2	2	1	2	1	2	1	1	2	2	2	2	2	2	
8-Dec	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	2	3	2	2	2	3	3	3	3	3	
9-Dec	3	2	3	2	2	2	2	2	2	2	3	3	3	3	3	2	2	1	1	1	1	2	1	1	3	
10-Dec	1	1	2	1	1	3	2	2	2	3	3	3	3	3	3	3	3	3	3	4	11	8	6	6	11	
11-Dec	7	6	6	7	7	8	6	6	5	4	3	3	3	3	2	2	2	2	2	2	2	1	1	2	8	
12-Dec	2	3	3	3	3	3	1	2	2	4	3	2	2	2	1	2	2	2	2	3	3	3	4	3	4	4
13-Dec	5	4	3	3	5	4	4	5	4	3	4	4	4	3	3	2	3	3	3	3	2	2	2	3	5	
14-Dec	2	3	3	3	2	3	2	3	3	3	2	3	2	2	2	2	2	2	2	2	2	2	3	2	3	3
15-Dec	2	2	3	3	3	4	3	4	3	2	4	4	6	5	4	4	5	5	5	5	4	5	5	5	6	6
16-Dec	5	5	4	3	3	3	4	5	4	3	4	3	5	4	3	2	1	2	2	1	1	3	3	3	5	
17-Dec	3	6	6	6	7	4	3	2	2	2	3	3	3	4	3	2	3	3	2	2	3	3	3	3	7	
18-Dec	3	4	3	5	5	5	4	4	3	3	3	3	3	2	3	3	2	2	1	3	3	2	1	1	5	
19-Dec	2	2	2	1	2	1	2	1	1	2	2	2	2	2	2	3	2	3	3	3	2	2	2	2	3	
20-Dec	3	3	2	2	2	1	2	2	1	2	2	3	4	4	4	3	3	3	3	3	2	3	4	4	4	
21-Dec	4	4	2	2	2	3	3	2	3	2	3	2	3	2	2	1	1	3	3	3	3	3	3	2	4	
22-Dec	2	2	2	2	2	2	2	2	1	1	2	1	1	1	1	2	2	2	2	3	3	2	2	1	3	
23-Dec	2	3	2	4	4	4	6	5	6	5	4	6	6	5	5	4	3	3	2	2	2	3	3	2	6	
24-Dec	2	2	2	2	2	3	3	2	2	3	3	4	4	3	4	4	4	5	4	2	3	2	3	4	5	
25-Dec	3	3	3	3	1	4	3	3	3	2	2	3	3	2	2	2	3	2	2	2	2	2	2	1	4	
26-Dec	2	2	2	2	1	1	1	1	2	1	2	2	2	3	3	3	3	3	4	3	4	3	3	3	4	
27-Dec	3	3	3	3	3	3	4	3	3	2	2	2	1	1	1	1	1	2	1	2	1	1	1	1	4	
28-Dec	1	1	2	2	1	1	2	1	2	1	1	2	1	2	1	1	1	2	1	1	1	1	1	1	2	
29-Dec	2	2	2	1	2	2	2	1	2	2	2	3	2	2	2	2	1	1	2	1	1	1	2	2	3	
30-Dec	1	1	1	1	1	2	1	2	2	1	1	1	1	1	2	3	3	3	3	3	3	4	3	4	4	
31-Dec	3	3	3	3	3	3	3	3	3	3	3	3	3	2	2	2	1	2	3	3	3	3	3	3	3	
														Diurnal Maximum												
7 6 6 7 7 8 6 6 6 5 4 6 6 5 5 4 5 5 5 4 11 8 6 6 6																										
UO - Unstable Operation																										



Wood Buffalo Environmental Association
Hourly Averages

Wind Speed 20 m (WS20m) - km/h
Janvier - December 2023





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Wind Speed 20 m (WS20m) - km/h
Janvier - December 2023

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	118	15.88	15.88
6 - 11	333	44.82	60.70
12 - 19	279	37.55	98.25
20 - 28	13	1.75	100.00
29 - 38	0	0.00	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 743

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed 20 m (WS20m) - km/h
Janvier - December 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	7	4	1	6	2	6	17	19	24	17	7	2	2	1	0	118
6 - 11	1	5	1	2	6	9	0	1	21	132	104	20	22	7	2	0	333
12 - 19	0	0	0	0	0	0	0	0	2	95	136	12	14	13	6	1	279
20 - 28	0	0	0	0	0	0	0	0	0	2	1	0	0	8	2	0	13
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	4	12	5	3	12	11	6	18	42	253	258	39	38	30	11	1	743

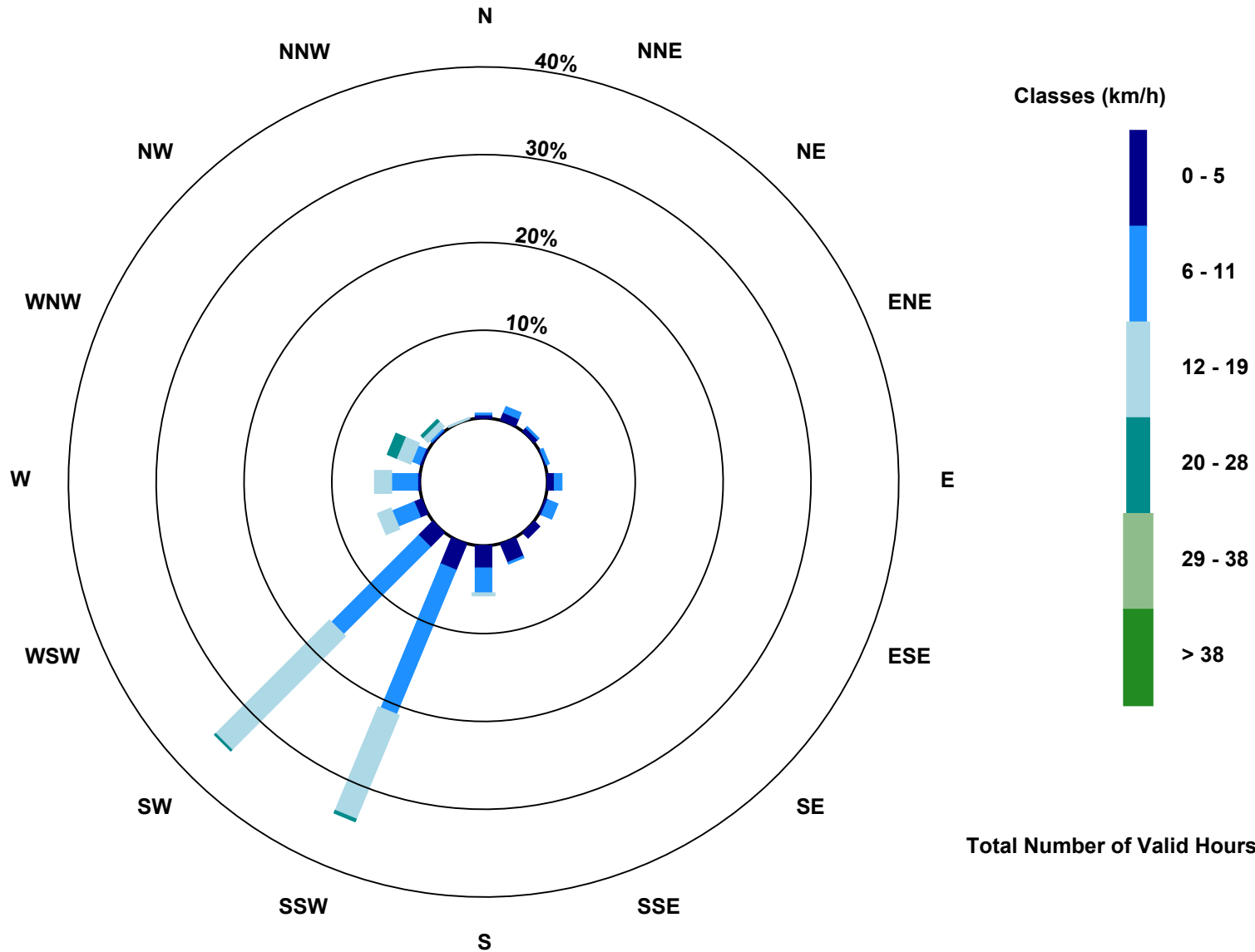
Total Number of Valid Hours: 743

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Dec 2023

Wind Speed 20 m (WS20m) - km/h
Janvier





Direction of Maximum Speed: 291 deg on Dec 10 21:00	Hours in Service: 744
Direction of Maximum Daily Speed Average: 212.7 deg on Dec 15	Hours of Data: 743
Direction of Minimum Speed: 317 deg on Dec 28 01:00	Hours of Missing Data: 1
Direction of Minimum Daily Speed Average: 2.4 deg on Dec 28	Percent Operational Time: 99.9
Monthly Average Direction: 221.7 deg	

Day	Hourly Period Ending At (MST)																								Daily Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Dec	214	218	217	210	209	214	207	207	202	206	221	233	236	246	201	168	170	181	182	208	212	199	180	190	207.2
2-Dec	189	224	193	190	196	199	202	199	191	205	232	211	274	247	232	213	202	195	214	218	214	211	217	209	207.7
3-Dec	213	221	210	216	199	211	223	171	148	215	207	205	207	207	54	UO	137	134	145	189	157	152	216	200	202.1
4-Dec	200	209	211	214	216	214	217	221	224	212	226	235	241	246	254	248	252	183	200	221	219	200	203	190	221.5
5-Dec	178	163	197	141	150	349	112	192	236	209	215	211	222	219	219	210	219	222	219	219	228	227	225	214.9	
6-Dec	225	221	227	223	226	218	215	218	211	211	214	214	219	220	224	218	215	208	211	209	215	224	231	214	217.7
7-Dec	218	224	242	237	220	204	212	201	183	200	222	220	226	238	261	250	235	232	225	226	222	220	205	207	221.1
8-Dec	200	204	201	203	204	203	204	212	206	210	215	214	212	208	216	217	232	229	213	225	223	222	221	227	212.9
9-Dec	225	217	215	208	208	202	214	212	208	209	213	216	218	215	217	201	203	210	200	189	151	150	148	144	207.6
10-Dec	95	66	197	209	191	177	186	188	191	210	215	227	233	238	248	225	229	237	255	268	291	290	295	300	249.6
11-Dec	304	303	305	301	307	315	304	305	310	304	250	253	268	261	252	231	219	193	198	196	214	212	208	215	276.9
12-Dec	223	223	226	222	217	210	209	212	212	219	219	198	194	224	204	195	203	210	204	206	205	214	208	222	212.0
13-Dec	222	220	211	213	221	212	219	229	225	218	218	222	223	221	218	225	226	224	227	223	215	208	199	215	219.5
14-Dec	218	230	259	264	275	263	265	280	273	263	236	248	226	229	219	226	223	224	227	221	221	213	201	190	237.9
15-Dec	174	192	204	215	217	219	227	226	223	213	225	220	220	216	201	189	196	209	206	211	219	222	219	222	212.7
16-Dec	225	237	249	254	267	270	280	303	312	292	294	288	283	278	278	285	274	266	252	247	251	297	288	277	272.6
17-Dec	263	299	300	315	328	318	288	241	233	216	211	229	229	230	228	217	212	214	199	204	210	213	218	223	242.9
18-Dec	224	212	220	222	230	233	232	238	232	231	233	247	228	227	267	258	257	268	262	263	301	291	289	259	240.5
19-Dec	360	12	10	24	20	29	26	15	26	48	66	97	95	101	87	75	81	108	114	115	104	108	106	97	72.6
20-Dec	113	115	102	93	101	93	159	156	161	168	182	194	211	209	202	207	198	203	201	196	213	216	218	217	190.5
21-Dec	220	220	222	218	215	230	227	222	223	208	213	207	212	215	200	198	194	191	199	201	211	214	216	209	212.6
22-Dec	189	195	199	205	204	203	205	205	208	213	202	238	221	200	188	218	210	209	213	212	216	200	175	198	204.4
23-Dec	232	253	264	266	273	276	294	288	285	280	278	280	289	294	289	282	275	271	269	252	240	254	271	256	274.3
24-Dec	228	221	218	214	205	208	214	214	210	215	217	226	220	217	213	211	218	217	214	215	199	208	217	221	215.4
25-Dec	214	209	214	212	191	198	212	211	209	208	213	224	219	226	230	221	204	221	199	183	172	167	129	200	208.6
26-Dec	167	216	173	190	205	207	204	206	215	206	206	214	208	221	208	206	211	219	222	220	222	221	218	212	211.7
27-Dec	219	228	219	218	218	216	217	221	219	214	209	220	294	41	79	30	86	190	206	87	354	22	214	180	218.6
28-Dec	317	20	30	186	210	194	211	207	216	150	208	166	220	267	232	293	26	49	35	253	225	217	210	197	210.8
29-Dec	208	203	206	210	207	206	202	205	208	199	211	207	214	207	201	203	186	191	189	205	205	206	202	203	204.0
30-Dec	203	208	206	205	207	205	195	197	198	194	216	225	226	176	162	175	172	177	192	195	194	202	207	204	197.9
31-Dec	207	214	211	217	219	217	215	212	213	214	213	213	207	217	209	208	210	217	217	229	219	226	223	231	215.7

218.2 224.0 226.6 225.4 226.2 224.6 227.8 227.5 224.1 220.8 220.9 224.9 228.0 227.5 223.6 218.3 213.7 213.6 212.2 214.9 220.0 220.8 219.4 219.6

Diurnal Average

UO - Unstable Operation

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



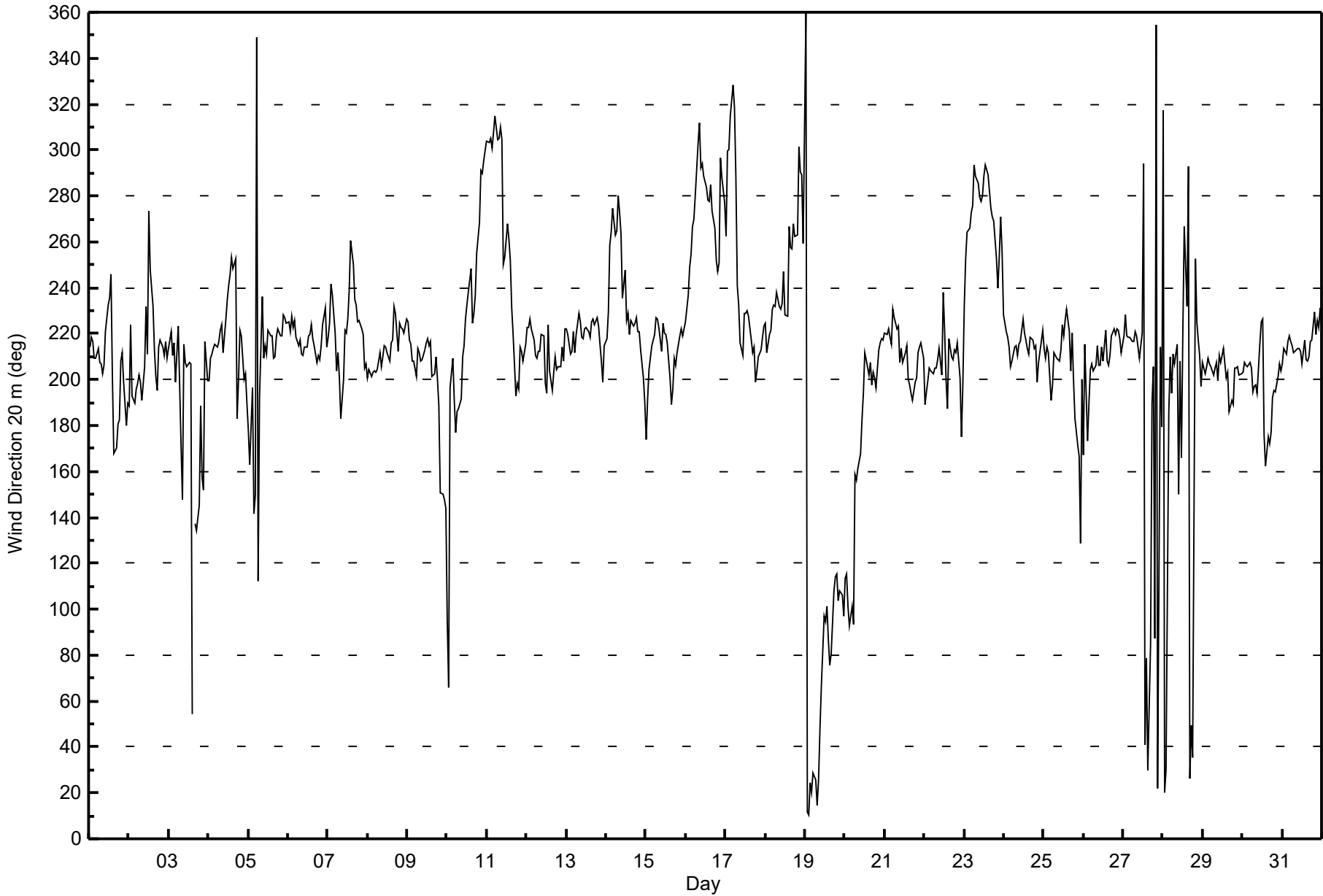
Wood Buffalo Environmental Association

Summary of Hour Standard Deviations

Wind Direction 20 m (WD20m) - deg

Janvier - December 2023

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 94 deg on Dec 28 00:00											Hours in Service: 744 Hours of Data: 743 Hours of Missing Data: 1 Hours of Calibration: 0 Percent Operational Time: 99.9														
Minimum Value: 6 deg on Dec 28 21:00																									
Percentiles: P ₁ = 8 P ₁₀ = 11 Q ₁ = 13 Median = 15 Q ₃ = 19 P ₉₀ = 28 P ₉₉ = 79																									
Day	Hourly Period Ending At (MST)																						Daily Maximum		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22		23	24
1-Dec	11	12	12	11	10	11	10	10	10	13	18	17	29	19	23	14	18	22	27	10	7	8	12	12	29
2-Dec	19	21	13	11	13	21	15	19	20	19	37	63	40	24	17	23	18	15	8	11	12	7	11	7	63
3-Dec	10	13	15	12	58	25	20	82	58	51	15	17	17	17	87	UO	79	83	43	35	22	14	28	18	87
4-Dec	12	9	11	12	13	13	14	14	13	16	16	15	16	16	16	16	72	33	21	13	13	12	9	23	72
5-Dec	16	20	61	55	63	57	66	28	55	12	23	19	20	17	16	13	13	15	14	14	14	15	15	15	66
6-Dec	15	13	16	16	15	15	14	14	12	12	16	14	17	16	14	13	13	11	13	11	14	29	43	12	43
7-Dec	10	11	15	15	18	14	10	18	12	10	15	14	17	16	16	15	13	13	11	11	12	15	11	10	18
8-Dec	10	11	8	8	9	9	10	10	8	11	15	15	17	13	14	14	16	15	13	14	14	14	13	14	17
9-Dec	18	14	13	11	11	11	10	10	11	12	15	17	16	18	16	10	11	9	13	15	65	55	16	16	65
10-Dec	69	68	84	48	22	32	13	17	12	13	15	16	18	19	18	14	15	17	16	17	22	18	17	18	84
11-Dec	19	22	23	19	21	27	21	19	21	19	27	19	19	22	19	11	17	11	11	14	14	16	9	11	27
12-Dec	13	13	16	14	14	12	7	8	12	15	16	26	21	15	11	12	11	11	10	12	13	14	13	16	26
13-Dec	17	16	13	16	16	15	17	16	15	14	17	16	16	15	16	15	16	17	20	16	17	20	10	9	20
14-Dec	11	15	17	19	16	17	18	17	15	17	14	17	22	16	17	15	14	15	14	13	15	13	13	14	22
15-Dec	15	10	11	13	14	16	15	16	15	13	17	18	17	17	15	15	15	16	16	17	19	20	17	17	20
16-Dec	18	18	19	19	18	16	15	20	25	17	21	18	17	19	16	17	16	18	18	18	21	19	19	17	25
17-Dec	20	20	18	31	35	26	21	23	17	17	17	17	18	17	17	13	12	14	14	15	14	13	15	16	35
18-Dec	17	15	17	15	15	15	14	15	17	15	14	17	16	16	23	17	15	16	19	22	38	15	20	18	38
19-Dec	42	22	21	11	14	14	14	18	17	18	28	24	25	23	28	21	20	20	22	22	24	24	24	25	42
20-Dec	20	24	28	21	22	32	30	23	19	20	18	16	18	16	17	22	16	15	13	14	16	17	16	15	32
21-Dec	16	15	18	13	11	16	14	14	15	11	14	12	15	13	10	9	9	12	14	12	13	13	13	14	18
22-Dec	12	11	12	9	10	10	11	12	17	19	11	25	31	10	15	15	12	11	14	15	17	12	17	9	31
23-Dec	21	16	17	18	20	18	19	18	17	19	20	20	19	19	19	15	20	18	16	15	16	15	18	22	22
24-Dec	14	12	12	11	11	13	14	16	14	14	14	18	17	15	16	14	16	15	15	28	14	12	13	14	28
25-Dec	13	13	13	10	13	13	14	14	12	11	12	16	17	16	12	11	20	13	11	14	21	22	61	38	61
26-Dec	55	34	31	30	19	12	11	11	16	11	10	17	14	17	27	13	14	15	15	15	16	15	14	12	55
27-Dec	14	15	14	13	13	13	14	14	12	11	12	21	50	67	72	34	64	85	79	58	43	79	36	94	94
28-Dec	74	27	54	47	11	21	11	9	11	78	41	24	71	62	73	60	15	35	34	57	6	9	8	18	78
29-Dec	7	12	8	12	10	9	11	9	9	15	15	14	15	12	11	10	15	15	42	16	8	8	9	8	42
30-Dec	8	9	9	8	8	12	9	34	20	20	28	55	24	15	25	72	15	15	15	14	12	13	14	14	72
31-Dec	14	14	13	14	14	14	14	14	15	14	15	17	16	16	16	10	9	12	13	16	15	14	16	16	17
74 68 84 55 63 57 66 82 58 78 41 63 71 67 87 72 79 85 79 58 65 79 61 94 Diurnal Maximum																									
UO - Unstable Operation																									





WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

AMS23 FORT HILLS DECEMBER 2023

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

January 31, 2024

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FORT HILLS (AMS23)
 DECEMBER 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	708	34	36	99.73	15.8	0	3.2	0
TRS(ppb) Average	706	36	38	99.73	2.9	0	0.9	0
THC(ppm) Average	708	34	36	99.73	7.9	-	4	-
NMHC(ppm) Average	708	34	36	99.73	1.619	-	0.446	-
CH4(ppm) Average	708	34	36	99.73	6.2	-	3.6	-
NO2 (ppb) Average	705	37	39	99.73	65.4	0	33.2	-
NO (ppb) Average	705	37	39	99.73	432.3	-	115.3	-
NOX (ppb) Average	705	37	39	99.73	497.7	-	148.5	-
PM2.5 (ug/m3) Average	742	1	2	99.87	39.7	0	19.3	0
Temperature 2 m (C) Average	743	0	1	99.87	11.1	-	3.2	-
Relative Humidity (%) Average	743	0	1	99.87	94.8	-	89.8	-
Wind Speed 10 m (km/h) Average	743	0	1	99.87	28	-	18	-
Wind Direction 10 m (deg) Average	743	0	1	99.87	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FORT HILLS (AMS23)
 DECEMBER 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	708	0.74	1.5	-	0	0	0.1	0.2	0.6	2.5	15.8
TRS (ppb) Average	706	0.37	0.4	-	0	0.1	0.2	0.2	0.4	0.8	2.9
THC (ppm) Average	708	2.44	0.6	-	2	2	2.1	2.3	2.5	2.9	7.9
NMHC(ppm) Average	708	0.117	0.159	-	0	0	0	0.1	0.2	0.3	1.619
CH4(ppm) Average	708	2.32	0.5	-	2	2	2.1	2.2	2.4	2.7	6.2
NO2 (ppb) Average	705	14.66	10.2	-	0.2	1.9	5.9	14.3	21.3	27.1	65.4
NO (ppb) Average	705	11.07	35.1	-	0	0	0.1	1.8	8.2	25.3	432.3
NOX (ppb) Average	705	25.73	42	-	0.2	2.1	6.5	17.8	29.9	48.4	497.7
PM2.5 (ug/m3) Average	742	5.59	5.3	-	0.2	1.2	2.3	3.7	7	12	39.7
Temperature 2 m (C) Average	743	-6.18	5.2	-	-16.4	-12.9	-10.3	-6.1	-2.7	0.6	11.1
Relative Humidity (%) Average	743	76.19	12.1	-	30.9	58.3	69	80.2	86	88.2	94.8
Wind Speed 10 m (km/h) Average	743	11.7	5	-	1	6	8	11	14	18	28
Wind Direction 10 m (deg) Average	743	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - FORT HILLS (AMS23)
DECEMBER 2023

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
ALL PARAMETERS	08 Dec 2023 12:00	08 Dec 2023 12:00	1	Maintenance - station logger/modem reset
ALL GASEOUS ANALYZERS	13 Dec 2023 09:00	13 Dec 2023 09:00	1	Maintenance - sample manifold cleaned



Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 15.8 ppb on Dec 26 13:00	Maximum Daily Average: 3.2 ppb on Dec 26		Hours of Data:	708
Minimum Value: 0.0 ppb on Dec 7 19:00	Minimum Daily Average: 0.0 ppb on Dec 16		Hours of Missing Data:	36
Maximum Diurnal Average: 1.4 ppb at hour 17	Minimum Diurnal Average: 0.4 ppb at hour 1		Hours of Calibration:	34
Monthly Average: 0.74 ppb	Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.1 Median = 0.2 Q ₃ = 0.6 P ₉₀ = 2.5 P ₉₉ = 7.0		Percent Operational Time:	99.7

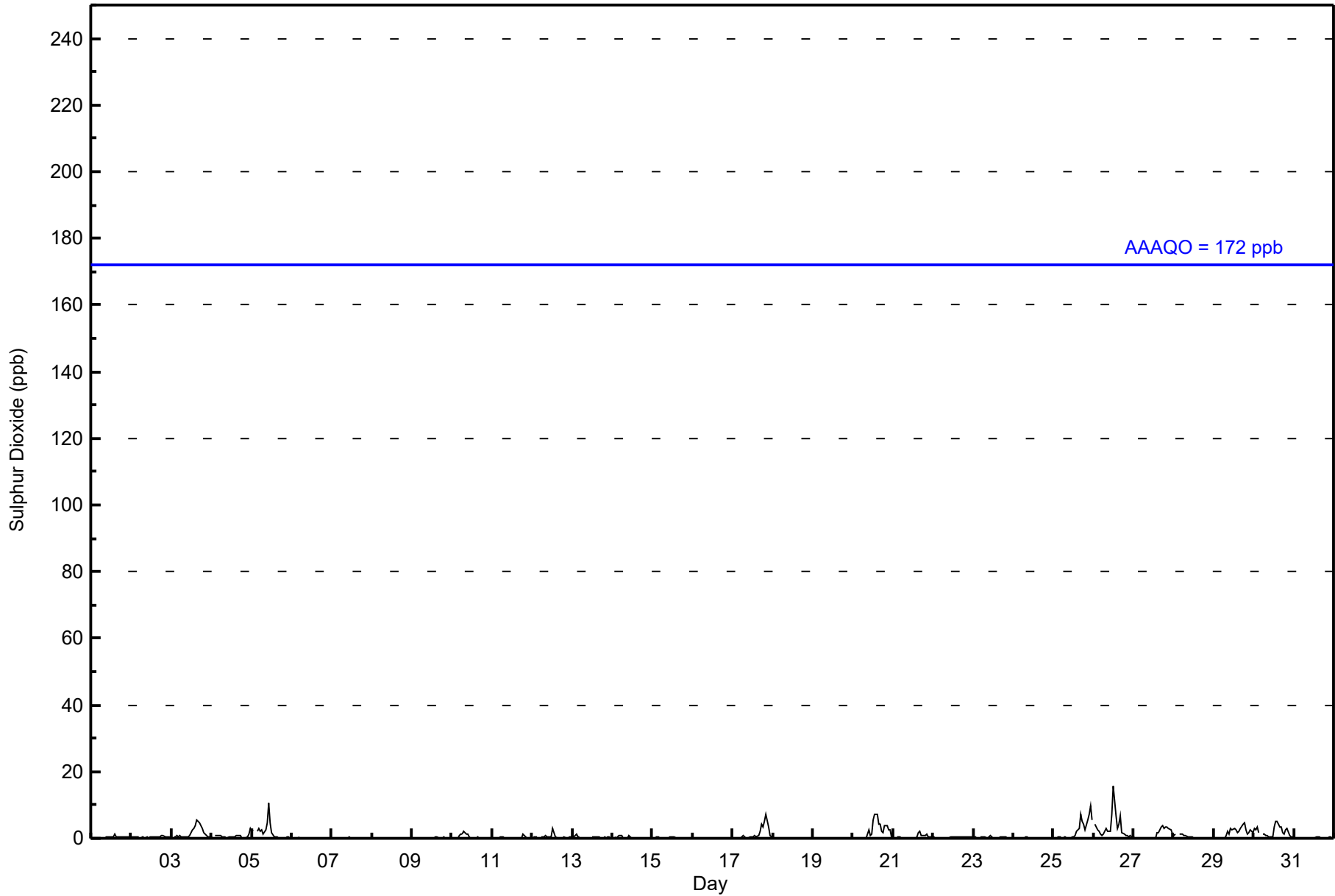
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Dec	0.0	0.1	0.1	0.1	Z	0.1	0.0	0.0	0.1	0.3	0.3	0.4	0.3	0.3	1.2	0.6	0.5	0.5	0.3	0.3	0.3	0.2	0.3	0.4	0.3	1.2																						
2-Dec	0.4	0.3	0.3	0.3	0.3	Z	0.3	0.2	0.1	0.2	0.2	0.3	0.3	0.2	0.2	0.4	0.6	0.3	0.6	0.7	0.4	0.5	0.4	0.4	0.4	0.7																						
3-Dec	Z	0.4	0.4	0.9	0.5	0.7	0.3	0.3	0.3	0.4	0.5	0.7	2.5	3.1	3.9	5.5	5.1	4.5	2.8	1.8	1.2	0.8	0.5	0.6	1.6	5.5																						
4-Dec	0.6	Z	0.7	0.8	0.9	0.9	0.6	0.4	0.3	0.2	0.2	0.5	0.4	0.5	0.5	0.9	1.1	0.6	0.2	0.2	0.2	0.4	1.3	3.0	0.7	3.0																						
5-Dec	2.1	2.7	Z	2.0	2.9	2.3	2.6	1.3	2.7	4.8	10.6	4.5	1.9	0.6	0.4	0.3	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.1	1.9	10.6																						
6-Dec	0.1	0.1	0.1	Z	0.3	0.2	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.1	0.2	0.2	0.2	0.1	0.1	0.1	0.2	0.1	0.2	0.1	0.3																						
7-Dec	0.1	0.2	0.2	0.1	Z	0.1	0.1	0.1	0.1	0.2	0.2	0.1	0.1	0.2	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.1	0.2																						
8-Dec	0.1	0.1	0.1	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	M	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																						
9-Dec	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.5	0.2	0.1	0.1	0.2	0.1	0.0	0.0	0.0	0.1	0.6																						
10-Dec	0.0	0.0	Z	0.1	0.9	1.3	1.4	1.9	1.1	1.1	0.3	0.1	0.1	0.0	0.1	0.3	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.4	1.9																						
11-Dec	0.2	0.1	0.1	Z	0.1	0.3	0.3	0.2	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.2	1.4	0.7	0.3	0.2	0.2	0.2	0.2	1.4																						
12-Dec	0.2	0.3	0.2	0.3	Z	0.3	0.4	0.3	0.7	0.5	0.4	0.4	3.0	1.5	0.3	0.2	0.1	0.1	0.2	0.6	0.2	0.1	0.5	0.4	0.5	3.0																						
13-Dec	0.4	0.5	1.1	0.2	0.3	Z	0.0	0.0	M	C	C	C	0.3	0.6	0.5	0.6	0.5	0.1	0.0	0.3	0.2	0.6	0.5	0.1	0.4	1.1																						
14-Dec	Z	0.4	0.2	0.3	0.8	0.9	0.2	0.0	0.1	0.2	0.9	0.2	0.0	0.1	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.2	0.9																						
15-Dec	0.1	Z	0.5	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.5	0.3	0.5	0.2	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.5																						
16-Dec	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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																						
17-Dec	0.0	0.0	0.0	Z	0.0	0.2	0.7	0.5	0.2	0.2	0.3	0.3	0.3	0.6	0.3	0.7	2.0	4.4	3.5	5.1	7.1	3.2	0.9	0.3	1.3	7.1																						
18-Dec	0.3	0.0	0.0	0.1	Z	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.3																						
19-Dec	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	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2																						
20-Dec	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	2.5	0.9	1.2	5.4	7.0	7.3	4.2	4.1	2.3	1.9	3.6	3.8	2.5	2.6	0.5	2.2	7.3																						
21-Dec	0.2	Z	0.3	0.4	0.2	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.5	1.5	1.9	0.8	0.9	0.7	1.3	0.5	0.3	0.2	0.4	1.9																						
22-Dec	0.2	0.1	Z	0.1	0.1	0.1	0.0	0.0	0.1	0.2	0.2	0.3	0.3	0.4	0.4	0.3	0.3	0.3	0.4	0.4	0.5	0.4	0.3	0.3	0.3	0.5																						
23-Dec	0.3	0.3	0.4	Z	0.4	0.3	0.4	0.5	0.2	0.4	1.1	0.2	0.2	0.2	0.1	0.2	0.5	0.5	0.3	0.2	0.1	0.1	0.1	0.1	0.3	1.1																						
24-Dec	0.1	0.1	0.1	0.1	Z	0.1	0.2	0.5	0.3	0.0	0.1	0.1	0.1	0.1	0.2	0.1	0.0	0.0	0.1	0.1	0.1	0.1	0.2	0.2	0.1	0.5																						
25-Dec	0.2	0.1	0.1	0.4	0.5	Z	0.5	0.3	0.2	0.1	0.2	0.2	0.3	0.7	2.0	2.8	7.0	5.1	4.4	2.4	5.6	7.4	9.7	5.7	2.4	9.7																						
26-Dec	Z	4.2	2.5	2.0	1.3	0.9	1.4	3.1	2.3	2.1	2.1	7.2	15.8	6.9	3.0	4.2	6.9	1.9	1.4	1.0	0.7	0.5	0.7	0.5	3.2	15.8																						
27-Dec	0.2	Z	0.1	0.1	0.1	0.0	0.0	0.1	0.2	0.1	0.2	0.1	0.0	0.2	1.7	1.9	3.4	3.7	3.1	3.3	3.5	3.1	2.5	1.1	1.2	3.7																						
28-Dec	0.9	1.1	Z	1.2	1.3	1.2	1.0	0.8	0.6	0.4	0.3	0.2	0.1	0.0	0.0	0.2	0.2	0.0	0.1	0.0	0.1	0.1	0.0	0.2	0.4	1.3																						
29-Dec	0.2	0.1	0.0	Z	0.0	0.0	0.0	0.8	2.0	1.2	3.1	2.5	3.0	2.4	1.7	2.0	3.2	4.2	4.5	2.7	1.5	1.7	2.5	1.6	1.8	4.5																						
30-Dec	3.1	2.5	3.3	1.7	Z	1.1	1.3	1.0	0.7	0.4	0.4	0.5	3.2	5.1	4.9	3.6	3.3	1.5	1.1	2.6	2.9	1.0	0.5	0.3	2.0	5.1																						
31-Dec	0.2	0.2	0.1	0.2	0.2	Z	0.1	0.1	0.1	0.1	0.0	0.1	0.1	0.2	0.3	0.2	0.1	0.1	0.1	0.1	0.1	0.3	0.2	0.2	0.2	0.3																						
																								0.4	0.5	0.4	0.4	0.5	0.4	0.4	0.4	0.4	0.5	0.8	0.7	1.2	1.0	1.0	1.0	1.4	1.0	0.9	0.9	1.0	0.8	0.8	0.5	Diurnal Average
																								3.1	4.2	3.3	2.0	2.9	2.3	2.6	3.1	2.7	4.8	10.6	7.2	15.8	7.0	7.3	5.5	7.0	5.1	4.5	5.1	7.1	7.4	9.7	5.7	Diurnal Maximum

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



Wood Buffalo Environmental Association
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Fort Hills - December 2023





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Fort Hills - December 2023

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

Total Number of Valid Hours: 708

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Fort Hills - December 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	26	33	11	8	4	7	52	133	199	106	52	20	26	14	9	6	706
11 - 20	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	2
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	26	33	11	8	4	7	52	134	200	106	52	20	26	14	9	6	708

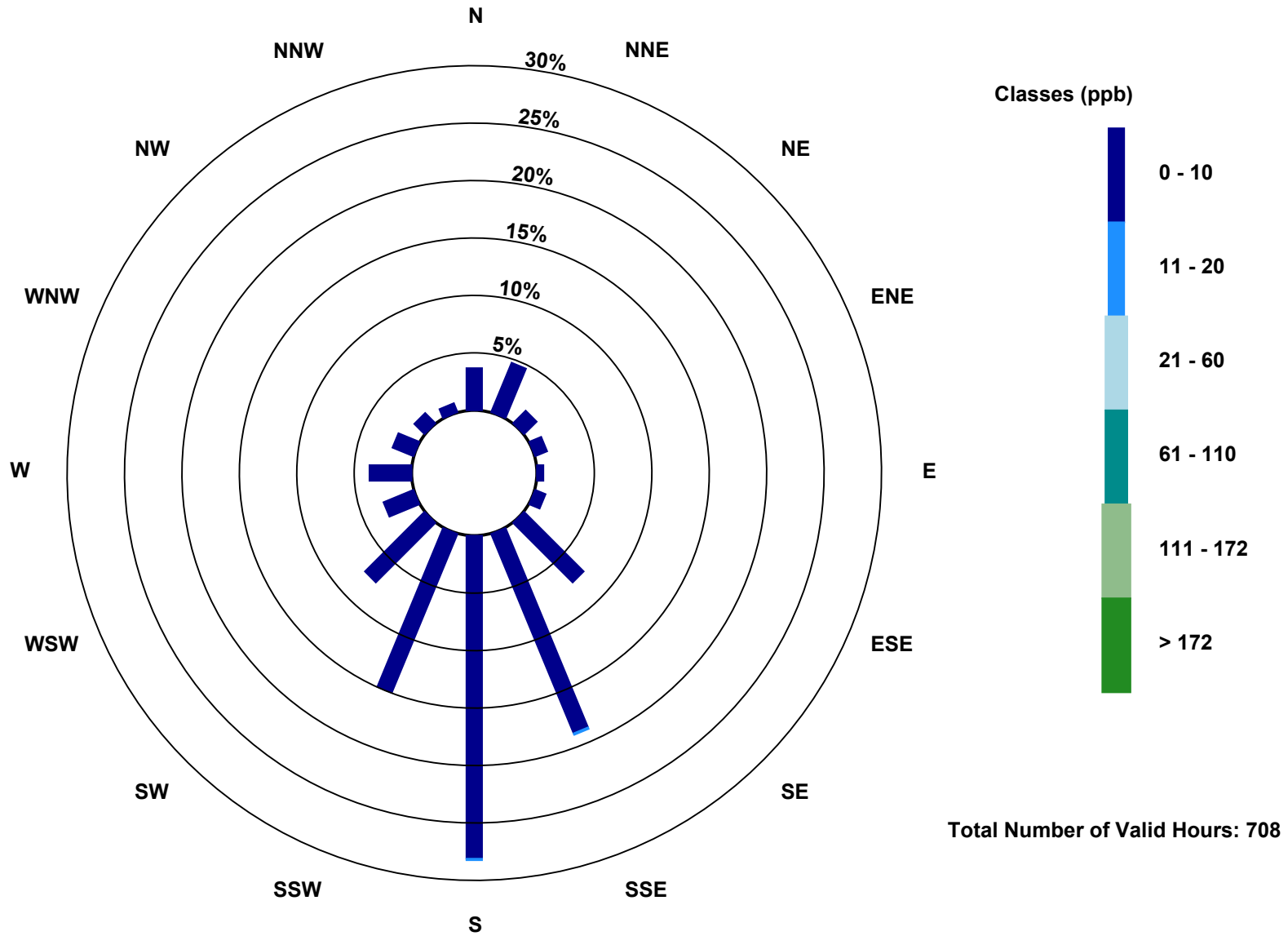
Total Number of Valid Hours: 708

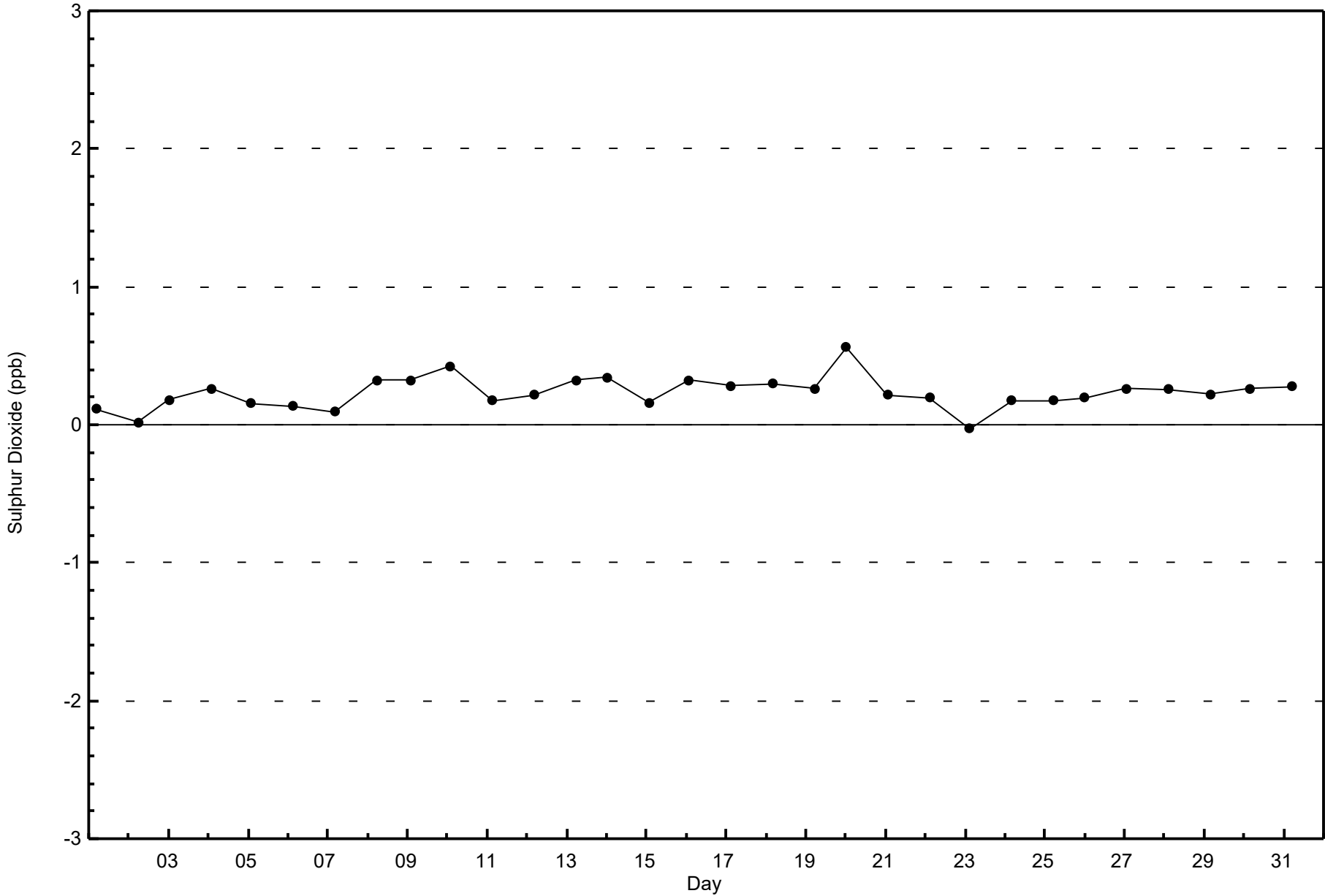
Total Number of Hours: 744

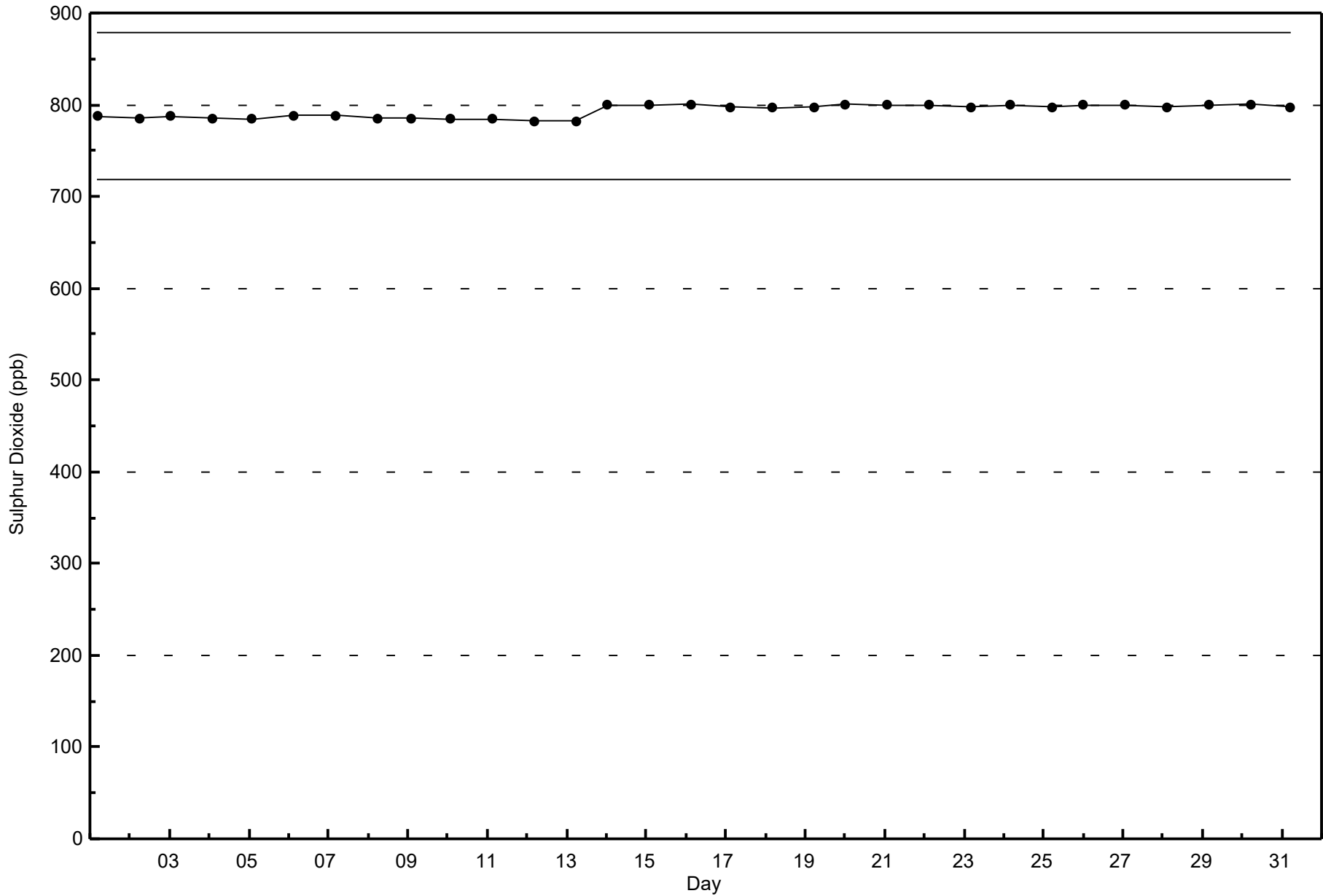


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Sulphur Dioxide (SO₂) - ppb
Fort Hills

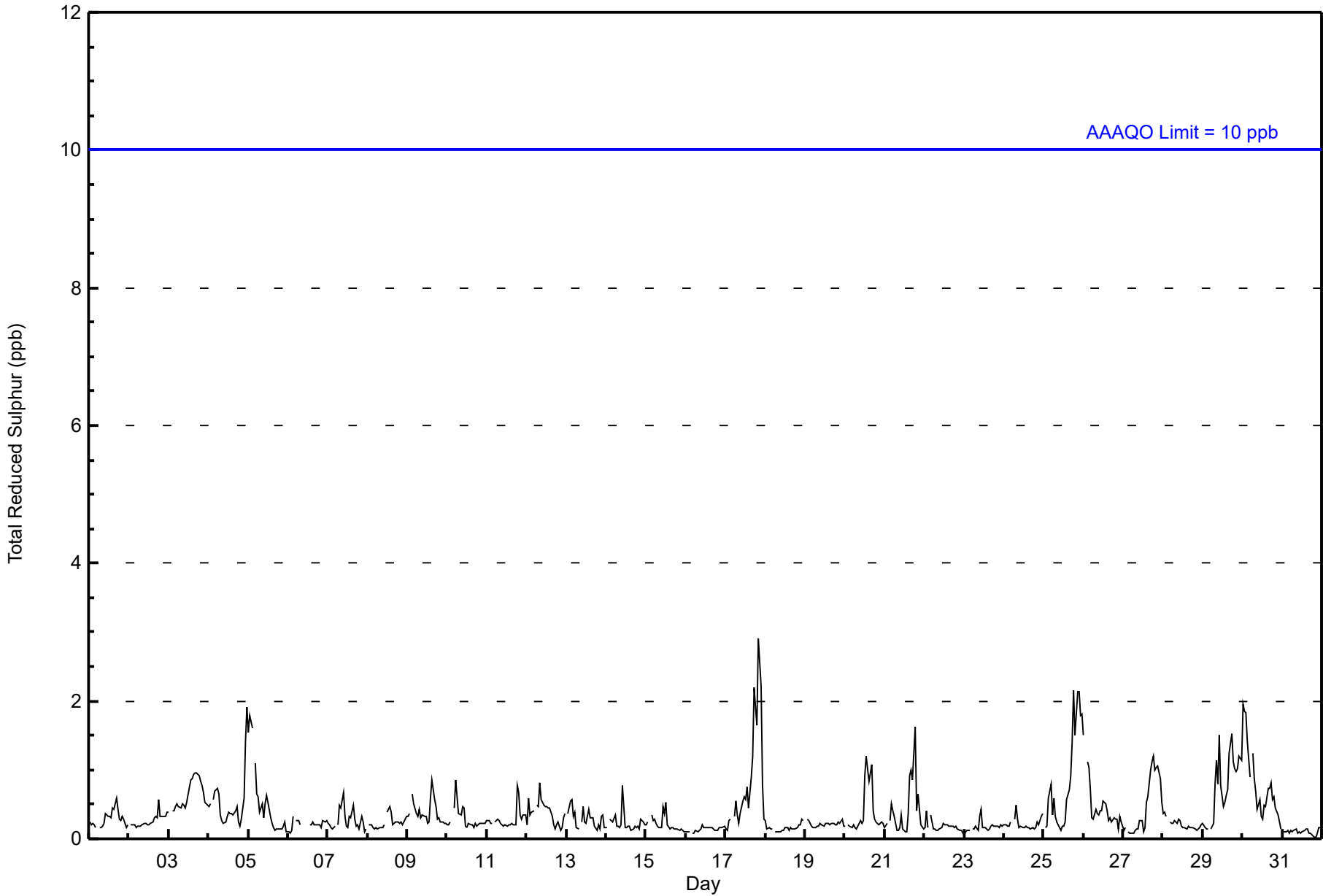








Number of Exceedences (AAAQO):		1-hr: 0		24-hr: 0		Hours in Service:																744																											
Maximum Value: 2.9 ppb on Dec 17 21:00		Maximum Daily Average: 0.9 ppb on Dec 17																Hours of Data:		706																													
Minimum Value: 0.0 ppb on Dec 31 21:00		Minimum Daily Average: 0.1 ppb on Dec 31																Hours of Missing Data:		38																													
Maximum Diurnal Average: 0.5 ppb at hour 19		Minimum Diurnal Average: 0.3 ppb at hour 10																Hours of Calibration:		36																													
Monthly Average: 0.37 ppb		Percentiles: P ₁ = 0.1 P ₁₀ = 0.1 Q ₁ = 0.2 Median = 0.2 Q ₃ = 0.4 P ₉₀ = 0.8 P ₉₉ = 1.9																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-Dec	0.2	0.2	0.2	0.2	0.2	Z	0.2	0.2	0.2	0.2	0.4	0.3	0.3	0.3	0.4	0.4	0.6	0.4	0.3	0.3	0.3	0.3	0.2	0.2	0.3	0.6																							
2-Dec	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	0.3	0.3	0.3	0.6	0.3	0.3	0.3	0.3	0.4	0.3	0.6																							
3-Dec	0.4	Z	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.7	0.8	0.9	0.9	1.0	1.0	0.9	0.8	0.8	0.7	0.5	0.5	0.6	1.0																							
4-Dec	0.5	0.5	Z	0.6	0.7	0.7	0.7	0.3	0.3	0.2	0.2	0.3	0.4	0.4	0.4	0.3	0.4	0.5	0.2	0.2	0.3	0.6	1.4	1.9	0.5	1.9																							
5-Dec	1.5	1.8	1.6	Z	1.1	0.7	0.6	0.4	0.5	0.3	0.5	0.6	0.5	0.3	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.1	0.5	1.8																							
6-Dec	0.1	0.1	0.1	0.3	Z	0.3	0.3	0.2	C	C	C	C	C	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.2	0.3	0.2	0.3																							
7-Dec	0.2	0.2	0.2	0.2	0.2	Z	0.2	0.5	0.4	0.7	0.3	0.2	0.2	0.2	0.3	0.3	0.5	0.3	0.2	0.2	0.1	0.3	0.2	0.1	0.1	0.3	0.7																						
8-Dec	Z	0.2	0.2	0.2	0.1	0.2	0.1	0.2	0.2	0.2	0.2	0.2	M	0.4	0.5	0.4	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.2	0.5																							
9-Dec	0.3	0.4	Z	0.7	0.5	0.4	0.3	0.4	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.6	0.9	0.6	0.5	0.3	0.3	0.3	0.2	0.2	0.2	0.4	0.9																						
10-Dec	0.2	0.2	0.2	Z	0.4	0.8	0.6	0.4	0.3	0.5	0.5	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.8																						
11-Dec	0.3	0.3	0.2	0.2	Z	0.2	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.8	0.7	0.3	0.3	0.3	0.4	0.3	0.8																							
12-Dec	0.2	0.6	0.3	0.4	0.4	Z	0.5	0.5	0.8	0.6	0.5	0.5	0.5	0.5	0.4	0.3	0.2	0.1	0.2	0.2	0.1	0.2	0.3	0.4	0.4	0.8																							
13-Dec	Z	0.4	0.6	0.6	0.3	0.4	0.2	0.1	M	0.2	0.5	0.3	0.2	0.4	0.3	0.3	0.2	0.1	0.2	0.1	0.3	0.3	0.2	0.3	0.6	0.6																							
14-Dec	0.2	Z	0.3	0.3	0.2	0.4	0.2	0.2	0.2	0.2	0.8	0.2	0.2	0.2	0.1	0.1	0.2	0.2	0.2	0.1	0.3	0.2	0.2	0.2	0.8	0.8																							
15-Dec	0.2	0.2	Z	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.5	0.4	0.5	0.2	0.1	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.5																							
16-Dec	0.1	0.1	0.1	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.1	0.2																							
17-Dec	0.1	0.1	0.3	0.3	Z	0.3	0.5	0.4	0.2	0.4	0.5	0.6	0.6	0.8	0.5	0.9	1.2	2.2	1.9	1.6	2.9	2.2	0.8	0.3	0.9	2.9																							
18-Dec	0.3	0.1	0.2	0.1	0.1	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.1	0.2	0.1	0.1	0.2	0.2	0.2	0.2	0.3	0.3	0.2	0.3																							
19-Dec	Z	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.2	0.2	0.3																							
20-Dec	0.2	Z	0.2	0.2	0.2	0.2	0.2	0.1	0.2	0.3	0.2	0.3	0.9	1.2	0.8	1.0	1.1	0.4	0.3	0.2	0.2	0.2	0.3	0.2	0.4	1.2																							
21-Dec	0.2	0.2	Z	0.3	0.5	0.4	0.3	0.1	0.1	0.2	0.3	0.2	0.1	0.1	0.4	0.9	1.0	0.9	1.6	0.4	0.6	0.4	0.2	0.1	0.4	1.6																							
22-Dec	0.2	0.4	0.2	Z	0.3	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.2	0.4																							
23-Dec	0.1	0.1	0.1	0.1	Z	0.1	0.1	0.2	0.1	0.3	0.4	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	0.4																							
24-Dec	0.2	0.2	0.2	0.2	0.2	Z	0.3	0.5	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.2	0.2	0.2	0.3	0.4	0.2	0.5																							
25-Dec	Z	0.2	0.2	0.6	0.8	0.4	0.6	0.3	0.2	0.2	0.1	0.2	0.2	0.2	0.3	0.6	0.7	0.9	1.4	2.2	1.5	2.1	2.1	1.8	1.8	2.2																							
26-Dec	1.5	Z	1.1	1.0	0.7	0.3	0.3	0.4	0.4	0.3	0.4	0.4	0.5	0.5	0.4	0.3	0.3	0.2	0.3	0.3	0.3	0.1	0.3	0.3	0.5	1.5																							
27-Dec	0.1	0.2	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.3	0.3	0.1	0.2	0.5	0.6	1.0	1.1	1.2	1.0	1.0	1.1	0.9	0.5	0.5	1.2																							
28-Dec	0.4	0.4	0.3	Z	0.2	0.2	0.2	0.3	0.2	0.3	0.3	0.2	0.2	0.2	0.1	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.2	0.2	0.4																							
29-Dec	0.2	0.2	0.1	0.1	Z	0.2	0.2	0.8	1.1	0.8	1.5	0.8	0.5	0.5	0.6	0.7	1.2	1.5	1.1	1.0	1.0	1.0	1.2	1.1	0.8	1.5																							
30-Dec	2.0	1.8	1.8	1.4	0.9	Z	1.2	0.9	0.7	0.4	0.6	0.3	0.3	0.5	0.5	0.7	0.7	0.8	0.6	0.6	0.5	0.4	0.2	0.2	0.8	2.0																							
31-Dec	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	0.1	0.2	0.2	0.1	0.2																							
																								Diurnal Average		0.4		0.4		0.4		0.4		0.4		0.3		0.3		0.3		0.3		0.3		0.4		0.4	
																								Diurnal Maximum		2.0		1.8		1.8		1.4		1.1		0.8		1.2		0.9		1.1		0.8		1.5		0.8	
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
Fort Hills - December 2023

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	705	99.86	99.86
3 - 4	1	0.14	100.00
5 - 7	0	0.00	100.00
8 - 11	0	0.00	100.00
> 11	0	0.00	100.00

Total Number of Valid Hours: 706

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Total Reduced Sulphur (TRS) - ppb
Fort Hills - December 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	27	32	11	8	4	7	52	134	202	103	49	21	26	12	11	6	705
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
Totals	27	32	11	8	4	7	52	134	203	103	49	21	26	12	11	6	706

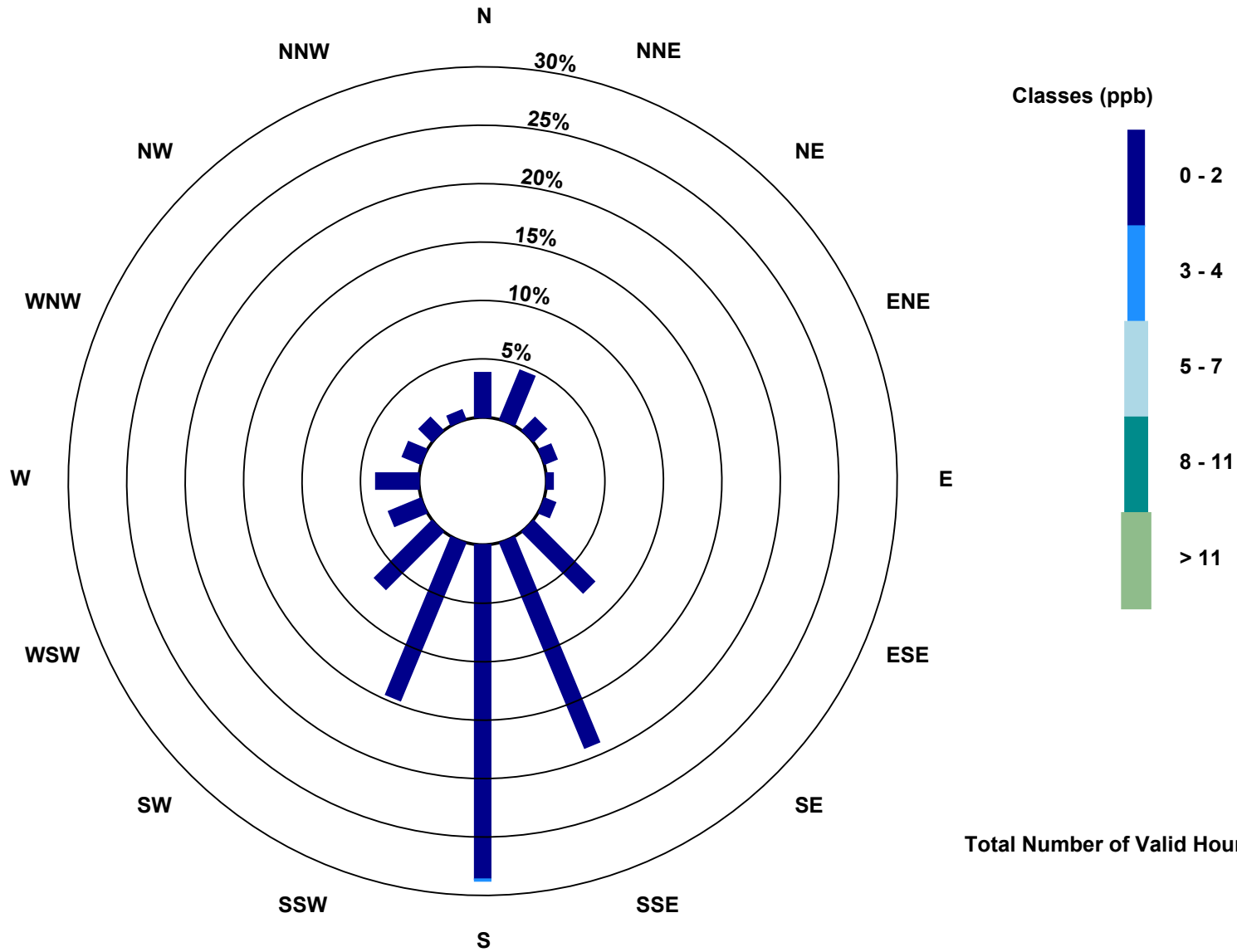
Total Number of Valid Hours: 706

Total Number of Hours: 744

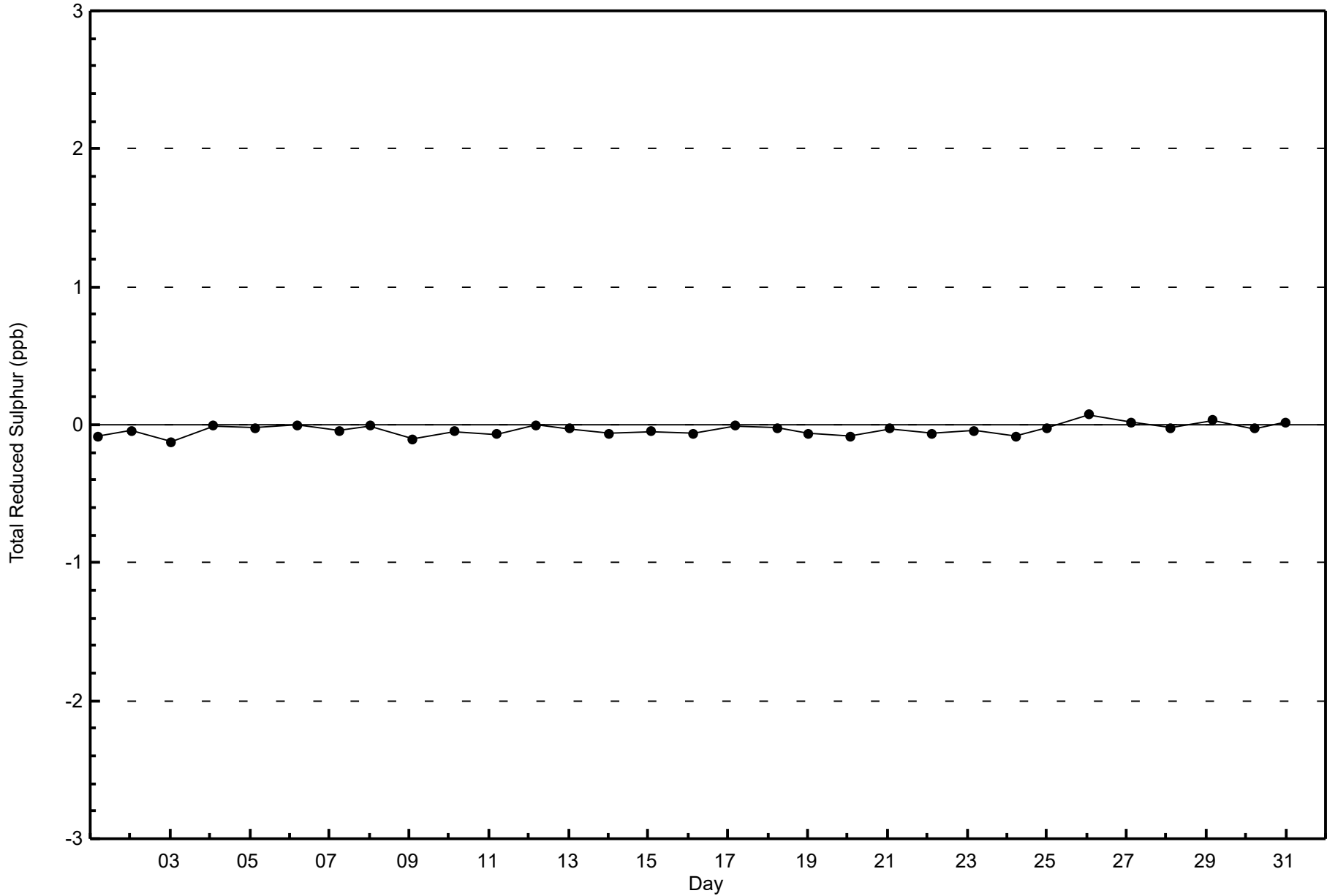


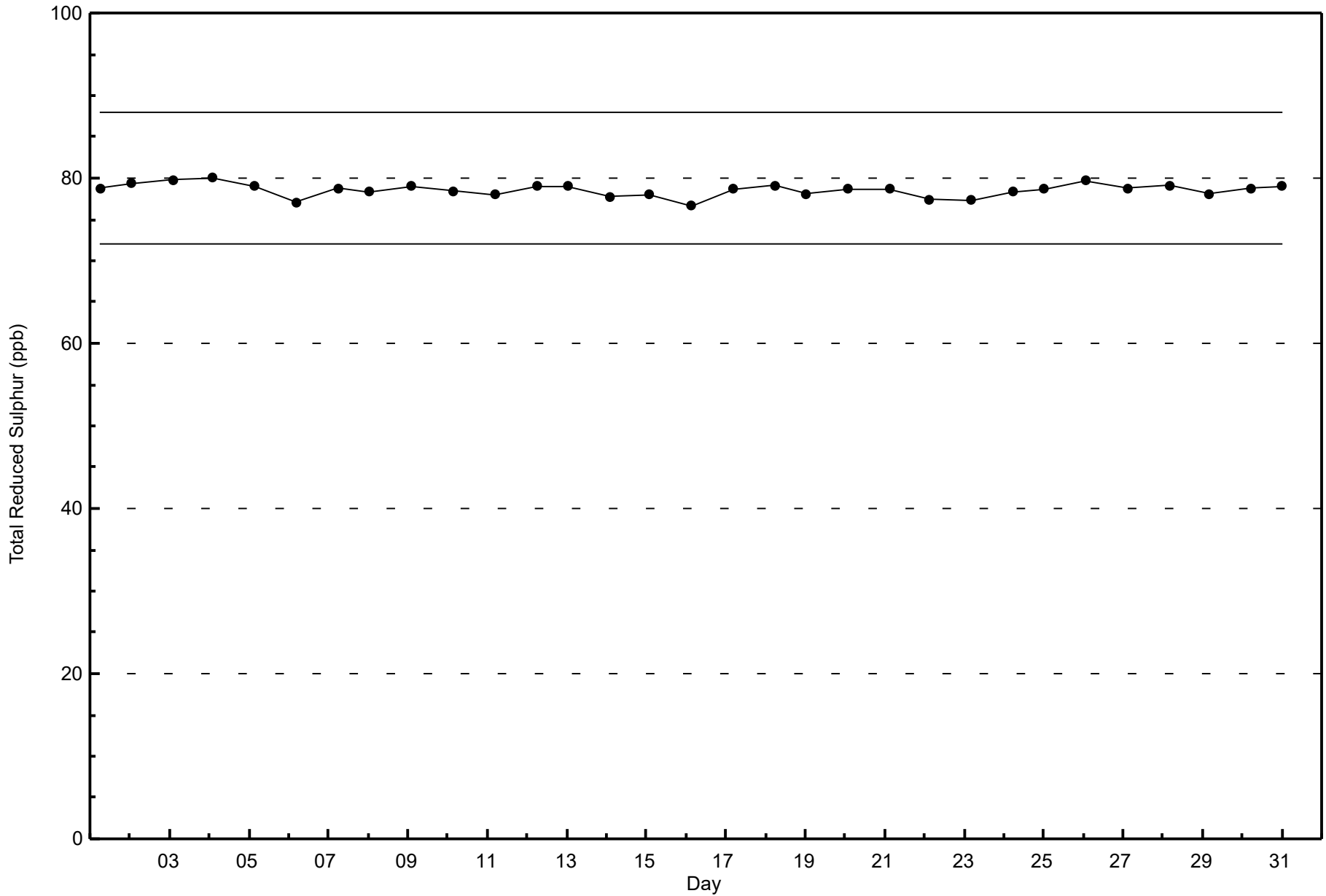
Wood Buffalo Environmental Association
Wind Rose Dec 2023

Total Reduced Sulphur (TRS) - ppb
Fort Hills



Total Number of Valid Hours: 706







Wood Buffalo Environmental Association

Summary of Hour Averages

Total Hydrocarbons (THC) - ppm

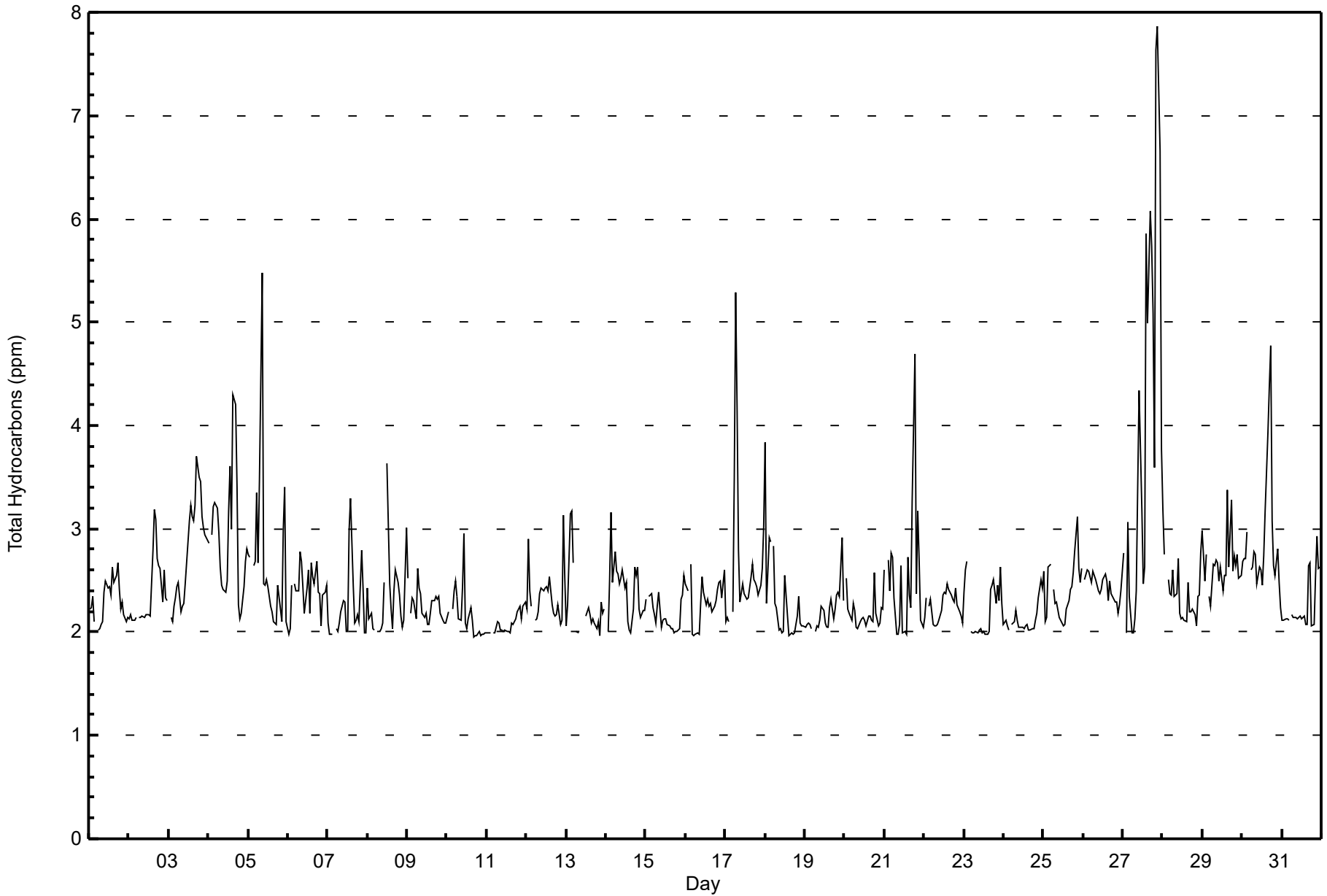
Fort Hills - December 2023

Number of Exceedences (AAAQO):		1-hr: 0		24-hr: 0		Hours in Service:		744																																									
Maximum Value: 7.9 ppm on Dec 27 22:00		Maximum Daily Average: 4.0 ppm on Dec 27				Hours of Data:		708																																									
Minimum Value: 2.0 ppm on Dec 10 17:00		Minimum Daily Average: 2.1 ppm on Dec 11				Hours of Missing Data:		36																																									
Maximum Diurnal Average: 2.6 ppm at hour 18		Minimum Diurnal Average: 2.3 ppm at hour 12				Hours of Calibration:		34																																									
Monthly Average: 2.44 ppm		Percentiles: P ₁ = 2.0 P ₁₀ = 2.0 Q ₁ = 2.1 Median = 2.3 Q ₃ = 2.5 P ₉₀ = 2.9 P ₉₉ = 5.3				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-Dec	2.2	2.2	2.3	2.1	Z	2.0	2.0	2.1	2.1	2.4	2.5	2.4	2.4	2.4	2.6	2.5	2.5	2.7	2.4	2.2	2.3	2.2	2.1	2.1	2.3	2.7																							
2-Dec	2.1	2.2	2.1	2.1	2.1	Z	2.1	2.1	2.2	2.1	2.2	2.2	2.2	2.2	2.8	3.2	3.1	2.7	2.6	2.6	2.3	2.6	2.3	2.3	2.4	3.2																							
3-Dec	Z	2.1	2.1	2.3	2.3	2.4	2.5	2.2	2.3	2.3	2.5	2.7	3.1	3.2	3.1	3.1	3.2	3.7	3.5	3.5	3.1	3.0	2.9	2.9	2.8	3.7																							
4-Dec	2.9	Z	2.9	3.2	3.3	3.2	3.0	2.6	2.5	2.4	2.4	2.5	3.2	3.6	3.0	4.3	4.2	3.4	2.3	2.1	2.2	2.4	2.7	2.8	2.9	4.3																							
5-Dec	2.7	2.7	Z	2.6	2.7	3.3	2.7	3.5	5.5	2.5	2.5	2.5	2.4	2.3	2.2	2.1	2.1	2.5	2.2	2.1	3.0	3.4	2.1	2.7	5.5																								
6-Dec	2.0	2.0	2.5	Z	2.5	2.4	2.4	2.8	2.7	2.4	2.2	2.4	2.6	2.2	2.7	2.5	2.5	2.7	2.4	2.4	2.1	2.4	2.4	2.5	2.4	2.8																							
7-Dec	2.1	2.0	2.0	2.0	Z	2.0	2.0	2.1	2.2	2.3	2.3	2.0	2.0	3.0	3.3	2.4	2.1	2.1	2.2	2.1	2.8	2.4	2.0	2.0	2.2	3.3																							
8-Dec	2.4	2.1	2.2	2.0	2.0	Z	2.0	2.0	2.0	2.1	2.5	M	3.6	2.5	2.2	2.0	2.4	2.6	2.5	2.4	2.2	2.1	2.1	3.0	2.3	3.6																							
9-Dec	2.5	Z	2.2	2.3	2.3	2.1	2.6	2.4	2.4	2.2	2.1	2.2	2.1	2.1	2.2	2.3	2.3	2.4	2.3	2.3	2.2	2.1	2.1	2.1	2.3	2.6																							
10-Dec	2.1	2.2	Z	2.2	2.4	2.5	2.4	2.1	2.1	2.4	3.0	2.1	2.0	2.1	2.2	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.2	3.0																							
11-Dec	2.0	2.0	2.0	Z	2.0	2.0	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.2	2.2	2.2	2.1	2.3	2.3	2.1	2.3	2.3																							
12-Dec	2.2	2.9	2.4	2.3	Z	2.1	2.1	2.2	2.4	2.4	2.4	2.4	2.4	2.4	2.5	2.3	2.2	2.2	2.2	2.3	2.1	2.1	3.1	2.5	2.4	3.1																							
13-Dec	2.1	2.3	3.1	3.2	2.7	Z	2.0	2.0	M	C	C	C	2.2	2.2	2.2	2.1	2.1	2.1	2.0	2.1	2.0	2.3	2.2	2.2	2.3	3.2																							
14-Dec	Z	2.0	2.5	3.2	2.5	2.8	2.6	2.6	2.5	2.5	2.6	2.4	2.5	2.1	2.0	2.0	2.2	2.6	2.6	2.2	2.1	2.2	2.2	2.4	3.2	3.2																							
15-Dec	2.3	Z	2.3	2.4	2.2	2.2	2.1	2.3	2.4	2.0	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.3	2.4	2.5	2.2	2.5																							
16-Dec	2.5	2.4	Z	2.7	2.0	2.0	2.0	2.0	2.0	2.3	2.5	2.4	2.3	2.3	2.3	2.3	2.2	2.2	2.3	2.4	2.5	2.5	2.3	2.6	2.3	2.7																							
17-Dec	2.1	2.1	2.1	Z	2.2	3.5	5.3	4.2	2.8	2.3	2.5	2.4	2.3	2.3	2.3	2.5	2.7	2.5	2.5	2.4	2.4	2.5	2.6	3.0	2.7	5.3																							
18-Dec	3.8	2.3	2.9	2.9	Z	2.8	2.3	2.2	2.0	2.0	2.0	2.0	2.6	2.2	2.0	2.0	2.0	2.0	2.0	2.2	2.3	2.1	2.1	2.1	2.3	3.8																							
19-Dec	2.0	2.1	2.1	2.1	2.0	Z	2.0	2.1	2.1	2.1	2.3	2.2	2.1	2.1	2.0	2.2	2.3	2.1	2.2	2.4	2.4	2.3	2.9	2.3	2.2	2.9																							
20-Dec	Z	2.5	2.2	2.2	2.1	2.3	2.2	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.6	2.2	2.1	2.1	2.2	2.2	2.2	2.6																							
21-Dec	2.6	Z	2.7	2.4	2.8	2.7	2.3	2.0	2.0	2.1	2.6	2.0	2.0	2.0	2.7	2.4	2.2	3.3	4.7	2.4	3.2	2.7	2.1	2.1	2.5	4.7																							
22-Dec	2.1	2.3	Z	2.2	2.3	2.1	2.1	2.1	2.1	2.1	2.2	2.4	2.4	2.4	2.5	2.4	2.4	2.3	2.3	2.4	2.3	2.2	2.2	2.1	2.2	2.5																							
23-Dec	2.4	2.6	2.7	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	2.4	2.5	2.5	2.3	2.5	2.3	2.6	2.3	2.2	2.7																							
24-Dec	2.1	2.1	2.1	2.0	Z	2.1	2.1	2.2	2.1	2.0	2.0	2.0	2.0	2.1	2.1	2.0	2.0	2.0	2.0	2.1	2.2	2.3	2.5	2.4	2.1	2.5																							
25-Dec	2.6	2.1	2.1	2.6	2.7	Z	2.4	2.3	2.3	2.1	2.1	2.1	2.1	2.1	2.2	2.3	2.4	2.4	2.6	2.8	3.1	2.6	2.5	2.6	2.4	3.1																							
26-Dec	Z	2.5	2.6	2.6	2.5	2.5	2.6	2.5	2.5	2.4	2.4	2.4	2.5	2.6	2.5	2.3	2.5	2.4	2.3	2.3	2.3	2.2	2.3	2.4	2.4	2.6																							
27-Dec	2.8	Z	2.0	3.1	2.3	2.0	2.0	2.1	2.4	3.4	4.3	3.2	2.5	2.6	5.9	5.0	6.1	5.7	5.1	3.6	7.6	7.9	6.7	3.8	4.0	7.9																							
28-Dec	3.2	2.7	Z	2.5	2.4	2.4	2.6	2.3	2.4	2.7	2.2	2.1	2.1	2.1	2.1	2.5	2.2	2.2	2.2	2.2	2.1	2.3	2.4	2.8	2.4	3.2																							
29-Dec	3.0	2.5	2.8	Z	2.3	2.3	2.7	2.6	2.7	2.7	2.5	2.6	2.4	2.6	2.5	3.4	2.6	3.3	2.6	2.7	2.6	2.8	2.5	2.5	2.7	3.4																							
30-Dec	2.7	2.7	2.7	3.0	Z	2.6	2.6	2.8	2.8	2.5	2.6	2.6	2.5	2.7	3.2	3.9	4.4	4.8	3.1	2.6	2.6	2.8	2.5	2.2	2.9	4.8																							
31-Dec	2.1	2.1	2.1	2.1	2.1	Z	2.2	2.1	2.1	2.1	2.1	2.2	2.1	2.2	2.1	2.1	2.6	2.7	2.1	2.1	2.5	2.9	2.6	2.6	2.3	2.9																							
																								2.4	2.3	2.4	2.5	2.4	2.4	2.3	2.4	2.3	2.4	2.3	2.4	2.3	2.5	2.5	2.6	2.6	2.5	2.4	2.5	2.6	2.6	2.4	Diurnal Average		
																								3.8	2.9	3.1	3.2	3.3	3.5	5.3	4.2	5.5	3.4	4.3	3.2	3.6	3.6	5.9	5.0	6.1	5.7	5.1	3.6	7.6	7.9	6.7	3.8	Diurnal Maximum	
Z - zerospan																								C - Calibration				M - Maintenance																					



Wood Buffalo Environmental Association
Hourly Averages

Total Hydrocarbons (THC) - ppm
Fort Hills - December 2023





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Fort Hills - December 2023

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	103	14.55	14.55
2.1 - 3.0	546	77.12	91.67
3.1 - 10.0	59	8.33	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 708

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Total Hydrocarbons (THC) - ppm
Fort Hills - December 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	4	1	0	0	0	0	0	11	27	17	6	0	20	10	6	1	103
2.1 - 3.0	16	32	9	7	4	3	36	113	168	80	43	19	6	4	3	3	546
3.1 - 10.0	6	0	2	1	0	4	16	10	5	9	3	1	0	0	0	2	59
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	26	33	11	8	4	7	52	134	200	106	52	20	26	14	9	6	708

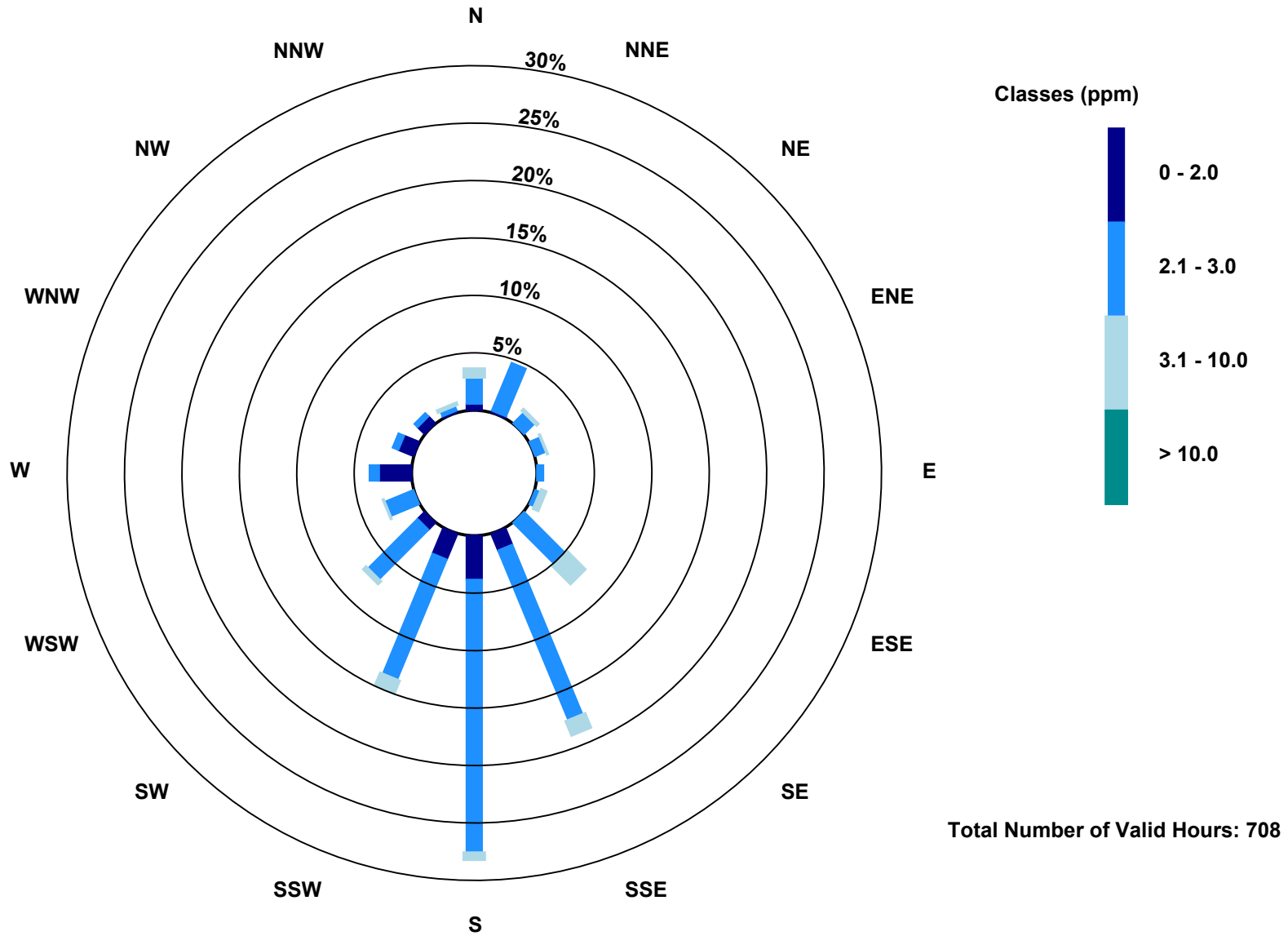
Total Number of Valid Hours: 708

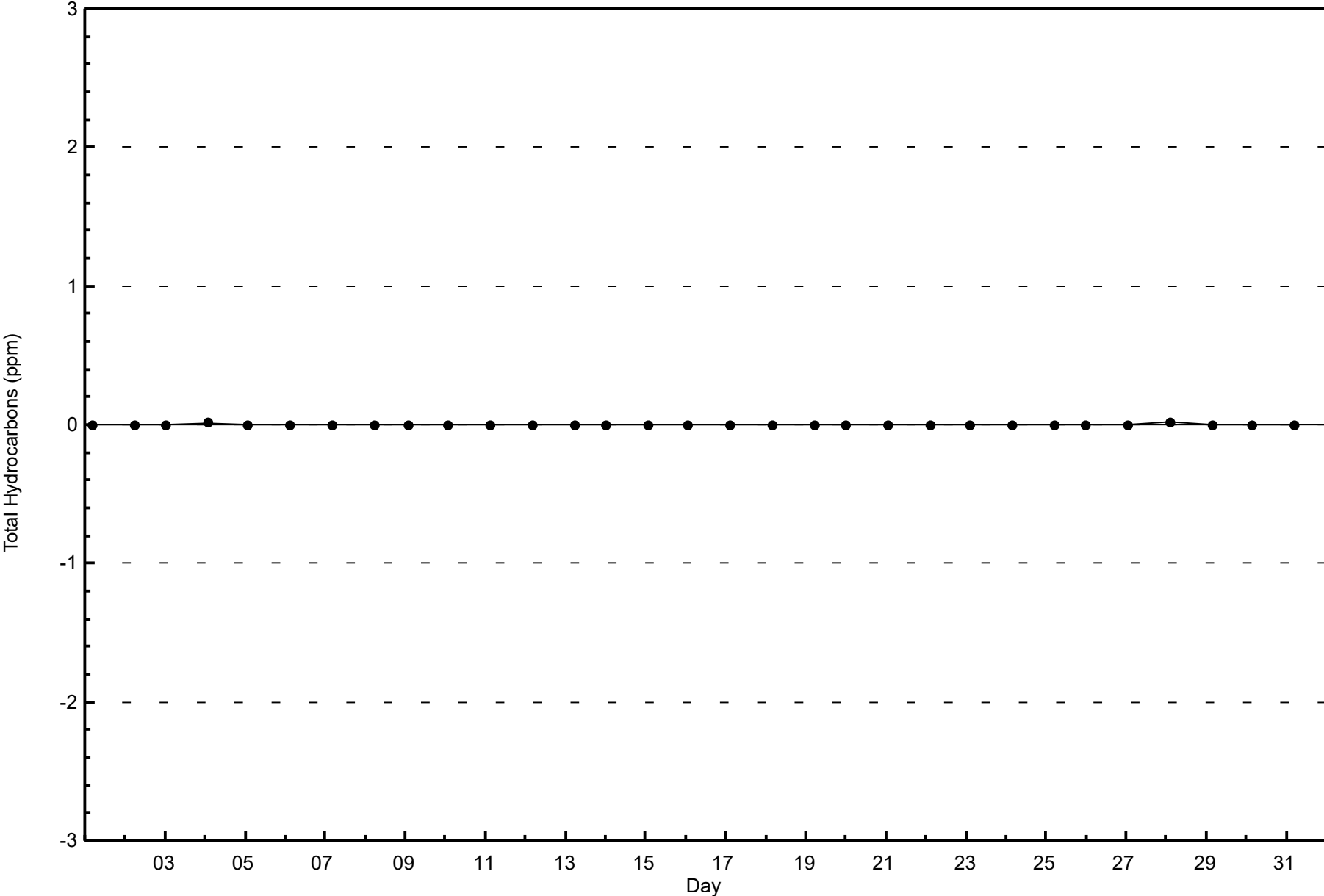
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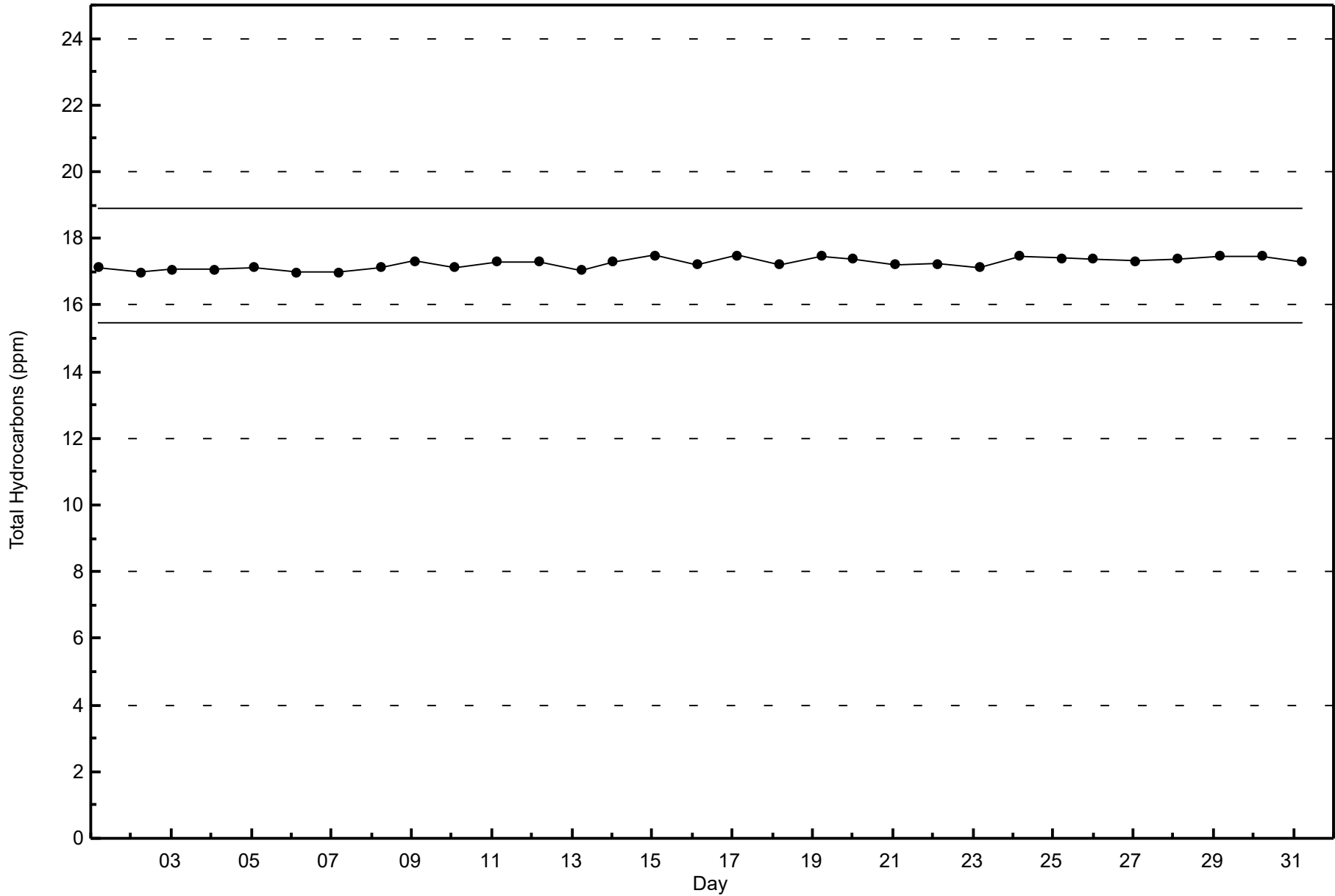


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Total Hydrocarbons (THC) - ppm
Fort Hills





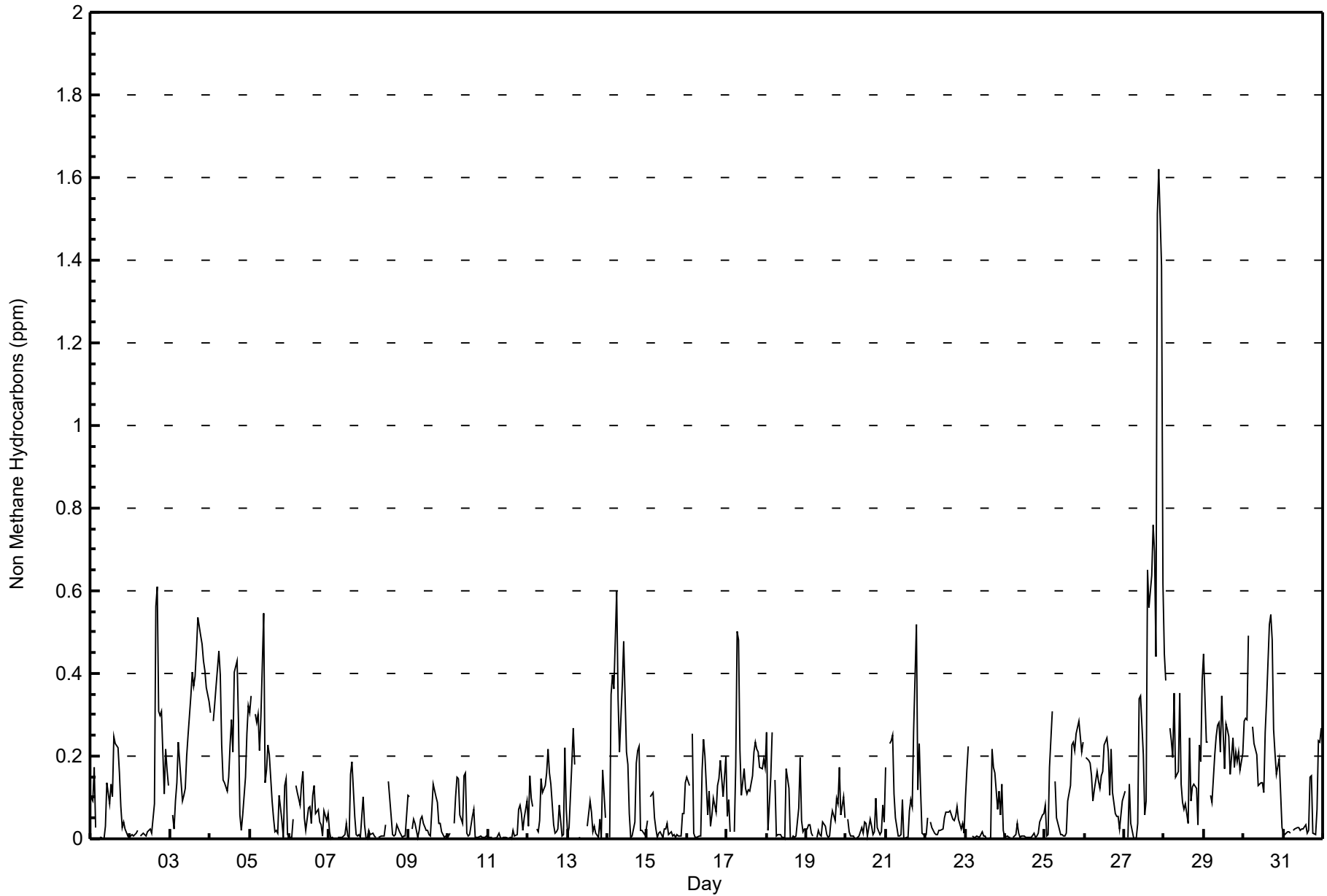




Summary of Hour Averages

Fort Hills - December 2023

Maximum Value: 1.619 ppm on Dec 27 22:00		Maximum Daily Average: 0.446 ppm on Dec 27		Hours in Service:	744																					
Minimum Value: 0.000 ppm on Dec 18 15:00		Minimum Daily Average: 0.013 ppm on Dec 24		Hours of Data:	708																					
Maximum Diurnal Average: 0.155 ppm at hour 17		Minimum Diurnal Average: 0.083 ppm at hour 8		Hours of Missing Data:	36																					
Monthly Average: 0.117 ppm		Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.0 Median = 0.1 Q ₃ = 0.2 P ₉₀ = 0.3 P ₉₉ = 0.6		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-Dec	0.099	0.090	0.172	0.028	Z	0.003	0.004	0.000	0.001	0.029	0.136	0.086	0.131	0.100	0.249	0.230	0.222	0.159	0.078	0.026	0.040	0.023	0.006	0.011	0.084	0.249
2-Dec	0.007	0.010	0.008	0.012	0.019	Z	0.008	0.012	0.014	0.007	0.018	0.021	0.025	0.013	0.085	0.563	0.611	0.308	0.297	0.310	0.107	0.216	0.168	0.130	0.129	0.611
3-Dec	Z	0.058	0.023	0.093	0.137	0.234	0.187	0.091	0.105	0.123	0.201	0.251	0.347	0.404	0.371	0.395	0.458	0.536	0.493	0.471	0.432	0.406	0.365	0.333	0.283	0.536
4-Dec	0.304	Z	0.284	0.326	0.370	0.454	0.398	0.227	0.141	0.134	0.114	0.149	0.229	0.287	0.209	0.404	0.429	0.281	0.058	0.021	0.058	0.148	0.253	0.321	0.243	0.454
5-Dec	0.306	0.346	Z	0.302	0.282	0.303	0.213	0.296	0.545	0.137	0.167	0.226	0.204	0.091	0.052	0.016	0.021	0.013	0.105	0.043	0.004	0.128	0.144	0.009	0.172	0.545
6-Dec	0.003	0.003	0.048	Z	0.129	0.112	0.082	0.132	0.164	0.049	0.019	0.076	0.078	0.036	0.106	0.128	0.060	0.072	0.042	0.035	0.008	0.067	0.045	0.062	0.068	0.164
7-Dec	0.017	0.000	0.005	0.001	Z	0.004	0.003	0.003	0.004	0.010	0.037	0.007	0.002	0.156	0.186	0.055	0.010	0.005	0.009	0.002	0.101	0.034	0.002	0.001	0.028	0.186
8-Dec	0.022	0.009	0.013	0.006	0.004	Z	0.003	0.008	0.007	0.006	0.034	M	0.139	0.054	0.010	0.006	0.012	0.034	0.016	0.009	0.004	0.006	0.007	0.104	0.023	0.139
9-Dec	0.102	Z	0.023	0.049	0.036	0.003	0.020	0.048	0.054	0.037	0.021	0.020	0.011	0.008	0.066	0.134	0.102	0.088	0.037	0.036	0.017	0.005	0.005	0.009	0.040	0.134
10-Dec	0.008	0.012	Z	0.036	0.101	0.150	0.146	0.058	0.036	0.153	0.159	0.014	0.008	0.009	0.055	0.071	0.003	0.005	0.002	0.006	0.002	0.003	0.003	0.006	0.046	0.159
11-Dec	0.002	0.004	0.004	Z	0.002	0.001	0.014	0.002	0.001	0.004	0.004	0.003	0.001	0.004	0.002	0.020	0.006	0.010	0.071	0.080	0.061	0.020	0.049	0.092	0.020	0.092
12-Dec	0.031	0.151	0.099	0.078	Z	0.022	0.017	0.044	0.147	0.111	0.127	0.159	0.218	0.159	0.132	0.035	0.015	0.018	0.023	0.080	0.007	0.009	0.219	0.070	0.086	0.219
13-Dec	0.010	0.029	0.185	0.269	0.180	Z	0.001	0.005	M	C	C	C	0.032	0.091	0.063	0.016	0.030	0.014	0.004	0.048	0.004	0.166	0.107	0.052	0.069	0.269
14-Dec	Z	0.005	0.348	0.397	0.363	0.599	0.338	0.209	0.293	0.372	0.479	0.210	0.181	0.063	0.005	0.006	0.042	0.182	0.213	0.223	0.021	0.021	0.009	0.022	0.200	0.599
15-Dec	0.045	Z	0.102	0.112	0.051	0.024	0.003	0.013	0.018	0.005	0.024	0.024	0.036	0.009	0.017	0.007	0.011	0.002	0.009	0.008	0.008	0.061	0.062	0.134	0.034	0.134
16-Dec	0.150	0.127	Z	0.255	0.013	0.004	0.002	0.006	0.007	0.167	0.242	0.200	0.056	0.115	0.031	0.057	0.097	0.066	0.130	0.145	0.190	0.146	0.101	0.199	0.109	0.255
17-Dec	0.055	0.094	0.018	Z	0.016	0.177	0.502	0.483	0.212	0.106	0.169	0.121	0.109	0.120	0.114	0.153	0.211	0.235	0.218	0.209	0.173	0.171	0.192	0.173	0.175	0.502
18-Dec	0.259	0.019	0.150	0.259	Z	0.143	0.008	0.009	0.009	0.003	0.002	0.000	0.171	0.122	0.000	0.001	0.006	0.004	0.006	0.074	0.197	0.043	0.017	0.024	0.066	0.259
19-Dec	0.025	0.033	0.033	0.013	0.006	Z	0.002	0.019	0.010	0.007	0.040	0.032	0.009	0.004	0.007	0.045	0.069	0.045	0.098	0.085	0.172	0.056	0.101	0.049	0.042	0.172
20-Dec	Z	0.049	0.019	0.007	0.005	0.001	0.001	0.002	0.008	0.026	0.015	0.040	0.038	0.006	0.046	0.032	0.009	0.017	0.097	0.029	0.009	0.017	0.083	0.039	0.026	0.097
21-Dec	0.172	Z	0.231	0.237	0.250	0.109	0.049	0.006	0.007	0.009	0.094	0.002	0.004	0.002	0.068	0.095	0.080	0.262	0.518	0.120	0.229	0.115	0.012	0.007	0.116	0.518
22-Dec	0.012	0.050	Z	0.041	0.028	0.013	0.009	0.012	0.019	0.019	0.022	0.051	0.064	0.064	0.065	0.067	0.047	0.045	0.053	0.079	0.047	0.023	0.036	0.015	0.038	0.079
23-Dec	0.099	0.165	0.224	Z	0.008	0.003	0.002	0.005	0.002	0.009	0.017	0.007	0.007	0.000	0.002	0.004	0.217	0.171	0.160	0.070	0.114	0.058	0.132	0.020	0.065	0.224
24-Dec	0.003	0.006	0.002	0.004	Z	0.004	0.011	0.036	0.013	0.003	0.007	0.006	0.005	0.004	0.003	0.002	0.002	0.012	0.003	0.006	0.014	0.042	0.059	0.060	0.013	0.060
25-Dec	0.080	0.007	0.010	0.173	0.310	Z	0.139	0.051	0.038	0.010	0.009	0.006	0.006	0.013	0.091	0.129	0.226	0.233	0.215	0.253	0.284	0.246	0.211	0.234	0.129	0.310
26-Dec	Z	0.195	0.191	0.184	0.154	0.090	0.118	0.162	0.139	0.123	0.154	0.163	0.227	0.244	0.210	0.106	0.216	0.111	0.060	0.054	0.053	0.024	0.058	0.090	0.136	0.244
27-Dec	0.116	Z	0.002	0.134	0.036	0.004	0.002	0.004	0.037	0.340	0.346	0.204	0.059	0.090	0.652	0.558	0.638	0.758	0.694	0.441	1.512	1.619	1.387	0.617	0.446	1.619
28-Dec	0.449	0.383	Z	0.268	0.239	0.196	0.353	0.148	0.164	0.352	0.132	0.089	0.071	0.086	0.037	0.245	0.093	0.126	0.131	0.121	0.033	0.226	0.186	0.384	0.196	0.449
29-Dec	0.446	0.234	0.233	Z	0.107	0.088	0.204	0.248	0.274	0.282	0.210	0.347	0.168	0.279	0.265	0.247	0.154	0.245	0.173	0.211	0.186	0.211	0.165	0.207	0.225	0.446
30-Dec	0.283	0.291	0.289	0.492	Z	0.271	0.232	0.216	0.205	0.130	0.137	0.136	0.112	0.257	0.337	0.520	0.542	0.482	0.264	0.208	0.157	0.195	0.111	0.028	0.256	0.542
31-Dec	0.015	0.010	0.017	0.018	0.015	Z	0.022	0.024	0.027	0.027	0.022	0.025	0.025	0.033	0.012	0.020	0.150	0.154	0.013	0.009	0.071	0.237	0.235	0.268	0.063	0.268
																								Diurnal Average		
																								Diurnal Maximum		
Z - zerospan C - Calibration M - Maintenance																										





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Non Methane Hydrocarbons (NMHC) - ppm
Fort Hills - December 2023**

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 0.005	92	12.99	12.99
0.006 - 0.05	252	35.59	48.59
0.06 - 0.1	153	21.61	70.20
> 0.1	211	29.80	100.00

Total Number of Valid Hours: 708

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Non Methane Hydrocarbons (NMHC) - ppm
Fort Hills - December 2023

Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 0.005	1	0	0	0	0	0	1	17	26	17	3	0	14	8	4	1	92
0.006 - 0.05	5	9	5	2	2	0	18	40	100	43	12	1	9	3	2	1	252
0.06 - 0.1	8	9	0	4	2	0	9	33	36	20	21	5	0	2	2	2	153
> 0.1	12	15	6	2	0	7	24	44	38	26	16	14	3	1	1	2	211
Totals	26	33	11	8	4	7	52	134	200	106	52	20	26	14	9	6	708

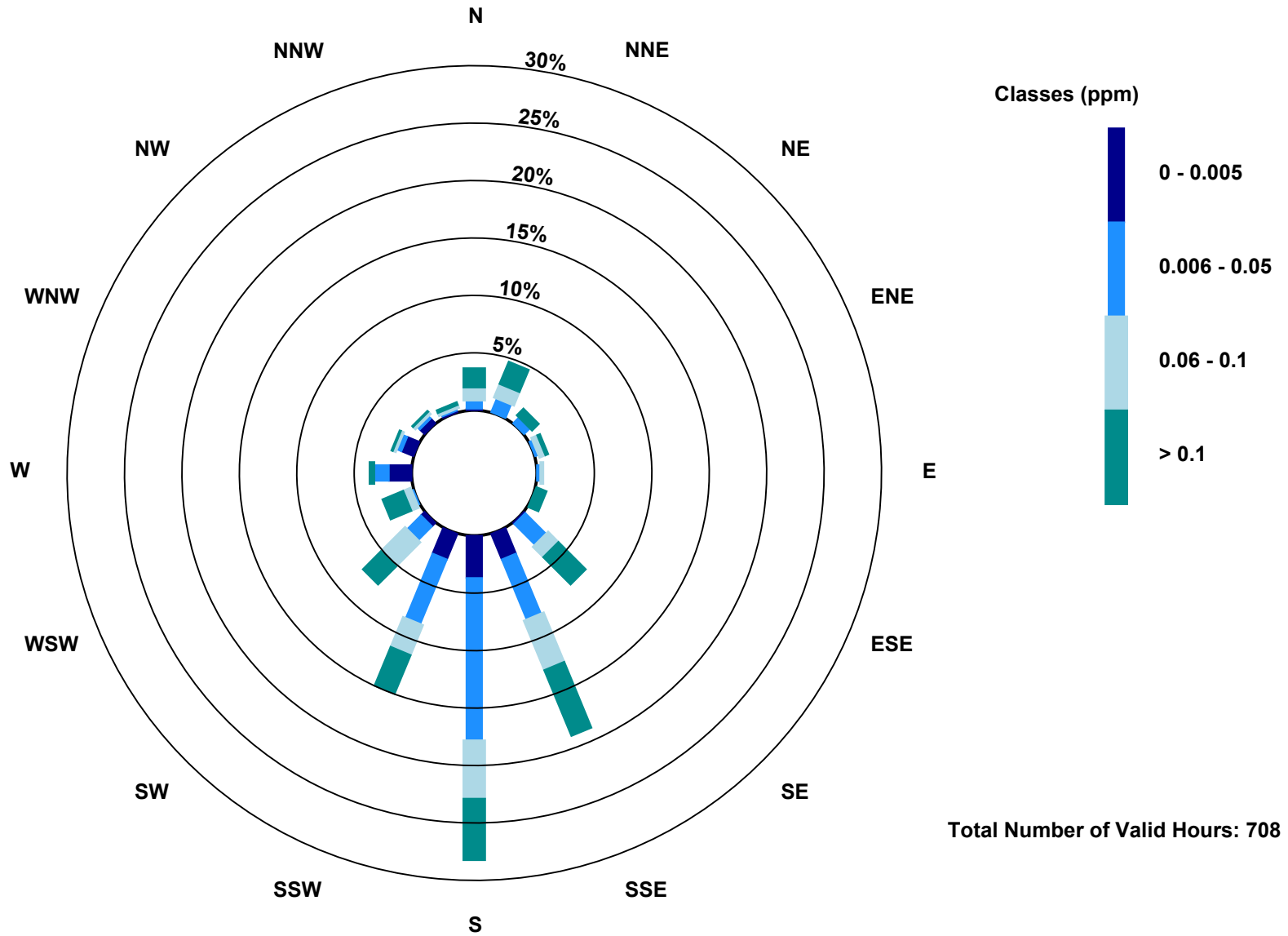
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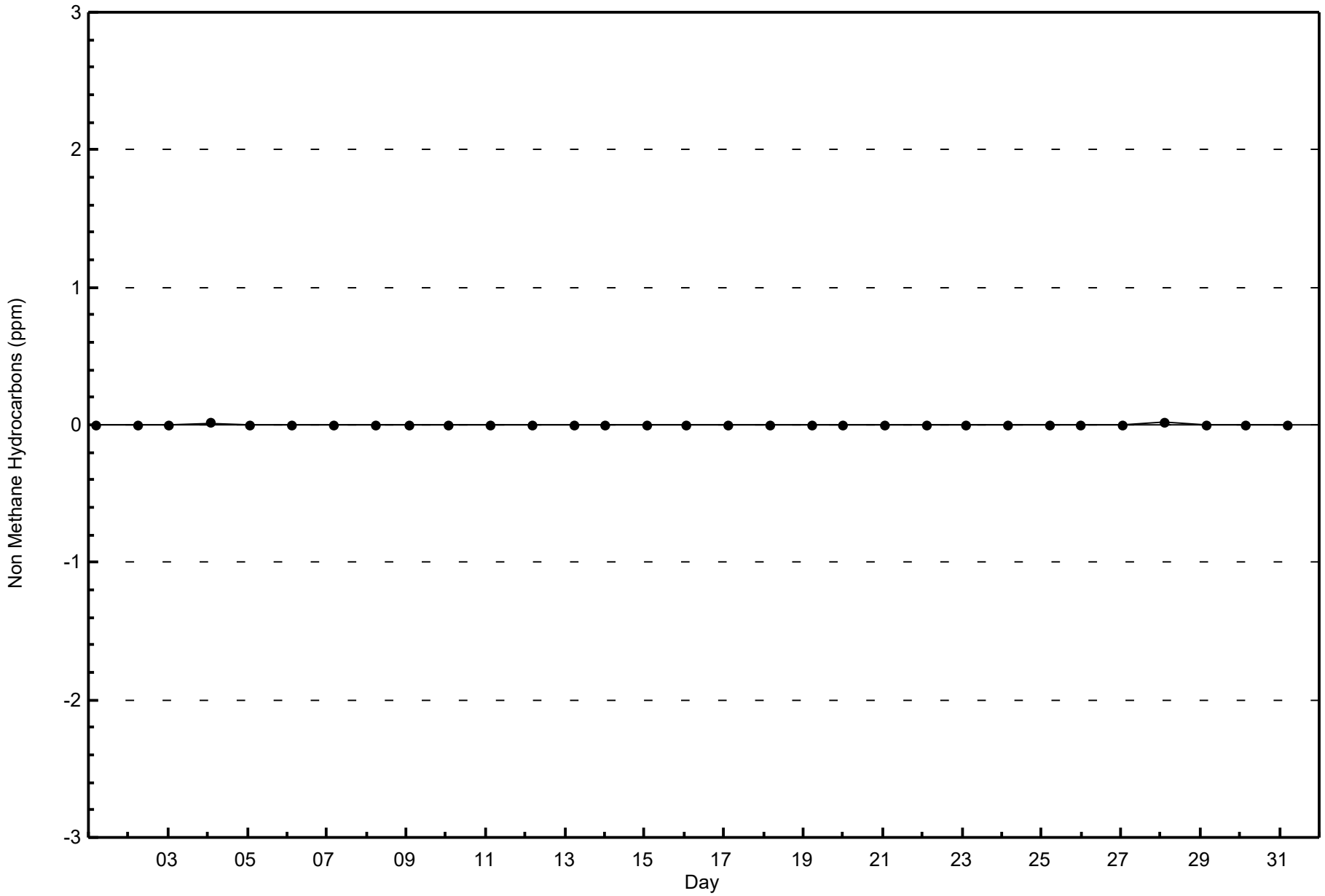
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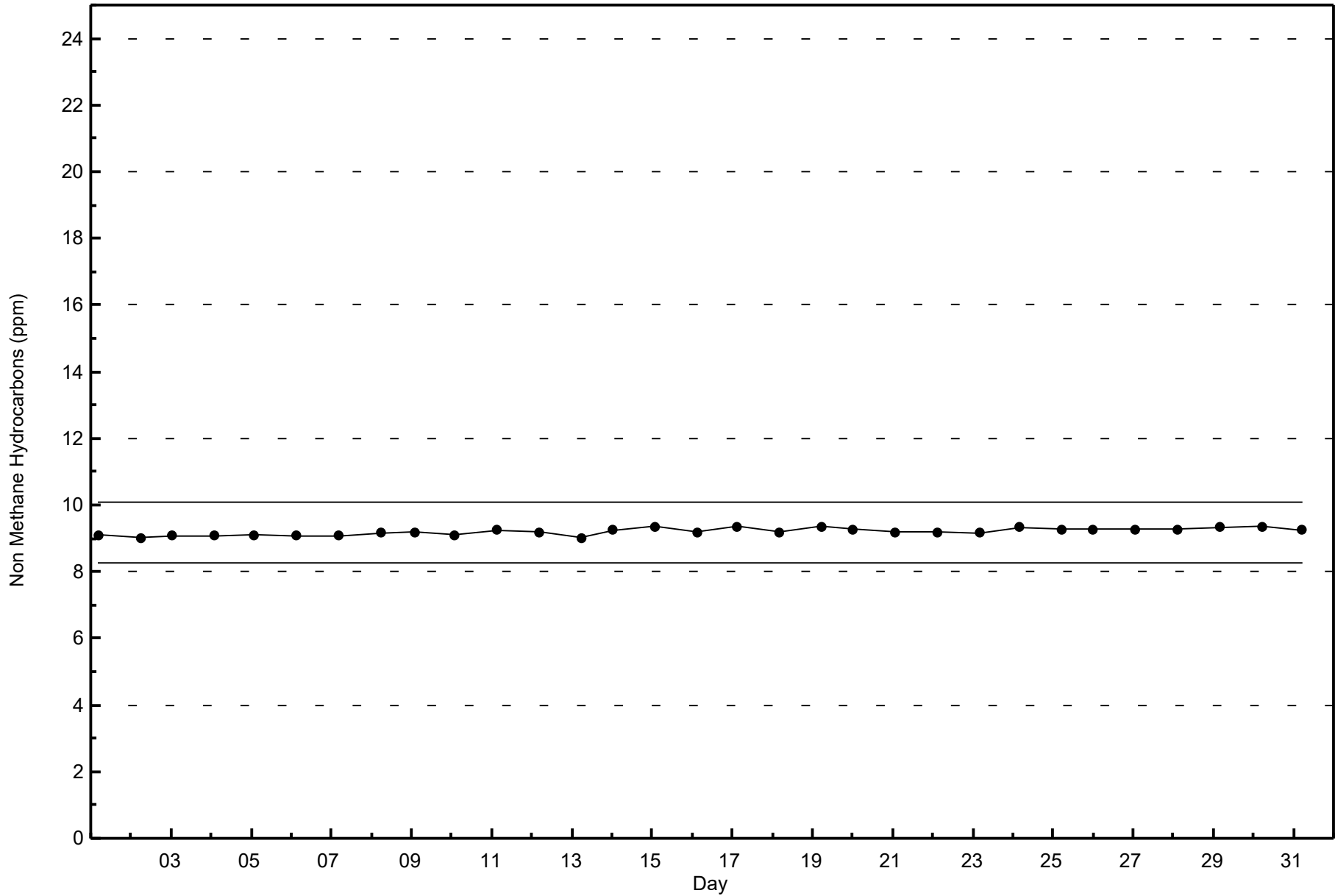


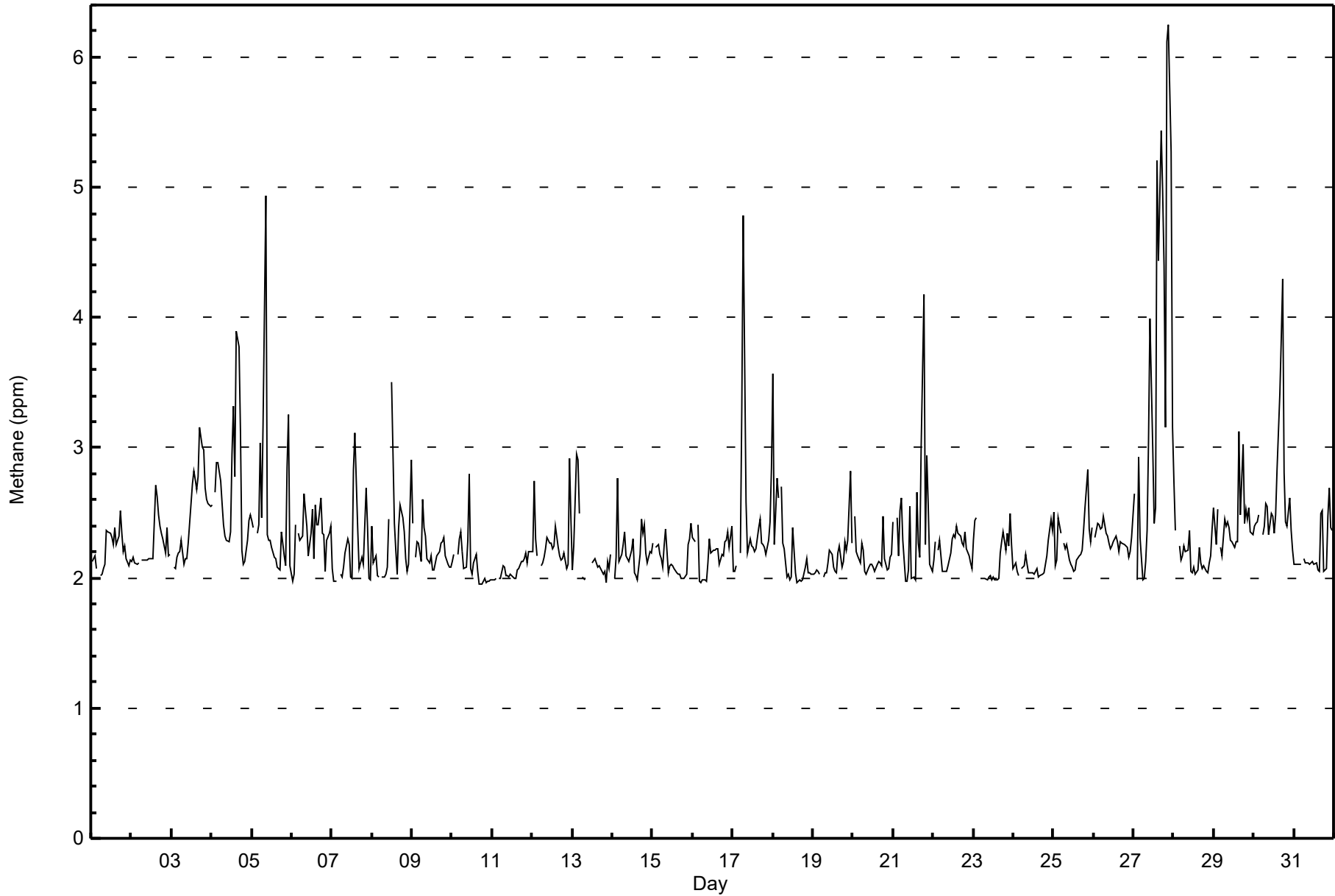
Wood Buffalo Environmental Association
Wind Rose Dec 2023

Non Methane Hydrocarbons (NMHC) - ppm
Fort Hills











Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Methane (CH₄) - ppm
Fort Hills - December 2023

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	123	17.37	17.37
2.1 - 3.0	555	78.39	95.76
3.1 - 10.0	30	4.24	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 708

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Methane (CH₄) - ppm
Fort Hills - December 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	6	8	2	0	0	0	0	12	33	18	6	0	20	11	6	1	123
2.1 - 3.0	17	25	7	7	4	4	41	119	167	82	46	20	6	3	3	4	555
3.1 - 10.0	3	0	2	1	0	3	11	3	0	6	0	0	0	0	0	1	30
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	26	33	11	8	4	7	52	134	200	106	52	20	26	14	9	6	708

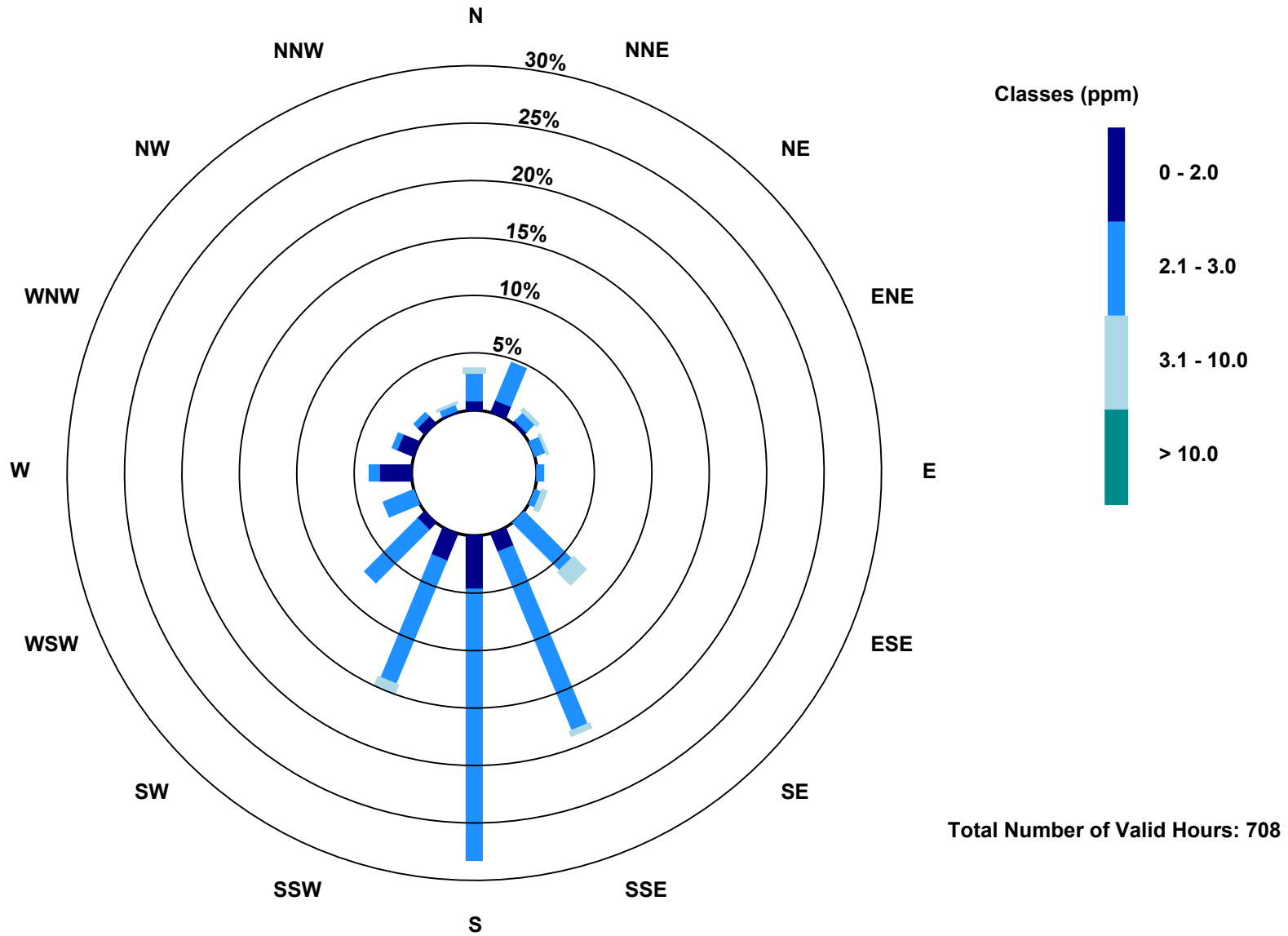
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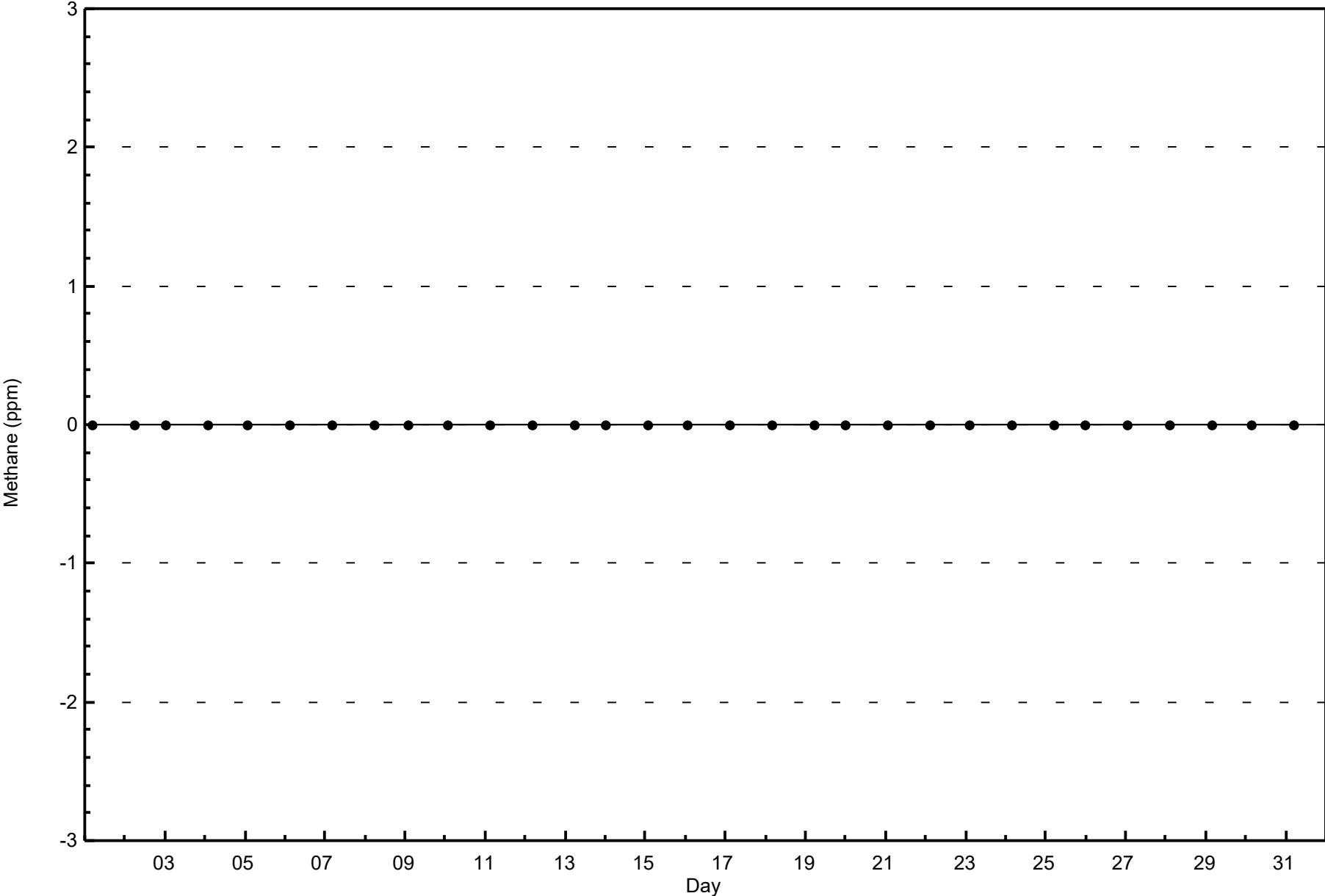
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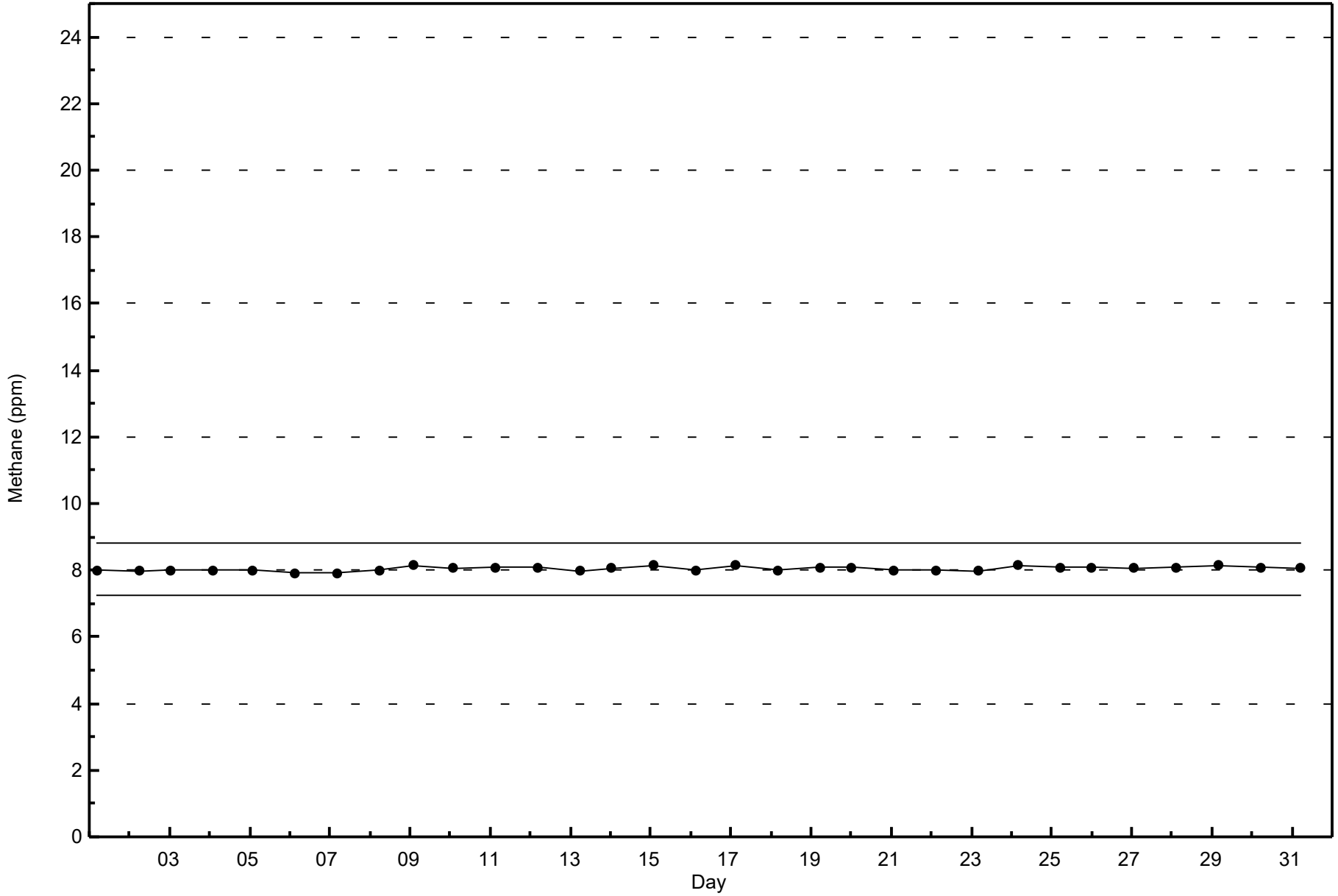


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Methane (CH₄) - ppm
Fort Hills









Wood Buffalo Environmental Association

Summary of Hour Averages

Nitric Oxide (NO) - ppb

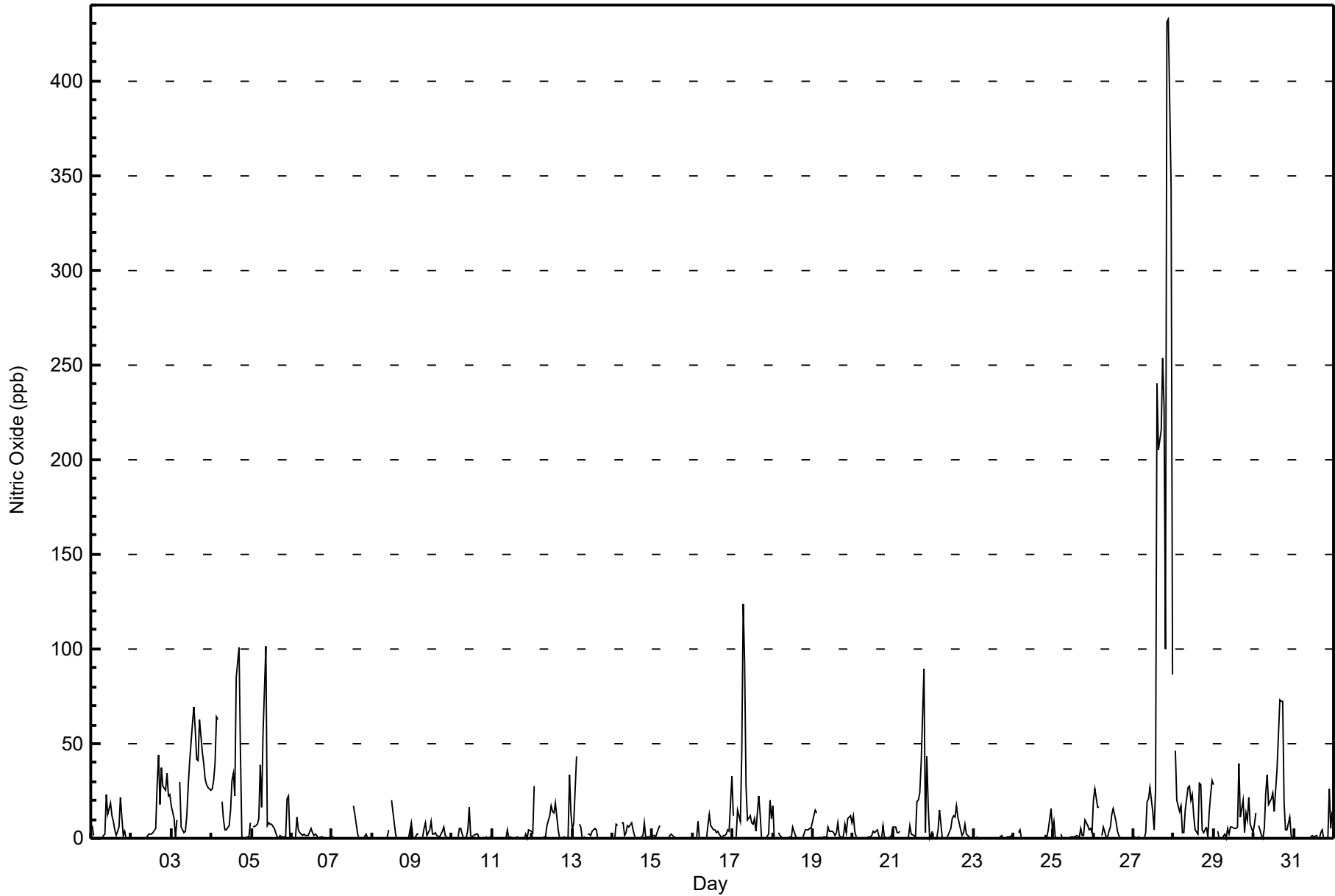
Fort Hills - December 2023

Number of Exceedences (AAAQO):		1-hr: 0	24-hr: 0	Hours in Service: 744																	744					
Maximum Value: 432.3 ppb on Dec 27 22:00		Maximum Daily Average: 115.3 ppb on Dec 27																	705							
Minimum Value: 0.0 ppb on Dec 1 04:00		Minimum Daily Average: 0.3 ppb on Dec 23																	39							
Maximum Diurnal Average: 20.7 ppb at hour 22		Minimum Diurnal Average: 5.5 ppb at hour 6																	37							
Monthly Average: 11.07 ppb		Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.1 Median = 1.8 Q ₃ = 8.2 P ₉₀ = 25.3 P ₉₉ = 202.0																	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-Dec	6.4	1.2	Z	0.0	0.0	0.0	0.0	1.1	2.3	23.4	12.6	18.6	12.1	8.9	4.8	1.7	5.7	21.8	11.4	1.4	3.5	0.2	0.0	0.2	6.0	23.4
2-Dec	0.0	0.1	0.0	Z	0.0	0.0	0.0	0.0	0.1	1.1	2.2	2.2	2.4	2.7	5.2	28.2	44.3	17.7	37.2	27.7	25.1	34.2	22.4	22.8	12.0	44.3
3-Dec	17.0	10.4	0.8	10.0	Z	29.9	6.1	2.9	3.7	12.1	27.6	40.5	60.0	69.4	57.1	41.8	40.8	62.5	45.7	39.3	31.1	28.0	26.7	25.1	29.9	69.4
4-Dec	25.7	30.8	39.8	64.4	62.4	Z	19.2	9.7	4.4	4.4	7.1	15.0	30.6	34.1	22.3	84.9	100.7	44.7	0.7	0.0	0.0	0.8	0.8	8.1	26.5	100.7
5-Dec	Z	6.2	6.6	7.2	10.2	38.8	16.6	56.2	101.2	6.7	7.9	7.6	7.4	5.2	2.8	0.4	0.1	1.6	1.1	0.8	0.4	20.8	22.4	0.7	14.3	101.2
6-Dec	0.0	Z	1.0	10.9	4.4	2.7	1.5	2.2	1.8	1.3	1.8	5.2	2.9	1.7	2.0	1.6	0.2	0.5	0.7	0.1	0.0	0.1	0.0	0.1	1.9	10.9
7-Dec	0.6	0.7	Z	0.0	0.0	0.2	0.2	C	C	C	C	C	C	16.8	13.0	2.4	0.0	0.0	0.0	0.0	2.4	0.0	0.0	0.0	-	16.8
8-Dec	0.1	0.1	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.9	4.3	M	20.1	7.3	1.3	0.1	0.2	0.2	0.1	0.0	0.0	0.0	0.1	8.3	2.0	20.1
9-Dec	0.7	0.3	0.7	2.3	2.3	Z	0.8	5.2	7.9	1.2	4.1	8.9	1.9	2.6	2.8	1.3	0.8	2.5	3.7	5.7	1.4	0.0	0.0	0.0	2.5	8.9
10-Dec	Z	0.6	0.0	0.2	5.0	5.5	1.9	0.1	0.9	4.6	16.5	1.7	1.1	1.2	2.1	1.9	0.0	0.0	0.0	0.1	0.4	0.0	0.1	0.5	1.9	16.5
11-Dec	0.0	Z	0.4	0.2	0.0	0.0	0.1	0.0	0.0	4.8	0.2	1.0	0.2	0.0	0.0	0.5	0.0	0.3	0.0	0.1	2.0	0.2	4.4	3.7	0.8	4.8
12-Dec	2.9	27.3	Z	0.0	0.0	0.0	0.0	0.8	0.8	6.6	11.7	17.4	13.9	13.7	18.6	4.5	0.1	0.0	0.0	0.7	0.0	0.9	33.4	13.3	7.2	33.4
13-Dec	4.5	8.0	43.3	Z	7.7	6.3	0.0	0.9	M	2.1	2.0	1.3	3.5	4.9	4.3	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.0	43.3
14-Dec	0.0	0.0	7.4	6.3	Z	8.3	8.4	1.4	3.2	6.9	5.6	8.1	4.5	1.1	0.0	0.0	0.0	0.4	1.5	8.6	0.1	0.5	0.8	0.2	3.2	8.6
15-Dec	1.2	1.6	0.4	5.1	6.8	Z	0.0	0.1	0.0	0.1	1.9	2.3	1.4	0.8	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.2	1.0	6.8
16-Dec	Z	0.3	0.2	9.3	0.0	0.0	0.0	0.0	0.1	6.9	12.4	6.9	4.8	4.4	3.1	3.5	2.1	0.3	1.2	1.1	2.1	4.4	3.4	32.8	4.3	32.8
17-Dec	11.8	Z	0.4	14.7	9.1	46.0	123.6	92.8	27.9	9.4	11.7	8.6	7.5	10.7	4.0	22.1	13.0	0.1	0.0	0.1	0.1	2.4	20.2	10.3	19.4	123.6
18-Dec	17.5	0.1	Z	2.6	1.7	0.9	0.0	0.0	0.0	0.0	0.9	0.2	6.1	1.5	0.0	0.0	0.0	0.0	0.0	4.7	4.2	4.5	5.2	5.4	2.4	17.5
19-Dec	11.9	15.0	13.5	Z	0.7	0.2	0.7	0.4	0.3	6.0	4.1	3.7	2.9	1.3	3.2	8.2	1.8	0.1	1.4	7.3	2.7	10.3	12.0	7.9	5.0	15.0
20-Dec	11.6	3.7	0.4	0.0	Z	0.0	0.0	0.0	0.0	0.5	0.7	1.6	4.0	2.8	4.5	1.5	0.0	0.0	6.9	0.5	0.0	0.0	0.5	1.7	1.8	11.6
21-Dec	5.8	5.7	3.0	2.9	3.9	Z	0.0	0.0	0.0	0.6	7.0	2.5	1.8	0.4	19.7	20.3	24.2	39.2	89.6	2.9	43.0	17.3	0.0	4.1	12.8	89.6
22-Dec	Z	0.1	0.1	4.3	14.9	0.0	0.0	0.0	0.0	1.7	5.0	10.6	12.0	11.4	17.1	10.9	4.8	1.8	3.0	7.7	2.4	0.5	0.0	0.0	4.7	17.1
23-Dec	0.6	Z	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.5	1.3	0.3	0.0	0.9	0.8	0.7	1.5	0.3	1.5	
24-Dec	0.3	0.1	Z	3.0	4.6	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.3	0.3	0.0	0.0	0.0	1.1	0.9	4.2	15.4	4.6	1.5	15.4	
25-Dec	9.0	0.2	0.3	Z	2.6	0.3	0.1	0.0	0.1	0.2	0.8	0.8	0.4	0.7	1.3	0.6	4.9	1.3	1.5	9.4	6.5	4.5	5.1	3.1	2.3	9.4
26-Dec	19.9	26.4	16.2	16.3	Z	1.8	5.9	1.0	1.0	4.1	6.1	12.4	15.9	8.7	3.7	1.5	0.3	0.1	0.0	0.0	0.1	0.0	0.0	0.3	6.2	26.4
27-Dec	0.9	0.2	0.0	0.8	0.1	Z	0.1	2.8	19.8	20.8	26.8	14.5	4.6	26.1	239.8	205.3	215.6	253.5	227.3	99.7	431.0	432.3	343.6	86.7	115.3	432.3
28-Dec	Z	46.2	19.9	14.0	16.8	2.8	2.6	14.7	27.1	27.8	20.5	23.2	12.2	4.4	2.2	29.3	28.5	4.3	3.2	5.8	0.7	14.2	22.9	30.4	16.2	46.2
29-Dec	28.6	Z	4.0	0.2	0.0	0.0	2.1	0.1	5.5	2.4	5.8	6.2	5.3	5.1	5.6	39.5	11.0	19.8	2.8	13.6	9.8	21.9	7.8	2.6	8.7	39.5
30-Dec	7.6	13.3	Z	6.7	1.3	0.2	5.5	24.2	33.3	17.8	21.0	23.6	14.4	25.4	36.3	73.3	72.0	72.1	18.5	4.3	4.3	11.4	1.8	0.2	21.2	73.3
31-Dec	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.4	1.1	0.9	1.2	0.4	0.1	3.0	4.2	0.0	0.0	0.2	26.2	5.4	14.1	2.5	26.2
7.1 7.6 6.4 7.3 5.7 5.5 6.3 7.2 8.3 5.8 7.6 8.5 8.5 8.9 15.4 18.9 18.5 17.8 14.8 7.8 18.6 20.7 17.9 9.3																								Diurnal Average		
28.6 46.2 43.3 64.4 62.4 46.0 123.6 92.8 101.2 27.8 27.6 40.5 60.0 69.4 239.8 205.3 215.6 253.5 227.3 99.7 431.0 432.3 343.6 86.7																								Diurnal Maximum		
Z - zerospan			C - Calibration			M - Maintenance																				



Wood Buffalo Environmental Association
Hourly Averages

Nitric Oxide (NO) - ppb
Fort Hills - December 2023





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitric Oxide (NO) - ppb
Fort Hills - December 2023

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	616	87.38	87.38
21 - 40	53	7.52	94.89
41 - 80	20	2.84	97.73
81 - 159	8	1.13	98.87
> 159	8	1.13	100.00

Total Number of Valid Hours: 705

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Nitric Oxide (NO) - ppb
Fort Hills - December 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	23	8	7	4	1	33	117	187	98	49	21	27	13	11	4	616
21 - 40	5	10	1	0	0	2	9	6	14	2	2	0	0	1	0	1	53
11 - 80	3	0	0	0	0	4	3	5	2	2	1	0	0	0	0	0	20
81 - 159	1	0	1	0	0	0	3	1	0	2	0	0	0	0	0	0	8
> 159	2	0	1	1	0	0	3	0	0	0	0	0	0	0	0	1	8
Totals	24	33	11	8	4	7	51	129	203	104	52	21	27	14	11	6	705

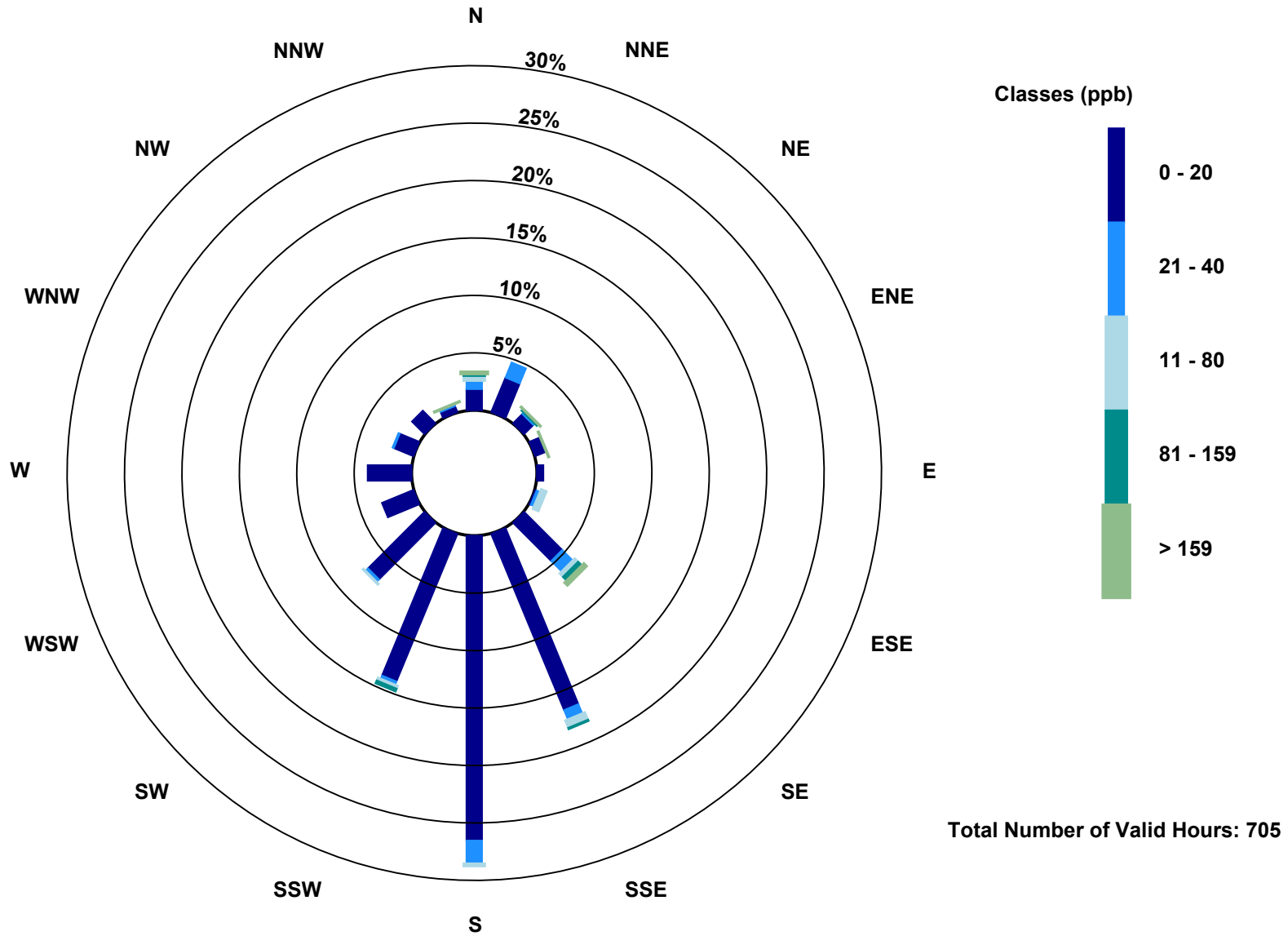
Total Number of Valid Hours: 705

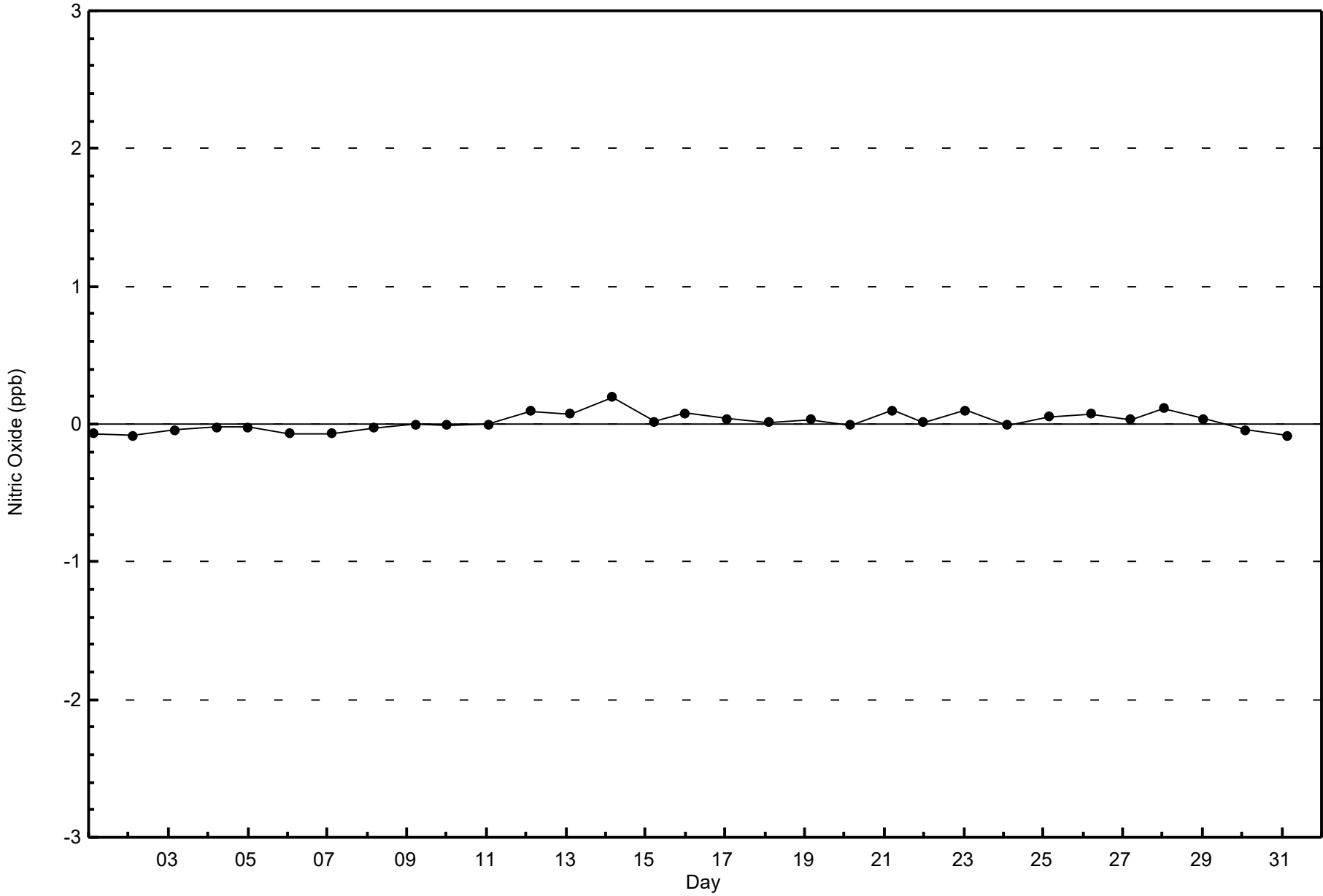
Total Number of Hours: 744

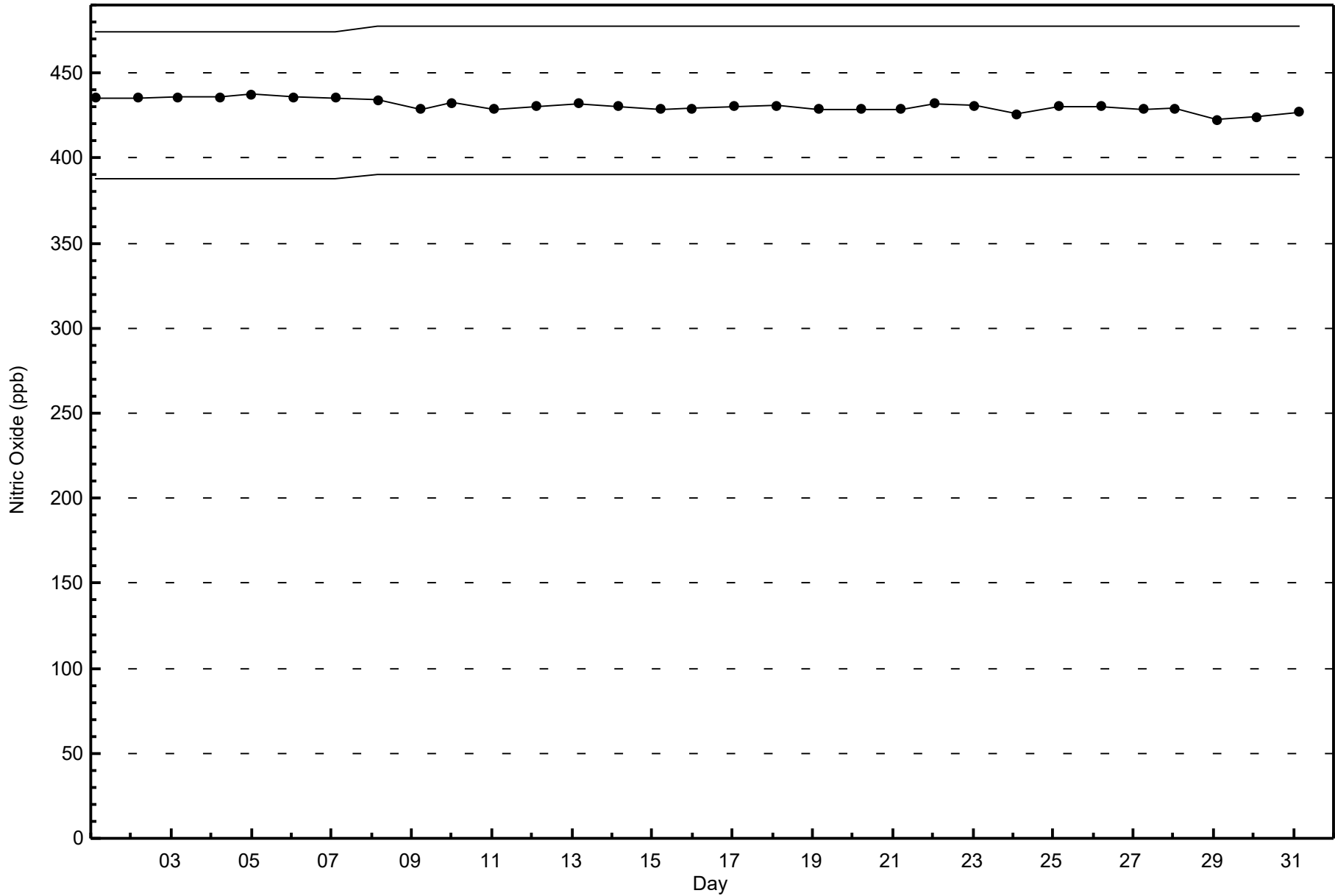


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Nitric Oxide (NO) - ppb
Fort Hills









Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO₂) - ppb

Fort Hills - December 2023

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 65.4 ppb on Dec 27 22:00	Maximum Daily Average: 33.2 ppb on Dec 27		Hours of Data:	705
Minimum Value: 0.2 ppb on Dec 16 06:00	Minimum Daily Average: 7.2 ppb on Dec 8		Hours of Missing Data:	39
Maximum Diurnal Average: 18.5 ppb at hour 23	Minimum Diurnal Average: 9.9 ppb at hour 14		Hours of Calibration:	37
Monthly Average: 14.66 ppb	Percentiles: P ₁ = 0.5 P ₁₀ = 1.9 Q ₁ = 5.9 Median = 14.3 Q ₃ = 21.3 P ₉₀ = 27.1 P ₉₉ = 49.7		Percent Operational Time:	99.7

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Dec	19.8	16.8	Z	6.1	3.2	1.6	3.8	11.4	15.0	20.1	14.6	14.7	12.2	12.2	12.6	13.8	19.2	24.4	22.4	17.3	19.9	12.0	6.9	9.4	13.5	24.4
2-Dec	7.2	6.3	4.9	Z	4.8	5.0	5.1	5.5	6.4	5.5	4.6	4.3	4.4	5.2	8.7	18.8	21.8	21.9	24.0	25.3	24.5	24.4	23.4	22.6	12.4	25.3
3-Dec	21.3	18.1	9.3	18.0	Z	23.0	17.2	15.0	16.5	18.0	19.8	21.1	22.7	24.5	24.2	23.2	23.6	26.0	22.5	19.8	19.2	19.0	18.0	17.4	19.9	26.0
4-Dec	16.8	17.4	18.2	19.2	18.6	Z	17.0	17.0	15.3	11.1	9.2	11.5	14.7	17.3	19.2	25.6	28.8	24.8	13.1	7.0	13.6	18.9	20.3	21.1	17.2	28.8
5-Dec	Z	18.6	18.4	19.8	19.6	22.6	21.3	24.7	27.1	18.7	15.7	11.1	10.1	9.7	8.0	5.3	5.9	5.9	13.9	9.7	6.1	22.6	21.2	5.1	14.8	27.1
6-Dec	1.0	Z	12.6	25.5	22.6	21.6	19.1	22.9	21.4	10.4	6.6	10.8	7.4	5.9	10.1	18.3	11.4	16.4	9.7	7.5	2.4	11.1	9.6	15.7	13.0	25.5
7-Dec	5.8	2.1	Z	1.1	1.3	4.1	2.8	C	C	C	C	C	C	17.8	19.6	14.0	6.5	5.3	6.1	3.8	17.9	7.4	1.7	1.8	--	19.6
8-Dec	9.5	5.6	8.3	Z	1.5	2.9	1.6	2.2	3.3	4.4	9.4	M	17.0	11.4	6.0	2.7	11.2	13.4	10.1	7.2	3.5	1.8	4.4	20.7	7.2	20.7
9-Dec	17.3	10.5	12.8	21.1	20.0	Z	13.7	19.4	22.3	8.8	10.4	12.7	4.6	6.4	10.0	11.4	17.4	21.8	23.9	23.4	17.0	11.8	8.2	8.6	14.5	23.9
10-Dec	Z	18.0	13.7	15.9	21.6	20.6	18.4	12.9	13.4	15.6	17.3	5.0	2.9	3.8	9.3	9.2	1.0	0.9	0.5	4.7	1.1	0.3	0.5	0.7	9.0	21.6
11-Dec	0.3	Z	0.8	0.8	0.3	0.9	6.1	3.5	2.5	7.8	1.9	3.8	1.0	0.6	1.3	6.4	7.8	21.9	17.4	18.2	26.9	17.7	21.4	25.3	8.5	26.9
12-Dec	22.1	30.5	Z	16.6	13.9	7.9	8.1	12.6	19.5	19.7	17.3	16.7	15.4	16.5	20.0	16.8	14.0	10.7	11.5	18.0	7.0	5.6	29.9	19.6	16.1	30.5
13-Dec	13.9	21.0	33.8	Z	32.8	24.4	2.9	5.0	M	11.3	16.1	10.1	12.2	14.3	14.5	8.4	12.4	10.2	5.3	6.4	0.9	9.9	6.9	3.8	12.6	33.8
14-Dec	2.2	1.4	17.5	30.3	Z	29.3	26.8	24.7	27.7	29.4	20.5	21.2	13.5	4.0	2.6	1.6	6.1	24.1	28.8	31.9	8.5	13.2	13.6	15.1	17.1	31.9
15-Dec	27.1	26.5	19.7	23.5	19.3	Z	5.6	7.3	4.6	3.2	10.3	10.1	8.7	7.4	5.4	5.3	4.5	2.0	1.8	1.7	1.6	6.4	9.5	15.8	9.9	27.1
16-Dec	Z	16.3	15.4	24.2	0.8	0.2	0.6	1.0	1.8	21.9	24.2	18.4	14.6	14.6	14.7	15.1	16.2	11.6	19.3	23.8	23.6	28.5	26.3	30.4	15.8	30.4
17-Dec	27.1	Z	18.1	21.9	15.6	30.5	36.5	35.4	28.6	21.8	21.3	16.5	14.8	16.7	14.6	27.1	26.5	19.9	19.3	24.7	24.0	19.8	27.7	27.5	23.3	36.5
18-Dec	26.1	7.0	Z	27.0	24.3	18.0	4.1	5.1	2.1	1.7	3.1	1.9	15.1	6.1	0.3	0.6	2.3	1.6	1.0	14.6	18.2	16.9	17.1	19.1	10.1	27.0
19-Dec	25.6	28.2	25.2	Z	5.7	2.6	6.3	6.7	5.3	14.3	17.4	12.5	10.0	6.8	14.3	27.5	22.6	14.0	23.2	31.7	24.2	28.2	31.8	20.6	17.6	31.8
20-Dec	31.3	26.6	12.1	5.6	Z	3.7	3.2	2.3	3.0	8.0	5.1	6.6	11.6	9.6	15.8	15.6	10.8	5.4	15.7	7.6	6.6	5.3	10.3	12.8	10.2	31.3
21-Dec	16.0	17.6	16.0	13.7	24.2	Z	5.9	0.5	0.4	4.6	14.2	3.5	3.2	1.2	19.6	25.2	24.3	27.2	30.3	20.7	32.5	18.7	4.8	7.2	14.4	32.5
22-Dec	Z	7.1	5.2	7.5	15.4	2.4	2.3	2.3	2.8	7.5	11.6	13.6	12.5	12.1	15.2	15.8	16.6	15.2	15.6	16.1	10.9	7.6	3.3	1.9	9.6	16.6
23-Dec	10.0	Z	18.1	1.2	1.3	0.6	1.0	1.5	0.8	1.8	2.3	0.9	0.7	0.3	0.5	1.0	17.7	22.7	20.7	10.4	23.6	11.9	20.6	11.9	7.9	23.6
24-Dec	4.6	6.0	Z	9.9	13.3	7.1	8.0	11.3	5.6	0.6	0.6	0.5	0.7	1.6	2.0	0.9	0.9	1.0	1.7	11.7	15.5	24.7	32.8	26.7	8.2	32.8
25-Dec	28.5	5.5	10.4	Z	16.4	21.1	17.6	13.1	14.2	6.6	4.5	3.1	1.9	3.2	7.5	11.4	23.2	23.1	21.5	27.2	24.0	28.3	27.5	25.1	15.9	28.5
26-Dec	26.6	25.9	26.4	26.9	Z	23.3	26.8	21.2	22.6	20.2	14.0	14.4	14.9	12.5	10.7	11.6	11.6	13.5	12.2	10.9	10.8	5.8	13.8	19.4	17.2	26.9
27-Dec	15.7	18.4	0.7	23.7	11.2	Z	4.3	15.0	30.1	35.3	32.6	24.2	11.4	15.2	55.7	51.6	52.5	52.4	50.1	41.2	64.3	65.4	55.1	37.8	33.2	65.4
28-Dec	Z	33.5	31.4	29.7	27.7	19.6	19.3	29.1	32.4	33.2	27.7	26.2	24.2	18.1	18.3	32.7	36.9	26.2	27.7	26.0	9.6	35.3	36.6	37.2	27.8	37.2
29-Dec	35.3	Z	26.8	18.3	7.7	7.8	22.3	14.9	22.1	15.1	12.3	11.5	10.3	11.1	13.8	25.2	21.1	25.1	21.6	23.0	22.0	21.6	20.0	19.8	18.6	35.3
30-Dec	20.3	20.4	Z	19.3	17.9	15.6	18.5	20.6	20.6	17.7	17.2	15.8	12.9	18.1	22.3	27.4	30.2	28.0	27.5	29.6	29.5	30.3	24.3	14.1	21.7	30.3
31-Dec	2.2	1.8	1.9	Z	2.1	5.8	4.6	2.6	2.7	2.6	2.8	3.5	2.7	4.1	2.8	3.3	19.1	21.3	4.3	4.4	12.8	27.1	24.5	26.1	8.0	27.1

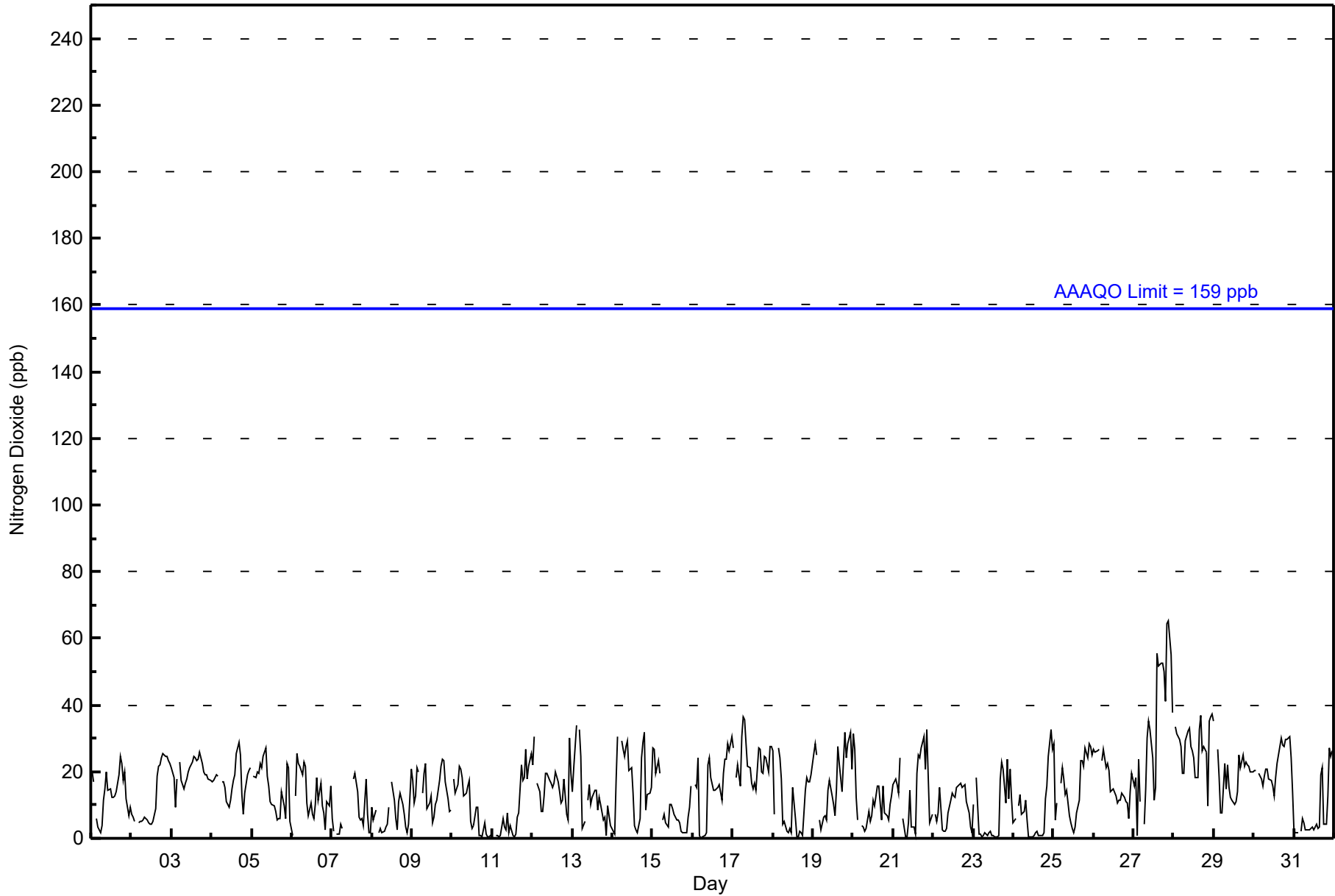
16.7	15.7	15.1	17.1	13.4	12.4	11.3	12.2	13.5	13.2	12.8	11.2	10.3	9.9	12.9	15.3	16.9	17.4	16.9	17.0	16.8	18.0	18.5	17.4	Diurnal Average	
35.3	33.5	33.8	30.3	32.8	30.5	36.5	35.4	32.4	35.3	32.6	26.2	24.2	24.5	55.7	51.6	52.5	52.4	50.1	41.2	64.3	65.4	55.1	37.8	Diurnal Maximum	

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



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Dioxide (NO₂) - ppb
Fort Hills - December 2023





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Fort Hills - December 2023**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	508	72.06	72.06
21 - 40	188	26.67	98.72
41 - 80	9	1.28	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 705

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Fort Hills - December 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	10	6	7	5	3	0	23	97	171	84	37	11	24	14	11	5	508
21 - 40	12	27	2	2	1	7	25	32	32	20	15	10	3	0	0	0	188
11 - 80	2	0	2	1	0	0	3	0	0	0	0	0	0	0	0	1	9
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	24	33	11	8	4	7	51	129	203	104	52	21	27	14	11	6	705

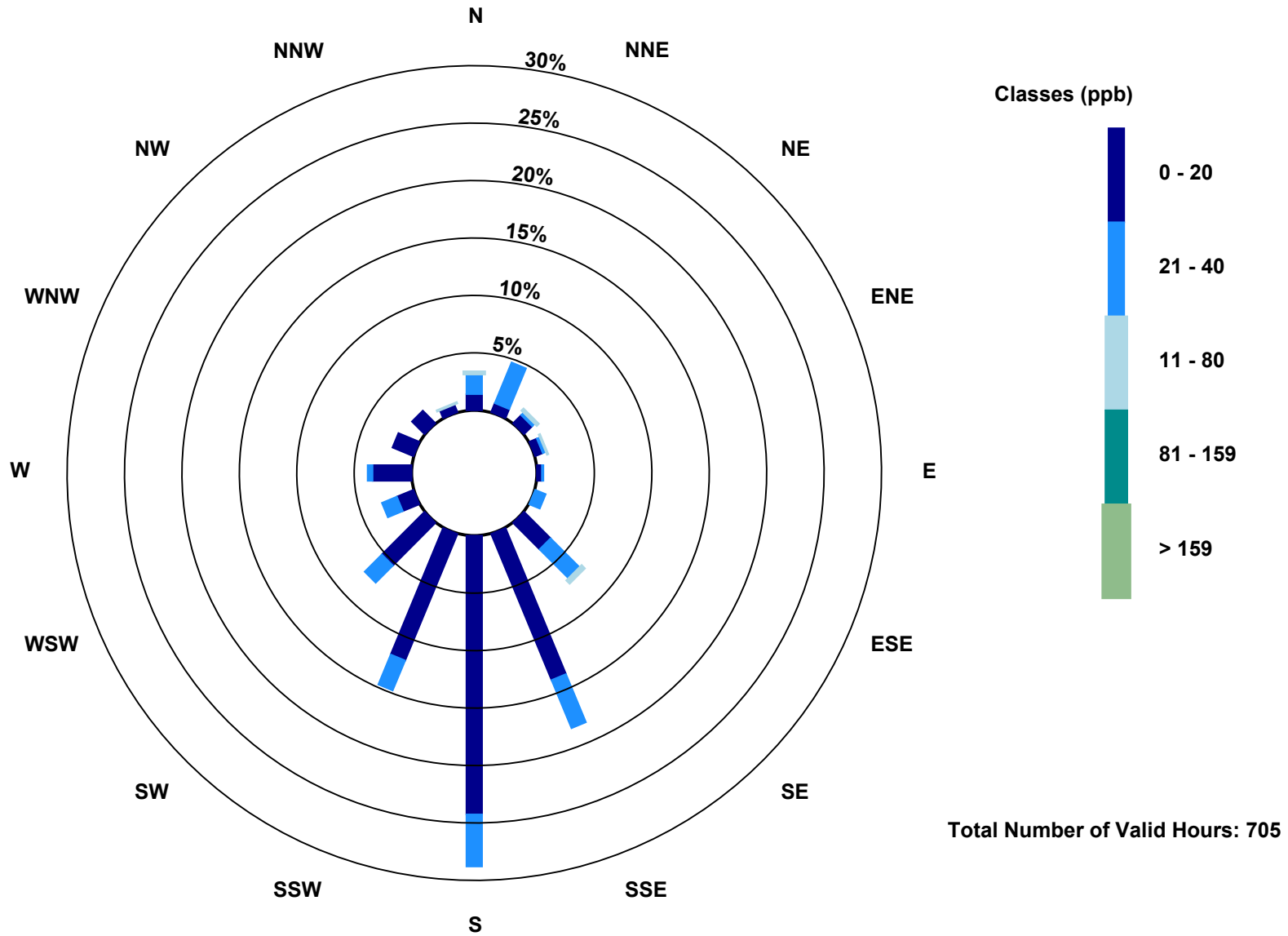
Total Number of Valid Hours: 705

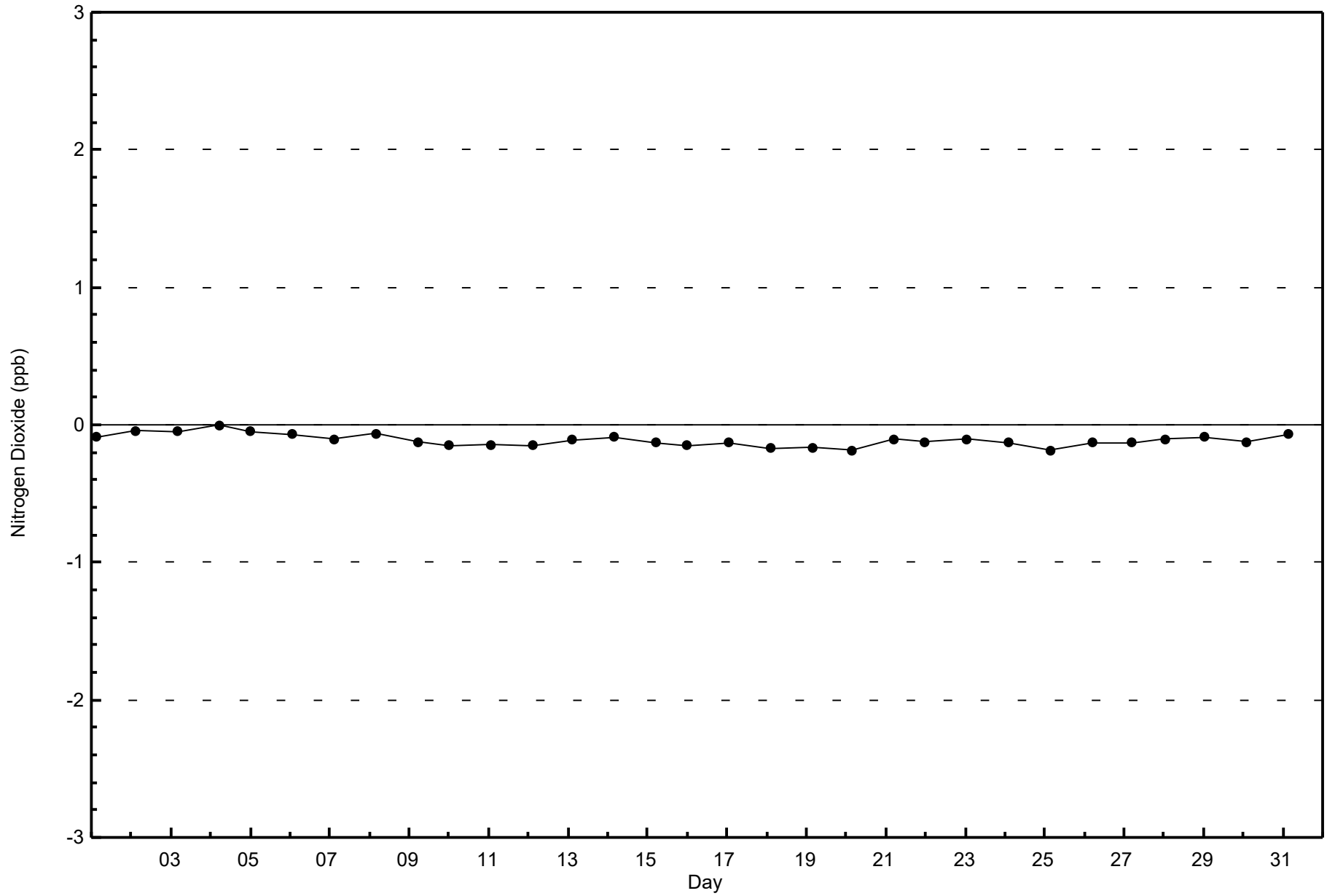
Total Number of Hours: 744

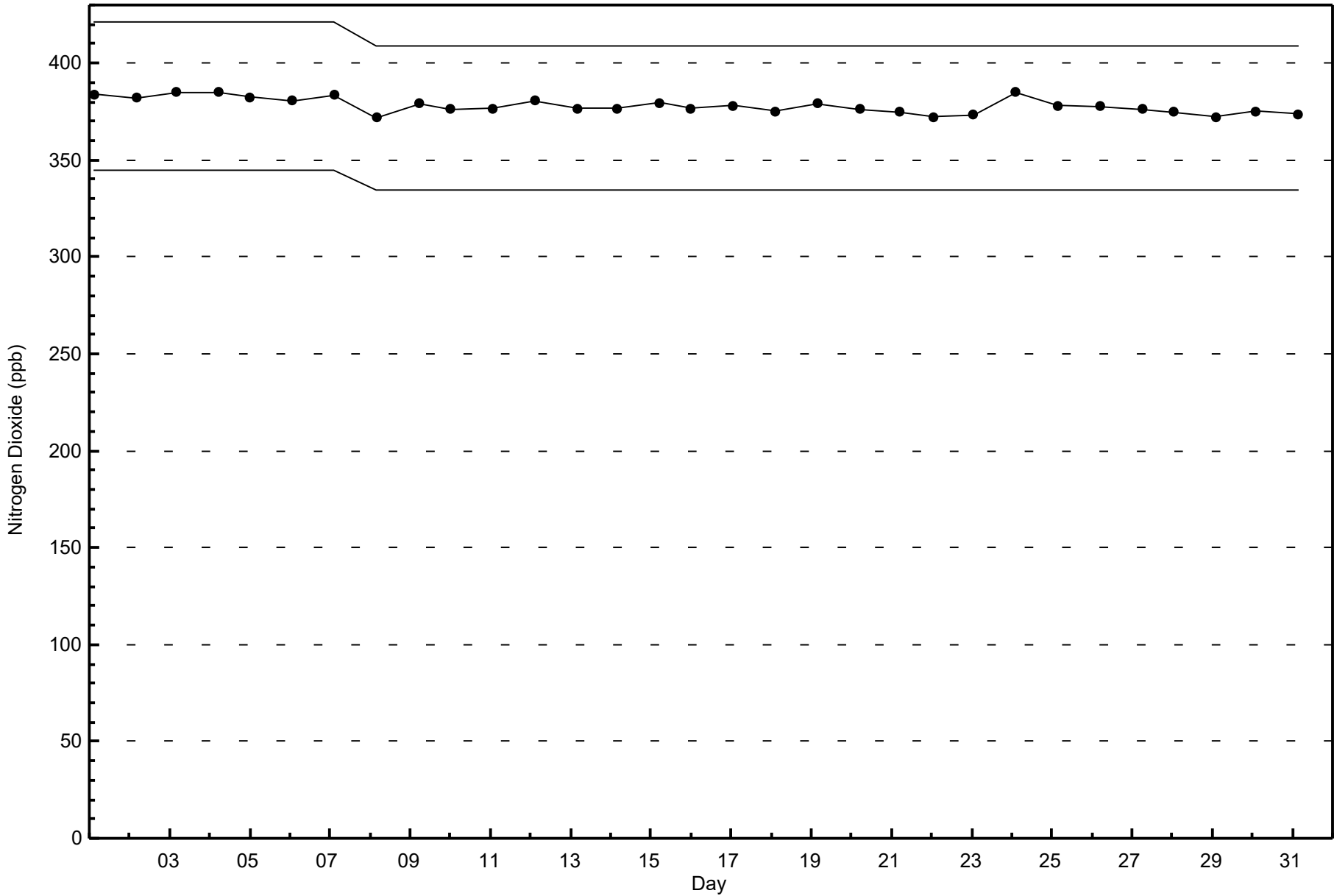


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Nitrogen Dioxide (NO₂) - ppb
Fort Hills









Wood Buffalo Environmental Association
Summary of Hour Averages

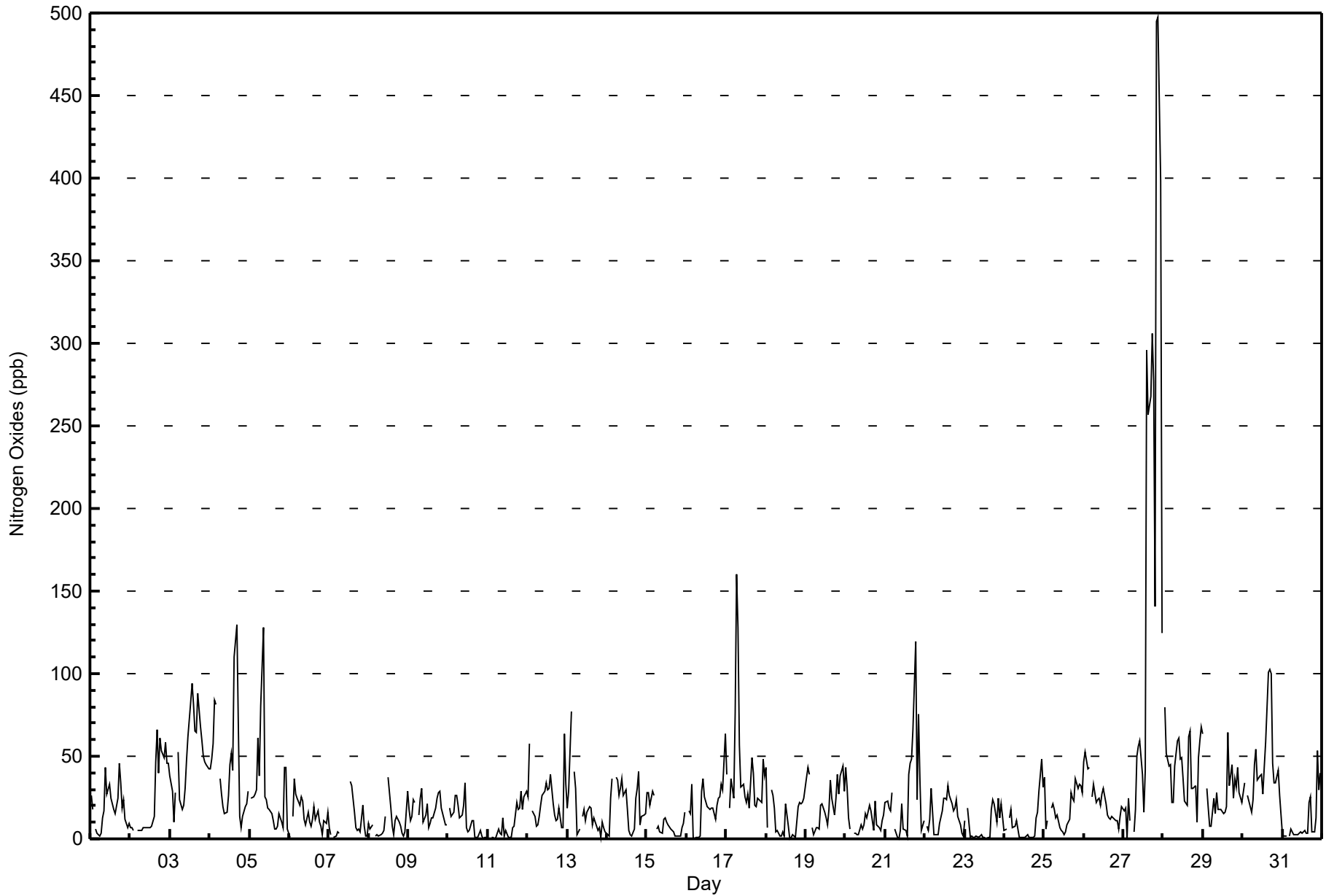
Nitrogen Oxides (NO_x) - ppb
Fort Hills - December 2023

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 497.7 ppb on Dec 27 22:00	Maximum Daily Average: 148.5 ppb on Dec 27		Hours of Data:	705
Minimum Value: 0.2 ppb on Dec 16 06:00	Minimum Daily Average: 8.2 ppb on Dec 23		Hours of Missing Data:	39
Maximum Diurnal Average: 38.7 ppb at hour 22	Minimum Diurnal Average: 17.6 ppb at hour 7		Hours of Calibration:	37
Monthly Average: 25.73 ppb	Percentiles: P ₁ = 0.5 P ₁₀ = 2.1 Q ₁ = 6.5 Median = 17.8 Q ₃ = 29.9 P ₉₀ = 48.4 P ₉₉ = 253.1		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-Dec	26.2	18.0	Z	6.1	3.2	1.6	3.8	12.5	17.3	43.5	27.2	33.3	24.3	21.1	17.4	15.5	24.9	46.2	33.8	18.7	23.4	12.2	6.9	9.6	19.4	46.2
2-Dec	7.2	6.4	4.9	Z	4.8	5.0	5.1	5.5	6.5	6.6	6.8	6.5	6.8	7.9	13.9	47.0	66.1	39.6	61.2	53.0	49.6	58.6	45.8	45.4	24.4	66.1
3-Dec	38.3	28.5	10.1	28.0	Z	52.9	23.3	17.9	20.2	30.1	47.4	61.6	82.7	93.9	81.3	65.0	64.4	88.5	68.2	59.1	50.3	47.0	44.7	42.5	49.8	93.9
4-Dec	42.5	48.2	58.0	83.6	81.0	Z	36.2	26.7	19.7	15.5	16.3	26.5	45.3	51.4	41.5	110.5	129.5	69.5	13.8	7.0	13.6	19.7	21.1	29.2	43.8	129.5
5-Dec	Z	24.8	25.0	27.0	29.8	61.4	37.9	80.9	128.3	25.4	23.6	18.7	17.5	14.9	10.8	5.7	6.0	7.5	15.0	10.5	6.5	43.4	43.6	5.8	29.1	128.3
6-Dec	1.0	Z	13.6	36.4	27.0	24.3	20.6	25.1	23.2	11.7	8.4	16.0	10.3	7.6	12.1	19.9	11.6	16.9	10.4	7.6	2.4	11.2	9.6	15.8	14.9	36.4
7-Dec	6.4	2.8	Z	1.1	1.3	4.3	3.0	C	C	C	C	C	C	34.6	32.6	16.4	6.5	5.3	6.1	3.8	20.3	7.4	1.7	1.8	--	34.6
8-Dec	9.6	5.7	8.3	Z	1.5	2.9	1.6	2.2	3.3	5.3	13.7	M	37.1	18.7	7.3	2.8	11.4	13.6	10.2	7.2	3.5	1.8	4.5	29.0	9.1	37.1
9-Dec	18.0	10.8	13.5	23.4	22.3	Z	14.5	24.6	30.2	10.0	14.5	21.6	6.5	9.0	12.8	12.7	18.2	24.3	27.6	29.1	18.4	11.8	8.2	8.6	17.0	30.2
10-Dec	Z	18.6	13.7	16.1	26.6	26.1	20.3	13.0	14.3	20.2	33.8	6.7	4.0	5.0	11.4	11.1	1.0	0.9	0.5	4.8	1.5	0.3	0.6	1.2	10.9	33.8
11-Dec	0.3	Z	1.2	1.0	0.3	0.9	6.2	3.5	2.5	12.6	2.1	4.8	1.2	0.6	1.3	6.9	7.8	22.2	17.4	18.3	28.9	17.9	25.8	29.0	9.3	29.0
12-Dec	25.0	57.8	Z	16.6	13.9	7.9	8.1	13.4	20.3	26.3	29.0	34.1	29.3	30.2	38.6	21.3	14.1	10.7	11.5	18.7	7.0	6.5	63.3	32.9	23.3	63.3
13-Dec	18.4	29.0	77.1	Z	40.5	30.7	2.9	5.9	M	13.4	18.1	11.4	15.7	19.2	18.8	8.4	12.8	10.2	5.3	6.4	0.9	9.9	6.9	3.8	16.6	77.1
14-Dec	2.2	1.4	24.9	36.6	Z	37.6	35.2	26.1	30.9	36.3	26.1	29.3	18.0	5.1	2.6	1.6	6.1	24.5	30.3	40.5	8.6	13.7	14.4	15.3	20.3	40.5
15-Dec	28.3	28.1	20.1	28.6	26.1	Z	5.6	7.4	4.6	3.3	12.2	12.4	10.1	8.2	5.7	5.3	4.5	2.0	1.8	1.7	1.6	6.4	9.6	16.0	10.8	28.6
16-Dec	Z	16.6	15.6	33.5	0.8	0.2	0.6	1.0	1.9	28.8	36.6	25.3	19.4	19.0	17.8	18.6	18.3	11.9	20.5	24.9	25.7	32.9	29.7	63.2	20.1	63.2
17-Dec	38.9	Z	18.5	36.6	24.7	76.5	160.1	128.2	56.5	31.2	33.0	25.1	22.3	27.4	18.6	49.2	39.5	20.0	19.3	24.8	24.1	22.2	47.9	37.8	42.7	160.1
18-Dec	43.6	7.1	Z	29.6	26.0	18.9	4.1	5.1	2.1	1.7	4.0	2.1	21.2	7.6	0.3	0.6	2.3	1.6	1.0	19.3	22.4	21.4	22.3	24.5	12.6	43.6
19-Dec	37.5	43.2	38.7	Z	6.4	2.8	7.0	7.1	5.6	20.3	21.5	16.2	12.9	8.1	17.5	35.7	24.4	14.1	24.6	39.0	26.9	38.5	43.8	28.5	22.6	43.8
20-Dec	42.9	30.3	12.5	5.6	Z	3.7	3.2	2.3	3.0	8.5	5.8	8.2	15.6	12.4	20.3	17.1	10.8	5.4	22.6	8.1	6.6	5.3	10.8	14.5	12.0	42.9
21-Dec	21.8	23.3	19.0	16.6	28.1	Z	5.9	0.5	0.4	5.2	21.2	6.0	5.0	1.6	39.3	45.5	48.5	66.4	119.9	23.6	75.5	36.0	4.8	11.3	27.2	119.9
22-Dec	Z	7.2	5.3	11.8	30.3	2.4	2.3	2.3	2.8	9.2	16.6	24.2	24.5	23.5	32.3	26.7	21.4	17.0	18.6	23.8	13.3	8.1	3.3	1.9	14.3	32.3
23-Dec	10.6	Z	18.9	1.2	1.3	0.6	1.0	1.5	0.8	1.8	2.4	1.0	0.7	0.3	0.5	1.0	18.2	24.0	21.0	10.4	24.5	12.7	21.3	13.4	8.2	24.5
24-Dec	4.9	6.1	Z	12.9	17.9	7.1	8.0	11.3	5.6	0.6	0.6	0.6	0.8	1.9	2.3	0.9	0.9	1.0	1.7	12.8	16.4	28.9	48.2	31.3	9.7	48.2
25-Dec	37.5	5.7	10.7	Z	19.0	21.4	17.7	13.1	14.3	6.8	5.3	3.9	2.3	3.9	8.8	12.0	28.1	24.4	23.0	36.6	30.5	32.8	32.6	28.2	18.2	37.5
26-Dec	46.5	52.3	42.6	43.2	Z	25.1	32.7	22.2	23.6	24.3	20.1	26.8	30.8	21.2	14.4	13.1	11.9	13.6	12.2	10.9	10.9	5.8	13.8	19.7	23.4	52.3
27-Dec	16.6	18.6	0.7	24.5	11.3	Z	4.4	17.8	49.9	56.1	59.4	38.7	16.0	41.3	295.5	256.9	268.1	305.9	277.4	140.9	495.3	497.7	398.7	124.5	148.5	497.7
28-Dec	Z	79.7	51.3	43.7	44.5	22.4	21.9	43.8	59.5	61.0	48.2	49.4	36.4	22.5	20.5	62.0	65.4	30.5	30.9	31.8	10.3	49.5	59.5	67.6	44.0	79.7
29-Dec	63.9	Z	30.8	18.5	7.7	7.8	24.4	15.0	27.6	17.5	18.1	17.7	15.6	16.2	19.4	64.7	32.1	44.9	24.4	36.6	31.8	43.5	27.8	22.4	27.3	64.7
30-Dec	27.9	33.7	Z	26.0	19.2	15.8	24.0	44.8	53.9	35.5	38.2	39.4	27.3	43.5	58.6	100.7	102.2	100.1	46.0	33.9	33.8	41.7	26.1	14.3	42.9	102.2
31-Dec	2.2	1.8	1.9	Z	2.1	5.8	4.6	2.6	2.7	2.6	3.2	4.6	3.6	5.3	3.2	3.4	22.1	25.5	4.3	4.4	13.0	53.3	29.9	40.2	10.5	53.3

23.8	23.3	21.5	24.3	19.2	17.9	17.6	19.4	21.8	19.1	20.5	19.7	18.8	18.8	28.3	34.1	35.5	35.1	31.6	24.8	35.4	38.7	36.4	26.7	Diurnal Average	
63.9	79.7	77.1	83.6	81.0	76.5	160.1	128.2	128.3	61.0	59.4	61.6	82.7	93.9	295.5	256.9	268.1	305.9	277.4	140.9	495.3	497.7	398.7	124.5	Diurnal Maximum	

Z - zerospan C - Calibration M - Maintenance





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Fort Hills - December 2023**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	405	57.45	57.45
21 - 40	193	27.38	84.82
41 - 80	81	11.49	96.31
81 - 159	14	1.99	98.30
> 159	9	1.28	99.57

Total Number of Valid Hours: 705

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Fort Hills - December 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	5	1	4	5	3	0	12	71	141	72	33	9	24	13	9	3	405
21 - 40	8	15	4	2	1	1	18	43	42	25	16	12	3	0	2	1	193
11 - 80	7	17	1	0	0	3	14	12	19	3	3	0	0	1	0	1	81
81 - 159	1	0	1	0	0	3	4	1	1	3	0	0	0	0	0	0	14
> 159	2	0	1	1	0	0	3	1	0	0	0	0	0	0	0	1	9
Totals	23	33	11	8	4	7	51	128	203	103	52	21	27	14	11	6	702

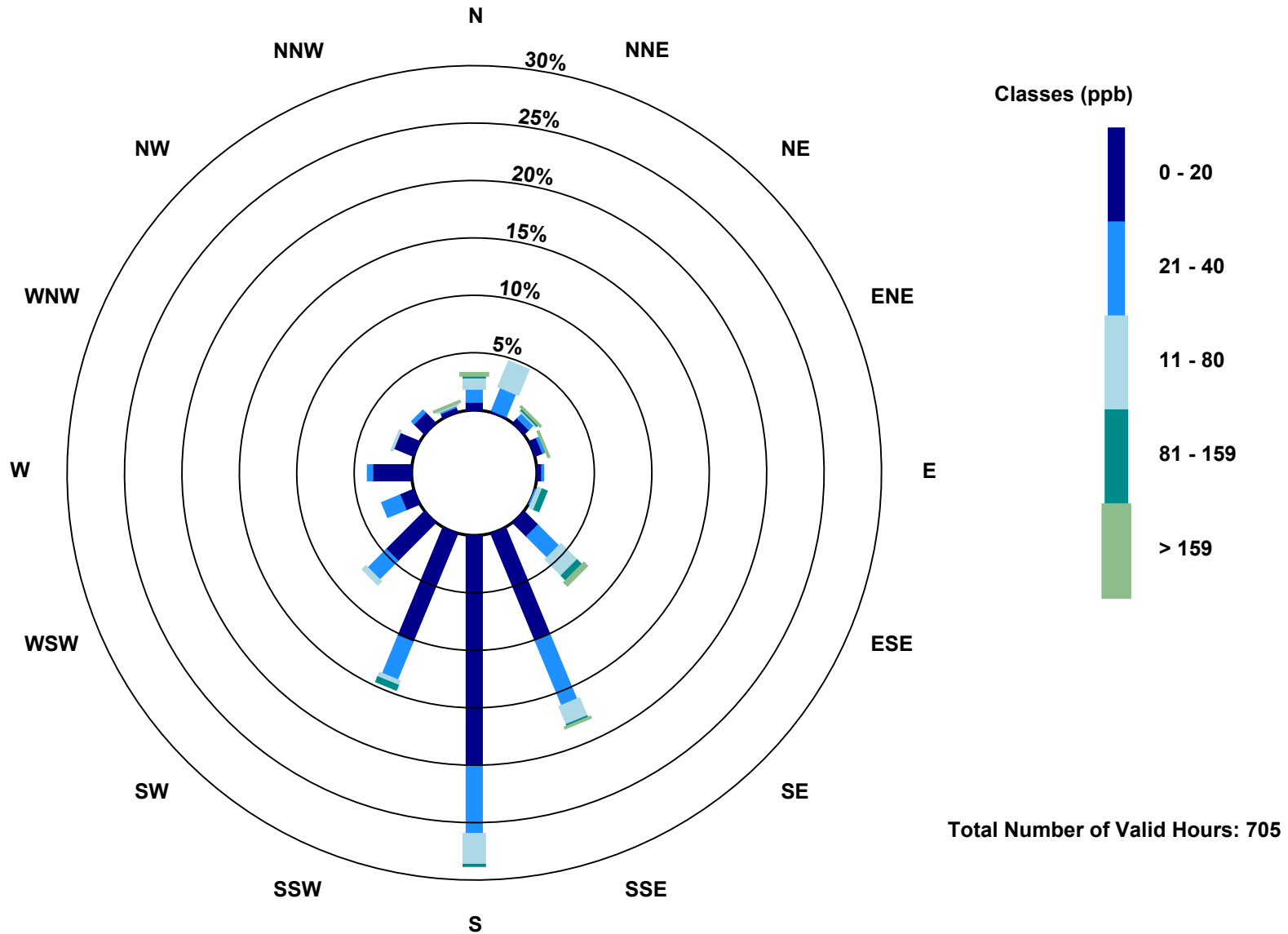
Total Number of Valid Hours: 705

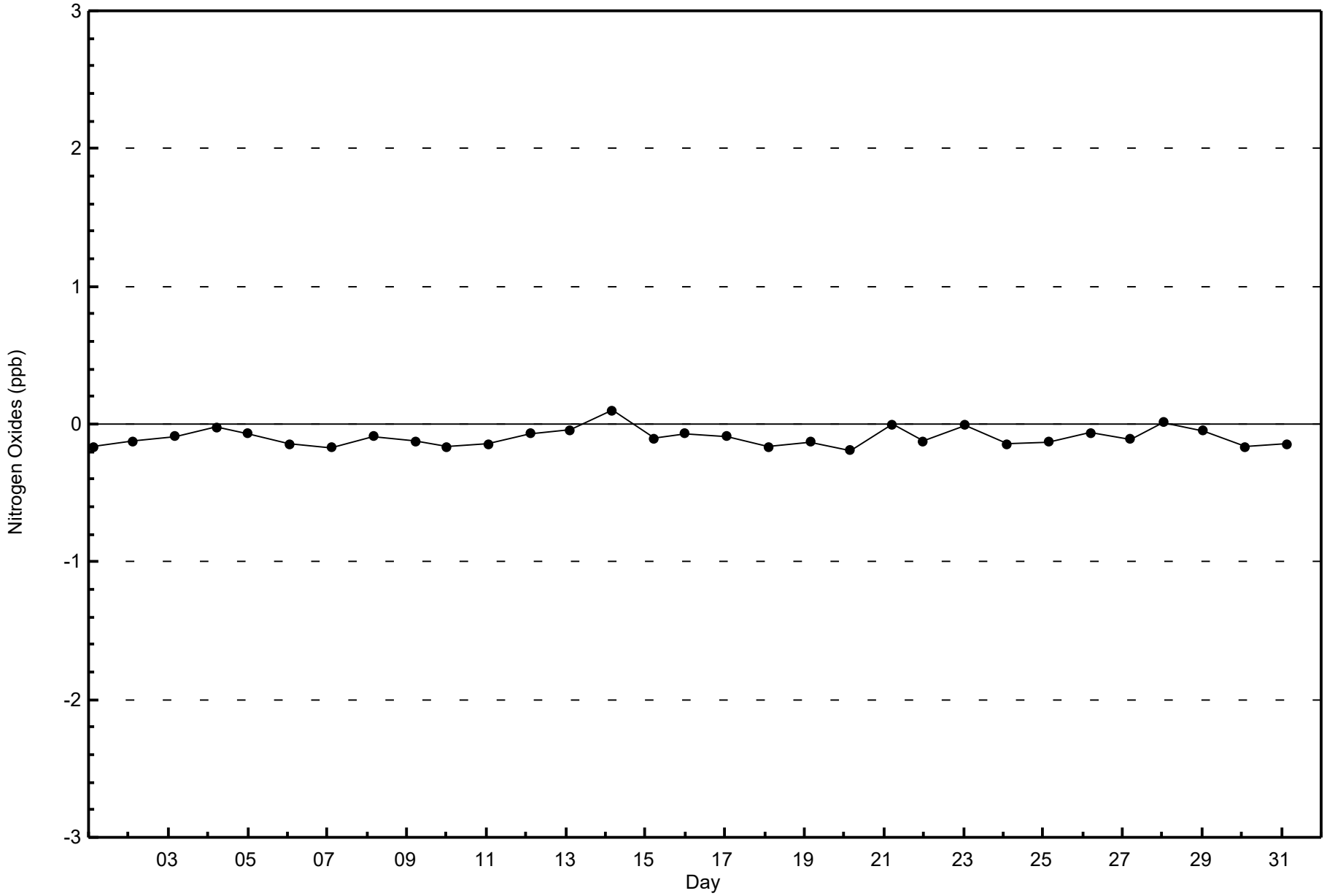
Total Number of Hours: 744

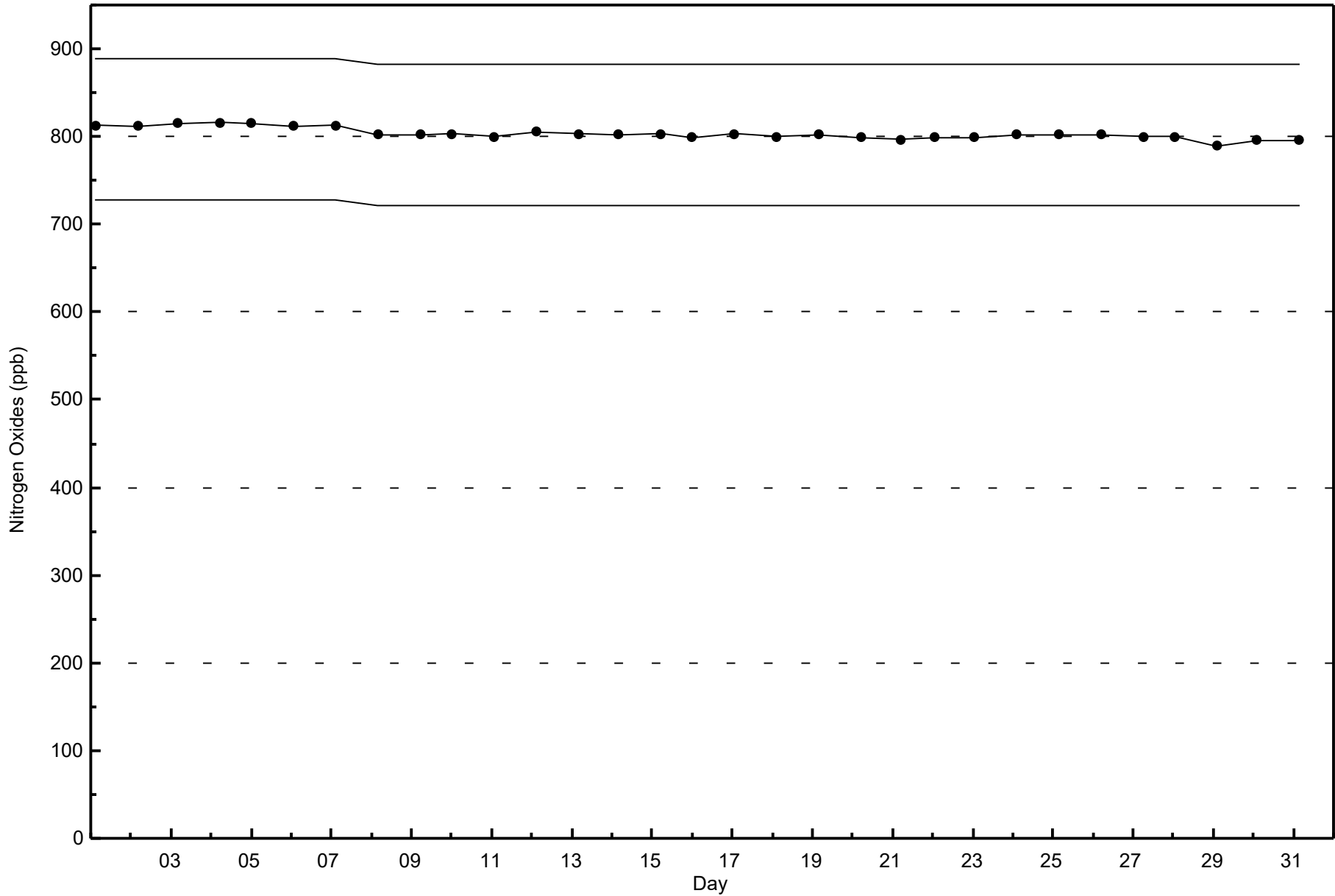


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Nitrogen Oxides (NO_x) - ppb
Fort Hills





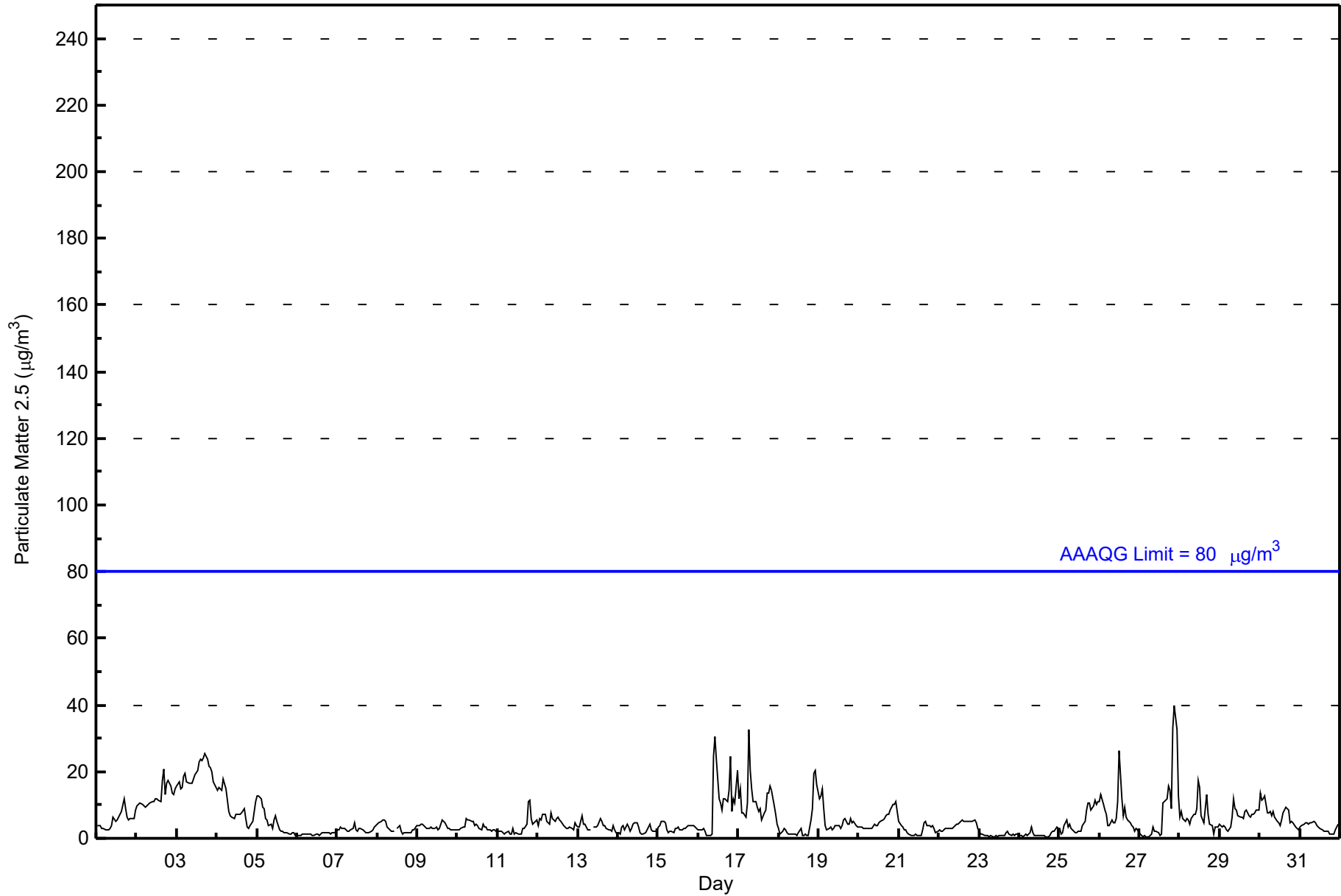




Summary of Hour Averages

Fort Hills - December 2023

Number of Exceedences (AAAQO):		1-hr: 0		24-hr: 0		Hours in Service:															744																											
Maximum Value: 39.7 µg/m ³ on Dec 27 22:00		Maximum Daily Average: 19.3 µg/m ³ on Dec 3		Hours of Data:															742																													
Minimum Value: 0.2 µg/m ³ on Dec 27 06:00		Minimum Daily Average: 1.0 µg/m ³ on Dec 23		Hours of Missing Data:															2																													
Maximum Diurnal Average: 6.9 µg/m ³ at hour 22		Minimum Diurnal Average: 4.5 µg/m ³ at hour 8		Hours of Calibration:															1																													
Monthly Average: 5.59 µg/m ³		Percentiles: P ₁ = 0.6 P ₁₀ = 1.2 Q ₁ = 2.3 Median = 3.7 Q ₃ = 7.0 P ₉₀ = 12.0 P ₉₉ = 24.4		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-Dec	3.6	3.8	3.7	2.8	3.0	2.5	2.4	2.6	2.8	3.9	6.5	5.0	5.7	6.2	7.3	8.1	11.7	8.9	6.5	5.5	5.9	5.9	5.8	8.6	5.4	11.7																						
2-Dec	9.8	10.3	10.5	10.2	9.6	9.3	9.7	10.3	10.6	10.8	11.0	11.9	11.8	11.5	11.2	17.3	20.7	13.2	16.4	17.5	15.8	13.8	13.1	14.9	12.5	20.7																						
3-Dec	15.6	17.1	14.6	15.1	18.6	19.6	16.8	16.6	16.7	16.7	17.8	18.9	20.6	22.9	23.6	23.2	24.3	25.4	23.9	21.8	21.0	19.9	16.9	15.4	19.3	25.4																						
4-Dec	14.6	15.0	14.9	14.6	17.8	14.9	11.3	8.1	6.8	6.4	6.0	7.1	7.2	7.2	7.3	7.8	8.9	5.8	3.3	2.9	3.9	5.1	8.2	11.1	9.0	17.8																						
5-Dec	12.5	12.9	11.7	9.4	8.7	6.1	5.5	3.7	4.2	2.8	5.7	6.8	4.9	2.7	2.2	2.0	1.7	1.6	1.6	1.2	1.1	1.7	1.6	0.8	4.7	12.9																						
6-Dec	0.6	0.7	0.9	1.4	1.3	1.2	1.1	1.3	1.3	1.0	1.0	1.1	1.1	1.0	1.3	1.6	1.7	1.8	1.8	1.6	1.4	1.5	1.5	2.2	1.3	2.2																						
7-Dec	2.4	2.7	3.2	3.0	2.9	2.6	2.1	2.2	2.6	3.1	4.5	2.4	2.1	3.1	3.2	2.7	2.3	1.8	1.7	1.8	2.3	2.7	3.5	3.9	2.7	4.5																						
8-Dec	4.2	4.7	5.2	5.3	5.5	5.0	3.5	2.4	2.0	2.1	2.3	M	3.0	3.6	2.0	1.4	1.7	1.9	1.8	1.6	1.8	2.3	2.7	3.7	3.0	5.5																						
9-Dec	3.8	3.9	4.1	4.2	3.9	3.1	2.8	2.8	3.2	3.1	3.1	3.2	2.7	3.0	4.3	5.7	4.5	3.9	3.0	3.0	2.6	2.5	2.5	2.5	3.4	5.7																						
10-Dec	2.7	2.7	3.0	3.5	3.5	6.1	5.3	5.4	5.1	5.2	3.9	4.1	3.6	2.8	2.4	4.1	3.2	3.2	2.4	2.5	2.1	2.6	2.5	2.0	3.5	6.1																						
11-Dec	2.0	2.0	2.0	1.8	1.5	1.6	2.2	1.5	1.3	3.0	1.2	1.7	1.3	1.2	1.2	3.2	3.0	4.2	11.1	11.3	6.1	4.0	4.6	5.7	3.3	11.3																						
12-Dec	3.7	5.8	5.4	7.2	7.4	5.2	4.6	4.3	7.4	5.9	5.0	5.8	6.4	5.7	5.3	3.7	3.2	3.0	2.9	3.5	2.8	2.5	4.5	3.7	4.8	7.4																						
13-Dec	3.4	3.4	6.7	4.4	4.2	3.6	2.4	2.4	C	3.2	3.6	3.5	3.7	5.8	5.2	3.8	3.8	3.1	2.4	2.4	1.9	3.7	2.5	1.6	3.5	6.7																						
14-Dec	1.6	1.5	3.5	3.9	2.7	4.4	3.5	2.2	3.1	4.4	4.8	4.6	3.4	1.6	1.1	1.6	2.7	3.5	4.2	2.4	2.2	2.3	2.6	2.9	4.8																							
15-Dec	3.3	3.6	5.2	5.1	4.5	2.6	1.9	2.2	2.1	1.9	3.1	2.8	3.6	2.5	2.7	2.8	3.0	3.4	3.9	3.9	3.9	4.0	3.3	2.8	3.3	5.2																						
16-Dec	2.6	2.6	2.5	3.2	2.3	0.9	0.9	0.9	1.4	24.4	30.7	23.9	11.7	10.4	8.4	12.1	11.9	11.2	14.3	24.4	8.0	11.8	10.7	20.2	10.5	30.7																						
17-Dec	11.8	14.7	7.6	7.5	6.3	10.4	32.7	20.5	14.7	11.1	11.1	9.5	8.3	9.0	5.6	7.8	8.5	13.5	13.4	15.6	14.5	9.6	7.0	4.2	11.5	32.7																						
18-Dec	2.8	1.4	2.0	2.9	2.6	1.9	1.4	1.5	1.4	1.3	1.2	1.0	1.7	2.9	0.9	0.7	1.4	1.0	0.7	5.6	9.0	19.7	20.2	15.9	4.2	20.2																						
19-Dec	12.0	12.7	14.7	9.0	3.9	2.7	3.1	3.2	2.7	3.1	3.6	3.8	3.8	3.0	3.8	5.6	5.9	4.0	4.2	5.8	4.5	5.3	3.7	3.4	5.3	14.7																						
20-Dec	3.4	3.4	3.3	3.1	3.1	3.0	2.9	3.0	3.1	4.0	3.9	3.9	4.9	5.0	5.5	5.9	6.8	7.1	7.1	8.7	10.3	10.2	11.0	8.2	5.4	11.0																						
21-Dec	5.2	4.0	3.2	2.5	2.6	1.6	1.3	1.0	0.9	0.8	1.3	0.9	0.9	0.8	2.4	4.5	5.0	4.0	4.0	3.2	4.0	3.2	1.7	2.1	2.5	5.2																						
22-Dec	2.6	2.2	2.3	2.5	2.9	2.8	2.8	3.0	3.1	3.5	4.0	4.2	4.5	4.9	5.4	5.1	5.0	5.0	4.9	5.1	5.2	5.6	4.7	3.1	3.9	5.6																						
23-Dec	2.1	1.3	1.2	1.0	0.6	0.7	0.6	0.8	0.6	0.6	0.8	0.5	0.7	0.7	0.7	0.6	1.8	2.1	1.3	0.9	1.2	0.9	1.3	1.2	1.0	2.1																						
24-Dec	0.8	0.8	0.6	1.0	1.1	1.0	1.6	3.3	1.7	0.7	0.8	0.7	0.7	0.7	0.7	0.7	0.6	0.6	0.9	1.8	2.2	2.2	3.5	3.0	1.3	3.5																						
25-Dec	2.9	1.4	1.5	3.9	5.5	3.6	4.1	2.8	2.6	1.8	1.6	2.2	1.9	2.3	3.8	5.0	8.5	10.4	10.5	8.4	9.7	11.6	10.3	11.2	5.3	11.6																						
26-Dec	10.9	13.3	10.3	8.6	7.4	3.9	3.6	5.6	4.8	4.8	6.0	11.2	26.4	11.7	6.7	9.2	6.3	5.3	4.5	3.8	3.3	2.2	3.1	2.7	7.3	26.4																						
27-Dec	1.1	0.7	0.3	0.7	0.6	0.2	0.8	1.2	3.4	2.3	2.3	1.9	0.9	1.5	10.6	10.9	11.9	15.6	14.2	9.1	32.9	39.7	32.6	12.8	8.7	39.7																						
28-Dec	6.4	8.2	6.1	5.2	5.8	5.3	4.3	6.1	7.2	7.2	8.9	17.2	15.4	7.0	4.6	9.0	13.0	7.2	4.2	3.7	1.2	3.3	3.4	3.6	6.8	17.2																						
29-Dec	4.3	3.4	3.8	3.5	2.5	2.1	3.6	6.5	11.7	9.1	8.5	6.9	6.4	6.2	5.7	8.1	8.4	6.8	6.2	7.0	7.0	7.6	8.6	8.5	6.4	11.7																						
30-Dec	13.7	11.3	11.7	12.7	7.6	7.5	8.1	6.9	8.2	6.5	5.0	4.5	3.7	5.7	7.4	9.3	9.0	8.5	4.8	5.2	4.5	3.3	2.9	2.6	7.1	13.7																						
31-Dec	3.2	3.9	4.3	4.6	4.5	4.4	4.5	4.6	4.9	4.5	3.9	3.6	3.0	2.7	2.2	2.1	2.1	2.0	1.4	1.2	1.4	2.5	3.5	4.1	3.3	4.9																						
																								5.5	5.7	5.5	5.3	5.0	4.5	4.9	4.5	4.7	5.1	5.6	5.8	5.7	5.0	5.0	6.0	6.5	6.1	5.9	6.3	6.3	6.9	6.6	6.1	Diurnal Average
																								15.6	17.1	14.9	15.1	18.6	19.6	32.7	20.5	16.7	24.4	30.7	23.9	26.4	22.9	23.6	23.2	24.3	25.4	23.9	24.4	32.9	39.7	32.6	20.2	Diurnal Maximum
C - Calibration																								M - Maintenance																								
Alberta Ambient Air Quality Guideline/Objectives: 1-hr 80 µg/m ³																								24-hr 29 µg/m ³																								





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Fort Hills - December 2023

Concentration Ranges ($\mu\text{g}/\text{m}^3$)	Number of Hours	%	Cumulative %
0 - 5	501	67.52	67.52
6 - 15	197	26.55	94.07
16 - 25	38	5.12	99.19
26 - 80	6	0.81	100.00
> 81.0	0	0.00	100.00

Total Number of Valid Hours: 742

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - μg/m³
Fort Hills - December 2023

Concentration Ranges (μg/m ³)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	6	7	8	2	2	2	33	82	143	93	54	20	26	12	9	2	501
6 - 15	11	19	2	5	2	3	19	55	61	15	1	1	1	1	0	1	197
16 - 25	8	7	1	0	0	2	3	3	5	0	1	1	0	1	2	4	38
26 - 80	2	1	0	1	0	0	0	1	1	0	0	0	0	0	0	0	6
> 81.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	27	34	11	8	4	7	55	141	210	108	56	22	27	14	11	7	742

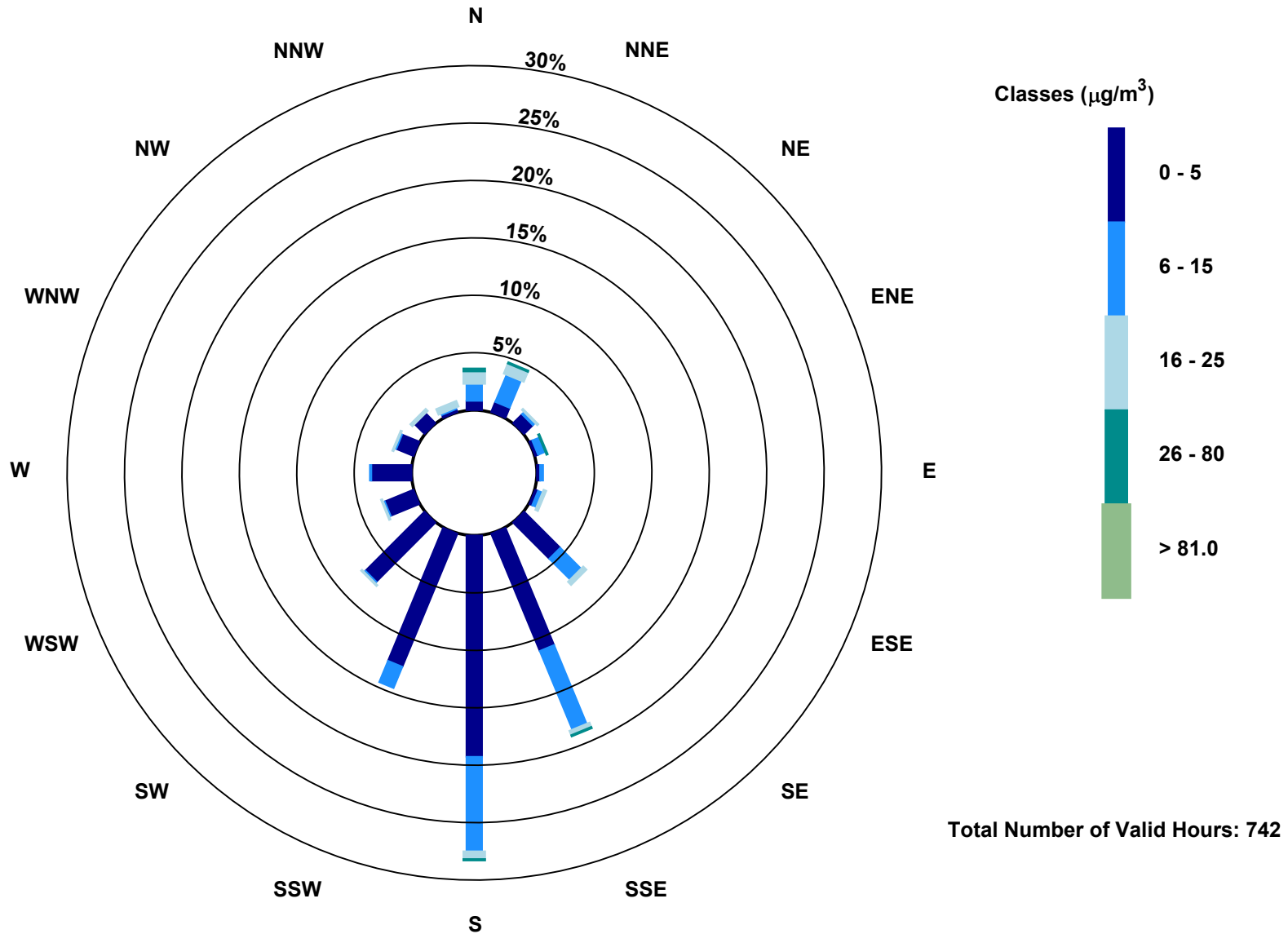
Total Number of Valid Hours: 742

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Dec 2023

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Fort Hills



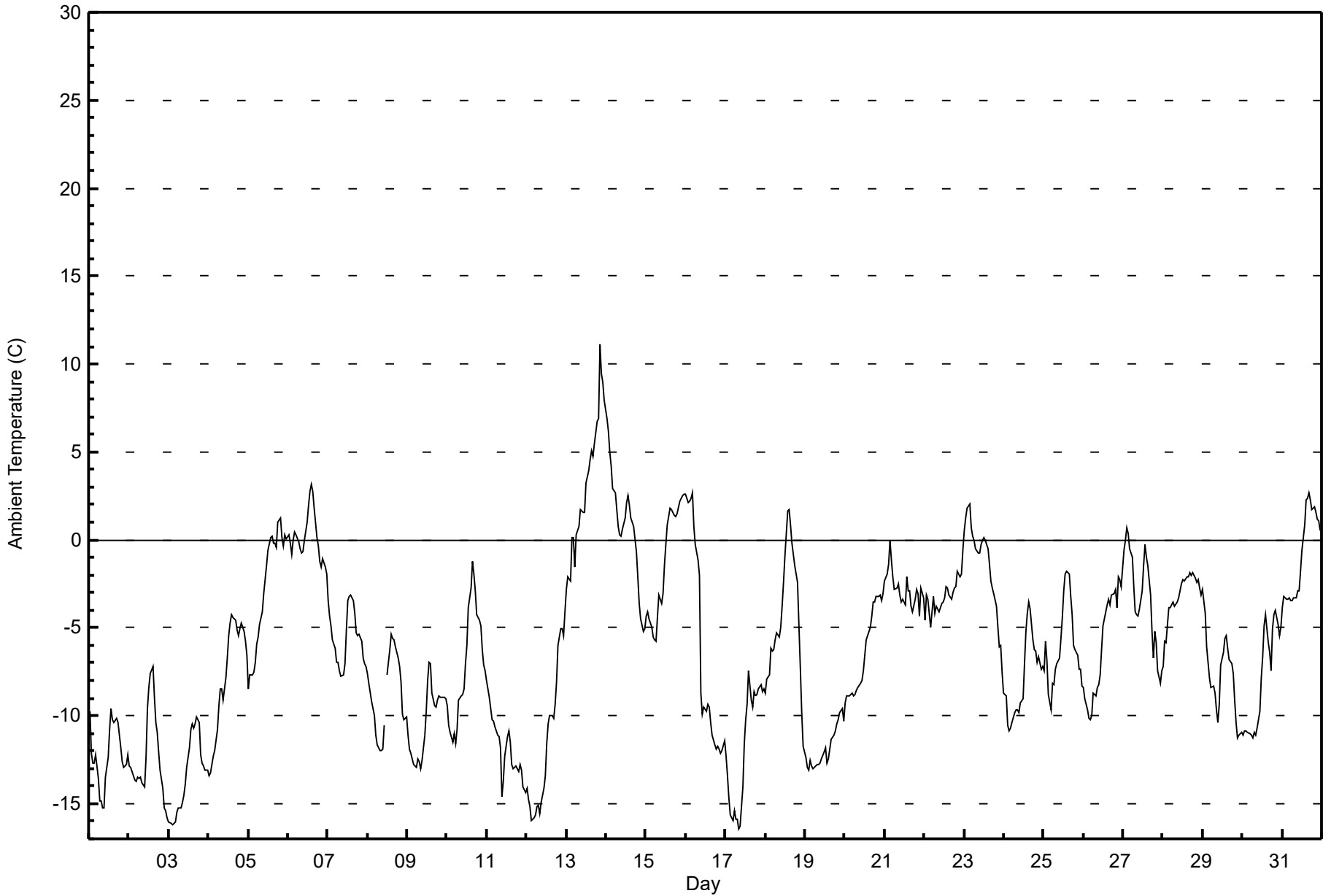


Maximum Value: 11.1 C on Dec 13 21:00		Maximum Daily Average: 3.2 C on Dec 13		Hours in Service: 744																						
Minimum Value: -16.4 C on Dec 17 09:00		Minimum Daily Average: -13.4 C on Dec 3		Hours of Data: 743																						
Maximum Diurnal Average: -3.8 C at hour 15		Minimum Diurnal Average: -7.9 C at hour 10		Hours of Missing Data: 1																						
Monthly Average: -6.18 C		Percentiles: P ₁ = -15.9 P ₁₀ = -12.9 Q ₁ = -10.3 Median = -6.1 Q ₃ = -2.7 P ₉₀ = 0.6 P ₉₉ = 5.9		Hours of Calibration: 0																						
				Percent Operational Time: 99.9																						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Dec	-9.8	-12.1	-12.7	-12.7	-12.2	-13.6	-14.9	-14.8	-15.3	-15.2	-13.5	-12.4	-10.8	-9.6	-10.2	-10.4	-10.1	-10.4	-11.1	-11.8	-12.6	-12.9	-12.8	-12.2	-12.3	-9.6
2-Dec	-12.9	-12.9	-13.2	-13.6	-13.7	-13.5	-13.6	-13.5	-13.8	-14.1	-12.4	-9.6	-8.4	-7.6	-7.2	-9.0	-10.4	-11.0	-12.1	-13.1	-14.2	-15.2	-15.4	-15.8	-12.3	-7.2
3-Dec	-16.1	-16.2	-16.2	-16.1	-16.1	-15.5	-15.2	-15.3	-15.0	-14.5	-13.9	-13.0	-11.8	-10.8	-10.5	-10.7	-10.4	-10.1	-10.4	-12.2	-12.7	-12.9	-13.1	-13.1	-13.4	-10.1
4-Dec	-13.4	-13.2	-12.8	-12.3	-12.0	-10.8	-9.5	-8.5	-8.5	-9.1	-7.9	-6.7	-5.5	-4.8	-4.3	-4.4	-4.5	-5.1	-5.5	-5.1	-4.7	-5.2	-5.8	-6.6	-7.7	-4.3
5-Dec	-8.5	-7.7	-7.7	-7.5	-6.9	-5.9	-5.5	-4.8	-4.1	-3.1	-2.3	-1.5	-0.6	0.1	0.2	-0.2	-0.2	-0.4	1.0	1.2	0.1	-0.3	0.2	0.1	-2.7	1.2
6-Dec	0.3	-0.2	-0.8	0.0	0.5	0.3	-0.1	-0.5	-0.8	-0.7	0.0	1.0	2.0	2.7	3.2	2.7	1.8	0.1	-0.4	-1.2	-1.6	-1.0	-1.6	-1.9	0.2	3.2
7-Dec	-3.4	-4.4	-4.9	-5.7	-6.2	-6.9	-7.0	-7.4	-7.7	-7.7	-7.0	-5.2	-3.4	-3.2	-3.1	-3.5	-4.1	-5.3	-5.5	-5.3	-5.7	-6.7	-7.0	-7.2	-5.6	-3.1
8-Dec	-7.6	-8.2	-9.2	-9.6	-10.0	-11.1	-11.7	-12.0	-12.0	-11.9	-10.5	M	-7.7	-6.2	-5.4	-5.6	-5.7	-6.1	-6.7	-7.2	-8.0	-9.9	-10.2	-10.0	-8.8	-5.4
9-Dec	-11.1	-11.9	-12.1	-12.5	-12.8	-13.0	-12.4	-12.6	-13.0	-12.5	-11.1	-9.7	-8.0	-7.0	-7.0	-8.7	-9.4	-9.5	-9.1	-8.9	-8.9	-8.9	-9.0	-9.0	-10.3	-7.0
10-Dec	-9.4	-10.6	-11.0	-11.5	-11.0	-11.6	-10.8	-9.1	-8.9	-8.8	-8.4	-7.0	-6.0	-3.8	-2.7	-1.2	-1.9	-2.9	-4.2	-4.6	-4.9	-6.3	-7.1	-7.4	-7.1	-1.2
11-Dec	-8.0	-9.0	-9.6	-10.2	-10.3	-10.7	-11.1	-11.2	-11.8	-14.6	-13.7	-12.3	-11.2	-10.8	-11.5	-12.8	-13.1	-12.9	-13.0	-13.2	-12.8	-13.1	-14.1	-14.4	-11.9	-8.0
12-Dec	-14.1	-14.8	-15.2	-16.0	-15.8	-15.6	-15.2	-15.1	-15.6	-14.9	-14.1	-13.4	-11.6	-10.5	-10.0	-10.0	-10.1	-9.4	-8.1	-6.0	-5.0	-5.0	-5.5	-4.1	-11.5	-4.1
13-Dec	-2.8	-2.1	-2.3	0.1	0.2	-1.6	0.3	0.8	1.7	1.6	1.6	1.6	3.2	4.0	4.6	5.1	4.8	5.4	6.8	6.9	11.1	9.4	9.0	7.9	3.2	11.1
14-Dec	6.9	6.2	5.0	4.2	2.9	2.7	1.7	0.7	0.3	0.2	0.6	1.2	2.1	2.5	2.0	1.2	0.7	0.0	-0.6	-2.1	-3.6	-4.5	-5.2	-5.1	0.8	6.9
15-Dec	-4.3	-4.1	-4.5	-5.0	-5.5	-5.7	-5.7	-4.4	-3.1	-3.6	-3.1	-1.5	-0.3	0.9	1.8	1.7	1.6	1.4	1.3	1.5	2.2	2.4	2.5	2.6	-1.3	2.6
16-Dec	2.6	2.1	2.2	2.3	2.6	0.8	-0.3	-1.1	-2.1	-8.7	-9.9	-9.5	-9.8	-9.4	-9.5	-10.4	-11.1	-11.7	-11.9	-11.7	-11.9	-12.2	-12.0	-11.4	-6.3	2.6
17-Dec	-12.3	-13.4	-14.7	-15.7	-15.9	-15.4	-15.9	-15.9	-16.4	-16.3	-14.0	-11.6	-10.2	-9.3	-7.5	-9.1	-9.5	-8.6	-8.8	-8.8	-8.5	-8.3	-8.6	-8.5	-11.8	-7.5
18-Dec	-8.7	-7.9	-7.7	-6.2	-6.3	-6.2	-5.7	-5.3	-5.5	-4.9	-3.8	-2.4	-0.9	1.6	1.7	0.9	-0.2	-0.8	-1.5	-2.4	-4.9	-7.3	-9.9	-11.7	-4.4	1.7
19-Dec	-12.4	-13.0	-13.1	-12.6	-12.9	-13.0	-12.9	-12.8	-12.8	-12.7	-12.5	-12.1	-11.9	-12.7	-12.4	-11.9	-11.4	-11.1	-10.8	-10.5	-10.2	-9.8	-9.6	-10.3	-11.9	-9.6
20-Dec	-9.3	-8.9	-8.9	-8.9	-8.8	-8.8	-8.8	-8.6	-8.4	-8.2	-8.0	-7.4	-6.5	-5.7	-5.2	-4.9	-4.3	-3.6	-3.5	-3.2	-3.2	-3.1	-3.4	-3.1	-6.4	-3.1
21-Dec	-2.4	-1.9	-1.4	0.0	-1.2	-2.1	-2.9	-2.7	-2.5	-3.2	-3.5	-3.4	-3.7	-2.1	-2.9	-2.9	-3.8	-4.1	-3.4	-2.8	-3.1	-4.4	-2.7	-3.3	-2.8	0.0
22-Dec	-4.5	-3.2	-3.4	-4.2	-4.9	-3.2	-4.2	-3.8	-4.0	-4.1	-3.6	-3.5	-3.3	-2.7	-2.7	-3.1	-3.4	-3.0	-2.7	-2.6	-1.8	-2.1	-2.0	-0.6	-3.2	-0.6
23-Dec	0.5	1.3	1.8	2.0	0.7	0.2	0.0	-0.5	-0.8	-0.8	-0.2	0.0	0.1	0.0	-0.5	-1.4	-2.4	-2.8	-3.0	-3.8	-5.0	-6.1	-6.0	-7.5	-1.4	2.0
24-Dec	-8.7	-8.9	-10.6	-10.9	-10.7	-10.4	-9.8	-9.7	-9.7	-9.8	-9.3	-9.0	-7.0	-5.2	-4.2	-3.6	-3.9	-5.7	-6.3	-6.3	-7.0	-6.6	-7.4	-7.2	-7.8	-3.6
25-Dec	-7.4	-5.8	-6.9	-8.8	-9.7	-8.2	-8.3	-7.3	-7.0	-6.8	-5.6	-4.4	-2.9	-2.0	-1.8	-2.0	-3.2	-4.2	-6.0	-6.3	-6.5	-7.3	-7.4	-8.3	-6.0	-1.8
26-Dec	-8.4	-9.0	-9.7	-10.1	-10.2	-10.0	-8.7	-8.9	-8.4	-8.2	-7.7	-6.2	-4.9	-4.1	-3.7	-3.4	-3.7	-3.2	-3.1	-2.8	-3.8	-2.1	-2.3	-2.6	-6.1	-2.1
27-Dec	-0.6	0.0	0.7	0.4	-0.5	-1.0	-2.7	-4.1	-4.3	-4.4	-3.9	-2.9	-1.4	-0.3	-1.0	-1.4	-3.2	-5.2	-6.8	-5.2	-5.9	-7.5	-8.2	-7.5	-3.2	0.7
28-Dec	-7.2	-5.8	-5.8	-3.8	-3.8	-3.7	-3.5	-3.8	-3.5	-3.3	-2.9	-2.5	-2.3	-2.4	-2.1	-2.1	-1.9	-2.0	-1.9	-2.2	-2.4	-2.3	-2.7	-3.1	-3.2	-1.9
29-Dec	-2.8	-4.2	-6.1	-7.0	-7.8	-8.4	-8.3	-8.7	-9.7	-10.4	-9.4	-7.1	-6.4	-5.6	-5.5	-6.2	-6.8	-7.1	-7.6	-9.1	-10.4	-11.2	-11.1	-10.9	-7.8	-2.8
30-Dec	-11.1	-10.9	-10.9	-10.9	-11.0	-11.1	-11.3	-10.9	-11.1	-10.7	-9.7	-7.8	-6.6	-4.9	-4.2	-5.8	-6.4	-7.4	-5.1	-4.3	-4.0	-4.8	-5.5	-5.0	-8.0	-4.0
31-Dec	-3.9	-3.2	-3.4	-3.4	-3.3	-3.4	-3.4	-3.3	-3.3	-2.9	-2.9	-1.8	-0.6	0.8	2.3	2.3	2.7	2.2	1.7	1.8	1.6	1.2	1.1	0.5	-0.9	2.7
																								Diurnal Average		
																								Diurnal Maximum		
M - Maintenance																										



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature (AT) - C
Fort Hills - December 2023





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C
Fort Hills - December 2023**

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	643	86.54	86.54
0 - 10	99	13.32	99.87
10 - 20	1	0.13	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 743

Total Number of Hours: 744



Wood Buffalo Environmental Association
Summary of Hour Averages

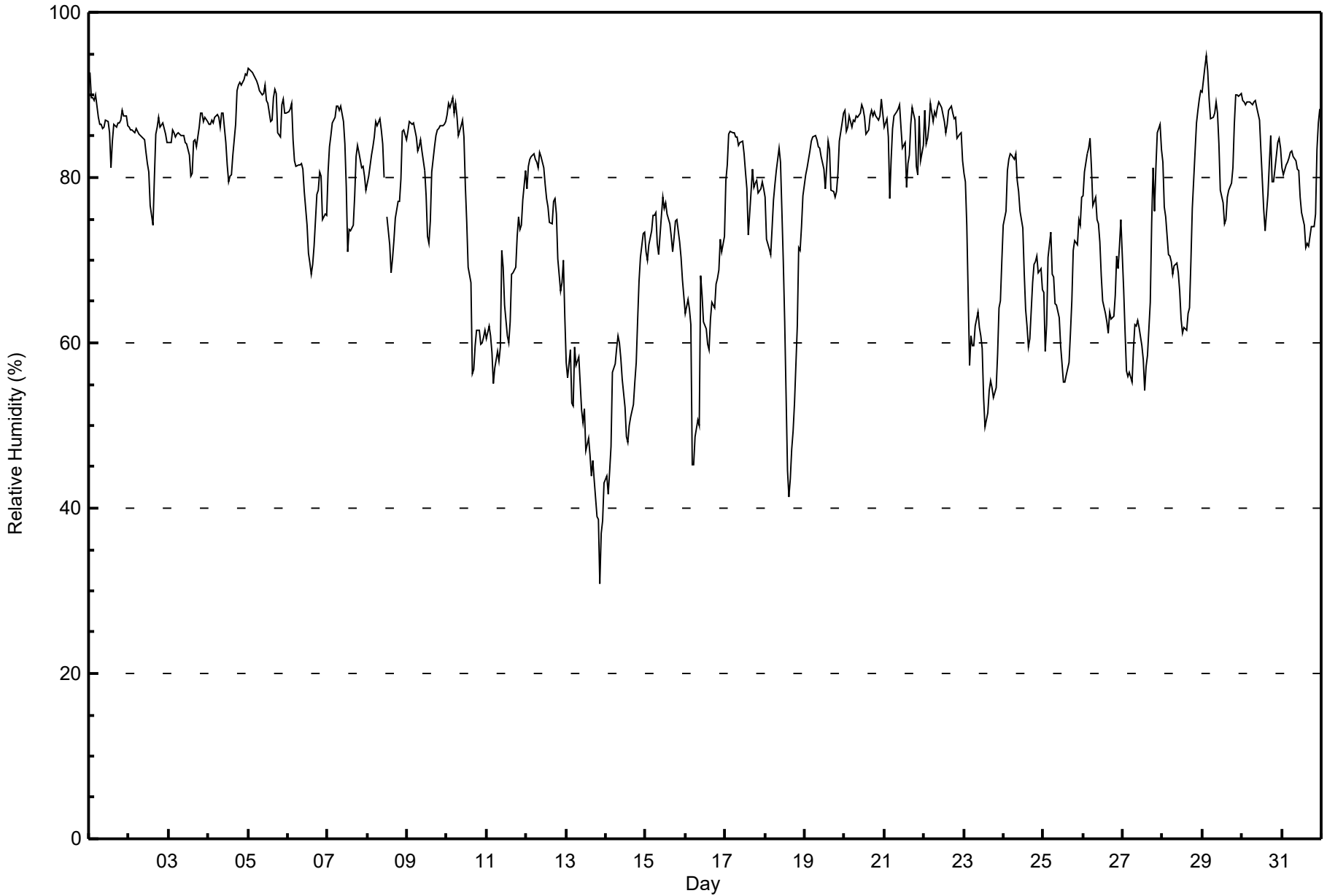
Relative Humidity (RH) - %
Fort Hills - December 2023

Maximum Value: 94.8 % on Dec 29 03:00		Maximum Daily Average: 89.8 % on Dec 5		Hours in Service: 744																							
Minimum Value: 30.9 % on Dec 13 21:00		Minimum Daily Average: 48.5 % on Dec 13		Hours of Data: 743																							
Maximum Diurnal Average: 78.9 % at hour 3		Minimum Diurnal Average: 69.3 % at hour 15		Hours of Missing Data: 1																							
Monthly Average: 76.19 %		Percentiles: P ₁ = 43.2 P ₁₀ = 58.3 Q ₁ = 69.0 Median = 80.2 Q ₃ = 86.0 P ₉₀ = 88.2 P ₉₉ = 92.5		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-Dec	92.8	89.7	89.7	89.3	89.9	87.3	86.4	86.4	85.9	86.1	87.0	86.8	85.4	81.1	84.4	86.4	86.0	86.7	86.6	86.9	88.2	87.5	87.4	86.3	87.1	92.8	
2-Dec	86.1	85.8	85.7	85.5	85.9	85.5	85.2	85.1	84.9	84.5	83.0	81.6	80.6	76.7	74.2	80.0	85.2	86.2	87.3	86.1	86.6	86.0	85.3	84.3	84.0	87.3	
3-Dec	84.3	84.2	85.7	85.5	84.9	85.3	85.3	85.1	85.2	85.1	84.3	84.0	82.7	80.2	80.4	84.3	84.6	83.8	86.2	87.7	87.7	86.8	87.2	86.8	84.9	87.7	
4-Dec	86.4	86.4	87.0	86.6	87.2	87.7	87.2	86.1	87.8	87.9	84.3	81.5	79.6	80.1	80.4	82.8	86.5	90.6	91.2	91.5	91.2	91.9	92.5	92.4	87.0	92.5	
5-Dec	93.3	93.0	92.7	92.4	92.1	91.7	91.2	90.5	90.0	90.2	91.1	89.4	88.9	86.7	87.0	89.7	90.7	90.1	85.4	84.8	88.8	89.4	87.9	87.8	89.8	93.3	
6-Dec	87.9	88.4	89.0	84.7	82.0	81.4	81.6	81.5	81.6	80.9	78.3	74.2	70.8	69.6	68.3	69.5	71.6	78.0	78.5	80.7	80.2	74.8	75.5	75.5	78.5	89.0	
7-Dec	80.6	83.7	85.2	86.6	87.3	88.7	88.6	88.2	88.6	86.8	84.1	78.8	71.1	73.7	73.5	74.3	77.8	82.5	83.9	83.0	81.2	81.3	80.1	78.6	82.0	88.7	
8-Dec	79.3	80.1	82.7	83.7	84.9	86.7	86.3	87.1	85.7	84.1	80.1	M	75.3	71.8	68.5	70.2	72.5	75.2	77.1	77.2	79.8	85.6	85.7	84.5	80.2	87.1	
9-Dec	85.5	86.8	86.6	86.5	86.7	84.9	83.3	83.8	84.5	83.3	80.9	77.8	72.9	72.1	74.7	80.6	83.7	85.0	85.7	85.9	86.3	86.3	86.5	86.8	83.2	86.8	
10-Dec	87.7	89.0	88.4	89.7	87.8	89.0	87.4	85.1	86.2	86.9	85.0	79.0	74.6	69.1	67.2	56.3	56.8	59.7	61.5	61.5	59.8	60.0	60.7	61.5	74.6	89.7	
11-Dec	60.4	62.1	60.8	58.7	55.1	57.0	59.0	57.8	59.5	71.2	69.1	64.5	60.9	60.0	62.6	68.3	68.4	69.1	72.9	75.3	73.8	74.2	77.4	80.9	65.8	80.9	
12-Dec	78.6	81.4	82.2	82.6	82.8	82.1	81.9	81.2	83.1	82.6	81.1	79.2	77.4	76.4	74.6	74.5	77.0	77.4	75.6	70.2	66.3	67.2	70.0	63.2	77.0	83.1	
13-Dec	57.7	55.8	59.2	52.7	52.3	59.4	57.3	58.3	55.1	51.9	50.3	52.0	46.9	48.5	46.4	43.9	45.8	43.5	38.9	38.7	30.9	36.9	38.5	43.0	48.5	59.4	
14-Dec	43.9	41.6	44.5	47.4	56.5	57.5	59.3	60.9	60.0	58.1	55.6	52.2	48.6	48.0	49.9	51.0	52.5	55.2	57.7	62.7	67.5	70.4	73.2	73.3	56.1	73.3	
15-Dec	71.0	69.9	71.9	73.6	75.5	75.5	75.7	72.0	70.7	75.5	77.6	76.2	77.0	75.6	74.5	72.9	70.9	72.6	74.7	74.8	72.2	70.3	67.7	65.5	73.1	77.6	
16-Dec	63.6	65.2	64.1	62.2	45.2	45.2	48.7	50.6	50.0	68.1	65.7	62.5	61.7	59.9	59.1	62.9	64.9	64.3	67.1	67.8	68.8	72.6	71.0	72.9	61.8	72.9	
17-Dec	79.6	81.5	85.3	85.6	85.4	85.4	84.9	85.0	83.9	84.3	84.4	82.9	80.6	78.6	73.0	78.2	81.0	78.8	79.3	79.7	78.1	78.7	79.5	78.7	81.3	85.6	
18-Dec	77.7	72.6	71.3	70.7	73.8	77.3	79.2	80.9	83.5	81.9	75.8	69.9	62.6	44.6	41.3	43.6	47.1	49.3	52.6	62.0	71.6	71.1	74.1	77.8	67.2	83.5	
19-Dec	80.3	81.2	82.2	83.2	84.4	84.9	85.2	84.5	83.8	83.5	82.5	81.0	78.7	81.4	84.5	83.3	78.4	78.4	77.7	78.2	80.4	84.4	86.7	87.9	82.4	87.9	
20-Dec	88.2	85.7	86.1	87.5	86.1	87.0	86.8	87.4	87.2	87.7	88.8	88.2	87.3	85.2	85.8	87.5	88.1	87.5	88.0	87.5	86.9	87.4	89.6	87.7	87.3	89.6	
21-Dec	86.1	87.1	84.9	77.4	82.2	86.0	87.4	87.9	88.3	88.8	86.1	83.5	84.3	78.9	81.7	82.7	86.5	88.5	86.9	81.4	80.4	87.5	82.1	84.0	84.6	88.8	
22-Dec	88.1	84.1	84.8	86.2	88.9	86.9	88.0	87.5	88.4	89.2	88.4	87.6	86.7	85.4	86.5	88.2	88.6	87.9	87.2	87.2	84.7	85.3	85.3	82.0	86.8	89.2	
23-Dec	80.4	79.5	74.2	57.4	60.8	59.7	59.7	62.0	63.8	61.8	60.9	59.3	53.5	49.8	51.5	54.2	55.5	54.6	53.3	54.6	58.7	64.2	65.1	69.8	61.0	80.4	
24-Dec	74.3	75.9	80.9	82.3	82.8	82.8	82.2	82.9	79.6	78.4	75.9	74.0	68.5	64.0	62.0	59.4	60.4	67.3	69.4	69.8	70.6	68.5	69.0	66.5	72.8	82.9	
25-Dec	66.2	59.0	62.2	70.4	73.4	68.3	67.9	64.8	64.6	63.1	59.6	57.4	55.3	55.3	56.1	57.7	61.2	65.1	71.1	72.3	71.9	75.0	74.2	77.6	65.4	77.6	
26-Dec	77.8	80.7	82.9	83.6	84.7	81.1	76.6	77.7	75.0	74.4	72.3	68.1	65.1	63.5	62.5	61.1	63.7	62.8	63.3	65.8	70.5	68.9	71.7	74.9	72.0	84.7	
27-Dec	66.4	61.4	56.6	55.9	56.4	55.3	59.4	62.2	62.0	62.6	61.9	59.6	57.9	54.2	57.1	58.5	64.9	74.6	81.1	75.9	81.1	85.3	86.4	83.5	65.8	86.4	
28-Dec	81.8	76.5	75.2	70.7	70.5	69.8	68.2	69.4	69.7	68.5	66.3	62.8	61.2	61.9	61.5	63.5	64.3	69.8	76.3	83.2	86.6	88.2	89.5	90.5	72.7	90.5	
29-Dec	90.4	93.4	94.8	92.8	89.6	87.0	87.2	87.8	89.1	87.7	84.1	78.5	77.0	74.3	74.9	77.6	78.5	79.3	81.2	86.5	90.0	90.0	89.8	90.2	85.5	94.8	
30-Dec	89.3	89.1	88.8	89.2	89.1	89.0	88.8	89.1	89.4	88.5	86.9	83.2	79.6	76.0	73.6	78.0	81.7	85.1	79.5	79.5	81.1	84.2	84.7	83.6	84.5	89.4	
31-Dec	81.2	80.4	81.5	81.9	82.4	83.1	83.3	82.6	82.1	81.0	80.8	77.6	75.8	74.3	71.5	72.0	71.8	73.0	74.0	74.0	75.7	83.4	86.5	88.4	79.1	88.4	
		78.9	78.4	78.9	78.1	78.3	78.3	78.4	78.4	78.4	78.9	77.2	74.4	71.9	69.6	69.3	70.7	72.5	74.2	75.2	75.9	76.7	78.2	78.7	78.9	Diurnal Average	
		93.3	93.4	94.8	92.8	92.1	91.7	91.2	90.5	90.0	90.2	91.1	89.4	88.9	86.7	87.0	89.7	90.7	90.6	91.2	91.5	91.2	91.9	92.5	92.4	Diurnal Maximum	
M - Maintenance																											



Wood Buffalo Environmental Association
Hourly Averages

Relative Humidity (RH) - %
Fort Hills - December 2023





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Relative Humidity (RH) - %
Fort Hills - December 2023**

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	5	0.67	0.67
40 - 60	92	12.38	13.06
60 - 80	268	36.07	49.13
80 - 100	378	50.87	100.00

Total Number of Valid Hours: 743

Total Number of Hours: 744



Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed (WS) - km/h

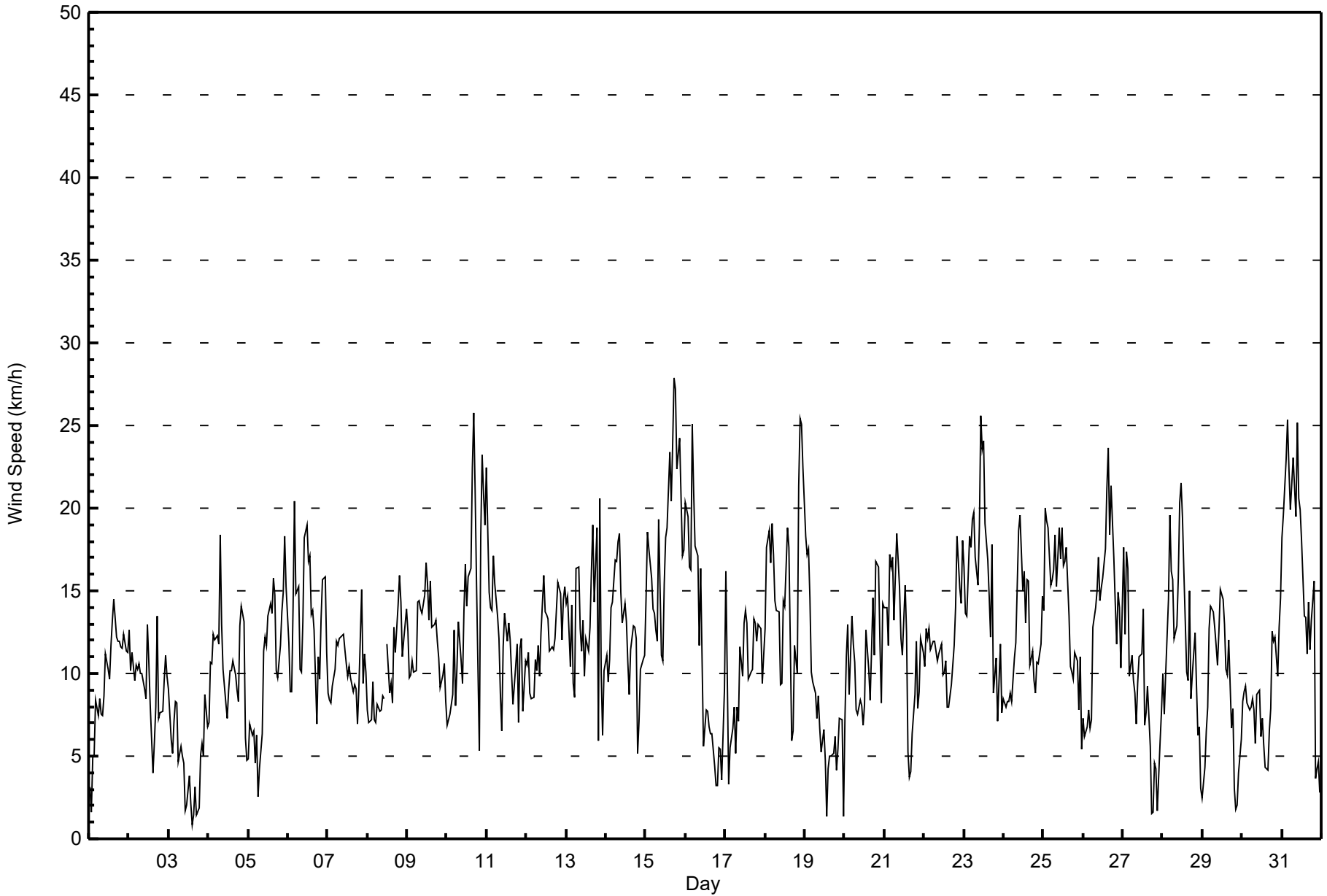
Fort Hills - December 2023

Maximum Speed: 28 km/h on Dec 15 18:00	Maximum Daily Speed Average: 17.2 km/h on Dec 15	Hours in Service: 744
Minimum Speed Value: 1 km/h on Dec 3 15:00	Minimum Daily Speed Average: 0.8 km/h on Dec 3	Hours of Data: 743
Maximum Diurnal Speed Average: 9.6 km/h at hour 13	Minimum Diurnal Speed Average: 4.9 km/h at hour 1	Hours of Missing Data: 1
Monthly Average Velocity: 7.2 km/h 189.0 deg	Percentiles: P ₁ = 2 P ₁₀ = 6 Q ₁ = 8 Median = 11 Q ₃ = 14 P ₉₀ = 18 P ₉₉ = 25	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-Dec	NW3	WSW2	S5	S5	SSE8	S7	S9	S8	S7	SSE9	SSE11	SSE10	SSE10	SSE12	SSE13	SSE15	S12	S12	SSE12	S12	S11	S12	S11	S11	S9.0	SSE15
2-Dec	SSW13	SSW10	SSE11	S10	S11	S10	S11	S10	S10	S9	S8	S13	S11	SSW8	WSW4	NNW6	N8	N13	NNE7	N8	N8	N10	NNE11	N10	S2.7	N13
3-Dec	N9	NNW6	NNW5	N7	N8	N8	NW5	NNW6	NW5	N5	WNW2	SW2	S4	SE2	N1	ESE1	SE3	ESE1	S2	SSE5	S6	SSE5	S9	S7	NNW0.8	N9
4-Dec	S7	S11	S11	SSE12	SSE12	SSE12	SSE12	S18	S13	SSE10	SSE8	SE7	SE9	SE10	SE10	SE11	SE10	SSE9	SSE8	S13	S14	SSE13	S6	SSW5	SSE9.9	S18
5-Dec	SSW5	S7	S6	SE7	SW5	S6	SSW3	SSW4	SSW6	S11	SSE12	SSW12	S14	S14	S14	S16	SSW15	S10	SW10	S12	SSE14	SE15	SSE18	SSW5	S9.7	SSE18
6-Dec	SSW12	S9	SSW9	SW14	SW20	SW15	SSW15	SSW10	SSW10	SSW13	SW18	SW19	SW17	SW17	SW14	SW14	SSW13	SSW7	SW11	S10	S13	SW16	SSW16	SW11	SSW13.1	SW20
7-Dec	SE9	S8	S8	SSE9	SE10	SSE12	SSE12	SSE12	SE12	SE12	SE11	SSE11	SSE10	SE10	SE10	SE9	S9	SSW9	SSW7	SSW9	SW15	S9	SSW11	SSW10	SSE9.0	SW15
8-Dec	SSW8	SE7	SSE7	SSE9	SSE7	S7	S8	S8	S8	SSW9	S9	M	SE12	SE9	SE9	S8	SSW13	SSW11	SW14	SW16	SSW14	SSE11	SSE12	SE14	S8.8	SW16
9-Dec	SSE13	SSE10	SE10	SE11	SE10	SSE10	SE14	SE14	SE14	SE14	SSE15	S17	S15	SSE13	S16	SSE13	S13	SSE13	S12	S11	SSW9	S10	S11	S8	SSE11.8	S17
10-Dec	SSE7	SSE7	S8	S9	SSE13	S8	S10	S13	S11	SSW9	SSW14	SSW17	SSW14	SSW16	SW16	WNW22	W26	W21	NW15	N5	NW18	WNW23	NW21	NW19	WSW8.2	W26
11-Dec	NW22	NNW15	NW14	NW14	WNW17	W15	WSW13	W12	WNW9	S7	S12	SW14	SSW12	S13	S12	SE10	SSE8	S11	S12	S7	S12	SSE12	SSE8	S11	SW5.5	NW22
12-Dec	SSE11	SE11	SSE9	SSE8	SSE9	SSE11	SSE10	S12	SSE10	SSE12	S16	S14	SSW14	S13	SSW11	SSW12	SSW11	S12	SSW14	SSW16	SSW15	S12	SE14	SSE15	S11.3	S16
13-Dec	SE14	SE15	SSE10	SW14	SW9	SE9	S16	S16	SSW13	SSW11	SW13	S10	SSE12	SSE11	S13	S16	S19	S14	SSW19	W6	WNW21	SSW10	WSW6	W10	S10.2	WNW21
14-Dec	NW11	WNW9	WSW11	WSW14	WSW14	WSW17	SW17	SW18	WSW19	WSW15	WSW13	SW14	SSW13	S11	SSE9	SSW11	SW13	SW13	WSW12	SSE5	SSE7	SE10	SE11	SSE11	SW9.5	WSW19
15-Dec	S14	S19	SSE18	SSE16	SSE14	SSE14	SSE13	S12	SSW19	S11	S11	S15	S18	S19	S23	S20	SSW24	SSW28	SSW27	SSW22	SSW24	SW21	SW17	SW17	SSW17.2	SSW28
16-Dec	SW20	WSW20	WSW16	WSW16	WNW25	WNW21	W18	W17	NW12	NNE16	NNE11	NE6	ENE8	ENE8	ENE7	E6	ENE6	E4	N3	WSW3	SSW5	SSW5	S4	NNE9	WNW4.4	WNW25
17-Dec	NNE16	N10	WNW3	S6	S7	SE8	SSE5	SE8	SSE7	SSE12	SSE10	S13	S14	SSE13	SSW10	SE10	SSE10	SSE13	SSE13	S12	S13	SSE13	SSE9	SSW11	SSE7.5	NNE16
18-Dec	SSW13	SW18	SW19	WSW17	WSW19	SW17	SSW14	SSW14	SSW14	S9	S9	SSW14	WSW14	WNW19	WNW18	W12	WNW6	W7	W12	NNE10	NNE21	NNE25	NNE25	NNE22	W6.0	NNE25
19-Dec	NNE18	NNE17	NNE18	NNE15	N10	NNW10	N9	NE7	NE9	NE7	NE5	NE7	ENE5	S1	N4	NNE5	ENE5	E5	SE6	SSE4	ESE5	SE7	SE7	E1	NE5.6	NNE18
20-Dec	SE7	SE11	SSE13	SSE9	SSE13	SSE12	SSE11	S8	S8	S8	S8	S7	S8	S13	S10	S8	S11	S15	SSW11	S17	S16	S12	S8	SSW14	S10.4	S17
21-Dec	SW14	SW14	SW12	WSW17	SW16	SW17	SSW13	SW18	SW17	SW15	SW12	SSE11	SSE15	S12	SSE5	SE4	S4	SW6	SSW9	SSE12	SSE8	SSW9	S12	S11	SSW10.4	SW18
22-Dec	SSE10	SSW13	SSW12	S13	SSE11	SSE12	SSE12	S11	S11	S11	S12	S10	S10	S11	SSW8	SSW8	SSW9	S11	S12	S14	S18	S15	SSW14	SSW18	S11.6	S18
23-Dec	SSW16	SSW14	WSW14	W18	W18	W19	W20	W17	W15	W19	W26	W24	W24	W19	W17	W15	WSW12	W18	W9	SW11	SW7	SSW10	SW12	SSW8	W14.6	W26
24-Dec	SSW8	SSW8	S8	S8	SSE9	S8	S11	SSE12	SSW15	SSW19	S20	S15	SSW16	SSW13	SSW16	SW16	SSW11	S11	SSE10	SSE9	SSE11	S11	SSE12	SSE15	S11.5	S20
25-Dec	SE14	S20	SSE19	SSE19	SSE15	SSE16	S16	S18	S15	S19	S17	S19	S16	S17	S18	S13	S10	SSE10	SE10	SE11	SSE11	SSE8	SSE11	SSW5	S14.0	S20
26-Dec	SSE7	SSE6	S7	S8	S7	S7	S13	S14	S15	S17	S14	S15	S16	SSE18	SSE21	SSE24	SSE18	S21	SSE17	SSE14	SSE12	S15	S14	SSW10	S13.4	SSE24
27-Dec	SW18	SW12	SW17	SW16	SSW10	SSW11	S10	SSE9	S7	SW9	SSW11	SSW11	SSW14	S7	SE8	SE9	SE6	NNW2	NE2	NE5	N4	ENE2	N6	N8	SSW5.9	SW18
28-Dec	N10	N8	NNE10	NNE15	NNE20	NNE16	NE16	NNE12	NNE13	NNE16	NNE20	NNE22	NNE19	N16	N10	NNE10	NNE15	NNE8	N10	NNE12	N9	NNE6	NNE7	NNE3	NNE12.4	NNE22
29-Dec	ESE2	SW4	SSW7	SSE8	S13	S14	S14	S13	SSE12	SSE10	SSE13	S15	SSE14	S13	SSE10	SE10	SE12	SE7	SSE8	N3	W2	ESE2	SSE4	SSE6	SSE8.1	S15
30-Dec	SSE8	SSE9	SE9	SSE8	S8	SSE8	SSE8	S8	S6	SSE9	SE9	S6	SSW7	S6	SSW4	ESE4	ESE7	SSW8	S13	S12	SSW12	S10	SSW13	SSW15	S7.9	SSW15
31-Dec	SSW18	S20	S23	S25	S22	S20	S21	S23	S19	S25	S21	SSE20	SSE18	SSE13	S13	SSW11	SW14	SSW11	S13	SW16	SSW4	NE4	NE5	ENE3	S14.6	S25

SSW4.9	SSW6.3	S6.9	SSW6.7	SSW6.2	SSW6.9	S8.3	S8.9	SSW7.9	S8.0	S8.6	S9.4	S9.6	S8.6	S7.8	S7.0	S7.2	SSW7.4	SSW7.4	S6.8	SSW6.4	S6.1	S5.6	SSW5.3	Diurnal Average
NW22	S20	S23	S25	WNW25	WNW21	S21	S23	S19	S25	W26	W24	W24	W19	S23	SSE24	W26	SSW28	SSW27	SSW22	SW24	NNE25	NNE25	NNE22	Diurnal Maximum

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





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h
Fort Hills - December 2023**

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	67	9.02	9.02
6 - 11	314	42.26	51.28
12 - 19	316	42.53	93.81
20 - 28	46	6.19	100.00
29 - 38	0	0.00	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 743

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed (WS) - km/h
Fort Hills - December 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	7	2	5	4	3	6	3	7	7	9	3	3	1	2	3	2	67
6 - 11	18	11	5	4	1	1	39	69	98	46	8	2	4	3	1	4	314
12 - 19	2	14	1	0	0	0	13	62	91	50	41	16	16	4	5	1	316
20 - 28	0	7	0	0	0	0	0	3	14	4	4	1	6	5	2	0	46
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	27	34	11	8	4	7	55	141	210	109	56	22	27	14	11	7	743

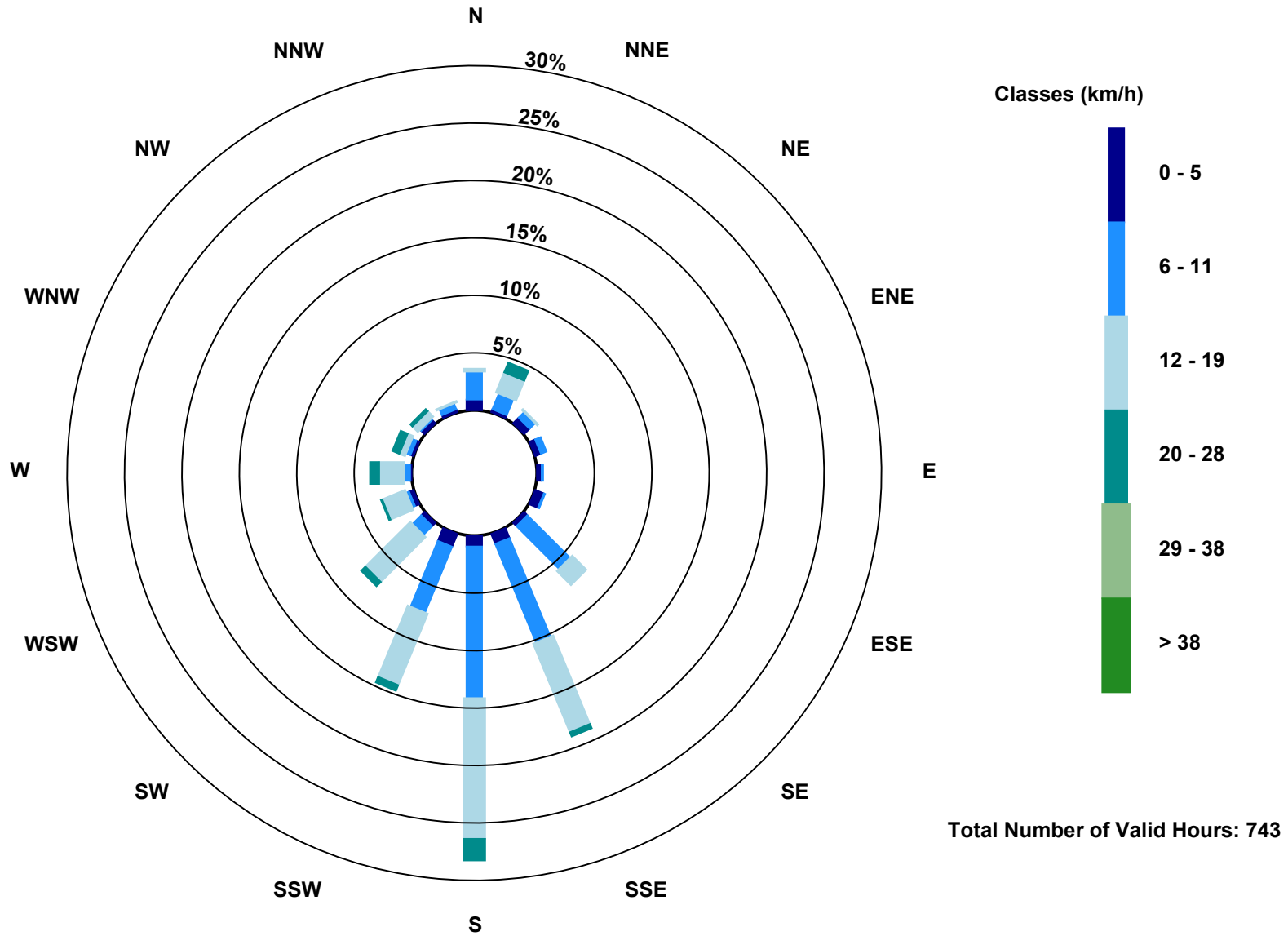
Total Number of Valid Hours: 743

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Dec 2023

Wind Speed (WS) - km/h
Fort Hills





Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Speed (WS) - km/h
Fort Hills - December 2023

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 10 km/h on Dec 10 16:00 Minimum Value: 1 km/h on Dec 8 09:00 Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 1 Median = 2 Q ₃ = 3 P ₉₀ = 4 P ₉₉ = 6																	Hours in Service: 744 Hours of Data: 743 Hours of Missing Data: 1 Hours of Calibration: 0 Percent Operational Time: 99.9									
Day	Hourly Period Ending At (MST)																								Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Dec	1	2	1	1	1	1	2	1	1	1	1	1	2	2	2	2	1	1	1	1	1	1	1	1	2	4
2-Dec	1	1	1	1	1	1	2	1	1	1	2	2	2	2	1	2	3	2	4	1	2	1	2	2	4	4
3-Dec	1	1	1	1	2	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1	2	1	2	2
4-Dec	1	2	2	2	2	1	2	3	2	2	2	1	1	1	1	2	1	2	2	2	2	2	4	2	4	4
5-Dec	2	2	1	2	2	1	1	1	3	2	3	3	2	3	3	2	3	4	6	3	2	2	2	2	6	6
6-Dec	2	2	2	4	4	3	3	3	2	2	2	2	3	3	3	2	3	3	1	3	3	3	2	4	4	4
7-Dec	3	2	2	1	2	1	1	1	2	1	2	1	1	1	1	1	1	2	2	3	2	3	3	3	3	3
8-Dec	2	1	2	1	1	2	2	1	1	2	1	M	1	1	1	2	2	1	2	2	3	2	2	2	3	3
9-Dec	2	1	1	1	3	2	1	1	1	1	2	2	3	3	2	2	1	2	1	2	1	1	1	1	3	3
10-Dec	1	2	2	2	2	2	3	2	2	2	3	3	2	3	3	10	5	9	5	3	6	5	5	4	10	10
11-Dec	6	4	5	5	4	3	2	2	3	2	1	2	2	2	2	1	2	1	2	2	1	1	2	2	6	6
12-Dec	2	1	1	1	1	1	1	1	3	3	3	2	2	2	1	1	1	1	2	2	3	2	1	2	3	3
13-Dec	2	3	2	2	4	2	2	2	2	4	3	2	2	1	2	2	4	3	4	4	7	5	3	2	7	7
14-Dec	3	1	1	2	3	3	2	3	3	3	4	2	2	3	3	2	2	2	2	2	1	2	2	2	4	4
15-Dec	4	2	3	2	1	1	1	3	5	2	1	3	3	3	3	3	3	3	4	4	5	4	3	3	5	5
16-Dec	3	3	2	5	7	5	4	4	3	3	5	3	2	1	1	3	3	3	1	2	1	1	2	5	7	7
17-Dec	3	3	2	2	1	1	2	3	3	2	1	2	1	2	2	1	1	1	3	2	2	1	2	1	3	3
18-Dec	2	3	3	3	3	2	2	2	2	2	3	3	2	5	5	4	2	3	2	7	4	5	4	4	7	7
19-Dec	4	3	3	3	3	2	2	2	1	1	1	1	2	1	1	1	1	1	1	1	2	2	1	1	4	4
20-Dec	2	3	3	2	2	2	1	1	1	1	1	2	3	1	1	1	2	2	2	3	3	3	2	2	3	3
21-Dec	3	3	2	3	2	2	3	3	3	2	2	2	2	3	2	2	1	2	1	2	3	2	1	3	3	3
22-Dec	1	2	1	2	2	1	2	2	1	1	2	1	2	1	2	3	1	2	1	2	3	2	2	4	4	4
23-Dec	3	3	3	5	3	5	4	4	3	5	4	4	5	5	3	3	2	3	3	4	4	4	6	3	6	6
24-Dec	2	2	2	2	2	2	1	1	5	3	3	2	3	3	3	3	2	1	1	1	1	2	2	5	5	5
25-Dec	2	6	4	3	3	3	3	3	2	4	3	3	3	2	3	2	2	2	2	2	3	3	3	1	6	6
26-Dec	2	1	1	1	2	2	1	2	2	2	2	2	2	2	4	3	3	3	2	1	1	3	4	5	5	5
27-Dec	2	2	3	2	2	2	2	2	1	1	1	3	1	2	2	2	2	2	1	1	1	1	2	1	3	3
28-Dec	4	6	4	4	7	5	3	4	3	3	4	5	6	3	2	3	3	3	3	3	2	2	1	2	7	7
29-Dec	1	1	1	1	2	1	1	2	3	3	2	2	3	2	1	1	2	2	3	2	1	1	1	1	3	3
30-Dec	2	2	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	2	1	1	2	2	3	3	3
31-Dec	2	3	3	4	3	2	2	4	3	3	2	2	2	2	2	2	2	2	2	2	4	4	3	2	4	4
																	Diurnal Maximum									
M - Maintenance																										



Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
Fort Hills - December 2023

Direction of Maximum Speed: 201 deg on Dec 15 18:00	Hours in Service: 744
Direction of Maximum Daily Speed Average: 193.2 deg on Dec 15	Hours of Data: 743
Direction of Minimum Speed: 5 deg on Dec 3 15:00	Hours of Missing Data: 1
Direction of Minimum Daily Speed Average: 0.8 deg on Dec 3	Percent Operational Time: 99.9
Monthly Average Direction: 189.0 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-Dec	317	241	184	170	156	179	185	180	173	149	148	148	165	164	158	163	179	187	166	180	188	186	176	177	171.5
2-Dec	192	200	162	169	174	184	187	185	181	183	177	171	177	208	244	345	355	9	16	1	360	351	17	8	182.2
3-Dec	7	330	340	357	1	4	320	339	321	354	297	219	176	129	5	118	131	112	176	168	189	168	178	181	341.8
4-Dec	176	175	176	156	151	156	167	170	172	163	163	142	127	134	129	125	128	160	158	183	182	162	181	203	160.0
5-Dec	210	177	186	145	217	180	207	206	199	177	167	194	175	176	179	191	197	185	220	178	155	137	147	164	177.0
6-Dec	194	191	202	225	233	232	210	201	198	198	215	218	215	218	224	221	213	198	215	187	187	222	206	221	212.3
7-Dec	139	171	190	155	141	147	147	150	141	142	141	154	163	133	133	137	170	206	203	207	220	191	207	206	165.2
8-Dec	203	139	164	158	157	189	181	182	174	199	180	M	137	146	146	181	213	207	216	219	208	149	149	140	177.7
9-Dec	151	149	140	143	146	148	145	146	145	143	153	175	182	168	177	168	173	166	182	184	195	182	185	183	163.4
10-Dec	154	168	180	185	161	184	179	179	191	208	201	196	201	209	224	282	275	279	304	350	312	303	308	317	244.6
11-Dec	320	327	325	316	302	276	253	268	282	172	184	218	193	181	169	139	164	186	183	180	174	160	147	180	226.6
12-Dec	158	145	160	147	163	165	166	172	163	168	170	187	192	189	202	211	192	180	193	204	203	170	131	148	175.4
13-Dec	144	146	160	214	218	134	178	172	205	197	216	176	168	160	172	185	179	178	199	262	294	206	252	266	190.3
14-Dec	323	290	254	248	258	247	236	229	244	245	248	231	201	186	156	202	227	226	238	154	150	140	142	165	225.8
15-Dec	183	180	168	164	163	160	160	190	212	188	184	189	188	184	181	188	197	201	204	208	218	223	217	226	193.2
16-Dec	231	239	241	252	301	296	270	268	312	14	27	35	63	58	63	81	77	101	11	255	198	199	176	16	288.3
17-Dec	16	6	283	183	170	130	151	142	162	149	157	172	176	150	204	144	160	167	166	188	180	164	167	211	164.6
18-Dec	213	217	223	239	241	225	209	212	199	183	185	210	240	290	297	281	286	279	281	32	31	23	21	17	259.2
19-Dec	20	20	24	27	356	348	3	37	46	52	47	48	69	169	349	14	73	100	129	147	113	146	145	89	39.5
20-Dec	130	146	155	158	161	161	160	179	183	181	170	175	182	180	183	189	185	183	197	175	172	185	188	195	174.4
21-Dec	227	229	225	252	231	220	208	215	215	216	214	167	151	184	151	131	174	224	196	164	158	206	185	174	203.7
22-Dec	166	207	199	174	152	166	164	184	190	169	177	182	172	182	195	204	193	189	181	177	186	172	194	203	182.6
23-Dec	208	212	244	277	267	272	269	270	267	272	266	271	271	278	276	271	252	274	274	216	224	211	234	211	259.5
24-Dec	197	192	172	172	150	174	185	164	199	199	189	178	200	202	202	215	194	182	167	156	162	181	157	159	183.6
25-Dec	146	181	165	151	149	166	174	177	172	189	181	189	189	173	179	180	170	160	142	134	158	168	158	201	170.0
26-Dec	155	168	173	172	180	188	179	183	189	189	186	186	182	165	160	168	165	173	164	158	148	187	181	213	174.9
27-Dec	220	216	216	218	212	212	179	162	186	217	204	206	200	176	143	146	127	334	36	49	360	64	358	352	200.1
28-Dec	0	7	21	28	15	30	38	23	24	16	23	20	25	9	2	17	21	20	11	12	3	18	28	24	19.1
29-Dec	121	235	206	162	176	179	181	181	162	155	160	184	168	174	150	140	144	137	148	358	277	107	149	164	166.5
30-Dec	160	150	145	165	177	165	148	174	174	151	143	191	200	184	195	118	122	199	186	185	194	190	205	203	175.1
31-Dec	207	189	171	183	183	182	170	178	179	191	177	167	166	161	173	197	226	199	186	221	208	35	51	58	182.8

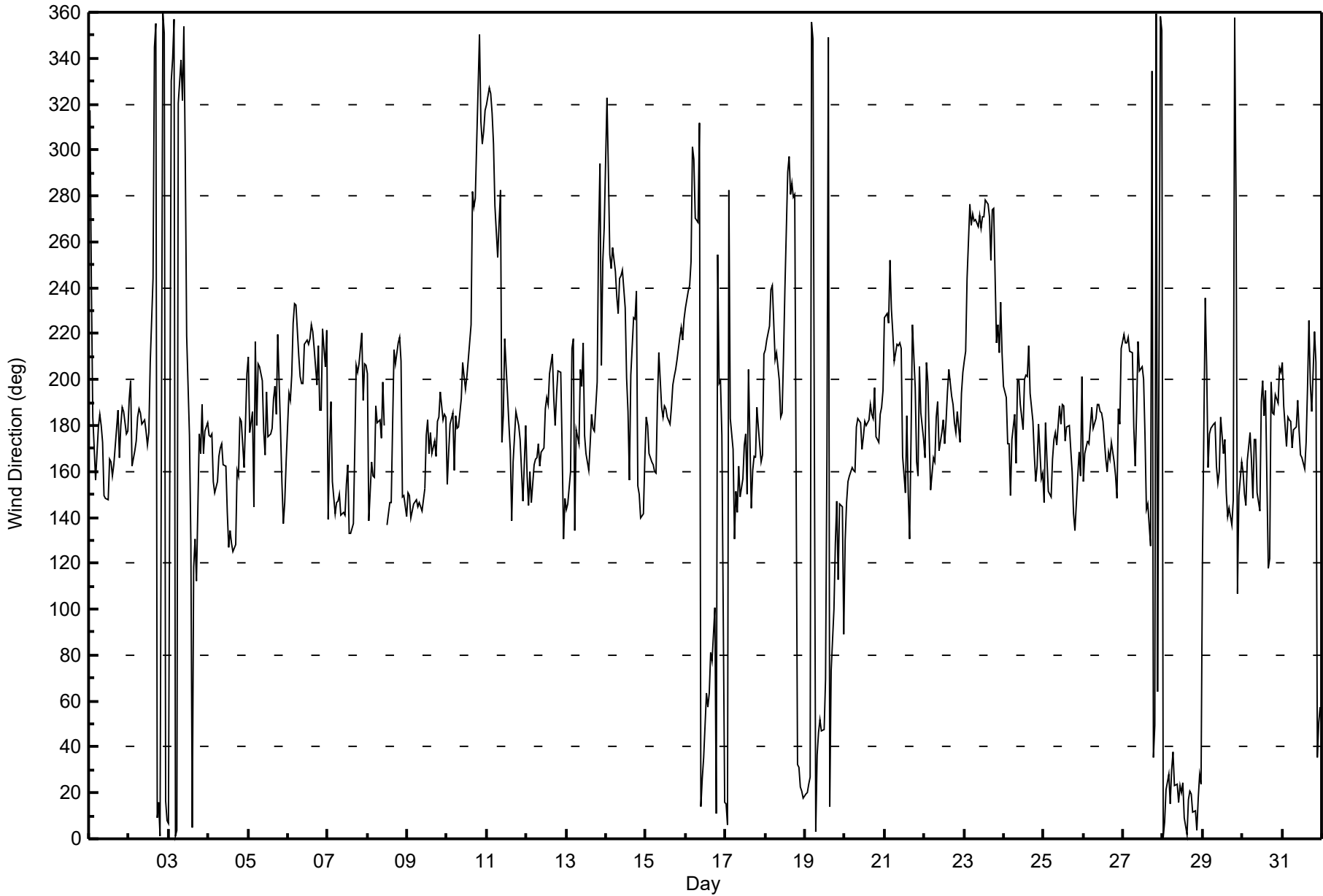
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 Diurnal Average

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



Wood Buffalo Environmental Association
Hourly Averages

Wind Direction (WD) - deg
Fort Hills - December 2023





Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Direction (WD) - deg
Fort Hills - December 2023

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 81 deg on Dec 20 00:00	Hours in Service: 744 Hours of Data: 743 Hours of Missing Data: 1 Hours of Calibration: 0 Percent Operational Time: 99.9
Minimum Value: 5 deg on Dec 30 20:00	
Percentiles: P ₁ = 6 P ₁₀ = 7 Q ₁ = 9 Median = 12 Q ₃ = 17 P ₉₀ = 27 P ₉₉ = 71	

Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Dec	29	48	11	26	9	8	9	13	18	13	7	7	19	11	14	10	8	7	8	6	6	5	11	9	48
2-Dec	9	17	10	8	11	9	6	7	8	10	9	7	18	10	30	17	13	8	27	17	12	12	10	13	30
3-Dec	10	29	14	14	13	11	38	21	15	21	72	73	24	66	80	71	34	60	55	22	19	24	23	14	80
4-Dec	11	10	10	11	10	11	10	12	11	16	35	13	10	9	6	9	9	25	15	10	7	10	47	28	47
5-Dec	17	18	15	19	35	17	65	35	25	12	15	19	13	13	14	8	11	26	39	34	19	10	7	9	65
6-Dec	12	10	25	9	9	10	10	15	14	16	7	8	7	10	11	10	10	20	10	27	12	11	9	18	27
7-Dec	27	21	14	17	12	7	10	7	6	6	7	12	12	7	7	10	12	9	15	23	8	26	13	10	27
8-Dec	12	23	17	13	14	13	11	12	11	14	18	M	7	14	10	15	7	7	6	6	19	11	16	9	23
9-Dec	9	11	9	11	12	15	10	6	6	8	8	12	10	13	7	6	6	10	8	13	16	7	6	7	16
10-Dec	11	14	24	8	12	13	8	11	13	18	12	10	10	10	17	21	12	17	25	63	14	12	12	11	63
11-Dec	12	13	13	18	13	13	10	18	33	36	15	9	12	11	12	13	19	7	8	10	7	11	17	20	36
12-Dec	19	9	13	11	9	10	13	10	13	9	12	8	9	13	9	7	10	8	8	8	8	21	7	11	21
13-Dec	11	11	22	10	33	17	9	13	11	23	10	8	10	17	13	9	11	24	11	46	19	43	78	13	78
14-Dec	19	21	16	19	13	9	10	8	9	10	16	9	11	33	31	17	6	7	10	52	17	10	11	18	52
15-Dec	9	11	7	7	7	6	11	29	11	13	11	12	7	7	9	9	7	7	7	11	8	9	10	10	29
16-Dec	9	8	8	21	14	12	12	13	19	12	18	41	17	14	13	33	27	50	33	46	14	14	50	14	50
17-Dec	9	17	49	22	23	13	32	22	26	6	19	11	8	7	26	15	19	7	12	11	9	10	10	12	49
18-Dec	9	7	10	8	9	8	11	9	7	21	32	8	18	18	15	16	29	36	10	66	11	11	9	10	66
19-Dec	9	9	10	14	20	12	12	23	11	15	13	17	27	69	19	20	21	24	15	32	23	13	12	81	81
20-Dec	17	10	7	11	9	7	9	11	11	10	16	14	21	11	11	9	9	9	11	8	8	8	15	15	21
21-Dec	9	9	18	9	12	6	7	7	8	7	13	19	8	21	26	36	36	21	17	16	17	11	11	15	36
22-Dec	18	7	9	12	8	8	12	7	8	7	9	10	8	7	8	9	11	7	11	10	12	12	19	7	19
23-Dec	11	13	21	14	11	11	12	11	10	11	10	10	10	12	11	10	15	12	30	26	54	38	40	38	54
24-Dec	23	13	15	20	16	12	10	7	21	7	12	10	12	22	14	7	25	7	12	28	16	12	10	10	28
25-Dec	16	15	15	8	7	10	14	12	11	10	15	12	14	11	7	7	9	13	11	8	14	14	10	28	28
26-Dec	18	14	16	10	18	22	10	8	6	6	7	7	9	9	9	8	10	9	9	12	16	12	12	23	23
27-Dec	10	13	9	7	10	11	20	10	26	10	8	14	13	44	13	9	17	74	53	20	30	38	23	11	74
28-Dec	18	66	27	13	12	25	12	14	11	10	9	9	13	13	13	13	10	15	14	17	20	15	18	41	66
29-Dec	49	26	9	21	8	7	6	13	12	10	12	7	12	12	16	8	7	11	18	48	38	63	16	12	63
30-Dec	9	13	7	11	9	16	9	10	12	9	13	19	9	16	37	18	11	17	8	5	8	7	6	9	37
31-Dec	9	9	8	10	9	9	8	9	12	9	10	10	8	9	8	13	12	17	19	8	71	67	72	64	72
	49	66	49	26	35	25	65	35	33	36	72	73	27	69	80	71	36	74	55	66	71	67	78	81	
	Diurnal Maximum																								

M - Maintenance



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

AMS25 WASKŌW OHCI PIMÂTISIWIN DECEMBER 2023

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

January 31, 2024

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - WASKŌW OHCI PIMĀTISIWIN (AMS25)
DECEMBER 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	709	34	35	99.87	12.6	0	3	0
H2S(ppb) Average	706	37	38	99.87	3.3	0	1.7	0
Temperature 2 m (C) Average	744	0	0	100	4.8	0	0.3	0
Relative Humidity (%) Average	744	0	0	100	98.2	-	93.6	-
Wind Speed 10 m (km/h) Average	743	0	1	99.87	14	0	7	0
Wind Direction 10 m (deg) Average	743	0	1	99.87	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - WASKŌW OHCI PIMĀTISIWIN (AMS25)
 DECEMBER 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	709	0.7	1.3	-	0	0	0.1	0.3	0.7	1.7	12.6
H2S (ppb) Average	706	0.52	0.5	-	0	0.1	0.1	0.3	0.8	1.2	3.3
Temperature 2 m (C) Average	744	-7.53	5.5	-	-19.4	-14.2	-11.7	-8.2	-3.3	0.2	4.8
Relative Humidity (%) Average	744	79.41	11.5	-	44.8	60.8	73.7	83.2	87.4	91.8	98.2
Wind Speed 10 m (km/h) Average	743	4	3	-	0	1	2	3	5	8	14
Wind Direction 10 m (deg) Average	743	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - WASKŌW OHCI PIMĀTISIWIN (AMS25)

DECEMBER 2023

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
SO2, H2S	21 Dec 2023 09:00	21 Dec 2023 09:00	1	Maintenance - sample manifold cleaned
Wind Speed, Wind Direction	02 Dec 2023 05:00	02 Dec 2023 05:00	1	Flat line in sensor output signal

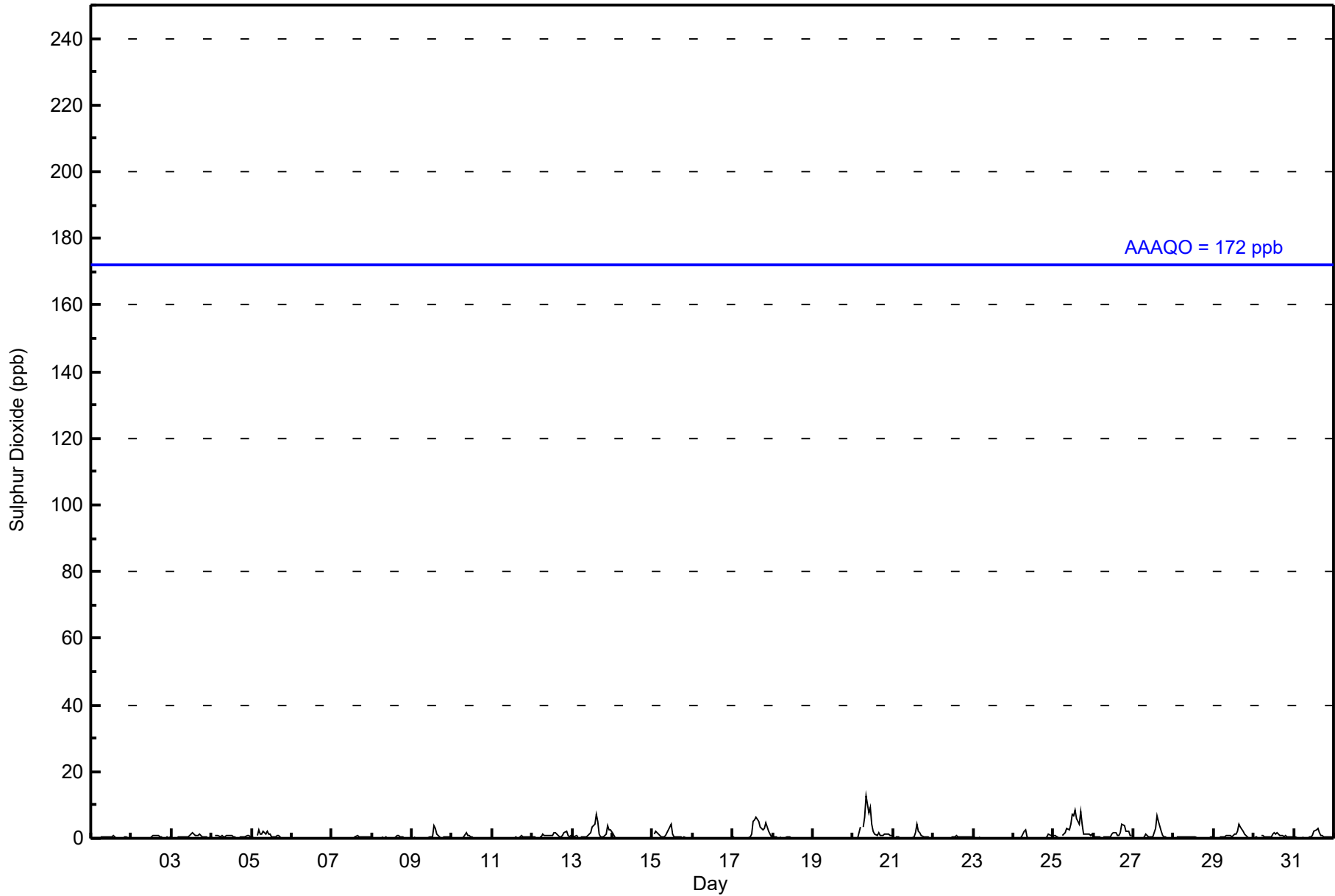


Number of Exceedences (AAAQO):		1-hr: 0	24-hr: 0																		Hours in Service:	744																											
Maximum Value: 12.6 ppb on Dec 20 09:00		Maximum Daily Average: 3.0 ppb on Dec 25																	Hours of Data:	709																													
Minimum Value: 0.0 ppb on Dec 5 21:00		Minimum Daily Average: 0.0 ppb on Dec 19																	Hours of Missing Data:	35																													
Maximum Diurnal Average: 1.6 ppb at hour 15		Minimum Diurnal Average: 0.2 ppb at hour 4																	Hours of Calibration:	34																													
Monthly Average: 0.70 ppb		Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.1 Median = 0.3 Q ₃ = 0.7 P ₉₀ = 1.7 P ₉₉ = 6.9																	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-Dec	0.1	0.2	0.1	0.1	Z	0.2	0.3	0.4	0.5	0.4	0.4	0.3	0.3	0.7	0.3	0.2	0.1	0.1	0.2	0.2	0.2	0.3	0.2	0.4	0.3	0.7																							
2-Dec	0.1	0.1	0.0	0.0	0.2	Z	0.1	0.1	0.0	0.1	0.1	0.2	0.3	0.8	0.8	0.7	0.7	0.4	0.3	0.2	0.1	0.2	0.2	0.2	0.3	0.8																							
3-Dec	Z	0.2	0.2	0.1	0.2	0.5	0.4	0.4	0.3	0.3	0.3	0.9	1.5	1.4	1.0	0.9	0.8	1.2	0.4	0.4	0.3	0.3	0.2	0.3	0.5	1.5																							
4-Dec	0.3	Z	0.7	0.7	0.7	0.6	0.7	0.6	0.6	0.7	0.7	0.7	0.7	0.6	0.4	0.2	0.1	0.3	0.3	0.4	0.6	0.7	0.7	0.5	0.5	0.7																							
5-Dec	0.6	0.5	Z	0.7	2.5	1.3	1.2	2.0	1.1	2.3	1.4	1.3	0.5	0.4	0.5	0.8	0.8	0.3	0.1	0.1	0.0	0.0	0.0	0.0	0.8	2.5																							
6-Dec	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	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1																							
7-Dec	0.0	0.0	0.0	0.0	Z	0.1	0.1	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.4	0.7	0.3	0.3	0.4	0.6	0.6	0.4	0.5	0.3	0.2	0.7																							
8-Dec	0.1	0.1	0.1	0.1	0.2	Z	0.3	0.2	0.2	0.2	0.1	0.2	0.2	0.2	0.3	0.7	0.7	0.4	0.3	0.2	0.2	0.2	0.1	0.1	0.2	0.7																							
9-Dec	Z	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.3	0.4	0.5	3.6	2.8	1.2	0.3	0.2	0.1	0.2	0.3	0.4	0.3	0.2	0.5	3.6																							
10-Dec	0.2	Z	0.1	0.1	0.1	0.2	0.1	0.3	1.5	0.8	1.0	0.3	0.2	0.2	0.1	0.1	0.0	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.2	1.5																							
11-Dec	0.0	0.1	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.1	0.1	0.2	0.2	0.1	0.8	0.5	0.3	0.2	0.3	0.3	0.3	0.2	0.8																							
12-Dec	0.3	0.4	0.4	Z	0.5	0.6	1.3	1.0	0.9	0.7	0.7	0.9	1.0	1.5	1.6	1.0	0.6	0.4	0.7	1.8	2.3	0.8	0.6	1.0	0.9	2.3																							
13-Dec	0.5	0.4	0.7	0.5	Z	0.4	0.3	0.2	0.5	0.8	1.1	1.7	3.2	4.2	7.1	5.0	1.4	0.5	0.4	0.8	1.2	3.8	2.7	2.7	1.7	7.1																							
14-Dec	1.2	0.4	0.2	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	0.7	0.1	1.2																							
15-Dec	Z	1.3	2.2	1.1	0.6	0.5	0.3	0.3	0.7	2.5	3.3	4.1	1.5	0.5	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.9	4.1																							
16-Dec	0.2	Z	0.2	0.2	0.1	0.1	0.0	0.1	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.1	0.1	0.2																							
17-Dec	0.2	0.1	Z	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.5	1.5	5.2	5.3	6.3	5.1	3.3	2.8	2.7	3.1	4.5	2.2	1.1	0.6	1.9	6.3																							
18-Dec	0.5	0.4	0.2	Z	0.4	0.1	0.1	0.2	0.2	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	0.5																							
19-Dec	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	C	C	C	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																							
20-Dec	0.0	0.0	0.1	0.1	3.4	Z	3.5	6.2	12.6	7.8	9.4	4.2	2.3	1.3	0.9	1.7	0.9	0.7	1.0	1.4	1.4	1.3	0.8	0.7	2.7	12.6																							
21-Dec	Z	0.4	0.3	0.2	0.2	0.2	0.2	0.2	M	0.2	0.1	0.2	0.4	1.9	4.1	2.0	1.9	1.0	0.5	0.3	0.4	0.3	0.2	0.1	0.7	4.1																							
22-Dec	0.1	Z	0.2	0.1	0.0	0.1	0.1	0.0	0.1	0.1	0.2	0.4	0.4	0.6	0.8	0.4	0.4	0.4	0.5	0.5	0.4	0.4	0.4	0.3	0.3	0.8																							
23-Dec	0.3	0.2	Z	0.3	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.3																							
24-Dec	0.0	0.0	0.0	Z	0.1	0.4	2.0	2.5	0.5	0.1	0.0	0.1	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.5	1.4	1.0	0.6	0.4	0.4	2.5																							
25-Dec	0.8	0.7	0.4	0.3	Z	0.9	1.3	1.7	2.8	2.5	4.1	7.3	6.8	8.5	5.9	4.3	8.3	4.2	1.4	1.3	1.2	1.3	0.8	1.2	3.0	8.5																							
26-Dec	0.6	0.4	0.3	0.4	0.3	Z	0.4	0.3	0.3	0.4	0.6	1.2	1.5	1.7	1.1	0.7	1.6	4.0	3.6	2.0	2.0	1.9	0.8	0.8	1.2	4.0																							
27-Dec	Z	0.2	0.0	0.1	0.0	0.1	0.4	1.1	1.0	0.5	0.3	0.3	1.9	3.2	6.9	5.2	2.0	0.9	0.5	0.2	0.2	0.1	0.0	0.1	1.1	6.9																							
28-Dec	0.1	Z	0.6	0.4	0.3	0.3	0.4	0.5	0.4	0.4	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	0.3	0.6																							
29-Dec	0.1	0.1	Z	0.2	0.2	0.3	0.5	1.0	1.0	0.9	0.7	0.6	1.5	1.2	2.3	4.2	3.3	2.1	1.1	0.7	0.5	0.2	0.2	0.2	1.0	4.2																							
30-Dec	0.2	0.3	0.4	Z	0.8	0.7	0.3	0.4	0.4	0.4	0.4	1.1	1.7	1.4	1.7	1.0	0.7	0.8	0.5	0.7	0.4	0.5	0.3	0.4	0.7	1.7																							
31-Dec	0.5	0.2	0.1	0.1	Z	0.4	0.1	0.2	0.2	0.2	0.6	0.8	1.9	2.5	2.9	1.6	0.9	0.7	0.6	0.4	0.4	0.3	0.4	0.4	0.7	2.9																							
																								0.3	0.3	0.3	0.2	0.5	0.3	0.5	0.7	0.9	0.7	0.9	1.0	1.1	1.4	1.6	1.2	1.0	0.7	0.5	0.5	0.6	0.6	0.4	0.4	Diurnal Average	
																								1.2	1.3	2.2	1.1	3.4	1.3	3.5	6.2	12.6	7.8	9.4	7.3	6.8	8.5	7.1	5.2	8.3	4.2	3.6	3.1	4.5	3.8	2.7	2.7	Diurnal Maximum	
Z - zerospan C - Calibration M - Maintenance																																																	
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 172 ppb 24-hr 48 ppb																																																	



Wood Buffalo Environmental Association
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Waskow ohci Pimatisiwin - December 2023





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Waskow ohci Pimatisiwin - December 2023

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	708	99.86	99.86
11 - 20	1	0.14	100.00
21 - 60	0	0.00	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 709

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Waskow ohci Pimatisiwin - December 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	7	10	7	4	9	64	227	96	45	60	58	37	23	19	21	707
11 - 20	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	20	7	10	7	4	9	64	228	96	45	60	58	37	23	19	21	708

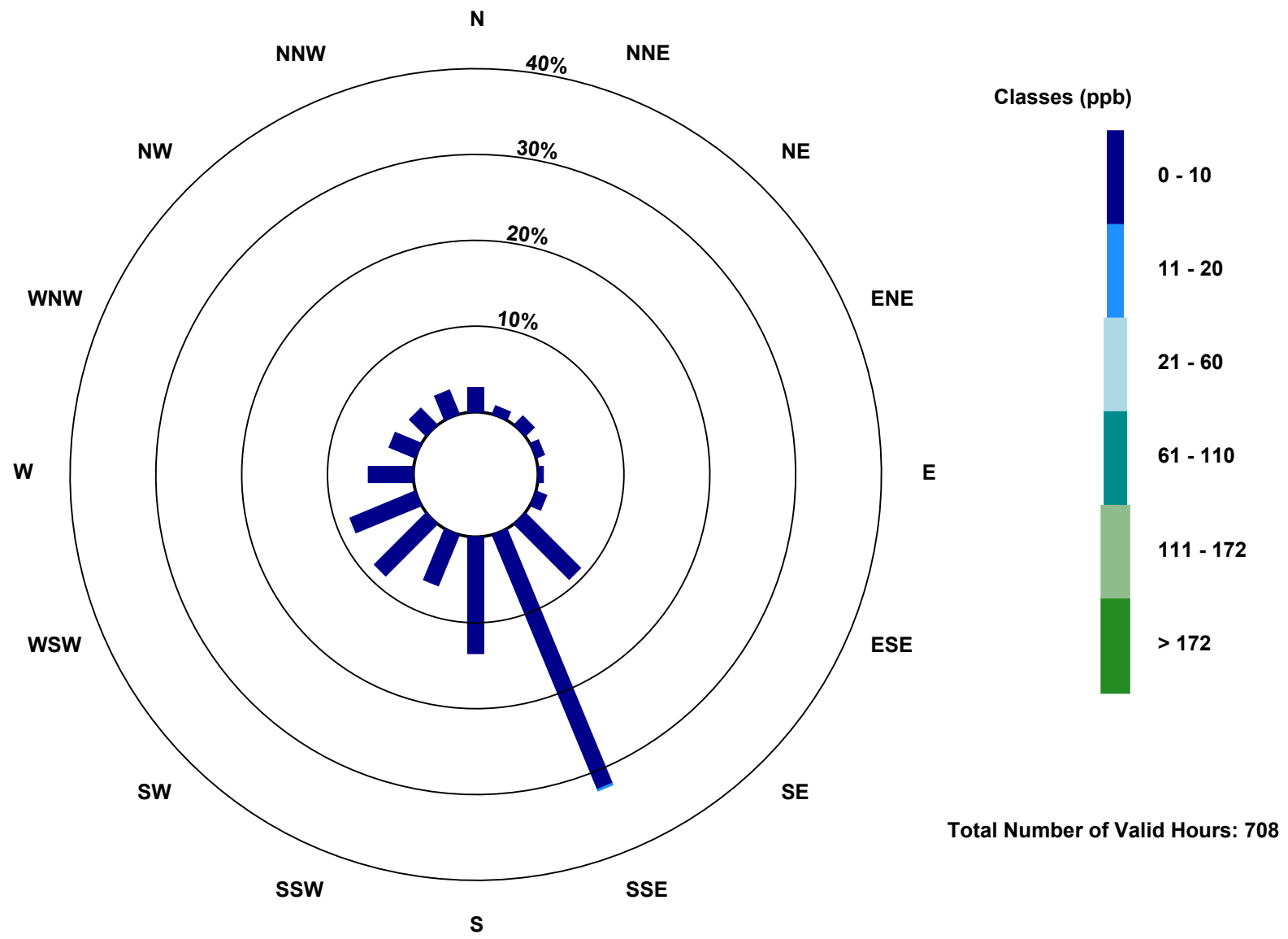
Total Number of Valid Hours: 708

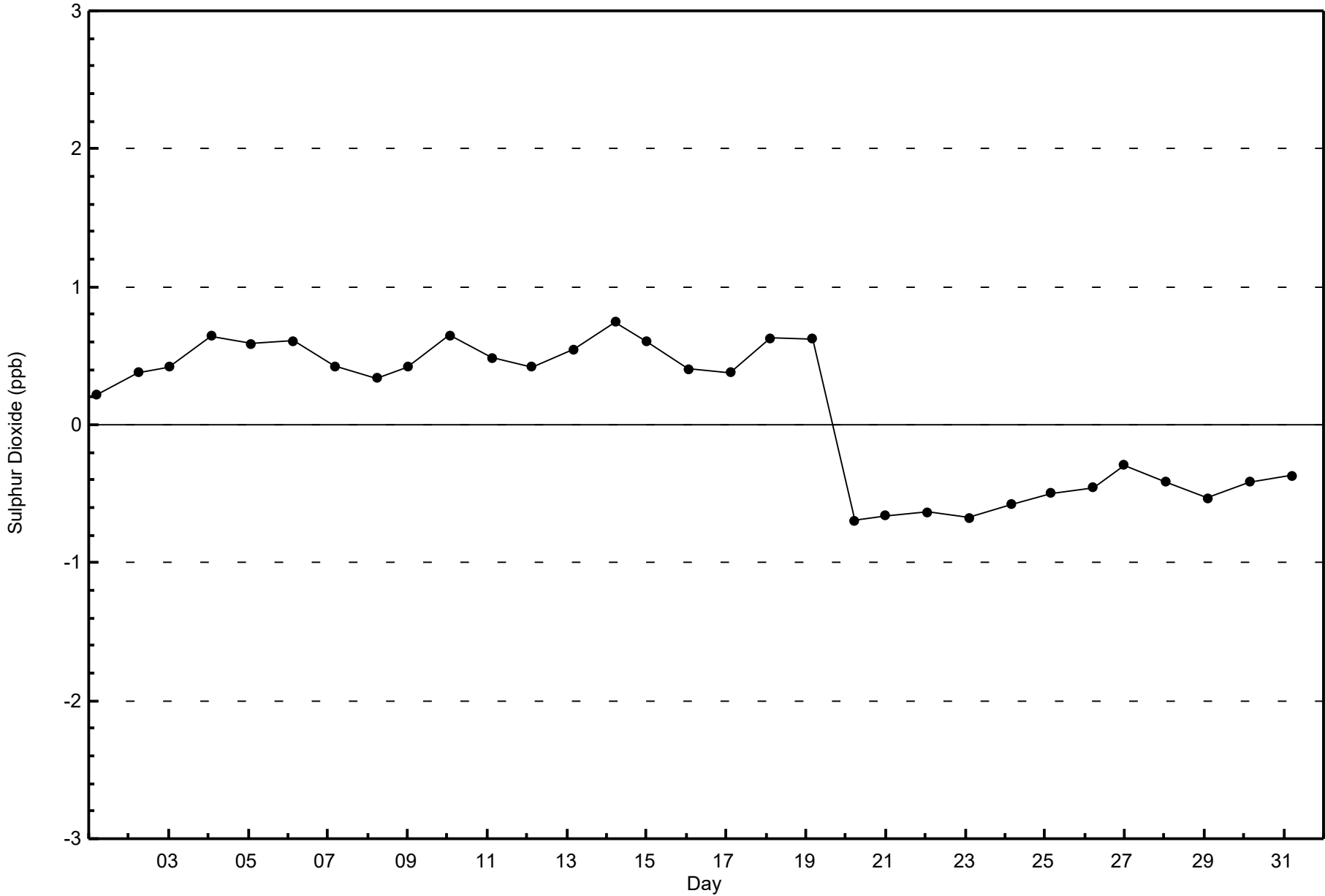
Total Number of Hours: 744

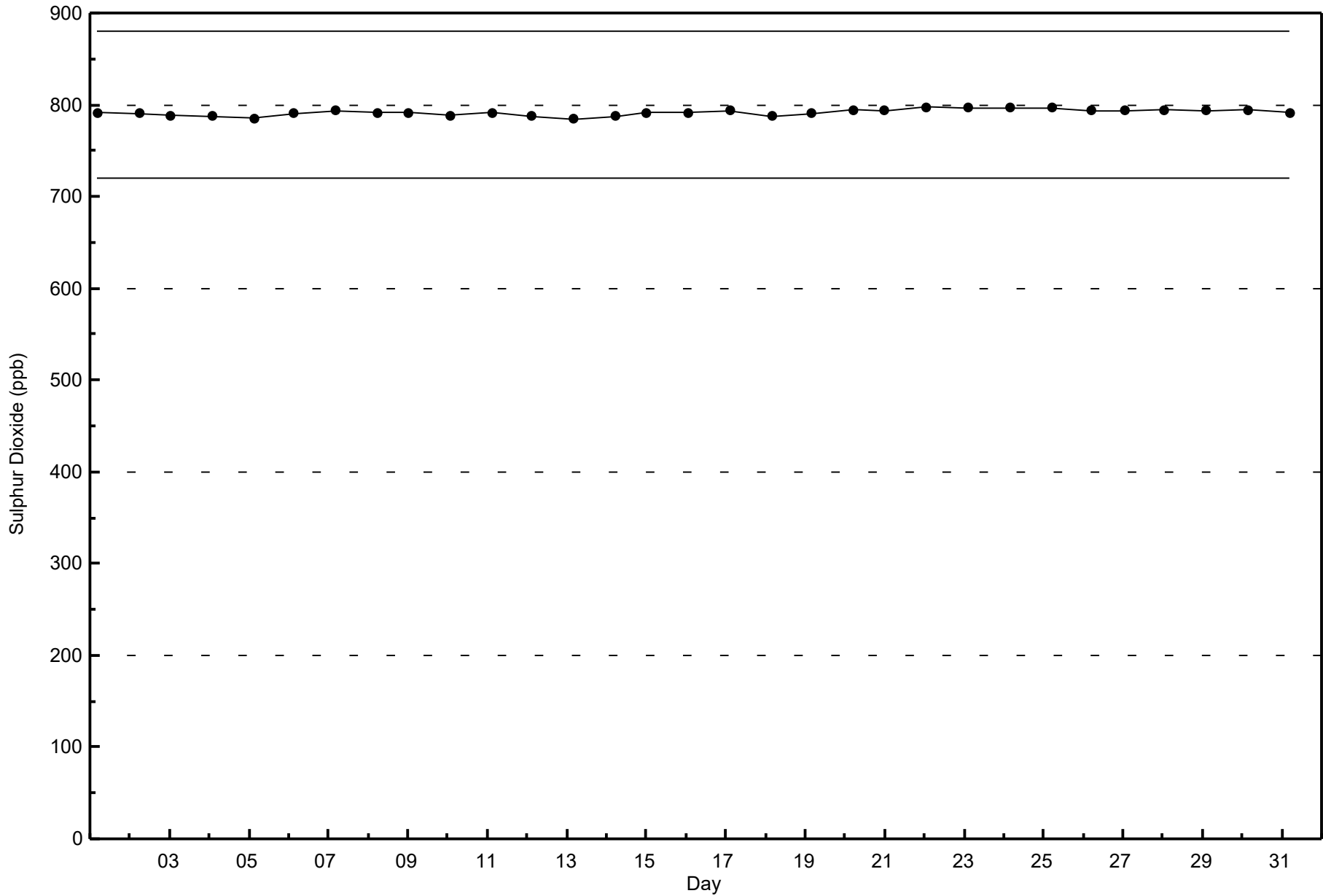


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Sulphur Dioxide (SO₂) - ppb
Waskow ohci Pimatisiwin









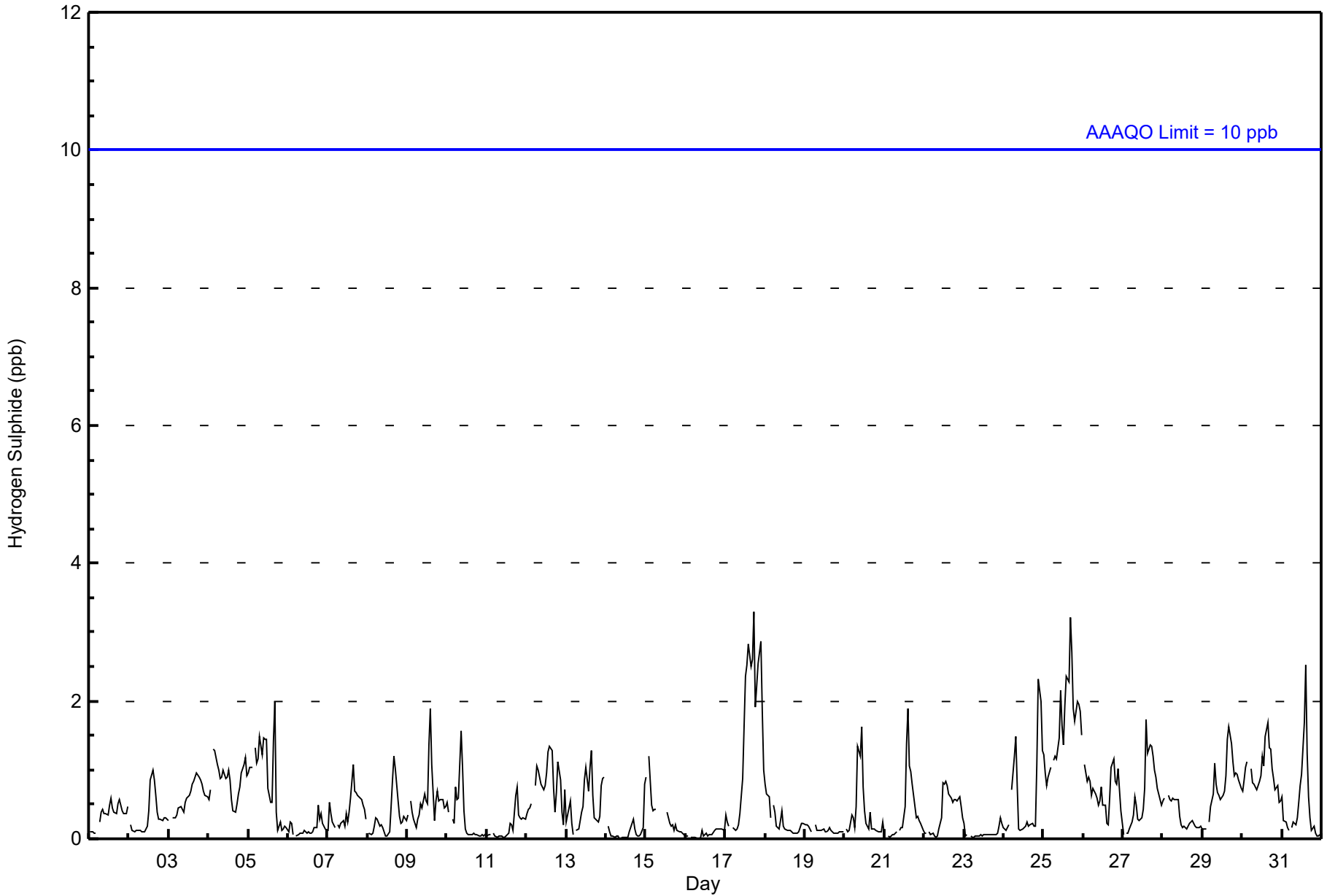
Number of Exceedences (AAAQO):		1-hr: 0		24-hr: 0		Hours in Service:		744																			
Maximum Value: 3.3 ppb on Dec 17 18:00		Maximum Daily Average: 1.7 ppb on Dec 25		Hours of Data:		706		Hours of Missing Data: 38																			
Minimum Value: 0.0 ppb on Dec 16 08:00		Minimum Daily Average: 0.1 ppb on Dec 16		Hours of Calibration: 37		Hours of Calibration: 37		Percent Operational Time: 99.9																			
Maximum Diurnal Average: 0.8 ppb at hour 15		Minimum Diurnal Average: 0.3 ppb at hour 5		Percentiles: P ₁ = 0.0 P ₁₀ = 0.1 Q ₁ = 0.1 Median = 0.3 Q ₃ = 0.8 P ₉₀ = 1.2 P ₉₉ = 2.5																							
Monthly Average: 0.52 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-Dec	0.1	0.1	0.1	0.1	0.1	Z	0.2	0.4	0.4	0.4	0.4	0.3	0.5	0.6	0.4	0.4	0.4	0.5	0.6	0.5	0.4	0.4	0.4	0.5	0.4	0.6	
2-Dec	Z	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.4	0.8	1.0	0.8	0.6	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	1.0
3-Dec	0.3	Z	0.3	0.3	0.3	0.4	0.4	0.5	0.4	0.4	0.5	0.6	0.6	0.7	0.8	0.8	0.9	1.0	0.9	0.9	0.8	0.7	0.6	0.6	0.6	1.0	
4-Dec	0.6	0.7	Z	1.3	1.3	1.3	1.1	1.0	0.9	0.9	1.0	0.9	0.9	1.0	0.8	0.6	0.4	0.4	0.5	0.7	0.7	1.0	1.1	1.2	0.9	1.3	
5-Dec	1.0	1.0	1.0	Z	1.3	1.1	1.2	1.5	1.2	1.5	1.4	1.4	0.7	0.5	0.5	1.4	2.0	0.4	0.1	0.3	0.1	0.1	0.2	0.2	0.9	2.0	
6-Dec	0.1	0.2	0.2	0.1	Z	0.0	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	0.3	0.4	0.2	0.1	0.1	0.1	0.5	
7-Dec	0.1	0.5	0.4	0.2	0.2	Z	0.2	0.2	0.2	0.3	0.2	0.4	0.2	0.4	0.6	1.1	0.7	0.7	0.6	0.6	0.6	0.5	0.4	0.3	0.4	1.1	
8-Dec	Z	0.1	0.1	0.1	0.2	0.3	0.3	0.2	0.2	0.2	0.1	0.0	0.0	0.1	0.5	0.9	1.2	1.0	0.5	0.3	0.2	0.2	0.3	0.3	0.3	1.2	
9-Dec	0.3	Z	0.5	0.4	0.3	0.2	0.3	0.3	0.5	0.5	0.7	0.5	0.5	1.4	1.9	1.1	0.3	0.6	0.7	0.5	0.6	0.6	0.4	0.5	0.6	1.9	
10-Dec	0.5	0.4	Z	0.3	0.2	0.8	0.6	0.6	1.6	1.0	0.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.1	0.0	0.1	0.3	1.6	
11-Dec	0.0	0.1	0.1	Z	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.2	0.1	0.6	0.8	0.4	0.3	0.3	0.3	0.3	0.8	
12-Dec	0.4	0.4	0.5	0.5	Z	0.8	1.1	1.0	0.9	0.8	0.7	0.8	1.0	1.3	1.3	1.3	0.7	0.4	0.7	1.1	0.9	0.4	0.2	0.7	1.3		
13-Dec	0.2	0.3	0.5	0.2	0.1	Z	0.1	0.2	0.3	0.4	0.5	0.8	1.0	0.7	1.0	1.3	0.6	0.3	0.3	0.3	0.3	0.8	0.9	0.9	1.3		
14-Dec	Z	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	0.2	0.3	0.2	0.1	0.0	0.0	0.1	0.2	0.8	0.8		
15-Dec	0.9	Z	1.2	0.5	0.4	0.4	0.4	C	C	C	C	C	C	C	0.4	0.2	0.2	0.2	0.1	0.2	0.1	0.1	0.1	0.1	--	1.2	
16-Dec	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.2	
17-Dec	0.4	0.2	0.2	Z	0.2	0.1	0.1	0.1	0.2	0.4	0.9	1.6	2.4	2.5	2.8	2.5	2.6	3.3	1.9	2.2	2.5	2.9	1.9	1.0	1.4	3.3	
18-Dec	0.8	0.7	0.6	0.3	Z	0.5	0.4	0.2	0.2	0.3	0.4	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.3	0.8	
19-Dec	0.2	0.2	0.2	0.1	0.1	Z	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	
20-Dec	Z	0.1	0.1	0.1	0.3	0.3	0.2	0.5	1.4	1.2	1.6	0.8	0.4	0.2	0.1	0.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	1.6	
21-Dec	0.1	Z	0.0	0.0	0.0	0.1	0.1	0.1	M	0.1	0.2	0.2	0.5	1.4	1.9	1.1	1.0	0.8	0.5	0.3	0.3	0.3	0.2	0.1	0.4	1.9	
22-Dec	0.1	0.1	Z	0.1	0.1	0.1	0.0	0.0	0.0	0.1	0.3	0.8	0.8	0.8	0.8	0.6	0.6	0.5	0.6	0.6	0.5	0.6	0.5	0.3	0.4	0.8	
23-Dec	0.2	0.0	0.1	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.3	0.2	0.1	0.3	
24-Dec	0.2	0.1	0.2	0.2	Z	0.7	1.2	1.5	0.8	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	1.1	2.3	2.0	1.3	0.6	2.3		
25-Dec	1.2	1.0	0.8	0.9	1.0	Z	1.1	1.2	1.2	1.5	2.2	1.6	1.4	1.9	2.4	2.3	3.2	2.7	1.9	1.7	2.0	1.9	1.5	1.7	3.2		
26-Dec	Z	1.1	0.8	0.9	0.8	0.6	0.7	0.7	0.6	0.5	0.6	0.8	0.5	0.5	0.2	0.2	0.6	1.0	1.2	0.8	0.8	1.0	0.7	0.4	1.2		
27-Dec	0.1	Z	0.1	0.1	0.1	0.2	0.3	0.6	0.5	0.3	0.3	0.3	0.4	0.7	1.7	1.2	1.4	1.3	1.2	1.0	0.9	0.7	0.6	0.5	1.7		
28-Dec	0.5	0.6	Z	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.3	0.2	0.2	0.2	0.1	0.2	0.2	0.3	0.3	0.2	0.2	0.2	0.2	0.3	0.6	
29-Dec	0.1	0.1	0.1	Z	0.2	0.5	0.7	1.1	0.8	0.7	0.6	0.6	0.6	0.7	0.9	1.4	1.6	1.4	1.1	0.9	1.0	0.9	0.8	0.7	0.8	1.6	
30-Dec	0.7	0.9	1.0	1.1	Z	1.0	0.8	0.8	0.8	0.7	0.8	0.9	1.2	1.1	1.5	1.7	1.3	1.3	1.0	0.9	0.7	0.8	0.5	0.6	1.7		
31-Dec	0.6	0.3	0.2	0.2	0.1	Z	0.2	0.2	0.2	0.3	0.5	0.8	0.9	1.7	2.5	1.2	0.6	0.3	0.1	0.2	0.1	0.0	0.0	0.1	0.5	2.5	
																								Diurnal Average			
																								Diurnal Maximum			
																								0.4 1.2			
																								0.4 1.1			
																								0.4 1.2			
																								0.3 1.3			
																								0.3 1.3			
																								0.4 1.1			
																								0.4 1.2			
																								0.5 1.5			
																								0.5 1.6			
																								0.4 1.5			
																								0.5 2.2			
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																								0.5 2.4			
																								0.7 2.5			
																								0.8 2.8			
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																								0.7 3.3			
																								0.6 1.9			
																								0.5 2.2			
																								0.5 2.5			
																								0.6 2.9			
																								0.5 2.0			
																								0.4 1.5			

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



Wood Buffalo Environmental Association
Hourly Averages

Hydrogen Sulphide (H₂S) - ppb
Waskow ohci Pimatisiwin - December 2023





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Hydrogen Sulphide (H₂S) - ppb
Waskow ohci Pimatisiwin - December 2023**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	697	98.73	98.73
3 - 4	9	1.27	100.00
5 - 7	0	0.00	100.00
8 - 11	0	0.00	100.00
> 11	0	0.00	100.00

Total Number of Valid Hours: 706

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Hydrogen Sulphide (H₂S) - ppb
Waskow ohci Pimatisiwin - December 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	20	7	11	7	4	9	63	221	92	42	62	56	37	23	19	23	696
3 - 4	0	0	0	0	0	0	0	7	2	0	0	0	0	0	0	0	9
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	20	7	11	7	4	9	63	228	94	42	62	56	37	23	19	23	705

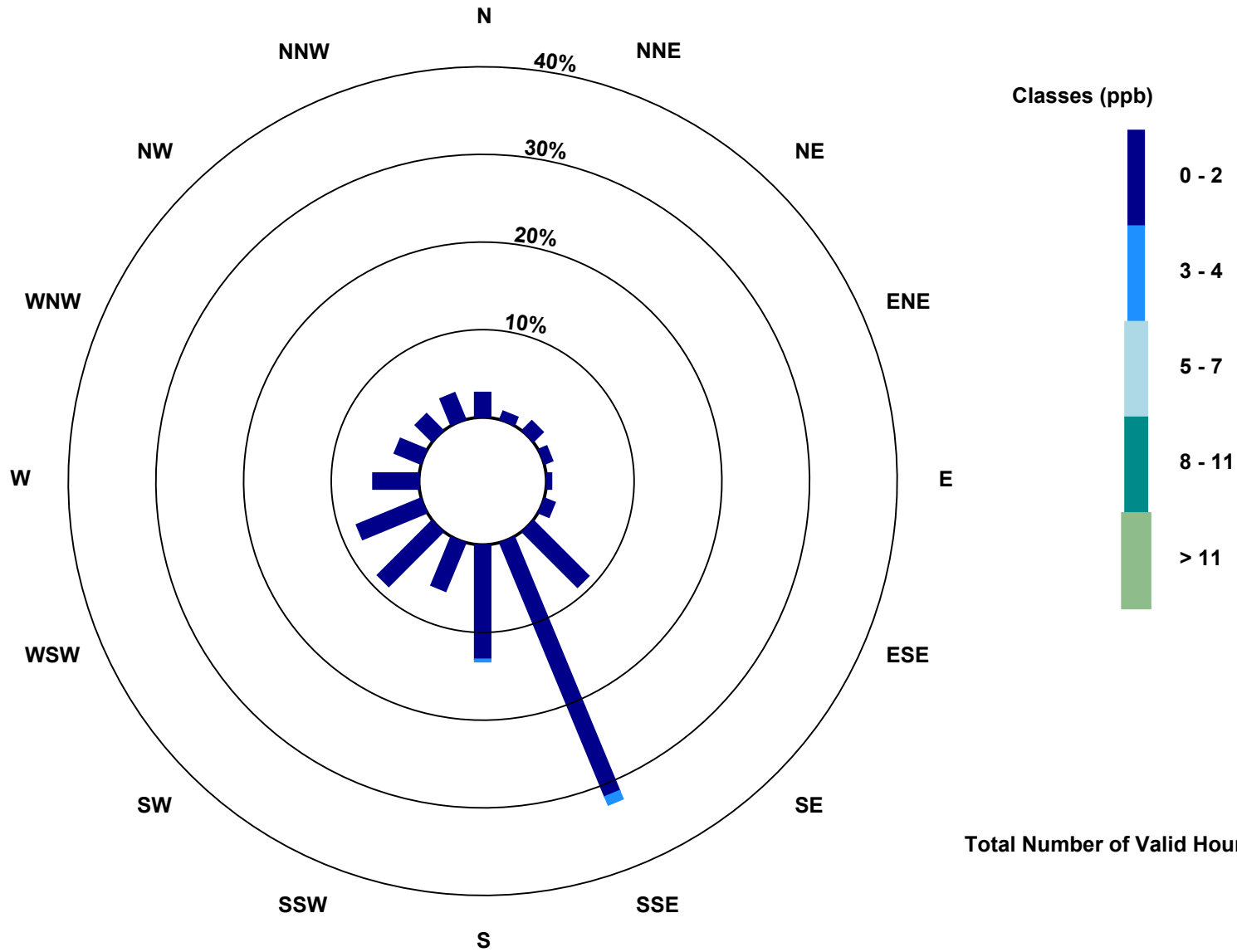
Total Number of Valid Hours: 705

Total Number of Hours: 744

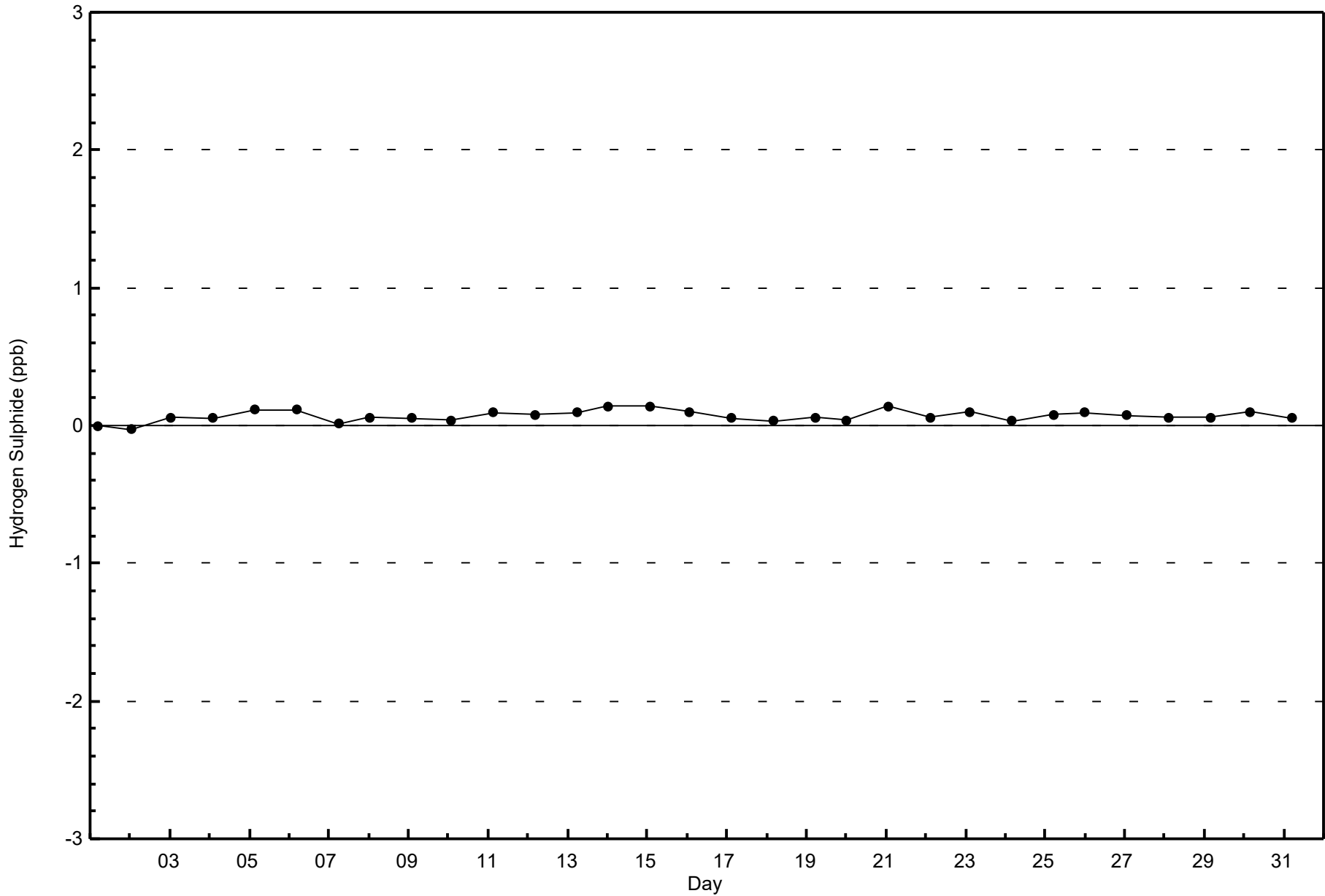


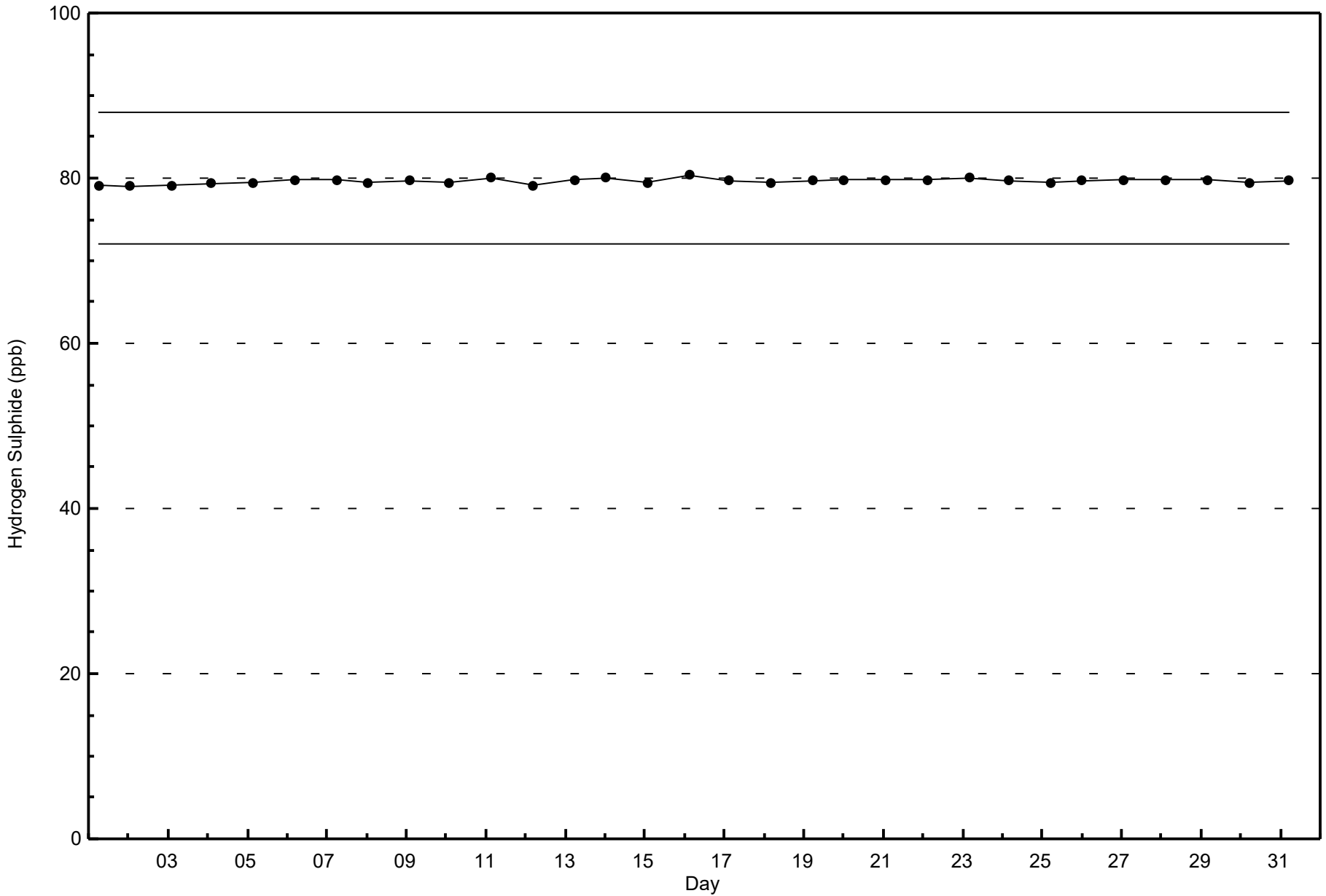
Wood Buffalo Environmental Association
Wind Rose Dec 2023

Hydrogen Sulphide (H₂S) - ppb
Waskow ohci Pimatisiwin



Total Number of Valid Hours: 705





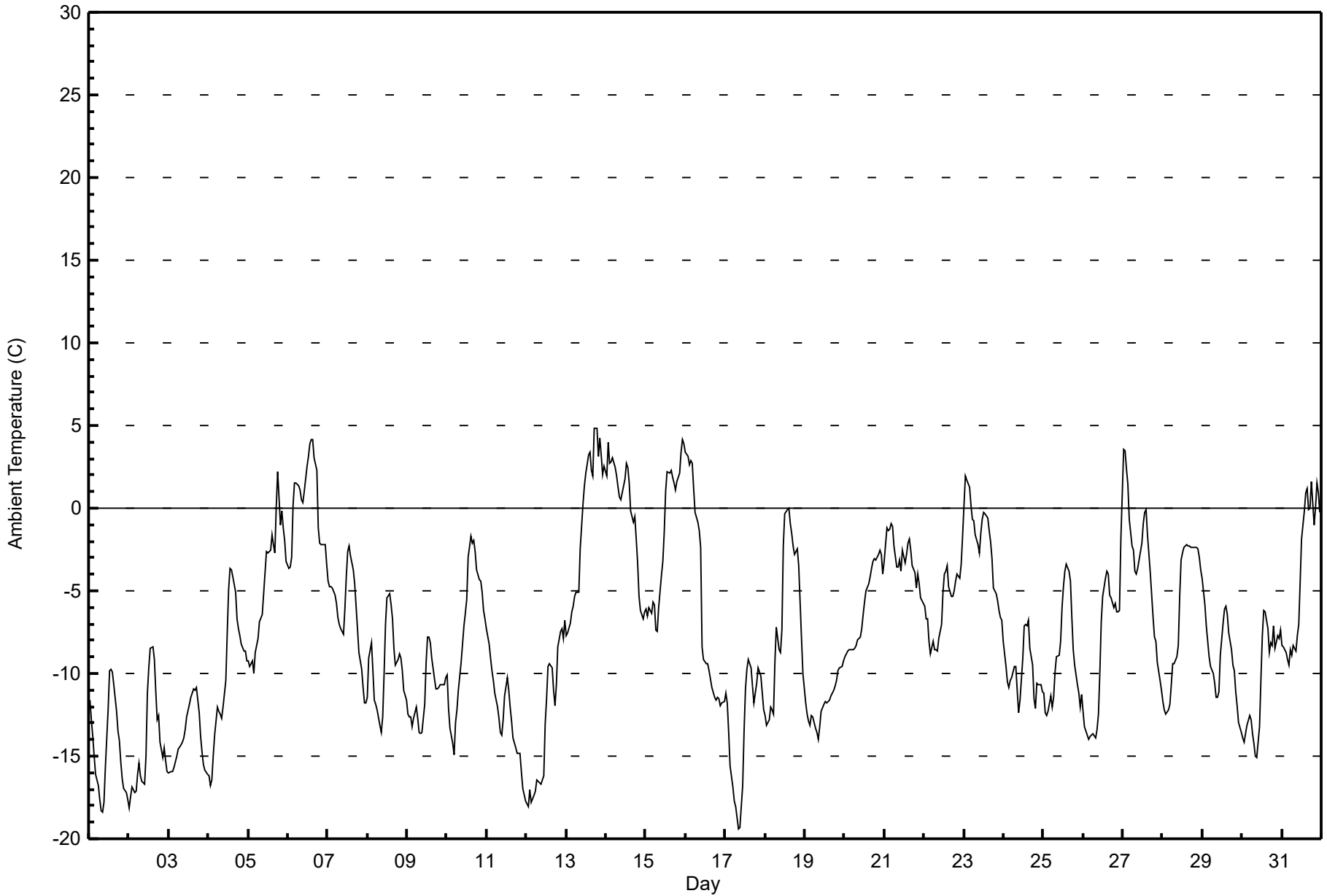


Maximum Value: 4.8 C on Dec 13 19:00 Maximum Daily Average: 0.3 C on Dec 6																						Hours in Service: 744 Hours of Data: 744				
Minimum Value: -19.4 C on Dec 17 09:00 Minimum Daily Average: -14.6 C on Dec 1																						Hours of Missing Data: 0 Hours of Calibration: 0				
Maximum Diurnal Average: -4.3 C at hour 15 Minimum Diurnal Average: -9.6 C at hour 9																						Percent Operational Time: 100.0				
Monthly Average: -7.53 C Percentiles: P ₁ = -18.0 P ₁₀ = -14.2 Q ₁ = -11.7 Median = -8.2 Q ₃ = -3.3 P ₉₀ = 0.2 P ₉₉ = 3.9																										
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-Dec	-11.6	-12.8	-13.8	-15.0	-16.1	-16.8	-17.6	-18.3	-18.4	-17.8	-15.7	-12.1	-9.9	-9.7	-10.0	-10.7	-12.3	-13.5	-14.1	-15.4	-16.4	-17.0	-17.2	-17.6	-14.6	-9.7
2-Dec	-18.2	-17.5	-16.9	-17.2	-17.1	-16.1	-15.4	-16.2	-16.5	-16.7	-15.0	-11.2	-9.6	-8.5	-8.4	-9.2	-11.1	-12.8	-12.6	-14.2	-15.1	-14.5	-15.3	-15.9	-14.2	-8.4
3-Dec	-16.0	-15.9	-16.0	-15.6	-15.3	-15.0	-14.6	-14.3	-14.1	-13.9	-13.4	-12.6	-11.9	-11.5	-11.2	-10.9	-11.0	-10.8	-12.4	-13.8	-14.7	-15.5	-15.8	-16.1	-13.9	-10.8
4-Dec	-16.2	-16.8	-16.5	-15.0	-13.7	-12.1	-12.3	-12.5	-12.7	-12.1	-10.5	-7.5	-4.9	-3.6	-3.7	-4.2	-5.0	-6.7	-7.3	-7.7	-8.2	-8.6	-8.7	-9.2	-9.8	-3.6
5-Dec	-9.3	-9.6	-9.3	-10.0	-8.7	-8.3	-7.9	-6.9	-6.4	-5.2	-3.9	-2.6	-2.7	-2.5	-1.6	-2.2	-2.7	0.1	2.2	-1.1	-0.2	-1.2	-1.9	-3.2	-4.4	2.2
6-Dec	-3.6	-3.5	-3.0	0.2	1.5	1.6	1.3	1.1	0.5	0.3	1.0	2.5	3.2	3.9	4.2	4.1	3.0	2.3	-1.2	-2.1	-2.2	-2.2	-2.2	-3.4	0.3	4.2
7-Dec	-4.4	-4.7	-4.8	-4.8	-5.3	-5.8	-6.7	-7.0	-7.3	-7.6	-6.1	-4.1	-2.7	-2.3	-2.9	-3.7	-4.6	-6.0	-7.3	-8.7	-9.7	-10.8	-11.8	-11.8	-6.3	-2.3
8-Dec	-11.5	-9.0	-8.1	-9.8	-11.6	-11.8	-12.2	-13.2	-13.5	-12.6	-10.0	-7.1	-5.4	-5.1	-5.8	-6.7	-8.5	-9.5	-9.1	-8.8	-9.1	-9.8	-11.0	-11.7	-9.6	-5.1
9-Dec	-12.5	-12.6	-12.6	-13.2	-12.7	-12.0	-12.7	-13.6	-13.6	-13.5	-11.9	-9.3	-7.8	-7.8	-8.1	-9.1	-10.3	-10.9	-11.0	-10.9	-10.6	-10.7	-10.7	-10.2	-11.2	-7.8
10-Dec	-10.1	-12.1	-13.3	-14.2	-14.9	-12.9	-12.2	-11.1	-9.3	-8.2	-7.1	-6.4	-5.5	-3.0	-1.7	-2.1	-2.0	-2.6	-3.7	-4.3	-4.4	-5.1	-6.2	-6.7	-7.5	-1.7
11-Dec	-7.3	-8.2	-9.1	-9.9	-10.4	-11.2	-12.1	-12.7	-13.6	-13.7	-12.8	-11.3	-10.3	-11.0	-12.0	-12.9	-13.9	-14.5	-14.9	-14.8	-14.9	-15.9	-17.0	-17.7	-12.6	-7.3
12-Dec	-17.9	-18.1	-17.1	-17.8	-17.3	-17.2	-16.5	-16.6	-16.6	-16.7	-16.2	-13.0	-11.5	-9.6	-9.4	-9.7	-11.0	-11.9	-10.7	-8.4	-7.4	-7.3	-7.9	-6.7	-13.0	-6.7
13-Dec	-7.7	-7.5	-6.9	-6.3	-6.0	-5.4	-5.0	-5.1	-2.4	-1.1	0.3	1.3	2.1	3.3	3.4	2.3	2.0	4.8	4.8	3.2	4.3	3.2	2.0	2.6	-0.6	4.8
14-Dec	2.0	4.0	2.7	2.8	3.0	2.5	2.0	1.3	0.7	0.5	1.0	1.8	2.7	2.5	1.6	-0.2	-0.9	-0.5	-1.8	-3.3	-5.4	-6.2	-6.7	-6.3	0.0	4.0
15-Dec	-6.1	-6.5	-6.0	-6.3	-5.7	-5.8	-7.4	-7.5	-6.0	-4.0	-3.3	-1.4	1.0	2.2	2.1	2.3	1.9	1.5	1.1	1.6	2.1	3.4	4.2	3.9	-1.6	4.2
16-Dec	3.4	3.2	2.6	2.9	2.7	1.2	-0.3	-0.8	-1.4	-2.4	-8.4	-9.1	-9.4	-9.4	-9.8	-10.3	-10.9	-11.4	-11.6	-11.4	-11.5	-11.9	-11.8	-11.7	-5.7	3.4
17-Dec	-11.2	-11.8	-13.6	-15.6	-16.9	-17.7	-18.1	-18.7	-19.4	-19.3	-16.8	-13.5	-10.9	-9.8	-9.1	-9.7	-10.8	-11.7	-11.2	-10.6	-9.6	-10.2	-11.2	-12.2	-13.3	-9.1
18-Dec	-12.5	-13.1	-12.8	-12.0	-12.2	-12.5	-9.3	-7.2	-8.5	-8.7	-7.4	-2.3	-0.3	0.0	0.0	-0.9	-1.6	-2.3	-2.8	-2.4	-3.5	-5.7	-7.9	-10.0	-6.5	0.0
19-Dec	-11.8	-12.4	-12.9	-13.1	-12.5	-12.7	-13.3	-13.6	-14.0	-13.3	-12.3	-11.9	-11.7	-11.8	-11.7	-11.6	-11.4	-11.0	-10.7	-10.4	-9.9	-9.6	-9.5	-9.3	-11.8	-9.3
20-Dec	-9.0	-8.8	-8.7	-8.6	-8.6	-8.6	-8.5	-8.3	-8.0	-7.8	-7.3	-6.5	-5.7	-5.0	-4.6	-4.1	-3.6	-3.3	-3.0	-3.1	-2.8	-2.5	-2.8	-3.9	-6.0	-2.5
21-Dec	-3.2	-1.2	-1.4	-1.3	-1.0	-1.1	-2.3	-3.6	-3.5	-3.1	-3.8	-2.6	-3.3	-2.8	-2.1	-1.9	-2.5	-3.5	-3.9	-4.8	-4.0	-4.6	-5.4	-5.8	-3.0	-1.0
22-Dec	-5.9	-6.7	-6.7	-8.1	-8.8	-8.0	-8.5	-8.6	-8.7	-7.9	-7.0	-5.1	-4.0	-3.8	-3.5	-4.8	-5.3	-5.4	-5.0	-4.4	-4.0	-4.2	-3.4	-1.7	-5.8	-1.7
23-Dec	0.2	1.9	1.7	1.2	0.2	-0.6	-0.8	-1.6	-2.2	-2.7	-1.5	-0.7	-0.3	-0.4	-0.6	-1.4	-2.1	-3.0	-4.8	-5.1	-5.6	-6.2	-6.7	-6.8	-2.0	1.9
24-Dec	-8.1	-9.5	-10.5	-10.8	-10.4	-10.3	-9.6	-9.6	-11.0	-12.4	-11.6	-9.1	-7.1	-7.0	-7.1	-6.8	-8.4	-9.5	-11.5	-12.2	-10.6	-10.7	-10.7	-11.1	-9.8	-6.8
25-Dec	-11.2	-12.3	-12.6	-12.3	-11.3	-12.0	-11.5	-9.9	-9.0	-8.9	-8.1	-6.0	-4.8	-3.8	-3.4	-3.8	-4.4	-6.6	-8.5	-9.5	-10.7	-11.2	-12.1	-11.3	-9.0	-3.4
26-Dec	-12.3	-13.2	-13.7	-14.0	-13.8	-13.8	-13.7	-13.9	-13.4	-12.4	-9.9	-6.9	-5.3	-4.2	-3.8	-4.0	-5.3	-5.4	-6.0	-5.7	-6.3	-6.3	-6.2	-1.9	-8.8	-1.9
27-Dec	3.5	3.5	2.4	1.4	-0.7	-2.3	-2.5	-3.8	-4.0	-3.6	-3.1	-2.1	-0.9	-0.2	-0.1	-1.6	-3.9	-5.3	-6.6	-7.8	-8.1	-9.3	-10.4	-11.1	-3.2	3.5
28-Dec	-11.7	-12.2	-12.5	-12.2	-11.9	-10.7	-9.4	-9.4	-9.0	-8.3	-5.4	-3.2	-2.7	-2.4	-2.2	-2.3	-2.3	-2.4	-2.4	-2.4	-2.4	-2.4	-2.9	-3.8	-6.1	-2.2
29-Dec	-4.2	-5.8	-7.1	-8.1	-9.0	-9.5	-10.0	-10.6	-11.4	-11.5	-11.1	-8.9	-7.0	-6.1	-5.9	-6.4	-7.6	-8.5	-9.5	-9.8	-11.1	-11.9	-12.9	-13.6	-9.1	-4.2
30-Dec	-13.9	-14.2	-13.7	-13.1	-12.5	-12.8	-13.7	-14.3	-15.0	-15.1	-13.3	-10.3	-7.7	-6.2	-6.3	-7.3	-8.7	-8.1	-8.3	-7.2	-8.5	-7.7	-7.8	-7.4	-10.5	-6.2
31-Dec	-8.3	-8.4	-8.7	-9.2	-9.5	-8.5	-8.9	-8.3	-8.6	-7.7	-7.0	-4.5	-1.9	-0.2	1.0	1.2	-0.1	0.0	1.6	-1.0	0.1	1.5	0.9	-0.2	-4.0	1.6
																								Diurnal Average		
																								Diurnal Maximum		



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature (AT) - C
Waskow ohci Pimatisiwin - December 2023





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C
Waskow ohci Pimatisiwin - December 2023**

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	664	89.25	89.25
0 - 10	80	10.75	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744

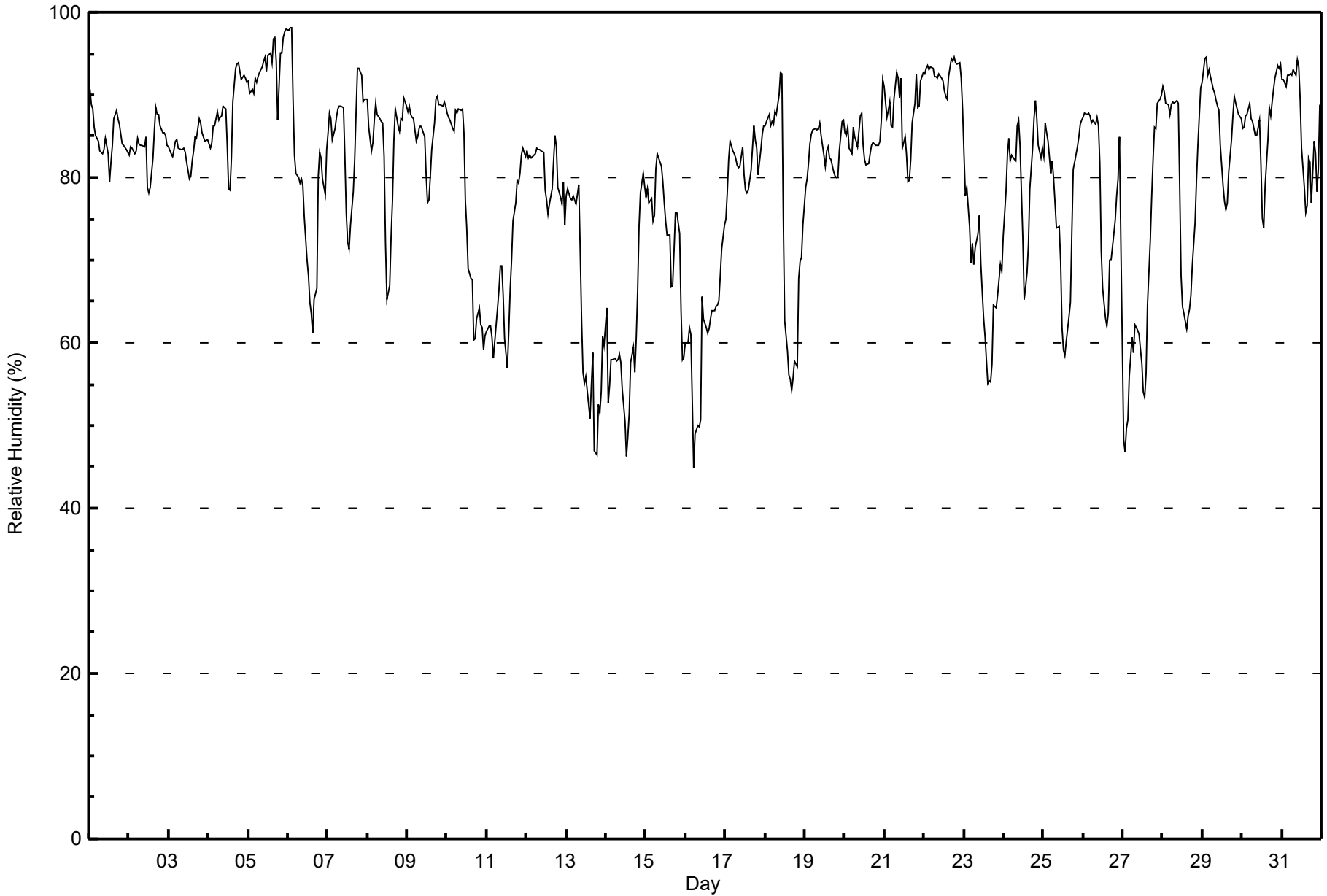


Maximum Value: 98.2 % on Dec 6 03:00																						Maximum Daily Average: 93.6 % on Dec 5																						Hours in Service: 744			
Minimum Value: 44.8 % on Dec 16 06:00																						Minimum Daily Average: 60.1 % on Dec 14																						Hours of Data: 744			
Maximum Diurnal Average: 82.7 % at hour 24																						Minimum Diurnal Average: 71.2 % at hour 14																						Hours of Missing Data: 0			
Monthly Average: 79.41 %																						Percentiles: P ₁ = 49.3 P ₁₀ = 60.8 Q ₁ = 73.7 Median = 83.2 Q ₃ = 87.4 P ₉₀ = 91.8 P ₉₉ = 96.0																						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-Dec	90.7	88.9	88.3	86.2	85.2	84.4	83.3	83.0	82.8	83.5	84.8	82.8	79.5	81.8	83.9	87.1	88.1	87.2	86.4	85.2	84.1	83.9	83.5	83.1	84.9	90.7																					
2-Dec	82.7	83.8	83.6	83.0	83.3	84.7	84.1	83.9	83.8	83.7	84.9	78.9	78.1	78.8	82.4	85.7	88.4	87.7	87.7	86.3	85.4	85.4	85.1	83.9	84.0	88.4																					
3-Dec	83.8	82.9	82.5	83.3	84.5	84.6	83.6	83.4	83.3	83.6	83.0	81.8	79.8	80.2	82.0	83.3	84.9	84.8	87.2	86.6	85.4	84.9	84.4	84.5	83.7	87.2																					
4-Dec	84.1	83.6	84.2	86.2	86.4	87.9	87.0	87.3	87.5	88.7	88.3	83.9	78.6	78.4	82.4	89.2	93.2	93.7	94.0	92.9	91.8	92.4	92.0	91.6	87.7	94.0																					
5-Dec	91.7	90.1	90.6	90.1	92.0	91.5	92.3	92.6	93.4	94.0	94.6	92.9	94.8	95.1	93.9	96.7	97.0	94.1	87.0	95.1	95.1	97.0	97.6	97.9	93.6	97.9																					
6-Dec	97.8	98.1	98.2	89.6	82.6	80.4	80.0	79.4	79.8	78.9	75.2	69.9	68.1	64.8	63.6	61.3	65.2	66.6	80.2	83.0	82.4	79.8	77.9	83.4	78.6	98.2																					
7-Dec	85.4	87.8	87.2	84.5	85.9	87.2	88.3	88.6	88.6	88.5	82.6	75.6	72.1	71.4	74.3	78.4	82.1	87.9	93.1	93.2	92.3	89.2	89.5	89.5	85.1	93.2																					
8-Dec	89.5	86.2	83.3	84.3	86.9	89.0	87.6	87.1	86.7	86.6	82.6	72.1	65.3	67.0	72.9	77.3	84.5	88.4	86.2	85.6	87.2	87.0	89.6	88.7	83.4	89.6																					
9-Dec	88.0	88.6	87.7	87.3	87.1	84.4	84.9	86.0	86.3	85.9	84.9	80.4	76.9	77.4	80.1	83.4	86.7	89.5	89.9	88.8	88.8	88.7	89.1	88.6	85.8	89.9																					
10-Dec	87.7	87.2	87.0	85.9	85.6	88.2	87.9	88.4	88.2	88.3	85.5	77.3	73.9	69.0	67.9	67.6	60.3	60.4	62.8	64.2	62.2	61.8	59.2	60.8	75.3	88.4																					
11-Dec	61.4	62.1	62.1	60.6	58.1	60.2	64.2	66.4	69.3	69.4	65.7	60.5	57.0	61.4	66.5	70.1	74.8	77.0	79.7	79.4	80.6	82.8	83.6	82.6	69.0	83.6																					
12-Dec	83.2	82.4	82.8	82.4	82.7	82.9	83.6	83.5	83.4	83.2	83.0	78.5	77.3	75.6	76.8	78.6	82.1	85.0	83.8	78.8	77.6	76.8	79.6	74.2	80.7	85.0																					
13-Dec	77.9	78.7	77.4	77.3	77.8	77.3	76.8	79.2	71.1	62.7	56.4	55.0	56.0	52.5	50.8	54.9	58.7	46.9	46.5	52.6	51.5	54.1	60.8	59.7	63.0	79.2																					
14-Dec	64.3	52.8	54.9	57.9	58.0	58.1	57.8	57.9	58.6	57.6	54.5	50.5	46.2	48.7	51.6	57.7	59.5	56.5	60.5	66.3	74.0	78.1	80.6	79.1	60.1	80.6																					
15-Dec	77.6	78.6	76.9	77.4	74.8	75.4	81.1	83.0	82.4	81.4	79.4	77.0	74.8	73.1	73.0	66.8	67.0	71.1	75.8	75.8	73.3	64.0	57.9	58.3	74.0	83.0																					
16-Dec	60.0	60.0	61.8	61.0	53.0	44.8	49.1	50.0	49.9	50.7	65.6	63.0	61.8	61.2	61.7	62.8	64.0	63.8	64.3	64.6	65.1	68.2	71.4	74.2	60.5	74.2																					
17-Dec	74.9	78.2	82.3	84.4	83.2	83.0	82.4	81.6	81.2	81.3	83.8	80.3	78.5	78.2	78.5	80.9	83.5	86.3	84.6	83.6	80.3	83.4	85.3	86.3	81.9	86.3																					
18-Dec	86.3	86.8	87.6	86.3	86.8	86.4	87.9	87.6	90.1	92.7	92.6	75.3	62.6	59.0	56.1	55.6	54.3	55.8	57.8	57.2	67.8	69.8	70.3	74.2	74.5	92.7																					
19-Dec	78.8	79.8	81.7	84.0	85.2	85.8	85.9	85.8	85.9	86.6	85.1	82.7	81.4	83.2	83.7	82.4	82.2	80.6	80.2	79.9	80.1	83.3	86.7	86.9	83.2	86.9																					
20-Dec	85.4	85.1	86.1	83.5	82.8	86.1	85.0	84.4	83.8	87.4	87.8	83.9	82.2	81.5	81.8	82.8	83.9	84.2	84.0	84.0	83.9	84.3	87.0	91.8	84.7	91.8																					
21-Dec	91.1	87.3	88.2	89.1	86.2	86.2	89.4	92.7	92.0	89.6	92.1	83.6	84.9	82.7	79.5	79.7	82.2	86.5	89.0	92.6	88.4	88.7	91.7	92.7	87.7	92.7																					
22-Dec	92.6	93.3	93.6	93.1	93.4	93.2	92.3	92.3	92.0	92.6	92.1	91.7	90.5	89.8	89.5	92.2	94.4	94.0	94.5	94.0	93.7	93.8	92.0	88.4	92.4	94.5																					
23-Dec	82.8	77.7	78.8	74.1	69.6	72.1	69.5	71.4	73.2	75.5	69.7	66.3	63.1	60.8	55.0	55.4	55.3	57.5	64.6	64.2	65.7	67.7	69.6	68.6	67.8	82.8																					
24-Dec	72.9	78.4	82.8	84.8	82.1	82.8	82.1	82.0	86.3	87.0	83.8	72.8	65.3	66.8	68.5	71.9	78.7	83.6	87.1	89.4	87.0	83.8	82.4	83.6	80.2	89.4																					
25-Dec	82.5	86.6	85.4	84.4	80.6	82.0	79.8	76.9	73.9	74.1	69.8	61.8	59.1	58.5	60.1	63.2	64.9	73.3	81.0	81.8	83.7	84.9	86.4	87.0	75.9	87.0																					
26-Dec	87.3	87.7	87.7	87.8	87.4	86.7	87.0	86.4	87.2	86.3	81.7	71.1	66.6	63.1	62.1	63.5	70.0	70.1	73.2	74.9	77.9	79.8	84.9	72.2	78.4	87.8																					
27-Dec	48.4	46.7	49.6	50.7	55.9	60.8	58.9	62.2	61.9	61.6	61.1	57.4	54.1	53.3	56.2	64.5	72.4	77.7	82.2	86.1	86.0	89.0	89.5	90.1	65.7	90.1																					
28-Dec	91.0	90.3	89.1	88.8	87.7	88.8	89.2	88.9	89.3	89.0	79.0	68.1	64.4	63.6	61.6	63.3	64.1	65.7	69.4	74.6	79.6	83.9	87.5	90.9	79.5	91.0																					
29-Dec	91.5	94.4	94.6	92.4	93.1	92.2	90.8	90.2	89.3	88.7	88.2	83.8	79.0	77.1	76.2	76.9	80.7	84.6	87.5	89.9	89.0	88.3	87.6	87.2	87.2	94.6																					
30-Dec	86.0	86.0	87.5	87.7	88.9	87.1	86.8	86.0	85.2	85.2	87.0	81.8	75.0	74.0	79.0	84.6	88.5	87.5	89.2	90.7	92.0	93.6	93.3	93.8	86.5	93.8																					
31-Dec	91.9	91.8	91.0	92.4	92.3	92.6	92.4	93.1	92.3	94.2	93.4	89.5	83.6	78.8	75.8	76.6	82.4	81.9	76.9	84.4	82.9	78.2	81.0	88.8	86.6	94.2																					
																						82.2	82.0	82.4	82.0	81.3	81.5	81.6	82.0	81.9	81.9	80.6	75.2	71.9	71.2	71.8	74.0	76.6	77.7	79.6	80.8	81.1	81.5	82.5	82.7	Diurnal Average	
																						97.8	98.1	98.2	93.1	93.4	93.2	92.4	93.1	93.4	94.2	94.6	92.9	94.8	95.1	93.9	96.7	97.0	94.1	94.5	95.1	95.1	97.0	97.6	97.9	Diurnal Maximum	



Wood Buffalo Environmental Association
Hourly Averages

Relative Humidity (RH) - %
Waskow ohci Pimatisiwin - December 2023





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Relative Humidity (RH) - %
Waskow ohci Pimatisiwin - December 2023

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	0	0.00	0.00
40 - 60	65	8.74	8.74
60 - 80	220	29.57	38.31
80 - 100	459	61.69	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744

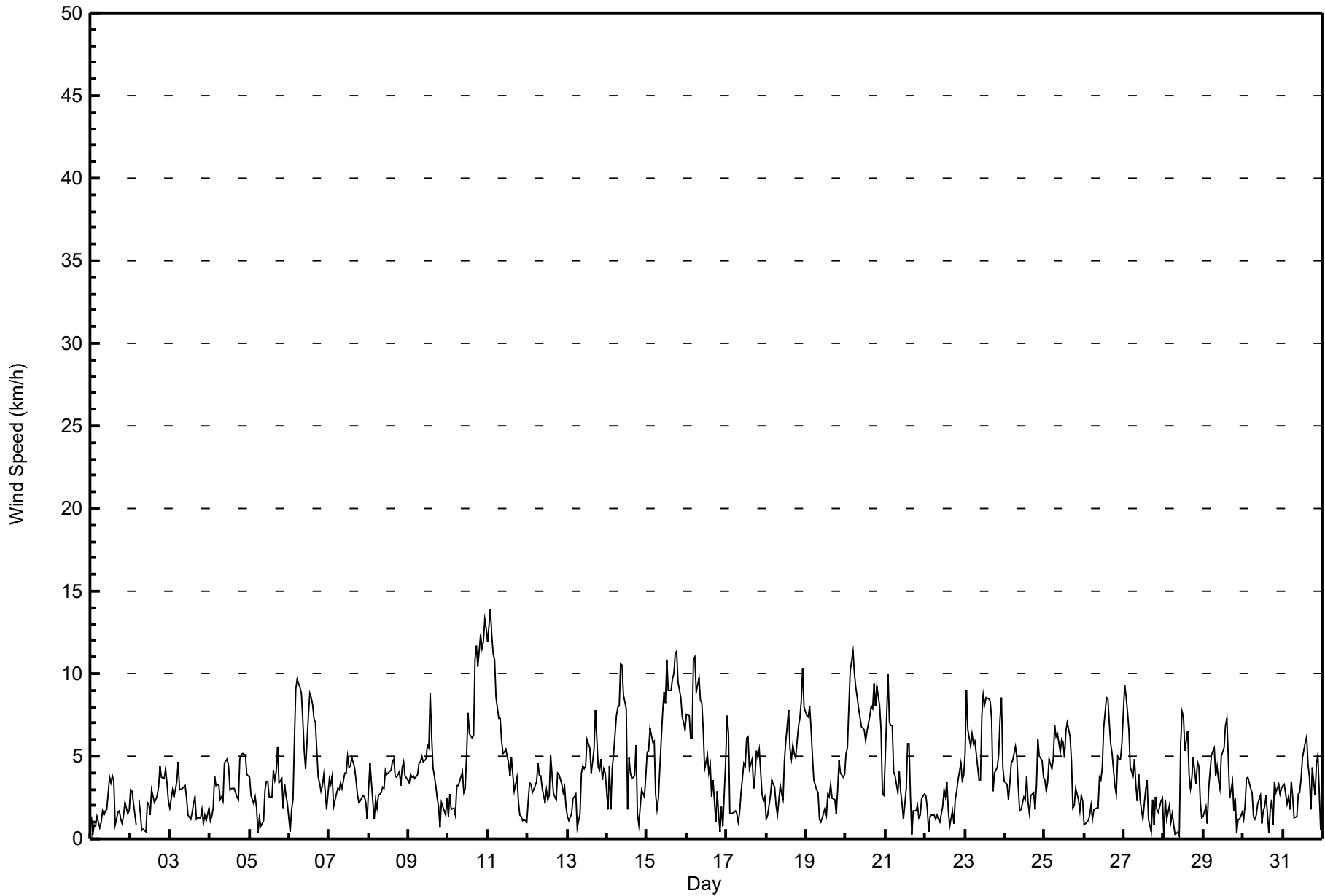


Maximum Speed: 14 km/h on Dec 11 02:00	Maximum Daily Speed Average: 7.3 km/h on Dec 20	Hours in Service: 744
Minimum Speed Value: 0 km/h on Dec 28 01:00	Minimum Daily Speed Average: 1.2 km/h on Dec 2	Hours of Data: 743
Maximum Diurnal Speed Average: 3.4 km/h at hour 14	Minimum Diurnal Speed Average: 1.2 km/h at hour 23	Hours of Missing Data: 1
Monthly Average Velocity: 2.1 km/h 189.0 deg	Percentiles: P ₁ = 0 P ₁₀ = 1 Q ₁ = 2 Median = 3 Q ₃ = 5 P ₉₀ = 8 P ₉₉ = 12	Percent Operational Time: 99.9

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Dec	SW1	SE0	S1	SSE1	SSE1	SSW1	SW1	SSW2	SW1	WSW2	SE2	SSE4	SE3	SE4	SSE3	SSE1	SSW2	WSW2	WSW1	SSW1	SSW1	SW2	W1	WSW2	S1.2	SE4	
2-Dec	WSW3	W3	W2	WSW1	UO	W2	WSW2	SSE0	SSW1	S0	SE2	SSE2	ESE1	SE3	SE2	NNW2	NW3	WNNW3	NW4	WNNW4	WNNW4	NW4	NNW3	WNNW2	WNNW1.2	NW4	
3-Dec	NW2	WNNW3	NNW3	NNW3	NNW4	NNW5	WNNW3	NNW3	NNW3	N3	N2	NW1	NNW1	NW2	NNW2	NNE3	NW1	WNNW1	WNNW1	WSW2	WSW1	SW1	SSW1	SE2	NW1.7	NNW5	
4-Dec	WSW1	SSW1	S2	S4	S3	S3	SW2	SSW3	SSE2	SSE5	SSE5	SSE4	SE3	SE3	SE3	SSE3	SSE3	SSE2	SSE5	SSE5	SSE5	SSE5	SSE4	SSE4	SSE3.1	SSE5	
5-Dec	SSE4	S3	SSE2	SSE3	WSW2	E0	SW1	N1	S1	SSE3	SE4	SSE4	S3	S3	SSE4	S4	SSE4	SSW6	SW3	N4	W2	SE3	SSE3	SSW2	S2.1	SSW6	
6-Dec	SSW0	S2	SSE2	SW6	WSW9	WSW10	WSW9	WSW9	SW7	SSW5	SSW4	SW7	SW9	SW9	SW8	SSW7	SSW7	SSW4	SSE3	SSE3	SSE3	S4	SE2	SSE3	SW4.9	WSW10	
7-Dec	SSE4	SSE3	S4	S2	SSE3	SSE3	SSE3	SE3	S3	SSE4	SSE4	SE5	SE4	SSE4	SSE5	SSE4	S4	SE3	S2	SSE2	SSE3	SE3	SE2	S1	SSE3.2	SE5	
8-Dec	S3	WSW5	SE2	S1	ESE2	E2	SSE3	S3	SE3	SSE3	SSW4	SSW4	S4	S4	SSE5	SSE5	S4	SSE4	SSE4	SSE3	SSE4	SSE5	SSE4	SSE4	SSE3.1	SSE5	
9-Dec	SSE3	S4	SSE4	SE4	SSE4	S4	SSE5	SSE5	SSE5	SSE5	SSE5	SSE5	SSE6	SE6	SE9	SSE6	SSE4	SSE3	SSE2	S2	SSE1	W2	SW2	SSW1	S2	SSE3.6	SSE9
10-Dec	S1	WSW3	WSW2	W2	S1	SSE3	SSE3	SE3	SSE4	S3	SW3	SW5	SW8	SW6	SW6	WSW6	W11	W12	WNNW10	W12	WNNW12	WNNW12	WNNW13	NW13	W4.8	WNNW13	
11-Dec	NW12	NW14	NW12	WNNW11	WNNW11	W9	WSW7	SW7	SW6	SW5	SW5	SW5	S5	SSE4	SSE5	SSE4	SSE3	SSE4	SSE2	SSE1	SSW1	SW1	S1	W1	WSW3.2	NW14	
12-Dec	SSW2	SSE3	S3	S3	S3	S3	SSE5	SSE4	SSE4	S3	SSE2	SSE3	ESE2	SSE3	SSE5	SSE3	WSW3	SW2	S4	SW4	SW3	SW3	S3	SSW2	S2.8	SSE5	
13-Dec	WSW1	N1	WSW2	S2	S3	SSW3	SW1	SW2	S4	S4	SSE4	SE4	SSE6	SSE4	SSE5	SSE5	SSE8	SE4	SSE4	SSE5	SSE4	SSE4	S4	SSE3.4	SSE8		
14-Dec	WSW2	W4	SW2	SW4	SW5	WSW7	WSW8	WSW8	WSW11	WSW11	W9	W8	SW2	SSE5	SSE4	SSE4	SSW4	SW6	SW1	ESE1	S2	SSE3	SE3	SSE4	WSW3.9	WSW11	
15-Dec	SSE5	SSE5	SSE7	SSE6	SSE6	S3	SW2	SW2	S4	SSE8	SSE9	SSE8	SSE11	SSE9	SSE9	SSE10	S10	S11	SSE11	SSE10	SSE9	S7	SSW7	SSW7	SSE7.0	SSE11	
16-Dec	SSW8	WSW7	WSW6	WSW6	W11	W11	W9	W10	W8	NW8	NE7	ENE4	NE5	NE4	NE4	NE3	NE4	NE1	N3	NE1	WNNW0	SW2	E1	N5	WNNW2.3	W11	
17-Dec	N7	N6	WNNW2	SSW1	S2	SE2	SSW1	SSE1	SSE2	SSE3	SSE5	SSE4	SSE6	SSE6	S4	SSE5	SSE3	SSE4	SSE5	SE5	SSE5	S3	WSW2	W3	SSE2.1	NNW7	
18-Dec	W1	SSW1	SSE3	SSE4	SE3	SE3	SSW2	SE1	SSE3	SSE3	SE2	SW5	SW6	WSW8	W5	WSW5	W6	W5	W5	W7	NNE7	NNE8	N10	NNE8	W1.4	N10	
19-Dec	NNE7	N7	NNW8	NNW7	N5	NW4	WNNW3	NW3	WNNW1	NNW1	NE1	NE2	NE1	N3	N3	NNE3	ENE2	E2	ENE1	E3	ESE5	ESE4	ESE4	ESE4	NNE2.1	NNW8	
20-Dec	ESE5	SE6	SE8	SE10	SE11	SSE10	SE9	SE9	SSE8	SSE7	SE7	SSE7	SSE6	SE7	SE7	SE8	SSE8	SSE9	SSE8	SSE9	SSE8	SSE7	S3	SSW3	SSE7.3	SE11	
21-Dec	SW5	WSW10	SW7	WSW7	WSW7	SSW4	SW4	S3	SSE4	SSE3	SSE2	SE1	SSE3	SSE6	SSE6	SSE3	SSE0	SW2	SW2	S2	S1	NNW1	WSW2	SW3	SSW2.7	WSW10	
22-Dec	SW3	WSW2	NW0	SE1	SE1	S1	WSW1	SSE1	S1	SSW1	S2	S3	S3	SSE3	SW2	SSW1	SW2	SW1	SSE2	SSE3	SSE4	SSE5	SSE4	S4	S1.9	SSE5	
23-Dec	SW5	WSW9	WSW7	W6	WSW6	WSW6	WSW6	WSW5	WSW4	SW4	WSW7	WSW9	WSW8	W9	W9	W8	W7	SSW3	SW4	SSW4	SW5	SW7	SW9	S4	WSW5.7	WSW9	
24-Dec	SSE3	S3	SSE2	SSE3	SSE5	SSE5	SSE6	SSE5	WSW3	SW2	W2	W3	S2	SE4	SE2	SSE2	SSE3	SSE3	SSE2	SSE3	SSE6	SSE5	SSE5	S4	SSE3.0	SSE6	
25-Dec	S4	S3	S3	SSE5	S4	SSE5	SSE7	SSE6	SSE6	SSE6	SSE6	SSE6	SSE5	SSE6	SSE7	SSE6	SSE5	SSE2	SSE2	SSE3	SSE2	SSW2	S3	SSW2	SSE4.3	SSE7	
26-Dec	WSW1	SSW1	NW1	NW1	W2	S1	SE2	SSE2	SSE2	SSE4	SSE4	SSE4	SE7	SSE9	SSE8	SSE7	SE6	SSE5	S3	S3	SSE5	SSE5	SSE5	S6	SSE3.4	SSE9	
27-Dec	SW9	SSW9	S8	S7	SSE4	SE4	SE5	SE3	SE2	SSE4	SSE2	ENE1	S2	SSE3	SSE4	SSE1	WNNW0	NW2	WSW1	WNNW3	NW2	NW2	W2	NW2	S2.1	SW9	
28-Dec	WNNW0	WNNW2	WNNW1	WNNW2	S1	S2	WSW1	ENE0	SE0	ENE0	N6	N8	N7	N5	NNW7	N4	NNW3	N4	NNW5	NNW3	NNW5	NNW4	N2	W1	NNW2.6	N8	
29-Dec	W1	WSW2	SSE1	SSE3	SSE4	SSE5	SSE5	SSE4	SE4	SSE4	SE3	SE5	SE6	SE7	SE7	SSE5	SSE2	SSE4	SE2	S2	NW0	WSW1	WSW1	SW2	SSE3.0	SSE7	
30-Dec	S1	SSE2	SSE4	SSE4	S3	S3	SSE1	SSW1	SSW1	SSE2	S3	SE1	SE2	SE2	S3	ENE0	WSW2	WSW2	WNNW1	S3	S3	SSE3	S3	S3	S1.9	SSE4	
31-Dec	WSW3	W3	S2	SSE3	SSW2	SSW3	SSW3	SW1	S1	S3	S3	S4	S5	SSE6	SSE6	S4	SSE4	SSE2	S4	SSE3	SW5	W5	N3	NNE0	SSW2.4	SSE6	

SW1.4	WSW2.1	SSW1.7	SSW2.0	SSW2.2	SSW2.3	SSW2.6	SSW2.3	SSW2.5	S2.5	S2.3	S2.5	SSE2.8	SSE3.4	SSE3.2	S2.5	S2.1	S2.3	S1.8	S1.9	S1.9	SSW1.6	SSW1.2	SSW1.4	Diurnal Average		
NW12	NW14	NW12	WNNW11	SE11	W11	SE9	W10	WSW11	WSW11	SSE9	WSW9	SSE11	SSE9	SSE9	SSE10	W11	W12	SSE11	WNNW12	WNNW12	WNNW12	WNNW12	WNNW13	NW13	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 - December 2023

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	578	77.79	77.79
6 - 11	156	21.00	98.79
12 - 19	9	1.21	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: 743

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Wind Speed (WS) - km/h
Waskow ohci Pimatisiwin - December 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	14	3	10	7	4	10	50	187	95	40	47	35	22	19	17	18	578
6 - 11	6	4	1	0	0	0	14	52	5	7	16	28	15	3	1	4	156
12 - 19	0	0	0	0	0	0	0	0	0	0	0	0	1	4	3	1	9
20 - 28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	20	7	11	7	4	10	64	239	100	47	63	63	38	26	21	23	743

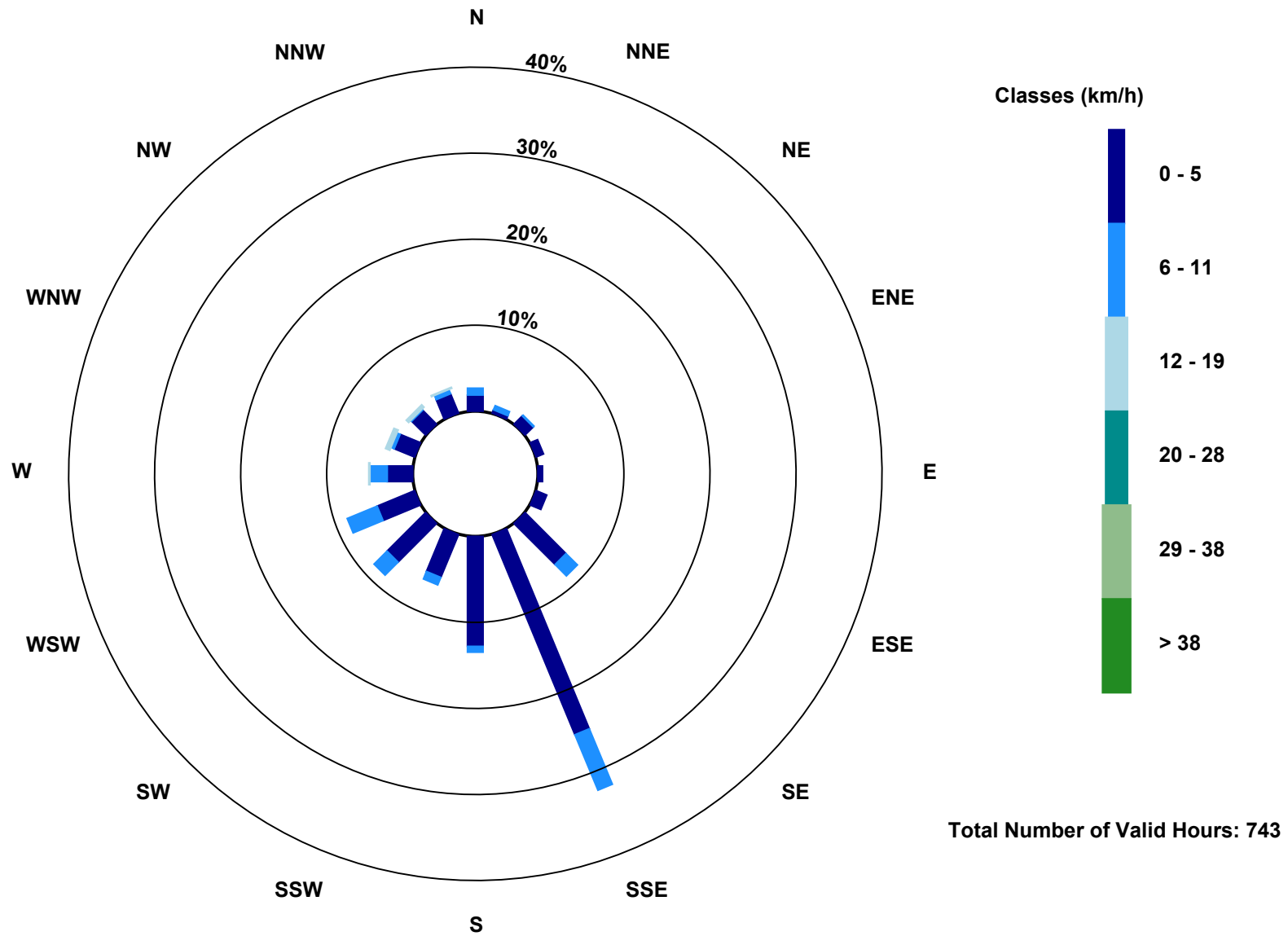
Total Number of Valid Hours: 743

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Dec 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 - December 2023

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 5 km/h on Dec 16 06:00 Minimum Value: 0 km/h on Dec 7 19:00 Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 1 Median = 1 Q ₃ = 2 P ₉₀ = 3 P ₉₉ = 4																		Hours in Service: 744 Hours of Data: 743 Hours of Missing Data: 1 Hours of Calibration: 0 Percent Operational Time: 99.9								
Day	Hourly Period Ending At (MST)																								Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Dec	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2-Dec	1	1	1	1	UO	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
3-Dec	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
4-Dec	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1
5-Dec	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	3	2	1	1	1	1	1	1
6-Dec	1	1	1	3	4	4	4	4	3	3	3	3	4	4	4	3	2	2	1	1	2	2	1	1	1	1
7-Dec	2	1	1	1	1	1	1	1	1	1	2	2	2	1	1	1	1	1	0	1	1	1	1	1	1	1
8-Dec	1	2	1	1	1	1	1	1	1	1	2	2	2	1	1	1	2	1	1	1	1	1	1	1	1	2
9-Dec	1	1	1	1	1	2	1	1	1	1	1	2	2	3	2	1	1	1	1	1	1	1	1	1	1	1
10-Dec	1	1	1	1	1	1	1	1	2	1	1	2	3	3	3	3	5	5	5	5	4	4	4	4	4	4
11-Dec	4	4	4	4	4	3	3	3	2	2	2	2	2	1	2	1	1	1	1	1	1	1	1	1	1	1
12-Dec	2	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	1	1	2	1	1	1	1	1	1	1
13-Dec	1	1	1	1	1	1	1	1	1	1	1	1	2	2	1	1	1	3	2	3	2	2	2	2	2	3
14-Dec	1	2	1	2	2	3	3	4	4	4	4	3	2	1	1	1	2	2	1	1	1	1	1	1	1	1
15-Dec	2	2	2	1	2	1	1	1	2	2	3	3	3	3	4	4	4	4	4	3	3	3	3	3	3	3
16-Dec	4	3	3	2	5	5	3	4	4	3	2	1	2	1	2	1	1	1	1	1	1	1	1	1	1	2
17-Dec	2	3	1	1	1	1	1	1	1	1	1	1	2	2	1	1	2	2	1	2	2	1	1	1	1	1
18-Dec	1	1	1	1	1	1	2	1	1	1	1	2	2	3	2	1	2	2	1	2	3	3	4	3	3	4
19-Dec	3	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	2	1	1	1	1	1
20-Dec	2	2	3	4	4	3	3	3	3	2	2	2	2	2	2	3	3	3	2	3	3	2	1	1	1	1
21-Dec	3	4	3	3	3	2	1	1	2	1	1	1	1	2	3	1	1	1	1	1	1	1	1	1	1	1
22-Dec	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	1	2	2	2
23-Dec	3	4	3	3	3	3	3	2	2	2	3	4	4	4	3	3	3	2	1	2	2	2	3	3	3	4
24-Dec	1	1	1	1	2	2	2	2	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	2	1	1
25-Dec	2	1	1	1	1	1	2	2	2	2	2	2	1	2	2	2	2	2	1	1	2	1	1	1	1	1
26-Dec	1	1	1	1	1	1	1	1	1	1	1	1	3	3	3	2	2	2	1	2	1	1	2	3	3	3
27-Dec	4	3	3	2	1	2	2	1	1	1	1	1	2	1	1	1	1	1	2	3	1	1	1	1	1	1
28-Dec	1	1	1	1	1	1	1	1	1	1	3	3	3	2	2	2	1	1	2	1	1	1	1	1	1	1
29-Dec	1	1	1	1	1	1	2	1	1	1	1	1	2	2	2	2	1	1	1	1	1	1	1	1	1	1
30-Dec	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
31-Dec	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	1	1	1	1	1	3	2	1	1	1	3
Diurnal Maximum																								4		
UO - Unstable Operation																										



Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Direction (WD) - deg

Waskow ohci Pimatisiwin - December 2023

Direction of Maximum Speed: 312 deg on Dec 11 02:00		Hours in Service:	744
Direction of Maximum Daily Speed Average: 146.7 deg on Dec 20		Hours of Data:	743
Direction of Minimum Speed: 291 deg on Dec 28 01:00		Hours of Missing Data:	1
Direction of Minimum Daily Speed Average: 1.2 deg on Dec 2		Percent Operational Time:	99.9
Monthly Average Direction: 189.0 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-Dec	234	142	184	163	162	196	230	209	223	241	139	147	141	143	151	162	208	239	256	206	205	217	273	256	187.7
2-Dec	254	270	272	249	UO	259	243	155	196	188	145	147	105	143	141	337	316	287	321	290	283	317	336	303	282.9
3-Dec	323	286	330	348	332	346	292	339	339	1	352	324	328	304	348	16	326	299	294	250	251	229	200	180	324.1
4-Dec	241	199	190	172	189	189	221	210	148	167	151	154	136	145	140	164	168	156	166	154	158	161	163	160	165.6
5-Dec	168	182	160	164	242	99	221	3	190	161	141	162	171	174	164	172	164	192	220	358	260	145	162	196	175.0
6-Dec	195	170	158	227	238	238	238	238	227	204	196	232	233	232	230	209	192	196	149	148	167	173	134	152	215.5
7-Dec	155	151	170	170	156	156	150	144	171	156	156	145	140	153	154	160	179	145	169	162	153	134	145	176	155.3
8-Dec	172	251	145	179	117	101	148	176	145	162	203	196	185	179	156	154	169	153	168	159	168	162	159	158	167.5
9-Dec	152	178	161	145	150	182	152	155	161	164	162	150	140	146	147	161	156	160	174	150	270	220	193	190	159.7
10-Dec	169	252	249	264	188	164	155	141	156	189	230	217	227	223	216	251	276	266	289	281	287	293	295	305	262.3
11-Dec	326	312	306	297	293	274	240	228	232	214	220	223	183	154	154	159	154	153	154	150	200	228	176	262	257.4
12-Dec	196	167	170	187	170	170	161	165	165	175	151	164	120	157	155	167	245	219	179	217	232	236	169	195	178.1
13-Dec	255	351	258	189	178	194	217	227	173	169	163	145	155	159	159	167	149	159	143	168	148	153	147	173	163.7
14-Dec	244	269	229	219	233	254	251	241	245	252	259	260	218	163	160	168	195	236	219	119	177	151	144	159	230.0
15-Dec	163	160	160	153	155	185	214	219	170	159	154	154	151	158	147	159	171	169	161	165	167	176	198	213	165.3
16-Dec	211	238	240	238	280	279	263	262	274	319	44	57	40	56	44	42	41	48	356	50	285	231	83	1	291.4
17-Dec	349	351	300	192	177	141	202	166	161	156	158	152	158	158	171	158	149	157	148	145	152	183	244	275	161.8
18-Dec	271	204	161	160	145	138	199	137	163	165	145	227	228	249	259	256	260	266	259	269	28	15	353	15	261.2
19-Dec	13	1	345	342	349	323	296	321	290	331	44	48	39	4	9	27	61	86	75	96	111	118	109	113	20.3
20-Dec	118	125	137	144	145	147	142	145	149	147	146	148	150	146	146	146	151	153	148	148	152	149	190	200	146.7
21-Dec	226	240	236	258	238	195	220	172	159	161	160	141	159	153	150	159	152	228	218	175	182	347	255	230	206.5
22-Dec	226	243	316	140	145	184	238	164	170	209	170	173	183	165	226	211	219	216	162	164	159	167	158	182	179.9
23-Dec	216	240	248	265	254	247	249	239	241	214	255	249	256	268	279	276	281	194	215	211	225	229	235	172	245.8
24-Dec	162	186	154	153	158	153	157	161	244	223	265	266	171	140	139	149	156	166	147	159	157	156	168	181	166.1
25-Dec	170	170	177	163	170	161	158	159	165	166	159	157	148	157	152	148	154	151	168	159	160	198	170	210	161.5
26-Dec	248	202	309	308	263	183	146	166	166	166	149	151	142	153	148	151	145	162	169	183	153	153	152	181	159.2
27-Dec	225	207	188	181	151	140	142	133	129	148	154	62	170	157	148	150	285	320	254	300	306	312	272	313	184.1
28-Dec	291	294	290	294	190	171	242	74	143	70	10	352	8	356	333	356	329	3	347	335	337	339	355	267	344.4
29-Dec	264	240	160	164	157	152	158	149	145	155	138	140	137	142	146	149	159	164	144	173	312	249	242	223	155.8
30-Dec	180	166	162	159	169	175	165	194	206	156	176	128	142	140	179	57	253	252	286	185	171	167	171	185	175.2
31-Dec	245	260	190	164	192	210	208	220	183	188	190	180	172	167	166	178	154	147	175	163	236	271	6	17	191.8

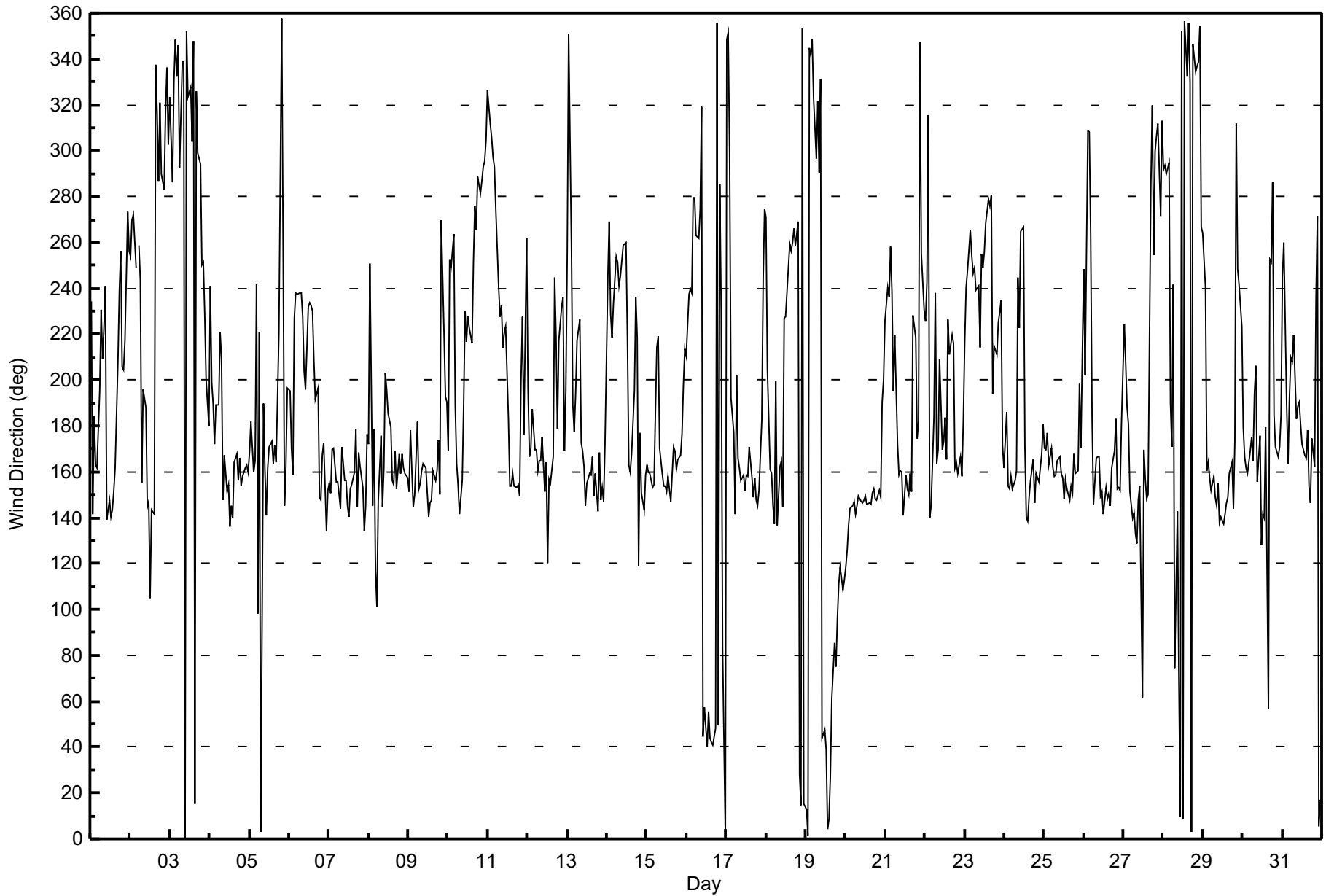
220.5 238.1 209.6 202.0 204.3 203.0 201.6 195.9 191.4 183.0 171.1 178.4 167.2 167.0 165.1 170.7 186.8 188.9 184.9 186.7 183.8 193.4 201.4 206.4
Diurnal Average

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
Waskow ohci Pimatisiwin - December 2023





Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Direction (WD) - deg
Waskow ohci Pimatisiwin - December 2023

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 104 deg on Dec 6 01:00 Minimum Value: 9 deg on Dec 2 01:00 Percentiles: P ₁ = 13 P ₁₀ = 20 Q ₁ = 24 Median = 33 Q ₃ = 47 P ₉₀ = 66 P ₉₉ = 92																			Hours in Service: 744 Hours of Data: 743 Hours of Missing Data: 1 Hours of Calibration: 0 Percent Operational Time: 99.9						
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Dec	52	88	81	54	30	81	69	40	57	51	40	27	30	23	32	45	32	35	48	75	39	26	24	26	88
2-Dec	9	23	21	70	UO	19	62	77	62	86	35	20	30	22	26	38	23	22	19	14	13	29	28	17	86
3-Dec	41	39	37	26	25	21	38	33	31	29	44	63	51	37	55	39	79	62	19	26	66	47	66	49	79
4-Dec	56	43	30	21	26	35	38	44	59	20	24	36	33	30	31	18	23	28	13	13	17	19	14	18	59
5-Dec	25	29	35	44	84	76	61	93	66	37	32	43	54	72	27	28	31	39	80	48	89	40	54	74	93
6-Dec	104	45	47	38	35	36	33	32	39	42	53	43	40	39	41	37	31	42	29	34	35	48	82	48	104
7-Dec	39	24	31	79	52	41	45	27	52	30	38	23	31	24	19	13	31	12	20	30	50	46	53	92	92
8-Dec	35	62	68	99	29	37	40	39	27	32	36	60	39	31	17	14	15	27	28	38	15	17	28	27	99
9-Dec	36	19	20	20	16	58	22	21	23	28	20	22	24	20	20	18	23	20	16	60	39	41	34	36	60
10-Dec	75	31	60	49	50	27	43	29	39	47	44	36	43	41	44	41	28	32	32	29	27	25	23	22	75
11-Dec	22	15	19	22	23	30	31	33	33	38	28	34	37	27	22	21	27	25	33	48	70	46	62	95	95
12-Dec	66	35	26	37	22	22	19	24	24	29	49	36	37	31	24	52	51	43	48	46	47	42	25	61	66
13-Dec	83	88	64	52	25	40	90	85	28	18	30	28	21	26	22	20	20	25	58	73	38	70	34	53	90
14-Dec	57	20	35	44	39	35	35	38	36	34	35	41	91	23	26	33	42	36	85	70	36	24	47	29	91
15-Dec	22	19	16	18	20	31	30	37	29	19	21	22	21	25	25	29	31	29	25	30	28	37	55	50	55
16-Dec	44	40	41	36	30	27	34	33	37	40	27	25	24	27	24	43	22	86	35	63	99	27	84	18	99
17-Dec	22	26	58	65	55	62	73	60	35	32	21	29	23	20	31	22	40	19	20	20	20	29	30	30	73
18-Dec	86	61	69	25	19	49	92	61	23	37	52	45	40	38	27	21	18	17	18	19	36	29	26	26	92
19-Dec	24	23	18	19	21	35	21	18	59	53	26	22	27	17	20	22	23	19	22	24	26	25	25	26	59
20-Dec	26	26	24	24	21	23	23	24	23	23	23	22	29	24	23	20	23	21	22	23	24	22	46	41	46
21-Dec	59	35	37	34	34	56	30	41	40	29	37	64	38	27	22	35	87	68	50	39	93	47	40	41	93
22-Dec	34	42	81	37	49	48	63	59	37	54	34	30	27	25	65	75	63	79	50	43	32	31	36	48	81
23-Dec	64	47	49	48	42	45	38	44	51	51	41	42	43	40	32	30	28	67	41	41	29	21	21	55	67
24-Dec	35	38	36	24	21	24	22	27	27	63	32	39	50	20	32	57	27	37	39	13	13	17	15	19	63
25-Dec	21	28	21	20	22	20	21	21	19	23	25	21	25	25	20	22	24	39	55	23	43	57	39	55	57
26-Dec	89	76	74	83	64	61	59	46	43	34	28	16	20	22	22	19	22	29	41	75	20	16	28	44	89
27-Dec	43	39	32	35	30	34	27	42	41	12	62	78	75	54	44	65	85	34	72	80	64	48	55	42	85
28-Dec	84	59	57	63	87	72	92	86	85	97	28	27	24	42	19	28	25	26	20	45	23	25	39	81	97
29-Dec	40	33	68	27	15	17	22	30	22	33	31	20	24	22	19	24	37	29	51	32	79	78	59	23	79
30-Dec	55	30	20	24	17	20	65	61	31	28	27	64	39	29	54	84	63	46	83	22	31	17	21	24	84
31-Dec	24	18	47	25	55	34	32	68	59	30	34	41	36	24	19	39	24	84	29	60	61	47	38	88	88
104 88 81 99 87 81 92 93 85 97 62 78 91 72 65 84 87 86 85 80 99 78 84 95																									
Diurnal Maximum																									
UO - Unstable Operation																									



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

AMS26 CHRISTINA LAKE DECEMBER 2023

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

January 31, 2024

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CHRISTINA LAKE (AMS26)
 DECEMBER 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	710	34	34	100	13.2	0	3.1	0
H2S (ppb) Average	704	35	40	99.33	1.1	0	0.5	0
NO2 (ppb) Average	707	37	37	100	19.7	0	9.3	-
NO (ppb) Average	707	37	37	100	31.5	-	5.8	-
NOX (ppb) Average	707	37	37	100	45.2	-	15.1	-
Temperature 2 m (C) Average	744	0	0	100	6.9	-	4.5	-
Relative Humidity (%) Average	744	0	0	100	94.3	-	85.3	-
Wind Speed 10 m (km/h) Average	744	0	0	100	32	-	18	-
Wind Direction 10 m (deg) Average	744	0	0	100	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CHRISTINA LAKE (AMS26)
 DECEMBER 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	710	1.07	1.4	-	0	0.1	0.3	0.7	1.2	2.5	13.2
H2S (ppb) Average	704	0.15	0.2	-	0	0	0	0.1	0.2	0.3	1.1
NO2 (ppb) Average	707	5.4	3.2	-	0.3	2	3.1	4.7	7	10	19.7
NO (ppb) Average	707	2.38	4	-	0	0	0.1	0.6	2.9	7	31.5
NOX (ppb) Average	707	7.78	6.7	-	0.3	2.2	3.5	5.6	9.2	16.1	45.2
Temperature 2 m (C) Average	744	-3.57	4.8	-	-16.9	-10	-7.5	-3	0.1	2.4	6.9
Relative Humidity (%) Average	744	68.59	14.8	-	24.5	48.8	59.2	69.6	81.9	86.1	94.3
Wind Speed 10 m (km/h) Average	744	11.1	5	-	1	6	7	10	14	19	32
Wind Direction 10 m (deg) Average	744	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - CHRISTINA LAKE (AMS26)
DECEMBER 2023

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
H2S	19 Dec 2023 12:00	19 Dec 2023 16:00	5	Maintenance - replaced calibration gas cylinder

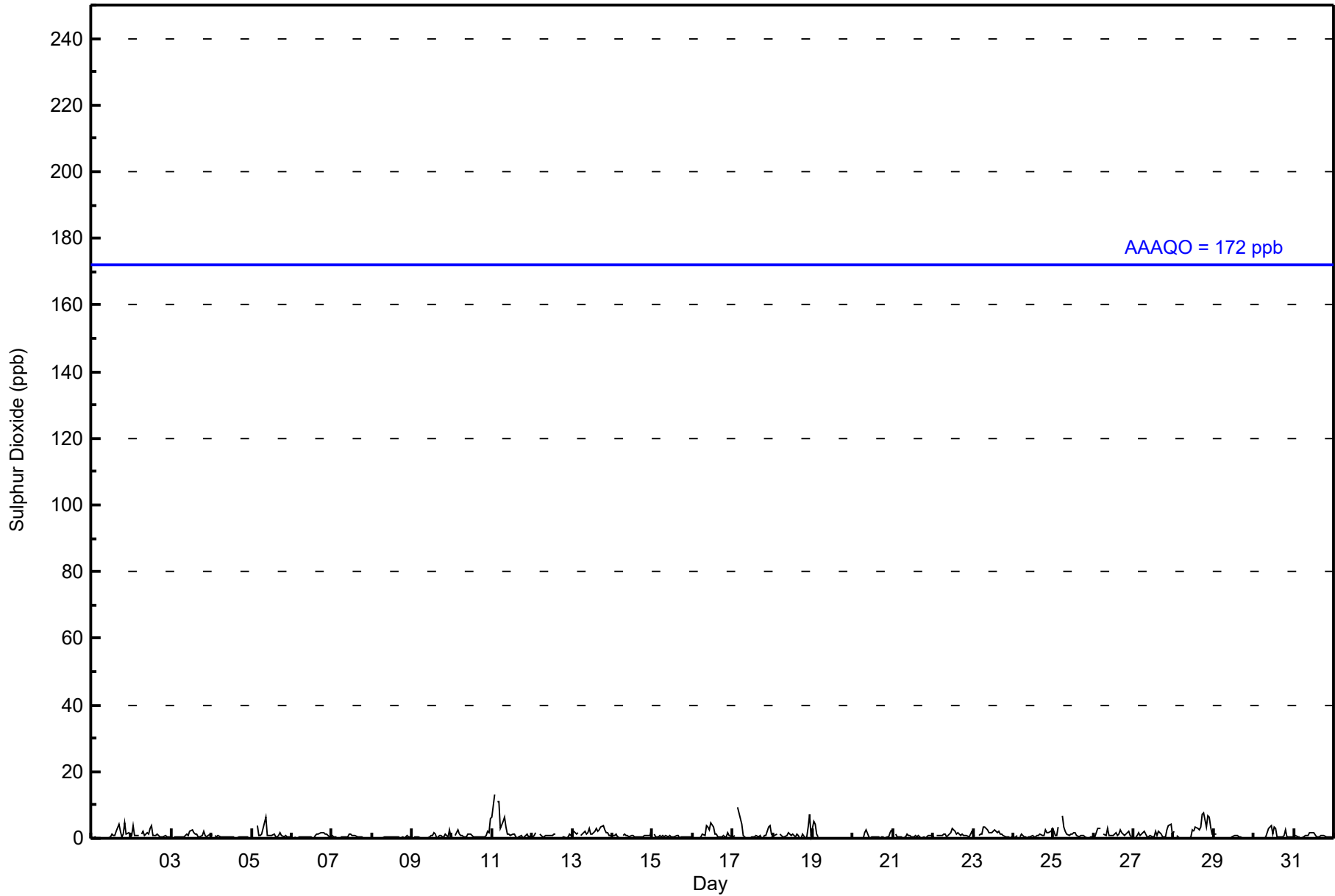


Number of Exceedences (AAAQO):		1-hr: 0		24-hr: 0		Hours in Service: 744														Daily Average		Daily Maximum																										
Maximum Value: 13.2 ppb on Dec 11 02:00		Maximum Daily Average: 3.1 ppb on Dec 11		Hours of Data: 710														Hours of Missing Data: 34		Hours of Calibration: 34																												
Minimum Value: 0.0 ppb on Dec 5 02:00		Minimum Daily Average: 0.3 ppb on Dec 29		Hours of Calibration: 34														Percent Operational Time: 100.0																														
Maximum Diurnal Average: 1.6 ppb at hour 4		Minimum Diurnal Average: 0.8 ppb at hour 3		Percentiles: P ₁ = 0.0 P ₁₀ = 0.1 Q ₁ = 0.3 Median = 0.7 Q ₃ = 1.2 P ₉₀ = 2.5 P ₉₉ = 6.9																																												
Monthly Average: 1.07 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-Dec	0.2	0.2	0.2	0.1	Z	0.1	0.2	0.1	0.1	0.2	0.2	0.6	1.4	0.7	1.0	2.1	4.4	2.2	0.4	1.3	4.5	1.4	1.6	0.9	1.1	4.5																						
2-Dec	0.7	3.9	0.7	0.7	0.8	Z	1.2	2.3	1.0	1.6	1.4	2.8	3.8	0.9	0.9	1.1	0.8	0.6	0.3	0.4	1.0	0.6	0.5	0.5	1.2	3.9																						
3-Dec	Z	0.6	0.5	0.4	0.3	0.3	0.3	0.4	0.8	1.3	1.0	2.0	2.5	1.7	1.2	1.3	0.4	0.3	0.8	2.0	0.8	0.5	0.8	1.4	0.9	2.5																						
4-Dec	0.8	Z	0.7	0.6	0.8	0.5	0.3	0.3	0.4	0.5	0.5	0.3	0.3	0.3	0.2	0.2	0.3	0.3	0.5	0.5	0.4	0.3	0.1	0.0	0.4	0.8																						
5-Dec	0.2	0.0	Z	3.7	1.0	1.0	1.4	3.0	6.2	0.7	0.7	1.1	1.0	1.1	0.5	0.5	0.7	1.7	0.9	0.4	0.6	0.4	0.3	0.4	1.2	6.2																						
6-Dec	0.2	0.1	0.2	Z	0.2	0.4	0.2	0.4	0.3	0.4	0.3	0.3	0.2	0.2	0.7	1.3	1.2	1.9	1.8	1.5	1.3	1.1	0.4	0.6	0.7	1.9																						
7-Dec	0.8	0.5	0.4	0.3	Z	0.5	0.3	0.6	0.6	0.6	1.2	1.3	0.7	0.8	0.7	0.5	0.3	0.4	0.5	0.2	0.1	0.1	0.2	0.2	0.5	1.3																						
8-Dec	0.1	0.1	0.1	0.1	0.1	Z	0.2	0.3	0.4	0.3	0.3	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.3	0.2	0.5	0.8	0.5	0.3	0.3	0.8																					
9-Dec	Z	0.3	0.3	0.2	0.3	0.1	0.1	0.2	0.2	0.2	0.4	0.9	0.8	1.8	1.3	0.2	0.7	1.1	0.6	0.2	1.3	0.3	2.5	0.5	0.6	2.5																						
10-Dec	0.6	Z	0.7	2.5	1.2	0.7	0.7	0.6	0.5	1.2	1.5	1.3	0.9	0.5	0.3	0.3	0.3	0.3	0.4	0.5	0.9	2.2	1.6	5.9	1.1	5.9																						
11-Dec	6.5	13.2	Z	10.9	10.9	3.0	4.9	6.4	3.6	1.1	1.4	0.7	1.2	1.2	0.6	0.1	0.2	1.0	0.1	0.4	0.7	1.3	0.5	1.0	3.1	13.2																						
12-Dec	0.5	0.7	1.7	Z	1.3	0.9	0.5	0.6	0.8	0.7	0.7	0.7	0.8	1.4	1.2	C	C	C	0.2	0.2	0.0	0.5	1.4	1.0	0.8	1.7																						
13-Dec	2.3	2.3	1.2	1.7	Z	0.8	1.4	2.3	1.4	1.5	2.8	1.4	1.5	2.1	2.9	2.2	2.6	3.2	3.7	2.7	1.7	1.7	1.0	1.0	2.0	3.7																						
14-Dec	0.8	1.0	1.1	0.5	0.6	Z	1.0	1.1	0.9	0.9	0.3	1.0	1.0	0.3	0.3	0.5	0.4	0.4	1.0	1.0	0.8	0.7	2.4	0.8	0.8	2.4																						
15-Dec	Z	1.4	0.6	0.6	0.9	0.5	0.7	0.5	0.7	0.4	0.8	0.4	0.3	0.4	1.0	0.8	0.1	0.4	0.6	0.3	0.5	0.3	0.3	0.4	0.6	1.4																						
16-Dec	0.5	Z	0.2	0.1	0.1	0.5	1.2	1.0	3.9	3.3	2.7	4.5	3.5	1.4	1.1	0.4	0.2	0.2	0.7	0.6	0.4	1.8	0.8	0.2	1.3	4.5																						
17-Dec	0.5	1.0	Z	9.3	5.9	4.4	0.8	0.4	0.1	0.2	0.2	0.3	0.5	0.5	0.8	0.6	0.9	0.2	0.2	0.7	0.7	3.4	4.0	1.5	1.6	9.3																						
18-Dec	1.0	0.9	1.5	Z	1.1	0.8	0.5	0.4	0.8	1.5	1.1	0.7	1.1	0.5	1.2	0.7	0.2	0.2	1.2	0.2	0.4	3.3	7.1	0.8	1.2	7.1																						
19-Dec	5.0	4.4	1.1	0.2	Z	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	0.1	0.0	0.0	0.0	0.0	0.5	5.0																						
20-Dec	0.1	0.1	0.1	0.1	0.1	Z	0.2	1.8	2.6	0.4	0.2	0.2	0.2	0.3	0.4	0.2	0.2	0.3	0.5	0.2	0.4	0.5	1.7	2.5	0.6	2.6																						
21-Dec	Z	1.1	0.4	0.4	0.3	0.2	0.2	0.4	1.4	0.8	0.7	0.4	0.3	0.7	0.5	0.6	0.3	0.2	0.2	0.2	0.5	0.9	0.7	0.7	0.5	1.4																						
22-Dec	0.4	Z	0.7	0.9	0.7	0.8	1.3	1.1	0.5	0.8	1.7	3.1	2.4	2.1	1.3	1.6	0.7	1.1	0.8	0.9	0.9	0.5	1.4	2.1	1.2	3.1																						
23-Dec	0.9	1.0	Z	1.0	1.1	1.3	3.4	3.2	2.6	1.5	1.6	1.7	2.1	2.5	1.8	2.0	1.2	1.2	1.0	0.4	0.3	0.3	0.2	0.4	1.4	3.4																						
24-Dec	0.2	0.2	1.0	Z	0.5	1.2	0.3	0.3	0.2	0.5	0.6	1.0	0.6	0.6	0.9	0.7	1.1	0.7	0.7	2.7	1.7	1.7	2.2	3.1	1.0	3.1																						
25-Dec	2.2	0.8	1.0	3.2	Z	6.8	3.3	2.1	1.1	1.0	1.2	1.4	1.5	1.5	0.7	0.5	0.7	0.9	0.7	0.5	0.1	0.2	0.3	0.5	1.4	6.8																						
26-Dec	0.7	0.6	2.9	2.8	3.2	Z	1.2	0.7	2.9	0.7	1.0	0.7	0.7	1.5	0.8	1.5	2.4	1.6	0.8	1.1	1.9	2.3	1.0	0.3	1.4	3.2																						
27-Dec	Z	0.3	1.1	1.6	0.8	1.6	2.0	1.4	0.2	0.3	0.9	0.4	0.3	1.9	0.7	2.1	1.2	0.4	0.4	0.6	2.5	3.8	4.4	0.9	1.3	4.4																						
28-Dec	2.3	Z	1.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.4	2.6	2.2	3.2	2.9	2.5	3.4	7.1	7.5	3.5	6.9	6.3	3.4	1.4	2.5	7.5																						
29-Dec	1.4	1.2	Z	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.1	0.5	0.7	0.7	0.6	0.6	0.3	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.3	1.4																						
30-Dec	0.0	0.0	0.0	Z	0.1	0.0	0.0	0.5	1.5	2.9	3.7	1.2	3.5	2.9	0.5	0.4	0.6	0.4	0.7	2.4	0.5	0.2	0.2	0.2	1.0	3.7																						
31-Dec	0.5	0.9	0.5	0.3	Z	0.3	0.3	0.7	0.7	1.6	1.6	1.9	1.5	0.5	0.4	0.5	0.9	0.8	0.8	0.5	0.3	0.2	0.2	0.6	0.7	1.9																						
																								1.1	1.4	0.8	1.6	1.3	1.0	0.9	1.1	1.2	0.9	1.0	1.2	1.2	1.1	0.9	0.9	0.9	1.0	0.9	0.9	1.1	1.2	1.3	1.0	Diurnal Average
																								6.5	13.2	2.9	10.9	10.9	6.8	4.9	6.4	6.2	3.3	3.7	4.5	3.8	3.2	2.9	2.5	4.4	7.1	7.5	3.5	6.9	6.3	7.1	5.9	Diurnal Maximum
Z - zerospan C - Calibration																																																
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 172 ppb 24-hr 48 ppb																																																



Wood Buffalo Environmental Association
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Christina Lake - December 2023





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Christina Lake - December 2023

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

Total Number of Valid Hours: 710

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Sulphur Dioxide (SO₂) - ppb
Christina Lake - December 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	1	1	1	5	7	14	21	41	93	152	145	123	56	37	10	0	707
11 - 20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	3
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	1	1	1	5	7	14	21	41	93	152	145	123	56	37	13	0	710

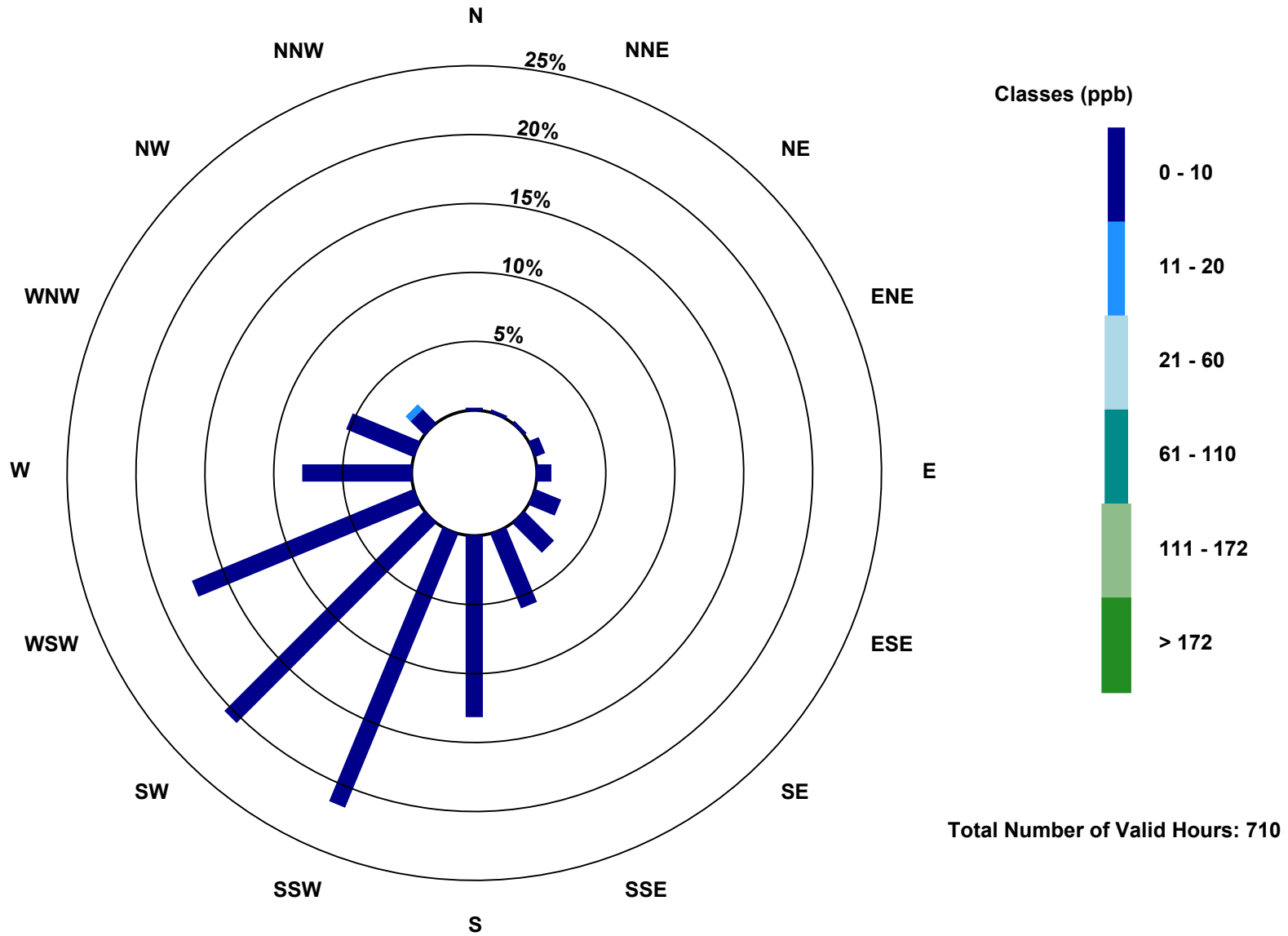
Total Number of Valid Hours: 710

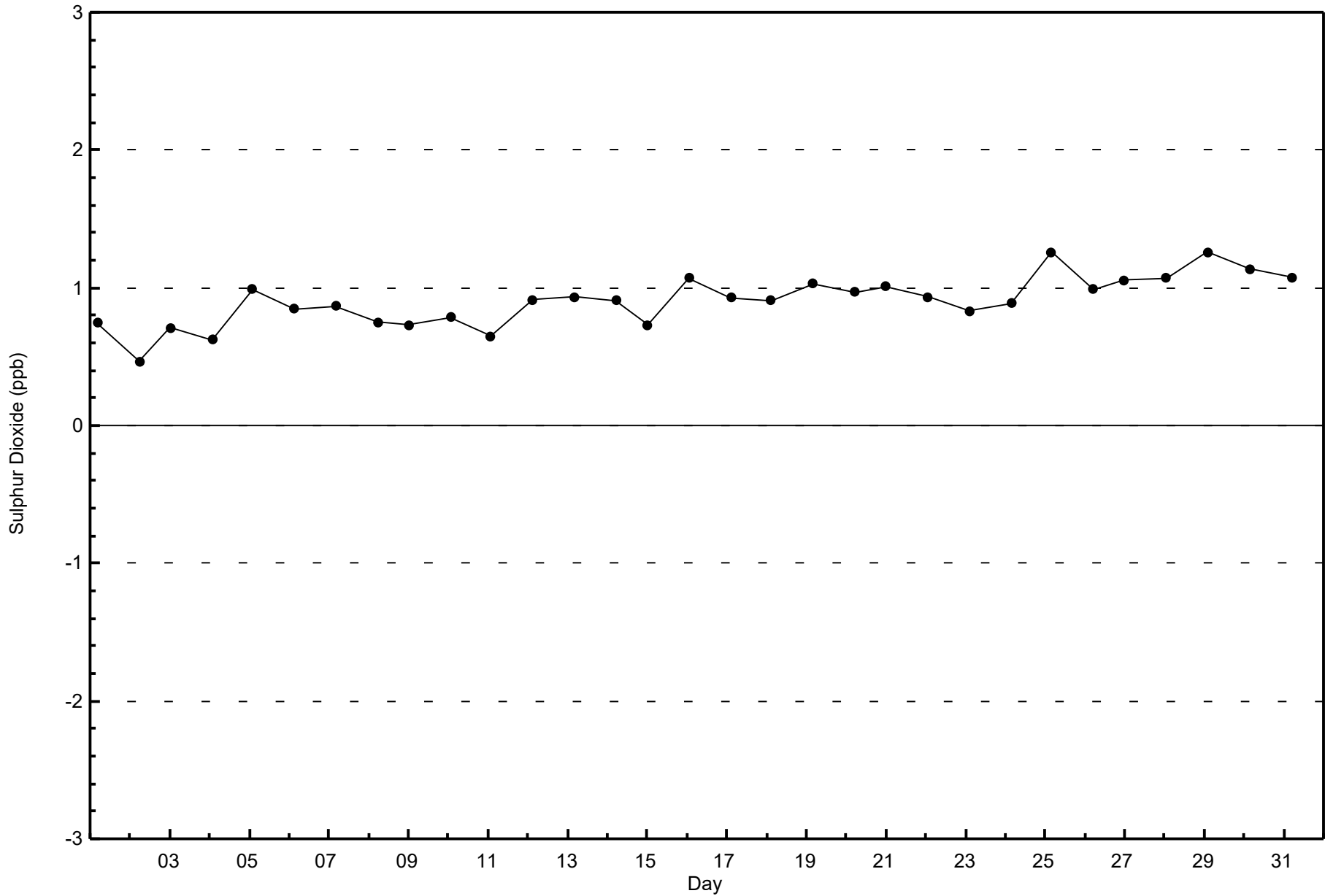
Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Dec 2023

Sulphur Dioxide (SO₂) - ppb
Christina Lake

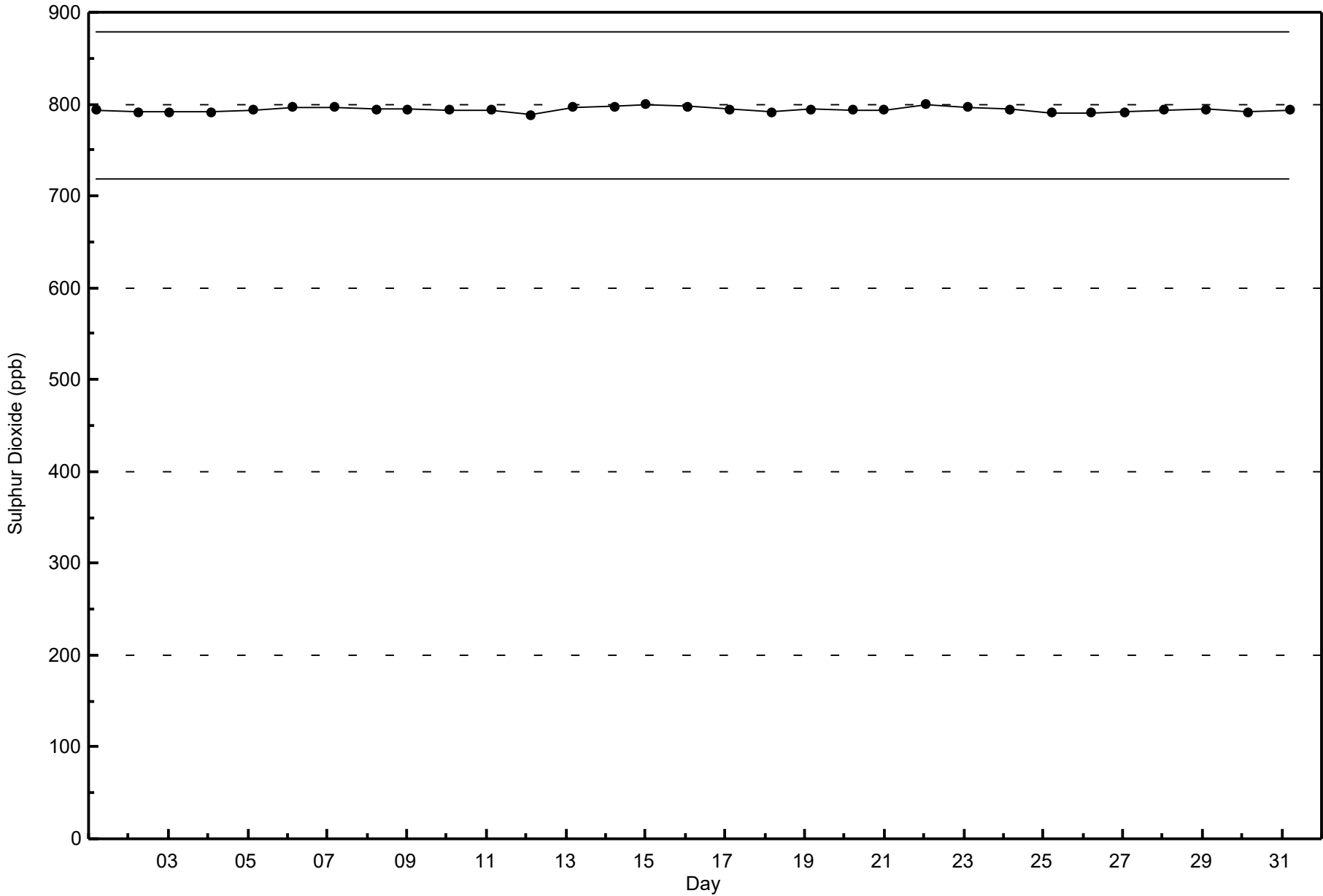






Wood Buffalo Environmental Association
Span Responses

Sulphur Dioxide (SO₂) - ppb
Christina Lake - December 2023

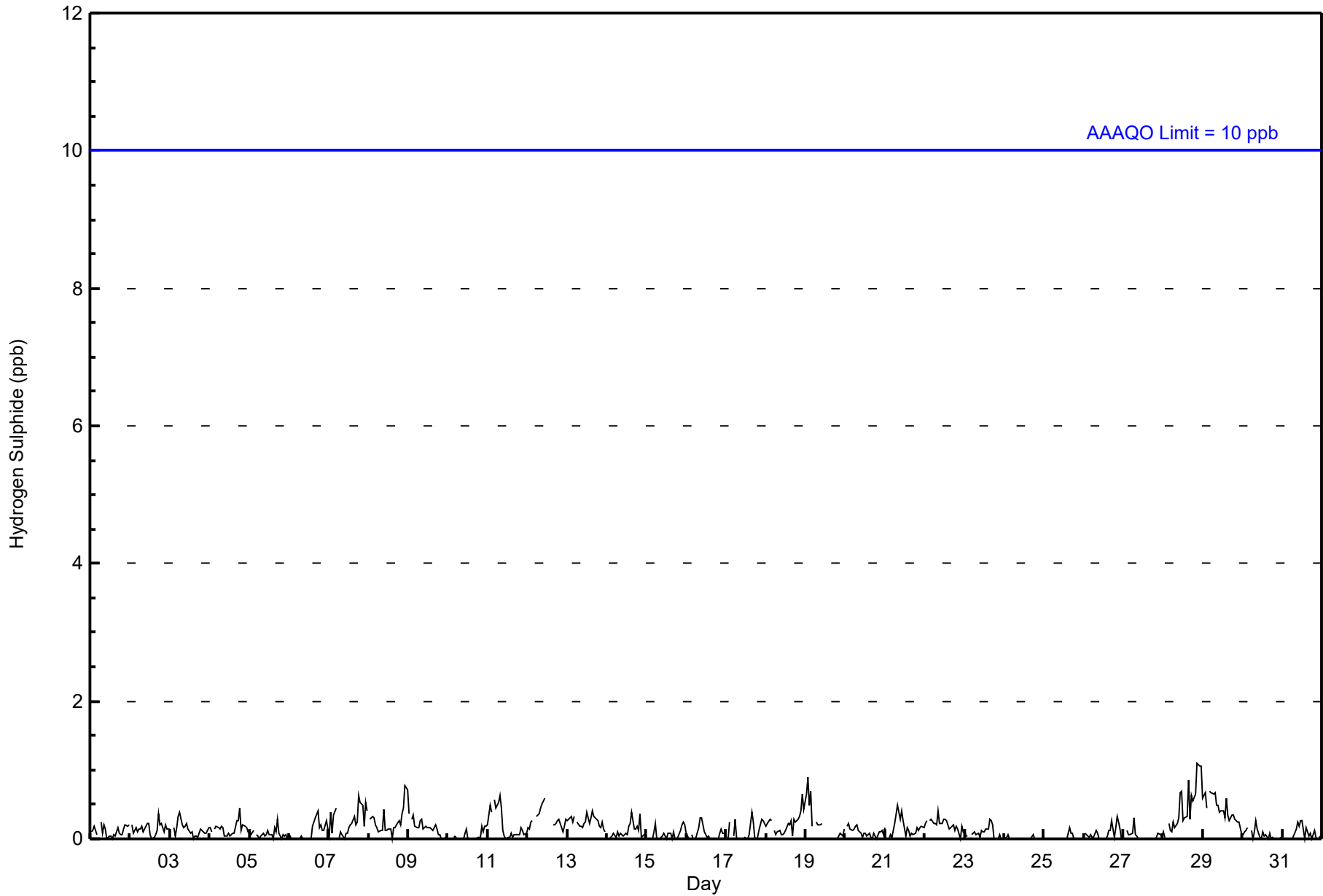




Wood Buffalo Environmental Association
Summary of Hour Averages

Hydrogen Sulphide (H₂S) - ppb
Christina Lake - December 2023

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 1.1 ppb on Dec 28 21:00 Maximum Daily Average: 0.5 ppb on Dec 28		Hours in Service: 744 Hours of Data: 704 Hours of Missing Data: 40 Hours of Calibration: 35 Percent Operational Time: 99.3																								
Minimum Value: 0.0 ppb on Dec 1 11:00 Maximum Diurnal Average: 0.2 ppb at hour 23 Monthly Average: 0.15 ppb		Minimum Daily Average: 0.0 ppb on Dec 24 Minimum Diurnal Average: 0.1 ppb at hour 14 Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.0 Median = 0.1 Q ₃ = 0.2 P ₉₀ = 0.3 P ₉₉ = 0.7																								
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-Dec	0.1	0.1	0.2	0.1	0.1	Z	0.2	0.1	0.2	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.2	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.1	0.2
2-Dec	Z	0.2	0.1	0.2	0.1	0.1	0.2	0.2	0.1	0.2	0.2	0.2	0.1	0.0	0.0	0.1	0.1	0.4	0.2	0.2	0.1	0.2	0.1	0.1	0.2	0.1
3-Dec	0.1	Z	0.2	0.0	0.2	0.3	0.4	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1
4-Dec	0.2	0.1	Z	0.1	0.2	0.2	0.1	0.2	0.2	0.0	0.0	0.1	0.0	0.1	0.1	0.1	0.3	0.3	0.4	0.1	0.2	0.2	0.2	0.1	0.1	0.1
5-Dec	0.1	0.1	0.1	Z	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.1	0.1	0.1	0.2	0.1	0.3	0.1	0.0	0.1	0.0	0.1	0.0	0.1	0.0
6-Dec	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	0.2	0.3	0.3	0.4	0.2	0.2	0.1	0.1	0.3	0.1	0.1	0.4
7-Dec	0.0	0.4	0.1	0.3	0.4	Z	0.0	0.1	0.1	0.0	0.1	0.1	0.2	0.2	0.2	0.3	0.2	0.3	0.6	0.5	0.5	0.2	0.5	0.4	0.2	0.6
8-Dec	Z	0.3	0.3	0.3	0.2	0.2	0.1	0.1	0.1	0.4	0.1	0.1	0.1	0.1	0.0	0.2	0.2	0.2	0.3	0.2	0.4	0.5	0.8	0.7	0.3	0.8
9-Dec	0.4	Z	0.3	0.3	0.2	0.2	0.2	0.3	0.3	0.1	0.2	0.2	0.2	0.2	0.1	0.1	0.2	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.2	0.4
10-Dec	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	0.2	0.1	0.2	0.2	0.0	0.2
11-Dec	0.2	0.5	0.4	Z	0.6	0.4	0.5	0.6	0.4	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.2	0.6
12-Dec	0.2	0.1	0.2	0.3	Z	0.3	0.3	0.4	0.5	0.5	0.6	C	C	C	C	0.2	0.2	0.2	0.3	0.3	0.2	0.1	0.2	0.3	0.3	0.6
13-Dec	0.3	0.3	0.3	0.2	0.3	Z	0.3	0.2	0.2	0.2	0.2	0.2	0.4	0.2	0.3	0.4	0.3	0.3	0.3	0.2	0.2	0.2	0.1	0.1	0.2	0.4
14-Dec	Z	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.1	0.1	0.0	0.1	0.1	0.2	0.2	0.4	0.1	0.1	0.2	0.1	0.4	0.0	0.1	0.0	0.1	0.4
15-Dec	0.0	Z	0.0	0.0	0.1	0.2	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.1	0.0	0.1	0.0	0.0	0.0	0.1	0.2	0.2	0.2	0.1	0.2
16-Dec	0.1	0.0	Z	0.1	0.0	0.0	0.0	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	0.1	0.1	0.1	0.1	0.3
17-Dec	0.0	0.0	0.2	Z	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.4	0.3	0.0	0.0	0.0	0.1	0.3	0.3	0.2	0.1	0.4
18-Dec	0.2	0.2	0.3	0.3	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.3	0.0	0.3	0.2	0.3	0.3	0.4	0.7	0.4	0.2	0.7
19-Dec	0.7	0.9	0.5	0.7	0.2	Z	0.3	0.2	0.2	0.2	0.2	M	M	M	M	M	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.2	0.9
20-Dec	Z	0.2	0.2	0.1	0.1	0.1	0.2	0.2	0.1	0.1	0.0	0.1	0.1	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.2
21-Dec	0.2	Z	0.0	0.1	0.0	0.1	0.2	0.5	0.4	0.3	0.4	0.3	0.0	0.2	0.1	0.0	0.1	0.1	0.1	0.2	0.1	0.2	0.2	0.2	0.2	0.5
22-Dec	0.2	0.3	Z	0.3	0.3	0.2	0.2	0.2	0.4	0.2	0.2	0.3	0.3	0.3	0.2	0.1	0.2	0.2	0.1	0.2	0.1	0.0	0.2	0.1	0.2	0.4
23-Dec	0.1	0.0	0.0	Z	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.3	0.3	0.2	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.3
24-Dec	0.0	0.0	0.1	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
25-Dec	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	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
26-Dec	Z	0.1	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	0.1	0.1	0.3	0.0	0.2	0.3	0.2	0.1	0.0	0.1	0.3
27-Dec	0.0	Z	0.1	0.1	0.1	0.1	0.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.3
28-Dec	0.1	0.0	Z	0.2	0.1	0.1	0.2	0.2	0.2	0.3	0.7	0.7	0.3	0.3	0.3	0.9	0.3	0.6	0.6	0.6	1.1	1.1	1.1	1.1	0.5	1.1
29-Dec	0.6	0.7	0.5	Z	0.7	0.7	0.7	0.7	0.5	0.5	0.4	0.4	0.4	0.3	0.6	0.3	0.3	0.4	0.3	0.3	0.3	0.2	0.2	0.1	0.4	0.7
30-Dec	0.1	0.1	0.1	0.2	Z	0.1	0.0	0.1	0.3	0.1	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	0.1	0.3
31-Dec	0.0	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.1	0.3	0.2	0.3	0.3	0.0	0.2	0.1	0.1	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.3
																								Diurnal Average		
																								Diurnal Maximum		
0.1 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.1 0.1 0.1 0.1 0.1 0.1 0.2 0.1 0.2 0.1 0.1 0.2 0.2 0.2 0.2 0.2 0.2 0.7 0.9 0.5 0.7 0.7 0.7 0.7 0.7 0.5 0.5 0.7 0.7 0.4 0.3 0.6 0.9 0.3 0.6 0.6 0.6 1.1 1.1 1.1 1.1																										
Z - zerospan C - Calibration M - Maintenance Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 10 ppb 24-hr 3 ppb																										





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Hydrogen Sulphide (H₂S) - ppb
Christina Lake - December 2023**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	704	100.00	100.00
3 - 4	0	0.00	100.00
5 - 7	0	0.00	100.00
8 - 11	0	0.00	100.00
> 11	0	0.00	100.00

Total Number of Valid Hours: 704

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Hydrogen Sulphide (H₂S) - ppb
Christina Lake - December 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	1	1	2	3	6	9	21	42	93	153	146	120	56	38	13	0	704
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	1	1	2	3	6	9	21	42	93	153	146	120	56	38	13	0	704

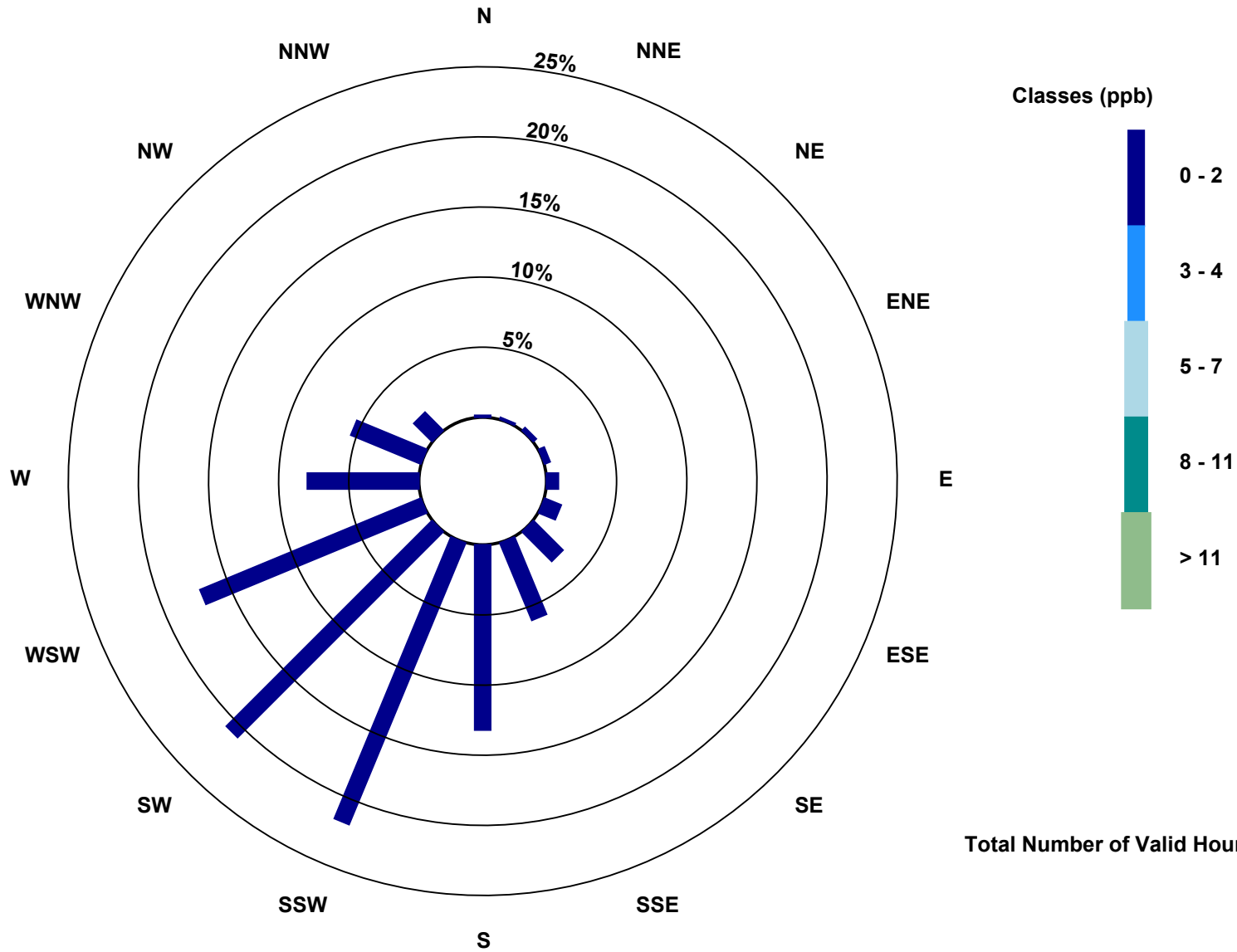
Total Number of Valid Hours: 704

Total Number of Hours: 744

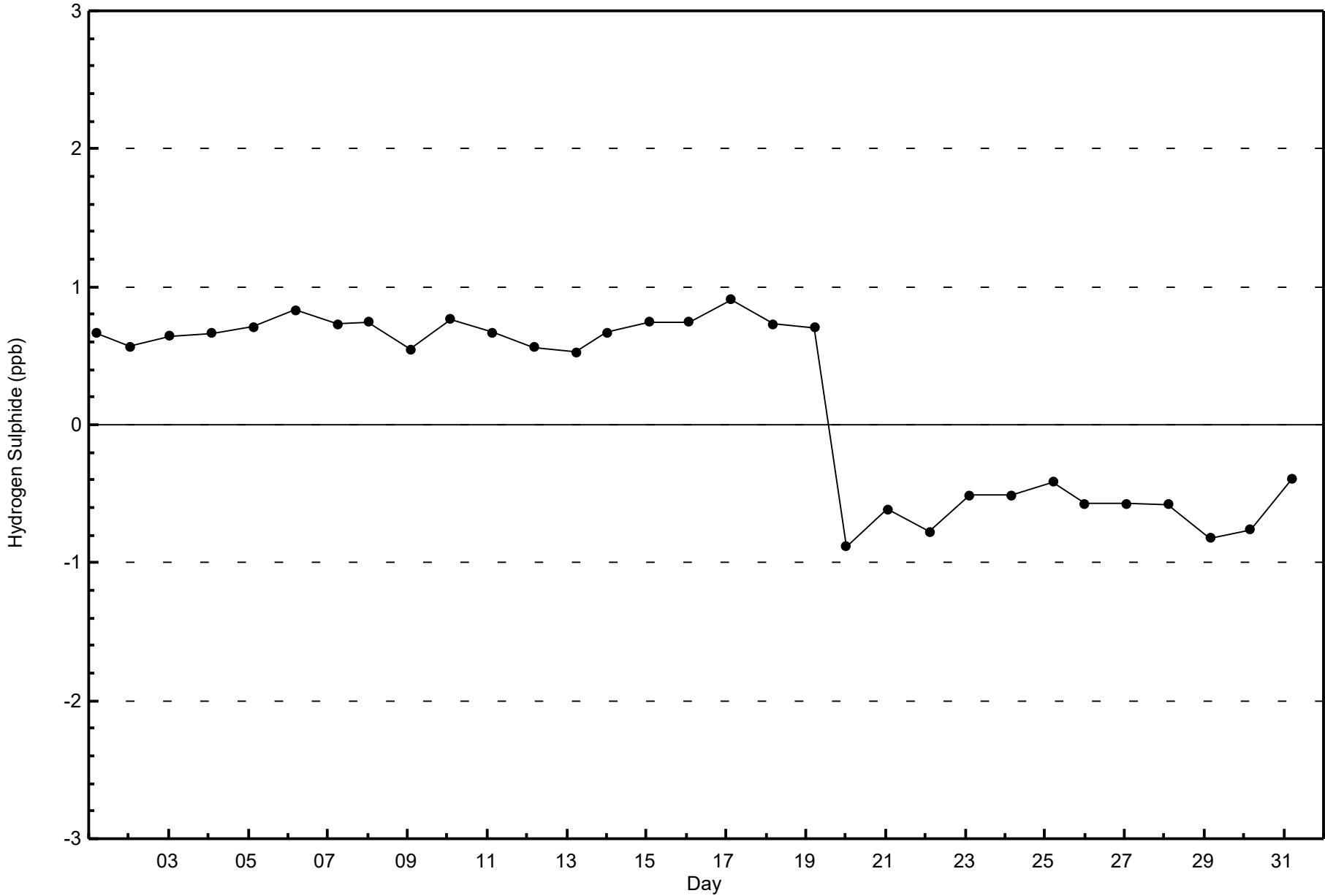


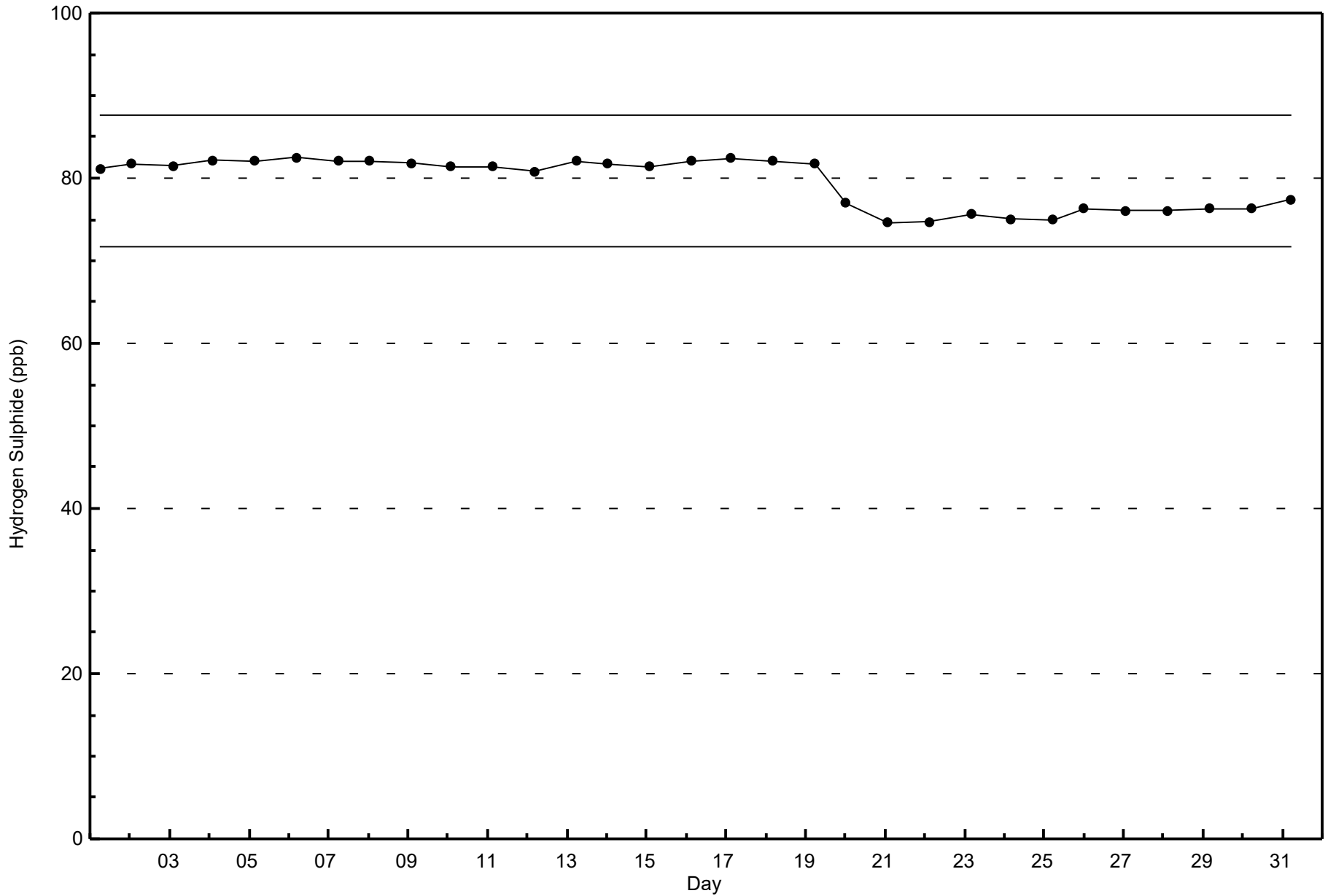
Wood Buffalo Environmental Association
Wind Rose Dec 2023

Hydrogen Sulphide (H₂S) - ppb
Christina Lake



Total Number of Valid Hours: 704







Wood Buffalo Environmental Association
Summary of Hour Averages

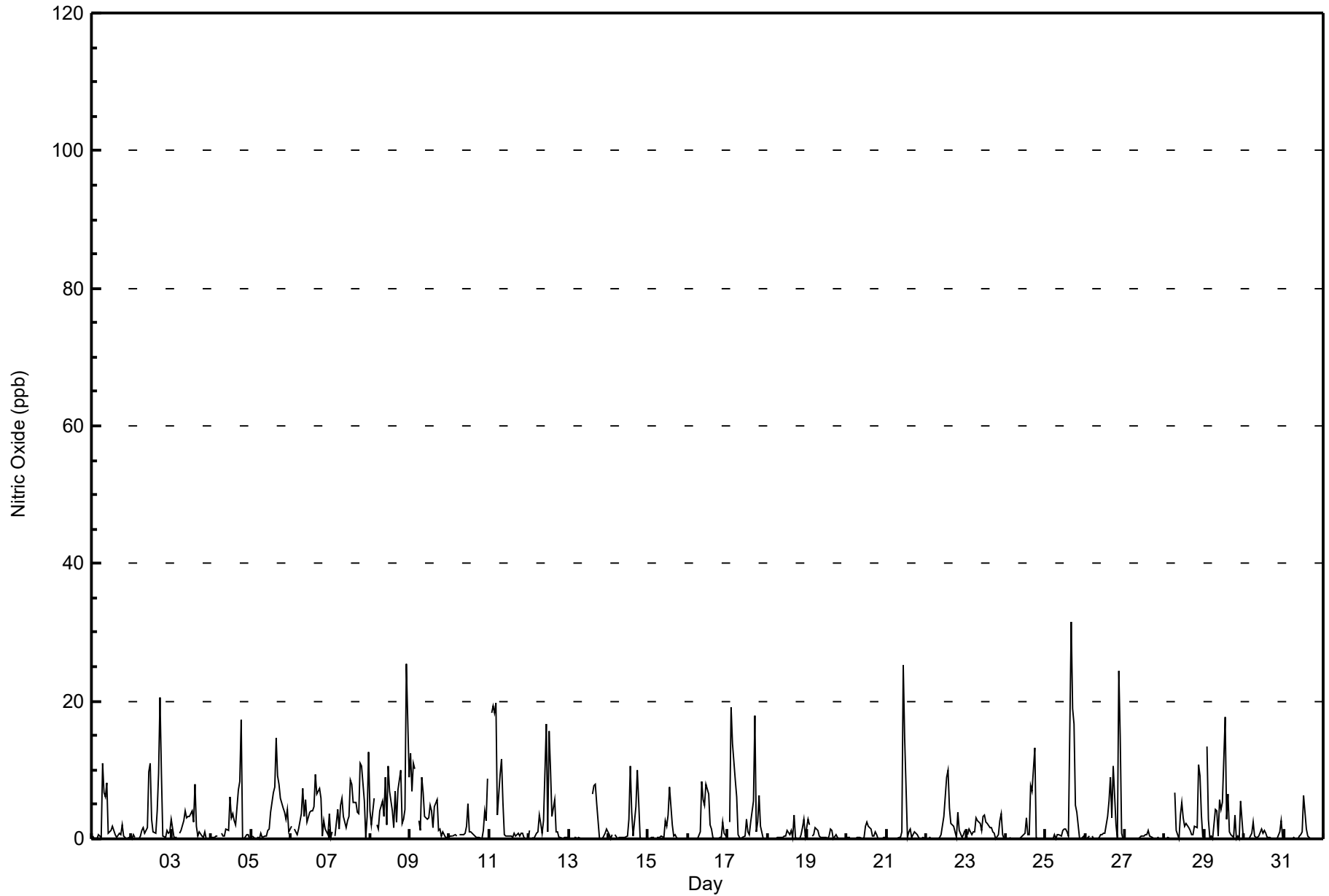
Nitric Oxide (NO) - ppb
Christina Lake - December 2023

Maximum Value: 31.5 ppb on Dec 25 16:00		Maximum Daily Average: 5.8 ppb on Dec 8		Hours in Service: 744																							
Minimum Value: 0.0 ppb on Dec 1 04:00		Minimum Daily Average: 0.2 ppb on Dec 27		Hours of Data: 707																							
Maximum Diurnal Average: 4.1 ppb at hour 16		Minimum Diurnal Average: 1.0 ppb at hour 6		Hours of Missing Data: 37																							
Monthly Average: 2.38 ppb		Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.1 Median = 0.6 Q ₃ = 2.9 P ₉₀ = 7.0 P ₉₉ = 19.2		Hours of Calibration: 37																							
				Percent Operational Time: 100.0																							
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Dec	0.4	0.1	Z	0.0	0.7	0.2	11.0	6.8	6.0	8.2	0.8	1.3	1.8	1.2	0.7	0.2	0.9	0.6	2.1	0.4	0.2	0.1	0.1	0.4	1.9	11.0	
2-Dec	0.0	0.5	0.1	Z	0.1	0.5	1.2	1.6	0.7	1.6	9.8	11.1	2.8	0.9	0.8	4.1	9.6	20.6	9.6	0.4	0.2	1.2	0.8	1.1	3.4	20.6	
3-Dec	2.9	0.2	0.2	0.1	Z	0.8	1.3	2.7	4.1	3.1	3.3	3.3	4.0	2.5	7.9	1.8	0.4	1.0	0.5	0.1	0.9	0.0	0.1	0.1	1.8	7.9	
4-Dec	0.2	0.2	0.2	0.4	0.4	Z	0.8	0.3	0.4	1.4	1.1	6.1	3.1	3.6	2.7	2.0	7.1	8.4	17.3	0.3	0.1	0.5	0.7	0.1	2.5	17.3	
5-Dec	Z	0.4	0.0	0.1	0.1	0.0	0.9	0.1	0.4	0.4	1.1	1.5	3.8	6.6	7.5	14.7	9.1	7.9	6.0	4.4	3.8	2.9	4.3	1.1	3.4	14.7	
6-Dec	1.8	Z	1.5	1.1	0.6	1.5	3.6	7.3	3.3	5.6	2.3	3.9	4.2	4.0	4.6	9.3	6.5	7.3	5.8	0.4	2.7	1.3	0.6	3.6	3.6	9.3	
7-Dec	0.2	1.0	Z	0.4	4.2	1.4	4.9	5.9	3.3	1.6	2.5	3.2	8.5	8.0	5.3	5.3	3.9	3.7	11.0	10.6	5.5	0.2	3.4	12.7	4.6	12.7	
8-Dec	4.2	2.0	5.9	Z	2.1	1.5	4.0	5.6	3.3	9.0	2.0	10.6	6.8	4.1	1.6	6.9	2.4	7.1	10.0	2.2	2.8	4.3	25.5	8.9	5.8	25.5	
9-Dec	12.4	6.9	11.0	10.2	Z	2.6	1.2	9.0	6.6	3.3	2.8	3.0	4.9	4.1	1.7	4.6	5.6	1.2	1.4	0.3	1.1	0.1	0.1	0.0	4.1	12.4	
10-Dec	0.4	0.3	0.3	0.6	0.3	Z	0.6	0.6	0.6	0.8	1.8	5.1	0.9	0.9	0.6	0.4	0.1	0.2	0.2	0.1	1.3	4.1	2.7	8.8	1.4	8.8	
11-Dec	Z	18.3	19.4	18.3	19.7	3.5	9.3	11.5	5.4	0.6	0.5	0.4	0.5	0.3	0.2	0.8	0.4	0.7	0.4	0.7	0.9	0.1	0.0	0.0	4.9	19.7	
12-Dec	1.1	Z	0.1	0.1	0.7	1.0	3.4	2.2	0.8	2.6	16.7	1.0	15.6	10.0	3.3	5.6	0.9	0.9	0.1	0.2	0.1	0.2	0.2	0.1	2.9	16.7	
13-Dec	0.1	0.1	Z	0.1	0.2	0.0	0.1	0.0	C	C	C	C	C	C	6.6	7.7	7.9	5.2	0.0	0.0	0.0	0.4	0.8	1.4	--	7.9	
14-Dec	0.6	0.1	0.5	Z	0.7	0.1	0.3	0.1	0.1	0.1	0.3	0.4	2.9	10.5	3.9	0.5	4.8	9.9	5.4	0.1	0.0	0.0	0.0	0.1	1.8	10.5	
15-Dec	0.0	0.0	0.1	0.1	Z	0.1	0.2	0.2	0.3	0.3	2.5	1.9	3.4	7.4	2.1	0.5	0.6	0.3	0.1	0.0	0.0	0.1	0.0	0.0	0.9	7.4	
16-Dec	0.0	0.0	0.0	0.0	0.1	Z	0.1	1.0	8.3	5.8	4.9	7.9	6.6	2.0	1.5	0.2	0.0	0.0	0.0	0.1	0.1	2.5	0.9	0.3	1.8	8.3	
17-Dec	Z	2.4	19.2	13.9	8.5	6.0	0.6	0.1	0.0	0.1	0.4	2.8	1.1	0.6	2.5	5.5	18.0	1.0	2.4	6.4	1.8	0.1	0.0	0.0	4.1	19.2	
18-Dec	0.0	Z	0.0	0.1	0.1	0.0	0.1	0.2	0.1	0.3	0.5	0.5	1.2	0.6	1.3	0.3	3.5	0.1	0.0	0.1	0.6	1.6	2.9	0.3	0.6	3.5	
19-Dec	2.8	2.1	Z	0.5	0.6	1.6	1.3	0.4	0.2	0.2	0.3	0.3	0.0	0.4	1.4	1.3	0.0	0.5	0.2	0.0	0.1	0.0	0.0	0.0	0.6	2.8	
20-Dec	0.1	0.2	0.2	Z	0.0	0.0	0.2	0.1	0.2	0.1	0.2	1.9	2.4	1.8	1.4	0.3	0.4	1.0	0.6	0.0	0.0	0.0	0.1	0.2	0.5	2.4	
21-Dec	0.2	0.1	0.1	0.1	Z	0.1	0.1	0.1	0.2	1.0	25.3	14.7	0.3	0.9	1.5	0.3	0.6	1.0	0.6	0.2	0.0	0.0	0.1	0.1	2.1	25.3	
22-Dec	0.0	0.0	0.2	0.0	0.0	Z	0.0	0.1	0.2	0.6	3.2	6.0	9.0	9.9	4.4	2.1	1.8	1.0	0.1	3.9	1.2	0.2	0.5	1.3	2.0	9.9	
23-Dec	Z	0.7	1.4	0.7	1.0	1.1	3.0	2.6	2.2	1.3	3.3	3.4	2.5	2.2	1.6	1.6	1.1	0.9	0.1	0.6	2.7	3.6	0.6	0.0	1.7	3.6	
24-Dec	0.0	Z	0.1	0.0	0.0	0.1	0.0	0.1	0.0	0.1	0.5	0.8	3.0	0.6	0.6	7.8	7.0	13.3	0.1	0.0	0.0	0.0	0.0	0.0	1.5	13.3	
25-Dec	0.0	0.0	Z	0.0	0.0	0.7	0.1	0.7	0.6	0.3	1.2	1.4	1.4	1.0	0.4	31.5	18.9	16.6	4.8	3.9	0.0	0.0	0.3	0.4	3.7	31.5	
26-Dec	0.0	0.0	0.4	Z	0.4	0.0	0.1	0.0	0.1	0.7	0.7	0.8	0.9	3.2	5.4	9.0	3.0	10.6	2.0	0.0	24.4	14.8	0.8	0.1	3.4	24.4	
27-Dec	0.0	0.0	0.0	0.0	Z	0.1	0.0	0.0	0.0	0.1	0.4	0.3	0.6	0.5	1.1	0.4	0.2	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.2	1.1	
28-Dec	0.0	0.0	0.2	0.0	0.0	Z	6.7	1.3	0.1	3.5	5.3	3.1	1.9	2.3	1.5	1.3	0.5	0.6	1.9	1.7	10.7	9.2	3.4	0.3	2.4	10.7	
29-Dec	Z	13.4	2.9	0.1	0.4	0.1	4.2	4.2	0.4	5.7	4.3	5.3	17.7	2.8	6.5	1.0	0.6	0.1	3.5	0.1	0.4	0.0	5.6	0.1	3.4	17.7	
30-Dec	0.0	Z	0.0	0.0	0.7	2.4	0.3	0.3	0.2	0.5	1.3	0.9	1.2	0.8	0.2	0.1	0.0	0.0	0.0	0.1	0.0	0.9	2.6	0.2	0.5	2.6	
31-Dec	0.0	0.0	Z	0.0	0.0	0.0	0.1	0.1	0.0	0.4	0.5	1.1	6.4	1.5	0.5	0.2	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.1	0.5	6.4	
		1.1	1.9	2.6	1.8	1.6	1.0	1.9	2.1	1.6	2.0	3.3	3.5	4.0	3.2	2.6	4.1	3.7	3.9	2.8	1.2	2.0	1.6	1.8	1.3	Diurnal Average	
		12.4	18.3	19.4	18.3	19.7	6.0	11.0	11.5	8.3	9.0	25.3	14.7	17.7	10.5	7.9	31.5	18.9	20.6	17.3	10.6	24.4	14.8	25.5	12.7	Diurnal Maximum	
Z - zerospan		C - Calibration																									



Wood Buffalo Environmental Association
Hourly Averages

Nitric Oxide (NO) - ppb
Christina Lake - December 2023





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitric Oxide (NO) - ppb
Christina Lake - December 2023

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	702	99.29	99.29
21 - 40	5	0.71	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitric Oxide (NO) - ppb
Christina Lake - December 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	0	1	2	5	6	14	21	43	90	152	138	124	54	38	14	0	702
21 - 40	0	0	0	0	0	0	0	0	0	4	1	0	0	0	0	0	5
41 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	0	1	2	5	6	14	21	43	90	156	139	124	54	38	14	0	707

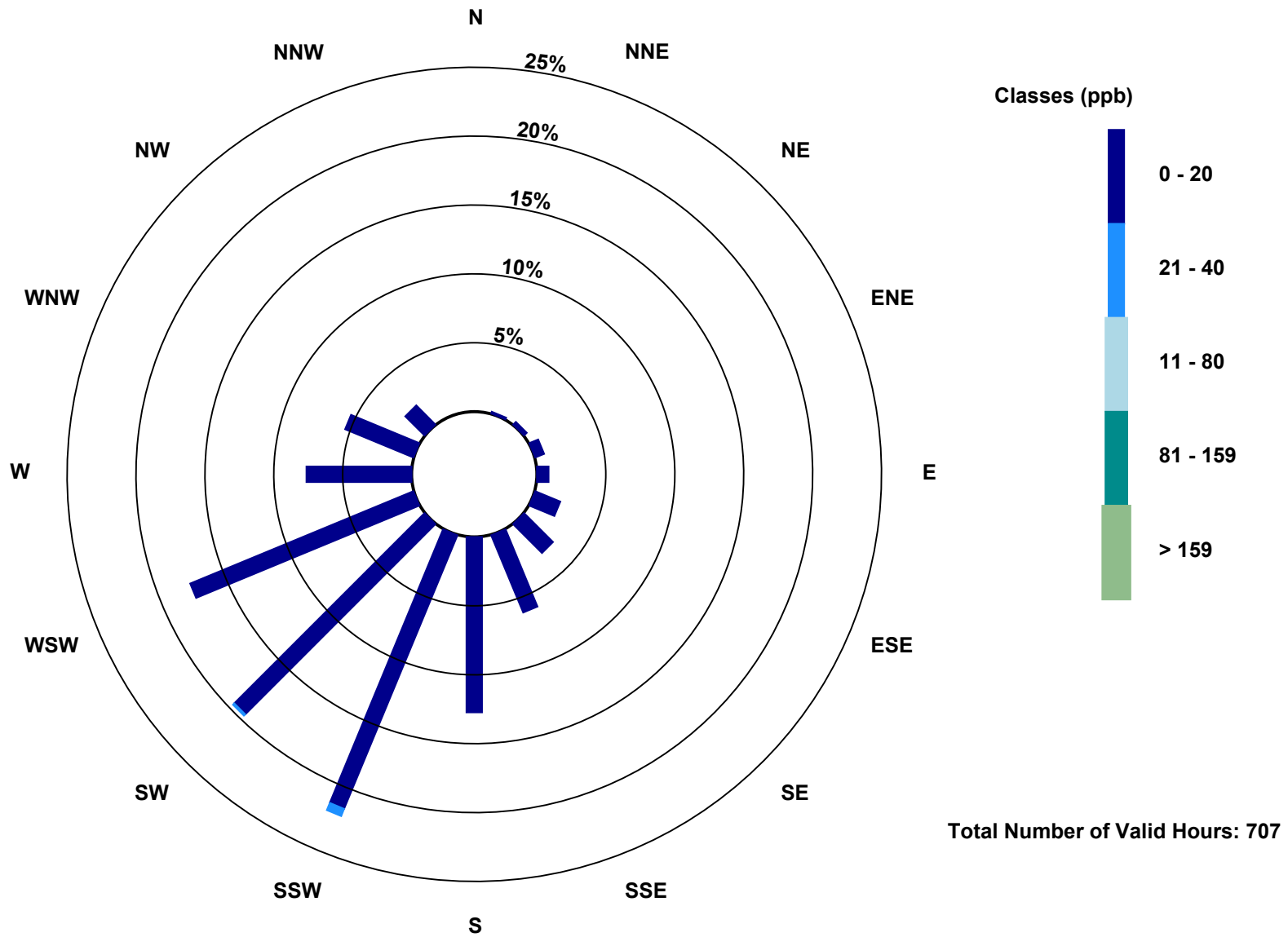
Total Number of Valid Hours: 707

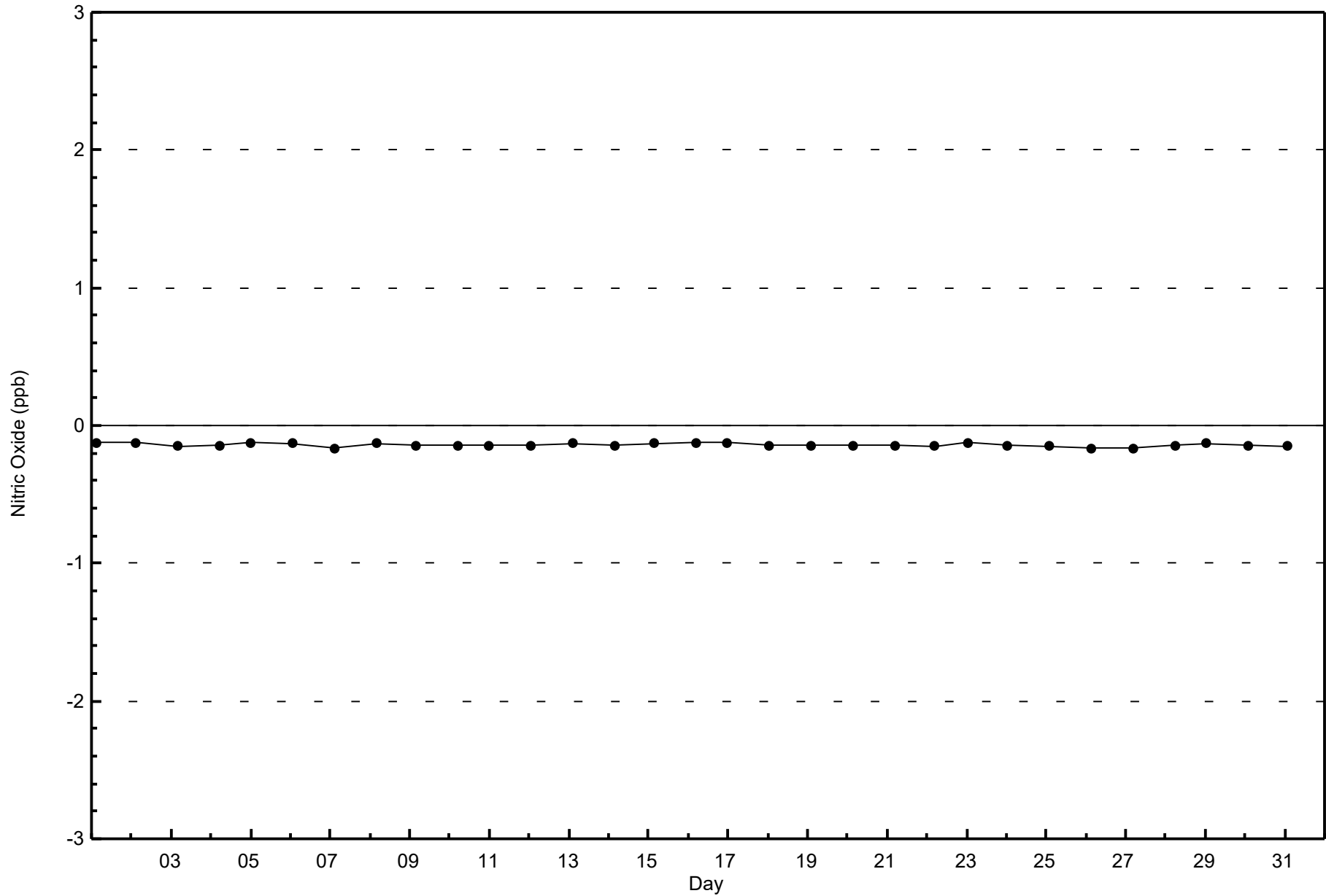
Total Number of Hours: 744

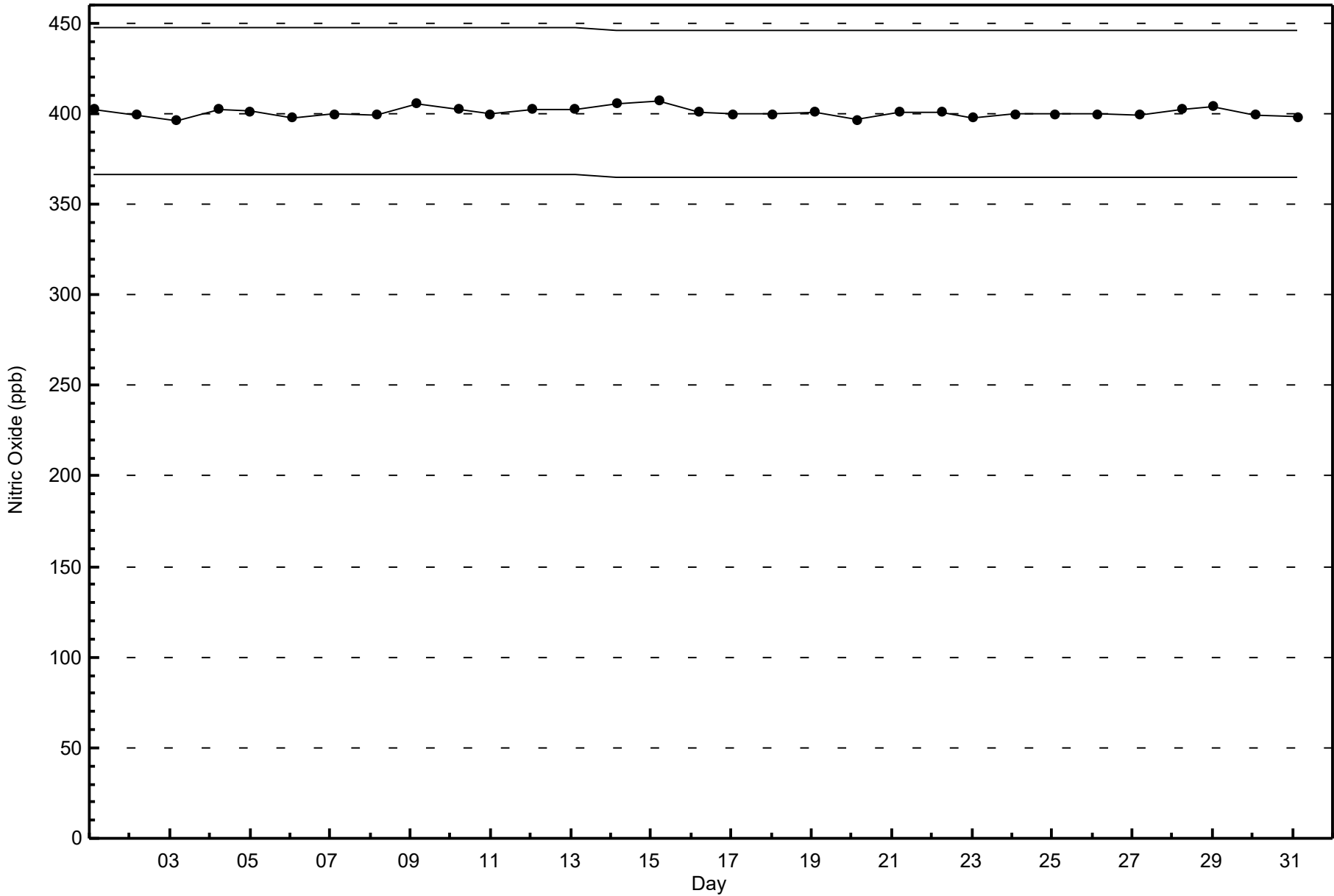


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Nitric Oxide (NO) - ppb
Christina Lake









Wood Buffalo Environmental Association
Summary of Hour Averages

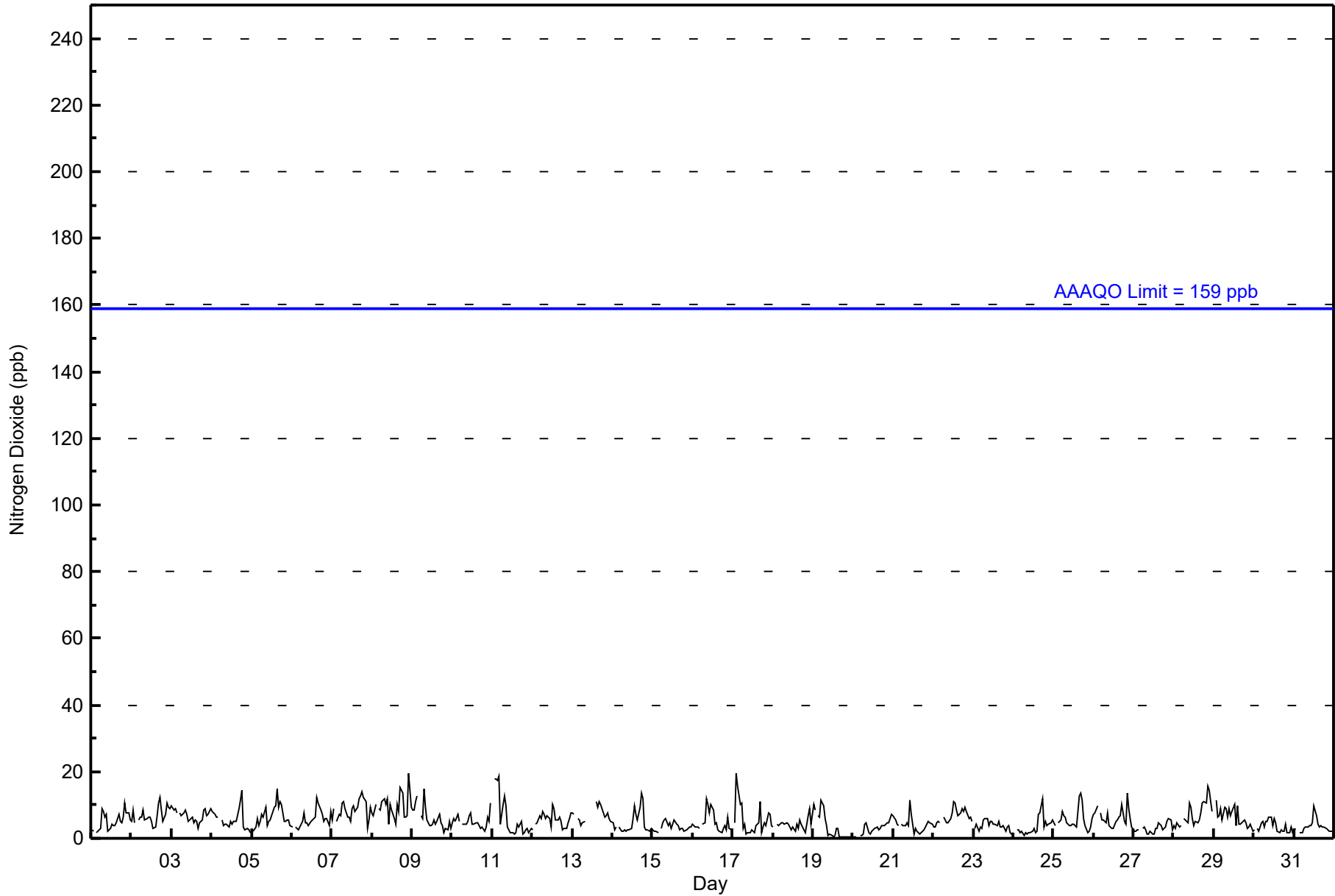
Nitrogen Dioxide (NO₂) - ppb
Christina Lake - December 2023

Number of Exceedences (AAAQO):		1-hr: 0	24-hr: 0																		Hours in Service:	744				
Maximum Value: 19.7 ppb on Dec 8 23:00		Maximum Daily Average: 9.3 ppb on Dec 8																	Hours of Data:	707						
Minimum Value: 0.3 ppb on Dec 19 13:00		Minimum Daily Average: 2.9 ppb on Dec 20																	Hours of Missing Data:	37						
Maximum Diurnal Average: 6.8 ppb at hour 18		Minimum Diurnal Average: 4.5 ppb at hour 20																	Hours of Calibration:	37						
Monthly Average: 5.40 ppb		Percentiles: P ₁ = 0.4 P ₁₀ = 2.0 Q ₁ = 3.1 Median = 4.7 Q ₃ = 7.0 P ₉₀ = 10.0 P ₉₉ = 15.5																	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-Dec	2.6	2.0	Z	1.5	2.3	2.9	9.1	8.0	6.3	7.0	2.3	3.0	4.1	3.8	3.8	4.6	7.3	5.0	4.5	6.5	10.5	7.6	7.8	5.6	5.1	10.5
2-Dec	5.0	8.5	4.6	Z	5.5	6.2	6.3	8.4	5.4	5.9	6.3	6.5	5.1	3.1	3.6	6.8	10.7	12.4	8.5	4.9	7.0	10.4	9.3	9.0	6.9	12.4
3-Dec	9.8	8.4	8.8	7.5	Z	7.5	6.6	7.6	8.4	7.1	5.1	5.4	6.5	4.5	5.3	4.9	3.0	4.8	5.6	8.3	8.9	6.7	7.2	8.8	6.8	9.8
4-Dec	7.9	7.6	7.0	6.5	6.3	Z	5.3	3.9	4.3	4.3	3.6	5.2	4.4	4.9	4.9	5.1	8.9	11.3	14.2	3.2	2.4	2.8	2.6	1.8	5.6	14.2
5-Dec	Z	2.0	3.5	6.1	3.8	5.2	7.0	6.4	9.2	4.0	5.0	5.3	6.8	9.3	9.8	14.7	9.5	11.2	10.1	5.2	5.1	5.5	5.5	3.7	6.7	14.7
6-Dec	3.4	Z	3.5	2.9	2.4	3.3	5.2	7.8	4.7	4.7	4.0	5.0	5.7	5.8	6.3	12.3	10.4	8.5	7.4	5.1	6.0	5.9	3.8	8.2	5.8	12.3
7-Dec	5.7	8.8	Z	5.0	7.3	6.9	10.7	11.2	9.1	6.4	6.4	5.1	8.7	9.8	8.2	9.3	11.7	12.5	13.9	12.3	11.2	3.1	5.4	9.3	8.6	13.9
8-Dec	7.6	6.7	10.0	Z	8.7	8.5	10.9	12.0	10.0	11.7	4.3	10.2	8.6	6.1	4.1	10.2	7.9	15.4	13.5	6.3	6.4	6.9	19.7	9.2	9.3	19.7
9-Dec	8.4	8.6	11.1	12.5	Z	6.9	5.9	14.9	9.3	5.3	3.8	4.0	4.2	5.5	4.2	5.0	7.3	4.8	4.0	1.8	3.1	2.5	5.1	3.0	6.1	14.9
10-Dec	4.8	6.0	5.0	7.1	5.0	Z	4.4	4.3	4.2	5.1	6.6	7.6	4.3	4.3	4.5	4.5	4.0	3.0	3.3	2.0	3.3	6.5	5.0	10.5	5.0	10.5
11-Dec	Z	17.8	17.9	17.2	18.6	4.3	10.1	12.9	9.7	3.3	2.5	1.5	1.7	1.4	1.8	4.4	3.6	5.2	1.1	1.9	2.4	2.8	1.6	2.8	6.4	18.6
12-Dec	2.5	Z	4.4	4.7	6.6	5.9	8.0	7.1	5.9	6.8	5.8	3.3	10.1	8.8	5.7	5.4	6.3	5.2	2.5	3.0	3.1	4.7	6.0	7.7	5.6	10.1
13-Dec	7.7	7.1	Z	5.9	5.5	3.9	4.8	5.0	C	C	C	C	C	C	11.0	9.5	10.9	10.1	7.5	6.5	6.6	7.7	6.1	5.0	--	11.0
14-Dec	4.5	2.6	3.6	Z	3.2	2.2	2.2	2.5	2.1	2.6	2.4	3.1	6.1	9.9	7.1	5.6	9.4	13.5	11.9	3.6	2.5	2.7	2.2	3.1	4.7	13.5
15-Dec	2.7	2.3	2.2	1.8	Z	2.9	4.8	5.5	5.9	3.9	4.8	3.0	4.4	5.5	4.2	4.0	2.7	3.1	3.0	2.0	2.7	2.9	3.4	3.5	3.5	5.9
16-Dec	4.3	3.6	3.5	3.4	3.1	Z	4.3	4.7	12.0	10.0	7.7	10.1	8.3	4.3	4.5	2.5	2.1	1.5	3.0	3.7	2.7	6.3	3.1	2.5	4.8	12.0
17-Dec	Z	4.7	19.5	15.5	10.2	10.6	2.9	4.3	1.2	1.8	1.8	2.6	2.2	1.6	3.7	4.8	11.2	1.7	3.4	4.7	4.0	7.7	7.1	3.8	5.7	19.5
18-Dec	3.2	Z	4.3	3.9	4.2	4.6	4.8	4.4	4.5	4.1	3.2	2.4	3.5	2.3	4.4	3.1	5.3	4.4	3.3	1.6	4.3	6.7	9.1	4.2	4.2	9.1
19-Dec	10.1	8.4	Z	6.7	6.3	11.6	9.7	5.9	3.8	1.0	1.2	1.0	0.3	0.7	3.1	2.9	0.3	0.5	0.4	0.3	0.4	0.4	0.4	0.4	3.3	11.6
20-Dec	0.6	0.4	0.5	Z	0.9	0.8	1.2	4.3	4.8	1.7	1.4	2.3	2.5	2.9	3.3	2.7	3.1	3.7	3.9	3.7	4.6	4.5	6.0	7.3	2.9	7.3
21-Dec	6.7	5.4	4.4	4.0	Z	4.1	4.0	3.9	4.8	3.9	11.3	7.2	1.2	2.8	2.3	1.6	1.3	1.9	2.5	3.4	4.4	5.2	4.5	4.2	4.1	11.3
22-Dec	3.4	3.2	4.7	5.2	4.5	Z	6.2	5.4	4.5	4.7	5.9	7.8	11.0	10.7	8.4	6.7	7.6	9.0	8.1	9.3	7.9	6.0	6.2	5.1	6.6	11.0
23-Dec	Z	2.9	4.2	2.3	3.2	3.1	5.4	6.0	5.8	3.7	5.2	5.1	4.3	4.2	3.7	5.2	3.6	3.5	3.9	2.2	3.6	3.7	1.5	1.4	3.8	6.0
24-Dec	1.7	Z	2.4	2.5	1.6	2.2	0.7	1.5	1.1	1.7	1.6	2.0	2.9	1.9	2.2	7.1	7.8	11.9	3.6	5.0	3.7	4.3	4.7	5.5	3.5	11.9
25-Dec	4.5	3.7	Z	4.7	5.3	7.9	6.9	6.3	4.5	4.0	4.0	4.2	4.3	4.0	3.3	12.9	13.7	11.5	5.9	3.9	1.9	2.1	3.3	6.1	5.6	13.7
26-Dec	7.2	7.5	9.6	Z	7.8	5.5	5.7	4.8	7.5	3.9	3.5	2.8	2.8	5.0	5.5	6.5	6.8	10.1	5.2	4.4	13.4	8.7	6.0	3.3	6.2	13.4
27-Dec	2.3	2.0	2.5	2.7	Z	3.1	3.4	2.6	1.2	1.4	2.1	1.4	1.4	2.9	2.8	4.6	3.9	2.6	2.9	3.5	5.0	6.1	5.4	2.4	3.0	6.1
28-Dec	3.9	3.0	4.6	3.5	3.8	Z	6.1	5.3	4.8	10.6	9.2	6.0	4.0	4.9	4.7	5.4	7.6	10.4	11.0	10.8	15.5	14.5	11.0	8.0	7.3	15.5
29-Dec	Z	11.5	6.3	6.8	8.8	5.5	9.3	8.8	6.3	8.7	6.7	8.2	10.1	3.8	9.6	4.3	4.3	5.1	5.4	4.8	3.0	3.5	4.3	2.2	6.4	11.5
30-Dec	2.4	Z	2.9	2.3	4.5	5.0	3.3	5.2	5.1	6.3	6.5	3.7	5.8	4.7	2.0	1.9	2.6	2.0	2.2	4.1	1.8	1.9	3.5	1.8	3.5	6.5
31-Dec	2.3	2.9	Z	1.8	1.7	1.7	2.8	3.5	3.2	3.8	3.9	4.8	9.7	6.8	4.3	3.4	3.8	3.5	3.6	2.9	2.6	2.0	2.1	2.3	3.5	9.7
4.8 5.7 6.0 5.5 5.4 5.1 5.7 6.3 5.7 5.0 4.6 4.7 5.2 4.9 4.9 5.9 6.4 6.8 5.8 4.5 5.2 5.2 5.4 4.9																								Diurnal Average		
10.1 17.8 19.5 17.2 18.6 11.6 10.9 14.9 12.0 11.7 11.3 10.2 11.0 10.7 11.0 14.7 13.7 15.4 14.2 12.3 15.5 14.5 19.7 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 (NO₂) - ppb
Christina Lake - December 2023





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Christina Lake - December 2023**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	707	100.00	100.00
21 - 40	0	0.00	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Christina Lake - December 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	0	1	2	5	6	14	21	43	90	156	139	124	54	38	14	0	707
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	0	1	2	5	6	14	21	43	90	156	139	124	54	38	14	0	707

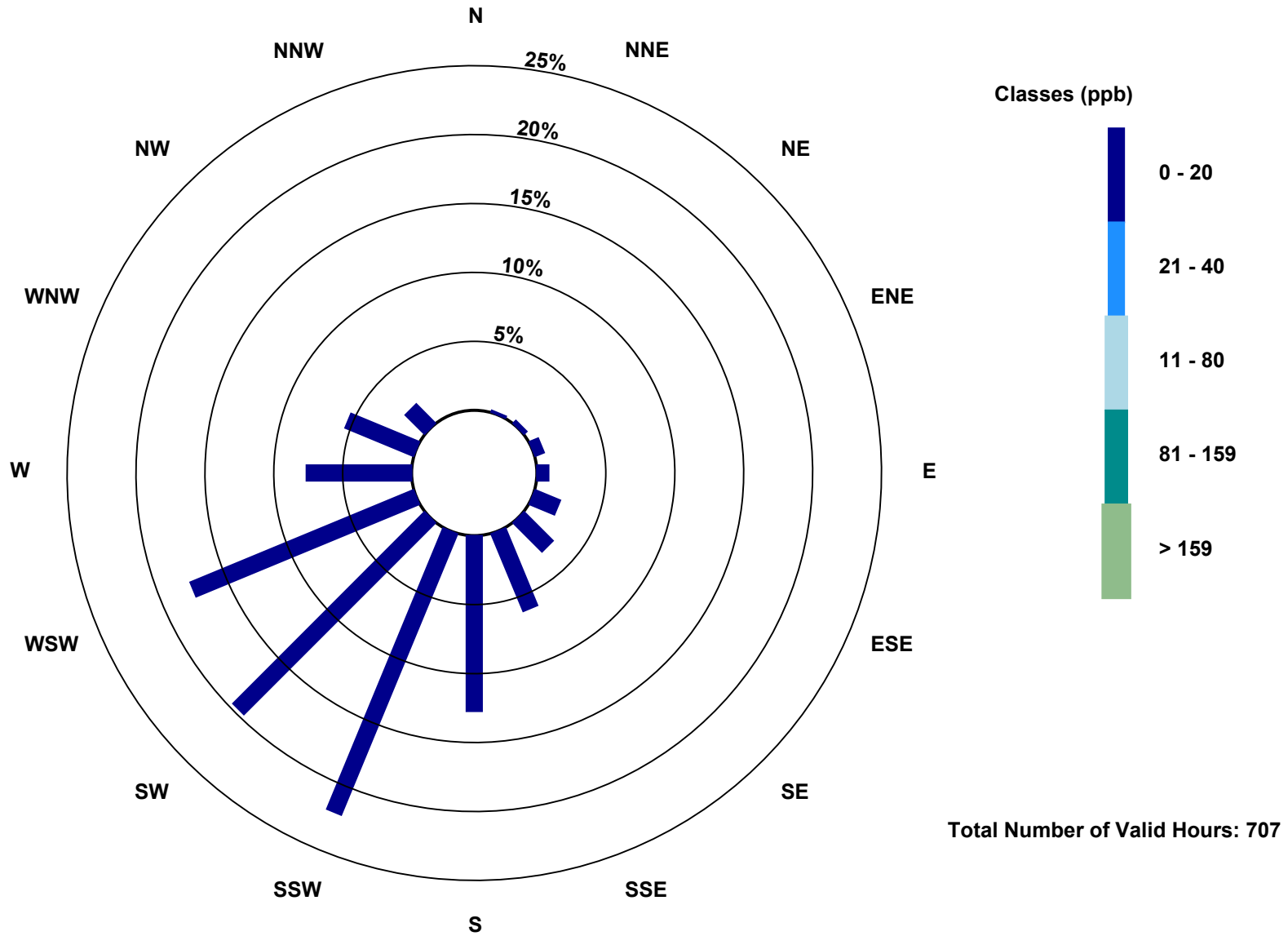
Total Number of Valid Hours: 707

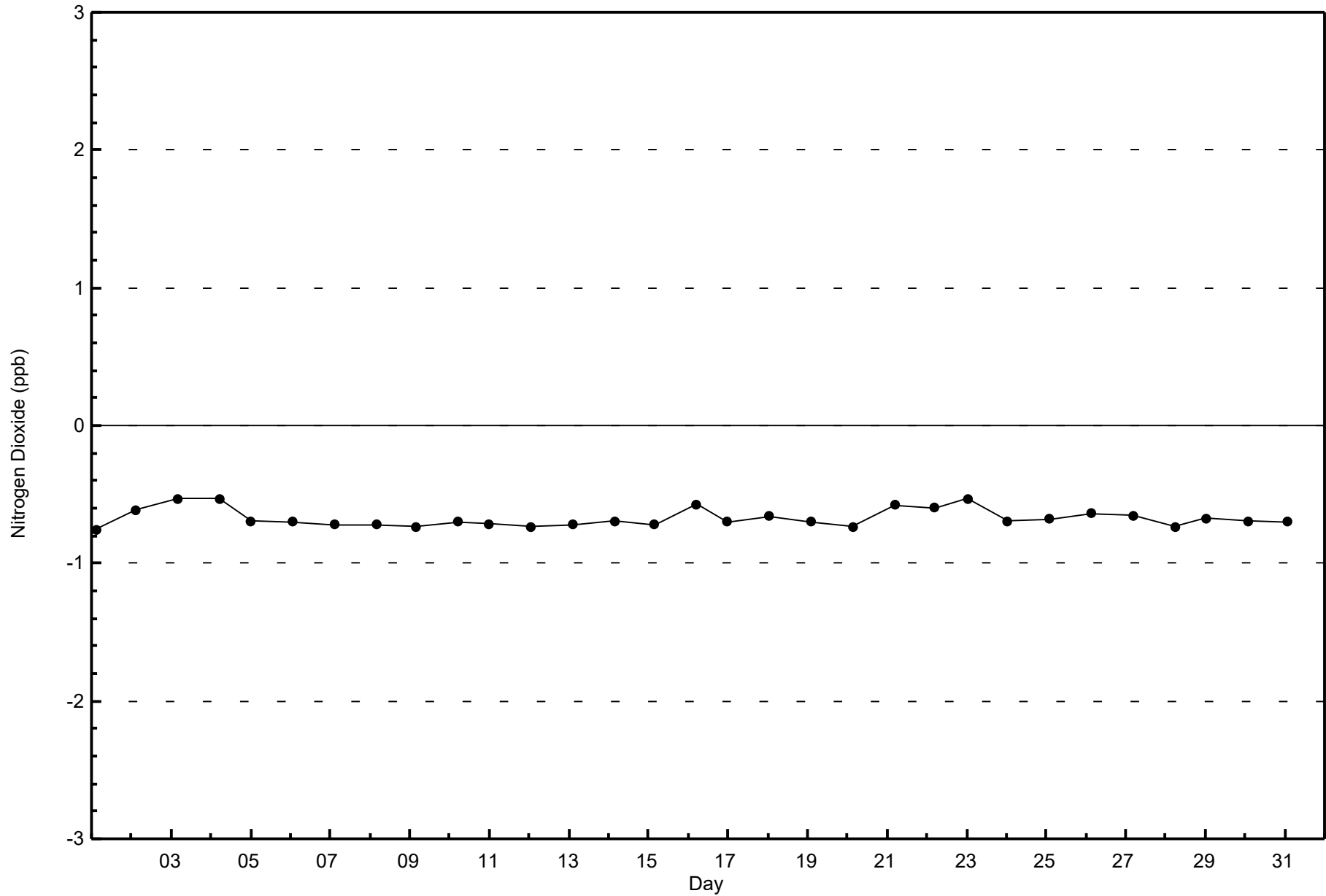
Total Number of Hours: 744

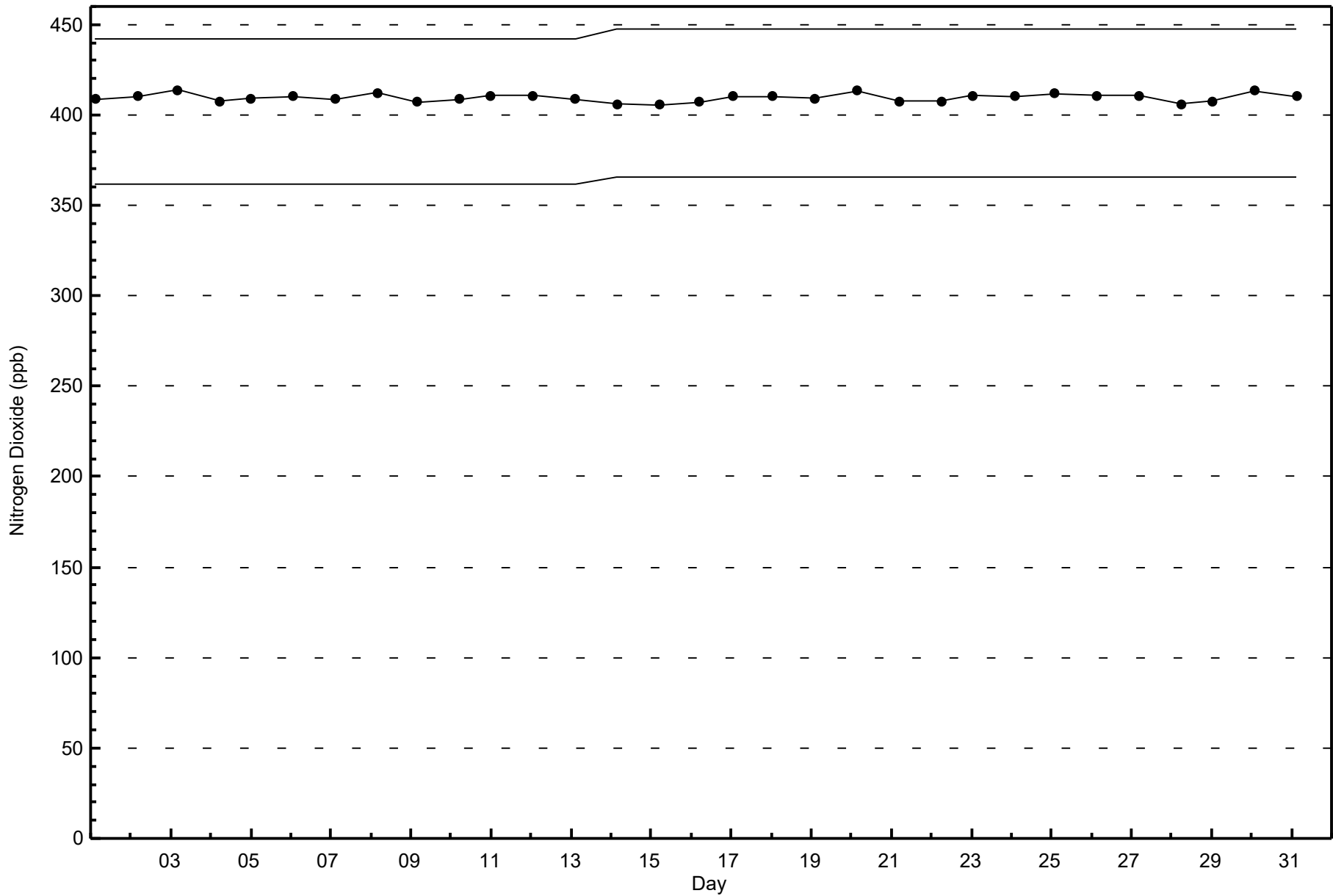


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Nitrogen Dioxide (NO₂) - ppb
Christina Lake









Wood Buffalo Environmental Association
Summary of Hour Averages

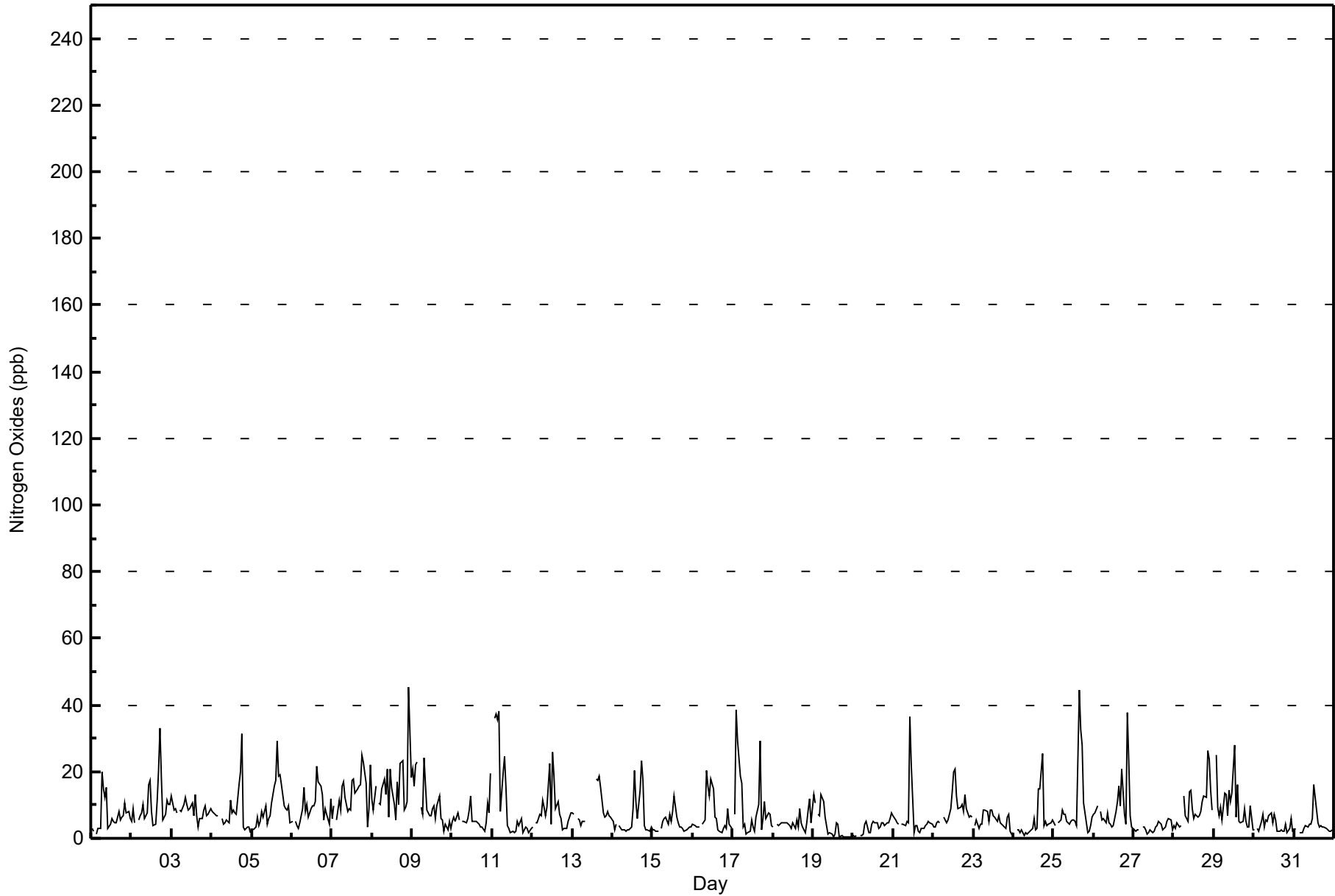
Nitrogen Oxides (NO_x) - ppb
Christina Lake - December 2023

Maximum Value: 45.2 ppb on Dec 8 23:00		Maximum Daily Average: 15.1 ppb on Dec 8		Hours in Service: 744																																													
Minimum Value: 0.3 ppb on Dec 19 20:00		Minimum Daily Average: 3.1 ppb on Dec 27		Hours of Data: 707																																													
Maximum Diurnal Average: 10.7 ppb at hour 18		Minimum Diurnal Average: 5.7 ppb at hour 20		Hours of Missing Data: 37																																													
Monthly Average: 7.78 ppb		Percentiles: P ₁ = 0.6 P ₁₀ = 2.2 Q ₁ = 3.5 Median = 5.6 Q ₃ = 9.2 P ₉₀ = 16.1 P ₉₉ = 36.1		Hours of Calibration: 37																																													
				Percent Operational Time: 100.0																																													
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Dec	3.0	2.1	Z	1.5	3.0	3.1	20.1	14.8	12.3	15.2	3.1	4.3	5.9	5.0	4.5	4.8	8.2	5.6	6.6	6.9	10.7	7.7	7.9	6.0	7.1	20.1																							
2-Dec	5.0	9.0	4.7	Z	5.6	6.7	7.5	10.0	6.1	7.5	16.1	17.6	7.9	4.0	4.4	10.9	20.3	33.0	18.1	5.3	7.2	11.6	10.1	10.1	10.4	33.0																							
3-Dec	12.7	8.6	9.0	7.6	Z	8.3	7.9	10.3	12.5	10.2	8.4	8.7	10.5	7.0	13.2	6.7	3.4	5.8	6.1	8.4	9.8	6.7	7.3	8.9	8.6	13.2																							
4-Dec	8.1	7.8	7.2	6.9	6.7	Z	6.1	4.2	4.7	5.7	4.7	11.3	7.5	8.5	7.6	7.1	16.0	19.7	31.5	3.5	2.5	3.3	3.3	1.9	8.1	31.5																							
5-Dec	Z	2.4	3.5	6.2	3.9	5.2	7.9	6.5	9.6	4.4	6.1	6.8	10.6	15.9	17.3	29.4	18.6	19.1	16.1	9.6	8.9	8.4	9.8	4.8	10.0	29.4																							
6-Dec	5.2	Z	5.0	4.0	3.0	4.8	8.8	15.1	8.0	10.3	6.3	8.9	9.9	9.8	10.9	21.6	16.9	15.8	13.2	5.5	8.7	7.2	4.4	11.8	9.4	21.6																							
7-Dec	5.9	9.8	Z	5.4	11.5	8.3	15.6	17.1	12.4	8.0	8.9	8.3	17.2	17.8	13.5	14.6	15.6	16.2	24.9	22.9	16.7	3.3	8.8	22.0	13.3	24.9																							
8-Dec	11.8	8.7	15.9	Z	10.8	10.0	14.9	17.6	13.3	20.7	6.3	20.8	15.4	10.2	5.7	17.1	10.3	22.5	23.5	8.5	9.2	11.2	45.2	18.1	15.1	45.2																							
9-Dec	20.8	15.5	22.1	22.7	Z	9.5	7.1	24.0	15.9	8.6	6.6	7.0	9.1	9.6	5.9	9.6	12.9	6.0	5.4	2.1	4.2	2.6	5.2	3.0	10.2	24.0																							
10-Dec	5.2	6.3	5.3	7.7	5.3	Z	5.0	4.9	4.8	5.9	8.4	12.7	5.2	5.2	5.1	4.9	4.1	3.2	3.5	2.1	4.6	10.6	7.7	19.3	6.4	19.3																							
11-Dec	Z	36.1	37.3	35.5	38.3	7.8	19.4	24.4	15.1	3.9	3.0	1.9	2.2	1.7	2.0	5.2	4.0	5.9	1.5	2.6	3.3	2.9	1.6	2.8	11.2	38.3																							
12-Dec	3.6	Z	4.5	4.8	7.3	6.9	11.4	9.3	6.7	9.4	22.5	4.3	25.7	18.8	9.0	11.0	7.2	6.1	2.6	3.2	3.2	4.9	6.2	7.8	8.5	25.7																							
13-Dec	7.8	7.2	Z	6.0	5.7	3.9	4.9	5.0	C	C	C	C	C	C	17.6	17.2	18.8	15.3	7.5	6.5	6.6	8.1	6.9	6.4	--	18.8																							
14-Dec	5.1	2.7	4.1	Z	3.9	2.3	2.5	2.6	2.2	2.7	2.7	3.5	9.0	20.4	11.0	6.1	14.2	23.4	17.3	3.7	2.5	2.7	2.2	3.2	6.5	23.4																							
15-Dec	2.7	2.3	2.3	1.9	Z	3.0	5.0	5.7	6.2	4.2	7.3	4.9	7.8	12.9	6.3	4.5	3.3	3.4	3.1	2.0	2.7	3.0	3.4	3.5	4.4	12.9																							
16-Dec	4.3	3.6	3.5	3.4	3.2	Z	4.4	5.7	20.3	15.8	12.6	18.0	14.9	6.3	6.0	2.7	2.1	1.5	3.0	3.8	2.8	8.8	4.0	2.8	6.7	20.3																							
17-Dec	Z	7.1	38.7	29.4	18.7	16.6	3.5	4.4	1.2	1.9	2.2	5.4	3.3	2.2	6.2	10.3	29.2	2.7	5.8	11.1	5.8	7.8	7.1	3.8	9.8	38.7																							
18-Dec	3.2	Z	4.3	4.0	4.3	4.6	4.9	4.6	4.6	4.4	3.7	2.9	4.7	2.9	5.7	3.4	8.8	4.5	3.3	1.7	4.9	8.3	12.0	4.5	4.8	12.0																							
19-Dec	12.9	10.5	Z	7.2	6.9	13.2	11.0	6.3	4.0	1.2	1.5	1.3	0.3	1.1	4.5	4.2	0.3	1.0	0.6	0.3	0.5	0.4	0.4	0.4	3.9	13.2																							
20-Dec	0.7	0.6	0.7	Z	0.9	0.8	1.4	4.4	5.0	1.8	1.6	4.2	4.9	4.7	4.7	3.0	3.5	4.7	4.5	3.7	4.6	4.5	6.1	7.5	3.4	7.5																							
21-Dec	6.9	5.5	4.5	4.1	Z	4.2	4.1	4.0	5.0	4.9	36.6	21.9	1.5	3.7	3.8	1.9	1.9	2.9	3.1	3.6	4.4	5.2	4.6	4.3	6.2	36.6																							
22-Dec	3.4	3.2	4.9	5.2	4.5	Z	6.2	5.5	4.7	5.3	9.1	13.8	20.0	20.6	12.8	8.8	9.4	10.0	8.2	13.2	9.1	6.2	6.7	6.4	8.6	20.6																							
23-Dec	Z	3.6	5.6	3.0	4.2	4.2	8.4	8.6	8.0	5.0	8.5	8.5	6.8	6.4	5.3	6.8	4.7	4.4	4.0	2.8	6.3	7.3	2.1	1.4	5.5	8.6																							
24-Dec	1.7	Z	2.5	2.5	1.6	2.3	0.7	1.6	1.1	1.8	2.1	2.8	5.9	2.5	2.8	14.9	14.8	25.2	3.7	5.0	3.7	4.3	4.7	5.5	5.0	25.2																							
25-Dec	4.5	3.7	Z	4.7	5.3	8.6	7.0	7.0	5.1	4.3	5.2	5.6	5.7	5.0	3.7	44.4	32.6	28.1	10.7	7.8	1.9	2.1	3.6	6.5	9.3	44.4																							
26-Dec	7.2	7.5	10.0	Z	8.2	5.5	5.8	4.8	7.6	4.6	4.2	3.6	3.7	8.2	10.9	15.5	9.8	20.7	7.2	4.4	37.8	23.5	6.8	3.4	9.6	37.8																							
27-Dec	2.3	2.0	2.5	2.7	Z	3.2	3.4	2.6	1.2	1.5	2.5	1.7	2.0	3.4	3.9	5.0	4.1	2.6	2.9	3.5	5.1	6.1	5.4	2.4	3.1	6.1																							
28-Dec	3.9	3.0	4.8	3.5	3.8	Z	12.8	6.6	4.9	14.1	14.5	9.1	5.9	7.2	6.2	6.7	8.1	11.0	12.9	12.5	26.2	23.7	14.4	8.3	9.7	26.2																							
29-Dec	Z	24.9	9.2	6.9	9.2	5.6	13.5	13.0	6.7	14.4	11.0	13.5	27.8	6.6	16.1	5.3	4.9	5.2	8.9	4.9	3.4	3.5	9.9	2.3	9.9	27.8																							
30-Dec	2.4	Z	2.9	2.3	5.2	7.4	3.6	5.5	5.3	6.8	7.8	4.6	7.0	5.5	2.2	2.0	2.6	2.0	2.2	4.2	1.8	2.8	6.1	2.0	4.1	7.8																							
31-Dec	2.3	2.9	Z	1.8	1.7	1.7	2.9	3.6	3.2	4.2	4.4	5.9	16.1	8.3	4.8	3.6	3.8	3.5	3.6	3.0	2.7	2.0	2.1	2.4	3.9	16.1																							
																								5.9	7.6	8.6	7.3	7.0	6.1	7.7	8.4	7.3	7.0	7.9	8.1	9.1	8.0	7.5	10.0	10.1	10.7	8.6	5.7	7.1	6.8	7.3	6.2	Diurnal Average	
																								20.8	36.1	38.7	35.5	38.3	16.6	20.1	24.4	20.3	20.7	36.6	21.9	27.8	20.6	17.6	44.4	32.6	33.0	31.5	22.9	37.8	23.7	45.2	22.0	Diurnal Maximum	
Z - zerospan																								C - Calibration																									



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Christina Lake - December 2023





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitrogen Oxides (NO_x) - ppb
Christina Lake - December 2023

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	666	94.20	94.20
21 - 40	39	5.52	99.72
41 - 80	2	0.28	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Christina Lake - December 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	0	1	2	5	6	14	21	43	89	144	129	117	52	34	9	0	666
21 - 40	0	0	0	0	0	0	0	0	1	11	9	7	2	4	5	0	39
41 - 80	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	2
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	0	1	2	5	6	14	21	43	90	156	139	124	54	38	14	0	707

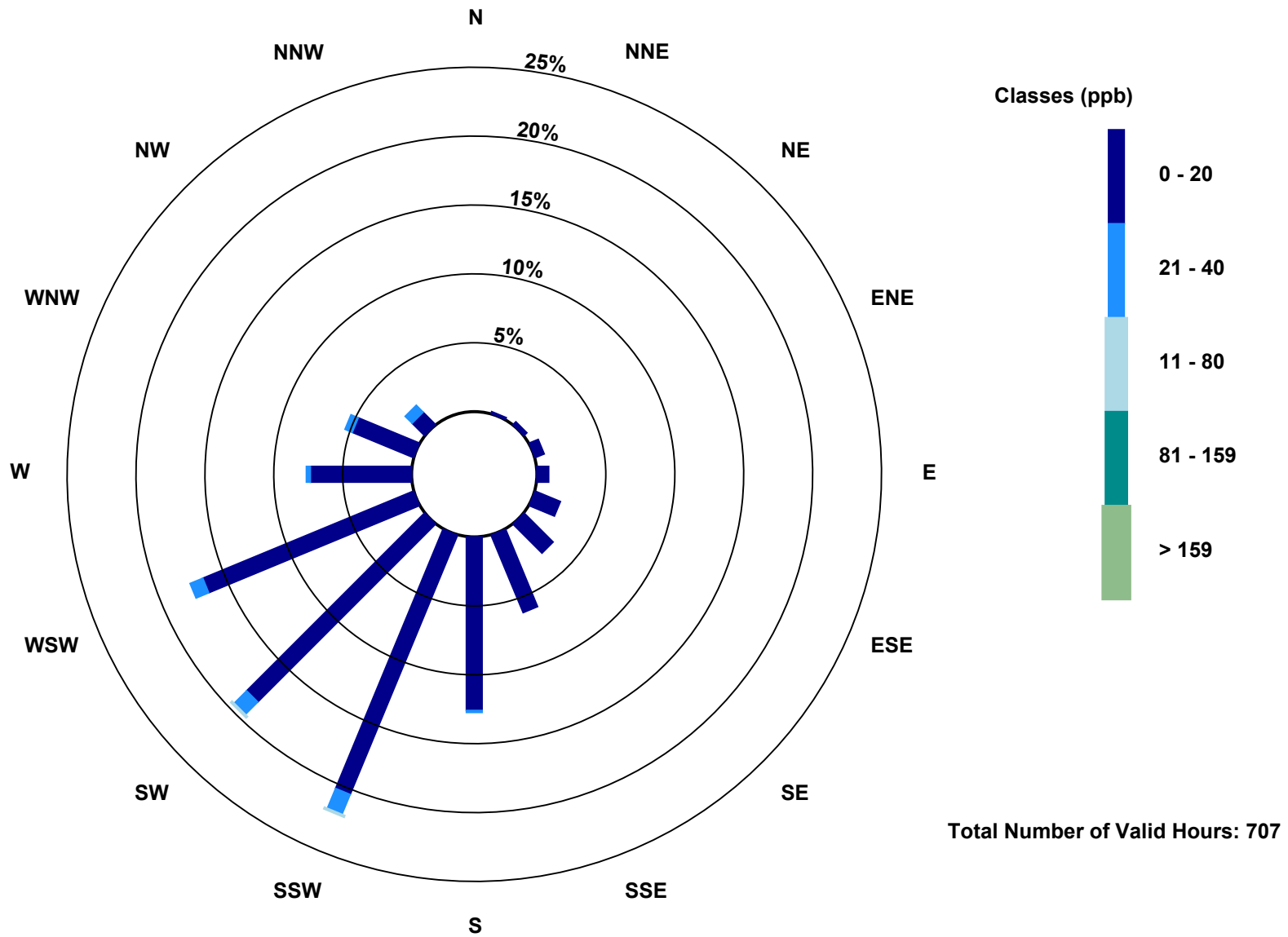
Total Number of Valid Hours: 707

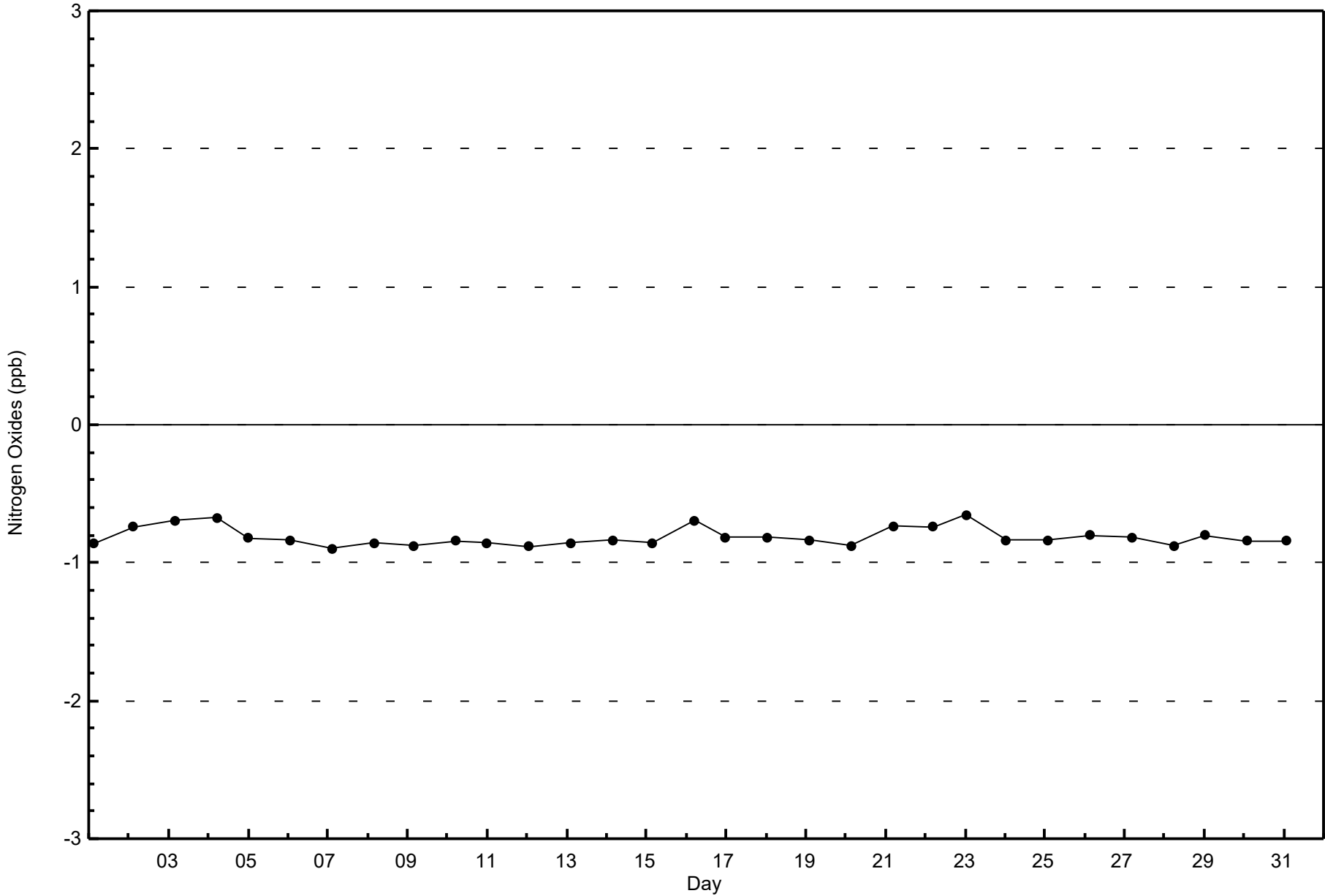
Total Number of Hours: 744

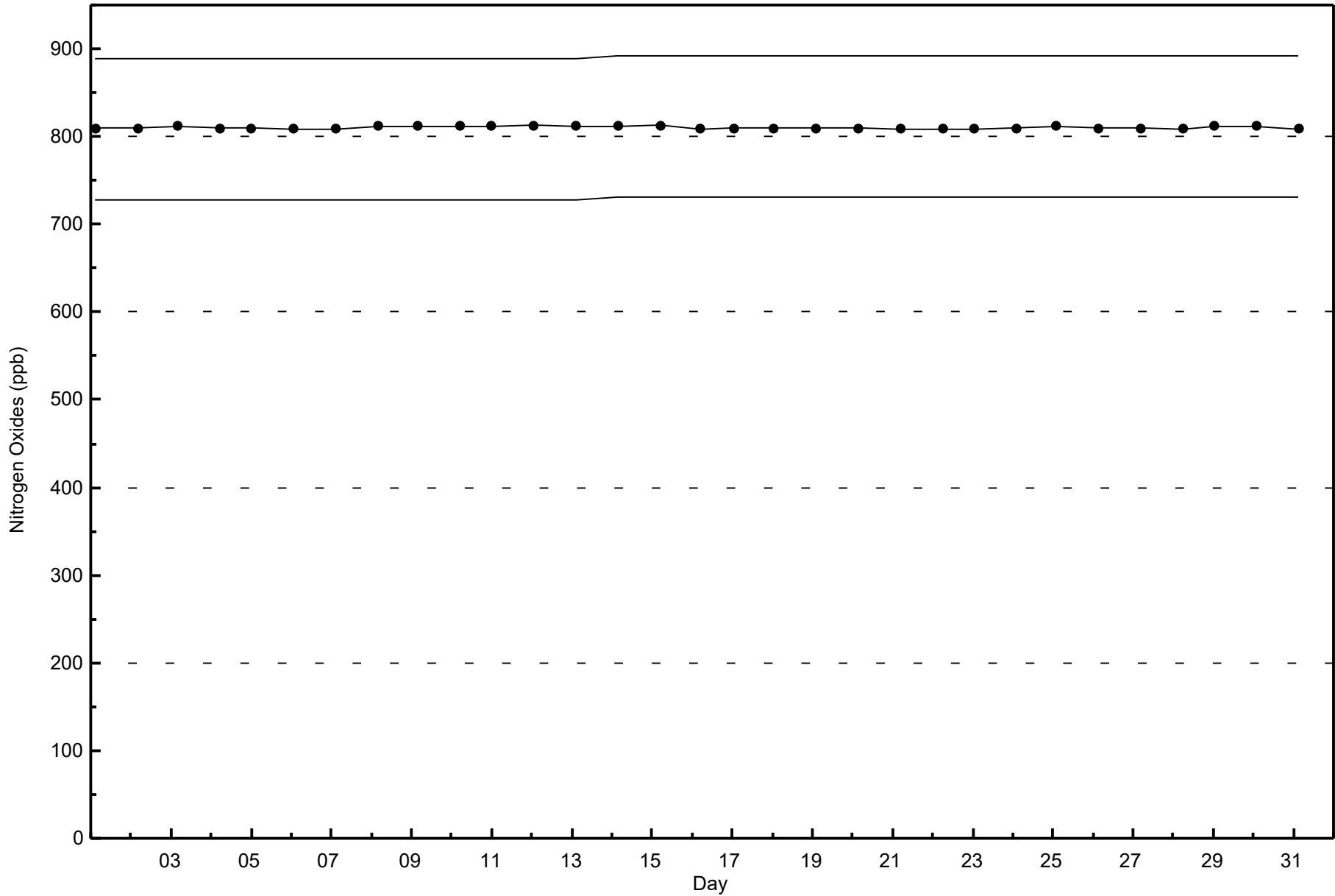


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Nitrogen Oxides (NO_x) - ppb
Christina Lake









Wood Buffalo Environmental Association
Summary of Hour Averages

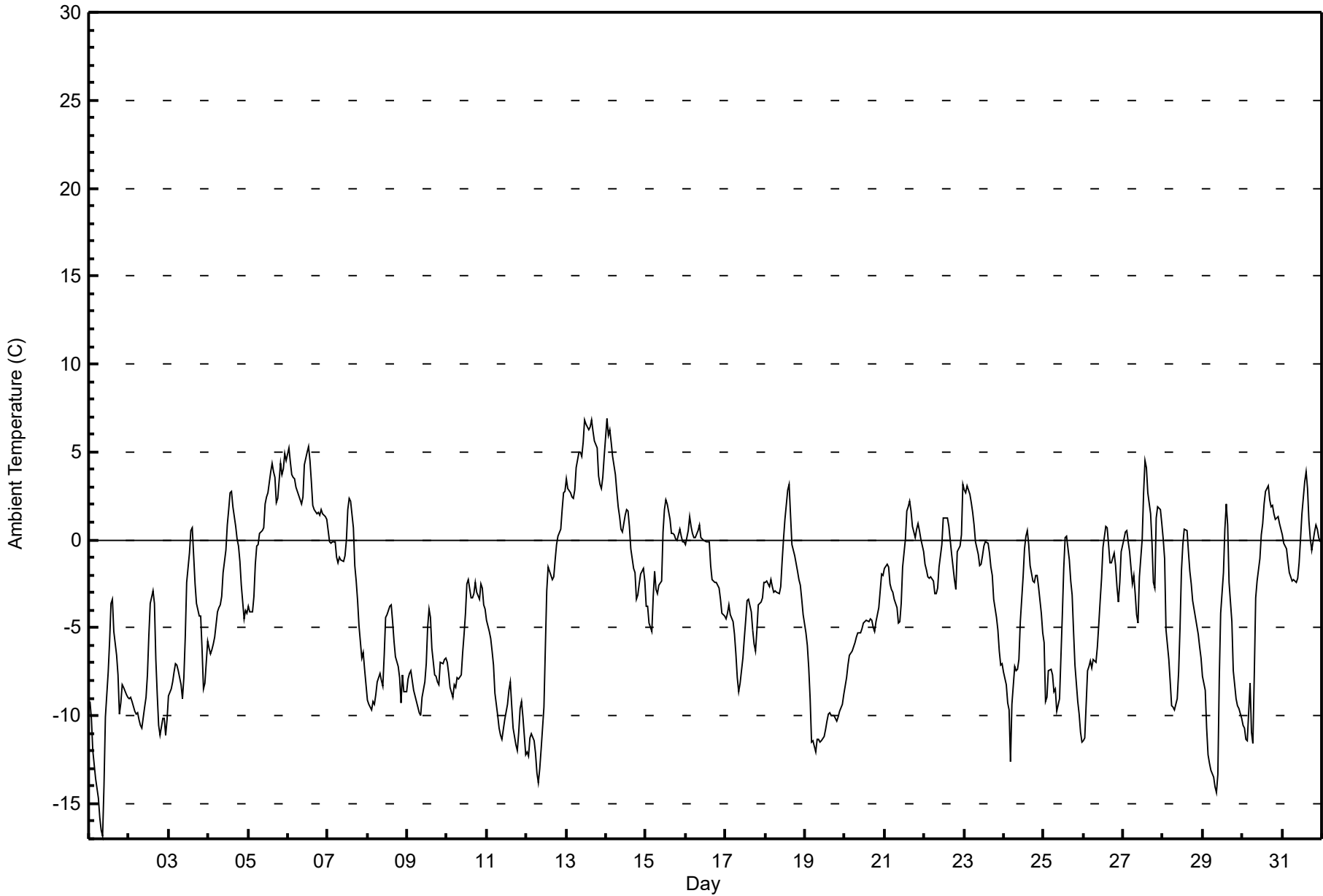
Ambient Temperature (AT) - C
Christina Lake - December 2023

Maximum Value: 6.9 C on Dec 14 01:00 Maximum Daily Average: 4.5 C on Dec 13																				Hours in Service: 744 Hours of Data: 744						
Minimum Value: -16.9 C on Dec 1 09:00 Minimum Daily Average: -9.9 C on Dec 1 Maximum Diurnal Average: -0.1 C at hour 15 Minimum Diurnal Average: -5.7 C at hour 8 Monthly Average: -3.57 C Percentiles: P ₁ = -13.7 P ₁₀ = -10.0 Q ₁ = -7.5 Median = -3.0 Q ₃ = 0.1 P ₉₀ = 2.4 P ₉₉ = 6.1																				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-Dec	-9.2	-10.2	-11.9	-12.8	-13.6	-14.7	-15.8	-16.5	-16.9	-14.0	-10.1	-7.5	-5.8	-3.6	-3.4	-5.2	-6.6	-7.6	-9.9	-9.3	-8.2	-8.4	-8.8	-8.9	-9.9	-3.4
2-Dec	-9.0	-9.0	-9.2	-9.7	-9.9	-9.8	-10.2	-10.5	-10.7	-9.5	-8.9	-7.7	-5.4	-3.6	-2.9	-3.6	-6.8	-8.8	-10.5	-11.1	-10.1	-10.2	-11.1	-10.3	-8.7	-2.9
3-Dec	-8.9	-8.5	-8.1	-7.5	-7.0	-7.1	-7.4	-8.3	-9.1	-7.9	-5.6	-2.4	-0.7	0.5	0.7	-0.9	-2.5	-3.6	-4.3	-4.4	-6.3	-8.5	-8.2	-5.8	-5.5	0.7
4-Dec	-6.1	-6.5	-6.2	-5.9	-5.6	-4.1	-3.9	-3.7	-3.2	-1.9	-0.6	0.8	1.7	2.7	2.8	1.9	0.8	0.1	-0.3	-1.2	-2.5	-4.5	-4.0	-4.2	-2.2	2.8
5-Dec	-3.8	-4.1	-4.1	-3.2	-1.4	-0.4	-0.3	0.4	0.5	0.7	2.0	2.4	2.7	3.9	4.3	3.9	3.6	2.1	2.4	4.4	3.7	4.0	4.9	4.5	1.4	4.9
6-Dec	5.3	4.4	3.7	3.5	3.5	3.0	2.6	2.3	2.1	2.4	4.3	4.9	5.3	4.5	3.3	1.9	1.7	1.5	1.5	1.4	1.7	1.5	1.3	1.2	2.9	5.3
7-Dec	0.5	-0.1	-0.2	-0.1	-0.1	-1.0	-1.3	-1.0	-1.2	-1.2	-0.9	0.0	1.7	2.4	2.2	0.7	-1.5	-2.3	-3.5	-4.9	-6.7	-6.4	-7.4	-8.2	-1.7	2.4
8-Dec	-9.1	-9.3	-9.7	-9.2	-9.4	-8.8	-8.1	-7.6	-8.0	-8.3	-6.5	-4.4	-4.2	-3.8	-3.7	-4.6	-5.8	-6.6	-7.2	-7.8	-9.3	-7.7	-8.7	-8.6	-7.4	-3.7
9-Dec	-7.9	-7.6	-7.4	-8.0	-8.5	-9.2	-9.5	-9.8	-10.0	-8.9	-8.0	-7.0	-4.9	-4.0	-4.4	-6.2	-7.7	-7.7	-8.1	-8.3	-7.0	-7.1	-6.8	-6.7	-7.5	-4.0
10-Dec	-6.9	-7.6	-8.4	-9.0	-8.2	-8.4	-7.8	-7.9	-7.7	-6.4	-5.4	-4.1	-2.5	-2.3	-3.3	-3.3	-3.1	-2.4	-3.0	-3.4	-2.5	-2.7	-3.7	-4.0	-5.2	-2.3
11-Dec	-4.6	-5.2	-5.6	-6.3	-7.1	-8.7	-10.0	-10.7	-11.1	-11.3	-10.8	-10.3	-9.3	-8.6	-8.1	-9.4	-10.7	-11.7	-12.0	-11.0	-9.6	-9.2	-10.1	-12.2	-9.3	-4.6
12-Dec	-12.1	-12.3	-11.3	-11.0	-11.4	-12.2	-13.3	-13.8	-13.0	-11.9	-9.5	-6.1	-2.9	-1.6	-1.8	-2.3	-2.1	-1.1	-0.3	0.2	0.6	1.7	2.7	2.7	-5.9	2.7
13-Dec	3.5	2.9	2.6	2.5	2.3	2.8	4.1	5.0	5.0	4.8	5.5	6.8	6.6	6.2	6.4	6.8	6.2	5.6	5.2	3.6	3.1	2.9	3.6	4.7	4.5	6.8
14-Dec	6.9	6.0	6.2	5.6	4.7	3.7	2.8	1.9	1.3	0.6	0.4	1.4	1.7	1.7	0.8	-0.5	-1.6	-1.9	-3.4	-3.2	-2.5	-2.0	-1.6	-2.3	1.1	6.9
15-Dec	-3.8	-3.8	-4.7	-5.2	-3.2	-1.8	-2.8	-3.1	-2.6	-2.3	0.4	1.7	2.3	2.0	1.1	0.3	0.4	0.3	0.1	-0.1	0.6	0.2	-0.1	-0.1	-1.0	2.3
16-Dec	-0.3	0.6	1.3	0.7	0.4	0.1	0.1	0.5	0.8	0.1	0.0	0.0	-0.1	-0.1	-0.1	-1.5	-2.3	-2.4	-2.5	-2.6	-2.7	-3.4	-4.1	-4.4	-0.9	1.3
17-Dec	-4.5	-4.2	-3.7	-4.2	-4.7	-5.3	-6.5	-7.9	-8.6	-8.2	-6.7	-5.6	-4.6	-3.4	-3.4	-4.1	-5.2	-5.9	-6.3	-5.1	-3.7	-3.5	-3.3	-2.4	-5.0	-2.4
18-Dec	-2.4	-2.4	-2.6	-2.2	-2.7	-3.0	-2.9	-3.0	-3.0	-2.7	-1.2	0.0	1.1	2.8	3.1	1.4	-0.2	-0.6	-0.9	-1.8	-2.3	-2.6	-3.4	-4.3	-1.5	3.1
19-Dec	-5.3	-6.0	-7.3	-9.0	-11.5	-11.4	-12.0	-11.4	-11.3	-11.5	-11.5	-11.2	-10.8	-10.3	-9.9	-9.8	-10.0	-10.0	-10.2	-10.3	-10.1	-9.7	-9.3	-8.8	-9.9	-5.3
20-Dec	-8.3	-7.8	-7.1	-6.6	-6.3	-6.1	-5.8	-5.5	-5.3	-5.3	-5.1	-4.7	-4.7	-4.6	-4.7	-4.5	-4.6	-5.0	-5.2	-4.7	-3.9	-2.9	-1.9	-2.0	-5.1	-1.9
21-Dec	-1.7	-1.4	-1.5	-2.5	-2.8	-3.0	-3.4	-3.9	-4.8	-4.7	-3.6	-1.5	0.1	1.6	1.9	2.2	1.7	0.7	0.1	0.6	0.9	0.6	0.0	-0.7	-1.0	2.2
22-Dec	-1.4	-1.7	-2.1	-2.2	-2.1	-2.4	-3.0	-3.1	-2.7	-1.6	-0.3	1.2	1.3	1.2	1.2	0.7	-0.9	-1.6	-2.3	-2.8	-0.7	-0.4	0.2	3.1	-0.9	3.1
23-Dec	2.8	2.7	3.0	2.6	2.2	1.6	0.8	-0.1	-0.8	-1.5	-1.4	-0.9	-0.3	-0.1	-0.2	-0.7	-1.5	-2.0	-3.4	-4.4	-5.1	-6.3	-7.1	-7.1	-1.1	3.0
24-Dec	-7.5	-8.2	-9.3	-9.7	-12.6	-9.3	-7.2	-7.4	-7.4	-6.8	-4.6	-2.1	-0.5	0.2	0.5	-0.2	-1.5	-2.4	-2.4	-2.0	-2.0	-2.7	-4.2	-5.3	-4.8	0.5
25-Dec	-5.9	-9.2	-8.9	-7.5	-7.4	-7.7	-8.6	-8.5	-9.8	-9.0	-6.6	-4.2	-1.6	0.2	0.2	-1.2	-2.3	-3.1	-5.2	-7.1	-9.2	-9.9	-10.9	-11.5	-6.5	0.2
26-Dec	-11.4	-11.2	-7.4	-7.2	-6.9	-7.3	-6.8	-7.0	-6.1	-4.8	-3.4	-2.2	-0.4	0.8	0.7	-0.3	-1.3	-1.3	-0.7	-1.4	-2.7	-3.5	-2.4	-0.7	-4.0	0.8
27-Dec	0.0	0.5	0.5	-0.1	-0.7	-2.5	-2.1	-3.1	-4.3	-4.7	-2.1	0.0	2.7	4.5	4.1	2.7	1.5	-0.2	-2.4	-2.8	1.2	1.9	1.7	0.9	-0.1	4.5
28-Dec	0.1	-1.0	-5.1	-6.8	-8.1	-9.5	-9.5	-9.7	-9.0	-7.5	-5.0	-1.8	-0.3	0.6	0.5	-0.6	-1.7	-2.5	-3.5	-4.4	-4.9	-5.4	-6.1	-6.7	-4.5	0.6
29-Dec	-7.8	-8.5	-10.7	-12.2	-12.7	-13.1	-13.5	-14.1	-14.4	-13.3	-7.9	-4.2	-1.9	0.6	2.0	0.9	-2.4	-4.6	-7.4	-8.2	-9.0	-9.5	-9.6	-10.1	-8.0	2.0
30-Dec	-10.5	-10.7	-11.4	-11.4	-8.2	-10.9	-11.6	-7.7	-3.3	-2.4	-1.0	0.3	0.9	2.1	2.7	3.1	2.3	1.8	2.0	1.5	1.2	1.3	0.9	0.6	-2.8	3.1
31-Dec	0.3	-0.2	-0.5	-1.2	-1.8	-2.1	-2.4	-2.3	-2.4	-2.2	-1.3	0.0	1.5	3.3	3.9	2.9	1.1	0.1	-0.6	0.5	0.8	0.6	0.1	-0.1	-0.1	3.9
																								Diurnal Average		
																								Diurnal Maximum		



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature (AT) - C
Christina Lake - December 2023





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C
Christina Lake - December 2023**

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	543	72.98	72.98
0 - 10	201	27.02	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association
Summary of Hour Averages

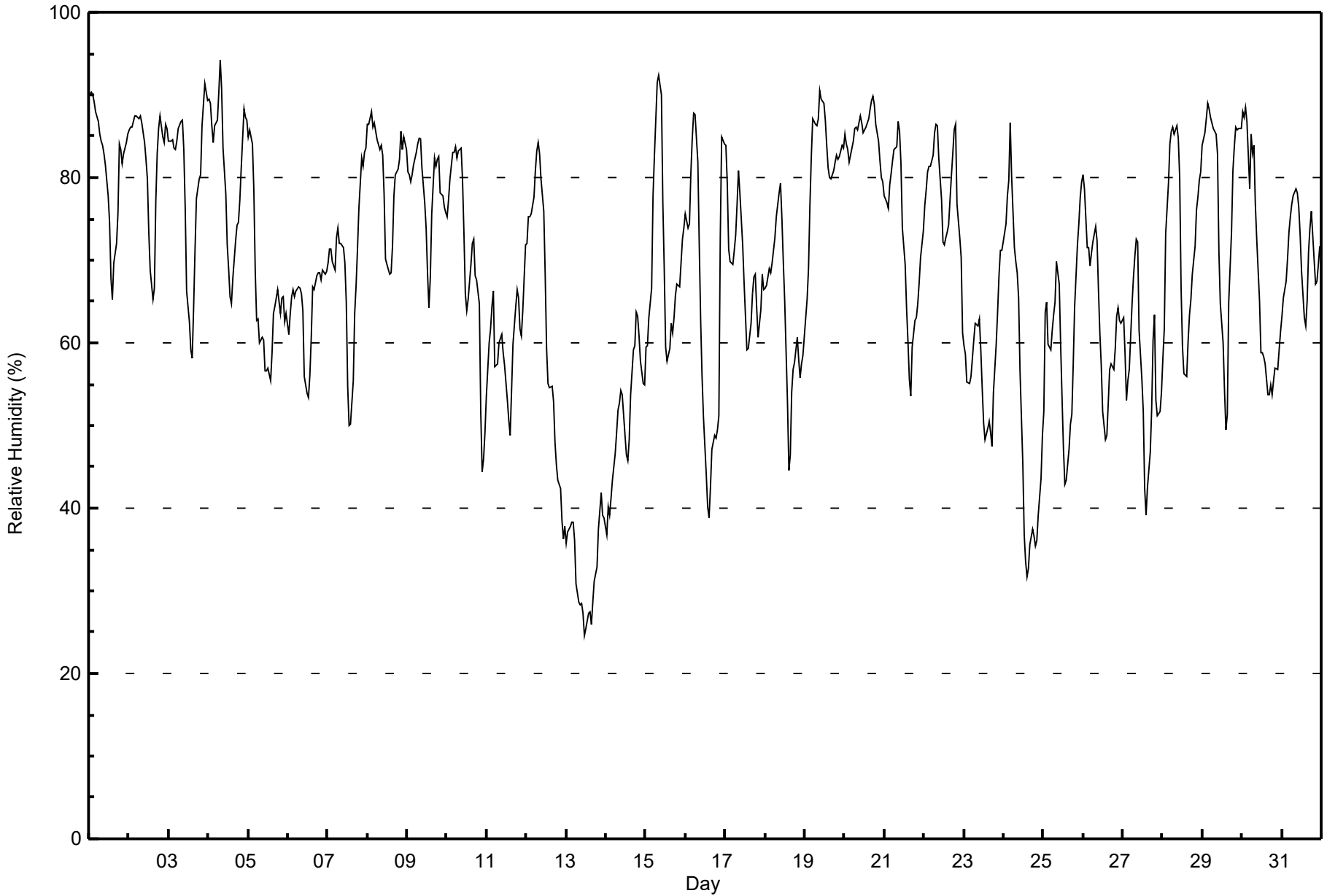
Relative Humidity (RH) - %
Christina Lake - December 2023

Maximum Value: 94.3 % on Dec 4 08:00 Maximum Daily Average: 85.3 % on Dec 20 Minimum Value: 24.5 % on Dec 13 12:00 Minimum Daily Average: 32.8 % on Dec 13 Maximum Diurnal Average: 76.4 % at hour 8 Minimum Diurnal Average: 56.5 % at hour 15 Monthly Average: 68.59 % Percentiles: P ₁ = 28.5 P ₁₀ = 48.8 Q ₁ = 59.2 Median = 69.6 Q ₃ = 81.9 P ₉₀ = 86.1 P ₉₉ = 90.3																						Hours in Service:	744																								
																						Hours of Data:	744																								
																						Hours of Missing Data:	0																								
																						Hours of Calibration:	0																								
																						Percent Operational Time:	100.0																								
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																					
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																							
1-Dec	90.1	90.4	89.9	89.1	88.0	86.8	85.3	84.4	84.0	82.9	81.5	77.8	74.7	67.7	65.3	69.6	72.1	75.8	84.0	83.3	81.8	82.8	84.2	85.3	81.5	90.4																					
2-Dec	85.7	86.1	86.2	87.4	87.5	87.2	87.1	87.5	86.7	84.2	82.2	79.9	73.5	68.9	65.3	66.6	77.2	83.0	86.0	87.5	85.0	84.3	86.4	86.0	82.4	87.5																					
3-Dec	84.4	84.4	84.5	83.6	83.3	84.4	86.0	86.8	87.0	83.3	76.3	66.2	62.5	59.1	58.2	64.3	71.2	77.5	79.8	80.3	86.3	88.8	91.3	89.3	79.1	91.3																					
4-Dec	89.5	89.0	86.3	84.2	86.4	87.0	90.4	94.3	90.6	83.5	78.0	71.9	68.9	65.5	64.7	67.8	72.3	74.2	74.6	77.3	81.2	88.3	87.3	87.0	80.8	94.3																					
5-Dec	85.0	85.7	84.1	78.5	68.7	62.6	62.8	60.0	60.8	60.4	56.7	57.0	55.5	58.8	63.5	64.4	65.4	66.5	63.6	65.5	65.6	62.5	63.6	65.6	65.6	85.7																					
6-Dec	61.1	63.5	65.5	66.5	65.7	66.3	66.9	66.5	66.0	63.9	55.9	53.9	53.3	56.1	60.6	66.8	66.4	68.1	68.5	68.5	67.7	68.8	68.4	68.7	64.3	68.8																					
7-Dec	69.6	71.4	71.3	69.8	68.7	72.8	73.9	72.1	72.1	71.6	69.7	64.8	54.7	49.9	50.2	55.5	63.5	66.9	71.3	76.3	82.4	81.3	83.0	83.5	69.4	83.5																					
8-Dec	86.4	86.4	87.9	86.1	86.7	85.6	84.6	83.3	83.9	82.7	77.9	70.2	69.5	68.3	68.4	71.8	77.7	80.4	81.0	82.3	85.6	83.5	84.9	83.5	80.8	87.9																					
9-Dec	80.6	80.3	79.5	80.4	81.5	83.0	84.0	84.7	84.7	81.2	76.9	73.9	68.5	64.3	67.9	75.6	82.4	81.4	82.2	82.5	78.2	77.8	76.4	75.7	78.5	84.7																					
10-Dec	75.2	77.3	79.7	83.1	83.1	83.7	82.3	83.3	83.6	79.7	73.3	66.0	63.9	65.2	69.4	72.1	72.5	68.2	67.6	64.7	51.7	44.3	46.0	49.2	70.2	83.7																					
11-Dec	53.6	60.0	61.7	64.4	66.3	57.0	57.5	60.0	60.5	61.0	58.8	57.3	53.1	50.6	48.7	54.2	59.8	64.3	66.4	65.4	61.7	60.8	64.0	71.9	60.0	71.9																					
12-Dec	72.0	75.3	75.2	75.5	77.6	80.9	83.2	84.2	82.9	79.9	75.9	68.3	59.4	55.0	54.6	54.8	52.9	48.0	45.3	43.4	42.3	38.5	36.3	37.8	62.5	84.2																					
13-Dec	35.8	37.2	37.9	38.3	38.3	36.1	30.9	28.7	28.3	28.5	27.2	24.5	25.5	27.3	27.4	25.9	28.6	31.2	32.8	37.4	39.7	41.9	39.2	38.9	32.8	41.9																					
14-Dec	36.7	40.2	39.2	41.2	43.4	46.6	49.2	51.8	52.7	54.3	53.7	48.8	46.5	45.8	48.4	53.8	59.2	59.6	63.8	63.2	60.9	57.7	55.1	55.0	51.1	63.8																					
15-Dec	59.4	59.6	63.1	66.6	77.9	82.7	87.2	91.5	92.4	90.1	77.0	69.1	59.6	57.8	59.4	62.4	61.2	63.1	65.8	67.1	66.7	69.6	72.5	73.8	70.6	92.4																					
16-Dec	75.5	73.9	74.3	80.5	84.8	87.7	87.7	81.9	71.8	62.7	55.9	51.0	44.1	40.2	38.8	42.6	47.2	48.8	48.5	49.5	51.2	72.7	85.0	84.0	64.2	87.7																					
17-Dec	84.0	79.3	71.4	69.9	69.5	71.2	73.0	76.9	80.8	78.2	71.9	67.4	63.2	59.2	59.4	62.3	66.0	67.9	68.4	64.2	60.7	64.1	68.3	66.4	69.3	84.0																					
18-Dec	66.5	67.0	68.9	68.5	69.7	71.3	72.7	75.3	78.1	79.4	75.1	69.9	65.1	52.6	44.6	46.5	54.1	56.7	57.6	60.6	58.0	55.8	57.5	58.5	63.8	79.4																					
19-Dec	63.0	65.3	69.0	76.5	82.6	87.2	86.4	86.3	87.1	90.6	89.5	89.0	87.0	84.0	81.2	79.9	79.8	80.9	81.9	82.7	82.2	82.6	83.9	83.5	81.7	90.6																					
20-Dec	85.2	84.1	83.4	81.9	83.5	84.4	85.9	86.0	85.8	87.4	86.6	85.4	85.8	86.2	87.2	88.3	89.3	89.8	88.9	86.5	84.4	82.1	80.0	79.5	85.3	89.8																					
21-Dec	77.8	76.9	76.3	79.2	80.5	82.0	83.4	83.8	86.8	85.6	81.8	74.0	69.4	64.2	60.2	55.7	53.6	59.5	62.8	63.0	64.7	67.4	70.3	73.6	72.2	86.8																					
22-Dec	76.6	78.6	80.8	81.3	81.4	82.6	85.4	86.4	86.2	82.3	77.3	72.1	71.8	72.7	73.4	74.2	80.2	82.9	85.8	86.4	76.9	72.7	70.4	61.2	78.3	86.4																					
23-Dec	59.7	58.6	55.2	55.1	55.9	58.1	60.3	62.3	62.0	63.0	59.1	54.6	50.4	48.3	49.7	50.5	49.1	47.5	53.9	59.8	63.7	68.2	71.2	71.2	57.8	71.2																					
24-Dec	72.2	74.5	77.8	79.7	86.6	80.2	71.5	69.8	68.4	65.4	56.7	45.5	36.8	33.6	31.7	32.7	35.5	37.4	36.6	35.5	36.1	39.2	43.5	48.8	54.0	86.6																					
25-Dec	51.7	63.7	65.0	59.8	59.2	61.6	63.4	65.0	69.8	67.1	59.8	53.4	47.3	42.8	43.4	47.1	50.1	51.4	57.5	64.3	71.8	74.4	77.6	79.5	60.3	79.5																					
26-Dec	80.4	78.7	71.5	71.4	69.4	70.9	72.1	74.0	72.3	66.5	61.1	57.3	51.8	48.3	48.8	52.8	56.7	57.5	56.7	59.4	63.2	64.2	62.7	62.3	63.8	80.4																					
27-Dec	63.0	58.6	53.0	55.4	56.8	64.8	67.9	70.6	72.5	72.2	61.5	55.5	51.6	42.4	39.2	42.5	46.8	52.0	60.3	63.4	53.1	51.1	51.8	54.1	56.7	72.5																					
28-Dec	58.1	61.7	73.3	79.3	84.1	85.6	86.1	85.3	86.3	84.8	80.0	66.6	59.5	56.3	56.0	60.2	63.5	65.2	68.3	71.7	76.1	77.6	79.7	80.7	72.7	86.3																					
29-Dec	84.0	85.4	87.2	88.9	88.3	87.3	85.9	85.6	85.3	82.9	71.0	64.8	60.1	54.3	49.5	51.4	64.9	73.4	80.8	83.7	86.1	85.8	86.0	85.9	77.4	88.9																					
30-Dec	87.9	87.2	88.5	86.7	78.7	85.2	82.9	83.9	76.7	72.5	65.0	58.7	58.8	58.3	57.5	53.7	53.8	54.9	53.8	55.4	56.9	56.8	59.2	61.4	68.1	88.5																					
31-Dec	63.3	65.4	67.4	70.1	73.5	75.3	76.9	77.8	78.7	78.2	76.4	73.1	68.7	63.0	62.0	65.1	70.9	73.9	76.0	70.0	67.0	67.4	69.6	71.7	70.9	78.7																					
																						71.4	72.4	72.7	73.5	74.4	75.4	75.9	76.4	76.3	74.4	69.3	64.1	60.1	56.9	56.5	59.0	62.7	64.7	66.9	67.7	67.4	68.3	69.5	70.1	Diurnal Average	
																						90.1	90.4	89.9	89.1	88.3	87.7	90.4	94.3	92.4	90.6	89.5	89.0	87.0	86.2	87.2	88.3	89.3	89.8	88.9	87.5	86.3	88.8	91.3	89.3	Diurnal Maximum	



Wood Buffalo Environmental Association
Hourly Averages

Relative Humidity (RH) - %
Christina Lake - December 2023





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Relative Humidity (RH) - %
Christina Lake - December 2023

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	40	5.38	5.38
40 - 60	163	21.91	27.28
60 - 80	323	43.41	70.70
80 - 100	218	29.30	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed (WS) - km/h

Christina Lake - December 2023

Maximum Speed: 32 km/h on Dec 11 06:00	Maximum Daily Speed Average: 17.0 km/h on Dec 23	Hours in Service: 744
Minimum Speed Value: 1 km/h on Dec 28 04:00	Minimum Daily Speed Average: 4.1 km/h on Dec 29	Hours of Data: 744
Maximum Diurnal Speed Average: 9.5 km/h at hour 13	Minimum Diurnal Speed Average: 7.2 km/h at hour 6	Hours of Missing Data: 0
Monthly Average Velocity: 8.3 km/h 227.6 deg	Percentiles: $P_1 = 2$ $P_{10} = 6$ $Q_1 = 7$ Median = 10 $Q_3 = 14$ $P_{90} = 19$ $P_{99} = 26$	Percent Operational Time: 100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Dec	SSW6	SW8	SSW5	SSW4	SSW5	SSW4	SSW3	S3	S4	SSE2	SSW7	SSW9	SSW11	SSW9	S10	S9	S9	SSE7	SE6	S7	S9	SSW10	S8	SSW9	S6.3	SSW11	
2-Dec	S11	SSW12	SSW9	S10	S8	S8	S8	S5	S8	S9	S10	S8	SSW9	SSW8	S7	SSW5	SSW6	SSW8	SSW6	SSW6	WSW2	WSW6	WSW5	WSW8	SSW7.2	SSW12	
3-Dec	WSW12	WSW10	SW9	SW10	SW7	SSW7	SSW6	SSW6	SSW6	SSW5	SSE5	S4	SSW6	SSW8	S10	SSE8	SSE9	SSE6	S8	SSE6	SE6	SE5	SSE4	S7	SSW6.0	WSW12	
4-Dec	SSW8	SSW7	SSW7	SSW8	SSW6	SW13	SW13	SW14	SW12	SW16	WSW15	WSW16	WSW14	WSW13	WSW13	WSW11	WSW10	SW11	SW11	SSW11	S6	SSE9	S7	SSW7	SSW9.9	WSW16	
5-Dec	SSE7	SE7	SE5	SSE7	SSE11	S10	S11	S15	S15	SSW15	SW10	SW13	SW10	WSW10	WSW10	WSW9	SW10	SW8	WSW10	WSW16	SW16	WSW17	WSW20	WSW19	SSW10.1	WSW20	
6-Dec	WSW20	WSW16	WSW17	WSW19	WSW21	WSW19	WSW19	WSW17	WSW17	WSW18	WSW19	WSW17	WSW14	WSW12	SW13	SW9	SW11	SW12	SW14	SW10	SW10	SW11	SW10	WSW8	WSW14.7	WSW21	
7-Dec	WSW10	SW1	SW9	SW10	W7	WSW10	WSW9	WSW10	WSW10	WSW11	WSW12	WSW11	W11	W12	W10	WSW9	WSW9	WSW10	SW10	SW5	SW8	SW10	SW9	SW9	WSW8.9	W12	
8-Dec	SW9	SSW9	SW6	WSW8	WSW9	WSW9	WSW9	WSW10	WSW10	WSW9	WSW12	W10	W10	WSW10	WSW10	WSW8	WSW8	WSW5	SW7	SW7	SSW6	SW9	SW10	SW10	WSW8.6	WSW12	
9-Dec	WSW10	WSW10	W11	WSW11	WSW11	WSW9	WSW7	WSW9	WSW9	SW9	S7	S7	SW9	SW8	SSW8	S6	S7	SSE7	SE5	SE6	S10	S6	SSE7	SE7	SW6.5	WSW11	
10-Dec	SSE9	SSE7	SSE6	SSE7	S8	S6	S7	SSW9	SSW10	SSW11	SW13	SW18	WSW16	WSW14	WSW12	WSW11	WSW14	W16	W16	W15	W24	WNNW26	WNNW26	WNNW24	WSW10.4	WNNW26	
11-Dec	WNNW27	NW26	WNNW27	NW26	NW30	NW32	NW27	NW22	NW16	W13	W13	W14	W13	W11	W9	SW9	SW11	SSW11	SSW9	SSW9	SSW9	SSW6	SSE7	SSE6	WNNW12.1	NW32	
12-Dec	S6	SSW4	SSW7	SW9	SW9	SSW7	SSW6	SSW7	SSW6	SSW6	SSW10	SSW7	SW14	SW15	SSW15	SSW14	SW15	SW16	SW21	SW20	SW19	SW19	SW21	SW18	SW11.8	SW21	
13-Dec	SW18	SW18	SW21	SW18	SW19	SW16	SW16	SW13	SW11	SW14	SW13	SW13	SSW13	SW10	SW11	SW16	SW10	SW10	SW7	SSW4	SW6	SW6	SW8	WSW11	SW12.5	SW21	
14-Dec	W13	W13	W15	W15	W17	W14	W14	W12	W12	WSW11	WSW9	WSW10	WSW10	SW9	SW10	SW11	SW12	WSW7	SW6	SW9	SW12	SW12	SSW12	SSW10	WSW10.8	W17	
15-Dec	SSW8	SSW7	S8	S7	SW12	SW14	SSW9	SSW10	SSW12	SSW12	SW17	SW22	SSW18	SSW18	S12	S14	SSW18	SSW19	SSW19	SSW19	SSW19	SSW19	SSW19	SSW19	SSW14.9	SW26	
16-Dec	WSW20	WSW19	WSW18	WSW16	WSW12	W12	W12	W14	WNNW19	WNNW17	WNNW18	WNNW20	WNNW19	WNNW16	WNNW13	W11	WSW11	WSW11	WSW10	WSW10	W10	NW17	WNNW13	W12	W13.5	WNNW20	
17-Dec	W12	WNNW17	NW29	WNNW26	WNNW24	NW17	W13	WSW10	WSW11	WSW11	WSW12	WSW13	WSW15	WSW17	SW17	SW15	SSW13	SSW11	SSW8	SW13	SW18	SW20	SW20	SW23	WSW13.3	NW29	
18-Dec	SW24	SW20	SW19	SW16	WSW14	WSW12	WSW11	W12	W12	W12	W11	WSW11	WSW10	W11	WNNW16	W10	WSW11	W11	W11	W12	W13	WNNW13	WNNW11	W10	WSW12.1	SW24	
19-Dec	WNNW9	NW10	N10	NNE4	NE5	ENE4	ENE7	NE9	E7	E12	E11	E9	ESE9	ESE10	ESE12	ESE13	ESE14	ESE13	SE14	SE13	SE12	SE11	SE10	SE11	E7.1	SE14	
20-Dec	SE12	SE12	SSE11	SSE14	SSE15	S16	S13	S14	S16	SSW14	SSW13	SSW14	SSW13	SSW14	SSW14	SSW14	SSW14	SSW13	SSW9	S11	S12	SSW12	SSW10	WSW14	SW20	SSW12.0	SW20
21-Dec	SW21	WSW18	WSW14	WSW11	WSW11	WSW10	SW11	SW12	SW11	SSW9	SSW8	SSW8	SSW10	SSW13	SSW16	SSW19	SSW23	SSW24	SSW22	SSW23	SSW18	SSW17	SSW15	SSW11	SW14.0	SSW24	
22-Dec	SSW10	SSW9	S11	SSW11	S8	S7	SSE5	SE7	SSE5	SSW7	S6	S9	S10	S8	S10	SSW9	S7	S6	S6	SSW7	WSW11	WSW14	W12	W17	SSW7.2	W17	
23-Dec	W17	W16	WNNW22	W20	W20	WNNW20	WNNW24	WNNW24	WNNW23	WNNW21	W20	WNNW20	WNNW23	WNNW21	WNNW20	WNNW17	W16	W15	WSW12	WSW9	SW9	SW10	WSW11	WSW11	W17.0	WNNW24	
24-Dec	WSW9	SW10	SW10	SSW8	SSE6	SSW9	SW15	SW14	SW14	SW15	SW15	SSW20	SSW21	SW18	SW17	SW13	SSW9	SSW8	SSW11	SW12	SW9	SW7	SSE4	S6	SW11.3	WSW21	
25-Dec	S6	S5	S4	SSE8	SSE10	SW5	SSW8	SSW8	S7	S6	S6	SSW6	SSW7	S8	S8	SSW10	SSW8	SSW8	SSE4	SSE6	ESE6	ESE7	ESE6	E7	S5.7	SSE10	
26-Dec	ESE8	SSE5	SSW11	S9	SSE9	SSE7	S7	SSW5	S9	SSW6	SSW10	S10	SSW9	SSW10	SW9	SSW10	SW9	SW10	WSW11	SW7	SSW6	SSW7	WSW9	WSW12	SSW7.4	WSW12	
27-Dec	WSW13	WSW15	SW15	WSW14	SW10	SSW11	SW12	SSW12	SW10	S8	SSE3	S5	SSW12	SSW17	SSW17	S12	SSE8	SE8	SSE6	ESE6	S9	S11	S8	SSE6	SSW8.8	SSW17	
28-Dec	SSW7	SSE2	ENE3	SW1	SE2	SE2	SSW2	ESE2	SSW3	SE3	WSW3	WNNW6	NW9	NW11	NW12	WNNW12	W13	W14	WNNW15	WNNW13	WNNW12	WNNW12	WNNW8	WNNW6	WNNW5.3	WNNW15	
29-Dec	WSW6	SW6	SW5	SSW4	SW4	S4	SW5	S4	SSW4	SSW3	S1	S2	SSW6	SSW5	SW8	SSW7	SSE5	SSE6	S5	S2	SSE4	SSE6	SSE6	ESE6	SSW4.1	SW8	
30-Dec	E4	E5	ESE5	SSW3	WSW4	E2	ENE2	SE5	S10	S8	S11	S15	S12	S14	S15	S19	S21	S21	S22	SSW18	SSW18	SSW19	SSW16	SSW18	S11.0	S22	
31-Dec	SSW16	SSW13	SSW10	SSW7	SSW7	S7	SSW7	SW8	SW8	SW8	SW9	SW6	SW4	WSW6	SW7	SSW8	SSW11	SSW9	SSW10	SW12	WSW13	WSW14	W13	W13	SW8.5	SSW16	

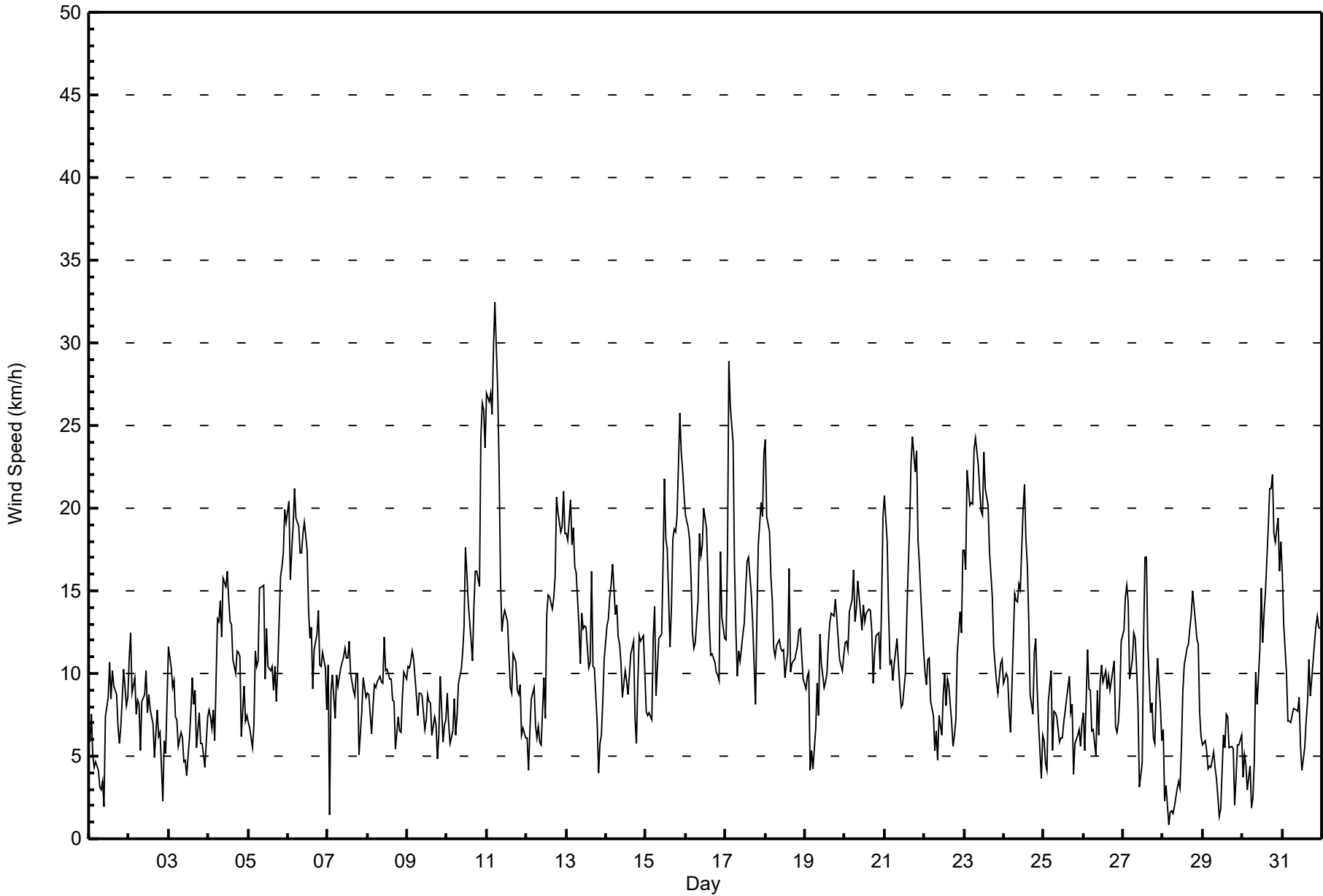
SW8.9 SW8.0 WSW7.9 SW7.9 SW7.5 SW7.2 SW7.4 SW7.4 SW7.8 SW7.8 SW8.2 SW8.9 SW9.5 SW9.4 SW9.2 SW9.1 SW9.3 SW8.5 SW8.5 SW8.6 SW8.9 SW8.8 SW8.6 SW8.7	Diurnal Average
WNNW27 NW26 NW29 WNNW26 NW30 NW32 NW27 WNNW24 WNNW23 WNNW21 W20 SW22 WNNW23 WNNW21 WNNW20 SSW19 SSW23 SSW24 SSW22 SSW23 SW26 WNNW26 WNNW26 WNNW24	Diurnal Maximum

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



Wood Buffalo Environmental Association
Hourly Averages

Wind Speed (WS) - km/h
Christina Lake - December 2023





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Wind Speed (WS) - km/h
Christina Lake - December 2023

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	72	9.68	9.68
6 - 11	385	51.75	61.42
12 - 19	229	30.78	92.20
20 - 28	55	7.39	99.60
29 - 38	3	0.40	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed (WS) - km/h
Christina Lake - December 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	1	3	3	2	7	12	13	17	8	5	0	0	0	0	72
6 - 11	1	0	1	1	4	8	10	31	64	99	72	70	16	5	3	0	385
12 - 19	0	0	0	1	0	4	5	2	15	40	55	49	38	16	4	0	229
20 - 28	0	0	0	0	0	0	0	0	3	4	17	5	4	18	4	0	55
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	3
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	1	1	2	5	7	14	22	45	95	160	152	129	58	39	14	0	744

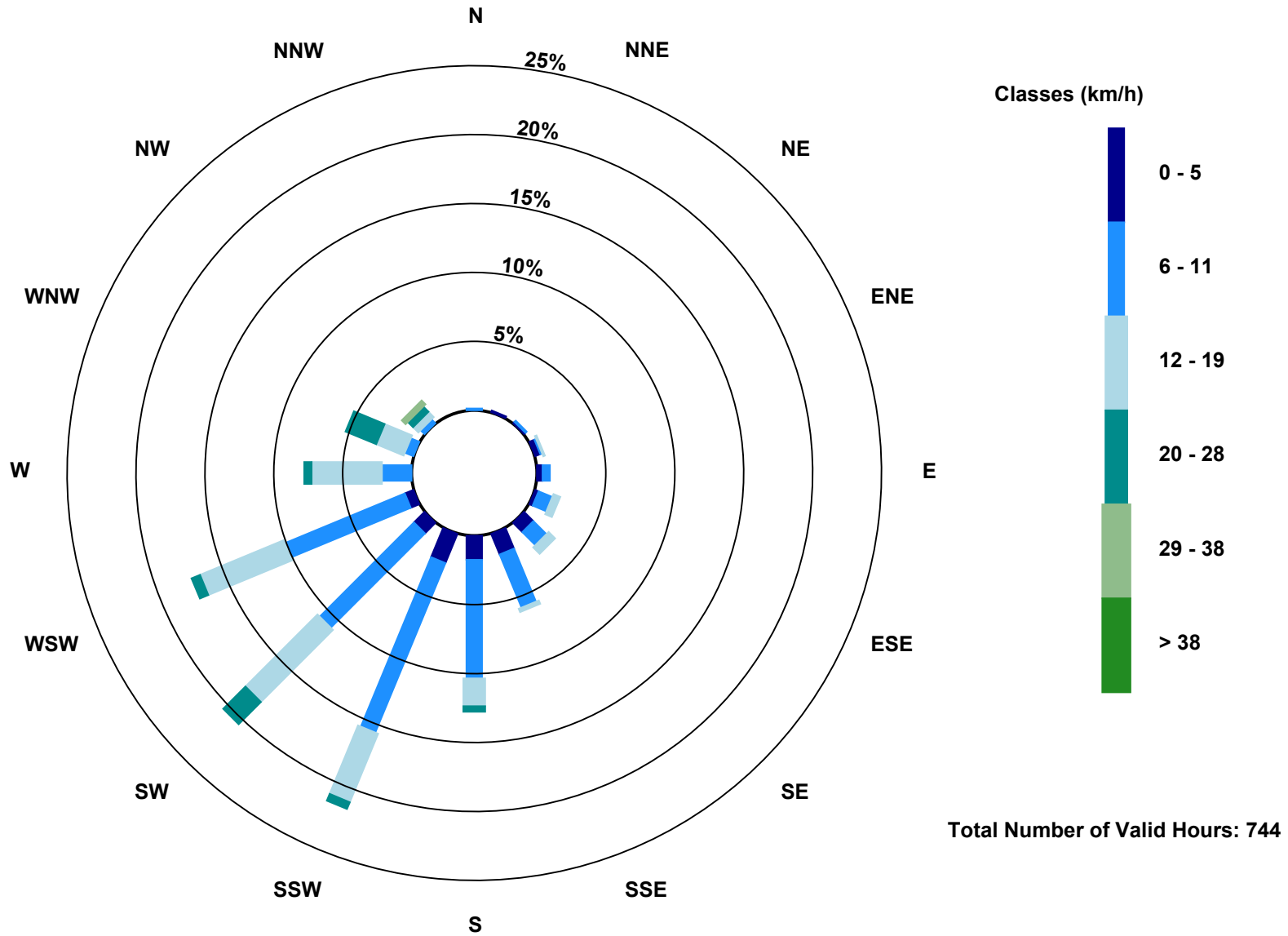
Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Dec 2023

Wind Speed (WS) - km/h
Christina Lake





Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Speed (WS) - km/h
Christina Lake - December 2023

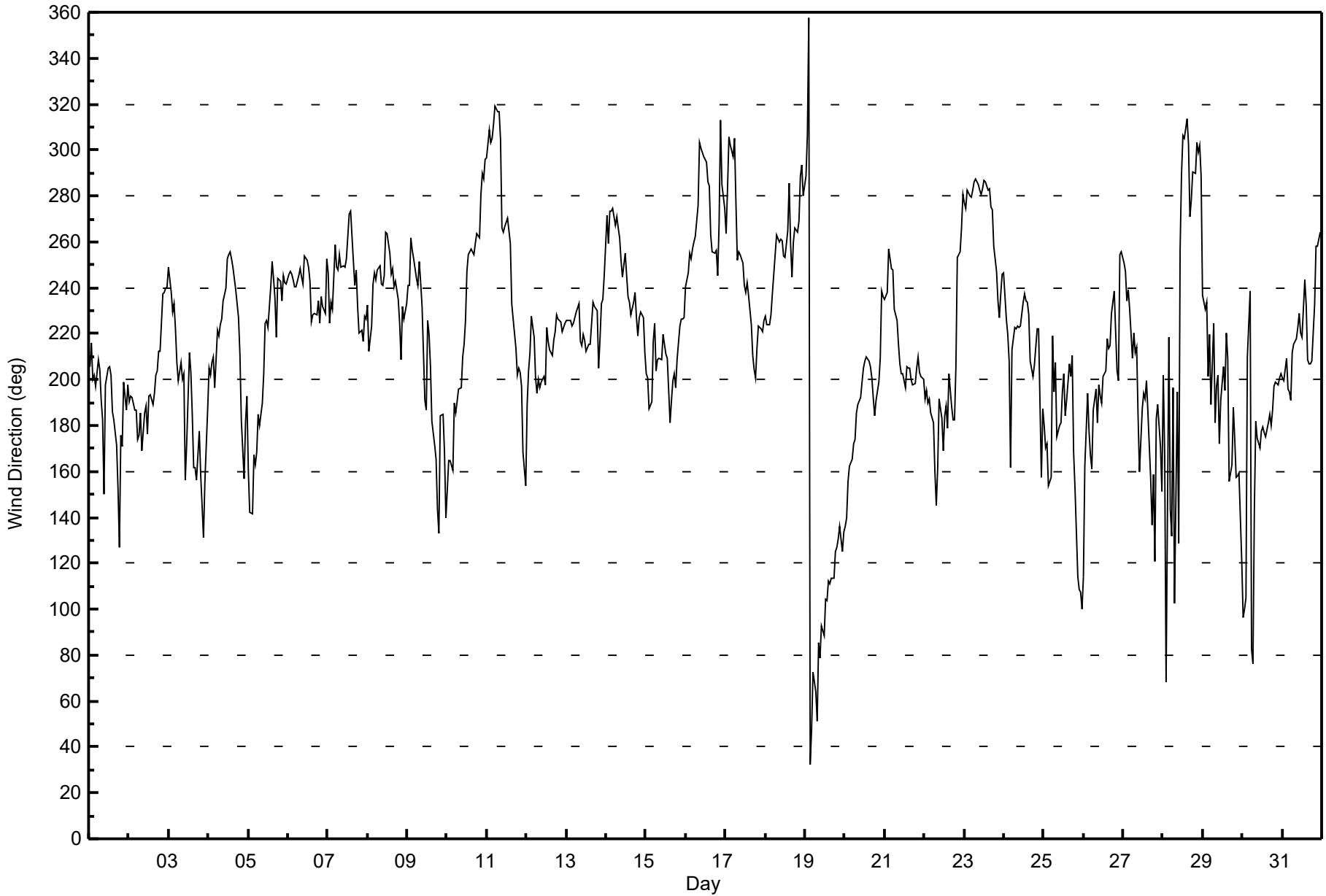
Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 8 km/h on Dec 11 02:00 Minimum Value: 1 km/h on Dec 29 18:00 Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 2 Median = 2 Q ₃ = 3 P ₉₀ = 4 P ₉₉ = 7																	Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0								
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Dec	1	1	1	1	3	2	1	1	1	1	4	3	3	2	2	2	1	2	1	2	3	2	2	2	4
2-Dec	2	3	2	2	2	2	1	2	2	2	2	2	2	2	2	1	1	1	2	2	2	2	2	3	3
3-Dec	2	1	1	2	1	1	1	1	1	1	1	2	2	2	1	1	1	2	3	1	1	1	2	3	
4-Dec	2	2	2	1	2	2	2	3	3	3	3	4	4	4	3	2	2	2	2	1	1	1	1	1	4
5-Dec	1	1	2	3	3	5	6	4	4	4	3	3	2	2	2	2	2	2	5	3	3	4	4	4	6
6-Dec	4	3	4	4	4	3	3	4	3	4	5	5	3	3	2	2	2	2	2	2	2	2	1	3	5
7-Dec	2	3	2	1	2	2	2	2	1	2	2	2	3	4	3	2	1	2	1	3	3	1	1	1	4
8-Dec	1	1	1	1	1	2	2	2	2	2	2	3	3	2	2	2	2	1	1	2	1	1	1	1	3
9-Dec	2	2	3	3	2	2	2	3	2	2	1	1	2	2	2	1	1	1	1	1	3	3	3	1	3
10-Dec	2	1	2	2	2	2	3	3	3	3	3	4	4	4	3	3	4	4	4	4	8	7	7	6	8
11-Dec	7	8	6	7	7	7	7	5	4	3	3	4	3	3	3	2	2	2	2	2	2	2	1	2	8
12-Dec	2	2	1	2	2	1	1	2	3	2	2	2	3	3	3	3	3	4	4	4	3	4	5	4	5
13-Dec	4	3	3	3	3	3	4	4	2	3	3	3	3	3	4	3	3	2	2	1	1	2	2	2	4
14-Dec	3	4	4	4	5	3	4	3	3	2	2	3	2	1	1	2	3	1	2	2	2	3	2	2	5
15-Dec	2	2	2	2	4	3	2	2	2	3	2	4	5	6	4	3	4	4	4	4	4	6	5	4	6
16-Dec	4	4	5	4	3	3	3	4	4	4	4	5	5	4	4	3	2	2	2	2	2	5	4	4	5
17-Dec	3	6	7	6	6	5	4	2	3	2	3	3	3	3	4	3	3	3	2	3	3	4	3	4	7
18-Dec	5	4	4	3	3	3	3	3	3	3	2	3	2	3	5	2	2	3	3	2	3	3	3	3	5
19-Dec	3	4	4	3	2	1	1	2	3	2	2	2	2	2	3	3	3	3	3	3	3	3	2	2	4
20-Dec	2	3	3	3	4	3	3	3	3	3	3	3	3	3	3	4	3	3	3	3	3	3	4	4	4
21-Dec	4	4	4	2	2	2	2	2	1	1	2	2	2	3	3	4	5	5	4	5	5	3	3	2	5
22-Dec	2	2	3	2	2	1	1	1	4	2	2	2	3	2	2	3	2	3	1	2	3	3	3	5	5
23-Dec	5	6	6	6	5	6	6	7	6	6	5	6	7	6	5	4	4	4	2	2	1	1	2	2	7
24-Dec	2	1	1	2	1	2	2	2	3	3	3	4	4	4	4	4	2	3	3	4	2	2	1	1	4
25-Dec	1	1	1	1	2	2	2	2	1	1	1	1	1	1	1	2	2	3	2	2	1	2	1	2	3
26-Dec	1	1	4	2	3	2	2	2	2	2	3	2	2	2	3	2	2	3	2	2	1	1	4	3	4
27-Dec	5	3	3	3	2	2	3	3	2	1	3	1	5	3	4	3	2	2	3	1	3	3	3	5	5
28-Dec	3	3	2	2	1	1	2	1	2	2	2	4	3	3	3	3	4	5	4	3	3	4	4	4	5
29-Dec	4	2	2	2	1	1	1	1	1	1	1	2	2	1	2	2	1	1	1	2	1	1	1	1	4
30-Dec	1	1	1	2	1	1	2	2	3	3	3	4	3	3	4	4	4	4	6	5	5	6	5	4	6
31-Dec	4	3	2	2	2	1	1	1	2	2	2	1	1	2	1	1	2	2	1	3	5	3	4	3	5
																	7 8 7 7 7 7 7 7 6 6 5 6 7 6 5 4 5 5 6 5 8 7 7 6								
Diurnal Maximum																									



Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
Christina Lake - December 2023

Direction of Maximum Speed: 319 deg on Dec 11 06:00																						Hours in Service: 744			
Direction of Maximum Daily Speed Average: 276.7 deg on Dec 23																						Hours of Data: 744			
Direction of Minimum Speed: 218 deg on Dec 28 04:00											Direction of Minimum Daily Speed Average: 4.1 deg on Dec 29											Hours of Missing Data: 0			
Monthly Average Direction: 227.6 deg																						Percent Operational Time: 100.0			
Day	Hourly Period Ending At (MST)																								Daily Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Dec	205	216	200	202	197	209	204	191	182	150	198	205	205	202	186	182	171	153	127	175	171	199	187	198	189.7
2-Dec	191	193	192	186	187	174	176	185	169	185	188	176	193	193	189	194	202	204	212	213	237	238	240	240	195.0
3-Dec	249	238	230	233	222	208	199	208	200	203	156	172	212	203	185	162	162	156	177	159	145	131	156	187	195.4
4-Dec	205	202	208	210	196	222	219	224	227	234	240	252	254	255	253	249	239	233	227	211	183	157	181	193	225.9
5-Dec	161	142	142	167	163	169	185	180	190	203	225	226	223	240	251	244	235	218	244	243	234	245	242	241	216.4
6-Dec	246	247	246	243	240	241	245	248	245	242	254	252	249	243	225	229	229	228	234	225	236	232	229	253	241.3
7-Dec	247	225	234	231	259	249	248	255	249	250	249	253	262	272	273	252	241	248	232	220	221	217	227	226	245.2
8-Dec	233	212	223	242	247	244	248	250	242	241	245	264	263	255	246	248	240	243	235	224	208	232	226	233	240.6
9-Dec	241	241	262	256	253	244	241	251	242	232	191	187	226	219	206	182	171	165	143	133	184	185	168	140	215.3
10-Dec	152	165	165	160	190	185	191	196	196	210	216	226	247	255	257	256	254	260	264	262	281	290	287	296	247.8
11-Dec	297	309	303	305	311	319	317	317	305	266	264	267	271	265	260	233	226	213	202	205	203	197	168	154	285.4
12-Dec	189	204	212	228	219	201	194	200	197	199	201	198	223	217	213	210	217	221	228	226	225	221	223	225	216.6
13-Dec	225	226	226	223	225	227	229	233	217	215	219	217	213	216	216	225	234	232	230	205	218	233	235	245	224.6
14-Dec	271	259	274	273	275	267	271	266	262	252	245	255	245	236	234	228	234	238	227	219	227	230	227	211	249.9
15-Dec	203	201	187	190	217	224	204	209	209	209	219	216	211	209	181	191	200	202	197	209	223	227	226	227	210.7
16-Dec	241	246	255	253	257	260	263	276	303	301	299	297	295	286	285	263	256	255	256	245	268	313	285	274	274.1
17-Dec	263	283	306	302	297	305	277	252	255	255	251	241	238	243	236	224	210	204	201	214	223	222	221	226	252.1
18-Dec	227	224	224	228	237	246	255	263	260	261	261	254	253	265	285	259	245	260	266	264	269	289	294	280	254.1
19-Dec	289	307	358	32	48	73	64	51	85	79	93	89	104	104	112	111	113	114	125	127	130	136	125	133	100.5
20-Dec	136	139	156	162	165	172	174	186	189	192	199	205	208	210	208	206	201	192	184	191	199	209	239	236	191.5
21-Dec	235	238	257	252	248	248	231	226	216	207	203	203	197	206	205	205	200	198	199	205	210	203	202	200	214.2
22-Dec	192	195	190	192	185	181	160	145	162	192	183	169	184	188	179	203	188	183	182	206	253	255	266	281	202.6
23-Dec	277	274	283	280	280	282	286	288	285	283	281	283	287	286	282	283	275	274	258	247	234	227	237	246	276.7
24-Dec	247	226	220	208	161	213	223	222	223	223	234	237	234	234	229	208	202	206	214	222	222	158	187	221.7	
25-Dec	180	170	172	154	157	219	195	208	175	180	181	195	202	184	191	207	202	211	168	153	114	108	108	100	175.6
26-Dec	114	162	194	177	167	161	187	196	181	198	193	190	201	204	218	213	215	229	239	221	204	199	254	256	202.1
27-Dec	251	247	234	239	230	209	220	212	214	184	160	188	194	192	199	186	157	136	159	121	183	189	171	152	201.8
28-Dec	202	167	68	218	144	132	197	103	194	129	256	289	306	305	314	302	271	278	291	290	303	299	302	289	288.0
29-Dec	237	231	234	202	220	189	225	181	197	202	172	191	206	195	221	209	156	163	188	174	158	158	159	121	193.4
30-Dec	96	100	105	210	239	83	76	144	182	175	170	178	179	177	175	181	185	180	187	197	199	198	201	202	183.2
31-Dec	201	200	209	196	195	191	212	215	218	223	229	220	218	243	233	209	207	207	208	232	258	258	261	264	222.9
231.5	232.5	240.6	235.9	235.2	234.8	234.9	233.3	227.4	226.0	227.5	229.9	232.6	231.1	227.1	219.7	214.3	214.2	215.1	214.9	222.3	227.7	229.1	230.7		
Diurnal Average																									
All monthly, daily, and diurnal averages have been calculated using vector methods																									





Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Direction (WD) - deg
Christina Lake - December 2023

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 89 deg on Dec 7 02:00 Minimum Value: 5 deg on Dec 25 05:00 Percentiles: P ₁ = 7 P ₁₀ = 10 Q ₁ = 12 Median = 14 Q ₃ = 17 P ₉₀ = 25 P ₉₉ = 65																	Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0								
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Dec	18	8	11	11	35	17	12	38	28	43	38	14	13	15	13	10	11	22	21	13	19	13	12	14	43
2-Dec	12	16	25	17	13	11	12	34	12	14	12	16	16	14	15	13	9	9	25	16	67	10	15	12	67
3-Dec	11	9	9	12	10	11	17	17	11	14	17	19	19	14	15	9	9	18	41	12	11	44	12	44	
4-Dec	14	13	17	10	24	10	10	11	12	10	12	15	16	17	15	13	12	8	9	7	33	16	11	13	33
5-Dec	15	16	36	28	14	53	46	13	16	17	20	14	16	17	15	17	12	14	21	12	10	13	10	11	53
6-Dec	12	13	13	11	10	11	11	12	13	12	15	15	15	13	11	10	11	10	9	10	11	9	9	29	29
7-Dec	10	89	13	7	32	11	13	14	10	10	11	13	17	21	20	14	10	16	12	50	25	6	10	10	89
8-Dec	9	7	18	9	10	9	12	10	8	8	11	19	18	17	12	15	11	14	13	23	14	8	7	7	23
9-Dec	13	15	17	16	14	12	13	15	14	21	17	13	20	14	15	19	11	13	20	12	14	29	25	13	29
10-Dec	12	15	17	22	15	18	23	17	16	16	16	12	15	16	15	15	16	17	17	17	16	15	14	14	23
11-Dec	13	14	14	15	13	11	12	12	16	18	17	17	16	18	18	18	10	11	11	15	16	28	16	23	28
12-Dec	21	36	18	12	11	8	7	12	22	24	12	18	12	11	12	11	12	12	10	10	11	11	11	13	36
13-Dec	10	10	10	10	10	10	13	14	12	12	13	14	13	13	16	11	14	12	20	35	23	18	21	20	35
14-Dec	18	16	17	15	16	17	17	17	16	15	16	17	17	12	9	8	8	13	15	10	10	10	12	11	18
15-Dec	11	13	11	16	11	11	13	11	14	12	13	13	15	14	20	16	14	14	12	13	12	12	11	11	20
16-Dec	14	13	17	16	16	16	16	18	18	17	17	15	15	17	18	18	15	15	15	11	22	19	17	18	22
17-Dec	18	20	14	13	13	17	18	17	16	14	14	13	11	12	11	11	11	12	14	13	12	11	11	10	20
18-Dec	11	11	12	12	14	16	16	17	16	15	15	15	15	20	15	19	12	17	17	16	17	21	25	19	25
19-Dec	26	33	29	60	24	26	9	11	23	11	12	16	15	14	14	12	12	12	12	12	13	13	12	14	60
20-Dec	12	12	15	13	13	12	12	13	13	13	13	15	13	16	16	16	14	15	14	15	15	20	21	13	21
21-Dec	11	12	16	14	10	10	10	10	8	7	12	10	14	13	11	12	11	11	11	11	12	11	13	11	16
22-Dec	11	15	13	11	11	10	16	20	72	24	24	14	16	29	14	21	23	24	13	23	20	15	18	16	72
23-Dec	15	17	14	15	15	15	14	14	16	16	15	14	15	15	15	15	16	15	12	8	9	15	12	17	
24-Dec	11	10	10	17	12	12	10	11	10	10	11	12	11	12	13	12	18	14	12	14	15	27	29	12	29
25-Dec	14	24	28	10	5	50	14	19	12	13	11	14	11	12	10	10	11	12	28	18	20	18	37	11	50
26-Dec	8	17	25	16	16	13	17	22	16	19	14	12	14	14	19	14	10	11	12	25	16	18	25	17	25
27-Dec	17	13	10	11	17	9	12	10	9	17	35	17	13	11	11	13	16	12	29	41	29	15	20	57	57
28-Dec	28	57	37	87	65	60	70	66	41	54	64	48	23	20	16	15	17	16	16	18	16	17	34	45	87
29-Dec	59	19	27	30	32	24	14	21	20	51	55	68	17	15	13	15	9	13	17	66	28	10	8	16	68
30-Dec	17	17	17	48	19	59	41	29	25	25	16	13	15	12	13	13	11	12	15	13	13	15	16	12	59
31-Dec	12	12	13	13	10	18	12	11	11	12	13	16	27	24	17	10	6	9	9	14	18	17	18	17	27
																	59 89 37 87 65 60 70 66 72 54 64 68 27 29 20 21 23 24 29 66 67 29 44 57 Diurnal Maximum								



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

AMS27
JACKFISH 2/3
DECEMBER 2023

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

January 31, 2024

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - JACKFISH 2/3 (AMS27)
 DECEMBER 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	695	33	49	97.85	15.1	0	2.1	0
H2S (ppb) Average	691	35	53	97.58	0.8	0	0.4	0
NO2 (ppb) Average	692	36	52	97.85	10.1	0	4.7	-
NO (ppb) Average	692	36	52	97.85	2.3	-	0.5	-
NOX (ppb) Average	692	36	52	97.85	10.2	-	5.1	-
Temperature 2 m (C) Average	728	0	16	97.85	5.2	-	3.2	-
Relative Humidity (%) Average	728	0	16	97.85	95.1	-	89.2	-
Wind Speed 10 m (km/h) Average	728	0	16	97.85	17	-	12	-
Wind Direction 10 m (deg) Average	728	0	16	97.85	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - JACKFISH 2/3 (AMS27)
 DECEMBER 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	695	0.77	1.4	-	0	0.1	0.1	0.4	0.8	1.7	15.1
H2S (ppb) Average	691	0.19	0.1	-	0	0.1	0.1	0.2	0.3	0.4	0.8
NO2 (ppb) Average	692	2.18	1.8	-	0	0.2	0.8	1.8	3.1	4.6	10.1
NO (ppb) Average	692	0.21	0.3	-	0	0	0	0.1	0.3	0.5	2.3
NOX (ppb) Average	692	2.39	1.9	-	0	0.3	0.9	2	3.4	5	10.2
Temperature 2 m (C) Average	728	-4.45	4.2	-	-14.6	-10.2	-7.9	-4.1	-1.2	0.8	5.2
Relative Humidity (%) Average	728	71.75	14.2	-	27.2	52.9	62.6	73.9	83.8	87.7	95.1
Wind Speed 10 m (km/h) Average	728	9.4	3	-	2	6	8	9	11	13	17
Wind Direction 10 m (deg) Average	728	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - JACKFISH 2/3 (AMS27)
DECEMBER 2023

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
H2S	25 Dec 2023 15:00	25 Dec 2023 16:00	2	Unstable Operation - excessive baseline drift
ALL PARAMETERS	17 Dec 2023 18:00	18 Dec 2023 06:00	13	DAS Failure - data not recorded
ALL PARAMETERS	18 Dec 2023 16:00	18 Dec 2023 16:00	1	DAS Failure - data not recorded
ALL PARAMETERS	25 Dec 2023 21:00	25 Dec 2023 21:00	1	DAS Failure - data not recorded
ALL PARAMETERS	26 Dec 2023 09:00	26 Dec 2023 09:00	1	DAS Failure - data not recorded



Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO₂) - ppb

Jackfish 2/3 - December 2023

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 15.1 ppb on Dec 11 02:00	Maximum Daily Average: 2.1 ppb on Dec 11		Hours of Data:	695
Minimum Value: 0.0 ppb on Dec 1 06:00	Minimum Daily Average: 0.1 ppb on Dec 14		Hours of Missing Data:	49
Maximum Diurnal Average: 1.4 ppb at hour 2	Minimum Diurnal Average: 0.4 ppb at hour 10		Hours of Calibration:	33
Monthly Average: 0.77 ppb	Percentiles: P ₁ = 0.0 P ₁₀ = 0.1 Q ₁ = 0.1 Median = 0.4 Q ₃ = 0.8 P ₉₀ = 1.7 P ₉₉ = 6.9		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-Dec	0.2	0.2	0.1	0.1	Z	0.0	0.0	0.0	0.0	0.0	0.5	1.2	0.4	0.2	0.2	0.6	0.2	0.1	0.1	0.4	0.5	1.0	0.5	0.6	0.3	1.2
2-Dec	0.5	0.6	0.3	0.1	0.2	Z	0.4	0.3	0.3	0.5	0.7	0.7	1.3	1.4	1.2	1.0	0.4	0.3	0.2	0.5	1.5	1.3	0.6	0.5	0.6	1.5
3-Dec	Z	0.2	0.2	0.2	0.2	0.3	0.2	0.1	0.0	0.1	0.1	0.2	0.2	0.2	0.1	0.4	0.1	0.2	0.2	0.5	0.7	0.6	0.5	0.6	0.3	0.7
4-Dec	0.5	Z	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.2	0.4	0.8	0.3	0.2	0.2	0.4	0.2	0.2	0.2	0.3	0.3	0.2	0.2	0.2	0.2	0.8
5-Dec	0.4	0.4	Z	0.3	0.8	1.2	0.9	0.7	0.7	1.7	0.9	0.4	0.5	1.2	1.2	0.9	0.7	0.7	1.4	1.3	0.6	0.9	0.7	0.7	0.8	1.7
6-Dec	0.8	0.8	0.7	Z	0.5	0.6	0.6	0.6	0.5	0.8	1.1	0.2	0.2	0.4	0.4	0.3	0.2	0.2	0.2	0.3	0.4	0.6	0.5	0.4	0.5	1.1
7-Dec	0.3	1.0	0.3	0.3	Z	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	0.0	0.0	0.0	0.1	1.0
8-Dec	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	0.2	0.2	0.1	0.3	0.4	0.7	0.2	0.6	0.4	0.5	0.2	0.7
9-Dec	Z	0.2	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.3	0.6	1.0	0.6	0.2	0.1	0.2	0.1	0.2	0.4	0.1	0.2	1.1	0.3	0.4	0.3	1.1
10-Dec	0.7	Z	1.0	0.7	1.3	2.1	0.6	0.4	0.3	1.1	0.8	0.6	0.5	0.6	0.2	0.2	0.3	0.2	0.2	0.2	0.2	7.6	5.6	13.6	1.7	13.6
11-Dec	14.2	15.1	Z	5.6	1.7	0.4	0.2	0.2	6.1	0.9	0.2	0.1	0.1	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.3	0.8	1.1	2.1	15.1
12-Dec	0.8	0.4	0.4	Z	0.3	0.3	0.2	0.1	0.1	0.1	C	C	C	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.8	1.5	0.3	1.5
13-Dec	1.3	1.4	1.1	0.9	Z	0.7	0.6	0.5	0.4	0.5	0.7	1.0	1.8	1.9	2.2	2.5	2.4	2.3	2.2	2.2	2.2	1.7	0.8	0.4	1.4	2.5
14-Dec	0.2	0.1	0.3	0.2	0.2	Z	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.3	0.0	0.2	0.4	0.4	0.1	0.0	0.0	0.1	0.0	0.1	0.1	0.4
15-Dec	Z	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.3	0.2	0.1	0.0	0.0	0.5	0.8	0.1	0.1	0.0	0.1	0.2	0.3	0.3	0.3	0.2	0.8
16-Dec	0.3	Z	0.1	0.0	0.0	0.0	0.0	0.0	7.5	1.4	6.9	6.6	7.0	5.0	0.7	0.0	0.0	0.1	0.0	0.0	3.3	0.7	5.3	0.7	2.0	7.5
17-Dec	0.2	1.5	Z	2.5	5.0	2.6	4.9	0.2	0.2	0.1	0.2	0.4	0.1	0.3	0.1	0.1	0.1	DF	DF	DF	DF	DF	DF	DF	--	5.0
18-Dec	DF	DF	DF	DF	DF	DF	0.6	0.3	0.2	0.2	0.2	0.2	0.2	5.8	DF	0.2	0.2	0.2	0.4	1.2	5.5	1.7	1.3	--	5.8	
19-Dec	0.9	0.5	0.4	0.6	0.4	Z	0.5	0.2	0.1	0.1	0.5	0.4	0.3	0.1	0.2	0.3	0.2	0.1	0.2	0.2	0.1	0.0	0.1	0.0	0.3	0.9
20-Dec	Z	0.0	0.0	0.1	0.1	0.1	0.0	0.1	0.2	0.5	0.1	0.0	0.1	0.1	0.1	0.0	0.1	0.1	0.2	0.1	0.2	0.4	1.0	0.9	0.2	1.0
21-Dec	0.7	Z	0.3	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	1.0	0.4	0.9	0.4	0.3	0.3	0.3	0.3	0.3	1.0
22-Dec	0.9	1.6	Z	0.5	1.0	0.6	0.5	1.3	0.2	0.3	1.0	1.0	0.4	1.4	2.2	1.2	0.5	0.4	0.3	1.0	0.8	0.4	0.5	1.7	0.9	2.2
23-Dec	0.1	0.1	0.1	Z	0.0	0.2	2.0	2.9	2.1	0.1	0.4	1.8	2.3	1.1	0.1	0.5	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.6	2.9
24-Dec	0.1	0.3	0.2	0.3	Z	0.1	0.0	0.1	0.1	0.1	0.2	0.3	0.2	0.3	0.2	0.3	0.6	0.7	1.2	1.7	2.2	2.9	3.3	2.8	0.8	3.3
25-Dec	2.0	2.3	4.3	6.3	7.8	Z	2.7	1.2	0.8	0.7	0.6	0.6	0.6	0.5	0.4	0.3	0.3	0.4	0.4	0.7	DF	2.3	2.8	3.3	1.9	7.8
26-Dec	Z	2.2	1.9	1.4	1.0	0.8	0.9	1.4	DF	0.5	2.7	2.4	0.4	0.3	0.4	1.2	1.0	0.7	0.6	0.4	0.4	0.4	0.5	0.5	1.0	2.7
27-Dec	0.5	Z	0.0	0.0	0.1	0.1	0.0	0.1	0.1	0.0	1.5	2.9	1.4	1.4	1.9	2.1	0.6	0.6	1.1	1.2	0.9	0.7	0.7	0.8	0.8	2.9
28-Dec	0.7	1.0	Z	0.7	0.4	0.7	0.6	0.3	0.2	0.2	0.6	2.2	1.1	1.5	1.0	0.9	5.1	3.2	5.6	2.7	1.4	1.8	1.9	2.3	1.6	5.6
29-Dec	1.5	1.3	1.5	Z	2.7	0.7	0.5	0.7	1.1	1.2	1.1	0.9	0.7	0.8	0.5	0.6	0.5	0.4	0.4	0.4	0.4	0.5	0.5	0.6	0.8	2.7
30-Dec	1.4	3.5	3.8	1.0	Z	1.3	1.4	0.5	0.5	0.5	0.6	0.7	0.6	0.4	0.4	0.4	0.6	0.6	0.5	1.2	1.2	1.0	0.8	0.4	1.0	3.8
31-Dec	0.4	0.5	0.4	0.3	0.3	Z	0.4	0.4	0.4	0.3	0.4	0.3	0.5	0.8	0.7	0.6	0.4	0.4	0.2	0.3	0.4	0.2	0.2	0.1	0.4	0.8

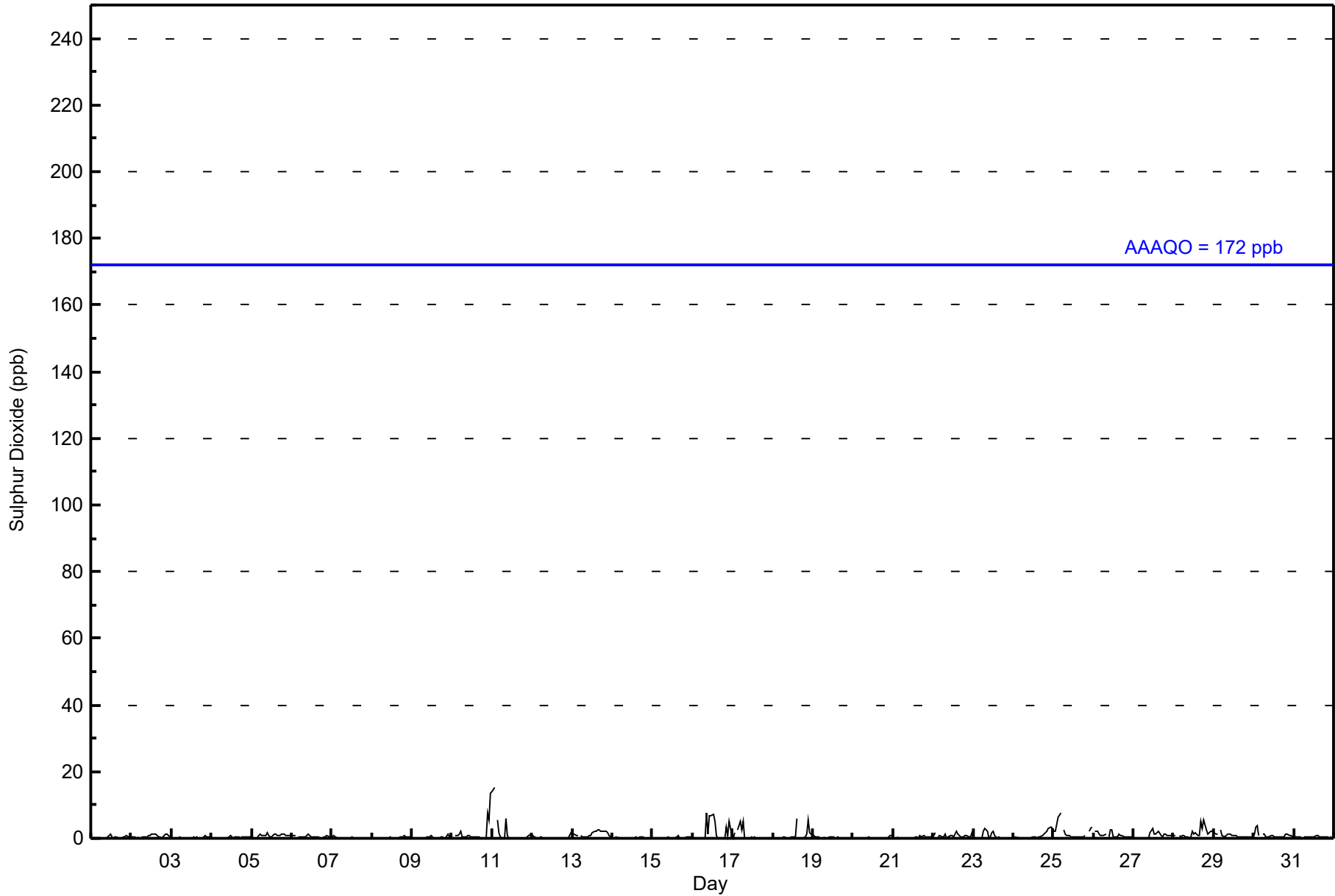
1.2	1.4	0.7	0.9	1.0	0.5	0.6	0.4	0.8	0.4	0.8	0.9	0.8	0.7	0.7	0.6	0.5	0.5	0.6	0.6	0.7	1.1	1.1	1.2	Diurnal Average	
14.2	15.1	4.3	6.3	7.8	2.6	4.9	2.9	7.5	1.7	6.9	6.6	7.0	5.0	5.8	2.5	5.1	3.2	5.6	2.7	3.3	7.6	5.6	13.6	Diurnal Maximum	

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



Wood Buffalo Environmental Association
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Jackfish 2/3 - December 2023





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Jackfish 2/3 - December 2023

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	692	99.57	99.57
11 - 20	3	0.43	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: 695

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Jackfish 2/3 - December 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	1	1	2	3	7	12	20	43	92	151	139	119	54	36	12	0	692
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	0	0	0
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	1	1	2	3	7	12	20	43	92	151	139	119	54	38	13	0	695

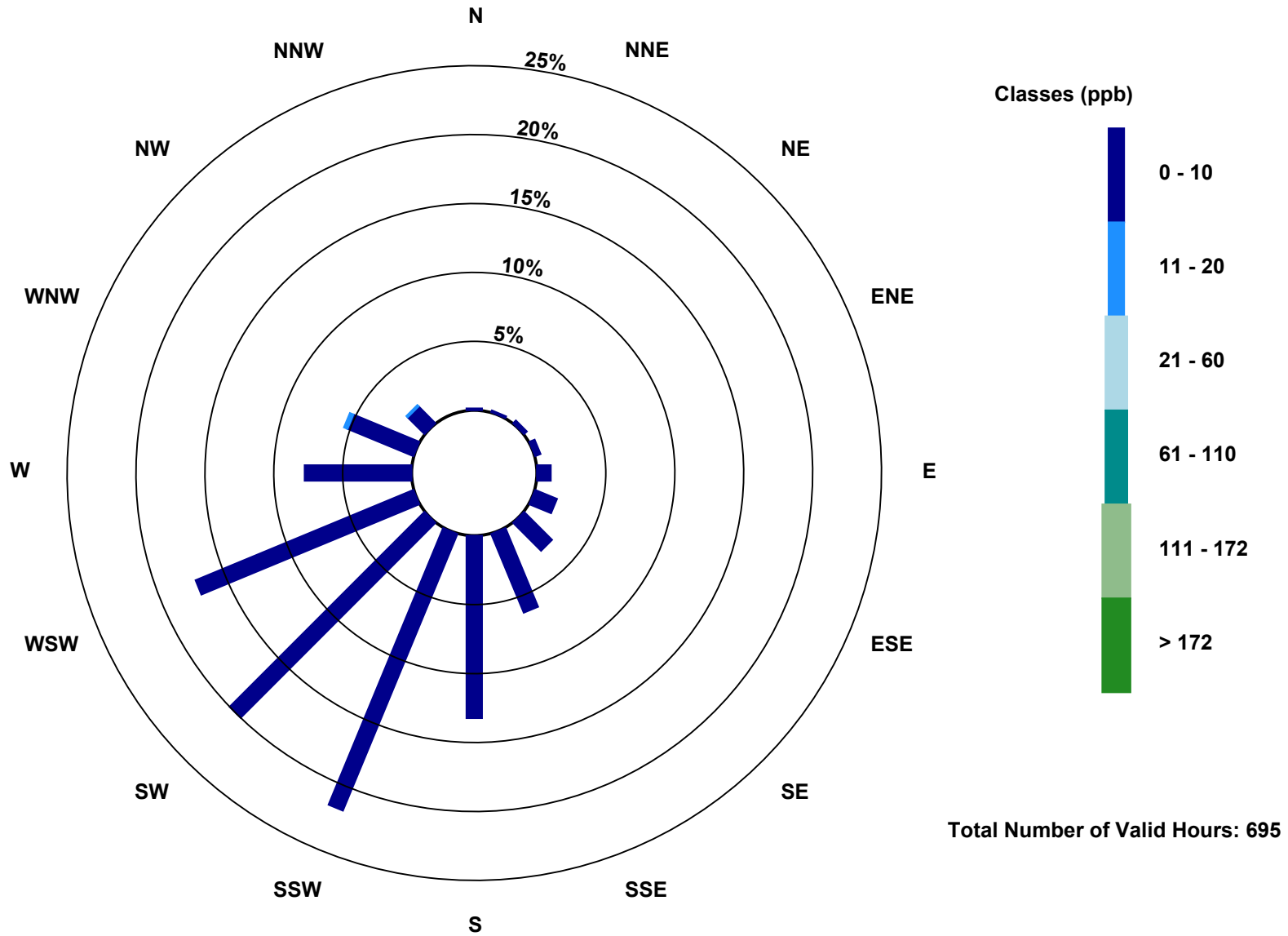
Total Number of Valid Hours: 695

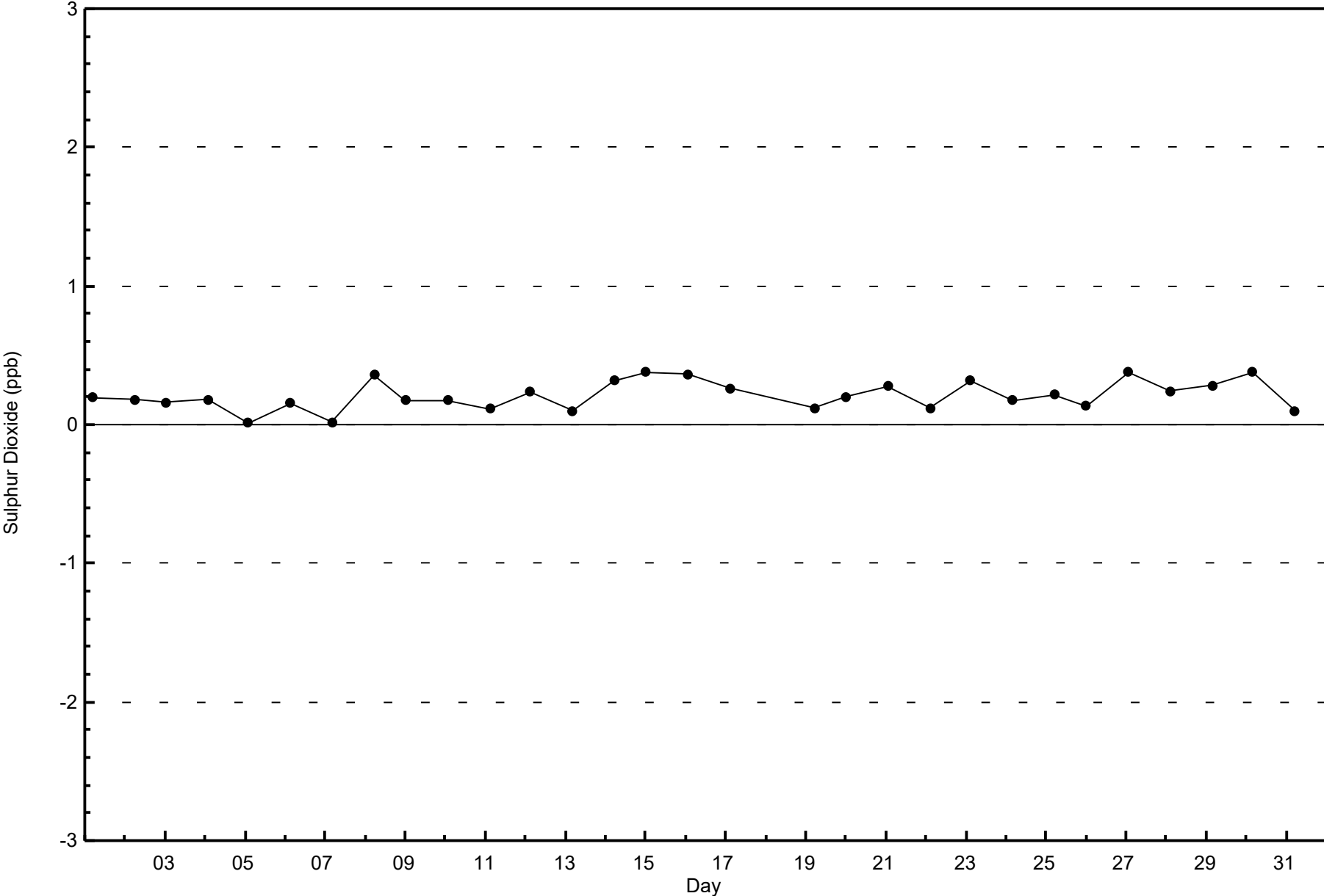
Total Number of Hours: 744

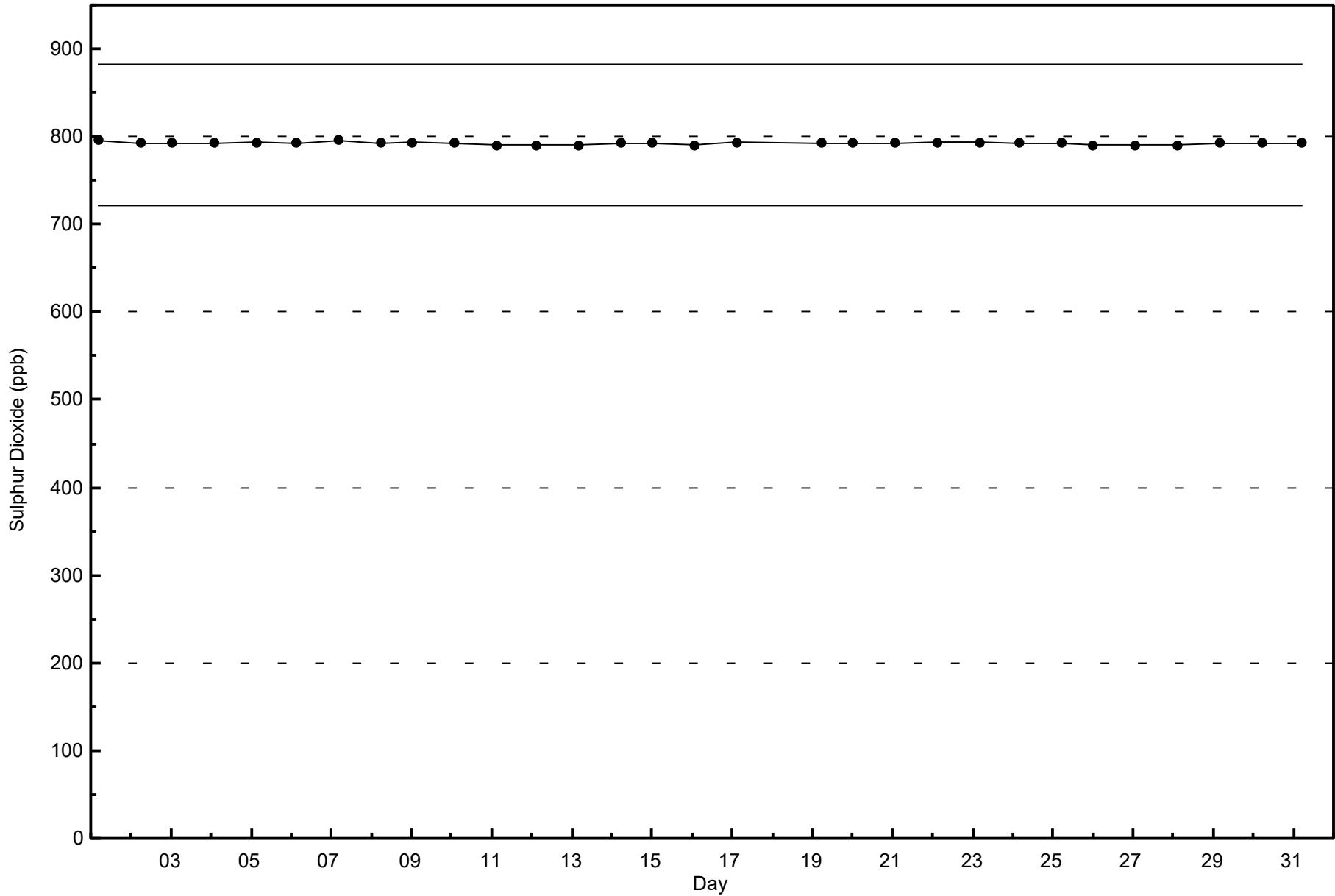


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Sulphur Dioxide (SO₂) - ppb
Jackfish 2/3

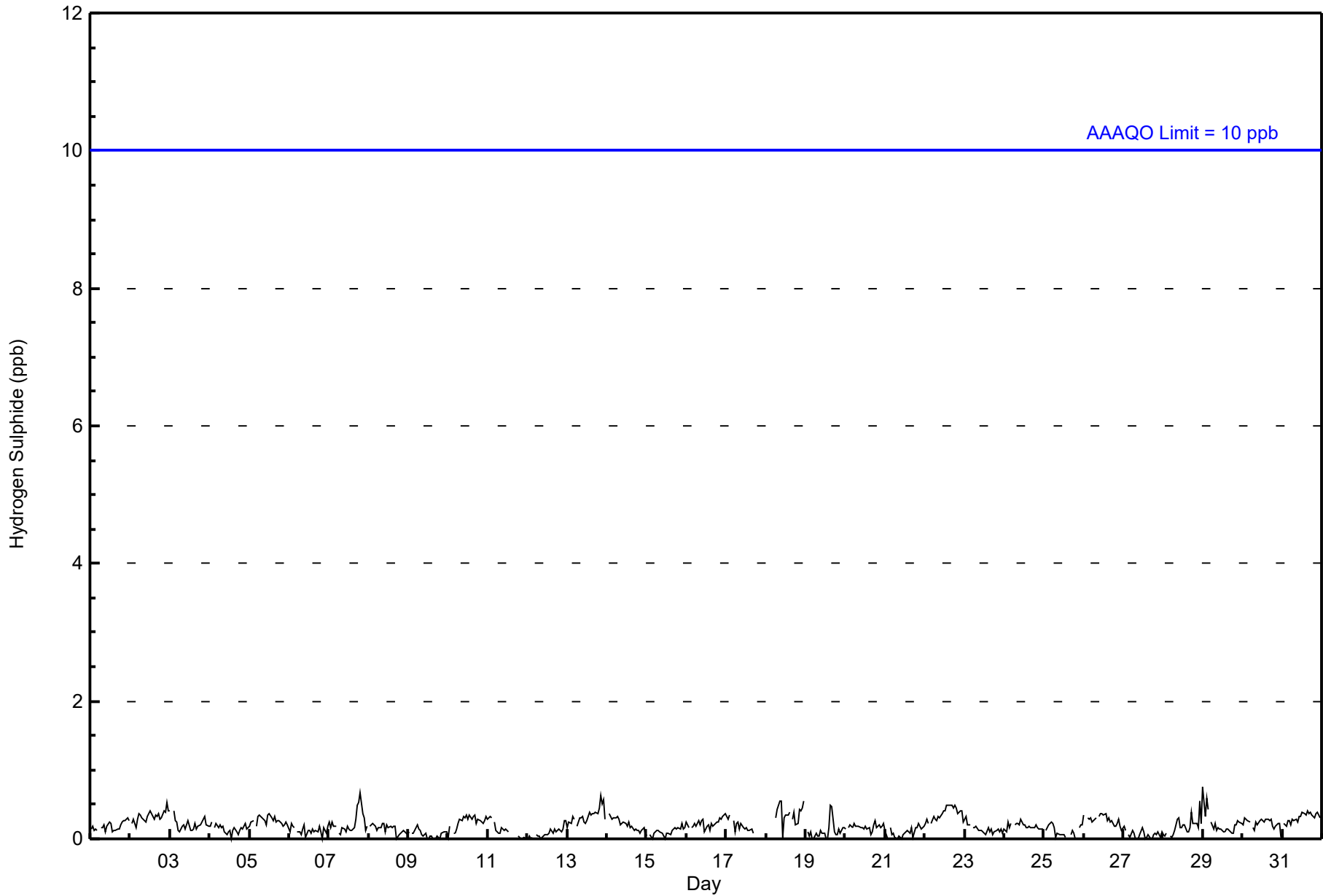








Number of Exceedences (AAAQO):		1-hr: 0	24-hr: 0																		Hours in Service:	744																											
Maximum Value: 0.8 ppb on Dec 29 01:00		Maximum Daily Average: 0.4 ppb on Dec 22																	Hours of Data:	691																													
Minimum Value: 0.0 ppb on Dec 4 14:00		Minimum Daily Average: 0.1 ppb on Dec 27																	Hours of Missing Data:	53																													
Maximum Diurnal Average: 0.2 ppb at hour 23		Minimum Diurnal Average: 0.2 ppb at hour 11																	Hours of Calibration:	35																													
Monthly Average: 0.19 ppb		Percentiles: P ₁ = 0.0 P ₁₀ = 0.1 Q ₁ = 0.1 Median = 0.2 Q ₃ = 0.3 P ₉₀ = 0.4 P ₉₉ = 0.5																	Percent Operational Time:	97.6																													
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-Dec	0.1	0.2	0.1	0.1	0.1	Z	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	0.3	0.3	0.3	0.3	0.2	0.3																							
2-Dec	Z	0.2	0.3	0.2	0.3	0.4	0.4	0.3	0.3	0.2	0.3	0.4	0.4	0.4	0.3	0.3	0.3	0.4	0.3	0.3	0.4	0.4	0.5	0.4	0.3	0.5																							
3-Dec	0.4	Z	0.4	0.3	0.2	0.1	0.1	0.2	0.2	0.1	0.2	0.3	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.2	0.2	0.2	0.4																							
4-Dec	0.2	0.2	Z	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.0	0.1	0.2	0.1	0.1	0.1	0.2	0.2	0.2	0.1	0.2	0.2	0.2																							
5-Dec	0.2	0.2	0.3	Z	0.2	0.3	0.3	0.3	0.3	0.3	0.2	0.3	0.4	0.3	0.3	0.3	0.2	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.4																							
6-Dec	0.1	0.2	0.2	0.2	Z	0.1	0.1	0.1	0.1	0.2	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.0	0.2	0.1	0.2	0.1	0.2																							
7-Dec	0.3	0.2	0.2	0.2	0.2	Z	0.1	0.1	0.2	0.2	0.1	0.2	0.1	0.1	0.1	0.2	0.3	0.5	0.5	0.7	0.4	0.3	0.1	0.2	0.2	0.7																							
8-Dec	Z	0.2	0.2	0.2	0.2	0.1	0.2	0.2	0.2	0.2	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2																							
9-Dec	0.1	Z	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.2																							
10-Dec	0.0	0.2	Z	0.1	0.1	0.1	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.2	0.3	0.3	0.2	0.2	0.3	0.3	0.2	0.4																							
11-Dec	0.3	0.3	0.3	Z	0.2	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	C	C	C	C	C	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3																							
12-Dec	0.0	0.0	0.0	0.0	Z	0.1	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	0.3	0.3	0.1	0.3																							
13-Dec	0.2	0.2	0.2	0.3	0.3	Z	0.2	0.3	0.3	0.3	0.2	0.2	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.6	0.5	0.6	0.3	0.3	0.6																							
14-Dec	Z	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.0	0.2	0.4																							
15-Dec	0.1	Z	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.2	0.1	0.2	0.2	0.2	0.1	0.2																							
16-Dec	0.3	0.2	Z	0.2	0.2	0.2	0.2	0.3	0.2	0.3	0.3	0.1	0.2	0.2	0.1	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.4	0.2	0.4																							
17-Dec	0.3	0.3	0.3	Z	0.3	0.1	0.2	0.3	0.1	0.2	0.2	0.1	0.2	0.1	0.1	0.1	0.1	DF	DF	DF	DF	DF	DF	DF	DF	0.3																							
18-Dec	DF	DF	DF	DF	DF	DF	0.3	0.4	0.5	0.6	0.0	0.3	0.4	0.3	0.4	DF	0.3	0.4	0.2	0.2	0.4	0.4	0.4	0.6	--	0.6																							
19-Dec	Z	0.1	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.1	0.1	0.1	0.0	0.0	0.2	0.5	0.5	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.5																							
20-Dec	0.2	Z	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.2	0.1	0.2	0.1	0.1	0.2	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.3																							
21-Dec	0.1	0.0	Z	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.2	0.0	0.2	0.2	0.2	0.2	0.1	0.2	0.1	0.2																							
22-Dec	0.2	0.3	0.2	Z	0.2	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.4	0.5	0.5	0.4	0.4	0.4	0.2	0.4	0.5																							
23-Dec	0.3	0.3	0.2	0.2	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	0.1	0.1	0.3																							
24-Dec	0.1	0.1	0.2	0.2	0.2	Z	0.2	0.2	0.2	0.2	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.3																							
25-Dec	Z	0.1	0.2	0.2	0.2	0.2	0.2	0.0	0.1	0.1	0.1	0.1	0.1	0.0	UO	UO	0.1	0.1	0.1	0.0	DF	0.2	0.2	0.2	0.1	0.2																							
26-Dec	0.3	Z	0.3	0.3	0.3	0.2	0.3	0.3	DF	0.3	0.4	0.4	0.3	0.4	0.3	0.3	0.2	0.3	0.2	0.2	0.2	0.3	0.2	0.1	0.3	0.4																							
27-Dec	0.2	0.1	Z	0.1	0.0	0.1	0.1	0.0	0.0	0.0	0.1	0.2	0.1	0.0	0.0	0.1	0.0	0.0	0.1	0.1	0.1	0.1	0.0	0.1	0.1	0.2																							
28-Dec	0.1	0.0	0.1	Z	0.0	0.0	0.1	0.1	0.3	0.3	0.2	0.2	0.2	0.2	0.1	0.1	0.2	0.4	0.2	0.2	0.2	0.2	0.5	0.2	0.2	0.5																							
29-Dec	0.8	0.3	0.6	0.4	Z	0.3	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	0.2	0.2	0.3	0.2	0.2	0.2	0.8																							
30-Dec	0.2	0.3	0.3	0.3	0.2	Z	0.2	0.1	0.3	0.2	0.3	0.3	0.3	0.2	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.0	0.2	0.3																							
31-Dec	Z	0.2	0.2	0.3	0.3	0.2	0.3	0.3	0.3	0.2	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.4	0.4	0.3	0.3	0.3	0.4																							
																								0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	Diurnal Average	
																								0.8	0.4	0.6	0.4	0.3	0.4	0.4	0.4	0.5	0.6	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.7	0.6	0.5	0.6	0.6	Diurnal Maximum
Z - zerospan																								C - Calibration						DF - DAS Failure						UO - Unstable Operation													
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 10 ppb 24-hr 3 ppb																																																	





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Hydrogen Sulphide (H₂S) - ppb
Jackfish 2/3 - December 2023**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	691	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: 691

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Hydrogen Sulphide (H₂S) - ppb
Jackfish 2/3 - December 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	0	1	2	6	5	3	6	2	75	166	167	135	63	44	15	1	691
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	0	1	2	6	5	3	6	2	75	166	167	135	63	44	15	1	691

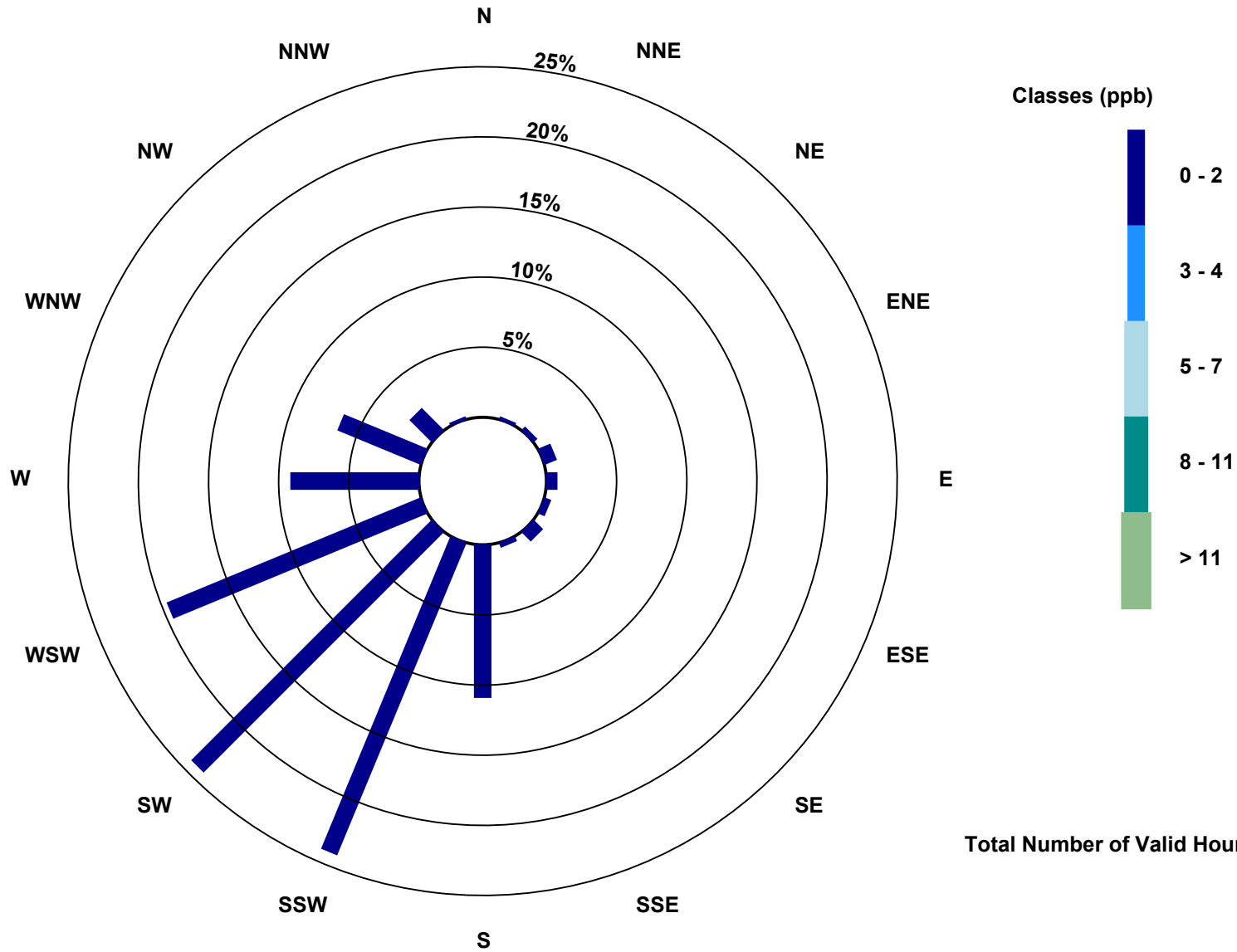
Total Number of Valid Hours: 691

Total Number of Hours: 744

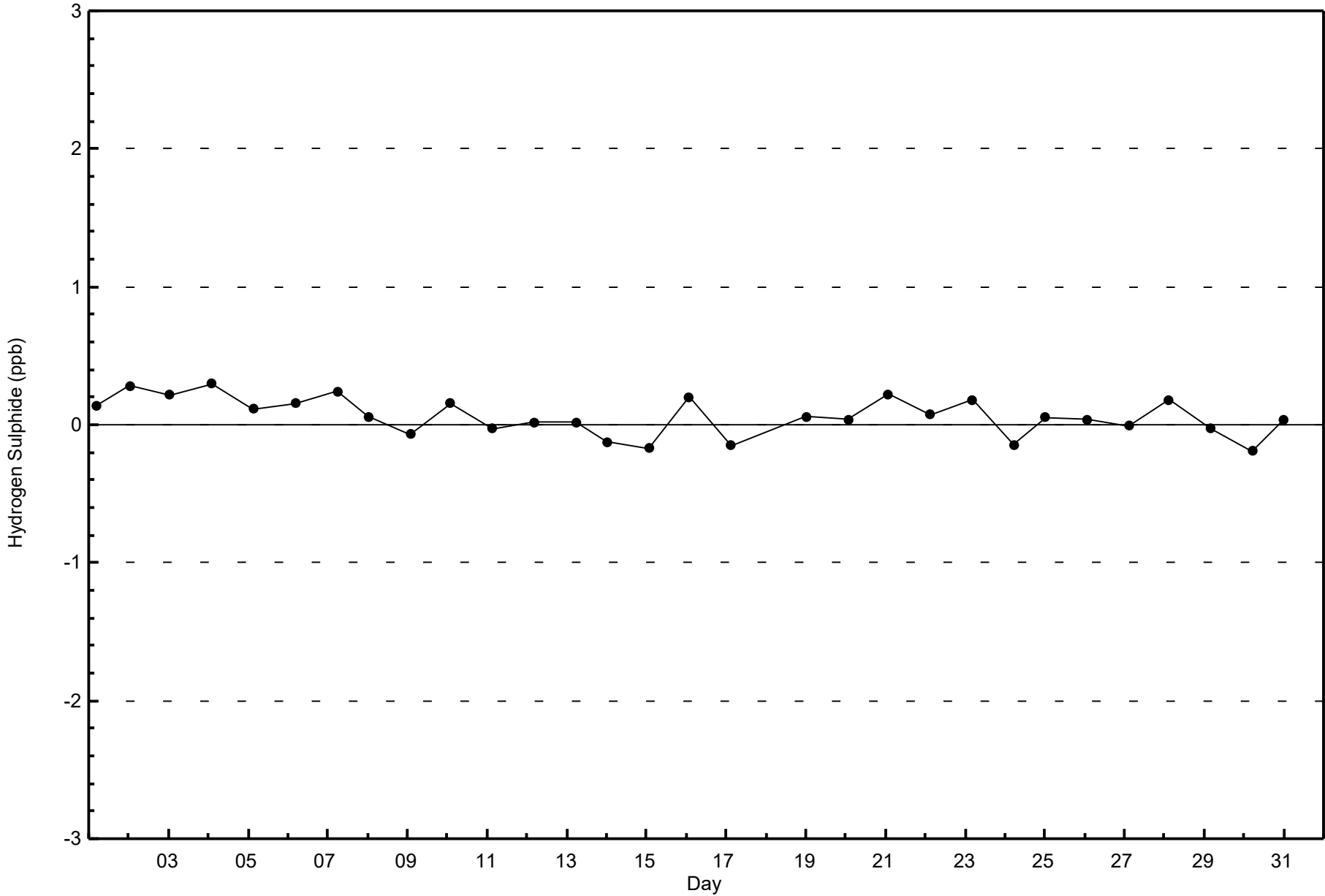


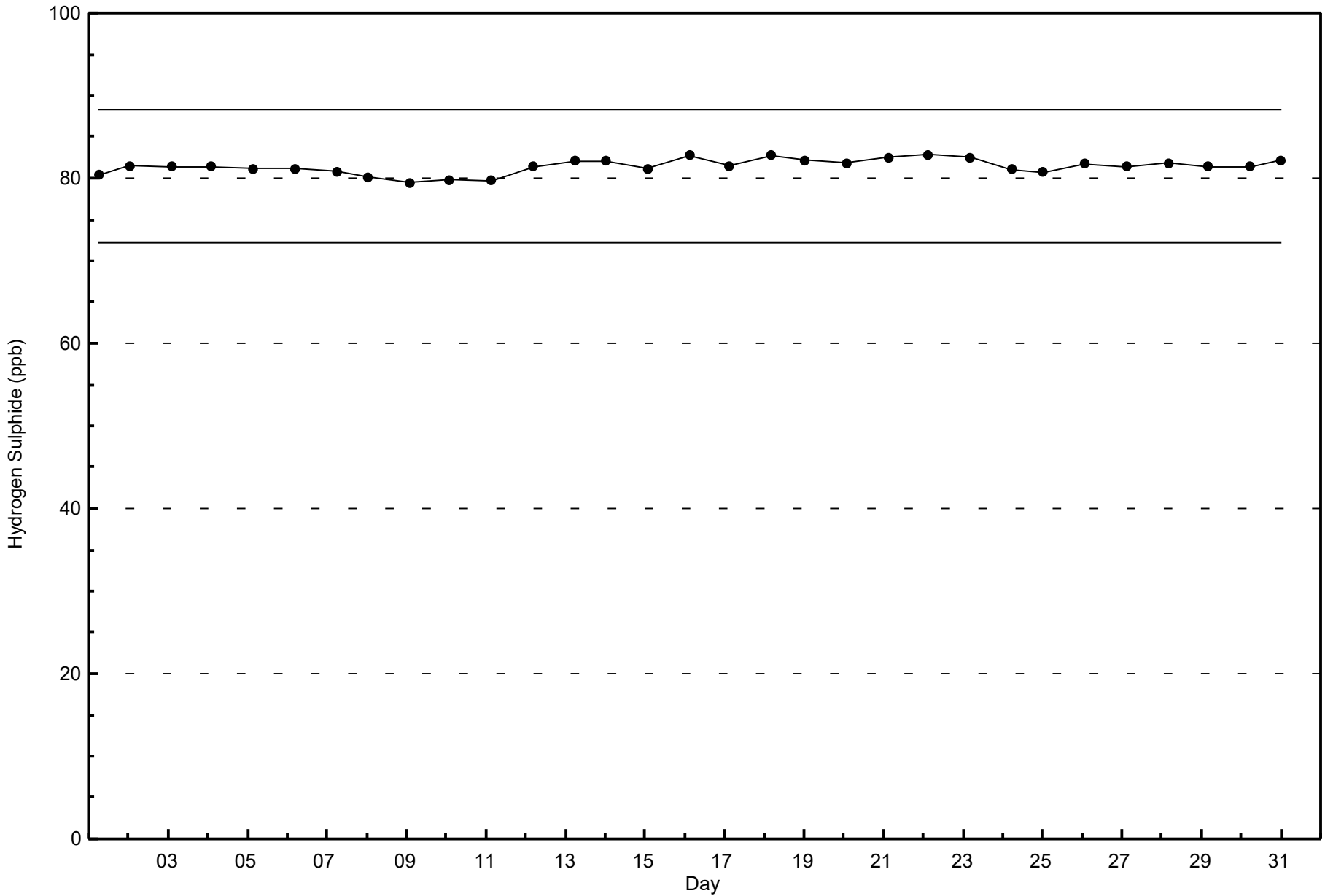
Wood Buffalo Environmental Association
Wind Rose Dec 2023

Hydrogen Sulphide (H₂S) - ppb
Jackfish 2/3



Total Number of Valid Hours: 691







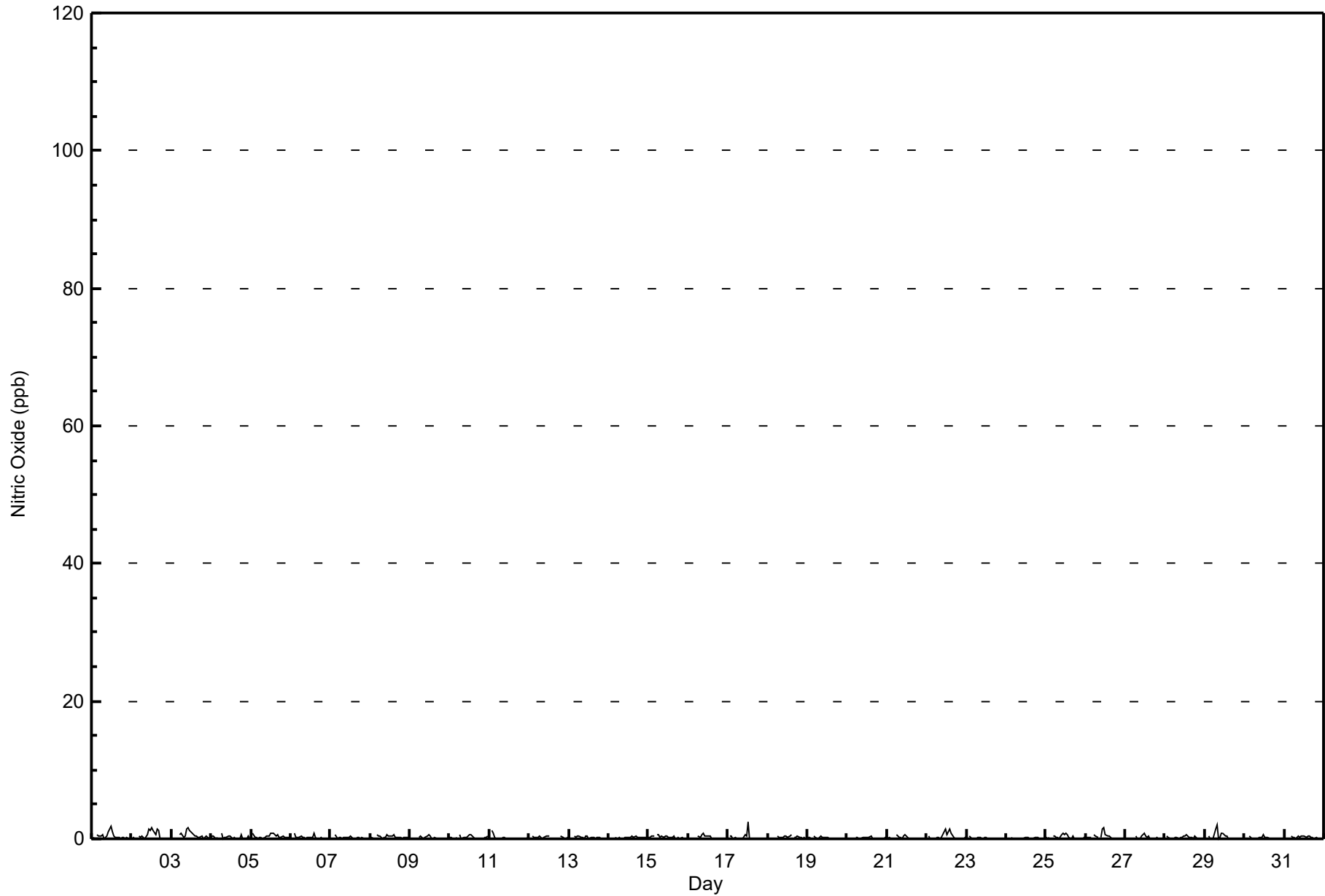
Maximum Value: 2.3 ppb on Dec 17 13:00		Maximum Daily Average: 0.5 ppb on Dec 2		Hours in Service: 744																							
Minimum Value: 0.0 ppb on Dec 1 23:00		Minimum Daily Average: 0.1 ppb on Dec 23		Hours of Data: 692																							
Maximum Diurnal Average: 0.6 ppb at hour 12		Minimum Diurnal Average: 0.1 ppb at hour 21		Hours of Missing Data: 52																							
Monthly Average: 0.21 ppb		Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.0 Median = 0.1 Q ₃ = 0.3 P ₉₀ = 0.5 P ₉₉ = 1.4		Hours of Calibration: 36																							
				Percent Operational Time: 97.9																							
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Dec	0.0	0.3	Z	0.7	0.3	0.4	0.6	0.1	0.2	0.4	1.0	1.7	1.1	0.4	0.3	0.2	0.2	0.0	0.3	0.1	0.0	0.2	0.0	0.1	0.4	0.4	1.7
2-Dec	0.1	0.1	0.1	Z	0.5	0.2	0.4	0.2	0.1	0.5	1.4	1.2	1.6	1.3	0.7	1.4	1.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.5	1.6	
3-Dec	0.1	0.1	0.0	0.0	Z	0.7	0.8	0.2	0.4	1.4	1.7	1.3	0.8	0.6	0.4	0.4	0.1	0.1	0.5	0.1	0.3	0.4	0.2	0.1	0.5	1.7	
4-Dec	0.4	0.3	0.2	0.1	0.3	Z	0.9	0.0	0.3	0.3	0.4	0.3	0.2	0.0	0.2	0.1	0.0	0.1	0.6	0.0	0.0	0.5	0.1	0.2	0.9		
5-Dec	Z	0.8	0.3	0.1	0.0	0.2	0.3	0.1	0.2	0.5	0.5	0.3	0.8	0.8	0.6	0.5	0.6	0.3	0.3	0.4	0.3	0.1	0.2	0.2	0.4	0.8	
6-Dec	0.2	Z	0.8	0.3	0.1	0.1	0.3	0.2	0.2	0.1	0.2	0.3	0.2	0.2	0.7	0.1	0.0	0.0	0.1	0.1	0.0	0.0	0.1	0.0	0.2	0.8	
7-Dec	0.0	0.0	Z	0.7	0.1	0.1	0.2	0.0	0.2	0.1	0.2	0.2	0.4	0.2	0.0	0.0	0.3	0.1	0.0	0.2	0.1	0.1	0.1	0.1	0.1	0.7	
8-Dec	0.2	0.2	0.0	Z	0.6	0.4	0.4	0.0	0.2	0.2	0.5	0.4	0.4	0.4	0.7	0.2	0.3	0.3	0.1	0.0	0.2	0.2	0.3	0.2	0.3	0.7	
9-Dec	0.0	0.0	0.0	0.0	Z	0.3	0.3	0.1	0.0	0.1	0.4	0.6	0.4	0.1	0.0	0.1	0.0	0.0	0.0	0.1	0.0	0.1	0.1	0.0	0.1	0.6	
10-Dec	0.2	0.1	0.0	0.0	0.1	Z	0.6	0.1	0.2	0.1	0.3	0.3	0.6	0.7	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.3	0.1	0.4	0.2	0.7	
11-Dec	Z	1.3	0.7	0.3	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	0.1	1.3	
12-Dec	0.0	Z	0.5	0.2	0.2	0.2	0.4	0.3	0.1	0.2	0.3	0.4	0.4	C	C	C	C	C	C	0.4	0.1	0.0	0.0	0.2	--	0.5	
13-Dec	0.2	0.3	Z	0.4	0.3	0.5	0.4	0.2	0.1	0.0	0.3	0.4	0.0	0.2	0.2	0.1	0.0	0.1	0.2	0.1	0.1	0.1	0.1	0.0	0.2	0.5	
14-Dec	0.0	0.0	0.0	Z	0.3	0.0	0.1	0.0	0.1	0.0	0.2	0.2	0.2	0.1	0.3	0.3	0.3	0.1	0.2	0.2	0.1	0.3	0.2	0.1	0.2	0.3	
15-Dec	0.2	0.2	0.4	0.3	Z	0.6	0.5	0.2	0.5	0.3	0.3	0.3	0.2	0.3	0.2	0.3	0.1	0.0	0.1	0.1	0.1	0.0	0.0	0.1	0.2	0.6	
16-Dec	0.0	0.0	0.0	0.0	0.0	Z	0.4	0.2	0.6	0.8	0.4	0.5	0.4	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	
17-Dec	Z	0.3	0.4	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.6	0.4	2.3	0.0	0.0	0.1	0.0	DF	DF	DF	DF	DF	DF	DF	DF	2.3	
18-Dec	DF	DF	DF	DF	DF	DF	0.4	0.2	0.2	0.2	0.4	0.5	0.3	0.3	0.6	DF	0.2	0.1	0.3	0.1	0.2	0.1	0.2	0.1	--	0.6	
19-Dec	0.1	0.1	0.1	Z	0.4	0.3	0.0	0.3	0.3	0.2	0.1	0.1	0.2	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.4	
20-Dec	0.0	0.0	0.0	0.0	Z	0.3	0.2	0.1	0.1	0.1	0.2	0.3	0.2	0.2	0.4	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.1	0.4	
21-Dec	0.1	0.2	0.0	0.1	0.1	Z	0.6	0.1	0.1	0.0	0.5	0.6	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	0.6	
22-Dec	Z	0.4	0.0	0.1	0.0	0.0	0.3	0.3	0.1	0.3	1.0	1.5	0.6	1.0	1.4	0.7	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.3	1.5	
23-Dec	0.0	Z	0.3	0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.0	0.2	0.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.3	
24-Dec	0.0	0.0	Z	0.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.2	0.1	0.1	0.0	0.2	0.2	0.1	0.0	0.0	0.0	0.1	0.1	0.3	
25-Dec	0.1	0.1	0.2	Z	0.3	0.3	0.1	0.2	0.0	0.5	0.7	0.7	0.7	0.6	0.3	0.0	0.4	0.0	0.0	0.1	DF	0.1	0.1	0.1	0.3	0.7	
26-Dec	0.1	0.2	0.2	0.1	Z	0.5	0.4	0.1	DF	0.2	1.4	1.6	0.6	0.5	0.4	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	1.6	
27-Dec	0.0	0.0	0.0	0.0	0.0	Z	0.4	0.0	0.0	0.0	0.5	0.8	0.4	0.1	0.4	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.1	0.8	
28-Dec	Z	0.3	0.1	0.1	0.0	0.0	0.3	0.2	0.0	0.2	0.3	0.5	0.5	0.6	0.2	0.1	0.2	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.2	0.6	
29-Dec	0.0	Z	0.3	0.0	0.1	0.1	1.4	2.1	0.0	0.2	0.8	0.8	0.3	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	2.1	
30-Dec	0.0	0.0	Z	0.3	0.1	0.0	0.0	0.1	0.0	0.2	0.3	0.6	0.3	0.1	0.2	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.6	
31-Dec	0.0	0.1	0.0	Z	0.3	0.2	0.2	0.1	0.3	0.3	0.4	0.4	0.4	0.3	0.3	0.4	0.3	0.1	0.1	0.2	0.0	0.1	0.1	0.0	0.2	0.4	
																								Diurnal Average			
																								Diurnal Maximum			
																								Diurnal Average			
																								Diurnal Maximum			
																								Diurnal Average			
																								Diurnal Maximum			

Z - zerospan C - Calibration DF - DAS Failure



Wood Buffalo Environmental Association
Hourly Averages

Nitric Oxide (NO) - ppb
Jackfish 2/3 - December 2023





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitric Oxide (NO) - ppb
Jackfish 2/3 - December 2023**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	692	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: 692

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Nitric Oxide (NO) - ppb
Jackfish 2/3 - December 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	0	1	1	6	5	3	6	3	77	165	164	138	62	43	17	1	692
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	0	1	1	6	5	3	6	3	77	165	164	138	62	43	17	1	692

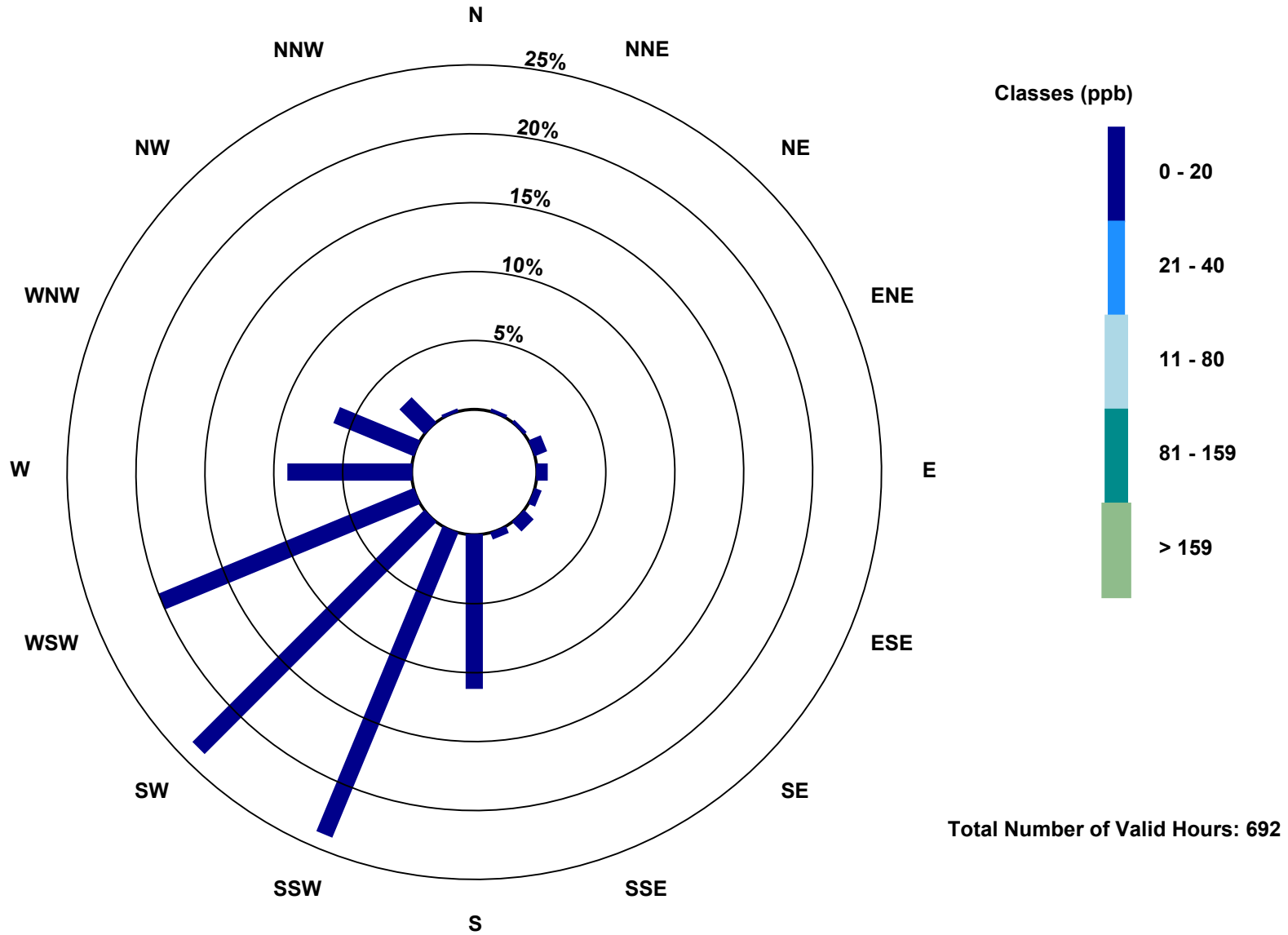
Total Number of Valid Hours: 692

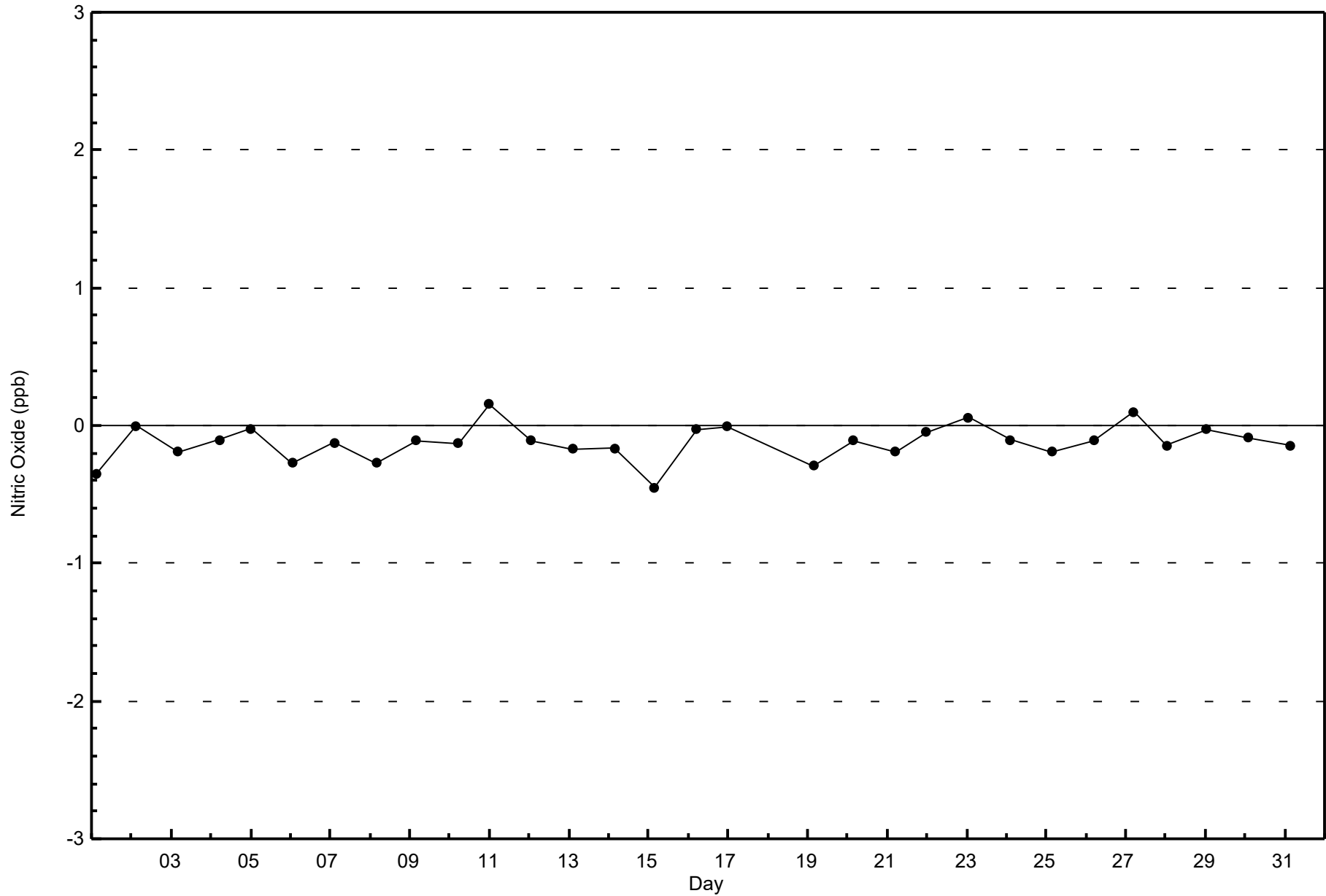
Total Number of Hours: 744

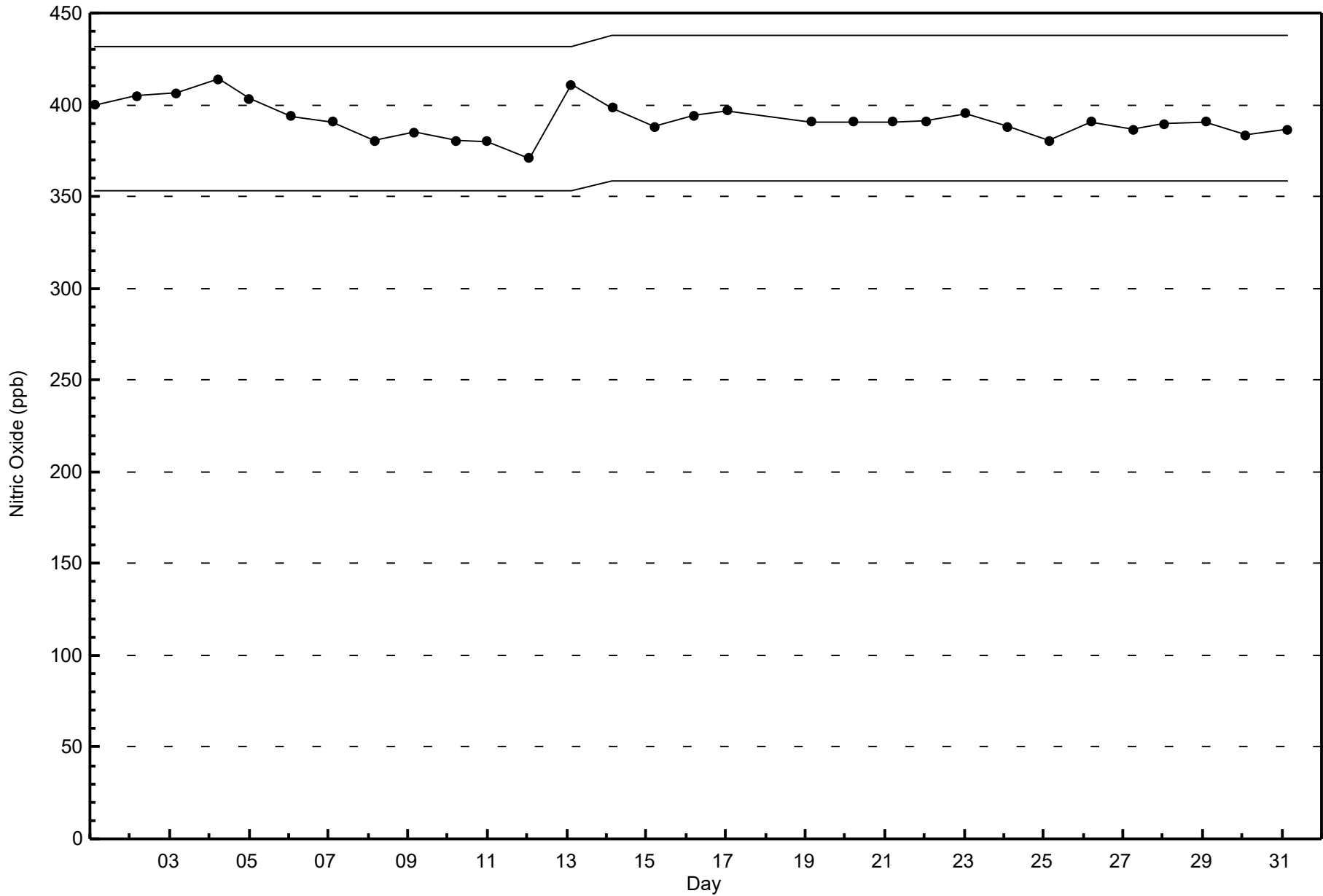


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Nitric Oxide (NO) - ppb
Jackfish 2/3









Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO₂) - ppb

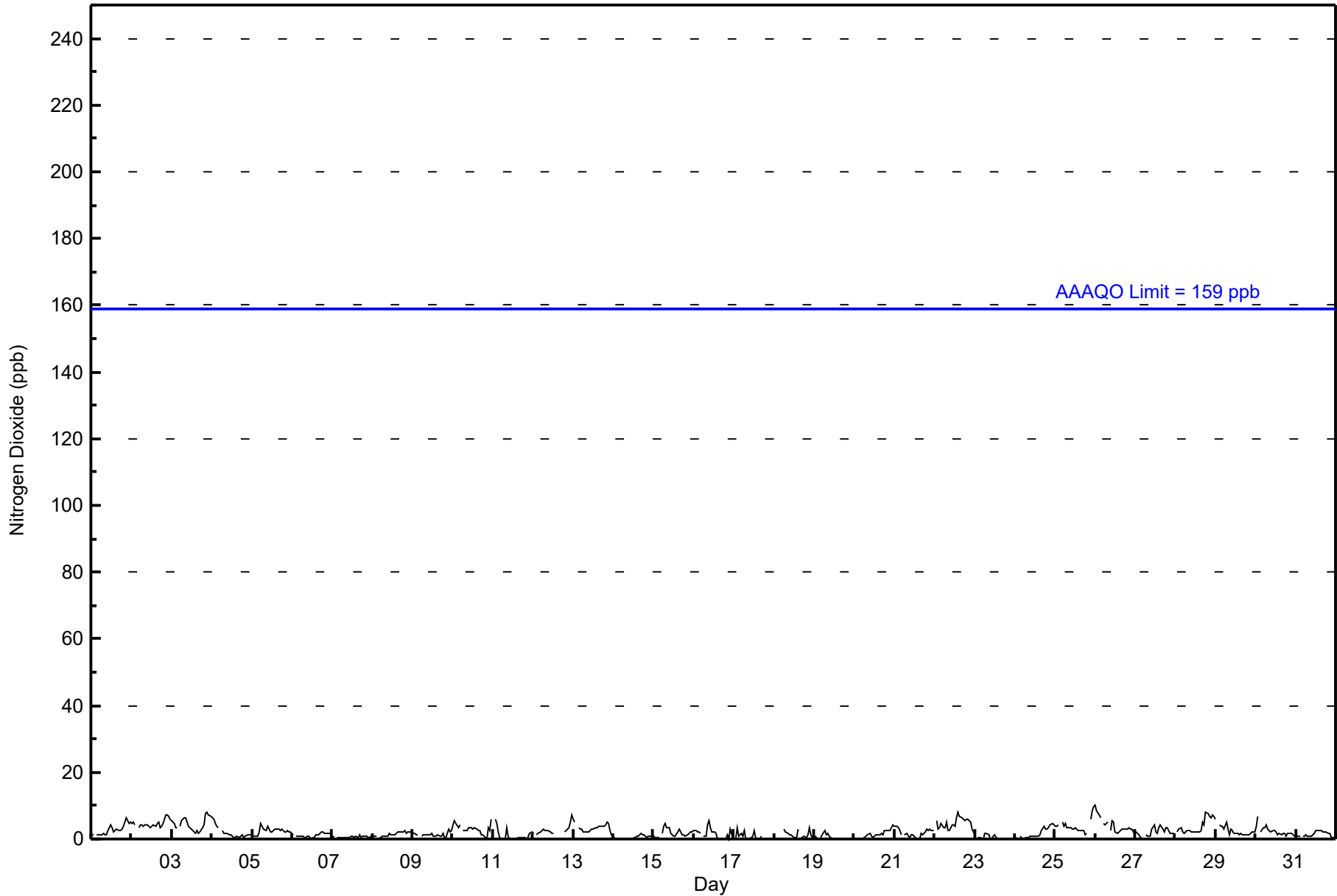
Jackfish 2/3 - December 2023

Number of Exceedences (AAAQO):		1-hr: 0	24-hr: 0	Hours in Service: 744																	Daily																												
Maximum Value: 10.1 ppb on Dec 26 01:00		Maximum Daily Average: 4.7 ppb on Dec 22		Hours of Data: 692																	Average	Maximum																											
Minimum Value: 0.0 ppb on Dec 10 21:00		Minimum Daily Average: 0.4 ppb on Dec 23																	Hours of Missing Data: 52																														
Maximum Diurnal Average: 2.9 ppb at hour 2		Minimum Diurnal Average: 1.6 ppb at hour 14																	Hours of Calibration: 36																														
Monthly Average: 2.18 ppb		Percentiles: P ₁ = 0.0 P ₁₀ = 0.2 Q ₁ = 0.8 Median = 1.8 Q ₃ = 3.1 P ₉₀ = 4.6 P ₉₉ = 7.5																	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-Dec	1.1	1.1	Z	1.1	1.2	1.2	1.4	1.7	1.2	1.3	2.6	4.1	3.3	2.3	2.4	3.1	2.4	2.5	2.8	3.8	5.0	6.2	4.7	5.2	2.7	6.2																							
2-Dec	4.7	4.9	4.3	Z	3.4	4.4	4.3	4.0	4.2	4.1	3.9	3.4	4.0	4.2	3.9	4.6	5.1	3.6	3.9	4.8	7.0	7.4	6.7	5.8	4.6	7.4																							
3-Dec	5.3	4.5	3.6	3.3	Z	3.8	5.3	6.2	6.4	5.2	3.9	3.2	2.6	2.2	1.8	2.5	1.9	2.0	3.2	4.2	7.5	8.0	7.2	6.7	4.4	8.0																							
4-Dec	6.2	5.9	4.6	3.8	3.2	Z	2.4	1.9	1.9	1.5	1.3	1.4	0.7	0.6	0.4	0.8	0.5	0.7	1.2	0.6	0.7	1.1	1.1	1.4	1.9	6.2																							
5-Dec	Z	1.0	0.8	1.0	2.2	4.7	3.9	3.0	2.5	3.9	2.8	2.0	2.2	2.9	3.1	2.8	3.1	2.6	2.8	2.2	2.1	2.6	2.2	2.0	2.5	4.7																							
6-Dec	1.3	Z	0.8	0.8	0.8	0.7	0.9	0.6	0.6	0.7	0.8	0.2	0.3	0.6	1.4	1.1	1.3	2.0	2.0	1.8	1.6	1.8	1.5	1.3	1.1	2.0																							
7-Dec	0.6	0.9	Z	0.3	0.4	0.5	0.6	0.6	0.6	0.4	0.6	0.9	1.0	0.6	0.8	0.6	1.2	0.6	1.0	0.7	0.7	0.6	0.6	0.7	0.7	1.2																							
8-Dec	0.6	0.8	0.8	Z	0.6	0.5	0.8	0.7	0.8	1.0	1.6	1.2	1.2	1.1	1.6	2.0	2.1	2.3	2.3	2.7	1.9	2.2	2.2	2.0	1.4	2.7																							
9-Dec	1.8	1.6	1.2	1.1	Z	1.0	1.1	1.2	1.2	1.4	1.4	1.5	1.0	0.8	0.9	1.3	0.9	0.9	1.6	0.4	0.5	3.1	2.1	2.4	1.3	3.1																							
10-Dec	4.2	5.3	4.8	3.6	4.3	Z	2.7	2.4	2.4	3.4	3.6	3.6	3.1	3.2	3.0	2.6	2.6	1.4	1.2	0.4	0.0	3.3	2.4	6.0	3.0	6.0																							
11-Dec	Z	6.1	4.6	2.3	0.4	0.0	0.0	0.0	3.2	1.0	0.0	0.0	0.0	0.0	0.2	0.3	0.3	0.4	0.5	0.3	0.1	0.5	1.9	2.0	1.0	6.1																							
12-Dec	1.7	Z	1.2	1.6	2.3	2.7	3.0	2.6	2.6	2.4	2.1	1.7	1.6	C	C	C	C	C	C	2.0	2.8	3.4	5.1	7.2	--	7.2																							
13-Dec	5.9	5.2	Z	3.6	3.1	2.9	2.3	2.1	2.0	2.0	2.4	2.8	3.0	3.3	3.5	3.8	4.0	3.7	3.8	4.3	5.1	4.6	2.5	1.3	3.4	5.9																							
14-Dec	0.4	0.0	0.0	Z	0.0	0.0	0.1	0.0	0.2	0.0	0.2	0.1	0.4	0.3	0.8	1.0	1.5	1.1	1.1	0.7	0.6	0.7	0.7	0.6	0.5	1.5																							
15-Dec	0.8	0.6	0.5	0.5	Z	1.5	3.9	4.6	3.5	3.2	1.8	1.1	0.7	0.8	2.3	3.1	2.3	1.4	1.1	0.8	1.3	1.7	2.1	2.3	1.8	4.6																							
16-Dec	2.7	2.5	2.3	2.3	1.6	Z	0.9	0.7	4.2	5.5	3.2	2.3	2.1	1.8	0.0	0.0	0.0	0.0	0.0	0.0	1.2	0.2	3.0	0.1	1.6	5.5																							
17-Dec	Z	0.4	3.6	0.9	1.9	0.8	2.6	0.0	0.0	0.0	0.5	0.7	2.7	0.3	0.0	0.1	0.9	DF	DF	DF	DF	DF	DF	DF	--	3.6																							
18-Dec	DF	DF	DF	DF	DF	DF	2.8	2.2	1.6	1.1	1.3	0.8	0.5	0.5	2.8	DF	0.4	0.6	0.7	0.3	1.2	3.2	1.1	0.6	--	3.2																							
19-Dec	0.9	0.3	0.1	Z	0.5	1.1	2.4	1.4	1.7	0.7	0.5	0.2	0.0	0.0	0.0	0.1	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	2.4																							
20-Dec	0.0	0.0	0.1	0.1	Z	0.4	0.5	0.7	1.1	1.6	0.8	0.6	0.9	1.1	1.3	1.4	1.5	1.4	2.6	2.6	2.6	2.6	3.6	4.4	1.4	4.4																							
21-Dec	3.9	3.7	3.2	2.4	1.3	Z	1.1	1.5	1.0	0.6	1.1	1.2	0.4	0.0	0.0	0.0	1.7	1.3	2.3	2.8	2.7	2.8	2.5	2.4	1.7	3.9																							
22-Dec	Z	5.7	3.0	3.4	4.6	3.5	3.6	5.2	2.6	2.7	4.2	4.4	3.9	6.2	8.1	6.6	6.3	5.8	5.3	6.1	6.1	5.0	2.9	2.2	4.7	8.1																							
23-Dec	1.1	Z	0.5	0.3	0.2	0.2	1.5	1.8	1.4	0.0	0.2	0.8	1.1	0.3	0.0	0.2	0.0	0.0	0.1	0.2	0.0	0.0	0.1	0.0	0.4	1.8																							
24-Dec	0.1	0.6	Z	0.7	0.6	0.2	0.3	0.5	0.5	0.7	0.9	1.0	0.9	0.9	0.7	1.1	2.6	3.8	3.1	3.0	3.5	4.4	4.7	4.3	1.7	4.7																							
25-Dec	3.7	3.7	4.3	Z	4.9	3.9	4.8	3.3	3.2	3.2	3.1	3.1	3.2	2.9	2.6	2.6	2.7	2.4	1.4	1.7	DF	6.0	8.6	9.7	3.9	9.7																							
26-Dec	10.1	8.5	7.4	6.3	Z	4.5	4.3	5.0	DF	2.4	5.3	5.2	2.0	1.9	2.0	2.5	2.8	2.9	3.0	3.0	3.2	2.9	3.1	2.3	4.1	10.1																							
27-Dec	2.0	1.7	1.2	0.5	0.4	Z	1.2	0.8	0.7	0.8	2.8	4.3	2.2	1.8	3.5	4.2	2.9	2.3	3.4	3.6	2.5	1.7	1.7	1.5	2.1	4.3																							
28-Dec	Z	2.2	2.9	3.2	2.0	1.9	2.2	2.4	2.6	2.0	2.1	2.3	2.1	2.1	2.0	2.7	5.1	4.2	8.1	7.5	6.8	6.4	7.2	6.7	3.8	8.1																							
29-Dec	6.1	Z	4.1	3.8	4.0	2.9	4.9	3.1	1.3	2.8	2.7	1.9	1.7	1.5	1.2	1.6	1.3	1.2	1.2	1.2	1.3	1.6	2.0	2.2	2.4	6.1																							
30-Dec	3.7	6.8	Z	2.2	3.2	3.2	4.1	2.9	2.6	2.1	2.6	2.7	2.1	1.2	1.5	1.1	1.6	1.6	0.9	1.5	1.8	1.5	1.4	0.9	2.3	6.8																							
31-Dec	0.7	0.7	0.7	Z	0.9	0.8	1.1	0.8	0.9	0.8	1.3	1.7	2.4	2.4	2.5	2.4	2.1	2.1	2.0	1.9	1.6	0.5	0.3	0.3	1.3	2.5																							
																								2.8	2.9	2.4	2.0	1.9	1.9	2.3	2.1	2.0	1.9	2.0	1.9	1.7	1.6	1.8	1.9	2.0	1.9	2.2	2.2	2.5	2.9	2.8	2.8	Diurnal Average	
																								10.1	8.5	7.4	6.3	4.9	4.7	5.3	6.2	6.4	5.5	5.3	5.2	4.0	6.2	8.1	6.6	6.3	5.8	8.1	7.5	7.5	8.0	8.6	9.7	Diurnal Maximum	
Z - zerospan C - Calibration DF - DAS Failure																																																	
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 159 ppb																																																	



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Dioxide (NO₂) - ppb
Jackfish 2/3 - December 2023





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Jackfish 2/3 - December 2023**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	692	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: 692

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Jackfish 2/3 - December 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	0	1	1	6	5	3	6	3	77	165	164	138	62	43	17	1	692
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	0	1	1	6	5	3	6	3	77	165	164	138	62	43	17	1	692

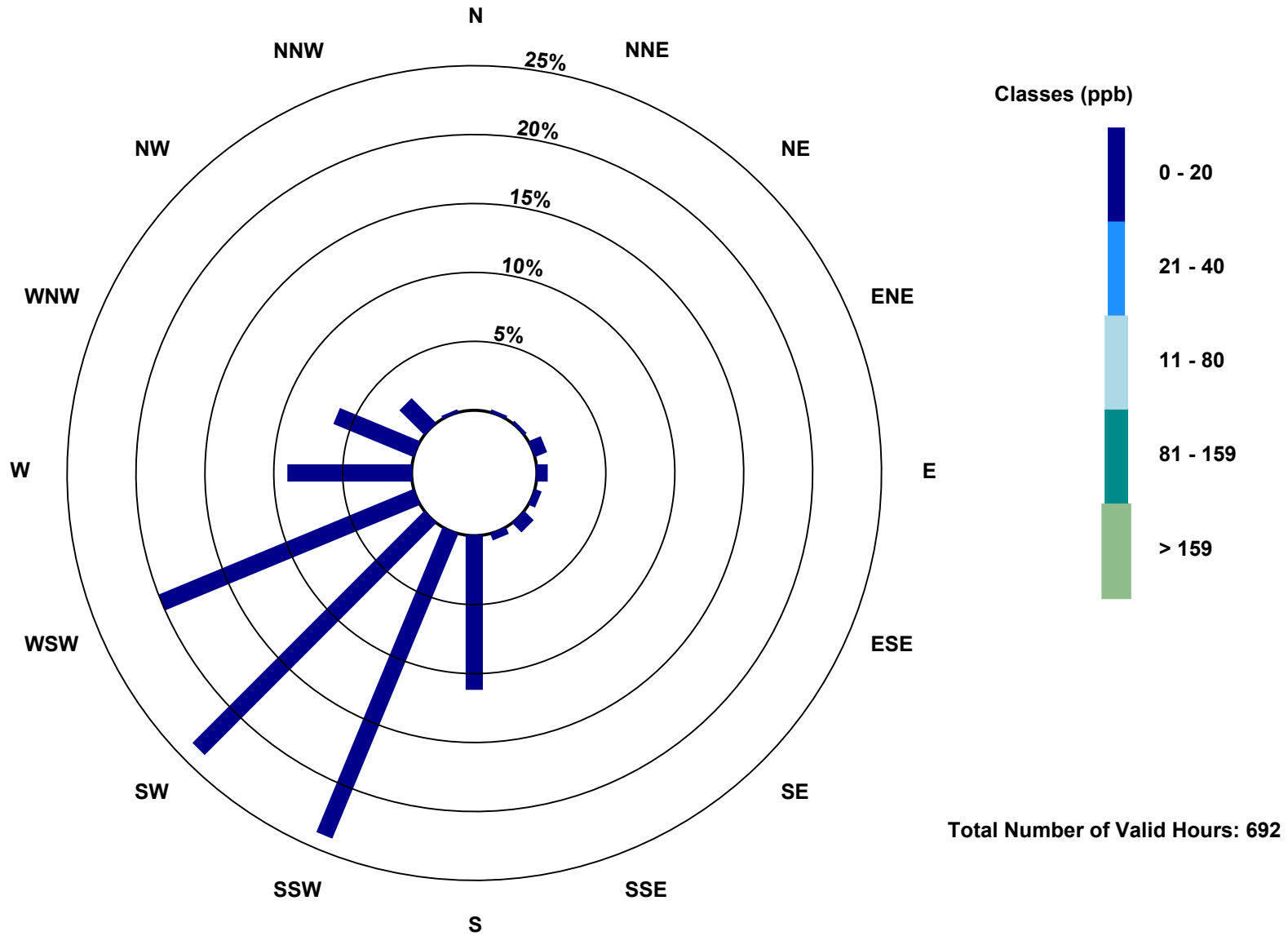
Total Number of Valid Hours: 692

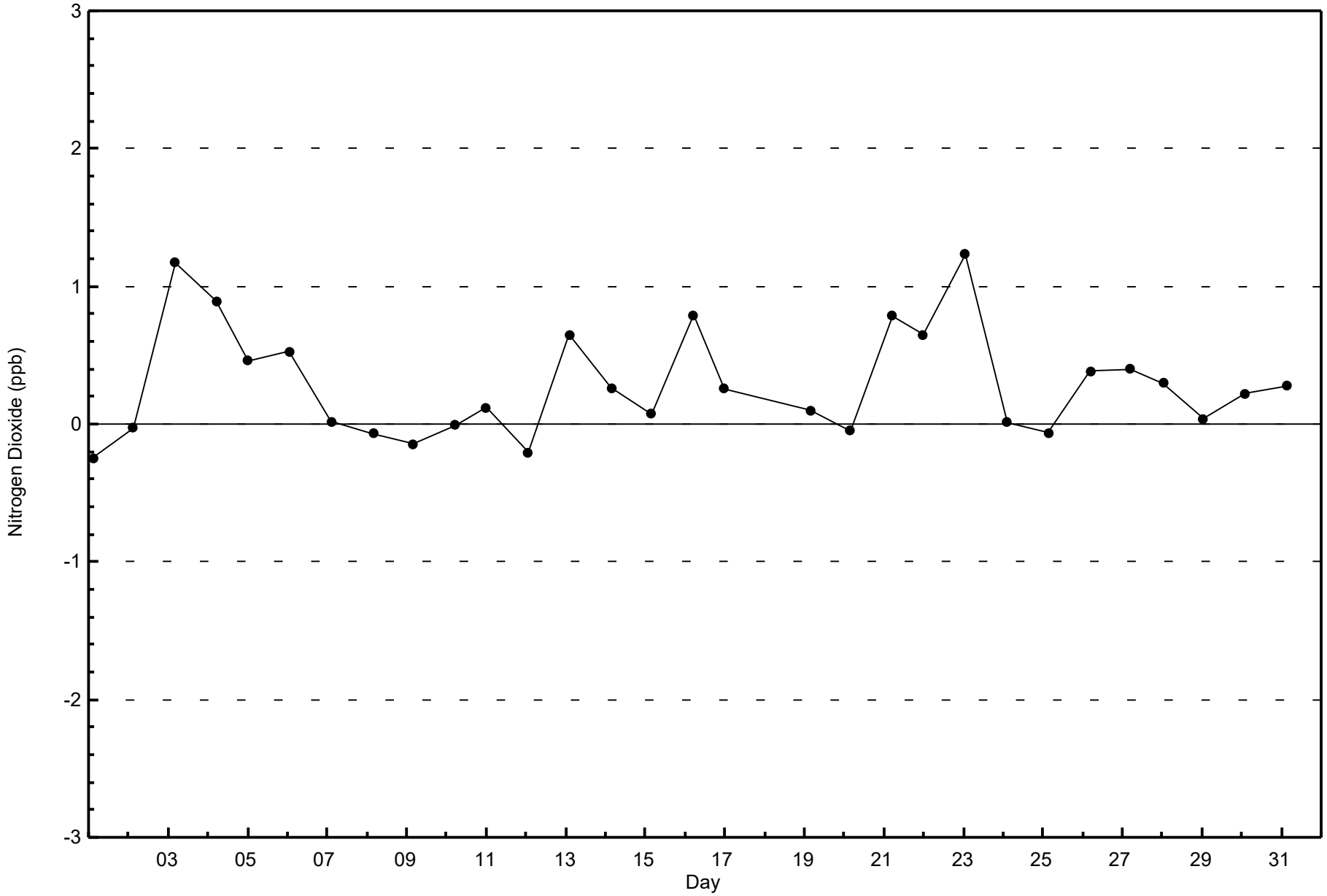
Total Number of Hours: 744

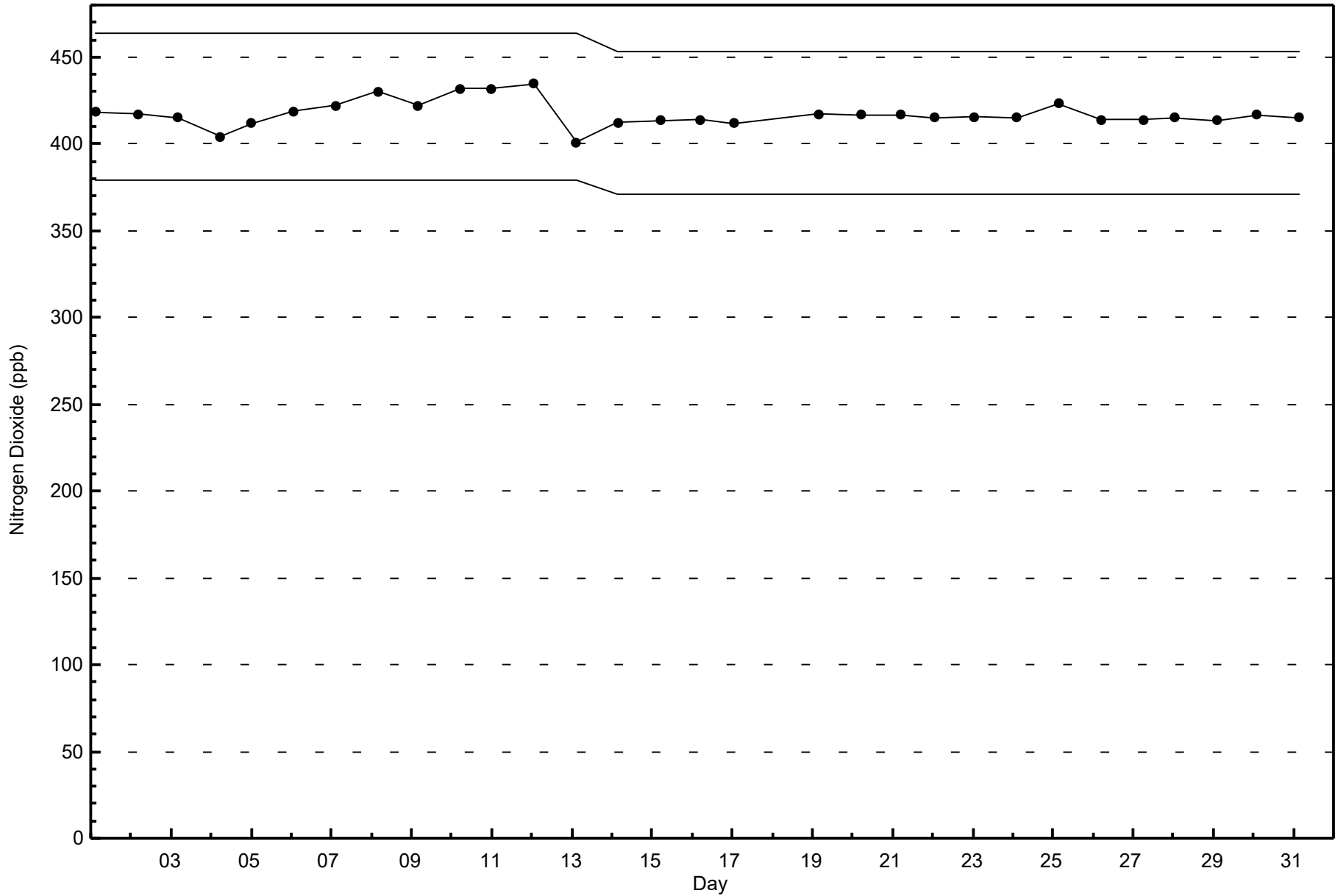


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Nitrogen Dioxide (NO₂) - ppb
Jackfish 2/3









Wood Buffalo Environmental Association
Summary of Hour Averages

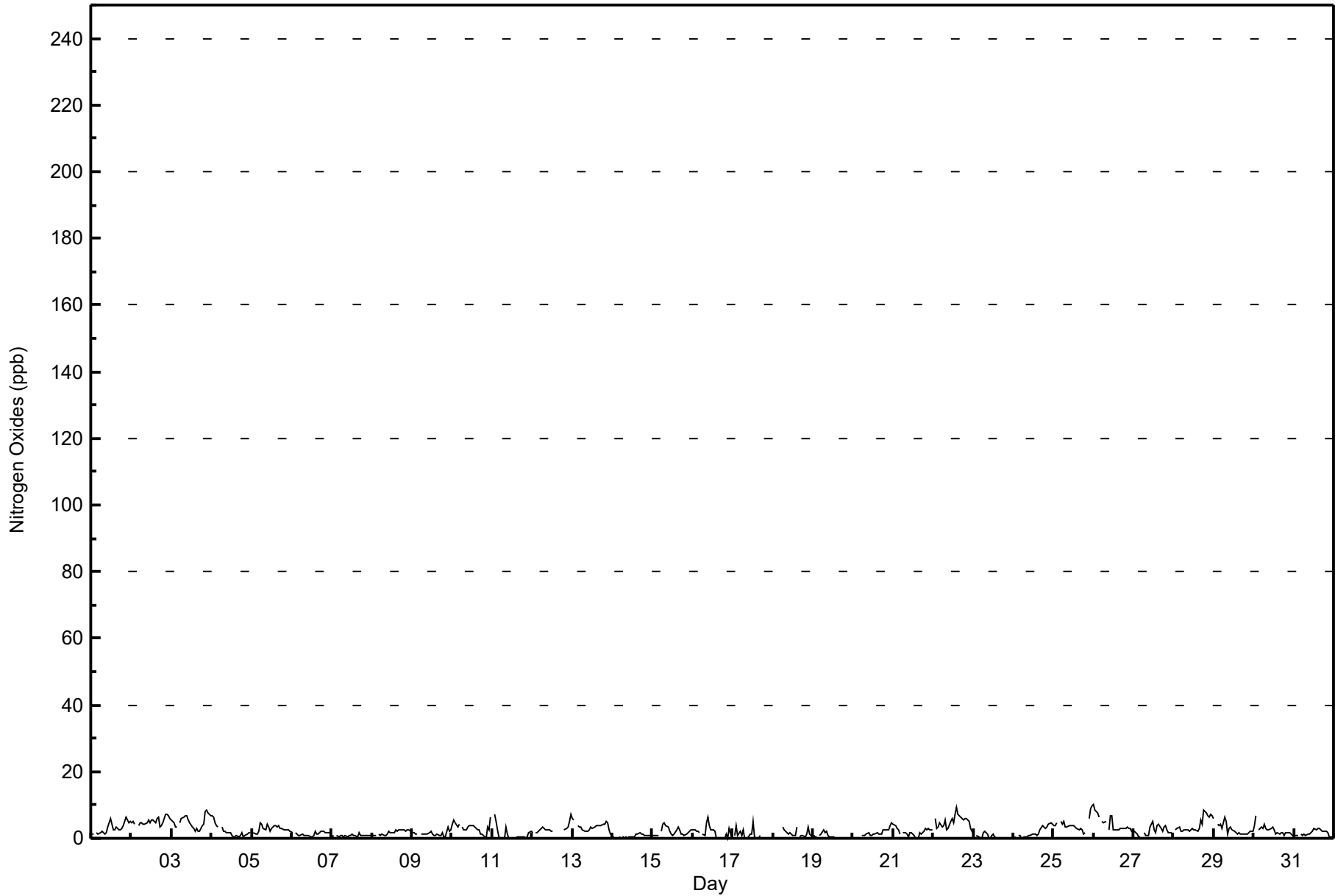
Nitrogen Oxides (NO_x) - ppb
Jackfish 2/3 - December 2023

Maximum Value: 10.2 ppb on Dec 26 01:00		Maximum Daily Average: 5.1 ppb on Dec 2		Hours in Service: 744																							
Minimum Value: 0.0 ppb on Dec 10 21:00		Minimum Daily Average: 0.5 ppb on Dec 23		Hours of Data: 692																							
Maximum Diurnal Average: 3.1 ppb at hour 2		Minimum Diurnal Average: 1.9 ppb at hour 14		Hours of Missing Data: 52																							
Monthly Average: 2.39 ppb		Percentiles: P ₁ = 0.0 P ₁₀ = 0.3 Q ₁ = 0.9 Median = 2.0 Q ₃ = 3.4 P ₉₀ = 5.0 P ₉₉ = 7.9		Hours of Calibration: 36																							
				Percent Operational Time: 97.9																							
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Dec	1.1	1.4	Z	1.8	1.5	1.6	2.0	1.8	1.4	1.7	3.6	5.8	4.4	2.7	2.7	3.3	2.6	2.5	3.1	3.9	5.0	6.4	4.7	5.3	3.0	6.4	
2-Dec	4.8	5.0	4.4	Z	3.9	4.6	4.7	4.2	4.3	4.6	5.3	4.6	5.6	5.5	4.6	6.0	6.2	3.6	3.9	4.8	7.1	7.4	6.7	5.8	5.1	7.4	
3-Dec	5.4	4.6	3.6	3.3	Z	4.5	6.1	6.4	6.8	6.6	5.6	4.5	3.4	2.8	2.2	2.9	2.0	2.1	3.7	4.3	7.8	8.4	7.4	6.8	4.8	8.4	
4-Dec	6.6	6.2	4.8	3.9	3.5	Z	3.3	1.9	2.2	1.8	1.7	1.7	0.9	0.6	0.6	0.9	0.5	0.8	1.8	0.6	0.7	1.1	1.6	1.5	2.1	6.6	
5-Dec	Z	1.8	1.1	1.1	2.2	4.9	4.2	3.1	2.7	4.4	3.3	2.3	3.0	3.7	3.7	3.3	3.7	2.9	3.1	2.6	2.4	2.7	2.4	2.2	2.9	4.9	
6-Dec	1.5	Z	1.6	1.1	0.9	0.8	1.2	0.8	0.8	0.8	1.0	0.5	0.5	0.8	2.1	1.2	1.3	2.0	2.1	1.9	1.6	1.8	1.6	1.3	1.3	2.1	
7-Dec	0.6	0.9	Z	1.0	0.5	0.6	0.8	0.6	0.8	0.5	0.8	1.1	1.4	0.8	0.8	0.6	1.5	0.7	1.0	0.9	0.8	0.7	0.7	0.8	0.8	1.5	
8-Dec	0.8	1.0	0.8	Z	1.2	0.9	1.2	0.7	1.0	1.2	2.1	1.6	1.6	1.5	2.3	2.2	2.4	2.6	2.4	2.7	2.1	2.4	2.5	2.2	1.7	2.7	
9-Dec	1.8	1.6	1.2	1.1	Z	1.3	1.4	1.3	1.2	1.5	1.8	2.1	1.4	0.9	0.9	1.4	0.9	0.9	1.6	0.5	0.5	3.2	2.2	2.4	1.4	3.2	
10-Dec	4.4	5.4	4.8	3.6	4.4	Z	3.3	2.5	2.6	3.5	3.9	3.9	3.7	3.9	3.2	2.7	2.6	1.4	1.2	0.4	0.0	3.6	2.5	6.4	3.2	6.4	
11-Dec	Z	7.4	5.3	2.6	0.4	0.0	0.0	0.0	3.3	1.1	0.0	0.0	0.0	0.0	0.2	0.3	0.3	0.4	0.5	0.3	0.1	0.5	1.9	2.1	1.2	7.4	
12-Dec	1.7	Z	1.7	1.8	2.5	2.9	3.4	2.9	2.7	2.6	2.4	2.1	2.0	C	C	C	C	C	C	2.4	2.9	3.4	5.1	7.4	--	7.4	
13-Dec	6.1	5.5	Z	4.0	3.4	3.4	2.7	2.3	2.1	2.0	2.7	3.2	3.0	3.5	3.7	3.9	4.0	3.8	4.0	4.4	5.2	4.7	2.6	1.3	3.5	6.1	
14-Dec	0.4	0.0	0.0	Z	0.3	0.0	0.2	0.0	0.3	0.0	0.4	0.3	0.6	0.4	1.1	1.3	1.8	1.2	1.3	0.9	0.7	1.0	0.9	0.7	0.6	1.8	
15-Dec	1.0	0.8	0.9	0.8	Z	2.1	4.4	4.8	4.0	3.5	2.1	1.4	0.9	1.1	2.5	3.4	2.4	1.4	1.2	0.9	1.4	1.7	2.1	2.4	2.1	4.8	
16-Dec	2.7	2.5	2.3	2.3	1.6	Z	1.3	0.9	4.8	6.3	3.6	2.8	2.5	2.2	0.0	0.0	0.0	0.0	0.0	0.0	1.2	0.2	3.0	0.1	1.8	6.3	
17-Dec	Z	0.7	4.0	0.9	2.0	0.8	2.7	0.0	0.0	0.0	1.1	1.1	5.0	0.3	0.0	0.2	0.9	DF	DF	DF	DF	DF	DF	DF	--	5.0	
18-Dec	DF	DF	DF	DF	DF	DF	3.2	2.4	1.8	1.3	1.7	1.3	0.8	0.8	3.4	DF	0.6	0.7	1.0	0.4	1.4	3.3	1.3	0.7	--	3.4	
19-Dec	1.0	0.4	0.2	Z	0.9	1.4	2.4	1.7	2.0	0.9	0.6	0.3	0.2	0.0	0.1	0.1	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	2.4	
20-Dec	0.0	0.0	0.1	0.1	Z	0.7	0.7	0.8	1.2	1.7	1.0	0.9	1.1	1.3	1.7	1.4	1.5	1.4	2.7	2.6	2.6	2.6	3.6	4.5	1.5	4.5	
21-Dec	4.0	3.9	3.2	2.5	1.4	Z	1.7	1.6	1.1	0.6	1.6	1.8	0.7	0.0	0.1	0.0	1.7	1.3	2.3	2.8	2.7	2.8	2.5	2.4	1.9	4.0	
22-Dec	Z	6.1	3.0	3.5	4.6	3.5	3.9	5.5	2.7	3.0	5.2	5.9	4.5	7.2	9.5	7.3	6.4	5.9	5.3	6.1	6.1	5.0	2.9	2.3	5.0	9.5	
23-Dec	1.1	Z	0.8	0.3	0.2	0.2	1.6	1.9	1.5	0.0	0.2	1.0	1.4	0.4	0.0	0.2	0.0	0.0	0.1	0.2	0.0	0.1	0.0	0.0	0.5	1.9	
24-Dec	0.1	0.6	Z	1.0	0.7	0.2	0.3	0.5	0.5	0.7	0.9	1.2	1.1	1.1	0.8	1.2	2.6	4.0	3.3	3.1	3.5	4.4	4.7	4.4	1.8	4.7	
25-Dec	3.8	3.8	4.5	Z	5.2	4.2	4.9	3.5	3.2	3.7	3.8	3.8	3.9	3.5	2.9	2.6	3.1	2.4	1.4	1.8	DF	6.1	8.7	9.8	4.1	9.8	
26-Dec	10.2	8.7	7.6	6.4	Z	5.0	4.7	5.1	DF	2.6	6.7	6.8	2.6	2.4	2.4	2.6	2.8	2.9	3.0	3.0	3.2	2.9	3.1	2.3	4.4	10.2	
27-Dec	2.0	1.7	1.2	0.5	0.4	Z	1.6	0.8	0.7	0.8	3.3	5.1	2.6	1.9	3.9	4.2	2.9	2.3	3.4	3.7	2.6	1.7	1.7	1.5	2.2	5.1	
28-Dec	Z	2.5	3.0	3.3	2.0	1.9	2.5	2.6	2.6	2.2	2.4	2.8	2.6	2.7	2.2	2.8	5.3	4.2	8.5	7.5	6.8	6.4	7.2	6.7	4.0	8.5	
29-Dec	6.1	Z	4.4	3.8	4.1	3.0	6.3	5.2	1.3	3.0	3.5	2.7	2.0	1.9	1.2	1.6	1.3	1.2	1.2	1.2	1.3	1.6	2.0	2.2	2.7	6.3	
30-Dec	3.7	6.8	Z	2.5	3.3	3.2	4.1	3.0	2.6	2.3	2.9	3.3	2.4	1.3	1.7	1.1	1.6	1.6	0.9	1.5	1.9	1.5	1.4	0.9	2.4	6.8	
31-Dec	0.7	0.8	0.7	Z	1.2	1.0	1.3	0.9	1.2	1.1	1.7	2.1	2.8	2.7	2.8	2.8	2.4	2.2	2.1	2.1	1.6	0.6	0.4	0.3	1.5	2.8	
		2.9	3.1	2.6	2.2	2.1	2.1	2.6	2.3	2.1	2.1	2.5	2.5	2.2	1.9	2.1	2.1	2.2	1.9	2.3	2.3	2.5	2.9	2.9	2.9	Diurnal Average	
		10.2	8.7	7.6	6.4	5.2	5.0	6.3	6.4	6.8	6.6	6.7	6.8	5.6	7.2	9.5	7.3	6.4	5.9	8.5	7.5	7.8	8.4	8.7	9.8	Diurnal Maximum	
Z - zerospan		C - Calibration			DF - DAS Failure																						



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Jackfish 2/3 - December 2023





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitrogen Oxides (NO_x) - ppb
Jackfish 2/3 - December 2023

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	692	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: 692

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Jackfish 2/3 - December 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	0	1	1	6	5	3	6	3	77	165	164	138	62	43	17	1	692
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	0	1	1	6	5	3	6	3	77	165	164	138	62	43	17	1	692

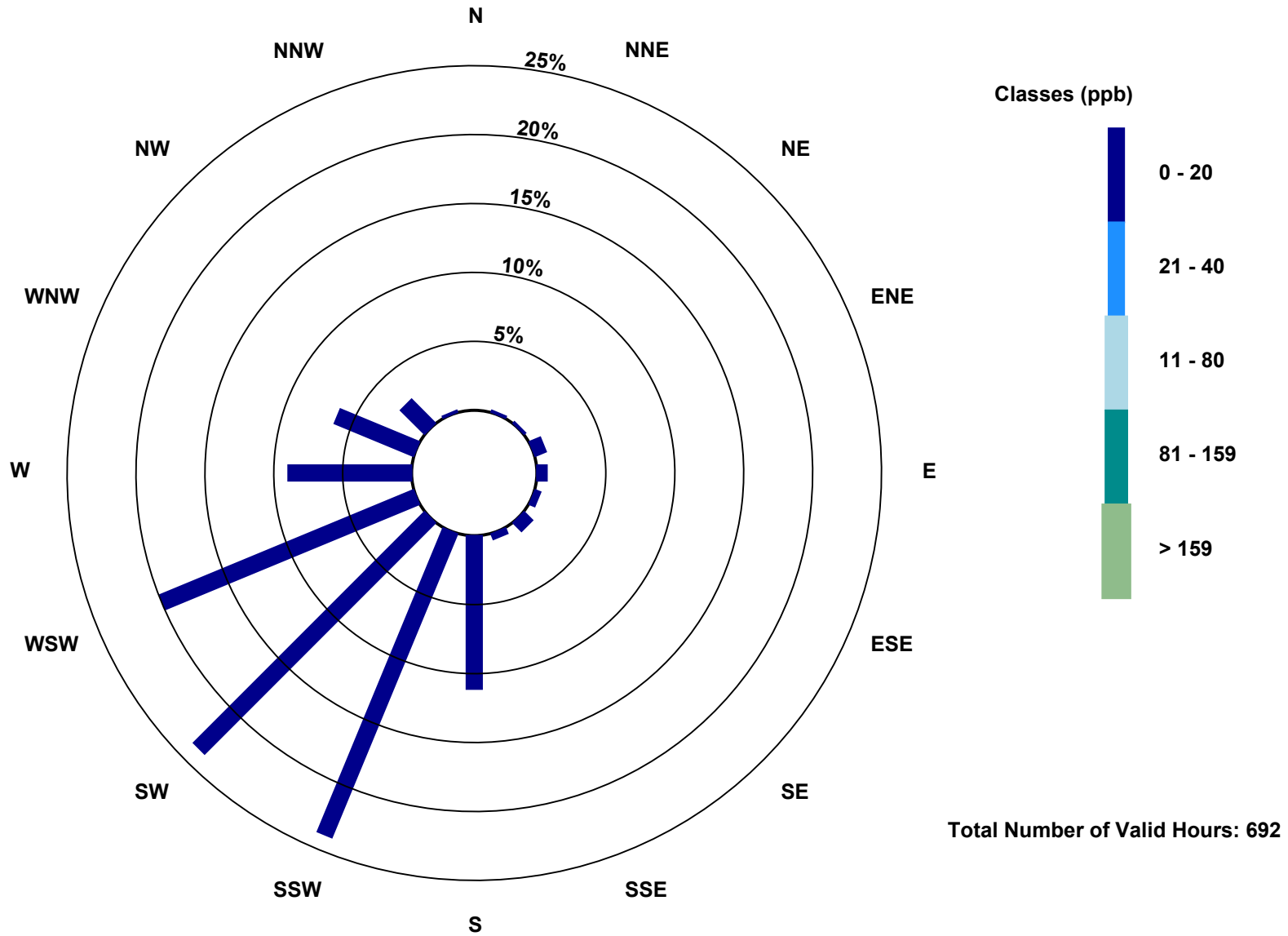
Total Number of Valid Hours: 692

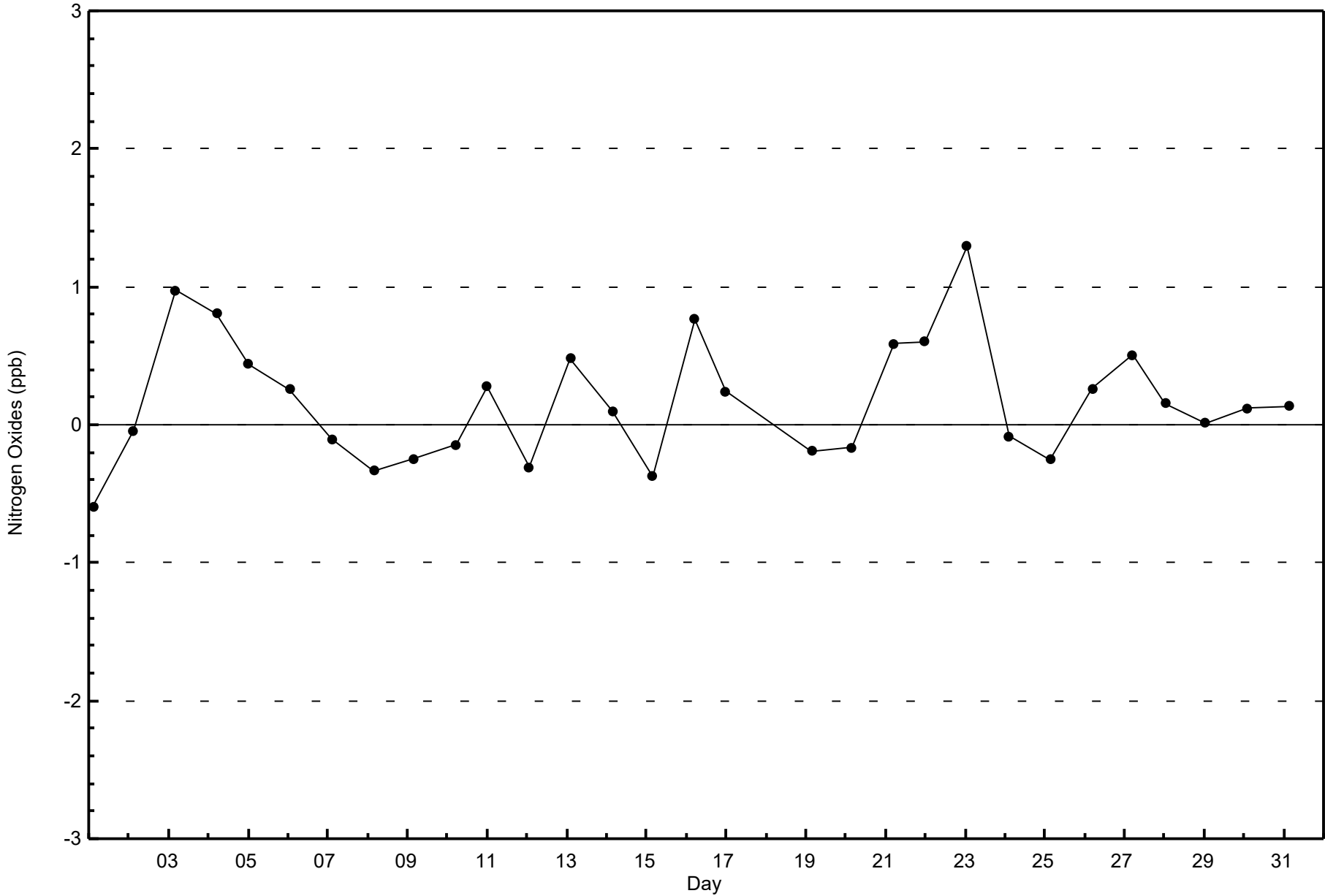
Total Number of Hours: 744

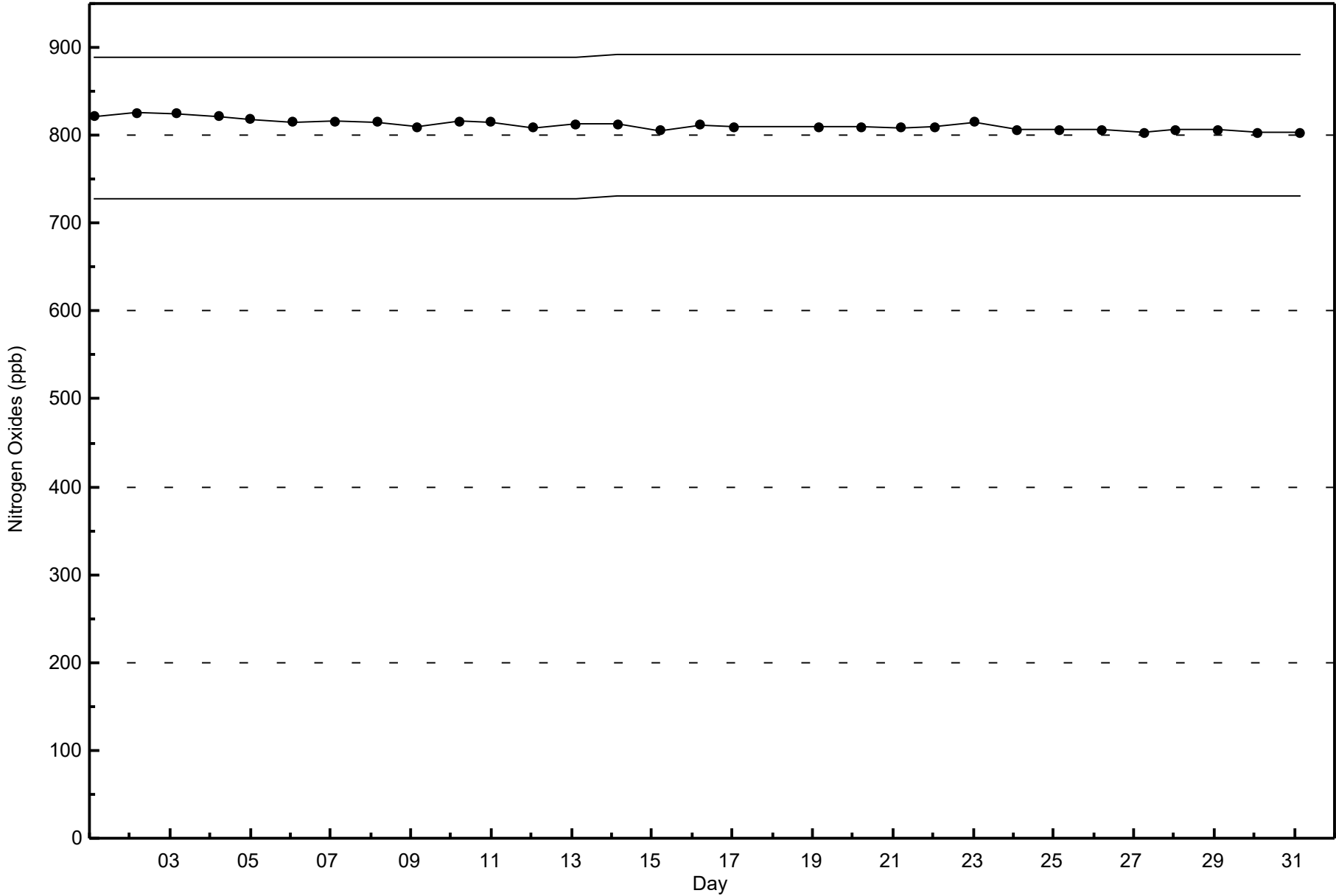


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Nitrogen Oxides (NO_x) - ppb
Jackfish 2/3









Wood Buffalo Environmental Association
Summary of Hour Averages

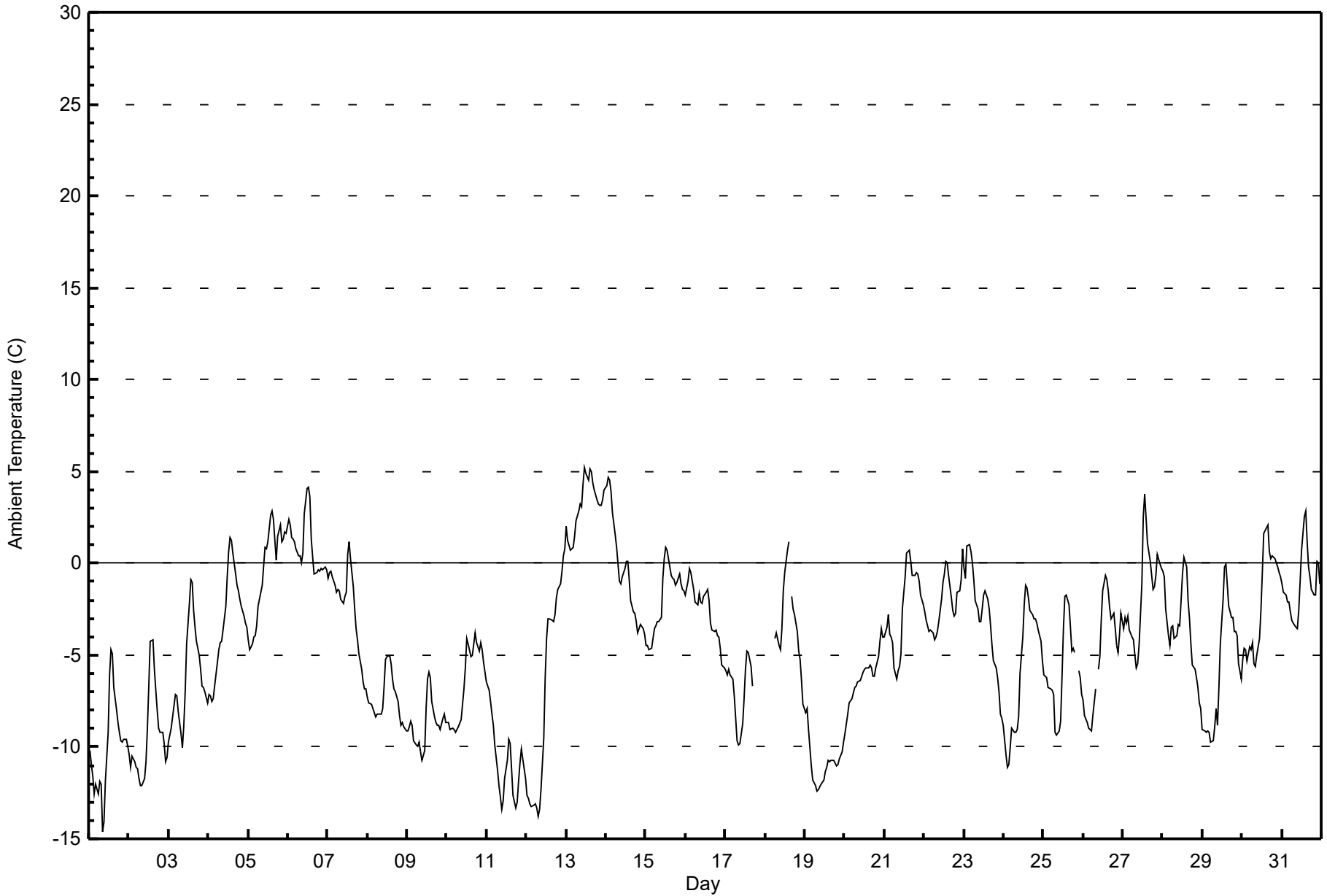
Ambient Temperature (AT) - C
Jackfish 2/3 - December 2023

Maximum Value: 5.2 C on Dec 13 12:00		Maximum Daily Average: 3.2 C on Dec 13		Hours in Service: 744																							
Minimum Value: -14.6 C on Dec 1 09:00		Minimum Daily Average: -10.8 C on Dec 19		Hours of Data: 728																							
Maximum Diurnal Average: -1.4 C at hour 14		Minimum Diurnal Average: -6.3 C at hour 9		Hours of Missing Data: 16																							
Monthly Average: -4.45 C		Percentiles: P ₁ = -13.2 P ₁₀ = -10.2 Q ₁ = -7.9 Median = -4.1 Q ₃ = -1.2 P ₉₀ = 0.8 P ₉₉ = 4.3		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-Dec	-10.2	-11.0	-11.5	-12.6	-12.0	-12.5	-11.9	-12.0	-14.6	-14.1	-11.9	-9.2	-6.1	-4.7	-4.9	-6.8	-8.0	-8.6	-9.2	-9.7	-9.8	-9.6	-9.6	-9.9	-10.0	-4.7	
2-Dec	-10.4	-11.1	-10.5	-10.8	-11.1	-11.2	-11.8	-12.1	-12.1	-11.7	-10.8	-9.0	-6.7	-4.3	-4.2	-5.8	-6.9	-8.0	-8.9	-9.2	-9.2	-9.8	-10.8	-10.6	-9.5	-4.2	
3-Dec	-9.7	-9.0	-8.4	-7.8	-7.2	-7.2	-8.0	-9.3	-10.0	-8.8	-7.0	-4.4	-2.2	-0.9	-1.1	-2.5	-3.5	-4.3	-5.0	-5.7	-6.7	-6.7	-7.0	-7.6	-6.3	-0.9	
4-Dec	-7.1	-7.2	-7.5	-7.4	-6.7	-5.4	-4.7	-4.3	-4.2	-3.7	-2.3	-0.7	0.6	1.4	1.2	0.5	-0.6	-1.2	-1.5	-2.0	-2.3	-2.9	-3.2	-3.5	-3.1	1.4	
5-Dec	-4.2	-4.7	-4.4	-4.0	-4.0	-3.4	-2.3	-2.0	-1.2	-0.1	0.9	0.8	1.2	2.6	2.9	2.4	1.3	0.2	1.4	2.1	1.2	1.3	1.7	1.6	-0.4	2.9	
6-Dec	2.4	2.1	1.4	1.3	1.2	0.8	0.4	0.4	0.1	0.6	2.7	4.0	4.1	3.6	1.3	0.4	-0.6	-0.5	-0.3	-0.4	-0.3	-0.4	-0.2	-0.3	1.0	4.1	
7-Dec	-0.8	-0.5	-0.5	-0.8	-1.2	-1.6	-1.4	-1.5	-2.0	-2.2	-1.8	-1.6	0.5	1.2	0.3	-1.2	-2.5	-3.6	-4.2	-4.9	-5.8	-6.4	-6.8	-6.9	-2.3	1.2	
8-Dec	-7.3	-7.6	-7.7	-7.9	-8.1	-8.4	-8.2	-8.2	-8.2	-7.9	-6.7	-5.2	-5.1	-5.0	-5.5	-6.3	-6.8	-7.0	-7.5	-8.3	-8.8	-8.7	-8.9	-9.1	-7.4	-5.0	
9-Dec	-9.1	-8.9	-8.6	-8.9	-9.7	-9.9	-10.0	-9.7	-10.3	-10.7	-10.2	-7.9	-6.3	-5.9	-6.2	-7.5	-8.4	-8.7	-8.8	-8.8	-9.0	-8.5	-8.2	-8.7	-8.7	-5.9	
10-Dec	-8.7	-8.7	-9.0	-9.0	-9.1	-9.2	-9.0	-8.9	-8.5	-7.7	-6.8	-5.7	-4.1	-4.4	-5.1	-5.0	-4.4	-3.8	-4.3	-4.8	-4.3	-4.7	-5.4	-5.9	-6.5	-3.8	
11-Dec	-6.5	-6.9	-7.5	-8.2	-8.8	-9.9	-11.3	-12.1	-12.7	-13.4	-12.9	-11.7	-10.7	-9.6	-9.8	-11.2	-12.6	-13.3	-13.0	-11.8	-10.9	-10.1	-10.6	-11.8	-10.7	-6.5	
12-Dec	-12.7	-12.8	-13.1	-13.2	-13.2	-13.1	-13.3	-13.7	-13.4	-12.3	-9.5	-6.2	-4.1	-3.0	-3.1	-3.1	-3.1	-2.8	-1.9	-1.4	-1.1	-0.4	0.4	0.8	-7.1	0.8	
13-Dec	2.0	1.2	0.7	0.8	0.9	1.5	2.3	2.9	3.2	3.1	4.3	5.2	4.9	4.5	5.1	5.0	4.3	4.0	3.4	3.2	3.1	3.2	3.4	4.0	3.2	5.2	
14-Dec	4.2	4.7	4.6	3.9	2.7	1.6	0.8	0.0	-1.0	-1.1	-0.8	-0.3	0.1	0.1	-0.9	-2.0	-2.6	-2.7	-3.2	-3.8	-3.6	-3.3	-3.5	-3.9	-0.4	4.7	
15-Dec	-4.5	-4.5	-4.7	-4.6	-4.1	-3.6	-3.4	-3.2	-3.1	-3.0	-0.8	0.3	0.9	0.7	0.2	-0.2	-0.6	-0.8	-0.9	-1.2	-1.1	-0.6	-1.1	-1.4	-1.5	-2.0	0.9
16-Dec	-1.7	-1.0	-0.3	-0.5	-0.9	-1.4	-2.1	-2.2	-1.7	-2.1	-2.2	-1.8	-1.5	-1.4	-2.0	-3.3	-3.6	-3.7	-3.6	-3.9	-4.0	-4.6	-5.5	-5.7	-2.5	-0.3	
17-Dec	-5.9	-6.1	-5.7	-6.1	-6.3	-7.2	-8.4	-9.6	-9.9	-9.8	-8.8	-7.3	-5.8	-4.8	-4.9	-5.6	-6.7	DF	DF	DF	DF	DF	DF	DF	--	-4.8	
18-Dec	DF	DF	DF	DF	DF	DF	-4.1	-3.8	-4.5	-4.7	-3.6	-1.5	-0.5	0.7	1.2	DF	-1.8	-2.5	-2.8	-3.7	-4.8	-5.2	-6.4	-7.6	--	1.2	
19-Dec	-8.1	-7.9	-9.1	-10.0	-11.0	-11.8	-12.1	-12.4	-12.3	-12.2	-12.1	-11.8	-11.3	-11.1	-10.8	-10.8	-10.7	-10.7	-10.9	-11.1	-11.0	-10.7	-10.2	-9.7	-10.8	-7.9	
20-Dec	-9.3	-8.8	-8.2	-7.6	-7.3	-7.1	-6.8	-6.7	-6.5	-6.4	-6.2	-5.9	-5.8	-5.7	-5.7	-5.6	-5.7	-6.1	-6.1	-5.7	-5.1	-4.2	-3.5	-4.0	-6.2	-3.5	
21-Dec	-4.0	-3.5	-2.8	-3.8	-4.0	-4.4	-5.7	-6.3	-5.9	-5.6	-4.9	-2.5	-0.7	0.6	0.6	0.7	0.1	-0.7	-0.7	-0.5	-0.6	-0.9	-1.8	-2.2	-2.5	0.7	
22-Dec	-2.7	-3.1	-3.4	-3.7	-3.6	-3.8	-4.2	-4.0	-3.7	-3.2	-1.9	-1.1	-0.6	0.1	0.0	-0.6	-1.9	-2.6	-2.8	-2.7	-1.6	-1.5	-0.9	0.8	-2.2	0.8	
23-Dec	-0.3	-0.8	1.0	1.0	0.6	0.0	-0.9	-2.0	-2.5	-3.2	-3.2	-2.5	-1.7	-1.5	-1.9	-2.5	-3.4	-4.5	-5.3	-5.7	-6.2	-7.0	-8.2	-8.4	-2.9	1.0	
24-Dec	-8.8	-10.4	-11.1	-11.0	-10.1	-9.0	-9.2	-9.2	-9.0	-8.4	-6.0	-4.0	-2.3	-1.2	-1.3	-1.9	-2.6	-2.8	-3.0	-3.0	-3.3	-3.7	-4.3	-5.3	-5.9	-1.2	
25-Dec	-6.1	-6.2	-6.2	-6.7	-6.9	-6.9	-7.2	-9.2	-9.3	-9.1	-8.6	-6.1	-3.6	-1.8	-1.7	-2.3	-3.5	-4.7	-4.7	-4.9	DF	-5.9	-6.2	-7.2	-5.9	-1.7	
26-Dec	-7.4	-8.3	-8.7	-8.9	-9.1	-9.1	-8.3	-6.9	DF	-5.8	-5.1	-3.1	-1.5	-0.7	-0.9	-1.5	-2.5	-3.0	-2.7	-3.6	-4.5	-4.9	-3.9	-2.7	-4.9	-0.7	
27-Dec	-3.5	-2.9	-3.3	-2.9	-3.6	-4.0	-4.2	-5.0	-5.7	-5.5	-4.5	-1.1	2.5	3.8	2.5	1.1	0.1	-0.7	-1.5	-1.3	-0.7	0.5	0.0	-0.2	-1.7	3.8	
28-Dec	-0.4	-0.7	-2.5	-3.9	-4.5	-3.5	-3.4	-4.1	-3.9	-3.3	-3.4	-2.0	-0.6	0.3	-0.2	-2.1	-3.0	-4.4	-5.5	-5.8	-6.2	-6.8	-7.6	-7.9	-3.6	0.3	
29-Dec	-9.1	-9.1	-9.2	-9.1	-9.2	-9.7	-9.6	-8.9	-7.9	-8.8	-6.7	-4.4	-1.9	-0.2	-0.1	-1.2	-2.3	-3.0	-3.0	-3.7	-3.7	-3.9	-5.5	-6.3	-5.7	-0.1	
30-Dec	-5.2	-4.7	-4.7	-5.3	-4.6	-4.7	-4.3	-5.5	-5.6	-5.0	-4.1	-2.5	-0.5	1.6	1.8	2.1	0.6	0.3	0.4	0.3	0.2	-0.2	-0.5	-0.7	-2.1	2.1	
31-Dec	-1.1	-1.6	-1.7	-2.1	-2.1	-2.7	-3.1	-3.2	-3.5	-3.5	-2.6	-0.9	0.7	2.6	2.9	1.1	-0.2	-0.8	-1.4	-1.7	-1.7	0.1	0.1	-1.1	-1.1	2.9	
		-5.2	-5.3	-5.4	-5.7	-5.8	-5.9	-6.0	-6.2	-6.3	-6.1	-5.1	-3.6	-2.2	-1.4	-1.6	-2.5	-3.3	-3.7	-3.9	-4.1	-4.2	-4.2	-4.5	-4.7	Diurnal Average	
		4.2	4.7	4.6	3.9	2.7	1.6	2.3	2.9	3.2	3.1	4.3	5.2	4.9	4.5	5.1	5.0	4.3	4.0	3.4	3.2	3.1	3.2	3.4	4.0	Diurnal Maximum	
DF - DAS Failure																											



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature (AT) - C
Jackfish 2/3 - December 2023





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C
Jackfish 2/3 - December 2023**

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	619	85.03	85.03
0 - 10	109	14.97	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 728

Total Number of Hours: 744



Wood Buffalo Environmental Association
Summary of Hour Averages

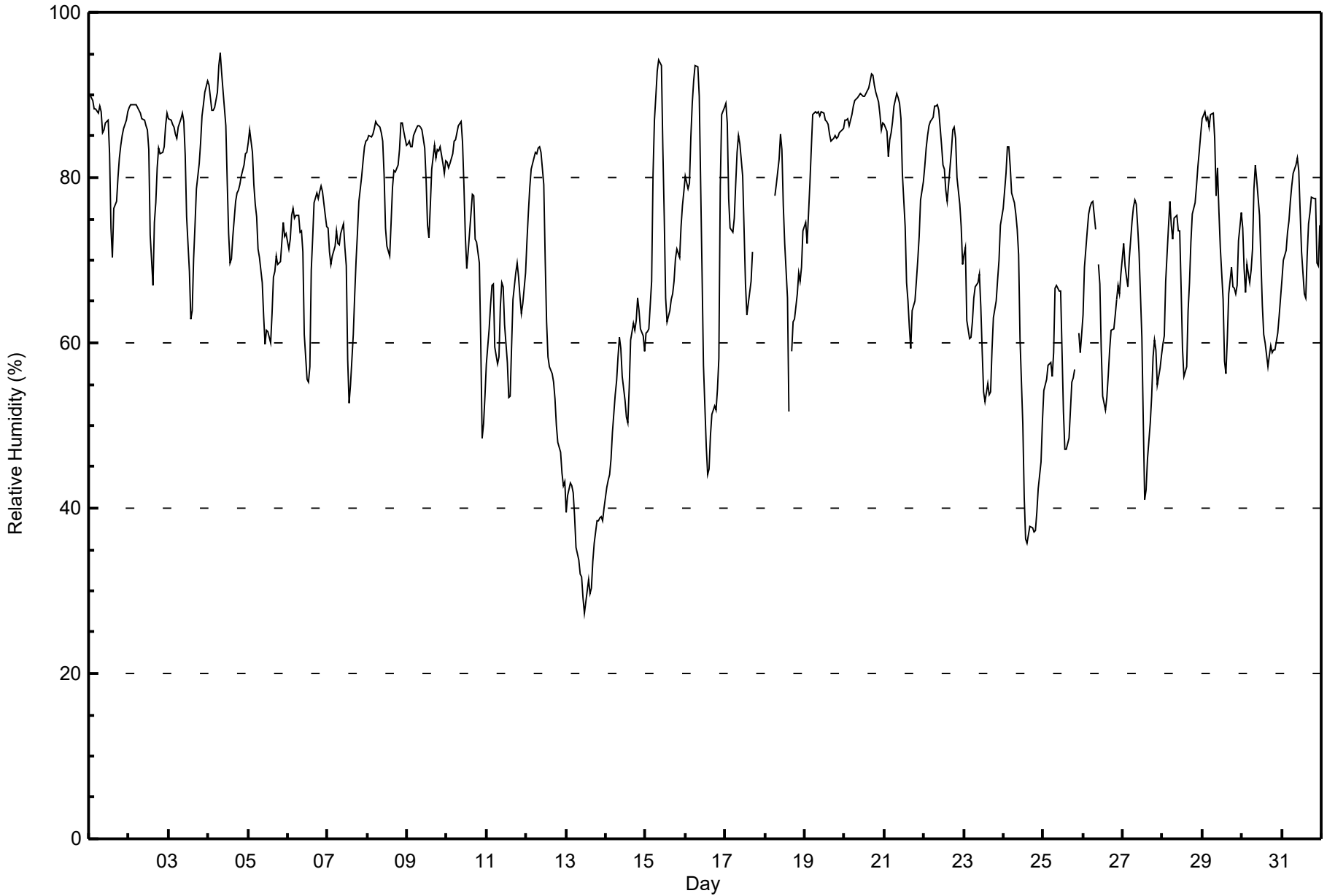
Relative Humidity (RH) - %
Jackfish 2/3 - December 2023

Maximum Value: 95.1 % on Dec 4 08:00 Maximum Daily Average: 89.2 % on Dec 20 Minimum Value: 27.2 % on Dec 13 12:00 Minimum Daily Average: 35.8 % on Dec 13 Maximum Diurnal Average: 79.2 % at hour 9 Minimum Diurnal Average: 60.8 % at hour 14 Monthly Average: 71.75 % Percentiles: P ₁ = 32.5 P ₁₀ = 52.9 Q ₁ = 62.6 Median = 73.9 Q ₃ = 83.8 P ₉₀ = 87.7 P ₉₉ = 92.6																						Hours in Service: 744 Hours of Data: 728 Hours of Missing Data: 16 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-Dec	90.1	89.6	89.3	88.3	88.3	87.8	88.6	88.0	85.4	85.8	86.6	87.0	82.9	73.9	70.4	76.2	77.1	80.0	82.4	83.9	85.0	85.9	86.9	88.0	84.5	90.1																						
2-Dec	88.5	88.8	88.9	88.8	88.9	88.5	88.1	87.7	87.2	86.9	86.3	85.7	83.4	73.1	66.9	74.6	76.9	81.1	83.6	82.8	83.1	83.7	86.2	87.7	84.1	88.9																						
3-Dec	87.2	86.9	86.4	86.2	85.3	84.7	86.1	87.2	87.8	86.8	82.7	75.2	68.6	62.9	64.0	70.2	74.3	78.6	81.8	84.2	87.4	88.8	90.3	91.7	81.9	91.7																						
4-Dec	91.1	89.7	88.2	88.1	88.5	90.3	93.5	95.1	92.7	90.4	86.2	79.5	73.1	69.6	70.2	72.9	77.1	78.2	78.5	79.2	80.2	81.6	83.0	83.0	83.3	95.1																						
5-Dec	84.3	85.8	83.0	79.2	76.8	75.3	71.4	70.3	67.4	63.3	59.9	61.5	61.4	59.9	63.6	67.9	68.7	70.6	69.5	69.8	72.2	74.6	72.9	73.2	70.9	85.8																						
6-Dec	71.4	72.6	75.4	76.2	75.1	75.5	75.4	73.5	73.6	71.0	61.1	55.6	55.3	57.1	68.8	72.8	76.9	78.1	77.4	78.2	79.0	78.4	75.4	74.1	72.0	79.0																						
7-Dec	73.9	71.1	69.5	70.6	71.7	73.6	72.0	71.9	73.2	74.4	71.6	69.3	57.9	52.7	54.9	61.0	65.8	70.0	73.5	77.1	80.1	82.0	83.7	84.4	71.1	84.4																						
8-Dec	84.5	85.0	85.0	85.2	86.0	86.9	86.4	86.0	85.5	84.4	80.3	73.9	71.7	70.5	74.5	78.8	80.9	80.7	81.5	83.4	86.6	86.7	85.7	83.9	82.2	86.9																						
9-Dec	84.0	84.4	83.7	83.8	85.1	85.9	86.2	86.2	86.1	85.8	83.6	79.6	74.2	72.8	76.5	81.0	84.0	82.3	83.5	83.2	83.8	81.6	80.5	82.0	82.5	86.2																						
10-Dec	81.9	81.3	81.7	82.8	84.5	84.7	85.5	86.2	86.7	84.3	79.0	72.9	69.0	71.0	75.5	78.0	77.7	72.5	72.2	69.6	59.9	48.5	50.1	53.5	74.5	86.7																						
11-Dec	57.5	61.6	64.6	66.9	67.1	59.5	57.5	58.3	64.4	67.2	66.8	62.3	57.6	53.4	53.6	59.6	65.3	68.4	69.7	68.0	65.6	63.6	64.7	68.5	63.0	69.7																						
12-Dec	72.4	75.7	78.7	81.1	82.4	83.1	82.9	83.5	83.7	83.0	79.2	70.3	62.6	58.3	57.2	56.2	55.2	53.2	50.0	48.0	46.8	44.2	42.6	43.2	65.6	83.7																						
13-Dec	39.5	41.6	43.1	42.6	41.9	39.0	35.3	33.8	32.1	31.8	29.2	27.2	28.7	31.4	29.6	30.3	33.5	35.8	38.4	38.4	38.8	39.0	38.5	40.0	35.8	43.1																						
14-Dec	42.6	43.4	44.1	45.9	49.2	53.6	55.5	58.3	60.7	59.3	56.0	53.0	51.0	50.4	54.5	60.3	62.4	61.5	62.6	65.5	63.9	61.7	60.8	59.0	55.6	65.5																						
15-Dec	61.2	61.4	61.6	67.5	80.4	87.0	89.9	92.9	94.3	93.5	83.5	75.2	65.5	62.6	63.8	65.2	65.9	67.5	70.2	71.3	70.3	74.1	76.7	78.3	74.2	94.3																						
16-Dec	80.2	78.7	79.3	85.0	89.1	91.7	93.6	93.4	89.8	79.2	68.4	57.4	47.5	44.0	44.7	48.8	51.3	52.4	51.8	54.4	58.1	79.1	87.7	88.5	70.6	93.6																						
17-Dec	88.9	86.7	77.5	73.9	73.3	75.0	79.2	83.1	85.1	84.1	80.2	73.8	67.1	63.4	64.7	67.4	70.9	DF	DF	DF	DF	DF	DF	DF	--	88.9																						
18-Dec	DF	DF	DF	DF	DF	DF	77.8	79.2	82.3	85.2	83.4	76.6	72.0	65.4	51.7	DF	58.9	62.5	62.8	66.0	68.5	67.5	69.2	73.5	--	85.2																						
19-Dec	74.6	72.0	75.6	79.3	83.6	87.7	88.1	87.7	88.0	87.4	88.0	87.9	86.9	86.8	86.5	85.3	84.4	84.7	85.1	84.8	84.9	85.5	85.8	85.9	84.4	88.1																						
20-Dec	86.9	87.0	87.1	86.3	87.6	88.6	89.3	89.6	89.7	90.1	89.9	89.8	89.9	90.3	90.9	91.8	92.5	92.4	91.3	90.4	89.2	87.6	85.7	86.6	89.2	92.5																						
21-Dec	86.4	85.6	82.5	84.6	85.4	86.7	88.7	90.2	89.6	89.0	87.2	80.5	74.0	67.3	65.1	61.8	59.3	63.9	65.1	67.4	70.0	72.9	77.3	79.5	77.5	90.2																						
22-Dec	81.4	83.5	85.1	86.3	86.8	87.3	88.6	88.7	88.8	88.1	83.9	81.5	81.1	78.4	77.2	79.1	83.3	85.7	86.2	84.7	79.9	76.8	74.1	69.5	82.7	88.8																						
23-Dec	70.7	71.5	62.8	60.5	60.8	62.6	65.4	66.9	67.2	68.4	64.3	58.9	54.0	52.8	55.0	53.8	54.0	59.1	63.1	65.0	67.5	70.1	74.3	75.3	63.5	75.3																						
24-Dec	76.3	80.5	83.7	83.8	81.4	78.1	77.0	75.6	73.7	70.7	60.5	50.1	41.3	36.3	35.8	36.7	37.7	37.6	37.1	37.3	39.4	42.4	45.6	50.4	57.0	83.8																						
25-Dec	54.2	54.9	55.6	57.2	57.7	56.0	58.9	66.6	66.9	66.3	66.2	59.0	51.8	47.0	47.1	48.5	51.9	55.2	55.8	56.8	DF	61.1	58.9	61.1	57.2	66.9																						
26-Dec	63.4	69.1	73.5	75.7	76.4	76.9	77.1	73.7	DF	69.5	67.2	59.1	53.5	51.8	53.3	56.0	59.1	61.5	61.7	63.4	65.2	66.9	65.9	68.4	65.6	77.1																						
27-Dec	72.0	69.3	67.9	66.8	70.1	74.7	76.5	77.2	76.8	74.1	70.9	60.7	50.4	41.0	42.2	46.0	50.3	53.6	58.4	60.4	59.1	55.0	57.0	58.5	62.0	77.2																						
28-Dec	59.8	60.9	67.5	74.0	77.1	74.3	72.5	75.1	75.4	73.5	73.6	66.8	59.3	55.9	57.2	64.0	67.2	72.2	75.5	77.0	78.9	81.3	83.2	85.3	71.1	85.3																						
29-Dec	87.1	88.0	86.9	87.3	86.2	87.6	87.8	84.7	77.7	81.2	76.0	71.5	65.2	57.8	56.3	60.6	65.9	69.2	66.8	66.5	65.9	66.9	72.3	75.7	74.6	88.0																						
30-Dec	74.0	69.1	66.2	69.4	67.4	68.8	71.3	78.7	81.6	79.6	75.5	69.9	64.6	61.0	60.0	57.2	58.5	59.6	58.8	59.2	59.2	61.1	63.2	65.4	66.6	81.6																						
31-Dec	67.6	70.0	71.2	73.4	74.8	77.2	78.9	80.5	81.5	82.3	80.8	76.0	70.9	65.9	65.4	70.5	74.4	75.8	77.6	77.5	77.5	69.6	69.4	74.3	74.3	82.3																						
																								74.4	74.9	74.9	75.9	76.9	77.6	78.2	79.0	79.2	77.9	74.4	69.3	64.3	60.8	61.2	64.4	66.5	68.1	69.1	69.8	70.6	70.6	71.6	72.9	Diurnal Average
																								91.1	89.7	89.3	88.8	89.1	91.7	93.6	95.1	94.3	93.5	89.9	89.8	89.9	90.3	90.9	91.8	92.5	92.4	91.3	90.4	89.2	88.8	90.3	91.7	Diurnal Maximum
DF - DAS Failure																																																



Wood Buffalo Environmental Association
Hourly Averages

Relative Humidity (RH) - %
Jackfish 2/3 - December 2023





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Relative Humidity (RH) - %
Jackfish 2/3 - December 2023

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	27	3.71	3.71
40 - 60	122	16.76	20.47
60 - 80	325	44.64	65.11
80 - 100	254	34.89	100.00

Total Number of Valid Hours: 728

Total Number of Hours: 744



Maximum Speed: 17 km/h on Dec 15 21:00	Maximum Daily Speed Average: 12.0 km/h on Dec 15	Hours in Service: 744
Minimum Speed Value: 2 km/h on Dec 28 04:00	Minimum Daily Speed Average: 3.5 km/h on Dec 28	Hours of Data: 728
Maximum Diurnal Speed Average: 8.6 km/h at hour 13	Minimum Diurnal Speed Average: 7.1 km/h at hour 4	Hours of Missing Data: 16
Monthly Average Velocity: 7.8 km/h 227.8 deg	Percentiles: P ₁ = 3 P ₁₀ = 6 Q ₁ = 8 Median = 9 Q ₃ = 11 P ₉₀ = 13 P ₉₉ = 16	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-Dec	SW7	SW7	SW8	SW7	SW8	SW8	SSW7	SSW6	S6	S6	S6	SSW5	SSW6	SW7	SSW6	S6	SSW7	SSW7	S7	S7	S7	SSW7	SSW8	SSW7	SSW6.6	SW8
2-Dec	S6	S7	SSW10	SSW9	SSW9	SSW10	SSW9	SSW9	SSW7	S9	SSW9	S8	SSW8	SSW6	SW7	SW5	SW6	SW7	SW8	WSW10	WSW10	WSW8	WSW7	WSW7	SSW7.5	WSW10
3-Dec	WSW6	WSW6	WSW6	WSW7	WSW6	SW6	SSW7	SSW8	SSW9	SSW9	SW8	SW7	SW8	SW6	SSW6	S6	S7	S7	S8	S7	S7	S8	S7	SSW7	SSW6.3	SSW9
4-Dec	SSW9	SSW9	SW9	SW8	SSW8	SW10	SW9	SW9	SW11	WSW9	WSW11	WSW12	WSW13	WSW15	WSW13	WSW11	WSW9	WSW9	SW9	SW8	SW9	SW9	SSW9	SSW9	SSW9.5	WSW15
5-Dec	S8	S7	S7	S7	S9	S8	S8	S9	S9	SSW10	SW12	SW14	SW13	WSW14	WSW13	WSW11	SW11	SW10	WSW12	WSW13	WSW13	WSW14	WSW14	WSW14	SSW9.6	WSW14
6-Dec	WSW13	WSW13	WSW12	WSW13	WSW14	WSW13	WSW13	WSW12	WSW12	WSW13	WSW14	W12	WSW11	WSW9	SW9	SW8	SW8	SSW8	SW9	SW9	SW8	WSW8	WSW9	WSW9	WSW10.5	WSW14
7-Dec	WNW5	WNW6	W5	W5	WSW8	WSW9	WSW10	WSW10	WSW10	W8	W9	W8	W7	W7	W6	W6	WSW6	W5	W6	W6	WSW7	WSW7	W6	W7	W6.9	WSW10
8-Dec	WSW8	WSW9	WSW9	WSW9	WSW9	WSW9	WSW10	WSW11	WSW11	WSW10	WSW10	WSW12	WSW13	WSW12	WSW12	WSW11	WSW10	WSW11	WSW10	WSW9	SW8	WSW9	WSW9	WSW9	WSW9.8	WSW13
9-Dec	WSW9	WSW11	WSW12	WSW11	WSW12	WSW12	WSW13	WSW13	WSW8	SW8	SW9	SW10	SW10	SW8	SSW7	SSW7	SSW7	SSW7	S7	S7	S7	SSW6	S7	S7	SW8.0	WSW13
10-Dec	SSE7	S6	S7	S7	SSW8	SSW8	SSW9	SW9	SSW11	SW12	SW13	SW13	WSW15	WSW15	WSW12	WSW11	WSW12	W11	W11	W10	W14	WNW17	WNW15	WNW12	WSW8.9	WNW17
11-Dec	WNW14	WNW15	WNW14	NW13	NW13	NW12	NW12	NW10	WNW8	W8	WSW10	W9	W9	W7	WSW9	SW7	SW6	SSW9	SSW9	SSW10	SSW9	SW10	SSW9	SSW8	W7.5	WNW15
12-Dec	SSW9	SW10	SW9	SW9	SW11	SW11	SW10	SSW9	SSW11	SW11	SW11	SSW10	SW11	SW11	SSW11	SW12	SSW13	SW12	SW13	SW13	SW13	SW14	SW14	SW13	SW11.2	SW14
13-Dec	SW13	SW13	SW12	SSW12	SW12	SW12	SW14	SW13	SW12	SW11	SW12	SW12	SSW11	SSW11	SW11	SW11	SW11	SW12	SW10	WSW9	WSW9	WSW9	W6	W8	SW10.8	SW14
14-Dec	W7	W8	W8	WNW10	W8	W7	W9	W9	W9	WSW11	WSW11	WSW9	WSW9	WSW6	SW6	SSW7	SW9	SW10	SW9	SW8	SW11	WSW11	SW11	SW10	WSW8.3	WSW11
15-Dec	SSW9	SSW9	SSW9	SSW10	SW11	SW12	SW11	SW10	SW10	SW10	SW15	SW14	SSW15	SSW13	SSW8	SSW12	SSW14	SSW14	SSW14	SW14	SW17	SW16	SW14	SW12	SSW12.0	SW17
16-Dec	WSW14	WSW13	WSW17	WSW16	W12	W11	W11	W8	WNW8	NW8	WNW7	NW9	NW9	WNW9	WNW7	W7	WSW8	WSW8	W6	WSW6	WNW5	NW8	WNW7	W8	W8.5	WSW17
17-Dec	W10	W11	WNW12	NW12	NW12	NW8	WNW8	W7	W8	WSW8	WSW9	SW11	WSW12	WSW15	SW11	SW8	SSW8	DF	DF	DF	DF	DF	DF	DF	---	WSW15
18-Dec	DF	DF	DF	DF	DF	DF	WSW12	WSW11	W10	W9	WSW12	WSW12	W10	W8	WNW9	DF	WSW9	W7	W6	WNW7	WNW5	WNW7	W5	W5	---	WSW12
19-Dec	WNW4	NW3	NNE2	NE2	NE4	ENE5	ENE5	ENE6	ENE6	ENE7	ENE6	E6	E6	E6	E6	E8	ESE7	ESE8	ESE7	SE9	SE8	SE7	SE8	SE9	E4.7	SE9
20-Dec	SE8	SSE7	SSE7	S8	S9	S10	S9	SSW9	SSW8	SSW10	SSW9	SW10	SW10	SW9	SW9	SW10	SSW10	SSW11	SSW11	SSW12	SSW12	SW13	SW16	SW13	SSW9.2	SW16
21-Dec	SW11	SW12	WSW13	W9	W7	WSW9	SW9	SW9	SW8	SSW8	SSW8	SW9	SSW9	SW11	SSW11	SSW10	SSW9	SSW9	SSW10	SSW12	SSW10	SSW9	SSW9	SSW9	SW9.0	WSW13
22-Dec	SSW9	SSW9	SSW10	SSW9	SSW9	SSW9	SSW9	S10	S9	SSW9	SSW8	S9	S8	SSW8	SSW9	SSW9	SSW10	SSW10	SSW10	SW11	WSW13	WSW12	W11	WNW11	SSW8.6	WSW13
23-Dec	W9	W9	WNW13	W11	W13	WNW13	WNW13	WNW14	WNW13	WNW13	WNW12	WNW13	WNW13	WNW13	WNW12	WNW10	WNW9	W9	W8	WSW9	WSW10	WSW9	WSW10	WSW10	W10.8	WNW14
24-Dec	WSW9	SW8	SW8	SW8	WSW11	SW10	SSW9	SSW10	SW10	SW11	WSW13	WSW16	WSW16	WSW17	SW16	SW13	SW11	SW12	SW13	SW14	SW15	SW13	SW12	SSW12	SW11.8	WSW17
25-Dec	SSW12	SSW13	SSW12	SSW12	SSW12	SSW11	SW10	SW11	SW10	SW10	SSW9	SSW9	SSW8	SSW8	S8	S8	S7	SSW7	SSW8	SSW7	DF	S8	S9	S9	SSW9.2	SSW13
26-Dec	S9	S11	S10	S9	S11	S10	SSW10	SSW12	DF	SSW10	SSW10	SSW11	SSW9	SW11	SW11	SW13	SSW14	SW12	SW12	SW12	SW11	SW11	WSW12	WSW11	SSW10.4	SSW14
27-Dec	WSW10	WSW11	SW10	SW10	SSW10	SSW10	SSW10	SSW10	SSW9	SW8	SSW6	SSW7	SSW9	SSW9	SSW9	S8	S7	S8	S8	S10	S8	SSW8	S8	S8	SSW8.2	WSW11
28-Dec	SSW7	SSW5	SSW2	SSW2	S2	S6	SW7	WSW9	W5	W4	WNW5	WNW5	NW4	WNW5	NW4	WNW3	WNW6	W6	WNW6	NW6	NNW4	NW4	WNW4	W3	W3.5	WSW9
29-Dec	WSW4	WSW3	WSW5	WSW4	WSW5	SSW3	SSW4	SSW6	SSW7	SSW8	SSW9	SSW10	SW11	SW10	SW10	SW10	SSW11	SSW10	SSW10	SSW9	SSW10	SSW10	S10	S10	SSW7.5	SW11
30-Dec	S9	SSW8	S8	SSW7	SSW7	SSW7	SSW8	S9	S9	S9	S10	S9	S8	S10	S9	S10	S10	S11	S12	SSW11	SSW15	SSW16	SSW15	SSW15	S9.8	SSW16
31-Dec	SSW14	SSW13	SW13	SW12	SW13	SSW12	SW13	SW13	SW13	SW11	SW11	SW11	SW10	SW11	SW9	SSW8	SW9	SW9	SW10	SW10	WSW11	W11	W14	W12	SW10.8	SSW14

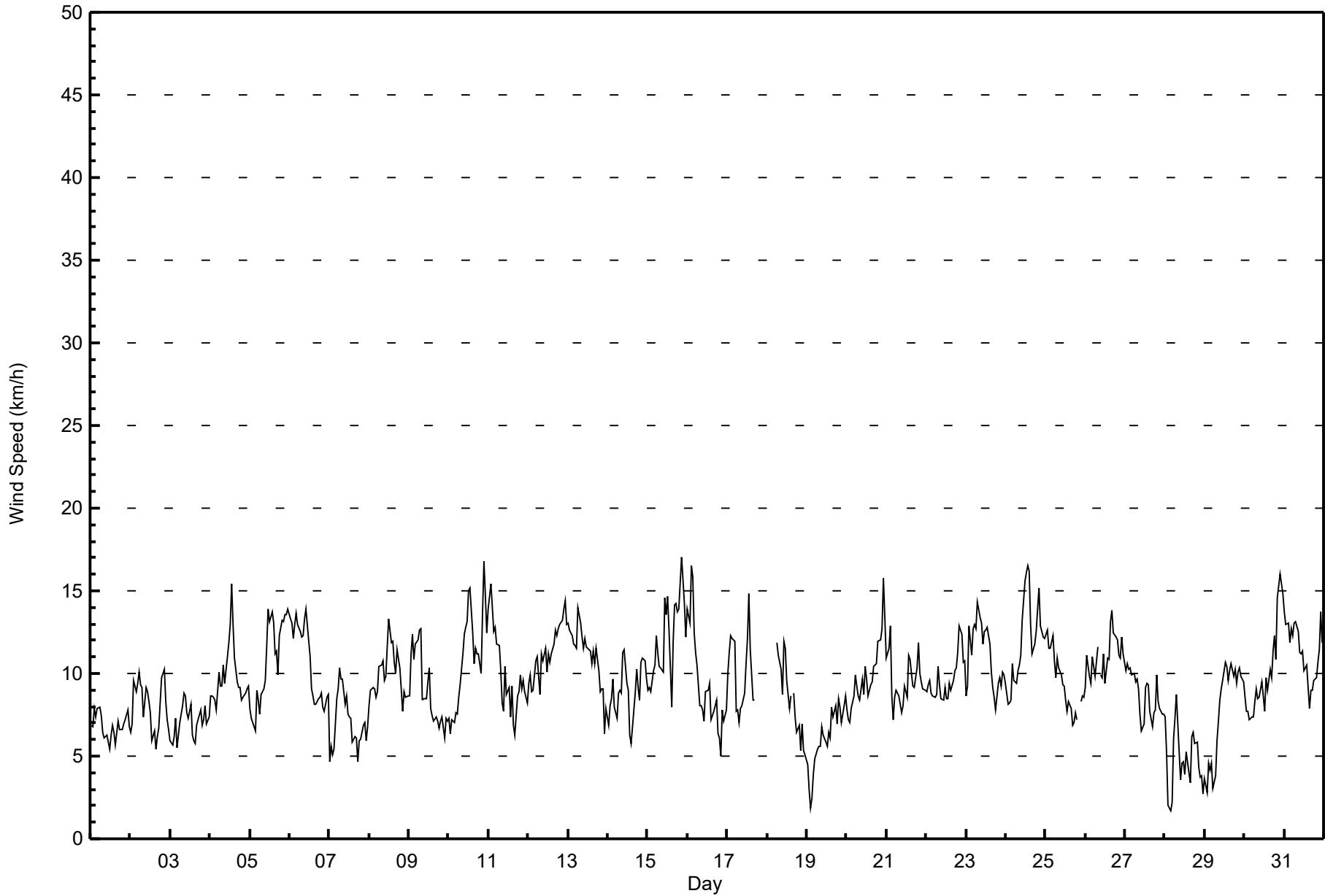
SW7.3 SW7.3 SW7.4 SW7.1 SW7.4 SW7.5 SW7.8 SW7.8 SW7.6 SW7.6 SW8.3 SW8.3 SW8.6 SW8.5 SW7.7 SW7.6 SW7.8 SW7.9 SW8.0 SW8.1 SW8.5 SW8.3 SW8.1 SW7.7	Diurnal Average
WSW14WNW15WSW17WSW16WSW14WSW13 SW14WNW14WNW13WSW13 SW15WSW16WSW16WSW17WSW16 SW13SSW14SSW14SSW14 SW14 SW17WNW17 SW16SSW15	Diurnal Maximum

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



Wood Buffalo Environmental Association
Hourly Averages

Wind Speed (WS) - km/h
Jackfish 2/3 - December 2023





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Wind Speed (WS) - km/h
Jackfish 2/3 - December 2023

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	40	5.49	5.49
6 - 11	523	71.84	77.34
12 - 19	165	22.66	100.00
20 - 28	0	0.00	100.00
29 - 38	0	0.00	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 728

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Wind Speed (WS) - km/h
Jackfish 2/3 - December 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	2	2	0	0	0	0	1	6	1	5	8	9	4	1	40
6 - 11	0	0	0	4	5	3	6	3	79	141	120	84	53	18	7	0	523
12 - 19	0	0	0	0	0	0	0	0	1	26	54	55	5	18	6	0	165
20 - 28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	0	1	2	6	5	3	6	3	81	173	175	144	66	45	17	1	728

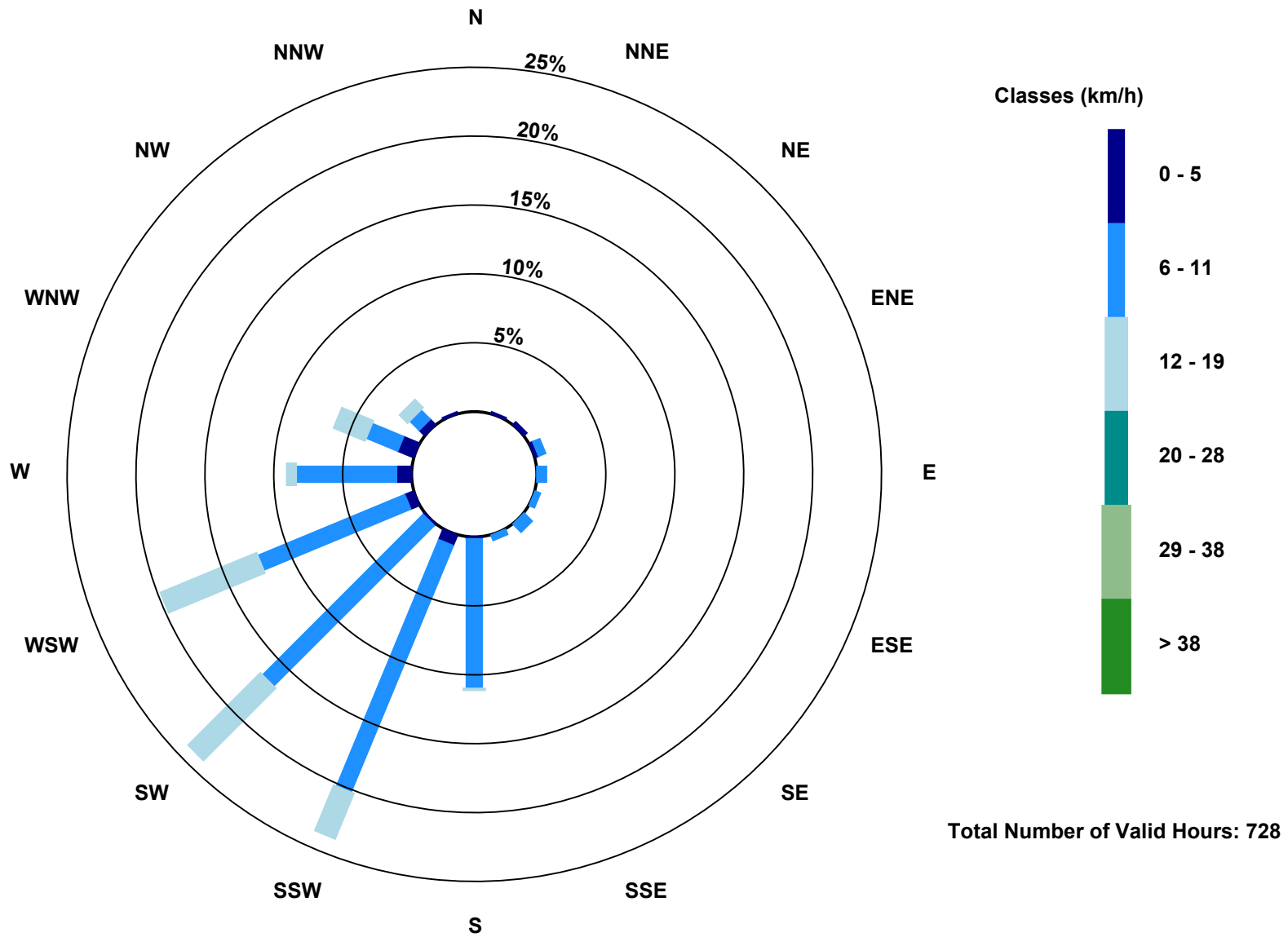
Total Number of Valid Hours: 728

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Dec 2023

Wind Speed (WS) - km/h
Jackfish 2/3





Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Speed (WS) - km/h
Jackfish 2/3 - December 2023

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 8 km/h on Dec 10 22:00																	Hours in Service: 744 Hours of Data: 728 Hours of Missing Data: 16 Hours of Calibration: 0 Percent Operational Time: 97.9								
Minimum Value: 0 km/h on Dec 29 07:00																									
Percentiles: P ₁ = 1 P ₁₀ = 2 Q ₁ = 2 Median = 2 Q ₃ = 3 P ₉₀ = 4 P ₉₉ = 6																									
Day	Hourly Period Ending At (MST)																							Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23		24
1-Dec	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	3	2	3
2-Dec	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	2	2	2	2	1	2	2
3-Dec	2	2	2	2	2	1	2	2	2	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2
4-Dec	2	2	2	2	2	3	2	2	3	2	3	3	4	4	3	3	2	2	2	2	2	2	2	2	2
5-Dec	2	2	2	2	3	3	2	3	3	3	4	4	3	3	3	2	3	2	3	3	3	3	4	3	4
6-Dec	3	3	3	3	3	3	3	3	3	3	4	3	3	2	2	2	2	2	2	2	2	1	1	2	4
7-Dec	2	2	1	1	2	2	2	2	2	2	2	2	3	3	2	2	1	1	2	2	1	2	1	1	3
8-Dec	2	2	2	2	2	2	2	2	2	2	3	3	3	3	3	2	2	2	2	2	2	2	2	2	3
9-Dec	2	3	3	3	3	3	2	3	2	2	2	2	3	2	2	2	2	2	2	2	2	2	2	2	3
10-Dec	2	2	3	2	2	2	2	3	3	3	3	3	4	4	3	2	3	3	4	3	6	8	6	5	8
11-Dec	6	7	6	6	6	5	5	4	4	3	3	3	3	2	2	2	2	2	2	2	2	2	2	2	7
12-Dec	2	2	2	2	2	2	2	2	2	2	3	3	4	3	3	3	3	3	4	3	4	4	5	4	5
13-Dec	3	3	3	3	3	3	4	3	3	3	3	3	3	3	3	3	3	2	2	2	2	2	2	2	4
14-Dec	2	3	4	4	3	2	3	2	2	2	3	3	3	2	1	2	2	2	2	2	2	2	2	2	4
15-Dec	2	2	2	2	2	3	3	3	3	3	5	5	5	4	3	5	5	5	4	4	5	4	4	3	5
16-Dec	4	4	5	4	3	3	2	3	3	3	3	4	4	3	3	2	2	2	2	1	2	3	3	3	5
17-Dec	3	4	6	5	5	4	3	2	2	2	2	3	3	4	3	2	2	DF	DF	DF	DF	DF	DF	DF	6
18-Dec	DF	DF	DF	DF	DF	DF	3	3	3	2	3	3	3	3	4	DF	2	2	2	2	2	2	2	1	4
19-Dec	1	1	1	1	1	2	2	1	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3
20-Dec	3	3	3	3	4	4	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	5	4	5
21-Dec	3	3	3	3	2	2	2	2	2	1	2	3	2	4	4	3	3	3	4	3	3	3	2	2	4
22-Dec	2	2	2	2	2	2	2	3	2	2	2	2	2	3	3	3	2	2	2	3	3	3	4	4	4
23-Dec	3	3	5	5	5	5	6	6	5	5	5	5	5	5	4	3	3	3	2	2	2	2	2	2	6
24-Dec	2	1	2	2	2	2	2	3	2	3	4	4	4	4	4	3	3	3	3	4	3	3	3	3	4
25-Dec	2	2	2	2	2	2	3	2	2	2	2	2	2	1	1	2	1	1	2	2	DF	2	2	2	3
26-Dec	2	3	3	2	3	3	2	3	DF	2	3	3	3	3	3	3	3	3	3	3	2	2	2	2	3
27-Dec	2	2	3	2	2	2	2	2	2	2	2	3	3	4	3	2	3	3	3	3	3	3	2	3	4
28-Dec	3	2	2	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	2	3
29-Dec	2	1	1	1	1	0	0	2	1	2	2	2	3	2	2	2	2	2	2	2	2	2	1	1	3
30-Dec	2	2	2	2	2	2	3	3	2	3	3	3	3	3	3	4	4	4	5	4	5	5	5	4	5
31-Dec	4	3	3	3	3	3	3	3	2	2	2	2	2	2	2	1	2	2	2	2	3	3	4	3	4
																	Diurnal Maximum								
DF - DAS Failure																									



Wood Buffalo Environmental Association
Summary of Hour Averages

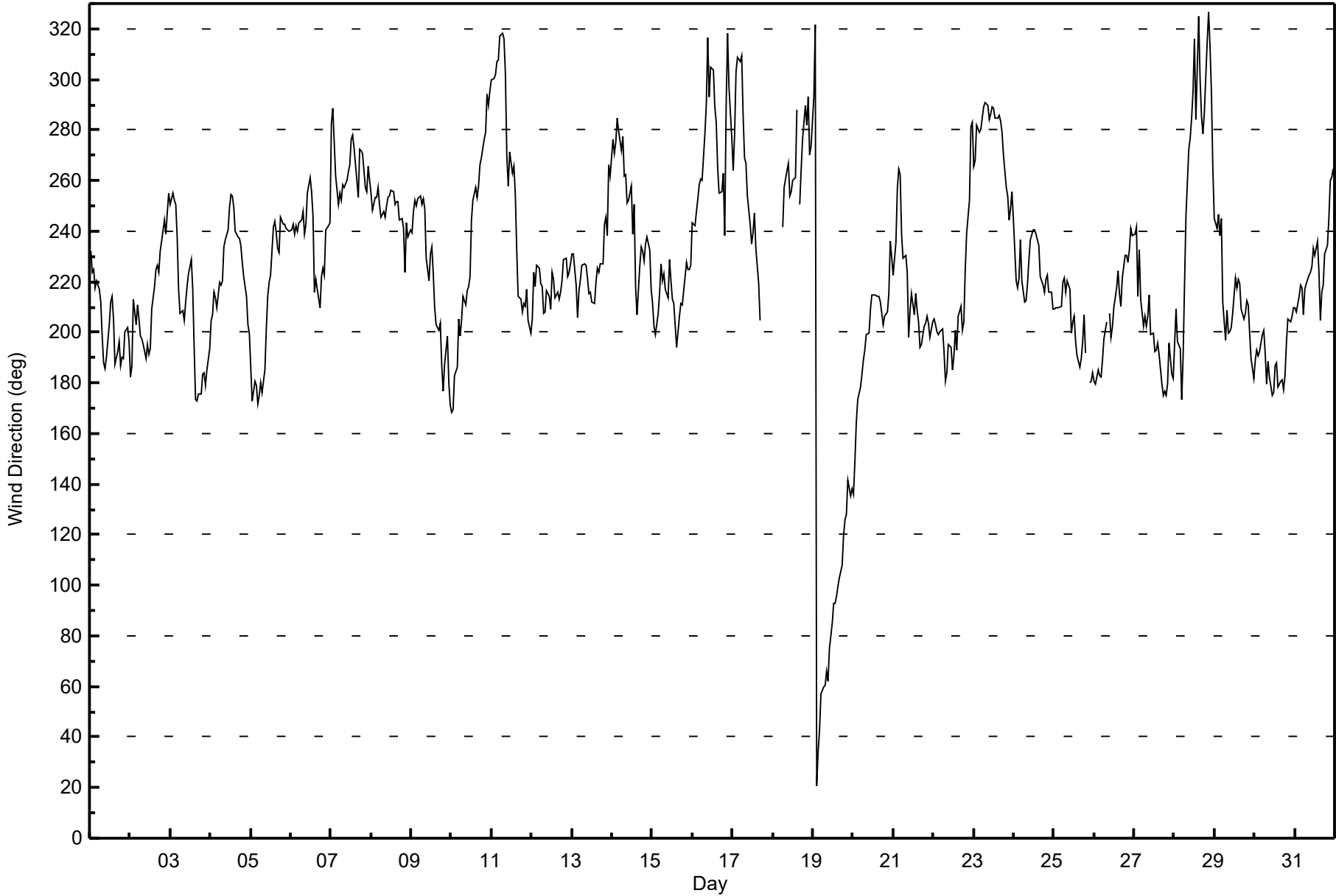
Wind Direction (WD) - deg
Jackfish 2/3 - December 2023

Direction of Maximum Speed: 227 deg on Dec 15 21:00	Hours in Service: 744
Direction of Maximum Daily Speed Average: 215.9 deg on Dec 15	Hours of Data: 728
Direction of Minimum Speed: 193 deg on Dec 28 04:00	Hours of Missing Data: 16
Direction of Minimum Daily Speed Average: 3.5 deg on Dec 28	Percent Operational Time: 97.9
Monthly Average Direction: 227.8 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-Dec	232	224	225	218	221	217	212	198	188	186	190	203	212	214	205	187	193	196	187	190	190	200	202	196	204.2
2-Dec	182	187	213	203	211	205	199	197	195	190	195	191	194	209	218	225	227	224	232	236	245	239	247	255	212.9
3-Dec	250	255	252	250	238	217	207	209	205	212	218	223	229	217	194	173	173	176	176	184	184	179	185	194	207.1
4-Dec	205	207	216	214	210	220	219	221	234	237	241	249	255	254	249	240	238	237	234	228	222	214	203	200	229.2
5-Dec	186	173	181	179	172	175	180	176	185	201	214	220	223	242	244	239	233	231	245	243	243	241	241	240	219.5
6-Dec	240	242	239	242	240	243	245	248	239	243	255	261	256	246	216	221	217	210	222	225	223	240	242	243	239.2
7-Dec	282	289	275	262	250	255	252	258	258	260	264	266	276	278	273	260	254	272	272	271	257	256	266	260	263.8
8-Dec	255	248	253	253	257	250	245	248	245	250	253	254	256	255	251	252	252	244	245	241	224	243	238	240	248.5
9-Dec	240	248	253	250	253	254	251	253	249	229	220	231	234	223	210	203	201	203	187	177	187	199	180	171	227.2
10-Dec	168	170	183	187	205	198	205	214	211	216	218	222	245	252	258	254	258	266	269	276	279	294	290	295	243.2
11-Dec	300	300	302	307	307	317	318	316	302	270	258	271	263	266	254	232	214	213	208	211	210	217	205	200	268.7
12-Dec	205	224	218	226	226	219	218	208	208	216	215	209	224	221	213	216	213	216	220	229	229	222	224	227	219.0
13-Dec	231	231	219	206	217	221	227	227	226	222	216	216	212	212	220	225	224	227	227	243	246	238	266	262	225.7
14-Dec	276	271	275	284	280	272	277	262	262	251	252	258	239	251	218	207	226	234	232	228	235	238	233	217	248.9
15-Dec	211	203	199	207	216	227	220	223	217	214	229	220	213	211	194	200	207	211	211	217	227	225	225	227	215.9
16-Dec	243	242	248	253	259	260	260	278	290	316	293	305	304	289	283	265	255	256	263	239	289	318	297	277	270.2
17-Dec	264	278	303	309	307	309	286	269	267	254	243	235	240	247	233	219	205	DF	DF	DF	DF	DF	DF	DF	--
18-Dec	DF	DF	DF	DF	DF	DF	241	258	264	267	254	256	260	261	288	DF	250	264	276	290	282	293	270	273	--
19-Dec	293	322	21	34	42	57	60	61	66	62	75	85	93	93	96	100	103	108	120	126	128	142	135	138	95.8
20-Dec	136	149	165	174	178	184	189	193	199	200	209	215	215	215	214	214	212	207	203	206	208	215	236	230	202.7
21-Dec	223	236	257	265	262	239	229	231	224	198	209	215	207	216	209	204	194	195	203	204	206	204	198	204	217.5
22-Dec	206	203	200	199	200	201	192	181	184	195	194	185	191	201	193	207	210	201	204	225	239	252	281	283	209.9
23-Dec	266	268	282	279	280	285	289	291	290	284	287	289	288	285	285	286	284	279	270	257	254	245	249	255	277.8
24-Dec	245	220	218	222	237	221	212	213	219	229	237	241	240	239	236	234	222	219	216	221	222	216	216	209	226.1
25-Dec	209	210	210	210	210	220	222	216	221	217	200	204	206	196	191	186	189	196	207	192	DF	180	180	184	204.0
26-Dec	180	179	185	183	182	189	197	204	DF	208	198	202	210	217	224	215	211	221	230	230	228	233	241	238	210.1
27-Dec	239	242	214	233	213	203	206	202	206	215	199	200	192	193	196	191	179	175	177	175	179	196	184	182	201.0
28-Dec	196	209	196	193	174	191	219	246	272	277	285	295	316	284	325	300	285	279	287	315	327	313	295	265	267.4
29-Dec	245	241	247	238	245	212	197	209	199	200	202	207	221	218	221	219	209	205	207	212	211	199	190	182	210.6
30-Dec	189	193	191	193	199	201	192	180	188	182	175	176	187	188	178	181	181	177	183	196	206	204	206	210	191.1
31-Dec	210	208	214	219	218	207	217	219	223	224	226	233	230	236	224	205	216	219	231	234	245	260	261	265	226.7

227.0 229.2 232.5 232.8 232.2 228.0 228.7 228.4 229.2 226.9 227.8 230.6 233.0 234.2 228.4 220.2 218.9 219.3 221.2 223.1 227.1 229.4 229.7 228.1
 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 (WD) - deg
Jackfish 2/3 - December 2023

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0														Hours in Service: 744											
Maximum Value: 88 deg on Dec 19 03:00														Hours of Data: 728											
Minimum Value: 8 deg on Dec 1 09:00														Hours of Missing Data: 16											
Percentiles: P ₁ = 13 P ₁₀ = 14 Q ₁ = 16 Median = 20 Q ₃ = 26 P ₉₀ = 34 P ₉₉ = 51														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-Dec	15	16	14	14	15	16	14	14	8	11	18	22	24	25	25	26	26	27	25	29	30	27	27	29	30
2-Dec	27	30	18	20	17	15	15	20	17	16	16	16	20	22	21	21	16	16	14	14	14	16	13	14	30
3-Dec	27	16	18	16	19	17	15	15	14	15	16	16	19	26	27	35	29	22	24	20	23	22	25	18	35
4-Dec	16	14	14	14	17	19	18	19	19	20	19	18	19	17	15	17	18	17	17	18	18	16	14	15	20
5-Dec	19	20	26	26	33	33	27	31	32	25	25	19	18	17	15	17	15	16	15	17	18	17	17	17	33
6-Dec	18	19	18	18	18	17	19	16	18	17	19	25	22	20	17	18	17	16	18	16	18	14	14	17	25
7-Dec	31	26	25	21	13	13	13	14	12	21	22	28	37	34	31	20	13	23	21	21	14	15	14	12	37
8-Dec	14	14	16	13	14	14	14	14	14	14	14	17	17	18	14	14	15	15	15	16	18	16	15	17	18
9-Dec	16	14	15	15	14	13	14	14	17	18	16	15	18	20	19	19	21	18	21	24	24	23	24	31	31
10-Dec	32	34	29	29	27	25	24	24	21	20	20	20	18	17	18	14	18	26	29	31	34	35	36	36	36
11-Dec	35	38	36	37	38	41	43	37	33	27	20	33	28	33	20	20	20	19	19	17	18	19	18	17	43
12-Dec	17	16	15	17	15	15	16	15	13	14	17	18	20	22	21	19	19	18	20	20	21	22	21	22	22
13-Dec	20	19	20	19	21	19	19	20	18	19	21	21	22	20	22	22	18	16	16	23	18	21	31	26	31
14-Dec	27	31	31	34	33	28	31	19	16	14	15	21	20	26	21	20	18	16	16	18	17	15	17	20	34
15-Dec	19	17	17	18	19	20	21	20	22	24	24	26	27	26	36	32	28	25	24	26	22	20	20	19	36
16-Dec	20	21	19	17	19	19	16	30	32	39	34	41	41	34	36	28	17	14	28	17	32	45	36	30	45
17-Dec	23	31	36	38	36	41	32	23	21	13	15	19	19	18	20	23	24	DF	DF	DF	DF	DF	DF	DF	41
18-Dec	DF	DF	DF	DF	DF	DF	16	21	20	22	15	17	21	24	35	DF	14	22	26	28	25	29	23	17	35
19-Dec	33	73	88	71	21	18	21	22	24	25	28	35	37	27	30	29	29	30	36	38	40	40	39	37	88
20-Dec	44	52	50	41	38	33	35	33	31	29	27	25	27	29	26	25	21	20	22	20	22	20	19	20	52
21-Dec	20	19	17	22	16	18	15	14	16	15	17	20	23	24	25	27	33	33	30	25	21	21	18	16	33
22-Dec	16	18	16	17	16	15	17	18	19	20	22	21	22	25	24	26	20	15	17	19	17	22	33	31	33
23-Dec	26	30	35	35	34	34	36	36	35	32	36	36	38	36	34	32	30	29	27	15	15	15	16	15	38
24-Dec	15	15	17	17	15	19	20	19	18	20	20	18	18	19	20	19	19	20	18	18	18	17	15	15	20
25-Dec	15	14	14	13	16	23	20	15	15	16	13	15	14	13	14	14	13	15	16	16	DF	19	19	17	23
26-Dec	19	20	22	22	20	19	18	19	DF	16	20	19	21	21	23	19	17	18	16	16	15	14	13	15	23
27-Dec	16	18	19	18	16	15	16	15	17	20	24	26	33	30	29	26	32	26	31	26	30	28	27	32	33
28-Dec	34	34	78	51	60	20	20	15	30	51	28	40	45	35	49	38	29	30	26	38	51	45	37	76	78
29-Dec	21	40	13	22	22	25	13	14	14	12	14	14	16	16	15	14	15	13	15	12	15	13	9	12	40
30-Dec	15	19	18	17	20	23	26	22	21	22	25	29	30	35	35	31	38	33	34	33	28	25	24	22	38
31-Dec	21	20	20	18	17	16	16	16	15	15	16	15	15	17	19	17	16	17	15	16	17	22	20	23	23
														44 73 88 71 60 41 43 37 35 51 36 41 45 36 49 38 38 33 36 38 51 45 39 76											
														Diurnal Maximum											
DF - DAS Failure																									



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

**AMS29
SURMONT 2
DECEMBER 2023**

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

January 31, 2024

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - SURMONT2 (AMS29)
DECEMBER 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	708	36	36	100	8.5	0	1.6	0
H2S (ppb) Average	706	37	38	99.87	0.5	0	0.2	0
THC(ppm) Average	708	36	36	100	2.6	-	2.5	-
NO2 (ppb) Average	708	36	36	100	20.4	0	8.9	-
NO (ppb) Average	708	36	36	100	5.3	-	0.9	-
NOX (ppb) Average	708	36	36	100	21.1	-	9.8	-
PM2.5 (ug/m3) Average	741	3	3	100	14.3	0	9.3	0
Temperature 2 m (C) Average	744	0	0	100	10.2	-	6.5	-
Relative Humidity (%) Average	744	0	0	100	96.3	-	91.1	-
Wind Speed 10 m (km/h) Average	744	0	0	100	20	-	12	-
Wind Direction 10 m (deg) Average	744	0	0	100	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - SURMONT 2 (AMS29)
 DECEMBER 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	708	0.44	0.9	-	0	0	0.1	0.2	0.4	0.8	8.5
H2S (ppb) Average	706	0.09	0.1	-	0	0	0.1	0.1	0.1	0.1	0.5
THC (ppm) Average	708	2.23	0.1	-	2	2.1	2.1	2.2	2.3	2.4	2.6
NO2 (ppb) Average	708	2.29	2.2	-	0.2	0.5	0.9	1.7	3	4.7	20.4
NO (ppb) Average	708	0.12	0.4	-	0	0	0	0	0.1	0.3	5.3
NOX (ppb) Average	708	2.4	2.5	-	0.2	0.5	0.9	1.7	3.1	4.8	21.1
PM2.5 (ug/m3) Average	741	2.71	2.3	-	0.2	0.8	1.2	2	3.3	6.1	14.3
Temperature 2 m (C) Average	744	-4.46	5.5	-	-17.8	-11.4	-9	-4.6	-0.4	2.9	10.2
Relative Humidity (%) Average	744	72.02	15.9	-	19.8	50.8	62.4	74.1	86.1	89.6	96.3
Wind Speed 10 m (km/h) Average	744	6	4	-	0	2	3	5	8	11	20
Wind Direction 10 m (deg) Average	744	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - SURMONT 2 (AMS29)
DECEMBER 2023

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
H2S	05 Dec 2023 10:00	05 Dec 2023 10:00	1	Unstable Operation - excessive baseline noise



Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO₂) - ppb

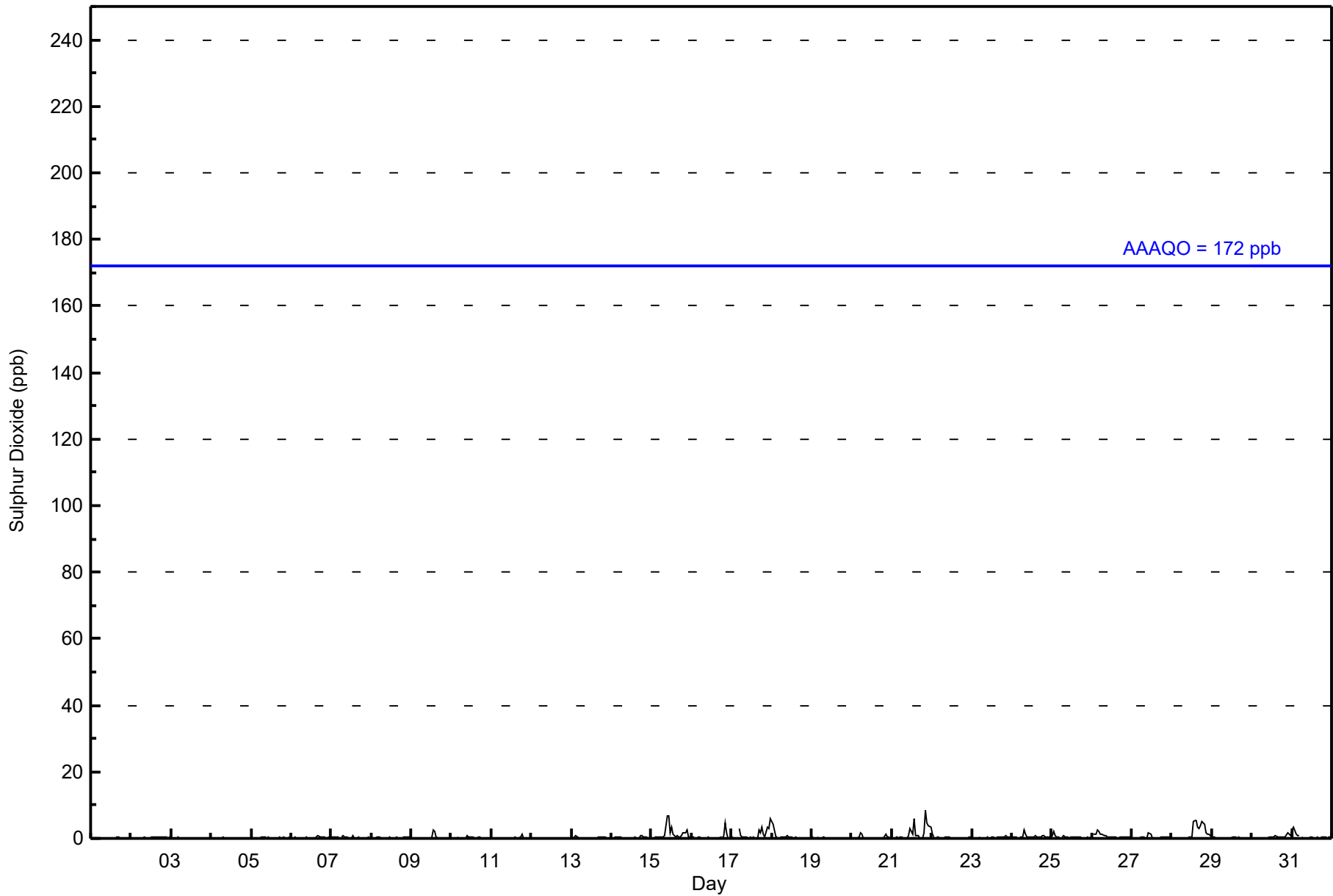
Surmont 2 - December 2023

Number of Exceedences (AAAQO):		1-hr: 0		24-hr: 0		Hours in Service:		744																																								
Maximum Value: 8.5 ppb on Dec 21 21:00		Maximum Daily Average: 1.6 ppb on Dec 28		Hours of Data:		708																																										
Minimum Value: 0.0 ppb on Dec 4 18:00		Minimum Daily Average: 0.0 ppb on Dec 12		Hours of Missing Data:		36																																										
Maximum Diurnal Average: 0.8 ppb at hour 21		Minimum Diurnal Average: 0.2 ppb at hour 9		Hours of Calibration:		36																																										
Monthly Average: 0.44 ppb		Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.1 Median = 0.2 Q ₃ = 0.4 P ₉₀ = 0.8 P ₉₉ = 4.9		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-Dec	0.1	0.1	0.0	0.1	0.1	Z	0.1	0.1	0.1	0.1	C	C	C	C	C	0.4	0.5	0.1	0.0	0.1	0.1	0.2	0.2	0.1	0.1	0.5																						
2-Dec	Z	0.1	0.0	0.1	0.0	0.0	0.1	0.1	0.3	0.1	0.2	0.1	0.2	0.5	0.6	0.4	0.3	0.4	0.4	0.4	0.4	0.4	0.1	0.5	0.3	0.6																						
3-Dec	0.1	Z	0.1	0.1	0.3	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.3																						
4-Dec	0.1	0.1	Z	0.1	0.1	0.1	0.1	0.4	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	0.0	0.1	0.4																						
5-Dec	0.0	0.0	0.0	Z	0.0	0.0	0.2	0.5	0.4	0.2	0.2	0.1	0.2	0.1	0.1	0.1	0.1	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.5																						
6-Dec	0.1	0.2	0.2	0.2	Z	0.1	0.1	0.1	0.1	0.2	0.2	0.1	0.1	0.0	0.1	0.2	0.7	0.4	0.5	0.5	0.2	0.2	0.2	0.2	0.2	0.7																						
7-Dec	0.2	0.4	0.4	0.3	0.2	Z	0.6	0.8	0.2	0.3	0.1	0.2	0.1	0.7	0.2	0.1	0.2	0.2	0.2	0.2	0.1	0.1	0.2	0.1	0.3	0.8																						
8-Dec	Z	0.1	0.2	0.4	0.3	0.2	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.1	0.1	0.4	0.2	0.1	0.1	0.2	0.3	0.3	0.4	0.3	0.2	0.4																						
9-Dec	0.2	Z	0.1	0.1	0.1	0.0	0.1	0.0	0.0	0.1	0.0	0.1	0.4	2.6	2.2	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	2.6																						
10-Dec	0.0	0.2	Z	0.6	0.1	0.2	0.2	0.1	0.1	0.9	0.3	0.3	0.3	0.2	0.2	0.1	0.2	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.9																						
11-Dec	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.3	0.1	0.1	0.5	1.3	0.1	0.2	0.1	0.1	0.0	0.1	1.3																						
12-Dec	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.2																						
13-Dec	0.1	0.1	0.8	0.3	0.3	Z	0.1	0.1	0.2	0.1	0.1	0.1	0.2	0.1	0.2	0.2	0.3	0.5	0.4	0.3	0.4	0.2	0.2	0.1	0.2	0.8																						
14-Dec	Z	0.2	0.5	0.2	0.2	0.5	0.1	0.1	0.2	0.2	0.1	0.1	0.1	0.2	0.2	0.1	0.1	0.7	0.7	0.6	0.4	0.4	0.1	0.0	0.3	0.7																						
15-Dec	0.1	Z	0.2	0.5	0.3	0.4	0.4	0.4	0.7	6.6	6.7	1.7	3.2	1.3	0.6	0.7	0.3	0.6	0.8	1.5	1.7	2.4	0.4	0.2	1.4	6.7																						
16-Dec	0.2	0.2	Z	0.2	0.5	0.6	0.2	0.0	0.0	0.0	0.2	0.1	0.0	0.1	0.1	0.0	0.0	0.2	0.0	0.9	4.5	1.7	0.2	0.4	0.4	4.5																						
17-Dec	0.3	0.1	0.2	Z	3.1	0.8	0.6	0.2	0.5	0.3	0.1	0.3	0.2	0.4	0.1	0.1	2.5	1.6	3.4	1.2	0.3	3.4	2.9	6.1	1.3	6.1																						
18-Dec	4.9	4.3	0.5	0.4	Z	0.3	0.3	0.4	0.4	1.0	0.6	0.3	0.3	0.2	0.3	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.0	0.1	0.6	4.9																						
19-Dec	0.3	0.2	0.1	0.1	0.2	Z	0.4	0.3	0.1	0.0	0.0	0.0	0.2	0.1	0.0	0.0	0.1	0.1	0.1	0.1	0.0	0.0	0.2	0.3	0.1	0.4																						
20-Dec	Z	0.2	0.1	0.1	0.6	1.9	1.4	0.1	0.0	0.0	0.1	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.1	1.3	0.3	0.2	0.1	0.3	1.9																						
21-Dec	0.1	Z	0.3	0.3	0.2	0.2	0.2	0.1	0.0	0.0	0.7	3.0	1.2	5.9	0.6	0.7	0.9	0.1	0.1	1.6	8.5	4.6	3.6	3.3	1.6	8.5																						
22-Dec	1.1	0.5	Z	0.2	0.3	0.2	0.2	0.2	0.4	0.4	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.3	0.3	0.2	1.1																						
23-Dec	0.2	0.1	0.1	Z	0.4	0.0	0.1	0.1	0.1	0.3	0.1	0.2	0.3	0.4	0.1	0.5	0.3	0.3	0.3	0.3	0.8	0.4	0.2	0.2	0.2	0.8																						
24-Dec	0.2	0.2	0.4	0.3	Z	0.3	0.3	2.6	1.1	0.3	0.3	0.5	0.3	0.5	0.6	0.3	0.2	0.4	0.9	0.7	0.5	0.4	0.5	0.5	0.5	2.6																						
25-Dec	0.7	2.2	0.8	0.3	0.3	Z	0.4	0.6	0.2	0.3	0.2	0.3	0.4	0.3	0.3	0.2	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.4	2.2																						
26-Dec	Z	1.4	1.4	2.7	2.2	1.4	1.2	0.8	0.8	0.6	0.4	0.4	0.3	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.2	0.4	0.3	0.3	0.7	2.7																						
27-Dec	0.1	Z	0.2	0.1	0.2	0.3	0.4	0.3	0.1	0.1	1.8	1.1	0.2	0.1	0.1	0.1	0.2	0.3	0.3	0.3	0.4	0.6	0.4	0.1	0.3	1.8																						
28-Dec	0.2	0.1	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.5	0.4	0.3	4.9	5.6	3.5	3.1	3.8	5.2	4.3	1.6	1.1	1.4	0.6	1.6	5.6																						
29-Dec	0.3	0.2	0.2	Z	0.1	0.1	0.2	0.2	0.1	0.1	0.2	0.2	0.3	0.4	0.3	0.2	0.3	0.2	0.1	0.1	0.2	0.2	0.1	0.1	0.2	0.4																						
30-Dec	0.1	0.1	0.1	0.1	Z	0.1	0.1	0.0	0.0	0.1	0.2	0.3	0.3	0.6	0.8	0.6	0.4	0.3	0.6	0.5	0.3	1.6	1.4	0.9	0.4	1.6																						
31-Dec	2.7	3.6	1.4	1.0	0.8	Z	0.3	0.1	0.0	0.0	0.0	0.3	0.2	0.2	0.2	0.2	0.1	0.1	0.4	0.3	0.2	0.2	0.4	0.3	0.6	3.6																						
																								0.5	0.6	0.3	0.3	0.4	0.3	0.3	0.3	0.2	0.4	0.5	0.4	0.3	0.7	0.5	0.3	0.4	0.4	0.5	0.5	0.8	0.6	0.5	0.5	Diurnal Average
																								4.9	4.3	1.4	2.7	3.1	1.9	1.4	2.6	1.1	6.6	6.7	3.0	3.2	5.9	5.6	3.5	3.1	3.8	5.2	4.3	8.5	4.6	3.6	6.1	Diurnal Maximum
Z - zerospan C - Calibration																																																
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 172 ppb 24-hr 48 ppb																																																



Wood Buffalo Environmental Association
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Surmont 2 - December 2023





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Sulphur Dioxide (SO₂) - ppb
Surmont 2 - December 2023**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	708	100.00	100.00
11 - 20	0	0.00	100.00
21 - 60	0	0.00	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 708

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Sulphur Dioxide (SO₂) - ppb
Surmont 2 - December 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	1	1	2	1	3	55	85	61	30	50	91	115	152	43	15	3	708
11 - 20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	1	1	2	1	3	55	85	61	30	50	91	115	152	43	15	3	708

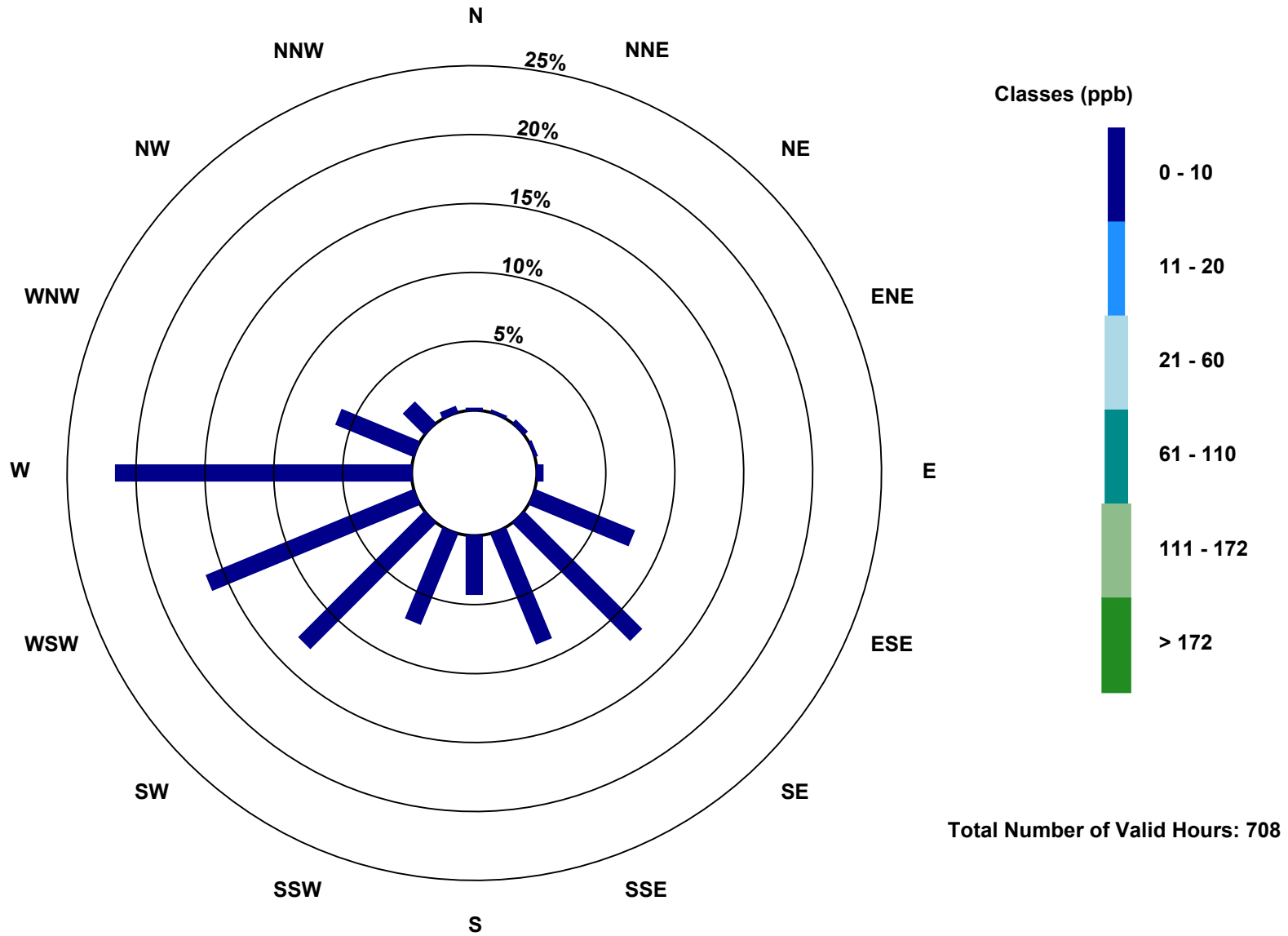
Total Number of Valid Hours: 708

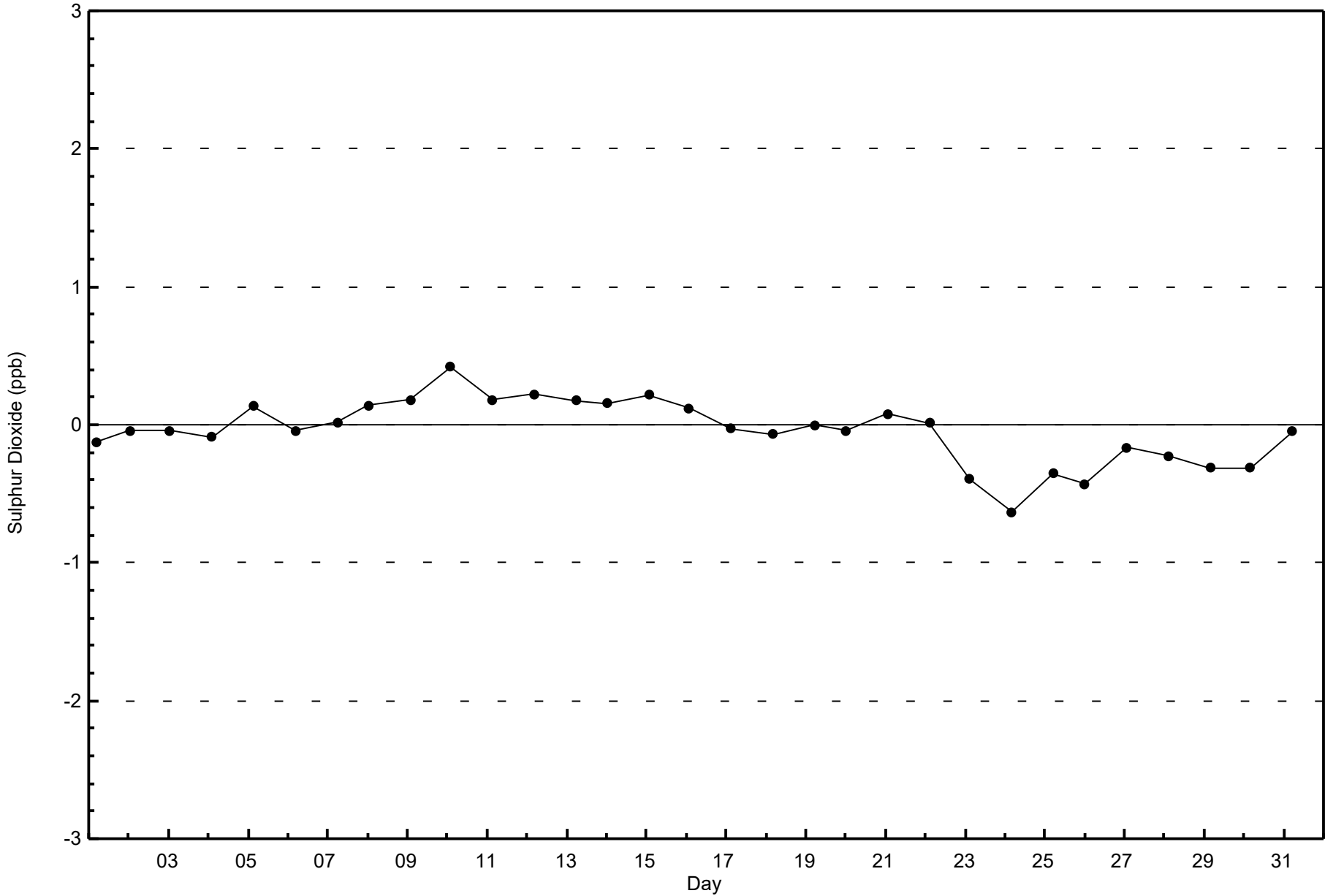
Total Number of Hours: 744

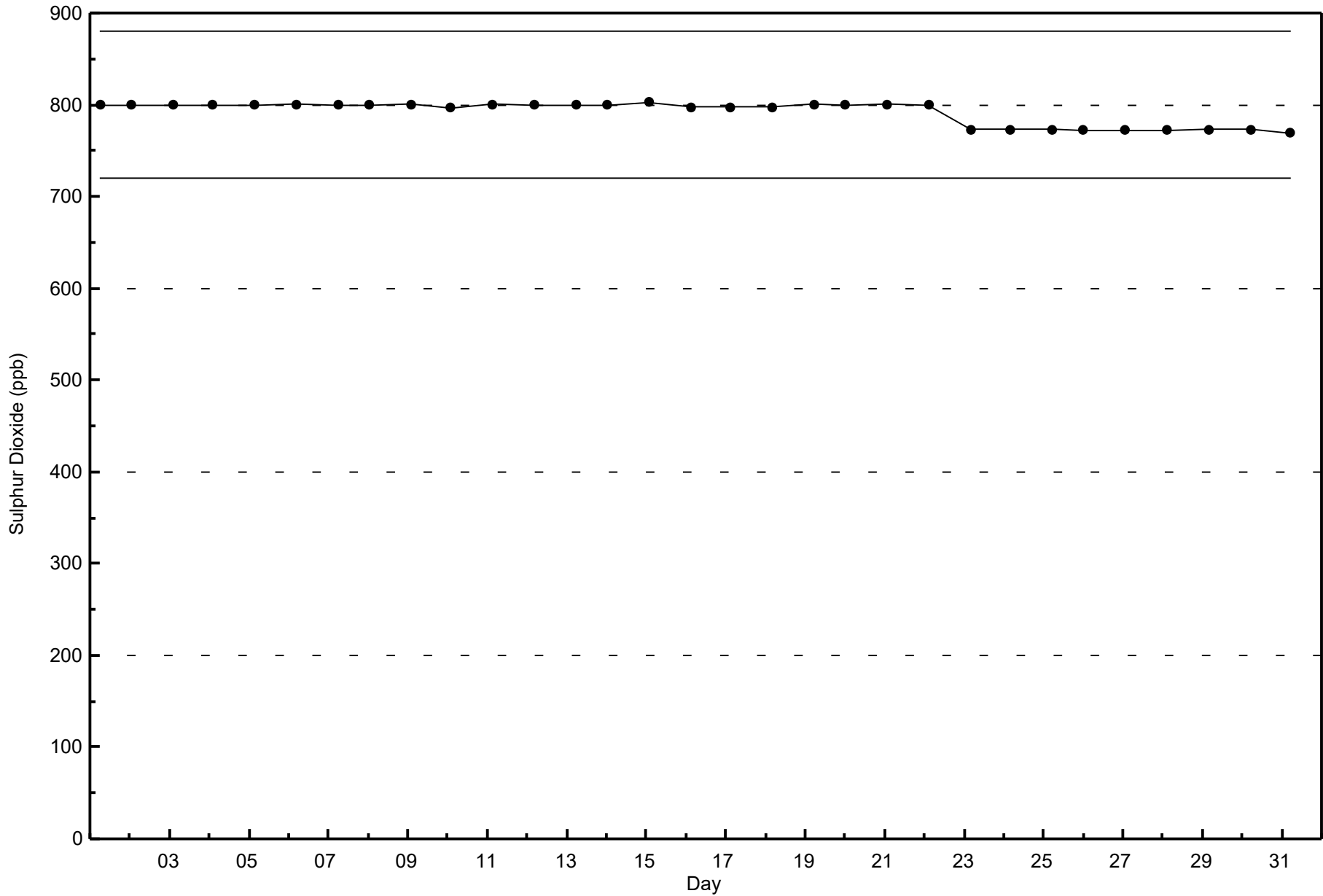


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Sulphur Dioxide (SO₂) - ppb
Surmont 2

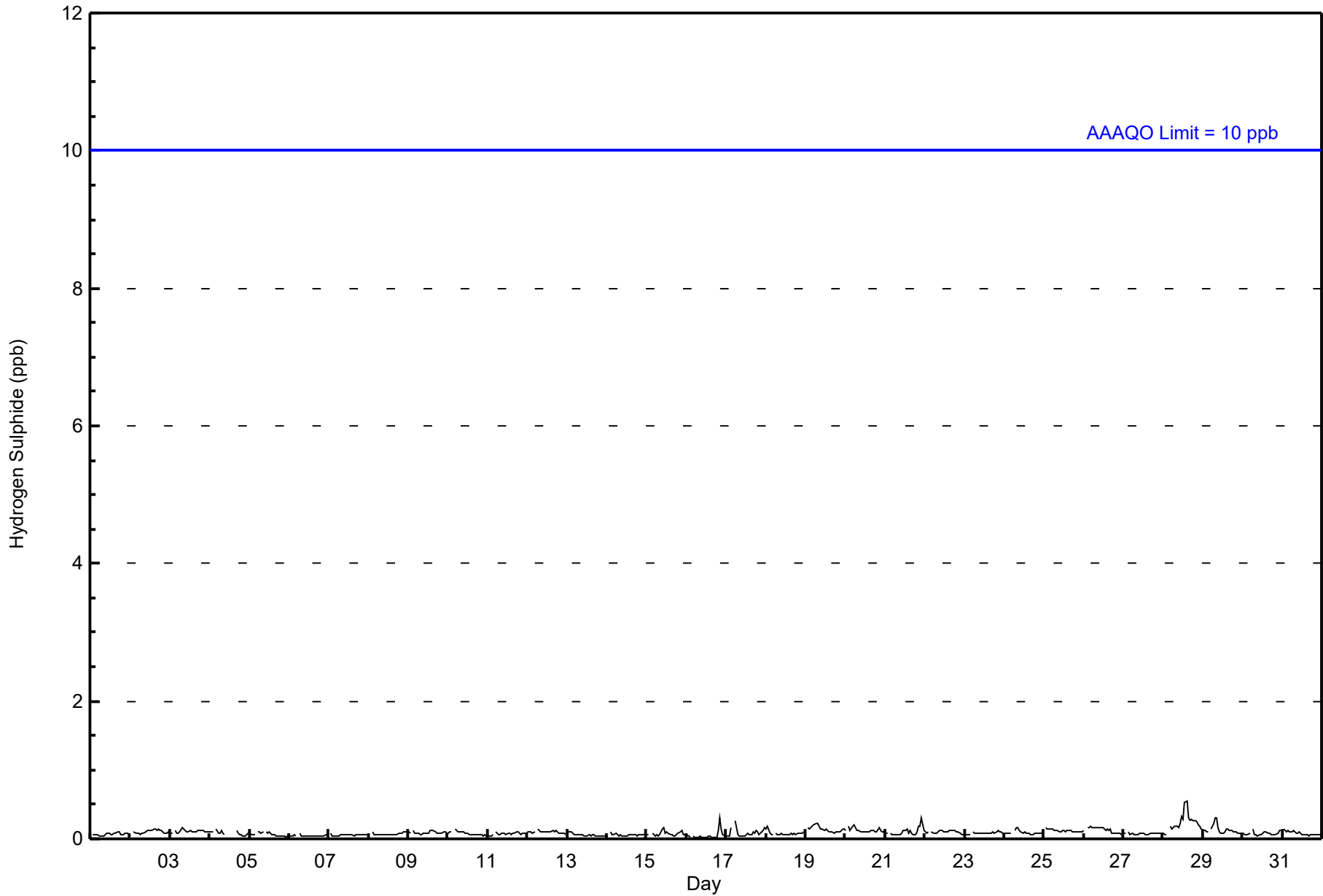








Number of Exceedences (AAAQO):		1-hr: 0	24-hr: 0																		Hours in Service:	744																																										
Maximum Value: 0.5 ppb on Dec 28 15:00		Maximum Daily Average: 0.2 ppb on Dec 28																			Hours of Data:	706																																										
Minimum Value: 0.0 ppb on Dec 16 08:00		Minimum Daily Average: 0.0 ppb on Dec 6																			Hours of Missing Data:	38																																										
Maximum Diurnal Average: 0.1 ppb at hour 6		Minimum Diurnal Average: 0.1 ppb at hour 1																			Hours of Calibration:	37																																										
Monthly Average: 0.09 ppb		Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.1 Median = 0.1 Q ₃ = 0.1 P ₉₀ = 0.1 P ₉₉ = 0.3																			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-Dec	Z	0.1	0.1	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	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1																													
2-Dec	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	0.2	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																													
3-Dec	0.1	0.1	Z	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	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-Dec	0.1	0.1	0.1	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.1	C	C	C	C	C	C	0.1	0.1	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	0.1	0.1	0.1																													
5-Dec	0.1	0.1	0.1	0.1	Z	0.1	0.1	0.1	0.1	0.1	UO	0.1	0.1	0.1	0.1	0.1	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	0.1	0.1																												
6-Dec	0.0	0.0	0.0	0.1	0.0	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	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.1																												
7-Dec	Z	0.1	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	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1																											
8-Dec	0.1	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1																											
9-Dec	0.1	0.1	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1																											
10-Dec	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	0.1	0.0	0.1	0.0	0.1	0.0	0.1	0.0	0.1	0.0	0.1	0.0	0.1	0.1																											
11-Dec	0.0	0.0	0.0	0.1	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1																											
12-Dec	0.1	0.1	0.1	0.1	0.1	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1																											
13-Dec	Z	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	0.1	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	0.1																											
14-Dec	0.0	Z	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	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1																											
15-Dec	0.1	0.1	Z	0.1	0.1	0.0	0.1	0.0	0.1	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	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1																											
16-Dec	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	0.0	0.1	0.3	0.1	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.3																											
17-Dec	0.0	0.0	0.0	0.2	Z	0.3	0.2	0.1	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	0.1	0.1	0.1	0.1	0.1	0.1	0.1																											
18-Dec	0.1	0.2	0.1	0.1	0.1	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1																											
19-Dec	Z	0.2	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1																											
20-Dec	0.1	Z	0.2	0.1	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1																											
21-Dec	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	0.2	0.2	0.3	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.3																											
22-Dec	0.1	0.1	0.1	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1																											
23-Dec	0.1	0.1	0.1	0.1	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1																											
24-Dec	0.1	0.1	0.1	0.1	0.1	Z	0.1	0.1	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	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-Dec	Z	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1																											
26-Dec	0.1	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	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1																										
27-Dec	0.1	0.1	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1																										
28-Dec	0.1	0.1	0.1	Z	0.2	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.5	0.5	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.5																										
29-Dec	0.1	0.1	0.1	0.1	Z	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	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.3																										
30-Dec	0.1	0.1	0.1	0.1	0.1	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1																										
31-Dec	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1																											
																													0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	Diurnal Average
																													0.1	0.2	0.2	0.2	0.2	0.3	0.2	0.3	0.3	0.2	0.2	0.3	0.3	0.5	0.5	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.3	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	Diurnal Maximum	
Z - zerospan C - Calibration UO - Unstable Operation																																																																
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 10 ppb 24-hr 3 ppb																																																																





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Hydrogen Sulphide (H₂S) - ppb
Surmont 2 - December 2023

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

Total Number of Valid Hours: 706

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Hydrogen Sulphide (H₂S) - ppb
Surmont 2 - December 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	1	1	2	1	2	54	85	64	31	51	90	113	150	44	14	3	706
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	1	1	2	1	2	54	85	64	31	51	90	113	150	44	14	3	706

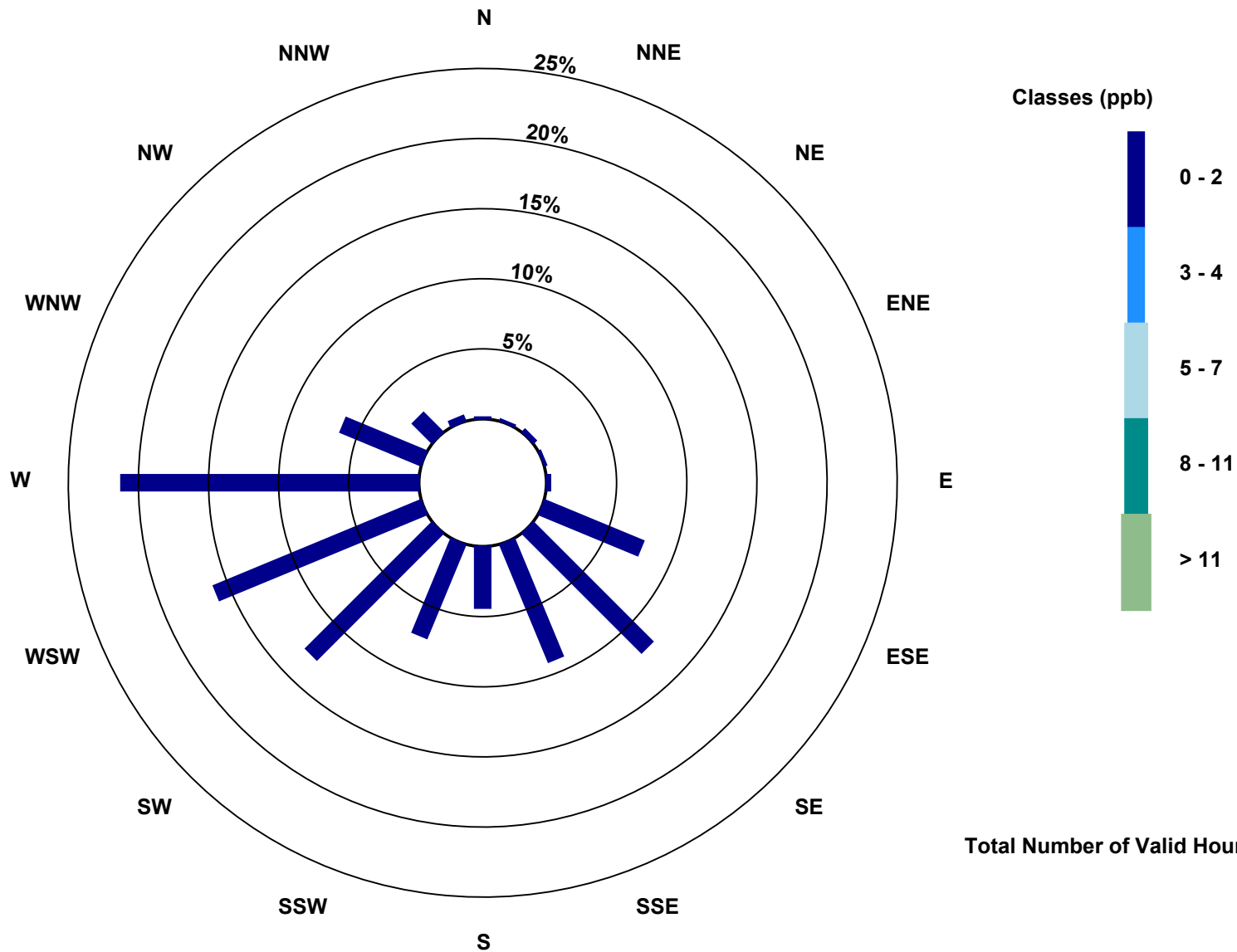
Total Number of Valid Hours: 706

Total Number of Hours: 744

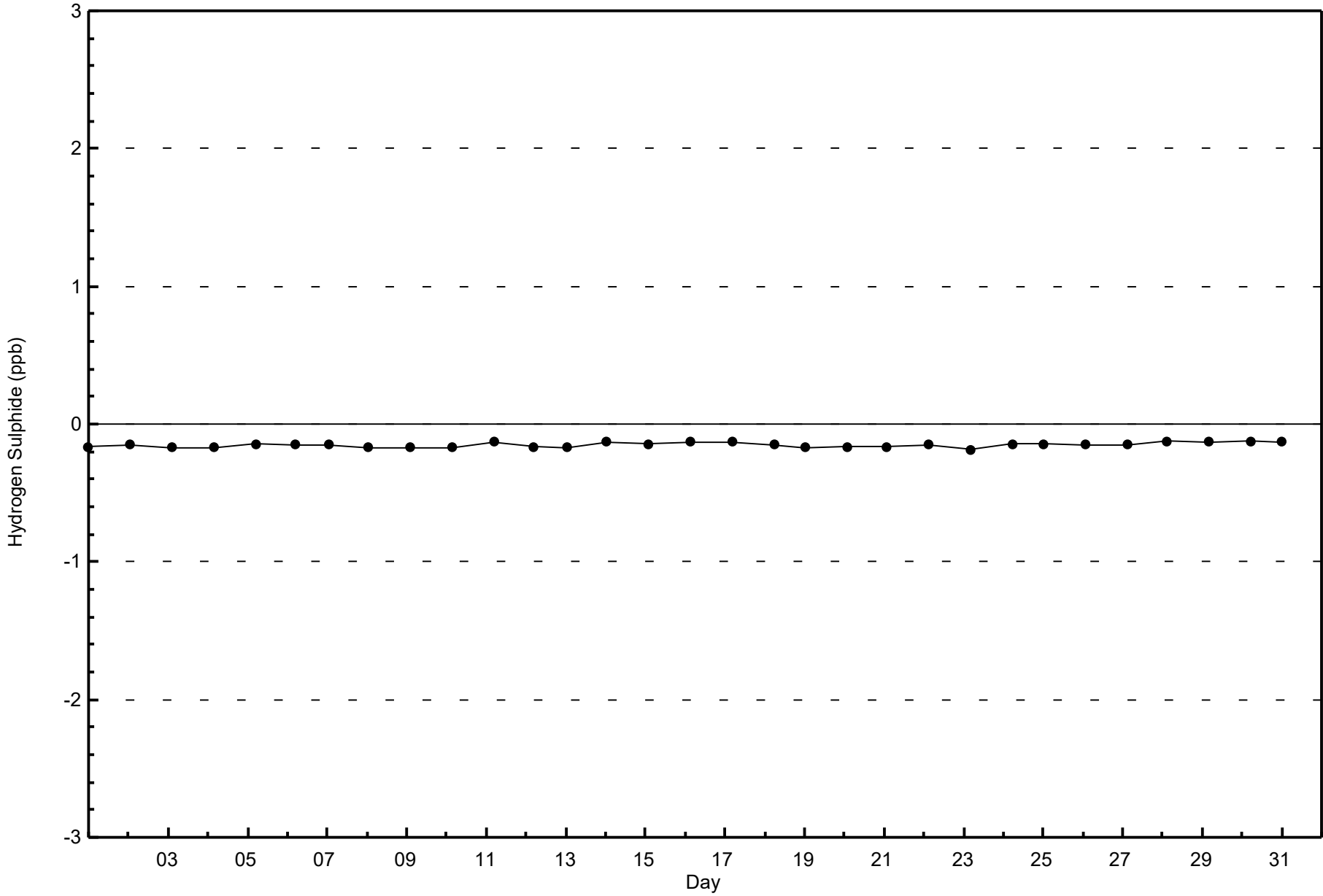


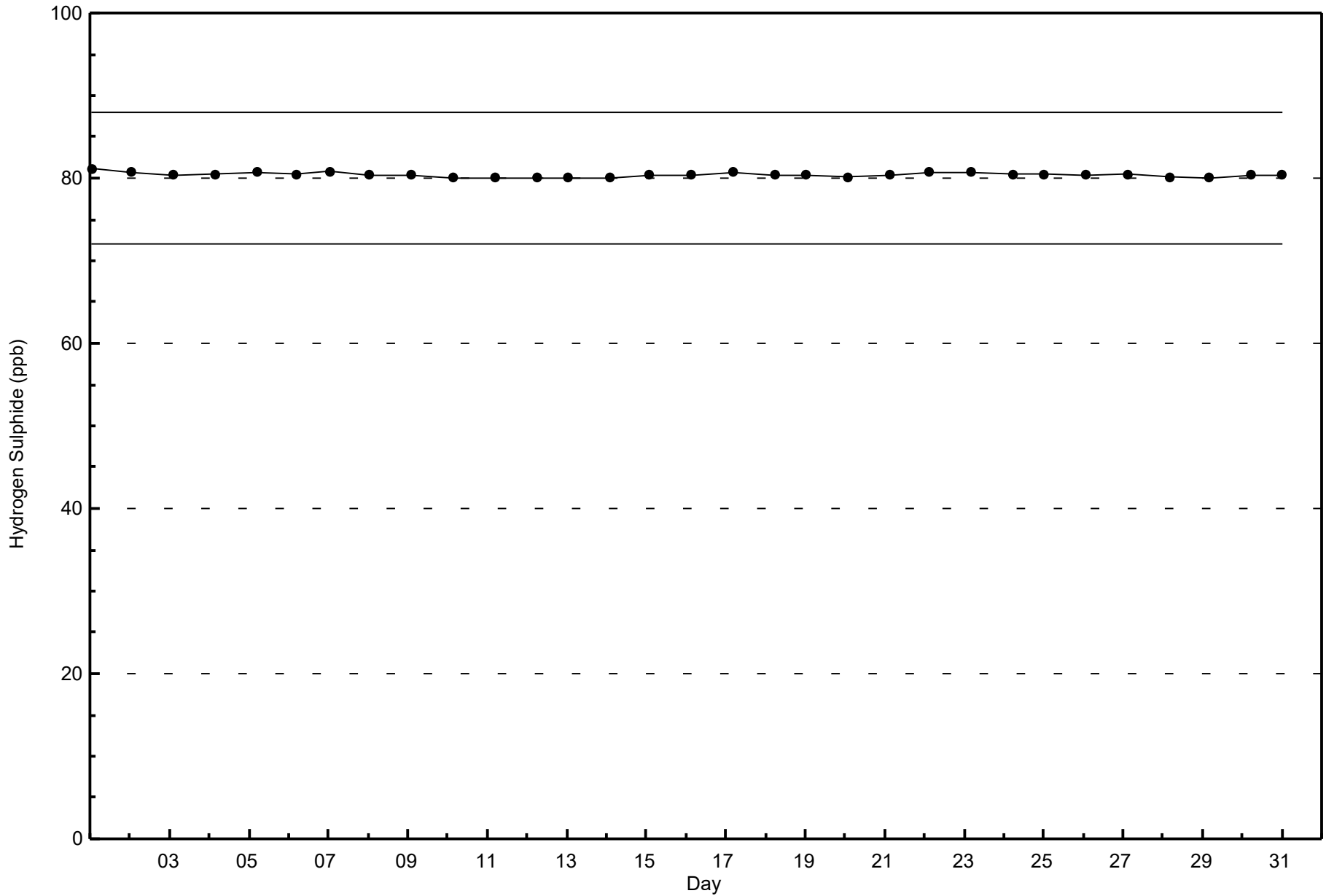
Wood Buffalo Environmental Association
Wind Rose Dec 2023

Hydrogen Sulphide (H₂S) - ppb
Surmont 2



Total Number of Valid Hours: 706







Wood Buffalo Environmental Association

Summary of Hour Averages

Total Hydrocarbons (THC) - ppm

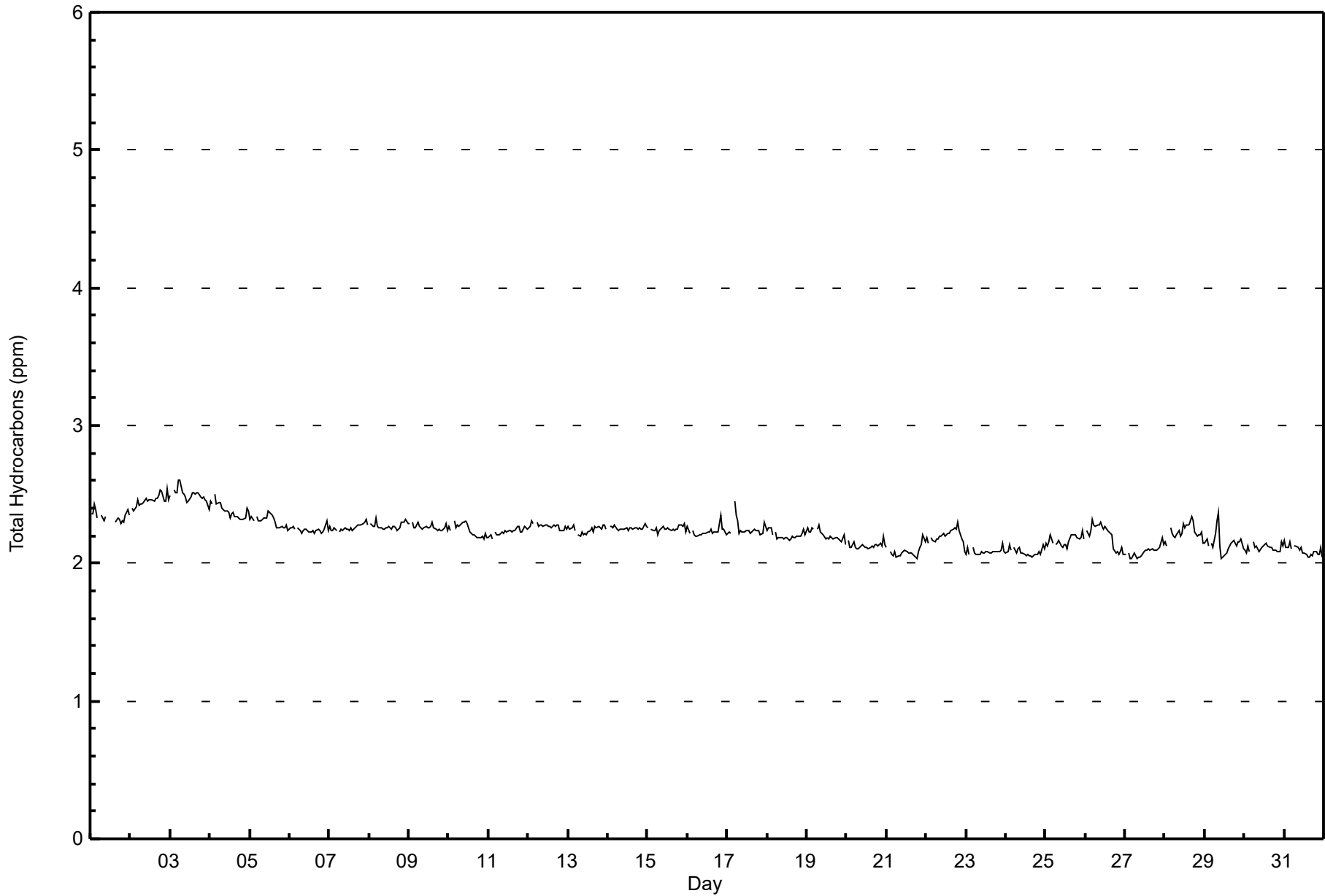
Surmont 2 - December 2023

Number of Exceedences (AAAQO):		1-hr: 0		24-hr: 0		Hours in Service: 744														744						
Maximum Value: 2.6 ppm on Dec 3 06:00				Maximum Daily Average: 2.5 ppm on Dec 3		Hours of Data: 708														708						
Minimum Value: 2.0 ppm on Dec 27 04:00				Minimum Daily Average: 2.1 ppm on Dec 24		Hours of Missing Data: 36														36						
Maximum Diurnal Average: 2.3 ppm at hour 23				Minimum Diurnal Average: 2.2 ppm at hour 24		Hours of Calibration: 36														36						
Monthly Average: 2.23 ppm				Percentiles: P ₁ = 2.0 P ₁₀ = 2.1 Q ₁ = 2.1 Median = 2.2 Q ₃ = 2.3 P ₉₀ = 2.4 P ₉₉ = 2.5		Percent Operational Time: 100.0														100.0						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Dec	2.4	2.4	2.4	2.4	2.3	Z	2.3	2.3	2.3	2.3	C	C	C	C	C	2.3	2.3	2.3	2.3	2.3	2.3	2.4	2.4	2.4	2.3	2.4
2-Dec	Z	2.4	2.4	2.4	2.5	2.4	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	2.4	2.5	2.5	2.5	2.5	2.5
3-Dec	2.5	Z	2.5	2.5	2.5	2.6	2.6	2.5	2.5	2.5	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	2.4	2.5	2.6
4-Dec	2.4	2.4	Z	2.5	2.4	2.4	2.4	2.4	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	2.4	2.4	2.4	2.5
5-Dec	2.3	2.3	2.3	Z	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.4	2.4	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.3	2.4
6-Dec	2.3	2.3	2.3	2.2	Z	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.3
7-Dec	2.3	2.2	2.2	2.3	2.2	Z	2.2	2.2	2.2	2.3	2.3	2.2	2.2	2.3	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
8-Dec	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	2.3	2.3	2.3	2.3	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.3
9-Dec	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	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.2	2.3	2.3
10-Dec	2.3	2.2	Z	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	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3
11-Dec	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	2.3	2.3	2.2	2.2	2.2	2.3	2.2	2.2	2.3
12-Dec	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	2.2	2.2	2.2	2.3	2.3	2.3	2.3
13-Dec	2.3	2.2	2.3	2.3	2.2	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	2.3	2.3	2.2	2.3	2.3	2.3	2.2	2.3
14-Dec	Z	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.3	2.2	2.3	2.2	2.3	2.2	2.3	2.2	2.3	2.3	2.3	2.3	2.3
15-Dec	2.3	Z	2.3	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.3	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.2	2.3	2.3
16-Dec	2.3	2.2	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.2	2.2	2.2	2.3
17-Dec	2.2	2.2	2.2	Z	2.5	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.5
18-Dec	2.2	2.3	2.3	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	2.3
19-Dec	2.3	2.2	2.2	2.3	2.2	Z	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.2	2.3
20-Dec	Z	2.2	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.2
21-Dec	2.1	Z	2.1	2.1	2.1	2.1	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.1	2.1	2.1	2.2	2.2	2.1	2.2
22-Dec	2.2	2.1	Z	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.2	2.2	2.2	2.1	2.2	2.3
23-Dec	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
24-Dec	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	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
25-Dec	2.1	2.1	2.2	2.2	2.1	Z	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
26-Dec	Z	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	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.3
27-Dec	2.1	Z	2.1	2.0	2.0	2.1	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.2
28-Dec	2.2	2.1	Z	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.1	2.2	2.3
29-Dec	2.1	2.2	2.1	Z	2.1	2.1	2.2	2.3	2.4	2.1	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	2.1	2.2	2.2	2.1	2.1	2.4
30-Dec	2.1	2.1	2.1	2.1	Z	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.1	2.1	2.2
31-Dec	2.2	2.1	2.1	2.2	2.1	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	2.1	2.1	2.1	2.1	2.0	2.0	2.1	2.2
																								Diurnal Average		
																								Diurnal Maximum		
Z - zerospan C - Calibration																										



Wood Buffalo Environmental Association
Hourly Averages

Total Hydrocarbons (THC) - ppm
Surmont 2 - December 2023





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Surmont 2 - December 2023

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	14	1.98	1.98
2.1 - 3.0	694	98.02	100.00
3.1 - 10.0	0	0.00	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 708

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Total Hydrocarbons (THC) - ppm
Surmont 2 - December 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	2	0	0	1	6	5	0	0	0	14
2.1 - 3.0	1	1	2	1	3	55	85	59	30	50	90	109	147	43	15	3	694
3.1 - 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	1	1	2	1	3	55	85	61	30	50	91	115	152	43	15	3	708

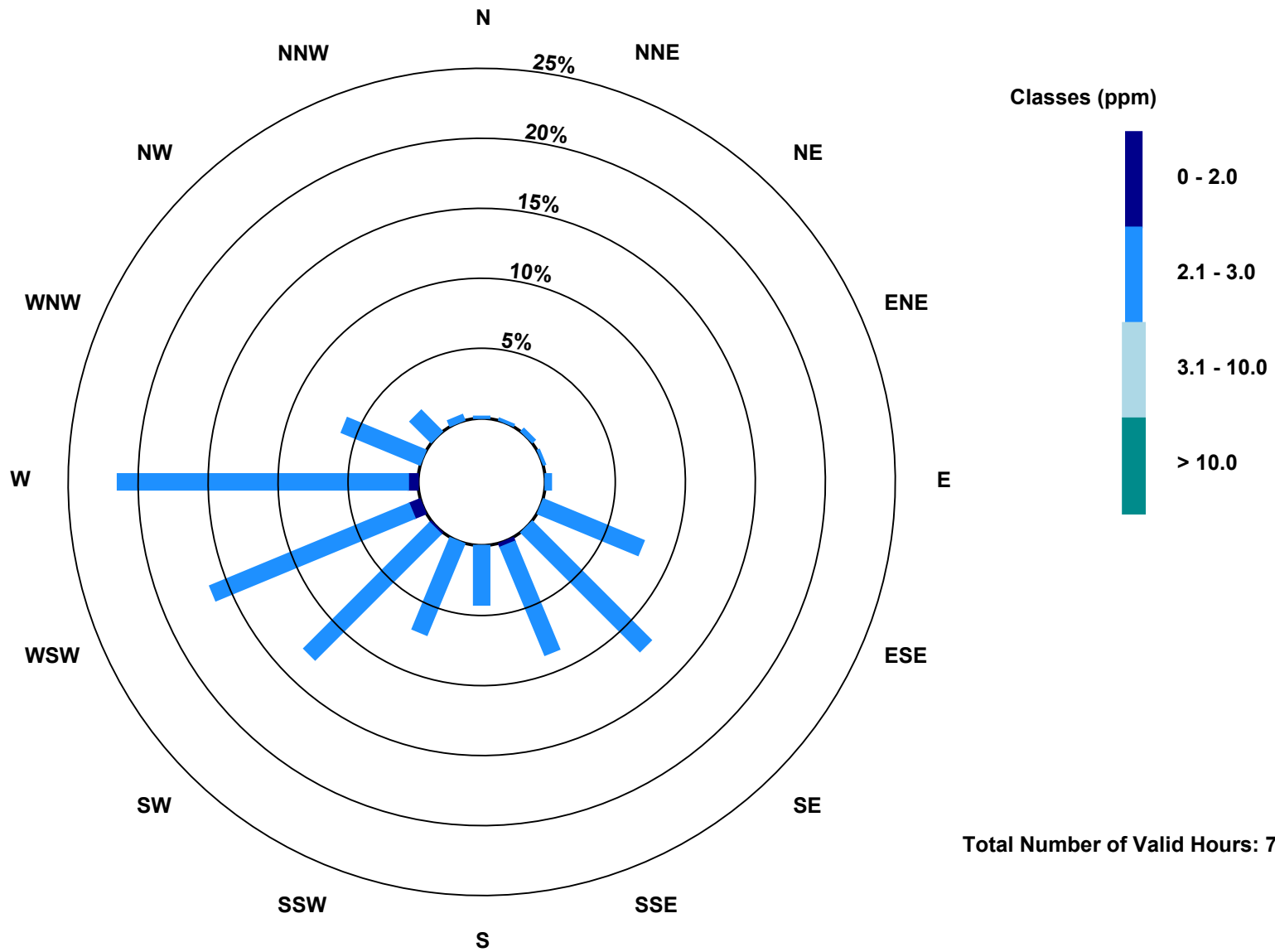
Total Number of Valid Hours: 708

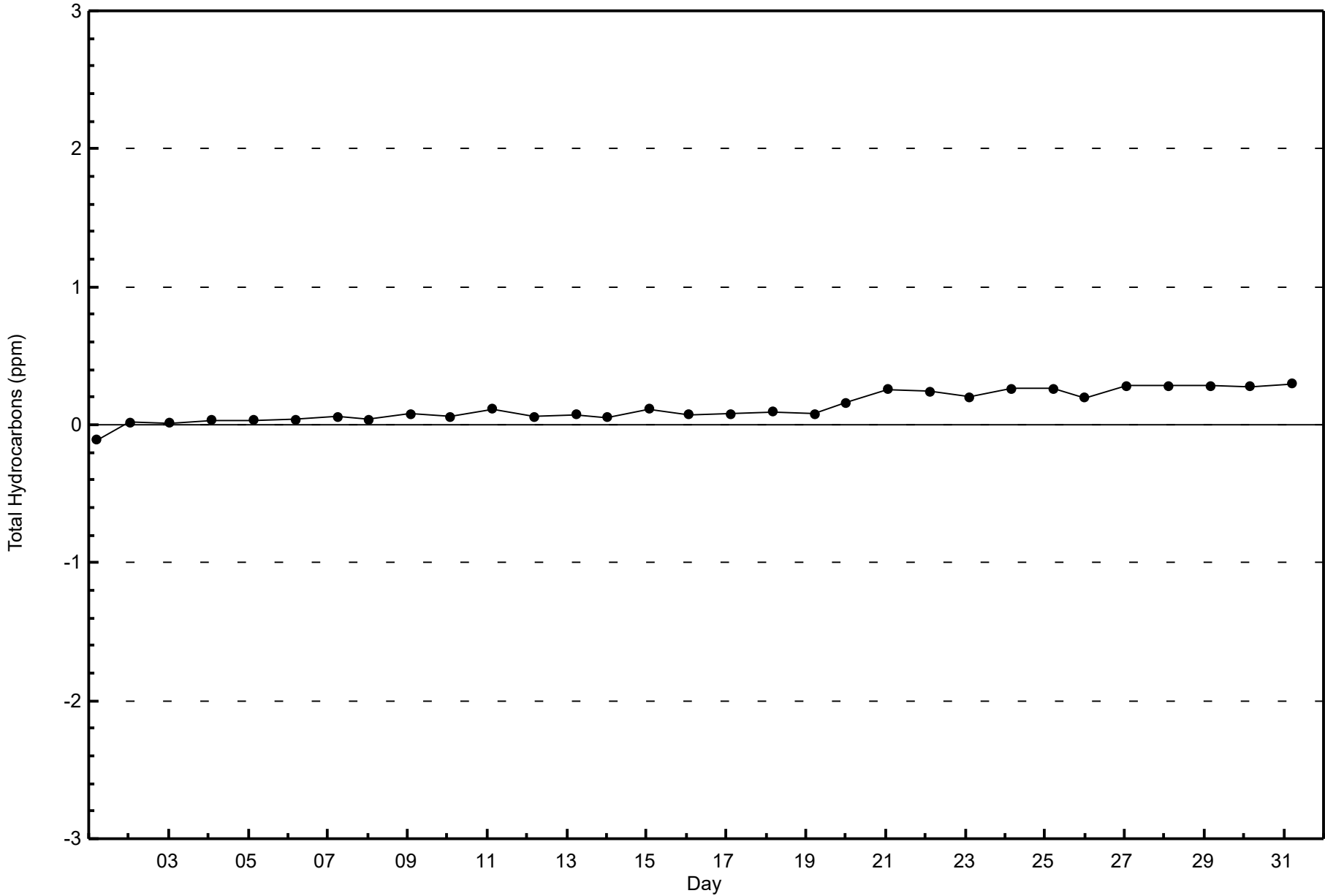
Total Number of Hours: 744

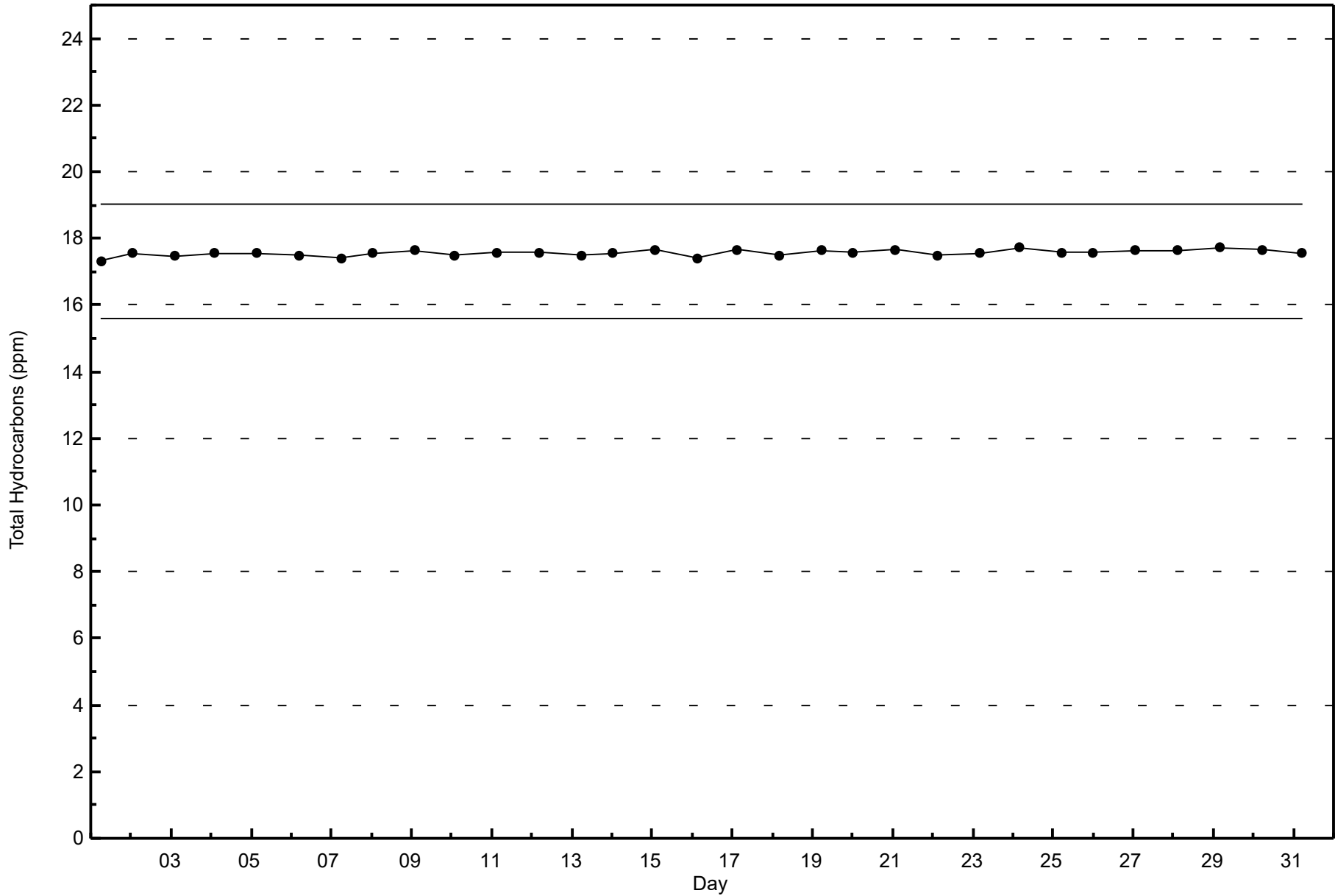


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Total Hydrocarbons (THC) - ppm
Surmont 2







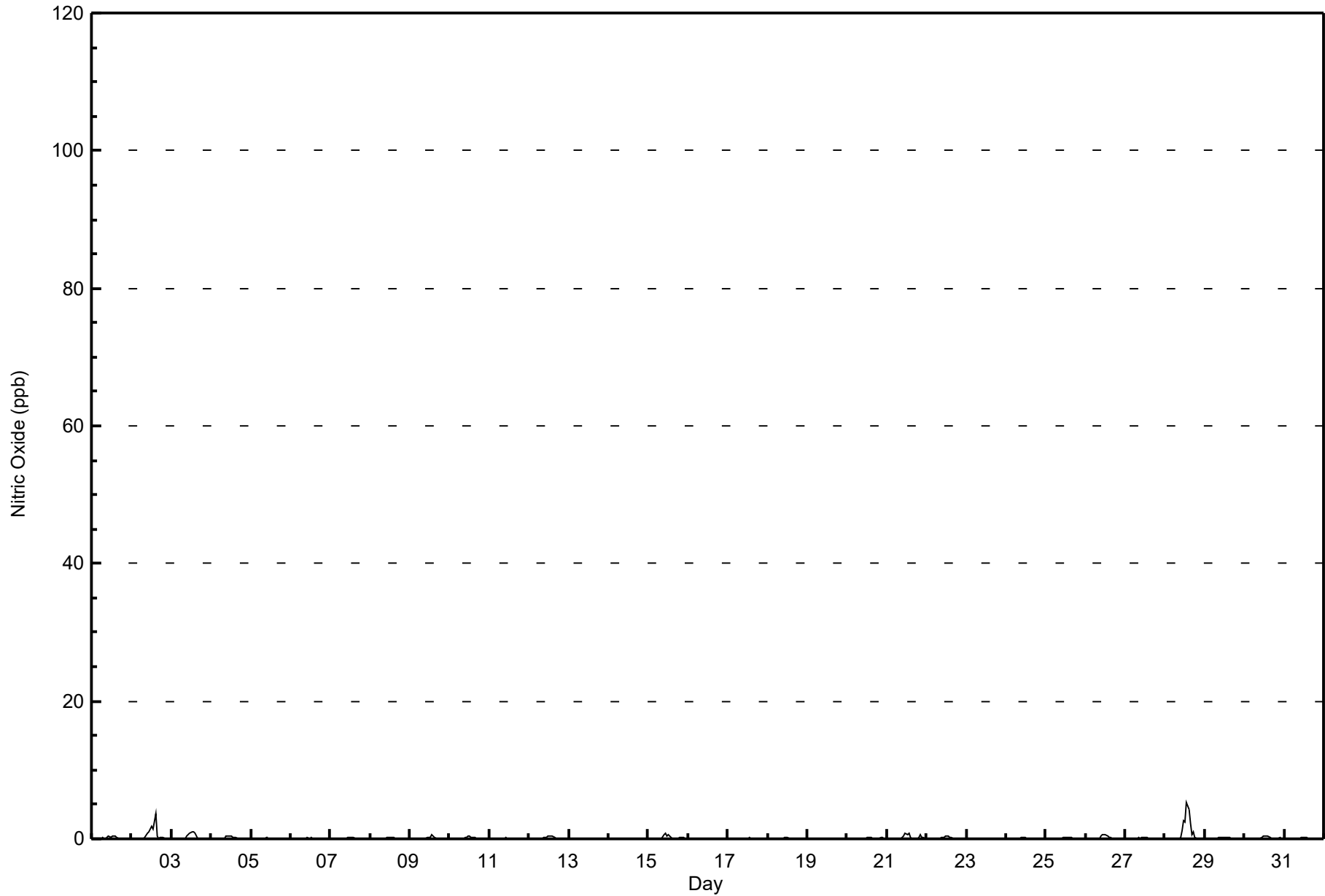


Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 5.3 ppb on Dec 28 14:00 Minimum Value: 0.0 ppb on Dec 5 20:00 Maximum Diurnal Average: 0.5 ppb at hour 14 Monthly Average: 0.12 ppb		Maximum Daily Average: 0.9 ppb on Dec 28 Minimum Daily Average: 0.0 ppb on Dec 19 Minimum Diurnal Average: 0.0 ppb at hour 3 Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.0 Median = 0.0 Q ₃ = 0.1 P ₉₀ = 0.3 P ₉₉ = 1.5		Hours in Service: 744 Hours of Data: 708 Hours of Missing Data: 36 Hours of Calibration: 36 Percent Operational Time: 100.0																								
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24				
1-Dec	0.0	0.0	0.0	Z	0.0	0.0	0.1	0.0	0.1	0.3	0.5	0.2	0.4	0.4	0.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.1	0.5
2-Dec	0.0	0.0	0.0	0.1	Z	0.1	0.1	0.1	0.1	0.8	1.1	1.5	1.9	1.4	3.6	0.5	0.1	0.1	0.3	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.5	3.6
3-Dec	0.0	0.0	0.0	0.0	0.1	Z	0.1	0.1	0.1	0.4	0.6	0.8	1.0	1.0	0.9	0.5	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	1.0	
4-Dec	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.3	0.5	0.4	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	0.1	0.5	
5-Dec	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.3	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	0.3	
6-Dec	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	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	
7-Dec	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.1	0.0	0.1	0.2	0.2	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	
8-Dec	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.1	0.1	0.1	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	0.0	0.3	
9-Dec	0.0	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.1	0.2	0.3	0.2	0.6	0.4	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.6	
10-Dec	Z	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.1	0.2	0.3	0.4	0.3	0.2	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.4	
11-Dec	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	0.1	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	
12-Dec	0.0	0.0	Z	0.0	0.0	0.0	0.1	0.1	0.1	0.2	0.3	0.4	0.4	0.5	0.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.5	
13-Dec	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	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-Dec	0.0	0.0	0.0	0.0	Z	0.0	0.0	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	0.1	
15-Dec	0.0	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.1	0.6	0.8	0.4	0.6	0.4	0.1	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.2	0.0	0.0	0.2	0.8	
16-Dec	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	Z	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.1	0.0	0.1	0.1	
18-Dec	0.1	0.1	Z	0.0	0.0	0.0	0.0	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	0.0	0.0	0.0	0.0	0.0	0.2	
19-Dec	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	0.0	
20-Dec	0.0	0.0	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	0.0	0.0	0.0	0.1	0.2	0.2	0.1	0.1	0.1	0.1	0.2	
21-Dec	0.1	0.1	0.1	0.0	0.1	Z	0.0	0.1	0.0	0.1	0.3	0.9	0.7	0.9	0.1	0.1	0.1	0.0	0.0	0.1	0.6	0.3	0.2	0.1	0.2	0.2	0.9	
22-Dec	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.3	0.5	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	0.5	
23-Dec	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	Z	0.0	0.0	0.0	0.0	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	0.0	0.0	0.0	0.2	
25-Dec	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	0.1	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	
26-Dec	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.3	0.6	0.7	0.7	0.5	0.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.7	
27-Dec	0.0	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.2	0.0	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	0.1	0.2	
28-Dec	Z	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.3	1.2	2.7	2.5	5.3	4.3	2.2	0.7	0.9	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.9	5.3	
29-Dec	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.1	0.3	0.2	0.1	0.1	0.2	0.3	0.3	0.2	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.3	
30-Dec	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.3	0.3	0.4	0.4	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.1	0.0	0.1	0.4	
31-Dec	0.1	0.1	0.0	Z	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	0.1	0.2	
																								Diurnal Average				
																								Diurnal Maximum				
Z - zerospan C - Calibration																												



Wood Buffalo Environmental Association
Hourly Averages

Nitric Oxide (NO) - ppb
Surmont 2 - December 2023





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitric Oxide (NO) - ppb
Surmont 2 - December 2023**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	708	100.00	100.00
21 - 40	0	0.00	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 708

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitric Oxide (NO) - ppb
Surmont 2 - December 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	1	1	2	1	3	55	82	62	35	49	94	113	151	43	12	4	708
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	1	1	2	1	3	55	82	62	35	49	94	113	151	43	12	4	708

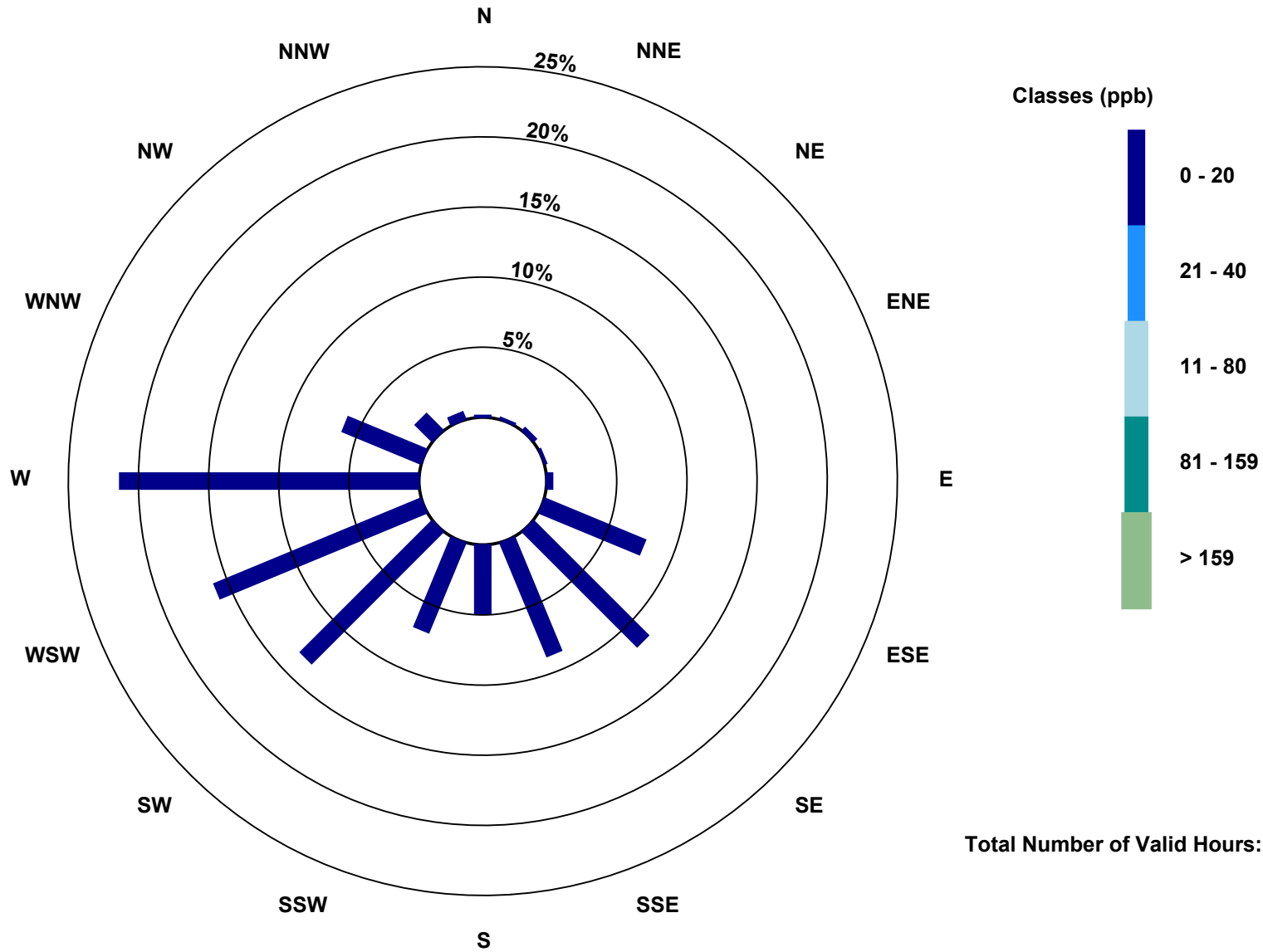
Total Number of Valid Hours: 708

Total Number of Hours: 744

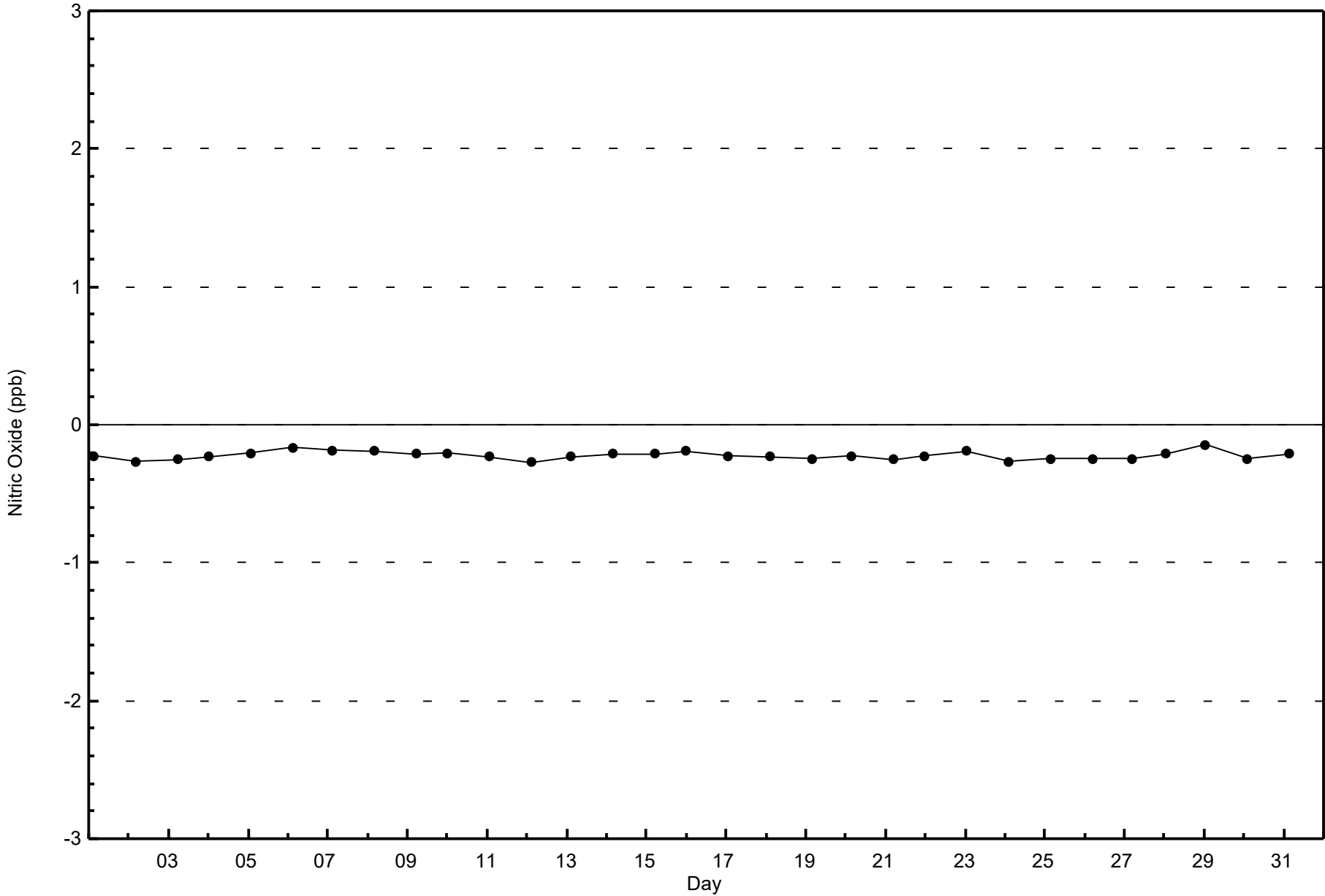


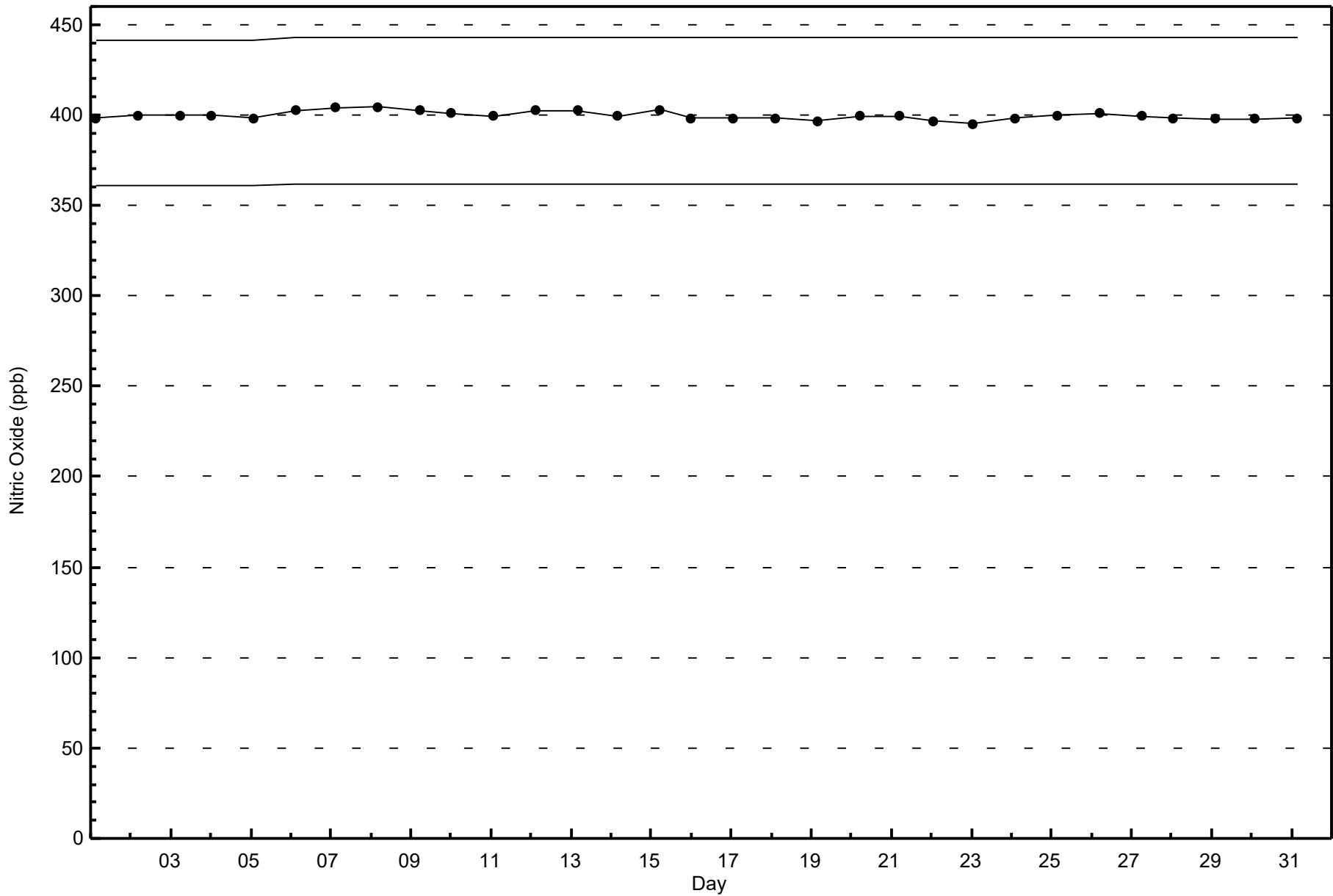
Wood Buffalo Environmental Association
Wind Rose Dec 2023

Nitric Oxide (NO) - ppb
Surmont 2



Total Number of Valid Hours: 708







Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO₂) - ppb

Surmont 2 - December 2023

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 20.4 ppb on Dec 28 17:00	Maximum Daily Average: 8.9 ppb on Dec 28		Hours of Data:	708
Minimum Value: 0.2 ppb on Dec 10 22:00	Minimum Daily Average: 0.4 ppb on Dec 23		Hours of Missing Data:	36
Maximum Diurnal Average: 2.7 ppb at hour 17	Minimum Diurnal Average: 1.8 ppb at hour 1		Hours of Calibration:	36
Monthly Average: 2.29 ppb	Percentiles: P ₁ = 0.2 P ₁₀ = 0.5 Q ₁ = 0.9 Median = 1.7 Q ₃ = 3.0 P ₉₀ = 4.7 P ₉₉ = 10.1		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-Dec	0.6	1.6	1.7	Z	1.8	1.7	7.6	6.3	3.7	2.1	1.9	1.1	1.5	1.5	2.1	2.6	3.1	2.8	2.2	2.3	2.9	2.9	3.6	2.8	2.6	7.6
2-Dec	2.7	3.0	2.9	3.3	Z	3.4	3.7	3.6	4.8	7.0	6.0	5.5	4.9	5.2	6.7	6.5	6.0	7.7	12.0	10.1	5.5	4.3	4.2	4.3	5.4	12.0
3-Dec	3.8	3.3	3.1	2.8	2.7	Z	2.9	3.2	3.4	2.8	2.2	2.5	2.8	2.8	3.2	4.8	5.1	4.5	4.5	4.2	4.4	3.6	3.1	3.2	3.4	5.1
4-Dec	Z	3.0	3.3	3.3	3.2	3.1	3.0	4.4	4.2	3.1	2.4	2.1	1.9	1.7	1.5	2.3	2.4	2.2	1.6	1.3	1.3	1.8	2.3	2.5	2.5	4.4
5-Dec	1.3	Z	1.2	1.0	1.2	1.6	2.1	2.9	3.2	2.9	2.9	C	C	C	C	C	1.4	1.4	1.5	1.3	1.1	1.0	1.1	1.0	1.7	3.2
6-Dec	0.8	0.7	Z	0.8	0.7	0.6	0.7	0.7	0.8	1.0	1.2	0.7	0.9	0.6	0.9	1.2	1.4	1.3	1.1	0.9	0.8	0.8	1.4	0.8	0.9	1.4
7-Dec	0.8	0.8	0.8	Z	0.8	0.8	0.9	1.2	1.0	1.1	1.5	1.1	0.9	1.2	1.4	1.8	1.4	1.2	1.2	1.1	1.0	1.0	0.9	0.7	1.1	1.8
8-Dec	0.6	0.5	0.5	0.6	Z	0.7	0.6	1.7	1.4	2.0	1.2	1.0	1.4	1.2	1.7	1.9	2.1	1.5	1.5	1.6	1.9	1.9	1.9	1.7	1.4	2.1
9-Dec	1.6	1.5	1.3	1.2	1.0	Z	0.9	0.8	0.8	1.0	1.5	1.6	1.3	4.0	4.1	3.8	1.7	1.1	1.3	1.2	1.0	0.8	0.9	0.8	1.5	4.1
10-Dec	Z	1.3	1.9	3.7	3.3	3.0	2.6	2.6	2.9	4.4	3.6	3.2	2.9	1.9	1.6	1.4	1.1	1.0	0.4	0.3	0.3	0.2	0.2	0.2	1.9	4.4
11-Dec	0.2	Z	0.3	0.2	0.2	0.2	0.2	0.3	0.3	0.4	0.5	0.4	0.4	0.5	0.7	1.3	2.6	2.6	3.2	1.1	1.3	0.9	0.8	2.0	0.9	3.2
12-Dec	2.7	2.2	Z	2.4	3.5	2.2	3.5	4.5	2.2	1.6	1.7	1.7	1.7	2.3	2.4	2.2	2.1	2.2	2.6	1.6	2.0	2.7	1.6	1.6	2.3	4.5
13-Dec	2.0	2.5	2.8	Z	1.9	1.5	1.1	0.9	1.3	1.3	1.3	1.3	1.3	1.9	2.3	2.3	2.4	3.0	2.5	2.0	1.6	1.3	1.0	0.8	1.8	3.0
14-Dec	0.8	0.8	0.8	0.6	Z	0.6	0.5	0.5	0.9	0.7	0.7	0.6	0.6	0.7	1.1	1.7	1.1	1.4	1.2	1.1	1.0	0.9	0.8	0.7	0.9	1.7
15-Dec	0.8	1.4	0.9	1.4	0.8	Z	1.0	1.4	2.0	6.9	6.7	2.5	3.6	3.4	1.3	1.3	1.1	2.3	3.3	4.9	5.6	5.2	3.0	2.8	2.8	6.9
16-Dec	Z	1.9	1.1	1.0	0.9	0.9	0.6	0.3	0.5	0.3	0.4	0.5	0.4	0.4	0.4	0.6	0.9	0.7	0.5	3.1	9.3	4.0	0.6	0.6	1.3	9.3
17-Dec	0.4	Z	0.6	6.3	9.8	6.2	4.5	0.7	1.1	0.9	0.7	0.6	0.7	1.0	0.9	1.1	4.1	3.4	4.7	3.5	1.9	3.3	2.9	5.6	2.8	9.8
18-Dec	5.6	5.2	Z	1.4	1.1	1.0	0.9	0.9	0.7	1.0	1.1	0.9	0.7	0.5	0.5	0.5	1.3	0.4	0.3	0.3	0.3	0.3	0.2	1.4	1.2	5.6
19-Dec	1.9	1.2	1.9	Z	4.4	5.4	5.8	4.3	2.0	0.8	0.6	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.7	0.6	0.3	2.1	1.8	1.6	5.8
20-Dec	0.9	1.4	0.8	0.8	Z	0.9	0.5	0.3	0.3	0.3	0.7	0.9	1.0	1.2	1.7	1.8	1.8	1.7	1.8	2.2	4.5	3.7	3.0	3.3	1.5	4.5
21-Dec	2.4	1.9	1.1	1.0	0.7	Z	0.7	0.5	0.8	1.5	2.0	4.4	3.6	5.4	1.3	2.7	3.1	0.5	0.8	4.7	9.3	6.8	6.3	6.5	3.0	9.3
22-Dec	Z	3.2	3.1	2.1	2.6	2.4	2.3	2.3	2.6	2.7	2.6	2.6	2.9	3.0	3.3	3.7	4.0	4.5	3.9	3.6	3.6	2.7	1.5	1.2	2.9	4.5
23-Dec	0.8	Z	0.6	0.5	0.5	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.3	0.4	0.3	0.3	0.3	0.2	0.6	0.4	0.4	0.4	0.4	0.8
24-Dec	0.5	0.5	Z	0.7	0.7	0.8	1.3	4.5	3.4	2.1	1.1	1.2	0.7	0.8	1.1	0.7	0.5	0.8	2.3	2.0	1.8	1.5	1.7	1.9	1.4	4.5
25-Dec	2.0	2.6	2.3	Z	3.0	3.1	2.5	2.5	1.9	1.3	1.1	1.6	1.8	1.2	1.8	2.3	2.3	1.9	1.7	1.4	1.2	1.6	1.4	1.4	1.9	3.1
26-Dec	2.7	4.7	5.4	6.9	Z	6.9	6.2	5.5	5.6	5.2	4.3	3.4	3.0	2.7	2.6	2.5	2.5	1.9	1.7	1.3	1.4	1.3	1.1	0.9	3.5	6.9
27-Dec	0.8	0.7	0.5	0.3	0.4	Z	0.5	0.5	1.1	0.6	2.6	1.6	1.2	1.1	1.1	1.3	1.6	1.9	2.2	2.0	2.7	3.2	2.9	2.4	1.4	3.2
28-Dec	Z	3.2	5.4	6.0	3.5	4.7	4.2	4.6	4.9	4.8	8.2	9.6	8.8	13.6	16.8	18.4	20.4	18.5	11.3	10.0	8.2	8.2	6.6	5.4	8.9	20.4
29-Dec	4.0	Z	2.9	3.3	3.3	5.2	6.1	8.0	8.6	3.2	1.2	1.3	1.7	1.7	2.0	1.9	2.3	2.3	2.1	2.5	2.9	3.1	3.7	2.6	3.3	8.6
30-Dec	1.7	1.1	Z	1.6	1.9	1.8	1.3	1.2	1.3	1.3	1.7	2.1	2.2	3.1	4.2	4.4	3.6	2.5	2.1	1.8	1.7	5.6	5.6	3.5	2.5	5.6
31-Dec	4.5	5.5	4.1	Z	3.5	3.2	3.0	4.0	2.4	2.1	2.0	1.9	1.4	1.2	1.0	1.2	1.2	2.0	1.5	1.4	1.6	1.3	0.8	0.6	2.2	5.5

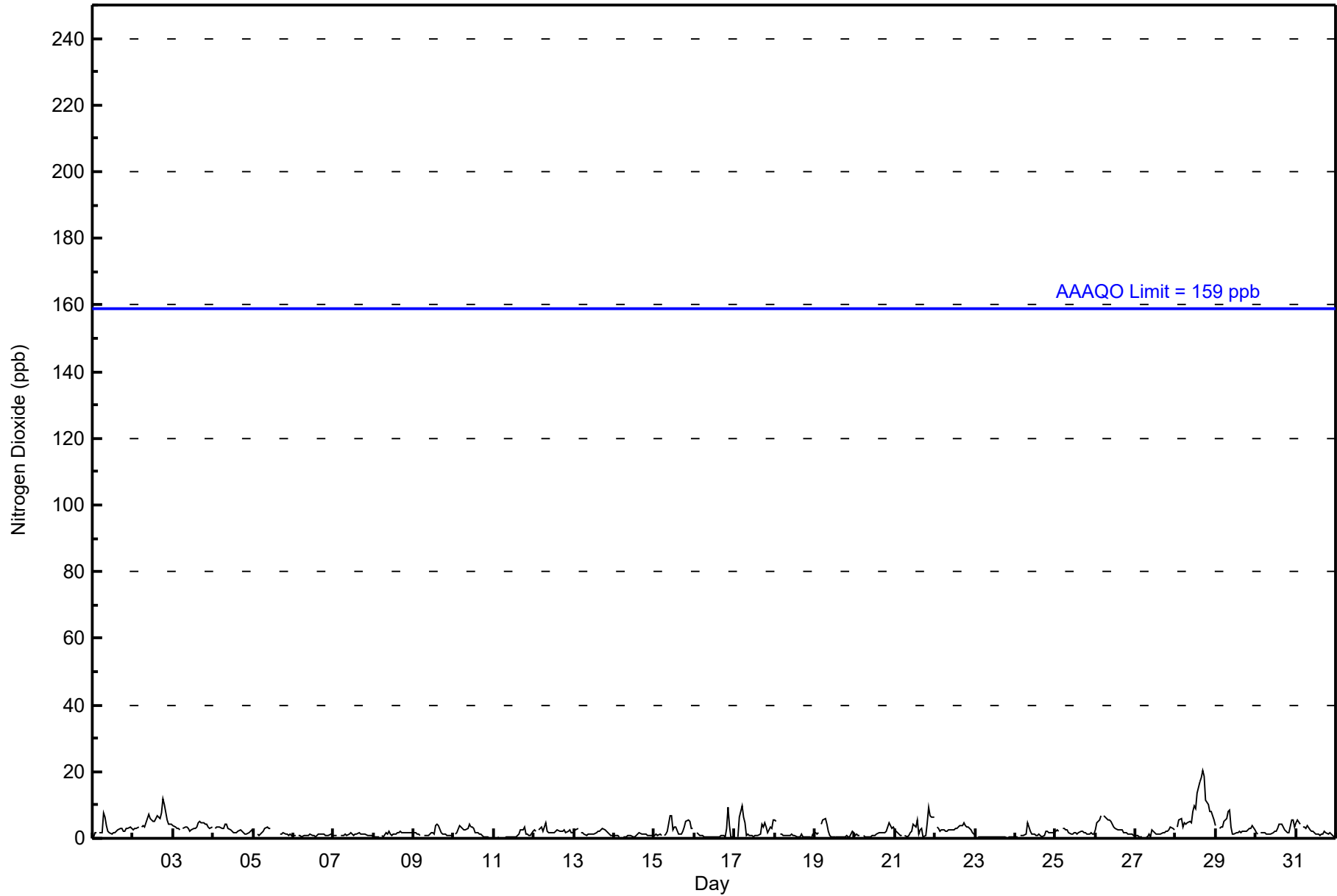
1.8	2.1	2.0	2.1	2.2	2.4	2.3	2.4	2.3	2.2	2.1	2.0	1.9	2.2	2.3	2.6	2.7	2.6	2.5	2.4	2.7	2.5	2.2	2.1	Diurnal Average	
5.6	5.5	5.4	6.9	9.8	6.9	7.6	8.0	8.6	7.0	8.2	9.6	8.8	13.6	16.8	18.4	20.4	18.5	12.0	10.1	9.3	8.2	6.6	6.5	Diurnal Maximum	

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



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Dioxide (NO₂) - ppb
Surmont 2 - December 2023





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Surmont 2 - December 2023**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	708	100.00	100.00
21 - 40	0	0.00	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 708

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Surmont 2 - December 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	1	1	2	1	3	55	82	62	35	49	94	113	151	43	12	4	708
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	1	1	2	1	3	55	82	62	35	49	94	113	151	43	12	4	708

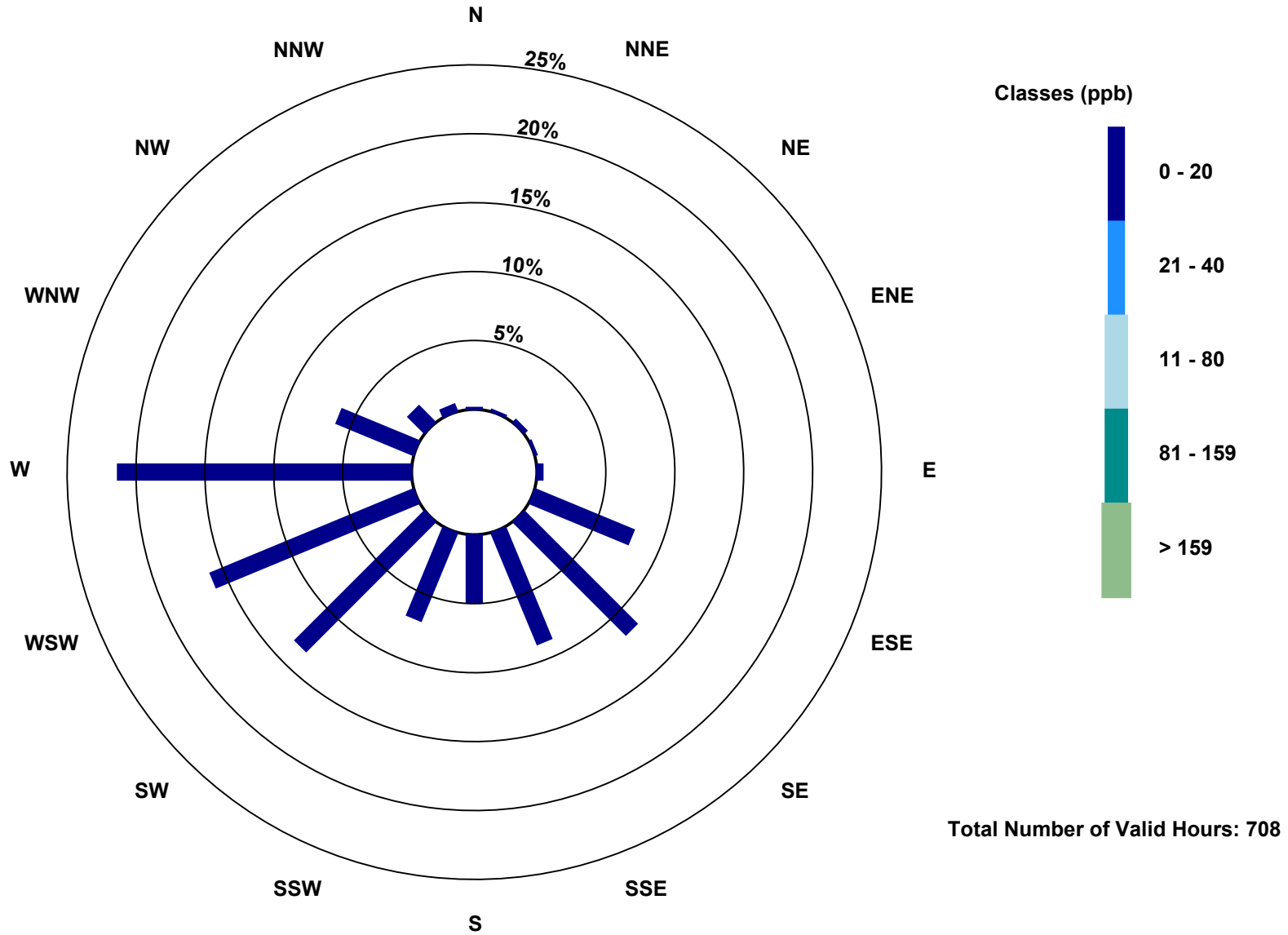
Total Number of Valid Hours: 708

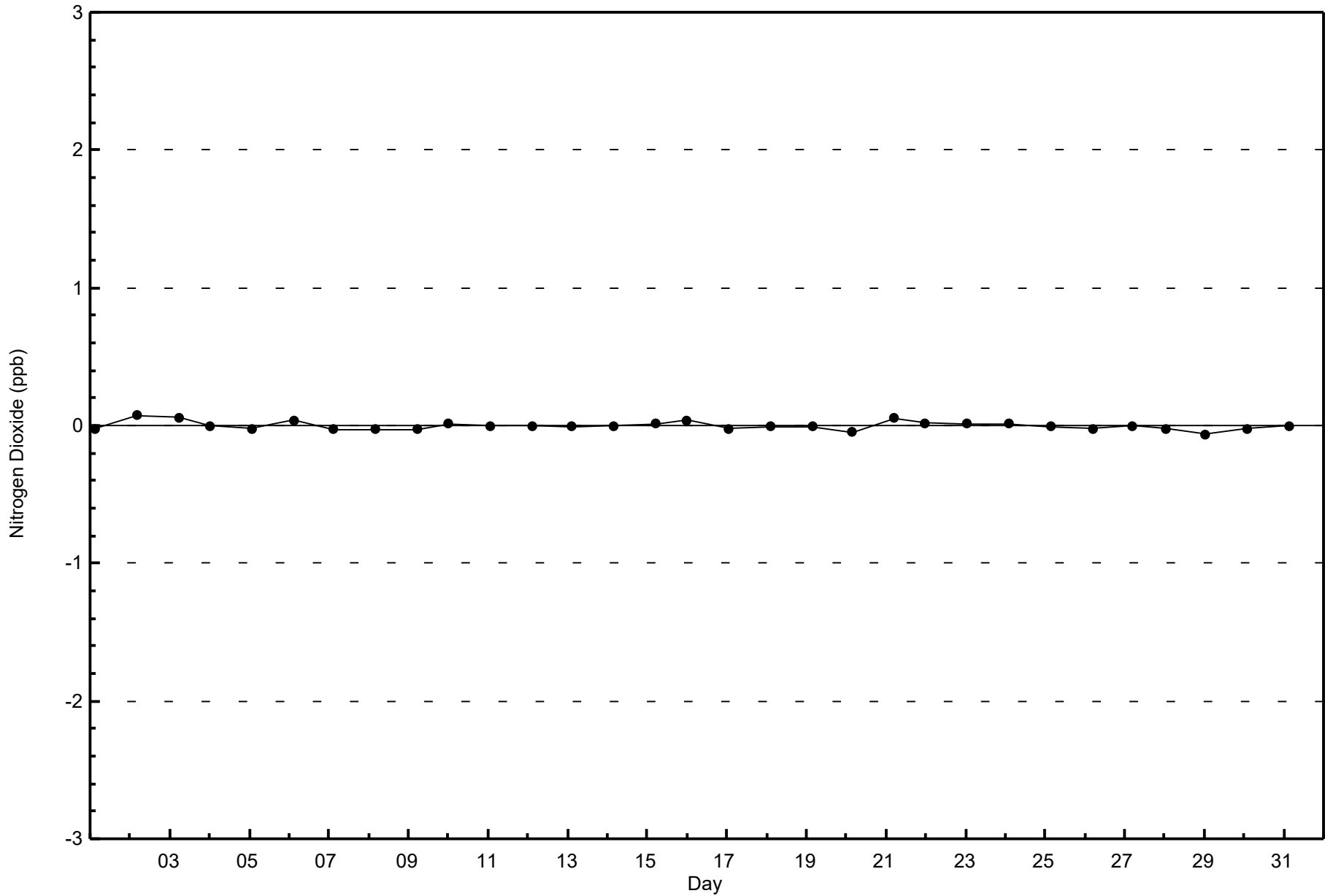
Total Number of Hours: 744

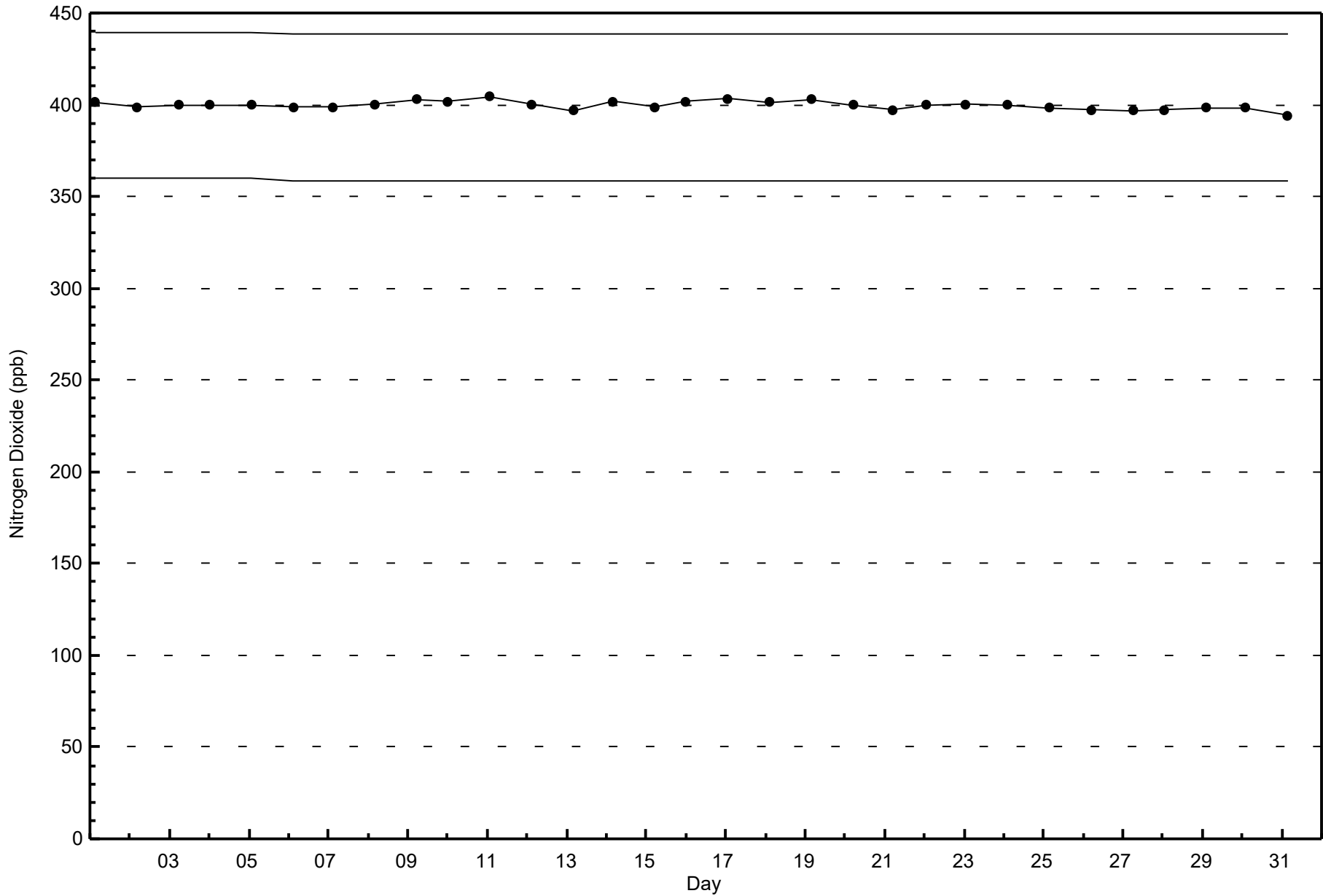


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Nitrogen Dioxide (NO₂) - ppb
Surmont 2









Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Oxides (NO_x) - ppb

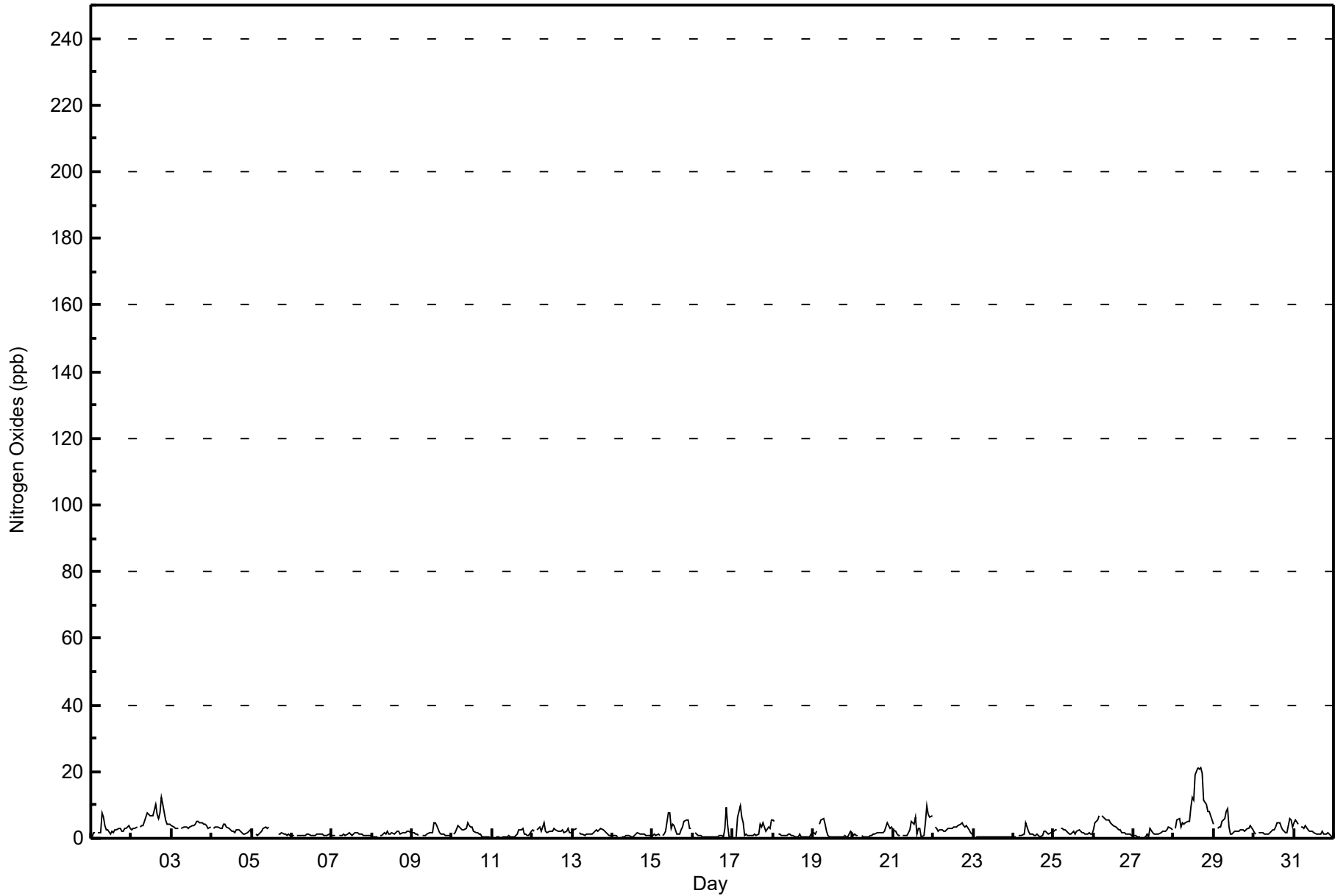
Surmont 2 - December 2023

Number of Exceedences (AAAQO):		1-hr: 0		24-hr: 0		Hours in Service: 744																																										
Maximum Value: 21.1 ppb on Dec 28 17:00		Maximum Daily Average: 9.8 ppb on Dec 28		Hours of Data: 708																																												
Minimum Value: 0.2 ppb on Dec 11 00:00		Minimum Daily Average: 0.4 ppb on Dec 23		Hours of Missing Data: 36																																												
Maximum Diurnal Average: 2.8 ppb at hour 16		Minimum Diurnal Average: 1.8 ppb at hour 1		Hours of Calibration: 36																																												
Monthly Average: 2.40 ppb		Percentiles: P ₁ = 0.2 P ₁₀ = 0.5 Q ₁ = 0.9 Median = 1.7 Q ₃ = 3.1 P ₉₀ = 4.8 P ₉₉ = 11.4		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-Dec	0.6	1.6	1.7	Z	1.8	1.7	7.7	6.3	3.8	2.4	2.4	1.3	1.9	1.9	2.4	2.7	3.1	2.8	2.2	2.3	2.9	2.9	3.7	2.8	2.7	7.7																						
2-Dec	2.7	3.0	2.9	3.4	Z	3.5	3.8	3.7	4.9	7.8	7.1	7.0	6.8	6.6	10.3	7.0	6.1	7.8	12.3	10.3	5.6	4.3	4.2	4.3	5.9	12.3																						
3-Dec	3.8	3.3	3.1	2.8	2.8	Z	3.0	3.3	3.5	3.2	2.8	3.3	3.8	3.8	4.1	5.3	5.2	4.6	4.5	4.2	4.4	3.6	3.1	3.2	3.7	5.3																						
4-Dec	Z	3.0	3.3	3.3	3.2	3.1	3.0	4.4	4.3	3.4	2.9	2.5	2.2	1.9	1.7	2.4	2.4	2.2	1.6	1.3	1.3	1.8	2.3	2.5	2.6	4.4																						
5-Dec	1.3	Z	1.2	1.0	1.2	1.6	2.1	2.9	3.2	3.0	3.2	C	C	C	C	C	1.4	1.4	1.5	1.3	1.1	1.0	1.1	1.0	1.7	3.2																						
6-Dec	0.8	0.7	Z	0.8	0.7	0.6	0.7	0.7	0.8	1.1	1.3	0.8	1.0	0.7	1.0	1.2	1.5	1.3	1.1	0.9	0.8	0.8	1.4	0.8	0.9	1.5																						
7-Dec	0.8	0.8	0.8	Z	0.8	0.8	0.9	1.3	1.0	1.2	1.7	1.3	1.0	1.4	1.5	1.9	1.4	1.2	1.2	1.1	1.0	1.0	0.9	0.7	1.1	1.9																						
8-Dec	0.6	0.5	0.5	0.6	Z	0.7	0.6	1.7	1.4	2.1	1.3	1.1	1.7	1.4	1.8	2.0	2.1	1.5	1.5	1.6	1.9	1.9	1.9	1.7	1.4	2.1																						
9-Dec	1.6	1.5	1.3	1.2	1.0	Z	0.9	0.8	0.8	1.1	1.7	1.9	1.5	4.6	4.5	3.9	1.7	1.1	1.3	1.2	1.0	0.8	0.9	0.8	1.6	4.6																						
10-Dec	Z	1.3	1.9	3.7	3.4	3.1	2.6	2.6	2.9	4.5	3.8	3.5	3.3	2.2	1.8	1.5	1.1	1.1	0.4	0.3	0.3	0.2	0.2	0.2	2.0	4.5																						
11-Dec	0.2	Z	0.3	0.2	0.2	0.2	0.2	0.3	0.3	0.4	0.6	0.4	0.5	0.6	0.8	1.3	2.6	2.6	3.2	1.1	1.3	0.9	0.8	2.0	0.9	3.2																						
12-Dec	2.7	2.2	Z	2.4	3.5	2.2	3.6	4.6	2.3	1.8	2.0	2.1	2.1	2.8	2.7	2.3	2.1	2.2	2.6	1.6	2.0	2.8	1.6	1.6	2.4	4.6																						
13-Dec	2.0	2.5	2.8	Z	1.9	1.5	1.1	0.9	1.3	1.3	1.3	1.3	1.3	2.0	2.3	2.3	2.4	3.0	2.5	2.0	1.6	1.3	1.0	0.8	1.8	3.0																						
14-Dec	0.8	0.8	0.8	0.6	Z	0.6	0.5	1.0	0.7	0.7	0.6	0.6	0.8	1.2	1.7	1.1	1.4	1.2	1.1	1.0	0.9	0.8	0.7	0.7	0.9	1.7																						
15-Dec	0.8	1.4	0.9	1.4	0.8	Z	1.0	1.4	2.1	7.5	7.5	2.9	4.2	3.8	1.4	1.3	1.1	2.4	3.4	5.0	5.7	5.4	3.0	2.8	2.9	7.5																						
16-Dec	Z	1.9	1.1	1.0	0.9	0.9	0.6	0.3	0.5	0.3	0.4	0.5	0.4	0.4	0.4	0.6	0.9	0.7	0.5	3.1	9.3	4.0	0.6	0.6	1.3	9.3																						
17-Dec	0.4	Z	0.6	6.3	9.9	6.2	4.5	0.7	1.1	0.9	0.7	0.7	0.8	1.1	0.9	1.1	4.1	3.4	4.8	3.5	1.9	3.4	2.9	5.7	2.8	9.9																						
18-Dec	5.7	5.3	Z	1.4	1.1	1.0	0.9	1.0	0.8	1.1	1.2	1.0	0.9	0.6	0.5	0.5	1.3	0.4	0.3	0.3	0.3	0.3	0.2	1.4	1.2	5.7																						
19-Dec	1.9	1.2	1.9	Z	4.4	5.4	5.8	4.3	2.0	0.8	0.6	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.7	0.6	0.3	2.1	1.8	1.6	5.8																						
20-Dec	0.9	1.4	0.8	0.8	Z	0.9	0.5	0.3	0.3	0.3	0.7	1.0	1.1	1.3	1.8	1.9	1.8	1.7	1.8	2.3	4.7	3.9	3.1	3.4	1.6	4.7																						
21-Dec	2.5	2.0	1.2	1.0	0.8	Z	0.7	0.6	0.8	1.6	2.3	5.3	4.3	6.3	1.4	2.8	3.2	0.5	0.8	4.8	9.9	7.1	6.5	6.6	3.2	9.9																						
22-Dec	Z	3.2	3.1	2.1	2.6	2.4	2.3	2.3	2.6	2.8	2.9	3.1	3.2	3.3	3.5	3.8	4.1	4.5	3.9	3.6	3.6	2.7	1.5	1.2	3.0	4.5																						
23-Dec	0.8	Z	0.6	0.5	0.5	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.3	0.4	0.3	0.3	0.3	0.2	0.6	0.4	0.4	0.4	0.4	0.8																						
24-Dec	0.5	0.5	Z	0.7	0.7	0.8	1.3	4.5	3.5	2.2	1.2	1.4	0.8	0.9	1.2	0.7	0.5	0.8	2.3	2.0	1.8	1.5	1.7	1.9	1.5	4.5																						
25-Dec	2.0	2.6	2.3	Z	3.0	3.1	2.5	2.5	1.9	1.3	1.2	1.8	2.1	1.3	2.0	2.4	2.3	1.9	1.7	1.4	1.2	1.6	1.4	1.4	2.0	3.1																						
26-Dec	2.7	4.7	5.4	6.9	Z	6.9	6.2	5.5	5.6	5.5	4.9	4.1	3.7	3.2	2.9	2.6	2.5	1.9	1.7	1.3	1.4	1.3	1.1	0.9	3.6	6.9																						
27-Dec	0.8	0.7	0.5	0.3	0.4	Z	0.5	0.5	1.3	0.6	2.8	1.8	1.4	1.2	1.2	1.3	1.6	1.9	2.2	2.0	2.7	3.2	2.9	2.4	1.5	3.2																						
28-Dec	Z	3.2	5.4	6.0	3.5	4.8	4.2	4.6	4.9	5.1	9.4	12.3	11.3	18.9	21.1	20.6	21.1	19.4	11.5	10.0	8.2	8.2	6.6	5.4	9.8	21.1																						
29-Dec	4.0	Z	2.9	3.3	3.3	5.2	6.1	8.1	8.9	3.4	1.3	1.4	1.9	2.0	2.3	2.1	2.4	2.4	2.2	2.5	2.9	3.1	3.7	2.6	3.4	8.9																						
30-Dec	1.7	1.1	Z	1.6	1.9	1.8	1.3	1.2	1.3	1.3	1.9	2.4	2.5	3.5	4.6	4.5	3.6	2.5	2.1	1.8	1.7	5.8	5.7	3.5	2.6	5.8																						
31-Dec	4.6	5.6	4.1	Z	3.5	3.2	3.0	4.0	2.4	2.2	2.2	2.1	1.6	1.3	1.1	1.2	1.2	2.0	1.5	1.4	1.6	1.3	0.8	0.6	2.3	5.6																						
1.8																								2.2	2.0	2.1	2.2	2.4	2.3	2.5	2.3	2.3	2.4	2.3	2.3	2.7	2.8	2.8	2.8	2.6	2.5	2.5	2.7	2.5	2.2	2.1	Diurnal Average	
5.7																								5.6	5.4	6.9	9.9	6.9	7.7	8.1	8.9	7.8	9.4	12.3	11.3	18.9	21.1	20.6	21.1	19.4	12.3	10.3	9.9	8.2	6.6	6.6	Diurnal Maximum	
Z - zerospan C - Calibration																																																



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Surmont 2 - December 2023





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Surmont 2 - December 2023**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	705	99.58	99.58
21 - 40	3	0.42	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 708

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Surmont 2 - December 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	1	1	2	1	3	55	82	62	35	49	94	113	151	42	10	4	705
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	3
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	1	1	2	1	3	55	82	62	35	49	94	113	151	43	12	4	708

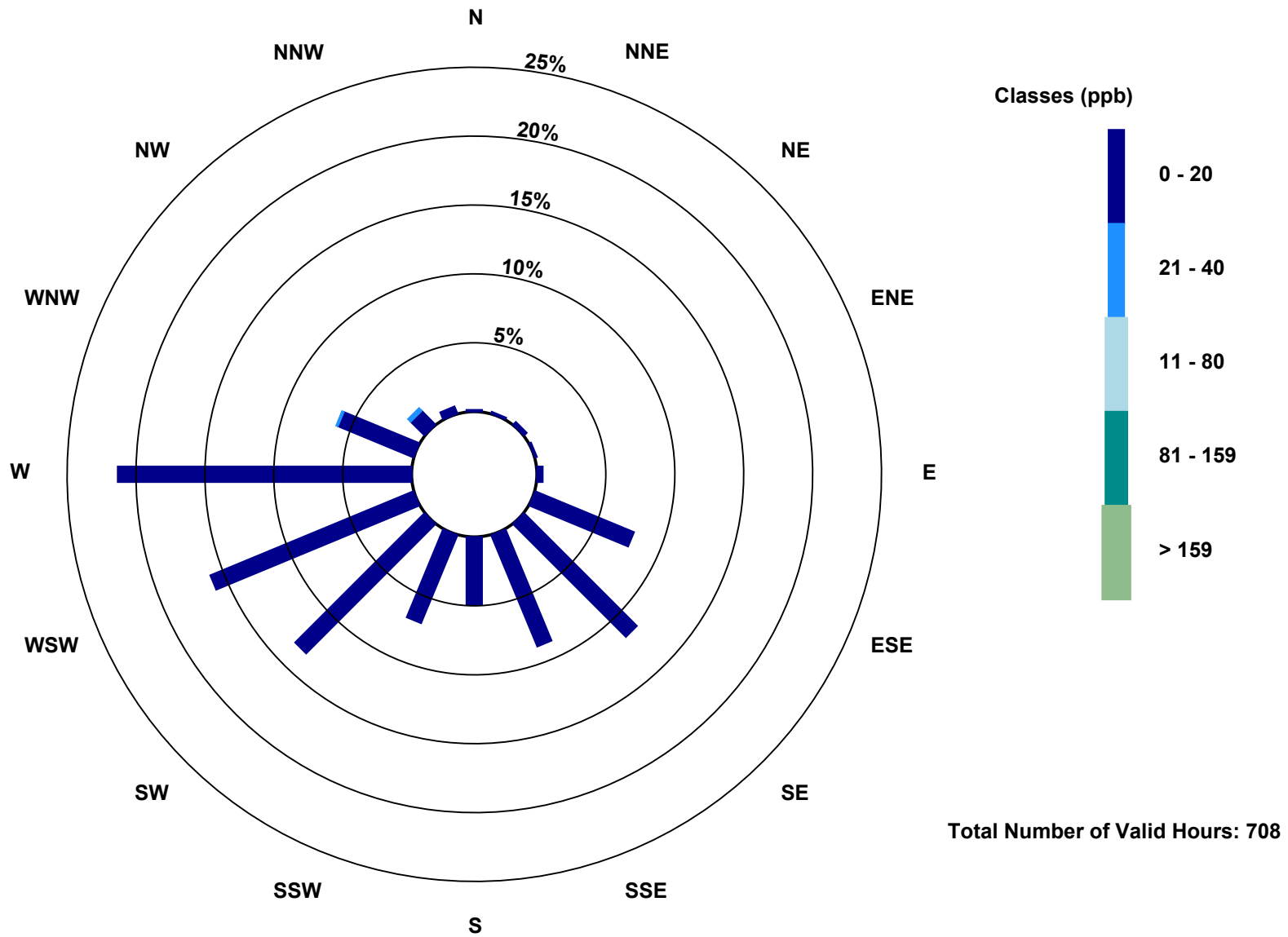
Total Number of Valid Hours: 708

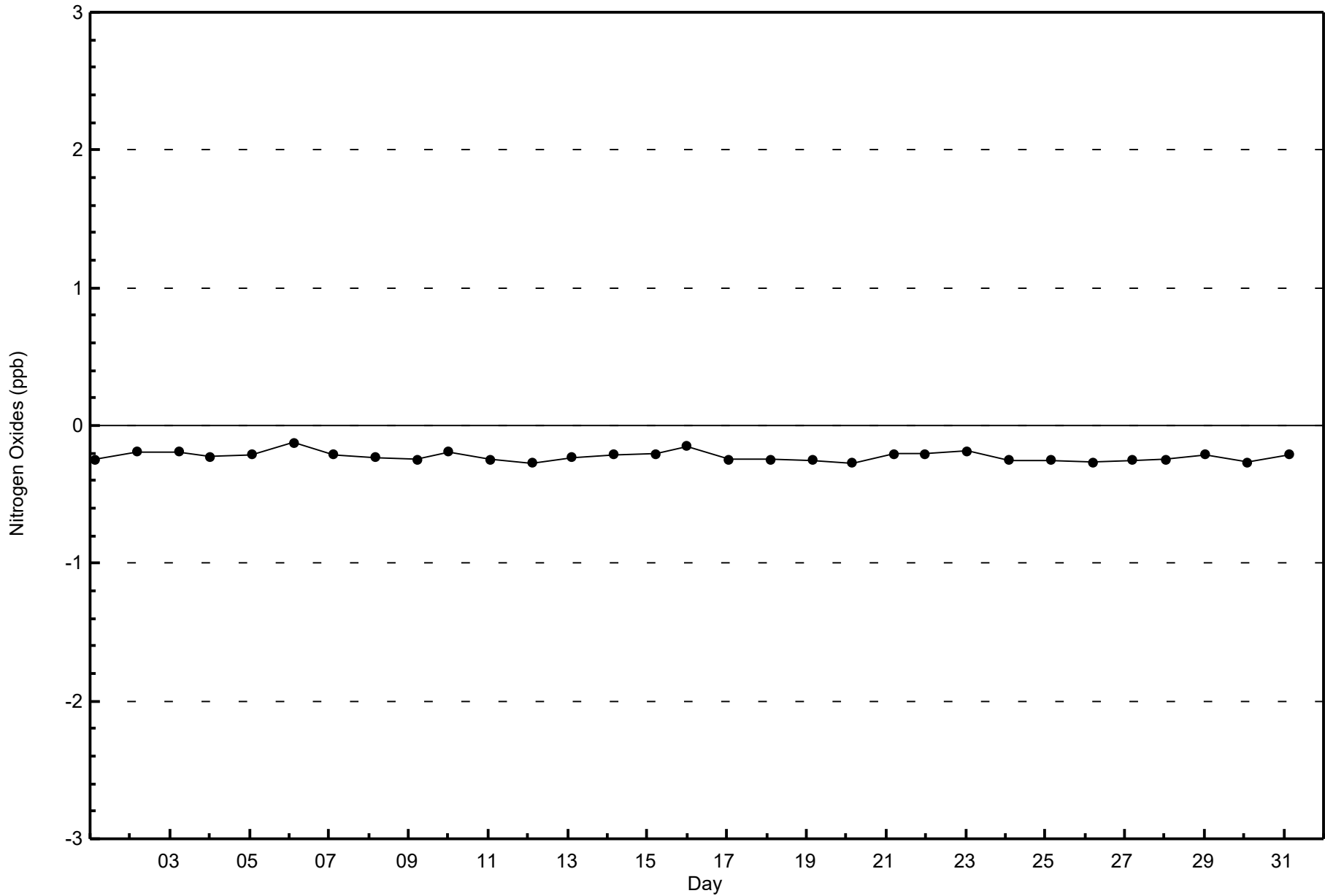
Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Dec 2023

Nitrogen Oxides (NO_x) - ppb
Surmont 2

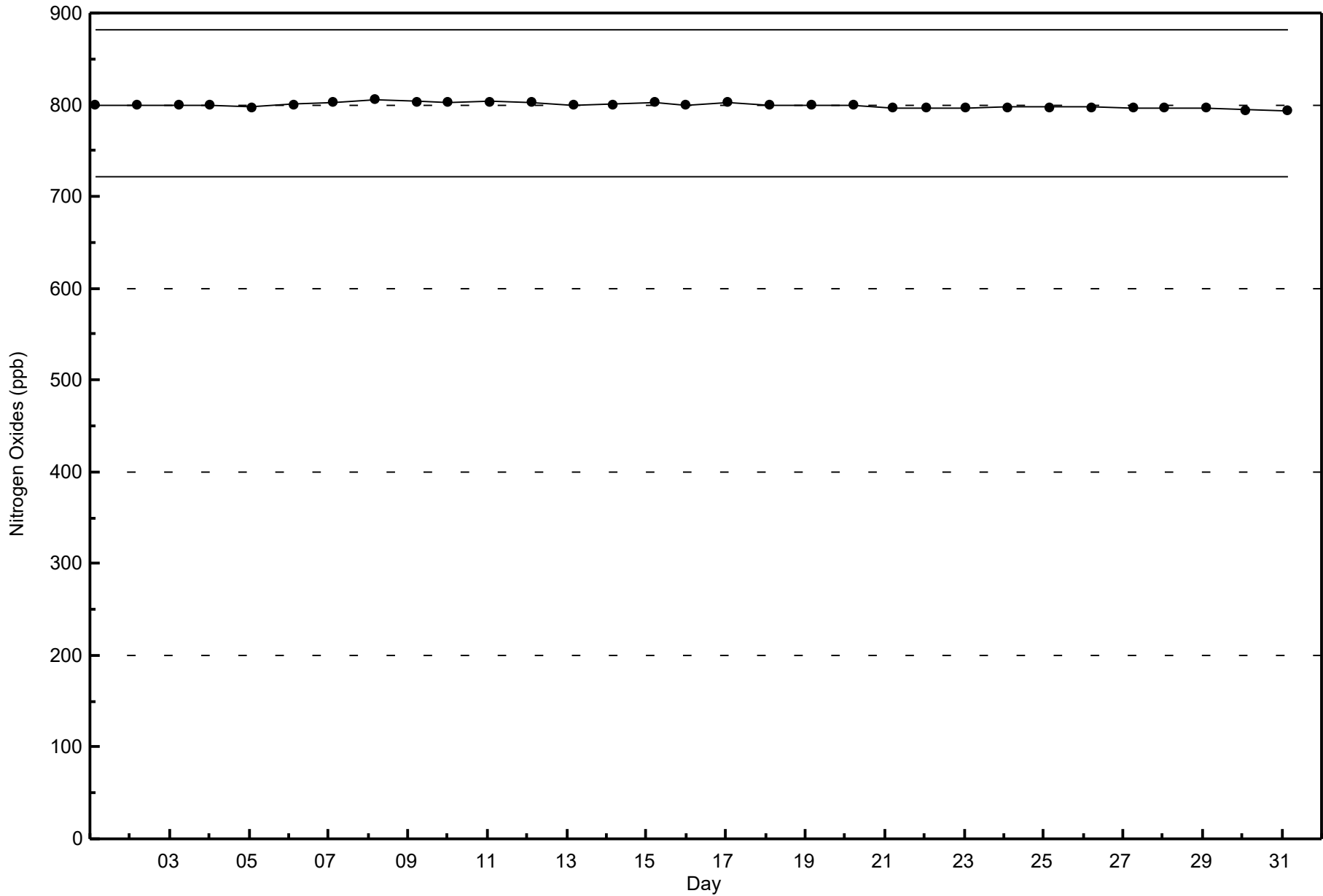






Wood Buffalo Environmental Association
Span Responses

Nitrogen Oxides (NO_x) - ppb
Surmont 2 - December 2023





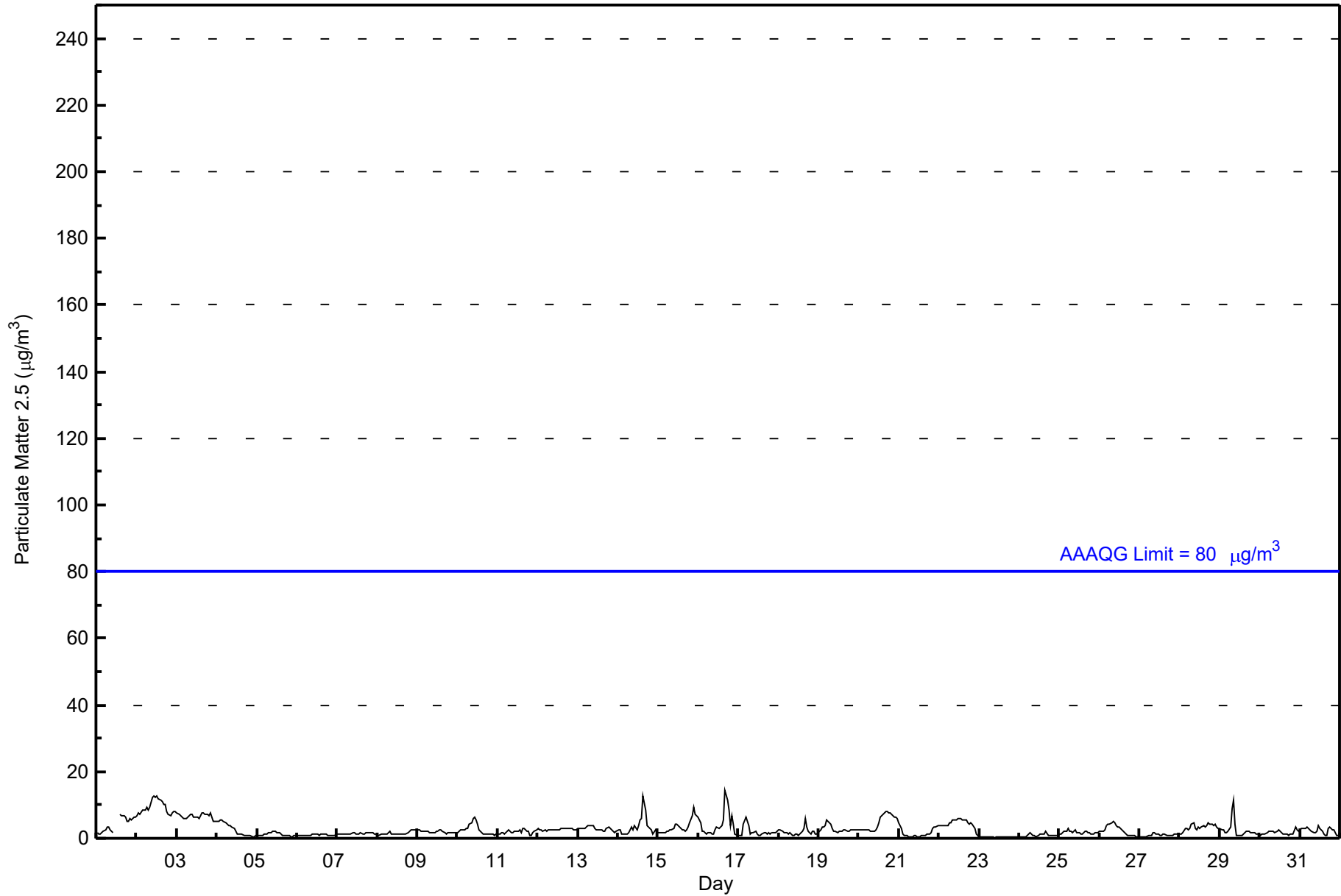
Wood Buffalo Environmental Association

Summary of Hour Averages

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

Surmont 2 - December 2023

Number of Exceedences (AAAQO):		1-hr: 0		24-hr: 0		Hours in Service:														744						
Maximum Value: 14.3 µg/m ³ on Dec 16 17:00		Maximum Daily Average: 9.3 µg/m ³ on Dec 2		Hours of Data:														741								
Minimum Value: 0.2 µg/m ³ on Dec 23 10:00		Minimum Daily Average: 0.3 µg/m ³ on Dec 23		Hours of Missing Data:														3								
Maximum Diurnal Average: 3.4 µg/m ³ at hour 17		Minimum Diurnal Average: 2.2 µg/m ³ at hour 3		Hours of Calibration:														3								
Monthly Average: 2.71 µg/m ³		Percentiles: P ₁ = 0.3 P ₁₀ = 0.8 Q ₁ = 1.2 Median = 2.0 Q ₃ = 3.3 P ₉₀ = 6.1 P ₉₉ = 11.6		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-Dec	1.5	1.4	1.4	1.6	2.0	2.4	3.5	3.2	2.6	2.0	1.6	C	C	C	7.2	6.6	6.7	6.3	5.2	5.2	5.7	5.7	6.4	6.2	4.0	7.2
2-Dec	6.6	7.5	7.4	8.4	8.4	8.5	9.1	8.5	9.3	12.1	12.8	12.3	12.6	11.9	11.6	11.0	10.0	10.1	8.3	7.2	6.6	7.5	8.1	8.1	9.3	12.8
3-Dec	7.6	7.0	6.6	6.2	6.0	5.9	6.1	6.6	7.2	7.3	6.4	6.3	6.3	6.1	6.6	7.6	7.7	7.2	7.1	6.8	7.6	6.4	5.1	5.0	6.6	7.7
4-Dec	5.0	4.9	5.5	5.4	4.9	4.6	4.3	3.9	3.7	3.5	3.1	2.1	1.4	1.3	1.1	1.1	1.0	0.8	0.7	0.7	0.7	0.6	0.6	0.7	2.6	5.5
5-Dec	0.7	0.7	0.8	0.8	1.1	1.3	1.2	1.6	1.8	2.1	2.0	1.9	1.7	1.7	1.4	0.9	0.7	0.8	0.9	0.8	0.6	0.6	0.7	0.8	1.2	2.1
6-Dec	0.7	0.7	0.7	0.7	0.7	0.8	1.0	1.0	1.0	1.2	1.2	1.3	1.4	1.1	1.3	1.2	1.1	1.1	1.0	1.0	1.0	0.9	1.0	1.1	1.0	1.4
7-Dec	1.1	1.2	1.2	1.1	1.2	1.3	1.3	1.4	1.5	1.8	1.7	1.4	1.3	1.4	1.6	1.4	1.4	1.5	1.6	1.7	1.7	1.5	1.3	1.2	1.4	1.8
8-Dec	1.0	0.9	1.3	1.2	1.2	1.3	1.3	2.0	1.3	1.3	1.4	1.3	1.3	1.4	1.4	1.5	1.2	1.2	1.6	2.1	2.5	2.5	2.5	2.3	1.5	2.5
9-Dec	2.5	2.4	2.3	2.3	2.1	2.1	2.3	1.9	1.5	1.5	1.8	2.3	2.2	2.4	2.4	1.9	1.6	1.4	1.6	1.7	1.6	1.6	1.8	1.7	2.0	2.5
10-Dec	1.9	2.1	2.3	2.5	2.5	2.8	3.1	4.2	4.8	6.1	6.5	5.6	4.1	2.4	1.9	1.5	1.1	1.1	1.2	1.2	1.1	1.1	1.0	1.2	2.6	6.5
11-Dec	1.2	1.3	1.7	1.5	1.5	1.8	2.3	2.0	1.7	1.9	2.2	2.2	2.3	2.6	1.7	2.9	3.0	2.1	2.0	0.8	0.8	1.6	1.9	2.3	1.9	3.0
12-Dec	2.8	2.7	2.5	2.3	2.4	2.3	2.5	2.7	2.5	2.6	2.6	2.4	2.5	2.6	2.9	2.9	3.0	3.0	2.9	3.0	2.8	2.6	2.6	2.6	2.7	3.0
13-Dec	3.0	3.1	2.9	3.0	2.9	3.4	4.0	3.9	3.9	3.6	3.1	2.6	2.6	2.7	2.7	1.9	2.0	2.9	3.3	2.8	2.4	2.1	1.7	2.1	2.9	4.0
14-Dec	2.6	2.5	1.1	1.4	1.4	1.1	1.6	2.4	3.3	2.5	3.7	2.5	3.8	5.5	5.8	12.9	8.6	3.9	3.4	2.9	2.4	1.3	2.4	1.8	3.4	12.9
15-Dec	1.6	1.8	1.9	1.7	1.9	2.0	2.2	2.4	2.5	3.1	4.1	4.3	3.8	3.2	2.7	2.6	2.2	2.7	3.2	4.6	6.6	9.1	7.1	7.0	3.5	9.1
16-Dec	6.3	4.6	2.2	1.9	1.5	1.4	1.8	1.7	1.3	1.3	2.5	3.2	3.0	3.3	4.0	5.4	14.3	11.4	8.6	3.7	6.6	4.4	1.3	0.9	4.0	14.3
17-Dec	0.7	0.8	0.9	4.3	6.3	5.2	3.7	1.5	1.7	1.9	2.0	1.4	0.9	0.9	1.3	1.7	1.6	1.2	1.8	1.4	1.8	1.5	1.8	2.1	2.0	6.3
18-Dec	2.5	2.4	2.3	1.7	1.7	1.7	1.3	1.5	0.9	0.9	1.1	1.1	1.0	1.6	2.0	3.0	6.1	3.3	2.3	1.2	1.9	2.2	1.1	1.4	1.9	6.1
19-Dec	2.1	2.6	3.3	3.6	4.0	5.5	4.8	4.2	3.1	2.2	2.2	1.8	2.1	2.1	2.3	2.6	2.4	2.2	2.3	2.3	2.5	2.5	2.6	2.6	2.8	5.5
20-Dec	2.4	2.4	2.4	2.4	2.6	2.6	2.4	2.3	2.2	2.2	2.6	3.4	4.6	6.4	7.2	7.6	8.0	7.9	7.6	7.5	7.0	6.4	6.2	5.8	4.7	8.0
21-Dec	4.6	3.0	1.3	0.9	0.8	0.7	0.5	0.6	0.5	0.7	0.7	0.5	0.4	0.8	0.8	0.7	0.7	1.3	1.3	1.9	2.9	3.2	3.6	3.9	1.5	4.6
22-Dec	3.7	3.8	3.9	3.7	3.7	3.7	4.5	4.5	5.7	5.7	5.4	6.1	6.1	5.9	5.5	5.4	5.3	4.5	4.2	4.8	4.2	2.9	1.1	0.8	4.4	6.1
23-Dec	0.6	0.4	0.3	0.3	0.4	0.4	0.4	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.4	0.3	0.4	0.4	0.4	0.3	0.4	0.3	0.4	0.4	0.3	0.6
24-Dec	0.6	0.5	0.5	0.5	0.5	0.8	1.6	1.3	0.9	0.6	0.6	0.6	1.1	1.2	1.2	1.3	2.1	1.0	0.9	0.8	0.8	0.9	0.9	0.9	0.9	2.1
25-Dec	1.1	1.5	1.5	1.9	2.3	2.8	2.1	2.1	1.8	2.6	1.9	1.6	1.7	1.3	1.4	1.9	2.0	1.8	1.7	1.4	1.3	1.8	1.8	1.6	1.8	2.8
26-Dec	2.0	2.0	2.0	2.6	3.7	4.1	4.2	4.5	4.9	4.7	3.9	3.3	3.2	2.6	2.0	1.5	1.2	0.9	1.0	0.8	0.9	0.7	0.6	0.5	2.4	4.9
27-Dec	0.6	0.6	0.4	0.4	0.5	0.8	0.9	0.8	1.7	1.6	1.4	1.2	1.0	1.0	1.1	1.2	1.0	1.0	1.0	0.9	1.0	1.4	1.2	1.1	1.0	1.7
28-Dec	1.2	1.4	1.7	3.1	3.2	2.7	3.1	4.1	4.7	3.0	2.7	3.3	3.0	3.2	3.8	3.4	3.9	4.8	4.1	4.1	3.8	4.0	3.5	2.9	3.3	4.8
29-Dec	2.9	2.6	2.3	1.9	1.7	2.2	3.4	8.8	11.5	4.3	0.7	0.7	0.7	1.0	1.4	1.6	2.0	1.9	1.8	1.8	1.8	1.6	1.3	1.1	2.5	11.5
30-Dec	1.0	1.1	1.1	1.3	1.7	1.9	1.9	2.1	2.1	1.9	2.3	2.6	2.3	1.8	1.5	1.2	1.1	1.0	1.1	1.3	1.4	3.3	2.5	2.2	1.7	3.3
31-Dec	2.5	2.8	2.8	2.9	3.3	2.9	2.6	2.3	1.9	1.9	2.0	3.7	2.8	2.0	1.2	1.0	1.0	2.9	3.3	2.6	2.7	1.6	1.0	1.0	2.3	3.7
2.4 2.3 2.2 2.4 2.5 2.6 2.7 2.9 3.0 2.8 2.8 2.8 2.7 2.7 2.9 3.2 3.4 3.0 2.8 2.6 2.8 2.7 2.4 2.4																								Diurnal Average		
7.6 7.5 7.4 8.4 8.4 8.5 9.1 8.8 11.5 12.1 12.8 12.3 12.6 11.9 11.6 12.9 14.3 11.4 8.6 7.5 7.6 9.1 8.1 8.1																								Diurnal Maximum		
C - Calibration																										
Alberta Ambient Air Quality Guideline/Objectives: 1-hr 80 µg/m ³ 24-hr 29 µg/m ³																										





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Surmont 2 - December 2023

Concentration Ranges ($\mu\text{g}/\text{m}^3$)	Number of Hours	%	Cumulative %
0 - 5	651	87.85	87.85
6 - 15	90	12.15	100.00
16 - 25	0	0.00	100.00
26 - 80	0	0.00	100.00
> 81.0	0	0.00	100.00

Total Number of Valid Hours: 741

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - μg/m³
Surmont 2 - December 2023

Concentration Ranges (μg/m ³)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 5	1	1	1	1	2	54	61	50	25	47	83	109	153	45	14	4	651
6 - 15	0	0	1	0	1	4	25	12	10	5	15	10	5	1	1	0	90
16 - 25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 81.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	1	1	2	1	3	58	86	62	35	52	98	119	158	46	15	4	741

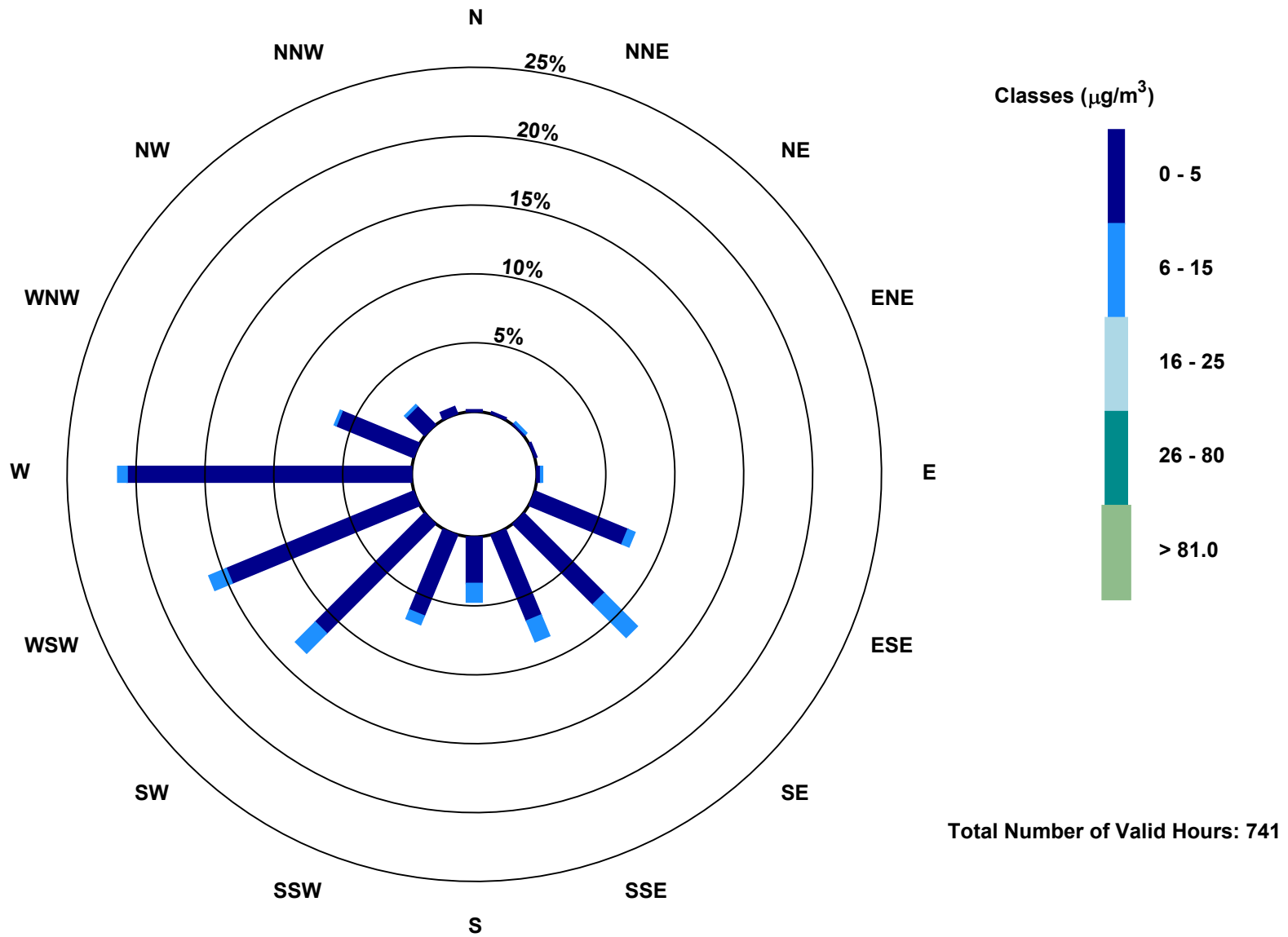
Total Number of Valid Hours: 741

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Dec 2023

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Surmont 2



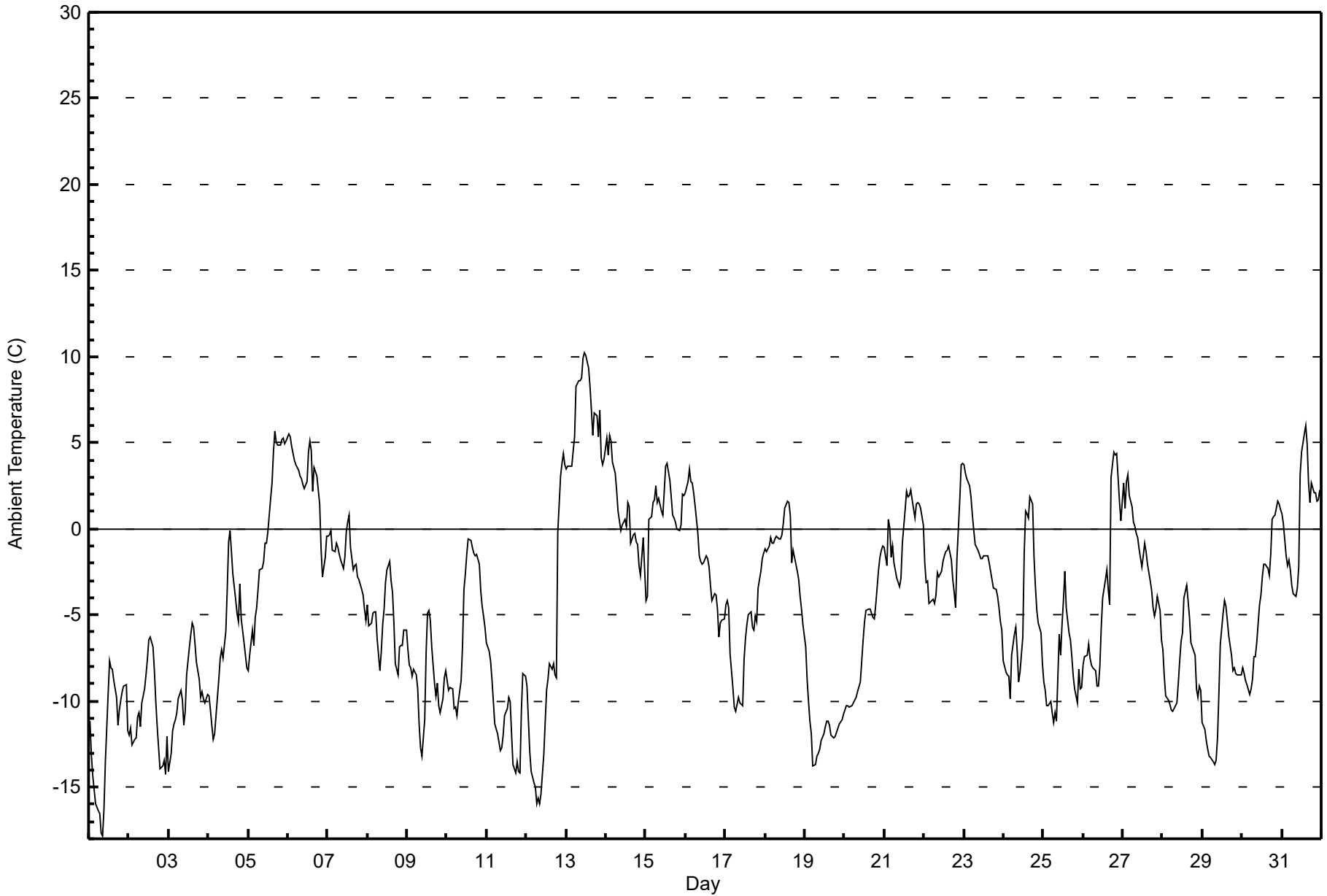


Maximum Value: 10.2 C on Dec 13 12:00		Maximum Daily Average: 6.5 C on Dec 13		Hours in Service: 744																																												
Minimum Value: -17.8 C on Dec 1 09:00		Minimum Daily Average: -12.1 C on Dec 1		Hours of Data: 744																																												
Maximum Diurnal Average: -1.8 C at hour 14		Minimum Diurnal Average: -6.3 C at hour 9		Hours of Missing Data: 0																																												
Monthly Average: -4.46 C		Percentiles: P ₁ = -15.8 P ₁₀ = -11.4 Q ₁ = -9.0 Median = -4.6 Q ₃ = -0.4 P ₉₀ = 2.9 P ₉₉ = 8.2		Hours of Calibration: 0																																												
				Percent Operational Time: 100.0																																												
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Dec	-11.2	-13.1	-14.3	-15.2	-16.0	-16.3	-16.5	-17.7	-17.8	-16.3	-13.5	-9.5	-7.7	-8.1	-8.1	-8.8	-9.8	-11.4	-10.5	-10.0	-9.5	-9.1	-9.0	-11.7	-12.1	-7.7																						
2-Dec	-12.0	-11.6	-12.6	-12.2	-12.1	-10.9	-10.7	-11.5	-10.1	-9.3	-8.5	-7.6	-6.4	-6.3	-6.9	-8.2	-10.0	-11.5	-12.7	-14.0	-13.7	-13.4	-14.3	-12.1	-10.8	-6.3																						
3-Dec	-14.1	-13.0	-11.8	-11.4	-11.1	-10.6	-9.9	-9.4	-10.0	-11.4	-10.6	-8.5	-6.9	-6.1	-5.4	-5.7	-6.7	-7.8	-8.7	-9.8	-9.4	-9.9	-10.1	-9.6	-9.5	-5.4																						
4-Dec	-9.7	-10.5	-11.4	-12.2	-11.9	-9.8	-8.7	-7.5	-7.0	-7.5	-5.9	-3.6	-0.8	-0.1	-1.3	-2.6	-4.1	-4.9	-5.4	-3.2	-5.2	-6.6	-7.3	-8.1	-6.5	-0.1																						
5-Dec	-8.2	-7.4	-5.9	-6.8	-5.2	-4.6	-3.5	-2.4	-2.3	-1.9	-0.9	-0.8	-0.2	1.8	2.7	4.4	5.6	5.0	4.9	4.9	5.2	5.2	5.0	5.1	0.0	5.6																						
6-Dec	5.5	5.3	4.7	4.3	4.0	3.7	3.4	3.0	2.9	2.6	2.4	2.8	4.5	5.1	4.5	2.2	3.5	3.1	2.3	1.4	-1.1	-2.8	-1.7	-0.4	2.7	5.5																						
7-Dec	-0.4	-0.3	-0.1	-1.3	-1.3	-0.8	-1.1	-1.5	-1.8	-2.3	-1.7	-0.2	0.4	0.8	-1.1	-2.4	-2.1	-2.1	-2.8	-2.9	-3.5	-3.9	-4.7	-5.3	-1.8	0.8																						
8-Dec	-4.4	-5.6	-5.5	-4.9	-4.8	-4.9	-6.3	-8.3	-7.1	-5.6	-4.6	-3.1	-2.4	-1.9	-3.0	-3.7	-5.5	-7.8	-8.5	-6.8	-6.8	-6.8	-5.8	-5.9	-5.4	-1.9																						
9-Dec	-7.0	-7.9	-8.1	-8.6	-8.2	-8.5	-9.3	-11.4	-12.7	-13.2	-11.1	-7.2	-4.9	-4.7	-5.3	-6.8	-8.9	-9.7	-8.9	-10.2	-10.7	-9.9	-8.6	-8.3	-8.8	-4.7																						
10-Dec	-8.8	-9.4	-9.2	-9.3	-10.5	-10.4	-10.8	-10.0	-8.8	-6.8	-3.5	-2.6	-1.5	-0.6	-0.7	-1.0	-1.4	-1.6	-1.5	-2.0	-3.6	-4.5	-5.1	-5.7	-5.4	-0.6																						
11-Dec	-6.6	-7.1	-7.7	-8.7	-10.0	-11.3	-11.9	-12.4	-12.8	-12.7	-12.0	-10.8	-10.4	-9.8	-10.0	-11.9	-13.7	-14.2	-13.5	-14.1	-14.1	-10.6	-8.4	-8.5	-11.0	-6.6																						
12-Dec	-9.2	-11.1	-13.0	-14.1	-14.8	-15.0	-15.9	-15.7	-16.0	-15.4	-13.1	-11.2	-9.4	-8.7	-7.8	-8.1	-7.8	-8.5	-8.6	-0.2	3.0	3.8	4.4	3.7	-8.7	4.4																						
13-Dec	3.5	3.7	3.6	3.6	4.5	5.4	8.3	8.6	8.6	8.8	9.9	10.2	10.1	9.3	8.2	6.9	5.4	6.8	6.6	5.4	6.9	4.1	3.7	4.1	6.5	10.2																						
14-Dec	5.2	4.3	5.4	5.1	3.9	3.3	2.2	1.0	0.5	-0.1	0.2	0.6	0.2	1.5	1.2	-0.8	-0.4	-0.3	-0.7	-0.9	-2.2	-2.7	-0.5	-2.4	1.0	5.4																						
15-Dec	-4.2	-3.9	0.6	0.7	1.5	1.7	2.5	1.6	1.7	1.0	0.8	2.2	3.6	3.8	2.8	1.8	0.8	0.7	0.4	0.0	-0.1	0.3	2.0	1.9	1.0	3.8																						
16-Dec	2.1	2.8	3.4	2.7	2.7	2.1	1.4	-0.3	-1.5	-1.9	-2.1	-1.9	-1.6	-1.7	-2.3	-3.2	-4.2	-3.8	-3.9	-4.7	-6.3	-5.5	-5.3	-5.2	-1.6	3.4																						
17-Dec	-4.4	-4.2	-4.6	-7.2	-9.2	-10.4	-10.6	-10.2	-9.8	-10.1	-10.2	-7.6	-6.4	-5.6	-5.0	-4.8	-5.7	-5.9	-5.1	-5.4	-3.4	-2.5	-1.8	-1.4	-6.3	-1.4																						
18-Dec	-1.2	-1.3	-1.0	-0.5	-0.9	-0.8	-0.6	-0.4	-0.6	-0.6	-0.4	0.3	1.2	1.6	1.5	0.8	-1.9	-1.2	-1.6	-2.5	-2.9	-3.9	-4.7	-5.6	-1.1	1.6																						
19-Dec	-6.9	-8.7	-10.0	-11.2	-11.9	-13.7	-13.7	-13.2	-13.1	-12.8	-12.3	-11.9	-11.5	-11.2	-11.1	-11.4	-12.0	-12.2	-12.0	-11.8	-11.6	-11.3	-11.1	-10.8	-11.6	-6.9																						
20-Dec	-10.5	-10.3	-10.3	-10.3	-10.3	-10.1	-10.0	-9.8	-9.4	-8.9	-7.6	-6.5	-5.4	-4.8	-4.6	-4.7	-4.9	-5.2	-5.2	-4.4	-2.4	-1.6	-1.3	-1.0	-6.6	-1.0																						
21-Dec	-1.0	-2.1	0.5	0.1	-1.7	-1.0	-1.9	-2.9	-3.1	-3.3	-2.8	-0.9	1.1	2.2	1.9	1.9	2.3	1.7	0.7	1.4	1.5	1.4	1.2	0.2	-0.1	2.3																						
22-Dec	-2.0	-3.1	-3.0	-4.4	-4.3	-4.1	-4.3	-3.8	-2.5	-2.8	-2.5	-1.9	-1.5	-1.3	-1.2	-1.0	-1.8	-3.0	-3.7	-4.6	-1.6	1.7	3.7	3.8	-2.1	3.8																						
23-Dec	3.7	3.2	2.9	2.5	1.8	0.8	-0.1	-0.9	-1.2	-1.5	-1.7	-1.7	-1.6	-1.5	-1.6	-2.0	-2.5	-2.9	-3.4	-3.5	-3.9	-4.6	-5.4	-5.9	-1.3	3.7																						
24-Dec	-7.7	-8.4	-8.5	-8.6	-9.8	-7.3	-6.1	-5.7	-7.1	-8.9	-8.3	-6.3	-1.4	1.0	0.9	0.6	1.9	1.4	-1.6	-3.4	-4.7	-5.4	-6.0	-7.8	-4.9	1.9																						
25-Dec	-8.9	-9.3	-10.2	-10.3	-10.0	-10.7	-11.2	-10.7	-11.2	-6.1	-7.4	-5.6	-4.2	-2.4	-4.6	-6.0	-6.4	-7.5	-8.6	-9.3	-10.1	-8.1	-9.3	-9.2	-8.2	-2.4																						
26-Dec	-7.9	-7.4	-7.4	-6.7	-7.5	-7.9	-8.1	-8.3	-9.1	-9.1	-8.0	-5.7	-4.0	-3.0	-2.4	-3.5	-4.4	3.0	4.4	4.3	4.4	3.0	1.6	0.4	-3.7	4.4																						
27-Dec	2.6	1.2	2.8	3.1	2.0	1.3	0.4	0.1	-0.3	-0.5	-1.2	-2.2	-1.6	-0.8	-1.3	-2.0	-3.0	-3.6	-4.6	-5.1	-4.6	-3.9	-4.8	-6.4	-1.3	3.1																						
28-Dec	-7.0	-8.5	-9.7	-9.9	-10.2	-10.5	-10.6	-10.4	-10.1	-9.0	-7.7	-6.5	-6.0	-4.0	-3.3	-4.2	-5.2	-6.6	-6.9	-7.4	-9.3	-9.8	-9.2	-9.4	-8.0	-3.3																						
29-Dec	-11.3	-11.7	-12.3	-12.8	-13.2	-13.3	-13.5	-13.7	-13.4	-12.1	-9.5	-6.7	-4.9	-4.2	-4.5	-5.3	-6.2	-7.4	-8.2	-8.1	-8.4	-8.5	-8.5	-8.5	-9.4	-4.2																						
30-Dec	-8.1	-8.4	-8.8	-9.1	-9.6	-9.3	-8.7	-7.4	-7.4	-6.6	-4.4	-3.9	-2.8	-2.1	-2.0	-2.3	-2.7	-1.5	0.5	0.7	0.8	1.6	1.5	1.2	-4.1	1.6																						
31-Dec	0.8	0.3	-1.5	-2.1	-1.8	-2.4	-3.3	-3.8	-4.0	-3.4	-2.2	3.1	4.5	5.5	6.0	4.9	2.6	1.5	2.6	2.1	2.1	1.6	1.7	2.3	0.7	6.0																						
																								-4.8	-5.3	-5.3	-5.7	-6.0	-6.0	-6.1	-6.3	-6.3	-6.1	-5.2	-3.7	-2.5	-1.8	-2.1	-2.8	-3.5	-3.8	-4.0	-4.0	-4.0	-4.0	-3.8	-4.1	Diurnal Average
																								5.5	5.3	5.4	5.1	4.5	5.4	8.3	8.6	8.6	8.8	9.9	10.2	10.1	9.3	8.2	6.9	5.6	6.8	6.6	5.4	6.9	5.2	5.0	5.1	Diurnal Maximum



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature (AT) - C
Surmont 2 - December 2023





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C
Surmont 2 - December 2023**

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	573	77.02	77.02
0 - 10	169	22.72	99.73
10 - 20	2	0.27	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association
Summary of Hour Averages

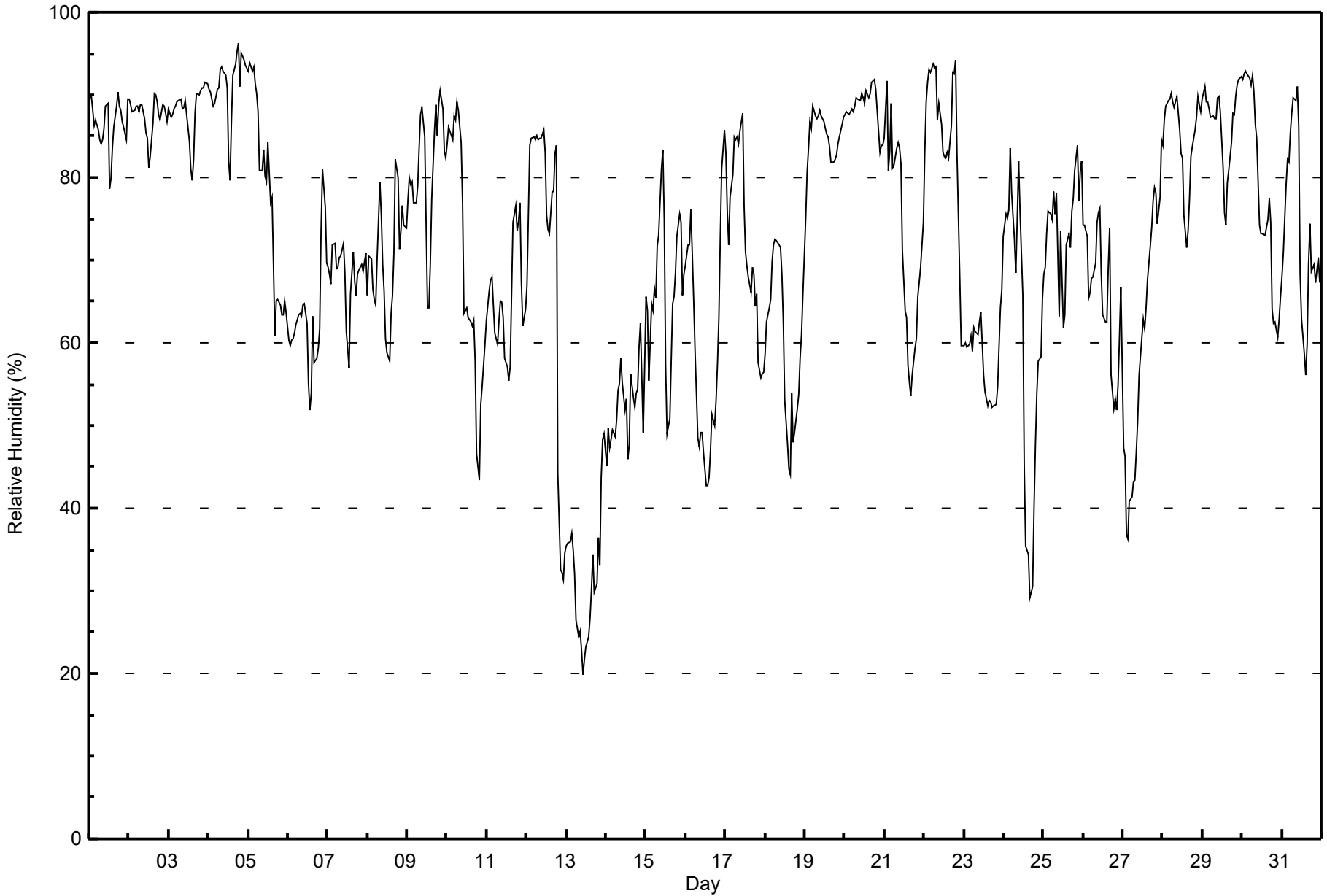
Relative Humidity (RH) - %
Surmont 2 - December 2023

Maximum Value: 96.3 % on Dec 4 19:00																						Maximum Daily Average: 91.1 % on Dec 4																						Hours in Service: 744			
Minimum Value: 19.8 % on Dec 13 11:00																						Minimum Daily Average: 31.7 % on Dec 13																						Hours of Data: 744			
Maximum Diurnal Average: 76.3 % at hour 10																						Minimum Diurnal Average: 64.0 % at hour 14																						Hours of Missing Data: 0			
Monthly Average: 72.02 %																						Percentiles: P ₁ = 26.5 P ₁₀ = 50.8 Q ₁ = 62.4 Median = 74.1 Q ₃ = 86.1 P ₉₀ = 89.6 P ₉₉ = 93.6																						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-Dec	89.6	89.8	88.2	86.2	86.9	85.7	84.6	84.1	84.5	85.9	88.7	89.0	78.7	79.8	83.6	86.2	88.7	90.3	88.7	88.2	86.8	86.2	84.6	89.4	86.4	90.3																					
2-Dec	89.5	88.7	87.9	88.1	88.6	88.7	88.0	88.9	88.8	87.1	85.4	84.8	81.3	82.6	86.6	90.1	90.0	89.2	87.7	86.9	88.7	88.6	87.8	86.7	87.5	90.1																					
3-Dec	88.3	87.3	87.6	88.3	88.6	89.2	89.3	89.4	88.3	88.5	89.3	87.7	84.3	81.1	79.7	82.3	87.9	90.2	90.0	90.5	90.9	90.9	91.6	91.3	88.0	91.6																					
4-Dec	90.6	90.4	89.5	88.6	88.9	90.7	90.8	93.1	93.4	92.9	92.4	90.9	82.0	79.7	86.8	92.4	93.7	95.2	96.3	91.0	95.1	94.3	93.6	93.3	91.1	96.3																					
5-Dec	92.9	93.8	92.9	93.3	91.4	90.2	88.0	80.8	80.9	83.4	80.2	79.5	84.3	77.0	77.7	69.6	60.9	65.1	65.2	64.6	63.5	63.4	65.1	63.7	77.8	93.8																					
6-Dec	60.4	59.6	60.3	60.6	61.3	62.2	63.4	63.6	63.1	64.5	64.8	62.4	55.1	51.8	54.0	63.2	57.6	58.2	59.4	61.7	73.6	81.0	76.5	69.6	62.8	81.0																					
7-Dec	69.1	68.3	67.2	71.9	72.0	68.9	69.2	70.3	70.6	72.0	68.5	61.4	59.3	56.9	65.9	71.1	67.5	65.8	68.4	68.7	69.5	68.7	69.8	70.9	68.0	72.0																					
8-Dec	65.8	70.5	70.1	66.5	65.2	64.5	70.1	79.6	75.4	69.5	66.2	60.5	58.8	57.8	63.5	65.7	70.9	82.2	79.9	71.4	73.5	76.6	74.2	74.0	69.7	82.2																					
9-Dec	77.4	80.0	79.2	79.5	77.0	76.9	79.0	83.6	87.6	88.4	84.8	74.2	64.2	64.2	69.6	77.5	85.8	88.8	85.2	88.9	90.5	88.3	83.2	82.3	80.7	90.5																					
10-Dec	84.0	86.1	85.6	84.6	87.5	86.9	89.1	88.2	84.3	77.0	63.5	63.9	64.2	63.0	62.6	62.0	62.7	57.8	46.6	43.3	52.6	54.7	57.3	59.8	69.5	89.1																					
11-Dec	62.8	66.3	67.7	67.9	64.5	61.2	59.8	62.8	65.1	64.9	63.0	58.2	57.1	55.4	57.0	65.9	74.5	76.6	73.6	74.8	77.0	67.3	62.0	64.0	65.4	77.0																					
12-Dec	67.0	75.4	84.0	84.8	85.0	84.6	85.0	84.6	84.8	84.7	85.8	83.1	75.4	73.8	73.3	78.3	78.4	82.9	84.0	44.2	32.5	32.3	31.3	34.6	71.2	85.8																					
13-Dec	35.4	35.8	36.0	37.0	34.9	32.0	26.4	24.5	25.1	22.7	19.8	21.8	23.2	24.4	26.6	30.0	34.4	29.9	30.9	36.5	33.1	43.8	48.3	48.9	31.7	48.9																					
14-Dec	45.0	49.6	47.4	48.2	49.5	48.6	50.7	54.2	55.0	58.2	55.3	51.9	53.3	45.9	47.6	56.3	53.4	52.3	53.8	54.4	59.6	62.4	49.2	57.1	52.5	62.4																					
15-Dec	65.5	63.8	55.4	64.7	63.9	66.7	65.4	71.8	73.1	81.0	83.4	74.9	57.1	48.9	50.8	57.9	64.7	65.5	68.4	72.9	75.7	74.5	65.8	68.3	66.7	83.4																					
16-Dec	69.4	71.8	71.9	76.0	70.8	65.2	58.9	48.5	47.5	49.2	46.8	42.7	42.8	43.8	47.0	51.4	50.1	53.1	57.4	63.0	72.7	81.0	85.8	59.0	85.8																						
17-Dec	83.0	76.0	71.8	77.6	80.4	84.9	84.5	84.9	84.1	85.6	87.7	76.6	71.0	69.4	68.0	66.2	69.2	68.4	64.3	65.9	57.6	55.8	56.3	56.4	72.7	87.7																					
18-Dec	58.7	62.5	64.2	65.3	69.8	71.9	72.5	72.3	71.8	71.6	68.4	62.6	53.1	47.8	44.7	44.0	53.9	47.9	49.1	52.1	53.7	58.2	61.0	66.0	60.1	72.5																					
19-Dec	75.2	80.6	83.5	86.7	85.9	88.6	87.5	87.1	87.5	88.2	87.5	86.9	86.0	85.2	84.9	83.8	81.8	81.9	82.3	82.8	84.1	85.0	86.5	87.3	84.9	88.6																					
20-Dec	87.7	87.9	87.8	87.6	88.3	87.9	88.7	89.7	89.5	89.3	90.1	89.7	89.0	90.6	89.7	90.1	91.6	91.7	91.9	90.7	85.6	83.1	84.0	83.9	88.6	91.9																					
21-Dec	84.7	91.7	80.8	83.3	88.9	81.3	81.6	83.6	84.3	83.6	81.7	71.2	63.9	63.0	57.3	55.2	53.6	56.1	59.4	60.4	65.6	67.3	69.2	74.6	72.6	91.7																					
22-Dec	83.0	89.2	91.5	93.0	92.8	93.7	93.3	93.3	87.0	89.0	86.4	83.0	82.5	82.3	83.1	82.3	86.2	92.7	92.5	94.3	82.9	67.8	59.6	59.7	85.0	94.3																					
23-Dec	59.7	60.0	59.5	59.9	60.9	58.9	61.9	61.4	61.0	62.6	63.8	60.0	56.1	54.0	52.4	53.1	52.8	52.3	52.4	52.5	54.6	59.5	64.3	66.4	58.3	66.4																					
24-Dec	72.9	75.5	75.1	76.1	83.5	78.1	72.5	68.5	74.9	82.1	76.0	65.7	45.3	35.4	34.9	34.4	29.1	30.4	40.0	47.6	54.0	57.8	58.3	65.3	59.7	83.5																					
25-Dec	68.4	69.1	73.3	76.0	75.6	74.9	78.3	75.6	78.1	63.2	73.5	67.4	61.8	63.4	71.8	73.2	71.5	76.0	77.5	80.9	83.9	77.2	80.7	82.1	73.9	83.9																					
26-Dec	74.3	74.2	72.8	65.4	66.1	67.8	68.0	69.7	74.5	75.8	76.2	68.3	63.4	62.6	62.5	69.2	74.0	56.1	52.1	53.3	51.9	54.9	60.7	66.7	65.9	76.2																					
27-Dec	47.2	46.3	36.8	36.2	40.8	41.4	43.2	43.4	46.8	50.5	56.1	60.7	62.9	61.7	64.2	67.7	71.7	73.9	77.2	78.8	78.1	74.5	77.5	84.6	59.3	84.6																					
28-Dec	84.0	87.0	88.6	89.4	89.5	90.2	89.1	88.5	89.9	87.7	85.7	83.0	82.4	75.5	71.6	73.5	77.4	82.6	83.7	85.7	87.2	89.8	88.8	88.1	85.0	90.2																					
29-Dec	89.6	91.1	89.1	89.2	88.3	87.2	87.5	87.1	87.1	89.6	89.8	88.0	81.1	75.7	74.2	79.3	80.8	84.2	87.8	87.6	89.8	91.2	91.8	92.3	86.7	92.3																					
30-Dec	91.8	92.6	92.9	92.5	92.0	91.1	92.3	90.3	86.5	84.7	74.2	73.2	73.2	73.0	73.0	75.0	77.4	74.6	64.0	62.3	62.6	60.8	62.8	65.7	78.3	92.9																					
31-Dec	68.0	70.8	79.1	82.2	81.9	85.5	87.8	89.6	89.2	91.0	86.1	68.4	62.9	58.6	56.1	59.8	69.5	74.5	68.6	69.5	67.3	68.7	70.4	67.3	73.9	91.0																					
																						73.6	75.2	74.8	75.7	76.2	75.7	75.7	75.9	76.1	76.3	75.0	70.8	66.3	64.0	65.1	67.8	69.8	70.4	70.1	69.7	70.5	70.9	70.7	72.5	Diurnal Average	
																						92.9	93.8	92.9	93.3	92.8	93.7	93.3	93.3	93.4	92.9	92.4	90.9	89.0	90.6	89.7	92.4	93.7	95.2	96.3	94.3	95.1	94.3	93.6	93.3	Diurnal Maximum	



Wood Buffalo Environmental Association
Hourly Averages

Relative Humidity (RH) - %
Surmont 2 - December 2023





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Relative Humidity (RH) - %
Surmont 2 - December 2023

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	1	0.13	0.13
20 - 40	31	4.17	4.30
40 - 60	129	17.34	21.64
60 - 80	287	38.58	60.22
80 - 100	296	39.78	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association

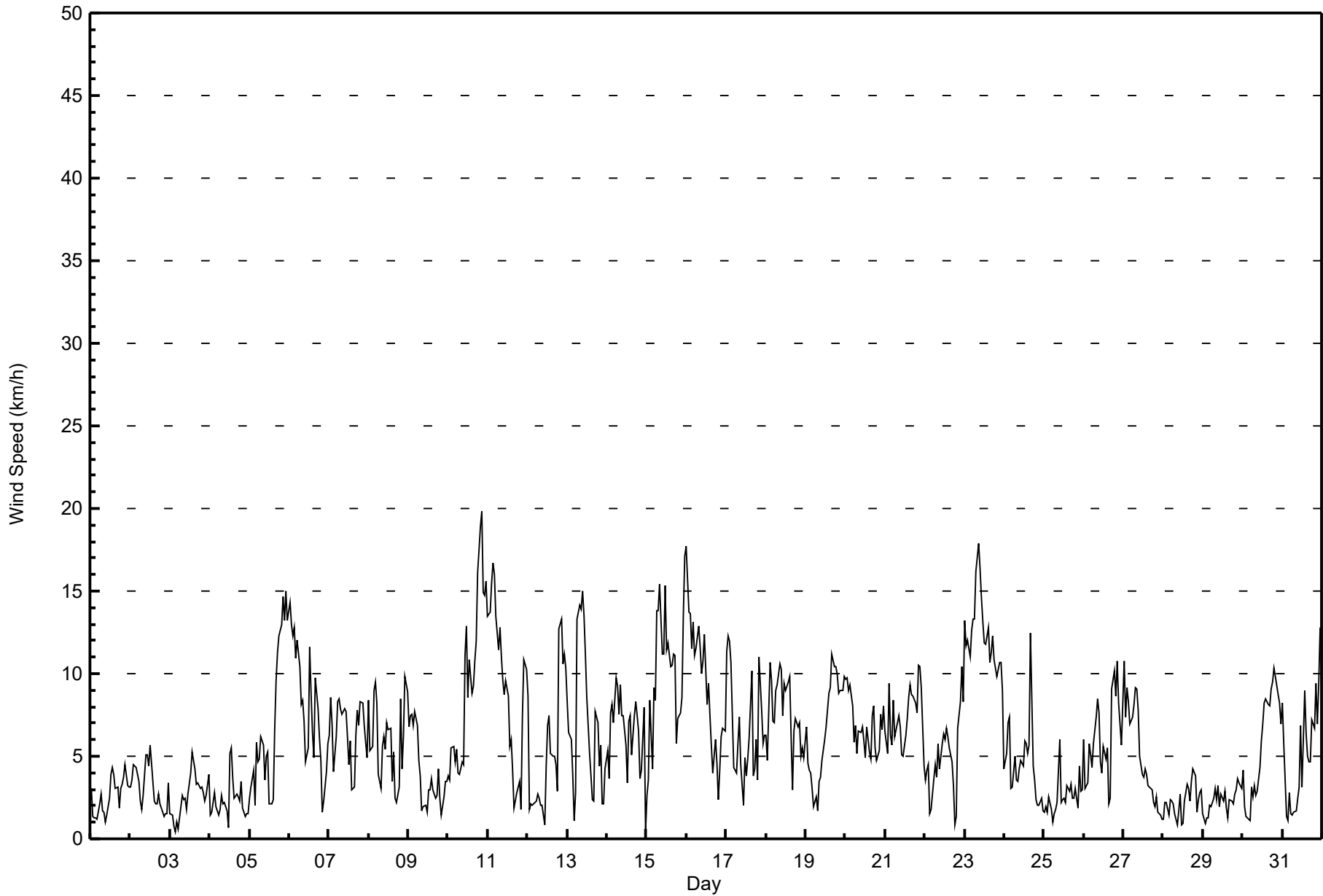
Summary of Hour Averages

Wind Speed (WS) - km/h

Surmont 2 - December 2023

Maximum Speed: 20 km/h on Dec 10 21:00		Maximum Daily Speed Average: 12.2 km/h on Dec 23		Hours in Service: 744																							
Minimum Speed Value: 0 km/h on Dec 3 04:00		Minimum Daily Speed Average: 1.8 km/h on Dec 28		Hours of Data: 744																							
Maximum Diurnal Speed Average: 5.0 km/h at hour 23		Minimum Diurnal Speed Average: 2.9 km/h at hour 15		Hours of Missing Data: 0																							
Monthly Average Velocity: 3.5 km/h 240.5 deg		Percentiles: P ₁ = 1 P ₁₀ = 2 Q ₁ = 3 Median = 5 Q ₃ = 8 P ₉₀ = 11 P ₉₉ = 16		Percent Operational Time: 100.0																							
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Dec	SW3	SW1	SW1	SW1	SW1	SW2	SW3	SW2	SW2	SW1	S1	SSE2	SSE4	SSE4	SE4	S3	S3	S2	SE3	SSE3	S4	SSE4	SE3	E3	S2.0	SSE4	
2-Dec	S3	S4	ESE4	SE4	SE4	SE3	SE2	SSE2	SE3	SE5	SE5	SE4	SE6	SE5	SSE2	SSW2	SSW2	SW3	SW2	SW2	WSW1	SW2	W1	W3	SSE2.3	SE6	
3-Dec	WSW2	SW1	S1	SSE0	SW1	SSE1	SE1	ESE3	SE2	S2	SE2	SE3	SE4	SE5	SE5	SSE4	SSE3	SSW3	SW3	SW3	SSW3	S2	SSE3	ESE4	SSE2.0	SE5	
4-Dec	SSE1	SW2	SW2	SW3	SSW2	SSW1	S2	SSE3	SSE2	SE2	SE2	WSW1	W5	W5	WSW4	SW2	SW3	SW3	SW2	WSW3	S2	SW1	SW2	SW2	SW1.8	W5	
5-Dec	SSE2	SSE3	SSE4	S2	ESE6	ESE5	SE5	ESE6	ESE6	E4	SE5	SE5	SSW2	W2	NW2	W7	WSW10	WSW11	WSW12	WSW13	WSW15	WSW13	WSW15	W13	SW3.8	WSW15	
6-Dec	WSW14	W13	W12	W13	W11	W12	W10	WNW8	W8	W7	NW5	W5	W12	W9	W6	W5	WSW10	WSW8	WSW6	W5	S2	SSW2	WSW4	WSW6	W7.8	WSW14	
7-Dec	W6	WSW9	W7	NW4	W6	W8	W8	W8	W8	W8	W8	W6	W4	W6	WSW3	WSW3	W6	W8	W7	W8	W8	W7	W6	W5	W6.5	WSW9	
8-Dec	W8	WSW5	WSW6	WSW9	WSW9	W8	WNW4	W3	WSW6	WSW6	W5	W7	W7	W7	W3	WSW5	SW2	SW2	SW3	WSW8	WNW4	W6	W10	W9	W5.8	W10	
9-Dec	WNW7	W7	W8	W7	W8	W7	W5	WSW4	SE2	SE2	SSE2	WSW2	WSW3	SSW3	SSW4	SSW3	S2	SSE3	SE4	SE2	SSW1	S3	SE3	SE4	SW2.4	W8	
10-Dec	SE4	SE4	ESE5	ESE6	SE5	ESE5	ESE4	ESE4	ESE5	SSE4	WSW11	WSW13	W9	W11	W9	W9	W11	W12	W16	W19	WNW20	WNW15	WNW15	WNW16	W5.9	WNW20	
11-Dec	WNW14	WNW14	WNW16	WNW17	WNW16	WNW13	WNW11	WNW13	WNW11	WNW10	W9	W10	W9	W6	WSW6	WSW4	SSW2	SSE3	SE3	SE3	NE2	WSW7	WSW11	WSW10	W7.8	WNW17	
12-Dec	WSW9	WSW2	SW2	SW2	SW2	SW2	SW3	SW2	SW2	S2	S1	ESE4	SE7	ESE7	SE5	SE5	SE5	SE4	SSE3	WSW13	WSW13	WSW11	WSW11	WSW10	SSW3.5	WSW13	
13-Dec	SW8	SW6	SSW6	SSW4	SW1	WSW3	WSW13	WSW14	WSW14	WSW15	WSW14	WSW11	WSW9	WSW5	SW4	SW2	WSW2	W8	W7	W4	W6	SSW2	WSW2	WSW4	WSW6.6	WSW15	
14-Dec	WSW5	WSW4	W8	W8	W7	WNW10	W9	W8	WSW9	W7	W7	W6	SW3	W7	W7	WSW5	WSW7	WSW8	WSW7	W7	WSW4	SW4	W8	NNW0	W6.4	WNW10	
15-Dec	SSE3	SSW4	WSW8	SW4	W9	W8	WSW14	WSW14	WSW15	SW11	SW11	SW15	SSW11	S12	SSE10	SSE11	SSE11	SSE11	SSE6	SSE7	SSE8	SW9	WSW14	WSW17	SW8.1	WSW17	
16-Dec	WSW18	W14	W14	W12	W13	W11	WNW12	WNW13	WNW12	WNW10	W11	W12	WNW8	WNW9	WNW7	W6	WSW4	W6	WNW5	N2	NE4	W6	W7	W6	W8.7	WSW18	
17-Dec	W11	WNW12	NW12	NNW11	NW4	W4	WNW4	W6	W7	W4	SSW2	SW5	SSW4	SSW5	SW6	WSW10	SSW4	SE4	SSW6	SSE4	WSW11	WSW8	WSW6	WSW6	WSW4.9	WNW12	
18-Dec	SW6	SW5	WSW11	W10	W7	W7	W9	WNW9	W11	W10	W7	W9	W9	W9	W10	WNW6	W3	WNW6	W7	W7	W7	W5	W5	NW5	W7.2	WSW11	
19-Dec	NNW7	NW5	WNW4	NW4	NW3	WNW2	NW3	NNE2	E3	ESE4	ESE5	ESE6	ESE7	ESE8	ESE9	ESE9	ESE11	ESE10	ESE10	ESE10	ESE9	ESE9	ESE9	ESE10	ESE4.4	ESE11	
20-Dec	ESE10	ESE10	ESE9	ESE9	ESE8	ESE6	SE7	SE5	SE7	SE6	ESE7	SE6	SSE5	SE7	S5	SSE5	SE7	SSE8	SE5	ESE5	S5	SW8	SW7	SW8	SE5.4	ESE10	
21-Dec	WSW7	WSW5	W9	WSW6	WSW6	W8	W6	WSW7	WSW7	WSW7	WSW5	SSW5	S6	SW7	SSW9	S9	SSE9	SE9	SSE8	SSW8	WSW11	WSW10	WSW9	S4	SW6.0	WSW11	
22-Dec	ESE4	SE4	SSE4	SSE2	ENE2	ESE4	ESE5	ESE4	SE6	ESE4	SE6	SE6	SE6	SE7	SSE6	SSE5	SSE5	S3	SSE1	SSW1	WNW7	NW8	WNW10	WNW8	SSE2.0	WNW10	
23-Dec	W13	WNW12	WNW12	WNW11	WNW13	WNW13	W13	W16	W18	W16	W15	W13	W12	W12	W13	W11	W11	W12	W11	W10	W10	W11	W11	W9	W12.2	W18	
24-Dec	W4	W5	WSW7	WSW7	SW3	SW3	SW5	SW4	SE4	SE4	SE5	SE4	SW6	SSW6	SSW5	SSW6	WSW12	SW4	SSW4	SSW2	SSW2	S2	ESE2	ESE2	SSW3.4	WSW12	
25-Dec	ESE2	SE2	SSW2	SW3	SW2	S1	SSE1	SSW2	SSW2	SW6	SSW2	SSE2	SSE2	SSE2	SE3	SSE3	SSE3	S2	SW2	SW3	SW2	S4	SSW3	SE3	S2.1	SW6	
26-Dec	ESE6	S3	SE3	ESE6	SE5	SE4	SE6	SE7	SE8	SE8	SE5	SE4	SE6	SE5	SE6	SSE2	SSE2	W9	W10	W9	WSW11	WSW8	W7	WSW6	S2.9	WSW11	
27-Dec	WSW11	WSW7	WSW9	W8	WSW7	WSW7	WSW8	WSW9	WSW9	WSW8	SE5	SE4	SSE4	SE4	SE4	SSE3	SSE3	SE3	S2	S2	SSE3	ESE2	S1	SSW1	SW3.6	WSW11	
28-Dec	WSW1	SW2	SW2	SW1	SW2	SW2	SW2	SW2	SW1	NW2	WNW3	SSW1	SE1	NNW2	NW3	NW3	WNW2	NW3	WNW4	W4	WSW2	W2	W3	WSW3	W1.8	WNW4	
29-Dec	SW2	SW1	SW1	SW1	SW2	SW2	SW2	SW3	SW2	WSW3	SW2	SSE3	SE2	SE3	SSE2	SSW1	SW2	SW2	SW2	SW3	SW3	SW4	SW3	SW3	SSW2.0	SW4	
30-Dec	SW4	SSW2	SSW1	SSW1	S1	S3	S3	SSE3	S3	SSE3	SSE4	ESE6	ESE7	ESE8	ESE8	ESE8	ESE8	ESE8	ESE9	SE10	SSE10	SE10	SE9	S8	SSW7	SE4.8	SSE10
31-Dec	SSW8	SSE6	WSW1	ESE1	SSE3	SSW2	SSW1	SW2	SSW2	SSW2	SE3	WSW7	W3	W9	W6	W5	WSW5	WSW5	WSW7	WSW7	WSW9	W7	W9	W13	WSW4.1	W13	
WSW4.2WSW3.5WSW4.0 W3.3WSW3.3WSW3.5WSW3.8WSW3.7WSW3.7WSW3.4 SW2.9 SW3.2 SW3.0 SW2.9 SW2.9 SW2.9SSW3.2 SW3.3 SW3.4 SW3.4 SW3.8WSW4.1WSW4.4WSW5.0WSW4.4																								Diurnal Average			
WSW18WNW14WNW16WNW17WNW16WNW13WSW14 W16 W18 W16 W15 SW15 W12 S12 W13 W11 WSW12 W12 W16 W19WNW20WNW15WSW15WSW17																								Diurnal Maximum			

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





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Wind Speed (WS) - km/h
Surmont 2 - December 2023

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	390	52.42	52.42
6 - 11	285	38.31	90.73
12 - 19	68	9.14	99.87
20 - 28	1	0.13	100.00
29 - 38	0	0.00	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed (WS) - km/h
Surmont 2 - December 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	1	1	2	1	3	24	63	51	32	43	84	34	27	9	13	2	390
6 - 11	0	0	0	0	0	34	23	14	2	9	13	64	105	18	1	2	285
12 - 19	0	0	0	0	0	0	0	0	1	0	1	21	26	18	1	0	68
20 - 28	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	1	1	2	1	3	58	86	65	35	52	98	119	158	46	15	4	744

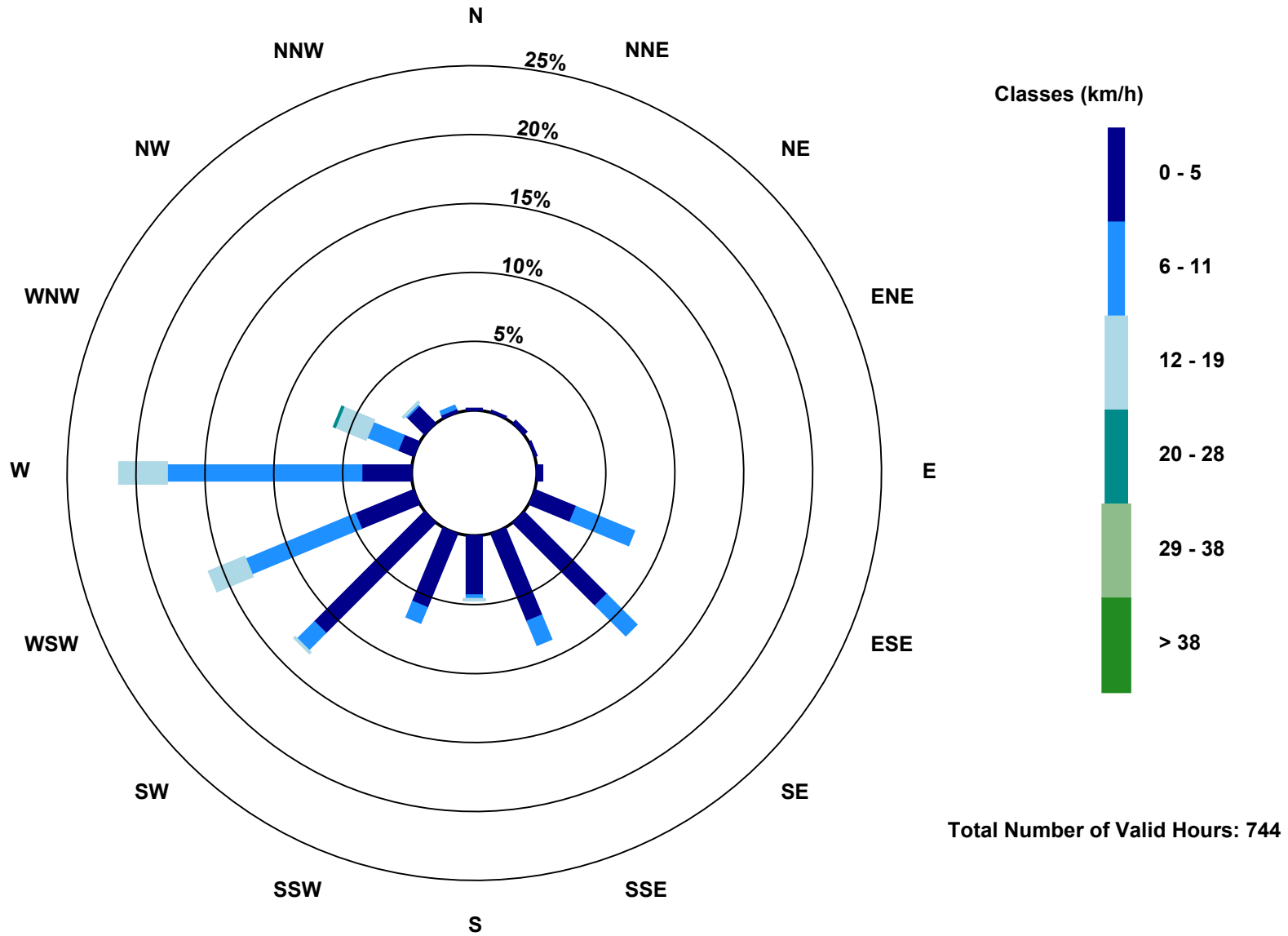
Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Dec 2023

Wind Speed (WS) - km/h
Surmont 2





Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Speed (WS) - km/h
Surmont 2 - December 2023

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 8 km/h on Dec 10 21:00														Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0											
Minimum Value: 1 km/h on Dec 30 03:00																									
Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 1 Median = 2 Q ₃ = 3 P ₉₀ = 4 P ₉₉ = 6																									
Day	Hourly Period Ending At (MST)																							Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23		24
1-Dec	1	1	1	1	1	1	1	1	1	1	1	1	2	2	1	1	1	1	2	1	1	2	2	1	2
2-Dec	1	1	1	1	1	1	1	1	1	1	1	1	2	2	1	1	1	1	2	1	1	1	2	2	2
3-Dec	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	1	1	1	1	1	1	1	2
4-Dec	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	1	1	1	2	2	1	1	1	1	2
5-Dec	1	1	2	1	2	2	2	2	2	1	2	2	1	2	2	3	3	4	4	4	5	5	6	5	6
6-Dec	5	4	5	4	4	4	4	3	3	3	2	3	4	3	3	2	3	3	2	3	1	1	2	2	5
7-Dec	1	3	4	2	3	3	3	2	2	3	2	3	2	2	1	2	2	2	2	2	2	2	1	2	4
8-Dec	3	2	2	1	2	2	2	2	2	1	2	2	2	2	2	2	2	1	2	3	2	4	4	4	4
9-Dec	3	2	3	2	2	2	2	2	1	1	1	1	2	1	2	2	1	1	1	1	1	1	1	1	3
10-Dec	1	1	1	2	2	2	1	1	2	3	4	4	4	5	3	3	4	4	6	7	8	6	6	6	8
11-Dec	6	6	6	7	6	6	4	5	4	3	3	3	3	3	2	2	1	2	2	2	1	4	4	3	7
12-Dec	4	2	1	1	1	1	1	1	1	1	1	2	2	2	2	2	1	1	1	5	5	4	4	4	5
13-Dec	3	3	3	2	2	3	6	5	5	6	5	5	4	3	2	1	2	3	3	2	3	1	1	2	6
14-Dec	1	2	3	3	3	4	4	3	3	3	3	3	2	2	2	1	2	2	2	2	4	4	1	4	4
15-Dec	1	2	4	4	4	4	6	6	6	5	5	6	5	5	5	5	5	5	3	3	4	4	6	6	6
16-Dec	6	5	5	4	5	3	5	5	5	4	4	4	3	4	3	2	1	2	2	2	2	3	2	3	6
17-Dec	4	5	5	4	3	2	3	2	2	2	1	3	2	3	3	4	2	2	3	3	4	4	3	3	5
18-Dec	3	2	5	4	2	3	3	3	4	3	3	3	4	4	3	3	2	3	3	3	3	2	2	2	5
19-Dec	2	2	1	1	1	1	1	1	2	1	2	1	2	2	2	3	3	3	3	3	2	2	2	3	3
20-Dec	3	3	3	3	2	2	2	2	2	2	2	2	2	3	3	2	3	3	2	2	3	4	3	4	4
21-Dec	3	3	3	2	3	3	2	3	3	3	2	2	3	3	4	4	4	4	3	3	4	4	3	2	4
22-Dec	1	1	2	1	1	1	1	1	2	1	2	2	2	2	2	2	2	1	1	1	4	4	5	4	5
23-Dec	5	5	4	5	5	5	5	5	7	6	5	5	4	4	5	4	4	4	4	3	4	3	3	3	7
24-Dec	2	2	2	3	2	2	3	2	1	1	2	2	3	3	2	3	5	4	2	1	1	1	1	1	5
25-Dec	1	1	1	1	1	1	1	2	2	3	1	1	1	1	1	2	1	1	1	1	1	2	1	2	3
26-Dec	2	2	1	2	2	2	2	2	2	2	1	2	2	2	2	1	1	3	3	4	3	2	3	3	4
27-Dec	4	3	4	4	2	2	2	2	3	4	2	1	1	2	1	1	1	1	1	1	1	1	1	1	4
28-Dec	1	2	2	1	1	2	1	1	1	1	2	1	1	1	1	1	1	1	2	1	1	1	1	1	2
29-Dec	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	2
30-Dec	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	3	4	4	4	4	4	3	4
31-Dec	3	2	1	1	1	1	1	1	1	1	1	3	3	3	3	2	2	2	2	2	3	4	4	4	4
														Diurnal Maximum											
														6 6 6 7 6 6 6 6 7 6 5 6 5 5 5 5 5 5 6 7 8 6 6 6 6											



Wood Buffalo Environmental Association
Summary of Hour Averages

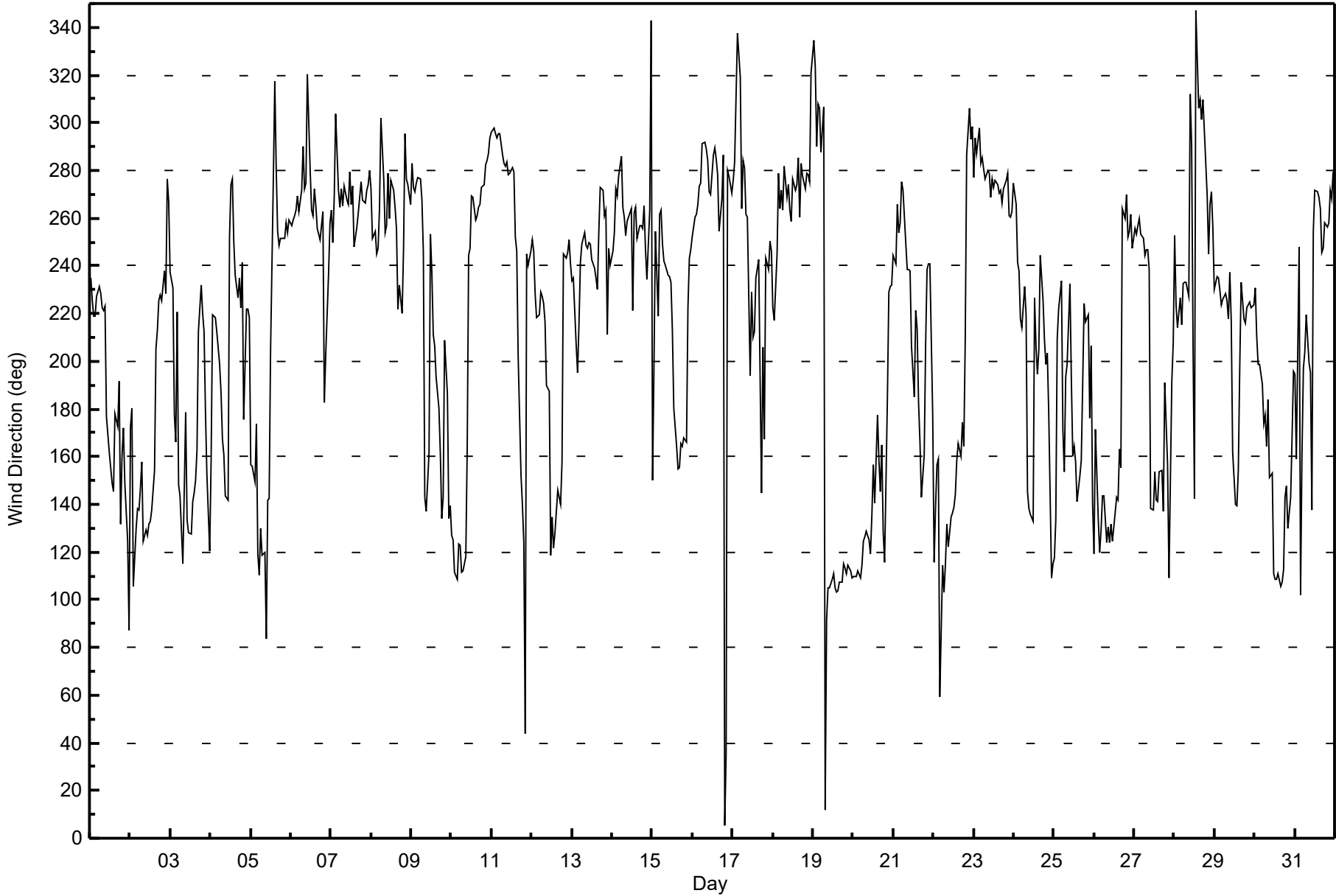
Wind Direction (WD) - deg
Surmont 2 - December 2023

Direction of Maximum Speed: 283 deg on Dec 10 21:00 Direction of Maximum Daily Speed Average: 276.5 deg on Dec 23	Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0
Direction of Minimum Speed: 166 deg on Dec 3 04:00 Direction of Minimum Daily Speed Average: 1.8 deg on Dec 28	Percent Operational Time: 100.0
Monthly Average Direction: 240.5 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-Dec	235	226	219	219	227	231	228	222	221	223	177	162	155	149	145	178	173	191	132	160	172	149	125	87	172.5
2-Dec	173	180	106	130	138	138	146	158	124	129	127	132	133	138	154	205	213	225	228	225	238	228	276	267	155.7
3-Dec	237	231	178	166	221	149	143	115	146	179	134	128	127	141	145	150	162	212	232	220	213	178	152	121	162.7
4-Dec	159	220	219	218	212	199	187	167	161	143	142	252	274	277	250	236	226	235	223	241	176	222	222	218	222.5
5-Dec	157	156	149	174	119	110	130	119	120	84	142	142	204	278	318	281	254	249	252	252	252	258	254	259	230.3
6-Dec	257	259	261	264	269	263	272	290	272	275	321	280	264	261	272	265	256	251	257	263	183	203	237	258	264.1
7-Dec	264	249	268	304	271	264	272	265	273	267	266	279	266	274	248	256	262	269	275	268	266	272	274	280	268.7
8-Dec	273	252	255	245	247	264	302	276	254	257	279	260	276	272	265	256	222	232	220	247	296	276	274	266	262.0
9-Dec	283	273	271	274	277	277	268	246	143	137	161	253	237	211	207	193	181	162	134	143	209	186	134	140	236.0
10-Dec	127	125	111	109	124	123	111	112	118	164	244	247	269	269	259	261	264	266	273	274	283	284	287	293	262.9
11-Dec	296	298	296	294	295	295	286	283	282	283	278	279	281	279	252	246	202	153	140	124	44	245	240	246	279.5
12-Dec	251	246	228	218	219	229	227	224	217	190	187	119	134	121	128	146	143	140	158	245	243	246	251	241	212.3
13-Dec	234	235	207	195	216	241	249	254	249	247	250	249	242	239	235	230	254	273	272	261	263	211	247	240	246.0
14-Dec	246	254	272	269	278	286	264	261	253	259	260	264	221	262	264	252	257	257	256	265	247	234	264	343	261.2
15-Dec	150	198	254	219	262	263	249	242	240	236	236	233	213	180	164	155	155	165	164	168	166	223	243	247	217.0
16-Dec	252	260	262	265	273	275	291	292	289	284	271	270	286	290	285	278	255	268	287	6	36	280	277	270	276.2
17-Dec	276	283	311	337	319	264	284	281	262	260	194	229	210	212	235	243	194	145	206	167	243	238	250	246	257.5
18-Dec	222	217	245	279	264	272	263	282	269	274	263	259	277	272	274	285	260	283	277	272	279	278	275	321	269.5
19-Dec	334	324	290	308	306	288	307	12	91	105	105	108	111	105	103	104	108	108	115	114	111	114	112	109	102.1
20-Dec	110	110	110	112	109	114	124	126	129	125	119	135	156	140	177	159	145	165	129	115	185	229	232	232	139.5
21-Dec	245	241	266	254	258	275	272	249	238	239	238	207	185	221	213	183	166	143	161	207	239	241	241	177	224.5
22-Dec	116	139	157	159	59	114	103	115	132	122	135	137	139	144	159	166	160	174	164	209	287	306	293	298	155.3
23-Dec	277	294	287	298	283	285	280	277	280	279	269	276	273	276	274	271	272	266	272	276	279	261	260	263	276.5
24-Dec	275	266	242	238	218	214	231	219	145	138	136	133	227	206	195	205	244	225	209	199	203	178	109	115	212.6
25-Dec	118	134	209	222	234	171	154	193	199	233	192	160	164	158	141	152	158	190	224	216	219	176	206	140	184.4
26-Dec	119	171	134	120	129	143	143	124	130	124	132	125	131	143	142	163	155	264	260	270	252	254	262	247	177.6
27-Dec	256	253	257	260	253	252	244	247	247	239	138	138	154	142	141	154	154	137	191	174	157	109	191	208	224.5
28-Dec	253	223	214	227	215	233	233	233	227	312	290	207	142	347	306	310	301	310	296	270	245	266	271	256	269.5
29-Dec	230	236	235	229	224	226	228	225	218	237	217	162	140	139	154	197	233	218	216	222	223	225	223	223	213.4
30-Dec	231	210	198	199	190	174	177	164	184	151	153	111	108	109	111	106	107	113	143	148	130	143	169	196	139.6
31-Dec	195	159	248	102	162	197	204	220	199	195	137	255	272	271	269	264	246	248	258	256	258	272	268	280	248.4

249.2 248.2 255.6 260.5 258.0 257.5 253.4 251.6 240.6 238.7 228.4 227.9 221.8 222.4 217.1 215.6 210.5 222.3 231.2 236.1 244.0 243.6 250.4 251.7
 Diurnal Average

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





Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Direction (WD) - deg
Surmont 2 - December 2023

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 118 deg on Dec 13 05:00		Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0																							
Minimum Value: 7 deg on Dec 1 05:00																									
Percentiles: P ₁ = 12 P ₁₀ = 23 Q ₁ = 29 Median = 35 Q ₃ = 50 P ₉₀ = 64 P ₉₉ = 92																									
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Dec	15	14	13	16	7	10	14	18	12	54	51	30	33	43	44	54	53	48	60	63	45	65	65	49	65
2-Dec	25	43	25	28	18	24	30	38	48	20	31	26	26	42	51	49	33	14	20	53	17	52	65	28	65
3-Dec	45	63	53	79	64	68	69	34	38	32	59	36	26	36	42	52	36	35	32	34	42	56	41	35	79
4-Dec	86	51	43	26	29	35	39	49	81	74	89	102	42	33	44	32	30	34	59	60	58	30	27	31	102
5-Dec	34	49	46	52	37	41	38	35	37	52	43	33	66	87	89	38	24	24	25	26	29	32	31	30	89
6-Dec	27	29	30	29	32	29	31	37	34	51	53	61	29	27	35	37	30	28	36	49	73	54	37	34	73
7-Dec	20	19	55	39	29	26	27	26	30	27	29	36	28	31	32	42	24	23	27	25	25	26	22	33	55
8-Dec	27	21	21	14	15	24	34	27	20	19	39	25	29	29	40	29	63	36	60	30	77	65	31	44	77
9-Dec	48	28	33	27	28	25	30	55	59	51	74	85	62	38	35	45	40	40	27	40	48	41	54	44	85
10-Dec	43	30	27	39	37	38	30	43	38	64	30	25	39	34	26	28	28	31	31	31	34	36	37	37	64
11-Dec	36	38	37	37	35	33	35	36	33	28	30	26	29	37	33	30	42	72	68	49	88	55	24	23	88
12-Dec	36	74	23	15	27	19	12	15	13	31	72	28	36	24	33	31	31	30	59	32	30	35	32	31	74
13-Dec	39	62	72	91	118	110	39	33	29	29	30	31	40	66	59	76	84	32	25	40	48	67	41	20	118
14-Dec	21	31	31	31	34	38	30	29	24	34	34	43	45	24	26	18	23	23	27	25	71	42	36	112	112
15-Dec	63	65	38	88	37	42	33	38	35	46	55	42	62	51	51	53	51	54	74	61	56	61	37	29	88
16-Dec	31	28	30	27	28	29	37	36	35	35	30	27	36	34	33	29	24	29	41	71	47	39	33	38	71
17-Dec	30	33	43	34	44	23	40	27	23	30	56	55	54	61	61	40	66	58	57	66	29	52	76	61	76
18-Dec	65	56	34	32	28	33	25	36	27	32	33	29	37	30	32	35	38	39	31	31	35	30	35	48	65
19-Dec	36	45	36	37	39	37	38	70	45	36	27	21	25	19	18	18	19	20	25	21	21	21	22	20	70
20-Dec	21	24	23	27	21	53	31	36	34	36	37	45	49	45	58	52	51	48	54	53	63	43	43	39	63
21-Dec	31	36	28	29	51	36	28	27	25	31	46	55	69	62	61	64	49	48	53	64	42	35	37	53	69
22-Dec	50	34	22	64	74	29	18	24	29	24	31	38	33	41	46	50	39	48	94	73	44	39	44	40	94
23-Dec	30	34	35	41	32	32	33	28	30	30	29	36	31	29	29	28	26	29	28	32	25	23	29	41	41
24-Dec	33	24	19	19	30	35	45	54	43	24	43	64	47	59	52	64	34	81	51	59	45	63	54	63	81
25-Dec	65	67	30	29	71	104	88	91	69	41	29	51	52	58	30	34	31	39	20	30	34	47	34	50	104
26-Dec	43	48	58	36	56	45	45	28	31	25	23	41	33	43	36	44	68	33	26	30	23	23	23	33	68
27-Dec	35	28	29	29	26	23	21	19	25	51	49	39	32	37	44	51	51	47	50	86	64	84	30	32	86
28-Dec	82	24	38	64	27	22	57	25	61	88	72	71	69	78	56	45	42	45	38	31	75	53	53	37	88
29-Dec	59	70	58	55	29	32	32	13	32	16	32	22	40	25	35	17	16	16	16	12	15	13	12	14	70
30-Dec	12	11	15	19	27	36	27	29	39	37	46	34	31	27	25	24	28	36	53	51	48	64	54	57	64
31-Dec	39	50	90	105	68	67	46	24	27	34	55	43	94	27	32	32	25	31	25	27	25	53	30	32	105
	86	74	90	105	118	110	88	91	81	88	89	102	94	87	89	76	84	81	94	86	88	84	76	112	
	Diurnal Maximum																								



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

AMS30 ELLS RIVER DECEMBER 2023

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

January 31, 2024

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - ELLS RIVER (AMS30)
DECEMBER 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	709	35	35	100	6.3	0	1.9	0
TRS (ppb) Average	708	36	36	100	2.8	0	1	0
THC (ppm) Average	707	35	37	99.73	4.3	-	2.8	-
NMHC (ppm) Average	707	35	37	99.73	0.347	-	0.09	-
CH4 (ppm) Average	707	35	37	99.73	4	-	2.7	-
NO2 (ppb) Average	708	36	36	100	33	0	18.6	-
NO (ppb) Average	708	36	36	100	113	-	29.1	-
NOX (ppb) Average	708	36	36	100	134.5	-	47.2	-
PM2.5 (ug/m3) Average	742	2	2	100	34.9	0	21.2	0
Temperature 2 m (C) Average	744	0	0	100	10.3	-	3.2	-
Relative Humidity (%) Average	744	0	0	100	92.6	-	89	-
Wind Speed 10 m (km/h) Average	741	0	3	99.6	23	-	14	-
Wind Direction 10 m (deg) Average	741	0	3	99.6	-	-	-	-
Global Solar Radiation (W/m2) Average	744	0	0	100	241.9	-	42.6	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - ELLS RIVER (AMS30)
 DECEMBER 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	709	0.23	0.6	-	0	0	0	0.1	0.2	0.5	6.3
TRS (ppb) Average	708	0.52	0.3	-	0.3	0.4	0.4	0.4	0.5	0.8	2.8
THC (ppm) Average	707	2.17	0.3	-	1.9	2	2	2.1	2.2	2.6	4.3
NMHC(ppm) Average	707	0.005	0.032	-	0	0	0	0	0	0	0.347
CH4(ppm) Average	707	2.16	0.3	-	1.9	2	2	2.1	2.2	2.5	4
NO2 (ppb) Average	708	7.84	8.1	-	0.1	0.5	0.8	3.9	14.3	20.2	33
NO (ppb) Average	708	5.16	11.9	-	0	0	0	0.1	2.4	19.4	113
NOX (ppb) Average	708	13	17.9	-	0.1	0.5	0.9	4.3	18.7	39.6	134.5
PM2.5 (ug/m3) Average	742	4.95	4.7	-	0.3	1.1	2.1	3.4	6.1	10.9	34.9
Temperature 2 m (C) Average	744	-6.45	5.7	-	-19.2	-14.2	-10.8	-6.4	-2.3	1.3	10.3
Relative Humidity (%) Average	744	73.36	12.3	-	33.3	55.7	65.3	77.4	82.8	86	92.6
Wind Speed 10 m (km/h) Average	741	9.4	4	-	1	4	7	9	12	14	23
Wind Direction 10 m (deg) Average	741	213.4	-	-	-	-	-	-	-	-	-
Global Solar Radiation (W/m2) Average	744	22.86	47.2	-	0	0	0	0.1	13.2	104.3	241.9

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - ELLS RIVER (AMS30)
DECEMBER 2023

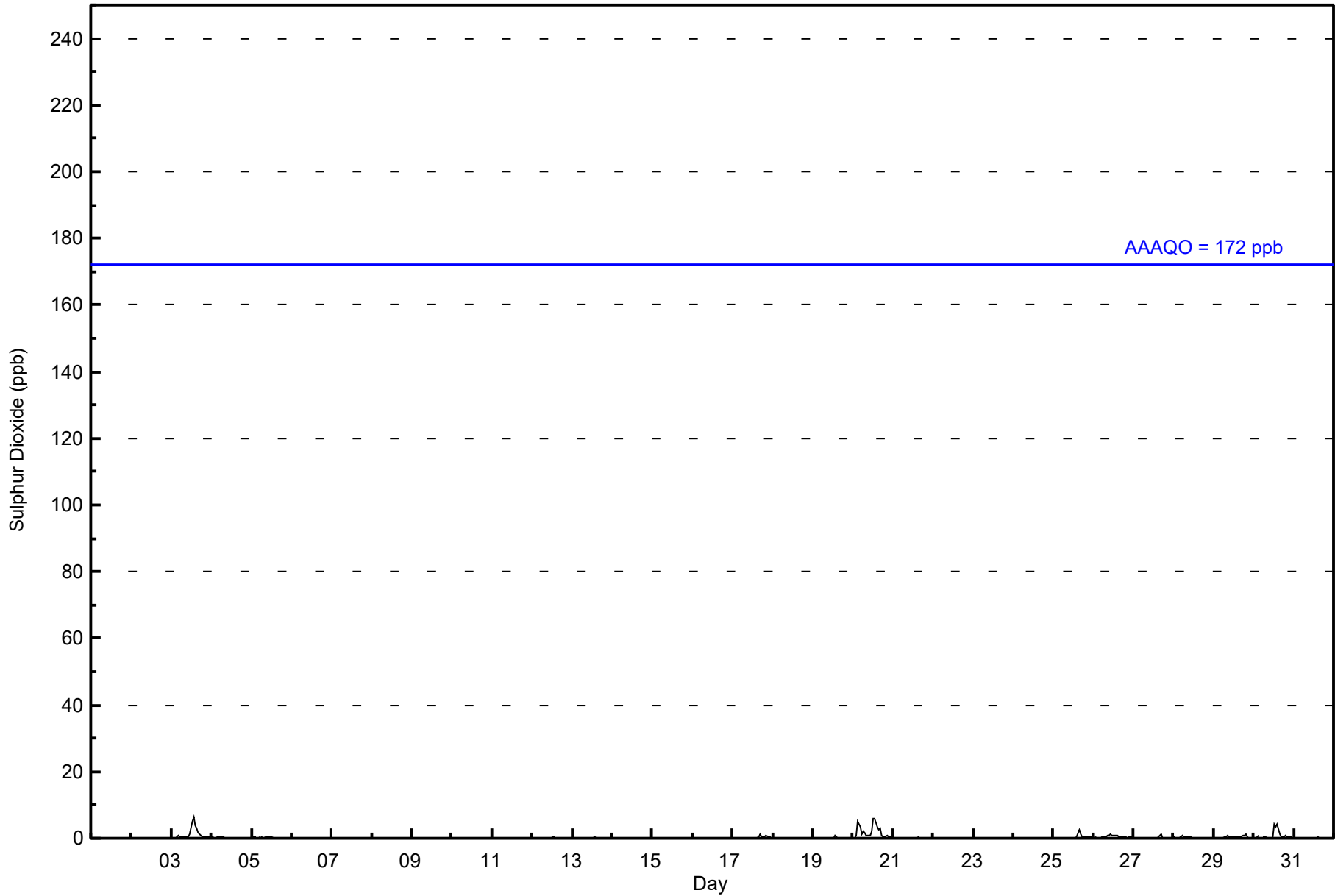
OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
THC/NMHC/CH4	15 Dec 2023 11:00	15 Dec 2023 12:00	2	Maintenance - replaced support gas cylinder
Wind Speed, Wind Direction	03 Dec 2023 04:00	03 Dec 2023 04:00	1	Flat line in sensor output signal
Wind Speed, Wind Direction	19 Dec 2023 10:00	19 Dec 2023 10:00	1	Flat line in sensor output signal
Wind Speed, Wind Direction	27 Dec 2023 20:00	27 Dec 2023 20:00	1	Flat line in sensor output signal



Wood Buffalo Environmental Association
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Ells River - December 2023





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Ells River - December 2023

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	709	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: 709

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Ells River - December 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	22	26	6	5	3	6	8	66	192	162	115	28	27	22	11	7	706
11 - 20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	22	26	6	5	3	6	8	66	192	162	115	28	27	22	11	7	706

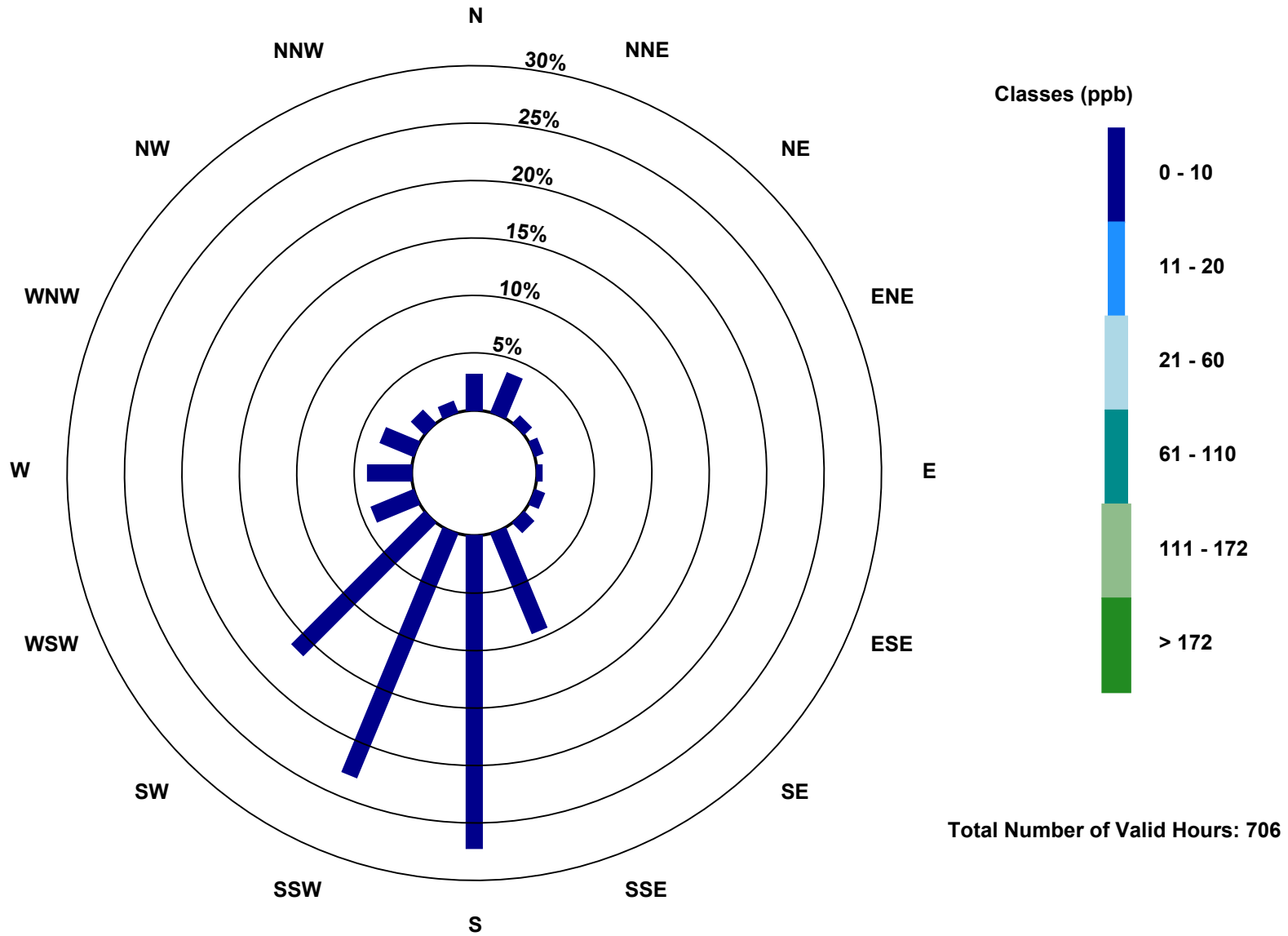
Total Number of Valid Hours: 706

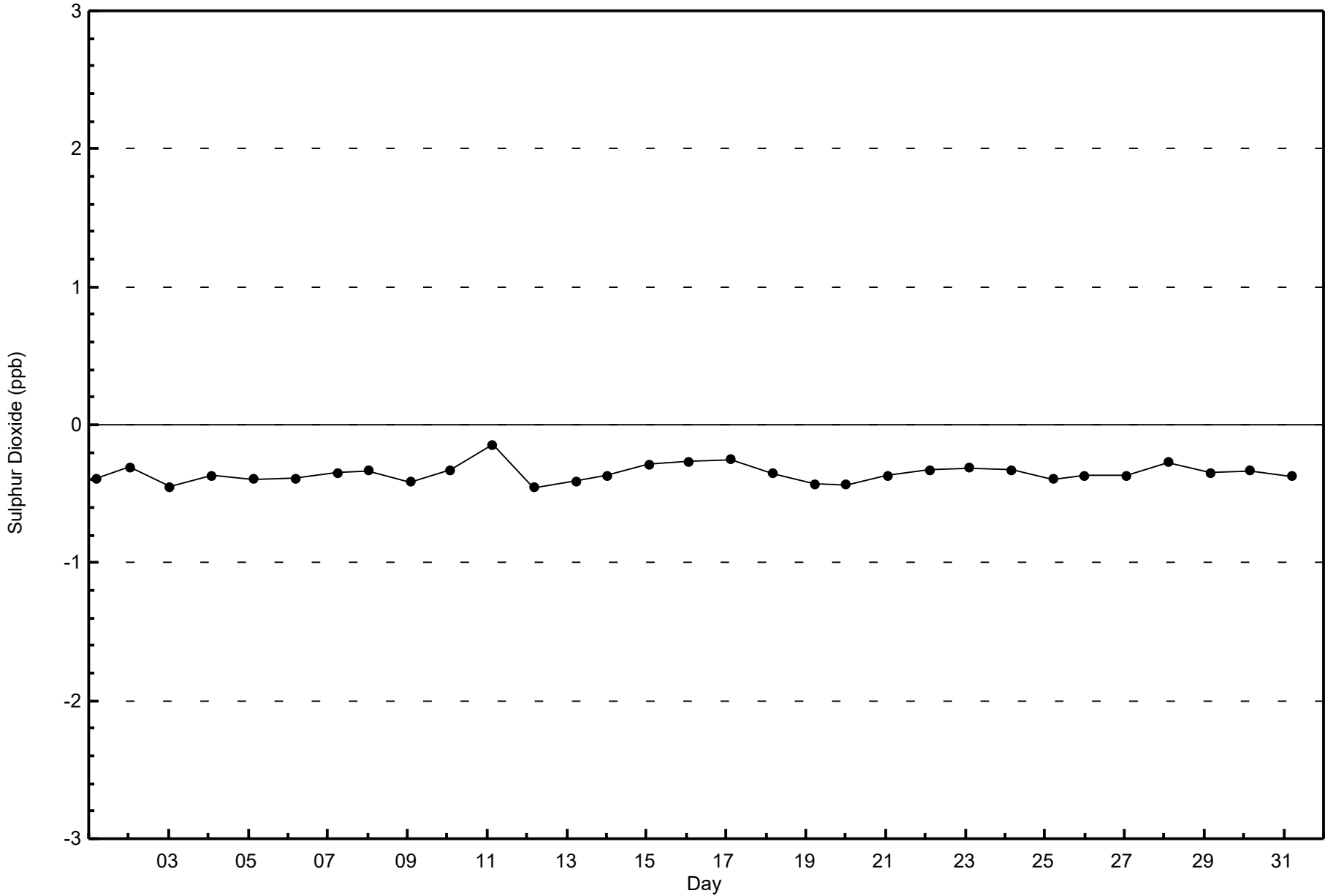
Total Number of Hours: 744

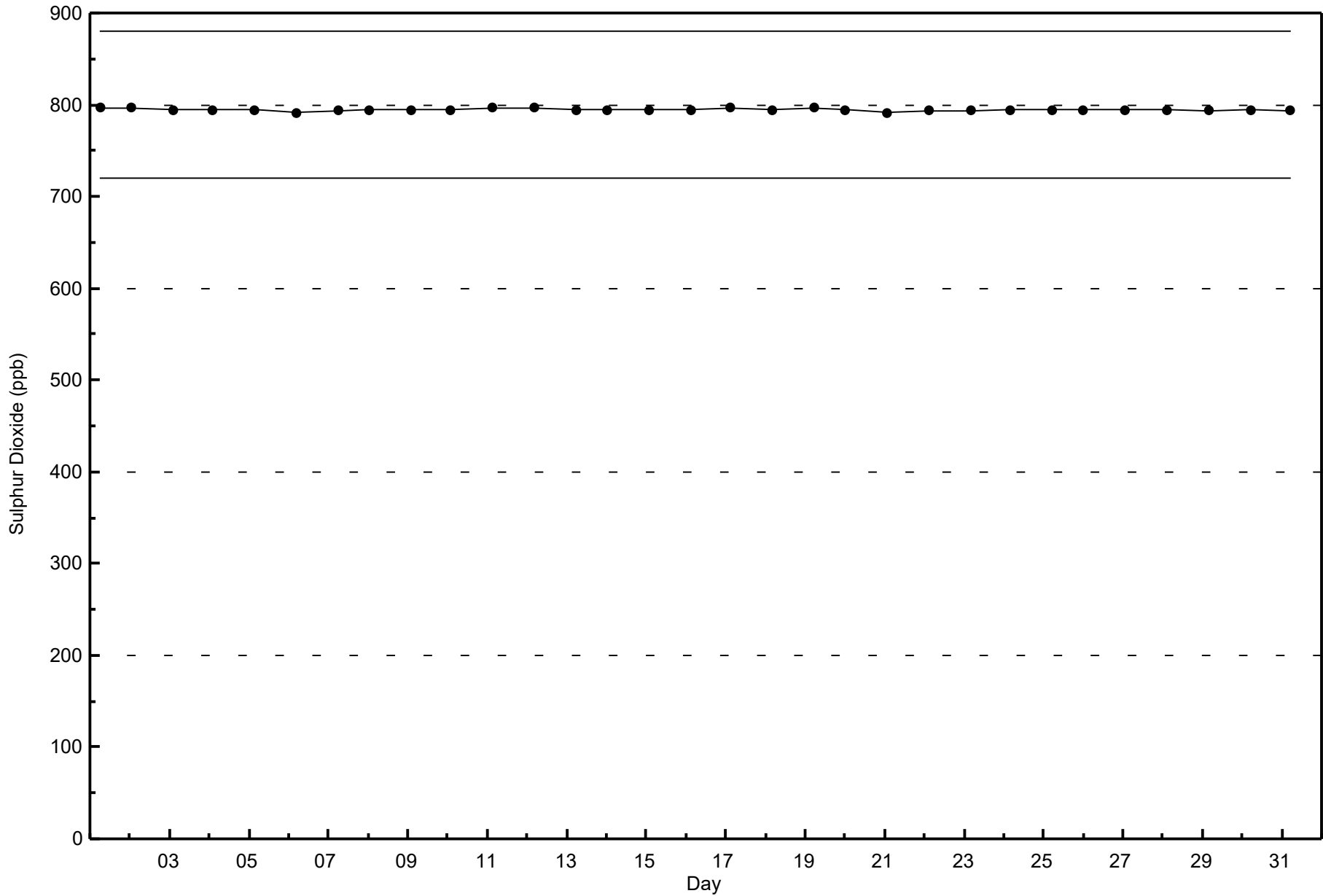


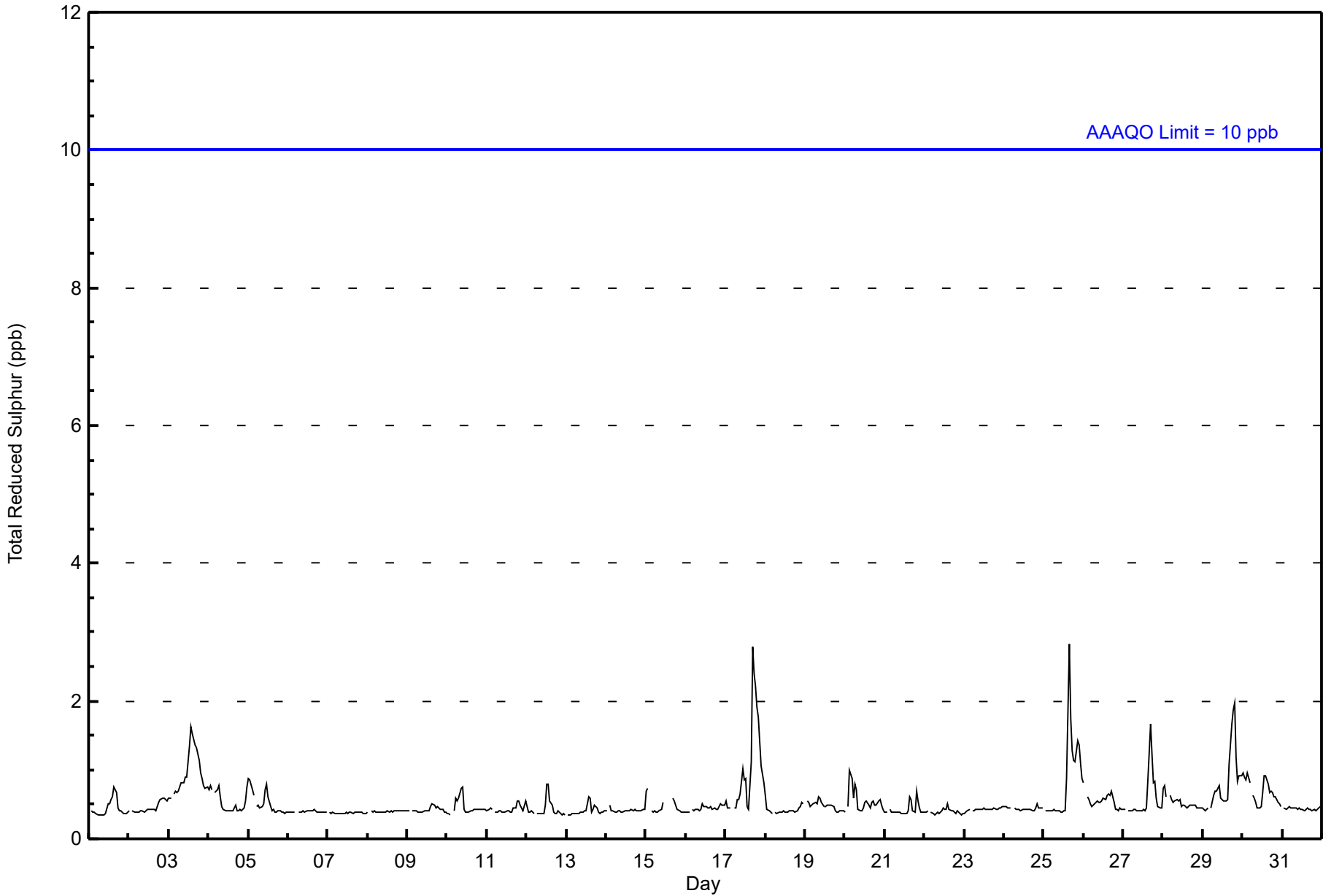
Wood Buffalo Environmental Association
Wind Rose Dec 2023

Sulphur Dioxide (SO₂) - ppb
Ells River











Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Reduced Sulphur (TRS) - ppb
Ells River - December 2023

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	706	99.72	99.72
3 - 4	2	0.28	100.00
5 - 7	0	0.00	100.00
8 - 11	0	0.00	100.00
> 11	0	0.00	100.00

Total Number of Valid Hours: 708

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Total Reduced Sulphur (TRS) - ppb
Ells River - December 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	21	25	6	5	3	7	7	65	188	165	116	28	25	23	11	8	703
3 - 4	0	0	0	0	0	0	0	2	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
Totals	21	25	6	5	3	7	7	67	188	165	116	28	25	23	11	8	705

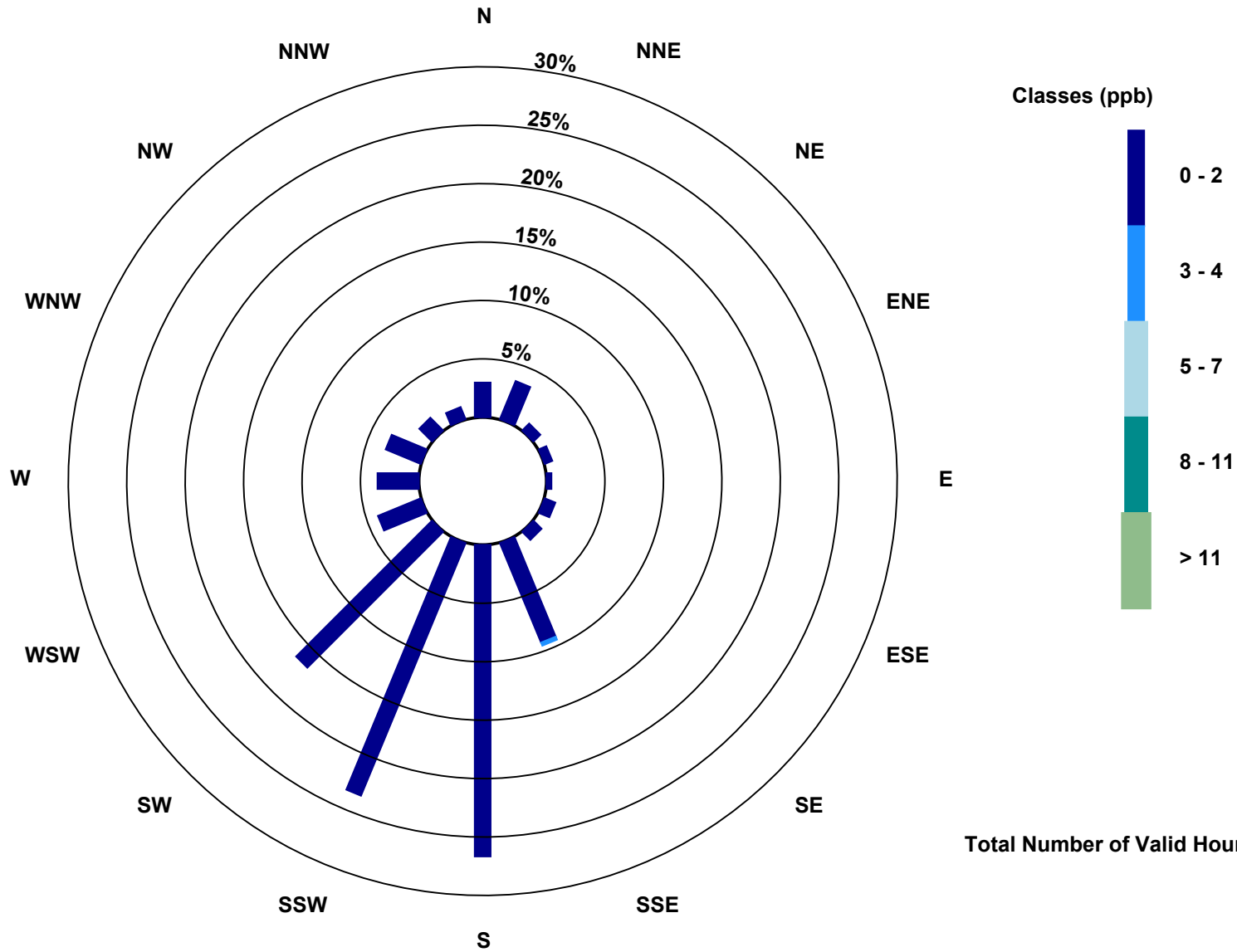
Total Number of Valid Hours: 705

Total Number of Hours: 744

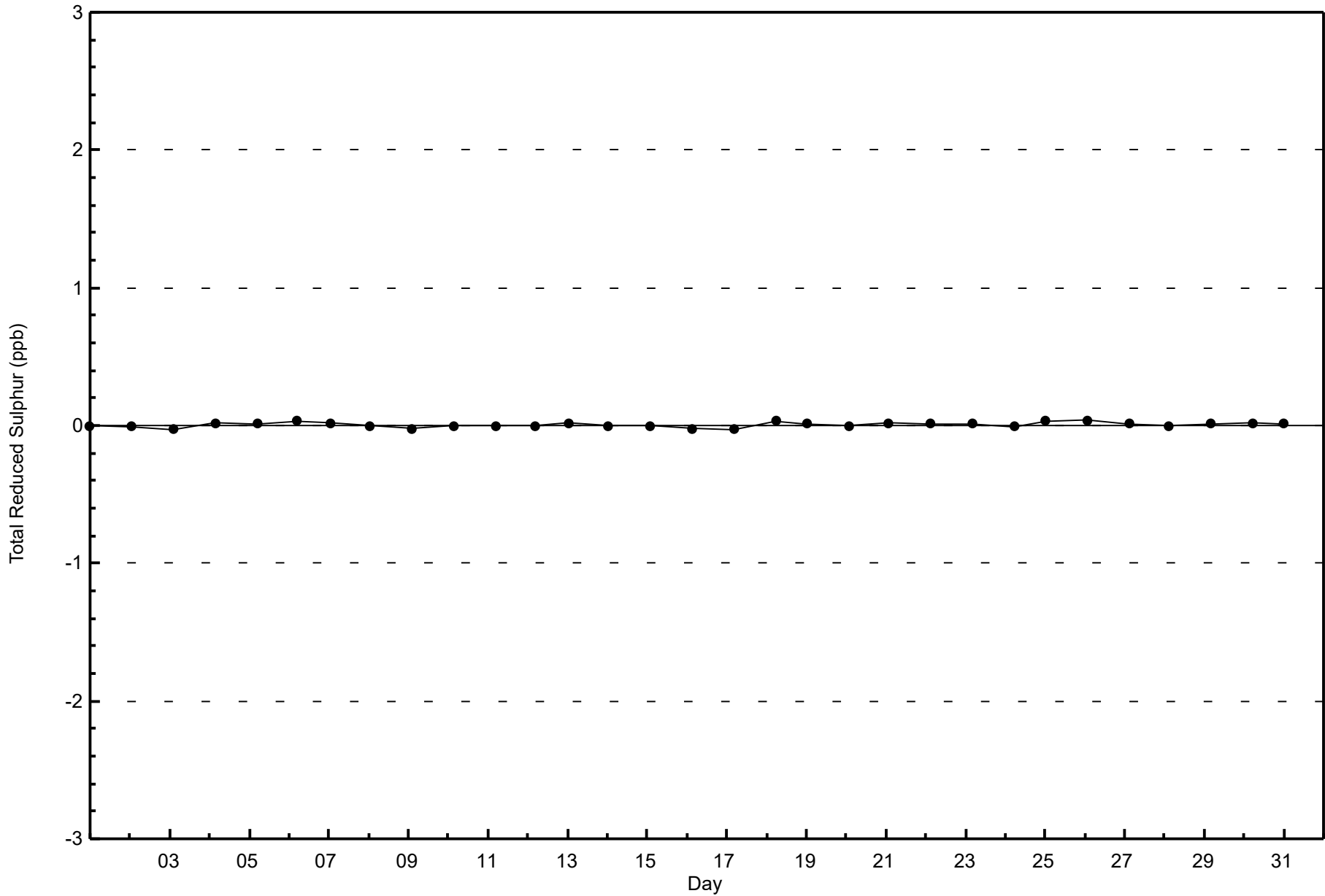


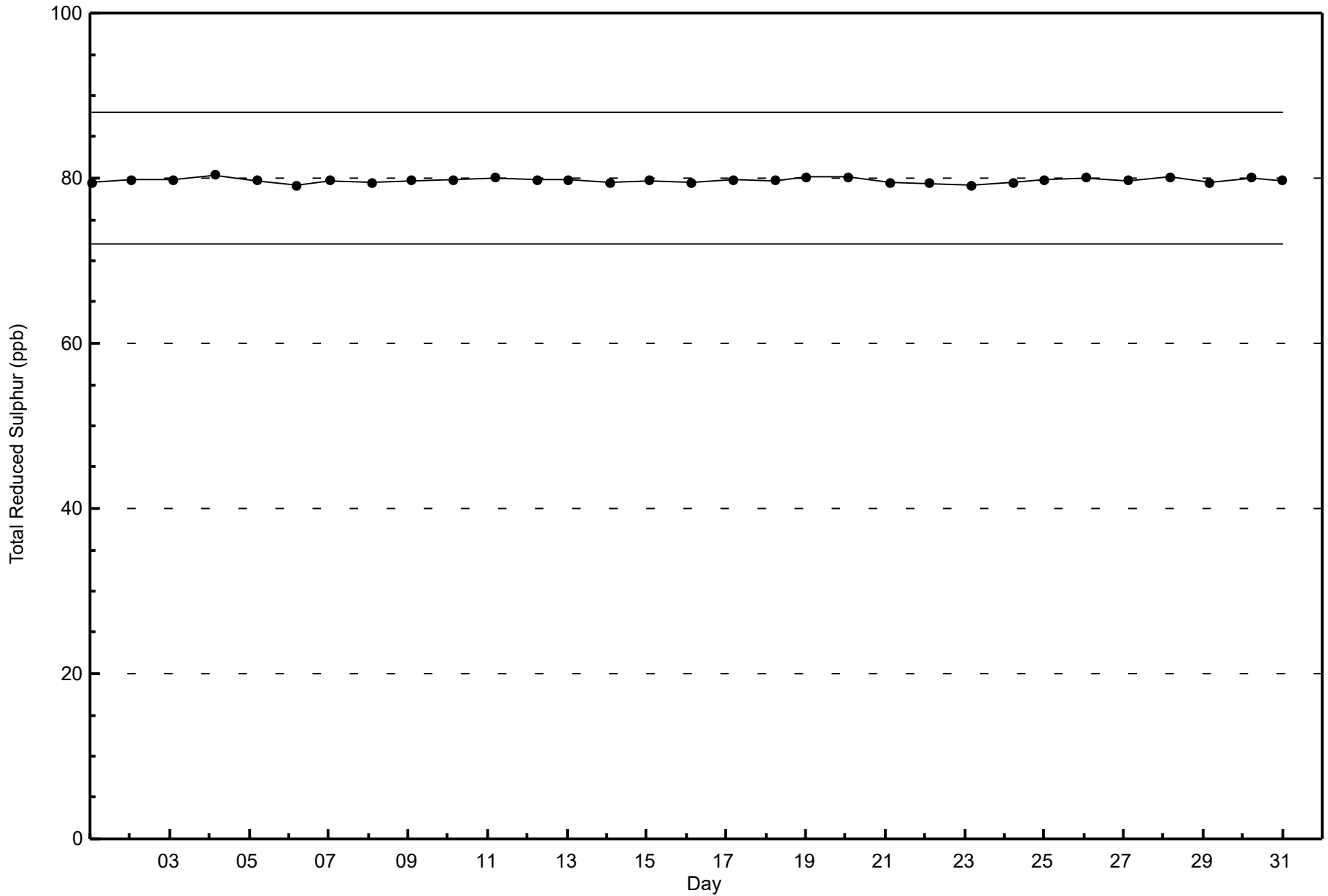
Wood Buffalo Environmental Association
Wind Rose Dec 2023

Total Reduced Sulphur (TRS) - ppb
Ells River



Total Number of Valid Hours: 705





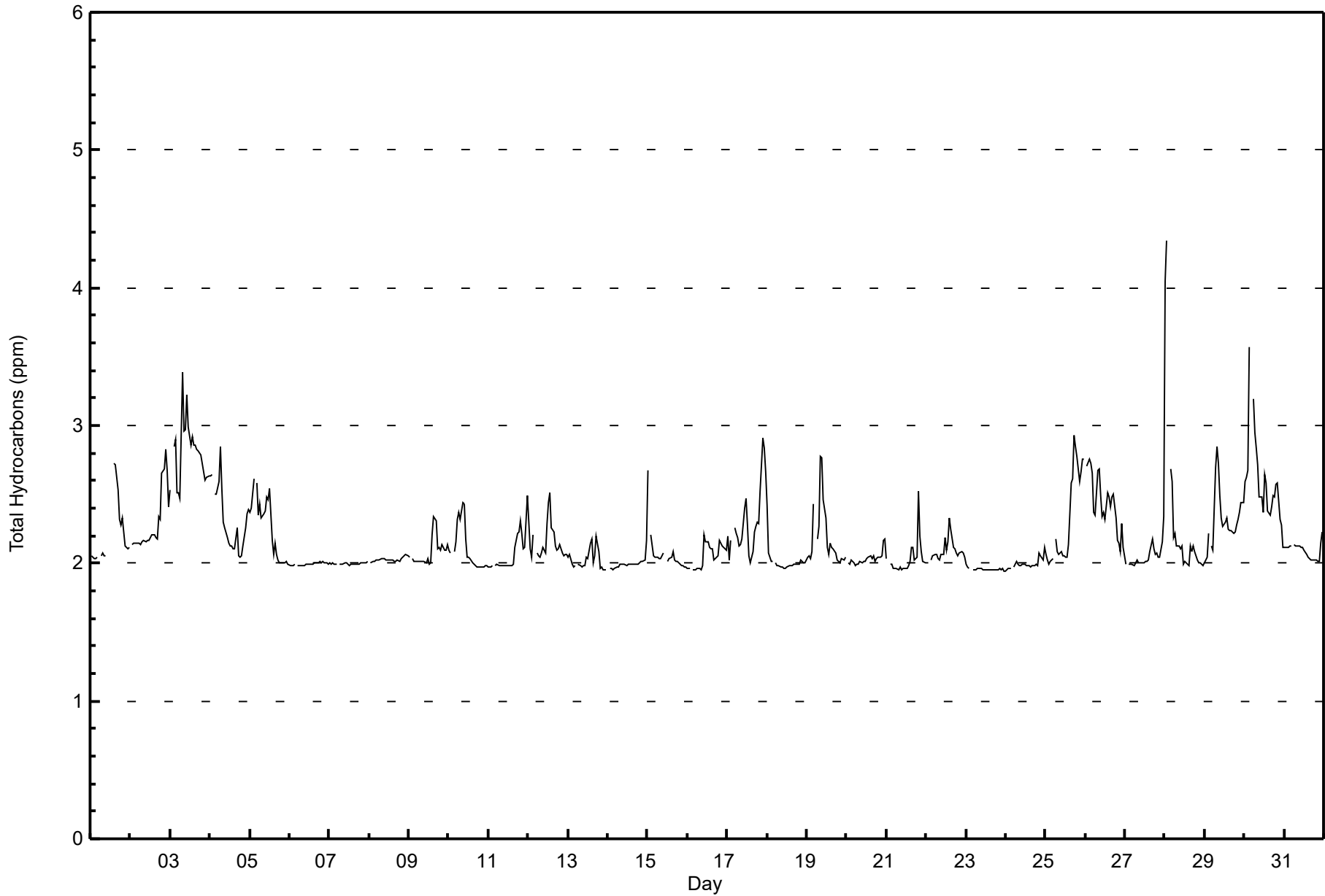


Maximum Value: 4.3 ppm on Dec 28 02:00																				Maximum Daily Average: 2.8 ppm on Dec 3					Hours in Service: 744	
Minimum Value: 1.9 ppm on Dec 24 01:00																				Minimum Daily Average: 2.0 ppm on Dec 23					Hours of Data: 707	
Maximum Diurnal Average: 2.2 ppm at hour 1																				Minimum Diurnal Average: 2.1 ppm at hour 14					Hours of Missing Data: 37	
Monthly Average: 2.17 ppm																				Percentiles: P ₁ = 2.0 P ₁₀ = 2.0 Q ₁ = 2.0 Median = 2.1 Q ₃ = 2.2 P ₉₀ = 2.6 P ₉₉ = 3.0					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-Dec	2.1	2.0	2.0	2.0	2.0	Z	2.1	2.1	2.1	2.1	C	C	C	C	2.7	2.7	2.5	2.3	2.3	2.3	2.2	2.1	2.1	2.1	2.2	2.7
2-Dec	Z	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	2.3	2.3	2.7	2.7	2.8	2.7	2.4	2.3	2.8
3-Dec	2.5	Z	2.8	2.9	2.5	2.5	2.5	3.4	3.0	3.0	3.2	3.0	2.9	2.9	2.9	2.9	2.8	2.8	2.8	2.7	2.7	2.6	2.6	2.6	2.8	3.4
4-Dec	2.6	2.6	Z	2.5	2.5	2.6	2.9	2.5	2.3	2.3	2.2	2.1	2.1	2.1	2.1	2.1	2.3	2.1	2.0	2.1	2.1	2.3	2.4	2.4	2.3	2.9
5-Dec	2.4	2.4	2.6	Z	2.6	2.4	2.4	2.3	2.4	2.4	2.5	2.5	2.5	2.2	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.3	2.6
6-Dec	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
7-Dec	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
8-Dec	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.0	2.1
9-Dec	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	2.2	2.3	2.3	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.3
10-Dec	2.1	2.1	Z	2.1	2.2	2.3	2.4	2.3	2.4	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	2.0	2.1	2.4
11-Dec	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	2.1	2.2	2.2	2.3	2.2	2.1	2.1	2.1	2.5	2.1	2.5
12-Dec	2.3	2.1	2.0	2.2	Z	2.1	2.1	2.0	2.1	2.1	2.1	2.3	2.4	2.5	2.3	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.5
13-Dec	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	2.1	2.2	2.0	2.1	2.2	2.1	2.0	2.0	2.0	1.9	2.0	2.2	2.2
14-Dec	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	2.2	2.0	2.2	2.2
15-Dec	2.7	Z	2.2	2.1	2.0	2.0	2.0	2.0	2.0	2.1	M	M	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	2.7
16-Dec	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.2	2.2	2.2	2.1	2.1	2.1	2.0	2.0	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.2
17-Dec	2.2	2.0	2.2	Z	2.3	2.2	2.2	2.1	2.1	2.2	2.4	2.5	2.3	2.1	2.0	2.1	2.2	2.3	2.3	2.3	2.5	2.9	2.8	2.7	2.3	2.9
18-Dec	2.4	2.1	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.4
19-Dec	2.0	2.1	2.0	2.1	2.4	Z	2.2	2.3	2.8	2.8	2.5	2.3	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.2	2.8
20-Dec	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	2.0	2.1	2.0	2.0	2.0	2.0	2.1	2.2	2.2	2.0	2.2
21-Dec	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	2.0	2.0	2.5	2.2	2.1	2.0	2.0	2.0	2.5
22-Dec	2.0	2.0	Z	2.0	2.1	2.1	2.1	2.0	2.0	2.1	2.1	2.2	2.1	2.2	2.3	2.3	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.1	2.3
23-Dec	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	1.9	2.0	2.0	2.0
24-Dec	1.9	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.0	2.1	2.0	2.1	2.1
25-Dec	2.1	2.0	2.0	2.0	2.0	Z	2.2	2.1	2.1	2.1	2.1	2.0	2.0	2.1	2.6	2.6	2.9	2.8	2.8	2.6	2.7	2.8	2.8	2.3	2.9	2.9
26-Dec	Z	2.7	2.8	2.7	2.7	2.4	2.4	2.7	2.7	2.5	2.3	2.4	2.3	2.5	2.5	2.4	2.5	2.5	2.3	2.2	2.1	2.1	2.3	2.1	2.4	2.8
27-Dec	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	2.1	2.1	2.1	2.1	2.0	2.0	2.2	2.3	2.0	2.3
28-Dec	4.0	4.3	Z	2.7	2.6	2.2	2.2	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.3	4.3
29-Dec	2.0	2.0	2.2	Z	2.1	2.1	2.7	2.8	2.7	2.5	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.4	2.4	2.4	2.3	2.8
30-Dec	2.6	2.6	2.7	3.6	Z	3.2	2.9	2.8	2.7	2.5	2.5	2.4	2.6	2.6	2.4	2.4	2.4	2.5	2.5	2.6	2.6	2.3	2.3	2.1	2.6	3.6
31-Dec	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	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.2	2.1	2.2
																								Diurnal Average		
																								Diurnal Maximum		
Z - zerospan C - Calibration M - Maintenance																										



Wood Buffalo Environmental Association
Hourly Averages

Total Hydrocarbons (THC) - ppm
Ells River - December 2023





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Hydrocarbons (THC) - ppm
Ells River - December 2023

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	344	48.66	48.66
2.1 - 3.0	357	50.50	99.15
3.1 - 10.0	6	0.85	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Total Hydrocarbons (THC) - ppm
Ells River - December 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	5	10	2	1	1	4	2	23	45	87	99	27	22	12	3	1	344
2.1 - 3.0	17	16	4	4	2	2	6	43	143	75	16	1	5	8	8	4	354
3.1 - 10.0	0	0	0	0	0	0	0	0	2	0	0	0	0	2	0	2	6
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	22	26	6	5	3	6	8	66	190	162	115	28	27	22	11	7	704

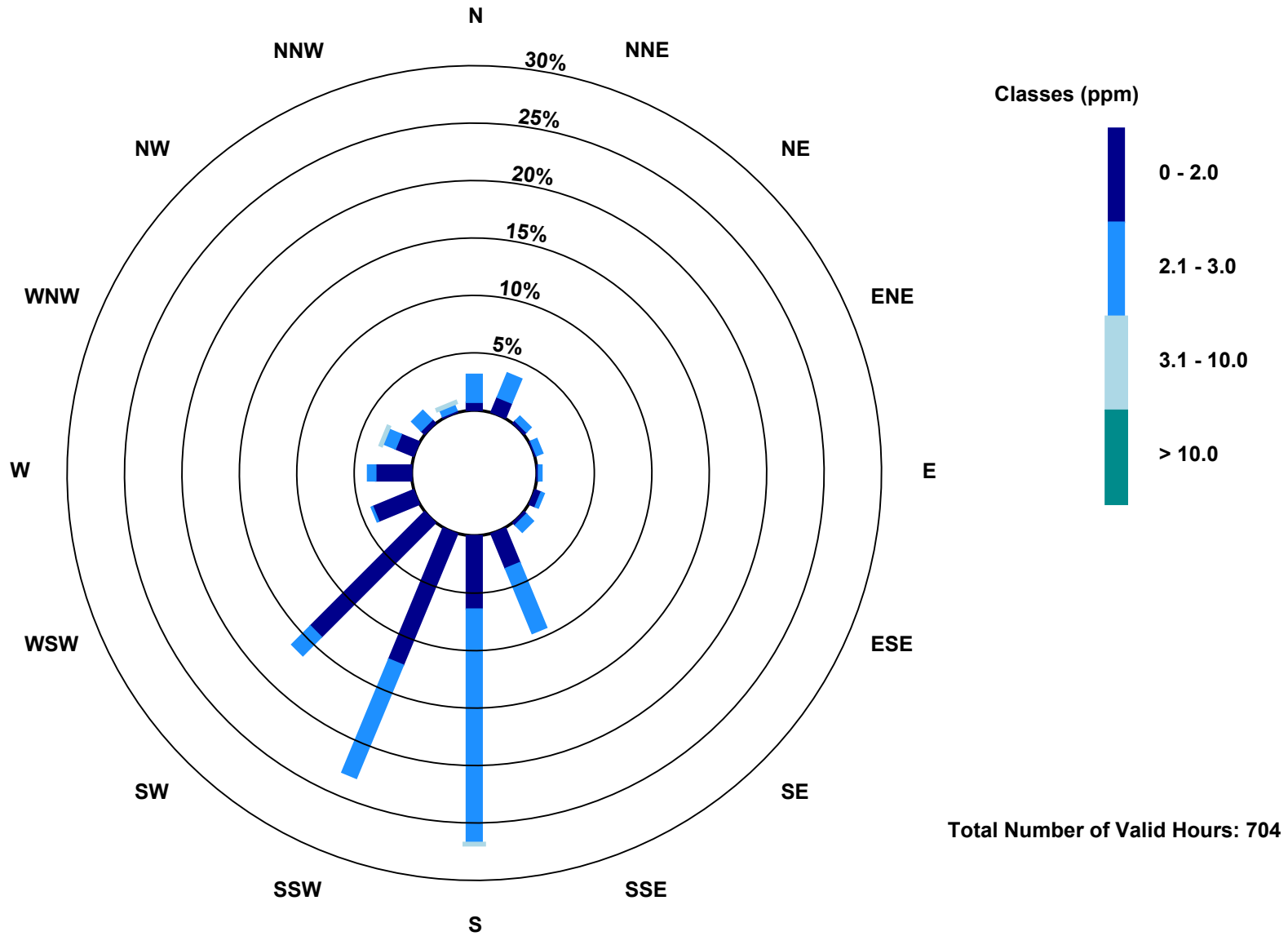
Total Number of Valid Hours: 704

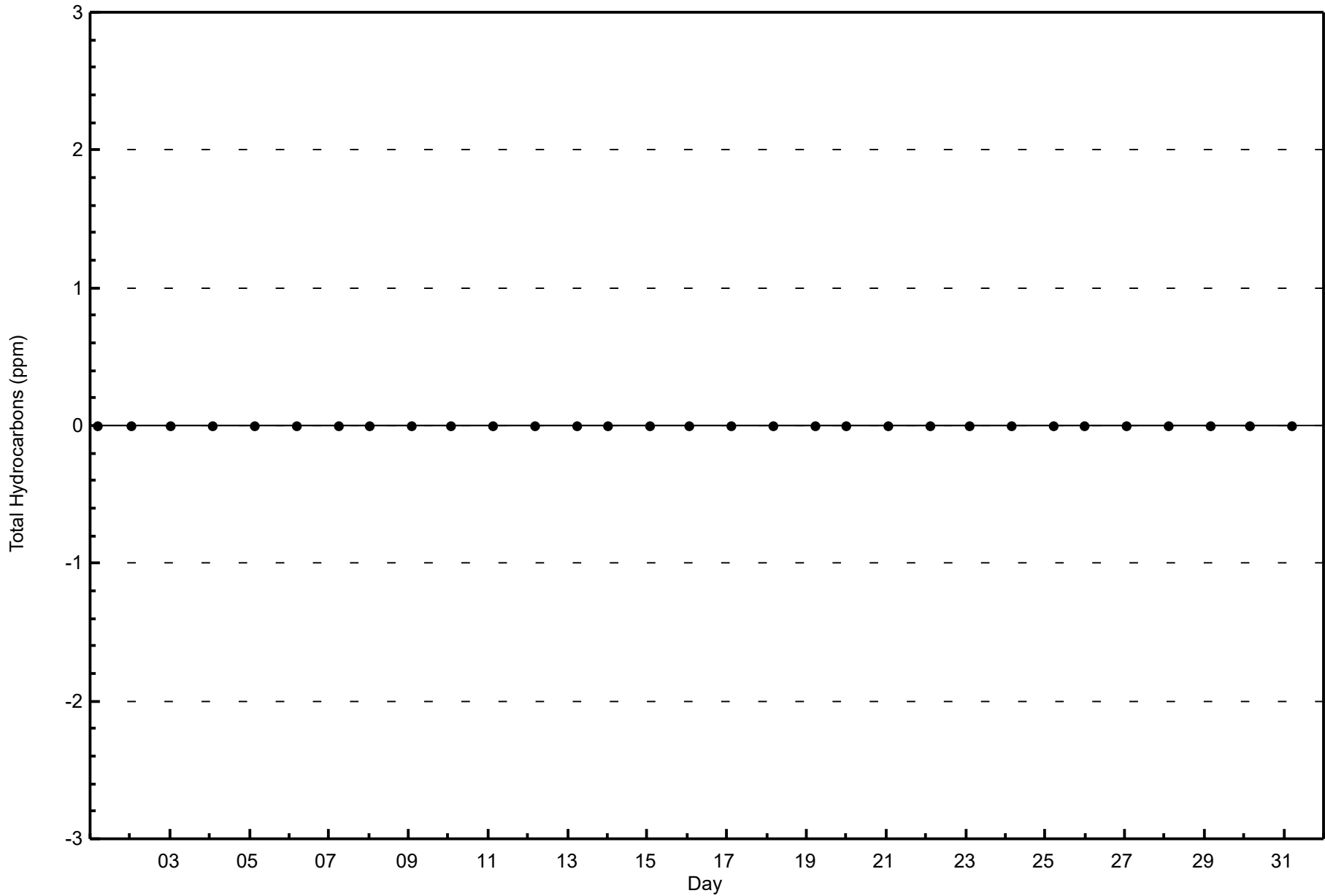
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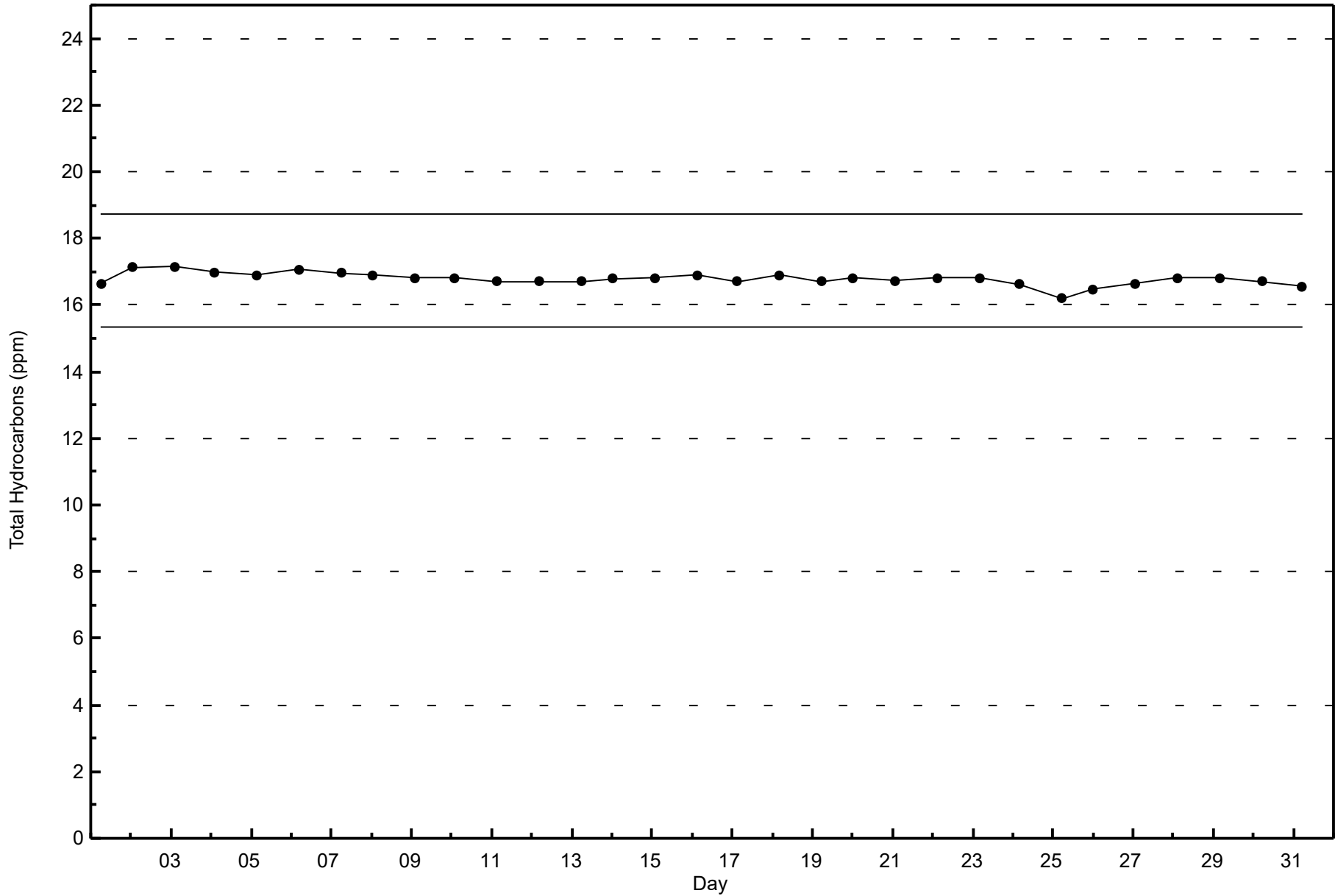


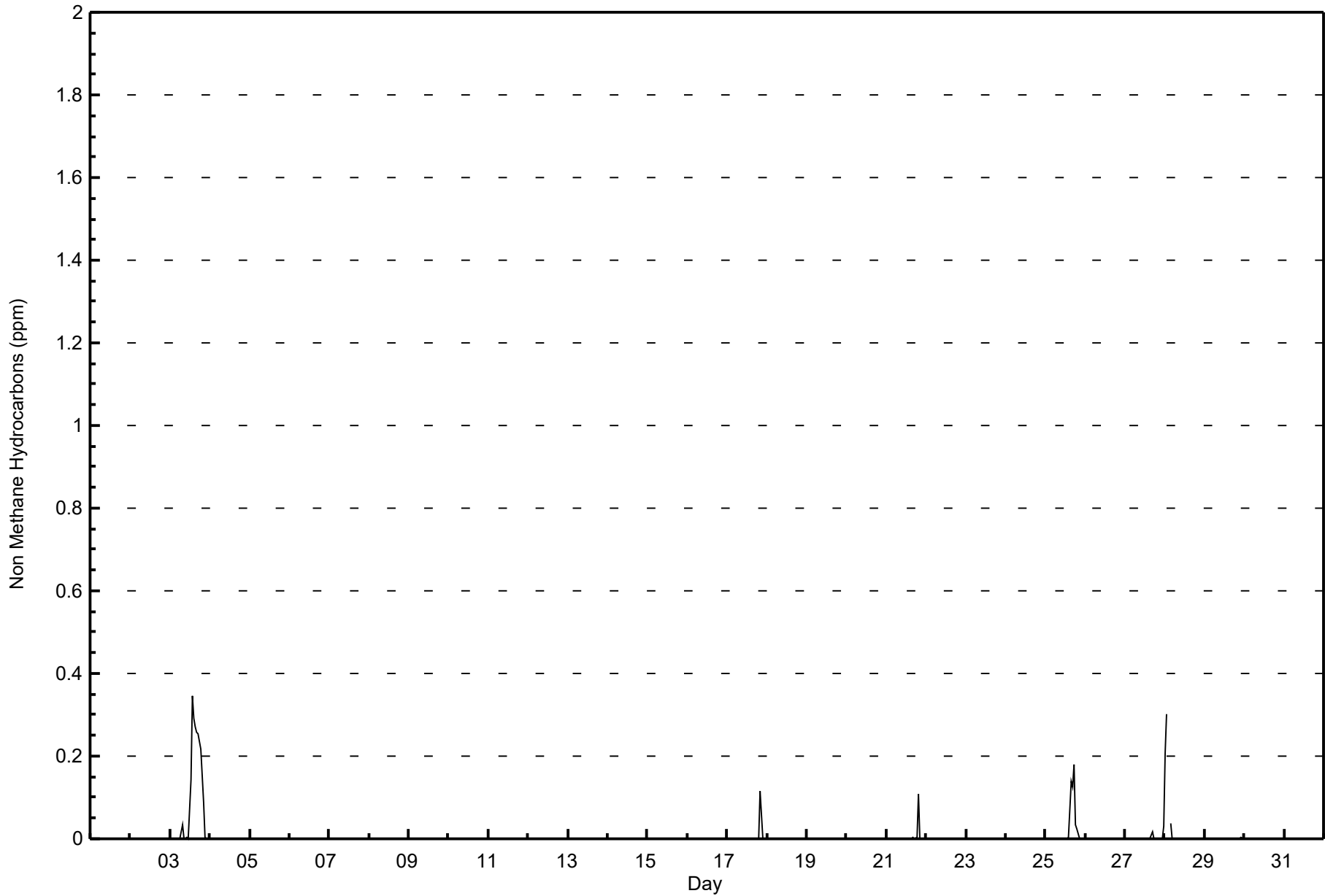
Wood Buffalo Environmental Association
Wind Rose Dec 2023

Total Hydrocarbons (THC) - ppm
Ells River











Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Non Methane Hydrocarbons (NMHC) - ppm
Ells River - December 2023

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 0.005	685	96.89	96.89
0.006 - 0.05	6	0.85	97.74
0.06 - 0.1	6	0.85	98.59
> 0.1	10	1.41	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Non Methane Hydrocarbons (NMHC) - ppm
Ells River - December 2023

Concentration Ranges (ppm)	Wind Direction																Totals
	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
0 - 0.005	21	26	5	5	2	5	7	60	186	160	114	28	27	19	11	6	682
0.006 - 0.05	1	0	0	0	0	0	0	3	0	0	0	0	0	1	0	1	6
0.06 - 0.1	0	0	0	0	0	0	0	3	2	1	0	0	0	0	0	0	6
> 0.1	0	0	1	0	1	1	1	0	2	1	1	0	0	2	0	0	10
Totals	22	26	6	5	3	6	8	66	190	162	115	28	27	22	11	7	704

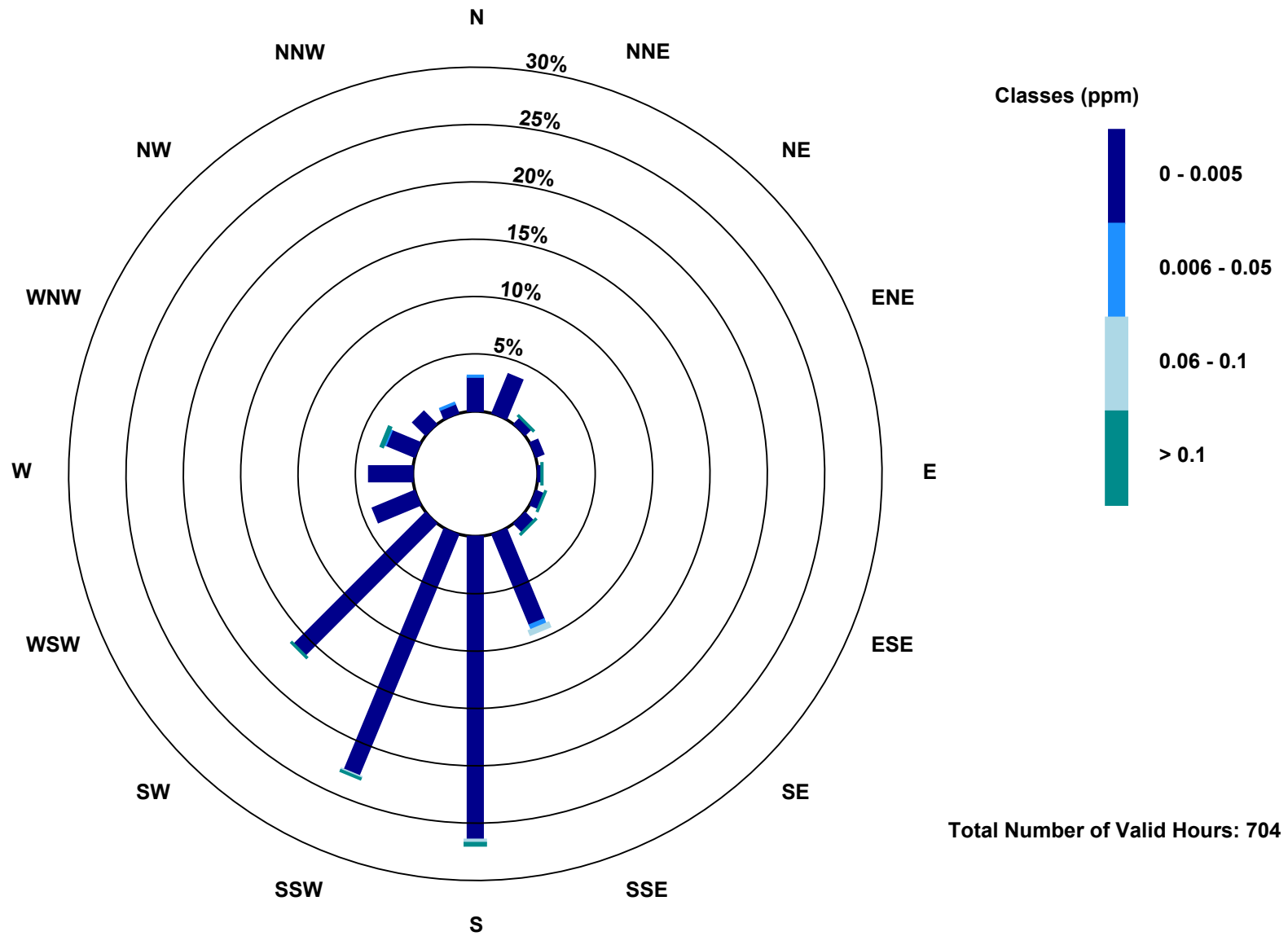
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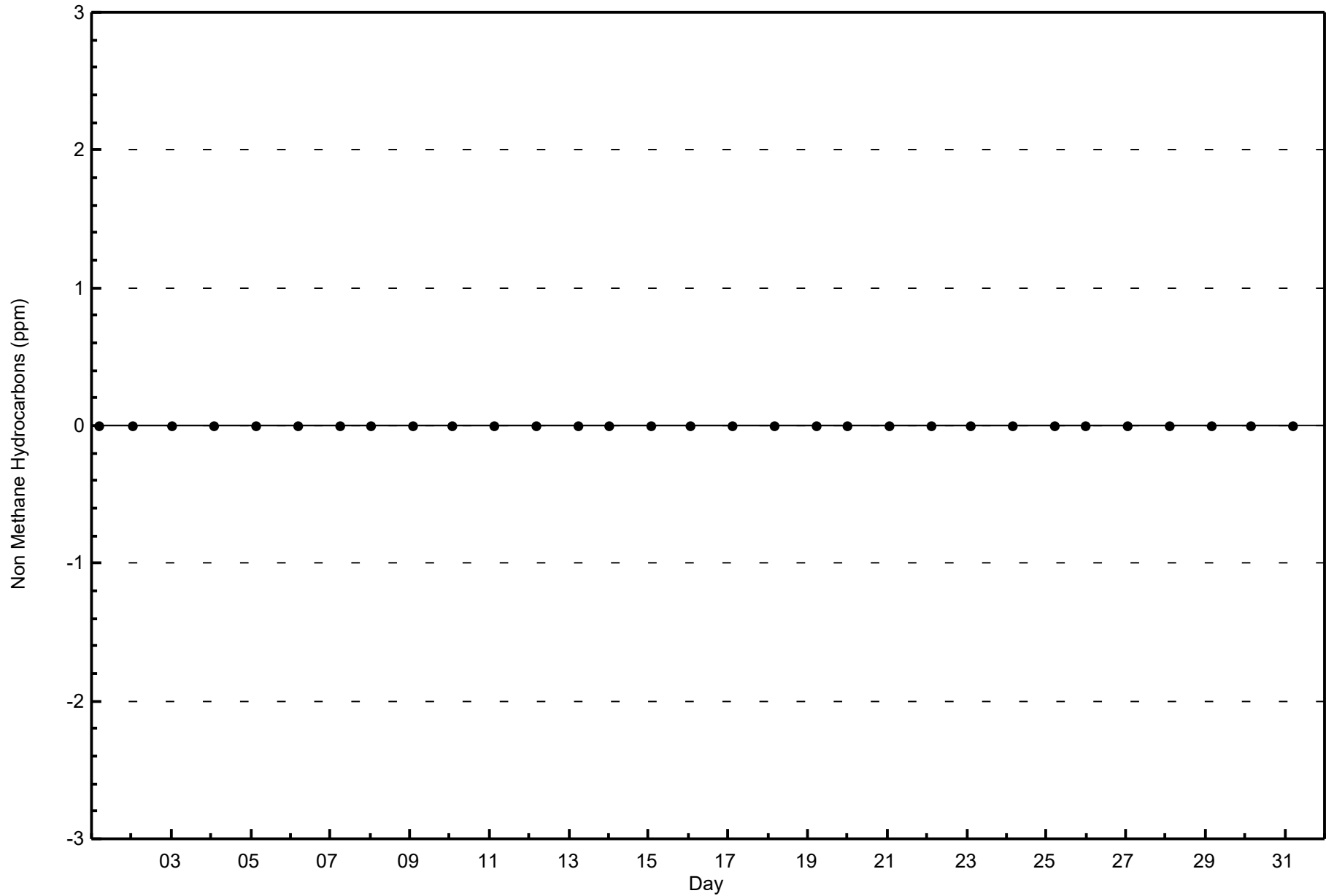
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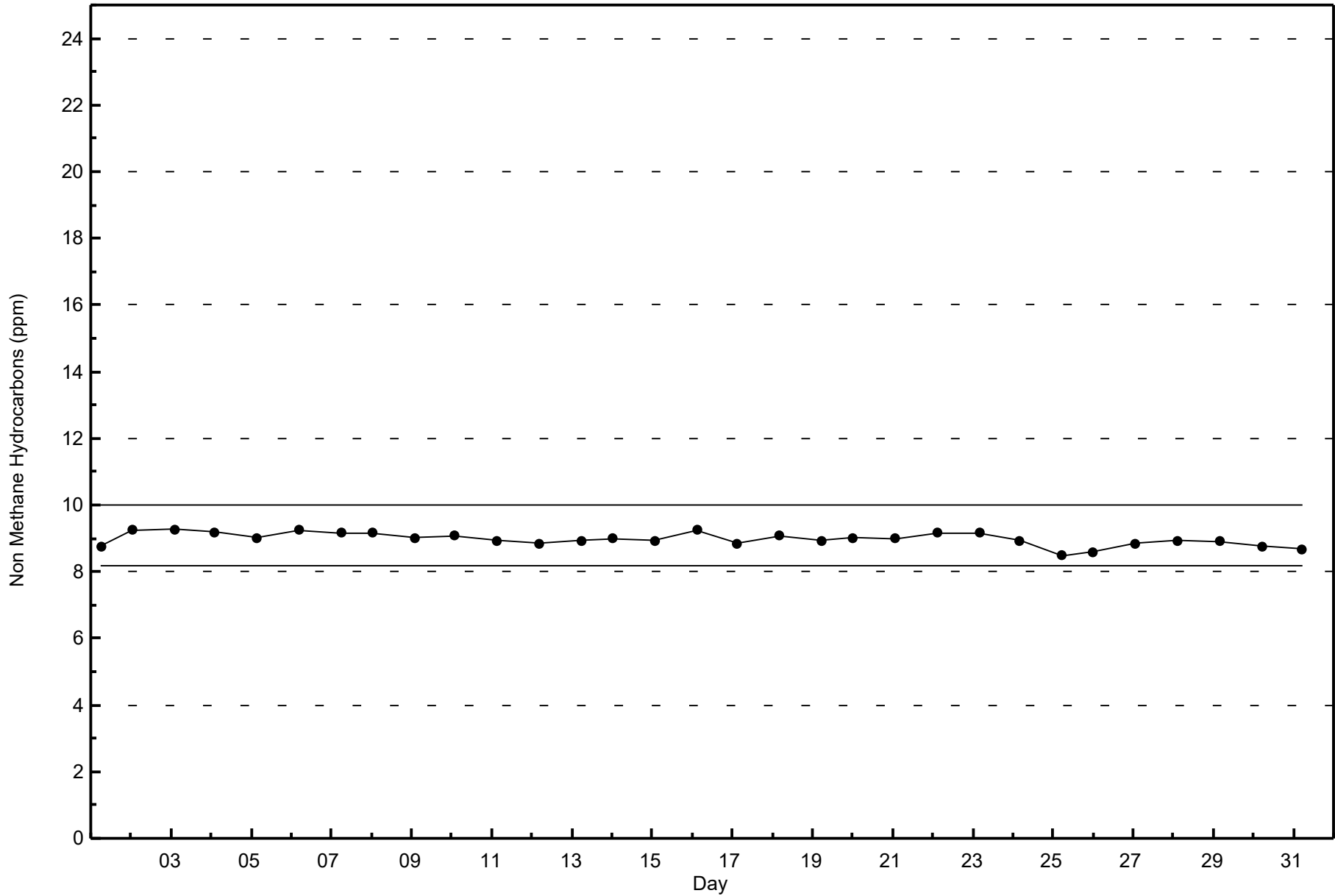


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Non Methane Hydrocarbons (NMHC) - ppm
Ells River









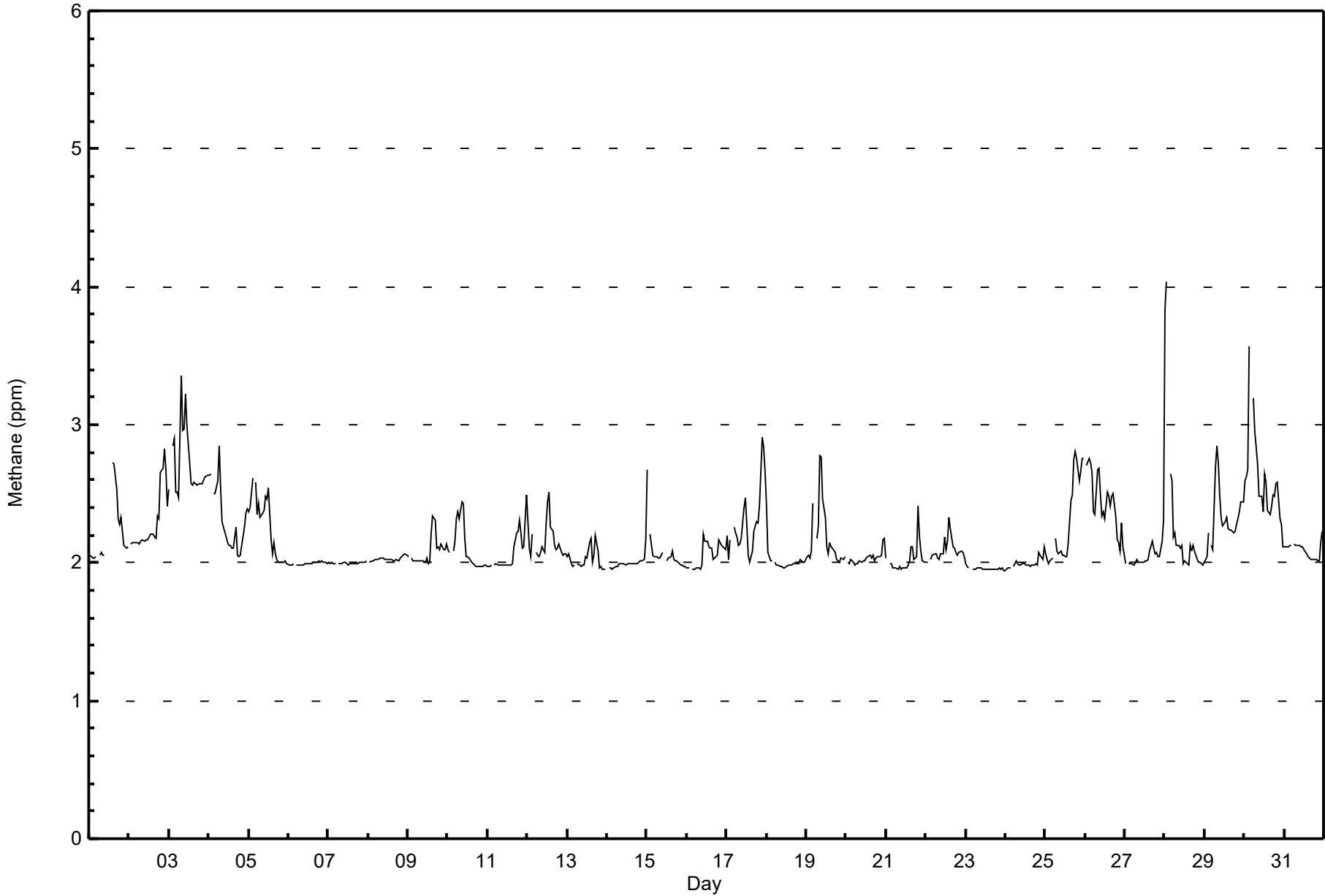
Wood Buffalo Environmental Association

Summary of Hour Averages

Methane (CH₄) - ppm

Ells River - December 2023

Number of Exceedences (AAAQO):		1-hr: 0	24-hr: 0	Hours in Service: 744																	744																											
Maximum Value: 4.0 ppm on Dec 28 02:00		Maximum Daily Average: 2.7 ppm on Dec 3																	Hours of Data: 707																													
Minimum Value: 1.9 ppm on Dec 24 01:00		Minimum Daily Average: 2.0 ppm on Dec 23																	Hours of Missing Data: 37																													
Maximum Diurnal Average: 2.2 ppm at hour 1		Minimum Diurnal Average: 2.1 ppm at hour 14																	Hours of Calibration: 35																													
Monthly Average: 2.16 ppm		Percentiles: P ₁ = 2.0 P ₁₀ = 2.0 Q ₁ = 2.0 Median = 2.1 Q ₃ = 2.2 P ₉₀ = 2.5 P ₉₉ = 3.0																	Percent Operational Time: 99.7																													
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Dec	2.1	2.0	2.0	2.0	2.0	Z	2.1	2.1	2.1	2.1	C	C	C	C	2.7	2.7	2.5	2.3	2.3	2.3	2.2	2.1	2.1	2.1	2.2	2.7																						
2-Dec	Z	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	2.3	2.3	2.7	2.7	2.8	2.7	2.4	2.3	2.8																						
3-Dec	2.5	Z	2.8	2.9	2.5	2.5	2.5	3.4	3.0	3.0	3.2	3.0	2.7	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.7	3.4																						
4-Dec	2.6	2.6	Z	2.5	2.5	2.6	2.9	2.5	2.3	2.3	2.2	2.1	2.1	2.1	2.1	2.1	2.3	2.1	2.0	2.1	2.1	2.3	2.4	2.4	2.3	2.9																						
5-Dec	2.4	2.4	2.6	Z	2.6	2.4	2.4	2.3	2.4	2.4	2.5	2.5	2.5	2.2	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.3	2.6																						
6-Dec	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																						
7-Dec	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																						
8-Dec	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.0	2.1																						
9-Dec	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	2.2	2.3	2.3	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.3																						
10-Dec	2.1	2.1	Z	2.1	2.2	2.3	2.4	2.3	2.4	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	2.0	2.1	2.4																						
11-Dec	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	2.1	2.2	2.2	2.3	2.2	2.1	2.1	2.1	2.5	2.1	2.5																						
12-Dec	2.3	2.1	2.0	2.2	Z	2.1	2.1	2.0	2.1	2.1	2.1	2.3	2.4	2.5	2.3	2.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.5																						
13-Dec	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	2.1	2.2	2.0	2.1	2.2	2.1	2.0	2.0	2.0	1.9	2.0	2.2	2.2																						
14-Dec	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	2.2	2.0	2.2	2.2																						
15-Dec	2.7	Z	2.2	2.1	2.0	2.0	2.0	2.0	2.0	2.1	M	M	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	2.7																						
16-Dec	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.2	2.2	2.2	2.1	2.1	2.1	2.0	2.0	2.1	2.2	2.1	2.1	2.1	2.1	2.1	2.2																						
17-Dec	2.2	2.0	2.2	Z	2.3	2.2	2.2	2.1	2.1	2.2	2.4	2.5	2.3	2.1	2.0	2.1	2.2	2.3	2.3	2.3	2.4	2.9	2.8	2.7	2.3	2.9																						
18-Dec	2.4	2.1	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.4																						
19-Dec	2.0	2.1	2.0	2.1	2.4	Z	2.2	2.3	2.8	2.8	2.5	2.3	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.2	2.8																						
20-Dec	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	2.0	2.1	2.0	2.0	2.0	2.0	2.1	2.2	2.2	2.0	2.2																						
21-Dec	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	2.1	2.0	2.0	2.4	2.2	2.1	2.0	2.0	2.0	2.0	2.4																						
22-Dec	2.0	2.0	Z	2.0	2.1	2.1	2.1	2.0	2.0	2.1	2.1	2.2	2.1	2.2	2.3	2.3	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.1	2.3																						
23-Dec	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	1.9	2.0	2.0	2.0																						
24-Dec	1.9	2.0	2.0	2.0	Z	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.0	2.1	2.0	2.1	2.1																						
25-Dec	2.1	2.0	2.0	2.0	2.0	Z	2.2	2.1	2.1	2.1	2.1	2.0	2.0	2.1	2.4	2.5	2.7	2.8	2.8	2.6	2.7	2.8	2.8	2.3	2.8	2.8																						
26-Dec	Z	2.7	2.8	2.7	2.7	2.4	2.4	2.7	2.7	2.5	2.3	2.4	2.3	2.5	2.5	2.4	2.5	2.5	2.3	2.2	2.1	2.1	2.3	2.1	2.4	2.8																						
27-Dec	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	2.1	2.1	2.1	2.1	2.0	2.0	2.2	2.3	2.0	2.3																						
28-Dec	3.8	4.0	Z	2.6	2.6	2.2	2.2	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.3	4.0																						
29-Dec	2.0	2.0	2.2	Z	2.1	2.1	2.7	2.8	2.7	2.5	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.4	2.4	2.4	2.3	2.8																						
30-Dec	2.6	2.6	2.7	3.6	Z	3.2	2.9	2.8	2.7	2.5	2.5	2.4	2.6	2.6	2.4	2.4	2.4	2.5	2.5	2.6	2.6	2.3	2.3	2.1	2.6	3.6																						
31-Dec	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	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.2	2.1	2.2																						
																								2.2	2.2	2.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.2	2.2	2.1	2.1	2.2	2.2	2.2	2.2	2.2	2.2	Diurnal Average
																								3.8	4.0	2.8	3.6	2.7	3.2	2.9	3.4	3.0	3.0	3.2	3.0	2.7	2.6	2.7	2.7	2.6	2.7	2.8	2.8	2.7	2.9	2.8	2.8	Diurnal Maximum
Z - zerospan C - Calibration M - Maintenance																																																





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Methane (CH₄) - ppm
Ells River - December 2023

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	344	48.66	48.66
2.1 - 3.0	357	50.50	99.15
3.1 - 10.0	6	0.85	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Methane (CH₄) - ppm
Ells River - December 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	5	10	2	1	1	4	2	23	45	87	99	27	22	12	3	1	344
2.1 - 3.0	17	16	4	4	2	2	6	43	143	75	16	1	5	8	8	4	354
3.1 - 10.0	0	0	0	0	0	0	0	0	2	0	0	0	0	2	0	2	6
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	22	26	6	5	3	6	8	66	190	162	115	28	27	22	11	7	704

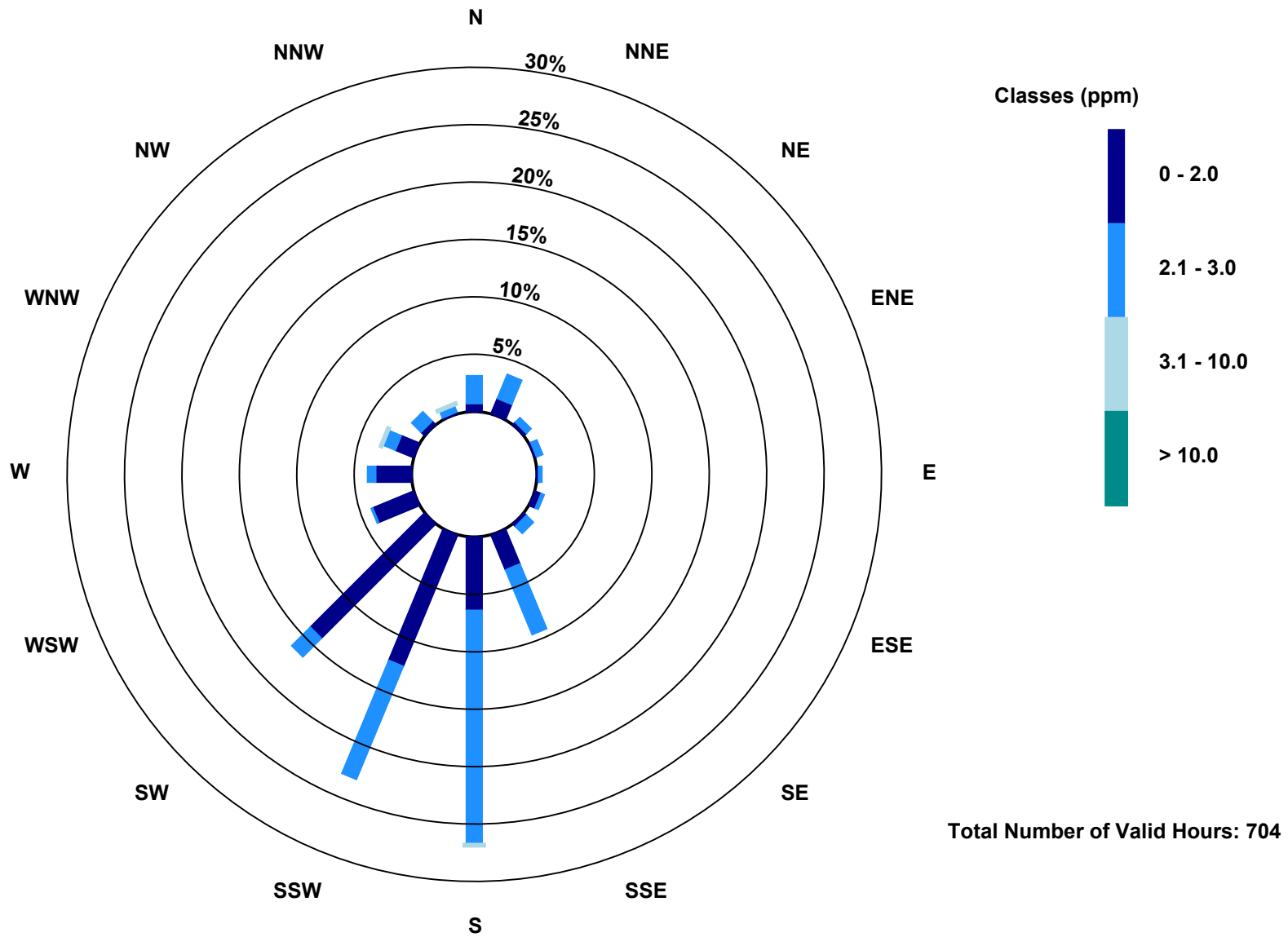
Total Number of Valid Hours: 704

Total Number of Hours: 744

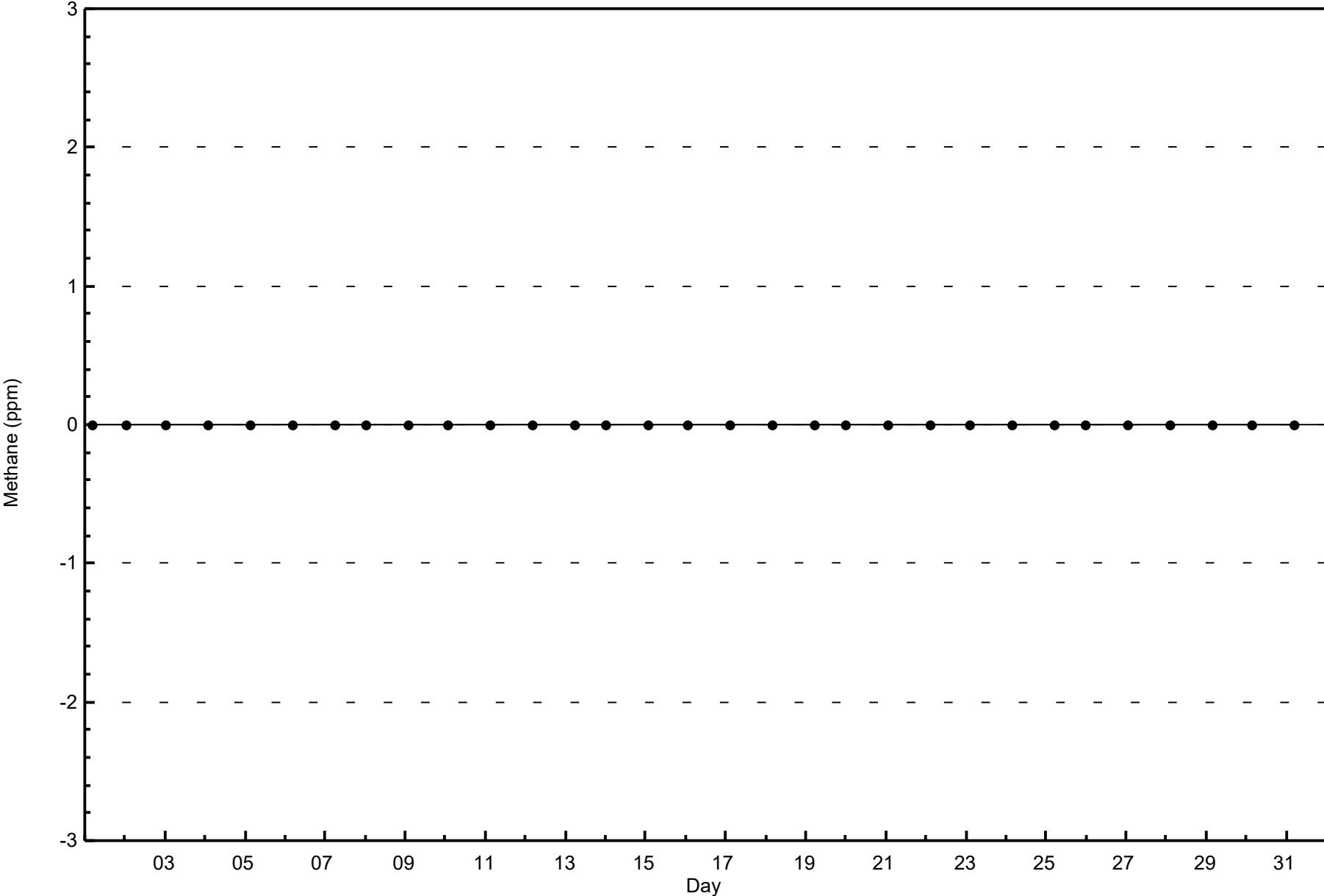


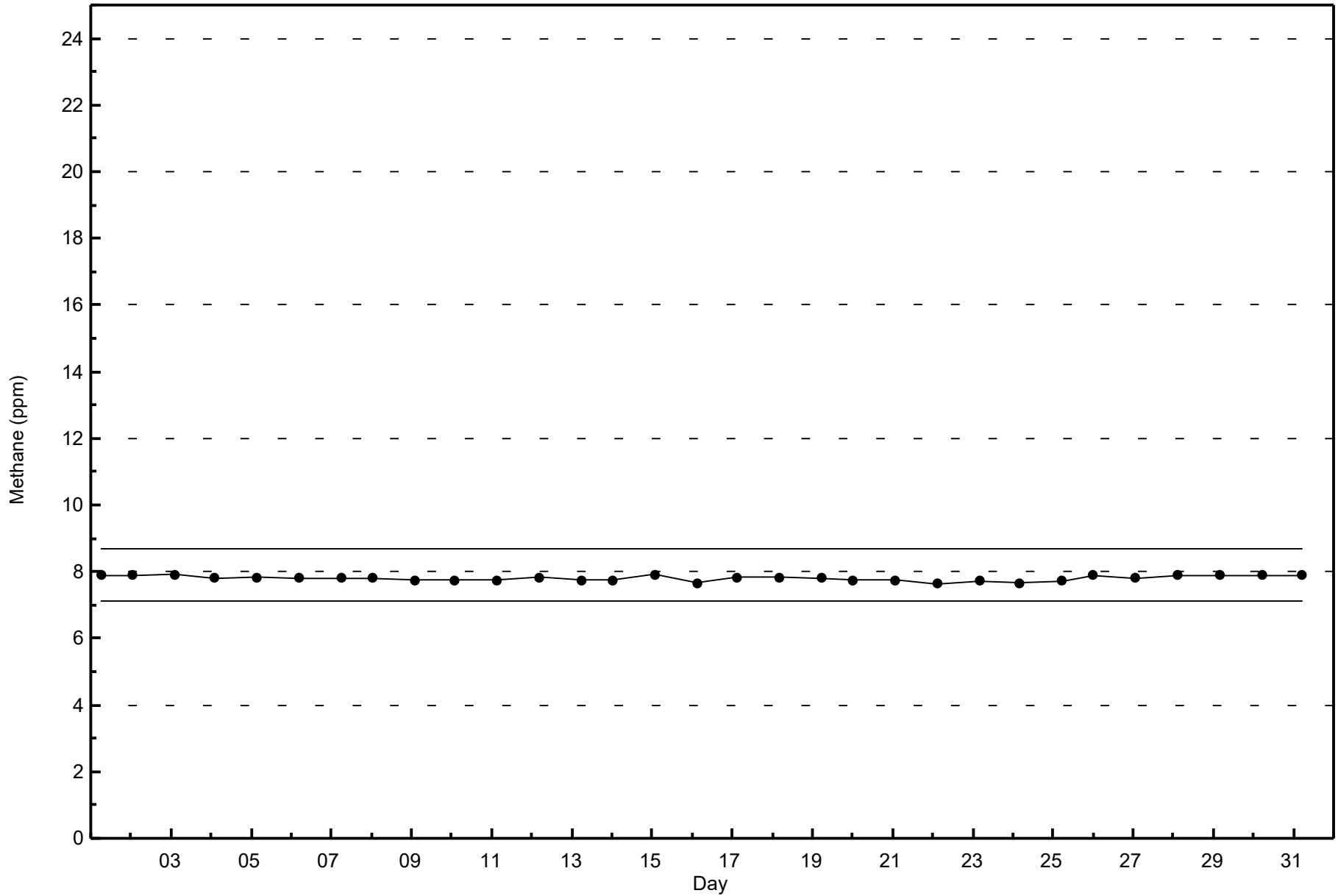
Wood Buffalo Environmental Association
Wind Rose Dec 2023

Methane (CH₄) - ppm
Ells River



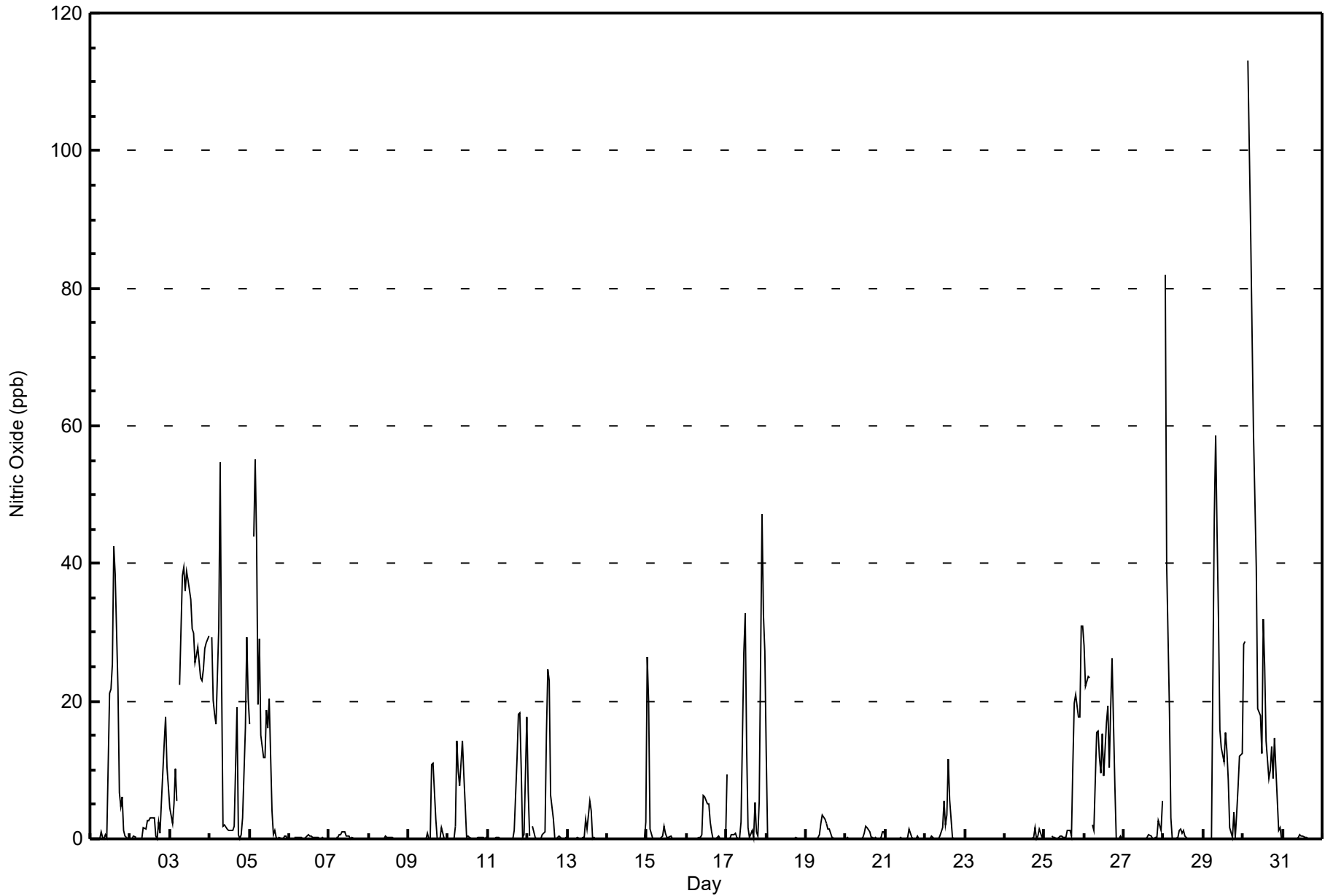
Total Number of Valid Hours: 704







Maximum Value: 113.0 ppb on Dec 30 04:00 Maximum Daily Average: 29.1 ppb on Dec 30																						Hours in Service: 744 Hours of Data: 708				
Minimum Value: 0.0 ppb on Dec 1 03:00 Minimum Daily Average: 0.0 ppb on Dec 23 Maximum Diurnal Average: 9.6 ppb at hour 4 Minimum Diurnal Average: 2.9 ppb at hour 19 Monthly Average: 5.16 ppb Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.0 Median = 0.1 Q ₃ = 2.4 P ₉₀ = 19.4 P ₉₉ = 54.3																						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-Dec	0.1	0.0	0.0	Z	0.0	0.0	0.9	0.1	0.1	0.6	0.2	21.2	21.8	25.5	42.5	38.4	21.7	6.7	4.7	6.1	1.3	0.4	0.0	0.0	8.4	42.5
2-Dec	0.0	0.0	0.5	0.3	Z	0.0	0.0	0.1	1.6	1.4	2.7	2.6	3.0	3.1	3.0	0.5	0.1	2.5	0.9	5.3	13.9	17.7	10.4	7.4	3.3	17.7
3-Dec	4.5	2.3	5.1	10.1	5.6	Z	22.4	38.3	39.4	36.0	38.8	37.7	34.9	30.5	29.9	25.6	26.5	27.8	23.4	23.0	24.5	27.7	28.4	29.4	24.9	39.4
4-Dec	Z	29.3	20.2	18.0	16.6	30.8	54.6	23.4	1.8	2.0	1.4	1.2	1.1	1.2	1.3	1.8	19.2	0.6	0.1	0.6	3.0	16.0	29.4	20.4	12.8	54.6
5-Dec	16.6	Z	44.0	55.0	43.4	19.5	29.0	15.0	11.8	11.9	18.8	16.0	20.4	4.0	0.5	1.3	0.1	0.0	0.2	0.0	0.1	0.4	0.3	0.0	13.4	55.0
6-Dec	0.1	0.1	Z	0.1	0.2	0.2	0.1	0.1	0.0	0.1	0.2	0.6	0.5	0.3	0.1	0.3	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.1	0.2	0.6
7-Dec	0.1	0.0	0.0	Z	0.2	0.2	0.6	0.6	1.0	1.0	0.4	0.4	0.3	0.1	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	1.0
8-Dec	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.3	0.1	0.1	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.3
9-Dec	0.0	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.1	0.9	0.1	0.0	10.8	11.0	2.9	0.1	0.0	0.1	1.6	0.0	0.0	0.1	1.2	11.0
10-Dec	Z	0.0	0.0	0.0	1.9	14.3	9.8	7.6	14.1	9.3	4.9	0.3	0.4	0.2	0.1	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	2.8	14.3
11-Dec	0.1	Z	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	0.1	1.2	11.5	18.1	18.3	10.2	0.2	0.6	17.7	3.4	18.3
12-Dec	7.0	0.5	Z	1.9	0.1	0.1	0.1	0.0	0.1	0.6	1.0	15.3	24.6	22.9	6.4	2.9	0.1	0.0	0.2	0.5	0.0	0.0	0.0	0.2	3.7	24.6
13-Dec	0.0	0.0	0.0	Z	0.1	0.1	0.1	0.1	0.1	0.2	0.1	2.9	1.5	5.5	4.1	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.7	5.5
14-Dec	0.0	0.0	0.0	0.0	Z	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	0.0	0.0	0.0	0.0	0.0	2.5	0.1	2.5
15-Dec	26.4	19.9	1.5	0.0	0.0	Z	0.0	0.1	0.0	0.3	1.9	0.8	0.1	0.3	0.4	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.3	26.4
16-Dec	Z	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.5	6.4	6.2	5.0	5.2	2.4	1.1	0.1	0.0	0.1	0.3	0.0	0.0	0.0	0.0	1.2	6.4
17-Dec	9.4	Z	0.1	0.5	0.6	0.8	0.3	0.1	0.1	2.4	27.1	32.7	13.5	1.6	0.2	1.2	0.3	5.3	0.9	0.5	5.4	47.2	32.5	27.2	9.1	47.2
18-Dec	12.4	0.1	Z	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	C	C	C	C	C	0.0	0.0	0.2	0.1	0.0	0.0	0.0	0.0	0.7	12.4
19-Dec	0.0	0.0	0.1	Z	0.1	0.1	0.1	0.1	0.5	2.2	3.5	2.9	2.2	1.4	1.4	0.7	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.7	3.5
20-Dec	0.0	0.1	0.1	0.0	Z	0.0	0.0	0.0	0.0	0.1	0.3	0.8	1.8	1.7	0.9	0.3	0.1	0.1	0.1	0.1	0.0	0.2	1.0	0.9	0.4	1.8
21-Dec	0.0	0.0	0.0	0.0	0.1	Z	0.1	0.0	0.1	0.1	0.0	0.0	0.1	0.1	1.3	0.9	0.2	0.1	0.1	0.4	0.1	0.0	0.0	0.0	0.2	1.3
22-Dec	Z	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.3	1.6	5.5	2.0	3.4	11.5	5.7	0.3	0.1	0.0	0.0	0.1	0.0	0.0	0.0	1.4	11.5
23-Dec	0.0	Z	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.0	0.1	0.0	0.0	0.0	0.1
24-Dec	0.0	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	0.0	0.3	1.5	0.0	0.5	1.4	0.3	0.2	0.2	1.5
25-Dec	0.1	0.1	0.1	Z	0.4	0.2	0.3	0.0	0.0	0.4	0.3	0.2	0.2	0.2	1.3	1.1	0.3	10.7	19.8	20.9	17.7	17.6	31.0	30.9	6.7	31.0
26-Dec	28.0	22.2	23.6	23.3	Z	1.9	1.2	15.5	15.6	11.7	9.7	15.2	9.1	16.9	19.4	10.3	18.9	26.2	7.7	0.1	0.0	0.0	0.3	0.1	12.0	28.0
27-Dec	0.0	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	0.2	0.6	0.4	0.1	0.1	0.1	0.1	2.6	1.2	5.5	0.5	5.5
28-Dec	Z	82.1	39.9	18.5	3.1	0.0	0.0	0.0	0.3	1.3	1.3	0.7	1.3	0.5	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	6.5	82.1
29-Dec	0.0	Z	0.0	0.0	0.0	0.0	46.7	58.6	44.3	32.1	15.9	13.3	11.2	15.5	12.8	8.6	1.7	0.2	3.8	0.2	3.7	7.6	12.0	12.5	13.1	58.6
30-Dec	28.3	28.7	Z	113.0	88.1	73.4	58.9	49.5	39.6	18.8	18.0	12.5	31.9	25.0	14.3	8.6	9.9	13.5	8.7	14.6	10.1	1.2	1.7	0.0	29.1	113.0
31-Dec	0.0	0.0	0.0	Z	0.0	0.0	0.1	0.0	0.1	0.3	0.6	0.4	0.4	0.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.6
5.1 7.1 5.2 9.6 6.2 5.5 7.3 6.8 5.5 4.3 5.0 6.4 6.3 5.5 5.5 4.0 3.4 3.4 2.9 2.9 3.0 4.5 4.8 5.0																								Diurnal Average		
28.3 82.1 44.0 113.0 88.1 73.4 58.9 58.6 44.3 36.0 38.8 37.7 34.9 30.5 42.5 38.4 26.5 27.8 23.4 23.0 24.5 47.2 32.5 30.9																								Diurnal Maximum		
Z - zerospan C - Calibration																										





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitric Oxide (NO) - ppb
Ells River - December 2023

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	643	90.82	90.82
21 - 40	50	7.06	97.88
41 - 80	12	1.69	99.58
81 - 159	3	0.42	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 708

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Nitric Oxide (NO) - ppb
Ells River - December 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	19	24	5	5	2	6	7	55	166	156	110	26	24	20	9	6	640
21 - 40	1	1	1	0	1	1	1	10	21	2	4	0	1	2	2	2	50
11 - 80	0	0	0	0	0	0	0	2	9	0	0	0	1	0	0	0	12
81 - 159	0	0	0	0	0	0	0	0	1	1	0	0	0	1	0	0	3
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	20	25	6	5	3	7	8	67	197	159	114	26	26	23	11	8	705

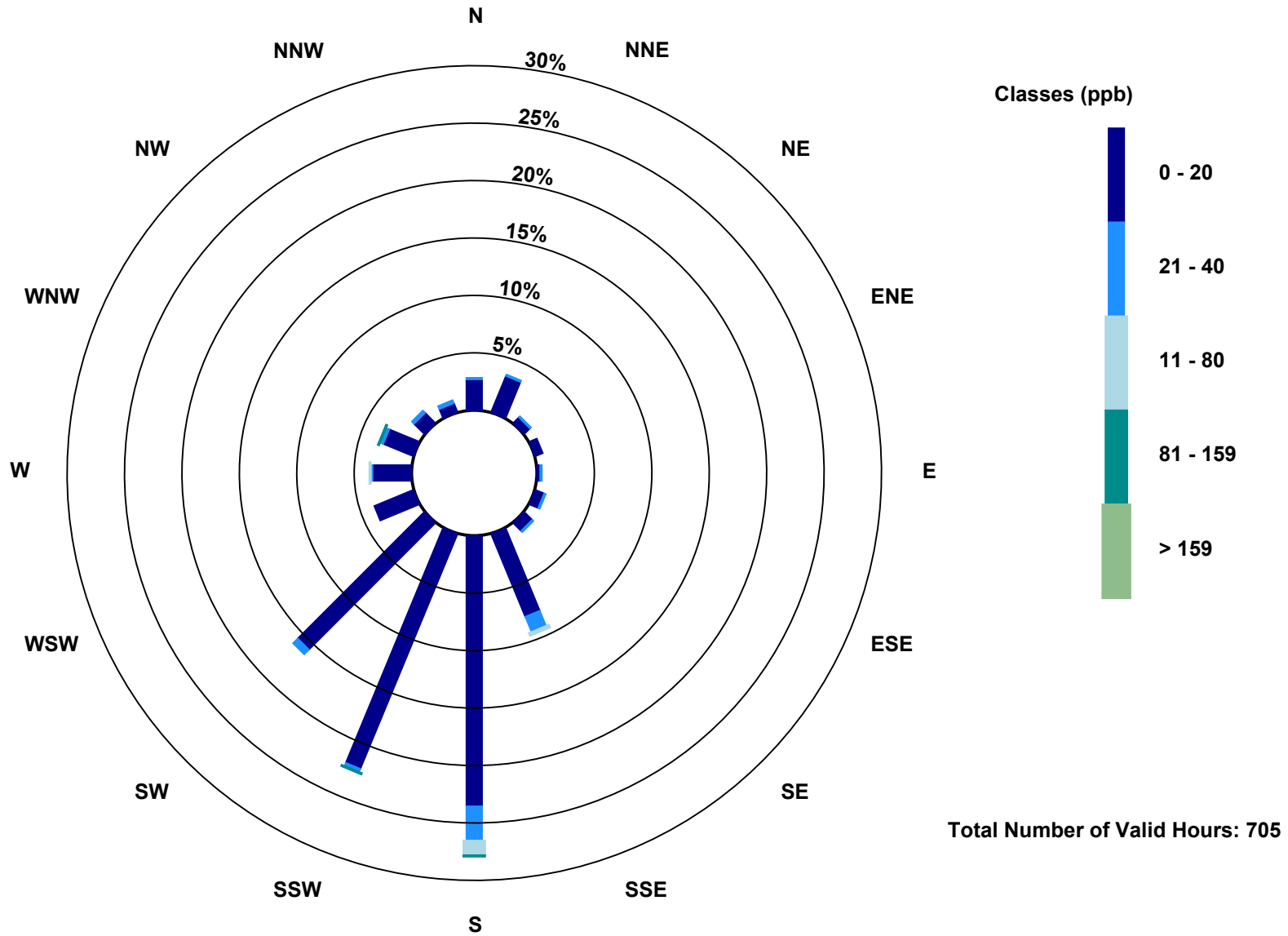
Total Number of Valid Hours: 705

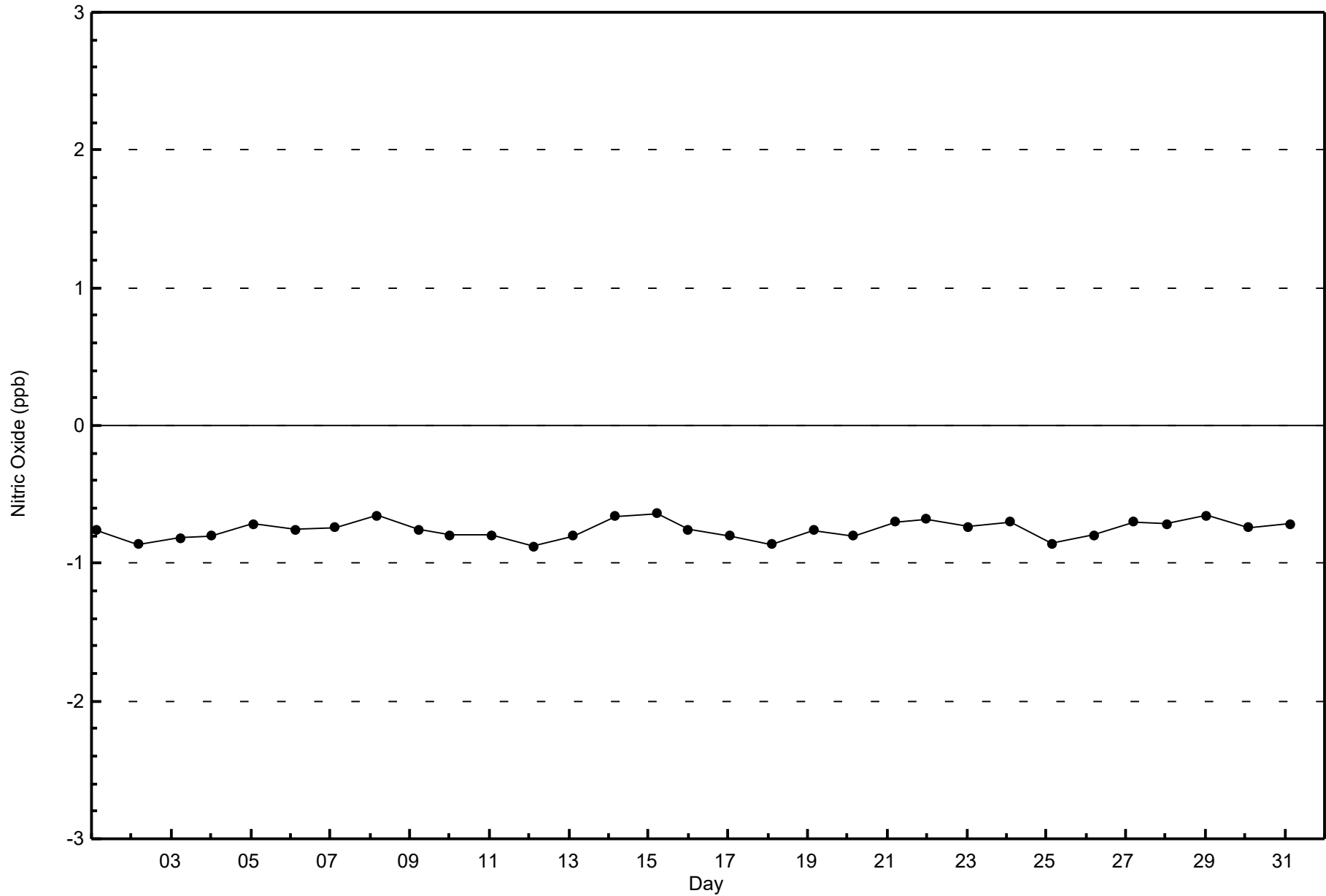
Total Number of Hours: 744

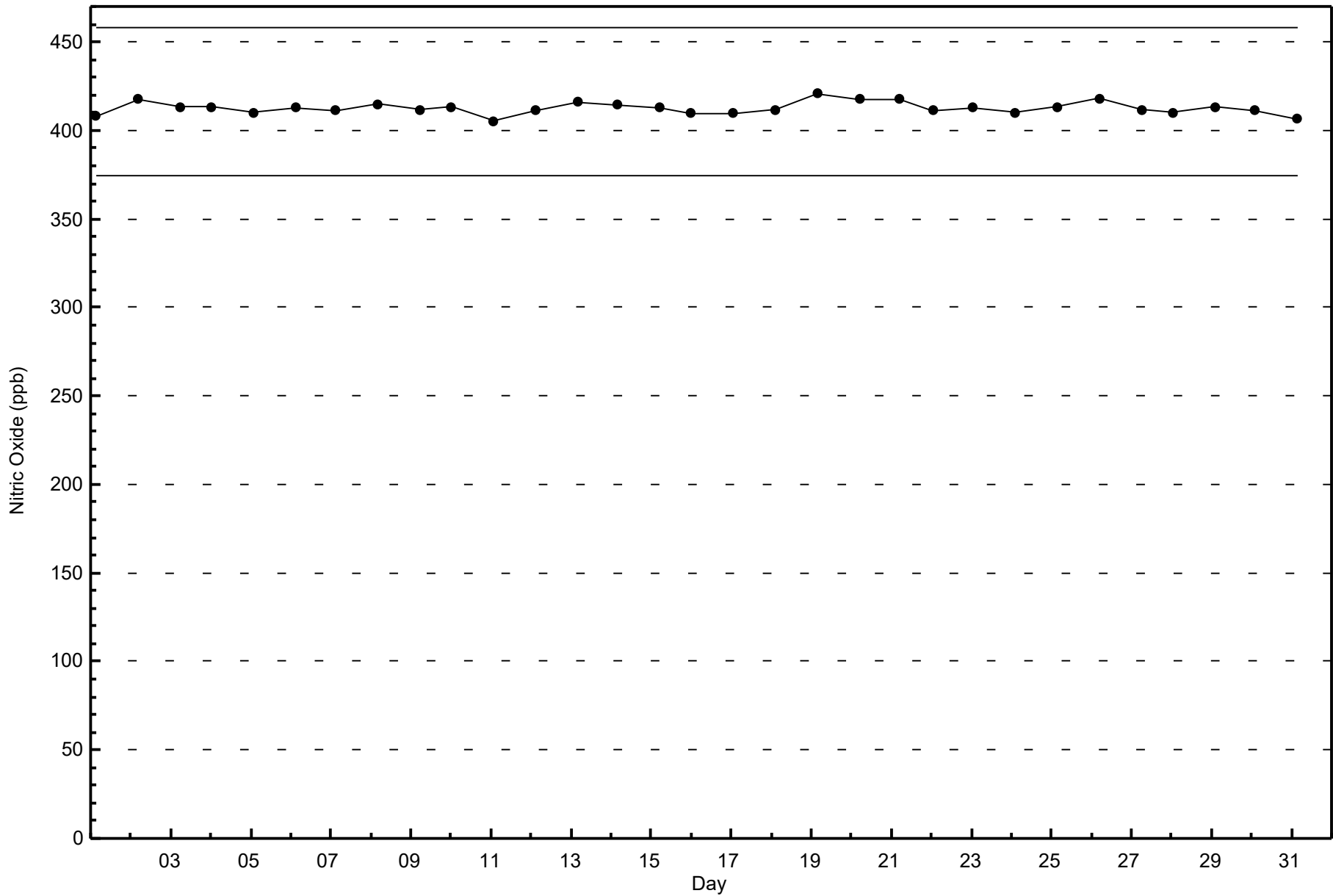


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Nitric Oxide (NO) - ppb
Ells River









Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO₂) - ppb

Ells River - December 2023

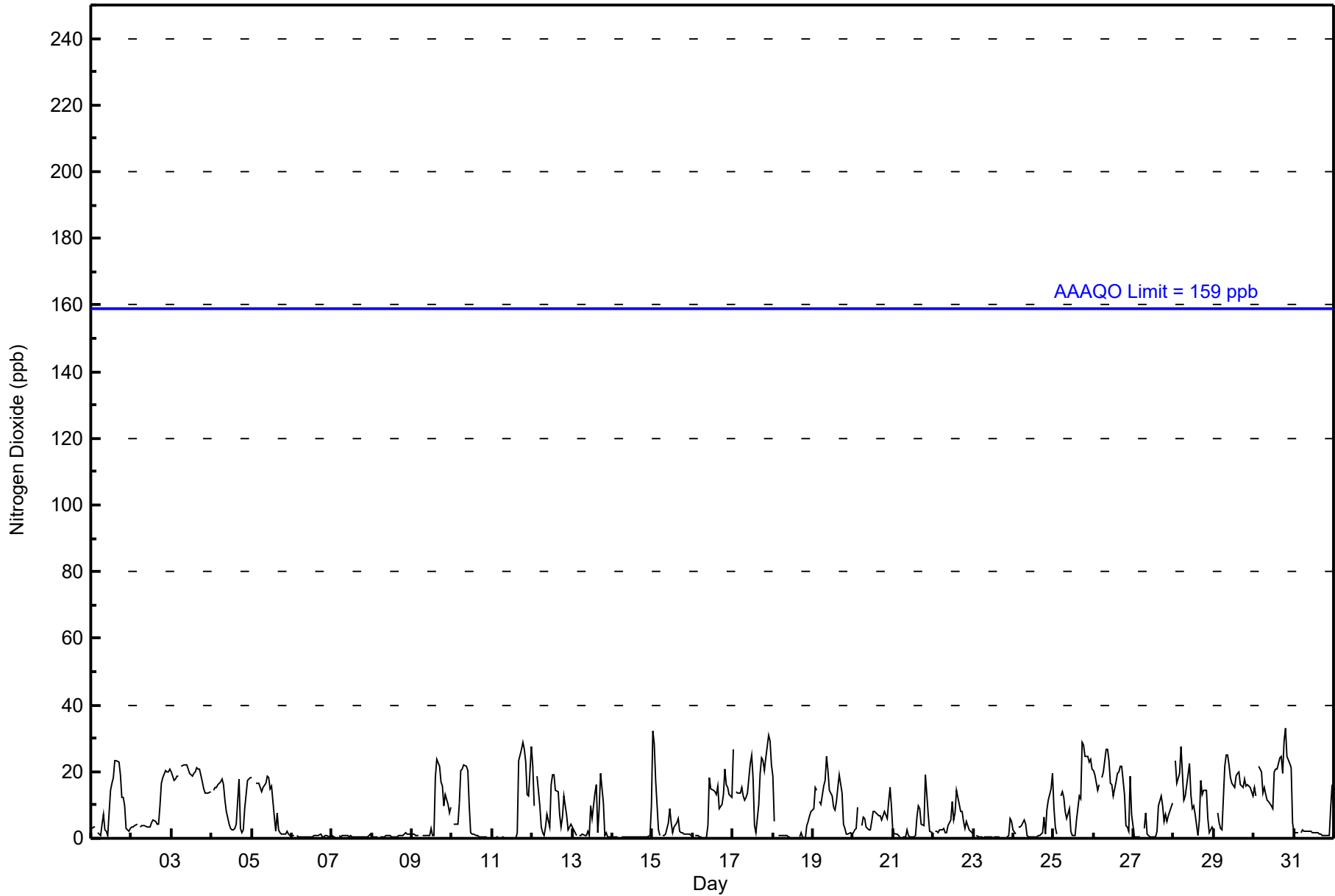
Number of Exceedences (AAAQO):		1-hr: 0	24-hr: 0	Hours in Service: 744																	Daily Average		Daily Maximum																									
Maximum Value: 33.0 ppb on Dec 30 20:00		Maximum Daily Average: 18.6 ppb on Dec 3		Hours of Data: 708																	9.1		23.2																									
Minimum Value: 0.1 ppb on Dec 11 05:00		Minimum Daily Average: 0.7 ppb on Dec 7		Hours of Missing Data: 36																	8.3		20.9																									
Maximum Diurnal Average: 10.1 ppb at hour 17		Minimum Diurnal Average: 6.2 ppb at hour 3		Hours of Calibration: 36																	18.6		22.2																									
Monthly Average: 7.84 ppb		Percentiles: P ₁ = 0.1 P ₁₀ = 0.5 Q ₁ = 0.8 Median = 3.9 Q ₃ = 14.3 P ₉₀ = 20.2 P ₉₉ = 28.5		Percent Operational Time: 100.0																	10.4		18.3																									
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-Dec	3.1	3.3	3.4	Z	1.8	0.9	4.1	7.3	2.7	2.3	1.0	14.2	16.4	18.4	23.1	23.2	23.0	19.0	12.4	12.4	9.6	2.9	2.2	3.1	9.1	23.2																						
2-Dec	3.5	3.4	3.9	4.1	Z	3.5	3.8	3.9	3.9	3.6	3.6	3.6	4.5	5.5	5.2	4.3	4.3	9.8	16.6	18.1	20.5	20.1	19.9	20.9	8.3	20.9																						
3-Dec	20.0	17.2	17.6	18.8	18.7	Z	21.5	22.1	22.2	21.9	20.7	19.3	18.8	19.5	20.0	21.2	20.7	20.7	17.0	14.8	13.5	13.5	13.4	14.1	18.6	22.2																						
4-Dec	Z	14.2	15.2	15.3	16.1	16.9	18.0	16.3	11.4	8.0	4.4	3.0	2.7	2.7	3.1	4.3	17.9	2.9	1.7	2.5	8.8	17.2	17.8	18.3	10.4	18.3																						
5-Dec	18.3	Z	16.4	16.4	16.4	15.1	14.0	15.2	16.4	18.8	18.2	14.9	15.6	6.4	2.3	7.6	2.6	1.5	1.4	1.2	1.1	2.0	1.2	0.9	9.7	18.8																						
6-Dec	0.8	0.7	Z	0.8	0.6	0.6	0.6	0.5	0.5	0.4	0.5	0.6	0.6	0.7	0.7	0.9	1.0	1.3	0.6	0.6	0.7	0.7	0.6	0.6	0.7	1.3																						
7-Dec	0.8	0.6	0.6	Z	0.7	0.6	0.8	0.7	1.0	0.8	0.6	0.7	0.6	0.4	0.5	0.5	0.5	0.5	0.6	0.6	0.5	0.5	1.0	1.3	0.7	1.3																						
8-Dec	0.5	0.5	0.5	0.5	Z	0.6	0.6	0.6	0.7	0.8	0.9	0.7	0.6	0.5	0.6	0.6	0.8	0.9	1.0	1.3	1.5	1.4	1.3	1.3	0.8	1.5																						
9-Dec	1.2	1.1	1.0	0.9	0.8	Z	1.0	0.8	0.8	0.9	0.9	3.0	0.9	0.8	18.1	23.8	21.7	17.1	15.7	9.6	13.3	10.1	7.7	9.3	7.0	23.8																						
10-Dec	Z	4.3	4.2	4.4	10.7	20.5	20.8	22.2	21.5	20.2	9.6	1.5	1.4	1.2	1.0	0.8	0.5	0.3	0.3	0.3	0.3	0.2	0.2	0.2	6.4	22.2																						
11-Dec	0.2	Z	0.3	0.3	0.1	0.1	0.6	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.1	1.9	23.4	26.9	28.8	26.9	22.8	13.2	12.5	27.7	8.1	28.8																						
12-Dec	21.8	9.7	Z	18.8	9.9	3.6	1.5	1.0	3.6	7.0	3.5	15.9	19.0	19.1	14.3	13.9	7.2	3.4	6.4	12.5	6.9	2.6	3.2	4.4	9.1	21.8																						
13-Dec	3.2	2.6	1.0	Z	0.9	0.8	1.2	0.9	0.8	2.0	0.8	9.6	6.1	13.5	16.2	1.8	9.1	19.3	10.5	0.8	1.6	0.5	0.5	0.4	4.5	19.3																						
14-Dec	0.4	0.4	0.4	0.4	Z	0.6	0.5	0.4	0.4	0.4	0.4	0.4	0.3	0.4	0.4	0.5	0.6	0.5	0.6	0.5	0.5	0.6	0.7	9.9	0.9	9.9																						
15-Dec	32.4	28.5	17.2	2.5	0.7	Z	0.9	0.7	1.2	4.7	8.7	4.8	1.7	3.5	4.6	5.9	2.3	1.6	1.8	1.4	1.3	1.2	1.1	1.0	5.6	32.4																						
16-Dec	Z	0.9	0.7	0.7	0.5	0.3	0.2	0.2	0.3	3.9	18.4	14.9	14.2	14.1	13.2	15.6	8.8	10.0	13.2	20.9	16.2	15.1	13.1	12.1	9.0	20.9																						
17-Dec	26.7	Z	14.0	13.6	13.4	15.4	12.5	11.4	12.1	13.7	22.3	25.1	17.6	4.0	1.8	10.1	19.7	24.3	23.3	20.2	24.0	31.0	29.3	22.0	17.7	31.0																						
18-Dec	18.6	5.1	Z	0.8	0.7	0.7	0.7	0.7	0.8	0.6	0.5	C	C	C	C	C	0.3	1.7	0.5	0.2	4.0	4.9	6.7	8.1	3.1	18.6																						
19-Dec	8.8	15.3	14.2	Z	11.1	10.3	15.7	17.5	24.5	20.4	14.5	12.8	9.3	8.6	11.0	15.2	19.1	13.4	4.4	2.8	1.3	1.2	1.7	1.2	11.1	24.5																						
20-Dec	1.5	2.6	2.8	9.2	Z	4.0	6.5	5.8	3.2	2.4	2.6	5.1	8.1	7.9	7.1	6.7	6.7	5.3	6.6	8.0	6.0	11.2	15.1	9.3	6.2	15.1																						
21-Dec	1.6	1.3	1.1	0.9	0.6	Z	0.6	0.5	2.5	0.9	0.5	0.5	0.6	0.9	6.3	9.9	8.7	4.1	4.0	18.9	13.3	7.0	2.3	1.9	3.9	18.9																						
22-Dec	Z	2.3	2.1	1.8	2.6	2.5	2.8	1.7	1.7	3.9	5.6	11.1	5.6	7.6	14.5	12.3	8.1	8.2	5.1	2.9	4.9	2.6	2.3	1.7	5.0	14.5																						
23-Dec	1.2	Z	0.9	0.5	0.4	0.3	0.2	0.3	0.3	0.3	0.4	0.3	0.2	0.3	0.3	0.3	0.2	0.2	0.2	0.1	0.3	0.9	6.0	5.2	0.8	6.0																						
24-Dec	2.4	1.1	Z	3.6	3.3	3.7	5.5	4.1	0.7	0.5	0.6	0.5	0.5	0.5	0.5	0.8	0.7	1.7	6.3	1.3	8.5	11.3	15.0	19.3	4.0	19.3																						
25-Dec	9.3	3.4	1.3	Z	12.9	13.8	12.2	8.1	6.1	8.7	2.2	0.8	0.9	1.0	5.5	12.7	11.8	28.9	28.1	24.6	24.5	23.0	23.7	20.7	12.4	28.9																						
26-Dec	20.4	19.1	14.6	16.3	Z	18.3	19.9	26.7	26.6	23.2	16.7	16.0	12.6	16.9	19.3	19.8	21.8	21.5	13.2	3.8	3.2	2.1	18.7	7.0	16.4	26.7																						
27-Dec	0.6	0.5	0.4	0.4	0.4	Z	2.9	7.7	1.1	0.7	0.5	0.4	0.5	0.5	2.0	9.6	12.6	9.6	5.0	7.3	4.9	6.8	9.2	10.7	4.1	12.6																						
28-Dec	Z	23.1	16.6	19.6	27.5	19.3	11.6	12.8	19.0	22.6	13.0	8.8	9.9	7.4	1.0	5.7	17.3	13.3	14.2	14.4	5.9	1.9	2.7	3.3	12.6	27.5																						
29-Dec	2.5	Z	7.8	4.8	3.0	2.6	21.4	25.1	25.2	22.1	18.1	16.7	15.4	18.8	19.3	19.9	15.9	15.2	18.0	15.8	15.9	15.5	15.2	12.6	15.1	25.2																						
30-Dec	15.1	12.7	Z	21.5	19.8	13.7	15.1	13.3	11.6	10.9	9.7	9.1	20.0	20.8	20.8	24.0	24.5	19.6	29.3	33.0	24.7	22.6	21.2	4.8	18.2	33.0																						
31-Dec	1.9	1.7	1.8	Z	1.9	2.4	2.0	2.0	2.2	2.1	2.2	1.8	1.6	1.5	1.5	1.3	1.3	1.0	0.9	0.7	0.7	0.7	9.4	16.1	2.6	16.1																						
8.3																								6.8	6.2	7.1	6.8	6.6	7.1	7.4	7.3	7.4	6.5	7.2	6.9	6.8	7.8	9.2	10.1	9.8	9.3	9.0	8.4	7.9	8.9	8.7	Diurnal Average	
32.4																								28.5	17.6	21.5	27.5	20.5	21.5	26.7	26.6	23.2	22.3	25.1	20.0	20.8	23.1	24.0	24.5	28.9	29.3	33.0	24.7	31.0	29.3	27.7	Diurnal Maximum	

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



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Dioxide (NO₂) - ppb
Ells River - December 2023





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Ells River - December 2023**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	641	90.54	90.54
21 - 40	67	9.46	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: 708

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Ells River - December 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	15	24	5	5	2	7	8	53	168	153	111	26	26	21	9	5	638
21 - 40	5	1	1	0	1	0	0	14	29	6	3	0	0	2	2	3	67
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	20	25	6	5	3	7	8	67	197	159	114	26	26	23	11	8	705

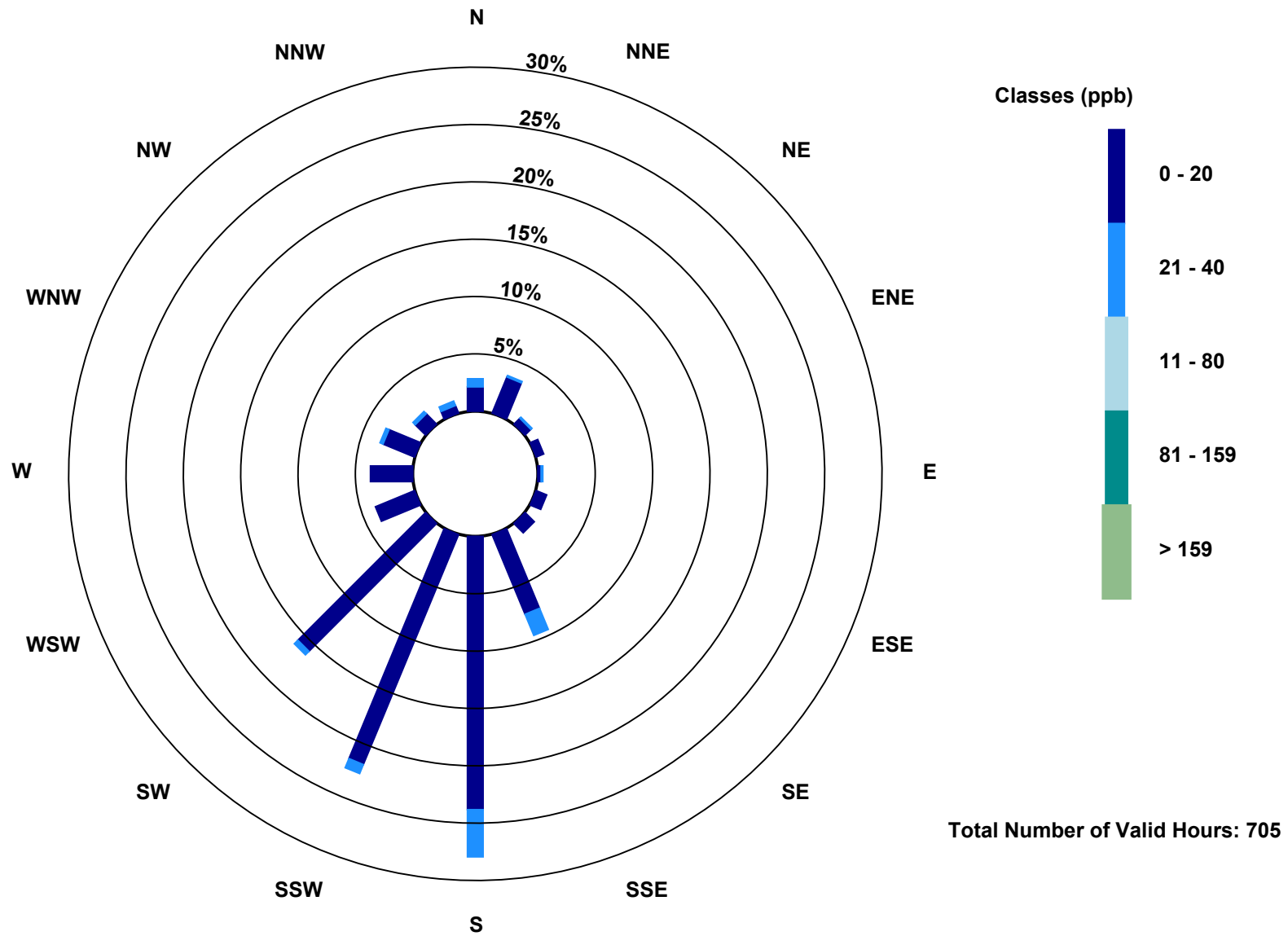
Total Number of Valid Hours: 705

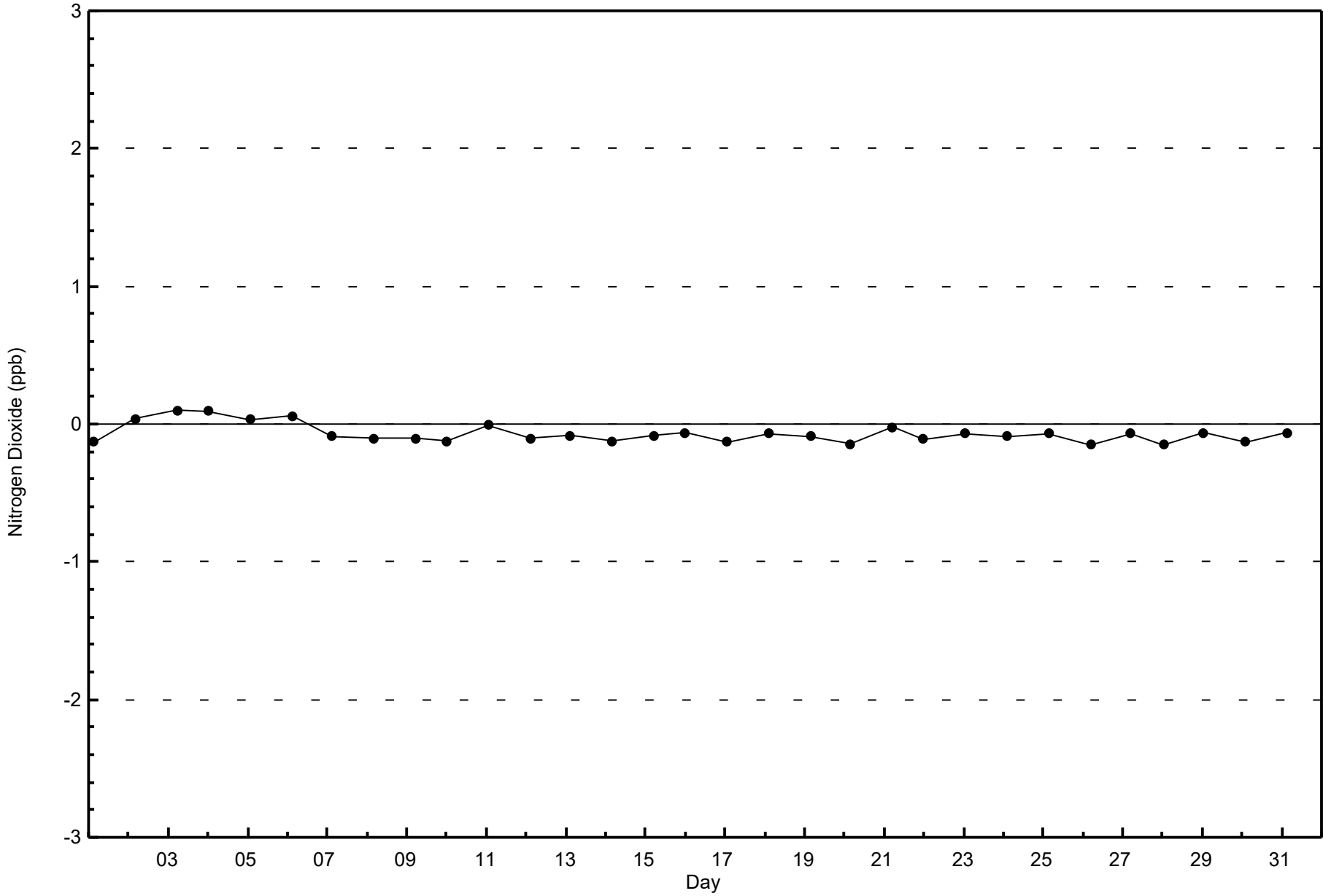
Total Number of Hours: 744

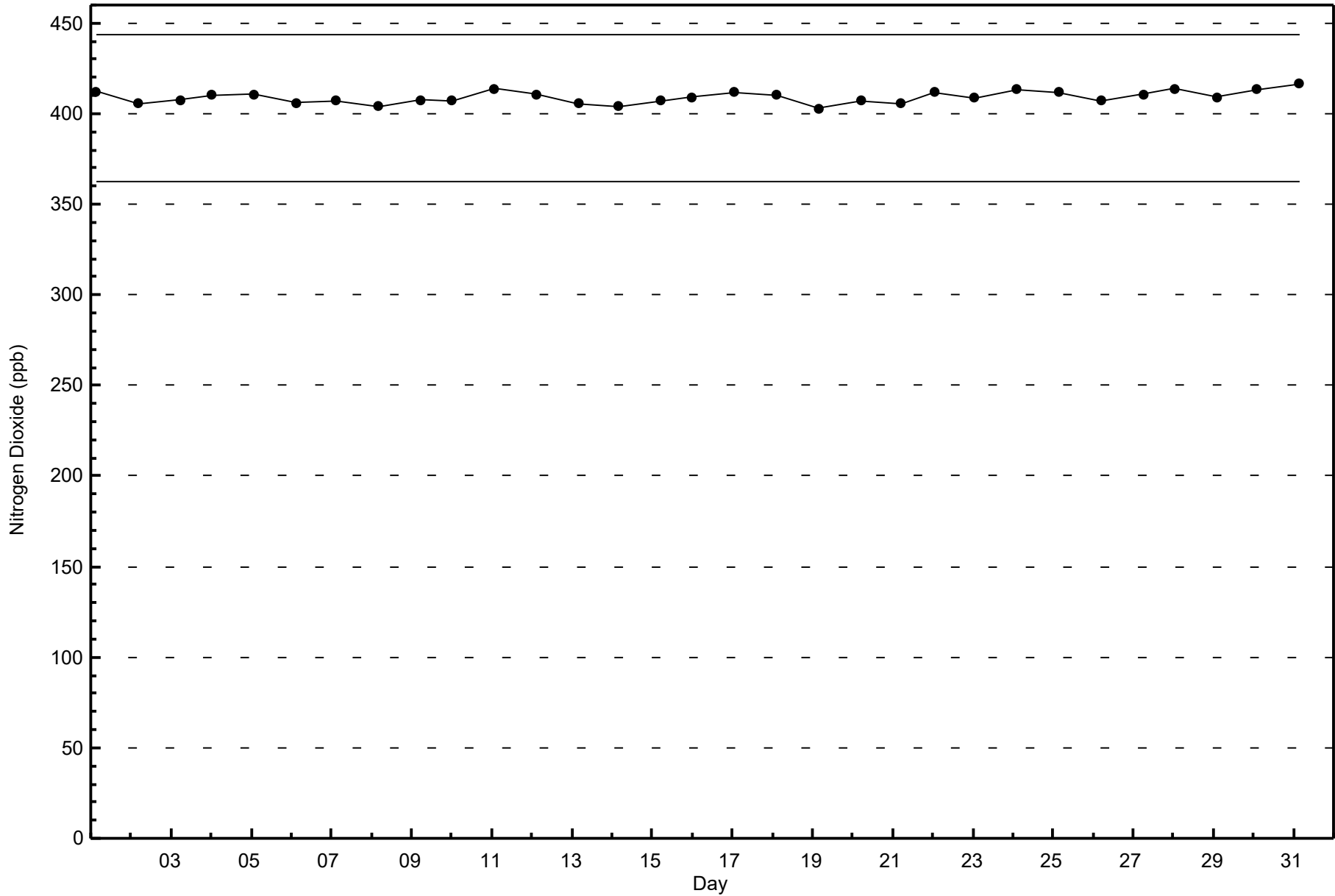


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Nitrogen Dioxide (NO₂) - ppb
Ells River





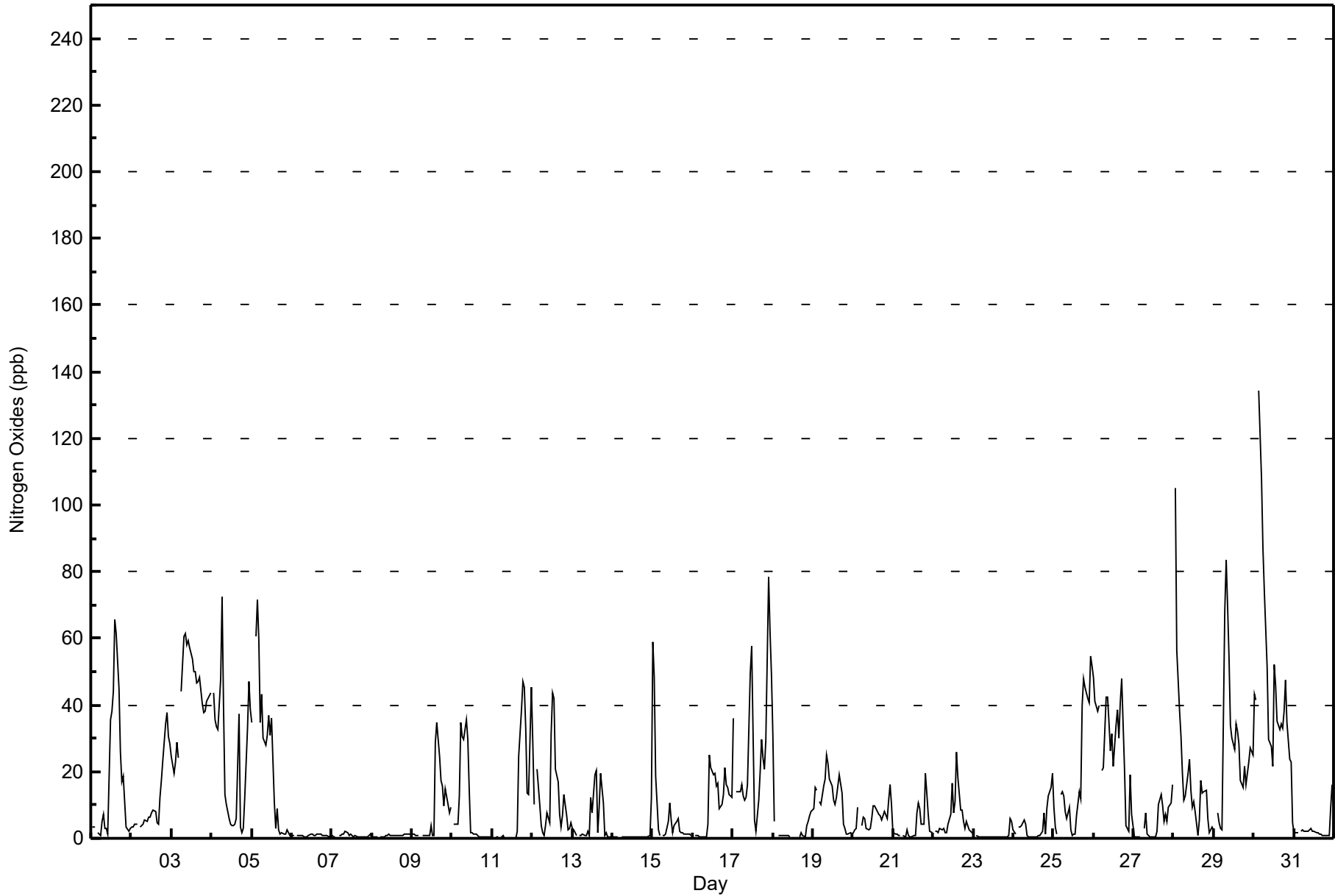




Wood Buffalo Environmental Association
Summary of Hour Averages

Nitrogen Oxides (NO_x) - ppb
Ells River - December 2023

Maximum Value: 134.5 ppb on Dec 30 04:00																								Maximum Daily Average: 47.2 ppb on Dec 30																								Hours in Service: 744	
Minimum Value: 0.1 ppb on Dec 11 09:00																								Minimum Daily Average: 0.8 ppb on Dec 6																								Hours of Data: 708	
Maximum Diurnal Average: 16.7 ppb at hour 4																								Minimum Diurnal Average: 11.4 ppb at hour 3																								Hours of Missing Data: 36	
Monthly Average: 13.00 ppb																								Percentiles: P ₁ = 0.2 P ₁₀ = 0.5 Q ₁ = 0.9 Median = 4.3 Q ₃ = 18.7 P ₉₀ = 39.6 P ₉₉ = 72.5																								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-Dec	3.2	3.3	3.4	Z	1.8	0.9	5.0	7.4	2.8	2.9	1.2	35.4	38.2	43.9	65.6	61.6	44.7	25.7	17.1	18.5	10.9	3.3	2.2	3.1	17.5	65.6																							
2-Dec	3.5	3.4	4.4	4.4	Z	3.5	3.8	4.0	5.5	5.0	6.3	6.2	7.5	8.6	8.2	4.8	4.4	12.3	17.5	23.4	34.4	37.8	30.3	28.3	11.6	37.8																							
3-Dec	24.5	19.5	22.7	28.9	24.3	Z	43.9	60.4	61.6	57.9	59.5	57.0	53.7	50.0	49.9	46.8	47.2	48.5	40.4	37.8	38.0	41.2	41.8	43.5	43.4	61.6																							
4-Dec	Z	43.5	35.4	33.3	32.7	47.7	72.6	39.7	13.2	10.0	5.8	4.2	3.8	3.9	4.4	6.1	37.1	3.5	1.8	3.1	11.8	33.2	47.2	38.7	23.2	72.6																							
5-Dec	34.9	Z	60.4	71.4	59.8	34.6	43.0	30.2	28.2	30.7	37.0	30.9	36.0	10.4	2.8	8.9	2.7	1.5	1.6	1.2	1.2	2.4	1.5	0.9	23.1	71.4																							
6-Dec	0.9	0.8	Z	0.9	0.8	0.8	0.7	0.6	0.5	0.5	0.7	1.2	1.1	1.0	0.8	1.2	1.1	1.4	0.7	0.7	0.8	0.7	0.6	0.7	0.8	1.4																							
7-Dec	0.9	0.6	0.6	Z	0.9	0.8	1.4	1.3	2.0	1.8	1.0	1.1	0.9	0.5	0.7	0.5	0.5	0.5	0.6	0.6	0.5	0.5	1.0	1.3	0.9	2.0																							
8-Dec	0.5	0.5	0.5	0.5	Z	0.6	0.6	0.6	0.7	0.8	1.2	0.8	0.7	0.7	0.7	0.7	0.8	0.9	1.0	1.3	1.5	1.4	1.4	1.3	0.9	1.5																							
9-Dec	1.2	1.1	1.0	0.9	0.8	Z	1.0	0.8	0.8	0.9	1.0	3.9	1.0	0.8	28.9	34.8	24.6	17.2	15.7	9.7	14.9	10.1	7.7	9.4	8.2	34.8																							
10-Dec	Z	4.3	4.2	4.4	12.6	34.8	30.6	29.8	35.6	29.5	14.5	1.8	1.8	1.4	1.1	0.8	0.5	0.4	0.4	0.4	0.4	0.3	0.3	0.3	9.1	35.6																							
11-Dec	0.3	Z	0.3	0.3	0.2	0.2	0.8	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.1	2.0	24.6	38.4	46.9	45.2	33.0	13.4	13.1	45.4	11.5	46.9																							
12-Dec	28.8	10.2	Z	20.7	10.0	3.7	1.6	1.0	3.7	7.6	4.5	31.2	43.6	42.0	20.7	16.8	7.3	3.4	6.6	13.0	6.9	2.6	3.2	4.6	12.8	43.6																							
13-Dec	3.2	2.6	1.0	Z	1.0	0.9	1.3	1.0	0.9	2.2	0.9	12.5	7.6	19.0	20.3	1.8	9.2	19.4	10.6	0.8	1.6	0.5	0.5	0.4	5.2	20.3																							
14-Dec	0.4	0.4	0.4	0.4	Z	0.6	0.5	0.4	0.5	0.5	0.5	0.4	0.4	0.4	0.5	0.6	0.5	0.6	0.5	0.5	0.6	0.7	12.4	1.0	1.0	12.4																							
15-Dec	58.8	48.4	18.7	2.5	0.7	Z	0.9	0.8	1.2	5.0	10.6	5.6	1.8	3.8	5.0	6.0	2.3	1.6	1.8	1.4	1.3	1.2	1.1	1.0	7.9	58.8																							
16-Dec	Z	0.9	0.8	0.8	0.6	0.4	0.3	0.3	0.4	4.4	24.8	21.1	19.2	19.3	15.6	16.7	8.9	10.0	13.3	21.2	16.2	15.1	13.1	12.1	10.2	24.8																							
17-Dec	36.1	Z	14.1	14.1	14.0	16.2	12.8	11.5	12.2	16.1	49.4	57.8	31.1	5.6	2.0	11.3	20.0	29.6	24.2	20.7	29.4	78.2	61.8	49.2	26.8	78.2																							
18-Dec	31.0	5.2	Z	0.8	0.7	0.7	0.7	0.7	0.9	0.6	0.5	Z	Z	Z	Z	Z	0.3	1.7	0.7	0.3	4.0	4.9	6.7	8.1	3.8	31.0																							
19-Dec	8.8	15.3	14.3	Z	11.2	10.4	15.8	17.6	25.0	22.6	18.0	15.7	11.5	10.0	12.4	15.9	19.3	13.5	4.4	2.8	1.3	1.2	1.7	1.2	11.7	25.0																							
20-Dec	1.5	2.7	2.9	9.2	Z	4.0	6.5	5.8	3.2	2.5	2.9	5.9	9.9	9.6	8.0	7.0	6.8	5.4	6.7	8.1	6.0	11.4	16.1	10.2	6.6	16.1																							
21-Dec	1.6	1.3	1.1	0.9	0.7	Z	0.7	0.5	2.6	1.0	0.5	0.5	0.7	1.0	7.6	10.8	8.9	4.2	4.1	19.3	13.4	7.0	2.3	1.9	4.0	19.3																							
22-Dec	Z	2.3	2.1	1.8	2.9	2.5	2.8	1.7	1.7	4.2	7.2	16.6	7.6	11.0	26.0	18.0	8.4	8.3	5.1	2.9	5.0	2.6	2.3	1.7	6.3	26.0																							
23-Dec	1.2	Z	0.9	0.5	0.4	0.3	0.3	0.3	0.3	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.3	1.0	6.0	5.2	0.9	6.0																							
24-Dec	2.4	1.1	Z	3.6	3.3	3.7	5.5	4.1	0.7	0.5	0.6	0.5	0.5	0.6	0.6	0.9	0.7	2.0	7.8	1.3	9.0	12.7	15.3	19.5	4.2	19.5																							
25-Dec	9.4	3.5	1.4	Z	13.3	14.0	12.5	8.1	6.1	9.1	2.5	1.0	1.1	1.2	6.8	13.8	12.1	39.6	47.9	45.5	42.2	40.6	54.7	51.6	19.0	54.7																							
26-Dec	48.4	41.3	38.2	39.6	Z	20.2	21.1	42.2	42.2	34.9	26.4	31.2	21.7	33.8	38.7	30.1	40.7	47.7	20.9	3.9	3.2	2.1	19.0	7.1	28.5	48.4																							
27-Dec	0.6	0.5	0.4	0.4	0.4	Z	3.0	7.8	1.1	0.8	0.5	0.5	0.6	0.6	2.2	10.2	13.0	9.7	5.1	7.4	5.0	9.4	10.4	16.2	4.6	16.2																							
28-Dec	Z	105.1	56.5	38.1	30.6	19.3	11.6	12.8	19.3	23.9	14.3	9.5	11.2	7.9	1.0	5.7	17.4	13.4	14.2	14.4	5.9	1.9	2.7	3.3	19.1	105.1																							
29-Dec	2.5	Z	7.8	4.8	3.0	2.6	68.1	83.7	69.5	54.2	34.0	30.0	26.6	34.3	32.1	28.5	17.6	15.4	21.8	16.0	19.6	23.1	27.2	25.1	28.1	83.7																							
30-Dec	43.4	41.4	Z	134.5	107.9	87.1	74.0	62.8	51.2	29.7	27.7	21.6	51.9	45.8	35.1	32.6	34.4	33.1	38.0	47.6	34.8	23.8	22.9	4.8	47.2	134.5																							
31-Dec	1.9	1.7	1.8	Z	1.9	2.4	2.1	2.0	2.3	2.4	2.8	2.2	2.0	1.8	1.6	1.3	1.3	1.0	0.9	0.7	0.7	0.7	9.5	16.2	2.7	16.2																							
																								13.4	13.9	11.4	16.7	12.9	12.0	14.4	14.2	12.8	11.7	11.5	13.6	13.1	12.3	13.3	13.2	13.5	13.2	12.2	11.9	11.4	12.4	13.7	13.7	Diurnal Average	
																								58.8	105.1	60.4	134.5	107.9	87.1	74.0	83.7	69.5	57.9	59.5	57.8	53.7	50.0	65.6	61.6	47.2	48.5	47.9	47.6	42.2	78.2	61.8	51.6	Diurnal Maximum	
Z - zerospan																								C - Calibration																									





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Ells River - December 2023**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	546	77.12	77.12
21 - 40	94	13.28	90.40
41 - 80	63	8.90	99.29
81 - 159	5	0.71	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 708

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Ells River - December 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	10	24	4	4	2	6	7	37	123	140	109	26	23	20	5	5	545
21 - 40	9	0	1	1	0	0	0	15	40	17	2	0	1	1	4	1	92
11 - 80	1	1	1	0	1	1	1	15	31	1	3	0	2	1	2	2	63
81 - 159	0	0	0	0	0	0	0	0	3	1	0	0	0	1	0	0	5
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	20	25	6	5	3	7	8	67	197	159	114	26	26	23	11	8	705

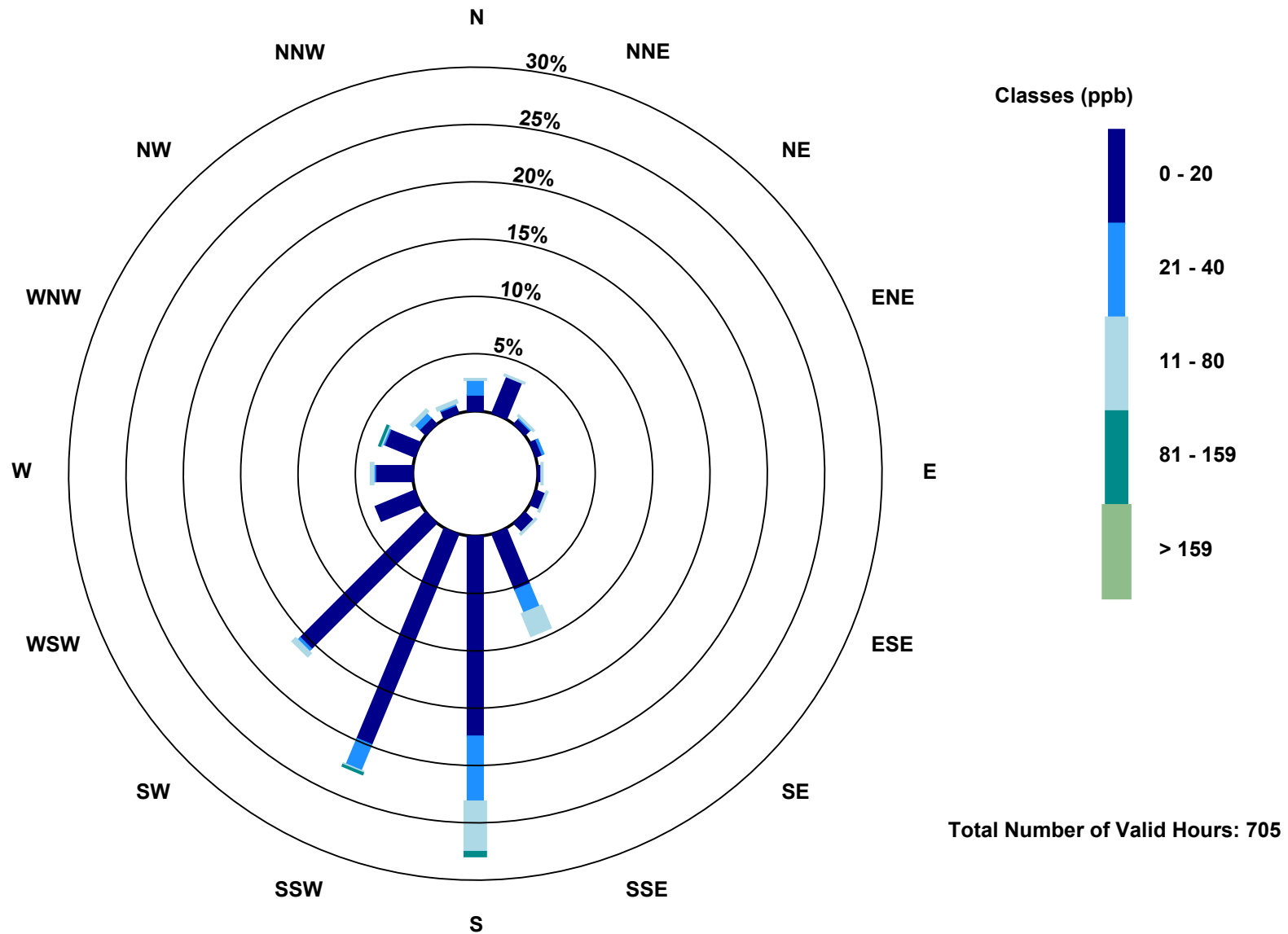
Total Number of Valid Hours: 705

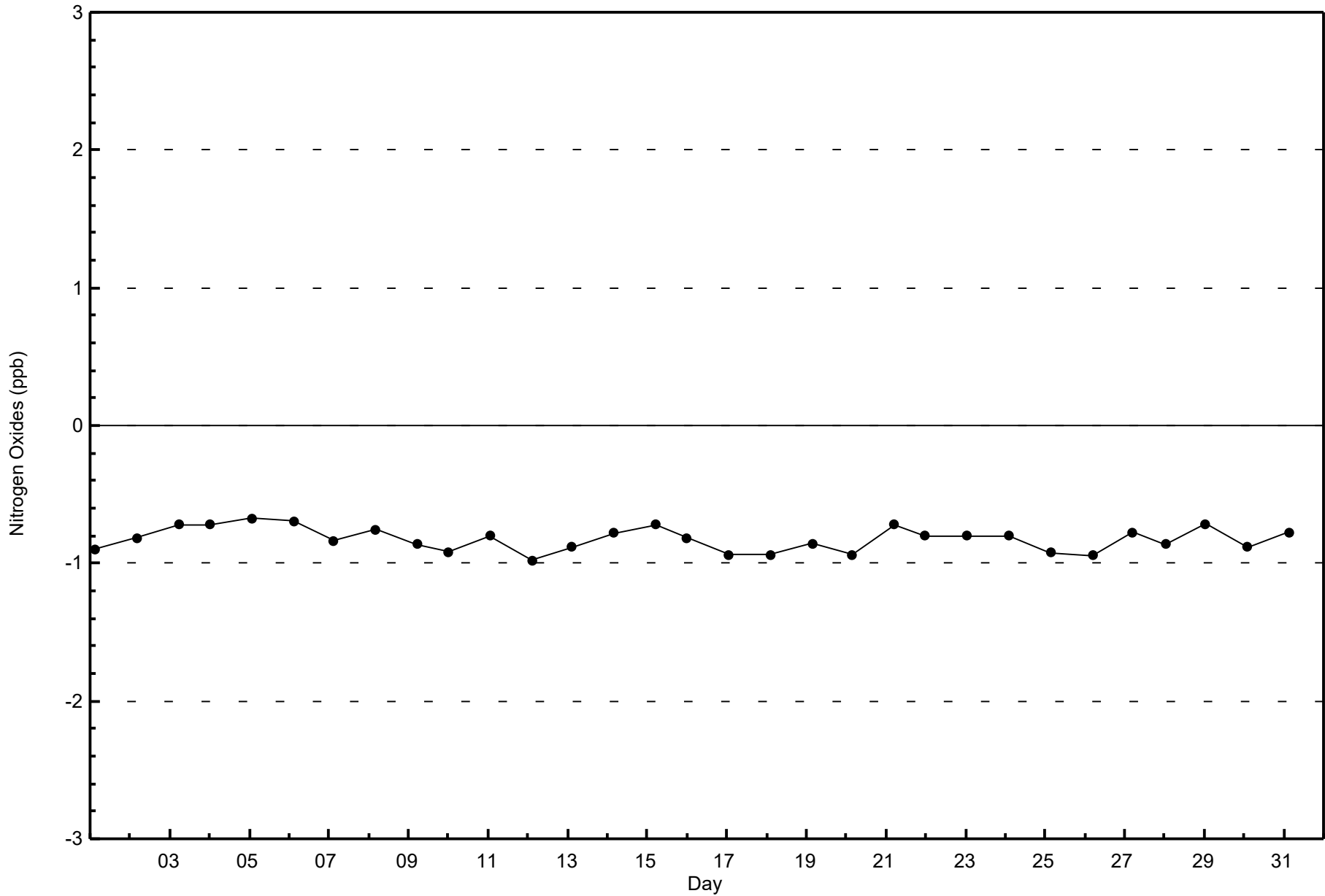
Total Number of Hours: 744

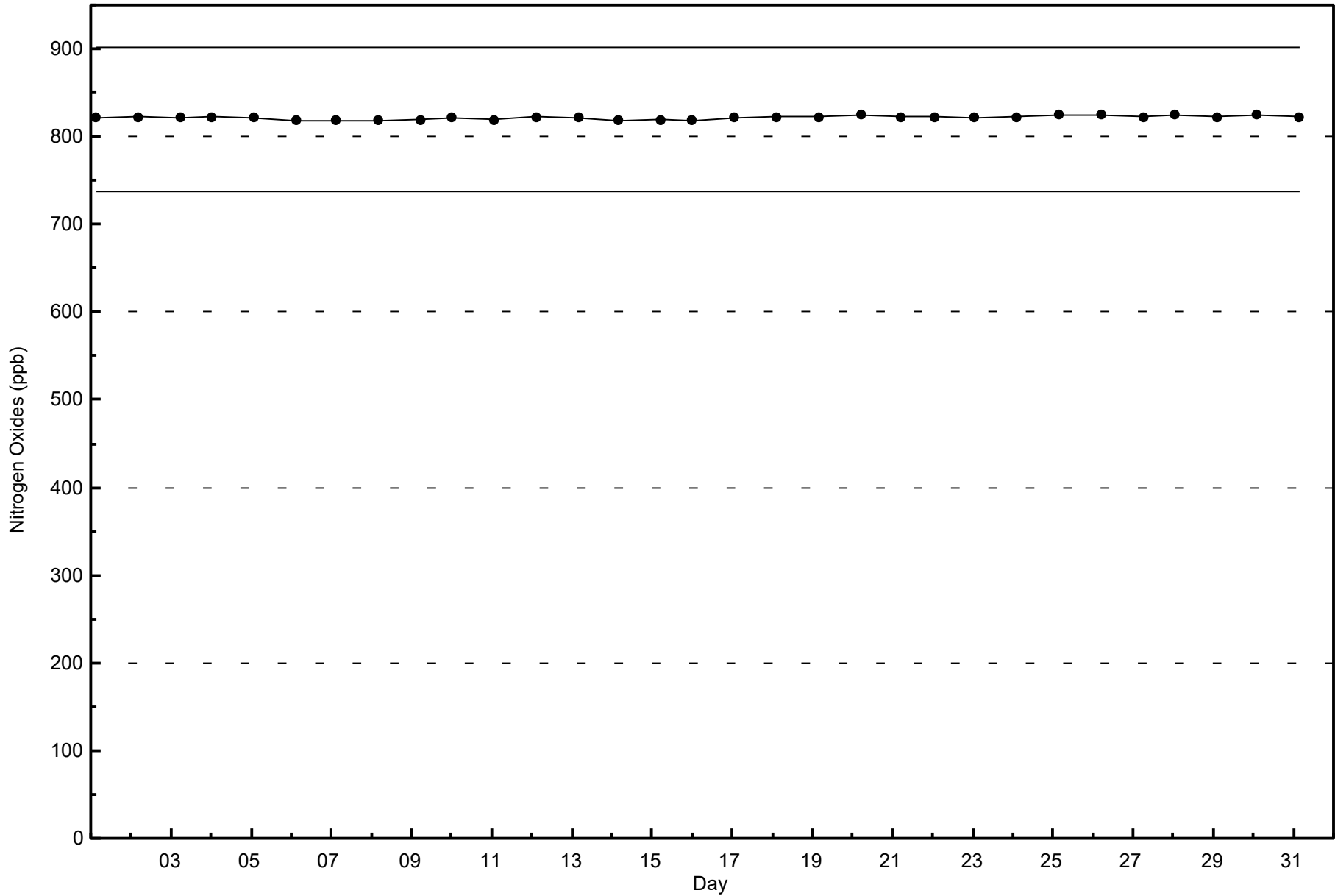


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Nitrogen Oxides (NO_x) - ppb
Ells River





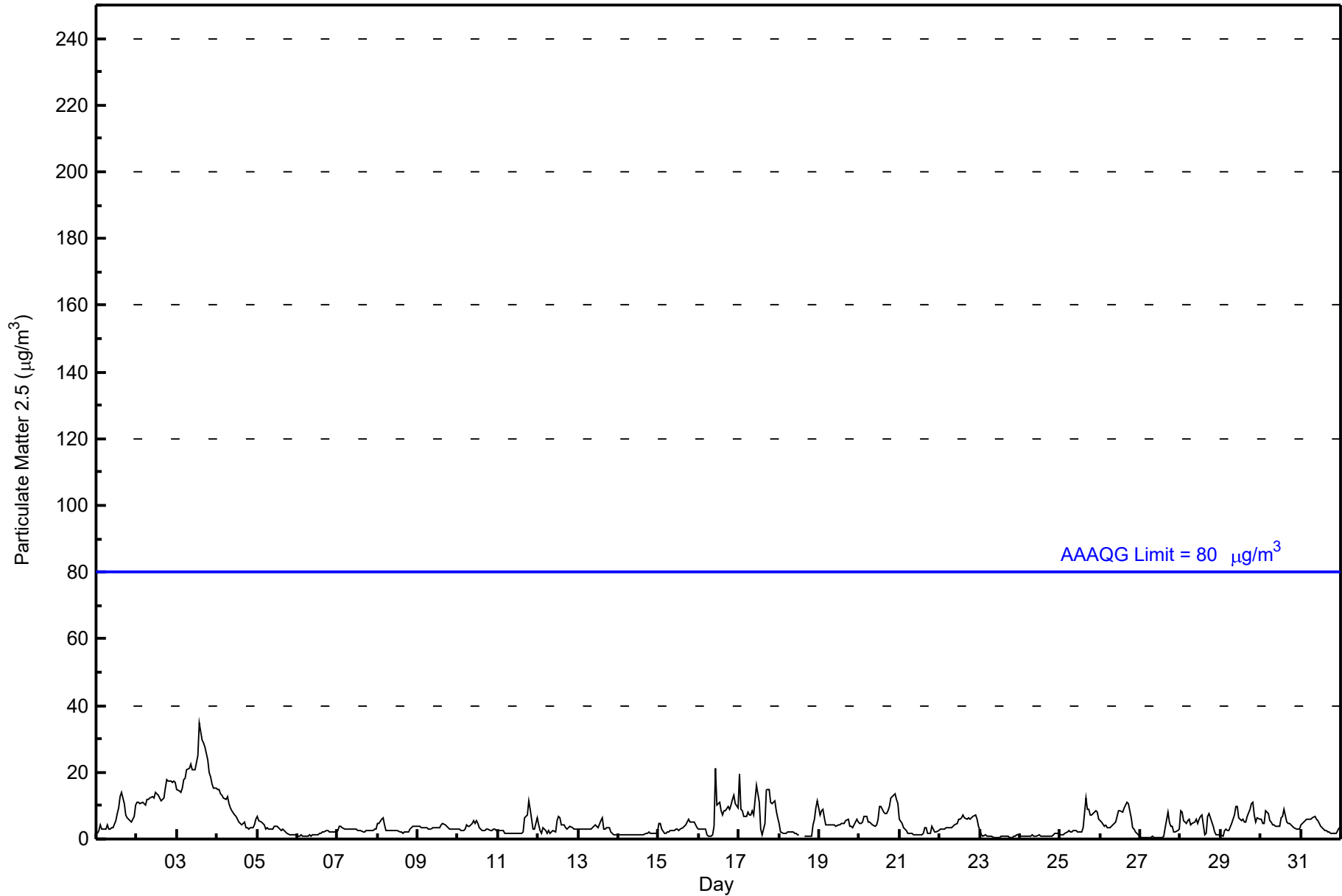




Summary of Hour Averages

Ells River - December 2023

Number of Exceedences (AAAQO):		1-hr: 0	24-hr: 0																		Hours in Service:	744																											
Maximum Value: 34.9 µg/m ³ on Dec 3 14:00		Maximum Daily Average: 21.2 µg/m ³ on Dec 3															Hours of Data:	742																															
Minimum Value: 0.3 µg/m ³ on Dec 27 03:00		Minimum Daily Average: 0.9 µg/m ³ on Dec 23															Hours of Missing Data:	2																															
Maximum Diurnal Average: 6.1 µg/m ³ at hour 17		Minimum Diurnal Average: 4.0 µg/m ³ at hour 6															Hours of Calibration:	2																															
Monthly Average: 4.95 µg/m ³		Percentiles: P ₁ = 0.4 P ₁₀ = 1.1 Q ₁ = 2.1 Median = 3.4 Q ₃ = 6.1 P ₉₀ = 10.9 P ₉₉ = 22.0															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-Dec	1.7	2.3	4.1	3.0	3.0	2.8	4.1	3.0	3.0	3.4	3.3	5.6	7.5	9.5	12.7	14.1	10.5	7.3	6.2	5.9	5.4	5.1	6.9	10.1	5.8	14.1																							
2-Dec	11.1	10.9	10.7	10.9	10.4	10.3	11.9	12.1	12.4	12.6	12.4	14.1	13.8	13.1	11.6	11.7	12.3	15.2	17.8	17.3	17.3	16.8	17.2	16.9	13.4	17.8																							
3-Dec	15.0	14.3	13.9	15.1	17.7	18.1	20.9	21.3	22.4	20.8	20.9	20.8	24.9	34.9	32.3	29.8	28.8	27.7	23.6	20.1	18.5	16.5	15.4	15.4	21.2	34.9																							
4-Dec	14.8	14.8	13.6	13.1	12.4	11.8	12.7	10.7	9.2	8.4	7.3	6.6	5.8	5.3	4.7	4.4	5.3	3.6	3.2	3.2	3.4	3.6	4.2	5.8	7.8	14.8																							
5-Dec	6.8	5.5	4.9	4.8	4.3	3.2	3.4	3.1	3.0	3.2	3.6	3.8	3.6	3.0	2.6	3.0	2.5	2.0	1.5	1.4	1.3	1.3	1.2	1.1	3.1	6.8																							
6-Dec	1.0	0.9	1.1	1.0	1.0	1.0	1.0	1.1	1.0	1.1	1.2	1.2	1.2	1.5	1.9	2.3	2.3	2.5	2.4	2.1	2.0	2.1	2.1	2.2	1.5	2.5																							
7-Dec	2.7	4.0	3.8	3.4	2.9	2.8	2.8	3.0	3.0	2.8	2.9	2.8	2.7	2.5	2.4	2.2	2.2	2.4	2.6	2.6	2.7	2.7	2.8	3.0	2.8	4.0																							
8-Dec	4.5	4.5	6.0	6.5	4.1	2.7	2.6	2.7	2.7	2.7	2.7	2.6	2.5	2.3	2.0	1.8	2.0	2.1	2.3	2.8	3.2	3.6	3.6	3.8	3.2	6.5																							
9-Dec	3.9	3.9	3.6	3.4	3.2	3.2	3.2	3.1	3.1	3.2	3.3	3.4	3.4	3.2	4.4	4.7	4.1	3.6	3.5	3.1	3.1	3.0	2.9	2.9	3.4	4.7																							
10-Dec	2.8	2.8	2.7	2.7	3.1	4.1	3.8	3.9	4.6	5.3	4.7	5.6	4.7	3.3	2.7	2.4	2.7	3.1	2.8	2.7	2.7	2.8	2.8	2.5	3.4	5.6																							
11-Dec	2.5	2.7	2.6	2.4	1.9	1.7	1.9	1.6	1.5	1.5	1.6	1.6	1.5	1.7	1.8	2.1	6.3	7.1	11.6	9.0	5.9	3.0	2.8	6.4	3.5	11.6																							
12-Dec	4.1	2.6	1.7	3.5	2.5	1.9	2.3	1.9	2.0	2.5	2.3	5.5	6.6	6.4	4.2	4.3	3.4	2.9	3.3	3.9	3.3	3.0	3.0	3.1	3.3	6.6																							
13-Dec	3.1	3.1	3.1	3.1	3.1	3.0	3.0	3.0	3.4	4.0	4.3	3.9	3.6	5.5	6.2	3.0	3.1	3.5	3.2	2.3	1.7	1.1	1.2	1.3	3.2	6.2																							
14-Dec	1.2	1.4	1.4	1.3	1.2	1.1	1.2	1.2	1.2	1.3	1.3	1.3	1.2	1.2	1.2	1.3	1.6	1.8	1.9	1.9	1.9	1.8	1.8	2.3	1.5	2.3																							
15-Dec	4.9	4.5	2.9	1.8	1.9	2.1	2.2	2.5	2.5	2.7	2.9	2.9	2.7	2.9	3.4	3.9	4.2	5.0	5.8	5.2	5.0	4.9	4.0	3.3	3.5	5.8																							
16-Dec	3.0	2.9	2.9	3.1	2.9	1.4	1.0	0.9	1.1	3.7	21.1	10.2	10.9	8.5	7.4	8.5	8.4	9.8	9.0	10.2	12.0	13.1	10.7	9.5	7.2	21.1																							
17-Dec	19.5	9.1	8.4	6.8	7.0	8.1	7.2	7.0	8.5	7.0	16.2	13.6	11.1	3.0	1.1	4.9	14.8	14.7	14.9	11.1	10.6	11.6	8.4	6.3	9.6	19.5																							
18-Dec	4.5	2.1	1.6	1.6	1.8	2.1	2.1	2.1	2.1	1.9	1.6	1.4	1.3	C	C	0.8	0.8	0.8	0.8	0.8	4.1	5.8	9.3	11.4	2.8	11.4																							
19-Dec	7.3	8.6	8.7	6.3	4.3	4.4	4.4	4.2	4.1	4.1	3.8	4.1	4.3	4.5	4.7	4.9	5.4	5.7	3.8	3.8	3.6	4.2	5.7	4.9	5.0	8.7																							
20-Dec	4.8	4.8	5.2	6.7	6.6	5.1	5.1	4.5	4.1	3.9	4.0	6.1	9.7	10.0	8.1	7.7	7.8	8.5	9.7	12.3	13.2	13.7	11.9	10.7	7.7	13.7																							
21-Dec	6.1	4.7	3.6	3.0	2.5	1.8	1.7	1.5	1.4	1.1	1.2	1.2	1.2	1.3	1.6	3.3	3.3	1.7	1.6	3.7	2.8	2.3	2.3	2.7	2.4	6.1																							
22-Dec	2.9	2.9	3.1	3.0	3.3	3.2	3.3	3.5	3.8	4.1	4.7	5.8	6.0	6.4	7.1	6.3	5.8	6.3	6.0	6.2	6.8	7.4	5.9	3.7	4.9	7.4																							
23-Dec	2.3	1.4	0.9	1.3	0.9	0.7	0.8	0.7	0.6	0.6	0.5	0.5	0.5	0.7	0.9	0.8	0.8	0.7	0.6	0.6	0.8	1.0	1.4	1.3	0.9	2.3																							
24-Dec	1.0	0.8	0.7	0.8	0.8	1.0	1.0	1.1	1.0	1.0	1.0	1.1	1.0	1.0	0.9	0.9	0.9	0.9	1.0	0.9	1.3	1.6	1.5	1.7	1.0	1.7																							
25-Dec	1.4	1.3	1.3	1.6	2.1	2.4	2.3	2.3	2.4	2.4	2.2	2.1	2.2	2.2	3.6	12.2	8.8	8.9	7.3	7.2	8.2	8.4	7.9	5.9	4.4	12.2																							
26-Dec	5.5	4.9	3.9	4.0	3.6	3.3	3.3	4.0	4.6	4.9	6.9	8.3	8.7	7.9	9.4	10.1	11.1	10.7	6.2	3.4	2.8	2.0	1.8	1.1	5.5	11.1																							
27-Dec	0.5	0.4	0.3	0.4	0.4	0.4	0.4	0.7	0.4	0.4	0.4	0.4	0.4	0.5	0.8	3.4	8.2	5.2	3.9	3.7	2.3	2.2	2.5	3.1	1.7	8.2																							
28-Dec	8.4	8.0	5.3	4.9	5.5	5.9	4.1	4.5	5.2	5.9	4.6	5.8	6.6	7.3	1.4	1.8	6.8	7.5	6.2	4.0	2.2	1.1	1.1	1.4	4.8	8.4																							
29-Dec	1.1	1.0	2.6	2.8	2.6	2.5	4.6	5.8	7.0	9.7	9.6	6.5	5.5	5.8	5.2	5.2	6.9	8.8	10.4	11.1	7.2	5.3	6.2	6.0	5.8	11.1																							
30-Dec	5.9	4.9	4.6	8.4	7.6	5.3	5.3	4.4	4.0	3.8	4.0	3.8	6.2	6.7	8.9	5.3	4.7	4.5	4.2	3.7	3.4	3.1	3.1	3.0	4.9	8.9																							
31-Dec	4.1	4.8	5.6	6.1	6.0	5.8	5.8	6.3	6.7	6.1	5.3	4.7	3.7	2.9	2.7	2.5	2.2	2.0	1.9	1.8	1.8	1.8	2.6	3.3	4.0	6.7																							
																								5.1	4.5	4.3	4.4	4.2	4.0	4.2	4.1	4.3	4.4	5.2	5.1	5.3	5.5	5.3	5.5	6.1	6.0	5.8	5.4	5.2	5.0	5.0	5.0	Diurnal Average	
																								19.5	14.8	13.9	15.1	17.7	18.1	20.9	21.3	22.4	20.8	21.1	20.8	24.9	34.9	32.3	29.8	28.8	27.7	23.6	20.1	18.5	16.8	17.2	16.9	Diurnal Maximum	
C - Calibration																																																	
Alberta Ambient Air Quality Guideline/Objectives: 1-hr 80 µg/m ³ 24-hr 29 µg/m ³																																																	





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Ells River - December 2023

Concentration Ranges ($\mu\text{g}/\text{m}^3$)	Number of Hours	%	Cumulative %
0 - 5	524	70.62	70.62
6 - 15	191	25.74	96.36
16 - 25	22	2.96	99.33
26 - 80	5	0.67	100.00
> 81.0	0	0.00	100.00

Total Number of Valid Hours: 742

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Ells River - December 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	9	11	3	0	1	4	4	33	132	131	112	27	28	17	6	4	522
6 - 15	7	13	1	5	1	2	3	34	67	38	8	1	0	6	2	2	190
16 - 25	6	2	1	0	0	0	0	2	3	1	0	0	0	1	4	2	22
26 - 80	0	0	1	0	1	1	1	0	0	0	1	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
Totals	22	26	6	5	3	7	8	69	202	170	121	28	28	24	12	8	739

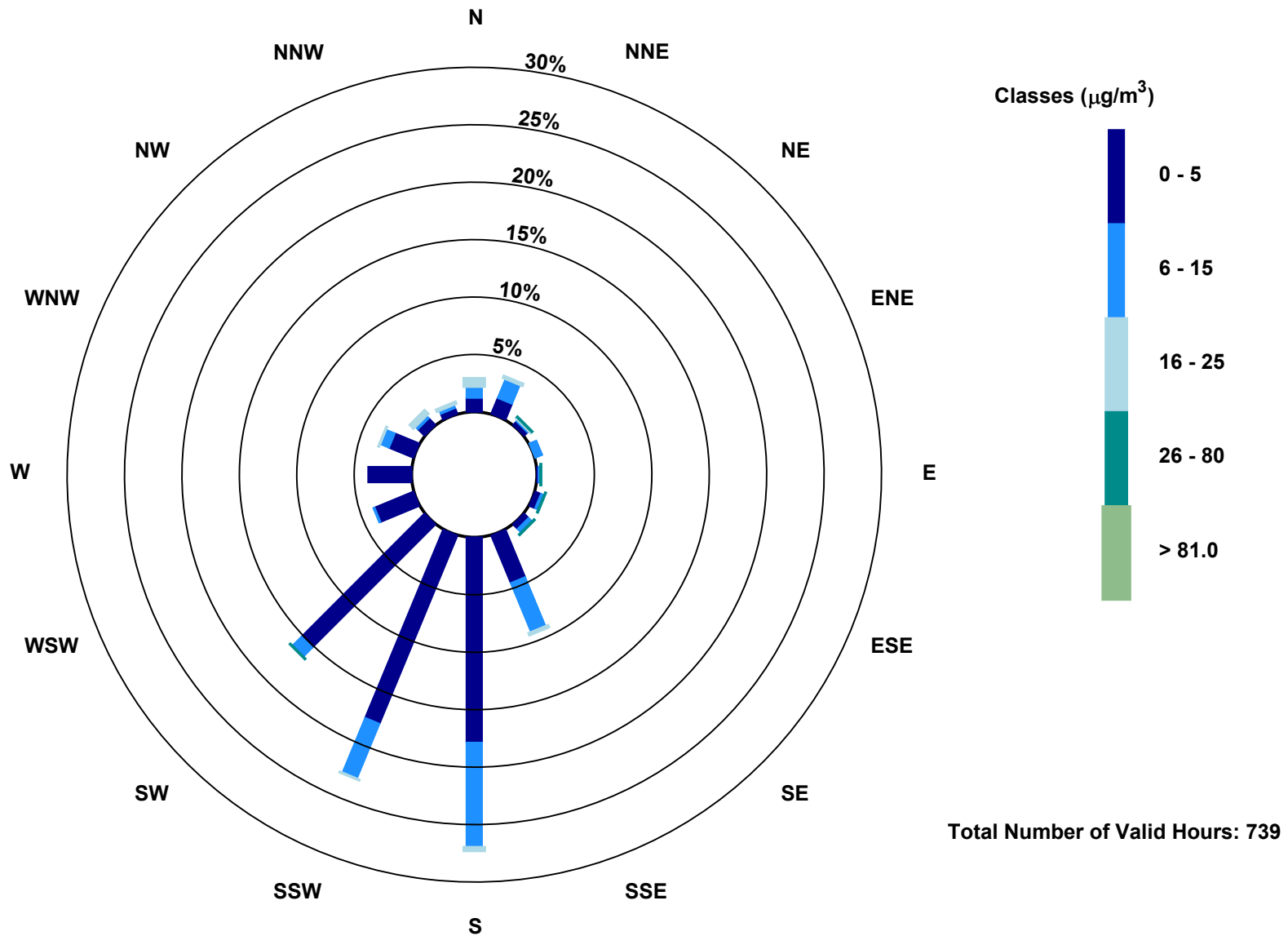
Total Number of Valid Hours: 739

Total Number of Hours: 744



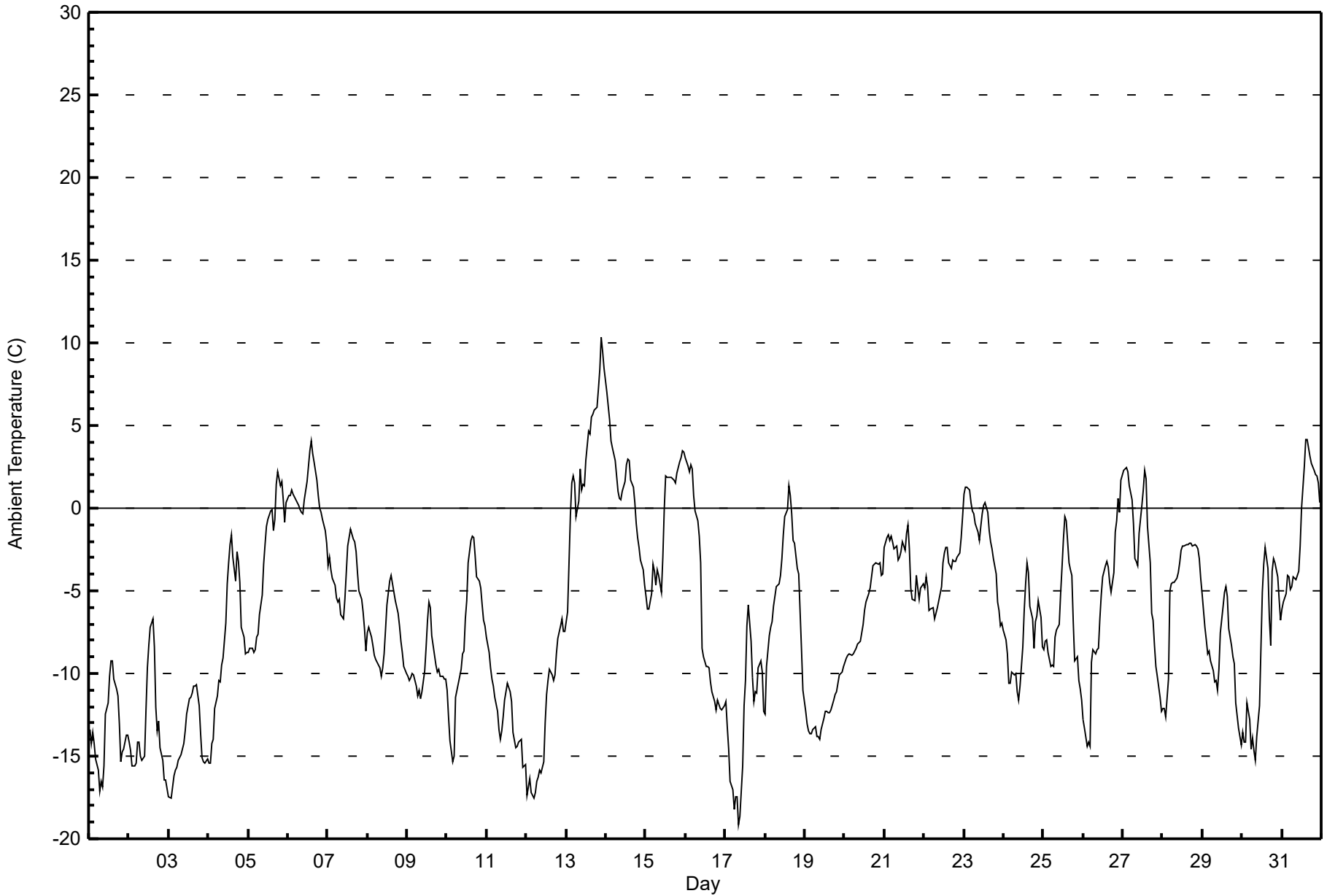
Wood Buffalo Environmental Association
Wind Rose Dec 2023

Particulate Matter 2.5 (PM_{2.5}) - $\mu\text{g}/\text{m}^3$
Ells River





Maximum Value: 10.3 C on Dec 13 22:00		Maximum Daily Average: 3.2 C on Dec 13		Hours in Service: 744																						
Minimum Value: -19.2 C on Dec 17 09:00		Minimum Daily Average: -14.1 C on Dec 3		Hours of Data: 744																						
Maximum Diurnal Average: -3.1 C at hour 15		Minimum Diurnal Average: -8.2 C at hour 9		Hours of Missing Data: 0																						
Monthly Average: -6.45 C		Percentiles: P ₁ = -17.4 P ₁₀ = -14.2 Q ₁ = -10.8 Median = -6.4 Q ₃ = -2.3 P ₉₀ = 1.3 P ₉₉ = 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-Dec	-13.4	-14.2	-13.5	-14.2	-15.2	-15.8	-17.2	-16.5	-16.9	-15.6	-12.4	-11.8	-10.2	-9.2	-9.2	-10.3	-10.9	-11.4	-13.1	-15.4	-14.8	-14.6	-13.7	-13.7	-13.5	-9.2
2-Dec	-14.1	-14.7	-15.6	-15.6	-15.4	-14.2	-14.2	-15.0	-15.3	-15.0	-12.2	-9.7	-8.3	-7.2	-6.7	-8.4	-12.0	-13.5	-12.9	-14.5	-15.3	-16.4	-16.4	-16.9	-13.3	-6.7
3-Dec	-17.4	-17.6	-16.9	-16.2	-15.8	-15.7	-15.3	-15.0	-14.6	-14.2	-13.5	-12.4	-11.5	-11.4	-11.2	-10.7	-10.7	-10.6	-12.0	-13.7	-15.1	-15.4	-15.4	-15.1	-14.1	-10.6
4-Dec	-15.5	-15.4	-14.2	-14.0	-12.1	-11.3	-10.4	-10.5	-9.5	-9.1	-6.9	-4.6	-3.3	-2.2	-1.6	-2.9	-4.4	-2.6	-3.2	-4.5	-7.2	-7.8	-8.8	-8.7	-8.0	-1.6
5-Dec	-8.7	-8.5	-8.5	-8.7	-8.5	-7.8	-7.7	-6.5	-5.2	-3.4	-2.2	-1.1	-0.6	-0.2	-0.1	-1.3	-0.7	1.4	2.2	1.3	1.6	0.5	-0.8	0.3	-3.1	2.2
6-Dec	0.8	0.8	1.1	0.8	0.7	0.5	0.2	-0.1	-0.3	-0.3	0.5	1.6	2.6	3.5	4.1	3.3	2.8	1.7	0.7	0.0	-0.2	-0.7	-1.4	-2.1	0.9	4.1
7-Dec	-3.5	-3.0	-3.8	-4.3	-4.7	-5.4	-5.6	-5.5	-6.4	-6.7	-5.5	-3.9	-2.3	-1.8	-1.2	-1.9	-2.0	-2.7	-3.9	-5.0	-5.5	-6.3	-7.3	-8.6	-4.4	-1.2
8-Dec	-7.5	-7.2	-7.8	-8.3	-8.9	-9.1	-9.3	-9.6	-10.2	-9.6	-8.8	-7.3	-5.8	-4.4	-4.0	-4.6	-5.1	-5.6	-6.4	-7.1	-8.0	-8.7	-9.6	-10.0	-7.6	-4.0
9-Dec	-10.2	-10.4	-10.3	-10.0	-10.0	-10.8	-11.4	-11.0	-11.5	-11.1	-9.9	-8.4	-6.8	-5.7	-6.1	-7.7	-8.9	-9.5	-9.9	-9.8	-10.2	-10.1	-10.4	-10.3	-9.6	-5.7
10-Dec	-11.0	-12.6	-14.1	-15.3	-15.0	-11.4	-11.0	-10.6	-9.7	-8.8	-8.6	-6.7	-5.6	-3.3	-1.9	-1.7	-1.8	-2.9	-4.1	-4.4	-4.8	-5.8	-6.8	-7.1	-7.7	-1.7
11-Dec	-7.8	-8.8	-9.7	-10.4	-10.8	-11.4	-12.3	-13.4	-14.0	-13.5	-12.6	-11.6	-10.6	-10.8	-11.1	-11.7	-13.5	-14.5	-14.4	-14.2	-14.1	-14.0	-15.6	-15.5	-12.3	-7.8
12-Dec	-17.3	-16.8	-16.4	-17.2	-17.6	-17.2	-16.5	-16.3	-15.9	-16.0	-15.3	-13.0	-11.3	-10.5	-9.7	-10.1	-10.4	-10.1	-8.9	-7.9	-7.1	-6.7	-7.5	-7.5	-12.6	-6.7
13-Dec	-6.8	-6.2	-0.4	1.6	1.9	1.5	-0.5	0.4	2.4	1.1	1.5	1.3	2.9	4.7	4.5	5.5	5.7	5.9	6.1	7.2	8.4	10.3	9.5	8.5	3.2	10.3
14-Dec	7.0	6.2	5.4	4.1	3.6	2.9	1.9	1.0	0.6	0.5	1.0	1.6	2.7	2.9	1.7	1.2	0.3	-0.9	-1.8	-2.4	-3.1	-3.7	-4.7	1.3	7.0	
15-Dec	-5.4	-6.1	-6.1	-5.2	-3.4	-3.8	-4.7	-3.7	-4.1	-5.0	-3.0	-0.1	1.9	1.8	1.9	1.9	1.8	1.7	1.5	2.1	2.8	3.1	3.4	3.4	-1.0	3.4
16-Dec	3.0	2.5	2.2	2.6	2.4	0.7	-0.2	-0.8	-1.7	-3.3	-8.4	-9.0	-9.6	-9.5	-9.7	-10.5	-11.1	-11.7	-12.2	-11.6	-11.9	-12.2	-12.2	-11.9	-6.0	3.0
17-Dec	-11.7	-13.2	-14.5	-16.5	-17.0	-18.2	-17.5	-17.4	-19.2	-18.6	-15.6	-12.0	-10.4	-7.1	-5.8	-8.1	-10.3	-11.7	-11.1	-11.2	-9.7	-9.2	-9.9	-12.3	-12.8	-5.8
18-Dec	-12.4	-9.6	-7.7	-7.2	-6.9	-5.9	-5.3	-4.7	-4.6	-4.1	-3.1	-1.6	-0.5	-0.1	1.3	0.8	-0.3	-2.0	-2.1	-3.6	-4.0	-6.3	-8.6	-11.0	-4.6	1.3
19-Dec	-12.3	-13.1	-13.5	-13.6	-13.6	-13.4	-13.3	-13.9	-13.8	-14.0	-13.4	-12.7	-12.3	-12.3	-12.3	-12.3	-12.2	-11.6	-11.3	-11.1	-10.6	-10.1	-9.9	-9.6	-12.3	-9.6
20-Dec	-9.3	-9.1	-8.9	-8.8	-8.9	-8.8	-8.6	-8.5	-8.3	-8.1	-7.6	-7.0	-6.2	-5.6	-5.2	-4.8	-4.1	-3.4	-3.4	-3.3	-3.4	-3.3	-4.1	-4.0	-6.4	-3.3
21-Dec	-2.4	-1.8	-1.6	-1.9	-1.7	-2.1	-2.4	-2.3	-3.1	-2.9	-2.7	-2.1	-2.6	-1.5	-1.0	-2.5	-4.9	-5.5	-5.6	-4.1	-4.8	-5.5	-4.8	-4.6	-3.1	-1.0
22-Dec	-4.9	-4.1	-4.7	-6.2	-6.1	-6.1	-6.7	-6.4	-6.0	-5.6	-4.7	-3.3	-2.7	-2.4	-2.3	-3.3	-3.7	-3.1	-3.2	-3.2	-3.0	-2.7	-1.8	-0.5	-4.0	-0.5
23-Dec	0.8	1.3	1.3	1.1	0.3	-0.2	-0.4	-0.9	-1.5	-1.9	-1.1	-0.4	0.1	0.3	-0.3	-1.3	-2.1	-2.4	-3.1	-4.0	-5.7	-6.2	-7.2	-6.9	-1.7	1.3
24-Dec	-7.3	-8.0	-8.8	-10.6	-10.6	-9.9	-10.1	-10.0	-11.1	-11.6	-10.8	-8.4	-6.2	-4.6	-3.3	-3.9	-6.0	-6.7	-8.4	-6.9	-6.5	-5.6	-6.6	-8.4	-7.9	-3.3
25-Dec	-8.6	-8.0	-8.0	-8.7	-9.6	-9.5	-9.6	-7.8	-7.3	-7.0	-5.2	-3.6	-1.9	-0.5	-0.7	-3.3	-3.8	-4.0	-6.9	-9.2	-9.0	-10.4	-10.9	-11.6	-6.9	-0.5
26-Dec	-12.8	-13.3	-14.4	-14.1	-14.4	-9.4	-8.5	-8.8	-8.6	-8.5	-6.7	-5.3	-4.2	-3.4	-3.2	-3.6	-4.5	-5.1	-3.9	-1.5	-0.7	0.6	-0.3	1.7	-6.4	1.7
27-Dec	2.3	2.4	2.5	2.2	1.3	0.5	-0.9	-3.1	-3.3	-3.4	-1.5	0.2	1.1	2.3	1.7	-1.1	-3.3	-6.3	-6.8	-8.3	-9.5	-10.2	-11.4	-12.3	-2.7	2.5
28-Dec	-12.1	-12.1	-12.6	-10.3	-5.0	-4.5	-4.5	-4.5	-4.3	-3.9	-3.3	-2.5	-2.3	-2.3	-2.2	-2.2	-2.1	-2.1	-2.3	-2.2	-2.3	-2.4	-3.0	-4.2	-4.6	-2.1
29-Dec	-5.2	-7.2	-8.0	-8.8	-8.7	-9.2	-9.8	-10.5	-10.4	-11.0	-9.8	-7.5	-6.0	-5.1	-4.7	-5.4	-7.3	-8.3	-8.9	-9.4	-11.8	-12.6	-13.3	-14.3	-8.9	-4.7
30-Dec	-13.6	-14.2	-14.1	-11.8	-12.8	-14.6	-13.9	-14.7	-15.2	-13.8	-12.0	-8.5	-5.1	-3.3	-2.4	-3.7	-6.6	-8.3	-3.8	-3.0	-3.3	-4.1	-5.5	-6.8	-9.0	-2.4
31-Dec	-6.1	-5.7	-5.1	-4.1	-4.1	-5.0	-4.8	-4.1	-4.4	-4.0	-3.8	-2.3	0.0	2.5	4.2	4.2	3.7	3.1	2.7	2.3	2.0	1.9	1.5	0.4	-1.0	4.2
																								Diurnal Average		
																								Diurnal Maximum		





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C
Ells River - December 2023**

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	633	85.08	85.08
0 - 10	110	14.78	99.87
10 - 20	1	0.13	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association
Summary of Hour Averages

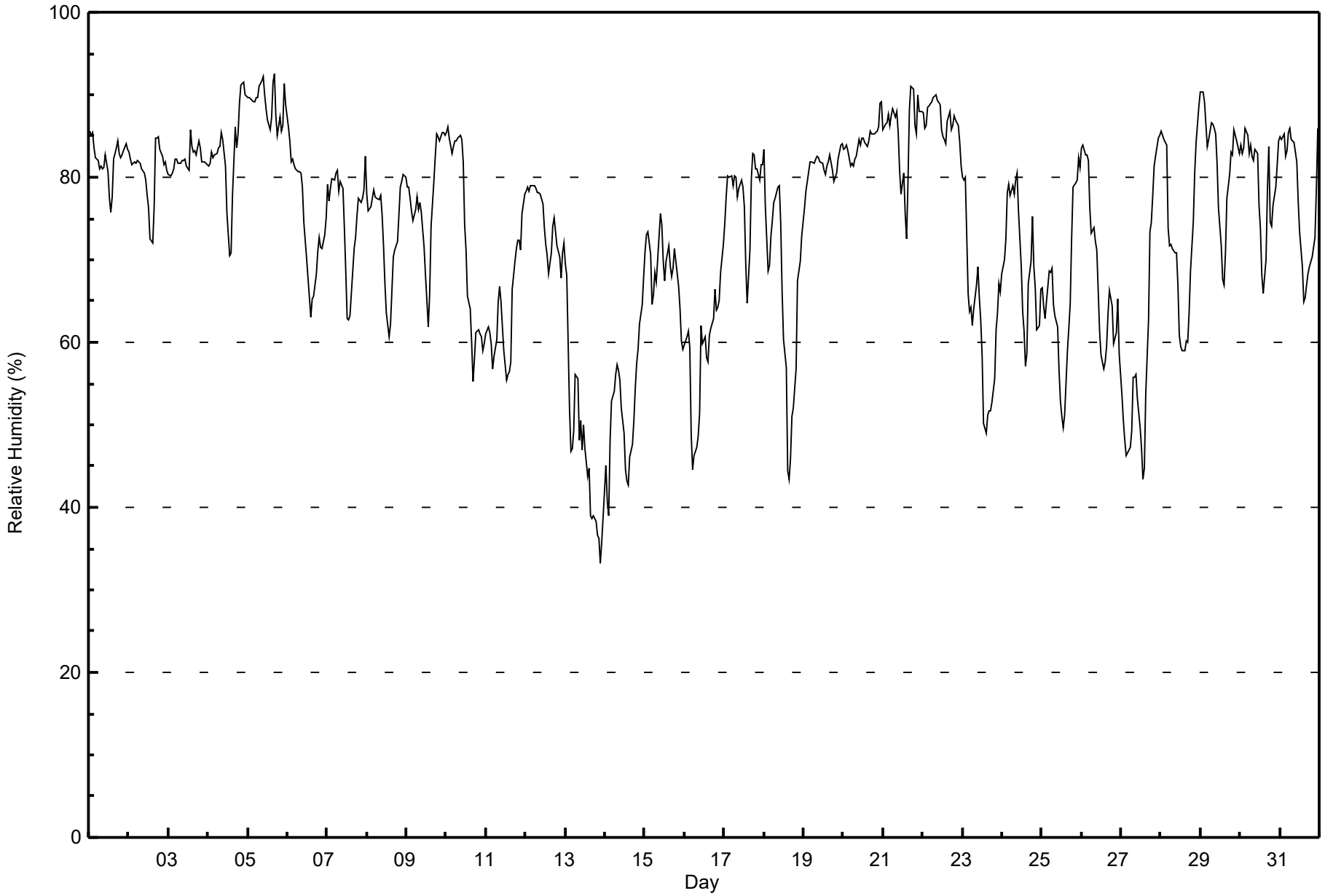
Relative Humidity (RH) - %
Ells River - December 2023

Maximum Value: 92.6 % on Dec 5 17:00																						Maximum Daily Average: 89.0 % on Dec 5																						Hours in Service: 744			
Minimum Value: 33.3 % on Dec 13 22:00																						Minimum Daily Average: 46.3 % on Dec 13																						Hours of Data: 744			
Maximum Diurnal Average: 77.4 % at hour 1																						Minimum Diurnal Average: 64.5 % at hour 15																						Hours of Missing Data: 0			
Monthly Average: 73.36 %																						Percentiles: P ₁ = 39.0 P ₁₀ = 55.7 Q ₁ = 65.3 Median = 77.4 Q ₃ = 82.8 P ₉₀ = 86.0 P ₉₉ = 91.0																						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-Dec	85.5	85.1	85.5	83.5	82.4	82.1	80.9	81.4	80.9	81.1	82.6	80.6	77.4	75.7	77.7	82.2	83.6	84.3	82.8	82.4	82.7	83.2	84.0	83.4	82.1	85.5																					
2-Dec	83.0	82.2	81.6	81.9	81.6	82.1	81.8	81.7	80.9	80.5	79.7	77.7	76.3	72.6	72.1	76.4	84.7	84.8	85.0	83.3	82.6	81.6	81.9	80.8	80.7	85.0																					
3-Dec	80.3	80.1	80.4	81.0	82.2	82.3	81.7	81.8	82.0	82.1	82.2	81.3	80.8	85.8	83.7	83.0	83.2	82.7	84.5	83.6	81.8	81.8	81.8	81.5	82.2	85.8																					
4-Dec	81.3	81.7	83.0	82.3	82.6	82.9	83.5	83.7	85.5	84.6	81.4	75.7	73.0	70.4	70.8	77.9	86.2	83.6	85.3	88.9	91.2	91.6	90.0	89.9	82.8	91.6																					
5-Dec	89.7	89.6	89.3	89.1	89.1	89.6	89.5	89.7	91.0	91.8	92.3	90.0	88.3	86.9	85.8	87.4	91.5	92.6	87.4	85.2	87.3	85.6	86.3	91.3	88.8	89.0	92.6																				
6-Dec	86.1	84.4	81.8	82.1	81.5	81.0	80.7	80.7	80.5	78.8	74.6	70.2	67.8	65.5	63.1	65.2	65.5	68.4	70.9	72.8	71.5	71.4	73.1	75.0	74.7	86.1																					
7-Dec	79.1	77.1	78.7	79.9	79.6	80.6	80.8	78.3	79.5	78.7	73.9	68.6	62.9	62.8	63.2	68.7	71.3	72.7	75.3	77.4	76.9	77.5	78.5	82.5	75.2	82.5																					
8-Dec	77.9	76.0	76.5	77.4	78.4	77.7	77.4	77.2	77.8	75.4	71.8	67.2	63.5	60.6	62.1	66.3	70.4	71.2	72.3	75.4	78.8	79.6	80.3	80.0	73.8	80.3																					
9-Dec	78.8	78.7	77.5	76.0	74.8	76.1	77.6	76.0	76.9	75.8	71.6	68.2	65.0	61.9	65.9	74.1	79.4	82.5	85.3	84.9	84.4	85.4	85.4	85.1	77.0	85.4																					
10-Dec	85.5	86.2	84.7	82.9	83.7	84.5	84.4	84.7	85.1	84.6	81.8	74.2	71.1	65.6	64.0	60.0	55.3	58.0	61.3	61.6	61.0	60.6	59.0	59.8	72.5	86.2																					
11-Dec	61.1	61.9	61.2	59.8	56.9	58.3	60.3	65.0	66.7	64.9	61.9	59.0	55.4	56.2	56.5	57.6	66.4	69.9	71.3	72.4	72.4	71.1	75.6	77.9	64.1	77.9																					
12-Dec	78.3	78.9	78.3	79.0	79.0	79.0	78.7	78.2	78.2	78.0	76.8	73.8	71.8	70.6	68.3	70.9	74.0	75.1	73.5	71.7	70.3	67.9	70.8	72.0	74.7	79.0																					
13-Dec	69.5	68.2	51.9	46.7	47.1	49.3	56.0	55.5	48.2	50.5	47.0	50.0	47.1	43.7	44.8	38.9	38.6	39.0	38.3	36.7	36.2	33.3	35.8	38.8	46.3	69.5																					
14-Dec	45.1	40.6	39.0	48.2	53.0	54.0	56.0	57.3	56.7	55.4	52.1	49.0	44.5	43.2	42.7	46.1	47.7	50.4	54.4	57.5	59.2	62.3	64.6	67.9	52.0	67.9																					
15-Dec	71.0	73.0	73.5	70.7	64.6	65.7	68.4	67.2	70.0	75.6	74.3	69.8	67.5	69.8	71.7	69.3	68.0	69.0	71.4	69.8	66.8	64.0	60.2	59.1	68.8	75.6																					
16-Dec	59.6	60.7	61.4	59.2	48.9	44.5	46.3	47.2	48.6	51.3	62.1	59.9	60.7	58.2	57.6	60.8	61.7	62.9	66.5	63.9	64.2	65.0	68.4	71.9	58.8	71.9																					
17-Dec	74.4	77.7	80.1	80.0	80.1	79.1	80.1	80.0	77.6	78.7	79.7	78.9	76.4	69.5	64.8	71.2	79.9	82.8	82.8	81.1	81.1	79.7	81.5	81.5	78.3	82.8																					
18-Dec	83.3	76.4	68.7	69.4	72.8	74.8	76.9	77.5	78.7	79.0	74.5	66.1	60.4	56.9	44.3	43.4	45.9	51.0	52.0	56.7	67.4	68.7	69.9	72.9	66.1	83.3																					
19-Dec	76.2	78.3	79.5	80.7	81.9	81.8	81.6	82.2	82.6	82.4	81.9	81.8	80.9	80.3	81.3	81.8	82.7	80.9	79.5	80.0	80.5	82.1	83.9	84.2	81.2	84.2																					
20-Dec	83.4	83.5	83.9	83.3	81.3	81.7	81.3	82.3	82.6	84.5	84.0	84.7	84.7	84.2	83.7	84.4	85.5	85.2	85.2	85.3	85.5	86.0	89.0	89.2	84.3	89.2																					
21-Dec	85.8	86.4	86.5	87.6	86.3	87.5	88.3	87.3	87.9	85.4	80.8	78.1	80.5	75.5	72.5	79.4	88.2	90.9	90.7	86.3	85.2	89.9	87.9	87.9	85.1	90.9																					
22-Dec	87.8	86.0	86.2	88.4	88.7	89.2	89.6	89.8	90.0	89.4	88.8	85.8	84.9	84.5	84.1	86.8	87.9	85.8	86.3	87.5	87.0	86.3	84.2	81.4	86.9	90.0																					
23-Dec	79.9	79.6	80.0	66.0	63.7	64.3	62.1	64.0	66.9	69.2	65.4	62.6	58.5	50.1	49.1	51.1	51.8	51.7	52.7	55.6	61.5	63.5	67.1	66.2	62.6	80.0																					
24-Dec	68.3	70.0	72.5	78.1	79.1	77.9	79.1	77.9	79.6	80.4	76.0	69.1	63.7	61.3	57.2	58.6	67.1	69.8	75.3	69.2	66.6	61.5	62.1	66.5	70.3	80.4																					
25-Dec	66.6	64.5	62.9	64.9	68.6	68.5	69.0	64.5	63.2	61.9	56.6	52.9	51.1	49.7	51.1	59.0	61.7	64.7	72.5	78.8	79.3	79.7	82.4	81.1	65.6	82.4																					
26-Dec	83.6	84.0	82.8	82.8	82.0	76.2	73.2	73.9	72.2	71.2	66.2	61.3	58.4	56.9	57.6	59.5	63.4	66.3	64.4	59.9	60.4	61.2	65.3	58.6	68.4	84.0																					
27-Dec	53.6	50.6	48.2	46.3	46.7	47.4	49.3	55.7	55.7	56.1	53.2	49.6	47.2	43.4	44.7	53.8	62.8	73.4	74.6	77.9	81.4	82.6	84.7	85.1	59.3	85.1																					
28-Dec	85.6	85.1	84.6	83.9	73.9	71.8	71.9	71.4	70.9	70.8	66.9	60.9	59.6	59.0	58.9	60.1	60.1	63.5	68.6	74.6	80.6	84.3	86.4	88.7	72.6	88.7																					
29-Dec	90.4	90.3	89.1	86.5	83.7	84.6	86.6	86.4	86.0	85.3	81.7	76.3	71.7	67.6	66.9	70.9	77.5	80.3	83.0	82.7	85.8	85.1	84.4	82.9	81.9	90.4																					
30-Dec	83.9	82.8	83.6	86.0	85.1	82.9	83.9	82.5	82.1	83.5	82.9	76.7	73.8	68.1	66.0	70.0	78.5	83.8	74.5	74.1	76.6	78.8	81.6	84.4	79.4	86.0																					
31-Dec	84.9	84.7	85.2	82.6	83.2	85.4	86.0	84.5	84.3	83.1	81.9	77.0	73.4	69.2	64.9	65.4	67.0	68.2	69.1	70.4	71.6	72.6	78.6	85.9	77.5	86.0																					
																						77.4	76.9	76.1	75.7	74.9	74.9	75.6	75.7	75.8	75.8	73.7	70.2	67.6	65.3	64.5	67.2	70.6	72.3	73.4	73.9	74.7	75.0	76.4	77.1	Diurnal Average	
																						90.4	90.3	89.3	89.1	89.1	89.6	89.7	91.0	91.8	92.3	90.0	88.3	86.9	85.8	87.4	91.5	92.6	90.9	90.7	88.9	91.2	91.6	91.3	89.9	Diurnal Maximum	



Wood Buffalo Environmental Association
Hourly Averages

Relative Humidity (RH) - %
Ells River - December 2023





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Relative Humidity (RH) - %
Ells River - December 2023

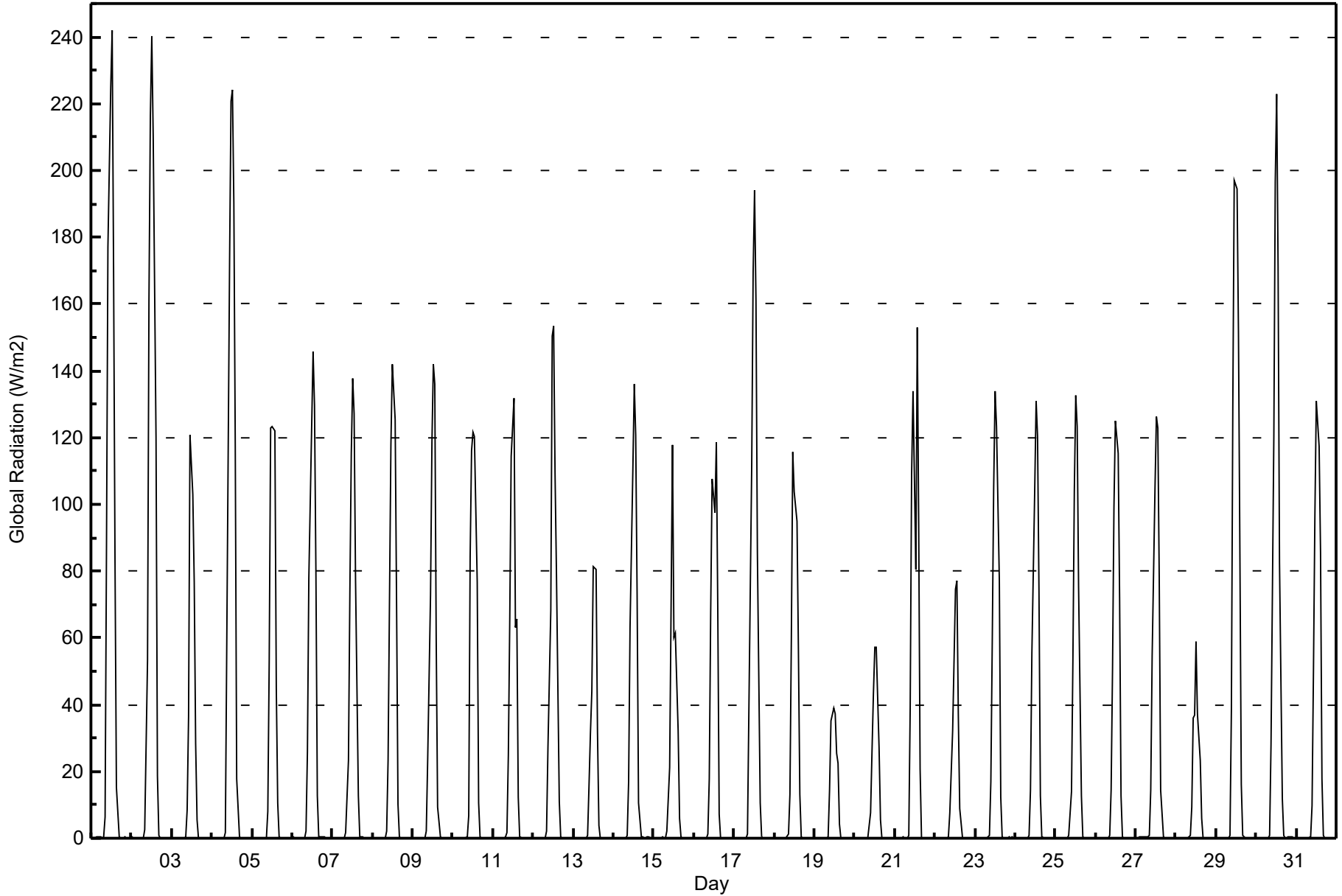
Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	10	1.34	1.34
40 - 60	105	14.11	15.46
60 - 80	329	44.22	59.68
80 - 100	300	40.32	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Maximum Value: 241.9 W/m2 on Dec 1 13:00 Maximum Daily Average: 42.6 W/m2 on Dec 2																						Hours in Service:	744			
Minimum Value: 0.0 W/m2 on Dec 2 03:00 Minimum Daily Average: 7.4 W/m2 on Dec 19																						Hours of Data:	744			
Maximum Diurnal Average: 131.7 W/m2 at hour 13 Minimum Diurnal Average: 0.0 W/m2 at hour 2																						Hours of Missing Data:	0			
Monthly Average: 22.86 W/m2 Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.0 Median = 0.1 Q ₃ = 13.2 P ₉₀ = 104.3 P ₉₉ = 204.5																						Hours of Calibration:	0			
																						Percent Operational Time:	100.0			
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Dec	0.1	0.0	0.0	0.2	0.3	0.3	0.2	0.2	6.6	87.5	177.0	224.8	241.9	170.4	83.8	15.1	0.4	0.2	0.2	0.1	0.2	0.2	0.2	0.2	42.1	241.9
2-Dec	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	2.3	53.4	160.8	216.4	240.4	210.0	120.1	18.5	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	42.6	240.4
3-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	8.7	36.4	121.0	103.1	76.9	28.4	5.5	0.0	0.0	0.2	0.2	0.0	0.0	0.0	0.0	15.9	121.0
4-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.6	58.4	173.4	220.7	224.2	190.3	117.2	17.6	0.4	0.1	0.2	0.1	0.0	0.0	0.0	0.0	41.8	224.2
5-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.1	53.5	122.8	123.1	122.0	44.9	10.8	0.4	0.0	0.1	0.0	0.2	0.1	0.0	0.1	20.3	123.1
6-Dec	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	2.1	26.0	78.2	123.2	145.7	129.8	79.5	12.6	0.6	0.3	0.3	0.2	0.1	0.0	0.1	0.2	25.0	145.7
7-Dec	0.2	0.0	0.1	0.0	0.0	0.1	0.0	0.1	1.9	23.4	73.7	115.2	137.7	127.2	77.4	12.7	0.6	0.2	0.3	0.2	0.1	0.1	0.2	0.0	23.8	137.7
8-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0	23.4	71.3	117.7	141.9	125.4	70.5	10.2	0.5	0.0	0.1	0.1	0.1	0.1	0.2	0.1	23.5	141.9
9-Dec	0.2	0.1	0.1	0.1	0.0	0.2	0.1	0.2	2.0	23.6	72.9	118.7	141.8	136.1	60.0	9.2	0.4	0.1	0.0	0.0	0.0	0.0	0.0	0.0	23.6	141.8
10-Dec	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.2	6.7	84.5	116.1	121.5	120.4	76.9	10.7	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	22.4	121.5
11-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2	1.7	25.1	65.6	114.4	131.7	63.3	65.7	12.5	0.3	0.2	0.0	0.0	0.0	0.2	0.1	0.1	20.1	131.7
12-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.3	27.5	68.1	150.3	153.3	109.4	79.2	10.9	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	25.1	153.3
13-Dec	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.9	15.5	31.4	44.2	81.3	80.4	31.8	3.9	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	12.1	81.3
14-Dec	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.1	0.9	17.0	63.0	110.4	136.0	120.9	73.1	10.7	0.4	0.2	0.1	0.2	0.2	0.2	0.2	0.1	22.2	136.0
15-Dec	0.1	0.0	0.0	0.0	0.1	0.2	0.1	0.0	2.2	21.2	68.7	117.7	60.1	61.3	32.3	6.1	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15.4	117.7
16-Dec	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	1.3	17.9	67.9	107.8	97.5	118.6	69.0	7.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.3	118.6
17-Dec	0.0	0.0	0.2	0.2	0.2	0.2	0.1	0.2	1.4	38.7	111.7	169.5	194.0	161.0	85.7	10.5	0.3	0.0	0.0	0.0	0.0	0.0	0.1	0.1	32.2	194.0
18-Dec	0.0	0.0	0.2	0.0	0.1	0.0	0.0	0.1	1.1	13.3	59.8	115.7	103.8	94.8	56.3	13.2	0.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0	19.1	115.7
19-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	14.6	35.2	39.2	37.1	25.6	22.3	4.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.4	39.2
20-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	7.6	25.8	43.4	57.3	57.0	26.9	5.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.3	57.3
21-Dec	0.0	0.0	0.2	0.1	0.1	0.2	0.2	0.2	0.9	39.3	108.7	133.8	80.6	153.1	93.7	20.7	0.1	0.0	0.0	0.1	0.2	0.0	0.0	0.1	26.3	153.1
22-Dec	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	7.7	32.2	53.5	74.5	77.1	37.2	8.8	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.2	12.2	77.1
23-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	17.2	59.0	105.1	133.7	123.2	77.0	12.4	0.5	0.0	0.1	0.1	0.2	0.2	0.2	0.2	22.1	133.7
24-Dec	0.2	0.0	0.2	0.1	0.0	0.0	0.0	0.0	0.8	14.3	55.6	104.4	130.7	120.2	74.7	12.7	0.6	0.1	0.0	0.1	0.2	0.1	0.1	0.1	21.5	130.7
25-Dec	0.1	0.1	0.0	0.1	0.1	0.0	0.0	0.0	0.7	14.1	53.8	104.1	132.5	123.4	75.4	12.8	0.4	0.2	0.2	0.0	0.0	0.1	0.0	0.0	21.6	132.5
26-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.1	0.8	14.3	51.0	99.0	124.9	115.1	71.6	12.8	0.4	0.0	0.0	0.0	0.1	0.1	0.1	0.0	20.4	124.9
27-Dec	0.1	0.2	0.2	0.2	0.2	0.3	0.2	0.2	0.7	14.3	54.7	104.5	126.1	122.8	77.9	14.4	0.6	0.0	0.1	0.0	0.0	0.0	0.0	0.0	21.6	126.1
28-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	9.3	35.9	36.7	58.8	37.1	23.5	6.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.7	58.8
29-Dec	0.0	0.1	0.0	0.0	0.1	0.1	0.0	0.0	0.8	38.6	129.2	197.2	194.5	151.3	85.8	16.1	0.7	0.1	0.0	0.2	0.1	0.1	0.0	0.0	34.0	197.2
30-Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	28.1	120.5	196.5	223.1	171.1	82.7	11.8	0.7	0.0	0.1	0.2	0.2	0.2	0.2	0.0	34.8	223.1
31-Dec	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.5	9.7	49.8	96.2	130.9	117.5	85.5	17.9	0.9	0.0	0.1	0.1	0.0	0.0	0.0	0.0	21.2	130.9
																								Diurnal Average		
																								Diurnal Maximum		





Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed (WS) - km/h

Ells River - December 2023

Maximum Speed: 23 km/h on Dec 15 19:00	Maximum Daily Speed Average: 13.2 km/h on Dec 15	Hours in Service: 744
Minimum Speed Value: 1 km/h on Dec 3 18:00	Minimum Daily Speed Average: 0.2 km/h on Dec 3	Hours of Data: 741
Maximum Diurnal Speed Average: 7.6 km/h at hour 14	Minimum Diurnal Speed Average: 4.7 km/h at hour 23	Hours of Missing Data: 3
Monthly Average Velocity: 6.3 km/h 203.9 deg	Percentiles: P ₁ = 1 P ₁₀ = 4 Q ₁ = 7 Median = 9 Q ₃ = 12 P ₉₀ = 14 P ₉₉ = 21	Percent Operational Time: 99.6

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Dec	W3	SSW3	SSW3	SSW5	S5	SSW4	S5	S6	S6	S8	S11	SSE10	S10	S10	S9	SSE9	S8	SSW7	SW6	SSW7	SSW7	SSW8	SSW8	SSW9	S6.5	S11	
2-Dec	SSW8	SSW7	S8	SSW7	SSW8	SW6	SSW6	SSW6	SW5	SSW6	SSW7	SSW8	S10	S10	SSW6	WNW5	WNW5	NNW7	N8	NW6	NW6	NW5	N6	N5	SW3.5	S10	
3-Dec	N6	WNW4	NW1	UO	N6	NNE7	WNW4	NNW4	NW4	NNE3	NNW1	N1	SSE2	SE5	ESE1	NE1	E1	SW1	S4	SSW3	S3	S5	S6	S4	WNW0.2	NNE7	
4-Dec	S7	S8	S9	S10	S13	S12	SSE13	S11	S13	SSW13	SSW15	SSW7	SSW8	SSW7	S6	SSE7	S6	SW9	SSW8	S8	S7	S8	SSE7	S8	S8.8	SSW15	
5-Dec	S9	S6	S6	SSE5	W3	S2	W2	W1	SSW5	S9	S8	SSW8	S9	S14	S13	S12	SSW12	SW16	SW15	WSW7	SSW10	S8	SSE10	S10	SSW7.6	SW16	
6-Dec	SSW8	SW11	SW13	SW13	SW16	SW16	SW16	SW16	SW12	SW10	SW13	SW12	SW15	SW14	SW12	SW9	SSW10	SW7	SSW11	SSW9	SW13	SW11	SW10	SW5	SW11.6	SW16	
7-Dec	S11	SW13	SW12	SW13	SW12	SW7	SW9	SW10	SW11	SW12	SSW13	S11	SSW9	SSW10	SSW9	SSW10	SSW13	SSW10	SSW7	SW9	SW11	SW11	SSW6	S7	SSW9.9	SW13	
8-Dec	SW11	SW14	SW12	SW13	SW11	WSW13	SW12	SW12	SW11	SW12	WSW15	SW12	SW10	SSW9	SSW8	SW10	SW9	SW11	SW10	SW10	SSW11	SSW11	SSW9	SSW13	SW11.0	WSW15	
9-Dec	SSW12	SSW10	SW10	SW9	SW12	SSW11	SSW10	SSW8	SSW12	S12	SSW14	SSW15	SSW14	SSW13	S11	S8	S9	S9	S7	SSW6	SSW4	S7	SSW5	SSW4	SSW9.4	SSW15	
10-Dec	W3	SW3	SSW4	S4	S10	SSW8	SSW8	S8	S8	SSW8	SSW7	SSW12	SSW11	SW15	SW12	W14	W20	W18	WNW13	WNW14	WNW18	WNW23	WNW23	WNW18	WSW8.5	WNW23	
11-Dec	NW22	NW22	NW17	WNW20	WNW21	W14	SW6	S11	SSW10	SW11	SW11	SSW8	SSW9	S8	S10	S8	SSE8	S7	S9	S7	S7	S8	S11	S7	SW6.2	NW22	
12-Dec	SSE9	S10	SSE7	S8	S7	S7	S7	S8	S11	S10	S9	S9	S11	S10	SSW8	SW7	SW8	SSW9	SSW9	SSW8	S4	SSW9	SSE10	SSE11	S8.3	SSE11	
13-Dec	SSE10	SSE8	SW9	SW10	SSW14	S10	SSE9	S10	SSW10	SSW7	S7	S5	S6	SSE9	S9	S12	S14	S13	SSW8	W9	SSW9	W9	W10	W7	SSW7.9	S14	
14-Dec	WNW10	WNW8	WSW5	SW9	WSW11	WSW13	WSW12	SW13	WSW16	WSW16	WSW14	WSW14	SW9	SSE11	S12	SSW11	SW12	SW9	SW8	SW7	SSW7	SSW10	S11	S10	SW9.3	WSW16	
15-Dec	SSE9	SSE11	S11	S12	SSW13	SSW11	SSW8	SSW10	S7	S8	S10	S11	S16	S17	SSE18	S17	S17	S22	SSW23	SSW17	SSW20	SW18	SW15	SW13	S13.2	SSW23	
16-Dec	SW15	SW13	SW11	SW11	WNW19	WNW16	W15	W16	W15	NNW12	NE13	ENE9	ENE10	ENE10	ENE8	E4	ENE7	ESE4	NNE4	NNW1	S4	SSW5	SE2	NNE8	WNW2.7	WNW19	
17-Dec	N15	N10	NW3	SSW4	S6	SE5	SSE7	SSE6	SSW4	S8	SSE9	SSE10	SSE10	SSW9	SSW7	SE6	SSE8	SSE6	S7	SSW5	SSW8	S7	S5	SW4	S4.4	N15	
18-Dec	S6	SW9	SW12	SW13	SW12	SW10	SW12	SW11	SSW12	SSW14	SW11	SSW12	SW12	SW11	WNW13	W8	WSW8	SW4	W9	S6	NNE17	NNE19	NNE19	NNE19	WSW5.1	NNE19	
19-Dec	NNE17	NNE13	N12	N11	NNW8	NNW10	NNW9	N7	N7	UO	NW2	N6	NE4	NNE5	N7	NNE7	NNE7	NE7	NE5	NE5	E5	ESE8	ESE6	ESE7	NNE5.9	NNE17	
20-Dec	ESE9	SE12	SE17	SSE14	SSE20	SSE19	SSE18	SSE16	SSE13	SSE11	SSE14	SSE10	S7	SSE8	SSE8	SSE8	SSE9	S12	S12	SSE13	SSE11	S5	WSW4	SSW8	SSE10.9	SSE20	
21-Dec	SW14	SW14	SW11	SW9	SW11	SSW8	SSW11	SSW8	S9	SW10	SW9	SSW7	S8	S7	SSE3	S5	WNW2	WSW2	SW4	S11	SW2	SSW5	SSW6	SSW7	SSW7.2	SW14	
22-Dec	SSW7	SW8	SW6	S10	S9	S8	S8	SSW7	SW6	SSW6	S7	SSW8	SSW8	SSW7	SSW6	SSW4	SSW8	SSW9	SSW8	S10	S11	S14	SSW10	SSW14	SSW8.0	S14	
23-Dec	SW13	SW14	WSW11	W18	W15	W13	WSW14	W11	WSW9	WSW10	WSW13	WSW16	WSW15	W17	W17	W16	W12	WSW12	SW9	SW9	S12	S11	SSW13	SSW12	WSW11.7	W18	
24-Dec	SSW10	WSW13	SSW10	SSW9	S9	SSW6	SSW5	SSW8	SSW8	SSW9	S9	SSW8	SW7	SSW10	SSW9	S9	SSE8	SSE8	SSE8	S8	SSW13	S11	SSW13	S9	S9	SSW8.7	SSW13
25-Dec	S12	SSW11	S13	S13	S13	S12	S13	S13	S11	S12	S12	S11	S13	S12	SSE10	SSE9	SSE9	S9	SSE6	SSE9	SSE8	S7	S8	SW3	S10.2	S13	
26-Dec	S1	S3	WNW3	SW1	SSW4	SSW13	SSW12	S12	S11	S12	S13	S14	S13	S13	SSE14	S11	SSE11	SSE9	S11	SSW11	SSW13	SSW14	SSE12	SW13	S9.7	SSW14	
27-Dec	SW13	SSW14	SSW16	SSW14	SSW12	SSW10	S8	SSW4	WSW6	SW6	SW7	WSW6	S6	SSW6	SSE2	ESE3	SSE5	NW3	SSW1	UO	WNW4	W3	WNW2	WNW6	SW5.7	SSW16	
28-Dec	WNW7	WNW2	NW2	N8	N16	NNE11	NNE10	NNE9	N7	N10	NNE17	NNE21	NNE18	N14	N8	NNE5	NNE4	NNE10	NNE8	NNE9	NNE11	NNE5	N3	W3	N8.5	NNE21	
29-Dec	SSW2	WSW2	SW6	SSW7	SSW9	S10	S10	S10	S10	SSE10	SSE13	SSE11	SSE12	SSE12	SSE9	SSE8	SE7	SSE7	SSE6	S6	WNW3	SW2	S5	S5	S6.8	SSE13	
30-Dec	S7	S7	S6	S9	SSW7	S7	S7	S5	S3	SSE6	SSE6	S3	SSW7	S8	SSW5	SSW5	S5	SSW6	S12	S11	S12	SSW10	SSW9	S11	S7.2	S12	
31-Dec	SSW10	S11	S13	S15	S13	S11	S13	S13	S15	S16	S12	S12	S12	SSW12	SW13	SSW13	SW11	SW9	SW8	SW7	SW10	WSW8	N4	SE4	SSW9.9	S16	

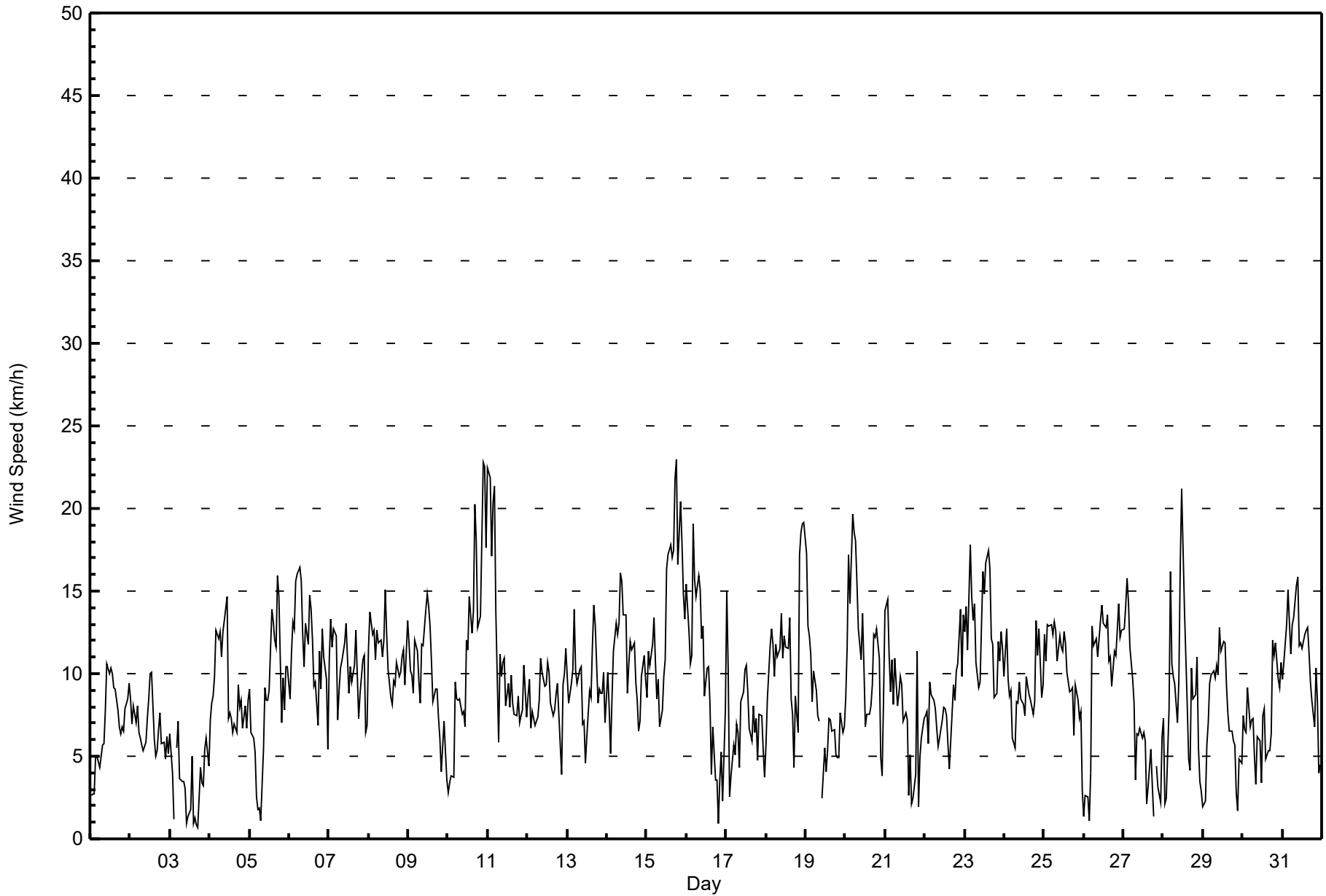
SW4.8 SW6.0SSW6.4 SW7.1 SW7.2SSW6.6SSW7.0SSW7.2SSW7.5SSW7.3SSW6.7 S7.4 S7.6SSW6.3SSW5.7SSW5.9SSW6.0SSW6.0SSW6.2SSW5.6SSW5.8SSW4.7SSW4.7	Diurnal Average
NW22 NW22 SE17WNW20WNW21 SSE19 SSE18 W16WSW16 S16 NNE17 NNE21 NNE18 S17 SSE18 S17 W20 S22 SSW23 SSW17 SSW20WNW23WNW23 NNE19	Diurnal Maximum

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 - December 2023





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h
Ells River - December 2023**

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	116	15.65	15.65
6 - 11	416	56.14	71.79
12 - 19	197	26.59	98.38
20 - 28	12	1.62	100.00
29 - 38	0	0.00	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 741

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Wind Speed (WS) - km/h
Ells River - December 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	4	6	4	0	3	3	4	5	22	23	11	4	7	10	7	3	116
6 - 11	14	11	1	5	0	4	2	49	130	109	64	10	7	4	2	4	416
12 - 19	4	8	1	0	0	0	2	14	49	36	47	14	13	7	1	1	197
20 - 28	0	1	0	0	0	0	0	1	1	2	0	0	1	4	2	0	12
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	22	26	6	5	3	7	8	69	202	170	122	28	28	25	12	8	741

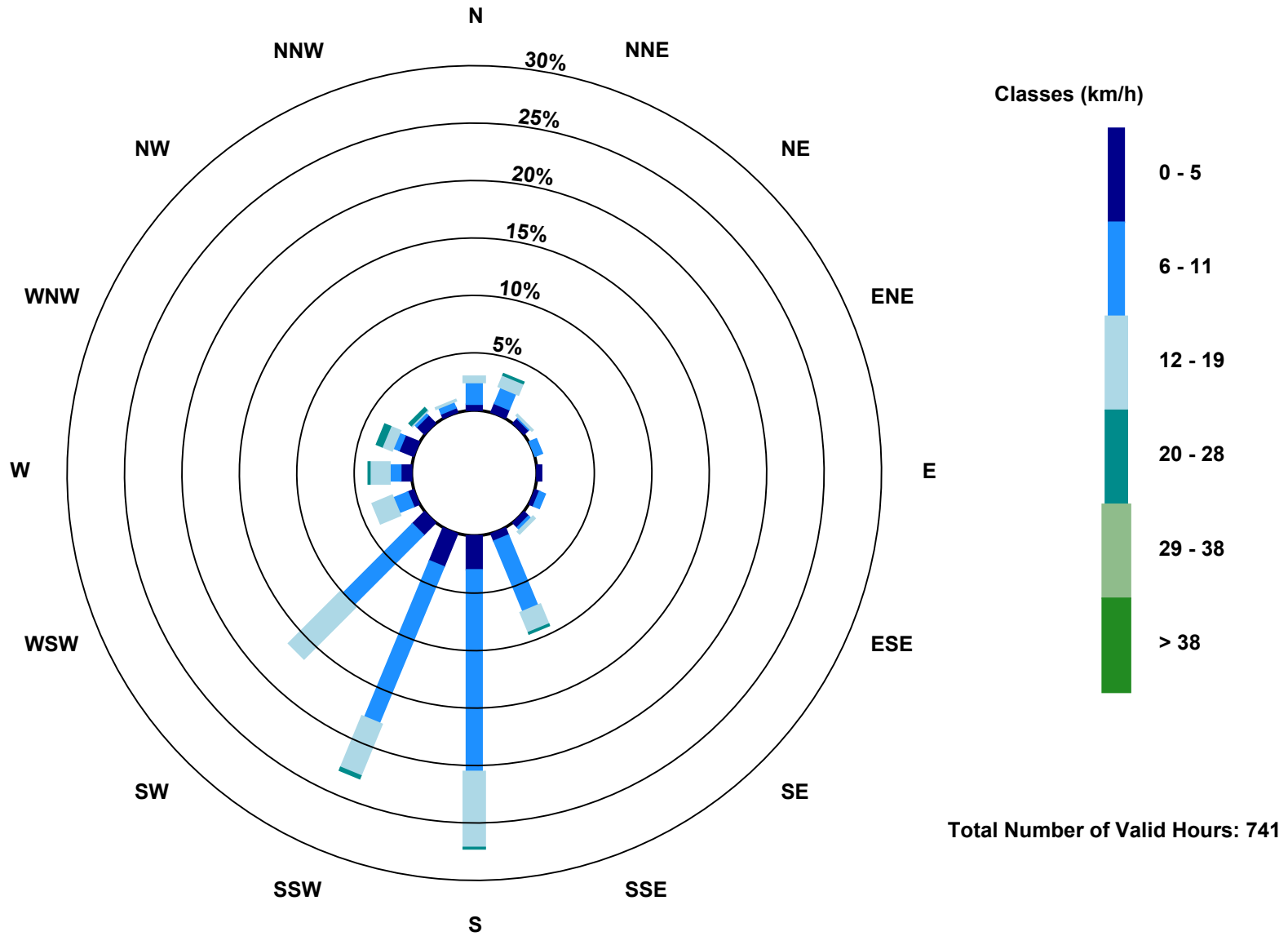
Total Number of Valid Hours: 741

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Dec 2023

Wind Speed (WS) - km/h
Ells River





Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Speed (WS) - km/h
Ells River - December 2023

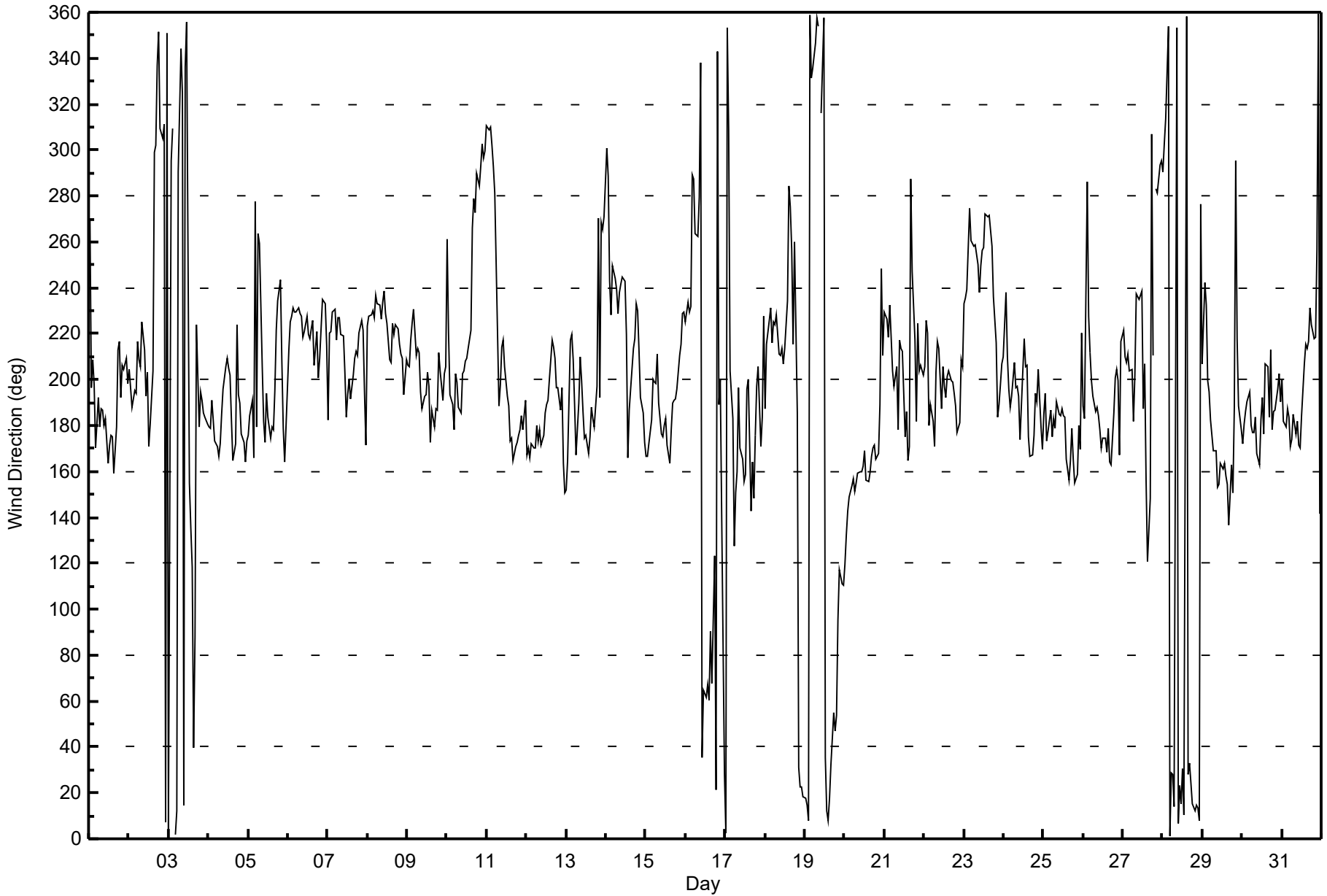
Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 8 km/h on Dec 16 05:00 Minimum Value: 1 km/h on Dec 19 12:00 Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 1 Median = 2 Q ₃ = 3 P ₉₀ = 4 P ₉₉ = 6																	Hours in Service: 744 Hours of Data: 741 Hours of Missing Data: 3 Hours of Calibration: 0 Percent Operational Time: 99.6								
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Dec	1	1	1	2	1	1	2	1	2	2	2	2	2	2	2	1	2	1	1	2	1	1	1	1	2
2-Dec	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	1	1	3	2	1	1	1	1	1	1
3-Dec	1	1	1	UO	1	1	1	1	1	2	1	1	2	1	1	1	1	1	2	2	1	1	2	2	
4-Dec	1	1	1	2	2	2	1	2	2	2	3	3	2	2	1	1	1	2	1	1	2	2	1	1	
5-Dec	1	1	1	2	1	2	1	2	2	2	2	2	3	3	3	1	2	4	5	3	3	2	2	2	
6-Dec	3	3	3	3	4	4	4	4	3	3	3	3	4	4	3	2	3	2	2	3	3	3	3	2	
7-Dec	4	2	2	3	3	3	3	4	3	2	2	2	3	2	2	2	2	2	2	2	2	2	2	1	
8-Dec	3	3	3	3	3	3	3	2	2	2	3	3	2	2	2	2	2	3	3	3	3	2	2	3	
9-Dec	4	2	3	2	3	3	2	2	2	2	3	3	3	4	2	1	1	1	1	1	1	2	2	2	
10-Dec	1	2	2	1	2	1	2	1	1	2	2	3	3	3	3	5	7	5	5	5	6	5	6	5	
11-Dec	5	5	4	6	4	5	2	3	2	2	2	2	2	2	2	2	1	2	1	3	2	1	1	1	
12-Dec	1	2	1	1	1	1	1	2	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
13-Dec	1	1	2	2	3	2	1	2	3	1	2	2	3	2	1	2	3	2	3	7	4	3	3	2	
14-Dec	2	3	2	2	3	3	3	4	5	4	4	4	3	2	2	2	2	2	2	1	2	2	2	1	
15-Dec	1	1	2	2	4	2	2	2	3	1	2	4	4	3	3	5	4	5	5	4	6	5	4	4	
16-Dec	4	4	2	3	8	5	4	4	4	4	3	2	2	2	1	2	1	2	2	2	2	1	1	3	
17-Dec	3	3	2	2	1	2	1	1	3	1	1	2	2	3	3	2	2	1	1	2	2	2	1	1	
18-Dec	2	3	3	3	3	3	3	3	3	3	3	3	3	3	5	3	2	2	3	1	6	3	5	4	
19-Dec	3	2	3	3	1	2	1	2	1	UO	1	1	1	1	1	1	1	1	1	1	1	1	1	2	
20-Dec	2	3	3	4	5	4	4	3	3	2	3	2	2	2	1	1	2	2	3	2	2	3	1	3	
21-Dec	4	3	2	2	2	3	2	2	2	3	2	2	1	1	2	3	2	2	3	1	3	2	1	2	
22-Dec	2	2	2	2	2	2	1	2	2	1	1	1	2	1	1	2	2	1	2	1	2	2	3	4	
23-Dec	4	4	3	7	4	4	5	3	3	2	3	4	4	5	5	4	3	3	2	2	2	2	3	7	
24-Dec	2	3	2	1	1	3	2	1	1	1	1	2	2	3	3	2	2	2	3	1	2	3	1	1	
25-Dec	2	2	3	3	3	3	2	3	1	2	3	2	2	2	2	1	1	1	1	1	2	2	2	3	
26-Dec	1	2	1	1	2	2	1	1	1	1	2	3	2	3	3	2	1	1	2	3	3	3	2	4	
27-Dec	3	3	4	4	3	2	2	2	2	1	2	2	2	2	3	2	2	2	1	UO	1	1	2	1	
28-Dec	2	2	2	3	3	3	2	2	3	1	5	4	3	4	2	2	1	2	2	2	2	2	2	5	
29-Dec	2	2	1	1	1	1	1	1	1	2	2	2	2	2	2	1	2	3	1	2	1	1	2	1	
30-Dec	1	1	1	2	1	2	2	1	2	1	1	2	2	2	1	1	1	3	1	1	1	1	1	1	
31-Dec	2	1	3	3	3	2	2	2	3	4	2	2	2	3	3	3	3	3	2	3	2	2	3	1	
																	Diurnal Maximum								
UO - Unstable Operation																									



Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
Ells River - December 2023

Direction of Maximum Speed: 192 deg on Dec 15 19:00																				Hours in Service: 744							
Direction of Maximum Daily Speed Average: 191.1 deg on Dec 15																				Hours of Data: 741							
Direction of Minimum Speed: 224 deg on Dec 3 18:00										Direction of Minimum Daily Speed Average: 0.2 deg on Dec 3										Hours of Missing Data: 3							
Monthly Average Direction: 203.9 deg																								Percent Operational Time: 99.6			
Day	Hourly Period Ending At (MST)																								Daily Average		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Dec	270	196	209	198	170	192	179	187	187	180	183	164	172	176	175	159	179	213	217	192	206	204	209	198	187.8		
2-Dec	205	196	188	195	194	216	208	205	225	213	193	203	171	180	204	299	302	337	351	310	305	311	7	351	223.3		
3-Dec	3	295	309	UO	2	12	291	344	324	15	336	356	155	136	118	40	88	224	180	195	191	186	183	180	293.7		
4-Dec	179	179	191	182	173	171	167	172	185	196	206	209	205	202	183	165	172	224	193	190	176	173	164	173	184.7		
5-Dec	176	185	191	166	278	179	264	260	206	182	172	194	183	174	180	178	195	221	234	243	208	179	164	180	192.9		
6-Dec	213	225	227	231	230	229	231	229	227	219	221	228	220	218	222	226	206	221	201	209	222	235	233	215	223.4		
7-Dec	183	220	221	229	231	217	227	227	220	219	203	184	194	200	192	202	209	212	211	220	225	221	195	172	211.1		
8-Dec	224	227	228	230	227	237	233	233	226	234	238	229	224	209	207	225	220	224	222	215	211	209	193	209	223.3		
9-Dec	206	206	217	225	231	211	213	212	195	187	193	194	203	197	173	187	179	187	187	212	204	191	203	206	200.4		
10-Dec	261	220	194	189	178	203	199	188	186	203	204	208	209	214	222	266	279	273	290	284	293	303	297	299	253.5		
11-Dec	310	309	310	302	293	281	220	188	197	214	217	206	193	189	173	175	165	171	173	176	178	184	178	191	234.0		
12-Dec	167	170	166	172	170	170	180	174	178	171	175	185	189	191	200	217	214	209	197	197	187	197	164	151	182.3		
13-Dec	152	165	217	220	209	189	167	190	210	199	186	175	176	168	175	188	183	179	197	270	192	269	265	271	198.3		
14-Dec	301	289	243	228	250	244	239	229	238	241	245	243	220	166	187	196	214	218	233	230	212	192	185	172	225.6		
15-Dec	167	167	172	183	200	199	198	211	190	176	175	180	183	172	164	178	190	191	192	196	210	216	229	230	191.1		
16-Dec	225	234	229	232	289	287	263	262	279	338	36	65	62	67	60	90	67	123	21	343	189	200	141	28	285.5		
17-Dec	2	353	308	204	183	127	151	160	197	170	166	156	159	196	200	143	164	148	176	197	205	171	184	228	172.3		
18-Dec	188	215	226	231	216	225	224	228	211	210	214	207	214	234	284	275	257	215	260	186	31	22	23	19	240.2		
19-Dec	18	15	8	359	331	335	347	358	354	UO	316	358	35	12	8	18	32	55	47	54	95	117	111	110	18.8		
20-Dec	120	132	143	149	154	157	151	155	159	160	160	162	169	156	155	160	167	170	172	165	168	189	248	210	159.0		
21-Dec	229	226	219	233	219	204	197	206	178	217	214	212	175	186	164	171	287	247	217	182	225	204	206	202	208.0		
22-Dec	205	226	220	180	189	182	171	203	216	213	188	205	197	192	201	204	200	199	194	189	177	181	209	205	196.2		
23-Dec	233	236	239	274	260	259	258	259	250	238	250	256	257	272	271	271	265	258	236	216	184	189	198	207	247.2		
24-Dec	210	238	210	196	188	193	207	196	197	193	174	204	218	206	206	175	167	167	176	194	190	204	180	170	195.0		
25-Dec	185	194	173	178	187	175	183	179	190	185	185	187	184	184	165	156	165	179	166	155	159	180	169	220	178.3		
26-Dec	188	183	286	228	212	199	193	186	188	184	178	170	174	175	168	179	164	163	186	201	205	199	167	216	185.5		
27-Dec	221	210	208	211	204	205	182	202	238	236	235	238	187	207	156	121	148	307	211	UO	283	281	294	295	215.9		
28-Dec	291	303	313	354	1	28	28	14	353	7	23	15	31	10	358	28	33	24	16	12	15	13	8	277	11.2		
29-Dec	207	242	233	200	194	183	169	169	169	153	154	164	161	164	158	154	136	163	151	188	295	218	188	178	171.2		
30-Dec	172	180	186	190	194	180	177	177	184	168	163	183	192	176	207	205	184	213	178	186	187	196	202	190	186.4		
31-Dec	200	182	179	188	184	171	174	185	176	182	172	171	184	207	215	213	217	231	224	218	218	257	359	142	193.8		
216.7 218.3 212.5 215.4 218.1 209.5 202.7 204.2 206.5 201.0 195.3 196.8 190.1 190.8 193.7 195.7 197.3 205.8 203.6 204.2 205.6 209.4 201.9 204.2																											
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 (WD) - deg
Ells River - December 2023

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 96 deg on Dec 3 15:00 Minimum Value: 5 deg on Dec 15 01:00 Percentiles: P ₁ = 6 P ₁₀ = 9 Q ₁ = 11 Median = 15 Q ₃ = 20 P ₉₀ = 34 P ₉₉ = 76																	Hours in Service: 744 Hours of Data: 741 Hours of Missing Data: 3 Hours of Calibration: 0 Percent Operational Time: 99.6								
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Dec	30	27	24	20	19	14	20	11	16	11	13	11	11	13	10	8	13	18	16	18	8	9	9	8	30
2-Dec	11	18	10	11	11	14	21	21	13	12	12	13	13	13	25	12	9	30	16	18	23	21	14	16	30
3-Dec	9	30	44	UO	29	11	34	39	25	27	76	62	93	20	96	68	87	64	20	16	30	10	32	26	96
4-Dec	11	9	10	9	10	9	8	9	13	13	22	16	15	16	10	15	14	16	11	12	10	10	9	22	
5-Dec	10	14	16	34	63	78	63	88	29	11	20	18	16	14	13	8	14	18	31	44	20	31	13	12	88
6-Dec	14	18	19	18	18	18	17	16	17	18	18	19	17	18	18	20	25	30	12	19	17	19	24	44	44
7-Dec	19	16	14	16	16	23	21	20	12	13	12	14	17	12	11	15	12	14	14	17	15	15	31	21	31
8-Dec	15	15	15	14	17	15	15	13	14	14	12	13	16	19	18	17	16	18	19	17	16	16	15	12	19
9-Dec	18	16	16	19	15	15	19	20	11	12	14	13	16	13	11	10	9	7	8	15	19	13	20	29	29
10-Dec	42	42	51	35	11	9	9	9	15	23	25	18	17	18	20	25	19	19	27	26	19	11	13	17	51
11-Dec	12	12	13	13	12	18	38	18	20	11	13	19	17	15	10	12	9	7	7	5	11	7	9	12	38
12-Dec	8	8	8	17	12	13	9	10	14	16	15	14	13	11	13	16	15	13	15	20	44	7	16	10	44
13-Dec	10	20	17	17	14	13	9	24	22	15	26	24	27	23	15	10	11	14	44	39	58	28	22	24	58
14-Dec	15	17	29	25	18	18	19	18	18	18	19	19	26	15	11	19	15	16	17	20	16	11	13	6	29
15-Dec	5	6	8	14	16	14	12	19	31	13	11	21	13	10	10	14	12	13	13	15	17	19	22	20	31
16-Dec	18	19	19	20	18	16	19	17	21	36	17	21	11	12	12	41	10	51	41	69	23	17	60	9	69
17-Dec	12	14	59	37	28	22	11	21	50	12	10	11	11	29	40	25	9	9	18	10	13	8	17	36	59
18-Dec	34	17	18	16	16	20	19	25	19	15	18	16	16	20	18	22	15	66	25	29	44	12	12	9	66
19-Dec	8	7	12	13	17	11	9	8	13	UO	24	13	19	11	6	6	9	14	11	11	21	12	11	13	24
20-Dec	12	11	10	10	11	11	10	11	12	11	11	12	19	14	11	11	12	12	12	10	11	37	20	20	37
21-Dec	18	16	16	18	19	20	13	19	22	19	19	23	15	12	64	54	57	52	54	7	71	58	23	21	71
22-Dec	16	17	22	10	16	20	19	21	18	18	17	13	12	11	14	41	14	15	15	13	11	12	22	17	41
23-Dec	22	19	23	20	18	21	20	22	21	18	19	18	20	19	18	18	18	16	20	30	9	23	13	16	30
24-Dec	16	14	18	11	10	19	24	11	10	11	14	20	23	17	21	24	8	10	11	7	10	12	12	6	24
25-Dec	7	14	13	10	13	10	10	12	12	10	15	15	13	11	25	10	9	9	14	8	15	15	18	47	47
26-Dec	72	69	66	79	45	8	9	8	8	7	10	11	12	12	10	11	7	8	16	15	17	14	13	29	79
27-Dec	21	15	16	17	14	13	9	34	15	15	17	24	35	23	74	68	13	17	62	UO	18	26	74	13	74
28-Dec	6	90	62	39	16	18	17	11	29	11	9	9	11	13	15	38	34	11	15	20	14	19	43	55	90
29-Dec	62	33	20	16	12	8	8	8	7	6	7	9	10	10	10	7	19	21	15	52	35	34	12	11	62
30-Dec	15	10	12	6	9	6	12	12	34	14	13	21	14	12	23	15	9	22	6	6	6	7	9	7	34
31-Dec	12	14	10	12	12	8	7	11	9	12	11	12	14	16	17	15	17	24	21	46	15	21	62	28	62
Diurnal Maximum																									
72 90 66 79 63 78 63 88 50 36 76 62 93 29 96 68 87 66 62 69 71 58 74 55																									
UO - Unstable Operation																									



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

**AMS501
LEISMER
DECEMBER 2023**

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

January 31, 2024

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - LEISMER (AMS501)
DECEMBER 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	710	34	34	100	29.9	0	8	0
H2S (ppb) Average	708	36	36	100	0.9	0	0.3	0
NO2 (ppb) Average	707	37	37	100	19.2	0	8.3	-
NO (ppb) Average	707	37	37	100	30.2	-	5.9	-
NOX (ppb) Average	707	37	37	100	48.9	-	14.2	-
Temperature 2 m (C) Average	744	0	0	100	5.1	-	0.6	-
Relative Humidity (%) Average	744	0	0	100	95.9	-	91.2	-
Wind Speed 10 m (km/h) Average	742	0	2	99.73	36	-	23	-
Wind Direction 10 m (deg) Average	742	0	2	99.73	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - LEISMER (AMS501)
DECEMBER 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	710	0.98	3	-	0	0	0.1	0.2	0.5	1.6	29.9
H2S (ppb) Average	708	0.1	0.1	-	0	0	0.1	0.1	0.1	0.2	0.9
NO2 (ppb) Average	707	2.59	2.4	-	0.1	0.6	1	1.9	3.2	5.3	19.2
NO (ppb) Average	707	0.63	2.3	-	0	0	0	0	0.3	1.2	30.2
NOX (ppb) Average	707	3.21	4.3	-	0.1	0.6	1	2.1	3.5	6.1	48.9
Temperature 2 m (C) Average	744	-5.19	4.3	-	-17.9	-11	-8.3	-5.2	-1.9	0.4	5.1
Relative Humidity (%) Average	744	75.42	13.3	-	29.8	56.1	66.2	77.3	87.3	90	95.9
Wind Speed 10 m (km/h) Average	742	9	6	-	0	3	5	7	11	18	36
Wind Direction 10 m (deg) Average	742	228.3	0	-	0	-	-	-	-	-	0

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - LEISMER (AMS501)
DECEMBER 2023

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
Wind Speed, Wind Direction	01 Dec 2023 06:00	01 Dec 2023 07:00	2	Flat line in sensor output signal - Sensor frozen



Wood Buffalo Environmental Association

Summary of Hour Averages

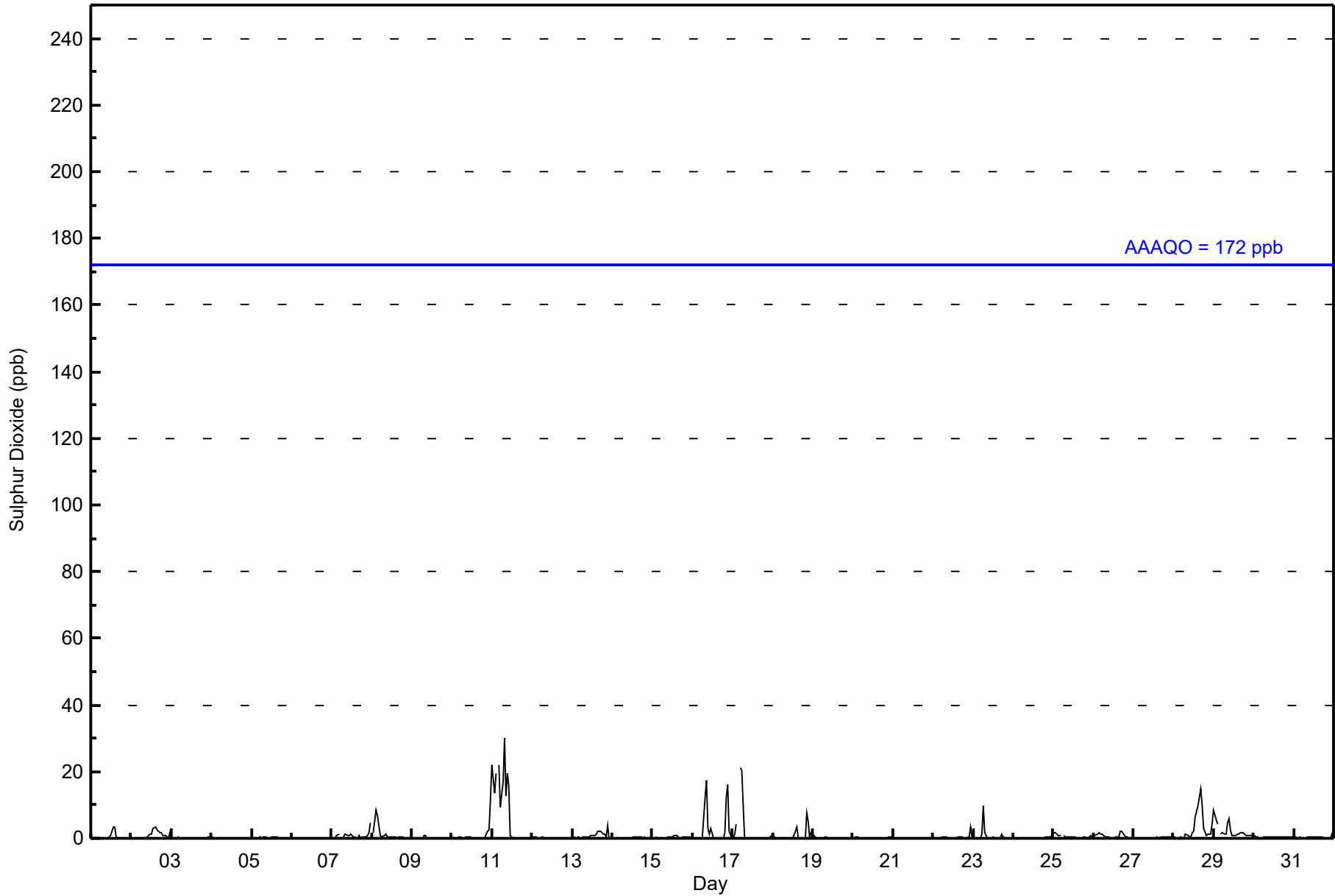
Sulphur Dioxide (SO₂) - ppb

Leismer - December 2023

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 29.9 ppb on Dec 11 08:00	Maximum Daily Average: 8.0 ppb on Dec 11		Hours of Data:	710
Minimum Value: 0.0 ppb on Dec 1 01:00	Minimum Daily Average: 0.0 ppb on Dec 6		Hours of Missing Data:	34
Maximum Diurnal Average: 2.1 ppb at hour 5	Minimum Diurnal Average: 0.3 ppb at hour 20		Hours of Calibration:	34
Monthly Average: 0.98 ppb	Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.1 Median = 0.2 Q ₃ = 0.5 P ₉₀ = 1.6 P ₉₉ = 17.4		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-Dec	0.0	0.0	0.0	0.1	0.0	Z	0.1	0.0	0.0	0.0	0.0	0.8	2.2	3.5	3.3	0.6	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.5	3.5	
2-Dec	Z	0.0	0.1	0.1	0.1	0.0	0.0	0.1	0.0	0.2	0.7	1.3	1.5	2.8	3.4	2.4	1.9	1.9	1.5	0.8	0.8	0.3	0.2	1.5	0.9	3.4	
3-Dec	0.3	Z	0.1	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.2	0.1	0.2	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.3	0.2	0.2	0.3	
4-Dec	0.3	0.1	Z	0.2	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.3	
5-Dec	0.1	0.1	0.1	Z	0.2	0.2	0.2	0.3	0.3	0.2	0.1	0.1	0.2	0.3	0.3	0.3	0.2	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.2	0.3	
6-Dec	0.0	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	0.1	0.1	0.1	0.0	0.1	0.1	0.0	0.1	0.1	0.0	0.1	0.1	
7-Dec	0.1	0.1	0.2	1.0	1.4	Z	0.2	0.5	1.2	1.0	0.7	1.1	0.7	0.3	0.3	0.2	0.9	0.2	0.2	0.2	0.3	0.7	1.6	4.9	0.8	4.9	
8-Dec	Z	1.9	8.7	6.8	3.9	1.0	0.3	0.8	1.4	0.4	0.6	0.3	0.3	0.3	0.2	0.2	0.2	0.3	0.3	0.1	0.1	0.1	0.1	0.0	1.2	8.7	
9-Dec	0.0	Z	0.0	0.0	0.0	0.0	0.1	0.7	0.8	0.1	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	0.1	0.1	0.8	
10-Dec	0.2	0.2	Z	0.4	0.4	0.3	0.2	0.2	0.3	0.5	0.5	0.4	0.2	0.2	0.1	0.1	0.1	0.1	0.0	0.1	1.3	2.3	2.5	11.6	1.0	11.6	
11-Dec	22.2	13.6	19.7	Z	22.1	9.5	16.9	29.9	12.8	19.3	15.5	0.7	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	8.0	29.9
12-Dec	0.4	0.4	0.4	0.4	Z	0.3	0.3	0.2	0.2	0.2	0.1	0.2	0.1	C	C	C	0.0	0.1	0.0	0.0	0.1	0.0	0.1	0.1	0.2	0.4	
13-Dec	0.1	0.2	0.2	0.2	0.3	Z	0.4	0.3	0.4	0.5	0.6	0.7	0.8	0.8	1.4	2.0	2.3	1.9	1.5	1.3	0.6	3.9	0.2	0.1	0.9	3.9	
14-Dec	Z	0.2	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.2	0.3	0.1	0.2	0.2	0.1	0.2	0.3	
15-Dec	0.2	Z	0.2	0.2	0.1	0.2	0.2	0.1	0.1	0.3	0.4	0.3	0.4	0.9	0.7	0.3	0.1	0.2	0.3	0.4	0.3	0.2	0.2	0.2	0.2	0.3	0.9
16-Dec	0.1	0.1	Z	0.1	0.1	0.1	0.1	12.2	17.4	2.9	1.1	2.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.7	12.4	16.3	2.0	0.0	3.0	17.4	
17-Dec	0.0	1.1	4.4	Z	21.2	20.5	9.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.4	1.0	2.5	21.2	
18-Dec	0.7	0.4	0.2	0.1	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.3	3.4	0.0	0.0	0.0	0.2	0.0	7.8	5.2	0.6	1.9	1.0	7.8	
19-Dec	0.9	0.3	0.1	0.1	0.1	Z	0.0	0.2	0.3	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.9	
20-Dec	Z	0.5	0.4	0.3	0.2	0.1	0.1	0.0	0.1	0.1	0.0	0.1	0.0	0.1	0.1	0.1	0.1	0.2	0.1	0.2	0.2	0.3	0.2	0.2	0.2	0.5	
21-Dec	0.2	Z	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.1	0.0	0.1	0.1	0.0	0.1	0.2	
22-Dec	0.1	0.0	Z	0.1	0.1	0.2	0.4	0.3	0.2	0.1	0.1	0.1	0.0	0.1	0.1	0.3	0.5	0.3	0.2	0.1	0.1	0.2	3.6	0.6	0.3	3.6	
23-Dec	0.1	0.0	0.0	Z	0.1	1.3	9.5	1.8	0.0	0.0	0.1	0.2	0.6	0.1	0.1	0.0	0.0	1.2	0.2	0.2	0.1	0.1	0.1	0.1	0.7	9.5	
24-Dec	0.1	0.1	0.1	0.1	Z	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.1	0.1	0.1	0.2	0.1	0.1	0.2	0.5	0.5	0.5	0.6	1.3	0.2	1.3	
25-Dec	1.9	1.6	1.2	0.9	0.7	Z	0.7	0.5	0.5	0.6	0.4	0.2	0.3	0.2	0.2	0.2	0.1	0.2	0.2	0.2	0.2	0.3	0.8	0.6	0.6	1.9	
26-Dec	Z	0.7	1.1	1.6	1.4	1.3	0.8	0.5	0.3	0.3	0.2	0.1	0.2	0.3	0.5	0.6	2.0	2.0	0.9	0.5	0.3	0.2	0.2	0.1	0.7	2.0	
27-Dec	0.1	Z	0.1	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.4	0.5	0.6	0.5	0.5	0.7	0.2	0.7	
28-Dec	0.6	0.6	Z	0.3	0.2	0.2	0.1	1.2	0.8	0.3	0.4	1.8	2.3	6.5	9.8	12.3	15.0	9.9	3.0	1.0	1.1	1.1	1.4	4.1	3.2	15.0	
29-Dec	8.5	5.7	4.1	Z	1.3	1.7	1.4	1.4	4.8	5.9	2.5	1.1	0.9	0.9	1.1	1.3	1.7	1.5	1.3	0.9	0.8	0.9	0.9	0.9	2.2	8.5	
30-Dec	0.8	0.6	0.6	0.5	Z	0.5	0.6	0.5	0.5	0.6	0.6	0.6	0.5	0.5	0.5	0.4	0.3	0.2	0.3	0.3	0.3	0.3	0.3	0.2	0.5	0.8	
31-Dec	0.2	0.2	0.2	0.2	0.3	Z	0.2	0.2	0.2	0.3	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	1.9	0.3	1.9	
	1.5	1.1	1.6	0.5	2.1	1.5	1.4	1.7	1.4	1.1	0.8	0.4	0.4	0.7	0.9	0.8	0.9	0.7	0.4	0.3	0.9	1.1	0.6	1.1		Diurnal Average	
	22.2	13.6	19.7	6.8	22.1	20.5	16.9	29.9	17.4	19.3	15.5	2.9	2.3	6.5	9.8	12.3	15.0	9.9	3.0	1.7	12.4	16.3	3.6	11.6		Diurnal Maximum	

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





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Leismer - December 2023

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	692	97.46	97.46
11 - 20	14	1.97	99.44
21 - 60	4	0.56	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 710

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Leismer - December 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	6	5	0	2	2	21	44	38	68	186	53	24	109	109	15	9	691
11 - 20	0	0	0	0	0	0	0	0	0	0	0	0	0	4	10	0	14
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	4
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	6	5	0	2	2	21	44	38	68	186	53	24	109	113	29	9	709

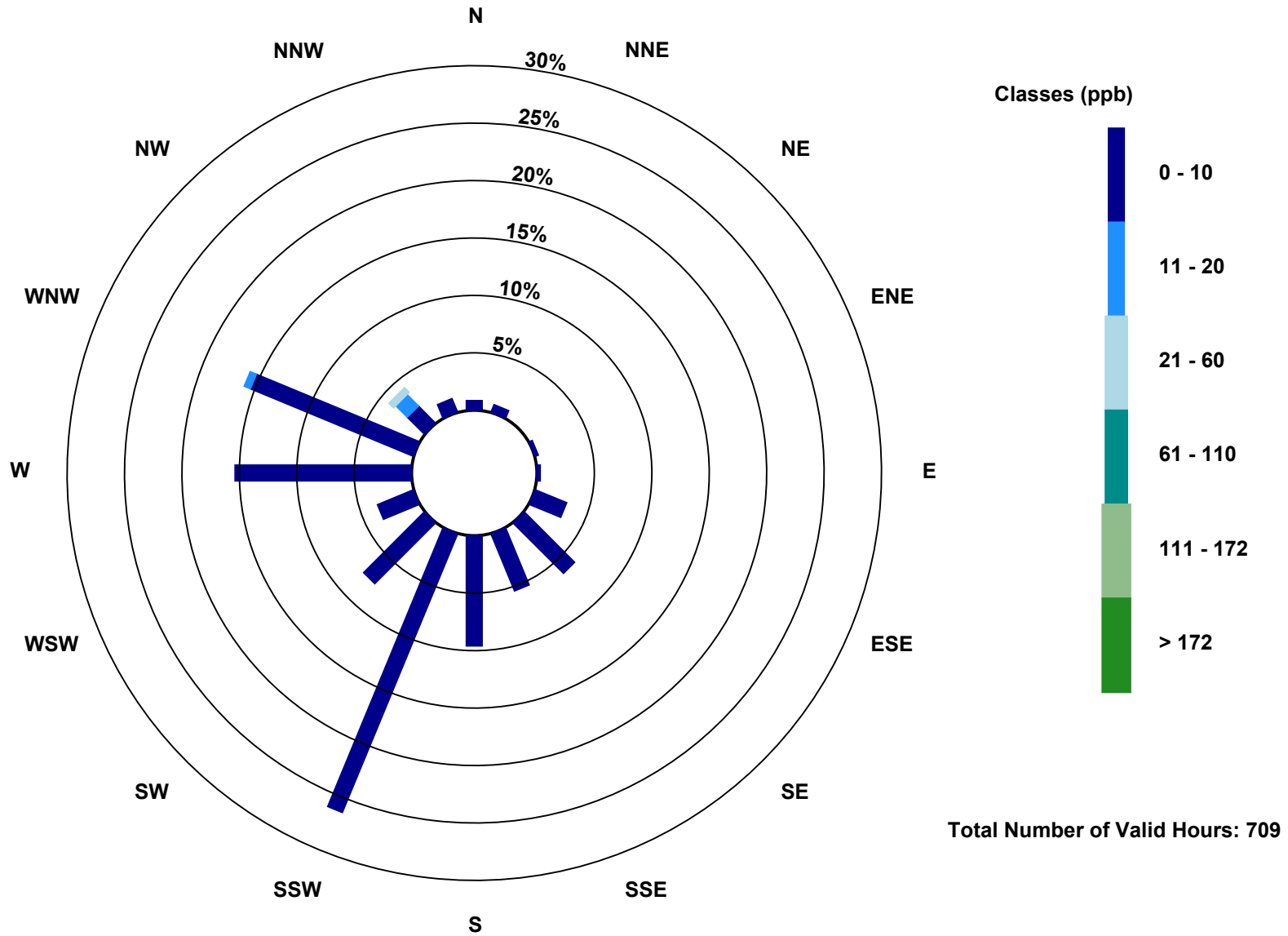
Total Number of Valid Hours: 709

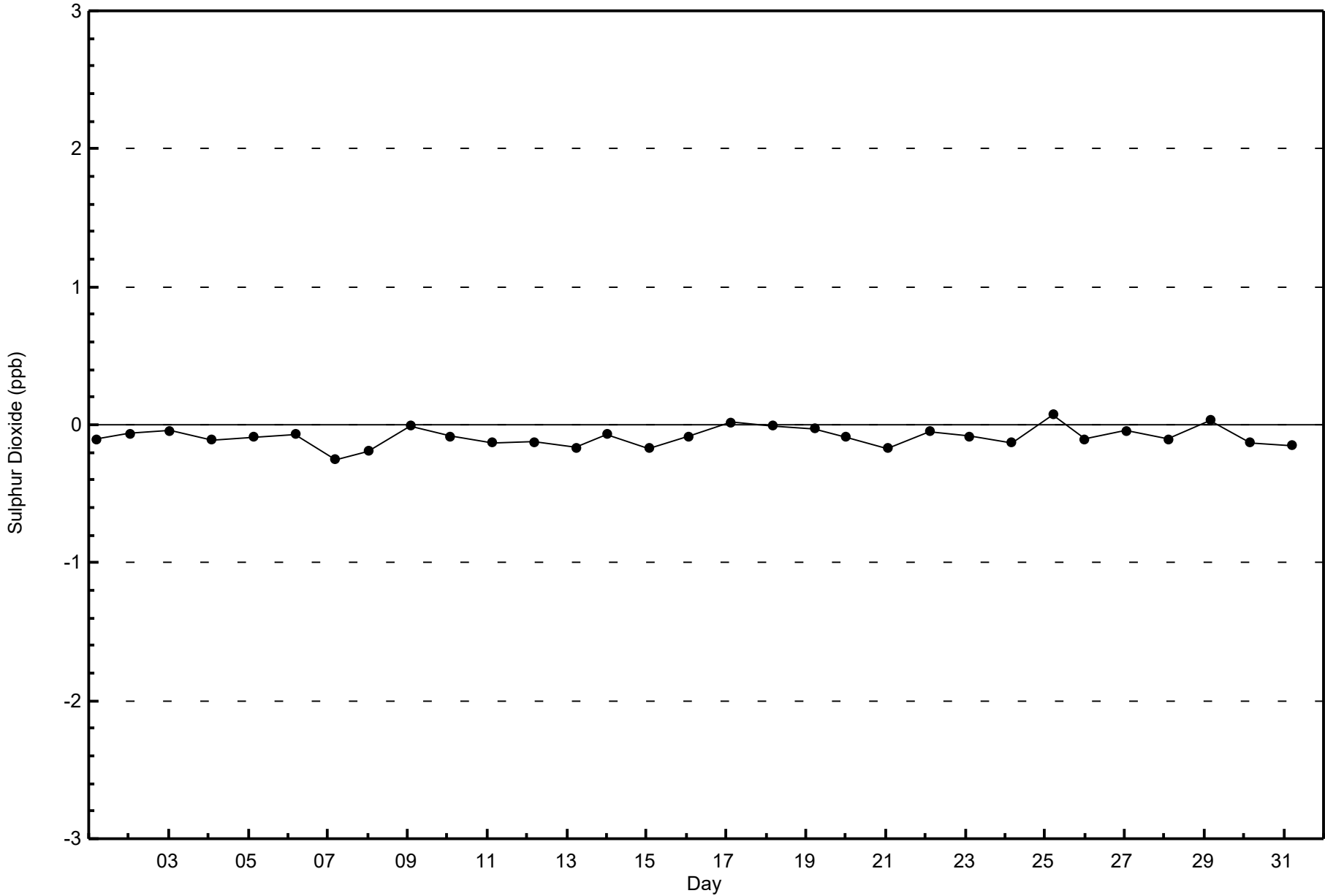
Total Number of Hours: 744

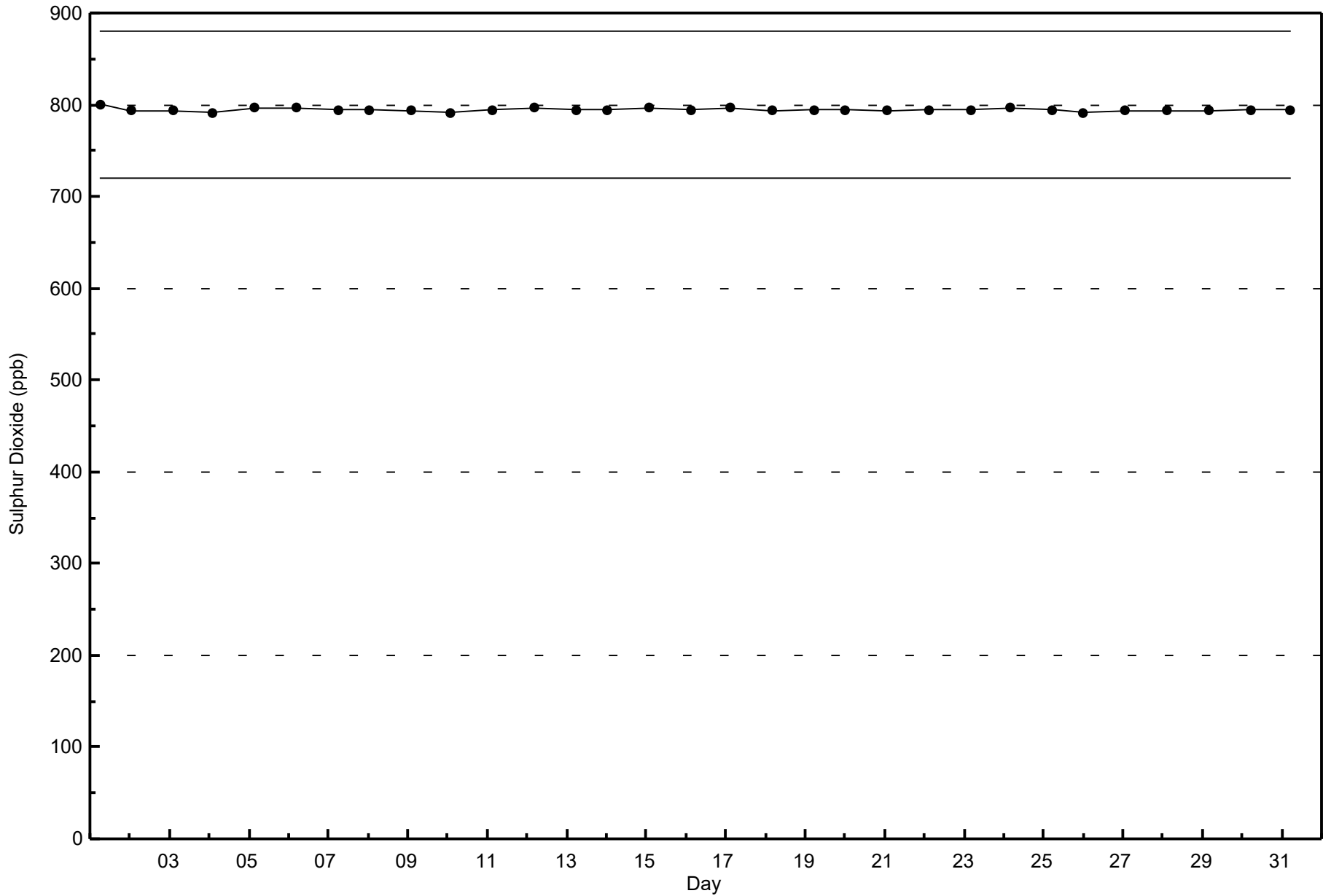


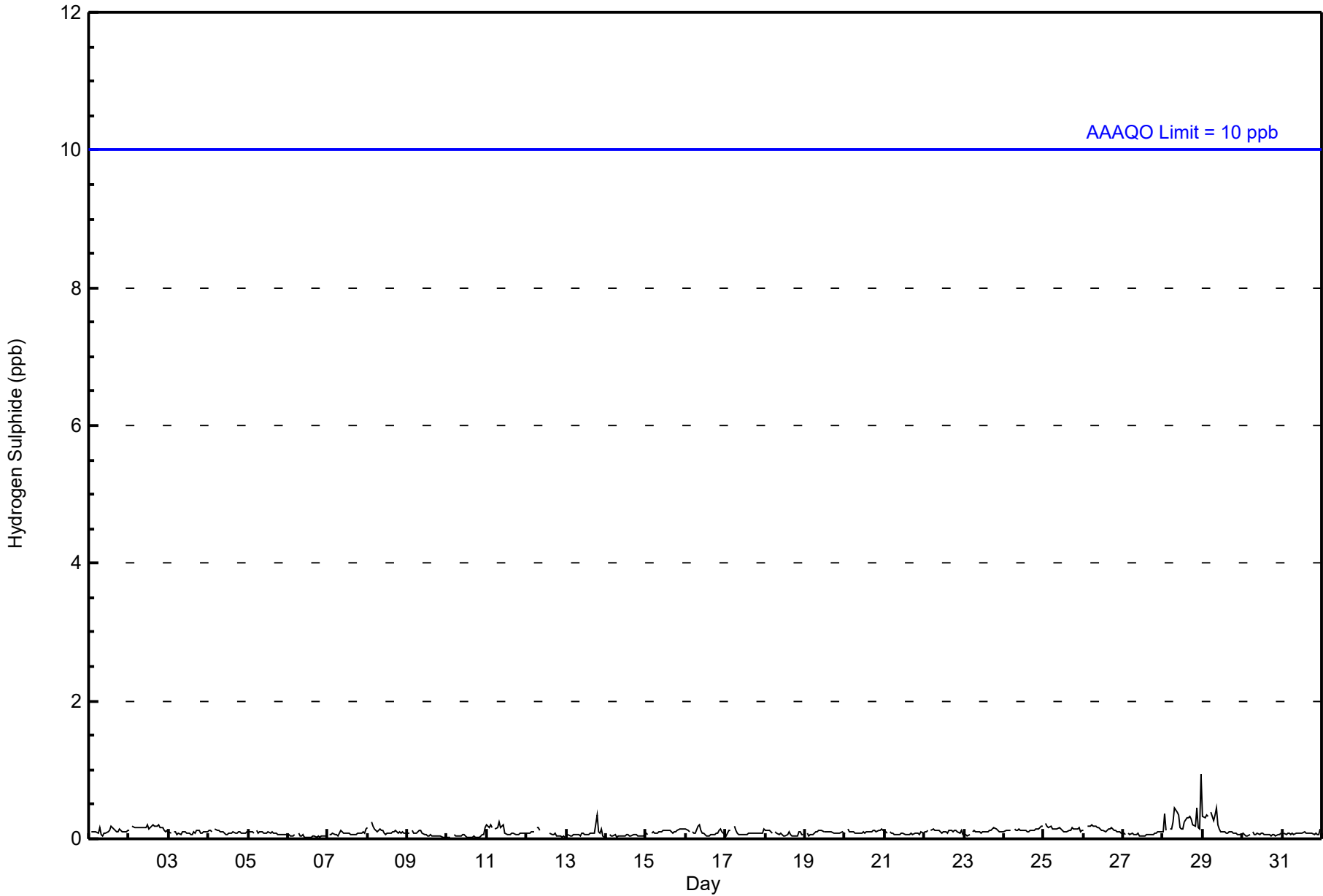
Wood Buffalo Environmental Association
Wind Rose Dec 2023

Sulphur Dioxide (SO₂) - ppb
Leismer











**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Hydrogen Sulphide (H₂S) - ppb
Leismer - December 2023**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	708	100.00	100.00
3 - 4	0	0.00	100.00
5 - 7	0	0.00	100.00
8 - 11	0	0.00	100.00
> 11	0	0.00	100.00

Total Number of Valid Hours: 708

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Hydrogen Sulphide (H₂S) - ppb
Leismer - December 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	6	6	1	2	2	20	46	35	68	182	53	25	109	116	25	10	706
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	6	6	1	2	2	20	46	35	68	182	53	25	109	116	25	10	706

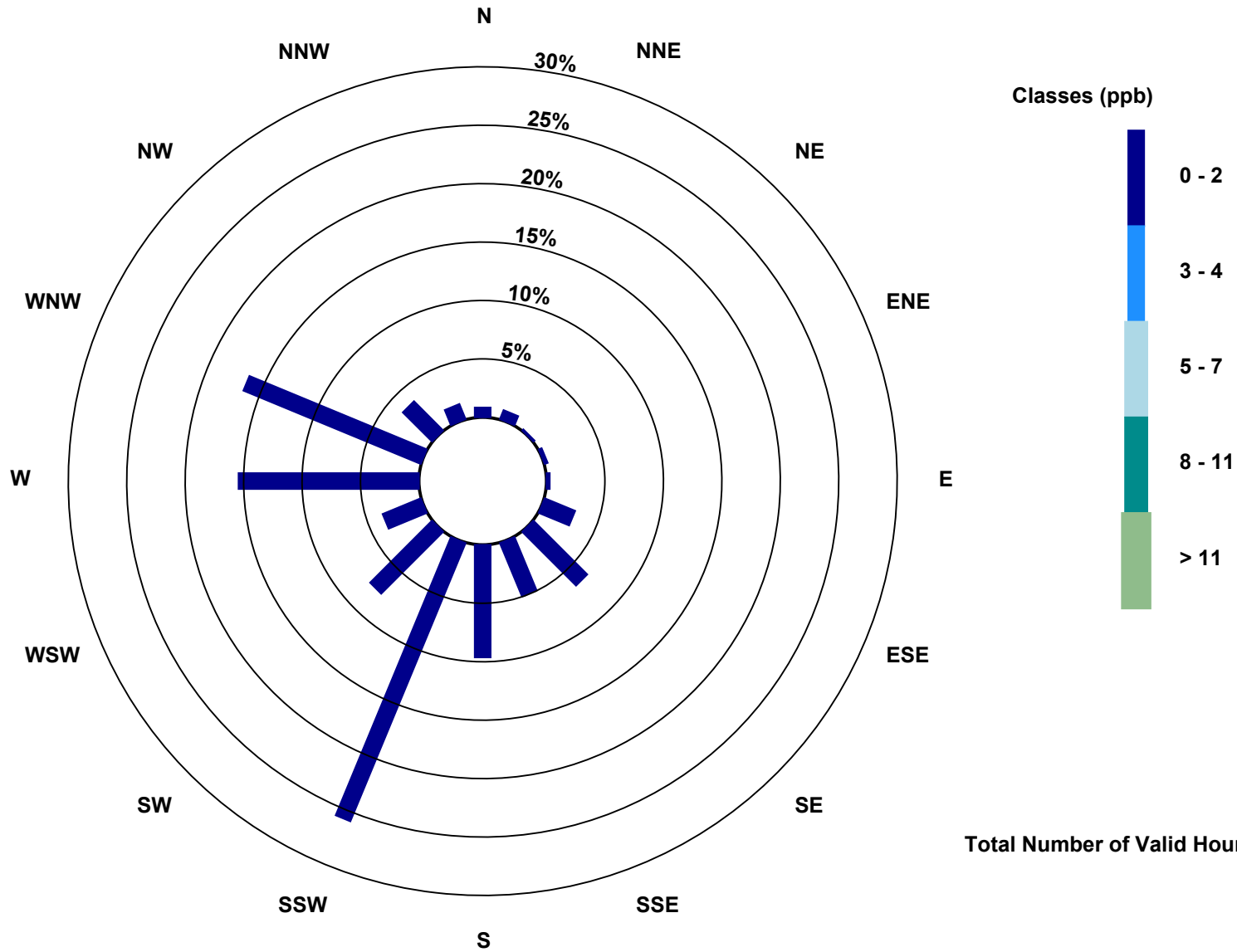
Total Number of Valid Hours: 706

Total Number of Hours: 744

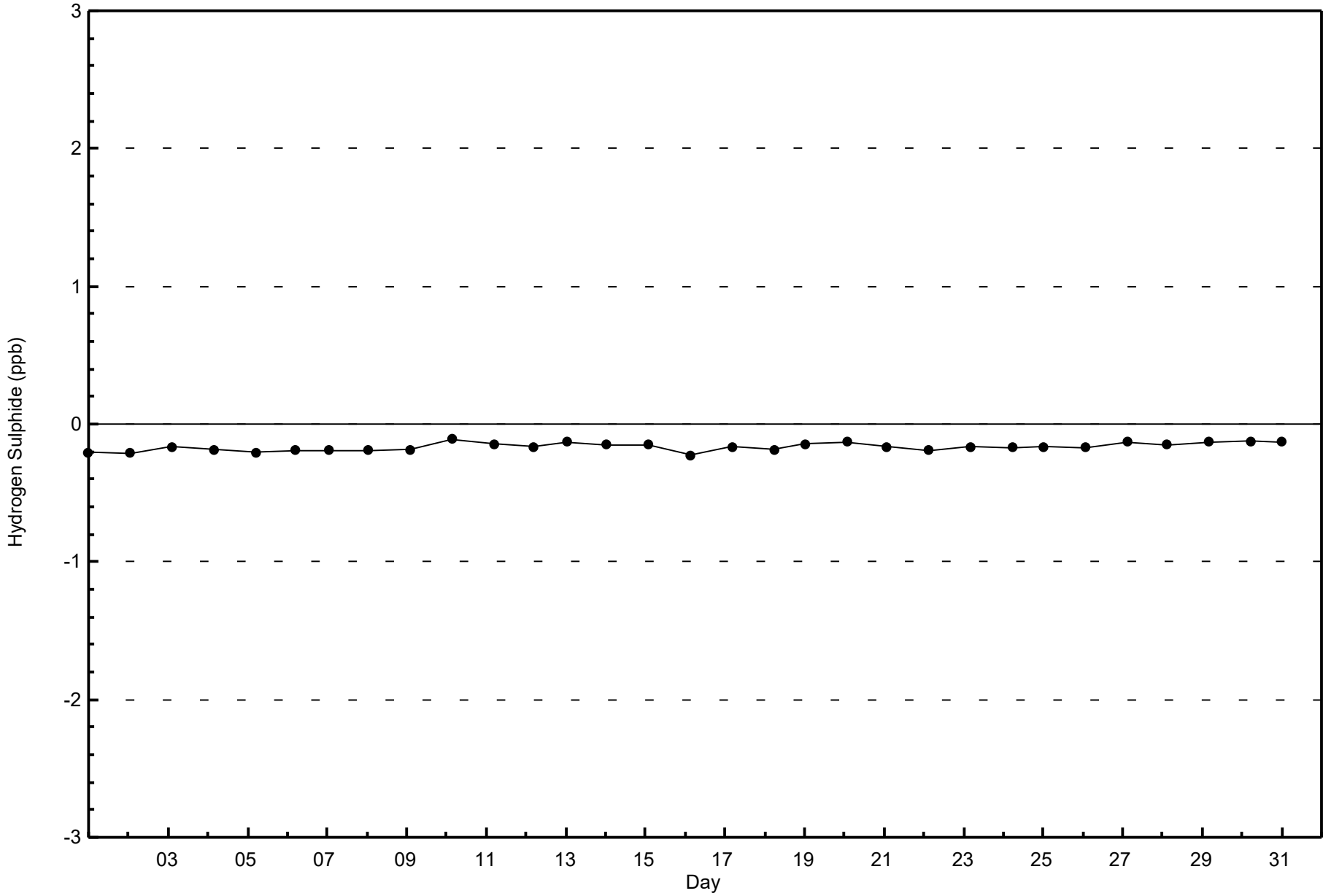


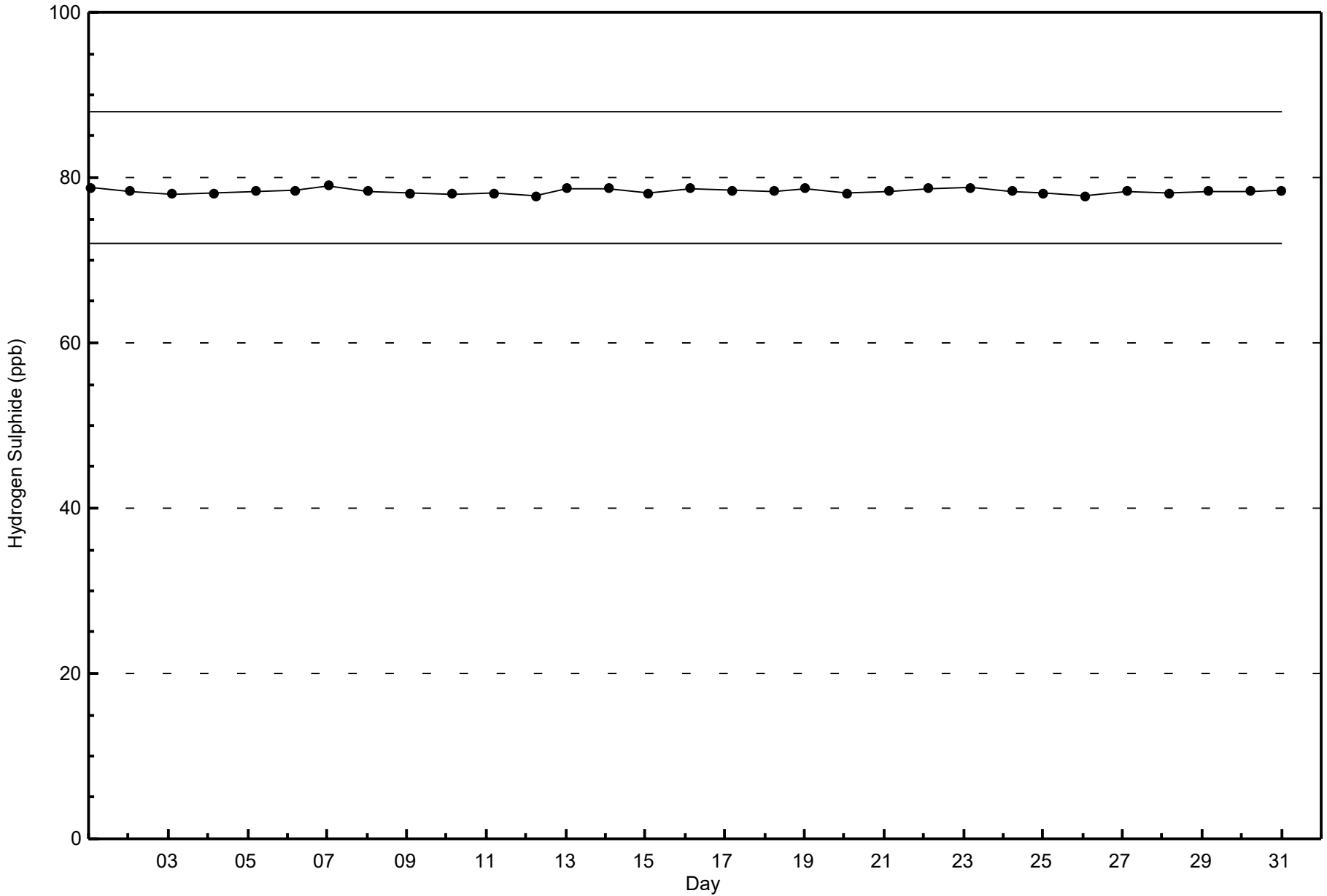
Wood Buffalo Environmental Association
Wind Rose Dec 2023

Hydrogen Sulphide (H₂S) - ppb
Leismer



Total Number of Valid Hours: 706





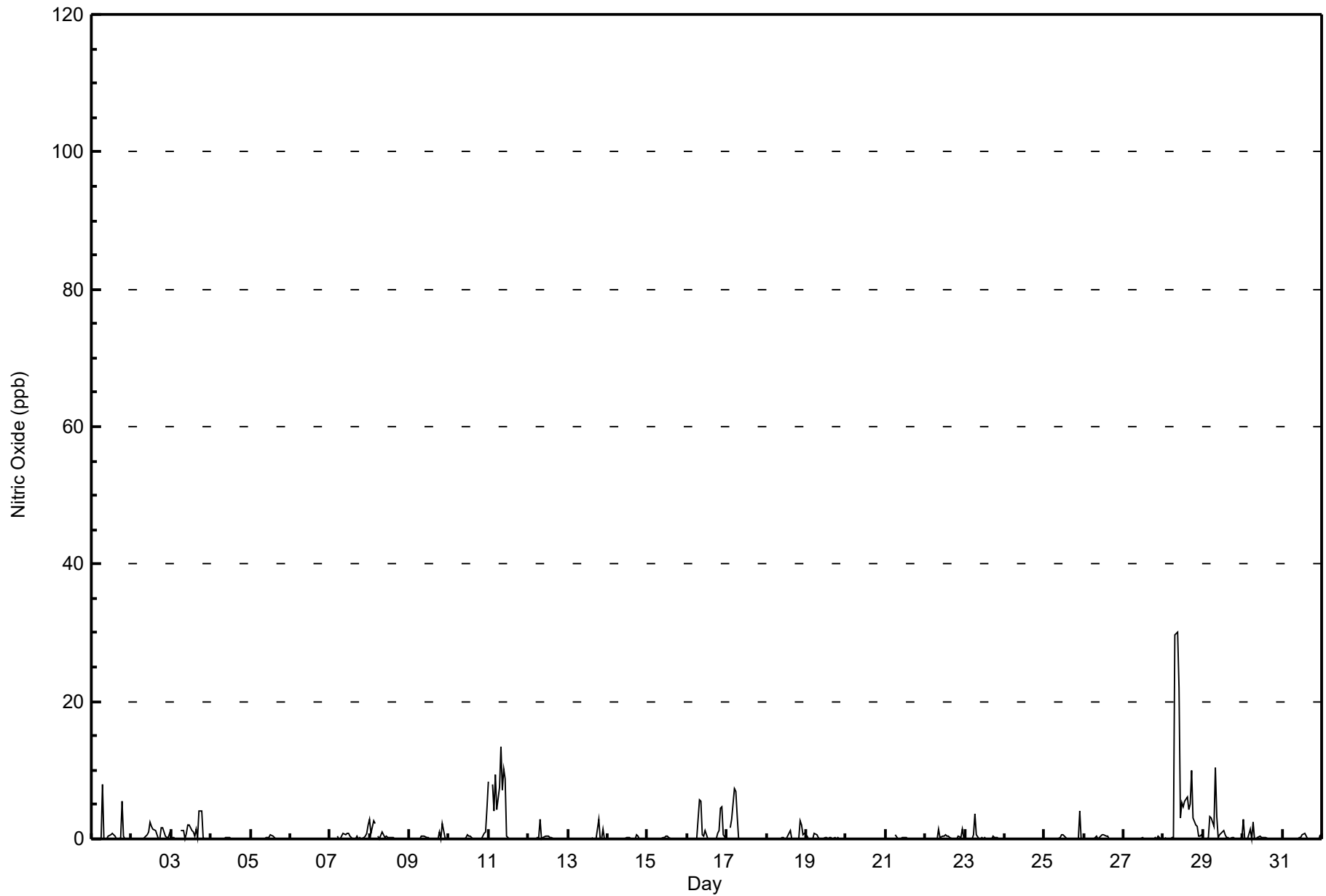


Maximum Value: 30.2 ppb on Dec 28 09:00																					Maximum Daily Average: 5.9 ppb on Dec 28					Hours in Service: 744	
Minimum Value: 0.0 ppb on Dec 1 06:00																					Minimum Daily Average: 0.0 ppb on Dec 24					Hours of Data: 707	
Maximum Diurnal Average: 2.1 ppb at hour 8																					Minimum Diurnal Average: 0.1 ppb at hour 2					Hours of Missing Data: 37	
Monthly Average: 0.63 ppb																					Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.0 Median = 0.0 Q ₃ = 0.3 P ₉₀ = 1.2 P ₉₉ = 9.2					Hours of Calibration: 37	
																					Percent Operational Time: 100.0						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Dec	0.0	0.0	0.0	Z	0.0	0.0	8.0	0.0	0.0	0.1	0.3	0.7	0.8	0.6	0.3	0.1	0.1	0.1	5.5	0.4	0.0	0.0	0.0	0.0	0.7	8.0	
2-Dec	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.1	0.5	1.1	2.4	1.8	1.4	1.2	0.6	0.0	0.0	1.6	1.6	0.4	0.3	0.3	0.9	0.6	2.4	
3-Dec	0.1	0.2	0.0	0.0	0.0	Z	1.1	1.2	0.1	0.9	2.0	2.0	1.3	1.0	0.4	1.5	0.2	4.1	4.1	0.2	0.0	0.0	0.0	0.9	4.1		
4-Dec	Z	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	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	0.2	
5-Dec	0.0	Z	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.3	0.2	0.5	0.4	0.3	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.5	0.5	
6-Dec	0.0	0.0	Z	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	0.0	0.0	0.0	0.1	
7-Dec	0.0	0.0	0.0	Z	0.3	0.0	0.0	0.5	0.7	0.6	0.8	0.8	0.5	0.2	0.0	0.0	0.3	0.1	0.1	0.0	0.2	0.4	0.7	2.0	0.4	2.0	
8-Dec	2.9	0.8	2.7	2.3	Z	0.4	0.1	0.9	0.6	0.2	0.5	0.3	0.3	0.2	0.2	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.5	2.9		
9-Dec	0.0	0.0	0.0	0.0	0.0	Z	0.1	0.4	0.4	0.3	0.1	0.3	0.1	0.0	0.0	0.0	0.1	0.1	1.0	0.0	2.2	0.1	0.0	0.2	2.2		
10-Dec	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.6	0.5	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.9	1.0	4.5	0.4	4.5	
11-Dec	8.4	Z	7.9	4.0	9.3	4.3	7.5	13.4	7.1	10.2	8.7	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.5	13.4	
12-Dec	0.0	0.0	Z	0.0	0.0	0.1	0.2	2.8	0.0	0.2	0.4	0.5	0.4	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	2.8	
13-Dec	0.0	0.0	0.0	Z	0.0	0.0	0.1	0.1	C	C	C	C	C	C	0.1	0.0	0.0	0.0	2.9	0.0	0.0	1.5	0.0	0.0	--	2.9	
14-Dec	0.0	0.0	0.0	0.0	Z	0.1	0.0	0.0	0.0	0.0	0.1	0.2	0.1	0.2	0.1	0.1	0.0	0.5	0.3	0.0	0.0	0.0	0.0	0.1	0.5	0.5	
15-Dec	0.0	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.1	0.2	0.4	0.4	0.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.4	
16-Dec	Z	0.0	0.0	0.0	0.0	0.0	0.1	5.6	5.6	0.7	0.5	1.2	0.0	0.0	0.0	0.0	0.0	0.8	1.3	4.5	4.7	0.6	0.0	1.1	5.6		
17-Dec	0.0	Z	1.6	2.8	7.3	6.8	3.2	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	0.0	1.0	7.3		
18-Dec	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.8	1.2	0.0	0.0	0.0	0.0	0.0	0.0	2.7	2.1	0.6	0.8	0.4	2.7	
19-Dec	0.5	0.1	0.0	Z	0.0	0.8	0.6	0.1	0.1	0.0	0.0	0.1	0.2	0.0	0.1	0.1	0.0	0.2	0.0	0.1	0.0	0.0	0.0	0.1	0.8	0.8	
20-Dec	0.0	0.0	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	
21-Dec	0.0	0.0	0.0	0.0	0.0	Z	0.6	0.1	0.0	0.1	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	0.1	0.6	
22-Dec	Z	0.0	0.0	0.0	0.0	0.0	0.1	1.5	0.2	0.4	0.4	0.6	0.4	0.3	0.3	0.0	0.0	0.0	0.0	0.3	0.2	1.5	0.3	0.3	1.5		
23-Dec	0.1	Z	0.0	0.0	0.0	0.6	3.6	0.7	0.0	0.1	0.1	0.1	0.3	0.0	0.0	0.0	0.0	0.4	0.1	0.1	0.1	0.0	0.0	0.3	3.6		
24-Dec	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	
25-Dec	0.0	0.0	0.0	Z	0.1	0.0	0.0	0.0	0.0	0.2	0.6	0.6	0.3	0.1	0.1	0.0	0.0	0.0	0.1	0.0	0.0	4.1	0.0	0.3	4.1		
26-Dec	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.3	0.0	0.1	0.4	0.5	0.6	0.5	0.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.6		
27-Dec	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	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.5	0.0	0.0	0.0	0.5	0.5	
28-Dec	Z	0.2	0.0	0.0	0.0	0.2	0.3	29.7	30.2	21.9	3.1	5.3	4.8	5.5	6.0	4.4	5.1	10.0	3.1	1.9	1.9	0.4	0.5	0.6	5.9	30.2	
29-Dec	0.2	Z	0.1	0.1	3.2	3.0	1.8	10.3	3.2	0.2	0.5	0.8	1.2	0.6	0.3	0.2	0.0	0.1	0.2	0.0	0.0	0.0	0.2	1.1	10.3		
30-Dec	2.8	0.0	Z	0.1	1.4	0.0	2.3	0.0	0.0	0.1	0.3	0.3	0.3	0.2	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	2.8		
31-Dec	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.6	0.9	0.4	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.1	0.9		
0.6 0.1 0.5 0.4 0.8 0.6 1.0 2.1 1.7 1.2 0.7 0.6 0.5 0.5 0.4 0.2 0.2 0.5 0.6 0.2 0.4 0.5 0.2 0.3																								Diurnal Average			
8.4 0.8 7.9 4.0 9.3 6.8 8.0 29.7 30.2 21.9 8.7 5.3 4.8 5.5 6.0 4.4 5.1 10.0 5.5 1.9 4.5 4.7 1.5 4.5																								Diurnal Maximum			
Z - zerospan C - Calibration																											



Wood Buffalo Environmental Association
Hourly Averages

Nitric Oxide (NO) - ppb
Leismer - December 2023





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitric Oxide (NO) - ppb
Leismer - December 2023**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	704	99.58	99.58
21 - 40	3	0.42	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitric Oxide (NO) - ppb
Leismer - December 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	5	4	1	2	2	20	44	39	67	181	52	23	113	113	29	7	702
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	3
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	5	4	1	2	2	20	44	39	67	181	52	23	113	113	29	10	705

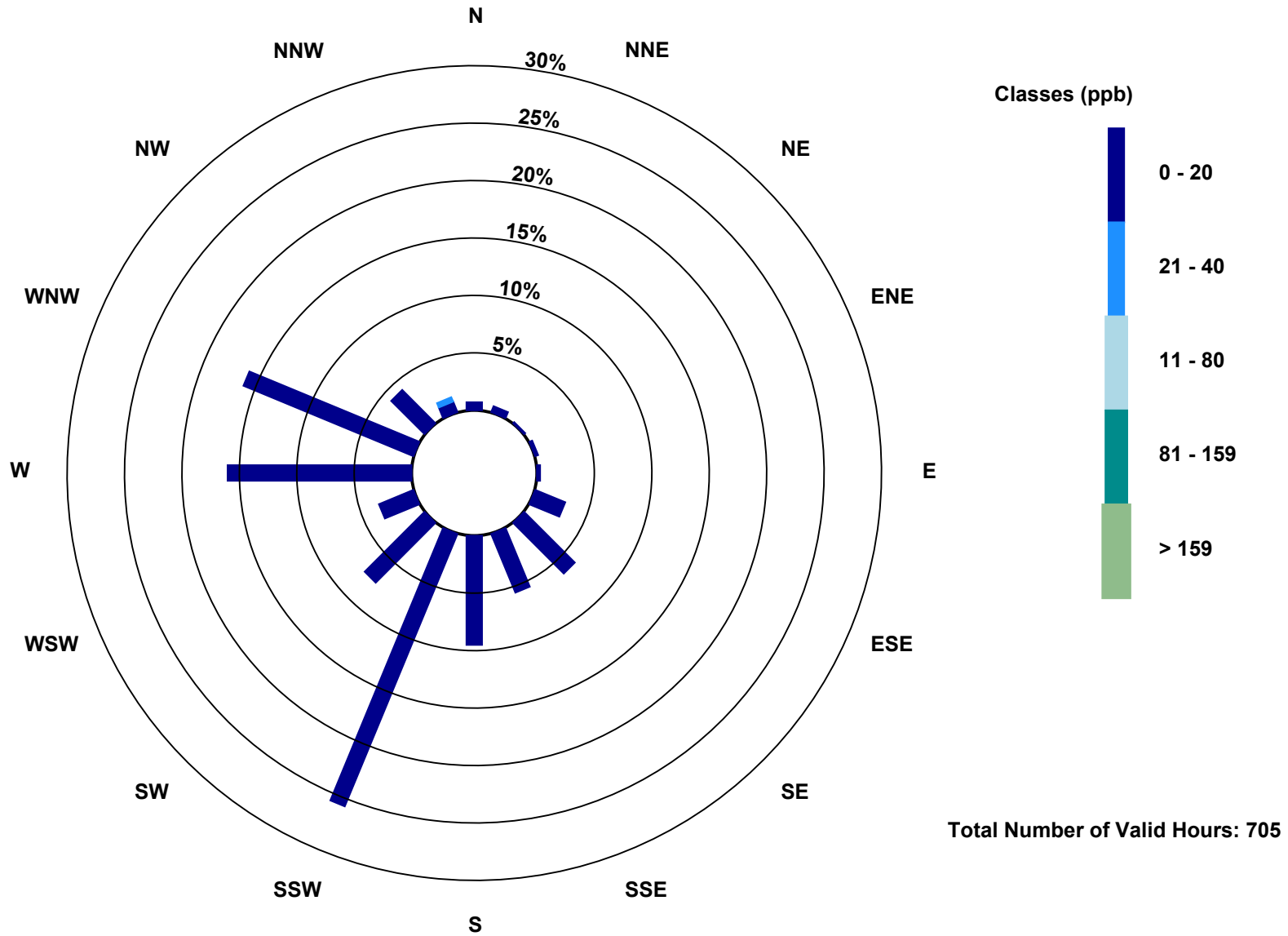
Total Number of Valid Hours: 705

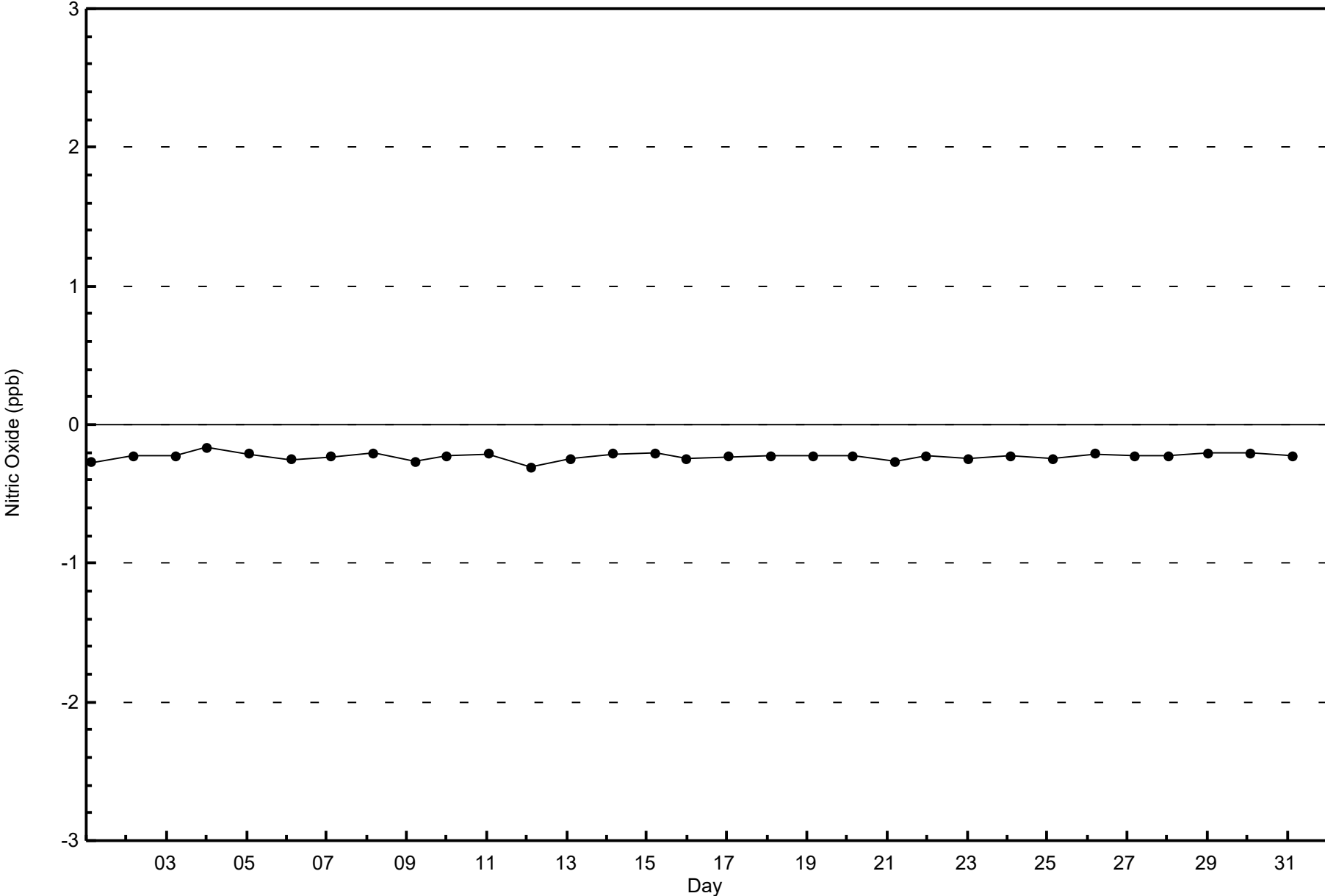
Total Number of Hours: 744

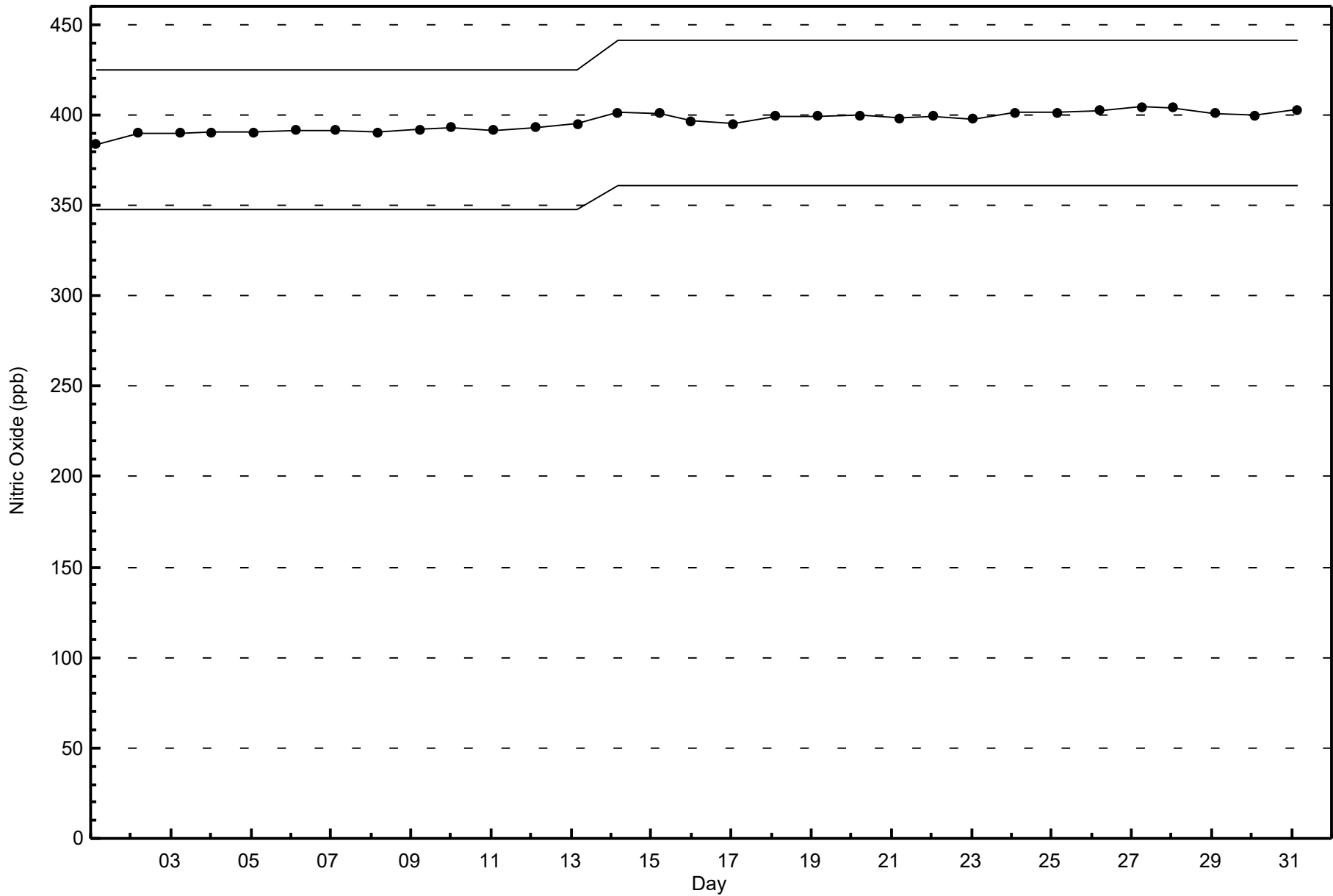


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Nitric Oxide (NO) - ppb
Leismer









Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO₂) - ppb

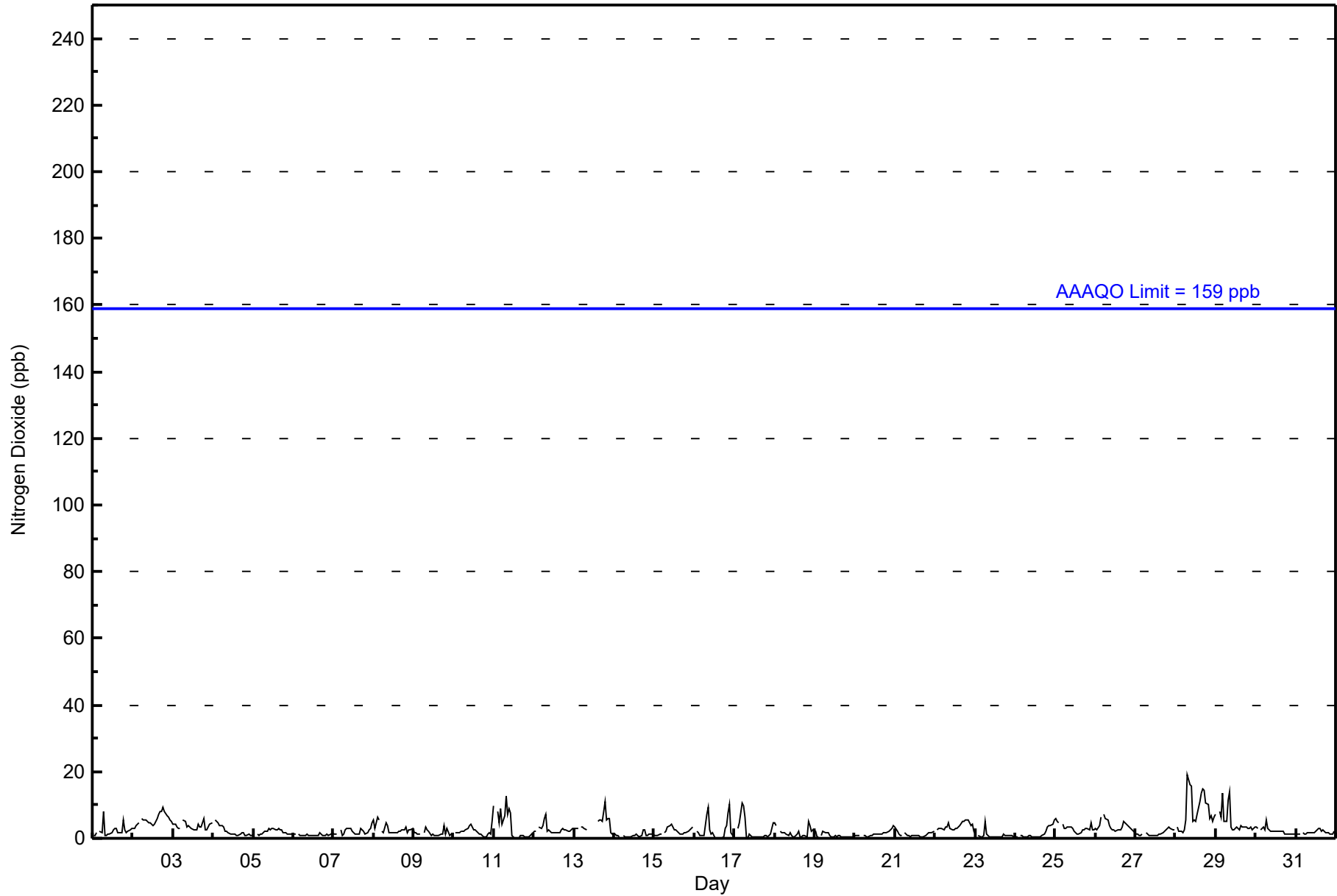
Leismer - December 2023

Number of Exceedences (AAAQO):		1-hr: 0	24-hr: 0	Hours in Service: 744																	Daily Average		Daily Maximum																									
Maximum Value: 19.2 ppb on Dec 28 08:00		Maximum Daily Average: 8.3 ppb on Dec 28																	Hours of Data: 707		Hours of Missing Data: 37																											
Minimum Value: 0.1 ppb on Dec 11 13:00		Minimum Daily Average: 0.9 ppb on Dec 23																	Hours of Calibration: 37		Percent Operational Time: 100.0																											
Maximum Diurnal Average: 3.8 ppb at hour 8		Minimum Diurnal Average: 1.7 ppb at hour 13																																														
Monthly Average: 2.59 ppb		Percentiles: P ₁ = 0.2 P ₁₀ = 0.6 Q ₁ = 1.0 Median = 1.9 Q ₃ = 3.2 P ₉₀ = 5.3 P ₉₉ = 13.4																																														
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-Dec	0.7	1.0	1.7	Z	2.2	1.8	8.0	0.8	0.7	1.1	1.2	1.9	2.6	3.0	2.8	1.9	1.7	1.7	5.3	2.4	1.8	2.1	2.4	2.9	2.2	8.0																						
2-Dec	2.8	3.1	3.9	4.7	Z	6.0	5.5	5.6	5.6	4.7	4.7	4.3	3.7	4.2	6.0	7.2	8.0	8.0	9.2	8.2	6.9	6.4	5.3	5.1	5.6	9.2																						
3-Dec	4.2	4.2	3.4	2.8	2.8	Z	5.3	4.9	3.3	3.8	3.3	2.9	2.7	2.6	2.6	4.4	3.4	3.6	5.8	2.6	2.6	3.3	4.2	4.5	3.6	5.8																						
4-Dec	Z	5.5	5.0	4.5	4.0	3.7	3.3	2.2	2.0	1.6	1.2	1.1	1.2	1.1	0.9	0.9	1.2	1.9	1.6	1.0	1.0	1.4	1.0	1.0	2.1	5.5																						
5-Dec	1.3	Z	1.4	1.0	1.2	1.4	1.9	2.1	2.3	2.8	2.7	3.0	2.8	2.6	2.7	2.8	2.5	2.6	1.9	1.7	1.4	1.3	1.2	1.3	2.0	3.0																						
6-Dec	1.2	1.1	Z	1.1	0.9	0.9	0.9	0.9	1.2	1.0	1.0	0.8	0.8	0.8	0.9	1.0	1.5	0.8	0.8	0.9	1.1	1.0	1.2	1.5	1.0	1.5																						
7-Dec	1.4	1.2	1.4	Z	2.6	0.8	1.2	2.7	2.9	2.9	2.8	2.2	1.8	1.4	1.1	1.1	2.9	2.4	2.3	1.3	1.8	2.4	3.0	4.6	2.1	4.6																						
8-Dec	5.6	3.1	6.4	5.6	Z	2.2	1.8	4.7	4.0	1.6	1.9	1.5	1.5	1.6	1.9	2.0	2.0	2.5	2.7	3.4	1.9	2.7	2.6	2.8	2.9	6.4																						
9-Dec	1.9	1.5	1.2	1.1	1.2	Z	1.9	3.3	2.4	2.0	0.9	1.4	0.9	0.8	0.8	1.0	1.3	1.4	3.9	1.1	3.0	1.0	1.3	1.3	1.6	3.9																						
10-Dec	Z	1.7	1.7	1.8	2.3	2.2	2.3	2.6	3.0	3.9	4.2	3.5	2.6	2.4	1.7	1.4	1.3	0.8	0.5	0.3	1.1	1.5	1.4	5.1	2.1	5.1																						
11-Dec	9.9	Z	8.1	4.5	8.8	4.1	6.8	12.5	7.2	9.1	7.7	0.8	0.1	0.1	0.1	0.1	0.8	0.9	0.3	0.4	0.3	0.5	0.9	1.6	3.7	12.5																						
12-Dec	2.1	2.2	Z	3.4	3.0	4.0	5.8	7.4	2.3	2.5	1.7	1.7	1.7	1.5	1.5	1.9	2.7	3.0	2.5	2.4	2.2	2.3	2.7	3.1	2.8	7.4																						
13-Dec	3.1	3.1	3.0	Z	3.6	3.5	3.1	2.7	C	C	C	C	C	C	5.1	5.4	5.3	5.1	11.1	5.4	6.1	6.0	1.6	1.1	--	11.1																						
14-Dec	1.1	0.9	0.7	0.6	Z	0.8	0.5	0.4	0.3	0.4	0.5	0.7	1.0	1.1	0.9	0.6	0.9	2.7	2.4	0.8	0.9	1.1	1.1	1.2	0.9	2.7																						
15-Dec	0.8	0.7	1.0	1.4	1.3	Z	1.9	2.2	3.3	4.0	4.1	3.3	2.5	2.4	1.8	1.3	1.3	1.4	1.7	1.8	2.0	2.6	3.0	3.3	2.1	4.1																						
16-Dec	Z	2.2	1.5	0.9	0.8	0.7	0.8	7.3	9.2	2.4	1.2	1.9	0.1	0.2	0.2	0.1	0.1	0.3	3.1	3.8	7.7	10.3	1.9	0.4	2.5	10.3																						
17-Dec	0.3	Z	2.8	4.6	10.4	9.6	6.2	0.6	0.2	1.1	0.5	0.4	0.4	0.3	0.5	0.5	0.4	0.6	0.7	0.7	0.6	1.2	2.9	4.8	2.2	10.4																						
18-Dec	4.5	3.9	Z	2.0	1.6	1.5	1.5	1.1	0.7	1.8	0.8	0.5	0.5	1.4	2.3	0.3	0.3	0.8	1.0	0.4	4.9	3.9	2.2	2.4	1.8	4.9																						
19-Dec	2.0	0.6	0.3	Z	1.0	2.1	1.7	1.9	1.7	0.8	0.6	0.6	0.7	0.4	0.7	0.8	0.4	0.5	0.4	0.6	0.4	0.5	0.5	0.6	0.9	2.1																						
20-Dec	0.8	1.0	0.9	0.9	Z	0.9	0.8	0.6	0.6	0.7	1.0	1.2	1.3	1.4	1.4	1.4	1.4	1.6	1.5	1.8	2.3	2.7	3.0	3.7	1.4	3.7																						
21-Dec	3.3	2.1	1.3	1.0	0.7	Z	1.5	0.9	0.9	0.6	0.8	0.9	0.7	0.8	0.7	0.6	0.5	0.5	0.9	1.4	1.7	1.8	1.9	2.0	1.2	3.3																						
22-Dec	Z	2.7	2.8	3.0	2.8	2.7	3.2	3.2	4.6	2.8	2.6	2.7	3.1	3.1	3.5	4.0	4.9	5.1	5.3	5.6	5.5	3.7	4.2	2.2	3.6	5.6																						
23-Dec	1.4	Z	0.9	0.5	0.4	0.9	5.0	1.1	0.3	0.3	0.3	0.3	0.4	0.3	0.4	0.6	1.3	0.8	1.0	0.9	1.0	0.8	0.4	0.9	0.9	5.0																						
24-Dec	0.4	0.5	Z	0.9	0.8	0.6	0.5	0.5	0.7	0.7	0.5	0.5	0.6	0.5	0.3	0.5	0.8	1.3	2.1	3.4	3.8	3.8	4.2	5.4	1.4	5.4																						
25-Dec	5.9	4.9	4.5	Z	4.1	3.1	3.1	3.6	3.6	3.4	3.0	2.1	1.6	1.2	1.2	1.9	2.7	2.7	3.1	3.1	2.7	4.7	2.4	2.6	3.1	5.9																						
26-Dec	2.8	2.7	3.8	6.2	Z	7.2	5.8	5.3	3.7	2.9	2.6	2.4	2.3	2.4	2.5	2.7	3.4	4.9	4.3	3.8	3.3	2.8	2.4	2.0	3.6	7.2																						
27-Dec	1.2	1.1	0.9	1.0	1.2	Z	1.7	1.3	1.0	0.9	0.9	1.0	0.7	0.8	1.1	1.3	1.6	2.0	2.6	3.1	3.2	2.9	2.4	2.7	1.6	3.2																						
28-Dec	Z	3.5	2.2	2.3	1.9	2.5	5.6	19.2	16.2	15.8	5.2	5.6	5.0	7.4	11.0	13.5	15.0	14.3	10.8	10.1	6.0	6.7	5.1	6.2	8.3	19.2																						
29-Dec	7.2	Z	8.0	6.4	13.7	5.2	5.0	11.6	13.8	3.4	2.7	2.6	3.4	2.8	2.4	4.0	3.6	3.4	3.4	2.8	2.9	3.2	2.6	3.3	5.1	13.8																						
30-Dec	3.5	2.9	Z	2.7	3.6	2.4	5.3	2.8	2.6	2.3	2.3	2.0	2.1	2.2	2.0	2.2	2.0	1.4	1.4	1.4	1.3	1.3	1.4	1.4	2.3	5.3																						
31-Dec	1.3	1.3	1.3	Z	1.5	1.3	1.3	1.5	1.6	1.5	1.5	1.7	2.2	2.9	3.1	2.2	2.6	2.1	1.7	1.5	1.3	1.1	1.1	2.3	1.7	3.1																						
																								2.7	2.3	2.7	2.6	3.0	2.8	3.2	3.8	3.4	2.8	2.1	1.9	1.7	1.8	2.1	2.2	2.5	2.6	3.1	2.5	2.7	2.8	2.3	2.7	Diurnal Average
																								9.9	5.5	8.1	6.4	13.7	9.6	8.0	19.2	16.2	15.8	7.7	5.6	5.0	7.4	11.0	13.5	15.0	14.3	11.1	10.1	7.7	10.3	5.3	6.2	Diurnal Maximum
Z - zerospan C - Calibration																																																
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 159 ppb																																																



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Dioxide (NO₂) - ppb
Leismer - December 2023





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitrogen Dioxide (NO₂) - ppb
Leismer - December 2023

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	707	100.00	100.00
21 - 40	0	0.00	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Leismer - December 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	5	4	1	2	2	20	44	39	67	181	52	23	113	113	29	10	705
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	5	4	1	2	2	20	44	39	67	181	52	23	113	113	29	10	705

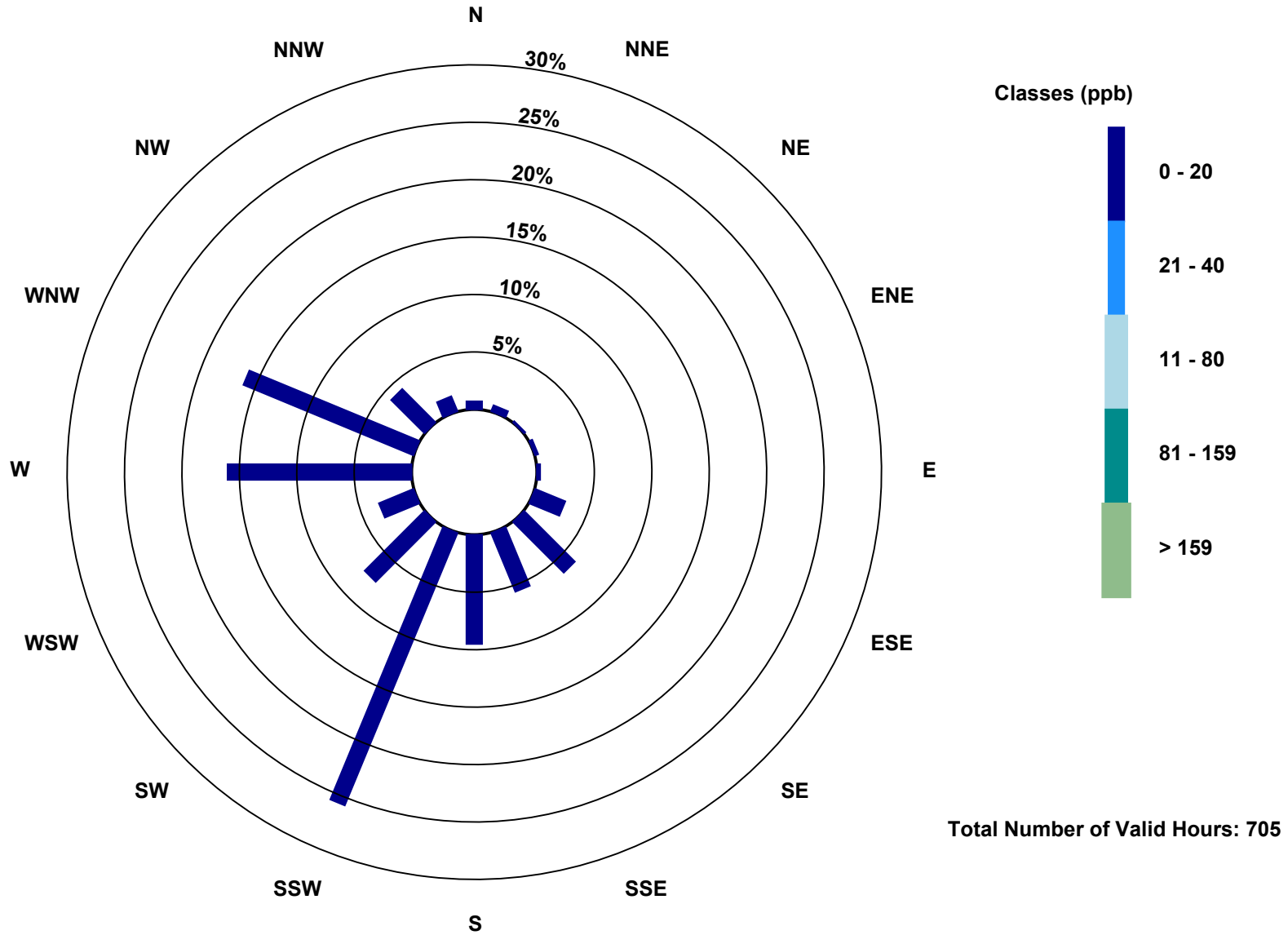
Total Number of Valid Hours: 705

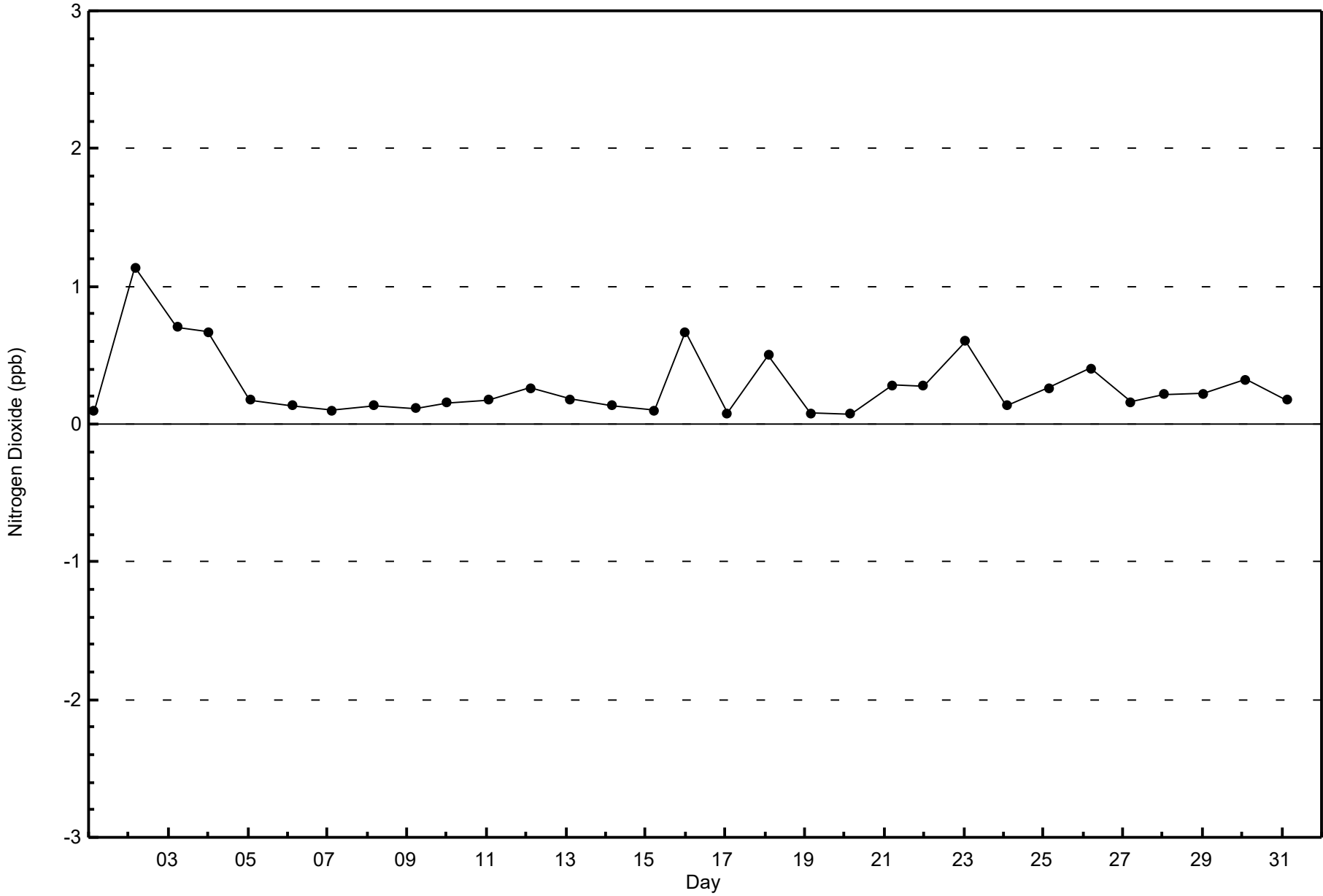
Total Number of Hours: 744

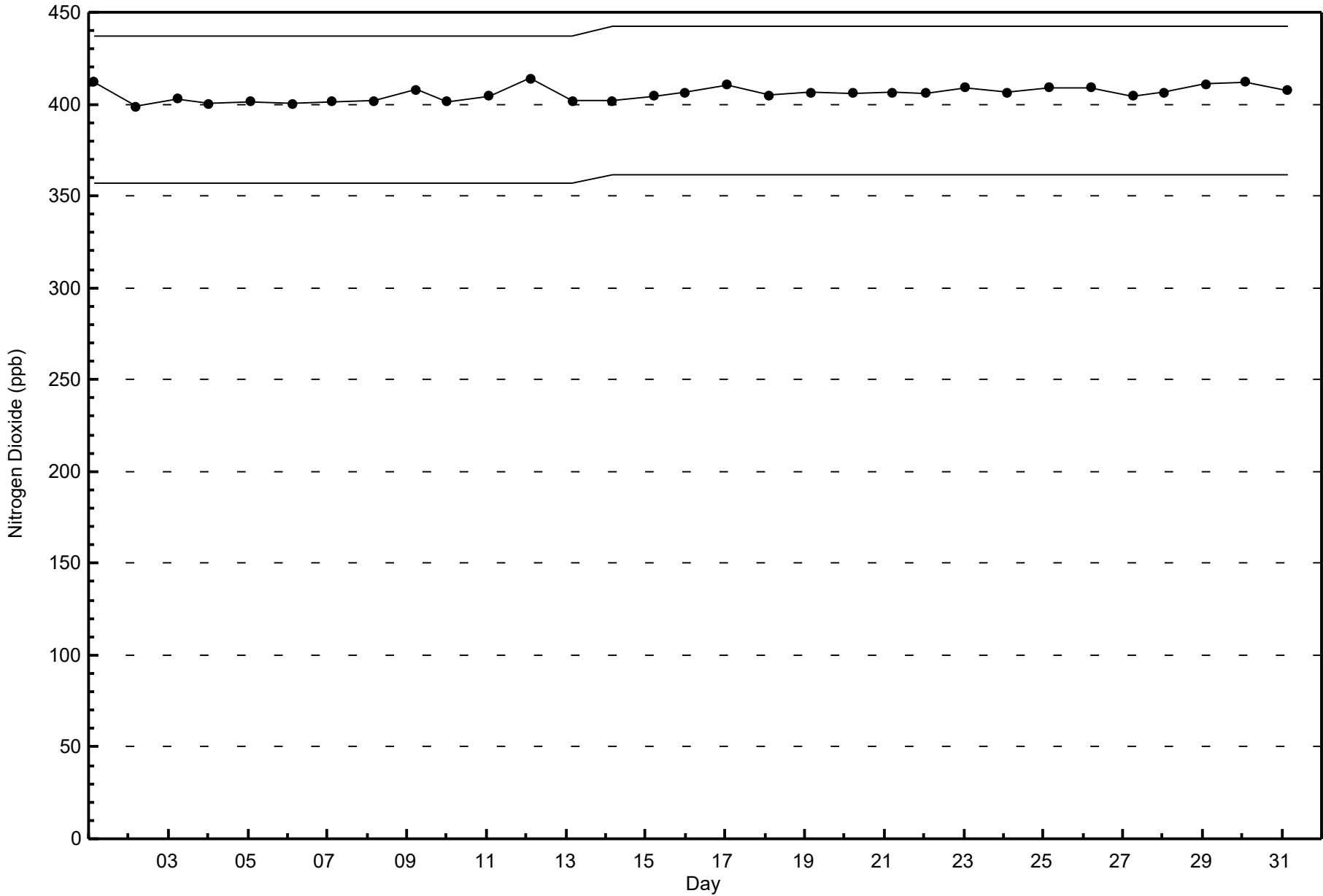


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Nitrogen Dioxide (NO₂) - ppb
Leismer









Wood Buffalo Environmental Association
Summary of Hour Averages

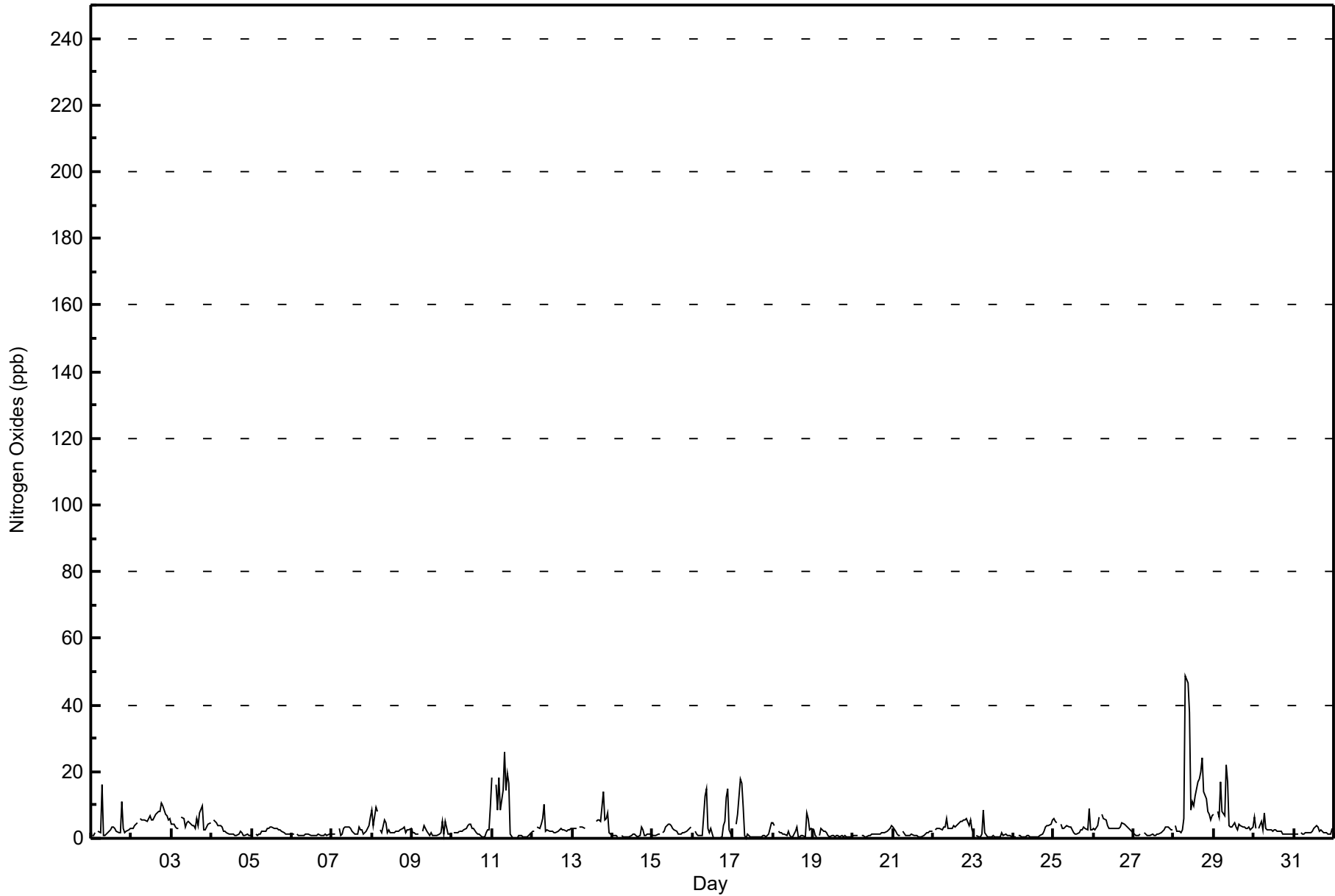
Nitrogen Oxides (NO_x) - ppb
Leismer - December 2023

Maximum Value: 48.9 ppb on Dec 28 08:00																						Maximum Daily Average: 14.2 ppb on Dec 28																						Hours in Service: 744					
Minimum Value: 0.1 ppb on Dec 11 13:00																						Minimum Daily Average: 1.0 ppb on Dec 14																						Hours of Data: 707					
Maximum Diurnal Average: 5.9 ppb at hour 8																						Minimum Diurnal Average: 2.2 ppb at hour 13																						Hours of Missing Data: 37					
Monthly Average: 3.21 ppb																						Percentiles: P ₁ = 0.2 P ₁₀ = 0.6 Q ₁ = 1.0 Median = 2.1 Q ₃ = 3.5 P ₉₀ = 6.1 P ₉₉ = 19.3																						Hours of Calibration: 37					
																																												Percent Operational Time: 100.0					
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Dec	0.7	1.0	1.7	Z	2.2	1.8	16.0	0.8	0.7	1.2	1.5	2.6	3.4	3.6	3.1	2.0	1.8	1.8	10.8	2.8	1.8	2.1	2.4	2.9	3.0	16.0																							
2-Dec	2.8	3.1	3.9	4.7	Z	6.0	5.5	5.6	5.7	5.2	5.8	6.7	5.5	5.6	7.2	7.8	8.0	8.0	10.8	9.8	7.3	6.7	5.6	6.0	6.2	10.8																							
3-Dec	4.3	4.4	3.4	2.8	2.8	Z	6.4	6.1	3.4	4.7	5.3	4.9	4.0	3.6	3.0	5.9	3.6	7.7	9.9	2.8	2.6	3.3	4.2	4.5	4.5	9.9																							
4-Dec	Z	5.5	5.0	4.5	4.0	3.7	3.4	2.2	2.0	1.7	1.4	1.2	1.2	1.1	0.9	0.9	1.2	1.9	1.6	1.0	1.0	1.4	1.0	1.0	2.1	5.5																							
5-Dec	1.3	Z	1.4	1.0	1.2	1.4	2.0	2.1	2.3	2.9	3.0	3.2	3.3	3.0	3.0	2.9	2.5	2.7	1.9	1.7	1.4	1.3	1.2	1.3	2.1	3.3																							
6-Dec	1.2	1.1	Z	1.1	0.9	0.9	0.9	0.9	1.3	1.1	1.1	0.9	0.8	0.8	0.9	1.0	1.5	0.8	0.8	0.9	1.1	1.0	1.2	1.5	1.0	1.5																							
7-Dec	1.4	1.2	1.4	Z	2.9	0.8	1.2	3.2	3.6	3.5	3.6	3.0	2.3	1.6	1.1	1.1	3.2	2.5	2.4	1.3	2.0	2.8	3.7	6.6	2.4	6.6																							
8-Dec	8.5	3.9	9.1	7.9	Z	2.6	1.9	5.6	4.6	1.8	2.4	1.8	1.8	1.8	2.1	2.0	2.0	2.6	2.8	3.4	1.9	2.7	2.6	2.8	3.4	9.1																							
9-Dec	1.9	1.5	1.2	1.1	1.2	Z	2.0	3.7	2.8	2.3	1.0	1.7	1.0	0.8	0.8	1.0	1.4	1.5	4.9	1.1	5.2	1.1	1.3	1.3	1.8	5.2																							
10-Dec	Z	1.7	1.7	1.8	2.3	2.2	2.3	2.6	3.0	4.0	4.4	4.1	3.1	2.8	1.7	1.4	1.3	0.8	0.5	0.3	1.5	2.4	2.4	9.6	2.5	9.6																							
11-Dec	18.3	Z	16.0	8.5	18.1	8.4	14.3	25.9	14.3	19.3	16.4	1.2	0.1	0.1	0.1	0.1	0.8	0.9	0.3	0.4	0.3	0.5	0.9	1.6	7.3	25.9																							
12-Dec	2.1	2.2	Z	3.4	3.0	4.1	6.0	10.2	2.3	2.7	2.1	2.2	2.1	1.7	1.6	2.0	2.7	3.0	2.5	2.4	2.2	2.3	2.7	3.1	3.0	10.2																							
13-Dec	3.1	3.1	3.0	Z	3.6	3.5	3.2	2.8	C	C	C	C	C	C	5.2	5.4	5.3	5.1	14.0	5.4	6.1	7.5	1.6	1.1	--	14.0																							
14-Dec	1.1	0.9	0.7	0.6	Z	0.9	0.5	0.4	0.3	0.4	0.5	0.8	1.2	1.2	1.0	0.6	0.9	3.2	2.7	0.8	0.9	1.1	1.1	1.2	1.0	3.2																							
15-Dec	0.8	0.7	1.0	1.4	1.3	Z	1.9	2.2	3.3	4.1	4.3	3.7	2.9	2.7	1.9	1.3	1.3	1.4	1.7	1.8	2.0	2.6	3.0	3.3	2.2	4.3																							
16-Dec	Z	2.2	1.5	0.9	0.8	0.7	0.9	12.9	14.8	3.1	1.7	3.1	0.1	0.2	0.2	0.1	0.1	0.3	3.9	5.1	12.2	15.0	2.5	0.4	3.6	15.0																							
17-Dec	0.3	Z	4.4	7.4	17.7	16.4	9.4	0.6	0.2	1.2	0.6	0.5	0.5	0.3	0.5	0.5	0.4	0.6	0.7	0.7	0.6	1.2	2.9	4.8	3.2	17.7																							
18-Dec	4.5	3.9	Z	2.0	1.6	1.5	1.5	1.1	0.7	1.9	0.9	0.6	0.5	2.2	3.5	0.3	0.3	0.8	1.0	0.4	7.6	6.0	2.8	3.2	2.1	7.6																							
19-Dec	2.5	0.7	0.3	Z	1.0	2.9	2.3	2.0	1.8	0.8	0.6	0.7	0.9	0.4	0.8	0.9	0.4	0.7	0.4	0.7	0.4	0.5	0.5	0.6	1.0	2.9																							
20-Dec	0.8	1.0	0.9	0.9	Z	0.9	0.8	0.6	0.6	0.7	1.0	1.3	1.4	1.5	1.5	1.4	1.4	1.6	1.5	1.8	2.3	2.7	3.0	3.7	1.4	3.7																							
21-Dec	3.3	2.1	1.3	1.0	0.7	Z	2.1	1.0	0.9	0.7	1.0	1.1	0.8	0.9	0.7	0.6	0.5	0.5	0.9	1.4	1.7	1.8	1.9	2.0	1.3	3.3																							
22-Dec	Z	2.7	2.8	3.0	2.8	2.7	3.2	3.3	6.1	3.0	3.0	3.1	3.7	3.5	3.8	4.3	4.9	5.1	5.3	5.6	5.8	3.9	5.7	2.5	3.9	6.1																							
23-Dec	1.5	Z	0.9	0.5	0.4	1.5	8.6	1.8	0.3	0.4	0.4	0.4	0.7	0.3	0.4	0.4	0.6	1.7	0.9	1.1	1.0	1.0	0.8	0.4	1.1	8.6																							
24-Dec	0.4	0.5	Z	0.9	0.8	0.6	0.5	0.5	0.7	0.7	0.6	0.5	0.6	0.5	0.3	0.5	0.8	1.3	2.1	3.4	3.8	3.8	4.2	5.4	1.5	5.4																							
25-Dec	5.9	4.9	4.5	Z	4.2	3.1	3.1	3.6	3.6	3.6	3.6	2.7	1.9	1.3	1.3	1.9	2.7	2.7	3.2	3.1	2.7	8.8	2.4	2.6	3.4	8.8																							
26-Dec	2.8	2.7	3.8	6.2	Z	7.2	5.8	5.6	3.7	3.0	3.0	2.9	2.9	2.9	2.8	2.8	3.4	4.9	4.3	3.8	3.3	2.8	2.4	2.0	3.7	7.2																							
27-Dec	1.2	1.1	0.9	1.0	1.2	Z	1.7	1.3	1.0	0.9	1.0	1.1	0.8	0.8	1.1	1.3	1.6	2.1	2.6	3.2	3.2	3.4	2.4	2.7	1.6	3.4																							
28-Dec	Z	3.7	2.2	2.3	1.9	2.7	5.9	48.9	46.4	37.7	8.3	10.9	9.8	12.9	17.0	17.9	20.1	24.3	13.9	12.0	7.9	7.1	5.6	6.8	14.2	48.9																							
29-Dec	7.4	Z	8.1	6.5	16.9	8.2	6.8	21.9	17.0	3.6	3.2	3.4	4.6	3.4	2.7	4.2	3.6	3.5	3.6	2.8	2.9	3.2	2.6	3.5	6.2	21.9																							
30-Dec	6.3	2.9	Z	2.8	5.0	2.4	7.6	2.8	2.6	2.4	2.6	2.3	2.4	2.4	2.2	2.3	2.0	1.4	1.4	1.4	1.3	1.3	1.4	1.4	2.6	7.6																							
31-Dec	1.3	1.3	1.3	Z	1.5	1.3	1.3	1.5	1.6	1.5	1.6	1.9	2.8	3.8	3.5	2.3	2.6	2.1	1.7	1.5	1.3	1.1	1.1	2.9	1.9	3.8																							
																								3.3	2.3	3.2	3.0	3.8	3.4	4.2	5.9	5.0	4.0	2.9	2.5	2.2	2.3	2.4	2.5	2.7	3.1	3.7	2.7	3.1	3.3	2.5	3.0	Diurnal Average	
																								18.3	5.5	16.0	8.5	18.1	16.4	16.0	48.9	46.4	37.7	16.4	10.9	9.8	12.9	17.0	17.9	20.1	24.3	14.0	12.0	12.2	15.0	5.7	9.6	Diurnal Maximum	
Z - zerospan																								C - Calibration																									



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Leismer - December 2023





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitrogen Oxides (NO_x) - ppb
Leismer - December 2023

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	701	99.15	99.15
21 - 40	4	0.57	99.72
41 - 80	2	0.28	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Nitrogen Oxides (NO_x) - ppb
Leismer - December 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	5	4	1	2	2	20	44	39	67	181	52	23	113	113	26	7	699
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	1	4
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	5	4	1	2	2	20	44	39	67	181	52	23	113	113	29	10	705

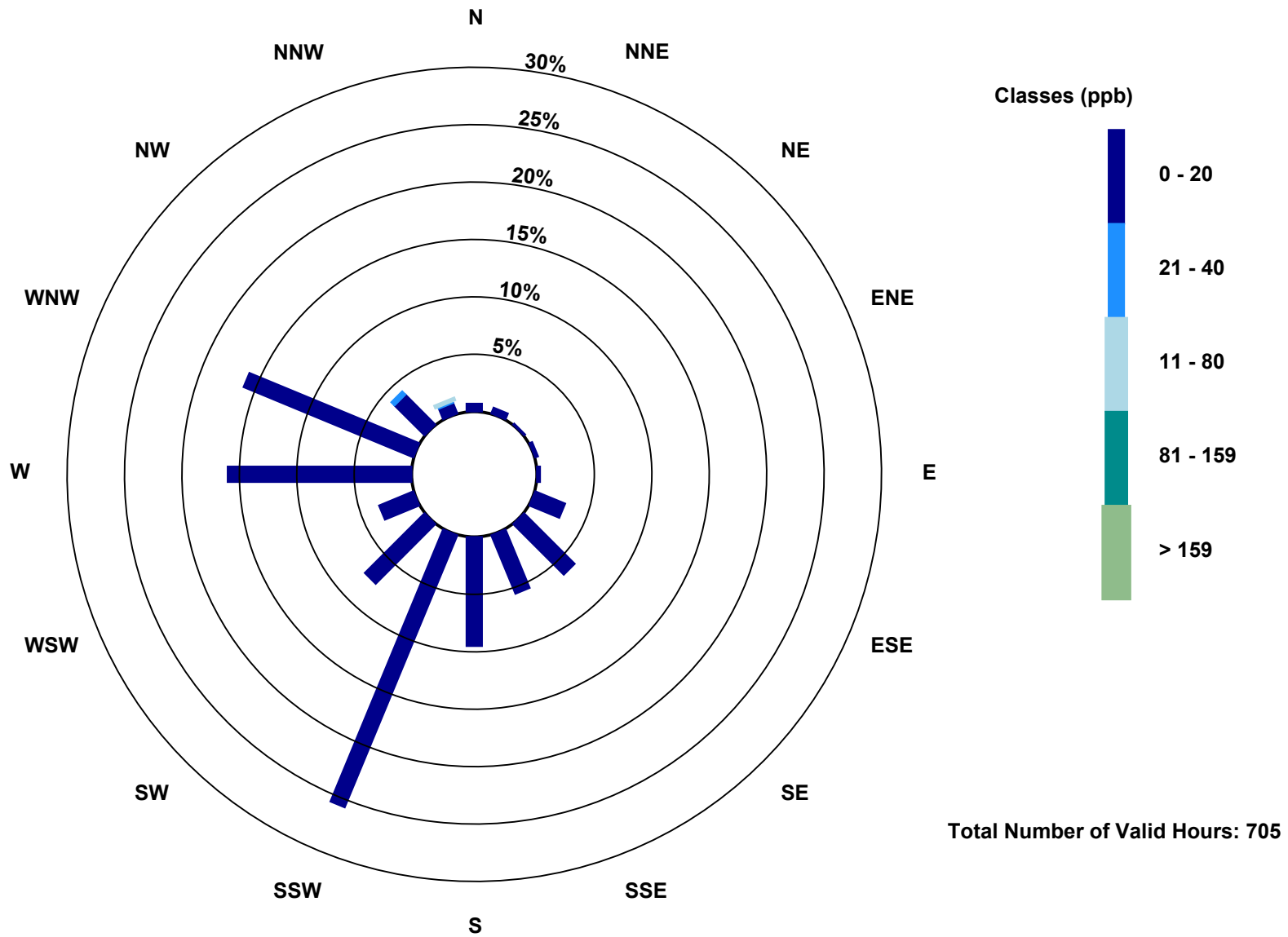
Total Number of Valid Hours: 705

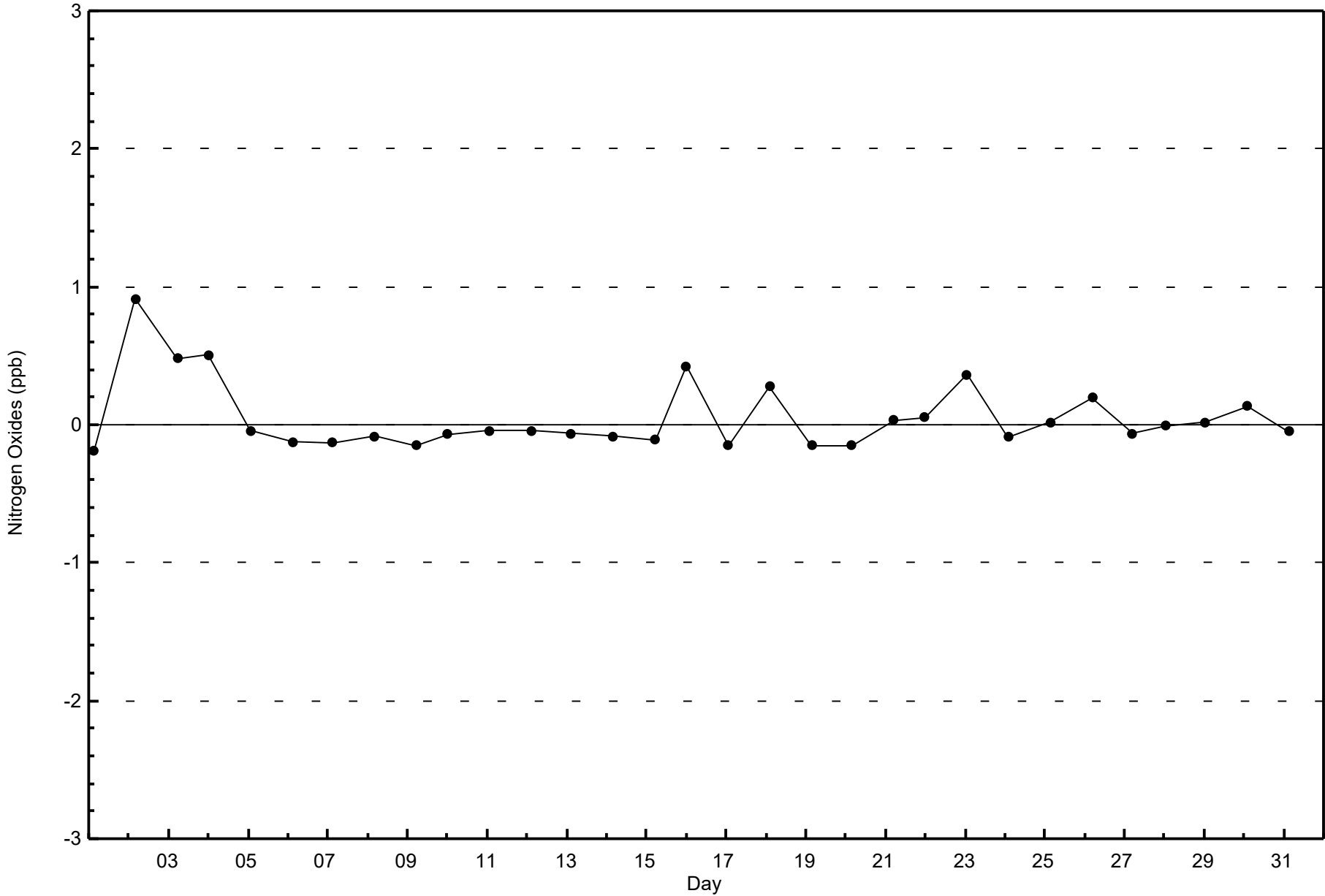
Total Number of Hours: 744

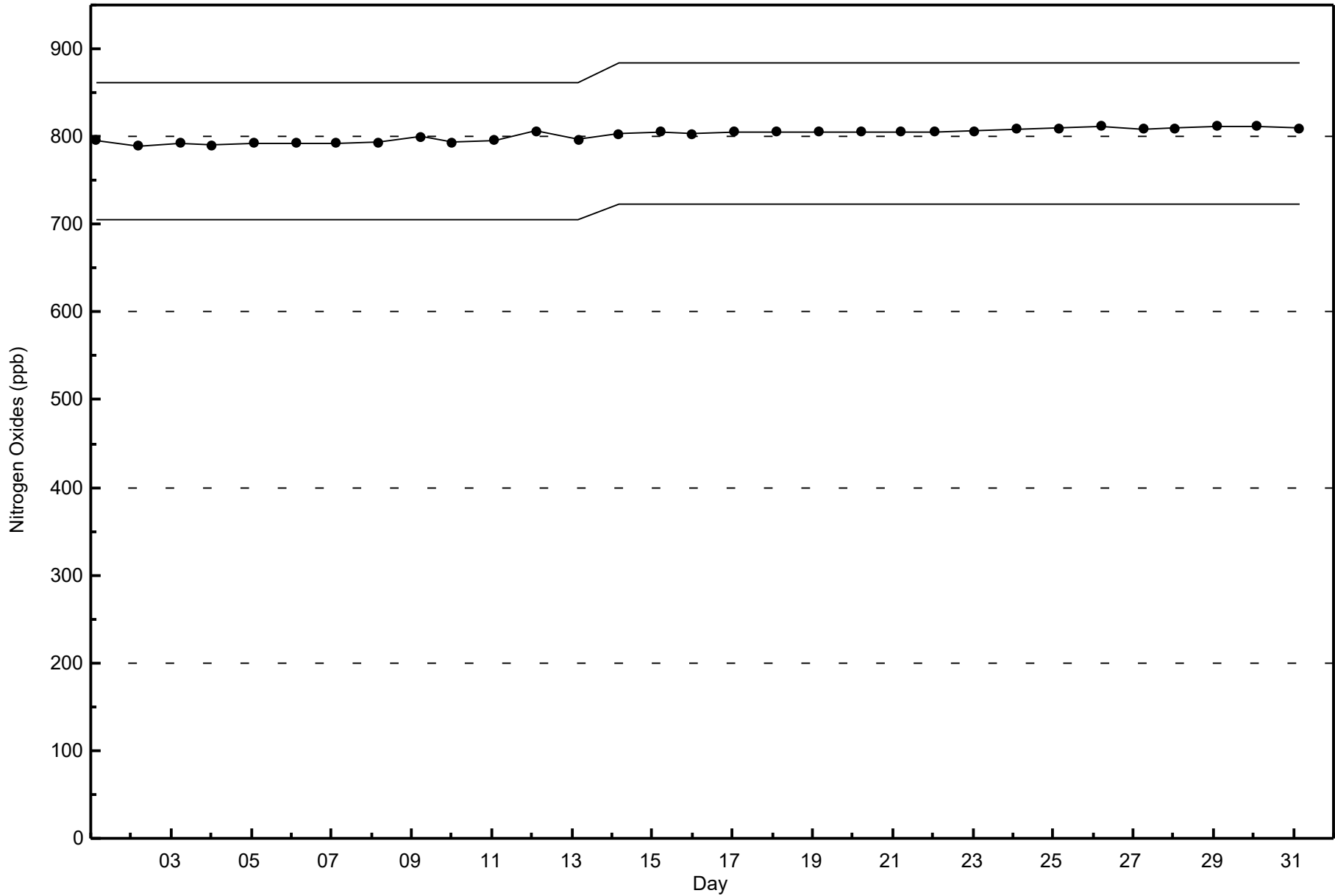


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Nitrogen Oxides (NO_x) - ppb
Leismer







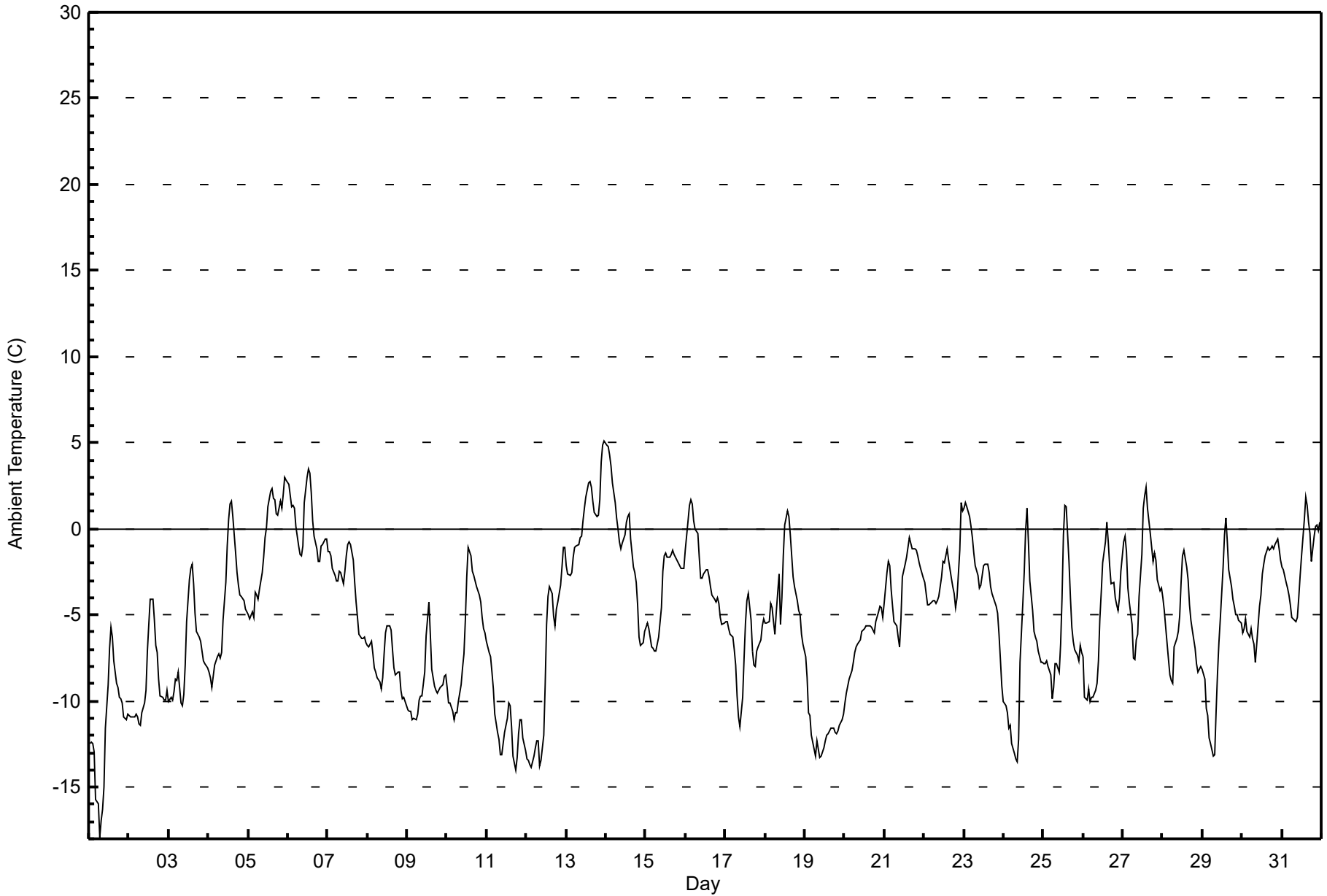


Maximum Value: 5.1 C on Dec 14 00:00 Maximum Daily Average: 0.6 C on Dec 13																						Hours in Service: 744 Hours of Data: 744				
Minimum Value: -17.9 C on Dec 1 07:00 Minimum Daily Average: -11.6 C on Dec 19 Maximum Diurnal Average: -1.8 C at hour 15 Minimum Diurnal Average: -7.5 C at hour 7 Monthly Average: -5.19 C Percentiles: P ₁ = -13.8 P ₁₀ = -11.0 Q ₁ = -8.3 Median = -5.2 Q ₃ = -1.9 P ₉₀ = 0.4 P ₉₉ = 3.4																						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-Dec	-12.5	-12.4	-12.5	-12.9	-15.7	-15.9	-17.9	-17.0	-16.3	-15.0	-11.5	-9.1	-6.9	-5.7	-6.3	-7.6	-8.9	-9.2	-9.8	-9.8	-10.1	-11.0	-11.1	-10.7	-11.5	-5.7
2-Dec	-10.9	-10.9	-10.9	-10.9	-10.8	-10.9	-11.3	-11.4	-10.7	-10.1	-9.4	-7.1	-5.6	-4.1	-4.1	-5.3	-6.8	-7.2	-8.7	-9.7	-9.8	-9.9	-10.0	-9.4	-9.0	-4.1
3-Dec	-10.0	-9.7	-9.9	-9.4	-8.7	-8.8	-8.3	-10.1	-10.3	-9.6	-7.9	-5.4	-2.9	-2.3	-2.0	-3.2	-4.9	-5.9	-6.3	-6.5	-7.1	-7.7	-7.8	-8.1	-7.2	-2.0
4-Dec	-8.3	-8.6	-9.2	-8.6	-7.9	-7.4	-7.3	-7.5	-7.2	-5.3	-3.1	-1.0	0.5	1.4	1.6	0.7	-1.4	-2.6	-3.3	-3.9	-3.9	-4.2	-4.6	-4.9	-4.4	1.6
5-Dec	-5.0	-5.2	-4.8	-5.1	-3.7	-3.9	-4.1	-3.5	-2.5	-1.7	-0.5	0.1	1.3	2.2	2.3	1.8	1.7	0.9	0.8	1.6	1.2	2.0	3.0	2.8	-0.8	3.0
6-Dec	2.6	1.9	1.2	1.4	1.2	0.1	-1.0	-1.5	-1.5	-1.0	1.5	3.0	3.5	3.2	2.1	0.4	-0.4	-1.1	-1.9	-1.9	-1.0	-0.9	-0.6	-0.6	0.4	3.5
7-Dec	-1.3	-1.3	-1.5	-2.3	-2.7	-3.0	-3.1	-2.5	-2.5	-3.2	-2.5	-1.5	-0.9	-0.8	-0.9	-1.8	-3.1	-4.3	-5.2	-6.1	-6.4	-6.4	-6.3	-6.6	-3.2	-0.8
8-Dec	-6.8	-6.8	-6.6	-7.3	-8.1	-8.3	-8.6	-8.9	-9.3	-8.7	-7.2	-6.0	-5.6	-5.7	-5.8	-7.0	-8.1	-8.4	-8.3	-8.4	-9.4	-9.8	-9.7	-10.2	-7.9	-5.6
9-Dec	-10.5	-10.6	-10.6	-11.1	-11.0	-11.1	-10.7	-10.0	-9.7	-9.7	-8.3	-6.2	-5.3	-4.3	-6.1	-8.2	-9.2	-9.4	-9.5	-9.4	-9.3	-9.0	-8.5	-8.5	-9.0	-4.3
10-Dec	-9.2	-10.1	-10.1	-10.6	-11.1	-10.7	-10.7	-10.0	-9.0	-8.1	-7.2	-5.3	-2.8	-1.0	-1.6	-2.4	-2.7	-3.0	-3.4	-3.8	-4.2	-5.2	-5.8	-6.0	-6.4	-1.0
11-Dec	-6.5	-7.2	-7.4	-8.3	-9.3	-10.8	-11.8	-12.2	-13.1	-13.1	-12.5	-11.8	-11.0	-10.1	-10.2	-11.5	-13.2	-14.0	-13.3	-11.9	-11.1	-11.1	-12.1	-12.8	-11.1	-6.5
12-Dec	-13.4	-13.5	-13.7	-13.9	-13.2	-12.7	-12.3	-12.3	-13.8	-13.4	-12.0	-9.1	-5.6	-3.9	-3.3	-3.8	-5.1	-5.7	-4.7	-4.2	-3.3	-2.2	-1.1	-1.1	-8.2	-1.1
13-Dec	-2.1	-2.6	-2.7	-2.5	-1.6	-1.1	-1.0	-0.9	-0.5	-0.4	0.5	1.2	1.9	2.7	2.8	2.4	1.6	1.0	0.7	0.8	1.7	3.9	4.8	5.1	0.6	5.1
14-Dec	4.9	4.8	4.3	3.7	2.7	1.6	0.7	0.0	-0.7	-1.2	-0.8	-0.3	0.4	0.7	0.8	0.6	-2.2	-2.6	-3.1	-4.4	-6.3	-6.8	-6.6	-5.9	-0.7	4.9
15-Dec	-5.7	-5.5	-5.8	-6.9	-6.9	-7.1	-7.1	-6.7	-6.3	-4.5	-2.5	-1.6	-1.4	-1.6	-1.7	-1.5	-1.3	-1.5	-1.7	-1.8	-2.2	-2.3	-2.3	-2.3	-3.7	-1.3
16-Dec	-1.3	0.5	1.3	1.6	1.5	0.5	0.0	-0.2	-1.6	-2.9	-2.9	-2.6	-2.4	-2.4	-2.8	-3.4	-3.8	-4.1	-4.3	-4.0	-4.3	-5.1	-5.5	-5.5	-2.2	1.6
17-Dec	-5.4	-5.4	-5.8	-6.1	-6.3	-7.0	-7.9	-9.7	-11.0	-11.5	-9.8	-7.5	-5.4	-4.2	-3.8	-5.3	-7.1	-7.9	-8.0	-7.1	-6.8	-6.5	-5.6	-5.2	-6.9	-3.8
18-Dec	-5.5	-5.5	-5.4	-4.4	-4.6	-5.4	-6.1	-4.8	-2.6	-5.6	-4.0	-1.5	0.2	1.0	0.7	-0.3	-1.6	-2.8	-3.4	-4.2	-4.8	-5.0	-6.1	-6.7	-3.7	1.0
19-Dec	-7.4	-8.6	-10.6	-10.8	-12.0	-12.3	-13.2	-12.3	-12.8	-13.3	-13.2	-12.7	-12.3	-12.0	-11.9	-11.7	-11.6	-11.5	-11.8	-11.9	-11.7	-11.4	-11.1	-10.7	-11.6	-7.4
20-Dec	-10.1	-9.6	-9.1	-8.7	-8.2	-7.7	-7.2	-6.8	-6.7	-6.5	-6.0	-5.8	-5.8	-5.6	-5.6	-5.6	-5.7	-5.9	-6.1	-5.4	-4.8	-4.5	-4.5	-5.2	-6.6	-4.5
21-Dec	-4.3	-2.5	-1.9	-2.2	-3.5	-4.5	-5.4	-5.6	-6.3	-6.9	-5.2	-2.8	-2.1	-1.7	-1.1	-0.5	-0.8	-1.2	-1.2	-1.2	-1.6	-2.0	-2.3	-2.8	-2.9	-0.5
22-Dec	-3.1	-3.8	-4.4	-4.4	-4.3	-4.2	-4.2	-4.3	-4.2	-4.0	-2.8	-1.9	-2.0	-1.5	-1.2	-1.8	-2.9	-3.3	-3.7	-4.6	-4.0	-1.2	1.5	1.0	-2.9	1.5
23-Dec	1.2	1.5	1.3	0.7	0.1	-0.5	-1.4	-2.1	-2.7	-3.4	-3.3	-2.7	-2.1	-2.0	-2.0	-2.6	-3.4	-3.8	-4.0	-4.5	-4.9	-6.1	-7.6	-9.1	-2.6	1.5
24-Dec	-10.1	-10.3	-10.7	-11.5	-11.4	-12.5	-13.0	-13.4	-13.5	-12.3	-7.7	-4.4	-2.5	-0.1	1.2	0.8	-3.0	-4.7	-6.0	-6.3	-6.6	-7.1	-7.7	-7.7	-7.6	1.2
25-Dec	-7.8	-7.9	-7.6	-8.0	-8.5	-9.8	-9.2	-7.9	-7.9	-8.3	-6.7	-4.0	-0.4	1.4	1.3	-2.0	-4.0	-5.7	-6.6	-7.0	-7.4	-7.7	-6.7	-7.2	-6.1	1.4
26-Dec	-7.4	-9.8	-10.0	-9.3	-10.0	-9.8	-9.8	-9.3	-8.9	-7.6	-5.2	-3.7	-2.0	-0.7	0.4	-0.8	-2.1	-3.2	-3.1	-4.0	-4.4	-4.7	-4.0	-2.4	-5.5	0.4
27-Dec	-0.7	-0.4	-1.3	-3.5	-4.2	-5.5	-7.5	-7.6	-6.4	-6.1	-3.9	-1.5	1.2	1.9	2.4	1.2	-0.2	-1.1	-1.9	-1.4	-1.8	-2.9	-3.6	-3.5	-2.4	2.4
28-Dec	-4.0	-4.7	-5.7	-7.6	-8.5	-8.8	-8.9	-6.8	-6.4	-6.0	-5.0	-3.1	-1.6	-1.2	-2.2	-3.0	-4.4	-5.3	-5.9	-6.9	-7.9	-8.3	-8.1	-8.0	-5.8	-1.2
29-Dec	-8.1	-8.8	-10.4	-10.8	-12.1	-12.5	-13.2	-13.1	-10.6	-8.4	-6.6	-5.2	-2.2	-0.3	0.6	-0.8	-2.3	-3.4	-4.1	-4.5	-5.0	-4.9	-5.3	-5.5	-6.6	0.6
30-Dec	-6.0	-5.8	-5.3	-5.9	-6.3	-5.8	-6.4	-6.7	-7.7	-6.7	-4.5	-3.8	-2.6	-2.1	-1.6	-1.1	-1.3	-1.2	-1.0	-1.1	-0.9	-0.6	-1.1	-1.8	-3.6	-0.6
31-Dec	-2.2	-2.4	-3.1	-3.4	-3.8	-4.4	-5.1	-5.3	-5.4	-5.2	-4.0	-2.7	-1.6	0.5	1.8	1.4	0.4	-0.2	-1.9	-0.4	0.1	0.3	-0.1	0.4	-1.9	1.8
																						Diurnal Average				
																						Diurnal Maximum				



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature (AT) - C
Leismer - December 2023





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Ambient Temperature (AT) - C
Leismer - December 2023

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	660	88.71	88.71
0 - 10	84	11.29	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

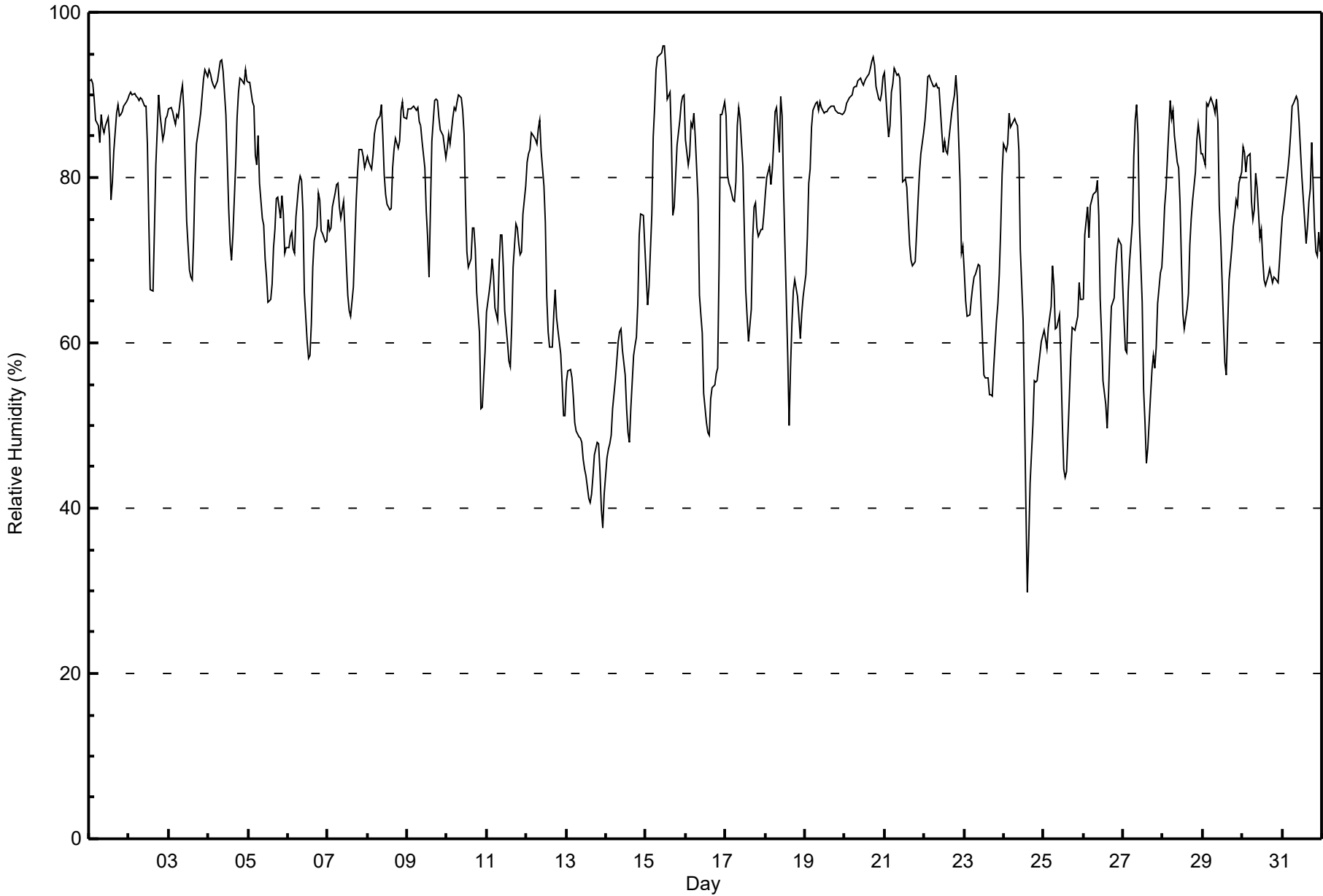
Leismer - December 2023

Maximum Value: 95.9 % on Dec 15 11:00																						Maximum Daily Average: 91.2 % on Dec 20																						Hours in Service: 744			
Minimum Value: 29.8 % on Dec 24 15:00																						Minimum Daily Average: 47.1 % on Dec 13																						Hours of Data: 744			
Maximum Diurnal Average: 82.5 % at hour 8																						Minimum Diurnal Average: 63.8 % at hour 15																						Hours of Missing Data: 0			
Monthly Average: 75.42 %																						Percentiles: P ₁ = 41.7 P ₁₀ = 56.1 Q ₁ = 66.2 Median = 77.3 Q ₃ = 87.3 P ₉₀ = 90.0 P ₉₉ = 94.1																						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-Dec	91.6	91.9	91.4	89.4	86.9	86.3	84.2	87.6	86.1	85.5	86.3	87.3	84.8	77.4	79.5	83.2	87.8	88.8	87.5	87.6	88.0	88.7	89.1	89.5	86.9	91.9																					
2-Dec	90.0	90.3	90.0	90.2	89.9	89.7	89.4	89.7	89.5	88.7	88.6	83.9	74.6	66.5	66.2	73.7	81.4	85.8	90.0	87.7	84.6	85.5	87.1	87.5	85.0	90.3																					
3-Dec	88.3	88.5	88.0	87.1	86.5	87.6	87.3	90.2	91.1	88.1	81.0	74.7	68.8	68.0	67.6	72.7	80.0	84.1	86.5	87.8	89.9	91.9	93.0	92.2	84.2	93.0																					
4-Dec	93.1	92.5	91.8	91.1	90.9	91.7	92.9	94.1	94.2	92.9	87.6	82.1	76.3	72.1	70.0	73.1	81.7	87.3	90.3	92.1	91.9	91.3	93.0	91.7	87.7	94.2																					
5-Dec	91.6	91.5	89.2	88.7	82.7	81.5	85.1	79.4	75.1	74.2	70.1	68.0	65.0	65.3	67.1	71.5	73.6	77.5	77.7	75.2	77.8	75.5	70.9	71.5	76.9	91.6																					
6-Dec	71.4	72.8	73.4	71.4	70.8	75.2	79.2	80.2	79.7	75.9	66.2	60.2	58.1	58.5	62.4	69.2	72.4	74.1	78.1	77.3	73.5	73.3	72.2	72.4	71.6	80.2																					
7-Dec	74.8	73.6	73.9	76.5	78.2	79.1	79.3	76.5	75.1	77.1	73.6	69.5	65.7	63.9	63.3	66.7	72.0	77.2	80.7	83.4	83.3	82.5	81.2	81.9	75.4	83.4																					
8-Dec	82.6	81.8	81.0	82.7	85.3	86.2	86.9	87.5	88.9	85.1	80.4	78.0	76.8	76.1	76.2	81.2	83.4	84.8	83.6	84.4	88.2	89.2	87.3	87.1	83.5	89.2																					
9-Dec	88.3	88.3	88.3	88.5	88.6	88.2	88.5	86.8	86.2	84.5	81.2	76.0	72.7	67.9	76.3	84.4	89.3	89.6	89.2	87.2	85.8	85.0	83.8	82.3	84.5	89.6																					
10-Dec	83.5	85.2	84.0	87.3	88.6	88.2	89.2	89.9	89.7	88.2	85.2	77.3	71.0	69.1	70.1	73.9	73.9	71.4	66.0	61.2	52.0	52.3	55.7	58.9	75.5	89.9																					
11-Dec	63.7	66.3	67.9	70.2	68.2	64.2	62.6	69.5	73.1	73.1	69.1	63.9	60.1	57.8	57.1	62.1	69.2	74.4	73.9	72.1	70.8	71.0	75.5	79.0	68.1	79.0																					
12-Dec	81.9	82.8	83.4	85.5	84.9	84.5	84.1	86.0	87.0	83.3	78.9	74.6	65.6	61.4	59.4	59.4	63.5	66.4	63.0	61.4	58.7	55.0	51.1	51.2	71.4	87.0																					
13-Dec	55.2	56.6	56.9	55.7	53.4	50.3	49.2	48.6	48.5	47.9	45.9	44.7	43.8	41.1	40.7	41.7	43.9	46.4	48.0	47.8	44.5	39.8	37.6	41.6	47.1	56.9																					
14-Dec	46.0	47.2	47.9	48.7	52.1	55.6	57.7	60.2	61.4	61.6	59.1	56.1	52.0	49.1	47.9	52.0	58.4	59.6	60.6	64.7	73.1	75.6	75.5	71.7	58.1	75.6																					
15-Dec	68.2	64.6	66.9	75.7	85.0	88.4	93.1	94.7	94.7	95.2	95.9	95.9	93.2	89.5	90.4	84.4	75.4	76.5	80.2	83.9	87.0	89.0	89.8	90.0	85.3	95.9																					
16-Dec	84.6	81.5	82.7	86.5	86.1	87.8	85.0	77.3	65.8	63.5	61.3	53.9	50.4	49.2	48.8	53.2	54.5	55.0	56.3	57.0	69.4	87.7	87.7	89.1	69.8	89.1																					
17-Dec	87.4	80.3	79.3	78.8	77.3	77.2	79.4	86.2	88.4	87.1	81.4	73.8	66.4	63.2	60.2	64.0	72.8	76.5	76.9	73.8	72.9	73.7	73.7	75.6	76.1	88.4																					
18-Dec	78.0	80.1	81.3	79.2	81.0	84.2	88.0	88.5	83.1	89.8	87.4	78.8	71.8	58.5	50.0	56.9	62.3	66.3	67.6	65.6	63.1	60.5	63.6	65.5	73.0	89.8																					
19-Dec	68.3	72.8	79.4	81.0	86.2	88.1	89.0	89.1	88.2	89.1	88.4	87.8	87.9	88.0	88.2	88.5	88.7	88.7	88.2	87.9	87.8	87.8	87.7	87.8	86.0	89.1																					
20-Dec	88.2	89.0	89.3	89.7	90.1	90.8	90.9	91.1	91.7	92.1	91.5	91.2	91.7	92.0	92.6	93.3	94.1	94.6	93.6	91.0	89.4	89.4	90.2	92.2	91.2	94.6																					
21-Dec	92.8	87.3	84.9	86.2	90.4	91.4	93.3	92.4	92.5	92.1	87.1	79.5	79.8	78.8	75.3	71.9	70.1	69.2	69.8	73.4	77.1	80.5	82.9	85.4	82.7	93.3																					
22-Dec	87.0	89.3	92.2	92.3	91.8	91.1	91.1	91.4	90.8	90.9	85.4	83.1	84.5	83.3	82.8	84.5	87.7	89.0	90.0	92.4	89.8	79.5	70.8	71.6	86.8	92.4																					
23-Dec	68.7	65.1	63.2	63.4	65.3	66.9	67.9	68.2	69.6	69.3	64.7	60.3	56.0	55.8	53.8	53.7	53.5	56.9	62.7	64.8	68.3	73.8	80.3	63.7	80.3																						
24-Dec	84.0	83.2	84.1	87.8	86.1	86.5	87.1	86.5	86.3	83.2	71.4	62.7	51.9	40.2	29.8	36.0	43.0	50.2	55.4	55.3	55.4	57.1	60.2	60.8	66.0	87.8																					
25-Dec	61.5	60.5	59.4	61.8	64.4	69.2	66.9	61.8	61.9	63.4	57.4	50.3	44.8	43.6	44.4	53.4	58.4	61.9	61.7	61.5	63.2	67.4	65.3	65.3	59.6	69.2																					
26-Dec	65.2	73.1	76.4	72.7	76.6	77.3	78.0	78.2	79.7	75.4	65.4	61.0	55.4	52.5	49.6	54.0	59.7	64.5	65.5	69.1	71.3	72.6	72.2	71.9	68.2	79.7																					
27-Dec	62.9	59.2	58.8	66.2	69.9	74.6	82.5	86.9	88.9	85.2	74.4	64.9	54.5	50.3	45.4	47.4	53.7	56.8	58.6	56.9	59.6	64.7	68.4	69.1	65.0	88.9																					
28-Dec	72.3	76.4	78.6	86.0	89.4	87.2	88.2	85.1	81.9	81.1	77.0	69.8	63.6	61.7	64.0	65.9	71.9	75.0	77.2	80.7	84.6	86.5	84.9	82.9	78.0	89.4																					
29-Dec	82.9	81.5	89.0	88.7	89.2	89.7	88.6	87.8	89.5	86.9	76.6	72.8	62.6	57.7	56.2	62.0	67.6	71.5	74.0	75.4	77.3	76.6	79.3	80.6	77.7	89.7																					
30-Dec	83.8	83.0	80.6	82.5	82.9	77.1	74.8	76.0	80.5	78.9	72.7	73.8	70.2	67.6	66.9	68.1	69.0	68.2	67.4	68.0	67.8	67.2	69.8	72.8	73.7	83.8																					
31-Dec	75.3	76.5	79.5	81.0	82.9	85.5	88.6	88.9	89.9	89.3	86.7	83.3	80.0	74.8	72.1	74.1	77.1	78.6	84.3	73.9	71.0	70.5	73.4	71.1	79.5	89.9																					
																						77.8	77.8	78.5	79.7	80.7	81.3	82.2	82.5	82.2	81.2	76.7	72.2	67.7	64.5	63.8	67.0	70.7	73.0	74.2	74.1	74.6	75.3	75.7	76.5	Diurnal Average	
																						93.1	92.5	92.2	92.3	91.8	91.7	93.3	94.7	94.7	95.2	95.9	95.9	93.2	92.0	92.6	93.3	94.1	94.6	93.6	92.4	91.9	91.9	93.0	92.2	Diurnal Maximum	



Wood Buffalo Environmental Association
Hourly Averages

Relative Humidity (RH) - %
Leismer - December 2023





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Relative Humidity (RH) - %
Leismer - December 2023

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	4	0.54	0.54
40 - 60	104	13.98	14.52
60 - 80	303	40.73	55.24
80 - 100	333	44.76	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed (WS) - km/h

Leismer - December 2023

Maximum Speed: 36 km/h on Dec 11 03:00	Maximum Daily Speed Average: 23.1 km/h on Dec 23	Hours in Service: 744
Minimum Speed Value: 0 km/h on Dec 1 10:00	Minimum Daily Speed Average: 1.5 km/h on Dec 29	Hours of Data: 742
Maximum Diurnal Speed Average: 6.9 km/h at hour 14	Minimum Diurnal Speed Average: 4.4 km/h at hour 9	Hours of Missing Data: 2
Monthly Average Velocity: 5.1 km/h 252.7 deg	Percentiles: P ₁ = 2 P ₁₀ = 3 Q ₁ = 5 Median = 7 Q ₃ = 11 P ₉₀ = 18 P ₉₉ = 31	Percent Operational Time: 99.7

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24				
1-Dec	SW3	W3	WNW3	N2	W1	UO	UO	SSE2	S1	SSW0	S1	SSW2	SSW5	S7	S7	SSE8	SSE7	SSE6	SE6	SSE5	SSW5	SSW7	SSW8	S8	S3.6	SSW8		
2-Dec	SSE7	SSW6	SSW6	SSW6	SSW4	S4	SSW4	S5	S5	S5	S5	S4	S7	SSW6	SSW6	WSW4	SW3	WSW3	WSW4	WNW7	NW6	WNW10	WNW11	NW11	SW3.7	WNW11		
3-Dec	W5	WNW5	SSE2	W3	W3	SW3	WSW2	SE5	SSE5	S5	SSW5	S4	S5	SSE7	SSE8	SE6	SE6	SE6	SE6	SE8	SE7	SE5	SSE5	SSW3	SSE3.5	SSE8		
4-Dec	SSW4	SSW5	S4	SSW2	SSW2	S4	S5	SSW5	S2	SW2	WSW3	W10	W12	W13	W12	W7	SSW3	SSE3	SSW4	SSW4	S2	SSW3	S4	S4	SW3.8	W13		
5-Dec	SSE4	SE7	SE6	SE7	SE9	ESE4	SSE8	SSE8	SSE6	SW5	SSW8	SW9	SW5	W7	W6	W6	WSW4	SSW3	WSW5	W8	SW5	WSW8	W9	W9	SSW3.9	W9		
6-Dec	W12	W8	W9	W11	W10	W9	W7	W5	WSW4	WSW5	W9	W10	W9	W7	SW5	SSW5	SSW5	SSW6	SSW5	SW3	W4	W8	W9	W8	W6.6	W12		
7-Dec	W4	W6	W7	WNW9	WNW10	W7	WNW10	WNW14	WNW18	WNW15	WNW14	WNW14	WNW15	WNW16	W11	W10	WNW13	WNW10	W9	W9	WNW13	WNW16	WNW16	WNW17	WNW11.7	WNW18		
8-Dec	WNW16	WNW16	WNW14	WNW12	WNW12	WNW14	WNW12	NW9	WNW9	W10	WNW11	W9	W9	W9	W9	W7	WNW7	WNW9	WNW9	WNW8	W3	W5	WNW5	W6	WNW9.3	WNW16		
9-Dec	W7	W11	W9	W10	WNW9	WNW9	WNW8	WNW11	WNW10	WNW9	W5	WSW4	W6	SW5	S6	S6	S5	S4	SSE5	SE5	SE5	SE6	SE7	ESE7	WSW3.7	WNW11		
10-Dec	ESE6	SE7	SE6	SSE8	SSE7	S8	S7	SSW9	SSW9	SSW9	SSW9	SW6	W12	WNW19	W14	W12	W19	W20	W19	WNW24	WNW32	WNW31	WNW31	WNW28	W10.3	WNW32		
11-Dec	NW26	WNW27	WNW36	WNW35	NW33	NW32	NW29	NW24	NW22	NW23	NW22	WNW14	W14	W11	W8	SW4	SW3	S5	SSW5	SSW6	SSW7	SSW7	SSW7	SSW5	WNW14.4	WNW36		
12-Dec	SW3	WSW4	WSW4	W5	WNW8	WNW9	WNW8	W4	SSW4	SSW5	SSW6	S6	SW8	SSW8	SSW8	SSW8	SSW9	SSW9	SSW8	SSW8	SSW8	SSW10	SSW9	SSW8	SW5.8	SSW10		
13-Dec	SSW8	SSW7	SSW8	SSW8	SSW9	SSW9	SSW7	SSW6	SSW8	SSW7	SSW8	SSW7	SSW6	SSW8	SSW8	SW6	SSW5	SW5	W2	WSW3	WNW10	WNW15	W10	W13	SW6.1	WNW15		
14-Dec	WNW19	WNW23	WNW22	WNW22	WNW21	WNW24	WNW21	W17	W17	W17	W19	WNW19	WNW20	WNW17	WNW13	SW3	SSW4	W4	W4	SW5	SSW6	SSW3	SSW3	S2	W12.6	WNW24		
15-Dec	S5	SSW4	SSW3	SSW6	SSW7	SSW8	SSW7	S5	S5	SSW9	SSW11	SSW9	SSW12	SSW15	SSW11	S9	SSW15	SSW14	SSW15	SW16	SW14	SW10	SSW9	SSW9	SSW9.4	SW16		
16-Dec	SW9	W13	W18	W20	WNW24	WNW19	WNW21	WNW22	NW18	WNW14	WNW16	WNW20	WNW19	WNW13	W8	W8	W7	WNW5	NW8	NW17	NW17	WNW17	WNW20	WNW15.0	WNW24			
17-Dec	WNW21	WNW27	WNW27	WNW25	NW22	NW21	WNW17	W9	W5	SSW5	SSW6	SSW7	SW7	WSW8	SW7	SSW7	SSW7	SSW8	SSW9	SSW8	SSW9	SSW9	SSW10	SSW11	W8.8	WNW27		
18-Dec	SSW9	SSW7	SW5	WSW5	SW5	SW3	SW4	W9	W12	SW6	WSW5	W9	WSW7	WNW17	WNW20	W14	W11	WNW11	W10	W12	WNW14	NNW14	NNW12	NW12	W8.2	WNW20		
19-Dec	NW12	N6	NNE5	NNE7	NNE7	NE6	ENE5	ENE6	E8	ESE11	ESE11	ESE9	ESE9	ESE10	ESE11	ESE11	ESE13	ESE13	ESE14	ESE15	ESE14	ESE14	ESE15	ESE14	E8.1	ESE15		
20-Dec	SE14	SE12	SE10	SE11	SE9	SSE9	SSE8	S10	S7	S8	SSW11	SSW12	SSW12	SSW12	SSW11	SSW9	S8	S10	S9	SSW11	SSW11	SSW10	SW8	SSW6	S8.7	SE14		
21-Dec	SW5	W11	W8	W10	SW3	WSW4	W3	S4	S5	S4	SSW5	S6	SSW7	SSW8	SSW9	SSW10	S10	S9	SSW12	SSW11	SSW10	SSW8	SSW6	SSW5	SSW6.2	SSW12		
22-Dec	S6	SSW5	SW4	SW4	SSW5	S5	SSW5	S3	SSE3	S4	S6	SSE5	SSE5	SSE4	S6	SSW7	SSW6	SSW7	SSW6	SW5	WNW8	WNW21	WNW26	WNW21	SW4.5	WNW26		
23-Dec	WNW20	WNW26	WNW30	WNW27	WNW28	WNW32	WNW26	WNW28	WNW29	WNW27	WNW27	WNW28	WNW27	WNW28	WNW27	WNW23	WNW22	WNW24	WNW20	WNW17	WNW24	WNW24	WNW22	WNW15	W6	WSW5	WNW23.1	WNW32
24-Dec	WSW4	W4	W4	SSW3	SSW3	SSW6	S5	SSW6	SSW6	SSW5	SSW3	SSW8	SSW9	SW8	SW9	SSW8	SSW9	SSW7	SSW7	SSW7	SW6	SW4	SSW6	SSW5	SSW5.6	SSW9		
25-Dec	S5	SW4	SW4	SSW5	W4	WSW4	W6	W7	W7	SW2	SSW2	SSW3	W6	W8	SW5	SSW5	SSE8	SSW3	SSE3	SE3	SE5	SE8	SE8	SE8	SSW3.2	SE8		
26-Dec	SE7	SSE3	SSE6	SSE4	SE4	SSE6	S5	S5	SSW7	SSW7	SW5	SSW8	SSW9	WSW7	SW5	SSW5	SSW6	SSW4	SSW3	S4	SW3	SW3	W10	W12	SSW4.5	W12		
27-Dec	W10	W11	W14	SW5	WSW4	S4	SSW6	SSW6	S5	S6	SSW6	SSW7	SSW8	S8	S8	S9	SE9	SE8	SE9	SE9	SE6	ESE4	ESE6	SE9	S4.7	W14		
28-Dec	SE5	SW1	NNE3	ESE4	E2	N2	WNW5	NNW6	NNW8	NNW7	WNW7	NW8	NW9	WNW12	NW12	NW12	NW13	NW14	NW16	NNW10	N7	NW6	NNW9	NNW9	NW6.5	NW16		
29-Dec	N9	NNE5	NNW3	NNW3	NW2	N5	NNE2	NW2	SE1	S3	SSW3	SSW5	SSW4	SW6	SW5	SW4	SSW5	SSW5	SSW5	SSW5	SSW4	SSW2	S3	S2	SW1.5	N9		
30-Dec	SSE4	SSE5	S4	S4	S2	SSE5	SE7	SE7	SSE5	SE8	SE8	SE9	SE9	SE11	SE11	SE10	SSE12	SSE15	S12	S11	S12	SSW12	SSW11	SSW10	SSE7.8	SSE15		
31-Dec	SSW9	SSW9	SSW8	SW7	SW7	SW4	SSW6	SSW5	SSW7	SSW6	SSW4	S2	S2	W3	W5	W5	W7	W5	SW3	W10	W16	W18	WNW18	WNW22	WSW6.4	WNW22		

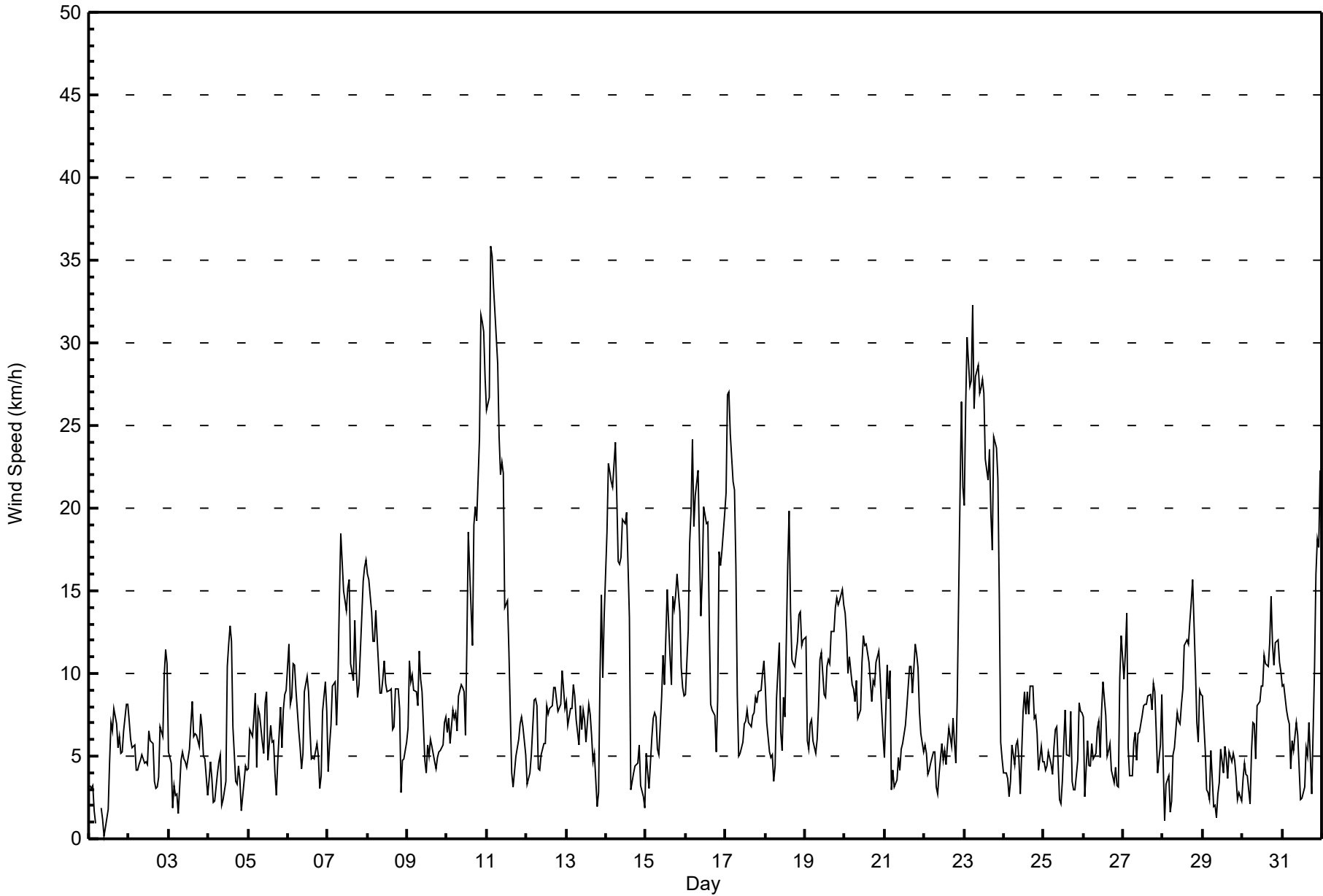
WSW4.5	W5.8	W6.2	W5.8	W5.6	W5.4	W5.2	W4.7	W4.4	WSW4.8	WSW5.3	WSW5.6	WSW6.4	WSW6.9	WSW6.0	SW4.8	SW4.7	SW4.4	SW4.5	WSW4.8	WSW5.1	W5.5	WSW5.5	W5.4	Diurnal Average																					
NW26																							WNW27	WNW36	WNW35	NW33	WNW32	NW29	WNW28	WNW29	WNW27	WNW27	WNW28	WNW27	WNW23	WNW22	WNW24	WNW20	WNW17	WNW24	WNW24	WNW22	WNW15	W6	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 - December 2023





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h
Leismer - December 2023**

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	241	32.48	32.48
6 - 11	338	45.55	78.03
12 - 19	102	13.75	91.78
20 - 28	50	6.74	98.52
29 - 38	11	1.48	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 742

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed (WS) - km/h
Leismer - December 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	4	0	1	1	3	9	21	41	65	39	20	25	5	2	2	241
6 - 11	3	2	1	1	1	10	37	16	27	117	15	5	64	26	7	6	338
12 - 19	0	0	0	0	0	8	2	2	2	10	2	0	24	40	10	2	102
20 - 28	0	0	0	0	0	0	0	0	0	0	0	0	2	41	7	0	50
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	0	8	3	0	11
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	6	6	1	2	2	21	48	39	70	192	56	25	115	120	29	10	742

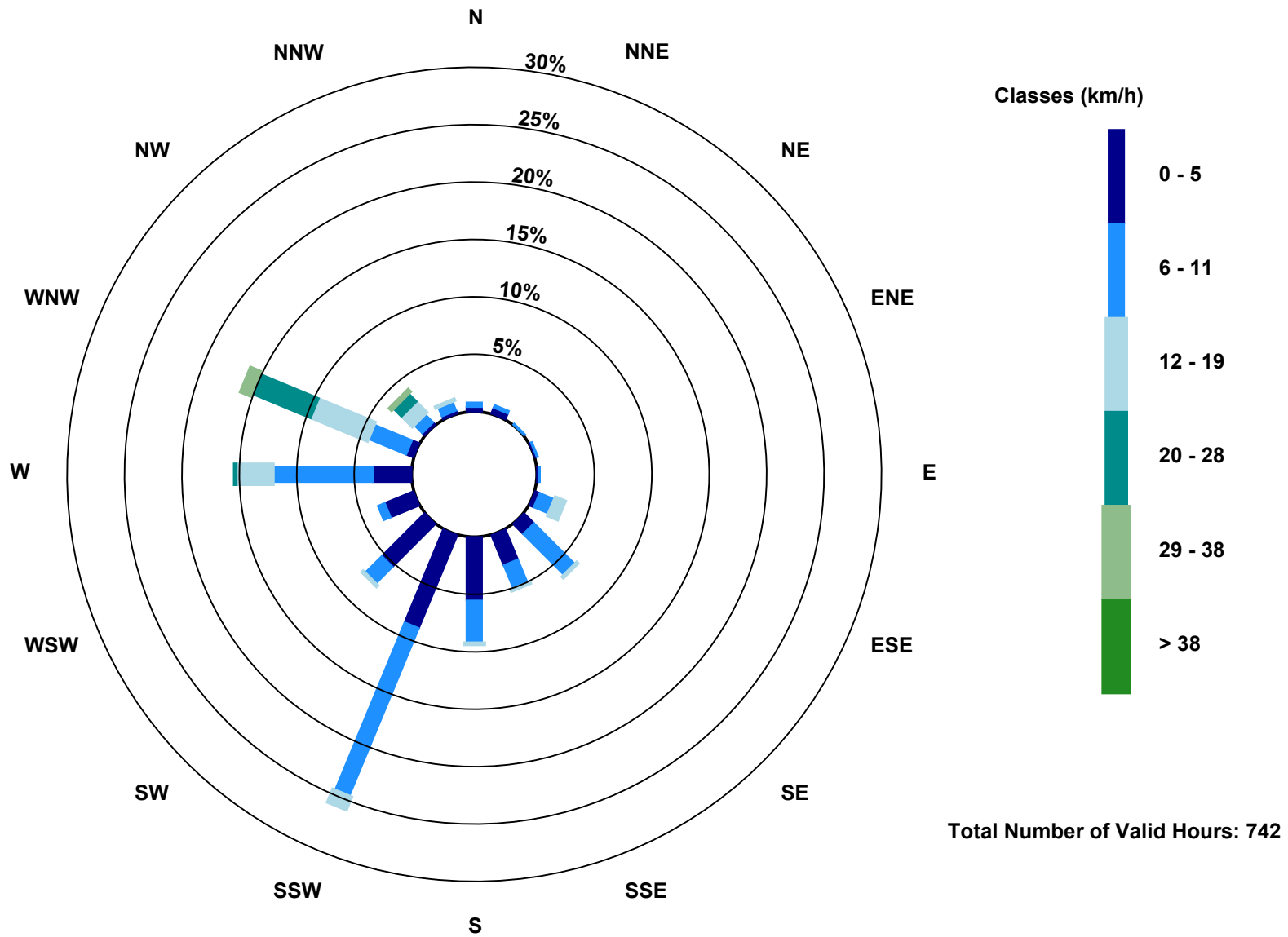
Total Number of Valid Hours: 742

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Dec 2023

Wind Speed (WS) - km/h
Leismer





Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Speed (WS) - km/h
Leismer - December 2023

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 8 km/h on Dec 10 21:00 Minimum Value: 0 km/h on Dec 1 08:00 Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 1 Median = 2 Q ₃ = 3 P ₉₀ = 4 P ₉₉ = 6																	Hours in Service: 744 Hours of Data: 742 Hours of Missing Data: 2 Hours of Calibration: 0 Percent Operational Time: 99.7								
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Dec	1	1	1	2	1	UO	UO	0	1	1	1	1	2	2	1	1	1	1	1	1	1	1	1	2	2
2-Dec	2	2	1	1	1	1	1	1	1	1	1	1	1	2	2	1	1	1	1	3	1	3	2	2	3
3-Dec	3	2	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1	3
4-Dec	1	1	1	1	1	1	1	1	1	2	2	4	3	3	4	3	2	1	1	1	1	1	1	1	4
5-Dec	1	1	2	3	2	3	3	3	1	2	3	3	2	3	2	2	2	1	3	2	2	3	3	4	4
6-Dec	4	3	2	3	4	3	3	2	1	3	3	3	3	2	1	1	1	2	1	2	2	2	3	3	4
7-Dec	1	1	2	3	3	1	2	4	3	2	2	3	4	3	2	2	3	2	3	2	3	3	3	3	4
8-Dec	3	2	4	2	2	3	2	2	2	2	3	2	2	2	3	2	1	2	2	1	1	1	1	2	4
9-Dec	2	2	2	2	2	2	2	3	3	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	3
10-Dec	2	2	2	1	1	2	1	2	2	2	2	2	5	5	3	3	4	4	5	5	8	6	6	5	8
11-Dec	5	5	7	6	6	6	6	5	3	4	4	6	3	3	4	2	1	1	1	1	2	2	1	1	7
12-Dec	1	1	1	1	2	2	2	1	1	1	1	1	3	2	2	2	2	1	2	1	2	3	2	2	3
13-Dec	2	1	1	1	2	2	2	2	2	2	2	2	2	2	3	2	1	2	1	2	3	3	3	3	3
14-Dec	4	5	5	4	3	4	4	3	3	4	4	3	3	4	3	1	1	2	2	1	1	2	1	1	5
15-Dec	2	1	1	1	1	2	1	1	1	2	3	3	4	4	3	3	4	5	5	5	4	3	3	2	5
16-Dec	4	5	5	5	5	4	4	4	3	3	3	4	4	4	3	2	2	1	1	3	4	3	3	3	5
17-Dec	5	5	4	4	4	4	3	4	1	1	1	2	2	3	3	2	1	2	2	2	2	2	3	3	5
18-Dec	3	2	2	2	2	1	1	4	4	1	2	2	3	7	4	3	2	2	2	2	3	4	2	2	7
19-Dec	2	2	1	2	1	2	2	2	2	3	3	2	2	3	3	2	3	3	4	3	4	3	3	3	4
20-Dec	3	3	2	3	2	2	1	3	2	2	3	3	4	3	3	2	2	3	2	3	3	3	2	2	4
21-Dec	2	4	4	3	1	2	1	1	1	1	2	2	2	2	2	3	3	3	3	3	3	2	1	2	4
22-Dec	1	1	1	1	1	1	1	1	1	1	2	1	1	1	2	2	1	2	2	1	3	6	5	3	6
23-Dec	3	5	5	5	5	6	6	6	6	6	5	5	6	5	5	4	3	4	4	3	4	3	4	1	6
24-Dec	1	1	1	1	1	1	1	1	1	2	1	2	2	3	3	2	2	2	2	2	1	1	1	1	3
25-Dec	1	1	1	2	3	1	2	1	2	1	1	1	2	2	2	1	1	1	1	2	1	2	2	1	3
26-Dec	2	2	1	1	1	1	1	1	2	2	2	2	3	3	1	1	1	1	1	1	1	2	5	3	5
27-Dec	4	4	4	2	2	1	2	2	1	1	1	2	3	2	2	2	2	2	2	2	1	2	2	2	4
28-Dec	1	2	2	2	1	2	2	2	2	2	1	2	2	2	4	3	3	3	3	2	2	1	2	2	4
29-Dec	1	3	1	1	1	1	1	2	2	1	1	2	1	2	2	1	1	0	1	1	1	1	1	1	3
30-Dec	0	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	3	3	3	3	3	3	2	3
31-Dec	4	3	2	2	2	1	1	1	1	1	2	1	1	2	2	2	2	2	2	3	4	3	3	4	4
Diurnal Maximum																									
UO - Unstable Operation																									



Wood Buffalo Environmental Association
Summary of Hour Averages

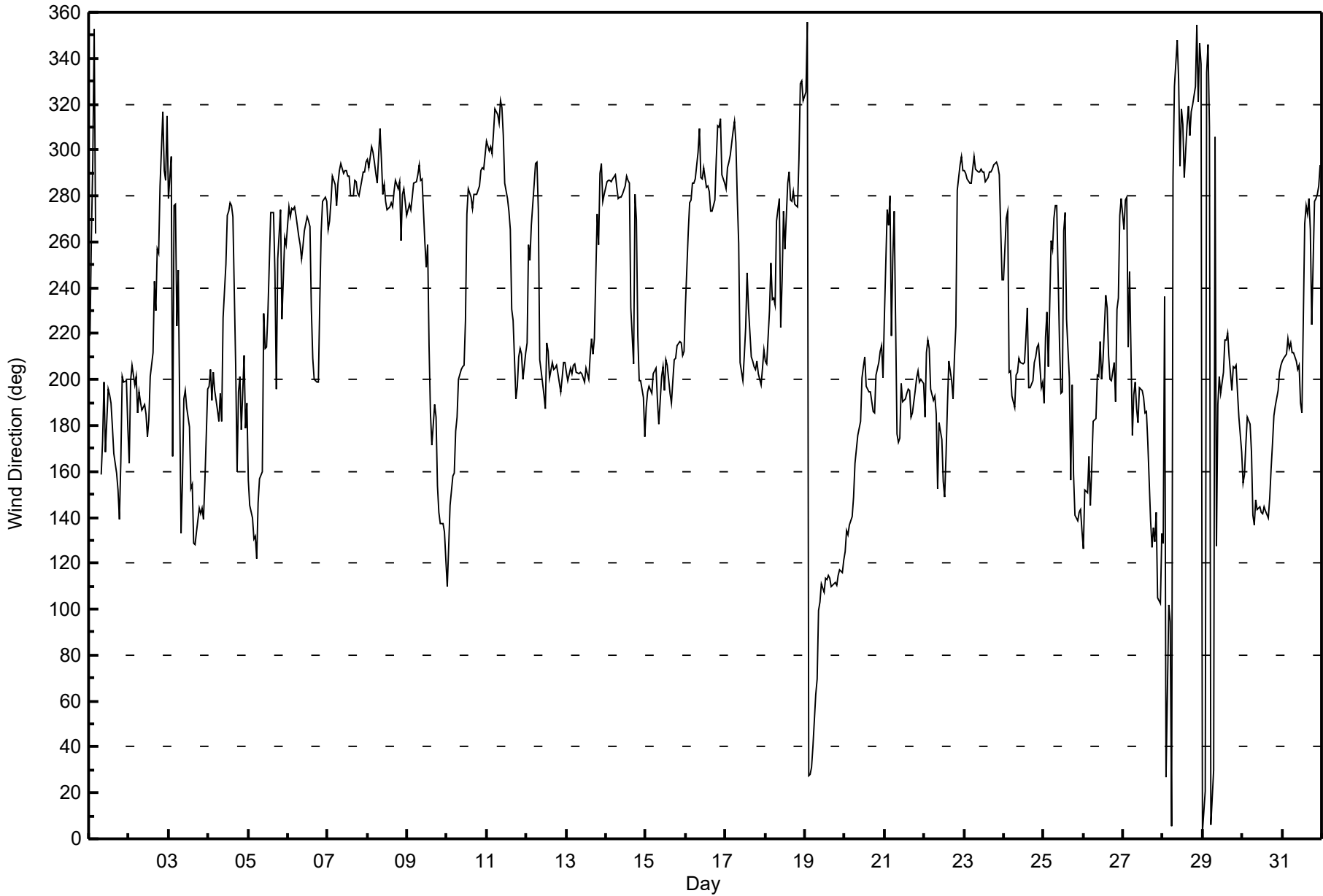
Wind Direction (WD) - deg
Leismer - December 2023

Direction of Maximum Speed: 301 deg on Dec 11 03:00	Hours in Service: 744
Direction of Maximum Daily Speed Average: 289.8 deg on Dec 23	Hours of Data: 742
Direction of Minimum Speed: 199 deg on Dec 1 10:00	Hours of Missing Data: 2
Direction of Minimum Daily Speed Average: 1.5 deg on Dec 29	Percent Operational Time: 99.7
Monthly Average Direction: 252.7 deg	

Day	Hourly Period Ending At (MST)																								Daily Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Dec	219	262	296	353	264	UO	UO	159	174	199	169	196	193	190	180	168	159	152	139	164	201	199	200	179	183.9
2-Dec	163	200	206	197	202	186	195	190	186	189	185	175	182	201	212	243	230	257	255	284	317	291	287	315	227.5
3-Dec	279	297	167	276	276	223	248	133	156	191	195	188	179	152	154	129	128	134	144	142	144	139	156	196	164.3
4-Dec	197	204	191	203	195	187	182	194	182	227	250	272	273	277	276	271	206	160	194	201	178	210	179	190	231.1
5-Dec	156	145	140	130	132	122	147	157	160	229	213	214	229	273	273	247	196	252	274	227	244	262	259	209.6	
6-Dec	275	271	274	274	275	272	263	259	253	258	265	271	269	266	231	209	200	199	199	233	264	278	279	278	261.9
7-Dec	266	269	278	289	285	276	286	291	294	290	291	291	288	289	280	280	287	286	281	280	287	290	290	295	287.1
8-Dec	296	293	301	299	295	290	285	310	296	280	285	277	274	275	277	275	282	287	283	286	260	281	283	272	287.4
9-Dec	274	277	274	280	286	286	289	294	287	288	260	249	259	215	185	171	189	184	154	142	137	137	134	121	249.2
10-Dec	110	127	145	158	159	178	184	200	205	206	206	226	272	283	280	275	281	281	281	284	291	292	292	298	269.0
11-Dec	304	299	301	298	307	318	315	312	322	318	306	285	279	273	265	231	226	191	197	210	213	211	200	212	296.4
12-Dec	216	258	252	268	285	294	295	274	209	204	194	188	216	212	201	208	205	205	206	203	195	201	207	208	220.6
13-Dec	203	200	205	203	206	207	203	203	203	201	199	205	200	210	218	211	218	272	258	290	294	277	281	225.2	
14-Dec	286	287	287	286	287	289	284	279	280	279	281	284	289	287	286	231	207	281	270	219	200	199	192	175	280.1
15-Dec	188	194	197	194	203	204	205	191	180	201	206	195	209	206	194	190	200	208	210	215	217	216	211	213	204.3
16-Dec	232	264	277	278	286	285	287	299	309	288	288	292	283	284	282	273	273	278	296	311	310	313	289	286	287.8
17-Dec	283	292	295	298	308	312	303	279	260	208	199	210	223	246	231	210	208	205	204	208	202	197	205	213	263.7
18-Dec	208	207	230	251	235	235	232	269	279	223	244	273	257	285	291	278	277	282	277	275	296	329	330	321	276.7
19-Dec	325	355	27	28	31	40	63	70	99	103	111	108	113	113	115	113	110	111	112	111	114	117	116	121	98.9
20-Dec	125	134	132	136	140	149	164	170	176	182	201	206	210	197	195	195	191	186	186	202	207	212	215	200	179.4
21-Dec	227	274	267	280	219	253	273	177	172	174	198	190	192	194	196	195	184	185	195	201	204	199	200	198	208.5
22-Dec	184	211	217	214	196	191	193	185	153	181	174	156	149	167	189	208	199	192	210	224	283	294	297	291	234.8
23-Dec	291	290	287	286	286	291	297	292	290	291	292	291	291	286	288	290	290	292	293	295	293	289	266	243	289.8
24-Dec	244	271	273	203	204	193	188	202	203	209	207	207	207	218	231	197	197	200	208	210	214	215	197	199	209.7
25-Dec	190	218	229	206	260	257	270	276	276	216	194	194	265	273	226	201	156	198	159	141	139	142	144	134	206.7
26-Dec	126	152	151	166	145	162	182	183	202	201	217	200	208	237	231	210	200	199	207	191	231	235	272	279	205.1
27-Dec	266	278	279	214	247	176	193	199	187	181	197	195	192	185	186	172	138	127	135	129	142	105	102	133	182.8
28-Dec	128	236	27	102	95	6	288	328	348	331	293	318	311	288	310	319	306	317	320	328	355	321	347	338	322.2
29-Dec	3	21	334	346	310	6	30	306	128	189	201	194	203	217	217	220	210	195	206	205	206	195	183	169	221.8
30-Dec	155	159	172	184	180	168	141	136	147	144	145	142	142	145	143	140	148	161	172	184	189	195	203	206	162.9
31-Dec	208	209	211	218	214	216	212	211	208	205	206	190	185	268	276	272	279	266	224	277	279	281	285	293	251.9

257.4 267.1 272.4 268.8 272.2 273.9 267.0 262.9 260.2 247.2 245.2 244.4 246.9 249.3 242.9 229.6 222.0 223.1 227.1 237.2 249.7 259.2 258.1 261.6
 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
Leismer - December 2023

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0											Hours in Service: 744														
Maximum Value: 84 deg on Dec 1 04:00											Hours of Data: 742														
Minimum Value: 8 deg on Dec 8 18:00											Hours of Missing Data: 2														
Percentiles: P ₁ = 8 P ₁₀ = 10 Q ₁ = 12 Median = 16 Q ₃ = 23 P ₉₀ = 34 P ₉₉ = 63											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-Dec	9	23	23	84	54	UO	UO	23	26	75	36	22	18	18	14	9	10	14	13	11	13	13	12	16	84
2-Dec	14	12	14	14	18	11	19	14	13	14	16	20	20	23	25	22	27	27	34	23	21	16	11	17	34
3-Dec	73	42	58	50	46	62	54	20	13	13	14	17	24	16	12	14	12	10	10	8	8	8	12	33	73
4-Dec	15	14	19	49	43	16	12	19	40	66	67	21	19	16	15	26	42	23	13	15	42	24	18	14	67
5-Dec	23	12	17	14	17	52	17	18	18	38	26	27	36	24	24	25	41	50	43	26	32	34	32	34	52
6-Dec	22	25	21	18	21	24	31	36	43	36	23	21	22	22	26	11	12	15	13	46	42	22	14	18	46
7-Dec	27	18	16	15	18	12	9	10	9	10	9	11	10	9	11	8	11	9	17	12	12	10	10	11	27
8-Dec	12	10	15	13	15	11	10	26	19	10	11	12	15	14	13	14	10	8	10	10	42	17	11	24	42
9-Dec	13	11	16	11	11	8	11	19	13	11	36	35	31	34	15	13	9	9	9	10	10	10	14	13	36
10-Dec	15	14	24	11	12	19	11	14	17	17	17	34	29	12	13	15	12	11	13	10	11	11	10	10	34
11-Dec	12	12	11	10	12	10	12	12	9	10	15	16	12	20	25	21	28	11	13	17	20	18	14	17	28
12-Dec	16	23	20	20	9	9	14	17	20	13	17	20	24	22	14	17	13	11	14	12	14	15	19	18	24
13-Dec	13	12	11	10	13	14	14	18	15	13	15	16	21	16	20	27	18	23	59	38	12	9	14	12	59
14-Dec	9	10	11	10	9	8	9	12	11	12	10	10	9	10	12	45	25	29	28	26	13	16	27	58	58
15-Dec	13	18	14	10	11	17	13	17	12	18	21	24	21	20	18	18	21	22	20	22	22	21	20	19	24
16-Dec	31	29	17	14	10	10	10	12	14	14	11	10	11	11	11	19	21	12	32	26	18	12	9	10	32
17-Dec	13	9	10	12	13	13	17	18	24	11	14	23	25	36	28	19	14	14	13	16	14	15	20	23	36
18-Dec	18	16	37	36	35	41	26	26	18	22	32	17	30	22	11	12	13	14	13	13	17	11	11	17	41
19-Dec	17	25	15	9	9	16	27	23	17	18	17	20	18	19	17	17	16	17	15	13	16	15	14	16	27
20-Dec	17	16	15	15	14	10	12	14	16	16	19	19	21	18	20	16	17	18	15	20	18	25	21	23	25
21-Dec	35	21	29	13	38	26	34	22	17	18	15	16	14	15	15	17	16	17	16	16	15	14	13	14	38
22-Dec	12	12	16	22	13	11	12	25	19	12	16	15	13	13	23	18	17	15	21	26	18	9	9	9	26
23-Dec	9	10	10	10	10	10	11	11	9	10	9	10	11	10	10	9	9	10	8	8	8	8	38	17	38
24-Dec	27	24	24	32	28	14	12	13	14	26	55	14	16	28	28	16	14	14	17	14	15	17	10	13	55
25-Dec	11	36	37	21	55	42	27	11	18	61	33	24	35	17	30	24	12	41	30	31	10	8	9	11	61
26-Dec	14	39	17	29	13	11	13	17	11	13	26	17	20	31	27	20	14	21	28	17	28	54	32	13	54
27-Dec	32	23	14	24	48	22	16	14	17	20	13	14	19	18	16	13	19	13	12	13	16	39	13	13	48
28-Dec	19	43	42	23	68	63	29	22	18	21	14	24	21	16	19	8	13	11	9	14	19	19	24	22	68
29-Dec	18	61	27	45	58	12	61	51	74	25	32	22	29	24	23	15	12	8	10	13	14	37	15	20	74
30-Dec	15	12	19	14	25	11	10	11	29	9	11	10	12	11	10	12	10	13	14	15	16	17	16	17	29
31-Dec	18	17	15	17	15	25	13	13	11	11	28	47	42	51	18	20	16	34	50	18	11	11	10	9	51
											73 61 58 84 68 63 61 51 74 75 67 47 42 51 30 45 42 50 59 46 42 54 38 58														
Diurnal Maximum																									
UO - Unstable Operation																									



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

AMS505 SAWBONES BAY DECEMBER 2023

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

January 31, 2024

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - SAWBONES BAY (AMS505)
DECEMBER 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	708	35	36	99.87	20.8	0	10.6	0
H2S (ppb) Average	707	36	37	99.87	1.9	0	0.9	0
NO2 (ppb) Average	707	36	37	99.87	20.8	0	12.7	-
NO (ppb) Average	707	36	37	99.87	16.4	-	7.1	-
NOX (ppb) Average	707	36	37	99.87	37.2	-	19.9	-
Temperature 2 m (C) Average	743	0	1	99.87	5.8	-	2.4	-
Relative Humidity (%) Average	737	0	7	99.06	99.1	-	90.7	-
Wind Speed 10 m (km/h) Average	743	0	1	99.87	32	-	20	-
Wind Direction 10 m (deg) Average	743	0	1	99.87	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - SAWBONES BAY (AMS505)
 DECEMBER 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	708	2.1	3.2	-	0	0.2	0.4	0.8	2.1	6.3	20.8
H2S (ppb) Average	707	0.24	0.3	-	0	0.1	0.1	0.1	0.2	0.6	1.9
NO2 (ppb) Average	707	5.55	3.9	-	0	1.4	2.9	4.7	7.3	11.3	20.8
NO (ppb) Average	707	1.33	2.5	-	0	0	0	0.2	1.4	4.5	16.4
NOX (ppb) Average	707	6.88	6	-	0	1.5	3.1	5.1	8.6	15.6	37.2
Temperature 2 m (C) Average	743	-4.48	4.5	-	-16.1	-10.6	-8.1	-4.2	-0.7	1.2	5.8
Relative Humidity (%) Average	737	73.97	14.4	-	33.3	53.5	64.7	75	86.7	91.6	99.1
Wind Speed 10 m (km/h) Average	743	11.3	5	-	1	6	8	10	14	17	32
Wind Direction 10 m (deg) Average	743	207.3	0	-	0	-	-	-	-	-	0

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - SAWBONES BAY (AMS505)
DECEMBER 2023

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
ALL PARAMETERS	13 Dec 2023 18:00	13 Dec 2023 18:00	1	Maintenance - station logger/modem reset
Relative Humidity	04 Dec 2023 08:00	04 Dec 2023 10:00	3	Sensor operated out of range
Relative Humidity	15 Dec 2023 08:00	15 Dec 2023 10:00	3	Sensor operated out of range



Wood Buffalo Environmental Association

Summary of Hour Averages

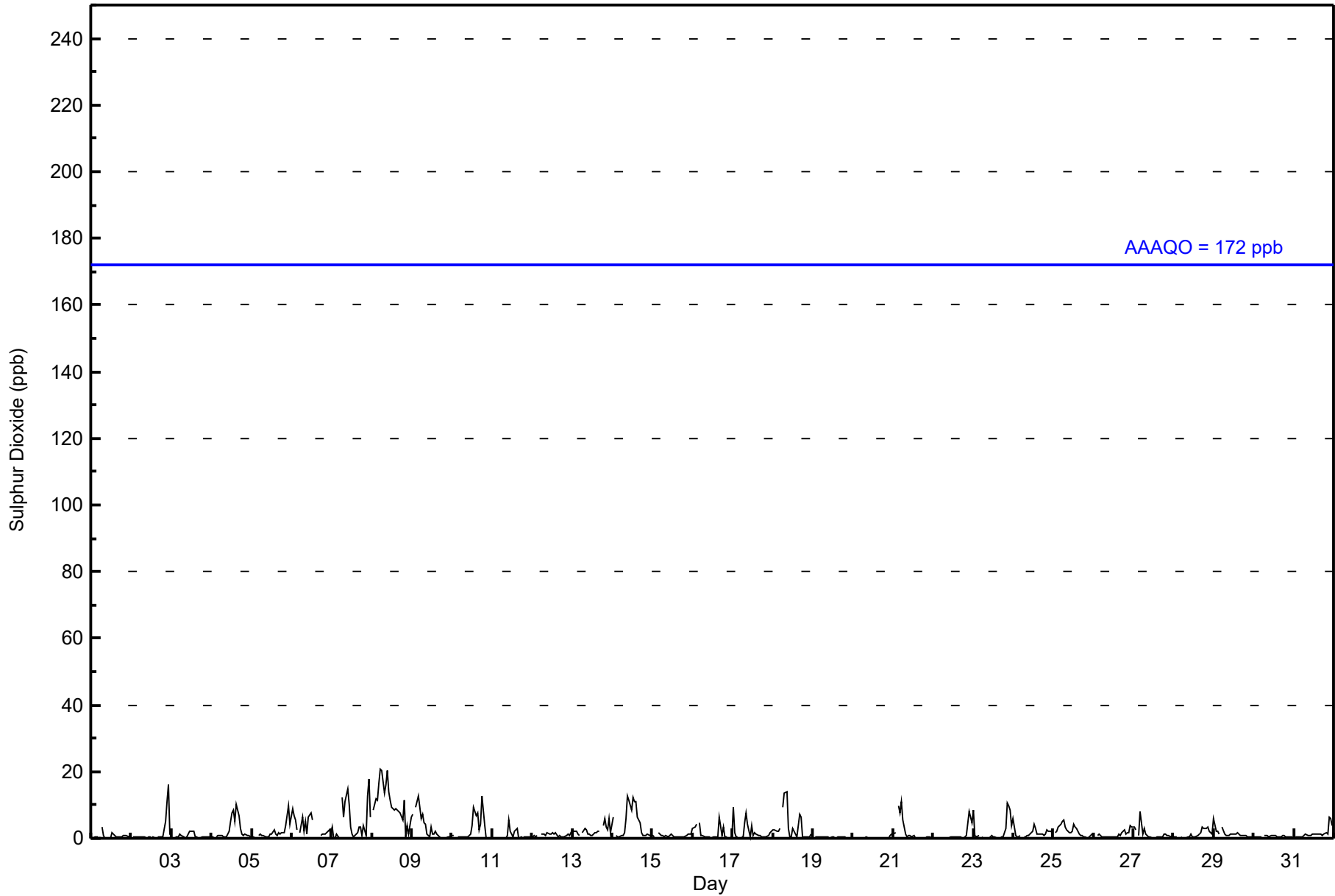
Sulphur Dioxide (SO₂) - ppb
Sawbones Bay - December 2023

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 20.8 ppb on Dec 8 06:00	Maximum Daily Average: 10.6 ppb on Dec 8		Hours of Data:	708
Minimum Value: 0.0 ppb on Dec 10 22:00	Minimum Daily Average: 0.1 ppb on Dec 20		Hours of Missing Data:	36
Maximum Diurnal Average: 3.0 ppb at hour 23	Minimum Diurnal Average: 1.5 ppb at hour 19		Hours of Calibration:	35
Monthly Average: 2.10 ppb	Percentiles: P ₁ = 0.0 P ₁₀ = 0.2 Q ₁ = 0.4 Median = 0.8 Q ₃ = 2.1 P ₉₀ = 6.3 P ₉₉ = 14.8		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-Dec	0.2	0.1	0.6	0.4	0.3	Z	3.5	0.9	0.1	0.0	0.1	0.2	1.5	1.1	0.8	0.3	0.3	0.3	0.5	0.8	1.0	0.7	0.6	0.7	0.7	3.5
2-Dec	Z	0.6	0.4	0.4	0.3	0.3	0.3	0.2	0.2	0.1	0.2	0.2	0.1	0.3	0.2	0.2	0.3	0.5	0.3	0.4	5.0	11.0	16.0	1.2	1.7	16.0
3-Dec	0.9	Z	0.6	0.5	0.5	1.1	0.7	0.3	0.2	0.6	1.4	2.1	1.9	2.1	0.6	0.4	0.2	0.2	0.5	0.4	0.4	0.6	0.3	0.4	0.7	2.1
4-Dec	0.4	0.2	Z	0.4	0.8	0.9	0.6	0.5	0.2	0.5	2.2	5.1	7.5	8.3	5.2	10.1	7.0	2.9	1.4	1.0	1.5	0.8	0.7	0.3	2.5	10.1
5-Dec	0.3	0.2	0.2	Z	0.9	1.2	0.9	0.7	0.6	0.6	0.6	1.1	1.4	2.6	1.2	0.7	1.5	1.2	1.5	1.7	3.8	6.8	9.7	4.1	1.9	9.7
6-Dec	8.8	7.0	5.4	2.7	Z	1.8	6.5	2.1	5.0	1.3	6.2	7.4	5.5	C	C	C	C	1.0	1.2	1.4	1.3	1.5	2.7	1.2	3.7	8.8
7-Dec	3.3	0.2	0.1	1.3	0.1	Z	12.1	6.5	11.2	14.9	10.1	3.4	1.1	0.5	1.0	1.9	3.4	3.5	0.8	4.0	1.0	12.8	17.8	6.2	5.1	17.8
8-Dec	Z	8.4	11.9	11.2	16.4	20.8	20.3	13.7	16.2	20.1	13.8	11.2	9.3	8.6	8.8	8.5	8.0	7.6	5.5	11.6	0.6	3.8	1.3	6.5	10.6	20.8
9-Dec	7.1	Z	9.5	11.0	12.7	5.8	7.3	4.8	4.4	1.1	0.4	3.5	1.4	1.4	2.1	1.2	0.5	0.2	0.1	0.1	0.2	0.3	0.5	0.8	3.3	12.7
10-Dec	0.8	0.8	Z	0.4	0.3	0.4	0.5	0.5	0.2	0.3	0.9	1.3	3.8	9.3	6.6	7.7	2.5	4.4	12.5	4.0	0.1	0.0	0.1	0.0	2.5	12.5
11-Dec	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.1	0.1	0.7	5.6	2.1	0.6	2.2	2.6	3.0	0.2	0.3	0.2	0.4	0.3	0.2	0.5	0.3	0.8	5.6
12-Dec	0.4	0.7	0.6	0.9	Z	1.2	1.3	1.1	0.9	1.5	1.3	1.1	1.8	1.2	1.6	0.6	0.9	0.6	0.5	0.6	0.9	1.1	0.7	1.6	1.0	1.8
13-Dec	2.6	2.1	2.3	1.4	1.0	Z	1.7	3.0	2.4	1.2	1.1	1.0	0.9	1.6	1.6	2.3	2.3	M	3.8	6.0	3.4	2.3	6.1	1.6	2.3	6.1
14-Dec	6.2	Z	0.7	0.3	0.3	0.8	0.9	1.6	5.9	12.8	11.3	8.6	12.1	10.9	10.9	6.2	4.6	1.8	0.7	0.8	1.0	1.2	0.8	0.8	4.4	12.8
15-Dec	0.8	0.5	Z	1.5	1.1	1.0	0.9	0.5	0.7	0.6	1.0	1.1	0.8	0.4	0.3	0.3	0.3	0.3	0.3	0.3	1.1	1.2	1.2	1.5	0.8	1.5
16-Dec	2.9	3.3	4.1	Z	4.8	0.7	0.7	0.3	0.2	0.3	0.3	0.2	0.3	0.4	0.4	0.5	6.4	0.8	3.2	0.5	0.3	0.2	0.2	0.5	1.4	6.4
17-Dec	9.3	1.6	0.3	0.3	Z	0.3	0.3	4.8	7.8	4.0	0.5	3.6	1.0	1.8	1.2	1.0	0.7	0.5	0.4	0.5	0.5	1.0	1.9	2.0	2.0	9.3
18-Dec	2.7	2.4	1.9	2.2	3.1	Z	9.4	13.5	14.0	2.8	0.6	0.6	2.9	1.2	0.4	3.8	7.1	6.3	0.4	0.5	0.5	0.5	0.5	1.3	3.4	14.0
19-Dec	Z	0.5	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.3	0.3	0.1	0.2	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.1	0.3	0.5
20-Dec	0.2	Z	0.1	0.1	0.0	0.0	0.0	0.1	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.2	0.7	1.3	0.1	1.3
21-Dec	1.2	1.6	Z	9.8	7.7	10.9	5.6	1.3	0.5	0.7	0.8	0.3	0.7	0.1	0.1	0.1	0.0	0.0	0.0	0.2	0.2	0.2	0.3	0.2	1.9	10.9
22-Dec	0.1	0.1	0.2	Z	0.2	0.1	0.1	0.1	0.1	0.1	0.2	0.4	0.6	0.4	0.4	0.4	0.3	0.1	0.1	0.3	1.1	7.9	6.3	4.5	1.0	7.9
23-Dec	8.5	0.7	0.5	0.7	Z	0.4	0.1	0.0	0.1	0.2	0.5	0.7	0.3	0.2	0.1	0.1	0.1	0.4	0.3	2.9	10.7	9.7	8.5	4.0	2.2	10.7
24-Dec	6.0	0.7	0.6	0.6	0.7	Z	0.6	0.5	0.7	0.8	1.4	2.1	4.3	3.1	1.1	1.4	1.1	1.3	1.0	1.4	2.7	2.2	2.0	1.3	1.6	6.0
25-Dec	Z	1.5	2.2	3.2	4.1	5.0	5.5	3.6	2.5	1.7	1.8	2.1	4.1	3.6	2.9	1.2	0.9	0.9	0.6	0.4	0.2	0.3	0.9	1.1	2.2	5.5
26-Dec	0.9	Z	1.0	1.1	0.7	0.6	0.6	0.5	0.5	0.4	0.4	0.4	0.4	0.3	0.6	1.1	1.0	1.8	2.3	1.4	1.6	1.5	3.6	3.6	1.1	3.6
27-Dec	3.2	2.7	Z	0.8	8.1	1.4	3.0	1.2	0.7	0.6	0.2	0.2	0.1	0.2	0.4	0.3	0.3	0.6	1.2	1.1	1.0	0.7	0.6	0.7	1.3	8.1
28-Dec	0.4	0.5	0.4	Z	0.3	0.1	0.1	0.2	0.4	0.4	1.2	0.5	0.6	0.6	0.7	1.1	1.5	3.3	2.8	3.1	3.3	2.2	1.6	1.1	1.1	3.3
29-Dec	6.1	2.3	2.2	1.5	Z	3.6	1.3	1.0	0.8	1.0	1.2	1.3	1.3	1.2	1.6	1.4	0.9	0.8	0.6	0.6	0.6	0.6	0.5	0.4	1.4	6.1
30-Dec	0.4	0.3	0.4	0.5	0.4	Z	0.7	0.8	0.7	0.6	0.8	0.9	0.8	0.8	0.5	0.6	0.6	0.6	0.8	0.8	0.6	0.6	0.5	0.4	0.6	0.9
31-Dec	Z	0.4	0.3	0.4	0.5	0.6	0.8	1.1	0.8	0.7	0.9	1.1	1.3	1.1	1.1	1.3	1.3	0.9	1.2	1.6	1.3	6.5	6.0	3.8	1.5	6.5

2.8	1.5	1.8	2.1	2.5	2.4	2.8	2.1	2.5	2.3	2.2	2.1	2.2	2.2	1.8	1.9	1.8	1.5	1.5	1.6	1.5	2.5	3.0	1.7	Diurnal Average	
9.3	8.4	11.9	11.2	16.4	20.8	20.3	13.7	16.2	20.1	13.8	11.2	12.1	10.9	10.9	10.1	8.0	7.6	12.5	11.6	10.7	12.8	17.8	6.5	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
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Sawbones Bay - December 2023

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	678	95.76	95.76
11 - 20	29	4.10	99.86
21 - 60	1	0.14	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 708

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Sawbones Bay - December 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	2	4	1	1	6	16	15	122	187	88	73	34	46	71	11	1	678
11 - 20	0	0	0	0	0	0	0	0	0	0	0	21	8	0	0	0	29
21 - 60	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	2	4	1	1	6	16	15	122	187	88	73	56	54	71	11	1	708

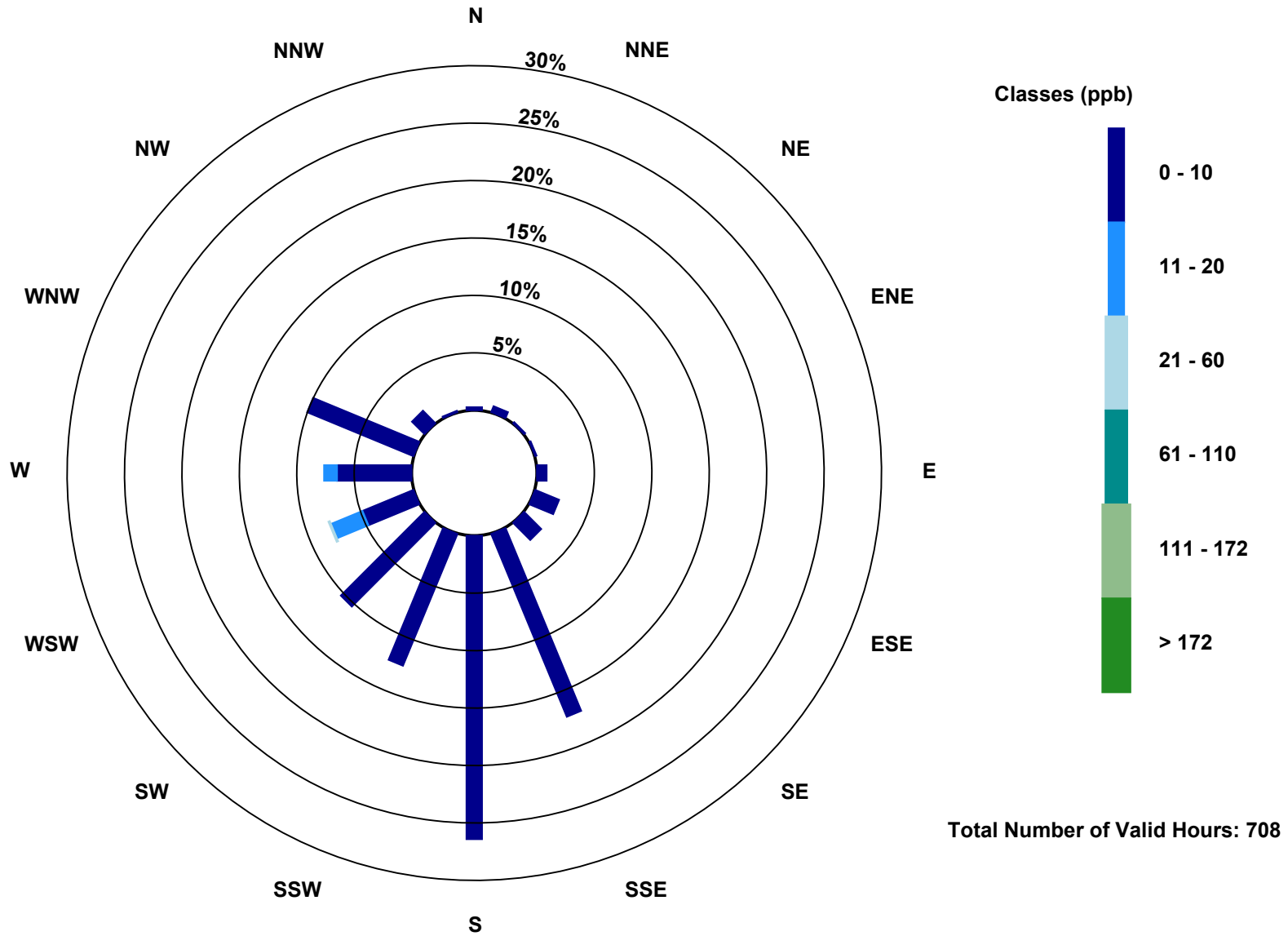
Total Number of Valid Hours: 708

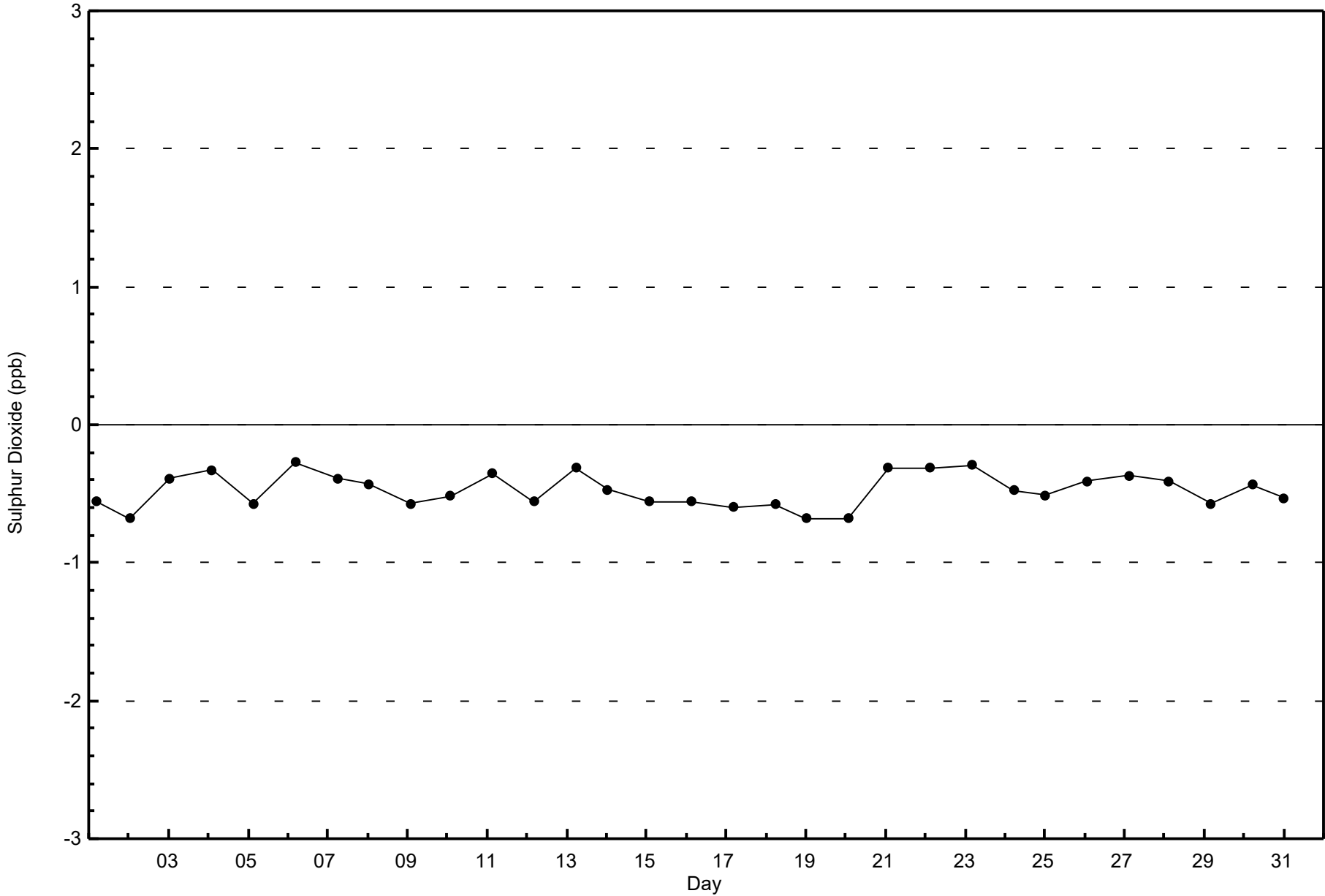
Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Dec 2023

Sulphur Dioxide (SO₂) - ppb
Sawbones Bay

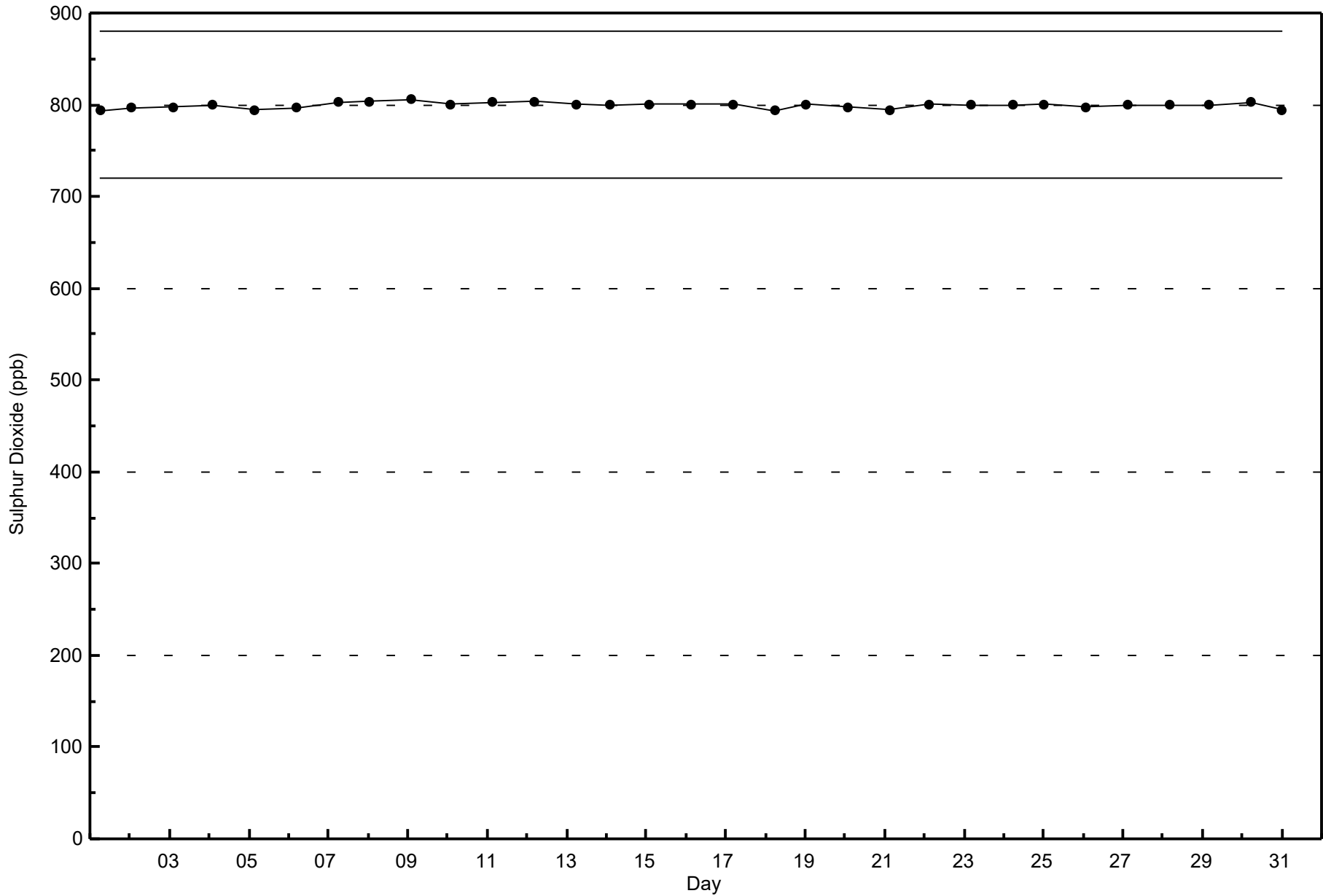






Wood Buffalo Environmental Association
Span Responses

Sulphur Dioxide (SO₂) - ppb
Sawbones Bay - December 2023





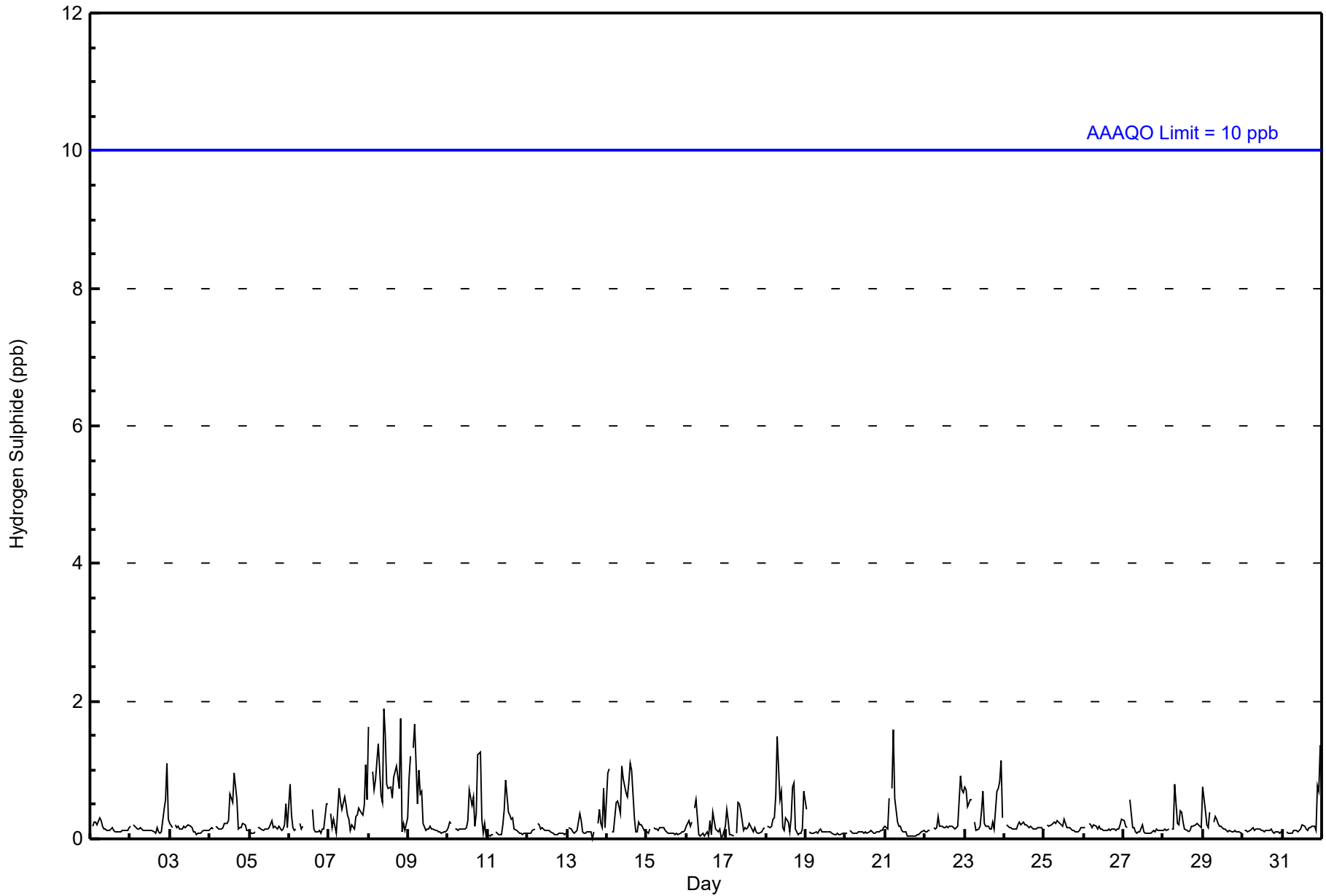
Wood Buffalo Environmental Association

Summary of Hour Averages

Hydrogen Sulphide (H2S) - ppb

Sawbones Bay - December 2023

Number of Exceedences (AAAQO):		1-hr: 0		24-hr: 0		Hours in Service:		744																					
Maximum Value: 1.9 ppb on Dec 8 10:00		Maximum Daily Average: 0.9 ppb on Dec 8		Minimum Value: 0.0 ppb on Dec 13 16:00		Minimum Daily Average: 0.1 ppb on Dec 20		Hours of Data: 707																					
Maximum Diurnal Average: 0.4 ppb at hour 1		Minimum Diurnal Average: 0.2 ppb at hour 21		Hours of Missing Data: 37		Hours of Calibration: 36		Percent Operational Time: 99.9																					
Monthly Average: 0.24 ppb		Percentiles: P ₁ = 0.0 P ₁₀ = 0.1 Q ₁ = 0.1 Median = 0.1 Q ₃ = 0.2 P ₉₀ = 0.6 P ₉₉ = 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-Dec	Z	0.2	0.2	0.2	0.2	0.3	0.3	0.2	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.3			
2-Dec	0.2	Z	0.2	0.2	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.4	0.6	1.1	0.3	0.2	1.1			
3-Dec	0.2	0.2	Z	0.2	0.2	0.2	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	0.2		
4-Dec	0.1	0.2	0.2	Z	0.2	0.1	0.1	0.2	0.2	0.2	0.2	0.3	0.7	0.6	0.5	1.0	0.6	0.1	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.3	1.0		
5-Dec	0.1	0.1	0.1	0.1	Z	0.2	0.2	0.1	0.1	0.1	0.2	0.1	0.2	0.3	0.2	0.2	0.2	0.1	0.2	0.1	0.2	0.1	0.2	0.5	0.2	0.2	0.5		
6-Dec	0.8	0.3	0.2	0.1	0.1	Z	0.2	0.1	0.2	C	C	C	C	C	0.4	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.5	0.5	0.2	0.8			
7-Dec	Z	0.4	0.2	0.3	0.1	0.4	0.7	0.6	0.4	0.6	0.5	0.3	0.3	0.1	0.2	0.2	0.3	0.3	0.5	0.4	0.3	0.5	1.1	0.6	0.4	1.1			
8-Dec	1.6	Z	1.0	0.7	0.8	1.1	1.4	0.6	0.5	1.9	1.5	0.8	0.7	0.8	0.6	0.9	1.0	1.1	0.7	1.7	0.1	0.2	0.1	0.3	0.9	1.9			
9-Dec	0.9	1.2	Z	1.3	1.7	0.5	1.0	0.6	0.7	0.2	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	0.1	0.1	0.4	1.7		
10-Dec	0.2	0.2	0.2	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.3	0.7	0.5	0.6	0.2	0.4	1.2	1.3	0.3	0.1	0.2	0.0	0.3	1.3			
11-Dec	0.1	0.0	0.1	0.1	Z	0.1	0.1	0.1	0.1	0.2	0.4	0.9	0.4	0.4	0.3	0.3	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.9		
12-Dec	0.1	0.1	0.1	0.1	0.1	Z	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	0.1	0.1	0.1	0.1	0.1	0.2		
13-Dec	Z	0.2	0.1	0.1	0.1	0.1	0.1	0.4	0.3	0.1	0.1	0.1	0.1	0.1	0.0	0.1	M	0.2	0.4	0.2	0.2	0.2	0.7	0.2	0.2	0.7			
14-Dec	1.0	1.0	Z	0.1	0.1	0.5	0.6	0.5	0.4	1.1	0.9	0.7	0.6	0.8	1.1	1.0	0.3	0.1	0.1	0.2	0.2	0.2	0.1	0.1	0.1	0.5	1.1		
15-Dec	0.1	0.1	0.1	Z	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	0.1	0.1	0.1	0.1	0.2		
16-Dec	0.2	0.3	0.2	0.2	Z	0.4	0.6	0.1	0.0	0.1	0.1	0.1	0.1	0.0	0.3	0.1	0.4	0.1	0.1	0.1	0.1	0.0	0.0	0.2	0.2	0.6			
17-Dec	0.4	0.3	0.1	0.1	0.0	Z	0.1	0.5	0.5	0.4	0.1	0.2	0.1	0.2	0.2	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.5			
18-Dec	Z	0.2	0.2	0.2	0.3	0.3	0.6	1.5	0.6	0.7	0.2	0.1	0.3	0.2	0.1	0.3	0.8	0.8	0.1	0.1	0.1	0.1	0.1	0.1	0.7	1.5			
19-Dec	0.4	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	0.4	0.4		
20-Dec	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	0.2	0.1	0.2		
21-Dec	0.2	0.1	0.6	Z	0.7	1.6	0.6	0.2	0.2	0.2	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.2	1.6			
22-Dec	0.1	0.1	0.1	0.1	Z	0.2	0.1	0.2	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.2	0.2	0.9	0.7	0.7	0.2	0.9			
23-Dec	0.8	0.7	0.5	0.6	0.6	Z	0.2	0.1	0.1	0.2	0.4	0.7	0.2	0.2	0.2	0.1	0.2	0.2	0.1	0.7	0.7	0.8	1.1	0.3	0.4	1.1			
24-Dec	Z	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.2	0.2	0.2	0.3	0.2	0.2	0.2	0.2	0.2	0.1	0.2	0.1	0.2	0.2	0.2	0.1	0.1	0.2	0.3		
25-Dec	0.1	Z	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.3		
26-Dec	0.2	0.2	Z	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	0.2	0.1	0.1	0.1	0.2	0.3	0.2	0.3			
27-Dec	0.3	0.2	0.2	Z	0.6	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	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.6		
28-Dec	0.1	0.1	0.1	0.1	Z	0.1	0.1	0.8	0.2	0.2	0.4	0.4	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	0.2	0.8		
29-Dec	0.7	0.4	0.2	0.2	0.4	Z	0.2	0.3	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	0.1	0.1	0.1	0.1	0.2	0.7		
30-Dec	Z	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2		
31-Dec	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	0.1	0.1	0.2	0.2	0.2	0.2	0.1	0.8	0.7	1.4	0.2	1.4			
																								Diurnal Average					
																								Diurnal Maximum					
																								0.4 0.3 0.2 0.2 0.3 0.3 0.3 0.3 0.2 0.3 0.3 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.3 0.2					
																								1.6 1.2 1.0 1.3 1.7 1.6 1.4 1.5 0.7 1.9 1.5 0.9 0.7 0.8 1.1 1.0 1.0 1.1 1.2 1.7 0.7 0.9 1.1 1.4					
Z - zerospan C - Calibration M - Maintenance																													
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 10 ppb 24-hr 3 ppb																													





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Hydrogen Sulphide (H₂S) - ppb
Sawbones Bay - December 2023**

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

Total Number of Valid Hours: 707

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Hydrogen Sulphide (H₂S) - ppb
Sawbones Bay - December 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	2	4	1	1	7	16	15	124	189	86	72	56	52	71	10	1	707
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	2	4	1	1	7	16	15	124	189	86	72	56	52	71	10	1	707

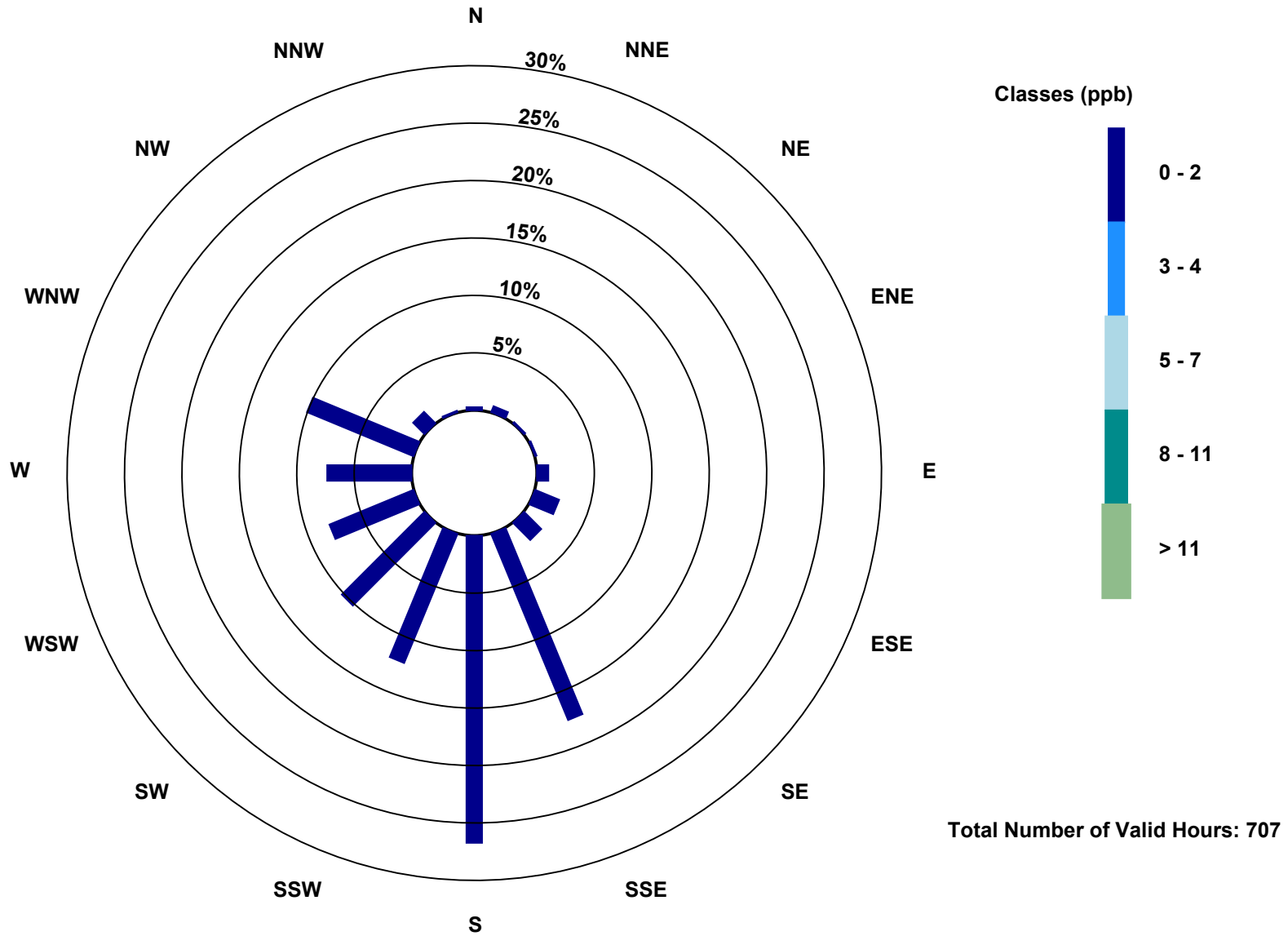
Total Number of Valid Hours: 707

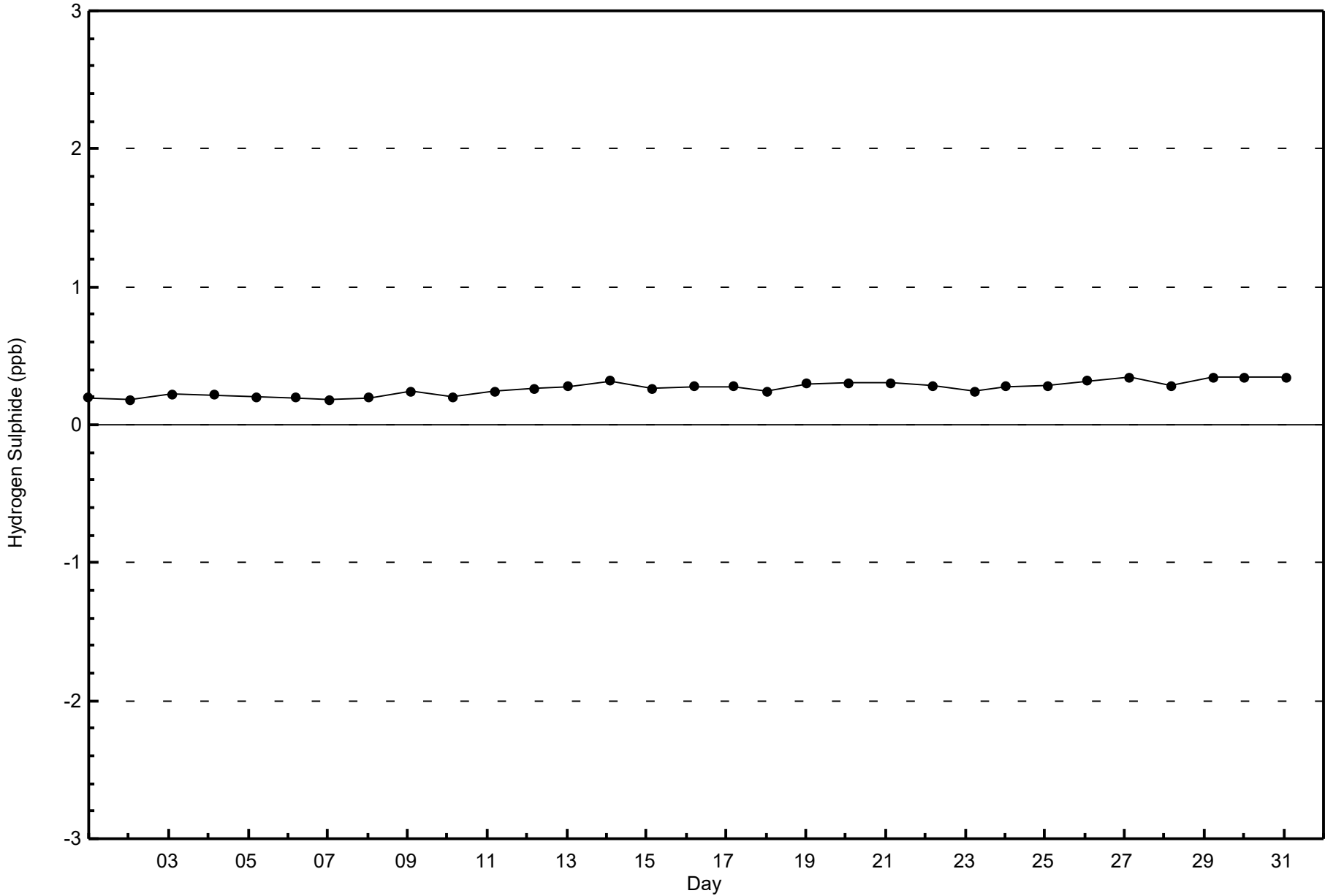
Total Number of Hours: 744

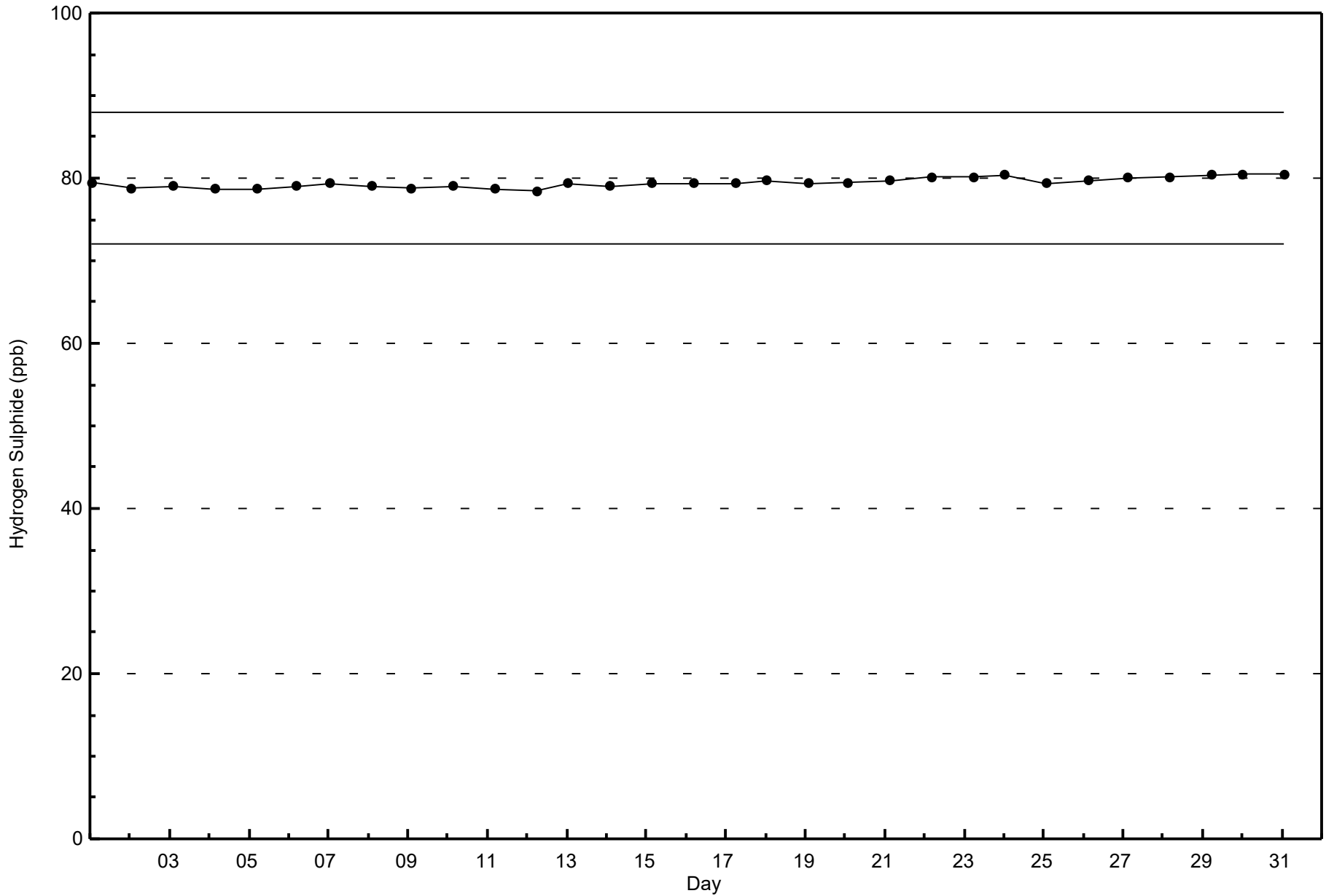


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Hydrogen Sulphide (H₂S) - ppb
Sawbones Bay







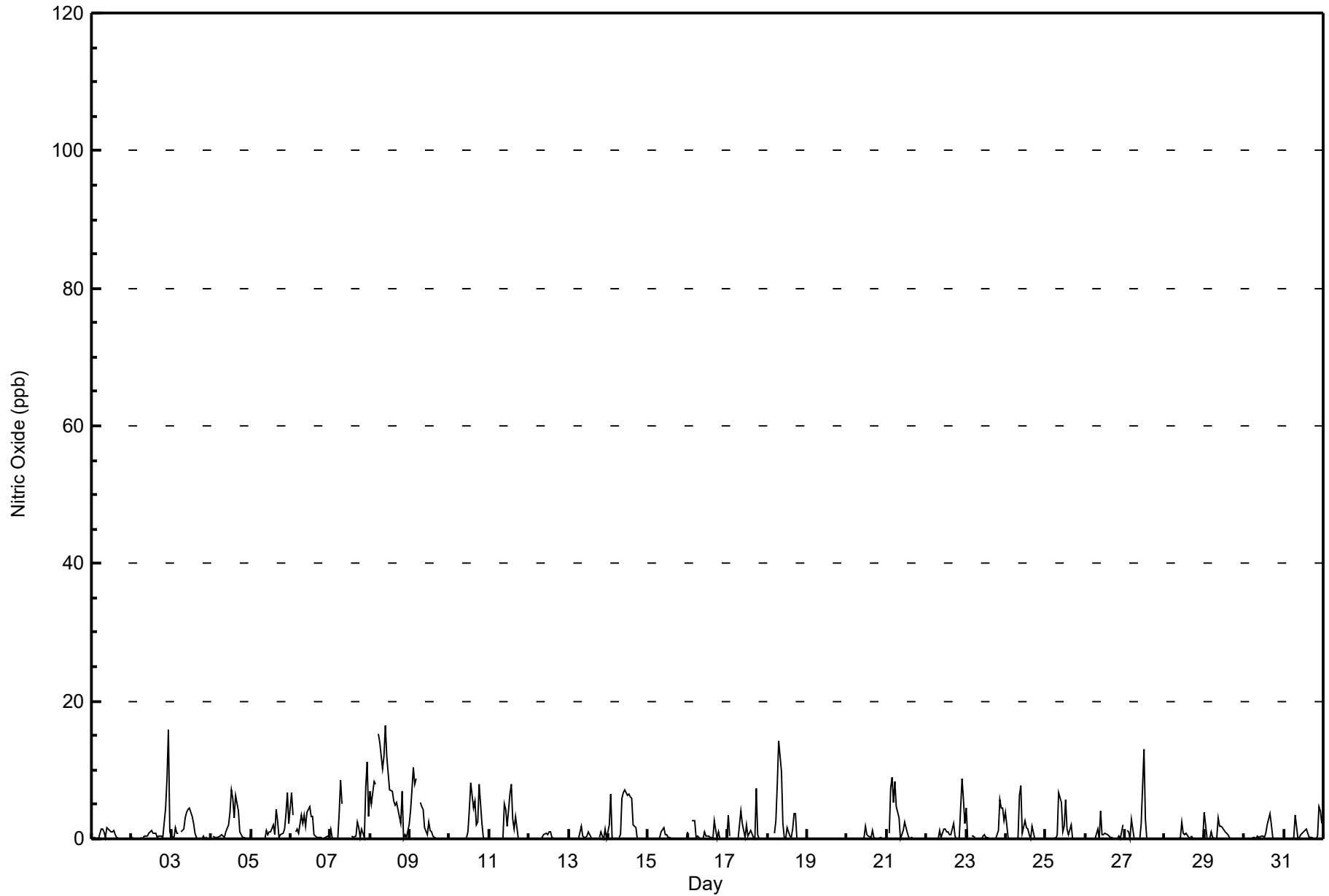


Maximum Value: 16.4 ppb on Dec 8 10:00																				Maximum Daily Average: 7.1 ppb on Dec 8					Hours in Service: 744		
Minimum Value: 0.0 ppb on Dec 3 17:00																				Minimum Daily Average: 0.0 ppb on Dec 19					Hours of Data: 707		
Maximum Diurnal Average: 2.3 ppb at hour 12																				Minimum Diurnal Average: 0.4 ppb at hour 21					Hours of Missing Data: 37		
Monthly Average: 1.33 ppb																				Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.0 Median = 0.2 Q ₃ = 1.4 P ₉₀ = 4.5 P ₉₉ = 11.9					Hours of Calibration: 36		
																									Percent Operational Time: 99.9		
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Dec	0.1	0.1	0.0	Z	0.1	1.4	1.3	1.0	0.3	1.5	1.5	0.9	1.0	1.1	0.6	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.5	1.5	
2-Dec	0.2	0.0	0.1	0.1	Z	0.1	0.0	0.1	0.4	0.4	0.8	1.0	1.1	0.8	0.8	0.3	0.4	0.3	0.4	0.1	4.5	8.7	15.9	1.1	1.6	15.9	
3-Dec	0.4	0.2	1.6	0.8	0.8	Z	0.9	1.5	3.0	3.9	4.2	4.5	3.3	2.1	0.9	0.3	0.0	0.0	0.1	0.5	0.1	0.1	0.1	0.1	1.3	4.5	
4-Dec	Z	0.5	0.2	0.1	0.1	0.4	0.6	0.4	0.2	1.0	1.9	3.9	7.0	5.9	3.1	6.3	4.0	1.0	0.5	0.2	0.1	0.1	0.1	0.1	1.6	7.0	
5-Dec	1.0	Z	0.0	0.1	0.0	0.0	0.1	0.1	0.1	1.2	0.6	1.1	0.9	2.0	0.7	4.3	2.7	0.3	0.6	0.8	1.5	3.7	6.7	2.2	1.3	6.7	
6-Dec	6.8	3.4	Z	1.1	1.3	0.8	3.4	2.2	3.4	1.7	3.9	4.6	3.3	3.2	0.6	0.4	0.2	0.2	0.2	0.1	0.1	0.1	0.5	0.5	1.8	6.8	
7-Dec	1.5	0.1	0.0	Z	0.1	3.6	8.6	5.2	C	C	C	C	C	0.4	0.3	0.5	2.4	1.6	0.1	1.5	0.1	7.4	11.1	3.2	2.7	11.1	
8-Dec	7.0	5.0	8.4	7.9	Z	15.2	14.0	10.2	12.1	16.4	12.0	9.5	7.1	6.9	5.5	4.8	5.3	4.3	2.3	7.0	0.0	0.7	0.2	2.0	7.1	16.4	
9-Dec	4.1	7.0	10.3	8.0	8.7	Z	5.4	4.7	4.4	1.7	0.6	2.4	1.3	1.1	0.3	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.6	10.3	
10-Dec	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	1.0	4.3	8.1	4.4	5.4	2.0	2.5	7.9	2.2	0.1	0.0	0.1	0.0	1.7	8.1	
11-Dec	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.0	4.3	1.9	6.4	7.9	2.8	1.5	3.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.4	7.9	
12-Dec	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.1	0.5	0.8	0.7	1.0	0.9	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	1.0	
13-Dec	0.0	0.0	0.0	Z	0.0	0.0	0.0	1.8	0.4	0.2	0.3	0.5	0.9	0.2	0.0	0.0	0.0	0.0	M	0.3	1.0	0.5	0.0	1.4	0.0	0.3	1.8
14-Dec	2.0	6.4	0.2	0.0	0.0	Z	0.2	0.6	5.8	6.6	7.2	6.3	6.5	6.0	5.9	2.0	1.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.5	7.2	
15-Dec	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.2	1.1	1.7	0.7	0.7	0.3	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	1.7	
16-Dec	1.1	Z	2.6	2.6	2.6	0.2	0.5	0.0	0.0	0.1	1.1	0.5	0.4	0.1	0.3	0.0	2.6	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.7	2.6	
17-Dec	3.6	0.4	Z	0.0	0.0	0.0	0.0	2.1	4.1	2.3	0.2	2.0	0.4	0.9	1.2	0.3	0.0	7.3	0.7	0.0	0.0	0.0	0.0	0.0	1.1	7.3	
18-Dec	0.2	0.0	0.0	Z	0.7	2.6	8.0	14.2	9.8	2.3	0.2	0.1	1.7	0.5	0.2	1.5	3.6	3.7	0.0	0.0	0.0	0.0	0.0	0.0	2.1	14.2	
19-Dec	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	0.0
20-Dec	0.0	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.1	1.9	0.5	0.4	0.2	1.3	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.2	1.9	
21-Dec	Z	0.8	7.3	9.0	5.3	8.3	4.6	3.1	0.0	0.7	1.3	2.5	0.8	0.3	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.9	9.0	
22-Dec	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	1.1	0.2	1.4	1.4	1.0	1.1	0.5	0.6	2.3	0.4	0.0	0.0	0.2	8.7	5.7	2.2	1.2	8.7	
23-Dec	4.5	0.3	Z	0.5	0.3	0.2	0.0	0.0	0.0	0.0	0.5	0.7	0.3	0.1	0.0	0.0	0.0	0.0	0.0	1.2	5.7	4.5	4.5	2.6	1.1	5.7	
24-Dec	3.8	0.0	0.0	Z	0.0	0.0	0.0	0.2	6.3	7.8	0.8	2.6	1.7	1.4	0.6	0.0	1.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.2	7.8	
25-Dec	0.0	0.0	0.0	0.0	Z	0.3	0.0	0.7	6.8	5.2	0.9	1.8	5.8	1.4	0.6	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	6.8	
26-Dec	0.0	0.0	0.0	0.0	0.0	Z	0.0	1.4	0.0	4.2	0.5	0.7	0.7	0.5	0.4	0.2	0.3	0.0	0.0	0.0	0.4	0.1	1.1	2.0	0.5	4.2	
27-Dec	Z	1.1	1.0	0.0	2.9	0.0	0.0	0.0	0.0	0.0	2.2	13.1	2.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	13.1	
28-Dec	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	2.5	0.9	0.7	0.9	0.3	0.1	0.3	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.3	2.5	
29-Dec	3.8	0.2	Z	0.0	1.0	0.2	0.0	0.3	3.1	1.8	1.8	1.7	1.1	0.8	0.5	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	3.8	
30-Dec	0.0	0.0	0.0	Z	0.0	0.2	0.1	0.0	0.3	0.2	0.4	0.4	0.2	0.8	2.0	3.7	2.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.5	3.7	
31-Dec	0.0	0.0	0.0	0.0	Z	0.0	0.1	3.5	0.0	0.1	0.5	0.7	1.0	1.3	0.7	0.3	0.3	0.1	0.0	0.0	0.4	4.6	4.0	2.3	0.9	4.6	
																								Diurnal Average			
																								Diurnal Maximum			
1.5 1.0 1.2 1.2 0.9 1.3 1.5 1.7 2.1 2.2 1.8 2.3 2.1 1.9 1.1 1.2 1.1 0.7 0.5 0.5 0.4 1.3 1.7 0.6																											
7.0 7.0 10.3 9.0 8.7 15.2 14.0 14.2 12.1 16.4 12.0 13.1 7.1 8.1 5.9 6.3 5.3 7.3 7.9 7.0 5.7 8.7 15.9 3.2																											
Z - zerospan C - Calibration M - Maintenance																											



Wood Buffalo Environmental Association
Hourly Averages

Nitric Oxide (NO) - ppb
Sawbones Bay - December 2023





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitric Oxide (NO) - ppb
Sawbones Bay - December 2023

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	707	100.00	100.00
21 - 40	0	0.00	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitric Oxide (NO) - ppb
Sawbones Bay - December 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	2	3	1	1	7	17	15	121	186	89	73	60	50	70	11	1	707
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	2	3	1	1	7	17	15	121	186	89	73	60	50	70	11	1	707

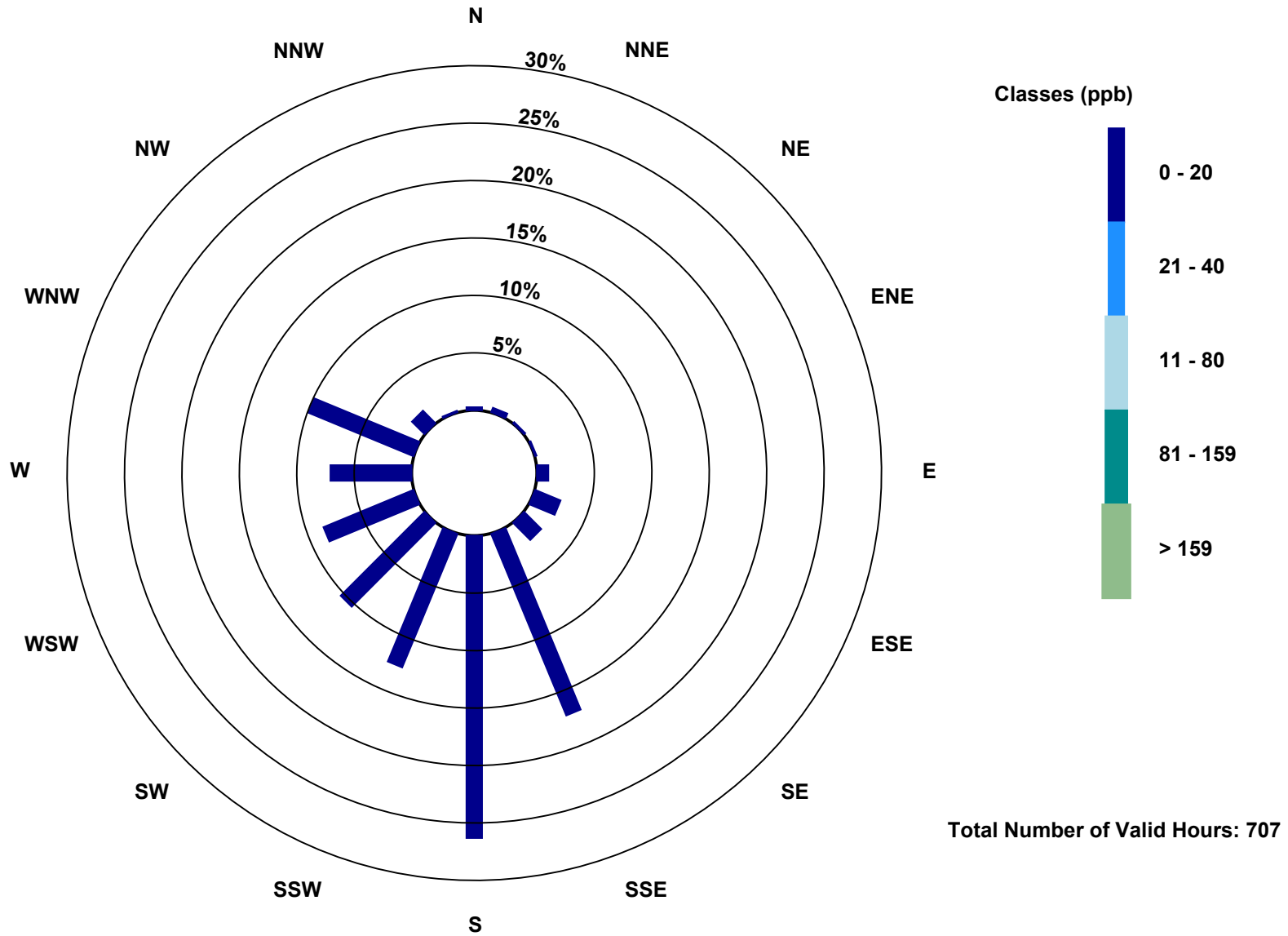
Total Number of Valid Hours: 707

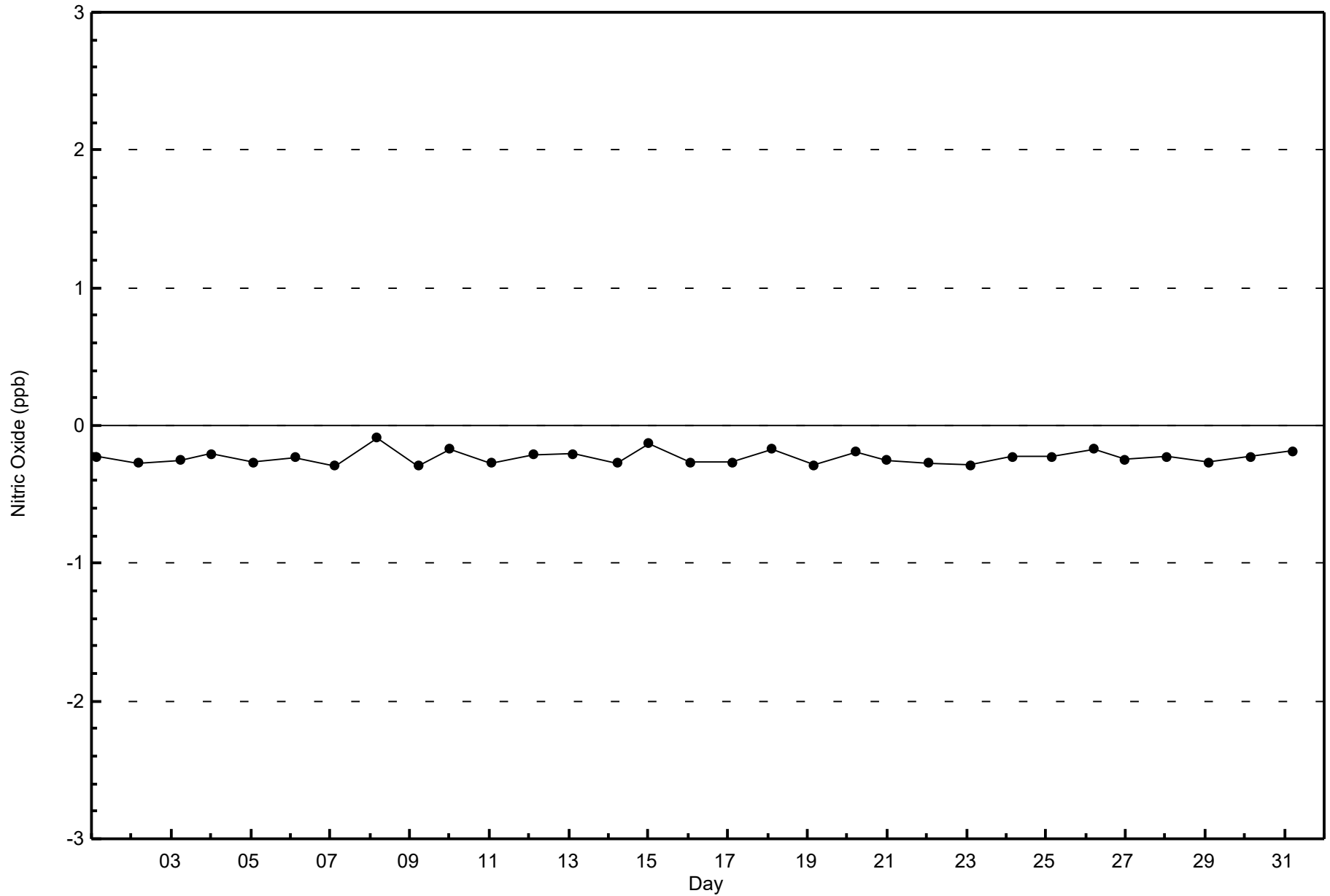
Total Number of Hours: 744

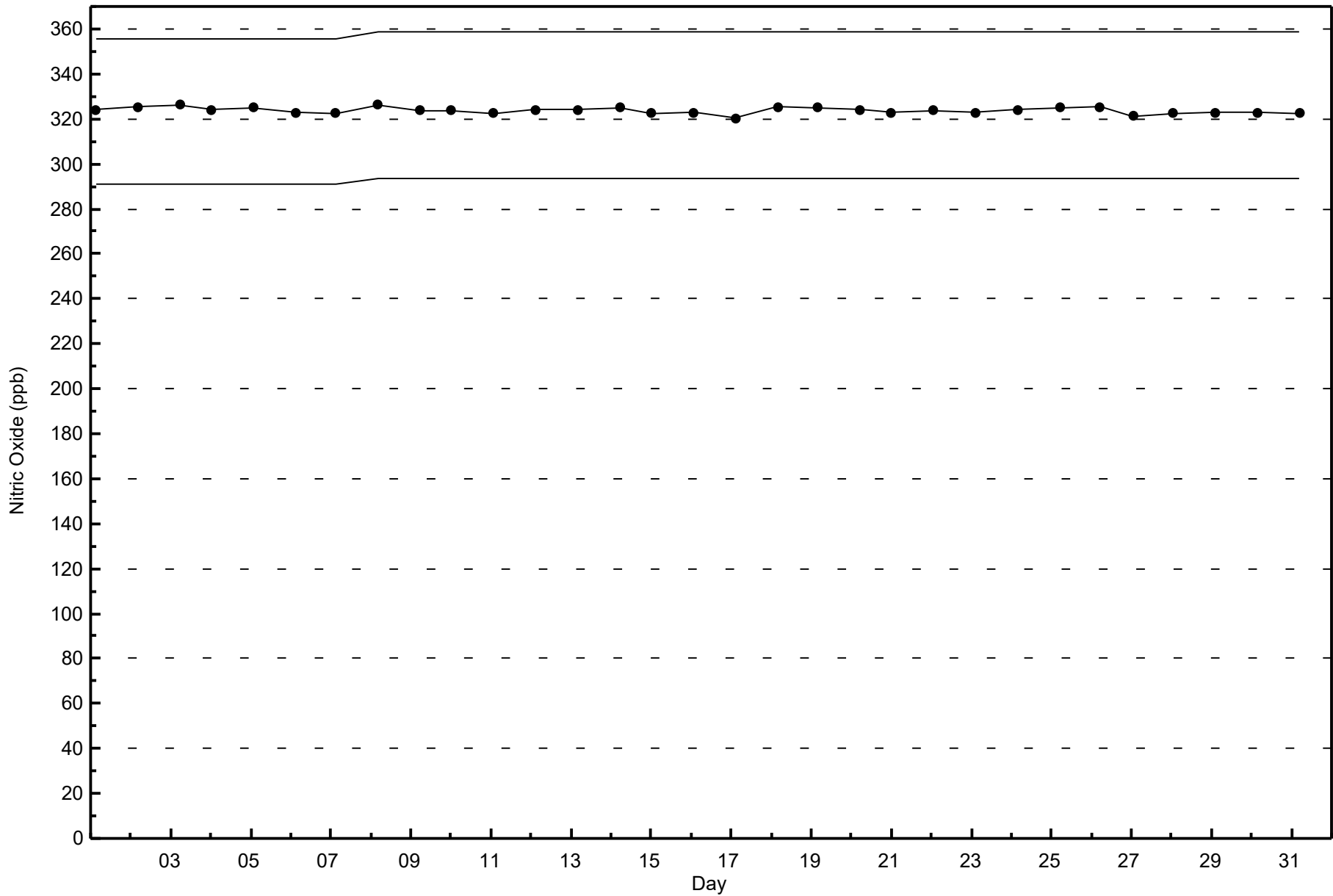


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Nitric Oxide (NO) - ppb
Sawbones Bay









Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO₂) - ppb

Sawbones Bay - December 2023

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 20.8 ppb on Dec 8 10:00	Maximum Daily Average: 12.7 ppb on Dec 8		Hours of Data:	707
Minimum Value: 0.0 ppb on Dec 11 04:00	Minimum Daily Average: 0.3 ppb on Dec 19		Hours of Missing Data:	37
Maximum Diurnal Average: 7.0 ppb at hour 8	Minimum Diurnal Average: 4.5 ppb at hour 15		Hours of Calibration:	36
Monthly Average: 5.55 ppb	Percentiles: P ₁ = 0.0 P ₁₀ = 1.4 Q ₁ = 2.9 Median = 4.7 Q ₃ = 7.3 P ₉₀ = 11.3 P ₉₉ = 18.0		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-Dec	1.8	1.6	1.9	Z	4.5	13.4	14.4	13.7	5.9	5.6	3.9	2.3	2.7	3.6	3.2	3.2	4.1	4.1	5.1	5.6	5.6	4.4	4.5	5.8	5.3	14.4
2-Dec	5.0	4.8	4.3	4.6	Z	5.7	4.7	5.4	5.0	3.6	3.1	3.1	2.8	2.6	3.0	3.3	5.0	7.5	8.6	5.3	11.5	13.6	17.3	8.7	6.0	17.3
3-Dec	8.0	8.1	12.1	9.8	9.8	Z	8.5	13.8	11.5	7.3	6.3	5.8	5.8	5.3	4.0	4.2	3.2	2.7	4.9	11.1	8.4	9.4	8.8	7.0	7.6	13.8
4-Dec	Z	9.7	8.4	7.6	8.7	8.5	7.0	6.0	4.6	5.1	4.6	6.3	9.6	9.5	7.1	12.8	8.9	4.8	3.6	2.6	3.7	3.8	2.7	4.9	6.5	12.8
5-Dec	7.6	Z	1.8	4.2	2.8	6.6	7.6	5.2	3.3	4.3	3.2	4.1	3.8	5.4	4.1	8.9	7.1	5.0	8.3	4.0	5.1	7.9	12.0	6.0	5.6	12.0
6-Dec	13.1	9.2	Z	3.5	3.8	3.5	6.9	5.0	7.5	4.4	7.3	9.2	7.0	8.2	3.1	5.1	4.6	6.7	4.7	3.9	4.6	4.9	7.4	5.5	6.0	13.1
7-Dec	6.1	2.2	1.3	Z	1.2	7.6	16.3	10.3	C	C	C	C	C	2.5	2.7	3.5	9.5	5.3	3.3	6.3	2.6	13.5	18.7	8.9	6.8	18.7
8-Dec	16.1	11.7	16.0	13.3	Z	20.4	20.1	14.0	16.1	20.8	15.9	12.5	11.7	12.2	12.2	13.1	12.6	12.0	7.9	13.7	2.7	6.4	4.5	7.1	12.7	20.8
9-Dec	9.1	12.5	14.7	14.1	15.6	Z	11.9	10.2	8.6	4.9	2.7	5.1	3.3	4.0	3.9	5.1	4.2	4.0	2.8	1.8	2.7	3.9	2.6	4.6	6.6	15.6
10-Dec	Z	6.3	7.6	5.5	3.8	5.8	6.8	8.6	5.4	3.6	4.6	5.8	8.0	11.8	8.9	11.9	6.5	7.8	15.5	7.3	1.6	0.4	1.4	0.3	6.3	15.5
11-Dec	0.1	Z	0.1	0.0	0.0	0.0	0.0	0.0	0.1	5.3	8.1	3.8	5.0	8.4	5.8	7.9	8.9	4.2	1.7	2.2	3.2	1.7	4.5	2.8	3.2	8.9
12-Dec	4.1	2.5	Z	3.0	4.7	6.3	5.8	6.8	7.5	6.3	4.9	3.6	4.3	4.6	4.4	3.7	4.1	3.9	3.3	2.9	3.9	5.1	4.4	6.0	4.6	7.5
13-Dec	9.2	7.6	8.0	Z	4.8	4.9	4.9	13.9	8.4	6.3	5.1	6.4	8.1	6.6	5.7	6.0	7.9	M	9.6	10.4	8.9	9.1	12.8	7.8	7.8	13.9
14-Dec	10.9	18.0	2.7	1.6	1.4	Z	2.9	3.8	9.8	18.7	16.6	13.7	15.3	15.5	17.3	11.2	10.0	3.8	3.7	7.5	6.6	6.7	5.3	5.0	9.0	18.7
15-Dec	Z	3.3	5.1	3.7	4.5	6.3	6.6	6.8	9.0	8.9	5.4	3.9	2.8	2.1	2.7	3.2	4.1	3.0	2.2	2.0	2.8	3.3	3.3	4.8	4.3	9.0
16-Dec	6.3	Z	7.1	7.8	9.1	2.8	3.3	1.6	1.1	2.4	3.6	2.0	2.2	1.4	2.4	2.0	10.2	1.9	4.3	1.4	1.2	0.5	0.2	0.9	3.3	10.2
17-Dec	11.4	2.7	Z	0.3	0.1	0.0	0.5	6.1	12.9	9.2	2.5	5.0	1.8	2.9	3.7	4.0	3.9	11.7	5.3	1.9	2.3	3.6	6.1	4.2	4.4	12.9
18-Dec	6.5	4.8	4.0	Z	6.6	8.1	13.8	19.4	14.2	6.4	2.2	1.5	4.3	2.3	1.8	6.0	12.7	10.5	1.5	0.8	1.6	1.5	1.2	2.9	5.9	19.4
19-Dec	1.6	1.2	0.6	0.7	Z	0.6	0.5	0.3	0.1	0.0	0.0	0.1	0.0	0.1	0.1	0.1	0.1	0.2	0.1	0.0	0.0	0.1	0.1	0.1	0.3	1.6
20-Dec	0.1	0.0	0.1	0.1	0.1	Z	1.1	1.4	1.4	1.6	2.3	3.7	2.1	2.1	2.1	3.5	3.1	2.9	2.9	3.2	3.9	3.7	5.0	6.4	2.3	6.4
21-Dec	Z	6.8	11.5	14.3	10.0	18.2	11.8	8.3	5.6	6.9	6.0	5.5	3.6	2.4	1.3	1.5	2.0	1.2	1.8	2.7	3.3	3.6	3.5	3.3	5.9	18.2
22-Dec	3.6	Z	3.3	4.9	4.2	4.0	5.1	5.1	6.6	5.0	5.8	5.8	6.4	6.6	6.5	6.7	7.5	6.9	5.8	6.7	8.1	13.4	10.8	8.3	6.4	13.4
23-Dec	12.5	3.4	Z	3.6	2.7	1.8	1.0	0.5	0.7	1.2	2.3	2.5	1.3	1.0	0.9	0.7	0.8	1.1	1.1	5.0	17.1	15.1	13.9	6.3	4.2	17.1
24-Dec	10.4	2.7	2.7	Z	6.3	2.1	4.5	5.3	10.2	11.5	3.6	5.1	4.7	4.6	3.4	3.2	5.7	3.8	4.8	4.2	5.4	4.4	4.5	3.6	5.1	11.5
25-Dec	3.9	3.7	4.3	5.2	Z	6.2	6.7	7.0	13.0	10.5	5.4	5.1	10.1	6.3	5.4	8.2	4.6	5.9	3.9	2.7	2.3	2.5	4.3	5.0	5.7	13.0
26-Dec	3.6	3.8	5.5	6.7	5.9	Z	6.0	7.3	4.5	7.7	4.0	3.4	3.3	3.2	3.5	4.4	4.9	6.1	6.5	4.5	6.0	6.1	7.7	8.3	5.3	8.3
27-Dec	Z	5.8	6.5	3.0	11.3	5.4	5.6	4.7	3.1	3.5	3.9	11.1	4.2	1.6	2.3	2.4	2.4	2.6	4.1	3.6	3.5	3.5	2.7	2.1	4.3	11.3
28-Dec	1.8	Z	2.3	1.6	1.2	1.1	1.9	3.6	3.7	5.4	6.9	2.9	2.4	2.9	2.4	3.1	6.3	6.8	5.9	7.7	9.0	9.7	8.8	7.9	4.6	9.7
29-Dec	11.2	9.2	Z	6.6	9.1	8.9	9.4	10.1	13.6	8.8	5.8	5.2	4.1	3.9	4.6	5.5	6.8	4.7	4.7	4.2	3.2	3.1	3.1	4.7	6.5	13.6
30-Dec	3.9	5.1	5.3	Z	4.0	9.0	12.2	6.5	7.2	5.1	4.0	3.1	3.1	3.9	5.0	5.8	5.1	3.0	1.8	1.7	1.8	1.9	1.7	1.8	4.4	12.2
31-Dec	1.6	1.7	1.6	2.1	Z	2.9	4.2	6.8	4.2	4.0	4.2	4.7	5.3	6.5	5.6	5.2	7.4	6.9	5.0	5.2	4.2	12.0	9.7	6.3	5.1	12.0

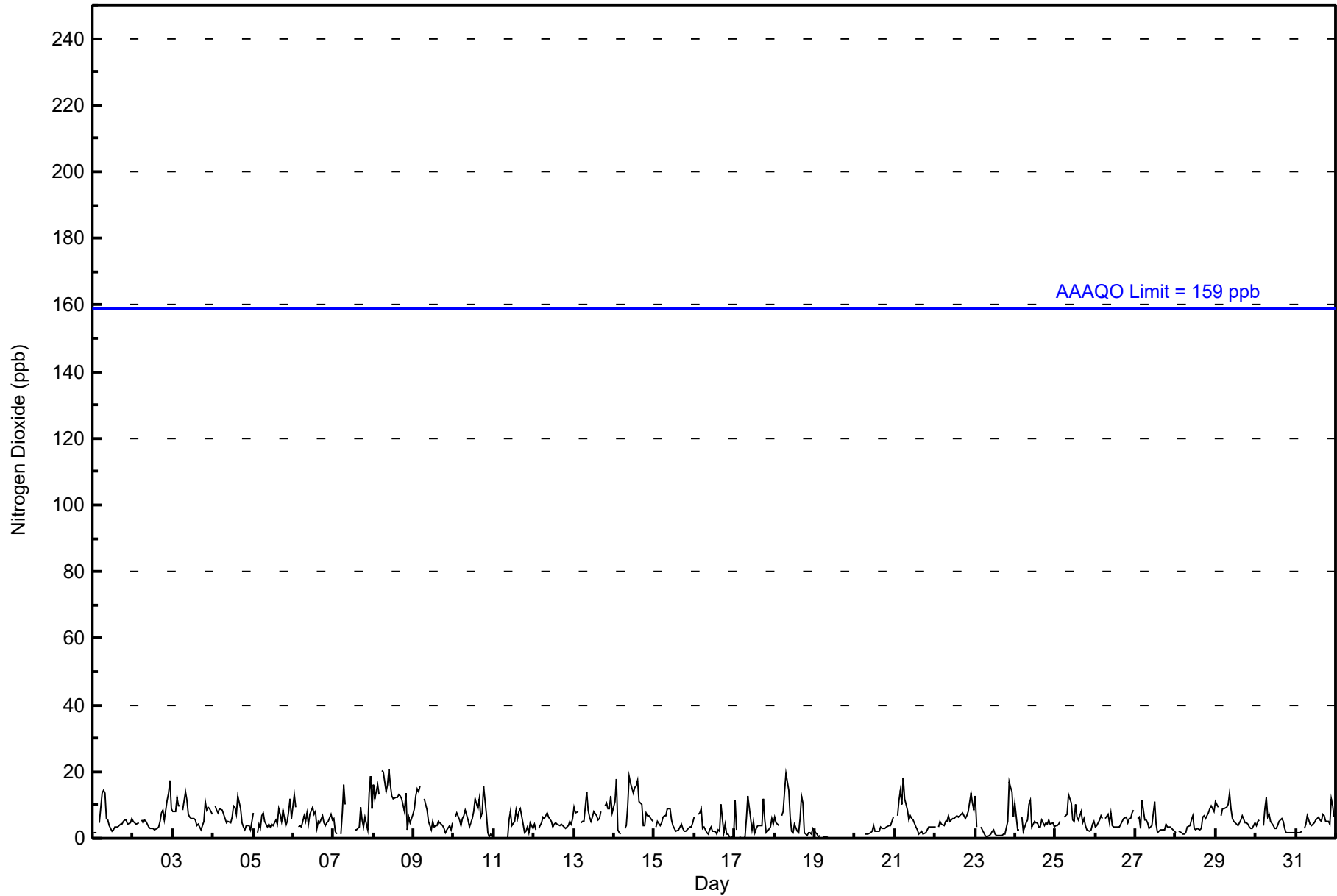
6.5	5.7	5.3	5.1	5.2	6.2	6.8	7.0	6.8	6.5	5.1	5.1	5.0	5.0	4.5	5.3	5.9	5.0	4.7	4.6	4.7	5.8	6.2	5.1	Diurnal Average	
16.1	18.0	16.0	14.3	15.6	20.4	20.1	19.4	16.1	20.8	16.6	13.7	15.3	15.5	17.3	13.1	12.7	12.0	15.5	13.7	17.1	15.1	18.7	8.9	Diurnal Maximum	

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



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Dioxide (NO₂) - ppb
Sawbones Bay - December 2023





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Sawbones Bay - December 2023**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	706	99.86	99.86
21 - 40	1	0.14	100.00
11 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Sawbones Bay - December 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	2	3	1	1	7	17	15	121	186	89	73	59	50	70	11	1	706
21 - 40	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1
41 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	2	3	1	1	7	17	15	121	186	89	73	60	50	70	11	1	707

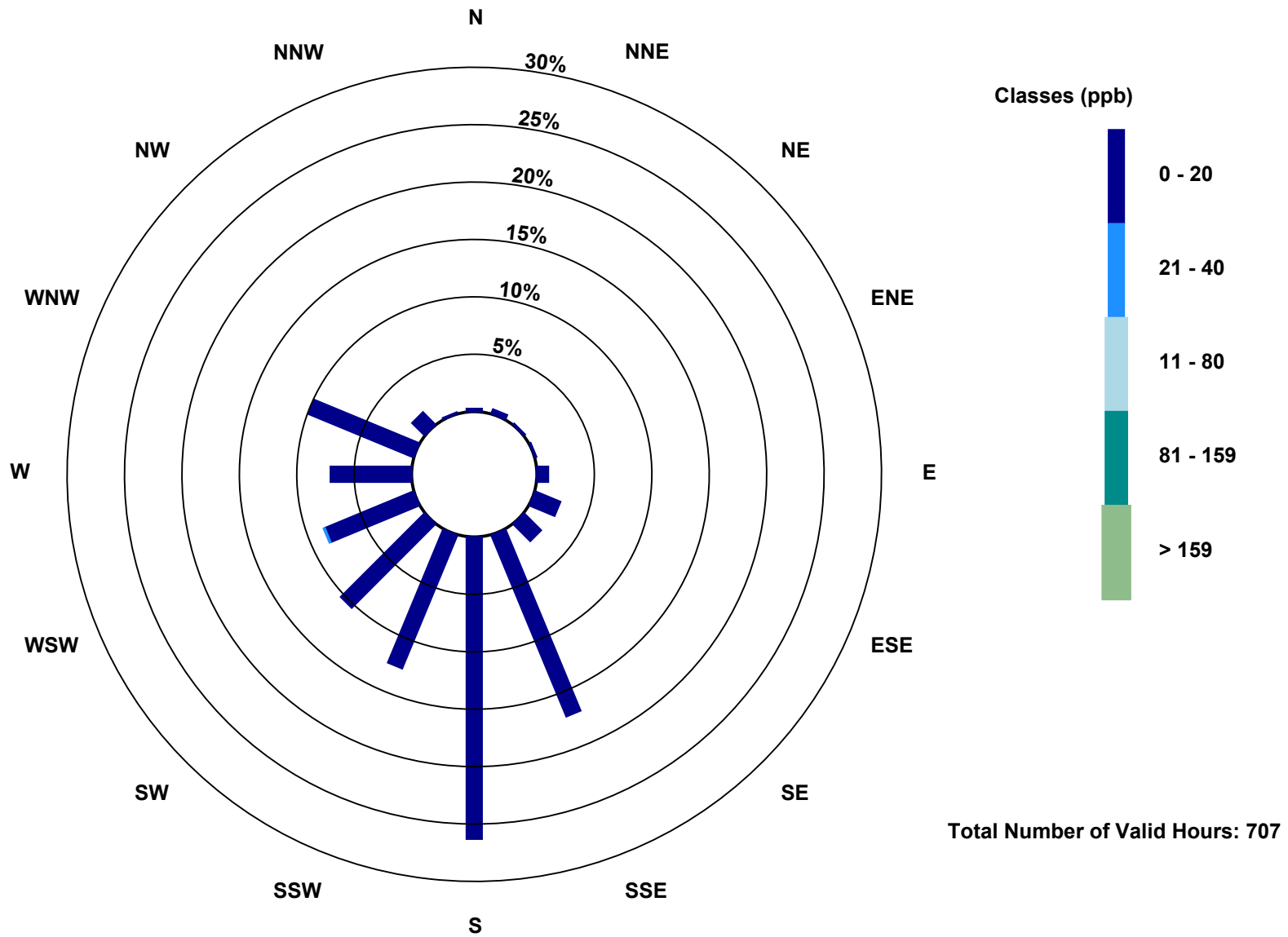
Total Number of Valid Hours: 707

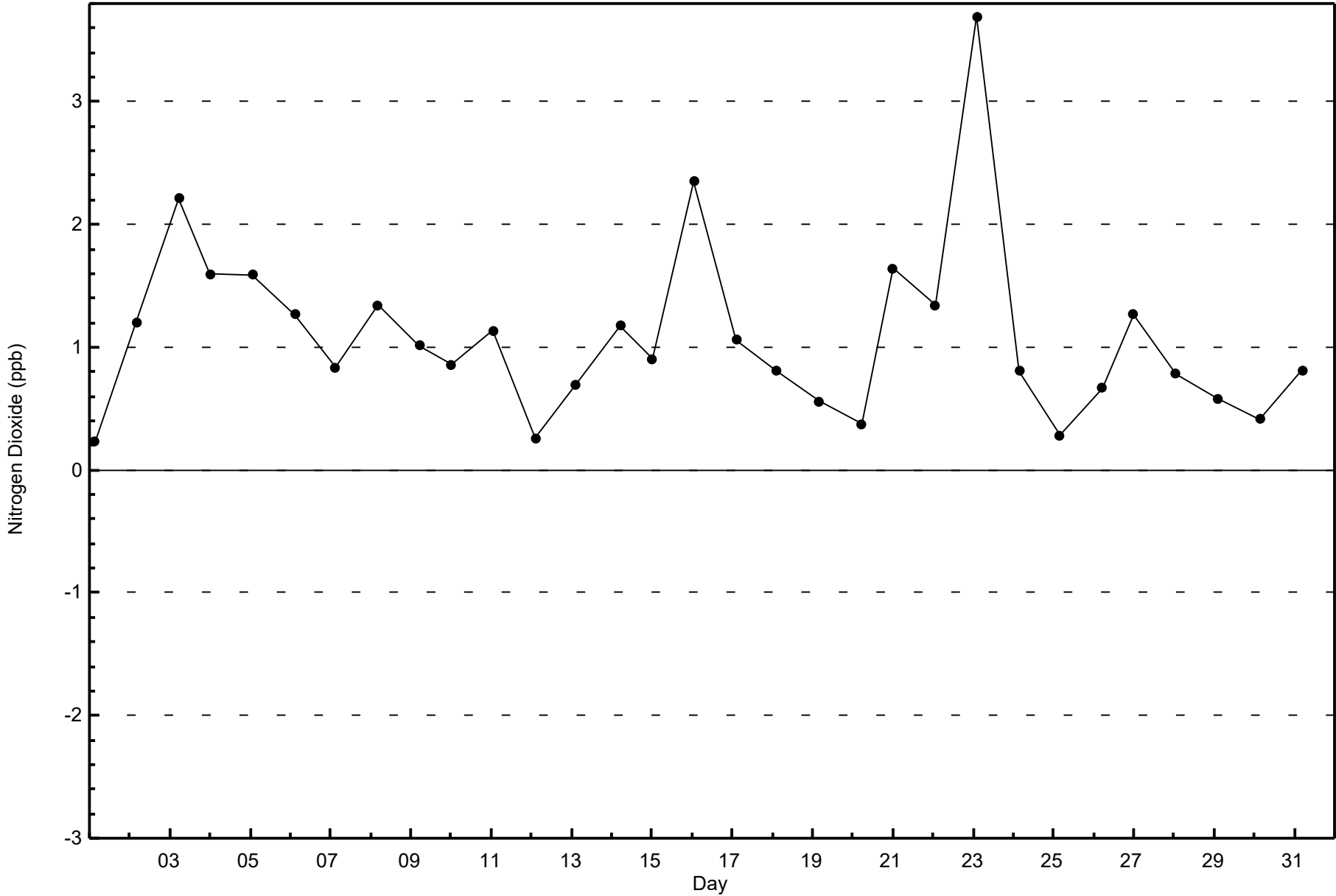
Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Dec 2023

Nitrogen Dioxide (NO₂) - ppb
Sawbones Bay

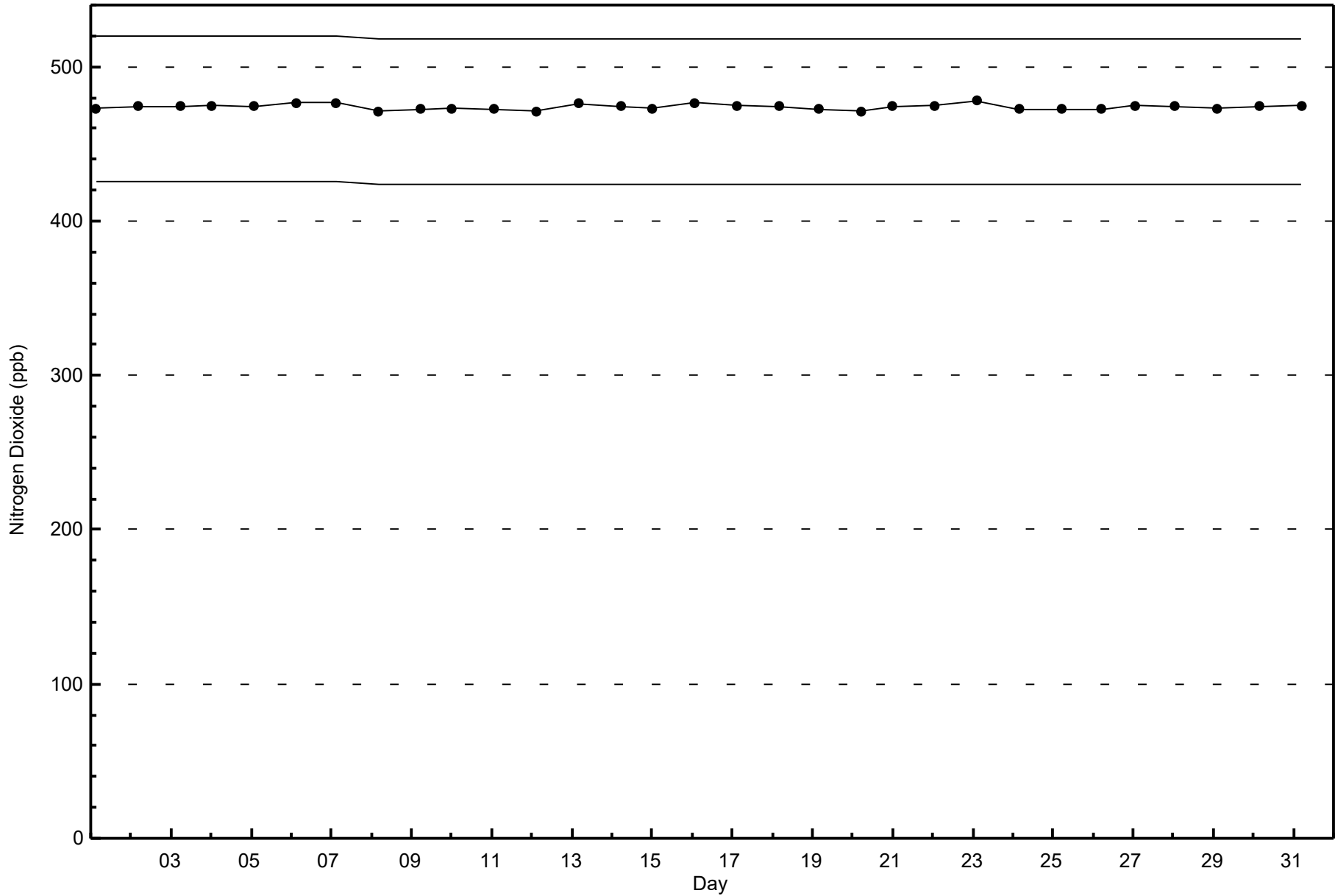






Wood Buffalo Environmental Association
Span Responses

Nitrogen Dioxide (NO₂) - ppb
Sawbones Bay - December 2023





Wood Buffalo Environmental Association
Summary of Hour Averages

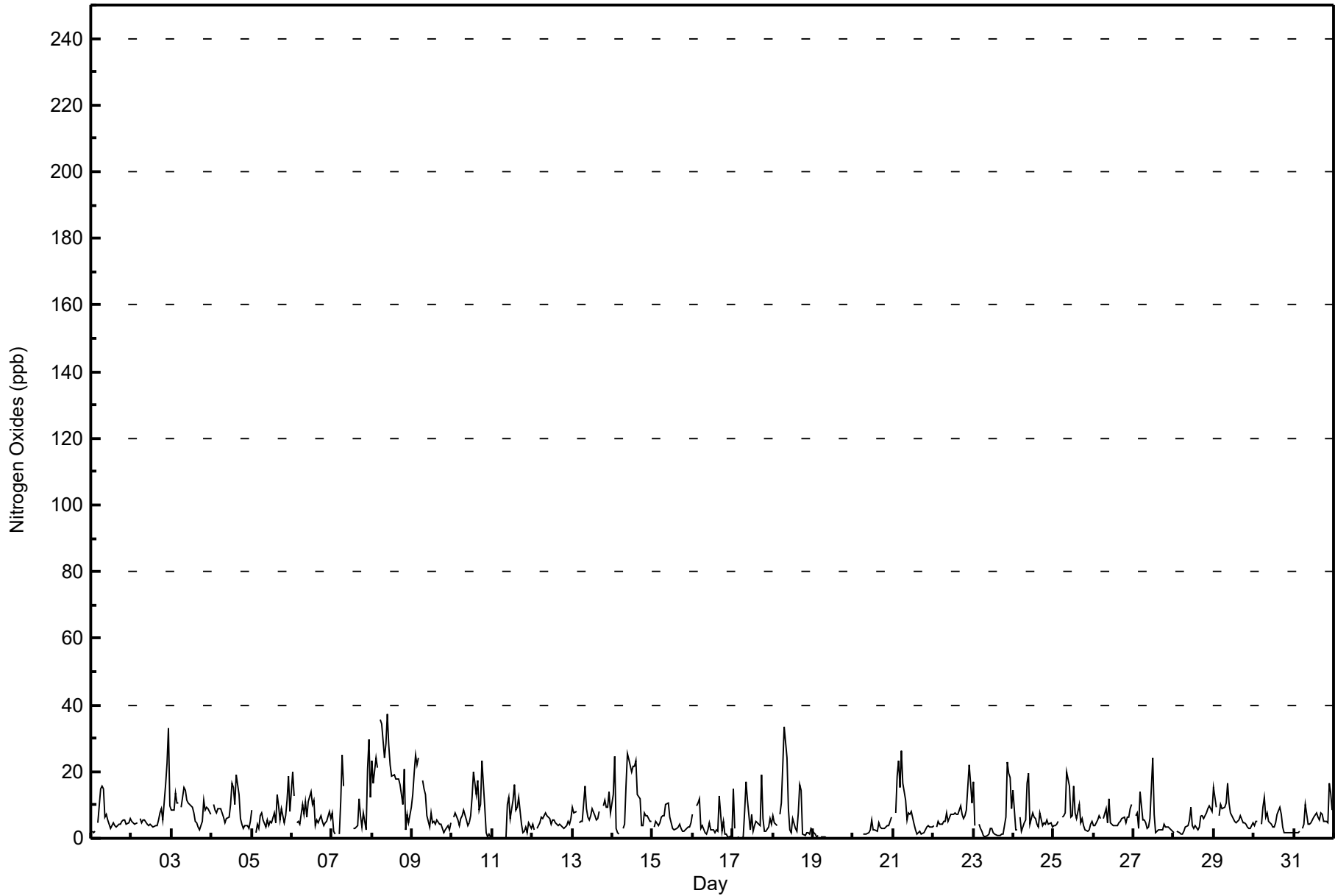
Nitrogen Oxides (NO_x) - ppb
Sawbones Bay - December 2023

Maximum Value: 37.2 ppb on Dec 8 10:00		Maximum Daily Average: 19.9 ppb on Dec 8		Hours in Service: 744																																													
Minimum Value: 0.0 ppb on Dec 11 05:00		Minimum Daily Average: 0.3 ppb on Dec 19		Hours of Data: 707																																													
Maximum Diurnal Average: 8.9 ppb at hour 9		Minimum Diurnal Average: 5.1 ppb at hour 20		Hours of Missing Data: 37																																													
Monthly Average: 6.88 ppb		Percentiles: P ₁ = 0.0 P ₁₀ = 1.5 Q ₁ = 3.1 Median = 5.1 Q ₃ = 8.6 P ₉₀ = 15.6 P ₉₉ = 27.9		Hours of Calibration: 36																																													
				Percent Operational Time: 99.9																																													
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																									
1-Dec	1.9	1.7	1.9	Z	4.6	14.8	15.7	14.7	6.2	7.1	5.4	3.2	3.7	4.7	3.8	3.4	4.1	4.1	5.1	5.6	5.6	4.4	4.5	5.9	5.7	15.7																							
2-Dec	5.2	4.8	4.4	4.7	Z	5.8	4.7	5.5	5.4	4.0	3.9	4.1	3.9	3.4	3.8	3.6	5.4	7.8	9.0	5.4	16.0	22.3	33.2	9.8	7.7	33.2																							
3-Dec	8.4	8.3	13.7	10.6	10.6	Z	9.4	15.3	14.5	11.2	10.5	10.3	9.1	7.4	4.9	4.5	3.2	2.7	5.0	11.6	8.5	9.5	8.9	7.1	8.9	15.3																							
4-Dec	Z	10.2	8.6	7.7	8.8	8.9	7.6	6.4	4.8	6.1	6.5	10.2	16.6	15.4	10.2	19.1	12.9	5.8	4.1	2.8	3.8	3.9	2.8	5.0	8.2	19.1																							
5-Dec	8.6	Z	1.8	4.3	2.8	6.6	7.7	5.3	3.4	5.5	3.8	5.2	4.7	7.4	4.8	13.2	9.8	5.3	8.9	4.8	6.6	11.6	18.7	8.2	6.9	18.7																							
6-Dec	19.9	12.6	Z	4.6	5.1	4.3	10.3	7.2	10.9	6.1	11.2	13.8	10.3	11.4	3.7	5.5	4.8	6.9	4.9	4.0	4.7	5.0	7.9	6.0	7.9	19.9																							
7-Dec	7.6	2.3	1.3	Z	1.3	11.2	24.9	15.5	C	C	C	C	C	2.9	3.0	4.0	11.9	6.9	3.4	7.8	2.7	20.9	29.8	12.1	9.4	29.8																							
8-Dec	23.1	16.7	24.4	21.2	Z	35.6	34.1	24.2	28.2	37.2	27.9	22.0	18.8	19.1	17.7	17.9	17.9	16.3	10.2	20.7	2.7	7.1	4.7	9.1	19.9	37.2																							
9-Dec	13.2	19.5	25.0	22.1	24.3	Z	17.3	14.9	13.0	6.6	3.3	7.5	4.6	5.1	4.2	5.3	4.2	4.0	2.8	1.8	2.7	3.9	2.6	4.6	9.2	25.0																							
10-Dec	Z	6.3	7.6	5.5	3.8	5.8	6.8	8.6	5.4	3.6	4.8	6.8	12.3	19.9	13.3	17.3	8.5	10.3	23.4	9.5	1.7	0.4	1.5	0.3	8.0	23.4																							
11-Dec	0.1	Z	0.1	0.0	0.0	0.0	0.0	0.0	0.1	10.3	12.4	5.7	11.4	16.3	8.6	9.4	12.1	4.2	1.7	2.2	3.2	1.7	4.5	2.8	4.7	16.3																							
12-Dec	4.1	2.5	Z	3.0	4.7	6.3	5.8	6.8	7.6	6.8	5.7	4.3	5.3	5.5	4.7	3.7	4.1	3.9	3.3	2.9	3.9	5.1	4.4	6.0	4.8	7.6																							
13-Dec	9.2	7.6	8.0	Z	4.8	4.9	4.9	15.7	8.8	6.5	5.4	6.9	9.0	6.8	5.7	6.0	7.9	M	9.9	11.4	9.4	9.1	14.2	7.8	8.2	15.7																							
14-Dec	12.9	24.4	2.9	1.6	1.4	Z	3.1	4.4	15.6	25.3	23.8	20.0	21.8	21.5	23.2	13.2	11.7	3.8	3.7	7.5	6.6	6.7	5.3	5.0	11.5	25.3																							
15-Dec	Z	3.3	5.1	3.7	4.5	6.3	6.6	7.0	10.1	10.6	6.1	4.6	3.1	2.3	2.8	3.2	4.1	3.0	2.2	2.0	2.8	3.3	3.3	4.8	4.6	10.6																							
16-Dec	7.4	Z	9.7	10.4	11.7	3.0	3.8	1.6	1.1	2.5	4.7	2.5	2.6	1.5	2.7	2.0	12.8	1.9	5.3	1.4	1.2	0.5	0.2	0.9	4.0	12.8																							
17-Dec	15.0	3.1	Z	0.3	0.1	0.0	0.5	8.2	17.0	11.5	2.7	7.0	2.2	3.8	4.9	4.3	3.9	19.0	6.0	1.9	2.3	3.6	6.1	4.2	5.5	19.0																							
18-Dec	6.7	4.8	4.0	Z	7.3	10.7	21.8	33.6	24.0	8.7	2.4	1.6	6.0	2.8	2.0	7.5	16.3	14.2	1.5	0.8	1.6	1.5	1.2	2.9	8.0	33.6																							
19-Dec	1.6	1.2	0.6	0.7	Z	0.6	0.5	0.3	0.1	0.0	0.0	0.1	0.0	0.1	0.1	0.1	0.1	0.2	0.1	0.0	0.0	0.1	0.1	0.1	0.3	1.6																							
20-Dec	0.1	0.0	0.1	0.1	0.1	Z	1.1	1.4	1.4	1.6	2.4	5.6	2.6	2.5	2.3	4.8	3.2	2.9	2.9	3.2	4.0	3.7	5.0	6.4	2.5	6.4																							
21-Dec	Z	7.6	18.8	23.3	15.3	26.5	16.4	11.4	5.6	7.6	7.3	8.0	4.4	2.7	1.3	1.6	2.0	1.2	1.8	2.7	3.3	3.6	3.5	3.3	7.8	26.5																							
22-Dec	3.6	Z	3.3	4.9	4.2	4.0	5.1	5.1	7.7	5.2	7.2	7.2	7.4	7.7	7.0	7.3	9.8	7.3	5.8	6.7	8.3	22.1	16.5	10.5	7.6	22.1																							
23-Dec	17.0	3.7	Z	4.1	3.0	2.0	1.0	0.5	0.7	1.2	2.8	3.2	1.6	1.1	0.9	0.7	0.8	1.1	1.1	6.2	22.8	19.6	18.4	8.9	5.3	22.8																							
24-Dec	14.2	2.7	2.7	Z	6.3	2.1	4.5	5.5	16.5	19.3	4.4	7.7	6.4	6.0	4.0	3.2	7.5	3.8	4.8	4.2	5.4	4.4	4.5	3.6	6.2	19.3																							
25-Dec	3.9	3.7	4.3	5.2	Z	6.5	6.7	7.7	19.8	15.7	6.3	6.9	15.9	7.7	6.0	10.2	4.6	5.9	3.9	2.7	2.3	2.5	4.3	5.0	6.9	19.8																							
26-Dec	3.6	3.8	5.5	6.7	5.9	Z	6.0	8.7	4.5	11.9	4.5	4.1	4.0	3.7	3.9	4.6	5.2	6.1	6.5	4.5	6.4	6.2	8.8	10.3	5.9	11.9																							
27-Dec	Z	6.9	7.5	3.0	14.2	5.4	5.6	4.7	3.1	3.5	6.1	24.2	7.0	1.6	2.3	2.4	2.4	2.6	4.1	3.6	3.5	3.5	2.7	2.1	5.3	24.2																							
28-Dec	1.8	Z	2.3	1.6	1.2	1.1	1.9	3.6	3.7	5.6	9.4	3.8	3.1	3.8	2.7	3.2	6.6	6.8	5.9	7.7	9.0	9.8	8.8	7.9	4.8	9.8																							
29-Dec	15.0	9.4	Z	6.6	10.1	9.1	9.4	10.4	16.7	10.6	7.6	6.9	5.2	4.7	5.1	5.6	6.8	4.7	4.7	4.2	3.2	3.1	3.1	4.7	7.2	16.7																							
30-Dec	3.9	5.1	5.3	Z	4.0	9.2	12.3	6.5	7.5	5.3	4.4	3.5	3.3	4.7	7.0	9.5	7.1	3.2	1.8	1.7	1.8	1.9	1.7	1.8	4.9	12.3																							
31-Dec	1.6	1.7	1.6	2.1	Z	2.9	4.3	10.3	4.2	4.1	4.7	5.4	6.3	7.8	6.3	5.5	7.7	7.0	5.0	5.2	4.6	16.6	13.7	8.6	6.0	16.6																							
																								8.1	6.7	6.6	6.3	6.2	7.4	8.4	8.7	8.9	8.7	6.9	7.4	7.1	6.8	5.6	6.5	7.1	5.8	5.1	5.1	5.2	7.0	7.9	5.7	Diurnal Average	
																								23.1	24.4	25.0	23.3	24.3	35.6	34.1	33.6	28.2	37.2	27.9	24.2	21.8	21.5	23.2	19.1	17.9	19.0	23.4	20.7	22.8	22.3	33.2	12.1	Diurnal Maximum	
Z - zerospan C - Calibration M - Maintenance																																																	



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Sawbones Bay - December 2023





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitrogen Oxides (NO_x) - ppb
Sawbones Bay - December 2023

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	673	95.19	95.19
21 - 40	34	4.81	100.00
11 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 707

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Sawbones Bay - December 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	2	3	1	1	7	17	15	120	186	89	72	35	43	70	11	1	673
21 - 40	0	0	0	0	0	0	0	1	0	0	1	25	7	0	0	0	34
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	2	3	1	1	7	17	15	121	186	89	73	60	50	70	11	1	707

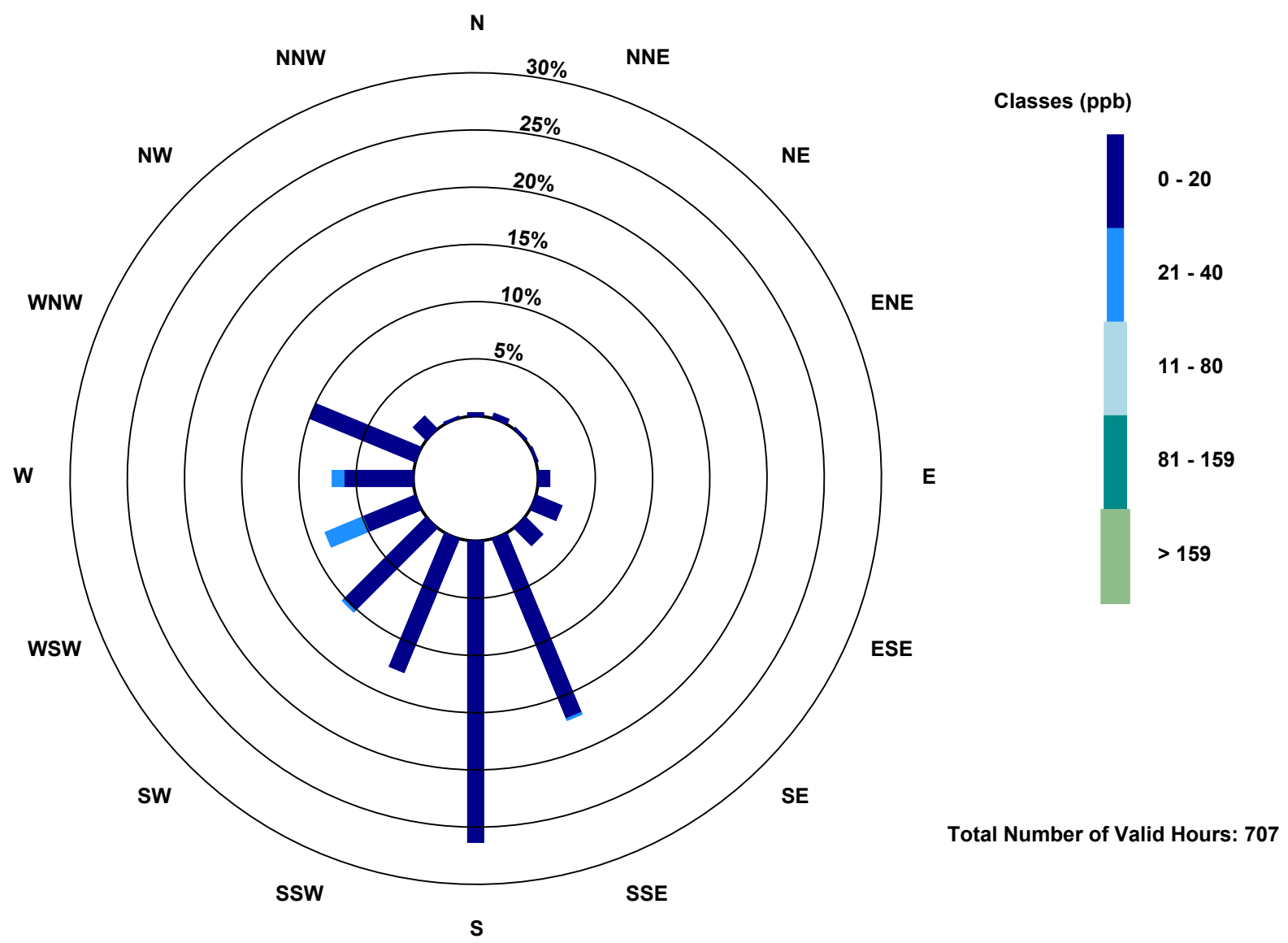
Total Number of Valid Hours: 707

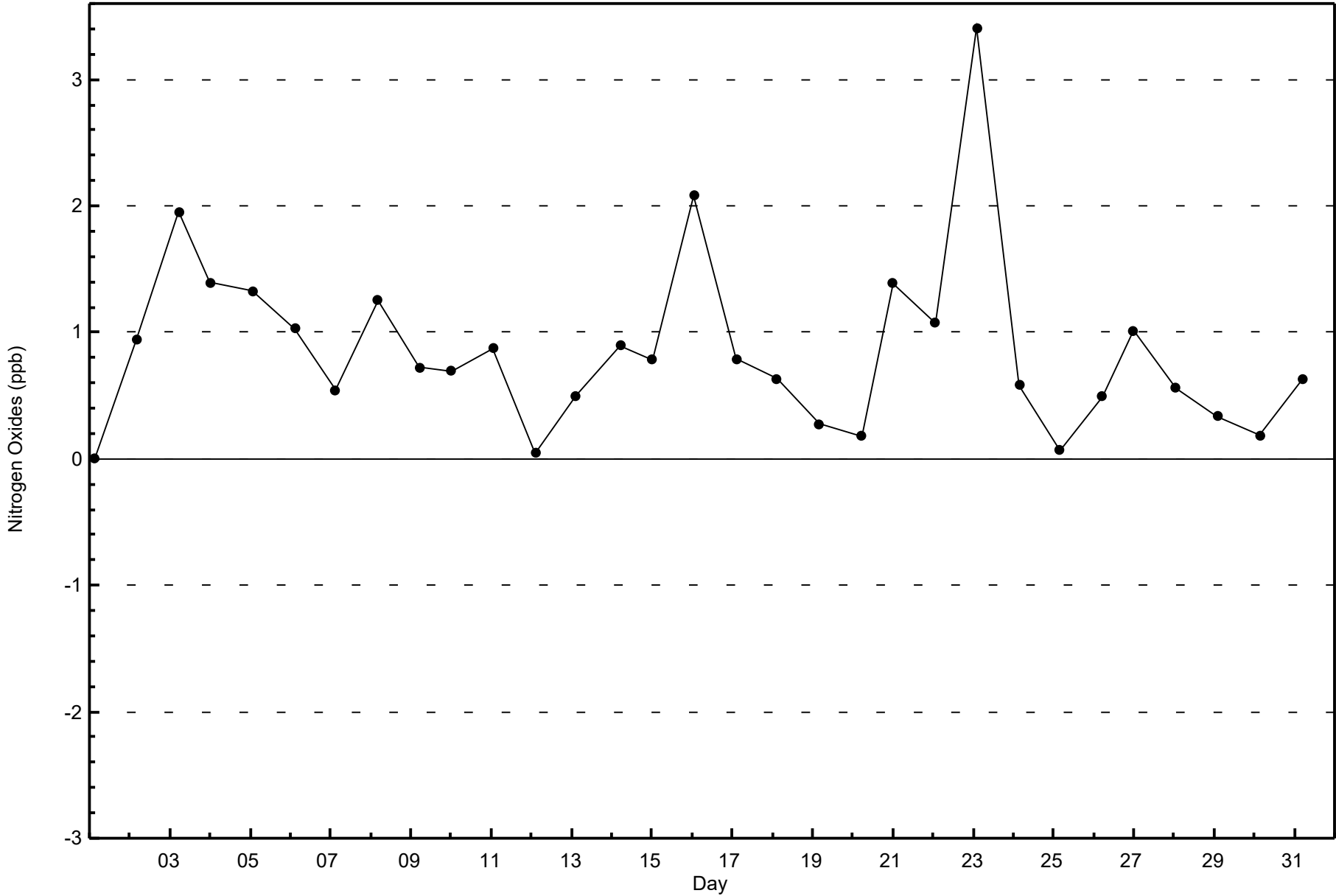
Total Number of Hours: 744

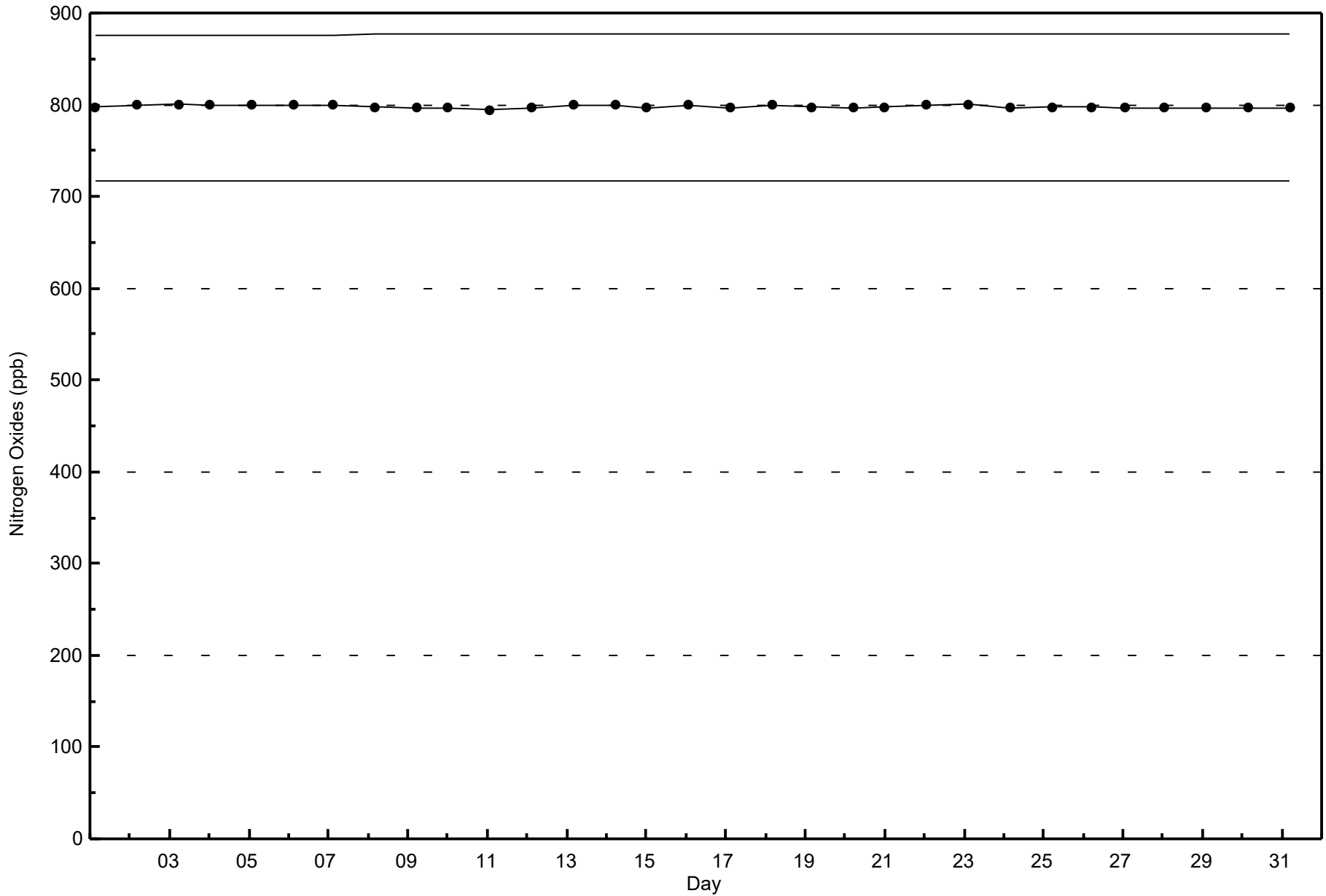


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Nitrogen Oxides (NO_x) - ppb
Sawbones Bay







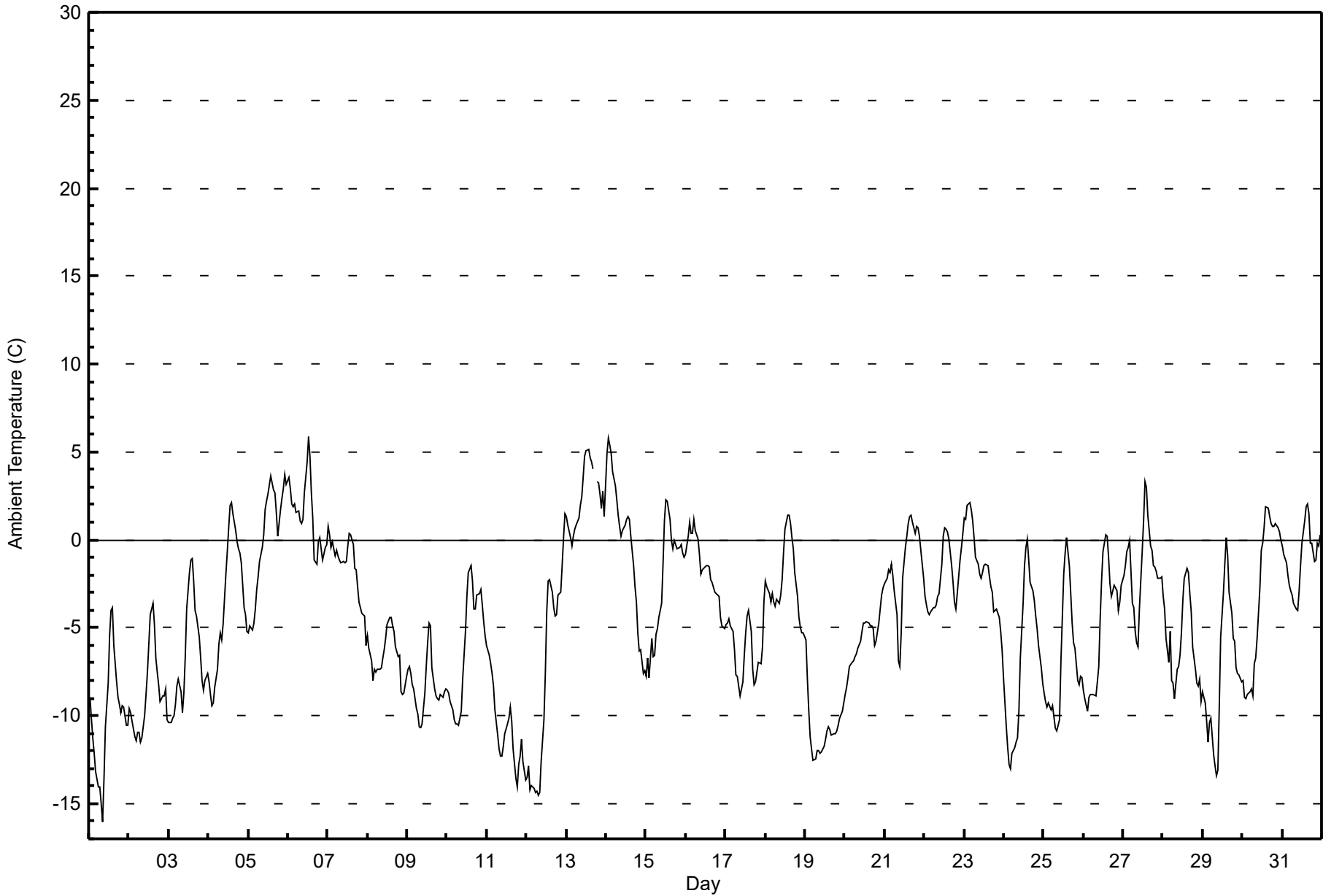


Maximum Value: 5.8 C on Dec 6 13:00		Maximum Daily Average: 2.4 C on Dec 13		Hours in Service: 744																						
Minimum Value: -16.1 C on Dec 1 09:00		Minimum Daily Average: -10.8 C on Dec 19		Hours of Data: 743																						
Maximum Diurnal Average: -1.0 C at hour 15		Minimum Diurnal Average: -6.8 C at hour 9		Hours of Missing Data: 1																						
Monthly Average: -4.48 C		Percentiles: P ₁ = -14.1 P ₁₀ = -10.6 Q ₁ = -8.1 Median = -4.2 Q ₃ = -0.7 P ₉₀ = 1.2 P ₉₉ = 4.7		Hours of Calibration: 0																						
				Percent Operational Time: 99.9																						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Dec	-9.0	-10.1	-11.3	-12.2	-13.1	-14.1	-14.1	-15.0	-16.1	-13.6	-10.6	-8.2	-5.4	-4.0	-3.8	-6.0	-8.1	-8.9	-9.3	-9.8	-9.4	-9.5	-10.5	-10.5	-10.1	-3.8
2-Dec	-9.6	-9.9	-10.3	-11.2	-11.4	-10.9	-11.0	-11.5	-11.3	-10.0	-8.8	-7.5	-5.9	-4.3	-3.6	-4.8	-6.7	-7.5	-8.3	-9.2	-8.9	-8.9	-8.5	-10.2	-8.8	-3.6
3-Dec	-10.4	-10.4	-10.2	-10.0	-9.3	-8.3	-7.9	-8.7	-9.8	-8.7	-6.6	-3.9	-1.8	-1.1	-1.1	-2.4	-4.0	-4.3	-5.5	-6.7	-8.0	-8.5	-8.0	-7.6	-6.8	-1.1
4-Dec	-8.1	-8.8	-9.5	-9.3	-8.4	-7.4	-5.9	-5.3	-5.7	-4.8	-1.9	-0.7	0.7	2.0	2.1	1.5	0.5	-0.1	-0.5	-0.8	-1.3	-3.9	-4.3	-5.2	-3.6	2.1
5-Dec	-5.3	-4.9	-5.2	-4.7	-3.9	-2.8	-2.1	-1.2	-0.5	0.3	1.7	2.2	2.6	3.6	3.2	2.8	2.7	1.5	0.2	1.7	2.3	2.9	3.7	3.1	0.2	3.7
6-Dec	3.6	2.9	2.0	1.9	2.0	1.6	1.6	1.1	0.9	1.1	2.7	4.4	5.8	4.7	2.7	1.2	-1.1	-1.4	-0.1	0.2	-0.5	-1.1	-0.5	-0.3	1.5	5.8
7-Dec	0.8	0.3	-0.4	-0.1	-0.9	-0.6	-0.9	-1.2	-1.3	-1.2	-1.3	-1.2	-0.4	0.4	0.3	-0.3	-1.6	-1.7	-2.7	-3.5	-4.2	-4.2	-4.4	-6.0	-1.5	0.8
8-Dec	-5.4	-6.1	-6.9	-8.0	-7.4	-7.5	-7.4	-7.4	-7.3	-6.8	-6.2	-5.6	-4.8	-4.4	-4.4	-4.9	-5.2	-6.1	-6.6	-6.6	-8.7	-8.8	-8.7	-7.8	-6.6	-4.4
9-Dec	-7.4	-7.2	-7.6	-8.2	-8.5	-9.6	-9.9	-10.6	-10.7	-10.4	-8.7	-7.2	-5.8	-4.7	-4.9	-7.3	-8.5	-8.9	-9.1	-9.1	-8.8	-9.0	-8.6	-8.4	-8.3	-4.7
10-Dec	-8.5	-8.8	-9.2	-9.6	-10.2	-10.4	-10.5	-10.6	-9.7	-7.9	-6.5	-5.2	-3.2	-1.9	-1.5	-2.4	-4.0	-4.0	-3.2	-3.1	-2.9	-3.7	-4.7	-5.4	-6.1	-1.5
11-Dec	-6.0	-6.5	-7.0	-7.6	-8.3	-9.7	-11.1	-11.9	-12.3	-12.3	-11.7	-11.0	-10.5	-10.2	-9.5	-10.3	-11.9	-13.6	-14.1	-12.8	-12.3	-11.3	-12.6	-13.7	-10.8	-6.0
12-Dec	-13.5	-12.8	-14.2	-14.0	-14.1	-14.3	-14.3	-14.5	-14.4	-12.7	-10.2	-7.6	-4.1	-2.3	-2.3	-3.0	-3.9	-4.4	-4.3	-3.1	-3.0	-1.5	0.1	1.5	-7.8	1.5
13-Dec	1.3	0.9	0.2	-0.4	0.2	0.6	0.9	1.2	2.0	2.4	3.6	4.7	5.1	5.2	4.6	4.4	4.0	M	3.3	3.2	2.6	1.8	2.7	1.3	2.4	5.2
14-Dec	4.9	5.8	5.4	4.9	3.9	3.0	2.2	1.4	0.8	0.2	0.5	0.9	1.2	1.3	1.2	0.2	-1.5	-2.6	-3.6	-5.3	-6.4	-6.2	-7.6	-7.4	-0.1	5.8
15-Dec	-7.8	-6.7	-7.8	-5.6	-6.7	-6.6	-5.4	-5.0	-4.4	-3.6	-1.4	1.0	2.3	2.2	1.2	-0.1	-0.5	-0.1	-0.3	-0.5	-0.5	-0.3	-0.7	-1.0	-2.4	2.3
16-Dec	-0.8	0.2	1.0	0.4	0.4	1.2	0.5	0.1	-0.8	-1.9	-1.7	-1.6	-1.4	-1.5	-1.5	-2.3	-2.4	-3.0	-3.1	-3.1	-3.2	-4.4	-4.9	-5.0	-1.6	1.2
17-Dec	-4.8	-4.7	-4.5	-4.9	-5.2	-6.2	-7.7	-7.8	-8.3	-8.9	-8.1	-6.6	-5.3	-4.3	-4.0	-5.2	-7.3	-8.2	-8.1	-7.5	-7.0	-7.1	-6.1	-3.5	-6.3	-3.5
18-Dec	-2.4	-2.7	-3.0	-3.5	-3.1	-3.5	-3.8	-3.4	-3.6	-3.1	-2.3	-0.7	0.6	1.4	1.4	0.9	0.1	-0.5	-1.9	-3.2	-4.4	-4.9	-5.3	-5.3	-2.3	1.4
19-Dec	-5.7	-7.8	-9.7	-11.2	-11.9	-12.6	-12.5	-11.9	-12.0	-12.1	-12.1	-11.8	-11.3	-10.9	-10.7	-10.8	-11.1	-11.0	-11.0	-10.9	-10.6	-10.1	-9.7	-9.3	-10.8	-5.7
20-Dec	-8.8	-8.4	-7.9	-7.2	-7.0	-6.9	-6.6	-6.5	-6.1	-5.8	-5.2	-4.8	-4.7	-4.6	-4.8	-4.9	-4.9	-5.1	-6.0	-5.8	-4.7	-3.9	-3.1	-2.8	-5.7	-2.8
21-Dec	-2.5	-2.2	-1.7	-1.8	-1.4	-2.0	-2.9	-4.3	-6.9	-7.2	-5.3	-2.2	-0.4	0.2	0.9	1.3	1.4	1.0	0.4	0.8	0.7	0.2	-0.6	-2.2	-1.5	1.4
22-Dec	-3.2	-3.7	-4.1	-4.3	-4.1	-3.9	-3.8	-3.7	-3.3	-3.1	-1.4	0.2	0.7	0.6	0.5	0.1	-1.4	-2.4	-3.5	-3.9	-3.1	-1.1	-0.5	0.4	-2.2	0.7
23-Dec	1.3	1.1	1.9	2.1	1.7	1.1	0.1	-1.0	-1.4	-1.9	-2.2	-1.8	-1.5	-1.4	-1.5	-2.1	-2.6	-3.0	-4.1	-4.0	-4.2	-4.4	-5.2	-6.2	-1.6	2.1
24-Dec	-7.9	-10.6	-11.8	-12.7	-13.0	-12.2	-11.8	-11.5	-11.3	-9.8	-6.7	-3.6	-1.4	-0.4	0.0	-1.1	-2.4	-2.9	-3.5	-4.3	-5.0	-6.0	-7.3	-8.1	-6.9	0.0
25-Dec	-8.8	-9.2	-9.5	-9.3	-9.7	-9.4	-10.1	-10.7	-10.8	-10.2	-6.9	-4.4	-1.9	-0.7	0.1	-1.4	-3.0	-4.7	-5.8	-6.2	-8.0	-8.2	-7.8	-7.8	-6.9	0.1
26-Dec	-8.5	-9.1	-9.8	-8.9	-8.8	-8.8	-8.8	-8.9	-8.1	-7.2	-4.5	-2.4	-0.6	0.3	0.2	-1.0	-2.5	-3.2	-2.6	-2.7	-2.9	-4.0	-3.5	-2.6	-5.0	0.3
27-Dec	-2.1	-1.5	-0.6	-0.4	0.0	-3.6	-3.8	-5.2	-5.8	-6.1	-3.9	-0.7	1.1	3.3	3.0	1.4	-0.4	-0.6	-1.5	-1.6	-1.7	-2.1	-2.2	-2.1	-1.6	3.3
28-Dec	-3.2	-3.9	-5.6	-6.9	-5.2	-8.0	-8.1	-9.0	-7.4	-7.2	-6.6	-5.3	-3.4	-2.2	-1.6	-1.9	-3.0	-4.1	-6.1	-7.4	-8.1	-8.3	-7.9	-9.2	-5.8	-1.6
29-Dec	-8.6	-9.2	-10.3	-11.5	-10.4	-10.2	-12.2	-12.8	-13.4	-13.1	-9.5	-5.6	-3.0	-1.3	0.2	-0.9	-3.0	-4.2	-5.6	-5.8	-7.3	-7.6	-7.6	-8.1	-7.5	0.2
30-Dec	-8.0	-9.0	-9.0	-8.8	-8.6	-8.5	-8.9	-7.1	-6.7	-5.6	-2.7	-0.6	-0.2	0.7	1.9	1.8	1.3	1.0	0.7	0.8	0.9	0.7	0.5	-0.1	-3.1	1.9
31-Dec	-0.4	-0.8	-1.3	-2.0	-2.5	-2.9	-3.2	-3.6	-4.0	-4.0	-2.9	-1.4	-0.2	1.1	1.9	2.0	1.5	-0.2	-0.2	-1.3	-1.1	-0.2	-0.4	0.3	-1.1	2.0
																								Diurnal Average		
																								Diurnal Maximum		
M - Maintenance																										



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature (AT) - C
Sawbones Bay - December 2023





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C
Sawbones Bay - December 2023**

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	600	80.75	80.75
0 - 10	143	19.25	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 743

Total Number of Hours: 744



Wood Buffalo Environmental Association
Summary of Hour Averages

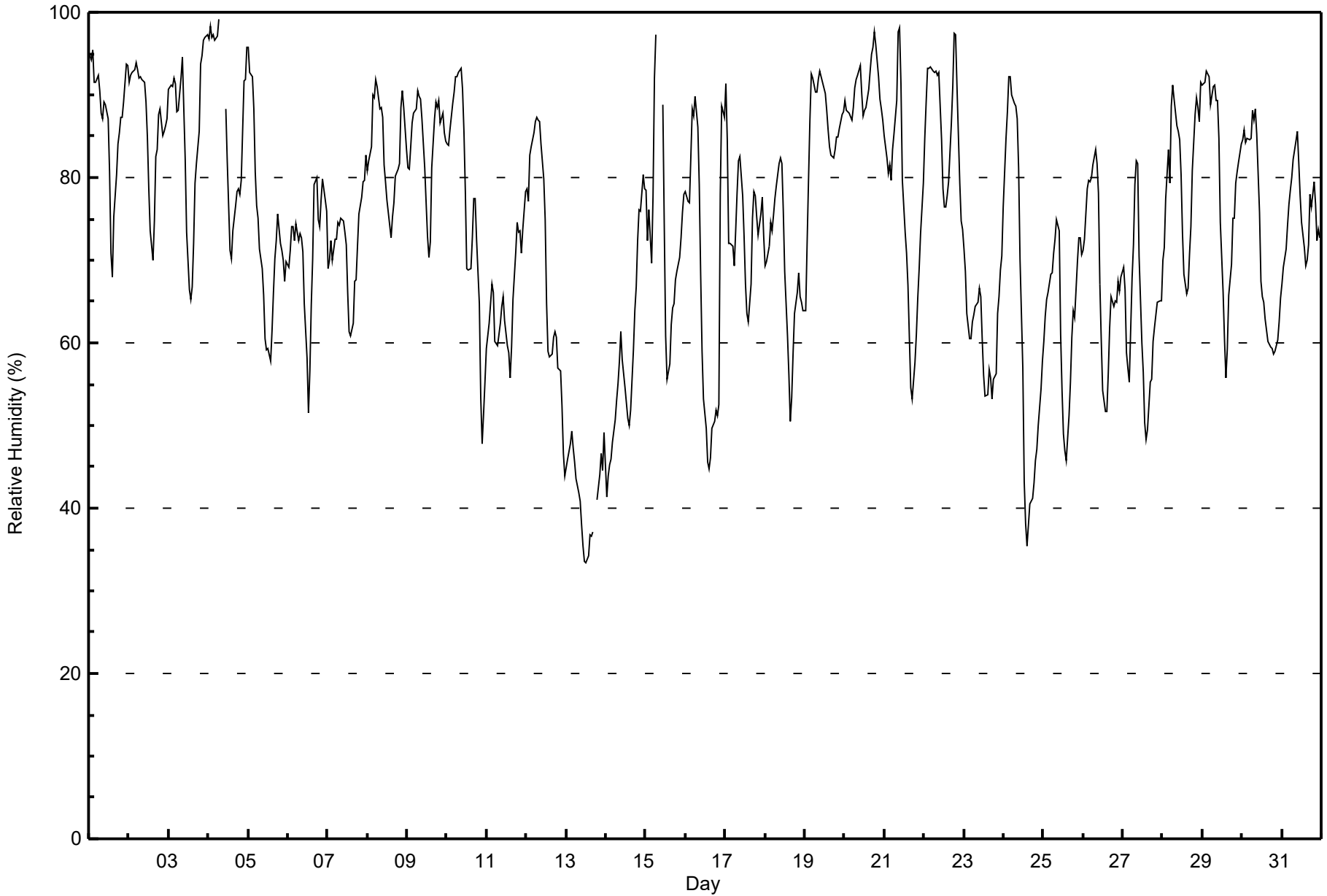
Relative Humidity (RH) - %
Sawbones Bay - December 2023

Maximum Value: 99.1 % on Dec 4 07:00 Maximum Daily Average: 90.7 % on Dec 20																						Hours in Service:	744				
Minimum Value: 33.3 % on Dec 13 13:00 Minimum Daily Average: 41.8 % on Dec 13																						Hours of Data:	737				
Maximum Diurnal Average: 81.7 % at hour 7 Minimum Diurnal Average: 61.5 % at hour 15																						Hours of Missing Data:	7				
Monthly Average: 73.97 % Percentiles: P ₁ = 37.4 P ₁₀ = 53.5 Q ₁ = 64.7 Median = 75.0 Q ₃ = 86.7 P ₉₀ = 91.6 P ₉₉ = 97.2																						Hours of Calibration:	0				
																						Percent Operational Time:	99.1				
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Dec	94.7	94.2	95.4	91.5	91.6	92.5	90.5	87.8	87.1	89.2	88.9	87.1	80.6	70.8	68.0	75.2	80.4	84.0	85.3	87.3	87.3	89.2	93.8	93.5	86.9	95.4	
2-Dec	91.6	92.3	92.8	93.1	93.8	93.0	92.1	92.3	91.9	91.5	89.1	84.9	78.6	73.5	70.0	74.7	82.5	83.3	87.6	88.4	85.1	85.7	86.3	87.1	86.7	93.8	
3-Dec	90.7	91.1	91.1	92.1	91.4	88.0	88.2	92.1	94.5	88.3	82.1	73.4	66.4	65.2	66.8	72.0	79.3	81.7	85.6	93.7	94.8	96.6	96.9	97.3	85.8	97.3	
4-Dec	96.9	98.3	97.0	97.2	96.6	97.1	99.1	OR	OR	OR	88.4	82.1	76.6	71.2	70.1	73.6	76.6	78.3	78.6	78.0	79.6	91.7	91.8	95.8	86.4	99.1	
5-Dec	95.8	92.7	92.2	88.3	80.6	76.7	75.1	71.4	69.0	65.7	60.6	59.2	59.4	57.7	61.6	66.1	70.1	72.4	75.6	72.0	71.1	70.0	67.5	69.8	72.5	95.8	
6-Dec	69.2	71.1	74.0	74.0	72.4	74.5	72.4	73.2	72.7	71.0	64.7	58.1	51.5	56.5	64.6	70.2	79.1	80.1	74.8	74.1	77.2	79.9	77.3	76.0	71.2	80.1	
7-Dec	69.0	70.1	72.4	70.0	72.5	72.5	74.5	74.2	75.0	74.8	73.4	71.8	66.1	61.3	60.8	62.5	67.5	67.6	71.7	75.6	77.6	79.4	79.7	82.7	71.8	82.7	
8-Dec	80.9	82.1	83.7	89.9	89.6	91.8	91.0	88.3	88.4	87.4	81.6	79.5	77.3	74.2	72.7	75.2	77.0	80.1	81.1	81.7	88.4	90.5	88.4	83.3	83.5	91.8	
9-Dec	81.1	81.0	83.8	86.6	87.8	88.3	90.4	89.8	89.5	87.1	81.1	77.0	72.9	70.3	72.3	81.3	87.2	89.2	88.5	89.3	86.7	87.8	85.4	84.5	84.1	90.4	
10-Dec	84.1	84.0	85.7	89.0	90.3	92.2	92.2	92.7	93.1	90.7	85.7	78.3	69.1	68.7	69.0	72.7	77.5	77.5	72.6	64.7	53.3	47.7	51.4	55.3	76.6	93.1	
11-Dec	59.3	62.3	64.8	67.1	66.1	60.2	59.6	61.0	62.4	64.3	65.6	62.6	59.7	58.8	55.8	59.6	65.3	71.1	74.5	73.5	73.5	70.8	73.8	78.3	65.4	78.3	
12-Dec	78.6	77.2	82.7	83.8	85.5	86.8	87.3	86.9	86.9	84.0	79.8	74.9	64.8	59.0	58.3	58.6	60.7	61.3	60.7	57.0	56.7	52.3	46.6	43.9	69.8	87.3	
13-Dec	44.9	45.9	47.9	49.4	47.3	45.6	43.6	41.9	40.8	38.0	35.5	33.6	33.3	34.2	36.8	36.6	37.1	M	40.9	42.5	44.0	46.6	44.6	49.1	41.8	49.4	
14-Dec	41.3	43.9	45.2	46.0	48.0	50.7	53.0	55.1	57.8	61.4	57.9	54.6	52.7	50.8	50.0	51.8	59.2	63.8	66.8	72.4	76.2	75.9	80.3	78.7	58.1	80.3	
15-Dec	78.4	72.4	76.1	69.7	77.7	92.1	97.2	OR	OR	OR	88.8	74.5	60.9	55.5	57.4	62.3	64.2	64.7	67.7	68.7	70.3	72.7	75.8	77.9	72.6	97.2	
16-Dec	78.3	77.2	76.9	82.6	88.3	87.4	89.9	86.1	79.2	68.3	59.0	53.2	49.6	45.6	44.7	46.2	49.7	50.4	51.9	51.3	52.5	77.9	88.6	87.2	67.6	89.9	
17-Dec	91.3	84.6	72.1	72.0	71.7	69.3	73.5	78.1	82.0	82.5	77.9	72.8	67.1	63.6	62.6	67.2	75.1	78.3	77.8	75.2	73.1	75.6	77.7	72.9	74.7	91.3	
18-Dec	69.4	69.8	71.7	74.6	73.5	75.4	77.5	79.0	81.8	82.4	81.7	76.0	68.7	60.8	56.1	50.6	53.4	58.8	63.6	66.1	68.4	65.6	65.0	63.9	68.9	82.4	
19-Dec	63.9	72.1	79.7	87.0	92.6	92.0	90.3	90.3	91.9	92.9	92.2	90.9	90.1	88.1	85.8	83.7	82.6	82.3	83.3	84.9	84.9	85.9	87.7	88.1	86.0	92.9	
20-Dec	89.3	88.2	88.0	87.8	87.0	88.5	90.8	91.8	92.3	93.5	90.1	87.5	88.1	88.5	90.7	92.9	94.9	95.7	97.6	96.1	92.2	89.5	88.3	87.0	90.7	97.6	
21-Dec	85.1	82.4	80.4	81.5	79.7	83.5	85.2	89.4	97.6	98.1	91.4	79.6	73.5	70.9	67.0	60.6	54.5	53.2	57.7	61.0	65.5	69.0	73.2	79.3	75.8	98.1	
22-Dec	84.8	89.1	93.2	93.2	93.4	92.8	92.8	92.9	92.4	92.7	84.6	78.7	76.5	76.4	77.8	79.6	86.6	91.0	97.5	97.2	91.0	79.4	74.8	73.7	86.8	97.5	
23-Dec	71.3	68.7	63.5	60.5	60.5	62.5	63.4	64.5	65.0	66.6	65.6	60.6	56.2	53.5	53.7	56.8	55.7	53.1	55.6	56.3	63.5	65.7	68.8	70.5	61.7	71.3	
24-Dec	76.5	84.8	87.9	92.3	92.1	89.9	89.0	88.6	87.1	81.2	70.2	56.9	49.2	38.2	35.4	37.9	40.5	41.2	43.0	45.7	47.1	50.1	54.3	57.8	63.8	92.3	
25-Dec	60.2	63.3	65.2	66.2	68.2	68.4	70.8	72.6	75.0	73.6	61.0	54.2	43.0	44.0	47.0	45.7	51.2	55.2	60.6	63.8	63.0	69.9	72.8	72.7	70.8	63.3	75.0
26-Dec	71.2	72.5	78.7	79.7	79.6	80.0	81.6	83.4	81.6	78.1	67.2	60.4	54.2	51.7	51.7	56.3	61.8	65.6	64.3	65.1	64.9	67.4	66.3	67.9	68.8	83.4	
27-Dec	69.2	66.4	58.8	57.0	55.2	67.7	71.8	79.2	82.0	81.6	70.6	60.1	56.4	50.3	48.2	49.5	55.2	55.5	60.2	61.9	63.4	64.9	65.0	65.0	63.1	82.0	
28-Dec	70.0	71.6	77.4	83.4	79.4	88.6	91.2	89.5	86.3	85.7	84.5	80.3	73.2	68.3	65.9	66.6	70.7	74.0	80.9	87.6	89.7	88.4	86.8	91.5	80.5	91.5	
29-Dec	91.2	91.5	92.8	92.5	92.1	88.8	91.0	91.2	89.3	89.4	84.7	74.7	66.2	60.4	55.8	59.4	65.8	69.6	75.0	75.1	79.4	80.7	81.8	84.1	80.1	92.8	
30-Dec	84.5	85.7	84.2	84.7	84.6	84.8	88.2	87.0	88.3	85.3	75.8	67.5	65.6	65.0	62.8	60.2	59.7	59.4	59.4	58.7	58.9	60.3	62.5	65.5	72.4	88.3	
31-Dec	67.1	69.2	71.3	74.3	76.8	78.5	80.1	82.2	84.3	85.5	81.8	77.8	74.7	71.4	69.3	70.0	71.9	77.9	76.5	79.5	76.9	72.4	73.7	72.6	75.7	85.5	
																						Diurnal Average					
																						Diurnal Maximum					
M - Maintenance OR - Out of Range																											



Wood Buffalo Environmental Association
Hourly Averages

Relative Humidity (RH) - %
Sawbones Bay - December 2023





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Relative Humidity (RH) - %
Sawbones Bay - December 2023

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	11	1.49	1.49
40 - 60	119	16.15	17.64
60 - 80	326	44.23	61.87
80 - 100	281	38.13	100.00

Total Number of Valid Hours: 737

Total Number of Hours: 744



Maximum Speed: 32 km/h on Dec 10 22:00	Maximum Daily Speed Average: 19.9 km/h on Dec 23	Hours in Service: 744
Minimum Speed Value: 1 km/h on Dec 3 02:00	Minimum Daily Speed Average: 3.8 km/h on Dec 28	Hours of Data: 743
Maximum Diurnal Speed Average: 8.7 km/h at hour 13	Minimum Diurnal Speed Average: 6.3 km/h at hour 6	Hours of Missing Data: 1
Monthly Average Velocity: 7.3 km/h 217.9 deg	Percentiles: P ₁ = 3 P ₁₀ = 6 Q ₁ = 8 Median = 10 Q ₃ = 14 P ₉₀ = 17 P ₉₉ = 26	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-Dec	SSW5	S5	S5	S6	S7	S5	S5	S3	S4	S5	SSE6	SSE5	S9	S11	S11	S10	S9	SSE11	SSE9	S11	S12	S10	S9	S9	S7.5	S12	
2-Dec	S13	SSE14	S7	SSE6	SSE7	SSE9	SSE10	SSE7	S8	SSE9	S8	SSE8	SSE9	S8	S8	S6	S1	SW2	SW4	SSW7	SW6	WSW9	WSW14	WSW5	S6.5	WSW14	
3-Dec	WSW2	ESE1	S4	S5	S6	S3	S4	S6	S6	S6	SSE7	SSE7	S8	SSE9	SE8	SE8	SE9	SSE10	SSE9	SSE9	SSE8	SSE8	S11	SSE10	SSE6.5	S11	
4-Dec	S9	SSE6	SSE7	S8	S8	S8	SSW9	S7	SSW9	SW15	SW15	WSW14	W19	WSW13	WSW15	WSW16	SW16	SW14	SW13	SSW10	S6	S8	SSE8	SW9.3	W19		
5-Dec	SSE9	SE9	SSE9	SSE9	SSE10	SSE10	SSE8	SSE14	SSE13	S9	SSW10	SSW11	SSW11	SW12	SSW7	SSW7	SW11	SSW9	SSW10	SW14	SW16	SW18	SW17	SW16	SSW9.7	SW18	
6-Dec	WSW15	SW15	SW17	SW17	SW18	SW16	SW18	SW16	SW15	SW15	SW16	WSW15	W21	WSW12	SW9	SSW9	S7	S8	SSW10	SSW9	SSW9	S8	SW3	WSW6	SW12.0	W21	
7-Dec	W11	WNW13	WNW11	WNW10	WNW14	W17	WSW14	WSW16	WSW18	W17	W18	W14	WNW12	WNW13	W12	W12	WSW8	W15	WNW14	W11	W14	W17	WSW16	SW8	W13.1	WSW18	
8-Dec	WSW10	WSW10	WSW9	WSW10	W15	WSW14	W14	W18	WSW19	WSW15	WSW16	W17	WSW12	WSW11	W12	WSW11	WSW13	WSW10	SW13	WSW13	SSW7	SSW8	SSW9	SW12	WSW12.0	WSW19	
9-Dec	WSW14	WSW17	WSW20	WSW16	WSW14	WSW9	WSW8	SW9	SW8	SSW8	SW9	SW10	SSW11	S8	S8	S9	S8	SSE8	S10	SSE9	SSE7	SSE5	SE9	SE9	SSW8.0	WSW20	
10-Dec	SSE8	SSE9	SSE7	SSE10	SSE9	SSE10	SSE9	S9	S7	S10	S13	SSW12	SW17	WSW20	W21	WSW14	SW13	SW14	WSW17	W17	WNW31	WNW32	WNW25	WNW26	WSW10.0	WNW32	
11-Dec	WNW23	WNW27	WNW26	WNW23	NW26	NW27	NW23	NW19	NW15	WNW14	W16	W19	W16	W14	W14	SW7	SSW9	S9	S9	S7	S6	S8	SSE8	S8	WNW11.3	NW27	
12-Dec	S8	SSW9	S8	S7	S7	S6	S7	S9	S8	S9	S8	S10	SSW11	SSW11	S9	S12	SSW11	S9	S10	SSW10	S9	S10	SSW10	SSW11	S9.0	S12	
13-Dec	SSW10	SSW11	SSW10	S10	SSW10	SSW11	SSW10	SSW8	SSW10	SSW11	SSW10	SSW9	S9	S8	S8	S9	S8	M	SSW5	SW6	S6	S5	SW5	SSE5	SSW8.3	SSW11	
14-Dec	W15	WSW18	WNW18	WNW20	WNW20	W17	W19	W17	W17	WSW15	WSW16	WSW18	W16	WSW15	WSW13	WSW13	SW13	SW9	SSW7	SSE6	S9	SSE8	SSE7	SSE9	WSW11.4	WNW20	
15-Dec	SSE11	SSE8	S9	SSW12	S11	S10	S10	S10	S10	S11	SSW12	SSW11	SSW17	SSW17	SSW19	S16	S14	S16	S24	S23	SSW17	SSW15	SW17	SSW14	SSW14	S13.8	S24
16-Dec	SW17	SW17	SW18	SW15	WSW14	WNW17	W17	WNW22	WNW15	NW11	WNW19	WNW20	WNW20	WNW20	WNW18	WNW15	W15	WNW13	W13	WNW11	WNW12	WNW12	WNW13	WNW15	W14.4	WNW22	
17-Dec	W19	WNW19	NW24	WNW24	NW20	NW17	NW10	W16	WSW13	SSW7	SSW8	SW14	SW13	SW14	SW14	SSW8	S8	S9	S10	S11	S9	S8	S8	SSW11	WSW8.9	WNW24	
18-Dec	SW15	SSW14	SSW13	SSW12	SW17	SW19	SW15	WSW19	W20	W18	WNW18	WNW17	W17	WNW16	WNW16	W15	WSW16	W17	WNW19	WNW11	WNW10	WNW13	WNW12	W12	W13.6	W20	
19-Dec	WNW12	WNW9	N7	N6	NNE7	NNE7	NNE5	NNE7	NE7	ENE6	E8	E7	ESE8	ESE9	E9	E11	ESE11	ESE13	ESE13	ESE13	ESE12	ESE10	ESE9	ESE11	E5.6	ESE13	
20-Dec	SE11	SE13	SE12	SSE14	SSE16	SSE16	SSE14	SSE13	SSE13	S10	S13	S14	SSW15	S13	S13	SSW13	S12	S12	S10	S10	S11	SSW11	SSW11	SW13	S11.7	SSE16	
21-Dec	SW14	SW15	WSW18	W15	W15	WSW11	SW11	SW10	S8	S8	S8	S9	S11	S11	S12	S17	S15	S14	S16	S17	S17	S16	S11	SSE6	SSW11.0	WSW18	
22-Dec	S9	S7	SSE7	SSE7	SSE6	SSE8	SSE7	SE6	SSE4	SSE7	SSE8	SSE11	SSE13	SSE9	SSE8	S6	S8	S8	S5	SSW8	SSW10	WSW14	W17	W14	S6.8	W17	
23-Dec	W17	W17	WNW24	WNW21	WNW23	WNW25	WNW27	WNW25	WNW24	WNW22	WNW21	W24	WNW24	WNW24	WNW22	WNW18	WNW19	WNW17	WNW14	W16	WSW15	WSW14	WSW15	W19	WNW19.9	WNW27	
24-Dec	WSW10	SSW6	S8	S8	SSE8	S8	S7	S7	S9	S10	SSW10	SW13	SW16	SW16	SW15	SW12	SSW11	SSW13	SSW12	S10	S9	S8	SSE7	SSE9	SSW9.4	SW16	
25-Dec	SSE8	S8	S9	SSE10	SSE11	S8	S10	S10	S8	S8	SSE7	S9	S8	SSE10	S10	S9	SSE8	S10	S6	SE6	SE7	ESE8	ESE9	SE6	SSE8.0	SSE11	
26-Dec	ESE9	SSE8	S8	SSE14	SSE10	SSE11	SSE8	SSE7	SSE10	S6	SSE10	S11	S12	S12	SSW11	SSW9	S9	SSW8	SSW11	SSW10	SW10	SSW8	SW13	SW12	S9.0	SSE14	
27-Dec	SW11	SW14	SW14	SW15	SW12	SSW7	SSW10	S8	SE5	SSE6	SSE10	SSE8	SSE8	SSE14	S12	S9	ESE6	SE9	SSE9	SE7	SSE6	SSE7	SSE6	SE6	S7.5	SW15	
28-Dec	E4	SSE5	E2	E5	ESE7	ESE6	S3	NW4	WNW7	SSE4	SW6	WNW10	W4	WNW9	WNW10	WNW8	WNW11	WNW11	NNW5	NW5	WNW8	WNW9	WNW14	WNW8	WNW3.8	WNW14	
29-Dec	W9	W4	SW3	SSW4	WSW6	SW2	SSE4	S5	SSE6	SSE7	SSE6	S6	S7	S6	S7	SSE7	S8	S10	S5	S2	S8	S11	SSE10	SSE8	S5.5	S11	
30-Dec	SSE4	SSE4	SSE6	SSE8	SSE6	SSE7	SSE9	SSE10	SSE10	SSE10	SSE13	SSE15	SSE13	SSE12	SSE17	SSE13	SSE16	SSE18	SSE20	S17	S16	S16	S16	S14	SSE11.8	SSE20	
31-Dec	S13	SSW13	SSW12	S10	S10	S10	SSW9	S9	S9	S9	S8	S9	S8	SSW6	SSW6	SW6	SW7	SSW8	SSW9	SSW10	SW11	WSW14	WSW16	W20	SSW9.1	W20	

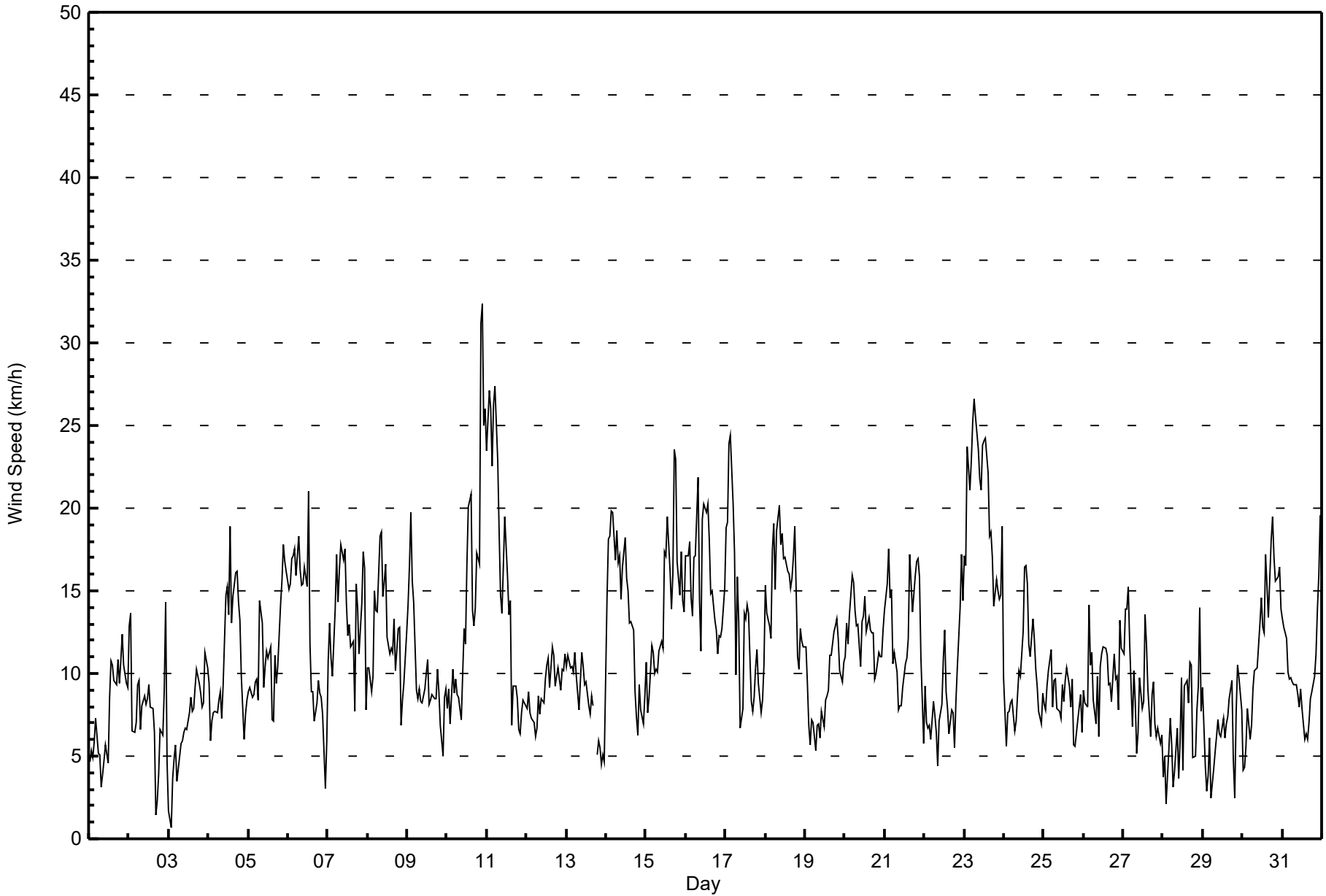
SW7.6 SW7.0 SW6.6 SW6.6 SW6.6 SW6.3 SW6.6 SW6.9 SW6.7	SSW6.8 SW7.9 SW8.5 SW8.7 SW8.5 SW7.9	SSW7.4	SSW7.9	SSW8.1	SSW7.7	SSW7.3	SSW7.4	SW7.4	SW7.6	SW7.1	Diurnal Average														
WNW23	WNW27	WNW26	WNW24	NW26	NW27	WNW27	WNW25	WNW24	WNW22	WNW21	W24	WNW24	WNW24	WNW22	WNW18	WNW19	S24	S23	S17	WNW31	WNW32	WNW25	WNW26	Diurnal Maximum	

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



Wood Buffalo Environmental Association
Hourly Averages

Wind Speed (WS) - km/h
Sawbones Bay - December 2023





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Wind Speed (WS) - km/h
Sawbones Bay - December 2023

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	49	6.59	6.59
6 - 11	401	53.97	60.57
12 - 19	251	33.78	94.35
20 - 28	40	5.38	99.73
29 - 38	2	0.27	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 743

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Wind Speed (WS) - km/h
Sawbones Bay - December 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	0	0	3	1	0	10	18	3	6	2	2	0	2	1	49
6 - 11	2	3	1	1	4	12	14	98	144	67	19	15	3	16	2	0	401
12 - 19	0	0	0	0	0	4	2	20	30	20	53	43	45	31	3	0	251
20 - 28	0	0	0	0	0	0	0	1	2	0	0	2	5	25	5	0	40
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
Totals	2	4	1	1	7	17	16	129	194	90	78	62	55	74	12	1	743

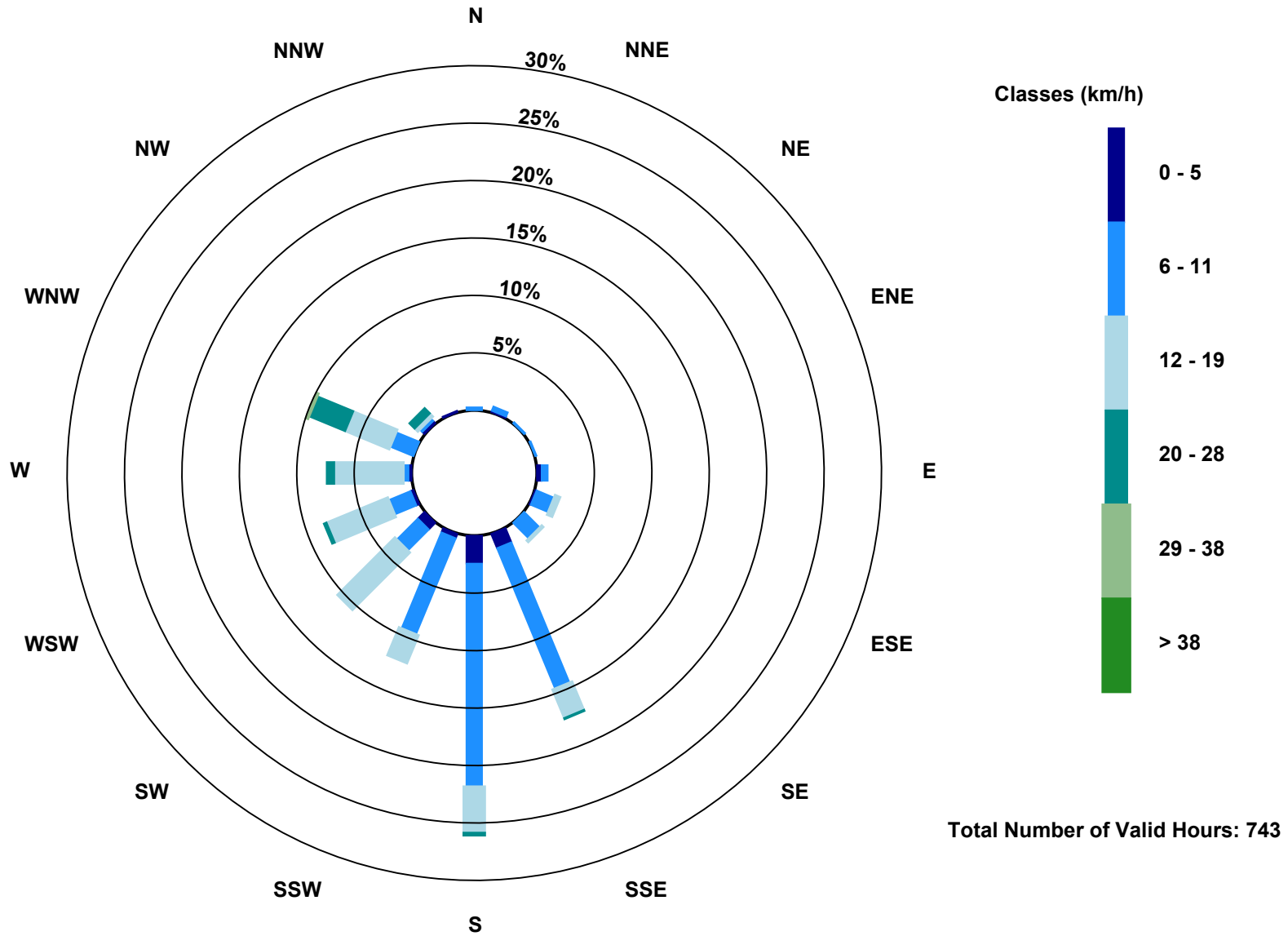
Total Number of Valid Hours: 743

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Dec 2023

Wind Speed (WS) - km/h
Sawbones Bay





Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Speed (WS) - km/h
Sawbones Bay - December 2023

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 7 km/h on Dec 10 22:00 Minimum Value: 1 km/h on Dec 29 22:00 Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 2 Median = 2 Q ₃ = 3 P ₉₀ = 4 P ₉₉ = 6																	Hours in Service: 744 Hours of Data: 743 Hours of Missing Data: 1 Hours of Calibration: 0 Percent Operational Time: 99.9									
Day	Hourly Period Ending At (MST)																								Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Dec	2	2	2	2	1	2	1	1	1	1	1	1	3	2	3	1	1	1	1	1	2	2	1	2	3	
2-Dec	2	3	2	2	1	2	2	2	2	2	2	2	2	2	2	1	2	1	1	1	4	4	3	4	4	
3-Dec	2	1	1	2	1	1	2	1	1	1	1	1	2	2	2	1	1	2	1	1	1	1	1	2	2	
4-Dec	2	1	1	1	1	1	1	2	1	2	4	4	4	4	5	4	4	3	3	3	2	3	2	1	5	
5-Dec	2	2	2	1	2	3	3	3	3	3	4	3	3	3	3	3	3	2	3	4	4	4	5	4	5	
6-Dec	4	4	4	4	4	3	4	4	4	3	4	5	4	4	2	2	1	1	2	2	1	2	2	2	5	
7-Dec	2	3	2	3	3	5	4	5	4	4	4	3	3	2	2	3	4	3	3	2	3	3	3	4	5	
8-Dec	3	3	4	5	4	3	2	4	4	3	4	4	3	3	3	4	5	3	4	3	2	3	2	3	5	
9-Dec	5	5	6	4	4	5	3	3	3	2	2	3	3	2	2	2	2	1	1	1	2	2	2	2	6	
10-Dec	2	2	1	2	1	2	1	1	2	3	3	3	4	5	3	5	3	4	4	4	7	7	6	6	7	
11-Dec	5	6	7	5	7	6	5	4	3	3	3	4	4	3	3	3	1	1	1	1	2	1	2	1	7	
12-Dec	1	2	1	1	1	2	2	1	1	2	2	2	3	3	2	2	2	2	2	2	2	2	2	2	3	
13-Dec	2	2	2	2	2	2	2	2	3	2	3	2	2	2	1	1	2	M	3	2	1	2	3	2	3	
14-Dec	5	4	4	3	3	4	4	4	4	3	4	4	3	4	3	4	2	2	2	2	1	2	4	2	5	
15-Dec	2	2	1	2	1	2	2	2	2	2	3	5	4	5	4	4	6	5	5	4	4	5	4	3	6	
16-Dec	5	4	4	4	5	4	4	3	5	2	4	4	4	4	4	3	4	4	4	2	3	3	3	3	5	
17-Dec	4	4	6	5	4	4	2	4	5	3	3	4	3	3	3	2	1	2	1	2	2	2	2	3	6	
18-Dec	4	3	3	3	4	4	4	5	4	4	3	3	4	4	3	4	5	4	3	3	2	3	2	2	5	
19-Dec	2	2	1	2	2	1	1	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3	2	2	3	
20-Dec	3	3	3	3	4	3	3	3	3	2	3	3	4	3	4	4	3	3	2	2	3	3	3	3	4	
21-Dec	3	3	4	4	4	3	3	3	1	1	1	2	2	2	3	4	4	3	3	4	4	4	3	1	4	
22-Dec	1	2	1	1	1	1	1	2	2	2	2	2	2	3	2	2	2	2	2	2	3	5	5	3	5	
23-Dec	4	4	5	5	5	4	6	6	5	4	5	5	5	5	5	4	4	3	2	4	3	3	3	3	6	
24-Dec	6	3	2	1	1	1	1	1	1	2	2	4	4	4	4	4	3	4	3	2	1	1	1	1	6	
25-Dec	1	1	1	1	1	2	2	1	1	2	2	2	2	2	2	2	2	2	1	1	1	1	1	3	3	
26-Dec	2	3	3	3	2	3	2	1	2	2	2	2	3	3	3	2	2	2	3	4	2	2	3	2	4	
27-Dec	3	3	3	3	4	2	2	2	1	2	2	2	2	3	3	2	1	2	2	3	2	2	3	2	4	
28-Dec	2	1	1	2	2	1	2	1	3	1	2	2	2	2	2	1	1	2	1	1	3	2	2	3	3	
29-Dec	3	2	1	1	3	1	1	1	1	1	2	2	1	2	1	1	1	1	3	1	3	1	2	1	3	
30-Dec	1	1	1	1	2	1	2	1	2	2	2	3	2	2	3	3	4	4	4	4	4	4	4	3	4	
31-Dec	3	3	3	2	2	2	2	2	1	1	1	1	2	1	2	2	1	1	2	2	3	4	5	5	5	
																	Diurnal Maximum									
M - Maintenance																										



Wood Buffalo Environmental Association
Summary of Hour Averages

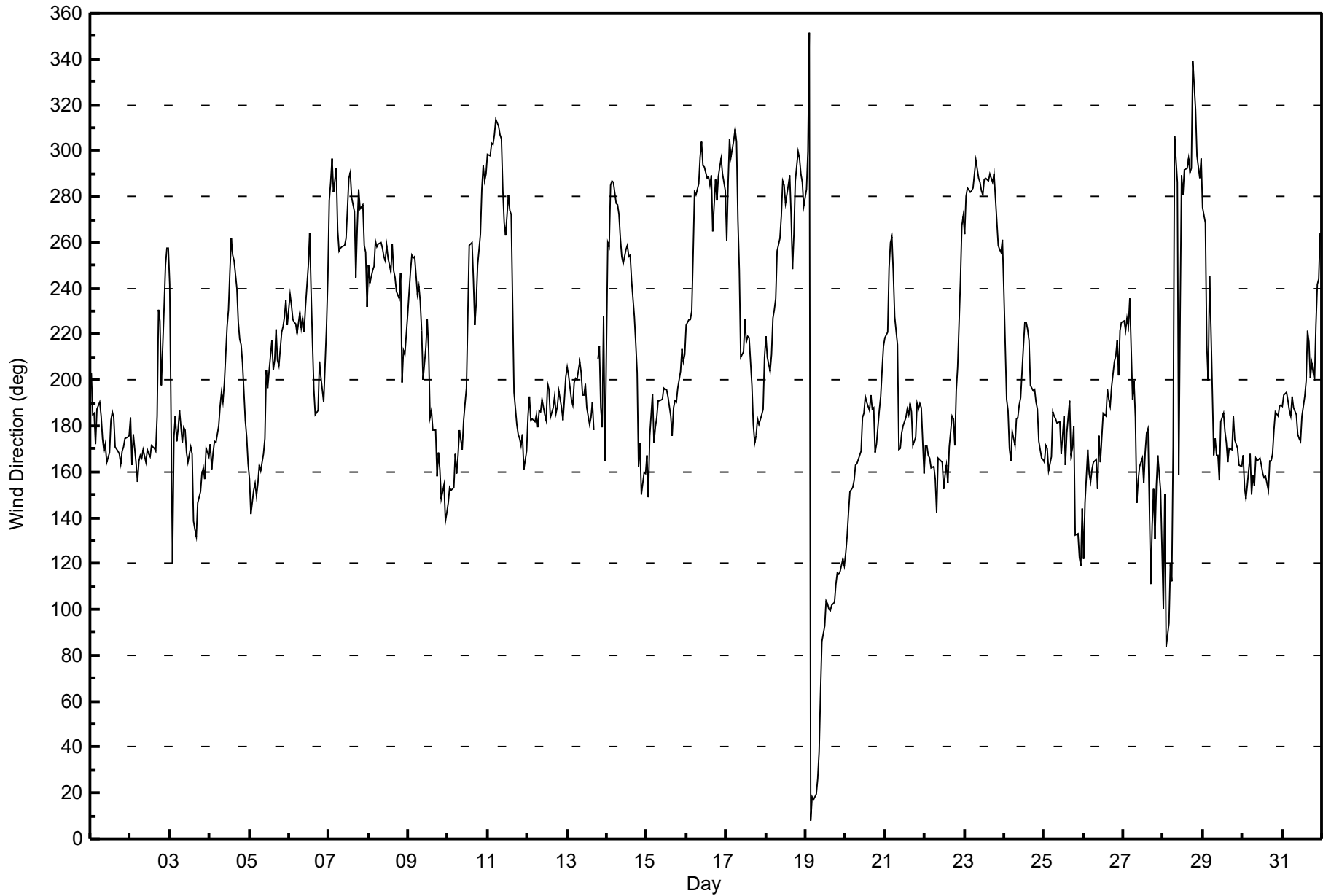
Wind Direction (WD) - deg
Sawbones Bay - December 2023

Direction of Maximum Speed: 294 deg on Dec 10 22:00	Hours in Service: 744
Direction of Maximum Daily Speed Average: 281.4 deg on Dec 23	Hours of Data: 743
Direction of Minimum Speed: 120 deg on Dec 3 02:00	Hours of Missing Data: 1
Direction of Minimum Daily Speed Average: 3.8 deg on Dec 28	Percent Operational Time: 99.9
Monthly Average Direction: 217.9 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-Dec	203	185	185	172	187	191	184	174	169	172	164	168	182	186	184	171	169	168	164	169	171	175	175	176	175.9
2-Dec	184	163	176	163	156	165	167	166	169	164	170	168	167	171	170	169	184	231	226	198	232	250	257	257	184.1
3-Dec	242	120	175	184	173	179	187	173	179	178	168	164	171	168	138	135	132	147	151	159	161	157	170	167	162.3
4-Dec	172	161	168	174	173	180	188	195	190	198	223	231	247	262	255	252	240	225	218	215	207	182	175	164	213.8
5-Dec	157	142	152	155	149	155	163	161	168	175	204	197	204	217	204	209	222	209	206	221	224	227	235	224	195.7
6-Dec	237	232	227	225	224	220	229	223	227	221	232	249	264	239	216	196	185	187	208	201	196	190	223	245	225.1
7-Dec	278	286	297	282	293	265	256	257	258	259	261	274	288	290	279	273	244	266	283	275	276	259	256	232	270.1
8-Dec	250	242	247	250	261	258	259	260	257	254	252	259	253	247	259	248	245	239	236	246	199	213	211	228	247.6
9-Dec	238	247	254	253	254	238	241	234	221	200	214	226	213	184	187	178	178	158	169	161	148	154	139	142	211.4
10-Dec	147	153	152	153	168	159	167	178	170	182	190	196	228	258	260	244	224	234	250	263	283	294	287	290	240.0
11-Dec	298	298	303	303	307	314	310	307	305	283	268	263	281	274	272	233	195	181	177	174	172	176	161	169	282.1
12-Dec	184	193	183	183	182	185	179	187	186	191	185	182	198	196	184	188	193	186	188	195	188	183	192	202	188.7
13-Dec	206	202	192	189	199	200	200	208	203	194	194	198	188	180	184	191	178	M	209	215	188	179	228	164	195.5
14-Dec	260	258	285	287	286	277	276	272	262	254	251	257	259	254	255	243	228	216	203	162	173	150	160	159	253.6
15-Dec	167	149	176	194	173	179	183	191	191	192	197	196	196	193	184	176	188	191	190	196	204	214	208	211	191.1
16-Dec	224	227	227	230	255	282	281	285	297	304	294	293	288	289	285	289	265	288	278	289	293	297	290	283	276.6
17-Dec	261	286	305	297	304	310	304	270	248	210	212	227	217	219	218	198	181	173	175	183	181	185	187	210	246.6
18-Dec	219	210	204	211	227	231	235	256	262	272	287	285	277	285	289	272	248	264	287	299	297	290	286	276	261.8
19-Dec	283	300	351	8	18	17	19	27	38	63	86	93	104	103	100	100	102	103	111	116	115	117	122	119	85.8
20-Dec	124	132	142	151	153	156	163	164	165	169	184	185	193	190	187	194	187	188	169	172	187	193	205	215	173.7
21-Dec	218	221	249	260	262	247	228	215	170	170	177	180	183	188	185	190	186	172	175	190	187	190	188	159	201.4
22-Dec	172	172	167	166	161	162	157	142	166	165	164	152	158	163	155	171	184	183	171	195	206	243	267	272	184.3
23-Dec	264	280	284	282	283	284	290	296	288	286	283	281	287	288	287	290	288	286	290	269	258	257	256	261	281.4
24-Dec	239	192	187	170	165	177	171	183	183	189	192	214	225	225	222	217	198	195	196	191	188	173	166	165	197.2
25-Dec	164	172	170	161	166	186	184	183	181	182	168	176	184	163	177	191	167	170	180	133	133	123	119	144	167.1
26-Dec	122	147	170	159	155	161	164	165	153	176	164	175	186	184	196	192	189	197	208	211	217	202	222	225	181.9
27-Dec	226	222	227	223	236	192	199	184	146	156	162	166	155	168	177	179	111	136	153	130	154	167	152	127	180.7
28-Dec	100	150	84	94	120	112	171	307	286	159	230	289	281	292	292	297	291	292	340	318	298	293	288	296	288.6
29-Dec	275	268	216	200	245	222	167	175	167	167	156	182	185	178	173	164	170	170	185	174	172	170	163	162	181.4
30-Dec	167	153	148	155	168	150	159	154	166	165	166	163	159	157	158	152	165	165	168	178	186	184	189	189	167.3
31-Dec	188	193	195	191	187	184	193	188	185	176	174	173	185	193	200	222	217	201	208	199	224	242	244	264	204.4

222.2 221.9 230.5 222.1 228.7 226.3 224.6 227.6 221.2 211.5 216.2 221.9 223.2 224.0 220.0 212.3 205.1 202.0 203.7 204.1 209.6 215.8 219.9 219.4
 Diurnal Average

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





Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Direction (WD) - deg
Sawbones Bay - December 2023

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 99 deg on Dec 2 17:00 Minimum Value: 4 deg on Dec 29 17:00 Percentiles: P ₁ = 6 P ₁₀ = 10 Q ₁ = 12 Median = 14 Q ₃ = 17 P ₉₀ = 23 P ₉₉ = 62																	Hours in Service: 744 Hours of Data: 743 Hours of Missing Data: 1 Hours of Calibration: 0 Percent Operational Time: 99.9								
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Dec	45	24	30	27	10	17	10	18	9	9	14	19	16	13	14	7	7	7	7	8	11	12	9	13	45
2-Dec	11	13	15	13	10	11	12	20	21	13	16	16	13	14	12	10	99	75	34	17	49	34	12	55	99
3-Dec	81	87	37	40	23	43	64	15	9	10	13	15	15	13	18	15	15	10	15	6	10	8	11	11	87
4-Dec	11	11	9	9	8	12	13	14	13	17	15	17	17	13	22	14	20	14	14	13	18	29	16	9	29
5-Dec	10	18	16	11	17	18	25	12	14	23	19	15	16	18	19	22	15	16	16	17	15	16	18	16	25
6-Dec	19	17	15	15	15	14	15	15	16	15	17	20	14	21	18	12	13	15	17	16	12	15	46	36	46
7-Dec	14	13	15	22	11	16	15	18	10	12	12	16	13	10	15	16	27	13	12	17	14	10	11	32	32
8-Dec	19	23	29	31	11	11	11	11	11	12	16	13	18	19	15	20	19	24	21	20	14	20	15	16	31
9-Dec	20	17	13	14	15	30	28	31	30	21	17	19	19	15	12	10	14	11	9	9	12	29	14	15	31
10-Dec	15	10	13	12	17	12	12	12	17	15	14	16	18	14	11	19	15	18	15	15	11	14	12	11	19
11-Dec	13	12	12	13	13	13	13	13	12	13	16	13	16	18	19	29	12	11	12	13	13	14	12	5	29
12-Dec	15	13	12	15	12	17	18	12	12	14	16	15	17	15	14	14	14	12	13	12	13	14	14	15	18
13-Dec	14	14	13	12	15	15	13	26	19	13	16	15	13	14	16	13	16	M	67	34	32	52	46	39	67
14-Dec	19	12	13	10	9	14	15	16	15	13	13	12	12	13	12	15	13	15	19	17	9	18	31	10	31
15-Dec	8	14	15	13	6	11	14	12	13	13	15	15	15	14	15	14	15	14	13	16	16	15	17	14	17
16-Dec	15	17	15	17	24	12	13	9	16	12	11	12	11	10	12	12	17	17	18	11	14	12	9	14	24
17-Dec	11	19	14	13	13	13	13	16	17	41	23	18	15	15	14	15	10	10	11	14	12	15	16	18	41
18-Dec	15	15	15	15	14	14	15	13	12	14	10	12	18	14	11	22	16	16	9	11	9	9	11	13	22
19-Dec	12	13	16	9	9	10	12	12	20	32	28	27	20	20	18	18	15	15	15	16	15	17	18	17	32
20-Dec	18	19	17	15	14	13	14	13	13	14	15	15	15	17	15	17	15	14	15	15	15	19	15	15	19
21-Dec	14	14	19	15	13	17	20	17	10	11	11	14	13	13	15	14	14	14	14	16	14	14	15	11	20
22-Dec	6	9	15	15	13	11	13	19	34	20	17	12	11	23	13	34	18	15	10	14	18	20	16	20	34
23-Dec	16	14	11	13	12	11	13	13	12	11	12	12	13	11	12	10	9	10	8	16	10	12	13	11	16
24-Dec	34	32	15	7	10	12	11	14	12	12	12	17	15	15	16	14	13	14	13	11	7	10	5	34	34
25-Dec	7	11	8	9	7	26	13	12	11	12	13	12	15	12	12	13	25	11	13	18	21	12	10	31	31
26-Dec	11	25	19	12	13	11	12	12	15	18	12	14	15	15	17	16	13	14	16	21	16	26	15	15	26
27-Dec	18	15	14	14	22	14	14	13	15	10	9	12	16	16	15	12	18	14	14	19	21	16	36	14	36
28-Dec	48	15	64	19	15	22	70	30	23	48	42	13	48	12	9	7	7	8	23	11	11	9	8	13	70
29-Dec	20	33	40	26	31	55	15	18	13	9	14	14	15	16	14	6	4	4	59	35	13	4	6	5	59
30-Dec	18	13	14	10	14	11	8	11	12	14	11	11	12	11	12	13	13	13	13	14	15	14	14	15	18
31-Dec	15	13	14	13	12	12	12	12	11	9	12	11	14	18	23	17	13	11	14	13	16	19	18	12	23
81 87 64 40 31 55 70 31 34 48 42 27 48 23 23 34 99 75 67 35 49 52 46 55																								Diurnal Maximum	
M - Maintenance																									



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

AMS507
KIRBY SOUTH
DECEMBER 2023

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

January 31, 2024

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - KIRBY SOUTH (AMS 507)
 DECEMBER 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	692	34	52	97.58	10.5	0	2.2	0
H2S (ppb) Average	707	37	37	100	2.1	0	0.5	0
THC (ppm) Average	709	35	35	100	3.3	-	2.6	-
NO2 (ppb) Average	708	36	36	100	13	0	6.3	-
NO (ppb) Average	708	36	36	100	9.2	-	1.2	-
NOX (ppb) Average	708	36	36	100	19.5	-	7	-
Temperature 2 m (C) Average	744	0	0	100	4.1	-	0.4	-
Relative Humidity (%) Average	744	0	0	100	95.5	-	90.9	-
Wind Speed 10 m (km/h) Average	744	0	0	100	27	-	19	-
Wind Direction 10 m (deg) Average	744	0	0	100	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - KIRBY SOUTH(AMS507)
 DECEMBER 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	692	0.66	1.1	-	0	0	0.1	0.3	0.8	1.6	10.5
H2S (ppb) Average	707	0.18	0.2	-	0	0.1	0.1	0.1	0.2	0.3	2.1
THC (ppm) Average	709	2.42	0.1	-	2	2.2	2.3	2.4	2.5	2.6	3.3
NO2 (ppb) Average	708	2.95	2.2	-	0.1	0.7	1.4	2.6	3.8	5.9	13
NO (ppb) Average	708	0.27	0.8	-	0	0	0	0	0.2	0.7	9.2
NOX (ppb) Average	708	3.22	2.7	-	0.1	0.7	1.4	2.7	4	6.5	19.5
Temperature 2 m (C) Average	744	-4.99	3.9	-	-14.7	-10.5	-7.7	-4.6	-1.8	-0.4	4.1
Relative Humidity (%) Average	744	73.75	12.7	-	36.7	54.9	65.7	75.7	84.3	88.8	95.5
Wind Speed 10 m (km/h) Average	744	13.4	4	-	2	9	11	13	16	19	27
Wind Direction 10 m (deg) Average	744	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - KIRBY SOUTH (AMS507)
DECEMBER 2023

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
SO2	23 Dec 2023 23:00	24 Dec 2023 11:00	13	Unstable Operation - flatline in analyzer output signal
SO2	24 Dec 2023 12:00	24 Dec 2023 16:00	5	Maintenance - analyzer rebooted & linearity check



Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO₂) - ppb

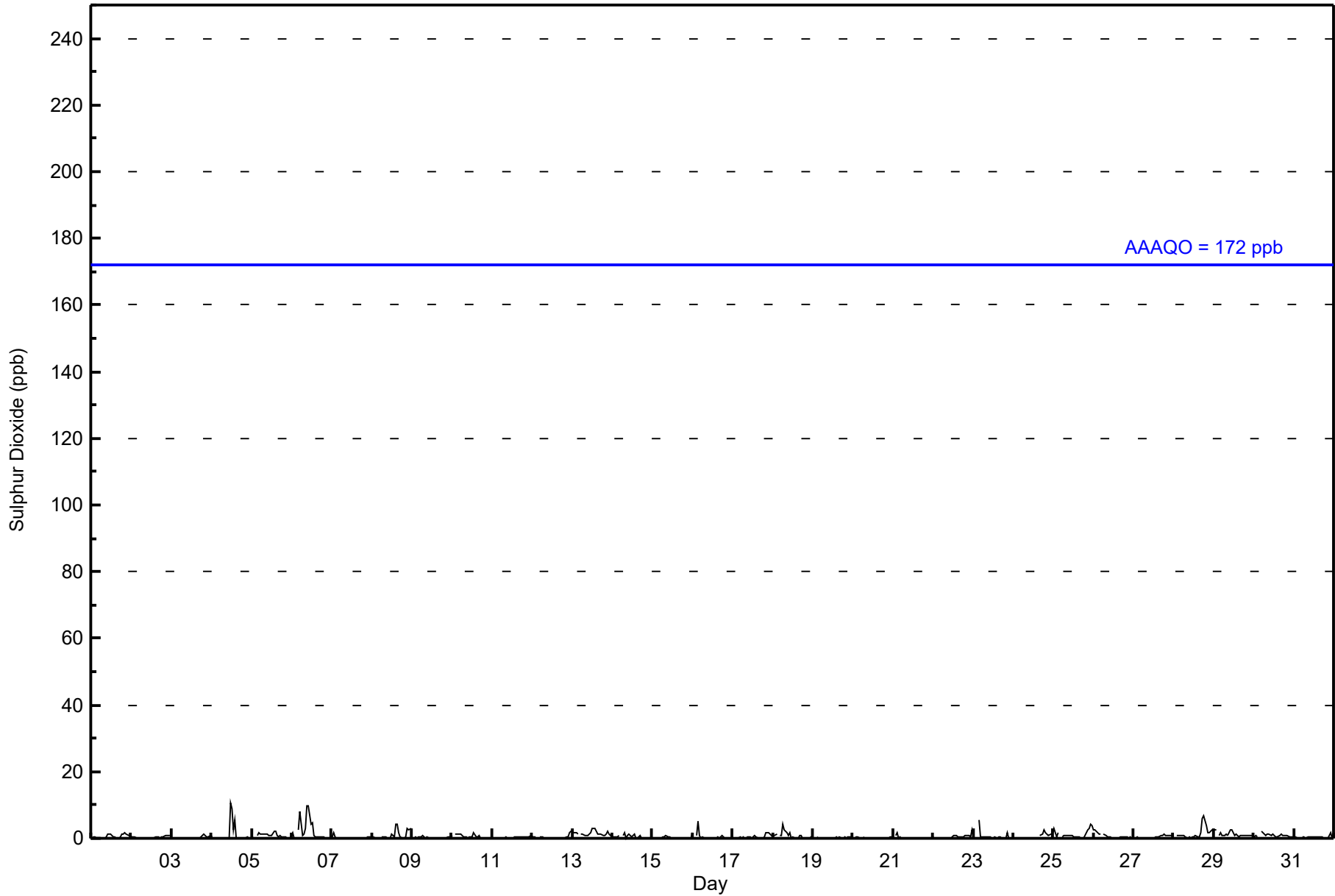
Kirby South - December 2023

Number of Exceedences (AAAQO):		1-hr: 0		24-hr: 0		Hours in Service:		744																																									
Maximum Value: 10.5 ppb on Dec 4 12:00		Maximum Daily Average: 2.2 ppb on Dec 6		Minimum Value: 0.0 ppb on Dec 2 07:00		Minimum Daily Average: 0.1 ppb on Dec 20		Hours of Data: 692																																									
Maximum Diurnal Average: 0.9 ppb at hour 13		Minimum Diurnal Average: 0.4 ppb at hour 16		Hours of Missing Data: 52		Hours of Calibration: 34		Percent Operational Time: 97.6																																									
Monthly Average: 0.66 ppb		Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.1 Median = 0.3 Q ₃ = 0.8 P ₉₀ = 1.6 P ₉₉ = 5.8																																															
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-Dec	0.1	0.3	0.2	0.2	Z	0.1	0.1	0.0	0.1	0.3	1.3	1.4	0.7	0.4	0.3	0.2	0.1	0.3	1.1	1.4	1.5	1.4	1.0	1.0	0.6	1.5																							
2-Dec	0.5	0.4	0.2	0.1	0.1	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.3	0.2	0.3	0.2	0.2	0.4	0.7	0.8	0.9	0.6	0.3	0.9																							
3-Dec	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	0.2	0.7	1.2	0.7	0.5	0.5	0.7	0.2	1.2																							
4-Dec	0.4	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.5	8.7	2.4	5.7	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.0	0.0	0.0	1.2	10.5																							
5-Dec	0.1	0.2	Z	1.0	1.6	1.4	1.3	1.1	1.3	1.2	1.1	0.8	0.8	2.0	1.9	0.9	0.6	0.7	0.6	0.5	0.5	0.2	0.0	0.1	0.9	2.0																							
6-Dec	1.8	0.0	0.0	Z	2.4	7.9	0.8	1.1	3.2	9.6	9.9	4.1	4.8	0.9	0.5	0.5	0.6	0.5	0.6	0.3	0.0	0.0	0.0	0.2	2.2	9.9																							
7-Dec	0.4	1.6	0.3	0.0	Z	0.0	0.0	0.1	0.1	0.0	0.0	0.0	C	C	C	C	0.0	0.0	0.0	0.2	0.4	0.2	0.4	0.2	1.6																								
8-Dec	0.5	0.4	0.2	0.2	0.1	Z	0.3	0.4	0.5	0.0	0.1	0.2	1.3	0.6	4.3	4.2	1.6	0.4	0.0	0.0	0.3	2.8	2.7	3.2	1.0	4.3																							
9-Dec	Z	0.0	0.4	0.1	0.2	0.2	0.7	0.6	0.2	0.3	0.2	0.1	0.1	0.1	0.0	0.0	0.0	0.1	0.1	0.0	0.1	0.4	0.4	0.6	0.2	0.7																							
10-Dec	0.8	Z	1.3	1.1	1.4	1.3	1.0	0.5	0.3	0.2	0.4	0.5	0.4	1.9	0.5	0.4	0.7	0.0	0.0	0.1	0.0	0.1	0.1	0.0	0.6	1.9																							
11-Dec	0.1	0.0	Z	0.0	0.0	0.0	0.0	0.1	0.4	0.0	0.0	0.0	0.1	0.3	0.4	0.3	0.3	0.2	0.3	0.4	0.3	0.4	0.5	0.6	0.2	0.6																							
12-Dec	0.6	0.5	0.5	Z	0.3	0.3	0.4	0.2	0.1	0.0	0.1	0.2	0.1	0.0	0.1	0.1	0.0	0.0	0.0	0.1	0.2	0.6	1.8	2.3	0.4	2.3																							
13-Dec	2.3	1.8	1.6	1.3	Z	1.1	1.1	0.9	0.9	1.0	1.2	1.8	3.0	2.9	2.1	1.2	1.2	1.3	1.0	1.0	1.2	2.0	1.2	0.9	1.5	3.0																							
14-Dec	0.4	0.5	0.6	0.4	0.9	Z	0.9	1.6	0.2	1.0	1.1	0.2	0.9	1.5	0.0	0.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	1.6																							
15-Dec	Z	0.0	0.0	0.0	0.0	0.1	0.3	0.3	0.7	0.5	0.4	0.1	0.1	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.2	0.1	0.7																							
16-Dec	1.5	Z	0.9	5.0	1.0	0.0	0.2	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.4	0.1	0.8	0.4	0.0	0.1	0.0	0.0	0.0	0.5	5.0																							
17-Dec	0.0	0.2	Z	0.1	0.2	0.1	0.3	0.2	0.1	0.4	0.3	0.1	0.4	1.0	0.4	0.2	0.0	0.0	0.0	0.6	1.6	1.8	1.1	0.7	0.4	1.8																							
18-Dec	0.9	0.9	1.1	Z	0.7	0.6	4.1	2.5	1.9	0.8	1.6	0.2	0.4	0.1	0.2	0.1	0.6	0.6	0.1	0.2	0.0	0.0	0.1	0.4	0.8	4.1																							
19-Dec	0.0	0.0	0.0	0.3	Z	0.2	0.0	0.1	0.1	0.0	0.1	0.1	0.2	0.1	0.3	0.2	0.2	0.1	0.2	0.2	0.1	0.2	0.5	0.5	0.2	0.5																							
20-Dec	0.2	0.1	0.2	0.2	0.1	Z	0.2	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	0.1	0.2	0.5	0.1	0.5																							
21-Dec	Z	0.9	1.5	0.2	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	0.2	0.1	0.0	0.1	0.2	1.5																							
22-Dec	0.3	Z	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.5	0.8	0.7	0.6	0.6	0.6	0.6	0.6	0.7	0.8	0.8	0.4	2.6	0.5	2.6																							
23-Dec	0.5	0.2	Z	5.4	0.3	0.4	0.4	0.5	0.5	0.4	0.4	0.1	0.2	0.3	0.0	0.3	0.3	0.1	0.0	0.1	1.6	0.1	UO	UO	0.6	5.4																							
24-Dec	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	UO	M	M	M	M	M	1.0	1.3	2.7	1.6	1.1	0.8	1.2	1.4	--	2.7																							
25-Dec	2.8	1.9	0.6	1.7	Z	0.4	0.7	0.8	0.7	0.7	0.9	0.7	0.5	0.4	0.4	0.3	0.2	0.2	0.2	0.9	2.4	2.9	4.2	3.7	1.2	4.2																							
26-Dec	2.7	2.7	1.7	1.3	1.1	Z	1.2	0.7	0.4	0.2	0.2	0.2	0.1	0.1	0.0	0.2	0.4	0.4	0.4	0.4	0.2	0.2	0.4	0.1	0.7	2.7																							
27-Dec	Z	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.3	0.4	0.7	0.9	1.3	1.1	0.8	0.8	0.8	0.8	0.8	0.4	1.3																							
28-Dec	0.9	Z	0.9	1.1	0.9	0.7	0.7	0.5	0.2	0.5	0.2	0.3	0.4	0.6	0.2	0.3	1.6	6.1	6.9	3.6	1.7	1.8	2.2	2.5	1.5	6.9																							
29-Dec	2.5	2.4	Z	0.8	1.5	0.8	0.7	1.3	1.0	1.6	2.5	2.4	1.0	1.1	0.7	0.5	0.7	0.9	1.0	1.0	0.8	0.8	0.7	0.7	1.2	2.5																							
30-Dec	0.6	0.7	0.6	Z	2.1	1.6	1.3	0.9	1.1	1.1	1.0	1.1	0.7	0.6	0.6	0.7	1.1	1.0	0.8	1.0	0.8	0.5	0.5	0.5	0.9	2.1																							
31-Dec	0.4	0.5	0.2	0.2	Z	0.4	0.3	0.2	0.4	0.3	0.4	0.6	0.5	0.6	0.4	0.3	0.3	0.3	0.2	0.1	0.1	0.8	1.8	0.1	0.4	1.8																							
																								0.9	0.7	0.5	0.8	0.6	0.7	0.6	0.5	0.5	0.7	0.8	0.9	0.9	0.7	0.7	0.4	0.5	0.6	0.6	0.5	0.6	0.7	0.8	0.8	Diurnal Average	
																								2.8	2.7	1.7	5.4	2.4	7.9	4.1	2.5	3.2	9.6	9.9	10.5	8.7	2.9	5.7	4.2	1.6	6.1	6.9	3.6	2.4	2.9	4.2	3.7	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 (SO₂) - ppb
Kirby South - December 2023





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Kirby South - December 2023

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	691	99.86	99.86
11 - 20	1	0.14	100.00
21 - 60	0	0.00	100.00
61 - 110	0	0.00	100.00
111 - 172	0	0.00	100.00
> 172	0	0.00	100.00

Total Number of Valid Hours: 692

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Kirby South - December 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	2	1	2	6	4	4	4	20	114	186	152	77	75	32	9	691
11 - 20	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	3	2	1	2	6	4	4	4	20	114	186	152	78	75	32	9	692

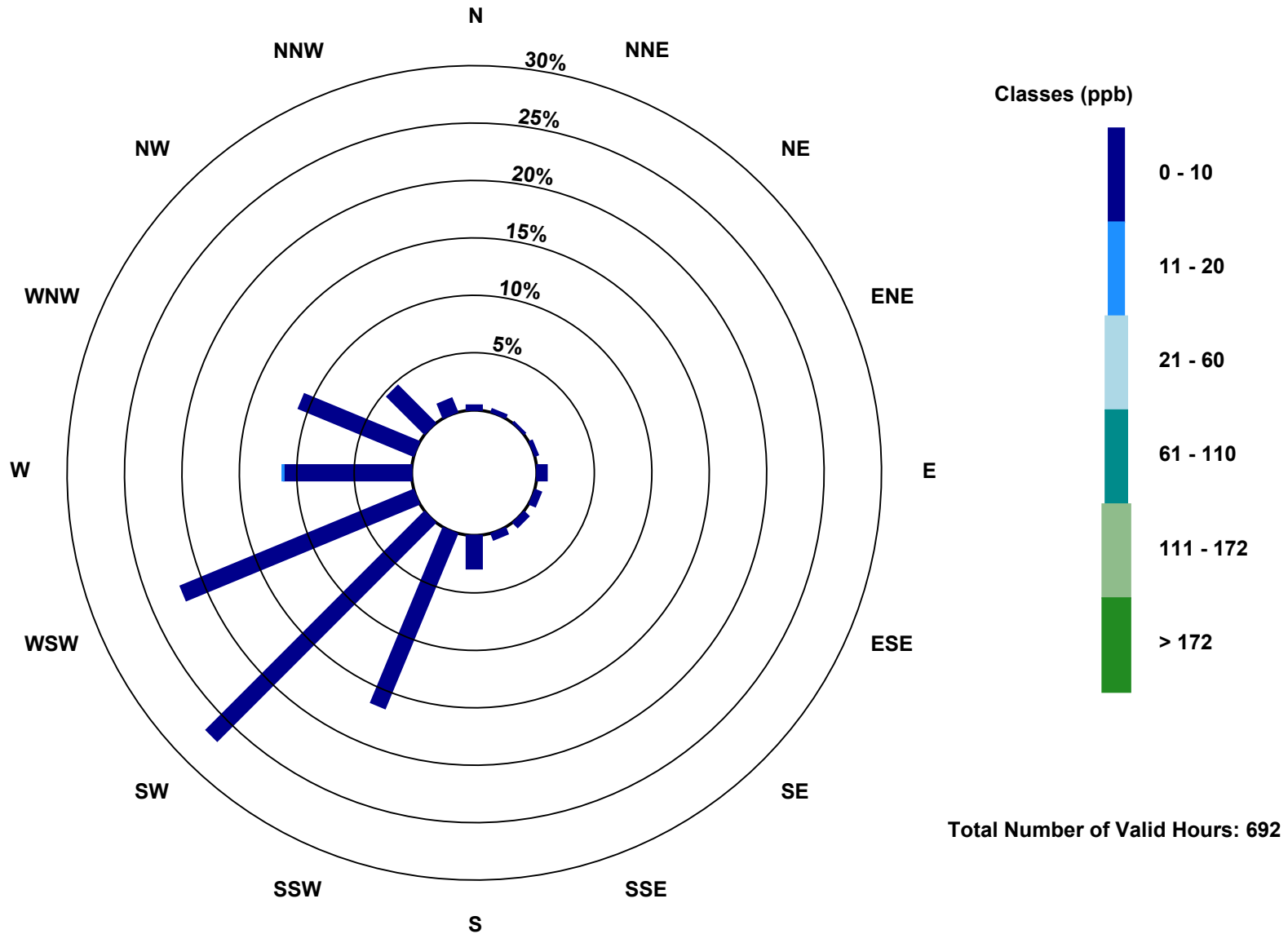
Total Number of Valid Hours: 692

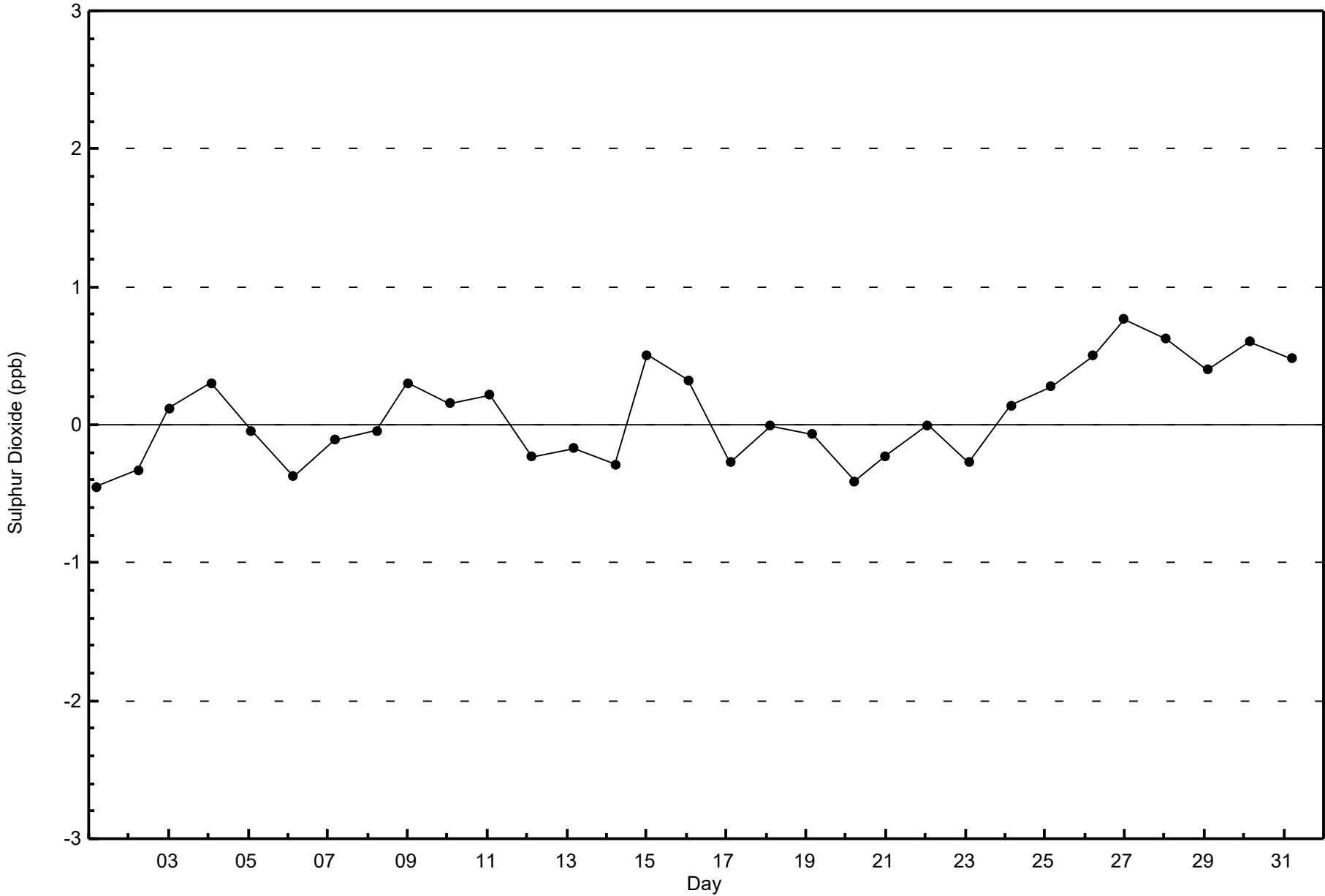
Total Number of Hours: 744

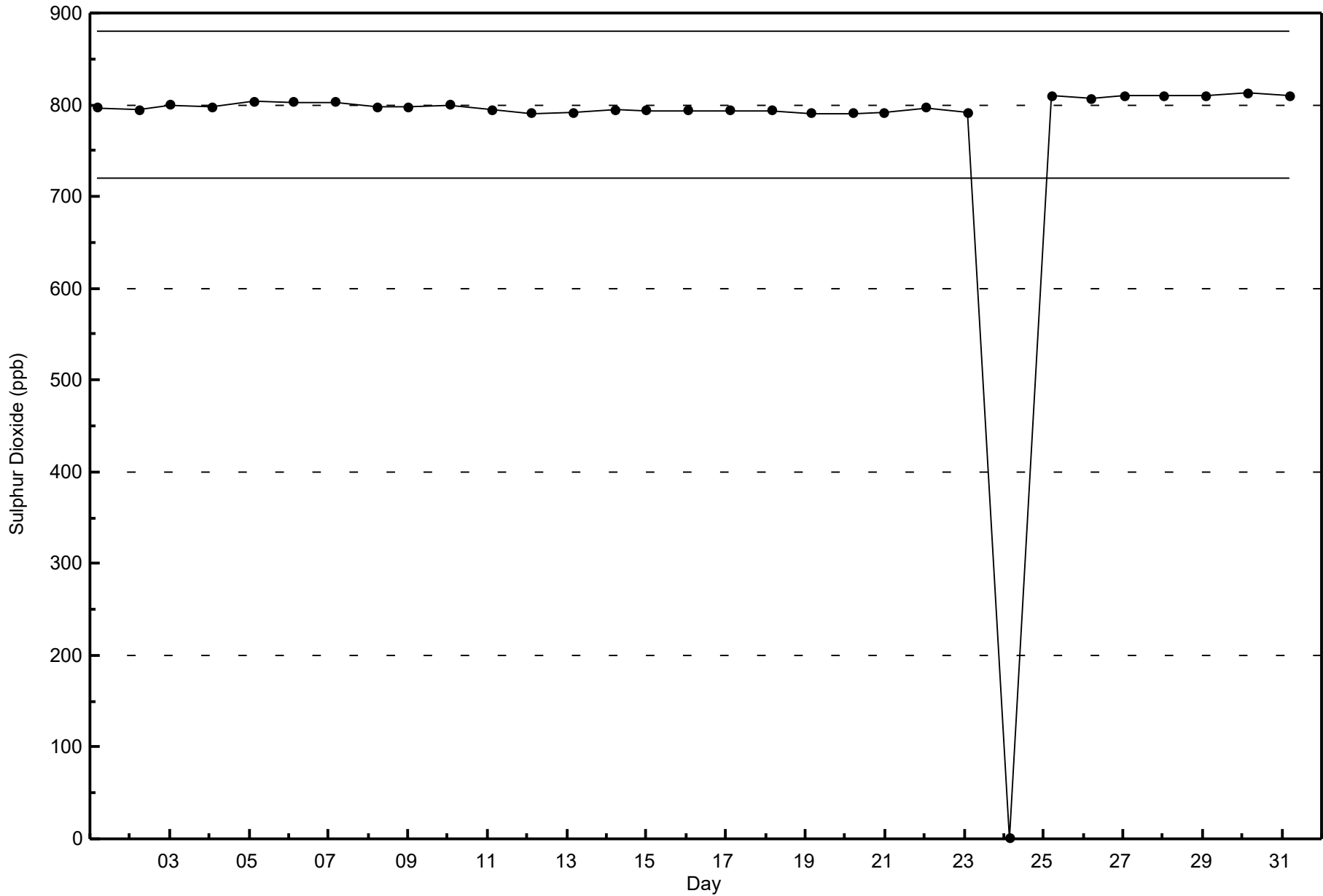


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Sulphur Dioxide (SO₂) - ppb
Kirby South



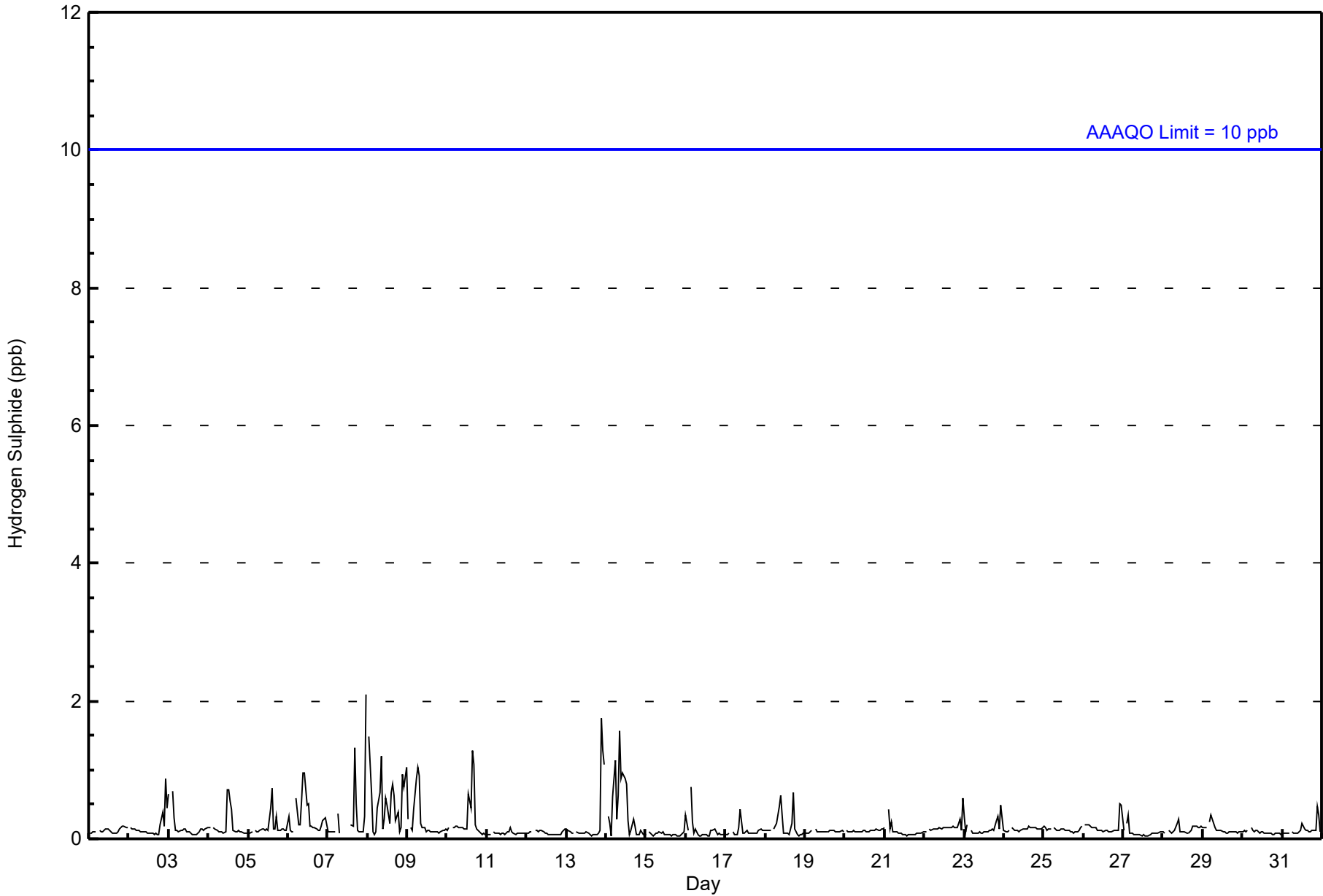






Number of Exceedences (AAAQO):		1-hr: 0		24-hr: 0		Hours in Service: 744																Daily Average		Daily Maximum			
Maximum Value: 2.1 ppb on Dec 8 00:00		Maximum Daily Average: 0.5 ppb on Dec 8		Hours of Data: 707																Hours of Missing Data: 37		Hours of Calibration: 37					
Minimum Value: 0.0 ppb on Dec 16 10:00		Minimum Daily Average: 0.1 ppb on Dec 15		Hours of Missing Data: 37																Hours of Calibration: 37		Percent Operational Time: 100.0					
Maximum Diurnal Average: 0.3 ppb at hour 24		Minimum Diurnal Average: 0.1 ppb at hour 20		Percentiles: P ₁ = 0.0 P ₁₀ = 0.1 Q ₁ = 0.1 Median = 0.1 Q ₃ = 0.2 P ₉₀ = 0.3 P ₉₉ = 1.2																							
Monthly Average: 0.18 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-Dec	0.1	0.1	0.1	0.1	0.1	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.1	0.2	
2-Dec	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	0.2	0.4	0.2	0.9	0.4	0.2	0.9	
3-Dec	0.7	Z	0.7	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	0.1	0.2	0.2	0.7	
4-Dec	0.2	0.2	Z	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.7	0.7	0.6	0.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.7	
5-Dec	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	0.5	0.7	0.2	0.1	0.3	0.1	0.1	0.2	0.1	0.1	0.1	0.2	0.7	
6-Dec	0.3	0.1	0.1	0.1	Z	0.6	0.2	0.2	0.6	1.0	1.0	0.5	0.5	0.2	0.2	0.2	0.1	0.1	0.1	0.2	0.3	0.3	0.2	0.3	1.0	1.0	
7-Dec	0.1	0.1	0.1	0.1	0.1	Z	0.4	0.1	C	C	C	C	C	C	0.2	0.2	1.3	0.5	0.1	0.1	0.1	0.1	0.3	2.1	2.1		
8-Dec	Z	1.5	0.6	0.1	0.1	0.1	0.5	0.7	1.2	0.1	0.3	0.6	0.5	0.2	0.7	0.8	0.6	0.3	0.4	0.1	0.2	0.9	0.7	1.0	1.5		
9-Dec	0.3	Z	0.2	0.1	0.4	0.9	1.0	0.9	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	1.0	1.0	
10-Dec	0.1	0.2	Z	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.6	0.5	1.3	1.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	1.3	1.3	
11-Dec	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	0.1	0.1	0.1	0.1	0.1	0.2	0.2	
12-Dec	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	
13-Dec	0.1	0.1	0.1	0.1	0.1	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.1	0.1	0.1	0.1	1.7	1.3	1.1	1.7	1.7	
14-Dec	Z	0.3	0.2	0.0	0.6	1.1	0.3	0.6	1.6	0.9	1.0	0.9	0.8	0.3	0.1	0.1	0.3	0.2	0.1	0.1	0.1	0.1	0.1	0.1	1.6	1.6	
15-Dec	0.1	Z	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	0.0	0.0	0.1	0.1	0.1	0.1	0.1	
16-Dec	0.3	0.1	Z	0.7	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	0.1	0.1	0.1	0.1	0.1	0.7	0.7	
17-Dec	0.1	0.1	0.1	Z	0.1	0.1	0.1	0.1	0.2	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	0.4	0.4	
18-Dec	0.1	0.1	0.1	0.1	Z	0.1	0.2	0.2	0.5	0.6	0.4	0.1	0.1	0.1	0.1	0.1	0.2	0.7	0.1	0.1	0.1	0.1	0.1	0.1	0.7	0.7	
19-Dec	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	
20-Dec	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	0.2	0.2	0.2	
21-Dec	0.2	Z	0.4	0.1	0.3	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	0.4	0.4	
22-Dec	0.1	0.1	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.1	0.6	0.6	0.6	
23-Dec	0.3	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	0.3	0.3	0.1	0.5	0.3	0.5	0.5	
24-Dec	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	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.2	0.2	0.2	
25-Dec	0.2	0.2	0.1	0.1	0.1	Z	0.2	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	0.2	0.2	0.2	
26-Dec	Z	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	0.5	0.5	0.5	0.5	
27-Dec	0.1	Z	0.2	0.3	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	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.3	0.3	
28-Dec	0.1	0.1	Z	0.1	0.1	0.1	0.1	0.1	0.2	0.3	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	
29-Dec	0.2	0.2	0.2	Z	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	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.3	0.3	
30-Dec	0.1	0.1	0.1	0.1	Z	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	
31-Dec	0.1	0.1	0.1	0.1	0.1	Z	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	0.5	0.4	0.1	0.5	0.5	
																								Diurnal Average		Diurnal Maximum	
																								0.2		0.7	
																								0.2		1.5	
																								0.2		0.7	
																								0.2		0.7	
																								0.2		0.6	
																								0.2		1.1	
																								0.2		1.0	
																								0.2		0.9	
																								0.2		1.6	
																								0.2		1.0	
																								0.2		1.0	
																								0.2		0.9	
																								0.2		0.8	
																								0.2		0.6	
																								0.2		0.7	
																								0.2		1.3	
																								0.2		1.3	
																								0.2		0.7	
																								0.2		0.4	
																								0.1		0.3	
																								0.1		0.4	
																								0.1		1.7	
																								0.2		1.3	
																								0.2		2.1	

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 (H₂S) - ppb
Kirby South - December 2023

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

Total Number of Valid Hours: 707

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Hydrogen Sulphide (H₂S) - ppb
Kirby South - December 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	2	1	2	6	4	4	3	22	113	193	160	80	74	31	9	707
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	3	2	1	2	6	4	4	3	22	113	193	160	80	74	31	9	707

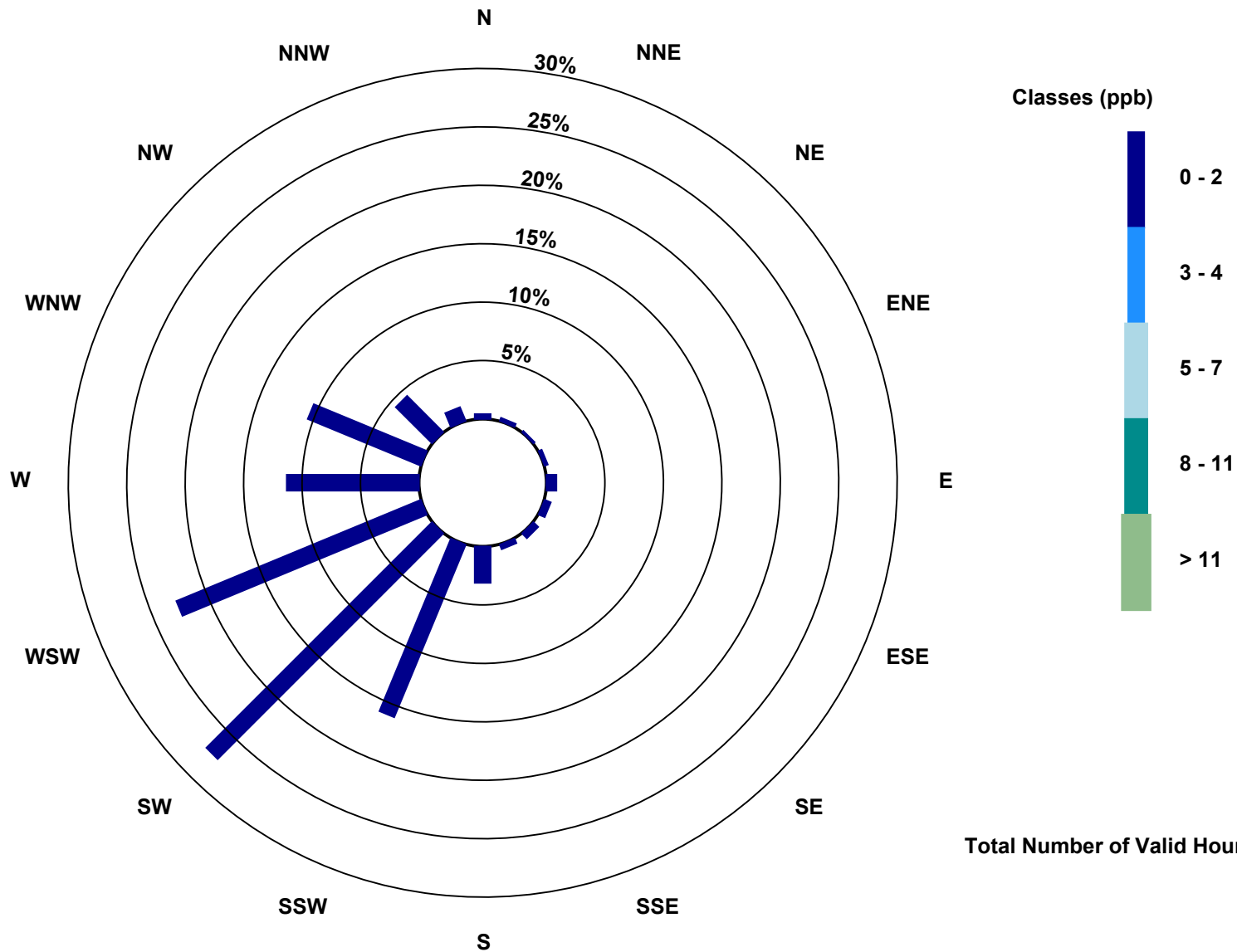
Total Number of Valid Hours: 707

Total Number of Hours: 744

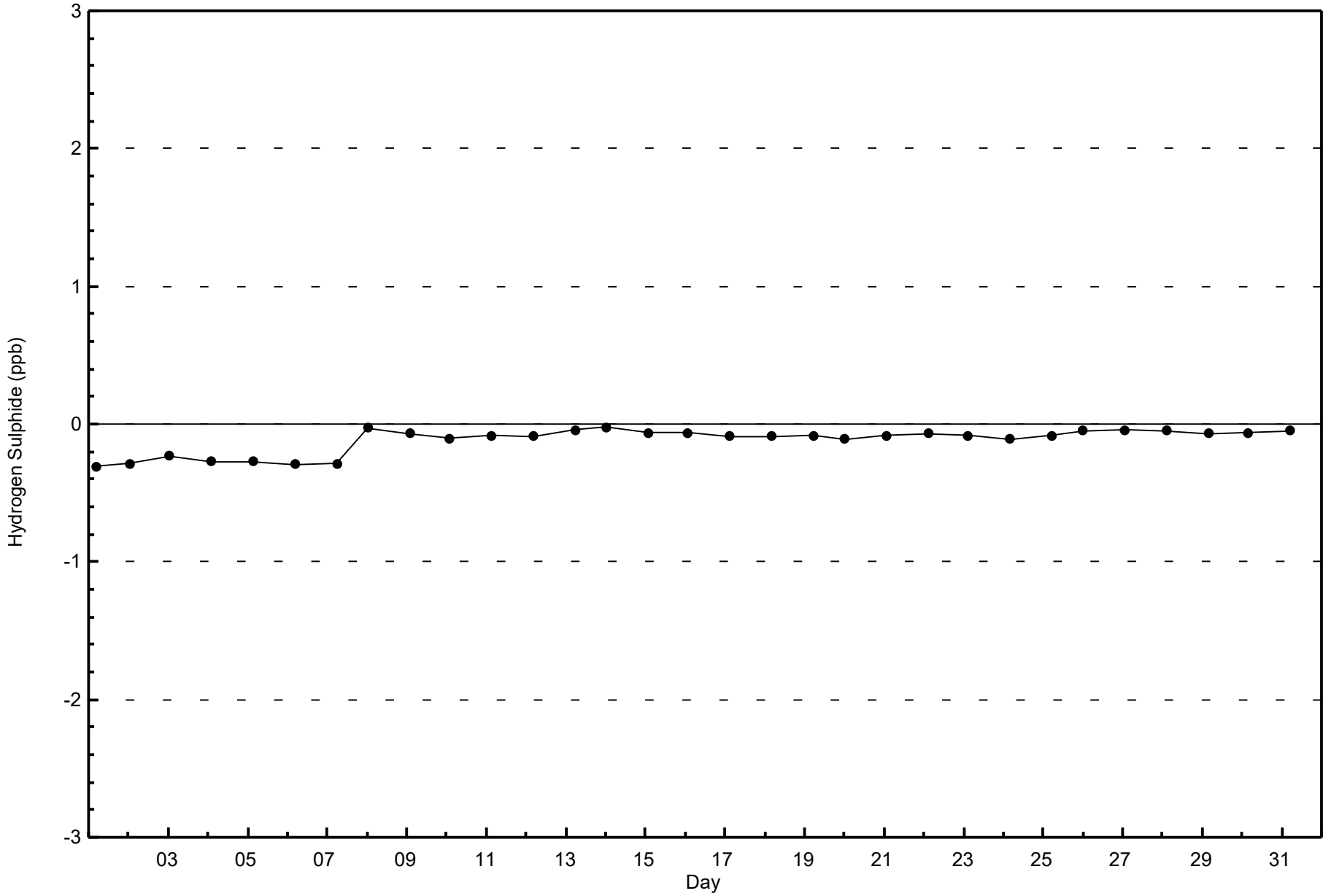


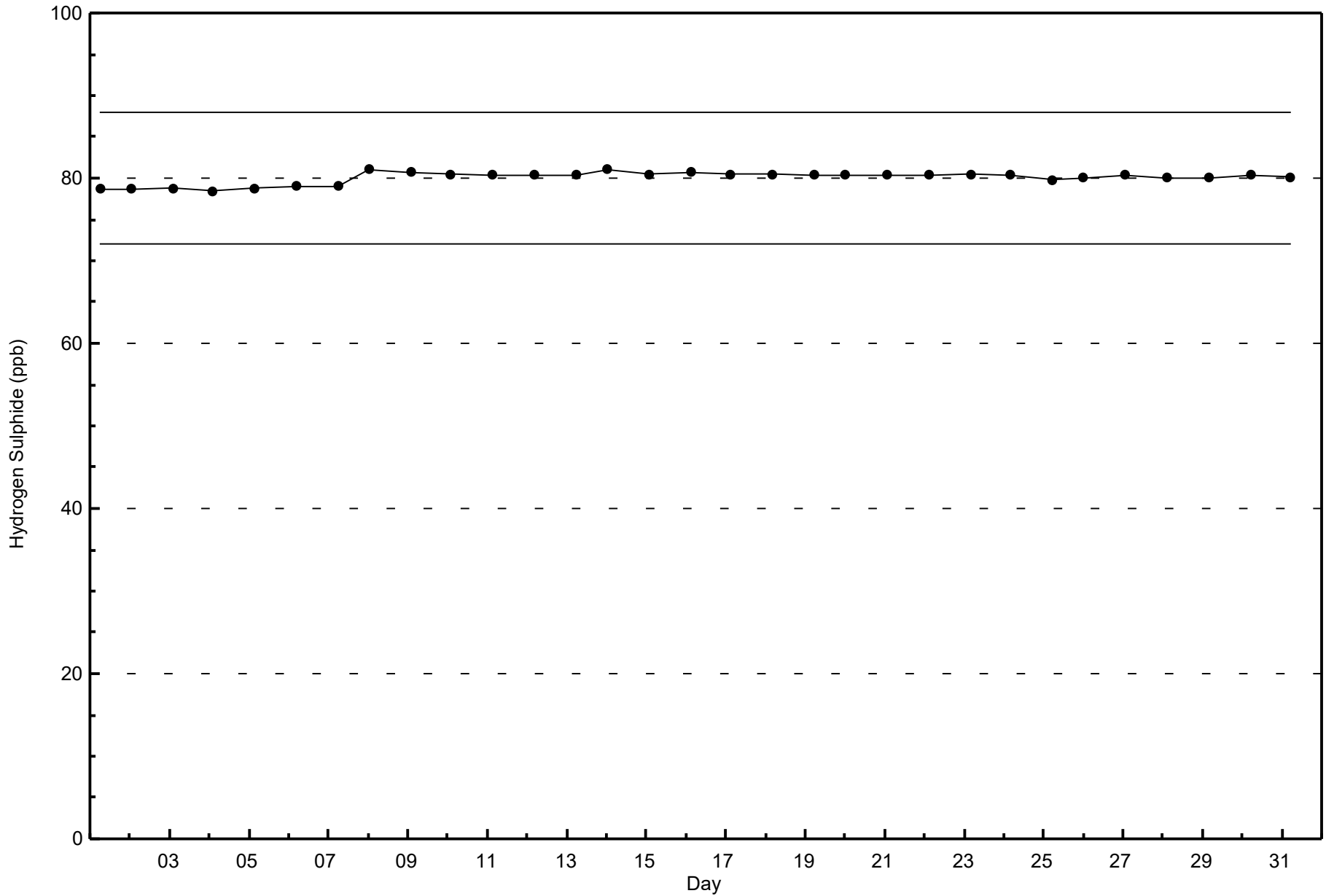
Wood Buffalo Environmental Association
Wind Rose Dec 2023

Hydrogen Sulphide (H₂S) - ppb
Kirby South



Total Number of Valid Hours: 707







Wood Buffalo Environmental Association

Summary of Hour Averages

Total Hydrocarbons (THC) - ppm

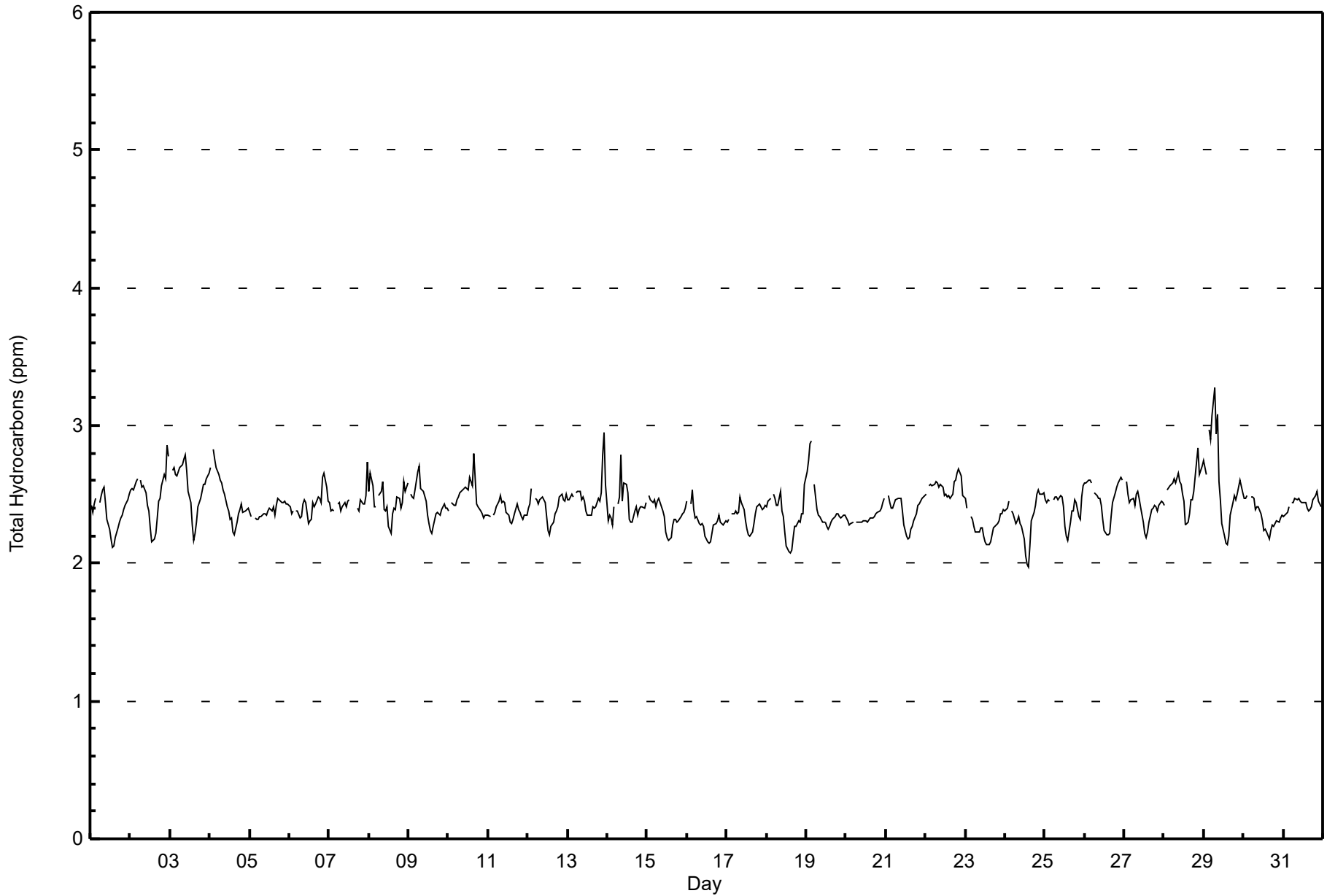
Kirby South - December 2023

Maximum Value: 3.3 ppm on Dec 29 07:00																				Maximum Daily Average: 2.6 ppm on Dec 29					Hours in Service: 744	
Minimum Value: 2.0 ppm on Dec 24 15:00																				Minimum Daily Average: 2.3 ppm on Dec 23					Hours of Data: 709	
Maximum Diurnal Average: 2.5 ppm at hour 3																				Minimum Diurnal Average: 2.2 ppm at hour 14					Hours of Missing Data: 35	
Monthly Average: 2.42 ppm																				Percentiles: P ₁ = 2.1 P ₁₀ = 2.2 Q ₁ = 2.3 Median = 2.4 Q ₃ = 2.5 P ₉₀ = 2.6 P ₉₉ = 2.9					Hours of Calibration: 35	
																									Percent Operational Time: 100.0	
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Dec	2.4	2.4	2.4	2.5	Z	2.4	2.5	2.5	2.5	2.4	2.3	2.2	2.2	2.1	2.1	2.2	2.3	2.3	2.3	2.4	2.4	2.4	2.5	2.5	2.4	2.5
2-Dec	2.5	2.5	2.5	2.6	2.6	Z	2.6	2.6	2.6	2.5	2.4	2.4	2.3	2.2	2.2	2.2	2.3	2.5	2.5	2.6	2.6	2.6	2.9	2.8	2.5	2.9
3-Dec	Z	2.7	2.7	2.6	2.6	2.7	2.7	2.7	2.8	2.8	2.7	2.5	2.4	2.3	2.2	2.2	2.3	2.4	2.5	2.5	2.6	2.6	2.6	2.7	2.6	2.8
4-Dec	2.7	Z	2.8	2.8	2.7	2.6	2.6	2.6	2.5	2.5	2.4	2.4	2.3	2.3	2.2	2.2	2.3	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.5	2.8
5-Dec	2.4	2.3	Z	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	2.5	2.5	2.4	2.4	2.4	2.4	2.4	2.4	2.5
6-Dec	2.4	2.4	2.4	Z	2.4	2.4	2.3	2.3	2.4	2.5	2.4	2.3	2.3	2.3	2.4	2.4	2.4	2.5	2.5	2.4	2.6	2.7	2.6	2.5	2.4	2.7
7-Dec	2.4	2.4	2.4	2.4	Z	2.4	2.4	2.4	2.4	2.4	2.4	2.5	2.5	C	C	C	C	2.4	2.4	2.5	2.4	2.4	2.5	2.7	2.4	2.7
8-Dec	2.5	2.7	2.6	2.4	2.4	Z	2.5	2.5	2.6	2.4	2.4	2.4	2.3	2.2	2.4	2.4	2.4	2.5	2.5	2.4	2.4	2.6	2.5	2.6	2.5	2.7
9-Dec	Z	2.5	2.5	2.5	2.5	2.7	2.7	2.5	2.5	2.5	2.4	2.3	2.3	2.2	2.2	2.3	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.7
10-Dec	2.4	Z	2.4	2.4	2.4	2.5	2.5	2.5	2.5	2.5	2.6	2.5	2.5	2.6	2.6	2.8	2.6	2.4	2.4	2.4	2.4	2.3	2.3	2.4	2.5	2.8
11-Dec	2.4	2.3	Z	2.4	2.4	2.4	2.5	2.5	2.4	2.4	2.4	2.4	2.4	2.3	2.3	2.3	2.4	2.4	2.4	2.4	2.3	2.3	2.3	2.4	2.4	2.5
12-Dec	2.4	2.4	2.5	Z	2.5	2.5	2.4	2.5	2.5	2.5	2.4	2.3	2.2	2.2	2.3	2.3	2.4	2.4	2.4	2.5	2.5	2.5	2.5	2.5	2.4	2.5
13-Dec	2.5	2.5	2.5	2.5	Z	2.5	2.5	2.5	2.5	2.5	2.4	2.4	2.3	2.3	2.3	2.4	2.4	2.4	2.5	2.4	2.5	2.8	2.9	2.6	2.5	2.9
14-Dec	2.3	2.4	2.3	2.3	2.4	Z	2.4	2.5	2.8	2.4	2.6	2.6	2.5	2.3	2.3	2.3	2.4	2.4	2.3	2.4	2.4	2.4	2.4	2.4	2.4	2.8
15-Dec	Z	2.5	2.5	2.4	2.5	2.4	2.5	2.5	2.4	2.4	2.3	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.4	2.4	2.4	2.4	2.5
16-Dec	2.4	Z	2.4	2.5	2.4	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.1	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.5
17-Dec	2.3	2.3	Z	2.4	2.4	2.4	2.4	2.4	2.5	2.4	2.4	2.3	2.2	2.2	2.2	2.2	2.3	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.5
18-Dec	2.4	2.4	2.5	Z	2.5	2.5	2.4	2.4	2.5	2.4	2.3	2.2	2.1	2.1	2.1	2.1	2.2	2.3	2.3	2.3	2.3	2.4	2.4	2.6	2.3	2.6
19-Dec	2.7	2.7	2.9	2.9	Z	2.6	2.4	2.3	2.3	2.3	2.3	2.3	2.3	2.2	2.3	2.3	2.3	2.3	2.4	2.4	2.3	2.3	2.3	2.3	2.4	2.9
20-Dec	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	2.4	2.4	2.4	2.4	2.4	2.5	2.3	2.5
21-Dec	Z	2.5	2.4	2.4	2.4	2.4	2.5	2.5	2.5	2.5	2.4	2.3	2.2	2.2	2.2	2.2	2.3	2.3	2.4	2.4	2.4	2.5	2.5	2.5	2.4	2.5
22-Dec	2.5	Z	2.6	2.6	2.6	2.6	2.6	2.6	2.5	2.6	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.6	2.6	2.7	2.7	2.6	2.5	2.5	2.6	2.7
23-Dec	2.5	2.4	Z	2.3	2.3	2.3	2.2	2.2	2.2	2.3	2.3	2.2	2.2	2.1	2.1	2.2	2.2	2.3	2.3	2.3	2.3	2.4	2.4	2.4	2.3	2.5
24-Dec	2.4	2.4	2.5	Z	2.4	2.4	2.3	2.3	2.3	2.3	2.3	2.2	2.1	2.0	2.0	2.1	2.3	2.4	2.4	2.5	2.5	2.5	2.5	2.5	2.3	2.5
25-Dec	2.5	2.4	2.5	2.5	Z	2.5	2.5	2.5	2.5	2.5	2.4	2.3	2.2	2.2	2.2	2.3	2.4	2.4	2.5	2.4	2.3	2.3	2.5	2.6	2.4	2.6
26-Dec	2.6	2.6	2.6	2.6	2.6	Z	2.5	2.5	2.5	2.5	2.4	2.3	2.2	2.2	2.2	2.2	2.3	2.4	2.5	2.5	2.6	2.6	2.6	2.6	2.5	2.6
27-Dec	Z	2.6	2.5	2.4	2.5	2.5	2.4	2.5	2.5	2.5	2.4	2.3	2.2	2.2	2.2	2.3	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.6
28-Dec	2.4	Z	2.5	2.6	2.6	2.6	2.6	2.6	2.7	2.6	2.6	2.5	2.5	2.3	2.3	2.4	2.5	2.5	2.5	2.7	2.8	2.6	2.7	2.7	2.5	2.8
29-Dec	2.7	2.6	Z	3.0	2.9	3.1	3.3	2.9	3.1	2.6	2.5	2.3	2.2	2.1	2.1	2.2	2.3	2.4	2.5	2.5	2.5	2.5	2.6	2.5	2.6	3.3
30-Dec	2.5	2.5	2.5	Z	2.5	2.5	2.5	2.4	2.4	2.4	2.4	2.4	2.3	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.5
31-Dec	2.3	2.3	2.4	2.4	Z	2.4	2.4	2.5	2.5	2.5	2.5	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.5	2.5	2.5	2.5	2.4	2.4	2.4	2.5
2.5																								Diurnal Average		
2.7																								Diurnal Maximum		
Z - zerospan C - Calibration																										



Wood Buffalo Environmental Association
Hourly Averages

Total Hydrocarbons (THC) - ppm
Kirby South - December 2023





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Total Hydrocarbons (THC) - ppm
Kirby South - December 2023**

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	2	0.28	0.28
2.1 - 3.0	704	99.29	99.58
3.1 - 10.0	3	0.42	100.00
> 10.0	0	0.00	100.00

Total Number of Valid Hours: 709

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Total Hydrocarbons (THC) - ppm
Kirby South - December 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	2	0	0	0	0	2
2.1 - 3.0	3	2	1	2	6	4	4	4	20	114	191	158	79	75	32	9	704
3.1 - 10.0	0	0	0	0	0	0	0	0	0	0	1	2	0	0	0	0	3
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	3	2	1	2	6	4	4	4	20	114	192	162	79	75	32	9	709

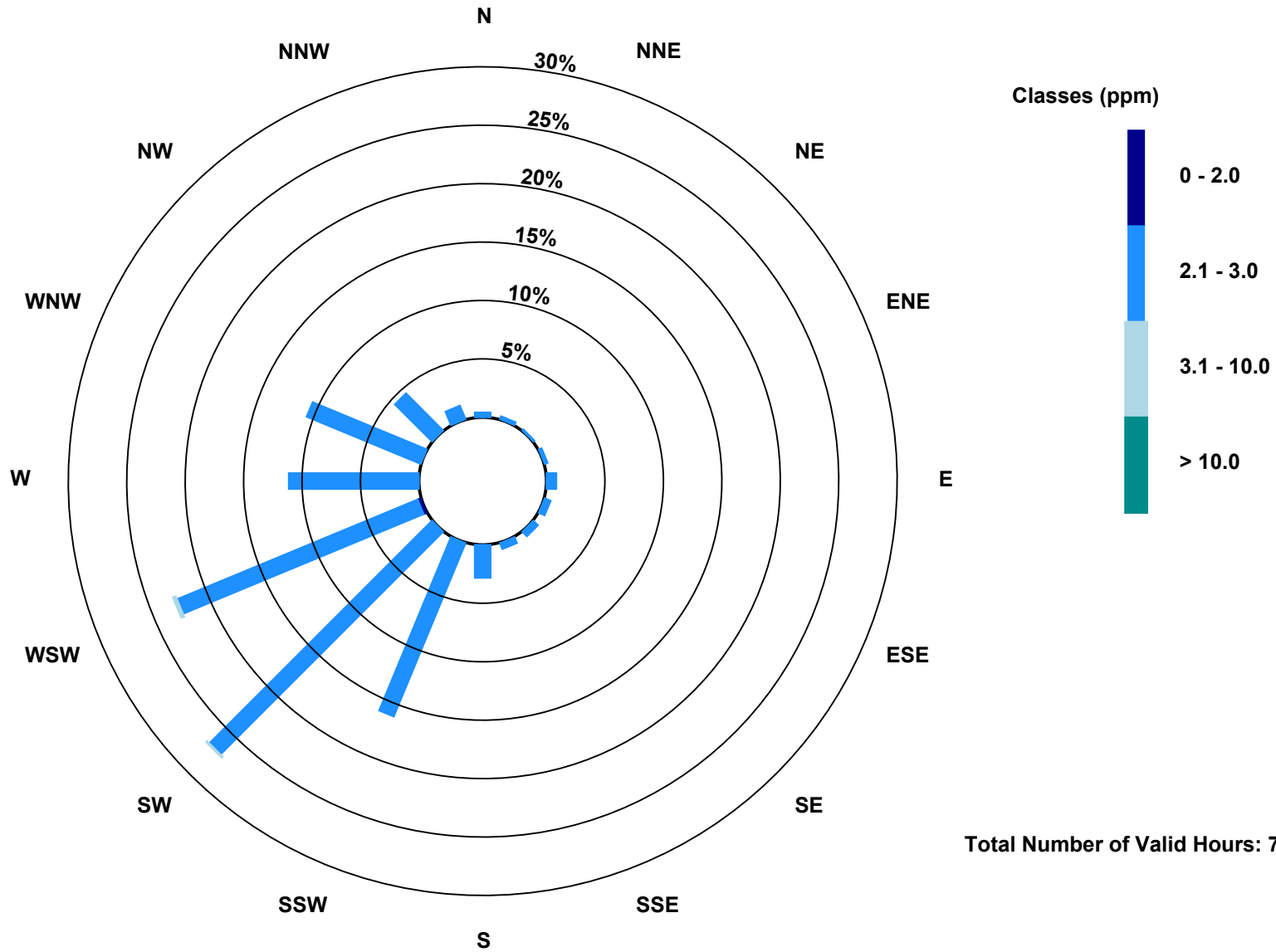
Total Number of Valid Hours: 709

Total Number of Hours: 744

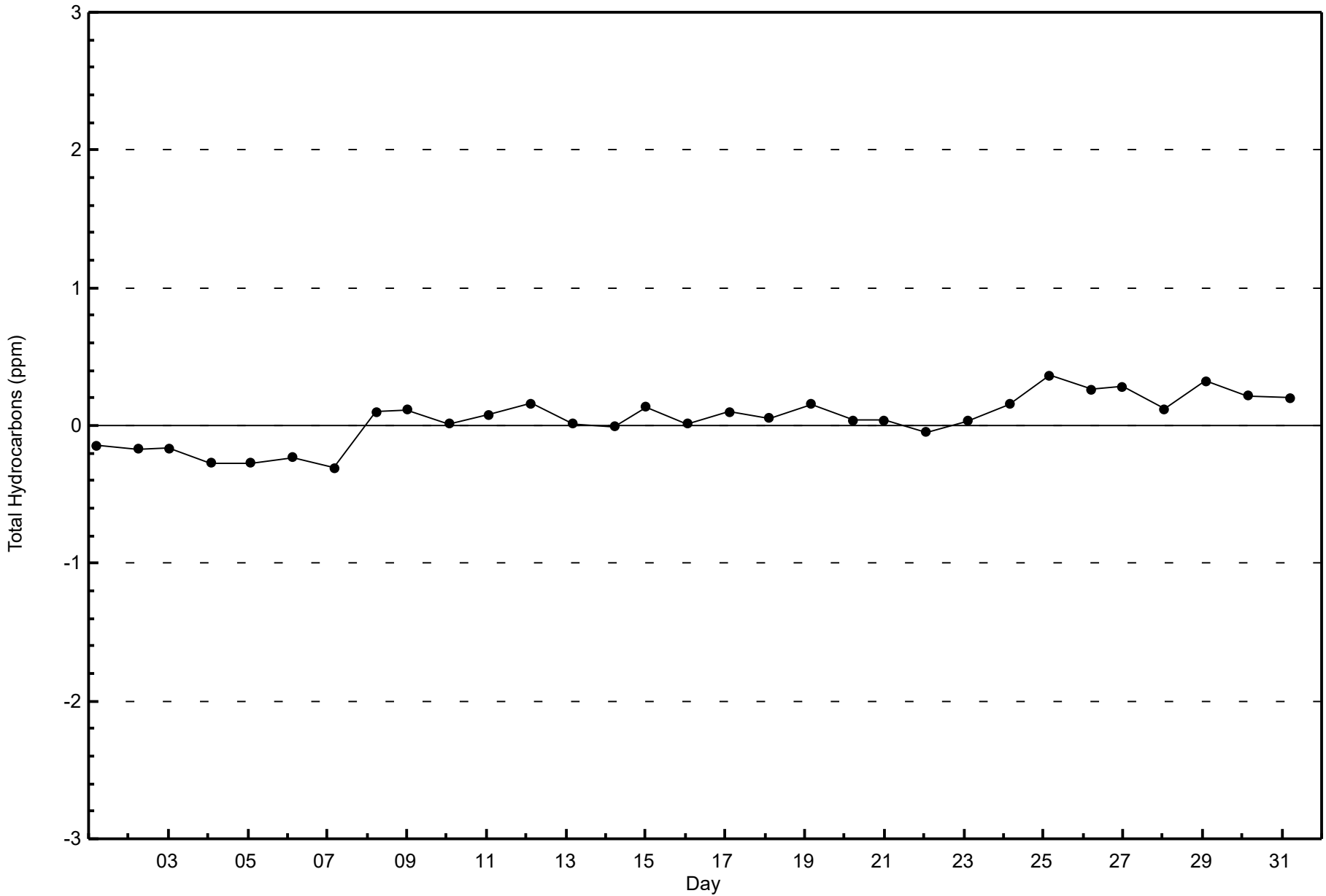


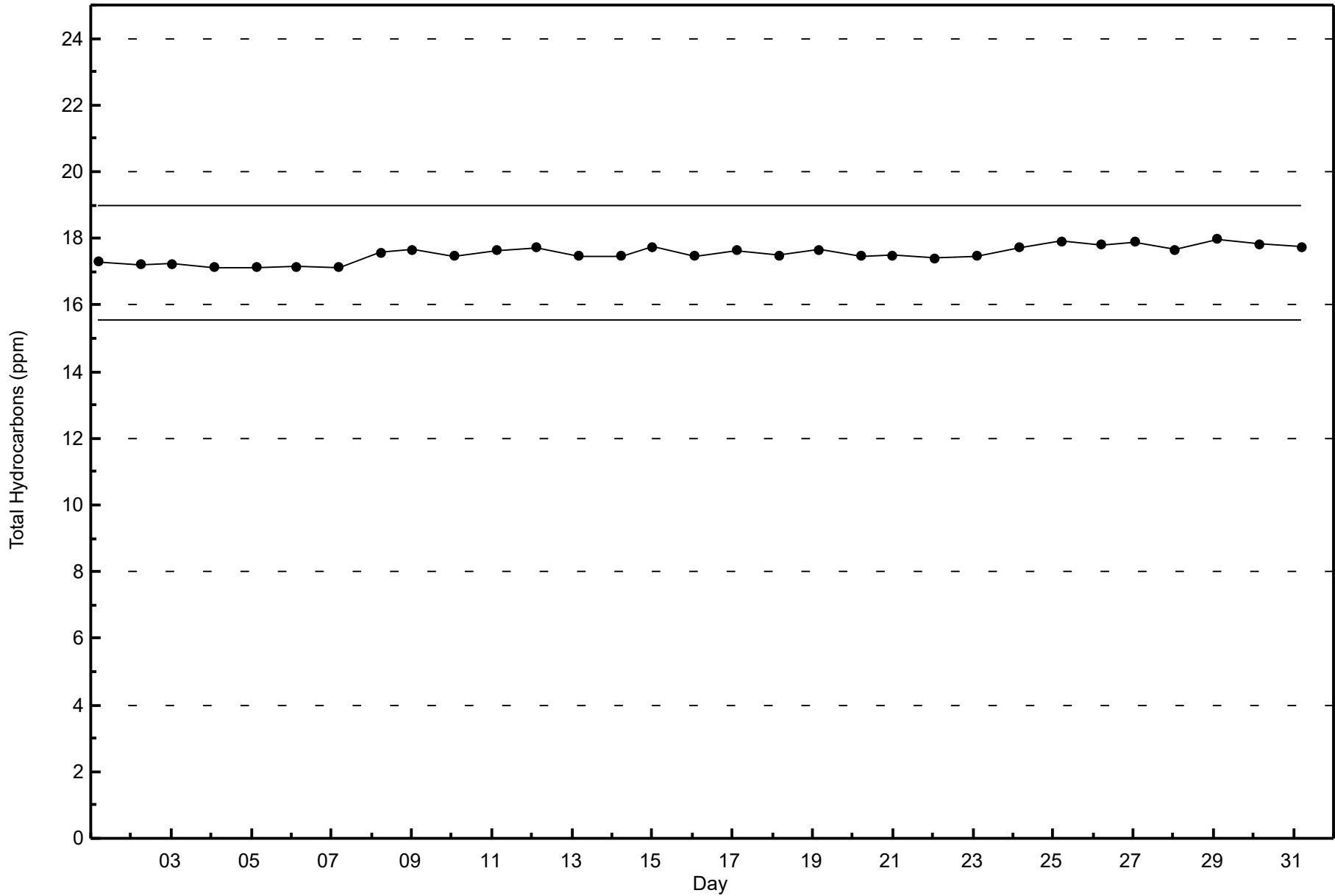
Wood Buffalo Environmental Association
Wind Rose Dec 2023

Total Hydrocarbons (THC) - ppm
Kirby South



Total Number of Valid Hours: 709





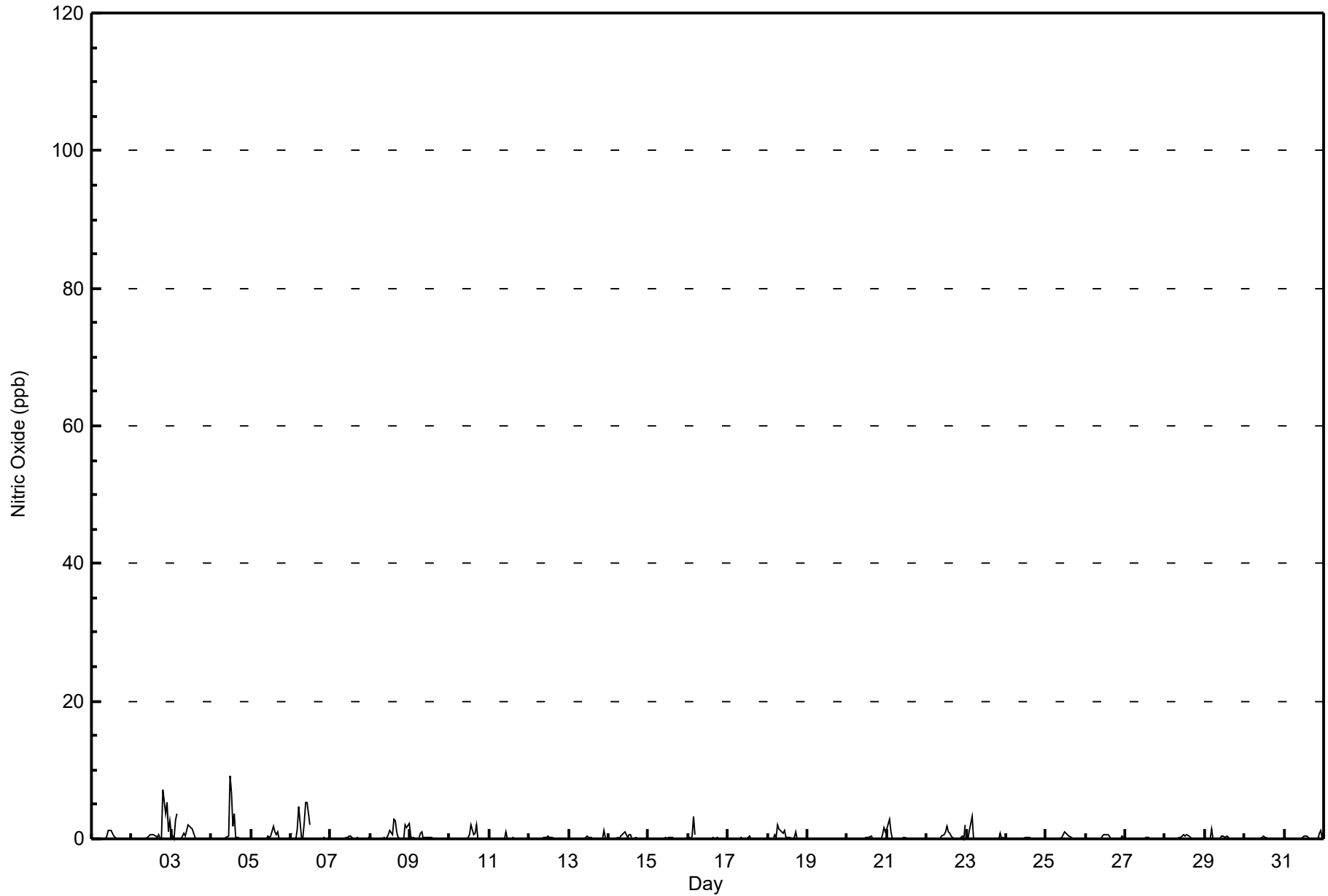


Maximum Value: 9.2 ppb on Dec 4 12:00																				Maximum Daily Average: 1.2 ppb on Dec 6					Hours in Service: 744								
Minimum Value: 0.0 ppb on Dec 1 01:00																				Minimum Daily Average: 0.0 ppb on Dec 19					Hours of Data: 708								
Maximum Diurnal Average: 0.7 ppb at hour 12																				Minimum Diurnal Average: 0.0 ppb at hour 19					Hours of Missing Data: 36								
Monthly Average: 0.27 ppb																				Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.0 Median = 0.0 Q ₃ = 0.2 P ₉₀ = 0.7 P ₉₉ = 3.7					Hours of Calibration: 36								
																				Percent Operational Time: 100.0													
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24									
1-Dec	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.3	1.2	1.2	0.7	0.5	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	1.2							
2-Dec	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.3	0.4	0.6	0.7	0.6	0.5	0.2	0.6	0.1	0.2	7.1	3.6	5.4	1.1	2.6	1.0	7.1							
3-Dec	0.8	0.0	2.5	3.7	Z	0.0	0.0	0.7	0.5	1.2	2.1	1.8	1.5	0.7	0.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	3.7							
4-Dec	0.0	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.1	0.3	9.2	6.7	1.9	3.7	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	9.2							
5-Dec	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.3	0.2	0.4	1.8	1.1	0.6	0.9	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.2	1.8							
6-Dec	0.8	Z	0.0	0.0	1.4	4.6	0.1	0.2	2.4	5.3	5.3	2.0	C	C	C	C	C	0.0	0.0	0.0	0.1	0.0	0.0	0.0	1.2	5.3							
7-Dec	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.3	0.4	0.3	0.1	0.1	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.4							
8-Dec	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.1	0.0	0.3	0.6	1.2	0.5	2.8	2.7	1.1	0.1	0.0	0.0	0.1	2.0	1.7	2.2	0.7	2.8							
9-Dec	0.4	0.0	0.1	0.0	Z	0.3	0.8	1.1	0.1	0.2	0.3	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	0.2	1.1							
10-Dec	0.0	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.1	0.3	0.6	2.0	0.6	0.9	2.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	2.1							
11-Dec	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	0.1	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	1.1							
12-Dec	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.3	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							
13-Dec	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	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.2	0.2	0.0	0.1	1.2							
14-Dec	0.0	0.0	0.0	Z	0.1	0.3	0.1	0.4	0.6	0.8	1.0	0.2	0.6	0.5	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	1.0							
15-Dec	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.2	0.1	0.2	0.3	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3							
16-Dec	0.5	0.0	0.4	3.2	0.7	Z	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.2	3.2							
17-Dec	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.1	0.2	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5							
18-Dec	0.0	Z	0.0	0.0	0.6	0.3	2.0	1.5	1.1	0.9	1.2	0.2	0.1	0.2	0.1	0.0	0.2	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	2.0							
19-Dec	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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-Dec	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.1	0.4	0.1	0.0	0.0	0.0	0.0	0.0	0.5	1.6	1.0	0.2	1.6							
21-Dec	1.5	2.8	1.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	2.8							
22-Dec	0.0	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.3	0.7	1.1	1.8	0.9	0.9	0.5	0.0	0.0	0.0	0.0	0.0	0.3	0.0	2.0	0.4	2.0							
23-Dec	Z	0.0	1.3	3.2	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	0.9	0.0	0.3	0.0	0.2	3.2							
24-Dec	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	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2							
25-Dec	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.6	1.0	0.8	0.7	0.4	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	1.0							
26-Dec	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.1	0.4	0.6	0.6	0.5	0.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.3	0.1	0.6							
27-Dec	0.0	0.0	0.0	0.0	Z	0.0	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	0.2							
28-Dec	0.0	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.1	0.3	0.3	0.6	0.5	0.6	0.4	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.6							
29-Dec	Z	0.0	0.0	0.0	1.4	0.0	0.0	0.0	0.0	0.0	0.3	0.4	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	1.4							
30-Dec	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.4	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	0.4							
31-Dec	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.4	0.3	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.7	1.1	0.0	0.1	1.1							
																								Diurnal Average									
																								Diurnal Maximum									
Z - zerospan C - Calibration																																	



Wood Buffalo Environmental Association
Hourly Averages

Nitric Oxide (NO) - ppb
Kirby South - December 2023





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Nitric Oxide (NO) - ppb
Kirby South - December 2023

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	708	100.00	100.00
21 - 40	0	0.00	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 708

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitric Oxide (NO) - ppb
Kirby South - December 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	2	1	2	2	6	4	4	4	22	112	191	161	79	75	34	9	708
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	2	1	2	2	6	4	4	4	22	112	191	161	79	75	34	9	708

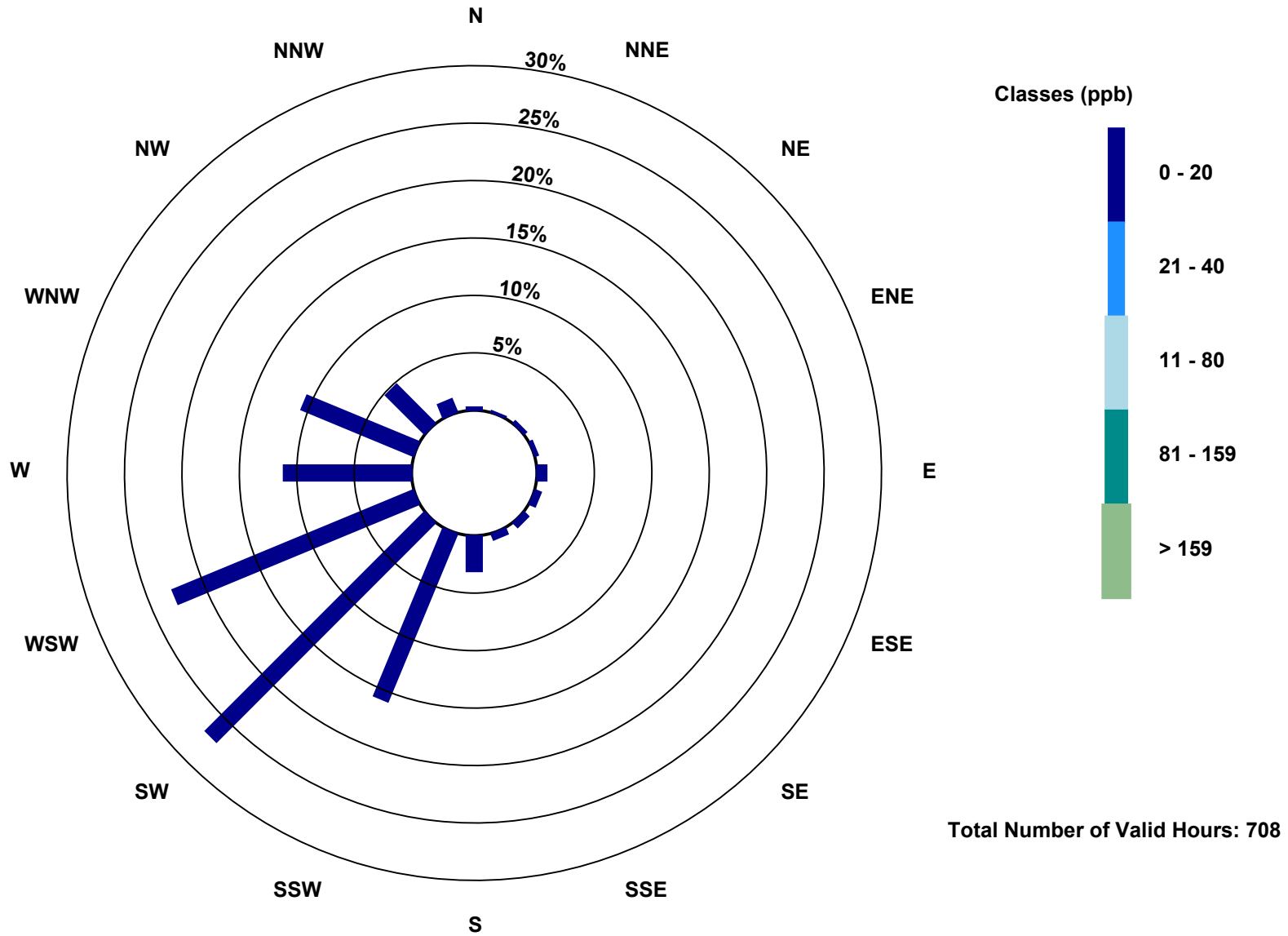
Total Number of Valid Hours: 708

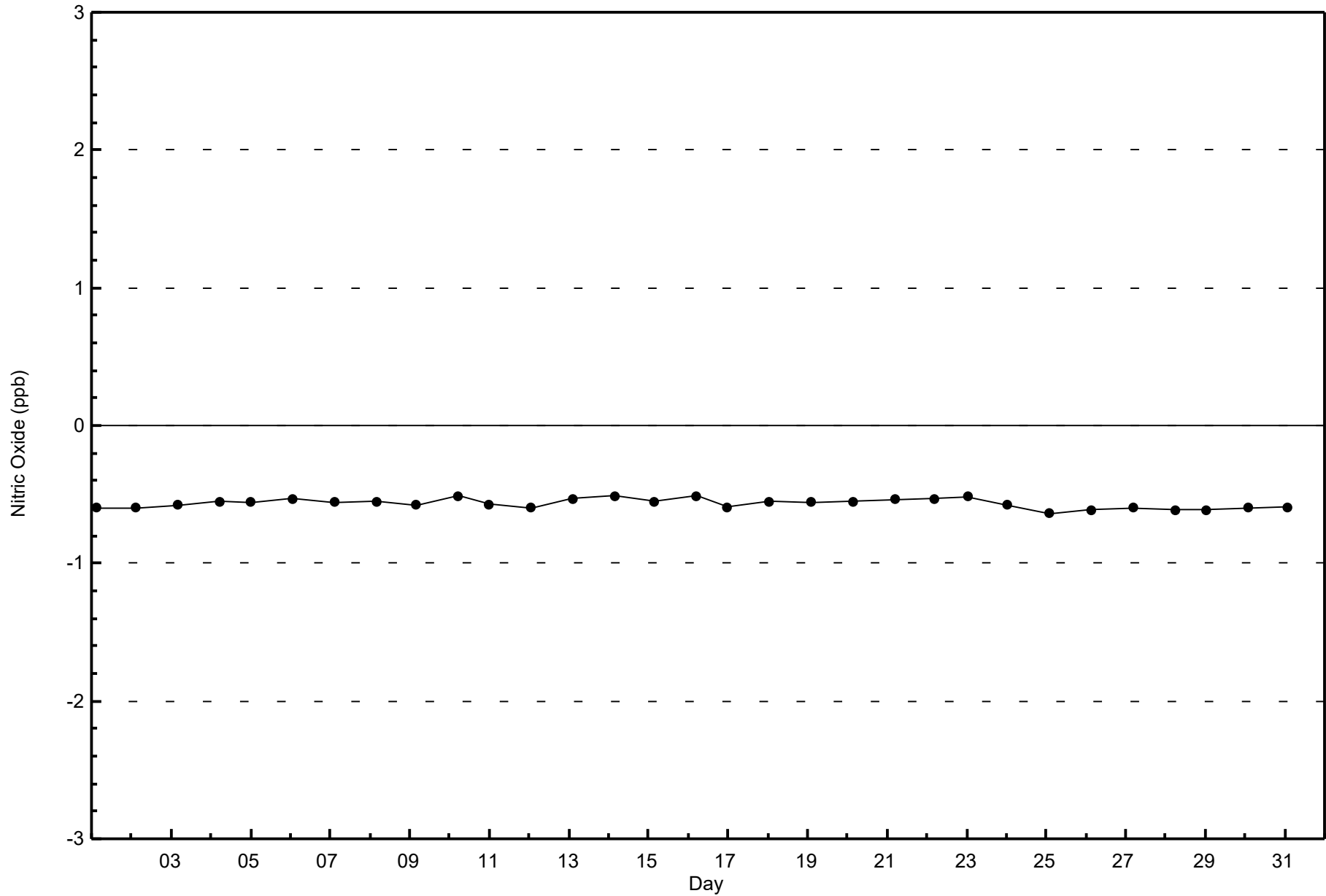
Total Number of Hours: 744

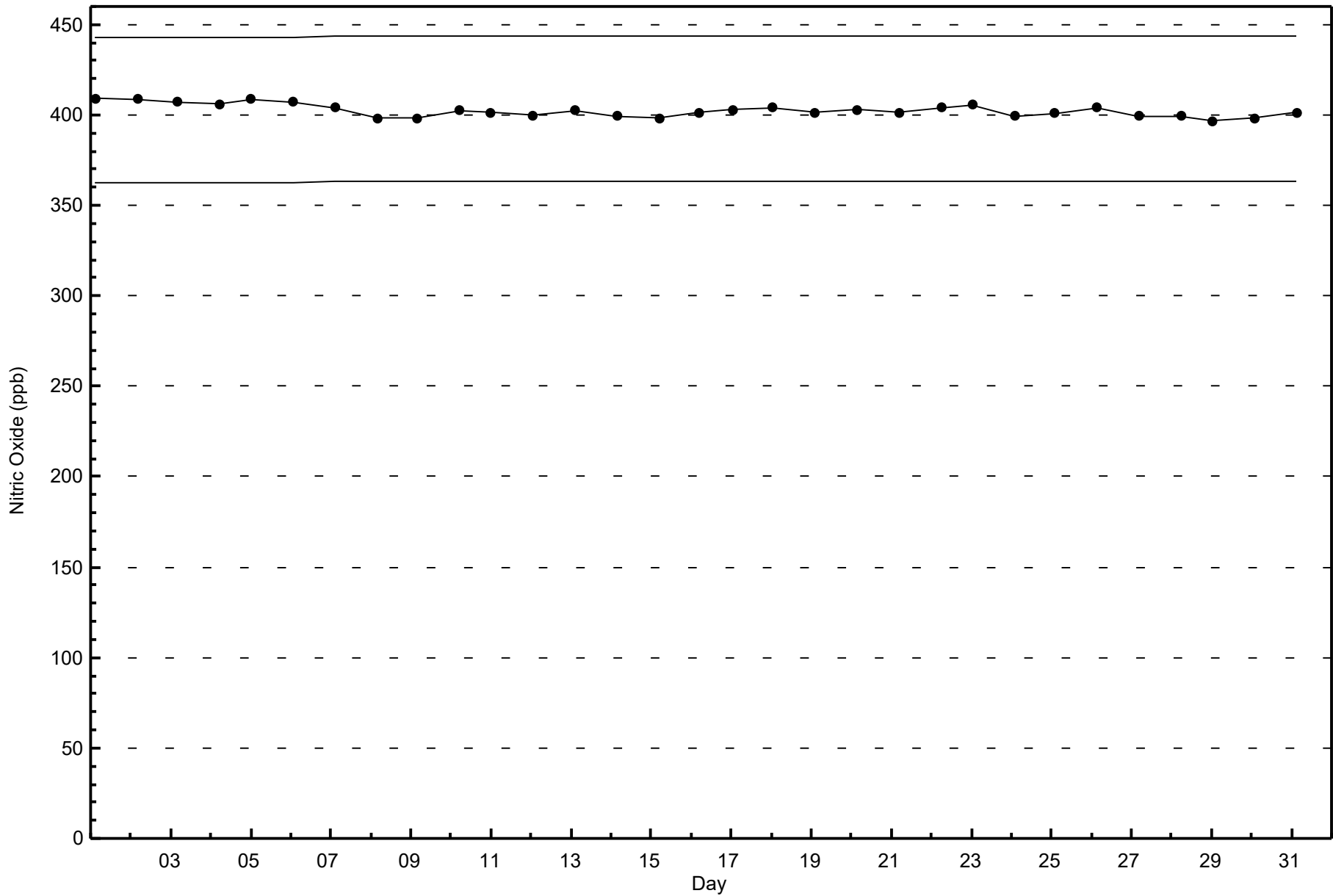


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Nitric Oxide (NO) - ppb
Kirby South









Wood Buffalo Environmental Association
Summary of Hour Averages

Nitrogen Dioxide (NO₂) - ppb
Kirby South - December 2023

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 13.0 ppb on Dec 29 05:00	Maximum Daily Average: 6.3 ppb on Dec 3		Hours of Data:	708
Minimum Value: 0.1 ppb on Dec 23 11:00	Minimum Daily Average: 0.5 ppb on Dec 11		Hours of Missing Data:	36
Maximum Diurnal Average: 3.8 ppb at hour 24	Minimum Diurnal Average: 2.3 ppb at hour 14		Hours of Calibration:	36
Monthly Average: 2.95 ppb	Percentiles: P ₁ = 0.1 P ₁₀ = 0.7 Q ₁ = 1.4 Median = 2.6 Q ₃ = 3.8 P ₉₀ = 5.9 P ₉₉ = 10.6		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-Dec	0.8	0.8	Z	1.1	1.1	1.1	1.2	1.3	1.2	2.8	4.2	3.5	2.7	2.4	2.5	2.5	2.9	2.9	5.2	6.6	7.5	6.1	4.6	4.0	3.0	7.5
2-Dec	3.9	3.8	3.8	Z	3.7	3.7	3.5	3.4	3.1	2.7	2.5	2.2	2.2	2.5	2.9	4.0	5.5	5.1	5.0	12.4	10.6	12.2	8.5	10.3	5.1	12.4
3-Dec	9.1	6.4	10.3	11.0	Z	6.9	6.9	7.6	7.1	5.6	4.1	3.6	3.3	3.0	2.6	2.7	2.2	4.4	6.5	10.3	9.1	7.8	7.7	7.6	6.3	11.0
4-Dec	7.3	6.5	5.9	5.3	4.7	Z	3.3	3.0	2.6	2.4	2.0	9.0	8.2	3.4	6.9	2.6	3.3	1.4	1.5	1.4	1.4	1.4	1.4	1.1	3.7	9.0
5-Dec	Z	1.8	2.5	2.7	4.5	4.8	4.5	3.6	3.9	3.5	3.0	2.9	2.7	4.1	4.9	5.3	6.5	5.3	3.5	3.4	3.7	3.6	3.3	2.6	3.8	6.5
6-Dec	4.1	Z	1.8	1.6	4.1	8.3	2.5	2.9	9.0	12.0	10.1	4.9	C	C	C	C	C	2.0	1.6	1.5	4.4	2.7	2.7	2.0	4.3	12.0
7-Dec	3.0	2.0	Z	1.2	1.0	1.0	1.0	0.8	1.2	1.6	1.5	1.5	1.7	1.7	1.1	1.2	4.0	2.6	2.2	5.4	3.5	2.8	2.2	3.7	2.1	5.4
8-Dec	1.8	2.3	2.1	Z	1.4	1.1	2.0	2.5	3.6	1.1	1.5	2.4	2.8	2.1	5.5	6.2	4.8	2.7	2.2	1.8	2.3	4.9	5.1	5.7	3.0	6.2
9-Dec	2.6	1.7	2.1	1.8	Z	3.6	4.0	4.2	2.1	1.5	1.5	1.1	1.1	1.3	1.2	1.2	1.0	0.9	0.8	1.2	2.6	3.0	2.2	2.6	2.0	4.2
10-Dec	3.3	4.3	3.5	3.1	3.3	Z	3.3	2.8	2.8	3.0	3.4	3.6	3.4	4.6	3.9	4.7	6.0	2.5	2.3	1.7	1.1	0.5	0.4	0.3	2.9	6.0
11-Dec	Z	0.5	0.4	0.3	0.2	0.3	0.2	0.2	1.3	1.1	0.4	0.7	0.5	0.6	1.1	0.8	0.3	0.2	0.3	0.3	0.3	0.3	0.5	1.0	0.5	1.3
12-Dec	1.3	Z	1.7	1.7	2.1	2.4	2.7	2.9	3.3	3.1	2.4	2.1	1.7	1.9	1.9	1.9	1.8	1.8	2.3	3.3	4.6	6.3	9.1	8.7	3.1	9.1
13-Dec	7.5	5.8	Z	4.6	3.9	3.6	3.4	3.1	3.1	3.4	3.5	3.9	4.6	4.7	4.7	4.7	4.8	5.0	5.0	5.0	5.2	9.3	6.0	3.5	4.7	9.3
14-Dec	1.8	1.8	1.4	Z	2.3	4.2	2.3	3.4	4.4	4.0	4.2	1.6	2.2	2.7	1.1	1.9	3.6	1.4	1.0	1.2	1.3	1.4	1.2	1.1	2.2	4.4
15-Dec	1.0	0.9	0.9	1.0	Z	2.2	4.1	3.6	4.2	3.3	2.7	2.0	2.0	2.7	2.9	3.3	2.6	2.1	1.8	1.6	1.6	1.8	2.0	2.6	2.3	4.2
16-Dec	3.7	3.4	3.7	5.9	3.1	Z	1.8	1.6	1.3	1.4	1.2	1.1	0.8	0.7	1.0	1.6	1.0	2.1	1.9	0.4	0.6	1.1	0.8	0.9	1.8	5.9
17-Dec	Z	0.3	0.4	0.3	0.2	0.5	0.7	0.9	2.6	1.4	0.5	0.7	0.9	1.5	0.8	0.8	0.6	0.5	0.6	1.7	2.8	2.6	2.2	2.2	1.1	2.8
18-Dec	2.4	Z	2.8	2.8	5.2	4.1	6.6	5.9	4.5	4.1	3.5	1.5	1.4	1.5	1.5	1.9	3.3	7.9	1.4	1.7	1.2	1.7	1.4	2.1	3.1	7.9
19-Dec	0.6	0.4	Z	0.7	1.1	1.1	1.2	0.7	0.4	0.4	0.3	0.3	0.2	0.2	0.3	0.6	0.2	0.4	0.2	0.2	0.2	0.6	1.0	1.0	0.5	1.2
20-Dec	0.8	0.3	0.5	Z	0.8	0.8	1.0	1.3	0.9	0.8	0.9	1.5	1.5	1.7	2.4	2.2	2.2	2.7	3.0	3.0	2.9	4.1	5.4	5.7	2.0	5.7
21-Dec	6.7	8.0	5.6	4.4	Z	2.5	2.6	3.4	2.0	1.8	1.9	1.2	0.9	0.9	0.9	1.0	2.7	2.1	2.7	3.9	3.9	3.4	3.1	3.0	3.0	8.0
22-Dec	3.0	3.1	3.2	3.3	3.2	Z	3.4	3.5	3.8	4.3	4.0	5.1	6.6	6.1	5.8	5.9	6.8	6.3	5.8	5.8	5.9	6.4	4.3	7.3	4.9	7.3
23-Dec	Z	2.5	3.7	6.5	1.0	0.5	0.2	0.2	0.3	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	1.0	3.0	0.5	2.2	1.2	1.0	6.5
24-Dec	0.7	Z	0.7	0.6	0.5	0.5	0.6	0.5	0.6	0.7	0.9	1.1	1.2	1.2	1.6	3.2	4.1	3.7	4.3	4.1	3.5	3.1	3.0	2.9	1.9	4.3
25-Dec	3.3	2.9	Z	2.7	2.3	2.4	2.3	2.5	2.7	3.1	3.4	3.5	3.1	3.0	3.2	3.1	2.6	3.3	2.1	3.3	5.5	7.1	11.8	11.7	4.0	11.8
26-Dec	8.5	8.6	7.5	Z	5.3	4.9	5.0	4.3	3.1	2.8	2.7	2.4	2.0	2.0	2.1	2.2	2.6	3.0	3.4	3.6	3.5	3.6	4.6	4.7	4.0	8.6
27-Dec	2.9	2.7	2.1	3.3	Z	1.1	1.2	1.0	0.9	1.0	0.9	1.2	1.4	1.6	2.4	3.0	3.6	3.6	4.5	3.3	2.9	2.7	2.5	2.6	2.3	4.5
28-Dec	2.9	2.7	2.7	2.8	2.6	Z	2.7	2.8	5.1	4.0	3.2	2.4	2.2	2.6	2.6	3.3	4.5	5.9	8.0	7.1	5.8	6.0	6.2	7.4	4.2	8.0
29-Dec	Z	5.5	5.9	5.6	13.0	7.2	6.5	4.2	1.8	1.8	2.8	2.6	1.6	1.9	1.6	1.6	2.1	2.7	2.9	3.1	3.1	3.3	3.5	3.9	3.8	13.0
30-Dec	3.4	Z	3.8	5.0	6.8	5.5	4.2	2.3	3.0	3.3	2.9	3.1	2.7	2.3	1.9	1.9	2.4	2.5	1.9	1.7	1.7	1.7	1.7	1.6	2.9	6.8
31-Dec	1.5	1.5	Z	1.6	1.7	1.7	1.6	1.6	1.7	1.6	1.7	2.0	2.7	2.9	3.0	3.0	3.0	2.8	2.5	2.5	2.6	4.0	4.1	1.7	2.3	4.1

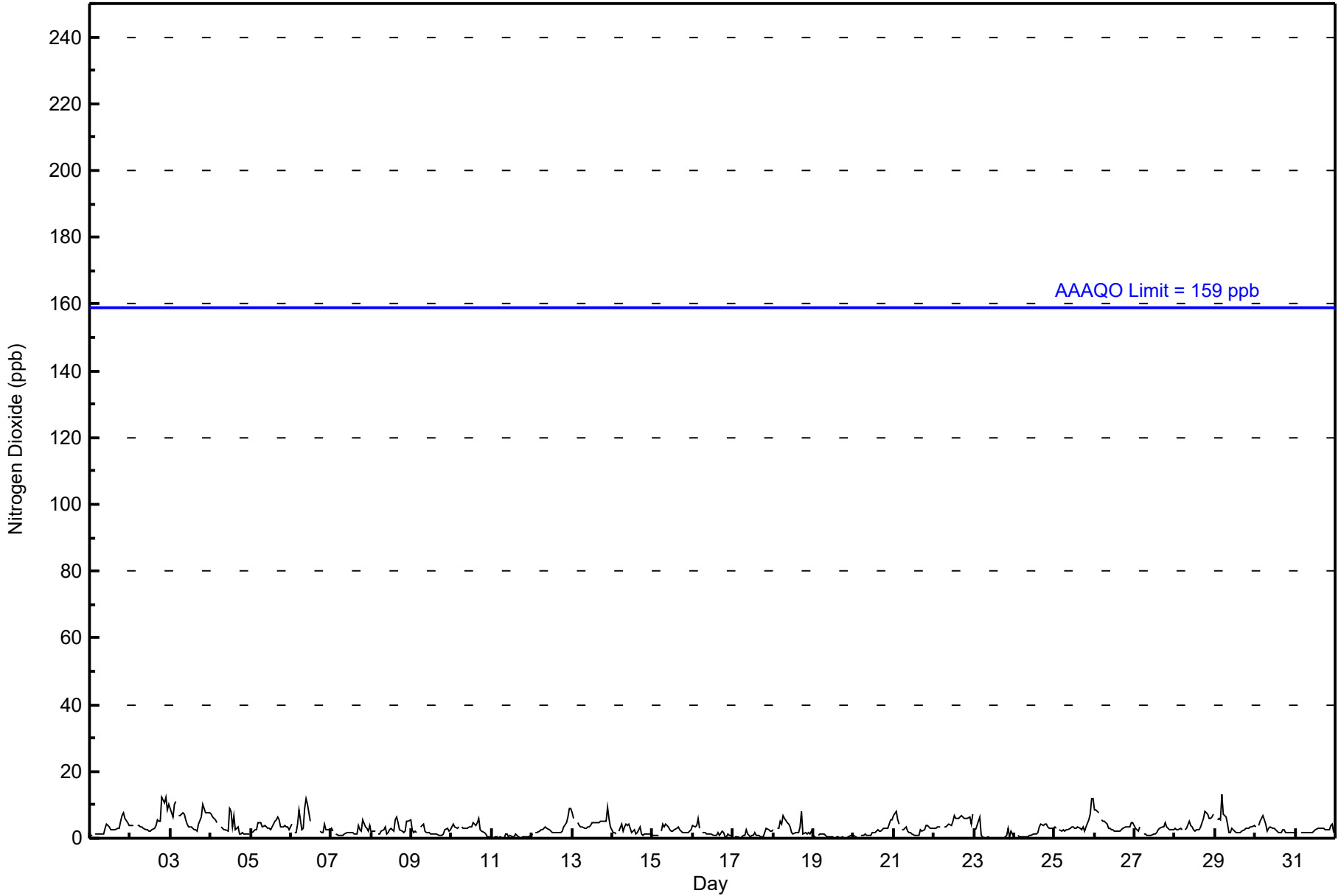
3.4	3.1	3.2	3.1	3.0	2.9	2.8	2.6	2.8	2.7	2.5	2.4	2.3	2.3	2.5	2.6	3.0	2.9	2.8	3.3	3.5	3.7	3.7	3.8	Diurnal Average	
9.1	8.6	10.3	11.0	13.0	8.3	6.9	7.6	9.0	12.0	10.1	9.0	8.2	6.1	6.9	6.2	6.8	7.9	8.0	12.4	10.6	12.2	11.8	11.7	Diurnal Maximum	

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



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Dioxide (NO₂) - ppb
Kirby South - December 2023





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Kirby South - December 2023**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	708	100.00	100.00
21 - 40	0	0.00	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 708

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Kirby South - December 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	2	1	2	2	6	4	4	4	22	112	191	161	79	75	34	9	708
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	2	1	2	2	6	4	4	4	22	112	191	161	79	75	34	9	708

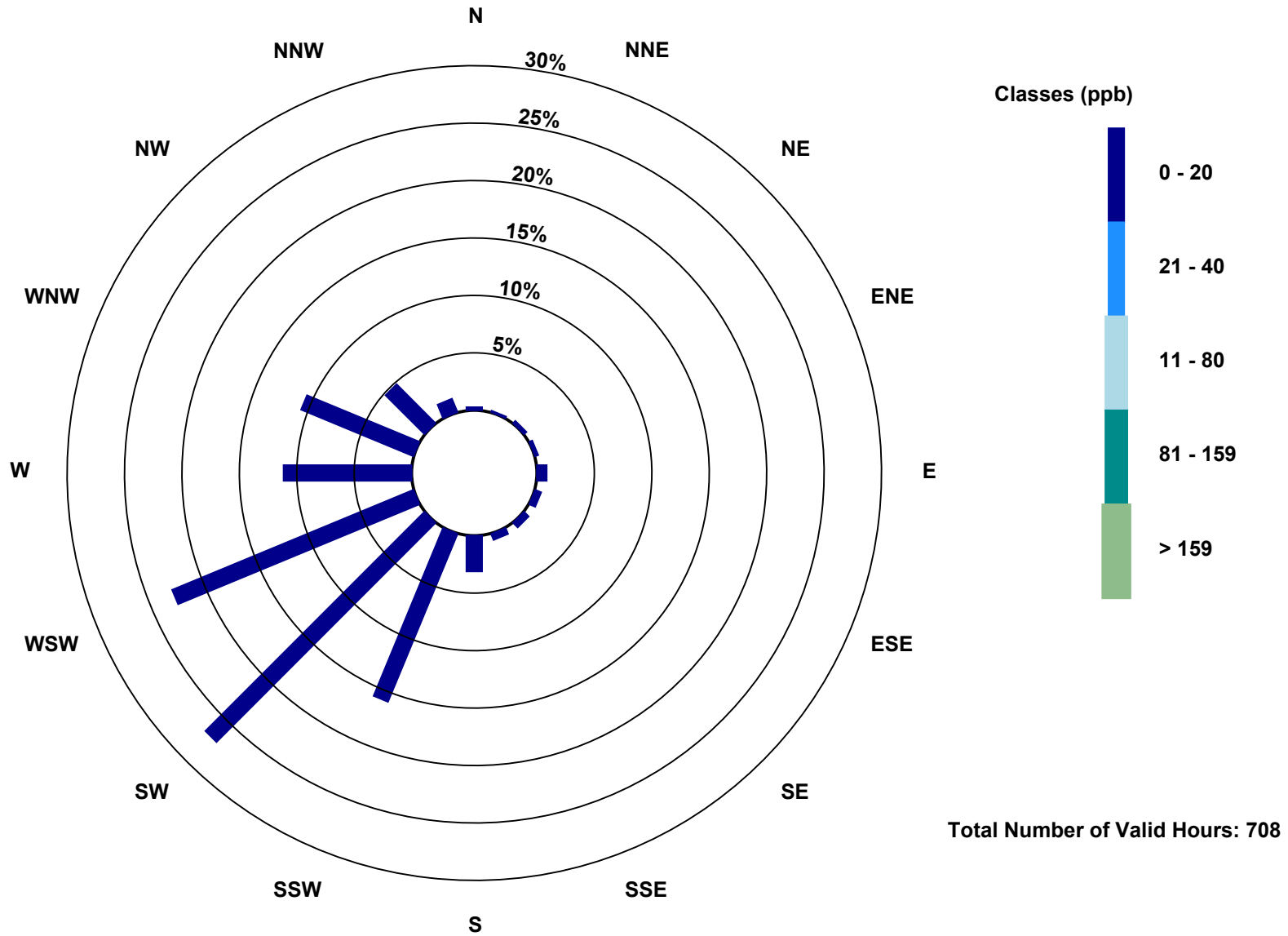
Total Number of Valid Hours: 708

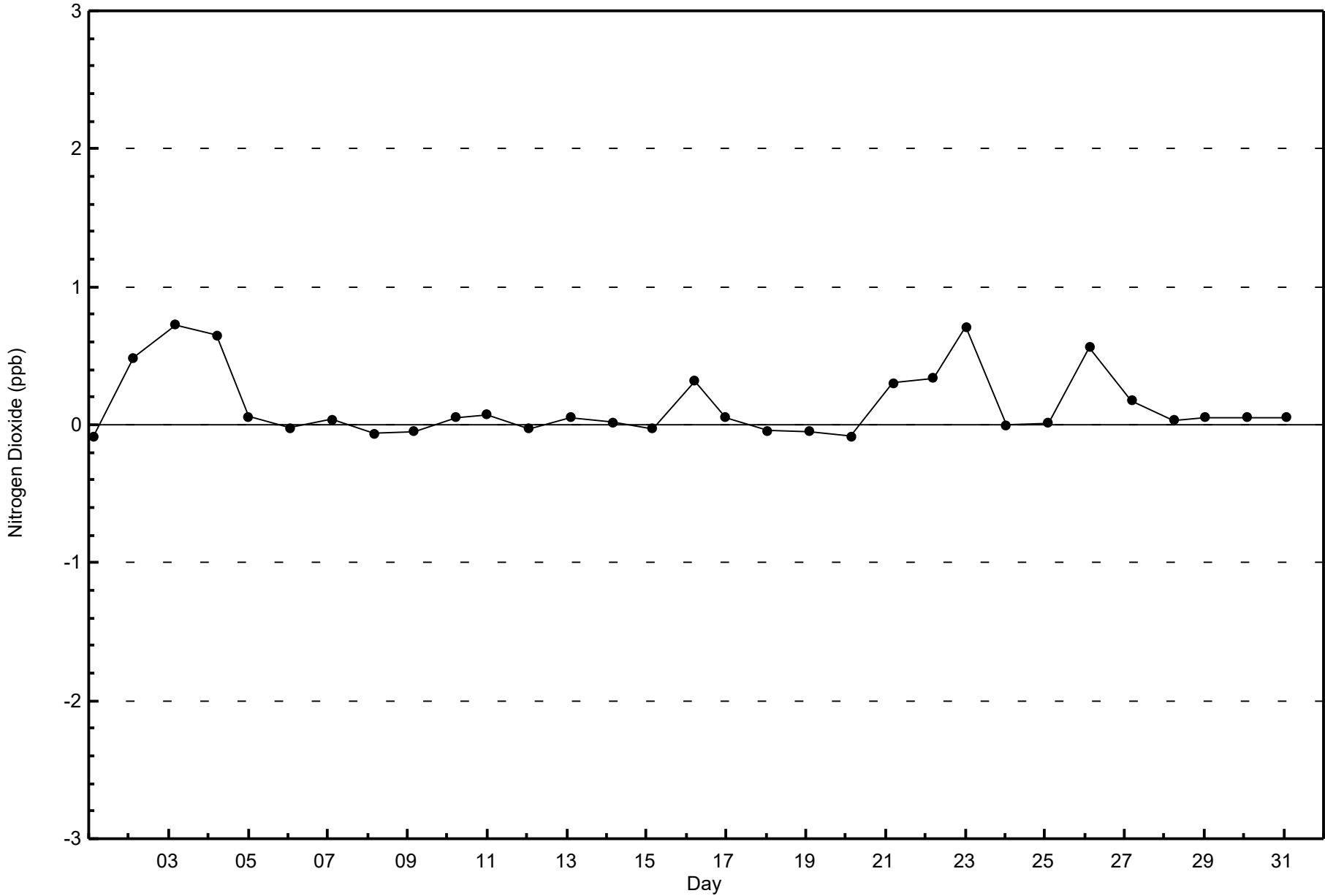
Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Dec 2023

Nitrogen Dioxide (NO₂) - ppb
Kirby South

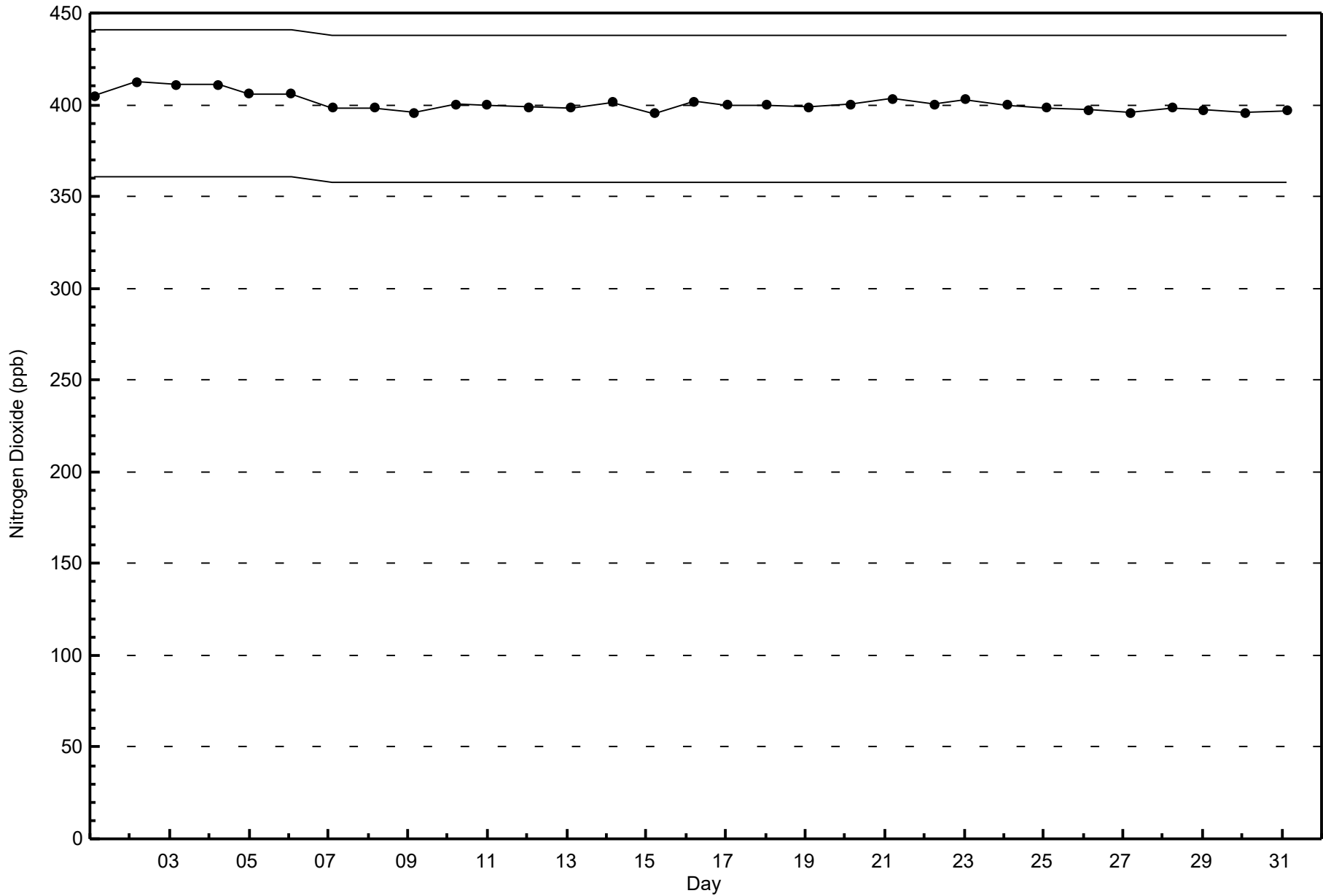






Wood Buffalo Environmental Association
Span Responses

Nitrogen Dioxide (NO₂) - ppb
Kirby South - December 2023





Wood Buffalo Environmental Association
Summary of Hour Averages

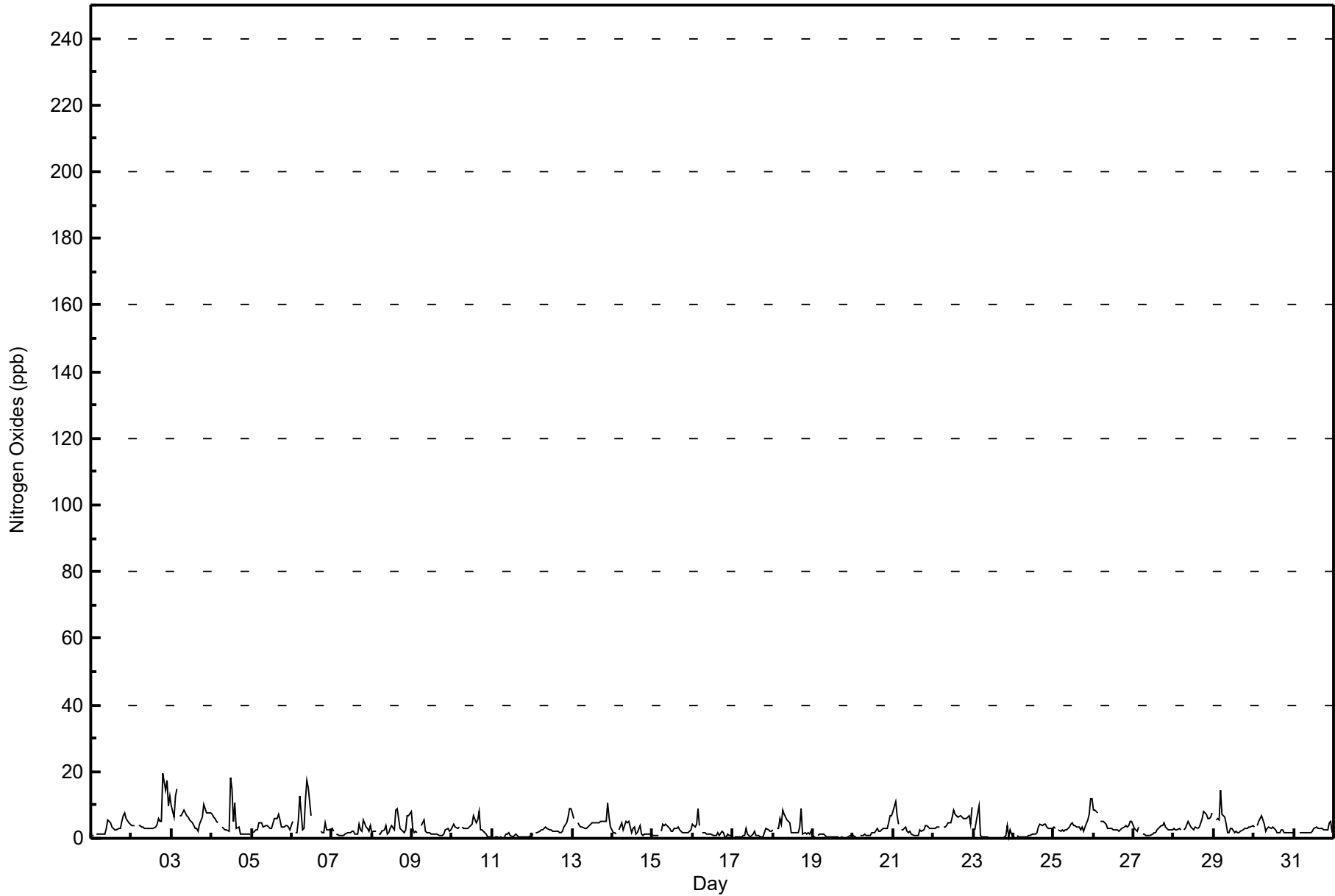
Nitrogen Oxides (NO_x) - ppb
Kirby South - December 2023

Maximum Value: 19.5 ppb on Dec 2 20:00		Maximum Daily Average: 7.0 ppb on Dec 3		Hours in Service: 744																						
Minimum Value: 0.1 ppb on Dec 23 18:00		Minimum Daily Average: 0.5 ppb on Dec 19		Hours of Data: 708																						
Maximum Diurnal Average: 4.1 ppb at hour 22		Minimum Diurnal Average: 2.7 ppb at hour 14		Hours of Missing Data: 36																						
Monthly Average: 3.22 ppb		Percentiles: P ₁ = 0.1 P ₁₀ = 0.7 Q ₁ = 1.4 Median = 2.7 Q ₃ = 4.0 P ₉₀ = 6.5 P ₉₉ = 14.4		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-Dec	0.8	0.8	Z	1.1	1.1	1.1	1.2	1.3	1.2	3.1	5.4	4.7	3.4	2.9	2.7	2.5	2.9	2.9	5.2	6.6	7.5	6.1	4.6	4.0	3.2	7.5
2-Dec	3.9	3.8	3.8	Z	3.7	3.7	3.5	3.4	3.1	3.0	2.9	2.8	2.9	3.1	3.4	4.2	6.1	5.2	5.2	19.5	14.2	17.6	9.6	12.9	6.1	19.5
3-Dec	9.9	6.4	12.8	14.7	Z	6.9	6.9	8.3	7.6	6.8	6.2	5.4	4.8	3.7	2.9	2.8	2.2	4.4	6.5	10.3	9.1	7.8	7.7	7.6	7.0	14.7
4-Dec	7.3	6.5	5.9	5.3	4.7	Z	3.3	3.0	2.6	2.5	2.3	18.2	14.9	5.3	10.6	2.8	3.4	1.4	1.5	1.4	1.5	1.4	1.4	1.1	4.7	18.2
5-Dec	Z	1.8	2.5	2.7	4.5	4.8	4.5	3.6	3.9	3.6	3.3	3.1	3.1	5.9	6.0	5.9	7.4	5.4	3.5	3.4	3.7	3.6	3.3	2.6	4.0	7.4
6-Dec	4.9	Z	1.8	1.6	5.5	12.9	2.6	3.1	11.4	17.3	15.4	6.9	C	C	C	C	C	2.0	1.6	1.5	4.5	2.7	2.7	2.0	5.6	17.3
7-Dec	3.0	2.0	Z	1.2	1.0	1.0	1.0	0.8	1.2	1.7	1.7	1.8	2.1	2.0	1.2	1.3	4.2	2.7	2.2	5.4	3.5	2.8	2.2	3.8	2.2	5.4
8-Dec	1.8	2.3	2.1	Z	1.4	1.1	2.0	2.5	3.7	1.1	1.8	3.0	4.0	2.6	8.3	8.9	5.9	2.8	2.2	1.8	2.4	6.9	6.8	7.9	3.6	8.9
9-Dec	3.0	1.7	2.2	1.8	Z	3.9	4.8	5.3	2.2	1.7	1.8	1.3	1.4	1.5	1.3	1.2	1.0	0.9	0.8	1.2	2.6	3.0	2.2	2.6	2.1	5.3
10-Dec	3.3	4.3	3.5	3.1	3.3	Z	3.3	2.8	2.8	3.0	3.5	3.9	4.0	6.6	4.5	5.6	8.1	2.5	2.3	1.7	1.1	0.5	0.4	0.3	3.2	8.1
11-Dec	Z	0.5	0.4	0.3	0.2	0.3	0.2	0.2	1.3	1.1	1.5	0.8	0.5	0.6	1.3	0.8	0.3	0.2	0.3	0.3	0.3	0.3	0.5	1.0	0.6	1.5
12-Dec	1.3	Z	1.7	1.7	2.1	2.4	2.7	2.9	3.3	3.2	2.7	2.4	2.0	2.1	2.0	1.9	1.8	1.8	2.3	3.3	4.6	6.3	9.1	8.7	3.1	9.1
13-Dec	7.5	5.8	Z	4.6	3.9	3.6	3.4	3.1	3.1	3.5	3.7	4.2	4.8	4.8	4.7	4.7	4.8	5.0	5.0	5.0	5.2	10.5	6.2	3.5	4.8	10.5
14-Dec	1.8	1.8	1.4	Z	2.4	4.5	2.4	3.8	5.0	4.8	5.2	1.8	2.8	3.2	1.1	1.9	3.8	1.4	1.0	1.2	1.3	1.4	1.2	1.1	2.4	5.2
15-Dec	1.0	0.9	0.9	1.0	Z	2.2	4.1	3.6	4.2	3.3	2.9	2.1	2.2	3.0	3.1	3.3	2.6	2.1	1.8	1.6	1.6	1.8	2.0	2.6	2.3	4.2
16-Dec	4.2	3.4	4.1	9.1	3.8	Z	1.8	1.6	1.3	1.4	1.3	1.1	0.8	0.7	1.0	1.7	1.0	2.3	1.9	0.4	0.6	1.1	0.8	0.9	2.0	9.1
17-Dec	Z	0.3	0.4	0.3	0.2	0.5	0.7	0.9	2.8	1.4	0.5	0.8	1.1	2.0	0.8	0.8	0.6	0.5	0.6	1.7	2.8	2.6	2.2	2.2	1.2	2.8
18-Dec	2.4	Z	2.8	2.8	5.8	4.4	8.6	7.4	5.6	5.0	4.7	1.7	1.5	1.7	1.6	1.9	3.5	8.9	1.4	1.7	1.2	1.7	1.4	2.1	3.5	8.9
19-Dec	0.6	0.4	Z	0.7	1.1	1.1	1.2	0.7	0.4	0.4	0.3	0.3	0.2	0.2	0.3	0.6	0.2	0.4	0.2	0.2	0.2	0.6	1.0	1.0	0.5	1.2
20-Dec	0.8	0.3	0.5	Z	0.8	0.8	1.0	1.3	0.9	0.8	0.9	1.6	1.7	1.8	2.8	2.3	2.2	2.7	3.0	3.0	2.9	4.6	7.0	6.7	2.2	7.0
21-Dec	8.2	10.8	6.6	4.4	Z	2.5	2.6	3.4	2.0	1.8	2.1	1.3	0.9	0.9	0.9	1.0	2.7	2.1	2.7	3.9	3.9	3.4	3.1	3.0	3.2	10.8
22-Dec	3.0	3.1	3.2	3.3	3.2	Z	3.4	3.5	3.8	4.6	4.7	6.2	8.4	7.0	6.7	6.4	6.8	6.3	5.8	5.8	5.9	6.7	4.3	9.3	5.3	9.3
23-Dec	Z	2.5	5.0	9.7	1.0	0.5	0.2	0.2	0.3	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	1.0	3.9	0.5	2.5	1.2	1.3	9.7
24-Dec	0.7	Z	0.7	0.6	0.5	0.5	0.6	0.5	0.6	0.7	0.9	1.2	1.4	1.4	1.8	3.3	4.1	3.7	4.3	4.1	3.5	3.1	3.0	2.9	1.9	4.3
25-Dec	3.3	2.9	Z	2.7	2.3	2.4	2.3	2.5	2.7	3.3	4.0	4.5	3.9	3.7	3.6	3.2	2.6	3.3	2.1	3.3	5.5	7.1	11.8	11.7	4.1	11.8
26-Dec	8.5	8.6	7.5	Z	5.3	4.9	5.0	4.3	3.1	2.9	3.1	3.0	2.6	2.5	2.4	2.3	2.6	3.0	3.4	3.6	3.5	3.6	4.9	5.0	4.2	8.6
27-Dec	2.9	2.7	2.1	3.3	Z	1.1	1.2	1.0	0.9	1.0	0.9	1.3	1.6	1.8	2.5	3.0	3.6	3.6	4.5	3.3	2.9	2.7	2.5	2.6	2.3	4.5
28-Dec	2.9	2.7	2.7	2.8	2.6	Z	2.7	2.8	5.2	4.3	3.5	3.0	2.7	3.2	3.0	3.4	4.5	5.9	8.0	7.1	5.8	6.0	6.2	7.5	4.3	8.0
29-Dec	Z	5.5	5.9	5.6	14.4	7.2	6.5	4.2	1.8	1.8	3.1	3.0	1.8	2.2	1.8	1.6	2.1	2.7	2.9	3.1	3.1	3.3	3.5	3.9	4.0	14.4
30-Dec	3.4	Z	3.8	5.0	6.8	5.5	4.2	2.3	3.0	3.3	3.1	3.5	2.9	2.4	1.9	1.9	2.4	2.5	1.9	1.7	1.7	1.7	1.7	1.6	3.0	6.8
31-Dec	1.5	1.5	Z	1.6	1.7	1.7	1.6	1.6	1.7	1.6	1.8	2.2	3.1	3.2	3.2	3.0	3.0	2.8	2.5	2.5	2.6	4.7	5.2	1.7	2.4	5.2
																								Diurnal Average		
																								Diurnal Maximum		
Z - zerospan C - Calibration																										



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Kirby South - December 2023





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Kirby South - December 2023**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	708	100.00	100.00
21 - 40	0	0.00	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 708

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Kirby South - December 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	2	1	2	2	6	4	4	4	22	112	191	161	79	75	34	9	708
21 - 40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	2	1	2	2	6	4	4	4	22	112	191	161	79	75	34	9	708

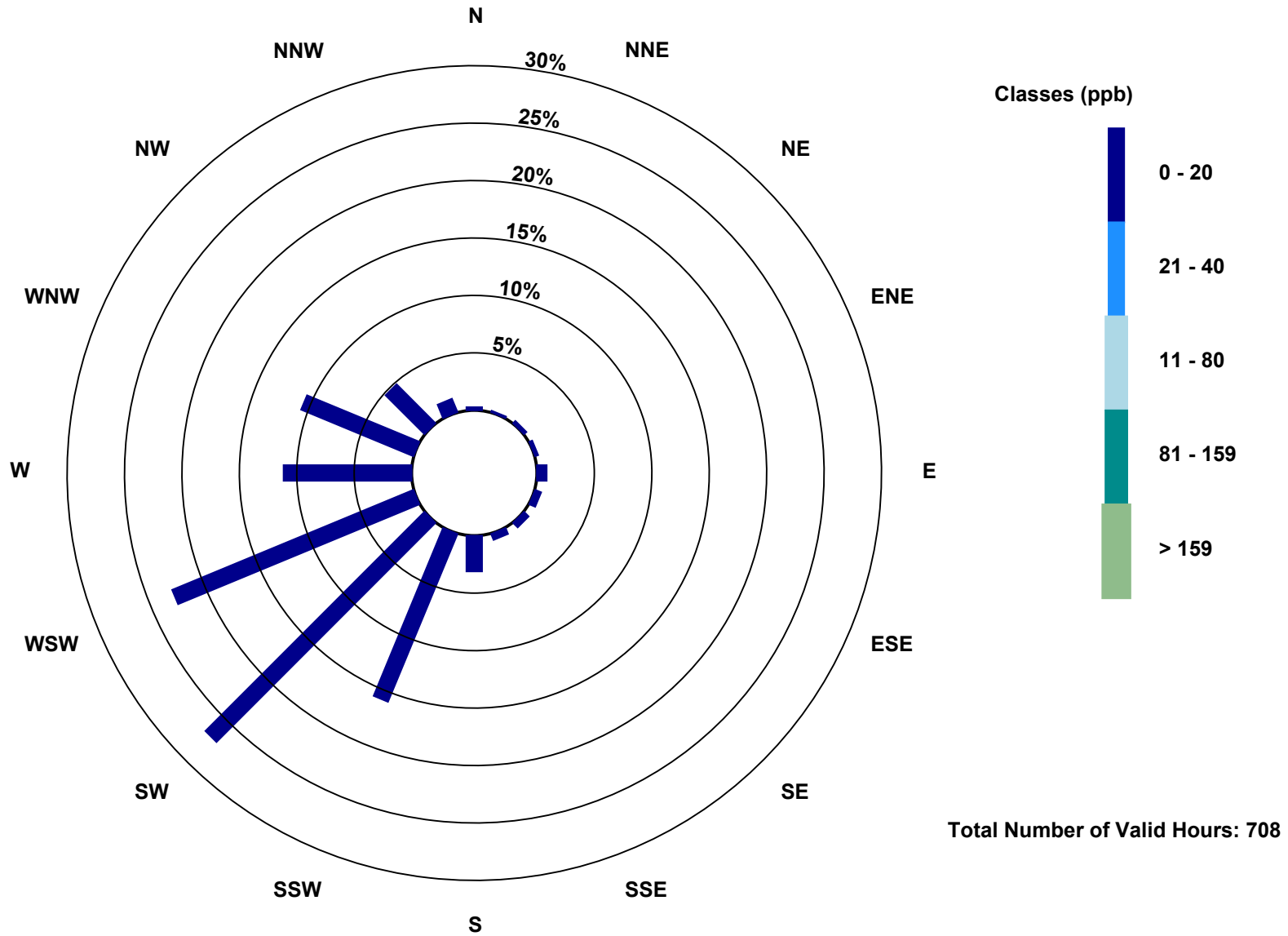
Total Number of Valid Hours: 708

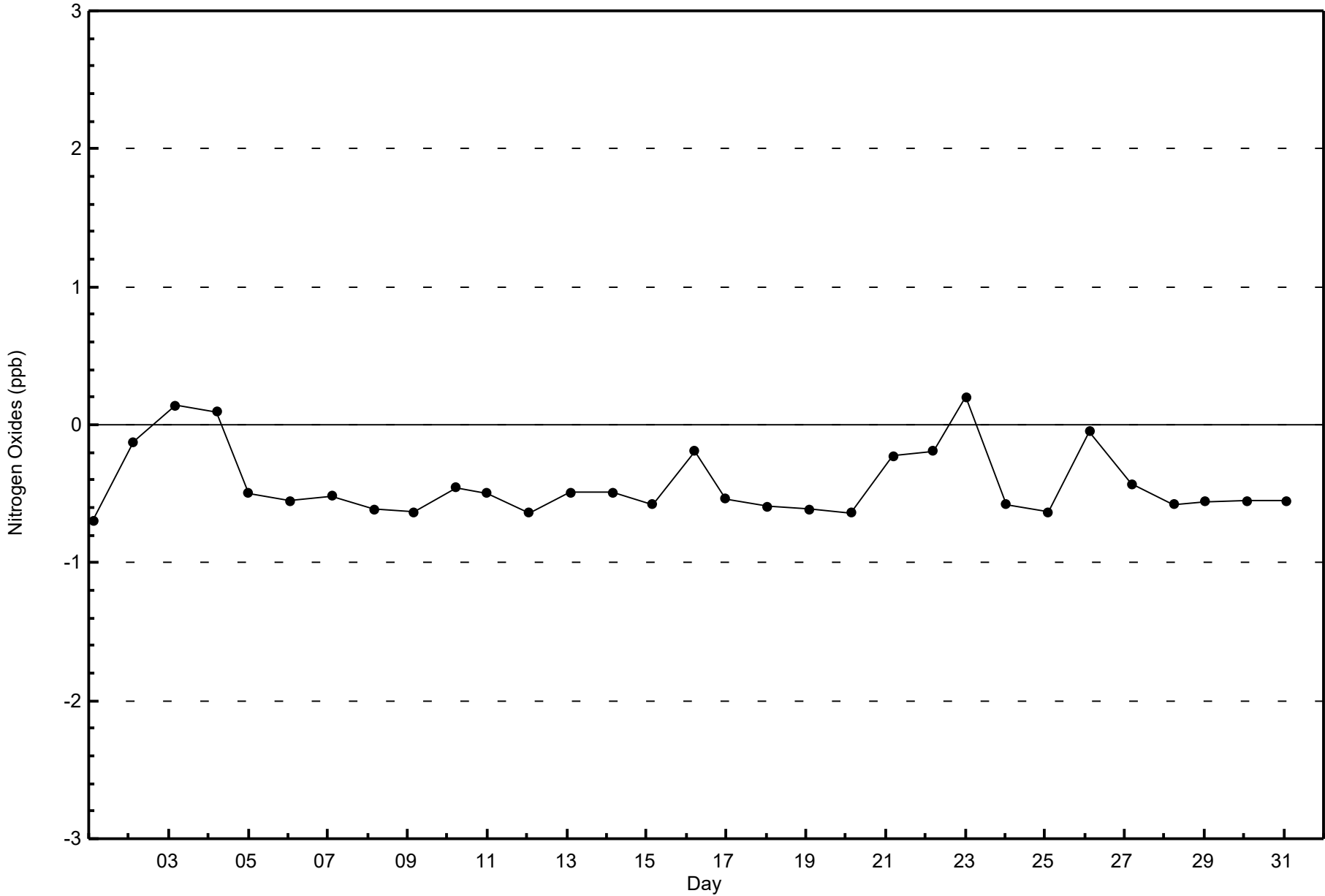
Total Number of Hours: 744

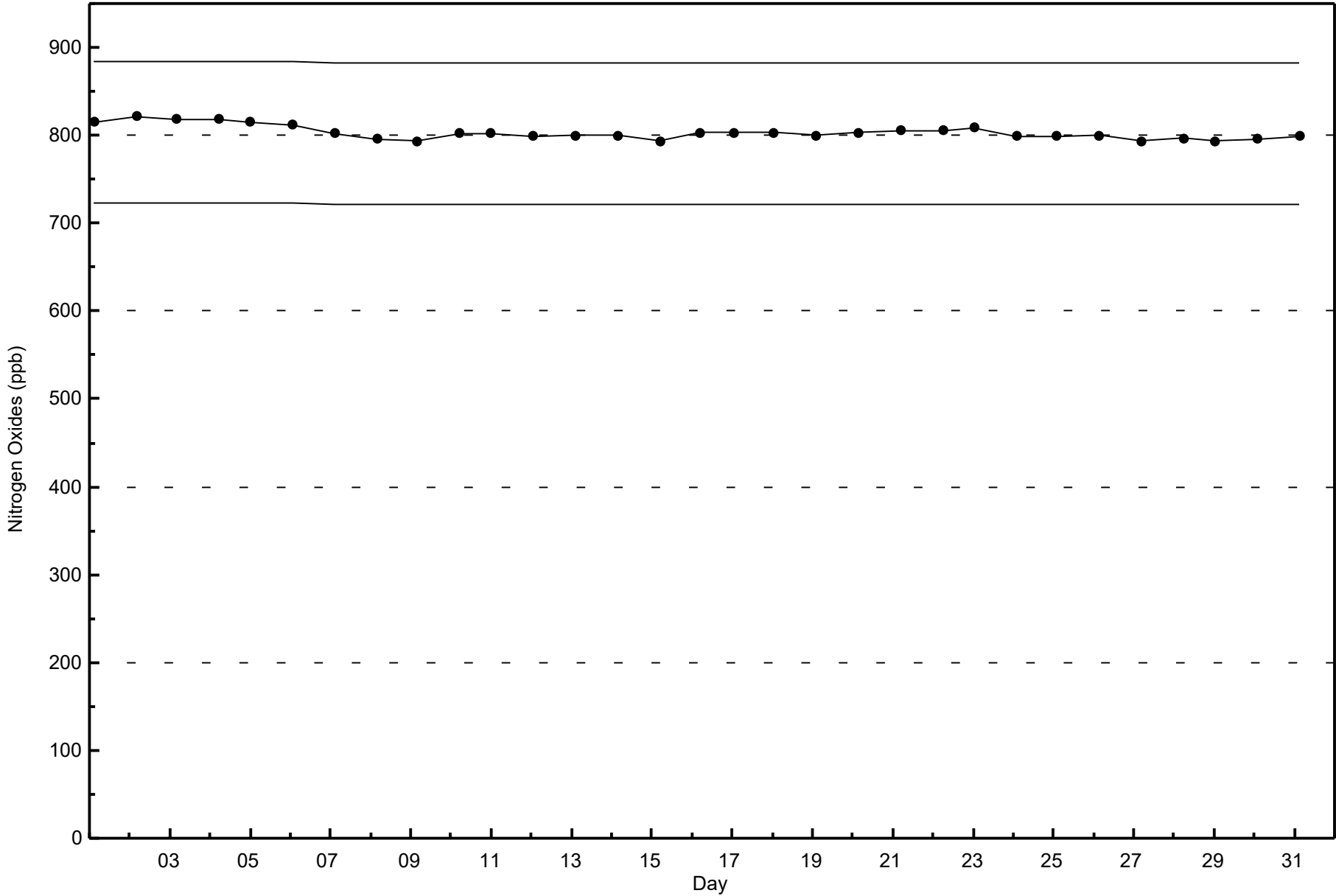


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Nitrogen Oxides (NO_x) - ppb
Kirby South









Wood Buffalo Environmental Association
Summary of Hour Averages

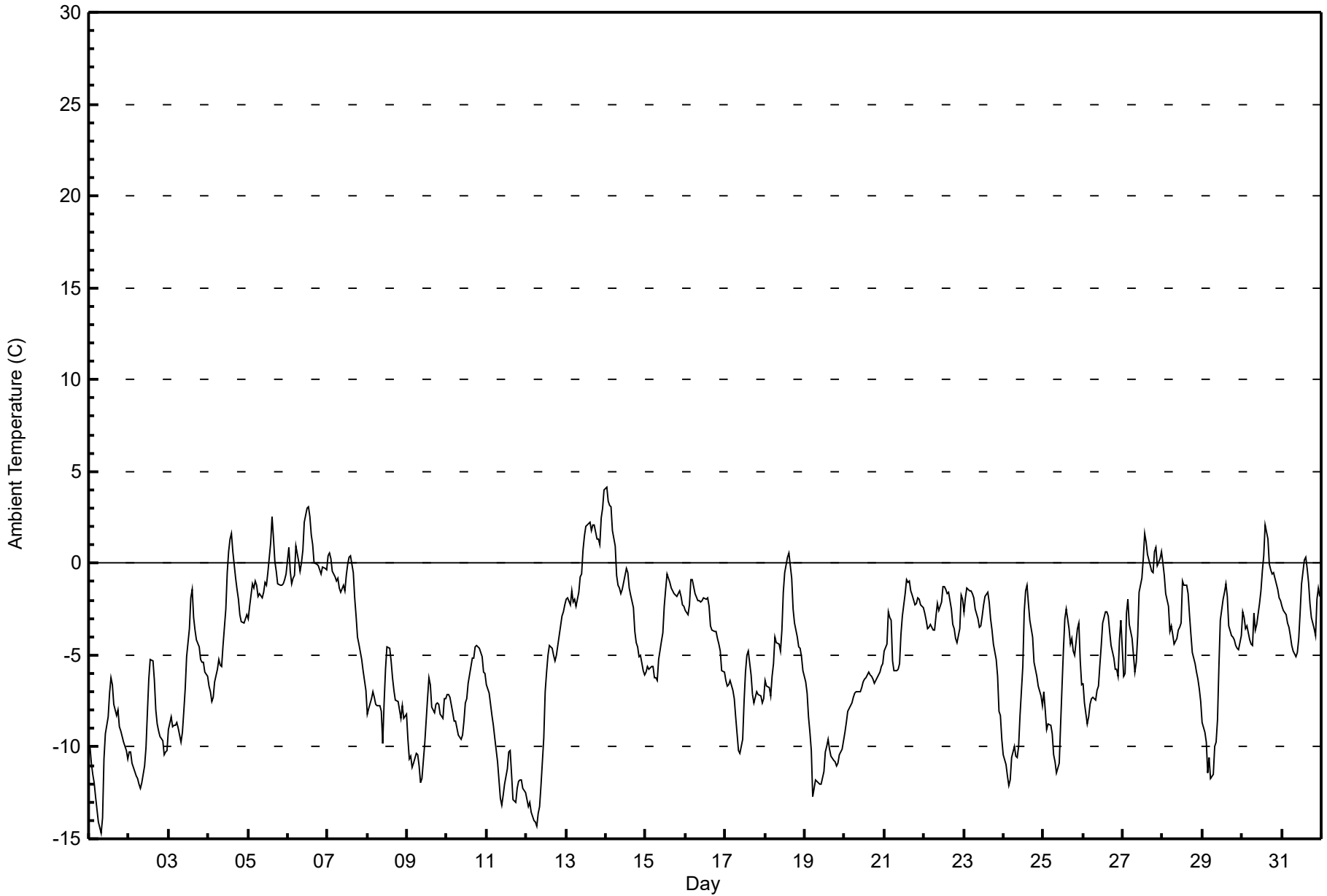
Ambient Temperature (AT) - C
Kirby South - December 2023

Maximum Value: 4.1 C on Dec 14 01:00 Maximum Daily Average: 0.4 C on Dec 13																						Hours in Service: 744 Hours of Data: 744				
Minimum Value: -14.7 C on Dec 1 08:00 Minimum Daily Average: -10.9 C on Dec 11 Maximum Diurnal Average: -2.3 C at hour 15 Minimum Diurnal Average: -6.8 C at hour 8 Monthly Average: -4.99 C Percentiles: P ₁ = -13.6 P ₁₀ = -10.5 Q ₁ = -7.7 Median = -4.6 Q ₃ = -1.8 P ₉₀ = -0.4 P ₉₉ = 2.8																						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-Dec	-10.0	-10.9	-11.5	-11.9	-12.7	-14.1	-14.4	-14.7	-13.9	-10.6	-9.3	-8.4	-7.0	-6.2	-6.6	-7.6	-8.3	-8.0	-8.9	-9.1	-9.4	-9.8	-10.2	-10.6	-10.2	-6.2
2-Dec	-10.3	-10.3	-10.9	-11.3	-11.6	-11.7	-12.0	-12.2	-12.0	-11.1	-10.1	-8.1	-6.3	-5.2	-5.3	-6.4	-8.0	-8.7	-9.1	-9.4	-9.7	-10.4	-10.2	-10.2	-9.6	-5.2
3-Dec	-9.1	-8.4	-8.9	-8.8	-8.8	-8.7	-9.0	-9.7	-9.2	-8.1	-6.8	-5.1	-3.6	-1.9	-1.5	-2.9	-3.6	-4.2	-4.6	-5.2	-5.4	-5.4	-5.9	-6.2	-6.3	-1.5
4-Dec	-6.7	-7.0	-7.6	-7.3	-6.5	-5.8	-5.2	-5.5	-5.6	-4.5	-2.5	-0.5	0.6	1.3	1.7	0.6	-0.8	-1.5	-2.0	-2.8	-3.2	-3.3	-3.0	-2.8	-3.3	1.7
5-Dec	-3.1	-2.3	-1.2	-1.3	-1.0	-1.2	-1.8	-1.7	-1.9	-1.6	-1.1	-1.2	-0.5	1.1	2.6	1.4	0.1	-0.5	-1.1	-1.2	-1.2	-1.1	-0.9	-0.6	-0.9	2.6
6-Dec	0.8	-0.4	-1.1	-0.8	-0.7	0.9	0.1	-0.4	0.0	0.7	2.2	3.0	3.1	2.5	1.6	1.0	0.0	-0.1	-0.1	-0.4	-0.6	-0.2	-0.3	-0.3	0.4	3.1
7-Dec	0.4	0.6	0.2	-0.4	-0.8	-1.0	-0.8	-1.4	-1.6	-1.2	-1.5	-0.7	-0.1	0.3	0.4	-0.5	-1.8	-2.9	-4.0	-4.4	-5.2	-5.8	-6.3	-6.9	-1.9	0.6
8-Dec	-8.2	-7.9	-7.4	-7.0	-7.3	-7.6	-7.7	-7.8	-8.1	-9.8	-7.6	-5.8	-4.6	-4.6	-5.3	-6.2	-6.9	-7.5	-7.5	-8.0	-8.4	-7.7	-8.4	-8.2	-7.3	-4.6
9-Dec	-9.6	-10.6	-10.5	-11.1	-10.9	-10.4	-10.4	-11.1	-11.9	-11.7	-9.8	-8.6	-7.4	-6.3	-6.6	-7.9	-8.2	-7.7	-7.6	-7.7	-8.2	-8.4	-7.4	-7.3	-9.1	-6.3
10-Dec	-7.1	-7.2	-7.3	-8.1	-8.6	-8.6	-9.0	-9.3	-9.6	-9.4	-8.6	-7.6	-7.3	-6.5	-5.6	-5.1	-5.2	-4.5	-4.5	-4.6	-4.9	-5.1	-5.9	-6.0	-6.9	-4.5
11-Dec	-6.6	-7.0	-7.7	-8.3	-8.8	-9.5	-10.8	-11.8	-12.8	-13.2	-12.6	-12.0	-11.2	-10.3	-10.2	-11.5	-12.9	-13.0	-12.2	-11.8	-11.8	-11.8	-12.2	-12.5	-10.9	-6.6
12-Dec	-12.9	-13.3	-13.0	-13.6	-14.0	-14.1	-14.3	-13.7	-13.2	-12.1	-9.5	-7.0	-5.9	-5.0	-4.5	-4.6	-5.0	-5.3	-5.0	-4.5	-3.4	-2.9	-2.6	-2.3	-8.4	-2.3
13-Dec	-1.9	-1.9	-2.2	-1.5	-2.1	-2.0	-2.4	-1.6	-0.8	-0.6	0.7	1.5	2.0	2.2	2.2	1.8	2.1	2.1	1.3	1.3	1.0	2.5	3.0	4.0	0.4	4.0
14-Dec	4.1	3.4	3.1	3.0	1.8	1.0	-0.6	-1.2	-1.4	-1.6	-1.4	-0.7	-0.3	-0.5	-1.3	-1.8	-2.5	-3.7	-4.3	-4.6	-5.1	-5.0	-5.9	-6.1	-1.3	4.1
15-Dec	-5.9	-5.6	-5.7	-5.6	-5.6	-6.2	-6.2	-6.3	-5.2	-4.3	-3.8	-2.4	-1.5	-0.6	-1.1	-1.4	-1.5	-1.7	-1.7	-1.8	-1.5	-1.8	-2.2	-2.3	-3.4	-0.6
16-Dec	-2.5	-2.8	-2.2	-0.9	-0.9	-1.3	-1.7	-2.0	-2.0	-2.1	-2.0	-1.9	-1.9	-1.9	-2.4	-3.4	-3.6	-3.7	-3.7	-4.1	-4.4	-4.8	-5.8	-6.0	-2.8	-0.9
17-Dec	-6.4	-6.7	-6.6	-6.4	-6.9	-7.4	-8.4	-9.3	-10.2	-10.4	-9.5	-7.5	-5.9	-5.0	-4.8	-6.1	-7.1	-7.6	-7.3	-7.0	-7.2	-7.2	-7.6	-7.4	-7.3	-4.8
18-Dec	-6.4	-6.7	-6.7	-7.3	-6.1	-5.5	-4.0	-4.3	-4.4	-4.8	-3.7	-1.6	-0.5	0.4	0.5	-0.1	-0.8	-2.5	-3.3	-4.0	-4.5	-4.6	-5.1	-5.8	-3.8	0.5
19-Dec	-6.4	-7.1	-8.3	-9.2	-10.2	-12.7	-11.8	-11.9	-12.0	-12.1	-12.0	-11.3	-10.3	-9.9	-9.6	-10.1	-10.5	-10.8	-10.8	-11.0	-10.9	-10.4	-10.1	-9.7	-10.4	-6.4
20-Dec	-9.2	-8.7	-8.0	-7.9	-7.6	-7.3	-7.1	-7.0	-7.0	-7.0	-6.7	-6.5	-6.3	-6.2	-5.9	-6.1	-6.2	-6.3	-6.5	-6.4	-6.1	-5.9	-5.6	-5.5	-6.8	-5.5
21-Dec	-4.8	-4.4	-2.7	-2.9	-3.1	-5.3	-5.8	-5.9	-5.8	-5.5	-3.9	-2.9	-1.7	-0.9	-1.0	-1.0	-1.5	-1.7	-2.3	-2.2	-1.9	-2.0	-2.2	-2.4	-3.1	-0.9
22-Dec	-2.7	-3.1	-3.6	-3.5	-3.3	-3.7	-3.6	-2.9	-2.2	-2.6	-2.1	-1.3	-1.3	-1.4	-1.6	-1.5	-2.5	-3.3	-3.6	-4.1	-4.4	-3.6	-1.7	-1.9	-2.7	-1.3
23-Dec	-2.7	-1.8	-1.4	-1.5	-1.5	-1.7	-1.9	-2.5	-3.0	-3.5	-3.4	-2.9	-2.3	-1.8	-1.6	-2.1	-3.0	-3.6	-4.4	-5.2	-6.2	-8.0	-8.3	-9.6	-3.5	-1.4
24-Dec	-10.4	-10.9	-11.6	-12.1	-11.8	-10.6	-9.9	-10.5	-10.6	-10.0	-8.3	-5.6	-2.6	-1.5	-1.2	-2.2	-3.1	-4.0	-5.4	-5.8	-6.2	-6.7	-7.2	-7.8	-7.3	-1.2
25-Dec	-7.0	-8.0	-9.1	-8.8	-8.9	-9.3	-10.4	-10.8	-11.4	-10.9	-8.7	-6.7	-4.7	-3.0	-2.5	-3.6	-4.4	-4.1	-4.7	-5.0	-3.6	-3.2	-5.3	-6.6	-6.7	-2.5
26-Dec	-6.5	-7.6	-8.8	-8.3	-7.7	-7.4	-7.3	-7.4	-6.9	-6.7	-5.5	-4.5	-3.3	-2.6	-2.7	-2.9	-3.7	-4.5	-5.2	-5.7	-5.8	-6.2	-4.2	-3.1	-5.6	-2.6
27-Dec	-6.2	-6.0	-2.7	-2.0	-3.3	-4.1	-5.0	-5.9	-5.4	-3.9	-1.6	-0.8	0.3	1.7	1.2	0.5	-0.1	-0.4	-0.5	0.6	0.9	-0.1	0.3	0.6	-1.7	1.7
28-Dec	0.0	-0.7	-1.7	-2.4	-3.7	-3.4	-3.9	-4.4	-4.1	-3.6	-3.5	-3.3	-1.0	-1.2	-1.2	-1.6	-2.8	-3.9	-4.8	-5.5	-5.9	-6.3	-6.8	-7.5	-3.5	0.0
29-Dec	-8.7	-9.2	-9.8	-11.4	-10.6	-11.7	-11.5	-10.0	-9.7	-8.6	-5.6	-3.1	-2.0	-1.6	-1.1	-1.8	-3.4	-4.0	-4.0	-4.2	-4.5	-4.6	-4.7	-3.9	-6.2	-1.1
30-Dec	-2.6	-3.0	-3.6	-3.4	-4.1	-4.4	-4.5	-2.7	-3.6	-3.3	-2.2	-1.5	-0.4	0.4	2.1	1.3	-0.1	-0.3	-0.6	-0.5	-0.8	-1.4	-1.9	-2.0	-1.8	2.1
31-Dec	-2.3	-2.6	-2.8	-3.2	-3.5	-4.0	-4.4	-4.8	-5.1	-4.8	-4.1	-2.7	-1.1	0.2	0.3	-0.3	-1.1	-2.2	-3.0	-3.6	-3.9	-2.0	-1.3	-1.8	-2.7	0.3
																								Diurnal Average		
																								Diurnal Maximum		



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature (AT) - C
Kirby South - December 2023





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Ambient Temperature (AT) - C
Kirby South - December 2023**

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	684	91.94	91.94
0 - 10	60	8.06	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association

Summary of Hour Averages

Relative Humidity (RH) - %

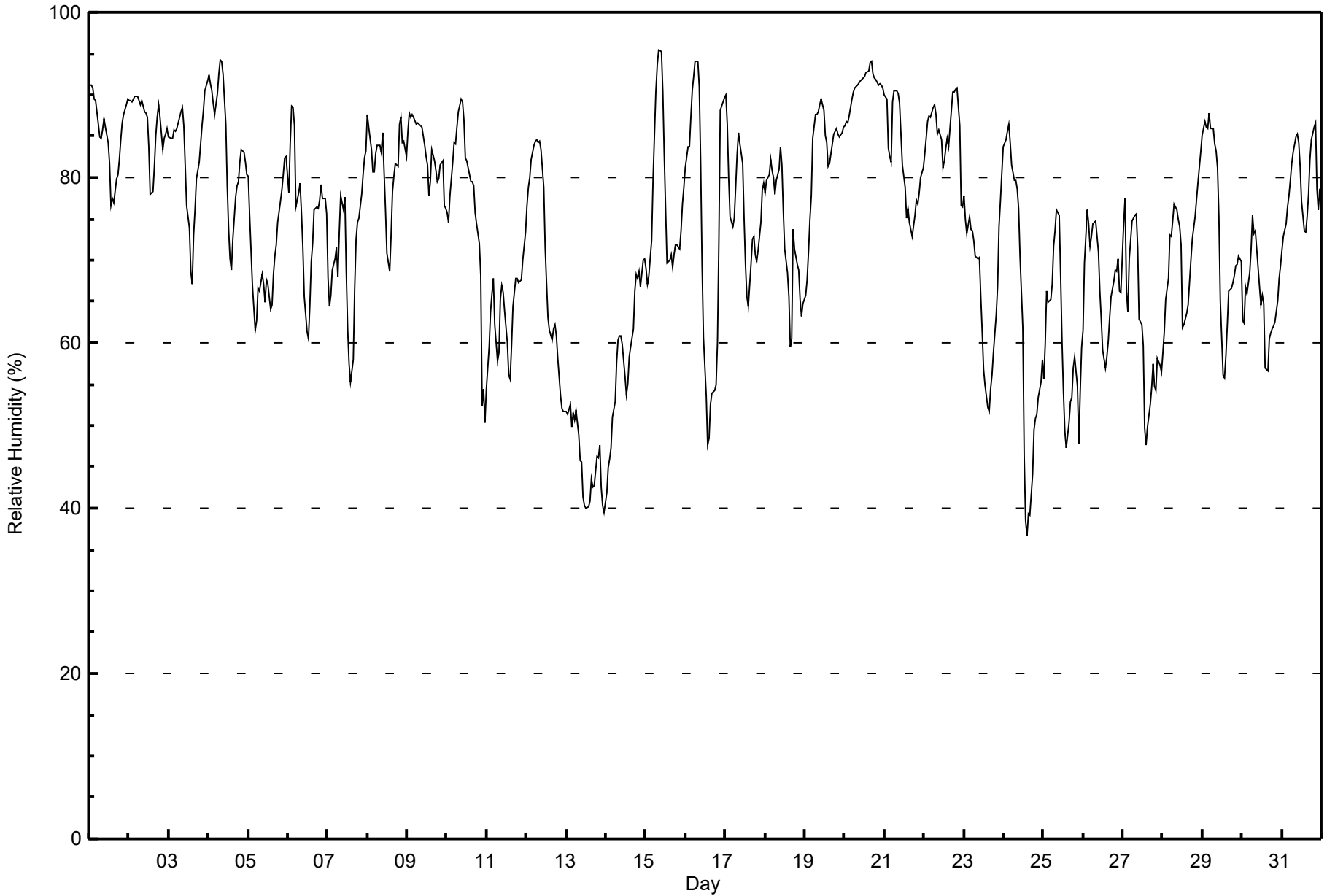
Kirby South - December 2023

Maximum Value: 95.5 % on Dec 15 09:00 Maximum Daily Average: 90.9 % on Dec 20																						Hours in Service: 744 Hours of Data: 744				
Minimum Value: 36.7 % on Dec 24 15:00 Minimum Daily Average: 45.6 % on Dec 13 Maximum Diurnal Average: 80.4 % at hour 9 Minimum Diurnal Average: 64.8 % at hour 15 Monthly Average: 73.75 % Percentiles: P ₁ = 40.4 P ₁₀ = 54.9 Q ₁ = 65.7 Median = 75.7 Q ₃ = 84.3 P ₉₀ = 88.8 P ₉₉ = 93.7																						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-Dec	91.3	91.1	90.8	89.5	89.4	86.4	85.0	84.7	85.8	87.0	86.1	84.3	81.7	76.7	77.4	76.9	79.8	80.4	82.2	84.5	86.6	87.6	88.9	89.5	85.1	91.3
2-Dec	89.3	89.3	89.2	89.8	89.8	89.8	89.4	88.8	89.3	88.0	87.8	87.3	83.8	77.9	78.4	81.3	85.1	87.3	88.8	87.3	83.3	84.7	85.3	85.9	86.5	89.8
3-Dec	85.0	84.7	84.7	85.7	85.6	85.9	86.6	87.9	88.5	86.2	81.5	76.7	73.8	68.6	67.2	73.0	76.1	79.9	81.9	84.1	86.3	88.1	90.5	91.8	82.5	91.8
4-Dec	92.3	91.3	90.5	89.1	87.6	90.2	92.6	94.3	94.1	92.6	86.5	79.1	73.7	70.1	68.9	72.5	77.6	78.9	79.4	81.9	83.4	83.0	81.8	80.3	83.8	94.3
5-Dec	80.2	75.4	66.9	64.2	61.6	62.7	66.6	66.3	68.3	67.1	65.0	67.7	67.2	64.0	64.6	68.3	70.6	71.8	74.6	77.1	78.5	80.3	82.4	82.6	70.6	82.6
6-Dec	78.1	84.3	88.6	88.4	86.3	76.4	78.1	79.3	75.7	71.5	65.6	61.3	60.5	64.5	69.9	72.1	76.1	76.4	76.3	77.3	79.1	77.4	77.4	75.7	75.7	88.6
7-Dec	67.8	64.4	65.7	68.8	70.2	71.5	68.0	73.4	77.9	76.0	77.6	68.4	61.8	57.5	55.3	57.9	66.7	72.5	74.5	75.0	77.9	80.4	82.4	83.3	70.6	83.3
8-Dec	87.6	86.2	83.3	80.7	80.7	82.9	83.9	83.8	83.0	85.5	80.7	76.2	70.9	68.7	73.1	78.2	80.2	81.7	81.4	86.5	87.3	84.2	84.4	82.6	81.4	87.6
9-Dec	85.6	87.7	87.2	87.6	87.3	86.5	86.7	86.4	86.3	86.1	83.8	82.6	81.6	77.8	79.5	83.4	82.0	80.8	79.4	79.9	81.5	82.1	76.6	76.3	83.1	87.7
10-Dec	75.7	74.6	77.8	81.9	84.3	84.1	86.1	87.9	89.5	89.2	86.9	82.4	82.0	81.1	79.5	79.5	79.0	75.8	74.4	72.0	68.2	52.4	54.5	50.4	77.0	89.5
11-Dec	54.4	59.6	63.6	65.9	67.8	62.3	57.8	58.8	65.3	67.0	66.1	63.8	60.0	56.1	55.6	59.7	64.5	67.7	67.7	67.2	67.4	67.7	70.0	73.4	63.7	73.4
12-Dec	76.5	78.9	80.1	82.2	84.0	84.4	84.5	84.2	84.4	83.3	78.8	71.5	67.1	63.1	61.4	60.3	61.6	62.2	60.8	58.2	53.6	52.0	51.7	51.8	69.9	84.5
13-Dec	51.7	51.3	52.5	49.9	51.5	50.8	51.8	48.8	45.8	45.7	41.4	40.4	40.0	40.2	40.9	43.5	42.5	42.7	46.2	46.0	47.6	42.6	40.4	39.5	45.6	52.5
14-Dec	41.9	45.0	45.9	47.3	51.0	52.9	57.7	60.3	60.8	60.8	59.8	56.0	53.7	55.0	58.3	59.4	61.7	66.3	68.3	67.8	68.6	66.8	70.0	70.1	58.6	70.1
15-Dec	69.0	67.2	68.2	72.4	79.6	85.2	90.3	93.5	95.5	95.2	90.4	82.6	76.1	69.7	70.0	70.7	69.1	70.7	71.9	71.8	71.3	73.6	76.8	78.8	77.5	95.5
16-Dec	81.2	83.7	83.8	87.3	90.5	92.2	94.0	94.0	91.1	81.9	69.5	60.7	53.6	47.7	48.4	52.6	53.9	54.3	55.0	60.0	72.3	88.2	88.6	89.7	73.9	94.0
17-Dec	90.0	86.4	80.0	75.3	74.1	75.1	78.9	82.7	85.5	84.0	81.7	75.1	69.5	65.6	64.5	69.7	72.5	72.8	70.7	69.9	71.1	74.6	78.5	79.3	76.2	90.0
18-Dec	78.1	79.7	80.4	82.2	80.9	80.1	77.9	79.6	81.0	83.7	81.5	75.9	71.4	68.5	65.7	59.5	60.6	73.7	71.4	69.5	68.9	65.3	63.2	64.8	73.5	83.7
19-Dec	65.7	67.6	71.1	75.0	77.9	84.8	87.6	87.6	88.1	88.8	89.4	88.2	85.2	84.3	81.3	81.7	82.9	85.3	85.6	86.0	85.2	84.9	85.4	86.1	82.7	89.4
20-Dec	86.2	86.8	86.6	87.5	89.4	90.3	90.8	91.0	91.3	91.7	91.9	92.0	92.1	92.8	92.9	93.9	94.0	92.6	92.0	91.8	91.2	91.4	91.1	90.8	90.9	94.0
21-Dec	90.0	89.5	83.6	82.5	81.8	89.2	90.6	90.5	90.2	89.0	85.2	81.6	78.8	75.1	76.3	74.5	73.6	72.9	75.5	77.3	76.8	78.1	80.0	81.2	81.8	90.6
22-Dec	82.8	84.7	86.8	87.5	87.3	88.5	88.9	87.6	85.2	85.7	84.6	81.1	82.0	83.6	84.8	83.8	88.2	90.3	90.4	90.8	90.8	86.3	76.6	76.5	85.6	90.8
23-Dec	77.8	74.9	73.1	75.2	73.7	73.6	72.4	70.6	70.2	70.3	65.6	61.3	56.8	54.9	52.2	51.7	54.5	56.2	58.8	63.3	66.7	74.1	77.1	80.4	66.9	80.4
24-Dec	83.8	84.6	85.7	86.4	84.3	81.5	79.7	79.7	78.6	76.2	70.5	61.8	46.2	38.5	36.7	39.3	39.1	44.0	49.4	50.8	51.3	53.4	55.3	58.0	63.1	86.4
25-Dec	55.5	59.9	66.2	65.0	65.3	67.1	71.8	73.5	76.0	75.4	68.1	60.1	54.0	49.3	47.3	50.3	52.8	53.4	56.9	58.2	54.8	47.8	54.2	59.5	60.1	76.0
26-Dec	61.6	69.6	76.1	74.4	71.8	72.9	74.3	74.8	72.9	71.0	66.3	62.9	59.2	56.9	58.3	60.3	63.1	65.5	67.4	68.7	68.7	70.2	66.2	66.2	67.5	76.1
27-Dec	74.5	77.5	66.3	63.8	70.3	74.7	75.1	75.5	75.6	71.6	62.8	62.2	59.6	49.6	47.6	49.9	52.5	54.6	57.4	54.8	54.2	58.2	57.3	56.4	62.6	77.5
28-Dec	58.8	61.3	65.3	67.8	73.0	72.8	74.7	76.9	76.0	74.9	74.0	71.9	61.8	62.2	63.5	64.6	67.3	70.0	72.6	75.2	77.4	79.4	81.2	83.1	71.1	83.1
29-Dec	85.0	86.8	86.1	86.0	87.7	85.9	86.0	84.0	83.2	81.1	75.3	65.1	56.1	55.8	58.5	62.2	66.2	66.7	67.2	68.2	69.3	69.6	70.5	69.8	73.9	87.7
30-Dec	62.7	62.4	66.7	66.0	68.4	71.4	75.5	73.2	73.5	71.3	66.7	64.5	65.7	64.8	56.9	56.5	60.4	61.2	61.7	62.0	62.5	65.1	67.8	69.4	65.7	75.5
31-Dec	71.2	72.9	74.3	76.4	77.8	79.7	81.7	83.1	84.8	85.2	84.2	81.3	77.2	73.5	73.3	75.3	78.1	82.3	84.5	86.1	86.7	78.6	76.0	78.6	79.3	86.7
75.2 76.1 76.4 76.8 77.8 78.4 79.5 80.1 80.4 79.4 76.0 71.8 67.8 65.0 64.8 66.5 68.8 70.7 71.8 72.6 73.2 73.2 73.6 74.2																								Diurnal Average		
92.3 91.3 90.8 89.8 90.5 92.2 94.0 94.3 95.5 95.2 91.9 92.0 92.1 92.8 92.9 93.9 94.0 92.6 92.0 91.8 91.2 91.4 91.1 91.8																								Diurnal Maximum		



Wood Buffalo Environmental Association
Hourly Averages

Relative Humidity (RH) - %
Kirby South - December 2023





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Relative Humidity (RH) - %
Kirby South - December 2023**

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	5	0.67	0.67
40 - 60	112	15.05	15.73
60 - 80	344	46.24	61.96
80 - 100	283	38.04	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed (WS) - km/h

Kirby South - December 2023

Maximum Speed: 27 km/h on Dec 11 05:00	Maximum Daily Speed Average: 18.1 km/h on Dec 23	Hours in Service: 744
Minimum Speed Value: 2 km/h on Dec 29 06:00	Minimum Daily Speed Average: 5.8 km/h on Dec 28	Hours of Data: 744
Maximum Diurnal Speed Average: 11.3 km/h at hour 19	Minimum Diurnal Speed Average: 10.1 km/h at hour 4	Hours of Missing Data: 0
Monthly Average Velocity: 10.6 km/h 241.4 deg	Percentiles: P ₁ = 5 P ₁₀ = 9 Q ₁ = 11 Median = 13 Q ₃ = 16 P ₉₀ = 19 P ₉₉ = 25	Percent Operational Time: 100.0

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24				
1-Dec	WSW8	WSW8	WSW9	WSW8	WSW8	WSW5	WSW5	SW4	SSW4	SSW7	SSW9	SW9	SW10	SW10	SSW8	SSW9	SSW11	SSW13	SSW13	SSW14	SSW13	SSW12	SW13	SW13	SW8.9	SSW14		
2-Dec	SW13	SSW13	SW12	SW12	SW11	SW12	SW11	SW11	SW9	SW9	SW9	SSW8	SSW8	SW9	SW10	SW9	WSW12	WSW10	WSW11	WSW10	WSW10	WSW11	W11	W9	SW10.0	SW13		
3-Dec	W9	WNW9	WSW7	WSW7	SW8	WSW9	WSW11	WSW13	WSW11	SW11	WSW10	WSW10	SW9	SW9	SSW8	S9	S10	S11	SSW13	SSW13	SSW12	SSW12	SSW13	SW13	SW9.3	SSW13		
4-Dec	SW14	SW12	SW11	SW11	SW11	SW10	SW11	SW10	WSW10	WSW12	WSW14	W17	W19	W20	W13	WSW12	WSW11	WSW13	WSW12	SW9	SW9	SW10	SW11	SW11	WSW11.5	W20		
5-Dec	SSW12	S12	S14	SSW14	S18	S17	SSW15	S15	SSW16	SSW17	SW19	SW16	WSW16	WSW15	W14	WSW13	SSW16	WSW14	WSW12	WSW14	WSW13	WSW13	WSW12	WSW10	SW12.7	SW19		
6-Dec	W12	WSW12	WSW13	WSW13	WSW14	W17	WSW16	WSW14	W14	W14	W15	W17	W13	WSW12	WSW12	WSW12	WSW10	SW10	WSW9	SW8	WSW5	W7	WSW8	WNW9	WSW11.5	W17		
7-Dec	NW11	NW10	WNW9	WNW8	WNW9	W12	WNW12	WNW13	WNW14	WNW15	WNW12	NW13	NW14	NW14	WNW12	WNW9	W10	WNW11	WNW8	NW10	WNW10	WNW9	WNW9	W9	WNW10.6	WNW15		
8-Dec	WSW8	W9	W11	WNW10	WNW10	WNW10	WNW9	WNW11	W9	WSW11	W9	W12	W14	WNW14	W15	W14	W14	W11	WSW9	WSW11	WSW9	W14	W10	W12	W10.8	W15		
9-Dec	WSW9	WSW11	WSW12	WSW11	W10	W14	W15	W14	WSW9	WSW8	WSW10	WSW13	WSW12	SW9	SW11	SSW10	SSW10	SSW12	SSW13	SSW12	SSW11	SSW13	SSW12	SSW13	SW10.2	W15		
10-Dec	S14	S13	S13	SSW13	SSW15	SSW17	SSW17	SW18	SW15	SW15	SW13	SW15	WSW16	W15	WNW16	W14	W16	WNW17	WNW19	WNW20	WNW23	WNW22	WNW20	WNW23	WSW12.8	WNW23		
11-Dec	NW21	NW26	NW27	NW26	NW27	NNW26	NNW24	NNW21	NW15	NW12	NW16	NNW15	NNW14	W13	WSW9	SW9	SW14	SW13	SW12	SW11	SW12	SW11	SW13	WNW13.0	NW27			
12-Dec	SW11	SW10	SW10	WSW11	WSW13	WSW13	WSW13	WSW12	WSW15	WSW15	SW13	SW14	SW13	SW13	SW16	SW16	SW16	SW15	SW15	SW15	SW16	SW16	SW17	SW16	SW14.0	SW17		
13-Dec	WSW14	WSW12	WSW12	SW14	SW16	SW14	SW15	SW14	SW14	SW15	SW14	SW14	SW13	SW12	SW12	SW12	SW13	SW13	SW10	WSW11	WSW10	W11	WNW12	W13	WSW12.6	SW16		
14-Dec	WNW13	W12	WNW15	WNW14	W13	W15	WSW11	W14	W14	W14	W15	W16	W13	WSW8	WSW9	WSW10	WSW10	WSW11	WSW12	WSW11	WSW11	WSW12	SW11	SW11	W11.7	W16		
15-Dec	SW12	SW12	SW11	SW11	SW12	WSW14	SW13	SW11	SW14	SW16	SW16	SW19	SW18	SSW16	SSW20	SSW24	SW25	SW25	SSW21	SW19	SW18	WSW16	WSW16	WSW15	SW16.1	SSW25		
16-Dec	WSW14	WSW17	WSW15	W21	WNW19	WNW18	WNW17	WNW16	WNW15	NW14	NW14	NW18	NW18	NW14	WNW11	W11	W12	W11	WSW9	WSW5	W10	NW12	NW12	WNW15	WNW13.0	W21		
17-Dec	WNW17	WNW20	NW23	NW26	NW21	NW17	NW13	WNW13	W13	WSW10	WSW11	WSW14	WSW19	WSW18	WSW14	SW11	SW11	SW14	SW16	SW17	SW14	SW15	SW12	SW14	W12.3	NW26		
18-Dec	SW16	SW14	SW14	WSW13	WSW16	WSW17	W15	W15	W18	W15	W14	WNW14	WNW13	W14	WNW11	WNW10	W13	W12	WNW13	WNW11	NW9	NW11	NW9	NNW7	W11.7	W18		
19-Dec	NNW7	N7	NNE6	NNE6	NE5	NE4	ENE8	ENE8	E8	E9	E9	E9	E9	E9	ESE10	ESE12	ESE13	ESE14	SE14	SE14	SE15	SSE13	SE14	SSE15	ESE7.5	SSE15		
20-Dec	SSE16	SSE16	S16	S16	S16	S15	SSW15	SSW17	SSW17	SSW15	SSW16	SW15	SW15	SW13	SW13	SW14	SW14	SW15	SW20	SW20	SW18	SW15	WSW15	WSW15	SSW14.6	SW20		
21-Dec	WSW15	WSW13	W17	W14	W11	WSW13	WSW12	WSW11	WSW10	SW8	SW11	SW13	SW14	SW18	SSW16	SSW15	SSW16	SSW18	SSW18	SSW19	SSW19	SSW18	SW16	SW17	SW13.5	SSW19		
22-Dec	SSW17	SW16	SW16	SSW14	SW14	SW13	SSW14	SSW15	SSW14	SSW16	SW15	SSW15	SW13	SSW16	SSW15	SW15	SW15	SW13	SW14	WSW14	WSW16	W16	WNW14	W18	SW14.0	W18		
23-Dec	W15	WNW17	W19	W19	WNW19	WNW18	WNW20	WNW22	WNW21	WNW21	WNW20	WNW21	WNW24	WNW22	WNW21	WNW20	WNW19	WNW22	WNW19	W16	W15	WSW12	W14	WSW12	WNW18.1	WNW24		
24-Dec	WSW12	WSW10	SW9	WSW12	WSW13	SW11	SW11	SW12	SW15	WSW18	WSW17	WSW16	WSW18	WSW20	WSW17	SW14	SW15	SW16	SW14	SW14	SW16	SW17	WSW17	WSW17	WSW14.6	WSW20		
25-Dec	WSW15	WSW16	WSW15	WSW15	WSW15	WSW16	WSW17	WSW14	WSW13	WSW12	SW10	SW8	SW7	SW7	SSW9	SSW9	SW9	SSW10	SSW13	SSW14	SSW14	SSW14	SSW14	SSW9	SW11.6	WSW17		
26-Dec	SSW13	SSW15	SSW14	SSW13	SSW15	SSW17	SSW19	SW19	SW20	SW17	SSW15	SW16	SW16	SW15	SW14	WSW16	WSW16	WSW16	WSW16	WSW14	WSW12	WSW12	WSW13	W16	W14	SW14.5	SW20	
27-Dec	WSW12	WSW13	W16	W14	WSW12	SW12	SW10	SW10	SW13	SSW16	SSW17	SSW19	SSW20	SSW20	SSW20	SSW16	SSW15	S15	S16	S19	SSW18	SSW15	S16	S20	SSW13.7	SSW20		
28-Dec	S18	SSW14	SSW9	SW6	SSW6	SSW9	SW10	WSW10	WNW6	W6	WNW8	NW9	NNW7	WNW11	WNW10	NW9	NW11	NW11	NW10	NNW7	N7	NNW8	NW7	NW5	W5.8	S18		
29-Dec	N5	NNW4	NW3	W4	WNW4	WSW2	WSW5	WSW7	SW6	SW6	SW9	SW12	SW13	SW13	WSW13	SW11	SW10	SW9	SW10	SW13	SW12	SW11	SW10	SSW12	WSW7.9	SW13		
30-Dec	SSW14	SSW15	SSW11	SSW14	SSW13	SSW12	SSW13	SSW18	SSW18	SSW17	SSW17	SSW17	SSW21	SSW20	SSW21	S21	S19	S21	SSW21	SSW20	SSW25	SSW22	SW23	SW24	SSW18.0	SSW25		
31-Dec	SW23	SW21	SW20	SW18	SW17	SW11	SW13	SW14	WSW13	WSW14	WSW12	WSW11	WSW11	WSW9	WSW11	WSW11	WSW11	WSW13	WSW13	WSW13	WSW13	WSW13	WSW13	W17	W20	WNW18	WSW14.0	SW23

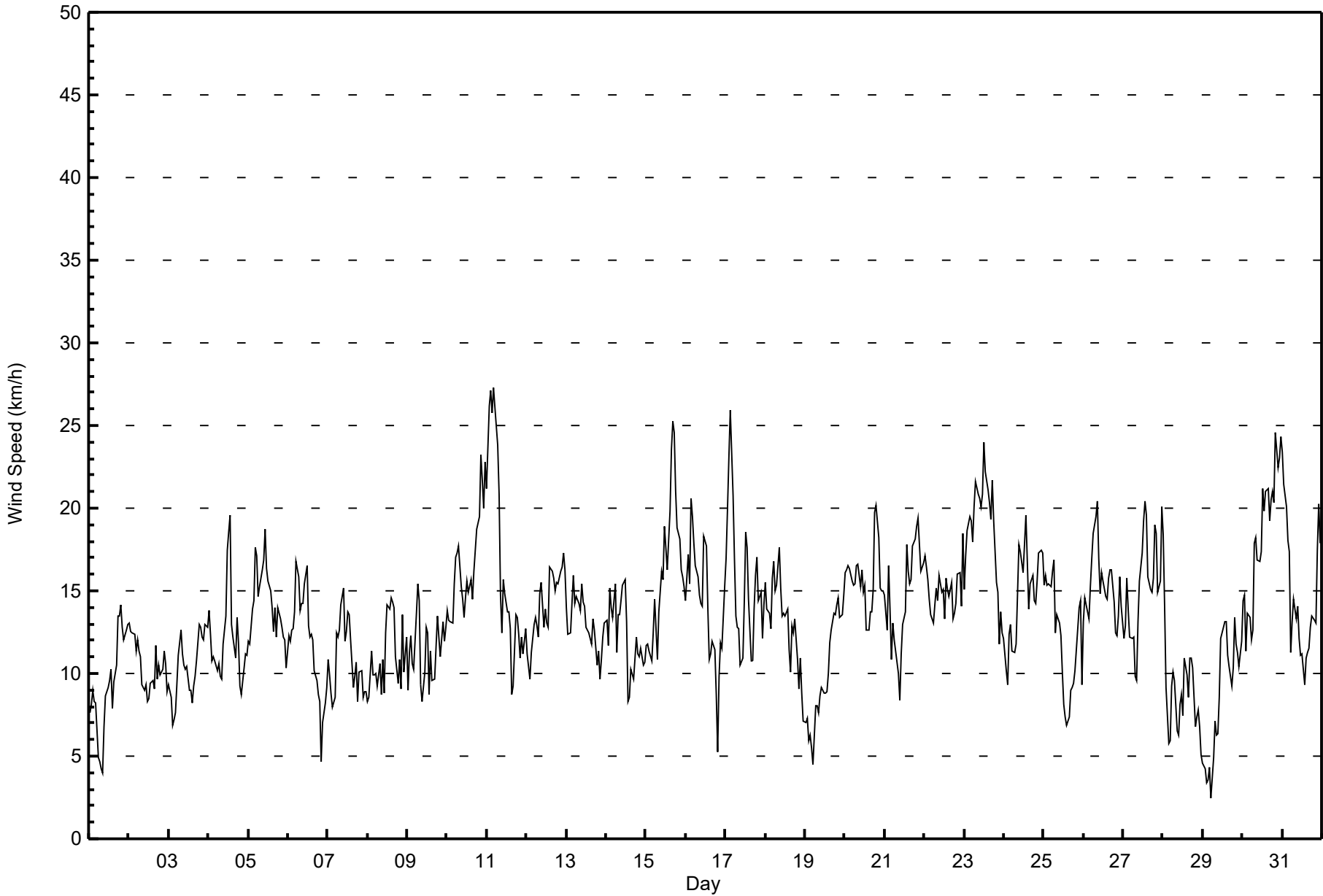
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SSW23	NW26	NW27	NW26	NW27	NNW26	NNW24	WNW22	WNW21	WNW21	WNW20	WNW21	WNW24	WNW22	WNW21	SSW24	SSW25	SW25	SSW21	SSW20	SSW25	SSW22	SW23	SW24	Diurnal Maximum		

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



Wood Buffalo Environmental Association
Hourly Averages

Wind Speed (WS) - km/h
Kirby South - December 2023





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Wind Speed (WS) - km/h
Kirby South - December 2023**

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	16	2.15	2.15
6 - 11	225	30.24	32.39
12 - 19	446	59.95	92.34
20 - 28	57	7.66	100.00
29 - 38	0	0.00	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed (WS) - km/h
Kirby South - December 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	1	0	2	0	0	0	0	0	0	0	1	1	6	1	1	2	1	16
6 - 11	2	2	0	2	6	1	0	0	2	20	69	61	19	25	11	5	225	
12 - 19	0	0	0	0	0	3	4	4	18	83	120	103	60	37	14	0	446	
20 - 28	0	0	0	0	0	0	0	0	3	13	9	1	3	17	8	3	57	
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Totals	3	2	2	2	6	4	4	4	23	117	199	171	83	80	35	9	744	

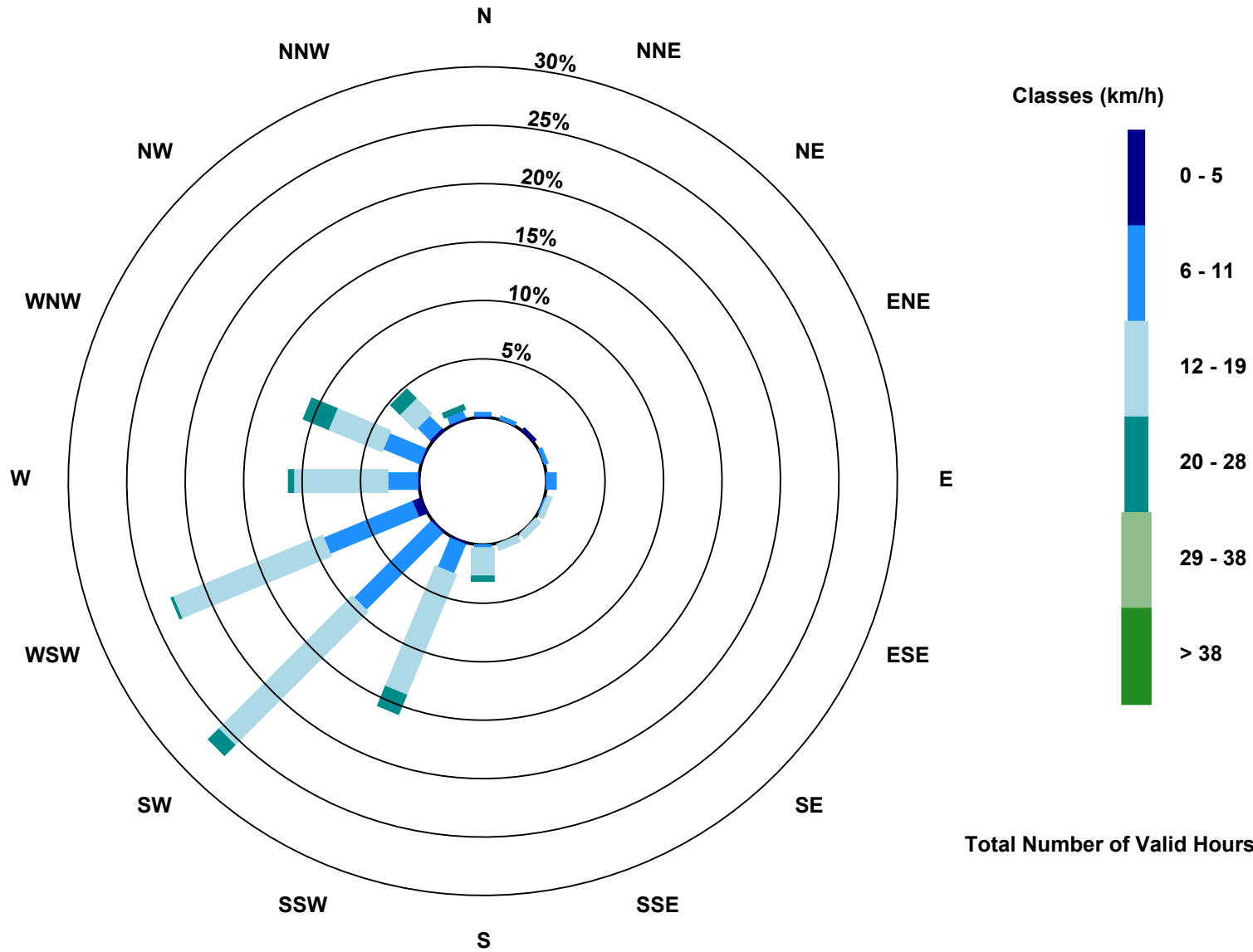
Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Dec 2023

Wind Speed (WS) - km/h
Kirby South



Total Number of Valid Hours: 744



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Speed (WS) - km/h
Kirby South - December 2023

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 7 km/h on Dec 11 06:00 Minimum Value: 1 km/h on Dec 1 07:00 Percentiles: P ₁ = 1 P ₁₀ = 2 Q ₁ = 2 Median = 3 Q ₃ = 3 P ₉₀ = 4 P ₉₉ = 6																	Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0								
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Dec	2	2	1	1	2	1	1	1	1	1	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3
2-Dec	3	3	3	3	2	2	3	2	3	2	2	2	2	2	2	2	2	2	2	2	3	2	2	3	3
3-Dec	2	2	2	2	2	2	3	2	2	2	2	2	2	2	2	2	2	2	3	3	2	2	3	3	3
4-Dec	3	2	2	2	2	2	2	2	2	2	3	4	4	4	4	4	2	2	2	1	1	2	2	2	2
5-Dec	2	2	3	4	4	4	3	4	4	4	4	4	4	4	3	2	2	2	2	2	2	2	2	2	2
6-Dec	2	2	2	2	2	3	3	2	3	3	3	3	4	3	2	2	2	2	1	1	1	2	1	2	4
7-Dec	2	2	2	1	2	2	2	2	3	2	2	3	3	2	2	2	2	2	2	2	2	1	1	1	3
8-Dec	2	2	1	2	2	2	2	1	3	2	2	2	3	3	3	3	3	3	2	2	2	3	3	3	3
9-Dec	2	2	2	2	3	3	3	3	2	2	2	3	3	2	2	2	2	3	3	3	3	3	3	3	3
10-Dec	3	3	3	3	4	4	4	4	3	3	3	3	3	3	3	2	3	3	3	4	7	5	5	5	7
11-Dec	5	6	7	6	6	7	6	5	3	2	3	3	3	3	3	2	2	3	3	3	2	3	2	3	7
12-Dec	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
13-Dec	3	2	2	3	3	3	3	3	3	3	3	3	3	2	2	3	3	2	2	2	2	3	3	2	3
14-Dec	3	2	4	3	3	2	3	3	2	3	3	3	3	2	2	2	2	3	2	2	2	2	2	2	4
15-Dec	2	2	2	2	2	3	2	2	3	3	4	4	4	4	4	6	6	6	5	4	4	4	3	4	6
16-Dec	3	3	3	4	4	3	3	3	3	4	3	4	4	3	2	3	3	4	3	2	3	2	2	3	4
17-Dec	3	4	5	7	5	4	3	2	2	2	2	4	4	4	3	2	2	3	3	3	3	3	2	3	7
18-Dec	3	3	3	3	3	3	3	4	3	3	3	2	3	2	2	2	3	2	2	3	2	2	2	2	4
19-Dec	2	2	1	1	2	2	2	2	2	2	2	2	2	2	3	3	4	3	3	3	3	3	3	4	4
20-Dec	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	3	4	5	5	5	4	3	2	5
21-Dec	3	2	3	3	2	2	2	2	2	2	3	3	3	4	3	3	4	4	4	4	4	4	4	4	4
22-Dec	4	4	3	3	3	3	3	3	3	4	3	3	3	4	3	3	3	3	3	2	2	3	3	3	4
23-Dec	3	3	4	4	4	3	4	5	5	4	4	4	6	5	5	4	4	4	3	3	3	1	3	2	6
24-Dec	2	2	1	3	2	2	2	2	3	3	3	3	4	4	4	3	3	3	3	4	3	3	2	4	4
25-Dec	2	2	2	2	2	3	2	2	2	2	2	2	2	2	2	1	2	1	2	2	2	3	3	2	3
26-Dec	3	3	3	3	3	4	4	4	4	4	3	4	4	4	3	3	3	3	3	3	2	2	2	3	4
27-Dec	2	2	2	3	2	3	2	1	1	3	3	4	4	5	5	4	3	3	3	4	4	3	3	5	5
28-Dec	5	3	2	1	2	2	2	2	2	3	2	2	2	2	2	1	2	2	2	2	2	2	1	2	5
29-Dec	2	1	2	2	2	1	2	1	1	2	2	2	3	3	2	2	2	1	2	2	2	2	1	2	3
30-Dec	3	3	2	3	3	3	3	4	4	4	4	5	5	5	5	5	5	5	5	5	6	5	5	5	6
31-Dec	5	5	4	4	4	3	3	3	3	2	3	2	2	2	2	2	2	2	2	2	2	3	4	3	5
Diurnal Maximum																									



Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
Kirby South - December 2023

Direction of Maximum Speed: 317 deg on Dec 11 05:00 Direction of Maximum Daily Speed Average: 287.5 deg on Dec 23	Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0
Direction of Minimum Speed: 244 deg on Dec 29 06:00 Direction of Minimum Daily Speed Average: 5.8 deg on Dec 28	Percent Operational Time: 100.0
Monthly Average Direction: 241.4 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-Dec	240	239	243	243	242	242	240	230	211	206	205	216	219	215	208	203	200	202	201	199	195	213	214	214	215.3
2-Dec	217	210	223	225	231	227	227	224	229	219	221	211	205	218	227	235	240	241	242	253	256	250	277	271	232.1
3-Dec	279	284	256	247	234	238	237	237	238	234	237	239	232	214	202	176	184	191	201	199	202	201	207	214	221.9
4-Dec	227	231	232	235	234	231	231	239	240	250	272	277	280	274	250	247	241	240	228	220	223	220	220	220	243.6
5-Dec	198	187	191	192	185	183	204	191	197	204	217	233	237	252	268	248	251	252	243	244	243	245	243	248	221.6
6-Dec	259	239	246	248	253	264	255	254	265	271	276	278	272	245	248	242	238	232	240	233	247	279	256	291	256.6
7-Dec	320	317	303	293	290	280	285	290	286	282	291	305	308	304	295	290	273	283	297	307	296	292	282	268	293.3
8-Dec	256	269	281	287	289	285	288	282	272	239	262	277	281	284	275	273	268	261	257	247	246	276	266	271	271.3
9-Dec	248	240	252	247	260	274	273	266	256	251	246	242	239	230	230	212	205	204	200	194	200	205	195	193	232.0
10-Dec	183	181	189	199	208	205	210	220	218	225	228	234	244	262	282	277	274	284	286	287	294	295	293	300	251.1
11-Dec	308	310	311	314	317	327	329	329	311	305	314	299	286	282	281	238	225	228	225	225	222	216	224	220	291.6
12-Dec	227	234	233	240	244	239	241	240	240	239	233	229	228	225	230	227	228	226	227	234	229	225	225	232	231.9
13-Dec	237	239	237	227	228	235	236	235	231	232	230	226	218	221	225	232	228	236	236	241	249	266	282	279	236.8
14-Dec	286	275	282	286	277	270	258	265	273	263	271	277	276	255	240	251	257	244	241	237	238	243	230	228	261.5
15-Dec	232	231	232	232	232	239	232	228	227	226	228	221	215	210	207	208	214	214	213	220	232	237	241	241	223.7
16-Dec	257	252	253	278	282	286	284	287	290	315	323	322	319	306	292	280	278	271	254	252	270	315	312	296	287.9
17-Dec	285	290	312	321	322	323	308	294	279	250	245	250	255	256	245	219	215	224	229	230	230	223	219	222	265.1
18-Dec	225	230	232	239	251	253	267	264	271	273	279	291	288	281	286	285	269	265	285	296	304	324	322	334	271.6
19-Dec	346	352	14	19	37	55	75	75	83	87	91	89	91	82	112	117	118	118	126	124	140	149	140	148	104.2
20-Dec	151	164	174	178	184	190	194	204	205	212	212	218	218	215	223	221	218	216	217	217	218	227	239	240	206.4
21-Dec	241	247	277	280	270	239	242	247	239	223	225	226	220	219	212	205	197	199	207	207	211	211	215	214	225.1
22-Dec	211	217	217	212	215	217	211	208	210	213	218	208	214	209	211	220	224	227	224	239	246	267	291	270	224.5
23-Dec	278	286	280	277	284	285	295	301	302	295	297	300	301	298	296	293	291	291	290	276	265	250	261	247	287.5
24-Dec	243	239	229	240	241	235	222	229	236	239	241	246	248	247	242	230	233	225	229	230	233	236	238	242	236.9
25-Dec	238	239	243	242	236	247	245	242	241	241	239	235	234	232	220	219	209	200	225	210	199	197	204	204	228.7
26-Dec	201	204	205	207	206	210	212	220	220	222	213	216	222	219	233	239	238	242	244	244	245	242	273	271	226.2
27-Dec	240	257	279	277	241	227	222	226	220	218	206	205	206	202	205	210	198	190	187	181	193	201	191	189	211.6
28-Dec	191	213	210	220	194	208	236	249	287	268	293	305	327	291	293	309	304	313	319	339	1	327	325	315	276.1
29-Dec	350	330	322	272	286	244	247	242	228	233	232	228	231	235	240	236	234	234	231	236	234	232	229	213	238.0
30-Dec	209	207	206	205	207	205	195	195	198	202	197	202	197	198	192	189	187	189	195	213	211	213	216	216	201.9
31-Dec	218	220	225	232	230	224	234	232	241	247	253	251	257	253	243	240	238	241	242	246	250	273	275	282	242.7

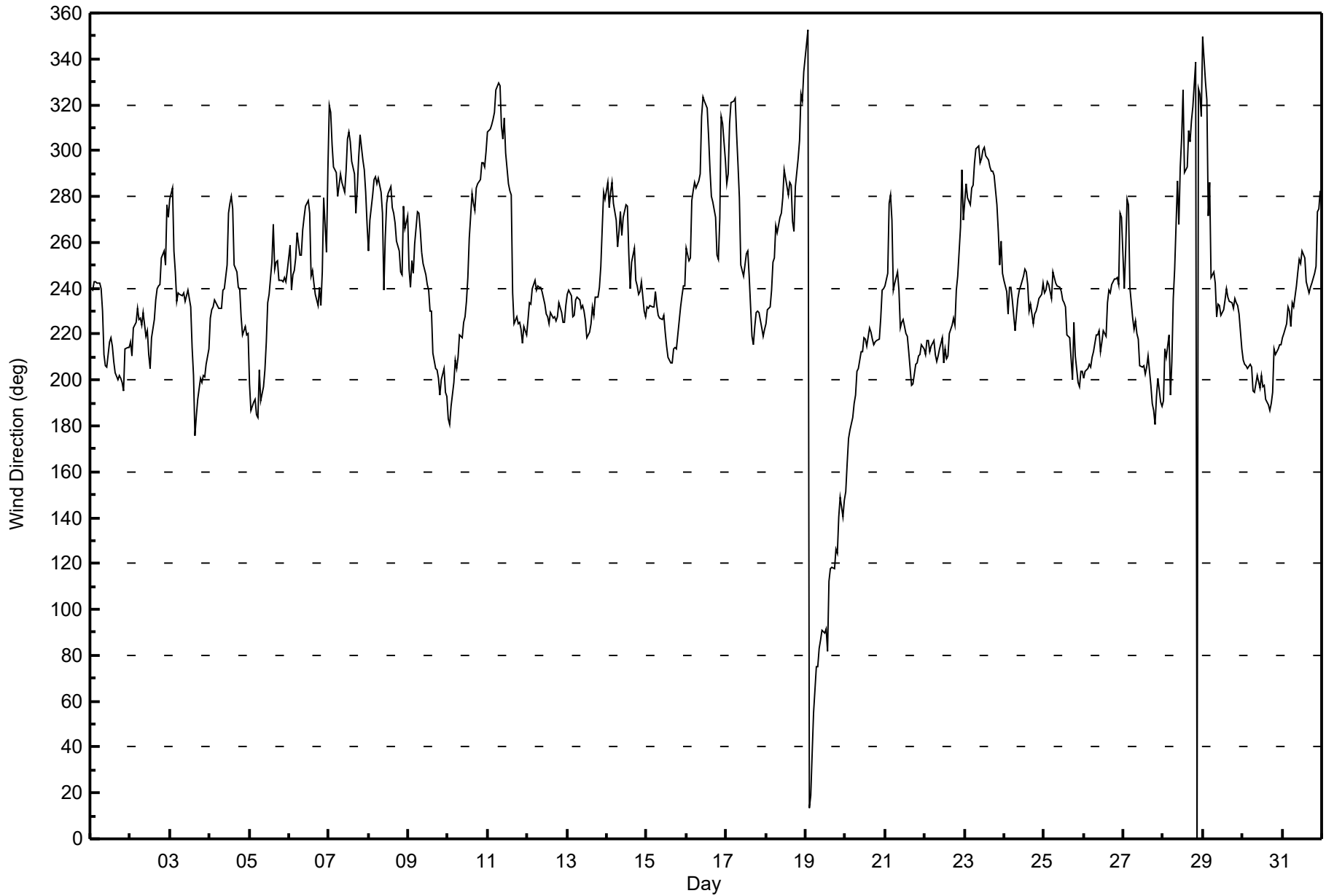
238.4 242.0 248.1 250.5 247.8 246.7 245.9 245.4 244.6 241.8 244.0 247.9 247.7 244.8 241.6 234.4 232.6 231.5 231.6 231.1 232.9 239.9 242.6 241.8
 Diurnal Average

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



Wood Buffalo Environmental Association
Hourly Averages

Wind Direction (WD) - deg
Kirby South - December 2023





Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Direction (WD) - deg
Kirby South - December 2023

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 50 deg on Dec 29 06:00											Hours in Service: 744 Hours of Data: 744 Hours of Missing Data: 0 Hours of Calibration: 0 Percent Operational Time: 100.0														
Minimum Value: 6 deg on Dec 29 10:00																									
Percentiles: P ₁ = 7 P ₁₀ = 10 Q ₁ = 11 Median = 13 Q ₃ = 14 P ₉₀ = 16 P ₉₉ = 29																									
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Dec	11	13	8	7	9	9	8	11	8	11	14	15	14	14	14	14	13	14	13	15	15	14	14	13	15
2-Dec	15	14	16	13	13	13	13	18	16	18	14	17	16	16	14	12	11	11	9	13	17	10	13	19	19
3-Dec	12	12	17	13	14	15	13	12	13	12	12	12	16	16	17	13	12	13	14	14	13	14	14	16	17
4-Dec	13	12	11	12	14	13	14	14	11	11	13	14	12	10	13	12	11	11	11	11	9	8	8	11	14
5-Dec	13	12	14	15	15	15	16	16	16	15	16	14	15	17	14	11	11	13	10	10	9	10	10	11	17
6-Dec	15	10	9	11	16	12	13	12	13	12	12	11	15	15	11	11	11	12	12	10	16	17	15	16	17
7-Dec	15	12	14	13	13	9	9	9	10	10	11	14	13	12	13	11	10	14	12	11	11	11	9	15	15
8-Dec	16	13	8	10	10	9	14	10	13	11	18	9	12	12	11	11	11	13	15	10	14	12	18	14	18
9-Dec	14	10	11	11	16	11	10	12	13	15	16	11	12	16	13	11	12	13	13	13	16	15	14	14	16
10-Dec	14	14	16	15	15	14	15	14	14	14	14	15	15	12	18	11	9	11	10	10	13	12	13	13	18
11-Dec	14	14	14	13	13	15	16	14	14	13	13	14	14	11	14	18	12	11	13	13	15	14	12	13	18
12-Dec	13	10	12	11	9	10	11	12	11	11	14	13	14	15	13	13	13	13	14	13	13	13	13	14	15
13-Dec	13	13	13	14	13	13	13	12	14	13	12	13	15	14	14	15	14	13	11	11	16	13	13	10	16
14-Dec	11	14	18	10	12	9	14	13	8	12	10	11	11	13	13	11	11	15	8	10	11	14	11	10	18
15-Dec	11	12	12	12	13	12	12	13	14	13	14	14	13	14	13	14	14	14	16	15	14	13	12	26	26
16-Dec	16	12	14	11	10	10	10	10	10	17	13	14	14	14	13	13	9	14	19	30	22	17	13	13	30
17-Dec	10	11	15	13	13	14	15	12	10	18	14	15	12	13	15	14	13	13	13	13	14	14	13	14	18
18-Dec	14	15	14	14	12	11	13	13	11	12	16	12	13	11	12	11	12	15	10	14	14	15	16	21	21
19-Dec	18	19	16	16	11	42	13	15	15	15	16	18	18	16	20	16	17	15	16	16	15	16	15	16	42
20-Dec	15	15	17	15	15	16	15	16	15	16	16	16	16	19	17	15	15	14	14	14	15	14	14	11	19
21-Dec	12	15	12	9	14	7	9	9	9	12	11	13	14	14	14	14	13	14	14	14	14	14	15	14	15
22-Dec	14	14	13	13	14	13	13	12	15	14	15	15	14	15	15	17	15	14	13	14	9	19	13	10	19
23-Dec	10	11	12	11	11	11	12	13	13	12	13	13	14	13	12	11	10	10	9	10	12	7	13	13	14
24-Dec	7	9	9	9	7	13	12	13	12	11	12	13	13	13	12	14	12	13	14	12	12	11	11	9	14
25-Dec	10	10	9	9	10	13	10	12	10	11	10	12	16	14	14	14	11	12	10	12	13	14	13	12	16
26-Dec	16	15	13	15	15	14	14	14	14	14	15	15	15	17	13	13	12	11	11	12	12	10	10	12	17
27-Dec	9	16	8	9	10	14	12	11	10	15	14	14	14	15	15	14	14	14	15	14	15	15	14	14	16
28-Dec	15	17	24	16	12	14	13	12	25	31	21	13	32	12	13	13	13	14	13	20	25	22	20	36	36
29-Dec	33	29	24	29	18	50	14	10	6	6	11	13	14	13	12	12	12	11	11	11	10	10	9	11	50
30-Dec	13	13	13	14	14	14	16	14	15	14	15	16	15	15	15	15	15	15	15	15	14	14	14	13	16
31-Dec	14	14	14	13	13	14	15	14	13	11	12	13	12	15	12	10	10	7	7	8	9	10	10	9	15
											33 29 24 29 18 50 16 18 25 31 21 18 32 19 20 18 17 15 19 30 25 22 20 36														
Diurnal Maximum																									



WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

CONTINUOUS AMBIENT AIR QUALITY
MONITORING PROGRAM
MONTHLY REPORT

AMS511
BLACKGOLD
DECEMBER 2023

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

January 31, 2024

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - BLACKGOLD (AMS511)
 DECEMBER 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	704	35	40	99.33	17.6	0	6.5	0
H2S (ppb) Average	699	36	45	98.79	1.9	0	0.5	0
THC (ppm) Average	703	35	41	99.19	3	-	2.6	-
NO2 (ppb) Average	701	35	43	98.92	37.3	0	10.7	-
NO (ppb) Average	701	35	43	98.92	58.7	-	12.4	-
NOX (ppb) Average	701	35	43	98.92	96	-	23	-
Temperature 2 m (C) Average	744	0	0	100	6.8	-	4.1	-
Relative Humidity (%) Average	744	0	0	100	96.1	-	86.1	-
Wind Speed 10 m (km/h) Average	743	0	1	99.87	22	-	13	-
Wind Direction 10 m (deg) Average	743	0	1	99.87	-	-	-	-

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

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - BLACKGOLD (AMS511)
 DECEMBER 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	704	1.82	3.1	-	0	0	0.2	0.7	1.7	5	17.6
H2S (ppb) Average	699	0.22	0.2	-	0	0.1	0.1	0.2	0.2	0.5	1.9
THC (ppm) Average	703	2.43	0.1	-	2.2	2.3	2.3	2.4	2.5	2.6	3
NO2 (ppb) Average	701	4	3.6	-	0	0.6	1.7	3.4	5.3	7.7	37.3
NO (ppb) Average	701	1.4	4.3	-	0	0	0	0.2	1.1	3.3	58.7
NOX (ppb) Average	701	5.4	7.5	-	0	0.6	1.8	3.7	6.6	10.3	96
Temperature 2 m (C) Average	744	-4.06	4.6	-	-19.1	-10.4	-7.9	-3.7	-0.4	1.7	6.8
Relative Humidity (%) Average	744	69.82	14.5	-	25.6	50.1	60.2	72.1	82.4	86.4	96.1
Wind Speed 10 m (km/h) Average	743	8.4	4	-	0	3	6	8	11	14	22
Wind Direction 10 m (deg) Average	743	-	-	-	-	-	-	-	-	-	-

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION - BLACKGOLD (AMS511)
DECEMBER 2023

OPERATIONAL NOTES

Parameter	Period Start	Period End	Duration (Hours)	Notes
SO2	05 Dec 2023 14:00	05 Dec 2023 14:00	1	Maintenance - WBEA internal audit
H2S, NO2	05 Dec 2023 12:00	05 Dec 2023 14:00	3	Maintenance - WBEA internal audit
THC	05 Dec 2023 14:00	05 Dec 2023 15:00	2	Maintenance - WBEA internal audit
H2S, NO2	14 Dec 2023 15:00	14 Dec 2023 15:00	1	Maintenance - sample manifold cleaned
H2S	27 Dec 2023 23:00	28 Dec 2023 03:00	5	Station power failure
NO2, SO2, THC	27 Dec 2023 23:00	28 Dec 2023 02:00	4	Station power failure
Wind Speed, Wind Direction	01 Dec 2023 08:00	01 Dec 2023 08:00	1	Flat line in sensor output signal - Sensor frozen



Wood Buffalo Environmental Association

Summary of Hour Averages

Sulphur Dioxide (SO₂) - ppb

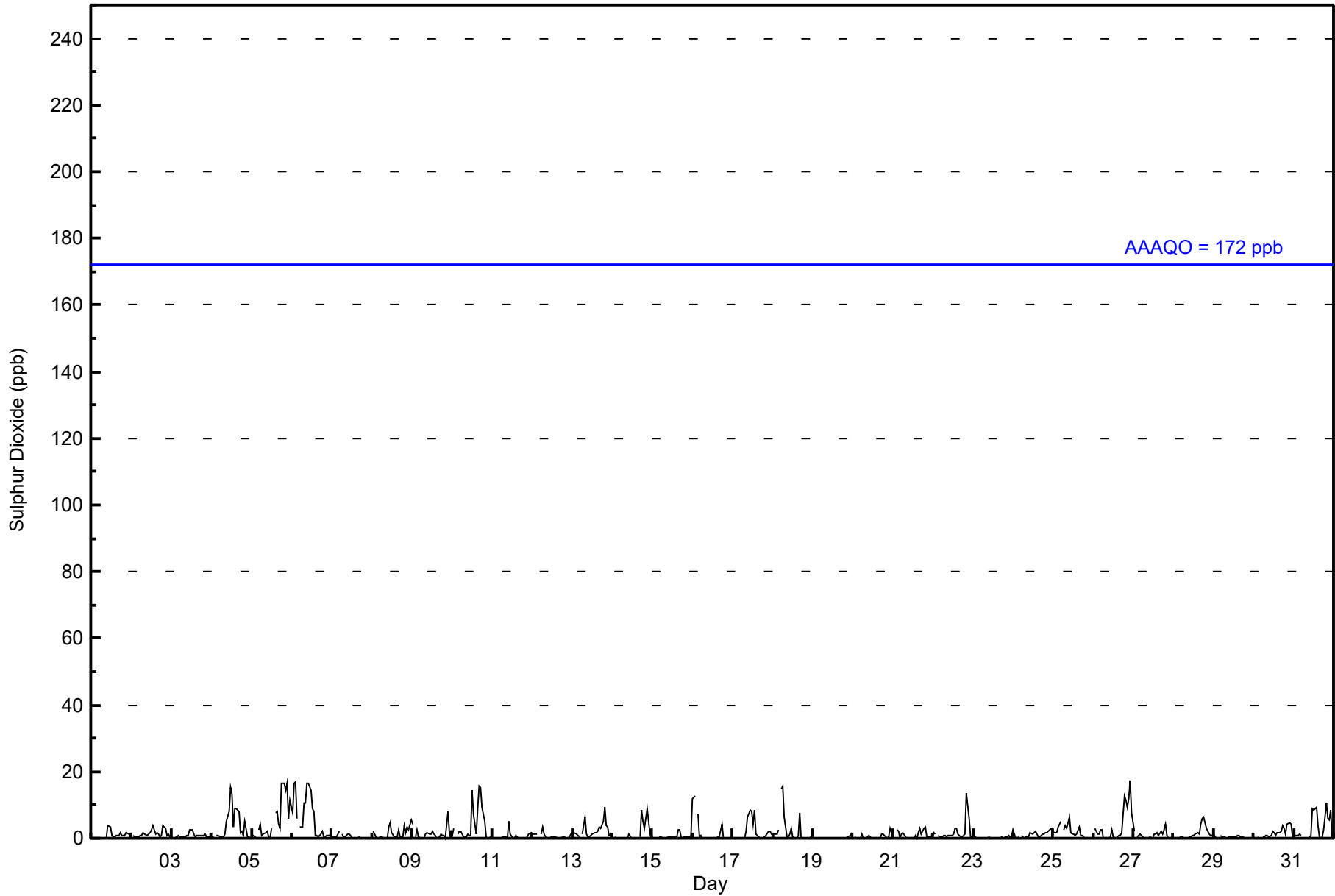
Blackgold - December 2023

Number of Exceedences (AAAQO):		1-hr: 0	24-hr: 0	Hours in Service: 744																	Daily Average		Daily Maximum																										
Maximum Value: 17.6 ppb on Dec 26 23:00		Maximum Daily Average: 6.5 ppb on Dec 6		Hours of Data: 704																	Hours of Missing Data: 40		Hours of Calibration: 35																										
Minimum Value: 0.0 ppb on Dec 1 09:00		Minimum Daily Average: 0.1 ppb on Dec 19		Hours of Calibration: 35																	Percent Operational Time: 99.3																												
Maximum Diurnal Average: 2.7 ppb at hour 20		Minimum Diurnal Average: 0.9 ppb at hour 9		Percent Operational Time: 99.3																																													
Monthly Average: 1.82 ppb		Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.2 Median = 0.7 Q ₃ = 1.7 P ₉₀ = 5.0 P ₉₉ = 16.3																																															
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-Dec	0.1	0.1	0.1	0.1	0.1	Z	0.0	0.0	0.0	0.0	3.9	3.3	1.0	0.3	0.3	0.9	1.0	1.6	0.9	0.7	0.8	1.8	1.3	0.7	0.8	3.9																							
2-Dec	Z	0.8	0.4	0.6	0.5	0.7	0.7	1.6	1.3	0.9	1.2	1.8	2.6	3.9	1.3	1.8	1.2	0.4	0.8	4.0	2.9	1.0	1.1	0.6	1.4	4.0																							
3-Dec	0.4	Z	0.3	0.5	0.7	0.4	0.3	0.5	0.4	0.7	1.0	2.4	2.6	1.2	0.5	0.7	0.9	0.8	1.0	1.0	1.1	0.6	0.4	0.3	0.8	2.6																							
4-Dec	0.4	0.2	Z	0.9	1.0	0.6	0.6	1.2	5.1	7.9	15.3	13.2	3.3	8.9	8.8	8.0	1.6	2.1	0.8	5.0	0.3	0.2	0.1		3.7	15.3																							
5-Dec	0.2	0.7	0.3	Z	2.4	4.1	1.0	1.4	1.6	2.3	0.4	0.2	2.8	M	7.5	8.0	4.2	2.9	16.4	16.5	14.4	16.7	6.1	11.6	5.5	16.7																							
6-Dec	7.8	16.7	16.9	5.9	Z	3.4	3.3	10.7	10.7	16.4	16.6	14.3	8.8	8.2	0.6	0.8	0.4	1.2	2.2	0.3	0.4	1.0	0.7	1.2	6.5	16.9																							
7-Dec	0.3	0.4	0.3	0.3	1.9	Z	1.4	0.2	0.4	1.2	1.1	1.0	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.2	0.4	1.9																							
8-Dec	Z	2.0	0.5	0.1	0.0	0.3	0.2	0.1	0.1	0.1	3.3	4.8	1.8	0.4	0.4	0.3	2.3	0.4	0.2	3.7	1.5	3.4	2.7	5.5	1.5	5.5																							
9-Dec	4.0	Z	0.5	2.7	0.3	0.1	0.1	0.2	1.1	1.7	1.2	1.4	2.3	1.3	1.0	0.1	0.5	1.2	0.7	0.8	0.1	7.9	1.4	2.2	1.4	7.9																							
10-Dec	0.9	2.9	Z	1.1	2.1	1.9	1.2	0.5	0.3	1.5	0.9	0.9	14.4	7.0	1.2	9.0	15.9	15.2	9.2	5.0	0.2	0.2	0.2	0.2	4.0	15.9																							
11-Dec	0.2	0.2	0.2	Z	0.2	0.2	0.3	0.3	0.4	0.2	5.0	1.3	0.1	0.1	1.0	0.5	0.2	0.1	0.1	0.1	0.1	0.3	1.4	1.7	0.6	5.0																							
12-Dec	1.2	1.1	1.2	1.3	Z	1.3	3.4	1.4	0.5	0.2	0.2	0.3	0.3	0.4	0.3	0.1	0.1	0.2	0.2	0.4	0.2	0.0	0.3	1.2	0.7	3.4																							
13-Dec	2.3	1.9	1.3	0.7	0.6	Z	1.2	6.4	1.3	0.3	0.4	0.7	1.2	1.5	1.7	2.3	3.4	3.2	5.0	9.4	3.9	3.4	0.9	1.0	2.4	9.4																							
14-Dec	Z	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.2	0.0	C	C	C	C	0.4	8.3	5.2	2.8	6.0	8.9	1.3	0.4	1.8	8.9																							
15-Dec	0.8	Z	0.2	0.2	0.5	0.3	0.1	0.2	0.1	0.6	0.5	0.3	0.2	0.2	0.6	2.4	2.5	0.3	0.2	0.3	0.4	0.5	0.6	0.7	0.6	2.5																							
16-Dec	11.8	12.9	Z	7.3	0.5	0.9	0.1	0.1	0.1	0.1	0.0	0.1	0.0	0.0	0.0	0.4	0.2	4.4	0.2	0.2	0.0	0.1	0.1	0.1	1.7	12.9																							
17-Dec	0.1	0.1	0.1	Z	0.0	0.1	0.1	0.2	2.3	6.3	8.5	8.0	4.4	8.5	1.3	0.2	0.2	0.2	0.2	0.3	0.7	2.1	1.9	1.5	2.1	8.5																							
18-Dec	1.1	1.1	1.2	2.7	Z	14.6	15.8	6.3	0.4	0.3	1.4	2.8	0.2	0.2	0.0	0.7	7.6	0.2	0.0	0.0	0.0	0.0	0.2	0.5	2.5	15.8																							
19-Dec	0.0	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	0.5	1.0	1.6	0.1	1.6																							
20-Dec	Z	0.6	0.0	0.0	0.0	1.2	0.2	0.0	0.1	0.7	0.5	0.2	0.0	0.1	0.0	0.0	0.0	1.2	1.2	0.9	0.1	0.3	2.8	1.7	0.5	2.8																							
21-Dec	1.3	Z	2.4	2.1	0.2	1.1	1.7	0.4	0.0	0.1	0.0	0.0	0.1	0.7	0.0	1.5	2.9	1.5	3.2	3.5	0.3	0.2	0.3	0.3	1.0	3.5																							
22-Dec	1.9	1.5	Z	0.7	0.6	0.6	0.8	0.8	0.5	0.7	0.9	1.0	1.2	3.0	3.0	1.4	0.6	0.6	0.8	1.3	13.7	6.1	0.6	0.4	1.9	13.7																							
23-Dec	0.2	0.3	0.3	Z	0.0	0.0	0.0	0.0	0.1	0.3	0.1	0.0	0.0	0.1	0.2	0.1	0.2	0.3	0.1	0.2	0.5	0.8	0.4	0.3	0.2	0.8																							
24-Dec	2.7	0.2	0.1	0.2	Z	0.7	0.0	0.4	0.4	0.4	1.8	1.3	1.6	1.9	1.2	0.6	0.2	1.3	1.4	1.9	1.8	2.1	2.8	2.6	1.2	2.8																							
25-Dec	1.8	1.7	1.9	3.2	5.0	Z	2.6	3.8	2.8	6.1	1.5	1.2	1.2	1.0	1.4	3.3	0.8	0.9	0.5	0.1	0.0	0.0	0.0	0.0	1.8	6.1																							
26-Dec	Z	2.8	1.5	1.2	2.7	2.5	0.1	0.1	0.0	0.1	0.6	2.6	0.3	0.0	0.4	0.9	0.9	1.5	12.6	11.3	9.1	11.9	17.6	7.6	3.8	17.6																							
27-Dec	2.2	Z	0.2	0.7	1.5	0.3	0.2	0.1	0.0	0.0	0.5	0.0	1.3	1.4	1.6	1.0	2.2	1.5	2.4	4.0	0.7	0.6	PF	PF	1.1	4.0																							
28-Dec	PF	PF	Z	0.3	0.3	0.5	0.0	0.0	0.0	0.6	0.5	0.9	0.9	1.4	1.7	1.2	4.2	6.0	6.2	2.9	1.9	1.1	0.8	1.0	1.5	6.2																							
29-Dec	1.2	0.1	0.0	Z	0.6	0.6	0.3	0.1	0.1	0.3	0.5	0.4	0.5	0.6	0.7	1.0	0.5	0.2	0.0	0.0	0.1	0.1	0.1	0.1	0.4	1.2																							
30-Dec	0.1	0.1	0.2	0.2	Z	0.5	0.5	0.7	0.8	0.3	0.7	2.3	1.6	0.7	1.9	1.9	2.2	3.9	3.0	1.2	4.2	4.6	4.2	0.6	1.6	4.6																							
31-Dec	1.0	0.7	0.9	1.1	0.7	Z	0.1	0.1	0.0	0.4	1.0	8.9	8.4	9.2	3.7	0.6	0.2	0.4	2.6	10.5	5.9	5.6	8.5	0.0	3.1	10.5																							
																								1.8	2.0	1.2	1.3	0.9	1.5	1.2	1.2	0.9	1.5	2.0	2.5	2.4	2.0	1.4	1.7	2.1	2.0	2.5	2.7	2.5	2.7	2.0	1.5	Diurnal Average	
																								11.8	16.7	16.9	7.3	5.0	14.6	15.8	10.7	10.7	16.4	16.6	15.3	14.4	9.2	8.9	9.0	15.9	15.2	16.4	16.5	14.4	16.7	17.6	11.6	Diurnal Maximum	
Z - zerospan C - Calibration M - Maintenance PF - Power Failure																																																	
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 172 ppb 24-hr 48 ppb																																																	



Wood Buffalo Environmental Association
Hourly Averages

Sulphur Dioxide (SO₂) - ppb
Blackgold - December 2023





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Sulphur Dioxide (SO₂) - ppb
Blackgold - December 2023

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 10	677	96.16	96.16
11 - 20	27	3.84	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: 704

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Sulphur Dioxide (SO₂) - ppb
Blackgold - December 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	4	1	2	5	5	11	5	20	72	141	163	39	97	87	19	5	676
11 - 20	0	0	0	0	0	0	0	0	0	0	0	27	0	0	0	0	27
21 - 60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61 - 110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 - 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 172	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	4	1	2	5	5	11	5	20	72	141	163	66	97	87	19	5	703

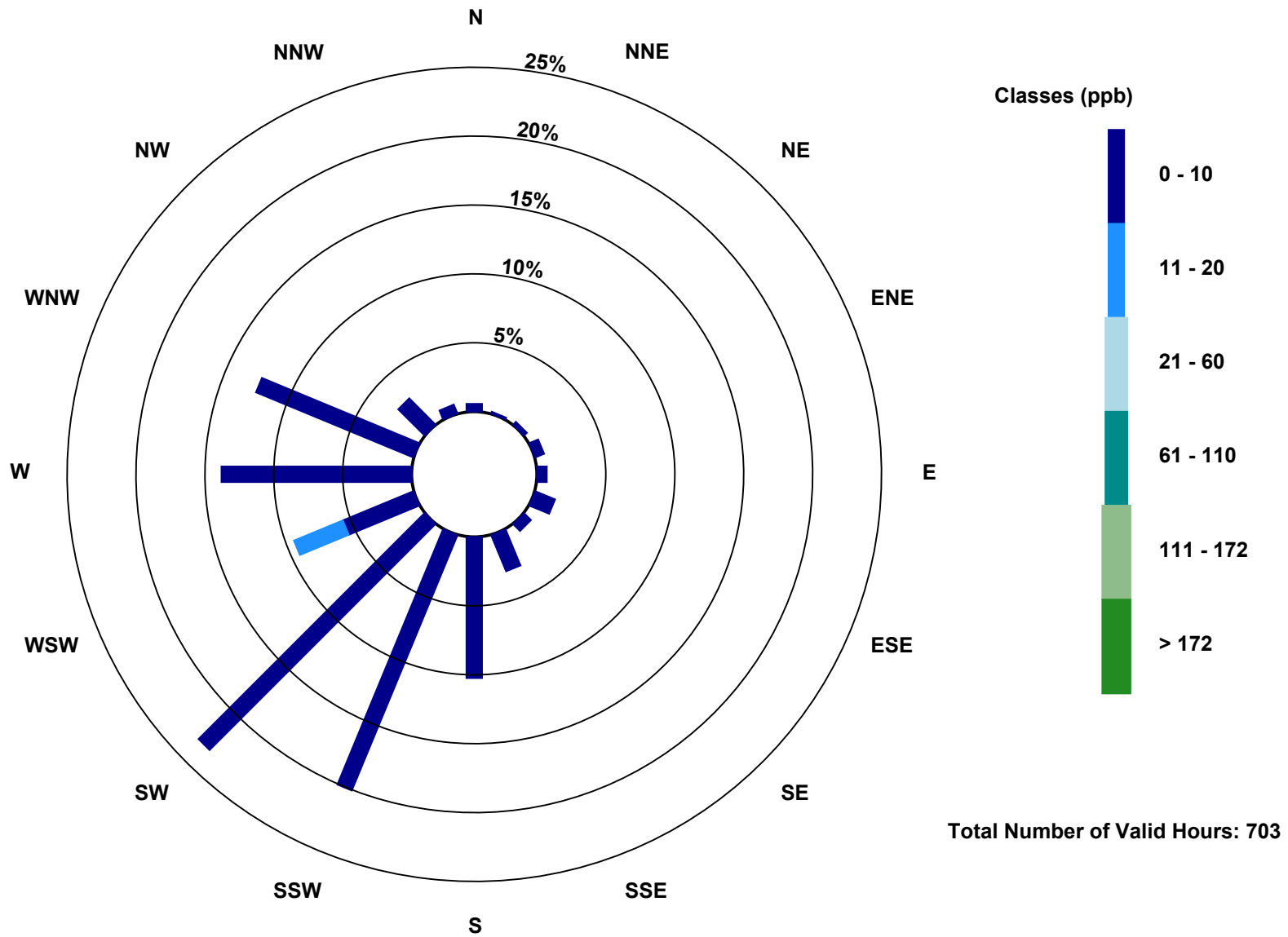
Total Number of Valid Hours: 703

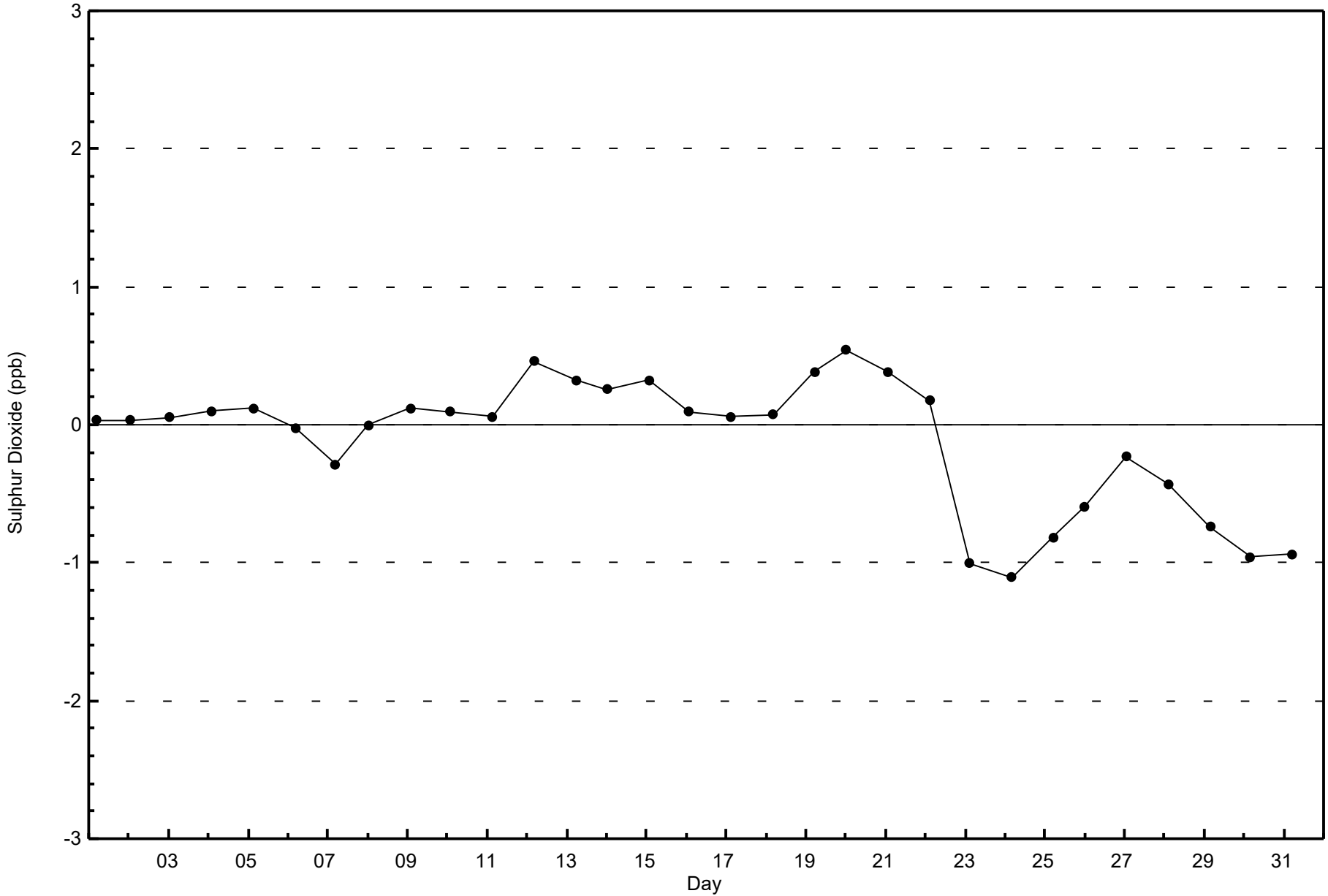
Total Number of Hours: 744

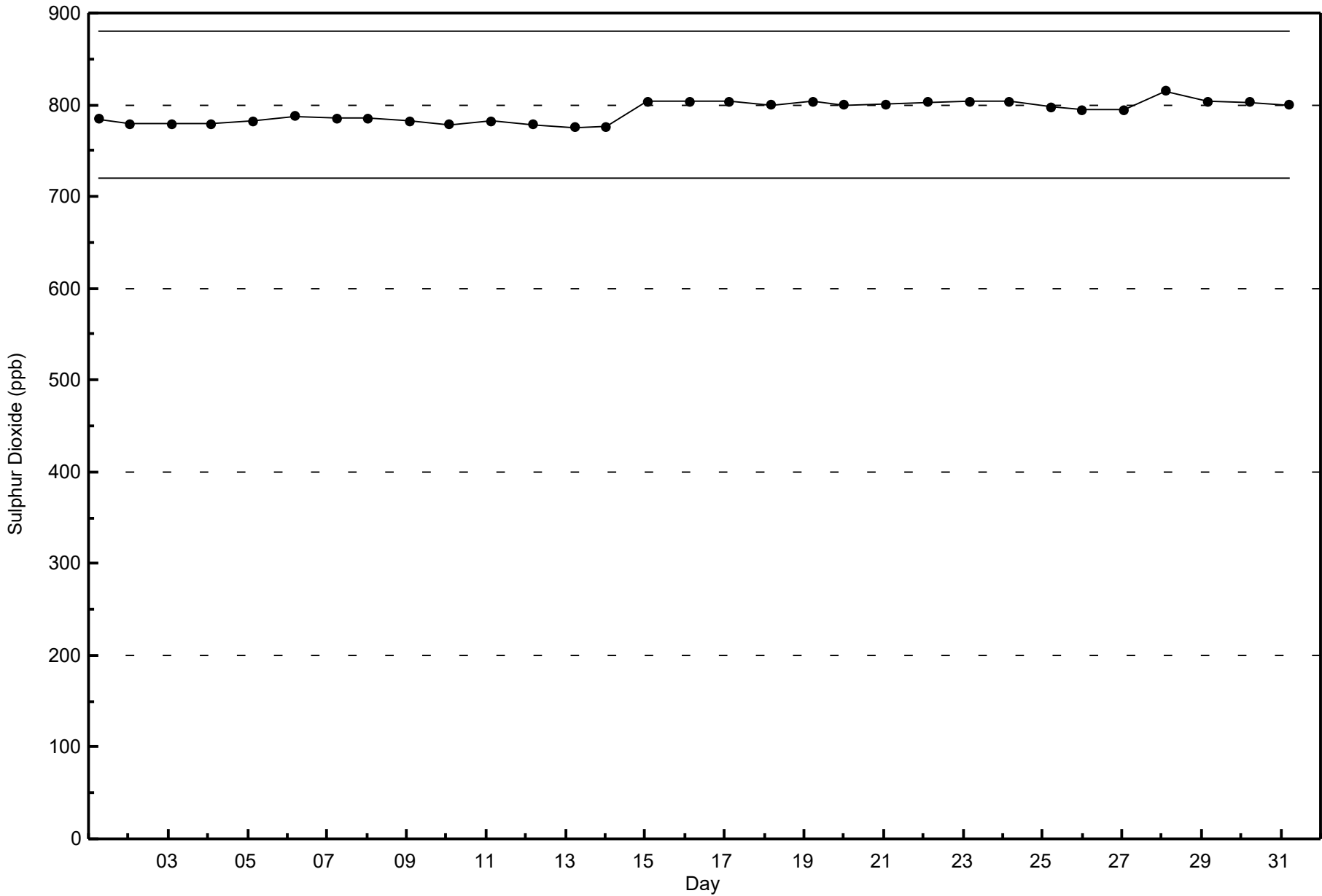


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Sulphur Dioxide (SO₂) - ppb
Blackgold









Wood Buffalo Environmental Association

Summary of Hour Averages

Hydrogen Sulphide (H₂S) - ppb

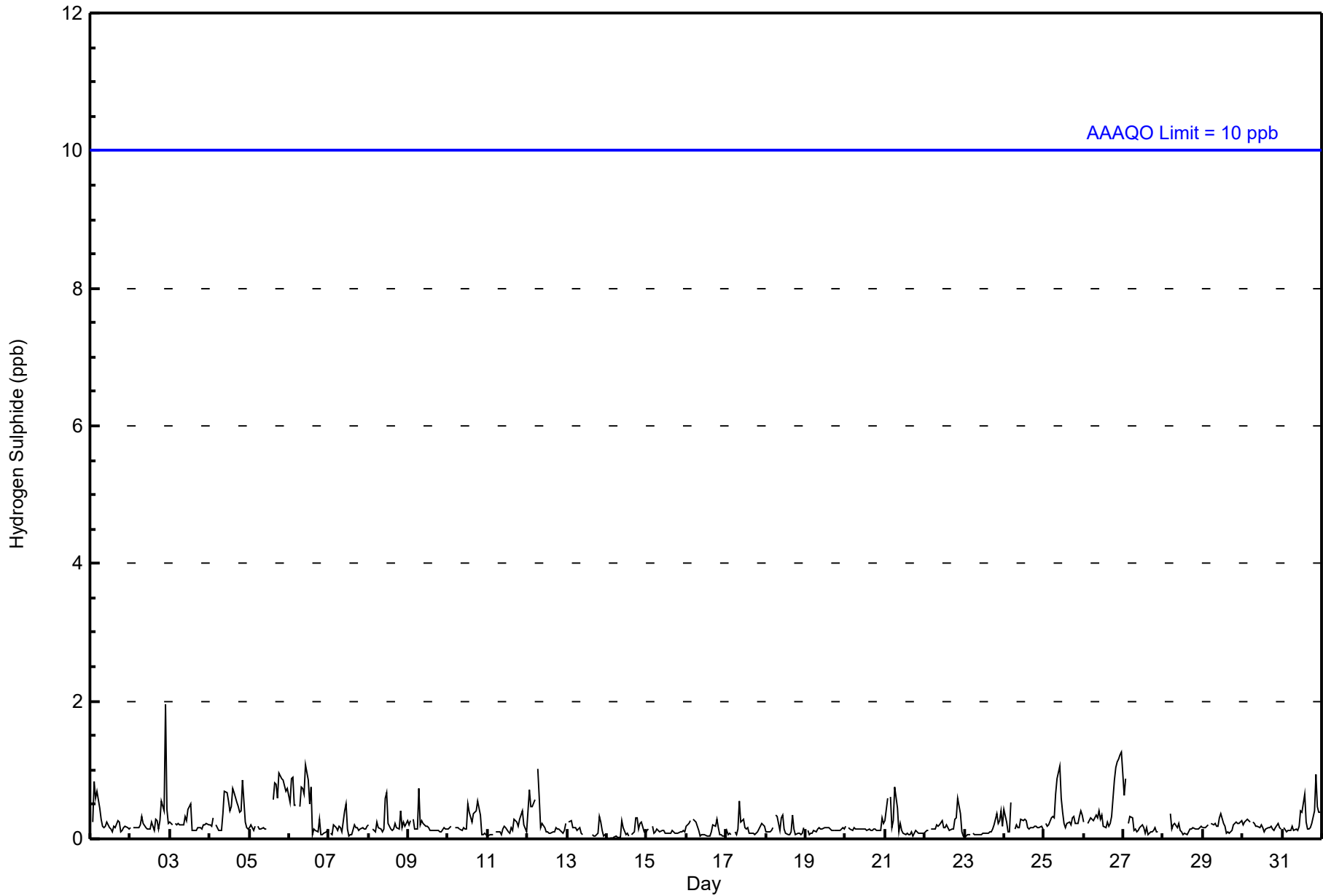
Blackgold - December 2023

Number of Exceedences (AAAQO):		1-hr: 0		24-hr: 0		Hours in Service:														744																																	
Maximum Value: 1.9 ppb on Dec 2 22:00		Maximum Daily Average: 0.5 ppb on Dec 26														Hours of Data:		699																																			
Minimum Value: 0.0 ppb on Dec 14 01:00		Minimum Daily Average: 0.1 ppb on Dec 14														Hours of Missing Data:		45																																			
Maximum Diurnal Average: 0.3 ppb at hour 22		Minimum Diurnal Average: 0.2 ppb at hour 15														Hours of Calibration:		36																																			
Monthly Average: 0.22 ppb		Percentiles: P ₁ = 0.0 P ₁₀ = 0.1 Q ₁ = 0.1 Median = 0.2 Q ₃ = 0.2 P ₉₀ = 0.5 P ₉₉ = 1.0														Percent Operational Time:		98.8																																			
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																											
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																													
1-Dec	Z	0.2	0.8	0.6	0.7	0.5	0.3	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.2	0.2	0.3	0.3	0.1	0.1	0.2	0.2	0.2	0.1	0.3	0.8																											
2-Dec	0.2	Z	0.2	0.2	0.2	0.2	0.2	0.3	0.2	0.2	0.1	0.2	0.1	0.2	0.1	0.3	0.3	0.1	0.3	0.5	0.4	1.9	0.4	0.2	0.3	1.9																											
3-Dec	0.3	0.2	Z	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.4	0.5	0.1	0.1	0.1	0.1	0.2	0.2	0.1	0.2	0.2	0.2	0.2	0.2	0.5																											
4-Dec	0.2	0.2	0.3	Z	0.2	0.1	0.1	0.1	0.4	0.7	0.7	0.5	0.4	0.5	0.7	0.5	0.5	0.4	0.4	0.9	0.2	0.2	0.1	0.1	0.4	0.9																											
5-Dec	0.2	0.2	0.1	0.2	Z	0.2	0.1	0.2	0.2	0.1	0.1	M	M	M	0.6	0.8	0.8	0.6	1.0	0.9	0.8	0.8	0.7	0.7	0.5	1.0																											
6-Dec	0.5	0.9	0.9	0.5	0.5	Z	0.5	0.7	0.7	0.7	1.1	0.9	0.5	0.8	0.1	0.1	0.1	0.1	0.3	0.1	0.1	0.1	0.1	0.1	0.4	1.1																											
7-Dec	Z	0.1	0.1	0.2	0.2	0.1	0.2	0.2	0.1	0.4	0.5	0.1	0.0	0.1	0.1	0.2	0.2	0.2	0.1	0.1	0.2	0.1	0.1	0.2	0.2	0.5																											
8-Dec	0.2	Z	0.1	0.1	0.1	0.2	0.2	0.1	0.1	0.1	0.6	0.7	0.2	0.1	0.1	0.1	0.2	0.2	0.1	0.4	0.2	0.2	0.2	0.3	0.2	0.7																											
9-Dec	0.2	0.3	Z	0.3	0.1	0.1	0.7	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	0.1	0.1	0.2	0.7																											
10-Dec	0.1	0.2	0.2	Z	0.2	0.2	0.2	0.1	0.1	0.2	0.1	0.1	0.5	0.4	0.2	0.4	0.4	0.4	0.6	0.3	0.1	0.1	0.1	0.1	0.2	0.6																											
11-Dec	0.0	0.1	0.1	0.1	Z	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.1	0.1	0.2	0.1	0.3	0.2	0.2	0.3	0.3	0.4	0.2	0.1	0.2	0.4																											
12-Dec	0.4	0.7	0.5	0.5	0.6	Z	1.0	0.6	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	0.3	1.0																											
13-Dec	Z	0.2	0.3	0.2	0.2	0.2	0.1	0.2	0.1	0.1	C	C	C	C	C	0.1	0.0	0.0	0.1	0.3	0.3	0.1	0.0	0.1	0.1	0.3																											
14-Dec	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.2	0.1	0.1	0.0	M	0.1	0.1	0.3	0.3	0.2	0.2	0.3	0.1	0.1	0.1	0.3																											
15-Dec	0.1	0.1	Z	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2																											
16-Dec	0.2	0.2	0.3	Z	0.3	0.3	0.2	0.1	0.0	0.1	0.1	0.1	0.0	0.1	0.0	0.1	0.2	0.2	0.3	0.2	0.1	0.1	0.0	0.1	0.1	0.3																											
17-Dec	0.1	0.1	0.1	0.1	Z	0.1	0.1	0.1	0.6	0.3	0.3	0.2	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.1	0.6																											
18-Dec	0.1	0.1	0.1	0.1	0.2	Z	0.3	0.3	0.1	0.3	0.3	0.1	0.1	0.1	0.1	0.1	0.4	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.4																											
19-Dec	Z	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.1	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.2																											
20-Dec	0.2	Z	0.2	0.1	0.1	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.3	0.2	0.2	0.3																											
21-Dec	0.3	0.6	Z	0.6	0.2	0.3	0.8	0.4	0.1	0.2	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	0.2	0.8																											
22-Dec	0.1	0.1	0.1	Z	0.2	0.1	0.1	0.2	0.2	0.2	0.3	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.3	0.3	0.6	0.4	0.1	0.0	0.2	0.6																											
23-Dec	0.0	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	0.2	0.4	0.2	0.3	0.4	0.2	0.1	0.4																											
24-Dec	0.4	0.2	0.1	0.1	0.5	Z	0.1	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.2	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.2	0.5																											
25-Dec	Z	0.2	0.2	0.2	0.3	0.3	0.3	0.7	0.9	1.1	0.6	0.4	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.2	0.2	0.3	0.4	0.3	0.4	1.1																											
26-Dec	0.2	Z	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.3	0.3	0.2	0.2	0.3	0.2	0.2	0.3	0.9	1.0	1.1	1.2	1.2	1.3	0.5	1.3																											
27-Dec	0.6	0.9	Z	0.2	0.3	0.3	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	0.2	0.1	0.1	PF	PF	0.2	0.9																											
28-Dec	PF	PF	PF	Z	0.4	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	0.2	0.1	0.1	0.1	0.2	0.2	0.2	0.4																											
29-Dec	0.2	0.2	0.2	0.2	Z	0.2	0.2	0.2	0.2	0.2	0.3	0.4	0.2	0.2	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.3	0.2	0.4																											
30-Dec	0.2	0.2	0.3	0.3	0.2	Z	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.2	0.2	0.2	0.1	0.1	0.2	0.2	0.2	0.1	0.2	0.3																											
31-Dec	Z	0.2	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.2	0.4	0.4	0.7	0.2	0.1	0.1	0.2	0.2	0.4	0.9	0.5	0.4	0.4	0.3	0.9																											
																								Diurnal Average		0.2		0.3		0.2		0.2		0.2		0.2		0.2		0.2		0.2		0.3		0.3		0.3		0.2		0.2	
																								Diurnal Maximum		0.6		0.9		0.9		0.6		0.7		0.5		1.0		0.7		0.9		1.1		1.1		0.9		0.8		0.7	
Z - zerospan																								C - Calibration		M - Maintenance		PF - Power Failure																									
Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 10 ppb 24-hr 3 ppb																																																					



Wood Buffalo Environmental Association
Hourly Averages

Hydrogen Sulphide (H₂S) - ppb
Blackgold - December 2023





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Hydrogen Sulphide (H₂S) - ppb
Blackgold - December 2023**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 2	699	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: 699

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Hydrogen Sulphide (H₂S) - ppb
Blackgold - December 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	1	3	5	6	11	5	20	71	135	163	67	97	87	19	5	698
3 - 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 - 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 - 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	3	1	3	5	6	11	5	20	71	135	163	67	97	87	19	5	698

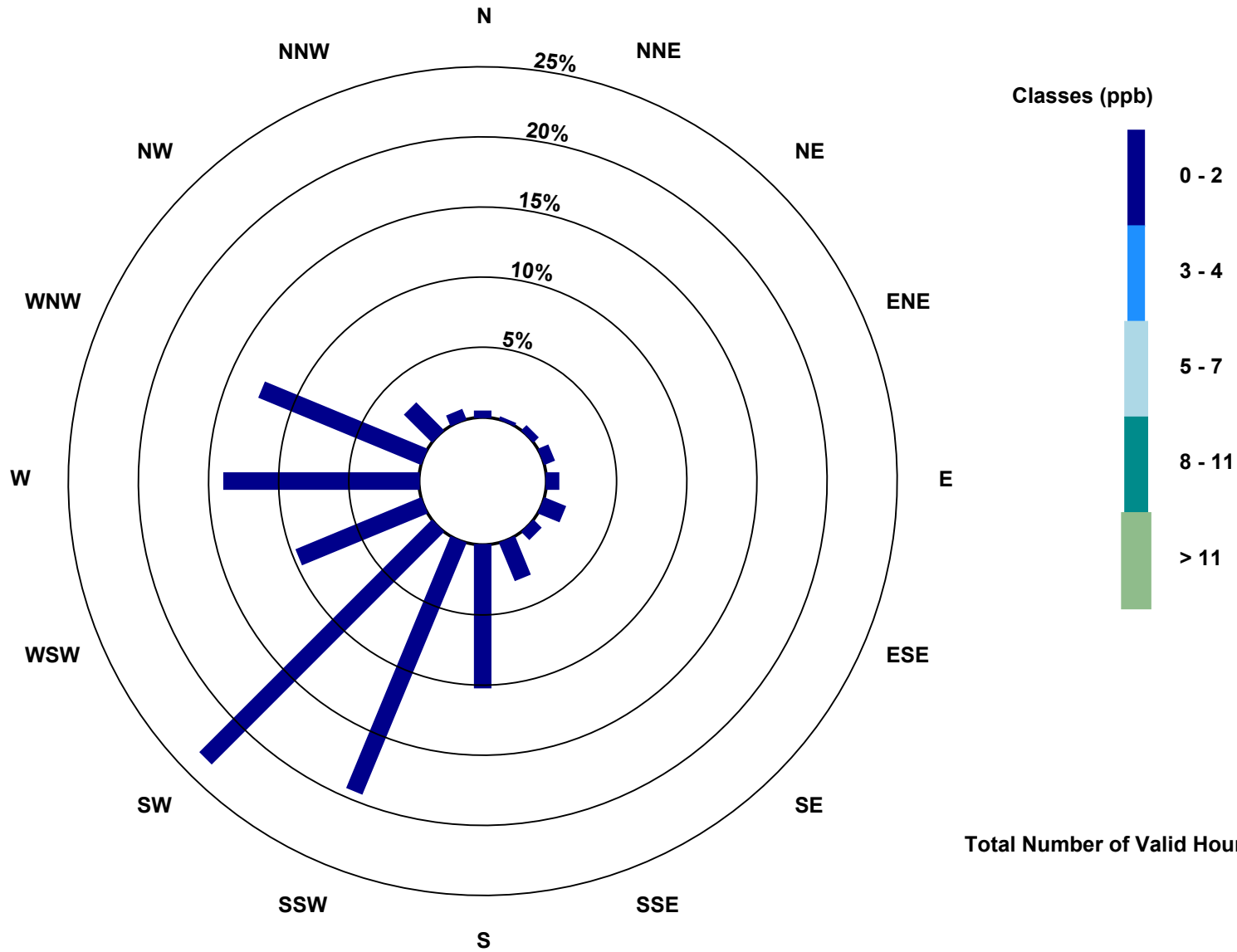
Total Number of Valid Hours: 698

Total Number of Hours: 744

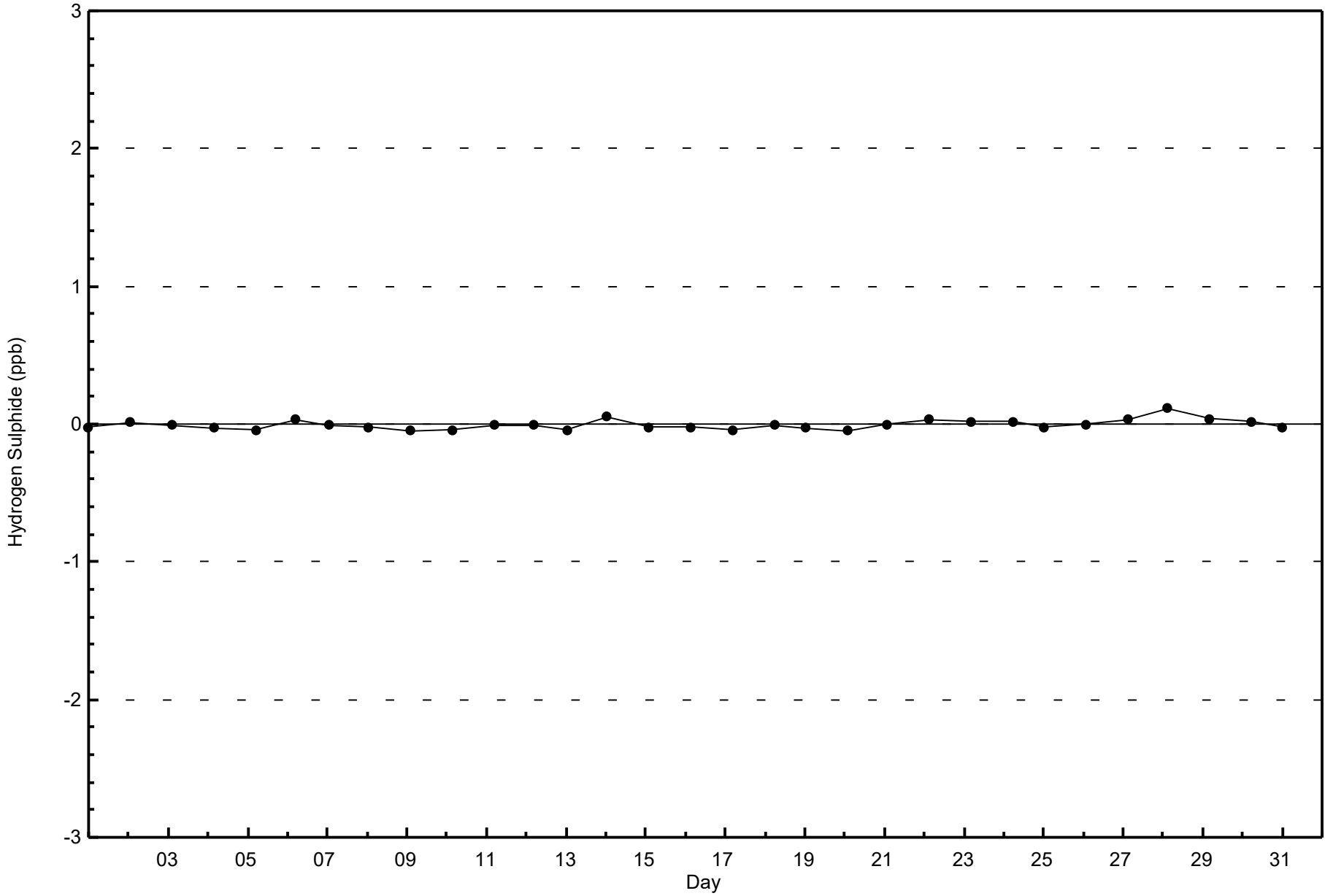


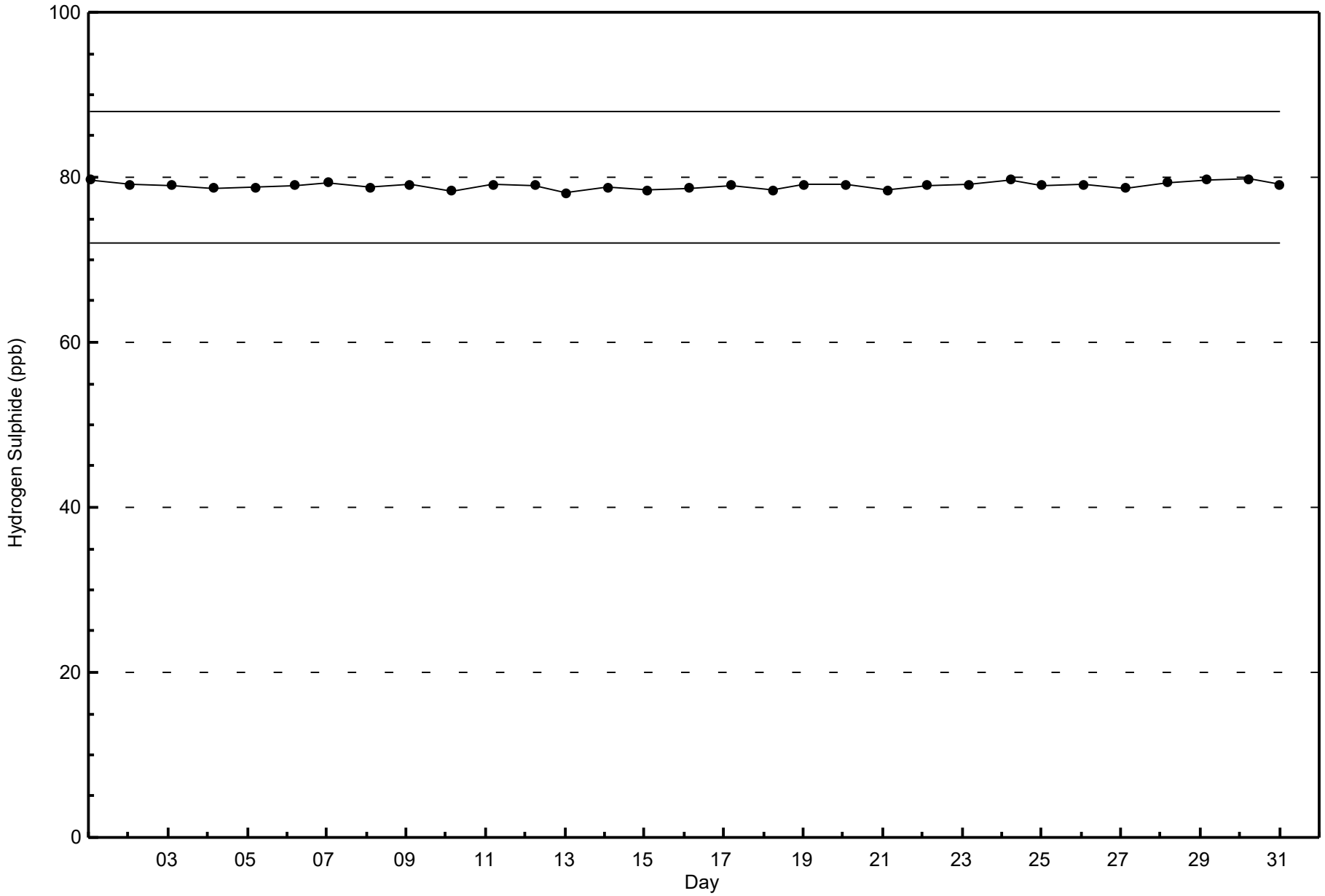
Wood Buffalo Environmental Association
Wind Rose Dec 2023

Hydrogen Sulphide (H₂S) - ppb
Blackgold



Total Number of Valid Hours: 698

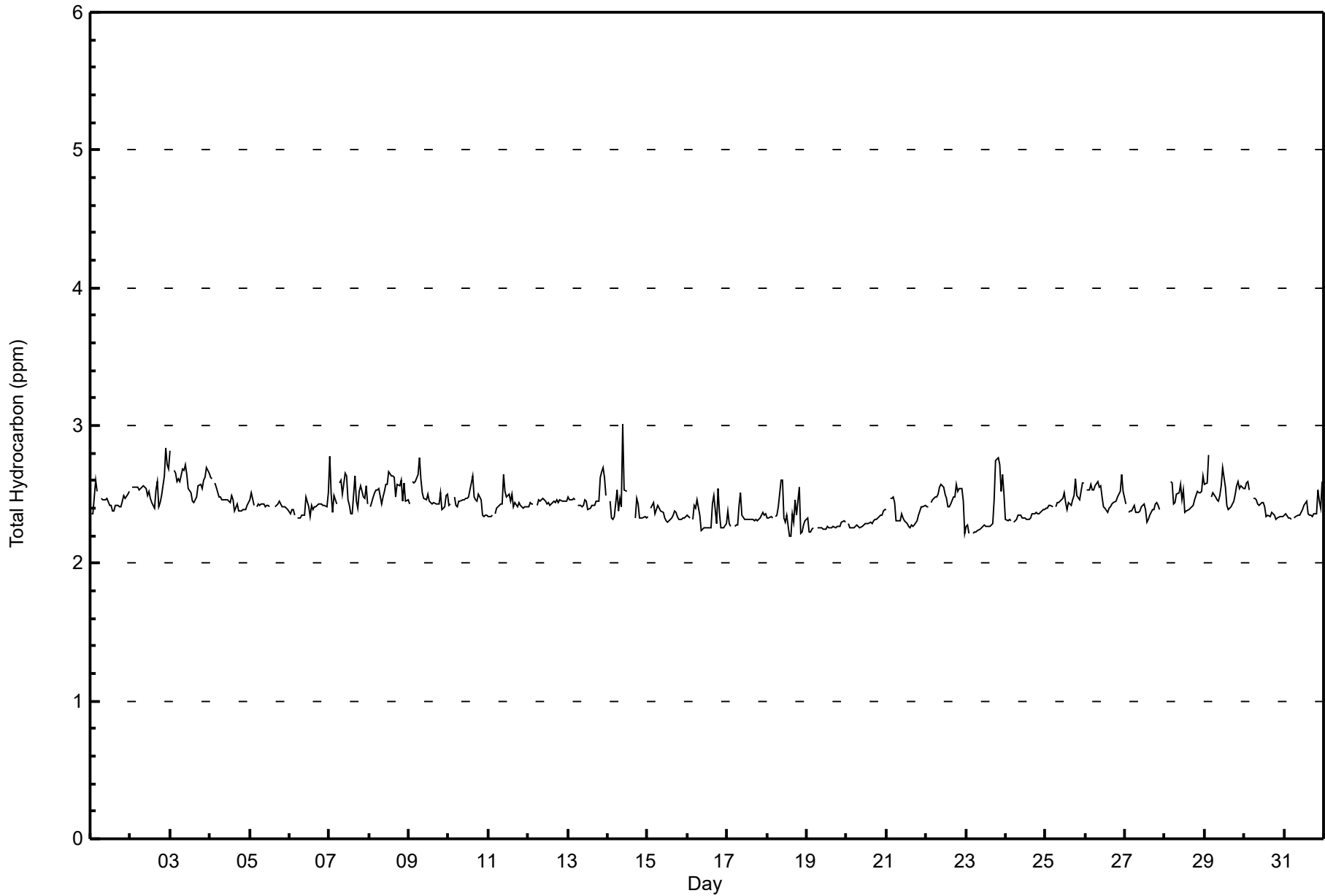






Wood Buffalo Environmental Association
Hourly Averages

Total Hydrocarbon (THC) - ppm
Blackgold - December 2023





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Total Hydrocarbon (THC) - ppm
Blackgold - December 2023

Concentration Ranges (ppm)	Number of Hours	%	Cumulative %
0 - 2.0	0	0.00	0.00
2.1 - 3.0	703	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: 703

Total Number of Hours: 744



Wood Buffalo Environmental Association
Frequency Distribution

Total Hydrocarbon (THC) - ppm
Blackgold - December 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	4	1	2	5	5	11	5	20	72	141	163	65	97	87	19	5	702
3.1 - 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	4	1	2	5	5	11	5	20	72	141	163	65	97	87	19	5	702

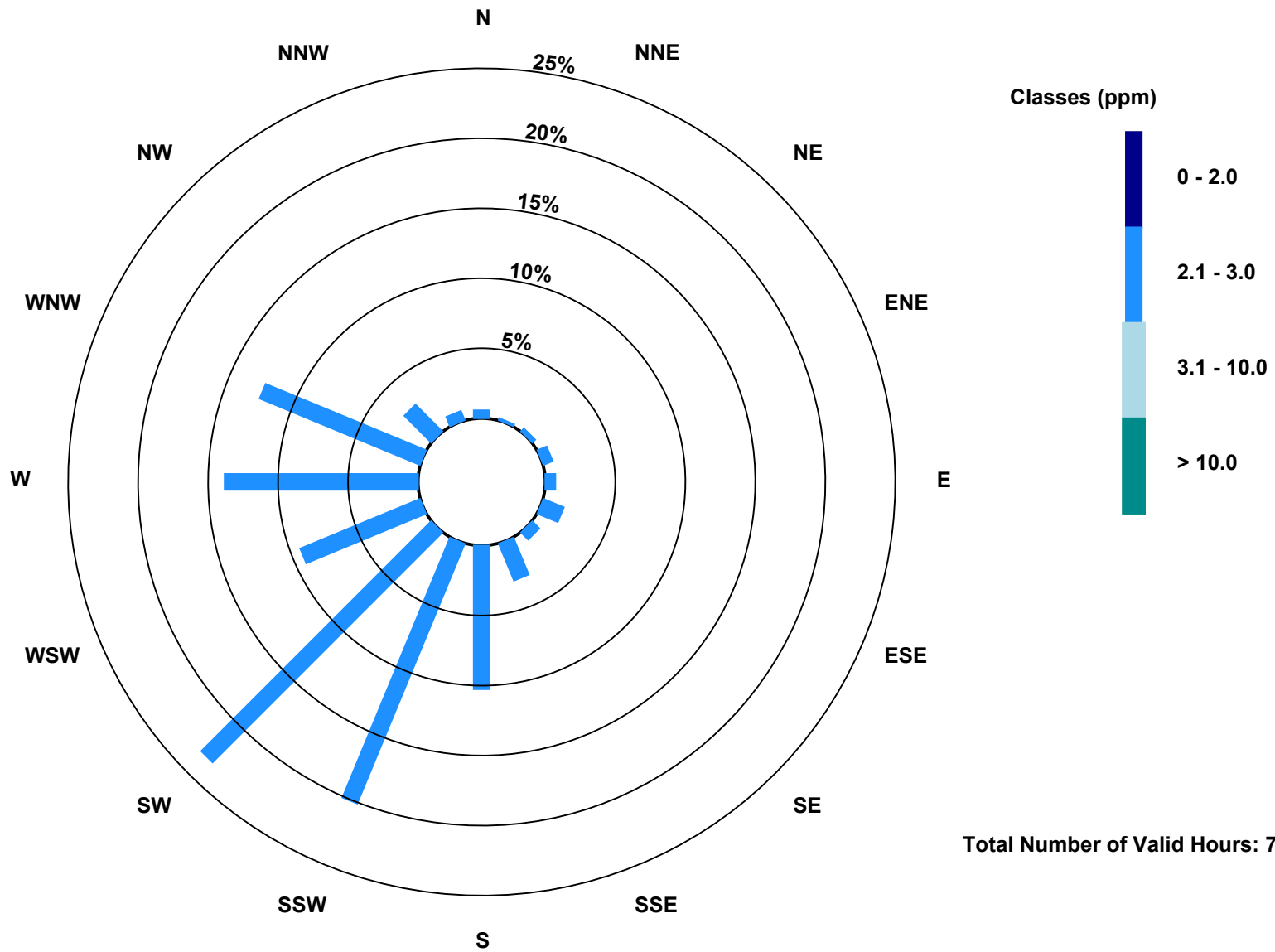
Total Number of Valid Hours: 702

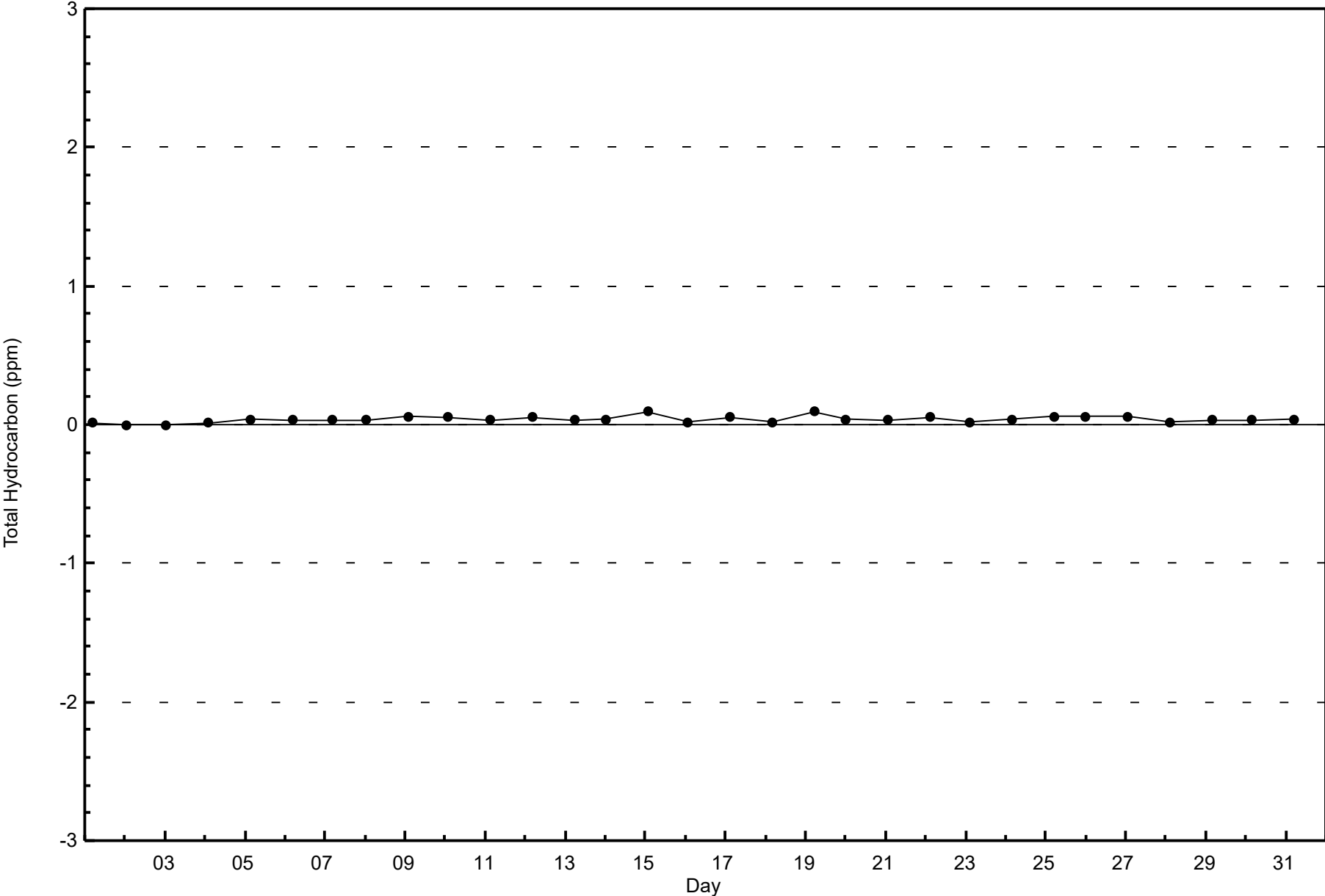
Total Number of Hours: 744

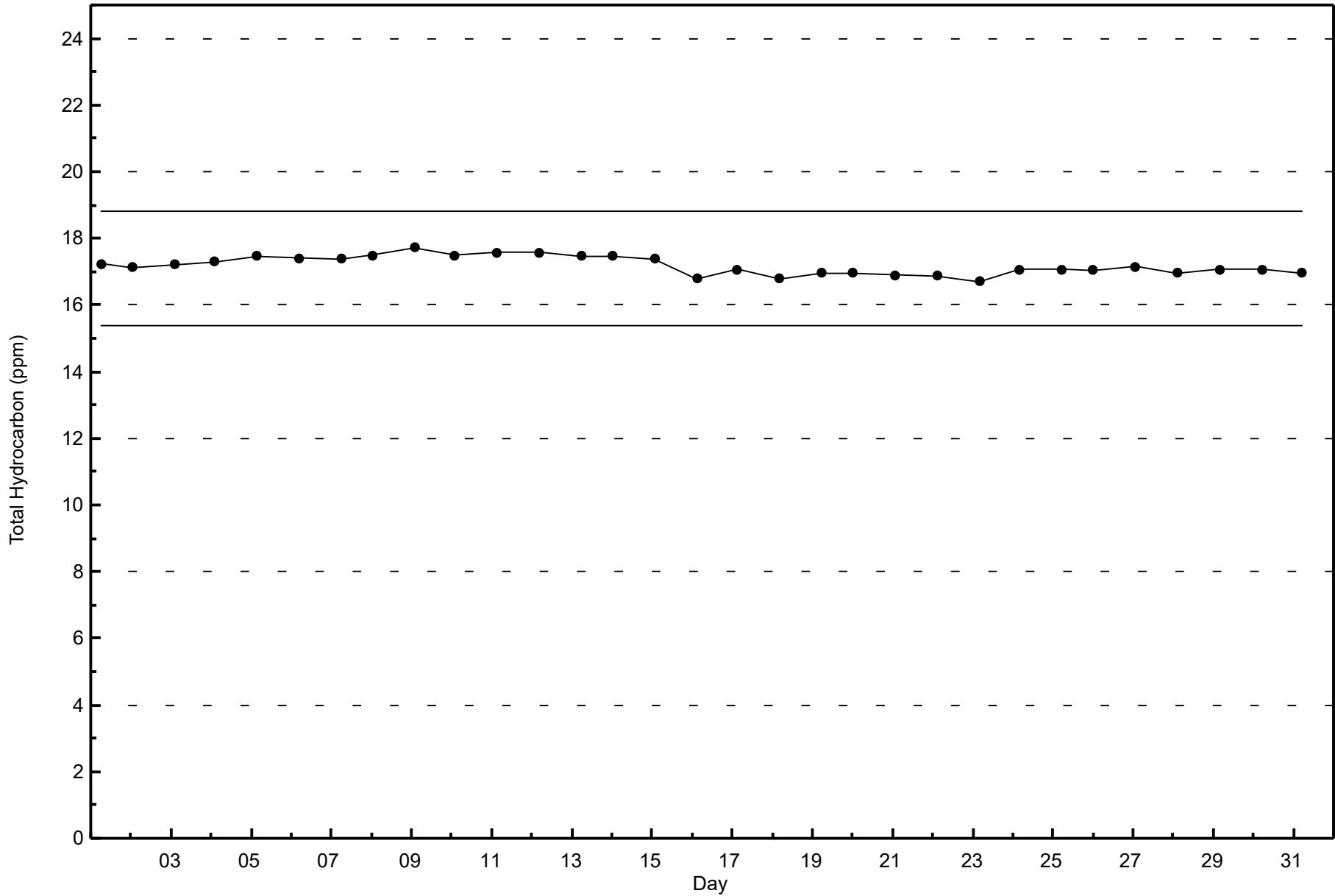


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Total Hydrocarbon (THC) - ppm
Blackgold









Wood Buffalo Environmental Association
Summary of Hour Averages

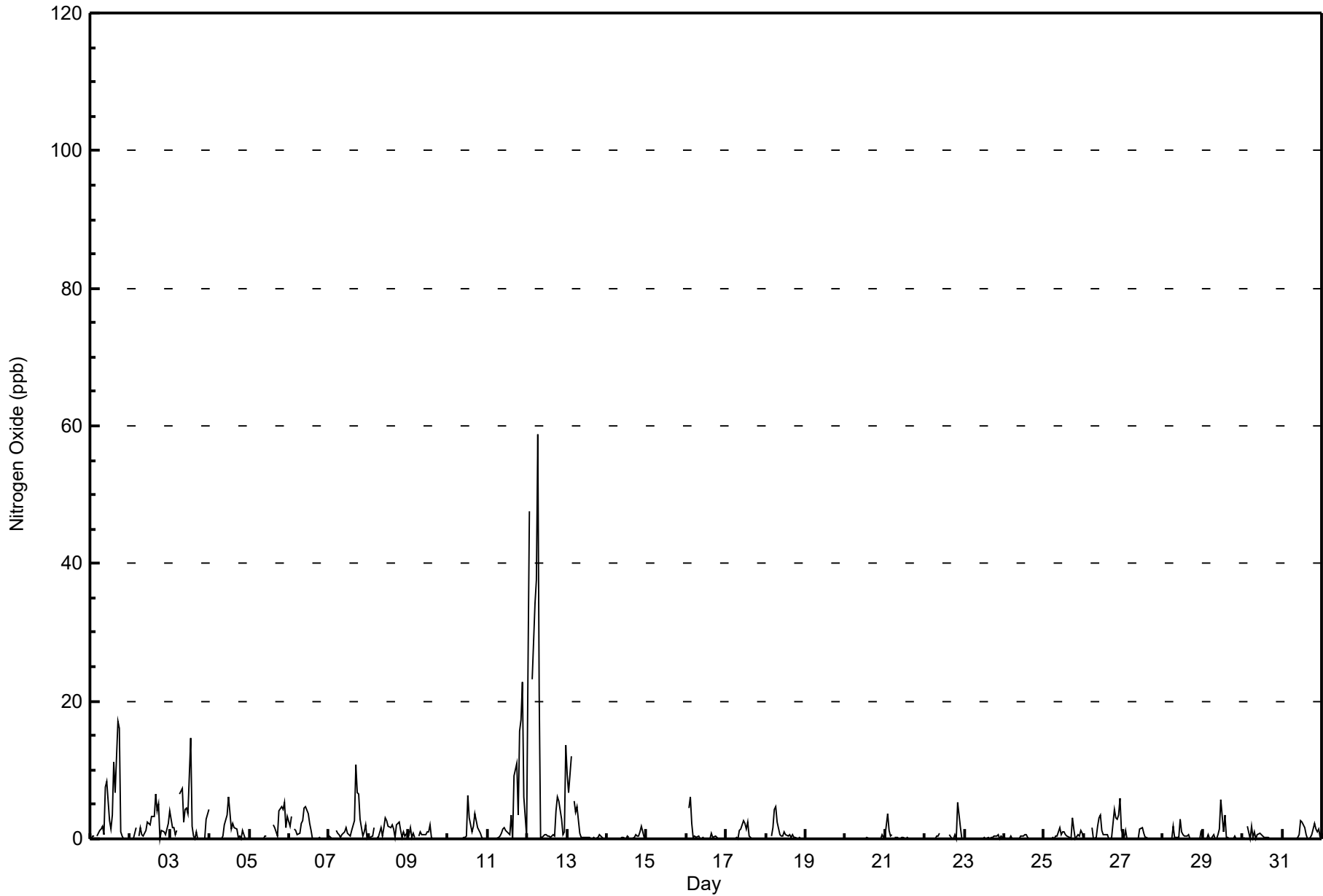
Nitrogen Oxide (NO) - ppb
Blackgold - December 2023

Maximum Value: 58.7 ppb on Dec 12 07:00		Maximum Daily Average: 12.4 ppb on Dec 12		Hours in Service: 744																																												
Minimum Value: 0.0 ppb on Dec 1 01:00		Minimum Daily Average: 0.0 ppb on Dec 19		Hours of Data: 701																																												
Maximum Diurnal Average: 2.8 ppb at hour 2		Minimum Diurnal Average: 0.5 ppb at hour 9		Hours of Missing Data: 43																																												
Monthly Average: 1.40 ppb		Percentiles: P ₁ = 0.0 P ₁₀ = 0.0 Q ₁ = 0.0 Median = 0.2 Q ₃ = 1.1 P ₉₀ = 3.3 P ₉₉ = 21.0		Hours of Calibration: 35																																												
				Percent Operational Time: 98.9																																												
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24																								
1-Dec	0.0	0.4	0.4	Z	0.4	1.3	1.3	1.8	0.7	7.5	8.4	2.7	1.4	3.4	11.3	6.7	17.0	16.1	0.9	0.4	0.0	0.0	0.0	0.0	3.6	17.0																						
2-Dec	0.0	0.0	0.0	1.5	Z	0.4	1.7	0.7	0.4	1.2	2.4	2.3	2.1	3.3	3.2	6.4	4.1	5.0	0.0	1.2	1.1	0.6	1.4	2.3	1.8	6.4																						
3-Dec	4.0	1.6	1.7	0.6	1.2	Z	6.5	7.3	2.5	4.2	4.6	3.8	14.6	1.7	0.4	0.0	1.0	0.0	0.0	0.0	0.0	0.0	2.8	4.3	2.7	14.6																						
4-Dec	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	2.1	3.4	6.1	3.9	1.5	2.2	1.6	1.4	0.3	0.4	0.0	1.2	0.0	0.0	0.0	1.1	6.1																						
5-Dec	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.4	M	M	M	2.0	1.6	0.9	0.5	4.2	4.6	4.2	5.3	1.6	3.2	1.4	5.3																						
6-Dec	1.9	3.3	Z	1.4	1.3	0.7	0.7	2.3	2.7	4.4	4.6	3.6	2.2	1.2	0.1	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.1	1.3	4.6																						
7-Dec	0.3	0.1	0.0	Z	1.1	0.9	0.6	0.3	0.6	1.0	1.6	0.7	0.6	0.5	1.3	2.6	10.7	6.8	6.4	2.8	0.3	0.9	2.1	0.1	1.8	10.7																						
8-Dec	0.2	0.1	0.5	1.6	Z	0.3	0.2	1.6	0.4	1.7	3.0	2.7	1.9	1.6	2.0	1.4	0.1	2.1	2.5	1.2	0.2	1.1	0.5	1.0	1.2	3.0																						
9-Dec	0.7	1.6	0.1	0.7	0.3	Z	0.5	1.0	0.6	0.6	0.6	1.0	1.0	2.1	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	2.1																						
10-Dec	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.4	6.2	3.0	1.1	1.8	3.6	2.7	1.6	0.8	0.1	0.0	0.0	0.0	0.9	6.2																						
11-Dec	0.0	Z	0.0	0.1	0.1	0.1	0.2	0.4	0.9	1.4	1.7	1.2	0.8	0.5	3.4	0.0	9.1	10.9	3.5	15.6	17.3	22.8	6.0	0.5	4.2	22.8																						
12-Dec	24.8	47.5	Z	23.2	34.2	37.6	58.7	21.0	0.2	0.3	0.6	0.6	0.5	0.5	0.2	0.6	0.4	4.1	6.0	5.6	2.9	0.5	1.1	13.6	12.4	58.7																						
13-Dec	9.3	6.6	11.9	Z	5.4	3.9	4.7	0.9	0.3	0.1	0.1	0.2	0.1	0.1	0.0	0.0	0.1	0.0	0.2	0.6	0.3	0.2	0.0	0.0	2.0	11.9																						
14-Dec	0.0	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.2	0.2	0.1	0.4	0.3	M	0.0	0.2	0.6	0.4	0.4	1.0	1.9	0.3	0.0	0.3	1.9																						
15-Dec	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	0.0	0.0	0.0	0.0	0.0	0.1	0.1																					
16-Dec	Z	4.5	6.2	2.3	0.2	0.3	0.2	0.4	0.0	0.1	0.3	0.0	0.0	0.1	0.0	0.8	0.1	0.4	0.2	0.1	0.0	0.0	0.0	0.0	0.7	6.2																						
17-Dec	0.0	Z	0.0	0.0	0.0	0.0	0.1	0.1	1.2	1.4	2.7	2.3	1.4	2.5	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	2.7																						
18-Dec	0.0	0.0	Z	0.3	1.6	4.2	4.6	2.4	0.6	0.5	0.3	1.0	0.7	0.3	0.6	0.2	0.6	0.3	0.2	0.0	0.2	0.0	0.0	0.0	0.8	4.6																						
19-Dec	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	0.0																					
20-Dec	0.0	0.0	0.0	0.0	Z	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	0.7	0.2	0.1	0.7																						
21-Dec	0.3	3.6	1.1	0.5	0.6	Z	0.3	0.2	0.0	0.1	0.3	0.3	0.1	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	3.6																						
22-Dec	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.5	0.9	C	C	C	C	C	0.5	0.0	0.0	0.6	0.0	5.2	1.6	0.0	0.1	0.5	5.2																						
23-Dec	0.0	Z	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.2	0.0	0.2	0.0	0.1	0.3	0.4	0.5	0.6	0.1	0.4	0.2	0.1	0.6																						
24-Dec	0.3	0.0	Z	0.0	0.0	0.4	0.1	0.0	0.0	0.0	0.4	0.5	0.5	0.6	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.6																						
25-Dec	0.0	0.0	0.0	Z	0.0	0.1	0.1	0.4	0.5	1.5	0.7	1.0	1.1	0.7	0.4	0.3	0.0	3.1	1.4	0.0	0.7	0.4	1.2	0.8	0.6	3.1																						
26-Dec	0.0	0.1	0.0	0.0	Z	1.6	0.0	0.2	1.9	3.0	3.4	1.2	0.7	0.5	0.6	0.1	0.0	0.2	4.3	3.0	2.8	3.4	5.9	1.2	1.5	5.9																						
27-Dec	0.3	1.2	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	1.3	1.6	0.8	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	1.6																						
28-Dec	PF	PF	0.0	0.0	0.0	0.0	1.9	0.1	0.3	0.1	2.8	1.1	0.6	0.4	0.4	0.6	0.0	0.1	0.0	0.0	0.0	0.0	0.0	1.3	0.4	2.8																						
29-Dec	0.2	Z	0.0	0.6	0.1	0.0	0.7	0.0	0.0	0.5	1.5	5.6	1.1	3.4	0.2	0.1	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.6	5.6																						
30-Dec	0.0	0.1	Z	1.8	0.1	1.9	0.1	1.0	0.0	0.6	0.7	0.6	0.5	0.1	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.4	1.9																						
31-Dec	0.0	0.0	0.0	Z	0.0	0.0	0.0	0.0	0.1	0.2	0.6	2.6	2.4	1.6	0.6	0.1	0.0	0.2	0.6	2.3	1.3	1.0	1.4	0.3	0.7	2.6																						
																								1.6	2.8	0.8	1.4	1.8	2.0	2.7	1.4	0.5	1.1	1.6	1.5	1.6	1.1	1.1	0.8	1.6	1.7	1.1	1.3	1.3	1.3	0.8	1.0	Diurnal Average
																								24.8	47.5	11.9	23.2	34.2	37.6	58.7	21.0	2.7	7.5	8.4	6.1	14.6	3.4	11.3	6.7	17.0	16.1	6.4	15.6	17.3	22.8	6.0	13.6	Diurnal Maximum
Z - zerospan		C - Calibration				M - Maintenance				PF - Power Failure																																						



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxide (NO) - ppb
Blackgold - December 2023





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Oxide (NO) - ppb
Blackgold - December 2023**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	693	98.86	98.86
21 - 40	6	0.86	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: 701

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxide (NO) - ppb
Blackgold - December 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	4	1	3	5	6	10	5	16	74	132	160	66	99	87	20	4	692
21 - 40	0	0	0	0	0	0	0	0	0	2	4	0	0	0	0	0	6
11 - 80	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	2
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	4	1	3	5	6	10	5	16	74	134	166	66	99	87	20	4	700

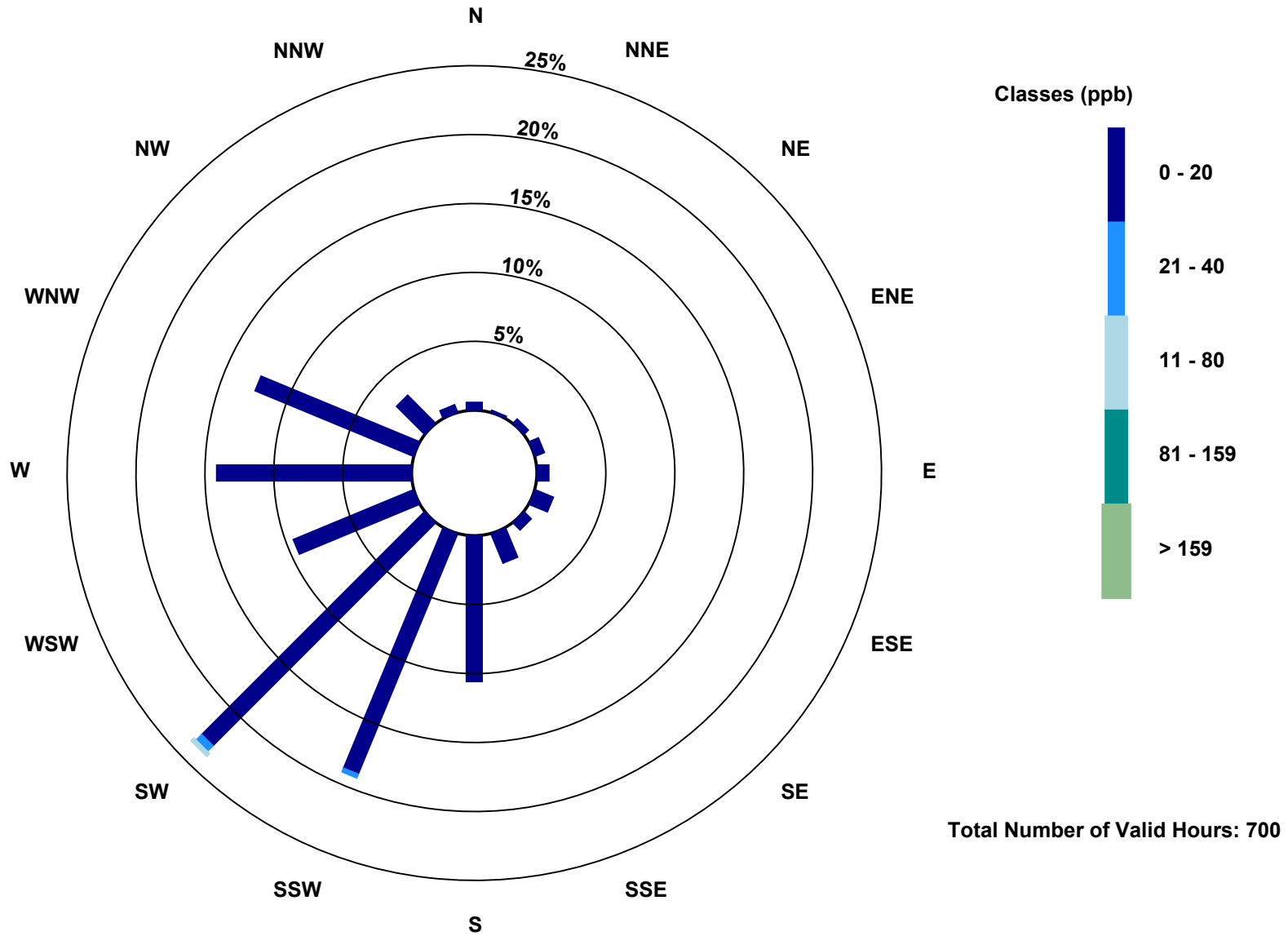
Total Number of Valid Hours: 700

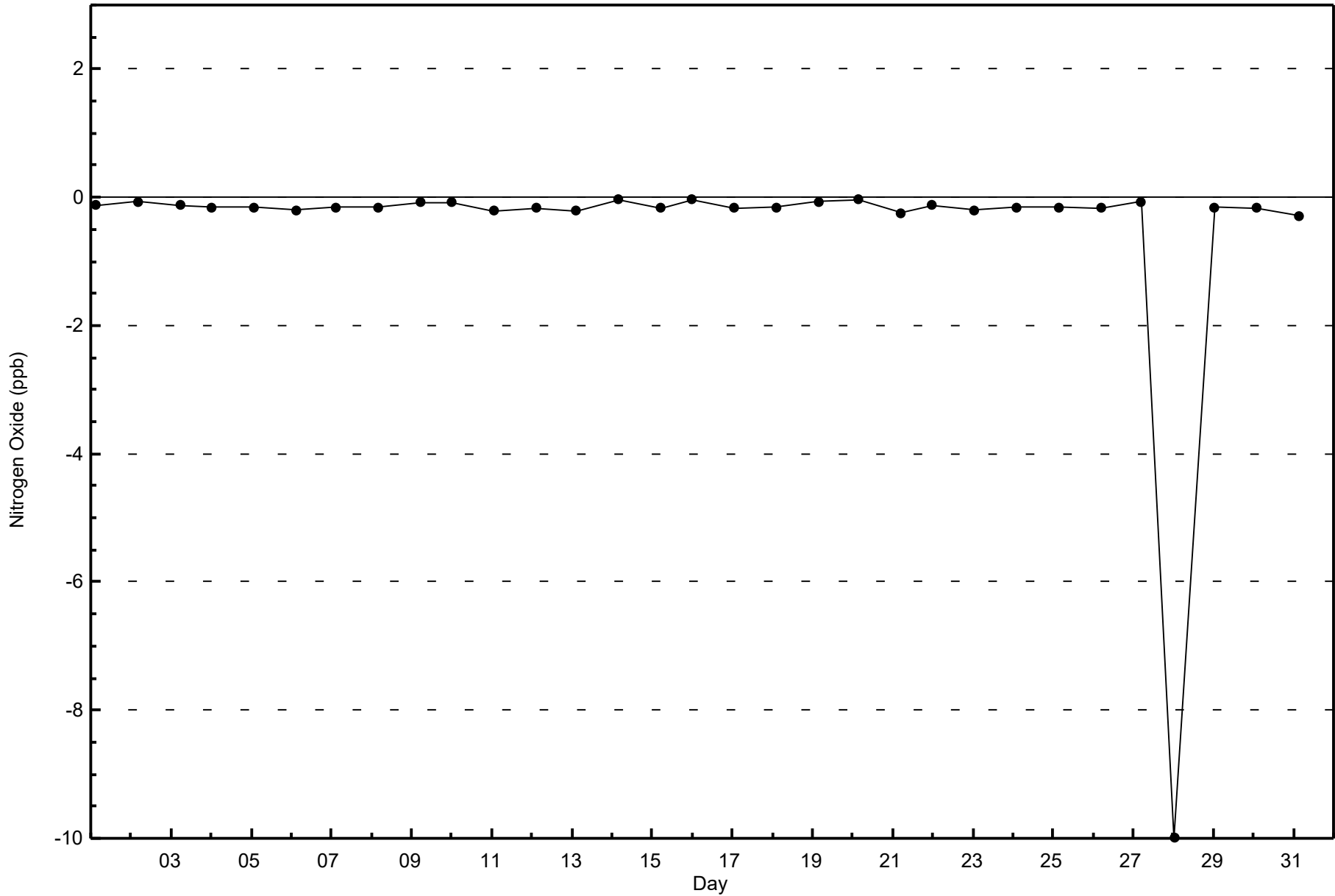
Total Number of Hours: 744

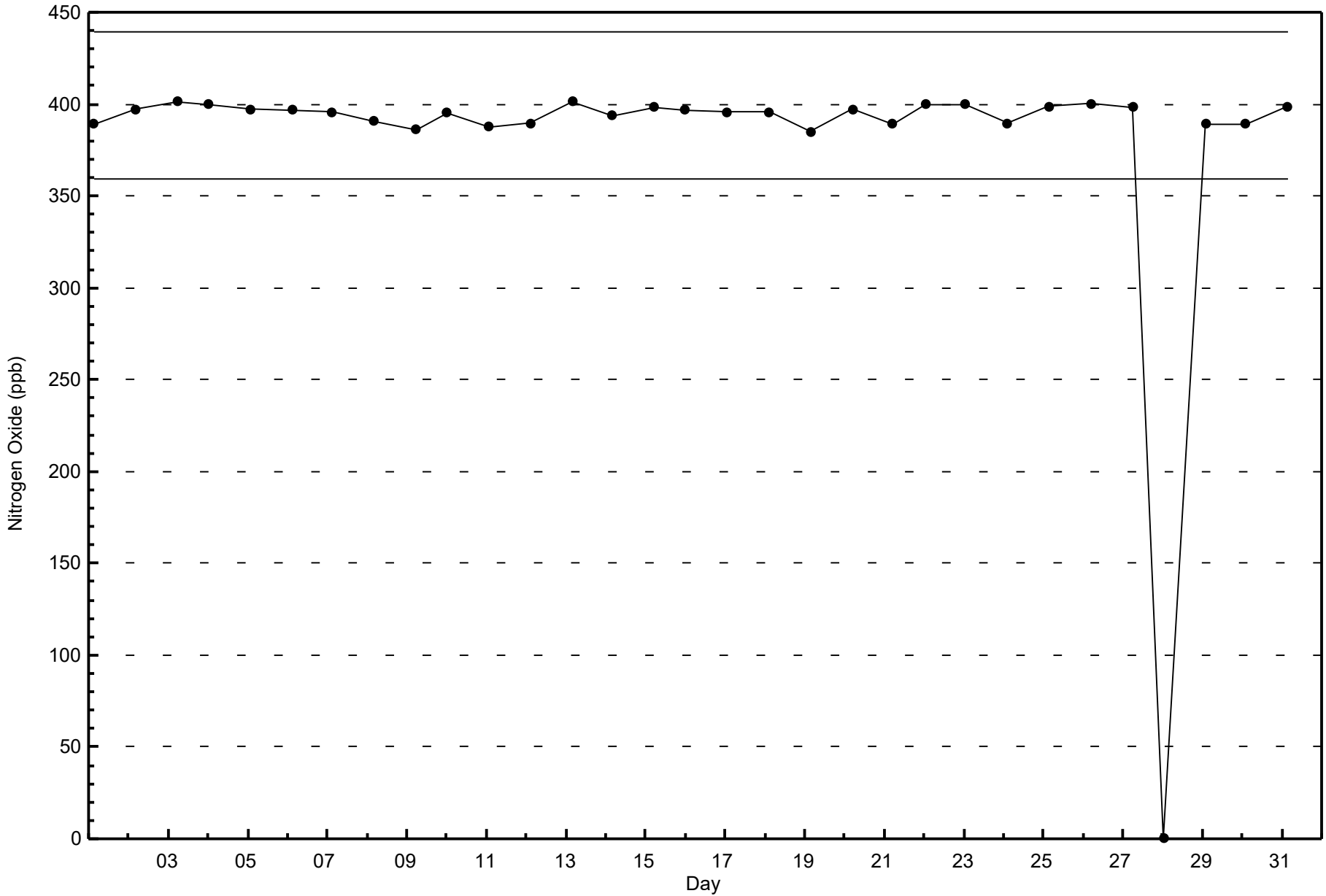


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Nitrogen Oxide (NO) - ppb
Blackgold









Wood Buffalo Environmental Association

Summary of Hour Averages

Nitrogen Dioxide (NO₂) - ppb

Blackgold - December 2023

Number of Exceedences (AAAQO):	1-hr: 0	24-hr: 0	Hours in Service:	744
Maximum Value: 37.3 ppb on Dec 12 07:00	Maximum Daily Average: 10.7 ppb on Dec 12		Hours of Data:	701
Minimum Value: 0.0 ppb on Dec 11 00:00	Minimum Daily Average: 0.7 ppb on Dec 19		Hours of Missing Data:	43
Maximum Diurnal Average: 5.4 ppb at hour 2	Minimum Diurnal Average: 2.7 ppb at hour 14		Hours of Calibration:	35
Monthly Average: 4.00 ppb	Percentiles: P ₁ = 0.0 P ₁₀ = 0.6 Q ₁ = 1.7 Median = 3.4 Q ₃ = 5.3 P ₉₀ = 7.7 P ₉₉ = 16.4		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-Dec	1.2	1.7	2.9	Z	3.8	3.8	4.3	4.7	2.6	6.0	7.8	5.1	3.8	5.7	11.7	7.6	16.4	14.2	5.5	3.6	4.7	6.2	5.2	4.0	5.8	16.4
2-Dec	4.1	4.3	3.6	4.9	Z	4.9	6.5	6.3	5.4	4.5	4.5	4.2	6.2	5.3	11.0	14.6	7.8	3.8	6.4	8.3	7.7	8.9	9.0	6.4	14.6	
3-Dec	9.3	8.1	7.0	5.2	6.1	Z	9.2	8.2	6.0	6.1	5.3	5.1	7.9	2.9	2.2	2.2	3.8	2.5	3.8	5.2	7.6	8.2	8.9	9.2	6.1	9.3
4-Dec	Z	6.0	4.9	5.4	4.8	3.5	3.5	3.2	3.5	4.9	5.1	7.3	5.6	3.2	4.5	5.3	5.9	1.9	2.2	1.3	3.9	1.3	1.4	1.3	3.9	7.3
5-Dec	1.9	Z	1.4	1.5	4.0	7.4	4.3	4.1	3.7	4.4	2.4	M	M	M	6.0	5.9	5.1	3.9	9.6	9.1	8.5	9.1	4.6	6.4	5.2	9.6
6-Dec	4.4	8.6	Z	3.4	3.1	2.1	1.9	5.6	5.8	8.1	7.6	6.4	4.4	3.6	1.0	1.6	1.3	2.5	3.1	1.5	1.5	1.8	1.4	2.9	3.6	8.6
7-Dec	4.2	2.1	0.7	Z	4.2	5.8	3.7	2.4	2.9	5.4	4.9	2.2	1.5	1.0	2.9	6.1	10.5	11.6	14.4	13.6	5.8	5.5	6.4	1.7	5.2	14.4
8-Dec	2.3	1.7	2.1	4.7	Z	2.2	2.3	5.0	3.6	4.6	5.4	5.1	5.1	3.9	5.3	6.8	3.7	9.9	8.7	7.0	2.8	5.7	3.5	5.0	4.6	9.9
9-Dec	4.0	5.9	2.1	3.3	1.9	Z	2.6	3.9	4.0	2.8	2.5	2.7	2.2	2.9	1.8	1.4	1.8	1.8	1.8	2.4	0.6	7.7	4.2	4.6	3.0	7.7
10-Dec	Z	6.7	6.4	4.2	4.5	4.2	3.1	2.8	2.7	4.1	4.8	4.4	9.0	6.5	4.9	6.6	9.2	8.3	5.7	4.0	0.6	0.2	0.1	0.0	4.5	9.2
11-Dec	0.0	Z	0.1	0.0	0.0	0.1	0.2	0.7	1.5	3.8	3.7	1.9	1.2	0.7	4.7	0.7	9.8	9.3	4.3	11.6	14.0	19.2	9.6	4.6	4.4	19.2
12-Dec	16.8	31.3	Z	21.5	22.7	30.1	37.3	15.2	4.9	2.9	2.9	2.4	2.1	2.2	2.2	3.0	2.8	5.8	6.2	7.6	4.2	3.4	4.3	13.6	10.7	37.3
13-Dec	15.0	11.6	13.1	Z	4.9	6.1	7.3	5.4	3.6	2.7	3.1	3.5	3.7	3.8	4.0	4.3	5.3	5.5	6.8	8.9	7.3	5.7	3.4	2.1	6.0	15.0
14-Dec	0.8	0.8	0.0	0.0	Z	0.8	0.0	0.3	0.3	3.4	1.9	1.2	2.0	2.7	M	1.1	1.7	5.8	4.1	3.0	4.4	6.0	1.4	1.1	1.9	6.0
15-Dec	1.9	1.2	0.8	1.4	1.8	Z	3.3	4.4	3.1	3.1	2.0	1.3	0.7	0.6	1.6	3.8	3.9	1.7	1.0	1.0	1.5	2.0	2.6	3.0	2.1	4.4
16-Dec	Z	8.3	10.2	6.5	3.2	3.4	2.4	1.9	0.3	0.4	0.7	0.0	0.0	0.2	0.1	4.7	3.3	3.0	2.5	3.0	0.8	0.0	0.0	0.0	2.4	10.2
17-Dec	0.1	Z	0.0	0.0	0.0	0.1	0.4	1.7	6.1	6.2	5.7	3.7	2.2	4.4	0.7	0.4	0.4	0.2	0.3	0.7	2.2	5.1	4.0	3.3	2.1	6.2
18-Dec	2.9	3.1	Z	4.1	5.3	8.9	10.8	8.2	4.3	3.3	2.2	3.2	2.3	0.9	0.7	2.7	4.9	2.1	2.0	1.9	1.2	0.2	0.5	1.1	3.3	10.8
19-Dec	0.4	0.3	0.7	Z	1.2	1.2	1.0	2.3	1.6	0.6	0.3	0.4	0.4	0.3	0.2	0.1	0.2	0.2	0.0	0.0	0.1	0.9	1.5	1.8	0.7	2.3
20-Dec	3.3	1.0	0.2	0.4	Z	2.1	1.1	0.8	1.3	1.6	1.0	1.1	1.1	1.4	1.3	1.4	1.5	2.7	2.9	3.4	3.2	3.3	5.0	5.8	2.0	5.8
21-Dec	5.0	7.1	5.3	4.2	2.7	Z	1.8	1.2	1.1	0.7	0.8	0.6	0.2	0.4	0.0	0.8	1.9	3.4	4.3	4.6	3.0	3.3	3.1	3.0	2.5	7.1
22-Dec	Z	3.4	3.4	2.9	2.9	3.3	4.1	4.5	7.2	6.2	C	C	C	C	C	6.2	5.7	5.9	8.0	6.8	9.6	7.6	3.8	1.3	5.2	9.6
23-Dec	0.8	Z	0.3	0.1	0.3	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.2	0.0	0.3	0.3	0.6	2.2	6.7	4.9	5.6	3.3	2.9	2.0	1.3	6.7
24-Dec	1.7	0.6	Z	0.8	1.4	1.4	0.7	0.8	0.8	0.9	1.9	1.8	1.7	1.7	1.4	1.3	1.8	4.4	3.7	3.1	3.2	4.2	4.9	4.1	2.1	4.9
25-Dec	3.4	3.2	3.3	Z	5.3	5.3	3.8	5.8	4.8	6.1	3.7	3.4	3.9	2.8	2.8	4.2	2.8	7.7	11.6	8.5	6.6	7.0	6.1	7.0	5.2	11.6
26-Dec	7.1	9.7	7.9	6.6	Z	8.5	7.2	6.2	5.8	7.1	4.9	3.1	1.8	1.6	2.2	2.5	3.4	3.9	8.5	7.6	7.3	7.8	9.7	5.1	5.9	9.7
27-Dec	2.5	4.5	0.8	1.2	1.6	Z	0.6	0.3	0.3	0.7	2.9	3.5	2.2	1.5	2.3	3.1	3.8	3.1	4.6	6.2	2.8	1.9	PF	PF	2.4	6.2
28-Dec	PF	PF	3.9	3.6	3.2	1.3	3.0	3.8	3.4	3.1	4.8	3.1	2.1	2.0	2.9	4.0	5.2	7.3	8.2	8.1	7.7	7.2	6.3	8.3	4.7	8.3
29-Dec	7.2	Z	4.5	5.7	5.0	4.4	5.0	3.6	3.6	3.2	3.6	4.7	2.6	7.3	2.1	2.7	3.0	4.5	4.2	7.0	7.1	6.2	3.9	1.7	4.5	7.3
30-Dec	2.6	3.2	Z	9.6	4.9	6.9	4.4	6.7	2.6	5.1	3.4	3.7	3.0	1.6	2.3	2.6	3.0	4.5	3.2	1.8	3.5	3.6	3.5	1.3	3.8	9.6
31-Dec	1.3	1.1	1.0	Z	1.1	1.1	1.2	1.4	1.3	2.2	3.6	6.1	5.1	5.1	3.2	2.3	2.6	2.7	3.7	5.9	4.5	4.1	5.0	2.0	2.9	6.1

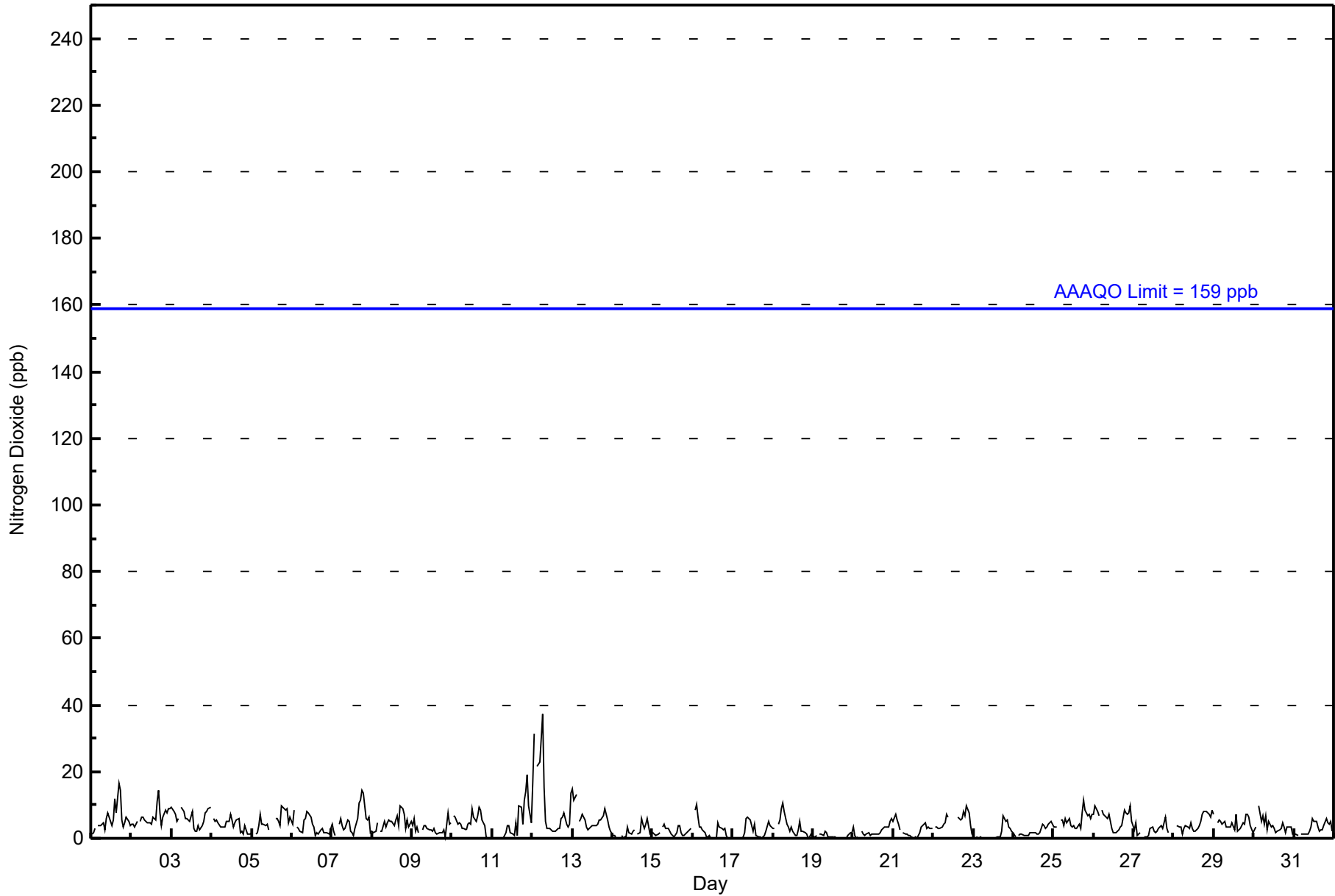
4.0	5.4	3.3	4.0	3.8	4.6	4.4	3.9	3.2	3.7	3.4	3.2	2.8	2.7	2.8	3.4	4.5	4.8	5.0	5.2	4.6	5.0	4.2	3.9	Diurnal Average	
16.8	31.3	13.1	21.5	22.7	30.1	37.3	15.2	7.2	8.1	7.8	7.3	9.0	7.3	11.7	11.0	16.4	14.2	14.4	13.6	14.0	19.2	9.7	13.6	Diurnal Maximum	

Z - zerospan C - Calibration M - Maintenance PF - Power Failure
 Alberta Ambient Air Quality Objectives (AAAQO): 1-hr 159 ppb



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Dioxide (NO₂) - ppb
Blackgold - December 2023





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Blackgold - December 2023**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	696	99.29	99.29
21 - 40	5	0.71	100.00
41 - 80	0	0.00	100.00
81 - 159	0	0.00	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 701

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Dioxide (NO₂) - ppb
Blackgold - December 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	4	1	3	5	6	10	5	16	74	134	161	66	99	87	20	4	695
21 - 40	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	5
11 - 80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81 - 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	4	1	3	5	6	10	5	16	74	134	166	66	99	87	20	4	700

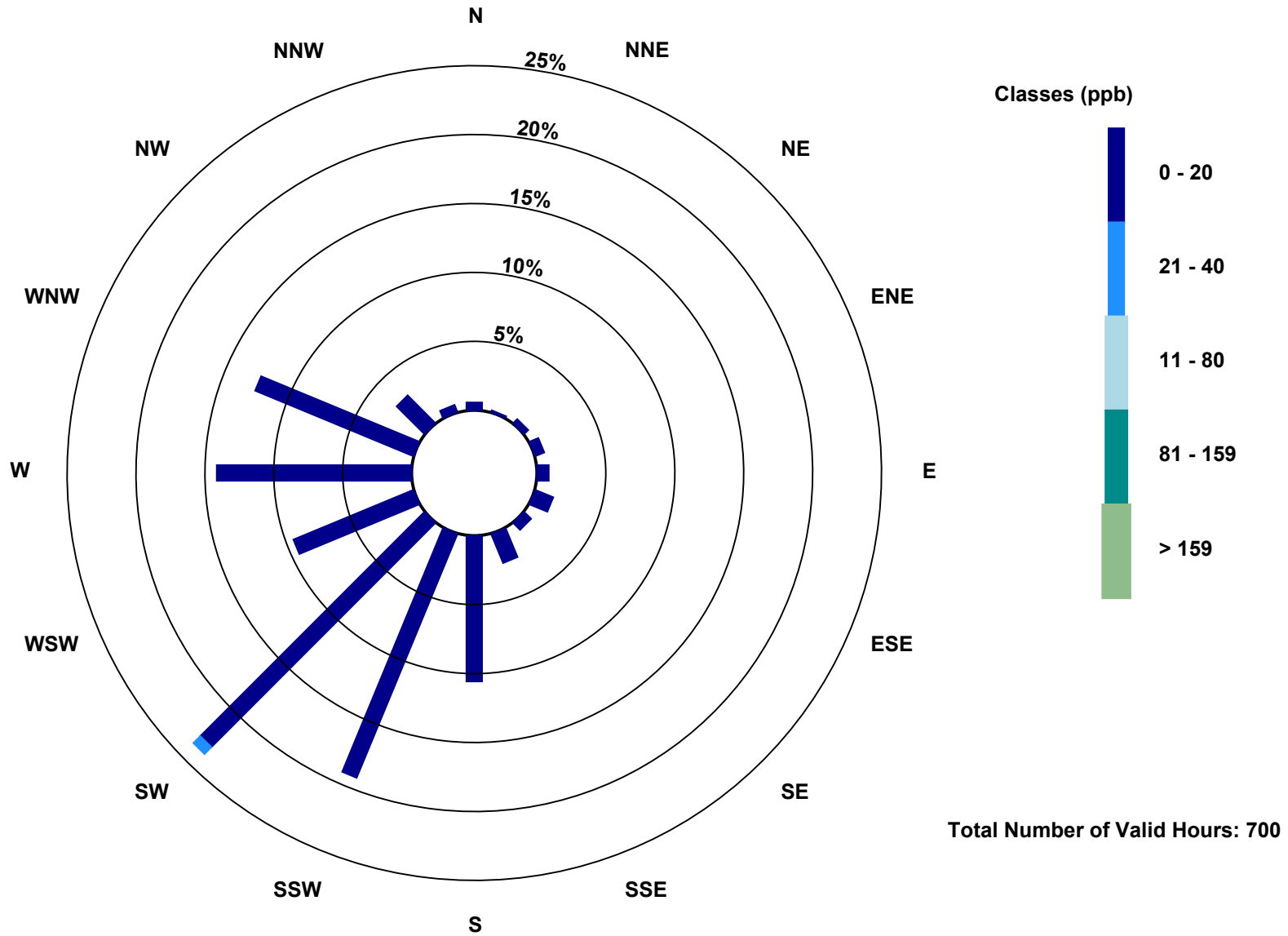
Total Number of Valid Hours: 700

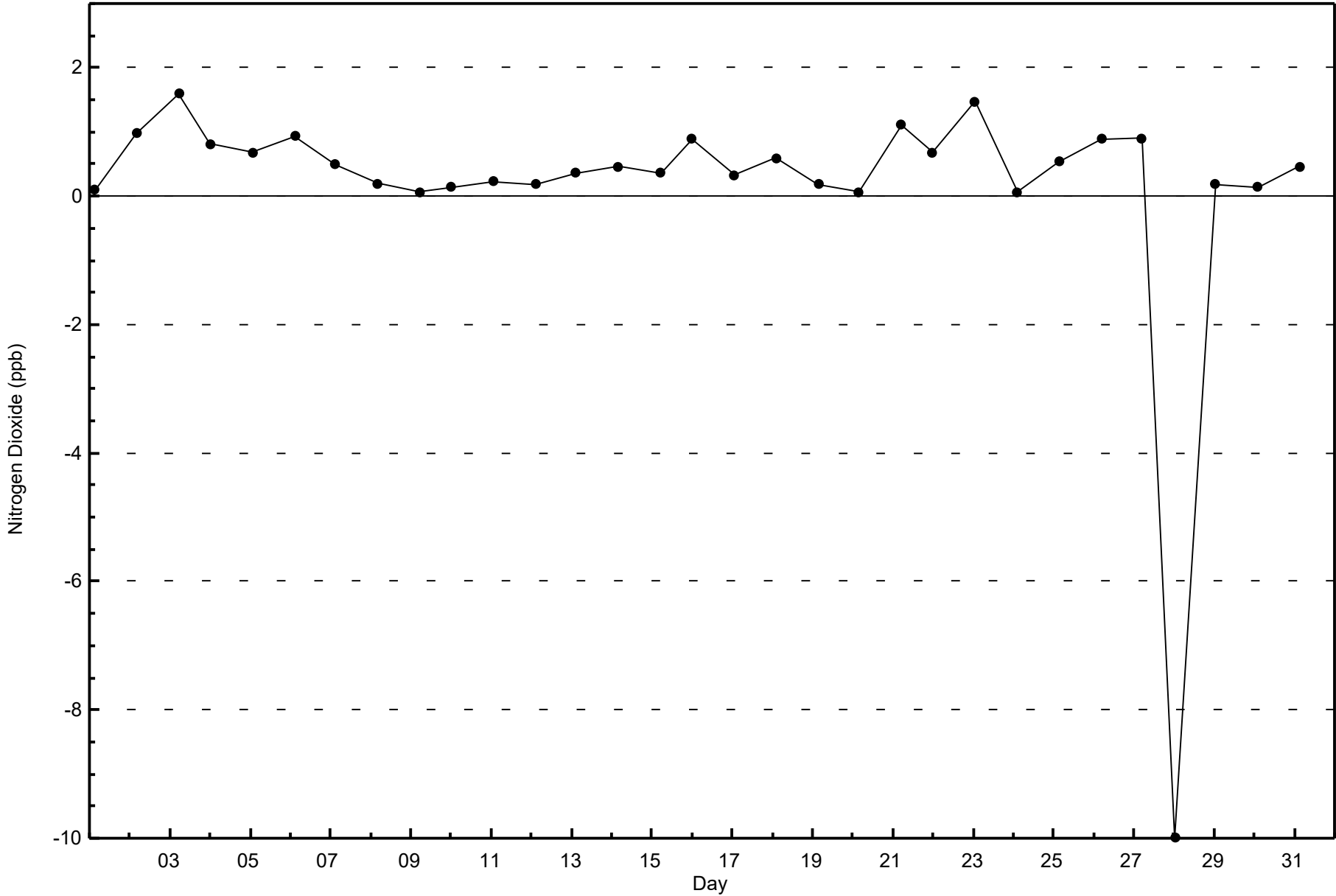
Total Number of Hours: 744

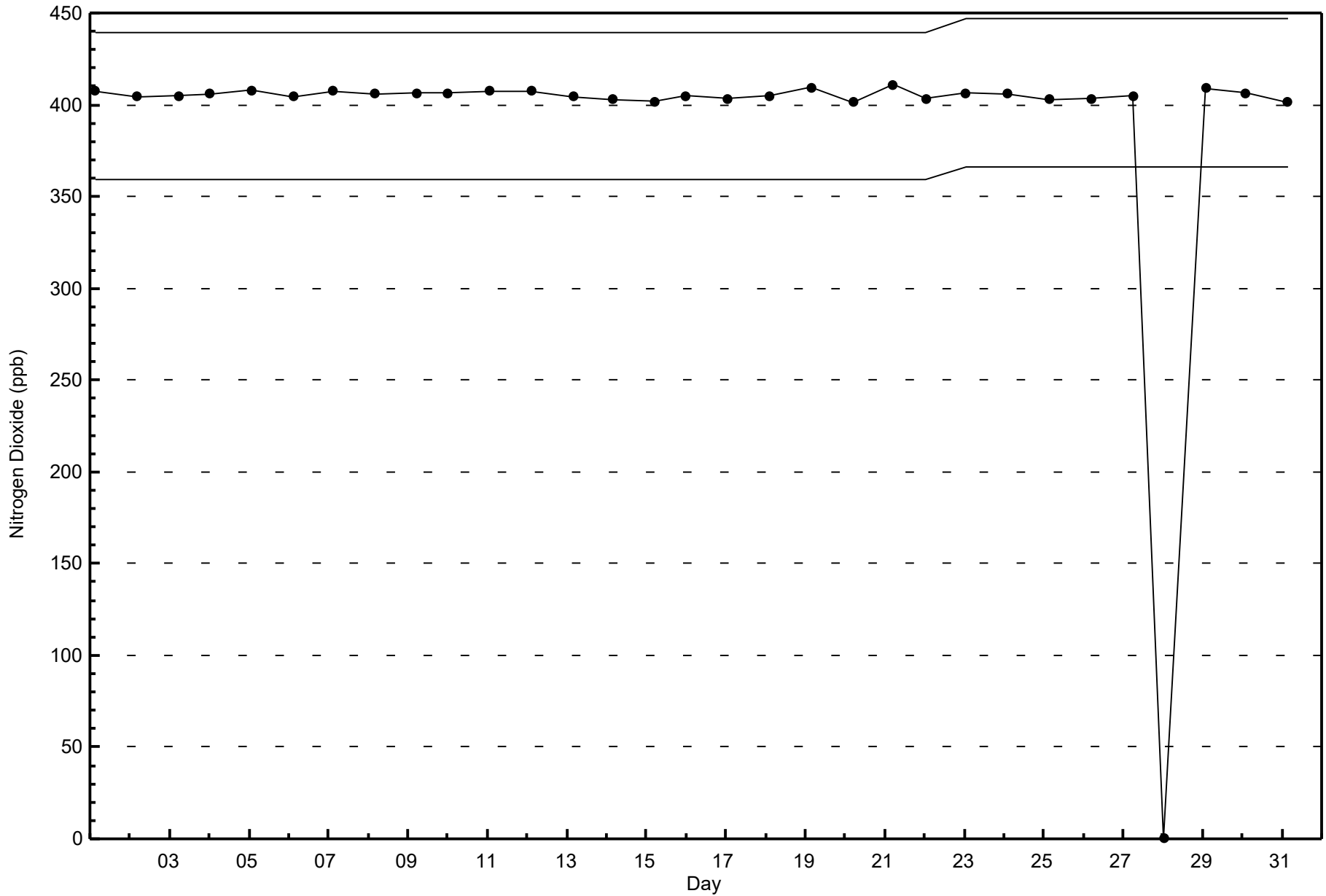


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Nitrogen Dioxide (NO₂) - ppb
Blackgold









Wood Buffalo Environmental Association
Summary of Hour Averages

Nitrogen Oxides (NO_x) - ppb
Blackgold - December 2023

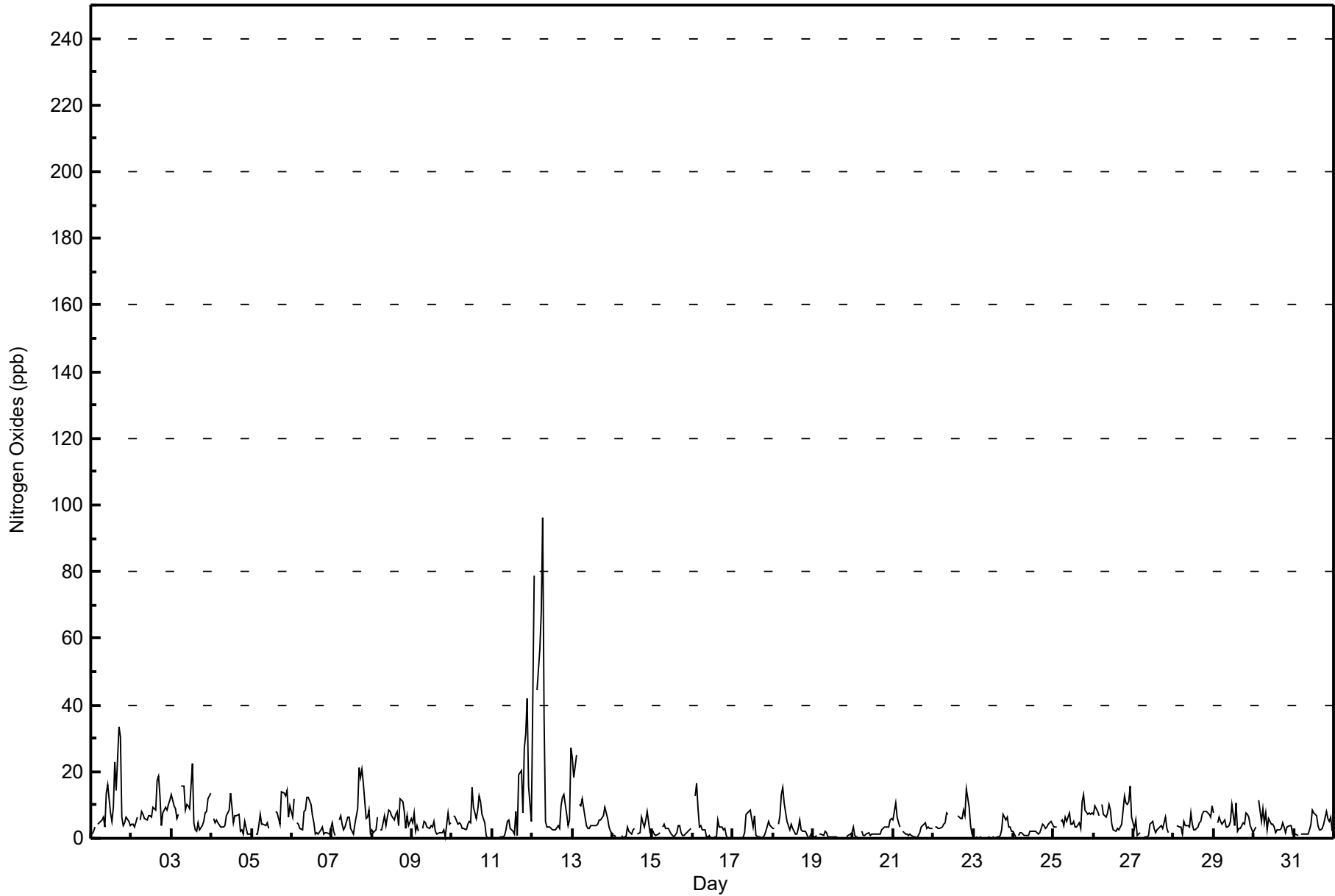
Maximum Value: 96.0 ppb on Dec 12 07:00																					Maximum Daily Average: 23.0 ppb on Dec 12					Hours in Service: 744	
Minimum Value: 0.0 ppb on Dec 11 00:00											Minimum Daily Average: 0.7 ppb on Dec 19					Hours of Data: 701											
Maximum Diurnal Average: 8.2 ppb at hour 2											Minimum Diurnal Average: 3.6 ppb at hour 9					Hours of Missing Data: 43											
Monthly Average: 5.40 ppb											Percentiles: P ₁ = 0.0 P ₁₀ = 0.6 Q ₁ = 1.8 Median = 3.7 Q ₃ = 6.6 P ₉₀ = 10.3 P ₉₉ = 36.2					Hours of Calibration: 35											
																					Percent Operational Time: 98.9						
Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24			
1-Dec	1.2	2.1	3.3	Z	4.2	5.1	5.6	6.5	3.3	13.5	16.2	7.8	5.2	9.1	23.0	14.3	33.4	30.3	6.4	4.0	4.7	6.2	5.2	4.0	9.3	33.4	
2-Dec	4.1	4.3	3.6	6.4	Z	5.3	8.2	7.0	5.8	5.7	6.9	6.8	6.3	9.5	8.5	17.4	18.7	12.8	3.8	7.6	9.4	8.3	10.3	11.3	8.2	18.7	
3-Dec	13.3	9.7	8.7	5.8	7.3	Z	15.7	15.5	8.5	10.3	9.9	8.9	22.5	4.6	2.6	2.2	4.8	2.5	3.8	5.2	7.6	8.2	11.7	13.5	8.8	22.5	
4-Dec	Z	6.0	4.9	5.4	4.8	3.5	3.5	3.2	3.9	7.0	8.5	13.4	9.5	4.7	6.7	6.9	7.3	2.2	2.6	1.3	5.1	1.3	1.4	1.3	5.0	13.4	
5-Dec	1.9	Z	1.4	1.5	4.0	7.4	4.3	4.1	3.7	4.7	2.8	M	M	M	8.0	7.5	6.0	4.4	13.8	13.7	12.7	14.4	6.2	9.6	6.6	14.4	
6-Dec	6.3	11.9	Z	4.8	4.4	2.8	2.6	7.9	8.5	12.5	12.2	10.0	6.6	4.8	1.1	1.6	1.3	2.5	3.3	1.5	1.5	1.8	1.4	3.0	5.0	12.5	
7-Dec	4.5	2.2	0.7	Z	5.3	6.7	4.3	2.7	3.5	6.4	6.5	2.9	2.1	1.5	4.2	8.7	21.2	18.4	20.8	16.4	6.1	6.4	8.5	1.8	7.0	21.2	
8-Dec	2.5	1.8	2.6	6.3	Z	2.5	2.5	6.6	4.0	6.3	8.4	7.8	7.0	5.5	7.3	8.2	3.8	12.0	11.2	8.2	3.0	6.8	4.0	6.0	5.8	12.0	
9-Dec	4.7	7.5	2.2	4.0	2.2	Z	3.1	4.9	4.6	3.4	3.1	3.7	3.2	5.0	2.0	1.4	1.8	1.8	1.8	2.4	0.6	7.7	4.2	4.6	3.5	7.7	
10-Dec	Z	6.7	6.4	4.2	4.5	4.2	3.1	2.8	2.7	4.2	5.0	4.8	15.2	9.5	6.0	8.4	12.8	11.0	7.3	4.8	0.7	0.2	0.1	0.0	5.4	15.2	
11-Dec	0.0	Z	0.1	0.1	0.1	0.2	0.4	1.1	2.4	5.2	5.4	3.1	2.0	1.2	8.1	0.7	18.9	20.2	7.8	27.2	31.3	42.0	15.6	5.1	8.6	42.0	
12-Dec	41.6	78.8	Z	44.7	56.9	67.7	96.0	36.2	5.1	3.2	3.5	3.0	2.6	2.7	2.4	3.6	3.2	9.9	12.2	13.2	7.1	3.9	5.4	27.2	23.0	96.0	
13-Dec	24.3	18.2	25.0	Z	10.3	10.0	12.0	6.3	3.9	2.8	3.2	3.7	3.8	3.9	4.0	4.3	5.4	5.5	7.0	9.5	7.6	5.9	3.4	2.1	7.9	25.0	
14-Dec	0.8	0.8	0.0	0.0	Z	0.8	0.0	0.3	0.3	3.6	2.1	1.3	2.4	3.0	M	1.1	1.9	6.4	4.5	3.4	5.4	7.9	1.7	1.1	2.2	7.9	
15-Dec	1.9	1.2	0.8	1.4	1.8	Z	3.3	4.4	3.1	3.1	2.1	1.3	0.7	0.6	1.6	3.8	3.9	1.7	1.0	1.0	1.5	2.0	2.6	3.0	2.1	4.4	
16-Dec	Z	12.8	16.4	8.8	3.4	3.7	2.6	2.3	0.3	0.5	1.0	0.0	0.0	0.3	0.1	5.5	3.4	3.4	2.7	3.1	0.8	0.0	0.0	0.0	3.1	16.4	
17-Dec	0.1	Z	0.0	0.0	0.0	0.1	0.5	1.8	7.3	7.6	8.4	6.0	3.6	6.9	1.0	0.4	0.4	0.2	0.3	0.7	2.2	5.1	4.0	3.3	2.6	8.4	
18-Dec	2.9	3.1	Z	4.4	6.9	13.1	15.4	10.6	4.9	3.8	2.5	4.2	3.0	1.2	1.3	2.9	5.5	2.4	2.2	1.9	1.4	0.2	0.5	1.1	4.1	15.4	
19-Dec	0.4	0.3	0.7	Z	1.2	1.2	1.0	2.3	1.6	0.6	0.3	0.4	0.4	0.3	0.2	0.1	0.2	0.2	0.0	0.0	0.1	0.9	1.5	1.8	0.7	2.3	
20-Dec	3.3	1.0	0.2	0.4	Z	2.1	1.1	0.8	1.3	1.6	1.0	1.2	1.2	1.5	1.3	1.4	1.5	2.7	2.9	3.4	3.2	3.3	5.7	6.0	2.1	6.0	
21-Dec	5.3	10.7	6.4	4.7	3.3	Z	2.1	1.4	1.1	0.8	1.1	0.9	0.3	0.6	0.0	0.8	1.9	3.4	4.3	4.6	3.0	3.3	3.1	3.0	2.9	10.7	
22-Dec	Z	3.4	3.4	2.9	2.9	3.3	4.1	4.9	7.7	7.1	C	C	C	C	C	6.7	5.7	5.9	8.6	6.8	14.8	9.2	3.8	1.4	5.7	14.8	
23-Dec	0.8	Z	0.3	0.1	0.3	0.0	0.0	0.0	0.0	0.2	0.0	0.1	0.4	0.0	0.5	0.3	0.7	2.5	7.1	5.4	6.2	3.4	3.3	2.2	1.5	7.1	
24-Dec	2.0	0.6	Z	0.8	1.8	1.5	0.7	0.8	0.8	0.9	2.3	2.3	2.2	2.3	1.6	1.4	1.8	4.4	3.7	3.1	3.2	4.2	4.9	4.1	2.2	4.9	
25-Dec	3.4	3.2	3.3	Z	5.3	5.4	3.9	6.2	5.3	7.6	4.4	4.4	5.0	3.5	3.2	4.5	2.8	10.8	13.0	8.5	7.3	7.4	7.3	7.8	5.8	13.0	
26-Dec	7.1	9.8	7.9	6.6	Z	10.1	7.2	6.4	7.7	10.1	8.3	4.3	2.5	2.1	2.8	2.6	3.4	4.1	12.8	10.6	10.1	11.2	15.6	6.3	7.4	15.6	
27-Dec	2.8	5.7	0.8	1.2	1.6	Z	0.6	0.3	0.3	0.7	4.2	5.1	3.0	1.7	2.5	3.1	3.8	3.1	4.6	6.2	2.8	1.9	PF	PF	2.7	6.2	
28-Dec	PF	PF	3.9	3.6	3.2	1.3	4.9	3.9	3.7	3.2	7.6	4.2	2.7	2.4	3.3	4.6	5.2	7.4	8.2	8.1	7.7	7.2	6.3	9.6	5.1	9.6	
29-Dec	7.4	Z	4.5	6.3	5.1	4.4	5.7	3.6	3.6	3.7	5.1	10.3	3.7	10.7	2.3	2.8	3.0	4.5	4.2	7.5	7.1	6.2	3.9	1.7	5.1	10.7	
30-Dec	2.6	3.3	Z	11.4	5.0	8.8	4.5	7.7	2.6	5.7	4.1	4.3	3.5	1.7	2.5	2.7	3.0	4.5	3.2	1.8	3.5	3.7	3.6	1.4	4.1	11.4	
31-Dec	1.3	1.1	1.0	Z	1.1	1.1	1.2	1.4	1.4	2.4	4.2	8.7	7.5	6.7	3.8	2.4	2.6	2.9	4.3	8.2	5.8	5.1	6.4	2.3	3.6	8.7	
																								Diurnal Average			
																								Diurnal Maximum			
																								Diurnal Average			
																								Diurnal Maximum			
																								Diurnal Average			
																								Diurnal Maximum			

Z - zerospan C - Calibration M - Maintenance PF - Power Failure



Wood Buffalo Environmental Association
Hourly Averages

Nitrogen Oxides (NO_x) - ppb
Blackgold - December 2023





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Blackgold - December 2023**

Concentration Ranges (ppb)	Number of Hours	%	Cumulative %
0 - 20	682	97.29	97.29
21 - 40	12	1.71	99.00
41 - 80	6	0.86	99.86
81 - 159	1	0.14	100.00
> 159	0	0.00	100.00

Total Number of Valid Hours: 701

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Nitrogen Oxides (NO_x) - ppb
Blackgold - December 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	4	1	3	5	6	10	5	16	72	129	156	66	99	85	20	4	681
21 - 40	0	0	0	0	0	0	0	0	2	3	5	0	0	2	0	0	12
11 - 80	0	0	0	0	0	0	0	0	0	2	4	0	0	0	0	0	6
81 - 159	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
> 159	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	4	1	3	5	6	10	5	16	74	134	166	66	99	87	20	4	700

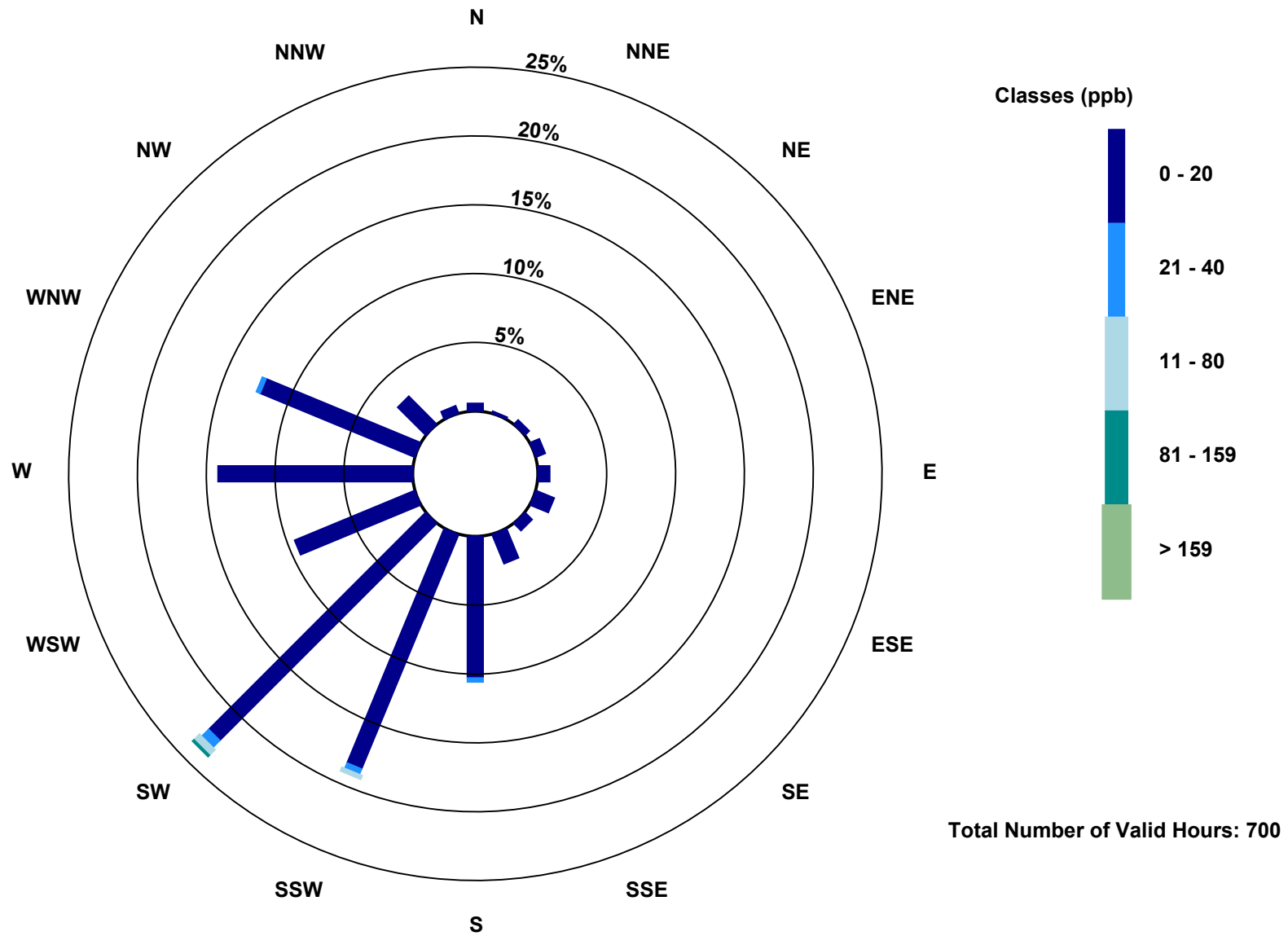
Total Number of Valid Hours: 700

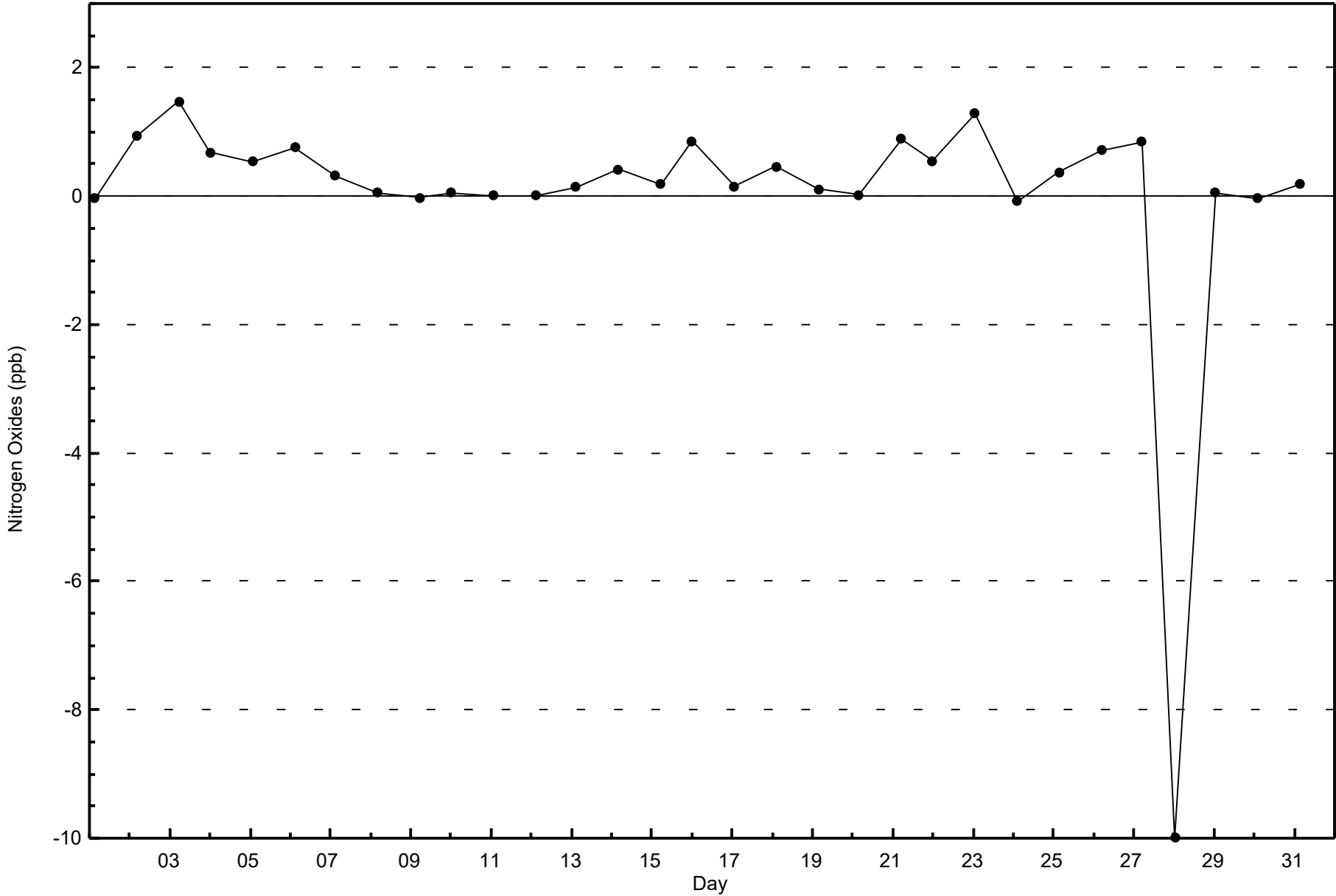
Total Number of Hours: 744

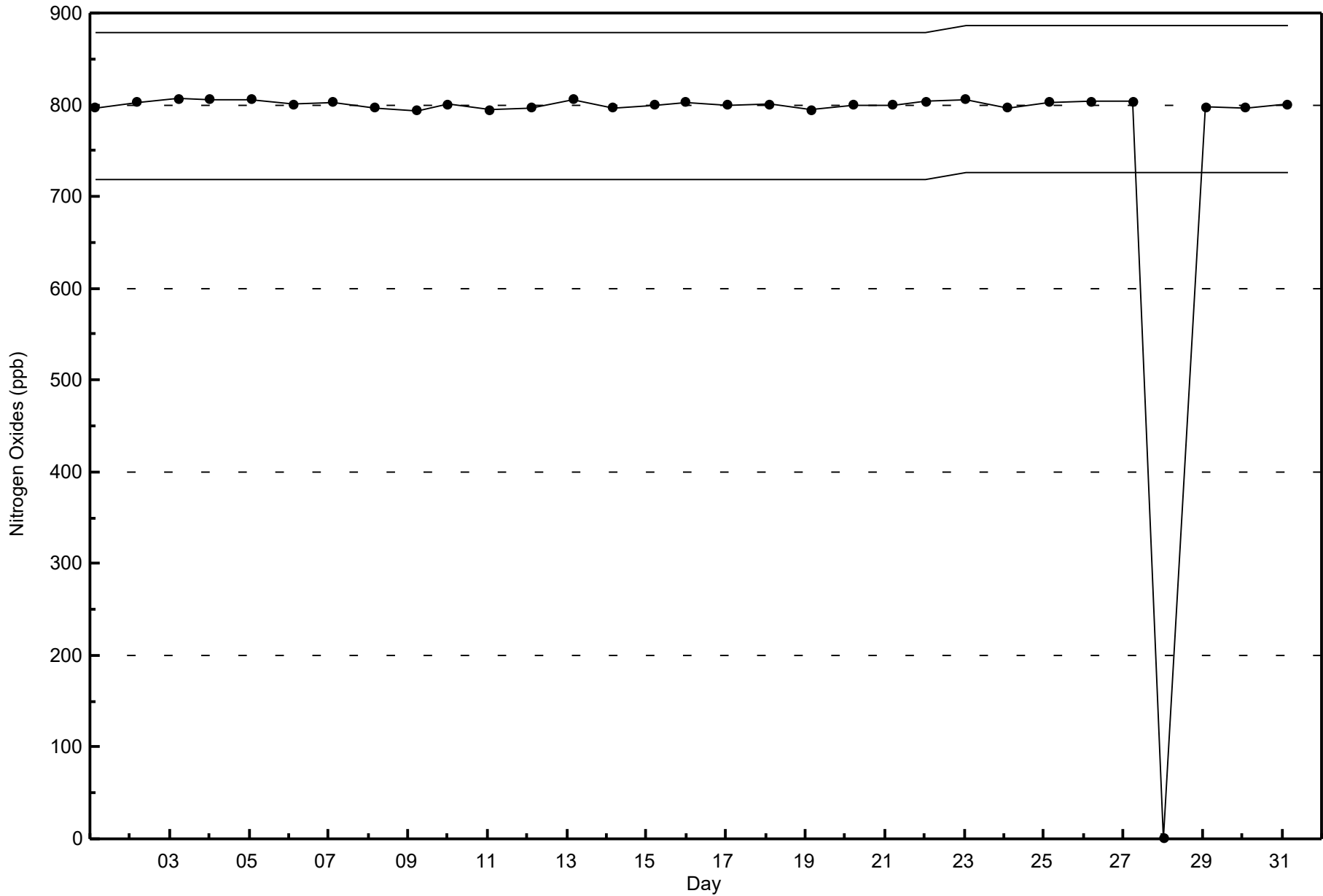


Wood Buffalo Environmental Association
Wind Rose Dec 2023

Nitrogen Oxides (NO_x) - ppb
Blackgold









Wood Buffalo Environmental Association
Summary of Hour Averages

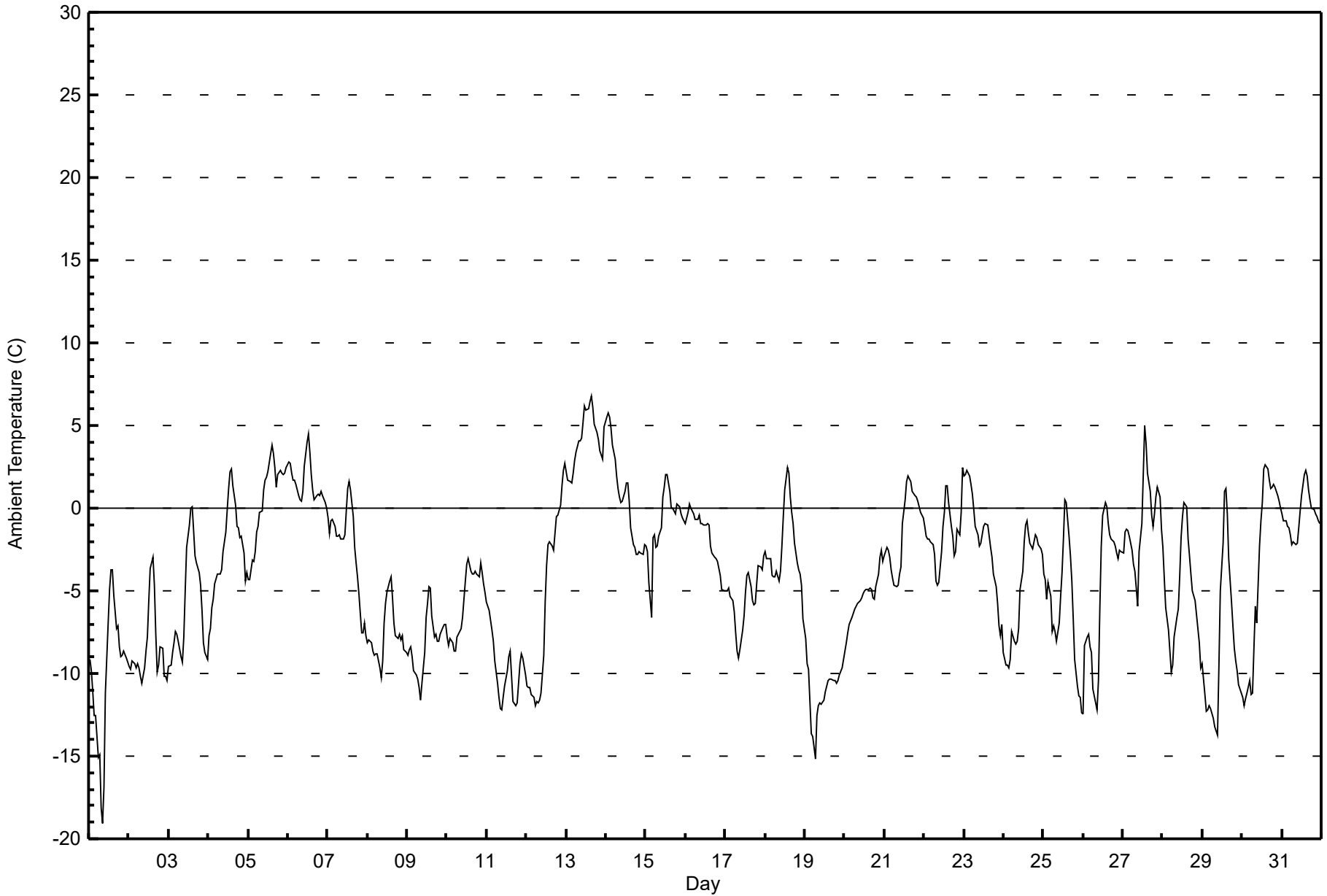
Ambient Temperature (AT) - C
Blackgold - December 2023

Maximum Value: 6.8 C on Dec 13 16:00 Maximum Daily Average: 4.1 C on Dec 13																				Hours in Service: 744 Hours of Data: 744						
Minimum Value: -19.1 C on Dec 1 09:00 Minimum Daily Average: -11.0 C on Dec 19 Maximum Diurnal Average: -0.5 C at hour 14 Minimum Diurnal Average: -6.4 C at hour 9 Monthly Average: -4.06 C Percentiles: P ₁ = -13.7 P ₁₀ = -10.4 Q ₁ = -7.9 Median = -3.7 Q ₃ = -0.4 P ₉₀ = 1.7 P ₉₉ = 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-Dec	-9.2	-9.9	-11.1	-12.5	-12.5	-15.1	-15.0	-18.1	-19.1	-16.9	-11.2	-6.9	-4.9	-3.7	-3.7	-5.3	-7.3	-7.1	-8.4	-9.0	-8.9	-8.6	-9.0	-9.3	-10.1	-3.7
2-Dec	-9.6	-9.7	-9.3	-9.4	-9.6	-9.4	-9.6	-10.2	-10.6	-9.7	-8.7	-7.8	-5.6	-3.6	-3.0	-4.7	-7.6	-9.9	-9.5	-8.3	-8.5	-10.2	-10.2	-10.5	-8.5	-3.0
3-Dec	-9.6	-9.5	-8.7	-8.1	-7.4	-7.6	-8.1	-9.0	-9.4	-7.8	-5.0	-2.4	-1.0	0.0	0.0	-1.3	-2.9	-3.3	-3.9	-4.6	-6.2	-8.1	-8.7	-9.1	-5.9	0.0
4-Dec	-7.7	-7.3	-6.0	-5.5	-4.6	-4.0	-4.0	-3.7	-2.6	-1.5	-0.1	1.2	2.2	2.3	1.3	0.2	-1.1	-1.2	-1.8	-1.7	-2.7	-4.4	-3.9	-2.5	2.3	
5-Dec	-4.3	-4.3	-3.2	-3.2	-2.6	-1.5	-1.1	-0.3	-0.2	1.1	1.7	1.9	2.2	3.3	3.8	3.3	2.5	1.3	2.0	2.3	2.1	2.0	2.1	2.5	0.6	3.8
6-Dec	2.8	2.7	2.2	1.7	1.7	1.4	0.8	0.5	0.4	1.1	2.5	4.0	4.5	3.4	2.0	1.1	0.5	0.8	0.9	0.8	1.0	0.7	0.3	0.0	1.6	4.5
7-Dec	-0.6	-1.5	-0.7	-0.7	-1.1	-1.7	-1.7	-1.6	-1.8	-1.9	-1.6	-0.2	1.2	1.6	1.1	-0.5	-2.3	-3.3	-4.2	-5.1	-7.6	-7.5	-6.9	-7.7	-2.3	1.6
8-Dec	-8.1	-7.9	-8.1	-8.6	-8.9	-8.8	-8.8	-9.7	-10.2	-9.2	-6.9	-5.7	-5.1	-4.4	-4.2	-5.5	-6.9	-7.7	-7.9	-7.7	-7.9	-7.7	-8.6	-8.7	-7.6	-4.2
9-Dec	-8.9	-8.6	-8.4	-8.9	-9.8	-10.1	-10.3	-10.8	-11.6	-10.6	-8.7	-6.6	-5.8	-4.8	-4.9	-6.5	-7.8	-7.6	-8.0	-8.0	-7.7	-7.2	-7.0	-7.0	-8.2	-4.8
10-Dec	-7.8	-8.3	-7.9	-8.1	-8.7	-8.6	-7.8	-7.6	-7.3	-6.6	-5.5	-4.4	-3.4	-3.0	-3.8	-4.0	-4.0	-3.8	-4.0	-4.1	-3.3	-3.9	-4.6	-5.1	-5.7	-3.0
11-Dec	-5.7	-6.2	-6.8	-7.4	-8.1	-9.3	-10.6	-11.5	-12.1	-12.2	-11.4	-10.8	-9.8	-9.0	-8.6	-10.2	-11.7	-11.9	-11.8	-10.6	-9.4	-8.8	-9.1	-10.1	-9.7	-5.7
12-Dec	-10.7	-10.9	-10.9	-11.3	-11.4	-11.9	-11.7	-11.8	-11.6	-11.2	-8.9	-5.6	-3.5	-2.2	-2.1	-2.3	-2.6	-1.5	-0.5	-0.4	0.2	1.4	2.3	2.7	-5.7	2.7
13-Dec	2.2	1.7	1.6	1.6	2.1	2.9	3.4	4.1	4.0	4.2	5.2	6.2	5.9	6.0	6.4	6.8	6.1	5.1	4.6	4.1	3.5	3.2	3.0	4.9	4.1	6.8
14-Dec	5.5	5.7	5.5	4.8	3.8	2.9	2.0	1.2	0.7	0.3	0.4	1.0	1.5	1.5	0.4	-1.2	-2.2	-2.4	-2.8	-2.8	-2.6	-2.7	-2.8	-2.2	0.6	5.7
15-Dec	-2.3	-2.6	-4.5	-6.6	-1.8	-1.6	-2.3	-2.3	-1.7	-1.2	0.7	1.3	2.0	2.0	1.1	0.0	0.0	-0.1	-0.3	0.3	0.1	-0.3	-0.6	-0.8	-0.9	2.0
16-Dec	-0.9	-0.3	0.2	0.0	-0.1	-0.3	-0.7	-0.7	-0.4	-0.9	-0.9	-1.0	-1.0	-0.9	-1.0	-2.3	-2.7	-3.0	-3.0	-3.2	-3.7	-4.1	-4.9	-5.0	-1.7	0.2
17-Dec	-5.0	-5.0	-4.8	-5.3	-5.6	-6.3	-7.6	-8.6	-9.1	-8.5	-7.4	-6.5	-5.1	-4.0	-3.9	-4.7	-5.6	-5.9	-5.7	-4.6	-3.4	-3.6	-3.8	-2.9	-5.5	-2.9
18-Dec	-2.6	-3.1	-3.1	-3.0	-4.1	-4.1	-4.2	-3.8	-4.4	-3.8	-2.3	-0.5	1.1	2.4	2.1	0.7	-0.2	-1.0	-2.1	-3.3	-3.7	-4.0	-4.6	-6.7	-2.4	2.4
19-Dec	-7.9	-9.4	-9.8	-11.7	-13.6	-13.8	-15.2	-12.5	-11.9	-11.8	-11.9	-11.6	-11.1	-10.8	-10.4	-10.4	-10.3	-10.4	-10.5	-10.6	-10.5	-10.1	-9.7	-9.1	-11.0	-7.9
20-Dec	-8.6	-8.2	-7.5	-7.0	-6.6	-6.3	-6.1	-6.0	-5.8	-5.6	-5.5	-5.2	-5.0	-4.9	-4.9	-4.8	-4.9	-5.4	-5.5	-4.7	-4.0	-2.9	-2.5	-3.3	-5.5	-2.5
21-Dec	-2.9	-2.4	-2.5	-3.0	-3.8	-4.2	-4.6	-4.8	-4.7	-4.0	-3.6	-1.0	0.5	1.6	1.9	1.8	1.6	1.0	0.7	0.6	0.4	0.1	-0.2	-0.6	-1.3	1.9
22-Dec	-1.1	-1.7	-1.9	-1.9	-2.0	-2.2	-2.8	-4.4	-4.7	-4.5	-2.6	-1.1	-0.2	1.3	1.4	0.4	-1.1	-1.7	-2.9	-2.6	-1.3	-1.6	-0.2	2.5	-1.5	2.5
23-Dec	1.9	2.0	2.3	1.9	1.4	0.8	-0.1	-1.1	-1.6	-2.3	-2.1	-1.6	-1.1	-0.9	-1.0	-1.7	-2.3	-3.0	-4.0	-4.8	-5.8	-7.1	-7.7	-7.0	-1.9	2.3
24-Dec	-8.7	-9.5	-9.5	-9.7	-9.1	-7.5	-8.0	-8.2	-8.0	-7.3	-4.9	-3.8	-2.0	-1.1	-0.8	-1.6	-2.2	-2.4	-2.0	-1.6	-1.7	-2.2	-2.5	-2.8	-4.9	-0.8
25-Dec	-4.0	-4.3	-5.5	-4.5	-5.4	-7.4	-7.1	-7.4	-8.1	-6.9	-5.4	-3.9	-1.8	0.5	0.4	-1.7	-2.9	-4.4	-6.7	-9.1	-10.8	-11.4	-11.4	-12.4	-5.9	0.5
26-Dec	-12.4	-8.3	-7.8	-7.6	-8.4	-8.7	-11.0	-11.8	-12.2	-10.4	-6.0	-2.3	-0.4	0.4	0.1	-0.9	-1.6	-1.8	-2.0	-2.3	-2.7	-3.0	-2.5	-2.6	-5.3	0.4
27-Dec	-2.7	-1.4	-1.3	-1.4	-1.7	-2.5	-3.4	-3.8	-4.9	-6.0	-2.6	-0.9	2.0	5.0	3.9	2.1	1.0	-0.4	-1.1	-0.3	0.7	1.2	0.7	-1.3	-0.8	5.0
28-Dec	-2.4	-4.2	-6.1	-7.4	-8.7	-10.0	-9.5	-7.8	-6.6	-6.1	-4.1	-1.7	-0.5	0.4	0.1	-1.9	-2.9	-4.0	-5.0	-5.6	-6.5	-7.3	-8.1	-9.6	-5.2	0.4
29-Dec	-9.4	-11.3	-12.3	-12.2	-11.9	-12.1	-12.7	-13.2	-13.5	-13.7	-9.6	-5.0	-2.1	1.0	1.2	-0.4	-3.1	-5.6	-7.1	-8.5	-9.2	-9.8	-10.7	-11.2	-8.4	1.2
30-Dec	-11.4	-12.0	-11.5	-11.2	-10.5	-11.2	-11.2	-8.5	-5.9	-7.0	-2.3	-0.7	0.4	2.4	2.6	2.3	1.7	1.2	1.3	1.4	1.2	0.7	0.5	0.0	-3.7	2.6
31-Dec	-0.4	-0.7	-0.8	-1.1	-1.2	-1.6	-2.2	-2.0	-2.2	-2.2	-1.2	-0.2	0.8	2.0	2.3	2.0	1.1	0.5	0.0	-0.1	-0.3	-0.5	-0.8	-0.9	-0.4	2.3
																								Diurnal Average		
																								Diurnal Maximum		



Wood Buffalo Environmental Association
Hourly Averages

Ambient Temperature (AT) - C
Blackgold - December 2023





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Ambient Temperature (AT) - C
Blackgold - December 2023

Concentration Ranges (C)	Number of Hours	%	Cumulative %
-50 - -20	0	0.00	0.00
-20 - 0	584	78.49	78.49
0 - 10	160	21.51	100.00
10 - 20	0	0.00	100.00
> 20	0	0.00	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association
Summary of Hour Averages

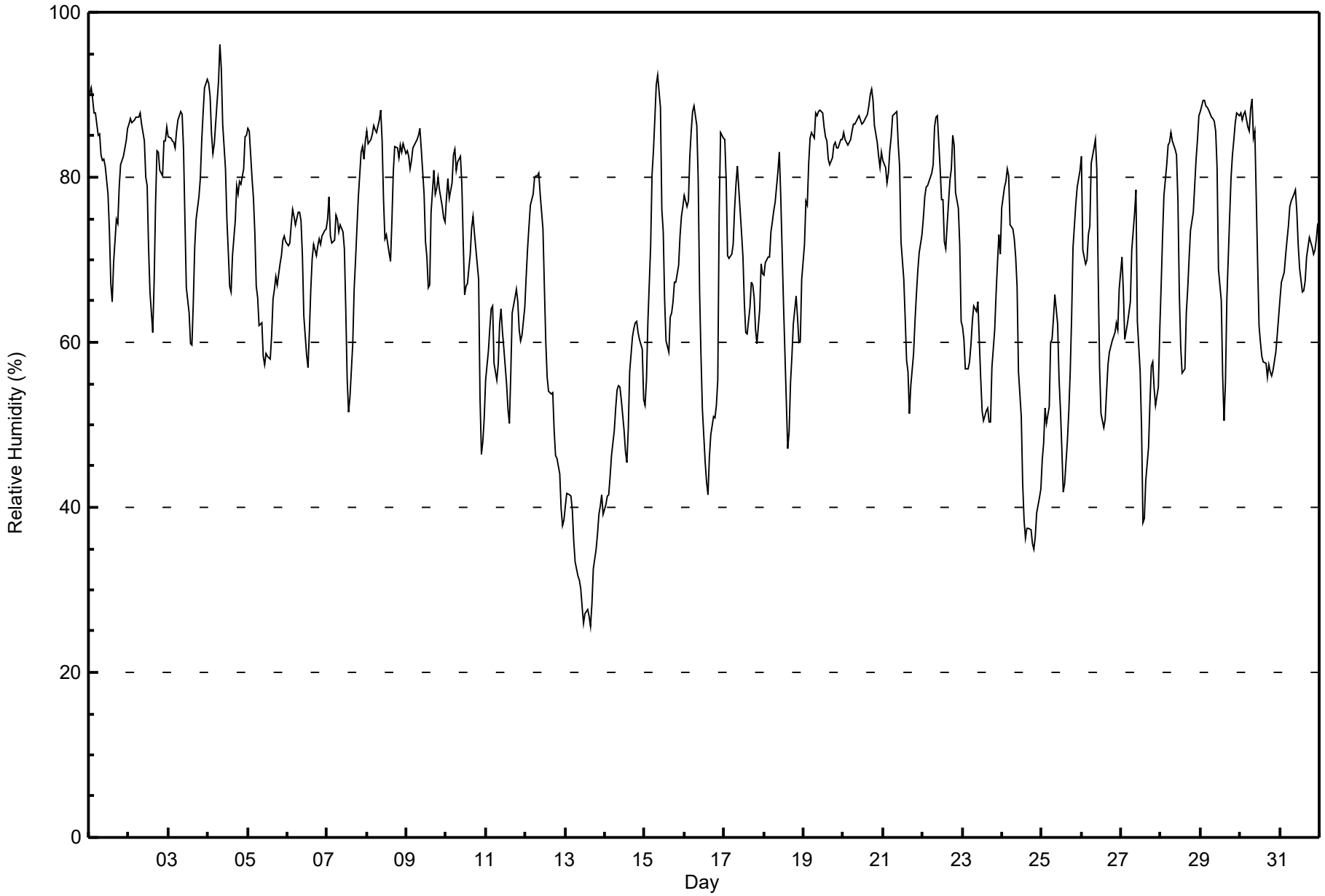
Relative Humidity (RH) - %
Blackgold - December 2023

Maximum Value: 96.1 % on Dec 4 08:00 Maximum Daily Average: 86.1 % on Dec 20																						Hours in Service:	744																								
Minimum Value: 25.6 % on Dec 13 16:00 Minimum Daily Average: 34.2 % on Dec 13																						Hours of Data:	744																								
Maximum Diurnal Average: 78.2 % at hour 9 Minimum Diurnal Average: 57.5 % at hour 15																						Hours of Missing Data:	0																								
Monthly Average: 69.82 % Percentiles: P ₁ = 30.6 P ₁₀ = 50.1 Q ₁ = 60.2 Median = 72.1 Q ₃ = 82.4 P ₉₀ = 86.4 P ₉₉ = 90.8																						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-Dec	90.2	90.9	89.5	87.9	87.8	85.1	85.2	82.7	82.1	82.3	81.4	77.9	73.6	67.1	65.0	69.7	74.9	74.3	78.8	81.5	82.0	82.5	84.3	86.0	80.9	90.9																					
2-Dec	86.5	87.1	86.7	86.9	87.3	87.4	87.4	87.8	86.5	84.5	80.1	78.9	71.6	66.1	61.1	67.5	76.8	83.3	83.0	80.9	80.2	84.5	84.4	86.1	81.3	87.8																					
3-Dec	85.0	84.8	84.4	84.2	83.5	85.7	87.0	87.9	87.6	83.3	74.9	66.7	63.5	59.8	59.6	65.0	71.5	74.9	77.6	79.9	84.4	87.7	90.8	91.9	79.2	91.9																					
4-Dec	91.4	89.8	85.3	82.8	84.0	89.1	91.5	96.1	93.2	86.5	80.9	74.9	71.0	66.9	66.0	70.5	74.8	78.9	78.0	79.5	79.2	81.0	84.9	85.2	81.7	96.1																					
5-Dec	86.0	85.7	79.9	77.5	73.2	66.7	65.4	62.0	62.4	58.3	57.3	58.6	58.3	58.0	60.9	65.2	66.5	67.9	66.9	69.4	70.5	72.4	72.9	72.2	68.1	86.0																					
6-Dec	71.7	72.1	74.2	76.2	75.2	74.2	75.8	75.8	74.8	70.6	63.2	58.5	56.9	61.3	66.4	70.2	71.9	70.6	71.7	72.6	71.8	72.8	73.5	73.7	70.7	76.2																					
7-Dec	75.0	77.6	72.9	72.0	72.3	75.5	74.9	73.5	74.2	73.4	71.3	64.1	55.6	51.5	53.3	59.8	66.4	69.9	73.9	77.7	83.1	83.8	82.2	84.4	71.6	84.4																					
8-Dec	85.6	84.1	84.7	85.3	86.3	85.8	85.4	86.9	88.1	84.4	77.2	72.6	73.0	70.8	69.8	74.7	80.7	83.7	83.6	82.4	83.9	83.0	84.1	82.8	81.6	88.1																					
9-Dec	83.2	82.5	81.0	82.0	83.5	84.2	84.6	85.1	86.0	83.4	77.9	72.1	70.3	66.5	67.0	75.7	80.9	77.9	78.7	79.9	78.5	76.4	75.0	74.5	78.6	86.0																					
10-Dec	77.4	79.9	77.4	79.3	82.7	83.4	80.9	81.8	82.5	79.1	72.1	65.7	66.7	67.1	70.7	73.9	75.2	73.2	71.4	67.6	53.3	46.4	48.0	50.9	71.1	83.4																					
11-Dec	55.4	58.9	61.8	64.1	64.4	57.5	55.5	57.4	62.2	64.1	61.4	59.2	54.9	51.8	50.1	56.3	63.5	65.4	66.5	64.9	61.6	60.2	60.8	64.3	60.1	66.5																					
12-Dec	67.9	71.4	74.1	76.5	78.0	80.0	80.2	80.2	80.5	77.9	73.6	66.7	60.2	55.7	54.1	53.7	53.9	49.3	46.2	46.0	44.1	39.8	37.8	38.5	61.9	80.5																					
13-Dec	40.2	41.6	41.5	41.3	39.6	36.0	33.4	31.7	31.2	30.2	27.9	26.0	27.1	27.7	26.8	25.6	28.3	32.6	34.9	36.9	39.1	40.1	41.5	39.2	34.2	41.6																					
14-Dec	40.3	41.3	41.4	43.7	46.3	49.4	52.0	54.3	54.8	54.5	53.0	49.4	46.7	45.4	49.6	56.5	60.7	61.7	62.5	62.5	61.3	60.3	59.2	53.1	52.5	62.5																					
15-Dec	52.3	55.5	62.3	71.7	80.3	83.3	87.1	91.2	92.3	88.5	76.1	73.4	65.1	60.1	58.8	63.0	63.6	65.0	67.3	67.3	69.3	72.9	75.2	76.5	71.6	92.3																					
16-Dec	77.8	76.4	77.2	82.5	85.6	88.0	88.7	86.2	79.7	66.1	58.3	51.8	45.4	43.0	41.6	46.0	48.9	51.0	50.9	52.4	55.4	75.8	85.4	84.7	66.6	88.7																					
17-Dec	84.7	79.7	70.5	70.2	70.6	71.9	76.1	79.1	81.4	78.7	73.2	70.3	64.7	61.2	61.0	64.2	67.2	66.9	65.4	61.6	59.9	64.0	69.4	68.3	70.0	84.7																					
18-Dec	68.2	69.7	70.3	70.4	73.3	74.6	76.0	77.0	80.7	83.0	77.9	71.2	64.6	52.8	47.1	49.2	55.1	58.3	62.1	65.6	63.0	60.0	60.3	67.6	66.6	83.0																					
19-Dec	71.9	77.1	76.6	81.7	84.7	85.5	84.8	87.8	87.5	87.9	88.1	87.8	86.1	84.9	84.4	82.2	81.5	82.5	83.9	84.2	83.5	83.6	84.7	84.6	83.6	88.1																					
20-Dec	85.4	84.7	84.3	83.9	84.6	85.6	86.4	86.4	86.7	87.4	87.0	86.5	86.6	86.9	87.7	88.7	90.1	90.6	89.3	86.2	84.2	82.5	81.3	83.1	86.1	90.6																					
21-Dec	82.0	81.1	79.3	80.6	83.2	85.0	87.5	87.8	88.0	84.1	81.3	72.2	67.6	62.8	57.8	56.4	51.4	54.7	58.7	62.5	65.7	68.6	70.9	73.0	72.6	88.0																					
22-Dec	75.1	77.6	78.9	79.0	79.6	80.5	81.5	86.1	87.3	87.4	81.0	77.3	77.3	72.1	71.4	74.3	79.6	81.1	85.1	83.8	78.2	76.3	71.9	62.5	78.5	87.4																					
23-Dec	61.9	60.3	56.7	56.7	57.6	59.7	62.6	64.3	63.8	64.9	60.2	55.6	51.7	50.4	51.7	52.1	50.3	50.4	56.9	61.6	66.0	69.6	73.1	70.6	59.5	73.1																					
24-Dec	76.3	78.9	79.4	81.0	80.2	74.2	73.7	72.6	70.4	66.8	56.5	51.0	42.9	38.5	36.3	37.5	37.5	37.3	35.6	34.9	36.4	39.4	41.2	42.2	55.0	81.0																					
25-Dec	45.8	47.8	52.0	50.1	52.2	60.0	60.4	62.9	65.8	62.1	55.7	51.8	47.0	41.9	42.9	48.2	51.6	56.5	63.0	71.6	76.8	78.8	79.8	80.8	58.6	80.8																					
26-Dec	82.5	71.2	69.5	70.0	73.1	74.1	81.7	83.6	84.5	81.0	68.1	57.0	51.3	49.6	50.7	54.1	57.3	58.9	60.2	60.6	61.2	62.3	61.5	66.4	66.3	84.5																					
27-Dec	70.4	66.0	60.4	61.3	62.4	64.9	71.2	73.5	75.5	78.5	62.6	56.4	49.7	38.2	38.7	43.3	47.2	52.7	57.1	57.5	54.5	52.4	54.5	61.4	58.8	78.5																					
28-Dec	66.8	72.7	77.8	81.6	84.0	84.3	85.4	84.3	83.4	82.8	77.2	66.0	59.5	56.3	56.7	63.6	66.5	70.2	73.5	75.7	79.0	82.3	84.6	87.5	75.1	87.5																					
29-Dec	87.9	89.4	89.4	88.6	88.6	88.2	87.3	87.0	86.9	85.6	81.2	68.8	65.1	55.9	50.6	55.2	65.2	75.3	80.1	82.7	84.6	86.7	87.9	87.4	79.4	89.4																					
30-Dec	87.8	87.0	87.6	88.0	86.1	85.7	88.3	89.5	84.8	85.6	69.7	62.0	60.0	58.4	57.6	57.5	55.7	57.2	56.5	55.9	56.6	58.8	60.8	63.0	70.8	89.5																					
31-Dec	65.3	67.3	68.5	70.5	72.4	74.0	76.5	77.2	78.0	78.5	75.9	71.9	68.9	66.2	66.3	67.4	70.4	71.6	72.8	71.5	70.7	71.2	72.5	74.4	71.7	78.5																					
																						73.5	73.9	73.4	74.4	75.6	76.1	77.2	78.1	78.2	76.2	70.4	65.2	61.4	57.9	57.5	60.9	64.0	65.9	67.5	68.3	68.3	69.6	70.8	71.5	Diurnal Average	
																						91.4	90.9	89.5	88.6	88.6	89.1	91.5	96.1	93.2	88.5	88.1	87.8	86.6	86.9	87.7	88.7	90.1	90.6	89.3	86.2	84.6	87.7	90.8	91.9	Diurnal Maximum	



Wood Buffalo Environmental Association
Hourly Averages

Relative Humidity (RH) - %
Blackgold - December 2023





**Wood Buffalo Environmental Association
Cumulative Frequency Distribution**

**Relative Humidity (RH) - %
Blackgold - December 2023**

Concentration Ranges (%)	Number of Hours	%	Cumulative %
0 - 20	0	0.00	0.00
20 - 40	32	4.30	4.30
40 - 60	147	19.76	24.06
60 - 80	334	44.89	68.95
80 - 100	231	31.05	100.00

Total Number of Valid Hours: 744

Total Number of Hours: 744



Wood Buffalo Environmental Association

Summary of Hour Averages

Wind Speed (WS) - km/h

Blackgold - December 2023

Maximum Speed: 22 km/h on Dec 11 02:00	Maximum Daily Speed Average: 13.1 km/h on Dec 23	Hours in Service: 744
Minimum Speed Value: 0 km/h on Dec 3 07:00	Minimum Daily Speed Average: 2.2 km/h on Dec 29	Hours of Data: 743
Maximum Diurnal Speed Average: 7.3 km/h at hour 21	Minimum Diurnal Speed Average: 5.3 km/h at hour 9	Hours of Missing Data: 1
Monthly Average Velocity: 6.1 km/h 230.5 deg	Percentiles: P ₁ = 1 P ₁₀ = 3 Q ₁ = 6 Median = 8 Q ₃ = 11 P ₉₀ = 14 P ₉₉ = 20	Percent Operational Time: 99.9

Day	Hourly Period Ending At (MST)																								Daily Average	Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Dec	SW7	SW7	SW5	WSW5	WSW5	WSW3	WSW4	UO	W2	SSW1	SSW4	SSW8	SSW8	SSW7	SSW9	S6	S8	S11	SSE4	S8	SSW8	SSW8	SSW9	SSW9	SSW5.8	S11
2-Dec	S9	S10	S8	SSW7	SSW8	S6	S6	SSW4	S6	S5	SSW7	SSE5	SSE5	S5	SSW6	WSW3	W3	SW3	SW5	SW7	W4	WSW4	WSW3	W6	SSW4.8	S10
3-Dec	W8	W5	W5	W5	W2	SSW1	NW0	SW5	SW5	SW6	SW6	SW6	SW7	SSW8	S8	S7	S6	S10	S10	S5	SSE5	SSE4	S3	S4	SSW4.4	S10
4-Dec	SSW6	SSW5	SW6	SW6	SW8	SW9	SW10	SW10	SW9	WSW10	WSW10	WSW9	WSW9	W10	W9	WSW8	SW5	SW6	SW7	SW6	SW7	SSW4	SSE3	SSW6	SW7.2	SW10
5-Dec	S6	S5	S7	S5	S10	S10	S9	S14	S11	SSW11	SW10	SW11	SW10	WSW8	WSW7	WSW8	SW9	SW8	WSW9	WSW10	WSW11	WSW12	WSW12	WSW12	SW8.3	S14
6-Dec	SW13	WSW10	WSW10	SW11	SW13	WSW12	SW10	WSW9	WSW10	WSW12	WSW11	WSW9	SW9	SW6	SW8	SW8	SW7	SW8	SW9	SW9	SW7	SW7	SW6	W4	SW8.9	SW13
7-Dec	W7	WNW4	WNW5	W4	W5	WNW8	W5	WNW8	WNW7	W6	W6	W7	W9	WNW9	WNW8	WNW6	WNW7	WNW6	WNW6	W7	W4	W5	W6	WSW4	W6.1	WNW9
8-Dec	WSW4	SW5	W6	W6	W8	W5	W6	WNW5	W5	W5	W7	W8	W8	W7	W6	SW4	W4	WNW7	WSW5	SW6	WSW6	SW6	SW6	W5.5	W8	
9-Dec	SW6	WSW7	W10	W8	W10	W10	W9	W8	SW3	SW4	SW6	SW6	SW9	SW7	SSW7	SSW8	SSW7	S6	S5	SSE5	S6	SSW6	S7	SSE6	SW5.4	W10
10-Dec	SE4	S6	S9	S7	SSW6	SSW9	SSW13	SSW13	SSW13	SSW12	SSW13	SW13	WSW13	W10	W7	WSW7	WSW8	WSW8	WSW10	WSW9	WNW19	WNW21	WNW19	WNW17	WSW8.5	WNW21
11-Dec	WNW20	WNW22	NW20	NW19	NW22	NW21	NW18	NW15	WNW11	W8	W8	W10	W9	WNW9	W7	SW6	SW7	SSW8	SSW9	SSW10	SSW9	SSW9	SSW6	S8	W9.2	WNW22
12-Dec	SSW7	SW7	SW7	SW7	SW7	SW6	SW7	SW6	SW6	SSW5	SSW5	SSW8	SSW11	SW11	SSW11	SSW12	SSW11	SW11	SW14	SW15	SW15	SSW15	SSW15	SW13	SW9.5	SW15
13-Dec	SW13	SW13	SW12	SSW11	SSW11	SW11	SW14	SW12	SW12	SW12	SSW10	SSW10	SSW11	S7	SSW11	SW11	SW9	SW9	WSW7	WSW5	WSW7	W6	W6	W7	SW9.2	SW14
14-Dec	W7	W9	WNW12	WNW12	WNW11	W10	WNW11	W9	WNW10	W8	W7	WNW9	W8	W6	SW5	SW5	WSW5	WSW4	SW6	SW9	SW9	SW9	SW9	SW9	W7.4	WNW12
15-Dec	SSW8	S7	SSW5	S2	SSW1	SSW10	SSW9	SSW8	S9	SSW11	SSW14	SSW16	SSW15	SSW15	S12	S13	SSW15	SSW15	SSW14	SSW17	SW19	SW17	SW16	SW15	SSW12.0	SW19
16-Dec	WSW13	WSW12	WSW12	WSW11	W10	W7	W9	WNW10	WNW11	NW11	NW12	WNW15	WNW13	WNW12	WNW10	W6	W7	WSW6	W6	W4	WNW6	NW12	WNW10	WNW9	WNW9.0	WNW15
17-Dec	W10	WNW15	NW22	WNW20	WNW17	NW12	WNW8	W6	W6	WSW5	SW8	SW11	SW12	SW12	SW11	SSW10	SSW11	SSW10	SSW9	SSW12	SW14	SSW16	SSW15	SSW16	WSW9.2	NW22
18-Dec	SW16	SW13	SW11	SW12	SW12	WSW11	WSW8	W9	W10	W8	WSW6	WSW6	WNW8	WNW11	WNW12	W7	WSW6	W8	WNW8	W6	WNW9	WNW9	WNW7	WSW5	W8.0	SW16
19-Dec	WNW6	WNW6	NW5	NW3	N3	NE3	ENE2	NE4	ENE5	ENE7	ENE8	E7	E8	E8	E8	ESE10	ESE11	ESE12	ESE11	ESE11	ESE10	SE10	ESE10	SE12	E5.4	SE12
20-Dec	SE14	SE13	SSE13	SSE13	SSE14	S14	S12	S11	S12	S12	SSW10	SSW13	SSW12	SSW10	SSW11	SSW10	SSW10	SSW9	S9	SSW11	SSW12	SSW11	SW13	SW13	S10.4	S14
21-Dec	SW11	SW11	W9	W6	WNW7	WSW4	SW6	SW6	SW7	SW7	SSW8	SSW7	SSW12	SSW14	SSW15	SSW16	SSW16	S18	SSW18	SSW17	SSW16	SSW16	SSW14	SSW10	SSW10.4	S18
22-Dec	SSW10	SSW10	SSW12	SSW12	SSW11	SSW9	S6	ESE2	NE1	W1	ESE2	SSE3	SSE3	SSW5	S7	SSW6	SSW9	SSW6	SW3	SW7	WSW10	W8	WNW12	WNW15	SSW5.4	WNW15
23-Dec	WNW12	WNW13	WNW17	WNW15	WNW17	WNW19	WNW18	WNW17	WNW18	WNW17	WNW15	WNW16	WNW17	WNW18	WNW16	WNW13	WNW12	W10	W8	W8	WNW7	SW3	W8	W6	WNW13.1	WNW19
24-Dec	SW6	SW6	SW6	SW7	SW7	SW9	SSW8	SSW8	SSW8	SW10	SW12	SW14	SW15	SW15	SW14	SW11	SSW8	SSW8	SSW11	SW13	SW12	SW11	SW10	SW8	SW9.9	SW15
25-Dec	SSW6	SSW6	SSW7	SSW8	SSW5	WNW4	SW7	SW7	SW7	SW8	SSW7	SW8	SSW5	S7	SSW6	SSW5	SW5	W3	W1	N1	NNE1	NNW2	NNW2	SW4.4	SSW8	
26-Dec	E2	S7	S8	S8	SSE5	S4	NW1	NW1	WSW1	SW1	ESE3	S6	SSW7	SSW10	SW9	SSW8	SW10	SW11	WSW11	WSW8	SW9	WSW8	WSW9	SW8	SSW5.5	WSW11
27-Dec	SW8	SW8	SW10	SW9	SW7	SW6	SW6	SSW7	SW4	S4	E3	ENE3	S5	S14	S7	S8	S8	SSE6	S7	S10	SSW10	S10	S7	SSE4	SSW6.3	S14
28-Dec	S3	W1	NW2	WNW3	W2	W2	WNW4	WNW4	WNW4	W2	WNW5	WNW6	NW7	NW7	NW6	NW6	WNW8	WNW5	WNW6	WNW6	WNW7	WNW6	WNW5	W4	WNW4.3	WNW8
29-Dec	W4	W3	W2	W3	W4	W3	W3	WSW3	W2	SW2	W2	SE2	SSW4	SSW3	SW7	SSW6	SW1	N2	WNW2	NNW2	NNW1	WNW2	W2	W2	WSW2.2	SW7
30-Dec	WNW2	NW1	NNW2	WNW2	W3	N1	SSE2	S4	SSE3	ESE2	S9	S14	S10	S14	SSE13	SSE12	SSE16	S16	S15	S16	SSW20	S17	SSW19	SSW17	S8.6	SSW20
31-Dec	SSW14	SSW10	SSW11	SSW7	SSW7	SSW7	SW7	SW9	SW10	SW10	SW9	SW8	WSW8	WSW6	SW6	SW6	SW6	SW6	SW7	WSW9	W9	WSW8	WSW8	W10	SW7.8	SSW14

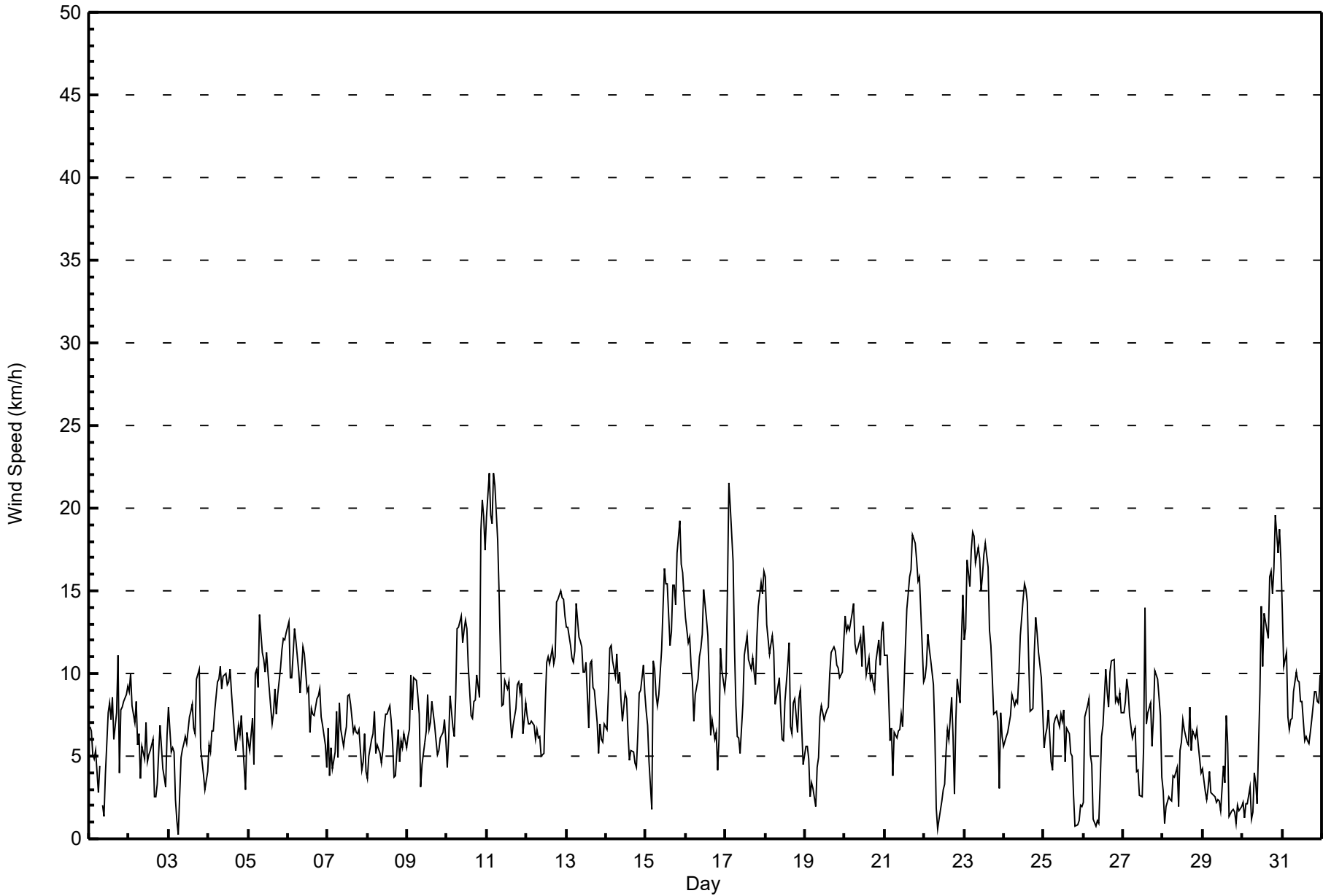
SW6.2 SW6.0WSW6.0WSW5.7WSW6.0WSW5.5WSW5.7WSW5.6WSW5.3 SW5.4 SW5.8 SW6.4 SW7.1 SW6.8 SW6.4 SW6.2SSW6.4SSW6.4 SW6.3 SW6.9 SW7.3 SW6.8 SW6.7 SW6.4	Diurnal Average
WNW20WNW22 NW22WNW20 NW22 WNW1WNW18WNW17WNW18WNW17WNW18WNW17WNW15WNW16WNW17WNW18WNW16WNW13WNW12	Diurnal Maximum

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
Blackgold - December 2023





Wood Buffalo Environmental Association
Cumulative Frequency Distribution

Wind Speed (WS) - km/h
Blackgold - December 2023

Wind Speed Ranges (km/h)	Number of Hours	%	Cumulative %
0 - 5	164	22.07	22.07
6 - 11	428	57.60	79.68
12 - 19	142	19.11	98.79
20 - 28	9	1.21	100.00
29 - 38	0	0.00	100.00
> 38	0	0.00	100.00

Total Number of Valid Hours: 743

Total Number of Hours: 744



**Wood Buffalo Environmental Association
Frequency Distribution**

**Wind Speed (WS) - km/h
Blackgold - December 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	4	1	3	3	2	4	2	13	14	15	20	19	37	15	7	5	164
6 - 11	0	0	0	2	4	6	1	2	49	89	119	43	67	42	4	0	428
12 - 19	0	0	0	0	0	1	3	6	15	38	34	9	0	30	6	0	142
20 - 28	0	0	0	0	0	0	0	0	0	1	0	0	0	4	4	0	9
29 - 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals	4	1	3	5	6	11	6	21	78	143	173	71	104	91	21	5	743

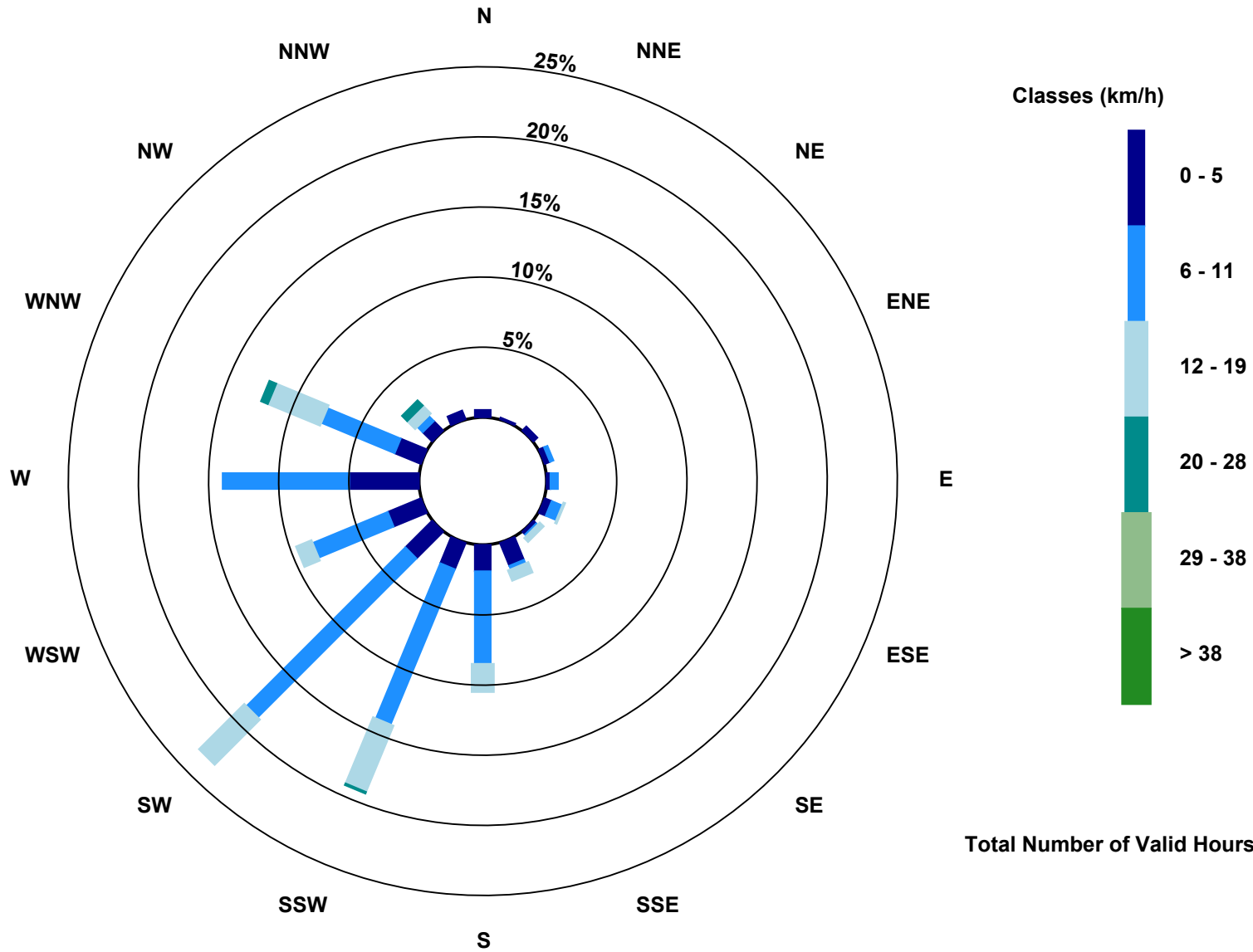
Total Number of Valid Hours: 743

Total Number of Hours: 744



Wood Buffalo Environmental Association
Wind Rose Dec 2023

Wind Speed (WS) - km/h
Blackgold



Total Number of Valid Hours: 743



Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Speed (WS) - km/h
Blackgold - December 2023

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 7 km/h on Dec 11 02:00 Minimum Value: 0 km/h on Dec 1 09:00 Percentiles: P ₁ = 1 P ₁₀ = 1 Q ₁ = 2 Median = 2 Q ₃ = 3 P ₉₀ = 4 P ₉₉ = 6																	Hours in Service: 744 Hours of Data: 743 Hours of Missing Data: 1 Hours of Calibration: 0 Percent Operational Time: 99.9									
Day	Hourly Period Ending At (MST)																								Daily Maximum	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1-Dec	2	1	1	1	2	1	2	UO	0	0	2	2	2	2	2	2	2	3	2	2	2	2	2	2	3	3
2-Dec	2	2	2	2	3	2	2	2	1	2	2	2	2	1	2	1	1	1	2	2	2	2	2	2	3	3
3-Dec	2	1	2	2	1	1	1	1	1	2	2	2	3	2	2	2	1	2	2	3	2	1	1	1	3	
4-Dec	2	1	2	2	2	2	3	3	3	3	4	4	4	4	4	3	3	2	2	2	2	2	1	2	4	
5-Dec	2	1	1	1	2	4	2	4	3	4	3	3	3	3	3	3	3	2	3	4	4	4	4	5	5	
6-Dec	5	4	4	4	4	4	3	3	4	4	4	4	3	3	2	2	2	2	3	3	2	2	2	2	5	
7-Dec	2	1	1	1	2	2	3	3	2	2	2	2	2	2	2	2	1	1	1	2	2	2	2	1	3	
8-Dec	2	1	3	3	2	2	2	2	1	2	3	3	3	3	2	2	1	1	2	2	2	3	2	2	3	
9-Dec	2	3	3	3	3	3	3	3	2	2	2	4	3	2	2	2	1	1	1	1	1	2	1	2	4	
10-Dec	2	3	2	1	1	2	3	3	4	3	4	4	4	4	3	3	3	3	4	3	7	7	6	6	7	
11-Dec	6	7	7	6	7	7	6	5	3	2	3	3	3	3	3	2	2	2	2	2	3	2	2	7	7	
12-Dec	2	2	2	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3	4	4	5	4	4	5	5	
13-Dec	4	4	4	3	3	3	4	5	4	3	3	2	3	3	3	4	3	3	3	3	2	3	2	5	5	
14-Dec	2	3	4	3	3	3	3	3	3	3	3	3	3	2	2	2	2	2	2	2	3	3	3	4	4	
15-Dec	2	2	2	2	3	3	2	2	2	3	4	5	5	4	3	4	5	4	4	5	6	5	5	4	6	
16-Dec	5	4	4	4	3	3	3	3	4	3	4	4	4	4	3	2	3	2	2	2	3	3	3	3	5	
17-Dec	4	6	7	6	4	3	2	3	2	2	3	3	4	4	4	2	2	3	2	3	4	4	3	5	7	
18-Dec	5	4	4	4	4	4	3	3	3	2	2	2	3	4	4	3	3	3	2	2	2	2	2	1	5	
19-Dec	1	1	2	1	1	1	1	1	1	3	2	2	2	2	2	3	3	3	2	3	2	2	2	3	3	
20-Dec	3	3	2	3	4	4	3	3	3	3	3	4	3	3	3	3	3	3	3	3	4	5	4	5	5	
21-Dec	4	4	4	3	2	2	2	2	2	2	2	2	3	3	4	4	5	5	4	4	4	4	3	3	5	
22-Dec	2	2	2	2	2	2	4	2	1	1	1	1	2	2	3	2	3	4	1	3	4	3	5	4	5	
23-Dec	4	4	5	4	5	5	6	5	5	5	4	4	5	5	5	4	3	3	2	2	2	1	3	2	6	
24-Dec	2	2	1	2	2	2	2	2	2	3	4	5	5	5	5	4	2	2	3	4	4	3	3	3	5	
25-Dec	2	2	3	2	2	4	2	3	2	2	2	2	2	2	2	2	2	2	2	1	1	1	0	1	4	
26-Dec	1	3	3	2	2	2	1	1	1	1	2	2	2	3	3	2	3	3	4	3	3	3	4	3	4	
27-Dec	2	3	3	3	2	2	2	3	1	1	2	1	5	4	3	2	1	2	2	3	3	3	2	1	5	
28-Dec	1	1	1	1	1	1	1	1	1	2	1	2	2	2	2	2	2	2	2	2	1	1	1	2	2	
29-Dec	2	1	1	1	2	1	1	2	1	1	1	1	1	2	3	2	1	1	1	1	1	1	1	0	3	
30-Dec	1	1	0	1	2	1	1	2	1	1	5	3	2	4	3	3	4	4	4	4	5	4	5	5	5	
31-Dec	4	3	3	3	2	2	2	3	3	3	3	3	3	2	2	1	2	2	3	3	4	3	4	3	4	
Diurnal Maximum																										
UO - Unstable Operation																										



Wood Buffalo Environmental Association
Summary of Hour Averages

Wind Direction (WD) - deg
Blackgold - December 2023

Direction of Maximum Speed: 303 deg on Dec 11 02:00	Hours in Service: 744
Direction of Maximum Daily Speed Average: 287.7 deg on Dec 23	Hours of Data: 743
Direction of Minimum Speed: 314 deg on Dec 3 07:00	Hours of Missing Data: 1
Direction of Minimum Daily Speed Average: 2.2 deg on Dec 29	Percent Operational Time: 99.9
Monthly Average Direction: 230.5 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-Dec	231	227	234	249	244	252	240	UO	261	204	193	199	204	205	201	176	185	185	157	183	198	201	194	196	204.4
2-Dec	185	186	183	195	195	181	182	210	169	170	193	160	165	175	196	253	259	222	222	233	259	255	257	276	200.0
3-Dec	281	270	278	277	273	198	314	217	223	217	215	218	225	206	190	172	179	182	183	176	156	162	190	190	208.9
4-Dec	213	212	220	218	221	218	220	221	228	239	238	252	250	267	259	233	233	221	219	217	228	205	159	200	228.9
5-Dec	191	173	180	173	169	177	182	178	180	201	219	218	228	244	250	238	235	228	245	242	243	241	237	238	214.9
6-Dec	235	245	242	236	233	237	232	239	239	244	252	247	235	235	216	223	223	219	227	218	219	221	222	274	234.1
7-Dec	279	283	288	273	276	289	269	283	285	271	275	276	280	291	285	290	292	290	285	280	277	275	277	241	281.0
8-Dec	248	235	269	277	278	265	276	285	276	281	268	263	276	277	273	277	233	278	283	248	228	247	232	234	264.4
9-Dec	236	248	278	264	278	275	271	278	230	233	221	236	233	219	206	197	196	188	173	165	184	192	170	159	227.6
10-Dec	143	177	182	185	213	202	204	202	209	211	211	222	241	260	271	244	243	250	255	257	290	297	293	300	242.4
11-Dec	299	303	305	307	307	313	311	309	295	277	262	276	277	287	279	216	214	207	201	207	209	209	197	189	280.2
12-Dec	208	227	218	219	221	221	233	232	223	211	207	205	212	217	206	208	210	216	220	222	218	213	212	223	216.2
13-Dec	225	223	222	208	209	217	222	229	223	215	209	200	197	191	208	222	225	232	237	250	257	268	280	271	222.9
14-Dec	275	275	289	287	287	275	284	278	283	272	272	282	277	279	234	218	221	258	244	227	232	231	224	217	263.3
15-Dec	204	189	192	178	216	213	195	198	190	205	212	208	204	202	177	185	198	198	195	208	214	218	220	223	204.4
16-Dec	241	242	247	242	273	269	275	288	302	304	305	303	300	296	297	277	274	243	275	281	297	307	295	284	281.3
17-Dec	274	295	305	301	302	304	286	270	268	246	236	232	232	236	225	205	203	205	200	206	216	207	207	213	246.3
18-Dec	221	221	219	230	231	246	248	259	281	272	240	245	284	289	298	277	251	278	282	281	293	295	286	249	259.0
19-Dec	282	295	319	314	10	47	66	50	57	77	77	84	93	90	100	105	106	107	111	112	119	127	121	128	97.7
20-Dec	130	137	148	153	159	169	175	181	180	187	198	201	200	202	197	204	196	195	185	198	204	208	232	226	185.2
21-Dec	227	236	266	265	282	252	228	226	225	217	211	207	200	199	201	201	193	189	195	200	204	201	202	200	209.8
22-Dec	195	200	196	193	192	192	186	108	56	272	114	147	163	207	189	201	196	204	224	219	256	262	288	289	213.3
23-Dec	283	285	286	286	287	290	293	291	293	289	291	292	292	292	293	295	289	281	277	279	283	215	281	263	287.7
24-Dec	225	216	216	218	224	222	209	210	213	215	226	227	228	229	222	220	211	209	211	218	219	219	220	214	219.4
25-Dec	194	202	196	209	210	285	221	225	226	235	223	211	217	208	179	211	207	235	261	270	357	19	329	337	218.6
26-Dec	98	177	181	174	158	172	323	312	239	232	120	182	208	205	220	213	225	228	239	241	235	239	247	233	213.0
27-Dec	229	228	214	220	225	218	222	208	218	186	101	69	177	181	180	178	169	157	174	179	196	184	178	161	193.1
28-Dec	184	268	323	287	269	273	288	289	283	267	284	292	305	309	324	305	290	290	287	297	294	292	288	274	291.8
29-Dec	274	270	265	259	266	262	264	248	261	230	267	140	208	209	221	210	229	4	297	330	337	303	275	275	250.2
30-Dec	289	323	338	296	263	5	167	176	166	106	172	180	175	176	159	156	168	171	180	188	193	191	198	200	182.2
31-Dec	199	199	205	194	202	208	217	218	224	228	227	236	238	246	224	216	216	223	230	239	260	256	254	277	225.9

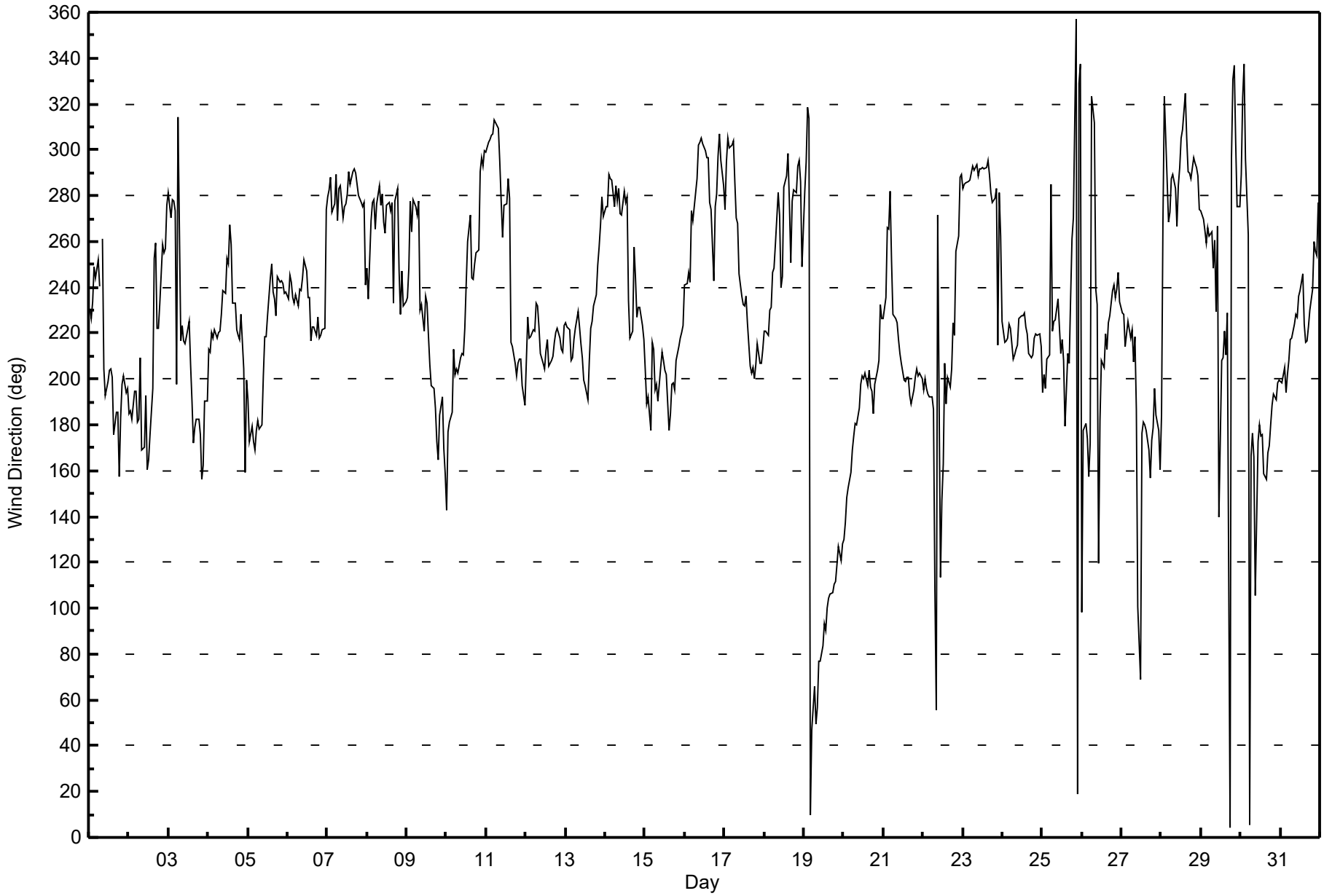
231.6 234.6 242.0 241.3 244.5 242.9 240.1 239.9 239.4 234.6 230.7 230.3 232.7 233.3 224.6 215.6 213.0 212.8 218.2 218.5 228.0 228.4 231.7 231.8
 Diurnal Average

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
Blackgold - December 2023





Wood Buffalo Environmental Association
Summary of Hour Standard Deviations

Wind Direction (WD) - deg
Blackgold - December 2023

Number of Exceedences (AAAQO): 1-hr: 0 24-hr: 0 Maximum Value: 94 deg on Dec 26 10:00 Minimum Value: 9 deg on Dec 9 17:00 Percentiles: P ₁ = 12 P ₁₀ = 15 Q ₁ = 18 Median = 23 Q ₃ = 30 P ₉₀ = 39 P ₉₉ = 80																			Hours in Service: 744 Hours of Data: 743 Hours of Missing Data: 1 Hours of Calibration: 0 Percent Operational Time: 99.9						
Day	Hourly Period Ending At (MST)																								Daily Maximum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1-Dec	15	14	14	15	17	28	22	UO	16	60	44	17	19	21	17	13	12	12	25	13	17	13	12	13	60
2-Dec	12	17	17	19	16	17	24	62	25	38	18	28	28	20	18	42	32	26	20	27	43	43	66	39	66
3-Dec	19	20	22	46	55	76	93	16	13	26	23	29	25	21	16	15	14	10	12	30	18	10	55	41	93
4-Dec	25	15	24	23	21	21	22	23	28	28	31	35	33	32	32	31	49	24	27	20	26	29	32	12	49
5-Dec	15	16	14	32	15	21	14	15	14	23	29	21	25	36	36	33	27	30	35	33	26	31	28	29	36
6-Dec	29	36	33	31	27	28	25	30	29	31	34	32	25	35	20	25	25	23	25	23	24	24	23	38	38
7-Dec	17	20	14	34	40	19	50	22	28	32	30	29	21	22	17	24	16	14	16	18	33	50	24	28	50
8-Dec	37	22	33	24	19	38	32	24	22	22	32	32	32	25	27	31	29	29	20	44	25	43	25	32	44
9-Dec	27	35	25	33	21	22	24	25	51	33	32	41	24	22	20	12	9	17	16	12	19	16	14	27	51
10-Dec	30	20	12	15	16	11	15	15	18	19	20	22	28	32	37	31	34	33	31	34	19	18	18	20	37
11-Dec	18	19	19	20	17	20	19	20	15	25	31	27	26	22	35	20	15	15	14	18	17	18	16	13	35
12-Dec	21	30	28	23	23	20	24	22	23	19	22	18	20	19	16	16	17	20	22	22	20	18	18	25	30
13-Dec	24	23	24	18	18	22	24	33	24	20	16	16	14	25	20	23	24	28	31	42	31	37	28	35	42
14-Dec	31	28	21	20	21	24	20	25	22	29	34	23	28	26	35	28	27	40	46	36	29	31	23	20	46
15-Dec	20	23	26	70	21	20	14	12	15	18	23	20	20	18	19	21	21	17	18	19	19	21	22	23	70
16-Dec	30	29	32	33	31	37	27	19	17	17	18	18	18	21	19	29	33	31	25	40	20	19	16	22	40
17-Dec	27	21	19	19	17	19	17	34	38	34	28	24	26	27	24	15	15	16	15	18	19	16	16	20	38
18-Dec	23	23	25	27	26	32	38	39	21	26	32	36	26	21	17	34	40	27	19	19	13	16	23	26	40
19-Dec	18	14	19	37	31	23	48	21	24	18	18	17	21	19	20	15	15	15	12	13	15	14	13	13	48
20-Dec	14	12	13	14	16	18	16	16	15	16	17	19	18	18	18	20	18	15	20	22	20	27	36	24	36
21-Dec	28	30	34	40	23	49	25	28	22	18	14	18	16	16	16	16	16	15	16	16	15	15	16	17	49
22-Dec	14	14	11	12	13	13	42	63	93	81	38	52	67	28	26	26	23	31	51	32	35	35	24	19	93
23-Dec	22	23	21	20	19	18	17	17	19	19	19	19	20	17	18	17	18	23	26	27	22	54	36	41	54
24-Dec	29	24	20	20	28	25	15	16	19	19	23	23	24	24	24	21	16	16	15	20	21	21	24	39	39
25-Dec	47	40	37	19	57	73	26	29	23	27	20	21	19	24	13	21	21	23	69	56	67	71	22	46	73
26-Dec	67	22	20	11	25	31	72	89	80	94	39	21	21	18	26	22	26	24	29	30	28	27	39	34	94
27-Dec	29	30	23	25	28	35	23	18	30	23	43	32	71	16	17	15	13	24	17	16	14	14	21	41	71
28-Dec	52	71	50	31	29	32	28	23	22	80	17	23	19	25	22	15	15	22	20	24	12	15	15	25	80
29-Dec	24	15	24	29	24	22	21	15	15	23	44	58	24	76	28	24	84	42	32	56	80	21	34	30	84
30-Dec	27	70	23	28	48	60	59	25	45	51	14	13	15	16	16	14	15	17	18	15	14	14	16	18	70
31-Dec	20	20	18	29	17	21	21	22	24	21	24	26	32	35	30	19	19	25	30	29	35	39	38	24	39
67 71 50 70 57 76 93 89 93 94 44 58 71 76 37 42 84 42 69 56 80 71 66 46																									
Diurnal Maximum																									
UO - Unstable Operation																									

**ELECTRONIC TRANSFER SYSTEM
AIRDATA
SUBMISSION REPORT**

January 31, 2024
8:39:11 AM
Request # 4637057

Submitted by: EN6138_DENNY
Submission Date: Jan 31, 2024 8:37:48 AM

File Type

Ambient Data

File Name

AMB-WBEA-202312-V00.xml

Total Number of Files: 1

*** End of Report ***

**ELECTRONIC TRANSFER SYSTEM
AIRDATA
SUBMISSION REPORT**

January 31, 2024
8:41:09 AM
Request # 4637065

Submitted by: EN6138_DENNY
Submission Date: Jan 31, 2024 8:40:49 AM

File Type

Calibration Report

File Name

CAL-WBEA-202312.pdf

Total Number of Files: 1

*** End of Report ***

**ELECTRONIC TRANSFER SYSTEM
AIRDATA
SUBMISSION REPORT**

January 31, 2024
3:43:26 PM
Request # 4637417

Submitted by: EN6138_DENNY
Submission Date: Jan 31, 2024 3:42:56 PM

File Type
Airshed Monitoring Report

File Name
WBEA-202312.pdf

Total Number of Files: 1

*** End of Report ***



End of Report